*Municipal Class Environmental Assessment for*
*Road Improvements near Derry Road East and Alstep Drive:*

*Environmental Study Report*

# Appendix J: Drainage and Stormwater Management Report

# Stormwater Management Report

*Bombardier Class EA*

**Type of Document:**
Stormwater Management Report in Support of Municipal Class Environmental Assessment

**Project Name:**
Municipal Class Environmental Assessment
for Road Improvements near Derry Road East and Alstep Drive

**Project Number:**
STR – 2018572-00

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**Date + Time Submitted:**
2020-11-17

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# 1. Introduction

## 1.1 Project Description

EXP has been retained by Bombardier Aerospace to assist with its industrial development on a parcel of land situated just north of the Toronto Pearson International Airport at 1890 Alstep Drive, Mississauga, Ontario. The land is owned by the Government of Canada and administered by the Greater Toronto Airports Authority (GTAA). It is proposed to widen Menkes Drive and Bramalea Road and extend the existing Alstep Drive to improve the transportation links to this site. This work is in the Preliminary Design phase.

A Class Municipal Class Environmental Assessment (EA) is required to examine to examine the effects that these works will have on the adjacent lands.

## 1.2 Project Background

The study area for this Class EA is primarily along Derry Road East (865 m west and 450 m east of Bramalea Road) and Bramalea Road (485 m south of Derry Road East and 410 m north of Derry Road East). It also includes four local roads: Menkes Drive, Alstep Drive, Menway Court and Telford Way. The study area is depicted in Figure 1 and represents approximately 28.66ha in total.

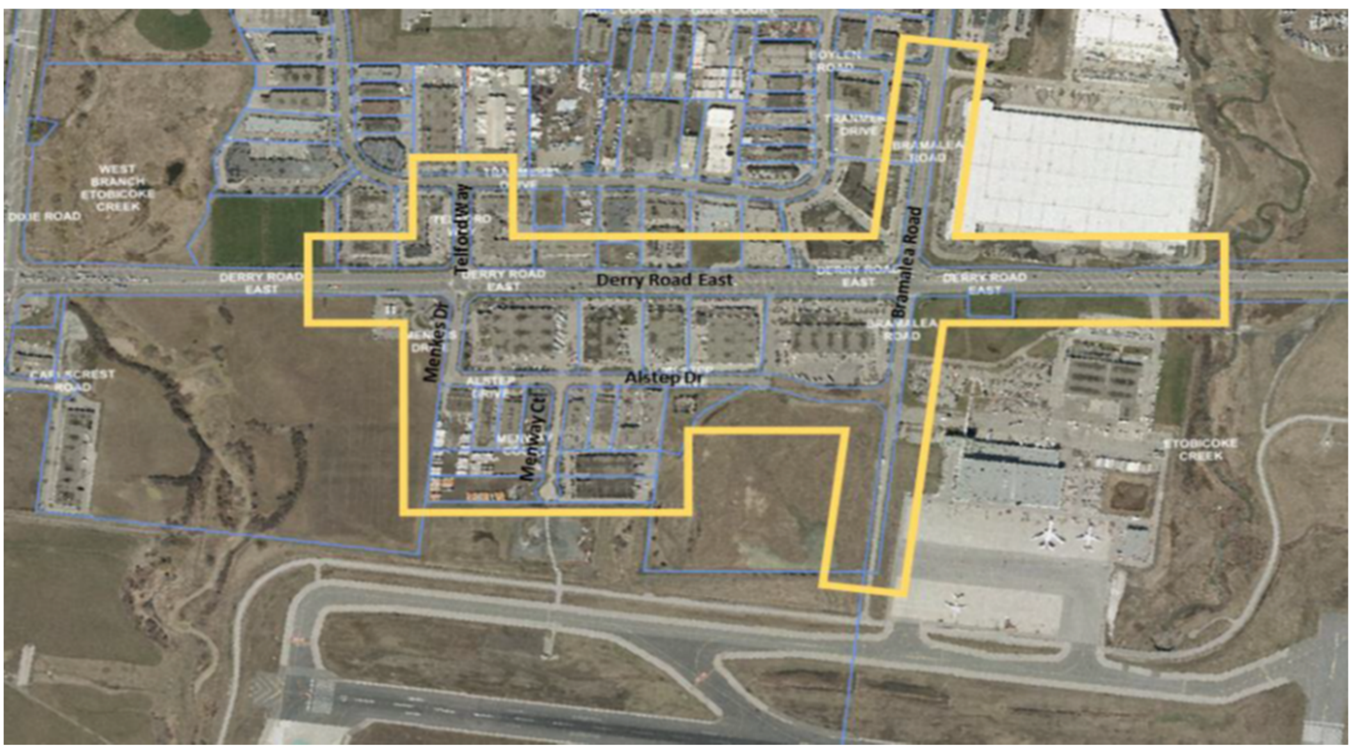



*Figure 1: Project Study Area*

This area is located within the Etobicoke Creek watershed, which is under the jurisdiction of the Toronto and Region Conservation Authority (TRCA). Potentially, TRCA an municipal approval from the City of Mississauga would be required, however it is expected that proposed changes will represent a minimal change to overall site drainage and stormwater runoff.

The proposed modifications are located within existing right-of-ways (ROWs) and as the proposed works are changes to the ROWs there is minimal expected changes in land use or impacted to existing Environmental features.

### Background Documents and References

The following is a list of the reference documents, background studies, design guidelines and data sources reviewed or used during the course of this study

- Guidelines for the Preparation of Stormwater management Report and Support of Municipal Class Environmental Assessments, June 2014, Region of Peel, Public Works Department
- City of Mississauga – Section 8 Storm Drainage Design Requirements
- Region of Peel Public Works Stormwater Design Criteria and Procedure Manual, June 2019 (version 2.1)
- Ontario Ministry of the Environment - Stormwater Management Planning and Design Manual, 2003
- Toronto and Region Conservation Authority (TRCA) Stormwater Management Criteria
- Low Impact Development Stormwater Management Planning and Design Guide (CVC, TRCA 2010)
- Storm Drainage Design Chart for Derryport Business Park by R.E Winter and Associates dated November 20th, 1986, Rev Jan 22nd, 1987
- Storm Drainage Areas Drawing D1 for Derryport Business Park by R.E Winter and Associates dated November 20th, 1986
- Storm Drainage Design Chart for Proposed Storm Sewer (on easement) for Menkes Construction Ltd by R.E Winter and Associates Ltd. (Major Drainage Area Z-42) dated November 199
- Menkes Construction Limited General Underground Plan Drawing G1 – Storm and Sanitary Design Areas by R.E Winter and Associates Ltd. dated January 2000
- Derryport Business Park Storm Sewer Easement on Lot 19, Plan - C22892 by R.E. Winter & Associate Ltd, dated May 1987
- Derryport Business Park Storm Easement Drawing C22893 by R.E Winter and Associates Ltd. dated November 1999
- Storm Channel Drawing C22894 by R.E Winter and Associates Ltd. dated November 1999
- Derryport Business Park Overland Flow Route C22886 by R.E Winter and Associates Ltd. Dated May 1987
- Derryport Business Park Overland Flow Calculations, File 21-76022M by R.E. Winter & Associate Ltd, dated January 14th, 1986
- H & R Industrial Estates Phase One – Storm Easement, Plan - C19361 by R.E. Winter & Associate Ltd, dated September 1981
- Stormwater Management Report, Bombardier Aviation, Proposed Flight Test Hanger & Aerostructures Facility Building, 1980 Alstep Drive, Mississauga, Ontario, dated May 6, 2020

## 1.3 Purpose

In support of the EA, this report will examine the implications on the existing stormwater infrastructure. The Drainage, Hydrology and Stormwater Management Assessment for this study was undertaken as part of the Class EA project to document existing drainage condition and assess the potential impacts from the proposed road improvements on overall site drainage and stormwater in the study area.

# 2. Existing Site Conditions Characterization

## 2.1 Tributary Areas, Outlets and Drainage Patterns

The internal and external drainage boundaries for pre- and post-development conditions are shown in the attached Figures 02 and 03. These figures were determined based on review of background materials including aerial maps as well as field investigations.

As this area is fully developed, all flows into the existing storm system are either from existing storm sewers or existing road catchbasins or road ditch inlet catchbasins. There are no natural channels or major ditches that drain into the storm system.

Flows from the site drain to the existing storm sewers. Storm flows from Derry Rd near Bramalea (areas 220 and 221 on Figures 02 and 03) drain via existing municipal sewers, which ultimately discharge to Spring Creek (a tributary of Etobicoke Creek) outside of the area of investigation. The remainder of the site discharge to the existing Juliet Stormwater Quality and Erosion Control Pond, which in turn drains to Etobicoke Creek.

There are no known drainage concerns and flooding issues or low points with no outlet within the area of investigation.

The area of investigation represents an existing developed industrial area which is almost fully hardscaped.

## 2.2 Condition of Receiving Watercourses

As discussed above, the subject site either drains to Etobicoke Creek directly or to Etobicoke Creek via the existing Juliet Stormwater Quality and Erosion Control Pond.

The Etobicoke Creek watershed is under TRCA's jurisdiction and is heavily urbanized. Etobicoke Creek drains 21,164 ha and consists of four main branches, namely: Main Etobicoke Creek, Little Etobicoke Creek, Etobicoke Creek West Branch and Spring Creek. The tributary adjacent to the subject lands is Spring Creek.

A new watershed plan for Etobicoke Creek watershed is currently under development. The existing watershed plan was completed in 2002 and updated in 2010.

In general, due to the extensive urbanization, limited and outdated stormwater management infrastructure as well as previous channelization efforts, this watershed has poor water quality due to sediment contamination and increased flood risk. In addition, urban heat island (UHI) effect is also a concern for this watercourse.

## 2.3 Watercourse and Drainage Crossings

There is only one culvert within the area of investigation. This culvert is 525mm in diameter and crosses under Derry Rd E west of Menkes Dr/Telford Way. However, this culvert is outside the area of the proposed modifications and therefore further no investigation is warranted.

There are no major swales or ditches within the area of investigation.

## 2.4 Soil and Groundwater Conditions

As per the "Supplementary Geotechnical Investigation Area 16 Land" prepared by EXP (dated May 3, 2019) the soils within the subject area are predominantly clayey sill till (mostly very stiff), with some areas of sand and gravel, underlaid with a layer of dense to very dense sill till.

As per the "Hydrogeological Investigation" report prepared by EXP (dated April 12, 2019), the hydraulic conductivity of this site ranges from 3.4 x $10^{-8}$ to 4.6 x $10^{-6}$ m/s. Using Table C2 in TRCA SWM Criteria, Aug 2012, these values correspond to a percolation rate range of 8.9 to 58.5 mm/hr, which suggests good infiltration capacity.

### 2.5 Significant Natural Features

As the study area comprises an existing developed industrial area, there are no natural heritage features within the study area, including significant vegetation communities or areas that could potentially provide habitat to species at risk.

## 3. Stormwater Objectives

The proposed development is designed to meet the requirements stipulated from Greater Toronto Airports Authority (GTAA), City of Mississauga (CoM), Ministry of Environment (MECP) Stormwater Management Planning and Design Manual, 2003; and the Toronto and Region Conservation Authority (TRCA) drainage standards.

### 3.1 Water Quantity and Flood Control

Each approval authority has its own requirements in terms of SWM, particularly in terms of water quantity control (control of peak flows). Various stormwater quantity control requirements are listed below.

- **GTAA Design Standards**: Stormwater quantity control facilities should be designed to attenuate peak discharge rates to either the 100yr pre-development levels or the capacity of the downstream storm sewer system, whichever governs;
- **CoM Design Standards**: Post development storm discharge is to be controlled to the pre-development levels for all storm event (2 through 100 year), with storage up to and including the 100-year storm;

### 3.2 Water Quality, Erosion and Sediment Control

**Stormwater Quality Control:** Stormwater is to be treated to Enhanced levels (i.e. 80% Total Suspended Solid removal) as defined in the MECP SWM Planning and Design Manual, 2003;

**Erosion and Sediment Control:** Since the site does not discharge directly to the receiving watercourse, erosion and sediment control measures are not required.

### 3.3 Water Balance

**Water Balance:** the first 5mm of runoff shall be retained on-site and managed in form of infiltration, evapotranspiration or re-use. Low Impact Development (LID) measures such as permeable pavers, infiltration systems, etc. may be considered to achieve this target.

### 3.4 Site Constraints

As the site comprises existing roadways there are limited opportunities to provide stormwater quantity and quality controls. Particularly as the modifications are to be limited to the roadway and small areas adjacent to the roadway (i.e. minimal modifications to the boulevard.), and any proposed surface works (roadways or sidewalks) are required to be built to the current municipal standard (for example, sidewalks are to be concrete not permeable pavers).

In addition, with the exception of the Alstep extension, no new stormwater infrastructure is proposed; all modifications are to be accommodated by existing CBs, which are to be relocated as per the new curb layout. No new CBs are proposed within the intersection modification zones.

For the Alstep Dr extension, due to the inverts of the existing 750mm diameter private sewer (servicing Subcatchment 206 in Figures 02 and 03) and the existing 600mm on Altep Dr, it is not possible to cross the 750mm sewer to provide a sewer connection for any new CBs within the proposed new ROW. Therefore, any CBs to service the western portion of the Alstep Dr extension would have to be located west of the 750mm private sewer.

It should be noted the proposed works represent a very small percentage of the total site area; therefore, it is expected that any proposed measures will have minimal change to the overall flows offsite.

Figure 03 shows the limits of the proposed works as shaded areas. In addition, the proposed roadworks drawings are also included in the attached documentation.

# 4. Future Drainage Conditions

## 4.1 Drainage Patterns

Under proposed conditions, it proposed to extend Alstep Drive to Bramalea Rd. In addition, Bramalea Rd and Menkes Dr are proposed to be widened, and the following intersections are proposed to be modified: Derry Rd E and Menkes Dr/Telford Way, Menkes Dr and Alstep Dr, and the northeast corner of Bramalea Rd and Derry Rd E.

The majority of these modifications are located within existing hardscaped areas. Figure 3 (Post Development Catchment Area Plan) details the proposed new impervious area. Over the entire site (27.53 ha) the new impervious area is only approximately 4298m$^2$, or 1.5% of the total site area.

Under proposed conditions, the existing drainage patterns will be maintained, with the exception of existing subcatchment Area 206 on Figure 02, bounded by Alstep Dr, Bramalea Rd and Derry Rd. Under current conditions, this area drains via the existing private 750mm sewer to the Juliet Pond. Under proposed conditions, a portion of this lot will be severed to create the new Alstep Dr extension. As a private sewer cannot be used to drain municipal runoff, the flow from this new area (subcatchments 231 and 232) on Figure 03 will directed to drain to either the existing Alstep Dr storm sewers (area 231) or the existing Bramalea Dr storm sewers (area 232). However, both of these public storm sewers also drain to the Juliet Pond, and therefore there will be no change to the overall drainage pattern.

A by-pass culvert will also be required in Area 207 on Figure 03. As discussed in the Functional Servicing Report (March 02, 2020) and the Stormwater Management Report (May 6, 2020), a proposed 2.4m x 1.5m concrete box culvert at 0.45% slope is proposed to convey upstream flows entering GTAA lands for storm events up to and including the 100-year event, as well as the Regional Storm (Hurricane Hazel). The concrete box will be constructed under the proposed Flight Test Hangar (FTH) building and connect into the existing 1650mm diameter culvert at North Service Road before it ultimately discharges into Juliet stormwater quality and erosion control pond. (Figure 4)

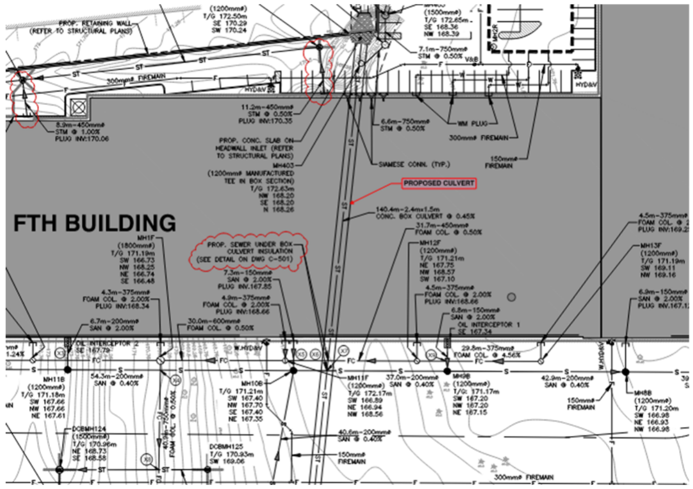



*Figure 4: Proposed Box Culvert*

The proposed box culvert has been oversized with a safety factor of 2.00 with consideration of blockage from debris and/or accumulation of sediment. The detailed sizing of the proposed 2.40m x 1.50m concrete box culvert has been conducted under a separate memorandum - Concrete box culvert under proposed Flight Test Hangar building, prepared by exp Service dated June 17th, 2019. The key statistics are also summarized below:

| | |
|---|---|
| 100 yr peak flow from external drainage area | = 6.91cms |
| Regional peak flow from external drainage area | = 3.35 cms |
| Full flow capacity of proposed 2.40m x1.50m concrete box culvert | = 14.18 cms |

As discussed in Section 3.4 above, there are limited opportunities for implementing facilities for the proposed design conditions for managing the impacted study area design elements.

Figure 03 shows the limits of the proposed works as shaded areas. In addition, the proposed roadworks drawings are also included in the attached documentation.

## 4.2 Outlet Identification

The study area has two outlets: storm flows from Derry Rd near Bramalea (areas 220 and 221 on Figures 02 and 03) drain via existing municipal sewers, which ultimately discharge to Spring Creek (a tributary of Etobicoke Creek) outside of the area of investigation. The remainder of the site drain via existing storm sewers and ultimately discharge to the Juliet Stormwater Quality and Erosion Control Pond, which in turn drains to Etobicoke Creek. Minor flows from the external lands north of the study area drain via the existing Derry Road sewers and major flows form these external lands outlet to the Juliet Pond.

The outlets for the proposed works are to remain the same as per existing conditions. As discussed in Section 4.1 above, although existing Area 206 is to be divided and each portion will drain via different sewers, the ultimate outlet for this site will remain the Juliet Pond.

Please refer to Figure 03 for more information.

Please refer to the list of related background reports in Section 1.2 above. However, these reports do not contain any stormwater design elements (including hydraulic elements) for the proposed design, nor do they include any stormwater management features that have been sized for the study area.

# 5. Hydrologic and Hydraulic Modelling

## 5.1 Design Storm

The City of Mississauga Intensity-Duration-Frequency (IDF) data has been used for storm analysis. Using the City IDF rainfall data and the 4-hour duration Chicago-type storm distribution, design flows were generated for the 2, 5, 10, 25, 50 and 100-year design storm events.

The rainfall intensity for the site was calculated using the following equation:

I = A / (T +B) ^ C

Where;
- I = Rainfall intensity in mm/hr,
- T = Time of concentration in minutes,
- A, B, C = constant parameters (see below)

*Table 5-1: City of Mississauga Rainfall IDF Parameters*

| Storm Return Interval (yr.) | A | B | C |
|---|---|---|---|
| 1: 2 | 610 | 4.60 | 0.78 |
| 1: 5 | 820 | 4.60 | 0.78 |
| 1: 10 | 1010 | 4.60 | 0.78 |
| 1: 25 | 1160 | 4.60 | 0.78 |
| 1: 50 | 1300 | 4.70 | 0.78 |
| 1: 100 | 1450 | 4.90 | 0.78 |

## 5.2 Hydrologic Modeling

The area of proposed modification is represents less than 10ha and the main focus is the minor flows, therefore peak flows will be determined using the rational formula.

The following table summarizes the results. As shown, the change in flow to Juliet Pond is less than 0.15%, and the change in flow to the existing Derry Rd sewers is less than 2.0%, which is a negligible increase. Refer to Calculation Sheets 1 and 2 in the Appendix.

*Table 5-2: Existing and Proposed Peak Flow Summary*

| Condition | Outlet | Total Area Contributing to Outlet (ha) | Weighted Runoff Coefficient | 10-yr Peak Flow [cms] | 25-yr Peak Flow [cms] | 100-yr Peak Flows [cms] |
|---|---|---|---|---|---|---|
| **Existing** | Juliet Pond | 24.94 | 0.750 | 6.483 | 7.446 | 9.161 |
| | Derry Rd | 3.81 | 0.744 | 0.983 | 1.129 | 1.389 |
| **Proposed** | Juliet Pond | 24.94 | 0.751 | 6.491 | 7.455 | 9.172 |
| | Derry Rd | 3.81 | 0.758 | 1.001 | 1.150 | 1.415 |
| **% Change** | **Juliet Pond** | **0** | **0.13%** | **0.12%** | **0.12%** | **0.12%** |
| | **Derry Rd** | **0** | **1.88%** | **1.90%** | **1.90%** | **1.90%** |

### 5.3 Hydraulic Analysis

With the exception of the one culvert crossing Derry Rd (as discussed above in Section 2.3), there are no existing or proposed bridges or other existing stormwater crossing structures within the site.

As the only culvert is outside the area of the proposed modifications and therefore will be unaffected by the changes, and no other structures are present, no hydraulic analysis is required.

# 6. SWM and LID Features Plan and Design

## 6.1 Selection of Candidate Features

As discussed in Section 3.4 above, there are limited opportunities for implementing facilities as the site comprises existing roadways and as the modifications are to be limited to the roadway and small portions of the adjacent boulevard, rather than the entire ROW. Further, with the exception of CBs and storm sewers to service the Alstep extension, no new stormwater infrastructure is proposed as all modifications are to be accommodated by relocating existing CBs.

As the change in peak flows is negatable as demonstrated above in Table 5-2, any SWM or LID features would be for quality purposes only. As such, facilities such as SWM ponds, proprietary SWM devices, perforated pipes or superpipe storage are not required.

As the work represents changes to an urban roadway, permeable pavement is not the best choice for this application, especially as sidewalks and roadways are to be built according to municipal standards, which call for concrete

Due to space considerations, bioretention filters, bioswales or infiltration trenches are also not ideal for this application. Oil grit separator (OGS) units are a feasible option for the Alstep Drive extension and can be sized to provide the required 80% TSS removal for the additional impervious areas. The OGS units can be coupled with goss traps on the new road catch basins to provide additional water quality treatment.

## 6.2 Evaluation of Features

The OGS units have been selected as a potential water quality treatment feature for the Alstep Drive

Goss traps have been selected as a potential LID feature due to their capacity for removal of pollutants, and minor requirements for maintenance and cost as well as impacts on the downstream storm system.

## 6.3 Impact Assessment of Proposed Design

Goss traps remove particulate from runoff and therefore provide water quality benefits while ensuring minimal impact to the overall function of the existing storm system.

While regular maintenance will be required, conventional CBs without goss traps also require regular maintenance, such as removal of debris in the sump.

## 6.4 Development of a LID/SWM Plan

Where new CBs are proposed, these CBs should be installed with goss traps to provide water quality benefits. Although they do not provide the same level as more advanced treatment options, they are estimated to have a 7% TSS removal rate.

Refer to Figure 03 for the location of the proposed CBs with goss traps.

## 6.5 Design of Features

As the City of Mississauga does not have a municipal standard for goss traps, goss traps shall be as per City of Hamilton Standard SEW-304

# 7. Drainage Plan and Design

## 7.1 Minor System Design

Using the existing storm sewer design sheets as a basis, storm sewer design sheets for existing and proposed scenarios were prepared using the previous time of concentration where known and the current City of Mississauga 10-year design storm.

As discussed in Section 3.4 above, due to the pipe elevation of the existing private 750mm sewer crossing Alstep Drive, it is not possible to extend the existing 600mm public sewer to service the new extension. In addition, there is insufficient cover to extend a new sewer the full length of the proposed Altep extension from Bramalea Rd, therefore it is proposed to split the storm flows from the proposed Alstep Rd extension to drain to both Astep Drive and Bramalea Rd.

As shown in the attached Calculation Sheet 3, the existing Bramalea Rd storm sewer appears to be undersized under existing conditions. In order to service the new extension and convey the additional flow, it is proposed to twin the existing 450mm sewer. As shown in Calculation Sheet 4 for proposed conditions, this twinned pipe would have adequate conveyance capacity.

Similarly, the length of the existing 600mm Alstep Rd sewer west of the proposed extension is over capacity under current conditions. Therefore, the additional proposed flows would cause this pipe to be further surcharged. Therefore, it is proposed to increase this pipe to a 675mm. Although some other lengths of sewers are surcharged under existing conditions, there is no increase in flow under proposed conditions with the exception of the very last leg immediately upstream of Juliet Pond, which has a negligible increase in flow (1% change) .

For the Derry Rd sewer, as shown Calculation Sheet 3 and 4, the proposed works represent a negligible increase to the pipe flows, with an increase of 0.012cms.

### 7.2 Major System Design

Given that the proposed modifications represent a only a minor change to the impervious areas, there are no existing flooding concerns and, as demonstrated above, the there is no significant change to the overall flows, it is assumed that the existing major overland routes are adequate for the proposed works.

# 8. Approval and Review Requirements

The City of Mississauga requires and Environmental Compliance Approval (ECA) application for the proposed 675mm storm sewer from the Alstep Extension to the City's system.

In addition, although this site is part of a TRCA regulated watershed, it does not directly drain directly to Etobicoke Creek nor Spring Creek and is not located within the regulated area and therefore TRCA approval is not required.

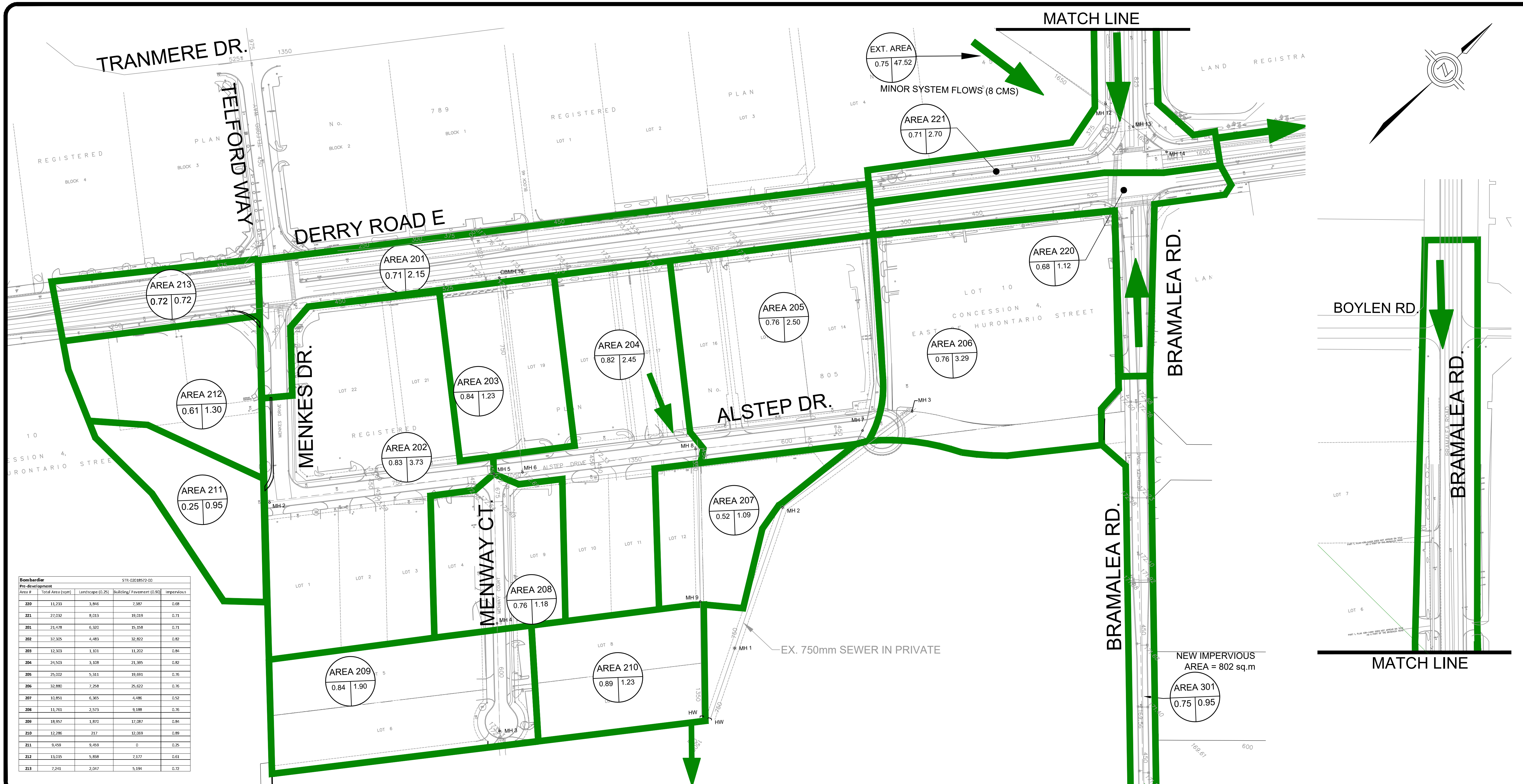
Any proposed road catch basins and storm manholes within Storm Drainage Area 232 will be maintained by the GTAA as required by the City of Mississauga. GTAA approval will be required for modifications to their storm drainage system including any additional proposed catchment areas (Storm Drainage Area 232)

# 9. Future Design Recommendations

At the detailed design stage, it is recommended to confirm that the total increase in impervious area will not represent a significant change to the overall flows. Should more area be considered for the road improvements, more intensive LID options may be considered as well as confirmation that the proposed sewer system design is the optimum solution.

# APPENDICES

# APPENDIX A




| Bombardier | | STR-02018572-00 | | |
|---|---|---|---|---|
| Pre-development | | | | |
| Area # | Total Area (sqm) | Landscape (0.25) | Building/ Pavement (0.90) | Impervious |
| 220 | 11,233 | 3,846 | 7,387 | 0.68 |
| 221 | 27,032 | 8,013 | 19,019 | 0.71 |
| 201 | 21,478 | 6,320 | 15,158 | 0.71 |
| 202 | 37,305 | 4,483 | 32,822 | 0.82 |
| 203 | 12,303 | 1,101 | 11,202 | 0.84 |
| 204 | 24,503 | 3,108 | 21,395 | 0.82 |
| 205 | 25,002 | 5,311 | 19,691 | 0.76 |
| 206 | 32,880 | 7,258 | 25,622 | 0.76 |
| 207 | 10,851 | 6,365 | 4,486 | 0.52 |
| 208 | 11,761 | 2,573 | 9,188 | 0.76 |
| 209 | 18,957 | 1,870 | 17,087 | 0.84 |
| 210 | 12,286 | 217 | 12,069 | 0.89 |
| 211 | 9,459 | 9,459 | 0 | 0.25 |
| 212 | 13,015 | 5,838 | 7,177 | 0.61 |
| 213 | 7,241 | 2,047 | 5,194 | 0.72 |

## LEGEND

DRAINAGE BOUNDARY

EX. STORM SEWER & DIA. (mm) 750

DRAINAGE DIRECTION

DRAINAGE AREA ID

RUNOFF COEFFICIENT

AREA 209 0.75 1.95

DRAINAGE AREA (Ha.)

exp.

Project: 1890 ALSTEP DRIVE MISSISSAUGA, ONTARIO REGIONAL MUNICIPALITY OF PEEL

Title: EXISTING CONDITIONS PLAN

| Approved by: MAR | Date: NOV.17, 2020 | Project No.: STR-02018572-00 |
|---|---|---|
| Drawn by: PM | Scale: 1:3000 | Figure no.: 02 |

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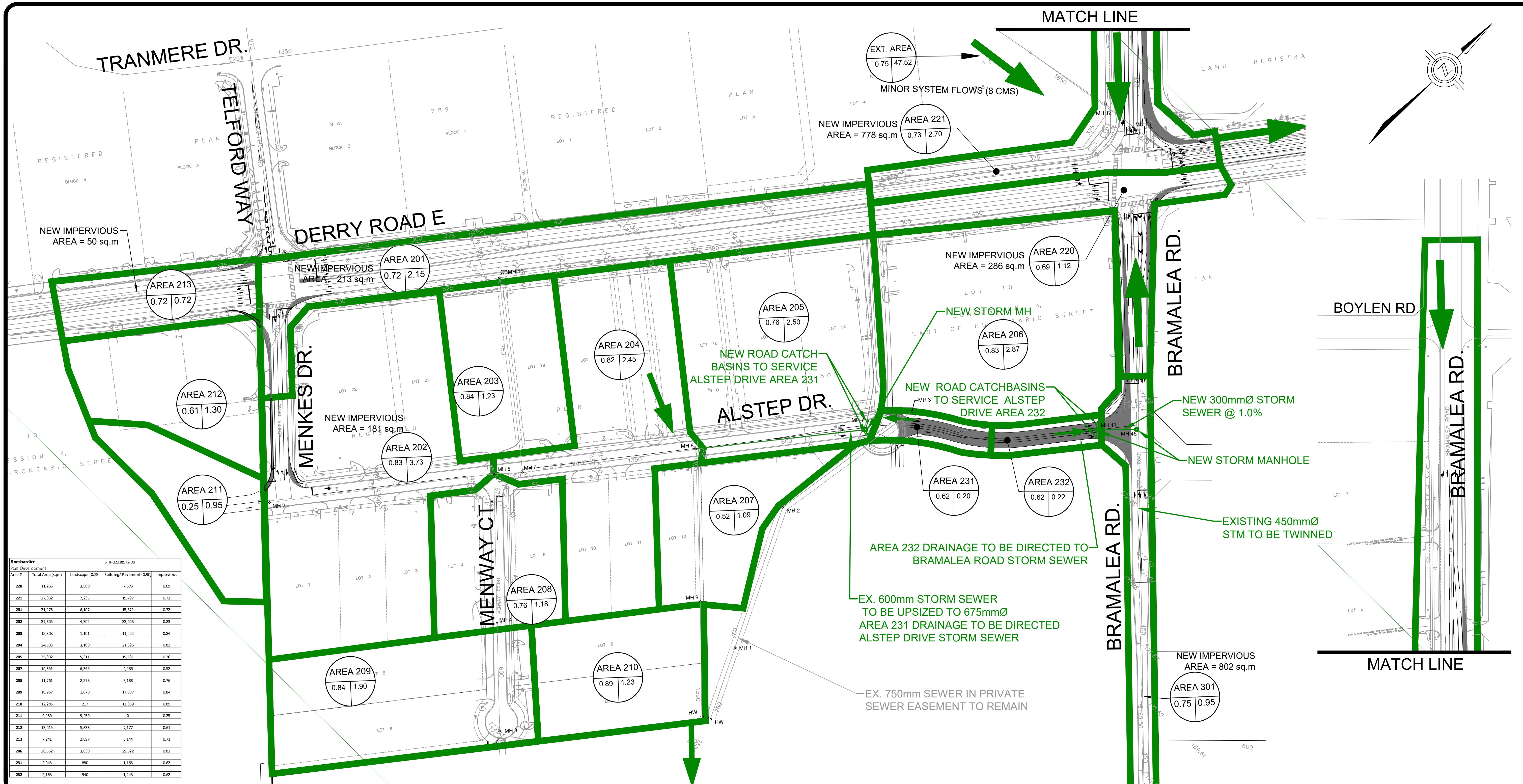



| Bombardier | STR-02018572-00 | | | |
|---|---|---|---|---|
| Post Development | | | | |
| Area # | Total Area (sqm) | Landscape (0.25) | Building/ Pavement (0.90) | Impervious |
| 220 | 11,233 | 3,560 | 7,673 | 0.69 |
| 221 | 27,032 | 7,235 | 19,797 | 0.73 |
| 201 | 21,478 | 6,107 | 15,371 | 0.72 |
| 202 | 37,305 | 4,302 | 33,003 | 0.83 |
| 203 | 12,303 | 1,101 | 11,202 | 0.84 |
| 204 | 24,503 | 3,108 | 21,395 | 0.82 |
| 205 | 25,002 | 5,311 | 19,691 | 0.76 |
| 207 | 10,851 | 6,365 | 4,486 | 0.52 |
| 208 | 11,761 | 2,573 | 9,188 | 0.76 |
| 209 | 18,957 | 1,870 | 17,087 | 0.84 |
| 210 | 12,286 | 217 | 12,069 | 0.89 |
| 211 | 9,459 | 9,459 | 0 | 0.25 |
| 212 | 13,015 | 5,838 | 7,177 | 0.61 |
| 213 | 7,241 | 2,097 | 5,144 | 0.71 |
| 206 | 28,652 | 3,030 | 25,622 | 0.83 |
| 231 | 2,045 | 880 | 1,165 | 0.62 |
| 232 | 2,183 | 940 | 1,243 | 0.62 |

E:\MRK\STR-02018572-00\60 Execution\65 Drawings_Trans_Offsite\Civil 3D\XREF-BASE_SWM FIG_nov17-2020 — 11-Jun-21

## LEGEND

DRAINAGE BOUNDARY

DRAINAGE AREA ID

RUNOFF COEFFICIENT

DRAINAGE AREA (Ha.)

AREA 209 0.75 1.95

PROP. STORM SEWER

PROP. ROAD CATCHBASIN

EX. STORM SEWER & DIA. (mm) 750

DRAINAGE DIRECTION

ROAD WIDENING/EXTENSION

exp.

Project: 1890 ALSTEP DRIVE MISSISSAUGA, ONTARIO
REGIONAL MUNICIPALITY OF PEEL

Title: PROPOSED CONDITIONS PLAN

| Approved by: MAR | Date: NOV.17, 2020 | Project No.: STR-02018572-00 |
|---|---|---|
| Drawn by: PM | Scale: 1:3000 | Figure no.: 03 |

# APPENDIX B

*PROJECT NO. : STR – 2018572-00*
*PROJECT NAME. :Bombardier SWM for Class EA*
*Date: June, 2021*

*CALCULATION Sheet :1a*

## Pre-Development Run off Coefficient & Peak Flow

Juliet Pond Oulet (does not inluclude external area)

| | | |
|---|---|---|
| Drainage Area | 24.67 | ha |
| Weighted Runoff Coefficent, C | 0.743 | |

[ See: FIGURE 02 ]

Run off Calculation (using Rational Method):

Q = C * i * A / 360 cms

C = Runoff Coefficient
i = Rainfall intensity (mm/hr) [City of Mississauga IDF]
A = Watershed area (ha)

| | | |
|---|---|---|
| Time of concentration, $T_c$ | 10 | min |

IDF Eqn : $i = A / (T + C)^{\wedge} B$

A & C parameter for IDF Curve

| Year | A = | B= | C= |
|---|---|---|---|
| 2 | 610 | 4.60 | 0.780 |
| 5 | 820 | 4.60 | 0.780 |
| 10 | 1010 | 4.60 | 0.780 |
| 25 | 1160 | 4.60 | 0.780 |
| 50 | 1300 | 4.70 | 0.780 |
| 100 | 1450 | 4.90 | 0.780 |

Pre Development Peak Flows to Juliet Pond:

| YEAR | Rainfall | Flows |
|---|---|---|
| | mm/hr | m3/sec |
| 2 | 75.36 | 3.835 |
| 5 | 101.30 | 5.155 |
| 10 | 124.77 | 6.350 |
| 25 | 143.31 | 7.293 |
| 50 | 159.75 | 8.130 |
| 100 | 176.31 | 8.973 |

*PROJECT NO. : STR – 2018572-00*
*PROJECT NAME. :Bombardier SWM for Class EA*
*Date: June, 2021*

*CALCULATION Sheet :1b*

## Pre-Development Run off Coefficient & Peak Flow
Ex Derry Rd Sewers (does not inluclude external area)

| | | |
|---|---|---|
| Drainage Area | 3.82 | ha |
| Weighted Runoff Coefficent, C | 0.689 | |

[ See: FIGURE 02 ]

Run off Calculation (using Rational Method):

Q = C * i * A / 360 cms

C = Runoff Coefficient
i = Rainfall intensity (mm/hr) [City of Mississauga IDF]
A = Watershed area (ha)

| | | |
|---|---|---|
| Time of concentration, $T_c$ | 10 | min |

IDF Eqn : $i = A / (T + C)^{\wedge} B$

A & C parameter for IDF Curve

| Year | A = | B= | C= |
|---|---|---|---|
| 2 | 610 | 4.60 | 0.780 |
| 5 | 820 | 4.60 | 0.780 |
| 10 | 1010 | 4.60 | 0.780 |
| 25 | 1160 | 4.60 | 0.780 |
| 50 | 1300 | 4.70 | 0.780 |
| 100 | 1450 | 4.90 | 0.780 |

Pre Development Peak Flows to Derry Rd:

| YEAR | Rainfall | Flows |
|---|---|---|
| | mm/hr | m3/sec |
| 2 | 75.36 | 0.5508 |
| 5 | 101.30 | 0.7404 |
| 10 | 124.77 | 0.9120 |
| 25 | 143.31 | 1.0474 |
| 50 | 159.75 | 1.1676 |
| 100 | 176.31 | 1.2886 |

## Pre-Development Run off Coefficient & Peak Flow

Juliet Pond Oulet (does not inluclude external area)

| | | |
|---|---|---|
| Drainage Area | 24.67 | ha |
| Weighted Runoff Coefficent, C | 0.743 | |

[ See: FIGURE 02 ]

Run off Calculation (using Rational Method):

Q = C * i * A / 360 cms

C = Runoff Coefficient
i = Rainfall intensity (mm/hr) Region of Peel
A = Watershed area (ha)

| | | |
|---|---|---|
| Time of concentration, $T_c$ | 10 | min |

IDF Eqn : $i = A / (T + C)^B$

A & C parameter for IDF Curve

| Year | A = | B= | C= |
|---|---|---|---|
| 2 | 1070 | 7.85 | 0.876 |
| 5 | 1593 | 11.00 | 0.879 |
| 10 | 2221 | 12.00 | 0.908 |
| 25 | 3158 | 15.00 | 0.934 |
| 50 | 3886 | 16.00 | 0.950 |
| 100 | 4688 | 17.00 | 0.962 |

Pre Development Peak Flows to Juliet Pond:

| YEAR | Rainfall | Region Flows |
|---|---|---|
| | mm/hr | m3/sec |
| 2 | 85.72 | 4.362 |
| 5 | 109.68 | 5.581 |
| 10 | 134.16 | 6.827 |
| 25 | 156.47 | 7.963 |
| 50 | 176.19 | 8.966 |
| 100 | 196.54 | 10.002 |

*PROJECT NO. : STR – 2018572-00*
*PROJECT NAME. :Bombardier SWM for Class EA*
*Date: 2021-03-01*

*CALCULATION Sheet :1d*

## Pre-Development Run off Coefficient & Peak Flow

Ex Derry Rd Sewers (does not inluclude external area)

| | | |
|---|---|---|
| Drainage Area | 3.82 | ha |
| Weighted Runoff Coefficent, C | 0.689 | |

[ See: FIGURE 02 ]

Run off Calculation (using Rational Method):

Q = C * i * A / 360 cms

C = Runoff Coefficient
i = Rainfall intensity (mm/hr)
A = Watershed area (ha)

Region of Peel

| | | |
|---|---|---|
| Time of concentration, $T_c$ | 10 | min |

IDF Eqn : i = A / (T + C)^ B

A & C parameter for IDF Curve

| Year | A = | B= | C= |
|---|---|---|---|
| 2 | 1070 | 7.85 | 0.876 |
| 5 | 1593 | 11.00 | 0.879 |
| 10 | 2221 | 12.00 | 0.908 |
| 25 | 3158 | 15.00 | 0.934 |
| 50 | 3886 | 16.00 | 0.950 |
| 100 | 4688 | 17.00 | 0.962 |

Pre Development Peak Flows to Derry Rd:

| YEAR | Rainfall | Region Flows |
|---|---|---|
| | mm/hr | m3/sec |
| 2 | 85.72 | 0.6265 |
| 5 | 109.68 | 0.8016 |
| 10 | 134.16 | 0.9806 |
| 25 | 156.47 | 1.1436 |
| 50 | 176.19 | 1.2878 |
| 100 | 196.54 | 1.4365 |

*CALCULATION Sheet :2a*

## Post-Development Run off Coefficient & Peak Flow
Juliet Pond Oulet (does not inluclude external area)

| | | | |
|---|---|---|---|
| Drainage Area | 24.67 | ha | [ See: FIGURE 03 ] |
| Weighted Runoff Coefficent, C | 0.755 | | |

Run off Calculation (using Rational Method):

Q = C * i * A / 360 cms

C = Runoff Coefficient
i = Rainfall intensity (mm/hr) [City of Mississauga IDF]
A = Watershed area (ha)

| | | |
|---|---|---|
| Time of concentration, $T_c$ | 10 | min |

IDF Eqn : $i = A / (T + C)^B$

A & C parameter for IDF Curve

| Year | A = | B= | C= |
|---|---|---|---|
| 2 | 610 | 4.60 | 0.780 |
| 5 | 820 | 4.60 | 0.780 |
| 10 | 1010 | 4.60 | 0.780 |
| 25 | 1160 | 4.60 | 0.780 |
| 50 | 1300 | 4.70 | 0.780 |
| 100 | 1450 | 4.90 | 0.780 |

Post Development Peak Flows to Juliet Pond:

| YEAR | Rainfall | Flows |
|---|---|---|
| | mm/hr | m3/sec |
| 2 | 75.36 | 3.9002 |
| 5 | 101.30 | 5.2429 |
| 10 | 124.77 | 6.4577 |
| 25 | 143.31 | 7.4168 |
| 50 | 159.75 | 8.2678 |
| 100 | 176.31 | 9.1251 |

*PROJECT NO. : STR – 2018572-00*
*PROJECT NAME. :Bombardier SWM for Class EA*
*Date: June, 2021*

*CALCULATION Sheet :2b*

## Post-Development Run off Coefficient & Peak Flow

Ex Derry Rd Sewers (does not inluclude external area)

| | | |
|---|---|---|
| Drainage Area | 3.82 | ha |
| Weighted Runoff Coefficent, C | 0.702 | |

[ See: FIGURE 03 ]

Run off Calculation (using Rational Method):

Q = C * i * A / 360 cms

C = Runoff Coefficient
i = Rainfall intensity (mm/hr) [City of Mississauga IDF]
A = Watershed area (ha)

| | | |
|---|---|---|
| Time of concentration, $T_c$ | 10 | min |

IDF Eqn : $i = A / (T + C)^B$

A & C parameter for IDF Curve

| Year | A = | B= | C= |
|---|---|---|---|
| 2 | 610 | 4.60 | 0.780 |
| 5 | 820 | 4.60 | 0.780 |
| 10 | 1010 | 4.60 | 0.780 |
| 25 | 1160 | 4.60 | 0.780 |
| 50 | 1300 | 4.70 | 0.780 |
| 100 | 1450 | 4.90 | 0.780 |

Post Development Peak Flows to Derry Rd

| YEAR | Rainfall | Flows | |
|---|---|---|---|
| | mm/hr | m3/sec | L/Sec |
| 2 | 75.36 | 0.561 | 561.13 |
| 5 | 101.30 | 0.754 | 754.31 |
| 10 | 124.77 | 0.929 | 929.09 |
| 25 | 143.31 | 1.067 | 1067.07 |
| 50 | 159.75 | 1.190 | 1189.50 |
| 100 | 176.31 | 1.313 | 1312.84 |

*CALCULATION Sheet :2c*

## Post-Development Run off Coefficient & Peak Flow

Juliet Pond Oulet (does not inluclude external area)

| | | |
|---|---|---|
| Drainage Area | 24.67 | ha |
| Weighted Runoff Coefficent, C | 0.755 | |

[ See: FIGURE 03 ]

Run off Calculation (using Rational Method):

Q = C * i * A / 360 cms

C = Runoff Coefficient
i = Rainfall intensity (mm/hr)
A = Watershed area (ha)

Region of Peel

| | | |
|---|---|---|
| Time of concentration, $T_c$ | 10 | min |

IDF Eqn : $i = A / (T + C)^{\wedge} B$

A & C parameter for IDF Curve

| Year | A = | B= | C= |
|---|---|---|---|
| 2 | 1070 | 7.85 | 0.876 |
| 5 | 1593 | 11.00 | 0.879 |
| 10 | 2221 | 12.00 | 0.908 |
| 25 | 3158 | 15.00 | 0.934 |
| 50 | 3886 | 16.00 | 0.950 |
| 100 | 4688 | 17.00 | 0.962 |

Post Development Peak Flows to Juliet Pond:

| YEAR | Rainfall | Flows |
|---|---|---|
| | mm/hr | m3/sec |
| 2 | 85.72 | 4.4364 |
| 5 | 109.68 | 5.6764 |
| 10 | 134.16 | 6.9436 |
| 25 | 156.47 | 8.0982 |
| 50 | 176.19 | 9.1189 |
| 100 | 196.54 | 10.1718 |

## Post-Development Run off Coefficient & Peak Flow
Ex Derry Rd Sewers (does not inluclude external area)

| | | |
|---|---|---|
| Drainage Area | 3.82 | ha |
| Weighted Runoff Coefficent, C | 0.702 | |

[ See: FIGURE 03 ]

Run off Calculation (using Rational Method):

Q = C * i * A / 360 cms

C = Runoff Coefficient
i = Rainfall intensity (mm/hr)
A = Watershed area (ha)

Region of Peel

| | | |
|---|---|---|
| Time of concentration, $T_c$ | 10 | min |

IDF Eqn : i = A / (T + C)^ B

A & C parameter for IDF Curve

| Year | A = | B= | C= |
|---|---|---|---|
| 2 | 1070 | 7.85 | 0.876 |
| 5 | 1593 | 11.00 | 0.879 |
| 10 | 2221 | 12.00 | 0.908 |
| 25 | 3158 | 15.00 | 0.934 |
| 50 | 3886 | 16.00 | 0.950 |
| 100 | 4688 | 17.00 | 0.962 |

Post Development Peak Flows to Derry Rd

| YEAR | Rainfall | Flows | |
|---|---|---|---|
| | mm/hr | m3/sec | L/Sec |
| 2 | 85.72 | 0.638 | 638.27 |
| 5 | 109.68 | 0.817 | 816.67 |
| 10 | 134.16 | 0.999 | 998.98 |
| 25 | 156.47 | 1.165 | 1165.10 |
| 50 | 176.19 | 1.312 | 1311.94 |
| 100 | 196.54 | 1.463 | 1463.43 |

*PROJECT NO. : STR – 2018572-00*
*PROJECT NAME. :Bombardier SWM for Class EA*
*Date: June, 2021*

*CALCULATION Sheet : 3*

## MINOR SYSTEM DESIGN - EXISTING CONDITION

Design Storm 10 Yr

Sewer Design Roughness= n= 0.013 for Manning's Equation

Q=0.0028*C*I*A (cms) [City of Mississauga IDF] - 10Yr
C : RUNOFF COEFFICIENT A = 1010.00
I : RAINFALL INTENSITY B = 4.60
I=A / (T+B)^ C C = 0.78
A : AREA (ha)

Velocity Limits= $V_{full}$ min = 0.8 m/s
$V_{full}$ max = 6 m/s

| STREETS | AREA No. | MAINTENANCE HOLE | | INCREMENT | | | TOTAL | | FLOW TIME (min) | | | I | TOTAL Q | S | D | LENGTH | V FULL | Q FULL | % Full | Sec. Time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FROM | TO | A | C | CA | $A_T$ | $CA_T$ | Tcf | Tci | Tc | (mm/h) | (cms) | (%) | (mm) | (m) | (m/s) | (cms) | | (min) |
| **City Sewer to HW** | | | | | | | | | | | | | | | | | | | | |
| Alstep Dr | 211 | Stub | 2 | 0.95 | 0.25 | 0.24 | 0.95 | 0.24 | 15.00 | | 15.0 | 99.17 | 0.066 | 0.80 | 600 | 2.5 | 1.94 | 0.549 | 12.0% | 0.00 |
| " | 202 | 2 | 5 | 3.73 | 0.82 | 3.06 | 4.68 | 3.30 | | | 15.0 | 99.17 | 0.915 | 0.78 | 750 | 178.0 | 2.23 | 0.983 | 93.1% | 1.33 |
| Menway Court | 209 | 3 | 4 | 1.95 | 0.84 | 1.64 | 1.95 | 1.64 | 15.00 | | 15.0 | 99.17 | 0.455 | 0.40 | 600 | 81.0 | 1.37 | 0.388 | 117.1% | 0.98 |
| " | 208 | 4 | 5 | 1.18 | 0.76 | 0.90 | 3.13 | 2.53 | | | 16.0 | 95.45 | 0.677 | 0.46 | 675 | 120.0 | 1.59 | 0.570 | 118.8% | 1.26 |
| Alstep Dr | | 5 | 6 | | | 0.00 | 7.81 | 5.83 | | | 17.2 | 91.14 | 1.488 | 0.34 | 1050 | 23.0 | 1.83 | 1.588 | 93.7% | 0.21 |
| Easement Lot 19 | 201 | CBMH 10 | 6 | 2.15 | 0.71 | 3.87 | 5.40 | 3.87 | | | 12.6 | 109.80 | 1.190 | 0.52 | 750 | 153.0 | 1.82 | 0.803 | 148.3% | 1.40 |
| | 213 | | | 0.72 | 0.72 | | | | | | | | | | | | | | | |
| | 212 | | | 1.30 | 0.61 | | | | | | | | | | | | | | | |
| | 203 | | | 1.23 | 0.84 | | | | | | | | | | | | | | | |
| Alstep Dr | 204 | 6 | 8 | 2.45 | 0.82 | 2.01 | 15.66 | 11.71 | | | 17.4 | 90.47 | 2.967 | 0.30 | 1350 | 140.0 | 2.04 | 2.923 | 101.5% | 1.14 |
| Alstep Dr | 205 | 7 | 8 | 2.50 | 0.76 | 1.90 | 2.50 | 1.90 | 15.00 | | 15.0 | 99.17 | 0.528 | 0.55 | 600 | 110.0 | 1.61 | 0.455 | 115.9% | 1.14 |
| Alstep Dr | 207 | 8 | 9 | 1.09 | 0.52 | 0.57 | 19.25 | 14.18 | | | 18.6 | 86.97 | 3.453 | 0.40 | 1350 | 120.0 | 2.36 | 3.376 | 102.3% | 0.85 |
| Alstep Dr | 210 | 9 | HW | 1.23 | 0.89 | 1.09 | 20.48 | 15.27 | | | 19.4 | 84.57 | 3.617 | 0.40 | 1350 | 89.0 | 2.36 | 3.376 | 107.1% | 0.63 |
| **Private Sewer to HW** | | | | | | | | | | | | | | | | | | | | |
| Alstep Dr/Easement | 206 | 3 | 2 | 3.29 | 0.75 | 2.47 | 3.29 | 2.47 | | | 15.00 | 99.17 | 0.685 | 0.35 | 750 | 127.0 | 1.49 | 0.659 | 104.0% | 1.42 |
| | | 2 | 1 | | | 0.00 | 3.29 | 2.47 | | | 16.4 | 93.90 | 0.649 | 0.35 | 750 | 120.0 | 1.49 | 0.659 | 98.5% | 1.34 |
| | | 1 | HW | | | 0.00 | 3.29 | 2.47 | | | 17.8 | 89.48 | 0.618 | 0.35 | 750 | 58.0 | 1.49 | 0.659 | 93.9% | 0.65 |
| **Derry Rd Sewer N** | | | | | | | | | | | | | | | | | | | | |
| Easement | External | 12 | 13 | 47.52 | 0.75 | 35.64 | 47.52 | 35.64 | | | 22.00 | 78.15 | 7.798 | 0.76 | 1650 | 29.0 | 3.72 | 7.946 | 98.1% | 0.13 |
| Bramalea Rd | 221 | 13 | 14 | 2.70 | 0.71 | 1.92 | 50.22 | 37.56 | | | 22.13 | 77.85 | 8.187 | 0.76 | 1650 | 40.0 | 3.72 | 7.946 | 103.0% | 0.18 |
| **Derry Rd Sewer S** | | | | | | | | | | | | | | | | | | | | |
| Bramalea Rd | 220 | 22 | 21 | 1.12 | 0.68 | 0.76 | 1.12 | 0.76 | | | 10.00 | 124.77 | 0.266 | 0.40 | 525 | 111.4 | 1.26 | 0.272 | 97.8% | 1.48 |
| **Bramalea Rd Sewer** | | | | | | | | | | | | | | | | | | | | |
| Bramalea Rd | 301 | 43 | 45 | 0.95 | 0.75 | 0.71 | 0.95 | 0.71 | | | 10.00 | 124.77 | 0.249 | 0.30 | 450 | 118.0 | 0.98 | 0.156 | 159.4% | 2.00 |

*PROJECT NO. : STR – 2018572-00*
*PROJECT NAME. :Bombardier SWM for Class EA*
*Date: June, 2021*

*CALCULATION Sheet : 4*

## MINOR SYSTEM DESIGN - PROPOSED CONDITION

Design Storm 10 Yr

Sewer Design Roughness= n= 0.013 for Manning's Equation

Q=0.0028*C*I*A (cms) [City of Mississauga IDF] - 10Yr
C : RUNOFF COEFFICIENT A = 1010.00
I : RAINFALL INTENSITY B = 4.60
$I=A / (T+B)^{C}$ C = 0.78
A : AREA (ha)

Velocity Limits= $V_{full}$ min = 0.8 m/s
$V_{full}$ max = 6 m/s

| STREETS | AREA No. | MAINTENANCE HOLE | | INCREMENT | | | TOTAL | | FLOW TIME (min) | | | I | TOTAL Q | S | D | LENGTH | V FULL | Q FULL | % Full | Sec. Time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FROM | TO | A | C | CA | $A_T$ | $CA_T$ | Tcf | Tci | Tc | (mm/h) | (cms) | (%) | (mm) | (m) | (m/s) | (cms) | | (min) |
| **City Sewer to HW** | | | | | | | | | | | | | | | | | | | | |
| Alstep Dr | 211 | Stub | 2 | 0.95 | 0.25 | 0.24 | 0.95 | 0.24 | 15.00 | | 15.0 | 99.17 | 0.066 | 0.80 | 600 | 2.5 | 1.94 | 0.549 | 12.0% | 0.00 |
| " | 202 | 2 | 5 | 3.73 | 0.83 | 3.10 | 4.68 | 3.33 | | | 15.0 | 99.17 | 0.926 | 0.78 | 750 | 178.0 | 2.23 | 0.983 | 94.1% | 1.33 |
| Menway Court | 209 | 3 | 4 | 1.90 | 0.84 | 1.60 | 1.90 | 1.60 | 15.00 | | 15.0 | 99.17 | 0.443 | 0.40 | 600 | 81.0 | 1.37 | 0.388 | 114.1% | 0.98 |
| " | 208 | 4 | 5 | 1.18 | 0.76 | 0.90 | 3.08 | 2.49 | | | 16.0 | 95.45 | 0.666 | 0.46 | 675 | 120.0 | 1.59 | 0.570 | 116.9% | 1.26 |
| Alstep Dr | | 5 | 6 | | | 0.00 | 7.76 | 5.83 | | | 17.2 | 91.14 | 1.487 | 0.34 | 1050 | 23.0 | 1.83 | 1.588 | 93.7% | 0.21 |
| Easement Lot 19 | 201 | CBMH 10 | 6 | 2.15 | 0.72 | 3.89 | 5.40 | 3.89 | | | 12.6 | 109.80 | 1.195 | 0.52 | 750 | 153.0 | 1.82 | 0.803 | 148.8% | 1.40 |
| | 213 | | | 0.72 | 0.71 | | | | | | | | | | | | | | | |
| | 212 | | | 1.30 | 0.61 | | | | | | | | | | | | | | | |
| | 203 | | | 1.23 | 0.84 | | | | | | | | | | | | | | | |
| Alstep Dr | 204 | 6 | 8 | 2.45 | 0.82 | 2.01 | 15.61 | 11.72 | | | 17.4 | 90.47 | 2.969 | 0.30 | 1350 | 140.0 | 2.04 | 2.923 | 101.6% | 1.14 |
| Alstep Dr | 205, 231 | 7 | 8 | 2.72 | 0.75 | 2.04 | 2.72 | 2.04 | 15.00 | | 15.0 | 99.17 | 0.566 | 0.55 | **675** | **132.0** | 1.74 | 0.623 | 90.8% | 1.26 |
| Alstep Dr | 207 | 8 | 9 | 1.09 | 0.52 | 0.57 | 19.42 | 14.33 | | | 18.6 | 86.97 | 3.489 | 0.40 | 1350 | 120.0 | 2.36 | 3.376 | 103.4% | 0.85 |
| Alstep Dr | 210 | 9 | HW | 1.23 | 0.89 | 1.09 | 20.65 | 15.42 | | | 19.4 | 84.57 | 3.652 | 0.40 | 1350 | 89.0 | 2.36 | 3.376 | 108.2% | 0.63 |
| **Private Sewer to HW** | | | | | | | | | | | | | | | | | | | | |
| Alstep Dr/Easement | 206 | 3 | 2 | 2.87 | 0.83 | 2.38 | 2.87 | 2.38 | | | 15.00 | 99.17 | 0.661 | 0.35 | 750 | 127.0 | 1.49 | 0.659 | 100.4% | 1.42 |
| | | 2 | 1 | | | 0.00 | 2.87 | 2.38 | | | 16.4 | 93.90 | 0.626 | 0.35 | 750 | 120.0 | 1.49 | 0.659 | 95.1% | 1.34 |
| | | 1 | HW | | | 0.00 | 2.87 | 2.38 | | | 17.8 | 89.48 | 0.597 | 0.35 | 750 | 58.0 | 1.49 | 0.659 | 90.6% | 0.65 |
| **Derry Rd Sewer N** | | | | | | | | | | | | | | | | | | | | |
| Easement | External | 12 | 13 | 47.52 | 0.75 | 35.64 | 47.52 | 35.64 | | | 22.00 | 78.15 | 7.798 | 0.76 | 1650 | 29.0 | 3.72 | 7.946 | 98.1% | 0.13 |
| Bramalea Rd | 221 | 13 | 14 | 2.70 | 0.73 | 1.97 | 50.22 | 37.61 | | | 22.13 | 77.85 | 8.198 | 0.76 | 1650 | 40.0 | 3.72 | 7.946 | 103.2% | 0.18 |
| **Derry Rd Sewer S** | | | | | | | | | | | | | | | | | | | | |
| Bramalea Rd | 220 | 22 | 21 | 1.12 | 0.69 | 0.77 | 1.12 | 0.77 | | | 10.00 | 124.77 | 0.270 | 0.40 | 525 | 111.4 | 1.26 | 0.272 | 99.3% | 1.48 |
| **Bramalea Rd Sewer** | | | | | | | | | | | | | | | | | | | | |
| Alstep Dr | 232 | 43 | 45 | 0.22 | 0.62 | 0.14 | 0.22 | 0.14 | | | 10.00 | 124.77 | 0.048 | **1.00** | **300** | **28.9** | 1.37 | 0.097 | 49.3% | 0.35 |
| Bramalea Rd | 301 | 43 | 45 | 0.95 | 0.75 | 0.71 | 1.17 | 0.85 | | | 10.4 | 122.48 | 0.291 | **0.30** | **twin-450** | 118.0 | 1.96 | 0.312 | 93.2% | 1.00 |

*PROJECT NO. : STR – 2018572-00*
*PROJECT NAME. :Bombardier SWM for Class EA*
*Date: 2021-03-01*

*CALCULATION Sheet : 5*

# MINOR SYSTEM DESIGN - EXISTING CONDITION

Design Storm 10 Yr

Sewer Design Roughness= n= 0.013 for Manning's Equation

Q=0.0028*C*I*A (cms) [Region of Peel IDF] - 10Yr
C : RUNOFF COEFFICIENT A = 2221.00
I : RAINFALL INTENSITY B = 12.00
I=A / (T+B)^ C C = 0.91
A : AREA (ha)

Velocity Limits= $V_{full}$ min = 0.8 m/s
$V_{full}$ max = 6 m/s

| STREETS | AREA No. | MAINTENANCE HOLE | | INCREMENT | | | TOTAL | | FLOW TIME (min) | | | I | TOTAL Q | S | D | LENGTH | V FULL | Q FULL | % Full | Sec. Time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FROM | TO | A | C | CA | $A_T$ | $CA_T$ | Tcf | Tci | Tc | (mm/h) | (cms) | (%) | (mm) | (m) | (m/s) | (cms) | | (min) |
| **City Sewer to HW** | | | | | | | | | | | | | | | | | | | | |
| Alstep Dr | 211 | Stub | 2 | 0.95 | 0.25 | 0.24 | 0.95 | 0.24 | 10.00 | | 10.0 | 134.16 | 0.089 | 0.80 | 600 | 2.5 | 1.94 | 0.549 | 16.2% | 0.02 |
| " | 202 | 2 | 5 | 3.73 | 0.82 | 3.06 | 4.68 | 3.30 | | | 10.0 | 134.04 | 1.237 | 0.78 | 750 | 178.0 | 2.23 | 0.983 | 125.8% | 1.33 |
| Menway Court | 209 | 3 | 4 | 1.90 | 0.84 | 1.60 | 1.90 | 1.60 | 10.00 | | 10.0 | 134.16 | 0.600 | 0.40 | 600 | 81.0 | 1.37 | 0.388 | 154.4% | 0.98 |
| " | 208 | 4 | 5 | 1.18 | 0.76 | 0.90 | 3.08 | 2.49 | | | 11.0 | 128.94 | 0.900 | 0.46 | 675 | 120.0 | 1.59 | 0.570 | 157.9% | 1.26 |
| Alstep Dr | | 5 | 6 | | | 0.00 | 7.76 | 5.79 | | | 12.2 | 122.86 | 1.991 | 0.34 | 1050 | 23.0 | 1.83 | 1.588 | 125.4% | 0.21 |
| Easement Lot 19 | 201 | CBMH 10 | 6 | 2.15 | 0.71 | 3.87 | 5.40 | 3.87 | | | 12.6 | 121.22 | 1.314 | 0.52 | 750 | 153.0 | 1.82 | 0.803 | 163.7% | 1.40 |
| | 213 | | | 0.72 | 0.72 | | | | | | | | | | | | | | | |
| | 212 | | | 1.30 | 0.61 | | | | | | | | | | | | | | | |
| | 203 | | | 1.23 | 0.84 | | | | | | | | | | | | | | | |
| Alstep Dr | 204 | 6 | 8 | 2.45 | 0.82 | 2.01 | 15.61 | 11.67 | | | 14.0 | 115.27 | 3.766 | 0.30 | 1350 | 140.0 | 2.04 | 2.923 | 128.8% | 1.14 |
| Alstep Dr | 205 | 7 | 8 | 2.50 | 0.76 | 1.90 | 2.50 | 1.90 | 10.00 | | 10.0 | 134.16 | 0.714 | 0.55 | 600 | 110.0 | 1.61 | 0.455 | 156.7% | 1.14 |
| Alstep Dr | 207 | 8 | 9 | 1.09 | 0.52 | 0.57 | 19.20 | 14.14 | | | 15.1 | 110.85 | 4.388 | 0.40 | 1350 | 120.0 | 2.36 | 3.376 | 130.0% | 0.85 |
| Alstep Dr | 210 | 9 | HW | 1.23 | 0.89 | 1.09 | 20.43 | 15.23 | | | 16.0 | 107.80 | 4.597 | 0.40 | 1350 | 89.0 | 2.36 | 3.376 | 136.2% | 0.63 |
| **Private Sewer to HW** | | | | | | | | | | | | | | | | | | | | |
| Alstep Dr/Easement | 206 | 3 | 2 | 3.29 | 0.76 | 2.50 | 3.29 | 2.50 | | | 10.00 | 134.16 | 0.939 | 0.35 | 750 | 127.0 | 1.49 | 0.659 | 142.6% | 1.42 |
| | | 2 | 1 | | | 0.00 | 3.29 | 2.50 | | | 11.4 | 126.76 | 0.887 | 0.35 | 750 | 120.0 | 1.49 | 0.659 | 134.7% | 1.34 |
| | | 1 | HW | | | 0.00 | 3.29 | 2.50 | | | 12.8 | 120.50 | 0.844 | 0.35 | 750 | 58.0 | 1.49 | 0.659 | 128.1% | 0.65 |
| **Derry Rd Sewer N** | | | | | | | | | | | | | | | | | | | | |
| Easement | External | 12 | 13 | 47.52 | 0.75 | 35.64 | 47.52 | 35.64 | | | 22.00 | 90.36 | 9.017 | 0.76 | 1650 | 29.0 | 3.72 | 7.946 | 113.5% | 0.13 |
| Bramalea Rd | 221 | 13 | 14 | 2.70 | 0.68 | 1.84 | 50.22 | 37.48 | | | 22.13 | 90.05 | 9.449 | 0.76 | 1650 | 40.0 | 3.72 | 7.946 | 118.9% | 0.18 |
| **Derry Rd Sewer S** | | | | | | | | | | | | | | | | | | | | |
| Bramalea Rd | 220 | 22 | 21 | 1.12 | 0.68 | 0.76 | 1.12 | 0.76 | | | 10.00 | 134.16 | 0.286 | 0.40 | 525 | 111.4 | 1.26 | 0.272 | 105.2% | 1.48 |
| **Bramalea Rd Sewer** | | | | | | | | | | | | | | | | | | | | |
| Bramalea Rd | 301 | 43 | 45 | 0.95 | 0.75 | 0.71 | 0.95 | 0.71 | | | 10.00 | 134.16 | 0.268 | 0.30 | 450 | 118.0 | 0.98 | 0.156 | 171.4% | 2.00 |

*PROJECT NO. : STR – 2018572-00*
*PROJECT NAME. :Bombardier SWM for Class EA*
*Date: 2021-03-01*

*CALCULATION Sheet : 6*

## MINOR SYSTEM DESIGN - PROPOSED CONDITION

Design Storm 10 Yr

Sewer Design Roughness= n= 0.013 for Manning's Equation

Q=0.0028*C*I*A (cms) [Region of Peel IDF] - 10Yr
C : RUNOFF COEFFICIENT A = 2221.00
I : RAINFALL INTENSITY B = 12.00
I=A / (T+B)^ C C = 0.91
A : AREA (ha)

Velocity Limits= $V_{full}$ min = 0.8 m/s
$V_{full}$ max = 6 m/s

| STREETS | AREA No. | MAINTENANCE HOLE | | INCREMENT | | | TOTAL | | FLOW TIME (min) | | | I | TOTAL Q | S | D | LENGTH | V FULL | Q FULL | % Full | Sec. Time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FROM | TO | A | C | CA | $A_T$ | $CA_T$ | Tcf | Tci | Tc | (mm/h) | (cms) | (%) | (mm) | (m) | (m/s) | (cms) | | (min) |
| **City Sewer to HW** | | | | | | | | | | | | | | | | | | | | |
| Alstep Dr | 211 | Stub | 2 | 0.95 | 0.25 | 0.24 | 0.95 | 0.24 | 10.00 | | 10.0 | 134.16 | 0.089 | 0.80 | 600 | 2.5 | 1.94 | 0.549 | 16.2% | 0.02 |
| " | 202 | 2 | 5 | 3.73 | 0.83 | 3.10 | 4.68 | 3.33 | | | 10.0 | 134.04 | 1.251 | 0.78 | 750 | 178.0 | 2.23 | 0.983 | 127.2% | 1.33 |
| Menway Court | 209 | 3 | 4 | 1.90 | 0.84 | 1.60 | 1.90 | 1.60 | 10.00 | | 10.0 | 134.16 | 0.600 | 0.40 | 600 | 81.0 | 1.37 | 0.388 | 154.4% | 0.98 |
| " | 208 | 4 | 5 | 1.18 | 0.76 | 0.90 | 3.08 | 2.49 | | | 11.0 | 128.94 | 0.900 | 0.46 | 675 | 120.0 | 1.59 | 0.570 | 157.9% | 1.26 |
| Alstep Dr | | 5 | 6 | | | 0.00 | 7.76 | 5.83 | | | 12.2 | 122.86 | 2.004 | 0.34 | 1050 | 23.0 | 1.83 | 1.588 | 126.2% | 0.21 |
| Easement Lot 19 | 201 | CBMH 10 | 6 | 2.15 | 0.72 | 3.89 | 5.40 | 3.89 | | | 12.6 | 121.22 | 1.319 | 0.52 | 750 | 153.0 | 1.82 | 0.803 | 164.3% | 1.40 |
| | 213 | | | 0.72 | 0.71 | | | | | | | | | | | | | | | |
| | 212 | | | 1.30 | 0.61 | | | | | | | | | | | | | | | |
| | 203 | | | 1.23 | 0.84 | | | | | | | | | | | | | | | |
| Alstep Dr | 204 | 6 | 8 | 2.45 | 0.82 | 2.01 | 15.61 | 11.72 | | | 14.0 | 115.27 | 3.783 | 0.30 | 1350 | 140.0 | 2.04 | 2.923 | 129.4% | 1.14 |
| Alstep Dr | 205, 231 | 7 | 8 | 2.72 | 0.75 | 2.04 | 2.72 | 2.04 | 10.00 | | 10.0 | 134.16 | 0.766 | 0.55 | 675 | 132.0 | 1.74 | 0.623 | 122.9% | 1.26 |
| Alstep Dr | 207 | 8 | 9 | 1.09 | 0.52 | 0.57 | 19.42 | 14.33 | | | 15.1 | 110.85 | 4.447 | 0.40 | 1350 | 120.0 | 2.36 | 3.376 | 131.7% | 0.85 |
| Alstep Dr | 210 | 9 | HW | 1.23 | 0.89 | 1.09 | 20.65 | 15.42 | | | 16.0 | 107.80 | 4.655 | 0.40 | 1350 | 89.0 | 2.36 | 3.376 | 137.9% | 0.63 |
| **Private Sewer to HW** | | | | | | | | | | | | | | | | | | | | |
| Alstep Dr/Easement | 206 | 3 | 2 | 2.87 | 0.83 | 2.38 | 2.87 | 2.38 | | | 10.00 | 134.16 | 0.895 | 0.35 | 750 | 127.0 | 1.49 | 0.659 | 135.9% | 1.42 |
| | | 2 | 1 | | | 0.00 | 2.87 | 2.38 | | | 11.4 | 126.76 | 0.845 | 0.35 | 750 | 120.0 | 1.49 | 0.659 | 128.4% | 1.34 |
| | | 1 | HW | | | 0.00 | 2.87 | 2.38 | | | 12.8 | 120.50 | 0.804 | 0.35 | 750 | 58.0 | 1.49 | 0.659 | 122.0% | 0.65 |
| **Derry Rd Sewer N** | | | | | | | | | | | | | | | | | | | | |
| Easement | External | 12 | 13 | 47.52 | 0.75 | 35.64 | 47.52 | 35.64 | | | 22.00 | 90.36 | 9.017 | 0.76 | 1650 | 29.0 | 3.72 | 7.946 | 113.5% | 0.13 |
| Bramalea Rd | 221 | 13 | 14 | 2.70 | 0.73 | 1.97 | 50.22 | 37.61 | | | 22.13 | 90.05 | 9.483 | 0.76 | 1650 | 40.0 | 3.72 | 7.946 | 119.3% | 0.18 |
| **Derry Rd Sewer S** | | | | | | | | | | | | | | | | | | | | |
| Bramalea Rd | 220 | 22 | 21 | 1.12 | 0.69 | 0.77 | 1.12 | 0.77 | | | 10.00 | 134.16 | 0.290 | 0.40 | 525 | 111.4 | 1.26 | 0.272 | 106.7% | 1.48 |
| **Bramalea Rd Sewer** | | | | | | | | | | | | | | | | | | | | |
| Alstep Dr | 232 | 43 | 45 | 0.22 | 0.62 | 0.14 | 0.22 | 0.14 | | | 10.00 | 134.16 | 0.051 | 1.00 | 300 | 28.9 | 1.37 | 0.097 | 53.0% | 0.35 |
| Bramalea Rd | 301 | 43 | 45 | 0.95 | 0.75 | 0.71 | 1.17 | 0.85 | | | 10.4 | 132.24 | 0.314 | 0.30 | twin-450 | 118.0 | 1.96 | 0.312 | 100.6% | 1.00 |

# IDF for: TORONTO INTL A ID:6158731

Station Info | IDF historical data | IDF under climate change

Climate Model Selection | Scenario RCP 2.6 | Scenario RCP 4.5 | Scenario RCP 8.5 | Comparison Graphs

Tables | Plots | Interpolation Equations | Box Plot - Uncertainty

Total precipitation amounts presented in mm and precipitation intensity rates presented in mm/h for different return periods (T) presented in years

○ Total PPT (mm) ◉ Intensity rates (mm/h)

| T (years) | 2 | 5 | 10 | 20 | 25 | 50 | 100 |
|---|---|---|---|---|---|---|---|
| 5 min | 118.58 | 159.51 | 185.91 | 212.72 | 220.06 | 242.07 | 265.32 |
| 10 min | 87.47 | 117.89 | 136.78 | 154.75 | 160.18 | 174.70 | 189.90 |
| 15 min | 72.22 | 97.91 | 113.57 | 128.00 | 132.40 | 144.19 | 155.83 |
| 30 min | 47.46 | 65.52 | 76.84 | 87.74 | 90.92 | 99.76 | 109.01 |
| 1 h | 27.26 | 38.11 | 45.33 | 52.80 | 54.92 | 61.31 | 68.01 |
| 2 h | 15.55 | 22.01 | 26.67 | 31.81 | 33.41 | 38.32 | 44.06 |
| 6 h | 6.62 | 9.29 | 11.38 | 13.83 | 14.63 | 17.42 | 20.48 |
| 12 h | 3.80 | 5.16 | 6.29 | 7.67 | 8.14 | 9.82 | 11.78 |
| 24 h | 2.17 | 2.91 | 3.53 | 4.28 | 4.53 | 5.44 | 6.50 |

Climate Change IDF data taken from IDF CC Tool developed by University of Western Ontario and the Canadian Water Institute

*PROJECT NO. : STR – 2018572-00*
*PROJECT NAME. :Bombardier SWM for Class EA*
*Date: 2021-03-01*

exp.

*CALCULATION Sheet : 7*

## MINOR SYSTEM DESIGN - PROPOSED CONDITION

Design Storm 10 Yr

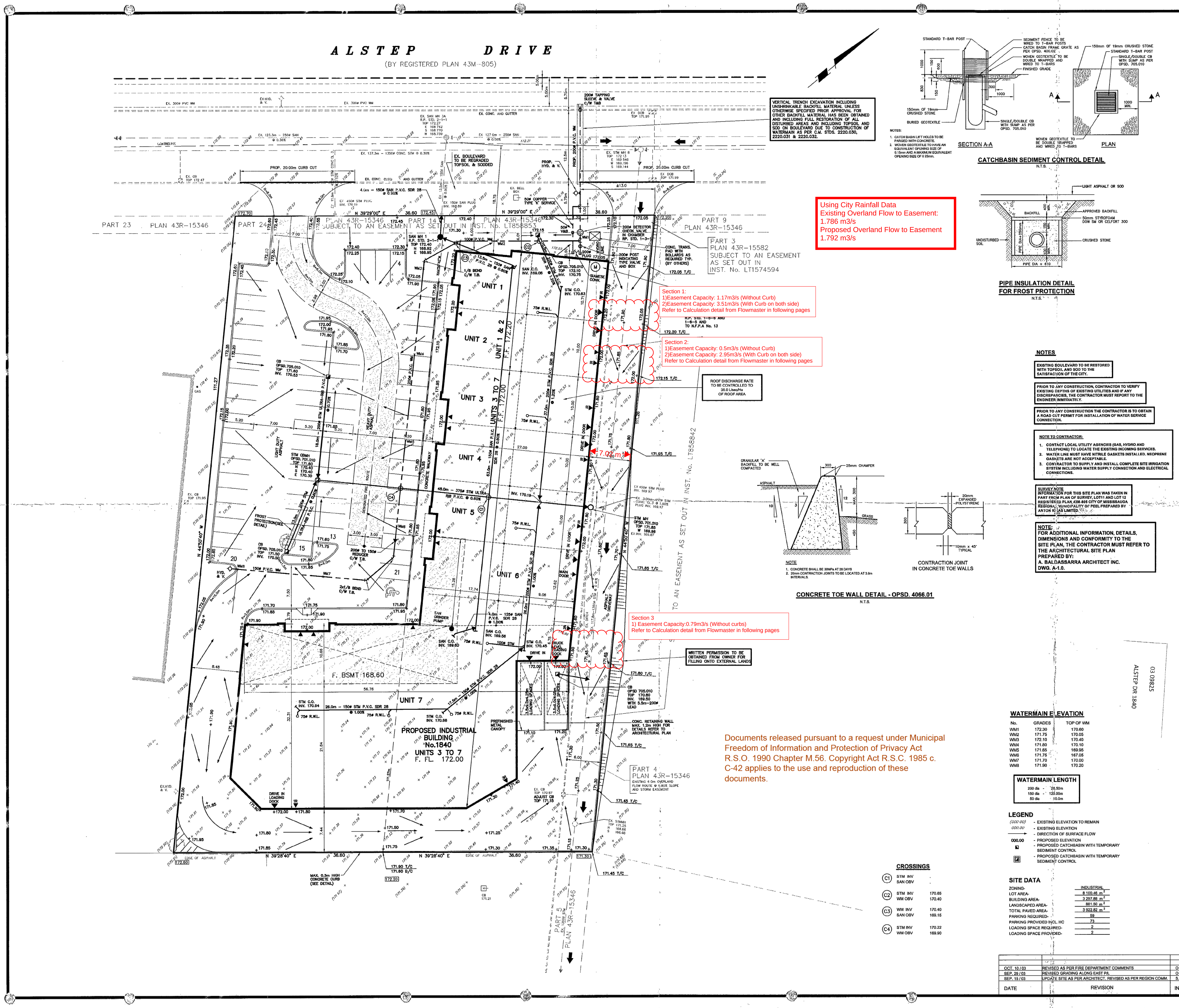
Sewer Design Roughness= n= 0.013 for Manning's Equation

Q=0.0028*C*I*A (cms)
C : RUNOFF COEFFICIENT
I : RAINFALL INTENSITY
I=A / (T+B)^ C
A : AREA (ha)

**Climate Change Scenario- 10-year**
A = 1486.32
B = 7.61
C = 0.825

Velocity Limits= $V_{full}$ min = 0.8 m/s
$V_{full}$ max = 6 m/s

| STREETS | AREA No. | MAINTENANCE HOLE | | INCREMENT | | | TOTAL | | FLOW TIME (min) | | | I | TOTAL Q | S | D | LENGTH | V FULL | Q FULL | % Full | Sec. Time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FROM | TO | A | C | CA | $A_T$ | $CA_T$ | Tcf | Tci | Tc | (mm/h) | (cms) | (%) | (mm) | (m) | (m/s) | (cms) | | (min) |
| **City Sewer to HW** | | | | | | | | | | | | | | | | | | | | |
| Alstep Dr | 211 | Stub | 2 | 0.95 | 0.25 | 0.24 | 0.95 | 0.24 | 10.00 | | 10.0 | 139.46 | 0.093 | 0.80 | 600 | 2.5 | 1.94 | 0.549 | 16.9% | 0.00 |
| " | 202 | 2 | 5 | 3.73 | 0.83 | 3.10 | 4.68 | 3.33 | | | 10.0 | 139.46 | 1.302 | 0.78 | 750 | 178.0 | 2.23 | 0.983 | 132.4% | 1.33 |
| | | | | | | | | | | | | | | | | | | | | |
| Menway Court | 209 | 3 | 4 | 1.90 | 0.84 | 1.60 | 1.90 | 1.60 | 10.00 | | 10.0 | 139.46 | 0.623 | 0.40 | 600 | 81.0 | 1.37 | 0.388 | 160.5% | 0.98 |
| " | 208 | 4 | 5 | 1.18 | 0.76 | 0.90 | 3.08 | 2.49 | | | 11.0 | 133.35 | 0.931 | 0.46 | 675 | 120.0 | 1.59 | 0.570 | 163.3% | 1.26 |
| | | | | | | | | | | | | | | | | | | | | |
| Alstep Dr | | 5 | 6 | | | 0.00 | 7.76 | 5.83 | | | 12.2 | 126.35 | 2.061 | 0.34 | 1050 | 23.0 | 1.83 | 1.588 | 129.8% | 0.21 |
| | | | | | | | | | | | | | | | | | | | | |
| Easement Lot 19 | 201 | CBMH 10 | 6 | 2.15 | 0.72 | 3.89 | 5.40 | 3.89 | | | 12.6 | 124.48 | 1.354 | 0.52 | 750 | 153.0 | 1.82 | 0.803 | 168.7% | 1.40 |
| | 213 | | | 0.72 | 0.71 | | | | | | | | | | | | | | | |
| | 212 | | | 1.30 | 0.61 | | | | | | | | | | | | | | | |
| | 203 | | | 1.23 | 0.84 | | | | | | | | | | | | | | | |
| Alstep Dr | 204 | 6 | 8 | 2.45 | 0.82 | 2.01 | 15.61 | 11.72 | | | 14.0 | 117.77 | 3.865 | 0.30 | 1350 | 140.0 | 2.04 | 2.923 | 132.2% | 1.14 |
| | | | | | | | | | | | | | | | | | | | | |
| Alstep Dr | 205, 231 | 7 | 8 | 2.72 | 0.75 | 2.04 | 2.72 | 2.04 | 10.00 | | 10.0 | 139.46 | 0.796 | 0.55 | 675 | 132.0 | 1.74 | 0.623 | 127.7% | 1.26 |
| | | | | | | | | | | | | | | | | | | | | |
| Alstep Dr | 207 | 8 | 9 | 1.09 | 0.52 | 0.57 | 19.42 | 14.33 | | | 15.1 | 112.87 | 4.528 | 0.40 | 1350 | 120.0 | 2.36 | 3.376 | 134.1% | 0.85 |
| Alstep Dr | 210 | 9 | HW | 1.23 | 0.89 | 1.09 | 20.65 | 15.42 | | | 16.0 | 109.52 | 4.729 | 0.40 | 1350 | 89.0 | 2.36 | 3.376 | 140.1% | 0.63 |
| **Private Sewer to HW** | | | | | | | | | | | | | | | | | | | | |
| Alstep Dr/Easement | 206 | 3 | 2 | 2.87 | 0.83 | 2.38 | 2.87 | 2.38 | | | 10.00 | 139.46 | 0.930 | 0.35 | 750 | 127.0 | 1.49 | 0.659 | 141.2% | 1.42 |
| | | 2 | 1 | | | 0.00 | 2.87 | 2.38 | | | 11.4 | 130.82 | 0.873 | 0.35 | 750 | 120.0 | 1.49 | 0.659 | 132.5% | 1.34 |
| | | 1 | HW | | | 0.00 | 2.87 | 2.38 | | | 12.8 | 123.67 | 0.825 | 0.35 | 750 | 58.0 | 1.49 | 0.659 | 125.2% | 0.65 |
| **Derry Rd Sewer N** | | | | | | | | | | | | | | | | | | | | |
| Easement | External | 12 | 13 | 47.52 | 0.75 | 35.64 | 47.52 | 35.64 | | | 22.00 | 90.83 | 9.064 | 0.76 | 1650 | 29.0 | 3.72 | 7.946 | 114.1% | 0.13 |
| Bramalea Rd | 221 | 13 | 14 | 2.70 | 0.73 | 1.97 | 50.22 | 37.61 | | | 22.13 | 90.50 | 9.531 | 0.76 | 1650 | 40.0 | 3.72 | 7.946 | 119.9% | 0.18 |
| **Derry Rd Sewer S** | | | | | | | | | | | | | | | | | | | | |
| Bramalea Rd | 220 | 22 | 21 | 1.12 | 0.69 | 0.77 | 1.12 | 0.77 | | | 10.00 | 139.46 | 0.302 | 0.40 | 525 | 111.4 | 1.26 | 0.272 | 110.9% | 1.48 |
| Bramalea Rd Sewer | | | | | | | | | | | | | | | | | | | | |
| Alstep Dr | 232 | 43 | 45 | 0.22 | 0.62 | 0.14 | 0.22 | 0.14 | | | 10.00 | 139.46 | 0.053 | 1.00 | 300 | 28.9 | 1.37 | 0.097 | 55.1% | 0.35 |
| Bramalea Rd | 301 | 43 | 45 | 0.95 | 0.75 | 0.71 | 1.17 | 0.85 | | | 10.4 | 137.20 | 0.326 | 0.30 | twin-450 | 118.0 | 1.96 | 0.312 | 104.4% | 1.00 |

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## NOTES

### SITE PLAN

### FIRE DEPARTMENT

### STORM SEWERS

### SANITARY SEWERS

### WATERMAINS

I HEREBY CERTIFY THAT THE PROPOSED GRADING & APPURTENANCE DRAINAGE WORKS COMPLY WITH SOUND ENGINEERING DESIGN AND THAT THE PROPOSED GRADING IS IN CONFORMITY WITH THOSE OF THE ADJACENT LANDS FOR DRAINAGE & RELATIVE ELEVATION.

OCT 14 2003
DATE

M. JOZWIK
OCT. 14/03
PROVINCE OF ONTARIO

**BENCH MARK**

No.:791 ELEVATION: 173.395

DESCRIPTION: ON THE N. FACE AT THE E. CORNER OF EASTERLY END OF CONCRETE POST OF CONCRETE BRIDGE ON S. SIDE OF DERRY ROAD, 350' E OF DIXIE ROAD.

03 09825

ALSTEP DR 1840

**SKIRA & ASSOCIATES LTD.**
CONSULTING ENGINEERS
3464 Semenyk Court, Suite 100, Mississauga, Ontario L5C 4P8
Tel. (905) 276-5100 Fax. (905) 270-1936 Email - info@skiraconsult.ca

A. BALDASSARRA
Architect Inc.
7800 Jane Street, Suite 200
Concord, Ontario L4K 4R6
Tel: (905) 660-0722
Fax: (905) 660-7019

# PROPOSED MANUFACTURING FACILITY AND OFFICES

LOT 11 AND LOT 12, REG. PLAN 43M-805

**1840 ALSTEP DRIVE**

**STEELGATE SECURITY PRODUCTS LTD.**
7895 TRANMERE DRIVE, UNIT 214, MISSISSAUGA, ONTARIO, L5S 1K4 TEL. (905) 405-0479

MISSISSAUGA

# SITE GRADING AND SERVICING PLAN

| | | |
|---|---|---|
| OCT. 10/03 | REVISED AS PER FIRE DEPARTMENT COMMENTS | O.C. |
| SEP. 29/03 | REVISED GRADING ALONG EAST P.L. | O.C. |
| SEP. 15/03 | UPDATE SITE AS PER ARCHITECT, REVISED AS PER REGION COMM. | S.R. |
| DATE | REVISION | INIT. |

REGION FILE:

| | | |
|---|---|---|
| DATE: JULY. 2003 | AREA: Z-42 | DWG.No. |
| SCALE: 1:300 | DRAWN BY: G.G. | 202-M98 |

# Worksheet for 1.Easement Capacity (Section 1- 7m easement, without curb)

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Discharge |

| Input Data | |
|---|---|
| Channel Slope | 0.700 % |
| Normal Depth | 250.0 mm |

## Section Definitions

| Station (m) | Elevation (m) |
|---|---|
| 0+00 | 172.20 |
| 0+04 | 171.85 |
| 0+07 | 172.05 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 172.20) | (0+07, 172.05) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Discharge | 1.17 $m^3/s$ |
| Roughness Coefficient | 0.016 |
| Elevation Range | 171.9 to 172.2 m |
| Flow Area | 0.8 $m^2$ |
| Wetted Perimeter | 6.1 m |
| Hydraulic Radius | 138.0 mm |
| Top Width | 6.00 m |
| Normal Depth | 250.0 mm |
| Critical Depth | 268.8 mm |
| Critical Slope | 0.477 % |
| Velocity | 1.40 m/s |
| Velocity Head | 0.10 m |
| Specific Energy | 0.35 m |
| Froude Number | 1.194 |
| Flow Type | Supercritical |

# Worksheet for 1.Easement Capacity (Section 1- 7m easement, without curb)

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 mm |
| Length | 0.0 m |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 mm |
| Profile Description | N/A |
| Profile Headloss | 0.00 m |
| Downstream Velocity | Infinity m/s |
| Upstream Velocity | Infinity m/s |
| Normal Depth | 250.0 mm |
| Critical Depth | 268.8 mm |
| Channel Slope | 0.700 % |
| Critical Slope | 0.477 % |

# Worksheet for 1.Easement Capacity (Section 1- 7m easement,with curb)

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Discharge |

| Input Data | |
|---|---|
| Channel Slope | 0.700 % |
| Normal Depth | 350.0 mm |

## Section Definitions

| Station (m) | Elevation (m) |
|---|---|
| 0+00 | 172.20 |
| 0+00 | 172.05 |
| 0+04 | 171.85 |
| 0+07 | 172.05 |
| 0+07 | 172.20 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 172.20) | (0+07, 172.20) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Discharge | 3.51 $m^3/s$ |
| Roughness Coefficient | 0.016 |
| Elevation Range | 171.9 to 172.2 m |
| Flow Area | 1.7 $m^2$ |
| Wetted Perimeter | 7.3 m |
| Hydraulic Radius | 239.3 mm |
| Top Width | 7.10 m |
| Normal Depth | 350.0 mm |
| Critical Depth | 396.9 mm |
| Critical Slope | 0.397 % |
| Velocity | 2.02 m/s |
| Velocity Head | 0.21 m |
| Specific Energy | 0.56 m |
| Froude Number | 1.300 |
| Flow Type | Supercritical |

# Worksheet for 1.Easement Capacity (Section 1- 7m easement,with curb)

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 mm |
| Length | 0.0 m |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 mm |
| Profile Description | N/A |
| Profile Headloss | 0.00 m |
| Downstream Velocity | Infinity m/s |
| Upstream Velocity | Infinity m/s |
| Normal Depth | 350.0 mm |
| Critical Depth | 396.9 mm |
| Channel Slope | 0.700 % |
| Critical Slope | 0.397 % |

# Worksheet for 1.Easement Capacity (Section 2- 7m easement, without curb)

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Discharge |

| Input Data | |
|---|---|
| Channel Slope | 0.700 % |
| Normal Depth | 250.0 mm |

## Section Definitions

| Station (m) | Elevation (m) |
|---|---|
| 0+00 | 172.20 |
| 0+04 | 171.85 |
| 0+07 | 172.05 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 172.20) | (0+07, 172.05) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Discharge | 1.17 $m^3/s$ |
| Roughness Coefficient | 0.016 |
| Elevation Range | 171.9 to 172.2 m |
| Flow Area | 0.8 $m^2$ |
| Wetted Perimeter | 6.1 m |
| Hydraulic Radius | 138.0 mm |
| Top Width | 6.00 m |
| Normal Depth | 250.0 mm |
| Critical Depth | 268.8 mm |
| Critical Slope | 0.477 % |
| Velocity | 1.40 m/s |
| Velocity Head | 0.10 m |
| Specific Energy | 0.35 m |
| Froude Number | 1.194 |
| Flow Type | Supercritical |

# Worksheet for 1.Easement Capacity (Section 2- 7m easement, without curb)

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 mm |
| Length | 0.0 m |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 mm |
| Profile Description | N/A |
| Profile Headloss | 0.00 m |
| Downstream Velocity | Infinity m/s |
| Upstream Velocity | Infinity m/s |
| Normal Depth | 250.0 mm |
| Critical Depth | 268.8 mm |
| Channel Slope | 0.700 % |
| Critical Slope | 0.477 % |

# Worksheet for 2.Easement Capacity (Section 2 - 7m easement, with curb)

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Discharge |

| Input Data | |
|---|---|
| Channel Slope | 0.700 % |
| Normal Depth | 300.0 mm |

## Section Definitions

| Station (m) | Elevation (m) |
|---|---|
| 0+00 | 172.15 |
| 0+00 | 172.00 |
| 0+04 | 171.85 |
| 0+07 | 172.00 |
| 0+07 | 172.15 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 172.15) | (0+07, 172.15) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Discharge | 2.95 $m^3/s$ |
| Roughness Coefficient | 0.016 |
| Elevation Range | 171.9 to 172.2 m |
| Flow Area | 1.6 $m^2$ |
| Wetted Perimeter | 7.3 m |
| Hydraulic Radius | 215.7 mm |
| Top Width | 7.10 m |
| Normal Depth | 300.0 mm |
| Critical Depth | 339.3 mm |
| Critical Slope | 0.412 % |
| Velocity | 1.88 m/s |
| Velocity Head | 0.18 m |
| Specific Energy | 0.48 m |
| Froude Number | 1.278 |
| Flow Type | Supercritical |

# Worksheet for 2.Easement Capacity (Section 2 - 7m easement, with curb)

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 mm |
| Length | 0.0 m |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 mm |
| Profile Description | N/A |
| Profile Headloss | 0.00 m |
| Downstream Velocity | Infinity m/s |
| Upstream Velocity | Infinity m/s |
| Normal Depth | 300.0 mm |
| Critical Depth | 339.3 mm |
| Channel Slope | 0.700 % |
| Critical Slope | 0.412 % |

# Worksheet for 3.Easement Capacity (Section 3 - 7m easement, without curb)

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Discharge |

| Input Data | |
|---|---|
| Channel Slope | 0.700 % |
| Normal Depth | 200.0 mm |

## Section Definitions

| Station (m) | Elevation (m) |
|---|---|
| 0+00 | 171.65 |
| 0+04 | 171.45 |
| 0+07 | 171.65 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 171.65) | (0+07, 171.65) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Discharge | 0.79 $m^3/s$ |
| Roughness Coefficient | 0.016 |
| Elevation Range | 171.5 to 171.7 m |
| Flow Area | 0.7 $m^2$ |
| Wetted Perimeter | 7.0 m |
| Hydraulic Radius | 99.8 mm |
| Top Width | 7.00 m |
| Normal Depth | 200.0 mm |
| Critical Depth | 208.8 mm |
| Critical Slope | 0.529 % |
| Velocity | 1.13 m/s |
| Velocity Head | 0.06 m |
| Specific Energy | 0.26 m |
| Froude Number | 1.136 |
| Flow Type | Supercritical |

# Worksheet for 3.Easement Capacity (Section 3 - 7m easement, without curb)

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 mm |
| Length | 0.0 m |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 mm |
| Profile Description | N/A |
| Profile Headloss | 0.00 m |
| Downstream Velocity | Infinity m/s |
| Upstream Velocity | Infinity m/s |
| Normal Depth | 200.0 mm |
| Critical Depth | 208.8 mm |
| Channel Slope | 0.700 % |
| Critical Slope | 0.529 % |

# Worksheet for Alstep Dr- Capacity

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Discharge |

| Input Data | |
|---|---|
| Channel Slope | 1.000 % |
| Normal Depth | 150.0 mm |

## Section Definitions

| Station (m) | Elevation (m) |
|---|---|
| 0+00 | 171.00 |
| 0+00 | 170.85 |
| 0+06 | 171.02 |
| 0+12 | 170.85 |
| 0+12 | 171.00 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 171.00) | (0+12, 171.00) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

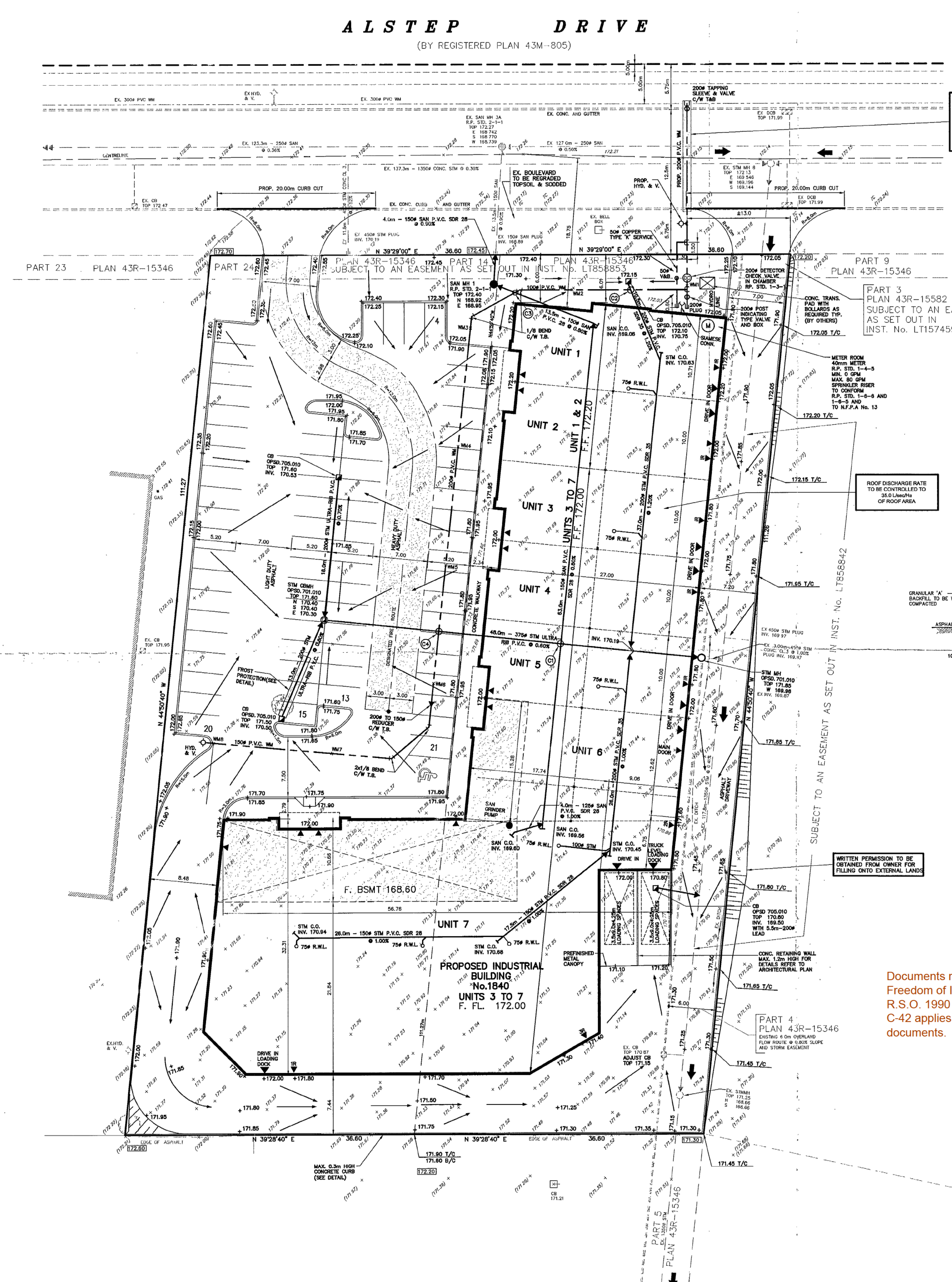
| Results | |
|---|---|
| Discharge | 0.87 $m^3/s$ |
| Roughness Coefficient | 0.016 |
| Elevation Range | 170.9 to 171.0 m |
| Flow Area | 0.8 $m^2$ |
| Wetted Perimeter | 10.9 m |
| Hydraulic Radius | 73.0 mm |
| Top Width | 10.60 m |
| Normal Depth | 150.0 mm |
| Critical Depth | 165.2 mm |
| Critical Slope | 0.597 % |
| Velocity | 1.09 m/s |
| Velocity Head | 0.06 m |
| Specific Energy | 0.21 m |
| Froude Number | 1.273 |
| Flow Type | Supercritical |

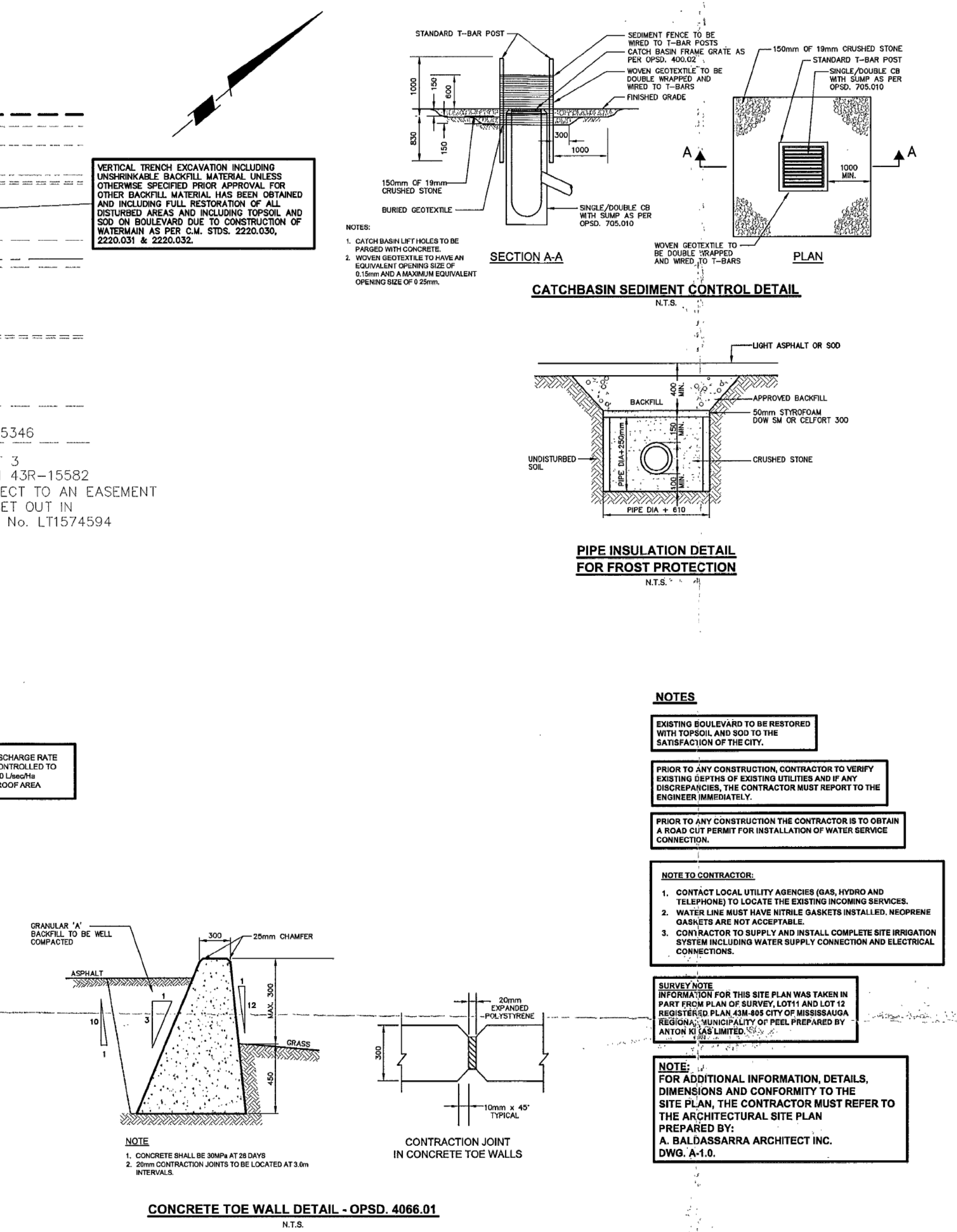
# Worksheet for Alstep Dr- Capacity

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 mm |
| Length | 0.0 m |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 mm |
| Profile Description | N/A |
| Profile Headloss | 0.00 m |
| Downstream Velocity | Infinity m/s |
| Upstream Velocity | Infinity m/s |
| Normal Depth | 150.0 mm |
| Critical Depth | 165.2 mm |
| Channel Slope | 1.000 % |
| Critical Slope | 0.597 % |

APPENDIX C




## CROSSINGS

| | | |
|---|---|---|
| C1 | STM INV | |
| | SAN OBV | |
| C2 | STM INV | 170.65 |
| | WM OBV | 170.40 |
| C3 | WM INV | 170.40 |
| | SAN OBV | 169.15 |
| C4 | STM INV | 170.22 |
| | WM OBV | 169.90 |



03 09825

ALSTEP DR 1840

## WATERMAIN ELEVATION

| No. | GRADES | TOP OF WM |
|---|---|---|
| WM1 | 172.30 | 170.60 |
| WM2 | 171.75 | 170.05 |
| WM3 | 172.10 | 170.40 |
| WM4 | 171.80 | 170.10 |
| WM5 | 171.65 | 169.95 |
| WM6 | 171.75 | 167.05 |
| WM7 | 171.70 | 170.00 |
| WM8 | 171.90 | 170.20 |

## WATERMAIN LENGTH

200 dia - 26.50m
150 dia - 120.00m
50 dia 10.0m

## LEGEND

(000 00) - EXISTING ELEVATION TO REMAIN
000.00 - EXISTING ELEVATION
- DIRECTION OF SURFACE FLOW
000.00 - PROPOSED ELEVATION
- PROPOSED CATCHBASIN WITH TEMPORARY SEDIMENT CONTROL
- PROPOSED CATCHBASIN WITH TEMPORARY SEDIMENT CONTROL

## SITE DATA

| | |
|---|---|
| ZONING- | INDUSTRIAL |
| LOT AREA- | 8 100.46 $m^2$ |
| BUILDING AREA- | 3 297.88 $m^2$ |
| LANDSCAPED AREA- | 881.50 $m^2$ |
| TOTAL PAVED AREA- | 3 922.82 $m^2$ |
| PARKING REQUIRED- | 59 |
| PARKING PROVIDED INCL. HC | 73 |
| LOADING SPACE REQUIRED- | 2 |
| LOADING SPACE PROVIDED- | 2 |

| DATE | REVISION | INIT. |
|---|---|---|
| OCT. 10 / 03 | REVISED AS PER FIRE DEPARTMENT COMMENTS | O C. |
| SEP. 29 / 03 | REVISED GRADING ALONG EAST P/L | O C. |
| SEP. 15 / 03 | UPDATE SITE AS PER ARCHITECT. REVISED AS PER REGION COMM. | S.R. |

# NOTES

## SITE PLAN

1. ALL DIMENSIONS AND INVERTS MUST BE VERIFIED PRIOR TO CONSTRUCTION AND IF ANY DISCREPANCIES EXIST, CONTRACTOR IS TO NOTIFY THE ENGINEER
2 THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL UTILITIES DURING CONSTRUCTION GAS, HYDRO, TELEPHONE OR ANY OTHER UTILITIES THAT MAY EXIST ON THE SITE OR WITHIN THE STREETLINES MUST BE LOCATED BY ITS OWN UTILITIES AND VERIFIED PRIOR TO CONSTRUCTION
3 AT ALL ENTRANCES TO THE SITE THE MUNICIPAL CURB AND SIDEWALK WILL BE CONTINUOUS THROUGH THE DRIVEWAY THE DRIVEWAY GRADE WILL BE COMPATIBLE WITH THE EXISTING OR FUTURE SIDEWALK AND CURB DEPRESSION WILL BE PROVIDED FOR EACH ENTRANCE.
4. SIDEWALKS DEPTHS TO BE INCREASED TO MINIMUM 180mm DEPTH FOR DRIVEWAYS
5. TOPSOIL IN FILL AREA TO BE STRIPPED AND CLEAN FILL TO BE PLACED AND COMPACTED TO 95% STANDARD PROCTOR DENSITY.
6. ALL GRADES TO BE WITHIN 33% MAXIMUM SLOPE AT PROPERTY LINE AND WITHIN THE SITE.
7. SPREAD PATTERN OF EXTERIOR LIGHTING SHALL NOT INFRINGE ON THE ADJACENT PROPERTY.
8. ALL UNDERGROUND SERVICE MATERIALS AND INSTALLATIONS TO BE IN ACCORDANCE WITH THE LATEST LOCAL MUNICIPALITY STANDARDS AND CODES, AND O B C
9. THE BUILDING SITED ON THIS PLAN HAS BEEN DESIGNED UTILIZING CONTROLLED FLOW ROOF DRAINS IN ACCORDANCE WITH LOCAL MUNICIPAL STANDARDS
10. ALL SURFACE DRAINAGE SHALL BE SELF CONTAINED, COLLECTED AND DISCHARGED AT A LOCATION TO BE APPROVED PRIOR TO THE ISSUANCE OF A BUILDING PERMIT.
11. CONTINUOUS CONCRETE CURB BETWEEN LANDSCAPE AREAS AND ASPHALT PAVING

## FIRE DEPARTMENT

1. FIRE ROUTE WILL BE DESIGNATED AS PER CITY OF MISSISSAUGA BYLAW (1036-81) AS AMENDED PRIOR TO OCCUPANCY OF THE BUILDINGS.
2. FIRE ROUTES TO BE DESIGNED TO WITH STAND A LOAD NOT LESS THAN 11,383Kg PER AXLE AND HAVE A CHANGE IN GRADIENT OF NOT MORE THAN 1 IN 12 5 OVER A DISTANCE 15 0m AS PER BY LAW 1036-81.
3 ALL 12 0m TURNING RADII HAVE MIN CLEARANCE OF 3.0m BETWEEN THE CENTRE LINE OF TURNING RADII AND ANY CURB OR PART OF BUILDING.
4. PRIVATE FIRE HYDRANTS SHALL BE FLOW TESTED AND COLOUR CODED IN CONFORMANCE WITH THE REGION OF PEEL "UNIFORM MARKING OF HYDRANTS".

## STORM SEWERS

1. ALL STORM SEWER MATERIALS AND CONSTRUCTION METHODS MUST CORRESPOND TO CURRENT MUNICIPAL STANDARDS & SPECIFICATIONS.
2. BEDDING TO BE TYPE 'B' AS PER **C.M. STD. 2112.080**, UNLESS OTHERWISE NOTED.
   A) SEWER BEDDING AND COVER MATERIAL SHALL CONFORM TO **C.M. STDS. 2112.09 AND 2112.100**, UNLESS OTHERWISE NOTED.
   B) IF WATER IS PRESENT IN THE TRENCH EXCAVATION, THEN 19mm CLEAR STONE OR 6mm WASHED CRUSHED GRAVEL IS TO BE USED FOR BEDDING IN ACCORDANCE WITH **C.M. STDS. 2112.110 AND 2112.14**, RESPECTIVELY.
   C) WHERE WET OR SOFT TRENCH SUBGRADE CONDITIONS ARE ENCOUNTERED, FURTHER ON-SITE GEOTECHNICAL ASSESSMENT MAY BE REQUIRED TO DETERMINE APPROPRIATE BEDDING IN ORDER TO STABILIZE THE SUBGRADE FOR SEWER CONSTRUCTION
3 STORM SEWERS AND CONNECTIONS 150dia AND SMALLER TO BE CONCRETE CL 3, OR PVC SDR-28 PIPE, UNLESS OTHERWISE LISTED.
4. STORM SEWERS AND CONNECTIONS 200dia AND LARGER TO BE CONCRETE CL 3, CONCRETE CL 65-D, PVC SDR 35, ULTRA-RIB PVC WITH TYPE 'B' BEDDING THROUGHOUT EXCEPT AT RISERS, UNLESS OTHERWISE NOTED.
5. ALL STREET CATCHBASINS TO BE **OPSD. 705.010**, UNLESS OTHERWISE NOTED AND ALL LANDSCAPED AREA CATCHBASINS TO BE **C.M. STD. 2114.010**.
6. ALL MANHOLES OR CATCHBASIN MANHOLES TO BE **OPSD. 701.010**, UNLESS OTHERWISE NOTED.
7. ALL CATCHBASIN FRAME AND GRATES SHALL BE AS PER **OPSD. 400.02**.
8. CATCHBASIN LEADS TO BE: SINGLE - 250dia, DOUBLE - 300dia UNLESS OTHERWISE NOTED.

## SANITARY SEWERS

1. ALL SANITARY SEWER MATERIALS AND CONSTRUCTION METHODS MUST CORRESPOND TO CURRENT REGION OF PEEL STD & SPEC.
2. SANITARY CONNECTIONS 150dia. AND LESS TO BE PVC SDR-28.
3. SANITARY SEWERS AND CONNECTIONS 200dia AND LARGER TO BE PVC SDR-35 ASTM D3034-81 WITH TYPE 'B' BEDDING THROUGHOUT EXCEPT AT RISERS, UNLESS OTHERWISE NOTED.
4. ALL MANHOLES TO BE **R.P. STD 2-1-1**, UNLESS OTHERWISE NOTED.

## WATERMAINS

1. ALL WATERMAINS AND WATER SERVICE MATERIALS AND CONSTRUCTION METHODS MUST CORRESPOND TO CURRENT R P. STD & SPEC
2 WATERMAIN MUST HAVE A MIN. VERTICAL CLEARANCE OF 0 15m OVER OR 0 30m UNDER SEWERS AND ALL OTHER UTILITIES WHEN CROSSING.
3. WATERMAINS AND/OR WATER SERVICES ARE TO HAVE A MIN. DEPTH OF 1 7m WITH A MIN. HORIZONTAL SPACING OF 1 2m FROM THEMSELVES AND OTHER UTILITIES.
4. WATERMAINS TO BE INSTALLED TO GRADE AS SHOWN ON APPROVED SITE PLAN. COPY OF GRADE SHEET MUST BE SUPPLIED TO INSPECTOR PRIOR TO COMMENCEMENT OF WORK WHERE REQUESTED BY INSPECTOR.
5. WATERMAIN AND WATER SERVICE MATERIALS 100dia UP TO AND INCLUDING 300dia TO BE P.V.C. CLASS 150 TO AWWA SPEC C900-75, COPPER TYPE 'K' FOR 50dia. AND SMALLER.
6. PROVISIONS FOR FLUSHING THE LINES PRIOR TO TESTING ETC MUST BE PROVIDED WITH AT LEAST A 50dia OUTLET ON 100dia AND LARGER LINES, COPPER LINES ARE TO HAVE FLUSHING POINTS AT THE END SAME SIZE AS THE LINES. THEY MUST ALSO BE HOSED OR PIPED TO ALLOW THE WATER TO DRAIN ONTO A PARKING LOT OR DOWN THE DRAIN ON FIRE LINES, FLUSHING OUTLET TO BE 100dia OR A HYDRANT.
7. DUCTILE IRON WATERMAIN FITTING TO BE CEMENT LINED TO AWWA SPEC C-110-77.
8. THRUST BLOCKS MUST BE INSTALLED ON ALL BENDS, TEES AND REDUCERS
9. ALL CURB STOPS TO BE 3 0m OFF THE FACE OF THE BUILDING UNLESS OTHERWISE NOTED.
10 HYDRANT AND VALVE SET TO **R.P. STD. 1-6-1**.
11. ALL HYDRANTS ARE TO HAVE PUMPER NOZZLE OUTLET.
12. ALL PROPOSED WATER PIPING MUST BE ISOLATED FROM EXISTING LINES IN ORDER TO ALLOW INDEPENDENT PRESSURE TESTING AND CHLORINATING FROM EXISTING SYSTEMS

I HEREBY CERTIFY THAT THE PROPOSED GRADING & APPURTENANCE DRAINAGE WORKS COMPLY WITH SOUND ENGINEERING DESIGN AND THAT THE PROPOSED GRADING IS IN CONFORMITY WITH THOSE OF THE ADJACENT LANDS FOR DRAINAGE & RELATIVE ELEVATION.

OCT 1 4 2003
DATE

LICENSED PROFESSIONAL ENGINEER
M. JOZWIK
OCT. 14/03
PROVINCE OF ONTARIO

## BENCH MARK

No.:791 ELEVATION: 173.395

DESCRIPTION: ON THE N. FACE AT THE E. CORNER OF EASTERLY END OF CONCRETE POST OF CONCRETE BRIDGE ON S. SIDE OF DERRY ROAD, 350' E OF DIXIE ROAD.

SKIRA & ASSOCIATES LTD.
CONSULTING ENGINEERS
3464 Semenyk Court, Suite 100, Mississauga, Ontario L5C 4P8
Tel. (905) 276-5100 Fax. (905) 270-1936 Email - info@skiraconsult.ca

A. BALDASSARRA
Architect Inc.
7800 Jane Street, Suite 200
Concord, Ontario L4K 4R6
Tel: (905) 660-0722
Fax: (905) 660-7019

# PROPOSED MANUFACTURING FACILITY AND OFFICES

LOT 11 AND LOT 12, REG. PLAN 43M-805

**1840 ALSTEP DRIVE**

## STEELGATE SECURITY PRODUCTS LTD.

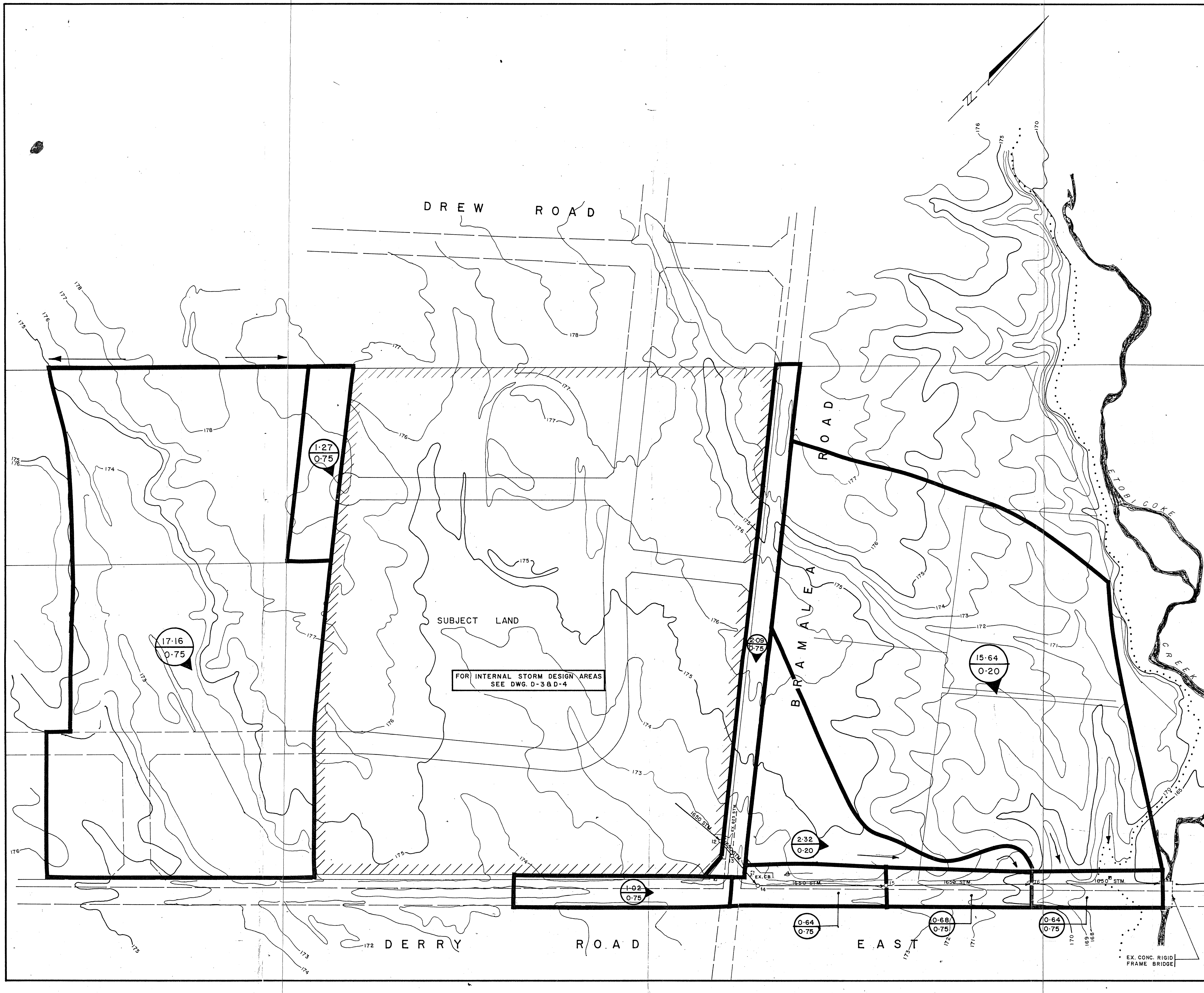
7895 TRANMERE DRIVE, UNIT 214, MISSISSAUGA, ONTARIO, L5S 1K4 TEL. (905) 405-0479

MISSISSAUGA

# SITE GRADING AND SERVICING PLAN

REGION FILE:

| | | |
|---|---|---|
| DATE: JULY. 2003 | AREA: Z-42 | DWG.No. 202-M98 |
| SCALE: 1:300 | DRAWN BY: G.G. | |




| REVISIONS | | |
|---|---|---|
| DATE | DETAILS | INIT. |

SUBMISSIONS 1st ___ 2nd ___ PRE-SERV. ___

DATE 5/7/81 INTERIM ___ FINAL ✓

REGISTERED PROFESSIONAL ENGINEER K. BUDHDEV PROVINCE OF ONTARIO

DESIGNED ___ APPROVED ___

CHK'D. ___

R. E. WINTER & ASSOCIATES LTD.
CONSULTING ENGINEERS
77 CITY CENTRE DRIVE MISSISSAUGA L5B 1M5. 270-0110

# H & R INDUSTRIAL ESTATES PHASE ONE

REGION No. T-79088 CITY FILE No. 16 III 80202

CITY OF MISSISSAUGA
REGIONAL MUNICIPALITY OF PEEL
ENGINEERING DEPARTMENT

## EXTERNAL DRAINAGE AREA

| | | |
|---|---|---|
| METRIC SCALE 1:2000 | AREA Z-50 | R.E.W.A.L. 7324X2 |
| DRAWN S.KEESARI | CHK'D. Y. K.W. | PLAN No. |
| DATE JUNE.1981 | SHEET 1 OF 1 | |

DWG. No. D-5

SUBDIVISION [illegible] INDUSTRIAL SUB.

CONSULTANT R.E. WINTER & ASSOCIATES LTD.

DRAINAGE AREA PLAN Nº 2-50

# CITY OF MISSISSAUGA

## STORM SEWER DESIGN CHART

REVISED: JULY, 81

SHEET Nº 1 OF

PROJECT Nº 7324X2 n: 0.013

DESIGNED BY YKW DATE MAY/81

| LOCATION | FROM M.H. | TO M.H. | AREA (ha) | RUNOFF COEFF | A x R | ACCUM A x R | T. OF C (minutes) | INTENSITY (mm./hr.) | EXPECTED FLOW (c.m.s.) | INVERT ELEVATION UPPER M.H. | INVERT ELEVATION LOWER M.H. | FALL (meters) | LENGTH (meters) | GRADIENT % | PIPE SIZE (mm) | CAPACITY (c.m.s.) | VELOCITY (m.p.s.) | TIME OF FLOW (minutes) | DROP IN M.H. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (EXTERNAL) | | 1.27 | 0.75 | 0.95 | | | | | | | | | | | | | | |
| GAGE COURT | 2 | 3 | 5.36 | 0.75 | 4.02 | 4.97 | 15.0 | 100 | 1.381 | 172.255 | 171.320 | 0.935 | 170 | 0.55 | 900 | 1.40 | 2.13 | 1.3 | 0.15 |
| " | 3 | 4 | 1.86 | " | 1.41 | 6.38 | 16.3 | 96 | 1.701 | 171.170 | 170.570 | 0.60 | 150 | 0.40 | 1050 | 1.80 | 2.02 | 1.0 | 0.04 |
| | | | | | | | (17.3) | | | | | | | | | | | | |
| TRANMERE DR | 1 | 4 | 3.33 | 0.75 | 2.498 | 2.498 | 15.0 | 100 | 0.694 | 172.850 | 171.290 | 1.56 | 120 | 1.30 | 600 | 0.72 | 2.46 | 0.8 | 0.75 |
| " | 4 | 6 | 0.44 | " | 0.330 | 9.208 | 17.3 | 93 | 2.379 | 170.530 | 169.911 | 0.619 | 82.5 | 0.75 | 1050 | 2.45 | 2.76 | 0.5 | 0.24 |
| | | | | | | | (17.8) | | | | | | | | | | | | |
| BOYLEN RD. | 5 | 6 | 1.35 | 0.75 | 1.013 | 1.013 | 15.0 | 100 | 0.281 | 172.107 | 170.575 | 1.530 | 90 | 1.70 | 450 | 0.40 | 2.35 | 0.6 | 0.899 |
| TRANMERE DR | 6 | 7 | 4.32 | 0.75 | 3.24 | 13.461 | 17.8 | 91 | 3.403 | 169.671 | 168.991 | 0.68 | 170 | 0.40 | 1350 | 3.51 | 2.36 | 1.2 | 0.03 |
| " | 7 | 11 | – | | – | 13.461 | 19.0 | 88 | 3.290 | 168.961 | 168.773 | 0.186 | 47 | 0.40 | 1350 | 3.51 | 2.36 | [illegible] | 0.46 |
| | | | | | | | (19.3) | | | | | | | | | | | | |
| | | | | FROM | UPPER | END TO | STORM | M.H. #8 = 1750' ÷ 530 M. | | | | | | | | | | | |
| | | | | ∴ | Tc = 15 | + (530 | -50)/2 | x60 = | 19.0 MIN. | | | | | | | | | | |
| | (EXTERNAL) | | 17.16 | 0.75 | 12.87 | | | | | | | | | | | | | | |
| TRANMERE DR. | 8 | 9 | 4.05 | " | 3.038 | 15.908 | 19.0 | 88 | 3.889 | 170.508 | 169.785 | 0.723 | 130 | 0.55 | 1350 | 4.13 | 2.71 | 0.8 | 0.150 |
| " | 9 | 10 | 3.78 | " | 2.835 | 18.743 | 19.8 | 85 | 4.425 | 169.635 | 168.955 | 0.68 | 170 | 0.40 | 1500 | 4.66 | [illegible] | 1.1 | 0.10 |
| " | 10 | 11 | 0.66 | " | 0.495 | 19.238 | 20.9 | 83 | 4.435 | 168.855 | 168.685 | 0.17 | 42.5 | 0.40 | 1500 | 4.66 | [illegible] | 0.3 | 0.372 |
| EA[illegible] | 11 | 12 | 2.90 | " | 2.175 | 34.874 | 21.2 | 82 | 7.944 | 168.313 | 167.048 | 1.265 | 171 | 0.74 | 1650 | 8.17 | 3.7[illegible] | 0.8 | 0.155 |
| " | 12 | 13 | 1.02 | " | 0.765 | 35.639 | 22.0 | 80 | 7.920 | 166.885 | 166.665 | 0.220 | 29 | 0.76 | 1650 | 8.39 | 3.73 | 0.1 | [illegible] |
| 2.09+0.64=2.73 | 13 | 14 | 2.73 | " | 2.048 | 37.687 | 22.1 | 79 | 8.270 | 166.635 | 166.331 | 0.304 | 40 | " | " | " | " | 0.2 | 0.166 |
| DERRY RD. E | 14 | 15 | – | – | – | 37.687 | 22.3 | 78 | 8.166 | 166.165 | 164.942 | 1.216 | 160 | " | " | " | " | 0.7 | 0 |
| " | 15 | 16 | 2.32<br>0.68 | 0.20<br>0.75 | 0.464<br>0.510 | 38.661 | 23.0 | 77 | 8.269 | 164.942 | 163.657 | 1.292 | 170. | " | " | " | " | 0.8 | 0.03 |
| [illegible] | 16 | EX. B.C. | 15.64<br>0.64 | 0.20<br>0.75 | 3.128<br>0.48 | 42.269 | 23.8 | 74 | 8.689 | 163.451 | 162.313 | 1.176 | 140 | 0.84 | " | 8.72 | 3.9[illegible] | 0.7 | 0.236 |

# APPENDIX D

**Annual TSS loading calculated for Derry Road with MOE Table 6.3**

| ID | Area | Existing Condition | | Proposed Condition | | Comparison |
|---|---|---|---|---|---|---|
| | | Imperviousness (%) | Total TSS loading ($m^3yr$) | Imperviousness (%) | Total TSS loading ($m^3/yr$) | Increase in total TSS loading ($m^3/yr$) |
| Area 220 | 1.11 | 65.76 | 2.57 | 68.31 | 2.73 | 0.16 |
| Area 221 | 2.70 | 70.36 | 2.86 | 73.24 | 3.0 | 0.18 |

## STORMCEPTOR®
## ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

06/08/2021

| | |
|---|---|
| Province: | Ontario |
| City: | Mississauga |
| Nearest Rainfall Station: | TORONTO LESTER B. PEARSON INT'L AP |
| NCDC Rainfall Station Id: | 8733 |
| Years of Rainfall Data: | 44 |
| Site Name: | |
| Drainage Area (ha): | 0.22 |
| % Imperviousness: | 57.00 |

Runoff Coefficient 'c': 0.64

| | |
|---|---|
| Particle Size Distribution: | Fine |
| Target TSS Removal (%): | 80.0 |
| Required Water Quality Runoff Volume Capture (%): | 90.00 |
| Estimated Water Quality Flow Rate (L/s): | 5.26 |
| Oil / Fuel Spill Risk Site? | No |
| Upstream Flow Control? | No |
| Peak Conveyance (maximum) Flow Rate (L/s): | |
| Site Sediment Transport Rate (kg/ha/yr): | |

| | |
|---|---|
| Project Name: | EA_BOM |
| Project Number: | 18572 |
| Designer Name: | Jessy Zhang |
| Designer Company: | 81HJ |
| Designer Email: | Jessy.Zhang@exp.com |
| Designer Phone: | 905-793-9800 |
| EOR Name: | |
| EOR Company: | |
| EOR Email: | |
| EOR Phone: | |

**Net Annual Sediment (TSS) Load Reduction Sizing Summary**

| Stormceptor Model | TSS Removal Provided (%) |
|---|---|
| EF4 | 87 |
| EF6 | 91 |
| EF8 | 92 |
| EF10 | 92 |
| EF12 | 93 |

| | |
|---|---|
| **Recommended Stormceptor EF Model:** | **EF4** |
| **Estimated Net Annual Sediment (TSS) Load Reduction (%):** | **87** |
| **Water Quality Runoff Volume Capture (%):** | **> 90** |

## 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)

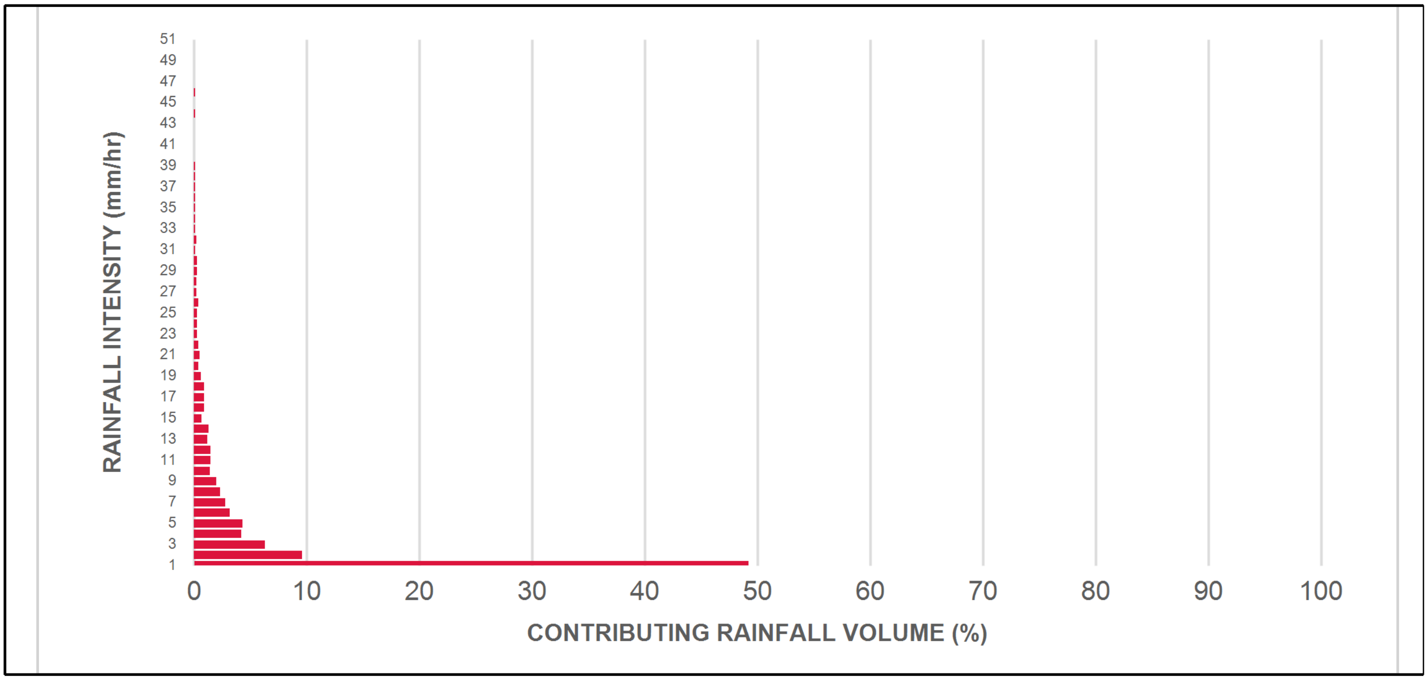
►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a 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 |

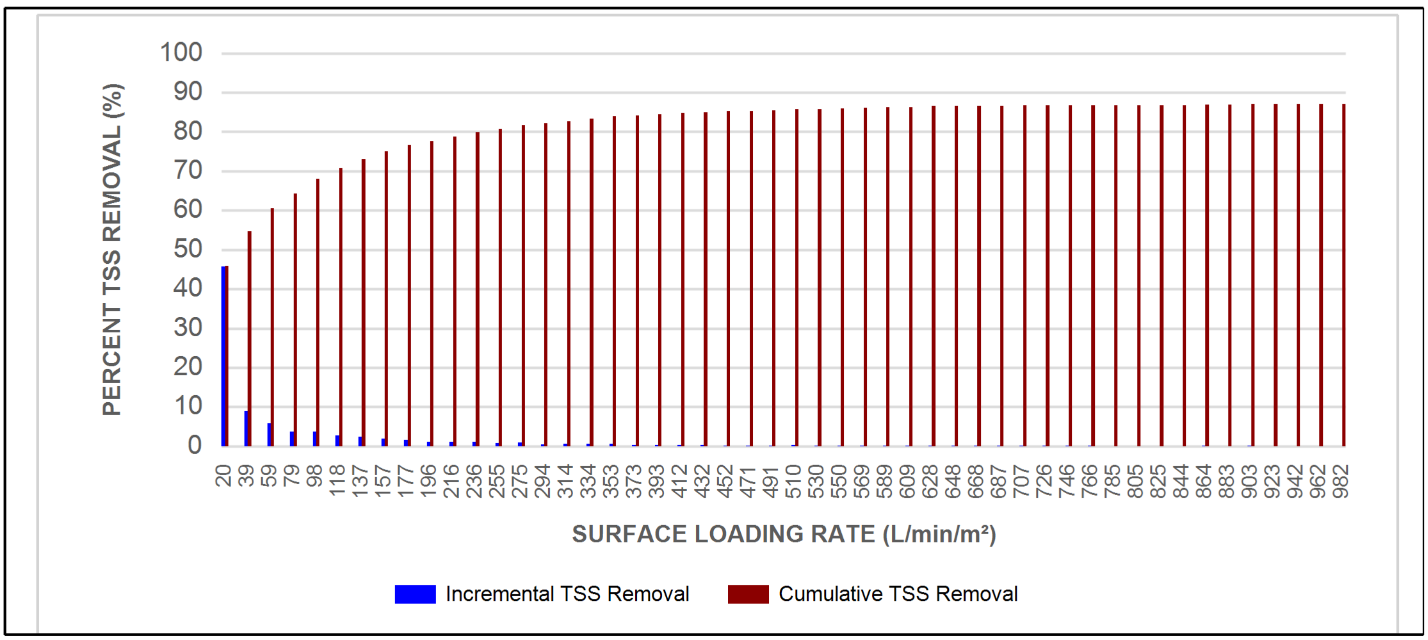
| Rainfall Intensity (mm / hr) | Percent Rainfall Volume (%) | Cumulative Rainfall Volume (%) | Flow Rate (L/s) | Flow Rate (L/min) | Surface Loading Rate (L/min/m²) | Removal Efficiency (%) | Incremental Removal (%) | Cumulative Removal (%) |
|---|---|---|---|---|---|---|---|---|
| 1 | 49.2 | 49.2 | 0.39 | 24.0 | 20.0 | 93 | 45.8 | 45.8 |
| 2 | 9.6 | 58.8 | 0.79 | 47.0 | 39.0 | 93 | 8.9 | 54.7 |
| 3 | 6.3 | 65.1 | 1.18 | 71.0 | 59.0 | 92 | 5.8 | 60.5 |
| 4 | 4.2 | 69.3 | 1.57 | 94.0 | 79.0 | 90 | 3.8 | 64.3 |
| 5 | 4.3 | 73.6 | 1.96 | 118.0 | 98.0 | 88 | 3.8 | 68.0 |
| 6 | 3.2 | 76.8 | 2.36 | 141.0 | 118.0 | 86 | 2.7 | 70.8 |
| 7 | 2.8 | 79.6 | 2.75 | 165.0 | 137.0 | 84 | 2.3 | 73.1 |
| 8 | 2.3 | 81.9 | 3.14 | 188.0 | 157.0 | 81 | 1.9 | 75.0 |
| 9 | 2.0 | 83.9 | 3.53 | 212.0 | 177.0 | 79 | 1.6 | 76.6 |
| 10 | 1.4 | 85.3 | 3.93 | 236.0 | 196.0 | 77 | 1.1 | 77.7 |
| 11 | 1.5 | 86.8 | 4.32 | 259.0 | 216.0 | 75 | 1.1 | 78.8 |
| 12 | 1.5 | 88.3 | 4.71 | 283.0 | 236.0 | 73 | 1.1 | 79.9 |
| 13 | 1.2 | 89.5 | 5.10 | 306.0 | 255.0 | 72 | 0.9 | 80.7 |
| 14 | 1.3 | 90.8 | 5.50 | 330.0 | 275.0 | 70 | 0.9 | 81.7 |
| 15 | 0.7 | 91.5 | 5.89 | 353.0 | 294.0 | 68 | 0.5 | 82.1 |
| 16 | 0.9 | 92.4 | 6.28 | 377.0 | 314.0 | 66 | 0.6 | 82.7 |
| 17 | 0.9 | 93.3 | 6.68 | 401.0 | 334.0 | 64 | 0.6 | 83.3 |
| 18 | 0.9 | 94.2 | 7.07 | 424.0 | 353.0 | 63 | 0.6 | 83.9 |
| 19 | 0.6 | 94.8 | 7.46 | 448.0 | 373.0 | 61 | 0.4 | 84.2 |
| 20 | 0.4 | 95.2 | 7.85 | 471.0 | 393.0 | 59 | 0.2 | 84.5 |
| 21 | 0.5 | 95.7 | 8.25 | 495.0 | 412.0 | 58 | 0.3 | 84.8 |
| 22 | 0.4 | 96.1 | 8.64 | 518.0 | 432.0 | 58 | 0.2 | 85.0 |
| 23 | 0.3 | 96.4 | 9.03 | 542.0 | 452.0 | 58 | 0.2 | 85.2 |
| 24 | 0.3 | 96.7 | 9.42 | 565.0 | 471.0 | 57 | 0.2 | 85.3 |
| 25 | 0.3 | 97.0 | 9.82 | 589.0 | 491.0 | 57 | 0.2 | 85.5 |

| 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 | 0.4 | 97.4 | 10.21 | 613.0 | 510.0 | 57 | 0.2 | 85.7 |
| 27 | 0.2 | 97.6 | 10.60 | 636.0 | 530.0 | 57 | 0.1 | 85.8 |
| 28 | 0.2 | 97.8 | 10.99 | 660.0 | 550.0 | 57 | 0.1 | 86.0 |
| 29 | 0.3 | 98.1 | 11.39 | 683.0 | 569.0 | 56 | 0.2 | 86.1 |
| 30 | 0.3 | 98.4 | 11.78 | 707.0 | 589.0 | 56 | 0.2 | 86.3 |
| 31 | 0.1 | 98.5 | 12.17 | 730.0 | 609.0 | 56 | 0.1 | 86.3 |
| 32 | 0.2 | 98.7 | 12.56 | 754.0 | 628.0 | 56 | 0.1 | 86.5 |
| 33 | 0.1 | 98.8 | 12.96 | 777.0 | 648.0 | 56 | 0.1 | 86.5 |
| 34 | 0.1 | 98.9 | 13.35 | 801.0 | 668.0 | 56 | 0.1 | 86.6 |
| 35 | 0.1 | 99.0 | 13.74 | 825.0 | 687.0 | 56 | 0.1 | 86.6 |
| 36 | 0.1 | 99.1 | 14.14 | 848.0 | 707.0 | 56 | 0.1 | 86.7 |
| 37 | 0.1 | 99.2 | 14.53 | 872.0 | 726.0 | 55 | 0.1 | 86.7 |
| 38 | 0.1 | 99.3 | 14.92 | 895.0 | 746.0 | 55 | 0.1 | 86.8 |
| 39 | 0.1 | 99.4 | 15.31 | 919.0 | 766.0 | 55 | 0.1 | 86.8 |
| 40 | 0.0 | 99.4 | 15.71 | 942.0 | 785.0 | 55 | 0.0 | 86.8 |
| 41 | 0.0 | 99.4 | 16.10 | 966.0 | 805.0 | 55 | 0.0 | 86.8 |
| 42 | 0.0 | 99.4 | 16.49 | 989.0 | 825.0 | 55 | 0.0 | 86.8 |
| 43 | 0.0 | 99.4 | 16.88 | 1013.0 | 844.0 | 55 | 0.0 | 86.8 |
| 44 | 0.1 | 99.5 | 17.28 | 1037.0 | 864.0 | 55 | 0.1 | 86.9 |
| 45 | 0.0 | 99.5 | 17.67 | 1060.0 | 883.0 | 55 | 0.0 | 86.9 |
| 46 | 0.1 | 99.6 | 18.06 | 1084.0 | 903.0 | 55 | 0.1 | 87.0 |
| 47 | 0.0 | 99.6 | 18.45 | 1107.0 | 923.0 | 54 | 0.0 | 87.0 |
| 48 | 0.0 | 99.6 | 18.85 | 1131.0 | 942.0 | 54 | 0.0 | 87.0 |
| 49 | 0.0 | 99.6 | 19.24 | 1154.0 | 962.0 | 54 | 0.0 | 87.0 |
| 50 | 0.0 | 99.6 | 19.63 | 1178.0 | 982.0 | 54 | 0.0 | 87.0 |
| **Estimated Net Annual Sediment (TSS) Load Reduction =** | | | | | | | | **87 %** |

RAINFALL DATA FROM TORONTO LESTER B. PEARSON INT'L 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 |
| EF6 / EFO6 | 1.8 | 6 | 90 | 914 | 36 | 914 | 36 | 990 | 35 |
| EF8 / EFO8 | 2.4 | 8 | 90 | 1219 | 48 | 1219 | 48 | 1700 | 60 |
| EF10 / EFO10 | 3.0 | 10 | 90 | 1828 | 72 | 1828 | 72 | 2830 | 100 |
| EF12 / EFO12 | 3.6 | 12 | 90 | 1828 | 72 | 1828 | 72 | 2830 | 100 |

## SCOUR PREVENTION AND ONLINE CONFIGURATION

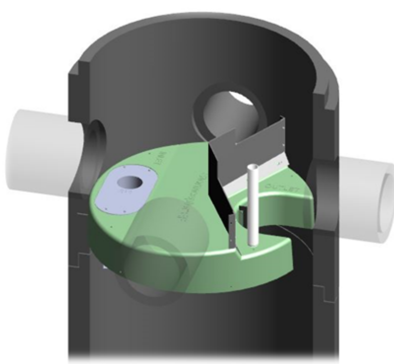
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

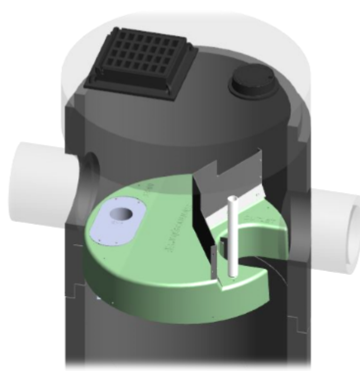
## DESIGN FLEXIBILITY

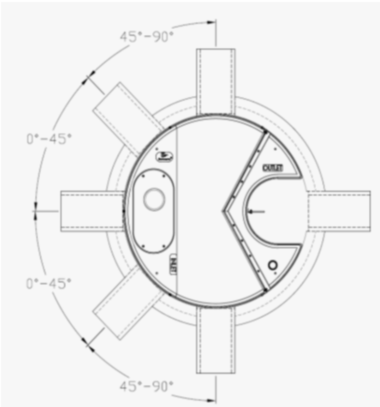
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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

## OIL CAPTURE AND RETENTION

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








**INLET-TO-OUTLET DROP**

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

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

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

**HEAD LOSS**

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

**Pollutant Capacity**

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

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

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

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

**STANDARD STORMCEPTOR EF/EFO DRAWINGS**

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

**STANDARD STORMCEPTOR EF/EFO SPECIFICATION**

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

## STANDARD PERFORMANCE SPECIFICATION FOR “OIL GRIT SEPARATOR” (OGS) STORMWATER QUALITY TREATMENT DEVICE

**PART 1 – GENERAL**

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

**PART 2 – PRODUCTS**

2.1 OGS POLLUTANT STORAGE

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

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

**PART 3 – PERFORMANCE & DESIGN**

3.1 GENERAL

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

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing 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/$m^2$.