NYX Capital Corp.

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT BRIEF

51-57 Tannery Street and 208 Emby Drive
City of Mississauga

August 2020
18038

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1 INTRODUCTION

1.1 SCOPE OF THE SWM AND SERVICING REPORT

LEA Consulting Ltd has been retained by NYX Capital Corp. to prepare a Servicing and Stormwater Management Report for a residential development project at 51-57 Tannery Street and 208 Emby Drive in the City of Mississauga. This stormwater management and servicing report shall:

- Examine the potential water quality and quantity impacts of the proposed townhouses and summarize how each will be addressed in accordance with the City of Mississauga and Credit Valley Conservation (CVC) stormwater management requirements.
- Review the existing water supply, storm, and sanitary services, and propose a site servicing plan.

1.1 SITE LOCATION

The proposed development site is located at the southeast quadrant of Tannery Street and Canadian Pacific Railway (CPR) and bounded by Tannery Street to the north, Canadian Pacific Railway (CPR) to the east, existing industrial building to the south and Mullet Creek to the west, contributory to Credit River watershed (or sub-watershed #4, Mullet Creek) under the jurisdiction of Credit Valley Conservation (CVC). Site access is via Tannery Street or Emby Drive.

The site is approximately 1.8 ha in area in total.

1.2 STORMWATER MANAGEMENT PLAN OBJECTIVES

The objective of the stormwater management plan is to review the stormwater environment impact by the proposed residential development and address the City's requirements for stormwater quantity control and quality control as required.

1.3 SWM DESIGN CRITERIA – CREDIT VALLEY CONSERVATION AUTHORITY

Credit Valley Conservation Authority (CVC), in partnership with the Toronto and Region Conservation Authority, has issued the Storm Water Management Criteria (August 2012) to provide direction on how to manage rainfall and runoff inside CVC's jurisdiction. A summary of the stormwater management criteria applied for this project is provided below:

- Storm Water Quality Control: Mullet Creek is classified as requiring an Enhanced level of protection (80% TSS removal) by CVC quality control criteria.
- Water Quantity Control: post-development to pre-development control for all storm events from 2-year to 100-year and Regional storm is required by CVC within Mullet Creek Sub-watershed. Flows into the City's storm sewers must be controlled to the existing conditions 10-year storm event.
- Water Balance Control – Maintain pre-development groundwater recharge rates and appropriate distribution ensuring the protection of related hydrologic and ecologic functions.
- Erosion Control – On-site detention of 5mm within Mullet Creek sub-watershed.

2 EXISTING CONDITIONS

2.1 GENERAL

The site is currently occupied by four single-family houses, two industrial buildings, 0.50 ha of green spaces, and 0.56 ha of paved parking areas.

Under the existing condition, the majority area of the site generally slopes from the east (CPR) to the west (Mullet Creek). During rainfall events, runoff drains by overland flow westerly within the development site and outlets to the Mullet Creek. Meanwhile, flow from the southeast area of the site drains southerly towards the existing Emby Drive.

Part of the land on the property is to be conveyed to the City for road widening at Tannery Street, and to the CVC at the west side (Mullet Creek) for environmental lands. The total drainage area after the conveyed land is 1.42 ha.

For the purpose of SWM analysis, the development site is considered as sub-catchment EXC1 based on existing drainage patterns.

The area and composite runoff coefficients of existing sub-catchment are illustrated in Table 1. Detailed calculations are provided in Appendix A.

TABLE 1: PRE-DEVELOPMENT RUNOFF COEFFICIENT

Sub-catchment No	Catchment Description	Catchment Area (ha)	Runoff Coefficient	Considered Runoff Coefficient
EXC1	Prop. Development Site	1.425	0.57	0.50

Figure 2 in Appendix G shows the existing catchment areas, storm flow discharge locations, overland flow routes and 2-yr and 100-yr flow based on the actual (existing) and City's criteria (0.5) runoff coefficient. Flow calculations are provided in Appendix A.

2.2 EXTERNAL DRAINAGE AREA

under existing condition, both minor and major flows from Pearl Street and Broadway Street (sub-catchment EC1), and part of CPR right-of-way (sub-catchment EC2) east of the site, discharge to the existing ditches along the railway and drain westerly across the track and subject site through 825mm CSP culverts, and finally outlet to Mullet Creek. The total drainage area is approximately 3.18 ha which has been considered as an external drainage area in storm flow calculations of the development site.

Based on our review of the topographic survey and site observation, there is no on-site stormwater management facility under the existing condition.

Figure 1 in Appendix G illustrates the existing storm drainage condition.

2.2 RAINFALL INFORMATION

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

$$I = A / (T_c + B)^{0.78}$$

Where; I = rainfall intensity in mm/hr,

T_c = time of concentration in minutes,

A, B = constant parameters (see below)

The parameters (A and B) recommended for use in the City of Mississauga are defined in City Standard Drawing No. 2111.010 and are summarized in Table 2.

TABLE 2: RAINFALL PARAMETERS

Return Period (Year)	2yr	5yr	10yr	25yr	50yr	100yr
A	610	820	1010	1160	1300	1450
B	4.6	4.6	4.6	4.6	4.7	4.9

An initial time of concentration, TC, of 15 minutes is recommended in the City's Development Requirements Manual.

2.3 PEAK FLOW RATES UNDER EXISTING CONDITION

Based on the existing site condition and rainfall parameters, the Rational Method is adopted to calculate peak flows at different design storm events up to 100-yr storm.

As required by CVC, the Regional Flood flow shall be considered in Stormwater quantity control. A 24-hour SCS type II distribution is modeled utilizing the Visual Otthymo V5.0 program to calculate the Regional flow for each sub-catchment.

The calculated peak flow rates for the site sub-catchment under pre-development condition are calculated based on the maximum runoff coefficient of 0.50 and summarized below in Table 3. Detailed calculations are provided on page A-04 of Appendices A.

TABLE 3: PRE-DEVELOPMENT PEAK FLOW RATES (L/s)

Sub-catchment No	Sub-Catchment	Return Period (Year)						
		2yr	5yr	10yr	25yr	50yr	100yr	Regional
EXC1	Prop. Development Site	118.5	159.30	196.21	255.35	251.55	278.37	200.0

3 POST-DEVELOPMENT CONDITIONS

3.1 GENERAL

The proposed development consists of 147 new condominiums in seven blocks with underground parking and a proposed extension on Emby Drive within the site between Tannery Street and southern property lint of the site. It is understood that Emby Drive Extension will be a municipal road. The proposed storm drainage pattern is designed as follows:

Sub-Catchment OC1 (Main Development Lands): this sub-catchment consists of six residential blocks, underground parking, amenity area, fire route, and landscape areas. Rainfall runoff from the proposed residential development will be captured by roof drains, area drains and catch basins and conveyed through storm sewers to the proposed concrete storm tank. The storm runoff collected from roof drains and area drains will be conveyed through the internal storm piping within the underground parking. A 364 m^3 storm tank is designed in the south of the development area outside of the underground parking level. The controlled flow from the storage tank will be discharged to the proposed storm sewer on the Emby Drive.

Sub-Catchment UC1: this sub-catchment consists of Emby Drive extension ROW, residential Building G which includes five proposed townhouses, proposed berm and the crash wall along the railway and proposed front areas of the buildings A to C. Rainfall runoff from a portion of building G, the proposed extension of Emby Drive and front areas of Building A to C will be collected by the proposed storm system on the Emby Drive, outlet to the municipal storm sewer on Thomas Street and ultimately discharge to Mullet Creek.

Sub-Catchment UC2: this sub-catchment consists of the grassed area at the back of the Building D to F. The rainfall runoff from this small green area will flow via the surface towards the Mullet Creek similar to the existing condition.

Since under post-development condition, it is not feasible to implement discharge control for sub-catchment UC1 and UC2, the discharge from proposed residential development or sub-catchment OC1 will be overcontrolled to satisfy the City's quantity control criteria.

Furthermore, the construction of Emby Drive extension and proposed development building and underground parking will block the Broadway Street and railway drainage outlet to the Mullet Creek. Therefore, all Minor and Major storm flow from that area will be diverted to the new storm sewers under Emby Drive.

Refer to Figure 2 in Appendix G for the proposed storm drainage condition.

The overland flow from proposed residential development and Emby Drive extension will discharge onto existing Emby Drive and outlets to the Thomas Street and Mullet Creek, as shown on Dwg. C100–Site Grading Plan in Appendix G.

3.2 PEAK FLOW RATES UNDER PROPOSED CONDITION

Based on the proposed site condition and rainfall parameters, the Rational Method is adopted to calculate peak flows for 2-yr to 100-yr design storm events. The Regional Flood flow is calculated based on the 24-hour SCS type II distribution using the Visual Otthymo V6.1 program.

Regarding Section 2 of the City of Mississauga Development Manual, September 2016, runoff coefficient adjustment factors should be considered for saturated soil conditions during larger, less frequent storm events. The runoff coefficient adjustment factors are presented below in Table 4.

TABLE 4: RUNOFF COEFFICIENT ADJACENT FACTORS

Return Period (Year)	Adjustment Factor
10yr	1.00
25yr	1.10
50yr	1.20
100yr	1.25

The calculated peak flow rates for the three sub-catchment OC1, UC1, and UC2 under the post-development condition are calculated by considering the adjustment factors and summarized below in Table 5. Detailed calculations are provided on page A-05of Appendices A.

TABLE 5: POST-DEVELOPMENT PEAK FLOW RATES (L/s)

Sub-catchment No	Sub-Catchment	Return Period (Year)						
		2yr	5yr	10yr	25yr	50yr	100yr	Regional
OC1	Prop. Residential Development	92.96	124.96	153.91	194.45	236.79	272.96	107.0
UC1	Emby Extension and Building G	54.46	73.21	90.17	113.92	138.72	159.91	87.0
UC2	Back of the building D, E, and F	4.01	5.39	6.64	8.39	10.21	11.77	13.0

3.3 ALLOWABLE FLOW RATE

As mentioned in section 1.4, the proposed site is located within Mullet Creek sub-watershed and required to control post-development flow to pre-development level for 2yr to 100yr and the regional storm events based on the CVC stormwater management Criteria, 2012. Since the stormwater from residential development will be discharged to the municipal storm sewers under post-development condition, the allowable flow rate from the proposed development will be limited to the 10-year pre-development flow according to the City's storm sewers design criteria.

Furthermore, under post-development condition, it is not feasible to implement discharge control for sub-catchment UC1 and UC2. Therefore, the discharge from proposed residential development (sub-catchment OC1) will be overcontrolled to satisfy the City's quantity control criteria.

As a result, the allowable flow rate from proposed residential development or sub-catchment OC1 is estimated at 24.53 L/s. Detailed calculations are provided on page A-04 of Appendices A.

3.4 IMPACT ON WATER ENVIRONMENT

Based on the review and analysis for existing and proposed site conditions, Table 6 summarizes the key hydrologic parameters of the site under the proposed condition.

TABLE 6: KEY HYDROLOGIC PARAMETERS

Sub-Catchment Area	Imperviousness (%)		Runoff Coefficient		100-year Peak Flow Rate (L/s)	
	Pre-Dev	Post-Dev	Pre-Dev	Post-Dev	Pre-Dev	Post-Dev
Prop. Residential Development site	36.3	64.2	0.57	0.64	278.37	446.63*

*The calculated 100yr will be 355.7 L/s without considering the runoff coefficient adjustment factor.

As shown in Table 6 The imperviousness and runoff coefficient will be increased under post-development conditions. Therefore, mitigation measures will be required for a development site in accordance with the CVC's design criteria.

Provided that future Emby Drive extension will be a typical linear development with the limited right-of-way, there is no space for stormwater quality and quantity control measures, therefore, there will no SWM measures implemented within the right-of-way of Emby Drive Extension. The sub-catchment OC1 is overcontrolled to compensate for the required water quantity of Emby Drive extension.

4 PROPOSED SWM PLAN – SUB-CATCHMENT OC1

4.1 WATER BALANCE REQUIREMENT

Based on the water balance requirement, the first 5mm of runoff shall be retained on-site and managed by way of infiltration, evapotranspiration, or re-use. To satisfy the water balance criteria, an on-site storage volume of approximate 45.51 m^3 is required for the entire development site. Refer to page A-03 of Appendix A for calculations.

A large landscape area within the site and Emby Drive extension boulevard, are proposed to achieve the water balance requirements. The other potential method to address the water balance criteria is to reuse the retained Stormwater for Irrigation of trees and plants on the property.

The exact application and consumption rate will be determined at the next design stage in consultation with the project design team landscape designer and mechanical engineer. Based on the past project experiences, irrigation water alone is anticipated to satisfy the water balance requirement.

4.2 WATER QUANTITY CONTROL REQUIREMENT

According to the CVC's stormwater quantity control criteria – the post-development to pre-development peak flow control for all storms up to 100-yr and Regional storm should be provided.

As mentioned in section 3.3, since the stormwater from residential development will be discharged to the municipal storm sewers under post-development condition, all flow rates from the proposed development will be controlled to the 10-year pre-development flow according to the City's storm sewers design criteria.

Based on the post-development conditions, the required on-site stormwater storage volume for different design storm events is calculated as shown in pages A-06 to A-11 of Appendix A and summarized in Table 7 below.

TABLE 7: REQUIRED ON-SITE STORAGE VOLUMES (m^3)

Sub-Catchment No.	Sub-Catchment	2yr	5yr	10yr	25yr	50yr	100yr
C1	Prop. Residential Area	64.30	100.23	135.64	187.75	248.98	304.94

Based on the proposed site condition for sub-catchment OC1, a stormwater storage tank (18.4L x 5.5W x 3.6H), located in the south of the site and outside of the underground parking is proposed and provide a total storage volume of 364 m^3 for water balance and water quantity control. Refer to Dwg. C101–Site Servicing Plan in Appendix G for the tank location.

Since the invert of the tank is lower than the invert of the proposed storm sewer in the Emby Drive Extension, the pumping system will be required to discharge the allowable flow from tank to the proposed City's sewer. Related pump and flow rate control device will be determined and designed by the project design team mechanical engineer in the next design stage.

The proposed drainage system consists of roof drains, area drains and catch basins within the development is designed to be self-contained in the main development area of the site, and all storm runoff will not discharge into the adjacent properties.

Refer to Dwg.C-100 in Appendix G for a temporary ponding limit and overland flow route within the site.

4.3 WATER QUALITY CONTROL REQUIREMENT

In order to achieve the long-term average removal of 80% of Total Suspended Solids (TSS) on an annual basis from all runoff leaving the sub-catchment OC1, the following quality control measures will be provided:

Uncontrolled sub-Catchment UC1, UC2, and UC3

As mentioned in section 3.3, under post-development condition storm runoff from the Building G, front areas of building A, B, C and back areas of the buildings D, E, and F and Emby drive extension (sub-catchment UC1 and UC2) will be uncontrolled and directly discharged to the Tannery Street, Emby Drive and Mullet Creek. The total area of sub-catchment UC2 and the majority of sub-catchment UC1 will be covered by building roof and soft landscape. Therefore, the runoff from these areas except Emby Drive extension will be considered to be clean, and additional water quality treatment facility is not required.

Overcontrolled sub-Catchment OC1

Based on the SWM design criteria, the residential building's rooftop is not subjected to vehicular traffic, and the application of sand and de-icing salt constituents, petroleum hydrocarbons, and heavy metals. As such, runoff from the roof surface is generally considered to be clean.

There is a small opportunity for unclean runoff to be generated from this development since the site will be taken up in its majority of rooftops and landscape areas. Table 8 provides a preliminary estimate of the TSS removal level of stormwater leaving the sub-catchment OC1.

TABLE 8: TTS REMOVAL ASSESSMENT SUB-CATCHMENT OC1

Land Use	Area (m^2)	TSS Removal Efficiency (%)	Composite TSS Removal Efficiency (%)
Roof	4226	80	46.2
Paved Areas	1558	0.0	0.0
Landscape	1526	80	16.7
OGS	7310	50	50.0
Total	7310	-	>80.0

To achieve a TSS removal of 80%, a CDS stormwater quality treatment facility model "PMSU2015-4" is proposed. Sizing details are provided in Appendix A.

This quality treatment unit will be installed within the Driveway at downstream of the storage tank.

4.4 EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION

Details of the erosion and sedimentation control for the entire site during construction will be subject to the City's approval prior to issuance of Building Permit.

During site construction, it is recommended that all erosion and sediment control Best Management Practices (BMPs) shall be installed and maintained in accordance with the Credit Valley Conservation Authorities' (CVC CA's) Stormwater Management criteria (August 2012);

In Report, the measures below will be provided on-site during the entire period of construction:

- Sediment control measures to prevent silt entry at all the existing area drains and catch basins;
- Granular mud-mats at all construction ingress/egress locations;
- An inspection and monitoring program following the CVC CA's Stormwater Management criteria (August 2012).

The above and additional Erosion and Sediment Control measures are summarized in the following Table 9.

TABLE 9: EROSION AND SEDIMENT CONTROL MEASURES

Activity	Erosion Control Practice
Area Grading	- Construct and maintain entrance "mud-mat". - Construct and maintain silt fencing around the downstream and west side of the site. - Locate stockpiles away from sensitive areas.
Servicing and Asphalt Works	- Limit open trench lengths to minimize erosion potential of excavated material. - Prevent erosion of material stockpiles. - During work stoppages or inclement weather, plug ends of open sewers to prevent downstream sedimentation. - Protect catch basins inlets with filter cloth wrapping.
Maintenance	- Remove accumulated sediments when depth exceeds 0.30m. - Maintain and repair siltation control fencing as required. - Maintain and repair catch basin sediment controls as required.

5 PROPOSED STORM SEWER PLAN – SUB-CATCHMENT UC1

The proposed Emby Drive Extension will be a municipal road. Under the post-development condition, the rainfall runoff from sub-catchment C2 will be collected by the proposed storm system consists of proposed catch basins, manholes, and storm sewers on the Emby Drive discharged to the municipal storm sewer on Thomas Street and finally outlet to the Mullet Creek through a replaced outfall.

It is understood that under existing condition, the minor and major flow from Pearl Street, Broadway Street and a part of the CPR right-of-way discharge to the existing ditch on the east side of the railway, flows westerly across the railway through an 825mm CSP culvert then convey through another 825mm culvert within the development site. The total drainage area is approximately 3.19 ha. Since flow could not be conveyed through the site after the construction of the residential development, it will be captured by a proposed ditch inlet catch basin and diverted to the proposed storm sewer under Emby Drive extension.

In order to calculate the size of the proposed storm in Emby Drive extension and assess the adequacy of the existing storm pipe in Thomas Street (between Emby Drive and Mullet Creek outfall), a drainage area plan and design sheet are provided based on the survey and City's record drawings.

Refer to Fig 3 in Appendix G for the drainage area plan. The design sheet of the pipe size calculations is presented in Appendix C.

Based on the pipe size calculations, the last three legs of the existing 600mm storm pipe in Thomas Street must be upsized and replaced with 750mm and 900mm pipes to provide adequate capacity to convey the existing and additional flow to the Mullet Creek.

The existing outfall is located at the left bank of the Mullet Creek and 5m upstream of the existing bridge. The size of the outfall pipe is 600mm with an invert of 151.06m which is about 0.16m above the Creek bed. There are no existing erosion protection measures at the outlet or downstream of the outfall. The picture of the existing outfall is presented in Appendix C.

Since the storm flow and pipe size of the outfall will be increased under post-development conditions, the outfall should be replaced. The new outfall is proposed in the same location and the same invert with a standard headwall (OPSD 804.030) and Rip-Rap protection. The detail of the rip-rap will be provided based on the CVC requirements in the next design stage.

The overland flow analysis is provided for Emby Drive extension. Calculations show that the maximum water depth at the southern entrance of the site and Emby Drive and Thomas Street intersection would be 0.05m and 0.07m at the face of the curb respectively. That means 100-yr flow spread for Emby Drive extension would be 2.5 m (runoff coefficient adjustment factor is considered). Detail of the calculations is provided in Appendix D.

6 SITE SERVICING

The purpose of this site servicing study is to review the site servicing requirement of the proposed new residential development and propose a site servicing plan, including water, sanitary, and storm services. Refer to Dwg. C-101 - Site Servicing Plan for details of the proposed site service connections.

6.2 EXISTING MUNICIPAL SERVICES

The proposed development will require new service connections to the existing municipal sewers and watermains, located on Thomas Street, Emby Drive and Tannery Street adjacent to the site. Existing underground municipal sewers and watermain are summarized below:

Thomas Street

- 600mm dia. storm sewer;
- 300mm dia. watermain;
- 200mm dia. PVC sanitary sewer;

Emby Drive:

- 250mm dia. PVC sanitary sewer;
- 300mm dia. PVC storm sewer;
- 300mm dia. watermain;

Tannery Street:

- 300mm dia. watermain;
- 200mm dia. PVC sanitary sewer;
- 1050mm dia. concrete storm sewer;

Refer to Dwg. C-101 for existing municipal utilities.

6.3 PROPOSED MUNICIPAL SERVICES ON EMBY DRIVE EXTENSION

Based on City's design criteria, the following new municipal services will be provided:

- New storm drainage system: catch basins, manholes, and storm sewers to convey minor and major flow from pearl St. and Broadway St.,10-year design storm of the proposed Emby Drive extension and overcontrolled storm discharged flow from the proposed residential development;
- New water supply system: the proposed 300mm dia. PVC watermain, valves, and fire hydrants;
- The new extension of existing 200mm PVC Sanitary sewer on Emby Drive.
- New 200mm Sanitary line from Tannery Street to the proposed Emby Drive extension up to the back of the Building G.

6.4 PROPOSED SITE SERVICE CONNECTIONS

Due to the site constraints and location of the Building G, it is not feasible to provide shared services for the entire site. Therefore, individual service connections for each townhouse in Building G have been proposed while shared services are provided for all buildings A to F. Based on the project statistics provided by the architect and Region's design criteria, sanitary flow and water demand are estimated in Appendix E and summarized in Table 10. The storm flow discharge rate has been provided in Section 3.3 of this report.

TABLE 10: SITE SERVICING REQUIREMENT

Site	Storm Discharge Rate (L/s)	Sanitary Discharge Rate (L/s)	Water Demand (L/s)
Prop. Condominium Area (Building A to F)	24.53	13.19	185.82*
Building G	-	13.02	133.42

* A firewall within each of building A to F has been considered in fire demand calculations.

Fire flow is calculated based on building B that has the highest fire demand.

Through discussion with the design team, the locations and sizes of the proposed site service connections have been determined to satisfy the requirements of the City of Mississauga and the Ontario Building Code (OBC). In summary:

Building A to F

- Sanitary Service: The existing sanitary sewer on Emby Drive is extended northerly by 22.5m from existing manhole No.137 to proposed manhole No.2A. A 150mm dia. sanitary service connection will be installed to service the proposed Townhouse buildings and discharge to the proposed manhole No.2A on Emby Drive extension.
- Storm Service: A 300mm dia. storm service connection will be installed to discharge the allowable storm flow rate from the proposed control manhole 2 to the proposed 675mm concrete pipe on Emby Drive extension.
- Water service: The existing 300mm diameter water main on Emby Drive will be extended northerly and connected to the existing 300mm diameter water main on Tannery Street to provide a loop connection and service the proposed development site.
  - Domestic Water Service: A 100mm dia. domestic water service connection will be installed to service the proposed condominiums and connected to the proposed 150mm dia. fire protection water service with a cut-in Tee.
  - Fire Protection Service: A 150mm fire protection PVC water service will be installed and connected to the proposed 200mm watermain in Emby Drive extension with a cut-in Tee.

Building G

Proposed Building G will be located between Emby Drive extension and Tannery Street. Therefore, it can be considered as a separate site with individual service connections. Due to the proposed road widening, streetscape design, and the depth of the existing 200mm sanitary sewer in Tannery Street, it is not feasible to provide the sanitary connection from each townhouse to Tannery Street. Therefore, a proposed 200mm sanitary will be installed within the Emby Drive extension from Tannery Street to the back of the Building G.

The service connections for Building G include:

- Sanitary Service: A 150mm dia. sanitary service connection will be installed within the driveway for each townhouse to provide sanitary services.

- Water service: A 25mm dia. copper domestic water pipe will be installed within the driveway of each townhouse and connected to the proposed watermain on Emby Drive extension to provide water services.

Refer to Dwg. C-101 in Appendix G for details of proposed service connections.

6.5 ADEQUACY OF EXISTING MUNICIPAL SERVICES

The capacity of existing municipal water mains and sewers shall be reviewed based on the site servicing requirement, record drawings, and hydrant flow test data.

6.5.1 Adequacy of Existing Storm and Sanitary Sewers

Based on the design criteria and design records, assessment of existing 600mm storm sewer on Thomas Street and 250mm sanitary sewer on Emby Drive are reviewed below:

The full flow capacity of the existing 250mm sanitary sewers on the Emby Drive is estimated at 76 L/s based on Region's record drawing. Since the site service will be connected to the first leg of the sanitary sewer, it is anticipated to be adequate to accommodate the sanitary flow (13.19 L/s) from the proposed development.

As mentioned in Section 5, based on the City's record and proposed storm sewer pipe size design sheet, the existing 600mm storm sewer on Thomas Street, from Emby Drive to Mullet Creek (Ex. MH 1 to Outlet), will not be adequate to accommodate the storm flow rate of 1598.4 L/s from all sub-catchments including the development site, minor and major flow from Pearl Street and Broadway Street and storm flow from Thomas Street and the industrial area south of the development site. In order to provide adequate capacity for the post-development storm flow, the last three legs of storm sewer on Thomas Street will need to be upsized to 750 mm and 900 mm diameter concrete pipe. As a result of the storm sewer upgrade, the existing outfall at Mullet Creek will need to be replaced.

6.5.2 Adequacy of Existing Watermain

The proposed water demand is estimated as 185.82 L/s based on the project statistics for Building B with the highest fire demand and Building G because of the separate water service. In order to evaluate the adequacy of existing water supply, the existing 300mm watermain on Tannery Street and existing 300mm watermain on Thomas Street were tested on June 15, 2017, and May 10, 2019, by Focus Fire Protection. Tests results are included in Appendix F.

As shown by the test readings on Tannery street, the available water pressure ranges from 58 psi with a flow of 983.3 US GPM to 54 psi with a flow of 683.5 US GPM during the flow test with a static pressure of 62 psi. At the design water demand of 185.82 L/s (or 2945.22 US GPM) generated from building A to F and 133.42 L/s (or 2114.72 US GPM) generated from building G, the flow test results show a residual pressure of 28.6 psi, and 41.1 Psi respectively which are greater than the minimum requirement of 20 psi (150 kPa).

The test readings on Thomas street shows that the available water pressure ranges from 73 psi with a flow of 602.9 US GPM to 71 psi with a flow of 696.2 US GPM during the flow test with a static pressure of 75 psi. At the design water demand of 185.82 L/s (or 2945.22 US GPM) generated from building A to F and 133.42 L/s (or 2114.72 US GPM) generated from building G, the flow test results show a residual pressure of 18.2 psi, and 37.7 Psi respectively.

The proposed watermain along the Emby extension will loop the existing 300mm watermain on Thomas St. and the existing watermain on Tannery Street with 18.2 psi and 28.6 psi residual pressure respectively at the maximum design water demand of 185.82 L/s. Therefore, sufficient water pressure is expected for the proposed watermain along the Emby extension to service the proposed development, despite the slightly less than 20 psi residual pressure on Thomas Street.

Therefore, adequate water supply and pressure are available to serve the proposed development

7 CONCLUSIONS

Stormwater Management Plan – Sub-Catchment OC1

- Under the existing condition, there are no existing on-site stormwater management facilities.
- An on-site storage volume of approximate 45.5 m^3 will be provided for the proposed development site for retaining the first 5mm rainfall runoff as required to achieve the water balance target. This portion of water shall be reused on-site for irrigation. The consumption rate will be provided by the project team landscape designer in the next stage of design.
- A CDS stormwater quality treatment facility model "PMSU2015-4" with the proposed landscape within the development site will satisfy the City's 80% TSS removal.
- Detention storm storage volume of 305 m^3 will be required in order to control the post-development 100-year stormwater flows to 10-year pre-development level;
- A Stormwater storage tank outside the underground parking is proposed to provide a total storage volume of 364 m^3.

Stormwater Management Plan – Sub-Catchment UC1 and UC2

- Due to the constraints of available right-of-way, no SWM measures are proposed for Emby Drive extension. therefore, the discharging flow from sub-catchment OC1 will be overcontrolled to compensate for uncontrolled flow from sub-catchment UC1 and UC2.

Temporary Erosion & Sediment Control Measures

- Temporary erosion and sediment control measures will be provided before construction and maintained during construction in accordance with CVC CA's "Stormwater Management Criteria"

New Municipal Services for Emby Drive Extension

Based on City's design criteria, the following new municipal services will be provided:

- New storm drainage system: catch basins, manholes and storm sewers to convey 10-year design storm;
- New water supply: valves, fire hydrants, and 300mm dia. PVC watermain.

Site Servicing

Proposed site service connections for the proposed development site:

- Storm service: 300mm dia. PVC pipe;
- Sanitary service: 150mm dia. PVC pipe;

- Water service:
  - 100mm dia. PVC pipe for domestic water supply
  - 150mm dia. PVC pipe for fire water supply
- Individual 150mm dia. PVC pipe sanitary service and 25mm copper pipe water service for each unit of building G.

Prepared By:

LEA Consulting Ltd.

Farshid Morshedi

Water Resources Engineer

APPENDIX A

Stormwater Peak Flow and Storage Calculation
Sub-Catchment C1

LEA Consulting Ltd. Consulting Engineers and Planners	Land Use			
	Prepared:	F.M	Page No.	A-01
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT EXC1 & OC1** **City Of Mississauga**	Proj. #	18038		
	Date:	04-Aug-20		

EXISTING CONDITIONS:

Sub-Catchment EXC1

Existing Land Use	Area (m^2)
Building	3065.0
Asphalt	2101.0
Gravel	3473.0
Lawn & Tree	5606.0
Total Residential Development Area (C1):	**14245.0**

PROPOSED DEVELOPMENT:

Sub-Catchment OC1- Overcontrolled Area

Proposed Land Use	Area (m^2)
Building	4226.0
Paved Area	1558.0
Green and Landscape Area	1526.0
Total:	**7310.0**

Sub-Catchment UC1-Uncontrolled Area

Proposed Land Use	Area (m^2)
Asphalt & Building	2371.0
Sidewalk	368.0
Green and Landscape Area	3232.0
Total:	**5971.0**

Sub-Catchment UC2- Uncontrolled Area

Proposed Land Use	Area (m^2)
Green and Landscape Area	964.0
Total:	**964.0**
Total Residential Development Area (C1):	**14245.0**

LEA Consulting Ltd. Consulting Engineers and Planners	Composite "C" Calculation			
	Prepared:	F.M	Page No.	A-02
	Checked:	R.B.		
Project: 51-57 Tannery Street SUB-CATCHMENT EXC1 & OC1 City Of Mississauga	Proj. #	18038		
	Date:	04-Aug-20		

EXISTING CONDITIONS:
Sub-Catchment EXC1

Existing Land Use	Area (ha)	C	Composite "C"
Building	0.307	0.90	
Asphalt	0.210	0.90	
Gravel	0.347	0.60	
Lawn & Tree	0.561	0.25	
Total Residential Development Area (C1):	**1.425**		**0.57**
			0.5 max. by City's Criteria
Imperviousness Percent:	**36.3**		

PROPOSED DEVELOPMENT:
Sub-Catchment OC1- Overcontrolled Area

Proposed Land Use	Area (ha)	C	Composite "C"
Building	0.423	0.90	
Paved Area	0.156	0.90	
Green and Landscape Area	0.153	0.25	
Total:	**0.731**		**0.76**
Imperviousness Percent:	**79.1**		

Sub-Catchment UC1-Uncontrolled Area

Proposed Land Use	Area (ha)	C	Composite "C"
Asphalt & Building	0.2371	0.90	
Sidewalk	0.0368	0.90	
Green and Landscape Area	0.3232	0.25	
Total:	**0.597**		**0.55**
Imperviousness Percent:	**45.9**		

Sub-Catchment UC2- Uncontrolled Area

Proposed Land Use	Area (ha)	C	Composite "C"
Green and Landscape Area	0.0964	0.25	
Total:	**0.0964**		**0.25**
Imperviousness Percent:	**0.0**		

Total Site Area:	**1.425**
Composite runoff coefficient for entire site:	**0.64**
Total impervious percent:	**61.4**

LEA Consulting Ltd. Consulting Engineers and Planners	5mm Rainfall Retention Volume (Water Balance)			
	Prepared:	F.M	Page No.	A-03
	Checked:	M.D.		
Project: 51-57 Tannery Street **SUB-CATCHMENT EXC1 & OC1** **City Of Mississauga**	Proj. #	18038		
	Date:	31-Jul-20		

According to the CVC Guidelines, in order to achieve the water balance target, it is required to retain all runoff from a small event - typically 5mm (in Toronto, storms with 24 hour volumes of 5mm or less contribute about 50% of the total average annual rainfall volume) through infiltration, evapotranspiration & rainwater reuse.

Site Area:	1.425	ha
Runoff Coefficient :	0.64	Post-development site conditions

Runoff volume from 5mm rainfall event on site:

$V = 1.425 \times 0.66 \times 0.005 \times 10000 = 45.51 \ m^3$

Required on-site retention volume for 5mm rainfall event: 45.51 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	Pre-Development Peak Flow Rates Calculation			
	Prepared:	F.M	Page No.	A-04
	Checked:	R.B.		
Project: 51-57 Tannery Street SUB-CATCHMENT EXC1 & OC1 City Of Mississauga	Proj. #	18038		
	Date:	31-Jul-20		

Rational Formulae: Q = 2.78 CIA (L/s)

Site Area:	1.425	ha
Time of Concentration	15	minutes as per City Guidelines
Runoff Coefficient :	0.50	Pre-development condition

Rainfall Intensity: $I = a/(Tc+b)^c$ (City Std. 2111.010)

Return Period:	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Rainfall Intensity (mm/hr):	59.89	80.51	99.17	113.89	127.13	140.69

Peak Flow Rate (L/s):

Return Period:	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Under existing site conditions (L/s):	118.50	159.30	196.21	225.35	251.55	278.37

The proposed site is under Mullet Creek and requires to control post development flow to pre development level for storm events that include the regional storm based on the CVC stormwater management Criteria, 2012.
Since the stormwater will be discharged to the municipal sewers, the allowable flow rate from the site is limited to the 10-year flow according to the City's storm sewers design flow.
Furthermore, the storm runoff from the proposed road, Building G and the area along the Creek (Sub-catchment UC1 and UC2) is not feaseable to controlled due to the site constraint, threfore, the stormwater discharge from catchment C1 will be overcontrolled. I.e. allowable discharge flow rate from sub-catchment OC1 will be:

Sub-catchment UC1 and UC2 (Post Development 100-yr storm):	171.68	L/s
Sub-catchment OC1 (Pre-development 10-yr storm):	196.21	L/s

Overcontrolled discharge rate from sub-Catchment OC1 into municipal storm sewer on Emby Drive: 24.53 L/s

LEA Consulting Ltd. Consulting Engineers and Planners	Post-Development Peak Flow Rates Calculation (Uncontrolled)			
	Prepared:	F.M	Page No.	A-05
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT EXC1 & OC1** **City Of Mississauga**	Proj. #	18038		
	Date:	31-Jul-20		

Rational Formulae: Q = 2.78 CIA (L/s)

Overcontrolled Area:	0.731	ha
Time of Concentration:	15	minutes as per City Guidelines
Runoff Coefficient :	0.76	
Uncontrolled Area (UC1):	0.597	ha
Time of Concentration:	15	minutes as per City Guidelines
Runoff Coefficient :	0.55	
Uncontrolled Area (UC2):	0.096	ha
Time of Concentration:	15	minutes as per City Guidelines
Runoff Coefficient :	0.25	

Runoff Coefficient Adjustment Factors:	1.00	(10-year)
	1.10	(25-year)
	1.20	(50-year)
	1.25	(100-year)

Rainfall Intensity: $I = a/(Tc+b)^c$ (City Std. 2111.010)

Return Period:	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Rainfall Intensity (mm/hr):	59.89	80.51	99.17	113.89	127.13	140.69

Sub-Catchment OC1- Overcontrolled Area

Return Period:	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Under Post development condition (L/s):	92.96	124.96	153.91	176.77	197.32	218.36
Under Post development condition with Adjastment Factors (L/s):	92.96	124.96	153.91	194.45	236.79	272.96

Sub-Catchment UC1-Uncontrolled Area

Return Period:	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Under Post development condition (L/s):	54.46	73.21	90.17	103.56	115.60	127.92
Under Post development condition with Adjastment Factors (L/s):	54.46	73.21	90.17	113.92	138.72	159.91

Sub-Catchment UC2- Uncontrolled Area

Return Period:	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Under Post development condition (L/s):	4.01	5.39	6.64	7.63	8.51	9.42
Under Post development condition with Adjastment Factors (L/s):	4.01	5.39	6.64	8.39	10.21	11.77

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (2-Year Storm)			
	Prepared:	F.M	Page No.	A-06
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT EXC1 & OC1** **City Of Mississauga**	Proj. #	18038		
	Date:	31-Jul-20		

Total Drainage Area (ha) = 0.731 ha
Drainage Area Composite C = 0.76
Allowable Release Rate = 24.53 L/s
Return Period = 2 Year

Site storage Requirement:

Time (minutes)	Rainfall Intensity (mm/hr)	Peak Flow (L/s)	Storm Runoff Volume (m^3)	Release Rate (L/s)	Release Flow Volume (m^3)	Required Storage Volume (m^3)
15	59.89	92.96	83.66	24.53	22.08	61.58
20	50.16	77.86	93.43	24.53	29.44	63.99
25	43.42	67.40	101.10	24.53	36.80	64.30
30	38.45	59.67	107.41	24.53	44.16	63.25
35	34.60	53.71	112.79	24.53	51.52	61.27
40	31.54	48.95	117.48	24.53	58.88	58.60
45	29.03	45.06	121.66	24.53	66.24	55.42
50	26.94	41.81	125.42	24.53	73.60	51.82
55	25.16	39.04	128.85	24.53	80.96	47.89
60	23.62	36.67	132.00	24.53	88.32	43.68
65	22.29	34.59	134.92	24.53	95.68	39.24
70	21.12	32.77	137.65	24.53	103.04	34.61
75	20.07	31.16	140.20	24.53	110.40	29.80
80	19.14	29.71	142.61	24.53	117.76	24.85
85	18.30	28.41	144.88	24.53	125.12	19.76
90	17.54	27.23	147.04	24.53	132.48	14.56
95	16.85	26.16	149.10	24.53	139.84	9.26
100	16.22	25.18	151.07	24.53	147.20	3.87
105	15.64	24.28	152.95	24.53	154.56	-1.61
110	15.11	23.45	154.75	24.53	161.92	-7.17

Required Storage Volume = 64.30 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (5-Year Storm)			
	Prepared:	F.M	Page No.	A-07
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT EXC1 & OC1** **City Of Mississauga**	Proj. #	18038		
	Date:	31-Jul-20		

Total Drainage Area (ha) = 0.731 ha
Drainage Area Composite C = 0.76
Allowable Release Rate = 24.53 L/s
Return Period = 5 Year

Site storage Requirement:

Time (minutes)	Rainfall Intensity (mm/hr)	Peak Flow (L/s)	Storm Runoff Volume (m^3)	Release Rate (L/s)	Release Flow Volume (m^3)	Required Storage Volume (m^3)
15	80.51	124.96	112.46	24.53	22.08	90.38
20	67.43	104.67	125.60	24.53	29.44	96.16
25	58.37	90.60	135.90	24.53	36.80	99.10
30	51.68	80.21	144.39	24.53	44.16	100.23
35	46.52	72.20	151.62	24.53	51.52	100.10
40	42.40	65.80	157.93	24.53	58.88	99.05
45	39.02	60.57	163.54	24.53	66.24	97.30
50	36.21	56.20	168.59	24.53	73.60	94.99
55	33.82	52.49	173.20	24.53	80.96	92.24
60	31.76	49.29	177.44	24.53	88.32	89.12
65	29.96	46.50	181.37	24.53	95.68	85.69
70	28.38	44.06	185.03	24.53	103.04	81.99
75	26.98	41.88	188.47	24.53	110.40	78.07
80	25.73	39.94	191.70	24.53	117.76	73.94
85	24.60	38.19	194.76	24.53	125.12	69.64
90	23.58	36.60	197.67	24.53	132.48	65.19
95	22.66	35.16	200.43	24.53	139.84	60.59
100	21.81	33.85	203.07	24.53	147.20	55.87
105	21.03	32.63	205.60	24.53	154.56	51.04
110	20.31	31.52	208.02	24.53	161.92	46.10

Required Storage Volume = 100.23 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (10-Year Storm)			
	Prepared:	F.M	Page No.	A-08
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT EXC1 & OC1** **City Of Mississauga**	Proj. #	18038		
	Date:	31-Jul-20		

Total Drainage Area (ha) = 0.731 ha
Drainage Area Composite C = 0.76
Allowable Release Rate = 24.53 L/s
Return Period = 10 Year

Site storage Requirement:

Time (minutes)	Rainfall Intensity (mm/hr)	Peak Flow (L/s)	Storm Runoff Volume (m^3)	Release Rate (L/s)	Release Flow Volume (m^3)	Required Storage Volume (m^3)
15	99.17	153.91	138.52	24.53	22.08	116.44
20	83.06	128.92	154.70	24.53	29.44	125.26
25	71.90	111.59	167.39	24.53	36.80	130.59
30	63.66	98.80	177.84	24.53	44.16	133.68
35	57.30	88.93	186.75	24.53	51.52	135.23
40	52.22	81.05	194.52	24.53	58.88	135.64
45	48.07	74.60	201.43	24.53	66.24	135.19
50	44.60	69.22	207.66	24.53	73.60	134.06
55	41.65	64.65	213.33	24.53	80.96	132.37
60	39.11	60.71	218.56	24.53	88.32	130.24
65	36.91	57.28	223.39	24.53	95.68	127.71
70	34.96	54.26	227.90	24.53	103.04	124.86
75	33.24	51.59	232.13	24.53	110.40	121.73
80	31.69	49.19	236.12	24.53	117.76	118.36
85	30.31	47.04	239.89	24.53	125.12	114.77
90	29.05	45.09	243.47	24.53	132.48	110.99
95	27.90	43.31	246.87	24.53	139.84	107.03
100	26.86	41.69	250.12	24.53	147.20	102.92
105	25.90	40.20	253.24	24.53	154.56	98.68
110	25.01	38.82	256.22	24.53	161.92	94.30

Required Storage Volume = 135.64 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (25-Year Storm)			
	Prepared:	F.M	Page No.	A-09
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT EXC1 & OC1** **City Of Mississauga**	Proj. #	18038		
	Date:	31-Jul-20		

Total Drainage Area (ha) = 0.731 ha
Drainage Area Composite C = 0.76
Allowable Release Rate = 24.53 L/s
Return Period = 25 Year
Runoff coefficient adjastment factor = 1.1

Site storage Requirement:

Time (minutes)	Rainfall Intensity (mm/hr)	Peak Flow (L/s)	Storm Runoff Volume (m^3)	Release Rate (L/s)	Release Flow Volume (m^3)	Required Storage Volume (m^3)
15	113.89	194.45	175.01	24.53	22.08	152.93
20	95.40	162.87	195.44	24.53	29.44	166.00
25	82.58	140.98	211.47	24.53	36.80	174.67
30	73.11	124.82	224.68	24.53	44.16	180.52
35	65.80	112.35	235.93	24.53	51.52	184.41
40	59.98	102.40	245.75	24.53	58.88	186.87
45	55.21	94.25	254.48	24.53	66.24	188.24
50	51.22	87.45	262.35	24.53	73.60	188.75
55	47.84	81.67	269.52	24.53	80.96	188.56
60	44.92	76.70	276.12	24.53	88.32	187.80
65	42.39	72.37	282.23	24.53	95.68	186.55
70	40.15	68.55	287.93	24.53	103.04	184.89
75	38.17	65.17	293.27	24.53	110.40	182.87
80	36.40	62.15	298.31	24.53	117.76	180.55
85	34.81	59.42	303.07	24.53	125.12	177.95
90	33.36	56.96	307.59	24.53	132.48	175.11
95	32.05	54.72	311.89	24.53	139.84	172.05
100	30.85	52.67	316.00	24.53	147.20	168.80
105	29.74	50.78	319.93	24.53	154.56	165.37
110	28.73	49.05	323.70	24.53	161.92	161.78

Required Storage Volume = 188.75 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (50-Year Storm)			
	Prepared:	F.M	Page No.	A-10
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT EXC1 & OC1** **City Of Mississauga**	Proj. #	18038		
	Date:	31-Jul-20		

Total Drainage Area (ha) = 0.731 ha
Drainage Area Composite C = 0.76
Allowable Release Rate = 24.53 L/s
Return Period = 50 Year
Runoff coefficient adjastment factor = 1.2

Site storage Requirement:

Time (minutes)	Rainfall Intensity (mm/hr)	Peak Flow (L/s)	Storm Runoff Volume (m^3)	Release Rate (L/s)	Release Flow Volume (m^3)	Required Storage Volume (m^3)
15	127.13	236.79	213.11	24.53	22.08	191.03
20	106.57	198.49	238.19	24.53	29.44	208.75
25	92.30	171.91	257.86	24.53	36.80	221.06
30	81.75	152.26	274.07	24.53	44.16	229.91
35	73.60	137.08	287.88	24.53	51.52	236.36
40	67.10	124.97	299.93	24.53	58.88	241.05
45	61.77	115.05	310.63	24.53	66.24	244.39
50	57.32	106.76	320.28	24.53	73.60	246.68
55	53.54	99.72	329.08	24.53	80.96	248.12
60	50.28	93.66	337.16	24.53	88.32	248.84
65	47.45	88.37	344.66	24.53	95.68	248.98
70	44.95	83.72	351.64	24.53	103.04	248.60
75	42.74	79.60	358.19	24.53	110.40	247.79
80	40.76	75.91	364.36	24.53	117.76	246.60
85	38.97	72.59	370.20	24.53	125.12	245.08
90	37.36	69.58	375.74	24.53	132.48	243.26
95	35.89	66.84	381.01	24.53	139.84	241.17
100	34.54	64.34	386.04	24.53	147.20	238.84
105	33.31	62.04	390.86	24.53	154.56	236.30
110	32.17	59.92	395.48	24.53	161.92	233.56

Required Storage Volume = 248.98 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (100 - Year Storm)			
	Prepared:	F.M	Page No.	A-11
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT EXC1 & OC1** **City Of Mississauga**	Proj. #	18038		
	Date:	31-Jul-20		

Total Drainage Area (ha) = 0.731 ha
Drainage Area Composite C = 0.76
Allowable Release Rate = 24.53 L/s
Return Period = 100 Year
Runoff coefficient adjastment factor = 1.25

Site storage Requirement:

Time (minutes)	Rainfall Intensity (mm/hr)	Peak Flow (L/s)	Storm Runoff Volume (m^3)	Release Rate (L/s)	Release Flow Volume (m^3)	Required Storage Volume (m^3)
15	140.69	272.96	245.66	24.53	22.08	223.58
20	118.12	229.17	275.01	24.53	29.44	245.57
25	102.41	198.69	298.03	24.53	36.80	261.23
30	90.77	176.11	317.00	24.53	44.16	272.84
35	81.77	158.65	333.16	24.53	51.52	281.64
40	74.58	144.69	347.26	24.53	58.88	288.38
45	68.68	133.25	359.78	24.53	66.24	293.54
50	63.75	123.69	371.07	24.53	73.60	297.47
55	59.56	115.56	381.34	24.53	80.96	300.38
60	55.95	108.55	390.79	24.53	88.32	302.47
65	52.81	102.45	399.55	24.53	95.68	303.87
70	50.03	97.07	407.71	24.53	103.04	304.67
75	47.58	92.30	415.36	24.53	110.40	304.96
80	45.38	88.03	422.56	24.53	117.76	304.80
85	43.39	84.19	429.37	24.53	125.12	304.25
90	41.60	80.71	435.84	24.53	132.48	303.36
95	39.97	77.54	441.99	24.53	139.84	302.15
100	38.47	74.64	447.86	24.53	147.20	300.66
105	37.10	71.98	453.48	24.53	154.56	298.92
110	35.84	69.53	458.87	24.53	161.92	296.95

Required Storage Volume = 304.96 m^3

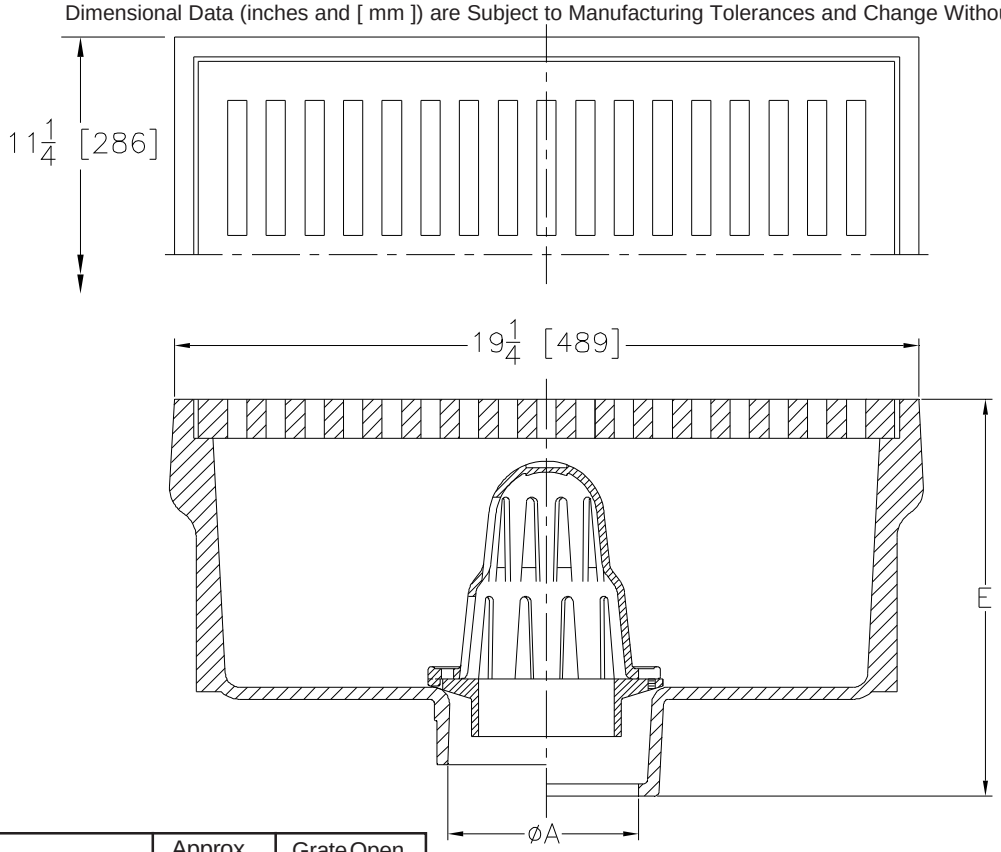
Z668

11-1/4 x 19-1/4 [286 X 489] HEAVY-DUTY DRAIN

SPECIFICATION SHEET

TAG _____

Dimensional Data (inches and [mm]) are Subject to Manufacturing Tolerances and Change Without Notice



A Pipe Size In [mm]	Approx. Wt. Lbs. [kg]	Grate Open Area Sq. In. [cm²]
4,6 [102,152]	115 [52]	60 [387]

ENGINEERING SPECIFICATION: ZURN Z668
11-1/4" X 19-1/4" [286mm x 489mm] Top drain, Dura-Coated cast iron body with bottom outlet, less seepage pan, with secondary strainer, loose heavy-duty slotted grate.

OPTIONS (Check/specify appropriate options)

PIPE SIZE	(Specify size/type) **OUTLET**		**'E' BODY HT. DIM.**
4,6 [102,152]	____ IC	Inside Caulk	10-1/4 [260]
4,6 [102,152]	____ IG	Inside Gasket	10-1/4 [260]
4,6 [102,152]	____ IP	Threaded	8-5/8 [219]
4,6 [102,152]	____ NH	No-Hub (IP w/ Z1040)	11-1/8 [283]
4 [102]	____ NL	Neo-Loc	9-1/2 [241]

PREFIXES

____ Z D.C.C.I. Body and Top*

SUFFIXES

____ -AR Acid Resistant Epoxy Coated Cast Iron
____ -DG Duresist Grate
____ -G Galvanized Cast Iron
____ -TC Neo-Loc Test Cap Gasket (4 [102] NL Bottom Outlet Only)
____ -TS Top Secured with Slotted Screws
____ -V Backwater Valve (See Z1099)
____ -VP Vandal-Proof Secured Top

* Regularly furnished unless otherwise specified.

Zurn Industries, LLC | **Specification Drainage Operation**
1801 Pittsburgh Avenue, Erie, PA U.S.A. 16502 · Ph. 855-663-9876, Fax 814-454-7929
In Canada | **Zurn Industries Limited**
3544 Nashua Drive, Mississauga, Ontario L4V 1L2 · Ph. 905-405-8272, Fax 905-405-1292
www.zurn.com

Rev. F
Date: 09/27/2017
C.N. No. 137940
Prod. | Dwg. No. Z668

CDS Average Annual Efficiency For TSS Removal & Total Annual Volume Treated

Area = 0.731 ha
C = 0.76
CDS Model: PMSU2015-4
Flowrate: 20 l/s
IDF Data: Mississauga
PSD: FINE

Upstream Storage:
Storage 305 m^3

Engineer: LEA Consulting Ltd.
Contact: F. Morshedi, P.Eng.
Date: 24-Jul-20

Project: 51-57 Tannery Street
Location: Mississauga, ON
OGS ID: OGS

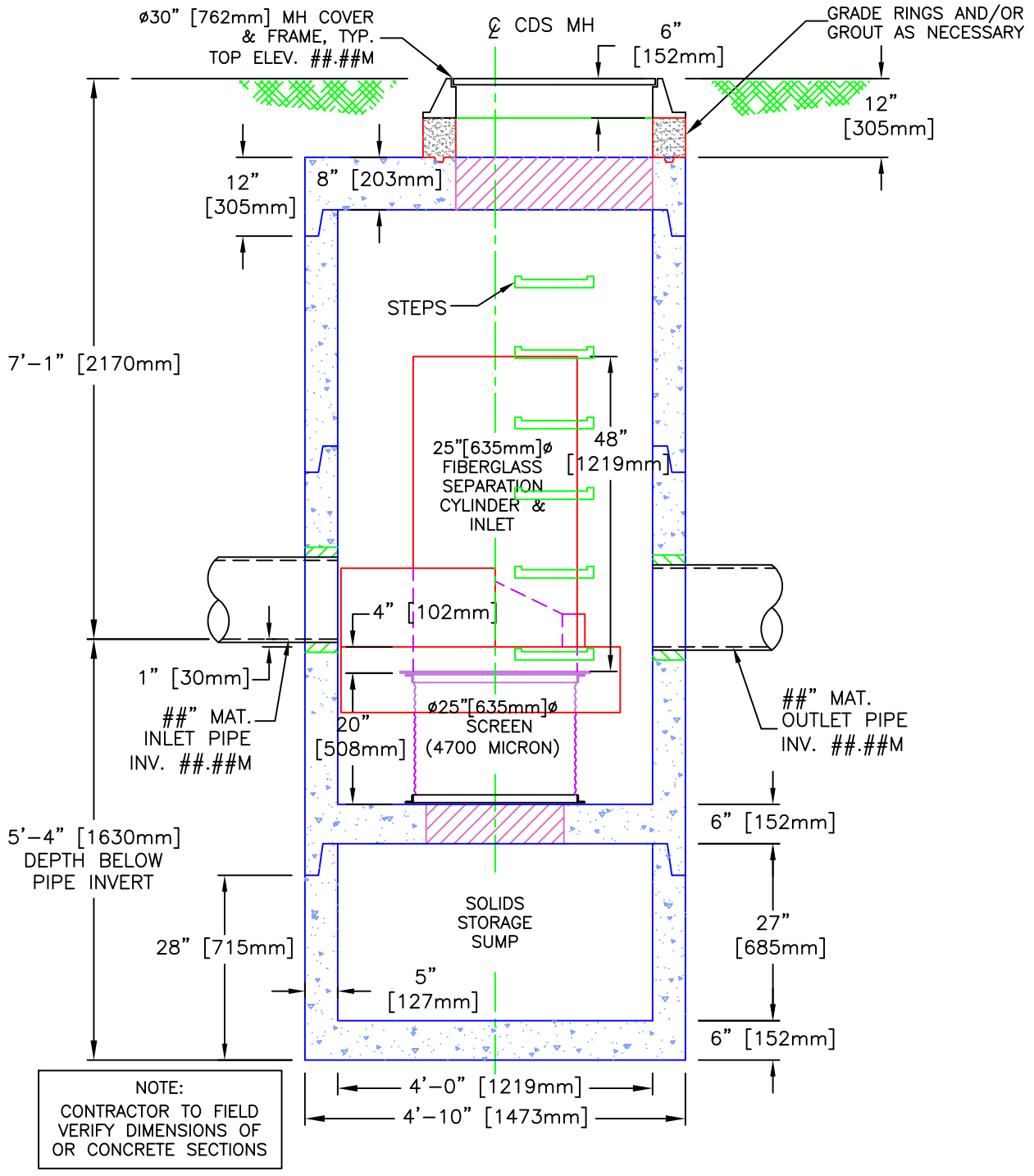
Return	Period	Peak Flow	TSS Percentage Captured	Treated Flow Volume	Total Flow Volume	Annual Exceedance Probability	System Flow	CDS Flow	By-Pass Flow	Volume Percentage Treated
month / yr	Yr	l/s	%	litres	litres	%	l/s	l/s	l/s	%
1-M	0.08	1.57	97.34	2784	2784	**100.00**	1.57	1.57	0.00	100.00
2-M	0.17	4.21	94.83	7641	7641	**99.75**	4.21	4.21	0.00	100.00
3-M	0.25	6.36	92.76	11706	11706	**98.17**	6.36	6.36	0.00	100.00
4-M	0.33	8.33	90.89	15435	15435	**95.04**	8.33	8.33	0.00	100.00
5-M	0.42	9.85	89.44	18350	18350	**90.91**	9.85	9.85	0.00	100.00
6-M	0.50	11.36	87.99	21266	21266	**86.47**	11.36	11.36	0.00	100.00
7-M	0.58	12.50	86.89	23485	23485	**82.01**	12.50	12.50	0.00	100.00
8-M	0.67	13.64	85.80	25704	25704	**77.67**	13.64	13.64	0.00	100.00
9-M	0.75	14.78	84.71	27924	27924	**73.64**	14.78	14.78	0.00	100.00
10-M	0.83	15.69	83.85	29698	29698	**69.90**	15.69	15.69	0.00	100.00
11-M	0.92	16.59	82.98	31472	31472	**66.40**	16.59	16.59	0.00	100.00
1-Yr	1	17.49	82.11	33247	33247	**63.21**	17.49	17.49	0.00	100.00
2-Yr	2	24.98	72.60	45185	48186	**39.35**	24.98	20.10	4.87	93.77
5-Yr	5	25.14	72.35	45363	48522	**18.13**	25.14	20.10	5.04	93.49
10-Yr	10	25.41	71.95	45651	49062	**9.52**	25.41	20.10	5.30	93.05
25-Yr	25	25.47	71.85	45723	49197	**3.92**	25.47	20.10	5.37	92.94
50-Yr	50	25.74	71.46	46009	49738	**1.98**	25.74	20.10	5.63	92.50
100-Yr	100	26.18	70.82	46458	50625	**1.00**	26.18	20.10	6.07	91.77
Average Annual TSS Removal Efficiency [%]:					**86.3**	Ave. Ann. T. Volume [%]:				**99.5**

Notes:
1) CDS Efficiency based on testing conducted at the University of Central Florida
2) CDS design flowrate and scaling based on standard manufacturer model & product specificiations

ECHELON ENVIRONMENTAL

CDS TECHNOLOGIES

SECTION A–A
ELEVATION VIEW

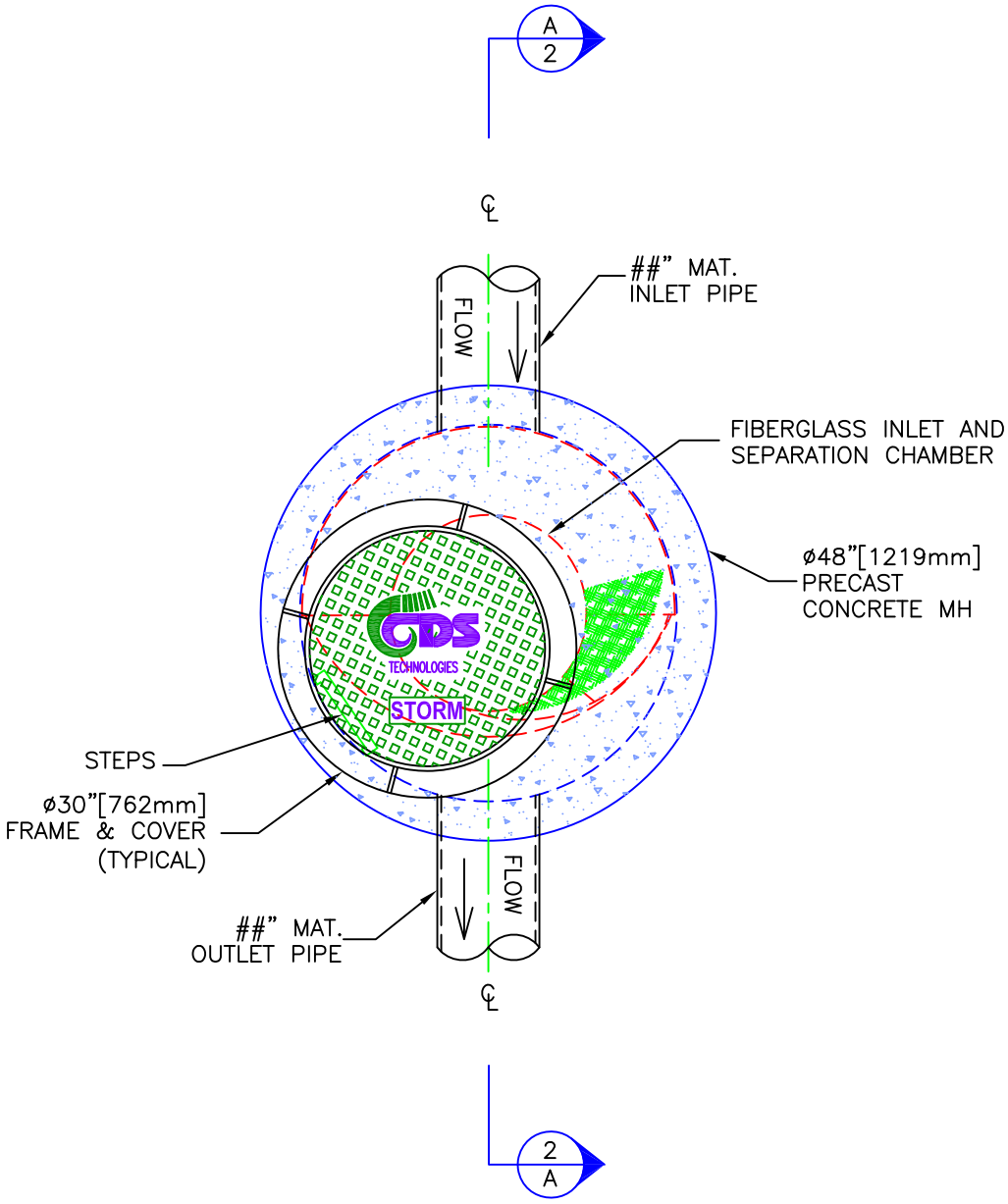


CDS MODEL PMSU20_15_4m
STORMWATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# XX–##–###	SCALE 1" = 2'
		DATE ##/##/##	SHEET 2
		DRAWN INITIALS	
		APPROV.	

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577
CONTECH Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

PLAN VIEW



CDS MODEL PMSU20_15_4m
STORMWATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# XX-##-###	SCALE 1" = 2'
		DATE ##/##/##	SHEET 1
		DRAWN INITIALS	
		APPROV.	

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577
CONTECH Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Nonpoint Pollution Control
Division of Water Quality
401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

March 21, 2017

Derek M. Berg
Contech Engineered Solutions, LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Re: Revised MTD Lab Certification
Continuous Deflective Separator (CDS®) Stormwater Treatment Device by Contech Engineered Solutions, LLC
On-line Installation

TSS Removal Rate 50%

Dear Mr. Berg:

This revised certification letter supersedes the Department's prior certification dated January 9, 2015. This revision was completed to reflect the updated Manufactured Treatment Device (MTD) scaling methodology as agreed upon by the manufacturers' working group on September 19, 2016. In part, the updated scaling for hydrodynamic MTDs is based on the depth of the reference (tested) MTD from the top of the false floor utilized during removal efficiency testing, not from the physical bottom of the unit. Based on the above decision, Table A-2 of the NJCAT Technology Verification report located at http://www.njcat.org/uploads/newDocs/CDSVerificationReportFinal1.pdf has been revised, and Table 1 noted below has been added.

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7 (c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Contech Engineered Solutions, LLC has requested an MTD Laboratory Certification for the CDS® Stormwater Treatment Device.

The verification is subject to the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification

Appendix dated September 2014 (Revised January 2017) for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the CDS® Stormwater Treatment Device by Contech Engineered Solutions, LLC at a TSS removal rate of 50% when designed, operated, and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.

2. The CDS® Stormwater Treatment Device shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in item 6 below.

3. This CDS® Stormwater Treatment Device cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the CDS® Stormwater Treatment Device. A copy of the maintenance plan is attached to this certification. However, it is recommended to review the maintenance website at http://www.conteches.com/products/stormwater-management/treatment/cds.aspx#1822141-technical-info for any changes to the maintenance requirements.

6. Sizing Requirements:

   The example below demonstrates the sizing procedure for the CDS®:

   Example: A 0.25-acre impervious site is to be treated to 50% TSS removal using a CDS®. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

   Maximum Treatment Flow Rate (MTFR) Evaluation:

   The site runoff (Q) was based on the following:
   time of concentration = 10 minutes
   i=3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
   c=0.99 (runoff coefficient for impervious)
   Q=ciA=0.99x3.2x0.25=0.79 cfs

   Given the site runoff is 0.79 cfs and based on Table 1 below, the CDS® Model CDS-4 with an MTFR of 0.93 cfs would be the smallest model approved that could be used for this site that could remove 50% of the TSS from the impervious area without exceeding the MTFR.

The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the Verification Appendix under Table A-1 and A-2.

Table 1 CDS Models

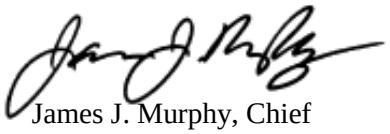
CDS Model	Manhole Diameter (ft.)	Treatment Chamber Depth (ft.)	MTFR (cfs)
CDS-3	3	3.50	0.52
CDS-4	4	3.50	0.93
CDS-5	5	3.75	1.5
CDS-6	6	4.50	2.1
CDS-7	7	5.25	2.8
CDS-8	8	6.00	3.7
CDS-10	10	7.50	5.8
CDS-12	12	9.00	8.4

- Treatment Chamber Depth is defined as the depth below the invert to the top of the false floor installed at 50% sediment depth.

A detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Mr. Shashi Nayak of my office at (609) 633-7021.

Sincerely,



James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

c: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
Ravi Patraju, NJDEP - BES
Gabriel Mahon, NJDEP - BNPC
Shashi Nayak, NJDEP – BNPC

CONTECH®
ENGINEERED SOLUTIONS

CDS® Inspection and Maintenance Guide – New Jersey

CDS TECHNOLOGIES

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump. Refer to Table 1 for depth from water surface to top of sediment pile for each model size indicating that maintenance is required.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile[1]		Sediment Storage Capacity	
	ft	m	ft	m	yd^3	m^3
CDS-3	3	0.9	3.0	0.9	0.5	0.4
CDS-4	4	1.2	3.0	0.9	0.9	0.7
CDS-5	5	1.5	3.25	1.0	1.5	1.1
CDS-6	6	1.8	4.0	1.2	2.1	1.6
CDS-7	7	2.1	4.75	1.4	2.9	2.2
CDS-8	8	2.4	5.5	1.7	3.7	2.8
CDS-10	10	3.0	7.0	2.1	5.8	4.4
CDS-12	12	3.4	8.5	2.6	8.4	6.4

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

[1] Distances from water surface to top of sediment pile are based on 75% of sump capacity being occupied.

Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, earth stabilization and stormwater treament products. For information, visit www.ContechES.com or call 800.338.1122

The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266; 7,517,450 related foreign patents or other patents pending.

CONTECH ENGINEERED SOLUTIONS

800.925.5240
www.ContechES.com

CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

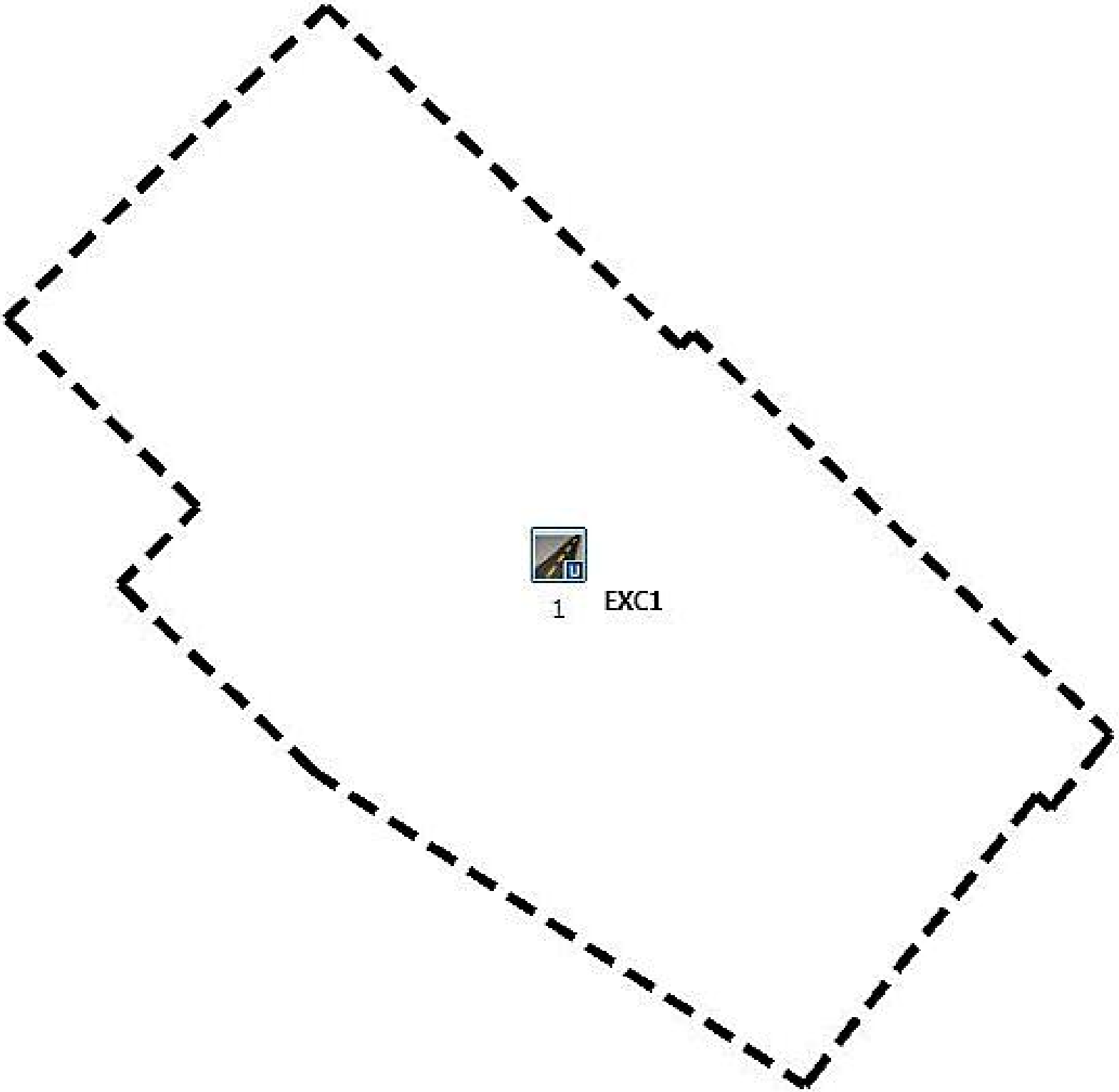
Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

APPENDIX B

Regional Flow Calculations


1
EXC1

```
=========

       V    V   I    SSSSS  U   U    A    L             (v 6.1.2002)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```


***** D E T A I L E D   O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.1\VO2\voin.dat

Output filename:
C:\Users\fmorshedi\AppData\Local\Civica\VH5\8d9e0e7d-7966-43ca-9251-48e843853e98\ab6edc7b-7254-4f48-a263-6880009db647\sc
Summary filename:
C:\Users\fmorshedi\AppData\Local\Civica\VH5\8d9e0e7d-7966-43ca-9251-48e843853e98\ab6edc7b-7254-4f48-a263-6880009db647\sc

DATE: 07/27/2020 TIME: 06:26:31

USER:

COMMENTS: _____

****
** SIMULATION : Regional **
****

READ STORM	Filename: C:\Users\fmorshedi\AppData\Local\Temp\760b82aa-12bd-45c2-9d28-5c9f04cd75c0\9c7215c3
Ptotal=212.00 mm	Comments: Hazel

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
1.00	6.00	4.00	13.00	7.00	23.00	10.00	53.00
2.00	4.00	5.00	17.00	8.00	13.00	11.00	38.00
3.00	6.00	6.00	13.00	9.00	13.00	12.00	13.00

CALIB STANDHYD (EXC1)	Area (ha)= 1.42
ID= 1 DT= 5.0 min	Total Imp(%)= 36.30 Dir. Conn.(%)= 10.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.52	0.91
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	1.20
Length	(m)=	97.47	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

output for regional storm-Existing Condition

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

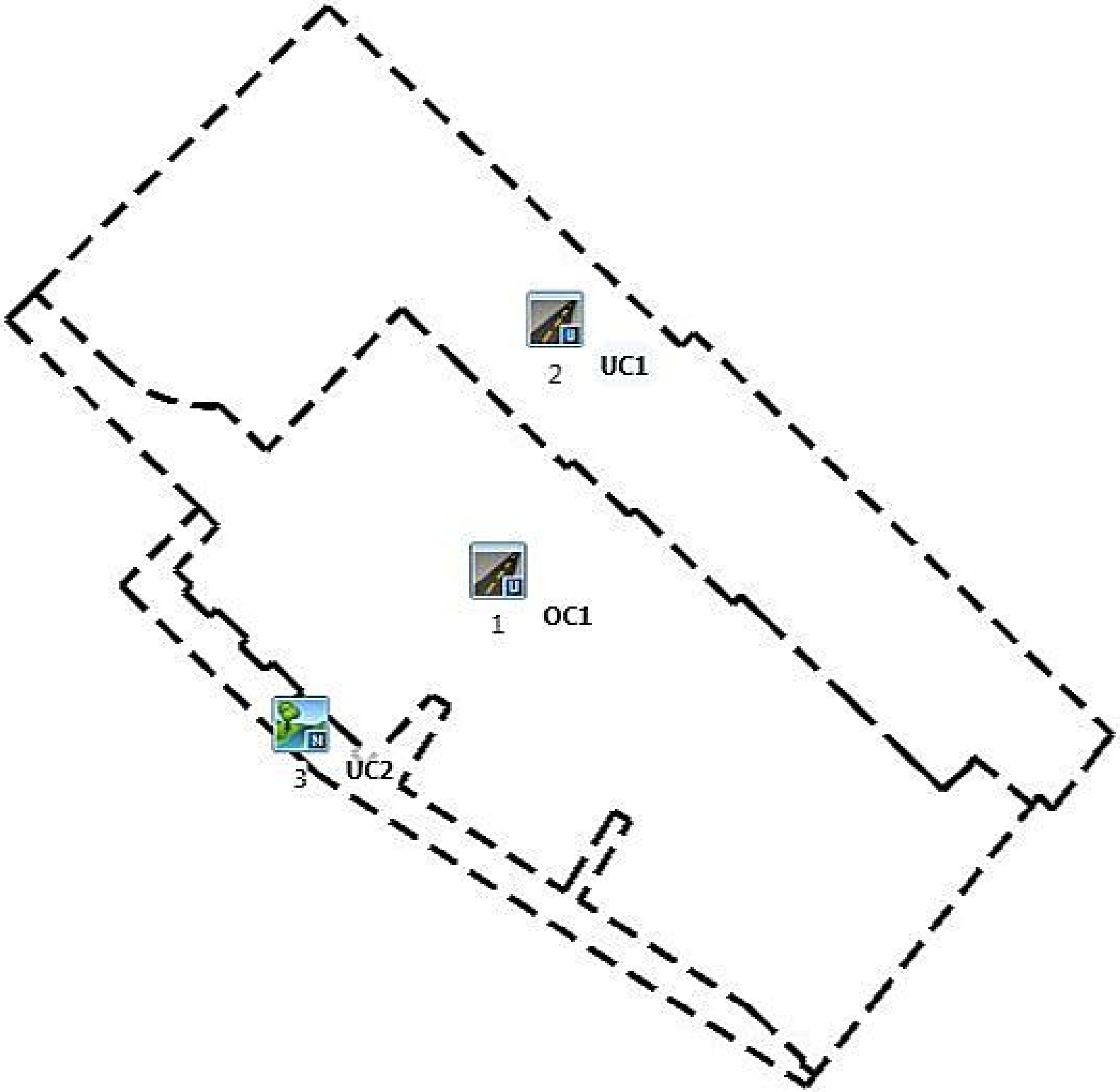
Max.Eff.Inten.(mm/hr)=	53.00	72.14		
over (min)	5.00	15.00		
Storage Coeff. (min)=	3.24 (ii)	12.62 (ii)		
Unit Hyd. Tpeak (min)=	5.00	15.00		
Unit Hyd. peak (cms)=	0.27	0.08		
			TOTALS	
PEAK FLOW (cms)=	0.02	0.18	0.200 (iii)	
TIME TO PEAK (hrs)=	9.75	10.00	10.00	
RUNOFF VOLUME (mm)=	211.00	179.59	182.72	
TOTAL RAINFALL (mm)=	212.00	212.00	212.00	
RUNOFF COEFFICIENT =	1.00	0.85	0.86	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 83.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

FINISH

==========


2
UC1
1
OC1
3
UC2

```
                              output for regional storm-Proposed condition
====================================================================================================
=========

       V    V   I    SSSSS  U   U    A    L              (v 6.1.2002)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
```



```
                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.1\VO2\voin.dat

  Output  filename:
C:\Users\fmorshedi\AppData\Local\Civica\VH5\8d9e0e7d-7966-43ca-9251-48e843853e98\eb682d50-8331-4db
2-9003-9d849dae14ab\sc
  Summary filename:
C:\Users\fmorshedi\AppData\Local\Civica\VH5\8d9e0e7d-7966-43ca-9251-48e843853e98\eb682d50-8331-4db
2-9003-9d849dae14ab\sc


DATE: 07/27/2020                           TIME: 06:09:18

USER:


COMMENTS: ____________________________________________________________


----------------------------------------------------------------------------------------------------
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  ***********************************************
  ** SIMULATION : Regional                     **
  ***********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\fmorshedi\AppD
|                  |              ata\Local\Temp\
|                  |              824a8dc4-67b2-4592-be03-fae4cf88c2f0\9c7215c3
| Ptotal=212.00 mm |    Comments: Hazel
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 1.00    6.00 |  4.00   13.00 |  7.00   23.00 | 10.00   53.00
                 2.00    4.00 |  5.00   17.00 |  8.00   13.00 | 11.00   38.00
                 3.00    6.00 |  6.00   13.00 |  9.00   13.00 | 12.00   13.00

-------------------------------------------------------------------------------


--------------------
| CALIB            |
| STANDHYD (  OC1) |   Area    (ha)=   0.73
|ID= 1 DT= 5.0 min |   Total Imp(%)=  79.10   Dir. Conn.(%)=  57.70
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.58         0.15
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      69.81        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

output for regional storm-Proposed condition

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

Max.Eff.Inten.(mm/hr)=	53.00	106.03		
over (min)	5.00	10.00		
Storage Coeff. (min)=	2.65 (ii)	9.55 (ii)		
Unit Hyd. Tpeak (min)=	5.00	10.00		
Unit Hyd. peak (cms)=	0.29	0.12		
			TOTALS	
PEAK FLOW (cms)=	0.06	0.04	0.107 (iii)	
TIME TO PEAK (hrs)=	9.67	10.00	10.00	
RUNOFF VOLUME (mm)=	211.00	194.03	203.82	
TOTAL RAINFALL (mm)=	212.00	212.00	212.00	
RUNOFF COEFFICIENT =	1.00	0.92	0.96	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 87.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (Uc1)
ID= 1 DT=15.0 min

Area (ha)= 0.60
Total Imp(%)= 45.90 Dir. Conn.(%)= 18.20

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.27	0.32
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	1.10
Length (m)=	63.09	20.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 15.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

Max.Eff.Inten.(mm/hr)=	53.00	78.78		
over (min)	15.00	15.00		
Storage Coeff. (min)=	2.50 (ii)	8.63 (ii)		
Unit Hyd. Tpeak (min)=	15.00	15.00		
Unit Hyd. peak (cms)=	0.11	0.09		
			TOTALS	
PEAK FLOW (cms)=	0.02	0.07	0.087 (iii)	
TIME TO PEAK (hrs)=	9.75	10.00	10.00	
RUNOFF VOLUME (mm)=	211.00	190.34	194.09	
TOTAL RAINFALL (mm)=	212.00	212.00	212.00	
RUNOFF COEFFICIENT =	1.00	0.90	0.92	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB NASHYD (UC2)	ID= 1 DT= 5.0 min

Area (ha)= 0.10 Curve Number (CN)= 80.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.20

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
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1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00

output for regional storm-Proposed condition

1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
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2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

Unit Hyd Qpeak (cms)= 0.018

PEAK FLOW (cms)= 0.013 (i)
TIME TO PEAK (hrs)= 10.000
RUNOFF VOLUME (mm)= 158.100
TOTAL RAINFALL (mm)= 212.000
RUNOFF COEFFICIENT = 0.746

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

FINISH

==========

APPENDIX C

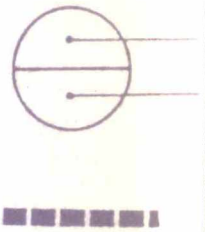
Storm Sewers Size Calculations

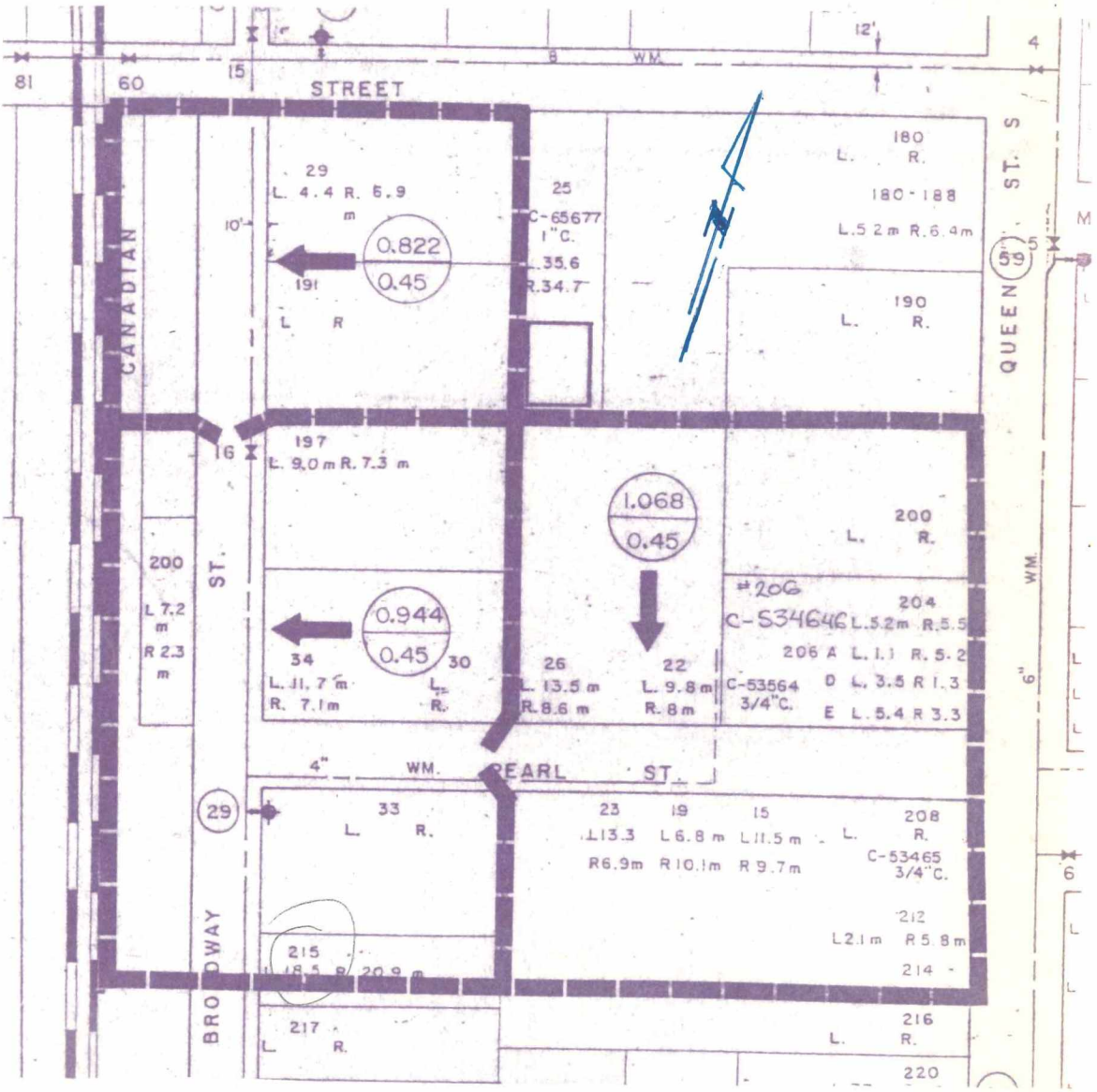
Sub-catchment EC1 City's record information

NOTES

1. TRENCH WIDTH (SEPARATE TRENCH) AT THE TOP OF THE PIPE SHALL BE AS PER CITY OF MISSISSAUGA STANDARD C.2-1-31.
2. CONTRACTOR IS RESPONSIBLE FOR SUPPLYING ADDITIONAL BEDDING AND/OR STRONGER PIPE, IF ACTUAL TRENCH WIDTHS EXCEED DESIGN WIDTHS.
3. SEWERS TO HAVE CLASS B BEDDING TO CITY OF MISSISSAUGA STANDARD C.2-1-31 AND CITY OF MISSISSAUGA STANDARD C.2-1-32 AND 300mm SAND COVER TO CITY OF MISSISSAUGA STANDARD C.2-1-33
4. CONCRETE SEWER PIPE TO HAVE RUBBER GASKET JOINTS.
5. CONCRETE SEWER PIPE TO BE ENCASED IN 20MPa CONCRETE, FROM EACH MANHOLE TO THE FIRST JOINT OUTSIDE MANHOLE. ENCASEMENT TO EXTEND FROM UNDISTURBED GROUND TO 300mm ABOVE TOP OF PIPE.
6. SURROUND ALL MANHOLES WITH A MINIMUM OF 1.0m COMPACTED GRANULAR BACKFILL.
   ALL CATCHBASINS TO HAVE COMPLETE, COMPACTED GRANULAR BACKFILL SURROUND.
7. EXCAVATED ROADS TO BE REINSTATED TO LATEST CITY OF MISSISSAUGA AND REGION OF PEEL STANDARDS.

LEGEND





STORM DESIGN AREAS

SUBDIVISION STREETSVILLE
CONSULTANT
MAJOR DRAINAGE AREA BROADWAY STREET

CITY OF MISSISSAUGA

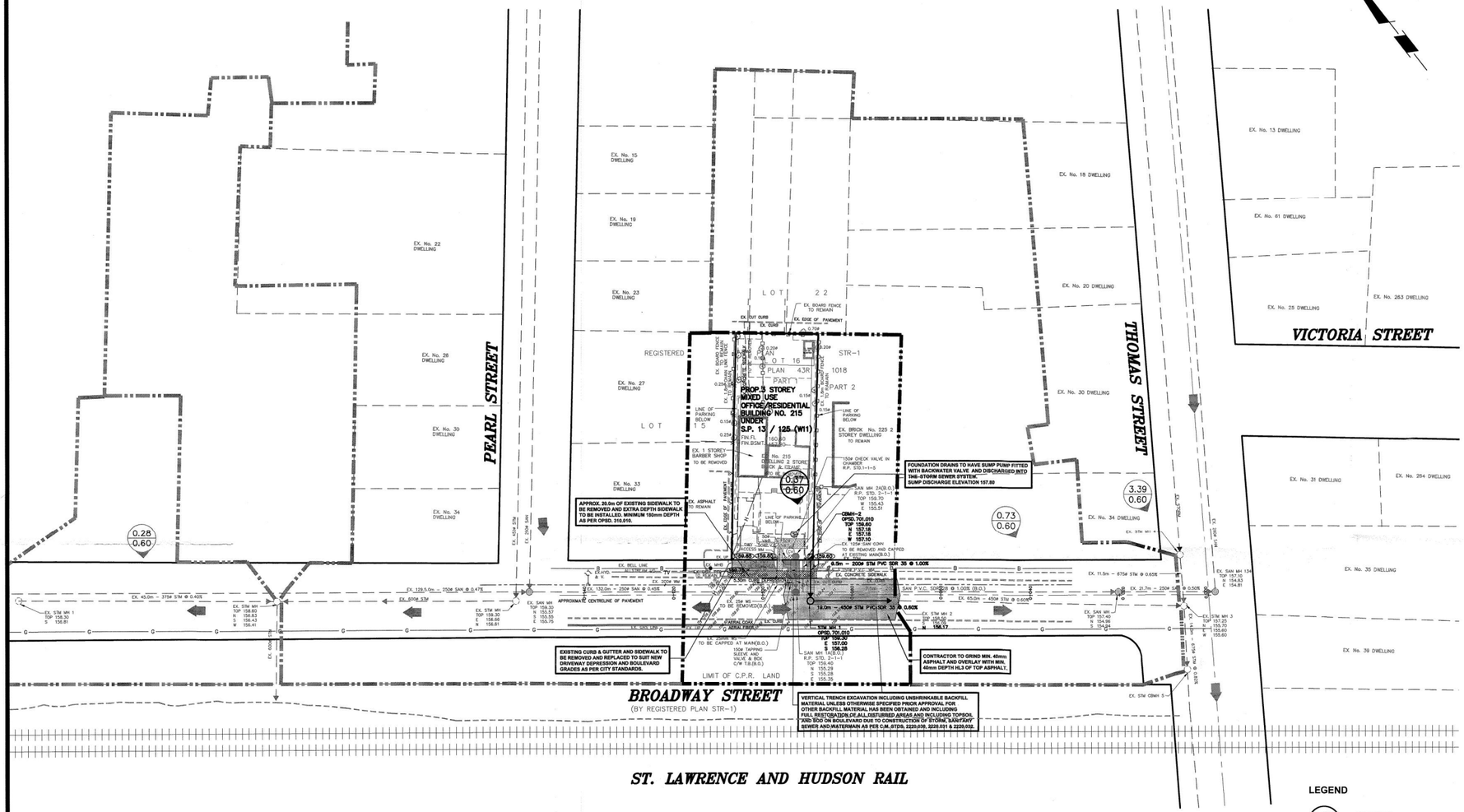
STORM DRAINAGE DESIGN CHART FOR CIRCULAR DRAINS FLOWING FULL

SHEET No. 1 OF 1 DATE MAY 03 1989
PROJECT No.
DESIGNED BY

LOCATION OF SECTION	FROM UPSTREAM	TO DOWNSTREAM	ADJACENT CONTRIBUTARY AREA	RUNOFF COEFFICIENT		ACCUMULATIVE AREA DRAINED BY SECTION	ACCUMULATIVE AREA TIMES RUNOFF COEFFICIENT FOR SECTION	FLOW TIME TO SECTION (FROM EXTREME UPSTREAM INLET)	INITIAL TIME OF CONCENTRATION AT EXTREME UPSTREAM INLET	TIME OF CONCENTRATION AT UPSTEAM END OF SECTION	INTENSITY OF RAINFALL	QUANTITY OF FLOW TO BE ACCOMMODATED IN SECTION.	TYPE OF PIPE	MANNINGS ROUGHNESS COEFFICIENT	SLOPE	DIAMETER	LENGTH OF SECTION	VELOCITY OF FLOW WITH PIPE FLOWING FULL	CAPACITY OF PIPE FLOWING FULL	PIPE INVERT AT UPSTREAM M.H.	PIPE INVERT AT DOWNSTREAM MH	TIME OF FLOW IN SECTION
	MH#	MH#	A_A	C_A	$A_A \times C_A$	$A = \Sigma A_A$	$A \times C = \Sigma A_A \times C_A$	t_{Cf}	t_{Ci}	$t_C = t_{Cf} + t_{Ci}$	I	$Q = \frac{1AC}{360}$		n	S	D	L	V	Q			$t = \frac{1}{V \times 60}$
			(ha)			(ha)		(min)	(min)	min	mm/hr	m^3/SEC			%	mm	m	m/SEC	m^3/SEC	m	m	min
BROADWAY ST.	PROP. 4B	EX.4	.822	0.45	0.370	.822	0.370			15.0	100	0.103		.013	0.5%	450	27.5	1.45	.208			0.31
	EX.4C	EX.4	2.012	0.45	0.905	2.012	0.905			15.0	100	0.251		.013	0.5%	600	53.75	1.77	.453			0.26
	EX 4	OUTFALL	2.834	0.45	1.275	2.834	1.275			15.31	98	0.347		.013	1.1%	600	15.5	2.628	.672			0.10

RETURN TO FILE
2-39

Sub-catchment EC4 City's record information

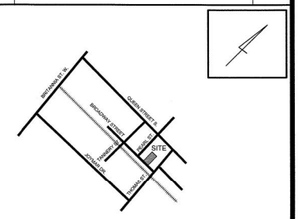


SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.

REVISIONS

DATE	DETAILS	INIT.



KEY PLAN (N.T.S.)

LEGEND

- SIDE INLET CATCHBASIN
- SINGLE CATCHBASIN
- DOUBLE CATCHBASIN
- CATCHBASIN WITH SEDIMENT CONTROL WITH SILT FENCE
- STORM MANHOLE
- SANITARY MANHOLE
- HYDRANT & VALVE
- VALVE & BOX
- SANITARY & STORM DOUBLE CONNECTION & WATER SERVICE CONNECTION
- CONCRETE ENCASEMENT
- LAND USE SIGN C.M. STD. 2430.550 & 2430.060
- UNABSLIMED ROAD SIGN
- SIDEWALK BARRICADE
- TRAFFIC SIGNAL DUCT & HANDWELL
- TRAFFIC SIGNAL POWER PEDESTAL
- SUPER MAILBOX LOCATION TYPE A
- SUPER MAILBOX LOCATION TYPE B
- DRIVEWAY LOCATION
- HYDRO TRANSFORMER
- PAD MOUNTED SWITCHGEAR
- STREET LIGHT POLES
- PEEL BOARD OF EDUCATION (PUBLIC SCHOOL)
- SEPARATE SCHOOL BOARD
- ACOUSTICAL FENCE C.M. STDS. 2850.040 & 2850.060
- BLACK VINYL CHAIN LINK FENCE
- WOOD SCREEN FENCE (REFER TO DWG.)
- SILTATION CONTROL FENCE
- SEMI-DETACHED DWELLING
- EX.TREE TO REMAIN
- EX.TREE TO BE REMOVED
- EX.TREE TO BE RELOCATED
- BOREHOLE

NOTE:
FOR REGULATORY SIGN AND STREET NAME SIGN STANDARDS REFER TO CITY OF MISSISSAUGA STD.

- STREET NAME SIGN
- NO EXIT SIGN
- STOP SIGN
- STOP SIGN & STREET NAME
- STOP SIGN, STREET NAME SIGN & NO EXIT SIGN
- AIRCRAFT NOISE WARNING SIGN

LEGEND

- 0.37 / 0.60 — AREA (HECTARES) / RUN-OFF COEFFICIENT
- SINGLE CATCHBASIN
- DOUBLE CATCHBASIN
- CATCHBASIN WITH SEDIMENT CONTROL WITH SILT FENCE
- STORM MANHOLE
- DIRECTION OF FLOW
- OVERLAND FLOW ROUTE
- EXISTING OVERLAND FLOW ROUTE
- DRAINAGE AREA BOUNDARY
- EXISTING DRAINAGE AREA BOUNDARY

FOR GENERAL NOTES REFER TO DWG No. 2

C.M. BENCHMARK No.: 257 ELEV. 162.08
DESCRIPTION: ON THE S. FACE 0.60m CORNER OF BANK OF NOVA SCOTIA BUILDING AT THE N.W. CORNER OF THOMAS STREET AND QUEEN STREET.

FIRST	SECOND	INTERIM	PRE-SER	FINAL
DATE NOV. 26/13	DATE NOV. 26/13	DATE JULY 28/15	DATE	DATE OCT. 16/15

SUBMISSION | **DWG No 212-M79-1**

REGISTERED PROFESSIONAL ENGINEER
ROMAN T. KERKUSZ
OCT. 16/15
PROVINCE OF ONTARIO

DESIGN BY — CHKD — APPROVED BY

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

215 BROADWAY HOLDINGS INC.

CITY FILE:S.P. 13/125(W11) REGION FILE: N/A

MISSISSAUGA Transportation and Works

GENERAL UNDERGROUND AND ABOVEGROUND AND STORM DRAINAGE PLAN

SCALE 1:500	AREA: Z-39E	PROJECT No. 212-M79	
DRAWN BY M.B.	CHECKED BY Z.S.	PLAN No. C-	
DATE NOV. 2013	SHEET 1 OF 1		

SUBDIVISION : 215 BROADWAY HOLDINGS INC.

215 BROADWAY STREET

MAJOR DRAINAGE AREA: Z-39E

CONSULTANT : SKIRA & ASSOCIATES LTD.

CITY OF MISSISSAUGA

STORM SEWER DESIGN CHART

FINAL SUBMISSION

SHEET No. 1 of 1

PROJECT No. : 212-M79

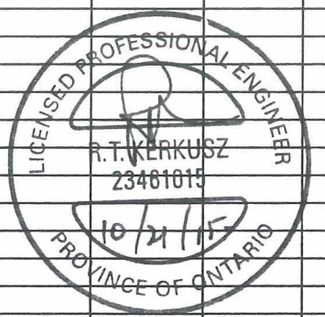
DESIGNED BY : M.B.

DATE : Oct - '15

$I_{(10YR)} = 1010/(Tc+4.6)^{0.78}$

MANNING'S ROUGHNESS COEFF. n = 0.013

LOCATION	FROM MH	TO MH	AREA Aa	RUNOFF COEFF. Ca	AaxCa	ACCUM. AREA A=∑Aa	ACCUM. AaxCa C=∑AaxCa	Tc	INTENSITY I	EXPECTED FLOW $Q=\frac{AIC}{360}$	TYPE OF PIPE	LENGTH L	SLOPE S	PIPE SIZE NOMINAL D	CAPACITY n=0.013 Q	VELOCITY n=0.013 V	TIME OF FLOW $T=\frac{L}{V\times 60}$	VELOCITY n = 0.009	VELOCITY ACTUAL	INVERT ELEV. UPPER	INVERT ELEV. LOWER
	MH#	MH#	ha			ha		min	mm/hr	m^3/s		m	%	mm	m^3/s	m/s	min	m/s		MH	MH
BROADWAY STREET	1	EX.2	0.37	0.60	0.22	0.37	0.22	15.00	99.17	**0.061**	PVC	19.0	0.60	450	**0.230**	1.40	0.77				
	EX.2	EX.3	0.73	0.60	0.44	1.10	0.66	15.77	96.23	**0.176**	CONC	65.0	0.60	450	**0.230**	1.40	0.77				
THOMAS STREET	EX.3	EX.5	3.39	0.60	2.03	4.49	2.69	16.54	93.48	**0.699**	CONC	14.0	0.82	675	**0.795**	2.15	0.11				



LEA Consulting Ltd. Consulting Engineers and Planners	Land Use			
	Prepared:	F.M	Page No.	C-01
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT C3** **City Of Mississauga**	Proj. #	18038		
	Date:	Feb.08/18		

Land Use	Area (m^2)
Sub-Catchment SC-1	
Asphalt & Concrete	541.0
Landscape	395.0
Building and Stairs	86.0
Total Site Area:	**1022.0**
Sub-Catchment SC2	
Asphalt & Concrete	742.0
Landscape	767.0
Building and Stairs	134.0
Berm	495.0
Total Site Area:	**2138.0**
Sub-Catchment SC3	
Asphalt & Concrete	803.0
Landscape	928.0
Stairs	80.0
Berm	42.0
Total Site Area:	**1853.0**
Sub-Catchment EC1	
Refer to City of Mississauga reecords including drainage area and design sheet	
Sub-Catchment EC2	
Railway (Gravel)	1161.0
Lown	2361.0
Berm	140.0
Total Site Area:	**3662.0**
Sub-Catchment EC3	
Building and Paved	1949.0
Gravel	574.0
Lawn & Tree	1747.0
Total Site Area:	**4270.0**
Sub-Catchment EC4	
Refer to City of Mississauga reecord design sheet	
Sub-Catchment EC5	
Building and Paved	6967.0
Gravel	3742.0
Lawn & Tree	2040.0
Total Site Area:	**12749.0**

LEA Consulting Ltd. Consulting Engineers and Planners	Composite "C" Calculation			
	Prepared:	F.M	Page No.	C-02
	R.B.	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT C3** **City Of Mississauga**	Proj. #	18038		
	Date:	Feb.08/18		

Composite Runoff Coefficient "C"

Land Use	Area (ha)	C	
Sub-Catchment SC-1			
Asphalt & Concrete	0.054	0.90	
Landscape	0.040	0.25	
Building and Stairs	0.009	0.90	
Total Site Area:	**0.102**		
Composite "C"			**0.65**
Imperviousness Percent:			**61.4%**
Sub-Catchment SC2			
Asphalt & Concrete	0.074	0.90	
Landscape	0.077	0.25	
Building and Stairs	0.013	0.50	
Berm	0.050	0.60	
Total Site Area:	**0.214**		
Composite "C"			**0.57**
Imperviousness Percent:			**41.0%**
Sub-Catchment SC3			
Asphalt & Concrete	0.080	0.90	
Landscape	0.093	0.25	
Stairs	0.008	0.50	
Berm	0.004	0.60	
Total Site Area:	**0.185**		
Composite "C"			**0.55**
Imperviousness Percent:			**47.7%**
Sub-Catchment EC1			
Based on the City's Records:	2.834	0.45	
Sub-Catchment EC2			
Railway (Gravel)	0.116	0.6	
Lown	0.236	0.25	
Total Site Area:	**0.366**		
Composite "C"			**0.35**
Imperviousness Percent:			**0.0%**
Sub-Catchment EC3			
Building and Paved	0.195	0.90	
Gravel	0.057	0.60	
Lawn & Tree	0.175	0.25	
Total Site Area:	**0.427**		
Composite "C"			**0.59**
Imperviousness Percent:			**45.6%**
Sub-Catchment EC4			
Based on the City's Records:	4.49	0.6	
Sub-Catchment EC5			
Building and Paved	0.697	0.90	
Gravel	0.374	0.60	
Lawn & Tree	0.204	0.25	
Total Site Area:	**1.275**		
Composite "C"			**0.71**
Imperviousness Percent:			**54.6%**

LEA Consulting Ltd. Consulting Engineers and Planners	Flow Rates Calculation			
	Prepared:	F.M	Page No.	C-03
	R.B.	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT C3** **City Of Mississauga**	Proj. #	18038		
	Date:	Feb.08/18		

Rational Formulae: Q = 2.78 CIA (L/s)

Rainfall Intensity: $I = a/(Tc+b)^c$ (City Std. 2111.010)

Sub-Catchment SC-1

Site Area: 0.1022 T_c= 15 min C: 0.65

Return Period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Rainfall Intensity (mm/hr)	59.89	80.51	99.17	113.89	127.13	140.69
Peak Flow Rate (L/s)	11.03	14.83	18.27	20.98	23.42	25.91

Sub-Catchment SC2

Site Area: 0.2138 T_c= 15 min C: 0.57

Return Period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Rainfall Intensity (mm/hr)	59.89	80.51	99.17	113.89	127.13	140.69
Peak Flow Rate (L/s)	20.36	27.37	33.71	38.71	43.21	47.82

Sub-Catchment SC3

Site Area: 0.1853 T_c= 15 min C: 0.55

Return Period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Rainfall Intensity (mm/hr)	59.89	80.51	99.17	113.89	127.13	140.69
Peak Flow Rate (L/s)	16.97	22.81	28.10	32.27	36.02	39.86

Sub-Catchment EC1

Site Area: 2.834 T_c= 15.31 min C: 0.45

Return Period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Rainfall Intensity (mm/hr)	59.16	79.53	97.96	112.51	125.59	139.00
Peak Flow Rate (L/s)	209.60	281.76	347.05	398.59	444.95	492.46

Sub-Catchment EC2

Site Area: 0.3662 T_c= 15 min C: 0.35

Return Period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Rainfall Intensity (mm/hr)	59.89	80.51	99.17	113.89	127.13	140.69
Peak Flow Rate (L/s)	21.41	28.78	35.45	40.72	45.45	50.29

Sub-Catchment EC3

Site Area: 0.427 T_c= 15 min C: 0.59

Return Period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Rainfall Intensity (mm/hr)	59.89	80.51	99.17	113.89	127.13	140.69
Peak Flow Rate (L/s)	42.18	56.70	69.84	80.21	89.54	99.09

Sub-Catchment EC4

Site Area: 4.49 T_c= 16.54 min C: 0.60

Return Period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Rainfall Intensity (mm/hr)	56.46	75.90	492.46	107.37	119.88	132.74
Peak Flow Rate (L/s)	422.55	568.02	3685.54	803.54	897.21	993.44

Sub-Catchment EC5

Site Area: 1.2749 T_c= 15 min C: 0.71

Return Period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Rainfall Intensity (mm/hr)	59.89	80.51	99.17	113.89	127.13	140.69
Peak Flow Rate (L/s)	150.17	201.86	248.64	285.56	318.76	352.75

DEVELOPMENT: 51-57 Tannery Street

CONSULTANT: LEA Consulting Ltd

MAJOR DRAINAGE AREA: Mullet Creek

MISSISSAUGA Transportation and Works

STORM DRAINAGE DESIGN CHART

FOR CIRCULAR DRAINS FLOWING FULL

SHEET No.:

DATE: August-06-20

DESIGNED BY: F.M.

CHECKED BY: F.M.

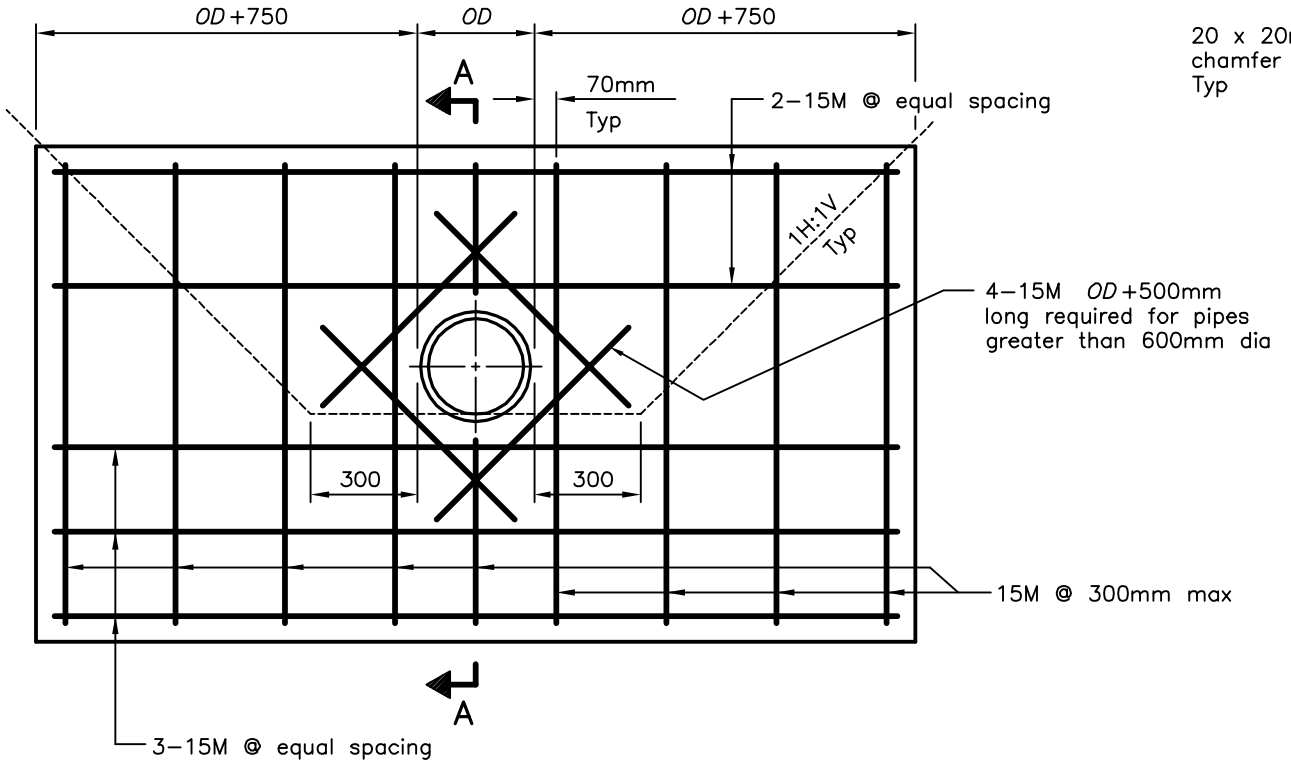
City of Mississauga Intensity 10yr = $1010/(tc+4.6)^{0.78}$

FROM UPSTREAM	TO DOWNSTREAM	Catchment AREA	RUNOFF COEFFICIENT	AREA TIMES RUNOFF COEFFICIENT	ACCUMULATIVE AREA DRAINED BY SECTION	ACCUMULATIVE AREA TIMES RUNOFF COEFFICIENT FOR SECTION	FLOW TIME TO SECTION FROM EXTREME UPSTREAM INLET	INITIAL TIME OF CONCENTRATION AT EXTREME UPSTREAM INL.	TIME OF CONCENTRATION UPSTREAM END OF SECTION	INTENSITY OF RAINFALL	QUANTITY OF FLOW TO BE ACCOMODATED IN SECTION	TYPE OF PIPE	MANNING ROUGHNESS COEFFICIENT	SLOPE	DIAMETER	LENGTH OF SECTION	VELOCITY OF FLOW WITH PIPE FLOWING FULL	CAPACITY OF PIPE FLOWING FULL	PIPE INVERT AT UPSTREAM M.H.	PIPE INVERT AT DOWNSTREAM M.H.	TIME OF FLOW IN SECTION	QUANTITY OF FLOW TO PIPE FLOWING FULL	NOTES
MH#	MH#	A ha	C	AxC	SUM. A ha	SUM AxC	tc_f min	tc_i min	$tc=tc_f+tc_i$ min	i mm/hr	Q=iAC/360 L/sec		n	S %	D mm	L m	V m/sec	Q_f m3/sec	m	m	t=L/Vx60 min	Q/Q_f %	
MH4	MH3	0.1022	0.65	0.07	0.1022	0.07	0	15	15.00	99.17	**18.3**	PVC	0.013	1.14	300	18.64	1.4607	103.25	155.77	155.56	0.2127	0.1772	Sub-catchment SC-1
MH3	CBMH2	0	0	0	0.1022	0.07	0.21	15	15.21	98.33	**18.1**	PVC	0.013	0.91	375	51.52	1.5143	167.25	155.48	155.01	0.567	0.1085	Sub-catchment SC-1
DICB2	CBMH2	3.200									**542.8**	CONC	0.013	1.52	600	9.9	2.6774	756.98	154.41	154.26	0.0616	0.7171	External minor and major flow from Pearl St. and broadwat St. based on the City's record. sub-catchment EC1: (Q_{10}= 351.3 l/s; Q_{100}=492.5 l/s) Minor and Major flow from Railway ditches- Sub-catchment EC2: (Q_{100}= 50.3 l/s)
CBMH2	CBMH1	0.2138	0.57	0.12	0.316	0.19	0.57	15	15.57	97.0	**593.5**	CONC	0.013	0.60	750	68.53	1.95	862.3	154.11	153.70	0.59	0.69	Sub-catchment SC2
CBMH1	Ex. DCBMH1	0.1853	0.55	0.10	0.50	0.29	0.59	15.57	16.15	94.8	**643.8**	CONC	0.013	0.59	750	113.28	1.94	855.1	153.68	153.01	0.98	0.75	Sub-catchment SC3 & Dischared flow from the site: 24.53 L/S
Ex. DCBMH1	MH1	0.4270	0.59	0.25	0.93	0.54	0.98	16.15	17.13	91.5	**705.1**	CONC	0.013	0.70	750	14.20	2.11	931.4	152.99	152.89	0.11	0.76	Minor Flow from EC3
MH1	Ex. DCBMH2	4.4900	0.60	2.69	5.42	3.24	0.11	17.13	17.24	91.1	**1386.6**	CONC	0.013	2.09	750	51.60	3.64	1609.4	152.81	151.73	0.24	0.86	Minor flow from EC4. based on the City's records: A= 4.49ha, C=0.6, Q=699l/s, Tc=16.54 min
Ex. DCBMH2	Ex. DCBMH3	1.2750	0.71	0.91	6.69	4.14	0.24	17.24	17.48	90.4	**1607.0**	CONC	0.013	1.02	900	27.40	2.87	1828.3	151.58	151.30	0.16	0.88	Sub-catchment EC5
Ex. DCBMH3	Outfall	0.0000	0.00	0.00	6.69	4.14	0.24	17.48	17.71	89.6	**1598.4**	CONC	0.013	1.00	900	21.90	2.85	1810.3	151.27	151.05	0.13	0.88	

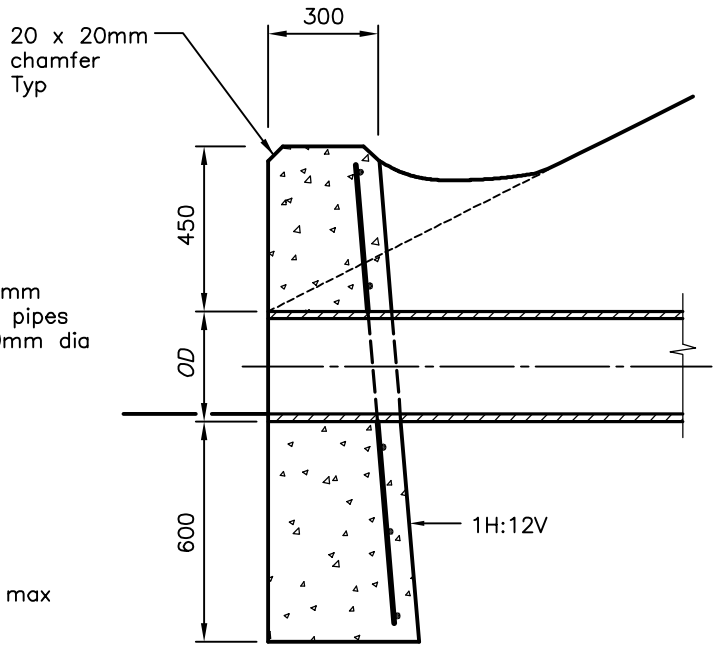
Refer to Fig. 3 in Appendix G for Sewers Drainage Area Plan

Existing Outfall

Existing Outfall



FRONT ELEVATION



SECTION A–A

LEGEND:

OD – Outside diameter of pipe

NOTES:

A This OPSD to be read in conjunction with OPSD 3940.150.

B If a steel grate is required, refer to OPSD 804.05.

C Class of concrete: 30MPa.

D Cover to reinforcing bars 70mm ± 20mm.

E All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

CONCRETE HEADWALL

FOR PIPE LESS THAN 900mm DIAMETER

Nov 2017 | Rev 2

ONTARIO STANDARDS – MUNICIPAL – PROVINCIAL

OPSD 804.030

APPENDIX D

Overland Flow calculations for Emby Drive Extension

DEVELOPMENT: 51-57 Tannery Street

CONSULTANT: LEA Consulting Ltd

MAJOR DRAINAGE AREA: Mullet Creek

MISSISSAUGA Transportation and Works

STORM DRAINAGE DESIGN CHART

FOR CIRCULAR DRAINS FLOWING FULL

SHEET No.:

DATE: July-31-20

DESIGNED BY: F.M.

CHECKED BY: R.B.

City of Mississauga Intensity 10yr = $1010/(tc+4.6)^{0.78}$

City of Mississauga Intensity 100yr = $1450/(tc+4.9)^{0.78}$

STREET NAME	CATCHBASIN No.	Catchment AREA	RUNOFF COEFFICIENT	AREA TIMES RUNOFF COEFFICIENT	ACCUMULATIVE AREA DRAINED BY SECTION	ACCUMULATIVE AREA TIMES RUNOFF COEFFICIENT FOR SECTION	TIME OF CONCENTRATION	INTENSITY OF RAINFALL (10yr)	INTENSITY OF RAINFALL (100yr)	Inlet Capacity (10yr flow)	CARRY OVER (100YR-10-YR) *	GUTTER SLOPE	GUTTER VELOCITY	CARRY OVER TIME	DEPTH AT CURB
		A ha	C	AxC	SUM. A ha	SUM AxC	tc min	I(10) mm/hr	I(100) mm/hr	Q=iAC/360 L/sec	Q=iAC/360 L/sec	% 	v m/s	T min	d m
Emby Dr. Extension (From Tannery to the site entrance)	6	0.4518	0.64	0.29	0.4518	0.29	15	99.17	140.69	**79.6**	**61.6**	0.010	0.61	5	0.05
Ex. Ebmy Dr. (From site entrance to Thomas St.)	10	0.8788	0.61	0.54	0.8788	0.54	20	83.06	118.12	**123.7**	**96.2**	0.013	0.78	1.9	0.06

* Adjastment factor of 1.25 has been considered in 100-year flow calculations

APPENDIX E

Sanitary and Water Demand Calculations

LEA Consulting Ltd. Consulting Engineers and Planners	Sanitary Flow Rate Calculation Building A to F			
	Prepared:	F.M.	Page No.	F-01
	Checked:	M.D.		
Project: 51-57 Tannery Street **City Of Mississauga**	Proj. #	18038		
	Date:	31-Jul-20		

POPULATION CALCULATION

Total Site Area	9300	m^2
Number of Townhoses	142	units

Proposed Building Type	**Density** (P.P.U)	**Population**
Residential	2.7	383.40
Total		**383.40**

SANITARY FLOW CALCULATION

Harmon Peaking Factor: $M=1+14/(4+P^{0.5})$

Peaking Factor	4.03	
Average Daily Wastewater Flow	302.8	L/cap/day
Total Actual Domestic Flow	5.42	L/sec
Total Domestic Flow (For less than 1000 person shall be 13.0 L/sec-STD.DWG. 2-5-2, Region of Peel)	13.00	L/sec
Infiltration Allowance (@ 0.2 L/sec/ha)	0.19	L/sec
Actual Design flow	**5.60**	L/sec
Standard Design Flow	**13.19**	L/sec

LEA Consulting Ltd. Consulting Engineers and Planners	Sanitary Flow Rate Calculation Building G			
	Prepared:	F.M.	Page No.	F-02
	Checked:	M.D.		
Project: 51-57 Tannery Street **City Of Mississauga**	Proj. #	18038		
	Date:	31-Jul-20		

POPULATION CALCULATION

Total Site Area	750	m^2
Number of Townhoses	5	units

Proposed Building Type	**Density** (P.P.U)	**Population**
Residential	2.7	13.50
Total		**13.50**

SANITARY FLOW CALCULATION

Harmon Peaking Factor: $M=1+14/(4+P^{0.5})$

Peaking Factor	4.40	
Average Daily Wastewater Flow	302.8	L/cap/day
Total Actual Domestic Flow	0.21	L/sec
Total Domestic Flow (For less than 1000 person shall be 13.0 L/sec-STD.DWG. 2-5-2, Region of Peel)	13.00	L/sec
Infiltration Allowance (@ 0.2 L/sec/ha)	0.02	L/sec
Actual Design flow	**0.22**	L/sec
Standard Design Flow	**13.02**	L/sec

LEA Consulting Ltd. Consulting Engineers and Planners	Water Demand Calculation (Building B)			
	Prepared:	F.M.	Page No.	F-03
	Checked:	M.D.		
Project: 51-57 Tannery Street	Proj. #	18038		
City Of Mississauga	Date:	31-Jul-20		

This calculation is following the "Water Supply for Public Fire Protection"
by Fire Underwriters Survey.

Formula: $F = 220C\sqrt{A}$

where

F = the required fire flow in litres per minute
C = coefficient related to the type of construction.
= 1.0 for Ordinary construction
A = the total floor area in square metres.

Step 1

According the Block B stats,

	Area (m2)	
Level 1	318	
Level 2	326	
Level 3	326	
A	970	GFA area has been calculated according to the proposed Fire wall

Therefore, F = 7000 **l/min**

Step 2

Occupancy reduction:

For occupancies with a low contents fire hazard, the reduction rate is 15%,
this building is not a low content fire hazard,
Therefore: F = 7000 l/min

Step 3

Reduction for sprinkler protection:

Using the NFPA sprinkler system, a reduction rate of 30% is used.
There is no sprinkler system,
Therefore: F = 7000 l/min

Step 4

Separation charge:

Charge for the separations on each side:

Separation	Charge	
3.1-10 m	20%	West
More than 45 m	0%	North
20.1 to 30 m	10%	South
0-3m	25%	East

Total charge in %	55%
Total charge in l/min	3850

Required Fire Flow:	11000	l/min
or	183.33	l/s
or	2906	US GPM

LEA Consulting Ltd. Consulting Engineers and Planners	Water Demand Calculation (Building B)			
	Prepared:	F.M.	Page No.	F-04
	Checked:	M.D.		
Project: 51-57 Tannery Street **City Of Mississauga**	Proj. #	18038		
	Date:	31-Jul-20		

Total Population: **383** (See Page F-01)

Peak Hour Demand Calculation:

Residential Per Capita Demand	280	L/cap/day
Peaking Factor	3	
Peak Hour Demand	**3.73**	L/sec

Maximum Day Demand Calculation:

Residential Per Capita Demand	280	L/cap/day
Peaking Factor	2	
Maximum Day Demand	**2.49**	L/sec
Fire Flow for Residential:	183.33	L/sec
Max. Day Demand plus Fire Flow:	**185.82**	L/sec
Design Water Demand	**185.82**	L/sec
or	**2945.22**	**US GPM**

LEA Consulting Ltd. Consulting Engineers and Planners	Water Demand Calculation (Building G)			
	Prepared:	F.M.	Page No.	F-05
	Checked:	M.D.		
Project: 51-57 Tannery Street	Proj. #	18038		
City Of Mississauga	Date:	31-Jul-20		

This calculation is following the "Water Supply for Public Fire Protection"
by Fire Underwriters Survey.

Formula: $F = 220C\sqrt{A}$

where

F = the required fire flow in litres per minute
C = coefficient related to the type of construction.
= 1.0 for Ordinary construction
A = the total floor area in square metres.

Step 1

According the Block B stats,

	Area (m2)
Level 1	165
Level 2	265
Level 3	288
A	718

Therefore, F = 6000 **l/min**

Step 2

Occupancy reduction:

For occupancies with a low contents fire hazard, the reduction rate is 15%,
this building is not a low content fire hazard,
Therefore: F = 6000 l/min

Step 3

Reduction for sprinkler protection:

Using the NFPA sprinkler system, a reduction rate of 30% is used.
There is no sprinkler system,
Therefore: F = 6000 l/min

Step 4

Separation charge:

Charge for the separations on each side:

Separation	Charge	
More than 45 m	0%	West
More than 45 m	0%	North
10.1 to 20 m	15%	South
20.1 to 30 m	10%	East

Total charge in %	25%
Total charge in l/min	1500

Required Fire Flow: 8000 l/min
or 133.33 l/s
or 2113 US GPM

LEA Consulting Ltd. Consulting Engineers and Planners	Water Demand Calculation (Building G)			
	Prepared:	F.M.	Page No.	F-06
	Checked:	M.D.		
Project: 51-57 Tannery Street **City Of Mississauga**	Proj. #	18038		
	Date:	31-Jul-20		

Total Population: **14** (See Page F-01)

Peak Hour Demand Calculation:

Residential Per Capita Demand	280	L/cap/day
Peaking Factor	3	
Peak Hour Demand	**0.13**	L/sec

Maximum Day Demand Calculation:

Residential Per Capita Demand	280	L/cap/day
Peaking Factor	2	
Maximum Day Demand	**0.09**	L/sec
Fire Flow for Residential:	133.33	L/sec
Max. Day Demand plus Fire Flow:	**133.42**	L/sec
Design Water Demand	**133.42**	L/sec
or	**2114.72**	**US GPM**

APPENDIX F

Single Use Demand Table, Hydrant Flow Test Data and Watermain Adequacy Assessment

LEA Consulting Ltd. Consulting Engineers and Planners	Connection Demand Table (Building A to F)			
	Prepared:	F.M.	Page No.	G-01
	Checked:	R.B.		
Project: 51-57 Tannery Street **City Of Mississauga**	Proj. #	18038		
	Date:	31-Jul-20		

Connection Demand Table

WATER CONNECTION

Connaction Point	Emby Drive Extension
Pressure zone of connection point	Zone 3
Total equivalent population to be serviced	383.4 Person- Based on 2.7 PPU
Total lands to be serviced	0.93 ha

HYDRANT FLOW TEST

Hydrant flow test location	Tannery Street		
	Pressure (kPa)	Flow (l/s)	Time
Minimum water pressure	54	683.5	
Maximum water pressure	58	983.3	
Hydrant flow test location	Thomas Street		
	Pressure (kPa)	Flow (l/s)	Time
Minimum water pressure	71	696.2	
Maximum water pressure	73	602.9	

*See fire hydrant flow tests

No.	Wate Demand Demand type	Demand	Units
1	Average day flow	1.25	l/s
2	Maximum day flow	2.49	l/s
3	Peak hour flow	3.73	l/s
4	*Fire flow	183.33	l/s
Analysis			
5	Maximum day plus fire flow	185.82	l/s

*See fire calculations

Wastewater Connection

Connaction Point	Emby Drive Extension, MH2A
Total equivalent population to be serviced	383 Person- Based on 2.7 PPU
Total lands to be serviced	0.93 ha
Wastewater sewers effluent (l/s)	*13.19

*As per Region of Peel Guidelines, population less than 1000 person, sewage flow is to be 13.0 L/s

LEA Consulting Ltd. Consulting Engineers and Planners	Connection Demand Table (Building G)			
	Prepared:	F.M.	Page No.	G-02
	Checked:	R.B.		
Project: 51-57 Tannery Street **City Of Mississauga**	Proj. #	18038		
	Date:	31-Jul-20		

Connection Demand Table

WATER CONNECTION

Connaction Point	Emby Drive Extension
Pressure zone of connection point	Zone 3
Total equivalent population to be serviced	14 Person- Based on 2.7 PPU
Total lands to be serviced	0.075 ha

HYDRANT FLOW TEST

Hydrant flow test location	Tannery Street		
	Pressure (kPa)	Flow (l/s)	Time
Minimum water pressure	54	683.5	
Maximum water pressure	58	983.3	
Hydrant flow test location	Thomas Street		
	Pressure (kPa)	Flow (l/s)	Time
Minimum water pressure	71	696.2	
Maximum water pressure	73	602.9	

*See fire hydrant flow tests

No.	Wate Demand Demand type	Demand	Units
1	Average day flow	0.045	l/s
2	Maximum day flow	0.09	l/s
3	Peak hour flow	0.13	l/s
4	*Fire flow	133.33	l/s
Analysis			
5	Maximum day plus fire flow	133.42	l/s

*See fire calculations

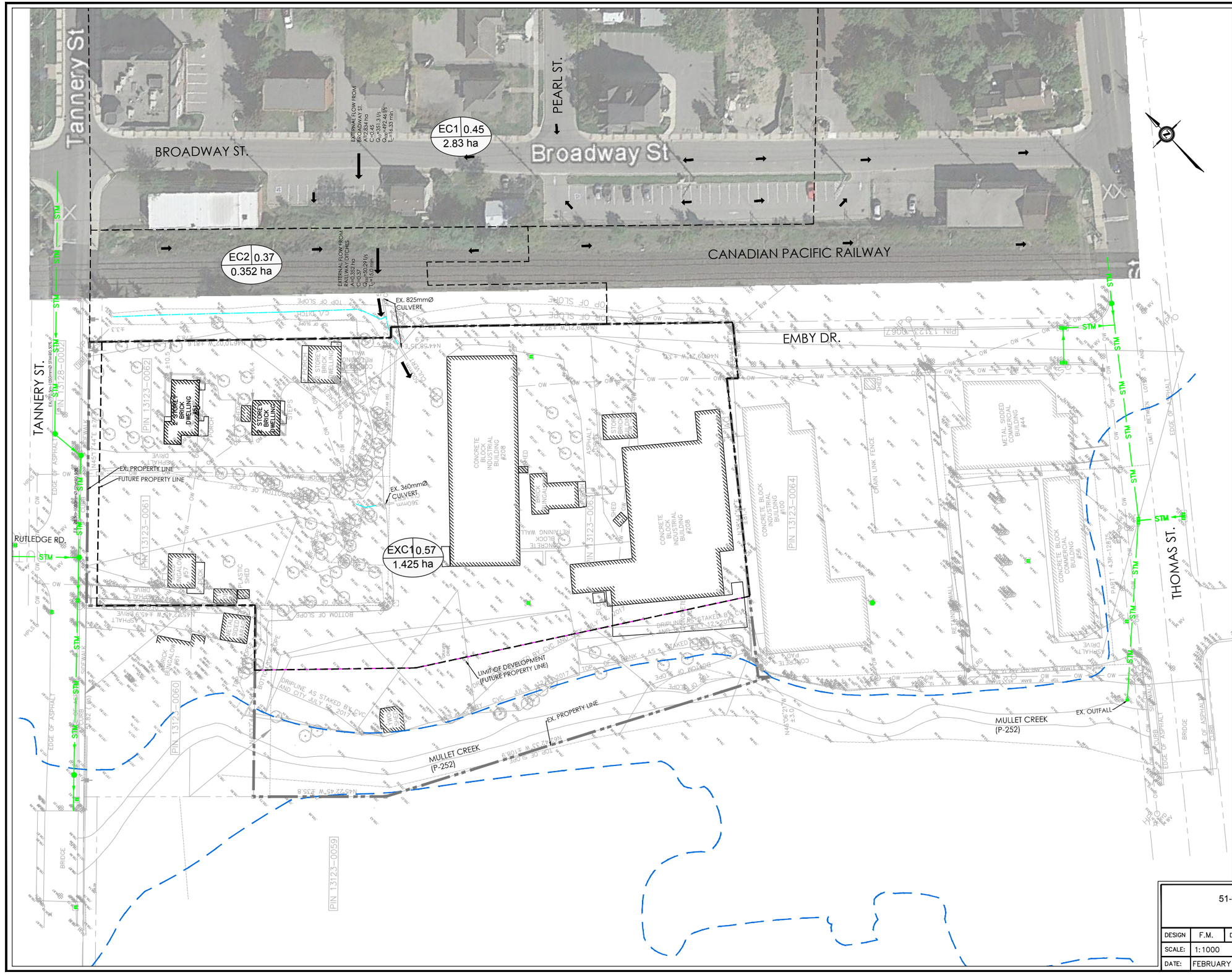
Wastewater Connection

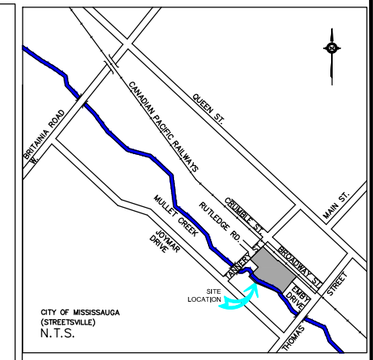
Connaction Point	Emby Drive Extension
Total equivalent population to be serviced	14 Person- Based on 2.7 PPU
Total lands to be serviced	0.075 ha
Wastewater sewers effluent (l/s)	*13.02

*As per Region of Peel Guidelines, population less than 1000 person, sewage flow is to be 13.0 L/s

APPENDIX G

Figures and Drawing





LEGEND

- EXISTING STORM MANHOLE
- EXISTING SANITARY MANHOLE
- EXISTING CATCHBASIN
- HP EXISTING HYDROPOLE
- LS EXISTING LIGHT STANDARD
- HPLS EXISTING HYDROPOLE/LIGHT STANDARD
- WV EXISTING WATER VALVE
- HYD EXISTING FIRE HYDRANT
- BLRD EXISTING BOLLARD
- CS EXISTING CURB STOP
- EXISTING MONITORING WELL
- OW EX. OVERHEAD WIRES
- X EXISTING FENCE
- PROPERTY LINE
- EXISTING TREE
- EXISTING DITCH
- REGIONAL FLOOD LINE (FROM MULLET CREEK FLOOD RISK MAP)
- OVERLAND FLOW ROUTE
- PROP. DEVELOPMENT DRAINAGE BOUNDARY
- C1 0.25 0.388 ha — CATCHMENT ID/RUNOFF COEFFICIENT DRAINAGE AREA (ha)
- EXISTING BUILDING

CITY OF MISSISSAUGA
REGIONAL MUNICIPALITY OF PEEL

No.	DATE	DESCRIPTION
1	2018/06/08	ISSUED FOR ZBA
2	2019/06/27	ISSUED FOR ZBA RESUBMISSION
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625 Cochrane Drive, Suite 900
Markham, Ontario
L3R 9R9, Canada
Tel: (905)470-0015, Fax: (905)470-0030

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Consulting Engineers and Planners
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51-57 TANNERY STREET DEVELOPMENT

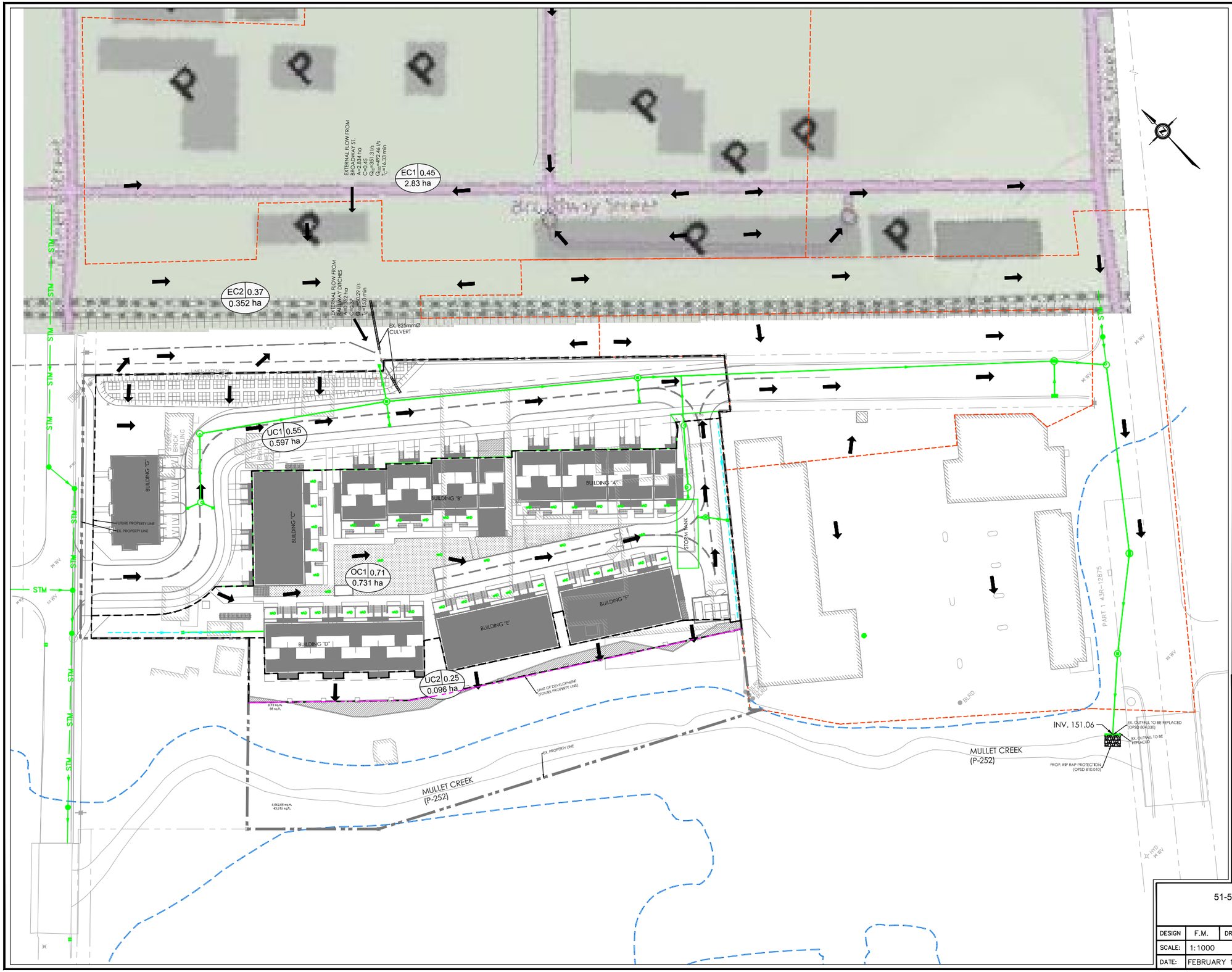
EXISTING STORM DRAINAGE PLAN

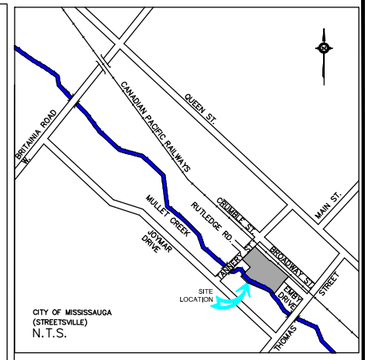
DESIGN	F.M.	DRAWN	F.M.	CHECKED	R.B.	CONTRACT No.	18038
SCALE:	1:1000			DRAWING NUMBER		FIG.01	
DATE:	FEBRUARY 10, 2018						

Aug 05, 2020 - 4:50pm

DRAWING NAME: P:\18038\Drafting\Contract Drawings\FIG01-Ex drainage Plan.dwg

(11"x17" / 279 x 431 mm)





LEGEND

- EXISTING STORM MANHOLE
- EXISTING SANITARY MANHOLE
- EXISTING CATCHBASIN
- HP EXISTING HYDROPOLE
- LS EXISTING LIGHT STANDARD
- HPLS EXISTING HYDROPOLE/LIGHT STANDARD
- WV EXISTING WATER VALVE
- HYD EXISTING FIRE HYDRANT
- BLRD EXISTING BOLLARD
- CS EXISTING CURB STOP
- EXISTING MONITORING WELL
- OW EX. OVERHEAD WIRES
- X EXISTING FENCE
- PROPERTY LINE
- EXISTING TREE
- EXISTING DITCH
- PROPOSED DITCH
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- PROPOSED CATCHBASIN
- AD PROPOSED AREA DRAIN
- REGIONAL FLOOD LINE (FROM MULLET CREEK FLOOD RISK MAP)
- OVERLAND FLOW ROUTE
- PROP. DEVELOPMENT DRAINAGE BOUNDARY
- DRAINAGE BOUNDARY
- C1 0.25 / 0.388 ha CATCHMENT ID/RUNOFF COEFFICIENT DRAINAGE AREA (ha)
- PROP. TREE

MISSISSAUGA

CITY OF MISSISSAUGA
REGIONAL MUNICIPALITY OF PEEL

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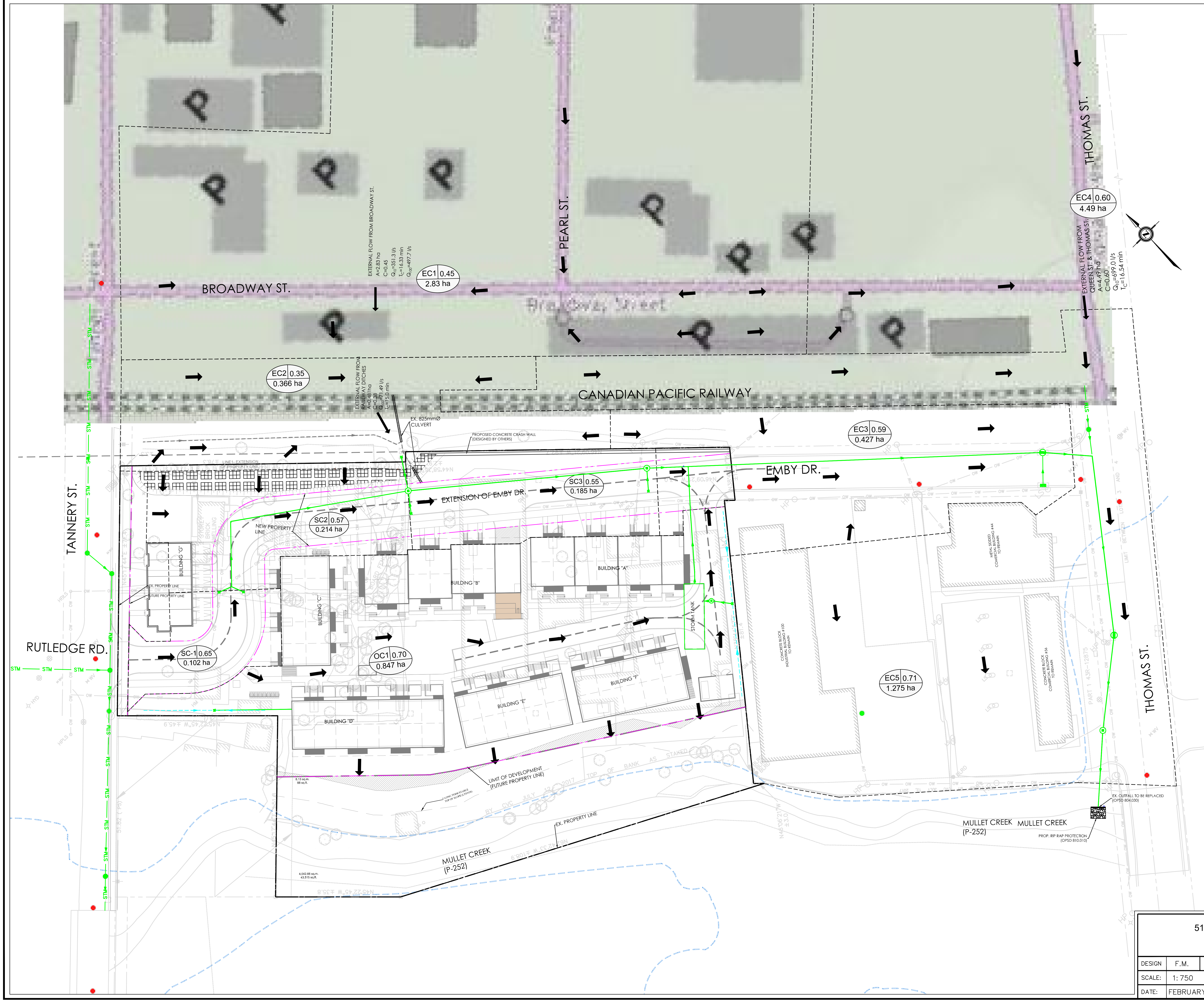
51-57 TANNERY STREET DEVELOPMENT
PROPOSED STORM DRAINAGE PLAN

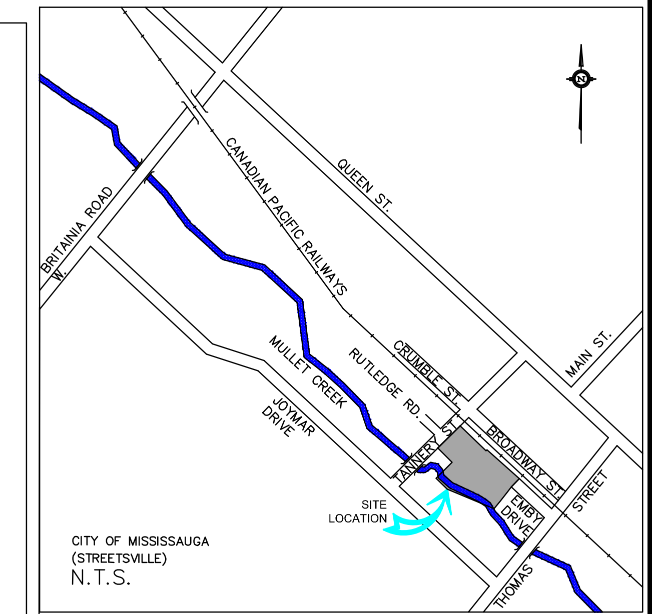
DESIGN	F.M.	DRAWN	F.M.	CHECKED	M.D.	CONTRACT No.	18038
SCALE:	1:1000			DRAWING NUMBER		FIG.02	
DATE:	FEBRUARY 10, 2018						

(11"x17" / 279 x 431 mm)

Aug 05, 2020 - 4:54pm

DRAWING NAME: P:\18038\Drafting\Contract Drawings\FIG2-Prop drainage Plan.dwg





LEGEND

- EXISTING STORM MANHOLE
- EXISTING SANITARY MANHOLE
- EXISTING CATCHBASIN
- EXISTING HYDROPOLE
- EXISTING LIGHT STANDARD
- EXISTING HYDROPOLE/LIGHT STANDARD
- EXISTING WATER VALVE
- EXISTING FIRE HYDRANT
- EXISTING BOLLARD
- EXISTING CURB STOP
- EXISTING MONITORING WELL
- EX. OVERHEAD WIRES
- EXISTING FENCE
- PROPERTY LINE
- EXISTING DITCH
- PROPOSED DITCH
- PROPOSED AREA DRAIN
- REGIONAL FLOOD LINE (FROM MULLET CREEK FLOOD RISK MAP)
- OVERLAND FLOW ROUTE
- DRAINAGE BOUNDARY
- CATCHMENT ID/RUNOFF COEFFICIENT DRAINAGE AREA (ha)
- PROP. TREE

CITY OF MISSISSAUGA
REGIONAL MUNICIPALITY OF PEEL

No.	DATE	DESCRIPTION
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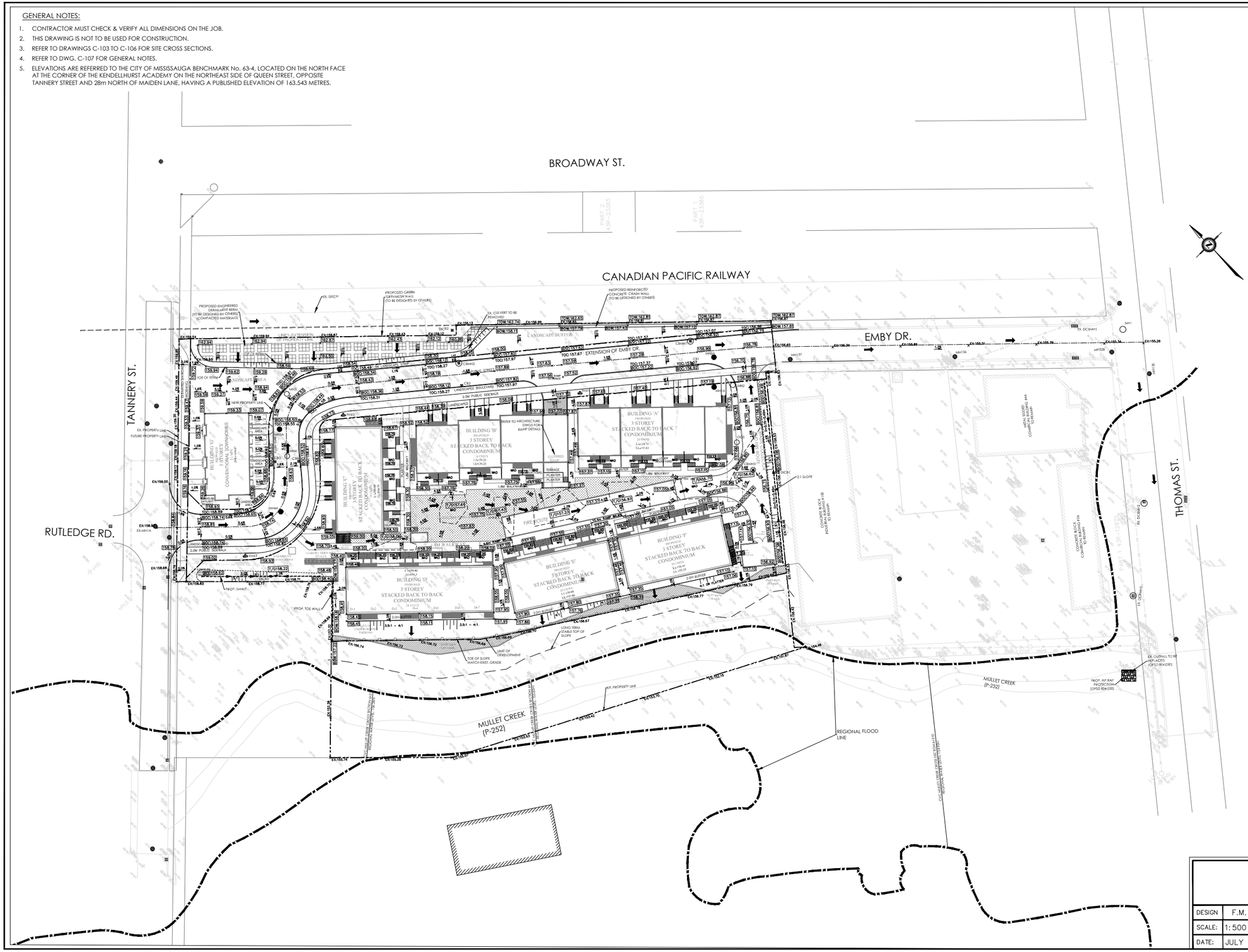
51-57 TANNERY STREET DEVELOPMENT
STORM SEWERS DRAINAGE PLAN

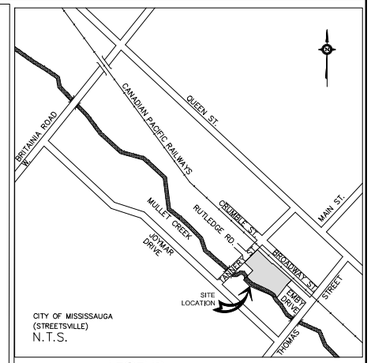
DESIGN	F.M.	DRAWN	F.M.	CHECKED	M.D.	CONTRACT No. 18038
SCALE:	1: 750			DRAWING NUMBER	FIG.03	
DATE:	FEBRUARY 10, 2018					

(22"x17" / 558 x 431 mm)

GENERAL NOTES:

1. CONTRACTOR MUST CHECK & VERIFY ALL DIMENSIONS ON THE JOB.
2. THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION.
3. REFER TO DRAWINGS C-103 TO C-106 FOR SITE CROSS SECTIONS.
4. REFER TO DWG. C-107 FOR GENERAL NOTES.
5. ELEVATIONS ARE REFERRED TO THE CITY OF MISSISSAUGA BENCHMARK No. 63-4, LOCATED ON THE NORTH FACE AT THE CORNER OF THE KENDELLHURST ACADEMY ON THE NORTHEAST SIDE OF QUEEN STREET, OPPOSITE TANNERY STREET AND 28m NORTH OF MAIDEN LANE, HAVING A PUBLISHED ELEVATION OF 163.543 METRES.





LEGEND

- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED FIRE HYDRANT
- EXISTING STORM MANHOLE
- EXISTING SANITARY MANHOLE
- EXISTING CATCHBASIN
- HP EXISTING HYDROPOLE
- LS EXISTING LIGHT STANDARD
- HPLS EXISTING HYDROPOLE/LIGHT STANDARD
- WV EXISTING WATER VALVE
- HYD EXISTING FIRE HYDRANT
- BLRD EXISTING BOLLARD
- CS EXISTING CURB STOP
- EXISTING MONITORING WELL
- OH — OH — EX. OVERHEAD WIRES
- X — X — EXISTING FENCE
- PROPERTY LINE
- PROPOSED DITCH / SWALE
- AD PROPOSED AREA DRAIN
- 158.47 EXISTING SURVEY ELEVATION
- EX: 158.32 EXISTING ELEVATION
- 158.32 PROPOSED ELEVATION
- TOC158.26 PROPOSED TOP OF CURB ELEVATION
- BOC158.11 PROPOSED BOTTOM OF CURB ELEVATION
- BOD157.20 PROPOSED BOTTOM OF DITCH ELEVATION
- OVERLAND FLOW ROUTE
- 100-yr TEMPORARY PONDING
- GM EXISTING GAS METER
- EXISTING TREE
- PROP. TREE
- EXISTING SIGN
- REGIONAL FLOOD LINE (FROM MULLET CREEK FLOOD RISK MAP)
- EXISTING BUILDING

CITY OF MISSISSAUGA
REGIONAL MUNICIPALITY OF PEEL
FILE No.: OZ 18-12

No.	DATE	DESCRIPTION
1	2018/06/08	ISSUED FOR ZBA
2	2019/04/27	ISSUED FOR ZBA RESUBMISSION
3	2020/08/07	ISSUED FOR ZBA RESUBMISSION

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F. MORSHEDI
100079090
AUG.07, 2020
PROVINCE OF ONTARIO

51-57 TANNERY STREET DEVELOPMENT

PRELIMINARY SITE GRADING PLAN

DESIGN	F.M.	DRAWN	S.X.	CHECKED	A.C.	CONTRACT No.	18038
SCALE:	1:500 (FULL SIZE)			DRAWING NUMBER		C-100	
DATE:	JULY 2020						

NOTES:

1. ELEVATIONS ARE REFERRED TO THE CITY OF MISSISSAUGA BENCHMARK NO. 63-4, LOCATED ON THE NORTH FACE AT THE CORNER OF THE KENDELLHURST ACADEMY ON THE NORTHEAST SIDE OF QUEEN STREET, OPPOSITE TANNERY STREET AND 28M NORTH OF MAIDEN LANE, HAVING A PUBLISHED ELEVATION OF 163.543 METRES.
2. ALL EXISTING UTILITIES WITHIN THE MAIN PROPERTY LINE INCLUDING CATCH BASINS, LIGHT STANDARDS, HYDRO POLES, OVERHEAD WIRES, GAS METERS AND FENCES TO BE REMOVED.
3. REFER TO DRAWING C-103 TO C-106 FOR SITE CROSS SECTIONS.
4. REFER TO DWG. C-107 FOR GENERAL NOTES.

PROPOSED STORM SEWER MANHOLES

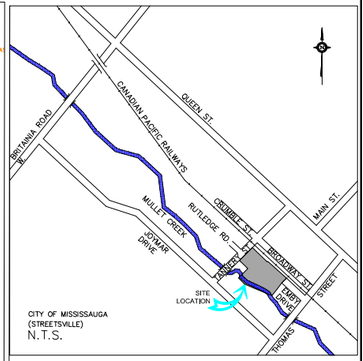
NO.	TOP. EL. (m)	INVERT (m) N	INVERT (m) E	INVERT (m) W	INVERT (m) S	OPSD NUMBER	
MH1 (1500mm)	155.56			152.89	152.81	701.011	401.010
MH2 (1200mm)	156.95	154.12			154.37	701.010	401.010
MH3 (1200mm)	158.48		155.48		155.56	701.010	401.010
MH4 (1200mm)	158.57	155.77	155.92	156.29		701.010	401.010
OGS	156.94	154.54			154.61		

PROPOSED SANITARY MANHOLES

NO.	TOP. EL. (m)	INVERT (m) N	INVERT (m) E	INVERT (m) W	INVERT (m) S	REGIONAL STANDARD	
MH1A (1200mm)	157.10	153.79			153.82	2–5–3	2–6–6
MH2A (1200mm)	156.88		153.55		153.70	2–5–3	2–6–6
MH3A (1200mm)	158.51			157.18	157.03	2–5–3	2–6–6
MH4A (1200mm)	158.73			155.98	156.79	2–5–3	2–6–6

PROPOSED STORM CATCHBASIN

NO.	TOP. EL. (m)	INVERT (m) N	INVERT (m) E	INVERT (m) W	INVERT (m) S	OPSD NUMBER	
CB1	156.96	154.49				705.010	400.020
CB2	157.98	155.51				705.010	400.020
CB3	158.57		156.37			705.010	400.020
CB4	158.53			155.99		705.010	400.020
DICB1	156.08			154.83		705.030	403.010
DICB2	156.34				154.41	705.040	403.010
DICB3	158.22		156.76			705.030	403.010
CBMH1 (1500mm)	156.95		153.68	153.70	154.36	701.011	400.020
CBMH2 (1500mm)	158.11	154.26	154.11	155.01	155.38	701.011	400.020
CBMH3 (1200mm)	156.62		154.77	154.69		701.010	400.020
EX. DCBMH1	155.20		152.99	153.01			
EX. DCBMH2	153.31	151.73			151.58		
EX. DCBMH3	153.79	151.30			151.28		
OUTFALL			151.06			804.030	



LEGEND

- EXISTING STORM MANHOLE
- EXISTING SANITARY MANHOLE
- EXISTING CATCHBASIN
- HP EXISTING HYDROPOLE
- LS EXISTING LIGHT STANDARD
- HPLS EXISTING HYDROPOLE/LIGHT STANDARD
- WV EXISTING WATER VALVE
- HYD EXISTING FIRE HYDRANT
- BLRD EXISTING BOLLARD
- EXISTING MONITORING WELL
- PROPOSED VALVE & BOX
- D PROPOSED DETECTOR CHECK VALVE IN CHAMBER
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- PROPOSED CATCHBASIN
- AD PROPOSED AREA DRAIN
- PROPOSED FIRE HYDRANT
- STM EXISTING STORM SEWER
- SAN EXISTING SANITARY SEWER
- WM EXISTING WATER MAIN
- B EXISTING BELL CABLE
- GAS EXISTING GAS MAIN
- OH OH EX. OVERHEAD WIRES
- X X EXISTING FENCE
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATER MAIN
- PROPERTY LINE
- NEW PROPERTY LINE
- GM EXISTING GAS METER
- EXISTING SIGN
- EXISTING TREE
- PROP. TREE
- REGIONAL FLOOD LINE (FROM MULLET CREEK FLOOD RISK MAP)

MISSISSAUGA

CITY OF MISSISSAUGA
REGIONAL MUNICIPALITY OF PEEL
FILE No.: OZ 18-12

No.	DATE	DESCRIPTION
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LICENSED PROFESSIONAL ENGINEER
F. MORSHEDI
100175030
AUG.07 2020
PROVINCE OF ONTARIO

51-57 TANNERY STREET DEVELOPMENT
PRELIMINARY SITE SERVICING PLAN

DESIGN	F.M.	DRAWN	J.W.	CHECKED	A.C.	CONTRACT No.	18038
SCALE:	1:500 (FULL SIZE)					DRAWING NUMBER	C-101
DATE:	FEBRUARY 10, 2018