Town of Cobourg

FANCTIONAL SERVICING AND STORMWATER ANAGEMENT BRIEF

Balder Corporation
325 University Avenue West

May 2019
20021

Disclaimer

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1 INTRODUCTION

1.1 SCOPE OF THE SWM AND SERVICING REPORT

LEA Consulting Ltd. has been retained by Balder Corporation, to prepare a Functional Servicing and Stormwater Management Brief for proposed new build of a 4-storey residential building located at 325 University Avenue West in the Town of Cobourg. This stormwater management and servicing brief shall:

- Examine the potential water quantity and quality impacts of the proposed development and summarize how each will be addressed in accordance with the Ganaraska Region Conservation Authority (GRCA), 2014.
- Review the water supply, storm and sanitary servicing requirement of the proposed development, and propose a preliminary site servicing plan.

1.2 SITE LOCATION

The proposed development site is located at the southwest quadrant of University Avenue West and William Street. The study area consists of the existing dwellings and vegetated lands. It is bounded by William Street to the east, single houses to the west, undeveloped property to the south, and University Street West to the north, contributory to Cobourg Creek watershed and under the jurisdiction of Ganaraska Region Conservation Authority (GRCA). Study area access, currently via University Avenue and is approximately 0.485 ha.

The location, surroundings, and layout of study area shown below in Figure 1.

Figure 1: Proposed Development SWM Study Area

1.3 STORMWATER MANAGEMENT PLAN OBJECTIVES

The objectives of the stormwater management plan are as follows:

- Determine site specific stormwater management requirements to ensure that the development project is in conformance with the *Technical and Engineering Guidelines for Stormwater Management Submission* issued by Ganaraska Region Conservation Authority (GRCA);
- Preparing a stormwater management plan documenting the strategy along with the technical information necessary for the sizing of the proposed stormwater management measures.

1.4 SWM DESIGN CRITERIA – GRCA

The GRCA has issued the *Technical and Engineering Guidelines for Stormwater Management Submission*, (December 2014) to provide direction on how to manage rainfall and runoff inside watersheds. A summary of the stormwater management criteria applicable to this project is as follows:

- Water Quality: water quality control, outflow from SWM facilities must meet enhanced level requirements (80% removal of total suspended solids); and
- Water Quantity Control and Discharge to Municipal Infrastructure: Runoff from the 5-year to 100-year design storms must not exceed the peak runoff rate from the site under pre-development conditions. The allowable release rate to the municipal storm sewer system from the development site is the 5-year pre-development flow rate.

2 EXISTING CONDITIONS

2.1 GENERAL

The site is currently occupied by four properties consist of dwelling, single houses and vegetated areas. Under existing condition, the majority of site drains towards the University Avenue West at north of the site. The southern part of the site drains towards the south and southwest corner of the site towards the adjacent properties.

For purpose of SWM analysis and calculating the allowable release rate from the proposed development, the site is divided into two sub-catchment areas based on the drainage pattern under existing condition, i.e.

- Sub-Catchment C1: Northern part of the site which drains to the University Avenue west;
- Sub-Catchment C2: Southern part of the site which drains to the adjacent properties;

Sub-catchment areas and runoff coefficients are summarized in Table 1 on the next page.

Table 1: Areas of Proposed Sub-Catchment

Sub-catchment No	Catchment Description	Catchment Area (m^2)	Runoff Coefficient
C1	Northern part of the site	3785	0.43
C2	Southern part of the site	1071	0.35

Under current condition, the eastern area of the property 395 William Street drains to the study area as an external flow. Drainage area boundaries, overland flow routes, grading and land use details under existing conditions are illustrated on Fig. 2 in Appendix C.

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

2.2 RAINFALL INFORMATION

The rainfall runoff and intensity under existing and proposed conditions are calculated using the following equations:

Rational Formula: $Q = 2.78CIA$ (L/s)

Where: C: runoff coefficient

I: rainfall intensity (mm/hr)

A: drainage area (ha)

IDF Curve Equation: $I = a/(b+T_C)$ (Yarnell Equation)

Where: I: rainfall intensity (mm/hr)

T_C: time of concentration (min)

a, b: parameters

The parameters (a and b) for use in beyond Clarington are defined in Appendix B of the *Technical and Engineering Guidelines for Stormwater Management Submission* and are summarized in Table 2.

Table 2: Values of a and c Parameters for the GRCA

Return Period (Year)	2	5	10	25	50r	100
a	1778	2464	2819	3886	4750	5588
b	13	16	16	18	24	28

An initial time of concentration, T, of 15 minutes is recommended in the GRCA document for normal residential and industrial developments.

2.3 PEAK FLOW RATES UNDER EXISTING CONDITIONS

Based on the existing site condition and rainfall parameters, the Rational Method is adopted to calculate peak flows at different design storm events. The calculated peak flow rates for the site in the pre-development condition are summarized below in Table 3. Detailed calculations are provided in Appendix A.

Table 3: Pre-Development Flow Rates (L/s)

Sub-catchment No	Sub-Catchment	Return Period (Year)					
		2	5	10	25	50	100
C1	Northern part of the site	28.9	36.1	41.3	53.5	55.3	59.1
C2	Southern part of the site	6.6	8.3	9.5	12.3	12.7	13.6

2.4 ALLOWABLE FLOW RATE

Since the site is located within the Cobourg Creek watershed, according to the *Technical and Engineering Guideline for Stormwater Management Submission* by GRCA, Table 3.1, the allowable release rate to the municipal storm sewer system from the proposed redevelopment would be based on the 5-year pre-development flow rate.

In order to maintain the existing drainage condition of the University Avenue West, only the 5-year flow from sub-catchment C1 is considered as the allowable discharge rate from the proposed development site to the existing municipal sewer on the University Avenue West. In other words, the maximum flow rate from the entire site is limited to 36.1 L/s under proposed condition.

3 POST-DEVELOPMENT CONDITIONS

3.1 GENERAL

The proposed development consists of construction of a 4-storey residential building on the north, new parking lots on south and new driveway on the west of the site. The existing 2-storey building on the south-east will be remained.

During rainfall events, the runoff from the building will be captured by buildings' roof drains, conveyed through the internal piping and discharged directly to the proposed stormwater storage on the proposed driveway. Runoff from the rest of the site will be collected by proposed catch basins and swales, conveyed through the storm pipes, discharged to the proposed stormwater storage on the new driveway, controlled by an orifice, and ultimately outlet to the existing municipal storm sewer on the University Avenue West.

Catchment area, drainage pattern and overland flow route for proposed condition are illustrated in Fig. 3, in Appendix C.

Based on the proposed land use, the composite runoff coefficients are estimated at 0.62 for the proposed development. Refer to Appendix A for details.

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 at different design storm events. The calculated peak flow rates for total site area and external drainage area under post-development condition are summarized in Table 4. Detailed calculations are provided in Appendix A.

Table 4: Post-Development Peak Flow Rates (L/s)

Sub-catchment No	Sub-Catchment	Return Period (Year)					
		2	5	10	25	50	100
C	Proposed site	55.1	69.0	78.9	102.2	105.7	112.8

4 PROPOSED SWM PLAN

4.1 WATER QUANTITY CONTROL REQUIREMENT

As noted in Section 2.4, the allowable discharge rate to the municipal sewer system from the site is estimated to be 36.1 L/s, which is equivalent to 5-yr existing flow from the 78% of the site area to the existing municipal sewer on the University Avenue West.

Based on the post-development condition, the stormwater detention requirements at different storm events are estimated in Appendix A and summarized in Table 5 below

Table 5: Required Stormwater Storage Volume

Sub-catchment No	Sub-Catchment	Target Release Rate (L/S)	Storage Volume (m^3)	
			Required	Provided
C	Proposed site	36.1	85.9	90.0

An underground Stormwater storage (S-29 Triton Chambers) is proposed on the new driveway for entire site. The exact type and material of the stormwater storage will be defined after receiving the geotechnical and groundwater elevation information in the next step of the design. The location and footprint of underground storages are shown on the DWG C01-site Grading Plan and DWG C02-site Servicing Plan. Typical sections of chamber are presented in Appendix A.

The type and exact location of the cistern, piping and detail of orifice tube will be determined by consultation with the geotechnical and mechanical designer during the next stage of design.

4.2 WATER QUALITY CONTROL

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 site, the following quality control measures will be provided:

Based on the SWM design criteria, the building rooftop area is not subject to vehicular traffic, and the application of sand and de-icing salt constituents, petroleum hydrocarbons and heavy metals. As such, the stormwater generated from the roof area is considered clean for the purposes of water quality control.

Under the post-development conditions, rooftop areas, will remove TSS from the rainfall runoff. Table 6 provides a preliminary estimate of TSS removal level of stormwater leaving the site.

Table 6: TSS Removal Assessment of Study Area

Land Use	Area (m^2)	TSS Removal Efficiency (%)	Composite TSS Removal Efficiency (%)
Roof	1300	80	20.5
Concrete and Asphalt	1380	0	0
Permeable pavement	1860	80	29.4
Landscape and vegetated Area	920	80	14.5
OGS	3372	50	33.2
Total	5066*		>80.0

**External flow drainage area included*

To achieve a TSS removal of 80%, a stormwater quality treatment facility (CDS model PMSU2015-4) is proposed. Sizing details are provided in Appendix A. This quality treatment unit will be installed before the inlet of storage tank within the new driveway.

5 EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION

During site construction, it is recommended that all erosion and sediment control Best Management Practices (BMPs) shall be constructed and maintained in accordance with the Greater Golden Horseshoe Area Conservation Authorities' (GGHA CAs) Erosion & Sediment Control Guidelines for Urban Construction (December 2006). In brief, the measures below are proposed to be provided on site during the entire period of construction:

- Siltation control fence along the perimeter of the construction site before commencement of construction;
- Sediment control measures to prevent silt entry at all the existing catch basins;
- Granular mud-mats at all construction egress locations (see mud-mat details);
- An inspection and monitoring program following the GGHA CA's Erosion and Sediment Control Guidelines for Urban Construction (December 2006).

6 SITE SERVICING

The purpose of this site servicing report is to review the site servicing requirement of the proposed development, and propose a site servicing plan, including water supply, sanitary and storm services. Refer to Dwg. C02 - Site Servicing Plan for details of the proposed site service connections.

6.1 EXISTING MUNICIPAL SERVICES

Base on the survey and Town's records, the existing underground sewers and watermains in the vicinity of the proposed development area include the followings:

University Ave.:

- a 150mm dia. PVC watermain;
- a 600mm dia. CONC sanitary sewer line
- a 300mm CONC storm sewer line
- a 900mm CONC storm sewer line

William Street:

- an 150mm dia. CI watermain;
- a 300mm dia. CONC storm sewer line;
- a 200mm dia. PVC sanitary sewer line.

Margaret Street:

- a 150mm dia. CI watermain;
- a 300mm storm sewer line;
- a 200mm dia. PVC sanitary sewer line.

6.2 PROPOSED SITE SERVICE CONNECTIONS

Design Parameters

The sanitary demands for the proposed site are based on the following Town of Cobourg design guidelines:

- Sanitary demand rate of 364 L/person/day for new residential development;
- Population densities of 1.62 person/unit for apartment;
- Infiltration Allowance of 0.26 L/s/ha; and,
- Peaking Factor based on the Harmon Equation.

The domestic water demands for the proposed site are based on the following criteria:

- Water demand rate of 191 L/person/day for domestic consumption.
- Population densities of 1.62 person/unit for apartment;
- Peaking Factor for drinking-water systems serving fewer than 500 people– 9.4 (Peak Hour) and 6.3 (Maximum Day).

The demand and peaking factors are based on the Ministry of Environment *Design Guidelines for Drinking-Water Systems, 2008.*

Based on the design criteria and project statistics of proposed development provided by the architect, sanitary flow and water demand are estimated in Appendices B and summarized below in Table 7. Storm flow discharge rates have been provided in the previous section of this report.

Table 7: Site Servicing Requirement

Building	Sanitary Flow rate (l/s)	Water Demand (l/s)
New Residential Building	1.97	118.3

Through discussion with design, the locations and sizes of the proposed site service connections for new residential building have been determined to satisfy the requirements of the Town of Cobourg. In summary:

Sanitary Service: A 200mm dia. sanitary service connection will be installed to service the proposed residential development and discharge to the exiting 600mm concreate sanitary sewer on University Avenue West

Storm Service: A new 250mm PVC storm service connection will be installed to provide servicing and discharge the storm flow from the proposed cistern to the proposed manhole No. MH.1 on the existing 300mm storm sewer on University Avenue West.

Water service:

- Domestic Water Service: An 100mm dia. PVC domestic water service connection will be installed to service the proposed building. The domestic water service connection will be connected to the proposed 150 mm dia. fire protection water service connection with a tee-connection.
- Fire Protection Service: A new 150mm dia. fire protection service will be installed and connect to the existing 150mm PVC watermain on the University Avenue West.

Refer to Dwg. C-02-site servicing plan in Appendix C for details of proposed service connections.

6.3 ASSESSMENT OF EXISTING MUNICIPAL SERVICE

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

6.3.1 Adequacy of Existing Storm and Sanitary Sewers

Sanitary: Based on the Town's record drawings, the full flow capacity of the existing 600mm sanitary sewer on University Avenue West at the north of the development site is estimated at 307.0 L/s. Therefore, it is anticipated to be adequate to accommodate the sanitary flow (1.19 L/s) from the proposed development.

Storm: Based on the Town's record drawings, the full flow capacity of the existing 300mm storm sewer on University Avenue West at the north of the development site is estimated at 71.1 L/s. Furthermore, under post-development condition, the storm water discharge form the site to the University Avenue West is to be maintained as the existing condition and an overcontrolled discharge is provided through the proposed stormwater management plan. Therefore, the existing 300mm storm sewer on the University Avenue West would be adequate to accommodate 36.1 L/s flow from the proposed development.

6.3.2 Adequacy of Existing Water mains

At the time of design, hydrant flow test is not completed yet. Adequacy of water supply will be assessed at the next stage of design.

7 CONCLUSIONS

7.1 STORMWATER MANAGEMENT PLAN

- Water Quantity: On-site storage volume of approximately 90 m^3 will be provided in order to control the post development 100-year stormwater flows to 5-yr pre-development flow to the existing municipal sewer on the University Avenue West. An underground Triton S-29 stormwater chamber is proposed to satisfy the on-site storage requirement.
- Water Quality: An oil/grit separator is required to satisfy the MOE's 80% TSS removal.

Temporary Erosion and Sediment Control during Construction

- Temporary erosion and sediment control measures should be provided before construction and maintained during construction in accordance with the GGHA CA's Erosion & Sediment Control Guidelines for Urban Construction and other requirements.

7.2 SITE SERVICING REQUIREMENT

- Sanitary Service: The sanitary service for proposed development will provided by a new 200 mm sanitary service connected to the existing 600mm sanitary sewer on University Avenue West. Based on the size and slope of the receiving municipal sanitary sewer, there is sufficient flow capacity within the existing sanitary sewers on University avenue to accommodate the proposed development.
- Storm Service: The proposed storm service connection for this site will be a 250mm PVC pipe that connects to the proposed manhole MH2 on the south side of University Avenue West.
- Water Services: New water service for the proposed building will consist of a 100mm domestic water and a 150mm fire service connection. The total water demand for the development is 118.3 L/s (or 1874.6 USGPM).

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APPENDIX A

Stormwater Peak Flow and Storage Calculations

LEA Consulting Ltd. Consulting Engineers and Planners	Land Use			
	Prepared:	F.M.	Page No.	A-01
	Checked:	R.B.		
Project: 315-325 University Avenue West Town of Cobourg	Proj. #	20021		
	Date:	02-May-19		

EXISTING CONDITION:

Existing Land Use	Area (m^2)
Sub.Catchment (C1)	
Building	1062
Vegetated Area	2723
Total	**3785**
Sub.Catchment (C2)	
Building	168
Vegetated Area	903
Total	**1071**
Total Site Area	**4856**
External Drainage Area	210
Total Drainage Area	**5066**

POST DEVELOPMENT CONDITION:

Proposed Land Use	Area (m^2)
Building and Concrete	1909
Asphalt	377
Permeable paving	1860
Landscaped Area	710
Total Site Area	**4856**
External Drainage Area	210
Total Drainage Area	**5066**

LEA Consulting Ltd. Consulting Engineers and Planners	Composite "C" Calculation			
	Prepared:	F.M.	Page No.	A-02
	Checked:	R.B.		
Project: 315-325 University Avenue West Town of Cobourg	Proj. #	20021		
	Date:	02-May-19		

Pre-Development Composite Runoff Coefficient "C"

Sub-Catchment C1

Land Use	Area (ha)	C	Composite "C"
Building	0.106	0.90	
Landscaped Area	0.272	0.25	
Total	**0.379**		**0.43**
Imperviousness:			**0.28**

Sub-Catchment C2

Land Use	Area (ha)	C	Composite "C"
Building	0.017	0.90	
Landscaped Area	0.090	0.25	
Total	**0.107**		**0.35**
Imperviousness:			**0.16**

Post-Development Composite Runoff Coefficient "C"

Land Use	Area (ha)	C	Composite "C"
Building and Concrete	0.191	0.90	
Asphalt	0.038	0.90	
Permeable paving	0.186	0.45	
Landscaped Area	0.071	0.25	
External Drainage Area	0.021	0.25	
Total	**0.507**		**0.62**
Imperviousness:			**0.45**

LEA Consulting Ltd. Consulting Engineers and Planners	Pre-Development Peak Flow Rates Calculation			
	Prepared:	F.M.	Page No.	A-03
	Checked:	R.B.		
Project: 315-325 University Avenue West Town of Cobourg	Proj. #	20021		
	Date:	02-May-19		

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

Time of Concentration: 15 minutes as per GRCA Guidelines

Rainfall Intensity: $I = a/(b+T_C)$

Return Period:	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Rainfall Intensity (mm/hr):	63.50	79.48	90.94	117.76	121.79	129.95

Sub-Catchment C1

Site Area: 0.379 ha

Runoff Coefficient : 0.43 Pre-development condition

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):	28.9	36.1	41.3	53.5	55.4	59.1

Sub-Catchment C2

Site Area: 0.107 ha

Runoff Coefficient : 0.35 Pre-development condition

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):	6.6	8.3	9.5	12.3	12.8	13.6

In order to maintain the existing drainage condition of the University Ave. W. the 5-year flow from the only sub-catchment C1 is considered as the allowable discharge rate from the proposed development site to the existing municipal sewer on the University Ave. W. Therefore,

LEA Consulting Ltd. Consulting Engineers and Planners	Pre-Development Peak Flow Rates Calculation			
	Prepared:	F.M.	Page No.	A-04
	Checked:	R.B.		
Project: 315-325 University Avenue West Town of Cobourg	Proj. #	20021		
	Date:	02-May-19		

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

Site Area:	0.507	ha
Time of Concentration:	15	minutes as per GRCA Guidelines
Runoff Coefficient :	0.62	Pre-development condition

Rainfall Intensity: $I = a/(b+T^{c)}$

Return Period:	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Rainfall Intensity (mm/hr):	63.50	79.48	90.94	117.76	121.79	129.95

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):	55.1	69.0	78.9	102.2	105.7	112.8

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (2-Year Storm)			
	Prepared:	F.M.	Page No.	A-05
	Checked:	R.B.		
Project: 315-325 University Avenue West Town of Cobourg	Proj. #	20021		
	Date:	02-May-19		

Total Drainage Area (ha) = 0.507 ha
Drainage Area Composite C = 0.62
Allowable Release Rate (5-year) = 36.14 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	63.50	55.12	49.60	36.14	32.52	17.08
17	59.27	51.44	52.47	36.14	36.86	15.61
19	55.56	48.23	54.98	36.14	41.20	13.78
21	52.29	45.39	57.19	36.14	45.53	11.66
23	49.39	42.87	59.16	36.14	49.87	9.29
25	46.79	40.61	60.92	36.14	54.20	6.72
27	44.45	38.58	62.50	36.14	58.54	3.96
29	42.33	36.74	63.93	36.14	62.88	1.05
31	40.41	35.07	65.24	36.14	67.21	-1.97
33	38.65	33.55	66.43	36.14	71.55	-5.12
35	37.04	32.15	67.52	36.14	75.89	-8.37
37	35.56	30.86	68.52	36.14	80.22	-11.70
39	34.19	29.68	69.45	36.14	84.56	-15.11
41	32.93	28.58	70.30	36.14	88.89	-18.59
43	31.75	27.56	71.10	36.14	93.23	-22.13
45	30.66	26.61	71.84	36.14	97.57	-25.73

Required Storage Volume = 17.08 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (5-Year Storm)			
	Prepared:	F.M.	Page No.	A-06
	Checked:	R.B.		
Project: 315-325 University Avenue West Town of Cobourg	Proj. #	20021		
	Date:	02-May-19		

Total Drainage Area (ha)	= 0.507	ha	
Drainage Area Composite C	= 0.62		
Allowable Release Rate (5-year)	= 36.14	L/s	Overcontrolled
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	79.48	68.99	62.09	36.14	32.52	29.57
17	74.67	64.81	66.10	36.14	36.86	29.24
19	70.40	61.10	69.66	36.14	41.20	28.46
21	66.59	57.80	72.83	36.14	45.53	27.30
23	63.18	54.84	75.68	36.14	49.87	25.81
25	60.10	52.16	78.24	36.14	54.20	24.04
27	57.30	49.74	80.57	36.14	58.54	22.03
29	54.76	47.53	82.69	36.14	62.88	19.81
31	52.43	45.50	84.64	36.14	67.21	17.43
33	50.29	43.65	86.42	36.14	71.55	14.87
35	48.31	41.93	88.06	36.14	75.89	12.17
37	46.49	40.35	89.58	36.14	80.22	9.36
39	44.80	38.88	90.99	36.14	84.56	6.43
41	43.23	37.52	92.30	36.14	88.89	3.41
43	41.76	36.25	93.52	36.14	93.23	0.29
45	40.39	35.06	94.66	36.14	97.57	-2.91
47	39.11	33.95	95.73	36.14	101.90	-6.17
49	37.91	32.90	96.73	36.14	106.24	-9.51
51	36.78	31.92	97.68	36.14	110.58	-12.90

Required Storage Volume = 29.57 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: 315-325 University Avenue West Town of Cobourg	Proj. #	20021		
	Date:	02-May-19		

Total Drainage Area (ha) = 0.507 ha
Drainage Area Composite C = 0.62
Allowable Release Rate (5-year) = 36.14 L/s Overcontrolled
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	90.94	78.93	71.04	36.14	32.52	38.52
17	85.42	74.14	75.63	36.14	36.86	38.77
19	80.54	69.91	79.69	36.14	41.20	38.49
21	76.19	66.13	83.32	36.14	45.53	37.79
23	72.28	62.74	86.58	36.14	49.87	36.71
25	68.76	59.68	89.52	36.14	54.20	35.32
27	65.56	56.90	92.18	36.14	58.54	33.64
29	62.64	54.37	94.61	36.14	62.88	31.73
31	59.98	52.06	96.83	36.14	67.21	29.62
33	57.53	49.93	98.87	36.14	71.55	27.32
35	55.27	47.98	100.75	36.14	75.89	24.86
37	53.19	46.17	102.49	36.14	80.22	22.27
39	51.25	44.49	104.10	36.14	84.56	19.54
41	49.46	42.93	105.60	36.14	88.89	16.71
43	47.78	41.47	106.99	36.14	93.23	13.76
45	46.21	40.11	108.30	36.14	97.57	10.73
47	44.75	38.84	109.52	36.14	101.90	7.62
49	43.37	37.64	110.67	36.14	106.24	4.43
51	42.07	36.52	111.75	36.14	110.58	1.17

Required Storage Volume = 38.77 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (25-Year Storm)			
	Prepared:	F.M.	Page No.	A-08
	Checked:	R.B.		
Project: 315-325 University Avenue West Town of Cobourg	Proj. #	20021		
	Date:	02-May-19		

Total Drainage Area (ha) = 0.507 ha
Drainage Area Composite C = 0.62
Allowable Release Rate (5-year) = 36.14 L/s Overcontrolled
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	117.76	102.21	91.99	36.14	32.52	59.47
17	111.03	96.37	98.30	36.14	36.86	61.44
19	105.03	91.16	103.92	36.14	41.20	62.72
21	99.64	86.48	108.97	36.14	45.53	63.44
23	94.78	82.27	113.53	36.14	49.87	63.66
25	90.37	78.44	117.66	36.14	54.20	63.46
27	86.36	74.95	121.42	36.14	58.54	62.88
29	82.68	71.76	124.87	36.14	62.88	61.99
31	79.31	68.83	128.03	36.14	67.21	60.82
33	76.20	66.14	130.95	36.14	71.55	59.40
35	73.32	63.64	133.64	36.14	75.89	57.75
37	70.65	61.33	136.14	36.14	80.22	55.92
39	68.18	59.17	138.47	36.14	84.56	53.91
41	65.86	57.17	140.63	36.14	88.89	51.74
43	63.70	55.29	142.66	36.14	93.23	49.43
45	61.68	53.54	144.55	36.14	97.57	46.98
47	59.78	51.89	146.33	36.14	101.90	44.43
49	58.00	50.34	148.00	36.14	106.24	41.76
51	56.32	48.88	149.58	36.14	110.58	39.00

Required Storage Volume = 63.66 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (50-Year Storm)			
	Prepared:	F.M.	Page No.	A-09
	Checked:	R.B.		
Project: 315-325 University Avenue West Town of Cobourg	Proj. #	20021		
	Date:	02-May-19		

Total Drainage Area (ha) = 0.507 ha
Drainage Area Composite C = 0.62
Allowable Release Rate (5-year) = 36.1 L/s Overcontrolled
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	121.79	105.71	95.14	36.14	32.52	62.62
17	115.85	100.56	102.57	36.14	36.86	65.71
19	110.47	95.88	109.30	36.14	41.20	68.10
21	105.56	91.62	115.44	36.14	45.53	69.91
23	101.06	87.72	121.05	36.14	49.87	71.18
25	96.94	84.14	126.21	36.14	54.20	72.01
27	93.14	80.84	130.96	36.14	58.54	72.42
29	89.62	77.79	135.35	36.14	62.88	72.47
31	86.36	74.96	139.43	36.14	67.21	72.22
33	83.33	72.33	143.21	36.14	71.55	71.66
35	80.51	69.88	146.74	36.14	75.89	70.85
37	77.87	67.59	150.04	36.14	80.22	69.82
39	75.40	65.44	153.13	36.14	84.56	68.57
41	73.08	63.43	156.03	36.14	88.89	67.14
43	70.90	61.53	158.76	36.14	93.23	65.53
45	68.84	59.75	161.33	36.14	97.57	63.76
47	66.90	58.07	163.75	36.14	101.90	61.85
49	65.07	56.48	166.04	36.14	106.24	59.80
51	63.33	54.97	168.21	36.14	110.58	57.63
53	61.69	53.54	170.27	36.14	114.91	55.36
55	60.13	52.19	172.22	36.14	119.25	52.97
57	58.64	50.90	174.07	36.14	123.59	50.48

Required Storage Volume = 72.47 m^3

LEA Consulting Ltd. Consulting Engineers and Planners	On-Site Storage Calculation (100 - Year Storm)			
	Prepared:	F.M.	Page No.	A-010
	Checked:	R.B.		
Project: 315-325 University Avenue West Town of Cobourg	Proj. #	20021		
	Date:	02-May-19		

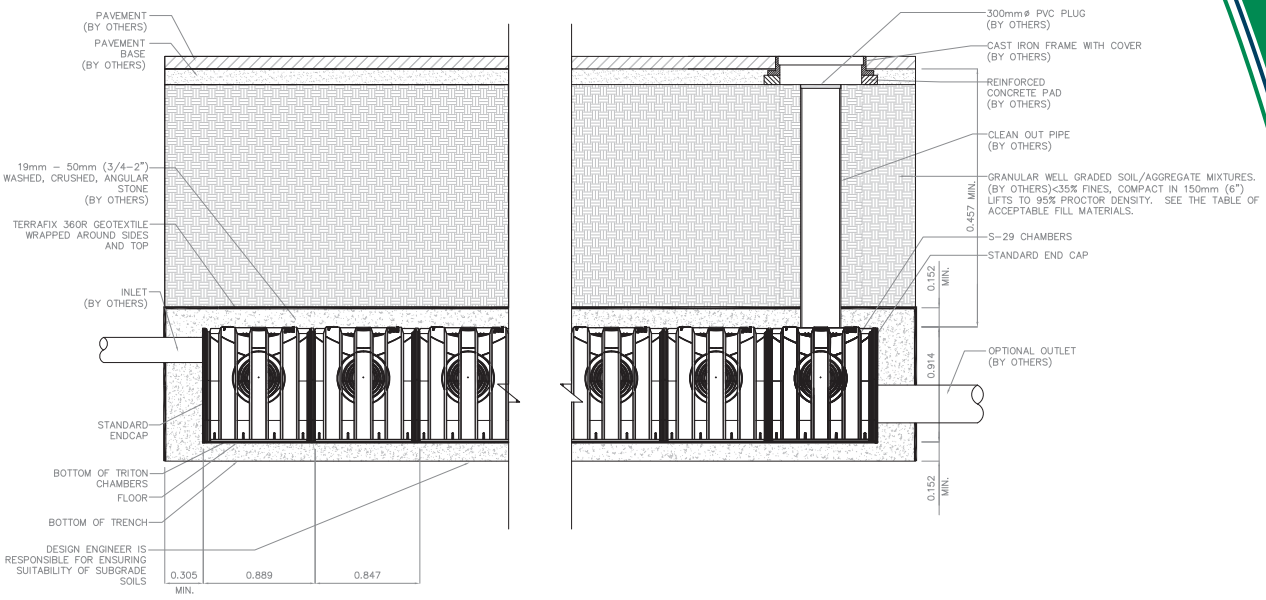
Total Drainage Area (ha) = 0.507 ha
Drainage Area Composite C = 0.62
Allowable Release Rate (5-year) = 36.14 L/s Overcontrolled
Return Period = 100 Year

Site storage Requirement:

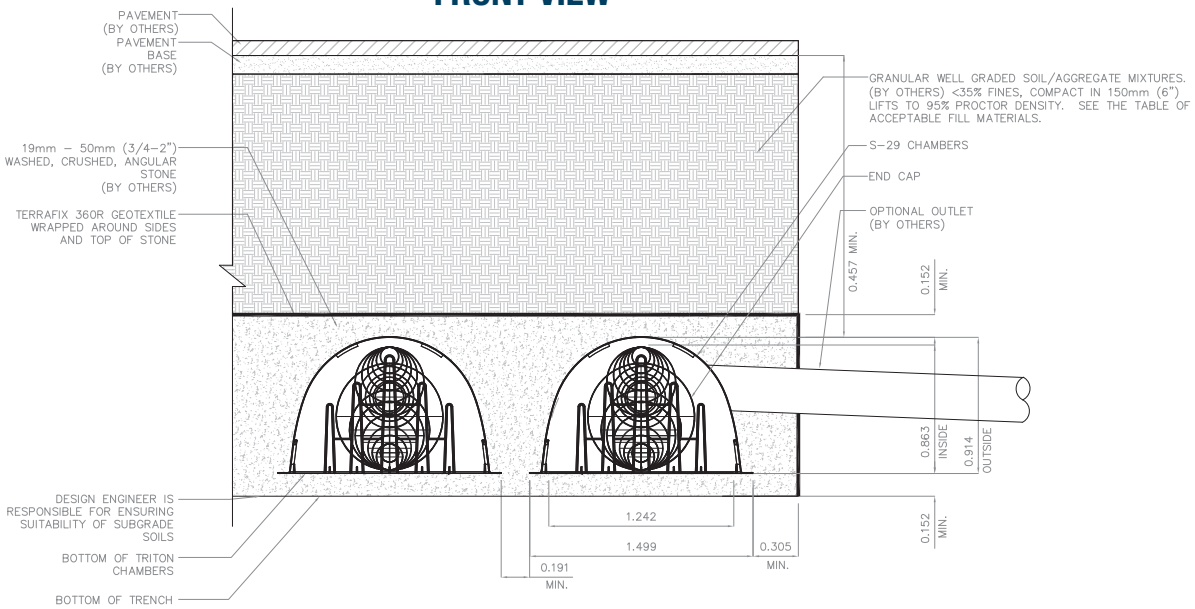
Time (minutes)	Rainfall Intensity (mm/hr)	Peak Flow (L/s)	Storm Runoff Volume (m^3)	Release Rate (L/s)	Release Flow Volume (m^3)	Required Storage Volume (m^3)
15	129.95	112.79	101.51	36.14	32.52	68.99
17	124.18	107.78	109.94	36.14	36.86	73.08
19	118.89	103.19	117.64	36.14	41.20	76.44
21	114.04	98.98	124.72	36.14	45.53	79.19
23	109.57	95.10	131.24	36.14	49.87	81.37
25	105.43	91.51	137.27	36.14	54.20	83.07
27	101.60	88.18	142.86	36.14	58.54	84.32
29	98.04	85.09	148.06	36.14	62.88	85.18
31	94.71	82.21	152.90	36.14	67.21	85.69
33	91.61	79.51	157.43	36.14	71.55	85.88
35	88.70	76.99	161.67	36.14	75.89	85.78
37	85.97	74.62	165.65	36.14	80.22	85.43
39	83.40	72.39	169.39	36.14	84.56	84.83
41	80.99	70.29	172.92	36.14	88.89	84.03
43	78.70	68.31	176.24	36.14	93.23	83.01
45	76.55	66.44	179.39	36.14	97.57	81.82
47	74.51	64.67	182.37	36.14	101.90	80.47
49	72.57	62.99	185.19	36.14	106.24	78.95
51	70.73	61.39	187.87	36.14	110.58	77.29
53	68.99	59.88	190.41	36.14	114.91	75.50
55	67.33	58.44	192.84	36.14	119.25	73.59
57	65.74	57.06	195.15	36.14	123.59	71.56
59	64.23	55.75	197.35	36.14	127.92	69.43

Required Storage Volume = 85.88 m^3

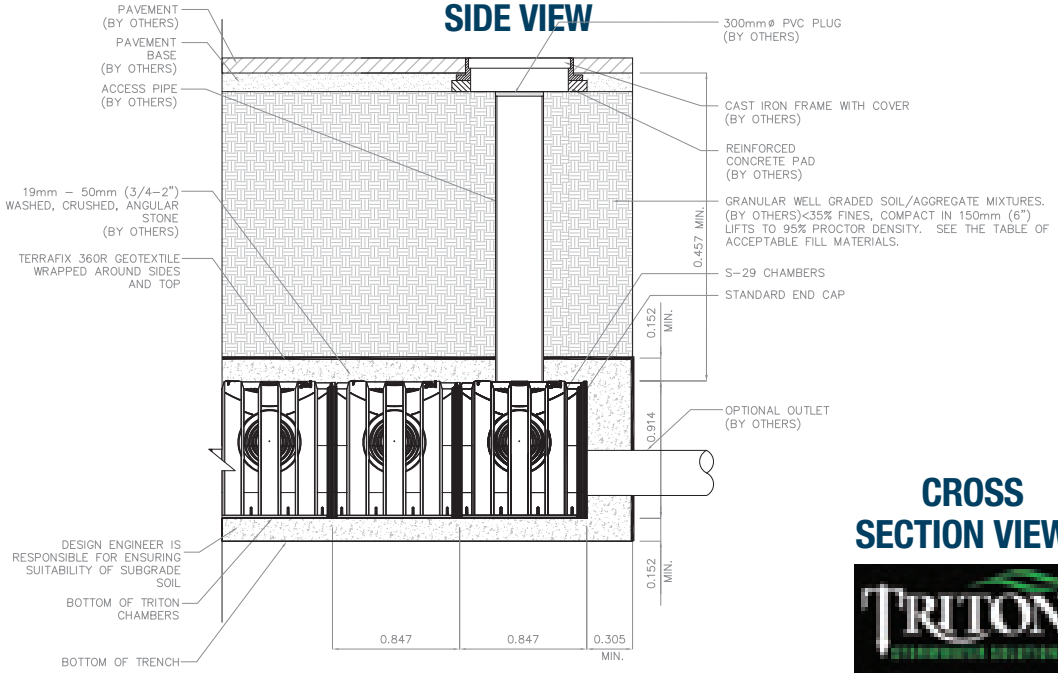
HEADER ROW



FRONT VIEW



SIDE VIEW



CROSS SECTION VIEWS

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: 235 University Ave
Location: Cobourg, ON
OGS #: OGS

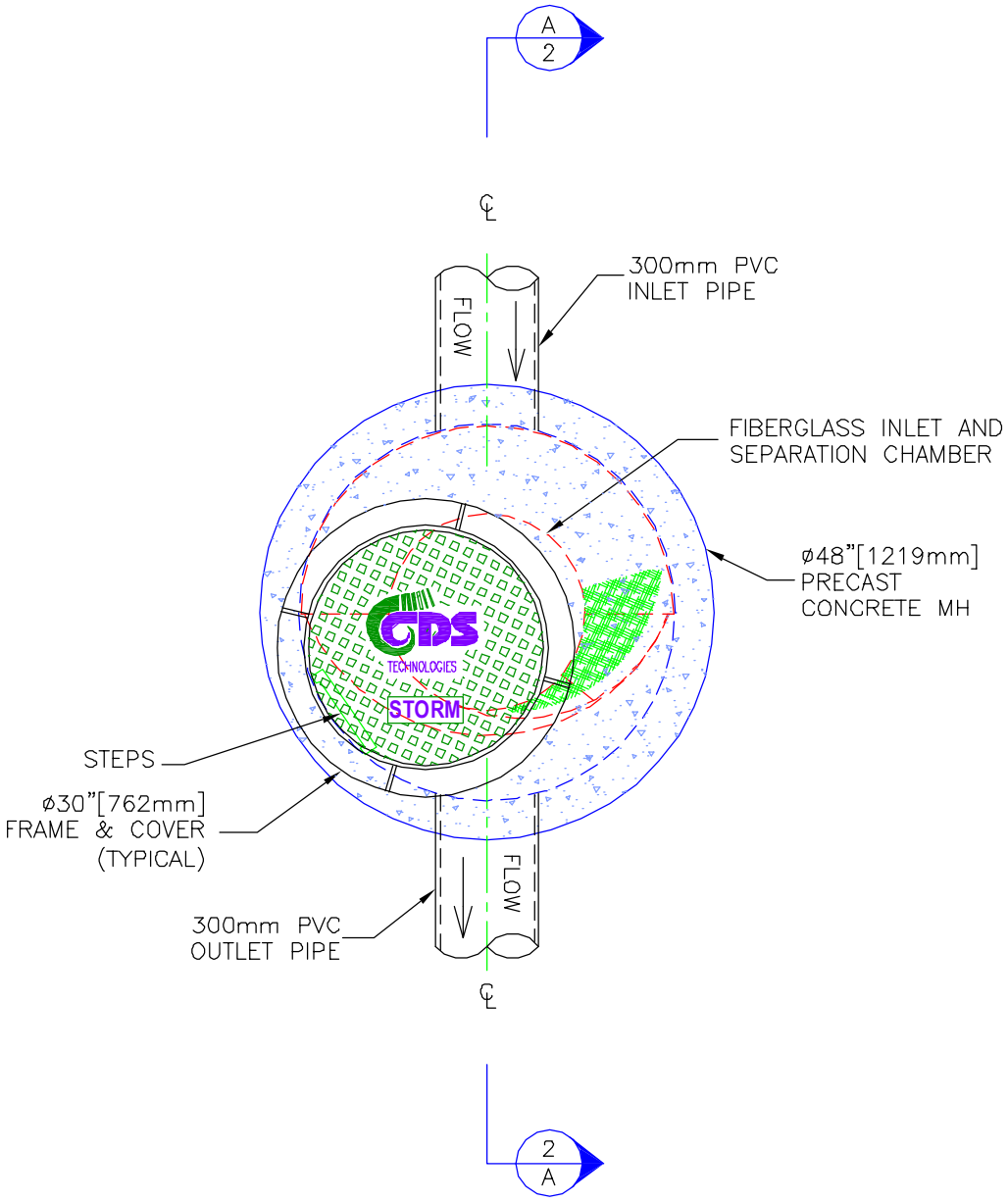
Engineer: Lea Consulting Ltd
Contact: Mahdi Noori
Report Date: 2-May-19

Area	0.37	ha	**Rainfall Station #**	211	
Weighted C	0.52		**Particle Size Distribution**	FINE	
CDS Model	2015-4		**CDS Treatment Capacity**	20	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
1.0	10.4%	19.9%	0.5	0.5	2.7	98.1	10.2
1.5	8.9%	28.8%	0.8	0.8	4.0	97.7	8.7
2.0	8.1%	36.9%	1.1	1.1	5.4	97.3	7.9
2.5	7.3%	44.2%	1.3	1.3	6.7	96.9	7.1
3.0	5.6%	49.9%	1.6	1.6	8.1	96.5	5.4
3.5	5.1%	55.0%	1.9	1.9	9.4	96.2	4.9
4.0	4.1%	59.0%	2.1	2.1	10.8	95.8	3.9
4.5	3.2%	62.2%	2.4	2.4	12.1	95.4	3.1
5.0	3.3%	65.5%	2.7	2.7	13.5	95.0	3.1
6.0	6.4%	71.9%	3.2	3.2	16.2	94.2	6.0
7.0	4.7%	76.6%	3.7	3.7	18.9	93.4	4.4
8.0	4.1%	80.7%	4.3	4.3	21.6	92.7	3.8
9.0	2.8%	83.5%	4.8	4.8	24.3	91.9	2.5
10.0	2.0%	85.5%	5.3	5.3	27.0	91.1	1.8
15.0	7.3%	92.8%	8.0	8.0	40.5	87.3	6.4
20.0	3.7%	96.5%	10.7	10.7	54.0	83.4	3.1
25.0	2.5%	99.1%	13.4	13.4	67.5	79.5	2.0
30.0	0.2%	99.3%	16.0	16.0	80.9	75.7	0.1
35.0	0.5%	99.7%	18.7	18.7	94.4	71.8	0.3
40.0	0.3%	100.0%	21.4	19.8	100.0	65.0	0.2
45.0	0.0%	100.0%	24.1	19.8	100.0	57.8	0.0
50.0	0.0%	100.0%	26.7	19.8	100.0	52.0	0.0
							94.4
						Removal Efficiency Adjustment[2] =	6.5%
						Predicted Net Annual Load Removal Efficiency =	**87.9%**
						Predicted Annual Rainfall Treated =	**99.3%**

1 - Based on 32 years of hourly rainfall data from Canadian Station 6166418, Peterborough ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

PLAN VIEW

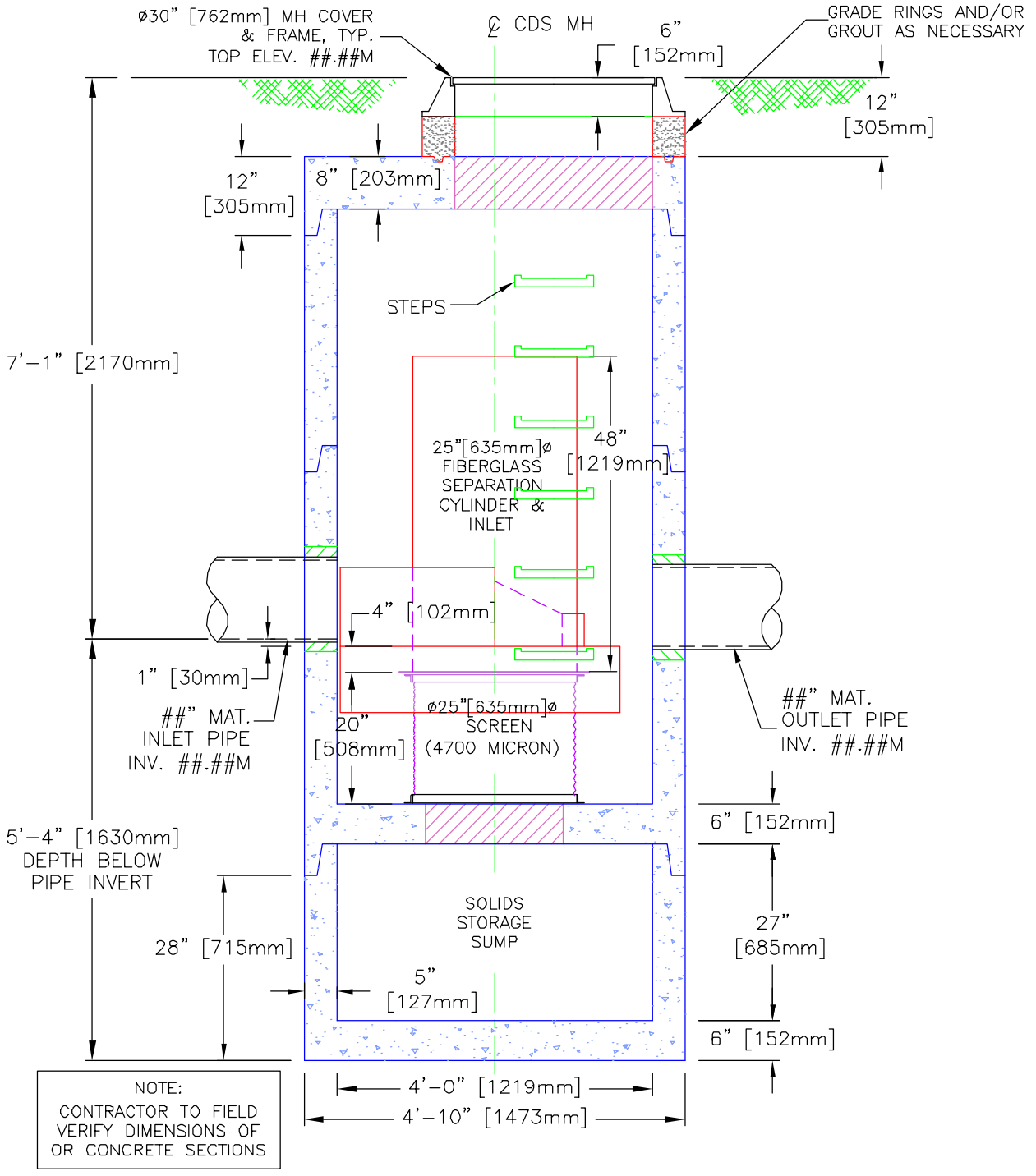


CDS MODEL PMSU20_15_4m
STORMWATER TREATMENT UNIT

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

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

SECTION A–A
ELEVATION VIEW



NOTE:
CONTRACTOR TO FIELD VERIFY DIMENSIONS OF OR CONCRETE SECTIONS

CDS MODEL PMSU20_15_4m
STORMWATER TREATMENT UNIT

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

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

APPENDIX B

Sanitary and Water Demand Calculations

LEA Consulting Ltd. Consulting Engineers and Planners	**Sanitary Flow Rate Calculation**			
	Prepared:	F.M.	Page No.	B-1
	Checked:	R.B.		
Project: 325 University Avenue West, Town of Cobourg	Proj. #	20021		
	Date:	02-May-19		

Proposed New Golden Plough Lodge

POPULATION CALCULATION

(Based on the Architect Statistics)

Site Area	4850.0	m^2
Number of Townhoused	71.0	units

Proposed Building Type	**Density** (P.P.U)	**Population**
Residential	1.62	115.02
Total		**115.02**

SANITARY FLOW CALCULATION

(Based on the Town of Cobourg Design Guidelines)

Harmon Peaking Factor: $K_H=1+(14/(4+(P/1000)^{0.5}))$

Peaking Factor (K_H)	4.23	
Max. Peaking factor based on Town of Cobourg Design Guidelines	3.80	
Average Daily Wastewater Flow	364	L/cap/day
Total Domestic Flow	1.84	L/sec
Infiltration Allowance (@ 0.26 L/sec/ha)	0.13	L/sec
Design Flow	**1.97**	L/sec

LEA Consulting Ltd. Consulting Engineers and Planners	Water Demand Calculation			
	Prepared:	F.M.	Page No.	B-2
	Checked:	R.B.		
Project: 325 University Avenue West, Town of Cobourg	Proj. #	20021		
	Date:	02-May-19		

Proposed New Golden Plough Lodge
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.
= 0.8 for fire non-combastable 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)
1st Floor	adjoining	1206
2nd Floor	largest	1303
3rd Floor	adjoining	1303
A		1930

Therefore, F = 8000 **l/min**

STEP 2 **Occupancy reduction:**

For occupancies with a low contents fire hazard, the reduction rate is 25%,
Therefore: F = 6000 l/min

Reduction for sprinkler protection:
Using the NFPA sprinkler system, a reduction rate of 30% is used.
Therefore: F = 4200 l/min

STEP 3 Separation charge:
Charge for the separations on each side:

Separation	Charge	
more than 45m	0%	South
30.1 to 45 m	5%	North
10.1 to 20m	15%	East
3.1 to 10 m	20%	West

Total charge in % 40%
Total charge in l/min 2400

STEP 4 Required Fire Flow: 7000 l/min
or 116.67 l/s
or 1849 US GPM

LEA Consulting Ltd. Consulting Engineers and Planners	Water Demand Calculation			
	Prepared:	F.M.	Page No.	B-3
	Checked:	R.B.		
Project: 325 University Avenue West, Town of Cobourg	Proj. #	20021		
	Date:	02-May-19		

Proposed Retirement Residence and Clinic Development

Total Population: **115** (See Page E-01)

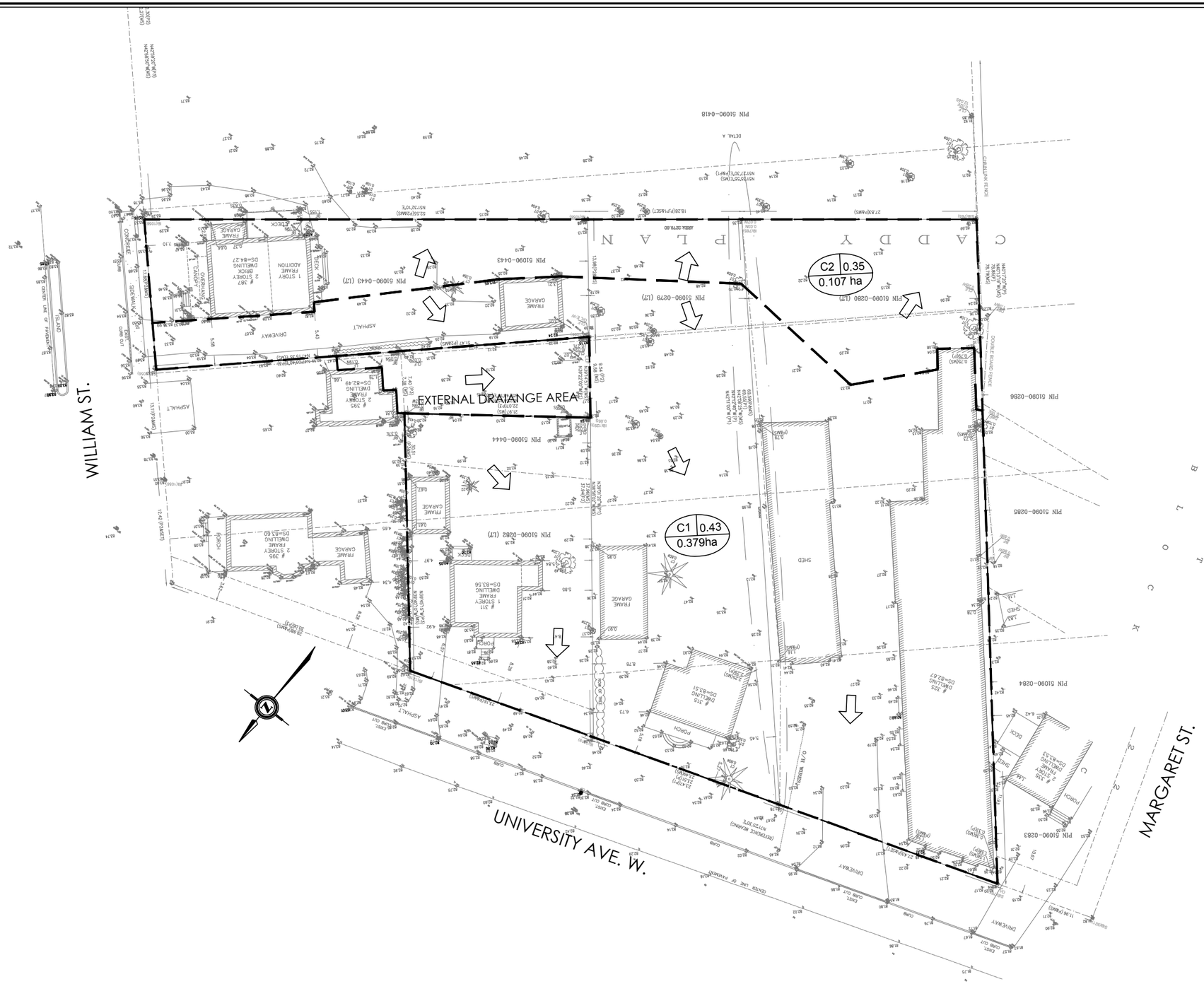
Peak Hour Demand Calculation:		
(Based on the MOE Design Guidelines for Drinking Water Systems)		
Residential Per Capital Demand (multi-unit)	191	L/cap/day
Peaking Factor	9.40	
Peak Hour Demand	**2.39**	L/sec

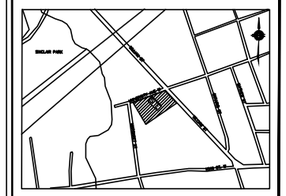
Maximum Day Demand Calculation:		
(Based on the MOE Design Guidelines for Drinking Water Systems)		
Residential Per Capital Demand (multi-unit)	191	L/cap/day
Peaking Factor	6.30	
Maximum Day Demand	**1.60**	L/sec

Fire Flow for High Rise Residential:	116.7	L/sec
Max. Day Demand plus Fire Flow:	**118.3**	L/sec
Design Water Demand	**118.3**	L/sec
	1874.6	**US GPM**

APPENDIX C

Figures and Drawings





LEGEND

- MH — EXISTING MANHOLE
- CB — EXISTING CATCH BASIN
- DIC — EXISTING DITCH INLET
- POA — EXISTING ANCHOR POLE
- POU — EXISTING UTILITY POLE
- POLS — EXISTING LIGHT STANDARD
- GM — EXISTING GAS METER
- GV — EXISTING GAS VALVE
- WV — EXISTING WATER VALVE
- FH — EXISTING FIRE HYDRANT
- EXISTING TREE
- PROPOSED TREE
- PROPERTY LINE
- SUB-CATCHMENT BOUNDARY
- OVERLAND FLOW ROUTE
- CATCHMENT ID/IMPERVIOUS DRAINAGE AREA (ha) — C1 | 0.25 | 0.388 ha

No.	DATE	DESCRIPTION
1	06/05/2019	ISSUED FOR ZBA

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

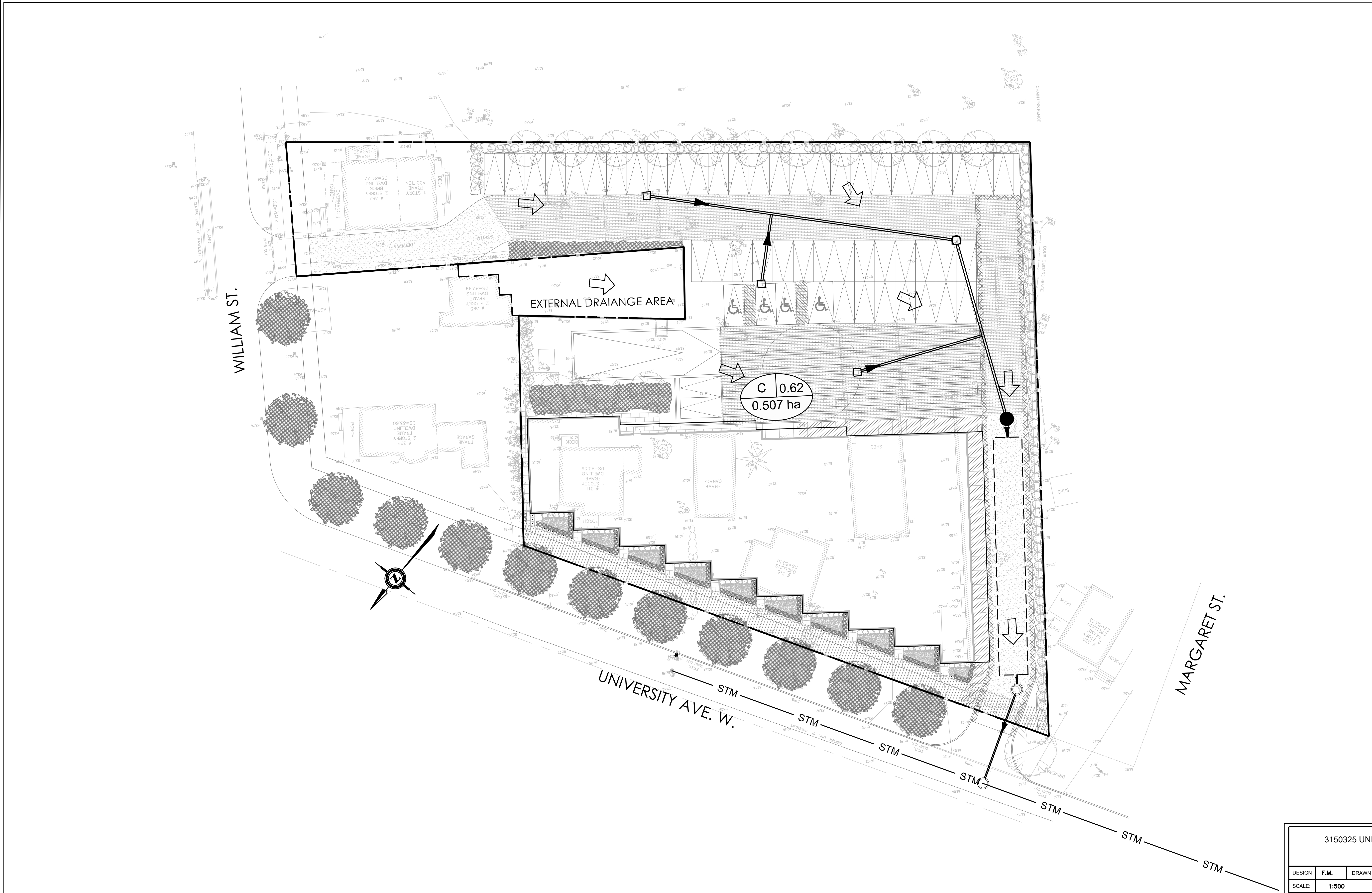
LEA Consulting Ltd.
Consulting Engineers and Planners
www.LEA.ca

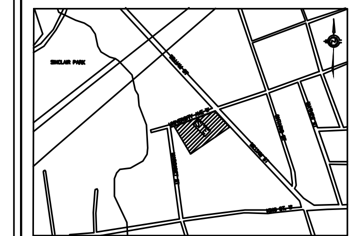
315-325 UNIVERSITY AVENUE REDEVELOPMENT

EXISTING DRAINAGE PLAN

DESIGN	F.M.	DRAWN	M.N.	CHECKED	R.B.	CONTRACT No.	20021
SCALE:	1:500						
DATE:	APR. 26,2019						

DRAWING NUMBER FIG. 2





LEGEND

- MH — EXISTING MANHOLE
- CB — EXISTING CATCH BASIN
- DIC — EXISTING DITCH INLET
- POA — EXISTING ANCHOR POLE
- POU — EXISTING UTILITY POLE
- POLS — EXISTING LIGHT STANDARD
- GM — EXISTING GAS METER
- GV — EXISTING GAS VALVE
- WV — EXISTING WATER VALVE
- FH — EXISTING FIRE HYDRANT
- 0.10ø — EXISTING TREE
- PROPOSED TREE
- STM — EXISTING STORM SEWER
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED MANHOLE
- PROPOSED OGS
- PROPOSED U/G SWM STORAGE
- PROPERTY LINE
- DRAINAGE AREA BOUNDARY
- OVERLAND FLOW ROUTE
- C1 0.25 0.388 ha — CATCHMENT ID/IMPERVIOUS DRAINAGE AREA (ha)

No.	DATE	DESCRIPTION
1	06/05/2019	ISSUED FOR ZBA

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

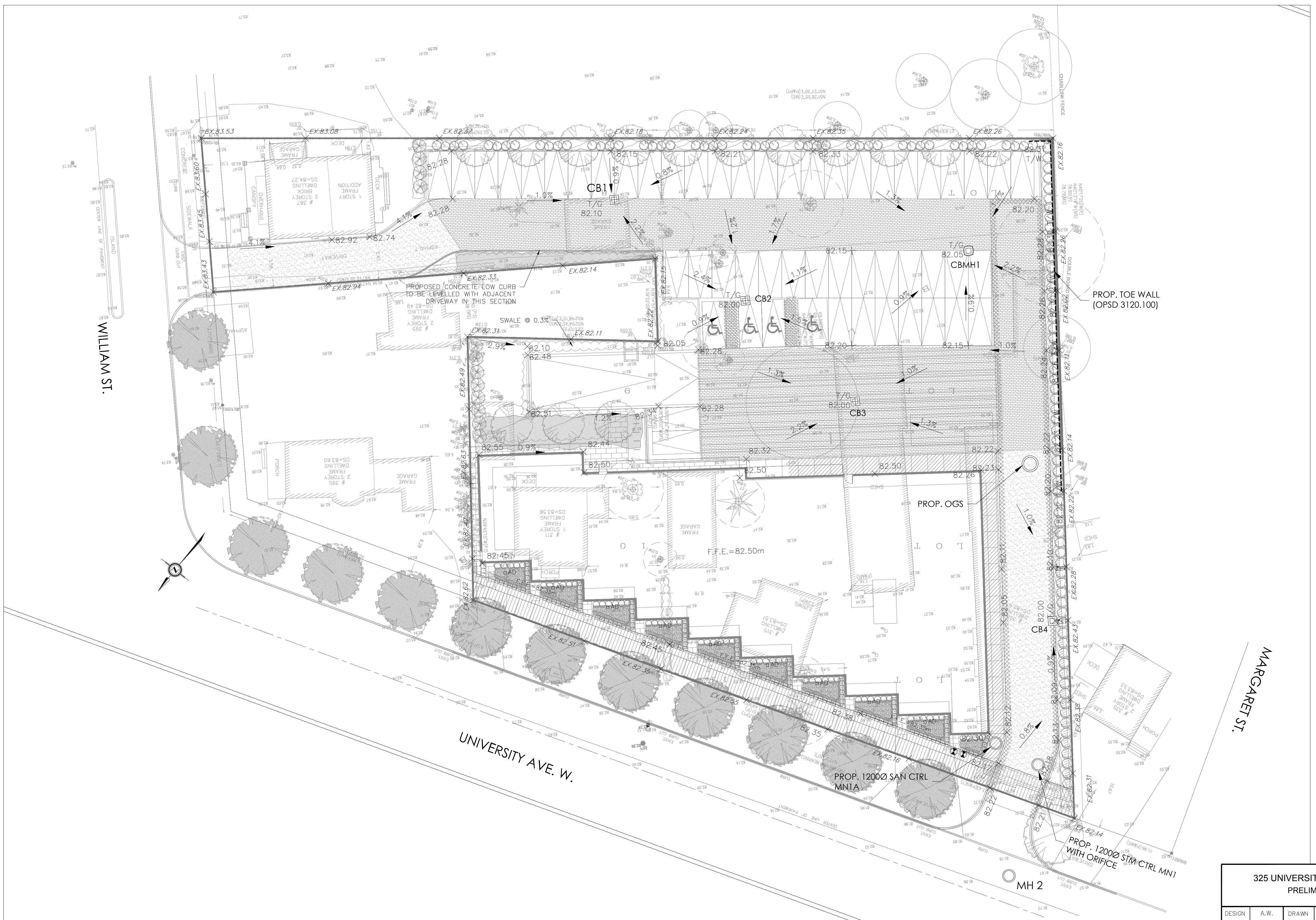
LEA Consulting Ltd.
Consulting Engineers and Planners
www.LEA.ca

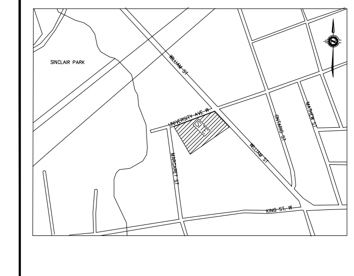
3150325 UNIVERSITY AVENUE REDEVELOPMENT

PROPOSED DRAINAGE PLAN

DESIGN	F.M.	DRAWN	M.N.	CHECKED	R.B.	CONTRACT No.	20021
SCALE:	1:500			DRAWING NUMBER	FIG. 2		
DATE:	APR. 26,2019						

DRAWING NAME: F:\20021\Municipal\Contract drawings\FIG 3- Proposed Drainage Plan.dwg May 06, 2019–5:02pm





LEGEND

▢	PROP. STORM CATCHBASIN
◎	PROP. STORM CATCHBASIN MANHOLE
○	PROP. STORM MANHOLE
▫ AD	PROP. AREA DRAIN
EX.82.49	EX. ELEVATION
82.49	PROP. ELEVATION
82.30 T/W	PROP. TOP OF WALL ELEVATION
82.30 T/G	PROP. TOP OF GRATE ELEVATION

GENERAL NOTES

- CONTRACTOR MUST CHECK & VERIFY ALL DIMENSIONS ON THE JOB.
- DO NOT SCALE DRAWINGS.
- THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION.
- ELEVATIONS SHOWN GEODETIC DRIVEN FROM TOWN OF COBOURG BENCH MARK #00121U2300 , ELEVATION 82.92M.

No.	DATE	DESCRIPTION
1	06/05/2019	ISSUED FOR ZBA

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

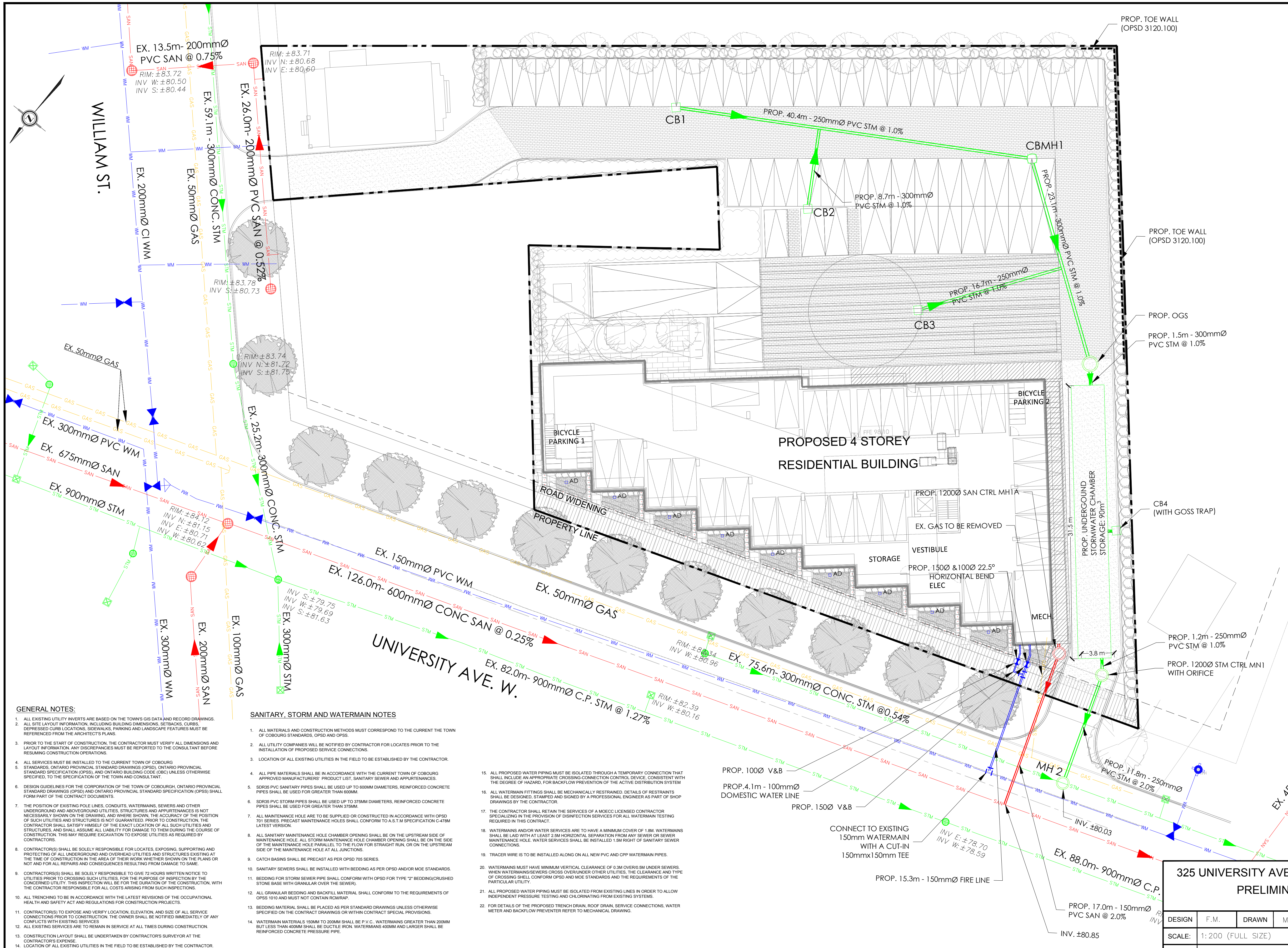
LICENSED PROFESSIONAL ENGINEER
F. MORSHEDI
100229200
MAY 06 2019
PROVINCE OF ONTARIO

325 UNIVERSITY AVE. RESIDENTIAL DEVELOPMENT

PRELIMINARY SITE GRADING PLAN

DESIGN	A.W.	DRAWN	A.W.	CHECKED	F.M.	CONTRACT No.
SCALE:	1:200 (FULL SIZE)			DRAWING NUMBER	C-01	
DATE:	APR. 26,2019					

DRAWING NAME: F:\20021\Municipal\Contract drawings\C-01-Site Grading Plan.dwg May 06, 2019-5:18pm



GENERAL NOTES:

1. ALL EXISTING UTILITY INVERTS ARE BASED ON THE TOWN'S GIS DATA AND RECORD DRAWINGS.
2. ALL SITE LAYOUT INFORMATION, INCLUDING BUILDING DIMENSIONS, SETBACKS, CURBS, DEPRESSED CURB LOCATIONS, SIDEWALKS, PARKING AND LANDSCAPE FEATURES MUST BE REFERENCED FROM THE ARCHITECT'S PLANS.
3. PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR MUST VERIFY ALL DIMENSIONS AND LAYOUT INFORMATION. ANY DISCREPANCIES MUST BE REPORTED TO THE CONSULTANT BEFORE RESUMING CONSTRUCTION OPERATIONS.
4. ALL SERVICES MUST BE INSTALLED TO THE CURRENT TOWN OF COBOURG
5. STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD), ONTARIO PROVINCIAL STANDARD SPECIFICATION (OPSS), AND ONTARIO BUILDING CODE (OBC) UNLESS OTHERWISE SPECIFIED, TO THE SPECIFICATION OF THE TOWN AND CONSULTANT.
6. DESIGN GUIDELINES FOR THE CORPORATION OF THE TOWN OF COBOURGH, ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND ONTARIO PROVINCIAL STANDARD SPECIFICATION (OPSS) SHALL FORM PART OF THE CONTRACT DOCUMENTS.
7. THE POSITION OF EXISTING POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND ABOVEGROUND UTILITIES, STRUCTURES AND APPURTENANCES IS NOT NECESSARILY SHOWN ON THE DRAWING, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL SATISFY HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM DURING THE COURSE OF CONSTRUCTION. THIS MAY REQUIRE EXCAVATION TO EXPOSE UTILITIES AS REQUIRED BY CONTRACTORS.
8. CONTRACTOR(S) SHALL BE SOLELY RESPONSIBLE FOR LOCATES, EXPOSING, SUPPORTING AND PROTECTING OF ALL UNDERGROUND AND OVERHEAD UTILITIES AND STRUCTURES EXISTING AT THE TIME OF CONSTRUCTION IN THE AREA OF THEIR WORK WHETHER SHOWN ON THE PLANS OR NOT AND FOR ALL REPAIRS AND CONSEQUENCES RESULTING FROM DAMAGE TO SAME.
9. CONTRACTORS(S) SHALL BE SOLELY RESPONSIBLE TO GIVE 72 HOURS WRITTEN NOTICE TO UTILITIES PRIOR TO CROSSING SUCH UTILITIES, FOR THE PURPOSE OF INSPECTION BY THE CONCERNED UTILITY. THIS INSPECTION WILL BE FOR THE DURATION OF THE CONSTRUCTION, WITH THE CONTRACTOR RESPONSIBLE FOR ALL COSTS ARISING FROM SUCH INSPECTIONS.
10. ALL TRENCHING TO BE IN ACCORDANCE WITH THE LATEST REVISIONS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
11. CONTRACTOR(S) TO EXPOSE AND VERIFY LOCATION, ELEVATION, AND SIZE OF ALL SERVICE CONNECTIONS PRIOR TO CONSTRUCTION. THE OWNER SHALL BE NOTIFIED IMMEDIATELY OF ANY CONFLICTS WITH EXISTING SERVICES
12. ALL EXISTING SERVICES ARE TO REMAIN IN SERVICE AT ALL TIMES DURING CONSTRUCTION.
13. CONSTRUCTION LAYOUT SHALL BE UNDERTAKEN BY CONTRACTOR'S SURVEYOR AT THE CONTRACTOR'S EXPENSE.
14. LOCATION OF ALL EXISTING UTILITIES IN THE FIELD TO BE ESTABLISHED BY THE CONTRACTOR.

SANITARY, STORM AND WATERMAIN NOTES

1. ALL MATERIALS AND CONSTRUCTION METHODS MUST CORRESPOND TO THE CURRENT THE TOWN OF COBOURG STANDARDS, OPSD AND OPSS.
2. ALL UTILITY COMPANIES WILL BE NOTIFIED BY CONTRACTOR FOR LOCATES PRIOR TO THE INSTALLATION OF PROPOSED SERVICE CONNECTIONS.
3. LOCATION OF ALL EXISTING UTILITIES IN THE FIELD TO BE ESTABLISHED BY THE CONTRACTOR.
4. ALL PIPE MATERIALS SHALL BE IN ACCORDANCE WITH THE CURRENT TOWN OF COBOURG APPROVED MANUFACTURERS' PRODUCT LIST, SANITARY SEWER AND APPURTENANCES.
5. SDR35 PVC SANITARY PIPES SHALL BE USED UP TO 600MM DIAMETERS, REINFORCED CONCRETE PIPES SHALL BE USED FOR GREATER THAN 600MM.
6. SDR35 PVC STORM PIPES SHALL BE USED UP TO 375MM DIAMETERS, REINFORCED CONCRETE PIPES SHALL BE USED FOR GREATER THAN 375MM.
7. ALL MAINTENANCE HOLE ARE TO BE SUPPLIED OR CONSTRUCTED IN ACCORDANCE WITH OPSD 701 SERIES. PRECAST MAINTENANCE HOLES SHALL CONFORM TO A.S.T.M SPECIFICATION C-478M LATEST VERSION.
8. ALL SANITARY MAINTENANCE HOLE CHAMBER OPENING SHALL BE ON THE UPSTREAM SIDE OF MAINTENANCE HOLE. ALL STORM MAINTENANCE HOLE CHAMBER OPENING SHALL BE ON THE SIDE OF THE MAINTENANCE HOLE PARALLEL TO THE FLOW FOR STRAIGHT RUN, OR ON THE UPSTREAM SIDE OF THE MAINTENANCE HOLE AT ALL JUNCTIONS.
9. CATCH BASINS SHALL BE PRECAST AS PER OPSD 705 SERIES.
10. SANITARY SEWERS SHALL BE INSTALLED WITH BEDDING AS PER OPSD AND/OR MOE STANDARDS.
11. BEDDING FOR STORM SEWER PIPE SHALL CONFORM WITH OPSD FOR TYPE "2" BEDDING(CRUSHED STONE BASE WITH GRANULAR OVER THE SEWER).
12. ALL GRANULAR BEDDING AND BACKFILL MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF OPSS 1010 AND MUST NOT CONTAIN RCM/RAP.
13. BEDDING MATERIAL SHALL BE PLACED AS PER STANDARD DRAWINGS UNLESS OTHERWISE SPECIFIED ON THE CONTRACT DRAWINGS OR WITHIN CONTRACT SPECIAL PROVISIONS.
14. WATERMAIN MATERIALS 150MM TO 200MM SHALL BE P.V.C.. WATERMAINS GREATER THAN 200MM BUT LESS THAN 400MM SHALL BE DUCTILE IRON. WATERMIANS 400MM AND LARGER SHALL BE REINFORCED CONCRETE PRESSURE PIPE.
15. ALL PROPOSED WATER PIPING MUST BE ISOLATED THROUGH A TEMPORARY CONNECTION THAT SHALL INCLUDE AN APPROPRIATE CROSSING-CONNECTION CONTROL DEVICE, CONSISTENT WITH THE DEGREE OF HAZARD, FOR BACKFLOW PREVENTION OF THE ACTIVE DISTRIBUTION SYSTEM
16. ALL WATERMAIN FITTINGS SHALL BE MECHANICALLY RESTRAINED. DETAILS OF RESTRAINTS SHALL BE DESIGNED, STAMPED AND SIGNED BY A PROFESSIONAL ENGINEER AS PART OF SHOP DRAWINGS BY THE CONTRACTOR.
17. THE CONTRACTOR SHALL RETAIN THE SERVICES OF A MOECC LICENSED CONTRACTOR SPECIALIZING IN THE PROVISION OF DISINFECTION SERVICES FOR ALL WATERMAIN TESTING REQUIRED IN THIS CONTRACT.
18. WATERMAINS AND/OR WATER SERVICES ARE TO HAVE A MINIMUM COVER OF 1.8M. WATERMAINS SHALL BE LAID WITH AT LEAST 2.5M HORIZONTAL SEPARATION FROM ANY SEWER OR SEWER MAINTENANCE HOLE. WATER SERVICES SHALL BE INSTALLED 1.5M RIGHT OF SANITARY SEWER CONNECTIONS.
19. TRACER WIRE IS TO BE INSTALLED ALONG ON ALL NEW PVC AND CPP WATERMAIN PIPES.
20. WATERMAINS MUST HAVE MINIMUM VERTICAL CLEARANCE OF 0.3M OVER/0.5M UNDER SEWERS. WHEN WATERMAINS/SEWERS CROSS OVER/UNDER OTHER UTILITIES, THE CLEARANCE AND TYPE OF CROSSING SHELL CONFORM OPSD AND MOE STANDARDS AND THE REQUIREMENTS OF THE PARTICULAR UTILITY.
21. ALL PROPOSED WATER PIPING MUST BE ISOLATED FROM EXISTING LINES IN ORDER TO ALLOW INDEPENDENT PRESSURE TESTING AND CHLORINATING FROM EXISTING SYSTEMS.
22. FOR DETAILS OF THE PROPOSED TRENCH DRAIN, ROOF DRAIN, SERVICE CONNECTIONS, WATER METER AND BACKFLOW PREVENTER REFER TO MECHANICAL DRAWING.

LEGEND

- EXISTING STORM MANHOLE
- EXISTING STORM CATCHBASIN MANHOLE
- EXISTING SANITARY MANHOLE
- EXISTING CATCHBASIN
- EXISTING WATER VALVE
- EXISTING FIRE HYDRANT
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATER MAIN
- EXISTING GAS MAIN
- PROPERTY LINE
- EXISTING TREE
- MH 1 — PROPOSED STORM MANHOLE
- MH 1A — PROPOSED SANITARY MANHOLE
- PROPOSED WATER MAIN
- PROPOSED SANITARY SERVICE CONNECTION
- PROPOSED STORM SERVICE CONNECTION
- PROPOSED FIRE HYDRANT
- PROPOSED WATER VALVE & BOX
- CB1 — PROPOSED CATCH BASIN
- PROPOSED TOE WALL
- AD — PROPOSED AREA DRAIN

GENERAL NOTES

- CONTRACTOR MUST CHECK & VERIFY ALL DIMENSIONS ON THE JOB.
- DO NOT SCALE DRAWINGS.
- ALL DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS ARE THE COPYRIGHT PROPERTY OF THE ARCHITECT AND MUST BE RETURNED UPON REQUEST. REPRODUCTION OF DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS IN PART OR IN WHOLE IS FORBIDDEN WITHOUT THE WRITTEN PERMISSION OF THE ARCHITECT.
- THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION UNTIL SIGNED BY THE ARCHITECT.
- BOUNDARIES: PART OF LOTS 8,9,10& 11/ BLOCK B, CADDY PLAN
- ENCROACHMENT: NOTE THE POSITION OF THE FENCES IN RELATION TO THE EASTERLY&WESTERLY BOUNDARIES; THEY ARE LOCATED OVER THE SUBJECT BOUNDARIES TO THE EXTENT SHOWN ON THE PLAN.
- BEARING: BEARING ARE ASTRONOMIC AND ARE REFERRED TO THE SOUTHERLY LIMIT OF UNIVERSITY AVENUE HAVING A BEARING OF N71°25'30"E AS SHOWN ON PLAN 39R-2336
- ELEVATIONS: ELEVATIONS SHOWN GEODETIC DRIVEN FROM TOWN OF COBOURG BENCH MARK #00121U2300 , ELEVATION 82.92M
- DISTANCES: DISTANCES AND COORDINATES ARE IN METERS AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048. DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 1.00021.
- ALL EXISTING FEATURE TO REMAIN UNLESS OTHERWISE NOTED.

No.	DATE	DESCRIPTION
1	06/05/2019	ISSUED FOR ZBA

LEA Consulting Ltd.

325 UNIVERSITY AVENUE W. RESIDENTIAL DEVELOPMENT
PRELIMINARY SITE SERVICING PLAN

DESIGN	F.M.	DRAWN	M.N.	CHECKED	R.B.	CONTRACT No.	20021
SCALE:	1:200 (FULL SIZE)			DRAWING NUMBER		C-02	
DATE:	APRIL 26,2019