214 Ontario Street
Brighton, ON

STORMWATER MANAGEMENT REPORT

FOR THE PROPOSED DEVELOPMENT AT

214 ONTARIO STREET, BRIGHTON, ONTARIO

Prepared By:

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L3R 5N8

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1. INTRODUCTION

1.1 Study Area

This study has been prepared on behalf of Tomba Enterprises Ltd. to address Stormwater Management (SWM) requirements for the proposed subdivision development of 84 townhouses located at 214 Ontario St, Brighton, ON.

The study area is approximately 2.3ha and is located on the west side of the Ontario St in the Municipality of Brighton, Ontario. The civic address of the property is 214 Ontario St, Brighton, ON and is approx. 60m south of Raglan St and Ontario St intersection. The legal description of the plot is Part Lot 3 CON Broken front designated as Part 1 Plan 39R13426 Municipality of Brighton. Client intends to develop the land by constructing 84 townhouses for residential purposes that includes 60 two-storey and 24 three-storey townhouse units with access roads and associated parking stalls. The Study area is shown in Figure 1.

1.2 Objectives of Stormwater Management Study

The objectives of the stormwater management study are to develop a strategy for the project that will:

- Identify potential stormwater runoff impacts to the receiving watercourses from the proposed development area
- Address the concerns from the review agencies including Municipality of Brighton, Northumberland County and the Ministry of Environment (MOE) for the preparation of a Stormwater Management study for quantity and quality purposes
- Provide an appropriate site drainage system for safe operational use

2. BACKGROUND

2.1 Land Use

The existing site is an undeveloped land parcel that is located along the Ontario Street. Majority of the site is vacant covered with trees and shrubs. Eastern portion of the site has been used for greenhouses and garden purposes with a gravel parking lot. The subject site is currently under Municipal Review of Applications for a Draft Plan of Subdivision and zoning by-law amendment.

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Figure 1 Study Area

3. SITE DRAINAGE CONDITIONS

3.1 Existing Drainage Conditions

The subject property is currently undeveloped of approximately 2.3ha in area. The property currently drains overland in south-west direction off the site ultimately discharging into Lake Ontario. For details refer to attached P-300 Grading Plan and P-302-Drainage Plan.

A surface run-off coefficient for the study area under existing conditions is shown in table xx which has been separated into two (2) regions; REGION 1 – north portion of the proposed development, REGION 2 – south portion of the proposed development + municipal ROW. Refer to P-302 for details.

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3.2 Proposed Drainage Conditions

REGION 1 – is the north portion of the proposed development which consists of townhouse blocks 1-4.

REGION 2 – is the south portion of the proposed development which consists of townhouse blocks 5-11, amenity area, parking areas and municipal ROW.

The stormwater runoff produced for both regions is expected to increase as there is an increase in impervious area. Table 3-1 and Table 3-2 shows the weighted runoff coefficients for both regions.

Surface Composition		Impervious	Pervious	Total
Existing Condition	(m^2)	2117.91	7850.92	9968.83
	(ha)	0.212	0.785	0.997
Runoff Coefficient		0.900	0.250	0.39

Surface Composition		Impervious	Pervious	Total
Proposed Condition	(m^2)	3541.12	6427.71	9968.83
	(ha)	0.354	0.643	0.997
Runoff Coefficient		0.900	0.250	0.48

Table 3-1 Runoff Coefficient for REGION 1

Surface Composition		Impervious	Pervious	Total
Existing Condition	(m^2)	3301.72	12444.53	15746.26
	(ha)	0.330	1.244	1.575
Runoff Coefficient		0.900	0.250	0.39

Surface Composition		Impervious	Pervious	Total
Proposed Condition	(m^2)	9759.80	5986.45	15746.26
	(ha)	0.976	0.599	1.575
Runoff Coefficient		0.900	0.250	0.65

Table 3-2 Runoff Coefficient for REGION 2

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3.3 Target Release Rate

Considering this is relatively a small area, the "Rational Method" was used to generate the target surface runoff as follows:

$$Q = 0.00278\ C\ I\ A \quad \leftarrow Equation\ (1)$$
$$Where\ Q := Maximum\ Runoff\ Rate\ (m^3/sec)$$
$$C := Runoff\ Coefficient$$
$$I := Rainfall\ Intensity\ (mm/hr)$$
$$A := Drainage\ Area\ (ha)$$

The result of peak flow rates (m^3/s) generated by the "Rational Method for existing and proposed conditions are shown on Table 3-3 and Table 3-4:

Storm Event	Rainfall Intensity (mm/hr)			<Equation 1> Flow Rate (m^3/sec)		
	a	b	I	Existing	Proposed	Excess Flow
2-Year	21.0	-0.699	73.48	0.0790	0.0979	0.0189
5-Year	27.7	-0.699	96.92	0.1042	0.1292	0.0249
10-Year	32.2	-0.699	112.66	0.1212	0.1501	0.0290
25-Year	37.7	-0.699	131.91	0.1419	0.1934	0.0515
50-Year	41.9	-0.699	146.60	0.1577	0.2345	0.0768
100-Year	46.0	-0.699	160.95	0.1731	0.2788	0.1057

Table 3-3 Peak Flow – REGION 1 (2-100 year Events)

Storm Event	Rainfall Intensity (mm/hr)			<Equation 1> Flow Rate (m^3/sec)		
	a	b	I	Existing	Proposed	Excess Flow
2-Year	21.0	-0.699	73.48	0.1242	0.2100	0.0857
5-Year	27.7	-0.699	96.92	0.1639	0.2770	0.1131
10-Year	32.2	-0.699	112.66	0.1905	0.3220	0.1315
25-Year	37.7	-0.699	131.91	0.2231	0.4147	0.1916
50-Year	41.9	-0.699	146.60	0.2479	0.5028	0.2549
100-Year	46.0	-0.699	160.95	0.2722	0.5980	0.3258

Table 3-4 Peak Flow – REGION 2 (2-100 year Events)

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4. PROPOSED STORMWATER MANAGEMENT PLAN

4.1 Quantity Control

With the proposed development, the drainage pattern is expected to change. In order to satisfy the Municipality's requirements we must provide quantity control ensuring post development peak run-off is controlled to pre-development levels for the 5 – 100 year storm events.

4.1.1 REGION 1

Controlled Sub-catchment (REGION 1)

The result of peak flow rates (m^3/s) generated by the "Modified Rational Method" for existing and proposed conditions for the North sub-catchment is shown in Table 4-1 below:

Storm Event	Rainfall Intensity (mm/hr)			<Equation 1> Flow Rate (m^3/sec)		
	a	b	I	Existing	Proposed	Excess Flow
2-Year	21.0	-0.699	73.48	0.0722	0.0889	0.0167
5-Year	27.7	-0.699	96.92	0.0952	0.1173	0.0221
10-Year	32.2	-0.699	112.66	0.1107	0.1364	0.0257
25-Year	37.7	-0.699	131.91	0.1296	0.1756	0.0460
50-Year	41.9	-0.699	146.60	0.1440	0.2129	0.0689
100-Year	46.0	-0.699	160.95	0.1581	0.2533	0.0951

Table 4-1 Peak Flow for Region 1 Controlled Sub-catchment (5-100 year Events)

To mitigate the impacts of the proposed development, on site storage and flow control should be provided using an orifice pipe restrictor located at the final outlet of developed site to limit the release rates to pre-development condition runoff as shown in Table 3-3 above.

Sizing of the orifice is given by the formula:

$$Q = C\,A\sqrt{2\,g\,h} \quad \leftarrow Equation\ (2)$$

$$Where\ Q := Flow\ Rate\ Through\ Orifice\ (m^3/sec) = Q_{Allowable}$$

$$C := Contractio\ n\ Coefficien\ t = 0.80\ (For\ Orifice\ Pipe)$$

$$A := Area\ of\ Orifice\ Pipe\ (m^2)$$

$$g := Accelerati\ on\ Due\ To\ Gravity\ (m/sec^2) = 9.81\ (m/sec^2)$$

$$h := Pressure\ Head\ To\ Be\ Dissipated\ (m)$$

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Based on allowable release rate, the required on site storage for the 100-year storm event is calculated by the "Modified Rational Method" is shown on Table 4-2:

Stm Event	Tc	Id	Qpost	Qorifice	Excess Flow	Volume(m^3)
	1	804.7955	1.2664	0.0776	1.1887	71.3245
	2	495.7533	0.7801	0.0776	0.7025	84.2949
	3	373.4030	0.5876	0.0776	0.5099	91.7887
	4	305.3835	0.4805	0.0776	0.4029	96.6978
	5	261.2796	0.4111	0.0776	0.3335	100.0527
	6	230.0159	0.3619	0.0776	0.2843	102.3533
	8	188.1160	0.2960	0.0776	0.2184	104.8246
100 Yr Post	10	160.9480	0.2533	0.0776	0.1756	105.3811
5 Yr Pre	15	121.2266	0.1908	0.0776	0.1131	101.8194
	20	99.1438	0.1560	0.0776	0.0784	94.0621
	25	84.8253	0.1335	0.0776	0.0559	83.7819
	30	74.6754	0.1175	0.0776	0.0399	71.7905
	35	67.0474	0.1055	0.0776	0.0279	58.5496
	40	61.0725	0.0961	0.0776	0.0185	44.3498
	45	56.2458	0.0885	0.0776	0.0109	29.3873
	50	52.2523	0.0822	0.0776	0.0046	13.8011
				Max Volume Required	cum	**105.38**

Table 4-2 Region 1 – Required Storage Volume

By trial and error calculations 160 mm diameter orifice pipe is required to control the flow rate to the 5 year pre-development condition.

$$Q = (0.60)\pi({}^{0.160}/_{2})^2 \sqrt{2 \times 9.81 \times (81.24 - 79.05 - \left(\frac{0.160}{2}\right))}$$

$$= 0.0776\ m^3/sec$$

Refer to Table 4-2 above, storage of 105.38 m^3 is required in order to accommodate the excess flow during 100 year major storm event. This volume is provided by underground storm sewer pipes and storm structures and is detailed in Table 4-3.

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Structure	Diameter (mm)	Area (m^2)	Top (m)	Maximum. Water Level (m)	Invert (m)	Volume (m^3)
CB#01	600X600	0.36	81.09	81.24	79.69	0.56
CB#02	600X600	0.36	81.41	81.24	80.01	0.44
CB#03	600X600	0.36	81.45	81.24	80.05	0.43
CB#04	600X600	0.36	82.25	81.24	80.85	0.14
CB#05	600X600	0.36	82.25	81.24	80.85	0.14
CB#06	600X600	0.36	82.90	81.24	81.27	0.00
CB#07	600X600	0.36	81.08	81.24	80.72	0.19
CB#08	600X600	0.36	81.57	81.24	80.50	0.27
CB#09	600X600	0.36	82.13	81.24	81.09	0.05
CB#10	600X601	0.36	82.73	81.24	81.65	0.00
STMMH#02	1200.00	1.13	81.63	81.24	79.95	1.46
STMMH#03	1200.00	1.13	82.19	81.24	80.51	0.83
STMMH#04	1200.00	1.13	82.87	81.24	81.22	0.02
Sum						**4.52**

From	To	Diameter (mm)	Area (m^2)	Length (m)	Volume (m^3)
OGS#1	MH2	250	0.0491	60.00	2.95
MH2	MH3	250	0.0491	53.00	2.60
MH3	MH4	250	0.0491	68.00	3.34
Sum					**8.88**

Storage Volume For 100-Year Event (m^3)	
Catch Basins & Manholes	4.52
Underground Conduits	8.88
Underground Chamber Stormtech SC-160	116.15
Total Provided	**129.56**

Table 4-3 Region 1 – Actual Storage Provided

The storage provided on site is 129.56 m^3 which is more than the required volume of 105.38 m^3.

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Uncontrolled Sub-catchment (REGION 1)

Storm Event	Rainfall Intensity (mm/hr)			<Equation 1> Flow Rate (m^3/sec)		
	a	b	I	Existing	Proposed	Excess Flow
2-Year	21.0	-0.699	73.48	0.0068	0.0090	0.0021
5-Year	27.7	-0.699	96.92	0.0090	0.0119	0.0028
10-Year	32.2	-0.699	112.66	0.0105	0.0138	0.0033
25-Year	37.7	-0.699	131.91	0.0123	0.0177	0.0055
50-Year	41.9	-0.699	146.60	0.0136	0.0215	0.0079
100-Year	46.0	-0.699	160.95	0.0150	0.0256	0.0106

Table 4-4 Peak Flow for Region 1 Uncontrolled Sub-catchment (5-100 year Events)

For the overall release rate for the North Sub-catchment is the sum of the flows from both controlled and uncontrolled sub-catchments. See below for overall release rate.

Overall release rate for north sub-catchment = Controlled Sub-catchment + Uncontrolled Sub-catchment

Q=0.0776 + 0.0256
Q=0.1032 m^3/s

Therefore, the overall release rate is less than target release rate of 0.1042 m^3/s (refer to Table 3-3 for details).

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4.1.2 REGION 2

Controlled Sub-catchment (REGION 2)

The result of peak flow rates (m^3/s) generated by the "Modified Rational Method" for existing and proposed conditions for the North sub-catchment is shown in Table 4-5 below:

Storm Event	Rainfall Intensity (mm/hr)			<Equation 1> Flow Rate (m^3/sec)		
	a	b	I	Existing	Proposed	Excess Flow
2-Year	21.0	-0.699	73.48	0.1242	0.1599	0.0356
5-Year	27.7	-0.699	96.92	0.1639	0.2109	0.0470
10-Year	32.2	-0.699	112.66	0.1905	0.2452	0.0547
25-Year	37.7	-0.699	131.91	0.2231	0.3158	0.0927
50-Year	41.9	-0.699	146.60	0.2479	0.3828	0.1349
100-Year	46.0	-0.699	160.95	0.2722	0.4553	0.1832

Table 4-5 Peak Flow for South Controlled Sub-catchment (5-100 year Events)

To mitigate the impacts of the proposed development, on site storage and flow control should be provided using an orifice pipe restrictor located at the final outlet of developed site to limit the release rates to pre-development condition runoff as shown in Table 3-4 above.

Sizing of the orifice is given by the formula:

$$Q = C\,A\sqrt{2\,g\,h} \quad \leftarrow Equation\ (2)$$

$$Where\ Q := Flow\ Rate\ Through\ Orifice\ (m^3/sec) = Q_{Allowable}$$

$$C := Contractio\ n\ Coefficien\ t = 0.80\ (For\ Orifice\ Pipe)$$

$$A := Area\ of\ Orifice\ Pipe\ (m^2)$$

$$g := Accelerati\ on\ Due\ To\ Gravity\ (m/sec^2) = 9.81\ (m/sec^2)$$

$$h := Pressure\ Head\ To\ Be\ Dissipated\ (m)$$

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Based on allowable release rate, the required on site storage for the 100-year storm event is calculated by the "Modified Rational Method" is shown on Table 4-6:

Stm Event	Tc	Id	Qpost	Qorifice	Excess Flow	Volume(m^3)
	1	804.7955	1.9518	0.0982	1.8535	111.2110
	2	495.7533	1.2023	0.0982	1.1040	132.4847
	3	373.4030	0.9056	0.0982	0.8073	145.3176
	4	305.3835	0.7406	0.0982	0.6424	154.1668
	5	261.2796	0.6336	0.0982	0.5354	160.6208
	6	230.0159	0.5578	0.0982	0.4596	165.4499
	8	188.1160	0.4562	0.0982	0.3580	171.8250
100 Yr Post	10	160.9480	0.3903	0.0982	0.2921	175.2492
5 Yr Pre	15	121.2266	0.2940	0.0982	0.1958	176.1760
	20	99.1438	0.2404	0.0982	0.1422	170.6362
	25	84.8253	0.2057	0.0982	0.1075	161.2083
	30	74.6754	0.1811	0.0982	0.0829	149.1428
	35	67.0474	0.1626	0.0982	0.0644	135.1516
	40	61.0725	0.1481	0.0982	0.0499	119.6826
	45	56.2458	0.1364	0.0982	0.0382	103.0379
	50	52.2523	0.1267	0.0982	0.0285	85.4321
				Max Volume Required	cum	**176.18**

Table 4-6 Region 2 – Required Storage Volume

By trial and error calculations 182 mm diameter orifice pipe is required to control the flow rate to the 5 year pre-development condition.

$$Q = (0.60)\pi({}^{0.182}/_{2})^2 \sqrt{2 \times 9.81 \times (80.57 - 78.46 - \left(\frac{0.182}{2}\right))}$$

$$= 0.0982\ m^3/sec$$

Refer to Table 4-6 above, storage of 176.18 m^3 is required in order to accommodate the excess flow during 100 year major storm event. This volume is provided by underground storm sewer pipes and storm structures and is detailed in Table 4-7.

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Structure	Diameter (mm)	Area (m^2)	Top (m)	Maximum. Water Level	Invert (m)	Volume (m^3)
CB#11	600X600	0.36	80.57	80.57	79.17	0.50
CB#12	600X600	0.36	80.57	80.57	79.17	0.50
CB#13	600X600	0.36	81.48	80.57	80.08	0.18
CB#14	600X600	0.36	81.48	80.57	80.08	0.18
CB#15	600X600	0.36	82.45	80.57	80.86	0.00
CB#16	600X600	0.36	82.45	80.57	80.86	0.00
CB#17	600X600	0.36	82.04	80.57	80.64	0.00
CB#18	600X600	0.36	81.13	80.57	79.15	0.51
CB#19	600X600	0.36	81.47	80.57	80.70	0.00
CB#20	600X600	0.36	81.47	80.57	81.00	0.00
STMMH#06	1200.00	1.13	80.53	80.57	79.06	1.71
STMMH#07	1200.00	1.13	81.16	80.57	79.48	1.23
STMMH#08	1200.00	1.13	81.95	80.57	80.36	0.24
STMMH#09	1200.00	1.13	82.40	80.57	80.77	0.00
BOX CULVERT x2	57000X3500	399.00	79.50	79.50	79.08	167.58
Sum						**172.63**

From	To	Diameter (mm)	Area (m^2)	Length (m)	Volume (m^3)
MH6	MH7	250	0.0491	54.00	2.65
MH7	MH8	250	0.0491	85.00	4.17
MH8	MH9	250	0.0491	38.00	1.87
Sum					**8.69**

Storage Volume For 100-Year Event (m^3)	
Catch Basins & Manholes & Box Culverts	172.63
Underground Conduits	8.69
Total Provided	**181.32**

Table 4-7 Region 2 – Actual Storage Provided

The storage provided on site is 181.32 m^3 which is more than the required volume of 176.18 m^3.

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Uncontrolled Sub-catchment (REGION 2)

Storm Event	Rainfall Intensity (mm/hr)			<Equation 1> Flow Rate (m^3/sec)		
	a	b	I	Existing	Proposed	Excess Flow
2-Year	21.0	-0.699	73.48	0.0136	0.0228	0.0092
5-Year	27.7	-0.699	96.92	0.0179	0.0301	0.0122
10-Year	32.2	-0.699	112.66	0.0208	0.0350	0.0142
25-Year	37.7	-0.699	131.91	0.0244	0.0451	0.0207
50-Year	41.9	-0.699	146.60	0.0271	0.0546	0.0275
100-Year	46.0	-0.699	160.95	0.0298	0.0650	0.0352

Table 4-8 Peak Flow for South Uncontrolled Sub-catchment (5-100 year Events)

For the overall release rate for the South Sub-catchment is the sum of the flows from both controlled and uncontrolled sub-catchments. See below for overall release rate.

Overall release rate for south sub-catchment = Controlled Sub-catchment + Uncontrolled Sub-catchment

Q=0.0982 + 0.0650
Q=0.1632 m^3/s

Therefore, the overall release rate is less than target release rate of 0.1639 m^3/s (refer to Table 3-4 for details).

4.1.3 SWM Summary

The overall release rates for both Region 1 and 2 have been respectively controlled to be below the allowable release rates. Therefore, proposed development will not have any adverse effect on the municipal storm drainage infrastructure.

4.2 Quality Control

To meet the quality requirements for the site, an EFO4 unit and an EFO5 unit are proposed, respectively, on north and south outlet points at the downstream of storm networks before being discharged to the existing municipal ditch along Ontario Street (Refer to P-301, Servicing Plan for location details).

Majority of the area within the subdivision (with exception to uncontrolled catchment area) will be conveyed through an internal drainage system which eventually discharges offsite into an existing roadside ditch. Prior to discharging offsite, the stormwater is expected to back-up into the proposed underground storage structures for all storm events greater than the 2-year event. The EFO4 will provide a TSS removal rate of approx. 85% for the Northern portion of the controlled catchment and the EFO5 will provide a TSS removal rate of approx. 85% for the southern portion of the controlled catchment area, as per manufacturer specifications. Please refer to the attached sizing report in Appendix for details.

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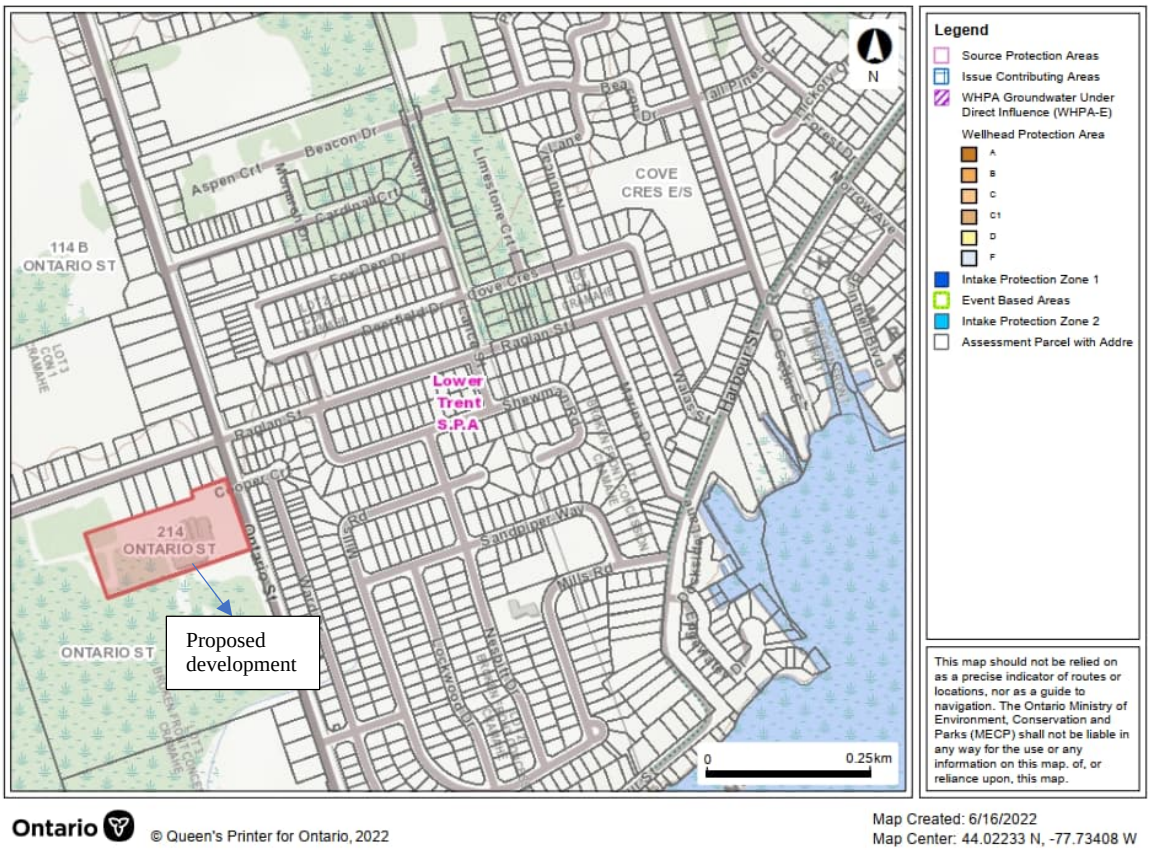
5. SOURCEWATER PROTECTION

The subject property is located in a WHPA B with a vulnerability score of 8. However, location is not in an Issue Contributing Area as per the Source Protection Information Atlas and the City of Brighton pre-consultation comments under 'Sourcewater Protection'. Please refer to the image below.



The subject area is proposed to be developed as a residential subdivision with on-site quality and quantity control measures provided via grass swales and two Stormceptors EFO4 and EFO5, therefore, the proposed development will not have any adverse effect on the wellheads located near the project area.

MARKHAM (HEAD OFFICE
25 CENTURIAN DR, SUITE 201, MARKHAM, ON L3R 5N8
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CALGARY
707 – 10TH AVE SW, SUITE 200, CALGARY, AB, T2R 0B3
T: 403 355 2295 F: 403 355 2297

6. EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION

The erosion potential of the study area was assessed using methods described in the "*MTO Drainage Management Manual*" of temporary erosion and sediment control measures suitable for construction sites close to highways.

During Site construction, various temporary measures will be implemented to prevent the discharge of sediment laden Stormwater from the Site. These measures include silt fencing, catch-basin buffers and mud-mats.

In addition to the above, the following "good housekeeping" measures are recommended:

- All exposed soil shall be stabilized as soon as possible with a seed and mulch application as directed by the Engineer.
- No construction activity or machinery shall intrude beyond the silt/snow fence or limit of construction area. All construction vehicles shall leave the site at designated locations as shown on the plans.
- Stockpiles of soil shall be set back from any watercourse and stabilized against erosion as soon as possible. A set back of at least 15m from any top-of-bank, watercourse or pond is required.
- Cleaning and repairs of mud-mats and any other temporary sediment control measures shall be completed as deemed necessary through regular inspection.
- Sediment/slit shall be removed from the sediment control devices after storm events and deposited in areas as approved by the engineer.
- All re-graded areas within the development which are not occupied by buildings, roadways, sidewalks, or driveways shall be top-soiled and sodded/seeded immediately after completion of final grading operations as directed by the engineer.

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7. SUMMARY AND CONCLUSIONS

In summary, all required conditions for the Municipality of Brighton, Northumberland County have been satisfied as follows:

- The Stormwater flow from the Site is controlled to the allowable release rate
- The proposed SWM techniques provide “Enhanced level” quality treatment.
- The Erosion and Sediment Control Plan demonstrates how erosion and sedimentation will be minimized during construction

This SWM Report satisfies all requirements for stormwater quantity, quality and erosion & sedimentation control.

Ben Lo, M.Eng
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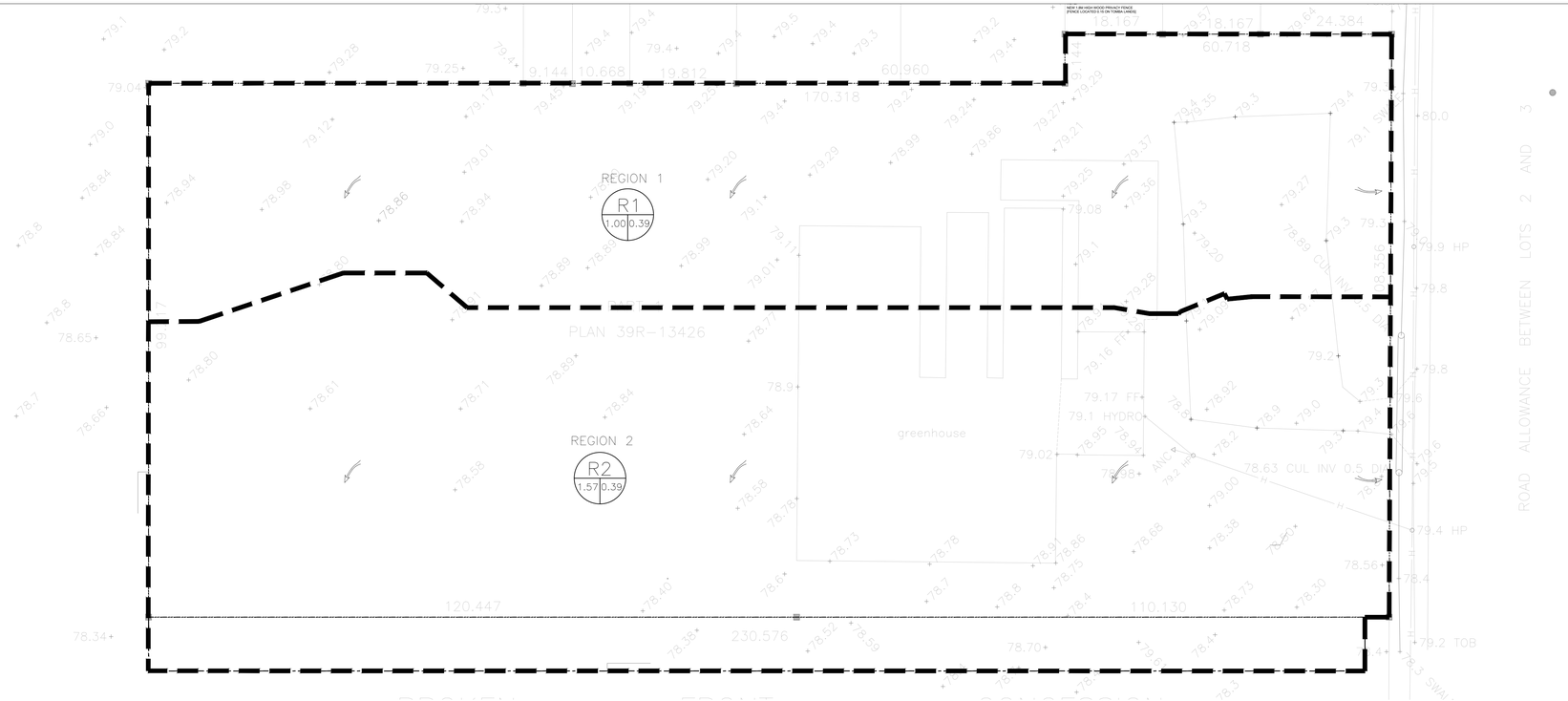
Appendix A – Pre/Post Development Condition

MARKHAM (HEAD OFFICE
25 CENTURIAN DR, SUITE 201, MARKHAM, ON L3R 5N8
T: 416 229 2636 F: 416 229 6965

CALGARY
707 – 10TH AVE SW, SUITE 200, CALGARY, AB, T2R 0B3
T: 403 355 2295 F: 403 355 2297



1 — PRE-DRAINAGE PLAN
SCALE 1:500

2 — POST-DRAINAGE PLAN
SCALE 1:500

KEY PLAN
SCALE: NTS

GENERAL NOTES

1. VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION.
2. DO NOT SCALE DRAWINGS.
3. REPORT ALL DISCOVERIES OF ERRORS, OMISSIONS OR DISCREPANCIES TO THE DESIGN ENGINEER AS APPLICABLE.
4. USE ONLY LATEST REVISED DRAWINGS OR THOSE THAT ARE MARKED "ISSUED FOR CONSTRUCTION".
5. DESIGN AND CONSTRUCTION OF THIS PROJECT SHALL COMPLY WITH THE PROVINCIAL AND LOCAL BUILDING CODES LATEST EDITION.
6. ALL WORKS AND MATERIALS USED SHALL COMPLY AS REQUIRED BY THE BUILDING CODE LATEST EDITION.
7. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS & SPECIFICATIONS.
8. EVERYTHING IS TO BE CONSIDERED NEW UNLESS SPECIFIED EXISTING OTHERWISE.

LEGEND

+100.00	EXISTING ELEVATION
	EXISTING CATCHBASIN
	EXISTING C.B./M.H.
	EXISTING MANHOLE
	OVERLAND FLOW ROUTE
0.716ha / 0.90	DRAINAGE AREA (ha) / RUNOFF COEFFICIENT
	UNCONTROLLED CATCHMENT
	CATCHMENT BOUNDARY

LICENSED PROFESSIONAL ENGINEER
M. Y. SAM
100127775
Aug 27, 2025
PROVINCE OF ONTARIO

No.	Date	Description	Drawn	Checked
4	27 AUG '25	ISSUED FOR SPA	BL	JS
3	27 JUN '22	ISSUED FOR SPA	MJ	BRS
2	17 JUN '22	ISSUED FOR SPA	MJ	BRS
1	03 MAY '22	FOR REVIEW	MJ	JS
0	18 MAR '22	FOR REVIEW	MJ	JS

REVISIONS

J + B ENGINEERING INC.
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MARKHAM, ON L3R 5N8
416 229 2636
CALGARY
727-10TH AVE. SW
SUITE 150
CALGARY AB T2R 0B3
403 355 2295

OWNER/CLIENT:

TOMBA ENTERPRISE LTD.

Project: BRIGHTON FREEHOLD TOWNHOUSE DEVELOPMENT

DRAINAGE PLAN

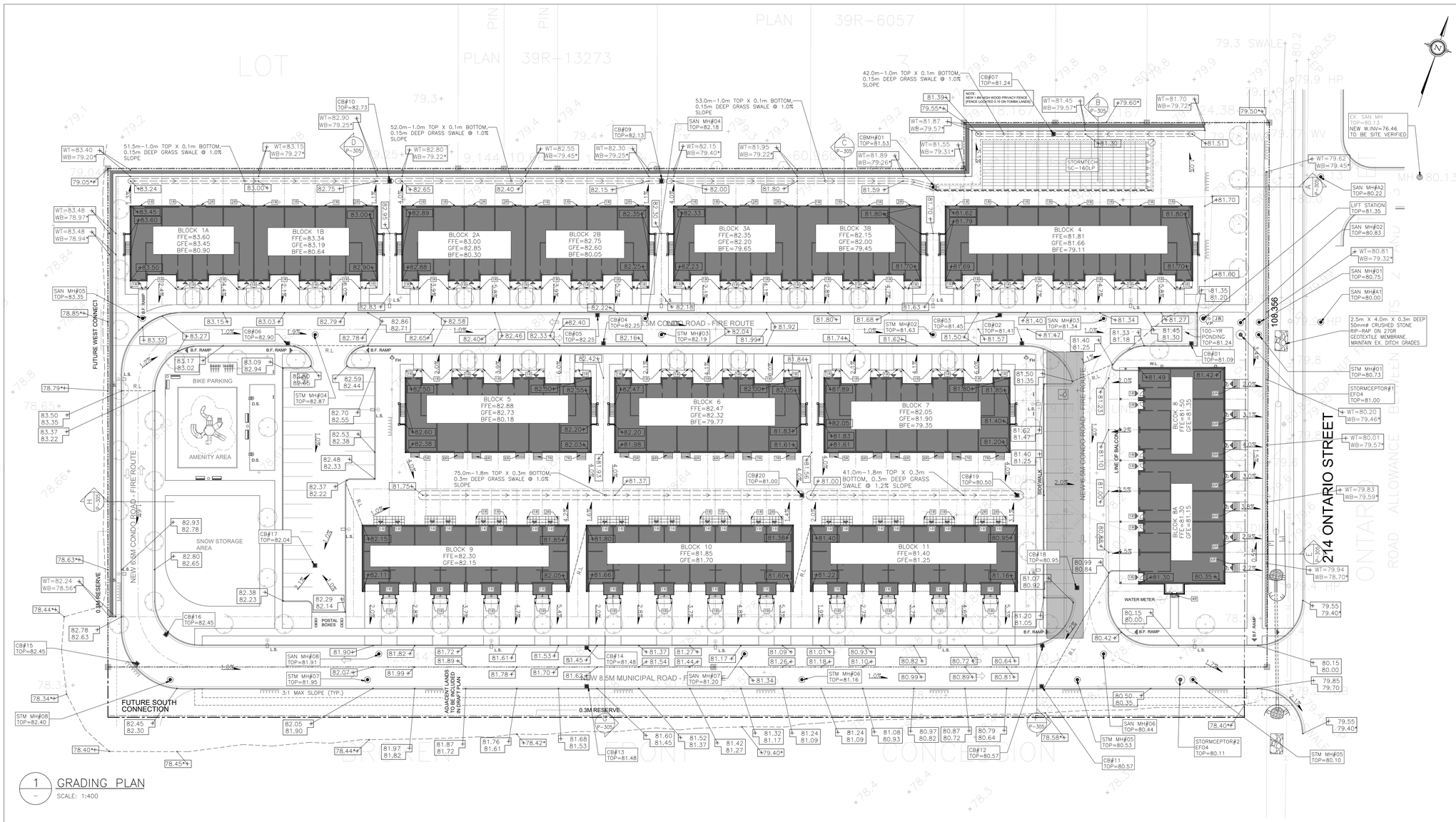
214 ONTARIO STREET — BRIGHTON, ON

File No: 220108	Date: 20 JAN '22	ACAD INFO
Drawn By: EM	Scale: AS SHOWN	Dwg. File: 220108-P-302
Checked By: JS	Sheet 1 of 1	Plotting Scale: 1=1
Drawing No: P-302		Drawing Size: D

Appendix B - Grading Plan

MARKHAM (HEAD OFFICE
25 CENTURIAN DR, SUITE 201, MARKHAM, ON L3R 5N8
T: 416 229 2636 F: 416 229 6965

CALGARY
707 – 10TH AVE SW, SUITE 200, CALGARY, AB, T2R 0B3
T: 403 355 2295 F: 403 355 2297



1 GRADING PLAN
SCALE: 1:400

KEY PLAN
SCALE: NTS

GENERAL NOTES

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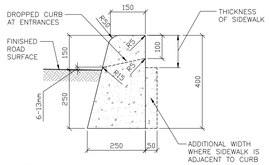
LEGEND

- +100.00 — EXISTING ELEVATION
- EXISTING CATCHBASIN
- EXISTING C.B./M.H.
- EXISTING MANHOLE
- 100.21 / 100.06 — PROPOSED ELEV. (CURB TOP) / PROPOSED ELEV. (CURB BOTTOM)
- +99.82 / +99.89* — PROPOSED ELEVATION / MATCH EXISTING ELEVATION
- PROPERTY LINE
- R.L. — RIDGE LINE
- 2.0% — SURFACE SLOPE
- 2.0%* — EXISTING SURFACE SLOPE
- RETAINING WALL
- RETAINING WALL
- MATCH LINE
- NEW CATCHBASIN
- NEW C.B./M.H.
- NEW MANHOLE
- PONDING LIMIT
- PONDING AREA

LICENSED PROFESSIONAL ENGINEER — M. Y. SAM — 100127775 — Aug 27, 2025 — PROVINCE OF ONTARIO

GRADING AND SERVICES NOTES

1. ALL DIMENSIONS AND ELEVATIONS ARE METRIC, UNLESS NOTED OTHERWISE.
2. ALL DIMENSIONS AND DESIGN ELEVATIONS MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. ANY DISCREPANCIES MUST BE BROUGHT TO THE ATTENTION OF THE DESIGN ENGINEER OR ARCHITECT WHERE APPLICABLE.
3. THE CONTRACTOR SHALL RESTORE TO ORIGINAL OR BETTER CONDITION FOR ANY EXISTING CONDITION DISTURBED DURING THE CONSTRUCTION AT CONTRACTOR'S EXPENSE.
4. WITHIN THE SITE THE FOLLOWING GRADING CRITERIA TO BE USED:
   A) PAVED PARKING AREA GRADES – MIN. 1% MAX. 8%
   B) LANDSCAPE AREAS
      (i) SOD GRADES 2% TO 10%
      (ii) EMBANKMENT (SLOPES) TO BE MAX. 3:1, BUT 4:1 PREFERRED
   C) DRIVEWAY GRADE – MIN. 2% MAX. 8%
5. CONTROL MANHOLES ARE TO BE BENCHED TO THE INVERTS.
6. LANDSCAPING SHALL NOT ENCROACH ON BOULEVARD NOR SHALL BOULEVARD GRADES BE ALTERED.
7. STANDARD DRAWINGS OF THE MUNICIPALITY CONSTITUTE PART OF THE PLANS OF THE CONTRACT.
8. ANY CONFLICT WITH EXISTING SERVICES SHALL BE RECTIFIED AS PER MUNICIPALITY'S REQUIREMENTS.
9. MINIMUM VERTICAL AND HORIZONTAL SEPARATION BETWEEN THE INVERTS OF THE SEWER AND A CROWN OF A WATER MAIN SHALL COMPLY WITH THE MUNICIPAL AND LOCAL BY–LAWS AT ALL CROSSINGS.
10. ALL CONCRETE CURBS FROM EXISTING ROAD CURB TO STREET LINE SHALL BE BARRIER CURB TO CITY STANDARDS. ALL CONCRETE CURB HEIGHTS SHALL BE 150mm ABOVE FINISHED GRADE (A.F.G.) UNLESS OTHERWISE NOTED. DRIVEWAY CURBS ARE TO BE DISCONTINUOUS AT SIDEWALKS AND TAPERED BACK MINIMUM OF 300mm OR TO THE APPROVAL OF DESIGN ENGINEER.
11. ALL REQUIRED CURB CUTTING AT ENTRANCES AND CURB DEPRESSIONS AT SIDEWALK CROSSINGS SHALL BE INSTALLED TO THE APPROVAL OF THE DESIGN ENGINEER.
12. A MINIMUM CLEARANCE OF 1000mm FROM ALL ABOVE GROUND SERVICES AND UTILITIES IS REQUIRED.
13. INSTALLATION OF WATER MAIN IN PRIVATE PROPERTY SHALL COMPLY WITH THE MUNICIPAL AND LOCAL BY–LAWS.
14. OUTDOOR LIGHTS ARE TO BE DIRECTED DOWNWARDS AS WELL AS INWARD.
15. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL UTILITIES DURING CONSTRUCTION. BELL, HYDRO, GAS, OR ANY OTHER UTILITIES THAT MAY EXIST ON THE SITE OR WITHIN THE STREET LINE MUST BE LOCATED AND VERIFIED BY THE RESPECTIVE UTILITY COMPANY PRIOR TO CONSTRUCTION.
16. ALL SANITARY SEWER, STORM SEWER, AND WATER MAIN ON PRIVATE PROPERTY ARE TO BE INSTALLED IN ACCORDANCE WITH THE PROVINCIAL BUILDING CODE.
17. ALL WATER MAIN AND HYDRANT INSTALLATIONS ARE TO BE CARRIED OUT IN ACCORDANCE WITH THE LATEST PLANS, STANDARDS, AND SPECIFICATIONS OF THE LOCAL UTILITIES COMMISSION.
18. NO BLASTING IS PERMITTED ON THE CITY RIGHT–OF–WAY AND NEAR ANY ADJACENT BUILDING.
19. THE TOP OF CONCRETE CURBS ABUTTING CITY'S SIDEWALKS SHALL BE KEPT LEVEL WITH THE SIDEWALKS FOR A DISTANCE OF 600mm FROM THE SIDEWALK.
20. THE PROPERTY IS TO BE GRADED AND SELF–CONTAINED SO THAT SURFACE DRAINAGE IS DIRECTED AWAY FROM THE BUILDINGS.
21. THE OWNER AND/OR CONTRACTOR IS REQUIRED TO OBTAIN A "ROAD CUT PERMIT" FROM THE COUNTY BEFORE COMMENCING ANY WORK ON THE MUNICIPALITY'S ROAD ALLOWANCE.
22. REGIONAL ROAD, BOULEVARD AND ENTRANCE MAKE–UP TO BE AS PER REGIONAL STD. SHOWN AS DETAIL 3 ON THIS DRAWING (P.300).
23. OWNER TO PROVIDE MAINTENANCE PLAN FOR STORM DRAINAGE SYSTEM FOR DISCHARGE INTO REGIONAL DITCH.
24. MUNICIPAL BOULEVARDS MUST BE GRADED BETWEEN 2% AND 6% MAXIMUM.

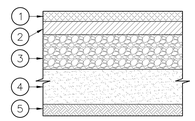


2 TYP. TYPE A CURB SECTION
SCALE: NTS

PAVING SCHEDULE

ITEM NO.	MATERIAL DESCRIPTION	PAVEMENT THICKNESS	COMPACTION REQUIREMENTS
1	ASPHALT HL–3/SP 12.5 (SURFACE COURSE)	60mm	> 98% (MBD)
2	ASPHALT HL–8 (BINDING COURSE)	50mm	> 98% (MBD)
3	GRANULAR 'A' (BASE) OPSS 1010	150mm	> 100% (SPMDD)
4	GRANULAR 'B' TYPE 1 (SUB–BASE) OPSS 1010	300mm	> 100% (SPMDD)
5	SUBGRADE (TO BE RESHAPED)	VARIES	> 98% (SPMDD)

MBD: MARSHALL BULK DENSITY
SPMDD: STANDARD PROCTOR MAX. DRY DENSITY
PAVEMENT STRUCTURE AS PER GEOTECH REPORT BY CAMBIUM INC. DATED OCTOBER 01, 2021.



3 STANDARD PAVEMENT STRUCTURE
SCALE: NTS

No.	Date	Description	Drawn	Checked
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4	27 JUN '22	ISSUED FOR SPA	MJ	BRS
3	17 JUN '22	ISSUED FOR SPA	MJ	BRS
2	25 MAY '22	FOR REVIEW	MJ	JS
1	03 MAY '22	FOR REVIEW	MJ	JS
0	18 MAR '22	FOR REVIEW	MJ	JS

REVISIONS

J + B ENGINEERING INC.
TORONTO
25 CENTURIAN DR.
SUITE 201
MARKHAM, ON L3R 5N8
416 229 2636
CALGARY
707-10TH AVE. SW
SUITE 150
CALGARY AB T2R 0B3
403 355 2295

OWNER/CLIENT:

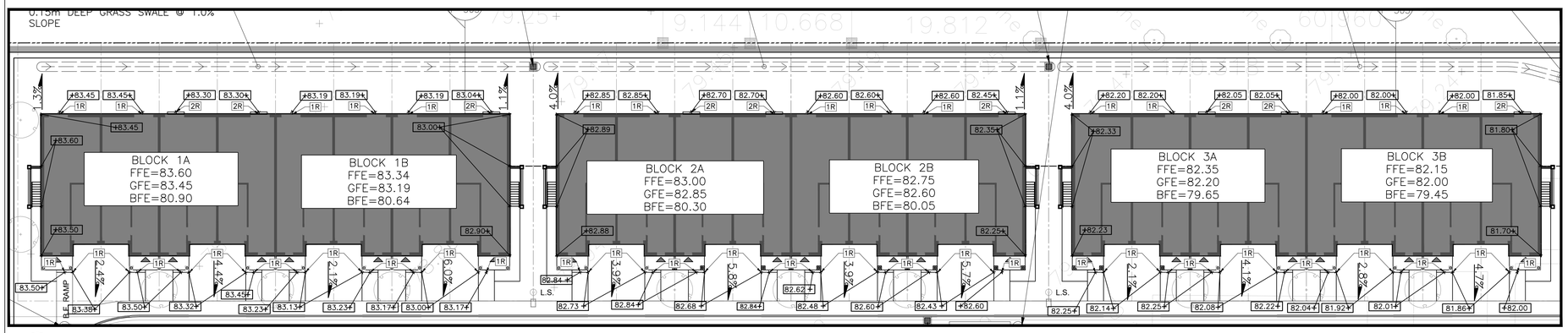
TOMBA ENTERPRISE LTD.

Project: BRIGHTON FREEHOLD TOWNHOUSE DEVELOPMENT

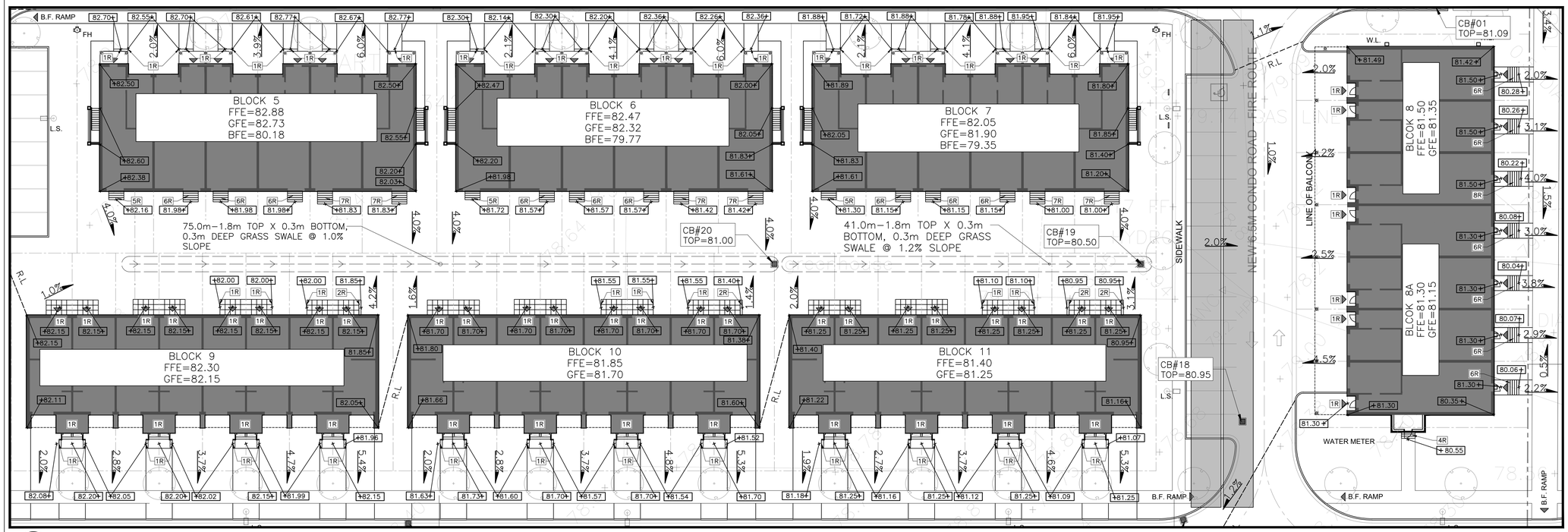
GRADING PLAN

214 ONTARIO STREET — BRIGHTON, ON

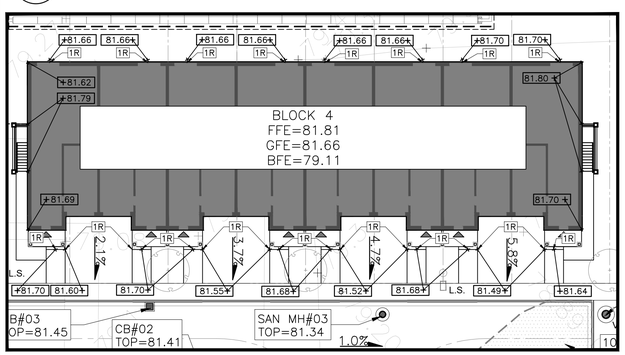
File No: 220108	Date: 20 JAN '22	ACAD INFO
Drawn By: EM	Scale: AS SHOWN	Dwg. File: 220108–P–300
Checked By: JS	Sheet 1 of 1	Plotting Scale: 1=1
Drawing No: P–300A		Drawing Size: D



1 PARTIAL GRADING PLAN – BLOCK 1–3
SCALE: 1:250



2 PARTIAL GRADING PLAN – BLOCK 5–11
SCALE: 1:250



3 PARTIAL GRADING PLAN – BLOCK 4
SCALE: 1:250

KEY PLAN
SCALE: NTS

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LEGEND

- +100.00 — EXISTING ELEVATION
- EXISTING CATCHBASIN
- EXISTING C.B./M.H.
- EXISTING MANHOLE
- +100.21 / 100.06 — PROPOSED ELEV. (CURB TOP) / PROPOSED ELEV. (CURB BOTTOM)
- +99.82 — PROPOSED ELEVATION
- +99.89* — MATCH EXISTING ELEVATION
- +WT=80.21 / WB=79.46 — PROPOSED ELEV. (WALL WALL) / PROPOSED ELEV. (WALL BOTTOM)
- R.L. — RIDGE LINE
- 2.0% — SURFACE SLOPE
- 2.0%* — EXISTING SURFACE SLOPE
- RETAINING WALL
- RETAINING WALL
- MATCH LINE
- NEW CATCHBASIN
- NEW C.B./M.H.
- NEW MANHOLE
- PONDING LIMIT
- PONDING AREA
- GRASSED SWALE
- 3:1 MAX SLOPE

No.	Date	Description	Drawn	Checked
0	27 AUG '25	FOR SPA	BL	JS

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SUITE 150
CALGARY AB T2R 0B3
403 355 2295

OWNER/CLIENT:

TOMBA ENTERPRISE LTD.

Project: BRIGHTON FREEHOLD TOWNHOUSE DEVELOPMENT

PARTIAL GRADING PLAN

214 ONTARIO STREET BRIGHTON, ON

File No: 220108	Date: 27 AUG '25	ACAD INFO
Drawn By: BL	Scale: AS SHOWN	Dwg. File: 220108-P-300
Checked By: JS	Sheet 1 of 1	Plotting Scale: 1=1
Drawing No: P-300B		Drawing Size: D

Appendix C - Site Servicing Plan

MARKHAM (HEAD OFFICE
25 CENTURIAN DR, SUITE 201, MARKHAM, ON L3R 5N8
T: 416 229 2636 F: 416 229 6965

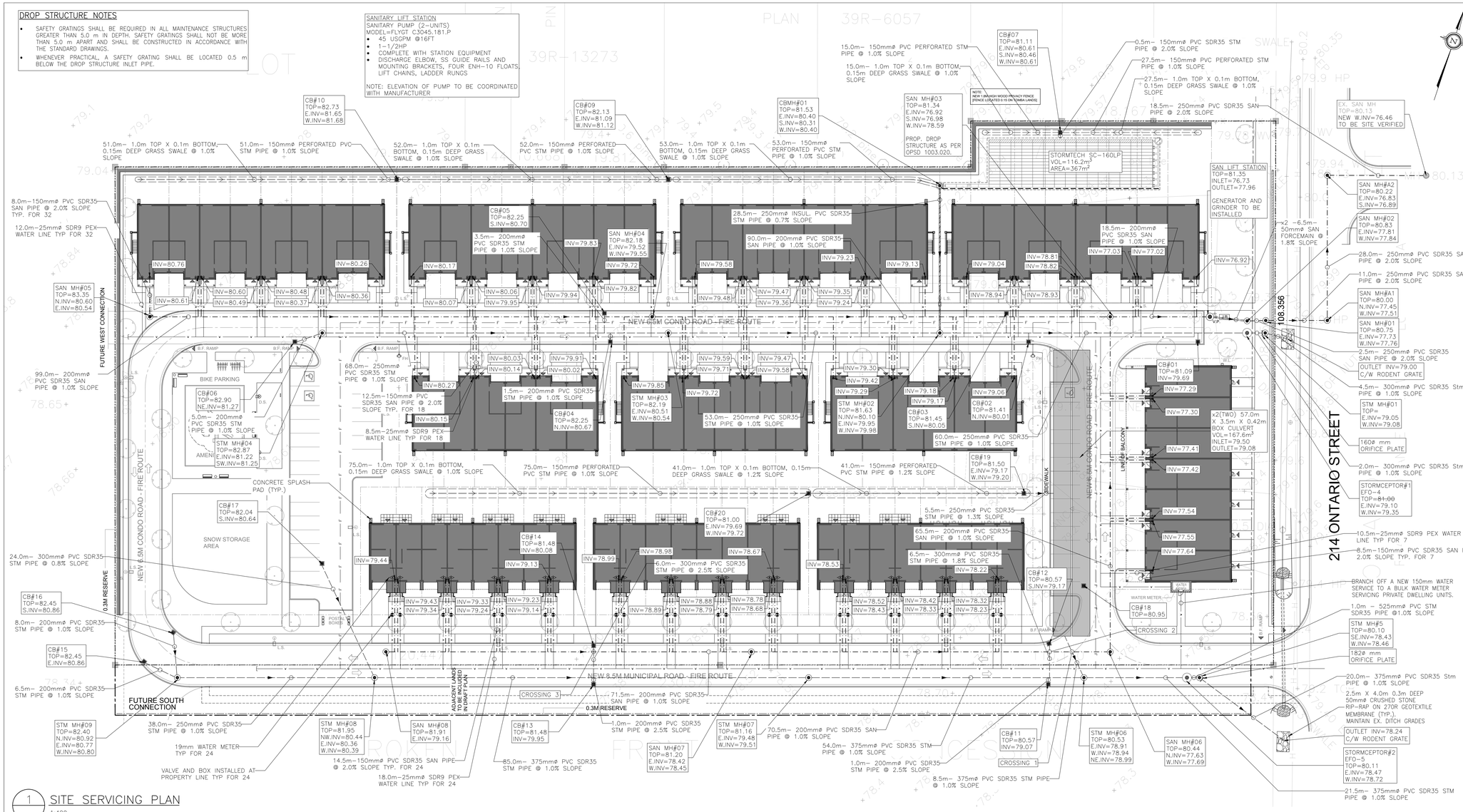
CALGARY
707 – 10TH AVE SW, SUITE 200, CALGARY, AB, T2R 0B3
T: 403 355 2295 F: 403 355 2297

DROP STRUCTURE NOTES

- SAFETY GRATINGS SHALL BE REQUIRED IN ALL MAINTENANCE STRUCTURES GREATER THAN 5.0 m IN DEPTH. SAFETY GRATINGS SHALL NOT BE MORE THAN 5.0 m APART AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE STANDARD DRAWINGS.
- WHENEVER PRACTICAL, A SAFETY GRATING SHALL BE LOCATED 0.5 m BELOW THE DROP STRUCTURE INLET PIPE.

SANITARY LIFT STATION
SANITARY PUMP (2-UNITS)
MODEL=FLYGT C3045.181.P
- 45 USGPM @16FT
- 1-1/2HP
- COMPLETE WITH STATION EQUIPMENT
- DISCHARGE ELBOW, SS GUIDE RAILS AND MOUNTING BRACKETS, FOUR ENH-10 FLOATS, LIFT CHAINS, LADDER RUNGS

NOTE: ELEVATION OF PUMP TO BE COORDINATED WITH MANUFACTURER



1 SITE SERVICING PLAN
1:400

KEY PLAN
SCALE: NTS

GENERAL NOTES

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LEGEND

- +100.00 EXISTING ELEVATION
- EXISTING CATCHBASIN
- EXISTING C.B./M.H.
- EXISTING MANHOLE
- PROPERTY LINE
- EXISTING SANITARY LINE
- NEW SANITARY LINE
- NEW STORM LINE
- NEW SANITARY FORCEMAIN
- NEW BOX CULVERT
- NEW CATCHBASIN
- NEW C.B./M.H.
- NEW MANHOLE
- RETAINING WALL
- RETAINING WALL
- CONCRETE SPLASH PAD
- RAINWATER LEADER

LICENSED PROFESSIONAL ENGINEER
M. Y. SAM
100127775
Aug 27, 2025
PROVINCE OF ONTARIO

No.	Date	Description	Drawn	Checked
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OWNER/CLIENT:

TOMBA ENTERPRISE LTD.

Project: BRIGHTON FREEHOLD TOWNHOUSE DEVELOPMENT

SITE SERVICING PLAN

214 ONTARIO STREET BRIGHTON, ON

File No: 220108	Date: 20 JAN '22	ACAD INFO	
Drawn By: EM	Scale: AS SHOWN	Dwg. File: 220108-P-301	
Checked By: JS	Sheet 1 of 1	Plotting Scale: 1=1	
Drawing No: P-301		Drawing Size: D	

Storm Sewer Hydraulic Design Sheet (from the Ontario Ministry of Environment, Conservation and Parks)

Site Location (City): **214 Ontario St, Brighton, ON**
Checking Date (yyyy/mm/dd): **2025-06-17**

Design Storm: The 5:100 Year Storm Event a=46.0 b=-0.699 n= **0.013** tc= **10** minutes
Rational Formula: Q = 2.78*CIA Concentration time: tc = ti + tf (minute) Manning Equation: Qcap. = (1/n)*A*R^(2/3)*S^0.5*1000 (L/s)
Where: Q: peak flow (L/s) Where: ti: inlet time before pipe (minute) D: pipe size (mm)
C: Runoff coefficient (pervious 0.20, impervious 0.95) tf: time flow in pipe (minute) S: slope (grade) of pipe(%)
I: Rainfall intensity (mm/h) = a*(tc/60)^b tf = L/(60V) (minute) n: roughness coefficient
A: area (ha)
Peak flow to be the minimum between the rational formula and the controlled flow when ICD are present

			Runoff						Pipe						
Street name	From (MH/CB)	To (MH/CB)	Area (A) (ha)	Runoff Coefficient C	Section (AC) (ha)	Accum (AC) (ha)	Concentration time (tc) (min)	Rainfall Intensity (I) (mm/hr)	Peak Flow (Q) (L/s)	Length (L) (m)	Slope (S) (%)	N. D. (D) (mm)	Qcap (full) (L/s)	V (full) (m/s)	Time of flow in pipe (min.) (tf)	(Q) / Qcap.
Proposed development	CB#16	STMMH#09	0.018	0.90	0.016	0.016	10.00	160.95	7.30	8.0	1.0%	200	32.80	1.04	0.13	0.22
	CB#15	STMMH#09	0.018	0.90	0.016	0.016	10.00	160.95	7.30	6.5	1.0%	200	32.80	1.04	0.10	0.22
	STMMH#09	STMMH#08	0.000	0.00	0.000	0.033	10.10	159.79	14.50	38.0	1.0%	250	59.47	1.21	0.52	0.24
	CB#17	STMMH#08	0.220	0.62	0.136	0.136	10.00	160.95	60.90	24.0	0.8%	300	86.49	1.22	0.33	0.70
	CB#14	STMMH#08	0.154	0.85	0.131	0.131	10.00	160.95	58.65	6.0	1.0%	300	96.70	1.37	0.07	0.61
	CB#13	STMMH#08	0.036	0.85	0.030	0.030	10.00	160.95	13.53	1.0	1.0%	200	32.80	1.04	0.02	0.41
	STMMH#08	STMMH#07	0.000	0.00	0.000	0.330	10.02	160.77	98.24	85.0	1.0%	375	175.33	1.59	0.89	0.56
	CB#12	STMMH#07	0.211	0.67	0.141	0.141	10.00	160.95	63.18	6.5	1.0%	300	96.70	1.37	0.08	0.65
	CB#11	STMMH#07	0.039	0.90	0.035	0.035	10.00	160.95	15.69	1.0	1.0%	200	32.80	1.04	0.02	0.48
	CB#19	TANK	0.450	0.25	0.113	0.113	10.00	160.95	50.34	5.5	1.3%	250	67.80	1.38	0.07	0.74
	CB#18	TANK	0.160	0.75	0.120	0.120	10.00	160.95	53.69	0.0	0.0%	0	0.00	0.00	0.00	0.00
	STMMH#07	STMMH#06	0.000	0.00	0.000	0.506	10.02	160.77	98.24	54.0	1.0%	375	175.33	1.59	0.57	0.56
	TANK	STMMH#06	0.000	0.00	0.000	0.233	10.00	160.95	98.24	8.5	1.1%	375	183.89	1.66	0.09	0.53
	STMMH#06	OGS#02	0.000	0.00	0.000	0.739	10.09	160.00	98.24	21.5	1.0%	375	175.33	1.59	0.23	0.56
	OGS#02	STMMH#5	0.000	0.00	0.000	0.739	10.31	157.54	98.24	1.0	1.0%	375	175.33	1.59	0.01	0.56
		Total	1.305					**Total released**	98.24						

UTILITY CROSSING TABLE		
CROSSING	ELEVATION (m)	VERTICAL CLEARANCE (m)
#1		
STM INV (375mm)	79.04	2.72
SAN OBV (200mm)	76.32	
#2		
STM INV (200mm)	79.14	2.73
SAN OBV (200mm)	76.41	
#3		
STM INV (200mm)	80.06	1.82
SAN OBV (200mm)	78.24	

Appendix D – Stormceptor Sizing Report

MARKHAM (HEAD OFFICE
25 CENTURIAN DR, SUITE 201, MARKHAM, ON L3R 5N8
T: 416 229 2636 F: 416 229 6965

CALGARY
707 – 10TH AVE SW, SUITE 200, CALGARY, AB, T2R 0B3
T: 403 355 2295 F: 403 355 2297

Stormceptor®

Rinker MATERIALS™

Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

06/12/2025

Province:	Ontario
City:	Brighton
Nearest Rainfall Station:	TRENTON AP
Climate Station Id:	6158875
Years of Rainfall Data:	19

Site Name:	Region 1

Drainage Area (ha):	0.86
Runoff Coefficient 'c':	0.50

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

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	12.58
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	345
Estimated Average Annual Sediment Volume (L/yr):	280

Project Name:	214 Ontario St - North
Project Number:	220108
Designer Name:	Ben Lo
Designer Company:	J and B Engineering
Designer Email:	b.lo@jandb-inc.com
Designer Phone:	416-229-2636
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	85
EFO5	91
EFO6	94
EFO8	97
EFO10	99
EFO12	99

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 85

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

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

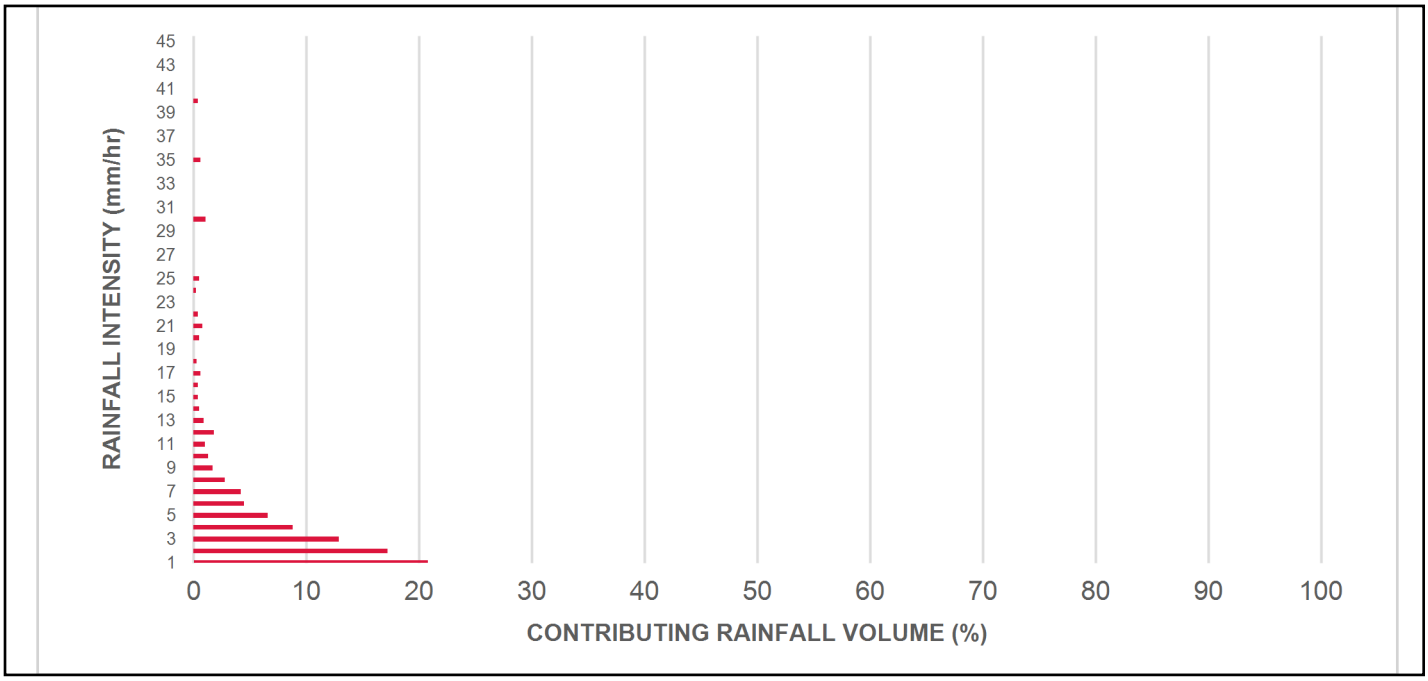
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

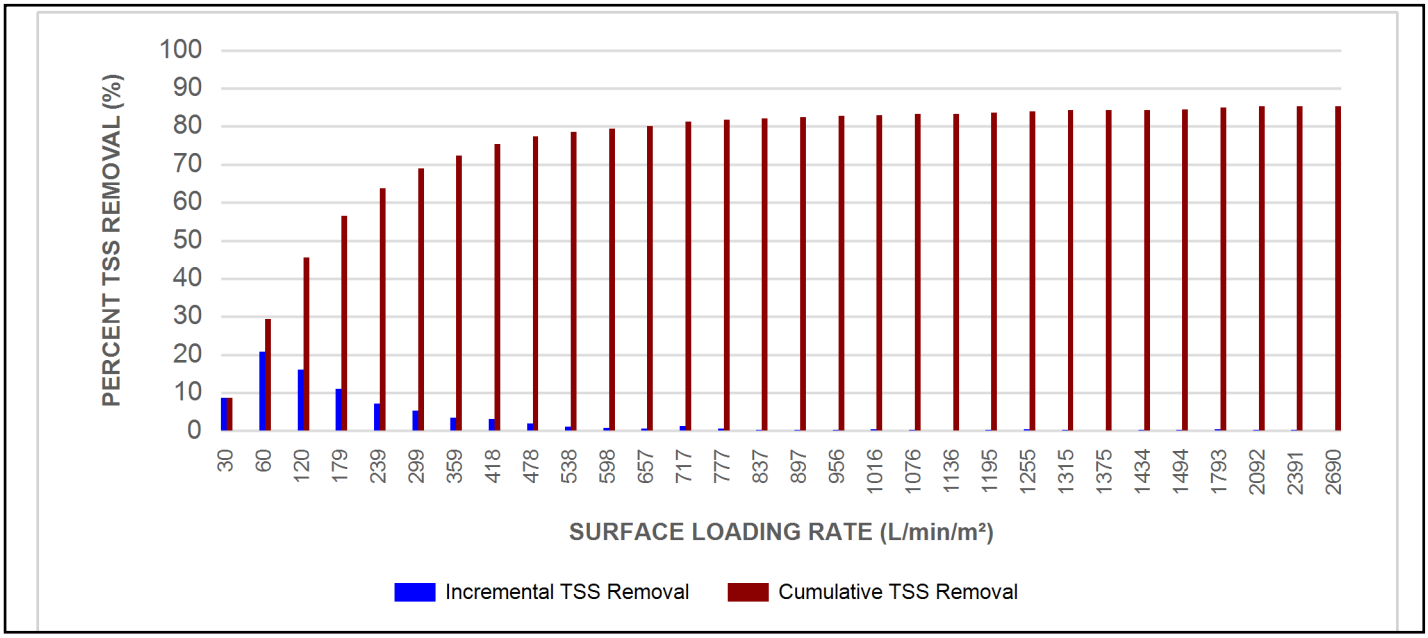
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.6	8.6	0.60	36.0	30.0	100	8.6	8.6
1.00	20.8	29.4	1.20	72.0	60.0	100	20.8	29.4
2.00	17.2	46.7	2.39	143.0	120.0	93	16.1	45.5
3.00	12.9	59.5	3.59	215.0	179.0	86	11.0	56.5
4.00	8.8	68.3	4.78	287.0	239.0	81	7.1	63.7
5.00	6.6	74.9	5.98	359.0	299.0	79	5.2	68.9
6.00	4.5	79.4	7.17	430.0	359.0	76	3.4	72.3
7.00	4.2	83.6	8.37	502.0	418.0	73	3.1	75.4
8.00	2.8	86.5	9.56	574.0	478.0	71	2.0	77.4
9.00	1.7	88.2	10.76	646.0	538.0	68	1.2	78.6
10.00	1.3	89.5	11.95	717.0	598.0	65	0.8	79.4
11.00	1.0	90.5	13.15	789.0	657.0	64	0.7	80.1
12.00	1.8	92.3	14.34	861.0	717.0	64	1.2	81.2
13.00	0.9	93.3	15.54	932.0	777.0	63	0.6	81.8
14.00	0.5	93.8	16.74	1004.0	837.0	63	0.3	82.1
15.00	0.4	94.2	17.93	1076.0	897.0	62	0.3	82.4
16.00	0.4	94.6	19.13	1148.0	956.0	62	0.3	82.7
17.00	0.6	95.2	20.32	1219.0	1016.0	61	0.4	83.0
18.00	0.3	95.6	21.52	1291.0	1076.0	60	0.2	83.2
19.00	0.0	95.6	22.71	1363.0	1136.0	59	0.0	83.2
20.00	0.5	96.1	23.91	1434.0	1195.0	57	0.3	83.6
21.00	0.8	96.9	25.10	1506.0	1255.0	56	0.4	84.0
22.00	0.4	97.3	26.30	1578.0	1315.0	54	0.2	84.2
23.00	0.0	97.3	27.49	1650.0	1375.0	53	0.0	84.2
24.00	0.2	97.5	28.69	1721.0	1434.0	51	0.1	84.3
25.00	0.5	97.9	29.89	1793.0	1494.0	49	0.2	84.5
30.00	1.1	99.0	35.86	2152.0	1793.0	41	0.4	85.0
35.00	0.6	99.6	41.84	2510.0	2092.0	35	0.2	85.2
40.00	0.4	100.0	47.82	2869.0	2391.0	31	0.1	85.3
45.00	0.0	100.0	53.79	3228.0	2690.0	28	0.0	85.3
Estimated Net Annual Sediment (TSS) Load Reduction =								**85 %**

Climate Station ID: 6158875 *Years of Rainfall Data*: 19

RAINFALL DATA FROM TRENTON AP 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
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
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

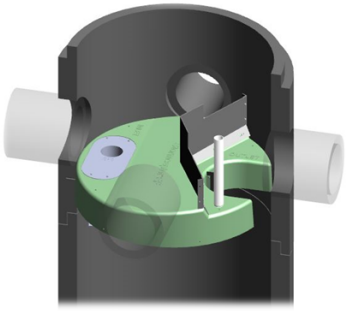
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test 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.

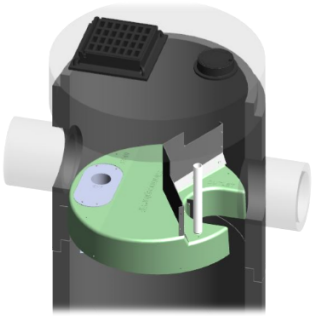
DESIGN FLEXIBILITY

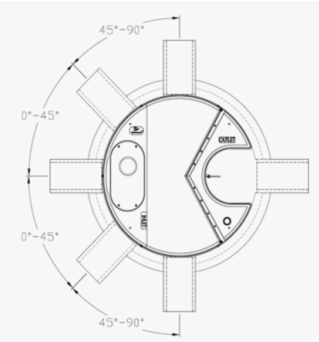
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend 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
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
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 TREAMENT 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
	5 ft (1524 mm) Diameter OGS Units:	1.95 m^3 sediment / 420 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.

Stormceptor®

Rinker MATERIALS™

Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

06/12/2025

Province:	Ontario
City:	Brighton
Nearest Rainfall Station:	TRENTON AP
Climate Station Id:	6158875
Years of Rainfall Data:	19

Site Name:	Region 2

Drainage Area (ha):	1.308
Runoff Coefficient 'c':	0.51

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

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	19.51
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	551
Estimated Average Annual Sediment Volume (L/yr):	448

Project Name:	214 Ontario St - South
Project Number:	220108
Designer Name:	Ben Lo
Designer Company:	J and B Engineering
Designer Email:	b.lo@jandb-inc.com
Designer Phone:	416-229-2636
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	79
EFO5	85
EFO6	90
EFO8	95
EFO10	97
EFO12	98

Recommended Stormceptor EFO Model: EFO5

Estimated Net Annual Sediment (TSS) Load Reduction (%): 85

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

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

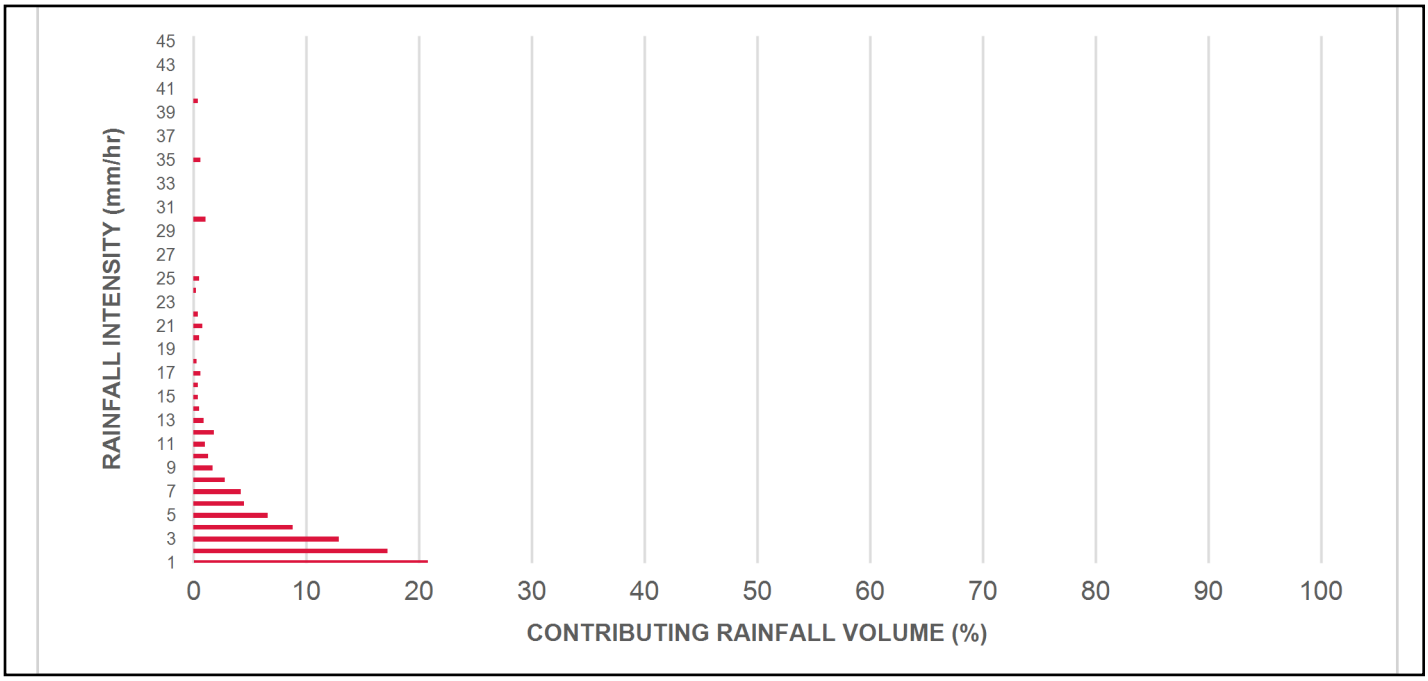
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

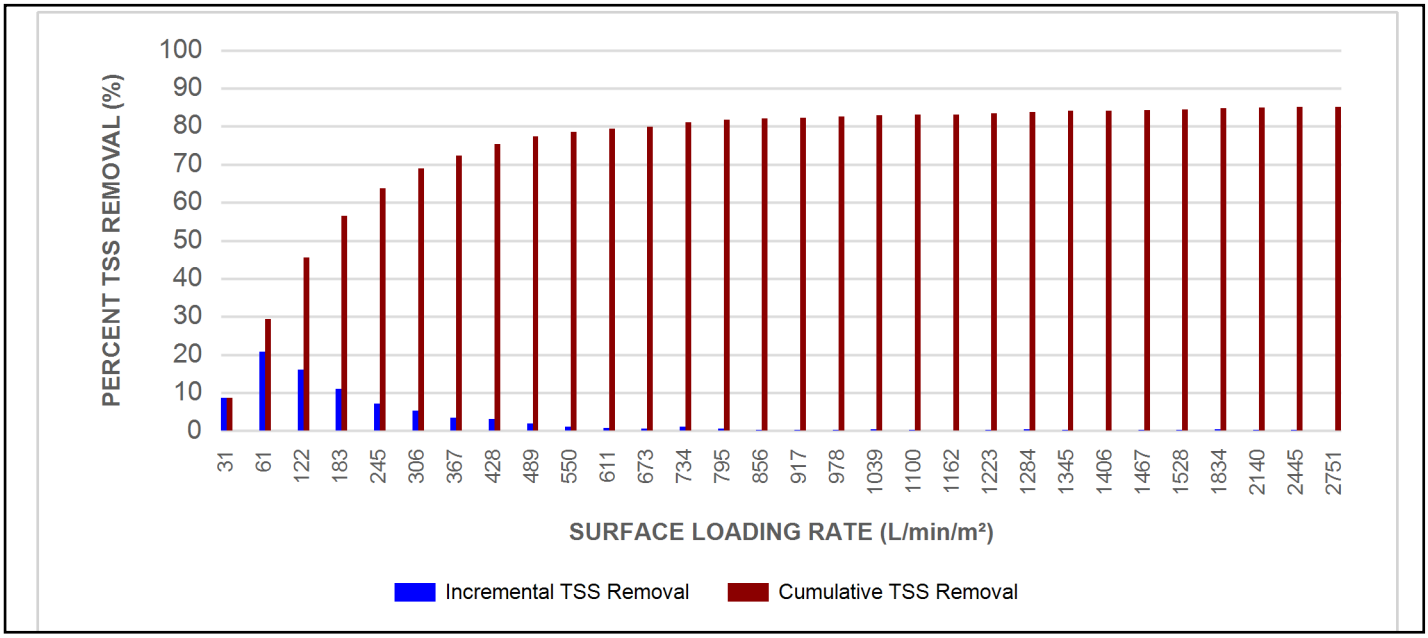
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.6	8.6	0.93	56.0	31.0	100	8.6	8.6
1.00	20.8	29.4	1.85	111.0	61.0	100	20.8	29.4
2.00	17.2	46.7	3.71	223.0	122.0	93	16.1	45.5
3.00	12.9	59.5	5.56	334.0	183.0	86	11.0	56.5
4.00	8.8	68.3	7.42	445.0	245.0	81	7.1	63.7
5.00	6.6	74.9	9.27	556.0	306.0	78	5.2	68.9
6.00	4.5	79.4	11.13	668.0	367.0	76	3.4	72.3
7.00	4.2	83.6	12.98	779.0	428.0	73	3.1	75.3
8.00	2.8	86.5	14.84	890.0	489.0	70	2.0	77.3
9.00	1.7	88.2	16.69	1001.0	550.0	67	1.2	78.5
10.00	1.3	89.5	18.54	1113.0	611.0	65	0.8	79.3
11.00	1.0	90.5	20.40	1224.0	673.0	64	0.7	79.9
12.00	1.8	92.3	22.25	1335.0	734.0	64	1.2	81.1
13.00	0.9	93.3	24.11	1446.0	795.0	63	0.6	81.7
14.00	0.5	93.8	25.96	1558.0	856.0	63	0.3	82.0
15.00	0.4	94.2	27.82	1669.0	917.0	62	0.3	82.3
16.00	0.4	94.6	29.67	1780.0	978.0	62	0.3	82.5
17.00	0.6	95.2	31.53	1892.0	1039.0	61	0.4	82.9
18.00	0.3	95.6	33.38	2003.0	1100.0	59	0.2	83.1
19.00	0.0	95.6	35.24	2114.0	1162.0	58	0.0	83.1
20.00	0.5	96.1	37.09	2225.0	1223.0	56	0.3	83.4
21.00	0.8	96.9	38.94	2337.0	1284.0	55	0.4	83.8
22.00	0.4	97.3	40.80	2448.0	1345.0	54	0.2	84.1
23.00	0.0	97.3	42.65	2559.0	1406.0	52	0.0	84.1
24.00	0.2	97.5	44.51	2670.0	1467.0	50	0.1	84.2
25.00	0.5	97.9	46.36	2782.0	1528.0	48	0.2	84.4
30.00	1.1	99.0	55.63	3338.0	1834.0	40	0.4	84.8
35.00	0.6	99.6	64.91	3894.0	2140.0	34	0.2	85.0
40.00	0.4	100.0	74.18	4451.0	2445.0	30	0.1	85.1
45.00	0.0	100.0	83.45	5007.0	2751.0	27	0.0	85.1
Estimated Net Annual Sediment (TSS) Load Reduction =								**85 %**

Climate Station ID: 6158875 *Years of Rainfall Data*: 19

RAINFALL DATA FROM TRENTON AP 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
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
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

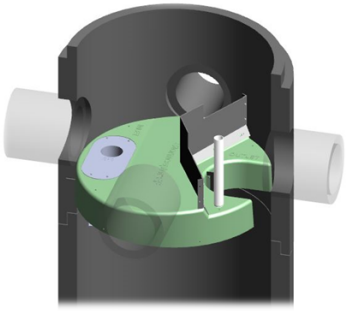
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test 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.

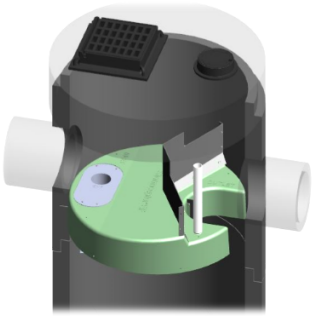
DESIGN FLEXIBILITY

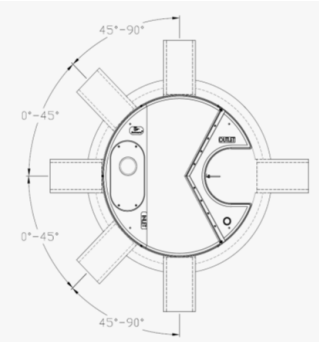
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend 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
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
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 TREAMENT 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
	5 ft (1524 mm) Diameter OGS Units:	1.95 m^3 sediment / 420 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.