NYX Capital Corp.

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT BRIEF

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

June 2019
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 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.

1.2 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.

1.3 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.

1.4 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 storm water 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 existing condition, 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 is1.4 ha.

For purpose of SWM analysis, the development site is divided into two sub-catchments based on post-development scheme, i.e.

Sub-Catchment C1 (Development Lands): Consists of proposed townhouses blocks, fire routes, in-site walkways and soft landscape areas.

Sub-Catchment C2 (Emby Drive Extension): Consists of the extension of Emby Drive from Tannery Street to the south property line of the site

The area and composite runoff coefficients of two sub-catchments are listed in Table 1. Detailed calculations are provided in Appendix A, B and C.

TABLE 1: PRE-DEVELOPMENT RUNOFF COEFFICIENT

Sub-catchment No	Catchment Description	Catchment Area (ha)	Runoff Coefficient
C1	Prop. Residential Development	1.060	0.56
C2	Prop. Extension of Emby Dr.	0.331	0.66

Furthermore, 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.

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

Figure 1 in Appendix H 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 two sub-catchments under pre-development condition are summarized below in Table 3. Detailed calculations are provided in Appendices A, B and C.

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

Sub-catchment No	Sub-Catchment	Return Period (Year)			
		2yr	10yr	100yr	Regional
C1	Prop. Residential Development	99.07	164.04	232.73	149.0
C2	Prop. Extension of Emby Dr.	33.44	55.38	78.56	53.0

3 POST-DEVELOPMENT CONDITIONS

3.1 GENERAL

The proposed development consists of 155 new condominium in seven blocks with underground parking, and a proposed extension on Emby Drive 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 C1 (Development Lands): 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 200 m^3 storm tank is designed at the southeast corner of the development area at underground parking level. The controlled flow from storage tank will be discharged to the proposed storm sewer on the Emby Drive.

Sub-Catchment C2 (Emby Drive Extension): Rainfall runoff from the proposed extension of Emby Drive will be collected by the proposed storm system on the Emby Drive and outlet to the municipal storm sewer on Thomas Street.

The construction of Emby Drive extension and proposed development will block the drainage outlet of Broadway Street and railway to the Mullet Creek. Therefore, all stormwater will be diverted to the new storm sewers under Emby Drive.

Refer to Figure 2 in Appendix F for 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 H.

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 V5.0 program.

Regarding to the 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 ADJACMENT FACTORS

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

Since under post development condition, it is not feasible to implement discharge control for front or back of the proposed buildings, the discharge from proposed residential development will be overcontrolled to satisfy the City's discharge control criteria.

The calculated peak flow rates for the four sub-catchment C1 and C2 under post-development condition are summarized below in Table 5. Detailed calculations are provided in Appendices A, B and C.

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

Sub-catchment No		Sub-Catchment	Return Period (Year)			
			2yr	10yr	100yr	Regional
C1	OC1	Prop. Residential Development	97.94	162.17	287.59	123.0
	UC1, UC2 & UC3		10.91	18.06	32.04	28.0
C2		Prop. Extension of Emby Dr.	38.83	64.29	114.01	55.0

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 the front areas of building A, B, C and D along the Tannery Street and Emby Drive Extension (sub-catchment UC1 and UC2) and back areas of the buildings E, F and G along the Mullet Creek (sub-catchment UC3). Therefore, the discharge from proposed residential development (sub-catchment OC1) will be overcontrolled to satisfy the City's discharge control criteria.

As a result, the allowable flow rate from proposed residential development or sub-catchment OC1 is estimated 131.63 l/s.

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 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
C1-Prop. Residential Development	35.1	51.1	0.56	0.66	232.73	324.16*
C2-Prop. Extension of Emby Dr.	34.0	78.6	0.54	0.69	78.56	126.67**

*The calculated 100yr will be 259.3 l/s without considering the runoff coefficient adjustment factor.

**The calculated 100yr will be 101.3 l/s without considering the runoff coefficient adjustment factor.

As shown in the Table 6 The imperviousness and runoff coefficient will be increase under post development conditions. Therefore, mitigation measures will be required for sub-catchment C1 in accordance with the CVC's design criteria.

Provided that future Emby Drive extension will be a typical linear development with 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.

4 PROPOSED SWM PLAN – SUB-CATCHMENT C1

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 34.7 m^3 is required for sub-catchment C1. Refer to Appendix A for calculations.

A large landscape area and permeable pavements for fire routes and internal walkways 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 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 flows rate 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 are calculated as shown in Appendix A and summarized in Table 7 below.

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

Sub-Catchment No.	Sub-Catchment	2yr	10yr	100yr
C1	Prop. Condominium Area	0.0	27.15	140.03

Based on the proposed site condition for sub-catchment C1, a stormwater storage tank, located in the southeast corner of the underground parking is proposed and provide a total storage volume of 220 m^3 for water balance and water quantity control. Refer to Dwg. C101–Site Servicing Plan in Appendix H 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, pumping system will be required to discharge flow. Related pump and orifice control device will be determined 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, and all storm runoff will not discharge into the adjacent properties.

Refer to Dwg.C-100 in Appendix H for 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 C1, 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 front areas of building A, B, C and D and back areas of the buildings E, F and G (sub-catchment UC1, UC2 and UC3) will be uncontrolled and directly discharged to the Tannery Street, Emby Drive Extension and Mullet Creek. More than 86% of these areas will be covered by soft landscape and the rest of area includes permeable pavement and buildings entrance stairs. Therefore, the runoff from uncontrolled areas would 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 blocks rooftop are 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, landscape and permeable pavements. Table 8 provides a preliminary estimate of 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	3738	80	35.3
Permeable Pavement	1704	50	10.1
Paved Areas and lower courtyards	1538	0.0	0.0
Landscape	1486	80	14.0
OGS	8466	50	50.0
Total	8466	-	>80.0

To achieve a TSS removal of 80%, a CDS stormwater quality treatment facility model “PMSU2020-5” is

proposed. Sizing details are provided in Appendix A.

This quality treatment unit will be installed within the fire route at south of the site and prior to storage tank. The exact location will be determined by the project team mechanical engineer and architect in the next stage of design.

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 is 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 C2

The proposed Emby Drive Extension will be a municipal road. Under 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 new 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 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 construction of the residential development, it should be captured by a 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 H for drainage area plan. Design sheet of the pipe size calculations is presented in Appendix D.

Based on the pipe size calculations, the last two legs of the existing 600mm storm pipe in Thomas Street must be 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 outlet or downstream of the outfall. Picture of the existing outfall is presented in Appendix D.

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 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 would be 0.04m at the face of the curb that means 100-yr flow spread would be 2 m (runoff coefficient adjustment factor is considered). Detail of the calculations is provided in Appendix E.

6 SITE SERVICING

The purpose of this site servicing study is to review the site servicing requirement of the proposed new condominium 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 services, i.e. storm sewers, sanitary sewers and watermains, located on Thomas Street, Emby Drive and Tannery Street adjacent to the site. Existing underground municipal services/utilities are summarized below:

- 600mm dia. storm sewer on Thomas Street;
- 200mm dia. PVC sanitary sewer on Emby Drive;
- 300mm dia. PVC watermain on the Emby Drive;
- 300mm dia. watermain on the Tannery Street;
- 300mm dia. watermain on the Thomas Street;

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 new Emby Drive extension and controlled storm discharged flow from the proposed residential development;
- New water supply system: valves, fire hydrants and 300mm dia. PVC watermain;
- New extension of existing 200mm PVC Sanitary sewer on Emby Drive.

6.4 PROPOSED SITE SERVICE CONNECTIONS

Based on the project statistics provided by the architect and Region's design criteria, sanitary flow and water demand are estimated in Appendix F and summarized in Table 10. Storm flow discharge rate has been provided in the previous section 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	13.22	13.22	102.73

Through discussion with 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 Ontario Building Code (OBC). In summary:

- Sanitary Service: The existing sanitary sewer on Emby Drive is extended northerly by 30m from existing manhole No.137 to proposed manhole No.2A. An 150mm dia. sanitary service connection will be installed to service the proposed condominiums and discharge to the proposed manhole No.2A on Emby Drive.
- Storm Service: A 375mm dia. storm service connection will be installed to drain condominium area to proposed manhole 675mm concrete pipe on Emby Drive extension.
- Water service:

- 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 provided.

The existing 300mm diameter water main on Emby Drive will be extended northerly and connected to the existing 200mm diameter water main on Tannery Street to service the proposed development site.

Refer to Dwg. C-101 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 and anticipated to be adequate to accommodate the sanitary flow (13.22 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 (MH.4 to Outlet), will not be adequate to accommodate the storm flow rate of 1719.2 L/s from development site, minor and major flow from pearl Street and Broadway Street and storm flow from Thomas Street and industrial area south of the development site. In order to provide adequate capacity for the storm flow, the last two 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 storm sewer upgrade, the existing outlet at Mullet Creek will need to be replaced.

6.5.2 Adequacy of Existing Watermain

The design water demand is estimated as 102.73 L/s based on the project statistics. 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 result are included in Appendix G.

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 102.71 L/s (or 1628.27 US GPM) generated from the development, the flow test results show a residual pressure of 48.3 psi, which is 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 102.71 L/s (or 1628.27 US GPM) generated from the development, the flow test

results show a residual pressure of 49.1 psi, which is greater than the minimum requirement of 20 psi (150 kPa).

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

7 CONCLUSIONS

Stormwater Management Plan – Sub-Catchment C1

- Under existing condition, there are no existing on-site stormwater management facilities.
- On-site storage volume of approximate 35 m^3 will be provided for proposed condominium development site for retaining the first 5mm rainfall runoff as required to achieve 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 "PMSU2020-5" with proposed landscape and permeable pavement within the residential development site will satisfy the City's 80% TSS removal.
- On-site storage volume of 144 m^3 in volume will be required in order to control the post-development 100-year/Regional stormwater flows to 10-year pre-development level;
- A Stormwater storage tank at underground parking lot is proposed to provide a total storage volume of 220 m^3.

Stormwater Management Plan – Sub-Catchment C2

- There will be no actual increase in Stormwater flow rate and volume in the Emby Drive Extension area;
- Due to the constraints of available right-of-way, no SWM measures are proposed for Emby Drive extension. However, implementation of SWM plan in sub-catchment C1 will reduce the total runoff discharge compared to existing condition

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: 375mm dia. PVC pipes
- Sanitary service: 150mm dia. PVC pipes
- Water service:
  - 100mm dia. PVC pipe for domestic water supply

- 150mm dia. PVC pipe for fire water supply

Prepared By:

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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 C1** **City Of Mississauga**	Proj. #	18038		
	Date:	13-Jun-19		

EXISTING CONDITIONS:

Existing Land Use	Area (m^2)
Building	2459.0
Asphalt	1266.0
Gravel	2524.0
Lawn & Tree	4351.0
Total Residential Development Area (C1):	**10600.0**

PROPOSED DEVELOPMENT:

Sub-Catchment OC1- Overcontrolled Area

Proposed Land Use	Area (m^2)
Building	4829.0
Paved Area	447.0
Permeable Pavement	1704.0
Landscaped Area	1486.0
Total:	**8466.0**

Sub-Catchment UC1, UC2 and UC3- Uncontrolled Areas

Proposed Land Use	Area (m^2)
Building's Stairs	141.0
Permeable Pavement	153.0
Landscaped Area	1840.0
Total:	**2134.0**
Total Residential Development Area (C1):	**10600.0**

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 C1 City Of Mississauga	Proj. #	18038		
	Date:	13-Jun-19		

Pre-Development Composite Runoff Coefficient "C"

Location	Area (ha)	C	Composite "C"
Building	0.246	0.90	
Asphalt	0.127	0.90	
Gravel	0.252	0.60	
Lawn & Tree	0.435	0.25	
Total Residential Development Area (C1):	**1.060**		**0.56**
Imperviousness Percent:	**35.1**		

Post-Development Composite Runoff Coefficient "C"

Sub-Catchment OC1- Overcontrolled Area

Location	Area (ha)	C	Composite "C"
Building	0.483	0.90	
Paved Area	0.045	0.90	
Permeable Pavement	0.170	0.50	
Landscaped Area	0.149	0.25	
Total:	**0.847**		**0.71**
Imperviousness Percent:	**62.3**		

Post-Development Composite Runoff Coefficient "C"

Sub-Catchment UC1, UC2 and UC3- Uncontrolled Areas

Location	Area (ha)	C	Composite "C"
Building's Stairs	0.0141	0.90	
Permeable Pavement	0.0153	0.50	
Landscaped Area	0.184	0.25	
Total:	**0.213**		**0.31**
Imperviousness Percent:	**6.6**		

Composite runoff coefficient for entire site: **0.66**
Total impervious percent: **51.1**

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 C1** **City Of Mississauga**	Proj. #	18038		
	Date:	13-Jun-19		

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:	1.060	ha
Runoff Coefficient :	0.66	Post-development site conditions

Runoff volume from 5mm rainfall event on site:

$V = 1.06 \times 0.66 \times 0.005 \times 10000 = 34.97 \ m^3$

Required on-site retention volume for 5mm rainfall event: 34.97 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 C1 City Of Mississauga	Proj. #	18038		
	Date:	13-Jun-19		

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

Site Area:	1.060	ha
Time of Concentration	15	minutes as per City Guidelines
Runoff Coefficient :	0.56	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):	99.07	133.18	164.04	188.40	210.30	232.73

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 stormwater from some areas in north, west and south of the site (Sub-catchment UC1, UC2 and UC3) 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, UC2 and UC3 (Post Development 100-yr storm):	32.41	L/s
Sub-catchment OC1 (Pre-development 10-yr storm):	164.04	L/s

Overcontrolled discharge rate from sub-Catchment OC1 into municipal storm sewer on Emby Drive: 131.63 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 C1** **City Of Mississauga**	Proj. #	18038		
	Date:	13-Jun-19		

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

Overcontrolled Area:	0.847	ha
Time of Concentration:	15	minutes as per City Guidelines
Runoff Coefficient :	0.71	
Uncontrolled Area:	0.213	ha
Time of Concentration:	15	minutes as per City Guidelines
Runoff Coefficient :	0.31	
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 existing site conditions (L/s):	99.36	133.57	164.52	188.95	210.91	233.40
Under Post development condition with Adjastment Factors (L/s):	99.36	133.57	164.52	207.84	253.10	291.75

Sub-Catchment UC1, UC2 and UC3- Uncontrolled Areas

Return Period:	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Under existing site conditions (L/s):	11.04	14.84	18.28	20.99	23.43	25.93
Under Post development condition with Adjastment Factors (L/s):	11.04	14.84	18.28	23.09	28.12	32.41

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 C1** **City Of Mississauga**	Proj. #	18038		
	Date:	13-Jun-19		

Total Drainage Area (ha) = 0.847 ha
Drainage Area Composite C = 0.71
Allowable Release Rate = 99.07 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	99.36	89.42	99.07	89.17	0.25
20	50.16	83.22	99.87	99.07	118.89	-19.02
25	43.42	72.04	108.06	99.07	148.61	-40.55
30	38.45	63.78	114.81	99.07	178.33	-63.52
35	34.60	57.41	120.56	99.07	208.05	-87.49
40	31.54	52.32	125.58	99.07	237.78	-112.20
45	29.03	48.16	130.04	99.07	267.50	-137.46
50	26.94	44.69	134.06	99.07	297.22	-163.16
55	25.16	41.73	137.72	99.07	326.94	-189.22
60	23.62	39.19	141.09	99.07	356.67	-215.58
65	22.29	36.98	144.21	99.07	386.39	-242.18
70	21.12	35.03	147.13	99.07	416.11	-268.98
75	20.07	33.30	149.86	99.07	445.83	-295.97
80	19.14	31.76	152.43	99.07	475.55	-323.12
85	18.30	30.37	154.86	99.07	505.28	-350.42
90	17.54	29.11	157.17	99.07	535.00	-377.83
95	16.85	27.96	159.37	99.07	564.72	-405.35
100	16.22	26.91	161.47	99.07	594.44	-432.97
105	15.64	25.95	163.48	99.07	624.16	-460.68
110	15.11	25.06	165.41	99.07	653.89	-488.48

Required Storage Volume = 0.25 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 C1** **City Of Mississauga**	Proj. #	18038		
	Date:	13-Jun-19		

Total Drainage Area (ha) = 0.847 ha
Drainage Area Composite C = 0.71
Allowable Release Rate = 133.18 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	133.57	120.21	133.18	119.86	0.35
20	67.43	111.87	134.25	133.18	159.82	-25.57
25	58.37	96.84	145.26	133.18	199.77	-54.51
30	51.68	85.74	154.33	133.18	239.73	-85.40
35	46.52	77.17	162.06	133.18	279.68	-117.62
40	42.40	70.34	168.81	133.18	319.63	-150.82
45	39.02	64.74	174.80	133.18	359.59	-184.79
50	36.21	60.07	180.21	133.18	399.54	-219.33
55	33.82	56.10	185.13	133.18	439.50	-254.37
60	31.76	52.68	189.66	133.18	479.45	-289.79
65	29.96	49.71	193.86	133.18	519.41	-325.55
70	28.38	47.09	197.78	133.18	559.36	-361.58
75	26.98	44.77	201.45	133.18	599.31	-397.86
80	25.73	42.69	204.90	133.18	639.27	-434.37
85	24.60	40.82	208.17	133.18	679.22	-471.05
90	23.58	39.13	211.28	133.18	719.18	-507.90
95	22.66	37.59	214.24	133.18	759.13	-544.89
100	21.81	36.18	217.06	133.18	799.09	-582.03
105	21.03	34.88	219.76	133.18	839.04	-619.28
110	20.31	33.69	222.35	133.18	879.00	-656.65

Required Storage Volume = 0.35 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (10-Year Storm)			
	Prepared:	F.M	Page No.	A-07
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT C1** **City Of Mississauga**	Proj. #	18038		
	Date:	13-Jun-19		

Total Drainage Area (ha) = 0.847 ha
Drainage Area Composite C = 0.71
Allowable Release Rate = 131.63 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	164.52	148.06	131.63	118.47	29.59
20	83.06	137.80	165.36	131.63	157.96	7.40
25	71.90	119.28	178.92	131.63	197.45	-18.53
30	63.66	105.61	190.09	131.63	236.93	-46.84
35	57.30	95.05	199.61	131.63	276.42	-76.81
40	52.22	86.63	207.92	131.63	315.91	-107.99
45	48.07	79.74	215.31	131.63	355.40	-140.09
50	44.60	73.99	221.96	131.63	394.89	-172.93
55	41.65	69.10	228.03	131.63	434.38	-206.35
60	39.11	64.89	233.61	131.63	473.87	-240.26
65	36.91	61.23	238.78	131.63	513.36	-274.58
70	34.96	58.00	243.60	131.63	552.85	-309.25
75	33.24	55.14	248.12	131.63	592.34	-344.22
80	31.69	52.58	252.38	131.63	631.82	-379.44
85	30.31	50.28	256.41	131.63	671.31	-414.90
90	29.05	48.19	260.23	131.63	710.80	-450.57
95	27.90	46.29	263.88	131.63	750.29	-486.41
100	26.86	44.56	267.35	131.63	789.78	-522.43
105	25.90	42.96	270.68	131.63	829.27	-558.59
110	25.01	41.50	273.87	131.63	868.76	-594.89

Required Storage Volume = 29.59 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (25-Year Storm)			
	Prepared:	F.M	Page No.	A-07
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT C1** **City Of Mississauga**	Proj. #	18038		
	Date:	13-Jun-19		

Total Drainage Area (ha) = 0.847 ha
Drainage Area Composite C = 0.71
Allowable Release Rate = 131.63 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	207.84	187.06	131.63	118.47	68.59
20	95.40	174.09	208.90	131.63	157.96	50.94
25	82.58	150.69	226.04	131.63	197.45	28.59
30	73.11	133.42	240.15	131.63	236.93	3.22
35	65.80	120.09	252.18	131.63	276.42	-24.24
40	59.98	109.45	262.68	131.63	315.91	-53.23
45	55.21	100.74	272.01	131.63	355.40	-83.39
50	51.22	93.47	280.42	131.63	394.89	-114.47
55	47.84	87.30	288.08	131.63	434.38	-146.30
60	44.92	81.98	295.13	131.63	473.87	-178.74
65	42.39	77.35	301.66	131.63	513.36	-211.70
70	40.15	73.28	307.76	131.63	552.85	-245.09
75	38.17	69.66	313.47	131.63	592.34	-278.87
80	36.40	66.43	318.85	131.63	631.82	-312.97
85	34.81	63.52	323.94	131.63	671.31	-347.37
90	33.36	60.88	328.77	131.63	710.80	-382.03
95	32.05	58.49	333.37	131.63	750.29	-416.92
100	30.85	56.29	337.76	131.63	789.78	-452.02
105	29.74	54.28	341.97	131.63	829.27	-487.30
110	28.73	52.42	346.00	131.63	868.76	-522.76

Required Storage Volume = 68.59 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (50-Year Storm)			
	Prepared:	F.M	Page No.	A-07
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT C1** **City Of Mississauga**	Proj. #	18038		
	Date:	13-Jun-19		

Total Drainage Area (ha) = 0.847 ha
Drainage Area Composite C = 0.71
Allowable Release Rate = 131.63 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	253.10	227.79	131.63	118.47	109.32
20	106.57	212.16	254.59	131.63	157.96	96.63
25	92.30	183.75	275.62	131.63	197.45	78.17
30	81.75	162.75	292.94	131.63	236.93	56.01
35	73.60	146.53	307.70	131.63	276.42	31.28
40	67.10	133.58	320.58	131.63	315.91	4.67
45	61.77	122.97	332.03	131.63	355.40	-23.37
50	57.32	114.11	342.34	131.63	394.89	-52.55
55	53.54	106.59	351.74	131.63	434.38	-82.64
60	50.28	100.11	360.38	131.63	473.87	-113.49
65	47.45	94.46	368.39	131.63	513.36	-144.97
70	44.95	89.49	375.86	131.63	552.85	-176.99
75	42.74	85.08	382.86	131.63	592.34	-209.48
80	40.76	81.14	389.46	131.63	631.82	-242.36
85	38.97	77.59	395.70	131.63	671.31	-275.61
90	37.36	74.37	401.62	131.63	710.80	-309.18
95	35.89	71.45	407.25	131.63	750.29	-343.04
100	34.54	68.77	412.63	131.63	789.78	-377.15
105	33.31	66.31	417.78	131.63	829.27	-411.49
110	32.17	64.05	422.72	131.63	868.76	-446.04

Required Storage Volume = 109.32 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (100 - Year Storm)			
	Prepared:	F.M	Page No.	A-08
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT C1** **City Of Mississauga**	Proj. #	18038		
	Date:	13-Jun-19		

Total Drainage Area (ha) = 0.847 ha
Drainage Area Composite C = 0.71
Allowable Release Rate = 131.63 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	291.75	262.58	131.63	118.47	144.11
20	118.12	244.96	293.95	131.63	157.96	135.99
25	102.41	212.37	318.56	131.63	197.45	121.11
30	90.77	188.24	338.84	131.63	236.93	101.91
35	81.77	169.58	356.11	131.63	276.42	79.69
40	74.58	154.66	371.18	131.63	315.91	55.27
45	68.68	142.43	384.56	131.63	355.40	29.16
50	63.75	132.21	396.62	131.63	394.89	1.73
55	59.56	123.52	407.61	131.63	434.38	-26.77
60	55.95	116.03	417.71	131.63	473.87	-56.16
65	52.81	109.50	427.07	131.63	513.36	-86.29
70	50.03	103.76	435.79	131.63	552.85	-117.06
75	47.58	98.66	443.97	131.63	592.34	-148.37
80	45.38	94.10	451.66	131.63	631.82	-180.16
85	43.39	89.99	458.94	131.63	671.31	-212.37
90	41.60	86.27	465.85	131.63	710.80	-244.95
95	39.97	82.88	472.43	131.63	750.29	-277.86
100	38.47	79.78	478.71	131.63	789.78	-311.07
105	37.10	76.94	484.71	131.63	829.27	-344.56
110	35.84	74.31	490.48	131.63	868.76	-378.28

Required Storage Volume = 144.11 m^3

Annual TSS Removal Efficiency Using Historical Weather Data

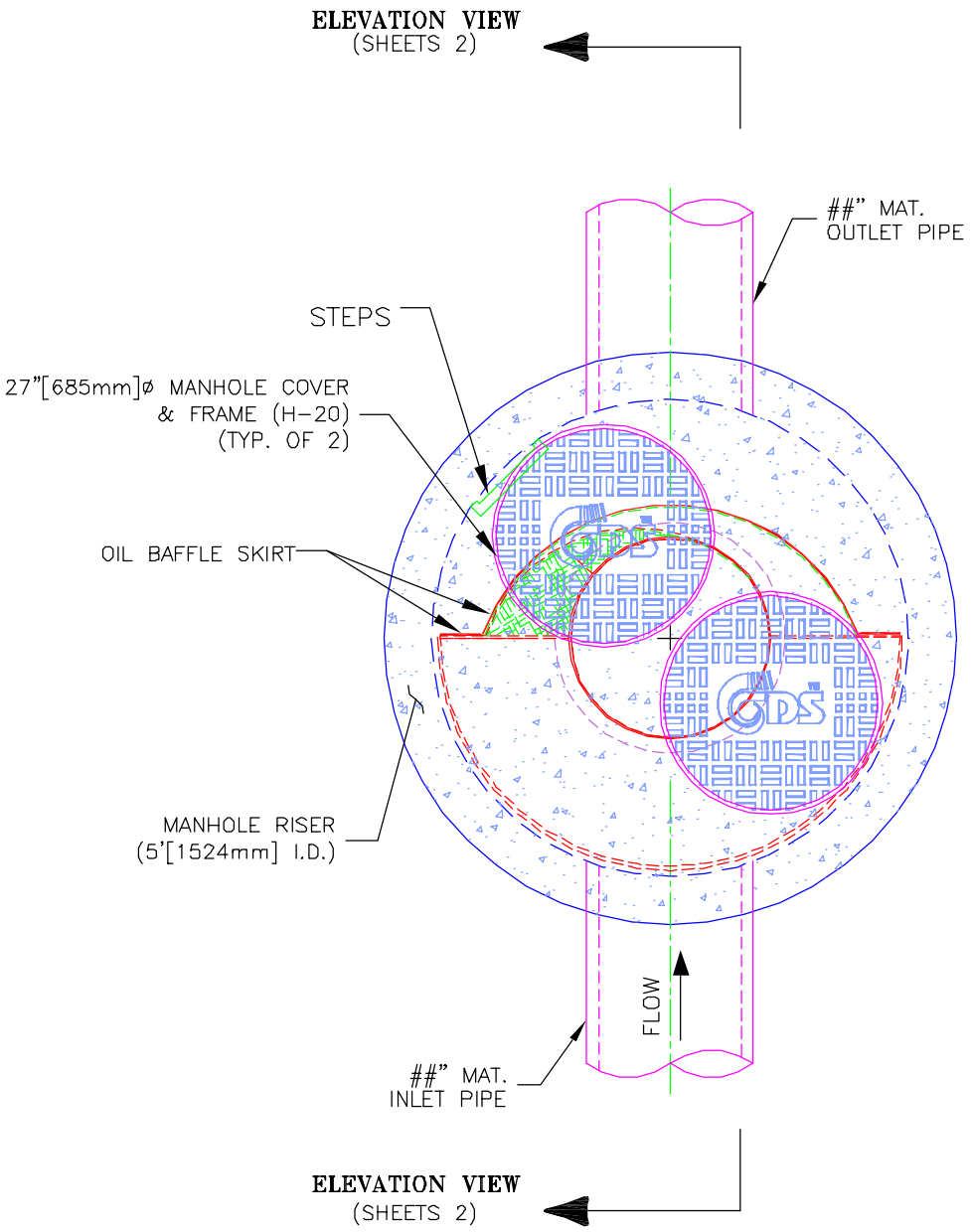
Area (ha) =	0.8466		**Engineer:**	**LEA Consulting Ltd.**
Composite C =	0.79		**Contact:**	Farshid Morshedi, P.Eng.
Rational Conv.	2.775	converts from m3/s to l/s	**Report Date:**	13-Jun-19
CDS Model:	PMSU2020-5			
Flowrate =	31	l/s	**Site:**	51 57 Tannery Street
Weather Station:	6158350		**Location:**	Mississauga, ON
PSD:	FINE		**OGS ID:**	OGS

Rainfall Intensity Range (mm/hr)	*Total Rainfall* (mm)*	*Rainfall intensity mm/hr (I)*	*Runoff Rate Per The Rational Method (l/s) Q = C x I x A x 2.77*	*Rainfall Volume %*	*CDS Flow Rate (l/s)*	*Operating Rate*	*Efficiency** (%)*	*Relative Efficiency (%)*
0.0 - 0.5	620.70	0.5	0.9	7.3%	0.9	0.03	98.0	7.2
0.5 - 1.0	791.80	1.0	1.8	9.4%	1.8	0.06	97.1	9.1
1.0 - 1.5	809.20	1.5	2.8	9.6%	2.8	0.09	96.3	9.2
1.5 - 2.0	765.50	2.0	3.7	9.1%	3.7	0.12	95.4	8.7
2.0 - 2.5	546.70	2.5	4.6	6.5%	4.6	0.15	94.6	6.1
2.5 -3.0	512.90	3.0	5.5	6.1%	5.5	0.18	93.7	5.7
3.0 - 4.0	840.50	4.0	7.4	10.0%	7.4	0.24	92.0	9.2
4.0 - 5.0	644.80	5.0	9.2	7.6%	9.2	0.30	90.3	6.9
5.0 - 6.0	505.30	6.0	11.1	6.0%	11.1	0.36	88.6	5.3
6.0 - 7.0	430.30	7.0	12.9	5.1%	12.9	0.42	86.9	4.4
7.0 - 8.0	302.10	8.0	14.8	3.6%	14.8	0.48	85.2	3.1
8.0 - 9.0	167.40	9.0	16.6	2.0%	16.6	0.54	83.5	1.7
9.0 - 10.0	275.00	10.0	18.5	3.3%	18.5	0.60	81.8	2.7
10.0 - 11.0	198.10	11.0	20.3	2.3%	20.3	0.66	80.1	1.8
11.0 - 12.0	160.70	12.0	22.2	1.9%	22.2	0.71	78.4	1.5
12.0 - 13.0	136.50	13.0	24.0	1.6%	24.0	0.77	76.7	1.2
13.0 - 15.0	150.10	15.0	27.7	1.8%	27.7	0.89	73.2	1.3
15.0 - 20.0	366.60	20.0	36.9	4.3%	31.0	1.00	58.9	2.5
20.0 - 25.0	70.80	25.0	46.2	0.8%	31.0	1.00	47.1	0.4
25.0 - 30.0	111.90	30.0	55.4	1.3%	31.0	1.00	39.3	0.5
30.0 -35.0	0.00	35.0	64.6	0.0%	31.0	1.00	33.7	0.0
35.0 - 40.0	38.70	40.0	73.9	0.5%	31.0	1.00	29.5	0.1
	8445.60							

TSS Removal:	**88.8%**
Efficiency Adjustment:	**6.5%**
Net Annual TSS Removal:	**82.3%**
Net Annual Volume Treated:	**96.8%**

1) Historical Data including years 1982 to 1998 from Ontario Climate Centre
2) CDS Efficiency based on testing conducted at the University of Central Florida
3) Adjustment for use of 60 minute time step data on site with a time of concentration less than 30 minutes
4) CDS design flowrate and scaling based on standard manufacturer model & product specifications

PLAN VIEW

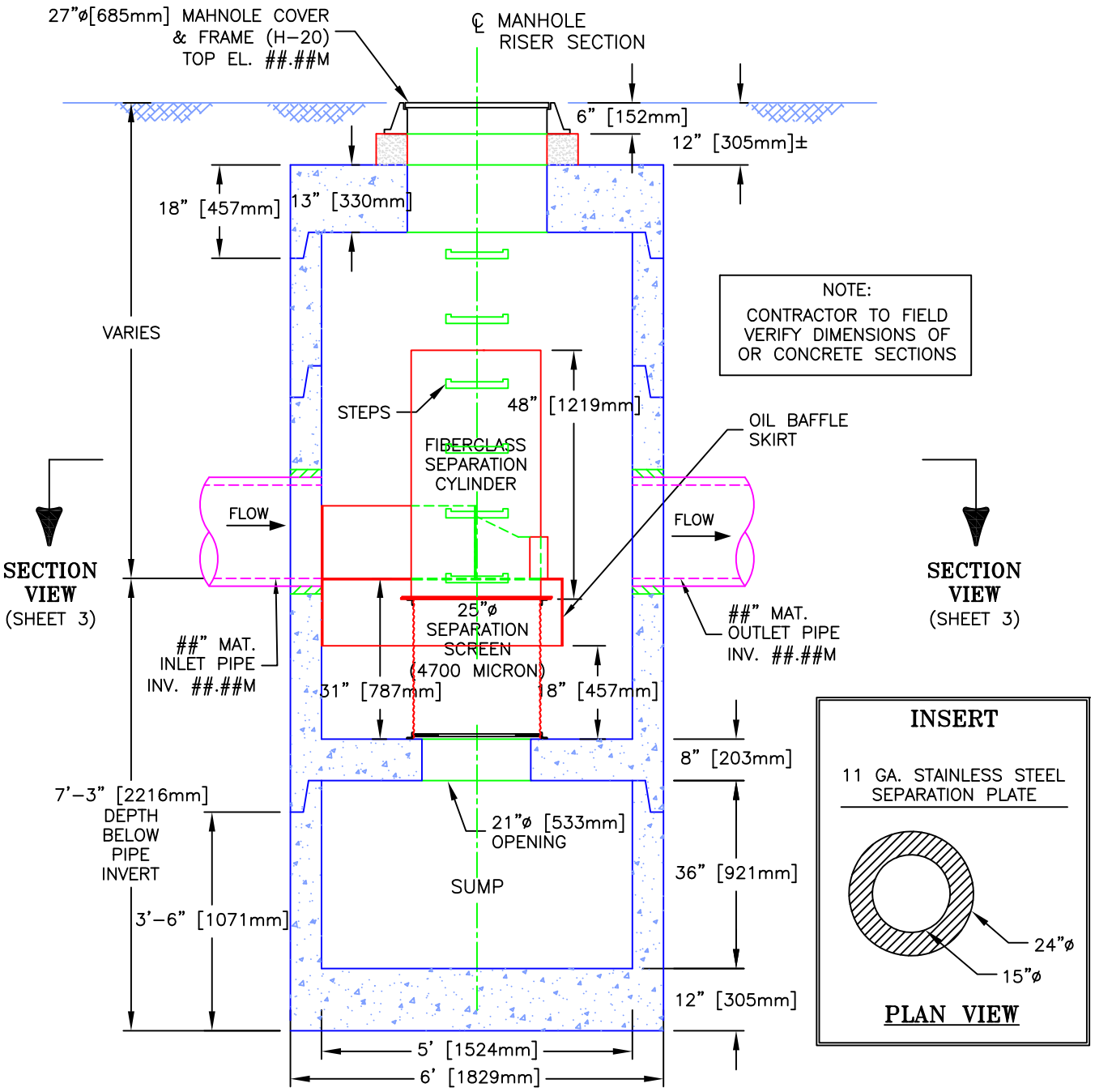


MODEL CDS20_20m, 31 L/s TREATMENT CAPACITY
STORM WATER TREATMENT UNIT

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

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577

ELEVATION VIEW



MODEL CDS20_20m, 31 L/s TREATMENT CAPACITY
STORM WATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS

PROJECT NAME
CITY, STATE

JOB#	XX-##-###	SCALE 1" = 2.5'
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

APPENDIX B

Stormwater Peak Flow Calculation

Sub-Catchment C2

LEA Consulting Ltd. Consulting Engineers and Planners	Land Use			
	Prepared:	F.M	Page No.	B-01
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT C2** **City Of Mississauga**	Proj. #	18038		
	Date:	26-Jun-19		

EXISTING CONDITIONS:

Existing Land Use	Area (m^2)
Building	454.0
Asphalt	817.0
Gravel	710.0
Lawn & Tree	1761.0
Total Site Area:	**3742.0**

PROPOSED DEVELOPMENT:

Proposed Land Use	Area (m^2)
Road and walkway	2091.0
Berm	852.0
Total Landscaped Area	799.0
Total Site Area	**3742.0**

LEA Consulting Ltd. Consulting Engineers and Planners	Composite "C" Calculation			
	Prepared:	F.M	Page No.	B-02
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT C2** **City Of Mississauga**	Proj. #	18038		
	Date:	26-Jun-19		

Pre-Development Composite Runoff Coefficient "C"

Location	Area (ha)	C	Composite "C"
Building	0.045	0.90	
Asphalt	0.082	0.90	
Gravel	0.071	0.60	
Lawn & Tree	0.176	0.25	
Total Site Area:	**0.374**		**0.54**
Imperviousness Percent:	**34.0**		

Post-Development Composite Runoff Coefficient "C"

Location	Area (ha)	C	Composite "C"
Road and walkway	0.209	0.90	
Berm	0.085	0.60	
Total Landscaped Area	0.080	0.25	
Total Site Area	**0.374**		**0.69**
Imperviousness Percent:	**78.6**		

LEA Consulting Ltd. Consulting Engineers and Planners	5mm Rainfall Retention Volume (Water Balance)			
	Prepared:	F.M	Page No.	B-03
	Checked:	R.B		
Project: 51-57 Tannery Street SUB-CATCHMENT C2 City Of Mississauga	Proj. #	18038		
	Date:	26-Jun-19		

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:	0.374	ha
Runoff Coefficient :	0.69	Post-development site conditions

Runoff volume from 5mm rainfall event on site:

$$V = 0.374 \times 0.71 \times 0.005 \times 10000 = 12.96 \quad m^3$$

Required on-site retention volume for 5mm rainfall event: 12.96 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	Pre-Development Peak Flow Rates Calculation			
	Prepared:	F.M	Page No.	B-04
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT C2** **City Of Mississauga**	Proj. #	18038		
	Date:	26-Jun-19		

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

Site Area:	0.374	ha
Time of Concentration	15	minutes as per City Guidelines
Runoff Coefficient :	0.54	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 condition (L/s):	33.44	44.96	55.38	63.60	70.99	78.56

Allowable discharge rate into municipal storm sewer:
@ 10-year storm: 55.38 L/s

LEA Consulting Ltd. Consulting Engineers and Planners	Post-Development Peak Flow Rates Calculation (Uncontrolled)			
	Prepared:	F.M	Page No.	B-05
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT C2** **City Of Mississauga**	Proj. #	18038		
	Date:	26-Jun-19		

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

Site Area:	0.374	ha
Time of Concentration	15	minutes as per City Guidelines
Runoff Coefficient :	0.69	Post-development

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

Peak Flow Rate (L/s):

Return Period:	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Under Post development condition (L/s):	43.14	57.99	71.43	82.04	91.57	101.34
Under Post development condition with Adjastment Factors (L/s):	43.14	57.99	71.43	90.24	109.89	126.67

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (2-Year Storm)			
	Prepared:	F.M	Page No.	B-06
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT C2** **City Of Mississauga**	Proj. #	18038		
	Date:	26-Jun-19		

Total Drainage Area (ha) = 0.374 ha
Drainage Area Composite C = 0.69
Allowable Release Rate = 55.38 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	43.14	38.83	55.38	49.84	-11.01
20	50.16	36.13	43.36	55.38	66.45	-23.09
25	43.42	31.28	46.92	55.38	83.06	-36.14
30	38.45	27.69	49.85	55.38	99.68	-49.83
35	34.60	24.93	52.34	55.38	116.29	-63.95
40	31.54	22.72	54.52	55.38	132.90	-78.38
45	29.03	20.91	56.46	55.38	149.52	-93.06
50	26.94	19.40	58.20	55.38	166.13	-107.93
55	25.16	18.12	59.79	55.38	182.74	-122.95
60	23.62	17.02	61.26	55.38	199.35	-138.09
65	22.29	16.05	62.61	55.38	215.97	-153.36
70	21.12	15.21	63.88	55.38	232.58	-168.70
75	20.07	14.46	65.06	55.38	249.19	-184.13
80	19.14	13.79	66.18	55.38	265.81	-199.63
85	18.30	13.18	67.24	55.38	282.42	-215.18
90	17.54	12.64	68.24	55.38	299.03	-230.79
95	16.85	12.14	69.19	55.38	315.64	-246.45
100	16.22	11.68	70.11	55.38	332.26	-262.15
105	15.64	11.27	70.98	55.38	348.87	-277.89
110	15.11	10.88	71.82	55.38	365.48	-293.66

Required Storage Volume = -11.01 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (5-Year Storm)			
	Prepared:	F.M	Page No.	B-07
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT C2** **City Of Mississauga**	Proj. #	18038		
	Date:	26-Jun-19		

Total Drainage Area (ha) = 0.374 ha
Drainage Area Composite C = 0.69
Allowable Release Rate = 55.38 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	57.99	52.19	55.38	49.84	2.35
20	67.43	48.57	58.29	55.38	66.45	-8.16
25	58.37	42.05	63.07	55.38	83.06	-19.99
30	51.68	37.23	67.01	55.38	99.68	-32.67
35	46.52	33.51	70.36	55.38	116.29	-45.93
40	42.40	30.54	73.29	55.38	132.90	-59.61
45	39.02	28.11	75.89	55.38	149.52	-73.63
50	36.21	26.08	78.24	55.38	166.13	-87.89
55	33.82	24.36	80.38	55.38	182.74	-102.36
60	31.76	22.87	82.35	55.38	199.35	-117.00
65	29.96	21.58	84.17	55.38	215.97	-131.80
70	28.38	20.45	85.87	55.38	232.58	-146.71
75	26.98	19.44	87.46	55.38	249.19	-161.73
80	25.73	18.53	88.96	55.38	265.81	-176.85
85	24.60	17.72	90.38	55.38	282.42	-192.04
90	23.58	16.99	91.73	55.38	299.03	-207.30
95	22.66	16.32	93.02	55.38	315.64	-222.62
100	21.81	15.71	94.24	55.38	332.26	-238.02
105	21.03	15.15	95.41	55.38	348.87	-253.46
110	20.31	14.63	96.54	55.38	365.48	-268.94

Required Storage Volume = 2.35 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (10-Year Storm)			
	Prepared:	F.M	Page No.	B-07
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT C2** **City Of Mississauga**	Proj. #	18038		
	Date:	26-Jun-19		

Total Drainage Area (ha) = 0.374 ha
Drainage Area Composite C = 0.69
Allowable Release Rate = 55.38 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	71.43	64.29	55.38	49.84	14.45
20	83.06	59.83	71.79	55.38	66.45	5.34
25	71.90	51.79	77.68	55.38	83.06	-5.38
30	63.66	45.85	82.53	55.38	99.68	-17.15
35	57.30	41.27	86.67	55.38	116.29	-29.62
40	52.22	37.61	90.27	55.38	132.90	-42.63
45	48.07	34.62	93.48	55.38	149.52	-56.04
50	44.60	32.12	96.37	55.38	166.13	-69.76
55	41.65	30.00	99.00	55.38	182.74	-83.74
60	39.11	28.17	101.43	55.38	199.35	-97.92
65	36.91	26.58	103.67	55.38	215.97	-112.30
70	34.96	25.18	105.77	55.38	232.58	-126.81
75	33.24	23.94	107.73	55.38	249.19	-141.46
80	31.69	22.83	109.58	55.38	265.81	-156.23
85	30.31	21.83	111.33	55.38	282.42	-171.09
90	29.05	20.92	112.99	55.38	299.03	-186.04
95	27.90	20.10	114.57	55.38	315.64	-201.07
100	26.86	19.35	116.08	55.38	332.26	-216.18
105	25.90	18.65	117.52	55.38	348.87	-231.35
110	25.01	18.02	118.91	55.38	365.48	-246.57

Required Storage Volume = 14.45 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (25-Year Storm)			
	Prepared:	F.M	Page No.	B-07
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT C2** **City Of Mississauga**	Proj. #	18038		
	Date:	26-Jun-19		

Total Drainage Area (ha) = 0.374 ha
Drainage Area Composite C = 0.69
Allowable Release Rate = 55.38 L/s
Return Period = 25 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	113.89	82.04	73.83	55.38	49.84	23.99
20	95.40	68.71	82.46	55.38	66.45	16.01
25	82.58	59.48	89.22	55.38	83.06	6.16
30	73.11	52.66	94.79	55.38	99.68	-4.89
35	65.80	47.40	99.54	55.38	116.29	-16.75
40	59.98	43.20	103.68	55.38	132.90	-29.22
45	55.21	39.76	107.36	55.38	149.52	-42.16
50	51.22	36.89	110.68	55.38	166.13	-55.45
55	47.84	34.46	113.71	55.38	182.74	-69.03
60	44.92	32.36	116.49	55.38	199.35	-82.86
65	42.39	30.53	119.07	55.38	215.97	-96.90
70	40.15	28.92	121.47	55.38	232.58	-111.11
75	38.17	27.50	123.73	55.38	249.19	-125.46
80	36.40	26.22	125.85	55.38	265.81	-139.96
85	34.81	25.07	127.86	55.38	282.42	-154.56
90	33.36	24.03	129.77	55.38	299.03	-169.26
95	32.05	23.08	131.58	55.38	315.64	-184.06
100	30.85	22.22	133.32	55.38	332.26	-198.94
105	29.74	21.42	134.98	55.38	348.87	-213.89
110	28.73	20.69	136.57	55.38	365.48	-228.91

Required Storage Volume = 23.99 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (50-Year Storm)			
	Prepared:	F.M	Page No.	B-07
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT C2** **City Of Mississauga**	Proj. #	18038		
	Date:	26-Jun-19		

Total Drainage Area (ha) = 0.374 ha
Drainage Area Composite C = 0.69
Allowable Release Rate = 55.38 L/s
Return Period = 50 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	127.13	91.57	82.42	55.38	49.84	32.58
20	106.57	76.76	92.12	55.38	66.45	25.67
25	92.30	66.48	99.72	55.38	83.06	16.66
30	81.75	58.88	105.99	55.38	99.68	6.31
35	73.60	53.01	111.33	55.38	116.29	-4.96
40	67.10	48.33	115.99	55.38	132.90	-16.91
45	61.77	44.49	120.13	55.38	149.52	-29.39
50	57.32	41.29	123.86	55.38	166.13	-42.27
55	53.54	38.56	127.26	55.38	182.74	-55.48
60	50.28	36.22	130.39	55.38	199.35	-68.96
65	47.45	34.18	133.29	55.38	215.97	-82.68
70	44.95	32.38	135.99	55.38	232.58	-96.59
75	42.74	30.78	138.52	55.38	249.19	-110.67
80	40.76	29.36	140.91	55.38	265.81	-124.90
85	38.97	28.07	143.17	55.38	282.42	-139.25
90	37.36	26.91	145.31	55.38	299.03	-153.72
95	35.89	25.85	147.35	55.38	315.64	-168.29
100	34.54	24.88	149.30	55.38	332.26	-182.96
105	33.31	23.99	151.16	55.38	348.87	-197.71
110	32.17	23.17	152.95	55.38	365.48	-212.53

Required Storage Volume = 32.58 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (100 - Year Storm)			
	Prepared:	F.M	Page No.	B-08
	Checked:	R.B.		
Project: 51-57 Tannery Street **SUB-CATCHMENT C2** **City Of Mississauga**	Proj. #	18038		
	Date:	26-Jun-19		

Total Drainage Area (ha) = 0.374 ha
Drainage Area Composite C = 0.69
Allowable Release Rate = 55.38 L/s
Return Period = 100 Year

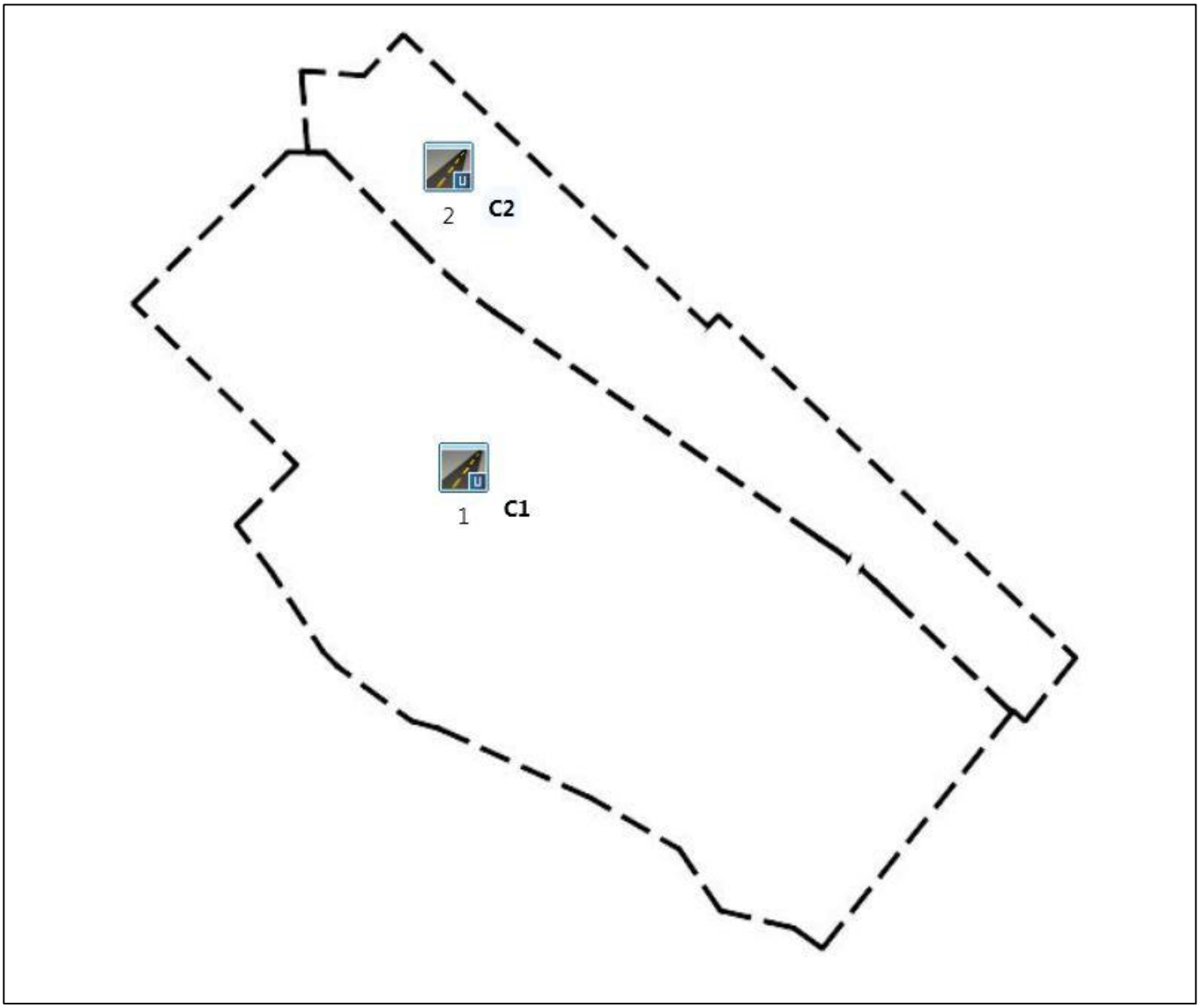
Site storage Requirement:

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	140.69	101.34	91.20	55.38	49.84	41.36
20	118.12	85.08	102.10	55.38	66.45	35.65
25	102.41	73.77	110.65	55.38	83.06	27.59
30	90.77	65.38	117.69	55.38	99.68	18.01
35	81.77	58.90	123.69	55.38	116.29	7.40
40	74.58	53.72	128.92	55.38	132.90	-3.98
45	68.68	49.47	133.57	55.38	149.52	-15.95
50	63.75	45.92	137.76	55.38	166.13	-28.37
55	59.56	42.90	141.58	55.38	182.74	-41.16
60	55.95	40.30	145.09	55.38	199.35	-54.26
65	52.81	38.04	148.34	55.38	215.97	-67.63
70	50.03	36.04	151.37	55.38	232.58	-81.21
75	47.58	34.27	154.21	55.38	249.19	-94.98
80	45.38	32.68	156.88	55.38	265.81	-108.93
85	43.39	31.26	159.41	55.38	282.42	-123.01
90	41.60	29.96	161.81	55.38	299.03	-137.22
95	39.97	28.79	164.09	55.38	315.64	-151.55
100	38.47	27.71	166.27	55.38	332.26	-165.99
105	37.10	26.72	168.36	55.38	348.87	-180.51
110	35.84	25.81	170.36	55.38	365.48	-195.12

Required Storage Volume = 41.36 m^3

APPENDIX C

Regional Flow Calculations



Pre-Development Schematic Drainage Area plan

output for regional storm-Existing Condition

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       V    V   I    SSSSS  U   U    A    L              (v 5.1.2004)
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        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
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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voin.dat

Output filename:
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Summary filename:
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DATE: 06/27/2019 TIME: 11:07:35

USER:

COMMENTS: _____

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  **********************************************
  ** SIMULATION : Regional                    **
  **********************************************
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READ STORM	Filename: C:\Users\FMorshedi\AppData\Local\Temp\4cfb9d5a-13a9-4837-adec-9befc572362a\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 (0001)	Area (ha)= 1.06

output for regional storm-Existing Condition

|ID= 1 DT= 5.0 min | Total Imp(%)= 35.10 Dir. Conn.(%)= 1.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.37	0.69
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	1.20
Length	(m)=	84.06	40.00
Mannings n	=	0.013	0.250

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
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	78.23	
over (min)		5.00	15.00	
Storage Coeff. (min)=		2.97 (ii)	12.04 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.28	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.15	0.149 (iii)
TIME TO PEAK	(hrs)=	9.58	10.00	10.00
RUNOFF VOLUME	(mm)=	211.00	181.66	181.94
TOTAL RAINFALL	(mm)=	212.00	212.00	212.00
RUNOFF COEFFICIENT	=	1.00	0.86	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.

READ STORM	Filename: C:\Users\FMorshedi\AppData\Local\Temp\4cfb9d5a-13a9-4837-adec-9befc572362a\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 (0002)	Area (ha)= 0.37		
ID= 1 DT=15.0 min	Total Imp(%)= 34.00	Dir. Conn.(%)= 1.00	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.13	0.25
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	1.50
Length	(m)=	49.95	40.00
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	77.38	
over (min)		15.00	15.00	
Storage Coeff. (min)=		2.17 (ii)	10.70 (ii)	
Unit Hyd. Tpeak (min)=		15.00	15.00	
Unit Hyd. peak (cms)=		0.11	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.05	0.053 (iii)

```
                output for regional storm-Existing Condition
     TIME TO PEAK    (hrs)=       9.50        10.00         10.00
     RUNOFF VOLUME    (mm)=     211.00       184.82        185.07
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.00
     RUNOFF COEFFICIENT   =       1.00         0.87          0.87

***** 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*  =  85.0    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.

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 FINISH
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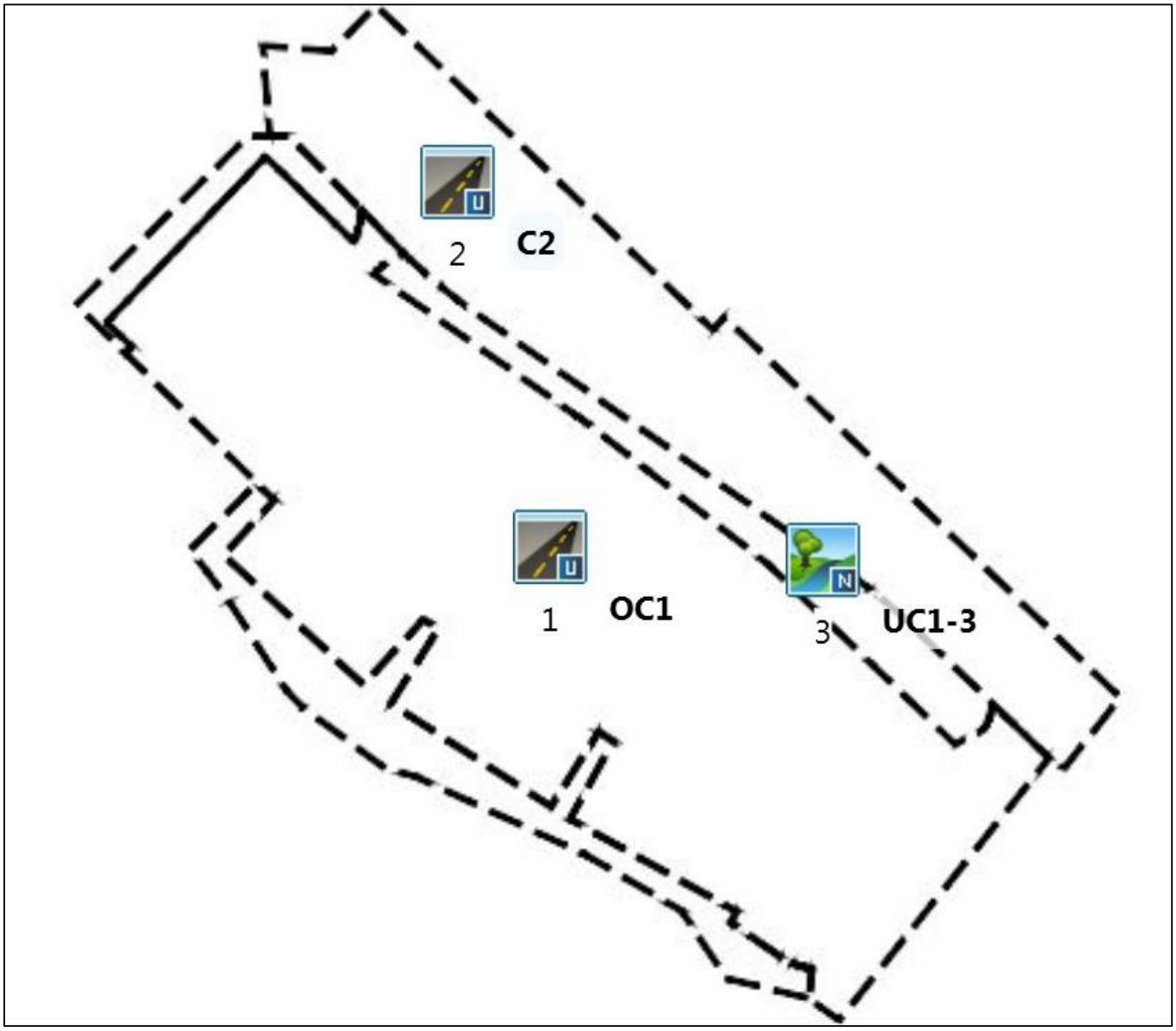

Post-Development Schematic Drainage Area plan

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================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 5.1.2004)
       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
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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voin.dat

Output filename:
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Summary filename:
C:\Users\FMorshedi\AppData\Local\Civica\VH5\8d9e0e7d-7966-43ca-9251-48e843853e98\eb682d50-8331-4db2-9003-9d849dae14ab\sc

DATE: 06/27/2019 TIME: 11:06:03

USER:

COMMENTS: _____

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

READ STORM	Filename: C:\Users\FMorshedi\AppData\Local\Temp\31cd175b-0273-4245-8d5c-9f00c3144d99\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 (0001)	Area (ha)= 0.85

output for regional storm-Proposed condition

|ID= 1 DT= 5.0 min | Total Imp(%)= 62.30 Dir. Conn.(%)= 48.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.53	0.32
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	75.14	40.00
Mannings n	=	0.013	0.250

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
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	71.45	
over (min)		5.00	15.00	
Storage Coeff. (min)=		2.77 (ii)	10.85 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.28	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.06	0.06	0.123 (iii)
TIME TO PEAK	(hrs)=	9.67	10.00	10.00
RUNOFF VOLUME	(mm)=	211.00	186.57	198.29
TOTAL RAINFALL	(mm)=	212.00	212.00	212.00
RUNOFF COEFFICIENT	=	1.00	0.88	0.94

output for regional storm-Proposed condition

***** 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.

READ STORM	Filename: C:\Users\FMorshedi\AppData\Local\Temp\31cd175b-0273-4245-8d5c-9f00c3144d99\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 (0002)	Area (ha)= 0.37
ID= 1 DT=15.0 min	Total Imp(%)= 78.60 Dir. Conn.(%)= 1.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.29	0.08
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	1.50
Length	(m)=	49.93	40.00
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	244.66	
over (min)		15.00	15.00	
Storage Coeff. (min)=		2.17 (ii)	7.55 (ii)	
Unit Hyd. Tpeak (min)=		15.00	15.00	
Unit Hyd. peak (cms)=		0.11	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.05	0.055 (iii)
TIME TO PEAK	(hrs)=	9.50	10.00	10.00
RUNOFF VOLUME	(mm)=	211.00	204.44	204.50

output for regional storm-Proposed condition

TOTAL RAINFALL (mm)=	212.00	212.00	212.00
RUNOFF COEFFICIENT =	1.00	0.96	0.96

***** 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.

READ STORM | Filename: C:\Users\FMorshedi\AppData\Local\Temp\31cd175b-0273-4245-8d5c-9f00c3144d99\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
NASHYD (0003) | Area (ha)= 0.21 Curve Number (CN)= 80.0
ID= 1 DT= 5.0 min | 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
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

output for regional storm-Proposed condition

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

Unit Hyd Qpeak (cms)= 0.041

PEAK FLOW (cms)= 0.028 (i)
TIME TO PEAK (hrs)= 10.000
RUNOFF VOLUME (mm)= 158.103
TOTAL RAINFALL (mm)= 212.000
RUNOFF COEFFICIENT = 0.746

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

FINISH

==========

APPENDIX D

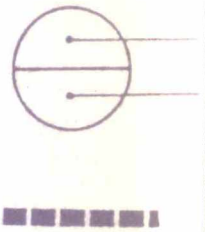
Storm Sewers Size Calculations

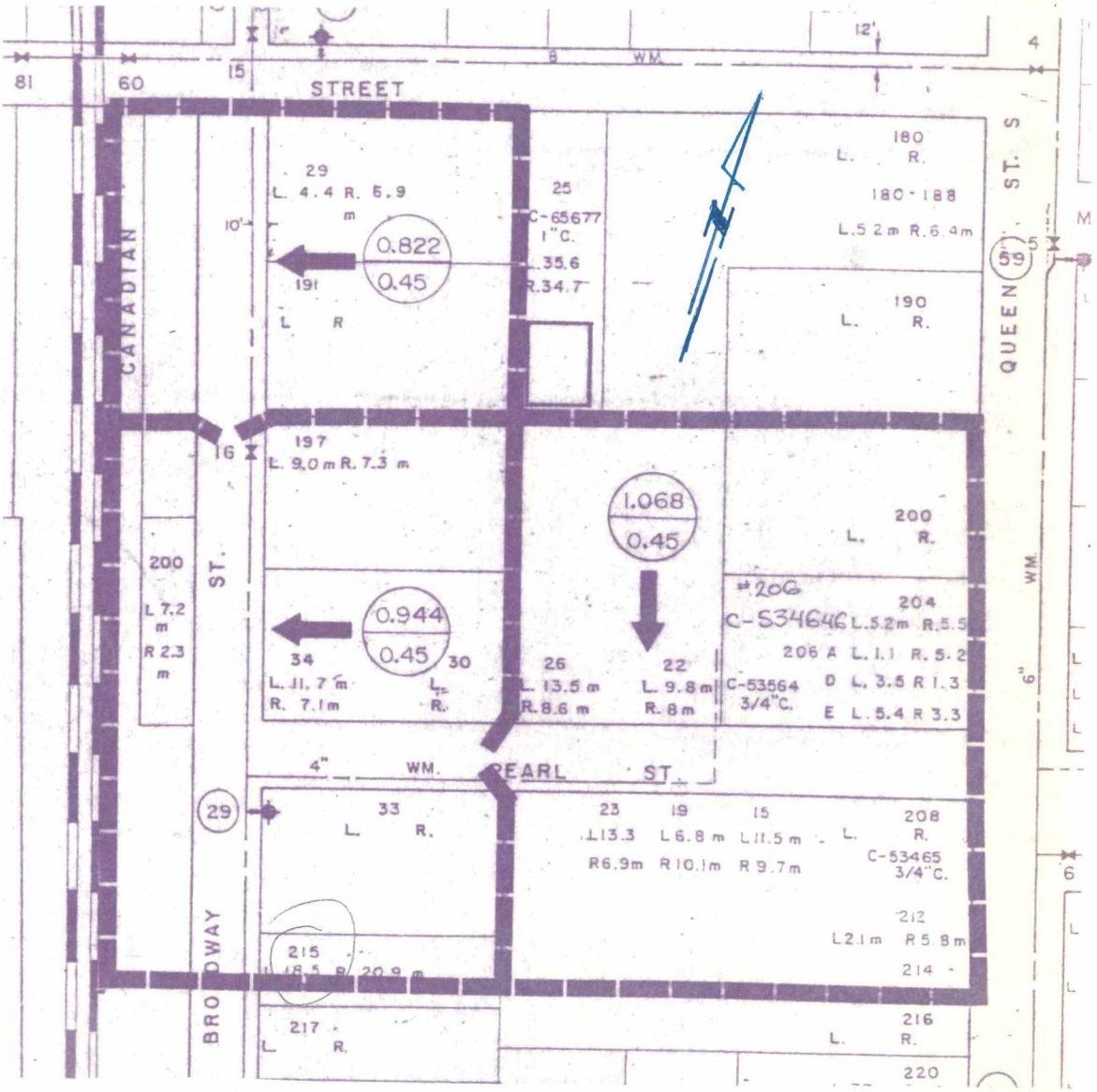
Sub-catchment EC1 City's record information

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

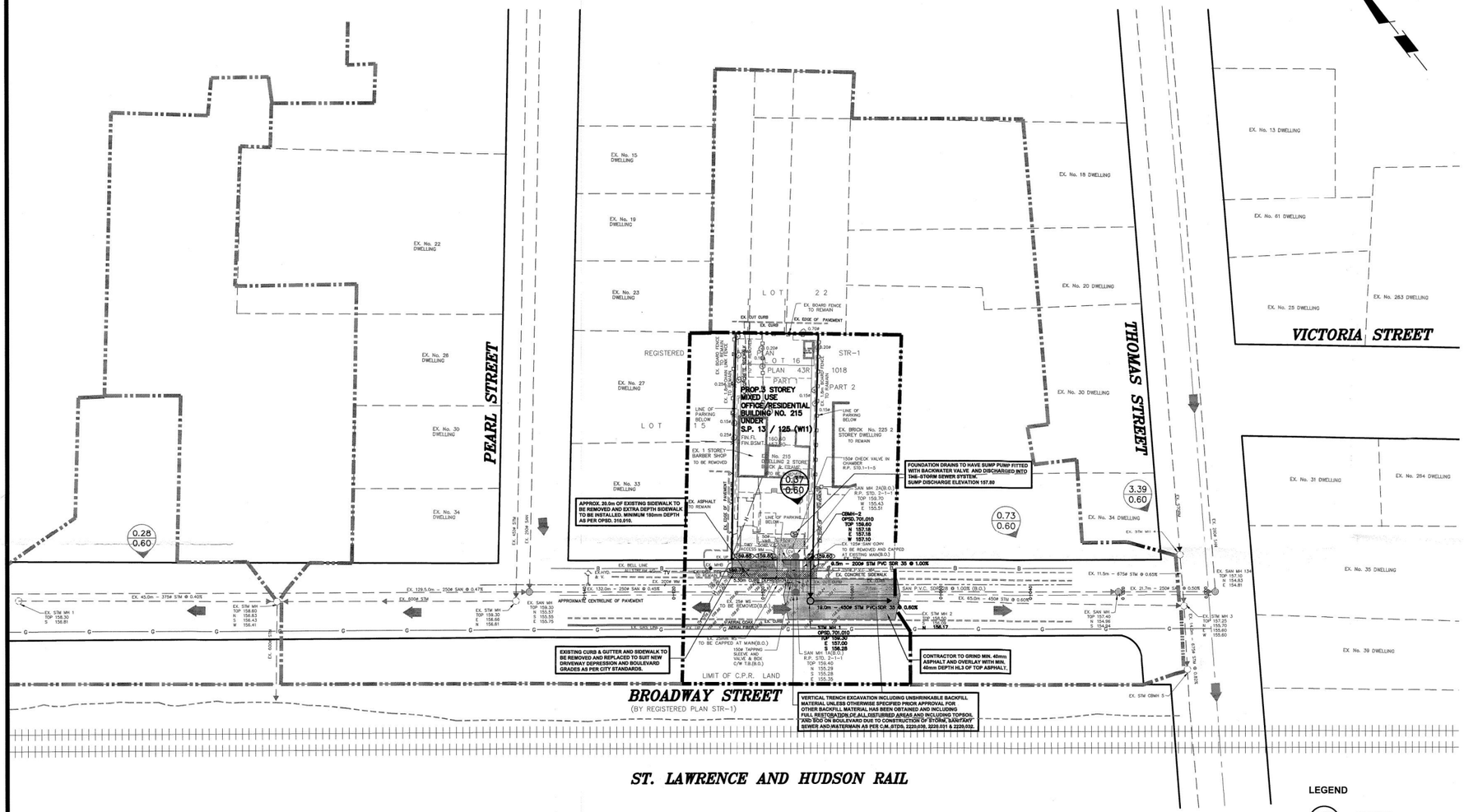
STORM DRAINAGE DESIGN CHART FOR CIRCULAR DRAINS FLOWING FULL

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

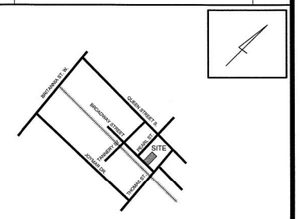


SERVICE DATA

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

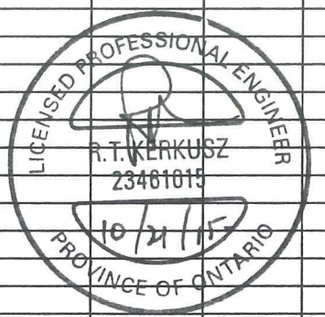
DESIGNED BY : M.B.

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.	D-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 SC1	
Asphalt & Concrete	990.0
Lown	719.0
Permeable Pavement	35.0
Berm	823.0
Total Site Area:	**2567.0**
Sub-Catchment SC2	
Asphalt & Concrete	725.0
Lown	823.0
Permeable Pavement	75.0
Total Site Area:	**1623.0**
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
Total Site Area:	**3522.0**
Sub-Catchment EC3	
Building and Paved	1949.0
Gravel	574.0
Lawn & Tree	1727.0
Total Site Area:	**4250.0**
Sub-Catchment EC4	
Refer to City of Mississauga reecord design sheet	
Sub-Catchment EC5	
Building and Paved	6967.0
Gravel	3742.0
Lawn & Tree	1975.0
Total Site Area:	**12684.0**

LEA Consulting Ltd. Consulting Engineers and Planners	Composite "C" Calculation			
	Prepared:	F.M	Page No.	D-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 SC1			
Asphalt & Concrete	0.099	0.90	
Lown	0.072	0.25	
Permeable Pavement	0.004	0.50	
Berm	0.082	0.60	
Total Site Area:	**0.174**		
Composite "C"			**0.62**
Imperviousness Percent:			**56.8%**
Sub-Catchment SC2			
Asphalt & Concrete	0.073	0.90	
Lown	0.082	0.25	
Permeable Pavement	0.008	0.50	
Total Site Area:	**0.162**		
Composite "C"			**0.55**
Imperviousness Percent:			**44.7%**
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:	**0.352**		
Composite "C"			**0.37**
Imperviousness Percent:			**0.0%**
Sub-Catchment EC3			
Building and Paved	0.195	0.90	
Gravel	0.057	0.60	
Lawn & Tree	0.173	0.25	
Total Site Area:	**0.425**		
Composite "C"			**0.60**
Imperviousness Percent:			**45.9%**
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	0.198	0.25	
Total Site Area:	**1.268**		
Composite "C"			**0.71**
Imperviousness Percent:			**54.9%**

LEA Consulting Ltd. Consulting Engineers and Planners	Flow Rates Calculation			
	Prepared:	F.M	Page No.	D-03
	R.B.	R.B.		
Project: 51-57 Tannery Street	Proj. #	18038		
SUB-CATCHMENT C3				
City Of Mississauga	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 SC1

Site Area: 0.1744 T_c= 15 min C: 0.62

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)	18.11	24.34	29.98	34.43	38.43	42.53

Sub-Catchment SC2

Site Area: 0.1623 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)	14.90	20.03	24.68	28.34	31.64	35.01

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: 0.3522 T_c= 15 min C: 0.37

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: 0.425 T_c= 15 min C: 0.60

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)	42.10	56.59	69.70	80.06	89.36	98.89

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: 1.2684 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)	149.90	201.50	248.19	285.05	318.19	352.11

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: March.27,2018

DESIGNED BY: F.M.

CHECKED BY: F.M.

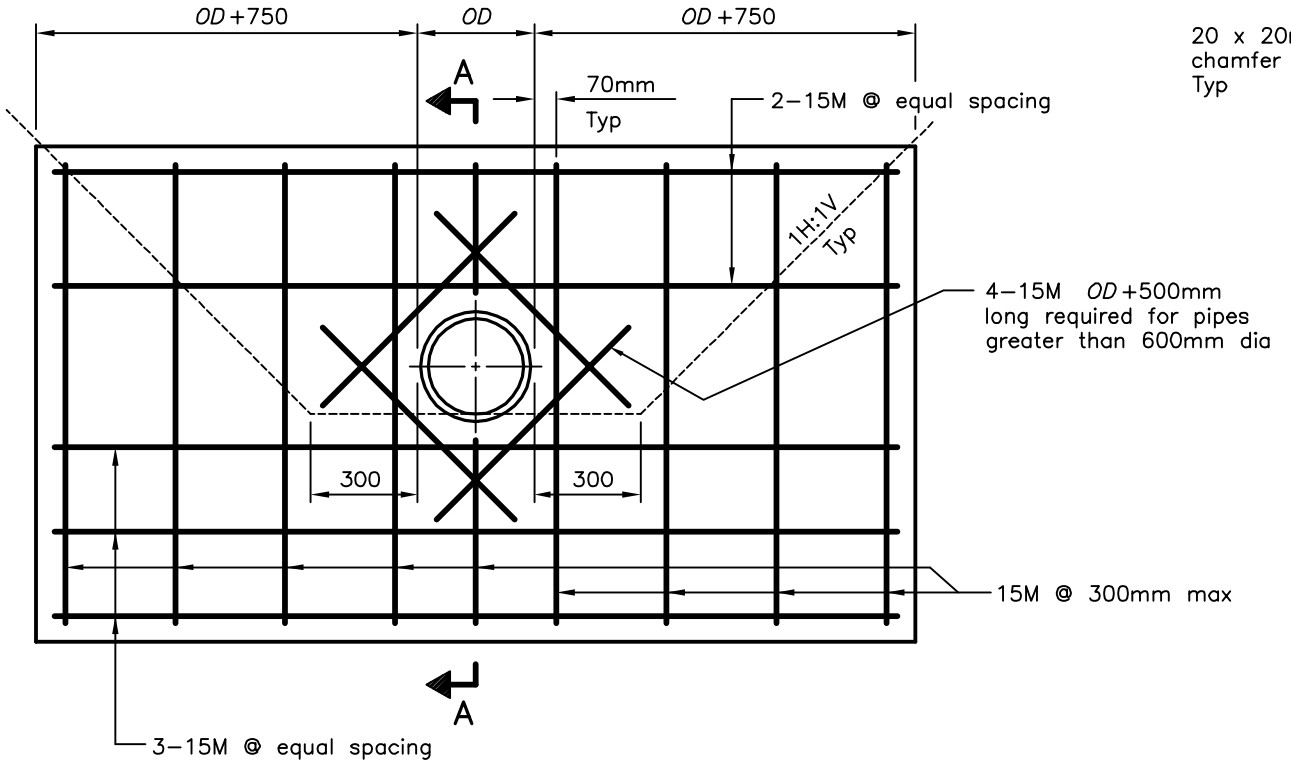
City of Mississauga Intensity 10yr = $1010.42/(tc+4.6)^{0.78}$

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 %	
DICB2	MH3	3.186									**542.8**	CONC	0.013	1.5	600	10.3	2.6597	751.99	154.91	154.76	0.0645	0.7218	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)
MH3	CBMH1	0.174	0.62	0.11	0.17	0.11	0.06454	15	15.06	98.9	**572.4**	CONC	0.013	0.60	750	69.90	1.95	862.3	154.61	154.19	0.60	0.66	Sub-catchment SC1
CBMH1	Ex. DCBMH1	0.162	0.55	0.09	0.16	0.09	0.60	15.06	15.66	96.6	**596.4**	CONC	0.013	0.60	750	108.90	1.95	862.3	154.17	153.51	0.93	0.69	Sub-catchment SC2
Ex. DCBMH1	MH4	0.425	0.60	0.26	0.59	0.34	0.93	15.66	16.59	93.3	**793.3**	CONC	0.013	1.00	750	12.70	2.52	1113.2	153.49	153.37	0.08	0.71	Dischared flow from the site: 131.6 L/S Minor Flow from EC3
MH4	Ex. DCBMH2	4.490	0.60	2.69	5.08	3.04	0.08	16.59	16.54	93.5	**1493.0**	CONC	0.013	2.80	750	50.10	4.22	1862.8	153.29		0.20	0.80	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	Outfall	1.268	0.71	0.90	6.35	3.94	0.20	16.54	16.74	92.8	**1719.5**	CONC	0.013	1.40	900	48.00	3.37	2141.9	-0.15	-0.82	0.24	0.80	Sub-catchment EC5

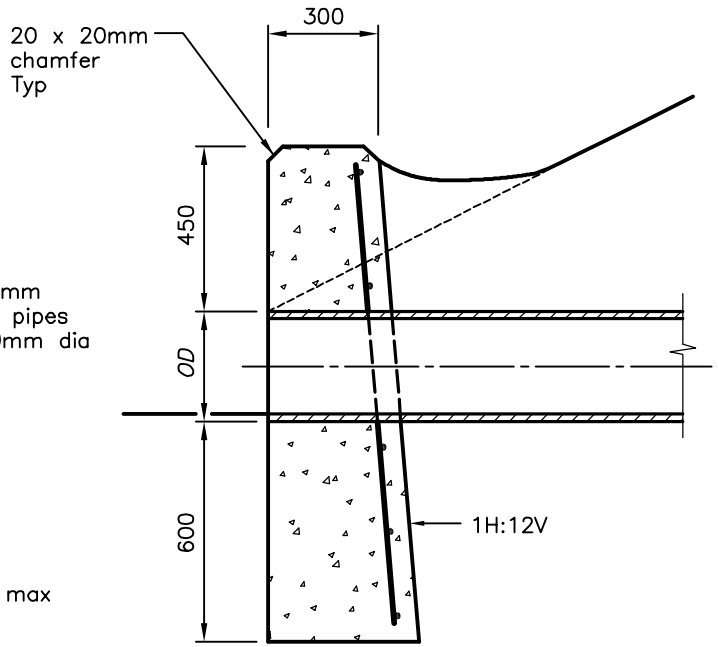
Refer to Fig. 3 in Appendix H for Sewers Drainage Area Plan

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 E

Overland Flow calculations for Emby Drive Extension

LEA Consulting Ltd. Consulting Engineers and Planners	Overland Flow Analysis along Emby Drive			
	Prepared:	M.D.	Page No.	E-01
	Checked:	F.M.		
Project: 51-57 Tannery Street Emby Drive Extension (From Tannery St. to Southern Entrance of the Site) City Of Mississauga	Proj. #	18038		
	Date:	May.28/19		

Composite Runoff Coefficient "C"

Land-use	Area (ha)	C	Composite "C"
Asphalt and paved	0.311	0.90	
Permeable Pavement	0.000	0.45	
Landscaped Area	0.151	0.25	
Total Site Area	**0.463**		**0.69**
Imperviousness Percent:			**67.3**

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

Drainage Area:	0.463	ha
Time of Concentration	15	minutes as per City Guidelines
Runoff Coefficient :	0.69	Post-development
Runoff Coefficient Adjustment Factors:	1.00	(10-year)
	1.25	(100-year)

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

Return Period:	10-yr	100-yr
Rainfall Intensity (mm/hr):	99.17	140.69
Peak flow rate under proposed site conditions (L/s):	87.62	155.38

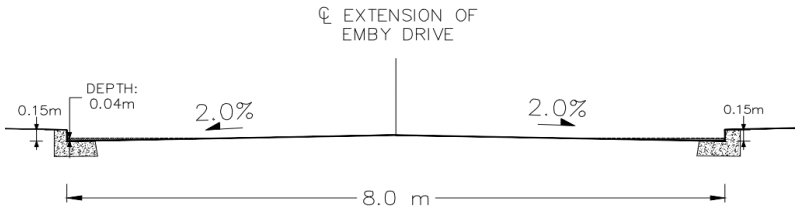
$Q_{100} - Q_{10}$ 67.76 L/s Overland Flow

INPUT DATA

Longitudinal slope, S_0	0.015	m/m
Manning's n	0.013	
Overland Flow, Q	0.068	m^3/s

CALCULATION

Overland flow Depth at end of the Emby Drive Extension	0.04	m



APPENDIX F

Sanitary and Water Demand Calculations

LEA Consulting Ltd. Consulting Engineers and Planners	Sanitary Flow Rate Calculation			
	Prepared:	F.M.	Page No.	F-01
	Checked:	M.D.		
Project: 51-57 Tannery Street **City Of Mississauga**	Proj. #	18038		
	Date:	Feb.08/18		

POPULATION CALCULATION

Site Area	10834	m^2
Number of Townhoses	156	units

Proposed Building Type	**Density** (P.P.U)	**Population**
Residential	2.7	421.20
Total		**421.20**

SANITARY FLOW CALCULATION

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

Peaking Factor	4.01	
Average Daily Wastewater Flow	302.8	L/cap/day
Total Actual Domestic Flow	5.92	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)	0.22	L/sec
Actual Design flow	**6.14**	L/sec
Standard Design Flow	**13.22**	L/sec

LEA Consulting Ltd. Consulting Engineers and Planners	**Water Demand Calculation**			
	Prepared:	F.M.	Page No.	F-02
	Checked:	M.D.		
Project: 51-57 Tannery Street	Proj. #	18038		
City Of Mississauga	Date:	Feb.08/18		

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. For fire resistive buildings, consider only the area of the largest floor plus 25% of each of the two immediately adjoining floors.

Step 1

According the building stats,

		Area (m2)
Ground Flo	adjoining	541
2nd Floor	largest	576
3rd Floor	adjoining	576
A		855

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

Step 2

Occupancy reduction:

For occupancies with a low contents fire hazard, the reduction rate is 15%,

Therefore: F = 5100 l/min

Step 3

Reduction for sprinkler protection:

Using the NFPA sprinkler system, a reduction rate of 30% is used.

Therefore: F = 3570 l/min

Step 4

Separation charge:

Charge for the separations on each side:

Separation	Charge	
0-3m	25%	West
30.1 to 45 m	5%	North
20.1 to 30 m	10%	South
0-3m	25%	East

Total charge in %	65%
Total charge in l/min	2320.5

Required Fire Flow:

6000	l/min	
or	100.00	l/s
or	1585	US GPM

LEA Consulting Ltd. Consulting Engineers and Planners	Water Demand Calculation			
	Prepared:	F.M.	Page No.	F-03
	Checked:	M.D.		
Project: 51-57 Tannery Street **City Of Mississauga**	Proj. #	18038		
	Date:	Feb.08/18		

Total Population: **421** (See Page F-01)

Peak Hour Demand Calculation:

Residential Per Capita Demand	280	L/cap/day
Peaking Factor	3	
Peak Hour Demand	**4.10**	L/sec

Maximum Day Demand Calculation:

Residential Per Capita Demand	280	L/cap/day
Peaking Factor	2	
Maximum Day Demand	**2.73**	L/sec
Fire Flow for Residential:	100.00	L/sec
Max. Day Demand plus Fire Flow:	**102.73**	L/sec
Design Water Demand	**102.73**	L/sec
or	**1628.27**	**US GPM**

APPENDIX G

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

LEA Consulting Ltd. Consulting Engineers and Planners	Connection Demand Table			
	Prepared:	F.M.	Page No.	G-01
	Checked:	R.B.		
Project: 51-57 Tannery Street **City Of Mississauga**	Proj. #	18038		
	Date:	27-Jun-19		

Connection Demand Table

WATER CONNECTION

Connaction Point	Emby Drive Extension
Pressure zone of connection point	Zone 3
Total equivalent population to be serviced	419 Person- Based on 2.7 PPU
Total lands to be serviced	1.08 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	1.37	l/s
2	Maximum day flow	2.73	l/s
3	Peak hour flow	4.10	l/s
4	*Fire flow	100.00	l/s
Analysis			
5	Maximum day plus fire flow	102.73	l/s

*See fire calculations

HYDRANT FLOW TEST

Connaction Point	Emby Drive Extension, MH2A
Total equivalent population to be serviced	419 Person- Based on 2.7 PPU
Total lands to be serviced	1.08 ha
Wastewater sewers effluent (l/s)	*13.22

*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	Residual Pressure			
	Prepared:	F.M.	Page No.	G-02
	Checked:	R.B.		
Project: 51-57 Tannery Street **City Of Mississauga**	Proj. #	18038		
	Date:	27-Jun-19		

Hydrant Test Readings (300mm watermain, 51 Tannery Street) undertaken on June 15, 2017, by Focus Fire Protection

Flow		Residual Pressure		
0	US GPM	62	psi	
683.5	US GPM	54	psi	
983.3	US GPM	58	psi	
3522	US GPM	20	psi	Focus Fire Protection Estimate

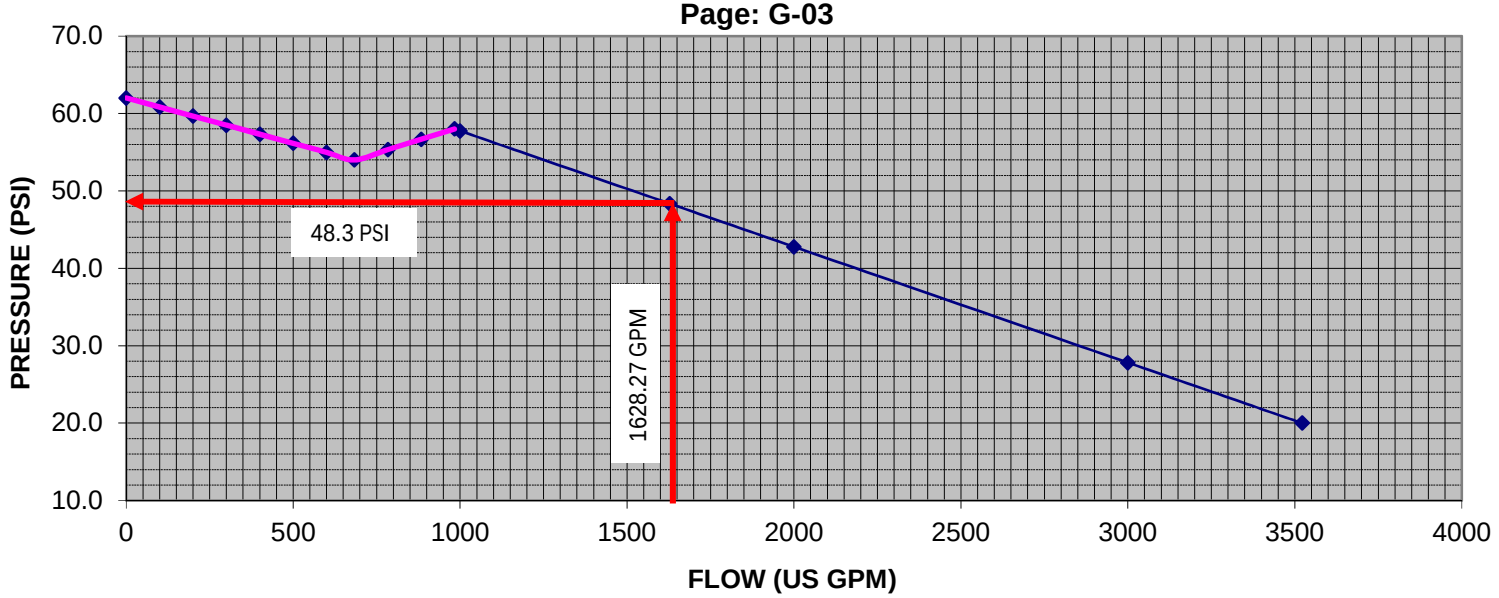
Interpolated

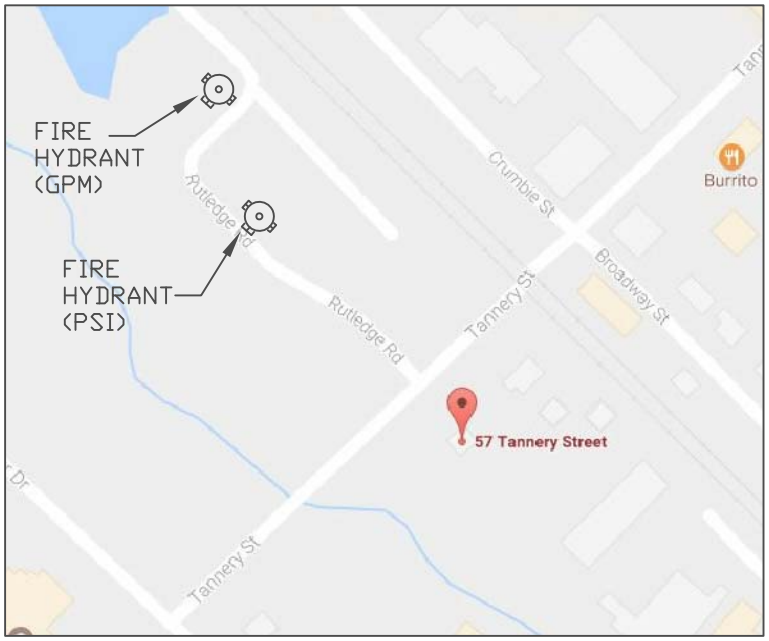
Flow (US GPM)	Residual Pressure (psi)
0	**62.0**
100	60.8
200	59.7
300	58.5
400	57.3
500	56.1
600	55.0
683.5	**54.0**
784	55.3
884	56.7
983.3	**58.0**
1000	57.8
1628	48.3
2000	42.8
3000	27.8
3522	**20.0**

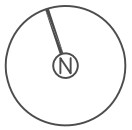
Existing 300mm Watermain on Tannery St., Mississauga

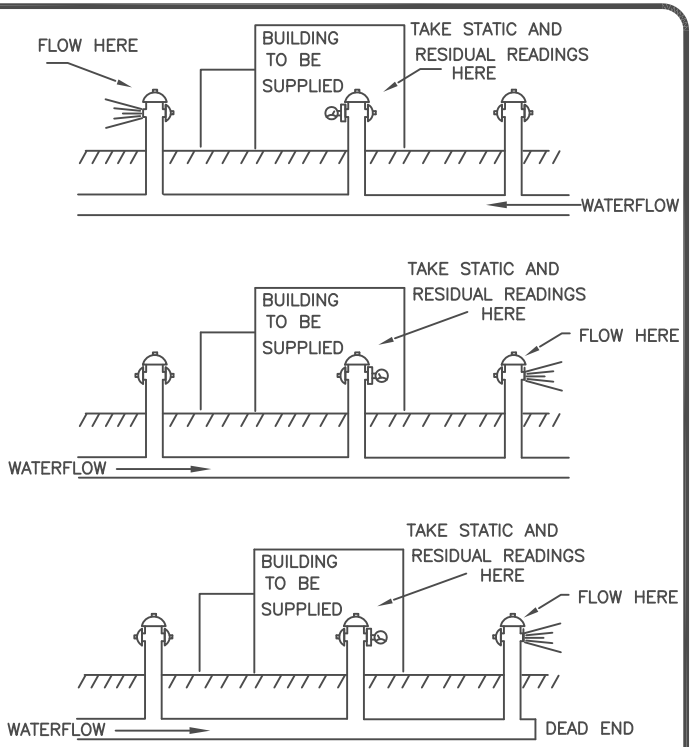
FLOW TEST CHART (BASED ON FOCUS FIRE PROTECTION TEST, JUN. 15, 2017)

Page: G-03





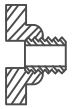




TEST:	PLAY PIPE	C=	STATIC(PSI)	RESIDUAL(PSI)	PITOT(PSI)	FLOW(USGPM)
	1x1 1/8					
	2x1 1/8					
	3x1 1/8					
	4x1 1/8					
	1x1 3/4					
	2x1 3/4					
	3x1 3/4					
	4x1 3/4					
	HYDRANT BUTT					
1	1x2 1/2	.80	62	54	21	683.5
2	2x2 1/2	.80	62	58	11	983.3
	3x2 1/2					
	4x2 1/2					
	FM NOZZLE					
	1x2 1/4	.88				
	2x2 1/4	.88				
	3x2 1/4	.88				
	4x2 1/4	.88				

OUTLET TYPE

☐  COEF.=0.90 OUTLET SMOOTH AND WELL ROUNDED

☒  COEF.=0.80 OUTLET SQUARE AND SHARP

☐  COEF.=0.70 OUTLET SQUARE AND PROJECTING INTO BARREL

Client:

Location:

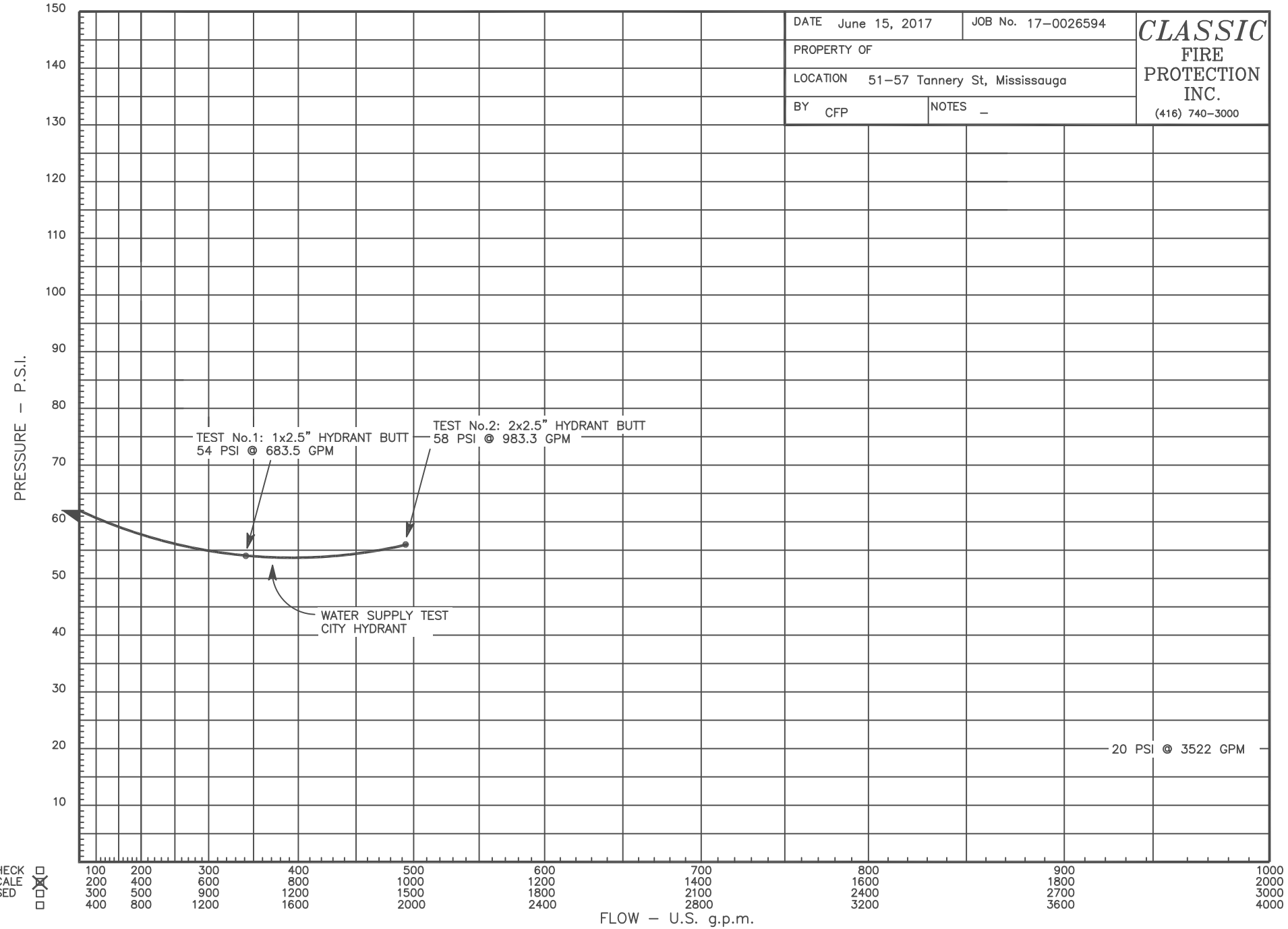
51–57 Tannery St

Mississauga, ON

DEDICATED SERVICE SINCE 1988
CLASSIC FIRE PROTECTION INC.
645 GARYRAY DR.
North York, ON
M9L 1P9
(416) 740-3000
Web: www.classicfire.com

WATER SUPPLY GRAPH

DATE June 15, 2017	JOB No. 17–0026594	CLASSIC FIRE PROTECTION INC. (416) 740–3000
PROPERTY OF		
LOCATION 51–57 Tannery St, Mississauga		
BY CFP	NOTES –	



LEA Consulting Ltd. Consulting Engineers and Planners	Residual Pressure			
	Prepared:	F.M.	Page No.	G-04
	Checked:	R.B.		
Project: 51-57 Tannery Street **City Of Mississauga**	Proj. #	18038		
	Date:	27-Jun-19		

Hydrant Test Readings (300mm watermain, Thomas Street) undertaken on May 10, 2019, by Focus Fire Protection

Flow		Residual Pressure		
0	US GPM	75	psi	
602.9	US GPM	73	psi	
692.2	US GPM	71	psi	
2866.9	US GPM	20	psi	Focus Fire Protection Estimate

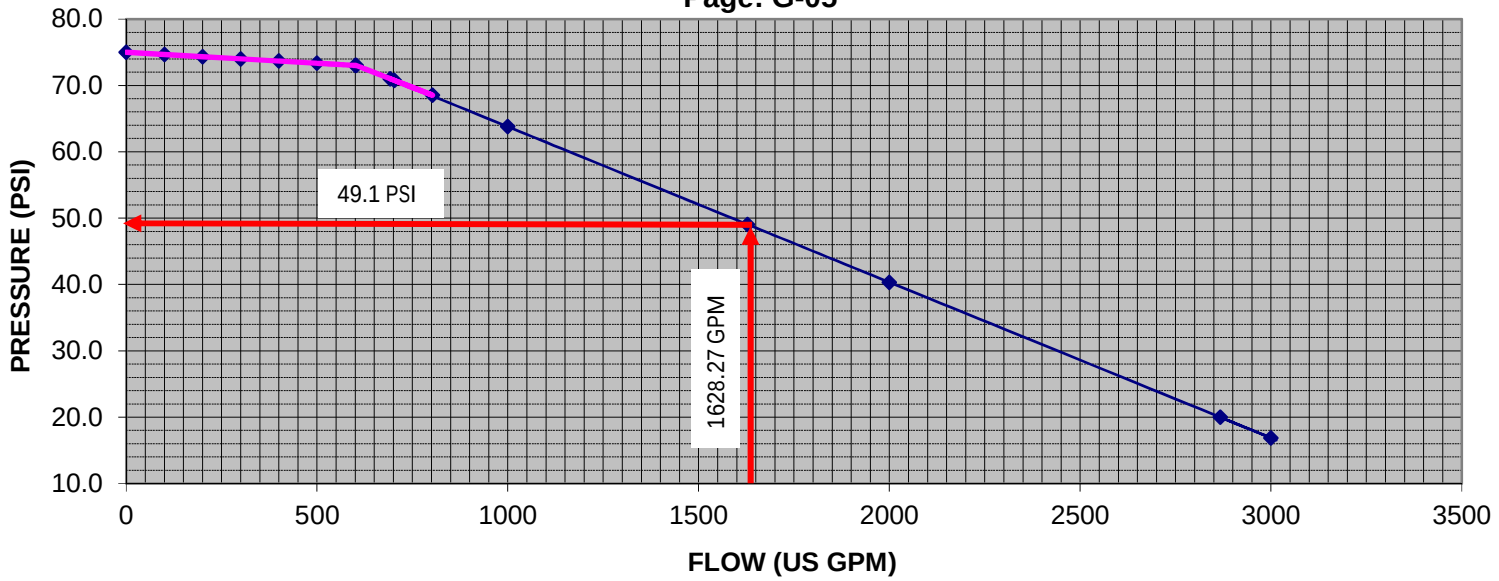
Interpolated

Flow (US GPM)	Residual Pressure (psi)
0	**75.0**
100	74.7
200	74.3
300	74.0
400	73.7
500	73.3
600	73.0
602.9	**73.0**
703	70.8
803	68.5
692.2	**71.0**
1000	63.8
1628	49.1
2000	40.3
3000	16.9
2867	**20.0**

Existing 300mm Watermain on Thomas St., Mississauga

FLOW TEST CHART (BASED ON FOCUS FIRE PROTECTION TEST, MAY. 10, 2019)

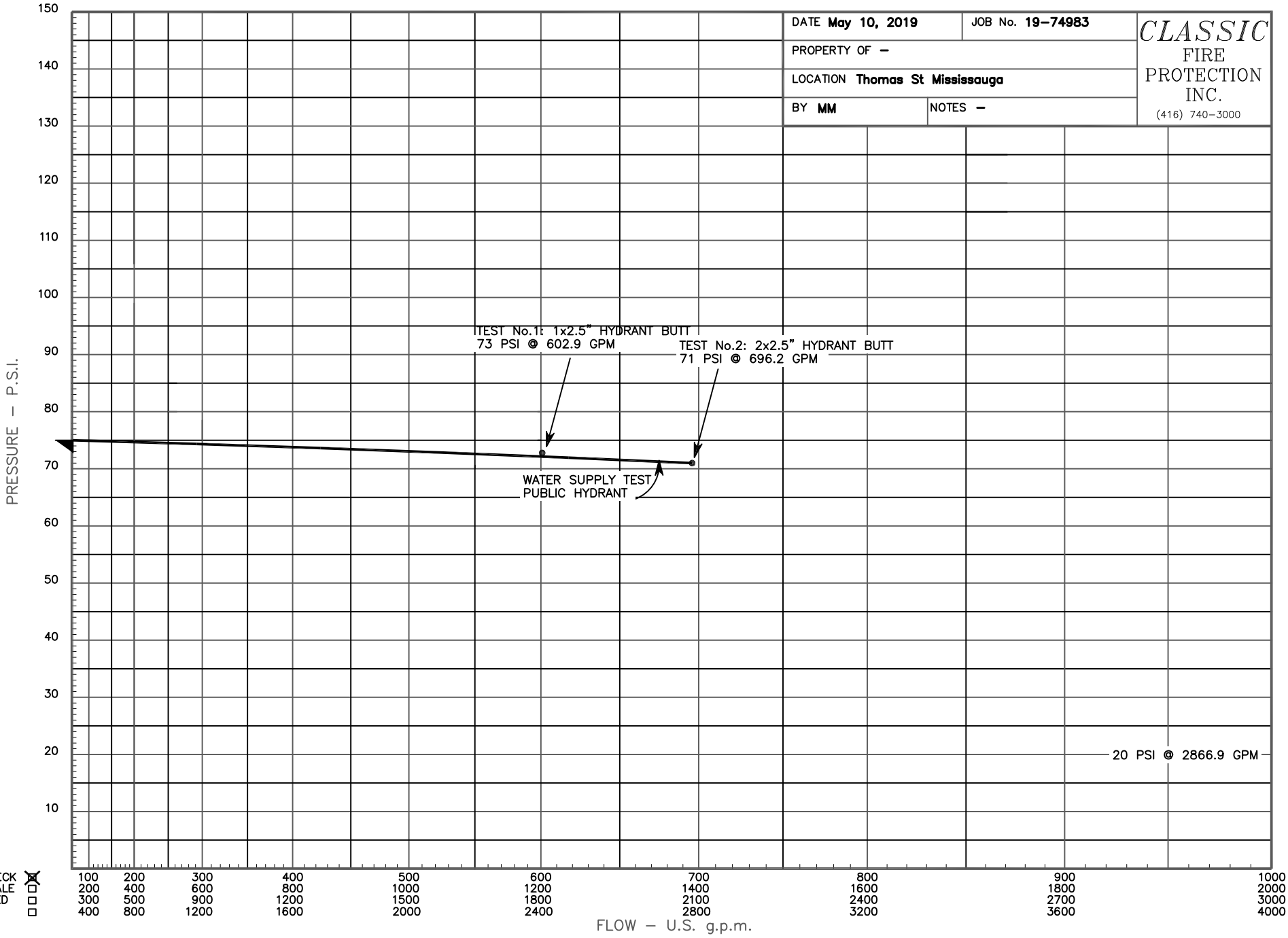
Page: G-05

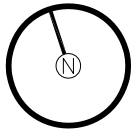


WATER SUPPLY GRAPH

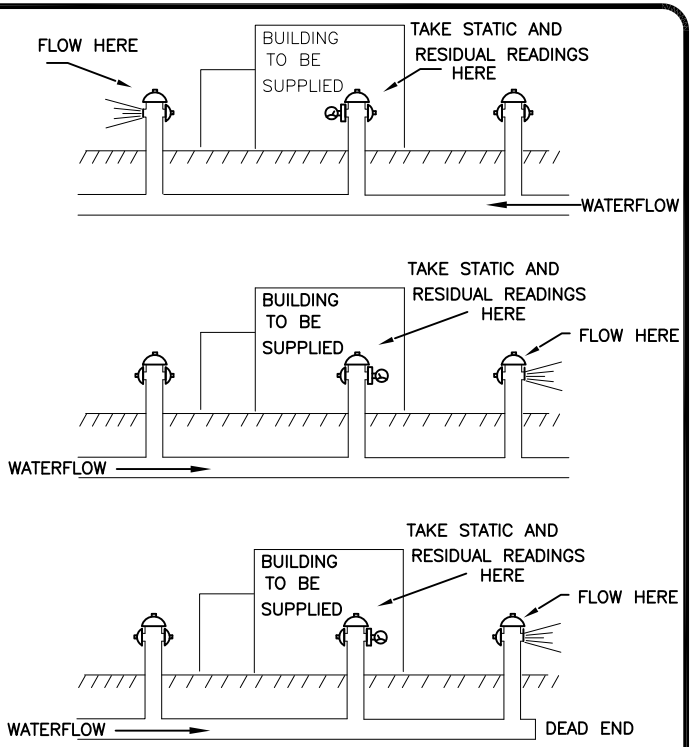
DATE **May 10, 2019**	JOB No. **19–74983**
PROPERTY OF **–**	
LOCATION **Thomas St Mississauga**	
BY **MM**	NOTES **–**

CLASSIC FIRE PROTECTION INC.
(416) 740–3000



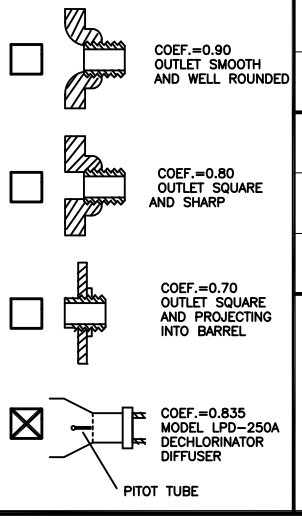


DURING THE FLOW TEST AS PER THE CITY WATER PERSONNEL, THE FLOW HYDRANT MAY HAVE BEEN DEFECTIVE. CITY TO INVESTIGATE.



TEST:	PLAY PIPE	C=	STATIC(PSI)	RESIDUAL(PSI)	PITOT(PSI)	FLOW(USGPM)
	1x1 1/8					
	2x1 1/8					
	3x1 1/8					
	4x1 1/8					
	1x1 3/4					
	2x1 3/4					
	3x1 3/4					
	4x1 3/4					
	HYDRANT BUTT					
1	1x2 1/2	.835	75	73	15	602.9
2	2x2 1/2	.835	75	71	5	696.2
	3x2 1/2					
	4x2 1/2					
	FM NOZZLE					
	1x2 1/4	.88				
	2x2 1/4	.88				
	3x2 1/4	.88				
	4x2 1/4	.88				

OUTLET TYPE



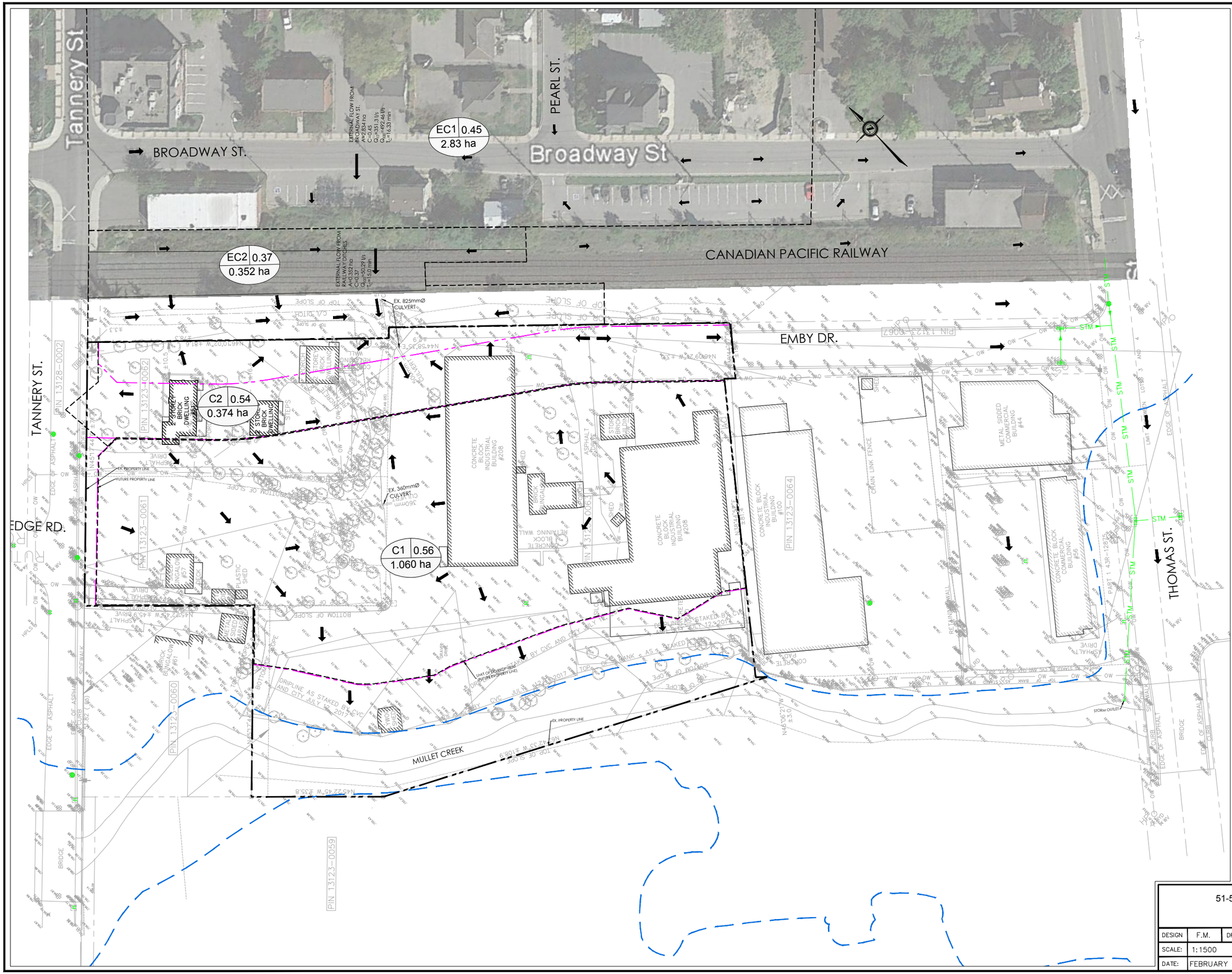
Client:
LEA CONSULTING LTD.
625 COCHRANE DR.
MARKHAM, ON

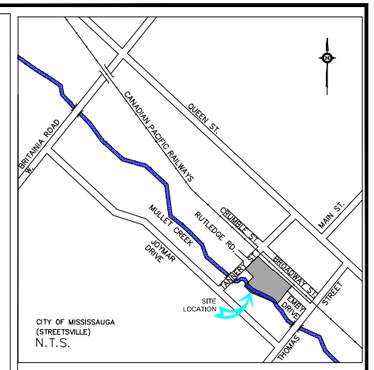
Location:
Thomas St
Mississauga, ON

DEDICATED SERVICE SINCE 1988
CLASSIC FIRE PROTECTION INC.
645 GARYRAY DR.
North York, ON
M9L 1P9
(416) 740-3000
Web: www.classicfire.com

APPENDIX H

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

MISSISSAUGA

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

625 Cochrane Drive, Suite 900
Markham, Ontario
L3R 9R9, Canada
Tel: (905)470-0015. Fax: (905)470-0030

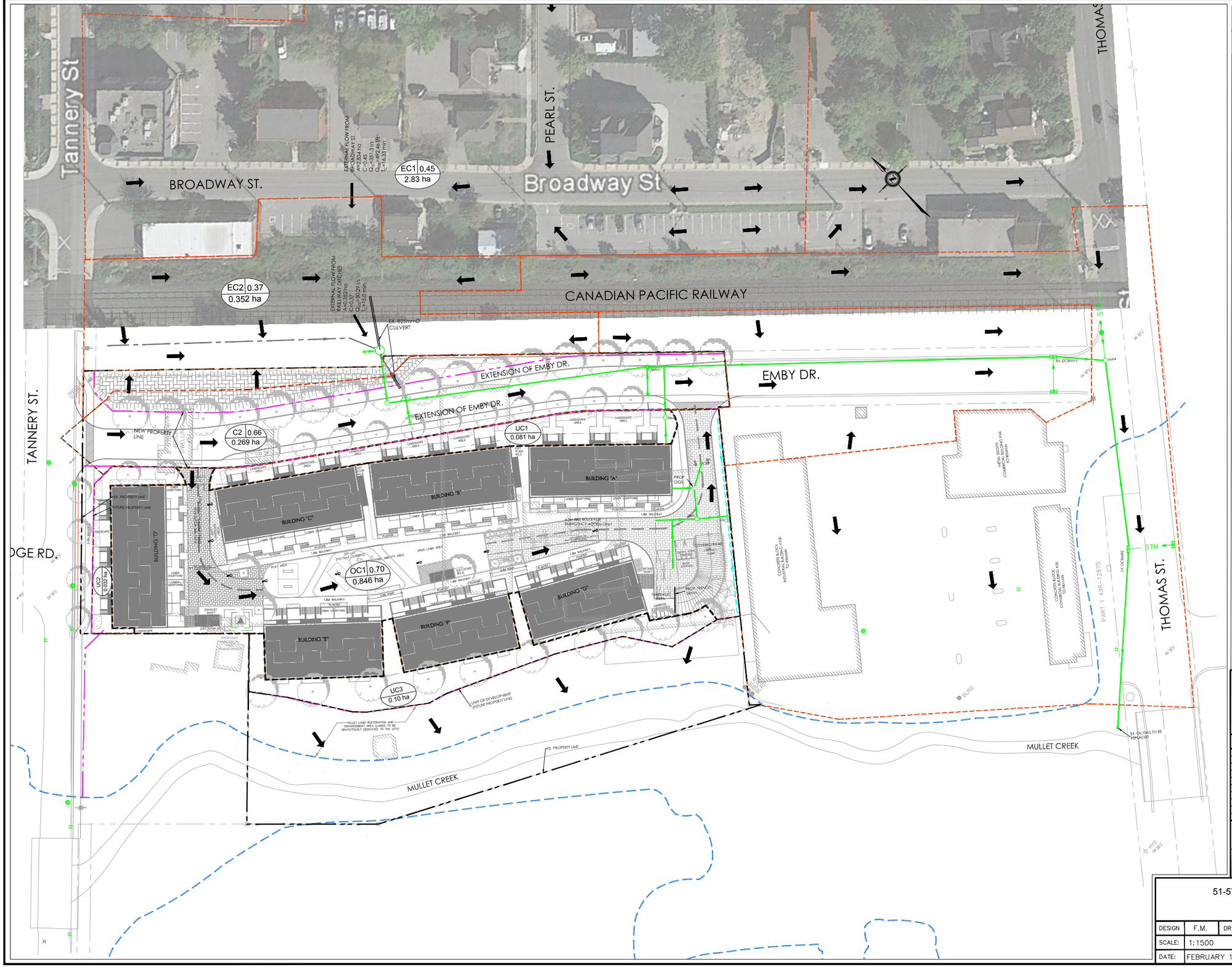
LEA Consulting Ltd.
Consulting Engineers and Planners
www.LEA.ca

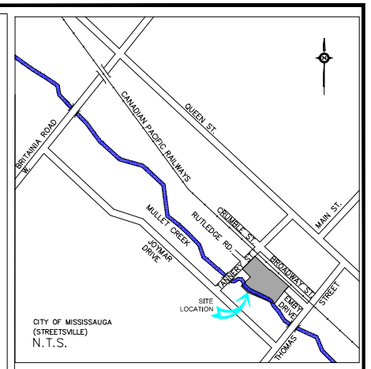
51-57 TANNERY STREET DEVELOPMENT
EXISTING STORM DRAINAGE PLAN

DESIGN	F.M.	DRAWN	F.M.	CHECKED	R.B.	CONTRACT No.	18038
SCALE:	1:1500			DRAWING NUMBER		FIG.01	
DATE:	FEBRUARY 10, 2018						

(11"x17" / 279 x 431 mm)

DRAWING NAME: F:\18038 - 51 Tannery\Drafting\Context Drawings\FIG1-Ex drainage Plan.dwg Jun 26, 2019 - 1:58pm





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 0.368 ha — CATCHMENT ID/RUNOFF COEFFICIENT DRAINAGE AREA (ha)
- PROP. TREE

MISSISSAUGA

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

625 Cochrane Drive, Suite 900
Markham, Ontario
L3R 9R9, Canada
Tel: (905)470-0015 Fax: (905)470-0030

LEA Consulting Ltd.
Consulting Engineers and Planners
www.LEA.ca

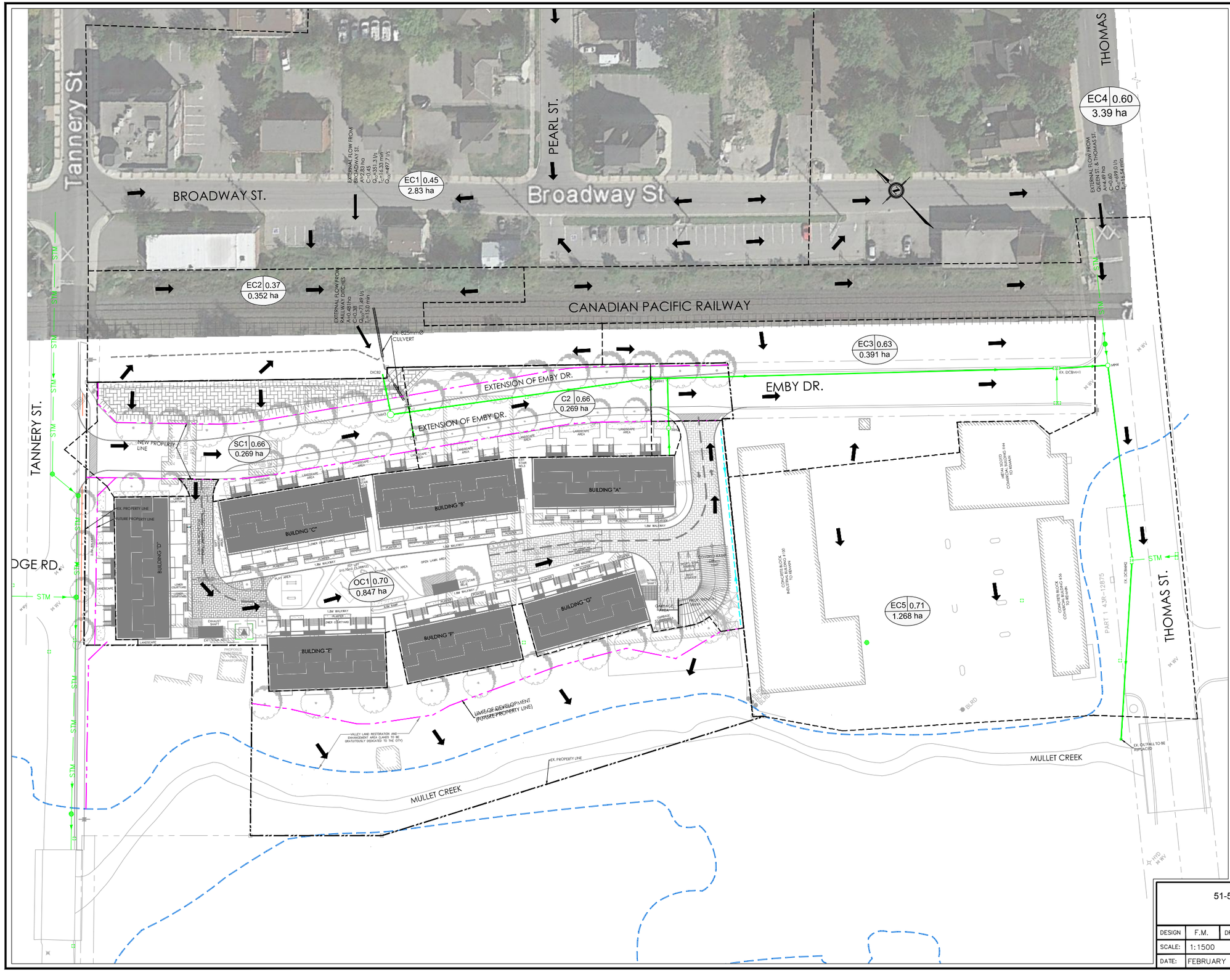
51-57 TANNERY STREET DEVELOPMENT

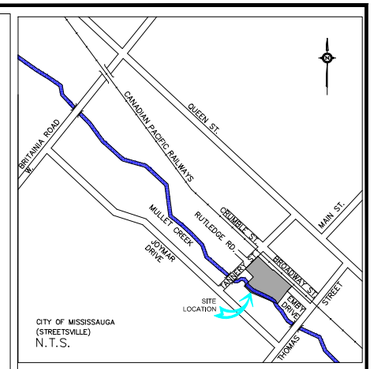
PROPOSED STORM DRAINAGE PLAN

DESIGN	F.M.	DRAWN	F.M.	CHECKED	M.D.	CONTRACT No. 18038
SCALE:	1:1500					DRAWING NUMBER FIG.02
DATE:	FEBRUARY 10, 2018					

(11"x17" / 279 x 431 mm)

DRAWING NAME: P:\18038 - 51 Tannery\Drafting\Current Drawings\002-Prop. drainage Plan.dwg
Jun 26, 2019-3:47pm





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
- EXISTING FENCE
- PROPERTY LINE
- EXISTING DITCH
- PROPOSED DITCH
- AD PROPOSED AREA DRAIN
- REGIONAL FLOOD LINE (FROM MULLET CREEK FLOOD RISK MAP)
- OVERLAND FLOW ROUTE
- DRAINAGE BOUNDARY
- C1 0.25 0.388 ha CATCHMENT ID/RUNOFF COEFFICIENT DRAINAGE AREA (ha)
- PROP. TREE

CITY OF MISSISSAUGA
REGIONAL MUNICIPALITY OF PEEL

No.	DATE	DESCRIPTION
1	2019/06/27	ISSUED FOR ZBA RESUBMISSION

625 Cochrane Drive, Suite 900
Markham, Ontario
L3R 9R9, Canada
Tel: (905)470-0015. Fax: (905)470-0030

LEA Consulting Ltd.
Consulting Engineers and Planners
www.LEA.ca

51-57 TANNERY STREET DEVELOPMENT
STORM SEWERS DRAINAGE PLAN

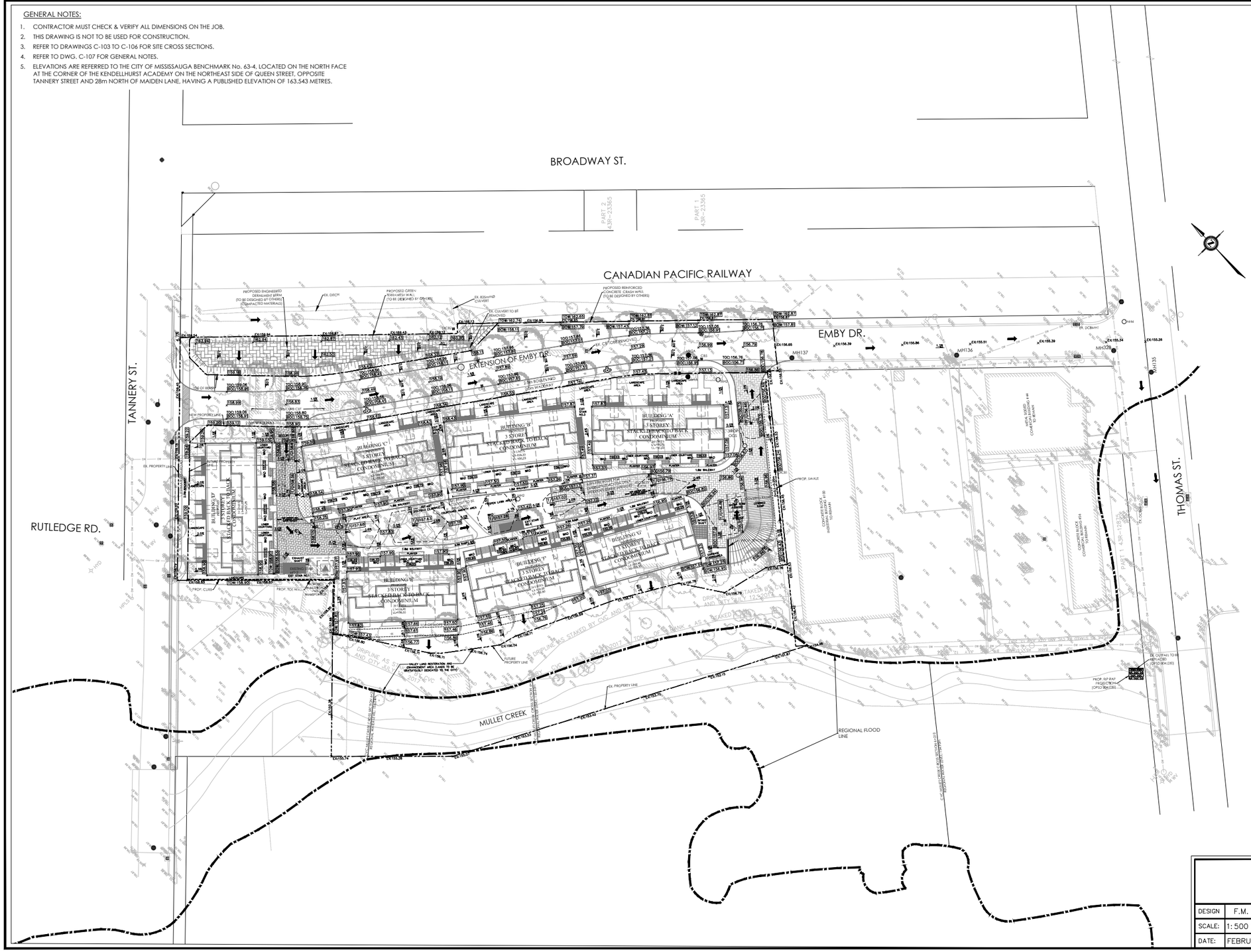
DESIGN	F.M.	DRAWN	F.M.	CHECKED	M.D.	CONTRACT No.	18038
SCALE:	1:1500					DRAWING NUMBER	FIG.03
DATE:	FEBRUARY 10, 2018						

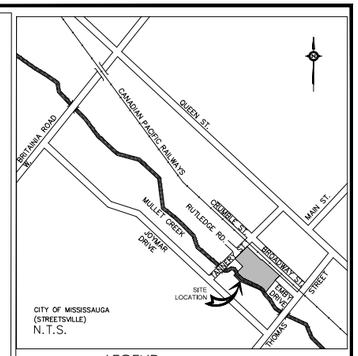
DRAWING NAME: F:\\18038 - 51 Tannery\Draft\Fig\Contract Drawings\XCG - Storm Sewer drainage Plan.dwg Jun 26, 2019 - 1:50pm

(11"x17" / 279 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
MW	EXISTING MONITORING WELL
OH OH	EX. OVERHEAD WIRES
X X	EXISTING FENCE
	PROPERTY LINE
	PROPOSED DITCH
⊠AD	PROPOSED CATCHBASIN
159.47	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	2018/04/08	ISSUED FOR ZBA
2	2019/06/27	ISSUED FOR ZBA RESUBMISSION

625 Cochrane Drive, Suite 900
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REGISTERED PROFESSIONAL ENGINEER F. MORSHEDI 100122000 JUNE 27 2019 PROVINCE OF ONTARIO

51-57 TANNERY STREET DEVELOPMENT

PRELIMINARY SITE GRADING PLAN

DESIGN	F.M.	DRAWN	F.M.	CHECKED	R.B.	CONTRACT No.	18038
SCALE:	1:500 (FULL SIZE)			DRAWING NUMBER		C-100	
DATE:	FEBRUARY 10, 2018						

Jun 28, 2019 - 7:06pm

DRAWING NAME: P:\18038 - 51 Tannery\Drafting\Planset Drawings\C100-Site Grading Plan.dwg

NOTES:

1. ELEVATIONS ARE REFERRED TO THE CITY OF MISSISSAUGA BENCHMARK NO. 63-4, LOCATED ON THE NORTH FACE AT THE CORNER OF THE KENDELHURST 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

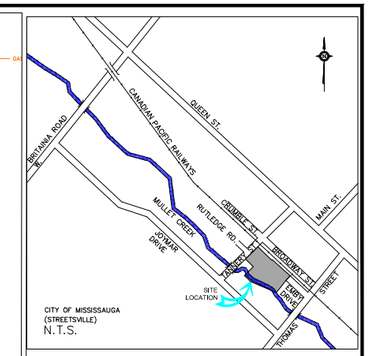
NO.	TOP. EL. (m)	INVERT (m)				OPSD NUMBER	
		N	E	W	S		
MH1	156.78	155.17	154.65		154.71	701.011	401.010
MH2	157.06		154.62	154.64		701.010	401.010
MH3	157.95		154.76		154.61	701.011	401.010
MH4	155.63	153.37		153.29		701.011	401.010
OGS	156.70	154.52	155.09	154.58			

PROPOSED SANITARY MANHOLES

NO.	TOP EL. (m)	INVERT (m)				REGIONAL STANDARD	
		N	E	W	S		
MH1A	157.21		153.89	153.91		2-5-3	2-6-6
MH2A	156.98			153.79	153.72	2-5-3	2-6-6

PROPOSED STORM CATCHBASIN

NO.	TOP. EL. (m)	INVERT (m)				OPSD NUMBER	
		N	E	W	S		
CB1	156.66			155.21		705.010	704.010
CB2	156.86		155.36			705.010	704.010
CB3	157.89			155.09		705.010	704.010
CB4	157.89		155.19			705.010	704.010
CB5	156.91	155.46				705.010	704.010
DICB1	156.24	154.79				705.030	403.010
DICB2	156.99			154.91		705.040	403.010
DBMH1	156.91	154.19		155.34	154.17	701.040	704.010
EX. DCBMH1	155.40	153.51			153.49		
EX. DCBMH2	153.70		151.89	151.74			
OUTFALL			151.07			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
- CS EXISTING CURB STOP
- EXISTING MONITORING WELL
- 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
- OW EXISTING OVERHEAD WIRES
- 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
1	2018/06/08	ISSUED FOR ZBA
2	2019/06/27	ISSUED FOR ZBA RESUBMISSION

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JUNE 27, 2019
PROVINCE OF ONTARIO

51-57 TANNERY STREET DEVELOPMENT
PRELIMINARY SITE SERVICING PLAN

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

DRAWING NAME: P:\18038 - 51 Tannery\Drafting\Current Drawings\C101-Site Servicing Plan.dwg Jun 26, 2019-4:57pm