SERVICING & STORMWATER MANAGEMENT REPORT

7170 GOREWAY DRIVE

CITY OF MISSISSAUGA
REGION OF PEEL

PREPARED FOR:

2150745 ONTARIO INC.

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
2800 HIGH POINT DRIVE, SUITE 100
MILTON, ON L9T 6P4

JUNE 2021

CFCA FILE NO. 1346-4573

CROZIER
CONSULTING ENGINEERS

Revision Number	Date	Comments
Rev.0	June 2021	Issued for Site Plan Application

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

LIST OF DRAWINGS & FIGURES

1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by 2150745 Ontario Inc. to prepare a Servicing & Stormwater Management Report to support the Site Plan Application to permit the development of 7170 Goreway Drive in the City of Mississauga, Region of Peel.

The following reports and design standards were referenced during the preparation of this report:

- City of Mississauga Transportation and Works Development Requirements Manual, September 2016
- Region of Peel Public Works Design, Specifications & Procedures Manual – Sanitary Sewer Design Criteria, July 2009 [MODIFIED March 2017 Rev 0.9 (CS)]
- Region of Peel Public Works Design, Specifications & Procedures Manual – Watermain Design Criteria, June 2010

This report demonstrates how the proposed development's servicing and stormwater management will integrate with the area's existing water, sanitary and stormwater infrastructure.

2.0 Site Description

The subject property is approximately 0.41 ha and is located in a mixed residential and commercial area in the City of Mississauga. The subject property is currently vacant but previously contained one house.

The property is bounded by:

- Etude Drive to the north
- Goreway Drive to the east
- Residential properties to the south and west

The project will consist of a 15-unit residential townhouse development with a private road and access from Etude Drive.

3.0 Water Servicing

The Region of Peel is responsible for the operation and maintenance of the public water supply and treatment in the City of Mississauga. Local water supply system will connect to the Region's municipal water network.

3.1 Existing Water Servicing

A review of Region of Peel as-constructed drawing no. 40529-D dated September 22, 2008 indicates that:

- There is an existing 300 mm diameter watermain within the far side (north side) of Etude Drive, north of the subject property.
- There is an existing fire hydrant in the north boulevard of Etude Drive near the subject property.

3.2 Design Water Demand

The Region of Peel's Sanitary Design Criteria (March 2017) was used to determine an equivalent population estimate for the proposed residential development. The results are provided in Table 1 and detailed calculations are provided in Appendix A.

Table 1: Equivalent Population Estimate

Standard	Unit Type	Site Area (ha)	Persons /unit	Total Persons
Region of Peel Public Works Design, Specifications & Procedures Manual – Sanitary Sewer Design Criteria, July 2009 (Modified March 2017)	Persons/ha	0.41	175	71

The Region of Peel's Watermain Design Criteria (June 2010) was used to determine the maximum domestic water demand generated by the proposed development based on the equivalent population estimate for the site. Table 2 summarizes the estimated design water demand. Appendix A contains detailed calculations.

Table 2: Estimated Design Water Demand

Standard	Average Daily Demand (L/s)			Maximum Daily Demand (L/s)	Peak Hourly Demand (L/s)
	Existing	Proposed	Increase		
Region of Peel Public Works Design, Specifications & Procedures Manual – Watermain Design Criteria, June 2010	0	0.23	0.23	0.46	0.69

Note: The subject property appears to have previously contained one residence. The subject property no longer contains any buildings and currently sits vacant.

For this application, the domestic water service will be designed to convey a design water demand of 0.69 L/s.

3.3 Fire Flow Demand

The Fire Underwriters Survey (FUS) method was used to estimate the fire flow demand for the proposed development. This calculation is used to estimate the size of incoming fire lines but does not provide a recommendation for fire protection for the townhouses.

The townhouses are assumed to have ordinary construction and therefore a construction coefficient of 1.0 was applied to the fire flow calculations (Water Supply for Public Fire Protection by Fire Underwriters Survey, 1999).

The preliminary fire demand flow is 200.0 L/s (3,168 US GPM) for a duration of 2.50 hours. According to the hydrant flow test conducted by Classic Fire dated September 15, 2020, the available flow for the watermain is 7,218 GPM at 20 PSI, which is sufficient to support this development. Please see Appendix A for detailed calculations and please note that the Fire Underwriter's Survey value is a conservative estimate for comparison purposes only. The Mechanical Engineer for this development will complete the required analysis for fire protection, and the Architect will design fire separation methods per the determined fire flow rate to meet municipally available flows and pressures.

3.4 Proposed Water Servicing

The development is proposed to be serviced by a 150 mm diameter PVC water service looped from the existing 300 mm diameter watermain in Etude Drive to the existing 150mm diameter watermain in Goreway Drive. An isolation valve and valve box will be installed between these two connections. Individual townhouse units will be serviced with copper service laterals. A water meter will be installed within the building envelope per the mechanical design and specifications. The proposed water servicing plan is shown on Drawing C103.

A private hydrant is proposed near Block 2 the according to Ontario Building Code 3.2.5.8. The internal water system of the building will be designed per the Mechanical Engineers' details and specifications. A hydrant flow test has been conducted to confirm the available water flow and pressure to service this development, please see Appendix A for details.

4.0 Sanitary Servicing

The Region of Peel is responsible for the operation and maintenance of the public sewage conveyance and treatment in the City of Mississauga. Local sewage systems will connect to the Region's municipal sanitary network.

4.1 Existing Sanitary Servicing

A review of Region of Peel as-constructed drawing no. 40529-D dated September 22, 2008 indicates that:

- There are no existing sanitary mains within Etude Drive directly in front of the subject property.

A review of Region of Peel as-constructed drawing no. 20065-D dated April 1993 indicates that:

- There is an existing 250 mm diameter sanitary sewer that flows south with an approximate 0.5% slope within the west boulevard of Goreway Drive.

4.2 Design Sanitary Flow

The sanitary design flow for the subject property was calculated using the Region of Peel's Sanitary Sewer Design Criteria (March 2017) and the equivalent population estimate described in Section 3.2. Estimated design sanitary calculations are provided in Table 3, and detailed calculations are provided in Appendix B.

Table 3: Estimated Sanitary Design Flows

Standard	Average Flow (L/s)	Peaking Factor	Peak Flow (L/s)	Infiltration Flow (L/s)	Groundwater Discharge (L/s)	Total Flow (L/s)
Region of Peel Public Works Design, Specifications & Procedures Manual – Sanitary Sewer Design Criteria, July 2009 (Modified March 2017)	0.25	4.28	1.16	0.08	1.92	3.07

According to the Hydrogeological Investigation provided by Orbit Engineering Limited dated June 18, 2021, the groundwater discharges at a maximum flow of 115 L/min (1.92 L/s) into the municipal sanitary sewer. A groundwater quality treatment system will be designed by mechanical consultant to ensure the quality meets the City of Mississauga's sewer discharge by-laws.

The proposed sanitary service was sized to convey a total sanitary flow of 3.07 L/s for the development, as determined by the Region of Peel Sanitary Sewer Design Criteria. The total sanitary flow for the proposed development includes peak flow, infiltration, and groundwater discharge as shown in the Table3.

4.3 Proposed Sanitary Servicing

It is proposed to service the subject property by connecting to the existing 250 mm diameter sanitary sewer on Goreway Drive with a proposed 150 mm diameter sanitary sewer. Individual sanitary services will branch off the proposed sanitary sewer, to service each unit.

The Site Servicing Plan (Drawing 102) illustrates the location of the sanitary sewer and all connections. The internal sanitary system of any buildings will be designed per the mechanical engineer's details and specifications.

5.0 Drainage Conditions

5.1 Pre-development Drainage

The subject property is currently a grassed field and contains no existing buildings. A pre-development runoff coefficient of 0.25 was selected based on the existing topography. Drawing C102 illustrates the existing storm sewer and manhole locations.

According to the topographic survey (J.H. Gelbloom Surveying Limited, updated November 27, 2018) the site maintains relatively flat grading throughout, and existing stormwater drainage splits between two outlets:

- Catchment 101 (0.27 ha) demonstrates drainage from the west of the site being conveyed overland through the south property line, eventually to the creek south of Goreway Drive.

- Catchment 102 (0.14 ha) demonstrates drainage from the east of the site discharging to the Goreway Drive municipal right-of-way.

External drainage from the west (0.11 ha) is conveyed overland towards the site where it ponds and ultimately spills south towards the watercourse. In proposed conditions a berm and drainage swale are proposed to maintain this existing condition. Refer to Section 5.3 for more details.

Figure 1 shows the delineation of the drainage areas that make up Catchments 101, 102 and External.

5.2 Post-development Drainage

The proposed development consists of a fifteen (15) unit row-style townhouse development and private road with access through Etude Drive.

The subject property has been divided into two catchment areas under post-development condition, as shown on Figure 2**.** The grading of the site results in:

- Catchment 201 (0.35 ha) discharging controlled to Goreway Drive through the internal storm system.
- External Catchment (0.11 ha) collected by property line swale, conveyed through the internal storm system. It will be discharging controlled to Goreway Drive through the internal storm system.
- Catchment UC01 (0.08 ha) discharging uncontrolled via overland flow to Goreway Drive.

An earthen berm will be constructed along the southwest corner of the subject site, to raise the grades and direct the overland flow from catchment 201 toward the Goreway Drive Right-of-Way. This earth berm will have a setback from the south and west property lines, to allow external runoff to be conveyed across the site along the property line swale, to the Goreway Drive Right-of-Way. A collection and conveyance system completed with catchbasins and a subsurface stone gallery will be capturing the 100-year storm event, ensuring the peak flows from catchment UC01 and external are kept below the surface to mitigate ponding in the swale.

Under post-development conditions, the minor and major stormwater in catchment 201 will be conveyed through an internal storm sewer system, on-site infiltration and an emergency overland flow route. External flow is collected by the property line swale and conveyed through the internal storm sewer system through a subsurface stone gallery and catchbasins. A proposed flow control device will restrict flows from catchment 201 and the external catchment, to minimize peak flows being conveyed to the existing 450 mm storm sewer along Goreway Drive.

Catchment UC01 consists of uncontrolled flow draining overland to Goreway Drive and Etude Drive which matches pre-development drainage conditions.

The Site Servicing and Site Grading Plans (Drawing C102 and C103) illustrate the proposed site drainage, the location and design of the storm sewers, and all proposed connections. Please refer to Figure 1 and 2 which highlights the pre- and post-development drainage catchments and associated parameters.

5.3 External Drainage and Existing Storm Sewer Capacity

Under pre-development conditions, approximately 0.11 ha of external drainage enters 7170 Goreway Drive, along the south and west property limits. There is no natural outlet for stormwater on site due to the existing grading. Until the ponding reaches an elevation of 166.32 meters above sea level (MASL), the stormwater will flow overland to the northeast corner and middle of the Site to an elevation of 166.32 MASL. Once the stormwater ponds to 166.32 MASL it spills south.

Since there is no existing overland flow route for the external drainage, best efforts including a swale with a subsurface stone trench, catchbasins at low points, and subdrains are proposed to provide an overland flow route towards Goreway Drive and subsequently mitigate surface ponding and spillage to the adjacent properties. Low points were added in the swale to optimize the swale slope. As a result, the external drainage is conveyed through the internal storm sewer network and subsequent stormwater controls. Refer to Section 6 for further details. A stone gallery below the swale is designed to retain and convey the 100-year storm event to the internal storm sewer network through a subdrain system. Therefore, for events up to the 100 year-storm event there will be no surface ponding or risk of spillage to adjacent properties.

Under post-development condition, the external drainage and majority of the site runoff (catchment 201) will be captured in the internal storm sewer system, controlled, and conveyed to the existing 450 mm diameter storm sewer in Goreway Drive. The flow will be controlled down to a maximum of 5 L/s with a vortex valve (CEV 350 with 85 mm orifice). An external storm sewer capacity analysis was prepared to identify the impact of the development on the existing municipal storm sewers. The existing storm sewer along Goreway Drive can accommodate the proposed development with 76% pipe full during a10-year storm event, which is below typical operating capacity of 80%. As we are capturing and controlling flows that previously spilled south and as a result increasing the onsite stormwater storage volume the impact to the existing storm sewer network is minimal at our site frontage and improved downstream. Therefore, no external municipal upgrade is required based on the external sewer capacity analysis, provided in Appendix C.

A Hydraulic Grade Line (HGL) analysis is also provided in Appendix C as requested by the City. In pre-development conditions, the highest HGL within the analyzed sewers occurs between MH8 and MH7 with an elevation of 165.32 m. Under post-development conditions, the flow leaving the site is controlled, resulting in the highest HGL between MH8 and MH7 to be reduced to 165.26 m. As the proposed development improves the existing HGL conditions, no external municipal upgrades are required.

6.0 Stormwater Management

Stormwater management design criteria were established through a review of the City of Mississauga's Transportation and Works Department's Development Requirements Manual. The stormwater management criteria include:

<u>Quantity Control</u>

Provide post to pre control for all design storms (2, 5, 10, 25, 50, and 100-year) per the Mimico Creek requirements in the City of Mississauga Transportation and Works Manual.

<u>Quality Control</u>

"Enhanced" level protection (80% TSS removal) per the MOECC SWM Design Manual (2003).

<u>Water Balance</u>

The initial 5 mm of runoff shall be retained on-site and managed through infiltration, evapotranspiration, or re-use.

NOTE: Considering the external municipal storm sewer capacity constraints and in accordance with the email from City staff dated March 9, 2021, the stormwater management design considers a water balance criteria of 25 mm retention.

6.1 Stormwater Quantity Control

Using the City of Mississauga intensity-duration-frequency (IDF) data, the Modified Rational Method was used to determine the pre-development and post-development peak flow rates for site stormwater runoff.

Under pre-development, catchment 102 (0.14 ha) drains directly towards Goreway Drive and the remainder of the site ponds in the south-west corner and ultimately spills south. In the post-development condition, the drainage from catchment 201 and external will be conveyed and captured in the internal storm sewer network through an underground pipe network, surcharging into an underground storage chamber, restricted by a vortex valve (CEV 350 with 85 mm orifice). Stormwater is then conveyed into the existing municipal storm sewer along Goreway Drive.

As described in Section 5.2, catchments UC01 will be uncontrolled with stormwater flowing overland to Etude Drive and Goreway Drive. The uncontrolled post-development flows from catchment UC01 exceed the pre-development flows from catchment 102. Therefore, best efforts have been applied to simultaneously improve the drainage situation and limit the additional drainage entering the municipal system from catchment 201 and external area. Table 4 illustrates the pre-development and post-development peak flows.

Table 4: Pre- and Post-Development Peak Flows

Storm Event (year)	**Qpre: Catchment 102** (L/s)	**Qpre: Whole Site (Catchment 101 + 102 + Ex)** (L/s)	**Post-development Peak Flows** (L/s)		
			Q_{post} (UC01)	**Q_{post} (Controlled 201+Ex)[1]**	**Q_{total}**
2	**6**	22	5	5	**10**
5	**8**	29	7		**12**
10	**10**	36	9		**14**
25	**11**	42	11		**16**
50	**12**	48	13		**18**
100	**14**	54	15		**20**

1. Catchment 201 and external runoff will be captured by the internal sewer system and controlled by vortex valve to maximum flow of 5 L/s.

Using the vortex valve (CEV 350 with 85 mm orifice), peak flows from catchment 201 and external area are restricted to maximum 5 L/s during 100-year storm event. The peak flows from catchments UC01 will be conveyed overland through the Goreway Drive right-of-way. As shown in Table 4, even though the total peak flows entering Goreway Drive right-of-way is greater than the pre-development peak flow from Catchment 102; when viewed holistically, the total post-development flow ultimately entering the creek, just south of Goreway Drive, are significantly less than the total pre-development peak flows from the entire site.

Approximately 226 m^3 of storage is required to achieve a peak flow rate of 5 L/s from catchment 201 and external area. A triton S-29 underground stormwater storage chamber provides a stormwater storage volume of 237 m^3; therefore, it provides sufficient storage capacity to achieve the stormwater quantity control criteria.

Refer to Appendix C for complete stormwater calculations. The Site Servicing Plan (Drawing C102) illustrates the locations of the underground stormwater chamber and the orifice tube.

6.2 Stormwater Quality Control

Stormwater quality controls for the Site must incorporate measures to provide an Enhanced Level of Protection (Level 1) according to the MOE (March 2003) guidelines. Enhanced water quality protection involves the removal of at least 80% of the total suspended solids (TSS) from 90% of the annual runoff volume.

From a quality control perspective, the proposed treatment train includes an oil-grit-separator (EFO-4) and infiltration below the underground stormwater storage chamber. TSS removal performance of the proposed SWM treatment train based on the individual removal rates obtained from the MECP SWM Planning and Design Manual is summarized in Table 5.

Table 5: TSS Removal

Treatment Train	Removal Rate	Total Removal Rate %
OGS (EFO4)	65.0	93.0
Infiltration	80.0	

As shown in Table 5, using a treatment train approach with an OGS and infiltration, provides a weighted TSS removal rate of 93.0% for catchment 201, therefore achieving the required TSS removal rate of 80%.

Catchments UC01 will discharge uncontrolled to the municipal right-of-way as shown in Figure 2. As catchment UC01 is comprised with mostly of grass and rooftop, which are both considered clean sources of water; therefore, catchments UC01 naturally achieves the quality control target.

6.3 Water Balance

As a minimum, retention of the first 5 mm of rainfall for private development areas is required by the City of Mississauga Development Requirements Manual (September 2016) to achieve the water balance criteria. In accordance with correspondence with City staff and considering the capacity constraints of the external storm sewer network, retention of the first 25 mm will be required on this site.

Due to the high groundwater table and tight servicing layout within the right-of-way, infiltration and underground irrigation tank are not feasible for the Site. Therefore, water balance for Catchment 201 will be achieved by enhanced topsoil with the best effort approach.

Best effort is applied to achieve the recommended water balance storage of 25 mm across the impervious area of Catchment 201, which is equivalent to 56 m^3 (0.22 ha x 25 mm) storage volume. A total topsoil depth of 450 mm is proposed for the landscaped area; 150 mm depth is for standard topsoil and 300 mm additional depth for enhanced topsoil. Approximately 49 m^3 of the storage is provided through the total topsoil depth of 450 mm for the proposed landscaped area, satisfying 100% of the first 5 mm (11 m^3) and 89% of the best effort water balance storage to capture the first 25 mm (56 m^3).

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 the City of Mississauga. Erosion and sediment 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.

Sediment Control Devices

Additionally, TRCA approved storm drain inlet protection is to be used on all internal catchbasins and external catchbasins directly abutting or immediately downstream during construction of the subject property.

8.0 Conclusions and Recommendations

The proposed development can be serviced for water, sanitary, and stormwater in accordance with the City of Mississauga requirements and standards. Best efforts have been provided to improve the drainage conditions on-site and ultimately the peak flows entering the stormwater system holistically are reduced. Our conclusions and recommendations include:

1. Water demand for the proposed development will be provided using a 150 mm diameter PVC water service connected at two points to the existing 300 mm diameter watermain in Etude Drive.
2. A private hydrant is proposed to provide fire protection for the development.
3. Sanitary servicing for the proposed development will be provided using a 150 mm diameter sanitary sewer extending form the existing 250 mm diameter sanitary sewer on Goreway Drive. Individual laterals will branch off the proposed sewer to service each unit.
4. Stormwater runoff from catchments UC01 will flow uncontrolled to Etude Drive and Goreway Drive. Stormwater runoff from catchment 201 and external area will be controlled down to 5L/s, and discharge into the City of Mississauga municipal storm system on Goreway Drive.
5. Quantity control will be achieved with best effort approach, using a vortex valve and provide underground storage chamber to promote stormwater retention.
6. Water quality requirements for catchments UC01 will be provided through landscaping and subsurface stone gallery under the property line swale. Water quality in catchment 201 will be provided using an oil-grit-separator and infiltration through underground storm chamber.

7. Approximately 49 m^3 of water balance storage is provided through enhanced topsoil with the total depth of 450 mm, satisfying the water balance requirement of the first 5 mm and applying the best effort for the capture of 25 mm.

8. 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 support the proposed development application from the perspective of water supply, sanitary servicing, and stormwater management.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.

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APPENDIX A

Water Demand Calculations

Connection Demand Table

Comprehensive FSR – 7170 Goreway Drive, City of Mississauga

WATER CONNECTION

Connection point [3]			
Pressure zone of connection point			
Total equivalent population to be serviced [1]		72	
Total lands to be serviced		0.41 ha	
Hydrant flow test			
Hydrant flow test location			
North-west corner of Goreway Drive and Etude Drive, Mississauga			
	Pressure (kPa)	Flow (in l/s)	Time
Minimum water pressure	310	172.93	-
Maximum water pressure	372	50.85	-

Note: Hydrant flow test performed by Classic Fire Protection Inc. dated September 15, 2020

No.	Water demands		
	Demand type	**Demand**	**Units**
1	Average day flow	0.23	l/s
2	Maximum day flow	0.46	l/s
3	Peak hour flow	0.69	l/s
4	Fire flow [2]	200.00	l/s
Analysis			
5	Maximum day plus fire flow	200.46	l/s

WASTEWATER CONNECTION

Connection point [4]		Existing 250mm diameter sanitary sewer on Central Parkway West
Total equivalent population to be serviced		72
Total lands to be serviced		0.41 ha
6	Wastewater sewer effluent (in l/s)	3.07

[1] Please refer to design criteria for population equivalencies
[2] Please reference the Fire Underwriters Survey Document
[3] Please specify the connection point ID
[4] Please specify the connection point (wastewater line or manhole ID)
Also, the “total equivalent population to be serviced” and the “total lands to be serviced” should reference the connection point. (the FSR should contain one copy of Site Servicing Plan)

Please include the graphs associated with the hydrant flow test information table
Please provide Professional Engineer's signature and stamp on the demand table
All required calculations must be submitted with the demand table submission.

CROZIER & ASSOCIATES Consulting Engineers

Project: 7170 Goreway Drive
Project No.: 1346-4573

Created By: KR
Checked By: HL/NRS

Date: 2017-09-29
Updated: 2021-03-02

Domestic Water Demand

Site Area: 0.41 ha
Population Density: 175 persons/ha
Population: 71 capita

Design Parameters

Average Demand (L/capita/d)
280

Water Demand:

Average Daily Demand = 19,933 L/day
0.23 L/s

Peaking Factors
Max Day = 2.0
Peak Hour = 3.0

Average Day = 0.23 L/s
Max Day = 0.46 L/s
Peak Hour = 0.69 L/s

Municipality	Average Daily Water Demand (L/s)	Max Day Demand (L/s)	Peak Hourly Demand (L/s)
Region of Peel	0.23	0.46	0.69

Notes & References

Site Plan by Jardin Design Group Inc. dated December 23, 2020

Population Density from Section 2.1 of Region of Peel Public Works Design Criteria Manual - Sanitary Sewer (2009)

Average Demand from Section 2.3 of Region of Peel Public Works Watermain Design Criteria (2010)

Peaking Factors from Section 2.3 of Region of Peel Public Works Watermain Design Criteria (2010)

Max Day = Average Day Demand * Max Day

Peak Hour = Average Day Demand * Peak Hour

Project: 7170 Goreway Drive	**Created By:** KR	**Date:**	2017-10-05
Project No.: 1346-4573	**Checked By:** HL/NRS	**Updated:**	2021-03-02

Fire Flow Calculations - Fire Underwriters Survey Method

Notes:

1. The development will use wood-frame construction (C-value = 1.0).
2. Total gross-floor-area (GFA) is based on Block 1, from Site Plan A-01a by JARDIN DESIGN GROUP INC, dated Dec 23, 2020
3. The building is assumed to have no sprinkler protection.
4. The building is classified as a low hazard occupancy per the appendix of the Water Supply for Public Fire Protection (1999) by FUS

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% below grade) in the building considered

Proposed Development: **Building Wood Frame Construction** (Worse case for the flow calculation)

A =	1,388 sq. m GFA	Block 1 GFA	1,388 sq. m
C =	1.0	Block 2 GFA	559 sq. m
		Block 3 GFA	804 sq. m

Therefore, F= 8,000 L/ min (rounded to nearest 1000 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 be increased by up to 25% surcharge for occupanies having a high fire hazard.

Non-Combustible	-25%	Free Burning	+15%
Limited Combustible	-15%	Rapid Burning	+25%
Combustible	No Charge		

Combustible:	0% Addition
0 L/min	**Addition**

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

Fire Flow Calculations - Fire Underwriters Survey Method

3. Sprinklers: The value obtained in No. 2 may be reduced by up to 50% for complete automatic sprinkler protection.

No automatic sprinklers:

0 L/min reduction

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 on 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
0 - 3 m	25%
3.1 - 10 m	20%
10.1 - 20 m	15%
20.1 - 30 m	10%
30.1 - 45 m	5%

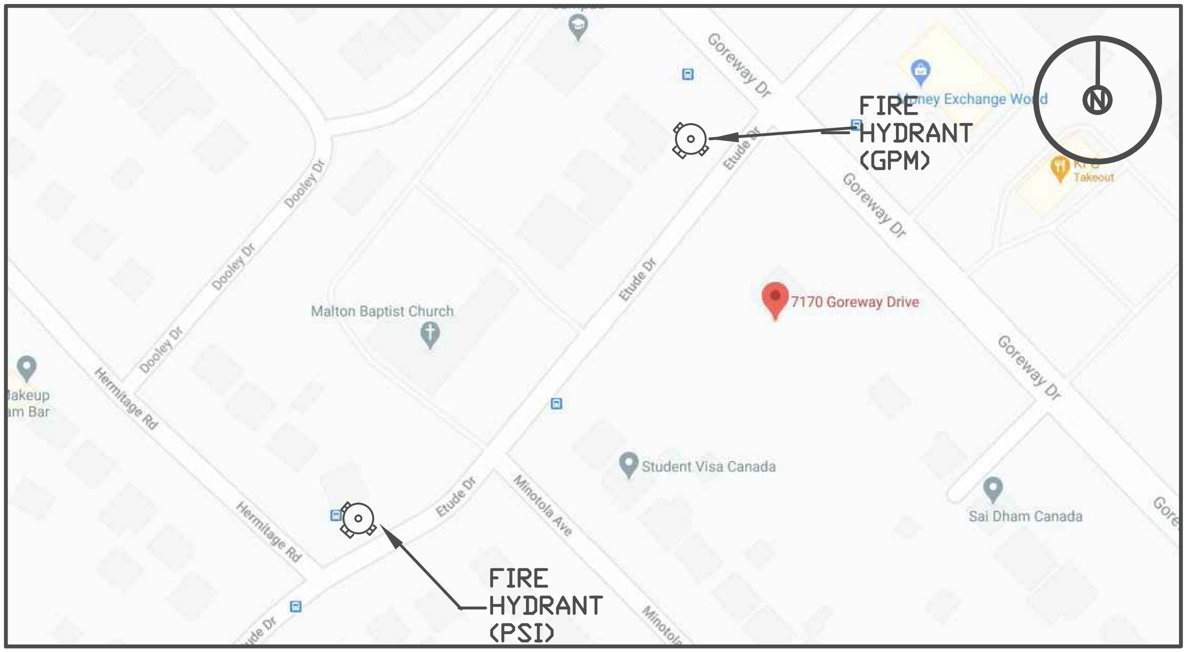
Exposed Buildings					
Direction	Distance	Charge	Surcharge		
North	26.5	10%	800	L/min	2-hr rating fire wall
East	>45	0%	0	L/min	
South	8.5	20%	1600	L/min	
West	17	15%	1200	L/min	
Total Surcharge:			**3600**	**L/min**	

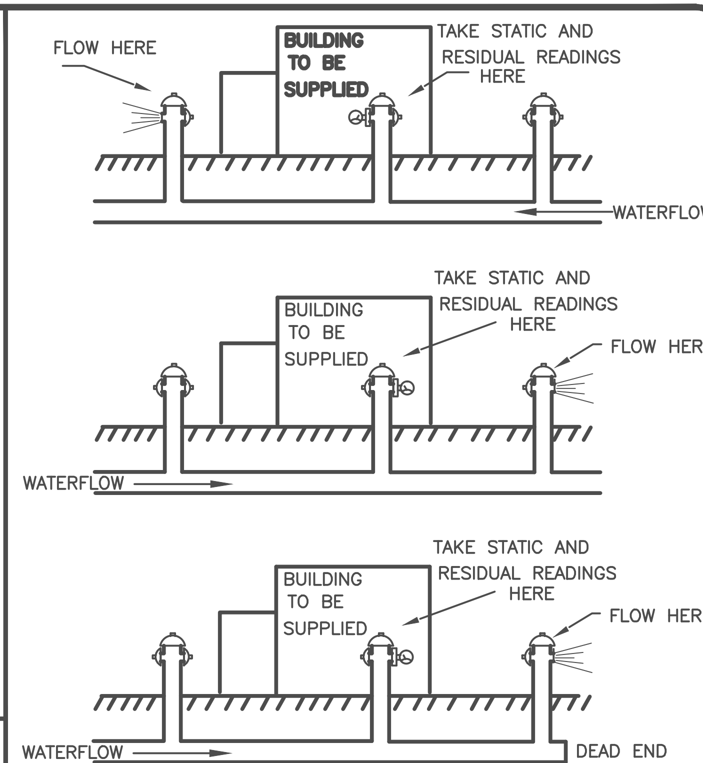
Determine Required Fire Flow

1.	8,000 base fire flow
2.	0 reduction
3.	0 reduction
4.	3,600 surcharge

Required Flow: **12,000 L/min, or**
200.0 L/s
3,168.0 USGPM

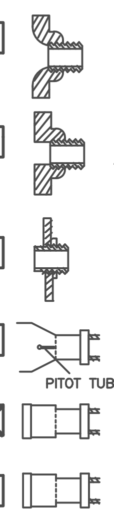
Required Duration of Fire Flow	
Flow Required (L/min)	Duration (hours)
2,000 or less	1.00
3,000	1.25
4,000	1.50
5,000	1.75
6,000	2.00
8,000	2.00
10,000	2.00
12,000	2.50
14,000	3.00
16,000	3.50
18,000	4.00
20,000	4.50
22,000	5.00
24,000	5.50
26,000	6.00
28,000	6.50
30,000	7.00
32,000	7.50
34,000	8.00
36,000	8.50
38,000	9.00
40,000 and over	9.50





TEST:	PLAY PIPE	C=	STATIC(PSI)	RESIDUAL(PSI)	PITOT(PSI)	FLOW(USGPM)
	1x1 1/8					
	2x1 1/8					
	3x1 1/8					
	4x1 1/8					
	1x1 3/4					
	2x1 3/4					
	3x1 3/4					
	4x1 3/4					
	HYDRANT BUTT					
1	1x2 1/2		58	57	54	806
2	2x2 1/2		58	56	45	1472
	3x2 1/2					
	4x2 1/2					
	FM NOZZLE					
	1x2 1/4	.88				
	2x2 1/4	.88				
	3x2 1/4	.88				
	4x2 1/4	.88				

OUTLET TYPE



- ☐ COEF.=0.90 OUTLET SMOOTH AND WELL ROUNDED
- ☐ COEF.=0.80 OUTLET SQUARE AND SHARP
- ☐ COEF.=0.70 OUTLET SQUARE AND PROJECTING INTO BARREL
- ☐ COEF.=0.835 MODEL LPD-250A DECHLORINATOR DIFFUSER
- ☒ HOSE MONSTER PITOTLESS NOZZLE 1 3/4"
- ☐ HOSE MONSTER PITOTLESS NOZZLE 1 3/4" OPEN ATMOSPHERE

Client:

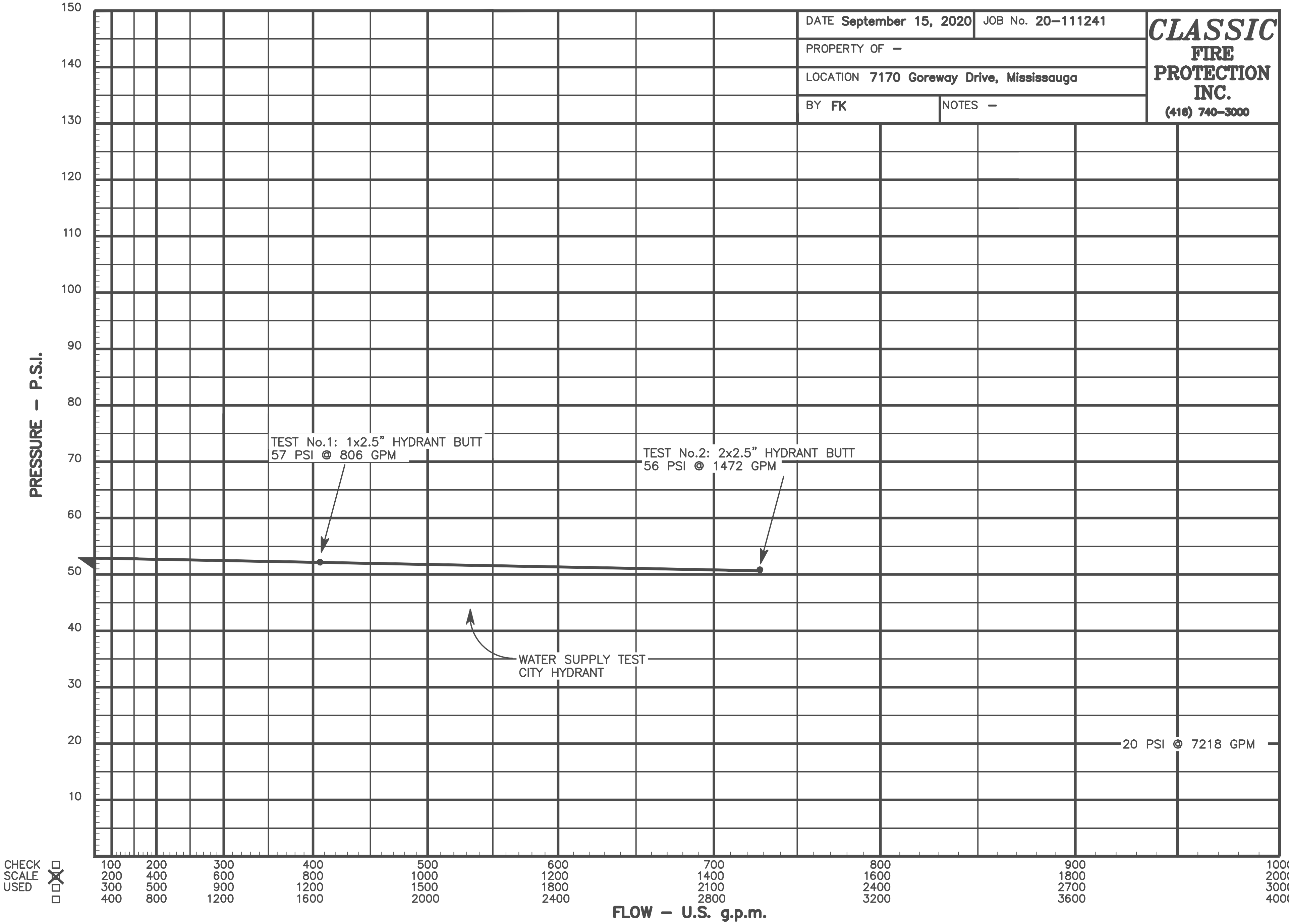
Location:

7170 Goreway Drive

Mississauga, ON.

DEDICATED SERVICE SINCE 1988
CLASSIC FIRE PROTECTION INC.
645 GARYRAY DR.
North York, ON
M9L 1P9
(416) 740-3000
Web: www.classicfire.com

WATER SUPPLY GRAPH



APPENDIX B

Sanitary Flow Calculations

Project: 7170 Goreway Drive
Project No.: 1346-4573

Created By: KR
Checked By: HL/NRS

Date: 2017-09-29
Updated: 2021-06-24

Domestic Sanitary Design Flow

Site Area:	0.41	ha
Population Density:	175	persons/ha
Population:	72	

Design Parameters

Average Flow (L/capita/d)
302.8

Sanitary Design Flow:

Average Daily Flow = 302.8 L/capita/d
Average Daily Flow = **0.25** L/s

Harmon Peak Factor: M = **4.28**

Peak Flow = **1.08** L/s

Infiltration Flow: Infiltration = 0.20 L/ha/s
Total Infiltration = **0.08** L/s

Groundwater Discharge = **115.00** L/min
= **1.92** L/s

Total Peak Flow = **3.07** L/s

Summary Table

Average Daily Flow (L/s)	Peaking Factor	Peak Flow (L/s)	Infiltration Flow (L/s)	Groundwater Flow (L/s)	Total Flow (L/s)
0.25	4.28	1.08	0.08	1.92	3.07

Notes & References

Site Plan by Jardin Design Group Inc. dated December 23, 2020

Population Density from Section 2.1 of Region of Peel Public Works Design Criteria Manual - Sanitary Sewer (2009)

Average Flow from STD.DWG 2-9-2 of Region of Peel Public Works Design Criteria Manual - Sanitary Sewer (2009)

Average Daily Flow = Average Daily Flow (L/cap./day) * population / 86400

M = 1 + 14 / (4 + (p/1000)^.5)

Peak Flow = Average Daily Flow * M

Infiltration Allowance from Section 2.3 of Region of Peel Public Works Design Criteria Manual - Sanitary Sewer (2009)

Hydrogeological Investigation provided by Orbit Engineering dated June 18, 2021

Total Flow = Peak Flow + Total Infiltration + Groundwater Discharge

APPENDIX C

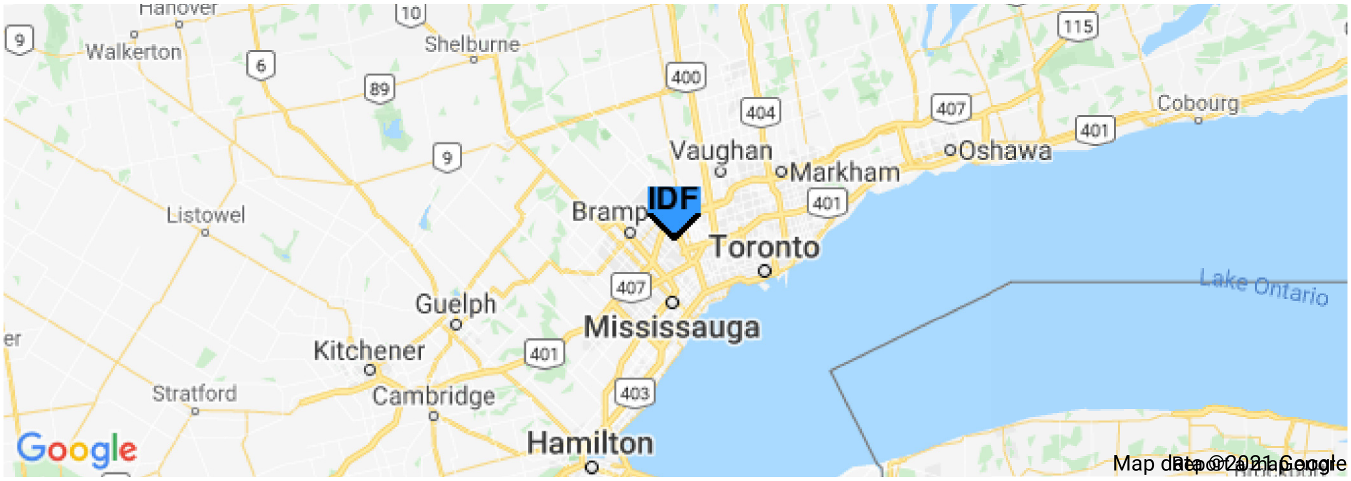
Stormwater Management Design and Calculations

Ontario IDF CURVE LOOKUP

Active coordinate

43° 42' 45" N, 79° 38' 15" W (43.712500,-79.637500)

Retrieved: Tue, 02 Mar 2021 19:22:06 GMT



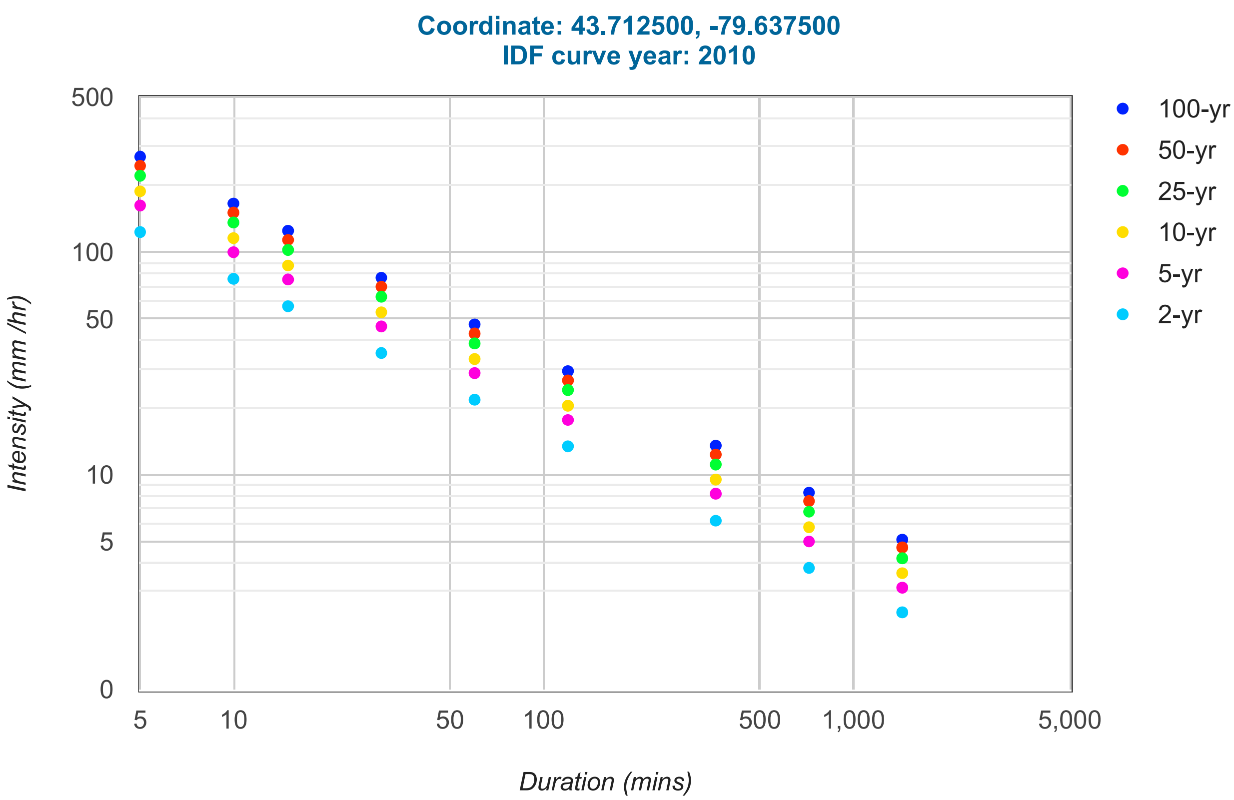
Location summary

These are the locations in the selection.

IDF Curve: 43° 42' 45" N, 79° 38' 15" W (43.712500,-79.637500)

Results

An IDF curve was found.



Coefficient summary

IDF Curve: 43° 42' 45" N, 79° 38' 15" W (43.712500,-79.637500)

Retrieved: Tue, 02 Mar 2021 19:22:06 GMT

Data year: 2010
IDF curve year: 2010

Return period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
A	21.7	28.6	33.1	38.9	43.1	47.4
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	123.3	75.9	57.2	35.2	21.7	13.4	6.2	3.8	2.4
5-yr	162.4	100.1	75.4	46.4	28.6	17.6	8.2	5.0	3.1
10-yr	188.0	115.8	87.2	53.7	33.1	20.4	9.5	5.8	3.6
25-yr	221.0	136.1	102.5	63.1	38.9	24.0	11.1	6.8	4.2
50-yr	244.8	150.8	113.6	70.0	43.1	26.5	12.3	7.6	4.7
100-yr	269.2	165.8	124.9	76.9	47.4	29.2	13.5	8.3	5.1

Rainfall depth (mm)

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	10.3	12.7	14.3	17.6	21.7	26.7	37.2	45.8	56.5
5-yr	13.5	16.7	18.8	23.2	28.6	35.2	49.0	60.4	74.4
10-yr	15.7	19.3	21.8	26.9	33.1	40.8	56.8	69.9	86.2
25-yr	18.4	22.7	25.6	31.6	38.9	47.9	66.7	82.2	101.2
50-yr	20.4	25.1	28.4	35.0	43.1	53.1	73.9	91.1	112.2
100-yr	22.4	27.6	31.2	38.5	47.4	58.4	81.3	100.1	123.4

Terms of Use

Modified Rational Calculations - Input Parameters

Storm Data: City of Mississauga

Time of Concentration: $T_C =$ **15** **min** (per City of Mississauga standards)

Return Period	A	B	C	I (mm/hr)
2 yr	610	4.6	0.78	59.89
5 yr	820	4.6	0.78	80.51
10 yr	1010	4.6	0.78	99.17
25 yr	1160	4.6	0.78	113.89
50 yr	1300	4.7	0.78	127.13
100 yr	1450	4.9	0.78	140.69

Pre - Development Conditions (101)				
Land Use	**Area** (ha)	**Area** (m^2)	**C**	**Weighted Average C**
Pervious	0.27	2670	**0.25**	**0.25**
Impervious	0.00	0	**0.90**	**0.00**
Total Site	**0.27**	**2670**	**-**	**0.25**

Pre - Development Conditions (102)				
Land Use	**Area** (ha)	**Area** (m^2)	**C**	**Weighted Average C**
Pervious	0.14	1400	**0.25**	**0.25**
Impervious	0.00	0	**0.90**	**0.00**
Total Site	**0.14**	**1400**	**-**	**0.25**

Note: Pre development flows to Goreway consist of only Catchment 102

Post - Development Conditions (Controlled Subcatchment 201)				
Land Use	**Area** (ha)	**Area** (m^2)	**C**	**Weighted Average C**
Pervious	0.11	1096	**0.25**	**0.08**
Impervious	0.22	2221	**0.90**	**0.60**
Total Site	**0.33**	**3317**	**-**	**0.69**

Post - Development Conditions (Uncontrolled Subcatchment UC01)				
Land Use	**Area** (ha)	**Area** (m^2)	**C**	**Weighted Average C**
Pervious	0.06	570	**0.25**	**0.19**
Impervious	0.02	183	**0.90**	**0.22**
Total Site	**0.08**	**753**	**-**	**0.41**

Post - Development Conditions (External)				
Land Use	**Area** (ha)	**Area** (m^2)	**C**	**Weighted Average C**
Pervious	0.11	1120	**0.25**	**0.25**
Impervious	0.00	0	**0.90**	**0.00**
Total Site	**0.11**	**1120**	**-**	**0.25**

Equations:

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

Intensity
$$i(T_d) = A / (T + B)^C$$

Modified Rational Calculations - Peak Flows Summary

Return Period	**Pre-development** (m^3/s)			**Post-development Peak Flows (Site)** (m^3/s)		
	C_{pre}	Q_{pre} (Catchment 102)	Q_{pre} (Catchment 101 + 102 + EX)	$Q_{post\ (UC01)}$	Q_{post} (Controlled 201+EX)	Q_{total}
2 yr	0.250	0.006	**0.022**	0.005	0.005	**0.010**
5 yr	0.250	0.008	**0.029**	0.007	0.005	**0.012**
10 yr	0.250	0.010	**0.036**	0.009	0.005	**0.014**
25 yr	0.250	0.011	**0.042**	0.011	0.005	**0.016**
50 yr	0.250	0.012	**0.048**	0.013	0.005	**0.018**
100 yr	0.250	0.014	**0.054**	0.015	0.005	**0.020**

Note: Q total for post-development includes controlled 201, uncontrolled UC01, and external catchment.

Catchment 201 Uncontrolled Post Peak Flows (m^3/s)

Return Period	Adjusted C_{post}	Q_{post}
2 yr	0.685	0.038
5 yr	0.685	0.051
10 yr	0.685	0.063
25 yr	0.754	0.080
50 yr	0.822	0.097
100 yr	0.857	0.112

External catchment Uncontrolled Post Peak Flows (m^3/s)

Return Period	Adjusted C_{post}	Q_{post}
2 yr	0.250	0.005
5 yr	0.250	0.006
10 yr	0.250	0.008
25 yr	0.275	0.010
50 yr	0.300	0.012
100 yr	0.313	0.014

A = 0.11 ha RC = 0.25

Catchment UC01 Uncontrolled Post Peak Flows (m^3/s)

Return Period	Adjusted C_{post}	Q_{post}
2 yr	0.408	0.005
5 yr	0.408	0.007
10 yr	0.408	0.009
25 yr	0.449	0.011
50 yr	0.490	0.013
100 yr	0.510	0.015

Equations:

Peak Flow

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

CROZIER & ASSOCIATES Consulting Engineers

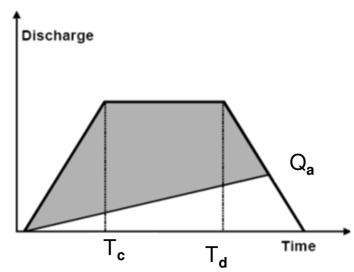
Project: 7170 Goreway Drive **Created By:** HL **Date:** 2019-05-02
Project No.: 1346-4573 (R.01) **Checked By:** NRS **Updated:** 2021-04-29

Modified Rational Calculations - Storage

Control Criteria

Q_{post} = 0.005 m^3/s Flow Rate using CEV 350 with 85 mm orifice

Storage Volume Determination				
T_d (min)	i (mm/hr)	T_d (sec)	Q_{Uncont} (m^3/s)	S_d (m^3)
10	176.31	600	0.158	90.8
20	118.12	1200	0.106	121.4
30	90.77	1800	0.081	139.2
40	74.58	2400	0.067	151.7
50	63.75	3000	0.057	161.1
60	55.95	3600	0.050	168.7
70	50.03	4200	0.045	175.0
80	45.38	4800	0.041	180.4
90	41.60	5400	0.037	185.0
110	35.84	6600	0.032	192.6
130	31.62	7800	0.028	198.6
150	28.39	9000	0.025	203.5
170	25.82	10200	0.023	207.6
190	23.73	11400	0.021	211.0
210	21.99	12600	0.020	213.8
230	20.52	13800	0.018	216.2
250	19.25	15000	0.017	218.2
270	18.15	16200	0.016	219.9
290	17.18	17400	0.015	221.3
310	16.32	18600	0.015	222.5
330	15.56	19800	0.014	223.5
350	14.87	21000	0.013	224.3
370	14.25	22200	0.013	224.8
390	13.68	23400	0.012	225.3
410	13.16	24600	0.012	225.6
430	12.69	25800	0.011	225.8
450	12.25	27000	0.011	225.8
470	11.85	28200	0.011	225.8
490	11.47	29400	0.010	225.6
510	11.12	30600	0.010	225.4
530	10.80	31800	0.010	225.0
550	10.49	33000	0.009	224.6
570	10.21	34200	0.009	224.1
590	9.94	35400	0.009	223.6
610	9.69	36600	0.009	223.0
630	9.45	37800	0.008	222.3
650	9.22	39000	0.008	221.6
670	9.01	40200	0.008	220.8
690	8.80	41400	0.008	219.9
710	8.61	42600	0.008	219.0
730	8.43	43800	0.008	218.1
750	8.25	45000	0.007	217.1
770	8.09	46200	0.007	216.1
Required Storage Volume:				**225.8**



Uncontrolled Flow
$Q_{uncont} = Q_{uncont\ 201} + Q_{uncont\ external}$

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

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

Stone Volume Storage

Rainfall Depth:	81.3	mm	(MTO IDF - 6hr storm event)
External Drainage Area:	1120	sqm	
Swale Area:	179	sqm	
Total Area (External+Swale):	1299	sqm	
Required Storage Volume (Excluding Stone):	26.4	cu.m	
Void Ratio:	0.4		
Required Storage Volume (Including Stone):	66.0	cu.m	
Provide Stone Storage Width:	0.60	m	
Provide Stone Storage Length:	122.0	m	
Minimum Stone Storage Height Required:	0.90	m	
Stone Storage Depth provided:	1.00	m	

Enhanced Topsoil Design

Impervious Area Catchment 201	0.22	ha	
Design Storm:	25	mm	Requested by City of Mississauga
Required Infiltration Volume:	55.5	m^3	

Note: Site Area based on Site Plan by Jardin Design group Inc. dated December 23, 2020

Storage Required	Total Area of Additional Topsoil	Extra Topsoil Depth	Soil Volume	Soil Porosity*	Soil Field Capacity*	Avalable Storage Volume[1]
m3	ha	mm	m3			m3
55.53	0.11	300.00	328.80	0.47	0.32	49.32

*Geotechnical Consultant to confirm site-specific topsoil design parameters

1. Water volume that can be stored for a given soil = (soil volume) x (soil porosity – soil field capacity)
2. Total topsoil depth will be 450mm. 450mm = 150mm + 300mm (Extra for water balance

Project: 7170 Goreway Drive
Project No.: 1346-4573
Prepared By: KR
Reviewed By: HL/NRS
Date: 2021-06-24

7170 GOREWAY DRIVE, CITY OF MISSISSAUGA
WATER QUALITY TREATMENT TRAIN CALCULATIONS

WATER QUALITY CALCULATIONS (TREATMENT TRAIN)			
Catchment ID	**Treatment**	**TSS removal**	**Total**
201	OGS (EFO4)	65.0	93.0
	Infiltration	80.0	

Note: The proposed open bottom underground storm storage unit has a stone storage of 59 m3 under the chamber for infiltration. The catchment 201 has an area of 0.35 ha, contributing to the infiltration. The storage volume for impervious level (85%) is 169 m3/ha, greater than 40 m3/ha. Therefore, the chamber infiltration area under the underground storm storage unit provides enhanced 80% long-term T.S.S. removal per Stormwater Management Planning and Design Manual, by MOE dated March 2003.

Treatment Train Approach:

$$R = A + B - [(A \times B) / 100] \qquad \text{(Equation 4-1)}$$

Where:

R = Total TSS Removal Rate

A = TSS Removal Rate of the First or Upstream BMP

B = TSS Removal Rate of the Second or Downstream BMP

*As per 'New Jersey Stormwater Best Management Practices Manual' Equation 4-1 (February 2004)

TSS Removal:

OGS EF6 (Rate 1) =	65	%
Infiltration (Rate 2) =	80	%

Removal at end of treatment train:

R_3 = Rate 1 + Rate 2 - [(Rate 1 x Rate 2)/100]

R_{total} = 93.0 %

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

04/29/2021

Province:	Ontario
City:	Mississauga
Nearest Rainfall Station:	TORONTO LESTER B. PEARSON INT'L AP
NCDC Rainfall Station Id:	8733
Years of Rainfall Data:	44
Site Name:	
Drainage Area (ha):	0.46
% Imperviousness:	50.00

Runoff Coefficient 'c': 0.60

Project Name:	7170 Goreway Drive
Project Number:	45199
Designer Name:	Heaven Lin
Designer Company:	C.F.Crozier & Associates Inc.
Designer Email:	hlin@cfcrozier.ca
Designer Phone:	519-831-8906
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0
Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	10.27
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	5.00
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	86
EFO6	91
EFO8	93
EFO10	93
EFO12	93

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 86

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 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.

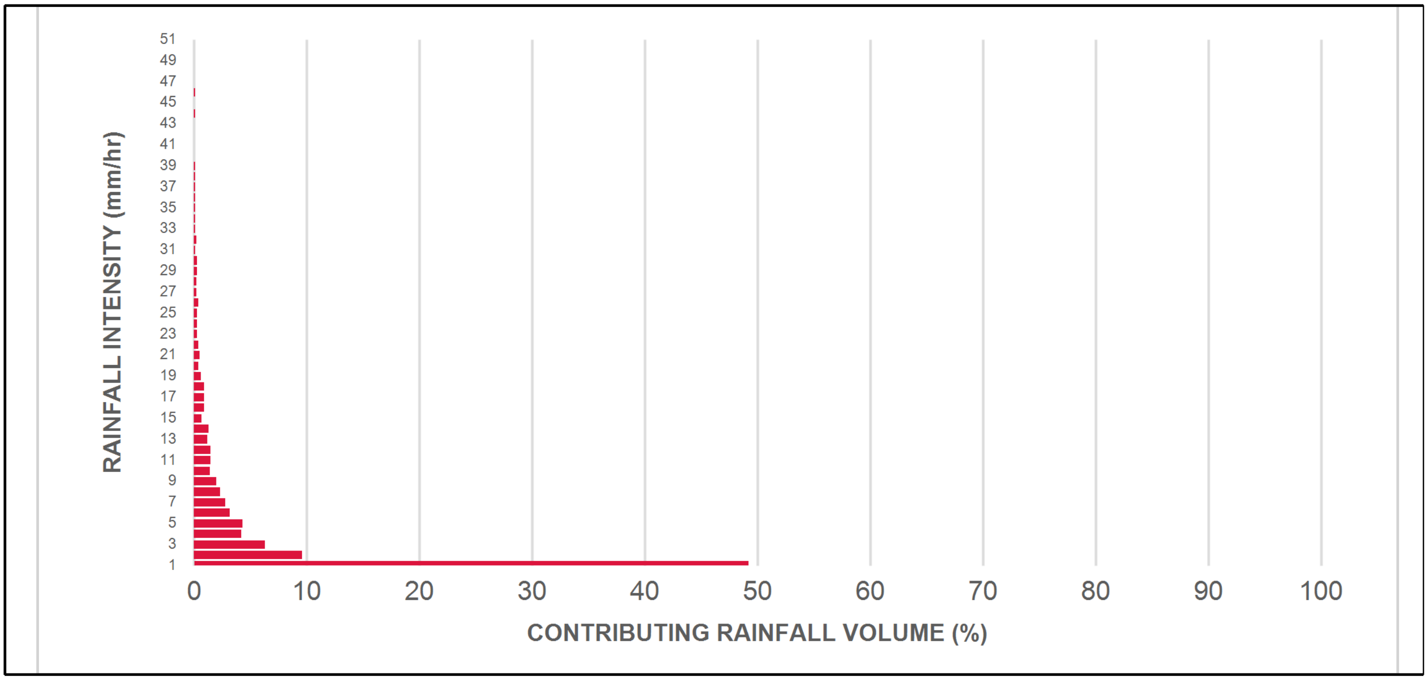
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Upstream Flow Controlled Results

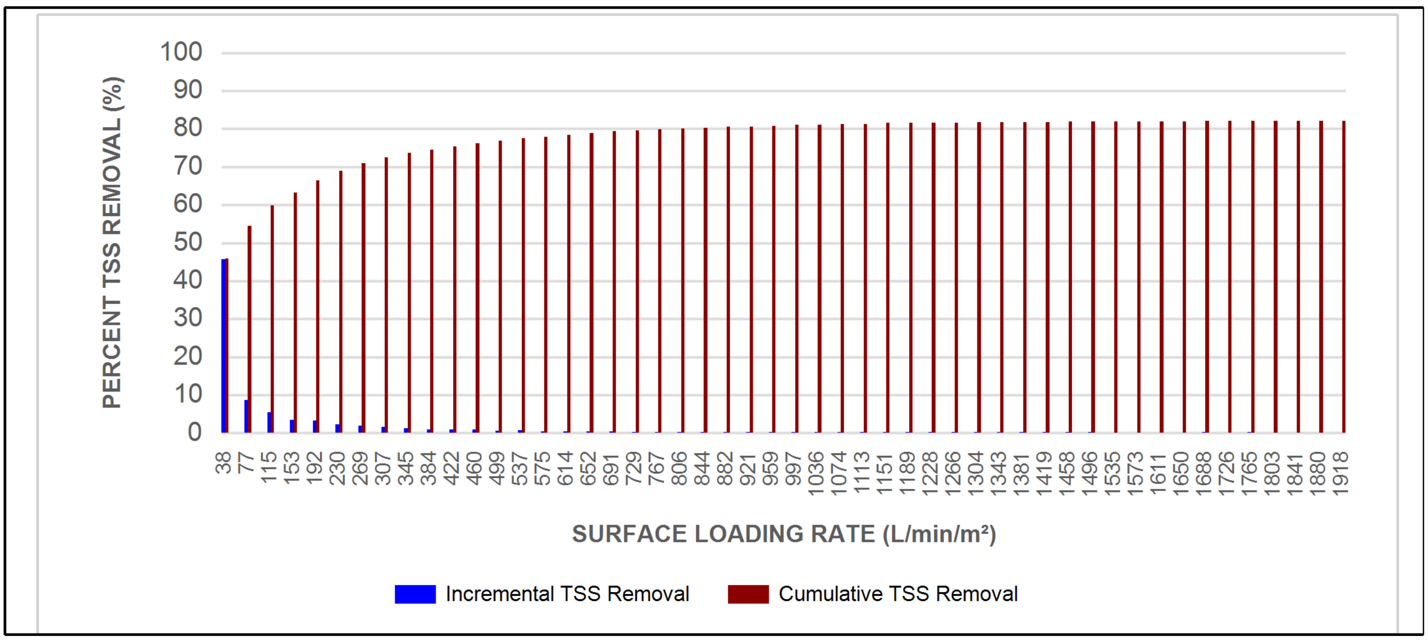
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	49.2	49.2	0.77	46.0	38.0	93	45.8	45.8
2	9.6	58.8	1.53	92.0	77.0	90	8.6	54.4
3	6.3	65.1	2.30	138.0	115.0	86	5.4	59.8
4	4.2	69.3	3.07	184.0	153.0	81	3.4	63.2
5	4.3	73.6	3.84	230.0	192.0	77	3.3	66.5
6	26.4	100.0	4.60	276.0	230.0	73	19.4	85.9
7	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
8	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
9	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
10	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
11	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
12	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
13	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
14	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
15	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
16	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
17	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
18	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
19	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
20	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
21	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
22	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
23	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
24	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
25	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9

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	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
27	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
28	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
29	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
30	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
31	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
32	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
33	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
34	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
35	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
36	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
37	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
38	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
39	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
40	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
41	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
42	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
43	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
44	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
45	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
46	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
47	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
48	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
49	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
50	0.0	100.0	5.00	300.0	250.0	72	0.0	85.9
Estimated Net Annual Sediment (TSS) Load Reduction =								**86 %**

RAINFALL DATA FROM TORONTO LESTER B. PEARSON INT'L AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

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

SCOUR PREVENTION AND ONLINE CONFIGURATION

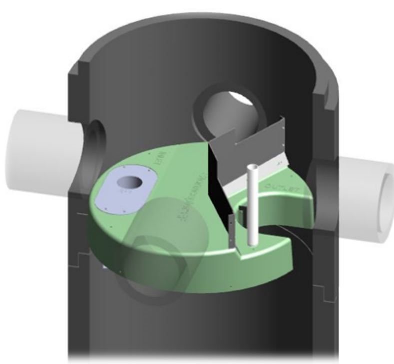
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

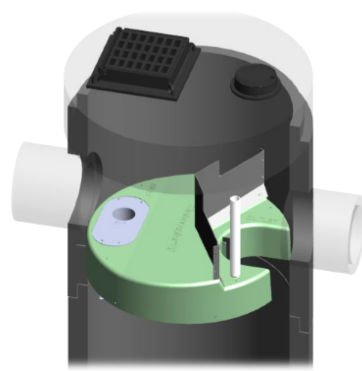
DESIGN FLEXIBILITY

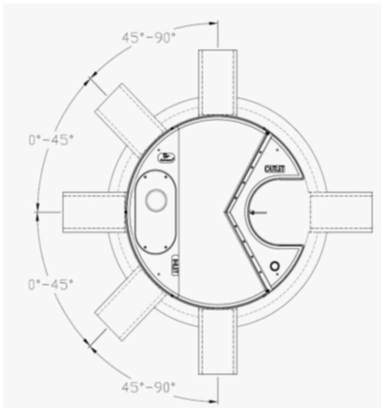
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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

OIL CAPTURE AND RETENTION

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







INLET-TO-OUTLET DROP

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

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

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

HEAD LOSS

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

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

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

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

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

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

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

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing shall be determined using historical rainfall data and a sediment removal performance curve derived from the actual third-party verified laboratory testing data. The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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

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

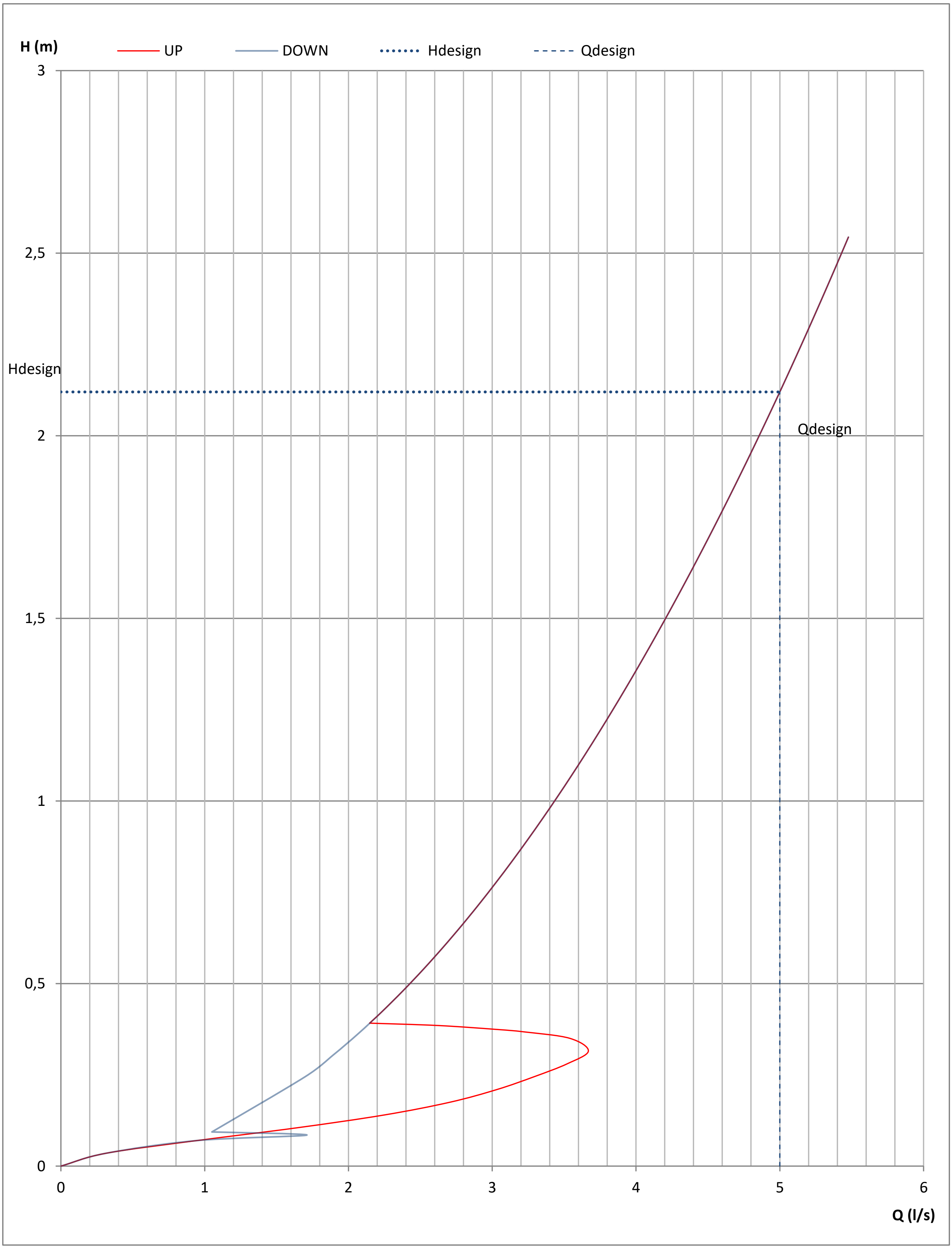
3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

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

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m2 to 2600 L/min/m2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

Ref: 21267.3.1
Date: 25-03-2021
Design: Q=5l/s
H=2,12m

CEV 350 ø85



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ECHELON ENVIRONMENTAL
505 Hood Road, Unit #26
Markham, ON, Canada
Tel 905-948-0000

Mosbaek A/S
Vaerkstedsvej 20
DK-4600 Koege, Denmark
Tel +45 56 63 85 80 Fax +45 56 63 86 80

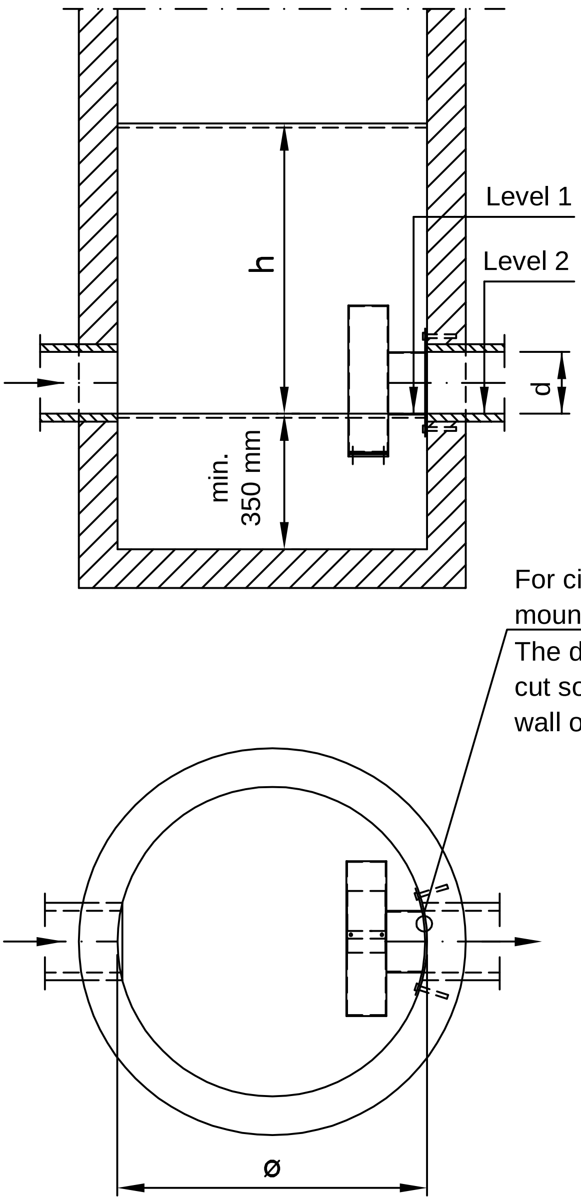
Date 25.03.2021 **Ref. No.** 21267.3.1
Type CEV 350 300 P
Q = 5 **l/s at h =** 2.12 **m**

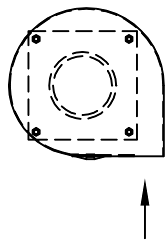
Projekt: 5 l/s, 7170 Goreway Dr, Mississauga

-

When ordering please state the information as follows:

1)	**Ref. No.**	**:**	**21267.3.1**	
2)	**d**	**:**	**ø300**	**mm**
3)	**ø**	**:**	**1200**	**mm**





For circular manholes the mounting plate is rolled.
The downstream pipe must be cut so it flushes with the wall of the manhole.

Installation

The flow regulator is provided with a mounting plate. The mounting plate must be fastened to the wall of the chamber covering the outlet opening by means of drilled or embedded bolts/threaded rods of acid-resistant steel.
Please note that level 1 and level 2 must be equal.
Tightening between plate and wall of chamber is made with waterresistant silicone, rubber sealing or the like.

CROZIER
CONSULTING ENGINEERS

7170 GOREWAY DRIVE
STORM SEWER DESIGN SHEET

10 YEAR DESIGN STORM - CITY OF MISSISSAUGA[1]

A	1010	B	4.6	C	0.78

PROJECT: 7170 Goreway Drive
PROJECT No.: 1346-4573
FILE: Storm Sewer Design
DATE: August 28, 2019
Revised: April 29, 2021
Design: HL/NRS

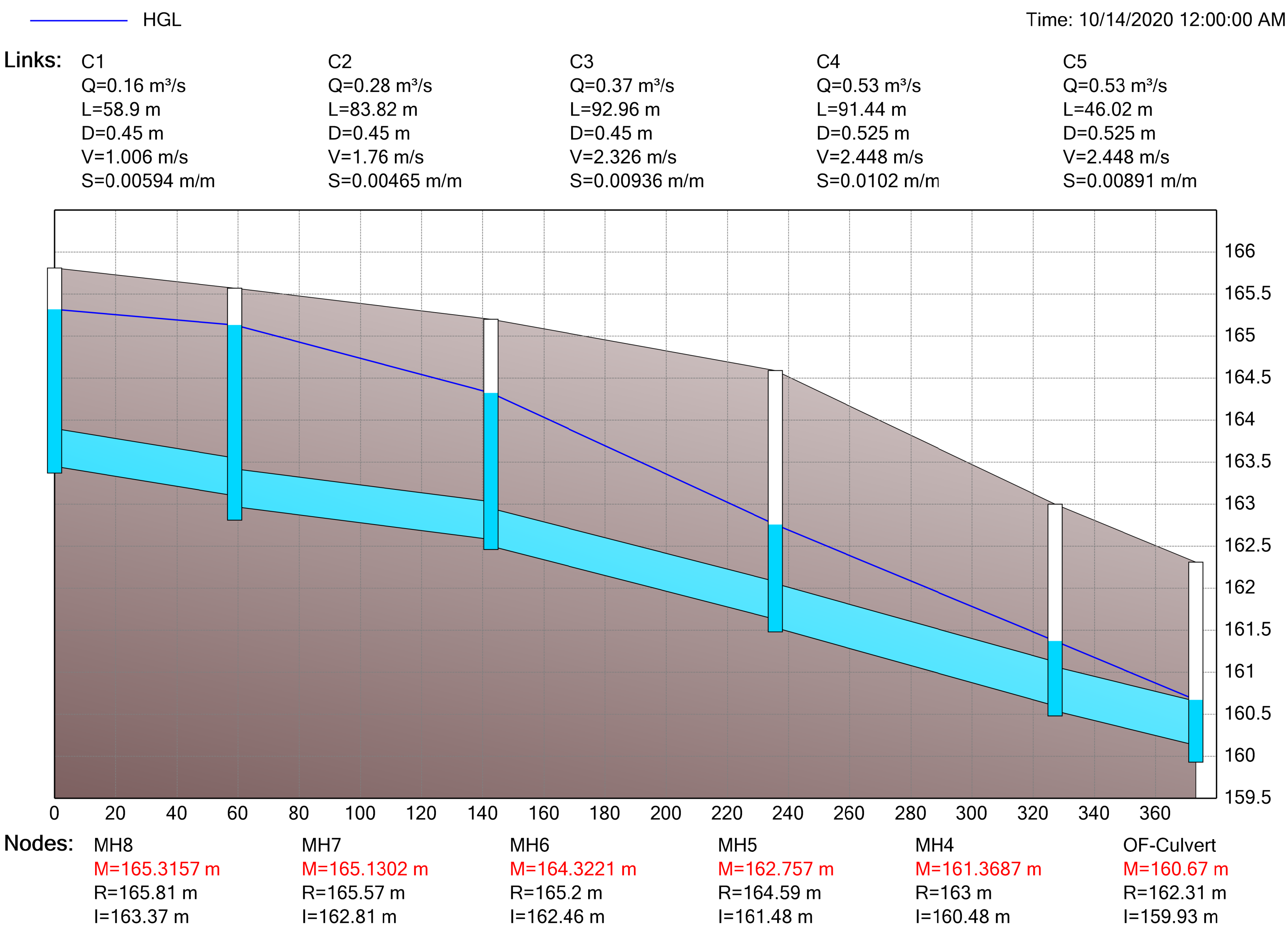
INITIAL TIME OF CONCENTRATION (min) 15.00

MANNINGS "n" 0.013

STREET	FROM MH	TO MH	DRAINAGE AREA	AREA AC	AREA HA	RUN-OFF	A x C	Cummul. A x C	TIME OF CONC.	I mm/hr	Q m3/s	CONSTANT CONTROLLED Q[2]	ACCUM. CONSTANT Q	TOTAL Q m3/s	LENGTH mm	SLOPE %	PIPE DIA. mm	VEL. m/s	INITIAL Tc	TIME OF CONC	ACC. TIME OF CONC.	CAPACITY m3/s	% Capacity Existing
DOWNSTREAM STORM SEWER ANALYSIS																							
	EX. MH 8	EX. MH 7	1	1.30	0.53	0.74	0.39																
			2	0.32	0.13	0.75	0.10																
			3	0.21	0.08	0.70	0.06																
			7170 Goreway - Catchment 102	0.35	0.14	0.25	0.04	0.58	15	99.2	0.16			0.16	58.9	0.59	450	1.38	15	0.71	15.7	0.219	73%
Goreway Dr. (Existing)	EX. MH 7	EX. MH 6	4	1.13	0.46	0.40	0.18					-	-										
			5	0.96	0.39	0.70	0.27	1.04	15.7	96.4	0.28	-	-	0.28	83.82	0.47	450	1.23	15.7	1.14	16.85	0.195	142%
	EX. MH 6	EX. MH 5	6	1.22	0.49	0.40	0.20																
			7	0.69	0.28	0.70	0.20	1.43	16.8	92.4	0.37	-	-	0.37	92.96	0.93	450	1.73	16.8	0.90	17.75	0.275	134%
	EX. MH 5	EX. MH 4	8	3.80	1.54	0.20	0.31																
			9	1.44	0.58	0.40	0.23																
			10	0.57	0.23	0.70	0.16	2.13	17.7	89.5	0.53	-	-	0.53	91.44	1.02	525	2.01	17.7	0.76	18.51	0.434	122%
	EX. MH 4	Culvert	11	0.43	0.17	0.40	0.07	2.20	18.5	87.2	0.53	-	-	0.53	46.02	0.89	525	1.87	18.5	0.41	18.91	0.406	132%
	EX. MH 8	EX. MH 7	1	1.30	0.53	0.74	0.39																
			2	0.32	0.13	0.75	0.10																
			3	0.21	0.08	0.70	0.06																
			7170 Goreway - 201 + EXT	0.86	0.35	Controlled Flow						0.005	0.005										
			7170 Goreway - UC01	0.20	0.08	0.58	0.05																
			7170 Goreway - External	0.26	0.11	Included in 201		0.59	15	99.2	0.16			0.17	58.9	0.59	450	1.38	15	0.71	15.7	0.219	76%
Goreway Dr. (Proposed)	EX. MH 7	EX. MH 6	4	1.13	0.46	0.40	0.18																
			5	0.96	0.39	0.70	0.27	1.04	15.7	96.4	0.28	-	0.005	0.28	83.82	0.47	450	1.23	15.7	1.14	16.85	0.195	145%
	EX. MH 6	EX. MH 5	6	1.22	0.49	0.40	0.20																
			7	0.69	0.28	0.70	0.19	1.43	16.8	92.4	0.37	-	0.005	0.37	92.96	0.93	450	1.73	16.8	0.90	17.75	0.275	135%
	EX. MH 5	EX. MH 4	8	2.87	1.16	0.20	0.23																
			9	1.44	0.58	0.40	0.23																
			10	0.57	0.23	0.70	0.16	2.06	17.7	89.5	0.51	-	0.005	0.52	91.44	1.02	525	2.01	17.7	0.76	18.51	0.434	119%
	EX. MH 4	Culvert	11	0.43	0.17	0.40	0.07	2.12	18.5	87.2	0.52	-	0.005	0.52	46.02	0.89	525	1.87	18.5	0.41	18.91	0.406	128%

Notes:
1. A, B, and C coefficients as per City of Mississauga Design Requirements.
2. Constant controlled Q from catchment 201 can be maximum 0.005 m^3/s for 7170 Goreway Drive.
3. Existing condition based on Storm Drainage Area Plan and associated Storm Sewer Design Chart (G.M. Sernas & Associates Ltd., September 30 1975, Project Np.: 7530) and updated based on existing topography of 7170 Goreway Drive.
4. Pipe diameter, slope, and length from Region of Peel as-built 20065-D, Mississauga as-built 1806, and Mississauga as-built 9080.

HGL ANALYSIS (PRE-DEVELOPMENT CONDITION)



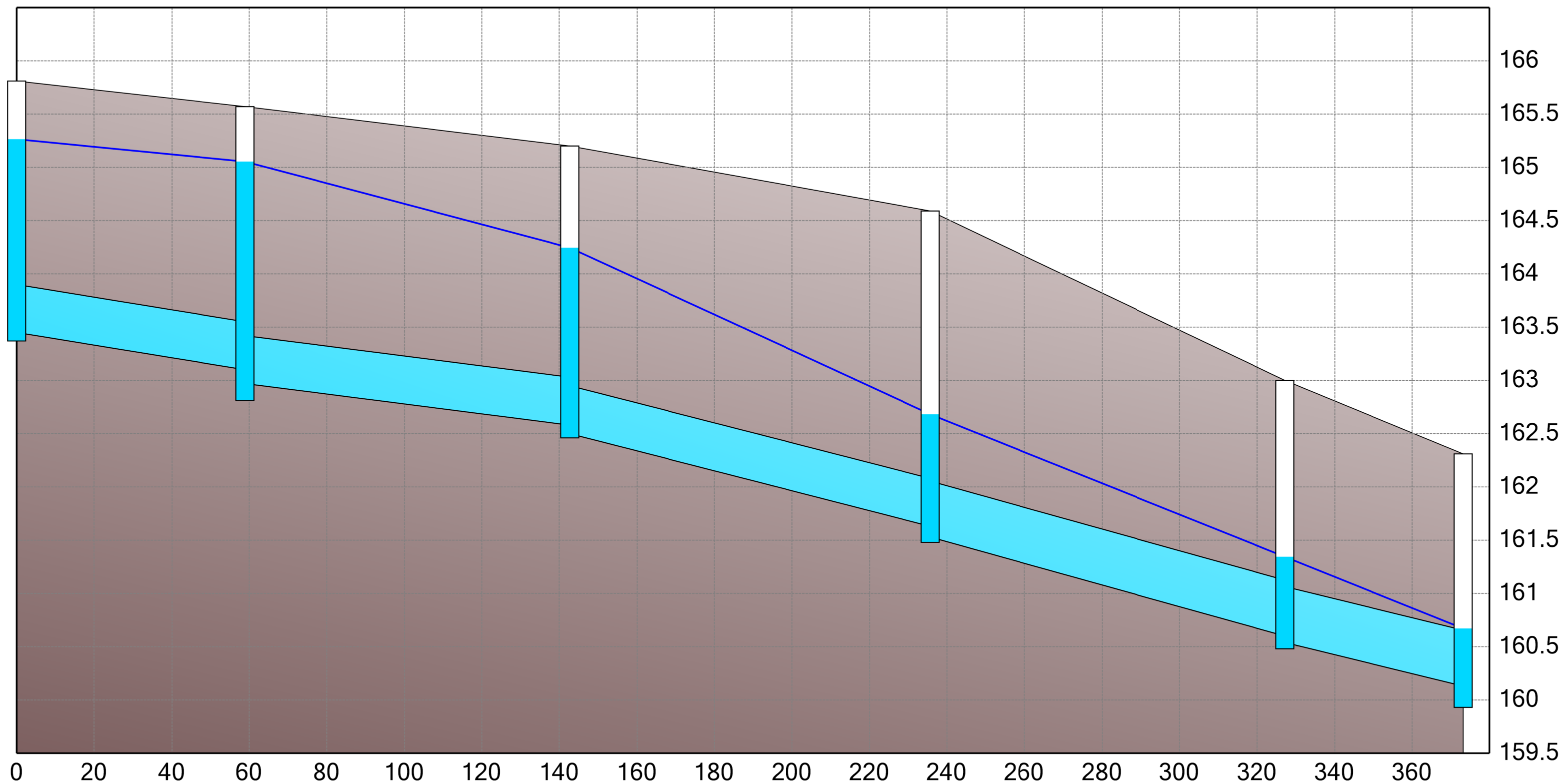
HGL ANALYSIS (POST-DEVELOPMENT CONDITION)

HGL

Time: 10/13/2020 8:30:00 AM

Links:

C1	C2	C3	C4	C5
Q=0.17 m³/s	Q=0.28 m³/s	Q=0.37 m³/s	Q=0.52 m³/s	Q=0.52 m³/s
L=58.9 m	L=83.82 m	L=92.96 m	L=91.44 m	L=46.02 m
D=0.45 m	D=0.45 m	D=0.45 m	D=0.525 m	D=0.525 m
V=1.069 m/s	V=1.76 m/s	V=2.326 m/s	V=2.402 m/s	V=2.402 m/s
S=0.00594 m/m	S=0.00465 m/m	S=0.00936 m/m	S=0.0102 m/m	S=0.00891 m/m



Nodes:

MH8	MH7	MH6	MH5	MH4	OF-Culvert
M=165.2616 m	M=165.0522 m	M=164.2441 m	M=162.679 m	M=161.3426 m	M=160.67 m
R=165.81 m	R=165.57 m	R=165.2 m	R=164.59 m	R=163 m	R=162.31 m
I=163.37 m	I=162.81 m	I=162.46 m	I=161.48 m	I=160.48 m	I=159.93 m

Heaven Lin

From: Nathan McFadden <Nathan.McFadden@mississauga.ca>
Sent: March 9, 2021 12:13 PM
To: Nicole Segal
Cc: Heaven Lin; Kurt Franklin; Muneef Ahmad
Subject: RE: 7170 Goreway Drive (1346-4573)

Hi Nicole,

Thanks again for the discussion and clarification this morning.

After completing my review I acknowledge that the proposed design has made a noticed improvement by reducing storm flows to the Goreway Drive external sewer. From the analysis provided I don't anticipate any major concerns, but I do request providing us with the HGL analysis, so we can confirm with certainty that municipal works will not be required.

I will be adding a Schedule C Clause in as we requested that an increased water balance target be achieved (more than the typical 5mm).

SCH C Clause: "Prior to Site Plan approval, the owner's consulting engineer will have to demonstrate that the stormwater management design can achieve the target water balance of the 25mm rain event to the satisfaction of the City."

For the swale – we won't be providing comment at this time because other staff, both within T&W as well as other groups will review and comment as well.

If you have any further questions please feel free to reach out again.

Thank you,

Nathan

From: Nicole Segal <nsegal@cfcrozier.ca>
Sent: Wednesday, March 3, 2021 5:47 PM
To: Nathan McFadden <Nathan.McFadden@mississauga.ca>
Cc: Heaven Lin <hlin@cfcrozier.ca>; Kurt Franklin <kfranklin@westonconsulting.com>
Subject: RE: 7170 Goreway Drive (1346-4573)

Hi Nathan,

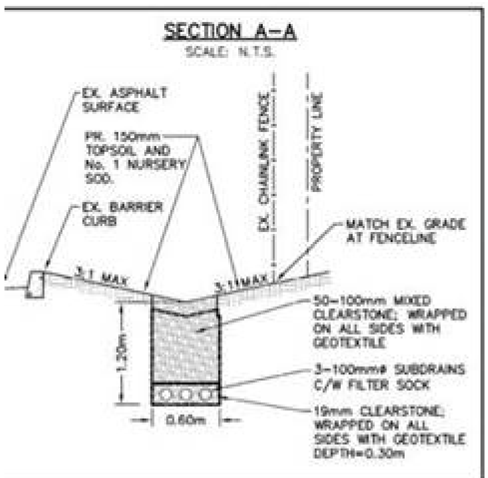
Hope you are doing well. Just a warning this is a relatively long email. It summarizes the current status of the external storm sewer analysis and swale conveying external drainage.

As a follow up to the email below and our subsequent meeting, we have some updated materials to share and discuss. Using a vortex orifice control (V*ortex valve CEV 425 with 96mm orifice – see attached),* we were able to reduce our controlled flow from approximately 30 L/s to 5 L/s. In addition, we are proposing CB's to pick up drainage that was previously uncontrolled therefore increasing our on-site storage but decreasing the uncontrolled flow to the storm sewer. The results are a marginal increase to flows to the storm sewer but no material impact to the first leg of pipe (i.e. capacity goes from 73% - 78% which is below typical operating capacity of 80%). Also, since we are capturing and controlling flows that previously spilled south, the downstream pipe capacities decreased. <u>The attached External Storm</u>

Sewer Design Sheet summarizes the analysis. By increasing the onsite storage volume and including more drainage in our controlled catchment, the impact to the existing storm sewer network is minimal at our site frontage and improved downstream. **Can you please review the attached analysis and let us know if you anticipate any major concerns prior to the formal submission? Is there anything else you need to settle the discussion about external upgrades?**

The second part of our conversation was related to the swale conveying external drainage. As previously discussed, in existing conditions external drainage flows towards the south west corner of the property, ponds, and spills south. Therefore, there is no existing overland flow route for the external drainage to get to Goreway Drive. This is evident in the topography and in the attached 'External Storm Sewer Design Plan'. In a best efforts attempt to convey the external drainage to Goreway Drive, the conveyance swale is less than the City standard of 2% and 0.15m depth in some spots. We are working on finalizing the design but here are some of the proposed features and the design to-date:

1. Add local low points with CB's connecting into external storm sewer network to reduce overland flow and increase swale slope to a minimum of 0.5%
2. Add a subsurface stone gallery complete with subdrain below the swale to convey the 100-year storm event to the CB's (similar to snippet below)



The design intent is to reduce the overland flow through the swale and therefore mitigate surface ponding and spillage to the adjacent properties. We are still working through the details, but the attached drawing C103 Site Grading Plan illustrates the design. **Similar to above, can you please review the swale design and let us know if you anticipate any major concerns prior to the formal submission?**

Thanks,
Nicole

Nicole Segal M.M.Sc., P.Eng. | Project Manager
2800 High Point Drive, Suite 100 | Milton, ON L9T 6P4
T: 905.875.0026

CROZIER
CONSULTING ENGINEERS

Crozier Connections:

Read our latest news and announcements here.

From: Nathan McFadden <Nathan.McFadden@mississauga.ca>
Sent: January 19, 2021 3:45 PM
To: Nicole Segal <nsegal@cfcrozier.ca>
Cc: Muneef Ahmad <muneef.ahmad@mississauga.ca>
Subject: RE: 7170 Goreway Drive

Hi Nicole – I will send the invite shortly but also wanted to pass this along in terms of guiding our discussion this Friday.

We would like to have a more technical conversation and are open to consider moving away from infrastructure upgrades but with a focus on the following:

- Capacity Analysis – Pre (as designed), Post (as designed), with SWM, with the best possible SWM release rates (consider a vortex control to obtain a lower release rate but maintaining a 75mm effective diameter).
- What is the best possible release rate the site can achieve while still maintaining the effective diameter of 75mm?
- Revisit the preliminary HGL to understand the effects on each segment of pipe in comparison to the CCTV results.
- Best possible option for water balance retention (15, 20, 25mm)? If infiltration is not an option is greenspace sufficient for re-use or will there be significant volumes remaining?

I realize this meeting is only 3 days away at this point so don't feel pressure to have definitive answers on the above but this is what we would like to discuss.

Thank you,

MISSISSAUGA

Nathan McFadden C.E.T.
Storm Drainage Technologist
Environmental Services
T 905-615-3200 ext.3192
nathan.mcfadden@mississauga.ca

City of Mississauga | Transportation & Works Department
Infrastructure Planning & Engineering Services

Follow us on Instagram **@saugastormwater**

****Please note that due to the ever evolving situation with Covid-19, response times to calls, emails, site matters relating to building permit applications, planning applications may be impacted, delayed or suspended. We appreciate your patience and understanding.****

From: Nicole Segal <nsegal@cfcrozier.ca>
Sent: Tuesday, January 19, 2021 10:06 AM
To: Nathan McFadden <Nathan.McFadden@mississauga.ca>
Subject: RE: 7170 Goreway Drive

Hi Nathan,

We are available this Friday January 22 from 1-2pm. From our end can you please add the following people to the invitation in addition to myself:

Kurt Franklin <kfranklin@westonconsulting.com>
Nick Constantin <nconstantin@cfcrozier.ca>

Thank you!

Nicole Segal M.M.Sc., P.Eng. | Project Engineer
2800 High Point Drive, Suite 100 | Milton, ON L9T 6P4
T: 905.875.0026

Crozier Connections:

Read our latest news and announcements here.

From: Nicole Segal
Sent: January 19, 2021 9:36 AM
To: Nathan McFadden <Nathan.McFadden@mississauga.ca>
Subject: RE: 7170 Goreway Drive

Hi Nathan,

Happy New Year! I am confirming the time internally and will let you know soon. Thank you for the update!

Nicole

From: Nathan McFadden <Nathan.McFadden@mississauga.ca>
Sent: January 15, 2021 4:05 PM
To: Nicole Segal <nsegal@cfcrozier.ca>
Subject: 7170 Goreway Drive

Hi Nicole,

Happy New Year!

Does your team have time next Friday (between 1:00 pm and 3pm) to touch base about this file again? If so I will send an email invite as a hold as we are still making our way through the review material but hope to be done by Friday and Muneef will be off the following week.

Thanks,

Nathan McFadden C.E.T.
Storm Drainage Technologist
Environmental Services
T 905-615-3200 ext.3192
nathan.mcfadden@mississauga.ca

City of Mississauga | Transportation & Works Department
Infrastructure Planning & Engineering Services

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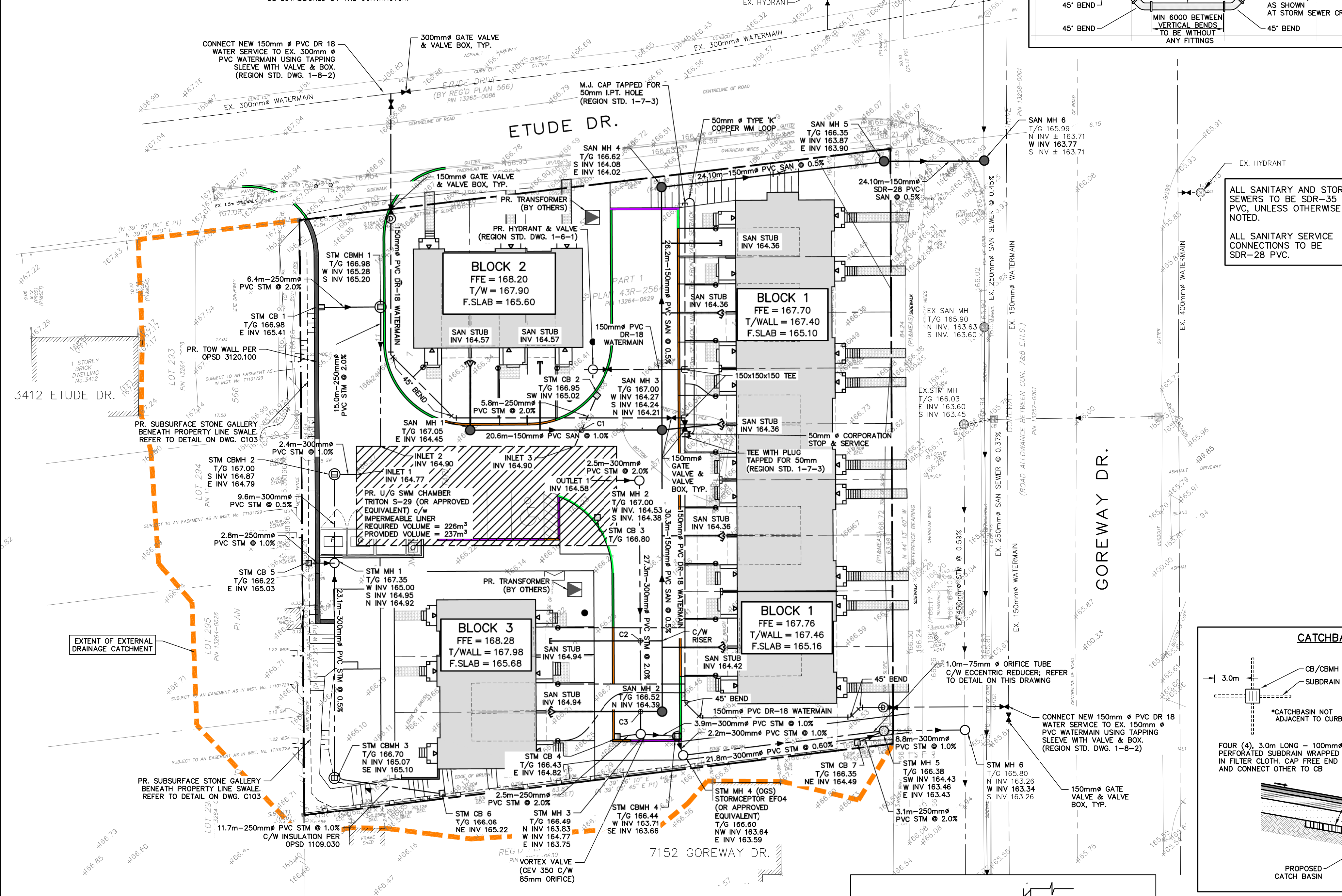
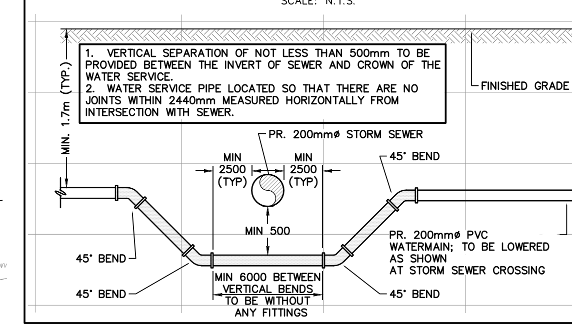
DRAWINGS & FIGURES



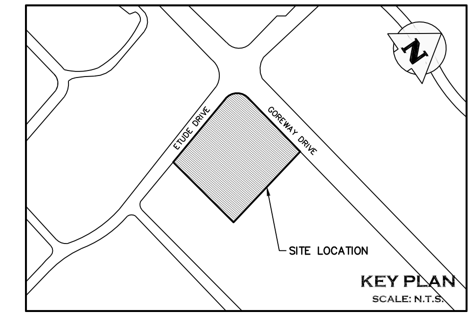
REGION OF PEEL NOTES:

1. ALL MATERIALS AND CONSTRUCTION METHODS MUST CORRESPOND TO THE CURRENT PEEL PUBLIC WORKS STANDARDS AND SPECIFICATIONS.
2. WATERMAIN AND/OR WATER SERVICE MATERIALS 100mmø (4") AND LARGER MUST BE PVC DR–18 (AWWA C900–16). SIZE 50mmø (2") AND SMALLER MUST BE COPPER TYPE 'K' (ASTM–B88–49)
3. WATERMAINS AND/OR WATER SERVICES ARE TO HAVE A MINIMUM COVER OF 1.7m (5'6") WITH A MINIMUM HORIZONTAL SPACING OF 1.2m (4') FROM THEMSELVES AND ALL OTHER UTILITIES.
4. PROVISIONS FOR FLUSHING WATER LINE PRIOR TO TESTING, ETC., MUST BE PROVIDED WITH AT LEAST A 50mmø (2") OUTLET ON 100mmø (4") AND LARGER LINES. COPPER LINES ARE TO HAVE FLUSHING POINTS AT THE END, THE SAME SIZE AS THE LINE. THEY MUST ALSO BE HOSED OR PIPED TO ALLOW WATER TO DRAIN ONTO A PARKING LOT OR DOWN A DRAIN. ON FIRE LINES, FLUSHING OUTLET TO BE 100mmø (4") MINIMUM ON A HYDRANT.
5. ALL CURB STOPS TO BE 3.0m(10') OFF THE FACE OF THE BUILDING UNLESS OTHERWISE NOTED.
6. HYDRANT AND VALVE SET TO REGION STANDARD 1–6–1 DIMENSION 'A' & 'B', 0.7m (2') AND 0.9m (3') AND TO HAVE PUMPER NOZZLE.
7. WATERMAINS TO BE INSTALLED TO GRADES SHOWN ON APPROVED SITE PLAN. COPY OF GRADE SHEET MUST BE SUPPLIED TO INSPECTOR PRIOR TO COMMENCEMENT OF WORK, WHERE REQUESTED BY INSPECTOR.
8. WATERMAINS MUST HAVE A VERTICAL CLEARANCE OF 0.3m (12") OVER / 0.5m (20") UNDER SEWERS AND ALL OTHER UTILITIES WHEN CROSSING.
9. ALL PROPOSED WATER PIPING MUST BE ISOLATED FROM EXISTING LINES IN ORDER TO ALLOW INDEPENDENT PRESSURE TESTING AND CHLORINATING FROM EXISTING SYSTEMS.
10. ALL LIVE TAPPING AND OPERATION OF REGION WATER VALVES SHALL BE ARRANGED THROUGH THE REGIONAL INSPECTOR ASSIGNED, OR BY CONTACTING THE OPERATIONS AND MAINTENANCE DIVISION.
11. LOCATION OF ALL EXISTING UTILITIES IN THE FIELD TO BE ESTABLISHED BY THE CONTRACTOR.
12. THE CONTRACTOR(S) SHALL SHALL BE SOLELY RESPONSIBLE FOR LOCATES, EXPOSING, SUPPORTING AND PROTECTING OF ALL UNDERGROUND AND OVERHEAD UTILITIES AND STRUCTURESEXISTING AT THE TIME OF CONSTRUCTION IN THE AREA OF THEIR WORK. WHETHER SHOWN ON THE PLANS OR NOT AND FOR ALL REPAIRSAND CONSEQUENCES RESULTING FROMDAMAGE TO SAME.
13. THE CONTRACTOR(S) SHALL BE SOLELY RESPONSIBLE TO GIVE 72 HOURS WRITTEN NOTICE TO UTILITIES PRIOR TO CROSSING SUCH UTILITIES, FOR THE PURPOSE OF INSPECTION BY THE CONCERNED UTILITY. THIS INSPECTION WILL BE FOR THE DURATION OF THE CONSTRUCTION, WITH THE CONTRACTOR RESPONSIBLE FOR ALL COSTS ARISING FROM SUCH INSPECTION.
14. ALL PROPOSED WATER PIPING MUST BE ISOLATED THROUGH A TEMPORARY CONNECTION THAT SHALL INCLUDE AN APPROPRIATE CROSS–CONNECTION CONTROL DEVICE, CONSISTENT WITH DEGREE OF HAZARD, FOR BACKFLOW PREVENTION OF THE ACTIVE DISTRIBUTION SYSTEM, CONFORMING TO REGION OF PEEL STANDARDS 1–7–7 OR 1–7–8.

WATERMAIN LOWERING DETAIL
SCALE: N.T.S.



1. VERTICAL SEPARATION OF NOT LESS THAN 500mm TO BE PROVIDED BETWEEN THE INVERT OF SEWER AND CROWN OF THE WATER SERVICE.
2. WATER SERVICE PIPE LOCATED SO THAT THERE ARE NO JOINTS WITHIN 2440mm MEASURED HORIZONTALLY FROM INTERSECTION WITH SEWER.



KEY PLAN
SCALE: N.T.S.

CONTRACTOR TO ENSURE MINIMUM 0.50m VERTICAL CLEARANCE BETWEEN THE EXTERIOR OF THE WATERMAIN PIPE AND THE EXTERIOR OF SEWER PIPES.

IN CASE OF CONFLICT BETWEEN THE PROPOSED WATERMAIN AND THE PROPOSED SEWERS, CONTRACTOR TO LOWER THE WATERMAIN UNDER THE SEWER PIPE TO ENSURE MINIMUM 0.50m CLEARANCE BETWEEN THE EXTERIOR OF THE PIPES.

ALL SANITARY AND STORM SEWERS TO BE SDR–35 PVC, UNLESS OTHERWISE NOTED.

ALL SANITARY SERVICE CONNECTIONS TO BE SDR–28 PVC.

LEGEND

- PROPERTY LINE
- EXISTING WATERMAIN & GATE VALVE
- EXISTING STORM SEWER & MANHOLE
- EXISTING SINGLE / DOUBLE CATCHBASIN
- EXISTING SANITARY SEWER & MANHOLE
- EXISTING FIRE HYDRANT & GATE VALVE
- PROPOSED WATERMAIN & GATE VALVE
- PROPOSED WATER SERVICE LATERAL (25mmø)
- PROPOSED FIRE HYDRANT & GATE VALVE
- PROPOSED DETECTOR CHECK VALVE IN CHAMBER INSTALLED PER REGION STD. 1–3–1
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN
- PROPOSED SANITARY SEWER & MANHOLE
- PROPOSED SAN. SERVICE LATERAL (125mmø)
- PROPOSED LIGHT STANDARD (BY OTHERS)

ALL CATCHBASIN GRATES WITHIN ROAD TO BE OPSD 400.02

ALL CATCHBASIN GRATES WITHIN LANDSCAPED AREAS/ SWALE TO BE OPSD 400.12

STORM STRUCTURE TABLE

STORM I.D.	SIZE	SPEC.
STM MH 1	1200mmø	OPSD 701.010
STM MH 2	1200mmø	OPSD 701.010
STM MH 3	1200mmø	OPSD 701.010
STM MH 4 (OGS)	STORMCEPTOR EF4 (OR APPROVED EQUIVALENT)	
STM MH 5	1200mmø	OPSD 701.010
STM MH 6	1200mmø	OPSD 701.010
STM CBMH 1	1200mmø	OPSD 701.010
STM CBMH 2	1200mmø	OPSD 701.010
STM CBMH 3	1200mmø	OPSD 701.010
STM CBMH 4	1200mmø	OPSD 701.010
STM CB 1	600mm x 600mm	OPSD 705.010
STM CB 2	600mm x 600mm	OPSD 705.010
STM CB 3	600mm x 600mm	OPSD 705.010
STM CB 4	600mm x 600mm	OPSD 705.010
STM CB 5	600mm x 600mm	OPSD 705.010
STM CB 6	600mm x 600mm	OPSD 705.010
STM CB 7	600mm x 600mm	OPSD 705.010

SANITARY STRUCTURE TABLE

SAN I.D.	SIZE	SPEC.
SAN MH 1	1200mmø	R.O.P. 2–5–3
SAN MH 2	1200mmø	R.O.P. 2–5–3
SAN MH 3	1200mmø	R.O.P. 2–5–3
SAN MH 4	1200mmø	R.O.P. 2–5–3
SAN MH 5	1200mmø	R.O.P. 2–5–3
SAN MH 6	1200mmø	R.O.P. 2–5–3

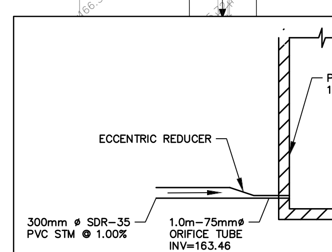
CROSSINGS

ID	UPPER		LOWER		SEP.
	TYPE	EL.(m)	TYPE	EL.(m)	(m)
C1	STM INV	164.94	SAN OBV	164.51	0.43
C2	SAN INV	164.84	STM OBV	164.34	0.50
C3	SAN INV	164.64	STM OBV	164.14	0.50

CATCHBASIN SUBDRAIN DETAIL
SCALE: N.T.S.

NOTES:
1. SUBDRAIN SHALL BE 100mmø PERFORATED PLASTIC WRAPPED IN GEOTEXTILE AND CLEARSTONE (UNLESS NOTED OTHERWISE).
2. SUBDRAIN SHALL BE PLACED WITHIN SUBGRADE AND HAVE POSITIVE DRAINAGE TOWARDS CATCHBASIN.

GROUNDWATER DISCHARGE/ TREATMENT SYSTEM TO BE DESIGNED BY MECHANICAL CONSULTANT/ TREATMENT SYSTEM MANUFACTURER INCLUDING QUALITY TREATMENT TO ENSURE GROUNDWATER QUALITY MEETS THE CITY'S SEWER DISCHARGE BY–LAWS. GROUNDWATER TO DISCHARGE TO MUNICIPAL SANITARY SEWER NETWORK.



ORIFICE TUBE DETAILS
SCALE N.T.S.

SCALE: 1:250

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PROJECT No.: 17–089

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SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY JARDIN DESIGN GROUP INC.
DRAWING No.: A–01a, REV.7 (2021/MAY/26)
PROJECT No.: 17–18

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EXISTING INVERTS FROM AS–BUILT DRAWINGS 20065–D, 40529–D

Region of Peel
Working for you

MISSISSAUGA

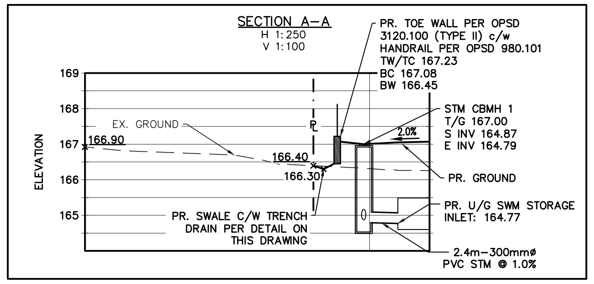
Project
7170 GOREWAY DRIVE
CITY OF MISSISSAUGA

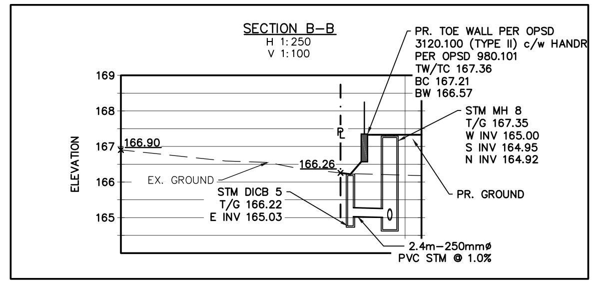
Drawing
SITE SERVICING PLAN

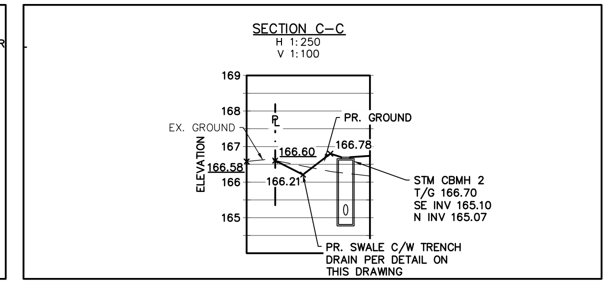
Stamp
LICENSED PROFESSIONAL ENGINEER
N. CONSTANTIN
100073636
2021.06.24
PR.1346-4573
PROVINCE OF ONTARIO

CROZIER
CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

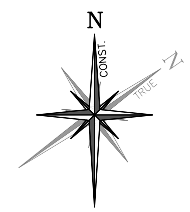
Drawn	Design	Project No.	
D.D.	H.L. / N.R.S.	1346–4573	
Check N.R.S.	Check N.C.	Scale 1:250	Dwg. C 102

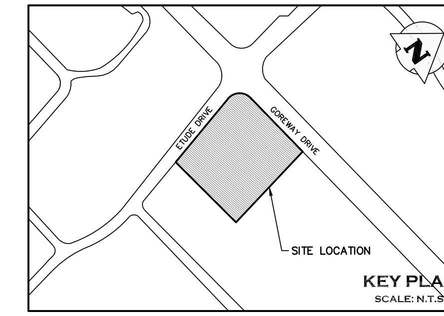


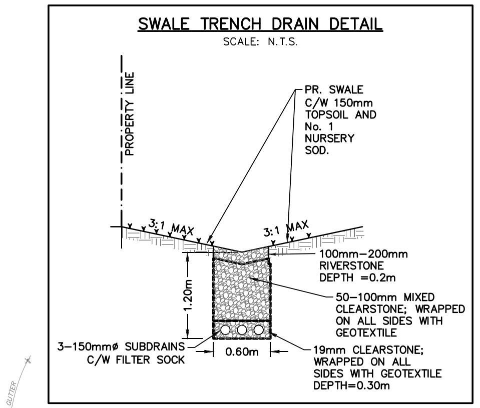




PR. SWALE TO BE C/W TRENCH DRAIN PER DETAIL ON THIS DRAWING

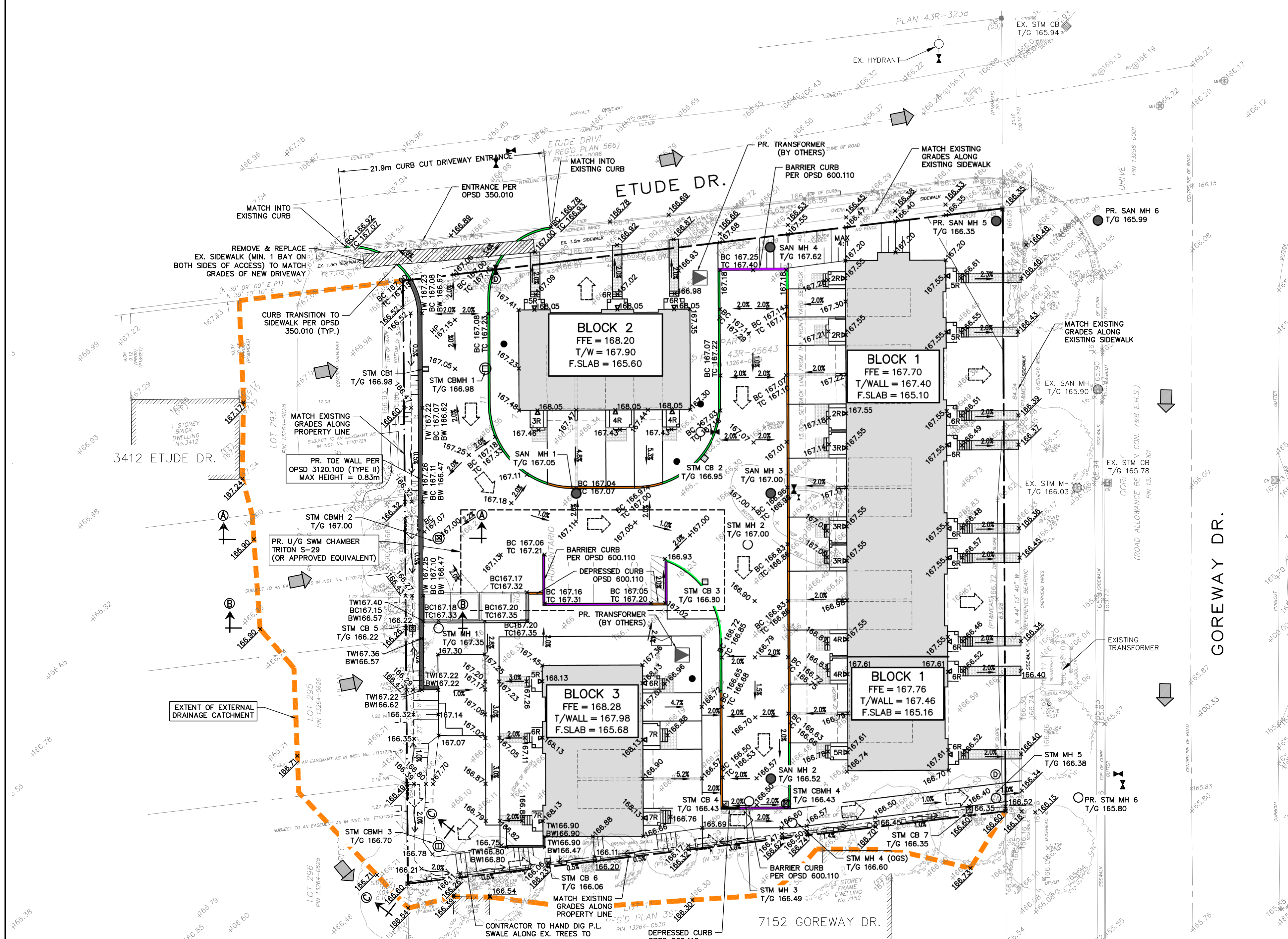






LEGEND

	PROPERTY LINE
	EXISTING CONTOUR (0.5m)
	EXISTING CONTOUR (1.0m)
	EXISTING FENCE
HP	EXISTING HYDRO POLE
215.00	EXISTING GRADE
215.00	PROPOSED GRADE
215.00	PROPOSED GRADE (TO MATCH EXISTING)
	BUILDING ENTRANCE (PERSONNEL DOOR)
	PROPOSED MAJOR OVERLAND FLOW DIRECTION
	EXISTING MAJOR OVERLAND FLOW DIRECTION
	EXISTING DRAINAGE CATCHMENTS
	PROPOSED RETAINING WALL
	PROPOSED SLOPING (MAX 3:1)
	PROPOSED CURB & GUTTER (OPSD 600.040)
	PROPOSED DEPRESSED CURB & GUTTER (OPSD 600.040)
	PROPOSED BARRIER CURB (OPSD 600.110)
	PROPOSED LIGHT STANDARD (BY OTHERS)
	PROPOSED WOOD PRIVACY FENCE (BY OTHERS)



ALL CURBS ARE CURB & GUTTER PER OPSD 600.040 UNLESS OTHERWISE NOTED ON THIS PLAN. CURBS TO BE DEPRESSED FRONTING UNITS AS SHOWN ON THIS PLAN.

5 0m 5 10 15 20
SCALE: 1:250

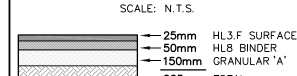
DRIVEWAY AND CONDOMINIUM ROAD PAVEMENT STRUCTURES PER CITY OF MISSISSAUGA TRANSPORTATION AND WORKS DEPARTMENT DEVELOPMENT REQUIREMENTS MANUAL, SECTION 6.

CONTRACTOR TO PROVIDE ALL TOPSOIL WITH 450mm DEPTH TO SATISFY WATER BALANCE.

WHERE RETAINING WALL HEIGHT EXCEEDS 0.60m, A PEDESTRIAN HANDRAIL PER OPSD 980.101 SHALL BE INSTALLED ON TOP OF RETAINING WALL.

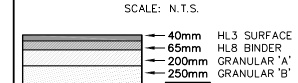
DRIVEWAY PAVEMENT

SCALE: N.T.S.



CONDOMINIUM ROAD PAVEMENT

SCALE: N.T.S.



I HAVE REVIEWED THE PLANS FOR THE CONSTRUCTION OF THE PROPOSED DEVELOPMENT LOCATED AT 7170 GOREWAY DRIVE, MISSISSAUGA, ONTARIO AND HAVE PREPARED THIS PLAN TO INDICATE THE COMPATIBILITY OF THE PROPOSAL TO EXISTING ADJACENT PROPERTIES AND MUNICIPAL SERVICES. IT IS MY BELIEF THAT ADHERENCE TO THE PROPOSED GRADES, AS SHOWN, WILL PRODUCE ADEQUATE SURFACE DRAINAGE AND PROPER FACILITY OF THE MUNICIPAL SERVICES WITHOUT ANY DETRIMENTAL EFFECT TO THE EXISTING DRAINAGE PATTERNS OR ADJACENT PROPERTIES.

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ELEVATION = 162.55m

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SITE PLAN NOTES:

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DRAWING No.: A-01a, REV.7 (2021/MAY/26)
PROJECT No.: 17-18

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EXISTING INVERTS FROM AS-BUILT DRAWINGS 20065-D, 40529-D

Region of Peel
Working for you

MISSISSAUGA

Project
7170 GOREWAY DRIVE
CITY OF MISSISSAUGA

Drawing
SITE GRADING PLAN

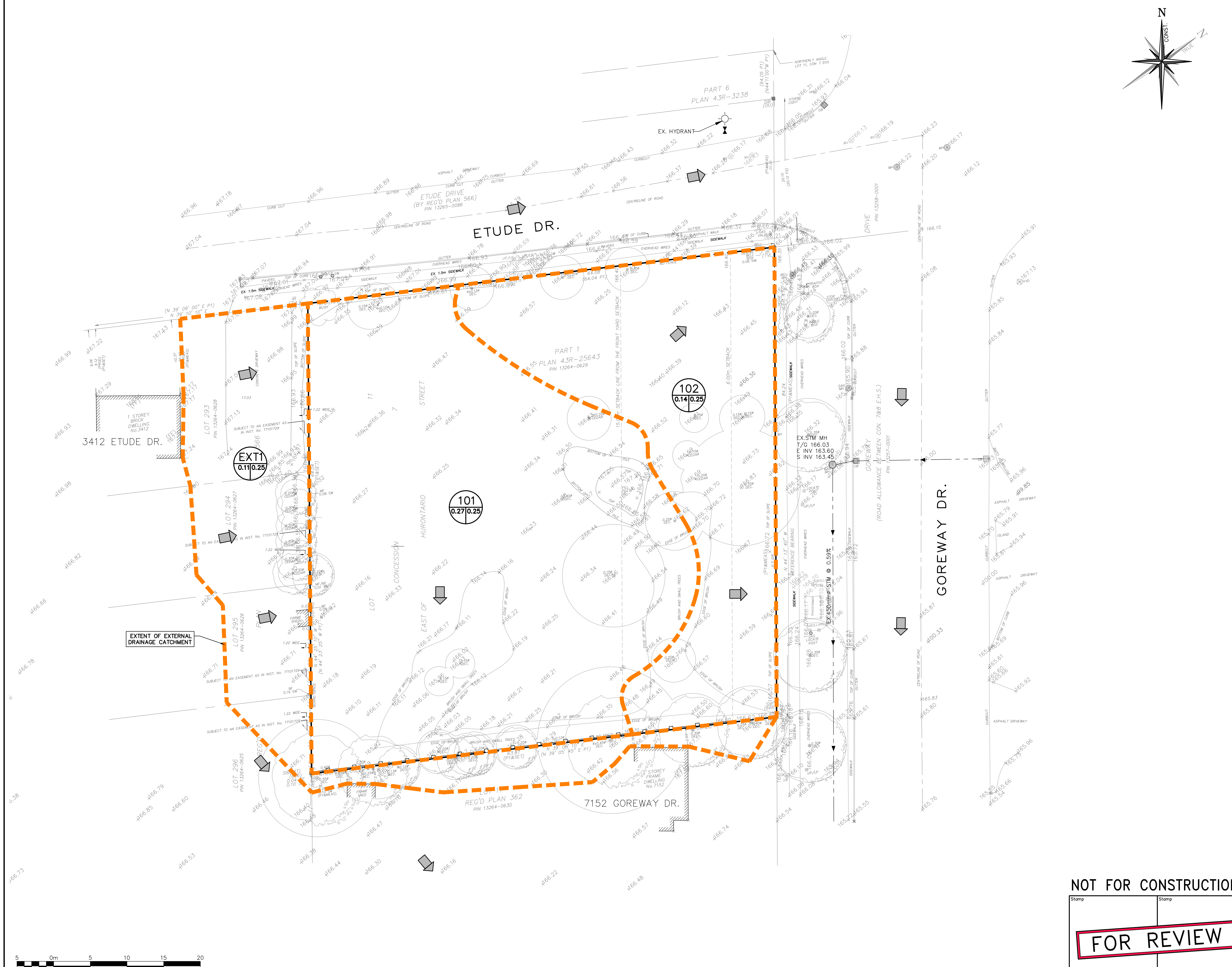
NOT FOR CONSTRUCTION

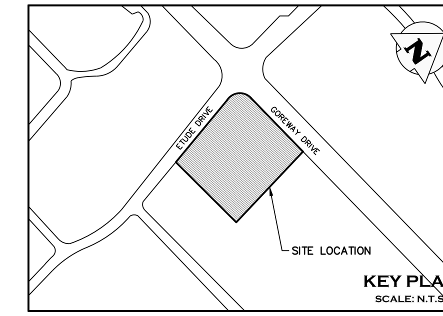
Stamp

Stamp
LICENSED PROFESSIONAL ENGINEER
N. CONSTANTIN
100073636
2021.06.24
PR.1346-4573
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	D.D.	Design	H.L. / N.R.S.	Project No.	1346–4573
Check	N.R.S.	Check	N.C.	Scale 1:250	Dwg. C 103





LEGEND

— — · —	PROPERTY LINE
× 215.00	EXISTING GRADE
▬ ▬ ▬	EXISTING DRAINAGE CATCHMENTS
ID / A | RC	EXISTING DRAINAGE CATCHMENT I.D. AREA (ha) | RC
⇨	EXISTING DRAINAGE DIRECTION

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SURVEY COMPLETED J.H. GELBLOOM SURVEYING LIMITED. (2017/MAY/08)
PROJECT No.: 17-089

BEARINGS ARE UTM GRID, DERIVED FROM RTN OBSERVATIONS
UTM ZONE 17, NAD83 (GSRS) (2010.0)

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.9996781

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY JARDIN DESIGN GROUP INC.
DRAWING No.: A-01a, REV.7 (2021/MAY/26)
PROJECT No.: 17-18

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.
EXISTING INVERTS FROM AS-BUILT DRAWINGS 20065-D, 40529-D

Region of Peel
Working for you

MISSISSAUGA

Project

7170 GOREWAY DRIVE
CITY OF MISSISSAUGA

Drawing

PRE-DEVELOPMENT DRAINAGE PLAN

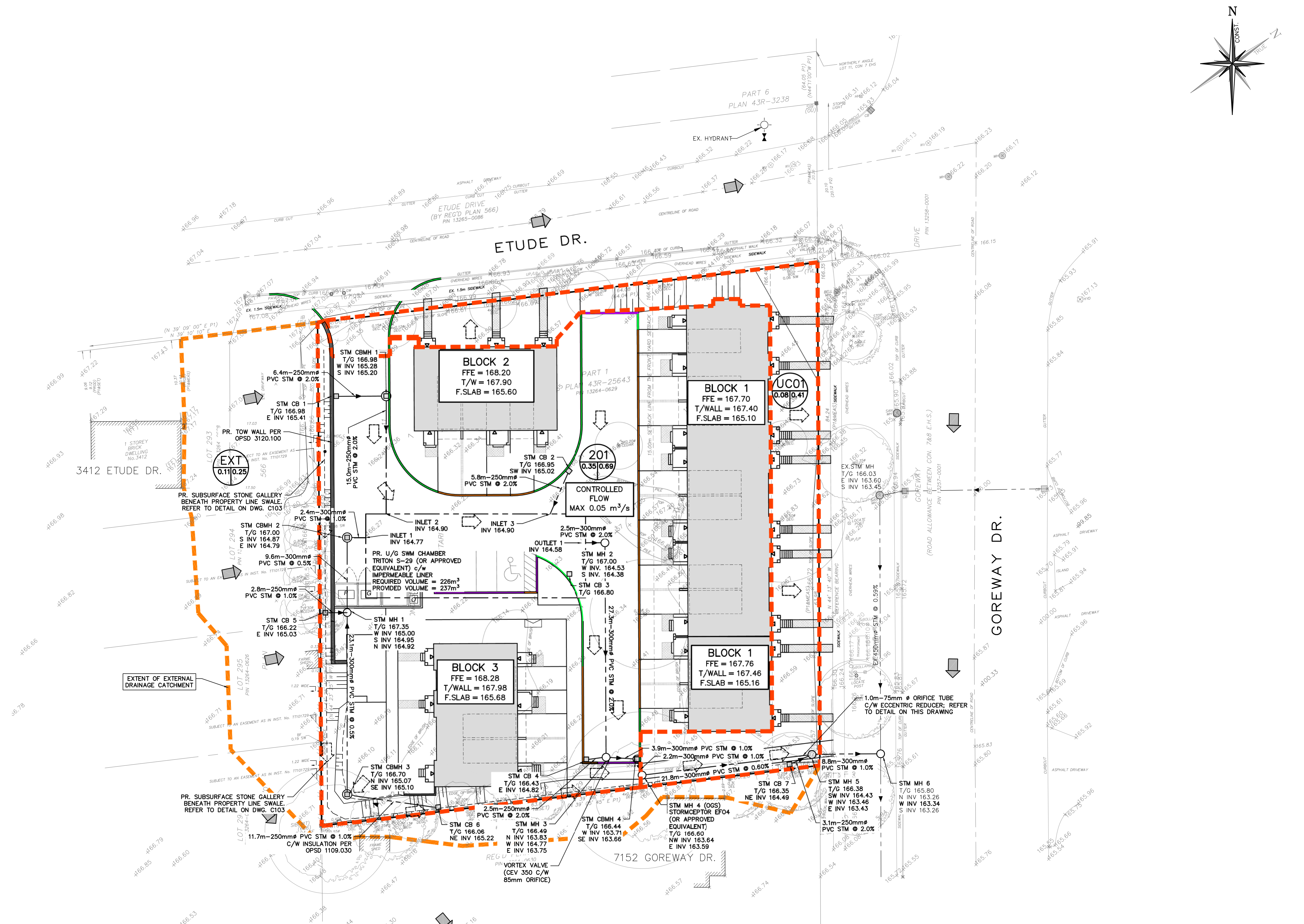
NOT FOR CONSTRUCTION

Stamp | Stamp

FOR REVIEW

CROZIER
CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

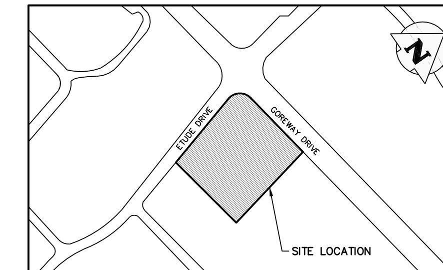
Drawn D.D.	Design H.L. / N.R.S.	Project No. 1346-4573	
Check N.R.S.	Check N.C.	Scale 1:250	Dwg. FIG. 1



NOT FOR CONSTRUCTION

FOR REVIEW

SCALE: 1:250



KEY PLAN
SCALE: N.T.S.

LEGEND

- PROPERTY LINE
- EXISTING GRADE
- PROPOSED DRAINAGE CATCHMENTS
- EXISTING DRAINAGE CATCHMENTS
- CATCHMENT I.D. / AREA (ha) | % IMP
- PROPOSED OVERLAND FLOW DIRECTION
- EXISTING DRAINAGE DIRECTION

No.	ISSUE / REVISION	YYYY/MMM/DD
0	ISSUED FOR 1st SUBMISSION SPA	2021/JUN/24

ELEVATION NOTE:

ELEVATIONS SHOWN HEREON ARE DERIVED FROM THE CANADIAN GEODETIC DATUM BENCHMARK No. 448

ELEVATION = 162.55m

SURVEY NOTES:

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Drawn	D.D.	Design	H.L. / N.R.S.	Project No.	1346-4573
Check	N.R.S.	Check	N.C.	Scale 1:250	Dwg. FIG. 2