FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

10819 HIGHWAY 9

TOWN OF CALEDON
REGION OF PEEL

PREPARED FOR:

LIONS GROUP INC.

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
211 YONGE STREET, SUITE 301
TORONTO, ON M5B 1M4

MAY 2020

CFCA FILE NO. 1651-5095

CROZIER
CONSULTING ENGINEERS

Revision Number	Date	Comments
Rev. 0	October 28, 2019	Issued for Temporary ZBA (Not Submitted)
Rev. 1	May 8, 2020	Issued for Temporary ZBA

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

LIST OF FIGURES

1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by Lions Group Inc. to prepare a Functional Servicing & Stormwater Management Report to support the Zoning By-Law Amendment for the property located at 10819 Highway 9 in the Town of Caledon.

The purpose of this report is to demonstrate that the proposed site can be developed in accordance with the Town of Caledon and Region of Peel guidelines from a functional servicing & stormwater management perspective.

2.0 Site Description

The site covers an area of approximately 0.64 ha and is currently occupied by an automotive service building, residential dwelling, associated surface parking, and landscape areas. The site is located in an extractive industrial and rural zoned neighbourhood in the Town of Caledon and is bound by Highway 9 to the north, rural residential properties to the east and west, and an Oak Ridges Moraine environmental policy area to the south.

According to the Site Plan provided by Glen Schnarr & Associates Inc. dated May 23, 2019, the proposed development will consist of a gas station with associated convenience building, an above-ground parking area, and landscaped areas.

3.0 Sanitary Servicing

3.1 Existing Sanitary Servicing

The site is currently serviced by a septic system, which will be decommissioned prior to construction.

3.2 Design Sanitary Flow

Design sanitary demand for the subject property was calculated using the Ontario Building Code. A summary of the results is presented in **Table 1** and detailed calculations are provided in **Appendix C.**

Table 1: Estimated Sanitary Design Flows

Standard	Type of Building	Average Flow (L/day)
Ontario Building Code Act	Gas Station	5260

The proposed sanitary sewage treatment system must be designed for a septic flow of 5260 L/day for the development, as determined by the Ontario Building Code table 8.2.1.3.B. This flow rate was determined based on an assumption of 6 fuel outlets and 2 washrooms for the site.

3.3 Proposed Sanitary Servicing

A septic system is proposed for the sanitary servicing of the gas station. The proposed septic system will have a design capacity of 5260 L/day and include an anaerobic digester tank with pump

chamber, a Waterloo Biofilter treatment system, and a Type A dispersal bed for the distribution of the treated wastewater effluent. The proposed anaerobic digester will hold the sewage long enough to allow the solids to sink and the oil and grease to float. The effluent will then be pumped into the proposed Waterloo Biofilter Wire Mesh Basket Model 50 or approved equivalent for treatment. The treated effluent will then be pumped into the Type A dispersal bed with a 660 m^2 sand layer footprint and a 110 m^2 stone layer footprint. The detailed septic system calculations are presented in **Appendix B.**

The Site Servicing Plan (**Figure 2**) and the Site Grading Plan (**Figure 3**) illustrate the location of the proposed septic system and service connections for sanitary servicing for the development. Details of the septic system are found in **Figure 4.** The internal sanitary plumbing within the building will be designed by the mechanical engineer in accordance with the Ontario Building Code (OBC).

4.0 Water Servicing

4.1 Existing Water Servicing

A review of the Ontario Water Resources Commission Act's Water Well Record dated May 30, 1968 indicates that there is an existing well located on the subject property. Further information on the existing well is provided in **Appendix A**, where a copy of the well record is provided.

4.2 Design Water Demand

The water demand for the proposed development was calculated assuming that the sanitary flows from the site are equivalent to the water demand. As such, a water demand of 5260 L/day, or 0.06L/s, was used to calculate the water demand for the development. Peaking factors were used with reference to the Region of Peel Public Works Watermain Design Criteria (June 2010). Refer to **Appendix B** for detailed water demand calculations.

Table 2: Estimated Design Water Demand

Standard	Average Daily Demand (L/s)	Maximum Daily Demand Peaking Factor	Peak Hour Demand Peaking Factor	Maximum Daily Demand (L/s)	Peak Hourly Demand (L/s)
OBC/Region of Peel	0.06	1.4	3.0	0.09	0.18

Using the Ontario Building Code Table 8.2.1.3.B. and the Region of Peel Design Criteria for domestic water demand, the projected daily demand and peak hourly flows for the site will be 0.06 L/s and 0.18 L/s, respectively.

4.3 Fire Flow Demand

The Fire Underwriters Survey method was used to estimate the fire flow requirements for the proposed development. This calculation estimates the flow rate required to service the development. The proposed convenience store building is assumed to be of ordinary construction and to have no sprinkler system.

Table 3 summarizes the required fire flow and duration to meet fire protection for the proposed development. Refer to **Appendix B** for detailed fire flow calculations.

Table 3: Estimated Fire Demand Flows

Method	Demand Flow (L/s)	Duration (h)	Volume (m^3)
Fire Underwriter's Survey (1999)	50	1.25	225

A fire cistern with a volume of 225 m^3 is proposed to accommodate a fire flow of 50 L/s for a duration of 1.25 hours.

Please note that the Fire Underwriters Survey value is a conservative estimate for comparison purposes only. The mechanical engineer for this development will complete the required analyses for fire protection and the architect will design fire separation methods per the determined fire flow rate.

4.4 Proposed Water Servicing

The existing well on-site will conflict with the proposed site plan, and as such will be decommissioned. The development is proposed to be serviced by a new well located on-site for domestic water demand, and a proposed 225 m^3 cistern for fire water demand. Please refer to **Figure 1** for approximate location of proposed water servicing. The exact location of this proposed well will be coordinated with a hydrogeological engineer at detailed design stage.

5.0 Drainage Conditions

The subject property is part of the Nottawasaga Valley Conservation Authority (NVCA), therefore the stormwater management design will adhere to the NVCA Stormwater Technical Guide (December 2013) guidelines.

5.1 Existing Drainage

The subject property currently consists of asphalt, grass, tree cover, and two buildings, with property access via Highway 9. According to the Cole Sherman drawing dated March 10, 2000, an existing minor system on-site drains to a 150 mm diameter CSP culvert beneath Highway 9 which outlets to a ditch located north of the road. **Figure 2** illustrates the existing storm sewer and manhole locations. A review of the topographic survey prepared by Avanti Surveying Inc. (January 22, 2019) indicates that stormwater runoff from the property drains from the south property line to the catchbasins located at the north property line.

5.2 Proposed Drainage

The proposed development consists of a gas station complete with gas pumps, a gas bar, parking, and landscaped areas. Upon development, the minor storm event will be collected by catchbasins located within the paved area at the north end of the site. These catchbasins will discharge to the existing culvert located beneath Highway 9, which drains to the ditch along the north boulevard of Highway 9.

The Preliminary Site Servicing and Site Grading Plans (**Figure 2** and **Figure 3**) illustrate the proposed site drainage, the location and design of the storm sewer, and all connections. Please refer to **Figure 5** which highlights the pre- and post-development pervious and impervious areas for the site. **Table 4** summarizes the results.

Table 4: Land Area Comparison

Conditions	Impervious Area (m^2)	Pervious Area (m^2)	MTO Setback Area (m^2)	Total Area (m^2)	Runoff Coefficient
Pre-Development	1861	4539	-	6400	0.46
Post-Development	1429	3599	1375	6400	0.43

6.0 Stormwater Management

A review of the stormwater management criteria and drainage plans for the subject property was completed to establish the required on-site stormwater management controls.

6.1 Stormwater Quantity Control

The pre-development runoff coefficient for the site was determined to be 0.46. The proposed commercial development includes a gas station with a convenience store and parking area. The post-development runoff coefficient for the commercial development was determined to be 0.43. As shown in **Table 5**, post-development peak flows decrease from pre-development peak flows. Site grading constraints limit the ability to use an underground storage chamber to store and control the increase in flow. Rooftop control measures will be used to control the flow rate from the roof to 1.4 L/s based on the roof drain release rate of 42L/s/ha. This further limits the increase in flow rate from pre-development to post-development. Based on the pre-development flows exceeding the post-development flow rates, no further quantity control measures are proposed for the site. Detailed stormwater management calculations are located in **Appendix C**.

Table 5: Comparison of Pre- and Post-Development Runoff Coefficients and Flow Rates

Site Area (ha)	Pre-Dev. Runoff Coefficient	Post-Dev. Runoff Coefficient	Design storm event	Pre-Dev. Peak Flow Rate (L/s)	Post-Dev. Peak Flow Rate (L/s)
0.53	0.46	0.43	2	52	47
			5	69	62
			10	81	72
			25	95	84
			50	105	94
			100	115	103

Note: Post-Development peak flow rates represent both uncontrolled flows and flow rates from the site draining to the proposed catchbasins, including a rooftop flow rate of 1.1 L/s. Rooftop flow rate calculations are shown in **Table 6**.

Table 6: Summary of Rooftop Control Calculations

Runoff Coefficient (100-Yr Storm Event)	0.9
Rooftop Area (ha)	0.026
Rooftop unit release rate (L/s/ha)[1]	42
Rooftop release rate (L/s)	1.1

Notes:

1. Release rate determined assuming a roof drain standard controlled release rate of 10 GPM (0.63 L/s/in), 6 in of depth, and the The Ontario Building Code (2006) standard which requires at least 1 drain per 900 m^2, equivalent to 11.11 drains/ha * 6 in * 0.63L/s/in = 42 L/s

6.2 Stormwater Quality Control

The stormwater quality criteria outlined in the Region of Peel Public Works Stormwater Design Criteria and Procedural Manual requires Level 1 enhanced treatment through the long-term removal of 80% total suspended solids (TSS). As such, a Stormceptor model EFO4 oil and grit separator was selected. EFO models provide enhanced oil capture and removal compared to STC and EF models, and as such was selected for the proposed gas station. The Stormceptor EFO4 will provide 63% TSS removal for the site. Rooftop flows bypass the proposed oil and grit separator and are assumed to be clean (80% TSS removal).

7.0 Erosion and Sediment Controls During Construction

Erosion and sediment controls will be installed prior to the beginning of any construction activities. They will be maintained until the site is stabilized or as directed by the Site Engineer and/or Town of Caledon. The Preliminary Erosion & Sediment Control Plan (**Figure 1**) identifies the location of the recommended controls. Controls will be inspected after each significant rainfall event and maintained in proper working condition.

The following erosion and sediment controls will be included during construction on the site:

Heavy Duty Silt Fencing

Silt fencing will be installed on the perimeter of the site to intercept sheet flow. Additional silt fence may be added based on field decisions by the Site Engineer and Owner, prior to, during and following construction.

Rock Mud Mat

A rock mud mat will be installed at the entrance to the construction zone to prevent mud tracking from the site onto surrounding lands and the perimeter roadway network. All construction traffic will be restricted to this access only.

8.0 Conclusions and Recommendations

The proposed development can be serviced for water, sanitary, and stormwater in accordance with the Town of Caledon and Region of Peel requirements and standards. Our conclusions and recommendations include:

1. The existing well on-site will be decommissioned and a new well is proposed to provide the water demand for the proposed development. The average daily water demand and peak hour water demand for the subject property are 0.06 L/s and 0.18 L/s, respectively.
2. Fire protection will be provided through a proposed 225 m^3 fire water cistern for the fire demand flow of 50 L/s for a duration of 1.25 hours.
3. Sanitary servicing for the proposed development will be provided by a septic system. The sanitary flow for the subject property is 5260 L/day.
4. Stormwater conveyance for the subject property will be provided through a storm sewer connection to the existing 150 mm culvert beneath Highway 9.
5. Stormwater quality control for the site will be provided by a Stormceptor model EFO4 oil and grit separator for the site surface and "clean" rooftop area.
6. Erosion and sediment controls will be implemented on-site during construction and will be maintained until the site is stabilized.

Based on the above conclusions, we recommend the approval of the Zoning By-Law Amendment, from the perspective of functional servicing and preliminary stormwater management.

C.F. CROZIER & ASSOCIATES INC.

James Boyd, E.I.T.
Civil

C.F. CROZIER & ASSOCIATES INC.

Ashish Shukla, P.Eng.
Associate, Civil

/kw

N:\1600\1651-Lions Group Inc\5095-10795&10819 Highway 9\Reports\2020.03.13_FSR&SWM.docx

APPENDIX A

Sanitary Flow Calculations

Project:	10819 Highway 9	Design by:	KW	Date:	2019-08-21
Project No.:	1651-5095	Check by:	MC	Updated:	2020-03-13

SANITARY FLOW CALCULATIONS (OBC)
10819 Highway 9, Caledon

			References/Notes
PROPOSED SANITARY FLOW			
GAS BAR			Development Concept Plan Proposed Gas Bar, GSAI, May 23, 2019
Assuming 2 water closets (WC) and 6 fuel outlets			
950 L/WC		560 L/fuel outlet	
2 WC		6 fuel outlets	
1900 L/day		3360 L/day	*Building Code Act, 1992 Table 8.2.1.3.B.*
TOTAL	5260 L/Day		
	0.0609 L/s		
TOTAL SANITARY FLOW	**5260 L/day**		*MOE ECA Permit Required for demand of 10,000 L/day or greater*
	0.0609 L/s		

CROZIER & ASSOCIATES Consulting Engineers

Project:	10819 Highway 9	Design by:	KW	Date:	2019-08-21
Project No.:	1651-5095	Check by:	MC	Updated:	2020-03-13

COMMERCIAL SEPTIC DESIGN (OBC)
10819 Highway 9, Caledon

		References/Notes
Anaerobic Digester (Waterloo Biofilter)		
Design Flow	5260 L/day	
Minimum Tank Capacity	**15780 L**	
DISPOSAL & TREATMENT SYSTEM		
Treatment:	Waterloo Biofilter Wire Mesh Basket Model BA75	*Waterloo biofilter Designer Manual Version 1.4 (May 2017)*
Disposal:	Type A Dispersal Bed	
SAND LAYER		
Soil T-time T	50 mins/cm	*Soil T-time assumed to be 50 mins/cm*
Total San Flow Q	5260 L/day	
Septic Area A =	Q*T/400	
Required Sand Area=	**658 sq. m**	*Building Code Act, 1992 Section 8.7.7.1*
L=	30.0 m	
W=	22.0 m	
Provided Sand Area=	660.0 sq. m	
STONE LAYER		
Total San Flow Q	5260 L/day	
B	50	*Building Code Act, 1992 Section 8.7.7.1*
Stone Area A=	Q/B	
Required Stone Area=	**105 sq. m**	
L=	11.0 m	
W=	10.0 m	
Provided Stone Area=	110.0 sq. m	
Minimum sand depth = 600mm		OBC 8.7.7.1 (4b)
Minimum stone depth = 300mm		OBC 8.7.7.1 (6B)
GROSS FLOOR AREA (GFA)		
GAS BAR	2795.0 sq ft	
	259.66 sq m	
TOTAL GFA	2795.0 sq ft	
	259.66 sq m	

APPENDIX B

Water and Septic Calculations

Project:	10819 Highway 9	Design by:	KW	Date:	2019-08-23
Project No.:	1651-5095	Check by:	MC	Updated:	2020-03-13

WATER DEMAND CALCULATIONS (OBC and Region of Peel)
10819 Highway 9, Caledon

PROPOSED WATER DEMAND

Commercial Average Daily Demand 5260 L/d

References/Notes

Building Code Act, 1992 Table 8.2.1.3.B. (See Sanitary Flow Calculations)

PEAKING FACTORS

Maximum Daily Demand:	1.40
Peak Hour Demand:	3.00

Region of Peel Design Criteria Manual - Watermain Design Section 2.3 Water Demands

FLOWS

	(L/day)	(L/s)
Average Daily Demand:	5260	**0.06**
Maximum Daily Demand:	7364	**0.09**
Peak Hour Demand:	15780	**0.18**

GROZIER & ASSOCIATES Consulting Engineers

10819 Highway 9
Fire Protection Volume Calculation
CFCA File: 1651-5095

Date: 2019-08-30
Design: KW
Check: JH

Water Supply for Public Fire Protection - 1999
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

1. An estimate of fire flow required for a given area may be determined by the formula:

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

where

F = the required fire flow in litres per minute

C = coefficient related to the type of construction:

=	1.5	for wood frame construction (structure essentially all combustible)
=	1.0	for ordinary construction (brick or other masonry walls, combustible floor and interior)
=	0.8	for non-combustible construction (unprotected metal structural components)
=	0.6	for fire-resistive construction (fully protected frame, floors, roof)

A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Buildings

Building Area = 260.0 sq.m

C = 1.0 Assume ordinary construction

Therefore F = 3,547 L/min

Fire flow determined above shall not exceed:

30,000 L/min for wood frame construction
30,000 L/min for ordinary construction
25,000 L/min for non-combustible construction
25,000 L/min for fire-resistive construction

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Non-Combustible	-25%	Free Burning	15%
Limited Combustible	-15%	Rapid Burning	25%
Combustible	0% (No Change)		

Non-Combustible	-25%

-887 L/min
2,661 L/min

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above maybe reduced by up to 50% for complete automatic sprinkler protection. The credit for the system will be a maximum of 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards.

As part of this analysis, building is assumed to have no sprinkler protection (no reduction),

0 L/min reduction

Water Supply for Public Fire Protection - 1999
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 45 metres by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) exposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

Separation	Charge	Separation	Charge
0 to 3 m	25%	20.1 to 30 m	10%
3.1 to 10 m	20%	30.1 to 45 m	5%
10.1 to 20 m	15%		

Exposed buildings

Name		**Distance (m)**	**Charge (%)**	**Surcharge (L/s)**
North	N/A			0.0
South	N/A			0.0
East	N/A			0.0
West	Adjacent Dwelling	40	5%	221.7
				222 L/min Surcharge

Determine Required Fire Flow

No.1	3,547			
No. 2	-887	reduction		
No. 3	0	reduction		
No. 4	222	surcharge		
Required Flow:	**2,882**	**L/min**		
Rounded to nearest 1000 L/min:	**3,000**	**L/min**	or	50.0 L/s
Total Volume Required:	**225000**	**L**		793 USGPM

Required Duration of Fire Flow

Flow Required L/min	Duration (hours)
2,000 or less	1.0
3,000	**1.25**
4,000	1.5
5,000	1.75
6,000	2.0
8,000	2.0
10,000	2.0
12,000	2.5
14,000	3.0
16,000	3.5
18,000	4.0
20,000	4.5
22,000	5.0
24,000	5.5
26,000	6.0
28,000	6.5
30,000	7.0
32,000	7.5
34,000	8.0
36,000	8.5
38,000	9.0
40,000 and over	9.5

22,500 LITRE PRECAST WASTEWATER HOLDING TANK MODEL H22.5S

WILKINSON HEAVY PRECAST LIMITED
DUNDAS, ONTARIO 905-628-5611
www.wilkinsonheavyprecast.com

CONSTRUCTION DETAILS *

Concrete: 35 MPa at 28 Days, 5 to 8% Air Entrainment.

Reinforcing: 10 M bars at 300 mm centres each way in roof, walls and floor; horizonally in top section partition.
Four extra 15 M bars around roof access opening.
Minimum cover over reinforcing steel - 25 mm.

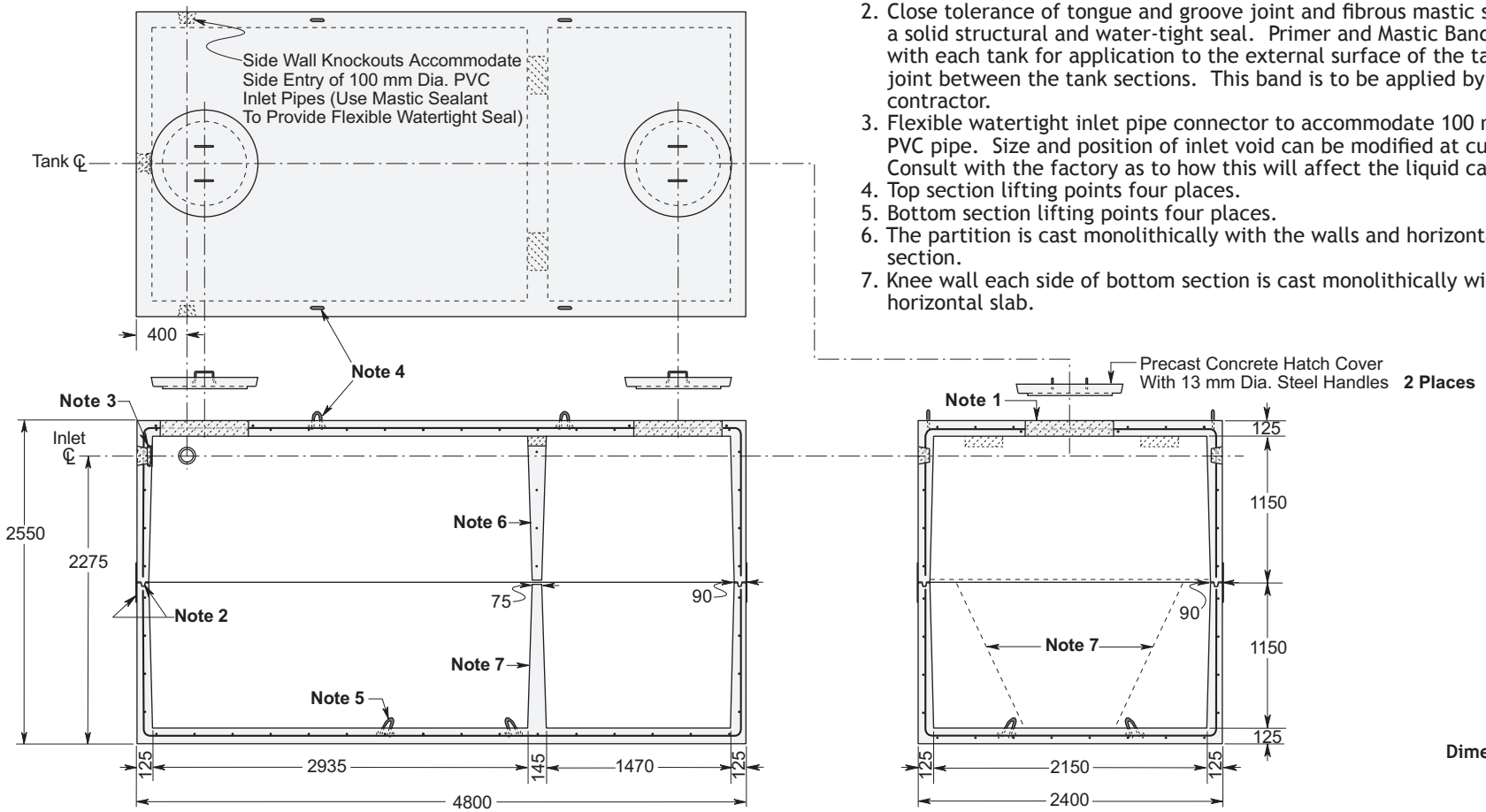
Weight:

Top Section	8421 kg
Bottom Section	7981 kg
Total	16,402 kg

Actual Capacity: 9778 Litres Per Vertical Metre.
22,489 Litres to Underside of Roof Slab.

NOTES

1. Large 685 mm diameter roof access openings facilitate tank maintenance. Unless otherwise specified/ordered this tank will be shipped with 840 mm diameter concrete hatch covers. Please note that each cover weighs approximately 125 kg and must be handled only with suitable mechanical lifting equipment. See Access Riser section for available options.
2. Close tolerance of tongue and groove joint and fibrous mastic sealant ensures a solid structural and water-tight seal. Primer and Mastic Band are supplied with each tank for application to the external surface of the tank over the joint between the tank sections. This band is to be applied by the installing contractor.
3. Flexible watertight inlet pipe connector to accommodate 100 mm diameter PVC pipe. Size and position of inlet void can be modified at customer's request. Consult with the factory as to how this will affect the liquid capacity of this tank.
4. Top section lifting points four places.
5. Bottom section lifting points four places.
6. The partition is cast monolithically with the walls and horizontal slab of top section.
7. Knee wall each side of bottom section is cast monolithically with the walls and horizontal slab.



Dimensions in mm
N.T.S.

* Commensurate with a **1.2 Metre** burial over the top slab in firm soil away from any area of vehicular traffic.

For recommended installation procedures refer to Wilkinson Installation Guidelines and Lifting and Assembly Instructions.

WARNING ! IMPROPER INSTALLATION ESPECIALLY IN UNSTABLE SOILS CAN RESULT IN THE STRUCTURAL FAILURE OF THIS PRODUCT

9 May, 2009

APPENDIX C

Stormwater Management Calculations

CROZIER & ASSOCIATES Consulting Engineers

Project: 10819 Highway 9 **Created By:** KW **Date:** 2019-08-21
Project No.: 1651-5095 **Checked By:** JB **Updated:** 2020-03-13

Modified Rational Calculations - Input Parameters

Storm Data: **MTO**

Time of Concentration: T_c = **0.16667** **min** = **10 mins**

Return Period	A	B	C	I (mm/hr)
2 yr	22.00	-0.70	0.00	76.98
5 yr	29.10	-0.70	0.00	101.82
10 yr	33.80	-0.70	0.00	118.26
25 yr	39.70	-0.70	0.00	138.91
50 yr	44.10	-0.70	0.00	154.30
100 yr	48.40	-0.70	0.00	169.35

Equations:

Intensity
$i(T_d) = A*T^B$

Peak Flow
$Q_{post} = 0.0028 \bullet C_{post} \bullet i(T_d) \bullet A$

Pre - Development Conditions

Catchment	Land Use	Area (ha)	Area (m^2)	C	Weighted Average C[1]
100	*Pervious*	0.39	3938	**0.25**	**0.15**
	Impervious	0.18	1801	**0.9**	**0.24**
101 (External)	*Pervious*	0.02	247	**0.25**	**0.01**
102	*Pervious*	0.00	14.35	**0.25**	**0.00**
	Impervious	0.03	296.65	**0.9**	**0.04**
	Total	**0.63**	**6297**	**-**	**0.44**
103 (uncontrolled)	*Pervious*	0.03	314	**0.25**	**0.01**
	Impervious	0.01	57	**0.9**	**0.01**
Total Site		**0.67**	**6668**	**-**	**0.46**
Total Site (Minus MTO Setback)		**0.53**	**5293**	**-**	**0.46**

Post - Development Conditions

Catchment	Land Use	Area (ha)	Area (m^2)	C	Weighted Average C
200	*Pervious*	0.30	2975	**0.25**	**0.18**
	Impervious	0.12	1169	**0.9**	**0.25**
	Total	**0.41**	**4144**	**-**	**0.43**
201 (External)	*Pervious*	0.02	247	**0.25**	**0.25**
	Total	**0.02**	**4391**	**-**	**0.25**
202 (Roof)	*Impervious*	0.03	260	**0.9**	**0.90**
203 (Uncontrolled)	*Pervious*	0.05	528	**0.25**	**0.25**
204 (Uncontrolled)	*Pervious*	0.01	114	**0.25**	**0.25**
Total Site		**0.53**	**5293**	**-**	**0.43**

CROZIER & ASSOCIATES Consulting Engineers

Project: 10819 Highway 9
Project No.: 1651-5095

Created By: KW
Checked By: JB

Date: 2019-08-21
Updated: 2020-03-13

Modified Rational Calculations - Peak Flows Summary

Peak Flows (m^3/s)						
Return Period	**Adjusted C_{pre}**	**Adjusted C_{post}**	**Q_{pre}**	**Q_{unc}**	**Q_{post}**	**Q_{total}**
2 yr	0.460	0.425	0.052	0.003	0.046	0.047
5 yr	0.460	0.425	0.069	0.005	0.061	0.062
10 yr	0.460	0.425	0.081	0.005	0.071	0.072
25 yr	0.460	0.425	0.095	0.006	0.083	0.084
50 yr	0.460	0.425	0.105	0.007	0.093	0.094
100 yr	0.460	0.425	0.115	0.008	0.102	0.103

Equations:

Peak Flow

$$Q_{post} = 0.0028 \bullet C_{post} \bullet i(T_d) \bullet A$$

Rooftop Area: 0.03 ha
Rooftop Release Rate: 0.042 $m^3/s/ha$
Rooftop Flowrate: 0.0011 m^3/s

CROZIER & ASSOCIATES Consulting Engineers

Project: 10819 Highway 9 **Created By:** KW **Date:** 2019-08-21
Project No.: 1651-5095 **Checked By:** JB **Updated:** 2020-03-13

Modified Rational Calculations - 100-Year Storm Event

Control Criteria

100 yr: Control Post-Development Peak Flows to Pre-Development Peak Flow

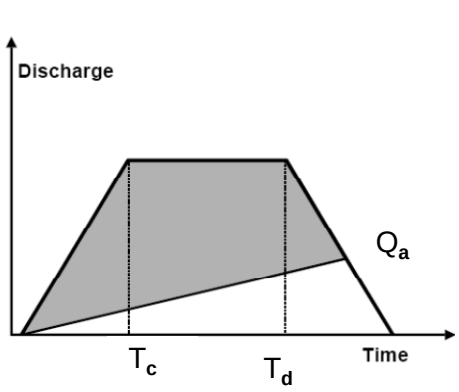
100 yr: Uncontrolled Post-Development Flow:

Q_{post} = 0.008 m^3/s

100 yr: Pre-Development Flow:

Q_{pre} = 0.115 m^3/s

Storage Volume Determination				
T_d (min)	i (mm/hr)	T_d (sec)	Q_{Uncont} (m^3/s)	S_d (m^3)
5	274.91	300	0.173	0.1
10	169.35	600	0.107	-5.2
15	127.55	900	0.080	-14.2
20	104.32	1200	0.066	-25.0
25	89.25	1500	0.056	-36.8
30	78.57	1800	0.050	-49.4
35	70.55	2100	0.044	-62.4
40	64.26	2400	0.041	-75.9
45	59.18	2700	0.037	-89.7
50	54.98	3000	0.035	-103.8
55	51.44	3300	0.032	-118.1
60	48.40	3600	0.031	-132.6
65	45.77	3900	0.029	-147.2
70	43.46	4200	0.027	-162.0
75	41.41	4500	0.026	-176.9
80	39.58	4800	0.025	-191.9
85	37.94	5100	0.024	-207.0
Required Storage Volume:				**0.1**



Peak Flow
$Q_{post} = 0.0028 \bullet C_{post} \bullet i(T_d) \bullet A$

Storage
$S_d = Q_{post} \bullet T_d - Q_{target} (T_d + T_c) / 2$

CROZIER & ASSOCIATES Consulting Engineers

Project: 10819 Highway 9 **Created By:** KW **Date:** 2019-08-21
Project No.: 1651-5095 **Checked By:** JB **Updated:** 2020-03-13

Modified Rational Calculations - 50-Year Storm Event

Control Criteria

50 yr: Control Post-Development Peak Flows to Pre-Development Peak Flow

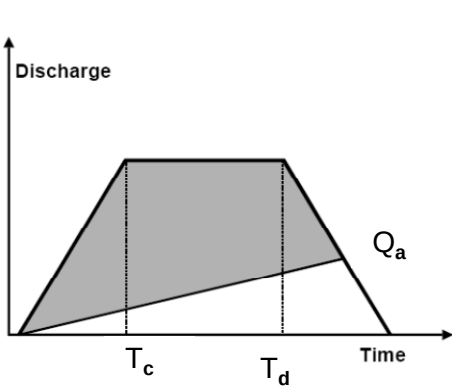
50 yr: Uncontrolled Post-Development Flow:

Q_{post} = 0.003 m^3/s

50 yr: Pre-Development Flow:

Q_{pre} = 0.105 m^3/s

Storage Volume Determination				
T_d (min)	i (mm/hr)	T_d (sec)	Q_{Uncont} (m^3/s)	S_d (m^3)
5	250.49	300	0.158	0.0
10	154.30	600	0.097	-4.7
15	116.22	900	0.073	-12.9
20	95.05	1200	0.060	-22.8
25	81.32	1500	0.051	-33.5
30	71.59	1800	0.045	-45.0
35	64.28	2100	0.041	-56.9
40	58.55	2400	0.037	-69.2
45	53.92	2700	0.034	-81.8
50	50.09	3000	0.032	-94.6
55	46.87	3300	0.030	-107.6
60	44.10	3600	0.028	-120.8
65	41.70	3900	0.026	-134.1
70	39.60	4200	0.025	-147.6
75	37.73	4500	0.024	-161.2
80	36.07	4800	0.023	-174.9
85	34.57	5100	0.022	-188.6
Required Storage Volume:				**0.0**



Peak Flow	Storage
$Q_{post} = 0.0028 \bullet C_{post} \bullet i(T_d) \bullet A$	$S_d = Q_{post} \bullet T_d - Q_{target} (T_d + T_c) / 2$

CROZIER & ASSOCIATES Consulting Engineers

Project: 10819 Highway 9 **Created By:** KW **Date:** 2019-08-21
Project No.: 1651-5095 **Checked By:** JB **Updated:** 2020-03-13

Modified Rational Calculations - 25-Year Storm Event

Control Criteria

25 yr: Control Post-Development Peak Flows to Pre-Development Peak Flow

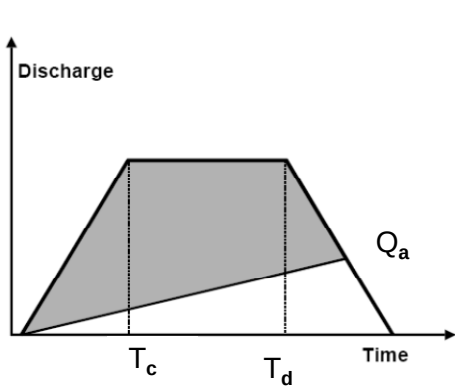
25 yr: Uncontrolled Post-Development Flow:

Q_{post}= 0.083 m^3/s

25 yr: Pre-Development Flow:

Q_{pre}= 0.095 m^3/s

Storage Volume Determination				
T_d (min)	i (mm/hr)	T_d (sec)	Q_{Uncont} (m^3/s)	S_d (m^3)
5	225.50	300	0.142	0.0
10	138.91	600	0.088	-4.3
15	104.62	900	0.066	-11.7
20	85.57	1200	0.054	-20.5
25	73.21	1500	0.046	-30.2
30	64.45	1800	0.041	-40.5
35	57.86	2100	0.036	-51.2
40	52.71	2400	0.033	-62.3
45	48.54	2700	0.031	-73.6
50	45.10	3000	0.028	-85.2
55	42.19	3300	0.027	-96.9
60	39.70	3600	0.025	-108.8
65	37.54	3900	0.024	-120.8
70	35.64	4200	0.022	-132.9
75	33.97	4500	0.021	-145.1
80	32.47	4800	0.020	-157.4
85	31.12	5100	0.020	-169.8
Required Storage Volume:				**0.0**



Peak Flow	Storage
$Q_{post} = 0.0028 \bullet C_{post} \bullet i(T_d) \bullet A$	$S_d = Q_{post} \bullet T_d - Q_{target} (T_d + T_c) / 2$

CROZIER & ASSOCIATES Consulting Engineers

Project: 10819 Highway 9 **Created By:** KW **Date:** 2019-08-21
Project No.: 1651-5095 **Checked By:** JB **Updated:** 2020-03-13

Modified Rational Calculations - 10-Year Storm Event

Control Criteria

10 yr: Control Post-Development Peak Flows to Pre-Development Peak Flow

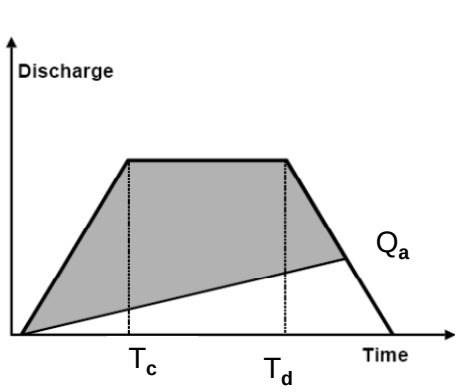
10 yr: Uncontrolled Post-Development Flow:

Q_{post} = 0.071 m^3/s

10 yr: Pre-Development Flow:

Q_{pre} = 0.081 m^3/s

Storage Volume Determination				
T_d (min)	i (mm/hr)	T_d (sec)	Q_{Uncont} (m^3/s)	S_d (m^3)
5	191.98	300	0.121	0.0
10	118.26	600	0.075	-3.6
15	89.08	900	0.056	-9.9
20	72.85	1200	0.046	-17.4
25	62.33	1500	0.039	-25.7
30	54.87	1800	0.035	-34.5
35	49.27	2100	0.031	-43.6
40	44.88	2400	0.028	-53.0
45	41.33	2700	0.026	-62.7
50	38.39	3000	0.024	-72.5
55	35.92	3300	0.023	-82.5
60	33.80	3600	0.021	-92.6
65	31.96	3900	0.020	-102.8
70	30.35	4200	0.019	-113.1
75	28.92	4500	0.018	-123.5
80	27.64	4800	0.017	-134.0
85	26.50	5100	0.017	-144.6
Required Storage Volume:				**0.0**



Peak Flow
$Q_{post} = 0.0028 \bullet C_{post} \bullet i(T_d) \bullet A$

Storage
$S_d = Q_{post} \bullet T_d - Q_{target} (T_d + T_c) / 2$

CROZIER & ASSOCIATES Consulting Engineers

Project: 10819 Highway 9 **Created By:** KW **Date:** 2019-08-21
Project No.: 1651-5095 **Checked By:** JB **Updated:** 2020-03-13

Modified Rational Calculations - 5-Year Storm Event

Control Criteria

5 yr: Control Post-Development Peak Flows to Pre-Development Peak Flow

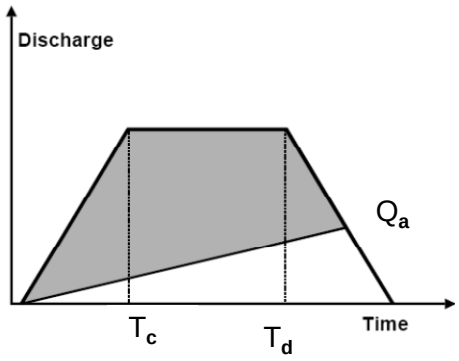
5 yr: Uncontrolled Post-Development Flow:

Q_{post} = 0.061 m^3/s

5 yr: Pre-Development Flow:

Q_{pre} = 0.069 m^3/s

Storage Volume Determination				
T_d (min)	i (mm/hr)	T_d (sec)	Q_{Uncont} (m^3/s)	S_d (m^3)
5	165.29	300	0.104	0.0
10	101.82	600	0.064	-3.1
15	76.69	900	0.048	-8.5
20	62.72	1200	0.040	-15.0
25	53.66	1500	0.034	-22.1
30	47.24	1800	0.030	-29.7
35	42.41	2100	0.027	-37.5
40	38.63	2400	0.024	-45.7
45	35.58	2700	0.022	-54.0
50	33.06	3000	0.021	-62.4
55	30.92	3300	0.020	-71.0
60	29.10	3600	0.018	-79.7
65	27.52	3900	0.017	-88.5
70	26.13	4200	0.016	-97.4
75	24.90	4500	0.016	-106.4
80	23.80	4800	0.015	-115.4
85	22.81	5100	0.014	-124.5
Required Storage Volume:				**0.0**



Peak Flow
$Q_{post} = 0.0028 \bullet C_{post} \bullet i(T_d) \bullet A$

Storage
$S_d = Q_{post} \bullet T_d - Q_{target} (T_d + T_c) / 2$

CROZIER & ASSOCIATES Consulting Engineers

Project: 10819 Highway 9 **Created By:** KW **Date:** 2019-08-21
Project No.: 1651-5095 **Checked By:** JB **Updated:** 2020-03-13

Modified Rational Calculations - 2-Year Storm Event

Control Criteria

2 yr: Control Post-Development Peak Flows to Pre-Development Peak Flow

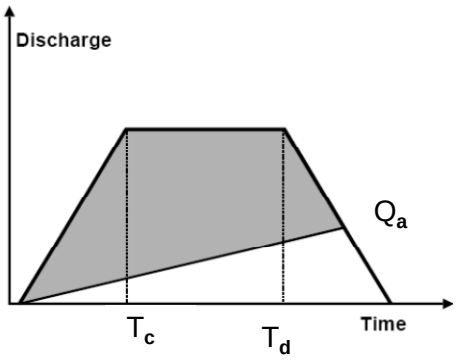
2 yr: Uncontrolled Post-Development Flow:

Q_{post}= 0.046 m^3/s

2 yr: Pre-Development Flow:

Q_{pre} = 0.052 m^3/s

Storage Volume Determination				
T_d (min)	i (mm/hr)	T_d (sec)	Q_{Uncont} (m^3/s)	S_d (m^3)
5	124.96	300	0.079	0.0
10	76.98	600	0.049	-2.4
15	57.98	900	0.037	-6.5
20	47.42	1200	0.030	-11.4
25	40.57	1500	0.026	-16.7
30	35.71	1800	0.023	-22.4
35	32.07	2100	0.020	-28.4
40	29.21	2400	0.018	-34.5
45	26.90	2700	0.017	-40.8
50	24.99	3000	0.016	-47.2
55	23.38	3300	0.015	-53.7
60	22.00	3600	0.014	-60.3
65	20.80	3900	0.013	-66.9
70	19.75	4200	0.012	-73.6
75	18.82	4500	0.012	-80.4
80	17.99	4800	0.011	-87.2
85	17.25	5100	0.011	-94.1
Required Storage Volume:				**0.0**



Peak Flow
$Q_{post} = 0.0028 \bullet C_{post} \bullet i(T_d) \bullet A$

Storage
$S_d = Q_{post} \bullet T_d - Q_{target} (T_d + T_c) / 2$

CROZIER & ASSOCIATES Consulting Engineers

Project: 10819 Highway 9 **Created By:** KW **Date:** 2019-08-21
Project No.: 1651-5095 **Checked By:** JB **Updated:** 2020-03-13

Modified Rational Calculations - Summary

Storm Event (yr)	Peak Flow Rate			Required Storage (m^3)
	Pre-Development (L/s)	Post-Development[1] (L/s)		
		Uncontrolled	Controlled	
2	0.052	0.003	0.047	0.0
5	0.069	0.005	0.062	0.0
10	0.081	0.005	0.072	0.0
25	0.095	0.006	0.084	0.0
50	0.105	0.007	0.094	0.0
100	0.115	0.008	0.103	0.1

Ontario IDF CURVE LOOKUP

Active coordinate

43° 59' 15" N, 79° 47' 45" W (43.987500,-79.795833)

Retrieved: Fri, 30 Aug 2019 20:07:53 GMT

Location summary

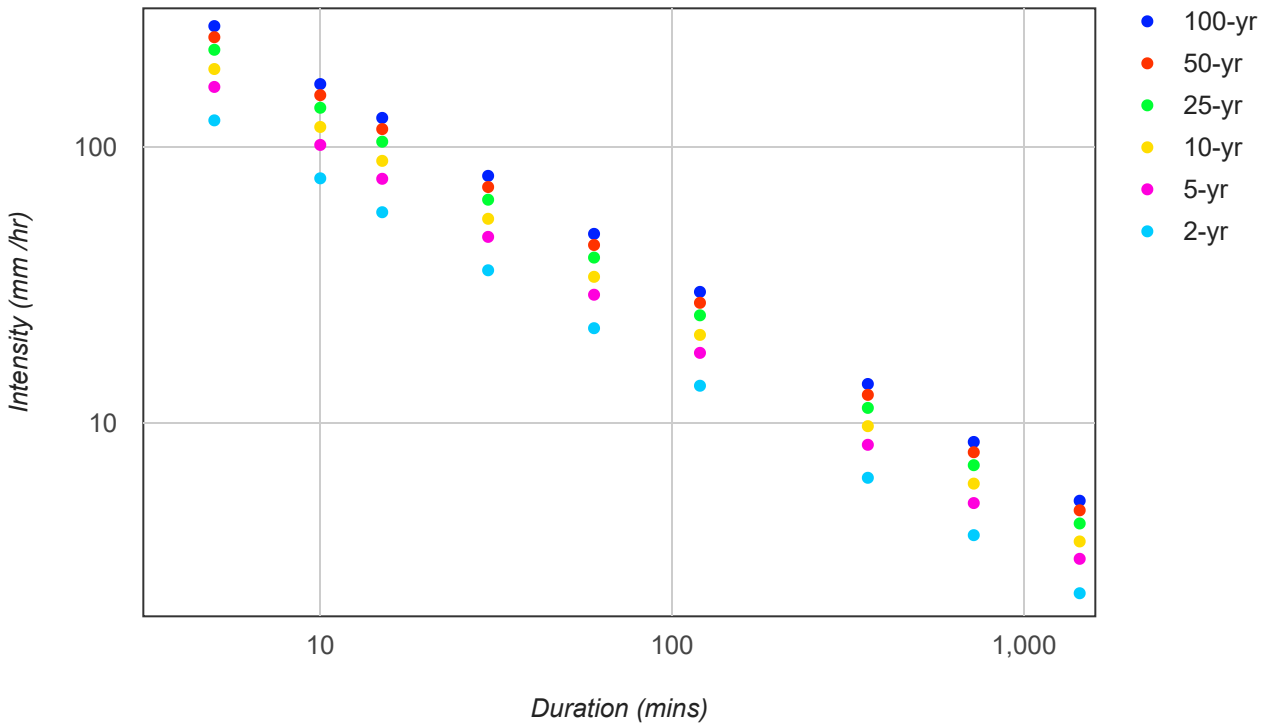
These are the locations in the selection.

IDF Curve: 43° 59' 15" N, 79° 47' 45" W (43.987500,-79.795833)

Results

An IDF curve was found.

Coordinate: 43.987500, -79.795833
IDF curve year: 2010



Coefficient Summary

IDF Curves: 43° 59' 15" N, 79° 47' 45" W (43.987500,-79.795833)
Retrieved: Fri, 30 Aug 2019 20:07:53 GMT

Data year: 2010
IDF curve year: 2010

Return period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
A	22.0	29.1	33.8	39.7	44.1	48.4
B	-0.699	-0.699	-0.699	-0.699	-0.699	-0.699

Statistics

Rainfall intensity (mm hr^{-1})

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	125.0	77.0	58.0	35.7	22.0	13.6	6.3	3.9	2.4
5-yr	165.3	101.8	76.7	47.2	29.1	17.9	8.3	5.1	3.2
10-yr	192.0	118.3	89.1	54.9	33.8	20.8	9.7	6.0	3.7
25-yr	225.5	138.9	104.6	64.4	39.7	24.5	11.3	7.0	4.3
50-yr	250.5	154.3	116.2	71.6	44.1	27.2	12.6	7.8	4.8
100-yr	274.9	169.3	127.6	78.6	48.4	29.8	13.8	8.5	5.2

Rainfall depth (mm)

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	10.4	12.8	14.5	17.9	22.0	27.1	37.7	46.5	57.3
5-yr	13.8	17.0	19.2	23.6	29.1	35.9	49.9	61.5	75.7
10-yr	16.0	19.7	22.3	27.4	33.8	41.6	58.0	71.4	88.0
25-yr	18.8	23.2	26.2	32.2	39.7	48.9	68.1	83.9	103.3
50-yr	20.9	25.7	29.1	35.8	44.1	54.3	75.6	93.2	114.8
100-yr	22.9	28.2	31.9	39.3	48.4	59.6	83.0	102.3	126.0

Terms of Use

You agree to the Terms of Use of this site by reviewing, using, or interpreting these data.

Ontario Ministry of Transportation | Terms and Conditions | About
Last Modified: September 2016

Stormceptor® FORTERRA

Stormceptor® EF Sizing Report

ESTIMATED NET ANNNUAL SEDIMENT (TSS) LOAD REDUCTION STORMCEPTOR®

Province :	Ontario
City :	Caledon
Nearest Rainfall Station :	TORONTO CENTRAL
NCDC Rainfall Station Id :	0100
Years Of Rainfall Data :	18

Project Name :	10819 Highway 9
Project Number :	19540
Designer Name :	Katrina Weel
Designer Company :	CF Crozier & Associates
Designer Email/Phone :	kweel@cfcrozier.ca
EOR Name :	
EOR Company :	
EOR Email/Phone :	

Drainage Area (ha) :	0.64
% Imperviousness :	48.0

Runoff Coefficient 'c' : 0.58

Partical Size Distribution :	CA ETV
Target TSS Removal (%) :	50.0

Require Hydrocarbon Spill Capture?	Yes
Upstream Flow Control?	No
Required Water Quality Runoff Volume Capture (%) :	
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	63
EFO6	67
EFO8	69
EFO10	70
EFO12	70

Recommended Stormceptor EFO Model : EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%) : 63

imbrium

THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS fromthe frequent rainfall events that contribute the vast majority of annualrunoff 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.

PARTICAL SIZE DISTRIBUTION (PSD)

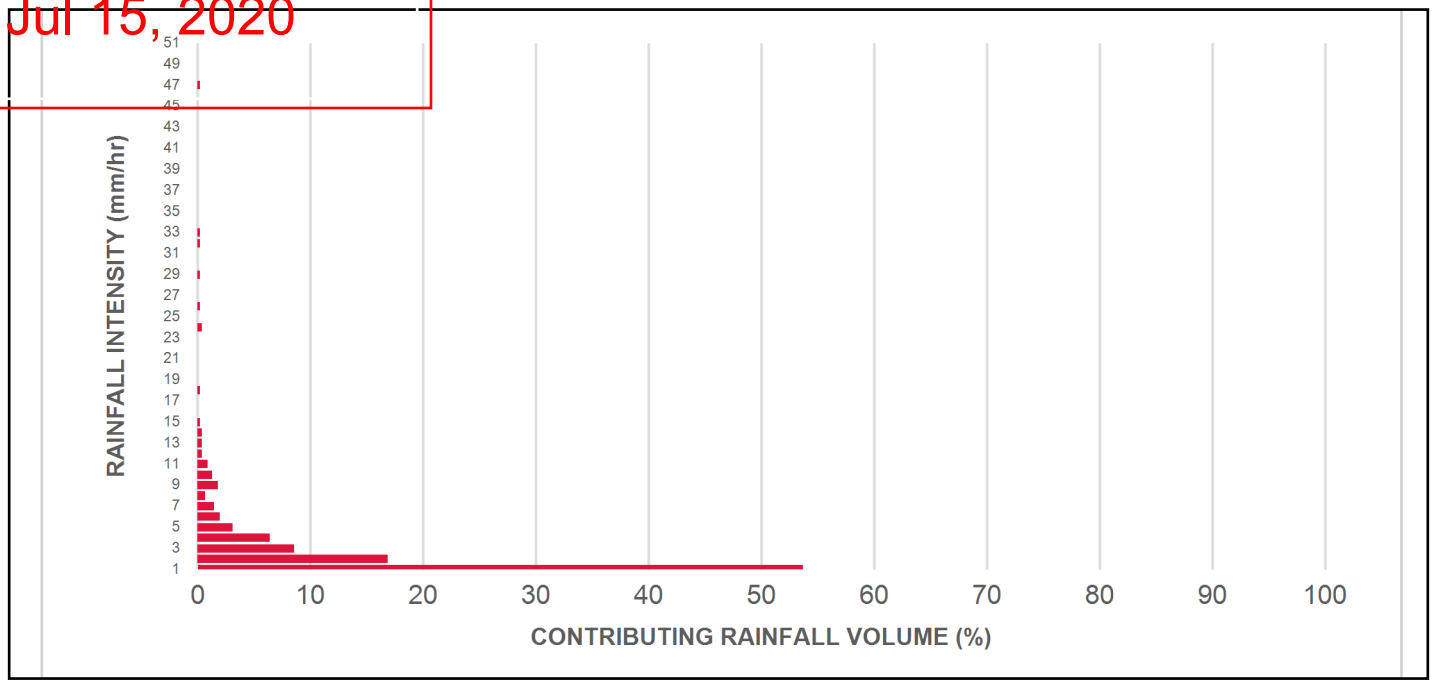
►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a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

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

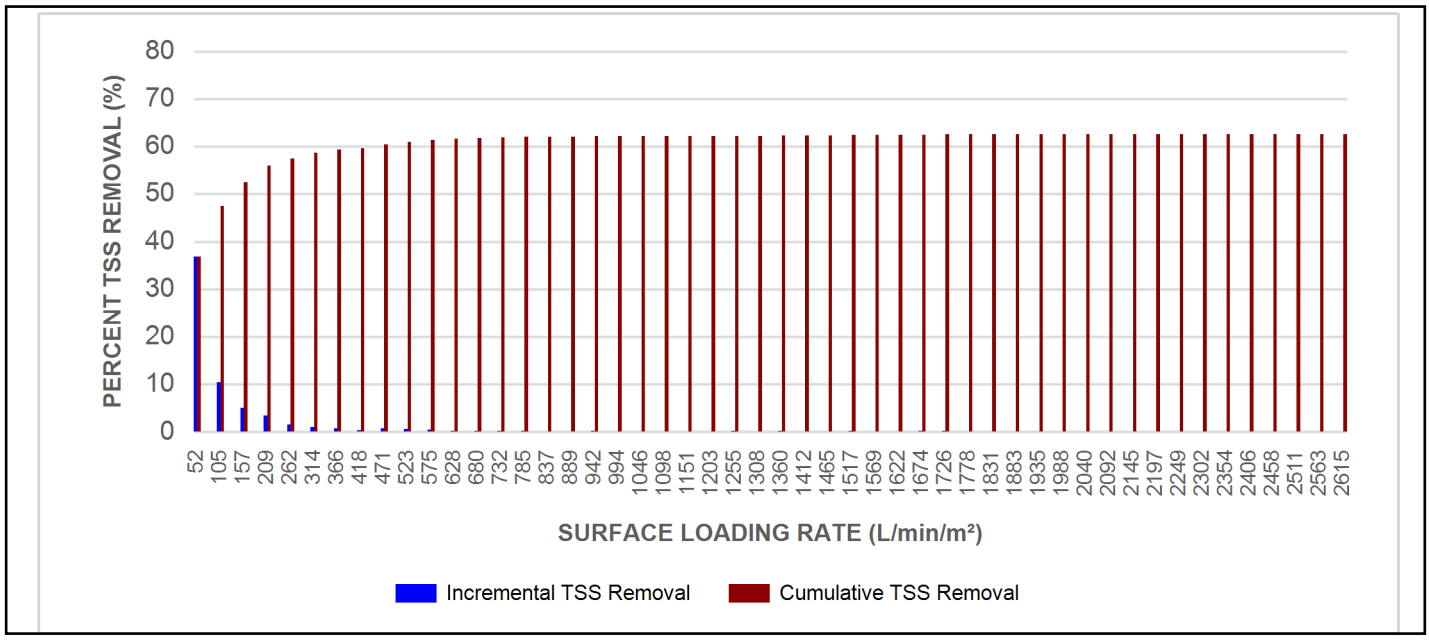
RainFall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	53.7	53.7	1.05	63.0	52.0	69	36.9	36.9
2	16.9	70.6	2.09	126.0	105.0	62	10.5	47.5
3	8.6	79.2	3.14	188.0	157.0	58	5.0	52.5
4	6.4	85.6	4.18	251.0	209.0	54	3.4	55.9
5	3.1	88.7	5.23	314.0	262.0	52	1.6	57.5
6	2.0	90.7	6.28	377.0	314.0	51	1.0	58.6
7	1.5	92.2	7.32	439.0	366.0	49	0.7	59.3
8	0.7	92.9	8.37	502.0	418.0	48	0.3	59.6
9	1.8	94.7	9.42	565.0	471.0	46	0.8	60.4
10	1.3	96.0	10.46	628.0	523.0	44	0.6	61.0
11	0.9	96.9	11.51	690.0	575.0	43	0.4	61.4
12	0.4	97.3	12.55	753.0	628.0	42	0.2	61.6
13	0.4	97.7	13.60	816.0	680.0	42	0.2	61.7
14	0.4	98.1	14.65	879.0	732.0	41	0.2	61.9
15	0.2	98.3	15.69	942.0	785.0	41	0.1	62.0
16	0.0	98.3	16.74	1004.0	837.0	41	0.0	62.0
17	0.0	98.3	17.78	1067.0	889.0	41	0.0	62.0
18	0.2	98.5	18.83	1130.0	942.0	40	0.1	62.1
19	0.0	98.5	19.88	1193.0	994.0	40	0.0	62.1
20	0.0	98.5	20.92	1255.0	1046.0	39	0.0	62.1
21	0.0	98.5	21.97	1318.0	1098.0	39	0.0	62.1
22	0.0	98.5	23.02	1381.0	1151.0	38	0.0	62.1
23	0.0	98.5	24.06	1444.0	1203.0	37	0.0	62.1
24	0.4	98.9	25.11	1506.0	1255.0	36	0.1	62.2
25	0.0	98.9	26.15	1569.0	1308.0	36	0.0	62.2

RainFall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
26	0.2	99.1	27.20	1632.0	1360.0	35	0.1	62.3
27	0.0	99.1	28.25	1695.0	1412.0	34	0.0	62.3
28	0.0	99.1	29.29	1758.0	1465.0	33	0.0	62.3
29	0.2	99.3	30.34	1820.0	1517.0	32	0.1	62.4
30	0.0	99.3	31.39	1883.0	1569.0	30	0.0	62.4
31	0.0	99.3	32.43	1946.0	1622.0	29	0.0	62.4
32	0.2	99.5	33.48	2009.0	1674.0	29	0.1	62.4
33	0.2	99.7	34.52	2071.0	1726.0	28	0.1	62.5
34	0.0	99.7	35.57	2134.0	1778.0	27	0.0	62.5
35	0.0	99.7	36.62	2197.0	1831.0	26	0.0	62.5
36	0.0	99.7	37.66	2260.0	1883.0	25	0.0	62.5
37	0.0	99.7	38.71	2322.0	1935.0	25	0.0	62.5
38	0.0	99.7	39.75	2385.0	1988.0	24	0.0	62.5
39	0.0	99.7	40.80	2448.0	2040.0	23	0.0	62.5
40	0.0	99.7	41.85	2511.0	2092.0	23	0.0	62.5
41	0.0	99.7	42.89	2574.0	2145.0	22	0.0	62.5
42	0.0	99.7	43.94	2636.0	2197.0	22	0.0	62.5
43	0.0	99.7	44.99	2699.0	2249.0	21	0.0	62.5
44	0.0	99.7	46.03	2762.0	2302.0	21	0.0	62.5
45	0.0	99.7	47.08	2825.0	2354.0	20	0.0	62.5
46	0.0	99.7	48.12	2887.0	2406.0	20	0.0	62.5
47	0.2	99.9	49.17	2950.0	2458.0	19	0.0	62.5
48	0.0	99.9	50.22	3013.0	2511.0	19	0.0	62.5
49	0.0	99.9	51.26	3076.0	2563.0	19	0.0	62.5
50	0.0	99.9	52.31	3139.0	2615.0	18	0.0	62.5
						Estimated Net Annual Sediment (TSS) Load Reduction =		**62 %**

RAINFALL DATA FROM TORONTO CENTRAL RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

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

SCOUR PREVENTION AND ONLINE CONFIGURATION

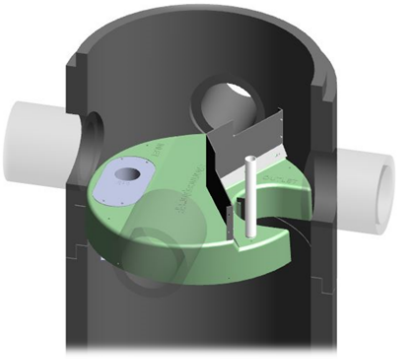
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

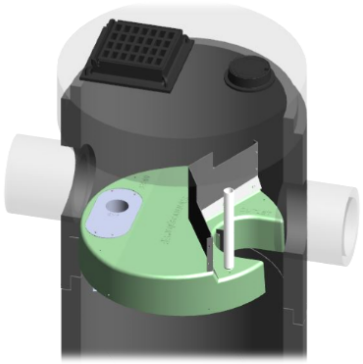
DESIGN FLEXIBILITY

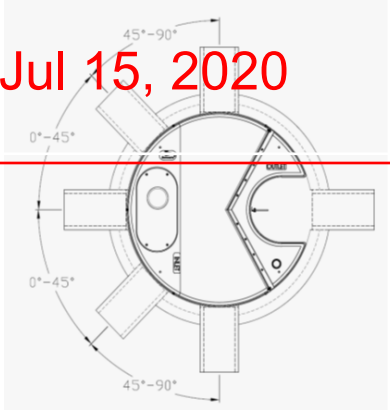
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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

OIL CAPTURE AND RETENTION

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







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0(degree)-45(degree):The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45(degree)-90(degree):The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

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

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	197	52	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	348	92	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	545	144	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	874	231	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	1219	322	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/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

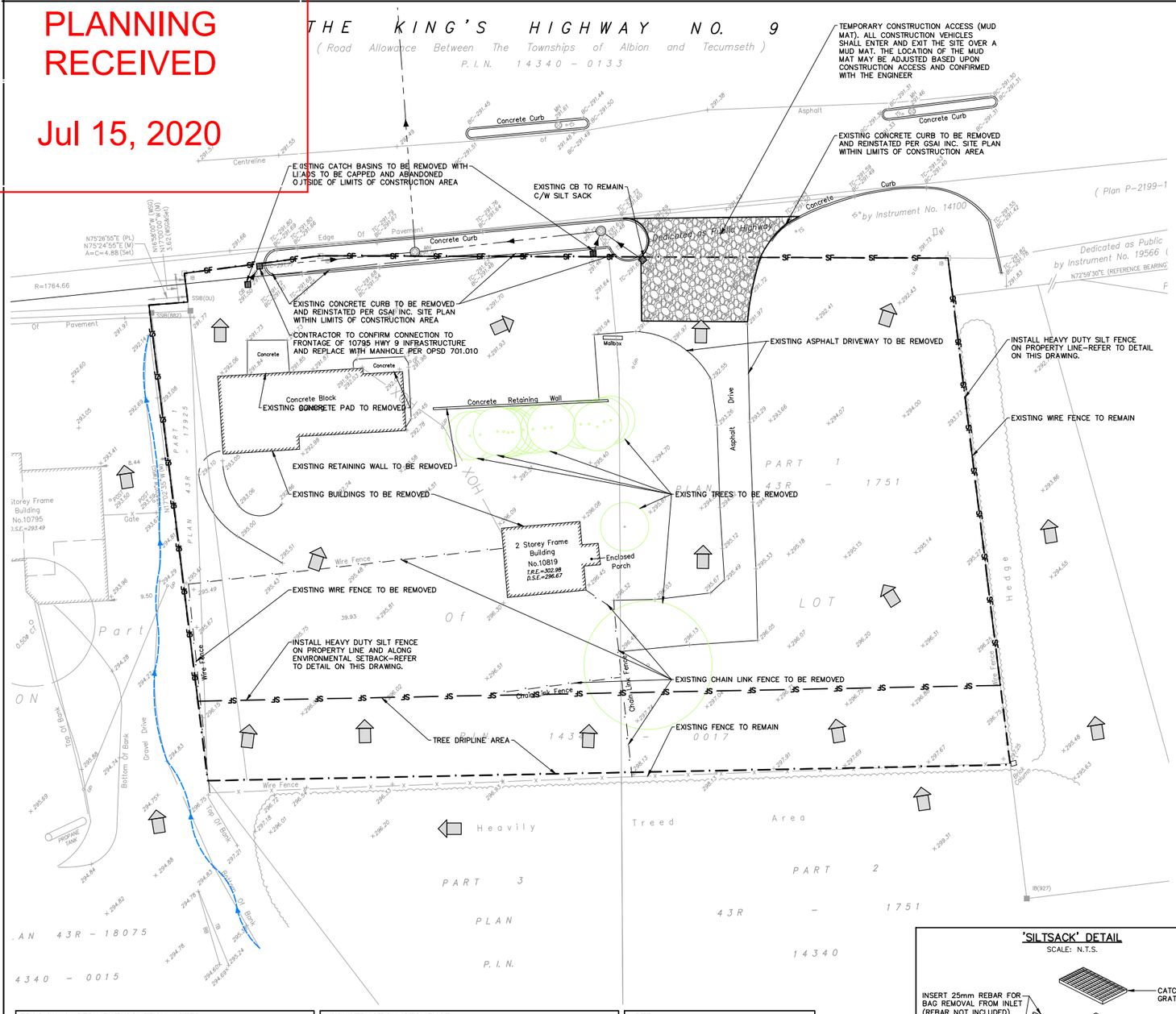
Table of TSS Removal vs Surface Loading Rate Based on Third-Party Test Results
Stormceptor® EFO

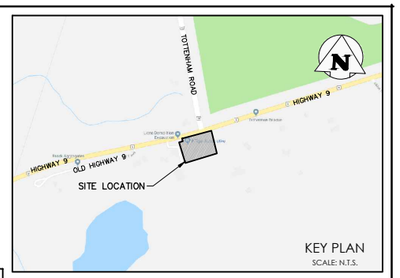
SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL
1	70	660	46	1320	48	1980	35
30	70	690	46	1350	48	2010	34
60	67	720	45	1380	49	2040	34
90	63	750	45	1410	49	2070	33
120	61	780	45	1440	48	2100	33
150	58	810	45	1470	47	2130	32
180	56	840	45	1500	46	2160	32
210	54	870	45	1530	45	2190	31
240	53	900	45	1560	44	2220	31
270	52	930	44	1590	43	2250	30
300	51	960	44	1620	42	2280	30
330	50	990	44	1650	42	2310	30
360	49	1020	44	1680	41	2340	29
390	48	1050	45	1710	40	2370	29
420	48	1080	45	1740	39	2400	29
450	48	1110	45	1770	39	2430	28
480	47	1140	46	1800	38	2460	28
510	47	1170	46	1830	37	2490	28
540	47	1200	47	1860	37	2520	27
570	46	1230	47	1890	36	2550	27
600	46	1260	47	1920	36	2580	27
630	46	1290	48	1950	35		

FIGURES

TOWN OF CALEDON
PLANNING
RECEIVED

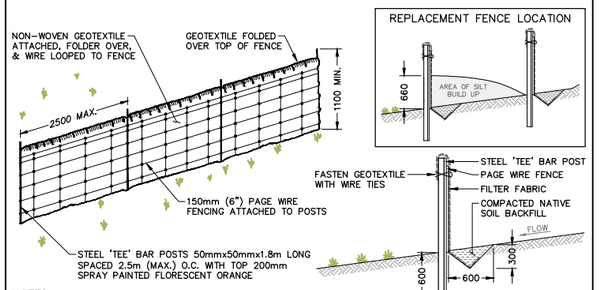
Jul 15, 2020





TYPICAL HEAVY DUTY SILT FENCE

SCALE: N.T.S.



NOTES:

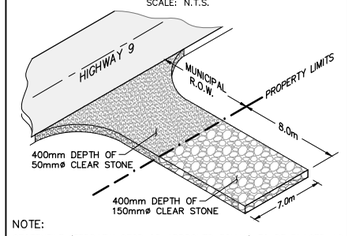
1. DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
2. SILT CONTROL FENCE SHOULD BE ALIGNED WITH CONTOURS FOR SHEET OVERLAND FLOW.
3. SILT CONTROL FENCE IS TO BE LOCATED IN AREAS OF LOW SEDIMENT YIELD ON SLOPES THAT CONFORM TO MTO DRAINAGE MANUAL VOLUME 2 "CHART F4-3C TOPOGRAPHIC FACTOR IS BASED ON SLOPE LENGTH AND GRADIENT."
4. SILT CONTROL FENCE TO BE INSTALLED WITH FILTER MEDIA FABRIC TOED INTO THE SOIL A MIN. OF 300mm BY EITHER STATIC SLICING OR TRENCH METHODS WITH COMPACTION OF TRENCH MATERIAL MEETING 95% INSITU SOIL STRENGTH.
5. STEEL 'TEE' BAR POSTS ARE TO BE SPACED MAX. 2.5m ON CENTER WITH A MIN. HEIGHT OF 1.1m.
6. FROZEN GROUND CONDITIONS REQUIRE FILTER FABRIC TO BE BACKFILLED IN TRENCH WITH CLEAR STONE
7. GEOTEXTILE FABRIC TO BE COMPRISED OF NON-WOVEN U.V. STABILIZED MATERIAL. FABRIC TO BE FOLDED OVER TOP OF FENCE MIN. 300mm AND WIRE FASTENED.

LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING FENCE
- EXISTING GRADE (x 215.00)
- EXISTING OVERLAND FLOW DIRECTION
- MUD-MAT; SEE DETAIL
- SF — SILT FENCE; SEE DETAIL

MUD-MAT DETAIL

SCALE: N.T.S.



NOTE:

GEOTEXTILE (TERRAFIX 270R OR APPROVED EQUAL) TO BE PLACED AS SEPARATION BARRIER BETWEEN EXISTING GROUND AND CLEAR STONE.

EROSION & SEDIMENT CONTROL NOTES:

1. EROSION & SEDIMENT CONTROL MEASURES MUST BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE WORKS.
2. EROSION & SEDIMENT CONTROLS MUST BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY RAIN FALL EVENT, AND MUST BE MAINTAINED AND REPAIRED IN A TIMELY MANNER TO PREVENT SEDIMENT FROM LEAVING THE SITE.
3. EXISTING AND PROPOSED CATCHBASINS ARE TO BE PROTECTED WITH FILTER CLOTH AND 150mm OF 50mm STONE COVER DURING CONSTRUCTION.
4. IT IS REQUIRED TO STABILIZE ALL AREAS THAT WILL REMAIN DISTURBED FOR MORE THAN 30 DAYS.
5. MUD MAT, SILT FENCE, AND CATCHBASIN PROTECTION ARE NOT TO BE REMOVED UNTIL COMPLETION OF CONSTRUCTION.

CONSTRUCTION SEQUENCE:

1. REMOVAL OF EXISTING CHAIN LINK AND WIRE FENCING.
2. INSTALLATION OF EROSION SEDIMENT CONTROL FENCING.
3. COMPLETE AREA GRADING OUTSIDE OF EXISTING FLOW PATH.
4. REMOVE SEDIMENT CONTROL DEVICES PRIOR TO PLACING GRANULAR MATERIAL.
5. ALL EXISTING EROSION AND SEDIMENT CONTROL MEASURES TO BE MAINTAINED FOR THE DURATION OF THE PROJECT UNLESS OTHERWISE NOTED.
6. EXISTING STORM SEWER WILL BE CLEANED OF SEDIMENT UPON STABILIZATION OF THE SITE OR AS AND WHEN DETECTED BY THE TOWN.

NOTE:

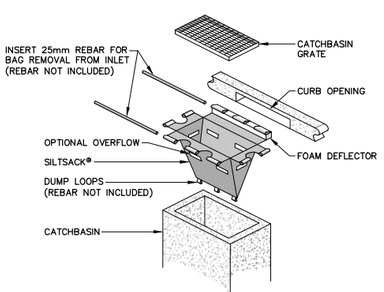
CONTRACTOR TO ENSURE THE REMOVALS OF ALL EXISTING STRUCTURES AND APPURTENANCES WITHIN PROPERTY LIMITS PRIOR TO CONSTRUCTION.

NOTE:

CONTRACTOR TO CONFIRM LOCATION OF WELL TO BE DECOMMISSIONED AND DECOMMISSION AS PART OF REMOVALS SCOPE

'SILTSACK' DETAIL

SCALE: N.T.S.



NOTES:

1. INSTALL TERRAFIX 'SILTSACK' IN ALL CATCHBASINS & CATCHBASIN MANHOLES AFFECTED BY CONSTRUCTION.
2. INSTALL TERRAFIX 'SILTSACK' IN ALL NEW CATCHBASINS & CATCHBASIN MANHOLES.

TOWN OF CALEDON NOTES:

a. CONSTRUCTION FOR THIS PROJECT TO COMPLY WITH THE MOST CURRENT VERSION OF THE DEVELOPMENT STANDARDS, POLICIES AND GUIDELINES, PREPARED BY THE TOWN OF CALEDON INFRASTRUCTURE DEPARTMENT AND THE ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS.

b. ALL PROPOSED CONSTRUCTION SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.

c. A MINIMUM OF FORTY-EIGHT (48) HOURS PRIOR TO COMMENCING CONSTRUCTION WITHIN THE MUNICIPAL RIGHT OF WAY THE CONTRACTOR MUST CONTACT THE FOLLOWING:

THE TOWN OF CALEDON
PUBLIC WORKS AND
ENGINEERING DEPARTMENT
905-584-2272

THE REGION OF PEEL	ENBRIDGE CONSUMERS
GAS HYDRO ONE	BELL CANADA
ROGERS CABLE	FIRE AND EMERGENCY SERVICES

d. ALL DRAINAGE TO BE SELF-CONTAINED AND DISCHARGED TO A LOCATION APPROVED BY THE PUBLIC WORKS AND ENGINEERING DEPARTMENT AND CONSERVATION AUTHORITY PRIOR TO THE ISSUANCE OF A BUILDING PERMIT.

e. SEDIMENT CONTROL DEVICES ARE TO BE INSTALLED PRIOR TO ANY CONSTRUCTION ON THE SITE AND SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD TO THE SATISFACTION OF THE TOWN AND THE APPLICABLE CONSERVATION AUTHORITY.

f. A MINIMUM OF 1.2m CLEARANCE IS TO BE PROVIDED FROM THE LIMITS OF ALL SIDEWALKS AND DRIVEWAYS TO EXISTING UTILITY STRUCTURES WITHIN THE MUNICIPAL RIGHT OF WAY. IF THIS CLEARANCE IS NOT MAINTAINED THEY SHALL BE RELOCATED AT THE APPLICANT'S EXPENSE.

g. STREET CURBS ARE TO BE CONTINUOUS THROUGH THE PROPOSED ENTRANCE.

h. MUNICIPAL SIDEWALKS SHALL BE CONTINUOUS THROUGH ALL ENTRANCES TO THE SITE AND THE CURB SHALL BE TAPERED BACK 600MM. SIDEWALKS SHALL BE COMPLETELY REMOVED AND REPLACED WITH A 180mm MINIMUM CONCRETE THICKNESS, 30MPa AND 5% TO 7% AIR ENTRAINMENT AT ALL PROPOSED INDUSTRIAL, COMMERCIAL AND INSTITUTIONAL ENTRANCES.

i. ANY CHANGES TO GRADES OR SERVICING FROM THE ORIGINAL APPROVED SITE PLAN MUST BE SUBMITTED BY THE ENGINEER TO THE TOWN FOR APPROVAL PRIOR TO CONSTRUCTION.

j. STRUCTURAL DESIGN OF THE FIRE ROUTE IS REQUIRED TO SUPPORT AN 18 TON VEHICLE.

k. ALL BOULEVARDS TO BE RESTORED WITH 150mm MINIMUM OF TOPSOIL AND SOD TO THE SATISFACTION OF THE TOWN OF CALEDON PUBLIC WORKS AND ENGINEERING DEPARTMENT.

l. THE MINIMUM PAVEMENT DESIGN FOR THE ASPHALT DRIVEWAY APRON WITHIN THE MUNICIPAL ROAD ALLOWANCE SHALL BE AS FOLLOWS:

40mm HL3 ASPHALT
50mm HL8 ASPHALT
150mm GRANULAR 'A'
300mm GRANULAR 'B'

THE CONSULTANT SHOULD REVIEW THE ABOVE WITH RESPECT TO THE EXPECTED USAGE.

m. SERVICE CONNECTION BACKFILL TO BE DISCUSSED WITH THE TOWN.

TOWN OF CALEDON

APPROVED AS NOTED

THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY.

THIS APPROVAL IS SUBJECT TO FURTHER CERTIFICATION OF THE "AS-CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT (AS APPROPRIATE) OF THE PROVINCE OF ONTARIO.

DATE: _____

APPROVED BY: _____

_____
DIRECTOR

ZBA# 0000-000

Stamp

Stamp

LICENSED PROFESSIONAL ENGINEER
A. SHUKLA
100188284
MAY 5, 2020
PROVINCE OF ONTARIO

10 0m 10 20
SCALE: 1:300

No.	ISSUE / REVISION	YYYY/MMM/DD
1	ISSUED FOR SECOND SUBMISSION	2020/MAY/08
0	ISSUED FOR FIRST SUBMISSION (NOT SUBMITTED)	2019/OCT/28

ELEVATION NOTE:

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE TOWN OF CALEDON BENCHMARK No. 00119120377

ELEVATION = 271.200m

LOCAL BENCHMARK:

BEARINGS ARE ASTRONOMIC AND ARE REFFERED TO THE NORTH LIMIT OF PART 1, AS SHOWN ON PLAN 43R-20138 HAVING A BEARING OF N72°59'30"W.

SURVEY NOTES:

SURVEY COMPLETED BY AVANTI SURVEYING INC. (2019/JAN/22)
REFERENCE No.: 18-278

DISTANCES ARE IN METERS AND MAY BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY GSAI INC.
DEVELOPMENT CONCEPT PLAN (2019/MAY/23)
PROJECT No.: 972-001

DRAWING NOTES:

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.

THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.

ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project

10819 HIGHWAY 9
TOWN OF CALEDON
REGION OF PEEL

Drawing

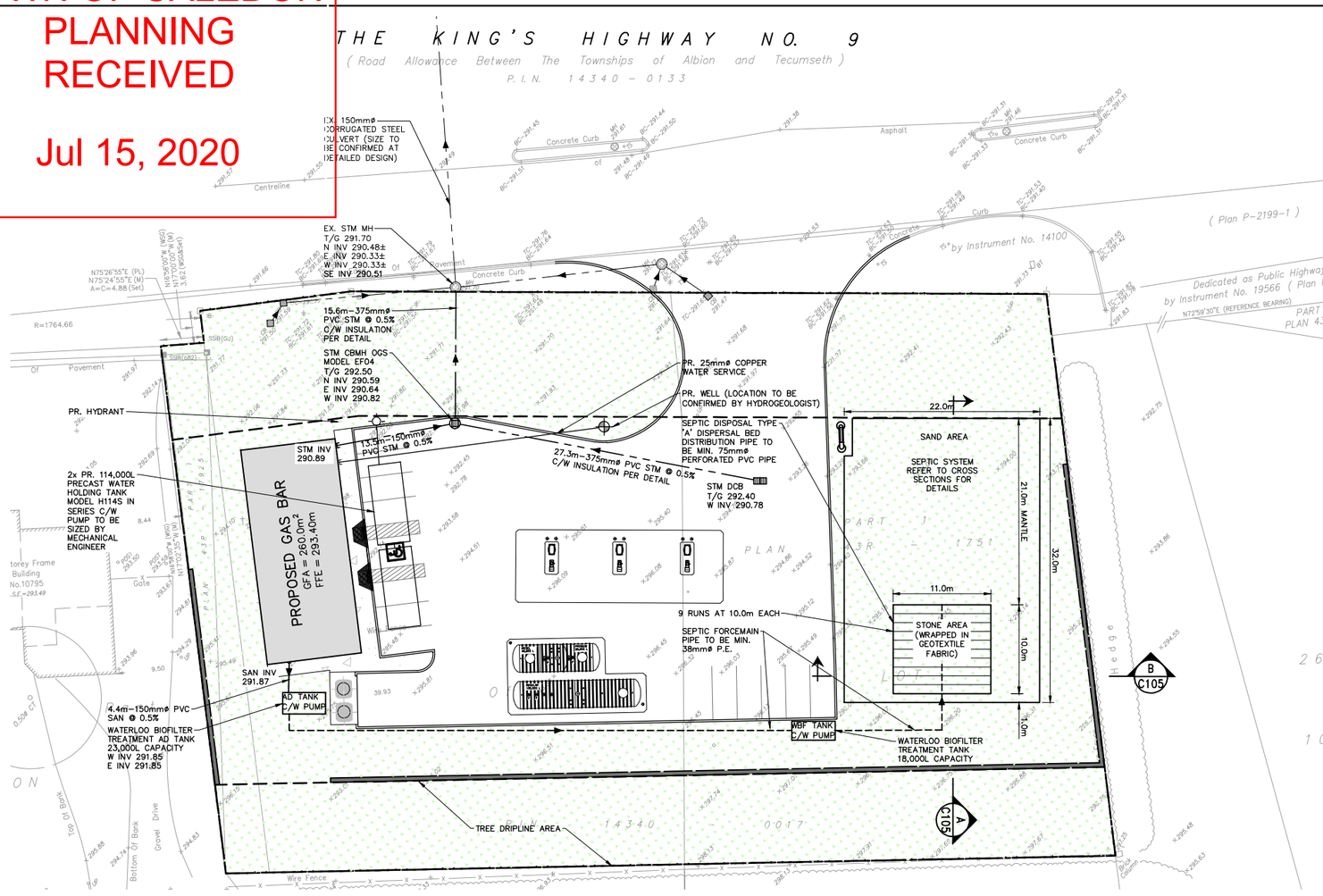
REMOVALS PLAN
EROSION & SEDIMENT CONTROL PLAN

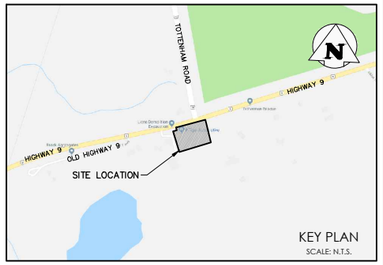
CROZIER CONSULTING ENGINEERS
211 Yonge Street
Suite 301
Toronto, ON M5B 1M4
416-477-3392 T
www.cfcrozier.ca

Drawn	J.B.	Design	J.B.	Project No.	1651-5095		
Check	J.H.	Check	A.S.	Scale	1:300	Dwg.	FIG. 1

TOWN OF CALEDON
PLANNING
RECEIVED

Jul 15, 2020



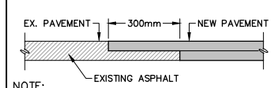


LEGEND

- PROPERTY LINE
- EXISTING STORM SEWER & MANHOLE
- EXISTING SINGLE / DOUBLE CATCHBASIN
- PROPOSED STANDPIPE / DRY HYDRANT
- PROPOSED WELL
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN
- PROPOSED SANITARY SEWER & MANHOLE

LAP JOINT DETAIL

SCALE: N.T.S.



NOTE:
SAWCUT & COLD PLANE 300mm WIDE & 40mm DEEP WHERE NEW PAVEMENT MEETS EXISTING PAVEMENT, ROUTE & SEAL WITH HOT RUBBERIZED ASPHALT.

NOTE:
LOCATION OF UNDERGROUND CISTERN FOR STORAGE OF FIRE FLOWS TO BE DETERMINED AT DETAILED DESIGN.

UTILITY LOCATES NOTE:
ALL UTILITY LOCATIONS, SIZES, AND INVERTS ARE APPROXIMATE BASED ON BEST AVAILABLE INFORMATION.

WATER SERVICING NOTE:
EXISTING WELL TO BE DECOMMISSIONED.
PROPOSED WELL TO BE DRILLED AND SIZED TO SERVICE SITE WITH CONNECTION TO BE DESIGNED BY HYDROGEOLOGICAL ENGINEER.

PIPE MATERIALS NOTE:
FOR SANITARY, STORM, AND/OR WATERMAIN PIPE MATERIALS, REFER TO CONSTRUCTION NOTES ON SHEET C 104

NOTE:
DISTURBED AREAS WITHIN HIGHWAY 9 R.O.W. DUE TO STORM, WORKS ARE TO BE REINSTATED TO MATCH EXISTING CONDITIONS OR BETTER, (INCLUDING PAVEMENT STRUCTURE) PAVED AREAS ARE TO BE REINSTATED C/W LAP JOINT; REFER TO DETAIL

TOWN OF CALEDON NOTES:

a. CONSTRUCTION FOR THIS PROJECT TO COMPLY WITH THE MOST CURRENT VERSION OF THE DEVELOPMENT STANDARDS, POLICIES AND GUIDELINES, PREPARED BY THE TOWN OF CALEDON INFRASTRUCTURE DEPARTMENT AND THE ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS.

b. ALL PROPOSED CONSTRUCTION SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.

c. A MINIMUM OF FORTY-EIGHT (48) HOURS PRIOR TO COMMENCING CONSTRUCTION WITHIN THE MUNICIPAL RIGHT OF WAY THE CONTRACTOR MUST CONTACT THE FOLLOWING:

THE TOWN OF CALEDON
PUBLIC WORKS AND
ENGINEERING DEPARTMENT
905-584-2272

THE REGION OF PEEL	ENBRIDGE CONSUMERS
GAS HYDRO ONE	BELL CANADA
ROGERS CABLE	FIRE AND EMERGENCY SERVICES

d. ALL DRAINAGE TO BE SELF-CONTAINED AND DISCHARGED TO A LOCATION APPROVED BY THE PUBLIC WORKS AND ENGINEERING DEPARTMENT AND CONSERVATION AUTHORITY PRIOR TO THE ISSUANCE OF A BUILDING PERMIT.

e. SEDIMENT CONTROL DEVICES ARE TO BE INSTALLED PRIOR TO ANY CONSTRUCTION ON THE SITE AND SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD TO THE SATISFACTION OF THE TOWN AND THE APPLICABLE CONSERVATION AUTHORITY.

f. A MINIMUM OF 1.2m CLEARANCE IS TO BE PROVIDED FROM THE LIMITS OF ALL SIDEWALKS AND DRIVEWAYS TO EXISTING UTILITY STRUCTURES WITHIN THE MUNICIPAL RIGHT OF WAY. IF THIS CLEARANCE IS NOT MAINTAINED THEY SHALL BE RELOCATED AT THE APPLICANT'S EXPENSE.

g. STREET CURBS ARE TO BE CONTINUOUS THROUGH THE PROPOSED ENTRANCE.

h. MUNICIPAL SIDEWALKS SHALL BE CONTINUOUS THROUGH ALL ENTRANCES TO THE SITE AND THE CURB SHALL BE TAPERED BACK 600MM. SIDEWALKS SHALL BE COMPLETELY REMOVED AND REPLACED WITH A 180mm MINIMUM CONCRETE THICKNESS, 30MPa AND 5% TO 7% AIR ENTRAINMENT AT ALL PROPOSED INDUSTRIAL, COMMERCIAL AND INSTITUTIONAL ENTRANCES.

i. ANY CHANGES TO GRADES OR SERVICING FROM THE ORIGINAL APPROVED SITE PLAN MUST BE SUBMITTED BY THE ENGINEER TO THE TOWN FOR APPROVAL PRIOR TO CONSTRUCTION.

j. STRUCTURAL DESIGN OF THE FIRE ROUTE IS REQUIRED TO SUPPORT AN 18 TON VEHICLE.

k. ALL BOULEVARDS TO BE RESTORED WITH 150mm MINIMUM OF TOPSOIL AND SOD TO THE SATISFACTION OF THE TOWN OF CALEDON PUBLIC WORKS AND ENGINEERING DEPARTMENT.

l. THE MINIMUM PAVEMENT DESIGN FOR THE ASPHALT DRIVEWAY APRON WITHIN THE MUNICIPAL ROAD ALLOWANCE SHALL BE AS FOLLOWS:

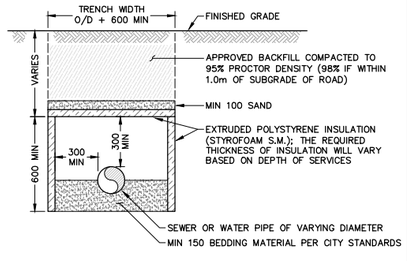
40mm HL3 ASPHALT
50mm HL8 ASPHALT
150mm GRANULAR 'A'
300mm GRANULAR 'B'

THE CONSULTANT SHOULD REVIEW THE ABOVE WITH RESPECT TO THE EXPECTED USAGE.

m. SERVICE CONNECTION BACKFILL TO BE DISCUSSED WITH THE TOWN.

INSULATION FOR SHALLOW MUNICIPAL SERVICES

SCALE: N.T.S.



NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. 50mm OF INSULATION IS REQUIRED FOR EVERY 600mm OF COVER DEFICIENCY.
3. MINIMUM COVER REQUIREMENTS;
   - STORM SEWER 1.0m

TOWN OF CALEDON

APPROVED AS NOTED

THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY.

THIS APPROVAL IS SUBJECT TO FURTHER CERTIFICATION OF THE "AS-CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER /LANDSCAPE ARCHITECT (AS APPROPRIATE) OF THE PROVINCE OF ONTARIO.

DATE: _____

APPROVED BY: _____

_____
DIRECTOR

ZBA#0000-000

Stamp

Stamp

LICENSED PROFESSIONAL ENGINEER
A. SHUKLA
100188284
MAY 5, 2020
PROVINCE OF ONTARIO

No.	ISSUE / REVISION	YYYY/MMM/DD
1	ISSUED FOR SECOND SUBMISSION	2020/MAY/08
0	ISSUED FOR FIRST SUBMISSION (NOT SUBMITTED)	2019/OCT/28

ELEVATION NOTE:

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE TOWN OF CALEDON BENCHMARK No. 0011912U377

ELEVATION = 271.200m

LOCAL BENCHMARK:

BEARINGS ARE ASTRONOMIC AND ARE REFFERED TO THE NORTH LIMIT OF PART 1, AS SHOWN ON PLAN 43R-20138 HAVING A BEARING OF N72°59'30"W.

SURVEY NOTES:

SURVEY COMPLETED BY AVANTI SURVEYING INC. (2019/JAN/22)
REFERENCE No.: 18-278

DISTANCES ARE IN METERS AND MAY BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY GSAI INC.
DEVELOPMENT CONCEPT PLAN (2019/MAY/23)
PROJECT No.: 972-001

DRAWING NOTES:

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.

THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.

ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project

10819 HIGHWAY 9
TOWN OF CALEDON
REGION OF PEEL

Drawing

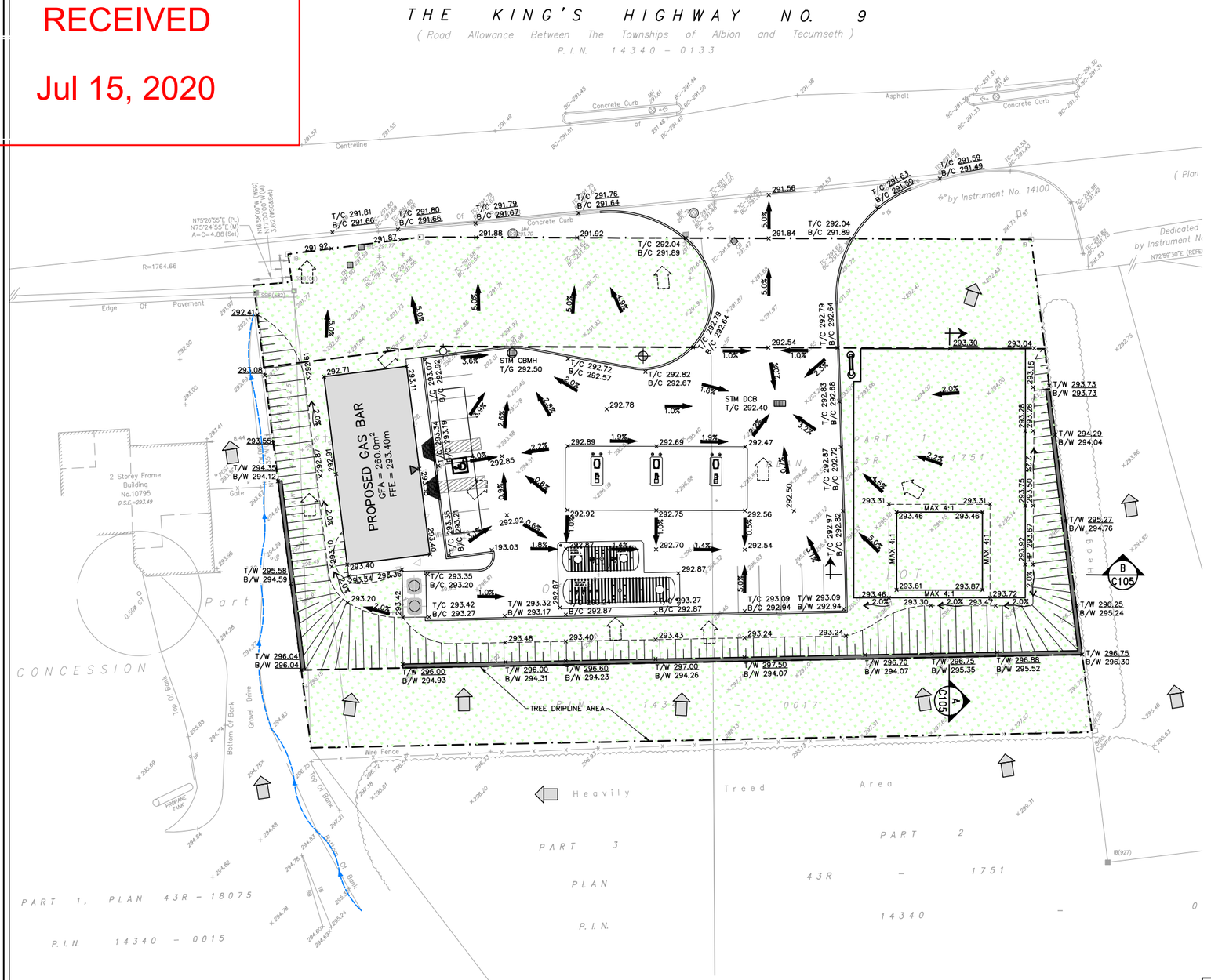
SITE SERVICING PLAN

CROZIER CONSULTING ENGINEERS
2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905-875-0026 T
905-875-4915 F
www.cfcrozier.ca

Drawn	J.B.	Design	K.W.	Project No.	1651-5095
Check	J.H.	Check	A.S.	Scale 1:300	Dwg. FIG. 2

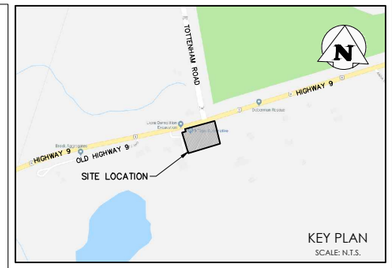
TOWN OF CALEDON
PLANNING
RECEIVED

Jul 15, 2020



10 0m 10 20
SCALE: 1:300

NN

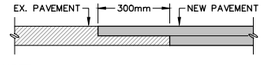


LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING FENCE
- x215.00 EXISTING GRADE
- x215.00 PROPOSED GRADE
- x215.00 PROPOSED GRADE (TO MATCH EXISTING)
- 2.0% PROPOSED MINOR FLOW DIRECTION
- 2.0% PROPOSED GRASSED SWALE
- PROPOSED RETAINING WALL
- PROPOSED SLOPE (3:1 MAX.)
- BUILDING ENTRANCE (PERSONNEL DOOR)
- PROPOSED MAJOR OVERLAND FLOW DIRECTION
- PROPOSED STANDPIPE / DRY HYDRANT
- PROPOSED WELL

ASPHALT LAP JOINT DETAIL

SCALE: N.T.S.



NOTE:
SAWCUT & COLD PLANE 300mm WIDE & 40mm DEEP WHERE NEW PAVEMENT MEETS EXISTING PAVEMENT, GROUT & SEAL WITH HOT RUBBERIZED ASPHALT.

TOWN OF CALEDON NOTES:

a. CONSTRUCTION FOR THIS PROJECT TO COMPLY WITH THE MOST CURRENT VERSION OF THE DEVELOPMENT STANDARDS, POLICIES AND GUIDELINES, PREPARED BY THE TOWN OF CALEDON INFRASTRUCTURE DEPARTMENT AND THE ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS.

b. ALL PROPOSED CONSTRUCTION SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.

c. A MINIMUM OF FORTY-EIGHT (48) HOURS PRIOR TO COMMENCING CONSTRUCTION WITHIN THE MUNICIPAL RIGHT OF WAY THE CONTRACTOR MUST CONTACT THE FOLLOWING:

THE TOWN OF CALEDON
PUBLIC WORKS AND
ENGINEERING DEPARTMENT
905-584-2272

THE REGION OF PEEL	ENBRIDGE CONSUMERS
GAS HYDRO ONE	BELL CANADA
ROGERS CABLE	FIRE AND EMERGENCY SERVICES

d. ALL DRAINAGE TO BE SELF-CONTAINED AND DISCHARGED TO A LOCATION APPROVED BY THE PUBLIC WORKS AND ENGINEERING DEPARTMENT AND CONSERVATION AUTHORITY PRIOR TO THE ISSUANCE OF A BUILDING PERMIT.

e. SEDIMENT CONTROL DEVICES ARE TO BE INSTALLED PRIOR TO ANY CONSTRUCTION ON THE SITE AND SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD TO THE SATISFACTION OF THE TOWN AND THE APPLICABLE CONSERVATION AUTHORITY.

f. A MINIMUM OF 1.2m CLEARANCE IS TO BE PROVIDED FROM THE LIMITS OF ALL SIDEWALKS AND DRIVEWAYS TO EXISTING UTILITY STRUCTURES WITHIN THE MUNICIPAL RIGHT OF WAY. IF THIS CLEARANCE IS NOT MAINTAINED THEY SHALL BE RELOCATED AT THE APPLICANT'S EXPENSE.

g. STREET CURBS ARE TO BE CONTINUOUS THROUGH THE PROPOSED ENTRANCE.

h. MUNICIPAL SIDEWALKS SHALL BE CONTINUOUS THROUGH ALL ENTRANCES TO THE SITE AND THE CURB SHALL BE TAPERED BACK 600MM. SIDEWALKS SHALL BE COMPLETELY REMOVED AND REPLACED WITH A 180mm MINIMUM CONCRETE THICKNESS, 30MPa AND 5% TO 7% AIR ENTRAINMENT AT ALL PROPOSED INDUSTRIAL, COMMERCIAL AND INSTITUTIONAL ENTRANCES.

i. ANY CHANGES TO GRADES OR SERVICING FROM THE ORIGINAL APPROVED SITE PLAN MUST BE SUBMITTED BY THE ENGINEER TO THE TOWN FOR APPROVAL PRIOR TO CONSTRUCTION.

j. STRUCTURAL DESIGN OF THE FIRE ROUTE IS REQUIRED TO SUPPORT AN 18 TON VEHICLE.

k. ALL BOULEVARDS TO BE RESTORED WITH 150mm MINIMUM OF TOPSOIL AND SOD TO THE SATISFACTION OF THE TOWN OF CALEDON PUBLIC WORKS AND ENGINEERING DEPARTMENT.

l. THE MINIMUM PAVEMENT DESIGN FOR THE ASPHALT DRIVEWAY APRON WITHIN THE MUNICIPAL ROAD ALLOWANCE SHALL BE AS FOLLOWS:

40mm HL3 ASPHALT
50mm HL8 ASPHALT
150mm GRANULAR 'A'
300mm GRANULAR 'B'

THE CONSULTANT SHOULD REVIEW THE ABOVE WITH RESPECT TO THE EXPECTED USAGE.

m. SERVICE CONNECTION BACKFILL TO BE DISCUSSED WITH THE TOWN.

TOWN OF CALEDON
APPROVED AS NOTED

THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY.

THIS APPROVAL IS SUBJECT TO FURTHER CERTIFICATION OF THE "AS-CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT (AS APPROPRIATE) OF THE PROVINCE OF ONTARIO.

DATE: _____

APPROVED BY: _____

_____
DIRECTOR

ZBA# 0000-000

Stamp

Stamp

LICENSED PROFESSIONAL ENGINEER
A. SHUKLA
100188284
MAY 9, 2020
PROVINCE OF ONTARIO

No.	ISSUE / REVISION	YYYY/MMM/DD
1	ISSUED FOR SECOND SUBMISSION	2020/MAY/08
0	ISSUED FOR FIRST SUBMISSION (NOT SUBMITTED)	2019/OCT/28

ELEVATION NOTE:

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE TOWN OF CALEDON BENCHMARK No. 00119120377

ELEVATION = 271.200m

LOCAL BENCHMARK:

BEARINGS ARE ASTRONOMIC AND ARE REFFERED TO THE NORTH LIMIT OF PART 1, AS SHOWN ON PLAN 43R-20138 HAVING A BEARING OF N72°59'30"W.

SURVEY NOTES:

SURVEY COMPLETED BY AVANTI SURVEYING INC. (2019/JAN/22)
REFERENCE No.: 18-278

DISTANCES ARE IN METERS AND MAY BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY GSAI INC.
DEVELOPMENT CONCEPT PLAN (2019/MAY/23)
PROJECT No.: 972-001

DRAWING NOTES:

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.

THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.

ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

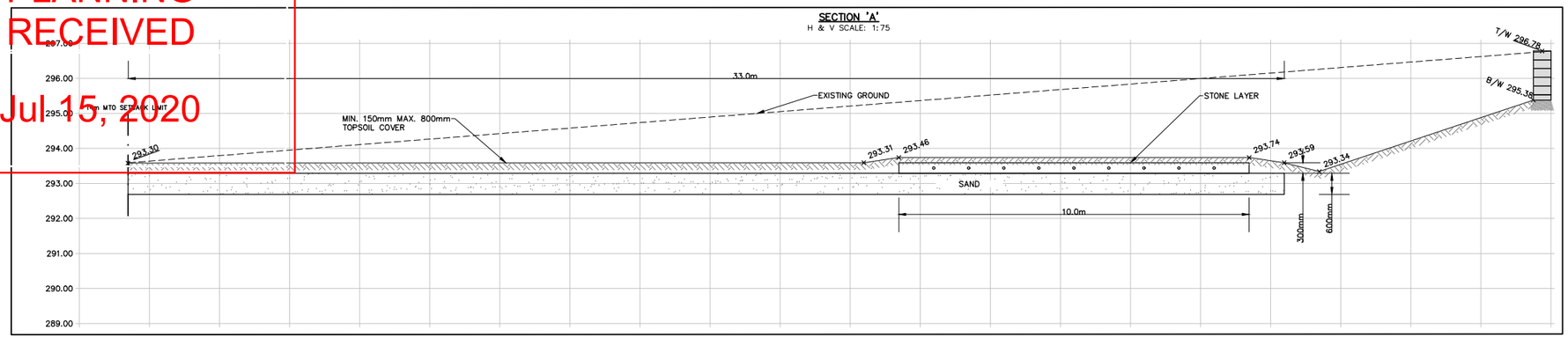
Project
10819 HIGHWAY 9
TOWN OF CALEDON
REGION OF PEEL

Drawing
SITE GRADING PLAN

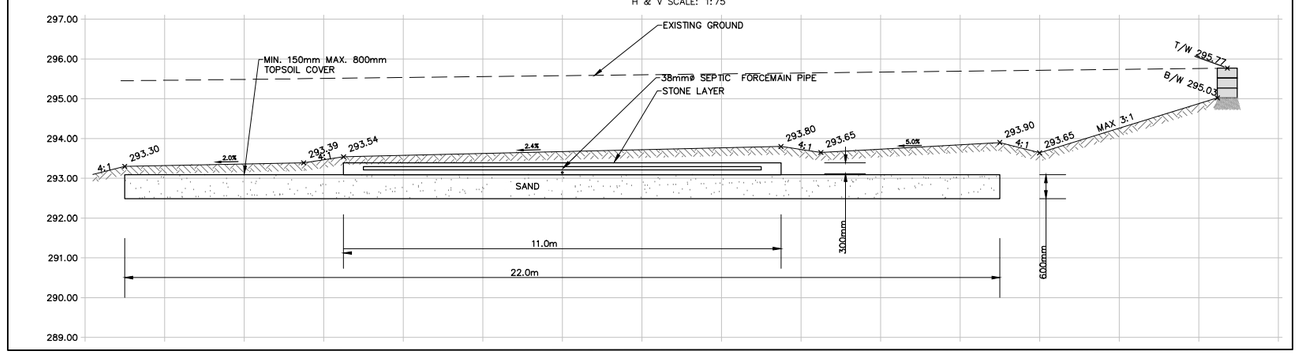
CROZIER CONSULTING ENGINEERS
211 Yonge Street
Suite 301
Toronto, ON M5B 1M4
416-477-3392 T
www.cfcrozier.ca

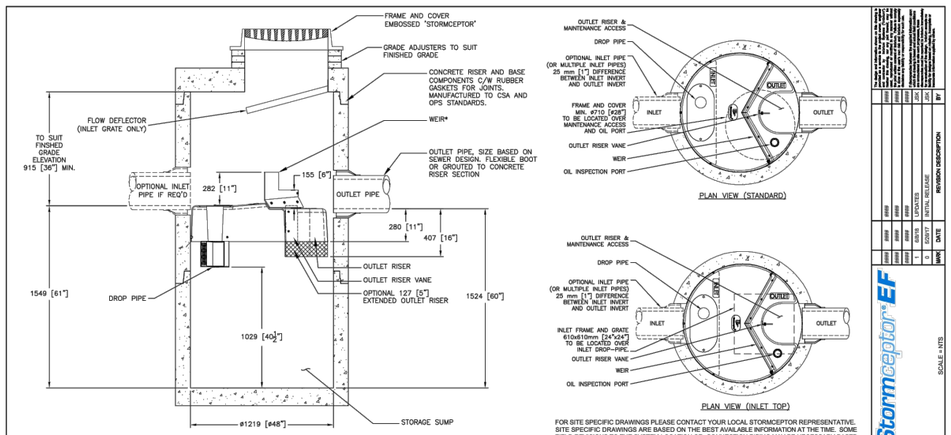
Drawn	Design	Project No.	
J.B.	J.H.	1651-5095	
Check	Check	Scale	Dwg.
J.H.	A.S.	1: 300	FIG. 3

SECTION 'A'
H & V SCALE: 1:75



SECTION 'B'
H & V SCALE: 1:75





SECTION VIEW

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL STORMCEPTOR REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE SYSTEM LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE (IF REQUIRED).

SITE SPECIFIC DATA REQUIREMENTS

STORMCEPTOR MODEL	EF04					
STRUCTURE ID						*
HYDROCARBON STORAGE REQ'D (L)						*
WATER QUALITY FLOW RATE (L/s)						*
PEAK FLOW RATE (L/s)						*
RETURN PERIOD OF PEAK FLOW (yrs)						*
DRAINAGE AREA (HA)						*
DRAINAGE AREA IMPERVIOUSNESS (%)						*
PIPE DATA:	I.E.	MATL	DIA	SLOPE %	HGL	
INLET #1	*	*	*	*	*	
INLET #2	*	*	*	*	*	
OUTLET	*	*	*	*	*	

* PER ENGINEER OF RECORD

GENERAL NOTES:

- MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m² (27.9 gpm/ft²) FOR STORMCEPTOR EF4 AND 535 L/min/m² (13.1 gpm/ft²) FOR STORMCEPTOR EF04 (OIL CAPTURE CONFIGURATION). WEIR HEIGHT IS 150 mm (6 INCH) FOR EF04.
1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
2. STORMCEPTOR STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE STORMCEPTOR SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
4. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

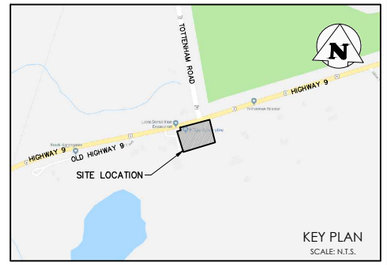
INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE DEVICE FROM CONSTRUCTION-RELATED EROSION RUNOFF.
E. DEVICE ACTIVATION, BY CONTRACTOR, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE STORMCEPTOR UNIT IS CLEAN AND FREE OF DEBRIS.

STANDARD DETAIL
NOT FOR CONSTRUCTION

BY	REVISION DESCRIPTION	DATE
JDK	ISSUED FOR SECOND SUBMISSION	2020/MAY/08
JDK	ISSUED FOR FIRST SUBMISSION (NOT SUBMITTED)	2019/OCT/28
JDK	INITIAL RELEASE	2019/OCT/28
JDK	UPDATED	2019/OCT/28
BSP	REVISED	2019/OCT/28
BSP	REVISED	2019/OCT/28

Stormceptor® EF
SCALE = NTS
mbrium
10/13/2017
DESIGNED: JDK | DRAWN: JDK
CHECKED: BSP | APPROVED: BP
PROJECT No.: EF04 | SEQUENCE No.: *
SHEET 1 OF 1



TOWN OF CALEDON
APPROVED AS NOTED

THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY.

THIS APPROVAL IS SUBJECT TO FURTHER CERTIFICATION OF THE "AS-CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER / LANDSCAPE ARCHITECT (AS APPROPRIATE) OF THE PROVINCE OF ONTARIO.

DATE: _____

APPROVED BY: _____

_____
DIRECTOR

ZBA # 0000-000

Stamp

Stamp

LICENSED PROFESSIONAL ENGINEER
A. SHUKLA
100180284
MAY 5, 2020
PROVINCE OF ONTARIO

1	ISSUED FOR SECOND SUBMISSION	2020/MAY/08
0	ISSUED FOR FIRST SUBMISSION (NOT SUBMITTED)	2019/OCT/28
No.	ISSUE / REVISION	YYYY/MMM/DD

ELEVATION NOTE:

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE TOWN OF CALEDON BENCHMARK No. 0011912U377

ELEVATION = 271.200m

LOCAL BENCHMARK:

BEARINGS ARE ASTRONOMIC AND ARE REFFERED TO THE NORTH LIMIT OF PART 1, AS SHOWN ON PLAN 43R-20138 HAVING A BEARING OF N72°59'30"W.

SURVEY NOTES:

SURVEY COMPLETED BY AVANTI SURVEYING INC. (2019/JAN/22)
REFERENCE No.: 18-278

DISTANCES ARE IN METERS AND MAY BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY GSAI INC.
DEVELOPMENT CONCEPT PLAN (2019/MAY/23)
PROJECT No.: 972-001

DRAWING NOTES:

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.

THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.

ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project
10819 HIGHWAY 9
TOWN OF CALEDON
REGION OF PEEL

Drawing
SECTIONS

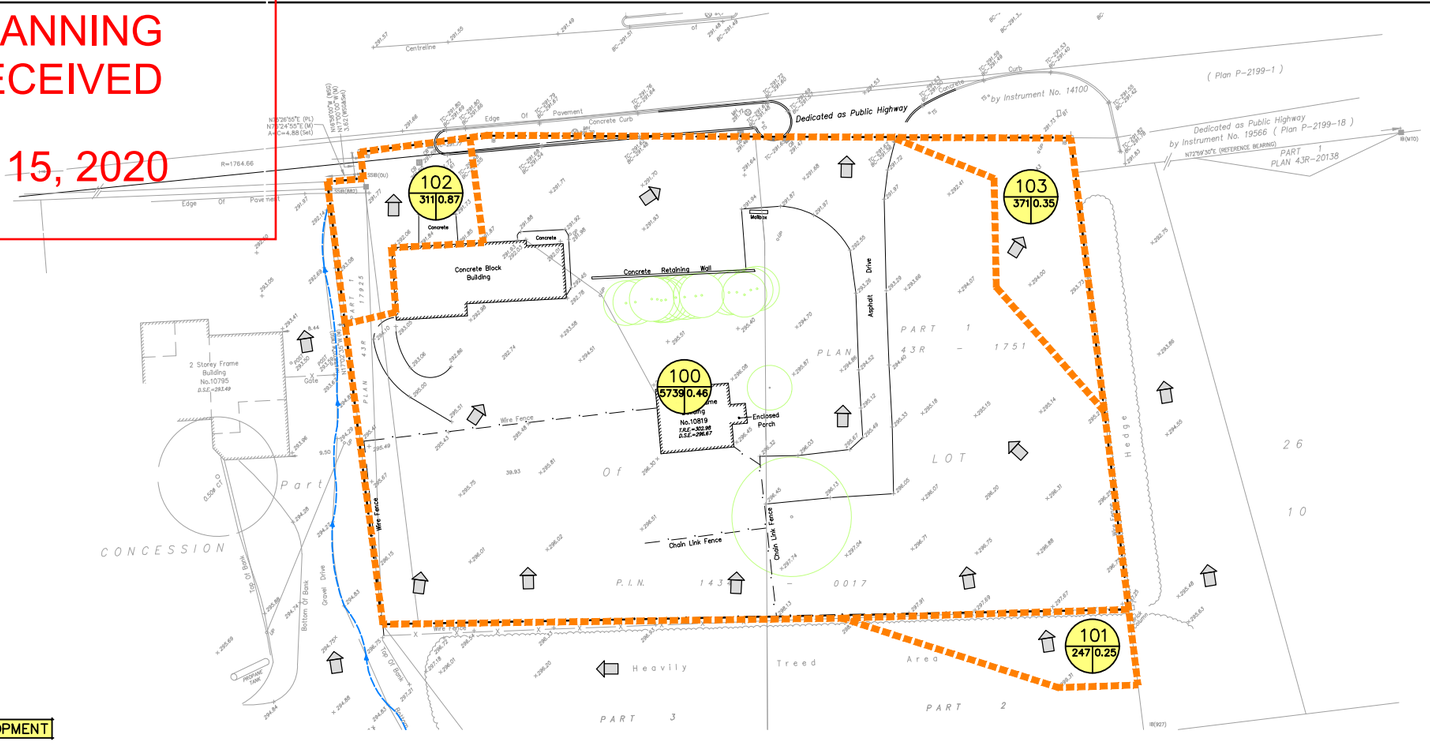
CROZIER CONSULTING ENGINEERS
2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905-875-0026 T
905-875-4915 F
www.cfcrozier.ca

Drawn	J.B.	Design	K.W.	Project No.	1651-5095
Check	J.H.	Check	A.S.	Scale	1: 75
				Dwg.	FIG. 4

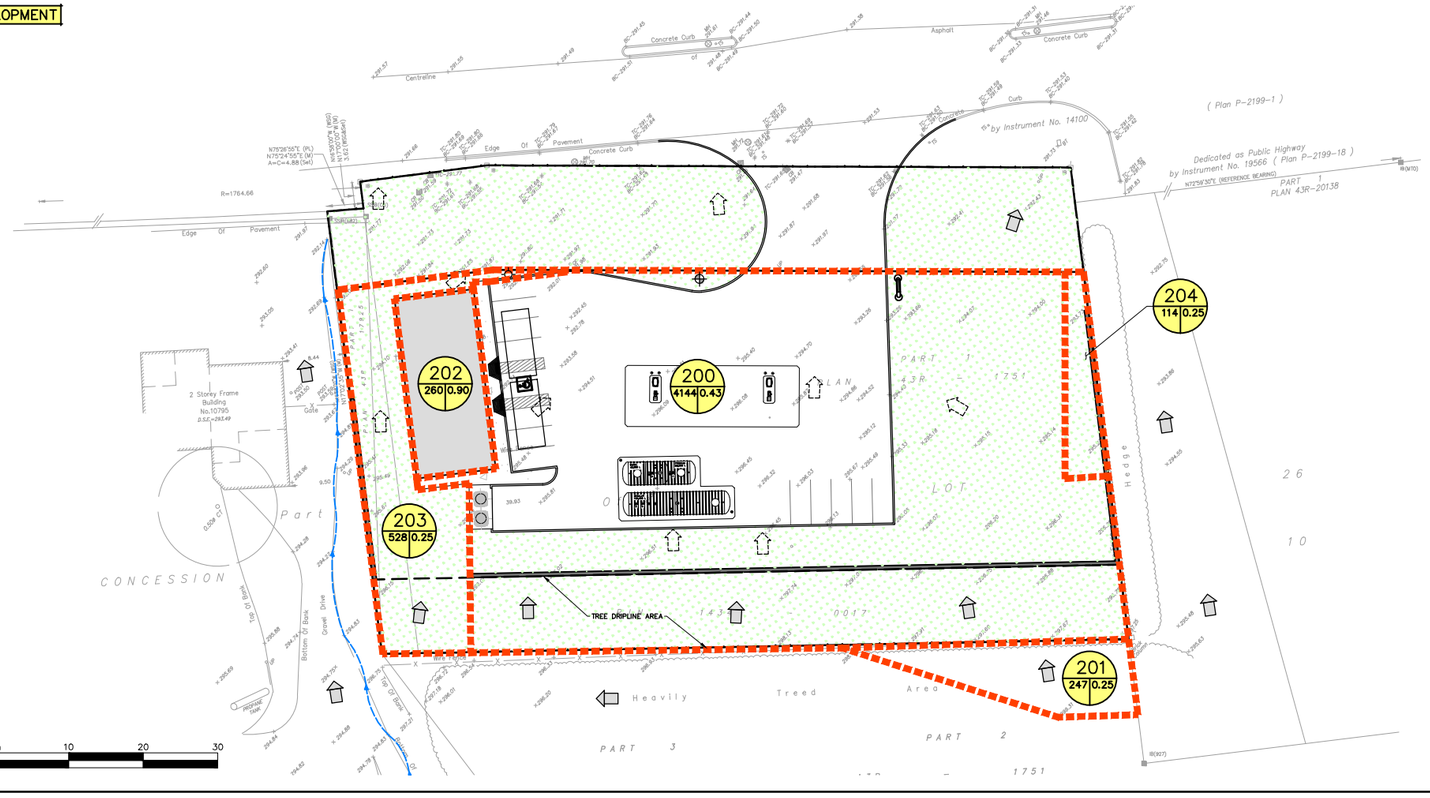
TOWN OF CALEDON
PLANNING
RECEIVED

Jul 15, 2020

PRE–DEVELOPMENT

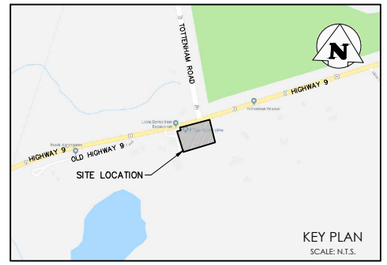


POST–DEVELOPMENT



10 0m 10 20 30
SCALE: 1:400

NN



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING GRADE (x 215.00)
- EXISTING MAJOR OVERLAND FLOW DIRECTION
- PROPOSED MAJOR OVERLAND FLOW DIRECTION
- STORM DRAINAGE CATCHMENT
- CATCHMENT I.D. (ID)
- AREA (m²) | RUNOFF COEFFICIENT (A | RC)

No.	ISSUE / REVISION	YYYY/MMM/DD
1	ISSUED FOR SECOND SUBMISSION	2020/MAY/08
0	ISSUED FOR FIRST SUBMISSION (NOT SUBMITTED)	2019/OCT/28

ELEVATION NOTE:

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE TOWN OF CALEDON BENCHMARK No. 0011912U377

ELEVATION = 271.200m

LOCAL BENCHMARK:

BEARINGS ARE ASTRONOMIC AND ARE REFFERED TO THE NORTH LIMIT OF PART 1, AS SHOWN ON PLAN 43R–20138 HAVING A BEARING OF N72°59'30"W.

SURVEY NOTES:

SURVEY COMPLETED BY AVANTI SURVEYING INC. (2019/JAN/22)
REFERENCE No.: 18–278

DISTANCES ARE IN METERS AND MAY BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY GSAI INC.
DEVELOPMENT CONCEPT PLAN (2019/MAY/23)
PROJECT No.: 972–001

DRAWING NOTES:

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.

THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.

ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project
10819 HIGHWAY 9
TOWN OF CALEDON
REGION OF PEEL

Drawing
PRE–DEVELOPMENT DRAINAGE PLAN
POST–DEVELOPMENT DRAINAGE PLAN

ZBA# 0000–000

Stamp

Stamp
LICENSED PROFESSIONAL ENGINEER
A. SHUKLA
100188284
MAY 8, 2020
PROVINCE OF ONTARIO

CROZIER
CONSULTING ENGINEERS
2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905–875–0026 T
905–875–4915 F
www.cfcrozier.ca

Drawn	J.B.	Design	J.B.	Project No.	1651–5095
Check	J.H.	Check	A.S.	Scale	1:400
				Dwg.	FIG. 5