Temporary Transport Truck/Trailer Parking Lot
12541 & 12577 Airport Road
Town of Caledon

Functional Servicing & Stormwater Management Report

March 2021

MAEL Project 2020-033

MASONGSONG ASSOCIATES ENGINEERING LIMITED
ENGINEERING SUSTAINABLE FUTURES

Functional Servicing & Stormwater Management Report

Temporary Transport Truck/Trailer Parking Lot
12541 & 12577 Airport Road
Town of Caledon

For

8181926 Canada Inc.

March 2021

Prepared by:

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Project No: MAEL 2020-033

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Site Conceptual Plan
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1. NTRODUCTION

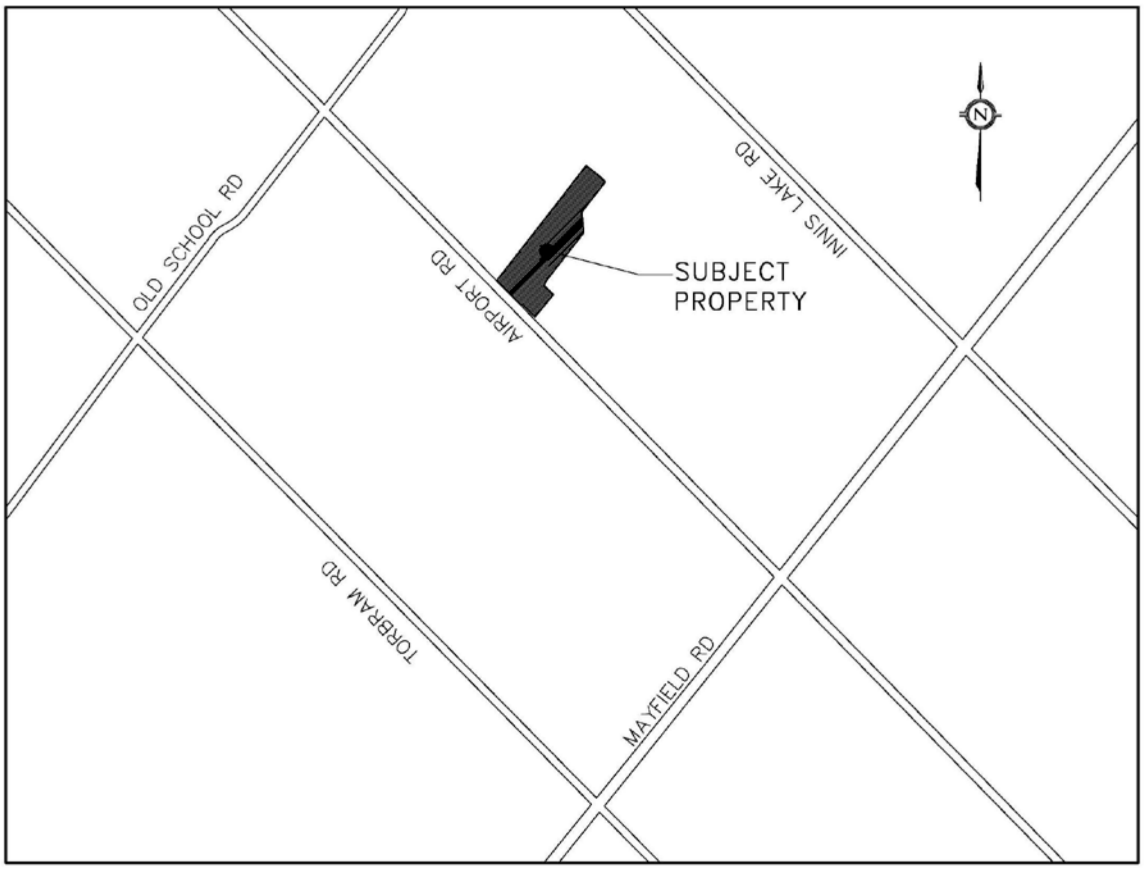
Masongsong Associates Engineering limited has been retained by 8181926 Canada Inc. to prepare this Functional Servicing & Stormwater Management Report in support of development application for a temporary Transport Truck/Trailer Parking facility, in the Town of Caledon, Regional Municipality of Peel.

The purpose of this report is to identify the requirements for servicing/stormwater management and to demonstrate how the subject site will function within the framework of existing and proposed infrastructures.

1.1 Background

The subject site is 11.85 ha and located at 12541 & 12577 Airport Road, Town of Caledon, situated south of Old School Road between Torbram Road and Innis Lake Road. The current use of property is mainly as agricultural field. The site is abutted by existing commercial and agricultural fields.

Refer to below key map for proposed site location plan:



1.2 Proposed Development

The subject development as illustrated in site conceptual plan prepared by Malone Given Parsons Ltd. (MGP) is a proposed temporary transport truck trailer parking lot. A Temporary Use Zoning Bylaw Amendment is being submitted to facilitate the development proposal.

Refer to Appendix-A for proposed conceptual site plan prepared by MGP dated January 06, 2021.

Main development works to include construction of a temporary gravel parking lot and installation of private storm sewer system.

1.3 Existing Grading and Landform

From the topographic survey observation, the subject land terrain generally remains undisturbed at natural state and slopes towards north-east direction. The existing landform feature generally ranges from 0.7 to 1 percent slopes with the exception of a small portion of the site near the existing creek which slopes about 15%. Existing pond concludes key feature found within the subject site.

1.4 Existing Infrastructures

The key existing infrastructures reviewed in support of the subject lands include:

Water A 300 mm diameter municipal watermain within Airport Road.

Sanitary A 600 mm diameter sanitary trunk sewer within Airport Road.

Storm The proposed development is located within rural part of the Town with municipal storm sewer system provided for road drainage only. Existing creek as receiving drainage system and roadside ditches as drainage conveyance system along with drainage culverts are considered existing stormwater drainage features within the vicinity of the subject site.

Refer to Appendix-C for Airport Road plan and profile drawings for existing services.

1.5 Proposed Services

The proposed site is a temporary gravel parking lot development and as such no sanitary or water service connections are proposed. Nonetheless, existing municipal watermain and sanitary sewer in the vicinity of the subject development are identified as part of functional servicing investigation. There is no evidence that the existing dwellings are provided with municipal services. No services are proposed for existing dwellings.

This report will mainly describe storm service and stormwater management aspect of the site servicing in context of temporary gravel parking lot development in accordance with the Town of Caledon and Region of Peel standard criteria. This report will also identify any potential constraints that may affect the serviceability of the site.

2 STORMWATER MANAGEMENT

2.1 Water Quantity

The proposed temporary gravel parking is the main change to the existing landform; however, this disturbance and increase to less permeable surface (gravel) will not result in a significant increase to post-development runoffs. This is due to makeup of proposed temporary gravel parking lot surface in comparison to predevelopment condition as vegetated surface.

2.1.1 Maximum Allowable Release Rate

The existing creek is considered downstream receiving system for site drainage. The maximum allowable release rate to the existing creek is determined to be to 100-year major flows at predevelopment 0.25 runoff coefficient. Also, drainage from certain areas due to grading constraints is considered uncontrolled and will be sheet draining to existing outlets at predevelopment rates.

Refer to Appendix-A, for pre and post drainage plan which also illustrates the controlled and uncontrolled drainage areas.

Based on noted parameters, site maximum allowable release rate is calculated as follows:

Q = 0.0028 CIA
Where:

Q= Flow in cubic metres per second (m^3/s)
A= Area in hectares
C= Run-off coefficient
I= Intensity in mm/hr

C = 0.25
A = 9.89 ha (11.89-1.96 ha-Controlled drainage area)
I = $a/(t+c)^b$ (a=4688, b=0.9624, c=17)
t = 10 min

I =$4688/(10+17)^{0.9624}$
=196.54 mm/hour

Q (100-y) = 0.0028 (0.25) x (196.54) x (9.89)
=1.36 m^3/s

2.1.2 Uncontrolled Release Rate

As stated, drainage from certain part of the subject site due to grading constraints cannot be controlled and will let to flow uncontrolled. The proposed onsite retention system will be overcontrolled to account for uncontrolled drainage areas. Uncontrolled flow from this rea is calculated as follows:

Q = 0.0028 CIA
Where:

Q= Flow in cubic metres per second (m^3/s)
A= Area in hectares
C= Run-off coefficient
I= Intensity in mm/hr

C = 0.25
A = 1.96 ha (11.85-9.89 ha-Uncontrolled drainage area)
I = $a/(t+c)^b$ (a=4688, b=0.9624, c=17)
t = 10 min

I = $4688/(10+17)^{0.9624}$
= 196.54 mm/hour

Q (100-y) = 0.0028 (0.25) x (196.54) x (1.96)
= 0.27 m^3/s

The net maximum allowable rate is therefore calculated to be 1.09 m^3/s (1.36-0.27).

Onsite storage is required to attenuate the flows and release it to a net maximum allowable rate of 1.09 m^3/s.

2.1.3 Pre and Post Development Runoff Coefficient

As noted, predevelopment runoff coefficient is selected 0.25 for mainly grassed/vegetated surface for a conservative approach.

Post development runoff coefficients is evaluated to determine on-site retention peak volume. The runoff coefficient for post development condition is calculated to be 0.32.

Refer to Appendix-A, for proposed development pre & post development drainage plan.

Below Tables 4.1 shows post development runoff coefficient calculations:

Table 4.1 Post Development Runoff Coefficient

Surface Area Component	Total Area	'R'	Total Area
Gravel	8.49	0.35	2.97
Landscape	2.18	0.25	0.55
Landscape (environmental area)	1.18	0.25	0.30
Total	11.85		3.82

Composite 'R' = 3.82/11.85 = 0.32

2.1.4 Peak Storage Volume

Containment of the 100-year post development storm event will be required. On-site control is to be provided to limit the flow from proposed site to predevelopment level.

Peak storage volume is calculated as follows:

Controlled Drainage Area (A) =9.89 ha (11.85-1.96))

Post development Composite (R) =0.32

Orifice Release Rate (Q) =1.01 m^3/s (400 mm orifice)

Table 4.2 Peak Storage Volumes

t_c (min)	i_{100} (mm/hr)	Q_{100} (m^3/s)	Q_{stored} (m^3/s)	Peak Volume (m^3)
10	196.536	1.742	0.732	439.22
11	189.777	1.682	0.672	443.61
12	183.475	1.626	0.616	**443.73**
13	177.585	1.574	0.564	439.99
14	172.068	1.525	0.515	432.78

Based on the above calculations, the peak storage volume is 443.73 m^3. This volume can be accommodated in the proposed site storm sewer system (superpipe). The total storage volume provided in the storm sewer system (superpipe) is 475.95 m^3 and the details are provided in the following Table 4.3:

Table 4.3 Storm Sewer System Storage Volume

Storm Sewer System Components	Diam (mm)	Area (m^2)	Length or Height (m)	Volume Provided (m^3)
Pipe	750	0.442	990.60	437.63
CB Lead (24)	250	0.049	280.50	13.77
CB (24)	600x600	0.360	1.00	8.64
MH (9)	1,500	1.767	1.00	15.90
Total				**475.95**

Refer to Appendix-B, for detailed onsite control calculations.

In addition to above, for post development peak runoff reduction, the Low Impact Development (LID) measure considered as lot-level infiltration-based controls for the subject site (as outlined in MECP Stormwater Management Planning and Design Manual) to include the followings:

- reduced grading to allow greater ponding of stormwater and natural infiltration;
- infiltration trenches;
- grassed swales;
- pervious pipe systems;
- vegetated filter strips; and

The above LIDs have been evaluated and there is a limited opportunity to design/implement grassed swales and infiltration trenches along the perimeter of the site which help in further reduction of site runoff by infiltration. The grass swales can convey the flows to existing receiving system in this case existing outlet and also has quality control benefit.

Design and Implementation of the above lot-level quantity controls will be applicable during detailed design stages.

Refer to Drawing SGR1 enclosed in Appendix-A, for illustration proposed development drainage scheme.

Furthermore, from the topographical survey contours observation, it is evident that the proposed development receives external drainage from upstream lands to the south-west of the subject site. Proposed site grading and sewer system is designed in manner to safely convey the external drainage to existing outlets consistent with predevelopment drainage pattern.

2.2 Water Quality

It is proposed to install a Stormceptor (Model EF010) treatment system to achieve water quality targets for the development site. The treatment unit is designed to provide a minimum 81% Total Suspended Solid Removal (T.S.S.R.). The treatment unit is to be installed at the downstream end of the proposed storm sewer storage system. The unit will provide the required quality treatment for flows prior to discharge to existing outlet.

Details of proposed Stormceptor (Model EF010) with TSS removal calculations are enclosed in Appendix -C for reference.

Proposed enhanced grass swale not only convey stormwater runoff, but it also provides effective quality control functionality. As such, the proposed enhanced grass swale provides additional quality treatment for site runoff.

Design of enhanced grass swale will be provided at detailed design stages.

TRCA standard Enhanced Grass Swale detail is enclosed in Appendix-C for reference.

2.3 Water Balance

No significant changes to overall water balance essential components are expected due to proposed development. As such, the impact of proposed lot development on water balance is considered minor in nature. Nonetheless, the recommended enhanced grass swale and infiltration trench LID mitigation measures promote natural infiltration of site runoff. This will offset the loss of infiltration from temporary gravel parking lot area to a significant level.

2.4 Sedimentation and Erosion Control During Construction

On-site erosion and sediment control should be implemented for all construction activities within the subject site, and for each consecutive stages of construction, including earthworks, and servicing activities. Erosion and sedimentation control plan is designed in accordance with TRCA Sedimentation Control Guidelines for Urban Construction (2006).

The basic principles to be considered for minimizing erosion, sedimentation, and resultant negative environmental impacts include:

- Minimize local disturbance activities (e.g. grading);
- Expose the smallest possible land area to erosion for the shortest possible time;
- Implement erosion and sediment control measures before the outset of construction activities; and,
- Carry out regular inspections of erosion and sediment control measures and repair or maintain as necessary;
- Erect sediment control fence around site perimeters;

- Install sediment control fence around site perimeters existing wetlands;
- Provide sediment traps (e.g. rock check dams, straw bales, scour basins) along interceptor swales and points of swale discharge;
- Provide gravel "mud mats" at construction vehicle access points to minimize off-site tracking of sediments; and,
- Confine refueling/servicing equipment to areas well away from inlets to the minor system or major system elements.
- Remove erosion and sediment controls once construction is completed and sediment run-off from the construction activities has stabilized.

Refer to Appendix-A, Drawing EC1 for Erosion and Sedimentation Control plan.

3 LANDFORM AND GRADING

Effort is made to preserves the existing landform and grades to the extent possible. To achieve this, proposed site corner grades match existing grades minimizing any grading disturbances along proposed site boundaries.

The proposed temporary gravel parking lot is graded in a manner to safely convey and bypass the external flow through the site to existing receiving systems.

Refer to Drawing SGR1 enclosed in Appendix-A for grading plan.

4 SUMMARY AND RECOMMENDATIONS

This report has demonstrated that the subject development can be serviced by existing and proposed servicing infrastructures. More specifically, storm servicing and SWM design analysis for proposed development are summarized as follows:

Quantity Control
Quantity control is required for subject site. Peak storage volume is to be provided by site storm sewer system (superpipe storage). In addition, as part of Low Impact Development (LID) measures, on site enhanced grass swale and infiltration trenches are also proposed to further reduce peak post development runoff.

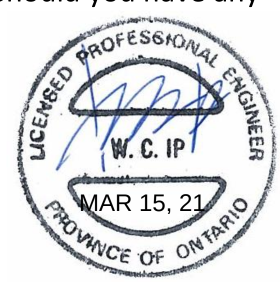
Quality Control

A Stormceptor treatment system is proposed to provide water quality treatment for site flows prior to discharging to existing receiving system. Enhanced grass swale is proposed which also provide additional at source quality treatment of the site drainage.

Water Balance
As noted, site water balance essential components do not experience significant changes due to proposed development. Nonetheless, proposed enhanced grass swale provides and infiltration trench infiltration as proposed mitigation measures to offset losses in infiltration.

We trust you will find this submission complete and in order. Should you have any questions, please contact the undersigned.

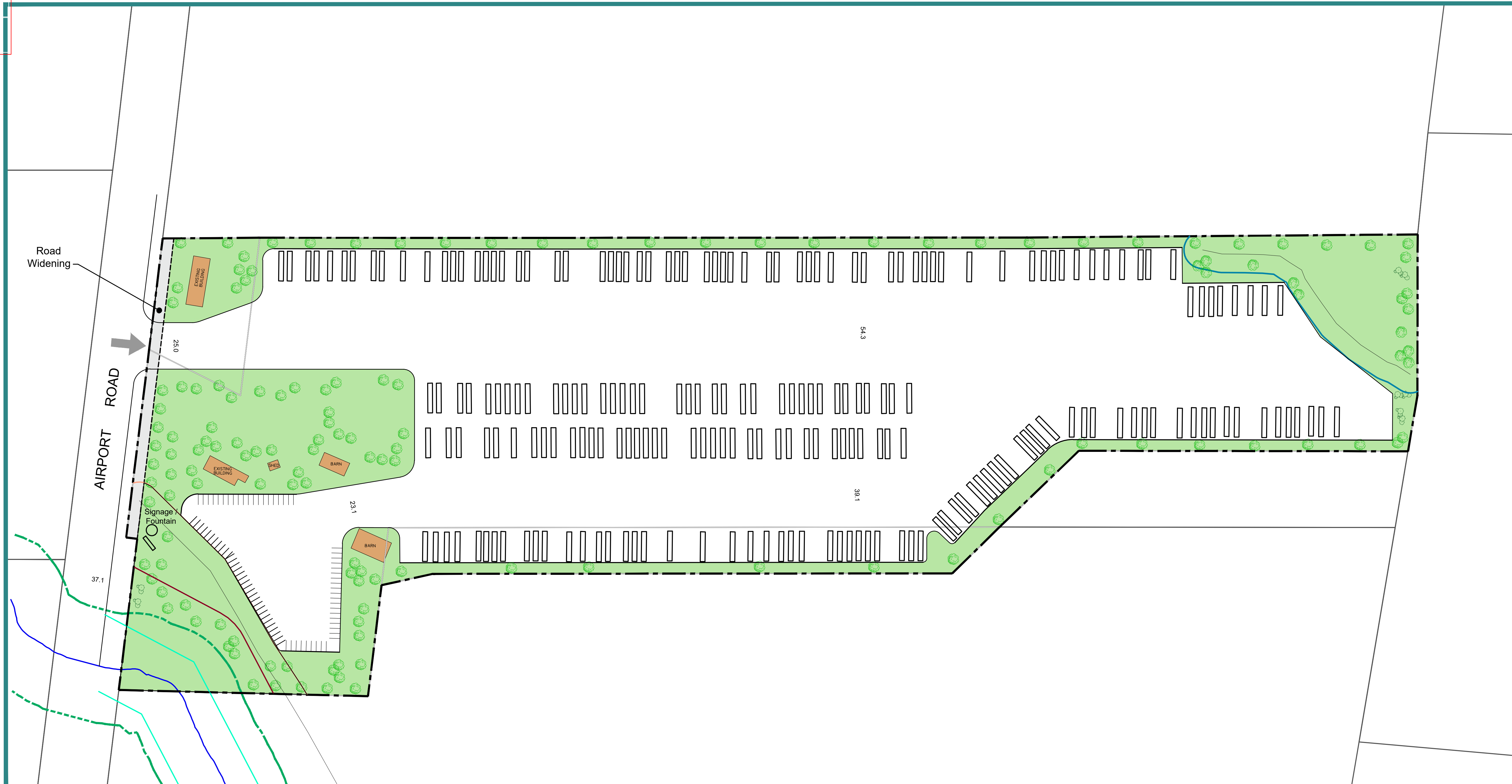
Respectfully Submitted,
MASONGSONG ASSOCIATES ENGINEERING LIMITED



Mansoor Nooristani, C.E.T.
Senior Project Technologist

Andrew Ip, P.Eng
Principal

Appendix A



Subject Lands - 11.85 ha	
Watercourse	
Watercourse +30m	
Meanderbelt	
Meanderbelt +30m	
Swamp Edge	
Top of Bank 10m Buffer	
Wetland 10m Buffer	

Schedule of Land Use

Parking Area	8.49 ha
Landscaped Area	2.18 ha
Environmental Area	1.18 ha
Total Area	11.85 ha

Scale: 0 20 40 60 80 100m

CONCEPTUAL TRANSPORT TRUCK / TRAILER PARKING LAYOUT

12541 & 12577 AIRPORT ROAD

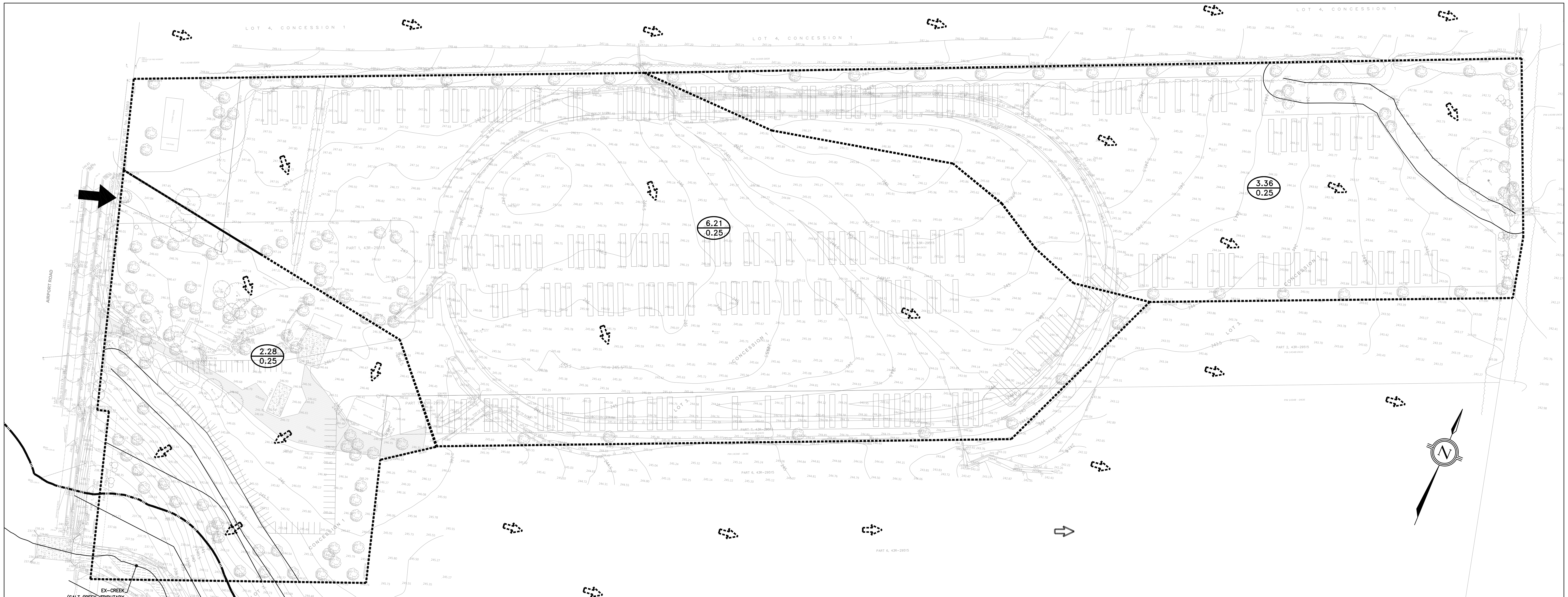
Town of Caledon
Regional Municipality of Peel

Date	Revision	By
Jan 6 / 21		

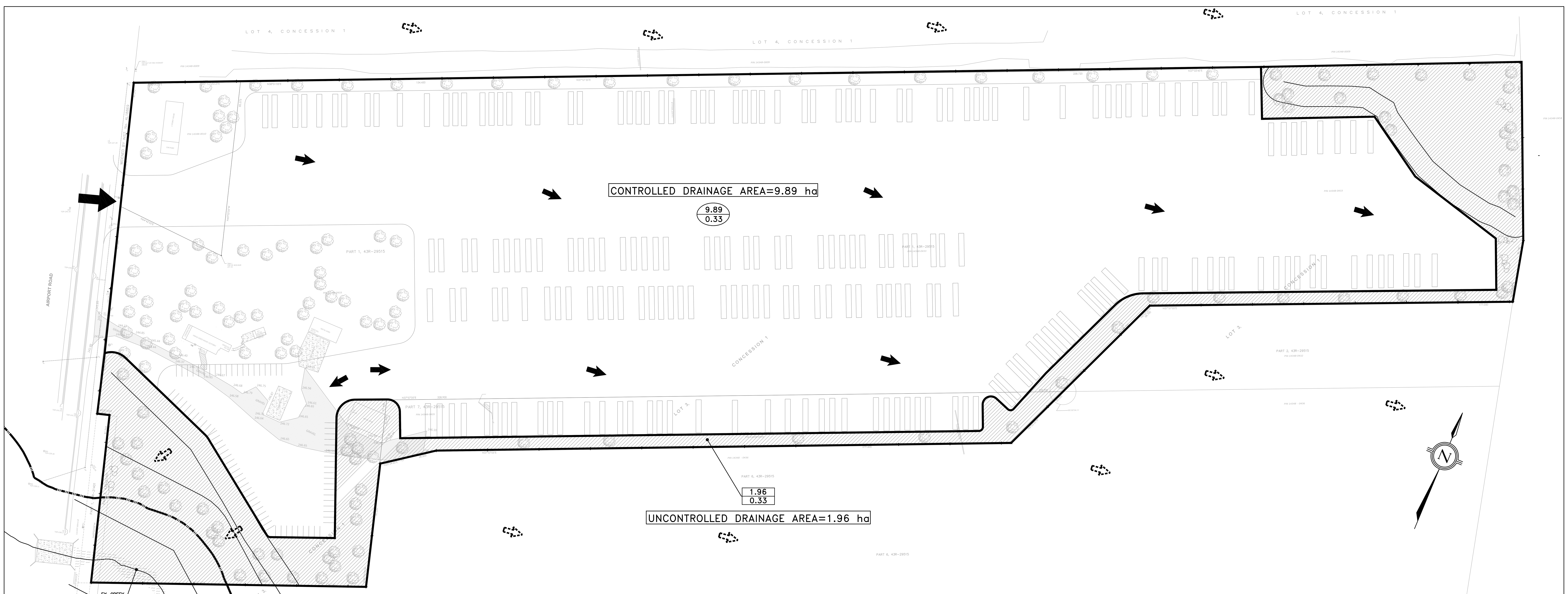
Prepared For:

MGP Malone Given Parsons.

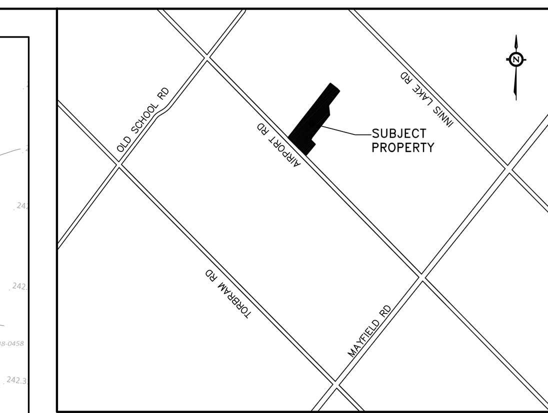
MGP File: 19-2801



PRE DEVELOPMENT DRAINAGE PLAN



POST DEVELOPMENT DRAINAGE PLAN



LEGEND:

- EXISTING CATCHBASIN
- EXISTING SANITARY MANHOLE
- EXISTING STORM MANHOLE
- EXISTING HYDRANT
- PROPOSED SANITARY MANHOLE
- PROPOSED STORM MANHOLE
- PROPOSED CATCHBASIN
- VALVE & CHAMBER
- HYDRANT & VALVE
- 0.40 — CONTROLLED DRAINAGE AREA (ha); 0.75 — RUNOFF COEFFICIENT
- 15.10 — UNCONTROLLED DRAINAGE AREA (ha); 0.25 — RUNOFF COEFFICIENT
- PROPOSED OVERLAND FLOW DIRECTION
- EXISTING OVERLAND FLOW
- PROPOSED DRAINAGE AREA
- EXISTING DRAINAGE AREA
- EXTERNAL DRAINAGE AREA
- PROPOSED ENHANCED GRASS SWALE

REVISIONS

No.	BY	DATE	REVISION	CONS. CHECKED	TOWN APPR'D
1	--	----			

APPROVED FOR CONSTRUCTION

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

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

DATE:________________ APPROVED BY:____________________
H. MUNTZ, P.ENG.
Town Engineer

ELEVATION NOTES

ELEVATIONS ARE BASED ON GPS OBSERVATION FROM PERMANENT REFERENCE STATIONS IN THE NAD83 (CSRS-2010) COORDINATES ON THE CGVD28 DATUM (1978 ADJUSTMENT) WITH GEOID MODEL HTv2.0, AS SUPPLIED BY NATURAL RESOURCES CANADA.

LOCAL BENCHMARK

TEM1, TOP OF IRON BAR, 248.55m & TEMP2 TOP NUT OF FIRE HYDRANT, 247.15m

DESIGNED BY

LICENSED PROFESSIONAL ENGINEER
W. C. IP
MAR 10, 21
PROVINCE OF ONTARIO

APPROVED BY

PROJECT:
TRANSPORT TRUCK/TRAILER PARKING
12541 & 12577 AIRPORT ROAD
TOWN OF CALEDAON

CONSULTANT:
MASONGSONG ASSOCIATES
7800 KENNEDY ROAD
SUITE 201
MARKHAM, ONTARIO
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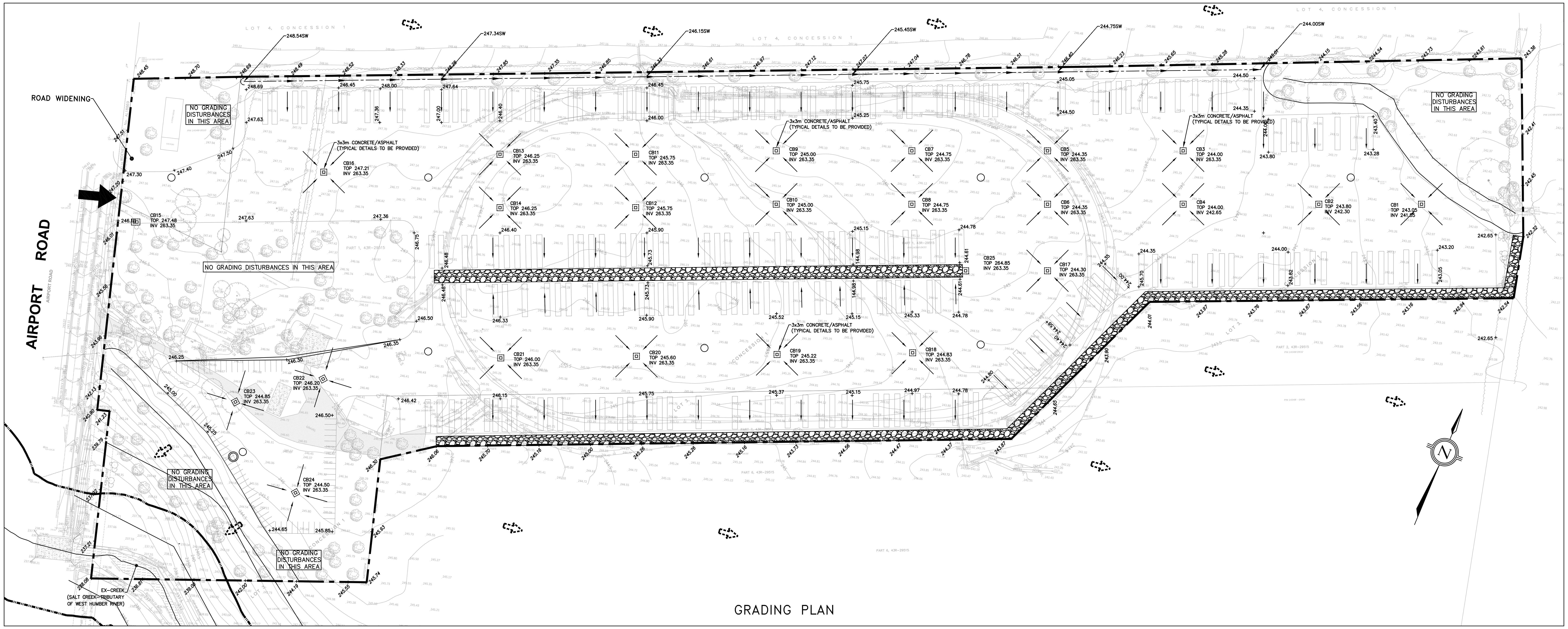
T: (905) 944-0162
www.maeng.ca

Region of Peel
Working for you

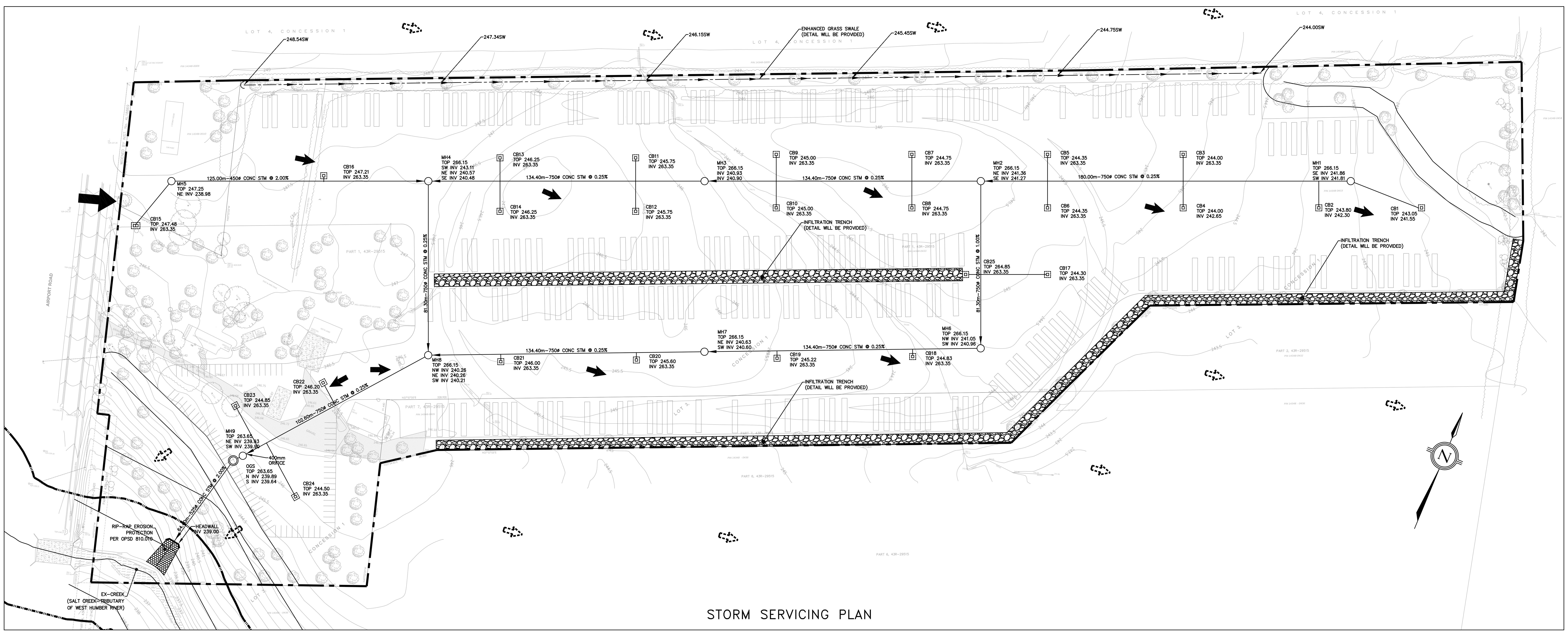
TOWN OF CALEDON

TITLE:
PRE & POST DEVELOPMENT DRAINAGE PLAN

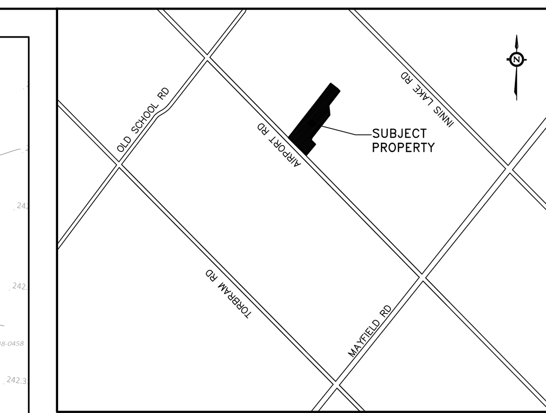
SCALE: 1:750		PROJECT No. 20-033
DESIGNED BY: M.N.	DRAWN BY: MAEL CAD	PLAN No. PPD-1
CHECKED BY: A.I.	DATE: MARCH 2021	



GRADING PLAN



STORM SERVICING PLAN



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CONSULTANT:
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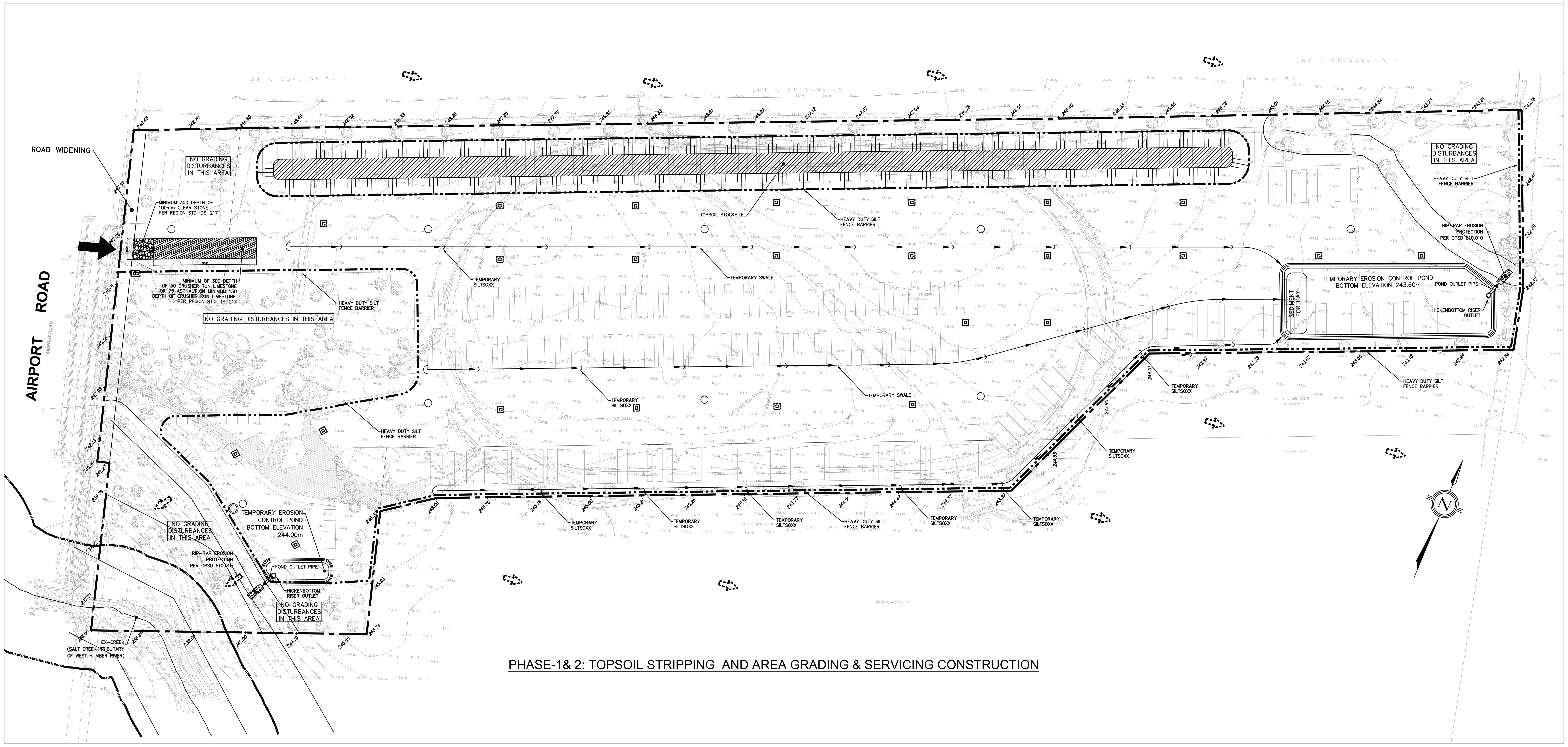
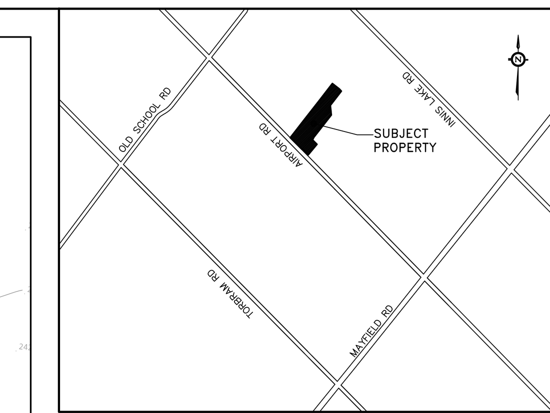
Region of Peel
Working for you

TOWN OF CALEDON

TITLE:
SERVICING & GRADING PLAN

SCALE: 1:750			PROJECT No. 20-033
DESIGNED BY: M.N.	DRAWN BY: MAEL CAD		PLAN No. SGR-1
CHECKED BY: A.I.	DATE: MARCH 2021		





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- PROPOSED ENHANCED GRASS SWALE

TOPSOIL STOCKPILE

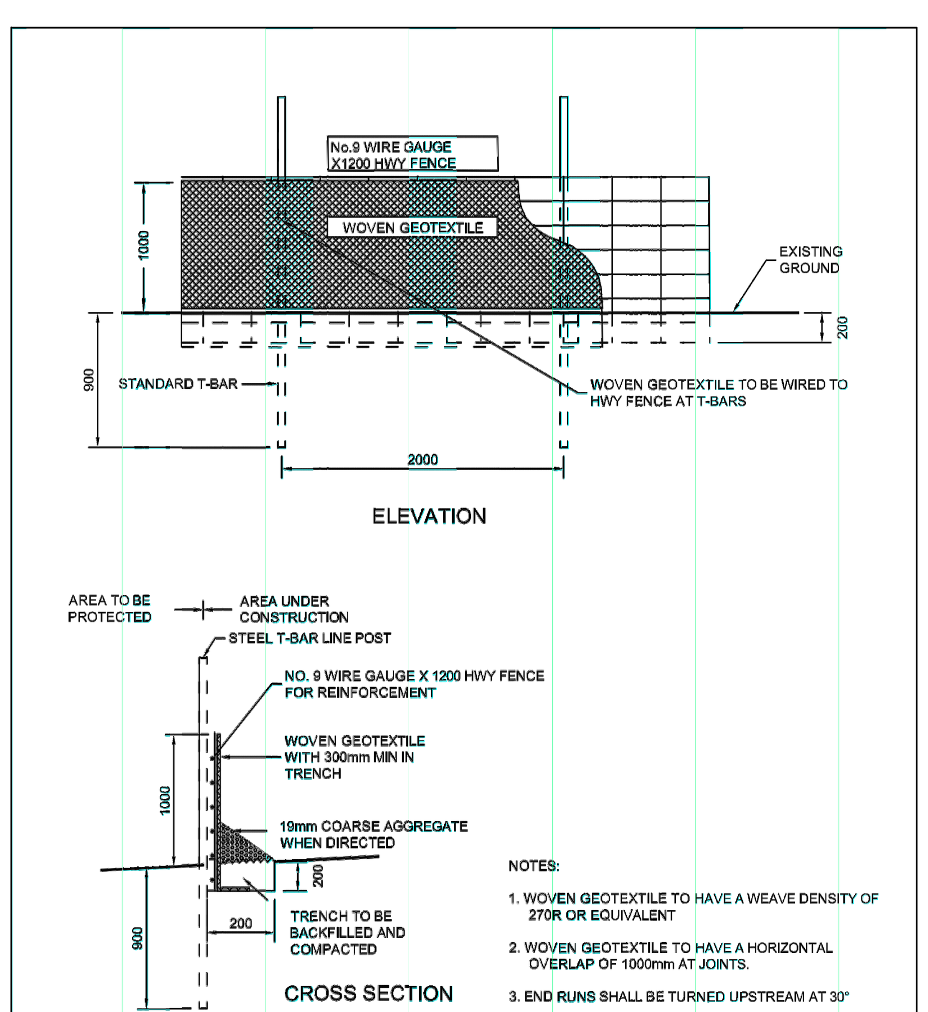
STRIPPED	=9.41ha
DEPTH	=0.30m
VOLUME	=0.30x7.23x10,000 =28,230m³
STOCKPILE FOOTPRINT AREA	=12,500.00m²
MAXIMUM HEIGHT	=4.00m
SLOPE	=2:1

TEMPORARY SEDIMENTATION CONTROL POND-A

CONTRIBUTING AREA	=10.10ha
REQUIRED ACTIVE POOL VOLUME	=125m³/hax10.10ha=1,262.50m³
REQUIRED PERMANENT POOL VOLUME	=125m³/hax10.10ha=1,262.50m³
PROVIDED ACTIVE POOL VOLUME	=1,300.00m³ (0.50m DEEP)
PROVIDED PERMANENT POOL VOLUME	=1,400.00m³ (0.50m DEEP)
TOTAL PROVIDED VOLUME	=2,700.00³

TEMPORARY SEDIMENTATION CONTROL POND-B

CONTRIBUTING AREA	=1.75ha
REQUIRED ACTIVE POOL VOLUME	=125m³/hax1.75ha=218.75m³
REQUIRED PERMANENT POOL VOLUME	=125m³/hax1.75ha=218.75m³
PROVIDED ACTIVE POOL VOLUME	=230.00m³ (0.50m DEEP)
PROVIDED PERMANENT POOL VOLUME	=230.00m³ (0.50m DEEP)
TOTAL PROVIDED VOLUME	=460.00³



NOTES:

1. WOVEN GEOTEXTILE TO HAVE A WEAVE DENSITY OF 270R OR EQUIVALENT
2. WOVEN GEOTEXTILE TO HAVE A HORIZONTAL OVERLAP OF 1000mm AT JOINTS.
3. END RUNS SHALL BE TURNED UPSTREAM AT 30°

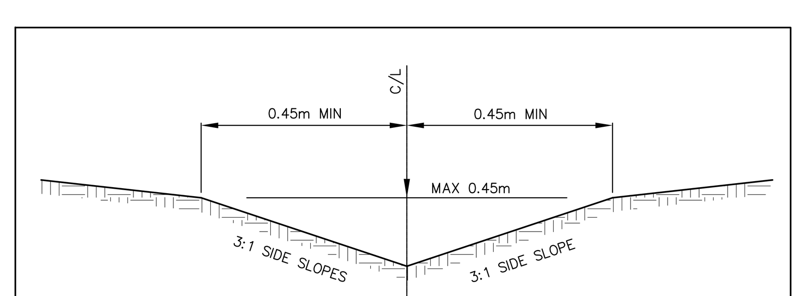
NO.	REVISION	APR'D	DATE
2	NAME CHANGED, STANDARD No. 325.01 NOW 304		JUNE 08
1	SUPPORT FENCING CHANGED TO HWY FENCE		Oct 02

TOWN OF CALEDON

SEDIMENT CONTROL FENCE

APR'D: C.C. DATE: APRIL 2000
DRAWN: BJM SCALE: N.T.S.

STANDARD No. 304



TEMPORARY SWALE CROSS-SECTION
N.T.S

DECOMMISSIONING OF TEMPORARY SEDIMENT CONTROL BASINS

1. AS DIRECTED BY THE CONSULTANT, REMOVE THE TEMPORARY HEADWALL STRUCTURE, MANHOLES, RIP RAP, FILTER FABRIC AND ANY CLEAR STONE AT THE BOTTOM OF THE TEMPORARY SEDIMENT CONTROL BASINS AND DISPOSE OFF-SITE.
2. EXCAVATE AND REMOVE ALL MATERIAL 0.60 METRE (MIN) BELOW BOTTOM OF THE TEMPORARY SWM POND OR MORE AS DIRECTED BY THE GEOTECHNICAL CONSULTANT. ALL EXCAVATED MATERIAL TO BE DISPOSED OFF-SITE.
3. ONCE THE TEMPORARY TEMPORARY SEDIMENT CONTROL BASINS HAVE BEEN REMOVED, THE LAND IS TO BE ENGINEERED FILLED. ALL FILLING IS TO BE COMPACTED TO 98% STANDARD PROCTOR DENSITY, OR AS APPROVED BY THE GEOTECHNICAL CONSULTANT.
4. IF DISCHARGING THE WATER THROUGH A FILTER BAG THE LOCATION OF THE DISCHARGE POINT MUST BE 30m AWAY FROM THE WATERCOURSE

DEWATERING NOTES:

1-LAY FILTER FABRIC
2-PLACE SEDIMENT BAG ON FILTER FABRIC
3-PLACE SILT SOXX ALONG THE PARAMETER OF FILTER FABRIC
4-PUMP SEDIMENT LADEN WATER FROM EROSION POND TO THE SEDIMENT BAG
5-TREATED WATER TO DISCHARGE TO CATCHBASIN
6-USE THE SAME METHOD FOR DEWATERING OF SEDIMENT TRAPS

LEGEND:

- INTERCEPTOR SWALE
- CATCHBASIN SEDIMENT CONTROL DEVICE
- TEMPORARY SILTSOXX
- HEAVY DUTY SILT FENCE BARRIER
- MUD-MAT FOR TEMPORARY CONSTRUCTION ACCESS

ESC MEASURE	TIMING OF INSTALLATION	INSPECTION/MAINTENANCE REQUIREMENTS	TIMING FOR REMOVAL
PHASE 1 - TOPSOIL STRIPPING AND AREA GRADING			
1. SILTATION CONTROL FENCE (OPSD 219.130) 2. CONSTRUCTION MUD MAT (DETAILED ON ESC DRAWING) 3. DRAINAGE/INTERCEPTOR SWALES (ILLUSTRATED ON ESC DRAWING) 4. SILTSOXX (CATCHBASIN SEDIMENT CONTROL DEVICE) 5. SEDIMENT CONTROL FACILITY (ILLUSTRATED ON ESC DRAWING) 6. OTHERS AS REQUIRED	PRIOR TO TOPSOIL STRIPPING PRIOR TO TOPSOIL STRIPPING DURING PRE-GRADING WORKS. DURING PRE-GRADING WORKS. DURING TOPSOIL STRIPPING. PRIOR TO TOPSOIL STRIPPING. DURING PRE-GRADING WORKS.	CONSULTANT TO ARRANGE INSPECTION WITH CITY STAFF ONCE INSTALLATION IS COMPLETE. CONSULTANT TO UNDERTAKE WEEKLY INSPECTIONS AND AFTER EACH RAINFALL EVENT, INCLUDING WEEKLY REPORTING. REGULAR MAINTENANCE TO REMOVE ACCUMULATED SEDIMENT ONCE 50% OF CAPACITY IS EXCEEDED AND REPAIR ESC MEASURES AS REQUIRED.	JUST PRIOR TO FINAL GRADING, REPLACEMENT WITH PHASE 2 MEASURES, OR CONSTRUCTION OF MUNICIPAL SERVICES.
PHASE 2 - MUNICIPAL SERVICING CONSTRUCTION			
1. GRASS VEGETATION HYDROSEEDING OF RESTORATION AREAS 2. SEDIMENT TRAPS (DETAILED ON ESC DRAWING) 3. DRAINAGE/INTERCEPTOR SWALES (ILLUSTRATED ON ESC DRAWING) 4. TEMPORARY CONNECTIONS TO STORM SEWER (ILLUSTRATED ON ESC DRAWING) 5. STORM DRAIN INLET PROTECTION, SILT SACK (DETAILED ON ESC DRAWING) 6. OTHERS AS REQUIRED BY CITY OR TRCA	GRADED AREAS TO BE SEEDED WITHIN 2 WEEKS AFTER GRADING AND INSTALLATION OF STORM DRAINAGE STSTEM IS COMPLETE.	CONSULTANT TO UNDERTAKE WEEKLY INSPECTIONS AND AFTER EACH RAINFALL EVENT, INCLUDING WEEKLY REPORTING. REGULAR MAINTENANCE TO REMOVE ACCUMULATED SEDIMENT ONCE 50% OF CAPACITY IS EXCEEDED AND REPAIR ESC MEASURES AS REQUIRED. RELOCATION OF THE ON-SITE SEDIMENTATION CONTROLS ARE REQUIRED AS BUILDING PROGRESSES.	JUST PRIOR TO FINAL GRADING OR BUILDING CONSTRUCTION
PHASE 3 - BUILDING CONSTRUCTION	STORM SERVICING PLAN		
1. MAINTENANCE AND REPAIRS TO ALL REMAINING ESC MEASURES AS PER DETAILED INSPECTION WITH CITY INSPECTOR 2. REMOVAL OF IDENTIFIED PHASE 1 OR 2 MEASURES	PRIOR TO BUILDING CONSTRUCTION, ESC MEASURES TO BE REPAIRED AS PER CITY DEFICIENCY LIST.	DETAILED INSPECTION OF ALL REMAINING ESC MEASURES WITH CITY INSPECTOR. CONSULTANT TO UNDERTAKE WEEKLY INSPECTIONS AND AFTER EACH RAINFALL EVENT, INCLUDING WEEKLY REPORTING. REGULAR MAINTENANCE TO REMOVE ACCUMULATED SEDIMENT ONCE 50% OF CAPACITY IS EXCEEDED AND REPAIR ESC MEASURES AS REQUIRED.	JUST PRIOR TO FINAL GRADING AND SODDING OF LOT/BLOCK AREAS.

EROSION AND SEDIMENT CONTROL GENERAL NOTES

1. THE OWNER IS RESPONSIBLE FOR OBTAINING ALL NECESSARY APPROVAL FROM THE TOWN AND EXTERNAL AGENCIES PRIOR TO ANY SITE ALTERATION ACTIVITY.
2. PRIOR TO COMMENCEMENT OF ANY ON-SITE/TOPSOIL STRIPPING, EROSION & SEDIMENT CONTROL (ESC) MEASURES, AS PER APPROVED SITE ALTERATION PLAN, MUST BE INSTALLED AND APPROVED BY THE DIRECTOR OF ENGINEERING. ADDITIONAL ESC MEASURES, IF REQUIRED, SHALL BE INSTALLED AS DIRECTED BY THE DIRECTOR OF ENGINEERING. THE ESC MEASURES SHALL REMAIN IN PLACE UNTIL DIRECTED BY THE DIRECTOR OF ENGINEERING FOR THEIR REMOVAL.
3. TREES ARE TO BE RESERVED AS PER THE APPROVED TREE PRESERVATION PLAN.
4. NO CONSTRUCTION ACTIVITY OR MACHINERY SHALL BE ALLOWED BEYOND THE SILT/SNOW FENCE OR LIMITS OF THE SUBDIVISION.
5. THE CONTRACTOR IS RESPONSIBLE TO IMPLEMENT DUST CONTROL MEASURES AND CONSTRUCTION PRACTICE GUIDELINES AS APPROVED BY TOWN/TRCA.
6. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL ESC MEASURES IN WORKING CONDITIONS AT ALL TIMES TO THE SATISFACTION OF THE DIRECTOR OF ENGINEERING. THE CONTRACTOR SHALL ROUTINELY INSPECT ALL ESC DEVICES MINIMUM ONCE A WEEK AND AFTER EACH RAINFALL EVENT GREATER THAN 10mm TO ENSURE THAT ESC MEASURES ARE IN PROPER WORKING CONDITIONS. ANY DAMAGES MUST BE REPAIRED WITHIN 24 HOURS.
7. ALL CONSTRUCTION VEHICLES MUST ENTER AND EXIT THE SITE ONLY FROM THE APPROVED ACCESS ROUTE(S) AS SHOWN ON THE PLAN.
8. CATCHBASIN SEDIMENT CONTROL DEVICES ARE TO BE INSTALLED IMMEDIATELY AFTER BASE ASPHALT.
9. SEDIMENTS COLLECTED IN THE SEDIMENT CONTROL PONDS SHALL BE REMOVED WHEN 50% OF THE STORAGE CAPACITY IS FILLED. THE POND SHALL BE KEPT IN OPERATION UNTIL SODDING OF DISTURBED AREAS IS COMPLETED TO THE SATISFACTION OF THE DIRECTOR OF ENGINEERING.
10. ALL DISTURBED GROUND LEFT INACTIVE FOR OVER 30 DAYS SHALL BE VEGETATED, SUBJECT TO WEATHER CONDITIONS, BY SEEDING OR APPROVED EQUIVALENT TO THE SATISFACTION OF THE DIRECTOR OF ENGINEERING.
11. ALL TOPSOIL STOCKPILES IF REMAIN ON SITE FOR MORE THAT 30 DAYS SHALL BE VEGETATED. SUBJECT TO WEATHER CONDITIONS, BY SEEDING OR APPROVED EQUIVALENT TO THE SATISFACTION OF THE DIRECTOR OF ENGINEERING.
12. STREET SWEEPING/CATCHBASIN CLEANING PROGRAM TO BE IMPLEMENTED UPON COMPLETION OF BASE ASPHALT TO THE SATISFACTION OF THE DIRECTOR OF ENGINEERING.
13. ALL TOPSOIL STOCKPILES SHALL BE SURROUNDED WITH SEDIMENT CONTROL FENCE. THE MAXIMUM SIDESLOPES FOR STOCKPILES SHALL BE 1.5 (H) TO 1.0 (V). THE MAXIMUM HEIGHT OF STOCKPILE SHOULD NOT EXCEED 5.0 METRES.
14. THE EROSION AND SEDIMENT CONTROL STRATEGIES OUTLINED ON THE PLANS ARE NOT STATIC AND MAY NEED TO BE UPGRADED/AMENDED AS SITE CONDITIONS CHANGE TO MINIMIZE SEDIMENT LADEN RUNOFF FROM LEAVING THE WORK AREAS. IF THE PRESCRIBED MEASURES ON THE PLANS ARE NOT EFFECTIVE IN PREVENTING THE RELEASE OF A DELETERIOUS SUBSTANCE, INCLUDING SEDIMENT,THEN ALTERNATIVE MEASURES MUST BE IMPLEMENTED IMMEDIATELY TO MINIMIZE POTENTIAL ECOLOGICAL IMPACTS. TRCA ENFORCEMENT OFFICER (BEN KRUL, TELEPHONE : 416-661-6600 EXT. 5769) SHOULD BE IMMEDIATELY CONTACTED. ADDITIONAL ESC MEASURES TO BE KEPT ON SITE AND USED AS NECESSARY.
15. THE CONTRACTOR SHALL ENDEAVOUR TO PREVENT MUD TRUCKING ONTO EXISTING RIGHT-OF-WAY AND SHALL PROVIDE FOR CLEANUP AT HIS/HER OWN EXPENSE AS DIRECTED BY ENGINEER.
16. THE CONTRACTOR SHALL CARE AND CONTROL SPILLS, FLUIDS, AND MATERIALS DURING CONSTRUCTION TO MINIMIZE RISK TO ENVIRONMENT.
17. EROSION AND SEDIMENT CONTROL (ESC) MEASURES WILL BE IMPLEMENTED PRIOR TO, AND MAINTAINED DURING THE CONSTRUCTION PHASES, TO PREVENT ENTRY OF SEDIMENT INTO THE WATER .ALL DAMAGED EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE REPAIRED AND/OR REPLACED WITHIN 48 HOURS OF THE INSPECTION

REVISIONS

No.	BY	DATE	REVISION	CONS. CHECKED	TOWN APPR'D
1	--	----			

APPROVED FOR CONSTRUCTION

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

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

DATE:________________ APPROVED BY:____________________
H. MUNTZ, P.ENG.
Town Engineer

ELEVATION NOTES

ELEVATIONS ARE BASED ON GPS OBSERVATION FROM PERMANENT REFERENCE STATIONS IN THE NAD83 (CSRS-2010) COORDINATES ON THE CGVD28 DATUM (1978 ADJUSTMENT) WITH GEOID MODEL HTv2.0, AS SUPPLIED BY NATURAL RESOURCES CANADA.

LOCAL BENCHMARK

TEM1, TOP OF IRON BAR, 248.55m & TEMP2 TOP NUT OF FIRE HYDRANT, 247.15m

DESIGNED BY: LICENSED PROFESSIONAL ENGINEER W. C. IP MAR 10, 21 PROVINCE OF ONTARIO

APPROVED BY

PROJECT:
TRANSPORT TRUCK/TRAILER PARKING
12541 & 12577 AIRPORT ROAD
TOWN OF CALEDAON

CONSULTANT:
MASONGSONG ASSOCIATES
7800 KENNEDY ROAD
SUITE 201
MARKHAM, ONTARIO
L3R 2C7
T: (905) 944-0162
www.maeng.ca

Region of Peel
Working for you

TOWN OF CALEDON

TITLE:
EROSION AND SEDIMENT CONTROL PLAN

SCALE: 1:750		PROJECT No. 20-033	
DESIGNED BY: M.N.	DRAWN BY: MAEL CAD	PLAN No. EC-1	
CHECKED BY: A.I.	DATE: MARCH 2021		

Appendix B

Table 101

On-Site Storage Calculator

Project: 1254 & 12577 Airport Road
Project No.: 20-033
By: M.N.
Date: 10-Mar-21

$$i_{100} = 4688 * (t_{c+17})^{0.9624}$$

A = 9.890 ha
Composite C = 0.320
Q_{ACTUAL} = 1.01 m^3/s

$Q_{ALLOWABLE}$ = 1.09 m^3/s

t_c (min)	i_{100} (mm/hr)	Q_{100} (m^3/s)	Q_{stored} (m^3/s)	Peak Volume (m^3)	
5	239.354	2.121	1.111	333.438	
6	229.330	2.032	1.023	368.149	
7	220.126	1.951	0.941	395.254	
8	211.646	1.875	0.866	415.647	
9	203.806	1.806	0.796	430.088	
10	196.536	1.742	0.732	439.223	
11	189.777	1.682	0.672	443.610	
12	183.475	1.626	0.616	443.730	***
13	177.585	1.574	0.564	439.999	
14	172.068	1.525	0.515	432.782	
15	166.890	1.479	0.469	422.399	
16	162.020	1.436	0.426	409.130	
17	157.432	1.395	0.386	393.225	
18	153.100	1.357	0.347	374.904	
19	149.005	1.320	0.311	354.364	
20	145.128	1.286	0.276	331.780	
21	141.450	1.253	0.244	307.309	
22	137.958	1.223	0.213	281.094	
23	134.637	1.193	0.184	253.261	
24	131.475	1.165	0.156	223.926	
25	128.461	1.138	0.129	193.193	
26	125.585	1.113	0.103	161.158	
27	122.837	1.089	0.079	127.906	
28	120.209	1.065	0.056	93.517	
29	117.693	1.043	0.033	58.063	

TABLE 102

Orifice Sizing Calculator

Project: 1254 & 12577 Airport Road
Project No.: 20-033
By: M.N.
Date: 10-Mar-21

Diam (mm)	Area (m^2)	C	h (m)	$Q_{release}$	
400	0.126	0.80	5.14	1.01	m^3/s
				1,009.56	L/s

Total Actual Release= **1.01**

Total Allowable Release= **1.09**

TABLE 103

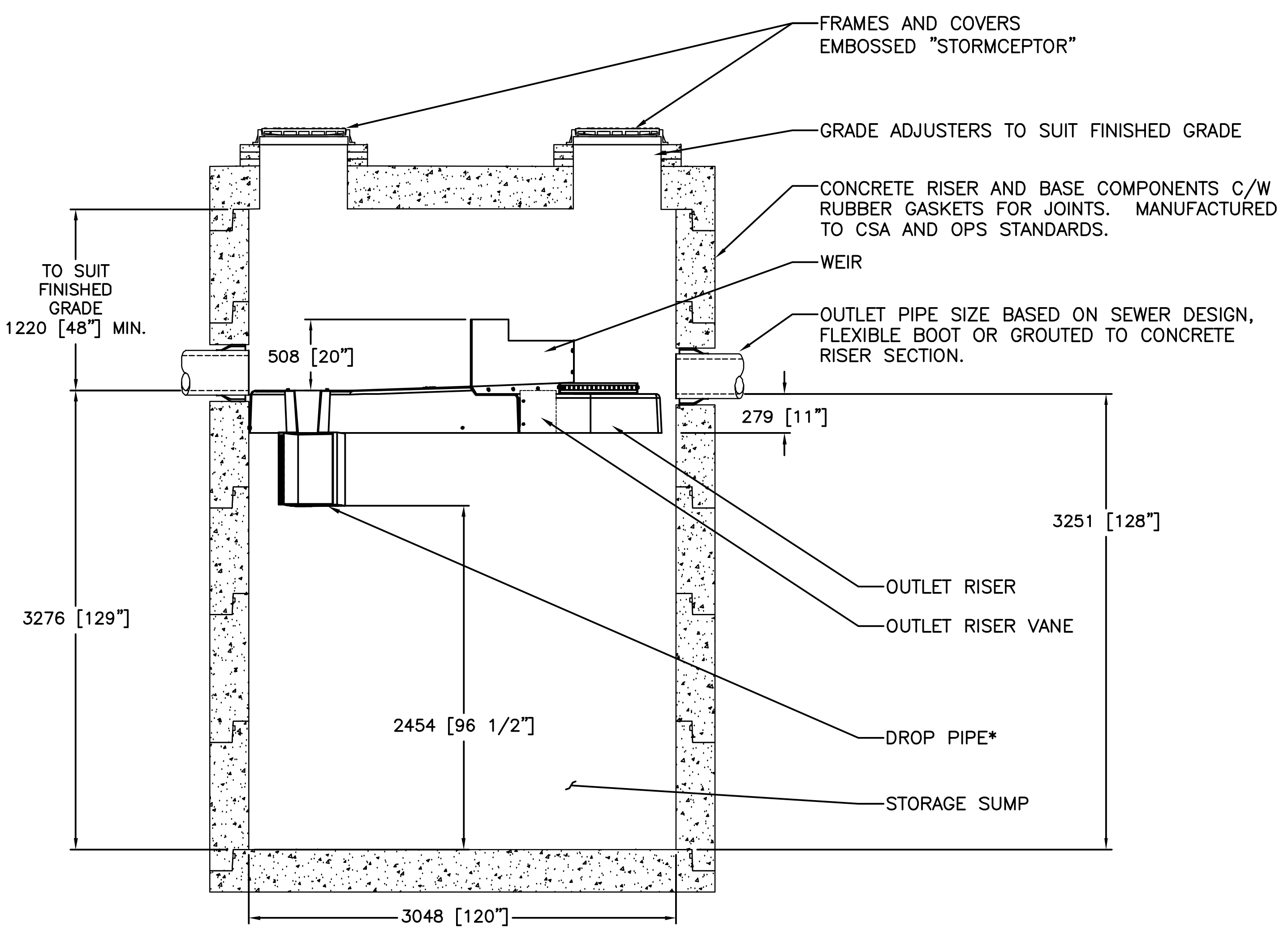
Storage Sizing Calculator

Project: 1254 & 12577 Airport Road
Project No.: 20-033
By: M.N.
Date: 10-Mar-21

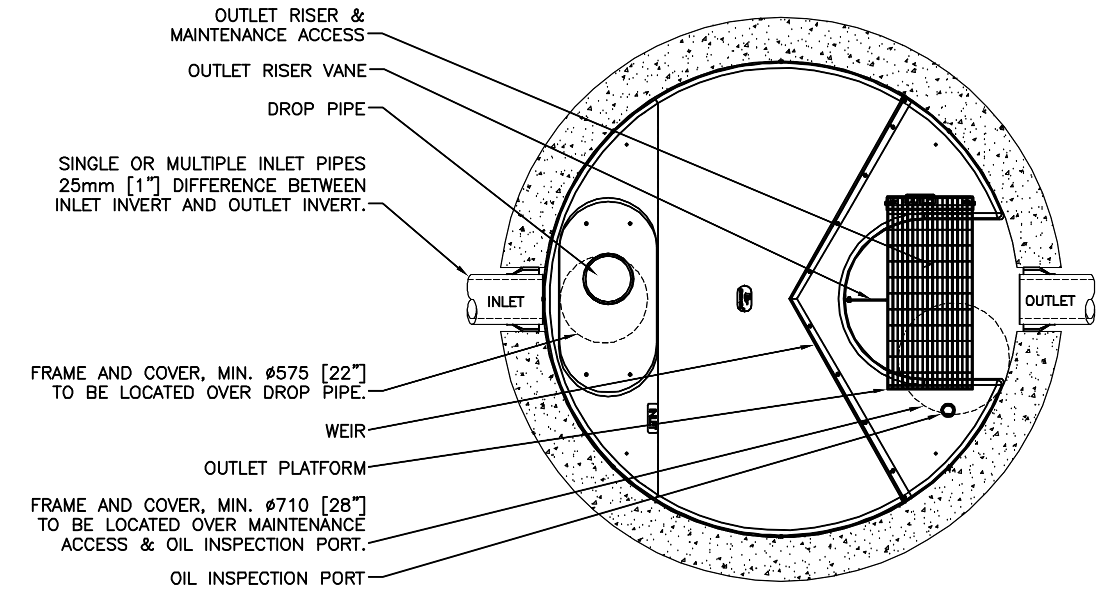
Sewer Component	Diam (mm)	Area (m^2)	Length or Height (m)	Vol. (Provided)	Vol. (Required)
Pipe	750	0.442	990.60	437.63	
CB Lead (24)	250	0.049	280.50	13.77	
CB (24)	600x600	0.360	1.00	8.64	
MH (9)	1,500	1.767	1.00	15.90	
Total				475.95	443.73

Appendix C

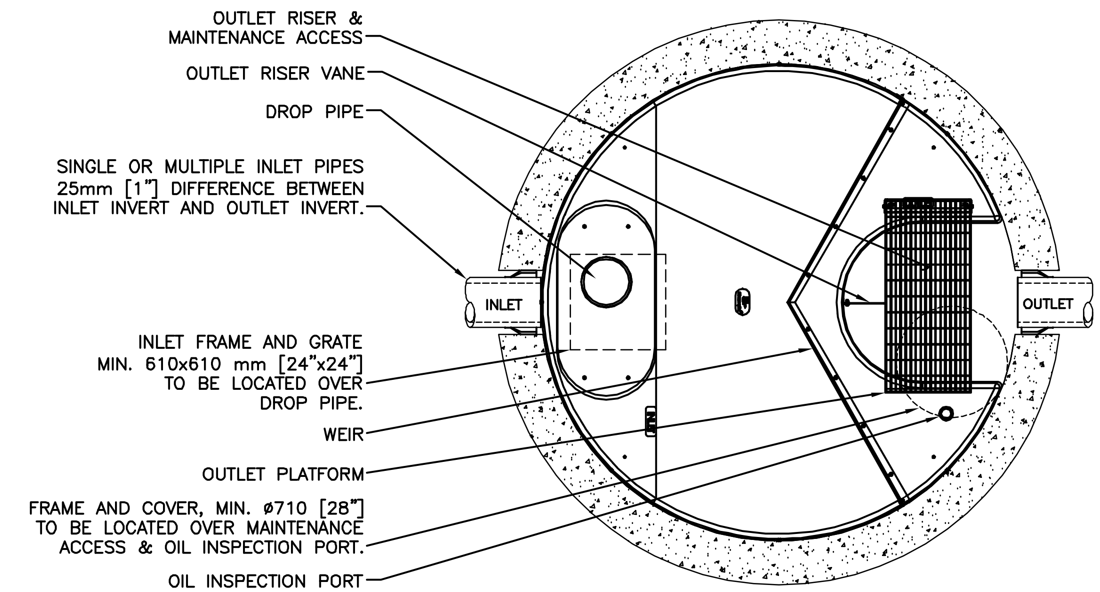
DRAWING NOT TO BE USED FOR CONSTRUCTION



SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

GENERAL NOTES:

* MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m^2 (27.9 gpm/ft^2) FOR STORMCEPTOR EF10 AND 535 L/min/m^2 (13.1 gpm/ft^2) FOR STORMCEPTOR EFO10 (OIL CAPTURE CONFIGURATION).

1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
2. STORMCEPTOR STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE STORMCEPTOR SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
4. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL STORMCEPTOR REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE STRUCTURE LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE (IF REQUIRED).

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE DEVICE FROM CONSTRUCTION-RELATED EROSION RUNOFF.
E. DEVICE ACTIVATION, BY CONTRACTOR, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE STORMCEPTOR UNIT IS CLEAN AND FREE OF DEBRIS.

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

STORMCEPTOR MODEL	EFO10				
STRUCTURE ID					*
HYDROCARBON STORAGE REQ'D (L)					*
WATER QUALITY FLOW RATE (L/s)					
PEAK FLOW RATE (L/s)					*
RETURN PERIOD OF PEAK FLOW (yrs)					*
DRAINAGE AREA (HA)					*
DRAINAGE AREA IMPERVIOUSNESS (%)					*
PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

* PER ENGINEER OF RECORD

MARK	DATE	REVISION DESCRIPTION	BY
1	6/8/18	OUTLET PLATFORM	JSK
0	5/26/17	INITIAL RELEASE	JSK

Stormceptor® EF

SCALE = NTS

imbrium

407 FAIRVIEW DRIVE, WHITBY, ON L1N 3A9

DATE: 10/24/2017
DESIGNED: JSK
DRAWN: JSK
CHECKED: BSF
APPROVED: SP
PROJECT No.: EFO10
SEQUENCE No.: *
SHEET: 1 OF 1

I:\IMBRIUM\PRODUCTS\STORMCEPTOR EF\40 DRAWINGS & DETAILS\STANDARD DETAILS\EFO STANDARD DETAILS\EFO10-DETAIL.DWG 4/12/2019 11:09 AM

Stormceptor®

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

03/10/2021

Province:	Ontario
City:	caledon
Nearest Rainfall Station:	TORONTO CENTRAL
NCDC Rainfall Station Id:	0100
Years of Rainfall Data:	18
Site Name:	12541 & 12577 Airport Road
Drainage Area (ha):	9.89
Runoff Coefficient 'c':	0.33
Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0
Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	51.26
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	1009.00
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	TRANSPORT TRUCK/TRAILER PARKING
Project Number:	20-033
Designer Name:	Mansoor Nooristani
Designer Company:	MAEL
Designer Email:	mansoorn@maeng.ca
Designer Phone:	905-944-0162
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	49
EFO6	64
EFO8	74
EFO10	81
EFO12	86

Recommended Stormceptor EFO Model: **EFO10**

Estimated Net Annual Sediment (TSS) Load Reduction (%): **81**

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 waterways.

PARTICLE SIZE DISTRIBUTION (PSD)

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

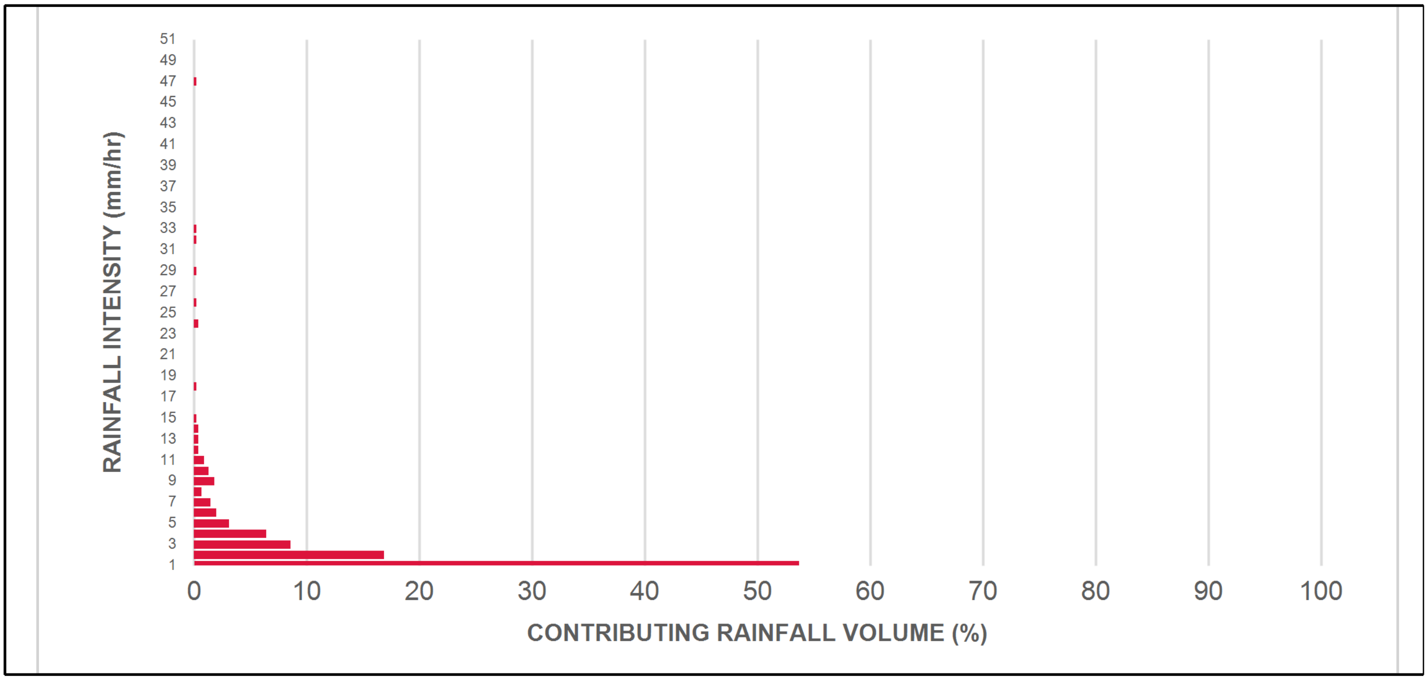
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Upstream Flow Controlled Results

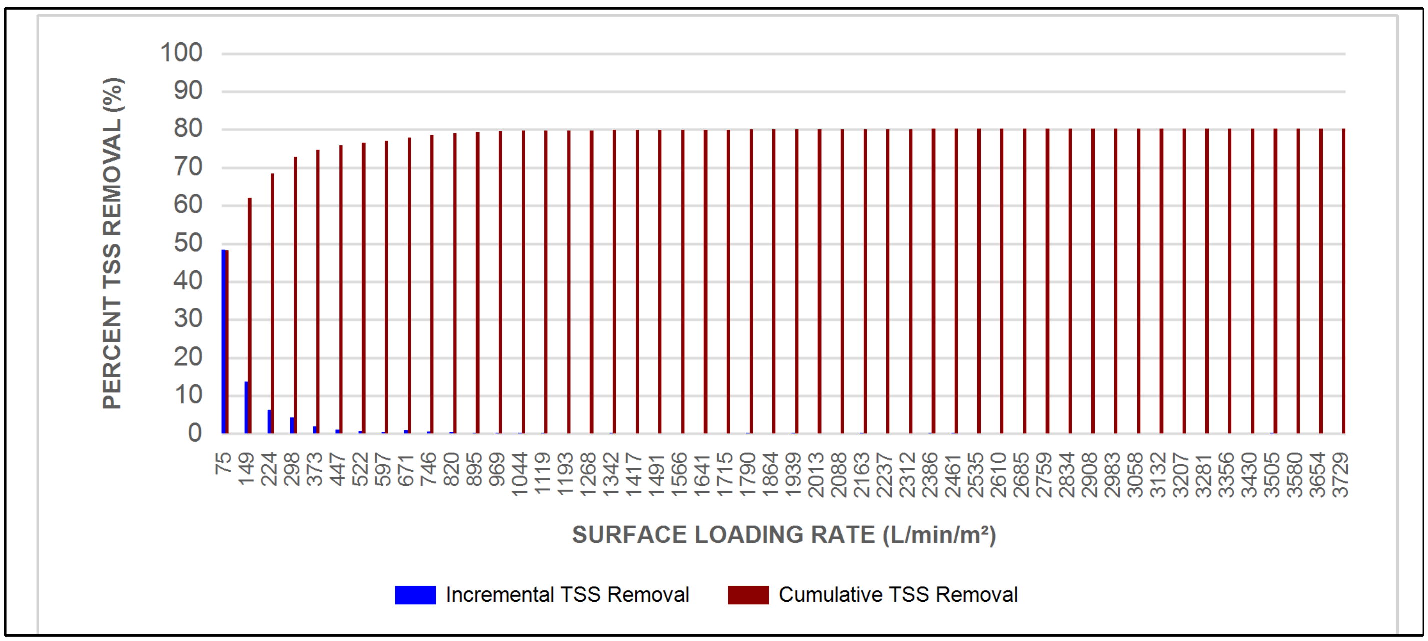
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	53.7	53.7	9.07	544.0	75.0	90	48.3	48.3
2	16.9	70.6	18.15	1089.0	149.0	81	13.8	62.1
3	8.6	79.2	27.22	1633.0	224.0	74	6.4	68.5
4	6.4	85.6	36.29	2178.0	298.0	68	4.3	72.8
5	3.1	88.7	45.37	2722.0	373.0	61	1.9	74.7
6	2.0	90.7	54.44	3266.0	447.0	57	1.1	75.8
7	1.5	92.2	63.51	3811.0	522.0	54	0.8	76.6
8	0.7	92.9	72.58	4355.0	597.0	52	0.4	77.0
9	1.8	94.7	81.66	4899.0	671.0	52	0.9	77.9
10	1.3	96.0	90.73	5444.0	746.0	51	0.7	78.6
11	0.9	96.9	99.80	5988.0	820.0	51	0.5	79.1
12	0.4	97.3	108.88	6533.0	895.0	51	0.2	79.3
13	0.4	97.7	117.95	7077.0	969.0	50	0.2	79.5
14	0.4	98.1	127.02	7621.0	1044.0	50	0.2	79.7
15	0.2	98.3	136.10	8166.0	1119.0	49	0.1	79.8
16	1.7	100.0	145.17	8710.0	1193.0	48	0.8	80.6
17	0.0	100.0	154.24	9255.0	1268.0	47	0.0	80.6
18	0.2	100.2	163.32	9799.0	1342.0	47	0.1	80.7
19	-0.2	100.0	172.39	10343.0	1417.0	46	N/A	80.6
20	0.0	100.0	181.46	10888.0	1491.0	43	0.0	80.6
21	0.0	100.0	190.53	11432.0	1566.0	41	0.0	80.6
22	0.0	100.0	199.61	11976.0	1641.0	39	0.0	80.6
23	0.0	100.0	208.68	12521.0	1715.0	38	0.0	80.6
24	0.4	100.4	217.75	13065.0	1790.0	36	0.1	80.7
25	-0.4	100.0	226.83	13610.0	1864.0	35	N/A	80.6

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
26	0.2	100.2	235.90	14154.0	1939.0	33	0.1	80.7
27	-0.2	100.0	244.97	14698.0	2013.0	32	N/A	80.6
28	0.0	100.0	254.05	15243.0	2088.0	31	0.0	80.6
29	0.2	100.2	263.12	15787.0	2163.0	30	0.1	80.7
30	-0.2	100.0	272.19	16332.0	2237.0	29	N/A	80.6
31	0.0	100.0	281.27	16876.0	2312.0	28	0.0	80.6
32	0.2	100.2	290.34	17420.0	2386.0	27	0.1	80.7
33	0.2	100.4	299.41	17965.0	2461.0	26	0.1	80.7
34	-0.4	100.0	308.48	18509.0	2535.0	25	N/A	80.6
35	0.0	100.0	317.56	19053.0	2610.0	25	0.0	80.6
36	0.0	100.0	326.63	19598.0	2685.0	25	0.0	80.6
37	0.0	100.0	335.70	20142.0	2759.0	25	0.0	80.6
38	0.0	100.0	344.78	20687.0	2834.0	25	0.0	80.6
39	0.0	100.0	353.85	21231.0	2908.0	25	0.0	80.6
40	0.0	100.0	362.92	21775.0	2983.0	25	0.0	80.6
41	0.0	100.0	372.00	22320.0	3058.0	25	0.0	80.6
42	0.0	100.0	381.07	22864.0	3132.0	25	0.0	80.6
43	0.0	100.0	390.14	23409.0	3207.0	25	0.0	80.6
44	0.0	100.0	399.22	23953.0	3281.0	25	0.0	80.6
45	0.0	100.0	408.29	24497.0	3356.0	25	0.0	80.6
46	0.0	100.0	417.36	25042.0	3430.0	25	0.0	80.6
47	0.2	100.2	426.44	25586.0	3505.0	25	0.1	80.7
48	-0.2	100.0	435.51	26130.0	3580.0	25	N/A	80.6
49	0.0	100.0	444.58	26675.0	3654.0	25	0.0	80.6
50	0.0	100.0	453.65	27219.0	3729.0	25	0.0	80.6
Estimated Net Annual Sediment (TSS) Load Reduction =								**81 %**

RAINFALL DATA FROM TORONTO CENTRAL RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

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

SCOUR PREVENTION AND ONLINE CONFIGURATION

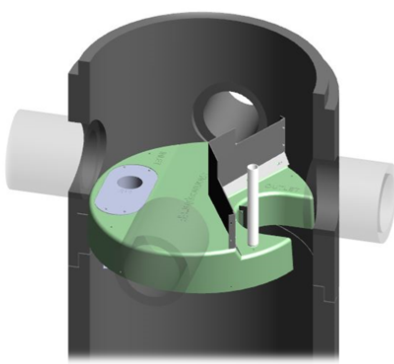
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

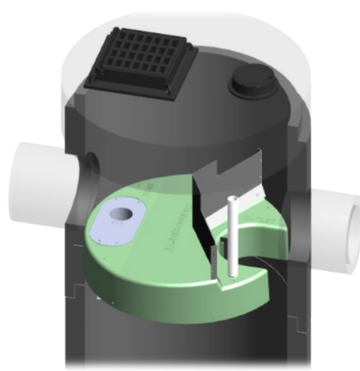
DESIGN FLEXIBILITY

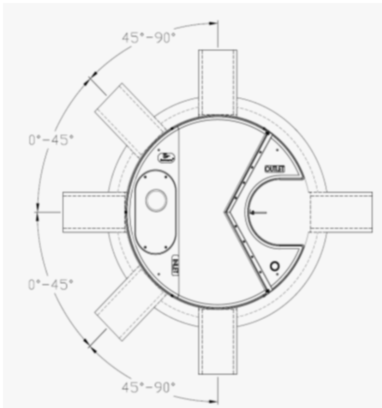
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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

OIL CAPTURE AND RETENTION

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







INLET-TO-OUTLET DROP

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

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

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

HEAD LOSS

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

Pollutant Capacity

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

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

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft³)

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

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

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

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

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

3.2 SIZING METHODOLOGY

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

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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

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

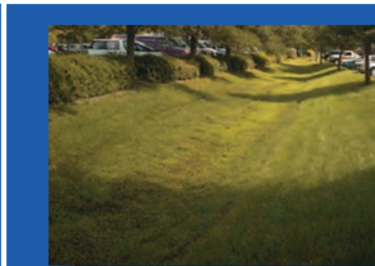
3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

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

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

ENHANCED GRASS SWALES

CVC/TRCA LOW IMPACT DEVELOPMENT
PLANNING AND DESIGN GUIDE - FACT SHEET



GENERAL DESCRIPTION

Enhanced grass swales are vegetated open channels designed to convey, treat and attenuate stormwater runoff (also referred to as enhanced vegetated swales). Check dams and vegetation in the swale slows the water to allow sedimentation, filtration through the root zone and soil matrix, evapotranspiration, and infiltration into the underlying native soil. Simple grass channels or ditches have long been used for stormwater conveyance, particularly for roadway drainage. Enhanced grass swales incorporate design features such as modified geometry and check dams that improve the contaminant removal and runoff reduction functions of simple grass channel and roadside ditch designs.

Where development density, topography and depth to water table permit, enhanced grass swales are a preferred alternative to both curb and gutter and storm drains as a stormwater conveyance system. When incorporated into a site design, they can reduce impervious cover, accent the natural landscape, and provide aesthetic benefits.

DESIGN GUIDANCE

GEOMETRY AND SITE LAYOUT

- Shape: Should be designed with a trapezoidal or parabolic cross section. Trapezoidal swales will generally evolve into parabolic swales over time, so the initial trapezoidal cross-section design should be checked for capacity and conveyance assuming it is a parabolic cross-section. Swale length between culverts should be 5 metres or greater.
- Bottom Width: Should be designed with a bottom width between 0.75 and 3.0 metres. Should allow for shallow flows and adequate water quality treatment, while preventing flows from concentrating and creating gullies.
- Longitudinal Slope: Slopes should be between 0.5% and 4%. Check dams should be incorporated on slopes greater than 3%.
- Length: When used to convey and treat road runoff, the length simply parallels the road, and therefore should be equal to, or greater than the contributing roadway length.
- Flow Depth: A maximum flow depth of 100 mm is recommended during a 4 hour, 25 mm Chicago storm event.
- Side Slopes: Should be as flat as possible to aid in providing pre-treatment for lateral incoming flows and to maximize the swale filtering surface. Steeper side slopes are likely to have erosion gullying from incoming lateral flows. A maximum slope of 2.5:1 (H:V) is recommended and a 4:1 slope is preferred where space permits.

PRE-TREATMENT

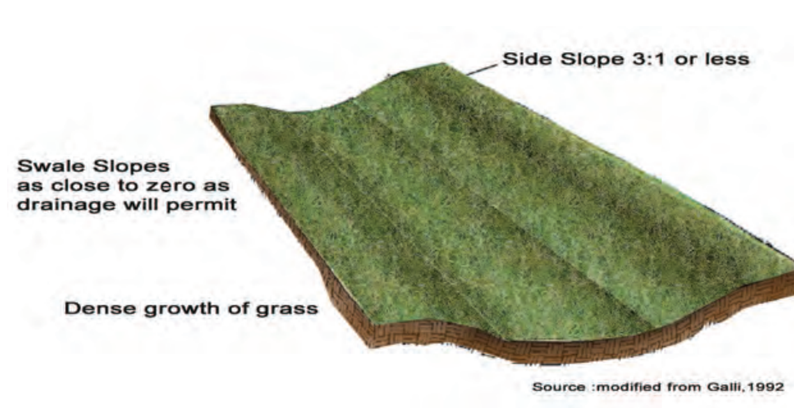
A pea gravel diaphragm located along the top of each bank can be used to provide pretreatment of any runoff entering the swale laterally along its length. Vegetated filter strips or mild side slopes (3:1) also provide pretreatment for any lateral sheet flow entering the swale. Sedimentation forebays at inlets to the swale are also a pretreatment option.

CONVEYANCE AND OVERFLOW

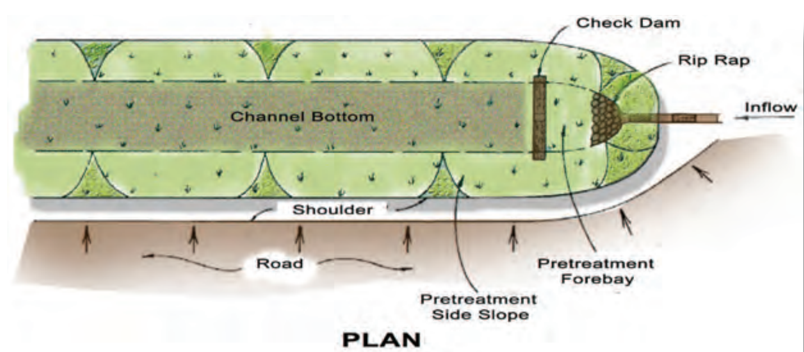
Grass swales must be designed for a maximum velocity of 0.5 m/s or less for the 4 hour 25 mm Chicago storm event. The swale should also convey the locally required design storm (usually the 10 year storm) at non-erosive velocities.

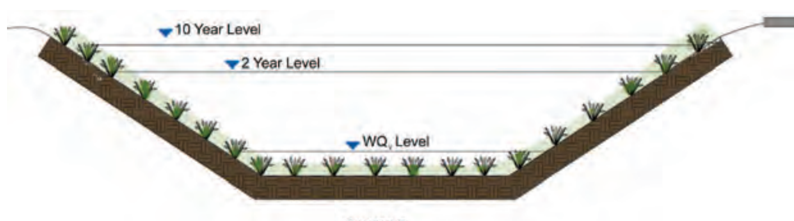
SOIL AMENDMENTS

If soils along the location of the swale are highly compacted, or of such low fertility that vegetation cannot become established, they should be tilled to a depth of 300 mm and amended with compost to achieve an organic content of 8 to 15% by weight or 30 to 40% by volume.



PLAN VIEW OF A GRASS SWALE





PLAN AND PROFILE VIEWS

ABILITY TO MEET SWM OBJECTIVES

BMP	Water Balance Benefit	Water Quality Improvement	Stream Channel Erosion Control Benefit
Enhanced Grass Swale	Partial - depends on soil infiltration rate	Yes, if design velocity is 0.5 m/s or less for a 4 hour, 25 mm Chicago storm	Partial - depends on soil infiltration rate

GENERAL SPECIFICATIONS

Component	Specification	Quantity
Check Dams	Constructed of a non-erosive material such as suitably sized aggregate, wood, gabions, riprap, or concrete. All check dams should be underlain with geotextile filter fabric. Wood used for check dams should consist of pressure treated logs or timbers, or water-resistant tree species such as cedar, hemlock, swamp oak or locust.	Spacing should be based on the longitudinal slope and desired ponding volume.
Gravel Diaphragm	Washed stone between 3 and 10 mm in diameter.	Minimum of 300 mm wide and 600 mm deep.

CONSTRUCTION CONSIDERATIONS

Grass swales should be clearly marked before site work begins to avoid disturbance during construction. No vehicular traffic, except that specifically used to construct the facility, should be allowed within the swale site. Any accumulation of sediment that does occur within the swale must be removed during the final stages of grading to achieve the design cross-section. Final grading and planting should not occur until the adjoining areas draining into the swale are stabilized. Flow should not be diverted into the swale until the banks are stabilized.

Preferably, the swale should be planted in the spring so that the vegetation can become established with minimal irrigation. Installation of erosion control matting or blanketing to stabilize soil during establishment of vegetation is highly recommended. If sod is used, it should be placed with staggered ends and secured by rolling the sod. This helps to prevent gullies.

OPERATION AND MAINTENANCE

Generally, routine maintenance will be the same as for any other landscaped area; weeding, pruning, and litter removal. Grassed swales should be mown at least twice yearly to maintain grass height between 75 and 150 mm. The lightest possible mowing equipment should be used to prevent soil compaction. Routine roadside ditch maintenance practices such as scraping and re-grading should be avoided. Regular watering may be required during the first two years until vegetation is established. Routine inspection is very important to ensure that dense vegetation cover is maintained and inlets and pretreatment devices are free of debris.

For the first two years following construction the swale should be inspected at least quarterly and after every major storm event (> 25 mm). Subsequently, inspections should be conducted in the spring and fall of each year and after major storm events. Inspect for vegetation density (at least 80% coverage), damage by foot or vehicular traffic, accumulation of debris, trash and sediment, and structural damage to pretreatment devices.

Trash and debris should be removed from pretreatment devices and the surface of the swale at least twice annually. Other maintenance activities include weeding, replacing dead vegetation, repairing eroded areas, dethatching and aerating as needed. Remove accumulated sediment on the swale surface when dry and exceeding 25 mm depth.

SITE CONSIDERATIONS

Available Space
Grass swales usually consume about 5 to 15% of their contributing drainage area. A width of at least 2 metres is needed.

Site Topography
Site topography constrains the application of grass swales. Longitudinal slopes between 0.5 and 6% are allowable. This prevents ponding while providing residence time and preventing erosion. On slopes steeper than 3%, check dams should be used.

Drainage Area & Runoff Volume
The conveyance capacity should match the drainage area. Sheet flow to the grass swale is preferable. If drainage areas are greater than 2 hectares, high discharge through the swale may not allow for filtering and infiltration, and may create erosive conditions. Typical ratios of impervious drainage area to treatment facility area range from 5:1 to 10:1.

Soil
Grass swales can be applied on sites with any type of soils.

Pollution Hot Spot Runoff
To protect groundwater from possible contamination, source areas where land uses or human activities have the potential to generate highly contaminated runoff (e.g., vehicle fueling, servicing and demolition areas, outdoor storage and handling areas for hazardous materials and some heavy industry sites) should not be treated by grass swales.

Proximity to Underground Utilities
Utilities running parallel to the grass swale should be offset from the centerline of the swale. Underground utilities below the bottom of the swale are not a problem.

Water Table
The bottom of the swale should be separated from the seasonally high water table or top of bedrock elevation by at least one (1) metre.

Setback from Buildings
Should be located a minimum of four (4) metres from building foundations to prevent water damage.

TORONTO AND REGION Conservation for The Living City
CVC CREDIT VALLEY CONSERVATION

FOR FURTHER DETAILS SEE SECTION 4.8 OF THE CVC/TRCA LID SWM GUIDE

Municipal and Development Engineering

Water Resources Engineering

Planning

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