

**FUNCTIONAL SERVICING &  
STORMWATER MANAGEMENT  
REPORT**

**71-79 MAIN STREET SOUTH  
TOWN OF HALTON HILLS (GEORGETOWN)**

**MCGIBBON CONDOMINIUM**

**PREPARED BY:**

**C.F. CROZIER & ASSOCIATES INC.  
2800 HIGH POINT DRIVE, SUITE 100  
MILTON, ON L9T 6P4**

**OCTOBER 2015**

**CFCA FILE NO. 811-4055**

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## 1.0 INTRODUCTION

C.F. Crozier & Associates Inc. (Crozier) was retained by Silvercreek Commercial Builders Inc. to prepare a Functional Servicing and Stormwater Management Report in support of an Official Plan Amendment and Zoning By-Law Amendment application for the property known as 71-79 Main Street South located in the Town of Halton Hills (Georgetown). The proposed development consists of an 11 storey, approximately 17,229 sq.m GFA residential apartment with ground floor commercial, with a 2773 sq.m footprint.

## 2.0 GENERAL SITE DESCRIPTION

The subject lands cover an area of approximately 0.28 ha and currently consists of commercial and paved areas. The property is bounded by Main Street South to the west, Mill Street to the south, mixed retail/commercial units to the north, and a parking lot to the east. It is situated in a mature commercial neighbourhood with mixed-use buildings in the immediate surrounding area.

## 3.0 WATER SERVICING

### 3.1 Existing Water Servicing

According to Dolliver Surveying Inc. as-built 1488-7, dated July 16, 2015, there is an existing 250mm diameter PVC watermain on Mill Street, as well as an existing 300mm diameter watermain along Main Street. Two existing water services extend from the municipal service to the current McGibbon Hotel and Mill St. Cheese Market along Mill Street. Five existing water services extend from the municipal service along Main Street to the current site. The existing water services have various diameters. One of these existing water service connections located within Main Street has a diameter of 150mm and has a 38mm branch.

### 3.2 Water Design Flows

The Region of Halton Design Criteria were used to estimate the proposed demands for domestic purposes. A summary of the results is presented below, and detailed calculations are provided in Appendix A.

**Table 1: Estimated Domestic Water Demand Design Flow**

Method	Average Day (L/s)	Peak Flow (L/s)
Region of Halton	11.6	27.3

**Note:** References to Region of Halton design guidelines are provided in Appendix A.

The Fire Underwriters Survey method was used to complete the fire flow demand analysis for the proposed development. Flow requirements were calculated based on the proposed footprint of the buildings and basic building construction. The proposed fireline water service will be required to accommodate a fire flow requirement of 244 L/s (3,856 US GPM) for a duration of 3.5 hrs as per the Fire Underwriters Survey calculation in Appendix A. Final determination for fire protection will be prepared once the building design drawings and occupancy are complete at the detailed design stage.

A hydrant flow test was carried out by Vipond Inc. on September 14, 2015 at the intersection of Main Street and Mill Street. Results from testing indicate that at 20 psi residual pressure in the municipal watermain, a minimum of 6000 USGpm is projected to be available within the municipal water system. As such, the existing water services are sufficient to meet the demands of the proposed development. Detailed results of the hydrant flow testing are provided in Appendix D.

### 3.3 Proposed Water Servicing

Domestic water will be serviced to the site using an existing 150mm dia. water service on Main Street South that currently services the McGibbon Hotel. This service line was chosen for its close proximity to the proposed mechanical room location. This existing 150mm diameter water service connection has a 38mm branch which will be decommissioned. A new 200mm diameter PVC water service (fire line) connection will connect the proposed development to the existing 250mm municipal watermain on Mill Street. Five existing water services along Main Street as well as two existing water services along Mill Street are recommended to be decommissioned. Drawing C02 shows all new and proposed water service connections. All proposed water service connections (domestic and fire) will be equipped with a valve and box near the property line. A water meter and backflow preventer will be installed in the new building, per mechanical design and specifications.

## 4.0 SANITARY SERVICING

### 4.1 Existing Servicing

According to Dolliver Surveying Inc. as-built 1488-7, dated July 16, 2015, there is an existing 300mm diameter sanitary sewer flowing south along Main Street as well as a 250mm diameter sanitary sewer flowing east along Mill Street. Currently, five existing sanitary service connections to the subject site are present along Main Street. There are some existing sanitary sewers crossing the subject site that drain towards the rear of the site. Brenda Kingsmill (Region of Halton) confirmed during a pre-consultation meeting that the existing sanitary sewers located within the subject site will be removed by the Region of Halton at their expense.

### 4.2 Sanitary Design Flows

To estimate the proposed sanitary design flows the Region of Halton design criteria was consulted to determine the design flows generated by the proposed development. A summary of the results is presented below, and detailed calculations are provided in Appendix B.

**Table 2: Estimated Sanitary Design Flows**

Design Criteria	Unit Type	Average Flow (L/s)	Peaking Factor	Peak Flow (L/s)	Infiltration (L/s)	Total Flow (L/s)
Region of Halton	Residential	0.66	4.14	2.75	0.08	3.79
	Commercial and Amenities	0.12	3.47	0.96		

### 4.3 Proposed Servicing

It is recommended that the existing 150mm dia. PVC sanitary service at 7.5% connecting at Artisan’s Attic will be used for the proposed development, with the remaining four existing sanitary services along Main Street to be abandoned. The existing 150 mm dia. PVC sanitary service connection installed at 7.5% (per the as-built drawings), will be able to convey a full capacity of 43.5 L/s. Abandoned sanitary services will be plugged on both ends of the pipe and filled with grout by the contractor. The internal sanitary system of the building will be designed by the Mechanical Engineer, and appropriate coordination will occur at the detailed design stage.

## 5.0 DRAINAGE CONDITIONS

### 5.1 Pre-Development

Based on a review of existing topographic survey and field reconnaissance, the development area currently consists of a parking lot and commercial buildings. Table 3 below provides a breakdown of pre-development site area, here called Drainage Area 101, and associated runoff coefficients. The site presently drains to internal catchbasins that ultimately conveys the stormwater to an existing 675mm dia. municipal storm sewer along Mill Street.

**Table 3: Pre-Development Hydrologic Parameters**

Drainage Area	Pervious Area (m <sup>2</sup> )	Impervious Area (m <sup>2</sup> )	Total Area (m <sup>2</sup> )	Runoff Coefficient
101	0	2773	2773	0.90

### 5.2 Post-Development

Based on the proposed Site Plan prepared Studio JCI dated September 2015, the development will consist of an 11 storey residential building with some main level commercial and an underground parking garage. The post-development drainage is divided into 2 areas, Drainage Area 201 and 202. Area 201 (201 m<sup>2</sup>) flows uncontrolled to a nearby catchbasin and Area 202 is collected via roof drains and internal catchbasins, then conveyed into a storage cistern within the underground parking garage. Table 4 below provides a breakdown of post-development site areas and associated runoff coefficients.

**Table 4: Post-Development Hydrologic Parameters**

Drainage Area	Pervious Area (m <sup>2</sup> )	Impervious Area (m <sup>2</sup> )	Total Area (m <sup>2</sup> )	Weighted Runoff Coefficient
201 (Uncontrolled)	0	201	201	0.90
202 (Controlled)	0	2572	2572	0.90
<b>Total</b>	<b>0</b>	<b>2773</b>	<b>2773</b>	<b>0.90</b>

## 6.0 STORMWATER MANAGEMENT

The stormwater management for this site will include controlling the stormwater from the subject property in accordance with design criteria agreed in a meeting between the Town of Halton Hills staff members Jeff Jelsma, Jeff Markowiak, and Steve Grace, and the Crozier team. It was confirmed that the stormwater outlet should be connected into the existing storm manhole on Mill Street, located close to the south east corner of the proposed building, leading into a 750mm dia storm sewer. The flow should be limited to the residual capacity of the sewer.

The Modified Rational Method was used to determine peak flow rates and requisite storage volumes using the Town of Halton Hills IDF values. Calculations are provided in Appendix C.

### 6.1 Stormwater Quantity Control

Since existing storm network capacity details were unavailable, the stormwater storage control was maximized through the design of a 75mm dia. orifice tube (i.e. smallest possible control tube size). Therefore the outlet flow is significantly reduced from the pre-development level, reducing the burden on the existing municipal sewer system.

Table 5 illustrates the runoff generated under the pre-development and post-development conditions. Runoff from the pre-development conditions produces a flow rate 122 L/s from the site during the 100yr storm event. Under the post-development conditions, 9 L/s of flow will be allowed to run uncontrolled to a catchbasin located northeast of the proposed development, while 113 L/s will be captured and sent to on-site storage, with a maximum of 21 L/s flowing to the municipal storm system.

**Table 5: Summary of Peak Flow Rates**

Pre-Development Peak Flows						
Drainage Area	2-Year (L/s)	5-Year (L/s)	10-Year (L/s)	25-Year (L/s)	50-Year (L/s)	100-Year (L/s)
101 (uncontrolled)	52.3	70.3	86.6	99.4	110.8	122.3
<b>Total</b>	<b>52.3</b>	<b>70.3</b>	<b>86.6</b>	<b>99.4</b>	<b>110.8</b>	<b>122.3</b>
Post-Development Peak Flows						
Drainage Area	2-Year (L/s)	5-Year (L/s)	10-Year (L/s)	25-Year (L/s)	50-Year (L/s)	100-Year (L/s)
201 (Uncontrolled)	3.8	5.1	6.3	7.2	8.0	8.9
202 (Uncontrolled)	48.5	65.2	80.3	92.2	102.8	113.5
202 (Controlled)	<21.0	<21.0	<21.0	<21.0	<21.0	21.0
<b>Site Total</b>	<b>&lt;24.8</b>	<b>&lt;26.1</b>	<b>&lt;27.3</b>	<b>&lt;28.2</b>	<b>&lt;29.0</b>	<b>29.9</b>

Required storage will be met using approximately 263 m<sup>3</sup> of underground storage in a cistern installed in the first floor of the parking structure. To provide the required stormwater storage, a 75mm dia. orifice tube will be installed on the cistern to control outflow. A 75mm dia. orifice tube is the smallest design size and will provide the most controlled flow, with a discharge rate of 21 L/s. Appendix C contains detailed calculations of the Modified Rational Method, storage requirements and orifice tube sizing.

## 6.2 Stormwater Quality Control

As discussed at the pre-consultation meeting with the Town's representatives, the stormwater quality objectives will be met using storage of the 5mm storm events. Dead storage space with the underground cistern has been designed to hold 5mm storm events (14 m<sup>3</sup>). As the stormwater stored within the cistern is collected from the roof only, it is assumed it is clean water. However, volume is provided for a 5 mm event to be stored and reused will ensure the sedimentation of any suspended particles in the storm water collected.

## 6.3 Sustainable Stormwater Management

Low Impact Development (LID) techniques will be incorporated into the design of the site development in the form of rainwater harvesting. These techniques have been specified with reference to the CVC/TRCA guidelines on Low Impact Development Stormwater Management Planning & Design Guide (Version 1.0, 2010), as described below. It is proposed to utilize rainwater harvesting as part of the underground storage cistern so that the rainwater can be intercepted and used for irrigation.

## 7.0 EROSION AND SEDIMENT CONTROL 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 Town of Halton Hills. The Removals Plan and Erosion & Sediment Control Plan (DWG C01), identifies the location of the recommended control features. Controls will be inspected after each significant rainfall event and maintained in proper working condition.

The following sediment and erosion controls will be included during construction on the site:

- Heavy Duty Silt Fencing

Heavy Duty Silt fence will be installed on the perimeter of the site to intercept sheet flow. Additional silt fence may be added based on field decisions by the Site Engineer and Owner, prior to, during and following 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. All construction traffic will be restricted to this access only.

- Siltsacks in Catchbasins

A siltsack shall be installed in the existing nearby storm sewer catchbasins.

## 8.0 CONCLUSIONS & RECOMMENDATIONS

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

1. The proposed development can be serviced by the existing municipal watermain infrastructure located within the Mill Street and Main Street R.O.W. An additional new water (fire line) connection has been proposed in the southwest corner of the proposed development. For domestic purposes, the development will use one existing 150mm diameter water service connection located on Main Street.
2. The proposed development can be serviced by the existing municipal sanitary sewer on Main Street. An existing 150mm dia. sanitary service is recommended for use by the proposed development.
3. Stormwater management quantity controls for the development include detention of site runoff through the use of a 263 m<sup>3</sup> storage cistern constructed in the 1<sup>st</sup> level of underground parking.
4. Stormwater management quality objectives will be achieved through the detention of the 5mm storm event in dead storage within the storage cistern.
5. Sustainable stormwater management design includes rainwater harvesting within the proposed storage cistern, and re-use of it for irrigation.

Based on the aforementioned conclusions and recommendations, we suggest the approval of the re-zoning application from the perspective of functional servicing and stormwater management.

Respectfully submitted,

**C.F. CROZIER & ASSOCIATES INC.**



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# APPENDIX A

## Water Demand Calculations

**Domestic Water Demand**

**Project: McGibbon Development 71-79 Main Street South, Georgetown**  
**Job No.: 811-4055** **Revised: 29-Sep-15**

**Proposed Site Conditions**

**A. Proposed Units**

A	30
B	56
C	35
D	3
<b>TOTAL</b>	<b>124</b>

**B. Area's (m<sup>2</sup>)**

Total Residential Units GFA	13,426
Commercial and Amenities GFA	4,244
Site Area	2,773.0

**C. Design Criteria**

$$\text{Population per Hectare}^1 = \frac{1.68 \text{ ppu} * (\# \text{ units})}{\text{area}}$$

Population per Hectare = 751 p/ha  
 Total Population = 208

Note 1: Apartment population density Population density per email confirmation from Tim Skriins - Region of Halton, dated September 29, 2015

Residential Average Consumption Rate<sup>2</sup> = 275.0 L/cap/d  
 Apartments Max Day Factor<sup>2</sup> = 2.25  
 Apartments Peak Hour Factor<sup>2</sup> = 4.0

Average day flow	275	x	208	=	57,288	L/day	=	0.66	L/s		
Maximum day flow	275	x	208	x	2.25	=	128,898	L/day	=	1.49	L/s
Peak hour flow	275	x	208	x	4.0	=	229,152	L/day	=	2.65	L/s

Note 3: Average Consumption Rate, Max day Factor and Peak Hour Factor each determined from Section 2.4, Halton Water Wastewater Linear Design Manual

**D. Commercial**

Approximate floor area of the proposed commercial **Total = 4244.00 sq.m**

Commercial Average Consumption Rate<sup>3</sup> = 24,750.0 L/ha/day

Retail population density	90.00	persons/ha	
Equivalent population	90.00 * 0.4244	=	38 people

Commercial Max Day Factor<sup>3</sup> = 2.25  
 Commercial Peak Hour Factor<sup>3</sup> = 2.25

Note 4: Average Consumption Rate, Max day Factor and Peak Hour Factor each determined from Section 2.4, Halton Water Wastewater Linear Design Manual

**E. Commercial Demands**

Average day flow	24,750	x	38.2	=	945,400	L/day	=	10.9	L/s		
Maximum day flow	24,750	x	38.2	x	2.25	=	2,127,000	L/day	=	24.6	L/s
Peak hour flow	24,750	x	38.2	x	2.25	=	2,127,000	L/day	=	24.6	L/s

**F. Total Domestic Demand (Residential + Retail)**

Average day flow	57,288.00	+	945,400	=	1,002,700	L/day	=	11.6	L/s
Maximum day flow	128,898.00	+	2,127,000	=	2,255,900	L/day	=	26.1	L/s
Peak hour flow	229,152.00	+	2,127,000	=	2,356,200	L/day	=	27.3	L/s

Note 5: Average consumption rate, max day factor and peak hour factor per Section 2.4, Halton Water Wastewater Linear Design Manual

**FIRE FLOW CALCULATIONS**  
**PRELIMINARY ESTIMATES FOR CONFIRMATION OF CAPACITY STATEMENT**

**Project:** McGibbon Development 71 - 79 Main Street South  
**Job No.:** 811-4055

**Date:** Sept 01, 2015  
**Revised:** Sep-15

Fire flow required for a given area based on Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection (1999)

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

where

F = Fire flow in Litres per minute (Lpm)  
 C = coefficient related to the type of construction  
 A = total floor area in square metres

**Calculations per FUS**

- Estimate of Fire Flow*  
 C = 1.0 for fire resistive construction

Largest Podium GFA

Level	GFA	Applied GFA
1	2424	2424
2	2089	522
3	2080	520
<b>Total</b>		<b>3466</b>

A = 2444 m<sup>2</sup> (largest GFA plus 25% of GFA for two immediately adjoining floors)<sup>1</sup>

$$F = 12,990 \text{ Lpm}$$

- Occupancy Reduction*  
 25% reduction based on low hazard occupancy ('apartments, Office Buildings, Public Buildings')  
 25% reduction of 12990 Lpm = 3,247 Lpm  
 F = 12990 - 3247 = 9,743 Lpm

- Sprinkler Reduction*  
 30% reduction for NFPA Sprinkler System<sup>2</sup>  
 30% reduction of 9743 Lpm = 2,923 Lpm  
 F = 9743 - 2923 = 6,820 Lpm

- Separation Charge*

Face	Distance (m)	Charge
West Side	20.00	15%
East Side	0.00	25%
North Side	0.00	25%
South Side	15.00	15%
<b>Total</b>		<b>80%</b>

of 9,743 = 7,794 Lpm

$$F = 6820 + 7794$$

$$F = 14,614 \text{ Lpm} \quad (2,000 \text{ Lpm} < F < 45,000 \text{ Lpm}; \text{OK})$$

$$F = 3,856 \text{ US GPM}$$

**Notes**

- GFA based on data provided by architects on september 28, 2015 and dated August 2015.
- Assumed to have sprinkler protection.

**FIRE FLOW CALCULATIONS**  
**PRELIMINARY ESTIMATES FOR CONFIRMATION OF CAPACITY STATEMENT**

**Project:** McGibbon Development 71 - 79 Main Street South  
**Job No.:** 811-4055

**Date:** Sept 01, 2015  
**Revised:** Sep-15

5. *Duration*

Required Duration of Fire Flow	
Flow Required L/min	Duration (hours)
2,000 or less	1.0
3,000	1.3
4,000	1.5
5,000	1.8
6,000	2.0
8,000	2.0
10,000	2.0
12,000	2.5
14,000	3.0
16,000	3.5
18,000	4.0
20,000	4.5
22,000	5.0
24,000	5.5
26,000	6.0
28,000	6.5
30,000	7.0
32,000	7.5
34,000	8.0
36,000	8.5
38,000	9.0
40,000 and over	9.5

L/s	Duration
233	3
267	3.5
4222	

# APPENDIX B

## Theoretical Sanitary Flow Calculations

THEORETICAL SANITARY SEWAGE FLOWS

Project: McGibbon Development 71 - 79 Main Street South  
 Job No.: 811-4055

Revised: 29-Sep-15

A. Proposed Development

Residential Unit Type	Total Res. Units
A (1 Bdr + Den)	30
B (2 Bdr + Den)	56
C (3 Bdr + Den)	35
D (3 Bdr + Den)	3
<b>Totals</b>	<b>124</b>

Site area = 0.2773 ha

Population per Hectare =  $\frac{1.68 \text{ ppu} * (\# \text{ units})}{\text{area}}$   
 Population per Hectare = 751 p/ha  
 Total Population 208 capita

Note 1: Population density per email confirmation from Tim Skrips - Region of Halton, dated September 29, 2015

B. Proposed Flow

Unit Type	Gross Floor Area (m <sup>2</sup> )	Site Area (ha)	Population <sup>3</sup>	Average Sanitary Flow (275L/cap/d)		Harmon Peaking Factor <sup>4</sup>	Total Peak Flow (L/s)
				(L/s)	(m <sup>3</sup> /day)		
Residential	13,426	0.277	208	0.66	57.29	4.14	2.75
Commercial and Amenities	4,244		38	0.12	10.50	3.47	0.96
<b>1</b>						<b>Total</b>	<b>3.71</b>

Note 2: Commercial flows designed using 90 person per Hectare. Table 3-2, Halton Water Wastewater Linear Design Manual

Note 3: Peaking Factor = Harmon Formula

C. Infiltration

Site Area (ha)	Infiltration Rate <sup>5</sup> (L/ha/s)	Total Infiltration (L/s)
0.2773	0.286	0.08

Note 4: Infiltration = 0.286 L/ha/s Section 3.2.4, Halton Water Wastewater Linear Design Manual

D. Total Proposed Site Flow

	Peak Flow (L/s)
Proposed Flow	3.71
Infiltration	0.08
<b>Total</b>	<b>3.79</b>

Proposed Design Flow

The sewage design flow from the proposed development is: **3.79 L/s**

# APPENDIX C

## Stormwater Management Calculations



RATIONAL METHOD

SCENARIO: Control 100-Year Post to Storm Sewer Capacity

	ACTUAL (100 YEAR)	TARGET (Storm Sewer Capacity)
-	0.0028 factor (Metric conversion in equation)	
$C_{post}$	0.90 -	
$Area_{post}$	0.28 ha	
$T_c$	10 min	
$T_d$	0.167 hours	
$i$	176.31 mm/hr	
$Q_{post}$	0.12 m <sup>3</sup> /s (Uncontrolled Peak Flow)	$Q_{pre}$ 0.02 m <sup>3</sup> /s (Peak Flow)

**Peak Flow**

$$Q_{post} = 0.0028 \cdot C_{post} \cdot i_{(T_d)} \cdot A$$

**Storage**

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

Preliminary Storage Volume Determination

$T_d$ <i>min</i>	$i_{@T_d}$ <i>mm/hr</i>	$T_d$ <i>sec</i>	$Q_{post}$ <i>m<sup>3</sup>/s</i>	$S_d$ <i>m<sup>3</sup></i>
10	171.05	600	0.120	59.1
15	142.06	900	0.099	73.6
20	122.22	1200	0.085	83.6
30	96.57	1800	0.067	96.3
35	87.74	2100	0.061	100.4
40	80.54	2400	0.056	103.6
45	74.56	2700	0.052	106.0
50	69.49	3000	0.049	107.9
240	22.12	14400	0.015	65.1

TOTAL STORAGE VOLUME REQUIRED: 107.9 m<sup>3</sup>



PROJECT: 71-79 Main Street  
PROJECT No.: 811-4055  
FILE: Orifice Design  
DATE: 06- Oct-2015  
UPDATE:  
DESIGN: HS  
CHECK:

### Orifice Plate Design Summary

Orifice Type =	Orifice Tube	
Invert Elevation =	249.50	m
Diameter of Orifice =	75	mm
Area of Orifice (A) =	0.0044	sq.m
Orifice Coefficient (Cd) =	0.820	

#### Calculation of Head

Centroid Elevation =	249.54	m
Water Elevation =	251.20	m
Upstream Head*, (h) =	1.66	m

$$Q_a = (C_d)(A)(2gh)^{0.5}$$

**Actual Controlled Discharge, Qa = 0.021 cms**

\*Head is based upon orifice area @ orifice face not Vena Contracta

# APPENDIX D

## Hydrant Flow Test Results

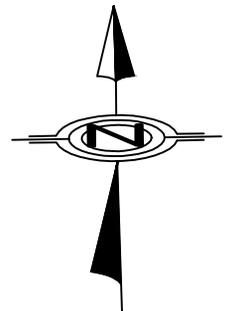
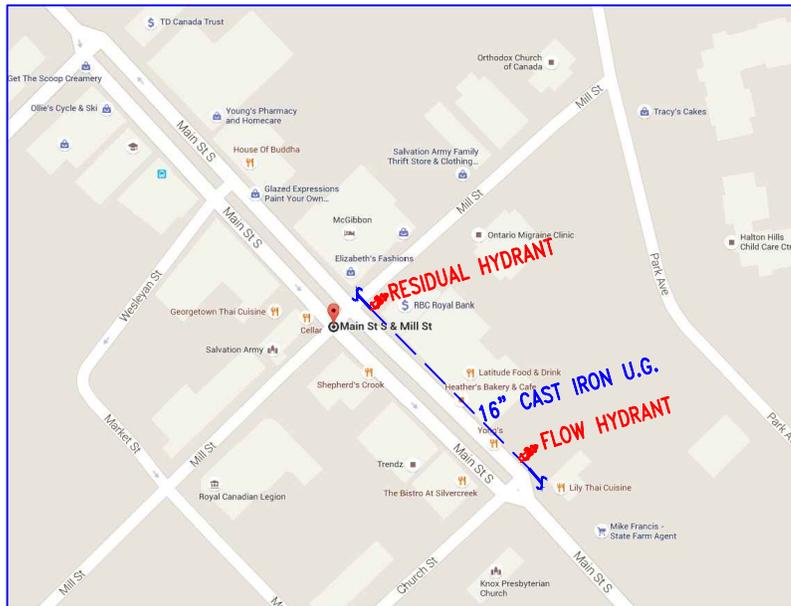
## FLOW TEST RESULTS



DATE :                    SEPTEMBER-14-2015                    TIME :                    09:30 AM

LOCATION :                    7179 MAIN STREET  
GEORGETOWN, ONTARIO  
(MAIN STREET & MILL STREET) INTERSECTION.

TEST BY :                    VIPOND (F.RASHIDIFAR & Z.DUBROS) & HALTON REGION PUBLIC WORKS



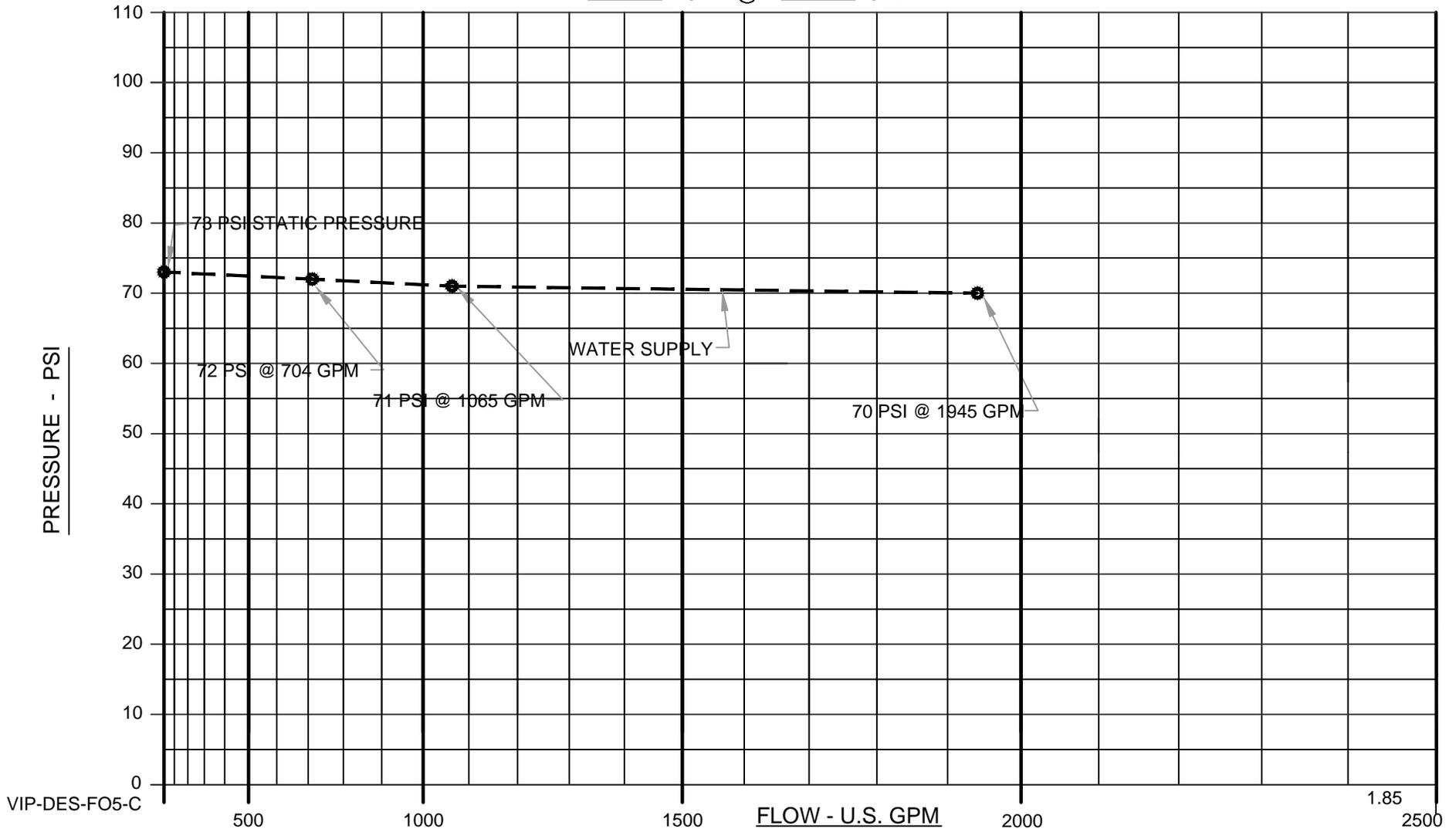
STATIC PRESSURE :                    73                    PSI

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"	.995	72	60	704
2	1	2 1/2"	.90	71	40	1065
3	2	2 1/2"	.90	70	35/32	1945



7179 MAIN STREET	OFFICE: MISSISSAUGA	2 OF 2
GEORGETOWN, ONTARIO	TEST BY: VIPOND (F.R. & Z.D.) & HALTON PUB. WORKS	
(MAIN STREET & MILL STREET) INTERSECTION.	DONE: SEP-14-2015 @ 09:30 AM	

STATIC : 73 PSI  
72 PSI @ 704 GPM  
71 PSI @ 1065 GPM  
70 PSI @ 1945 GPM



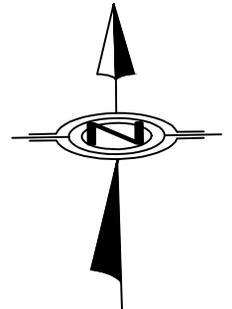
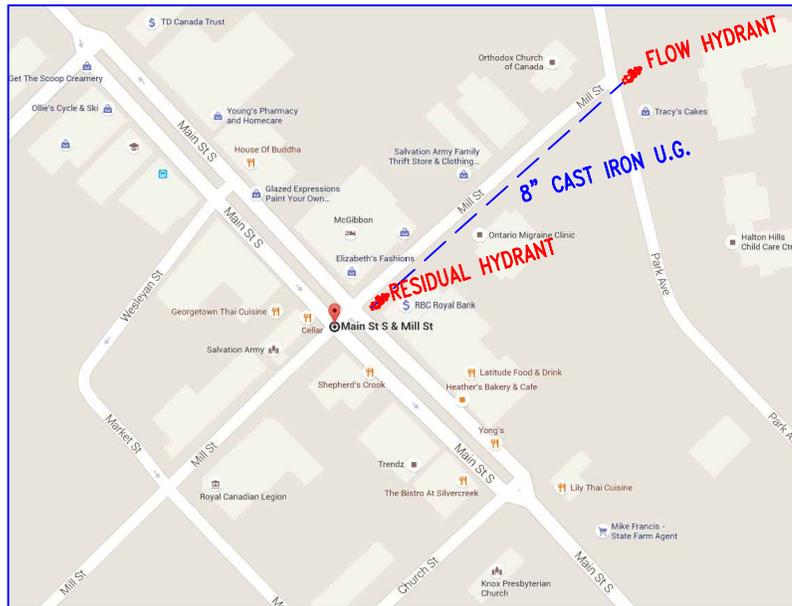
## FLOW TEST RESULTS



DATE :                      SEPTEMBER-14-2015                      TIME :                      09:45 AM

LOCATION :                      7179 MAIN STREET  
GEORGETOWN, ONTARIO  
(MAIN STREET & MILL STREET) INTERSECTION.

TEST BY :                      VIPOND (F.RASHIDIFAR & Z.DUBROS) & HALTON REGION PUBLIC WORKS



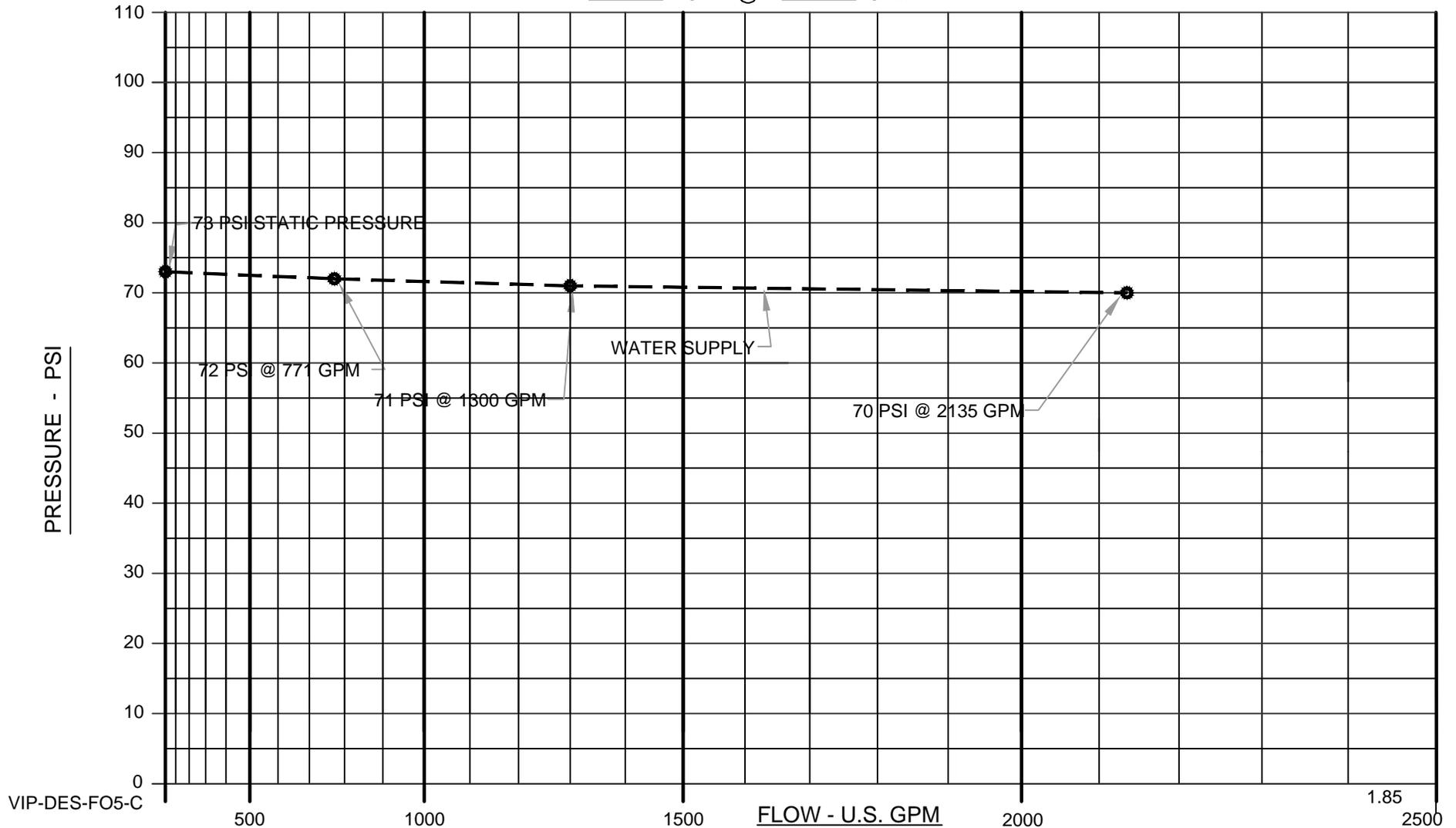
STATIC PRESSURE :                      73                      PSI

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"	.995	72	72	771
2	1	2 1/2"	.90	71	60	1300
3	2	2 1/2"	.90	70	38/43	2135



7179 MAIN STREET	OFFICE: MISSISSAUGA	2 OF 2
GEORGETOWN, ONTARIO	TEST BY: VIPOND (F.R. & Z.D.) & HALTON PUB. WORKS	
(MAIN STREET & MILL STREET) INTERSECTION.	DONE: SEP-14-2015 @ 09:45 AM	

STATIC : 73 PSI  
72 PSI @ 771 GPM  
71 PSI @ 1300 GPM  
70 PSI @ 2135 GPM





PROJECT: 71-79 Main St.  
Georgetown  
PROJECT No.: 811-4055  
FILE: Demand  
DATE: 9/14/2015  
UPDATE: 9/14/2015  
DESIGN: WST  
CHECK: NC

**Date of Flow Tests - Sept 14, 2015**

Test	Hydrant Location / ID	Static Pressure	Residual Pressure during Test	Flow from Hydrant Test	Desired Residual Pressure	Projected Fire Flow Available at 20 psi  Qr (USGPM)
		Ps	Pt	Qt	Pr	
		(psi)	(psi)	(USGPM)	(psi)	
1	Main St	73	72	704	20	6,007
2			71	1065		6,250
3			70	1945		9,170
4	Mill St	73	72	771	20	6,579
5			71	1300		7,630
6			70	2135		10,066

$Q_r = Q_t \times ((P_s - P_r)/(P_s - P_t))^{0.54}$       Formula to determine available flow as per AWWA M17 (1989)

NOTE: Projected fire flows are calculated on the basis of hydrant tests carried out by Vipond Inc. on Sept.14, 2015 at 9.30am/9.45am.

# LIST OF FIGURES

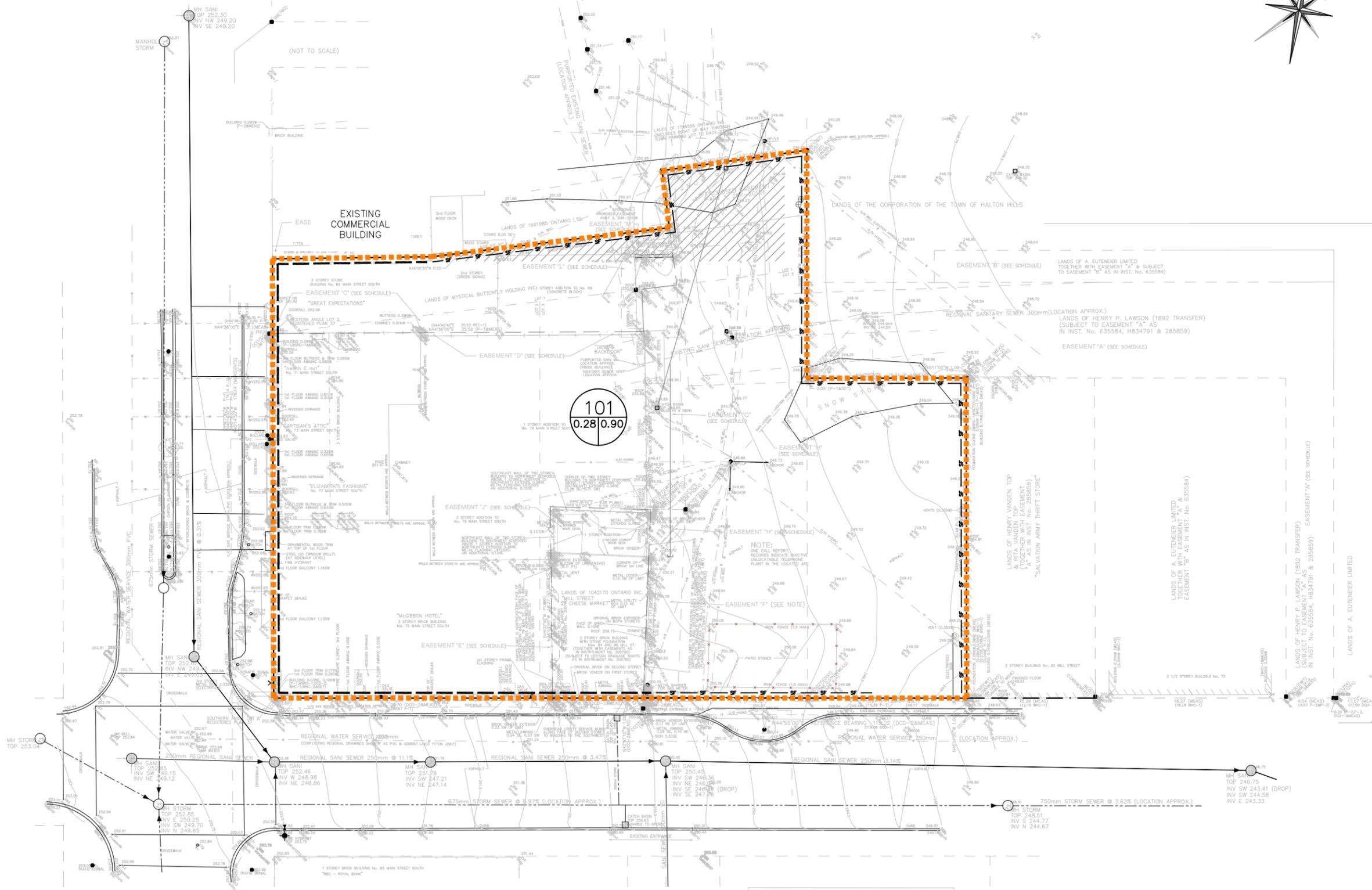
- Figure 1: Site Location
- Figure 2: Pre-Development Drainage Plan
- Figure 3: Post-Development Drainage Plan



<b>Legend</b>  = SUBJECT LANDS	<b>Project</b> SILVER CREEK COMMERCIAL TOWNSHIP OF HALTON HILLS	 <b>CROZIER &amp; ASSOCIATES ENGINEERS</b> 2800 HIGH POINT DRIVE SUITE 100 MILTON, ON L9T 6P4 905-875-0026 T 905-875-4915 F WWW.CFCROZIER.CA											
	<b>Drawing</b> SITE LOCATION		<table border="1"> <tr> <td>Drawn By</td> <td>M.M.</td> <td>Design By</td> <td>T.R.</td> <td>Project</td> <td>811-4055</td> </tr> <tr> <td>Scale</td> <td>N.T.S.</td> <td>Date</td> <td>15/04/2015</td> <td>Check By</td> <td>K.J.F.</td> </tr> </table>	Drawn By	M.M.	Design By	T.R.	Project	811-4055	Scale	N.T.S.	Date	15/04/2015
Drawn By	M.M.	Design By	T.R.	Project	811-4055								
Scale	N.T.S.	Date	15/04/2015	Check By	K.J.F.								
		<b>FIG 1</b>											



LEGEND	
	PROPERTY LINE
	EXISTING CONTOUR (0.5m)
	EXISTING CONTOUR (1.0m)
	EXISTING DITCH
	EXISTING HYDRO POLE
	EXISTING FENCE
	EXISTING GRADE
	STORM DRAINAGE CATCHMENT
	SILT FENCE; REFER TO DETAIL
	EXISTING OVERLAND FLOW DIRECTION
	CATCHMENT I.D.
	AREA (ha) RUNOFF COEFFICIENT



101  
0.28 | 0.90

B	ISSUED FOR COORDINATION	2015/OCT/13
A	ISSUED FOR COORDINATION	-
No.	ISSUE / REVISION	YYYY/MM/DD

**BENCHMARK ELEVATION NOTE:**  
ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO TOWN OF HALTON HILLS BENCHMARK GBM 90-0051 - HAVING AN ELEVATION OF 246.26m

**SURVEY NOTES:**  
SURVEY COMPLETED BY DOLLIVER SURVEYING INC. ON THE 16TH DAY OF JULY, 2014 REFERENCE No. 1488-7.  
BEARINGS ARE ASTROMONIC AND REFERRED TO THE NORTHWESTERN LIMIT OF MILL STREET, HAVING A BEARING OF N44°55'00"E AS INDICATED ON PLAN 20R-4220.  
ALL DISTANCES AND ELEVATIONS SHOWN ON THIS PLAN ARE IN METERS AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

**SITE PLAN NOTES:**  
DESIGN ELEMENTS SHOWN ARE BASED ON SITE PLAN PREPARED BY STUDIO JCI INC. DATED: 2015/OCT

**DRAWING NOTES:**  
THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART OF IT WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.  
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THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.  
ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

SILVERCREEK COMMERCIAL BUILDERS INC.  
71-79 MAIN STREET S.  
TOWN OF HALTON HILLS (GEORGETOWN)

PRE-DEVELOPMENT DRAINAGE PLAN

				2800 HIGH POINT DRIVE SUITE 100 MILTON, ON L9T 6P4 905 875-0029 F 905 875-4915 F WWW.CFCROZIER.CA	
Drawn	M.I.M.	Design	W.T./N.C.	Project No.	811-4055
Check	J.R.S.	Check	N.M.	Scale	1:400
				Dwg.	FIG 2



ALL EXISTING SANITARY SEWER SERVICES TO EXISTING SUBJECT BUILDING SHALL BE ABANDONED. CONTRACTOR TO PLUG BOTH ENDS OF THE PIPES AND FILL WITH GROUT FOR EACH SERVICE.

ALL EXISTING WATER SERVICE CONNECTIONS TO EXISTING SUBJECT BUILDING SHALL BE ABANDONED. CONTRACTOR TO SHUT OFF EX. VALVES AT BOTH THE PROPERTY LINE AND MAIN FOR EACH SERVICE.

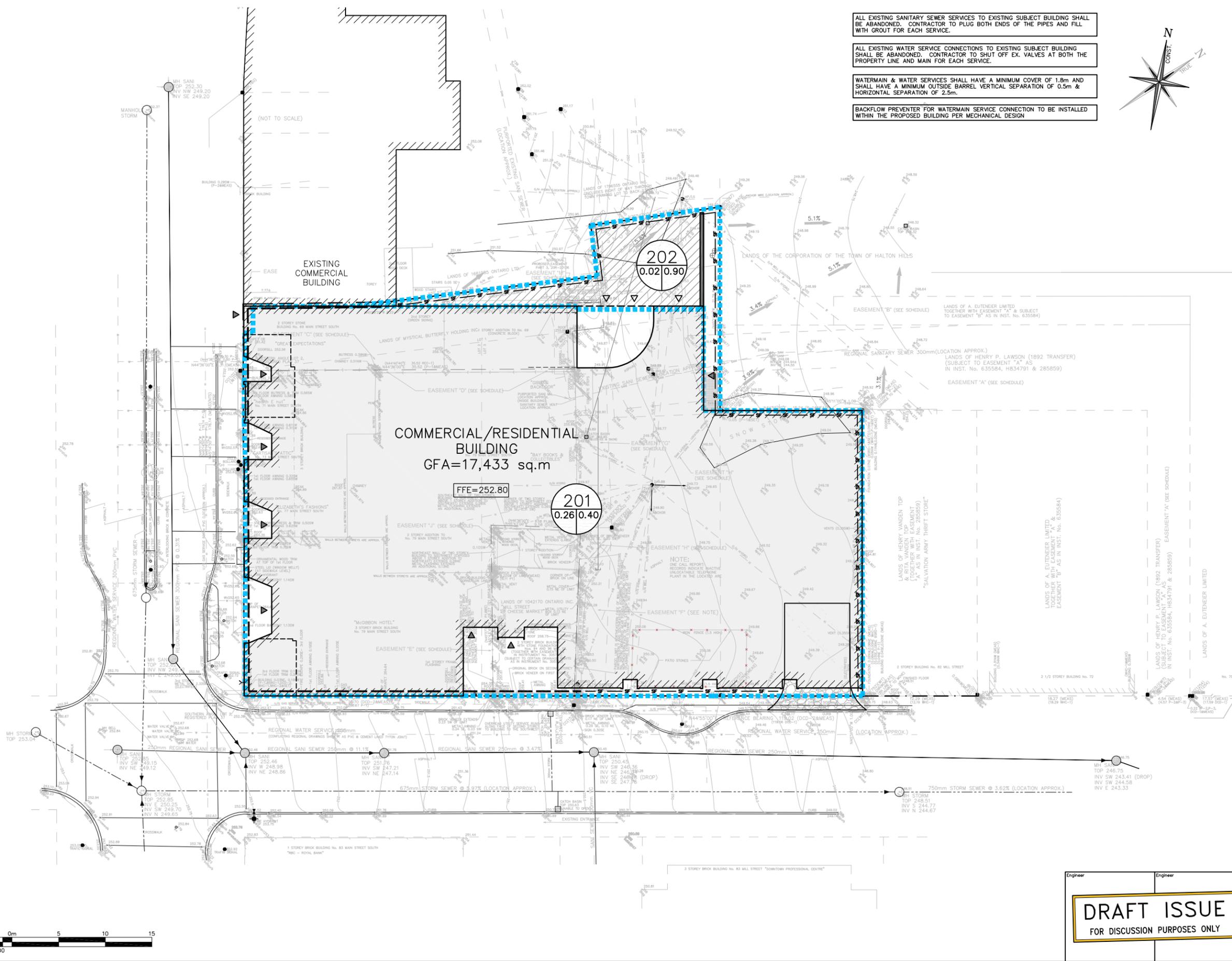
WATERMAIN & WATER SERVICES SHALL HAVE A MINIMUM COVER OF 1.8m AND SHALL HAVE A MINIMUM OUTSIDE BARREL VERTICAL SEPARATION OF 0.5m & HORIZONTAL SEPARATION OF 2.5m.

BACKFLOW PREVENTER FOR WATERMAIN SERVICE CONNECTION TO BE INSTALLED WITHIN THE PROPOSED BUILDING PER MECHANICAL DESIGN



**LEGEND**

- PROPERTY LINE
- - - EXISTING CONTOUR (0.5m)
- - - EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- o HP EXISTING HYDRO POLE
- EXISTING FENCE
- EXISTING GRADE
- STORM DRAINAGE CATCHMENT (POST DEVELOPMENT)
- SILT FENCE; REFER TO DETAIL
- EXISTING OVERLAND FLOW DIRECTION
- ID / ARC CATCHMENT I.D. AREA (ha) RUNOFF COEFFICIENT



B	ISSUED FOR COORDINATION	2015/OCT/13
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SILVERCREEK COMMERCIAL BUILDERS INC.  
71-79 MAIN STREET S.  
TOWN OF HALTON HILLS (GEORGETOWN)

POST DEVELOPMENT DRAINAGE PLAN

<p>Engineer</p> <p><b>DRAFT ISSUE</b> FOR DISCUSSION PURPOSES ONLY</p>		<p>Engineer</p> <p><b>CROZIER &amp; ASSOCIATES</b> Consulting Engineers</p> <p>2800 HIGH POINT DRIVE SUITE 100 MILTON, ON L9T 6P4 905 875-0029 T 905 875-4915 F WWW.CFCROZIER.CA</p>				
Drawn	M.I.M.	Design	W.T./N.C.	Project No.	811-4055	
Check	J.R.S.	Check	N.M.	Scale	1:200	
					Dwg.	FIG 3

# LIST OF DRAWINGS

- DWG C01: Removals and Sediment & Erosion Control Plan
- DWG C02: Site Servicing Plan
- DWG C03: Overall Grading Plan

**EROSION AND SEDIMENT CONTROL – PROJECT SPECIFIC NOTES**

1. SEDIMENT BARRIERS, CHECK DAMS AND TEMPORARY CONSTRUCTION ACCESS TO BE INSTALLED PRIOR TO THE BEGINNING OF CONSTRUCTION.
2. ALL SEDIMENT CONTROL DEVICES TO BE ROUTINELY INSPECTED AND MAINTAINED IN PROPER WORKING ORDER UNTIL AREA IS STABILIZED.
3. IF NECESSARY, TRUCKS WILL BE WASHED DOWN BEFORE LEAVING THE SITE.
4. THE CONTRACTOR SHALL SUPPLY ALL NECESSARY WATER AND/OR CALCIUM CHLORIDE AS REQUIRED FOR COMPACTION AND/OR DUST CONTROL.
5. ALL CONSTRUCTION EQUIPMENT MUST BE PARKED ON-SITE.
6. IF CONSTRUCTION IS INTERRUPTED, AND/OR INACTIVITY EXCEEDS 30 DAYS, STRIPPED/BARE AREAS WILL BE STABILIZED BY SEEDING.
7. SEDIMENT CONTROL FENCE TO BE INSTALLED PER ESC DWG. 101 AND DETAIL ON DWG 104.
8. ALL CONSTRUCTION VEHICLES TO ENTER AND EXIT SITE FROM TEMPORARY CONSTRUCTION ACCESS.
9. ALL TOPSOIL STOCKPILES TO BE SURROUNDED WITH SEDIMENT CONTROL FENCING.
10. FILTER CLOTH WILL BE PLACED ON THE CATCHBASINS ON ALL STREETS ACROSS THE PROPERTY FRONTAGE.
11. STREET SWEEPING, CATCH BASIN CLEANING AND DUST CONTROL ARE THE RESPONSIBILITY OF THE CONTRACTOR AND MUST BE KEPT UNDER CONTROL ON ALL ROADWAYS TO THE SATISFACTION OF THE TOWN.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONDITION OF THE SITE AT ALL TIMES. EROSION AND SEDIMENT CONTROL MEASURES INCLUDING SEDIMENT CONTROL FENCE, CATCHBASIN SEDIMENT BARRIERS, SEDIMENT TRAPS AND OTHER EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO COMMENCING CONSTRUCTION, IN ACCORDANCE WITH TOWNSHIP REQUIREMENTS.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING POSITIVE SURFACE DRAINAGE TO THE SEDIMENT CONTROL STRUCTURES, FOR THE DURATION OF THE CONSTRUCTION PERIOD.
14. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL DEVICES AND STRUCTURES IN GOOD WORKING ORDER AT ALL TIMES. CONTRACTOR SHALL INSPECT SUCH DEVICES AT LEAST ONCE PER WEEK AND AFTER EACH RAINFALL EVENT GREATER THAN 10mm, AND MAKE ALL NECESSARY REPAIRS AS REQUIRED.
15. ALL SEDIMENTS SHALL BE DISPOSED OFF-SITE AS PER TOWN REGULATIONS.
16. CONTRACTOR IS RESPONSIBLE FOR CLEAN UP OF MUDTRACKING ON A DAILY BASIS OR ON A MORE FREQUENT BASIS IF DIRECTED BY THE TOWN OR OWNER.
17. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL OF ALL EROSION AND SEDIMENT CONTROL DEVICES AND STRUCTURES ONCE SEEDING OR SODDING IS IN PLACE AND THE SITE HAS STABILIZED.

RELOCATION AND REMOVALS OF EXISTING ELECTRICAL CABLES AND HYDRO POLES TO BE COORDINATED WITH ELECTRICAL DRAWINGS.

ALL UNDERGROUND ELECTRICAL CONDUITS NEAR CIVIL ENGINEERING WORKS ARE TO BE MAINTAINED AND PROTECTED IF THEY ARE NOT INDICATED TO BE REMOVED ON THE ELECTRICAL DRAWINGS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ASSURE PROPER COORDINATION.

ASPHALT REMOVALS IN AREA OF EXISTING PAVEMENT TO REMAIN REQUIRE SAW CUTS AT LIMIT OF REMOVAL. LAP JOINTS TO BE USED DURING RESTORATION PROCESS.

ALL THE MATERIALS RESULTING FROM THE REMOVAL PROCESS HAVE TO BE DISPOSED OFF SITE, AT AN APPROVED LOCATION.

**EXISTING UTILITIES AND SERVICES**

CONTRACTOR SHALL NOTE THAT THE CONSTRUCTION ZONE HAS NUMEROUS EXISTING UNDERGROUND UTILITIES AND SERVICES, SOME OF WHICH ARE TO BE ABANDONED OR REMOVED, AND OTHERS WHICH ARE TO BE PROTECTED AND MAINTAINED IN SERVICE.

PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL RETAIN THE SERVICES OF A COMPANY, WHICH SPECIALIZES IN SUBSURFACE UTILITY ENGINEERING FOR THE PURPOSES OF LOCATING, MARKING AND SURVEYING ALL UNDERGROUND UTILITIES AND SERVICES. ALL CURRENT METHODS SHALL BE USED FOR THESE LOCATIONS INCLUDING ELECTRONIC METHODS, VACUUM EXCAVATIONS, SURVEYING MANHOLES AND CHAMBERS ETC.

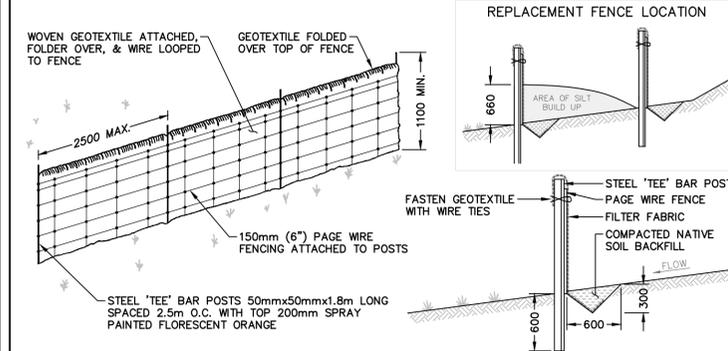
THE UTILITIES AND SERVICES SHALL BE SURVEYED AND TIED INTO THE PROJECT COORDINATE SYSTEM. A COPY OF THE SURVEY SHALL BE PROVIDED TO THE ENGINEER FOR RECORD PURPOSES.

ANY CONFLICT WITH THE PROPOSED WORKS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL LOCATIONS FOR PROTECTION AND TEMPORARY RELOCATION OF UNDERGROUND UTILITIES AND SERVICES AS REQUIRED FOR THE COMPLETE INSTALLATION OF THE PROPOSED WORKS.

**TYPICAL HEAVY DUTY SILT FENCE**

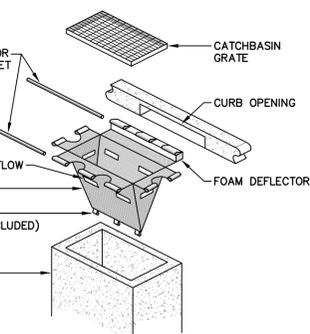
SCALE: N.T.S.



- NOTES:
1. DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
  2. SILT CONTROL FENCE SHOULD BE ALIGNED WITH CONTOURS FOR SHEET OVERLAND FLOW.
  3. SILT CONTROL FENCE IS TO BE LOCATED IN AREAS OF LOW SEDIMENT YIELD ON SLOPES THAT CONFORM TO MTO DRAINAGE MANUAL VOLUME 2 'CHART F4-3C TOPOGRAPHIC FACTOR IS BASED ON SLOPE LENGTH AND GRADIENT.'
  4. SILT CONTROL FENCE SHALL BE INSTALLED WITH FILTER MEDIA FABRIC TIED INTO THE SOIL A MIN. OF 300mm BY EITHER STATIC SLICING OR TRENCH METHODS WITH COMPACTION OF TRENCH MATERIAL MEETING 95% IN SITU SOIL STRENGTH.
  5. STEEL 'TEE' BAR POSTS ARE TO BE SPACED MAX. 2.5m ON CENTER WITH A MIN. HEIGHT OF 1.1m.
  6. FROZEN GROUND CONDITIONS REQUIRE FILTER FABRIC TO BE BACKFILLED IN TRENCH WITH CLEAR STONE.
  7. GEOTEXTILE FABRIC TO BE COMPRISED OF WOVEN OR NON-WOVEN U.V. STABILIZED MATERIAL. FABRIC TO BE FOLDED OVER TOP OF FENCE MIN. 300mm AND WIRE FASTENED.

**'SILTSACK' DETAIL**

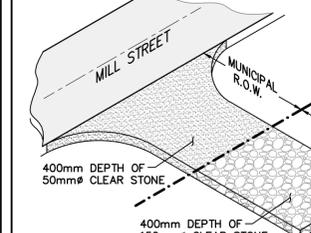
SCALE: N.T.S.



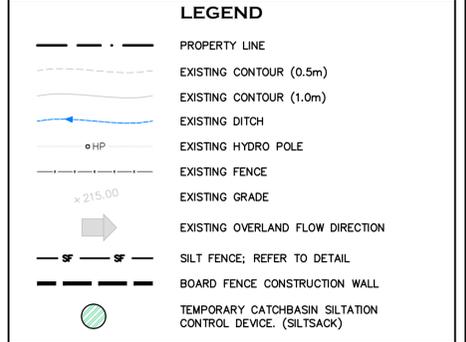
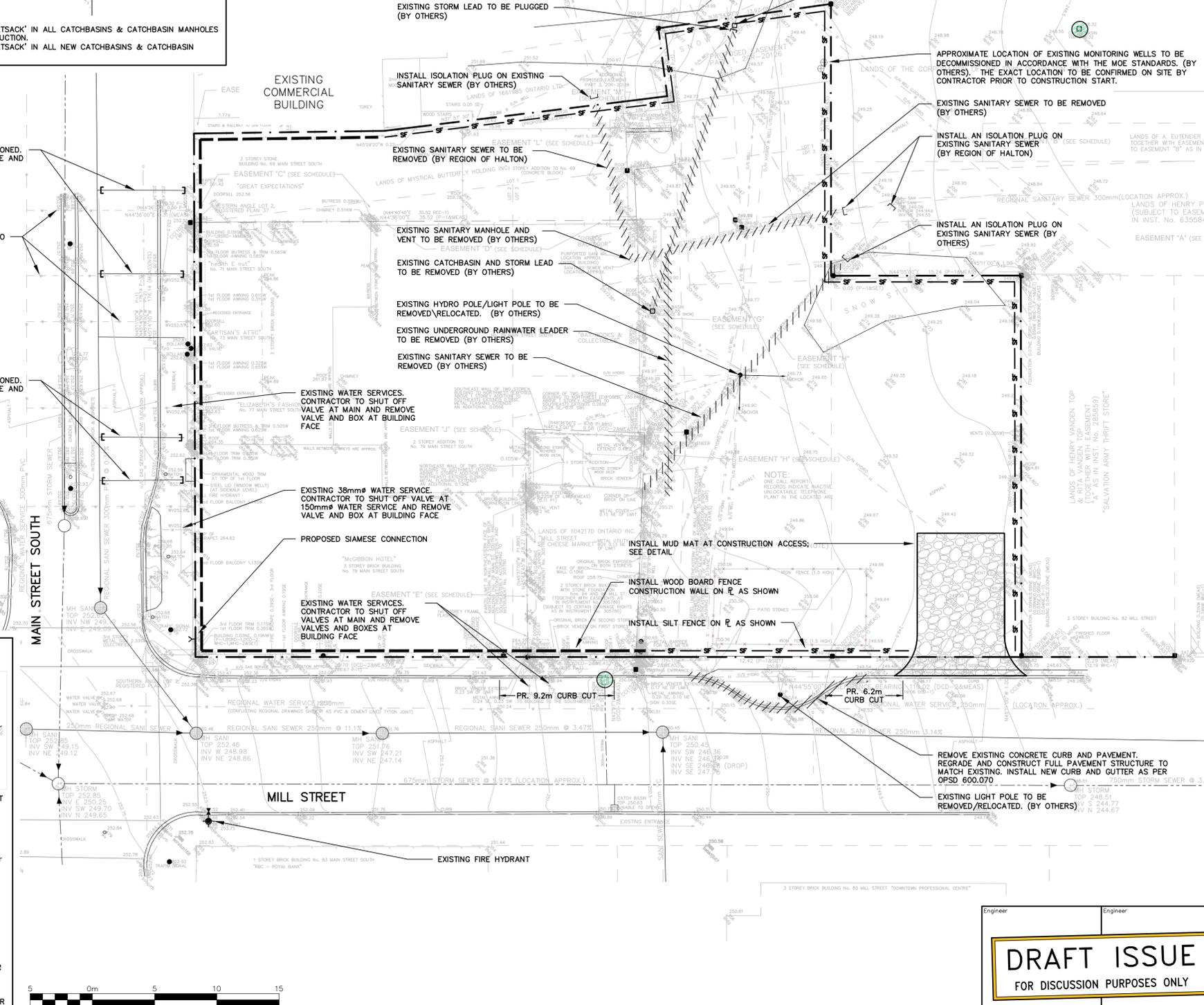
- NOTES:
1. INSTALL TERRAFIX 'SILTSACK' IN ALL CATCHBASINS & CATCHBASIN MANHOLES AFFECTED BY CONSTRUCTION.
  2. INSTALL TERRAFIX 'SILTSACK' IN ALL NEW CATCHBASINS & CATCHBASIN MANHOLES.

**MUD MAT DETAIL**

SCALE: N.T.S.



NOTE:  
GEOTEXTILE (TERRAFIX 270R OR APPROVED EQUAL) TO BE PLACED AS SEPARATION BARRIER BETWEEN EXISTING GROUND AND CLEAR STONE.



- NOTES:
1. EROSION & SEDIMENT CONTROL MEASURES MUST BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE WORKS.
  2. EROSION & SEDIMENT CONTROLS MUST BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY RAIN FALL EVENT, AND MUST BE MAINTAINED AND REPAIRED IN A TIMELY MANNER TO PREVENT SEDIMENT FROM LEAVING THE SITE.
  3. EXISTING AND PROPOSED CATCHBASINS ARE TO BE PROTECTED WITH FILTER CLOTH AND 150mm OF 50mm STONE COVER DURING CONSTRUCTION.
  4. IT IS REQUIRED TO STABILIZE ALL AREAS THAT WILL REMAIN DISTURBED FOR MORE THAN 30 DAYS.
  5. MUD MAT, SILT FENCE, AND CATCHBASIN PROTECTION ARE NOT TO BE REMOVED UNTIL COMPLETION OF CONSTRUCTION.

1	ISSUED FOR OPA/ZBA	2015/OCT/19
No.	ISSUE / REVISION	YYYY/MM/DD

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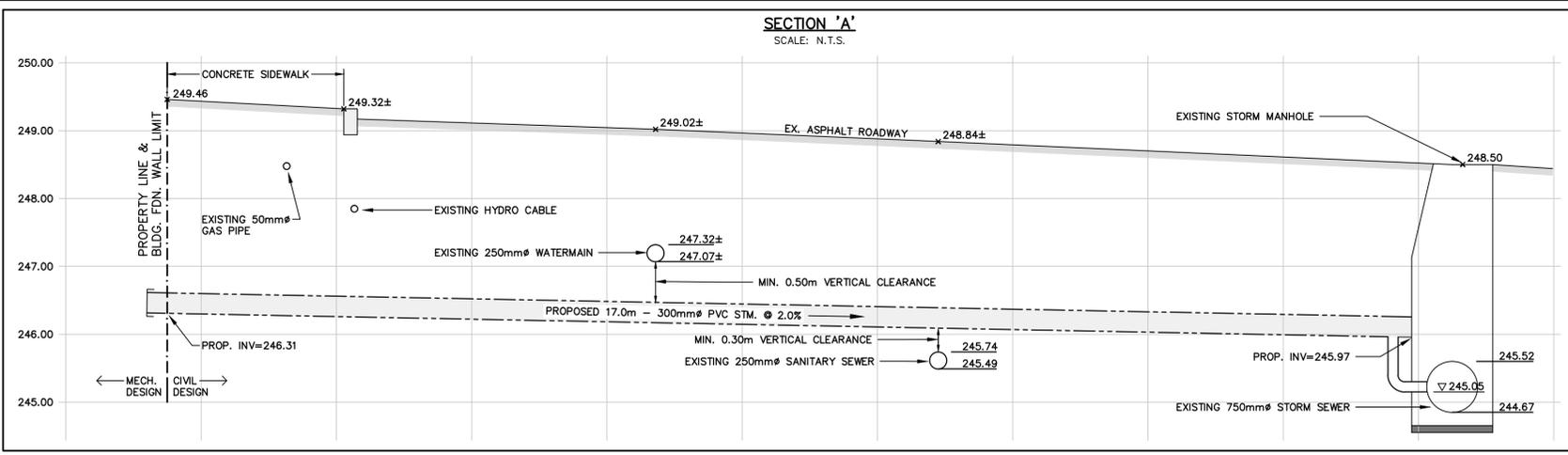
Project: SILVERCREEK COMMERCIAL BUILDERS INC. 71-79 MAIN STREET S. TOWN OF HALTON HILLS (GEORGETOWN)

Drawing: PRELIMINARY REMOVALS AND EROSION & SEDIMENT CONTROL PLAN

**CROZIER & ASSOCIATES**  
Consulting Engineers  
2800 HIGH POINT DRIVE SUITE 100 MILTON, ON L9T 6P4 905-875-0026 T 905-875-4915 F WWW.CFCROZIER.CA

Drawn	M.I.M.	Design	W.T./N.C.	Project No.	811-4055
Check	J.R.S.	Check	N.M.	Scale	1:200
				Dwg.	C 01

**DRAFT ISSUE**  
FOR DISCUSSION PURPOSES ONLY

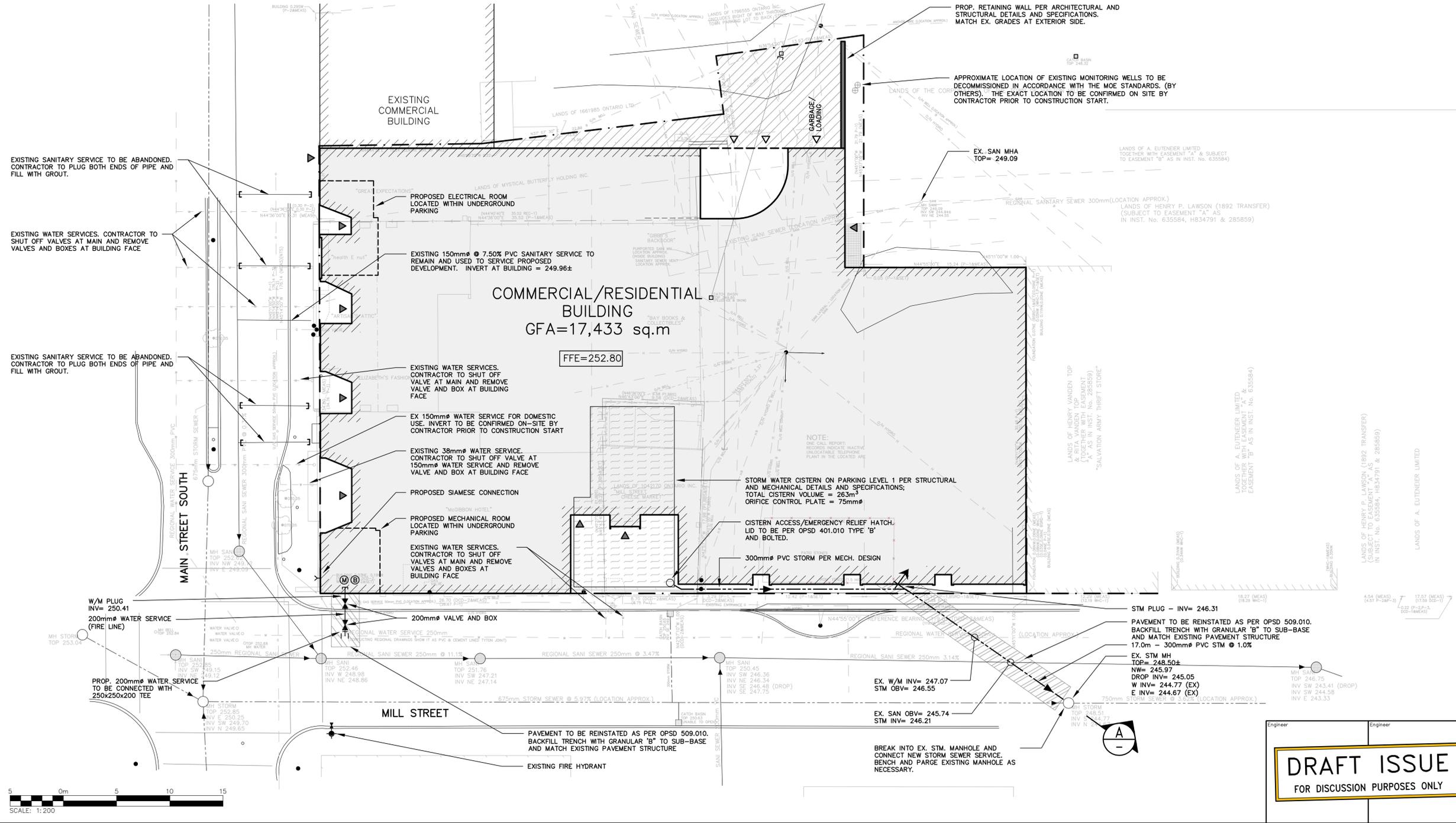


- NOTES:**
1. ALL EXISTING WATER SERVICE CONNECTIONS TO EXISTING SUBJECT BUILDING SHALL BE ABANDONED, WITH THE EXCEPTION OF THE EXISTING 150mm $\phi$  WATER SERVICE, AS NOTED ON THIS DRAWING. CONTRACTOR TO SHUT OFF EXISTING VALVES AT MAIN AND REMOVE EX. VALVES AT BUILDING FACE FOR EACH SERVICE.
  2. WATERMAIN & WATER SERVICES SHALL HAVE A MINIMUM COVER OF 1.7m AND SHALL HAVE A MINIMUM OUTSIDE BARREL VERTICAL SEPARATION OF 0.5m & HORIZONTAL SEPARATION OF 2.5m.
  3. WATERMAIN COVER ASSUMED PER HALTON REGION DESIGN CRITERIA. CONTRACTOR TO CONFIRM THE EXACT LOCATION PRIOR TO CONSTRUCTION START.
  4. WATER METER AND BACKFLOW PREVENTER FOR WATERMAIN SERVICE CONNECTION TO BE INSTALLED WITHIN THE PROPOSED BUILDING PER MECHANICAL DETAILS AND SPECS.
  5. INVERTS OF EXISTING SEWERS PER TERRA DISCOVERY LOCATES DATED JULY 16, 2015.
  6. ALL EXISTING SANITARY SEWER SERVICES TO EXISTING SUBJECT BUILDING SHALL BE ABANDONED, WITH THE EXCEPTION OF THE EXISTING 150mm $\phi$  SANITARY SERVICE, AS NOTED ON THIS DRAWING. CONTRACTOR TO PLUG BOTH ENDS OF THE PIPE AND FILL WITH GROUT FOR EACH SERVICE.
  7. COVER SHOWN ON EXISTING GAS PIPE AND ELECTRICAL DUCTS ARE APPROXIMATE. CONTRACTOR TO CONFIRM THE EXACT LOCATION PRIOR TO CONSTRUCTION START.



**LEGEND**

	PROPERTY LINE
	EXISTING WATERMAIN & GATE VALVE
	EXISTING STORM SEWER
	EXISTING STORM CATCHBASIN MANHOLE
	EXISTING SANITARY SEWER
	EXISTING SANITARY MANHOLE
	PROPOSED WATERMAIN & GATE VALVE
	PROPOSED FIRE HYDRANT & GATE VALVE
	PROPOSED STORM SEWER
	PROPOSED STORM CATCHBASIN MANHOLE
	PROPOSED SANITARY SEWER
	PROPOSED SANITARY MANHOLE
	PROPOSED ELECTRICAL TRANSFORMER
	PROPOSED BACKFLOW PREVENTER
	PROPOSED WATER METER



1	ISSUED FOR OPA/ZBA	2015/OCT/19
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**SITE PLAN NOTES:**  
DESIGN ELEMENTS SHOWN ARE BASED ON SITE PLAN PREPARED BY STUDIO JOI INC. DATED: 2015/OCT

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Project  
**SILVERCREEK COMMERCIAL BUILDERS INC.**  
71-79 MAIN STREET S.  
TOWN OF HALTON HILLS (GEORGETOWN)

Drawing  
**PRELIMINARY SITE SERVICING PLAN**

**DRAFT ISSUE**  
FOR DISCUSSION PURPOSES ONLY

**CROZIER & ASSOCIATES**  
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Drawn	M.I.M.	Design	W.T./N.C.	Project No.	<b>811-4055</b>
Check	J.R.S.	Check	N.M.	Scale	1:200
				Dwg.	<b>C 02</b>

