Proposed Commercial Development
8584 Regional Rd. 25, Milton

SERVICING & STORMWATER MANAGEMENT REPORT

Prepared for:

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1. INTRODUCTION

MGM Consulting Inc. has been retained by Salmona Development Consultants to prepare a Functional Servicing and Stormwater Report to address the site-specific infrastructure and grading for a site development located at 8584 Regional Rd. No 25, in the Town of Milton that includes for a two-storey commercial truck dealership building, with site access off of Regional No 25, associated surface parking and servicing infrastructures.

The site is approximately 0.7 ha in area with the legal description "Part of Lot 4, Concession 2 Esq, in the Town of Milton in the Regional Municipality of Halton."

2. EXISTING CONDITIONS AND DEVELOPMENT LIMITS

The proposed site development consists of three residential lots which include grassed and soft landscaped areas, and three residential dwelling units with vehicular access off of Regional Rd. 25. The development site abuts the fire station to the north, Regional Rd. 25 to the east and undeveloped lots to the south and west side.

The existing ground elevations within the site range from the high point in the order of 217.80 m. at the face of the house, and the drainage splits a half toward the back of the property and the other half toward the road right of way then conveys to the storm sewer within Regional Rd 25 right of way via the existing ditch inlet within the roadside ditch.

The existing site drainage areas and location are indicated in Figures No. 2 & 1.

3. EXISTING MUNICIPAL INFRASTRUCTURE

The subject site fronts the Regional Road 25 to the east and Regional Rd. 25 is currently a four-lane roadway and a median lane offering left and right turns to the existing development lots on both sides of the right of way. The road was developed with an urban cross section with a 0.5m concrete sidewalk adjacent to the roadside curb.

Existing municipal servicing as indicated on record drawings provided by the Town of Milton and Region of Halton is as follows:

<u>Regional Road 25 Right of Way:</u>

- A 600 mm diameter storm sewer along the east side of Regional Rd. 25 captures drainage from the site via roadside ditch and ditch inlet connects to the municipal storm system.
- A 300mm sanitary sewer located within the Regional Rd. 25 right of way which provided sanitary service for the existing houses.
- A 300mm watermain is located within the east side of the Regional Rd. 25 right of way which provided the feed for an existing fire hydrant located on the east side of the Regional Rd. 25 and provided service to the existing property.

4. PROPOSED DEVELOPMENT SCENARIO

The proposed site development includes the construction of a two-storey truck dealership building, with vehicular access off of Regional Rd. 25 to the east side of the property, surface parking and soft landscaped areas. The proposed building footprint is approximately 1181m^2 with a total gross floor area of 2281 m^2. Concrete curbs are proposed along all sides of the site to contain the drainage within the site and ensure major storm conveyance flow to the Regional Rd. 25 right of way. Minor storm drainage from the parking lot is proposed to be captured in the proposed storm system and conveyed to the municipal storm system on Regional Rd 25 right of way.

The proposed site development is indicated in Figure No. 3.

5. PROPOSED GRADING AND DRAINAGE

The proposed site grading will take into account the existing topography and perimeter elevations, as required to accommodate the proposed building finish floor elevation, provide safe vehicular and pedestrian access and to provide minimum cover on storm servicing as required for frost protection. Slopes within the paved areas of the site will typically be set between 1% and 5%. Grading will also be completed such that the majority of the storm drainage from the development area will be contained with storm runoff being conveyed to proposed on-site catchbasins, and the internal storm system, outletting to the existing storm sewer within the Regional Rd. 25 right of way. Drainage off of building roofs will be conveyed to the infiltration pit via rainwater leaders and completed with overflow to the onsite storm system.

Proposed site grading is indicated on the Site Grading Plan, Drawing No. CV-2.

Emergency overland during severe storm events, or when an outlet is blocked, will be to Regional Rd. 25 right of way at an elevation of 217.33 m through the east entrance to the site.

6. PROPOSED STORMWATER MANAGEMENT

Proposed stormwater management controls for the site have been completed based on the proposed redevelopment area of 0.7ha. The following summarizes the proposed minor and major storm drainage systems, and the stormwater management features proposed for the subject site. Detailed calculations supporting the selection of proposed storm servicing and stormwater management are included in **Appendix A**.

Water Quantity Storage Requirements

The stormwater management design has been based on reducing flows from the site to below the peak flows during the 2 and 100-year storm event based on a pre-development runoff coefficient of 0.38 as indicated on the pre-development drainage areas Figure No. 2.

Pre and post-development storm drainage areas for the site are included as **Figures 2 and 3**.

Water Quality Requirement

Stormwater quality controls are proposed as required to remove an estimated 80% of the total suspended solids, on an annual loading basis.

6.1 Proposed Minor Storm System

The proposed minor system has been designed to convey the 5-year flow, without surcharging, which is consistent with current Town of Milton standards. The internal storm systems will consist of a series of underground storm sewers, manholes and catchbasins as indicated on the attached Site Servicing Plan-CV1

A storm design sheet for the components of the proposed internal storm system is included in **Appendix A**

6.2 Proposed Major Storm System

Major storm flows from the site are to be conveyed to Regional Rd. 25 right of way through proposed east vehicular access at an elevation of 217.33m. This elevation is 320 mm below the building finish floor elevation proposed within the site. Perimeter elevations surrounding attenuated areas of the site have been set at a minimum elevation of 217.45 m to ensure conveyance of overland flow to the municipal right of way and contain major site flow without impacting adjacent properties.

6.3 Proposed Stormwater Rate Controls and Site Storage

Stormwater rate controls have been provided as required to control post-development flows from the site to the peak flow during 5 to 100-year storm events based on the pre-development runoff coefficient of 0.38. Based on a total area of 0.7 ha which includes the external drainage area, the allowable storm flows from the site are as indicated below:

Storm Events	Allowable Flows (m^3)
5	0.077
10	0.089
25	0.105
50	0.116
100	0.127

Rate controls have been provided with the installation of a 150 mm diameter orifice tube,

installed at the outlet of the proposed Oil Grit Separator, which will cause the post-development flows during the 5- and 100-year storm events to be controlled to 0.074 cms and 0.118 cms respectively, which are both below the calculated allowable flow rates.

On-site storage has been provided as required, including 40.1 m^3 within the proposed storm system and 288.9 m^3 of surface storage within pavement areas which exceeds the calculated required storage of 53.7 m^3 during the 100-year storm event.

Rooftop quantity controls are proposed with the installation of control flow roof drains. The proposed roof layout allows for a maximum 150mm ponding depth and a controlled flow of 0.0068 m^3/sec.

Detailed Stormwater Management Calculations are included in **Appendix A**.

6.4 Proposed Storm Water Quality Controls

The current stormwater quality control objective is to provide an "enhanced" level of treatment which is equivalent to removing 80% of the total suspended solids from the site runoff on an annual loading basic.

An Oil/Grit Separator model EFO-04 is recommended to meet the water quality objective for the site. Model EFO-04 has been sized to accommodate for the external drainage conveyed through the site from the north and southeast portion of the park. This unit will be installed on the downstream end of the private side storm sewer before outletting into the municipal storm system. The proposed unit will be adequate to ensure 82% removal of Total Suspended Solids (TSS) and 90% of the runoff volume.

Output from the manufacturer's modelling software used to select the proposed package treatment unit is included in **Appendix C**.

7. SEDIMENT AND EROSION CONTROLS DURING CONSTRUCTION

In 2019, Toronto and Region Conservation Authority (TRCA) under the Sustainable Technology Program (STEP) prepared a guideline entitled "Toronto and Region Conservation Authority (TRCA). 2019. Erosion & Sediment Control Guideline for Urban Construction. Toronto and Region Conservation Authority, Vaughan, Ontario". Based on the guideline, all projects involving the removal of topsoil or site alteration requires an Erosion and Sediment Control (ESC) Plan in place prior to commencing construction. Failure to adhere to the plan could lead to the potential for prosecution under the various environmental legislations.

The following principles assist in creating an effective ESC Plan.

(Ref. Erosion and Sediment Control Guidelines for Urban Construction, 2019)

- Adopt a multi-barrier approach to provide erosion and sediment control through

erosion controls first.

- Retain existing ground cover and stabilize exposed soils with vegetation where possible.
- Stabilize bare soil areas that are inactive for 30 days or longer.
- Reducing flow velocities and flow runoff using flow interrupters (e.g check dams) & erosion controls (e.g vegetation).
- Limit the duration of soil exposure and phase construction where possible.
- Limit the size of disturbed areas by minimizing nonessential clearing and grading.
- Minimize slope length (>30m) and gradient (>10%) of disturbed areas.
- Maintain overland sheet flow and avoid concentrated flows.
- Store/stockpile soil away (e.g. greater than 15 meters) from watercourses, drainage features and top of steep slopes.
- Ensure contractors and all involved in the ESC practices are trained in ESC Plan, implementation, inspections, maintenance, and repairs.
- Adjust ESC Plan at construction site to adapt to site features.
- Assess all ESC practices before and after all rainfall and significant snowmelt events.

8. PROPOSED SANITARY SERVICING

Sanitary servicing is proposed with a connection to the existing sanitary manhole located within the Regional Rd. 25 right of way. Based on the available invert elevation of 212.50m on the existing sanitary manhole, and proposed grading indicating a finished first floor elevation of 207.65 m. a gravity sewer connection can be provided to service the proposed building.

As indicated on the sanitary sewer design sheet included in **Appendix D**, the expected post sanitary discharge from the site is approximately 0.886 L/s.

The proposed sanitary drainage system is indicated on Site Servicing Plan - CV-1

9. PROPOSED WATER SERVICING

A preliminary calculation for the required water demand for fire protection and domestic supply is included in **Appendix B**. The proposed water supply requirements are calculated in accordance with the Fire Underwriter Survey and Design Criteria Manual provided by the Region of Halton.

As indicated, the estimated domestic water consumption is 0.45 L/s required to service the proposed development. The maximum daily demand plus fire flow is calculated as 67.12 L/sec which is the flow that is required to be available at a local hydrant at a minimum pressure of 150 KPa. A Siamese connection is to be installed along the face of the building and within 45m of the existing fire hydrant. The exact location of the water service connection will be provided in coordination with the mechanical engineer.

A 150mm watermain is proposed to adequately provide fire protection and service to the site.

A pressure and flow test will be provided as required to confirm adequate flow are pressure for fire protection during the detailed design phase.

Preliminary fire flow calculations are included in **Appendix B**.

Proposed water servicing is indicated on Site Servicing Plan - CV-2.

10. SUMMARY

The following summarizes the proposed site works as required to accommodate the proposed site redevelopment:

- Site grading can be completed taking into account perimeter elevations, and as required to accommodate the proposed building finish floor elevation, provide safe vehicular and pedestrian access and to provide minimum cover on storm servicing as required for frost protection, convey storm flows to proposed drainage features, and to safely convey major storm flows to the adjacent municipal right of way,
- Storm drainage is provided to contain site drainage, convey minor storm flows to the existing municipal storm system, and as required to convey the 5-year storm flows without surcharging,
- Stormwater management peak flow objectives can be achieved with the installation of a control orifice that will control the post-development flows to below the pre-development level calculated for 5-100 year flow based on the pre-development runoff coefficient.
- Sufficient on-site storage can be provided in surface ponding areas, and below ground in the internal storm system and proposed underground storage chambers.
- Stormwater quality controls are proposed to be achieved using a package EFO-04 treatment unit.
- Sediment and erosion controls as indicated on the Removals/Sediment and Erosion Control Plan are to be implemented prior to construction and maintained until the site is stabilized.

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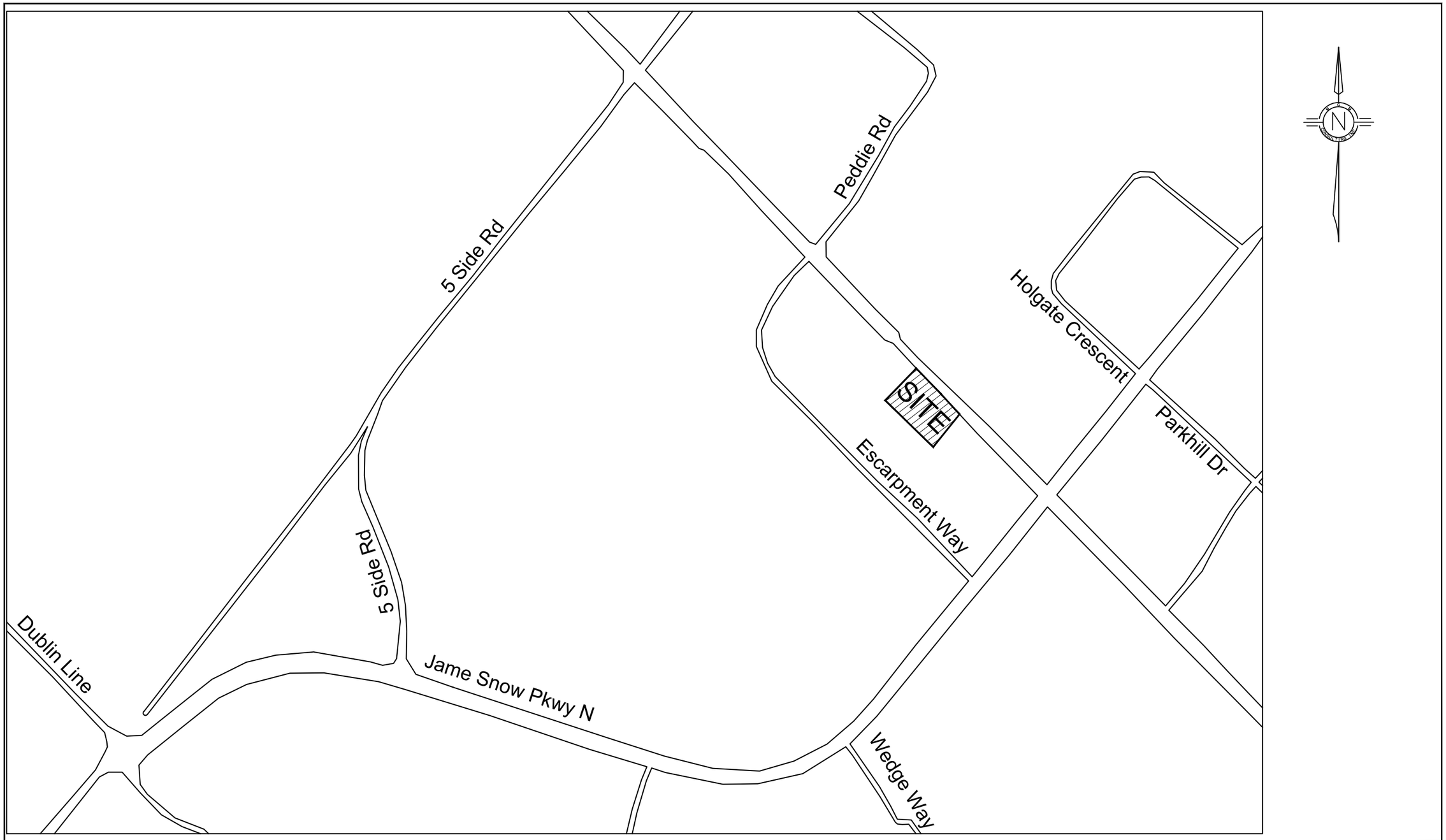

LOCATION PLAN

8584-8604 REGIONAL ROAD 25, MILTON, ONTARIO

MGM CONSULTING INC
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400 Bronte Street South
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FIGURE 1.0

DATE: MAY 2023
N.T.S
DWG#: 2023-021 C2

LEGENDS:

0.017 / 0.90 — DRAINAGE AREA / RUNOFF COEFFICIENT

PRE-DEVELOPMENT DRAINAGE CONDITION

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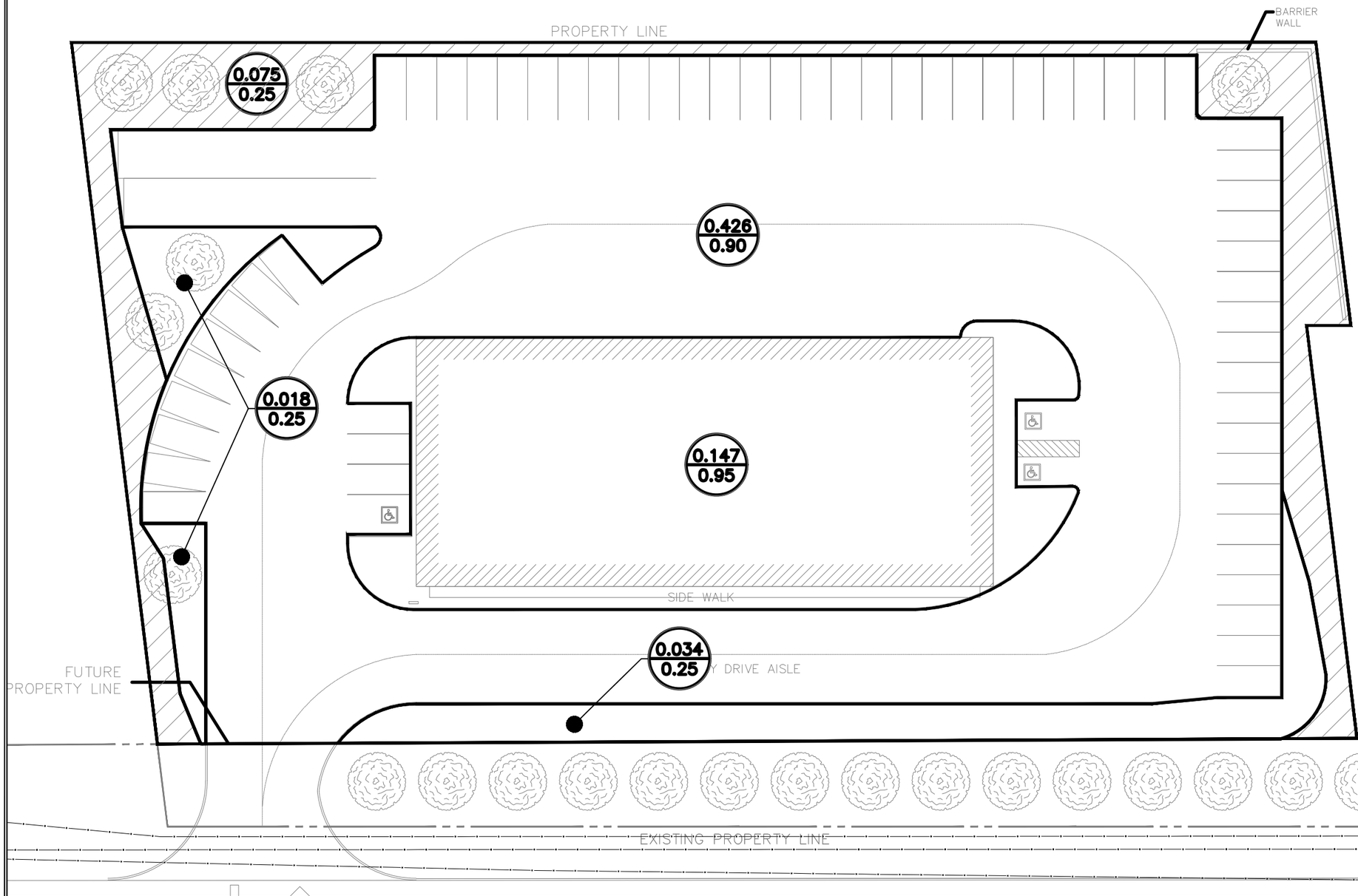
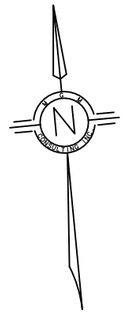
FIGURE 2.0

DATE: MAY 2023
N.T.S
DWG#: 2023-021 C2





LEGENDS:

UNATTENUATE AREAS

0.100
0.90

DRAINAGE AREA

RUNOFF COEFFICIENT

POST-DEVELOPMENT DRAINAGE CONDITION

8584-8604 REGIONAL ROAD 25, MILTON, ONTARIO

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FIGURE 3.0

DATE: MAY 2023
N.T.S
DWG#: 2023-021 C2

APPENDIX A

STORMWATER MANAGEMENT CALCULATIONS

PROPOSED COMMERCIAL DEVELOPMENT
8584 Regional Road No 25, Milton, Ontario
STORMWATER MANAGEMENT CALCULATIONS

1.0 Redevelopment Drainage Area Characteristics

1.1 Existing Drainage Areas (see Figure No. 2):

	"c"	Area (ha)
Landscape	0.25	0.570
Pavement	0.90	0.062
Roof	0.95	0.068
Total Site Area:		0.700
Exisiting Site 'C' Coefficient	0.38	

External Drainage Areas:

	"c"	Area (ha)
Landscape	0.25	0.000
Total Catchment Area		**0.700**
Total 'C' Coefficient	**0.38**	

1.2 Proposed Drainage Areas (see Figure No. 3)

Attenuated areas	"c"	Area (ha)
Landscape	0.25	0.052
Pavement	0.90	0.425
Roof + Concrete Pavement	0.95	0.148
Sub Total Area:		0.625

Unattenuated areas	"c"	Area (ha)
Landscape	0.25	0.075
Sub Total Area:		0.075
Total (Attenuated + Unattenuated)		**0.700**
Total 'C' Coefficient	**0.79**	

External Attenuated Drainage Areas:

	"c"	Area (ha)
Landscape	0.25	0.000
Total Catchment Area		**0.700**
Total 'C' Coefficient	**0.79**	

As indicated, the proposed development will cause an increase in the imperviousness of the site.

2.0 Allowable Post Development Flows

Post development flows from the redevelopment area for the 2 to 100 year storm event are to be controlled to the pre-development flow rate based on an existing coefficient of 0.38

Based on Tc = 10 minutes
Intensity=A/(Tc+b)^c
Flow "Q"= 2.78CIA/1000, where C 0.38

Storm (years)	A	b	c	I (mm/hr)	Q (allow.) (cms)
2	779	6	0.8206	80.1	0.059
5	959	5.7	0.8024	105.3	0.077
10	1089	5.7	0.7955	121.8	0.089
25	1234	5.5	0.7863	143.0	0.105
50	1323	5.3	0.7786	158.2	0.116
100	1435	5.2	0.7751	174.1	0.127

3.0 Rooftop Controlled Flow and Storage Calculations

Flow from new roof areas are to be controlled with the installation of Zurn " Control-Flo" roof drains.

Controlled Roof Area =	0.118	ha
Total No. of Hoppers=	3	each
1 weir per Hopper	1	each
Weir Rating=	0.015	l/sec/mm
Max ponding depth =	150	mm.
Peak Flow from roof =	0.0068	m^3/sec.
Max. Storage provided =	59	cu.m.

4.0 Controlled Flow Calculations

Flows from the proposed storm system are to be controlled with the installation of an orifice over the outlet at OGS as indicated on the site servicing plan.

2 year ponding elevation =	215.10	m.
5 year ponding elevation =	215.60	m.
10 year ponding elevation =	216.00	m.
25 year ponding elevation =	216.80	m.
50 year ponding elevation =	217.30	m.
100 year ponding elevation =	217.33	m.

Orifice equation: Q = CA(2hg)^0.5, where,

orifice invert elev. =	214.4	m.
c =	0.82	
g =	9.81	cu.m./sec
Orifice Diameter =	150	mm.
A =	0.0177	sq.m.
centreline orifice =	214.48	m.

	Head h (m)	Controlled Flow (cms)	Controlled Flow+Unattenuated (cms)	Allowable Flow (cms)
2 year storm =	0.63	0.0507	0.055	0.059
5 year storm =	1.13	0.0681	0.074	0.077
10 year storm =	1.53	0.0793	0.086	0.089
25 year storm =	2.33	0.0979	0.105	0.105
50 year storm =	2.83	0.1079	0.116	0.116
100 year storm =	2.86	0.1085	0.118	0.127

5.0 Storage Calculations

5.1 2-Year Site Storage

Rainfall Duration min.	s	2 Year Rainfall Intensity (I) mm/h	Controlled Roof Flow cms	Attenuated Flow cms	External Attenuated Flow cms	Controlled Flow cms	Unattenuated Flow cms	Controlled Detention Volumes cu.m.
10	**600**	**80.1**	**0.0068**	**0.0880**	**0.0000**	**0.0507**	**0.0042**	**26.4**
15	900	64.1	0.0068	0.0704	0.0000	0.0507	0.0033	23.7
20	1200	53.8	0.0068	0.0591	0.0000	0.0507	0.0028	18.1
25	1500	46.5	0.0068	0.0511	0.0000	0.0507	0.0024	10.7
30	1800	41.2	0.0068	0.0452	0.0000	0.0507	0.0021	2.2

A maximum detention volume required when the 2 year post development flow is controlled to the predevelopment flow **26.4** **cu.m**

The total flow from the site during the 2 year storm event (attenuated + unattenuatec 0.0549 cms. Which is below allowable flow rate.

5.2 5-Year Site Storage

Rainfall Duration min.	s	5 Year Rainfall Intensity (I) mm/h	Controlled Roof Flow cms	Attenuated Flow cms	External Attenuated Flow cms	Controlled Flow cms	Unattenuated Flow cms	Controlled Detention Volumes cu.m.
10	**600**	**105.3**	**0.0068**	**0.1156**	**0.0000**	**0.0681**	**0.0055**	**32.6**
15	900	84.3	0.0068	0.0926	0.0000	0.0681	0.0044	28.2
20	1200	70.9	0.0068	0.0779	0.0000	0.0681	0.0037	19.8
25	1500	61.5	0.0068	0.0675	0.0000	0.0681	0.0032	9.3

A maximum detention volume required when the 5 year post development flow is controlled to the predevelopment flow **32.6** **cu.m**

The total flow from the site during the 5 year storm event (attenuated + unattenuated 0.0736 cms. Which is below allowable flow rate.

5.3 10-Year Site Storage

Rainfall Duration min.	s	10 Year Rainfall Intensity (I) mm/h	Controlled Roof Flow cms	Attenuated Flow cms	External Attenuated Flow cms	Controlled Flow cms	Unattenuated Flow cms	Controlled Detention Volumes cu.m.
10	**600**	**121.8**	**0.0068**	**0.1338**	**0.0000**	**0.0793**	**0.0063**	**36.8**
15	900	97.8	0.0068	0.1074	0.0000	0.0793	0.0051	31.4
20	1200	82.3	0.0068	0.0904	0.0000	0.0793	0.0043	21.5
25	1500	71.5	0.0068	0.0785	0.0000	0.0793	0.0037	9.0

A maximum detention volume required when the 10 year post development flow is controlled to the predevelopment flow **36.8** **cu.m**

The total flow from the site during the 10 year storm event (attenuated + unattenuate 0.0856 cms. Which is below allowable flow rate.

5.4 25-Year Site Storage

Rainfall Duration min.	s	25 Year Rainfall Intensity (I) mm/h	Controlled Roof Flow cms	Attenuated Flow cms	External Attenuated Flow cms	Controlled Flow cms	Unattenuated Flow cms	Controlled Detention Volumes cu.m.
10	**600**	**143.0**	**0.0068**	**0.1571**	**0.0000**	**0.0979**	**0.0074**	**39.6**
15	900	114.8	0.0068	0.1261	0.0000	0.0979	0.0060	31.5
20	1200	96.7	0.0068	0.1062	0.0000	0.0979	0.0050	18.1
25	1500	84.0	0.0068	0.0923	0.0000	0.0979	0.0044	1.7

A maximum detention volume required when the 25 year post development flow is controlled to the predevelopment flow **39.6** **cu.m**

The total flow from the site during the 25 year storm event (attenuated + unattenuate 0.1053 cms. Which is below allowable flow rate.

5.5 50-Year Site Storage

Rainfall Duration min.	s	50 Year Rainfall Intensity (I) mm/h	Controlled Roof Flow cms	Attenuated Flow cms	External Attenuated Flow cms	Controlled Flow cms	Unattenuated Flow cms	Controlled Detention Volumes cu.m.
10	**600**	**158.2**	**0.0068**	**0.1738**	**0.0000**	**0.1079**	**0.0082**	**43.6**
15	900	126.9	0.0068	0.1394	0.0000	0.1079	0.0066	34.5
20	1200	106.9	0.0068	0.1175	0.0000	0.1079	0.0056	19.6
25	1500	92.9	0.0068	0.1021	0.0000	0.1079	0.0048	1.4

A maximum detention volume required when the 50 year post development flow is controlled to the predevelopment flow **43.6** **cu.m**

The total flow from the site during the 50 year storm event (attenuated + unattenuate 0.1161 cms. Which is below allowable flow rate.

5.6 100-Year Site Storage

Rainfall Duration min.	s	100 Year Rainfall Intensity (I) mm/h	Controlled Roof Flow cms	Attenuated Flow cms	External Attenuated Flow cms	Controlled Flow cms	Unattenuated Flow cms	Controlled Detention Volumes cu.m.
10	**600**	**174.1**	**0.0068**	**0.1913**	**0.0000**	**0.1085**	**0.0091**	**53.7**
15	900	139.7	0.0068	0.1534	0.0000	0.1085	0.0073	46.6
20	1200	117.7	0.0068	0.1293	0.0000	0.1085	0.0061	33.1
25	1500	102.3	0.0068	0.1123	0.0000	0.1085	0.0053	16.0

A maximum detention volume required when the 100 year post development flow is controlled to the predevelopment flow **53.7** **cu.m**

The total flow from the site during the 100 year storm event (attenuated + unattenua 0.1175 cms. Which is below allowable flow rate.

* See controlled flow calculations in Section 3.0 & 4.0.

6.0 On-Site Storage Provided

6.1 Storm Sewer Pipe Storage

The detention volume available within the storm sewer pipes are as follows:

From	Size	Length	Vol. (cu.m.)
250mm PIPE	250	0	0.0
300mm PIPE	300	0	0.0
375mm PIPE	375	52.1	5.8
450mm PIPE	450	75.6	12.0
600mm PIPE	600	78.8	22.3

Total Pipe Storage = **40.1** m^3

6.2 Surface Ponding

The detention volume available within the ponding areas at an assumed elev of 220.70 m. is as follows:

Structure	Grate Elev. Elevation	Ponding Elevation	Area	Depth	Volume
CB4, CBMH3, CBMH8, CBMH5, CBMH6, CB7	217.03	217.33	2889	0.30	288.9

Total SurfaceStorage = **288.9** m^3

6.4 Total Stormwater Storage Provided Onsite

2-25yr Storage (Pipe) **40.1** m^3

25-100 yr Storage (Pipe + Surface Ponding) **329.0** m^3

7.0 Water Balance Calculation

7.1 Water balance calculations:

Proposed infiltration feature dimension = 8x16.5x0.5(m)

Volume of stone base under storm chamber = 66 m^3

Provided water retention at 40% void in stone base = 26.4 m^3

Equivalent depth of water over site area = **3.8** mm.

Estimated water balance achieved in soft landscaped areas and areas of permeable pavement are as follows:

Surface Construc	Area (ha)	Initial Abstraction (mm)	Prorated Depth over Site Area
Pavement	0.573	0.5	0.4
Soft Landscapin	0.127	5	0.9

Based on the above, the total water balance provided by the proposed features is app **5.1 mm.**

The estimated time to infiltrate water contained within the infiltration trench is as follows:

Depth of trench = 500 mm

Estimated Infiltration rate = 30 mm/hr (To be confirmed by the Geotechnical Engineer)

Equivalent Average "T" time = 50 min/cm.

Time to infiltrate = 2500 min = 41.7 hours

MGM CONSULTING Inc.

STORM SEWER DESIGN SHEET

8584-8604 Regional Road 25
Milton, Ontario

By: Duy Lam Tran
Date: June 06, 2023

Location				Areas		A * C			Rainfall		Flow	Sewer Design						
Manhole from	Invert m.	Manhole to	Invert m.	Area ha	Cumulative Area ha	Coefficient C	Incremental A * C	Cumulative A * C	Time min	Intensity I 5 mm/hr.	Q cms	Pipe Size mm.	Slope %	Max. Flow Q max cms	Max Velocity V max m./sec.	Length m.	Time in Section min.	Actual Flow to 85% of Max. Allowabl Flow Ratio
CB7		CBMH6		0.102	0.102	0.83	0.084	0.084	10.0	105.3	0.025	450	0.5	0.202	1.27	37.4	0.49	12%
CBMH6		CBMH5		0.098	0.200	0.91	0.089	0.173	10.5	102.7	0.049	450	0.5	0.202	1.27	38.2	0.50	24%
CBMH5		CBMH8		0.096	0.296	0.90	0.087	0.260	11.0	100.2	0.072	600	1.6	0.778	2.75	35.6	0.22	9%
Building		MH9		0.118	0.118	0.95	0.112	0.112	Controlled Roof Flow		0.007	375	1.0	0.176	1.59	10.2	0.11	4%
MH9		CBMH8		0.000	0.118	0.00	0.000	0.112			0.007	375	1.0	0.176	1.59	11.9	0.12	4%
CBMH8		OGS2		0.064	0.478	0.76	0.049	0.421	11.2	99.2	0.116	600	1.0	0.615	2.17	2.8	0.02	19%
CB4		CBMH3		0.094	0.094	0.81	0.077	0.077	10.0	105.3	0.022	375	1.0	0.176	1.59	38.5	0.40	13%
CBMH3		OGS2		0.053	0.147	0.75	0.040	0.116	10.4	103.1	0.033	600	0.5	0.435	1.54	35.9	0.39	8%
OGS2		MH1		0.000	0.625	0.00	0.000	0.537	Controlled flow		0.068	150	3.0	0.026	1.50	2.5	0.03	
MH1		EX. ST-MH		0.000	0.625	0.00	0.000	0.537			0.068	300	2.0	0.137	1.94	32.8	0.28	50%

n = 0.013

APPENDIX B

WATER DEMAND & FIRE CALCULATIONS

Appendix B
8584-8604 Regional Road 25
Town Of Milton
Regional of Halton

Site Development
Water Demand Calculations

Date: May 31, 2022

According to the Region of Halton Design Guildlines for Drinking Water System

Connection Point – Regional Road No. 25				
		Industrial		
Total equivalent population to be serviced		63	persons	
Industrial Per Capital Demand (L/ha/Day)		24.75	m3/ha/day	
Total Lands to be Serviced		0.700	ha	
Hydrant Flow Test Location				
	Hydrant Flow Test Location			
			Pressure (kPa)	Time
Minimum water pressure			N/A	
Maximum water pressure			N/A	

	Water Demands			
	Demand type	Demand (units)		
No.		Use 1	Use 2	Total
1	Average day flow (l/s)	0.201	0	0.201
2	Maximum day flow (l/s)	0.45	0	0.45
3	Peak hour flow (l/s)	0.45	0	0.45
4	Fire Flow (l/s)	66.67	0	66.67
Analysis				
5	Maximum day plus fire flow (l/s)			67.12
6	Peak hour flow (l/s)			0.45
7	Maximum demand flow (l/s)			67.12

Note: Fire flow calculated based on the largest proposed building on the site.

8584-8604 Regional Road 25 Fire Flow Calculation

The FUS requires that a minimum water supply source 'F' be provided at 140 kPa
The min flow 'F' can be calculated as such:

$F=220C\sqrt{A}$
where:
F- Required fire flow in L/min
C- Coefficient related to construction
A- Total area in sq.m

C = 0.8 (Non-combusitble construction)

For non-combustible construction, the area shall be a total of all floors (excluding basements at least 50 percent below grade) in the building being considered.

A = 2281 sq.m

Therefore,

F= 8405.73 L/min
= 8000 L/min (rounded to nearest 1000)

Reduction Factors:

F'=F*f1*f2

where:
f1- Occupancy factor
Low hazard occupancy, f1 = 25%

Therefore, the reduction due to low hazard occupancy = 2000 l/min.
and F = **6000** l/min

f2- Sprinkler protection factor

Based on fully automated sprinkler system, maximum reduction = 40%

Reductior **2400** L/min

Exposure Factors:
F'' = F'*f3
where:
f3- Exposure factor not to exceed 75%

Separation between subject building and other structures, and associated charges are as follows:

	Distance (m)	Charge
North Side	41	5%
South Side	>45	0%
East Side	Road >45	0%
West Side	>45	0%
Total		**5%**

The total increase for exposures is 5%
and the increase due to exposures = 300

The resulting required minimum flow, F = **3900** l/min

Therefore a minimum flow of approximately **4000** L/min must be available at the nearest hydrant with a minimum pressure of 140 kPa.

Note: This fireflow calculation has been prepared as a guide only. Confirmation should be obtained from a Fire Protection professional for confirmation

APPENDIX C

TREATMENT UNIT SIZING REPORT

Stormceptor®

FORTERRA

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

06/01/2023

Province:	Ontario
City:	Milton
Nearest Rainfall Station:	TORONTO CITY
Climate Station Id:	6158355
Years of Rainfall Data:	20

Site Name:	

Drainage Area (ha):	0.70
% Imperviousness:	79.00

Runoff Coefficient 'c': 0.77

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	17.51
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	118.00
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	Commercial Truck Dealership
Project Number:	2023-021
Designer Name:	Calvin Dang
Designer Company:	MGM Consulting
Designer Email:	cdang@mgm.on.ca
Designer Phone:	416-985-1214
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	82
EFO6	91
EFO8	95
EFO10	98
EFO12	99

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 82

Water Quality Runoff Volume Capture (%): > 90

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THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

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

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

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Stormceptor® EF Sizing Report

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.5	8.7	8.7	0.75	45.0	38.0	100	8.7	8.7
1	20.2	28.9	1.51	90.0	75.0	100	20.2	28.9
2	16.4	45.3	3.01	181.0	151.0	89	14.7	43.6
3	11.8	57.1	4.52	271.0	226.0	82	9.7	53.3
4	8.1	65.2	6.02	361.0	301.0	78	6.4	59.7
5	6.6	71.9	7.53	452.0	377.0	75	5.0	64.6
6	5.2	77.1	9.04	542.0	452.0	72	3.7	68.4
7	2.7	79.8	10.54	633.0	527.0	68	1.8	70.2
8	3.6	83.4	12.05	723.0	602.0	65	2.3	72.5
9	2.0	85.4	13.56	813.0	678.0	64	1.3	73.8
10	1.9	87.3	15.06	904.0	753.0	63	1.2	75.0
11	1.6	88.9	16.57	994.0	828.0	63	1.0	76.0
12	1.8	90.7	18.07	1084.0	904.0	62	1.1	77.2
13	1.0	91.6	19.58	1175.0	979.0	62	0.6	77.8
14	1.0	92.7	21.09	1265.0	1054.0	60	0.6	78.4
15	1.3	93.9	22.59	1356.0	1130.0	59	0.7	79.1
16	1.0	95.0	24.10	1446.0	1205.0	57	0.6	79.7
17	0.4	95.3	25.61	1536.0	1280.0	55	0.2	79.9
18	0.4	95.7	27.11	1627.0	1356.0	53	0.2	80.1
19	0.2	95.9	28.62	1717.0	1431.0	51	0.1	80.2
20	0.6	96.5	30.12	1807.0	1506.0	49	0.3	80.5
21	0.0	96.5	31.63	1898.0	1582.0	46	0.0	80.5
22	0.5	97.0	33.14	1988.0	1657.0	44	0.2	80.7
23	0.7	97.7	34.64	2079.0	1732.0	42	0.3	81.0
24	0.0	97.7	36.15	2169.0	1807.0	41	0.0	81.0
25	0.3	98.0	37.66	2259.0	1883.0	39	0.1	81.1
30	0.3	98.3	45.19	2711.0	2259.0	32	0.1	81.2
35	0.8	99.1	52.72	3163.0	2636.0	28	0.2	81.4
40	0.4	99.5	60.25	3615.0	3012.0	24	0.1	81.5
45	0.5	100.0	67.78	4067.0	3389.0	22	0.1	81.7
Estimated Net Annual Sediment (TSS) Load Reduction =								**82 %**

Climate Station ID: 6158355 *Years of Rainfall Data*: 20

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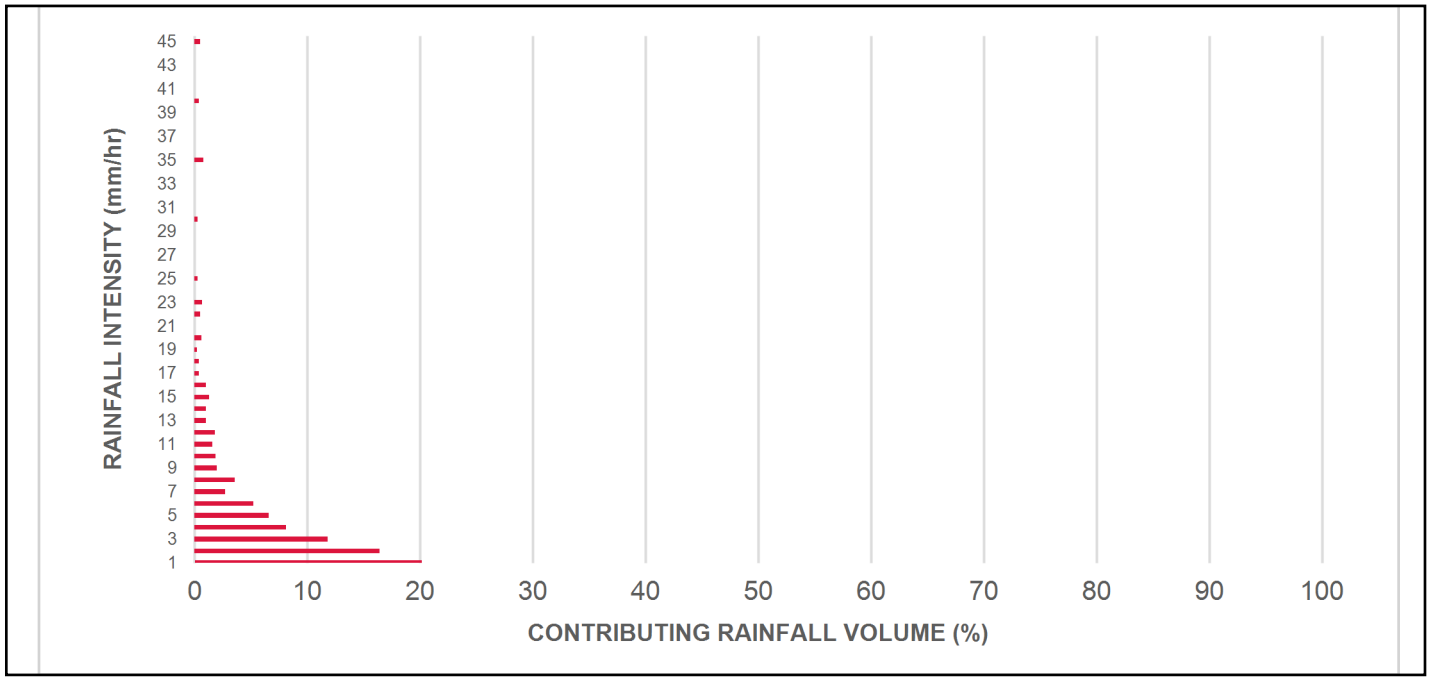
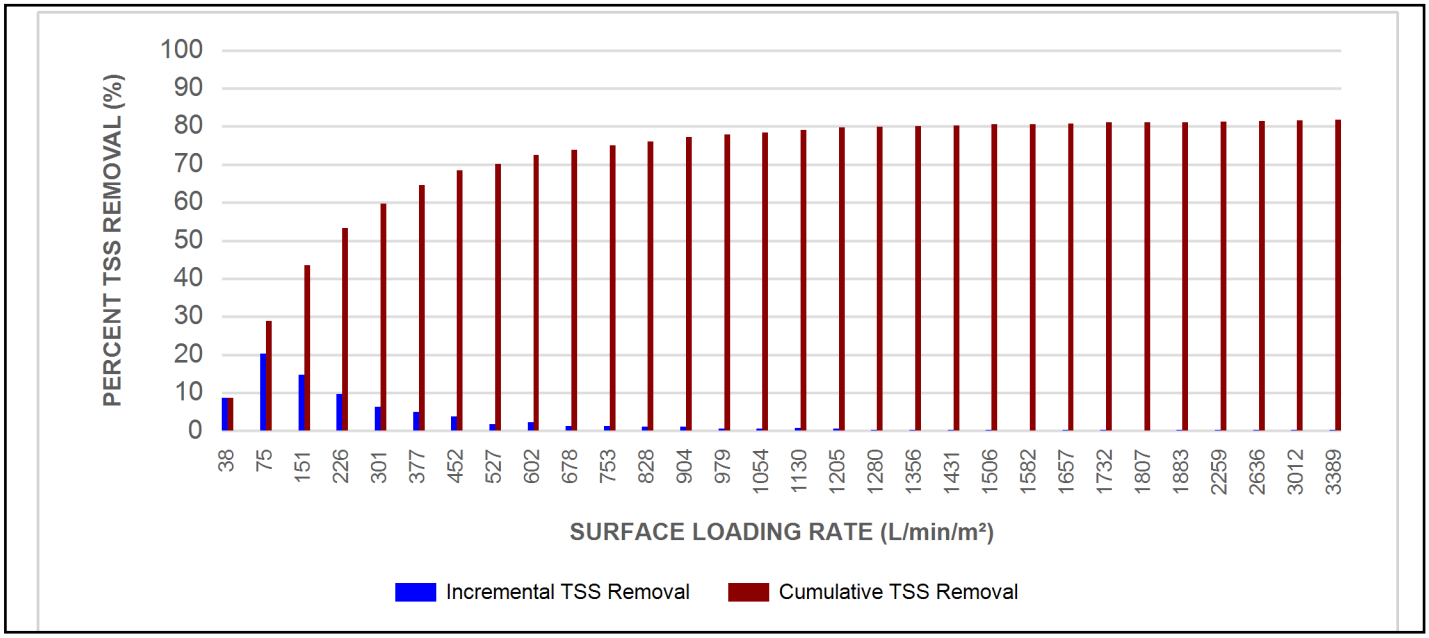
RAINFALL DATA FROM TORONTO CITY RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

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

SCOUR PREVENTION AND ONLINE CONFIGURATION

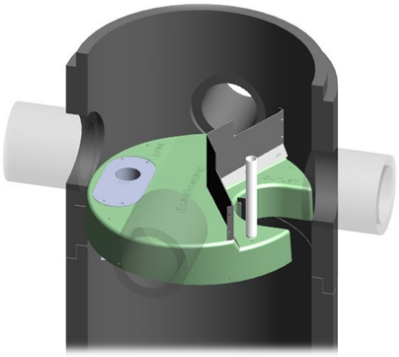
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

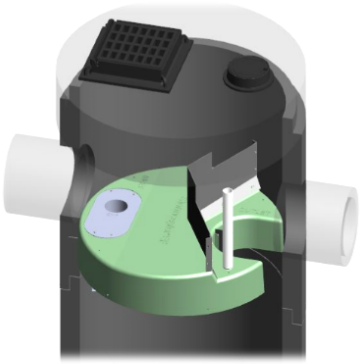
DESIGN FLEXIBILITY

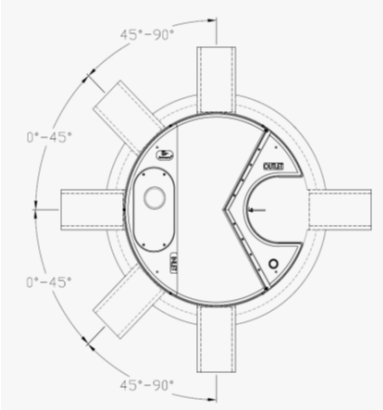
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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

OIL CAPTURE AND RETENTION

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







INLET-TO-OUTLET DROP

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

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

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

HEAD LOSS

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

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

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

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

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

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

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

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

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

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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

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

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

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

assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

APPENDIX D

SANITARY DESIGN CALCULATIONS

REGION OF HALTON

SANITARY SEWER DESIGN SHEET

Project No. 2023-021
Subdivision Truck Dealership Development
Date: 01-Jun-23
Des. By: CD Chk. By:

1. Sanitary Design Flow for Proposed Development

	Tributary Area Hectare				Population Tributary				Average	Average					SEWER					PIPE			
	Increment			Total	Increment			Total	Increment	Total	Peaking	Max.	Infiltration	Max. Flow			Q	V m/S					
Street	Res. ha	Comm. ha	Ind. ha	ha	Res.	Comm.	Ind.		L/s	L/s	Factor	m^3/s	L/s	L/s	mm.	%	L/s	Full Flow	Act. Flow	Type	n	Class	**REMARKS**
Building to MHA1	0.7			0.70			63	63	0.1805	0.1805	3.435	0.686	0.200	0.886	150	2.00	21.55	1.22	0.6	PVC	0.013	SDR35	
MHA1 to Ex San MH				0.70				63	0.1805	0.1805	3.435	0.686	0.200	0.886	150	2.00	21.55	1.22	0.6	PVC	0.013	SDR35	

* Min peaking factor based on Halton Region Design Guidelines = 2.0
* Population density for commercial area = 90 person/hectare
* Unit Sewage Flow = 0.28646*10^-3 m3/ha/s
* Infiltration = 0.286 L/s