FUNCTOINAL SERVICING AND STORMWATER MANAGEMENT REPORT

PROPOSED RESIDENTIAL DEVELOPMENT AT 1583 CORMACK CRESCENT

ELM CORMACK (2017) INC.

CITY OF MISSISSAUGA
Project: 2018-4679 **MAY 2019**

Revision	Description	Prepared		Checked	
		By	Date	By	Date
0.	Original Report Issued for SPA	Y. Gollamudi J. Pathmanapan	May 2019	K. Shahbikian	May 2019

SCHAEFFERS
CONSULTING ENGINEERS
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Concord, Ontario L4K 4R3

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SCHAEFFERS

1.0 INTRODUCTION

1.1 Objective

This Functional Servicing and Stormwater Management Report is provided in support of the proposed residential development located at 1583 Cormack Crescent in the City of Mississauga and prepared at the request of ELM Cormack (2017) Inc. The property is legally defined as Lot 5, Concession 2, south of Dundas Street, City of Mississauga, Regional Municipality of Peel.

Based on the new property line, further to the 2.14m road widening on Cormack Crescent, the property is 0.86ha. It is located within the boundaries of Marionville Drive to the north east, Queen Elizabeth Way South Service Road to the north west, and Cormack Crescent to the south west, as shown in **Figure 1.1**.

This report evaluates the existing and proposed water supply, sanitary and stormwater management services within and surrounding the subject property, thereby demonstrating the viability of the proposed development.

1.2 Existing Conditions/Site Constraints

Presently there is an existing private school on the site. According to the site plan drawing for the private school presented in **Appendix A**, the sanitary service connection and water service connection for the private school were provided on Cormack Crescent.

According to the Region of Peel soil map, the predominant type of soil on the site is sand. The sandy soil conditions on site were confirmed by the borehole logs presented in Phase 2 Environmental Site Assessment (ESA) which was completed by Toronto Inspection Geo Environmental Consultants . The borehole logs for the site are presented in **Appendix A** for your review.

The property on the north east side of the subject site was recently developed by others (S.P.12/168W1) and according to the storm drainage plan for the development, the subject site and property to the west of the subject site is considered with a runoff coefficient of 0.40. Please refer to

the storm drainage plan (DWG No. 208-M140-4) in **Appendix A** for further details.

W:\4600's\4679 - 1583 Cormack Crescent\Drawings\Servicing\2019-01-29-4679-Servicing.dwg

Phil Gotfried

1583 CORMACK CRESCENT

LEGEND

SITE LOCATION

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6 Ronrose Drive, Concord, Ontario L4K 4R3
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FIGURE 1.1
LOCATION PLAN

2018-4679	FEBRUARY 2019	SCALE: N.T.S.

1.3 Proposed Development Plan and Population

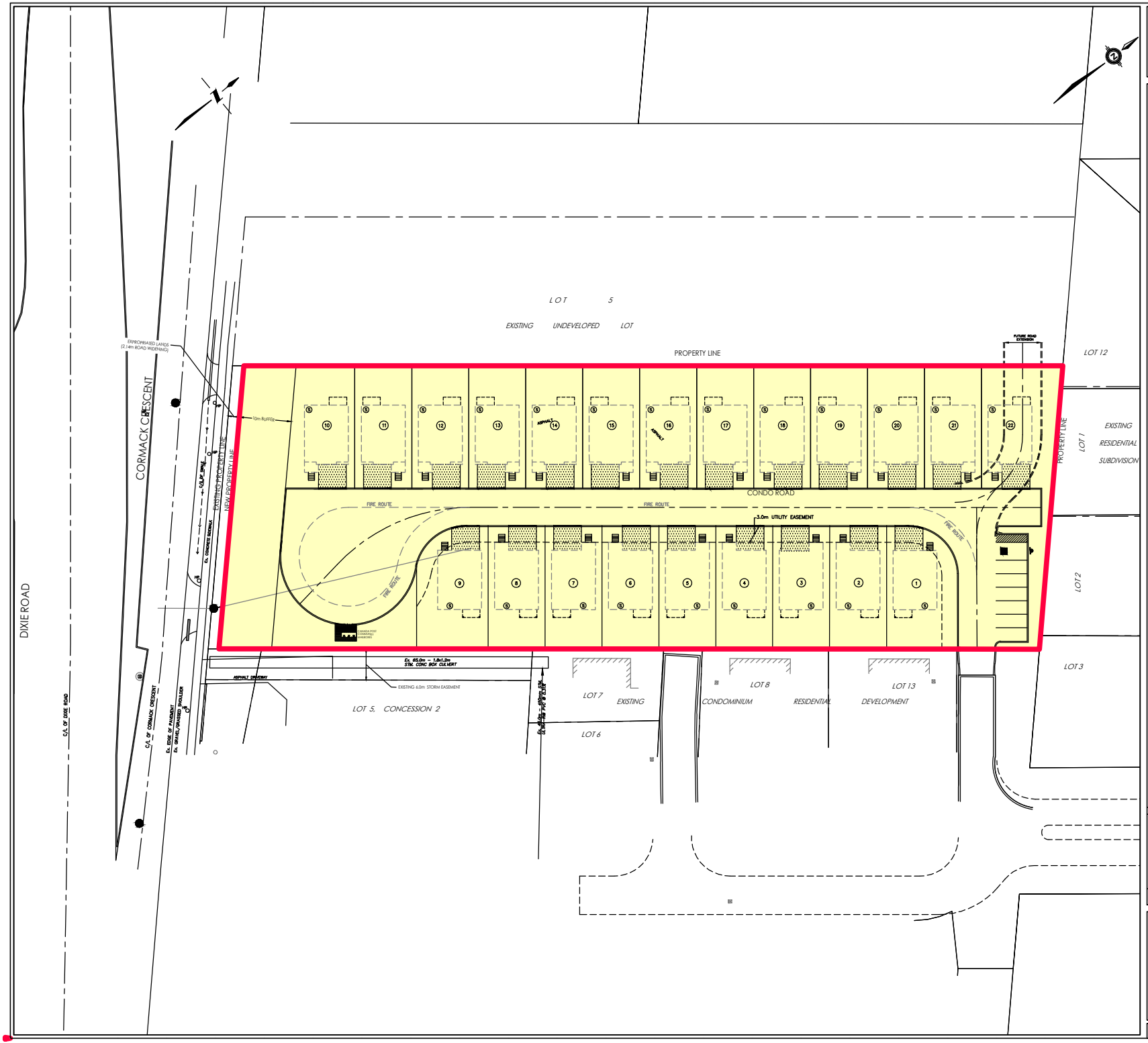
The subject site has an area of 0.86ha (**Figure 1.2**) and is proposed to consist of 22 single detached houses (10.93m frontage). The Region of Peel guidelines for sanitary sewer and water supply design recommends a population density of 50 persons/hectare for single family houses with greater than 10m frontage. Based on this criteria, the design population for the site is 30 persons, as shown in **Table 1.1.**

Table 1.1: Estimated Population Summary

Land Use	Criteria (Population/ha)	Area (ha)	Population
Residential – Single Family (greater than 10m frontage)	50	0.59	30

Based on preliminary consultation with the municipality, a future road connection is shown on **Figure 1.2** to allow for road connectivity to future developments. For the purpose of SWM, sanitary and water calculations, lot 22 was considered a single family residential block since the imperviousness is similar to the imperviousness of the future road connection. Imperviousness calculations are provided in **Appendix D** for reference.

Pavel Recnik



1583 CORMACK CRESCENT

LEGEND

SITE LOCATION

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FIGURE 1.2
PROPOSED
DEVELOPMENT PLAN

2018-4679	MAY 2019	SCALE: N.T.S.

2.0 WATER SUPPLY

2.1 Existing Water Supply Services

The subject property is located within the South Peel Water Supply System Pressure Zone 2. Zone 2 is serviced by the Streetsville Reservoir and Pumping Station. Based on information received from the Region of Peel, the following watermains exist in the vicinity of the site:

- a 450mm diameter C.I watermain along Cormack Crescent;
- an abandoned 300mm diameter PVC watermain along Cormack Crescent;

The existing private school on the subject property is connected to the 450mm diameter watermain on Cormack Crescent through a 200mm water service connection. Existing water supply infrastructure can be seen schematically on **Figure 2.1**.

2.2 Design Criteria

The proposed water supply scheme will be designed in accordance with the Region of Peel design criteria for water systems. The following summarizes typical residential-use design criteria.

- The system shall be designed to provide sufficient flow and pressure to meet the greater of the Maximum Daily Demand Plus Fire Flow or the Maximum Hourly Demand;
- Average Daily Demand of 0.280 m^3/capita/day for residential areas;
- Maximum Daily Demand and Peak Hourly Demand factors shall be 2.0 and 3.0, respectively;
- Minimum watermain size of 150mm for residential areas;
- Operating pressure requirements are noted as follows:

Description	Pressure
Minimum Pressure	275 kPa (40 psi)
Maximum Pressure	690 kPa (100 psi)

- The dead ends shall be minimized by looping all watermains.
- Fire Flows in accordance with Water Supply for Public Fire Protection Survey;

2.3 Proposed Water Supply

Based on the Region of Peel's design criteria for water supply, the population of the site is 30 persons (as shown in **Table 1.1**). For a population of 30, the Average Daily Demand (based on 0.280 m^3/capita/day) will be 0.10L/s.

The Maximum Daily Demand and Peak Hour Demand are calculated as 0.19L/s and 0.29 L/s respectively, based on the prescribed peaking factors. **Table 2-1** summarizes the estimated potable water demand.

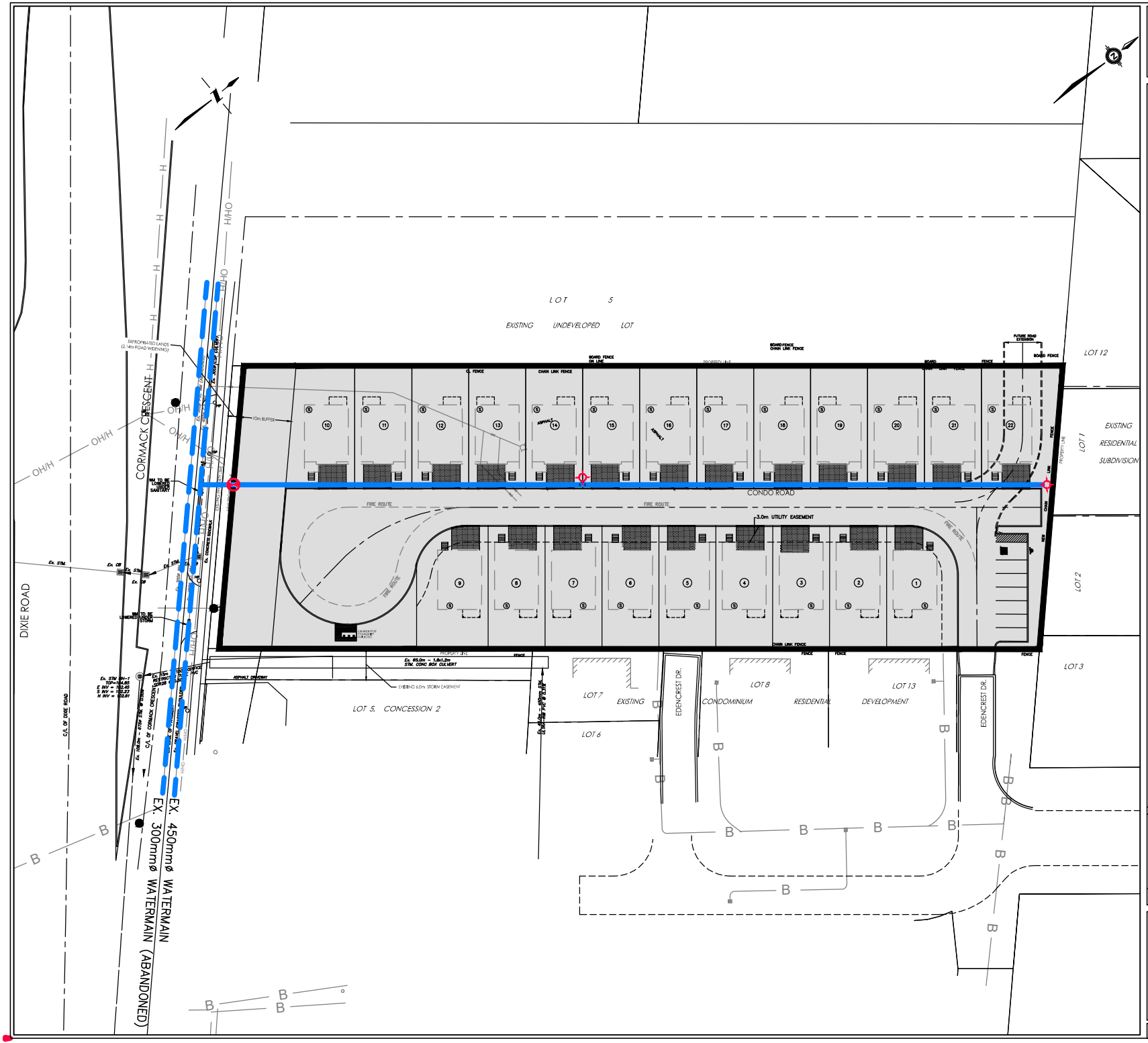
Table 2.1: Summary of Estimated Potable Water Demand

Land Use	Population	Average Daily Demand (L/s)[1]	Maximum Daily Demand (L/s)[2]	Peak Hour Demand (L/s)[3]
Residential	30	0.10	0.19	0.29

1. Based on 0.280 m^3/capita/day
2. Based on a Max Day Factor of 2.0
3. Based on a Peak Hour Factor of 3.0

It is proposed that the subject site be serviced via connection to the existing 450mm watermain along Cormack Crescent. A preliminary servicing scheme is illustrated in **Figure 2.1**. It is anticipated that sufficient capacity and pressure will be available to service the proposed development. Hydrant testing should be conducted to verify the adequacy of the water supply service.

Farzad Fahimi



1583 CORMACK CRESCENT

LEGEND

SITE LOCATION

PROPOSED WATERMAIN

EXISTING WATERMAIN

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FIGURE 2.1
EXISTING & PROPOSED
WATER SUPPLY SERVICING

2018-4679	MAY 2019	SCALE: N.T.S.

3.0 SANITARY SERVICING

3.1 Existing Sanitary Infrastructure

Based on information received from the Region of Peel, there is an existing 250mm sanitary sewer on Cormack Crescent. Existing sanitary sewers are shown schematically in **Figure 3.1**. These sewers are intended to convey sanitary flows from the subject lands and adjacent developments to the Lakeview Wastewater Treatment Plant.

The existing private school is connected to the sanitary sewer on Cormack Crescent through a 150mm sanitary lateral connection.

3.2 Design Criteria

The proposed sanitary servicing of the subject site will be designed in accordance with the Region of Peel's "Public Works Design, Specifications and Procedures Manual". These criteria, where applicable to the proposed development, are summarized below.

- The design flow is equal to the Average Dry Weather Flow multiplied by the Average Peak Sanitary Flow Factor, plus the Infiltration Allowance;
- The Average Dry Weather Flow is based on 302.8 L/capita/day;
- If the population is less than 1000 persons, the domestic sewage flow shall be 13L/s plus the infiltration allowance
- For residential areas, the peak sanitary flow factor is based on the Harmon formula ($M = 1 + 14/(4 + P^{0.5})$, where P is population in thousands;
- Except under unusual circumstances, infiltration allowance shall be determined at 0.2×10^{-3} $m^3/s/ha$ for all types of land use;
- Determination of pipe sizes and capacities to be based on Region of Peel standard drawing SD-2-9-3 or use Manning's Formula;
- For residential areas, minimum pipe size shall be 250mm in diameter;
- Maximum velocity shall not be greater than 3.50 m/s with pipe flowing full, and minimum

velocity shall not be less than 0.75 m/s at actual flow; and

- The top of the sewer pipe shall be a minimum of 2.5 meters below the centre line of the road allowance.

3.3 Proposed Sanitary Servicing

The subject development is proposed to be serviced via connection to the existing 250mm sewer along the Cormack Crescent (**Figure 3.1**).

Based on Region of Peel design criteria, the equivalent population for a Junior Public School is 1/3 of the number of students considering a minimum of 600 students. Hence, the existing school's equivalent population (for sanitary design) is estimated to be at least 200. Since, the estimated population of the proposed development is less than the existing private school, the anticipated design flow rates for the proposed development are expected to be less than the flow rates for the existing school. Therefore, no constraints are expected on the downstream sanitary sewers.

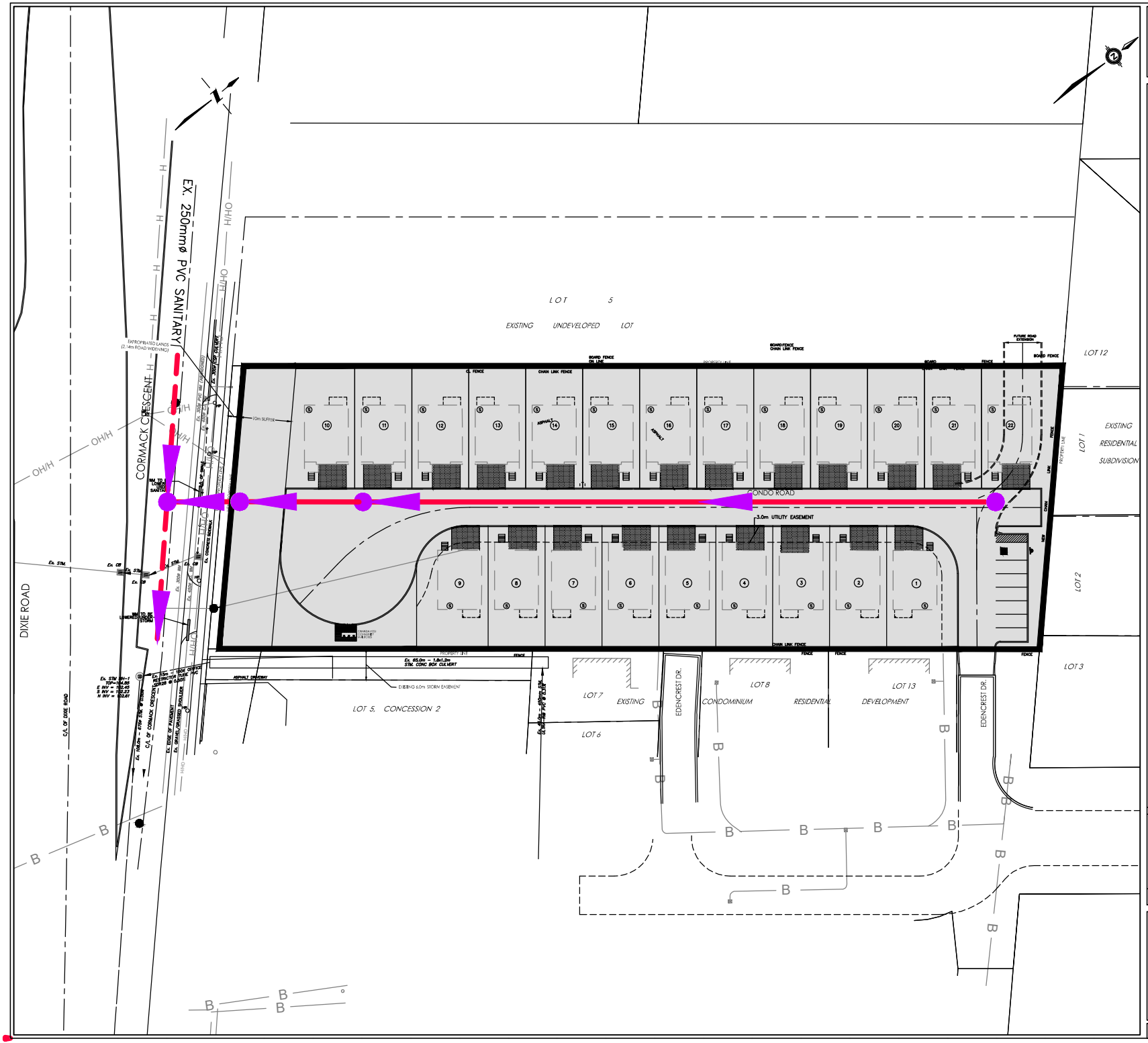
According to the Region of Peel STD.DWG.2-9-2, the domestic sewage flow for populations less than 1000 persons, shall be 0.013m^3/s plus the infiltration allowance. **Table 3.1** summarizes the estimated sanitary flow demands.

Table 3.1: Summary of Estimated Sanitary Flows

Land Use	Area (ha)	Expected Population (1)	Average Sewage Flow (2) (L/s)	Infiltration Inflow (3) (L/s)	Estimated Total Flow (L/s)
Residential	0.86	30	13	0.17	13.17

(1) From Table 1.1
(2) According to the Region of Peel STD.DWG.2-9-2
(3) Infiltration rate of 0.2 L/s/ha (Region of Peel Design Criteria)

Farzad Fahimi



1583 CORMACK CRESCENT

LEGEND

SITE LOCATION

PROPOSED SANITARY SEWER

EXISTING SANITARY SEWER

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FIGURE 3.1
EXISTING & PROPOSED
SANITARY SERVICING

2018-4679	MAY 2019	SCALE: N.T.S.

4.0 STORMWATER MANAGEMENT

4.1 Existing Conditions

Presently there is an existing private school on the site. Based on the Region of Peel Soil Map and the borehole logs from the Phase Two Environmental Site Assessment Report, dated November 2017, the predominant type of soil on the site is Sand.

As presented on DWG SS-1, there are two existing storm sewer systems within the vicinity of the site. There is an existing 675 diameter storm sewer which conveys the flows from the recently developed adjacent property. According to the Storm Drainage plan (DWG No. 208-M140-4 presented in **Appendix A**) prepared in support of the adjacent recently developed property the subject site was considered with a runoff coefficient of 0.40.

There is an another existing storm sewer system which collects the flows from the existing ditch and conveys the flows. The existing sewers systems are identified on Figure 4.1.

4.2 Design Criteria

The stormwater flow calculations are based on the following City of Mississauga design criteria:

- Storm sewers shall be designed using Rational Formula; Q = .0028 CIA, where Q is the flow rate in m^3/s, C is the runoff coefficient (dimensionless), I is rainfall intensity in mm/hr and A is area in ha;
- Storm sewer design should be based on City of Mississauga Rainfall Intensity Curves and a minimum time of concentration of 15 min. $I = A/ (T + B)^C$, where I is rainfall intensity in mm/hr, T is time of Concentration in hours (15 mins used), A = 1010, B = 4.6, C = 0.78 for the 10-year storm event;
- Runoff Coefficient:
    - Residential – Single Family 0.55

- Parks and Open Space 0.25

4.3 Proposed Stormwater Management

The proposed stormwater management scheme for the subject development will be designed in accordance with the City of Mississauga's stormwater servicing criteria. It is proposed to control runoff from the site for storms up to and including the 100-year event to pre-development 2-year storm event based on our correspondence with City of Mississauga (Refer to **Appendix A**). This can be accomplished by using a combination of underground storage and a flow restrictor. The following describes the proposed plan for stormwater management.

Both the major and minor flows will be conveyed to the southeast corner of the site where it will connect to the proposed 300mm diameter storm sewer extension along Cormack Crescent as shown on **Figure 4.1.** On-site controls will limit the peak flows to the allowable release rate via the orifice pipe and on-site storage. For more details for on-site control refer to **Section 4.3.1**.

On-site quality controls to provide 'Enhanced' (Level 1) protection are proposed via a treatment train approach (Refer to **Section 4.3.2** for more details). Water Balance and Volumetric Control which involves retention of 5mm on site will be achieved via proposed infiltration bed underneath the storage tank.

Based on our analysis, the average runoff coefficient for the site was determined to be 0.62, with an imperviousness of 60%. Detailed TIMP & XIMP calculations are presented in **Appendix D** for reference.

4.3.1 QUANTITY CONTROL

Allowable Release Rate

The allowable release rate has been determined based on the input received from the City of Mississauga and based on the Storm Drainage plan (DWG No. 208-M140-4) for the property adjacent to the subject site. As per recommendations from the City, post-development flows were controlled to the 2-year pre-development flows. Please refer to **Appendix A** for correspondence with

the City. As previously mentioned, the site adjacent to the subject site considered the subject site for their proposed storm sewers with a runoff coefficient of 0.40.

Therefore, to estimate the appropriate allowable release rate, a runoff coefficient of 0.40 has been used with a 15 minute time of concentration. The allowable release is as summarized in **Table 4.1**

Table 4.1: Allowable Release Rate Summary

Area (ha)	Runoff Coeff. 'C'	Time of Concentration (min.)	2 Year Intensity* (mm/hr)	2-Year Pre-development Peak Flow (m^3/s)
0.857	0.40	15	59.89	0.057

Storage Requirements

On-site controls (i.e. flow reducer and on-site storage) are proposed to reduce post-development 100-year peak flow to the allowable release rate. The rational method was used to estimate the total volume of storage required. **Table 4.2** summarizes the storage requirements. Detailed storage volume calculations are provided in **Appendix D**.

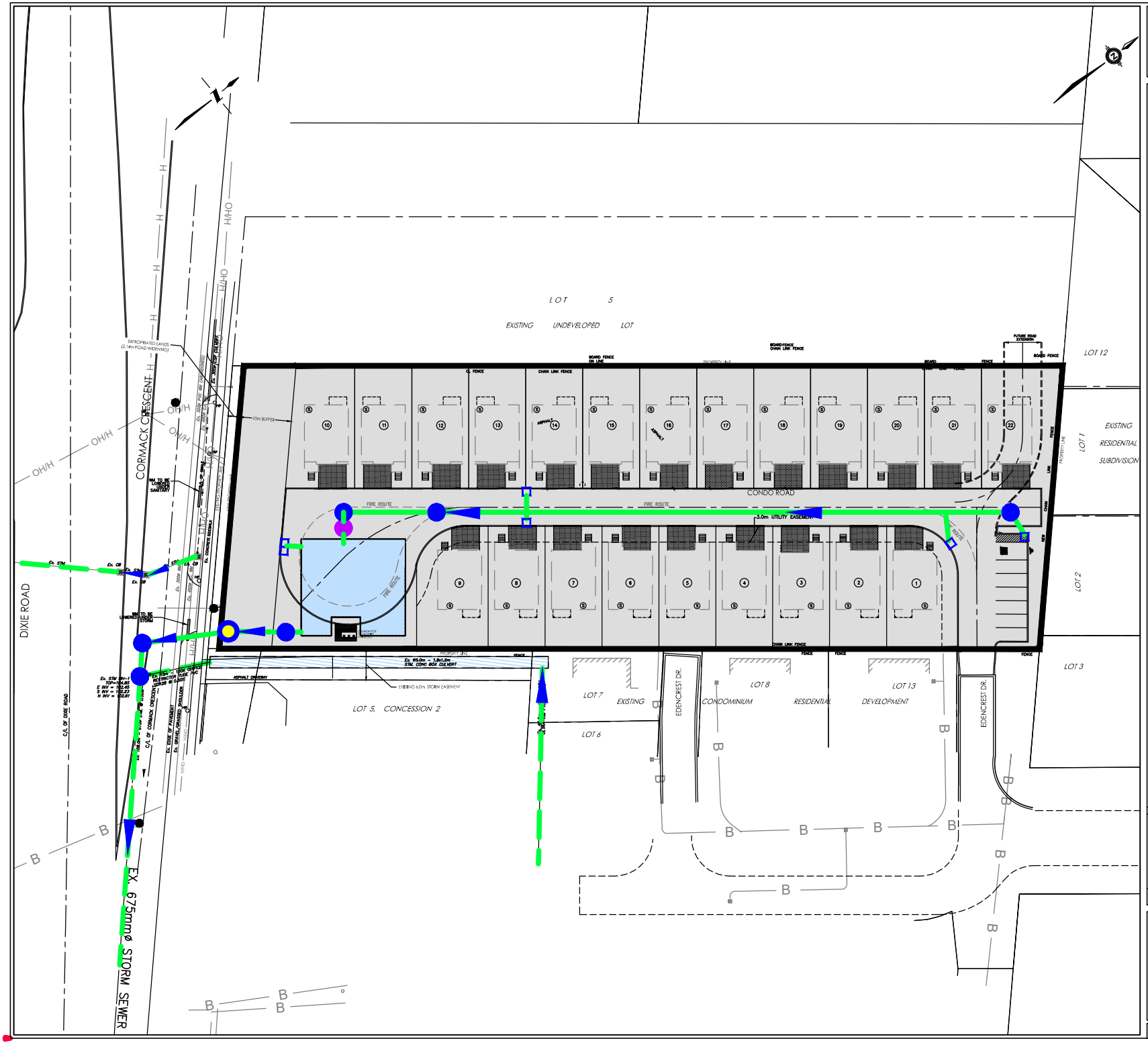
A 150mm diameter orifice tube at an elevation of 102.96m is proposed to control the flow. The discharge rate of a 150mm orifice tube with a HWL of 103.54m was calculated to $0.0456m^3/s$. According to the calculations presented in **Appendix D**, the required storage at the maximum discharge from the orifice tube of $0.0456m^3/s$ is $221.31m^3$.

Storage is proposed via an underground storage tank (Cupolex stormwater tank) located at the cul-de-sac. The total available volume in the Cupolex tank is $225m^3$. Please refer to the engineering drawings submitted as part of the development application package for additional details related to the design of the proposed Cupolex storage system.

Table 4.2: Storage Requirement Summary

Area (ha)	Allowable Release Rate (m^3/s)	Actual Release Rate (m^3/s)	Required Storage Volume (m^3)	Available Storage Volume (m^3)
0.86	0.057	0.046	221.31	225

Farzad Fahimi



1583 CORMACK CRESCENT

LEGEND

- SITE LOCATION
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- CONTROL MANHOLE
- OIL GRIT SEPARATOR
- PROPOSED STORAGE TANK
- EXISTING BOX CULVERT

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FIGURE 4.1
PROPOSED
STORMWATER MANAGEMENT
INFRASTRUCTURE

2018-4679	MAY 2019	SCALE: N.T.S.

4.3.2 WATER BALANCE AND RUNOFF VOLUME REDUCTION

According to the City of Mississauga Design standards, the first 5mm of runoff shall be retained on site via infiltration or re-use. An infiltration chamber is proposed underneath the storage system to achieve this requirement. Based on the overall site imperviousness of 60%, the volume required to infiltrate on site is 26m3 (5mm x 10 x 0.6 x 0.86 = 25.8m3).

Water Balance calculations for the site were completed based on the 30 year data from the Environment Canada Pearson Station. According to the calculations presented in Appendix D, retention of 2.11mm on site will satisfy the post-pre volumetric infiltration requirement. Therefore, the 5mm retention proposed on the site will satisfy both the Water Balance and Runoff Volume Reduction Criteria. According to the Region of Peel soil map and the borehole logs from the Phase Two Environmental Site Assessment Report, dated November 2017, the predominant type of soil on the site is Sand, therefore no constraints are expected in terms of infiltration.

4.3.3 WATER QUALITY CONTROL

Water quality control is proposed to be provided via a treatment train approach. Catch basin (CB) Shields are proposed at the CB locations to provide initial quality control. The runoff from the ROW is proposed to drain to the CB shields where the sediments from the flow are retained at bottom of the CB Shield sump and the remaining flow is directed to the proposed storm sewer system. Based on the ETV certification, a CB shield can provide 50% TSS removal.

Before discharging to an underground storage system, the flow from the storm sewer is directed towards an Oil Grit Separator (STC-2000) where 50% TSS removal is achieved. Additionally, an infiltration volume of $30m^3$ is proposed underneath the underground storage tank to satisfy the 5mm retention on site. Based on Table 3.2 of MOE, Required volume for 80% TSS removal by infiltration is $27.14m^3$(i.e. $31.67m^3$/ha*0.857ha = $27.14m^3$). Therefore, the infiltration at the bottom of the chamber will help in providing additional 80% TSS removal. Hence, the combined efficiency of the above measures are greater than the required 80% TSS removal for quality control.

Based on the proposed infiltration bed depth of 0.3m and infiltration rate of 15mm/hr, the drawdown time was calculated to be 20hrs. For detailed calculations refer to **Appendix D**.

4.3.4 FULL CAPTURE POINT

A Double Catch Basin is proposed along the Cul-de-sac to capture major flow from the proposed development. A flow of approximately is 0.167m^3/s (Refer to SWM calculations in **Appendix D**) is required to be captured. According to the calculations provided in the **Appendix D**, the application of honeycomb (OPSD 403.010) inlet grates ensures an inlet capacity of 0.183m^3/s (including the 50% clogging factor) which is greater than the 0.167m^3/s that needs to be captured.

5.0 SUMMARY

This Functional Servicing Report provides an overview of the proposed servicing plan for the residential development located at 1583 Cormack Crescent, within the City of Mississauga.

This report demonstrates that adequate stormwater, sanitary, and water supply servicing will be available for the proposed development. In summary, the functional servicing analysis established the following:

Water Supply

- Water supply servicing will be provided from an existing 450 mm diameter watermain located along Cormack Crescent.
- The peak hour water demand for the site is anticipated to be 0.29 L/s.
- No servicing constraints are expected.

Sanitary Servicing

- The entire proposed developments will be serviced by the existing 250mm diameter sanitary sewer located along Cormack Crescent.
- The existing school's equivalent population is estimated to be at least 200. Since, the estimated population of the proposed development is less than the existing private school, the anticipated design flow rates for the proposed development are expected to be less than the

flow rates for the existing school.

- Therefore, no constraints are expected on the downstream sanitary sewers. The anticipated total peak sewage flow from the site is 13.17 L/s

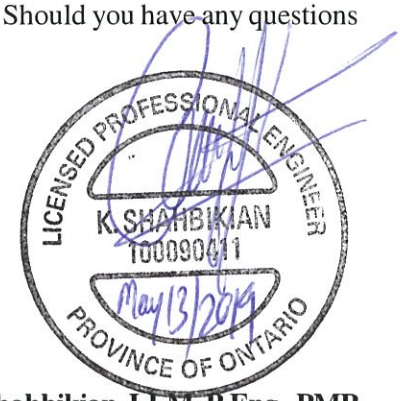
Stormwater Servicing

- Peak flows from the subject property will be controlled via on-site measures, prior to discharging to a proposed 300mm diameter storm sewer along Cormack Crescent.
- Water quality will be provided via a treatment train approach.
- An infiltration trench is proposed underneath the underground storage tank to satisfy the water balance and runoff reduction criteria.

We trust the above information is suitable for your needs at this time. Should you have any questions or comments, please do not hesitate to contact the undersigned.

Sincerely,

SCHAEFFER & ASSOCIATES LTD.



Yashaswy Gollamudi, B.Sc.

Water Resources Analyst

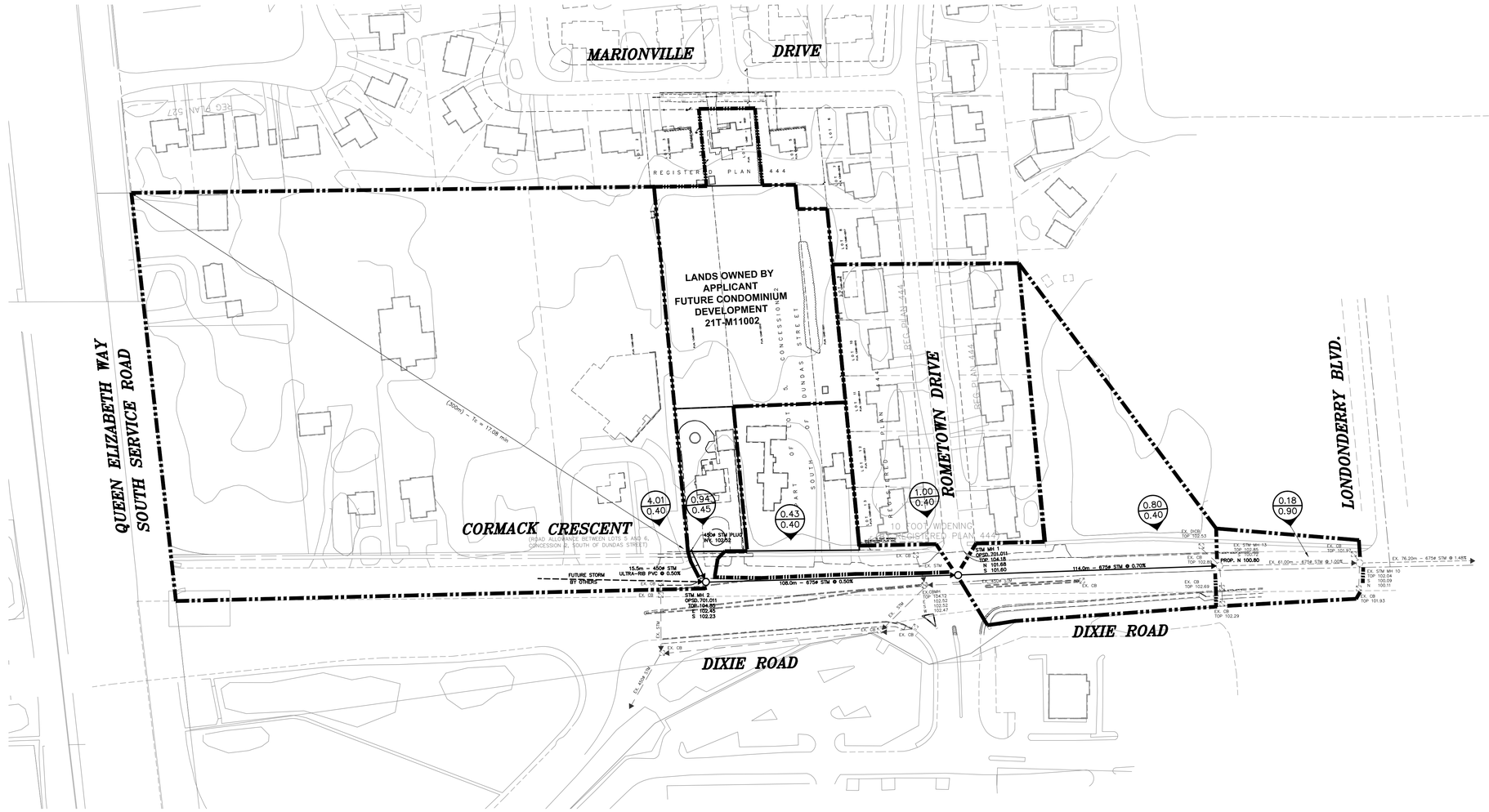
Koryun Shahbikian, LLM, P.Eng., PMP

Partner

Jenny Pathmanapan, B.Sc.

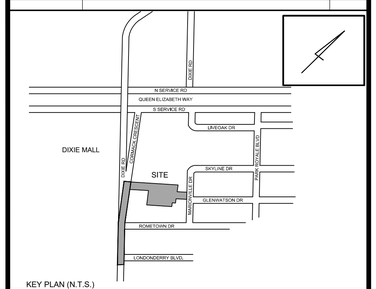
Water Resources Analyst

APPENDIX A: BACKGROUND INFORMATION



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.

REVISIONS		
DATE	DETAILS	INIT.



KEY PLAN (N.T.S.)

LEGEND

- 0.27 / 0.45 — AREA (HECTARES) / RUN-OFF COEFFICIENT
- SINGLE CATCHBASIN
- DOUBLE CATCHBASIN
- CATCHBASIN WITH SEDIMENT CONTROL WITH SILT FENCE
- STORM MANHOLE
- DIRECTION OF FLOW
- OVERLAND FLOW ROUTE
- EXISTING OVERLAND FLOW ROUTE
- DRAINAGE AREA BOUNDARY
- EXISTING DRAINAGE AREA BOUNDARY

FOR GENERAL NOTES REFER TO DWG No. 1.

C.M. BENCHMARK No.: 43 ELEV. 102.696

DESCRIPTION : LOCATED ON THE WEST FACE, 0.30m NORTH OF THE MAIN ENTRANCE OF A TWO STOREY RED BRICK HOUSE No 1455, ON THE EAST SIDE OF DIXIE ROAD, 45.72m SOUTH OF LONDNDERRY BOULEDARD.

FIRST	SECOND	INTERIM	PRE-SER	FINAL
DATE MAR. 30/12	DATE DEC. 13/12	DATE	DATE	DATE

SUBMISSION — **DWG No 208-M140- 4**

REGISTERED PROFESSIONAL ENGINEER — ROMAN T. KERKUS — DEC. 13/12 — PROVINCE OF ONTARIO

DESIGN BY — CHKD — APPROVED BY

SKIRA & ASSOCIATES LTD.
CONSULTING ENGINEERS
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SEDONA LIFESTYLES (ROMETOWN) INC.

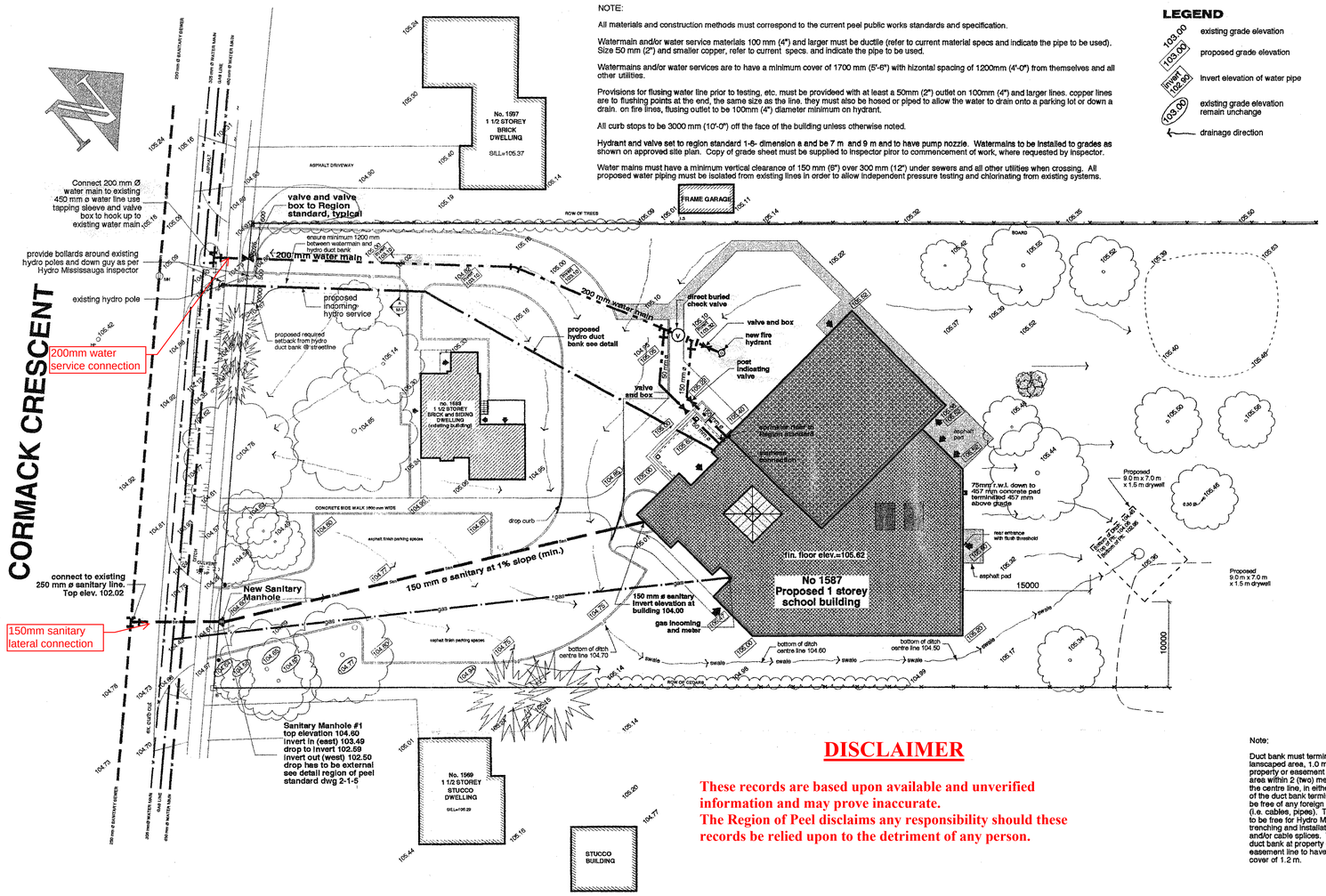
21T-M11002
CITY FILE: O□-09/013 (W1) — REGION FILE:

Region of Peel — Working for you

MISSISSAUGA Transportation and Works

STORM DRAINAGE PLAN

SCALE 1:1000	AREA: □-5	PROJECT No. 208-M140
DRAWN BY M.B.	CHECKED BY □.S.	PLAN No. C-
DATE MARCH 2012	SHEET 1 OF 1	



NOTE:

All materials and construction methods must correspond to the current peel public works standards and specification.

Watermain and/or water service materials 100 mm (4") and larger must be ductile (refer to current material specs and indicate the pipe to be used). Size 50 mm (2") and smaller copper, refer to current specs. and indicate the pipe to be used.

Watermains and/or water services are to have a minimum cover of 1700 mm (5'-6") with hizontal spacing of 1200mm (4'-0") from themselves and all other utilities.

Provisions for flusing water line prior to testing, etc. must be providesd with at least a 50mm (2") outlet on 100mm (4") and larger lines. copper lines are to flushing points at the end, the same size as the line. they must also be hosed or piped to allow the water to drain onto a parking lot or down a drain. on fire lines, flusing outlet to be 100mm (4") diameter minimum on hydrant.

All curb stops to be 3000 mm (10'-0") off the face of the building unless otherwise noted.

Hydrant and valve set to region standard 1-6- dimension a and be 7 m and 9 m and to have pump nozzle. Watermains to be installed to grades as shown on approved site plan. Copy of grade sheet must be supplied to inspector piror to commencement of work, where requested by inspector.

Water mains must have a minimum vertical clearance of 150 mm (6") over 300 mm (12") under sewers and all other utilities when crossing. All proposed water piping must be isolated from existing lines in order to allow independent pressure testing and chlorinating from existing systems.

LEGEND

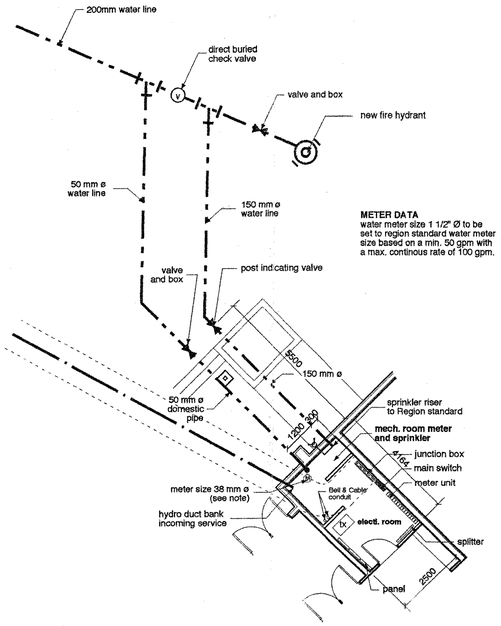
- 103.00 — existing grade elevation
- 103.00 — proposed grade elevation
- invert 103.00 — Invert elevation of water pipe
- 103.00 — existing grade elevation remain unchange
- drainage direction

DISCLAIMER

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

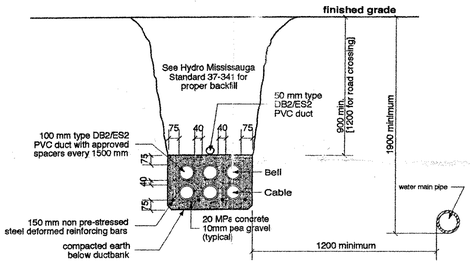
Note:

Duct bank must terminate in lanscaped area, 1.0 m awey from property or easement line. The area within 2 (two) metres from the centre line, in either direction, of the duct bank termination is to be free of any foreign objects (i.e. cables, pipes). This area is to be free for Hydro Mississauga trenching and installation of cable and/or cable splices. Terminated duct bank at property or easement line to have a minimum cover of 1.2 m.

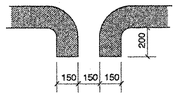


METER DATA
water meter size 1 1/2" Ø to be set to region standard water meter size based on a min. 50 gpm with a max. continous rate of 100 gpm.

Mechanical & Electrical Room Layout



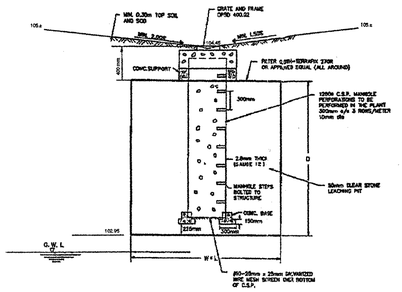
A M-1 **Detail of Hydro Duct Bank**



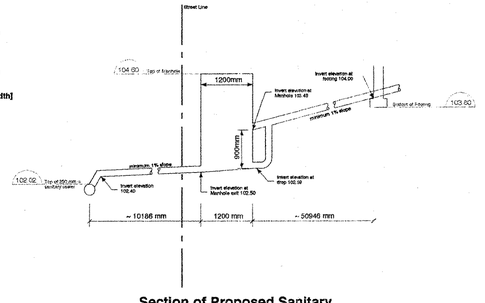
Typical Detail of Curb Opening for Runoff

Site Statistics

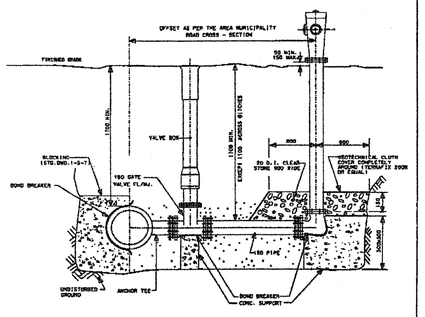
Zoning	R 3	
Lot Type	INTERIOR	
Lot Area	8,680.10 sq m (0.868 ha)	
Lot Frontage	54460 mm	
Permitted Lot Coverage (35%)		3038.04 sq m
Proposed Lot Coverage (12.53 %) [Existing Residance & School]		1,088.18 sq m
Required Front Yard Setback		7500 mm
Provided Front Yard Setback		ex. 22000 mm
Required Side Yard Setback Height of the building or 10% of the Lot width, whichever is less.		5456 mm [10% of lot width]
Proposed Side Yard Setback (south)		6000 mm
(north)		10107 mm
Required Rear Yard Setback		7500 mm
Proposed Rear Yard Setback		72166 mm
Gross Floor Area		
Existing Gross Floor Area (Caretaker's Residence)		
First Floor		115.96 sq m
Second Floor		92.25 sq m
Total Gross Floor Area (Caretaker's Residence)		208.22 sq m
ProposedGross Floor Area (School)		
Ground Floor		934.24 sq m
Total Gross Floor Area (Residence & School)		1,142.46 sq m



DITCH INLET AND LEACHING PIT
N.T.S.



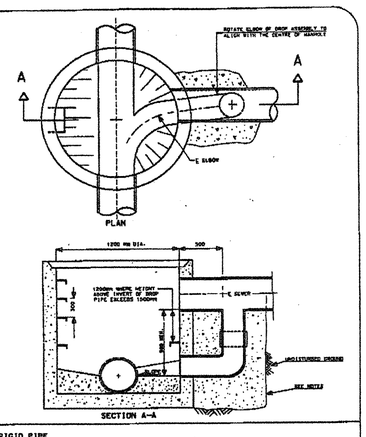
Section of Proposed Sanitary Sewer and Manhole



NOTE

1. IF THE HYD IS NOT AT THE STANDARD OFFSET, THE LOCATION OF THE HYDRANT TO BE AS PER THE CONSTRUCTION DWGS.
2. BACKFILL TRENCH WITH GRANULAR 'B' COMPACTED TO 100% STD. PROCTOR DENSITY.
3. ON UNPAVED ROADS OR SHOULDERS MAY NEED TO LEAVE 150mm BELOW FINISHED GRADE.

Region of Peel Working for you.	PUBLIC WORKS STANDARD DRAWING	REV. DATE: MARCH 1998	
		APPROVED BY	DRAWN BY ALEX M.
HYDRANT SETTING FOR D.I. OR P.V.C. PIPE		STD. DWG. 1-6-1	SCALE N.T.S.



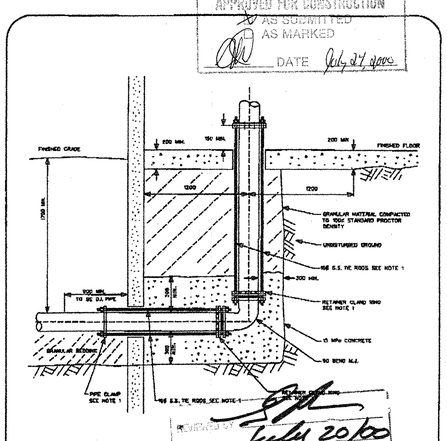
NOTES FOR RIGID PIPE

1. CONVERT OF DROP PIPE TO MEET THE CONVERT OF THE RECEIVING SEWER.
2. DROP STRUCTURE TO BE COMPLETELY ENCASED IN MIN. 150mm OF 20 MPa CONCRETE.
3. WYE FITTINGS MAY BE USED IN LIEU OF TEES.
4. DROP PIPE TO BE ONE SIZE SMALLER THAN THE INCOMING SEWER. MINIMUM SIZE 250mm.

NOTES FOR FLEXIBLE PIPE

1. CONVERT OF DROP PIPE TO MEET THE CONVERT OF THE RECEIVING SEWER.
2. DROP STRUCTURE TO BE COMPLETELY ENCASED IN MIN. OF 150 mm OF GRANULAR BEDDING MATERIAL.
3. WYE FITTINGS MAY BE USED IN LIEU OF TEES.
4. DROP PIPE TO BE ONE SIZE SMALLER THAN THE INCOMING SEWER. MINIMUM SIZE 250mm.
5. IN LIEU OF NO. 2, THE DROP STRUCTURE MAY BE ENCASED IN MIN. OF 150mm OF 20 MPa CONCRETE TO WITHIN 100mm OF TEE. BEDDING FOR THE TEE IS TO REMAIN GRANULAR.
6. SAFETY PLATFORMS TO BE LOCATED ABOVE DROP STRUCTURE.

Region of Peel Working for you.	PUBLIC WORKS STANDARD DRAWING	REV. DATE: MARCH 1998	
		APPROVED BY	DRAWN BY ALEX M./I.F.
MANHOLE DROP STRUCTURE EXTERNAL ASSEMBLY		STD DWG. 2-1-5	SCALE N.T.S.



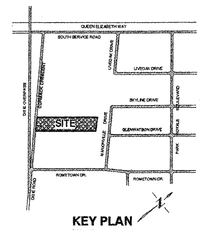
NOTE

1. TWO STAINLESS STEEL (PASSIVE 304) PVC RODS MAY BE USED AS AN ALTERNATIVE TO RETAINER CLAMS RINGS AND PIPE CLAMP.

REGION OF PEEL
PUBLIC WORKS/ENGINEERING & CONSTRUCTION DIVISION
WATER & SANITARY SEWER CONNECTIONS
APPROVED FOR CONSTRUCTION
AS SUBMITTED
AS MARKED
DATE July 27, 2000

REVIEWED BY
DATE July 20/00
CITY OF MISSISSAUGA FIRE DEPARTMENT

Region of Peel Working for you.	PUBLIC WORKS STANDARD DRAWING	REV. DATE: MARCH 1998	
		APPROVED BY	DRAWN BY ALEX M./I.F.
BUILDING RISER DETAIL 100mm AND LARGER		STD. DWG. 1-6-5	SCALE N.T.S.



KEY PLAN

No.	Date	Issuance and or Revisions	By
5	07-17-2000	revisions as per Hydro Drawing 00-0116-1	jpr
4	7-06-2000	revised direct buried check valve and domestic line	jpr
3	6-21-2000	revised invert elevation for proposed sanitary sewer	jpr
2	6-13-2000	Issued for site plan approvaltor fire, water ,etc.	bw
1	Oct. 21, 98	Issued for client's approval	ad

Revisions:

Note:

All drawings are the property of this firm and shall not be used without their expressed written consent.

Contractors shall check and verify all dimensions and elevations and report any discrepancies before commencement of work.

Drawings shall not be scaled.

This drawing shall not be used for construction purposes until completed and signed by the Engineer as follows:

Engineer: Date:

REGISTERED PROFESSIONAL ENGINEER S. W. WONG PROVINCE OF ONTARIO

RECEIVED
JUL 24 2000
PUBLIC WORKS
REGION OF PEEL

Wong Associates Engineers

400 Brimley Road, #5, Scarborough
Ontario M1J 1A1 tel.# (416) 267-5111

Project title:

Proposed Private School
Site Plan file# SP 00/28 W1
Date: March 07, 2000

STAR ACADEMY

1583 / 1587 Cormack Crescent
Part of Lot 5, Concession 2
South of Dundas Street
City of Mississauga

Drawing title:

Site Plan & General Notes

drawn by:	Arnel
designed by:	Victor MC Rodrigues
checked by:	
date:	October, 1999
scale:	as noted

project no. B-2730
sheet no. **SS-1**
1 of 8 sheets

C# 411690

Janaani Pathmanapan

From: Ghazwan Yousif <Ghazwan.Yousif@mississauga.ca>
Sent: January 21, 2019 8:14 AM
To: Hovig Tozcu
Cc: Yashaswy Gollamudi; Mark Mitchell
Subject: RE: 4679 - 1583 Cormack Cresc - DARC 18-243 Ward 1

Good morning Hovig,
Thank you For asking. If you are proposing a new storm sewer on Cormack Crest. then a quality control measure will be required, otherwise no need to provide quality control, as I do assume you are proposing a residential development. Quality control will be part of the development charges that your client will have to pay on a later day.
In regards to quantity control, based on our latest updated sept 2016, development requirements manual, your site within the Applewood watershed and required to control the 100 year post development discharge to the 2 year pre development level. Water balance should also be addressed (first 5mm of rain should be retained within the site). Keep in mind your site may be within the Region of Peel area as so far we are not sure where the discharge point and if the sewer have the capacity to accept your site drainage. Also, keep in mind that your site within the MTO regulated area and you should first contact them if they will allow your development to go ahead at this stage (they have a big project at this area).

Regards,

Ghazwan Yousif M.Sc., P. Eng.
Storm Drainage Technologist, Environmental Services Team
T 905-615-3200 ext.3526
ghazwan.yousif@mississauga.ca

City of Mississauga | Transportation and Work Department,
Transportation & Infrastructure Planning Division

From: Hovig Tozcu [mailto:hhtozcu@schaeffers.com]
Sent: Friday, January 18, 2019 2:24 PM
To: Ghazwan Yousif
Cc: Yashaswy Gollamudi; Mark Mitchell
Subject: 4679 - 1583 Cormack Cresc - DARC 18-243 Ward 1

Hi Ghazwan,

Hope you are doing well. We are preparing site plan application documents related to the property at 1583 Cormac Crescent, which the City reviewed as part of a DARC application last September. I had corresponded with you at length around that time about the surrounding infrastructure and the recently constructed development immediately to the south of our subject site (Rometown Condo Development).

Since then we have obtained the site servicing and stormwater management letter prepared by the consultant for the Rometown development (Skira & Associates Ltd.) through Mississauga's freedom of information request process. These have been attached for your reference.

We note that the design for this site did not incorporate any quality treatment for stormwater run-off. Neither the servicing drawing or the report address any sort of quality treatment for TSS removal.

Can you advise why this is the case and what the expectation is in regards to the quality treatment proposed for our subject site immediately to the north? We are proposing to discharge to the same storm sewer on Cormack Crescent and expect to have the same SWM criteria applied to our site, but we would like to understand what was applied to the neighboring site so that we can prepare our initial submission along those lines.

Thanks,

SCHAEFFERS
CONSULTING ENGINEERS

HOVIG H. TOZCU, P.Eng
PROJECT MANAGER

6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: 905.738.6100 ext. 252 Fax: 905.738.6875
Tor. Line: (416) 213-5590 E-mail: hhtozcu@schaeffers.com

Population	Peak Flow (m^3/sec)	Population	Peak Flow (m^3/sec)	Population	Peak Flow (m^3/sec)
1000	0.0130	4750	0.0542	13000	0.1292
1050	0.0139	5000	0.0569	14000	0.1376
1100	0.0145	5250	0.0594	15000	0.1459
1150	0.0151	5500	0.0618	16000	0.1540
1200	0.0157	5750	0.0640	17000	0.1620
1300	0.0169	6000	0.0666	18000	0.1700
1400	0.0181	6250	0.0691	19000	0.1779
1500	0.0193	6500	0.0710	20000	0.1857
1600	0.0204	6750	0.0737	25000	0.2236
1700	0.0217	7000	0.0762	30000	0.2601
1800	0.0228	7250	0.0784	35000	0.2955
1900	0.0239	7500	0.0809	40000	0.3298
2000	0.0251	7750	0.0830	45000	0.3634
2200	0.0273	8000	0.0854	50000	0.3963
2400	0.0296	8250	0.0878	55000	0.4286
2600	0.0318	8500	0.0898	60000	0.4603
2800	0.0340	8750	0.0922	65000	0.4915
3000	0.0361	9000	0.0945	70000	0.5224
3250	0.0387	9250	0.0968	75000	0.5528
3500	0.0415	9500	0.0981	80000	0.5828
3750	0.0441	9750	0.1010	85000	0.6126
4000	0.0467	10000	0.1033	90000	0.6420
4250	0.0492	11000	0.1120	95000	0.6711
4500	0.0518	12000	0.1210	100000	0.7000

Notes:
1. Domestic sewage flows are based upon a unit sewage flow of 302.8 Lpcd.
2. The flows in the above table include the Harmon Peaking Factor.
3. Domestic sewage flow for less than 1000 persons shall be 0.013m^3/sec.
4. Domestic sewage flow for greater than 100,000 persons shall be 7.0×10^{-6} m^3/sec per capita.
5. Lpcd = Litres per capita per day 1 Litre = 0.001 $metre^3$

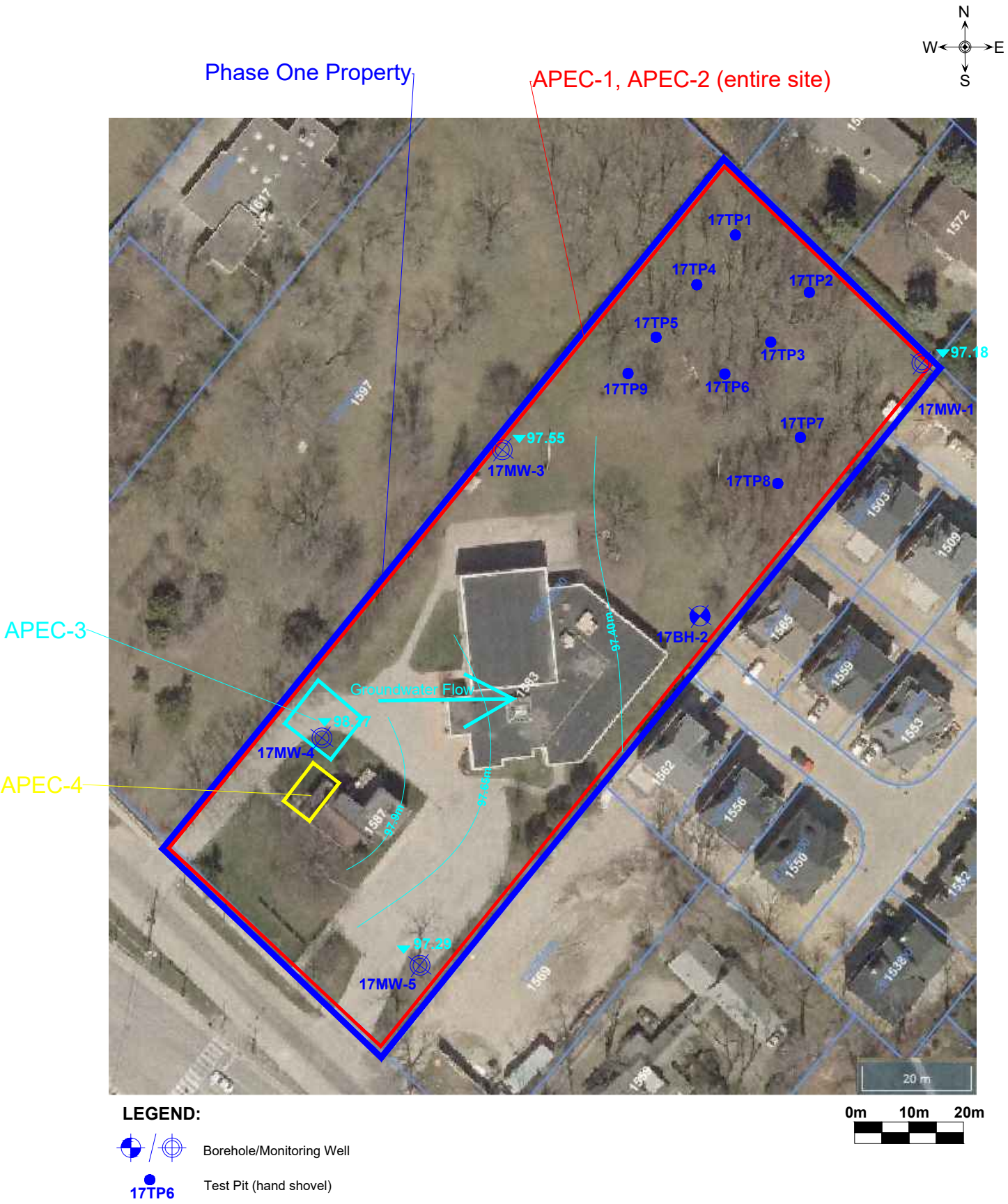
Region of Peel
Working for you

Date: June 2005 Rev: 1

Approved:

SEWAGE FLOWS
(EXCLUDING INFILTRATION)

STD. DWG. ~~2-5-2~~ 2-9-2



LEGEND:

Borehole/Monitoring Well

17TP6 Test Pit (hand shovel)

TorontoInspection Ltd.
GEO-ENVIRONMENTAL CONSULTANTS
110 Konrad Crescent, Unit 16, Markham, Ontario L3R 9X2
Tel: 905-940 8509 Fax: 905-940 8192

TITLE: Borehole/Monitoring Well/Test Pit Location Plan with Groundwater Contours			
LOCATION: 1583, 1587 Cormack Crescent, Mississauga			
PROJECT NO. 4553-17-EB	DATE : November 2017	FIGURE NO : 04	

Project No. 4553-17-EE

Log of Borehole 17BH-1

Dwg No. 2

Project: Phase Two Environmental Site Assessment

Sheet No. 1 of 1

Location: 1583 Cormack Crescent, Mississauga, Ontario

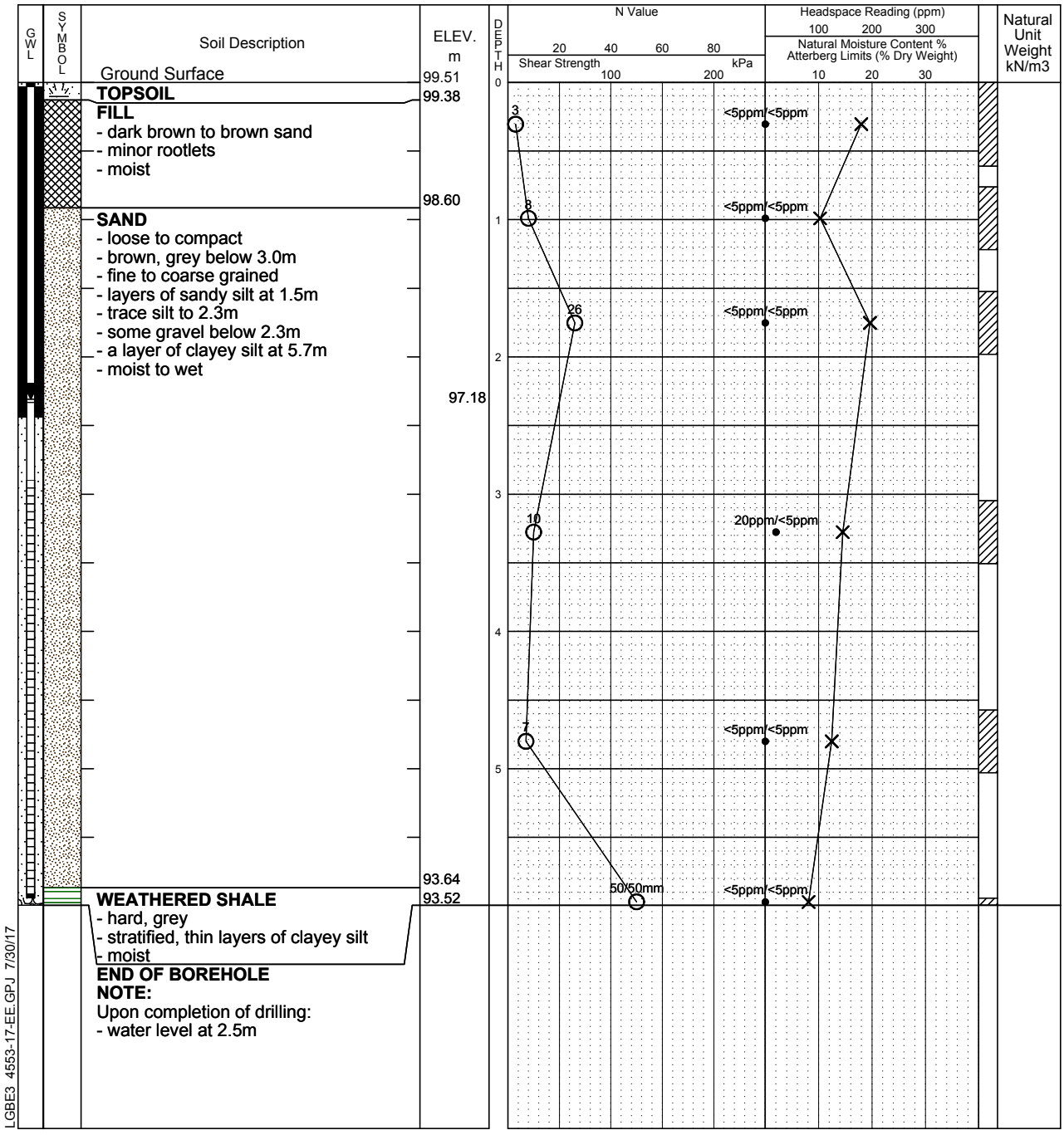
Date Drilled: 6/16/17

Drill Type: Truck Mounted Drill Rig

Datum: Temporary

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Headspace Reading (ppm)
Natural Moisture
Plastic and Liquid Limit
Unconfined Compression % Strain at Failure
Penetrometer



LGBE3 4553-17-EE.GPJ 7/30/17

NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)
June 19, 2017	2.33m	

Project No. 4553-17-EE

Log of Borehole 17BH-2

Dwg No. 3

Project: Phase Two Environmental Site Assessment

Sheet No. 1 of 1

Location: 1583 Cormack Crescent, Mississauga, Ontario

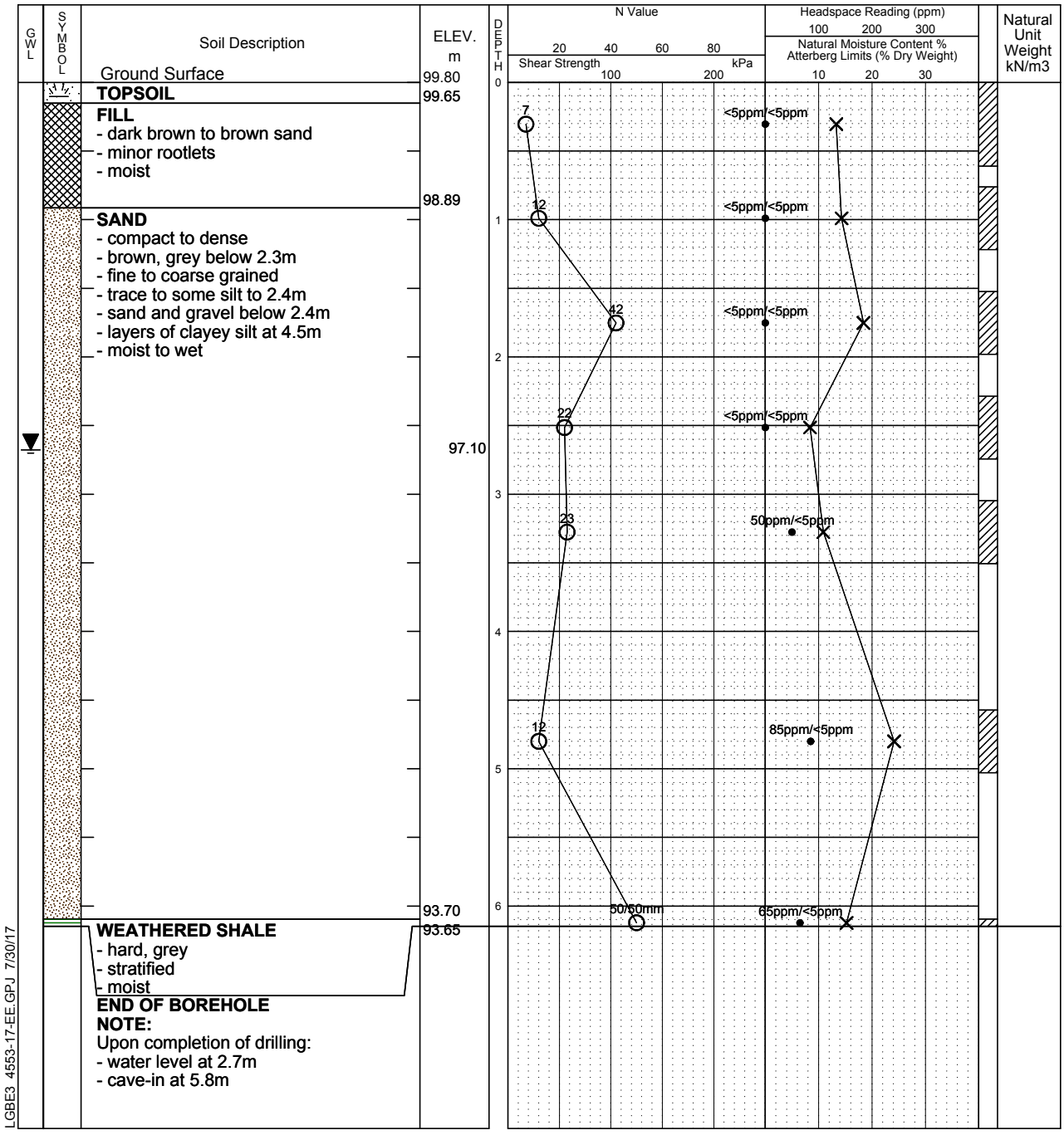
Date Drilled: 6/16/17

Drill Type: Truck Mounted Drill Rig

Datum: Temporary

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Headspace Reading (ppm)
Natural Moisture
Plastic and Liquid Limit
Unconfined Compression
% Strain at Failure
Penetrometer



LGBE3 4553-17-EE.GPJ 7/30/17

NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)

Project No. 4553-17-EE

Log of Borehole 17BH-3

Dwg No. 4

Project: Phase Two Environmental Site Assessment

Sheet No. 1 of 1

Location: 1583 Cormack Crescent, Mississauga, Ontario

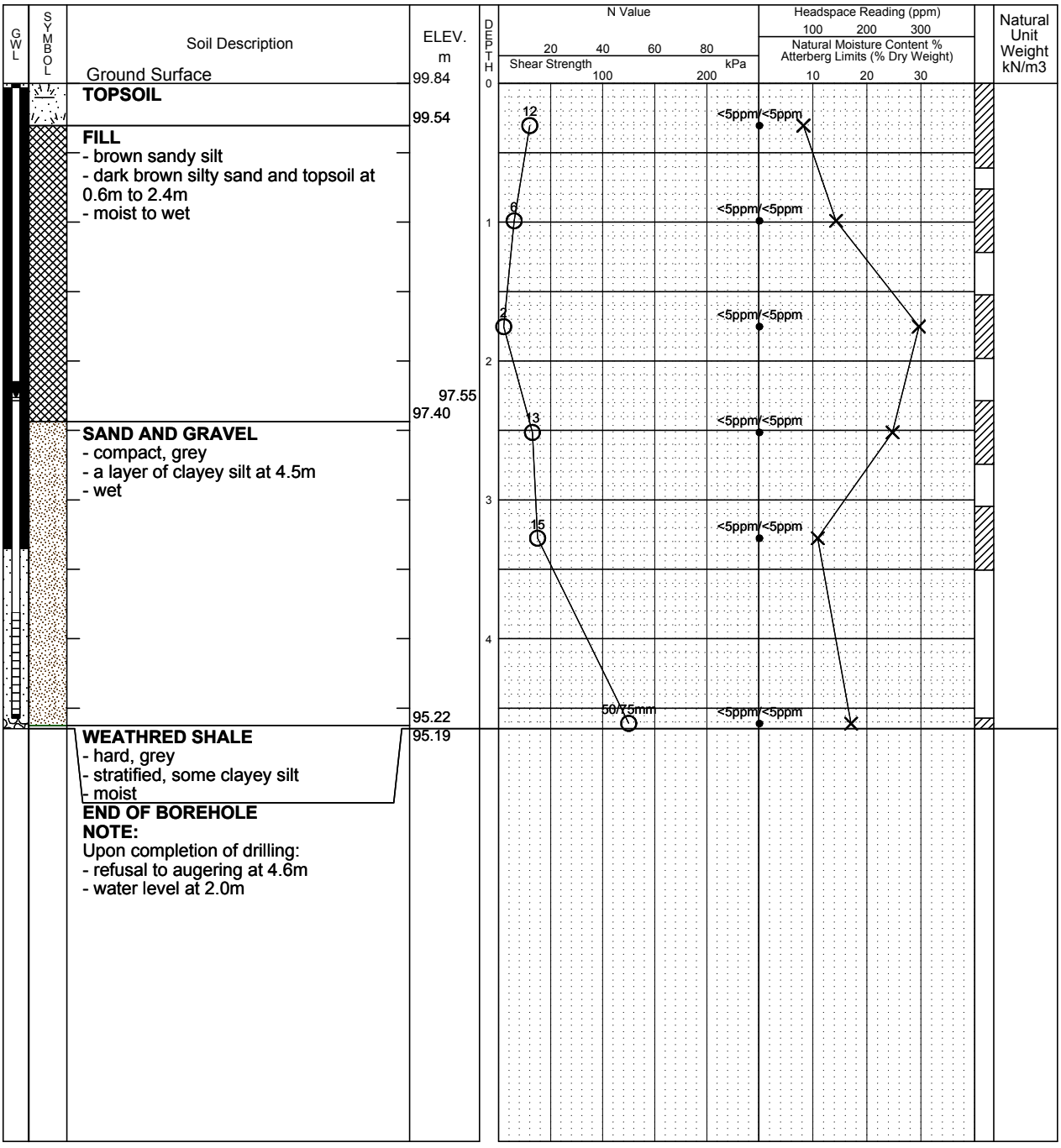
Date Drilled: 6/16/17

Drill Type: Truck Mounted Drill Rig

Datum: Temporary

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Headspace Reading (ppm)
Natural Moisture
Plastic and Liquid Limit
Unconfined Compression
% Strain at Failure
Penetrometer



LGBE3 4553-17-EE.GPJ 7/30/17

NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)
June 19, 2017	2.29m	

Project No. 4553-17-EE

Log of Borehole 17BH-4

Dwg No. 5

Project: Phase Two Environmental Site Assessment

Sheet No. 1 of 1

Location: 1583 Cormack Crescent, Mississauga, Ontario

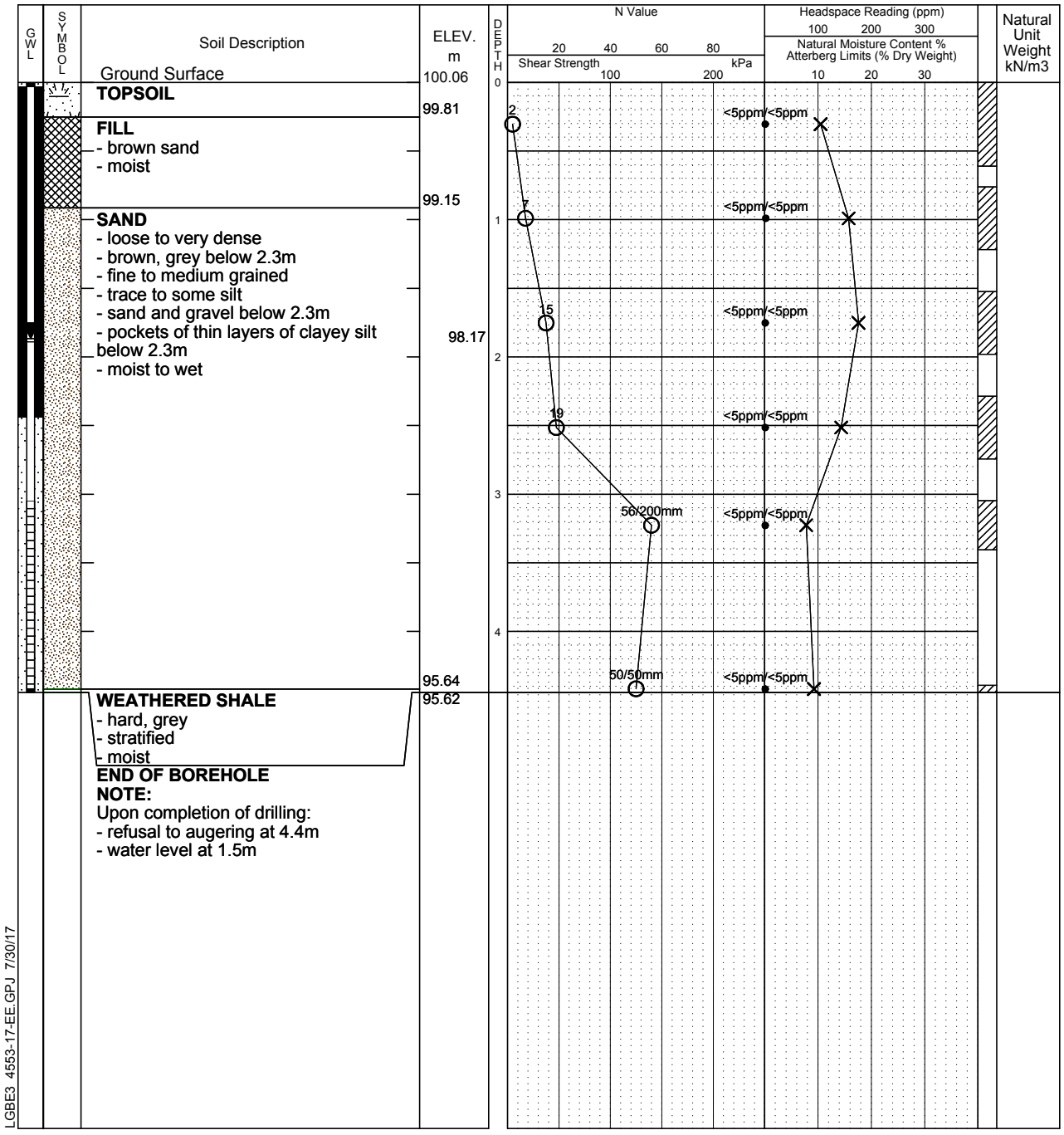
Date Drilled: 6/16/17

Drill Type: Truck Mounted Drill Rig

Datum: Temporary

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Headspace Reading (ppm)
Natural Moisture
Plastic and Liquid Limit
Unconfined Compression
% Strain at Failure
Penetrometer



LGBE3 4553-17-EE.GPJ 7/30/17

NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)
June 19, 2017	1.89m	

Project No. 4553-17-EE

Log of Borehole 17BH-5

Dwg No. 6

Project: Phase Two Environmental Site Assessment

Sheet No. 1 of 1

Location: 1583 Cormack Crescent, Mississauga, Ontario

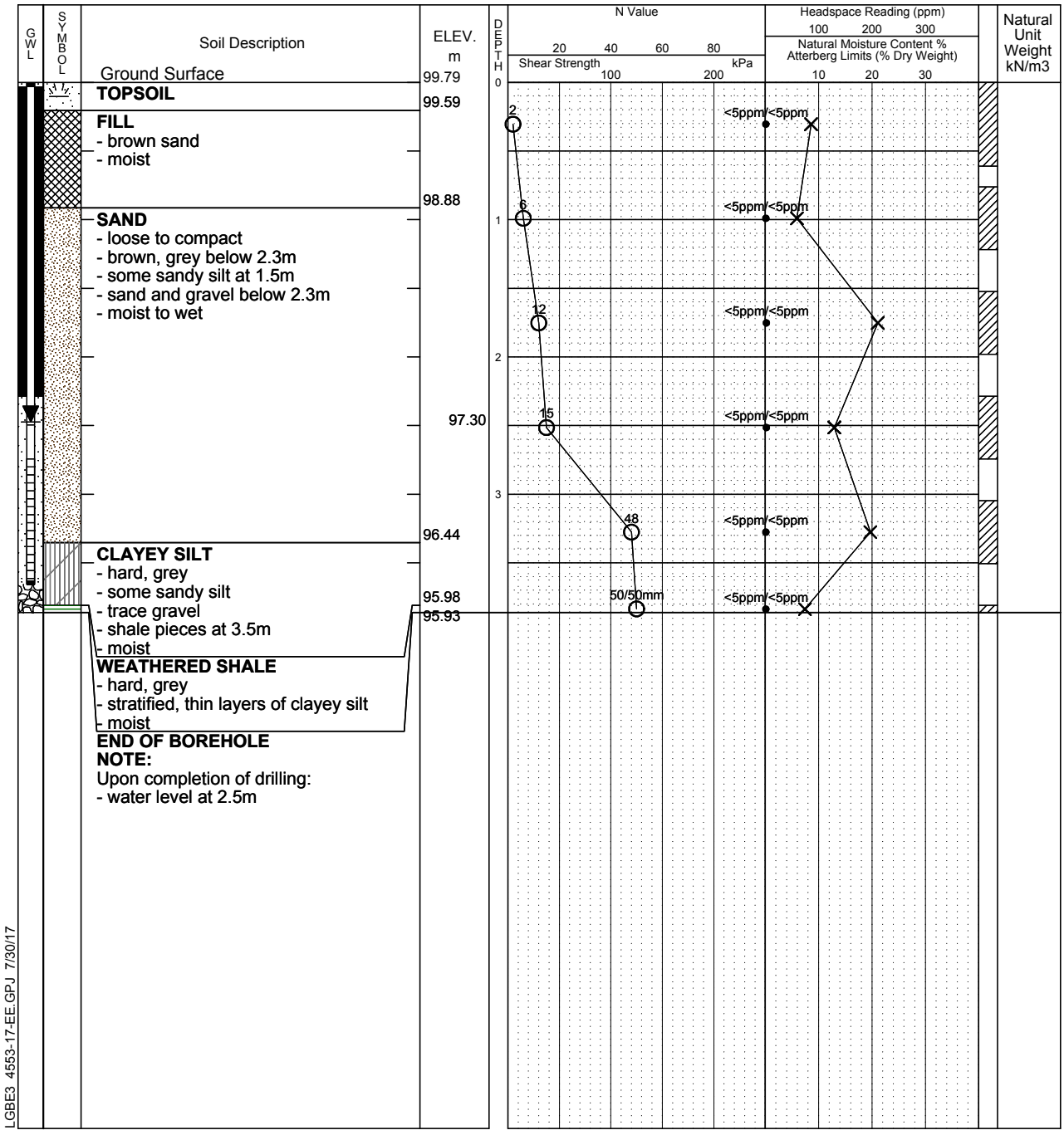
Date Drilled: 6/16/17

Drill Type: Truck Mounted Drill Rig

Datum: Temporary

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Headspace Reading (ppm)
Natural Moisture
Plastic and Liquid Limit
Unconfined Compression
% Strain at Failure
Penetrometer



LGBE3 4553-17-EE.GPJ 7/30/17

NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)
June 19, 2017	2.50m	

APPENDIX B: WATER SUPPLY CALCULATIONS

Project: ***2019-4679***
1583 Cormack Crescent
City of Mississauga

SCHAEFFERS
CONSULTING ENGINEERS

Population Calculation

Proposed Residential Development

Density	Pop/hectare	Area (ha)	Population
Single Family (greater than 10m frontage)	50	0.59	30
Total			30

Note: Based on Region of Peel Public Works Design Criteria Manual - Section 2.1

Project: ***2019-4679***
1583 Cormack Crescent
City of Mississauga

SCHAEFFERS
CONSULTING ENGINEERS

Sanitary Flow Calculation

Infiltration Rate:		0.2	L/s/ha
Generation Rate:	For populations less than 1000	13	L/s

Estimated Site Discharge

Site Discharge	Units	Population	Flow (L/s) *	Infiltration (L/s)**	Total PeakFlow (L/s)
Residential	22	30	13.00	0.172	**13.17**

** According to the Region of Peel STD.DWG.2-9-2*
***According to Region of Peel Design Criteria, Infiltration rate of 0.2 L/s/ha*

Project: 2019-4679
1583 Cormack Crescent
City of Mississauga

SCHAEFFERS
CONSULTING ENGINEERS

Water Supply Calculation

Average Daily Demand: 280 L/capita/day

Average Daily Demand

Land Use	Population	Average Daily Demand (l/s)‡
Residential	30	**0.10**

Max Daily Demand

Land Use	Population	Peaking Factor	Maximum Daily Demand (L/s)‡
Residential	30	2.0	**0.19**

Peak Hour Demand

Land Use	Population	Peaking Factor	Peak Hour Demand (L/s)‡
Residential	30	3.0	**0.29**

APPENDIX C: SANITARY CALCULATIONS

Project: ***2019-4679***
1583 Cormack Crescent
City of Mississauga

SCHAEFFERS
CONSULTING ENGINEERS

Population Calculation

Proposed Residential Development

Density	Pop/hectare	Area (ha)	Population
Single Family (greater than 10m frontage)	50	0.59	30
Total			30

Note: Based on Region of Peel Public Works Design Criteria Manual - Section 2.1

Project: ***2019-4679***
1583 Cormack Crescent
City of Mississauga

SCHAEFFERS
CONSULTING ENGINEERS

Sanitary Flow Calculation

Infiltration Rate:		0.2	L/s/ha
Generation Rate:	For populations less than 1000	13	L/s

Estimated Site Discharge

Site Discharge	Units	Population	Flow (L/s) *	Infiltration (L/s)**	Total PeakFlow (L/s)
Residential	22	30	13.00	0.172	**13.17**

** According to the Region of Peel STD.DWG.2-9-2*
***According to Region of Peel Design Criteria, Infiltration rate of 0.2 L/s/ha*

Project: 2019-4679
1583 Cormack Crescent
City of Mississauga

SCHAEFFERS
CONSULTING ENGINEERS

Water Supply Calculation

Average Daily Demand: 280 L/capita/day

Average Daily Demand

Land Use	Population	Average Daily Demand (l/s)‡
Residential	30	**0.10**

Max Daily Demand

Land Use	Population	Peaking Factor	Maximum Daily Demand (L/s)‡
Residential	30	2.0	**0.19**

Peak Hour Demand

Land Use	Population	Peaking Factor	Peak Hour Demand (L/s)‡
Residential	30	3.0	**0.29**

Project 1583 Cormack Crescent
(CITY OF MISSISSAUGA)

CONSULTANT Schaeffer & Associates Ltd.

DRAINAGE AREA PLAN NO.

REGIONAL MUNICIPALITY OF PEEL

SANITARY SEWER DESIGN SHEET

POST-DEVELOPMENT CONDITIONS

SHEET No. 1 OF 1

PROJECT No. 2018-4679

DESIGNED BY M.M.

DATE 9-May-19

LOCATION	From MH	Up Stream Inv.	To MH	Down Stream Inv.	AREA (ha)	DENSITY persons per ha	POP	CUM. AREA (ha)	CUM. POP.	SEWAGE FLOW (L/sec)	INFILTRATION FLOW (L/sec)	FOUNDATION DRAINS (L/sec)	TOTAL FLOW (L/sec)	Length (m)	Pipe Dia NOM (mm)	Pipe Dia ACT (mm)	Grade (%)	Capacity (L/sec)	Full Velocity (m/s)
Condo Road	4A		3A		0.69	70	49	0.69	49	13.00	0.14	0.000	13.14	120.0	250	254.0	1.00	62.04	1.22
Condo Road	3A		CTL.MH.1A		0.16	70	12	0.85	61	13.00	0.17	0.000	13.17	22.2	250	254.0	0.50	43.87	0.87
Cormack Crescent	CTL.MH.1A		2A		0.00	70	0	0.85	61	13.00	0.17	0.000	13.17	13.9	250	254.0	0.50	43.87	0.87
								0.85	**61**										

APPENDIX D: STORMWATER MANAGEMENT CALCULATIONS

1583 Cormack Crescent
Post-Development Drainage Area & Runoff Coefficient

SUBJECT SITE CONDITIONS

Site Area = 0.857 ha

For Total Site

Composite Runoff Coefficient

	Area (ha)	Runoff Coeff	Impervious	A*R	A*Imp	Ximp	A*Ximp
Proposed ROW	0.185	0.90	1.00	0.17	0.19	1.00	0.19
Canada post Mailboxes	0.001	0.90	1.00	0.00	0.00	1.00	0.00
Boulevard Area	0.030	0.25	0.07	0.01	0.00	0.07	0.00
Buffer Block	0.055	0.38	0.25	0.02	0.01	0.25	0.01
Detached Lot - 22 (or future ROW)	0.034	0.57	0.53	0.02	0.02	0.34	0.01
Detached House Lots -10.95m x 24.5m	0.552	0.57	0.53	0.32	0.29	0.34	0.19
Total Area	**0.857**	**0.62**	**0.60**	**0.53**	**0.51**	**0.47**	**0.40**

Calculated Impervious Values based on Site Plan

Detached Houses

Typical House

Roof Area	100.344	m^2	
Measured impervious are (Roof+Driveway+Porch)	131.955	m^2	
Total Area	268.21	m^2	(10.95 Width x 24.494 Depth)
Imperviousness (TIMP)	49%		
XIMP	30%		

**Please note that impervious calculations were completed based on a typical lot size and the actual proposed base plan. The higher imperviousness was considered for calculations.*

Based on Typical lot calculations

TIMP	53%	
XIMP	34%	

Block 22

Total Area	344.662	m^2
If detached house		
Imperviousness (%)	53%	
If road extension		
Impervious area	181.799	m^2
Imperviousness (%)	53%	

Estimating Sheet - TIMP/XIMP for Typical 10.95m Detached House Lots

W= Lot Width	10.95	m	
D= Lot Depth	24.5	m	
bs= minimum Back yard set back	7.5	m	
fs= minimum Front set back	6	m	
ss= Minimum side set back	1.2	m	
ss= Minimum side set back	0.61	m	
dw = driveway Width	6	m	
Porch area=	6.28	sqm	(min. set back for Porch is4m)

Calculation based on lot Fabric

Total Lot Area	268.28	sqm	
Roof Area	100.54	sqm	0.374765
Porch	6.28	sqm	0.023409
Drive way	36.00	sqm	0.134191
Grass Area	125.46	sqm	0.467636

Total impervious Areas	142.82	sqm
Direct Impervious areas	92.55	sqm

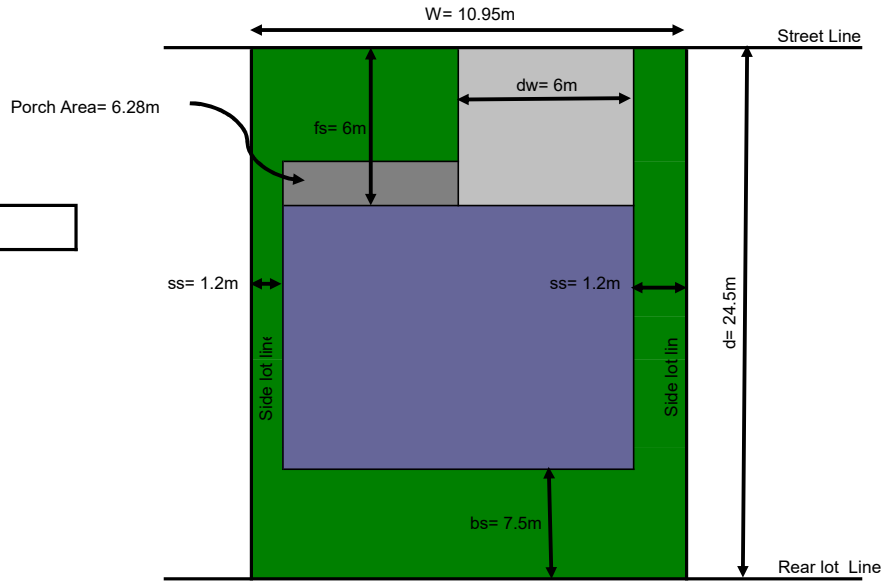
T IMP	53%
XIMP	34%

Minimum TIMP based on City Criteria

C	0.55	(Low Density Residential)
TIMP	50%	

Minimum TIMP/XIMP used in the model

C	0.57
TIMP	53%
XIMP	34%



Project: ***2019-4679***
1583 Cormack Crescent
City of Mississauga

SCHAEFFERS
CONSULTING ENGINEERS

Allowable Release Rate

Criteria: Allowable Release Rate based on the Tributary Plan DWG No-208-M140-4

Area =	0.857	ha
Runoff Coefficent=	0.4	
Tc=	15	mins
2-year Intensity=	59.89	mm/hr
2-year Flow Q =	0.057	m^3/s

Allowable Release Rate = 0.057 m^3/s

1583 Cormack Crescent
Residential Development
City of Mississauga
Size Orifice Tube

Allowable Release Rate = 0.057 m^3/s Max HWL* = 103.54

**Bottom of tank (102.84m) + Height of cupolex (0.7m)*

CALCULATE DIAMETER KNOWING Q & H	
$Q(m^3/s)$ =	0.057
Td(m) =	3.00
Approx A =	0.0091
Approx D =	107
$A(m^2)$ =	0.009
D(mm) =	**108**

Control Manhole Orifice Tube

DIA (mm) =	**150**	
AREA m^2 =	0.018	
COEFF =	**0.82**	
GRAVITY =	9.81	
K =	1.0	
D/S HGL =	N/A	m
Orifice Inv. =	102.96	m

Effective Head m	Depth Water At CTL MH m	Qp m^3/s	TOTAL FLOW Qp m^3/s	ELEVATION of Water m
0.00	0.075	0.0000	0.0000	103.04
1.000	1.075	0.0642	0.0642	104.04
1.100	1.175	0.0673	0.0673	104.14
0.505	0.580	0.0456	0.0456	103.54
1.600	1.675	0.0812	0.0812	104.64
1.800	1.875	0.0861	0.0861	104.84
1.850	1.925	0.0873	0.0873	104.89
2.100	2.175	0.0930	0.0930	105.14
2.200	2.275	0.0952	0.0952	105.24

ORIFICE FLOW Q(m^3/s)= COEF*AREA*(2*GRAVITY*HEAD/K)^0.5

WEIR FLOW Q(m^3/s)= CLH^1.5 C=1.5

Schaeffers Consulting Engineers

Project: ***2019-4679***
1583 Cormack Crescent
City of Mississauga

SCHAEFFERS
CONSULTING ENGINEERS

Storage Volume Calculation (U/S orifice tube)

Modified Rational Method

Area (ha) =	0.857
C (5-year) =	0.62
C (100-year) =	0.78
Maximum Release Rate (l/s) =	57.0
Actual Release Rate (l/s) =	45.6

100 Year Storm

Design Storm =	City of Mississuaga
A =	1450
B =	4.9
C =	0.78

	100 Year		Total	Maximum	Required
Time	Intensity	Total	Runoff	Release	Storage
(min)	100 year	Runoff	Volume	Volume	Volume
	(mm/hr)	(l/s)	(m^3)	(m^3)	(m^3)
7	210.11	387.94	162.94	19.15	143.78
10	176.31	325.54	195.33	27.36	167.97
15	140.69	259.77	233.79	41.04	192.75
20	118.12	218.10	261.72	54.72	207.00
25	102.41	189.09	283.64	68.40	215.24
30	90.77	167.61	301.69	82.08	219.61
35	81.77	150.99	317.07	95.76	221.31
40	74.58	137.70	330.49	109.44	221.05
45	68.68	126.82	342.41	123.12	219.29
50	63.75	117.71	353.14	136.80	216.34
60	55.95	103.31	371.92	164.16	207.76
70	50.03	92.38	388.02	191.52	196.50
80	45.38	83.78	402.15	218.88	183.27
90	41.60	76.81	414.78	246.24	168.54
100	38.47	71.04	426.23	273.60	152.63
110	35.84	66.17	436.71	300.96	135.75
120	33.58	62.00	446.38	328.32	118.06
130	31.62	58.38	455.39	355.68	99.71
140	29.90	55.22	463.81	383.04	80.77
150	28.39	52.41	471.73	410.40	61.33
160	27.04	49.92	479.22	437.76	41.46
170	25.82	47.68	486.32	465.12	21.20
180	24.73	45.65	493.07	492.48	0.59
190	23.73	43.82	499.51	519.84	0.00

Required Storage (m^3):	**221.31**
Provided Storage (m^3):	**225.00**

INLET CAPACITY AT ROAD SAG
DCB Sizing at CUL-DE-SAC

Date: January 2018
Job: 4679

Input:

Location =	Cul-De-SAC		
Catchment Area =	0.857	ha	
100 YR Runoff Coeff.	0.775		= 0.62*1.25
Enter Tc =	15	min	
100-yr Intensity =	141	mm/hr	
100-Year Overland Flow =	0.260	m^3/s	
			*The 5-year flow from this area is capture by the proposed catchbasins along the Condo Road
Cactchment Area (5 year)=	0.667	ha	
5 YR Runoff Coeff.	0.62		
Enter Tc =	15	min	
5-yr Intensity =	80.5	mm/hr	
5-Year Overland Flow =	0.093	m^3/s	
100-5 YEAR Overland Flow=	**0.167**	m^3/s	
Catchbasin Type =	2	*	
Number of Catchbasins =	1		
Depth of Ponding =	110	mm	

Output:

Flow Capacity per Inlet =	0.367	m^3/s **
Flow Capacity per Inlet with 50% Blockage =	0.183	m^3/s
Number of Inlet =	1	
Total Flow Capacity with 50% Blockage =	**0.183**	m^3/s

Total flow capacity with 50% blockage is greater than the incoming 100-Year overland flow,

Notes:

* Catchbasin Type (1 for single, 2 for twin)

** Calculation based on MTO Design Chart 4.19: Inlet Capacity at Road Sag

Pre-Development Water Balance

TABLE 1: WATER BUDGET - PRE DEVELOPMENT
WATER BALANCE/WATER BUDGET ASSESSMENT

	Site		
Catchment Designation	Grass	Impervious	Total
Area (m^2)	5731	2296	8027
Pervious Area (m^2)	5731	0	5731
Impervious Area (m^2)	0	2296	2296
Infiltration Factors			
Topography Infiltration Factor	0.25	N/A	
Soil Infiltration Factor	0.40	N/A	
Land Cover Infiltration Factor	0.15	N/A	
MOE Infiltration Factor	0.80	N/A	
Inputs (mm/year)			
Precipitation	787	787	**787**
Total Inputs	787	787	**787**
Outputs (mm/year)			
Precipitation Surplus	145	708	306
Net Surplus	145	708	306
Downspout Disconnection Retention	0	0	0
Evapotranspiration	642	79	481
Roof Evapotranspiration	0	0	0
Rooftop Runoff Lawn Evaporation	0	0	0
Total Evapotranspiration	**642**	**79**	**481**
Infiltration	116	0	83
Rooftop Infiltration	0	0	0
Total Infiltration	**116**	**0**	**83**
Runoff Pervious Area	29	708	223
Runoff Impervious Area	0	0	0
Total Runoff	**29**	**708**	**223**
Total Outputs	**787**	**787**	787
Difference (Inputs - Outputs)	0	0	0
Input (Volumes - m^3/year)			
Precipitation	4510	1807	6317
Total Inputs	**4510**	**1807**	**6317**
Outputs (Volumes - m^3/year)			
Precipitation Surplus	831	1626	2457
Net Surplus	831	1626	2457
Downspout Disconnection Retention	0	0	0
Evapotranspiration	3679	181	3860
Roof Evapotranspiration	0	0	0
Rooftop Runoff Lawn Evaporation	0	0	0
Total Evapotranspiration	3679	181	**3860**
Infiltration	665	0	665
Rooftop Infiltration	0	0	0
Total Infiltration	**665**	**0**	**665**
Runoff Pervious Area	166	1626	1792
Runoff Impervious Area	0	0	0
Total Runoff	**166**	**1626**	**1792**
Total Outputs	**4510**	**1807**	**6317**
Difference (Inputs - Outputs)	0	0	0

Assuming 0.4 Runoff Coefficent

Post-Development Water Balance

TABLE 2: WATER BUDGET - POST-DEVELOPMENT WITHOUT MITIGATION

WATER BALANCE/WATER BUDGET ASSESSMENT

Catchment Designation	Prive Grass	Roof Area	Public Grass	Road/Pavement/Walkways/ Patios/Driveways	Total
Area (m^2)	2875	1937	295	2919	8027
Pervious Area (m^2)	2875	0	295	0	3170
Impervious Area (m^2)	0	1937	0	2919	4857
Infiltration Factors					
Topography Infiltration Factor	0.25	N/A	0.25	N/A	
Soil Infiltration Factor	0.40	N/A	0.40	N/A	
Land Cover Infiltration Factor	0.15	N/A	0.15	N/A	
MOE Infiltration Factor	0.80	N/A	0.80	N/A	
Inputs (mm/year)					
Precipitation	787	787	787	787	787
Total Inputs	787	787	787	787	787
Outputs (mm/year)					
Precipitation Surplus[1]	145	708	394	708	495
Net Surplus	145	708	394	708	495
Downspout Disconnection Retention[2]	0	0	0	0	0
Evapotranspiration	642	0	0	79	259
Roof Evapotranspiration[2]	0	79	394	0	33
Rooftop Runoff Lawn Evaporation	0	0	0	0	0
Total Evapotranspiration	**642**	**79**	**394**	**79**	**292**
Infiltration	116	0	0	0	42
Rooftop Infiltration[2]	0	0	0	0	0
Mitigation Infiltration	0	0	0	0	0
Total Infiltration	**116**	**0**	**0**	**0**	**42**
Runoff Pervious Area	29	0	394	0	25
Runoff Impervious Area	0	708	0	708	429
Total Runoff	**29**	**708**	**394**	**708**	**453**
Total Outputs	**787**	**787**	**787**	**787**	**787**
Difference (Inputs - Outputs)	0	0	0	0	**0**
Input (Volumes - m^3/year)					
Precipitation	2263	1525	232	2297	6317
Total Inputs	**2263**	**1525**	**232**	**2297**	**6317**
Outputs (Volumes - m^3/year)					
Precipitation Surplus	417	1372	116	2068	3973
Net Surplus	417	1372	116	2068	3973
Downspout Disconnection Retention[2]	0	0	0	0	0
Evapotranpiration	1846	0	0	230	2075
Roof Evapotranspiration	0	152	116	0	269
Rooftop Runoff Lawn Evaporation	0	0	0	0	0
Total Evapotranspiration	**1846**	**152**	**116**	**230**	**2344**
Infiltration	333	0	0	0	333
Rooftop Infiltration	0	0	0	0	0
Total Infiltration	**333**	**0**	**0**	**0**	**333**
Runoff Pervious Area	83	0	116	0	200
Runoff Impervious Area	0	1372	0	2068	3440
Total Runoff	**83**	**1372**	**116**	**2068**	**3639**
Total Outputs	**2263**	**1525**	**232**	**2297**	**6317**
Difference (Inputs - Outputs)	0	0	0	0	0

1 - Assumes 10% Evaporation from Impervious Surfaces

Water Balance Mitigation Calculations

Pre Development Infiltration =	**665**	**m^3/y**
Post Development Infiltration =	**333**	**m^3/y**
Post to Pre Deficit =	**331**	**m^3/y**

Total Proposed Impervious Area =	**4,857**	**m^2**
Total Rainall to meet deficit =	**68.22**	**mm/year**
As per Rain Fall Analysis =	**2.106**	**mm**

Based on the analysis summarized above, the erosion critieria of 5mm retention across the site's impervious area will achieve the pre-post volumetric infiltration requirement.

Table 1: Average Monthly Temperature

Monthly Average Temperature Calculation Based on Data from Environment Canada Pearson Station (˚C)												
Month/Year	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
1983	-4.1	-3.1	0.6	5.5	10.1	18.3	22.3	21.1	16.7	8.9	3.3	-6.4
1984	-9.7	-1.5	-4.6	7.2	10.3	18.2	19.8	21.1	13.9	10.3	2.7	-0.2
1985	-8.4	-5.8	0.3	7.3	13.1	15.7	19.6	19.4	17.0	9.4	3.4	-4.6
1986	-5.6	-6.1	0.6	7.6	14.3	16.4	21.0	18.4	14.7	8.7	1.6	-1.2
1987	-4.6	-5.8	1.8	8.8	14.7	19.6	22.5	19.6	15.5	7.0	3.4	-0.3
1988	-4.5	-6.8	-0.8	5.9	13.9	17.7	22.9	21.4	15.5	7.2	4.5	-2.8
1989	-2.2	-6.5	-2.1	5.1	13.0	18.4	21.5	19.7	15.7	9.8	1.9	-10.1
1990	-0.8	-3.5	0.7	8.3	11.6	18.7	20.9	20.3	15.3	9.5	4.6	-1.0
1991	-5.7	-2.4	1.6	8.7	16.3	20.0	21.7	21.1	14.9	10.4	2.4	-2.4
1992	-4.2	-3.9	-1.1	5.6	12.3	16.4	18.0	17.9	14.7	7.4	2.8	-1.6
1993	-4.0	-8.4	-2.0	6.6	12.1	17.1	21.7	21.1	13.6	7.9	3.1	-2.7
1994	-12.4	-8.3	-0.8	7.3	11.8	19.1	21.5	18.7	15.9	10.0	5.4	-0.1
1995	-3.1	-7.3	1.9	4.1	13.3	19.9	21.9	21.8	14.0	11.0	1.0	-5.1
1996	-6.7	-5.8	-2.8	4.4	11.6	18.6	19.6	20.7	16.5	9.2	0.9	-0.4
1997	-6.4	-3.2	-1.4	5.8	9.6	73.9	20.9	19.0	15.5	9.5	2.5	-0.9
1998	-2.2	-0.3	2.1	8.6	17.0	18.9	21.2	21.7	18.2	10.8	4.9	0.7
1999	-6.2	-1.6	0.2	8.1	15.5	20.4	24.3	20.3	18.0	9.4	5.8	-0.7
2000	-5.8	-3.1	4.5	6.7	14.3	18.2	20.1	20.6	15.9	11.2	3.6	-7.2
2001	-4.1	-3.0	-0.3	8.3	14.8	19.7	21.0	23.2	16.7	10.6	7.1	1.7
2002	-0.5	-1.3	0.4	7.3	10.9	19.1	24.2	22.6	20.2	8.9	3.2	-2.0
2003	-8.3	-7.0	-0.7	5.7	12.3	18.3	21.8	22.1	17.0	9.1	4.7	-0.1
2004	-9.4	-3.8	2.3	7.0	13.2	17.6	20.7	19.5	18.4	10.7	5.4	-2.8
2005	-6.8	-4.0	-1.6	7.8	11.9	22.6	24.1	22.5	19.0	11.1	5.1	-3.5
2006	0.2	-3.6	1.3	8.2	14.4	19.8	23.4	21.1	15.7	8.7	5.3	1.9
2007	-2.9	-8.4	0.4	6.1	14.3	20.8	21.3	22.4	18.4	14.2	2.6	-2.3
2008	-2.1	-5.3	-1.7	9.5	11.8	19.6	21.5	19.7	16.9	9.0	2.9	-3.1
2009	-8.8	-3.7	0.8	7.8	13.1	17.5	19.2	20.6	16.9	8.7	6.0	-2.4
2010	-5.2	-3.4	4.4	10.5	16.0	19.2	23.3	22.4	16.4	10.2	4.5	-3.8
2011	-7.0	-5.4	-0.5	6.9	14.1	19.1	24.4	21.9	17.7	10.5	6.6	0.8
2012	-1.7	-0.3	6.7	7.3	16.6	20.6	24.3	21.6	16.4	10.2	3.5	0.8
Average	**-5.1**	**-4.4**	**0.3**	**7.1**	**13.3**	**20.6**	**21.7**	**20.8**	**16.4**	**9.7**	**3.8**	**-2.1**

Table 2: Average Monthly Precipitation

Monthly Average Precipitation Calculation Based on Data from Environment Canada Pearson Station (mm)													
Month/Year	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	
1983	33.7	40.6	77.3	83.2	99.5	33.0	18.3	112.2	54.9	71.8	89.1	82.0	
1984	30.2	59.0	59.5	58.7	102.8	48.1	63.3	63.8	74.7	26.1	69.9	61.3	
1985	76.6	83.1	78.6	33.1	75.9	37.3	91.5	152.5	57.6	52.3	161.8	35.9	
1986	26.5	32.0	48.8	54.0	75.2	67.4	122.3	146.2	212.3	54.8	44.4	67.3	
1987	56.6	14.8	44.2	49.8	29.6	68.3	108.1	52.3	108.0	48.1	83.4	47.4	
1988	21.5	64.6	23.6	55.2	39.6	25.0	109.7	37.2	70.6	67.4	58.1	31.5	
1989	25.9	19.0	37.1	41.1	79.2	94.7	70.4	39.6	44.1	76.2	78.5	23.8	
1990	36.7	76.9	28.7	53.0	86.6	69.4	68.4	112.6	42.8	87.8	39.6	112.8	
1991	33.6	23.5	98.1	115.4	83.6	24.4	91.0	91.4	52.1	46.3	56.3	44.7	
1992	37.2	35.0	21.7	133.8	69.7	37.2	134.5	154.4	98.4	66.0	107.2	56.3	
1993	70.6	26.6	31.0	85.4	51.6	133.8	87.7	39.9	59.2	71.0	65.2	28.8	
1994	61.0	20.2	51.2	96.0	78.8	54.4	83.0	60.1	51.4	27.4	84.9	51.4	
1995	133.3	20.8	50.8	76.6	87.0	52.1	55.4	135.4	27.5	131.8	121.6	35.8	
1996	72.6	38.2	36.2	101.6	90.6	118.0	97.4	48.2	166.2	75.8	29.8	95.2	
1997	64.6	78.6	69.8	29.2	65.4	50.8	30.0	71.8	48.0	35.2	55.0	30.2	
1998	97.2	45.8	98.4	57.2	71.8	80.5	45.4	26.8	38.4	24.0	33.6	63.0	
1999	107.0	27.4	23.4	48.9	39.0	66.2	44.4	59.0	80.0	61.8	78.2	26.5	
2000	29.2	48.4	18.8	79.3	124.4	169.2	33.8	38.0	70.0	17.6	55.6	71.4	
2001	31.2	94.0	31.4	36.4	92.2	61.8	34.0	34.6	50.4	108.8	75.0	40.6	
2002	46.2	38.4	61.3	103.2	80.7	59.6	59.0	11.6	59.2	43.0	67.2	32.5	
2003	35.4	46.8	50.0	60.8	152.8	63.8	66.2	53.4	114.2	49.4	141.2	61.6	
2004	49.6	20.8	63.4	64.2	98.8	62.8	119.8	60.0	25.2	35.2	64.8	90.4	
2005	70.4	75.6	32.8	97.6	14.4	31.8	20.4	135.6	79.6	47.4	102.2	58.9	
2006	74.6	74.8	48.8	62.4	82.0	45.4	105.2	40.2	77.6	120.6	71.7	62.4	
2007	38.6	24.6	33.4	60.8	73.6	43.2	47.4	20.8	28.6	41.2	87.8	92.7	
2008	58.2	107.6	61.6	54.6	68.8	110.4	193.2	92.6	83.4	39.6	79.8	99.8	
2009	44.4	73.6	68.8	133.6	60.8	70.2	84.8	144.0	40.2	71.0	32.2	80.4	
2010	24.4	24.8	62.6	36.2	51.0	191.6	89.6	58.6	88.2	57.2	66.2	36.8	
2011	42.0	47.0	91.4	96.6	142.0	59.0	32.4	72.2	85.0	119.2	98.0	52.0	
2012	54.2	26.6	18.0	43.6	44.4	76.4	100.0	52.4	121.0	126.4	10.2	58.4	
Average	**52.8**	**47.0**	**50.7**	**70.1**	**77.1**	**70.2**	**76.9**	**73.9**	**73.6**	**63.3**	**73.6**	**57.7**	**786.9**

	Rainfall Depth					
Year	<= 5mm	<= 10mm	<= 15mm	<=20mm	<=25mm	<=50mm
1983	169	271	444	638	683	796
1984	171	359	447	630	717	717
1985	197	350	524	572	659	936
1986	138	314	522	590	655	655
1987	137	307	431	533	533	711
1988	161	331	446	497	520	604
1989	156	309	431	540	603	630
1990	154	332	481	589	673	815
1991	143	321	494	526	616	760
1992	146	311	421	522	544	873
1993	149	267	340	445	445	579
1994	150	340	464	581	604	720
1995	139	301	411	512	604	863
1996	142	448	652	741	785	903
1997	209	350	462	517	629	629
1998	110	256	383	482	570	682
1999	174	270	416	450	493	609
2000	206	372	457	508	578	643
2001	143	311	435	523	587	690
2002	153	352	500	583	606	662
2003	147	277	450	624	753	896
2004	176	347	524	628	696	755
2005	177	329	413	479	632	767
2006	159	337	481	598	707	866
2007	165	324	402	456	523	593
2008	170	408	625	727	770	997
2009	140	248	437	595	661	904
2010	124	250	365	493	582	734
2011	167	321	577	692	827	937
2012	164	283	426	514	580	732
	158	**320**	**462**	**559**	**628**	**755**

5	**158**
10	**320**
15	**462**
20	**559**
25	**628**
50	**755**

y = -0.4311x2 + 36.772x - 7.2976

rainfall depth

5	10	15	20	25	50
166	317	447	556	643	754

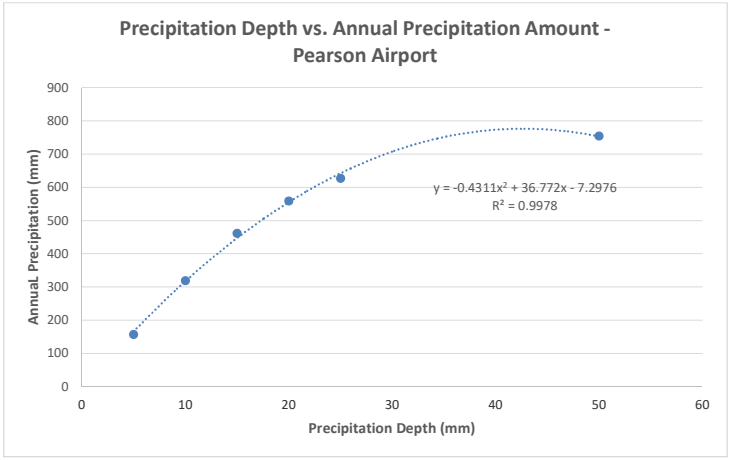


Table 3: CLIMATIC WATER BUDGET: CLIMATE NORMAL 1983 - 2013 (PEARSON STATION)
Potential Evapotranspiration

	Table 3: Thornthwaite (1948)							
Month	T Mean Temperature (ºC)	I Heat Index	E Potential Evapo-transpiration (mm)	Daylight Correction Value	Adjusted Potential Evapo-transpiration (mm)	P Total Precipitation (mm)	S Surplus (mm)	D Deficit (mm)
January	-5.11	0.00	0.00	0.81	0.00	52.77	52.77	
February	-4.42	0.00	0.00	0.82	0.00	46.97	46.97	
March	0.34	0.02	0.88	1.02	0.90	50.69	49.79	
April	7.13	1.71	29.97	1.12	33.67	70.05	36.38	
May	13.27	4.38	61.52	1.27	77.96	77.06	0.00	0.90
June	20.65	8.56	102.62	1.28	131.06	70.19	0.00	60.87
July	21.69	9.22	108.62	1.30	140.91	76.89	0.00	64.02
August	20.78	8.65	103.40	1.20	124.12	73.91	0.00	50.21
September	16.37	6.03	78.45	1.04	81.58	73.63	0.00	7.96
October	9.65	2.71	42.53	0.95	40.25	63.35	23.10	
November	3.82	0.67	14.55	0.80	11.68	73.62	61.93	
December	-2.06	0.00	0.00	0.77	0.00	57.73	57.73	
Total		41.94			642	787		183.05

Total Water Surplus = **145**

Notes:
1. Average values of precipitation and temperature were used (see the attached calculations, Table 1)
2. Water budget adjusted for latitude and daylight
3. Mean temperature (ºC) represents calculated mean of day temperature for the month
4. Precipitation and temperature data from Environment Canada Richmond Hill Station, located at Latitude 43°40'38.000" N, Longitude 79°37'50.000" W, Elevation 173.40 m Which is the closest station
5. Total Water Surplus (Thornthwaite 1948) is calculated as total precipitation minus adjusted potential evapotranspiration
6. Heat Index, $I = (T/5)^{1.514}$
7. Potential Evapotranspiration (mm), $E = 16.2x(10xT/I_{total})^{a}$ when T < 0.0 ºC E = 0.0 when T < 0.0 ºC
8. Empirical Exponent $a = 0.675 \times 10^{-6} x (I_{total})^{3} - 0.771 \times 10^{-4} \times (I_{total})^{2} + 0.1792 \times 10^{-1} \times (I_{total}) + 0.49239$

a = 1.158092

	Northern Latitude	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	**0°**	1.04	0.94	1.04	1.01	1.04	1.01	1.04	1.04	1.01	1.04	1.01	1.04
10	**10°**	1.00	0.91	1.03	1.03	1.08	1.06	1.08	1.07	1.02	1.02	0.98	0.99
20	**20°**	0.95	0.90	1.03	1.05	1.13	1.11	1.14	1.11	1.02	1.00	0.93	0.94
30	**30°**	0.90	0.87	1.03	1.08	1.18	1.17	1.20	1.14	1.03	0.98	0.89	0.88
35	**35°**	0.87	0.85	1.03	1.09	1.21	1.21	1.23	1.16	1.03	0.97	0.86	0.85
40	**40°**	0.84	0.83	1.03	1.11	1.24	1.25	1.27	1.18	1.04	0.96	0.83	0.81
45	**45°**	0.80	0.81	1.02	1.13	1.28	1.29	1.31	1.21	1.04	0.94	0.79	0.75
50	**50°**	0.74	0.78	1.02	1.15	1.33	1.36	1.37	1.25	1.06	0.92	0.76	0.70

	Between 40-45												
Latitude	43.4	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
		0.8128	0.8164	1.0232	1.1236	1.2672	1.2772	1.2972	1.2004	1.04	0.9464	0.8028	0.7692

Project: ***2018-4679***
1583 Cormack Crescent
City of Mississauga

SCHAEFFERS
CONSULTING ENGINEERS

Water Quality Requirements

Table: Water Quality Storage Requirements Based on Receiving Waters

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level					
		0%	35%	55%	70%	85%	100%
Level 1	Infiltration		25	30	35	40	

Input:

Estimated Imperviousness =	60%	
Area =	0.857	ha
Level of Protection:	1	
SWMP Type :	Infiltration	

Calculation:

Total Storage Volume Required = 31.67 m^3/ha → 27.14 m^3

Project: ***2018-4679***
1583 Cormack Crescent
City of Mississauga

SCHAEFFERS
CONSULTING ENGINEERS

Drawdown Time Calculation

Infiltration Rate	15	mm/h
Safety Factor	2.5	
Design Infiltration Rate	6.00	mm/h
Provided depth within Cupolex for Infiltration	0.3	m
Drawdown Time	20	hrs

* Soils with Satutrated Hydraulic Conductivity = 1(10-6) cm/s correlates to an infiltration rate of 15mm/h
Stormwater Management Criteria (TRCA 2012)

Detailed Stormceptor Sizing Report – 1583 Cormack Crescent

Project Information & Location			
Project Name	1583 Cormack Crescent	**Project Number**	4679
City	City of Mississauga	**State/ Province**	Ontario
Country	Canada	**Date**	1/21/2019
Designer Information		**EOR Information (optional)**	
Name	Yashaswy Gollamudi	**Name**	
Company	Schaeffers Consulting Engineers	**Company**	
Phone #	905-738-6100	**Phone #**	
Email	ygollamudi@schaeffers.com	**Email**	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	
Recommended Stormceptor Model	STC 2000
Target TSS Removal (%)	80.0
TSS Removal (%) Provided	81
PSD	City of Toronto PSD
Rainfall Station	TORONTO CENTRAL

The recommended Stormceptor model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 300	66
STC 750	76
STC 1000	77
STC 1500	78
STC 2000	81
STC 3000	83
STC 4000	86
STC 5000	87
STC 6000	89
STC 9000	92
STC 10000	92
STC 14000	94
StormceptorMAX	Custom

Stormceptor
The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for each rainfall event, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.
Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

Design Methodology
Stormceptor is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology using local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective. The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. The Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing:
• Site parameters
• Continuous historical rainfall data, including duration, distribution, peaks & inter-event dry periods
• Particle size distribution, and associated settling velocities (Stokes Law, corrected for drag)
• TSS load
• Detention time of the system

Hydrology Analysis
PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of Stormceptor are based on the average annual removal of TSS for the selected site parameters. The Stormceptor is engineered to capture sediment particles by treating the required average annual runoff volume, ensuring positive removal efficiency is maintained during each rainfall event, and preventing negative removal efficiency (scour). Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station			
State/Province	Ontario	**Total Number of Rainfall Events**	2719
Rainfall Station Name	TORONTO CENTRAL	**Total Rainfall (mm)**	13185.4
Station ID #	0100	**Average Annual Rainfall (mm)**	732.5
Coordinates	43°37'N, 79°23'W	**Total Evaporation (mm)**	858.6
Elevation (ft)	328	**Total Infiltration (mm)**	4595.8
Years of Rainfall Data	18	**Total Rainfall that is Runoff (mm)**	7731.0

Notes
• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules. • Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed. • For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

Drainage Area	
Total Area (ha)	0.86
Imperviousness %	65.0

Up Stream Storage	
Storage (ha-m)	Discharge (cms)
0.000	0.000

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (L)	
Peak Conveyed Flow Rate (L/s)	
Water Quality Flow Rate (L/s)	

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cms)	

Design Details	
Stormceptor Inlet Invert Elev (m)	
Stormceptor Outlet Invert Elev (m)	
Stormceptor Rim Elev (m)	
Normal Water Level Elevation (m)	
Pipe Diameter (mm)	
Pipe Material	
Multiple Inlets (Y/N)	No
Grate Inlet (Y/N)	No

Particle Size Distribution (PSD)

Removing the smallest fraction of particulates from runoff ensures the majority of pollutants, such as metals, hydrocarbons and nutrients are captured. The table below identifies the Particle Size Distribution (PSD) that was selected to define TSS removal for the Stormceptor design.

City of Toronto PSD		
Particle Diameter (microns)	Distribution %	Specific Gravity
10.0	20.0	2.65
30.0	10.0	2.65
50.0	10.0	2.65
95.0	20.0	2.65
265.0	20.0	2.65
1000.0	20.0	2.65

Site Name	

Site Details

Drainage Area

Total Area (ha)	0.86
Imperviousness %	65.0

Surface Characteristics

Width (m)	185.00
Slope %	2
Impervious Depression Storage (mm)	0.508
Pervious Depression Storage (mm)	5.08
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Maintenance Frequency

Maintenance Frequency (months) >	12

Infiltration Parameters

Horton's equation is used to estimate infiltration

Max. Infiltration Rate (mm/hr)	61.98
Min. Infiltration Rate (mm/hr)	10.16
Decay Rate (1/sec)	0.00055
Regeneration Rate (1/sec)	0.01

Evaporation

Daily Evaporation Rate (mm/day)	2.54

Dry Weather Flow

Dry Weather Flow (lps)	0

Winter Months

Winter Infiltration	0

TSS Loading Parameters

TSS Loading Function	

Buildup/Wash-off Parameters

Target Event Mean Conc. (EMC) mg/L	
Exponential Buildup Power	
Exponential Washoff Exponent	

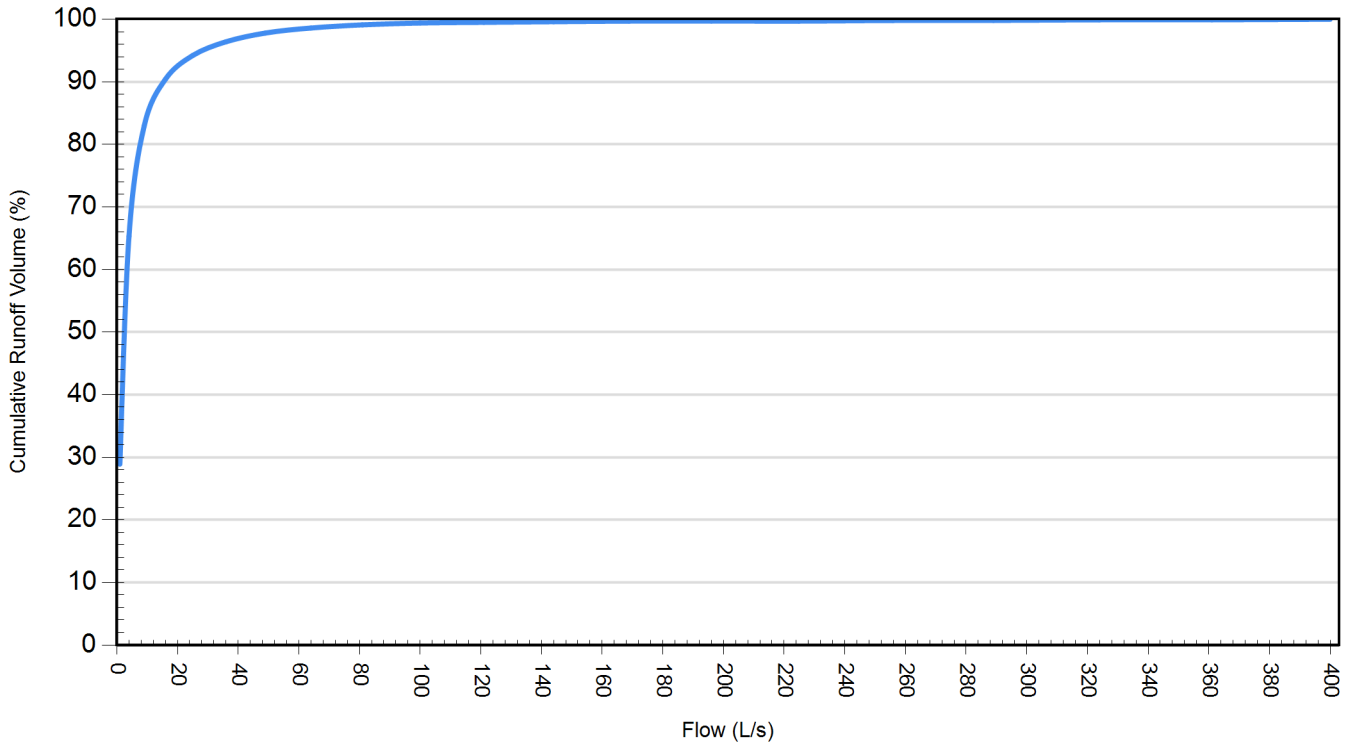
TSS Availability Parameters

Availability Constant A	
Availability Factor B	
Availability Exponent C	
Min. Particle Size Affected by Availability (micron)	

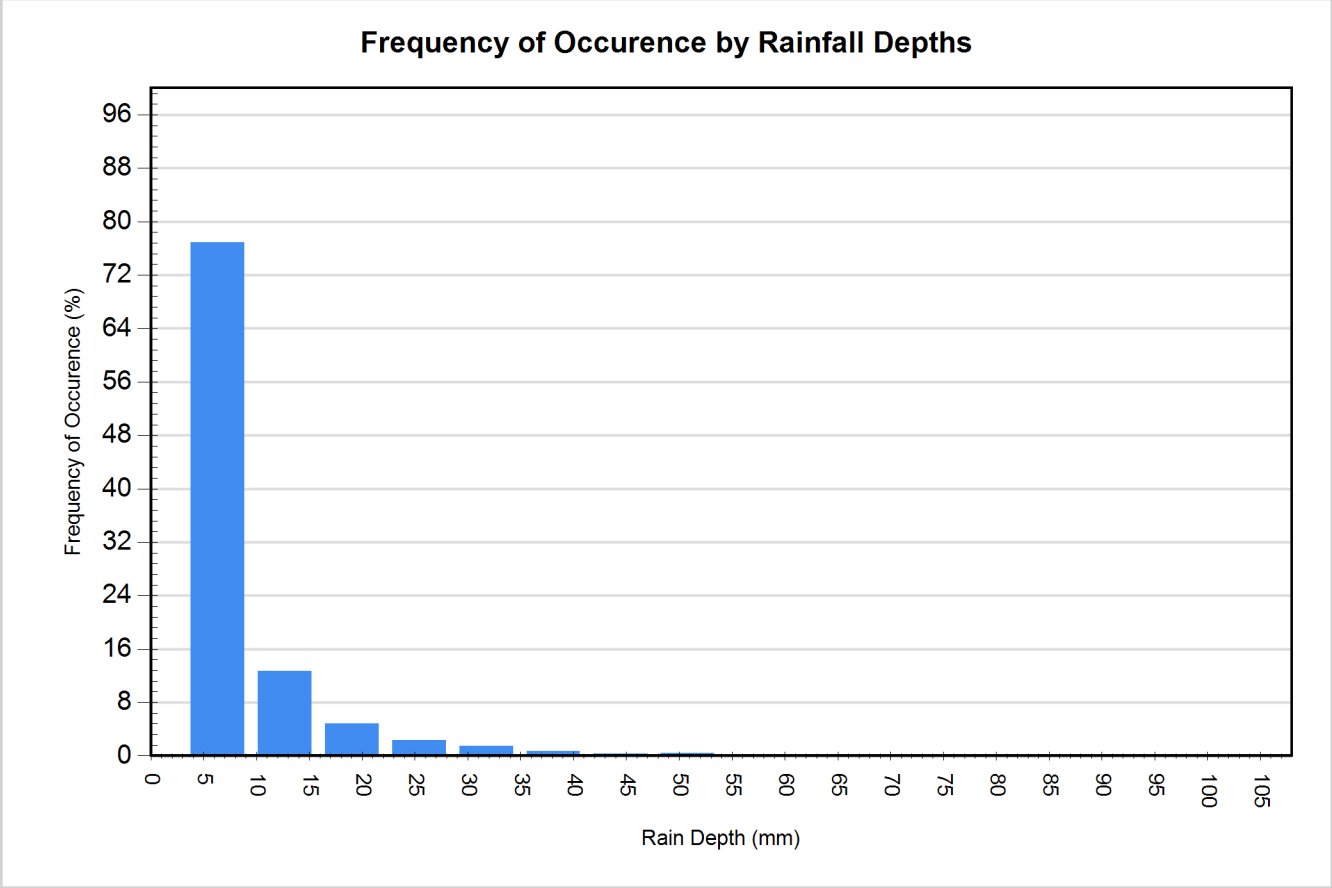
Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (L/s)	**Runoff Volume (m^3)**	**Volume Over (m^3)**	**Cumulative Runoff Volume (%)**
1	19359	47718	28.9
4	43829	23251	65.3
9	55630	11451	82.9
16	60616	6465	90.4
25	63186	3895	94.2
36	64699	2382	96.4
49	65612	1470	97.8
64	66168	913	98.6
81	66502	580	99.1
100	66678	404	99.4
121	66751	331	99.5
144	66805	276	99.6
169	66847	234	99.7
196	66883	199	99.7
225	66909	172	99.7
256	66937	144	99.8
289	66967	114	99.8
324	66999	83	99.9
361	67029	52	99.9
400	67053	29	100.0

Cumulative Runoff Volume by Runoff Rate

For area: 0.86(ha), imperviousness: 65.0%, rainfall station: TORONTO CENTRAL



Rainfall Event Analysis				
Rainfall Depth (mm)	**No. of Events**	**Percentage of Total Events (%)**	**Total Volume (mm)**	**Percentage of Annual Volume (%)**
6.35	2091	76.9	3344	25.4
12.70	345	12.7	3201	24.3
19.05	131	4.8	2062	15.6
25.40	63	2.3	1358	10.3
31.75	42	1.5	1185	9.0
38.10	20	0.7	678	5.1
44.45	9	0.3	377	2.9
50.80	11	0.4	521	4.0
57.15	3	0.1	159	1.2
63.50	1	0.0	61	0.5
69.85	0	0.0	0	0.0
76.20	1	0.0	73	0.6
82.55	1	0.0	80	0.6
88.90	1	0.0	85	0.6
95.25	0	0.0	0	0.0
101.60	0	0.0	0	0.0



For Stormceptor Specifications and Drawings Please Visit:
http://www.imbriumsystems.com/technical-specifications

Project: 1583 Cormack Crescent
(CITY OF MISSISSAUGA)
Consultant: Schaeffer & Associates Ltd.
DRAINAGE AREA PLAN NO.

STORM SEWER DESIGN SHEET

CITY OF MISSISSAUGA
1583 Cormack Crescent - Post Development

PROJECT No.: 2018-4679
DESIGNED BY: M.M.
CHECKED BY:
DATE: May 9, 2019

AREA NO	STREET	LAND USE	UPSTREAM		DOWNSTREAM		NO. OF HECTARES		AREA x STORM C0-EFF.				TIME		$I10_{YR}$	Q_{10}=2.78 x CIA / 1000 (m^3/s)	PIPE					
			MH	INV	MH	INV	IN AREA	TOTAL	C	INCR AxC	TOTAL SECT AxC	TOTAL AxCx2.78	IN AREA	TOT			Length (m)	SIZE NOM (mm)	SIZE ACT (mm)	GRADE	TYPE OF PIPE	CAPACITY (m^3/s)	VELOCITY (m/s)
	Condo Road	RES	6		5		0.660	0.66	0.68	0.449	0.449	1.248	1.63	15.00	99.17	0.124	108.8	450	457	0.50	CONC	0.182	1.11
	Condo Road	RES	5		4		0.030	0.69	0.68	0.020	0.469	1.304	0.24	16.63	93.16	0.122	16.3	450	457	0.50	CONC	0.182	1.11
	Condo Road	RES	4		OGS		0.00	0.69		0.000	0.469	1.304	0.06	16.88	92.34	0.120	1.5	450	457	0.50	CONC	0.182	1.11
	Condo Road	RES	OGS		TANK		0.00	0.69		0.000	0.469	1.304	0.02	16.93	92.15	0.120	1.5	450	457	0.50	CONC	0.182	1.11
								0.69			**0.469**			**16.96**									
	Condo Road	RES	DCB		TANK		0.160	0.16	0.65	0.104	0.104	0.289	3.38	15.00	99.17	0.029	450.0	450	457	2.00	CONC	0.365	2.22
	Cormack Crescent	RES	CTL.MH.1		2					Controlled Flow From The Tank =						0.054	16.7	300	305	1.00	UR-PVC	0.087	1.20
	Cormack Crescent		2		Ex.1					Controlled Flow From The Tank =						0.054	5.4	300	305	0.50	UR-PVC	0.062	0.85

$I10_{YR}=35.1(T)^{-0.695}$, T in hours
Inlet Time = 15 min

APPENDIX E: ENGINEERING DRAWINGS

GENERAL NOTES

1. ALL CONCRETE AND PLASTIC SEWER PIPE SHALL HAVE RUBBER GASKET JOINTS.
2. ALL SEWERS SHALL BE CONSTRUCTED WITH BEDDING IN ACCORDANCE WITH OPSD 802.03 CLASS "B" UNLESS OTHERWISE NOTED.
3. PLASTIC SEWER PIPES SHALL BE CONSTRUCTED WITH ULTRA RIB OR APPROVED EQUAL UP TO THE MAXIMUM DIAMETER OF 600mm.
4. ALL WORKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH CURRENT CITY OF MISSISSAUGA AND OPSD STANDARD DRAWINGS AND SPECIFICATIONS.
5. DOUBLE CATCHBASIN LEADS TO BE 300mm UNLESS OTHERWISE NOTED. ALL CATCHBASIN LEADS TO BE EITHER C–14–ES MINIMUM OR P.V.C. TYPE S.D.R. 28.
6. ALL BACKFILL FOR SEWERS, WATERMAINS AND UTILITIES ON PAVED AREAS MUST BE MECHANICALLY COMPACTED TO 95% STANDARD PROCTOR DENSITY.
7. INVERTS, ELEVATIONS AND EXACT LOCATIONS OF ALL EXISTING UNDERGROUND SERVICES TO BE VERIFIED IN THE FIELD BEFORE COMMENCING ANY WORK.
8. ALL AREAS DISTURBED DURING CONSTRUCTION TO BE RESTORED TO ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE CITY OF MISSISSAUGA AND REGION OF PEEL.
9. GRASSED AREAS TO BE TOPPED WITH 150mm TOPSOIL AND SODDED WITH No.1 NURSERY SOD.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTROLLING MUD AND DUST ON ALL PUBLIC ROADS TO THE SATISFACTION OF THE CITY AND REGION.

SPECIAL NOTES

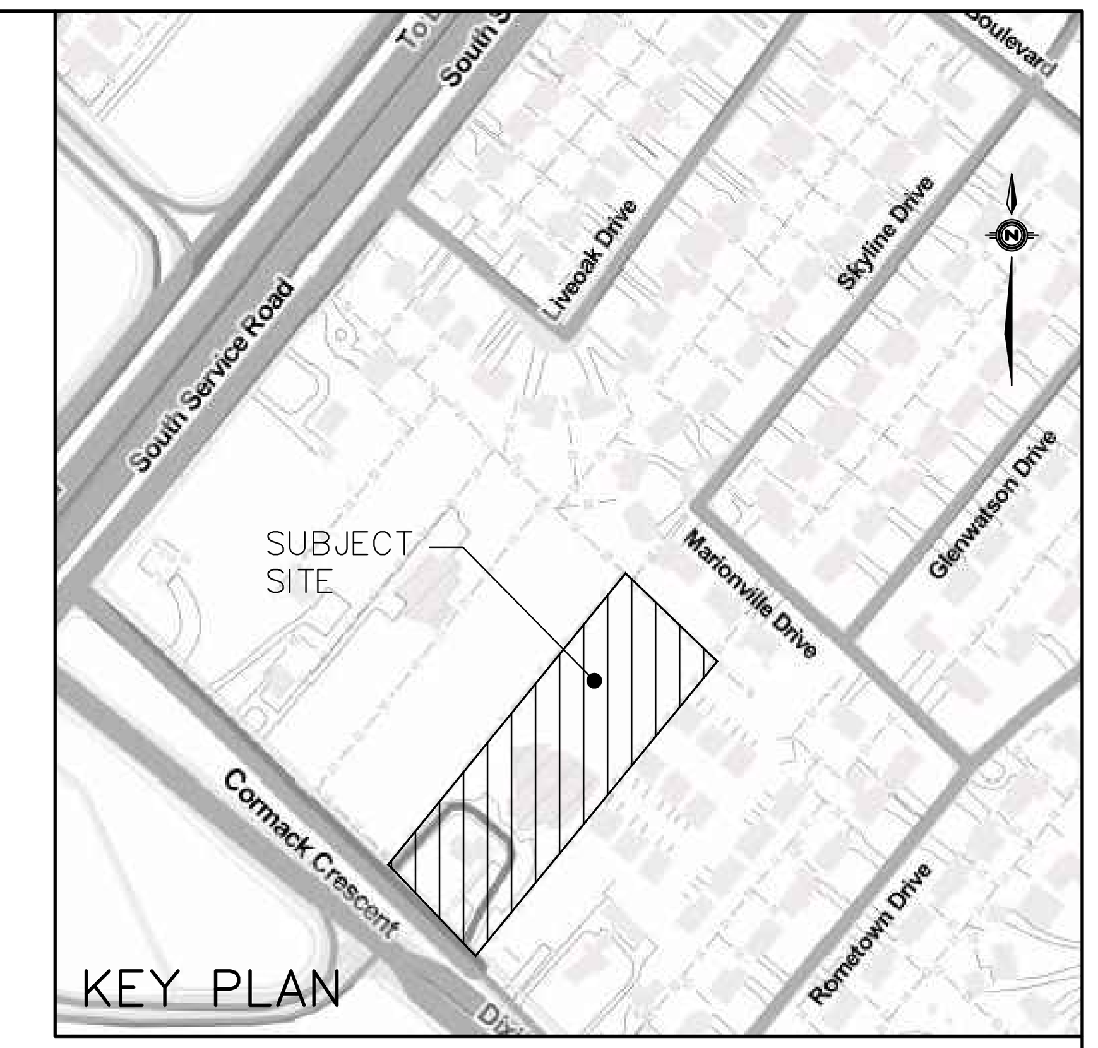
1. ALL BUILDINGS SHOWN ON THIS PLAN TO BE CONSTRUCTED WITH SUMP PUMPS FOR FOUNDATION DRAINAGE. PUMPS TO BE INSTALLED SUCH THAT DISCHARGE IS DIRECTED TO ADJACENT SURFACE SURROUNDING BUILDINGS, COMPLETE WITH CONCRETE SPLASH PADS. DISCHARGE FROM SUMP PUMPS IS TO BE DIRECTED AWAY FROM ALL NEARBY BUILDING FOUNDATIONS.
2. ALL ROAD CB'S AND DCB's TO BE FITTED WITH CB SHIELD INSERTS, PER DETAIL ON DRAWING DET–2.

REGION OF PEEL NOTES:

1. ALL MATERIALS AND CONSTRUCTIONS METHODS MUST CORRESPOND TO THE CURRENT PEEL PUBLIC WORKS STANDARDS AND SPECIFICATIONS.
2. WATERMAIN AND/ OR WATER SERVICE MATERIAL UP TO AND INCLUDING 300mm (12") DIAMETER MUST BE POLYVINYL CHLORIDE (PVC), DR18, A.W.W.A. C900–16. SIZE 50mm (2") AND SMALLER MUST BE COPPER, TYPE K SOFT COPPER ASTM B88–49.
3. WATERMAIN 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. PROVISION FOR FLUSHING LINE PRIOR TO TESTING, ETC. MUST BE PROVIDED WITH AT LEAST A 50mm (2") OUTLET ON 100mm (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 THE WATER TO DRAIN ONTO A PARKING LOT OR DOWN A DRAIN. ON FIRE LINES, FLUSHING OUTLET TO BE 100mm (4") DIAMETER MINIMUM ON A HYDRANT.
5. ALL CURBS 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 AND B, 0.7m (2') AND 0.9m (3') AND TO HAVE PUMPER NOZZLE.
7. WATERMAIN TO BE INSTALLED TO GRADES AS SHOWN ON APPROVED SITE PLAN. COPY OF GRADE SHEET MUST BE SUPPLIED TO INSPECTOR PRIOR TO COMMENCEMENT OF WORK, WHERE REQUESTED BY INSPECTOR.
8. WATERMAIN MUST HAVE A MINIMUM VERTICAL CLEARANCE OF 0.30m (12") OVER / 0.5m (20") UNDER SEWERS AND ALL OTHERS 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. ALL PROPOSED WATER PIPING MUST BE ISOLATED THROUGH A TEMPORARY CONNECTION THAT SHALL INCLUDE AN APPROPRIATE CROSS–CONNECTION CONTROL DEVICE, CONSISTENT WITH THE DEGREE OF HAZARD, FOR BACKFLOW PREVENTION OF THE ACTIVE DISTRIBUTION SYSTEM, CONFORMING TO REGION OF PEEL STANDARD 1–7–7 OR 1–7–8.
12. LOCATION OF ALL EXISTING UTILITIES IN THE FIELD TO BE ESTABLISHED BY THE CONTRACTOR.
13. THE CONTRACTOR(S) SHALL BE SOLELY RESPONSIBLE FOR LOCATES, EXPOSING, SUPPORTING AND PROTECTING OF ALL UNDERGROUND AND OVERHEAD UTILITIES AND STRUCTURES EXISTING AT THE TIME OF CONSTRUCTION IN THE AREA OF THEIR WORK WHETHER SHOWN ON THE PLANS OR NOT AND FOR ALL REPAIRS AND CONSEQUENCES RESULTING FROM DAMAGE TO SAME.
14. THE CONTRACTOR(S) SHALL BE SOLELY RESPONSIBLE TO GIVE 72 HOURS WRITTEN NOTICE TO THE 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.

LEGEND

- AD/CB — DENOTES AREA DRAIN / CATCHBASIN
- DENOTES CATCHBASIN w/ CB SHIELD INSERT (REFER TO DETAIL ON DRAWING DET–2)
- DENOTES DOUBLE CATCHBASIN
- DENOTES STORM MANHOLE
- DENOTES SANITARY MANHOLE
- DENOTES HYDRANT
- VB/VC — DENOTES VALVE & BOX / CHAMBER
- DENOTES PROPERTY LINE
- DENOTES LIMIT OF U/G CONSTRUCTION
- DENOTES OGS (OIL GRIT SEPARATOR)
- DENOTES SUMP FOR FOUNDATION DRAINAGE
- DENOTES WATER VALVE BOX



SCHAEFFERS
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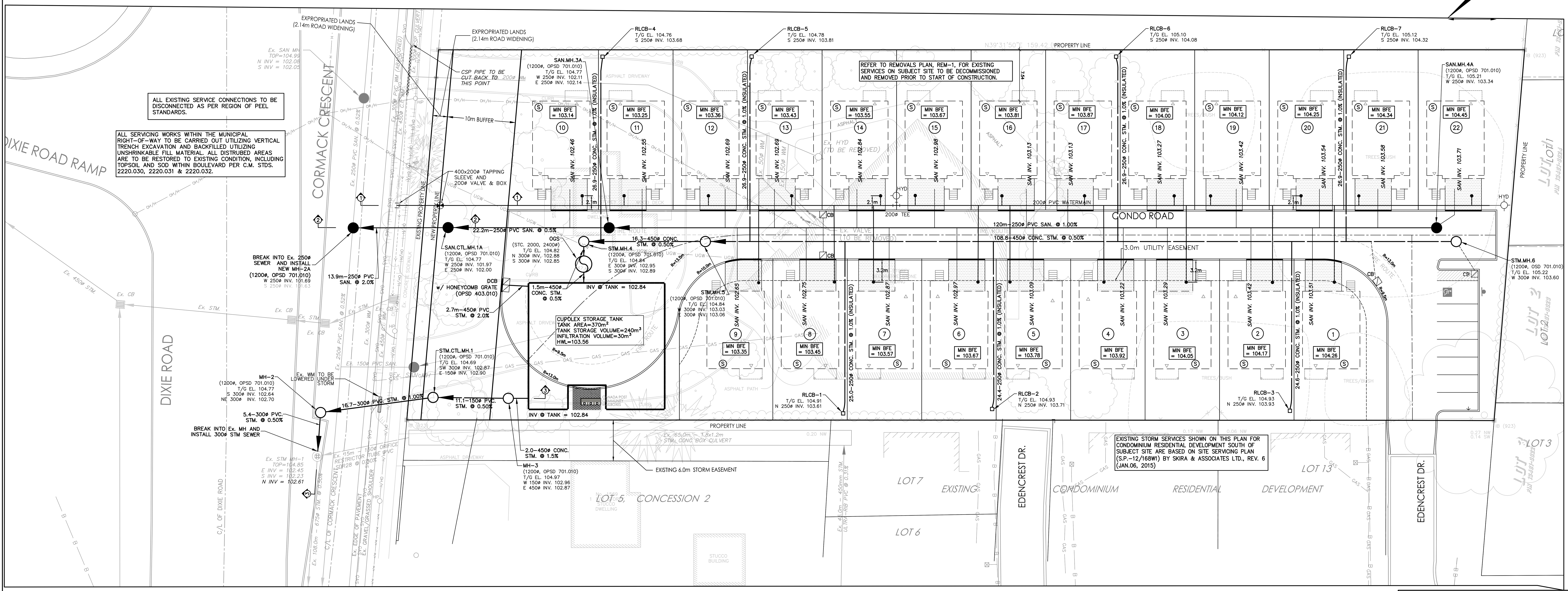

NOTES:

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2. ALL AREAS DISTURBED DURING CONSTRUCTION OF SEWERS AND WATERMAINS TO BE RESTORED TO ORIGINAL CONDITION OR BETTER, TO THE SATISFACTION OF THE CITY OF VAUGHAN AND REGION OF YORK. AREAS WHERE GRASS EXISTS UNDER PREDEVELOPMENT CONDITIONS ARE TO BE TOPPED WITH 150mm TOPSOIL AND SODDED; OTHERWISE, AREAS TO BE RESTORED WITH 150mm TOPSOIL AND HYDROSEEDED, ALL TO THE SATISFACTION OF THE CITY AND REGION. ALL EXISTING SERVICES TO BE ADJUSTED TO SUIT NEW GRADES.
3. FOR GENERAL NOTES REFER TO DWG. No. GN–1.
4. FOR SECTION DETAILS, REFER TO DRAWING SEC–1.
5. EXISTING SEWER INFORMATION SHOWN ON THESE PLANS HAS BEEN OBTAINED FROM LIMITED RECORD DRAWING INFORMATION PROVIDED BY LOCAL MUNICIPAL AUTHORITIES WHICH MAY BE PARTIAL OR INCOMPLETE. ANY DEVIATION OBSEREVED ON SITE IS TO BE REPORTED TO THE OWNER AND THEIR CONSULTANT IMMEDIATELY IN ORDER TO CONFIRM ANY REQUIRED DESIGN REVISIONS.

PRIOR TO COMMENCING ANY WORK WITHIN THE MUNICIPAL RIGHT OF WAY, THE CONTRACTOR OR DEVELOPER WILL OBTAIN ALL NECESSARY ROAD OCCUPANCY PERMITS FROM THE APPLICABLE MUNICIPAL AUTHORITY.

PAVEMENT DESIGN

PER RECOMMENDATION FROM MISSISSAUGA STANDARD 2220.010, FOR 80% SAND CONDITION.

COURSE	THICKNESS (mm)	OPS SPECIFICATIONS
SURFACE COURSE	40	HL–3
BINDER COURSE	50	HL–8
GRANULAR BASE	200	GRANULAR 'A' OR EQUIVALENT
GRANULAR SUB–BASE	0	GRANULAR 'B' OR EQUIVALENT
TOTAL DEPTH	290	

NOTE:
- PAVEMENT DESIGN PROVIDED ABOVE IS CONSIDERED A MINIMUM STANDARD AND IS SUBJECT TO REVISION BASED ON SITE–SPECIFIC GEOTECHNICAL RECOMMENDATIONS PROVIDED BY A QUALIFIED CONSULTANT.
- THE GRANULAR BASES SHOULD BE COMPACTED TO 100% OF THE MAXIMUM STANDARD PROCTOR DRY DENSITY

I HAVE REVIEWED THE PLANS FOR THE CONSTRUCTION OF PROPOSED CONDO SITE PLAN LOCATED AT 1583 CORMACK CRESCENT AND HAVE PREPARED THIS PLAN TO INDICATE THE COMPATIBILITY OF THE PROPOSAL TO EXISTING ADJACENT PROPERTIES AND MUNICIPAL SERVICES. IT IS MY BELIEF THAT ADHERANCE 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.

REGISTERED PROFESSIONAL ENGINEER
H. H. TOZCU
100130655
MAY 13, 2019
PROVINCE OF ONTARIO

ELEVATIONS ARE DERIVED FROM CITY OF MISSISSAUGA BENCHMARK No. 518, ELEVATION = 106.564m, AND BASED ON LOCAL BENCHMARK, CUT CROSS ON SIDEWALK, 1.4m WEST OF SOUTHWEST CORNER OF PROPERTY CORNER ON DIXIE ROAD, ELEVATION = 104.87m, AND AS PROVIDED ON TOPOGRAPHIC SURVEY BY J.D. BARNES LTD. (REF. NO. 18–30–305–00–A), DATED NOVEMBER 29, 2018.

ELM CORMACK (2017) INC.

1931 HIGHWAY 7
CONCORD, ONTARIO
L4K 1V5

tel. 905 709 8232
fax. 905 709 8234

CITY FILE No.: TBD

PROPOSED CONDO SITE PLAN

1583 CORMACK CR.

MISSISSAUGA, ONTARIO

DATE	REMARKS
MAY 13, 2019	ISSUED FOR SITE PLAN APPROVAL

PA / PM:	H.H.T. / H.T.
DRAWN BY:	M.M.
JOB NO.:	4679

SHEET
SS–1
SERVICING PLAN

SCALE 1:300

GENERAL:

1. ALL LOTS (INCLUDING DRAINAGE DITCHES OR SWALES) ARE TO BE SODDED WITH A MINIMUM DEPTH OF 100mm OF TOPSOIL AND No.1 NURSERY SOD, AND THE MINIMUM DEPTH OF 150mm OF CRUSHED STONE TO BE PROVIDED ON THE ENTIRE LENGTH OF EACH DRIVEWAY ON A FIRM SUBGRADE.

2. GRADE ALL AREAS TO:
   I) PROVIDE PROPER SURFACE DRAINAGE AND MAXIMIZE USABLE LAND AREA
   II) PRESERVE EXISTING TREES WHERE POSSIBLE
   III) DIRECT FLOWS AWAY FROM BUILDING

3. MINIMUM YARD SLOPE – 2.00%

4. DRIVEWAY SLOPES:
   I) MIN. 2.00% AWAY FROM BUILDINGS
   II) PREFERRED MAX. 7.50% (FROM STD.SIDEWALK LOCATION)
   III) ABSOLUTE MAX. 1.00%

5. MAXIMUM SLOPE BETWEEN BUILDINGS IN ANY DIRECTION 3:1. USE STEPS AND/OR RETAINING WALLS IF THIS CRITERIA CANNOT BE MET. CONSTRUCT RETAINING WALL WITHIN SIDE LOT LINE.

6. PROVIDE A 0,60m GENTLE SLOPING AREA (2.00% MAX) AWAY FROM THE BUILDING ON AT LEAST ONE SIDE WHERE SIDE YARD SETBACK PERMITS.

7. CLEAR STONE RATHER THAN TOPSOIL AND SOD IS REQUIRED FOR 1.2m OR LESS COMBINED SIDE YARDS BETWEEN TWO BUILDINGS.

RETAINING WALLS:

1. RETAINING WALLS ARE GENERALLY REQUIRED WHERE THE DIFFERENCE IN ELEVATION EXCEEDS 0.60m AND A 3:1 SLOPE CANNOT BE USED BECAUSE OF OTHER FACTORS.

2. CONSTRUCT RETAINING WALLS ENTIRELY ON THE HIGHER LOT SO THAT TIE BACKS DO NOT CROSS PROPERTY BOUNDARIES.

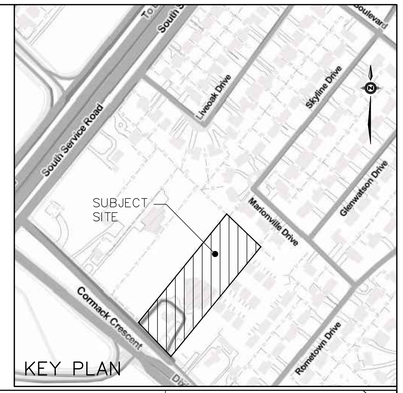
3. CERTIFICATION BY THE CONSULTANT IS REQUIRED ATTESTING TO STRUCTURAL (INTEGRITY, MATERIAL AND TIE BACKS, LINE AND GRADE).

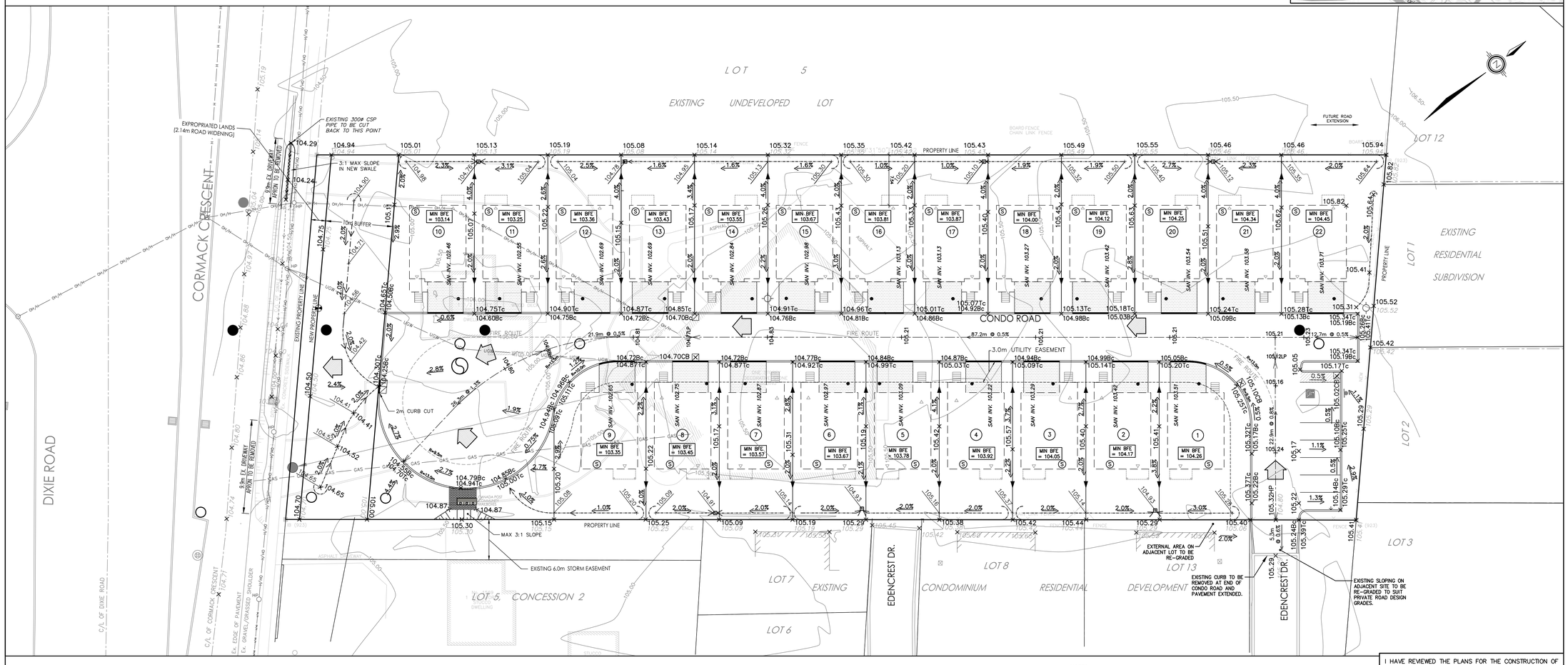
4. A) FENCING WILL BE REQUIRED WHERE WALL HEIGHT EXCEEDS 0.60m
   B) SCREEN FENCING, WHERE APPLICABLE, WILL GENERALLY BE PLACED ON TOP OF THE RETAINING WALL. HOWEVER, DUE CONSIDERATION SHOULD BE GIVEN TO THE AESTHETIC IMPACT OF THE COMBINED WALL/FENCE HEIGHT.

5. DETAILS OF WALL OVER 0.60m ARE TO BE SUBMITTED WITH GRADING PLANS AND STAMPED BY A PROFESSIONAL ENGINEER.

LEGEND

- DENOTES CATCHBASIN
- DENOTES DOUBLE CATCHBASIN
- DENOTES STORM MANHOLE
- DENOTES SANITARY MANHOLE
- DENOTES HYDRANT
- DENOTES VALVE & BOX
- DENOTES LIMIT OF DEVELOPMENT
- 199.80 — DENOTES PROPOSED ELEVATION
- 198.5 — DENOTES EXISTING CONTOUR
- 199.14 — DENOTES EXISTING ELEVATION
- DENOTES OVERLAND FLOW ROUTE
- DENOTES BARRIER CURB PER OPSD 600.110
- DENOTES DEPRESSED BARRIER CURB PER OPSD 600.060
- DENOTES WATER VALVE BOX
- 105.03 — DENOTES PROPOSED BOTTOM OF SWALE ELEVATION
- DENOTES CUT–OFF SWALE
- 4.0% — DENOTES PROPOSED GRADE





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