FUNCTIONAL SERVICING AND

STORMWATER MANAGEMENT (SWM) REPORT

For

Mixed Used Condominium Development

28-60 Bronte Street North, Milton, Ontario

Prepared for:

Durante Group

Prepared by:

LANHACK CONSULTANTS INC.
1425 Cormorant Road, Suite 302
Ancaster, ON L9G 4V5

Project No. 18147

Date: October 19th, 2018

Table of Contents

1.0 INTRODUCTION

1.1 Overview

Lanhack Consultants Inc. has been retained by Durante Group to prepare a Functional Servicing Report to support a by-law and official plan amendment applications for the proposed development consisting of two (2) buildings at 28-60 Bronte Street North; Building A will contain primarily residential occupancy and Building B will have one floor of retail/commercial space with the remaining floors being residential units. See Site Plan prepared by KNYMH Inc. in **Appendix E** for more detail. Lanhack Consultants Inc. will be assessing the grading, servicing, water/wastewater and storm water management requirements. The property (Phase 1) is approximately 1.342 hectares, located west of Bronte St. N. and north of Main St. W. Refer to **Figure 1** for the Location Map.

The site is currently developed land as a farm store chain (TSC). The site consists of developed impervious surfaces (concrete, asphalt, building, etc.) and some vacant grassed areas north of the property. Currently, a portion of the site drains easterly towards Bronte St. N. and the other portion drains towards an on-site 600mm diameter CSP culvert that ultimately drains towards an on-site 1500mm diameter concrete storm pipe. See **Appendix E** for Existing Drainage Area Plan.

The existing 1500mm diameter concrete storm sewer runs through the site and captures the watercourse for approximately 10.0 hectares of land west of the proposed development. This concrete storm sewer will be re-directed to the north side of the site and will be used as the storm connection point for the proposed development. The existing 300mm diameter PVC sanitary sewer along Bronte St. N. will be used as the sanitary connection point for the proposed development. There is an existing 400mm diameter PVC watermain along Bronte St. N. that will service the proposed development. See **Appendix E** for Servicing Plan.

1.2 Background Information

The following documents were referenced in the preparation of this report:

Ref. 1: Water and Wastewater Linear Design Manual by Halton Region (July 2017 – V.3.01)

Ref. 2: Ministry of the Environment and Climate Change (MOECC) - Stormwater Management Practices Planning and Design Manual (Ministry of Environment, March 2003)

Ref. 3: Erosion & Sediment Control Guideline for Urban Construction (December, 2006)

Ref 4: Ontario Building Code (2012)

1.3 Geotechnical Investigation

The Geotechnical Report will be submitted by others under a separate cover.

***Figure 1**: Location plan of 28-60 Bronte Street North (via googlemaps)*

2.0 STORMWATER MANAGEMENT

The following section will describe the proposed stormwater management (SWM) plan for the existing and proposed development conditions.

2.1 Stormwater Management Criteria

Based on the Town of Milton standards, the following stormwater management (SWM) criteria will be applied to the site:

Stormwater Quantity Control

Controlling the post-development peak flows for the 5-year through 100-year storm event to the pre-development levels.

Stormwater Quality Control

Water quality control requirement is to provide Level 1 (enhanced) treatment levels for the proposed site works as per the MOECC SWM Practices Planning and Design Manual (2003) and as per Town of Milton.

2.2 Existing Conditions

The entire site currently drains to an existing 1500mm concrete storm sewer on Bronte Street North. The east portion of the site drains easterly towards Bronte St. N. and the west portion of the site drains westerly towards an existing 600mm diameter CSP culvert that connects to the 1500mm concrete pipe on Bronte St. N. These two existing drainage areas are illustrated by two catchment areas (101 and 102). See Existing Drainage Area Plan in **Appendix E**.

The existing conditions were assessed using the SWMHYMO Hydrologic Modeling and the 5-year to 100-year IDF parameters for the Town of Milton design storms (Town of Milton – IDF Curves: Engineering and Parks Standards Manual). See Table 2.1 and 2.2 below and **Appendix B** for more detail.

Table 2.1: Existing Conditions Drainage Areas

Catchment ID	**Description**	**Area (ha)**	**Imperviousness (%)**
101	*Existing Building and gravel draining northerly*	0.887	74.8
102	*Existing gravel and landscaped lands draining southerly*	0.455	10.9
	Total (101+102)	**1.342**	**53.1**

The SWMHYMO analysis was performed on Catchment 101 and 102 for the 5-year to 100-year (24-hour) Town of Milton design storms. A summary of the results can be found in Table 2.2 and detailed SWMHYMO input/output can be found in **Appendix B.**

Table 2.2: Existing Condition Storm Discharge

STORM EVENT	Catchment 101 (m^3/s) Existing Building and Gravel	Catchment 102 (m^3/s) Existing Culvert Outlet	Total Peak Existing Flow (m^3/s)
5-Year	0.199	0.020	0.219
10-Year	0.233	0.027	0.260
25-Year	0.282	0.039	0.321
50-Year	0.315	0.045	0.360
100-Year	0.349	0.053	0.402

2.3 Proposed Conditions

The proposed runoff conditions have been defined by catchments 201 and 202. See Table 2.3 and Proposed Storm Drainage Area Plan in **Appendix E**. The storm runoff from the developed site will be controlled by an underground stormwater storage tank through a **370mm diameter orifice plate at the SWM Tank Outlet**. See Servicing Plan in **Appendix E.**

Table 2.3: Proposed Conditions Catchment Areas

Catchment ID	Description	Area (ha)	Imperviousness (%)
201	*Proposed Development East of the Crash Wall/Retaining Wall (Controlled)*	1.236	87.8
202	*Vacant Grasslands West of the Crash Wall/Retaining Wall (Uncontrolled)*	0.170	0.0
	Total (201+202)	**1.342**	**80.9**

The proposed conditions were assessed using the SWMHYMO Hydrologic Modeling program developed by J.F. Sabourin & Associates for the 5-year to 100-year Town of Milton 24-hour Chicago storm distribution. The 24-hour duration storm was modelled because it generated higher required storage volumes than the 4-hour or 12-hour storms. The stormwater tanks are designed for the largest required storage at 24-hours. **Appendix A** contains detailed hydrologic modeling parameters and **Appendix B** contains SWMHYMO input/output printouts for the proposed conditions.

All stormwater management quantity controls will be controlled through the use of the underground stormwater management (SWM) tank; sized to hold approximately **273.0m^3** of stormwater. Storage requirements to control the total peak outlet from the site were determined. It is proposed to control the outlet rate using a **370mm orifice plate** at the SWM Tank outlet location**,** at an invert elevation of **198.45m**. The depth of water in the SWM tank (under a 100-year, 24-hour storm event condition) will be approximately ±2.20m (with ±143.0m^2 footprint). See SWMHYMO Model analysis in **Appendix B** and Servicing Plan in **Appendix E** for more detail.

Table 2.4 summarizes the stage-storage-discharge characteristics for the underground SWM tank.

Table 2.4: Stage-Storage-Discharge Relationship for Stormwater (SWM) Storage Tank

Elevation (m)	Cumulative Storage Volume (m^3)*	Head above C/L of Orifice (m)	Discharge (Q)* (m^3/s)	Comments
198.45	0.0	0.000	0.000	Invert of SWM Tank + Orifice
198.75	39.0	0.185	0.123	
199.05	78.0	0.485	0.199	
199.35	117.0	0.785	0.253	
199.65	156.0	1.085	0.298	
199.95	195.0	1.385	0.336	
200.35	234.0	1.685	0.371	
200.65	273.0	1.985	0.403	Top of SWM Tank

* *Volume = Base Area of SWM Tank x Depth*

** *Discharge based on orifice equation of $Q = CA(2gh)^{1/2}$*

Table 2.5 summarizes the peak discharge rates for the development under proposed conditions.

Table 2.5: Proposed Conditions Site Peak Discharge Rates

Storm Event	Proposed Conditions		
	Controlled Discharge* (Catchment 201) (m^3/s)	Uncontrolled Discharge* (Catchment 202) (m^3/s)	Total Site Discharge** Rate (m^3/s)
5-Yr	0.215	0.005	0.219
10-Yr	0.230	0.006	0.236
25-Yr	0.283	0.009	0.291
50-Yr	0.302	0.010	0.312
100-Yr	0.306	0.012	0.317

* Discharge rates based off of SWMHYMO Hydrologic Modeling

** Total discharge (controlled + uncontrolled areas)

Note that some of the flows do not add directly from each catchment due to the hydrograph timing resulting from the on-site detention.

Table 2.6 summarizes and compares the pre-development and post-development storm rates for the development.

Table 2.6: Storm Discharge Comparison – Pre- to Post-Development

Storm Event	Pre-Development Discharge (m^3/s)	Post-Development Discharge (m^3/s)	Discharge Difference
5-Year	0.219	0.219	-0.000
10-Year	0.260	0.236	-0.024
25-Year	0.321	0.291	-0.030
50-Year	0.360	0.312	-0.048
100-Year	0.402	0.317	-0.085

Table 2.7 summarizes the storage volume requirements for the underground stormwater tank for the 5-year to 100-year storm events.

Table 2.7: Proposed Conditions Volume Requirements Summary

Storm Event	Stormwater (SWM) Storage Tank – Orifice-Controlled at Outlet of SWM TANK	
	24-Hour Storage Volume Required* (m^3)	Storage Volume Provided** (m^3)
5-Yr	105.5	**± 273.0**
10-Yr	143.8	
25-Yr	161.7	
50-Yr	180.2	
100-Yr	226.5	

* *Storage Volume Required taken from SWMHYMO Modeling (24-Hour Storm Governs)*

*** Depth of storage tank for 100-year storm approximately at 2.20m*

From these results, it can be concluded that for the 5-year to 100-year storm events, the total proposed conditions peak discharge rates leaving the site are all less than the pre-development flows for the 5-year to 100-year design storms. The post-development condition discharge rates will not exceed discharge rates in the pre-development condition during all storm events. Sufficient storage volume is provided within the underground SWM storage tanks to contain the 100-year design storm for the 24-hour storm event for the site.

Stormwater Quality Control

As per MOECC, level 1 enhanced quality control for the proposed site works is required. Please note that the existing developed site is currently 53% impervious and there is currently no on-site treatment for water quality on the site. It is not our intention to retrofit the entire site to accommodate for enhanced 1 treatment; especially since the existing developed site has not been equipped with any water quality control measures.

The proposed development increases the total imperviousness of the existing site by approximately 27%. We are proposing a Stormceptor Enhanced Flow **(STC EF-8)** model that has been ETV certified for up to 61% removal for the entire site, inclusive of the existing untreated impervious surfaces. The removal of 61% TSS for the entire site far exceeds the required 80% TSS removal for the proposed site works. See Servicing Plan for STC EF-8 location and refer to the detailed Stormceptor EF Sizing Report prepared by Forterra in **Appendix C** for further detail.

2.4 Sediment and Erosion Control

During development of the site, it is important that sediment disturbed by the construction operations are controlled and maintained throughout the construction period. Sediment and erosion control measures will be implemented on site during construction and will conform to the Erosion & Sediment Control Guideline for Urban Construction (Ref 6) and Town of Milton Standards.

Sediment and erosion control measures will include:

- Installation of silt control fencing at strategic locations around the perimeter of the site where feasible;
- Preventing silt or sediment laden water from entering inlets (existing catch basins/catch basin manholes) by wrapping their tops with filter fabric or installing silt sacks, where feasible;
- Maintaining sediment and erosion control structures in good repair (including periodic cleaning as required) until such time that the Engineer or Town of Milton approves their removal. Erosion control measures to be inspected daily and after any rainfall event.
- Should excess mud-tracking occur during construction, mud-mats shall be installed to assist with mud-tracking control; where feasible

2.5 Conclusions and Recommendations

Based on the information provided herein, we conclude that the stormwater management practices for this development can be constructed to meet the requirements of the Town of Milton, Halton Region, and MOECC as follows:

- The controlled outlet rate through the use of a **370mm diameter orifice plate at** the **SWM Tank Outlet** and the proposed underground storage tank is sufficient to control the 100-year outlet rate from this site (no rooftop storage or surface storage)
- As per MOECC, enhanced quality control will be obtained through the use of a **STC EF-8** unit as described above.
- Erosion and sediment controls be installed as described in section 2.4 of this report.

Respectfully submitted,

Lanhack Consultants Inc.

Tu Vu, B. Eng., E.I.T.
Lanhack Consultants Inc.

John Lamarre, P.Eng.
Lamarre Consulting Group Inc.

3.0 Wastewater Assessment

The proposed development will consist of two (2) residential condominiums (6-storey podium + 13-15 residential storeys above) with one floor of retail/commercial space. Based on the site plan prepared by KNYMH Inc., the equivalent population density (persons/hectare) and unit sewage flow will be based on Table 3-1 in the Halton Water Wastewater Linear Design Manual (July 2017).

3.1 Existing Sanitary Drainage System

There is an existing 300mm diameter PVC sanitary sewer at a 0.33% slope along Bronte Street North where the development will discharge towards.

3.2 Sanitary Demands

The anticipated sanitary discharge from the proposed development was estimated using Table 3-2 in the Halton Water Wastewater Linear Design Manual (July 2017). Although Building B will consist of one floor of retail/commercial space, for analysis purposes, we will consider the entire building as residential space. This is the more conservative approach as it takes the equivalent population density at 285 persons/hectare (residential) as opposed to 90 persons/hectare (commercial). The sanitary discharge flow from the subject site is summarized in **Table 3.1.**

Table 3.1: Sanitary Discharge Flow Rate

Type of Development	Development Area (hectares)(1)	Equivalent Population Density (persons/hectare)(2)	Equivalent Population	Unit Sewage Flow (L/persons/day) (2)	Peak Flow(3) (L/s)
Apartment (over 6 stories high)	1.342	285.0	383.0	275.0	**4.91**
(1) Based on Site Plan prepared by KNYMH Inc.					
(2) Based on Table 3-1 in the Halton Water Wastewater Linear Design Manual (Apartment - Residential)					
(3) Peak flow obtained using peak factor of 4.03 based on Harmon Formula (Halton Standards)					

Therefore, the estimated peak(3) sanitary discharge flow is **4.91 L/s.**

3.3 Proposed Servicing Plan and Capacity Analysis

The proposed development will be serviced from the existing 300mm diameter sanitary sewer along Bronte Street North at a slope of 0.33%, with a full flow capacity of 55.6 L/s. As calculated in Table 3.1, the total anticipated peak sanitary sewer discharge from the proposed development is **4.91 L/s** which contributes to approximately 8.8% of the total sanitary system. It is expected that the receiving system has the capacity for the estimated sanitary discharge rate.

4.0 Proposed Water Assessment

The proposed development will consist of two (2) residential condominiums (6-storey podium + 13-15 residential storeys above) with one floor of retail/commercial space. Based on the site plan prepared by KNYMH Inc., the equivalent population density (persons/hectare) and average day service demands will be based on Table 2.1 and 2.2 in the Halton Water Wastewater Linear Design Manual (July 2017).

4.1 Existing Water Distribution System

The existing municipal water distribution system consists of a 400mm diameter PVC watermain within the Bronte Street North right-of-way. One existing municipal hydrant are located at the east side of the development on Plains Road West. The existing hydrant on the north side of the development on Bronte Street North. See Servicing Plan in **Appendix E** for hydrant location.

4.2 Domestic/Fire Water Demands

The expected domestic water demand for the proposed development was estimated based on Table 2-1 in the Halton Water Wastewater Linear Design Manual (July 2017). Although Building B will consist of one floor of retail/commercial space, for analysis purposes, we will consider the entire building as residential space. This is the more conservative approach as it takes the equivalent population density at 285 persons/hectare (residential) as opposed to 90 persons/hectare (commercial). Anticipated water supply demands are summarized in **Table 4.1.**

Water supply calculations for fire protection were determined using the method outlined in the Fire Underwriters Survey (FUS). **Appendix D** goes through the analysis as per the guidelines. The required fire flow is to be **17,000 L/min.**

Table 4.1: Estimated Domestic Water Supply Demands

Equivalent Population(1)	**Average Daily Demand (L/capita/day)(2)**	**Maximum Day (3) Demand (L/s)**	**Peak Hour (4) Demand (L/s)**	**Fire Flow (5) (L/s)**	**Max. Day + Fire Flow (L/s)**
383.0	275.0	**2.74**	4.88	283.33	**286.07**
(1) Based on Table 2-1 in Halton Water Wastewater Linear Design Manual (285 persons/hectare)					
(2) Based on Table 2-1 in Halton Water Wastewater Linear Design Manual (275 L/capita/day)					
(3) Based on Section 2.4 in Halton Water Wastewater Linear Design Manual (Peak Factor = 2.25)					
(4) Based on Section 2.4 in Halton Water Wastewater Linear Design Manual (Peak Factor = 4.00)					
*(5) Fire Flow of **17,000 L/min** calculation based on Fire Underwriter's Survey (FUS)*					

4.3 Proposed Water Servicing Plan and Analysis

Water servicing for the site will include the installation of a 250mm diameter fire service connected to the existing 400mm diameter watermain on Bronte Street North. A 250mm diameter domestic service will be teed off the 250mm diameter fire service to service the site. A 100mm diameter commercial service will also be teed off the 250mm diameter fire service. The fire and domestic services will be installed with backflow preventers and the domestic service will be equipped with a water meter. Refer to the Servicing Plan in **Appendix E** for further details.

Available fire flows and heads for the existing fire hydrants along Bronte Street North and Main Street West have been reviewed and confirmed by Halton Region. Refer to **Appendix D** for existing fire hydrant information. The existing fire hydrant on Main Street West (H509) has an existing fire flow of **1,066 L/s** (14,072 GPM) and the existing fire hydrant on Bronte Street North (H17636) has an existing fire flow of **1,053 L/s** (13,895 GPM). Minimum residual pressure exceeds 140 kPa (20 psi) and operating pressure exceeds 280 kPa (40 psi). The required fire flow + maximum daily demand is estimated at **286.07 L/s** which is well below the available fire flows that were provided by Halton Region. Hence, the existing fire hydrants on Main Street West and Bronte Street North satisfies the required fire flow (RFF) for the development. Please note that due to the high static hydraulic in the area (high fire flows), a pressure reducing device may be required for the water service.

5.0 Conclusion (Domestic/Fire and Sanitary)

Based on the information provided herein, we conclude that the maximum water supply flow and the sanitary discharge at 28-60 Bronte Street North meet the design requirements of the Town of Milton, Halton Region, and the Ministry of Environment and Climate Change (MOECC). Therefore:

Sanitary Drainage System

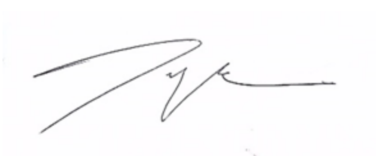
- The sanitary discharge for the subject site will discharge to the existing 300mm diameter sanitary sewer along Bronte Street North. The anticipated peak discharge will be **5.11 L/s**.

Water Supply System

- The water supply for the subject site will be serviced from the existing **400mm** diameter watermain along Bronte Street North. The anticipated maximum daily water consumption rate for the development will be **2.86 L/s**.
- A minimum fire suppression flow of approximately **17,000 L/min (283.33 L/s)** will be required as per the guidelines of the Fire Underwriters Survey (FUS).

We trust the information enclosed herein is satisfactory. Should you have any questions please do not hesitate to contact our office.

Respectfully submitted,



Tu Vu, B.Eng., E.I.T.
Lanhack Consultants Inc.

Dave Hacking, P.Eng
Lanhack Consultants Inc.

APPENDIX A: Stormwater Management Information

The rainfall intensities used in the SWMHYMO Modeling Program were taken from the IDF Curve from the Town of Milton (based on Engineering and Parks Standard Manual). From this information, we were able to determine the intensity coefficients for each storm event, as shown below.

Town of Milton – Intensity, Duration, Frequency (IDF) Curves
IDF PARAMETERS

Parameter	2	5	10	25	50	100
A	779.00	959.00	1089.00	1234.00	1323.00	1435.00
B	6.00	5.70	5.70	5.50	5.30	5.20
C	0.8206	0.8024	0.7955	0.7863	0.7786	0.7751

Source: Town of Milton – IDF Curves: Engineering and Parks Standards Manual

Design storm information used in the hydrologic modeling was based on Chicago Storm Distribution Intensity-Duration Frequency (IDF) equations for the Town of Milton in the form:

$$i = \frac{A}{(t+B)^C}$$

- i = rainfall intensity (mm/hour)
- t = time of concentration in minutes (10 minutes)
- A, B and C = constant (see above)

APPENDIX B: SWMHYMO Input and Summary

INPUT:

```
*************************************************************************
*              28 Bronte Street North                                   *
*              DATE:   September 2018                                   *
*              FILE:   Bronte.dat                                       *
*                                                                       *
*   ALLOWABLE OUTLET RATE = Pre-Development Flows                       *
*                                                                       *
*************************************************************************
START          TZERO=[0.0]hrs,  METOUT=[2],  NSTORM=[1],  NRUN=[1]
*************************************************************************
#************************************************************************
*# 5 YEAR (24 HOUR) - PRE-DEVELOPMENT FLOWS
*#***********************************************************************
CHICAGO STORM      IUNITS=2 TD=24hrs TPRAT=.38 CSDT=10min ICASEcs=1
             A=959.00  B=5.70 and C=.8024
*#***********************************************************************
*# CATCHMENT 101
*#***********************************************************************
CALIB STANDHYD     ID=1 NHYD=101 DT=5 min AREA=0.887ha XIMP=0.75
            TIMP=0.75  DWF=0 cms, LOSS=2, CN=70
            IAper=5.0 mm SLPP=2.0% LGP=60m, MNP=0.250 SCP=0.0
            IAimp=1.0 mm SLPI=2.0% LGI=60m, MNI=0.014 SCI=0.0 -1
*#***********************************************************************
*# CATCHMENT 102
*#***********************************************************************
CALIB NASHYD       ID=2 NHYD=102 DT=5 min AREA=0.455
            DWF=0.0cms CN=70 IA=5mm N=3 TP=0.25hrs -1
*#***********************************************************************
*# 5 YEAR (24 HOUR) - POST-DEVELOPMENT FLOWS
*#***********************************************************************
*# CATCHMENT 202
*#***********************************************************************
CALIB NASHYD       ID=1 NHYD=202 DT=5 min AREA=0.106
            DWF=0.0cms CN=70 IA=5mm N=3 TP=0.25hrs -1
*#***********************************************************************
*# CATCHMENT 201
*#***********************************************************************
CALIB STANDHYD     ID=3 NHYD=201 DT=5 min AREA=1.236ha XIMP=0.88
            TIMP=0.88  DWF=0 cms, LOSS=2, CN=70
            IAper=5.0 mm SLPP=2.0% LGP=60m, MNP=0.250 SCP=0.0
            IAimp=1.0 mm SLPI=2.0% LGI=60m, MNI=0.014 SCI=0.0 -1

ROUTE RESERVOIR    ID=4 NHYD=201  IDIN=3  DT=5min
            DISCH(cms)  STORAGE(ha m)
             0.000      .0000
             0.123      .0039
             0.199      .0078
             0.253      .0117
             0.298      .0156
             0.336      .0195
             0.371      .0234
             0.403      .0273   -1   -1

ADD HYD          IDsum=5 NHYD=201 ID=4 ID=1

*#***********************************************************************
*# 10 YEAR (24 HOUR) - PRE-DEVELOPMENT FLOWS
*#***********************************************************************
CHICAGO STORM      IUNITS=2 TD=24hrs TPRAT=.38 CSDT=10min ICASEcs=1
             A=1089.00  B=5.70 and C=.7955
*#***********************************************************************
*# CATCHMENT 101
```

```
*#**********************************************************************
CALIB STANDHYD      ID=1 NHYD=101 DT=5 min AREA=0.887ha XIMP=0.75
             TIMP=0.75  DWF=0 cms, LOSS=2, CN=70
             IAper=5.0 mm SLPP=2.0% LGP=60m, MNP=0.250 SCP=0.0
             IAimp=1.0 mm SLPI=2.0% LGI=60m, MNI=0.014 SCI=0.0 -1
*#**********************************************************************
*# CATCHMENT 102
*#**********************************************************************
CALIB NASHYD       ID=2 NHYD=102 DT=5 min AREA=0.455
             DWF=0.0cms CN=70 IA=5mm N=3 TP=0.25hrs -1
*#**********************************************************************
*# 10 YEAR (24 HOUR) - POST-DEVELOPMENT FLOWS
*#**********************************************************************
*# CATCHMENT 202
*#**********************************************************************
CALIB NASHYD       ID=1 NHYD=202 DT=5 min AREA=0.106
             DWF=0.0cms CN=70 IA=5mm N=3 TP=0.25hrs -1
*#**********************************************************************
*# CATCHMENT 201
*#**********************************************************************
CALIB STANDHYD      ID=3 NHYD=201 DT=5 min AREA=1.236ha XIMP=0.88
             TIMP=0.88  DWF=0 cms, LOSS=2, CN=70
             IAper=5.0 mm SLPP=2.0% LGP=60m, MNP=0.250 SCP=0.0
             IAimp=1.0 mm SLPI=2.0% LGI=60m, MNI=0.014 SCI=0.0 -1

ROUTE RESERVOIR    ID=4 NHYD=201  IDIN=3  DT=5min
             DISCH(cms)  STORAGE(ha m)
              0.000      .0000
              0.123      .0039
              0.199      .0078
              0.253      .0117
              0.298      .0156
              0.336      .0195
              0.371      .0234
              0.403      .0273   -1   -1

ADD HYD          IDsum=5 NHYD=201 ID=4 ID=1

*#**********************************************************************
*# 25 YEAR (24 HOUR) - PRE-DEVELOPMENT FLOWS
*#**********************************************************************
CHICAGO STORM      IUNITS=2 TD=24hrs TPRAT=.38 CSDT=10min ICASEcs=1
              A=1234.00  B=5.50 and C=.7786
*#**********************************************************************
*# CATCHMENT 101
*#**********************************************************************
CALIB STANDHYD      ID=1 NHYD=101 DT=5 min AREA=0.887ha XIMP=0.75
             TIMP=0.75  DWF=0 cms, LOSS=2, CN=70
             IAper=5.0 mm SLPP=2.0% LGP=60m, MNP=0.250 SCP=0.0
             IAimp=1.0 mm SLPI=2.0% LGI=60m, MNI=0.014 SCI=0.0 -1
*#**********************************************************************
*# CATCHMENT 102
*#**********************************************************************
CALIB NASHYD       ID=2 NHYD=102 DT=5 min AREA=0.455
             DWF=0.0cms CN=70 IA=5mm N=3 TP=0.25hrs -1
*#**********************************************************************
*# 25 YEAR (24 HOUR) - POST-DEVELOPMENT FLOWS
*#**********************************************************************
*# CATCHMENT 202
*#**********************************************************************
CALIB NASHYD       ID=1 NHYD=202 DT=5 min AREA=0.106
             DWF=0.0cms CN=70 IA=5mm N=3 TP=0.25hrs -1
*#**********************************************************************
*# CATCHMENT 201
*#**********************************************************************
CALIB STANDHYD      ID=3 NHYD=201 DT=5 min AREA=1.236ha XIMP=0.88
```

```
              TIMP=0.88  DWF=0 cms, LOSS=2, CN=70
              IAper=5.0 mm SLPP=2.0% LGP=60m, MNP=0.250 SCP=0.0
              IAimp=1.0 mm SLPI=2.0% LGI=60m, MNI=0.014 SCI=0.0 -1

ROUTE RESERVOIR     ID=4 NHYD=201  IDIN=3  DT=5min
              DISCH(cms)  STORAGE(ha m)
               0.000      .0000
               0.123      .0039
               0.199      .0078
               0.253      .0117
               0.298      .0156
               0.336      .0195
               0.371      .0234
               0.403      .0273    -1    -1

ADD HYD          IDsum=5 NHYD=201 ID=4 ID=1

*#**********************************************************************
*# 50 YEAR (24 HOUR) - PRE-DEVELOPMENT FLOWS
*#**********************************************************************
CHICAGO STORM       IUNITS=2 TD=24hrs TPRAT=.38 CSDT=10min ICASEcs=1
               A=1323.00  B=5.30 and C=.7786
*#**********************************************************************
*# CATCHMENT 101
*#**********************************************************************
CALIB STANDHYD      ID=1 NHYD=101 DT=5 min AREA=0.887ha XIMP=0.75
              TIMP=0.75  DWF=0 cms, LOSS=2, CN=70
              IAper=5.0 mm SLPP=2.0% LGP=60m, MNP=0.250 SCP=0.0
              IAimp=1.0 mm SLPI=2.0% LGI=60m, MNI=0.014 SCI=0.0 -1
*#**********************************************************************
*# CATCHMENT 102
*#**********************************************************************
CALIB NASHYD        ID=2 NHYD=102 DT=5 min AREA=0.455
              DWF=0.0cms CN=70 IA=5mm N=3 TP=0.25hrs -1
*#**********************************************************************
*# 50 YEAR (24 HOUR) - POST-DEVELOPMENT FLOWS
*#**********************************************************************
*# CATCHMENT 202
*#**********************************************************************
CALIB NASHYD        ID=1 NHYD=202 DT=5 min AREA=0.106
              DWF=0.0cms CN=70 IA=5mm N=3 TP=0.25hrs -1
*#**********************************************************************
*# CATCHMENT 201
*#**********************************************************************
CALIB STANDHYD      ID=3 NHYD=201 DT=5 min AREA=1.236ha XIMP=0.88
              TIMP=0.88  DWF=0 cms, LOSS=2, CN=70
              IAper=5.0 mm SLPP=2.0% LGP=60m, MNP=0.250 SCP=0.0
              IAimp=1.0 mm SLPI=2.0% LGI=60m, MNI=0.014 SCI=0.0 -1

ROUTE RESERVOIR     ID=4 NHYD=201  IDIN=3  DT=5min
              DISCH(cms)  STORAGE(ha m)
               0.000      .0000
               0.123      .0039
               0.199      .0078
               0.253      .0117
               0.298      .0156
               0.336      .0195
               0.371      .0234
               0.403      .0273    -1    -1

ADD HYD          IDsum=5 NHYD=201 ID=4 ID=1

*#**********************************************************************
*# 100 YEAR (24 HOUR) - PRE-DEVELOPMENT FLOWS
*#**********************************************************************
CHICAGO STORM       IUNITS=2 TD=24hrs TPRAT=.38 CSDT=10min ICASEcs=1
```

```
                A=1435.00  B=5.20 and C=.7751
*#**********************************************************************
*# CATCHMENT 101
*#**********************************************************************
CALIB STANDHYD      ID=1 NHYD=101 DT=5 min AREA=0.887ha XIMP=0.75
               TIMP=0.75  DWF=0 cms, LOSS=2, CN=70
               IAper=5.0 mm SLPP=2.0% LGP=60m, MNP=0.250 SCP=0.0
               IAimp=1.0 mm SLPI=2.0% LGI=60m, MNI=0.014 SCI=0.0 -1
*#**********************************************************************
*# CATCHMENT 102
*#**********************************************************************
CALIB NASHYD        ID=2 NHYD=102 DT=5 min AREA=0.455
               DWF=0.0cms CN=70 IA=5mm N=3 TP=0.25hrs -1
*#**********************************************************************
*# 100 YEAR (24 HOUR) - POST-DEVELOPMENT FLOWS
*#**********************************************************************
*# CATCHMENT 202
*#**********************************************************************
CALIB NASHYD        ID=1 NHYD=202 DT=5 min AREA=0.106
               DWF=0.0cms CN=70 IA=5mm N=3 TP=0.25hrs -1
*#**********************************************************************
*# CATCHMENT 201
*#**********************************************************************
CALIB STANDHYD      ID=3 NHYD=201 DT=5 min AREA=1.236ha XIMP=0.88
               TIMP=0.88  DWF=0 cms, LOSS=2, CN=70
               IAper=5.0 mm SLPP=2.0% LGP=60m, MNP=0.250 SCP=0.0
               IAimp=1.0 mm SLPI=2.0% LGI=60m, MNI=0.014 SCI=0.0 -1

ROUTE RESERVOIR     ID=4 NHYD=201  IDIN=3  DT=5min
               DISCH(cms)  STORAGE(ha m)
                0.000      .0000
                0.123      .0039
                0.199      .0078
                0.253      .0117
                0.298      .0156
                0.336      .0195
                0.371      .0234
                0.403      .0273    -1    -1

ADD HYD          IDsum=5 NHYD=201 ID=4 ID=1

FINISH
```

SUMMARY:

```
RUN:COMMAND#
 001:0001-----------------------------------------------------------------------------
    START
     [TZERO =    .00 hrs on       0]
     [METOUT=   2    (1=imperial, 2=metric output)]
     [NSTORM=   1 ]
     [NRUN  =   1 ]
#**************************************************************************
# 5 YEAR (24 HOUR) - PRE-DEVELOPMENT FLOWS
#**************************************************************************
 001:0002-----------------------------------------------------------------------------
    CHICAGO STORM
     [SDT=10.00:SDUR=  24.00:PTOT=  67.05]
     [A/B/C= 959.000/   5.700/    .802]
#**************************************************************************
# CATCHMENT 101
#**************************************************************************
 001:0003---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  CALIB STANDHYD     01:      101      .89     .199 No_date    9:10   55.17 .823
     [XIMP=.75:TIMP=.75]
     [LOSS= 2 :CN= 70.0]
     [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  60.:MNP=.250:SCP=   .0]
     [Impervious   area: IAimp= 1.00:SLPI=2.00:LGI=  60.:MNI=.014:SCI=   .0]
#**************************************************************************
# CATCHMENT 102
#**************************************************************************
 001:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB NASHYD      02:      102      .46     .020 No_date    9:25   22.53 .336
     [CN= 70.0: N= 3.00]
     [Tp=  .25:DT= 5.00]
#**************************************************************************
# 5 YEAR (24 HOUR) - POST-DEVELOPMENT FLOWS
#**************************************************************************
# CATCHMENT 202
#**************************************************************************
 001:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB NASHYD      01:      202      .11     .005 No_date    9:25   22.52 .336
     [CN= 70.0: N= 3.00]
     [Tp=  .25:DT= 5.00]
#**************************************************************************
# CATCHMENT 201
#**************************************************************************
 001:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  CALIB STANDHYD     03:      201     1.24     .321 No_date    9:10   60.82 .907
     [XIMP=.88:TIMP=.88]
     [LOSS= 2 :CN= 70.0]
     [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  60.:MNP=.250:SCP=   .0]
     [Impervious   area: IAimp= 1.00:SLPI=2.00:LGI=  60.:MNI=.014:SCI=   .0]
 001:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 03:      201     1.24     .321 No_date    9:10   60.82  n/a
     [RDT= 5.00] out<- 04:      201     1.24     .215 No_date    9:15   60.82  n/a
    {MxStoUsed=.1055E-01}
 001:0008---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD           04:      201     1.24     .215 No_date    9:15   60.82  n/a
                  +  01:      202      .11     .005 No_date    9:25   22.52  n/a
     [DT= 5.00]  SUM=  05:      201     1.34     .219 No_date    9:15   57.80  n/a
#**************************************************************************
# 10 YEAR (24 HOUR) - PRE-DEVELOPMENT FLOWS
#**************************************************************************
 001:0009-----------------------------------------------------------------------------
    CHICAGO STORM
     [SDT=10.00:SDUR=  24.00:PTOT=  80.06]
     [A/B/C=1089.000/   5.700/    .795]
#**************************************************************************
```

```
# CATCHMENT 101
#***********************************************************************
 001:0010---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  CALIB STANDHYD     01:       101      .89     .233 No_date    9:10   66.95 .836
     [XIMP=.75:TIMP=.75]
     [LOSS= 2 :CN= 70.0]
     [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  60.:MNP=.250:SCP=   .0]
     [Impervious   area: IAimp= 1.00:SLPI=2.00:LGI=  60.:MNI=.014:SCI=   .0]
#***********************************************************************
# CATCHMENT 102
#***********************************************************************
 001:0011---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB NASHYD       02:       102      .46     .027 No_date    9:20   30.63 .383
     [CN= 70.0: N= 3.00]
     [Tp=  .25:DT= 5.00]
#***********************************************************************
# 10 YEAR (24 HOUR) - POST-DEVELOPMENT FLOWS
#***********************************************************************
# CATCHMENT 202
#***********************************************************************
 001:0012---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB NASHYD       01:       202      .11     .006 No_date    9:20   30.63 .383
     [CN= 70.0: N= 3.00]
     [Tp=  .25:DT= 5.00]
#***********************************************************************
# CATCHMENT 201
#***********************************************************************
 001:0013---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  CALIB STANDHYD     03:       201     1.24     .373 No_date    9:10   73.25 .915
     [XIMP=.88:TIMP=.88]
     [LOSS= 2 :CN= 70.0]
     [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  60.:MNP=.250:SCP=   .0]
     [Impervious   area: IAimp= 1.00:SLPI=2.00:LGI=  60.:MNI=.014:SCI=   .0]
 001:0014---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 03:       201     1.24     .373 No_date    9:10   73.25  n/a
     [RDT= 5.00] out<- 04:       201     1.24     .230 No_date    9:15   73.25  n/a
    {MxStoUsed=.1438E-01}
 001:0015---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            04:       201     1.24     .230 No_date    9:15   73.25  n/a
                  + 01:       202      .11     .006 No_date    9:20   30.63  n/a
     [DT= 5.00]  SUM=  05:       201     1.34     .236 No_date    9:15   69.88  n/a
#***********************************************************************
# 25 YEAR (24 HOUR) - PRE-DEVELOPMENT FLOWS
#***********************************************************************
 001:0016---------------------------------------------------------------------------
    CHICAGO STORM
     [SDT=10.00:SDUR=  24.00:PTOT= 102.60]
     [A/B/C=1234.000/   5.500/    .779]
#***********************************************************************
# CATCHMENT 101
#***********************************************************************
 001:0017---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  CALIB STANDHYD     01:       101      .89     .282 No_date    9:10   87.73 .855
     [XIMP=.75:TIMP=.75]
     [LOSS= 2 :CN= 70.0]
     [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  60.:MNP=.250:SCP=   .0]
     [Impervious   area: IAimp= 1.00:SLPI=2.00:LGI=  60.:MNI=.014:SCI=   .0]
#***********************************************************************
# CATCHMENT 102
#***********************************************************************
 001:0018---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB NASHYD       02:       102      .46     .039 No_date    9:20   46.14 .450
     [CN= 70.0: N= 3.00]
     [Tp=  .25:DT= 5.00]
#***********************************************************************
# 25 YEAR (24 HOUR) - POST-DEVELOPMENT FLOWS
```

```
#**********************************************************************
# CATCHMENT 202
#**********************************************************************
 001:0019---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB NASHYD      01:      202      .11     .009 No_date    9:20   46.13 .450
     [CN= 70.0: N= 3.00]
     [Tp=  .25:DT= 5.00]
#**********************************************************************
# CATCHMENT 201
#**********************************************************************
 001:0020---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  CALIB STANDHYD     03:      201     1.24     .450 No_date    9:10   94.94 .925
     [XIMP=.88:TIMP=.88]
     [LOSS= 2 :CN= 70.0]
     [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  60.:MNP=.250:SCP=   .0]
     [Impervious   area: IAimp= 1.00:SLPI=2.00:LGI=  60.:MNI=.014:SCI=   .0]
 001:0021---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 03:      201     1.24     .450 No_date    9:10   94.94  n/a
     [RDT= 5.00] out<- 04:      201     1.24     .283 No_date    9:15   94.94  n/a
    {MxStoUsed=.1617E-01}
 001:0022---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD           04:      201     1.24     .283 No_date    9:15   94.94  n/a
                 + 01:      202      .11     .009 No_date    9:20   46.13  n/a
     [DT= 5.00]  SUM=  05:      201     1.34     .291 No_date    9:15   91.09  n/a
#**********************************************************************
# 50 YEAR (24 HOUR) - PRE-DEVELOPMENT FLOWS
#**********************************************************************
 001:0023---------------------------------------------------------------------------
    CHICAGO STORM
     [SDT=10.00:SDUR=  24.00:PTOT= 110.01]
     [A/B/C=1323.000/   5.300/    .779]
#**********************************************************************
# CATCHMENT 101
#**********************************************************************
 001:0024---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  CALIB STANDHYD     01:      101      .89     .315 No_date    9:10   94.65 .860
     [XIMP=.75:TIMP=.75]
     [LOSS= 2 :CN= 70.0]
     [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  60.:MNP=.250:SCP=   .0]
     [Impervious   area: IAimp= 1.00:SLPI=2.00:LGI=  60.:MNI=.014:SCI=   .0]
#**********************************************************************
# CATCHMENT 102
#**********************************************************************
 001:0025---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB NASHYD      02:      102      .46     .045 No_date    9:20   51.56 .469
     [CN= 70.0: N= 3.00]
     [Tp=  .25:DT= 5.00]
#**********************************************************************
# 50 YEAR (24 HOUR) - POST-DEVELOPMENT FLOWS
#**********************************************************************
# CATCHMENT 202
#**********************************************************************
 001:0026---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    CALIB NASHYD      01:      202      .11     .010 No_date    9:20   51.56 .469
     [CN= 70.0: N= 3.00]
     [Tp=  .25:DT= 5.00]
#**********************************************************************
# CATCHMENT 201
#**********************************************************************
 001:0027---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  CALIB STANDHYD     03:      201     1.24     .493 No_date    9:10  102.11 .928
     [XIMP=.88:TIMP=.88]
     [LOSS= 2 :CN= 70.0]
     [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  60.:MNP=.250:SCP=   .0]
     [Impervious   area: IAimp= 1.00:SLPI=2.00:LGI=  60.:MNI=.014:SCI=   .0]
 001:0028---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
```

```
   ROUTE RESERVOIR -> 03:      201     1.24     .493 No_date    9:10  102.11  n/a
    [RDT= 5.00] out<- 04:      201     1.24     .302 No_date    9:15  102.11  n/a
   {MxStoUsed=.1802E-01}
 001:0029---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
   ADD HYD          04:      201     1.24     .302 No_date    9:15  102.11  n/a
              + 01:      202      .11     .010 No_date    9:20   51.56  n/a
    [DT= 5.00]  SUM=  05:      201     1.34     .312 No_date    9:15   98.12  n/a
#**************************************************************************
# 100 YEAR (24 HOUR) - PRE-DEVELOPMENT FLOWS
#**************************************************************************
 001:0030--------------------------------------------------------------------------
   CHICAGO STORM
    [SDT=10.00:SDUR=  24.00:PTOT= 122.41]
    [A/B/C=1435.000/   5.200/    .775]
#**************************************************************************
# CATCHMENT 101
#**************************************************************************
 001:0031---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  CALIB STANDHYD     01:      101      .89     .349 No_date    9:10  106.28 .868
    [XIMP=.75:TIMP=.75]
    [LOSS= 2 :CN= 70.0]
    [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  60.:MNP=.250:SCP=   .0]
    [Impervious   area: IAimp= 1.00:SLPI=2.00:LGI=  60.:MNI=.014:SCI=   .0]
#**************************************************************************
# CATCHMENT 102
#**************************************************************************
 001:0032---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
   CALIB NASHYD      02:      102      .46     .053 No_date    9:20   60.92 .498
    [CN= 70.0: N= 3.00]
    [Tp=  .25:DT= 5.00]
#**************************************************************************
# 100 YEAR (24 HOUR) - POST-DEVELOPMENT FLOWS
#**************************************************************************
# CATCHMENT 202
#**************************************************************************
 001:0033---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
   CALIB NASHYD      01:      202      .11     .012 No_date    9:20   60.92 .498
    [CN= 70.0: N= 3.00]
    [Tp=  .25:DT= 5.00]
#**************************************************************************
# CATCHMENT 201
#**************************************************************************
 001:0034---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  CALIB STANDHYD     03:      201     1.24     .544 No_date    9:10  114.15 .933
    [XIMP=.88:TIMP=.88]
    [LOSS= 2 :CN= 70.0]
    [Pervious     area: IAper= 5.00:SLPP=2.00:LGP=  60.:MNP=.250:SCP=   .0]
    [Impervious   area: IAimp= 1.00:SLPI=2.00:LGI=  60.:MNI=.014:SCI=   .0]
 001:0035---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
   ROUTE RESERVOIR -> 03:      201     1.24     .544 No_date    9:10  114.15  n/a
    [RDT= 5.00] out<- 04:      201     1.24     .306 No_date    9:15  114.15  n/a
   {MxStoUsed=.2265E-01}
 001:0036---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
   ADD HYD          04:      201     1.24     .306 No_date    9:15  114.15  n/a
              + 01:      202      .11     .012 No_date    9:20   60.92  n/a
    [DT= 5.00]  SUM=  05:      201     1.34     .317 No_date    9:15  109.94  n/a
 001:0037--------------------------------------------------------------------------
    FINISH
```

APPENDIX C: Stormceptor Enhanced Flow Unit (STC EF-8) Sizing

Stormceptor®

FORTERRA

Detailed Stormceptor Sizing Report – EFO

Project Information & Location			
Project Name	Milton Site	**Project Number**	8701
City	Milton	**State/ Province**	Ontario
Country	Canada	**Date**	9/7/2018
Designer Information		**EOR Information (optional)**	
Name	Kent Campbell	**Name**	Tu Vu
Company	Forterra Pipe & Products	**Company**	Lanhack
Phone #	519-622-7574	**Phone #**	
Email	kent.campbell@forterrabp.com	**Email**	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	EFO
Recommended Stormceptor Model	EF8
TSS Removal (%) Provided	61
PSD	CA ETV
RainFall Station	TORONTO CENTRAL

The recommended Stormceptor model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

EF Sizing Summary		
EF Model	**% TSS Removal Provided**	**% Runoff Volume Captured Provided**
EF4	52	85
EF6	57	94
EF8	61	97
EF10	64	99
EF12	66	99
Parallel Units / MAX	Custom	Custom

OVERVIEW

Stormceptor ® EF is a continuation and evolution of the most globally recognized oil-grit separator (OGS) stormwater treatment technology - **Stormceptor ®.** Also known as a hydrodynamic separator, the enhanced flow Stormceptor EF is a high performing oil-grit separator that effectively removes a wide variety of pollutants from stormwater and snowmelt runoff at higher flow rates as compared to the original Stormceptor. Stormceptor EF captures and retains sediment (TSS), free oils, gross pollutants and other pollutants that attach to particles, such as nutrients and metals. Stormceptor EF's patent-pending treatment and scour prevention technology and internal bypass ensures sediment is retained during all rainfall events.

Sizing Methodology

Stormceptor ® EF and Stormceptor ® EFO are sized using local historical rainfall data for the site of interest, specific site parameters, and a performance curve for TSS removal derived from third-party testing conducted in accordance with the Canadian Environmental Technology Verification (ETV) Program's Procedure for Laboratory Testing of OilGrit Separators. Every Stormceptor unit is designed to achieve the specified target TSS removal, however, for sites where oil/fuel capture and retention is an additional specified water quality objective Stormceptor EFO is the proper selection. The sizing methodology includes various considerations, including:

- Site parameters
- Local historical rainfall data
- Capture of the Canadian ETV particle size distribution
- Requirements for oil/fuel capture and retention
- Performance results from third-party testing and verification

Hydrology Analysis

PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of Stormceptor are based on the average annual removal of TSS for the selected site parameters. The Stormceptor is engineered to capture sediment particles by treating the required average annual runoff volume, ensuring positive removal efficiency is maintained during each rainfall event, and preventing negative removal efficiency (scour).
Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station			
State/Province	Ontario	**Total Number of Rainfall Events**	3329
Rainfall Station Name	TORONTO CENTRAL	**Total Rainfall (mm)**	13189.2
Station ID #	0100	**Average Annual Rainfall (mm)**	732.7
Coordinates	43°40'N, 79°20'W	**Total Evaporation (mm)**	1317.2
Elevation (ft)	328	**Total Infiltration (mm)**	648.2
Years of Rainfall Data	18	**Total Rainfall that is Runoff (mm)**	11223.8

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

ONLINE APPLICATION
Stormceptor EF's internal bypass and patent-pending scour prevention technology has demonstrated very effective retention of pollutants in third-party testing and verification following the Canadian ETV's **Procedure for Laboratory Testing of Oil-Grit Separators.** Sediment scour prevention demonstrated an effluent concentration of less than 10 mg/L for sediment particles ranging from 1 to 1,000 microns, even during peak influent flow rates associated with infrequent high intensity storm events. While Stormceptor EF will capture oil, only the Stormceptor EFO configuration has been third-party tested and verified to retain greater than 99% of captured oil. Based on these verified performance attributes, the most efficient and widely accepted application of Stormceptor EF is an online configuration, which allows all upstream conveyance flows to enter and exit the unit. The online application eliminates the need for costly additional bypass structures, piping and installation expense.

FLOW ENTRANCE OPTIONS

Single Inlet Pipe – A common design which includes one inlet pipe and one outlet pipe. A 90-degree (maximum) bend is also accepted with this configuration.

Inlet Grate – Allows surface runoff to enter the unit from grade. The inlet grate option can also be used in conjunction with one inlet pipe or multiple inlet pipes. A removable flow deflector is added in the Stormceptor EF4/EFO4.

Maximum Pipe Diameter		
Model	Inlet (In/mm)	Outlet (In/mm)
EF4 / EFO4	24 / 610	24 / 610
EF6 / EFO6	36 / 915	36 / 915
EF8/ EFO8	48 / 1220	48 / 1220
EF10/EFO10	72 / 1828	72 / 1828
EF12/EFO12	72 / 1828	72 / 1828

Multiple Inlet Pipe – Allows for multiple inlet pipes of various diameters to enter the unit.

Maximum Pipe Diameter		
Model	Inlet (In/mm)	Outlet (In/mm)
EF4 / EFO4	18 / 457	24 / 610
EF6 / EFO6	30 / 762	36 / 915
EF8/ EFO8	42 / 1067	48 / 1220
EF10/EFO10	60 / 1524	72 / 1828
EF12/EFO12	60 / 1524	72 / 1828

Drainage Area	
Total Area (ha)	1.343
Imperviousness %	95.0

Up Stream Storage	
Storage (ha-m)	Discharge (cms)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cms)	0.00000

Water Quality Objective	
TSS Removal (%)	60.0
Runoff Volume Capture (%)	90.00
Oil Spill Capture Volume (L)	
Peak Conveyed Flow Rate (L/s)	
Water Quality Flow Rate (L/s)	

Design Details	
Stormceptor Inlet Invert Elev (m)	
Stormceptor Outlet Invert Elev (m)	
Stormceptor Rim Elev (m)	
Normal Water Level Elevation (m)	
Pipe Diameter (mm)	
Pipe Material	
Multiple Inlets (Y/N)	No
Grate Inlet (Y/N)	No

Particle Size Distribution (PSD)

Removing the smallest fraction of particulates from runoff ensures the majority of pollutants, such as metals, hydrocarbons and nutrients are captured. The table below identifies the Particle Size Distribution (PSD) that was selected to define TSS removal for the Stormceptor design.

CA ETV		
Particle Diameter (microns)	Distribution %	Specific Gravity
2.0	5.0	2.65
5.0	5.0	2.65
8.0	10.0	2.65
20.0	15.0	2.65
50.0	10.0	2.65
75.0	5.0	2.65
100.0	10.0	2.65
150.0	15.0	2.65
250.0	15.0	2.65
500.0	5.0	2.65
1000.0	5.0	2.65

Stormceptor® FORTERRA

Site Name	EFO

Site Details

Drainage Area	
Total Area (ha)	1.343
Imperviousness %	95.0

Infiltration Parameters	
Horton's equation is used to estimate infiltration	
Max. Infiltration Rate (mm/hr)	61.98
Min. Infiltration Rate (mm/hr)	10.16
Decay Rate (1/sec)	0.00055
Regeneration Rate (1/sec)	0.01

Surface Characteristics	
Width (m)	232.00
Slope %	2
Impervious Depression Storage (mm)	0.508
Pervious Depression Storage (mm)	5.08
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Evaporation	
Daily Evaporation Rate (mm/day)	2.54

Dry Weather Flow	
Dry Weather Flow (lps)	0

Maintenance Frequency	
Maintenance Frequency (months) >	12

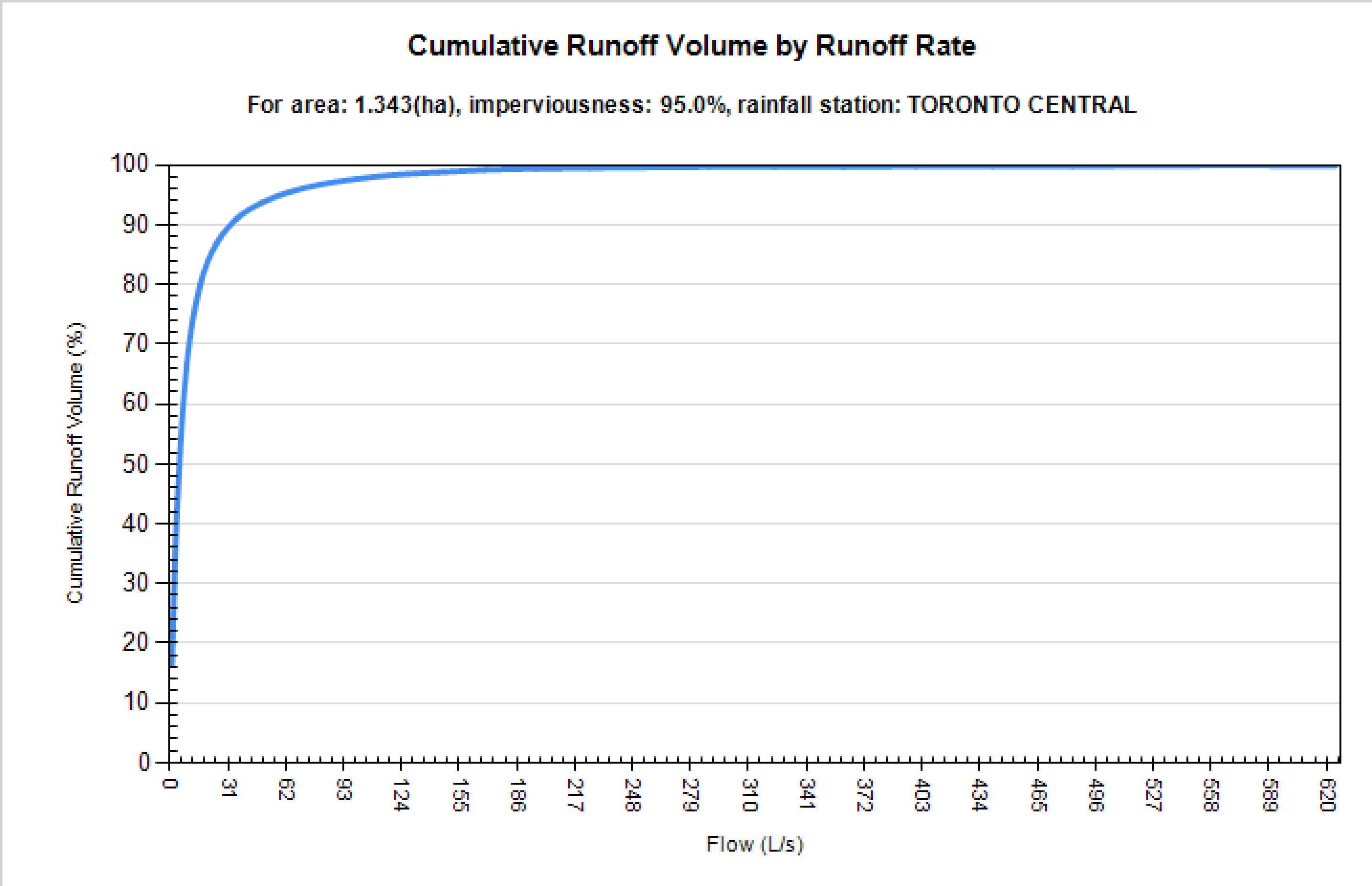
Winter Months	
Winter Infiltration	0

TSS Loading Parameters	
TSS Loading Function	Build Up/ Wash-off

Buildup/Wash-off Parameters	
Target Event Mean Conc. (EMC) mg/L	125
Exponential Buildup Power	0.40
Exponential Washoff Exponent	0.20

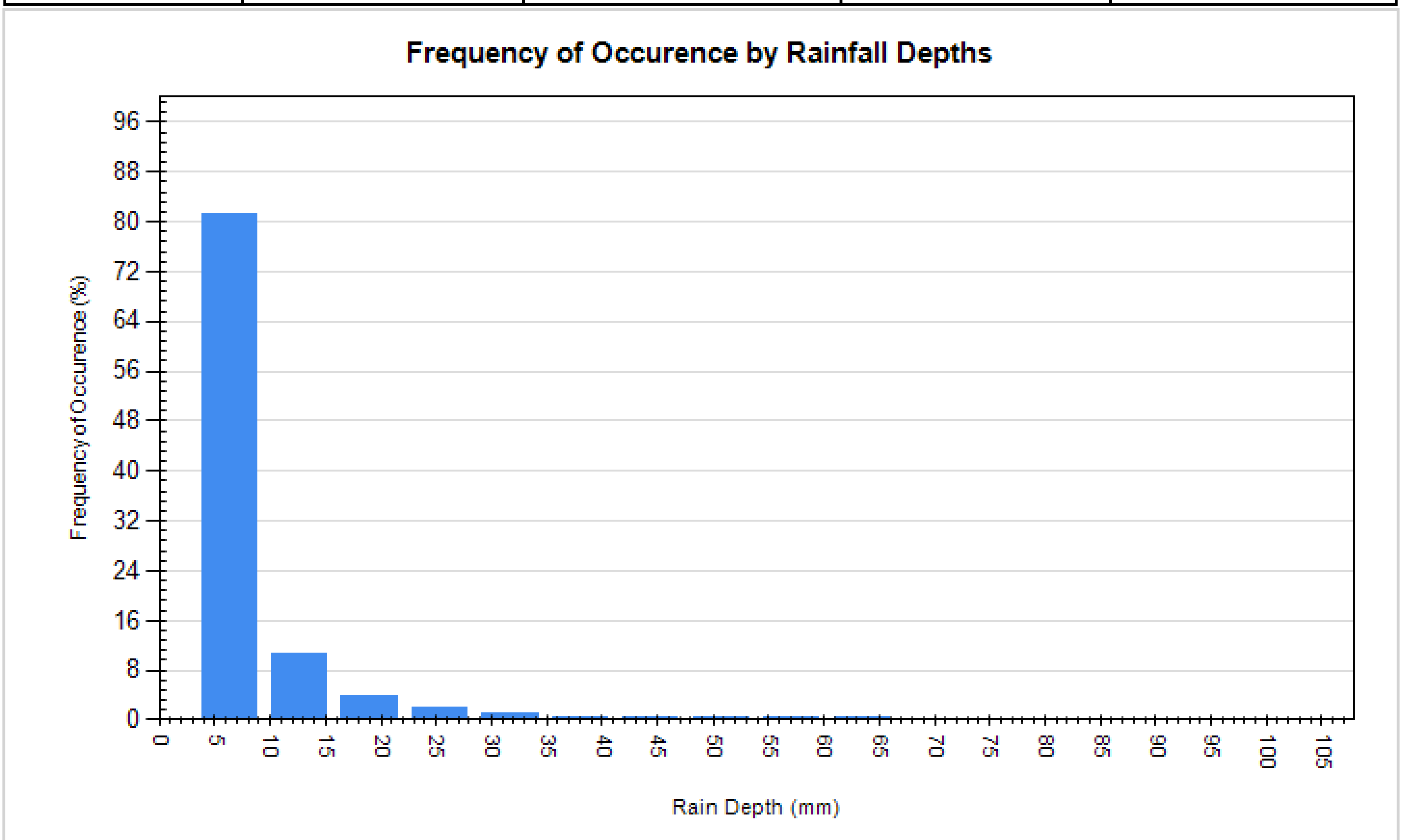
TSS Availability Parameters	
Availability Constant A	0.05
Availability Factor B	0.04
Availability Exponent C	1.10
Min. Particle Size Affected by Availability (micron)	400

Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (L/s)	**Runoff Volume (m^3)**	**Volume Over (m^3)**	**Cumulative Runoff Volume (%)**
1	24697	126987	16.3
4	67215	84475	44.3
9	100995	50710	66.6
16	121020	30665	79.8
25	131826	19863	86.9
36	138198	13487	91.1
49	142182	9503	93.7
64	144901	6782	95.5
81	146853	4831	96.8
100	148239	3444	97.7
121	149209	2474	98.4
144	149912	1772	98.8
169	150412	1271	99.2
196	150778	905	99.4
225	151000	683	99.5
256	151105	578	99.6
289	151174	509	99.7
324	151237	446	99.7
361	151295	389	99.7
400	151349	335	99.8
441	151386	298	99.8
484	151424	259	99.8
529	151465	219	99.9
576	151507	176	99.9
625	151551	132	99.9



Cumulative Runoff Volume by Runoff Rate
For area: 1.343(ha), imperviousness: 95.0%, rainfall station: TORONTO CENTRAL
Cumulative Runoff Volume (%)
100
90
80
70
60
50
40
30
20
10
0
0
31
62
93
124
155
186
217
248
279
310
341
372
403
434
465
496
527
558
589
620
Flow (L/s)

Rainfall Event Analysis				
Rainfall Depth (mm)	No. of Events	Percentage of Total Events (%)	Total Volume (mm)	Percentage of Annual Volume (%)
6.35	2711	81.4	3900	29.6
12.70	356	10.7	3266	24.8
19.05	127	3.8	1991	15.1
25.40	62	1.9	1346	10.2
31.75	32	1.0	905	6.9
38.10	16	0.5	541	4.1
44.45	8	0.2	334	2.5
50.80	11	0.3	519	3.9
57.15	2	0.1	106	0.8
63.50	2	0.1	120	0.9
69.85	0	0.0	0	0.0
76.20	0	0.0	0	0.0
82.55	1	0.0	77	0.6
88.90	1	0.0	85	0.6
95.25	0	0.0	0	0.0
101.60	0	0.0	0	0.0



For Stormceptor Specifications and Drawings Please Visit:
http://www.imbriumsystems.com/technical-specifications

APPENDIX D: Fire Flow Requirements & Halton Region Fire Flow Information

The following calculations are for the proposed development at 28-60 Bronte Street North, Milton, Ontario. The Fire Underwriters Survey (FUS) requires that a minimum water supply source 'F' be provided at a minimum pressure of 140 kPa (20 psi). The minimum flow 'F' can be calculated as:

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

C = coefficient related to construction = ***0.8***

- *Non-combustible construction materials*
- *Unprotected metal structural components*

A = total floor area = ***See below***

Determining 'A' – Floor Area for Fire Flow:

The proposed development consists of two (2) buildings; Building A with a 6-storey podium and 13 residential storeys and Building B with a 6-storey podium and 15 residential storeys. For this analysis, we will take the building with the largest total floor area (Building B). Therefore, total floor area required for this analysis will be:

A = 24,579.0m^2

Determining 'F' including Reduction Factors:

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

F = 220 x 0.8 x $\sqrt{24{,}579.0}$

F = 27,592.7 L/min → Rounded to the nearest 1,000 L/min = **28,000 L/min**

Reduction formula for combustibility:

- The building is considered to be a low hazard occupancy and limited combustible, so a reduction factor of 15% will be applied:

F = 28,000 x 0.85 = **23,800 L/min**

Reduction formula for sprinkler protection systems:

- The building will consist of NFPA 13 approved sprinklers, water will be supplied by the same municipal water system, and the sprinkler system will be supervised. Therefore a 50% reduction will be applied:

F = 23,800 x 0.50 = 11,900 L/min reduction

Increase formula for exposure and building separation:

- Building A and Building B are approximately 4.0m away from each other, with no other major structures in the surrounding area. Therefore, an exposure surcharge factor of 20% surcharge will be applied.

F = 23,800 x 0.20 = 4,760 L/min increase

TOTAL F = 23,800 – 11,900 + 4,760 = 16,660 L/min → Rounded to nearest 1,000 L/min = **17,000 L/min**

F = 17,000 L/min = 283.33 L/s

Tu Vu

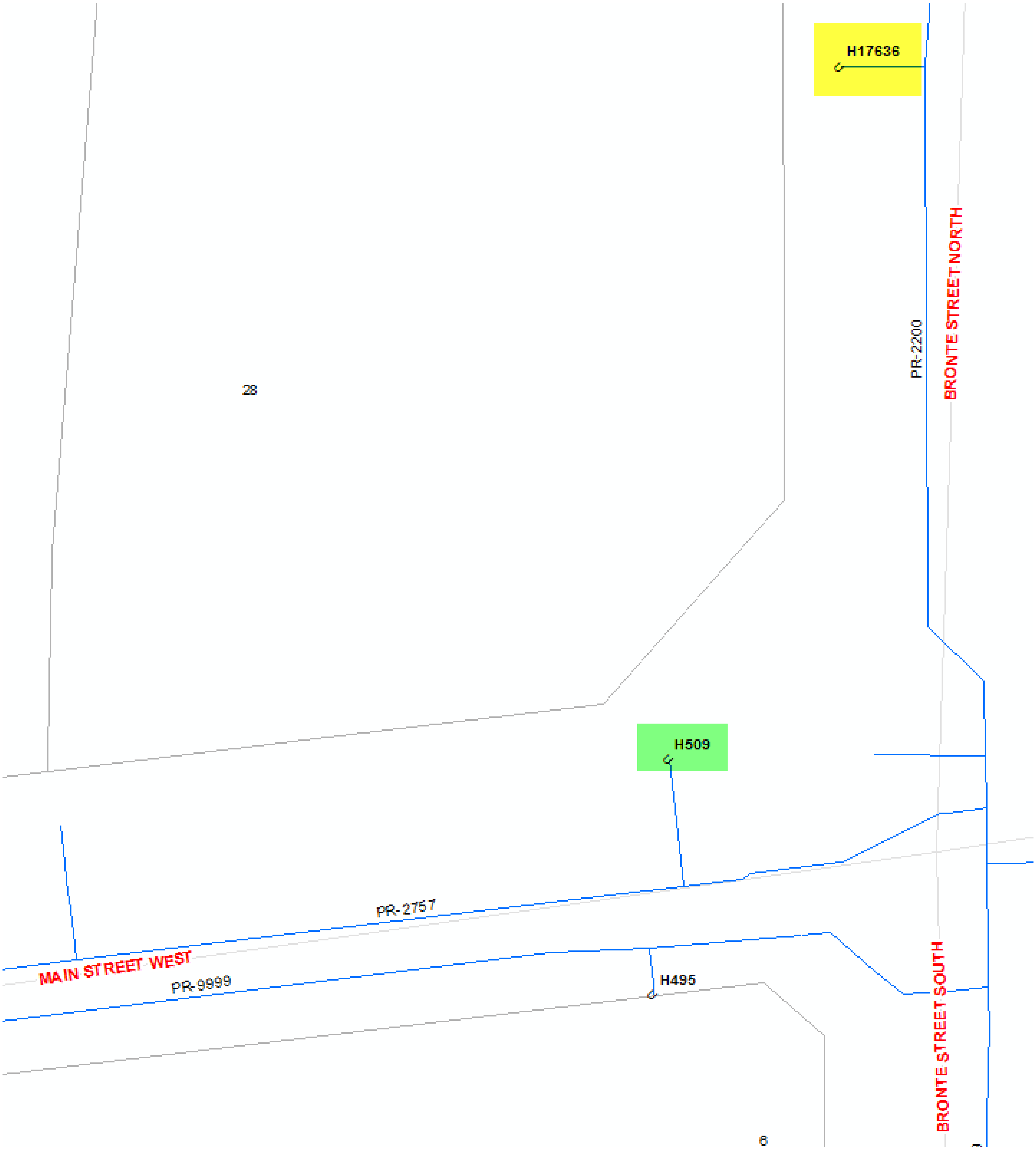
From:	Jensen, Miranda <miranda.jensen@halton.ca>
Sent:	September-17-18 10:06 AM
To:	Tu Vu
Subject:	Fire Hydrant Information - Bronte St North and Main St West
Follow Up Flag:	Follow up
Flag Status:	Flagged

Good morning. As per our phone discussion, here is the information regarding the two fire hydrants at the North West corners of Bronte Street North and Main Street West in Milton.

Hydrant **H17636** has a static pressure of 78 psi and a Fire Flow Rating of 14,072.153 GPM last recorded on July 19, 2010

Hydrant **H509** has a static pressure of 76 psi and a Fire Flow Rating of 13,895.833 GPM last recorded on July 19, 2010

If you require any further information, please feel free to contact myself. Thank you.

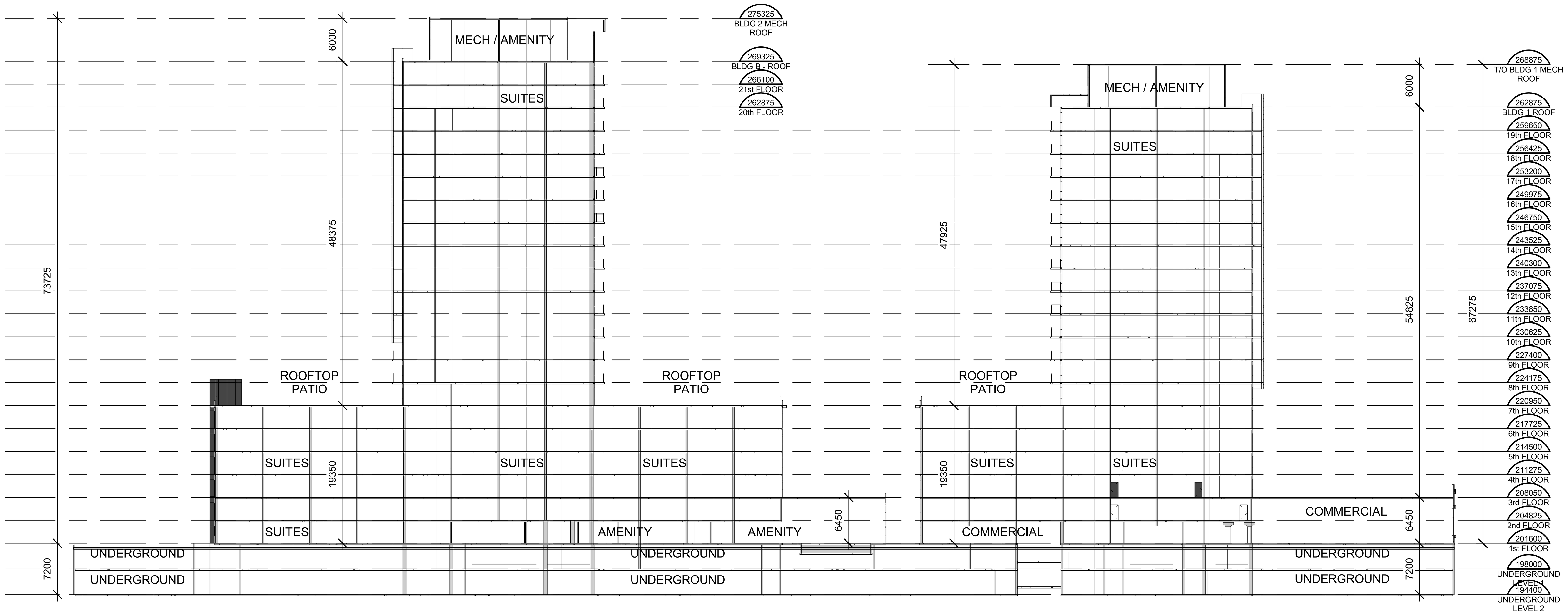


Regards,

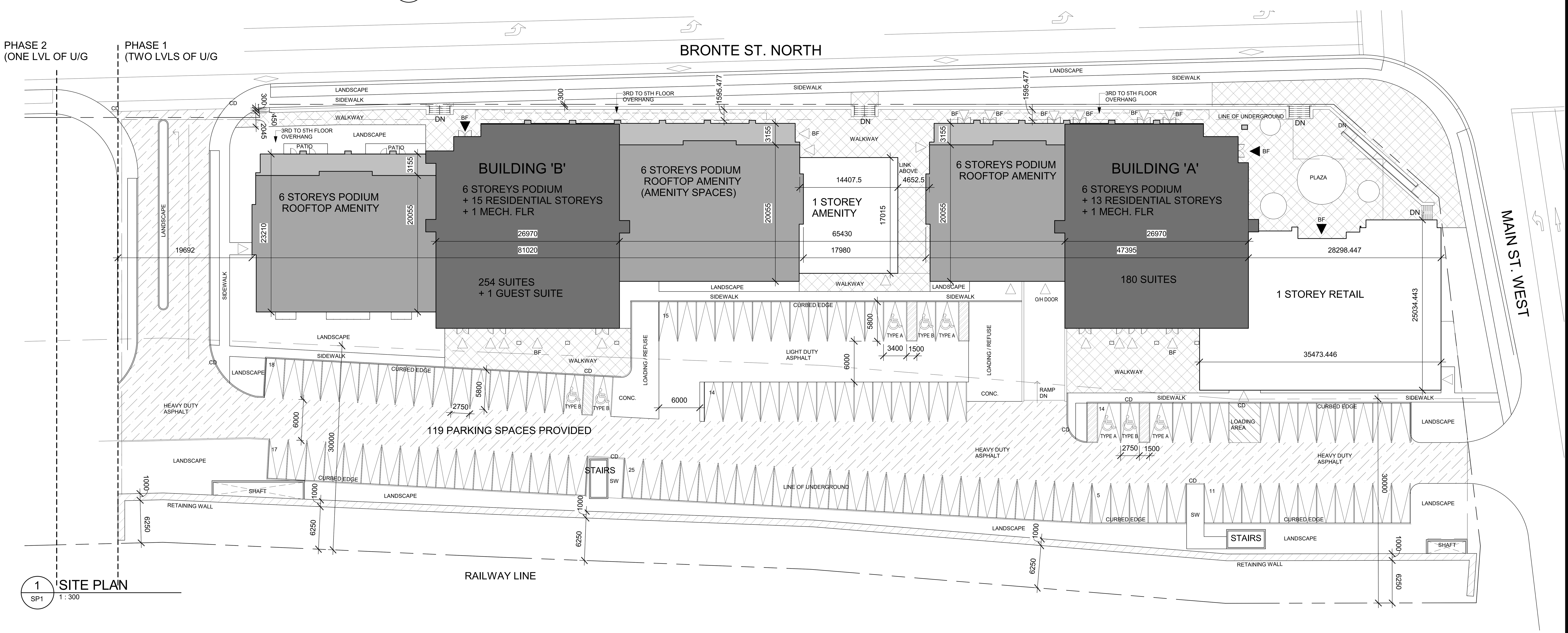
Miranda Jensen
District Works Coordinator
Water & Wastewater System Services
Public Works

APPENDIX E: Engineering Drawings

- *Site Plan prepared by KNYMH Inc.*
- *Grading Plan prepared by Lanhack*
- *Servicing Plan prepared by Lanhack*
- *Sections Plan prepared by Lanhack*
- *Storm Drainage Area Plans prepared by Lanhack*



2 SP1 BUILDING 'A' & 'B' CROSS SECTION
1 : 400



1 SP1 SITE PLAN
1 : 300

CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS AND JOB CONDITIONS BEFORE PROCEEDING WITH WORK

ALL DRAWINGS MAY BE TO BE SUBJECT TO CHANGE DUE TO COMMENTS FROM MUNICIPAL DEPARTMENTS AND OTHER AGENCIES WITH AUTHOURITY

ALL DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF THE ARCHITECTS AND MUST BE RETURNED AT THE COMPLETION OF THE WORK

THE CONTRACTOR WORKING FROM DRAWINGS NOT SPECIFICALLY MARKED "FOR CONSTRUCTION" MUST ASSUME FULL RESPONSIBILITY AND BEAR COSTS FOR ANY CORRECTIONS OR DAMAGES RESULTING FROM HIS OR HER WORK

KEY TO DETAIL LOCATION
No. DETAIL NUMBER
No. DRAWING SHEET NUMBER

DRAWING SETS ISSUED	No.	DATE (DD.MM.YY)	BY
-	1	-	-

ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED

REVISIONS TO DRAWING	No	DATE (DD.MM.YY)	BY

NOT FOR CONSTRUCTION

BUILDING PERMIT NUMBER:
NOT FOR CONSTRUCTION WITHOUT PERMIT

KNYMH
ARCHITECTURE • SOLUTIONS

KNYMH INC.
1006 SKYVIEW DRIVE • SUITE 101
BURLINGTON, ONTARIO • L7P 0V1
T 905.639.6595
F 905.639.0394
www.knymh.com
info@knymh.com

PROJECT NORTH
TRUE NORTH

THIS DOCUMENT IS INCOMPLETE AND MAY NOT BE USED FOR REGULATORY APPROVAL, PERMIT OR CONSTRUCTION UNTIL CALCULATED FOR USE BY CONSULTANTS, SUBCONSULTANTS, OWNER AND CONTRACTORS TO PROVIDE THEIR INPUT TO THE COORDINATION OF THIS DOCUMENT.

PRELIMINARY

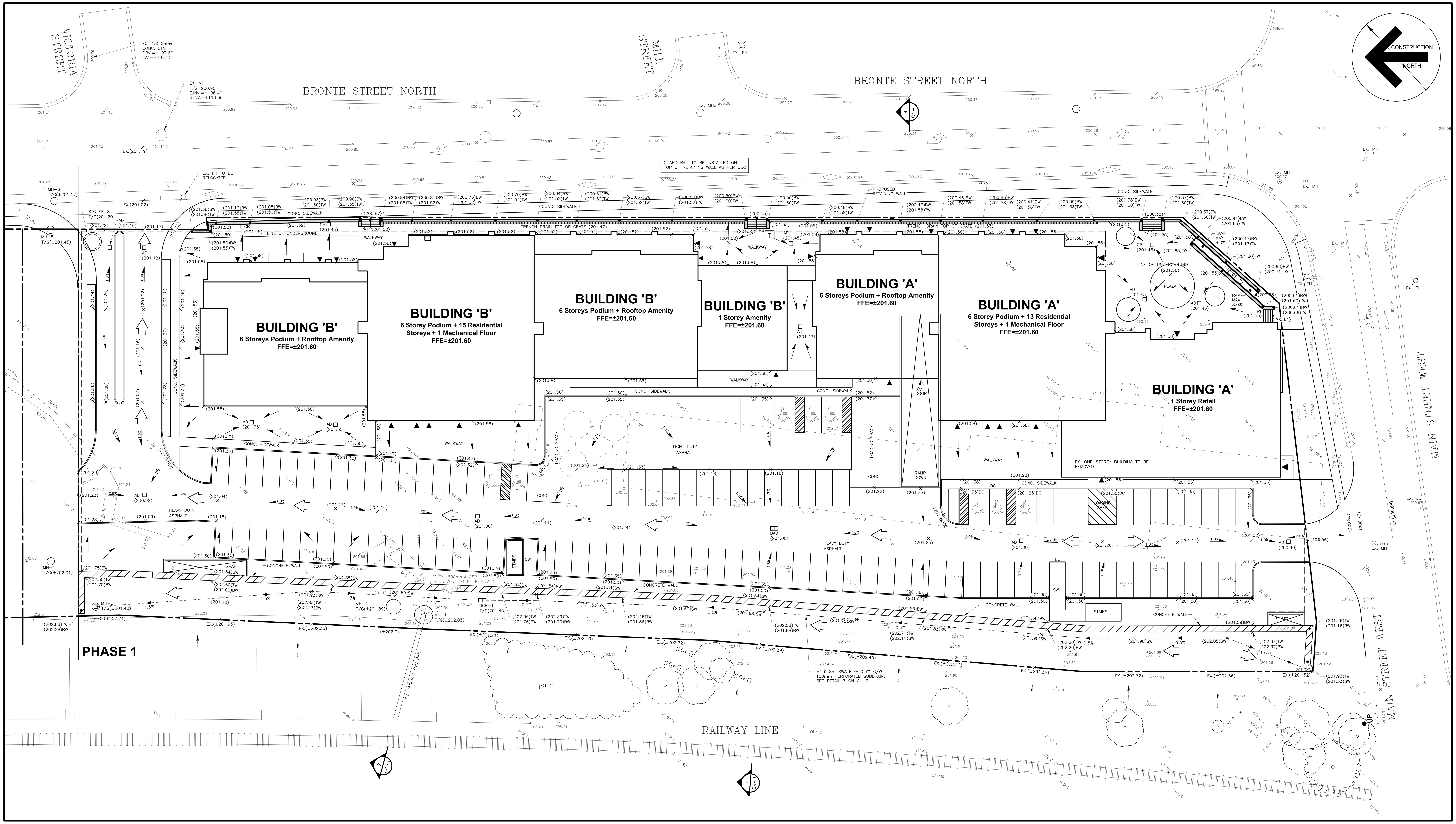
BRONTE AND MAIN
28 - 60 BRONTE
MILTON, ONTARIO

DRAWING SHEET TITLE:
SITE PLAN

DRAWING SCALE:	PROJECT NUMBER:
As indicated	16079

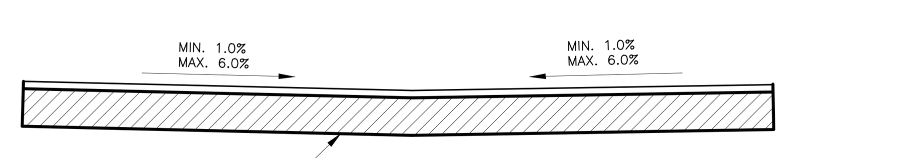
DRAWN BY:	CHECKED BY:	DRAWING SHEET NUMBER:
Author	Checker	SP1
DRAWING VERSION:		
PLOT DATE:		

TIMESTAMP: 2018-10-01 4:31:36 PM FILEPATH: C:\Revit Local\16079 - Bronte and Main_TimE.rvt



1 GRADING PLAN
C1-1

1:300



LIGHT DUTY (CAR PARKING)
- 40mm OPSS 1150 HL-3 TOP COURSE ASPHALT
- 40mm OPSS 1150 HL-8 BINDER COURSE ASPHALT
- 150mm OPSS GRANULAR 'A' BASE COURSE
- 200mm OPSS GRANULAR 'B', SUB-BASE 50mm CRUSHER-RUN LIMESTONE

HEAVY DUTY (TRUCK/FIRE ROUTE)
- 50mm OPSS 1150 HM-3 TOP COURSE ASPHALT
- 80mm OPSS 1150 HL-8 BINDER COURSE ASPHALT
- 150mm OPSS GRANULAR 'A' BASE COURSE
- 300mm OPSS GRANULAR 'B', SUB-BASE 50mm CRUSHER-RUN LIMESTONE

NOTES:
1. ALL THICKNESSES ARE AT COMPACTED DEPTHS.
2. COMPACTION RATES BASED ON OPSS 401 & 1010 (AS PER TOWN STANDARDS).
3. THE ABOVE PAVEMENT STRUCTURE TO BE CONFIRMED BY A GEOTECHNICAL ENGINEER PRIOR TO CONSTRUCTION.

2 TYPICAL PARKLING LOT X-SECTION
C1-1
NTS

GENERAL GRADING NOTES:

1. ALL GENERAL GRADING DETAILS AND PROCEDURES ARE TO FOLLOW THE TOWN OF MILTON ENGINEERING AND PARKS STANDARDS (AUGUST 2014).
2. GRADING ON ADJACENT LANDS NOT OWNED BY THE DEVELOPER: THE DEVELOPER IS REQUIRED TO OBTAIN PERMISSION TO CARRY OUT THE GRADING ON THE ADJACENT LANDS. IF SUCH PERMISSION TO GRADE ON THE LANDS ADJACENT TO THE SITE IS NOT OBTAINED BY THE DEVELOPER, OR IF PERMISSION IN WITHDRAWN PRIOR TO CARRYING OUT THE GRADING, THE DEVELOPER IS REQUIRED TO REVISE THE GRADING PLAN, AS REQUIRED, AND RESUBMIT THE PLAN TO THE TOWN FOR APPROVAL.
3. ANY CHANGES IN GRADES AND/OR CATCH BASINS, REQUIRES THE APPROVAL OF THE DIRECTOR DEVELOPMENT DIVISION, PLANNING AND DEVELOPMENT DEPARTMENT FROM THE TOWN OF MILTON.
4. THE APPROVAL OF THIS GRADING PLAN DOES NOT EXEMPT THE OWNER'S BONDED CONTRACTOR FROM THE REQUIREMENTS TO OBTAIN THE VARIOUS PERMITS/APPROVALS NORMALLY REQUIRED TO COMPLETE A CONSTRUCTION PROJECT, SUCH AS, BUT NOT LIMITED TO THE FOLLOWING:
   - ROAD CUT PERMITS
   - APPROACH APPROVAL PERMITS
   - COMMITTEE OF ADJUSTMENT
   - SERVICING PERMITS
   - RELOCATION SERVICES
   - ENCROACHMENT AGREEMENTS (IF REQUIRED)

GENERAL EARTHWORKS NOTES:

1. THE SUB-GRADE SOILS EXPOSED AFTER EXCAVATION SHALL BE INSPECTED AND CERTIFIED BY A QUALIFIED REGISTERED PROFESSIONAL SOILS ENGINEER AND A COPY OF THE REPORT SHALL BE FORWARDED TO THE TOWN OF MILTON BUILDING DIVISION. WHERE THE FOOTING WILL BE SITUATED ON FILL MATERIAL, THE FOOTINGS SHALL BE DESIGNED AND APPROVED BY A QUALIFIED REGISTERED PROFESSIONAL ENGINEER.
2. ALL FILL PLACED ON THE SITE SHALL BE COMPACTED TO A MINIMUM OF 95% STANDARD PROCTOR DRY DENSITY. A SUFFICIENT NUMBER OF TESTS SHALL BE TAKEN AT VARIOUS LEVELS SATISFACTORY TO THE DIRECTOR OF ENGINEERING. TEST RESULTS SHALL BE SENT TO THE TOWN WITH A LETTER, SIGNED AND STAMPED BY THE SOILS ENGINEER, STATING THAT A SUFFICIENT NUMBER OF TESTS HAVE BEEN TAKEN AND THE MINIMUM DEGREE OF COMPACTION HAS BEEN REACHED.

BEFORE STARTING WORK

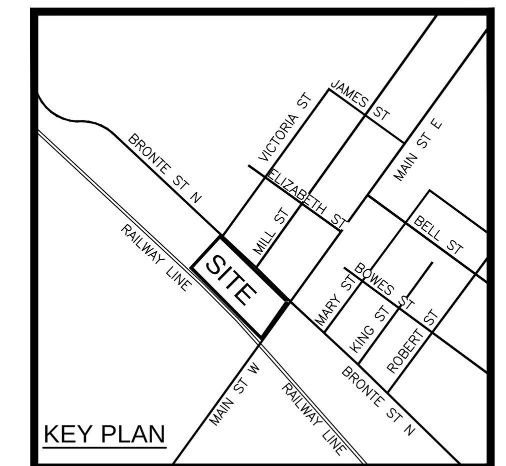
1. THE CONTRACTOR SHALL NOTIFY THE TOWN OF MILTON AND LANHACK CONSULTANTS INC. AT LEAST 48 HOURS PRIOR TO COMMENCING CONSTRUCTION.
2. THE POSITION OF THE POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.
3. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, ALL BENCHMARKS, ELEVATIONS, DIMENSIONS, AND GRADES MUST BE CHECKED BY THE CONTRACTOR AND ANY DISCREPANCIES REPORTED TO THE ENGINEER.
4. ALL EXISTING UNDERGROUND UTILITIES SHALL BE LOCATED, MARKED AND PROTECTED. ANY UTILITIES DAMAGED OR DISTURBED DURING CONSTRUCTION SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE ENGINEER, AT THE CONTRACTOR'S EXPENSE.
5. AT LEAST TWO DIFFERENT BENCHMARKS MUST BE REFERRED TO AT ALL TIMES.

BENCHMARK

TOWN OF MILTON BENCH MARK No. 92-013 HAVING AN ELEVATION OF 195.723 METRES.

LEGEND

XXX.XX	EXISTING GRADE	FFE	FINISHED FLOOR ELEVATION
(XXX.XX)	PROPOSED GRADE	AD	PROPOSED AREA DRAIN
EX.(XXX.XX)	EXISTING PROPOSED GRADE	CB	PROPOSED CATCHBASIN
(XXX.XX)DC	PROPOSED GRADE AT DROP CURB		EXISTING CATCHBASIN
(XXX.XX)BW	PROPOSED GRADE AT BOTTOM OF CONCRETE WALL (AT GRADE)	EX. FH	EXISTING FIRE HYDRANT
(XXX.XX)TW	PROPOSED GRADE AT TOP OF CONCRETE WALL		PROPOSED MANHOLE
	PROPOSED SHEET FLOW ARROW		ENTRY DOOR
	EXISTING SHEET FLOW ARROW	T/G	TOP OF GRATE
	PROPOSED EMERGENCY SHEET FLOW ARROW	DAD	DOUBLE AREA DRAIN
	EXISTING MANHOLE		
	PROPERTY LINE		



KEY PLAN

Contractor must verify all dimensions on the Project Site and report any discrepancies before proceeding with the Work.

This drawing is a part of the Contract Documents and is to be read in conjunction with all other Contract Documents.

SOURCE
1. EXISTING BOUNDARY SURVEY AND TOPOGRAPHICAL INFORMATION OBTAINED FROM CUNNINGHAM McCONNEL LTD., DWG. No. 16-62-4B, DATED SEPTEMBER 7, 2018.
2. TOWN OF MILTON PLAN & PROFILE, 14M-00346-01, CONTRACT #18-508, SHEETS G1 TO G5, AS RECORDED 06/18/18.

THE POSITION OF THE POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

Revision Record

No.	Description	Date (m/d/y)
A	ISSUED FOR OPA/ZBA	10/22/18

Issue Record

No.	Description	Date (m/d/y)

D. LAMARRE
LICENSED PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO

NOT FOR CONSTRUCTION

LANHACK Consultants Inc.
Consulting Engineers
1709 Upper James Street
Hamilton, ON L9B 1K7
Tel: (905) 777-1454
Fax: (905) 336-8142

DURANTE GROUP RESIDENTIAL CONDOS

28 Bronte Street North
Town of Milton

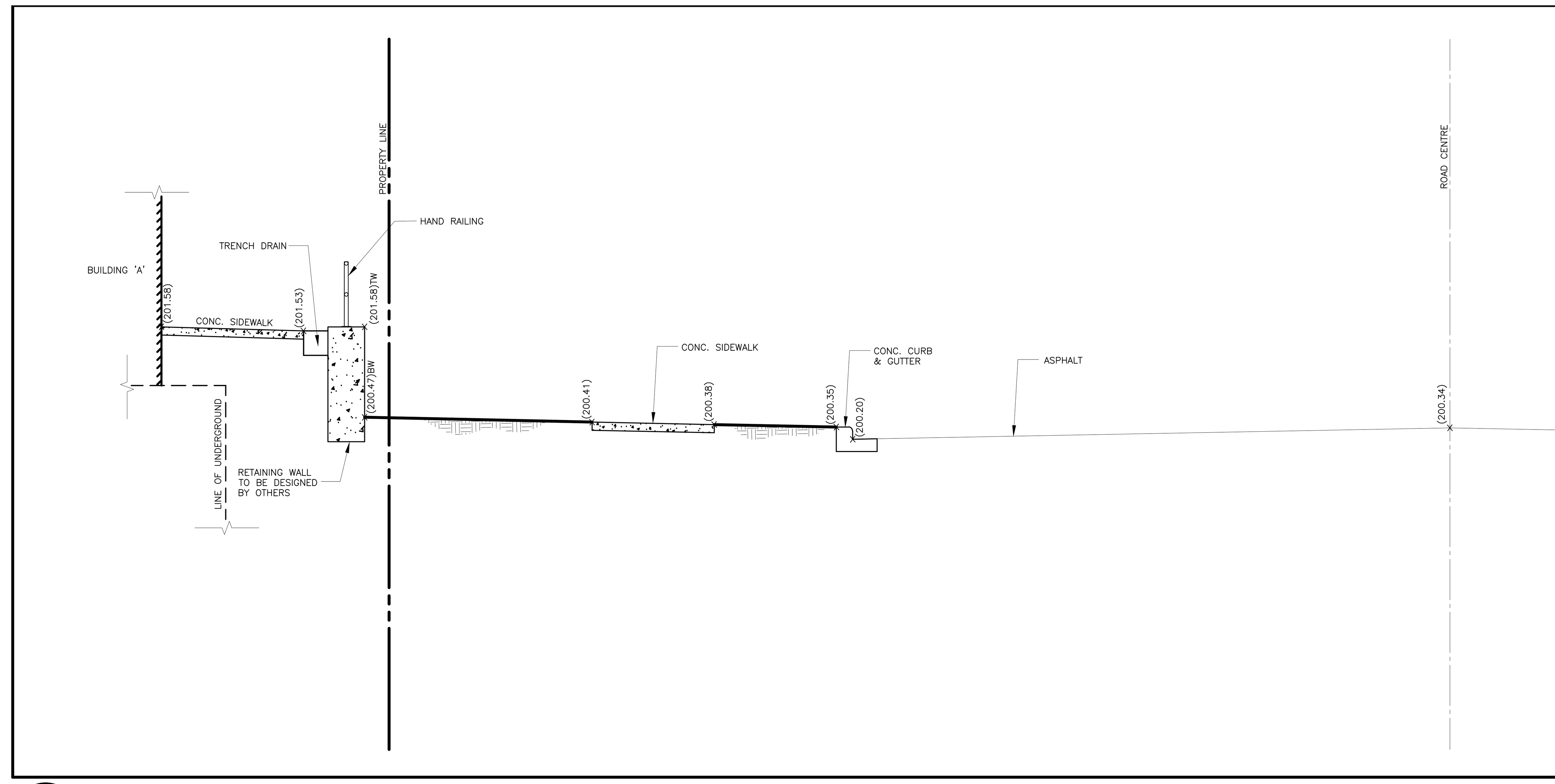
Date:	October 2018
Drawn By:	TV
Chkd By:	SMP
Scale:	AS NOTED

GRADING PLAN

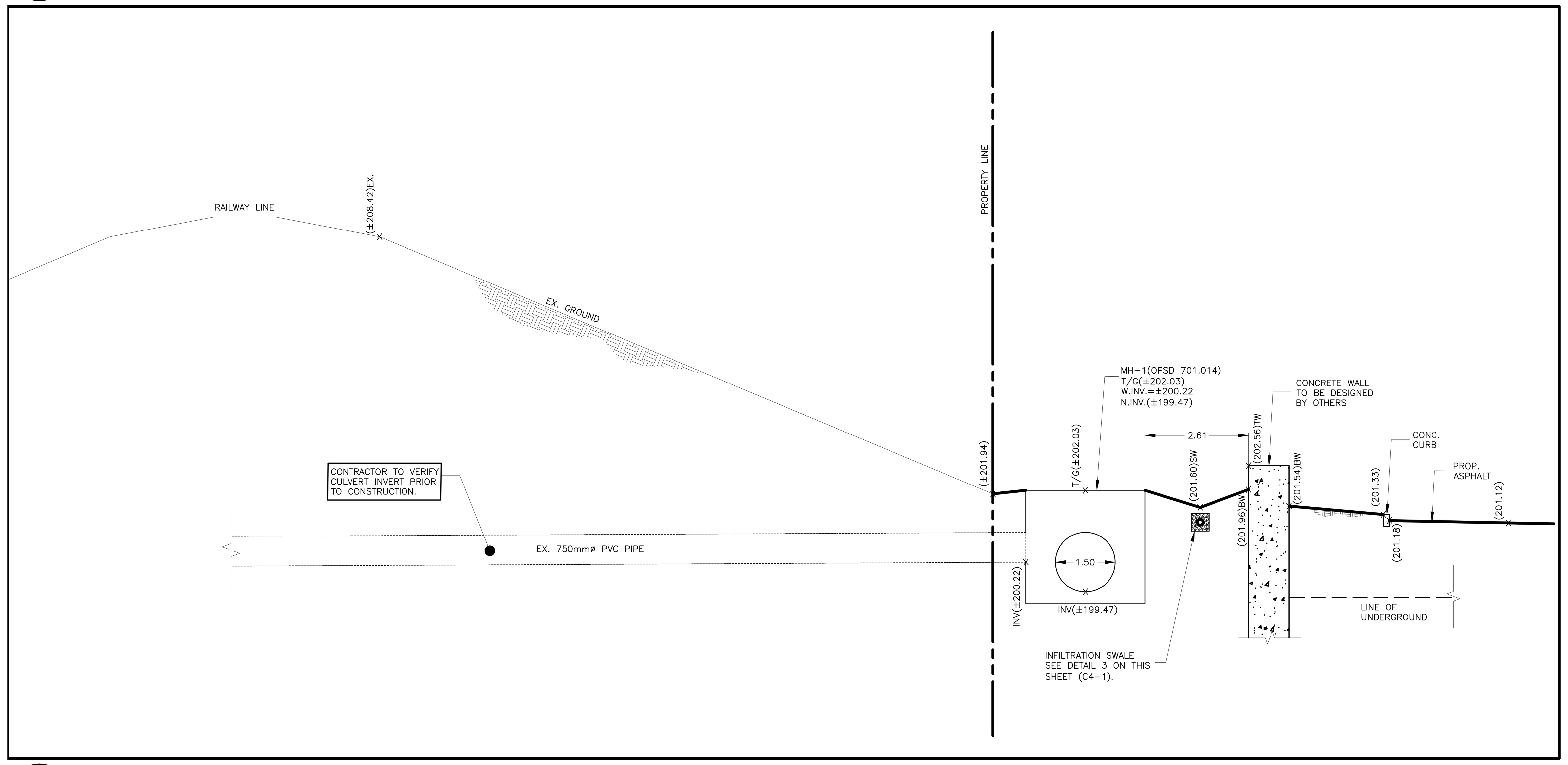
Project No.:	Drawing No.:	Rev.:
18147	C1-1	A

Plot Date: 10/22/18
M:\2018\18147 – Bronte St. Milton\Civil\18147_C1-1 Grading and Servicing Plandwg.dwg

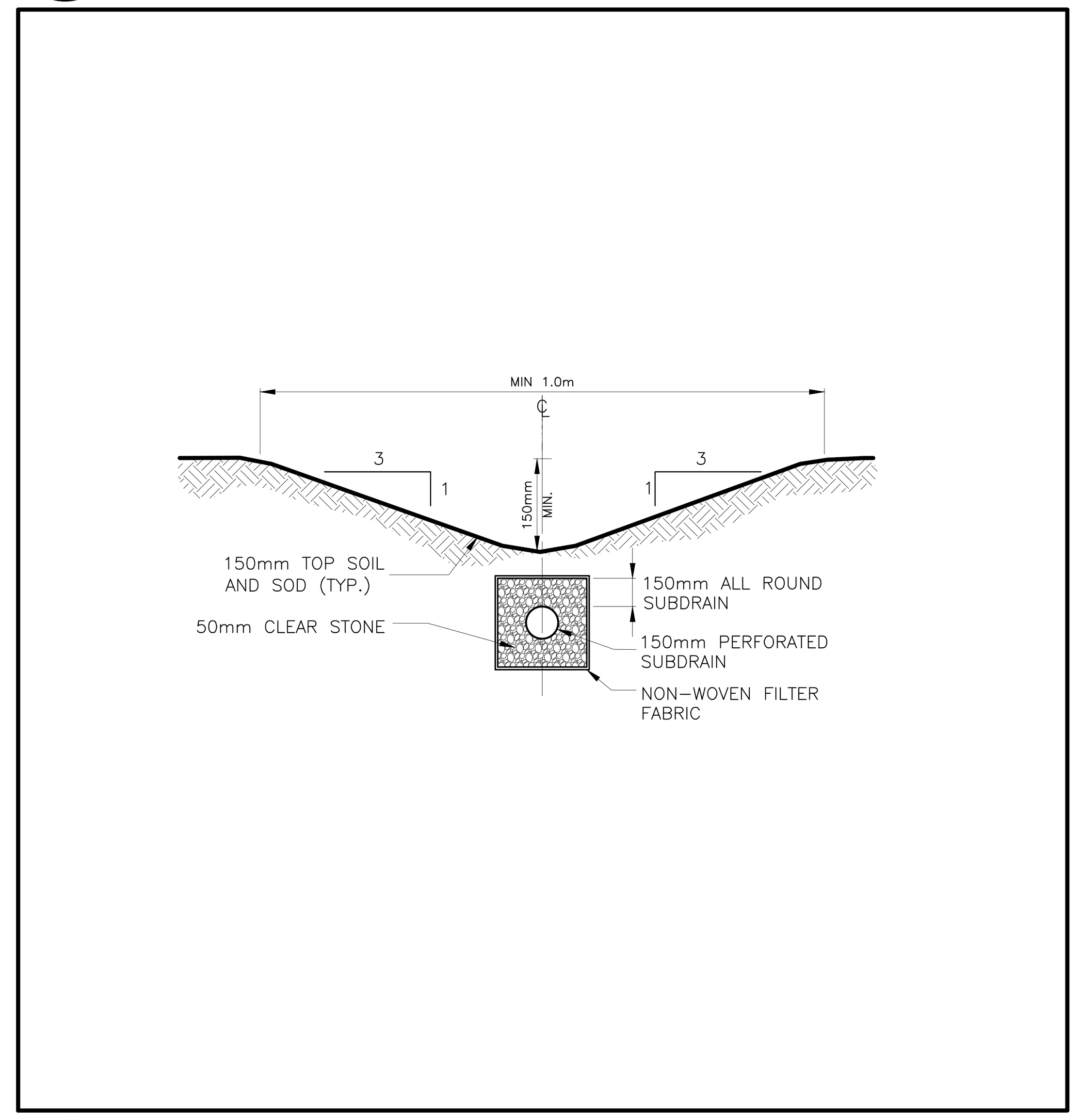
1 C4-1 **SECTION THROUGH CONCRETE WALL** 1:100



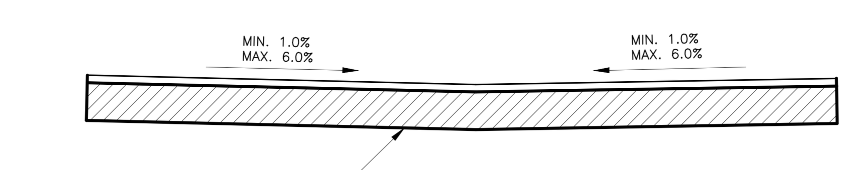
4 C4-1 **SECTION THROUGH RETAINING WALL** 1:50



2 C4-1 **SECTION THROUGH CONCRETE WALL** 1:100



3 C4-1 **TYPICAL SWALE X-SECTION** N.T.S.

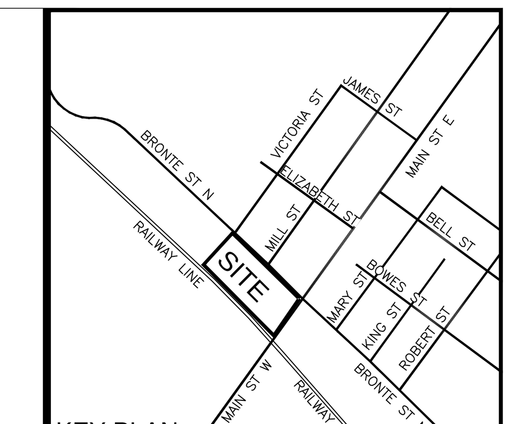


LIGHT DUTY (CAR PARKING)
- 40mm OPSS 1150 HL-3 TOP COURSE ASPHALT
- 40mm OPSS 1150 HL-8 BINDER COURSE ASPHALT
- 150mm OPSS GRANULAR 'A' BASE COURSE
- 200mm OPSS GRANULAR 'B', SUB-BASE 50mm CRUSHER-RUN LIMESTONE

HEAVY DUTY (TRUCK/FIRE ROUTE)
- 50mm OPSS 1150 HM-3 TOP COURSE ASPHALT
- 80mm OPSS 1150 HL-8 BINDER COURSE ASPHALT
- 150mm OPSS GRANULAR 'A' BASE COURSE
- 300mm OPSS GRANULAR 'B', SUB-BASE 50mm CRUSHER-RUN LIMESTONE

NOTES:
1. ALL THICKNESSES ARE AT COMPACTED DEPTHS.
2. COMPACTION RATES BASED ON OPSS 401 & 1010 (AS PER TOWN STANDARDS).
3. THE ABOVE PAVEMENT STRUCTURE TO BE CONFIRMED BY A GEOTECHNICAL ENGINEER PRIOR TO CONSTRUCTION.

5 C1-2 **TYPICAL PARKLING LOT X-SECTION** NTS



KEY PLAN

Contractor must verify all dimensions on the Project Site and report any discrepancies before proceeding with the Work.

This drawing is a part of the Contract Documents and is to be read in conjunction with all other Contract Documents.

SOURCE
1. EXISTING BOUNDARY SURVEY AND TOPOGRAPHICAL INFORMATION OBTAINED FROM CUNNINGHAM McCONNEL LTD., DWG. No. 16-62-4B, DATED SEPTEMBER 7, 2018.
2. TOWN OF MILTON PLAN & PROFILE, 14M-00346-01, CONTRACT #18-508, SHEETS G1 TO G5, AS RECORDED 06/18/18.

THE POSITION OF THE POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

Revision Record

No.	Description	Date (m/d/y)
A	ISSUED FOR OPA/ZBA	10/22/18
No.	Description	Date (m/d/y)

Issue Record

NOT FOR CONSTRUCTION

LANHACK Consultants Inc.
Consulting Engineers
1709 Upper James Street
Hamilton, ON L9B 1K7
Tel: (905) 777-1454
Fax: (905) 336-8142

DURANTE GROUP RESIDENTIAL CONDOS

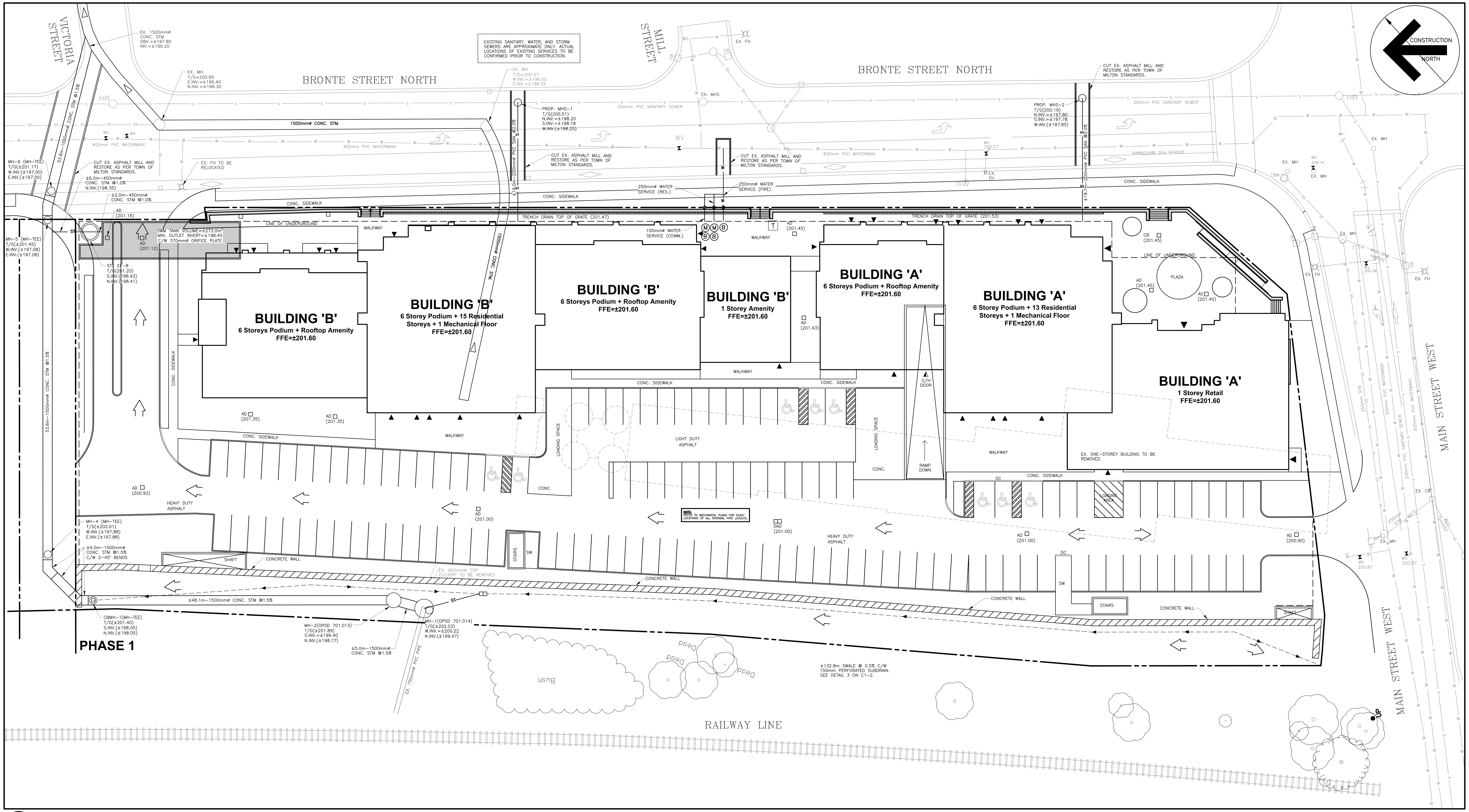
28 Bronte Street North
Town of Milton

Date:	October 2018
Drawn By:	RZ
Chkd By:	SMP
Scale:	AS NOTED

SECTIONS

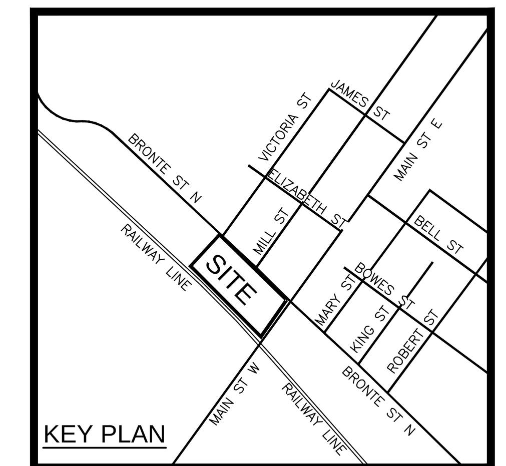
Project No.:	Drawing No.:	Rev.:
18147	C1-2	A

Plot Date: 10/22/18
M:\2018\18147 - Bronte St. Milton\Civil\18147_C1-1 Grading and Servicing Plandwg.dwg



1 C2-1 SERVICING PLAN

1:300



Contractor must verify all dimensions on the Project Site and report any discrepancies before proceeding with the Work.

This drawing is a part of the Contract Documents and is to be read in conjunction with all other Contract Documents.

SOURCE

1. EXISTING BOUNDARY SURVEY AND TOPOGRAPHICAL INFORMATION OBTAINED FROM CUNNINGHAM McCONNEL LTD., DWG. No. 16–62–4B, DATED SEPTEMBER 7, 2018.
2. TOWN OF MILTON PLAN & PROFILE, 14M–00346–01, CONTRACT #18–508, SHEETS G1 TO G5, AS RECORDED 06/18/18.

THE POSITION OF THE POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

Revision Record

No.	Description	Date (m/d/y)

No.	Description	Date (m/d/y)
A	ISSUED FOR SPA	10/22/18

Issue Record

NOT FOR CONSTRUCTION

LANHACK Consultants Inc.
Consulting Engineers
1709 Upper James Street
Hamilton, ON L9B 1K7
Tel: (905) 777-1454
Fax: (905) 336-8142

DURANTE GROUP RESIDENTIAL CONDOS

28 Bronte Street North
Town of Milton

Date:	October 2018
Drawn By:	TV
Chkd By:	SMP
Scale:	AS NOTED

SERVICING PLAN

Project No.:	Drawing No.:	Rev.:
18147	C2-1	A

Plot Date: 10/22/18
M:\2018\18147 – Bronte St. Milton\Civil\
18147_C1-1 Grading and Servicing Plandwg.dwg

GENERAL SERVICING NOTES:

1. ALL SERVICES TO BE INSTALLED AS PER TOWN OF MILTON ENGINEERING AND PARKS STANDARDS (AUGUST 2014) AND MINISTRY OF THE ENVIRONMENT GUIDELINES (LATEST EDITION).
2. APPROVAL OF THIS DRAWING IS FOR MATERIAL ACCEPTABILITY AND COMPLIANCE WITH MUNICIPAL AND PROVINCIAL SPECIFICATIONS AND STANDARDS ONLY. APPROVAL AND INSPECTION BY THE TOWN OF THE WORKS DOES NOT CERTIFY THE LINE AND GRADE OF THE WORKS AND IT IS THE OWNER'S RESPONSIBILITY TO HAVE THEIR ENGINEER CERTIFY THIS ACCORDINGLY.
3. ALL PLANS ARE TO BE READ IN CONJUNCTION WITH THE TOWN OF MILTON ENGINEERING AND PARKS STANDARDS (AUGUST 2014).

BEFORE STARTING WORK

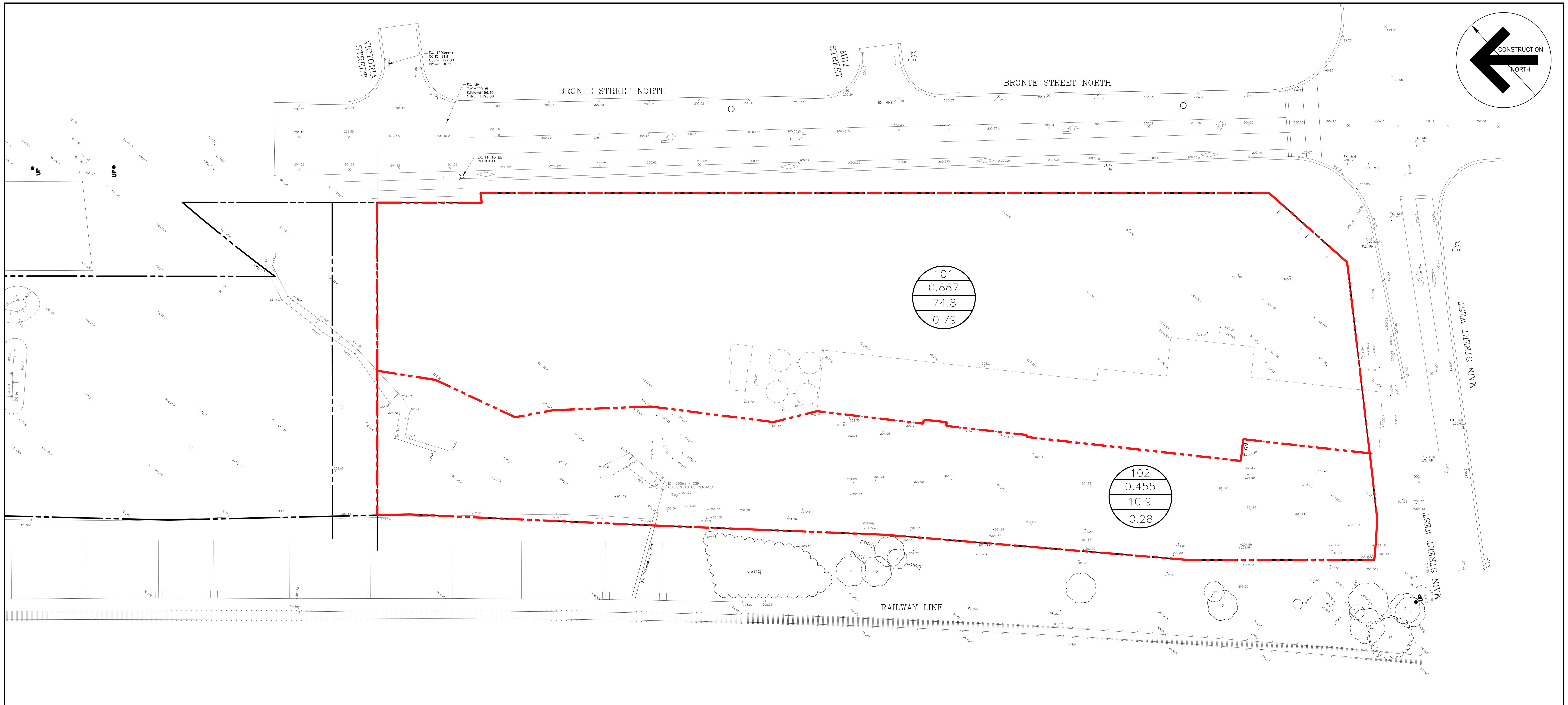
1. THE CONTRACTOR SHALL NOTIFY THE TOWN OF MILTON AND LANHACK CONSULTANTS INC. AT LEAST 48 HOURS PRIOR TO COMMENCING CONSTRUCTION.
2. THE POSITION OF THE POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.
3. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, ALL BENCHMARKS, ELEVATIONS, DIMENSIONS, AND GRADES MUST BE CHECKED BY THE CONTRACTOR AND ANY DISCREPANCIES REPORTED TO THE ENGINEER.
4. ALL EXISTING UNDERGROUND UTILITIES SHALL BE LOCATED, MARKED AND PROTECTED. ANY UTILITIES DAMAGED OR DISTURBED DURING CONSTRUCTION SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE ENGINEER, AT THE CONTRACTOR'S EXPENSE.
5. AT LEAST TWO DIFFERENT BENCHMARKS MUST BE REFERRED TO AT ALL TIMES.

BENCHMARK

TOWN OF MILTON BENCH MARK No. 92–013 HAVING AN ELEVATION OF 195.723 METRES.

LEGEND

○	EXISTING MANHOLE	CONC.	CONCRETE
□AD	PROPOSED AREA DRAIN	MH	MANHOLE
EX. CB □	EXISTING CATCH BASIN	SAN.	SANITARY
○	PROPOSED SANITARY MANHOLE	DAD	DOUBLE AREA DRAIN
○	PROPOSED STORM MANHOLE	EX. FH	EXISTING FIRE HYDRANT
—— S ——	EXISTING SANITARY SEWER	⊕	GATE VALVE
—— W ——	EXISTING WATERMAIN	(M)	WATER METER
—— ST ——	EXISTING STORM SEWER	(B)	BACKFLOW PREVENTER
—— W ——	PROPOSED WATERMAIN		
—— S ——	PROPOSED SANITARY SEWER		
═══	PROPOSED STORM SEWER		
— — —	PROPERTY LINE		



1 / C3-1 **Existing Drainage Area Plan** 1:400

LEGEND

MAJOR OVERLAND FLOW ROUTE

CATCHMENT AREA

201	CATCHMENT NAME/NUMBER
0.003	HECTARES (ha)
76.0	CALCULATED IMPERVIOUSNESS (%)
0.75	CALCULATED RUNOFF COEFFICIENT (C)

ASSUMPTIONS FOR RUNOFF COEFFICIENT, C

BUILDINGS = 0.95
ASPHALT/CONCRETE = 0.90
GRASS/LANDSCAPING = 0.20

Contractor must verify all dimensions on the Project Site and report any discrepancies before proceeding with the Work.

This drawing is a part of the Contract Documents and is to be read in conjunction with all other Contract Documents.

Revision Record

No.	Description	Date (m/d/y)

No.	Description	Date (m/d/y)

Issue Record

LANHACK Consultants Inc.
Consulting Engineers
1709 Upper James Street
Hamilton, ON L9B 1K7
Tel: (905) 777-1454
Fax: (905) 336-8142

DURANTE GROUP RESIDENTIAL CONDOS

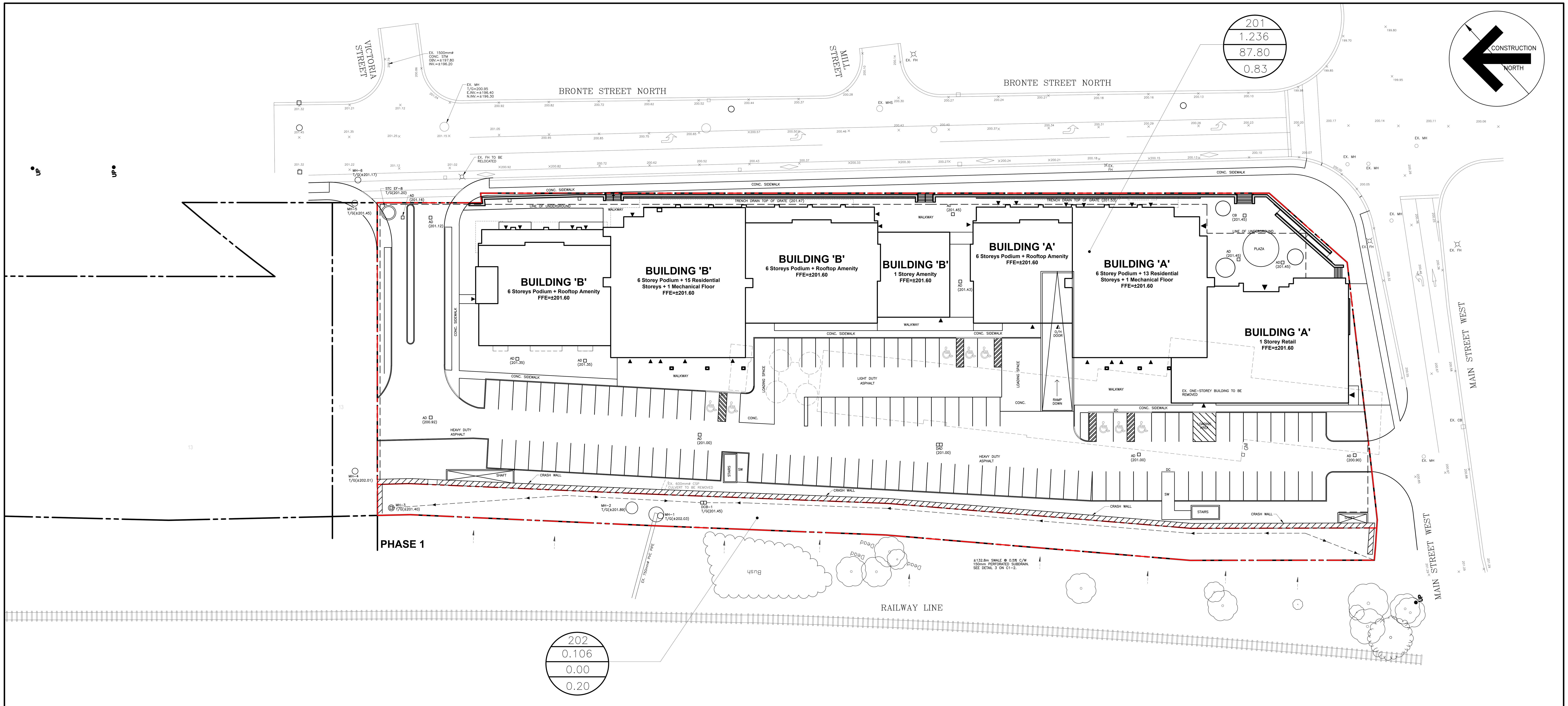
28 Bronte Street North
Town of Milton

Date:	September 2018
Drawn By:	RZ
Chkd By:	SMP
Scale:	1:400

Existing Drainage Area Plan

Project No.:	Drawing No.:	Rev.:
18147	C3-1	–

Plot Date: 10/19/18
M:\2018\18147 – Bronte St. Milton\Civil\18147_C1-1 Grading and Servicing Plan.dwg



1 C3-2 Drainage Area Plan

1:400

LEGEND

MAJOR OVERLAND FLOW ROUTE

CATCHMENT AREA

101	CATCHMENT NAME/NUMBER
0.003	HECTARES (ha)
76.0	CALCULATED IMPERVIOUSNESS (%)
0.75	CALCULATED RUNOFF COEFFICIENT (C)

ASSUMPTIONS FOR RUNOFF COEFFICIENT, C

BUILDINGS = 0.95
ASPHALT/CONCRETE = 0.90
GRASS/LANDSCAPING = 0.20

Contractor must verify all dimensions on the Project Site and report any discrepancies before proceeding with the Work.

This drawing is a part of the Contract Documents and is to be read in conjunction with all other Contract Documents.

Revision Record

No.	Description	Date (m/d/y)

No.	Description	Date (m/d/y)

Issue Record

LANHACK Consultants Inc.
Consulting Engineers
1709 Upper James Street
Hamilton, ON L9B 1K7
Tel: (905) 777-1454
Fax: (905) 336-8142

DURANTE GROUP RESIDENTIAL CONDOS

28 Bronte Street North
Town of Milton

Date: September 2018
Drawn By: RZ
Chkd By: SMP
Scale: 1:400

Drainage Area Plan

Project No.: 18147
Drawing No.: C3-2
Rev.: -

Plot Date: 10/19/18
M:\2018\18147 - Bronte St. Milton\Civil\18147_C1-1 Grading and Servicing Plandwg.dwg