SERVICING & STORMWATER MANAGEMENT IMPLEMENTATION REPORT

440 ESSA ROAD
MIXED USE DEVELOPMENT
CITY OF BARRIE

PREPARED FOR:

ONE URBAN DEVELOPMENTS INC.

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
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APRIL 2023

CFCA FILE NO. 1321-5312

CROZIER
CONSULTING ENGINEERS

Revision Number	Date	Comments
Rev. 0	September 23, 2019	Issued for ZBA.
Rev. 1	December 22, 2020	Issued for First Submission.
Rev. 2	March 3, 2023	Issued for Third SPA Resubmission.
Rev. 3	April 26, 2023	Issued for Fourth SPA Resubmission.

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1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by ONE Urban Developments Inc. to complete a Servicing & Stormwater Management Implementation Report in support of the Site Plan Application for a proposed mixed-use development within the City of Barrie.

The purpose of this report is to demonstrate that the proposed site can be developed in accordance with the City of Barrie and Lake Simcoe Conservation Authority (LSRCA) guidelines from a servicing & stormwater management perspective.

The following reports and design standards were referenced during the preparation of this report:

- City of Barrie Official Plan (January 2018)
- City of Barrie Development Manual (2017)
- City of Barrie Water Transmission and Distribution Policies and Design Guidelines (2017)
- City of Barrie Sanitary Sewage Collection System Policies and Design Guidelines (2017)
- City of Barrie Stormwater Management Policies and Design Guidelines (2017)
- City of Barrie Comprehensive Zoning By-Law (August 2009)
- LSRCA Technical Guideline for Stormwater Management Submissions (June 2016)
- Lake Simcoe Protection Plan (July 2009)
- Ministry of the Environment - Design Guideline's for Drinking-Water Systems (2008)

2.0 General Site Description

The subject property is approximately 0.50 hectares in size and is located at 440 Essa Road in City of Barrie, County of Simcoe. The property is bounded by Essa Road to the west, undeveloped grassed lands to the north (430 Essa Road), and existing residential dwellings to the east and south. A site-specific Zoning By-Law Amendment has been approved in 2020 to rezone the subject property from General Commercial (C4) area to Mixed-use Corridor (MU2) with special provisions. **Figure 1** illustrates the site location.

The proposed Site Plan consists of a nine-storey mixed use building containing 262 residential units and commercial space, with above-ground parking areas and a two-storey underground parking area. Access to the site will be provided by way of Essa Road and connection to 430 Essa Road. The proposed development Site Plan has been included in **Appendix D**.

The site consisted of a gas station, convenience store, restaurant, and above-ground paved and gravel parking areas, all of which have been recently removed. The site is relatively flat, with an elevation change of approximately 0.5 m across the site. The site has split drainage with much of the western portion of the site draining towards Essa Road, and the remainder of the site draining towards the eastern border of the site. Existing catchbasins located along Essa Road and McCausland Court capture stormwater runoff from the site.

External documents/plans were reviewed in the course of completing this engineering assessment. As such, the servicing and design considerations contained herein are dependent on the following:

- Geotechnical and Hydrogeological Investigation by Fisher Environmental Ltd. – July 2017
- As-built drawings of Essa Road and Veterans Drive provided by the City of Barrie

The Geotechnical and Hydrogeological Investigation by Fisher Environmental Ltd. (July, 2017) was prepared for a proposed development located at 430 Essa Road, located along the north border of the subject site. On-site soils primarily consisted of silt and fine sand and can be classified of hydrologic group B (MTO Drainage Management Manual, 1997). The subsoil conditions identified in this investigation were assumed to be representative of the subsoil soil conditions within the subject site, as a geotechnical investigation was not available for the subject site at the time of completion of this report.

3.0 Water Servicing

3.1 Existing Water Servicing

As-built drawings of existing watermain infrastructure for the surrounding area were provided by the City of Barrie. There is an existing 300 mm diameter watermain running along Essa Road and three (3) separate service connections to the site. Two existing fire hydrants are located on the west side of the Essa Road Right-of-Way. Refer to **Appendix D** for as-built drawings of Essa Road and Veterans Drive.

A hydrant flow test has been completed to confirm the available flows and pressures in this system and is provided in **Appendix A**.

3.2 Proposed Water Servicing

Fire service and domestic water service connections (200 mm diameter and 150 mm diameter respectively) are proposed to service the development via the existing 300 mm diameter watermain along Essa Road. The domestic water service will replace the existing northmost service to the property. A new 200 mm dia. fire line will be extended from the existing main in Essa Road. The proposed building is within a 90 m radius of the existing fire hydrants on Essa Road and therefore internal hydrants are not required.

Domestic water demands for the site were estimated using the following criteria as specified in the City of Barrie Guidelines and Ministry of the Environment - Design Guidelines for Drinking-Water Systems (2008):

- Average Residential Flow Rate - 225 L/cap/day
- Average Commercial Flow Rate – 28000 L/ha/day
- Peak Factors: Peak Day/ Peak Hour – 3.05/4.57
- Population Density – 1.67 Persons Per Unit

Table 1 summarizes the design flow calculations based on the values estimated for water demand for 440 Essa Road.

Table 1: Summary of Water Design Flow Calculations

Area (ha)	Residential Flow		Commercial Flow		Max Day		Peak Hour	
	Unit Flow (L/cap/d)	**Total Flow** (L/s)	**Unit Flow** (L/ha/d)	**Total Flow** (L/s)	**Peak Factor**	**Total Flow** (L/s)	**Peak Factor**	**Total Flow** (L/s)
0.50	225	1.14	28,000	0.03	3.05	3.57	4.57	5.35

The maximum daily and peak hour water demands from the development are approximately 3.57 and 5.35 L/s, respectively.

Fire flows required to service the site were determined to be 267 L/s per the Fire Underwriters Survey. The total design flow for the water distribution system is 272 L/s. All internal building water connections will be designed by the mechanical engineer. **Drawing C101** illustrates the layout of the proposed watermain connections and system. Potable water demand calculations are provided in **Appendix A**.

4.0 Sanitary Servicing

4.1 Existing Sanitary Servicing

As-built drawings of existing sanitary sewer infrastructure for the surrounding area were provided by the City. There is an existing 250 mm diameter sanitary sewer that runs northeast along Essa Road. An existing 200 mm diameter sanitary stub extends from the sewer along Essa Road to an existing sanitary manhole located on-site.

4.2 Proposed Sanitary Servicing

Sanitary flows from the site will be directed to the existing 200 mm diameter sanitary stub extending from the sewer along Essa Road. The existing sanitary manhole is to be removed and replaced with a proposed manhole at the property line. The design of the internal collection system for this area will be completed by the Mechanical Engineer.

The site has 262 proposed residential units across 0.50 ha, designating the site as a high-density residential development per the City of Barrie Standards. In addition to the 262 residential units, approximately 930 m^2 of retail space is proposed.

Preliminary sanitary flows for the site were estimated using the following values, per the City of Barrie Standards:

- Average Flow Rate - 225 L/cap/day
- Infiltration – 0.1 L/s/ha
- Peaking Factor – 4.00 (Harmon)
- Population Density – 1.67 Persons/Unit

Table 2 summarizes the design sewage flow calculations.

Table 2: Summary of Sewage Design Flow Calculations

Area (ha)	Residential Flow		Commercial Flow		Infiltration		Peak Factor (Residential/ Commercial)	Total Peak Daily Flow (L/s)
	Unit Flow (L/cap/d)	Total Flow (L/s)	Unit Flow (L/ha/d)	Total Flow (L/s)	Unit Flow (L/s/ha)	Total Flow (L/s)		
0.50	225	1.14	28,000	0.03	0.10	0.05	4.00/2.00	4.68

Based on these values it is estimated that peak sanitary flow from the site will be 4.68 L/s. It is assumed that the municipal sanitary system has sufficient capacity to accept flows from the existing 200 mm diameter sanitary lead extending to the site. All internal building sanitary connections will be reconfigured to suit by the mechanical engineer. The sanitary servicing demand calculations can be found in **Appendix B**. Refer to **Drawing C101** for the proposed sanitary servicing for the development.

5.0 Drainage Conditions

5.1 Pre-Development

On-site soils were estimated to consist of silt and fine sand as outlined in the Geotechnical and Hydrogeological Investigation by Fisher Environmental Ltd. (July, 2017) for the property located at 430 Essa Road.

Existing drainage patterns were identified during on-site reconnaissance and a review of the topographic survey prepared by Rudy Mak Surveying Ltd. Drainage from the subject site is predominately overland sheet flow from east to west towards Essa Road. A single catchbasin is present along the western border of the property and collects internal runoff from Catchment 101 and conveys it to the existing 525 mm dia. storm sewer located within Essa Road (Essa Road Improvements As-Built drawings – City of Barrie Engineering Department, March 2016). An area in the north eastern portion of the site (approximately 2100 m^2), herein referred to as Catchment 102, currently drains overland from west to east to eastern border of the subject site. This runoff is conveyed to an existing catchbasin located on McCausland Court through an overland flow spillway.

The pre-development drainage plan is illustrated in **Figure 2**.

5.2 Post-Development

The proposed development will be graded with varying slopes typically ranging from 0.5% - 5.0% to promote stormwater drainage towards proposed area drains throughout the site. Stormwater runoff that is captured in these area drains will be conveyed through a series of pipes and directed to a storage tank located in parking floor 1. The internal layout of storm conveyance pipes is to be determined by the mechanical engineer. Discharge from the storage tank will be controlled with a pump located in storage tank. The controlled discharge from the development will be conveyed to the existing storm sewer in Essa Road through a 375 mm dia. storm sewer.

Stormwater generated on the roof of the building will be detained in rooftop storage. This runoff will be controlled to a release rate of 42 L/s/ha and will be directed from the roof to STM MH2. The rooftop will provide 110 m^3 of storage.

Two small areas, herein referred to Catchments 202 and 203, will drain uncontrolled off the site. Catchment 202 is located along the frontage of Essa Road. This Catchment will drain

uncontrolled towards the Essa Road Right-of-Way (ROW). Catchment 203 is located in the north east corner of the site and will drain uncontrolled to McCausland Court. The uncontrolled flows for each of these catchments are considered to be negligible and have not been considered in the SWM calculations.

An emergency overland flow route has been provided via the internal parking road. In the event of a major storm or if the area drains significantly clog, stormwater will be safely conveyed along the internal road towards McCausland Court via the existing stormwater spillway. A curb cut has been provided along the parking area in the north east corner of the site to allow water to spill towards McCausland Court. The curb cut elevation has been set at a minimum elevation of 19 cm above all area drains to ensure that overland flow will only spill through the curb cut in emergency events.

The proposed site grading plan is shown in **Drawing C102**. **Figure 3** illustrates the post-development drainage plan.

6.0 Stormwater Management

Stormwater management (SWM) for the proposed development must comply with the policies and standards of various agencies including the City of Barrie and the Lake Simcoe Region Conservation Authority (LSRCA).

The recommended stormwater management strategy for the proposed development based on these efforts has been included below:

- Water Quantity Control
  - Control of the post development 100-year peak flow rate to the 5-year pre-development peak flow rate
- Water Quality Control
  - Provide an Enhanced Level of Protection (80% TSS removal for 90% of the annual runoff)
- Water Balance
  - Best efforts to maintain pre-development infiltration rates
- Phosphorus Control
  - At a minimum, removal of 80% of the annual Total Phosphorus load from the development area. Any Phosphorus load that cannot be controlled will be offset at a ratio of 2.5:1

6.1 Stormwater Quantity Control

A hydrologic stormwater analysis was completed using the rational method to analyze and compare pre- and post-development conditions. Rainfall events were modeled using the IDF data provided in the City of Barrie Design Standards. A summary of resultant peak flows is presented in **Table 3**. Refer to **Appendix C** for the detailed rational method calculations.

Table 3: Pre- and Post-Development Peak Flows (L/s)

Catchment	2-year	5-year	10-year	25-year	50-year	100-year
Pre-Development						
101	53	69	80	103	123	142
102	42	55	64	82	93	104
Post-Development						
201	91	119	138	178	209	232
202	7	9	11	14	15	17
203	0	0	1	1	1	1

Stormwater runoff from the site will be discharged to the existing storm sewer in Essa Road. Stormwater flows will be controlled to meet the 5-year pre-development peak flow rate from Catchment 101 as this catchment currently outlets to Essa Road and signifies the existing site drainage discharging to the Essa Road Sewer. The control of this flow from the development will prevent surcharging of the existing storm sewer within Essa Road. Runoff from the development will be stored on-site through a combination of rooftop ponding and an underground storage tank. Peak flows will be controlled by pumps located within the storage tank that have been sized for a maximum discharge rate of 60 L/s. A summary of the on-site storage is provided in **Table 4** below.

Table 4: Stormwater Storage System Summary

	Rooftop Storage (m^3)		Underground Storage (m^3)	
	Required	**Provided**	**Required**	**Provided**
5-year	45	45	38	38
100-year	110	110	59	60

Stormwater quantity control calculations are provided in **Appendix C**.

Storage Tank

The storage tank has been designed to provide 60 m^3 of storage on-site to meet the quantity control requirements. The tank will include an access manhole that will be accessible from outside of the proposed building along the west property line. The tank has been designed to accept the site storm sewer via gravity flow prior to being pumped out to the existing storm sewer in Essa Road. The pumps within the tank have been designed by the Mechanical Engineer. The tank will be configured such that there is approximately 15m^3 of 'dead storage' that will be further filtered and reused on site for irrigation purposes. There will also be approximately 60m^3 of active storage within the tank that will provide sufficient capacity to control the 100yr storm runoff.

6.2 Stormwater Quality Control

To provide an enhanced level of protection for water quality control, a Up-Flo Filter has been provided within the storage tank. The Up-Flo filter has been sized to provide 82.5% TSS removal from 92.1% of the annual runoff using the ETV particle size distribution. Refer to **Appendix** C for additional design details on the Up-Flo filter.

6.3 Water Balance

Best efforts to maintain pre-development infiltration rates were made due to limited infiltration opportunities within the proposed development. The Thornthwaite method was used to determine pre- and post-development infiltration rates. Annual infiltration volumes have been decreased from 155 m^3/year to 121 m^3/year.

To maintain pre-development water balance, approximately 0.5 m^3 (the first 0.2 mm of rainfall across the ground-level impervious surfaces) of water will need to be captured and re-used annually. A dead storage volume of 15 m^3 has been provided within the storage tank and is to be re-used on-site, exceeding the required volume to meet the water balance criteria. Potential re-use opportunities include:

- An internal car wash station utilizing captured stormwater runoff to reduce runoff from the development
- Using captured runoff for irrigating landscaped areas

Refer to **Appendix C** for water balance calculations.

6.4 Phosphorus Control

A phosphorus budget analysis was completed to determine pre- and post-development phosphorus loads. The redevelopment of the existing development will result in a decrease of phosphorus loads from 0.912 kg/yr in pre-development to 0.661 kg/yr in post-development. Additional phosphorus removal will be provided by the proposed Up-Flo Filter. Refer to **Appendix C** for the Phosphorus loading calculations.

It is noted that any phosphorus that cannot be offset from the development will be subject to the Lake Simcoe Offsetting Policy fees and will be required to be offset at a ratio of 2.5:1. Phosphorus Offsetting rates can been estimated elements using the following equation:

Phosphorus Loading (Kg/year) x $3,500 $/kg + 15% administration fee.

7.0 Utilities

The Subject Site is proposed to be serviced with natural gas, telephone, cable TV and hydro. Utilities have not been contacted at the time of this investigation. Site Plan circulation and coordination with the aforementioned utilities will be undertaken immediately to confirm capacity.

8.0 Road standard

Access to the site will be provided by entrances from Essa Road and the 430 Essa Road development. The internal parking area will be constructed to geotechnical recommendations, City of Barrie standards and in compliance with Accessibility for Ontarians with Disabilities Act (AODA). The internal paved private parking lot areas will be constructed complete with concrete curb. Refer to **Drawing C104** for details regarding the internal pavement structure.

9.0 Erosion & Sediment Controls During Construction

Erosion and Sediment controls will be installed prior to the commencement of any construction activities and will be maintained until the site is stabilized or as directed by the Site Engineer

and/or the City of Barrie. Controls will be inspected after each significant rainfall event and maintained in proper working condition. Further details on the specified controls are provided below.

Silt Fencing: Silt fence will be installed where required to intercept sheet flow. Silt fence will be located around the downstream side of the work zone limits. It should be noted that additional silt fencing may be added based on field decisions by the Site Engineer prior to, during and following construction.

Silt Sacks on Catchbasins: The existing catchbasins located along Essa Road at the location of the site shall be equipped with silt sacks during construction.

Rock Mud Mat: A rock mud mat will be installed at the entrance to the construction zone in order to prevent mud tracking from the site onto the surrounding lands and perimeter roadway network.

Dust Suppression: During construction activities, the Contractor is responsible to ensure that measures for dust suppression are provided as required, such as the application of water or lime.

10.0 Conclusions & Recommendations

Based on the information contained within this report, we offer the following conclusions:

1. A 150 mm dia. domestic water service and 200 mm dia. fire line have been provided to the building from the existing watermain located in Essa Road. Hydrants are not required within the proposed development.

2. A sanitary manhole and 200 mm dia. service have been provided at the west property boundary of the site from the existing sanitary service on-site.

3. Stormwater quantity control is to be provided through a combination of rooftop storage and a storage tank and orifice control to meet the 5-year pre-development flow rate to Essa Road.

4. Water quality control will be provided by a proposed Up-Flow in the storage tank.

5. Best efforts will be made to maintain pre-development water balance by utilizing dead storage in the storage tank for on-site water re-use.

6. The redevelopment of the site will result in an overall reduction in phosphorus loading. Any remaining phosphorus will be required to be offset at a ratio of 2.5:1.

Therefore, we recommend approval of the Site Plan Application from the perspective of servicing and stormwater management.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.

Brent Layton, P.Eng.
Project Engineer
/bl

C.F. CROZIER & ASSOCIATES

Rebecca Alexander, P.Eng.
Project Manager

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APPENDIX A

Water Calculations

CROZIER & ASSOCIATES
Consulting Engineers

File: 1321-5312
Date: 03-Mar-23
By: AB
Check By: BL

440 Essa Road, City of Barrie Development - Water Design Criteria

Site Information

Developed Site Area	0.50	ha
Retail Floor Space	0.09	ha
Number of residential units	262	units

Commercial & Residential Water Design Flows Per City of Barrie Design Standards

Residential:

Average Day Domestic Demand per capita	225	L/cap/d
High Density Population (54-300 units/hectare per City of Barrie Standards)	1.67	people/unit
Residential population	438	people
Average Day Domestic Demand	1.14	L/s

Commercial:

Equivalent domestic unit flow for commercial (MOE Design Guidelines 2008)	28000	L/ha/d
Average Day Commercial Flow	0.03	L/s
Total average daily water demand for building:	1.17	L/s
Max Day Peak Factor	3.05	
Max Day Demand Flow	3.57	L/s
Peak Hour Factor	4.57	
Peak Hour Flow	5.35	L/s

Fire Flow Demand (per City of Barrie Standards)

From Fire Underwriters Survey, fire flow requirements are:	267.0	L/s
Design Peak Flow	**272**	**L/s**

FUS Fire Flow Calculations

CROZIER CONSULTING ENGINEERS

PROJECT NAME: 440 Essa Rd
PROJECT NUMBER: 1321-5312
PREPARED BY: AB
CHECKED BY: RA
DATE: 2023-03-03

Fire Flow Determination Per Fire Underwriters Survey (2020)

Water Supply for Public Fire Protection - 2020
Fire Underwriters Survey
Part II - Guide for Determination of Fire Flows for Public Fire Protection in Canada

An estimate of fire flow required for a given area may be determined by the formula:

RFF = 220 * C * sqrt A

where:

RFF = the required fire flow in litres per minute (L/min)
C = the construction coefficient is related to the type of construction of the building
= 1.5 for Type V Wood Frame Construction
= 0.8 for Type IV-A Mass Timber Construction
= 0.9 for Type IV-B Mass Timber Construction
= 1.0 for Type IV-C Mass Timber Construction
= 1.5 for Type IV-D Mass Timber Construction
= 1.0 for Type III Ordinary Construction
= 0.8 for Type II Non-combustible Construction
= 0.6 for Type I Fire Resistive Construction
A = the total effective floor area (effective building area) in square metres (excluding basements at least 50 percent below grade) in the building considered

STEP A: Construction Coefficient (C) 0.8 Type II Non-combustible Construction Assumed

STEP B: Total Effective Floor Area

Proposed Building

Nine storey mixed use building containing 262 residential units, commercial space, and a two storey underground parking area. Refer to architectural plans by Studio JCI dated Dec. 21, 2022

	Yes/No/Unknown	
Is basement at least 50% below grade?	Yes	If yes, basement floor area excluded
Vertical openings protected?	No	*For consideration for effective area calculations

Calculate Effective Floor Area based on the highlighted cell
-C value from 1.0 to 1.5: 100% of all floor areas are used
-C value below 1 and vertical openings are not protected: Consider two largest floors plus 50% of all floor above to a max of eight
-C value below 1 and vertical openings are protected: Consider single largest floor plus 25% of the two immediately adjoining floors

*A building may be subdivided if there is a vertical firewall with a fire-resistance rating greater than 2 hours, and meets the requirements of the National Building Code.

Floors Above Grade	Total Floor Area (m^2)	% of Area Considered	Effective Floor Area (m^2)
Basement	39	0%	0.0
Ground Floor	1237	100%	1237.1
Mezzanine	0	100%	0.0
Level 2	2180	100%	2180.4
Level 3	2555	100%	2555.4
Level 4	2556	100%	2555.7
Level 5	2556	100%	2555.7
Level 6	2521	50%	1260.5
Level 7	2230	50%	1115.0
Level 8	1969	50%	984.7
Level 9	1434	50%	717.1
Mech. Penthouse	11	50%	5.7
Total	**19250**		**15167.3**

Total Effective Floor Area **15167 m^2**

STEP C: Therefore RFF = **22,000 L/min (rounded to nearest 1000 L/min)**

STEP D: Occupancy Contents Adjustment Factor

The required fire flow may be reduced by as much as -25% for occupancies having contents with very low fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Occupancy and Contents Adjustment Factor	
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

*Refer to Table 3 for recommended Occupancy and Contents Charges by major occupancy examples.

Type of Occupancy	Adjustment Factor	
Residential Occupancy	Limited Combustible	-15%

Total Reduction % **-3,300 L/min (reduction)**

RFF = **18,700 L/min (not rounded)**

Note: The RFF flow 18700 L/min is used in Step E and F.

CROZIER CONSULTING ENGINEERS

PROJECT NAME: 440 Essa Rd
PROJECT NUMBER: 1321-5312
PREPARED BY: AB
CHECKED BY: RA
DATE: 2023-03-03

Fire Flow Determination Per Fire Underwriters Survey (2020)

STEP E: Automatic Sprinkler Protection

Sprinklers - The required fire flow may be reduced by up to 50% for complete automatic sprinkler protection depending upon adequacy of system.

	Yes/No/Unknown	*Possible Reduction Available	Actual Reduction Provided
Automatic sprinkler protection designed and installed in accordance with NFPA 13?	Yes	-30%	-30%
Water supply is standard for both the system and Fire Department hose lines?	Yes	-10%	-10%
Fully supervised system?	Yes	-10%	-10%

*Reduction available assumes complete building coverage
*30% reduction typical for building requiring sprinkler system

Total Reduction % **-50% (reduction)**

Total Reduced Flow **-9,350 L/min (reduction, not rounded)**

STEP F: Exposure Adjustment Charge

Exposure - A percentage of water for the exposures should be added to the required fire flow for the subject building to provide adequate flow rates for hose streams used to reduce the spreading of fire from the subject building to exposed risks. The required fire flow of a subject building may be increased depending on the severity of exposed risks to the subject building and the distance between the exposed risks and the subject building. This charge considers the usage of water supplies to prevent exposed risks from igniting or being damaged during a major fire incident in the subject building.

Separation Distance	Maximum Exposure Adjustment Charge
0 to 3m	25%
3.1 to 10m	20%
10.1 to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

*If a vertical fire wall is properly constructed and has a rating of no less than 2 hours, then the boundary can be treated as protected with no exposure charge
*The maximum exposure adjustment charge to be applied to a subject building is 75%
*The distance in metres from the subject building facing wall to the exposed building facing wall, measured to the nearest metre, between the nearest points of the buildings. Where either the subject building or the exposed building is at a diagonal to the other building, the shortest distance should be increased by 3 metres and this adjusted value used as exposure distance.

Exposed buildings		Distance	Surcharge Factor	Surcharge (L/min)
North	Adjacent Dwelling	18.16	15%	2805
East	Adjacent Dwelling	23.11	10%	1870
South	Adjacent Dwelling	20.38	10%	1870
West	Adjacent Dwelling	66.03	0%	0

Total Reduced Flow **6,545 L/min Surcharge (not rounded)**

STEP G: Final Required Fire Flow

Step D - Occupancy Adjusted Fire Flow Demand	18,700	L/min
Step E - Sprinkler (Reduction)	-9,350	L/min
Step F - Exposure Charge	6,545	L/min
Final Fire Flow:	**15,895**	**L/min**
	16,000	**L/min (rounded to nearest 1000L/min)**
or	**267**	**L/s**
or	**4,227**	**USGPM**
Required duration:	**3.50**	**hours**

**Refer to Table 1 for Duration*

Table 1 - FUS 2020

Required Duration of Fire Flow	
Flow Required (L/min)	**Duration (hours)**
2,000 or less	1.00
3,000	1.25
4,000	1.50
5,000	1.75
6,000	2.00
8,000	2.00
10,000	2.00
12,000	2.50
14,000	3.00
16,000	3.50
18,000	4.00
20,000	4.50
22,000	5.00
24,000	5.50
26,000	6.00
28,000	6.50
30,000	7.00
32,000	7.50
34,000	8.00
36,000	8.50
38,000	9.00
40,000 and over	9.50

Interpolate for intermediate figures

440 Essa Road, City of Barrie - Mixed Use Development
Fire Protection Volume Calculation
CFCA File: 1321-5312

2023-03-02

Fire Protection Water Supply Guideline
Part 3 of the Ontario Building Code (2006)

$$Q = KVS_{TOT}$$

Q = minimum supply of water in litres (L)
K = water supply coefficient
V = total building volume in cubic metres
S_{TOT} = total of spatial coefficient values from property line exposures on all sides

K =	18.0	Group C building with combustible construction (Table 1)
V =	55975.27	Total building volume in cubic metres
S_{TOT} =	1	S_{TOT} Need Not Exceed 2.0

Q = 1,007,555 L

Based on ranges listed in Table 2, the required minimum water supply flow rate is **9000 L/min**

150 L/s

Hydrant Flow Test Results

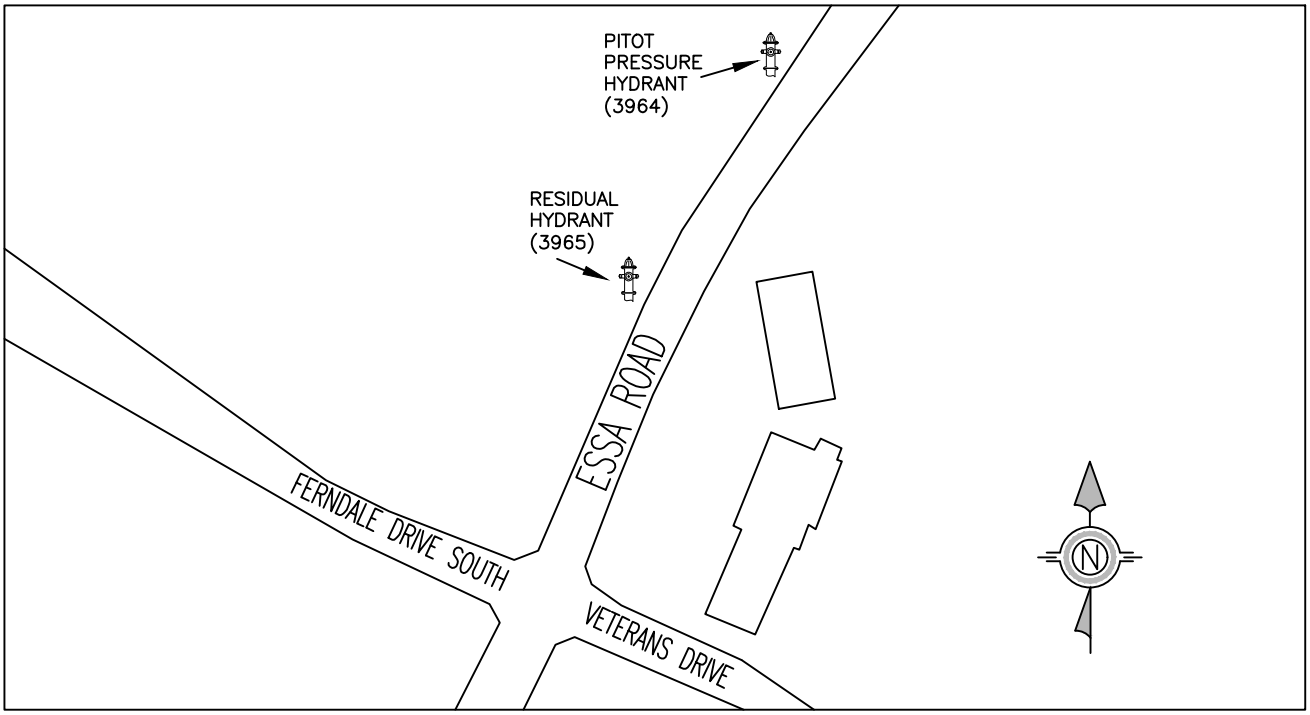
FLOW TEST RESULTS

FIRST FOR FIRE, LIFE SAFETY & SECURITY
VIPOND INC
est. 1945

DATE : TUESDAY SEPTEMBER 22, 2020 TIME : 2:30 PM

LOCATION : 440 ESSA ROAD
BARRIE
ONTARIO

TEST BY : VIPOND FIRE PROTECTION AND LOCAL PUC



STATIC PRESSURE : 50 PSI UNDERGROUND TYPE & SIZE: 12" PVC

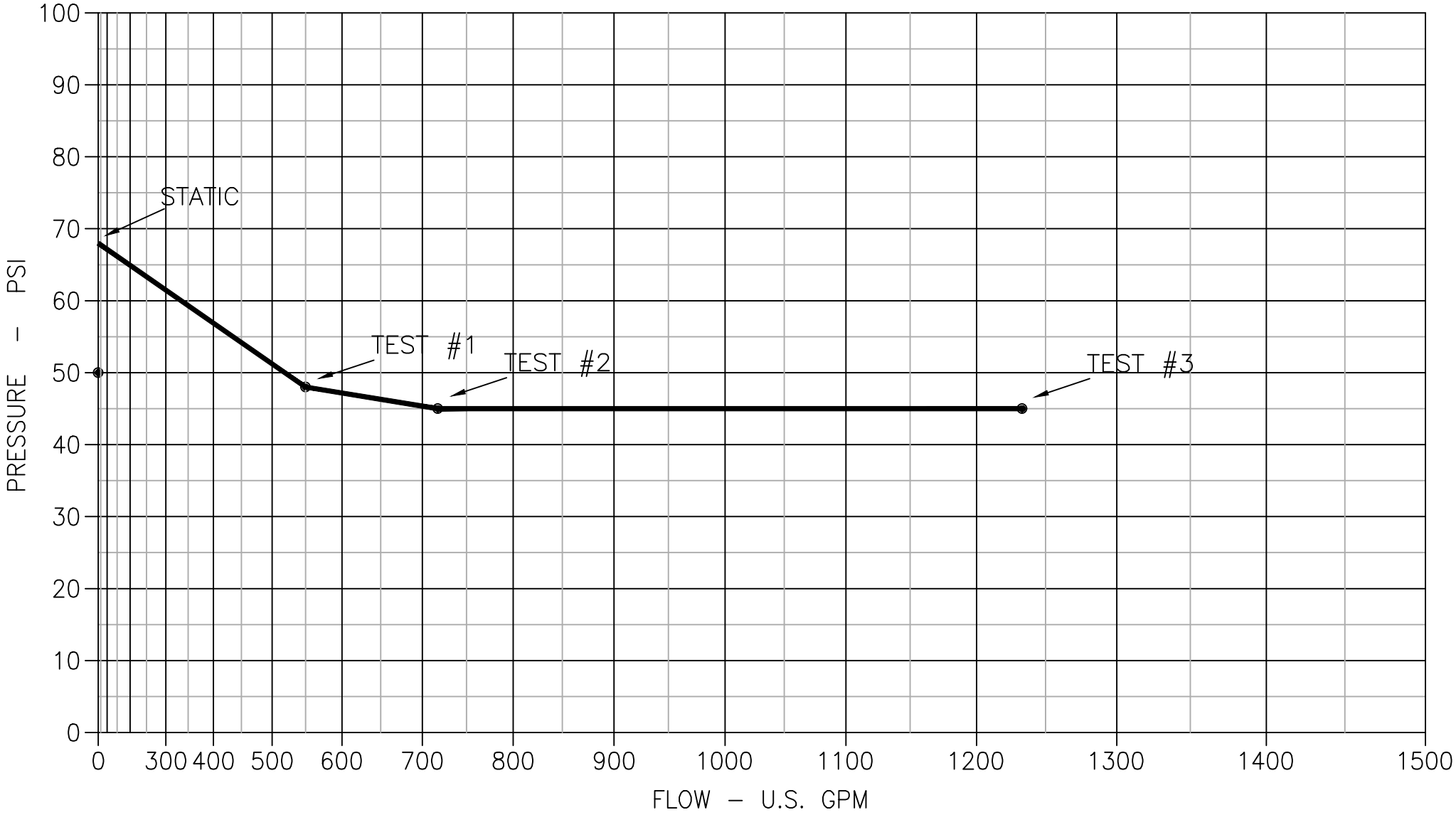
TEST NO.	NO. OF NOZZLES	NOZZLE DIAMETER (INCHES)	DISCHARGE CO-EFFICIENT	RESIDUAL PRESSURE (PSI)	PITOT PRESSURE (PSI)	DISCHARGE (U.S.GPM)
1	1	1-3/4	0.995	48	38	549
2	1	2-1/2	0.9	45	18	716
3	2	2-1/2	0.9	45	14	1262

FIRST FOR FIRE, LIFE SAFETY & SECURITY

VIPOND INC est. 1945

440 ESSA ROAD	BY : GUS A.
BARRIE	OFFICE : BARRIE
ONTARIO	TEST BY : VIPOND & PUC
	DATE : SEPTEMBER 22, 2020

STATIC:	RESIDUAL:		FLOW:
50 PSI	TEST#1 48 PSI	@	549 GPM
	TEST#2 45 PSI	@	716 GPM
	TEST#3 45 PSI	@	1262 GPM



Hydrant Flow Test Results

APPENDIX B

Sanitary Calculations

CROZIER & ASSOCIATES
Consulting Engineers

File: 1321-5312
Date: 02-Mar-23
By: AB
Check By: BL

440 Essa Road, City of Barrie Development - Sanitary Design Criteria

Site Information:

Developed Site Area	0.50	ha
Retail Floor Space	0.09	ha
Number of residential units	262	units

Sanitary Design Flows Per City of Barrie Design Standards

Residential/Domestic:		
Average daily per capita sewage flow	225	L/cap/d
High Density Population (54-300 units/hectare per City of Barrie Standards)	1.67	people/unit
Residential population	438	people
Average residential area domestic flow	1.14	L/s
Harmon Peaking Factor	4.00	
Residential Maximum Peak Flow	4.57	L/s
Retail Area:		
Equivalent domestic unit flow for commercial (per City of Barrie Standards)	28000	L/d/ha
Average commercial area daily flow	0.03	L/s
Peaking Factor	2	
Retail Maximum Peak Flow	0.06	L/s
Inflow/Infiltration:		
Unit Infiltration Allowance (per City of Barrie Standards)	0.10	L/s/ha
Total Infiltration Allowance	0.05	L/s
Total Sanitary Design Flow	**4.68**	**L/s**

APPENDIX C

Stormwater Calculations

Rational Method Calculations

CROZIER & ASSOCIATES
Consulting Engineers

PROJECT: 440 Essa Road
PROJECT No.: 1321-5312
FILE: Modified Rational Method
DATE: 11-19-20
DESIGN: BL
CHECK: RA

Time of Concentration 10 min

Barrie IDF Curve Parameters				
	a	b	c	i (mm/hr)
2	678.085	4.699	0.781	83.11
5	853.608	4.699	0.766	108.92
10	975.865	4.699	0.760	126.55
25	1146.275	4.922	0.757	148.15
50	1236.152	4.966	0.751	162.02
100	1426.408	5.273	0.759	180.15

Pre-Development Runoff Coefficient

Surface	Pre-development 101		Pre-development 102	
	Area (ha)	Runoff Coefficient	Area (ha)	Runoff Coefficient
Landscaped	0.07	0.16	0.02	0.16
Rooftop	0.01	0.95	0.04	0.95
Parking	0.22	0.95	0.15	0.95
Total *	0.29	0.77	0.21	0.87

Post-Development Runoff Coefficient

Surface	Post-development 201		Post-development 202		Post-development 203	
	Area (ha)	Runoff Coefficient	Area (ha)	Runoff Coefficient	Area (ha)	Runoff Coefficient
Landscaped	0.06	0.16	0.00	0.16	0.01	0.16
Rooftop	0.19	0.95	0.00	0.95	0.00	0.95
Parking/Walkway	0.21	0.95	0.03	0.95	0.00	0.95
Total *	0.46	0.85	0.03	0.90	0.01	0.16

Adjusted Runoff Coefficient

Catchment	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr
101	0.77	0.77	0.77	0.84	0.92	0.96
102	0.87	0.87	0.87	0.96	1.00	1.00
201	0.85	0.85	0.85	0.93	1.00	1.00
202	0.90	0.90	0.90	0.99	1.00	1.00
203	0.16	0.16	0.16	0.18	0.19	0.20

Peak Flow Rates (L/s) - Uncontrolled

Catchment	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr
101	52.52	68.84	79.98	102.99	122.87	142.32
102	41.71	54.66	63.51	81.79	93.14	103.56
201	90.66	118.82	138.05	177.78	208.68	232.04
202	6.93	9.08	10.55	13.58	14.97	16.65
203	0.37	0.49	0.57	0.73	0.87	1.01

Control From: Post-development 201 100 yr
Control To: Pre-development 101 5 yr

Rooftop Control Rate 42 L/s/ha

*Total runoff coefficient based on weighed runoff for landscaped and impervious areas

CROZIER & ASSOCIATES
Consulting Engineers

PROJECT: 440 Essa Road
PROJECT No.: 1321-5312
FILE: Modified Rational Method
DATE: 2020-11-19
DESIGN: BL
CHECK: RA

Modified Rational Method - Storage Sizing: Scenario 100-Post to 5 Pre

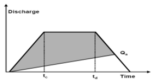
Storm Data				
Inputs			**Outputs**	
IDF Location		Barrie	5 yr Intensity (mm/hr)	108.92
Return Period	5	100	100 yr Intensity (mm/hr)	180.15
Time of Concentration (mir	10	10		
Coeff A	854	1426		
Coeff B	4.7	5.3		
Coeff C	0.766	0.8		

Intensity
$i_{(Td)} = A\ (T_d+B)^{-C}$

Peak Flow
$Q_{post} = 0.0028 \cdot C_{post} \cdot i_{(Td)} \cdot A$

Storage
$S_d = Q_{post} \cdot T_d - Q_{Target}\ (T_d + T_c) / 2$

Target Scenario Data (5 yr Pre-Development)			
Inputs		**Outputs**	
Runoff Coefficient	0.77	Uncont. Flow (L/s)	68.84
Area (ha)	0.29		



Post-Development Scenario Data (ROOF AREA)			
Inputs		**Outputs**	
Runoff Coefficient	1.00	Uncont. Flow (L/s)	95.84
Area (ha)	0.19		

Post-Development Scenario Data (UNCONTROLLED)			
Inputs		**Outputs**	
Runoff Coefficient	1.00	Uncont. Flow (L/s)	16.65
Area (ha)	0.03		

Post-Development Scenario Data (CONTROLLED AREA)			
Inputs		**Outputs**	
Runoff Coefficient	1.00	Uncont. Flow (L/s)	136.20
Area (ha)	0.27		

Target Flow for Entire Site (L/s)	68.84

Target Flow for Roof Area (L/s)	7.98

Target Flow for Controlled Area (L/s)	60.86
Controlled Flow from Orifice (L/s)	59.50

REQUIRED STORAGE VOLUME ON ROOF (m^3):	**110**
REQUIRED STORAGE VOLUME FOR REMAINING AREA (m^3)	**59**
TOTAL REQUIRED STORAGE VOLUME (m^3)	**169**

Storage Volume Determination (ROOF)					Storage Volume Determination (PARKING/TANK)				
T_d	$i_{100@Td}$	T_d	Q_{post}	S_d	T_d	$i_{100@Td}$	T_d	Q_{post}	S_d
min	*mm/hr*	*sec*	m^3/s	m^3	*min*	*mm/hr*	*sec*	m^3/s	m^3
10	180.15	600	0.096	52.7	10	180.15	600	0.136	46.0
15	145.31	900	0.077	63.6	15	145.31	900	0.110	54.2
20	122.92	1200	0.065	71.3	20	122.92	1200	0.093	58.0
25	107.18	1500	0.057	77.2	25	107.18	1500	0.081	59.1
30	95.44	1800	0.051	81.8	30	95.44	1800	0.072	58.5
35	86.31	2100	0.046	85.6	35	86.31	2100	0.065	56.7
40	78.97	2400	0.042	88.9	40	78.97	2400	0.060	54.0
45	72.93	2700	0.039	91.6	45	72.93	2700	0.055	50.7
50	67.87	3000	0.036	94.0	50	67.87	3000	0.051	46.8
55	63.55	3300	0.034	96.0	55	63.55	3300	0.048	42.5
60	59.82	3600	0.032	97.8	60	59.82	3600	0.045	37.9
65	56.56	3900	0.030	99.4	65	56.56	3900	0.043	32.9
70	53.69	4200	0.029	100.8	70	53.69	4200	0.041	27.7
75	51.13	4500	0.027	102.1	75	51.13	4500	0.039	22.2
80	48.84	4800	0.026	103.2	80	48.84	4800	0.037	16.6
85	46.77	5100	0.025	104.2	85	46.77	5100	0.035	10.8
90	44.90	5400	0.024	105.0	90	44.90	5400	0.034	4.8
95	43.19	5700	0.023	105.8	95	43.19	5700	0.033	0.0
100	41.62	6000	0.022	106.5	100	41.62	6000	0.031	0.0
105	40.18	6300	0.021	107.1	105	40.18	6300	0.030	0.0
110	38.85	6600	0.021	107.7	110	38.85	6600	0.029	0.0
115	37.62	6900	0.020	108.2	115	37.62	6900	0.028	0.0
120	36.47	7200	0.019	108.6	120	36.47	7200	0.028	0.0
125	35.41	7500	0.019	108.9	125	35.41	7500	0.027	0.0
130	34.41	7800	0.018	109.3	130	34.41	7800	0.026	0.0
135	33.47	8100	0.018	109.5	135	33.47	8100	0.025	0.0
140	32.59	8400	0.017	109.7	140	32.59	8400	0.025	0.0
145	31.77	8700	0.017	109.9	145	31.77	8700	0.024	0.0
150	30.99	9000	0.016	110.1	150	30.99	9000	0.023	0.0
155	30.25	9300	0.016	110.2	155	30.25	9300	0.023	0.0
160	29.55	9600	0.016	110.2	160	29.55	9600	0.022	0.0
165	28.89	9900	0.015	110.3	165	28.89	9900	0.022	0.0
170	28.27	10200	0.015	110.3	170	28.27	10200	0.021	0.0
175	27.67	10500	0.015	110.3	175	27.67	10500	0.021	0.0
180	27.10	10800	0.014	110.2	180	27.10	10800	0.020	0.0
185	26.56	11100	0.014	110.1	185	26.56	11100	0.020	0.0
190	26.04	11400	0.014	110.0	190	26.04	11400	0.020	0.0
195	25.55	11700	0.014	109.9	195	25.55	11700	0.019	0.0
200	25.07	12000	0.013	109.8	200	25.07	12000	0.019	0.0
205	24.62	12300	0.013	109.6	205	24.62	12300	0.019	0.0
210	24.18	12600	0.013	109.4	210	24.18	12600	0.018	0.0
215	23.76	12900	0.013	109.2	215	23.76	12900	0.018	0.0
220	23.36	13200	0.012	109.0	220	23.36	13200	0.018	0.0

CROZIER & ASSOCIATES
Consulting Engineers

PROJECT: 430 Essa Road
PROJECT No.: 1321-4508
FILE: Modified Rational Method
DATE: 09-12-17
DESIGN: JE
CHECK:

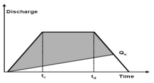
Modified Rational Method - Storage Sizing: Scenario 100-Post to 5 Pre

Storm Data				
Inputs			**Outputs**	
IDF Location		Barrie	5 yr Intensity (mm/hr)	108.92
Return Period	5	100	100 yr Intensity (mm/hr)	108.92
Time of Concentration (mir	10	10		
Coeff A	854	854		
Coeff B	4.7	4.7		
Coeff C	0.766	0.8		

Intensity
$i_{(Td)} = A\ (T_d+B)^{-C}$

Peak Flow
$Q_{post} = 0.0028 \cdot C_{post} \cdot i_{(Td)} \cdot A$

Storage
$S_d = Q_{post} \cdot T_d - Q_{Target}\ (T_d + T_c) / 2$



Target Scenario Data (5 yr Pre-Development)			
Inputs		**Outputs**	
Runoff Coefficient	0.77	Uncont. Flow (L/s)	68.84
Area (ha)	0.29		

Post-Development Scenario Data (ROOF AREA)			
Inputs		**Outputs**	
Runoff Coefficient	0.95	Uncont. Flow (L/s)	55.05
Area (ha)	0.19		

Post-Development Scenario Data (UNCONTROLLED)			
Inputs		**Outputs**	
Runoff Coefficient	0.90	Uncont. Flow (L/s)	9.08
Area (ha)	0.03		

Post-Development Scenario Data (CONTROLLED AREA)			
Inputs		**Outputs**	
Runoff Coefficient	0.85	Uncont. Flow (L/s)	118.82
Area (ha)	0.46		

Target Flow for Entire Site (L/s)	68.84
Target Flow for Roof Area (L/s)	7.98
Target Flow for Controlled Area (L/s)	60.86

REQUIRED STORAGE VOLUME ON ROOF (m^3):	**45**
REQUIRED STORAGE VOLUME FOR REMAINING AREA (m^3)	**38**
TOTAL REQUIRED STORAGE VOLUME (m^3)	**83**

Storage Volume Determination (ROOF)					Storage Volume Determination (PARKING)				
T_d	$i_{100@Td}$	T_d	Q_{post}	S_d	T_d	$i_{100@Td}$	T_d	Q_{post}	S_d
min	*mm/hr*	*sec*	*m^3/s*	*m^3*	*min*	*mm/hr*	*sec*	*m^3/s*	*m^3*
10	106.08	600	0.054	27.4	10	106.08	600	0.116	32.9
15	84.52	900	0.043	32.5	15	84.52	900	0.092	37.3
20	70.91	1200	0.036	35.8	20	70.91	1200	0.077	38.1
25	61.46	1500	0.031	38.2	25	61.46	1500	0.067	36.7
30	54.47	1800	0.028	40.0	30	54.47	1800	0.059	33.9
35	49.07	2100	0.025	41.3	35	49.07	2100	0.054	30.2
40	44.75	2400	0.023	42.3	40	44.75	2400	0.049	25.9
45	41.22	2700	0.021	43.1	45	41.22	2700	0.045	21.0
50	38.26	3000	0.019	43.7	50	38.26	3000	0.042	15.7
55	35.75	3300	0.018	44.1	55	35.75	3300	0.039	10.0
60	33.59	3600	0.017	44.4	60	33.59	3600	0.037	4.1
65	31.70	3900	0.016	44.5	65	31.70	3900	0.035	0.0
70	30.04	4200	0.015	44.6	70	30.04	4200	0.033	0.0
75	28.57	4500	0.014	44.6	75	28.57	4500	0.031	0.0
80	27.25	4800	0.014	44.6	80	27.25	4800	0.030	0.0
85	26.07	5100	0.013	44.4	85	26.07	5100	0.028	0.0
90	24.99	5400	0.013	44.3	90	24.99	5400	0.027	0.0
95	24.01	5700	0.012	44.0	95	24.01	5700	0.026	0.0
100	23.12	6000	0.012	43.8	100	23.12	6000	0.025	0.0
105	22.30	6300	0.011	43.5	105	22.30	6300	0.024	0.0
110	21.54	6600	0.011	43.1	110	21.54	6600	0.023	0.0
115	20.84	6900	0.011	42.7	115	20.84	6900	0.023	0.0
120	20.19	7200	0.010	42.3	120	20.19	7200	0.022	0.0
125	19.58	7500	0.010	41.9	125	19.58	7500	0.021	0.0
130	19.01	7800	0.010	41.4	130	19.01	7800	0.021	0.0
135	18.48	8100	0.009	41.0	135	18.48	8100	0.020	0.0
140	17.99	8400	0.009	40.4	140	17.99	8400	0.020	0.0
145	17.52	8700	0.009	39.9	145	17.52	8700	0.019	0.0
150	17.08	9000	0.009	39.4	150	17.08	9000	0.019	0.0
155	16.66	9300	0.008	38.8	155	16.66	9300	0.018	0.0
160	16.27	9600	0.008	38.2	160	16.27	9600	0.018	0.0
165	15.89	9900	0.008	37.6	165	15.89	9900	0.017	0.0
170	15.54	10200	0.008	37.0	170	15.54	10200	0.017	0.0
175	15.20	10500	0.008	36.4	175	15.20	10500	0.017	0.0
180	14.88	10800	0.008	35.7	180	14.88	10800	0.016	0.0
185	14.58	11100	0.007	35.1	185	14.58	11100	0.016	0.0
190	14.29	11400	0.007	34.4	190	14.29	11400	0.016	0.0
195	14.01	11700	0.007	33.8	195	14.01	11700	0.015	0.0
200	13.74	12000	0.007	33.1	200	13.74	12000	0.015	0.0
205	13.49	12300	0.007	32.4	205	13.49	12300	0.015	0.0
210	13.24	12600	0.007	31.7	210	13.24	12600	0.014	0.0
215	13.01	12900	0.007	30.9	215	13.01	12900	0.014	0.0
220	12.78	13200	0.006	30.2	220	12.78	13200	0.014	0.0

Orifice Sizing Calculations

Project: 440 Essa Rd
Project No.: 1321-5312
Date: 2020-12-22
Updated: 2020-12-22
Created By: BL
Checked By:

Orifice Calculation

Q = CA x sqrt(2gh)

Orifice Parameters

Diameter Ø (m) =	0.160
Area (A) (m^2) =	0.020
Coefficient (C) =	0.62
Orifice Invert =	311.31
Centroid =	311.39
100-Year Water Level =	312.55
Controlled Orifice Flow (L/s) =	59.5

Up-Flo Filter Design Details

September 28, 2020

ADS UFF Sizing Summary

Project Name: 440 Essa Road
Consulting Engineer: Crozier
Location: Barrie, ON
Sizing Completed By: Cody Neath **Email:** cody.neath@ads-pipe.com

Recommended Unit	
Recommended Model:	UFF-6
TSS Removal Percentage:	82.5%
Total Site Volume Treated:	92.1%

Site Details	
Site Area:	0.5 ha
% Impervious:	90%
Rational C:	0.84
Rainfall Station:	Barrie, ONT
Particle Size Distribution:	ETV / NJDEP
Peak Storm Flowrate:	70 L/s

Unit Specifications:	
Number of Filter Modules:	6
Maximum Treatment Flowrate:	9.6 L/s
Inlet - Outlet Drop:	240 mm*
Max. Pipe Diameter:	600 mm

* Drop across unit can be reduced when required.

Site Elevations:	
Rim Elevation:	100.00
Inlet Pipe Elevation:	98.74
Outlet Pipe Elevation:	98.50

Consult approved shop drawings for final elevations. Riser sections (and/or grade rings) may be required to reach final grade on site.

Rainfall Intensity[1]	Fraction of Rainfall[1]	Removal Efficiency[2]	Weighted Net-Annual Removal Efficiency
mm/hr	%	%	%
0.50	0.1%	92.3%	0.1%
1.00	18.0%	91.3%	16.4%
1.50	7.5%	90.4%	6.8%
2.00	13.7%	89.4%	12.2%
2.50	4.3%	88.5%	3.8%
3.00	5.1%	87.6%	4.4%
3.50	7.8%	86.6%	6.8%
4.00	3.4%	85.7%	2.9%
4.50	3.2%	84.8%	2.7%
5.00	5.3%	83.8%	4.4%
6.00	4.7%	81.9%	3.8%
7.00	5.4%	80.1%	4.3%
8.00	4.6%	78.2%	3.6%
9.00	2.5%	76.3%	1.9%
10.00	2.8%	74.4%	2.1%
20.00	9.9%	55.7%	5.5%
30.00	1.3%	36.9%	0.5%
40.00	0.2%	18.1%	0.0%
50.00	0.0%	0.0%	0.0%
100.00	0.0%	0.0%	0.0%
0.00	0.0%	93.2%	0.0%
Net Annual Treatment			**82.5%**
Total Runoff Volume Treated:			**92.1%**

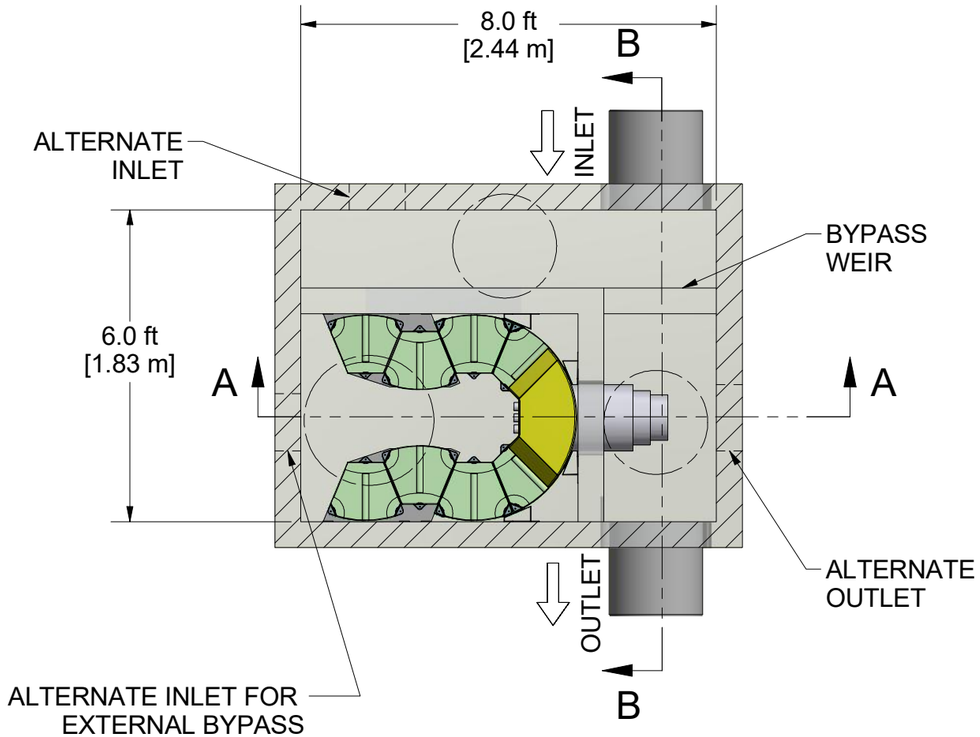
Rainfall Data: 1978:2007, HLY03, Barrie, ONT, 6110557.

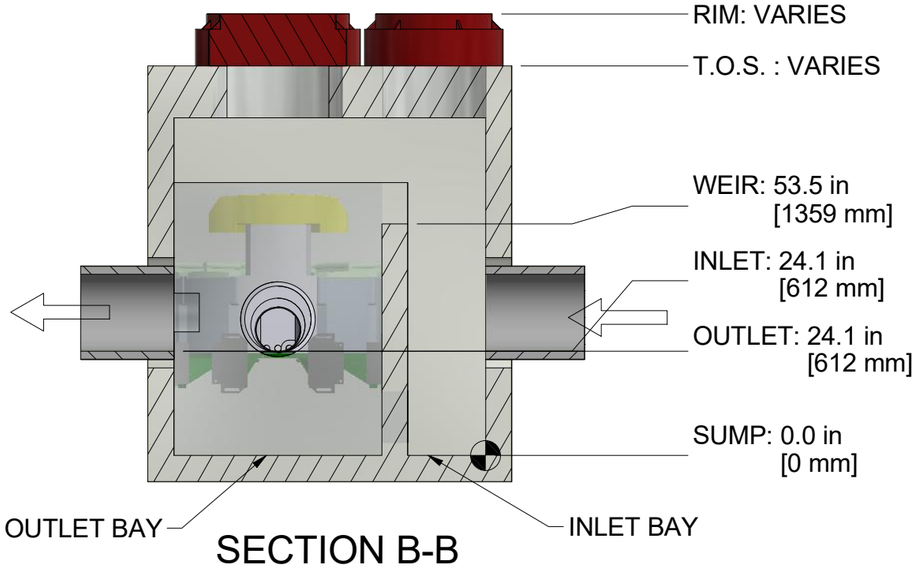
Notes:

Removal efficiencies are based on NJDEP Test Protocols and independently verified.

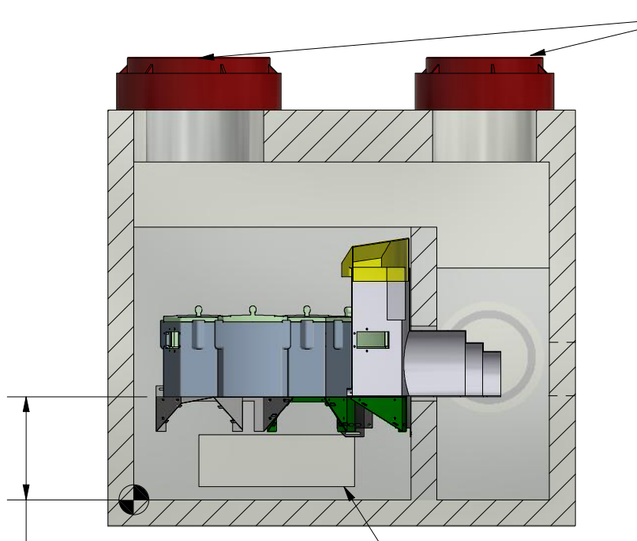
TSS removal based on ETV/NJDEP particle size distribution.

All units supplied by ADS have numerous local, provincial, and international certifications (copies of which can be provided upon request). The design engineer is responsible for ensuring compliance with applicable regulations.





SECTION B-B



SECTION A-A

CAPACITIES:

- Minimum performance: 80% removal. Washington DOE/NJCAT verified at the peak treatment flow.
- Peak treatment flow:
  .033 CFS (0.9 LPS) (15 GPM) per module (Ribbons)
  .022 CFS (0.6 LPS) (10 GPM) per module (Long Ribbons)
  .056 CFS (1.6 LPS) (25 GPM) per module (CPZ)
- Maximum number of ribbon modules per outlet module: 36
- Maximum number of CPZ modules per outlet module: 18 (contract Hydro if more are required)

ADDITIONAL DESIGN INFORMATION:

- Normal operating W.S.E. is 26-30" (660-762mm) above the outlet invert
- Media Types Available: Ribbons, CPZ

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

TOLERENCES ARE:
FRACTIONS ± 1/16
DECIMALS:
X.X ± .06
X.XX ± .03
X.XXX ± .015
ANGLES: ± .5°

PROJECTION

COMMENTS:
1. STRUCTURE WALL AND SLAB THICKNESSES ARE NOT TO SCALE
2. CONTACT HYDRO INTERNATIONAL FOR A BOTTOM OF STRUCTURE ELEVATION PRIOR TO SETTING THE STRUCTURE
3. NOT FOR CONSTURCION CONTACT HYDRO FOR SITE SPECIFIC DRAWING
4. NOT ALL SIZES AVAILABLE IN ALL AREAS
5. SUMP DEPTH AVAILABLE IN 24" (610mm) CPZ, RIBBONS AND 36" (914mm) LONG RIBBONS DEPTH

REVISION HISTORY

REV	BY	DESCRIPTION	DATE
-	ER	FIRST RELEASE	3/8/2019

DATE: 3/8/2019
SCALE: 1:35
DRAWN BY: ER
CHECKED BY:
APPROVED BY

Title
UP-FLO FILTER
6ft (1829mm) X 8ft (2438mm)

8 MODULES MAX

Hydro International

94 Hutchins Drive
Portland, ME 04102
Tel: +1 (207) 756-6200
Fax: +1 (207) 756-6212
hydro-int.com

WEIGHT: N/A
MATERIAL:
NEXT ASSEMBLY: 6x8-1
DRAWING NO.: 6x8-UFF-1
SHEET SIZE: B
SHEET: 1 OF 1
Rev: -

Water Balance

Project Name: 440 Essa Road
Project No: 1321-5312
Modelled By: BL
Checked By: RA
Date: 25-Nov-20

Climatic Water Budget - Thornthwaite Method

Project Name: 440 Essa Road
BARRIE WPCC - Climate Normals 1981-2010 Station Data

Month	Mean Temperature (◦C)	Heat index	" a "	PET - Potential Evapotranspiration (mm)	Daily Correction Value	Adjusted PET - Potential Evapotranspiration (mm)	Total Precipitation (mm)	Surplus (mm)	Deficit (mm)
January	-7.7	0.0	0.49	0.0	0.76	0.0	82.5	82.5	0.0
February	-6.6	0.0	0.49	0.0	0.87	0.0	61.8	61.8	0.0
March	-2.1	0.0	0.49	0.0	0.99	0.0	58.1	58.1	0.0
April	5.6	1.2	0.51	25.2	1.12	28.1	62.2	34.1	0.0
May	12.3	3.9	0.56	59.0	1.23	72.7	82.4	9.7	0.0
June	17.9	6.9	0.61	88.5	1.29	114.5	84.8	0.0	29.7
July	20.8	8.7	0.64	104.1	1.27	132.2	77.2	0.0	55.0
August	19.7	8.0	0.63	98.1	1.17	115.2	89.9	0.0	25.3
September	15.3	5.4	0.59	74.7	1.05	78.3	94.0	15.7	0.0
October	8.7	2.3	0.53	40.6	0.92	37.3	77.5	40.2	0.0
November	2.7	0.4	0.50	11.5	0.80	9.2	88.9	79.7	0.0
December	-3.5	0.0	0.49	0.0	0.74	0.0	73.6	73.6	0.0
Totals		**36.8**	**1.08**			**587.5**	**932.9**	**455.4**	**110.0**

TOTAL WATER DEFICIT = 110.0 mm
TOTAL WATER SURPLUS (SURPLUS - DEFICIT) = 345.4 mm
Precipitation Adjustment Factor : none

NOTES:

1. Water budget adjusted for latitude and daylight.
2. (◦C) - Represents calculated mean of daily temperatures for the month.
3. Precipitation and Temperature data from theBARRIE WPCC (Station No.6110557) Environment Canada Station Data
4. Total Water Surplus (Thornthwaite, 1948) is calculated as total precipitation minus adjusted potential evapostranspiration.

CROZIER & ASSOCIATES Consulting Engineers

Project Name: 440 Essa Road
Project No: 1321-5312
Modelled By: BL
Checked By: RA
Date: 25-Nov-2020

Water Budget - Pre-Development
Project Name: 440 Essa Road
Water Balance/Water Budget Assessment

Pre-development area available for infiltration (landscaped/lawn area considered to infiltrate)
Pre-development area not available for infiltration (total site area less landscaped area noted above)
Remaining Impervious area (e.g. parking asphalt area, building/rooftop area)

Note: site land use areas consistent with Pre-Development SWM hydrologic modeling & calculations

Catchment Designation	Site - Pre-Development			
	Lawn & Trees	Impervious	Roof Area	Totals
Area (m^2)	900	3630	480	5010
Pervious Area (m^2)	900	0	0	900
Impervious Area (m^2)	0	3630	480	4110
Infiltration Factors				
Topography Infiltration Factor	0.15	0.1	0.1	
Soil Infiltration Factor	0.2	0.1	0.1	
Land Cover Infiltration Factor	0.15	0	0	
MOE Infiltration Factor	0.5	0	0	
Actual Infiltration Factor	0.5	0	0	
Run-off Coefficient	0.16	0.95	1	
Runoff from Impervious Surfaces *	0	0.8	0.8	
Inputs (per Unit Area)				
Precipitation (mm/yr)	933	933	933	933
Run-On (mm/yr)	0	0	0	0
Other Inputs (mm/yr)	0	0	0	0
Total Inputs (mm/yr)	**933**	**933**	**933**	**933**
Outputs (per Unit Area)				
Precipitation Surplus (mm/yr)	345	746	746	674
Net Surplus (mm/yr)	345	746	746	674
Evapotranspiration (mm/yr) *	587	187	187	259
Infiltration (mm/yr)	173	0	0	31
Soakaway Infiltration (mm/yr)	0	0	0	0
Total Infiltration (mm/yr)	173	0	0	31
Runoff Pervious Areas (mm/yr)	173	0	0	31
Runoff Impervious Areas (mm/yr)	0	746	746	612
Total Runoff (mm/yr)	173	746	746	643
Total Outputs (mm/yr)	**933**	**933**	**933**	**933**
Difference (Inputs- Outputs)	**0**	**0**	**0**	**0**
Inputs (Volumes)				
Precipitation (m^3/yr)	840	3386	448	4674
Run-On (m^3/yr)	0	0	0	0
Other Inputs (m^3/yr)	0	0	0	0
Total Inputs (m^3/yr)	**840**	**3386**	**448**	**4674**
Outputs (Volumes)				
Precipitation Surplus (m^3/yr)	311	2709	358	3378
Net Surplus (m^3/yr)	311	2709	358	3378
Evapotranspiration (m^3/yr) *	529	677	90	1296
Infiltration (m^3/yr)	155	0	0	155
Soakaway Infiltration (m^3/yr)	0	0	0	0
Total Infiltration (m^3/yr)	155	0	0	155
Runoff Pervious Areas (m^3/yr)	155	0	0	155
Runoff Impervious Areas (m^3/yr)	0	2709	358	3067
Total Runoff (m^3/yr)	155	2709	358	3223
Total Outputs (m^3/yr)	**840**	**3386**	**448**	**4674**
Difference (Inputs- Outputs)	**0**	**0**	**0**	**0**

Existing Site Aerial Image:

CROZIER & ASSOCIATES
Consulting Engineers

Project Name: 440 Essa Road
Project No: 1321-5312
Modelled By: BL
Checked By: RA
Date: ##########

Water Budget - Post-Development *without Mitigation*
Project Name: 440 Essa Road
Water Balance/Water Budget Assessment

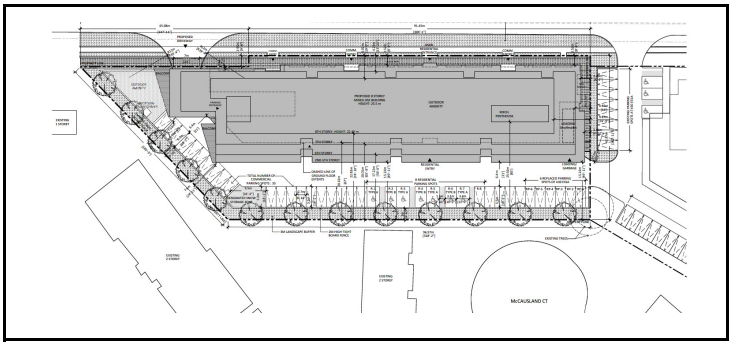
Post-development area available for infiltration (landscaped/lawn area considered to infiltrate)
Post-development area not available for infiltration (total site area less landscaped area noted above)
Remaining Impervious area (e.g. parking asphalt area, building/rooftop area)

Note: site land use areas consistent with Post-Development SWM hydrologic modeling & calculations

Catchment Designation	Site - Post-Development			
	Lawn	Impervious	Roof Area	Totals
Area (m^2)	700	2410	1900	5010
Pervious Area (m^2)	700	0	0	700
Impervious Area (m^2)	0	2410	1900	4310
Infiltration Factors				
Topography Infiltration Factor	0.15	0.1	0.1	
Soil Infiltration Factor	0.2	0.1	0.1	
Land Cover Infiltration Factor	0.15	0	0	
MOE Infiltration Factor	0.5	0	0	
Actual Infiltration Factor	0.5	0	0	
Run-off Coefficient	0.16	0.95	0.95	
Runoff from Impervious Surfaces *	0	0.8	0.8	
Inputs (per Unit Area)				
Precipitation (mm/yr)	933	933	933	933
Run-On (mm/yr)	0	0	0	0
Other Inputs (mm/yr)	0	0	0	0
Total Inputs (mm/yr)	**933**	**933**	**933**	**933**
Outputs (per Unit Area)				
Precipitation Surplus (mm/yr)	345	746	746	690
Net Surplus (mm/yr)	345	746	746	690
Evapotranspiration (mm/yr) *	587	187	187	243
Infiltration (mm/yr)	173	0	0	24
Soakaway Infiltration (mm/yr)	0	0	0	0
Total Infiltration (mm/yr)	173	0	0	24
Runoff Pervious Areas (mm/yr)	173	0	0	24
Runoff Impervious Areas (mm/yr)	0	746	746	642
Total Runoff (mm/yr)	173	746	746	666
Total Outputs (mm/yr)	**933**	**933**	**933**	**933**
Difference (Inputs- Outputs)	**0**	**0**	**0**	**0**
Inputs (Volumes)				
Precipitation (m^3/yr)	653	2248	1773	4674
Run-On (m^3/yr)	0	0	0	0
Other Inputs (m^3/yr)	0	0	0	0
Total Inputs (m^3/yr)	**653**	**2248**	**1773**	**4674**
Outputs (Volumes)				
Precipitation Surplus (m^3/yr)	242	1799	1418	3458
Net Surplus (m^3/yr)	242	1799	1418	3458
Evapotranspiration (m^3/yr) *	411	450	355	1215
Infiltration (m^3/yr)	121	0	0	121
Soakaway Infiltration (m^3/yr)	0	0	0	0
Total Infiltration (m^3/yr)	121	0	0	121
Runoff Pervious Areas (m^3/yr)	121	0	0	121
Runoff Impervious Areas (m^3/yr)	0	1799	1418	3217
Total Runoff (m^3/yr)	121	1799	1418	3338
Total Outputs (m^3/yr)	**653**	**2248**	**1773**	**4674**
Difference (Inputs- Outputs)	**0**	**0**	**0**	**0**

Pre-Development Total Infiltration:
155 m3/yr

Proposed Site Plan:



CROZIER & ASSOCIATES
Consulting Engineers

Project Name: 440 Essa Road
Project No: 1321-5312
Modelled By: BL
Checked By: RA
Date: ##########

Water Budget - Post-Development *with Mitigation*
Project Name: 440 Essa Road
Water Balance/Water Budget Assessment

Post-development area available for infiltration (lawn/landscaped area considered to infiltrate, BLDG. A roof area (clean water) directed to Infiltration Trench via non-perforated sub-drains. Sub-drains designed to be connected to building roof drains/downspouts (refer to Crozier Engineering Drawings).

Post-development area not available/directed to infiltrate (total site area less lawn/landscaped and BLDG. A roof area noted above)

Remaining Impervious area (e.g. parking area)

Catchment Designation	Site - Post-Development			
	Lawn	Impervious	Roof Area	Totals
Area (m^2)	700	2410	1900	5010
Pervious Area (m^2)	700	0	0	700
Impervious Area (m^2)	0	2410	1900	4310
Infiltration Factors				
Topography Infiltration Factor	0.15	0.1	0.1	
Soil Infiltration Factor	0.2	0.1	0.1	
Land Cover Infiltration Factor	0.15	0	0	
MOE Infiltration Factor	0.5	0	0	
Actual Infiltration Factor	0.5	0	0	
Run-off Coefficient	0.16	0.95	0.95	
Runoff from Impervious Surfaces *	0	0.8	0.8	
Inputs (per Unit Area)				
Precipitation (mm/yr)	933	933	933	933
Run-On (mm/yr)	0	0	0	0
Other Inputs (mm/yr)	0	0	0	0
Total Inputs (mm/yr)	**933**	**933**	**933**	**933**
Outputs (per Unit Area)				
Precipitation Surplus (mm/yr)	345	746	746	690
Net Surplus (mm/yr)	345	746	746	690
Evapotranspiration (mm/yr) *	587	187	187	243
Infiltration (mm/yr)	173	0	0	24
On-site re-use (mm/yr)	0	15	0	7
Total Infiltration (mm/yr)	173	15	0	31
Runoff Pervious Areas (mm/yr)	173	0	0	24
Runoff Impervious Areas (mm/yr)	0	731	746	635
Total Runoff (mm/yr)	173	731	746	659
Total Outputs (mm/yr)	**933**	**933**	**933**	**933**
Difference (Inputs- Outputs)	**0**	**0**	**0**	**0**
Inputs (Volumes)				
Precipitation (m^3/yr)	653	2248	1773	4674
Run-On (m^3/yr)	0	0	0	0
Other Inputs (m^3/yr)	0	0	0	0
Total Inputs (m^3/yr)	**653**	**2248**	**1773**	**4674**
Outputs (Volumes)				
Precipitation Surplus (m^3/yr)	242	1799	1418	3458
Net Surplus (m^3/yr)	242	1799	1418	3458
Evapotranspiration (m^3/yr) *	411	450	355	1215
Infiltration (m^3/yr)	121	0	0	121
Soakaway Infiltration (m^3/yr)	0	36	0	36
Total Infiltration (m^3/yr)	121	36	0	157
Runoff Pervious Areas (m^3/yr)	121	0	0	121
Runoff Impervious Areas (m^3/yr)	0	1762	1418	3180
Total Runoff (m^3/yr)	121	1762	1418	3301
Total Outputs (m^3/yr)	**653**	**2248**	**1773**	**4674**
Difference (Inputs- Outputs)	**0**	**0**	**0**	**0**

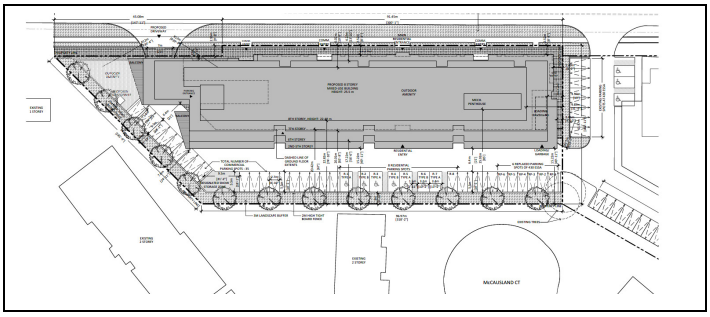
Proposed Infiltration via Mitigation

Pre-Development Total Infiltration:
31 mm/yr

Note:
568 mm
Precipitation available between Apr-Oct (non-winter months). Therefore available for infiltration into non-frozen soil

Pre-Development Total Infiltration:
155 m3/yr

Proposed Servicing Plan:



Project: 440 Essa Road
Project No: 1321-5312
Modelled By: BL
Checked By: RA
Date: 25-Nov-2020

Water Budget Summary
Project Name: 440 Essa Road
Water Balance/Water Budget Assessment

Characteristic	Site				
	Pre-Development	Post-Development	Post-Development *with Mitigation*	Change (Pre to Post)	Change (Pre to Post) *with Mititgation*
Inputs (Volumes)					
Precipitation (m^3/yr)	4674	4674	4674	0%	0%
Run-On (m^3/yr)	0	0	0	0%	0%
Other inputs (m^3/yr)	0	0	0	0%	0%
Total Inputs (m^3/yr)	**4674**	**4674**	**4674**	**0**	**0**
Outputs (Volumes)					
Precipitation Surplus (m^3/yr)	3378	3458	3458	2%	2%
Net Surplus (m^3/yr)	3378	3458	3458	2%	2%
Evapotranspiration (m^3/yr)	1296	1215	1215	-6%	-6%
Infiltration (m^3/yr)	155	121	121	-22%	-22%
On-site re-use (m^3/yr)	0	0	**36**	-	**36 m3/yr**
Total Infiltration (m^3/yr)	**155**	121	**157**	-22%	1%
Runoff Pervious Areas (m^3/yr)	155	121	121	-22%	-22%
Runoff Impervious Areas (m^3/y	3067	3217	3180	-	-
Total Runoff (m^3/yr)	3223	3338	3301	4%	2%
Total Outputs (m^3/yr)	**4674**	**4674**	**4674**	0%	0%

Project: 440 Essa Road
Project No: 1321-5312
Modelled By: BL
Date: ########

Design Storm Determination
Project Name: 440 Essa Road
Water Balance/Water Budget Assessment

Days with Precipitation (From Climate Data)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
>= 0.2 mm	12.2	12.9	11.4	11.1	11.8	13.3	15.6	88
>= 5 mm	4.2	5.8	4.4	4.7	5.1	5.4	5.7	35
>= 10 mm	1.7	2.7	2.9	2.5	3.4	3	2	18
>= 25 mm	0.31	0.36	0.73	0.62	0.81	0.73	0.19	4

Available Precipitation

Storm Event (mm)	Total Days Per Year	Incremental Precipitation (mm/yr)	Cummulative Precipitation (mm/yr)
0.2	88	17.7	17.7
5	35	176.5	194.2
10	18	182.0	376.2
25	4	93.8	469.9
Total	**146**	**469.9**	

Soakaway Infiltration Target: 15 mm/yr

Runoff Coefficient: 0.95

Design Precipitation: 16 mm/yr (Design Infiltration / Contributing RC)

Therefore Design Storm: 0.2 mm
Contributing Drainage Area: 2410 m^2
Storage Volume Required: 0.5 m^3

Phosphorus Loading

Project: 440 Essa Rd
Project No.: 1321-5312
Created By: BL
Checked By:
Date: 2020-11-25

Pre-Development Phosphorus Loading

Pre - Development Conditions					
Catchment	**Land Use**	**Area** (ha)	**P coeff** (kg/ha/yr)	**P Load** (kg/yr)	**P Load Total (kg/yr)**
101/102	Commercial	0.50	1.82	0.912	0.912
Total		**0.50**		**0.912**	**0.912**

Note:
Phosphorus Coefficients derived from Phosphorus Budget Tool in Support of Sustainable Development for the Lake Simcoe Watershed (Hutchinson Environmental Services Ltd, 2012)

Project: 440 Essa Rd
Project No.: 1321-5312
Created By: BL
Checked By: 0
Date: 2020-11-25

Post-Development Phosphorus Loading

Post - Development Conditions					
Catchment	**Land Use**	**Area** (ha)	**P coeff (kg/ha)**	**P Load (kg/yr)**	**P Load Total (kg/yr)**
201	Residential	0.50	1.32	0.661	0.661
Total		**0.50**		**0.661**	**0.661**

Note:

Phosphorus Coefficients derived from Phosphorus Budget Tool in Support of Sustainable Development for the Lake Simcoe Watershed (Hutchinson Environmental Services Ltd, 2012)

APPENDIX D

Supporting Information

Site Plan

FINISHED GRADE LEVEL: 313.21
AS PER CITY OF BARRIE COMPREHENSIVE ZONING BY-LAW 2009-141

CALCULATED BASED ON THE AVERAGE OF FOLLOWING ELEVATIONS:
313.68, 313.31, 313.12, 313.06, 313.10,
313.31, 313.31, 313.09, 313.11, 312.98

REFER TO CIVIL DRAWINGS FOR DETAILED SITE GRADING PLAN

LEGEND:

- PROPOSED BUILDING FOOTPRINT
- PROPOSED SOD
- PROPOSED CONCRETE PAVING
- PROPOSED CONCRETE UNIT PAVING
- TREE PROTECTION FENCE
- EXISTING TREES TO BE PRESERVED
- EXISTING TREES TO BE REMOVED

EX. FIRE HYDRANT AND VALVE TO BE MAINTAINED
EX. CB TO BE MAINTAINED
EX. DCB TO BE MAINTAINED
EX. 300mmø WM
EX. STM MH
EX. 525mmø STM SWR
EX. 250mmø SAN SWR
EX. 225mmø WATER SERVICE
EX. 100mmø STM
EX. 100mmø W
ESSA ROAD
34M RIGHT-OF-WAY AS PER OFFICIAL PLAN ROAD WIDENING
APPROXIMATE LOCATION OF EXISTING WATERMAIN
APPROXIMATE LOCATION EXISTING CONC. STM
APPROXIMATE LOCATION OF EXISTING SAN SEWER
APPROXIMATE LOCATION OF HYDRO LINES ABOVE
EXISTING CONCRETE SIDEWALK TO REMAIN
DASHED LINE OF 200mm CANOPY PROJECTION
DOTTED LINE OF UNDERGROUND PARKING EXTEND
REFER TO LANDSCAPE PLAN
NEW CONCRETE SIDEWALK
PROPOSED DRIVEWAY
PROPERTY LINE
SNOW STORAGE & SEASONAL-USE OUTDOOR AMENITY AREA
7.5m SETBACK
DOTTED LINE OF BUILDING EXTENTS ABOVE
INTAKE
REQUIRED TREE PRESERVATION FENCING (REFER TO TREE INVENTORY AND PRESERVATION PLAN REPORT)
BICYCLE PARKING
EXISTING BOARD FENCE ON PROPERTY LINE TO BE MAINTAINED
3m LANDSCAPE BUFFER REFER TO LANDSCAPE
EXISTING 2 STOREY
PARKING ENTRANCE
7.5 % RAMP DM
15 % RAMP DM
COMMS. ROOM
ELEC. ROOM
COMM. ENTRY
MAIN RESIDENTIAL ENTRANCE
WALKWAY
VESTIBULE
INDOOR AMENITY 2065.5 sf 191.9 m2
COMMERCIAL 1 6497 sf 603.6 m2
COMMERCIAL 2 5565 sf 517.0 m2
DOG WASH STN.
MAIL
LOBBY
MGMT. OFFICE
MOVING ROOM
CACF
RESIDENTIAL ENTRY (BARRIER-FREE)
BULK STORAGE 104 sf 9.7 m2
FIRE PUMP ROOM
GAS METER
RESI. GARBAGE ROOM 806 sf 74.9 m2
WALL EXHAUST
COMM. GARBAGE ROOM 320 sf 29.7 m2
LOADING 3mx9mx4m
LOADING/ GARBAGE
OPEN TO ABOVE
STR TANK W/ GRATE
STR ACCESS MH
SIAMESE CONNECTION
430 ESSA PARKING SPACES TO BE MAINTAINED
TOTAL NUMBER OF COMMERCIAL PARKING SPOTS : 33
8 RESIDENTIAL PARKING SPOTS
6 REPLACED PARKING SPOTS OF 430 ESSA
DESIGNATED SNOW STORAGE ZONE
DOTTED LINE OF UNDERGROUND PARKING EXTEND
LIMIT OF UNDERGROUND PARKING
PROPOSED CURB CUT
McCAUSLAND CT
EXISTING 2 STOREY
TRANSFORMER 2.16m x 3.5m

37.94m [124'-6"] | 16.6m [54'-6"] | 36m [118'-1"] | 136.53m [447'-11"] | 96.1m [315'-3"] | 6m [19'-8"] | 37.5m [123'] | 2.49m [8'-2"]

1 SITE PLAN
Scale: 1 : 250

Revisions:

DESCRIPTION:	DATE:

General Notes:

1. These Contract Documents are the property of the Architect. The Architect bears no responsibility for the interpretations of these documents by the Contractor. Upon written application the Architect will provide written/graphic clarification or supplementary information regarding the intent of the Contract Documents. The Architect will review Shop Drawings submitted by the Contractor for design conformance only.

2. Drawings are not to be scaled for construction. Contractor to verify all existing conditions and dimensions required to perform the Work and report any discrepancies with the Contract Documents to the Architect before commencing work.

3. Positions of exposed or finished mechanical or electrical devices, fittings, and fixtures are indicated on the Architectural drawings. The locations shown on the Architectural drawings govern over the Mechanical and Electrical drawings. Those items not clearly located will be located as directed by the Architect.

Issued:

Issued for SPA	Dec. 21, 2020
Issued for ZBA	Aug. 23, 2019
DESCRIPTION:	DATE:

Consultants:

STRUCTURAL:

MECHANICAL:

ELECTRICAL:

ARCHITECT:

STUDIO JCI
20 De Boers Drive suite 525
Toronto ON M3H 0H1
t. 416.901.6528 f. 416.901.8962
www.studiojci.com

ONTARIO ASSOCIATION OF ARCHITECTS — Jacob Cheng — LICENCE 6108

PROPOSED MIXED USE DEVELOPMENT

ADDRESS:
440 Essa Road, Barrie ON

GROUND FLOOR SITE PLAN

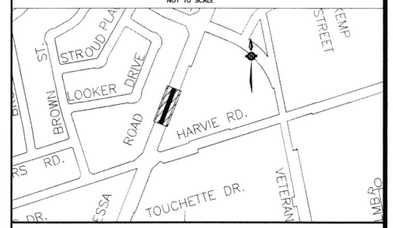
PROJECT NO.:	1905
SCALE:	1:200
DATE:	December 21, 2020
DRAWN BY:	

DRAWING NO.:

A1.02

As-Built Drawings

KEY PLAN
NOT TO SCALE



GENERAL NOTES

ASBUILT LEGEND

- ASBUILT STORM DATA
- ASBUILT SANITARY DATA
- ASBUILT WATERMAIN DATA
- ASBUILT TRAIL DATA
- ASBUILT SOD DATA
- ASBUILT DRIVEWAY DATA
- 314.56× ASBUILT ELEVATION

THE CONTRACTOR IS ADVISED THAT THERE MAY BE SEPTIC SYSTEM TILE BEDS IN THE FRONT YARDS OF PROPERTIES ON ESSA ROAD. SHOULD A TILE BED OR MANTLE BE DISTURBED IT MUST BE REPORTED TO THE CONTRACT ADMINISTRATOR IMMEDIATELY.

ALL DISTURBED AREAS TO BE REINSTATED WITH 200mm TOPSOIL AND SOD.

BENCH MARKS

DISTANCE NOTE
DISTANCES SHOWN HEREON ARE GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999684.

BEARING NOTE
BEARINGS HEREIN ARE GRID BEARINGS AND ARE DERIVED FROM CONTROL MONUMENTS 031950003 (N=4910748.411, E=603095.546) AND ARE REFERRED TO THE CENTRAL MERIDIAN (81 DEGREES OF LONGITUDE) IN ZONE, 17 AND ARE BASED ON NAD83.

BENCH MARK V010865470
300.3254 – CONCRETE HEADWALL ON EAST SIDE OF REDFERN AVENUE, 0.15KM NORTH OF DYER ROAD. TABLET IS SET HORIZONTALLY IN THE EAST FACE, 16.3m EAST OF CENTRELINE OF ROAD, 52cm WEST OF THE SOUTH END, 42cm BELOW THE TOP.

NO.	REVISIONS	DATE	APPROVED
0	ISSUED FOR TENDER	JAN 15	DMJ
1	ISSUED FOR CONSTRUCTION	APRIL 15	DMJ
2	REVISED SERVICES/CB'S	JULY 15	DMJ
	AS CONSTRUCTED	MARCH 16	

CITY OF BARRIE
APPROVED
DATE. . . . . .
. . . . . .
DIRECTOR OF ENGINEERING

ESSA ROAD IMPROVEMENTS (ASBUILTS)

ESSA ROAD
STA. 2+980 TO 3+130

The City of BARRIE
ENGINEERING DEPARTMENT

SCALE HOR. 1:250	VERT. 1:50	DRAWING NO.	2015-004
DESIGN J.P.R.	DRAWN J.P.R.	SHEET NO.	PP9
REVIEWED D.M.J.	DATE 2015.01.00		

2015-004-013

FIGURES

Legend

= SUBJECT LANDS

Project

440 ESSA ROAD
CITY OF BARRIE

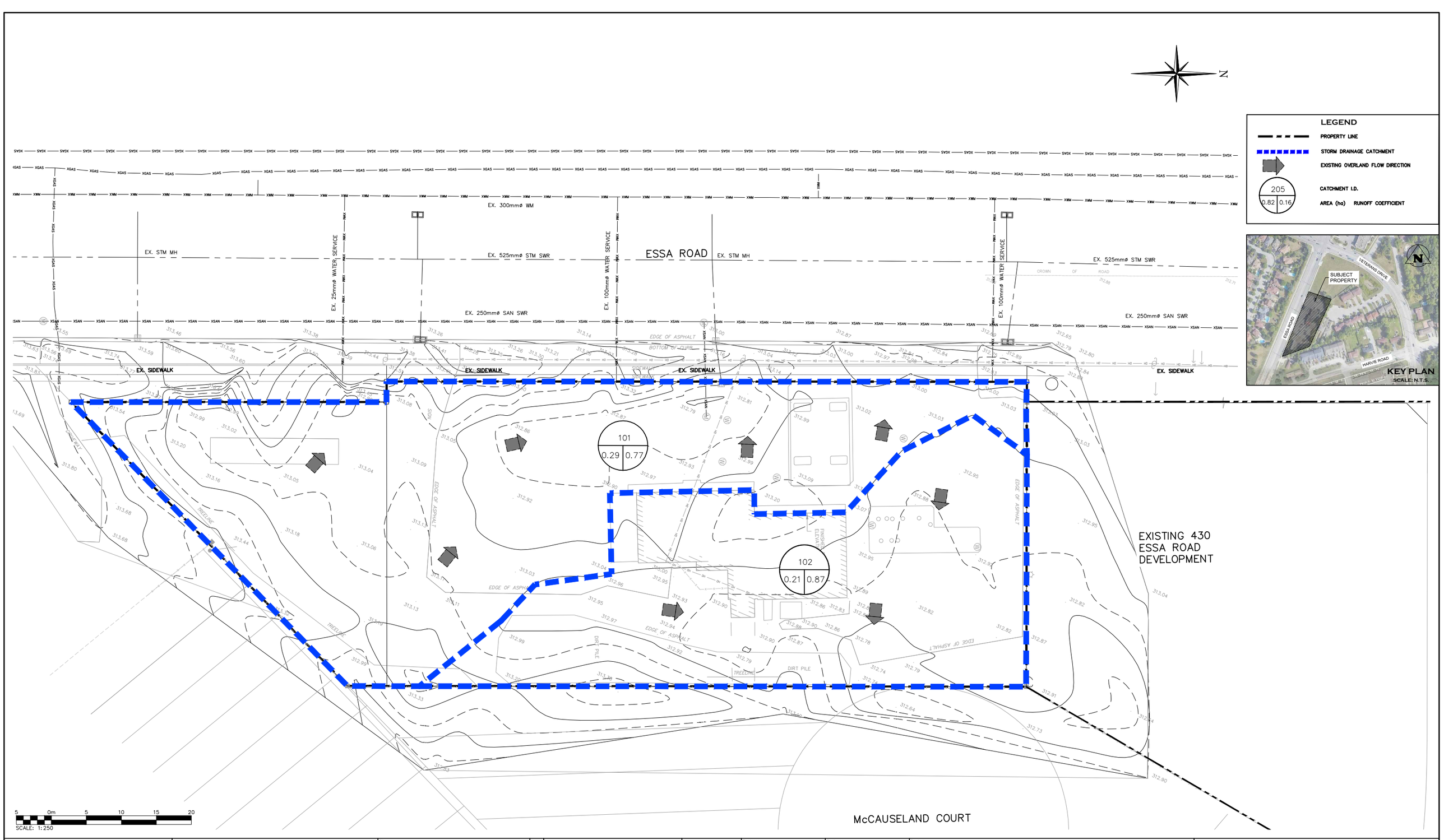
Drawing

SITE LOCATION

CROZIER CONSULTING ENGINEERS
57 John Street West
P.O. Box 1011
Bradford, ON L3Z 2B4
905-952-3111 T
www.cfcrozier.ca

Drawn By	Design By	Project
B.L.	B.L.	1321-5312

Scale	Date	Check By	Drawing
N.T.S.	09/13/2019		FIGURE 1



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TOPOGRAPHIC SURVEY:
TOPOGRAPHIC SURVEY PROVIDED BY RUDY MAK SURVEYING LTD.

BENCHMARK NOTE:
SITE BENCHMARK IS THE TOP OF THE IB AT THE SOUTHEAST CORNER HAVING AN ELEVATION OF 312.81

City of Barrie

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR 1ST SUBMISSION SPA	12/22/2020

Engineer | Engineer

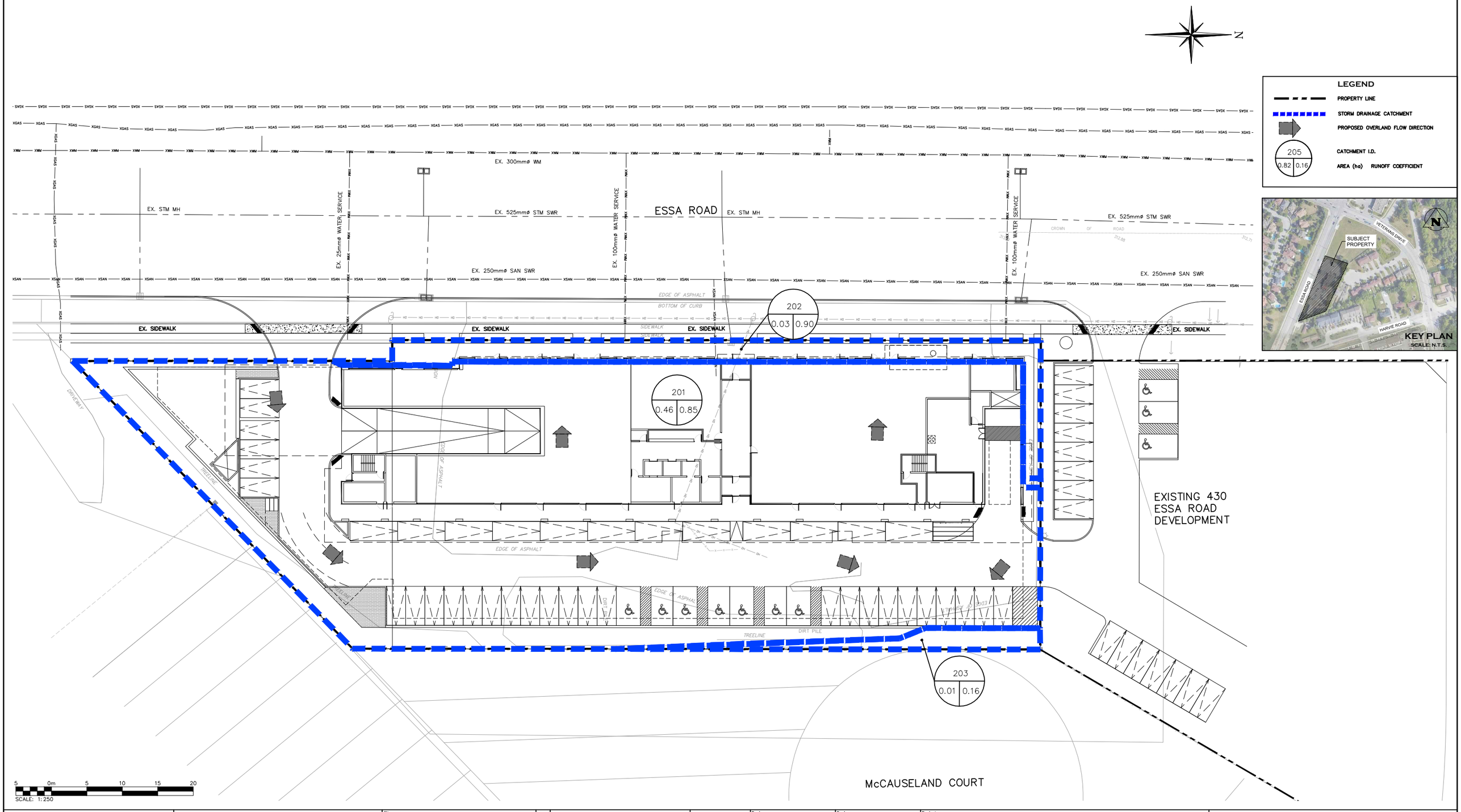
FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Project: 440 ESSA ROAD
CITY OF BARRIE

Drawing: PRE-DEVELOPMENT DRAINAGE PLAN

CROZIER CONSULTING ENGINEERS
57 JOHN STREET WEST
P.O. Box 1011
BRADFORD, ON L3Z 2B4
905-952-3111 T
WWW.CFCROZIER.CA

Drawn By	B.L.	Design By	N.C./B.L.	Project	1321-5312
Check By	R.A.	Check By	G.M.	Scale 1:250	Drawing FIGURE 2



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TOPOGRAPHIC SURVEY PROVIDED BY RUDY MAK SURVEYING LTD.

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City of Barrie

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR 1ST SUBMISSION SPA	12/22/2020

Engineer

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Engineer

Project: 440 ESSA ROAD
CITY OF BARRIE

Drawing: POST-DEVELOPMENT DRAINAGE PLAN

CROZIER CONSULTING ENGINEERS
57 JOHN STREET WEST
P.O. BOX 1011
BRADFORD, ON L3Z 2B4
905-952-3111 T
WWW.CFCROZIER.CA

Drawn By	Design By	Project
B.L.	N.C./B.L.	1321-5312
Check By	Check By	Scale / Drawing
R.A.	G.M.	1:250 / FIGURE 3

DRAWINGS

Drawing C101: General Site Servicing Plan

Drawing C102: General Grading Plan

Drawing C103: Removals & Erosion & Sediment Control Plan

Drawing C104: Construction Notes & Standard Details

Drawing C105: Pavement Markings & Signage Plan

NOTE: MAXIMUM ROOFTOP DISCHARGE TO STORM MH#2 = 8.0 L/S. REFER TO MECHANICAL DRAWINGS FOR DETAILS ON ROOFTOP CONTROL DEVICES.

EX. FIRE HYDRANT AND VALVE TO BE MAINTAINED

45.00m

EX. FIRE HYDRANT AND VALVE TO BE MAINTAINED

CONNECT 200mmø FIRE SERVICE C/W BACKFLOW PREVENTER TO EX. 300mmø W/M VIA LIVE TAP AND SLEEVE

EX. CB TO BE MAINTAINED

EX. DCB TO BE MAINTAINED

EX. DCB TO BE MAINTAINED

EX. CB TO BE MAINTAINED

EXISTING 25mmø WM TO BE ABANDONED AND CAPPED AT THE MAIN. DISTURBED AREA TO BE RESTORED

EX. 300mmø WM

EXISTING 100mmø WM TO BE ABANDONED AND CAPPED AT THE MAIN. DISTURBED AREA TO BE RESTORED

AREA OF ESSA ROAD DISTURBANCE. SAW CUT, REMOVE AND REPLACE EXISTING CURB AS REQUIRED TO CONSTRUCT NEW ENTRANCE. SAW CUT, REMOVE AND REPLACE EXISTING CONCRETE SIDEWALK AS REQUIRED. RE-INSTATE ALL DISTURBED AREAS TO EXISTING CONDITION OR BETTER.

AREA OF ESSA ROAD DISTURBANCE. SAW CUT, REMOVE AND REPLACE EXISTING CURB AS REQUIRED TO CONSTRUCT NEW ENTRANCE. SAW CUT, REMOVE AND REPLACE EXISTING CONCRETE SIDEWALK AS REQUIRED. RE-INSTATE ALL DISTURBED AREAS TO EXISTING CONDITION OR BETTER.

EX. STM MH

EX. 525mmø STM SWR

ESSA ROAD

EX. STM MH
S INV. = 311.17
N INVE. = 311.14

BREAK INTO EXISTING STM SEWER AND INSTALL PROPOSED MANHOLE.

PR. STM MH #1
T/G 313.00
(OPSD 701.010)
E INV. 311.50
S INV. 311.00
N INV. 310.97

EX. 525mmø STM SWR @ 0.7%

REMOVE EX. 100mmø WATER SERVICE AND REPLACE WITH A 150mmø WATER SERVICE

EX. 525mmø STM SWR

PROPOSED ENTRANCE TO BE CONSTRUCTED AS PER OPSD 350.010

EXISTING HYDRO POLE AND GUY WIRE TO BE MAINTAINED

EX. SAN MH

EX. CB TO BE MAINTAINED

PROPOSED CURB CUT

EX. 1200mmø SAN MH
E INV. 309.87
N INV. 309.81
S INV. 309.84

18.5m– 375mmø STM @ 0.5%

PR. 200mmø FIRE SERVICE C/W VALVE INSTALLED ON PROPERTY LINE AS PER BSD-505.

EX. DCB TO BE MAINTAINED

EXISTING HYDRO POLE AND GUY WIRE TO BE MAINTAINED

EX. 250mmø SAN SWR

EX. 200mmø SAN SWR

REMOVE EX. CATCHBASIN & 250mmø LEAD AND PARGE EX. CB

WATER SERVICE ENTRY AND VALVE AS PER BSD-505.

PR. SAN MH #1
T/G 313.20
(OPSD 701.010)
W INV. 309.92
E INV. 309.95

EX. SIDEWALK

PR. SIDEWALK

PR. SIDEWALK

INCOMING LINE FROM ROOF DRAINAGE

PROPOSED STORM TANK ACCESS

8.3m– 375mmø STM @ 0.5% (PER MECHANICAL)

EX. SIDEWALK

2.0m–300mmø SAN @ 1.0%

PR. STM MH #2
T/G 313.29
(OPSD 701.010)
W INV. 311.59
N INV. 311.67

PR. STM MH #3
T/G 313.10
(OPSD 701.010)
E INV. 310.49
S INV. 310.41

SAN INV 309.97

REMOVE EX. SAN MH & 200mmø PIPE FROM MH TO PROPERTY LINE

1.0m– 375mmø STM @ 0.5%

PROPOSED STORM TANK C/W PUMP OUTLET TO STM MH #2 (PUMPS BY MECHANICAL ENGINEER) WITH A MAXIMUM FLOW OF 60 L/S
N INV. = 310.38

PROPOSED SIAMESE CONNECTION

PROPOSED BUILDING

150mmø WATER SERVICE TO BE INSTALLED C/W 150mmø WATER METER AND BY-PASS ASSEMBLY PER BSD-533. REFER TO MECHANICAL DRAWINGS

TOWER ROOF DRAINS TO BE CONTROLLED TO 8.0 L/S AND DISCHARGE TO STM MH#2 (DOWNSTREAM OF ORIFICE CONTROL)

TREE PROTECTION FENCING AS PER BSD-1232. SEE DWG 104 FOR DETAIL

TREE PROTECTION LIMIT

CONCRETE BARRIER CURB AS PER OPSD 600.110

EX. BOARD FENCE ON PROPERTY LINE TO BE MAINTAINED

38.5m– 375mmø STM @ 0.5%

CONCRETE BARRIER CURB AS PER OPSD 600.110

AD#1 (PER MECHANICAL)
T/G 312.90
E INV. 311.80

5.8m– 300mmø STM @ 0.5% (PER MECHANICAL)

AD#2 (PER MECHANICAL)
T/G 312.70
E INV. 311.80

5.9m– 300mmø STM @ 0.5% (PER MECHANICAL)

72.5m– 375mmø STM @ 0.5%

11.1m– 375mmø STM @ 0.5%

PR. STM MH #4
T/G 313.02
(OPSD 701.010)
S INV. 310.76
W INV. 310.68

TREE PROTECTION FENCING AS PER BSD-1232. SEE DWG 104 FOR DETAIL

TREE PROTECTION LIMIT

ALL AREA DRAINS TO DISCHARGE TO THE STORMWATER TANK. AREA DRAIN COLLECTION SYSTEM TO BE PER MECHANICAL DESIGN SPECIFICATIONS.

PR. STM MH #6
T/G 313.14
(OPSD 701.010)
W INV. 311.29
N INV. 311.21

CONCRETE BARRIER CURB AS PER OPSD 600.110

EX. BOARD FENCE ON PROPERTY LINE TO BE MAINTAINED

PR. STM MH #5
T/G 312.87
(OPSD 701.010)
W INV. 311.10
S INV. 310.85
N INV. 310.82

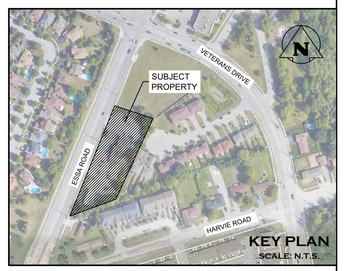
LIMIT OF UNDERGROUND PARKING

PROPOSED CURB CUT

EX. BOARD FENCE ON PROPERTY LINE TO BE MAINTAINED

McCAUSELAND COURT

EXISTING 430 ESSA ROAD DEVELOPMENT



KEY PLAN
SCALE: N.T.S.

LEGEND

- PROPERTY LINE
- EX. STORM SEWER & MANHOLE
- PR. STORM SEWER & MANHOLE
- EX. SANITARY SEWER & MANHOLE
- PR. SANITARY SEWER & MANHOLE
- EX. WATERMAIN & VALVE
- PR. WATERMAIN & VALVE
- EX. STORM CATCHBASIN
- AD PR. AREA DRAIN
- PR. LIMIT OF UNDERGROUND PARKING
- PR. TREE PROTECTION FENCE
- PR. BUILDING ENTRANCE
- PR. PEDESTRIAN CROSSWALK

5 0m 5 10 15 20
SCALE: 1:250

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TOPOGRAPHIC SURVEY PROVIDED BY RUDY MAK SURVEYING LTD.

BENCHMARK NOTE:
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City of Barrie

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR 1ST SUBMISSION SPA	12/22/2020
2	ISSUED FOR 2ND SUBMISSION SPA	04/30/2021
3	ISSUED FOR BLDG PERMIT & SPA SUBMISSION	12/22/2022
4	ISSUED FOR 4TH SUBMISSION SPA	04/26/2023

Engineer: LICENSED PROFESSIONAL ENGINEER R.A. ALEXANDER 100213093 April 26, 2023 PROVINCE OF ONTARIO

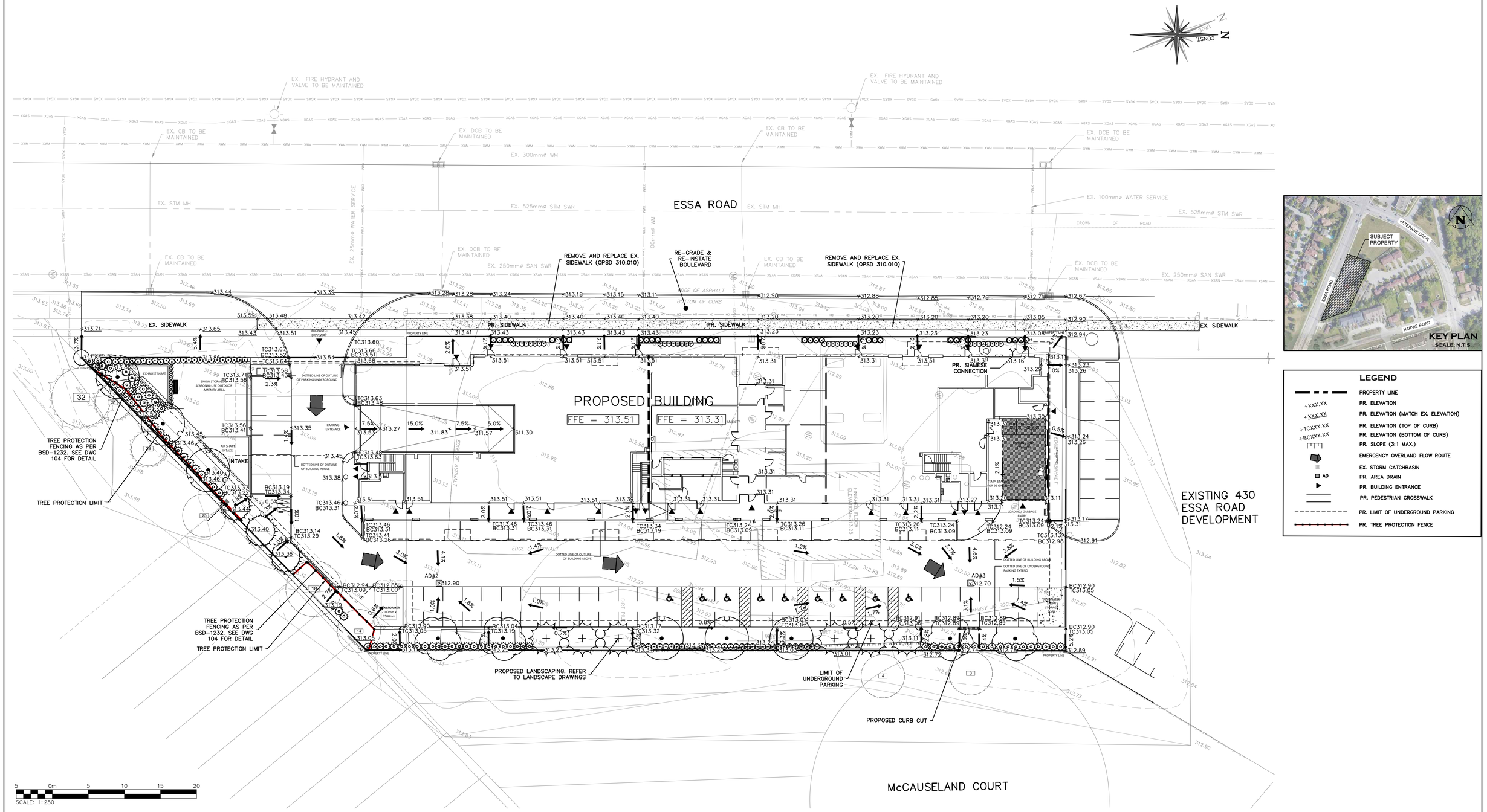
Engineer: LICENSED PROFESSIONAL ENGINEER B. D. LAYTON 100543645 APR.26,2023 PROVINCE OF ONTARIO

Project: 440 ESSA ROAD CITY OF BARRIE

Drawing: GENERAL SITE SERVICING PLAN

CROZIER CONSULTING ENGINEERS
57 JOHN STREET WEST
P.O. BOX 1011
BRADFORD, ON L3Z 2B4
905-952-3111 T
WWW.CFCROZIER.CA

Drawn By	Design By	Project	
B.L.	N.C./B.L.	1321-5312	
Check By	Check By	Scale	Drawing
R.A.A.	R.A.A.	1:250	101



LEGEND

- PROPERTY LINE
- +XXX.XX — PR. ELEVATION
- +XXX.XX — PR. ELEVATION (MATCH EX. ELEVATION)
- +TCXXX.XX — PR. ELEVATION (TOP OF CURB)
- +BCXXX.XX — PR. ELEVATION (BOTTOM OF CURB)
- PR. SLOPE (3:1 MAX.)
- EMERGENCY OVERLAND FLOW ROUTE
- EX. STORM CATCHBASIN
- AD — PR. AREA DRAIN
- PR. BUILDING ENTRANCE
- PR. PEDESTRIAN CROSSWALK
- PR. LIMIT OF UNDERGROUND PARKING
- PR. TREE PROTECTION FENCE

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TOPOGRAPHIC SURVEY PROVIDED BY RUDY MAK SURVEYING LTD.

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City of Barrie

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3	ISSUED FOR BLDG PERMIT & SPA SUBMISSION	12/22/2022
4	ISSUED FOR 4TH SUBMISSION SPA	04/26/2023

Engineer: LICENSED PROFESSIONAL ENGINEER — R.A. ALEXANDER — 100213093 — April 26, 2023 — PROVINCE OF ONTARIO

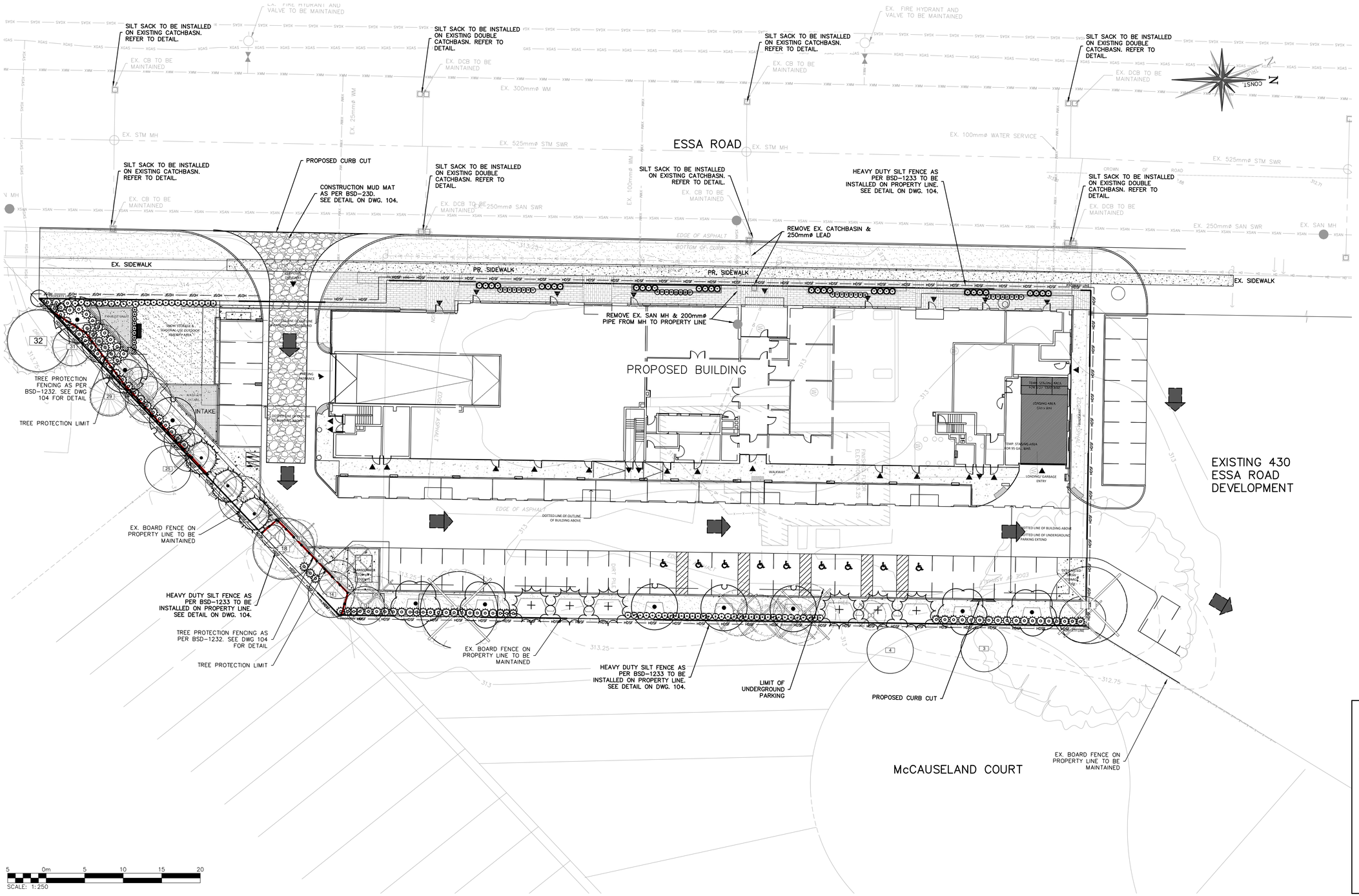
Engineer: LICENSED PROFESSIONAL ENGINEER — B. D. LAYTON — 100543645 — APR.26,2023 — PROVINCE OF ONTARIO

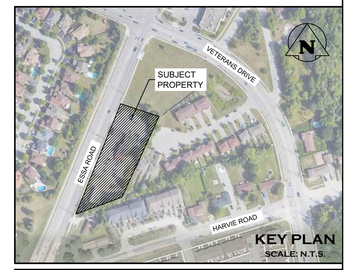
Project: 440 ESSA ROAD CITY OF BARRIE

Drawing: GENERAL GRADING PLAN

CROZIER CONSULTING ENGINEERS
57 JOHN STREET WEST
P.O. BOX 1011
BRADFORD, ON L3Z 2B4
905-952-3111T
WWW.CFCROZIER.CA

Drawn By	Design By	Project
B.L.	N.C./B.L.	1321-5312
Check By	Check By	Scale / Drawing
R.A.A.	R.A.A.	1:250 / 102



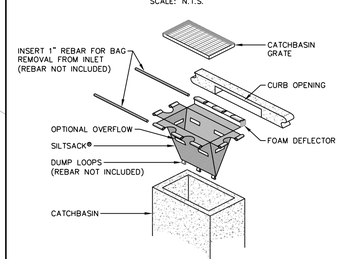


LEGEND

- PROPERTY LINE
- LIMIT OF CONSTRUCTION
- EXISTING HYDRO POLE
- EXISTING HYDRO LINE
- EXISTING FENCE
- EXISTING GRADE
- EXISTING WATERMAIN
- EXISTING STORM SEWER & MANHOLE
- EXISTING SINGLE / DOUBLE CATCHBASIN
- EXISTING SANITARY SEWER & MANHOLE
- CONSTRUCTION MUD-MAT; SEE DETAIL
- HEAVY-DUTY SILT FENCE; SEE DETAIL
- PR. LIMIT OF UNDERGROUND PARKING
- PR. TREE PROTECTION FENCE
- OVERLAND FLOW ARROW
- PROPOSED BUILDING ENTRANCE
- PR. PEDESTRIAN CROSSWALK

'SILTSACK' DETAIL

SCALE: N.T.S.



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TOPOGRAPHIC SURVEY:
TOPOGRAPHIC SURVEY PROVIDED BY RUDY MAK SURVEYING LTD.

BENCHMARK NOTE:
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Etsyn

No.	ISSUE	DATE: MM/DD/YYYY
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Engineer: LICENSED PROFESSIONAL ENGINEER — R.A. ALEXANDER — 100213093 — April 26, 2023 — PROVINCE OF ONTARIO

Engineer: LICENSED PROFESSIONAL ENGINEER — B. D. LAYTON — 100543645 — APR.26,2023 — PROVINCE OF ONTARIO

Project: 440 ESSA ROAD
CITY OF BARRIE

Drawing: REMOVALS AND EROSION & SEDIMENT CONTROL PLAN

CROZIER CONSULTING ENGINEERS
57 JOHN STREET WEST
P.O. BOX 1011
BRADFORD, ON L3Z 2B4
905-952-3111 T
WWW.CFCROZIER.CA

Drawn By	Design By	Project
B.C.	N.C./B.L.	1321-5312
Check By	Check By	Scale / Drawing
R.A.A.	R.A.A.	1:250 / 103

CONSTRUCTION NOTES

1. DRAWINGS
1.1. ALL DRAWINGS SHALL BE PRODUCED IN ACCORDANCE WITH CURRENT CITY OF BARRIE STANDARDS AND SYMBOLS FOR PLAN & PROFILE DRAWINGS, GENERAL SERVICE PLANS AND LOT GRADING PLANS.

2. MEASUREMENT
2.1. ALL DIMENSIONS ARE IN METRES (m), EXCEPT PIPE DIAMETERS, WHICH ARE IN MILLIMETRES (mm), UNLESS SPECIFIED OTHERWISE.
2.2. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER.

3. GENERAL
3.1 ALL WORK SHALL BE IN ACCORDANCE WITH CURRENT CITY OF BARRIE STANDARD DRAWINGS (BSD) AND ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD).
3.2 ORDER OF PRECEDENCE OF STANDARD DRAWINGS IS FIRSTLY CITY OF BARRIE STANDARD DRAWINGS (BSD) AND SECONDLY ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD).
3.3 LOCATION OF EXISTING SERVICES ARE NOT GUARANTEED. THE CONTRACTOR IS REQUIRED TO NOTIFY THE VARIOUS UTILITY COMPANIES 48 HOURS PRIOR TO THE COMMENCEMENT OF ANY WORK.
3.4 A ROAD OCCUPANCY PERMIT IS REQUIRED FROM THE ROADS AND PARKS OPERATIONS BRANCH PRIOR TO THE COMMENCEMENT OF WORK WITHIN ANY CITY RIGHT-OF-WAY.
3.5 A SITE ALTERATION PERMIT IS REQUIRED FROM THE ENGINEERING DEPARTMENT PRIOR TO THE COMMENCEMENT OF ANY EARTH WORKS ON THE SITE.
3.6 NATIVE MATERIAL, SUITABLE FOR BACKFILL, SHALL BE COMPACTED TO 95% STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD).
3.7 GRANULAR MATERIAL, USED FOR BACKFILL, SHALL BE PLACED IN LAYERS OF 150mm IN DEPTH MAXIMUM AND COMPACTED TO 100% SPMDD.
3.8 ALL DISTURBED AREAS ARE TO BE REINSTATED TO THEIR ORIGINAL CONDITION OR BETTER, AS DETERMINED BY THE CITY ENGINEERING DEPARTMENT.
3.9 ALL SILT CONTROL AND EROSION PROTECTION DEVICES ARE TO BE IN PLACE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION AND SHALL REMAIN IN PLACE AND BE MAINTAINED BY THE CONTRACTOR UNTIL CONSTRUCTION IS COMPLETE AND THE GRASS HAS ESTABLISHED GROWTH. SUBJECT TO APPROVAL BY THE ENGINEERING DEPARTMENT.

4. GENERAL
4.1 SINGLE-STAGE CURB AND GUTTER TO COMPLY WITH OPSD 600.040.
4.2 TWO-STAGE CURB AND GUTTERTO COMPLY WITH OPSD 600.070.
4.3 SIDEWALKS TO COMPLY WITH OPSD 310-010 AND ARE TO BE 1.5 METRES WIDE
MINIMUM THICKNESS AS FOLLOWS:
- RESIDENTIAL DRIVEWAY 150mm
- COMMERCIAL/INDUSTRIAL DRIVEWAY 200mm (REINFORCEMENT AS PER OPSS IF REQUIRED)
- WHEN NO DRIVEWAY IS PRESENT, 125mm

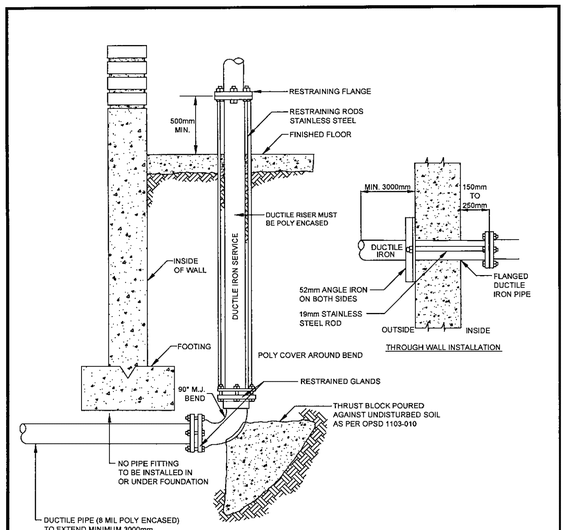
4.4 NATIVE SUBGRADE SHALL HAVE CROSSFALL OF 3% AND MATERIAL SHALL BE APPROVED BY A SOILS CONSULTANT AND IS SUBJECT TO APPROVAL BY THE DIRECTOR OF ENGINEERING.
4.5 THE ROAD BASE SHALL INCORPORATE 100mm DIAMETER SUBDRAIN WITH FACTORY INSTALLED FILTER FABRIC AS PER CITY OF BARRIE STANDARD BSD-34.
4.6 ALL CURB RADII TO BE MINIMUM 10.0 METRES AT THE EDGE OF ASPHALT.
4.7 NATIVE SUBGRADE TO BE COMPACTED TO MINIMUM 95% SPMDD AND SHALL BE PROOF ROLLED.
4.8 GRADE AND CRANSSFALL ADJUSTMENTS OF MAINTENANCE HOLE AND CATCHBASIN FRAMES WILL BE MADE USING PRODUCTS SPECIFICALLY MANUFACTURED FOR THAT PURPOSE. THE TOP ADJUSTMENT OF ALL CATCHBASIN AND MAINTENANCE HOLES SHALL BE RUBBER.
4.9 ADJUSTMENT UNITS MUST BE CERTIFIED TO MEET ALL PERTINENT OPS, CSA, ASTM AND MTO-DSM LIST, OR OTHER INDUSTRY GUIDELINES FOR MATERIALS, PERFORMANCE AND USE AS APPLICABLE.
4.10 ADJUSTMENT UNITS AND JOINTS WILL BE SEALED AND OR PARGED IN COMPLIANCE WITH MANUFACTURERS SPECIFICATIONS AND GUIDELINES.
4.11 MORTAR USED FOR LEVELING OF PRECAST UNITS ONLY. THE THICKNESS OF MORTAR WILL BE 10mm TO FILL ALL VOIDS CREATED BY IRREGULARITIES IN THE PRECAST UNITS TO ENSURE AN EVEN SURFACE ONLY.
4.12 NON COMPRESSIVE BACKFILL WILL BE USED DURING REBUILDING, ADJUSTING, OR ANY OTHER APPLICABLE CATCHBASIN OR MAINTENANCE HOLE WORKS.

5. SANITARY SEWERS
5.1 SANITARY SEWER TO BE LOCATED AT THE CENTRELINE OF THE ROAD.
5.2 SEWERS SHALL BE CONSTRUCTED WITH BEDDINGS AS PER OSD 802.010 (GRAN 'A' EMBEDMENT MATERIAL) FOR FLEXIBLE PIPES AND OPSD 802.030 OR 802.031 CLASS B (GRAN 'A' BEDDING MATERIAL) FOR RIGID PIPES UNLESS OTHERWISE APPROVED BY THE DIRECTOR OF ENGINEERING.
5.3 MAXIMUM DEFLECTION FROM COMBINED LIVE AND DEAD LOADING SHALL NOT EXCEED AND CSA, OPS, OR MANUFACTURES RECOMMENDED SPECIFICATIONS.
5.4 PVC, CONCRETE AND PROFILE WALL PVC SEWERS SHALL HAVE RUBBER GASKET TYPE JOINTS AND SHALL BE CERTIFIED TO CONFORM TO ALL APPLICABLE CURRENT CSA SPECIFICATIONS.
5.5 CONCRETE SANITARY SEWERS SHALL HAVE A MINIMUM STRENGTH OF 50N/m/mm CONFORMING TO CSA STANDARD A257.2-1982, CLASS 50-D (PREVIOUSLY CSA STANDARD A257.2-1974, CLASS II).
5.6 MAINTENANCE HOLE TOPS (FRAMES) ARE TO BE SET TO BASE COURSE ASPHALT GRADE AND THEN ADJUSTED TO FINAL GRADE WHEN THE TOP LIFT OF ASPHALT IS PLACED. ALL ADJUSTMENTS WILL BE IN ACCORDANCE WITH BSD-N2.
5.7 ALL CONNECTIONS TO NEW SANITARY MAINS SHALL BE PRE-MANUFACTURED, FABRICATED TEES. CONNECTIONS TO EXISTING SANITARY SEWER SHALL BE MADE WITH APPROVED FACTORY MADE TEES OR INSERTA-TEES IN STRICT ACCORDANCE TO MANUFACTURERS GUIDELINES.
5.8 SANITARY LATERAL CONNECTION TO BE LOCATED AT THE CENTRELINE OF THE LOT AND CAPPED.
5.9 LOCATION OF LATERAL TO BE MARKED 2.0m PAST PROPERTY LINE WITH A 50mm x 100mm WOOD MARKER PAINTED GREEN, EXTENDING FROM SERVICE INVERT TO 300mm ABOVE GROUND LEVEL.
5.10 PIPE TO BE MINIMUM 100mm DIA. PVC SDR28, RUBBER GASKET TYPE JOINTS AND SHALL CONFORM TO CSA (B-182.2.3.4) (COLOURED) FOR A RESIDENTIAL HOUSE AND 150mm MINIMUM DIA. PVC SDR28 FOR INDUSTRIAL/COMMERCIAL DEVELOPMENT.
5.11 MINIMUM DEPTH OF LATERAL AT PROPERTY LINE SHALL BE 2.4m MEASURED FROM THE SEWER OBVERT TO FINISHED GROUND SURFACE ELEVATION UNLESS NOTES OTHERWISE.
5.12 ALL CONNECTIONS TO NEW SANITARY MAINS SHELL BE PRE-MANUFACTURED, FABRICATED TEES. CONNECTIONS TO EXISTING SANITARY SEWER SHALL BE MADE WITH APPROVED FACTORY MADE TEES OR INSERTA-TEES IN STRICT ACCORDANCE WITH MANUFACTURERS GUIDELINES.
5.13 MINIMUM PIPE SLOPE TO BE 2.0%, MAXIMUM 8.0% (SEE OPSD 1006.010, 1006.020).

6. STORM SEWERS
6.1 STORM SEWER TO BE PROVIDED ON ALL ROADS WITH CURB AND GUTTER.
6.2 PLACE ALL CATCHBASIN LATERALS AT 2.0% GRADE UNLESS OTHERWISE NOTES. PIPE SIZE MINIMUM 250mm DIA. SINGLE, 300mm DIA. DOUBLE.
6.3 STORM SEWERS SHALL BE CONSTRUCTED WITH BEDDING AS PER OPSD 802.010 (GRAN 'A' EMBEDMENT MATERIAL) FOR FLEXIBLE PIPES AND OPSD 802.030 OR 802.031 (GRAN 'A' BEDDING MATERIAL) FOR RIGID PIPE UNLESS OTHERWISE APPROVED BY THE DIRECTOR OF ENGINEERING.
6.4 MAINTENANCE HOLE TOPS (FRAMES) AND CATCHBASIN TOPS (FRAMES) ARE TO BE SET TO BASE COURSE ASPHALT GRADE AND THEN ADJUSTED TO THE FINAL GRADE WHENTHE TOP COURSE ASPHALT IS PLACED. ALL ADJUSTMENT WILL BE IN ACCORDANCE WITH BD-N2.
6.5 STORM SEWER SHALL BE LOCATED OFFSET 3.0m SOUTH OR EAST OF CENTRELINE UNLESS OTHERWISE SPECIFIED.
6.6 ALL CONNECTIONS TO THE STORM MAIN SHALL BE MADE WITH A STORM MANHOLE OR APPROVED FACTORY TEE CONNECTION AS PER OPSD 708-010 OR 708.030.
6.7 PIPE MATERIAL TO BE REINFORCED CONCRETE WITH A MINIMUM STRENGTH OF 50N/m/mm CERTIFIED TO CSA STANDARD A247.2-1982, CLASS 50-D (PREVIOUSLY CSA STANDARD A257.2-1974, CLASS II) OR PVC CERTIFIED TO CSA STANDARDS 182.2 AND 182.4.
6.8 STORM SEWER TO BE MINIMUM 300mm DIAMETER WITH JOINTS CONFORMING TO CSA STANDARD A257.3.
6.9 ALL PIPE BEDDING MUST CONFORM TO OPSD, MAXIMUM COVER TABLE. NO FLEXIBLE PIPES WILL BE INSTALLED WITH A DEPTH OF COVER GREATER THAN 6 METRES UNLESS SPECIFICALLY APPROVED BY THE DIRECTOR OF ENGINEERING.
6.10 ALL PIPE HANDLING INSTALLATIONS MUST BE IN STRICT COMPLIANCE WITH MANUFACTURERS INSTALLATIONS GUIDELINES AND THE O.C.P.A. OR UNIBELL GUIDELINES.
6.11 SUMP PUMP DISCHARGE PIPING IN BOULEVARD:
IN THE EVENT OF OVERACTIVE SUMP PUMP ACTIVITY, A 150mm DIAMETER PVC DR-28 SEWER MAY BE INSTALLED, WHEN SO DIRECTED BY THE DIRECTOR OF ENGINEERING, ALONG THE FRONTAGES OF DESIGNATED LOTS, WITH AN OFFSET OF 0.6m FROM BACK OF CURB. THIS SEWER IS THE BE CAPPED AT THE UPSTREAM END AND IS TO OUTLET INTO THE NEAREST CATCHBASIN DOWNSTREAM. DEPTH OF THE SEWER IS TO BE EQUAL TO SUBDRAIN DEPTH, NOT TO BE DIRECTLY CONNECTED TO FOUNDATION DRAINS.

7. WATERMAINS
7.1 CONTRACTOR SHALL INFORM THE CITY OF BARRIE ENGINEERING DEPARTMENT A MINIMUM OF 48 HOURS IN ADVANCE OF THEIR INTENTIONS TO WORK.
7.2 OPERATIONS OF FIRE HYDRANTS AND VALVES ON POTABLE WATER BY OTHER THAN ENGINEERING DEPARTMENT IS PROHIBITED. BY-LAW 1-88 AS AMENDED BY BY-LAW 99-290. THE CITY WILL SWAB, PRESSURE TEST, CHLORINATE AND FLUSH ALL NEW WATERMAINS.
7.3 MINIMUM COVER OVER WATERMAIN IS 1.7m. THE MINIMUM HORIZONTAL SEPARATION BETWEEN WATERMAIN AND SEWERS IS THE BE 2.5m. WHERE WATERMAIN CONFLICTS WITH SEWER PIPES, DEFLECT WATERMAIN HORIZONTALLY OR VERTICALLY WHILE PROVIDING A MINIMUM OF 0.5m CLEARANCE BETWEEN WATERMAINS AND SEWERS. MAINTAIN MINIMUM DEPTH OF COVER AT ALL TIMES.
7.4.1 WATERMAIN SHALL BE CONSTRUCTED WITH BEDDINGS AS PER OPSD 802.010 (GRAN 'A' EMBEDMENT MATERIAL) FOR FLEXIBLE PIPES AND OPSD 802.030 OR 802.031 CLASS 'B' (GRAN 'A' BEDDING MATERIAL, GRAN 'A' OR SELECT NATIVE COVER MATERIAL) FOR RIGID PIPE UNLESS OTHERWISE APPOVED BY THEDIRECTOR OF ENGINEERING OR *ALTERNATIVE.
* ALTERNATIVE EMBEDMENT MATERIAL - SAND MEETING GRADATION REQUIREMENTS OF OPS 1004.05.05 COMPACTED TO 95% SPMDD. GEOTECHNCAL CLARIFICATION OF MATERIAL AND COMPACTION TESTING MUST BE PROVIDED EVERY 150 METRES. THE COMPACTION TESTING MUST INCLUDE THE ENTIRE EMBEDMENT ENVELOPE (HAUNCHES, BEDDING AND TOP OF PIPE).
7.4.2 COPPER WATERMAINS AND SERVICES 19mm TO 50mm IN DIAMETER SHALL BE EMBEDDED IN SAND 100mm ABOVE AND BELOW TO CONFORM TO OPSS 1004.05.05.
7.5 CONCRETE THRUST BLOCKS ARE TO BE INSTALLED AT ALL TEES, BENDS, HYDRANTS, END OF MAINS AND CONNECTIONS 100mm AND LARGER AS PER OPSD 1103.010 AND 1103.020. RESTRAINING DEVICES MER BE REQUIRED IN ADDITION TO STANDARD CONCRETE THRUST BLOCKING WHERE SOIL CONDITIONS WARRANT.
7.6 RESTRAINING WILL BE REQUIRED ON ALL FIRE HYDRANTS.
7.7 NEW WATERMAINS TO BE PVC DR18 CL150, OR DUCTILE IRON CL52.
7.8 TRACING WIRE (#12 TWO STRANDED COPPER) TO BE INSTALLED ON THE TOTAL LENGTH OF ALL NON-METALLIC WATERMAIN AND BROUGHT UP AT EACH HYDRANT AND CONNECTED TO FLANGE BOLT.
7.9 ALL WATER SERVICES SHALL BE MINIMUM 19mm TYPE 'K' COPPER UNLESS OTHERWISE APPROVED BY THE DIRECTOR OF ENGINEERING. WATER SERVICE SADDLES SHALL BE USED WHEN TAPPING INTO PVC WATERMAIN.
7.10 RISER PIPES ARE TO BE INSTALLED AS PER BSD-45 (REV #1), AND REMOVED AS DIRECTED. SWABBING SCHEDULE TO BE SUPPLIED BY A CITY OF BARRIE FIELD REPRESENTATIVE.
7.11 DOMESTIC AND FIRE SERVICE RISER PIPES TO BE BUILT AS PER BSD-505.
7.11 SERVICE TAPPINGS SHALL BE PLACED AT A MINIMUM SEPARATION OF 1.0m AND A MINIMUM OF 0.6m FROM JOINTS (ENDS OF PIPE).
7.12 ALL NEW CURB STOPS AND BOXES TO BE LOCATED AT PROPERTY LINE AND OUT OF DRIVEWAYS AND SIDEWALKS.

8. EROSION AND SEDIMENT CONTROL
8.1 ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO THE COMMENCEMENT OF CONSTRUCTION AND SHALL REMAIN IN PLACE UNTIL ALL DISTURBED AREAS HAVE BEEN STABILIZED. SEDIMENT AND EROSION CONTROL MEASURES THAT ARE DESIGNED TO CONTROL RUNOFF FROM SPECIFIC AREAS MUST BE INSTALLED PRIOR TO ANY DISTURBANCE TO SITE.
8.2 THE CONTRACTOR MAY CONSIDER ALTERNATIVE SEDIMENT AND EROSION CONTROL MEASURES. SUCH MEASURES MUST BE PRESENTED IN WRITING FOR APPROVAL OF THE CONTRACT ADMINISTRATOR AND THE TOWN.
8.3 THE CONTRACTOR SHALL HAVE MATERIALS AVAILABLE ON-SITE TO REPAIR SEDIMENT AND EROSION CONTROL MEASURES IN THE EVENT OF UNFORESEEN CONDITIONS; HIGHWATER, EXTREME RAINFALL EVENTS, ETC.
8.4 MUD MAT TO BE CONSTRUCTED AT ACCESS POINT.
8.5 NO MAINTENANCE OR REPAIR WORK ON CONSTRUCTION EQUIPMENT IS ALLOWED WITHIN 30M OF AN EXISTING WATERCOURSE OR DITCH EXCEPT AS NOTED.
8.6 ALL TEMPORARY SOIL OR DIRT STOCKPILES ARE TO BE PROVIDED WITH THE NECESSARY SEDIMENT AND EROSION CONTROL FEATURES. IF STOCKPILES ARE TO REMAIN FOR A PERIOD LONGER THAN 30 DAYS, STOCKPILES SHALL BE HYDROSEEDED AND SURROUNDED WITH SILT FENCE.
8.7 CONTRACTOR TO ENSURE POSITIVE DRAINAGE THROUGH SITE SUCH THAT NO UPSTREAM OR DOWNSTREAM IMPACT OCCURS DURING CONSTRUCTION ACTIVITIES.
8.9 THE CONTRACTOR WILL BE RESPONSIBLE TO CLEAN ALL ADJACENT ROADWAYS AS REQUIRED OR AS DIRECTED BY THE SITE ENGINEER OR TOWN.
8.10 SILT FENCE MUST BE INSPECTED WEEKLY FOR RIPS OR TEARS, BROKEN STAKES, BLOW-OUTS AND ACCUMULATION OF SEDIMENT.
8.11 SILT FENCE MUST BE INSPECTED IMMEDIATELY AFTER EVERY RAIN STORM EVENT OR AS DIRECTED BY SITE ENGINEER.
8.12 SEDIMENT DEPOSITS MUST BE REMOVED FROM SILT FENCE WHEN ACCUMULATION REACHES 50% OF THE HEIGHT OF THE FENCE.
8.13 ALL SILT FENCES MUST BE REMOVED ONLY WHEN THE ENTIRE SITE IS STABILIZED AND AS DIRECTED BY THE SITE ENGINEER.
8.14 ALL SILT FENCES INSTALLED AT THE LIMIT OF THE DEVELOPMENT ARE TO BE PLACED ON THE PROPERTY LINE.
8.15 GEOTEXTILE (TERRAFIX 270R OR APPROVED EQUAL) TO BE PLACED AS SEPARATION BARRIER BETWEEN EXISTING GROUND AND CLEAR STONE.
8.16 INSPECT MUD MAT WEEKLY TO ASSESS CONDITION AND TO ENSURE OPERATION EFFICIENCY.
8.17 SUPPLY AND PLACE ADDITIONAL STONE TO PREVENT MUD TRACKING AS DIRECTED BY SITE ENGINEER.
8.18 MUD MAT TO REMAIN IN PLACE UNTIL SITE IS STABILIZED OR AS DIRECTED BY SITE ENGINEER.



NOTES:
1. INSTALLATION MUST MEET THE CURRENT NATIONAL FIRE PROTECTION ACT.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.

APPROVED
DATE 6 FEB 2015
DIRECTOR OF ENGINEERING

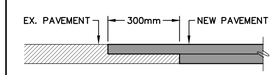
City of BARRIE STANDARD DETAIL

TYPICAL SERVICE ENTRY 100mm TO 300mm DIAMETER PIPE

REV No. 1 | DATE: FEB 2015 | SCALE: N.T.S.

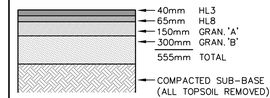
BSD-505 (PREVIOUSLY BSD-61)

LAP JOINT DETAIL
SCALE: N.T.S.

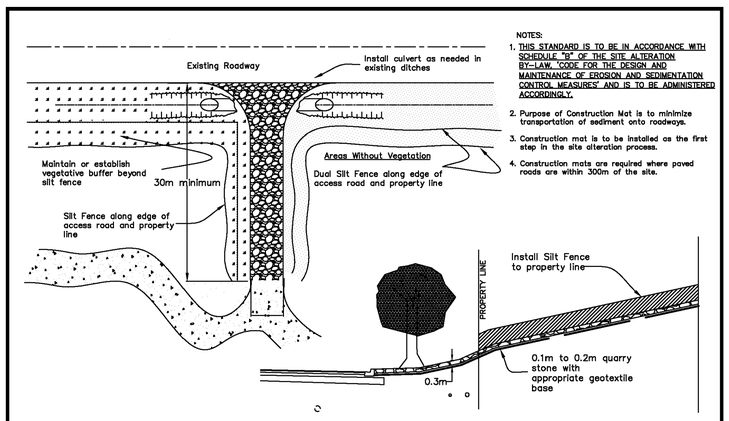


NOTE:
SAWCUT & COLD PLANE 300mm WIDE & 40mm DEEP WHERE NEW PAVEMENT MEETS EXISTING PAVEMENT.

PAVEMENT STRUCTURE
SCALE: N.T.S.

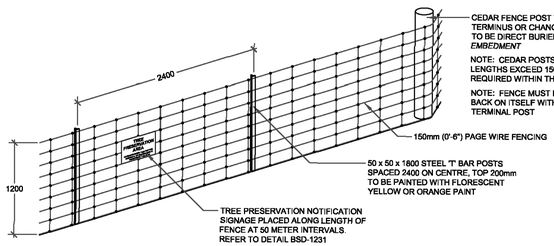


NOTE:
REFER TO CONSTRUCTION NOTES FOR DETAILS ON COMPACTION. PAVEMENT STRUCTURE IS SUBJECT TO CHANGE BASED ON GEOTECHNICAL CONSULTANT'S RECOMMENDATIONS.



NOTES:
1. THIS STANDARD IS TO BE IN ACCORDANCE WITH SCHEDULE "B" OF THE SITE ALTERATION BY-LAW, "CODE FOR THE DESIGN AND MAINTENANCE OF EROSION AND SEDIMENTATION CONTROL MEASURES" AND IS TO BE ADMINISTERED ACCORDINGLY.
2. Purpose of Construction Mat is to minimize transportation of sediment onto roadways.
3. Construction mat is to be installed as the first step in the site alteration process.
4. Construction mats are required where paved roads are within 300m of the site.

CITY OF BARRIE STANDARD						
CONSTRUCTION ENTRANCE MAT	1.	Standardized Dimension Text	J.S.	05.10.28	APR'D: R.G.N.	DATE: 04.03.16
					DRAWN: A.S.C	SCALE: N.T.S
	NO.	REVISION	APR'D	DATE	**BSD-23D**	



1. THIS DETAIL IS USED IN CONJUNCTION WITH BSD-1233 -SEDIMENTATION CONTROL FENCE.
2. PAGE WIRE FENCE TO BE ATTACHED TO CEDAR RAIL POSTS WITH 'U' SHAPED GALVANIZED NAILS ON EACH HORIZONTAL STRAND.
3. USE A MINIMUM OF FOUR (4) 100MM, 16 GAUGE GALVANIZED T-POST CLIPS TO ATTACH PAGE WIRE FENCE TO EACH 'T' BAR POST.
4. 'T' BARS ARE TO BE DRIVEN INTO THE GROUND TO A MINIMUM DEPTH OF 800mm.
5. ALL MEASUREMENTS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
6. THIS DETAIL TO BE USED IN CONJUNCTION WITH BSD-1230, BSD-1231, BSD-1234 AND BSD-1235.

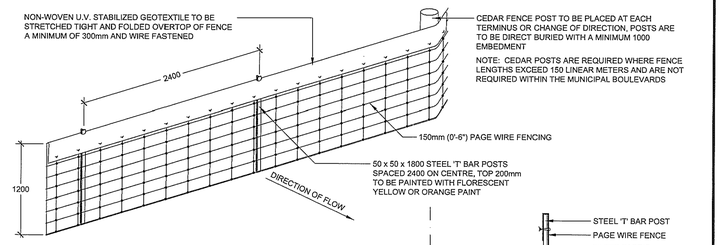
The City of BARRIE STANDARD DETAIL

TREE PRESERVATION FENCING

REV No. 1 | DATE: JUNE 2015 | SCALE: N.T.S.

BSD-1232

APPROVED
DATE .....
DIRECTOR OF ENGINEERING



1. THIS STANDARD IS TO BE USED IN ACCORDANCE WITH THE SITE ALTERATION BY-LAW FOR THE DESIGN AND MAINTENANCE OF EROSION CONTROL MEASURES AND IS TO BE ADMINISTERED ACCORDINGLY
2. SILT / SEDIMENT CONTROL FENCE SHOULD BE ALIGNED WITH CONTOURS FOR SHEET OVERLAND FLOW
3. SILTATION CONTROL FENCE IS TO BE LOCATED IN AREAS OF LOW SEDIMENT YIELD ON SLOPES THAT CONFIRM TO M.T.O. DRAINAGE MANUAL VOLUME 2 "CHART F4-3C TOPOGRAPHIC FACTOR LS BASED ON SLOPE LENGTH AND GRADIENT"
4. SILTATION CONTROL FENCE SHALL BE INSTALLED WITH FILTER MEDIA FABRIC TOED INTO THE SOIL 300mm BE EITHER STATIC SLICING OR TRENCHING METHODS WITH COMPACTION OF TRENCH MATERIAL MEETING 95% S.P.D.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN
6. SILT / SEDIMENT CONTROL FENCE MAY BE UTILIZED FOR TREE PRESERVATION AND IS TO BE USED IN CONJUNCTION WITH BSD-1231, BSD-1232 AND BSD-1235

Barrie STANDARD DETAIL

SILTATION CONTROL FENCING

REV No. 1 | DATE: OCT 2017 | SCALE: N.T.S.

BSD-1233 FORMERLY BSD-23A

APPROVED
DATE Oct 10/17
DIRECTOR OF ENGINEERING

1. THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.
2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.
3. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT.
4. DO NOT SCALE THE DRAWINGS.
5. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

TOPOGRAPHIC SURVEY:
TOPOGRAPHIC SURVEY PROVIDED BY RUDY MAK SURVEYING LTD.

BENCHMARK NOTE:
SITE BENCHMARK IS THE TOP OF THE IB AT THE SOUTHEAST CORNER HAVING AN ELEVATION OF 312.81

Client: Barrie

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR 1ST SUBMISSION SPA	12/22/2020
2	ISSUED FOR 2ND SUBMISSION SPA	04/30/2021
3	ISSUED FOR BLDG PERMIT & SPA SUBMISSION	12/22/2022
4	ISSUED FOR 4TH SUBMISSION SPA	04/26/2023

Engineer: LICENSED PROFESSIONAL ENGINEER R.A. ALEXANDER 100213093 April 26,2023 PROVINCE OF ONTARIO

Engineer: LICENSED PROFESSIONAL ENGINEER B. D. LAYTON 100543645 APR.26,2023 PROVINCE OF ONTARIO

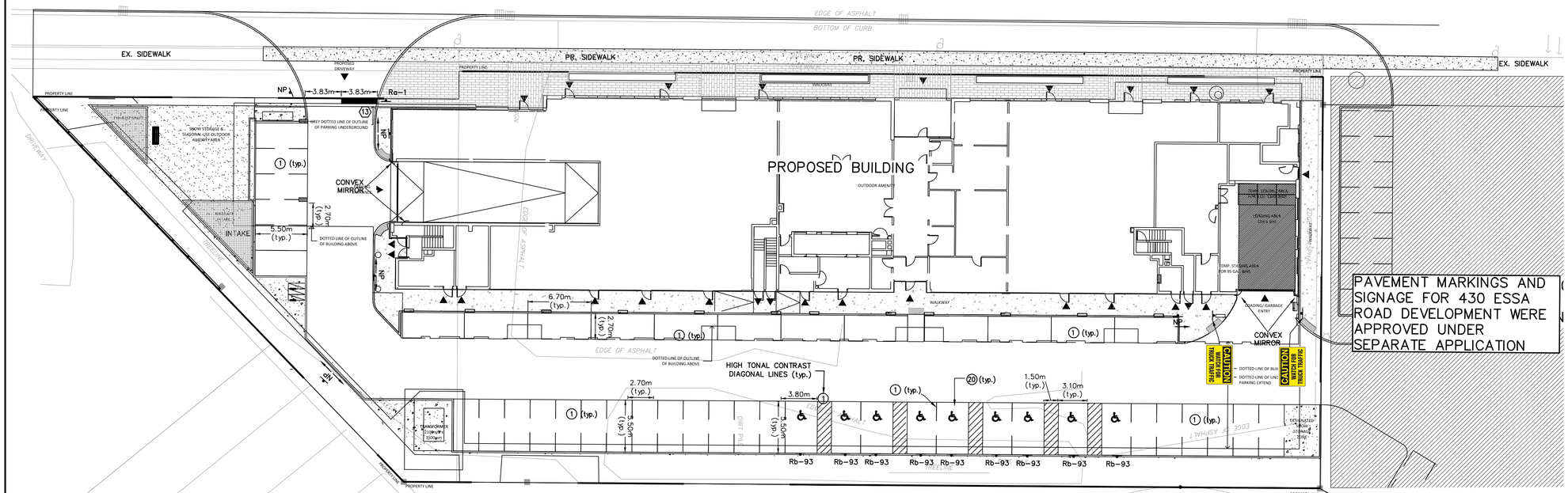
Project: 440 ESSA ROAD CITY OF BARRIE

Drawing: CONSTRUCTION NOTES AND STANDARD DETAILS

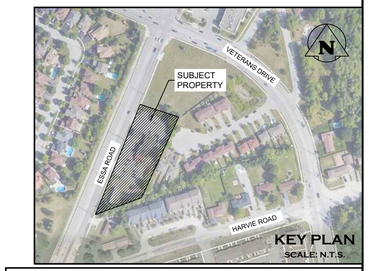
CROZIER CONSULTING ENGINEERS
57 JOHN STREET WEST
P.O. BOX 1011
BRADFORD, ON L3Z 2B4
905-952-3111 T
WWW.CFCROZIER.CA

Drawn By	Design By	Project	
N.C./B.L.	N.C./B.L.		1321-5312
Check By	Check By	Scale	Drawing
R.A.	G.M.	1: 250	104

ESSA ROAD



PAVEMENT MARKINGS AND SIGNAGE FOR 430 ESSA ROAD DEVELOPMENT WERE APPROVED UNDER SEPARATE APPLICATION



McCAUSELAND COURT

LEGEND

	PR. PEDESTRIAN CROSSWALK
⌒	CONVEX MIRROR

SIGNAGE

Rb-93	ACCESSIBLE PARKING
NP	NO PARKING/FIRE ROUTE SIGN, SEE DETAIL
Ra-1	STOP SIGN
CAUTION WATCH FOR TRUCK TRAFFIC	WARNING SIGN TO CAUTION MOTORISTS AND PEDESTRIANS OF HEAVY VEHICLES WHEN LOADING OPERATIONS ARE OCCURING.

NOTES:

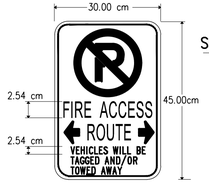
1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH BOOK 5 (REGULATORY SIGNS) AND BOOK 11 (PAVEMENT, HAZARD & DELINEATION MARKINGS).
2. PAVEMENT MARKINGS FOR PARKING STALLS TO CONFORM TO OPSS 1712.
3. ADDITIONAL TRAFFIC SIGNAGE AND MIRRORS TO BE PROVIDED FOR THE UNDERGROUND PARKING
4. SIGNS TO BE WALL MOUNTED WHERE APPLICABLE

PAVEMENT MARKINGS LEGEND

1	SOLID YELLOW, 10cm
13	SOLID WHITE, 30cm
20	SYMBOLS
][	LIMITS OF MARKINGS

NOTES:
1. USE ① TO DENOTE PAVEMENT MARKING, PAINT
2. USE ⓘ TO DENOTE PAVEMENT MARKING, DURABLE

FIRE ROUTE SIGNAGE AND INSTALLATION SPECIFICATIONS



SIGN REQUIREMENTS

SIGNS SHALL COMPLY WITH THE ATTACHED FIGURE 5.
1. ALL SIGN SHALL HAVE APPROPRIATE RADIUS. CORNER AS PER DIAGRAM OR 4 cm RADIUS.
2. ALL SHARP EDGES REMOVED FROM SIGN BLANKS. COMPLETED SIGNS SHALL HAVE 11mm X 18mm SLOTTED HOLES TO ACCEPT METRIC OR IMPERIAL MOUNTING WITH HOLES 3cm–12cm FROM OUTER EDGE OR AS PER DIAGRAM.
3. CENTRE OF MOUNTING SLOTS SHALL BE EQUAL TO MULTIPLE OF 5.08cm (2 INCHES) CENTRALLY LOCATED ON BLANK. ON STEEL BLANKS, FABRICATIONS SHALL BE FABRICATED BEFORE GALVANIZING AS TO PREVENT CORROSION. ON ALUMINUM BLANKS, FABRICATING SHALL BE PERFORMED PRIOR TO PAINTING AND BAKING.
4. FINISHED SIGNS AND SYMBOLS SHALL BE APPLIED TO 1.63mm UTILITY GRADE ALUMINUM WITH BRIGHT WHITE MILL BAKED FINISH ON BOTH SIDES. ALL INKS SHALL BE FACES TO CONFORM TO REG. 486 OF THE HIGHWAY TRAFFIC ACT.
5. ALL LETTERING TO MEET M.T.O. STANDARDS.
6. ALL COLOURS TO MEET M.T.O. STANDARDS.

DETAIL 1
FIRE ROUTE SIGN DETAIL
SCALE: N.T.S.

5 0m 5 10 15 20
SCALE: 1:250

TOPOGRAPHIC SURVEY:
TOPOGRAPHIC SURVEY PROVIDED BY RUDY MAK SURVEYING LTD.

BENCHMARK NOTE:
SITE BENCHMARK IS THE TOP OF THE IB AT THE SOUTHEAST CORNER HAVING AN ELEVATION OF 312.81

City: Barrie

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR 1ST SUBMISSION SPA	12/22/2020
2	ISSUED FOR 2ND SUBMISSION SPA	04/30/2021
3	ISSUED FOR 3RD SUBMISSION SPA	12/22/2022

Engineer

Engineer: LICENSED PROFESSIONAL ENGINEER R. MacLAUGHLAN 100201141 Dec 22, 2022 PROVINCE OF ONTARIO

Project: 440 ESSA ROAD
CITY OF BARRIE

Drawing: PAVEMENT MARKING AND SIGNAGE PLAN

CROZIER CONSULTING ENGINEERS
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P.O. Box 1011
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Drawn By	Design By	Project	
N.C.	N.C./B.L.		1321–5312
Check By	Check By	Scale	Drawing
R.A.	G.M.	1:250	105