FUNCTIONAL SERVICING REPORT & STORMWATER MANAGEMENT REPORT

BOLTON VILLAGE, 13656-13668 EMIL KOLB PARKWAY

TOWN OF CALEDON

PROJECT 2024-5440 **DECEMBER 2025**

DATE	DESCRIPTION	PREPARED	APPROVED
December 2025	ZBA & SPA Submission	C. D'Souza	H. Sarkissian
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1.0 INTRODUCTION

1.1 Study Objectives and Location

Schaeffers Consulting Engineers (SCE) has been retained by CAMCOS Living to prepare a Functional Servicing Report and Stormwater Management Report in support of the proposed high-density residential development located north west of Harvest Moon Drive and Emil Kolb Parkway within the West Bolton Secondary Plan Area in the Town of Caledon.

The subject properties are approximately **0.83 ha** and are bound by Harvest Moon Drive to the south, Emil Kolb Parkway to the east, and residential properties to the west and north. The subject property can be legally defined as Part of Lot 9, Concession 5, Town of Caledon, Regional Municipality of Peel. The municipal address for the subject property to the north is 13656 Emil Kolb Parkway, Bolton, Ontario and the municipal address for the property to the south is 13668 Emil Kolb Parkway, Bolton Ontario. The location of the subject sites are illustrated in **Figure 1.1**.

The purpose of this report is to provide site-specific information for the Town, Region, and Toronto Region and Conservation Authority (TRCA) with respect to infrastructure required to support the proposed development regarding storm drainage, sanitary drainage, and water servicing. All of the proposed infrastructure shall be in accordance with the Town and Region's design requirements. Additionally, the report is to clearly demonstrate the impact the proposed development has on the capacity of the existing municipal services and to ensure the existing municipal infrastructure is capable of servicing the proposed site, and to address any impacts to the municipal services.

1.2 Existing Site Condition

The subject property consists of a single detached residential house with an associated driveway in the north, and a vacant commercial block in the southern half. In preparing this report, Schaeffers' staff secured and reviewed available Town of Caledon and Region of Peel drainage figures, plan and profile drawings for the roads and existing sewers adjacent to the site. Refer to **Appendix A** for all as-built information.

As per the information received from the Town and Region the existing site has storm flows discharging to an existing storm sewer on Emil Kolb Parkway and Harvest Moon Drive and ultimately discharging to the storm water management (SWM) pond located just south of the development across Harvest Moon Drive.

It should be noted per as-built drawings obtained from the Town & Region the existing southern parcel contains a Block connection to the Regional sanitary sewer on Emil Kolb Parkway, as well as a Block connection to the Regional watermain on Harvest Moon Drive. The northern parcel also has a sanitary connection to the Regional sanitary sewer on Emil Kolb Parkway.

1.3 Proposed Development Plan & Population

The proposed development will consist of two townhouse blocks, consisting of three (3) storey units, and one mid-rise building with an associated parking lot. A total of 124 residential units is proposed for this development. The site plan associated site statistics, prepared by Q4 Architects Inc. have been included in **Appendix A**.

Detailed population estimate calculations for the proposed development are provided in **Table 1-1** below, utilizing townhouse and apartment population densities as per the Region of Peel Linear Wastewater Standards dated March 29, 2023 and the 2020 Development Charges Background Study.

Table 1-1: Estimated Design Population

Housing Classification	Population Density	Area (ha)	Units	Population
Multiples (Townhouses)	3.4 persons/unit (ppu)	N/A	22	75
Large Apartment (>1 bedroom)	3.1 persons/unit (ppu)	N/A	29	90
Small Apartment (≤ 1 bedroom)	1.7 persons/unit (ppu)	N/A	73	125
TOTAL	--		124	**290**

1.4 Emil Kolb Parkway Roundabout

In support of future growth to 2041 the Region of Peel completed a 'Schedule C' Municipal Class Environmental Assessment (Class EA) to consider a range of options for long term traffic improvements on Coleraine Drive and Emil Kolb Parkway. The study area included Coleraine Drive from Holland Drive to Emil Kolb Parkway at the Harvest Moon Drive/King Street West intersection. The Emil Kolb Parkway and Harvest Moon Drive / King Street West intersection was identified to be in need of improvement to accommodate future traffic needs. To facilitate improvements at the intersection, the Region of Peel will be converting the existing intersection to a roundabout.

In consultation with the Region of Peel, relevant information available at the time regarding the future roundabout was provided in October 2024 in order to ensure the ultimate condition of the roundabout is reflected in terms of property impacts / limits.

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LEGEND
PROPERTY LINE

FIGURE 1.1
SITE LOCATION

5440	NOV. 2025	SCALE: N.T.S.

2.0 STORMWATER MANAGEMENT

2.1 Existing Services & Tributary Area

According to information provided by the Town of Caledon and Region of Peel, there is an existing 375 mm diameter storm sewer running south on Emil Kolb Parkway and a 300 mm diameter storm sewer from a double catch basin running south across Harvest Moon Drive. The existing storm sewers both discharge to SWM pond 5 located south west of Harvest Moon Drive and Emil Kolb Parkway and outlets to the Jaffary Creek.

As per the tributary drainage figure received from the Town of Caledon the tributary area for SWM Pond 5 is approximately 72 ha and the subject property is confirmed to be included in the tributary area for SWM Pond 5. Refer to **Appendix A** to review the SWM Pond 5 tributary drainage figure.

Site investigations and the topographic survey indicate that approximately **0.39 ha** (with runoff coefficient **C=0.39**) drains to the existing 375 mm diameter storm sewer running south on Emil Kolb Parkway. In addition, approximately **0.44 ha** (with runoff coefficient **C=0.46**) drains to the existing double catch basin located on Harvest Moon Drive. Ultimately both drainage areas discharge to the existing SWM Pond 5 south of Harvest Moon Drive.

As per the drainage figure provided by the Town of Caledon a portion of the rear lots of the existing residential development located to the west of the subject property on Frank Johnston Road drains south east into the subject lands. Under pre-development conditions the external drainage area totals approximately **0.09 ha** with a runoff coefficient **C=0.45**. Refer to **Figure 2.1** for the pre-development drainage patterns.

2.2 Design Criteria

The Town of Caledon and Toronto and Region Conservation Authority Design Standards require the following stormwater management (SWM) criteria for development:

- Quality control (80% long-term Total Suspended Solids removal);
- Quantity control is to be provided where the SWM system should provide adequate control to meeting pre-development flows for all design storm events from 2 to 100 year
- Water balance assessment to identify infiltration deficit

2.3 Allowable Release Rate

As previously noted, the subject site consists of a single detached lot and commercial parcel. The area breakdown for the pre-development condition is included in **Appendix B.** The proposed stormwater management strategy is to ultimately discharge all post-development flows towards the existing 300 mm diameter outlet of the double catch basin located on Harvest Moon Drive, which discharges to the existing SWM Pond 5 south of Harvest Moon Drive. The stormwater design

criteria is to provide adequate control to meet pre-development flows for all design storm events from 2 to 100-year. But given that the subject property is constrained by out letting to an existing 300 mm storm sewer within the Harvest Moon Drive right-of-way (ROW) we are proposing to control the subject site from post to pre-development flows for a 2-year storm and then to attenuate all storm events from 5-year to 100-year (inclusive) to 5-year peak flows. The allowable release rates are established in **Table 2-1** with supporting calculations in **Appendix B.**

Table 2-1: Allowable Release Rates

Design Storm event	Allowable Release Rate (L/s)
2 year	48.2
5year – 100 year	61.7

2.4 Proposed Servicing & Stormwater Management Plan

As previously noted, the proposed development consists of two townhome blocks, and a mid-rise building with associated parking. The weighted runoff coefficient for the proposed development is approximately **0.76**. The proposed area breakdown and weighted runoff coefficient and corresponding calculations are included in **Appendix B.**

All post-development flows will discharge to the existing double catch basin located on Harvest Moon Drive (with its 300mm dia. outlet to SWM Pond 5) where the existing double catch basin will be replaced with a 1500mm double catch basin manhole. The runoff from the 0.09 ha external area that is currently draining across the proposed development shall be fully collected (up to and including 100-year flows) at internal catch basins and conveyed through storm sewers within the site. Refer to **Figure 2.2** for the post-development drainage plan, **Figure 2.3** for the storm tributary plan in **Appendix B**, and **Figure 2.4** for the proposed stormwater servicing schematic.

2.5 Quantity Control

The post-development flows shall be controlled to the allowable release rates as defined in **Section 2.3** above. Stormwater runoff from the site will be captured and directed to an underground stormwater management tank via stormwater sewers such that the site is self-contained. The maximum required storage volume for the proposed development was calculated to be **81 m^3** for the 2-year storm event, and **307 m^3** for the (5-year to) 100-year storm event. The provided storage volume for the proposed development was calculated to be **81 m^3** and **335 m^3** by using a CULTEC

chamber system, for the 2-year and (5 year to) 100-year storm events, respectively.

A control structure was sized to control the runoff for 2 year and 5-100-year peak flows to the allowable release rates. A **149 mm** diameter orifice plate will be provided and located upstream of the filtration unit, controlling flows to **48.1 L/s** and **61.5 L/s** for the 2-year and 5 to 100-year storm events, respectively. Both flow rates are less than the allowable release rates of **48.2 L/s** (2-year) and **61.7 L**/s (5 to 100-year) established in **Section 2.3** above. Refer to **Appendix B** for supporting calculations.

2.6 Quality Control

The water quality target, as set out in the MOE's Stormwater management Planning and Design Manual, is the long-term average removal of 80% of Total Suspended Solids (TSS).

A Jellyfish (Model JF6-5-1) by Imbrium Systems Inc. has been sized to provide a minimum TSS removal rate of 80% according to the manufacturer. The off-line filtration unit is proposed upstream of the site's control manhole, thus treating the entirety of the site's discharge. Refer to **Appendix B** for the sizing of the filtration unit.

2.7 Water Balance

The proposed development was reviewed using the Ontario Source Water Protection Atlas. The site was found to be outside of any source water well-head protection areas or significant groundwater recharge areas. Best efforts will be made to match pre-development infiltration volumes.

A water balance analysis was prepared for the subject site to determine infiltration levels for pre-post-development conditions. The analysis uses precipitation, evapotranspiration, infiltration, soil types, and land use to determine the water balance. Precipitation and evapotranspiration parameters were obtained using the TRSPA Water Balance Tool (see **Appendix B**). The soil infiltration factor was based on the soil type, which was identified as clayey silt soils. The land cover and topography infiltration factors were determined via desktop analysis and reviewing topographic information. Infiltration factors related to land cover and topography were applied based on existing conditions and updated to reflect proposed site development for the post-development scenarios.

The water balance analysis was conducted for three scenarios:

1. Existing (pre-development) conditions
2. Post-development conditions without mitigation measures
3. Post-development conditions incorporating proposed mitigation measures

It is to be noted that based on the findings of the site-specific geotechnical and hydrogeological investigation, the underlying soils consist primarily of clayey silt. These soils are characterized by poor infiltration potential, which limits the feasibility of infiltration-based Low Impact Development (LID) measures. Furthermore, groundwater conditions were observed to indicate elevated groundwater levels relative to proposed grades. In light of these conditions, the proposed SWM strategy incorporates LID practices where feasible. This includes an infiltration trench located northwest of the development.

The infiltration component was evaluated for each scenario to determine the infiltration deficit and required infiltration volume to eliminate the deficit. The results of the water balance analysis are summarized in **Table 2-2**. As shown in the table below, the analysis revealed a deficit of **916 m^3/year**.

Table 2-2: Water Balance Summary Based on Infiltration

Pre-Development	Post Development w/o Mitigation	Annual Deficit	Post-Development w/ Mitigation
1,180 m^3/year	264 m^3/year	916 m^3/year	545 m^3/year

As per the geotechnical and hydrogeological study, the soils were deemed to be low permeability; as such, an infiltration rate of 15 mm/hour with a factor of safety of 2.5 was utilized, resulting in an effective rate of 6 mm/hour (15 / 2.5 = 6). Groundwater level monitoring was completed on the property, and water levels were measured to show significantly high groundwater levels. Refer to **Appendix E** for excerpts from the Hydrogeological Assessment.

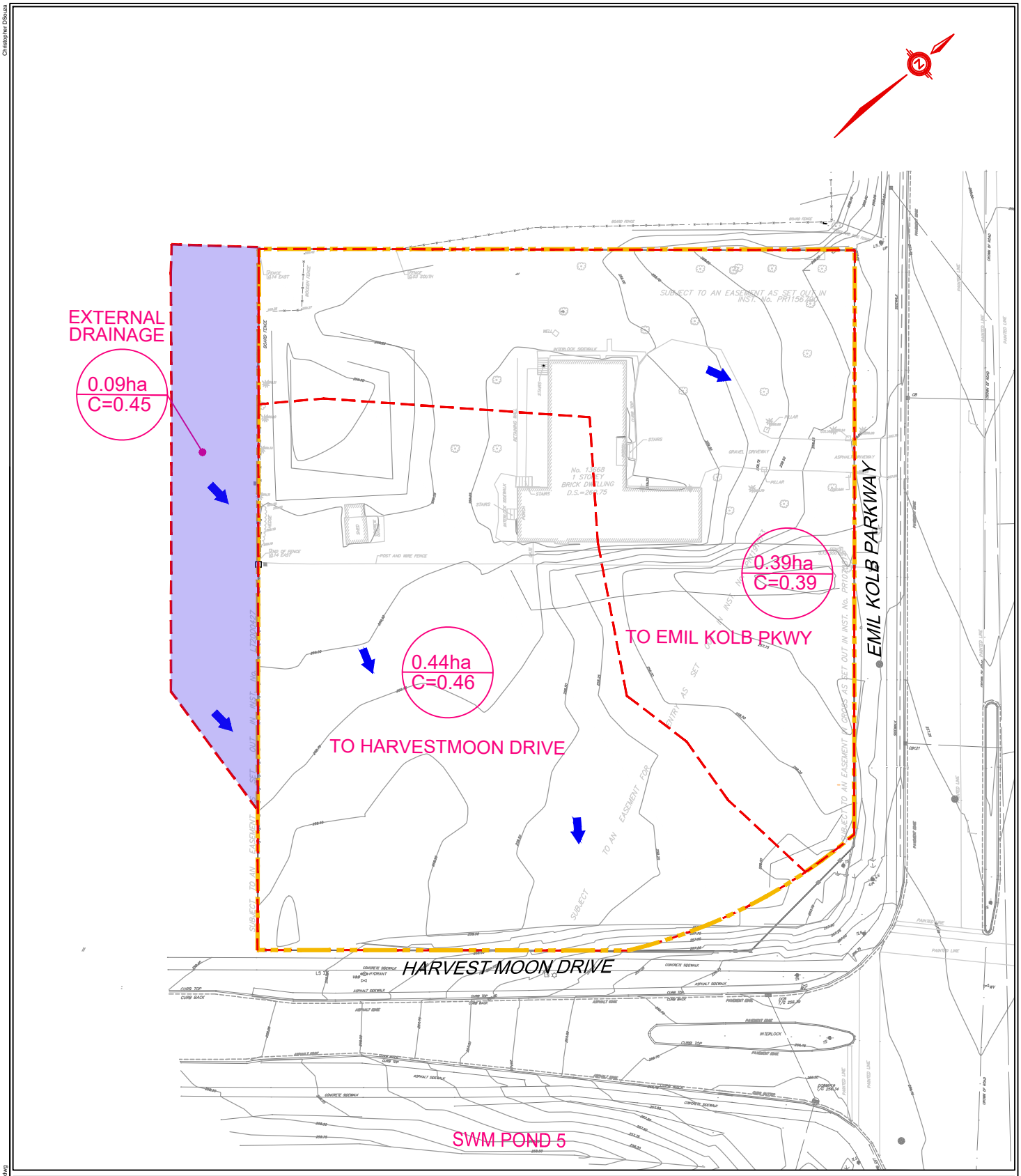
Based on the site constraints and in-situ conditions, a location was identified to be able to implement an infiltration gallery at the northwest corner of the site. Here, the infiltration gallery maintains the required clearances from adjacent structures and is located in an area of the site where 1.0m separation from the groundwater is feasible.

The infiltration gallery, with an effective footprint of approximately **36.9 m^2**, and a depth of 0.7m, provides a total storage volume of **10.4 m^3** (36.9m^2 x 0.7m height x 40% void ratio = 10.3m^3). Utilizing a lower infiltration rate of 15 mm/hour (or an effective rate of 6mm/hour when taking into account a factor of safety of 2.5), resulted in a drawdown time of approximately 46 hours, satisfying a maximum drawdown time of 48 hours.

Based on the proposed LID strategy, the post-development scenario achieves infiltration of 545 m^3/year annually, whereas in the pre-development scenario, the annual infiltration was determined to be 1,180 m^3/year.

Please refer to **Appendix B** for detailed calculations.

As noted above, due to the site constraints such as the underlying soils and groundwater levels, best efforts were implemented. As previously noted, the proposed development is outside of Q1, Q2 well-head protection areas, as well as significant groundwater recharge areas.



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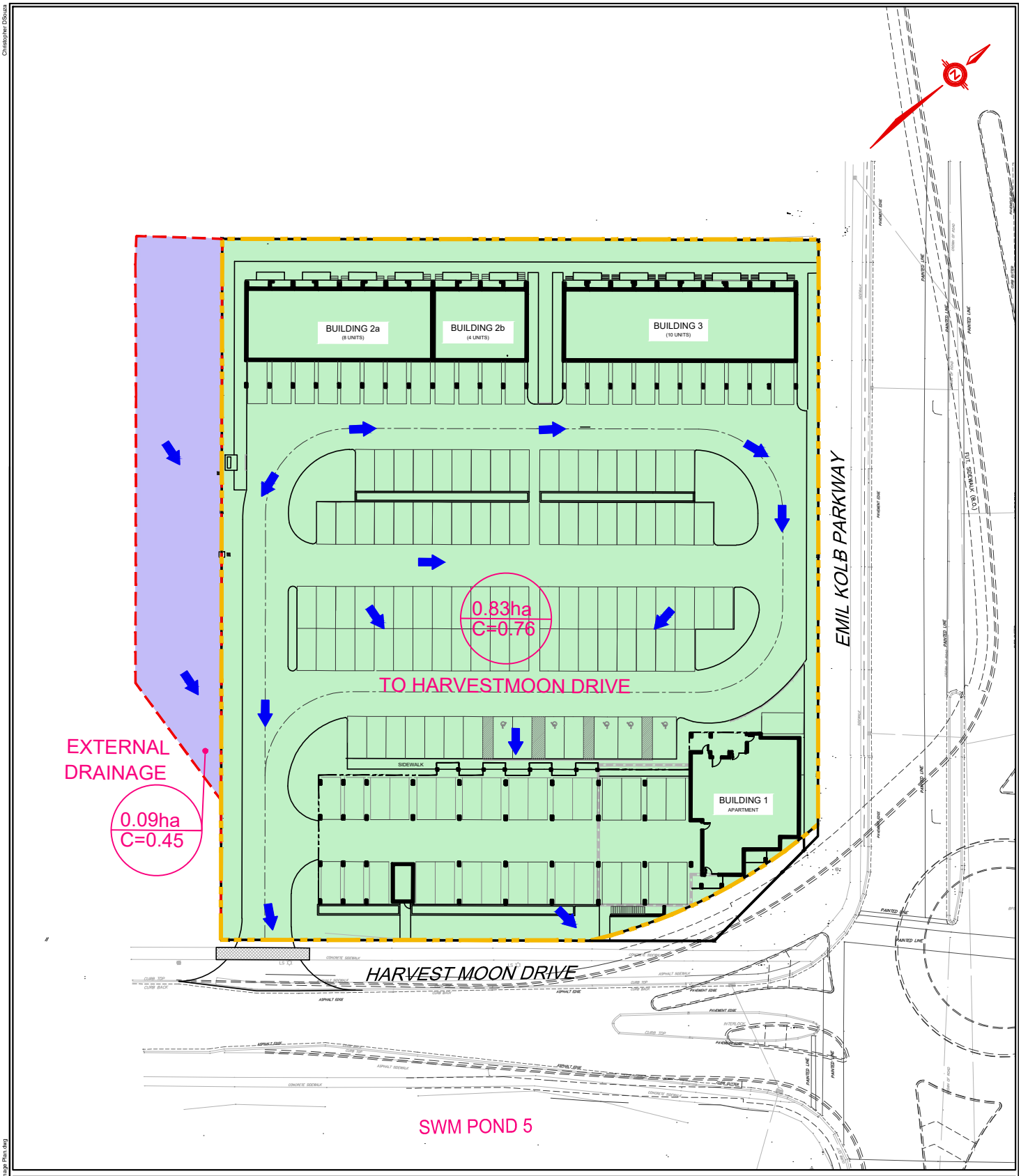
LEGEND

PROPERTY LINE
DRAINAGE AREA
OVERLAND FLOW ROUTE
0.11ha / C=0.50 — AREA IN HECTARES / RUN-OFF COEFFICIENT

FIGURE 2.1
EXISTING DRAINAGE PLAN

5440	NOV. 2025	SCALE: N.T.S.



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LEGEND

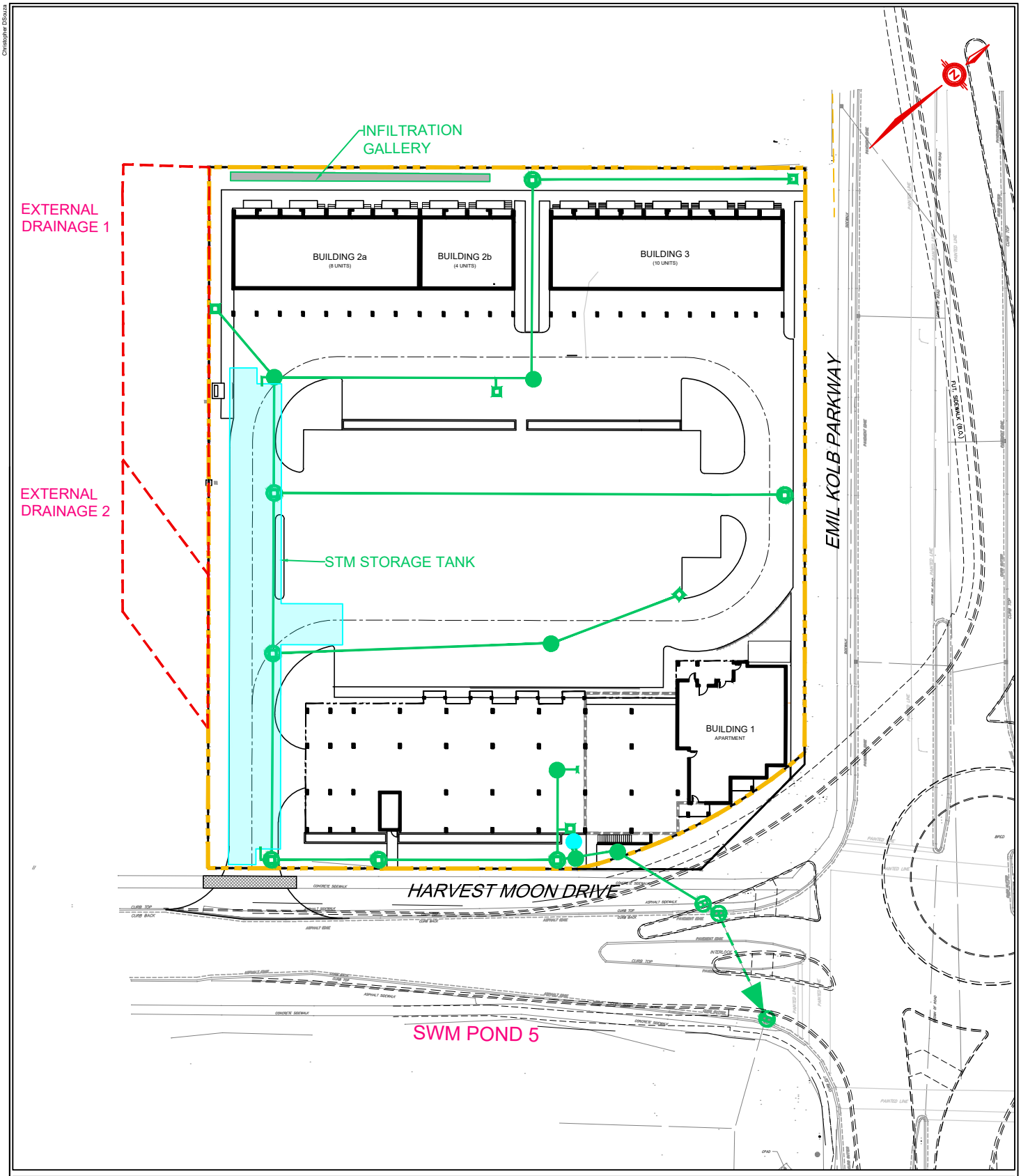
PROPERTY LINE
DRAINAGE AREA
OVERLAND FLOW ROUTE

0.11ha
C=0.50

AREA IN HECTARES
RUN-OFF COEFFICIENT

FIGURE 2.2
POST-DEVELOPMENT
DRAINAGE PLAN

5440	NOV. 2025	SCALE: N.T.S.



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LEGEND

- PROPERTY LINE
- EX. STORM SEWER AND MANHOLE
- PROPOSED STORM SEWER AND MANHOLE
- FILTRATION UNIT

FIGURE 2.4
PROPOSED STORMWATER SERVICING

5440	NOV. 2025	SCALE: N.T.S.

3.0 SANITARY SERVICING

3.1 Existing Servicing Infrastructure

According to information obtained from the Town of Caledon and Region of Peel, sanitary servicing in the vicinity of the subject site is provided by a 150 mm diameter sanitary service located on the southern parcel connecting to the 375 mm diameter sanitary sewer flowing south-westerly on Emil Kolb Parkway. North of the existing driveway there is also an existing service connection. North and south existing service connections will be decommissioned as per Peel Region standards.

3.2 Design Criteria & Parameters

The following information from the *Region of Peel Sanitary Sewer Design Criteria and 2020 Development Charges Background Study* will be utilized to calculate estimated flows from the subject site:

Table 3-1: Region of Peel Sanitary Sewer Design Parameters

Design Criteria	Parameter
Region of Peel 2020 DC Background Study & Linear Wastewater Standards (March 29, 2023)	Avg. Daily Domestic Flow Q_D = 290 litres/person/day
	Infiltration Rate Q_I = 0.26 litres/second/hectare
	Population (Single Detached) P = 4.2 person/unit
	Population Townhomes P = 3.4 persons/unit Large Apartment (>1 bedroom) P = 3.1 persons/unit Small Apartment (<=1 bedroom) P = 1.7 persons/unit
	Harmon Peaking Factor $M = [1+(14/(4+P(total)^{1/2}))]$
	Peak Flow Rate $Q = (ADWF \times PF) + Q_{I\&I}$

3.3 Existing Conditions & Sanitary Flows

Based on the Region's design criteria, the pre-development peak flow from the site is estimated to be **0.27 L/s** as indicated in the calculations shown in **Appendix C**. The estimated flow is based on one (1) single family dwelling within the existing property.

3.4 Proposed Sanitary Servicing

The development is proposed to connect to the existing 375 mm diameter sanitary sewer on Emil Kolb Parkway by removing the existing 150 mm connection for the southern parcel and installing a new 200 mm connection with a mainline manhole. Refer to **Figure 3.1** for the proposed sanitary servicing plan schematic.

As previously mentioned in **Section 1.3**, the proposed residential development consists of **124** residential units, which totals a population of **290** persons.

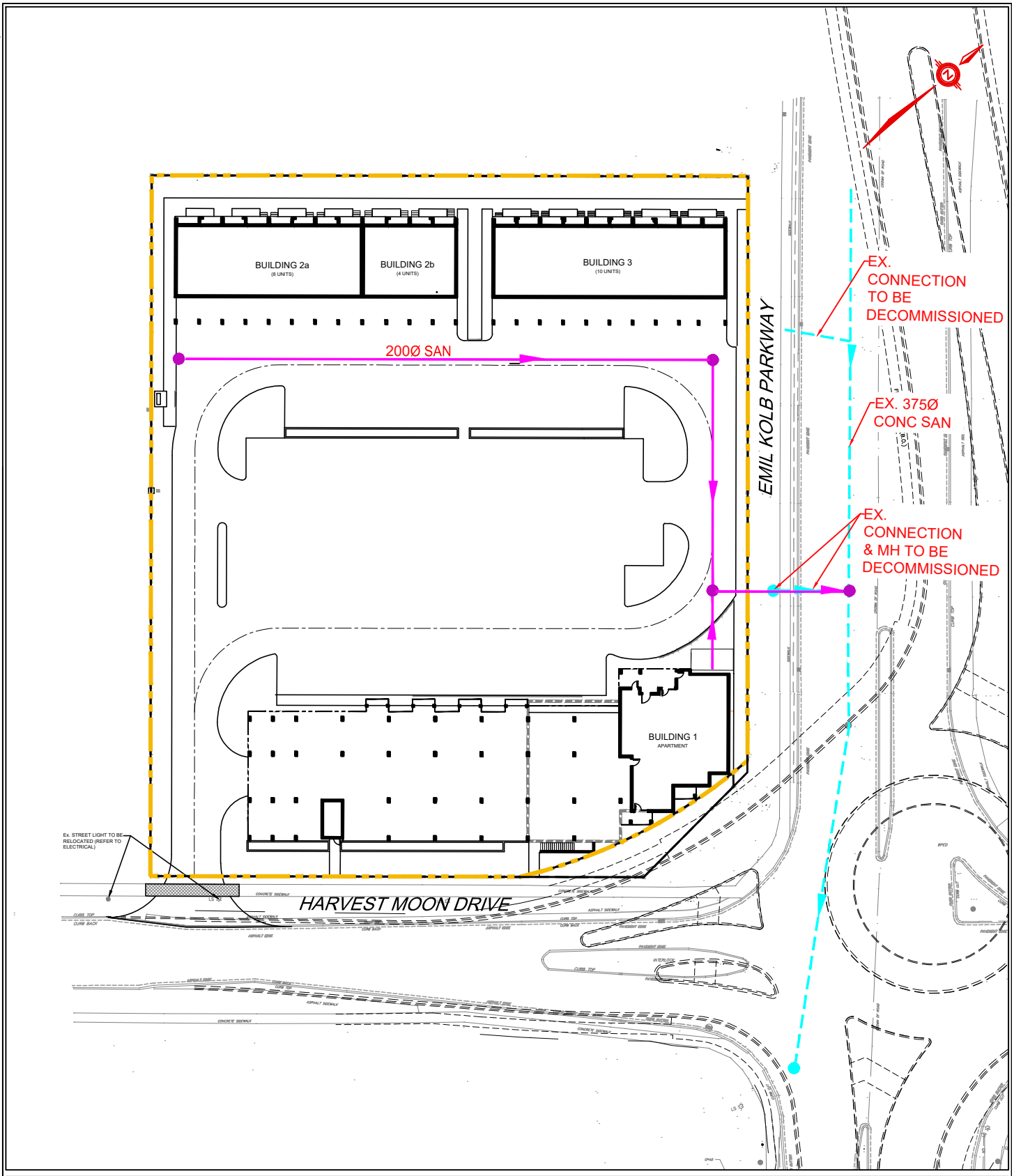
An estimate of the expected sanitary flow generation for the development, on the basis of the Region's criteria, has been included in **Appendix C** including the Region's water and wastewater modeling demand table. The sanitary flow estimate was based on the expected population using an average flow of **290 L/person/day**. The average sanitary flow was calculated to be **0.97 L/s**. Applying a peaking factor and allowance for infiltration results in an estimated sanitary design flow of **4.11 L/s**. Sanitary flows for the development are summarized below in **Table 3.2**.

Table 3-2: Estimated Sanitary Servicing Demands

Expected Population [(1)]	Development Area (ha)	Harmon's Peaking Factor (M)[(2)]	Average Sanitary Demand (L/s)[(3)]	Infiltration (L/s) [(4)]	Total Peak Flow (L/s)[(5)]
290	0.83	4.00	0.97	0.22	4.11

Note:

(1) Expected population from Table 1.1
(2) $M = 1+ (14/(4+ (\rho/1000)^{0.5})$
(3) Average day consumption rate of 290 L/cap/day as per 2020 DC Background Study
(4) Based on infiltration allowance of 0.26 L/s/ha
(5) Peak Flow = average demand * M + infiltration



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LEGEND

PROPERTY LINE

PROPOSED SANITARY SEWER

EX. SANITARY SEWER

FIGURE 3.1
PROPOSED SANITARY
SERVICING

5440	NOV. 2025	SCALE: N.T.S.

4.0 WATER SUPPLY SERVICING

4.1 Existing Servicing

The subject site is located in watermain pressure zone 6 and based on information received from Peel Region and the Town of Caledon, the following watermains exist in the vicinity of the site:

- 300 mm diameter PVC watermain on Harvest Moon Drive
- 300 mm diameter PVC watermain on Emil Kolb Parkway
- Existing Hydrant on Harvest Moon Drive
- Existing Hydrant on Emil Kolb Parkway

There is an existing water service connection located off of Harvest Moon Drive. The existing water supply infrastructure adjacent to the subject site can be seen schematically on **Figure 4.1**

4.2 Water Supply Design Criteria

In accordance with the Region of Peel's 2020 Development Charges Background Study, Ministry of Environment, conservation & Parks (MECP Design Guidelines for Drinking Water Systems (May 2019), and the Fire Underwriters Survey (2020) the following design criteria outlined in **Table 4.1** will be utilized

Table 4-1: Water Supply Design Criteria

Design Criteria	Parameters
Region of Peel 2020 Development Charges Background Study	Avg. Daily Domestic Flow (Residential) Q_D = 270 L/capita/day
	Maximum Hour Demand Peaking Factor Max. Hour PF = 3.0
	Maximum Day Demand Peaking Factor Max. Day PF = 1.8
Ministry of Environment, Conservation and Parks (MECP) Design Guidelines for Drinking Water Systems (May 2019)	Minimum Peak Hour Demand Pressure Min. $P_{PEAK\ HR}$ = 275 kPa (40 psi)
	Minimum Peak Day Demand Pressure Min. $P_{PEAK\ DAY}$ = 140 kPa (20 psi)
	Maximum Static Pressure Max. P_{STATIC} = 690 kPa (100 psi)
Fire Underwriters Survey (2020)	Refer to the Fire Underwriters Survey Calculations in **Appendix D** for the applicable guidelines

4.3 Proposed Water Servicing

The subject property will be serviced by a looped 200 mm PVC watermain service connection to the existing 300 mm watermain on Harvest Moon Drive in order to provide a redundant supply and improve circulation and water quality. Within the subject site the 200mm watermain will provide domestic and fire flow for the two townhouse blocks. The mid-rise building will be serviced by the 200 mm diameter for a fire line and a 150 mm diameter domestic line. Two internal hydrants are proposed to ensure fire coverage for all three proposed buildings. Additionally, two single check valves within two water chambers will be installed within the property line, water meters will be installed for each town house unit, and one water meter installed in the mechanical room of the mid-rise building all in accordance with Region of Peel standards. **Figure 4.1** illustrates the proposed water servicing strategy for the subject site.

As indicated above in Section 1.3 the proposed development has a population equivalency of **290** persons. The expected water supply demands have been summarized in **Table 4.2.**

Table 4-2: Water Supply Demands

Population	Average Day Demand (L/s) [2]	Maximum Day Demand (L/s) [3]	Peak Hour Demand (L/s) [4]	Fire Flow + Max Day Demand (L/s) [5]
290	0.91	1.63	2.72	234.96

The fire flow demand was calculated using Fire Underwriters Survey (FUS). It is assumed that the construction type for the two town house blocks is categorized as “wood-frame” (C = 1.5). The mid-rise building it is assumed the construction type is categorized as “non-combustible” (C = 0.8) with an NFPA 13 sprinkler system (F = 30%). It is assumed for building 2A and 2B that the proposed firewall has a fire-resistance rating of no less than 2 hours and meets the requirements of the National Building Code. The fire flow required for the proposed development was found to be **14,000 L/min** resulting in a fire flow demand of **233.33 L/s.** Water supply demand and fire flow calculations are included in **Appendix D**.

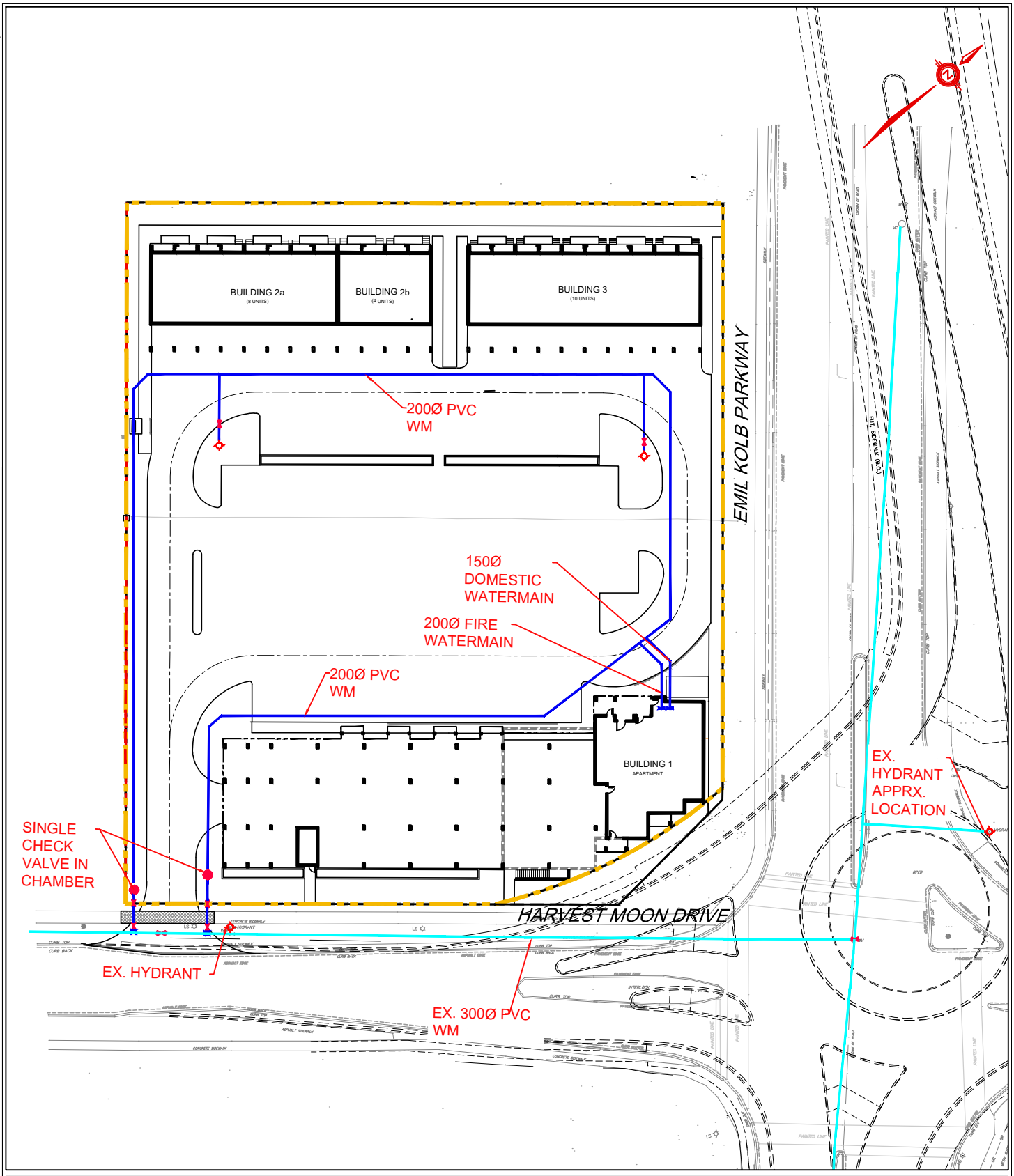
4.4 Existing System Analysis

A hydrant flow test was conducted by Tyco Integrated fire and Security Canada Inc. on June 20, 2024 on the existing 300 mm diameter watermain and hydrant on Harvest Moon Drive – refer to **Appendix D** for the test results.

The water supply test measured a static pressure of **49 psi (338 kPa)**, a pressure of **47 psi (324 kPa)** during a flow of **923 U.G.P.M. (58 L/s)**, and a pressure of **45 psi (311 kPa)** during a flow of **1686 U.G.P.M. (106 L/s)**.

Extrapolation of the hydrant flow test results indicate that the maximum day plus fire scenario of **14,098 L/min (234.96 L/s)** has an expected pressure of **218.17 kPa (31.6 psi)**, which is greater than the minimum required residual pressure of **140 kPa**. Additionally, at a pressure of **140 kPa (20 psi)**, the available flow in the system is **18,601 L/min (310.019 L/s)**, which is greater than the required peak flow.

To conclude, the analysis results suggest that the surrounding municipal watermain satisfied the required water demand for the proposed development. Detailed analysis calculations are presented in **Appendix D.**



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LEGEND

- PROPERTY LINE
- PROPOSED WATERMAIN
- EXISTING WATERMAIN
- PROPOSED HYDRANT
- PROPOSED VALVE
- DECTECTOR CHECK VALVE

FIGURE 4.1
PROPOSED WATER SUPPLY SERVICING

5440	NOV. 2025	SCALE: N.T.S.

5.0 GROUNDWATER CONDITIONS

A hydrogeological assessment of the subject site was undertaken by Hydrogeology Consulting Services (HCS) to assess the potential effects of groundwater on the proposed development. Refer to excerpts from the hydrogeological assessment report included in **Appendix E**.

The detailed investigation has indicated that construction dewatering may be required and is estimated to be approximately 90,300 L/day. An Environmental Activity and Sector Registry (EASR) would be required to authorize pumping at this rate.

All required permitting will be obtained for the above noted dewatering and discharge. The quality of the water shall comply with the applicable sewer by-laws prior to its discharge to the municipal system.

6.0 SUMMARY

This document has provided detailed information on the functional servicing and stormwater management plan for the subject site, indicating the Town/Regional criteria are met:

- A stormwater management plan can be implemented to meet quantity, quality and water balance requirements. On-site controls are required to ensure a controlled release rates of **48.1 L/s** and **61.5 L/s** for the 2-year and 5-100-year storm events, respectively from the site to the existing 300 mm diameter storm sewer on Harvest Moon Drive. Quality requirements will be met via a filtration unit. A water balance analysis was completed and best efforts will be made to match pre-development infiltration volumes via the implementation of an infiltration gallery.

- Sanitary servicing for the proposed development will be provided by connecting to the existing 375 mm sanitary sewer within the Emil Kolb Parkway ROW using a 200 mm PVC sanitary sewer and a mainline manhole.

- Water supply servicing will be provided from the existing 300 mm diameter watermain on Harvest Moon Drive. Within the subject site the 200 mm diameter watermain will provide domestic and fire flow for the two townhouse blocks, as well as the mid-rise building. A hydrant flow test was conducted to confirm sufficient pressure and flows are available to service the subject site.

We trust that you will find the contents of this report satisfactory. Should you have any questions or comments, please do not hesitate to contact the undersigned.

Respectfully Submitted,

SCHAEFFER & ASSOCIATES LTD.

Prepared by:

Christopher D'Souza
Intermediate Designer

Reviewed by:

Hagop Sarkissian, P.Eng.
Partner

APPENDIX A

Background Information

PROJECT INFORMATION

PROJECT NAME	BOLTON VILLAGE - ARPEGGIO
LEGAL DESCRIPTION	PART OF LOT 9, CONCESSION 5 TOWN OF CALEDON REGIONAL MUNICIPALITY OF PEEL PIN# 14326-1856 (LT)
MUNICIPAL ADDRESS	13656 and 13668 EMIL KOLB PARKWAY, BOLTON, ON

SITE

SITE AREA	8,363.7 m² / 0.83 ha / 90,026.1 SqFt
TOTAL LANDSCAPE AREA	2,033.3 m² 24 %
SOFT LANDSCAPE AREA	1,378.9 m²
HARD LANDSCAPE AREA	602.0 m²
OUTDOOR PARKING AREA	4,245.7 m²
SITE COVERAGE	28%

BUILDING AREAS

TOTAL BUILDING AREA	2,303 m²
BLDG 1 AREA - HIGH BLDG	1,201 m² (INCLD. OPEN PARKING AREA)
BLDG 2 AREA - 12 UNITS	602 m² (BLDG 2a: 400 m² BLDG 2b: 202 m²)
BLDG 3 AREA - 10 UNITS	500 m²

UNIT BREAKDOWN

BLDG 1 - HIGH BLDG	
No OF STOREYS	8
No OF UNITS	102
ACCESSIBLE UNITS	15
BLDG 2a - TOWNHOUSES	
No OF STOREYS	3
No OF UNITS	8
BLDG 2b - TOWNHOUSES	
No OF STOREYS	3
No OF UNITS	4
BLDG 3 - TOWNHOUSES	
No OF STOREYS	3
No OF UNITS	10
TOTAL # OF RESIDENTIAL UNITS	124

GFA

BLDG 1 - HIGH BLDG RESIDENTIAL	8,158 m²
BLDG 2A - TOWNHOUSES	1,171 m²
BLDG 2B - TOWNHOUSES	592 m²
BLDG 3 - TOWNHOUSES	1,470m²
FSI = 1.36	

PARKING

	REQUIRED (RM)		PROPOSED (PROVIDED)	
TOTAL # OF PARKING SPACES	228		168	
AT GRADE PARKING				
HIGH-RISE (RESIDENTS)	(Ratio 1.5)	153	(Ratio 1:1)	102
STACKS (RESIDENTS)	(Ration 1:2)	44	(Ration 1:2)	44 (Incl. Tandem Spaces)
VISITOR PARKING	(Ration 1:0.25)	31	(Ration 1:0.17)	22
BARRIER-FREE PARKING (Incl.)	(3% of total parking)	6	(4% of total parking)	7 (incl.)

INFORMATION TAKEN FROM

PLAN OF SURVEY AND TOPOGRAPHY
PART OF LOT 9,
CONCESSION 5
(GEOGRAPHIC TOWNSHIP OF ALBION)
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL
SCALE: 1:250
R-PE SURVEYING LTD., O.L.S.
METRIC:
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

LEGEND

TRAVEL DISTANCE

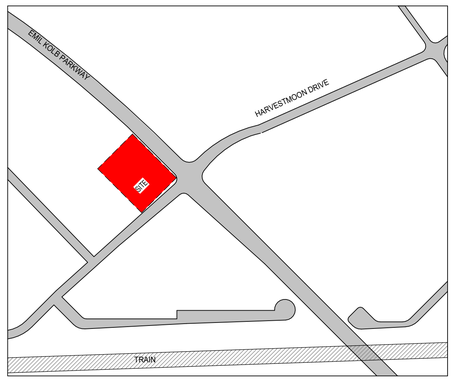
RESIDENTS PARKING — 2.75 | 2.75 | 2.75 — 6.00

ACCESSIBLE PARKING TYPE A — 3.40 — 6.00

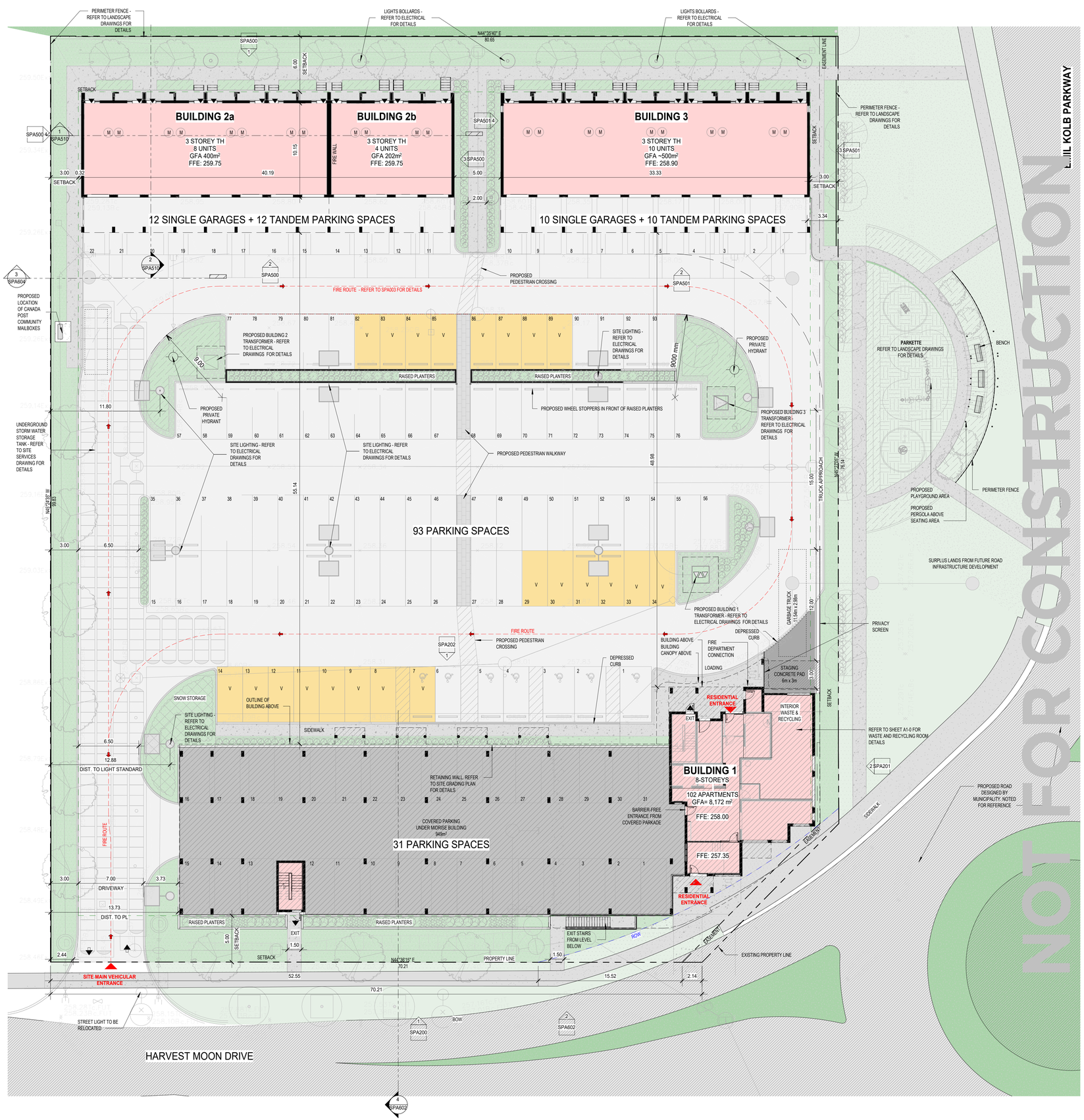
ACCESSIBLE PARKING TYPE B — 2.75 — 6.00

NO PARKING AREA

VISITOR PARKING



KEY PLAN N.T.S.



Q4A ARCHITECTS

Q4 ARCHITECTS INC.

4110 Yonge Street
Suite 602,Toronto,ON.
M2P 2B7

T. 416.322.6334
F. 416.322.7294
E. info@q4architects.com

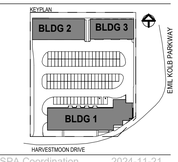
PN / TN

TN = TRUE NORTH
PN = PROJECT NORTH

The contractor / builder must verify all dimensions on the job and report any discrepancy to the designer before proceeding with the work.

Drawings are NOT to be scaled. All drawings and specifications are instruments of service and the copyright property of the designer and must be returned upon request.

KEYPLAN



Issued For:

01	Issue for SPA Coordination	2024-11-21
02	Issue for SPA Coordination #2	2025-01-07
03	Issued for Review - Stubbes	2025-01-22
04	Issued for Client Review	2025-01-23
06	Issued for SPA Coordination #3	2025-01-29
07	Issued for Client Review	2025-01-31
08	Issued for SPA Coordination #4	2025-02-20
09	Issued for Site Plan Application	2025-02-28
10	Issued for Rezoning Application	2025-02-28
11	Issued for SPA #2 Coordination	2025-09-24
12	Issued for SPA #2 Coord. #2	2025-10-21
13	Issued for SPA #2 Coord. #3	2025-10-23
14	Issued for SPA #2 Coord. #4	2025-11-13
15	Issued for SPA #2- CLIENT REVIEW	2025-11-18
16	Issued for SPA #2 Coord. #5	2025-11-26
17	Issued for Site Plan App. #2	2025-1x-xx
18	Issued for Rezoning App #2	2025-1x-xx

No	Description	Date

Revision Schedule

Project Title

Project Description

BOLTON VILLAGE (ARPEGGIO)

13656, 13668 EMIL KOLB PARKWAY
BOLTON, ON

CAMCOS LIVING

Project No.	23005
Scale	As indicated
Drawn By	Author
Checked By	Checker

MASTER SITE PLAN

BUILDING 1-2-3

SPA001 2

C:\Users\vgonzalez\Documents\Bolton_Site_cgonzalezA3TWL.rvt
2025-11-26 12:43:03 PM

PLAN OF SURVEY AND TOPOGRAPHY
PART OF LOT 9, CONCESSION 5
(GEOGRAPHIC TOWNSHIP OF ALBION)
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

SCALE 1:250

10m 5m 0 10m

R-PE SURVEYING LTD., O.L.S.

METRIC
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 20th DAY OF MARCH 2024.

DATE APRIL 3rd, 2024

A. U. KUMARANAYAKE
ONTARIO LAND SURVEYOR

THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM NUMBER V-74418.

NOTES

BXP □	DENOTES COMMUNICATION BOX
CB	DENOTES CATCH BASIN
	DENOTES DECIDUOUS TREE
	DENOTES CONIFEROUS TREE
---x---	DENOTES FENCE
	DENOTES LAMP STANDARD
MHW	DENOTES MANHOLE WATER
	DENOTES OVERHEAD WIRE
	DENOTES GUY WIRE ANCHOR
TS	DENOTES TRAFFIC SIGNAL
UP	DENOTES UTILITY POLE
C PAD	DENOTES CONCRETE PAD
D.S.	DENOTES DOOR SILL ELEVATION
■	DENOTES MONUMENT FOUND
SSIB	DENOTES SHORT STANDARD IRON BAR
SIB	DENOTES STANDARD IRON BAR
IB	DENOTES IRON BAR
CP	DENOTES CONCRETE PIN
P.I.N.	DENOTES PROPERTY IDENTIFIER NUMBER
PL1	DENOTES PLAN 43R-10166
PL3	DENOTES PLAN 43R-24675
PL4	DENOTES PLAN 43R-23739
PL6	DENOTES PLAN 43R-30591
PL7	DENOTES PLAN 43R-37169
PL8	DENOTES EXPROPRIATION PLAN PR1156790
CALC	DENOTES CALCULATED FROM PL1 AND PL8
CALC2	DENOTES CALCULATED FROM PL3 AND PL4
(RPE)	DENOTES RADY-PENTEK AND EDWARD SURVEYING LTD., O.L.S.
(1493)	DENOTES YOUNG AND YOUNG SURVEYING INC., O.L.S.
(1075)	DENOTES HOLDING AND JONES LIMITED, O.L.S.
ORP	DENOTES OBSERVED REFERENCE POINT
(WIT)	DENOTES WITNESS
(NI)	DENOTES NOT IDENTIFIED

INTEGRATION NOTE

BEARINGS ARE UTM GRID, DERIVED FROM OBSERVED REFERENCE POINTS (A) AND (B) USING CANNET REAL TIME NETWORK (RTN) OBSERVATIONS, UTM ZONE 17, NAD83 (CSRS: CBNV6: 2010.0).

COORDINATES ARE UTM ZONE 17, NAD83 (CSRS: CBNV6: 2010.0), TO URBAN ACCURACY PER SEC. 14 (2) OF O.REG. 216/10, AND CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

POINT	NORTHING	EASTING
ORP (A)	4858480.81	600227.75
ORP (B)	4858403.36	600291.52
PRS402698094688	4854714.46	596022.52

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999688.

ROTATION NOTE

FOR BEARING COMPARISONS, A ROTATION OF 00° 54' 10" COUNTER CLOCKWISE WAS APPLIED TO PL1 TO CONVERT TO GRID BEARINGS.

FOR BEARING COMPARISONS, A ROTATION OF 00° 56' 55" COUNTER CLOCKWISE WAS APPLIED TO PL3 TO CONVERT TO GRID BEARINGS.

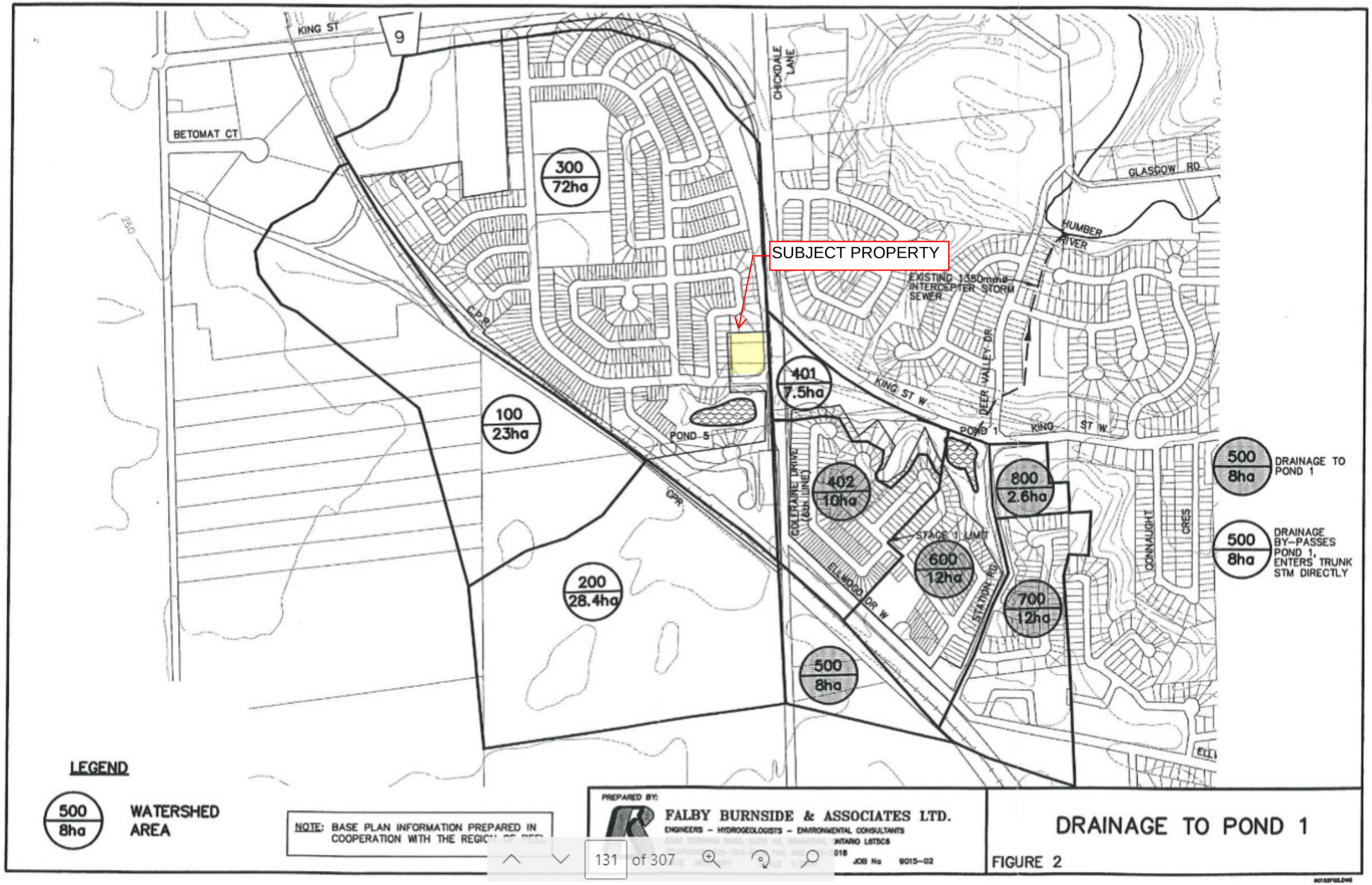
FOR BEARING COMPARISONS, A ROTATION OF 00° 53' 35" COUNTER CLOCKWISE WAS APPLIED TO PL4 TO CONVERT TO GRID BEARINGS.

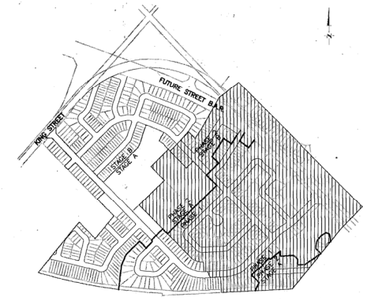
BENCHMARK NOTE

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO MINISTRY OF NATURAL RESOURCES AND FORESTRY BENCHMARK NUMBER 00819758057 HAVING AN ORTHOMETRIC ELEVATION OF 251.929 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928:1978).

BENCHMARK LOCATED ON THE BUILDING (ELLWOOD MEMORIAL PUBLIC SCHOOL) ON EAST SIDE OF HIGHWAY 50, 0.8 KM SOUTH OF JUNCTION OF HWY 50 AND KING ST IN THE TOWN OF CALEDON (BOLTON), 55.2 METRES NORTH OF ELLWOOD DR AND 104 METRES EAST OF CENTRELINE OF HWY 50. TABLET IS SET HORIZONTALLY IN WEST FACE OF CONCRETE FOUNDATION OF GYMNASIUM, 1.7 METRES NORTH OF SOUTHWEST CORNER AND 12 CM BELOW BRICKWORK.

R-PE SURVEYING LTD.
ONTARIO LAND SURVEYORS
643 Chrislea Road, Suite 7
Woodbridge, Ontario L4L 8A3
Tel.(416)635-5000 Fax (416)635-5001
Tel.(905)264-0881 Fax (905)264-2099
Website: www.r-pe.ca
DRAWN: S.F. CHECKED: A.K.
JOB No. 24-056 CAD FILE No. 24056R01


KING ST
9
BETOMAT CT
CHICKDALE LANE
GLASGOW RD
HUMBER RIVER
SUBJECT PROPERTY
EXISTING 1350mmø INTERCEPTER STORM SEWER
C.P.R.
300
72ha
401
7.5ha
100
23ha
POND 5
DEER VALLEY DR
KING ST W
POND 1
402
10ha
800
2.6ha
500
8ha
DRAINAGE TO POND 1
DRAINAGE BY-PASSES POND 1, ENTERS TRUNK STM DIRECTLY
COLERAINE DRIVE (6th LINE)
STAGE 1 LIMIT
600
12ha
ELLWOOD DR W
STATION RD
700
12ha
CONNAUGHT CRES
200
28.4ha
500
8ha
LEGEND
500
8ha
WATERSHED AREA
NOTE: BASE PLAN INFORMATION PREPARED IN COOPERATION WITH THE REGION OF PEEL
PREPARED BY:
FALBY BURNSIDE & ASSOCIATES LTD.
ENGINEERS – HYDROGEOLOGISTS – ENVIRONMENTAL CONSULTANTS
JOB No 9015-02
DRAINAGE TO POND 1
FIGURE 2



KEY PLAN

0.35 / 0.40 — DRAINAGE AREA IN HECTARES, RUN-OFF COEFFICIENT

MAJOR SYSTEM FLOW DIRECTION

MAJOR SYSTEM DRAINAGE DIVIDE

(1) MAJOR SYSTEM OUTLET

■ CB's SHOWN AS ARE TO BE CONSTRUCTED WITH TYPE 'A' INLET RESTRICTOR.

No.	REVISIONS	Date	By	Approved
6	AS-CONSTRUCTED	08-07	D.R.	
5	ISSUED FOR APPROVAL AND CONSTRUCTION	05-07-02	D.K.	
4	ISSUED FOR APPROVAL, NOT FOR CONSTRUCTION	07-31-01	D.K.	
3	ISSUED FOR APPROVAL, NOT FOR CONSTRUCTION	02-28-01	D.K.	
2	ISSUED FOR APPROVAL, NOT FOR CONSTRUCTION	11-30-00	D.K.	
1	ISSUED FOR APPROVAL, NOT FOR CONSTRUCTION	10-22-99	P.G.	

BENCH MARK

EAST FACE AT THE SOUTH CORNER OF A WHITE BRICK HOUSE S.E. CORNER OF REGIONAL ROAD 9 AND COLERAINE DRIVE.
ELEV. 258.312m

REGISTERED PROFESSIONAL ENGINEER — D.E. ROCKEL — Dec 24/07 — P. Eng.

DESIGNED BY

APPROVED

TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

PAPERTIOUS INVESTORS

STORM DRAINAGE PLAN

Sheet 1 of 3

EARTH TECH

Earth Tech Canada Inc. Markham, Ontario 905.886.7022

Scale: 1:1000	PHASE 2 21T-88071	Project No. 97638
Drawn By: CADD		Drawing No. A1-97638-G4
Designed By: D.K.		
Checked By: J.C.B.		
Date: JULY 1999		

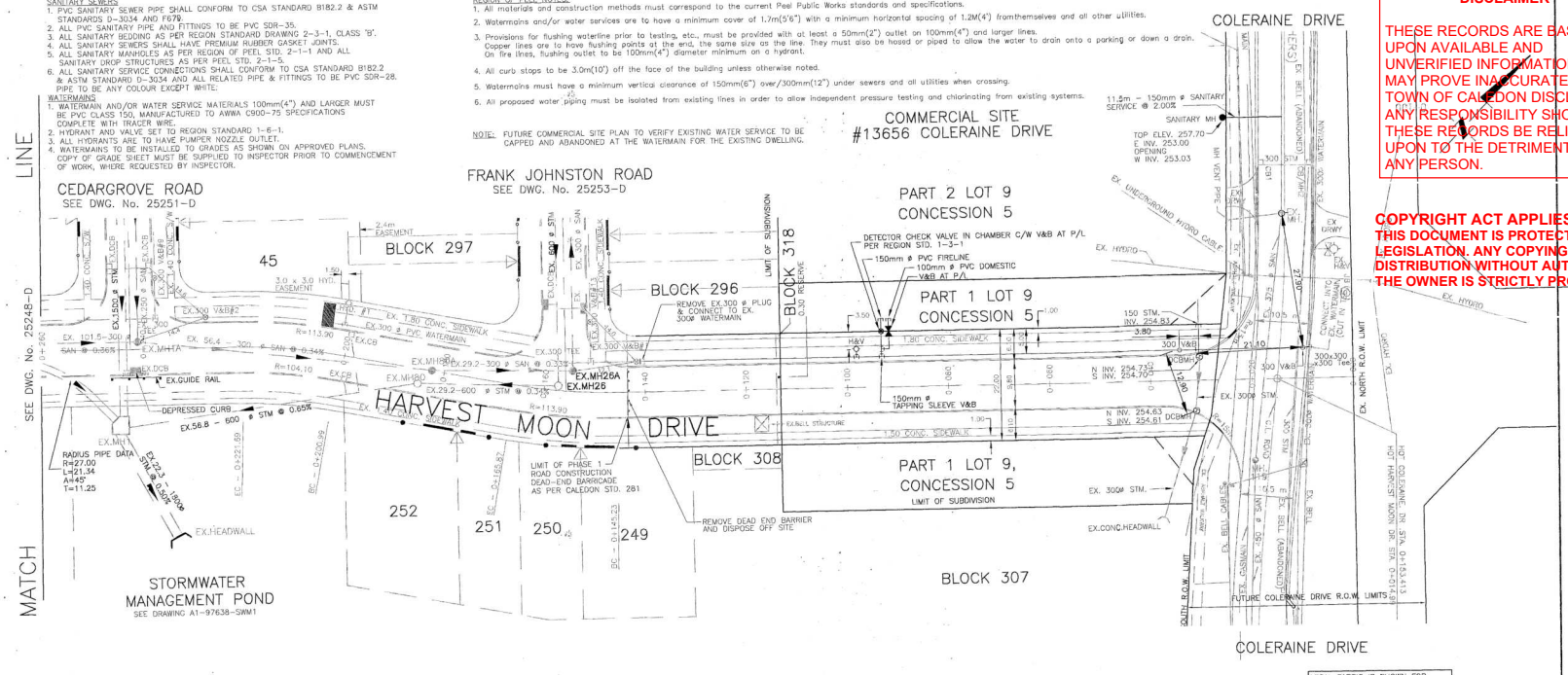
Drawing File: P:\PROJECTS\1997\97638\PHASE2\As-constructed\04.DWG

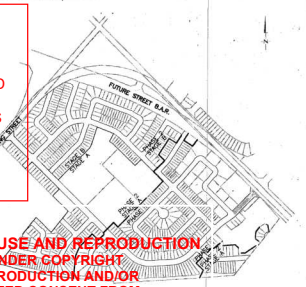
SANITARY SEWERS
1. PVC SANITARY SEWER PIPE SHALL CONFORM TO CSA STANDARD B182.2 & ASTM STANDARDS D-3034 AND F679.
2. ALL PVC SANITARY PIPE AND FITTINGS TO BE PVC SDR-35.
3. ALL SANITARY BEDDING AS PER REGION STANDARD DRAWING 2-3-1, CLASS 'B'.
4. ALL SANITARY SEWERS SHALL HAVE PREMIUM RUBBER GASKET JOINTS.
5. ALL SANITARY MANHOLES AS PER REGION OF PEEL STD. 2-1-1 AND ALL SANITARY DROP STRUCTURES AS PER PEEL STD. 2-1-5.
6. ALL SANITARY SERVICE CONNECTIONS SHALL CONFORM TO CSA STANDARD B182.2 & ASTM STANDARD D-3034 AND ALL RELATED PIPE & FITTINGS TO BE PVC SDR-28. PIPE TO BE ANY COLOUR EXCEPT WHITE.

WATERMAINS
1. WATERMAIN AND/OR WATER SERVICE MATERIALS 100mm(4") AND LARGER MUST BE PVC CLASS 150, MANUFACTURED TO AWWA C900-75 SPECIFICATIONS COMPLETE WITH TRACER WIRE.
2. HYDRANT AND VALVE SET TO REGION STANDARD 1-6-1.
3. ALL HYDRANTS ARE TO HAVE PUMPER NOZZLE OUTLET.
4. WATERMAINS TO BE INSTALLED TO GRADES AS SHOWN ON APPROVED PLANS. COPY OF GRADE SHEET MUST BE SUPPLIED TO INSPECTOR PRIOR TO COMMENCEMENT OF WORK, WHERE REQUESTED BY INSPECTOR.

REGION OF PEEL NOTES:
1. All materials and construction methods must correspond to the current Peel Public Works standards and specifications.
2. 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.
3. Provisions for flushing waterline 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 or down a drain. On fire lines, flushing outlet to be 100mm(4") diameter minimum on a hydrant.
4. All curb stops to be 3.0m(10') off the face of the building unless otherwise noted.
5. Watermains must have a minimum vertical clearance of 150mm(6") over/300mm(12") under sewers and all utilities when crossing.
6. All proposed water piping must be isolated from existing lines in order to allow independent pressure testing and chlorinating from existing systems.

NOTE: FUTURE COMMERCIAL SITE PLAN TO VERIFY EXISTING WATER SERVICE TO BE CAPPED AND ABANDONED AT THE WATERMAIN FOR THE EXISTING DWELLING.





DISCLAIMER

THESE RECORDS ARE BASED UPON AVAILABLE AND UNVERIFIED INFORMATION AND MAY PROVE INACCURATE. THE TOWN OF CALEDON DISCLAIMS ANY RESPONSIBILITY SHOULD THESE RECORDS BE RELIED UPON TO THE DETRIMENT OF ANY PERSON.

GENERAL NOTES:
1. ALL DIMENSIONS ARE IN METRICS UNLESS OTHERWISE NOTED.
2. ALL PIPE SIZES ARE IN MILLIMETRES.
3. SEE INDEX SHEET FOR LIST OF DRAWINGS.
4. SEE INDEX SHEET FOR LISTS OF GENERAL NOTES.
5. CB's SHOWN AS ■ ARE TO BE CONSTRUCTED WITH IPEX TYPE 'A' INLET RESTRICTOR.
6. ALL SANITARY SEWER TO BE PVC AND ALL STORM SEWER TO BE CONCRETE UNLESS SHOWN OTHERWISE.

MINIMUM ROAD BASE REQUIREMENTS:
40 mm HL-3
90 mm HL-8
150 MM GRANULAR "A"
450 MM GRANULAR "B"

APPROVED AS NOTED

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

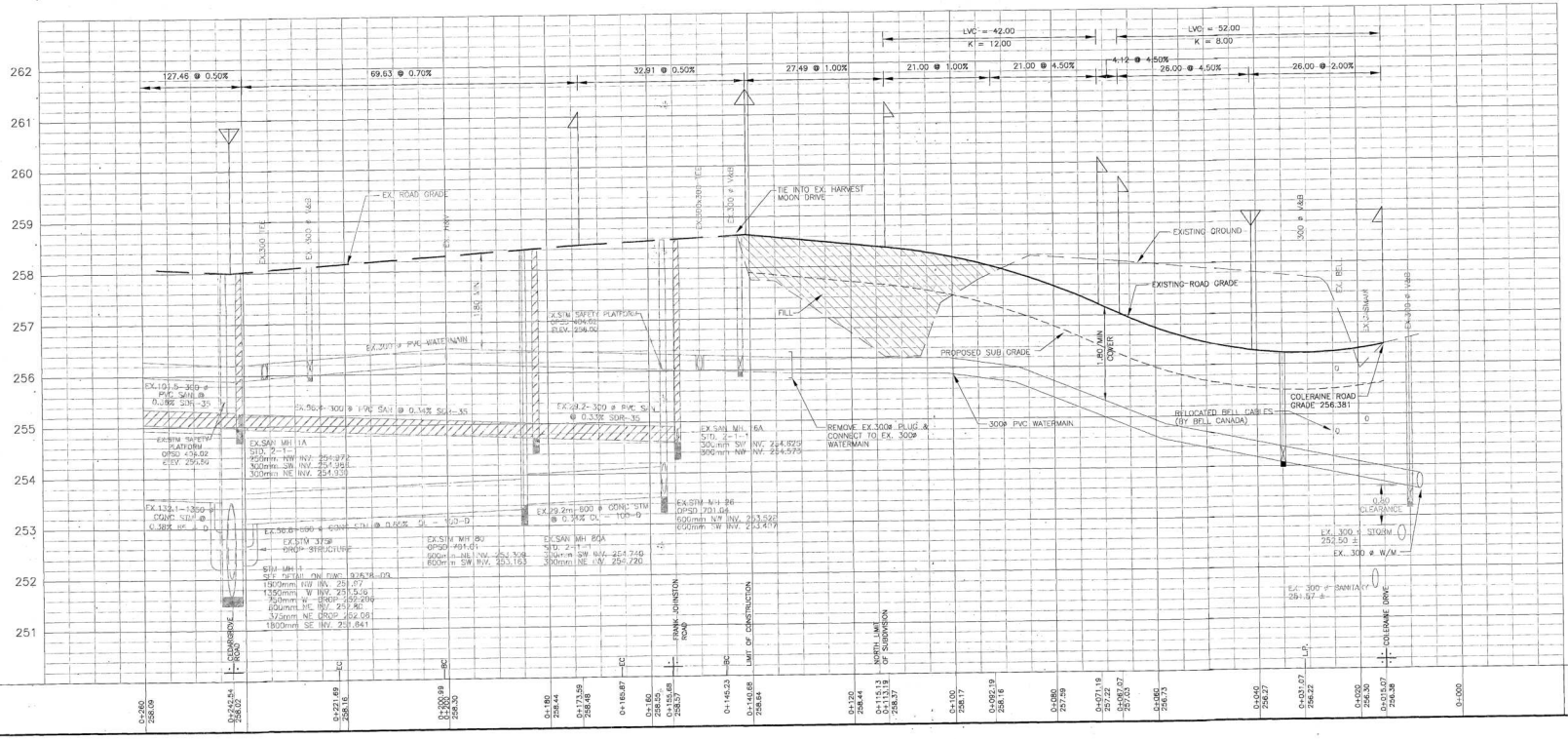
THIS APPROVAL IS SUBJECT TO THE FURTHER CERTIFICATION OF THE "AS-CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER OF THE PROVINCE OF ONTARIO.

DATE: _____ APPROVED BY: _____
H.MUNTZ, P.ENG.
TOWN ENGINEER

No.	REVISIONS	Date	By	Approved
9	RE-ISSUED FOR COMMERCIAL BLOCK SERVICES	07-06-05	B.G.	
8	AS-CONSTRUCTED	02-19-05	B.G.	
7	ISSUED FOR APPROVAL AND CONSTRUCTION	06-19-03	B.G.	
6	ISSUED FOR APPROVAL, NOT FOR CONSTRUCTION	01-29-03	B.G.	
5	ISSUED FOR APPROVAL AND CONSTRUCTION	05-07-02	D.K.	
4	ISSUED FOR APPROVAL, NOT FOR CONSTRUCTION	07-31-01	D.K.	
3	ISSUED FOR APPROVAL, NOT FOR CONSTRUCTION	02-28-01	D.K.	
2	ISSUED FOR APPROVAL, NOT FOR CONSTRUCTION	11-30-00	D.K.	
1	ISSUED FOR APPROVAL, NOT FOR CONSTRUCTION	10-22-99	P.G.	

BENCH MARK
EAST FACE AT THE SOUTH CORNER OF A WHITE BRICK HOUSE S.E. CORNER OF REGIONAL ROAD 9 AND COLERAINE DRIVE.
ELEV. 258.312m

LEGAL FABRIC IS SHOWN FOR INFORMATION PURPOSES ONLY FOR ACCURATE LEGAL INFORMATION SEE APPROPRIATE M-PLAN.



DESIGNED BY

D.E. ROCKEL P. Eng.
APPROVED

TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

PAPERTIOUS INVESTORS

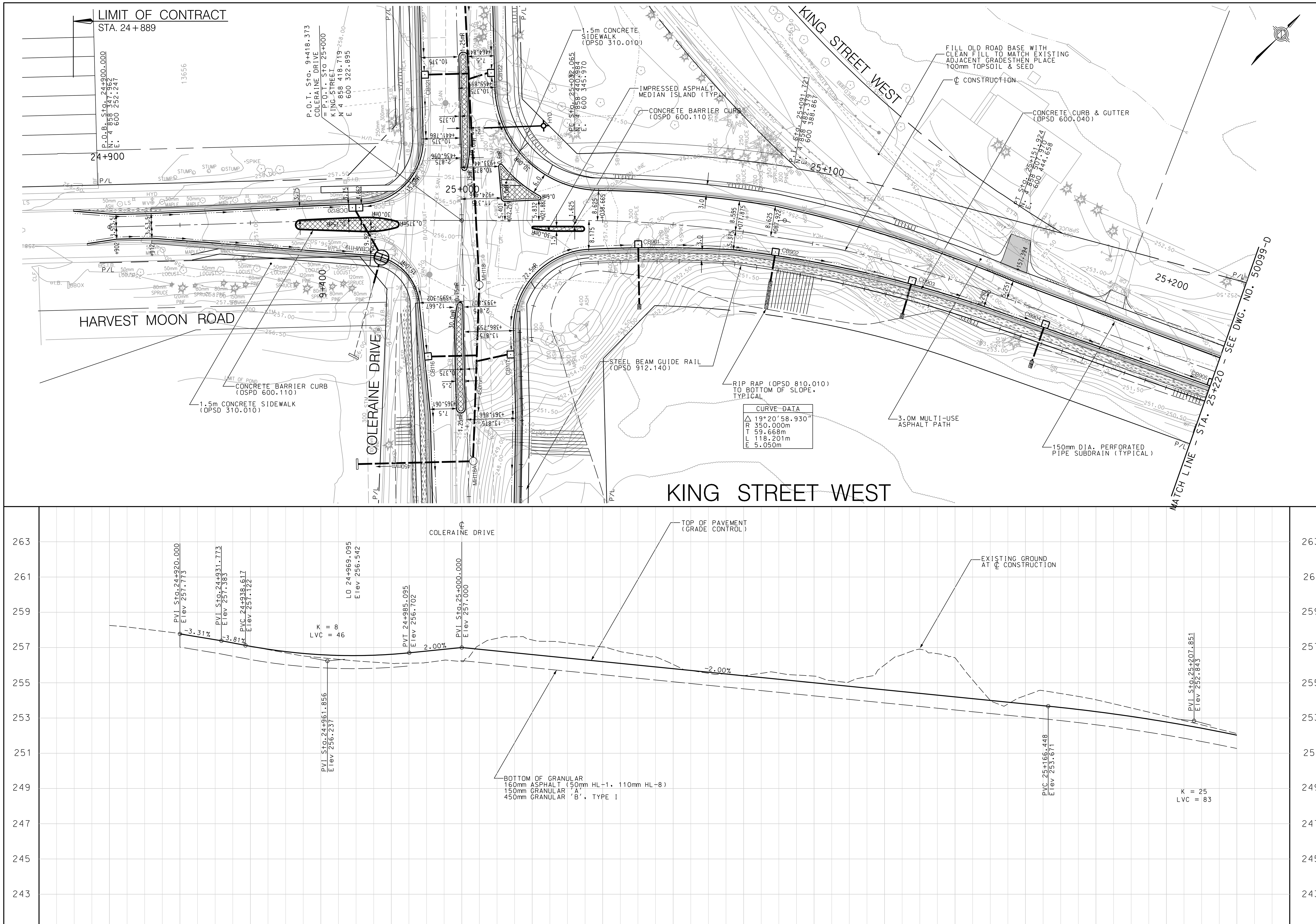
HARVEST MOON DRIVE

Sheet 1 of 5
From Sta. 0+000 to Sta. 0+260

EARTH TECH

Earth Tech Canada Inc. Markham, Ontario 905.886.7022

Scale:	H. 1:500 V. 1:50	PHASE 2 21T-88071'D'	Project No.: 97638
Drawn By:	CADD		Drawing No. 32176-D
Designed By:	D.K.		
Checked By:	J.C.B.		
Date:	JUNE 1999		



	24+900	24+920	24+940	24+960	24+980	25+000	25+020	25+040	25+060	25+080	25+100	25+120	25+140	25+160	25+180	25+200	25+220
STORM INVERT																	
PROPOSED ℄ ROAD GRADES		257.773	257.071	256.594	256.616	257.000	256.600	256.200	255.800	255.400	255.000	254.600	254.200	253.800	253.363	252.775	252.026
EXISTING ℄ ROAD GRADES		257.77	257.07	256.42	256.10	256.20	257.43	257.04	256.04	255.40	255.38	256.01	256.42	254.28	254.04	253.09	252.12

GENERAL NOTES

AS-BUILT DRAWING
CONTRACTOR: MARDAVE CONSTRUCTION (2007) LTD.
WORK COMMENCED: MAY, 2010
WORK COMPLETED: OCTOBER, 2012
These As-Built Drawings have been prepared based on inspections and observations undertaken by MRC staff during key stages of construction and on information submitted, in part, by others. While this information is believed to be reliable, MRC is not responsible for its accuracy, or for errors or omissions that may have been incorporated into this drawing as a result.

THESE DESIGN DOCUMENTS ARE PREPARED SOLELY FOR THE USE BY THE PARTY WITH WHOM THE DESIGN PROFESSIONAL HAS ENTERED INTO A CONTRACT AND THERE ARE NO REPRESENTATIONS OF ANY KIND MADE BY THE DESIGN PROFESSIONAL TO ANY PARTY WITH WHOM THE DESIGN PROFESSIONAL HAS NOT ENTERED INTO A CONTRACT.

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE.

NO.	BY	DATE	REVISION	CONS. CHECKED	TOWN APPR'D
1.	R.I.R.	04/12/10	ISSUED FOR CONSTRUCTION		
2.	R.I.R.	03/06/13	CONSTRUCTION RECORD DRAWING		

APPROVED FOR CONSTRUCTION

DATE: APPROVED BY: C.A. Campbell, C.E.T. Director

BENCH MARK:

Designed by

PROJECT NAME
COLERAINE DRIVE WIDENING AND RECONSTRUCTION

CONSULTANT
McCORMICK RANKIN CORPORATION

IN THE REGION OF PEEL

TOWN OF CALEDON

KING STREET REALIGNMENT
GRADING, PAVEMENT AND DRAINAGE

STA. 24+900 TO STA. 25+220

AREA: C-02
SCALE: HORIZ. 1:500 VERT. 1:100
PROJECT No. 08-4280
DESIGNED BY: W.J.B. DRAWN BY: A.K.S.
CHECKED BY: M.W.S. DATE: FEBRUARY 2010
DRAWING No. 50101-D

FILE: $FILE$
DATE: 20/05/2014

APPENDIX B

Stormwater Management Calculations

PRE-DEVELOPMENT RUNOFF COEFFICIENT

Municipality: Town of Caledon, Municipality of Peel
Project Address:
13656-13668 Emil Kolb Parkway
Project No. 5440
Completed By: C.D.
Checked By: H.S.
Date: 2025-11-04

SCHAEFFERS
CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.

INTERNAL DRAINAGE AREA - DRAINING TO EMIL KOLB PKWY

Type of Area	Area (ha)	Runoff Coeff.*	A x C
Impervious	0.08	0.90	0.08
Pervious	0.30	0.25	0.08
Sub Total	**0.39**		**0.15**

Weighted Coefficient	0.39

INTERNAL DRAINAGE AREA TO HARVEST MOON DRIVE

Type of Area	Area (ha)	Runoff Coeff.*	A x C
Impervious	0.14	0.90	0.13
Pervious	0.30	0.25	0.08
Sub Total	**0.44**		**0.20**

Weighted Coefficient	0.46

POST-DEVELOPMENT RUNOFF COEFFICIENT

Municipality: Town of Caledon, Municipality of Peel
Project Address: 13656-13668 Emil Kolb Parkway
Project No. 5440
Completed By: C.D.
Checked By: H.S.
Date: 2025-11-04

SCHAEFFERS
CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.

Controlled Internal Drainage Area

Site Features	Area (ha)	Runoff Coeff.	A x C
Impervious	0.69	0.90	0.62
Pervious	0.13	0.25	0.03
Sub Total	**0.83**		**0.67**

Weighted Coefficient	0.81

Controlled External Drainage Area

Type of Area	Area (ha)	Runoff Coeff.*	A x C
Impervious	0.03	0.90	0.02
Pervious	0.06	0.25	0.02
Sub Total	**0.09**		**0.04**

Weighted Coefficient	0.45

COMBINED CONTROLLED DRAINAGE AREA TO HARVEST MOON DRIVE

Type of Area	Area (ha)	Runoff Coeff.*	A x C
Impervious	0.72	0.90	0.65
Pervious	0.19	0.25	0.05
Sub Total	**0.92**		**0.70**

Weighted Coefficient	0.76

PRE-DEVELOPMENT RELEASE RATE

Municipality:	Town of Caledon, Municipality of Peel
Project Address:	13656-13668 Emil Kolb Parkway
Project No.	5440
Completed By:	C.D.
Checked By:	H.S.
Date:	2025-11-04

SCHAEFFERS CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.

Town of Caledon IDF Curves

RAINFALL INTENSITY

Design Storm Event	A	B	C	I (mm/hr)
2-Year	1070	0.8759	7.85	85.718
5-Year	1593	0.8789	11	109.677
10-Year	2221	0.9080	12	134.162
25-Year	3158	0.9335	15	156.471
50-Year	3886	0.9495	16	176.192
100-Year	4688	0.9624	17	196.536

I=A/(T+C)^B

Time of Concetration (min) = 10

EXISTING PEAK DISCHARGE RATE TO EMIL KOLB PKWY

Weighted Runoff Coefficient, C	**0.39**	
Drainage Area	**0.39**	**ha**
2-Year Peak Flow, Q_2	36.3	L/s
5-Year Peak Flow, Q_5	46.4	L/s
10-Year Peak Flow, Q_{10}	56.8	L/s
25-Year Peak Flow, Q_{25}	66.2	L/s
50-Year Peak Flow, Q_{50}	74.5	L/s
100-Year Peak Flow, Q_{100}	83.2	L/s

EXISTING PEAK DISCHARGE RATE TO HARVEST MOON DRIVE

Weighted Runoff Coefficient, C	**0.46**	
Drainage Area	**0.44**	**ha**
2-Year Peak Flow, Q_2	48.2	L/s
5-Year Peak Flow, Q_5	61.7	L/s
10-Year Peak Flow, Q_{10}	75.5	L/s
25-Year Peak Flow, Q_{25}	88.1	L/s
50-Year Peak Flow, Q_{50}	99.2	L/s
100-Year Peak Flow, Q_{100}	110.6	L/s

ALLOWABLE RELEASE RATES TO HARVEST MOON DRIVE

2-Year Peak Flow, Q_2	**48.2**	**L/s**
5 to 100-Year Peak Flow, $Q_{5\text{-}100}$	**61.7**	**L/s**

Town of Caledon

Control Orifice Sizing - 2-year

Project: 13656-13668 Emil Kolb Parkway

5440

Allowable Release Rate = 48.2 l/sec

Control Manhole Orifice(s) =

	Orifice
DIA (mm)=	**149**
AREA m^2=	0.017
COEFF =	**0.62**
GRAVITY =	9.81
K =	1.0
D/S HGL (m)=	N/A
Orifice Inv. (m)=	255.43

Effective Head (m)	Depth of Water (m)	Orifice Qp m^3/s	TOTAL FLOW Qp m^3/s	Elevation of Water (m)
0.00	0.075	0.0000	0.0000	255.50
0.800	0.875	0.0428	0.0428	256.30
0.900	0.974	0.0454	0.0454	256.40
1.000	1.075	0.0479	0.0479	256.50
1.010	**1.084**	**0.0481**	**0.0481**	**256.51**
1.700	1.774	0.0624	0.0624	257.20
1.900	1.974	0.0660	0.0660	257.40

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

Town of Caledon

Control Orifice Sizing - 5-100 year

Project: 13656-13668 Emil Kolb Parkway

5440

Allowable Release Rate = 61.7 l/sec

Control Manhole Orifice(s) =

	Orifice
DIA (mm)=	**149**
AREA m^2=	0.017
COEFF =	**0.62**
GRAVITY =	9.81
K =	1.0
D/S HGL (m)=	N/A
Orifice Inv. (m)=	255.43

Effective Head (m)	Depth of Water (m)	Orifice Qp m^3/s	TOTAL FLOW Qp m^3/s	Elevation of Water (m)
0.00	0.075	0.0000	0.0000	255.50
1.000	1.075	0.0479	0.0479	256.50
1.200	1.274	0.0525	0.0525	256.70
1.500	1.575	0.0586	0.0586	257.00
1.650	**1.724**	**0.0615**	**0.0615**	**257.15**
1.700	1.774	0.0624	0.0624	257.20
1.900	1.974	0.0660	0.0660	257.40

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

ORIFICE DESIGN AND STAGE STORAGE - 2 year Event

Municipality: Town of Caledon, Municipality of Peel
Project Address: 13656-13668 Emil Kolb Parkway
Project No. 5440
Completed By: C.D.
Checked By: H.S.
Date: 2025-11-04

SCHAEFFERS CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.

MODIFIED RATIONAL METHOD

Area (ha)	0.92
C	0.76
Allowable Release Rate (L/s)	48.2
Actual Release Rate (L/s)	48.1

Controlled Roof Flow (L/s)	0.0
Groundwater Allowance (L/s)	2.0

Town of Caledon: 2-Year Storm Event	
A	1070
B	0.8759
C	7.85

Time (min)	100-YEAR RAINFALL EVENT				Total Runoff Volume (m^3)	Max. Release Volume (m^3)	Req'd Storage Volume (m^3)
	Intensity 100-Year (mm/yr)	Surface Runoff (L/s)	Allowable G.W. (L/s)	Total Runoff (L/s)			
10	85.72	167.55	2.00	169.55	101.73	28.87	72.86
15	69.05	134.96	2.00	136.96	123.27	43.31	79.95
20	58.06	113.48	2.00	115.48	138.58	57.75	80.83
25	50.24	98.20	2.00	100.20	150.30	72.19	78.12
30	44.38	86.74	2.00	88.74	159.74	86.62	73.11
35	39.81	77.81	2.00	79.81	167.60	101.06	66.54
40	36.14	70.64	2.00	72.64	174.34	115.50	58.84
45	33.13	64.75	2.00	66.75	180.23	129.94	50.29
50	30.60	59.82	2.00	61.82	185.46	144.37	41.09
55	28.46	55.63	2.00	57.63	190.19	158.81	31.38
60	26.62	52.02	2.00	54.02	194.49	173.25	21.24
65	25.01	48.88	2.00	50.88	198.44	187.68	10.76
70	23.60	46.12	2.00	48.12	202.11	202.12	0.00
75	22.34	43.67	2.00	45.67	205.53	216.56	0.00
80	21.23	41.49	2.00	43.49	208.75	231.00	0.00
85	20.22	39.53	2.00	41.53	211.78	245.43	0.00
90	19.31	37.75	2.00	39.75	214.65	259.87	0.00
95	18.49	36.14	2.00	38.14	217.39	274.31	0.00
100	17.74	34.67	2.00	36.67	220.00	288.75	0.00
105	17.05	33.32	2.00	35.32	222.50	303.18	0.00
110	16.41	32.08	2.00	34.08	224.90	317.62	0.00
115	15.82	30.93	2.00	32.93	227.21	332.06	0.00
120	15.28	29.87	2.00	31.87	229.45	346.49	0.00
125	14.78	28.88	2.00	30.88	231.60	360.93	0.00

I=A/(T+C)^B

Required Storage (m^3):	**81.0**
Provided Storage (m^3):	**81.1**

ORIFICE DESIGN AND STAGE STORAGE - 5 year - 100 year Events

Municipality: Town of Caledon, Municipality of Peel
Project Address: 13656-13668 Emil Kolb Parkway
Project No. 5440
Completed By: C.D.
Checked By: H.S.
Date: 2025-11-04

SCHAEFFERS CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.

MODIFIED RATIONAL METHOD

Area (ha)	0.92
C	0.76
Allowable Release Rate (L/s)	61.7
Actual Release Rate (L/s)	61.5

Controlled Roof Flow (L/s)	0.0
Groundwater Allowance (L/s)	2.0

Town of Caledon: 100-Year Storm Event	
A	4688
B	0.9624
C	17

Time (min)	100-YEAR RAINFALL EVENT				Total Runoff Volume (m^3)	Max. Release Volume (m^3)	Req'd Storage Volume (m^3)
	Intensity 100-Year (mm/yr)	Surface Runoff (L/s)	Allowable G.W. (L/s)	Total Runoff (L/s)			
10	196.54	384.17	2.00	386.17	231.70	36.91	194.79
15	166.89	326.22	2.00	328.22	295.40	55.36	240.04
20	145.13	283.68	2.00	285.68	342.81	73.81	269.00
25	128.46	251.10	2.00	253.10	379.65	92.26	287.39
30	115.28	225.34	2.00	227.34	409.21	110.72	298.49
35	104.59	204.45	2.00	206.45	433.54	129.17	304.37
40	95.75	187.16	2.00	189.16	453.98	147.62	306.36
45	88.31	172.61	2.00	174.61	471.45	166.08	305.37
50	81.95	160.19	2.00	162.19	486.58	184.53	302.05
55	76.47	149.47	2.00	151.47	499.87	202.98	296.88
60	71.69	140.12	2.00	142.12	511.64	221.44	290.20
65	67.47	131.89	2.00	133.89	522.17	239.89	282.28
70	63.74	124.59	2.00	126.59	531.66	258.34	273.32
75	60.40	118.06	2.00	120.06	540.28	276.79	263.49
80	57.40	112.20	2.00	114.20	548.16	295.25	252.91
85	54.69	106.90	2.00	108.90	555.40	313.70	241.70
90	52.23	102.09	2.00	104.09	562.09	332.15	229.93
95	49.98	97.70	2.00	99.70	568.29	350.61	217.68
100	47.93	93.68	2.00	95.68	574.07	369.06	205.01
105	46.03	89.98	2.00	91.98	579.48	387.51	191.97
110	44.29	86.57	2.00	88.57	584.56	405.97	178.59
115	42.67	83.41	2.00	85.41	589.34	424.42	164.92
120	41.17	80.48	2.00	82.48	593.85	442.87	150.98
125	39.78	77.75	2.00	79.75	598.13	461.32	136.80

I=A/(T+C)^B

Required Storage (m^3):	307.0
Provided Storage (m^3):	335.0

13656 EMIL KOLB PKWY TOWNHOUSES

13656 EMIL KOLB PARKWAY

BOLTON, ON

DRAWING INDEX

TITLE	SHEET NO.
COVER SHEET	1 OF 5
SYSTEM LAYOUT SHEET	2 OF 5
SYSTEM CALCULATION SHEET	3 OF 5
SYSTEM OVERLAY SHEET	4 OF 5
360HD DETAIL SHEET	5 OF 5

PROJECT INFORMATION						
PROJECT NO:	25-0122					
CULTEC SALES REP:	DOMINIC TURNER 438-266-4033 DOMINIC.TURNER@CULTEC.COM					
CULTEC TECHNICAL SALES ENGINEER:						
CULTEC PROJECT COORDINATOR:	TYLER BRUSH 475-289-7120 TYLER.BRUSH@CULTEC.COM					
ENGINEER OF RECORD	SCHAEFFERS CONSULTING ENGINEERS					
REVISIONS:	ITERATION	DATE	BY	COMMENTS	EOR SHEET REFERENCE	DATE
	00	02/03/2025	SRA	INITIAL SUBMITTAL DRAWINGS	SITE SERVICING PLAN	06/2024
	01	10/17/2025	SRA	REVISED PER UPDATED SERVICING PLAN	SITE SERVICING PLAN	02/08/2025
	02	10/21/2025	SRA	REVISED ELEVATIONS	SITE SERVICING PLAN	02/08/2025

CULTEC

Subsurface Stormwater Management Systems

878 Federal Road
Brookfield, CT 06804
www.cultec.com

PH: 1(203) 775-4416
PH: 1(800) 4-CULTEC
CT-tech@cultec.com

NOTE: THESE SHOP DRAWINGS MAY CONTAIN COMPONENTS INCLUDING BUT NOT LIMITED TO MANHOLES, CATCH BASINS, STORM PIPES AND FITTINGS, MANIFOLDS, CASTINGS AND OTHER NECESSARY APPURTENANCES THAT MAY NOT BE SUPPLIED BY CULTEC, INC. IT IS THE RESPONSIBILITY OF THE CONTRACTOR AND/OR SUPPLIER TO CONFIRM WITH CULTEC THE MATERIALS PROVIDED.

BEFORE YOU BEGIN - REQUIRED MATERIALS AND EQUIPMENT

1. PROPER GEOTECHNICAL SOIL EVALUATION BY A QUALIFIED ENGINEER OR SOIL SCIENTIST TO DETERMINE SUITABILITY OF STRUCTURAL INSTALLATION
2. OSHA COMPLIANCE
3. CULTEC WARNING TAPE, OR EQUIVALENT
4. ASSURANCES FROM LOCAL UTILITIES THAT NO UNDERGROUND GAS, ELECTRICAL OR OTHER POTENTIALLY DANGEROUS PIPELINES OR CONDUITS ARE ALREADY BURIED AT THE SITE
5. ACCEPTABLE 1- 2 INCH (25 - 51 mm) WASHED, CRUSHED STONE AS DETAILED IN CULTEC'S INSTALLATION INSTRUCTIONS. CLEANLINESS OF STONE TO BE VERIFIED BY ENGINEER.
6. ACCEPTABLE FILL MATERIAL AS SHOWN IN CULTEC'S INSTALLATION INSTRUCTIONS.
7. ALL CULTEC CHAMBERS AND ACCESSORIES AS SPECIFIED IN THE ENGINEER'S PLANS INCLUDING CULTEC NO. 410 NON-WOVEN GEOTEXTILE, CULTEC STORMFILTER AND CULTEC NO. 4800 WOVEN GEOTEXTILE, WHERE APPLICABLE.
8. RECIPROCATING SAW OR ROUTER
9. STONE BUCKET
10. STONE CONVEYOR AND/OR TRACKED EXCAVATOR
11. TRANSIT OR LASER LEVEL MEASURING DEVICE
12. COMPACTION EQUIPMENT WITH MAXIMUM GROSS VEHICLE WEIGHT OF 12,000 LBS (5,440 KGS). VIBRATORY ROLLERS MAY ONLY BE USED ON THE STONE BASE PRIOR TO THE INSTALLATION OF CHAMBERS.
13. CHECK CULTEC CHAMBERS FOR DAMAGE PRIOR TO INSTALLATION. DO NOT USE DAMAGED CULTEC CHAMBERS, CONTACT YOUR SUPPLIER IMMEDIATELY TO REPORT DAMAGE OR PACKING-LIST DISCREPANCIES.

REQUIREMENTS FOR CULTEC CHAMBER SYSTEM INSTALLATIONS

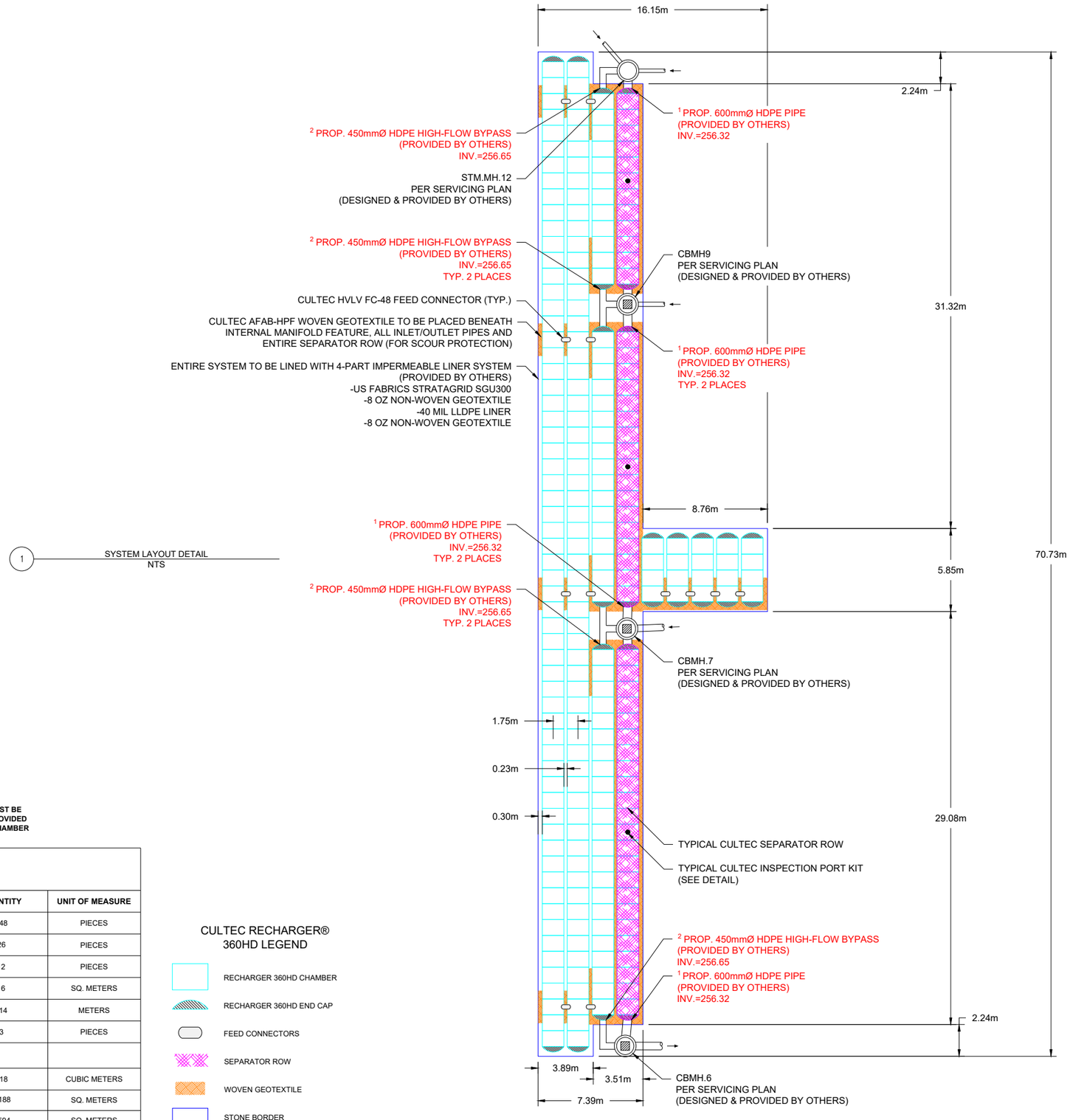
1. INSTALLING CONTRACTORS ARE EXPECTED TO COMPREHEND AND USE THE MOST CURRENT INSTALLATION INSTRUCTIONS PRIOR TO BEGINNING A SYSTEM INSTALLATION. IF THERE IS ANY QUESTION AS TO WHETHER YOU POSSESS THE MOST CURRENT INSTRUCTIONS, CONTACT CULTEC AT (203) 775-4416 OR VISIT WWW.CULTEC.COM.
2. CONTACT CULTEC AT LEAST THIRTY DAYS PRIOR TO SYSTEM INSTALLATION TO ARRANGE FOR A PRE-CONSTRUCTION MEETING.
3. ALL CULTEC SYSTEM DESIGNS MUST BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER.
4. USE CULTEC INSTALLATION INSTRUCTIONS AS A GUIDELINE ONLY FOR MINIMUM/MAXIMUM REQUIREMENTS. ACTUAL DESIGN MAY VARY. REFER TO APPROVED CONSTRUCTION DRAWINGS FOR JOB-SPECIFIC DETAILS. BE SURE TO FOLLOW THE ENGINEER'S DRAWINGS AS YOUR PRIMARY GUIDE.
5. THE FOUNDATION STONE SHALL BE LEVEL AND COMPACTED PRIOR TO CHAMBER INSTALLATION.
6. OVERLAPPING RIB CONNECTIONS OF CHAMBERS SHALL BE FULLY SHOULDERED PRIOR TO STONE PLACEMENT.
7. CENTER-TO-CENTER SPACING SHALL BE CHECKED AND MAINTAINED THROUGHOUT INSTALLATION PROCESS.
8. ANY DISCREPANCIES WITH THE SYSTEM SUB-GRADE SOIL'S BEARING CAPACITY MUST BE REPORTED TO THE DESIGN ENGINEER.
9. NON-WOVEN GEOTEXTILE MUST BE USED AS SPECIFIED IN THE ENGINEER'S DRAWINGS.
10. CULTEC REQUIRES THE CONTRACTOR TO REFER TO CULTEC'S INSTALLATION INSTRUCTIONS CONCERNING VEHICULAR TRAFFIC. RESPONSIBILITY FOR PREVENTING VEHICLES THAT EXCEED CULTEC'S REQUIREMENTS FROM TRAVELING ACROSS OR PARKING OVER THE CHAMBER SYSTEM LIES SOLELY WITH THE CONTRACTOR THROUGHOUT THE ENTIRE SITE CONSTRUCTION PROCESS. THE PLACEMENT OF WARNING TAPE, TEMPORARY FENCING, AND/OR APPROPRIATELY LOCATED SIGNS IS HIGHLY RECOMMENDED. IMPRINTED WARNING TAPE IS AVAILABLE FROM CULTEC. FOR ACCEPTABLE VEHICLE LOAD INFORMATION, REFER TO CULTEC INSTALLATION INSTRUCTIONS.
11. TRAFFIC OF INSTALLATION EQUIPMENT OR OTHER VEHICULAR TRAFFIC OVER TOP OF THE CULTEC STORMWATER SYSTEM IS STRICTLY RESTRICTED AND PROHIBITED UNTIL SATISFACTORY COVER AND COMPACTION IS ACHIEVED ACCORDING TO CULTEC'S MANUFACTURER INSTALLATION INSTRUCTIONS.
12. EROSION AND SEDIMENT-CONTROL MEASURES MUST MEET LOCAL CODES AND THE DESIGN ENGINEER'S SPECIFICATIONS THROUGHOUT THE ENTIRE SITE CONSTRUCTION PROCESS.
13. CULTEC SYSTEMS MUST BE DESIGNED AND INSTALLED IN ACCORDANCE WITH CULTEC'S MINIMUM REQUIREMENTS. FAILURE TO DO SO WILL VOID THE LIMITED WARRANTY.
14. CONTACT CULTEC, INC. AT 203-775-4416 WITH ANY QUESTIONS OR FURTHER CLARIFICATION OF REQUIREMENTS.
15. PLACEMENT OF EMBEDMENT STONE MUST BE IN ACCORDANCE WITH CULTEC'S INSTALLATION INSTRUCTIONS. STONE COLUMN HEIGHT DEFERENTIAL MUST NEVER EXCEED 12" (305 mm) BETWEEN CHAMBER ROWS, ADJACENT CHAMBERS OR STONE PERIMETER. STONE MUST BE PLACED OVER THE CROWN OF THE CHAMBERS TO ANCHOR THE CHAMBERS IN PLACE AND MAINTAIN ROW SPACING.
16. EMBEDMENT STONE MUST ONLY BE PLACED BY EXCAVATOR OR TELESCOPING CONVEYOR BOOM. PLACEMENT OF EMBEDMENT STONE WITH BULLDOZER IS NOT AN ACCEPTABLE METHOD OF INSTALLATION AND MAY CAUSE DAMAGE TO THE CHAMBERS. ANY CHAMBERS DAMAGED USING AN UNACCEPTABLE METHOD OF BACKFILL ARE NOT COVERED UNDER THE CULTEC LIMITED WARRANTY.

THIS DRAWING HAS BEEN PREPARED TO SUPPORT THE PROJECT ENGINEER OF RECORD FOR THE PROPOSED SYSTEM. THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO CULTEC UNDER THE DIRECTION OF THE PROJECT ENGINEER OF RECORD OR OTHER PROJECT REPRESENTATIVE. IT IS ULTIMATE RESPONSIBILITY OF THE PROJECT ENGINEER OF RECORD TO ENSURE THAT THE CULTEC SYSTEM'S DESIGN IS IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS, REGULATIONS AND MANUFACTURER REQUIREMENTS.

PROPOSED STORMWATER MANAGEMENT SYSTEM ELEVATIONS

(TO BE APPROVED BY ENGINEER OF RECORD)
*ENGINEER OF RECORD TO CONFIRM MINIMUM AND MAXIMUM BURIAL REQUIREMENTS ARE MET)

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT OR UNPAVED)	260.89
MINIMUM ALLOWABLE GRADE (UNPAVED TRAFFIC)	257.83
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT)	257.68
MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT)	257.68
TOP OF STONE ELEVATION	257.39
TOP OF CHAMBER ELEVATION	257.23
(6) 450mm HIGH-FLOW BYPASS PIPE INVERT	256.65
(6) 600mm INLET PIPE INVERT	256.32
BOTTOM OF CHAMBER ELEVATION	256.32
BOTTOM OF STONE ELEVATION	256.17
CULTEC STORMWATER MANAGEMENT SYSTEM SUMMARY	
TOTAL STORAGE PROVIDED (m^3) BELOW ELEV. 256.51	81.12
TOTAL STORAGE PROVIDED (m^3) BELOW ELEV. 257.14	335.00
BEDDING STONE DISCOUNTED FROM TOTAL STORAGE PROVIDED	
% STONE POROSITY	40
SYSTEM AREA (m^2)	558.29
DEPTH OF EMBEDMENT STONE (mm)	152
DEPTH OF BEDDING STONE (mm)	152
STONE PERIMETER (mm)	305
SPACING BETWEEN CHAMBER ROWS (mm)	229



1 SYSTEM LAYOUT DETAIL
NTS

NOTE: ALL EXTERNAL SYSTEM STRUCTURES, INLET/OUTLET PIPES AND PROPOSED ELEVATIONS MUST BE DESIGNED AND APPROVED BY THE ENGINEER OF RECORD. ALL PROPOSED SYSTEM ELEVATIONS PROVIDED MUST BE VERIFIED BY THE ENGINEER OF RECORD AND THE ENGINEER OF RECORD MUST ENSURE CHAMBER BURIAL REQUIREMENTS ARE MET

MATERIALS LIST SUPPLIED BY CULTEC

PRODUCT DESCRIPTION	SKU	QUANTITY	UNIT OF MEASURE
CULTEC RECHARGER 360HD CHAMBER	360HD	248	PIECES
CULTEC RECHARGER 360HD END CAP	360HD EC	26	PIECES
CULTEC HVLV FEED CONNECTORS	FC-48	12	PIECES
CULTEC NO. 410 NON-WOVEN GEOTEXTILE	75NWG410	16	SQ. METERS
CULTEC AFAB-HPF WOVEN GEOTEXTILE	75WGHPF	114	METERS
CULTEC INSPECTION PORT KIT	1299CGC	3	PIECES
MATERIALS LIST NOT SUPPLIED BY CULTEC			
1-2 INCH WASHED, CRUSHED STONE	---	418	CUBIC METERS
8 OZ. NON-WOVEN GEOTEXTILE	---	3,188	SQ. METERS
40 MIL. LLDPE THERMOPLASTIC LINER	---	1,594	SQ. METERS

CULTEC RECHARGER® 360HD LEGEND

- RECHARGER 360HD CHAMBER
- RECHARGER 360HD END CAP
- FEED CONNECTORS
- SEPARATOR ROW
- WOVEN GEOTEXTILE
- STONE BORDER

PROPOSED SYSTEM ALTERATION TABLE

1	PROPOSED SEPARATOR ROW ACCESS PIPE
2	PROPOSED SEPARATOR ROW HIGH-FLOW BYPASS PIPE

CULTEC STORMWATER CHAMBER

DATE:	10/21/2025
CHECKED BY:	TNB
SHEET NO:	2 OF 5
PROJECT NO:	25-0122.02
DESIGNED BY:	SRA
SCALE:	N.T.S

13656 EMIL KOLB PKWY TOWNHOUSES
13656 EMIL KOLB PARKWAY
BOLTON, ON
SYSTEM LAYOUT SHEET

CULTEC
Subsurface Stormwater Management Systems
878 Federal Road
Brookfield, CT 06804
PH: 1(203) 775-4416
PH: 1(800) 4-CULTEC
www.cultec.com
CT-tech@cultec.com

1.02

CULTEC Recharger 360HD Stormwater System Calculations

Consulting Engineer:

Schaeffers Consulting Engineers
Concord, ON

Project Information:

13656 Emil Kolb Pkwy Townhouses
13656 Emil Kolb Parkway
Bolton, ON

Calculations Performed By:

Steve Almendarez
CULTEC
878 Federal Rd.
Brookfield, CT 06804
PH: 203-775-4416
FX: 203-775-5887

Date: 10/21/25

Project Number: 25-0122.02

System Information

Irregular Bed Inputs

	No. of Rows	13		Total No. of Chambers	248
	System Area (sq. ft) (from CAD)	6009.58		System Perimeter (ft) (from CAD)	570.08
Given:					
Storage required			CF	318.00 m^3	
CULTEC AFAB-HPF For Internal Manifolds		70	feet		
Number of Inlet/Outlet Pipes (Do Not Include Separator Rows)		6			
Stone **Base**		6	inches	152 mm	☑ Discount stone base from Total storage provided (If Applicable)
Stone **Above**		6	inches	152 mm	☐ Discount stone above from Total storage provided (If Applicable)
Spacing **Between** Rows		9	inches	229 mm	
No. of HVLV FC-48 Feed Connectors		12	units		
12" PVC Universal Inline Drain Body Only - Kit		3	units		
12" Ductile Iron Square Solid Drain Base Cover		3	units		
Stone Porosity		40	%		
Stone Border Width		12	inches	305 mm	
Other Parameters:					
Length of Separator Row		198.5	feet	60.503 m	
Type of Lining		All Sides			
☐ Sand Filter Depth (If Applicable)			feet	0.000 m	
☐ Sloped Sides (1:1) (If Applicable)					

Assumptions

Model Name		Chamber Height	Design Unit Height	Chamber Width	Chamber Spacing	Design Unit Width	Chamber Volume per Linear Foot	Design Unit Volume	Installed Chamber Length
		inches / mm	feet / m	inches / mm	inches / mm	feet / m	cu. ft/ft / cu. m/m	cu. ft/ft / cu. m/m	feet / m
Recharger® 360HD Chamber	English	36	4.000	60	9	5.75	10.00	15.199	3.667
	Metric	914	1.219	1524	229	1.75	0.929	1.412	1.118
Recharger® 360HD End Cap	English	36.5	4.000	60	9	5.75	5.168	12.301	1.250
	Metric	927	1.219	1524	229	1.75	0.480	1.143	0.381
HVLV™ FC-48 Feed Connectors	English	12	n/a	16	n/a	n/a	0.913	n/a	0.750
	Metric	305	n/a	406	n/a	n/a	0.085	n/a	0.229

Storage Provided within CULTEC Recharger 360HD Stormwater Chamber, End Caps and HVLV FC-48 Feed Connector Internal Manifold System - *not including stone*

Number of Recharger 360HD chambers by design			=	248 pcs	
248	pcs x	3.667	=	909.33 feet	277.16 m
Number of Recharger 360HD end caps			=	26 pcs	
26	pcs x	1.250	=	32.50 feet	9.91 m
Number of HVLV FC-48 Feed Connectors			=	12 pcs	
12	pcs x	0.750	=	9.00 feet	2.74 m
Total footage of Recharger 360HD chambers			=	909.33 feet	277.16 m
Total footage of Recharger 360HD end caps			=	32.50 feet	
Total footage of HVLV FC-48 Feed Connectors			=	9.00 feet	2.74 m
Storage provided within Recharger 360HD chambers			=	9091.06 CF	257.46 m^3
Storage provided within Recharger 360HD end caps				167.96 CF	4.76 m^3
Storage provided within HVLV FC-48 Feed Connectors			=	8.22 CF	0.23 m^3
Total Storage within chambers and feed connectors			=	**9267.24 CF**	**262.45 m^3**

Storage Provided within Entire CULTEC Stormwater System - *including stone*

Bed Depth	4.00 feet	1.22 m	
Total Area	6009.58 sq. ft.	558.29 m^2	
Volume of Effective Excavation *(not including additional cover)*	24038.32 CF	680.77 m^3	
Perimeter of Bed	570.08 feet	173.76 m	
Total Storage within CULTEC Recharger 360HD chambers, end caps and feed connectors	9267.24 CF	262.45 m^3	
Total Stone Required	14771.08 CF	418.32 m^3	
	547 CY		
	766 tons		
Storage provided within stone	4706.52 CF	133.29 m^3	
Total Storage within CULTEC Stormwater System =	**13974 CF**	**395.70 m^3**	*Req. storage attained.*

CULTEC MATERIALS LIST

Model	Model #	Quantity	Unit of Measure	Quantity	Unit of Measure
Recharger 360HD Heavy Duty Chamber	360HD	248	pcs		
Recharger 360HD End Cap	360HD EC	26	pcs		
HVLV FC-48 Feed Connectors	FC-48	12	pcs		
CULTEC No. 410 Non-Woven Geotextile	NWG410	20	Sq. Yards	16	m2
CULTEC AFAB-HPF Woven Geotextile 7.5' x 100'	75WGHPF	375	feet	114	m
12" PVC Universal Inline Drain Body Only - Kit	2712AGSB	3	pcs		
12" Ductile Iron Square Solid Drain Base Cover	1299CGC	3	pcs		
Total Stone		547	cubic yards	418	m^3
8 oz. Non-Woven Geotextile (Not provided by Cultec)		3813	Sq. Yards	3188	m2
40 mil. LLDPE Thermoplastic Liner (Not provided by Cultec)		1907	Sq. Yards	1594	m2

¤ DISCLAIMER: If this is a value-engineered project based on a competitor's design.
The following inputs and calculations are based upon limited design information provided to CULTEC by a third-party. An engineer should review the inputs to confirm accuracy of the assumptions.

SYSTEM STORAGE CALCULATION

CULTEC Recharger 360HD Stormwater Incremental Storage

Date: October 21, 2025

Project Information
13656 Emil Kolb Pkwy Townhouses
13656 Emil Kolb Parkway
Bolton, ON

Project Number
25-0122.02

Base of Stone Elevation- 256.17

Recharger 360HD Incremental Storage Volumes

Height of System		End Cap Volume		Chamber Volume		HVLV FC-48 Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Stage/Area		Elevation		
in	mm	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft^2	m^2	ft	m	
48.00	1219	0.00	0.00	0.00	0.00	0.00	0.00	200.32	5.67	200.32	5.67	13973.77	395.69	2403.83	223.32	260.17	257.39	**Top of Stone Elevation**
47.00	1194	0.00	0.00	0.00	0.00	0.00	0.00	200.32	5.67	200.32	5.67	13773.45	390.02	2403.83	223.32	260.09	257.36	
46.00	1168	0.00	0.00	0.00	0.00	0.00	0.00	200.32	5.67	200.32	5.67	13573.13	384.35	2403.83	223.32	260.00	257.34	
45.00	1143	0.00	0.00	0.00	0.00	0.00	0.00	200.32	5.67	200.32	5.67	13372.81	378.68	2403.83	223.32	259.92	257.31	
44.00	1118	0.00	0.00	0.00	0.00	0.00	0.00	200.32	5.67	200.32	5.67	13172.49	373.00	2403.83	223.32	259.84	257.29	
43.00	1092	0.00	0.00	0.00	0.00	0.00	0.00	200.32	5.67	200.32	5.67	12972.17	367.33	2403.83	223.32	259.75	257.26	
42.00	1067	0.26	0.01	19.89	0.56	0.00	0.00	192.26	5.44	212.41	6.01	12771.85	361.66	2548.91	236.79	259.67	257.24	**Top of Chamber Elevation**
41.00	1041	0.52	0.01	42.18	1.19	0.00	0.00	183.24	5.19	225.94	6.40	12559.44	355.64	2711.31	251.88	259.59	257.21	
40.00	1016	0.78	0.02	62.72	1.78	0.00	0.00	174.92	4.95	238.42	6.75	12333.50	349.25	2861.03	265.79	259.50	257.19	
39.00	991	1.04	0.03	106.24	3.01	0.00	0.00	157.41	4.46	264.69	7.50	12095.08	342.49	3176.27	295.08	259.42	257.16	
38.00	965	1.30	0.04	134.17	3.80	0.00	0.00	146.13	4.14	281.60	7.97	11830.39	335.00	3379.20	313.93	259.34	257.15	
37.00	940	1.56	0.04	155.10	4.39	0.00	0.00	137.66	3.90	294.31	8.33	11548.79	327.02	3531.78	328.10	259.25	257.11	
36.00	914	1.82	0.05	172.48	4.88	0.00	0.00	130.60	3.70	304.90	8.63	11254.48	318.69	3658.82	339.90	259.17	257.08	
35.00	889	2.08	0.06	187.51	5.31	0.00	0.00	124.48	3.52	314.08	8.89	10949.58	310.06	3768.90	350.13	259.09	257.06	
34.00	864	2.34	0.07	200.81	5.69	0.00	0.00	119.06	3.37	322.21	9.12	10635.50	301.16	3866.48	359.20	259.00	257.03	
33.00	838	2.60	0.07	212.73	6.02	0.00	0.00	114.19	3.23	329.52	9.33	10313.30	292.04	3954.24	367.35	258.92	257.01	
32.00	813	2.86	0.08	223.57	6.33	0.00	0.00	109.75	3.11	336.18	9.52	9983.78	282.71	4034.14	374.77	258.84	256.98	
31.00	787	3.12	0.09	233.44	6.61	0.00	0.00	105.69	2.99	342.26	9.69	9647.60	273.19	4107.08	381.55	258.75	256.96	
30.00	762	3.64	0.10	242.52	6.87	0.00	0.00	101.86	2.88	348.01	9.85	9305.34	263.50	4176.18	387.97	258.67	256.93	
29.00	737	3.90	0.11	250.90	7.10	0.00	0.00	98.40	2.79	353.20	10.00	8957.33	253.64	4238.40	393.75	258.59	256.91	
28.00	711	4.16	0.12	258.64	7.32	0.00	0.00	95.20	2.70	358.00	10.14	8604.12	243.64	4295.99	399.10	258.50	256.88	
27.00	686	4.42	0.13	265.86	7.53	0.00	0.00	92.21	2.61	362.48	10.26	8246.13	233.50	4349.82	404.10	258.42	256.86	
26.00	660	4.68	0.13	272.60	7.72	0.00	0.00	89.41	2.53	366.69	10.38	7883.64	223.24	4400.26	408.78	258.34	256.83	
25.00	635	4.94	0.14	278.93	7.90	0.00	0.00	86.77	2.46	370.64	10.50	7516.95	212.86	4447.66	413.19	258.25	256.81	
24.00	610	5.20	0.15	284.85	8.07	0.00	0.00	84.30	2.39	374.35	10.60	7146.31	202.36	4492.21	417.33	258.17	256.78	
23.00	584	5.20	0.15	290.46	8.22	0.00	0.00	82.06	2.32	377.71	10.70	6771.96	191.76	4532.57	421.08	258.09	256.75	
22.00	559	5.46	0.15	295.72	8.37	0.00	0.00	79.85	2.26	381.02	10.79	6394.25	181.06	4572.29	424.77	258.00	256.73	
21.00	533	5.72	0.16	300.70	8.51	0.00	0.00	77.75	2.20	384.17	10.88	6013.22	170.28	4610.06	428.27	257.92	256.70	
20.00	508	5.98	0.17	305.39	8.65	0.00	0.00	75.77	2.15	387.14	10.96	5629.05	159.40	4645.68	431.58	257.84	256.68	
19.00	483	6.24	0.18	309.80	8.77	0.00	0.00	73.90	2.09	389.94	11.04	5241.91	148.43	4679.33	434.71	257.75	256.65	
18.00	457	6.24	0.18	313.97	8.89	0.04	0.00	72.22	2.05	392.47	11.11	4851.97	137.39	4709.59	437.52	257.67	256.63	
17.00	432	6.50	0.18	317.91	9.00	0.28	0.01	70.44	1.99	395.13	11.19	4459.50	126.28	4741.60	440.49	257.59	256.60	
16.00	406	6.76	0.19	321.63	9.11	0.54	0.02	68.75	1.95	397.68	11.26	4064.37	115.09	4772.14	443.33	257.50	256.58	
15.00	381	6.76	0.19	325.15	9.21	0.66	0.02	67.29	1.91	399.86	11.32	3666.69	103.83	4798.33	445.77	257.42	256.55	
14.00	356	7.02	0.20	328.45	9.30	0.73	0.02	65.84	1.86	402.04	11.38	3266.83	92.51	4824.47	448.19	257.34	256.53	
13.00	330	7.28	0.21	331.58	9.39	0.77	0.02	64.47	1.83	404.09	11.44	2864.79	81.12	4849.10	450.48	257.25	256.51	
12.00	305	7.54	0.21	334.50	9.47	0.80	0.02	63.18	1.79	406.03	11.50	2460.70	69.68	4872.30	452.64	257.17	256.47	
11.00	279	7.54	0.21	337.28	9.55	0.84	0.02	62.06	1.76	407.71	11.55	2054.67	58.18	4892.56	454.52	257.09	256.45	
10.00	254	7.80	0.22	339.86	9.62	0.86	0.02	60.91	1.72	409.43	11.59	1646.96	46.64	4913.13	456.43	257.00	256.42	
9.00	229	7.80	0.22	342.29	9.69	0.87	0.02	59.93	1.70	410.90	11.64	1237.53	35.04	4930.76	458.07	256.92	256.40	
8.00	203	8.06	0.23	344.60	9.76	0.89	0.03	58.90	1.67	412.45	11.68	826.64	23.41	4949.37	459.80	256.84	256.37	
7.00	178	8.84	0.25	346.65	9.82	0.95	0.03	57.74	1.64	414.19	11.73	414.19	11.73	4970.26	461.74	256.75	256.35	
6.00	152	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	256.67	256.32	**Bottom of Chamber Elevation**
5.00	127	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	256.59	256.30	
4.00	102	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	256.50	256.27	
3.00	76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	256.42	256.25	
2.00	51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	256.34	256.22	
1.00	25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	256.25	256.20	
0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	256.17	256.17	**Bottom of Stone Elevation**
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SYSTEM STAGE-STORAGE TABLE

CULTEC STORMWATER CHAMBER

DATE: 10/21/2025 | CHECKED BY: TNB | SHEET NO: 3 OF 5
PROJECT NO: 25-0122.02 | DESIGNED BY: SRA | SCALE: N.T.S

13656 EMIL KOLB PKWY TOWNHOUSES
13656 EMIL KOLB PARKWAY
BOLTON, ON
SYSTEM CALCULATION SHEET

CULTEC
Subsurface Stormwater Management Systems
878 Federal Road
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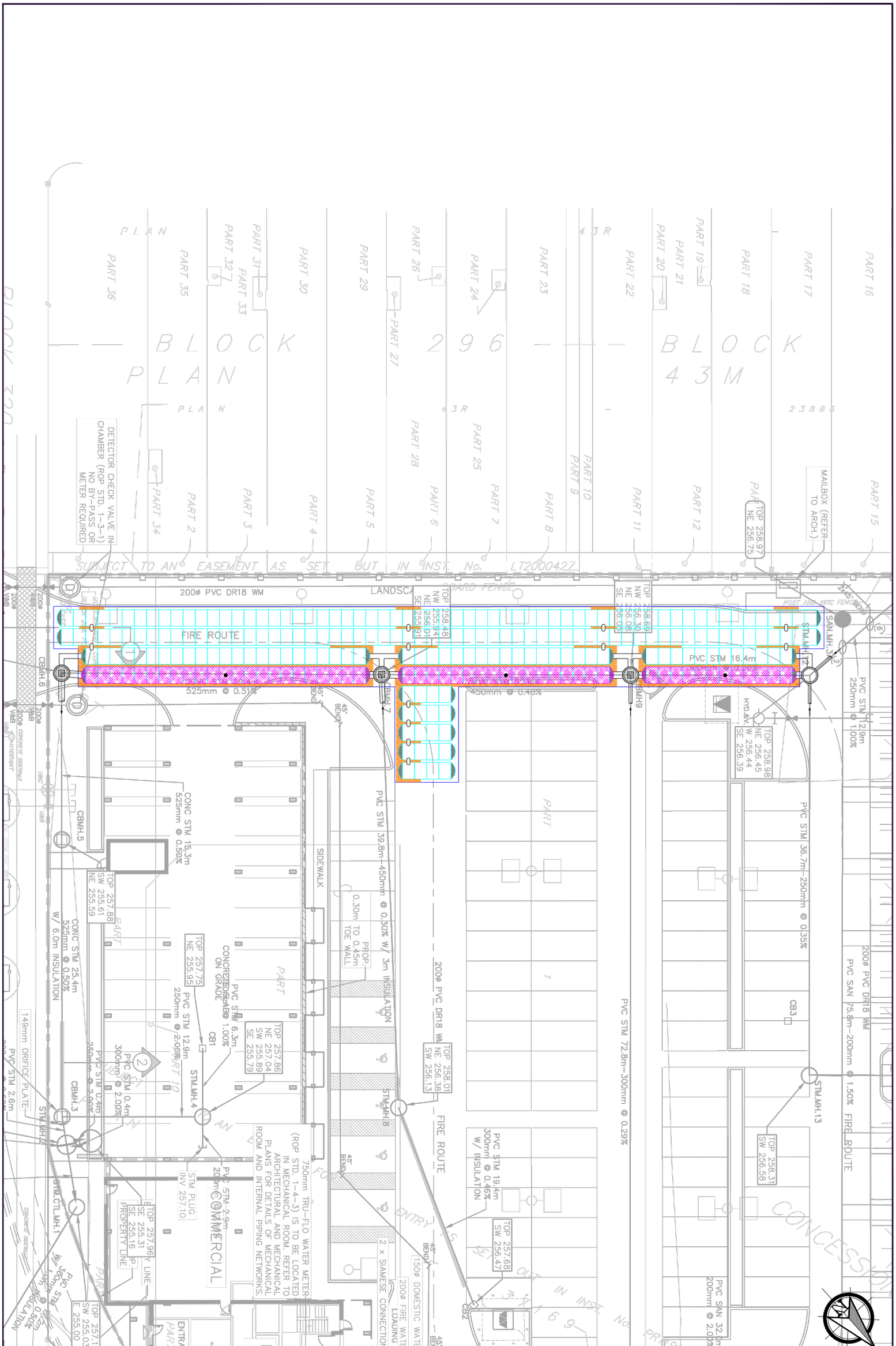

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878 Federal Road
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1.02

13656 EMIL KOLB PKWY TOWNHOUSES

13656 EMIL KOLB PARKWAY

BOLTON, ON

SYSTEM OVERLAY SHEET

CULTEC STORMWATER CHAMBER

PROJECT NO:	25-0122.02	**DATE:**	10/21/2025
DESIGNED BY:	SRA	**CHECKED BY:**	TNB
SCALE:	N.T.S	**SHEET NO:**	4 OF 5

CULTEC RECHARGER® 360HD PRODUCT SPECIFICATIONS

GENERAL

CULTEC RECHARGER® 360HD CHAMBERS ARE DESIGNED FOR UNDERGROUND STORMWATER MANAGEMENT. THE CHAMBERS MAY BE USED FOR RETENTION, RECHARGING, DETENTION OR CONTROLLING THE FLOW OF ON-SITE STORMWATER RUNOFF.

CHAMBER PARAMETERS

1. THE CHAMBERS SHALL BE MANUFACTURED IN THE U.S.A. OR CANADA BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE CHAMBERS SHALL BE DESIGNED AND TESTED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS.
3. THE CHAMBER SHALL BE DESIGNED TO WITHSTAND THE AASHTO DESIGN TRUCK LOAD AND LIVE AND DEAD LOAD FACTORS AS DEFINED BY AASHTO LRFD SECTION 12.12 WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.
4. THE CHAMBER SHALL BE STRUCTURAL FOAM INJECTION MOLDED OF BLUE VIRGIN HIGH MOLECULAR WEIGHT IMPACT-MODIFIED POLYPROPYLENE.
5. THE CHAMBER SHALL BE ARCHED IN SHAPE.
6. THE CHAMBER SHALL BE OPEN-BOTTOMED.
7. THE CHAMBER SHALL BE JOINED USING AN INTERLOCKING OVERLAPPING RIB METHOD. CONNECTIONS MUST BE FULLY SHOULDERED OVERLAPPING RIBS, HAVING NO SEPARATE COUPLINGS.
8. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC RECHARGER® 360HD SHALL BE 36 INCHES (915 mm) TALL, 60 INCHES (1525 mm) WIDE AND 50 INCHES (1275 mm) LONG. THE INSTALLED LENGTH OF A JOINED RECHARGER® 360HD SHALL BE 3.67 FEET (1.12 m).
9. MULTIPLE CHAMBERS MAY BE CONNECTED TO FORM DIFFERENT LENGTH ROWS. EACH ROW SHALL BEGIN AND END WITH A SEPARATELY FORMED CULTEC RECHARGER® 360HD END CAP. MAXIMUM INLET OPENING ON THE END CAP IS 24 INCH (600 mm) HDPE OR 30 INCH (750mm) PVC.
10. THE CHAMBER SHALL HAVE TWO SIDE PORTALS TO ACCEPT CULTEC HVLV™ FC-48 FEED CONNECTORS TO CREATE AN INTERNAL MANIFOLD. MAXIMUM ALLOWABLE PIPE SIZE IN THE SIDE PORTAL IS 10 INCH (250mm) HDPE OR 12 INCH (300mm) PVC.
11. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC HVLV™ FC-48 FEED CONNECTOR SHALL BE 12 INCHES (305 mm) TALL, 16 INCHES (406 mm) WIDE AND 49 INCHES (1245 mm) LONG.
12. THE NOMINAL STORAGE VOLUME OF THE RECHARGER® 360HD CHAMBER SHALL BE 10.0 FT³ / FT (.928 m³ / m) - WITHOUT STONE. THE NOMINAL STORAGE VOLUME OF A JOINED RECHARGER® 360HD SHALL BE 36.66 FT³ / UNIT (1.038 m³ / UNIT) - WITHOUT STONE.
13. THE NOMINAL STORAGE VOLUME OF THE HVLV™ FC-48 FEED CONNECTOR SHALL BE 0.913 FT³ / FT (0.085 m³ / m) - WITHOUT STONE.
14. THE RECHARGER® 360HD CHAMBER SHALL HAVE 7 CORRUGATIONS.
15. THE CHAMBER SHALL BE MANUFACTURED IN A FACILITY EMPLOYING CULTEC'S QUALITY CONTROL AND ASSURANCE PROCEDURES.
16. MAXIMUM ALLOWABLE COVER OVER THE TOP OF THE CHAMBER SHALL BE 12.0 FEET (3.66 m).

END CAP PARAMETERS

1. THE CULTEC RECHARGER® 360HD END CAP (REFERRED TO AS 'END CAP') SHALL BE MANUFACTURED IN THE U.S.A. OR CANADA BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
4. THE END CAP SHALL BE STRUCTURAL FOAM INJECTION MOLDED OF BLUE VIRGIN HIGH MOLECULAR WEIGHT IMPACT-MODIFIED POLYPROPYLENE.
5. THE END CAP SHALL BE ARCHED IN SHAPE.
6. THE END CAP SHALL BE OPEN-BOTTOMED.
7. THE END CAP SHALL BE JOINED AT THE BEGINNING AND END OF EACH ROW OF CHAMBERS USING AN INTERLOCKING OVERLAPPING RIB METHOD. CONNECTIONS MUST BE FULLY SHOULDERED OVERLAPPING RIBS, HAVING NO SEPARATE COUPLINGS.
8. THE END CAP SHALL HAVE 5 CORRUGATIONS.
9. THE NOMINAL DIMENSIONS OF THE END CAP SHALL BE 36.5 INCHES (927 mm) TALL, 60 INCHES (1525 mm) WIDE AND 18 INCHES (458 mm) LONG. WHEN JOINED WITH A RECHARGER 360HD CHAMBER, THE INSTALLED LENGTH OF THE END CAP SHALL BE 15 INCHES (381 mm).
10. THE NOMINAL STORAGE VOLUME OF THE END CAP SHALL BE 5.17 FT³ / FT (0.48 m³ / m) - WITHOUT STONE. THE NOMINAL STORAGE VOLUME OF AN INTERLOCKED END CAP SHALL BE 6.46 FT³ / UNIT (0.183 m³ / UNIT) - WITHOUT STONE.
11. MAXIMUM INLET OPENING ON THE END CAP IS 24 INCH (600 mm) HDPE OR 30 INCH (750 mm) SMOOTH-WALL PVC.
12. THE CHAMBER SHALL BE MANUFACTURED IN A FACILITY EMPLOYING CULTEC'S QUALITY CONTROL AND ASSURANCE PROCEDURES
13. THE END CAP SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12.

CULTEC HVLV FC-48 FEED CONNECTOR PRODUCT SPECIFICATIONS

GENERAL

CULTEC HVLV FC-48 FEED CONNECTORS ARE DESIGNED TO CREATE AN INTERNAL MANIFOLD FOR CULTEC RECHARGER MODEL 360HD STORMWATER CHAMBERS.

FEED CONNECTOR PARAMETERS

1. THE FEED CONNECTOR SHALL BE MANUFACTURED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE FEED CONNECTOR SHALL BE VACUUM THERMOFORMED OF BLACK HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE (HMWHDPE).
3. THE FEED CONNECTOR SHALL BE ARCHED IN SHAPE.
4. THE FEED CONNECTOR SHALL BE OPEN-BOTTOMED.
5. THE NOMINAL DIMENSIONS OF THE CULTEC HVLV FC-48 FEED CONNECTOR SHALL BE 12 INCHES (305 mm) TALL, 16 INCHES (406 mm) WIDE AND 49 INCHES (1245 mm) LONG.
6. THE NOMINAL STORAGE VOLUME OF THE HVLV FC-48 FEED CONNECTOR SHALL BE 0.913 FT³ / FT (0.085 m³ / m) - WITHOUT STONE.
7. THE HVLV FC-48 FEED CONNECTOR SHALL HAVE 4 CORRUGATIONS.
8. THE HVLV FC-48 FEED CONNECTOR MUST BE FORMED AS A WHOLE UNIT HAVING TWO OPEN END WALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS. THE UNIT SHALL FIT INTO THE SIDE PORTALS OF THE CULTEC RECHARGER STORMWATER CHAMBER AND ACT AS CROSS FEED CONNECTIONS CREATING AN INTERNAL MANIFOLD.
9. THE FEED CONNECTOR SHALL BE DESIGNED TO WITHSTAND AASHTO HS-25 DEFINED LOADS WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.
10. THE FEED CONNECTOR SHALL BE MANUFACTURED IN AN ISO 9001:2008 CERTIFIED FACILITY.

CULTEC NO. 410™ NON-WOVEN GEOTEXTILE

CULTEC NO. 410™ NON-WOVEN GEOTEXTILE MAY BE USED WITH CULTEC CONTACTOR® AND RECHARGER® STORMWATER INSTALLATIONS TO PROVIDE A BARRIER THAT PREVENTS SOIL INTRUSION INTO THE STONE.

GEOTEXTILE PARAMETERS

1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK AND WHITE IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TYPICAL WEIGHT OF 4.5 OZ/SY (142 G/M).
4. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH VALUE OF 120 LBS (533 N) PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE AN ELONGATION @ BREAK VALUE OF 50% PER ASTM D4632 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A MULLEN BURST VALUE OF 225 PSI (1551 KPA) PER ASTM D3786 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A PUNCTURE STRENGTH VALUE OF 65 LBS (289 N) PER ASTM D4833 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE VALUE OF 340 LBS (1513 N) PER ASTM D6241 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A TRAPEZOID TEAR VALUE OF 50 LBS (222 N) PER ASTM D4533 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A AOS VALUE OF 70 U.S. SIEVE (0.212 MM) PER ASTM D4751 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY VALUE OF 1.7 SEC-1 PER ASTM D4491 TESTING METHOD.
12. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATE VALUE OF 135 GAL/MIN/SF (5500 L/MIN/SM) PER ASTM D4491 TESTING METHOD.
13. THE GEOTEXTILE SHALL HAVE A UV STABILITY @ 500 HOURS VALUE OF 70% PER ASTM D4355 TESTING METHOD.

CULTEC AFAB-HPF™ WOVEN GEOTEXTILE

CULTEC AFAB-HPF WOVEN GEOTEXTILE IS DESIGNED AS A UNDERLAYMENT TO PREVENT SCOURING CAUSED BY WATER MOVEMENT WITHIN THE CULTEC CHAMBERS AND FEED CONNECTORS UTILIZING THE CULTEC MANIFOLD FEATURE. IT MAY ALSO BE USED AS A COMPONENT OF THE CULTEC SEPARATOR ROW TO ACT AS A BARRIER TO PREVENT SOIL/CONTAMINANT INTRUSION INTO THE STONE WHILE ALLOWING FOR MAINTENANCE.

GEOTEXTILE PARAMETERS

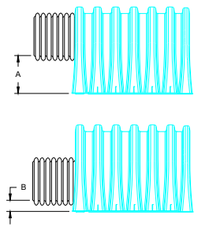
1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH OF 320 X 320 LBS (1,420 X 1,420 N) PER ASTM D4632 TESTING METHOD.
4. THE GEOTEXTILE SHALL HAVE A ELONGATION @ BREAK RESISTANCE OF 15 X 15% PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE OF 3,563 X 3,563 LBS/FT (52 X 52 KN/M) PER ASTM D4595 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE RESISTANCE OF 1,500 LBS (6,670 N) PER ASTM D6241 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A TRAPEZOIDAL TEAR RESISTANCE OF 120 X 120 LBS (540 X 540 N) PER ASTM D4533 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE AN APPARENT OPENING SIZE OF 30 US STD. SIEVE (0.60 MM) PER ASTM D4751 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY RATING OF 0.2 SEC-1 PER ASTM D4491 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATING OF 22 GPM/FT2 (900 LPM/M2) PER ASTM D4491 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE A UV RESISTANCE OF 70% @ 500 HRS. PER ASTM D4355 TESTING METHOD.

360HD 1.0

GENERAL NOTES

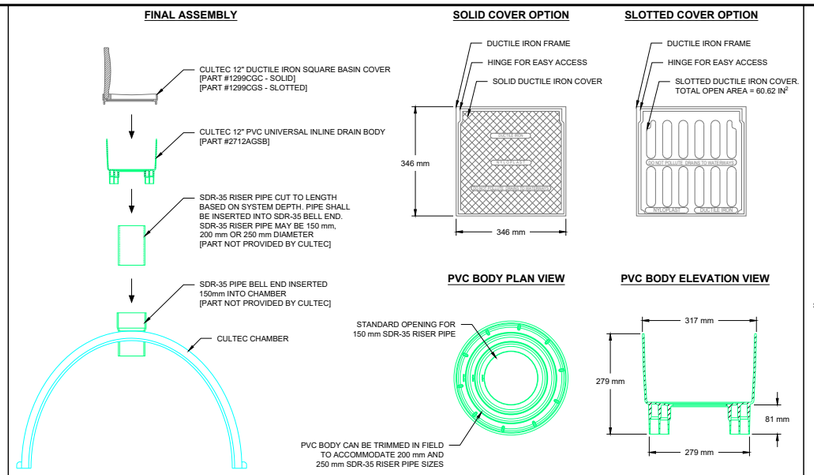
PIPE	A	B
6" [150 mm]	26.00" [660 mm]	0.75" [20 mm]
8" [200 mm]	24.00" [600 mm]	1.00" [25 mm]
10" [250 mm]	21.00" [525 mm]	1.25" [32 mm]
12" [300 mm]	18.00" [450 mm]	1.75" [45 mm]
15" [375 mm]	15.00" [375 mm]	2.00" [50 mm]
18" [450 mm]	12.00" [300 mm]	2.25" [58 mm]
24" [600 mm]	6.00" [150 mm]	2.50" [64 mm]

*THE TYPICAL INVERT TABLE ABOVE IS BASED ON THE INSIDE DIAMETER OF STANDARD CORRUGATED PLASTIC PIPE. THE HEAVY DUTY END CAP HAS PRE-MARKED TRIM LINES FOR PIPE DIAMETERS 12" (300mm), 15" (375mm), 18" (450mm) AND 24" (600mm). PIPES OF ANY SIZE AND MATERIAL UP TO 24" (600mm) MAY BE PLACED AT CUSTOM LOCATIONS AND CUSTOM INVERTS. 30" (750 mm) SMOOTH-WALL SDR-35 PVC PIPE MAY BE USED AT THE BOTTOM OF THE END CAP. THE CROWN OF THE PIPE MUST REMAIN A MINIMUM OF 3" (75mm) FROM THE EDGE OF THE HEAVY DUTY END CAP.



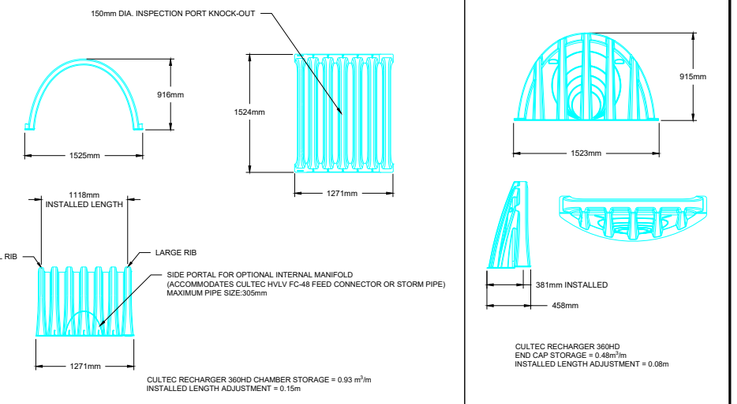
360HD 7.0

CULTEC RECHARGER 360HD TYPICAL PIPE INVERTS



360HD 2.0

CULTEC UNIVERSAL INSPECTION PORT KIT DETAIL

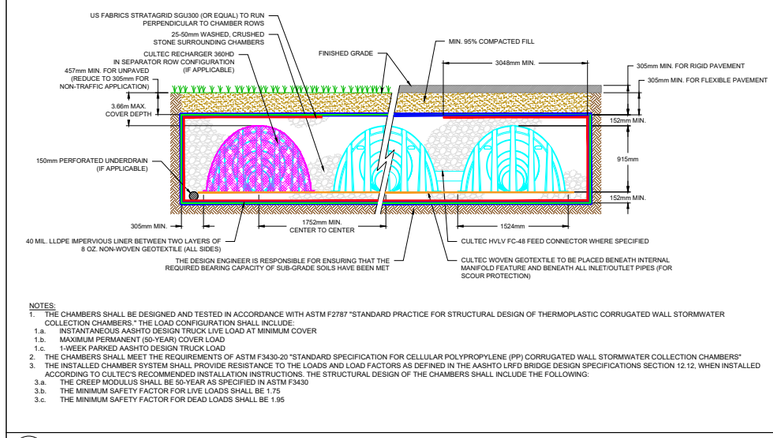


360HD 3.0

CULTEC RECHARGER 360HD HEAVY DUTY THREE VIEW

360HD 4.0

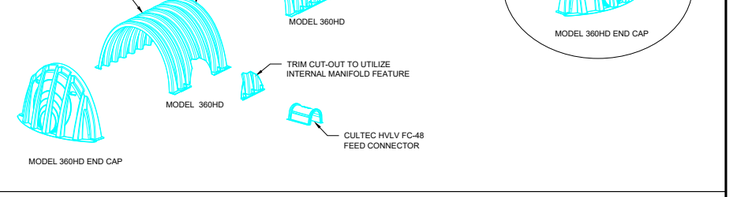
CULTEC RECHARGER 360HD HEAVY DUTY END CAP THREE VIEW



NOTES:
1. THE CHAMBERS SHALL BE DESIGNED AND TESTED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS." THE LOAD CONFIGURATION SHALL INCLUDE:
   1.a. INSTANTANEOUS AASHTO DESIGN TRUCK LIVE LOAD AT MINIMUM COVER
   1.b. MAXIMUM PERMANENT (50-YEAR) COVER LOAD
   1.c. 1-WEEK PARKED AASHTO DESIGN TRUCK LOAD
2. THE CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F3430-20 "STANDARD SPECIFICATION FOR CELLULAR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS"
3. THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12, WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS. THE STRUCTURAL DESIGN OF THE CHAMBERS SHALL INCLUDE THE FOLLOWING:
   3.a. THE CREEP MODULUS SHALL BE 50-YEAR AS SPECIFIED IN ASTM F3430
   3.b. THE MINIMUM SAFETY FACTOR FOR LIVE LOADS SHALL BE 1.75
   3.c. THE MINIMUM SAFETY FACTOR FOR DEAD LOADS SHALL BE 1.95

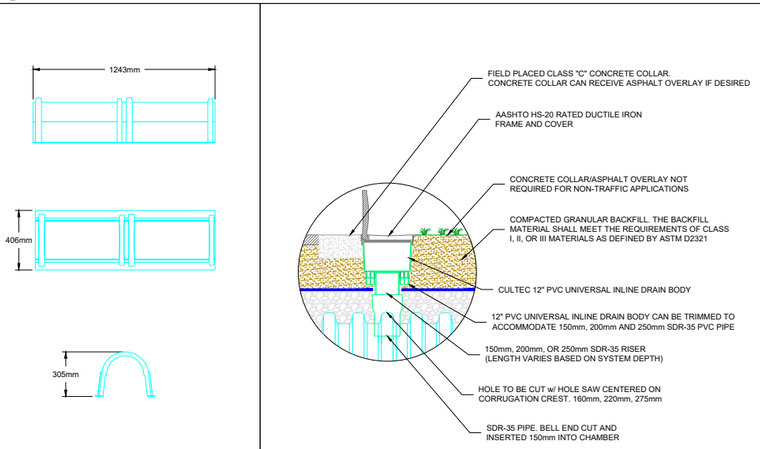
360HD 5.0

CULTEC RECHARGER 360HD HEAVY DUTY CROSS SECTION



360HD 6.0

CULTEC RECHARGER 360HD HEAVY DUTY TYPICAL INTERLOCK

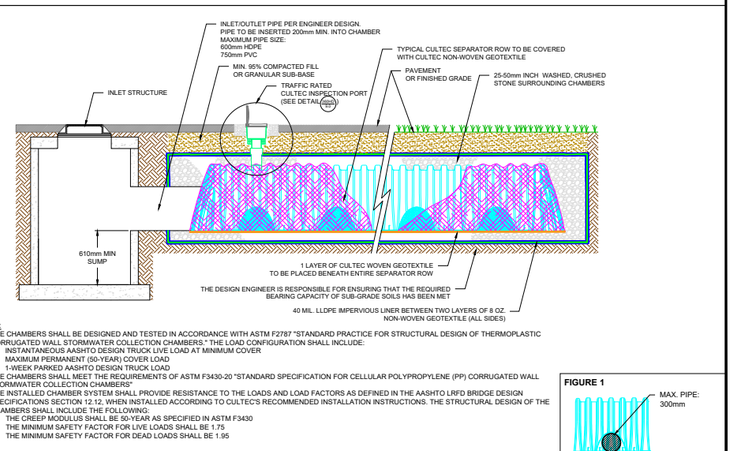


360HD 8.0

CULTEC HVLV FC-48 FEED CONNECTOR THREE VIEW

360HD 9.0

CULTEC INSPECTION PORT - ZOOM DETAIL



NOTES:
1. THE CHAMBERS SHALL BE DESIGNED AND TESTED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS." THE LOAD CONFIGURATION SHALL INCLUDE:
   1.a. INSTANTANEOUS AASHTO DESIGN TRUCK LIVE LOAD AT MINIMUM COVER
   1.b. MAXIMUM PERMANENT (50-YEAR) COVER LOAD
   1.c. 1-WEEK PARKED AASHTO DESIGN TRUCK LOAD
2. THE CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F3430-20 "STANDARD SPECIFICATION FOR CELLULAR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS"
3. THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12, WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS. THE STRUCTURAL DESIGN OF THE CHAMBERS SHALL INCLUDE THE FOLLOWING:
   3.a. THE CREEP MODULUS SHALL BE 50-YEAR AS SPECIFIED IN ASTM F3430
   3.b. THE MINIMUM SAFETY FACTOR FOR LIVE LOADS SHALL BE 1.75
   3.c. THE MINIMUM SAFETY FACTOR FOR DEAD LOADS SHALL BE 1.95

FIGURE 1

ZOOM OF SIDE PORTAL SHOWING MAX. PIPE O.D.

360HD 10.0

CULTEC SEPARATOR ROW - CULTEC INSPECTION PORT DETAIL (IF APPLICABLE)

CULTEC STORMWATER CHAMBER

DATE: 10/21/2025 | CHECKED BY: TNB | SHEET NO: 5 OF 5
PROJECT NO: 25-0122.02 | DESIGNED BY: SRA | SCALE: N.T.S

13656 EMIL KOLB PKWY TOWNHOUSES
13656 EMIL KOLB PARKWAY
BOLTON, ON
SYSTEM DETAIL SHEET

CULTEC
Subsurface Stormwater Management Systems
878 Federal Road
Brookfield, CT 06804
www.cultec.com
PH: 1(203) 775-4416
PH: 1(800) 4-CULTEC
CT-tech@cultec.com

CULTEC Buoyancy Calculation Tool

Project Information

Project Information:		**Calculations By:**	
Project Name	13656 Emil Kolb Pkwy Townhouses	Name	Tyler Brush
Address	13656 Emil Kolb Parkway	Company	
City	Bolton	Address	
State/Province	Ontario	City	
ZIP/Postal Code		State/Province	
Country	Canada	ZIP/Postal Code	
CULTEC Project #	25-0122.02	Date	10/22/2025

System Input Information

Select Unit of Measure:	Metric		**System Footprint Area:**	558.29	m^2
Select Chamber Model:	Recharger 360HD		**Bottom of System Elevation:**	256.17	m
Chamber Height:	914	mm	**Top of System Elevation:**	257.39	m
Chamber Width:	1525	mm	**Minimum Finished Grade Elevation:**	258.37	m
Chamber Installed Length:	1.12	meters	**Groundwater Elevation:**	257.00	m
Chamber Weight:	25.8	kg	**Volume of Crushed Stone:**	418	m^3
Density of Soil Cover:	1600	kg/m^3	**Number of Chambers:**	248	units
Density of Crushed Stone:	1200	kg/m^3	Depth of Submerged Soil Cover:	0.00	m
Density of Water:	1000	kg/m^3	Depth of Dry Soil Cover:	0.98	m
			Submerged System Depth:	0.83	m

Buoyancy Calculations

Buoyancy Force F_b = (System Footprint Area) • (System Submerged Depth) • (Density of Water)

System Footprint Area =	558.29	m^2
Submerged System Depth =	0.83	m
Density of Water =	1,000.00	kg/m^3
Buoyancy Force =	**463,381**	**kg**

Resisting Force = (Chamber Weight) + (Crushed Stone Weight) + (Submerged Soil Cover Weight) + (Dry Soil Cover Weight)

Weight of Chambers =	6,404	kg
Weight of Crushed Stone =	501,984	kg
Weight of Submerged Soil Cover =	-	kg
Weight of Dry Soil Cover =	875,399	kg
Resisting Force =	**1,383,786**	**kg**

Buoyancy Report

Buoyancy Force =	463,381	kg
Resisting Force =	1,383,786	kg

Factor of Safety Against Buoyancy = (Resisting Force) / (Buoyancy Force)

FoS = **2.99**

*The chambers system is assumed to be empty (dry)

DEVELOPMENT 13656-13668 Emil Kolb Parkway

CONSULTANT

SCHAEFFERS Consulting Engineers
SCHAEFFER & ASSOCIATES LTD.
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100
Fax: (905) 738-6875
design@schaeffers.com

TOWN OF CALEDON

FINANCE & INFRASTRUCTURE SERVICES
STORM DRAINAGE DESIGN CHART
FOR CIRCULAR DRAINS FLOWING FULL
5 YEAR RAINFALL INTENSITY

SHEET No. 1 **OF** 1 **2025-11-10**

DESIGN BY C.D

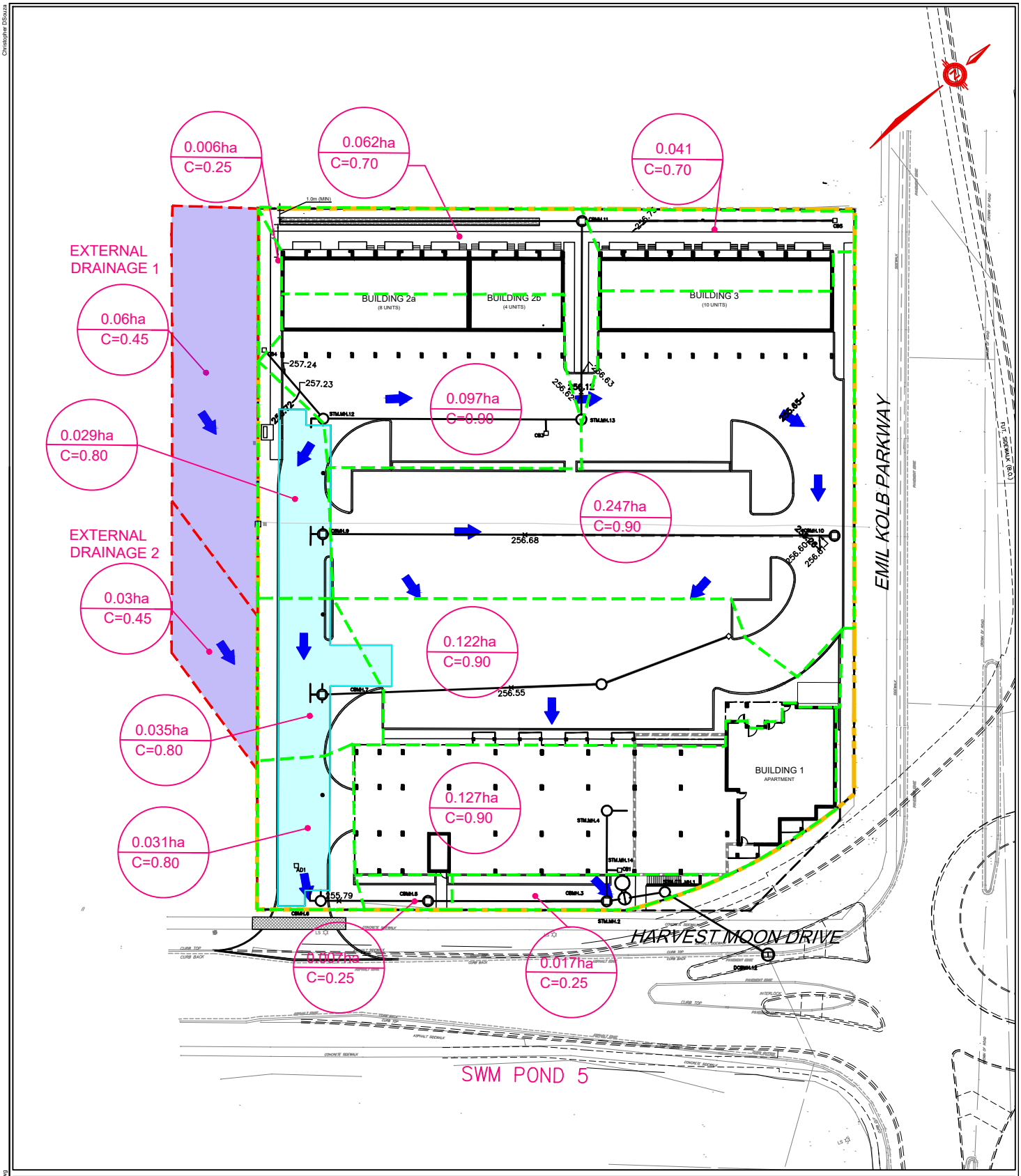
CHECKED BY H.S.

F:\5440\5440-DESIGN SHEETS\[5440-STM - 2025-10-21 (Recovered).xlsx]STM

LOCATION			DRAINAGE AREA								PIPE SELECTION						
STREET	FROM MH. No.	TO MH. No.	A Site ha.	C Site	A*C Site	Cumul A*C 5YR	Cumul Tc (Ti-_) min	I_{5YR} mm/h	Q_{5YR} m^3/s	Q_{DESIGN} m^3/s	Pipe L m	Pipe So m/m	Pipe Dia mm	Actual Capacity (Full) m^3/s	V (Average) m/s	Time of Flow min	NOTES / DESCRIPTIONS % of Full Capacity
	CB 5	CBMH 11	0.041	0.70	0.03	0.03	10.00	109.68	0.009	0.009	36.0	0.30	250	0.033	0.18	3.34	*27*
	CBMH 11	MH 13	0.062	0.70	0.043	0.07	13.34	96.33	0.019	0.019	28.3	0.32	300	0.055	0.28	1.71	*36*
	MH 13	MH 12	0.097	0.90	0.09	0.16	15.06	90.73	0.040	0.040	36.7	0.30	375	0.096	0.37	1.67	*42*
	CB4	MH 12	0.006	0.25	0.0015	0.0015	10.00	109.68	0.000	0.000	12.9	0.39	250	0.037	0.01	22.91	*1*
	MH 12	Tank	0.000	0.00	0.00	0.16	37.97	52.11	0.023	0.023	1.5	0.50	600	0.434	0.08	0.30	*5*
	External 1	CBMH 9	0.060	0.45	0.0270	0.0270	10.00	109.68	0.008	0.008							
	CBMH 10	CBMH 9	0.247	0.90	0.2223	0.249	10.00	109.68	0.077	0.077	72.8	0.30	375	0.096	0.69	1.75	*80*
	CBMH 9	Tank	0.029	0.80	0.0232	0.433	47.97	44.26	0.054	0.054	1.5	0.50	600	0.434	0.19	0.13	*12*
	CB 2	MH 8	0.122	0.90	0.1098	0.1098	10.00	109.68	0.034	0.034	19.4	0.46	300	0.066	0.48	0.68	*51*
	MH 8	CBMH 7	0.035	0.80	0.03	0.14	10.68	106.66	0.041	0.041	39.8	0.30	450	0.156	0.26	2.56	*26*
	External 2	CBMH 7	0.030	0.45	0.01	0.01	10.00	109.68	0.004	0.004							
	CBMH 7	Tank	0.000	0.00	0.00	0.58	58.64	38.24	0.063	0.063	1.5	0.50	600	0.434	0.22	0.11	*14*
	Tank	MH 6	0.000	0.00	0.00	0.58	58.64	38.24	0.063	0.063	15.3	2.64	600	0.998	0.22	1.15	*6*
	MH 6	CBMH 5	0.031	0.80	0.0248	0.61	59.80	37.69	0.064	0.064	15.3	1.24	525	0.479	0.30	0.86	*13*
	CBMH 5	CBMH 3	0.070	0.25	0.0175	0.63	60.65	37.29	0.065	0.065	25.4	0.50	525	0.304	0.30	1.40	*22*
	MH 4	CBMH 3	0.127	0.90	0.1143	0.1143	10.00	109.68	0.035	0.035	12.9	2.00	250	0.084	0.72	0.30	*42*
	CBMH 3	MH 2	0.017	0.25	0.0043	0.75	62.05	36.67	0.077	0.062	2.6	0.50	300	0.068	0.87	0.05	*90*
	MH2	CTRL MH 1				0.75	62.10	36.64	0.076	0.062	5.8	0.50	300	0.068	0.87	0.11	*90*
	CTRL MH 1	DCBMH 12	0.000	0.00	0.00	0.75	62.21	36.59	0.076	0.062	17.2	0.50	300	0.068	0.87	0.33	*90*
	DCBMH 12	DCBMH19	0.000	0.00	0.00	0.00	62.54	36.45	0.000	0.062	16.0	2.07	300	0.139	0.87	0.31	*44*

* Controlled release rate of 61.5L/s per control release rates found in the FSR Report Prepared by Schaeffers Consulting

n=0.013
I10YR=2221*(Tc+12)^-0.9080



13656-13668 EMIL KOLB PKWY

SCHAEFFERS
CONSULTING ENGINEERS
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100 Email: general@schaeffers.com
www.schaeffers.com

LEGEND
PROPERTY LINE
TRIBUTARY AREA
OVERLAND FLOW ROUTE
0.11ha / C=0.50 — AREA IN HECTARES / RUN-OFF COEFFICIENT

FIGURE 2.3
STORM TRIBUTARY AREA

5440	NOV. 2025	SCALE: N.T.S.

Christopher DSouza
F:\5440\5440-FSR\Figures\Figure2.3 - STM Tributary Area.dwg

Table 3.1: Hydrologic Cycle Component Values

	Water Holding Capacity mm	Hydrologic Soil Group	Precipitation mm	Evapo-transpiration mm	Runoff mm	Infiltration* mm
Urban Lawns/Shallow Rooted Crops (spinach, beans, beets, carrots)						
Fine Sand	50	A	940	515	149	276
Fine Sandy Loam	75	B	940	525	187	228
Silt Loam	125	C	940	536	222	182
Clay Loam	100	CD	940	531	245	164
Clay	75	D	940	525	270	145
Moderately Rooted Crops (corn and cereal grains)						
Fine Sand	75	A	940	525	125	291
Fine Sandy Loam	150	B	940	539	160	241
Silt Loam	200	C	940	543	199	199
Clay Loam	200	CD	940	543	218	179
Clay	150	D	940	539	241	160
Pasture and Shrubs						
Fine Sand	100	A	940	531	102	307
Fine Sandy Loam	150	B	940	539	140	261
Silt Loam	250	C	940	546	177	217
Clay Loam	250	CD	940	546	197	197
Clay	200	D	940	543	218	179
Mature Forests						
Fine Sand	250	A	940	546	79	315
Fine Sandy Loam	300	B	940	548	118	274
Silt Loam	400	C	940	550	156	234
Clay Loam	400	CD	940	550	176	215
Clay	350	D	940	549	196	196

Notes: Hydrologic Soil Group A represents soils with low runoff potential and Soil Group D represents soils with high runoff potential. The evapotranspiration values are for mature vegetation. Streamflow is composed of baseflow and runoff.

**This is the total infiltration of which some discharges back to the stream as base flow. The infiltration factor is determined by summing a factor for topography, soils and cover.*

Topography	Flat Land, average slope < 0.6 m/km	0.3
	Rolling Land, average slope 2.8 m to 3.8 m/km	0.2
	Hilly Land, average slope 28 m to 47 m/km	0.1
Soils	Tight impervious clay	0.1
	Medium combinations of clay and loam	0.2
	Open Sandy loam	0.4
Cover	Cultivated Land	0.1
	Woodland	0.2

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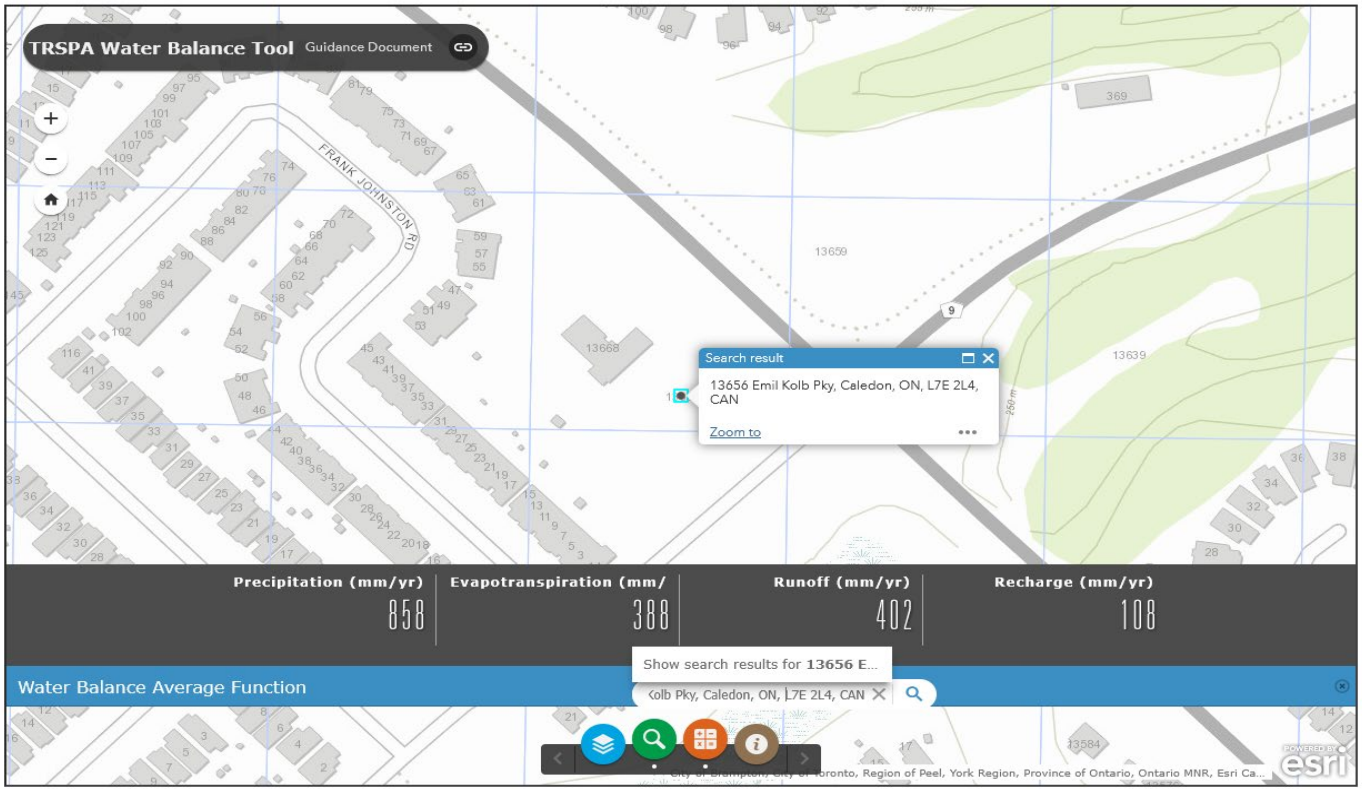
Project: 5440
Date: 2025-12-05

TRSPA WATER BALANCE TOOL



	mm/year	%
Input:		
Precip	858	96%
Output:		
Evavp	388	43%
Runoff	402	45%
Recharge	108	12%
Total Output	898	100%

	mm/year	%
Input:		
Precip	858	**100%**
Output:		
Evavp	371	**43%**
Runoff	384	**45%**
Recharge	103	**12%**
Total Output	858	**100%**

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SCHAEFFER & ASSOCIATES LTD.

Project: 5440

Date: 2025-12-05

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

	Site		
Catchment Designation	Grass	Roof/Pavement/Impervious	Total
Area (m^2)	6060	2240	8300
Pervious Area (m^2)	6060	0	6060
Impervious Area (m^2)	0	2240	2240
Infiltration Factors			
Topography Infiltration Factor	0.20		
Soil Infiltration Factor (clayey silt)	0.10		
Land Cover Infiltration Factor	0.10		
MOE Infiltration Factor	0.40	N/A	
Inputs (mm/year)			
Precipitation	858	858	**858**
Total Input	858	858	**858**
Outputs (mm/year)			
Precipitation Surplus	487	772	564
Net Surplus	487	772	564
Downspout Disconnection Retention	0	0	0
Evapotranspiration	371	0	271
Roof Evapotranspiration	0	86	23
Rooftop Runoff Lawn Evaporation	0	0	0
Total Evapotranspiration	**371**	**86**	**294**
Infiltration	195	0	142
Rooftop Infiltration	0	0	0
Total Infiltration	**195**	**0**	**142**
Runoff Pervious Area	292	0	213
Runoff Impervious Area	0	772	208
Total Runoff	**292**	**772**	**422**
Total Outputs	**858**	**858**	**858**
Difference (Inputs - Outputs)	0	0	0
Input (Volumes - m^3/year)			
Precipitation	5199	1922	7121
Total Inputs	**5199**	**1922**	**7121**
Outputs (Volumes - m^3/year)			
Precipitation Surplus	2951	1730	4681
Net Surplus	2951	1730	4681
Downspout Disconnection Retention	0	0	0
Evapotranspiration	2248	0	2248
Roof Evapotranspiration	0	192	192
Rooftop Runoff Lawn Evaporation	0	0	0
Total Evapotranspiration	**2248**	**192**	**2440**
Infiltration	1180	0	1180
Rooftop Infiltration	0	0	0
Total Infiltration	**1180**	**0**	**1180**
Runoff Pervious Area	1771	0	1771
Runoff Impervious Area	0	1730	1730
Total Runoff	**1771**	**1730**	**3500**
Total Outputs	**5199**	**1922**	**7121**
Difference (Inputs - Outputs)	0	0	0

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Date: 2025-12-05

Table 2: Post-Development Conditions
Water Balance/Water Budget Assessment

	Land Type		Total	
Catchment Designation	Landscape Area	Roads,Sidewalks and Driveways	**Total**	
Area (m^2)	1357	6943	**8300**	
Pervious Area (m^2)	1357	0	**1357**	
Impervious Area (m^2)	0	6943	**6943**	
Infiltration Factors				
Topography Infiltration Factor	0.1	N/A		
Soil Infiltration Factor (clayey silt)	0.2	N/A		
Land Cover Infiltration Factor (Cultivated Land)	0.1	N/A		
MOE Infiltration Factor	0.4	N/A		
Inputs (mm/year)				
Precipitation	858	858	858	
Total Inputs	858	858	858	
Outputs (mm/year)				
Precipitation Surplus	487	772	726	
Net Surplus	487	772	726	
Downspout Disconnection Retention	0	0	0	
Evapotranspiration	371	86	132	
Roof Evapotranspiration	0	0	0	
Rooftop Runoff Lawn Evaporation	0	0	0	
Total Evapotranspiration	**371**	**86**	**132**	
Infiltration	195	0	32	
Rooftop Infiltration	0	0	0	
Total Infiltration	**195**	**0**	**32**	
Runoff Pervious Area	292	0	48	
Runoff Impervious Area	0	772	646	
Total Runoff	**292**	**772**	**694**	
Total Outputs	**858**	**858**	**858**	
Difference (Inputs - Outputs)	0	0	**0**	
Input (Volumes - m^3/year)				
Precipitation	1164	5957	7121	
Total Inputs	**1164**	**5957**	**7121**	
Outputs (Volumes - m^3/year)				
Precipitation Surplus	661	5361	6022	
Net Surplus	661	5361	6022	
Downspout Disconnection Retention	0	0	0	
Evapotranspiration	503	596	1099	
Roof Evapotranspiration	0	0	0	
Rooftop Runoff Lawn Evaporation	0	0	0	
Total Evapotranspiration	**503**	**596**	**1099**	**15%**
Infiltration	264	0	264	
Rooftop Infiltration	0	0	0	
Total Infiltration	**264**	**0**	**264**	**4%**
Runoff Pervious Area	397	0	397	
Runoff Impervious Area	0	5361	5361	
Total Runoff	**397**	**5361**	**5758**	**81%**
Total Outputs	**1164**	**5957**	**7121**	
Difference (Inputs - Outputs)	0	0	**0**	

1 - Assumes 10% Evaporation from Impervious Surfaces

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Date: 2025-12-05

TABLE 3: WATER BUDGET - POST-DEVELOPMENT WITH MITIGATION
WATER BALANCE/WATER BUDGET ASSESSMENT

	Draining to Infiltration Trench						
Catchment Designation	Roof/Concrete Walkway Draining to Infiltration Trench	Grass Draining to Infiltration Trench	Landscape Area	Roof Area	Roads,Sidewalks and Driveways	Total	
Area (m^2)	326	88	1269	1991	4952	8300	
Pervious Area (m^2)	0	88	1269	0	0	1357	
Impervious Area (m^2)	326	0	0	1991	4952	7269	
Infiltration Factors							
Topography Infiltration Factor	N/A	0.10	0.10	N/A	N/A		
Soil Infiltration Factor	N/A	0.20	0.20	N/A	N/A		
Land Cover Infiltration Factor	N/A	0.10	0.10	N/A	N/A		
MOE Infiltration Factor	N/A	0.40	0.40	N/A	N/A		
Inputs (mm/year)							
Precipitation	861	861	861	861	861	861	
Total Inputs	861	861	861	861	861	861	
Outputs (mm/year)							
Precipitation Surplus[1]	775	490	490	775	775	945	
Net Surplus	775	490	490	775	775	945	
Downspout Disconnection Retention	0	0	0	0	0	0	
Evapotranspiration	0	371	371	0	86	112	
Roof Evapotranspiration	86	0	0	86	0	45	
Rooftop Runoff Lawn Evaporation	0	0	0	0	0	0	
Total Evapotranspiration	**86**	**371**	**371**	**86**	**86**	**157**	
Infiltration	0	196	196	0	0	32	
Rooftop Infiltration	0	0	0	0	0	0	
Additional Topsoil	0	0	0	0	0	0	
Infiltration Trench	775	294	0	0	0	34	
Total Infiltration	**775**	**490**	**196**	**0**	**0**	**66**	
Runoff Pervious Area	0	0	294	0	0	45	
Runoff Impervious Area	0	0	0	775	775	834	
Total Runoff	**0**	**0**	**294**	**775**	**775**	**879**	
Total Outputs	**861**	**861**	**861**	**861**	**861**	**1101**	
Difference (Inputs - Outputs)	0	0	0	0	0	0	
Input (Volumes - m^3/year)							
Precipitation	281	76	1093	1715	4263	7427	
Total Inputs (m^3/year)	**281**	**76**	**1093**	**1715**	**4263**	**7427**	
Outputs (Volumes - m^3/year)							
Precipitation Surplus	253	43	622	1543	3837	6298	
Net Surplus	253	43	622	1543	3837	6298	
Downspout Disconnection Retention[2]	0	0	0	0	0	0	
Evapotranpiration	0	33	471	0	426	930	
Roof Evapotranspiration	28	0	0	171	0	200	
Rooftop Runoff Lawn Evaporation	0	0	0	0	0	0	
Total Evapotranspiration	**28**	**33**	**471**	**171**	**426**	**1129**	**15%**
Infiltration	0	17	249	0	0	266	
Rooftop Infiltration	0	0	0	0	0	0	
Additional Topsoil	0	0	0	0	0	0	
Infiltration Trench	253	26	0	0	0	279	
Total Infiltration	**253**	**43**	**249**	**0**	**0**	**545**	**7%**
Runoff Pervious Area	0	0	373	0	0	373	
Runoff Impervious Area	0	0	0	1543	3837	5380	
Total Runoff	0	0	**373**	**1543**	**3837**	**5753**	**77%**
Total Outputs	**281**	**76**	**1093**	**1715**	**4263**	**7427**	
Difference (Inputs - Outputs)	0	0	0	0	0	0	

1 - Assumes 10% Evaporation from Impervious Surfaces
2 - Runoff Reduction of 45% for additional Topsoil

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Project: 5440
Date: 2025-12-05

Water Balance Mitigation Calculations

Pre Development Infiltration =	**1,180**	**m^3/y**
Post Development Infiltration without mitigation =	**264**	**m^3/y**
Post to Pre Deficit =	**916**	**m^3/y**
Mitigation Measures		
Infiltration Trench =	**279**	**m^3/y**
Mitgation Volume Provided =	**279**	**m^3/y**
Deficit =	**637**	**m^3/y**

In order to try and meet the annual pre-development infiltration deficit, the runoff from the site directed to the infiltration trench shall be equal to the annual deficit volume. Therefore,

Infiltration Trench =

0.04 ha x Annual Precipitation Depth = 279 m^3/year
Required Annual Precpitation Depth to meet deficit = 673 mm/yr

Based on this analysis, it is concluded that precipitation events of depth less than or equal to *21.00 mm* 8.70 m^3/event
will produce an annual amount of precipitation equal to 666 mm/yr

The total required volume of 21.0mm x 0.04ha x 10 = 8.70 m^3/event

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Job: 5440
Dec-25

Infiltration Sizing Calculations for Infiltration Trench

Infiltration Volume	8.70	m^3	
Number Trenches	1		
Inillftration Volume Per lot	8.70	m^3/unit	
Drawdown Time	72	hours	
Infiltration Rate	15	mm/h	As per typical Clayey silt Soils
Safety Factor	2.5		
Design Infiltration Rate	6.00	mm/h	

Proposed Infiltration Details

Length =	37.0	m
Width =	**1.00**	m
Total Trench Volume Provided per trench =	10.36	m^3/trench
Minimum Required Storage Depth =	0.70	m
Drawdown time =	46.67	hours
Total Volume retained =	10.36	m^3

(37m x 1m x 0.7 m)

Therefore the proposed system has the required footprint area to drain within 72 hours and will provide a retention volume that exceeds the required volume for mitigation

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Job: 5440
Dec-25

TABLE 4: WATER BUDGET - SUMMARY TABLE

Characteristics	Site				
	Pre-development	Post-development	Change (Pre to Post)	Post-development with mitigation	Change (pre to post with mitigation)
Inputs (Volumes)					
Precipitation (m^3/year)	7121	7121	0.0%	7427	0.0%
Total Inputs (m^3/year)	7121	7121	0.0%	7427	0.0%
Outputs (Volumes)					
Precipitation surplus (m^3/year)	4681	6022	28.7%	6298	34.5%
Net Surplus (m^3/year)	4681	6022	28.7%	6298	34.5%
Total Evapotranspiration (m^3/year)	2440	1099	-55.0%	1129	-53.7%
Total Infiltration (m^3/year)	1180	264	-77.6%	545	-53.9%
Total Runoff (m^3/year)	3500	5758	64.5%	5753	64.4%
Total Outputs (m^3/year)	7121	7121	0.0%	7427	4.3%

STANDARD OFFLINE
Jellyfish Filter Sizing Report

Project Information

Date	Saturday, January 25, 2025
Project Name	13656 Emil Kolb Pkwy.
Project Number	5440
Location	Caledon

Jellyfish Filter Design Overview

This report provides information for the sizing and specification of the Jellyfish Filter. When designed properly in accordance to the guidelines detailed in the Jellyfish Filter Technical Manual, the Jellyfish Filter will exceed the performance and longevity of conventional horizontal bed and granular media filters.
Please see ***www.ImbriumSystems.com*** *for more information.*

Jellyfish Filter System Recommendation

The Jellyfish Filter model JF6-5-1 is recommended to meet the water quality objective by treating a flow of 27.8 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 18 years of TORONTO CENTRAL rainfall data for this site. This model has a sediment capacity of 313 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF6-5-1	5	1	1.8	27.8	313

The Jellyfish Filter System

The patented Jellyfish Filter is an engineered stormwater quality treatment technology featuring unique membrane filtration in a compact stand-alone treatment system that removes a high level and wide variety of stormwater pollutants. Exceptional pollutant removal is achieved at high treatment flow rates with minimal head loss and low maintenance costs. Each lightweight Jellyfish Filter cartridge contains an extraordinarily large amount of membrane surface area, resulting in superior flow capacity and pollutant removal capacity.

Maintenance

Regular scheduled inspections and maintenance is necessary to assure proper functioning of the Jellyfish Filter. The maintenance interval is designed to be a minimum of 12 months, but this will vary depending on site loading conditions and upstream pretreatment measures. Quarterly inspections and inspections after all storms beyond the 5-year event are recommended until enough historical performance data has been logged to comfortably initiate an alternative inspection interval.

Please see ***www.ImbriumSystems.com*** *for more information.*

Thank you for the opportunity to present this information to you and your client.

Performance

Jellyfish efficiently captures a high level of Stormwater pollutants, including:

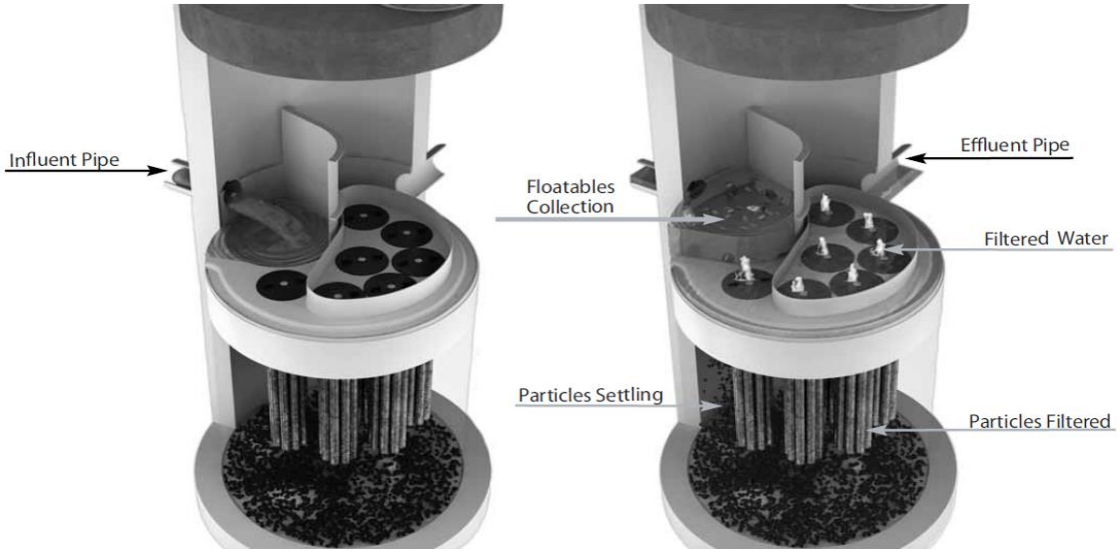
- ☑ 89% of the total suspended solids (TSS) load, including particles less than 5 microns
- ☑ 77% TP removal & 51% TN removal
- ☑ 90% Total Copper, 81% Total Lead, 70% Total Zinc
- ☑ Particulate-bound pollutants such as nutrients, toxic metals, hydrocarbons and bacteria
- ☑ Free oil, Floatable trash and debris

Field Proven Peformance

The Jellyfish filter has been field-tested on an urban site with 25 TAPE qualifying rain events and field monitored according to the TAPE field test protocol, demonstrating:

- A median TSS removal efficiency of 90%, and a median SSC removal of 99%;
- The ability to capture fine particles as indicated by an effluent d50 median of 3 microns for all monitotred storm events, and a median effluent turbidity of 5 NTUs;
- A median Total Phosphorus removal of 77%, and a median Total Nitrogen removal of 51%.

Jellyfish Filter Treatment Functions



Pre-treatment and Membrane Filtration

Jellyfish® Filter

Project Information

Date:	Saturday, January 25, 2025
Project Name:	13656 Emil Kolb Pkwy.
Project Number:	5440
Location:	Caledon

Designer Information

Company:	Schaeffers Consulting Engineers
Contact:	Debbie Wong
Phone #:	

Notes

Rainfall

Name:	TORONTO CENTRAL
State:	ON
ID:	100
Record:	1982 to 1999
Co-ords:	45°30'N, 90°30'W

Drainage Area

Total Area:	0.92 ha
Runoff Coefficient:	0.76

Upstream Detention

Peak Release Rate:	n/a
Pretreatment Credit:	n/a

Design System Requirements

Flow Loading	90% of the Average Annual Runoff based on 18 years of TORONTO CENTRAL rainfall data:	**20.6 L/s**
Sediment Loading	Treating 90% of the average annual runoff volume, 4398 m³, with a suspended sediment concentration of 60 mg/L.	**264 kg***

** Indicates that sediment loading is the limiting parameter in the sizing of this Jellyfish system*

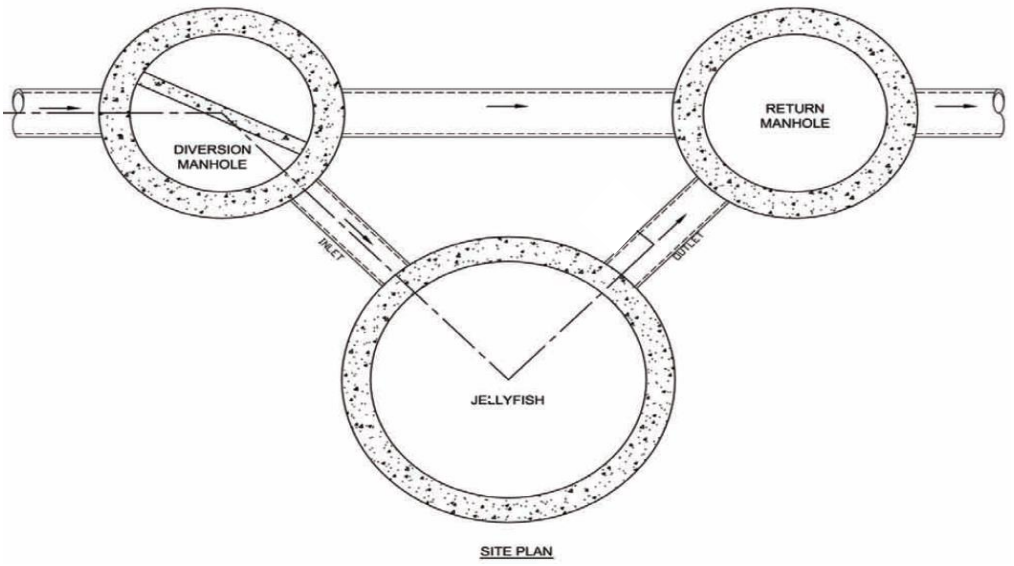
Recommendation

The Jellyfish Filter model JF6-5-1 is recommended to meet the water quality objective by treating a flow of 27.8 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 18 years of TORONTO CENTRAL rainfall data for this site. This model has a sediment capacity of 313 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Wet Vol Below Deck (L)	Sump Storage (m³)	Oil Capacity (L)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF4-1-1	1	1	1.2	2313	0.34	379	7.6	85
JF4-2-1	2	1	1.2	2313	0.34	379	12.6	142
JF6-3-1	3	1	1.8	5205	0.79	848	17.7	199
JF6-4-1	4	1	1.8	5205	0.79	848	22.7	256
JF6-5-1	**5**	**1**	**1.8**	**5205**	**0.79**	**848**	**27.8**	**313**
JF6-6-1	6	1	1.8	5205	0.79	848	28.6	370
JF8-6-2	6	2	2.4	9252	1.42	1469	35.3	398
JF8-7-2	7	2	2.4	9252	1.42	1469	40.4	455
JF8-8-2	8	2	2.4	9252	1.42	1469	45.4	512
JF8-9-2	9	2	2.4	9252	1.42	1469	50.5	569
JF8-10-2	10	2	2.4	9252	1.42	1469	50.5	626
JF10-11-3	11	3	3.0	14456	2.21	2302	63.1	711
JF10-12-3	12	3	3.0	14456	2.21	2302	68.2	768
JF10-12-4	12	4	3.0	14456	2.21	2302	70.7	796
JF10-13-4	13	4	3.0	14456	2.21	2302	75.7	853
JF10-14-4	14	4	3.0	14456	2.21	2302	78.9	910
JF10-15-4	15	4	3.0	14456	2.21	2302	78.9	967
JF10-16-4	16	4	3.0	14456	2.21	2302	78.9	1024
JF10-17-4	17	4	3.0	14456	2.21	2302	78.9	1081
JF10-18-4	18	4	3.0	14456	2.21	2302	78.9	1138
JF10-19-4	19	4	3.0	14456	2.21	2302	78.9	1195
JF12-20-5	20	5	3.6	20820	3.2	2771	113.6	1280
JF12-21-5	21	5	3.6	20820	3.2	2771	113.7	1337
JF12-22-5	22	5	3.6	20820	3.2	2771	113.7	1394
JF12-23-5	23	5	3.6	20820	3.2	2771	113.7	1451
JF12-24-5	24	5	3.6	20820	3.2	2771	113.7	1508
JF12-25-5	25	5	3.6	20820	3.2	2771	113.7	1565
JF12-26-5	26	5	3.6	20820	3.2	2771	113.7	1622
JF12-27-5	27	5	3.6	20820	3.2	2771	113.7	1679

Jellyfish Filter Design Notes

- Typically the Jellyfish Filter is designed in an offline configuration, as all stormwater filter systems will perform for a longer duration between required maintenance services when designed and applied in off-line configurations. Depending on the design parameters, an optional internal bypass may be incorporated into the Jellyfish Filter, however note the inspection and maintenance frequency should be expected to increase above that of an off-line system. Speak to your local representative for more information.



Jellyfish Filter Typical Layout

- Typically, 18 inches (457 mm) of driving head is designed into the system, calculated as the difference in elevation between the top of the diversion structure weir and the invert of the Jellyfish Filter outlet pipe. Alternative driving head values can be designed as 12 to 24 inches (305 to 610mm) depending on specific site requirements, requiring additional sizing and design assistance.
- Typically, the Jellyfish Filter is designed with the inlet pipe configured 6 inches (150 mm) above the outlet invert elevation. However, depending on site parameters this can vary to an optional configuration of the inlet pipe entering the unit below the outlet invert elevation.
- The Jellyfish Filter can accommodate multiple inlet pipes within certain restrictions.
- While the optional inlet below deck configuration offers 0 to 360 degree flexibility between the inlet and outlet pipe, typical systems conform to the following:

Model Diameter (m)	Minimum Angle Inlet / Outlet Pipes	Minimum Inlet Pipe Diameter (mm)	Minimum Outlet Pipe Diameter (mm)
1.2	62º	150	200
1.8	**59º**	**200**	**250**
2.4	52º	250	300
3.0	48º	300	450
3.6	40º	300	450

- The Jellyfish Filter can be built at all depths of cover generally associated with conventional stormwater conveyance systems. For sites that require minimal depth of cover for the stormwater infrastructure, the Jellyfish Filter can be applied in a shallow application using a hatch cover. The general minimum depth of cover is 36 inches (915 mm) from top of the underslab to outlet invert.
- If driving head caclulations account for water elevation during submerged conditions the Jellyfish Filter will function effectively under submerged condtions.
- Jellyfish Filter systems may incorporate grated inlets depending on system configuration.
- For sites with water quality treatment flow rates or mass loadings that exceed the design flow rate of the largest standard Jellyfish Filter manhole models, systems can be designed that hydraulically connect multiple Jellyfish Filters in series or alternatively Jellyfish Vault units can be designed.

STANDARD SPECIFICATION
STORMWATER QUALITY – MEMBRANE FILTRATION TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

Specifies requirements for construction and performance of an underground stormwater quality membrane filtration treatment device that removes pollutants from stormwater runoff through the unit operations of sedimentation, floatation, and membrane filtration.

1.2 REFERENCE STANDARDS

ASTM C 891: Specification for Installation of Underground Precast Concrete Utility Structures
ASTM C 478: Specification for Precast Reinforced Concrete Manhole Sections
ASTM C 443: Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM D 4101: Specification for Copolymer steps construction

CAN/CSA-A257.4-M92
Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections and Fittings Using Rubber Gaskets

CAN/CSA-A257.4-M92
Precast Reinforced Circular Concrete Manhole Sections, Catch Basins and Fittings

Canadian Highway Bridge Design Code

1.3 SHOP DRAWINGS

Shop drawings for the structure and performance are to be submitted with each order to the contractor. Contractor shall forward shop drawing submittal to the consulting engineer for approval. Shop drawings are to detail the structure's precast concrete and call out or note the fiberglass (FRP) internals/components.

1.4 PRODUCT SUBSTITUTIONS

No product substitutions shall be accepted unless submitted 10 days prior to project bid date, or as directed by the engineer of record. Submissions for substitutions require review and approval by the Engineer of Record, for hydraulic performance, impact to project designs, equivalent treatment performance, and any required project plan and report (hydrology/hydraulic, water quality, stormwater pollution) modifications that would be required by the approving jurisdictions/agencies. Contractor to coordinate with the Engineer of Record any applicable modifications to the project estimates of cost, bonding amount determinations, plan check fees for changes to approved documents, and/or any other regulatory requirements resulting from the product substitution.

1.5 HANDLING AND STORAGE

Prevent damage to materials during storage and handling.

PART 2 – PRODUCTS

2.1 GENERAL

2.1.1 The device shall be a cylindrical or rectangular, all concrete structure (including risers), constructed from precast concrete riser and slab components or monolithic precast structure(s), installed to conform to ASTM C 891 and to any required state highway, municipal or local specifications; whichever is more stringent. The device shall be watertight.

2.1.2 Cartridge Deck The cylindrical concrete device shall include a fiberglass deck. The rectangular concrete device shall include a coated aluminum deck. In either instance, the insert shall be bolted and sealed watertight inside the precast concrete chamber. The deck shall serve as: (a) a horizontal divider between the lower treatment zone and the upper treated effluent zone; (b) a deck for attachment of filter cartridges such that the membrane filter elements of each cartridge extend into the lower treatment zone; (c) a platform for maintenance workers to service the filter cartridges (maximum manned weight = 450 pounds (204 kg)); (d) a conduit for conveyance of treated water to the effluent pipe.

2.1.3 Membrane Filter Cartridges Filter cartridges shall be comprised of reusable cylindrical membrane filter elements connected to a perforated head plate. The number of membrane filter elements per cartridge shall be a minimum of eleven 2.75-inch (70-mm) diameter elements. The length of each filter element shall be a minimum 15 inches (381 mm). Each cartridge shall be fitted into the cartridge deck by insertion into a cartridge receptacle that is permanently mounted into the cartridge deck. Each cartridge shall be secured by a cartridge lid that is threaded onto the receptacle, or similar mechanism to secure the cartridge into the deck. The maximum treatment flow rate of a filter cartridge shall be controlled by an orifice in the cartridge lid, or on the individual cartridge itself, and based on a design flux rate (surface loading rate) determined by the maximum treatment flow rate per unit of filtration membrane surface area. The maximum design flux rate shall be 0.21 gpm/ft² (0.142 lps/m²).

Each membrane filter cartridge shall allow for manual installation and removal. Each filter cartridge shall have filtration membrane surface area and dry installation weight as follows (if length of filter cartridge is between those listed below, the surface area and weight shall be proportionate to the next length shorter and next length longer as shown below):

Filter Cartridge Length (in / mm)	Minimum Filtration Membrane Surface Area (ft2 / m2)	Maximum Filter Cartridge Dry Weight (lbs / kg)
15	106 / 9.8	10.5 / 4.8
27	190 / 17.7	15.0 / 6.8
40	282 / 26.2	20.5 / 9.3
54	381 / 35.4	25.5 / 11.6

2.1.4 Backwashing Cartridges The filter device shall have a weir extending above the cartridge deck, or other mechanism, that encloses the high flow rate filter cartridges when placed in their respective cartridge receptacles within the cartridge deck. The weir, or other mechanism, shall collect a pool of filtered water during inflow events that backwashes the high flow rate cartridges when the inflow

event subsides. All filter cartridges and membranes shall be reusable and allow for the use of filtration membrane rinsing procedures to restore flow capacity and sediment capacity; extending cartridge service life.

2.1.5 Maintenance Access to Captured Pollutants The filter device shall contain an opening(s) that provides maintenance access for removal of accumulated floatable pollutants and sediment, removal of and replacement of filter cartridges, cleaning of the sump, and rinsing of the deck. Access shall have a minimum clear vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.

2.1.6 Bend Structure The device shall be able to be used as a bend structure with minimum angles between inlet and outlet pipes of 90-degrees or less in the stormwater conveyance system.

2.1.7 Double-Wall Containment of Hydrocarbons The cylindrical precast concrete device shall provide double-wall containment for hydrocarbon spill capture by a combined means of an inner wall of fiberglass, to a minimum depth of 12 inches (305 mm) below the cartridge deck, and the precast vessel wall.

2.1.8 Baffle The filter device shall provide a baffle that extends from the underside of the cartridge deck to a minimum length equal to the length of the membrane filter elements. The baffle shall serve to protect the membrane filter elements from contamination by floatables and coarse sediment. The baffle shall be flexible and continuous in cylindrical configurations, and shall be a straight concrete or aluminum wall in rectangular configurations.

2.1.9 Sump The device shall include a minimum 24 inches (610 mm) of sump below the bottom of the cartridges for sediment accumulation, unless otherwise specified by the design engineer. Depths less than 24 inches may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.

2.2 PRECAST CONCRETE SECTIONS

All precast concrete components shall be manufactured to a minimum live load of HS-20 truck loading or greater based on local regulatory specifications, unless otherwise modified or specified by the design engineer, and shall be watertight.

2.3 JOINTS All precast concrete manhole configuration joints shall use nitrile rubber gaskets and shall meet the requirements of ASTM C443, Specification C1619, Class D or engineer approved equal to ensure oil resistance. Mastic sealants or butyl tape are not an acceptable alternative.

2.4 GASKETS Only profile neoprene or nitrile rubber gaskets in accordance to CSA A257.3-M92 will be accepted. Mastic sealants, butyl tape or Conseal CS-101 are not acceptable gasket materials.

2.5 FRAME AND COVER Frame and covers must be manufactured from cast-iron or other composite material tested to withstand H-20 or greater design loads, and as approved by the

local regulatory body. Frames and covers must be embossed with the name of the device manufacturer or the device brand name.

2.6 DOORS AND HATCHES If provided shall meet designated loading requirements or at a minimum for incidental vehicular traffic.

2.7 CONCRETE All concrete components shall be manufactured according to local specifications and shall meet the requirements of ASTM C 478.

2.8 FIBERGLASS The fiberglass portion of the filter device shall be constructed in accordance with the following standard: ASTM D-4097: Contact Molded Glass Fiber Reinforced Chemical Resistant Tanks.

2.9 STEPS Steps shall be constructed according to ASTM D4101 of copolymer polypropylene, and be driven into preformed or pre-drilled holes after the concrete has cured, installed to conform to applicable sections of state, provincial and municipal building codes, highway, municipal or local specifications for the construction of such devices.

2.10 INSPECTION All precast concrete sections shall be inspected to ensure that dimensions, appearance and quality of the product meet local municipal specifications and ASTM C 478.

PART 3 – PERFORMANCE

3.1 GENERAL

3.1.1 Verification – The stormwater quality filter must be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV).

3.1.2 Function - The stormwater quality filter treatment device shall function to remove pollutants by the following unit treatment processes; sedimentation, floatation, and membrane filtration.

3.1.3 Pollutants - The stormwater quality filter treatment device shall remove oil, debris, trash, coarse and fine particulates, particulate-bound pollutants, metals and nutrients from stormwater during runoff events.

3.1.4 Bypass - The stormwater quality filter treatment device shall typically utilize an external bypass to divert excessive flows. Internal bypass systems shall be equipped with a floatables baffle, and must avoid passage through the sump and/or cartridge filtration zone.

3.1.5 Treatment Flux Rate (Surface Loading Rate) – The stormwater quality filter treatment device shall treat 100% of the required water quality treatment flow based on a maximum design treatment flux rate (surface loading rate) across the membrane filter cartridges of 0.21 gpm/ft² (0.142 lps/m²).

3.2 FIELD TEST PERFORMANCE

At a minimum, the stormwater quality filter device shall have been field tested and verified with a minimum 25 TARP qualifying storm events and field monitoring shall have been conducted according to the TARP 2009 NJDEP TARP field test protocol, and have received NJCAT verification.

3.2.1 Suspended Solids Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median TSS removal efficiency of 85% and a minimum median SSC removal efficiency of 95%.

3.2.2 Runoff Volume – The stormwater quality filter treatment device shall be engineered, designed, and sized to treat a minimum of 90 percent of the annual runoff volume determined from use of a minimum 15-year rainfall data set.

3.2.3 Fine Particle Removal - The stormwater quality filter treatment device shall have demonstrated the ability to capture fine particles as indicated by a minimum median removal efficiency of 75% for the particle fraction less than 25 microns, an effluent d_{50} of 15 microns or lower for all monitored storm events.

3.2.4 Turbidity Reduction - The stormwater quality filter treatment device shall have demonstrated the ability to reduce the turbidity from influent from a range of 5 to 171 NTU to an effluent turbidity of 15 NTU or lower.

3.2.5 Nutrient (Total Phosphorus & Total Nitrogen) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Phosphorus removal of 55%, and a minimum median Total Nitrogen removal of 50%.

3.2.6 Metals (Total Zinc & Total Copper) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Zinc removal of 55%, and a minimum median Total Copper removal of 85%.

3.3 INSPECTION and MAINTENANCE

The stormwater quality filter device shall have the following features:

3.3.1 Durability of membranes are subject to good handling practices during inspection and maintenance (removal, rinsing, and reinsertion) events, and site specific conditions that may have heavier or lighter loading onto the cartridges, and pollutant variability that may impact the membrane structural integrity. Membrane maintenance and replacement shall be in accordance with manufacturer's recommendations.

3.3.2 Inspection which includes trash and floatables collection, sediment depth determination, and visible determination of backwash pool depth shall be easily conducted from grade (outside the structure).

3.3.3 Manual rinsing of the reusable filter cartridges shall promote restoration of the flow capacity and sediment capacity of the filter cartridges, extending cartridge service life.

3.3.4 The filter device shall have a minimum 12 inches (305 mm) of sediment storage depth, and a minimum of 12 inches between the top of the sediment storage and bottom of the filter cartridge tentacles, unless otherwise specified by the design engineer. Variances may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.

3.3.5 Sediment removal from the filter treatment device shall be able to be conducted using a standard maintenance truck and vacuum apparatus, and a minimum one point of entry to the sump that is unobstructed by filter cartridges.

3.3.6 Maintenance access shall have a minimum clear height that provides suitable vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.

3.3.7 Filter cartridges shall be able to be maintained without the requirement of additional lifting equipment.

PART 4 – EXECUTION

4.1 INSTALLATION

4.1.1 PRECAST DEVICE CONSTRUCTION SEQUENCE

The installation of a watertight precast concrete device should conform to ASTM C 891 and to any state highway, municipal or local specifications for the construction of manholes, whichever is more stringent. Selected sections of a general specification that are applicable are summarized below.

4.1.1.1 The watertight precast concrete device is installed in sections in the following sequence:

- aggregate base
- base slab
- treatment chamber and cartridge deck riser section(s)
- bypass section
- connect inlet and outlet pipes
- concrete riser section(s) and/or transition slab (if required)
- maintenance riser section(s) (if required)
- frame and access cover

4.1.2 The precast base should be placed level at the specified grade. The entire base should be in contact with the underlying compacted granular material. Subsequent sections, complete with joint seals, should be installed in accordance with the precast concrete manufacturer's recommendations.

4.1.3 Adjustment of the stormwater quality treatment device can be performed by lifting the upper sections free of the excavated area, re-leveling the base, and re-installing the sections. Damaged sections and gaskets should be repaired or replaced as necessary to restore original condition and watertight seals. Once the stormwater quality treatment device has been constructed, any/all lift holes must be plugged watertight with mortar or non-shrink grout.

4.1.4 Inlet and Outlet Pipes Inlet and outlet pipes should be securely set into the device using approved pipe seals (flexible boot connections, where applicable) so that the structure is watertight, and such that any pipe intrusion into the device does not impact the device functionality.

4.1.5 Frame and Cover Installation Adjustment units (e.g. grade rings) should be installed to set the frame and cover at the required elevation. The adjustment units should be laid in a full bed of mortar with successive units being joined using sealant recommended by the manufacturer. Frames for the cover should be set in a full bed of mortar at the elevation specified.

4.2 MAINTENANCE ACCESS WALL
In some instances the Maintenance Access Wall, if provided, shall require an extension attachment and sealing to the precast wall and cartridge deck at the job site, rather than at the precast facility. In this instance, installation of these components shall be performed according to instructions provided by the manufacturer.

4.3 FILTER CARTRIDGE INSTALLATION Filter cartridges shall be installed in the cartridge deck only after the construction site is fully stabilized and in accordance with the manufacturer's guidelines and recommendations. Contractor to contact the manufacturer to schedule cartridge delivery and review procedures/requirements to be completed to the device prior to installation of the cartridges and activation of the system.

PART 5 – QUALITY ASSURANCE

5.1 FILTER CARTRIDGE INSTALLATION Manufacturer shall coordinate delivery of filter cartridges and other internal components with contractor. Filter cartridges shall be delivered and installed complete after site is stabilized and unit is ready to accept cartridges. Unit is ready to accept cartridges after is has been cleaned out and any standing water, debris, and other materials have been removed. Contractor shall take appropriate action to protect the filter cartridge receptacles and filter cartridges from damage during construction, and in accordance with the manufacturer's recommendations and guidance. For systems with cartridges installed prior to full site stabilization and prior to system activation, the contractor can plug inlet and outlet pipes to prevent stormwater and other influent from entering the device. Plugs must be removed during the activation process.

5.2 INSPECTION AND MAINTENANCE

5.2.1 The manufacturer shall provide an Owner's Manual upon request.

5.2.2 After construction and installation, and during operation, the device shall be inspected and cleaned as necessary based on the manufacturer's recommended inspection and maintenance guidelines and the local regulatory agency/body.

5.3 REPLACEMENT FILTER CARTRIDGES When replacement membrane filter elements and/or other parts are required, only membrane filter elements and parts approved by the manufacturer for use with the stormwater quality filter device shall be installed.

END OF SECTION

APPENDIX C

Sanitary Servicing Calculations

EXISTING SANITARY DEMAND

Municipality:	Town of Caledon, Municipality of Peel
Project Address:	13656-13668 Emil Kolb Parkway
Project No.	5440
Completed By:	C.D.
Checked By:	H.S.
Date:	2025-11-27

SCHAEFFERS CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.

Average Demand Calculation

Tenure Type	Unit	Area (ha)	Pop. Density (persons/unit)	Population (persons)	Sanitary Demand (L/cap/d)	Average Demand (L/s)
Single Detached	1	0.83	4.2	4	290	0.01

Peak Demand Calculation

Average Sanitary Demand (L/s)	Total Population	M	Site Area (ha)	*Infiltration (L/s)	Total Peak Flow (L/s)
0.01	4	4.0	0.83	0.22	**0.27**

*Based on 0.20 L/s/ha of gross area

$M = 1 + 14/(4 + (P/1000)^{0.5})$

PROPOSED SANITARY DEMAND

Municipality: Town of Caledon, Municipality of Peel
Project Address 13656-13668 Emil Kolb Parkway
Project No. 5440
Completed By: C.D.
Checked By: H.S.
Date: 2025-11-27

SCHAEFFERS CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.

Average Demand Calculation

Tenure Type	Area (ha)	Units	Pop. Density (Persons/ha)	Unit Density (ppu)	Population (Persons)	Sanitary Demand (L/cap/d)	Average Demand (L/s)
Townhouse	N/A	22	N/A	3.4	75	290.00	0.25
Large Apartment (>1 bedroom)	N/A	29	N/A	3.1	90	290.00	0.30
Small Apartment (<=1 bedroom)	N/A	73	N/A	1.7	125	290.00	0.42

Peak Demand Calculation

Tenure Type	Average Sanitary Demand (L/s)	Total Population	M	Site Area (ha)	*Infiltration (L/s)	Total Peak Flow (L/s)
Residential	0.97	290	4.0	0.83	0.22	**4.11**

*Based on 0.26 L/s/ha of gross area

$M = 1 + 14/(4 + (P/1000)^{0.5})$

APPENDIX D

Water Supply Calculations

WATER DEMAND

SCHAEFFERS CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.

Municipality:	Town of Caledon, Municipality of Peel
Project Address:	13656 -13668 Emil Kolb Parkway
Project No.	5440
Completed By:	C.D
Checked By:	H.S.
Date:	2025-11-27

FUS Fire Flow:	14,000	L/minute
FUS Fire Flow:	233.33	L/s
Generation Rate:	270	L/capita/day

Population	Unit Average Day Demand (L/capita/day)	Average Day Demand (L/s)
290	270	**0.91**

TOTAL DEMANDS

	Average Day Demand (L/s)	Max Hour Demand Peaking Factor †	Max Hour Demand (L/s)	Max Day Demand Peaking Factor †	Max Day Demand (L/s)	Max Day Demand + Fire Flow (L/s)
Residential	**0.91**	3.0	**2.72**	1.8	**1.63**	**234.96**

	Demand (L/s)
Total Average Day Demand	0.91
Total Maximum Day Demand	1.63
Peak Hourly Demand	2.72
Fire Flow	233.33
Total Demand	234.96

FIRE UNDERWRITERS SURVEY CALCULATION

Municipality:	Town of Caledon, Municipality of Peel
Project Address:	13656-13668 Emil Kolb Parkway - Building 1
Project No.	5440
Completed By:	C.D.
Checked By:	H.S.
Date:	2025-11-27

A = Type of Construction

Type of Construction:	C	Description
Wood Frame	1.5	(essentially all combustible)
Ordinary	1	(brick/masonry walls, combustible interior)
Non-Combustible	0.8	(unprotected metal structure, masonry/metal walls)
Fire-Resistive	0.6	(fully protected frame, roof, floors)

Construction Coefficient:	0.8

D = Fire Flow (000's)

GFA*	5122	**square metres**
Construction Type	0.8	
Fire Flow	**12,595**	**L/min**

*GFA of Building based on considering two largest adjoining floor areas plus 50% of all floors immediately above
GFA = (1175+1175) + (0.5*1175) + (0.5*1175) + (0.5*1097) + (0.5*1048) + (0.5*1048)

Fire Flow	**13,000**	**L/min**

E = Occupancy Factor

Fire Hazard of Contents	Charge
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

Occupancy Factor	-15%	
Fire Flow	**11,050**	**L/min**

F = Sprinkler Factor

Sprinkler System	Charge
n/a	0%
NFPA 13 System	-30%
Fully Supervised System	-50%

Sprinkler Factor:	-30%

G = Exposure Factor

Separation	Charge	
0 to 3 m	25%	North: 52m (0%)
3.1 to 10 m	20%	West: 13.9m +3.4m = 17.3m (15%)
10.1 to 20 m	15%	South: 45+ (0%)
20.1 to 30 m	10%	East: 45m+ (0%)
Greater than 30 m	0%	

Exposure Factor	15%	(no more than 75%)

H - Net Fire Flow Required

F + G Factors	**-15%**

Calculated Fire Flow:	**9393**	**L/min**
Fire Flow:	**9000**	**L/min** (round to the nearest 1000th)
Fire Flow:	**150**	**L/s**

FIRE UNDERWRITERS SURVEY CALCULATION

Municipality:	Town of Caledon, Municipality of Peel
Project Address:	13656-13668 Emil Kolb Parkway - Building 2A
Project No.	5440
Completed By:	C.D.
Checked By:	H.S.
Date:	2025-11-27

A = Type of Construction

Type of Construction:	C	Description
Wood Frame	1.5	(essentially all combustible)
Ordinary	1	(brick/masonry walls, combustible interior)
Non-Combustible	0.8	(unprotected metal structure, masonry/metal walls)
Fire-Resistive	0.6	(fully protected frame, roof, floors)

Construction Coefficient:	1.5

D = Fire Flow (000's)

GFA*	1171	**square metres**
Construction Type	1.5	
Fire Flow	**11,293**	**L/min**

*GFA of Building 2A based on100% all floor areas
GFA = 280+400+395+96

Fire Flow	**11,000**	**L/min**

E = Occupancy Factor

Fire Hazard of Contents	Charge
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

Occupancy Factor	-15%	
Fire Flow	**9,350**	**L/min**

F = Sprinkler Factor

Sprinkler System	Charge
n/a	0%
NFPA 13 System	-30%
Fully Supervised System	-50%

Sprinkler Factor:	0%

G = Exposure Factor

Separation	Charge
0 to 3 m	25%
3.1 to 10 m	20%
10.1 to 20 m	15%
20.1 to 30 m	10%
Greater than 30 m	0%

North: 6.9 + 15.1 = 22m (10%)
West: 4.0 + 10.5 = 14.5 (15%)
South: 59.8 (0%)
East: 0% due to proposed firewall

Exposure Factor	25%	(no more than 75%)

H - Net Fire Flow Required

F + G Factors	**25%**

Calculated Fire Flow:	**11688**	**L/min**
Fire Flow:	**12000**	**L/min** (round to the nearest 1000th)
Fire Flow:	**200**	**L/s**

FIRE UNDERWRITERS SURVEY CALCULATION

Municipality:	Town of Caledon, Municipality of Peel
Project Address:	13656-13668 Emil Kolb Parkway - Building 2B
Project No.	5440
Completed By:	C.D.
Checked By:	H.S.
Date:	2025-11-27

A = Type of Construction

Type of Construction:	C	Description
Wood Frame	1.5	(essentially all combustible)
Ordinary	1	(brick/masonry walls, combustible interior)
Non-Combustible	0.8	(unprotected metal structure, masonry/metal walls)
Fire-Resistive	0.6	(fully protected frame, roof, floors)

Construction Coefficient:	1.5	

D = Fire Flow (000's)

GFA*	592	**square metres**
Construction Type	1.5	
Fire Flow	**8,029**	**L/min**

*GFA of Building 2B based on100% all floor areas
GFA = 142+202+200+48

Fire Flow	**8,000**	**L/min**

E = Occupancy Factor

Fire Hazard of Contents	**Charge**
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

Occupancy Factor	-15%	
Fire Flow	**6,800**	**L/min**

F = Sprinkler Factor

Sprinkler System	**Charge**
n/a	0%
NFPA 13 System	-30%
Fully Supervised System	-50%

Sprinkler Factor:	0%

G = Exposure Factor

Separation	**Charge**
0 to 3 m	25%
3.1 to 10 m	20%
10.1 to 20 m	15%
20.1 to 30 m	10%
Greater than 30 m	0%

North: 7 + 15 = 22m (10%)
West: 0% due to proposed firewall
South: 58m (0%)
East: 5.0m (20%)

Exposure Factor	30%	(no more than 75%)

H - Net Fire Flow Required

F + G Factors	**30%**

Calculated Fire Flow:	**8840**	**L/min**
Fire Flow:	**9000**	**L/min** (round to the nearest 1000th)
Fire Flow:	**150**	**L/s**

FIRE UNDERWRITERS SURVEY CALCULATION

Municipality:	Town of Caledon, Municipality of Peel
Project Address:	13656-13668 Emil Kolb Parkway - Building 3
Project No.	5440
Completed By:	C.D.
Checked By:	H.S.
Date:	2025-11-27

A = Type of Construction

Type of Construction:	C	Description
Wood Frame	1.5	(essentially all combustible)
Ordinary	1	(brick/masonry walls, combustible interior)
Non-Combustible	0.8	(unprotected metal structure, masonry/metal walls)
Fire-Resistive	0.6	(fully protected frame, roof, floors)

Construction Coefficient:	1.5

D = Fire Flow (000's)

GFA*	1470	**square metres**
Construction Type	1.5	
Fire Flow	**12,652**	**L/min**

*GFA of Building 3 based on 100% all floor areas

GFA = 350+500+494+126

Fire Flow	**13,000**	**L/min**

E = Occupancy Factor

Fire Hazard of Contents	Charge
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

Occupancy Factor	-15%	
Fire Flow	**11,050**	**L/min**

F = Sprinkler Factor

Sprinkler System	Charge
n/a	0%
NFPA 13 System	-30%
Fully Supervised System	-50%

Sprinkler Factor:	0%

G = Exposure Factor

Separation	Charge
0 to 3 m	25%
3.1 to 10 m	20%
10.1 to 20 m	15%
20.1 to 30 m	10%
Greater than 30 m	0%

North: 7.2 + 21.3 = 28.5m (10%)
West: 5.3m (20%)
South: 59.6 (0%)
East: 45m+ (0%)

Exposure Factor	30%	(no more than 75%)

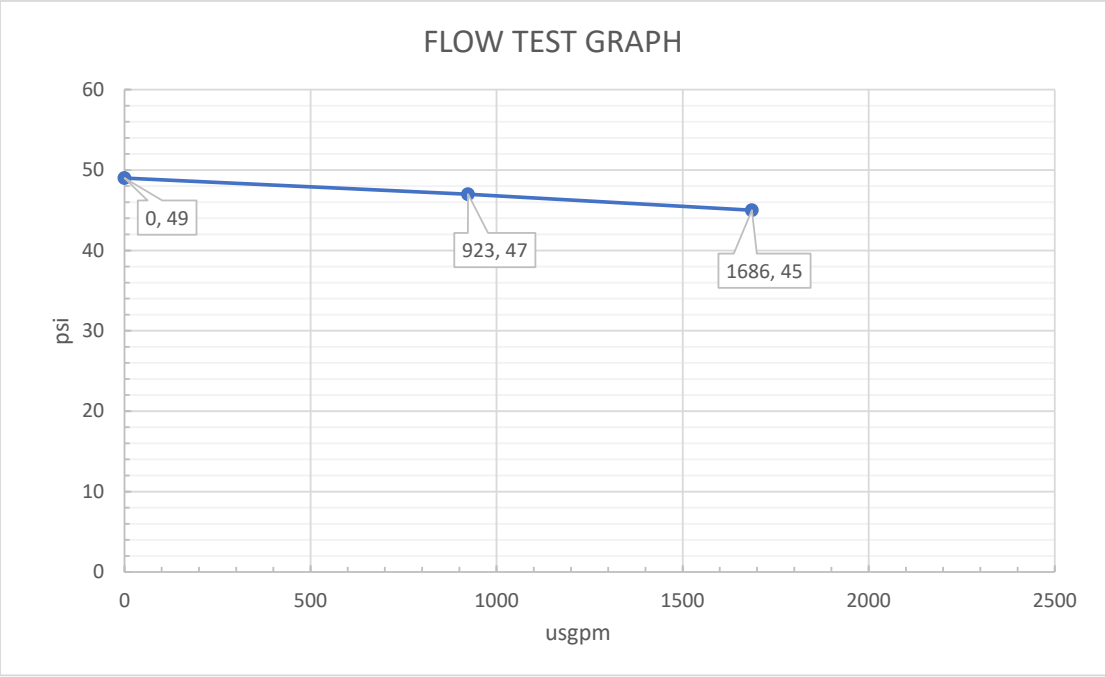
H - Net Fire Flow Required

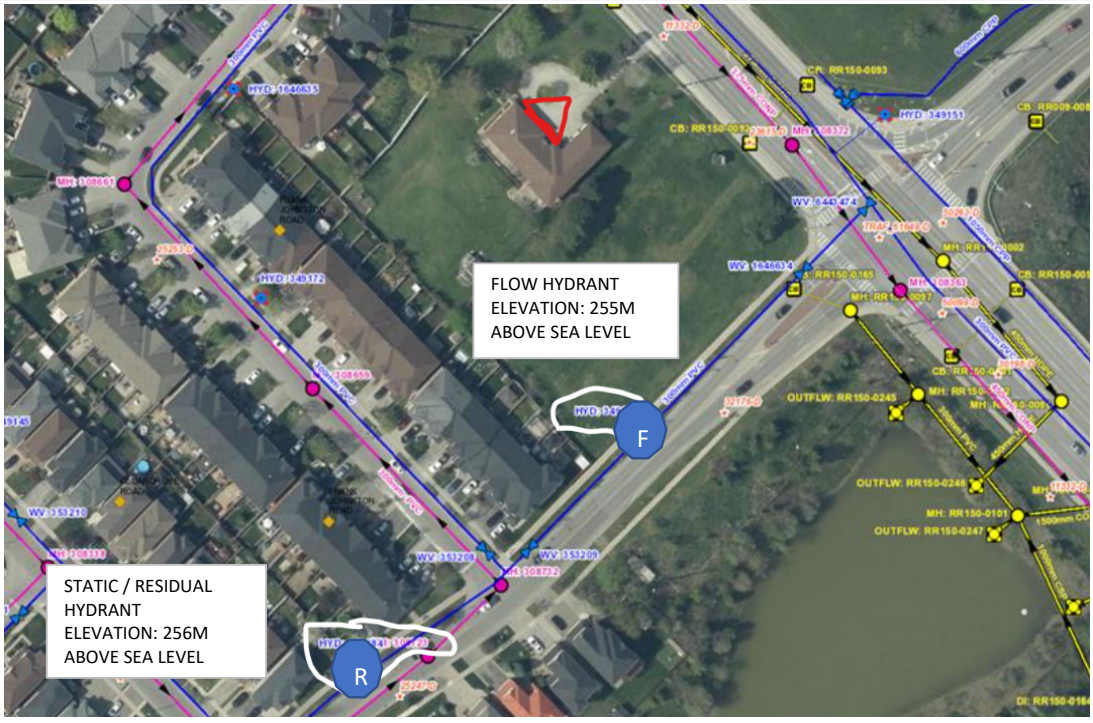
F + G Factors	**30%**

Calculated Fire Flow:	**14365**	**L/min**
Fire Flow:	**14000**	**L/min** (round to the nearest 1000th)
Fire Flow:	**233**	**L/s**

FLOW TEST REPORT

Project No.	24-F020								
Address	Harvest Moon Drive & Emil Kolb Pkwy - Bolton								
Date:	2024-06-20			Time	2:30pm		Size of Main		12"PVC
Static	Pitot. 1 (2.5")	Flow 1	Res. Pres. 1	Pitot 2a (2.5")	Flow 2a	Pitot 2b (2.5")	Flow 2b	Flow 2a+2b	Res. pres. 2
49	30	**923**	**47**	25	843	25	843	**1686**	**45**





Note: Flow Test was performed as per NFPA 291.

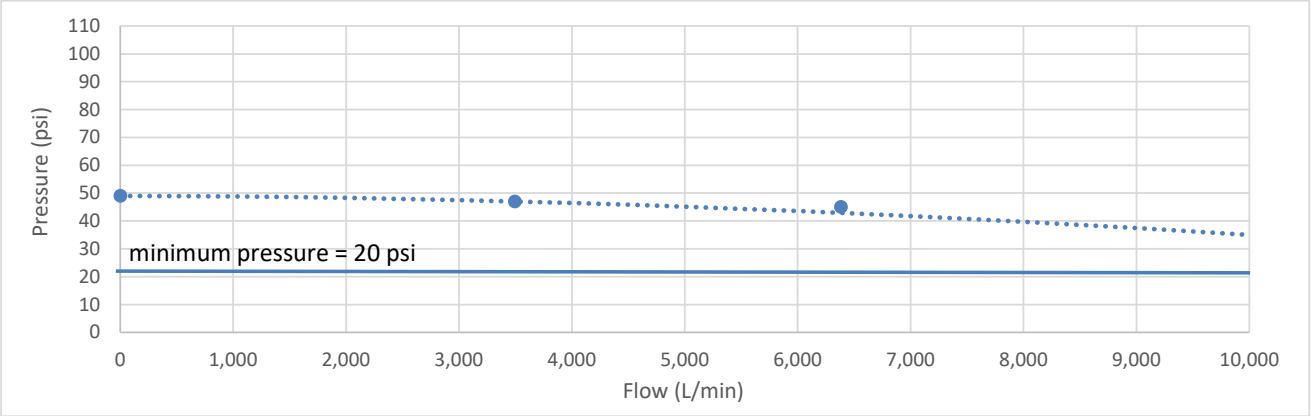
Note: Hydrant's elevation is obtained from Google Earth.

Water System Pressure Calculation Worksheet

Hydrant Flow Test Results

Flow Test Location: 13656 Emil Kolb Parkway
Residual Test Location: 13656 Emil Kolb Parkway
Main Size: 300
Test Date: 2024-06-20
Tested By: Hydrant Testing Ontario

Number of Outlets & Orifice Size	Pilot Pressure (psi)	Flow (US GPM)	Flow (L/min)	Residual Pressure (psi)
0	0	0	0	49
1 x 2.5"	30	923	3494	47
2 x 2.5"	25	1686	6382	45



$$Q_R = \mathrm{Q_T}\left(\frac{\mathrm{P_S} - \mathrm{Pr}}{\mathrm{P_S} - \mathrm{Pt}}\right)\text{^}0.54$$

Where,

Q_r = Projected Flow Rate
Q_t = Flow Rate from Flow Test = 6382 L/min
P_s = Static Pressure = 49 psi
P_r = Desired System Pressure
P_t = Residual Presure inTest = 45 psi

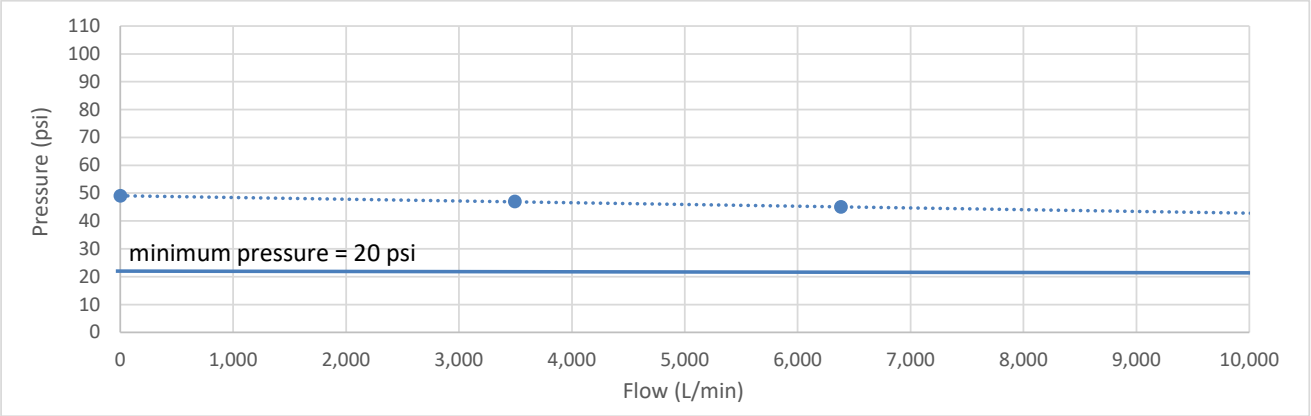
Pressure Under Fire Suppression (P_{r1}) =	20.0	psi
Calculated Flow Rate (Q_{r1}) =	18,601	L/min
Pressure Under Normal Operation (P_{r2}) =	40.0	psi
Calculated Flow Rate (Q_{r2}) =	9,889	L/min

Water System Pressure Calculation Worksheet

Hydrant Flow Test Results

Flow Test Location: 13656 Emil Kolb Parkway
Residual Test Location: 13656 Emil Kolb Parkway
Main Size: 300
Test Date: 2024-06-20
Tested By: Hydrant Testing Ontario

Number of Outlets & Orifice Size	Pilot Pressure (psi)	Flow (US GPM)	Flow (L/min)	Residual Pressure (psi)
0	0	0	0	49
1 x 2.5"	30	923	3494	47
2 x 2.5"	25	1686	6382	45



$$P_r = P_s - (Ps - Pt)\sqrt[0.54]{Q_r/Q_t}$$

Where,

Q_r = Projected Flow Rate at the Desired Pressure
Q_t = Flow Rate from Flow Test = 6382 L/min
P_s = Static Pressure = 49 psi
P_r = Calculated Pressure
P_t = Residual Presure inTest = 45 psi

Fire Flow + Max Day (Q_{r1}) =	14,098	L/min
Calculated Pressure(P_{r1}) =	31.6	psi
Peak Flow (Q_{r2}) =	163.8	L/min
Calculated Pressure(P_{r2}) =	49.0	psi

APPENDIX E

Excerpts from Hydrogeological Reports

October 27, 2025

Ontario Ministry of the Environment, Conservation, and Parks
Environmental Approvals Access and Service Integration Branch
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

Re: Application for Environmental Activity and Sector Registry
Temporary Construction Dewatering
13656-13668 Emil Kolb Parkway
Bolton, Ontario
Project 10377

Dear Director,

Hydrogeology Consulting Services Inc. (HCS) was retained by CAMCOS Living to prepare and submit an Environmental Activity and Sector Registry (EASR) for the above-referenced project.

Previous investigation for each of the two properties includes Geotechnical, Phase I Environmental Site Assessment (ESA), and Scoped Hydrogeological Assessment reports. The 13656 and 13668 Emily Kolb Parkway properties have since been combined into one development proposal titled Bolton Village, and the construction dewatering assessment included below contemplates the most recent development plans for the combined Bolton Village property.

Previous investigation of the combined property includes eleven boreholes drilled between 2021-2023 to assess the subsurface stratigraphy and groundwater conditions, with seven monitoring wells installed. Copies of the borehole logs are attached for reference.

The scoped hydrogeological assessments for 13656 and 13668 Emil Kolb Parkway include detailed discussion of on-site geological and hydrogeological conditions, and have been referenced extensively in the development of this report.

1. MEASURED GROUNDWATER LEVELS

On June 6, 2021, March 28, 2023, and February 25, 2025 the groundwater level observations listed in Table 1 below were collected by HCS Inc. during previous site investigations:

Table 1: Measured Groundwater Levels:

Location	Depth to Groundwater (mBGS)			Groundwater Elevation (mASL)		
	06-Jun-2021	28-Mar-2023	25-Feb-2025	06-Jun-2021	28-Mar-2023	25-Feb-2025
BH 1	--	dry	1.75	--	dry	256.41
BH 2	--	5.48	1.70	--	252.74	256.52
BH 3	--	4.65	0.73	--	254.63	254.63
BH 01	5.10	--	1.00	253.37	--	257.46
BH 04	2.83	--	1.09	255.69	--	257.42
BH 05	4.35	--	1.56	253.62	--	256.41

mBGS – metres below ground surface
mASL – metres above sea level

2. GROUNDWATER CHEMISTRY ANALYSIS RESULTS

On June 6, 2021 one water chemistry sample was obtained from on-site monitoring well BH 01, and on March 28, 2023 one water chemistry sample was obtained from on-site monitoring well BH1. The samples were collected in the appropriate containers, stored in a cooler, and delivered to ALS Environmental Laboratories in Waterloo, Ontario for analysis of Region of Peel's Storm Sewer and Sanitary Sewer Use By-Law chemistry parameters. The laboratory Certificates of Analysis (COA) are attached.

It is important to consider the water chemistry samples were obtained using inertial valves (Waterra) and tubing. The method of water collection inherently results in the inclusion of sediments into the water sample, thereby increasing concentrations of parameters such as colour, turbidity, total suspended solids, total dissolved solids, and total metals where metals are adsorbed onto soil particles. Water chemistry samples analyzed for Total Metals were not filtered during or after collection; however, additional samples were collected for analysis of Dissolved Metals and were laboratory-filtered prior to analysis to provide a more accurate assessment of actual groundwater chemistry.

Additionally, it is important to consider that the 4AAP laboratory analysis for Phenols detects a wide variety of naturally occurring organic substances, along with the chemical Phenol (C_6H_5OH). Measured exceedances of "Phenols" may not be indicative of a contamination issue, but rather groundwater that is influenced by natural environmental factors.

2.1 Region of Peel Storm Sewer Use By-Law

As shown on the attached COAs, the samples from BH 01 and BH 1 exhibited exceedances of the Region of Peel's Storm Sewer By-Law criteria limits for the following parameters:

- Total Suspended Solids (TSS)
- Total Manganese
- Total Zinc

It is important to note the sampling methodology causes sediments to become suspended in the water column within the well, and likely affected the TSS concentration in the samples.

The presence of sediments in the sample likely resulted in metals adsorbed on to sediment particles influencing the water chemistry analysis results as they are leached into solution by the lab-added preservative in the metals sampling bottle.

2.1.1 Discharge to Municipal Storm Sewers

Based on the analysis results, discharge to municipal storm sewers may require treatment such as settling tanks with flocculation and/or mechanical filtration (e.g. using filter bags) to reduce TSS and metals concentrations to acceptable concentrations.

2.2 Region of Peel Sanitary Sewer Use By-Law

As shown on the attached COAs, the sample from BH 01 exhibited exceedances of the Region of Peel's Storm Sewer By-Law criteria limits for the following parameters:

- Total Suspended Solids (TSS)

As explained previously it is important to note the sampling methodology causes sediments to become suspended in the water column within the well, and likely affected the TSS concentration in the samples.

The presence of sediments in the sample likely resulted in metals adsorbed on to sediment particles influencing the water chemistry analysis results as they are leached into solution by the lab-added preservative in the metals sampling bottle.

2.2.1 Discharge to Municipal Sanitary Sewers

Based on the analysis results, discharge to municipal sanitary sewers may require treatment such as settling tanks with flocculation and/or mechanical filtration (e.g. using filter bags) to reduce TSS concentrations to acceptable concentrations.

3. SOIL HYDRAULIC CONDUCTIVITY

Hydraulic conductivity estimates for the site soils were determined using single response hydraulic (slug) tests of the soil deposits screened by selected monitoring wells. Estimates of hydraulic conductivity were also made using soil sample grain size analyses and the Kaubisch, Breyer, Kozeny-Carman, and Hazen formulae where appropriate.

3.1.1 Slug Test Results

Prior to conducting slug testing of the monitoring wells, each well was developed (purged) to mitigate smearing during drilling and remove fine-grained material from the sand pack around the well screen and the screened interval.

The slug test methodology followed the procedures developed by Hvorslev (1951), as described in Freeze and Cherry (1979). The slug tests were conducted as falling head tests by introducing a volume (slug) of potable water into the well to cause a temporary rise in the water table; or, as rising head tests by purging a well dry and allowing water to flow naturally back into the well. The displacement and gradual re-equilibration of the water level in the wells was recorded using electronic pressure transducers (dataloggers).

Hvorslev's method is expressed by the following equation:

$$K = \frac{r^2 \ln (L/R)}{2LT_{0.37}}$$

where:

- K = hydraulic conductivity of the tested material (m/sec)
- r = inner radius of the well riser pipe (m)
- R = outer radius of the well riser pipe (m)
- L = length of screen and sand pack (m)
- $T_{0.37}$ = time lag (sec), where $(H-h)/(H-H_0) = 0.37$
- h = water level at each time of measurement (m)
- H_0 = initial water level (m, start of test)
- H = stabilized water level prior to slug testing (m)

The time lag, $T_{0.37}$, represents the time required for the water level to recover to the stabilized level if the initial flow rate from the surrounding aquifer into the well is maintained. This time lag is determined graphically as the time where (H-h) divided by ($H-H_0$) is equal to 0.37.

Graphical analyses of the slug tests are attached, and the hydraulic conductivity estimates are summarized in Table 2 below.

3.1.2 Grain Size Analysis Results

Samples of soil collected from selected boreholes during drilling were submitted to the CMT Engineering Inc. laboratory facility in St. Clements, Ontario for analysis of particle size distribution (grain size). As shown on the attached grain size analysis graphs, the near-surface soils predominantly consist of clay and silt with trace amounts of sand and gravel (i.e. glacial till). The grain size analysis results were used to estimate soil hydraulic conductivity (K) values by applying the Kaubisch, Breyer, Hazen, and Kozeny-Carman formulae where appropriate based on the limitations of each formula. The hydraulic conductivity estimates are summarized in Table 3 below.

It is noted that for all soil samples a high percentage of fine-grained material was present in a sample, requiring the D_{10} value of the sample to be approximated; therefore, calculated values are considered estimates.

Table 2: Estimated Soil Hydraulic Conductivity – Slug Tests

Borehole Name	Screened Interval (mBGS)	Slug Test Hydraulic Conductivity (m/sec)
BH 01*	2.8-5.8	$<1.0 \times 10^{-7}$
BH 04*	3.1-6.1	$<1.0 \times 10^{-7}$
BH 05*	2.6-5.6	$<1.0 \times 10^{-7}$
BH 2*	3.1-6.1	$<1.0 \times 10^{-7}$
BH 3*	3.1-6.1	$<1.0 \times 10^{-7}$

* - $T_{0.37}$ was not achieved; therefore, the hydraulic conductivity value is considered approximate

Table 3: Estimated Soil Hydraulic Conductivity – Grain Size Analysis

Name	Soil Sample Depth or Screened Interval (mBGS)	Soil Type	Analysis Method	Hydraulic Conductivity (m/sec)
BH 03	1.52-2.13	Clayey silt, some sand, trace gravel	Kaubisch	4.57×10^{-9}
BH 05	4.57-5.18	Clayey silt, some sand, trace gravel	Kaubisch	2.10×10^{-9}
BH 1	1.52-2.13	Clayey silt, some sand, trace gravel	Kaubisch	6.83×10^{-10}
BH 1	4.57-5.18	Clayey silt, some sand, trace gravel	Kaubisch	1.36×10^{-9}
BH 2	5.18-6.10	Clayey silt, some sand, trace gravel	Kaubisch	1.02×10^{-9}
BH 3	5.18-6.10	Clayey silt, some sand, trace gravel	Kaubisch	7.80×10^{-10}

mBGS - metres Below Ground Surface

m/sec - metres per second

The hydraulic conductivity values of $<1.0 \times 10^{-7}$ m/sec for the slug tests, and 6.83×10^{-10} to 4.57×10^{-9} m/sec for the grainsize analyses indicate a low hydraulic conductivity that correlates well with clayey silt (till) overburden.

The hydraulic conductivity estimates correlate reasonably well with published ranges for major soil/bedrock types (Freeze and Cherry, 1979).

4. PROPOSED WATER TAKING

As part of the proposed construction shown on the attached Master Site Plan (Q4A Architects, January 2025), temporary dewatering will be required for excavations to support construction of the proposed development. Building 1 includes a slab-on grade structure plus a partial one-level underground storage area. Buildings 2 and 3 include slab-on-grade structures. During construction the dewatering system will be operating 24 hours per day to maintain a dry working area.

It is noted development design changes have occurred since the 2021 and 2023 Scoped Hydrogeological Assessment reports were prepared for the individual properties that now make up the current Site.

The following construction dewatering calculations supersede the previous reports.

5. CONSTRUCTION DEWATERING CALCULATIONS

Based on excavation locations, dimensions, and depths provided for this report, construction of the proposed underground level associated with Building1 will require construction dewatering to lower the groundwater table within the excavation to maintain a dry excavation base and sidewalls.

Temporary dewatering requirements are dependent on factors such as excavation parameters (excavation dimensions, infrastructure invert elevations, the number of concurrent excavations, etc.), hydrogeological conditions at the site (groundwater levels, soil/bedrock hydrogeological parameters, etc.), construction and dewatering methodologies (open cuts, dewatering pits, sumps, wellpoints, etc.), and the amount of groundwater drawdown required to achieve and maintain dry working conditions and stable excavations.

Additionally, factors such as the use of shoring would be expected to influence the rate of groundwater inflow into the excavation. The calculations provided below assume an open excavation as a conservative factor of safety.

It is important to note that the dewatering contractor retained to perform construction dewatering is solely responsible for achieving and maintaining dry working conditions at the site at all times. The calculations and dewatering rates/volumes provided below are not directives for a dewatering contractor, and the dewatering contractor must review the information, calculations, and recommendations provided as part of their own assessment of dewatering requirements to determine appropriate methodologies and designs for their construction dewatering project.

5.1 Excavation Requirements and Temporary Construction Dewatering Assumptions

During the construction project dewatering operations are expected to take place twenty-four hours per day to maintain a dry excavation. Dewatering calculations include a number of variables such as the static groundwater level, soil hydraulic conductivity, aquifer thickness, confined aquifer conditions, etc. that can be adjusted to provide conservative buffers to account for conditions beyond those encountered in the available monitoring wells.

Based on the available information Table 4 below summarizes the preliminary excavation requirements for the proposed underground level.

Additionally, Table 4 includes the following buffers as factors of safety:

- A buffer of 2 m (assumed, although the exact buffer shall be determined during the construction design phases with the shoring engineer, and accounting for property limits) for all excavation widths and lengths to account for an excavation large enough to accommodate working around the perimeter;

- A buffer of 1 m for the excavation invert depth to ensure groundwater is drawn down 1 m below the base of the excavation to maintain a dry work surface. The excavation invert is taken as 3.6 mBGS which is understood to be the lowest Underside of Footing (USF) elevation across the building footprint.

- "Squared off" excavation shapes to account for excavation dimension adjustments during the construction process.

- A buffer of 0.23 m for the depth to groundwater (the highest measured groundwater elevation from the monitoring wells on site, increased by 0.23 m) to account for seasonal fluctuations.

It is noted based on available information the slab-on-grade structures for Building 2 and Building 3 are not expected to have footing elevations extending more than 1.75 mBGS; therefore, it is anticipated no construction dewatering will be required.

Table 4: Preliminary Excavation Requirements

Excavation	Excavation Length (m) (+2 m)	Excavation Width (m) (+2 m)	Excavation Depth (mBGS) (-1 m)	GW Depth (mBGS) (+0.23 m)
Building 1 - Underground Structure	30.9	25.5	4.6	0.50

It is important to note the dewatering calculations included in this report are based on the information provided to HCS as outlined above. In the event design parameters (e.g. excavation footprint, excavation depth, servicing trench depths and lengths, etc.) are modified the dewatering calculations provided will also need to be updated.

5.1.1 Concurrent Excavations

The following concurrent tasks are contemplated for construction dewatering:

- Concurrent excavation of the entire underground footprint.

5.1.2 Dewatering Assumptions

Dewatering calculations have been prepared based on the following assumptions to account for variability in soil, bedrock, and groundwater conditions:

- A soil hydraulic conductivity of 5.0 x 10^{-7} m/sec for the underground excavations (the highest hydraulic conductivity measured in the on-site well slug tests and grain size samples, increased as a conservative factor of safety).
- An initial unconfined saturated aquifer thickness of 8 m;

- An initial groundwater elevation corresponding to the highest measured/observed groundwater elevation from monitoring wells/boreholes across the combined property (0.73 mBGS), increased by 0.23 m to 0.50 mBGS to account for seasonal variation.

5.2 Dewatering Calculations

To estimate the steady-state dewatering flow rate needed to maintain dry conditions in the excavation for the underground structure, the following equation (for radial flow to an unconfined aquifer) from Powers (2007)[1] was used:

$$Q = \frac{\pi K\left(H^2 - {h_w}^2\right)}{\ln\left(\frac{R_o}{r_e}\right)}$$

Where:

Q = Flow Rate (m^3/sec)

H = Initial Saturated Thickness (Piezometric Head) of Aquifer (m)

h_w = Dewatered Saturated Thickness (Piezometric Head) of Aquifer (m)

K = Soil Hydraulic Conductivity (m/sec)

r_e = Effective radius, $r_e = \sqrt{(excavation\ area/\pi)}$ (m)

R_o = Radius of influence, $R_o = 3000*(H-h_w)*\sqrt{K}$ (m)

Where R_o is very close to r_e or less than r_e, to avoid $\ln\left(\frac{R_o}{r_e}\right)$ resulting in a very small or negative number R_o is replaced with ($R_o + r_e$) in the formula above, which gives a reasonable estimate of the dewatering requirements.

Using the assumptions listed in Section 5.1 and its subsections, the steady-state inflow rate and radius of influence listed in Table 5 below were estimated.

Table 5: Steady-State Dewatering Requirements

Excavation	Daily Dewatering Rate (L/day)	Radius of Influence (m)
Building 1 - Underground Structure	15,150	8.70

[1] **Powers, P.J. et al. 2007. Construction Dewatering and Groundwater Control: New Methods and Applications. Wiley.**

5.2.1 Calculated Dewatering Rates, With Factors of Safety

It is important to consider that dewatering requirements will be highest at the start of the dewatering process when the volume of water stored within the pore spaces of the soil and/or within the bedrock fracture matrix must be extracted. This storage must be accounted for to allow for rapid achievement of drawdown targets.

Initial drawdown of the overburden soils within a short period of time would be expected to require additional pumping capacity. An initial drawdown requirement has been calculated assuming a surcharge of 100% of the estimated steady state dewatering rate.

While it is important to consider that during and after precipitation events significantly higher dewatering flow rates may be required to account for direct precipitation and surficial runoff falling into an excavation; recent changes to Ontario Regulation 63/16 mandate that stormwater does not need to be counted as part of the daily dewatering limit (although measurements of the total water taking form the site each day must include both groundwater and stormwater).

Additionally, at the time of preparation of this assessment the extent of site servicing trenches is unknown. To account for additional dewatering requirements associated with servicing, an estimated water taking volume for servicing trenches has been included.

Table 6 below provides a summary of the calculated dewatering rates and factors of safety for the excavation.

Table 6 – Calculated Maximum Total Dewatering Rate including Factors of Safety

	Steady State Dewatering (L/day)	**Initial Drawdown Surcharge (100%) (L/day)**	**Potential Servicing Trench Dewatering Requirements (L/day)**	**Maximum Total Dewatering Requirement (L/day)**
Building 1 - Underground Structure	15,150	15,150	60,000	90,300

The totals shown in Table 6 indicate a potential maximum dewatering requirement of up to 90,300 L/day for dewatering of the excavation footprint. An Environmental Activity and Sector Registry (EASR) would be required to authorize pumping at this rate. Additionally, a Sewer Discharge Permit from the City of Bolton/the Region of Peel would be required to discharge to municipal sewers if pumped water is not collected for off-site disposal.

While the conservative assumptions and factors of safety discussed in the preceding sections combine to create conservative dewatering calculations, it is important to consider the variable nature of the overburden aquifer.

5.2.2 Management of Precipitation and/or Runoff

It is important to consider that during and after precipitation events significantly higher dewatering flow rates may be required to account for direct precipitation and surficial runoff falling into an excavation. As an example, based on excavation area footprints assumed above a 50 mm storm event pumped out within 24 hours has been assumed in Table 7 below.

Table 7 –Estimated Precipitation Dewatering Volume (50 mm storm event within 24 hours)

	Potential Precipitation Dewatering Volumes (L/day)
Building 1 - Underground Structure	39,400

The direct dewatering of precipitation inflow and runoff into an excavation is excluded from daily dewatering volumes as part of an EASR. While the total volume of water taken each day (including groundwater, surface water, precipitation, and runoff) must be measured and recorded as part of the dewatering monitoring program, only the volume of groundwater taken is “counted” towards the EASR-permitted daily water taking volume.

5.3 Dewatering Calculations - Discussion

The potential maximum dewatering requirements outlined above are reasonable based on the information available; however, a less-conservative assumption of total dewatering requirements (e.g. allowing a longer initial drawdown time for the excavation, using a less conservative hydraulic conductivity value, using a less conservative excavation depth and/or seasonally high groundwater elevation, assuming shorter servicing alignment dewatering sections, etc.) could reduce the estimated total dewatering requirement significantly.

The purpose of applying multiple conservative assumptions to the calculation variables is to attempt to consider “worst case scenario” conditions to provide enough buffer in the EASR maximum permitted daily pumping volume. The calculations above are not intended to accurately predict actual dewatering volumes, but rather to estimate potential maximum dewatering volumes.

Additionally, it is important to consider a factor of safety of 2.0 is applied to all dewatering calculations. This factor of safety is applied to account for uncertainties, unknown conditions, and other variables; however, under real-world conditions it is reasonable to anticipate dewatering at rates 2.0x the steady state calculated rates may not be required. The client, the construction

contractor, and the dewatering contractor shall review the dewatering calculations provided above and make their own determinations regarding expected typical daily dewatering requirements.

Further, performing one or several pumping tests in advance of designing and installing dewatering systems would provide empirical data that could be used to refine maximum daily pumping requirements. The client, the construction contractor, and the dewatering contractor shall review the dewatering calculations provided above and make their own determinations regarding the potential benefits of performing pumping tests, and the potential maximum daily dewatering requirements for the project, as part of their construction dewatering design strategy.

As noted previously, in the event construction parameters change beyond the assumptions included in these calculations, revised construction dewatering calculations will be necessary.

6. PERMIT REQUIREMENTS AND DEWATERING DISCHARGE

Ontario Regulation 387/04 requires authorization from the Ministry of the Environment, Conservation, and Parks (MECP) for all water takings over 50,000 L/day. Ontario Regulation 63/16 historically specified that for temporary construction dewatering at rates between 50,000 and 400,000 L/day an Environmental Activity and Sector Registry (EASR) could be obtained in lieu of a Permit to Take Water (PTTW).

However, as of July 2, 2025 changed to Ontario Regulation 63/16 have removed the upper limit for temporary construction dewatering. As a result, an EASR registration is sufficient to manage the calculated temporary dewatering rates provided in Section 5 and its subsections

Temporary discharge to a municipal sewer would require a Sewer Discharge Permit/Agreement from the City of Bolton/Region of Peel if pumped water is not contained for off-site disposal.

6.1 Dewatering Discharge

It is expected that dewatering discharge will be directed to municipal sewers; or, collected for off-site haulage and disposal.

As discussed in Section 2, groundwater chemistry samples exhibited exceedances of Region of Peel Storm Sewer Use By-Law criteria limits for TSS and multiple Total Metals; and exceedance of Region of Peel Sanitary Sewer Use By-Law criteria limits for TSS. Discharge treatment and mitigation measures will need to be developed and implemented to permit discharging to municipal sewers.

Section 7 below discusses mitigation measures that will need to be implemented to permit discharging to municipal sewers.

It is noted based on the relatively low calculated steady-state dewatering rates collection of discharge for disposal by a licensed hauler may be a possibility for the project. Disposal by a licensed hauler would eliminate the requirement for on-site treatment, and for a Sewer Discharge Permit. The client and their dewatering contractor should evaluate the potential benefits of haulage vs. discharge to municipal sewers as part of the overall construction dewatering strategy.

7. POTENTIAL IMPACTS OF CONSTRUCTION DEWATERING

7.1 Municipal Supply Wells and Surface Water Intakes

Ontario Source Protection Information Atlas (OSPIA) mapping shows the study area does not lie within a municipal Wellhead Protection Area (WHPA) or municipal surface water Intake Protection Zone (IPZ).

As all construction dewatering discharge would be required to meet the appropriate Sewer Use By-Law prior to discharge, and dewatering of the shallow subsurface soils will only occur during the construction period, it is anticipated that routing dewatering discharge to the municipal sewers would not result in negative impacts to surface water quality where municipal sewers discharge.

7.2 Sensitive Features

OSPIA mapping indicates that the subject property does not fall within a highly vulnerable aquifer (HVA) zone, or a significant groundwater recharge area (SGRA).

Natural Heritage Area maps from the Ministry of Natural Resources and Forestry (MNRF; 2023) reveal no Areas of Natural and Scientific Interest (ANSIs) within the subject property or surrounding area.

While no impacts to municipal supply wells, surface water intakes, or sensitive features are anticipated, minimization of the potential for discharge of contaminants to the ground surface where they could infiltrate into the subsurface along with minimization of erosion resulting from construction dewatering discharge shall be considered of prime importance during all on-site construction and dewatering activities.

7.3 Private Supply Wells

Well Records from the Ministry of the Environment, Conservation, and Parks (MECP) Water Well Record (WWR) Database (2020) were reviewed to determine the number of supply wells present. According to the MECP WWR Database nineteen wells are located within an approximate radius of 500 m from the subject property.

Of these wells, eight are identified as test holes or monitoring wells. Five well records pertain to abandoned wells, two well records have partial or no data, and one additional well is identified as not in use. These records have been excluded from further consideration.

The two remaining domestic use wells are completed in overburden soils at depths of 15.24 and 77.72 mBGS, respectively.

The Region of Peel Department of Public Works was consulted to determine where municipal watermains existed within a 500 m radius of the property. Watermains were identified along Colerain Drive, Harvest Moon Drive, King Street (Emil Kolb Parkway), and 6th Line. It is anticipated that MECP WWRs which may plot along these roadways could represent wells which have been previously decommissioned, or wells which are not used for drinking water supply.

Based on the calculated maximum radius of influence of 8.70 m, and the anticipated dewatering depth of up to 4.6 m in low-permeability soils that do not represent an aquifer, no impacts to private water supply wells from construction dewatering would be expected.

7.4 Surface Water Features

There are no surface water features on or adjacent to the property. A stormwater management pond is located south of Harvest Moon Drive to the south of the subject property. There is a tributary of Jaffary's Creek located east of the property leading to Jaffary's pond. TRCA mapping indicates that the creek and surrounding area are regulated by the TRCA; however, the subject property is not within a regulated area.

Based on the calculated maximum radius of influence of 8.70 m, no impacts to wetlands or surface water features from construction dewatering would be expected.

7.5 Groundwater Resources

As construction dewatering will temporarily withdraw water from the shallow overburden soils which are not expected to be utilized by private water supply wells within the estimated radius of influence of construction dewatering, and are not supporting surface water features, no material impacts to shallow groundwater resources are anticipated.

7.6 Confined Groundwater Conditions and Excavation Bottom Heave

While confined aquifer conditions were not identified in the boreholes drilled on the subject property, bottom heave occurring in excavations due to unweighting of the soils as a result of excavations removing soil/bedrock weight overlying pressurized aquifer conditions should still be considered a (relatively unlikely) possibility.

As discussed in Section 8.5 below, diligent observation of conditions in the excavation is recommended to monitor for potential bottom heaving. In the unlikely event bottom heaving or other issues due to pressurized aquifer conditions occur, the construction and dewatering strategies for the project would need to be revised.

7.7 Geotechnical Issues and Settlement

The conservatively calculated radius of influence of construction dewatering is up to 8.70 m. Some buildings may lie within the radius of influence, and roadways and services may be located within the radius of influence; therefore, a geotechnical engineer shall be consulted prior to commencement of any on-site dewatering to determine whether geotechnical issues or impacts due to settlement resulting from construction dewatering could be anticipated. A geotechnical engineer shall provide any applicable monitoring and/or mitigation recommendations to address any potential geotechnical issues or impacts that are identified.

PLEASE NOTE: The MECP expects an assessment of geotechnical issues and the potential impact of soil settlement; as well as a contingency plan to address any risks associated with land subsidence, to be included as part of an EASR application package. HCS understands and assumes this assessment of geotechnical issues and settlement will be prepared by a qualified geotechnical engineer and provided to the client prior to commencement of any dewatering activities.

The proponent is therefore advised of the need for a geotechnical engineer to complete an assessment of geotechnical issues/settlement potential prior to commencement of dewatering activities.

This scope of this report does not include detailed analysis of the potential for geotechnical issues or settlement, and it will be the responsibility of the construction contractor and dewatering contractor to retain a geotechnical engineer to complete an assessment of geotechnical issues and provide any appropriate monitoring and/or mitigation measures to support the EASR for the project.

8. MONITORING AND MITIGATION

The following monitoring and mitigation recommendations are provided to ensure construction dewatering does not impact surface water features or groundwater resources used by private or municipal water supply wells, and to ensure any impacts from construction dewatering are promptly and effectively resolved. These monitoring and mitigation recommendations shall be implemented during construction dewatering, along with any monitoring and mitigation recommendations that may be provided by a geotechnical engineer.

8.1 Discharge Volumes

During all construction dewatering operations, total pumping rates and discharge volumes from all excavations shall be measured using calibrated flow measurement devices (such as flow meters), with daily summation of total pumping rates and volumes and comparison to the permitted rates and volumes to ensure no exceedances occur.

As discussed previously in Section 5.2.2, while dewatering of direct precipitation and runoff does not count towards the EASR-permitted daily dewatering volume, all water taking (groundwater, surface, water, precipitation, and runoff) must be measured and recorded on a daily basis.

In the event daily water taking rates or volumes exceed permitted values, the construction methodology or dewatering methodology shall be modified immediately to bring the daily water taking back into compliance with the permitted values.

The dewatering contractor shall maintain records of all daily water taking rates and volumes, including dates and locations of all water takings. The recorded data shall be retained for a period of five years per MECP requirements, and uploaded to the MECP's Water Taking Reporting System (WTRS) by March 31 of the year following the water taking.

8.2 Dewatering Discharge Location, and Chemistry Monitoring

It is expected dewatering discharge will be routed to the municipal sewers. As discussed below, water chemistry samples shall be collected weekly from the discharge location(s) and analyzed for the appropriate Sewer Use By-Law criteria limits for discharge to municipal sewers.

If any exceedances are measured, water treatment and mitigation measures will need to be implemented immediately and the water shall be re-tested with a maximum 24-hour turnaround time (where possible based on lab analysis methods) to confirm compliance with the appropriate criteria limits prior to continued discharge.

All conditions specified in any Discharge Permit(s) that may be required must be also be adhered to during construction dewatering operations.

8.2.1 Collection of Dewatering Discharge for Off-Site Disposal

As noted previously, based on the relatively low calculated steady-state dewatering rates collection of discharge for disposal by a licensed hauler may be a possibility for the project, and would eliminate the requirement for treatment, and for a Sewer Discharge Permit. The client and their dewatering contractor should evaluate the potential benefits of haulage vs. discharge to municipal sewers as part of the overall construction dewatering strategy.

8.3 Discharge Water Chemistry and Treatment

As discussed in Section 2, the groundwater chemistry samples exhibited exceedances of Region of Peel Storm Sewer Use By-Law criteria limits for TSS and multiple Total Metals; and exceedance of Region of Peel Sanitary Sewer Use By-Law criteria limits for TSS. Mitigation measures that will need to be implemented to permit discharging to municipal sewers are described below.

The dewatering contractor must implement appropriate treatment methodologies for these exceedances as well as any exceedances that may occur during the construction dewatering program, and all required treatment equipment shall be set up on site prior to any construction dewatering.

8.3.1 Discharge to Municipal Sewers

Although field testing will be required to ensure the appropriate Region of Peel Sewer Use By-Law criteria are being met if discharge is directed to municipal sewers, a suggested initial treatment system could consist of the following (for each dewatering system):

- A Settling Tank sufficiently sized for the expected dewatering flow rate;
- Two filter vessels (appropriately sized for the dewatering flow rate) equipped with disposable 25-micron filter bags.

Field testing will be required to ensure the appropriate Sewer Use By-Law criteria are being met, along with any requirements mandated in additional permits that may need to be obtained to support discharge to municipal sewers.

It will be the responsibility of the dewatering contractor to design and implement an appropriate treatment methodology; and, to revise the methodology if regular sampling and analysis of the discharge (as discussed below) shows Sewer Use by-Law parameter exceedances.

8.3.2 Assessment and Monitoring

Once the treatment system(s) are set up, short-term trial dewatering should take place to allow representative water samples to be collected upstream (pre-treatment) and downstream (post-treatment) of the system(s), with sampling for appropriate Sewer Use By-Law parameters for discharge to municipal sewers. In the event post-treatment samples exhibit exceedances of any parameters, the treatment system(s) will need to be modified and chemistry re-testing completed until the post-treatment samples show no exceedances.

During all construction dewatering operations, samples from each dewatering system should be collected on a weekly basis and analyzed for the appropriate suite of parameters:

- Region of Peel Storm Sewer / Sanitary Sewer Use By-Law

If water chemistry testing shows an exceedance of applicable criteria limits, the dewatering contractor or a water treatment specialist shall be consulted immediately to determine the most effective method of mitigating the exceedance. Treatment should be implemented with follow-up water chemistry sampling to confirm that no further exceedances are measured.

Weekly water chemistry sampling can also include upstream (pre-treatment) sampling to assess whether continued use of treatment systems is required. If upstream sampling results demonstrate that the pumped water meets the appropriate criteria, the treatment system(s) can be taken offline. In the event exceedances are measured in future weekly samples, the treatment system(s) would need to be brought back online immediately.

8.4 Excavation Bottom Heave

All excavations shall be monitored daily for signs of bottom heave. In the unlikely event heaving is observed, all excavation work in the immediate area shall cease and soils shall be replaced in the excavation to restore overburden weight. If bottom heave occurs, alternate construction and/or dewatering methodologies will be required to address the issue, and coordination between the construction contractor, the dewatering contractor, and engineering consultants will be required to ensure the situation is effectively mitigated.

The scope of this report does not include detailed analysis of the potential for excavation bottom heave, and it will be the responsibility of the construction contractor and dewatering contractor to identify and mitigate bottom heave in the (relatively unlikely) event it occurs.

8.5 Geotechnical Issues for Adjacent Infrastructure

A geotechnical consulting engineer shall be retained to evaluate all infrastructure, (utility poles, light poles, above ground and underground services, building foundations, roadways, etc.) within the calculated radius of influence of dewatering at all dewatering locations. Infrastructure such as utility poles, light poles, underground services, etc. within the radius of influence of construction dewatering may need to be braced and supported, based on the geotechnical engineer's recommendations. Supported infrastructure shall be monitored regularly during construction dewatering activities to ensure no settlement or impacts are occurring. Any settlement or impacts that are noted by the geotechnical consulting engineer shall be assessed and mitigated promptly and effectively using appropriate methodology.

For building foundations and other structures that may be identified within the calculated radius of influence, a geotechnical consulting engineer shall perform a foundation assessment, install crack monitors as required, and monitor the foundations on a weekly basis for signs of settlement or other impact.

In the event settlement or other impact to foundations occurs, construction dewatering and/or excavation methodologies may need to be revised, dewatering may need to cease temporarily, and the geotechnical consulting engineer shall take all required steps to halt resolve the impact.

8.6 Water Supply Wells

As discussed previously, no impacts to private or municipal water supply wells from construction dewatering are anticipated due to the lack of any municipal wells or private supply wells screened within the overburden deposits that will be dewatered within the conservatively calculated maximum area of influence of construction dewatering.

9. REPORTING

Daily water taking volumes shall be summarized and submitted to the MECP at the end of each calendar year, by March 31 of the following year, using the Water Taking Reporting System (WTRS), or the Regulatory Self-Reporting System (RSRS) through the Public Secure Client Access Management System (CAMS). All monitoring data will be retained for five years.

10. EASR NOTIFICATION REQUIREMENTS

Once an EASR has been registered with the MECP, at least 48-hours prior to commencement of dewatering activities the local Ministry District Office (the Halton-Peel District Office) must be notified in writing of the upcoming water taking. The notification must include the following:

- Description of where the water taking will occur
- Dates on which the water taking will occur
- Approximate time and duration of the water takings
- The EASR registration number
- The name and phone number of a person who can be contacted to report any concerns about interference with another water supply.

As the project is being undertaken in the City of Bolton and the Region of Peel (the Tier 1 Municipality), the Region and the City must be notified in writing prior to any water taking under this EASR. Notification must include the following:

- The name of the persons/companies who will be taking water
- The start and end dates of construction dewatering
- The location of the construction dewatering, the method of discharge, and the location of discharge.

Additionally, in the event the water taking is proposed to continue (or does continue) for more than 365 days, the lower tier municipality(ies) and any conservation authority within whose jurisdiction the proposed water taking is located must receive the same written notification as the Tier 1 municipality.

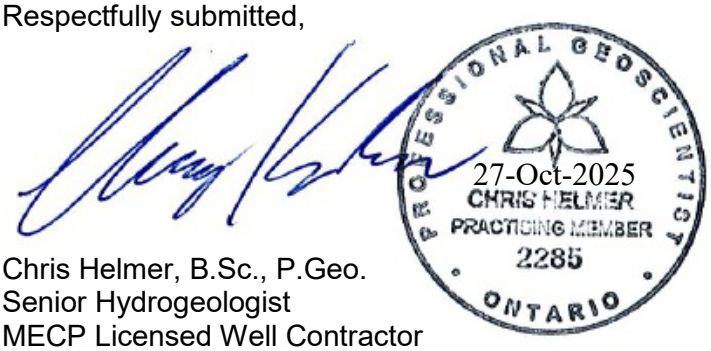
11. QUALIFICATIONS

Chris Helmer is a licensed Professional Geoscientist, registered with the Association of Professional Geoscientists of Ontario since 2013. Mr. Helmer has been employed in the field of hydrogeology for more than twenty years, and has worked on construction dewatering projects Environmental Activity and Sector Registry applications, and Permit to Take Water applications for more than fifteen years.

12. REPORTING

Daily water taking volumes shall be summarized and submitted to the MECP at the end of each calendar year, by March 31 of the following year, using the Water Taking Reporting System (WTRS), or the Regulatory Self-Reporting System (RSRS) through the Public Secure Client Access Management System (CAMS). All monitoring data will be retained for five years.

Respectfully submitted,



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encl: Master Site Plan (Q4A Architects, January 2025)
encl: Laboratory Certificates of Analysis L2597301 and WT2307652
encl: Slug Test Analyses
encl: Grain Size Analysis Graphs
encl: Borehole Logs
encl: MECP Well Records