FUNCTIONAL SERVICING AND

STORMWATER MANAGEMENT REPORT

PROPOSED RESIDENTIAL DEVELOPMENT

MILTERON DEVELOPMENTS LTD.

8010, 8020, 8030, 8110, 8120, 8140, 8150 DERRY ROAD WEST

PART OF LOT 10, CONCESSION 3, NEW SURVEY

TOWN OF MILTON

FILE NO. SP 21-19

5 OCTOBER 2017

(Revised August 14, 2023)

AUGUST 23, 2023

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1 INTRODUCTION

Milteron Developments Ltd. is proposing to develop the subject parcel for residential purposes. The proposal seeks to add 27 stacked townhouse units fronting Derry Road to an approved high density residential development consisting of:

- 34 Freehold Townhouse units on a common element roadway
- 614 Apartment Condominium Units in three connected buildings
- 27 stacked Townhouse Units fronting Derry Road
- Amenity and Open Space

The objective of this Functional Servicing Report is to demonstrate how the proposed development can be serviced. This report also addresses the Stormwater Management (SWM) strategy for the site. This report was originally submitted as part of the planning approval for the Official Plan and Zoning By-Law Amendment application. (LOPA-06/17 and Z-12/17) It has now been updated as part of a new official plan application to add 27 stacked townhouse units to the site.

The Subject Property is located on the east side of Regional Road 25, immediately south of Derry Road. This is illustrated on Figure 1.1 – Site Location provided hereinafter.

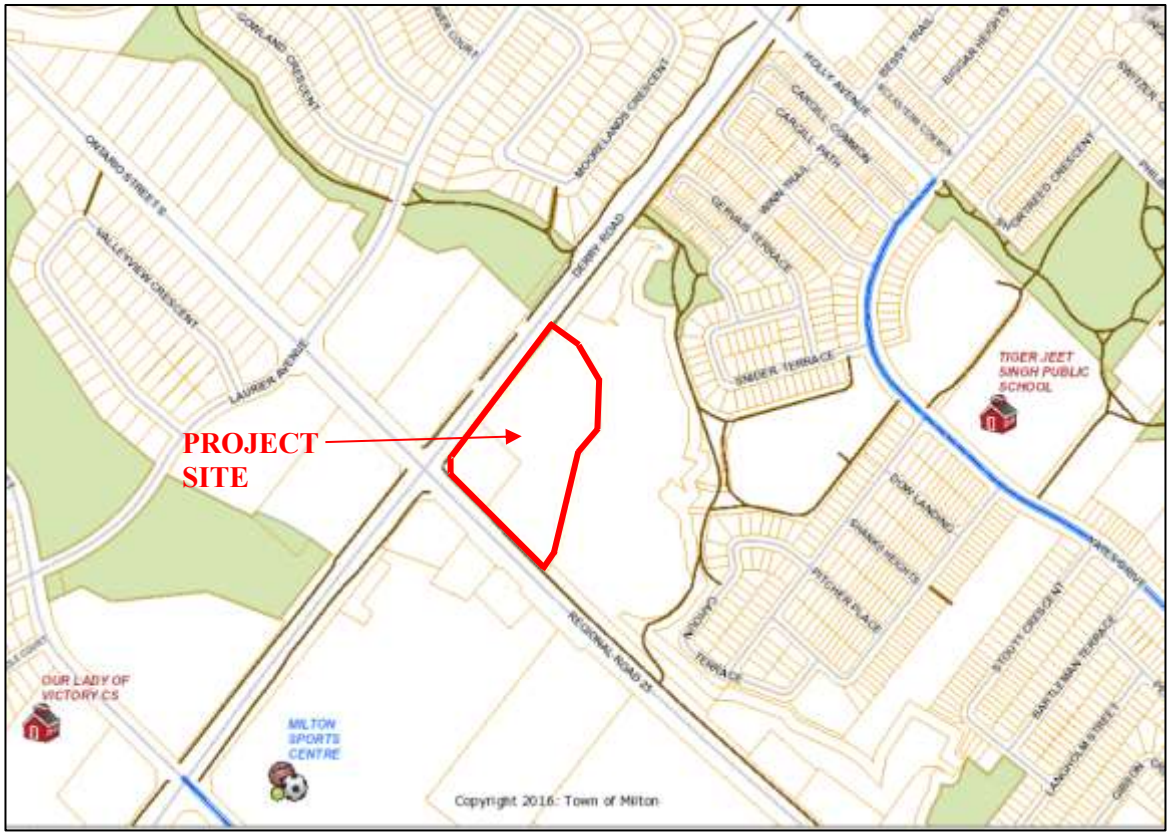

Figure 1.1- Site Location

The proposed development site has municipal addresses of:

8010, 8020, 8030, 8110, 8120, 8140, & 8150 DERRY Road West

The legal description of the site is generally described as:

Part of Lot 10
Concession 3
New Survey
(Geographical Township of Trafalgar)
Town of Milton
Regional Municipality of Halton

2 PROPOSED DEVELOPMENT PLAN

The appended Site Plan illustrates the proposed development layout for the area (see dA1.2 Site Plan by Kirkor Architect + Planners dated May 3, 2023). The subject development of this report is located on the east side of Regional Road 25 (Ontario Street) immediately south of Derry Road.

The site plan represents a condominium development including five freehold townhouse structures on a common element roadway with three apartments and one stacked townhouse. The site encompasses a total of 2.29 ha. The site plan for the residential block envisions the development involving thirty-four freehold townhouse units and 614 apartment units and 27 stacked town house units in a condominium ownership format.

Access is provided to a common element road. This intersects Derry Road approximately 205m east of Region Road 25, opposite an entrance to the commercial lands to the north. The access road swings westward to intersect Regional Road 25 approximately 140m south of Derry Road. This road is proposed just outside the outline of the underground parking structure. An internal loop provides access to the high rise buildings entrances. The latter access is constructed entirely over the underground parking structure.

Parking is located in individual, at-grade garages located off the access driveways for the freehold townhouses. Parking for the high rise apartments and stacked Townhouses is supplied in the two level underground structure. This is accessed from the inner looped access. Visitor parking is provided in surface parking spaces off the internal access roads and as part of the underground car park.

3 EXISTING CONDITIONS – BACKGROUND INFORMATION

3.1 General

The subject lands is currently occupied by a vacant car dealership building (now removed) with associated paved and gravel parking areas. The Subject Site is not currently being used. The remainder of the property is occupied by cultural meadow and thicket areas (see Figure 3.1).

The Subject Lands are surrounded by the following land uses:

- To the north, Derry Road and a retail/commercial plaza beyond the arterial road;
- To the east, an wooded open space corridor with a watercourse (Tributary to Sixteen Mile Creek) and a SWM pond beyond;
- To the south, the continuation of the wooded open space corridor with a watercourse (Tributary to Sixteen Mile Creek);
- To the west, Regional Road 25 (Ontario Street) and a gas station beyond the arterial road.

Sanitary sewers, watermains and utilities for the development are currently available along the Regional Road 25 and Derry Road rights-of-way, north and west of the Subject Lands. Reduced copies of the following relevant drawings for Regional Road 25 and Derry Road are appended to this report:

Regional Road 25 and Derry Road Services

Plan S-388-79:	ONTARIO STREET – DERRY ROAD TO LAURIER AVE.
Plan M-994:	GRADING, PAVEMENT & SANITARY SEWER – DERRY ROAD – HWY 25 TO THOMPSON ROAD – Sta 0+010 TO Sta 0+315
Plan M-5101:	WATER AND WASTEWATER TRUNK MAINS – REGIONAL ROAD 25 – From Sta 12+380 TO Sta 12+750
Plan M-5102:	WATER AND WASTEWATER TRUNK MAINS – DERRY ROAD – From Sta 12+750 TO Sta 13+000

3.2 Topography, Drainage and Natural Features

A two storey concrete block structure originally occupied the northwest corner of the site. This was recently removed. A Sales Pavilion has recently been constructed on the site, central to the Derry Road frontage. A reasonably flat asphalt and gravel pad (previous parking area) surrounded the structure. The remainder of the tableland is covered by the meadow grasses up to the tree canopy that borders the sloped bank down to the watercourse, along the east and south boundary of the site.

Building A and B are currently under construction.

The tableland of the site topography is generally flat. This portion of the site varies from a high point of 196.12m at the asphalt driveway on the north boundary. The low point on the tableland

occurs in the southwest corner of the site (elevation = 193.37m). The watercourse has an elevation of 183.96m where it intersects the Regional Road 25 right-of-way.

The existing site generally drains toward the south (i.e. to the bank of the watercourse). A portion of the site (approximately 0.76 ha) drains to the west; to Region Road 25 or north to Derry Road.

Figure PD-1 appended hereto illustrates the general drainage pattern and the pre-development pervious and impervious surfaces. Nearly 2.06 ha (73.0% of the site) drains in sheet flow to the watercourse.

The pervious area of the site is dominated by a meadow community containing various weed type vegetation (e.g. Goldenrod, Cow Vetch and teasel). The Hickory Deciduous forest found on the steep valley slope extends onto the Subject Property in the southeast corner of the site. "*A small portion of the dripline of this unit extends onto the subject property and past the staked top-of-bank. The tree species composition of this unit is 46% Bitternut Hickory …, 25% Red Oak …, 18% Ironwood …, and 12% other species including Bur Oak …, Sugar Maple …, and Shagbark Hickory …, with a basal area of 19 m^2/ha. … One mature Butternut … was found within this unit" (*Kuntz 2020, page 10)[1].

[1] Kuntz. 2020. *Scoped Environmental Impact Assessment, Derry Road and Regional Road 25, Milton, ON (project P1581)*. Prepared for Briarwood (Milton Greenfields) Ltd. by Kuntz Forestry Consulting Inc. Oakville, Ontario. (last dated 2 November 2020).

Figure 3.1 – Aerial View of Site and Surroundings

Kuntz notes that "*the subject property is located within the Sixteen Mile Creek watershed. … As it is surrounded by roads and residential subdivisions, the site displays some, but limited connectivity to the surrounding natural features. The site is adjacent a Sixteen Mile Creek natural area; however, is divided by Regional Road 25 by greater than 30m. The study area is in close proximity to Moorelands Park (northwest) and two construction stormwater management ponds (east)"* (Kuntz 2020, page 8).

3.3 Geotechnical Information

Sirati & Partners Consultants (SPC) investigated the geotechnical and hydrogeological conditions on the site. They describe the "… *physiographic features are characterized by the Peel Plain physiographic region …. This plain is the former lake bottom of the glacial Lake Peel… The Peel Plain gradually slopes down toward Lake Ontario, following the topography of the underlying Halton Till. A calm lake environment resulted in the deposition of silts and clays, particularly in the depressions in the till. These sediments were quite thin*…"

"*The surficial geology of the area is mostly represented by glacier and glacial lake sediments overlying the … Queenston Formation shale, consisting primarily of thick silty to sandy clay till referred to as the Halton Till. This till is reddish in colour as it is composed primarily of glacially reworked Queenston shales. Soils, which form on the Halton Till, are heavier clay loams. The overburden consisting of silt, sand, clay and clayey silt extends to maximum depth ranging from 13.0 to 17.0 m below the existing grade, corresponding to elevations of 178.5 to 180.5 mASL*" (SPC 2020, page 7 & 8)[2].

SPC undertook monitoring of the groundwater levels. In the first set of readings, the elevation of the groundwater ranged from 188.48 to 189.17m with one reading at elevation 190.36 (i.e. MW-A). During the second round of monitoring on 8 August 2017, the groundwater elevation ranged from 188.21 to 188.81m, with the one well registering an elevation of 190.23m (i.e. MW-A). At the request of HRCA, SPC continued to monitor the water elevations from July 2018 through March 2019. In the latter monitoring, SPC recorded the highest water elevations in November 2018. SPC indicted "*the measured groundwater levels ranged from 4.59 mbgs at monitoring well MW-A in November 2018 to 7.46 mbgs at MW-1 in October 2018, while elevations ranged from 190.41 mAMSL at MW-A in November 2018 to 188.24 mAMSL at MW-2 in August 2018"* (SPC 2020, Page 13).

Monitoring well, MW2, is located closest to the top of bank for the watercourse. SPC reported that the water table elevation ranged from a low of 188.24 to a high of 189.37, during the monitoring period (see SPC 2019, Table 9-2). The associated ground elevation of the well is reported to be 195.60m. The water table is six to seven metres below the current ground elevations.

Two test pits were excavated on 20 October 2020 to observe the soil and ground water conditions associated with the Phase One site. The first test pit was excavated to a depth of 7.3m (approximately elevation 187.1) at a location approximate ten metre northeast of MW-A. The second test pit was excavated to a depth of 6.7m (approximately elevation 198.7) located approximately 80 north east of MW-A. Although both holes were advanced to a sandy silt till, they were dry and no seepage was observed.

Excerpts from the geotechnical reports are appended to this report.

3.4 Water Mains

The Subject Site is located at the southerly limit of Pressure Zone M5G. This zone had historically been serviced by wells located near Milton. The 2011 Sustainable Halton Water and Wastewater Master Plan (AECOM 2011)[3] identified the Subject Site should be part of the

[2] SPC. 2020. *Updated Hydrological Investigation Report, 6791 Regional Road 25, Milton, Ontario* (project SP17-219-30). Prepared for Briarwood Group by Sirati & Partners Consultants Limited, Vaughan Ontario. (revised 20 November 2020)

[3] AECOM. 2011. *Sustainable Halton Water & Wastewater Master Plan* (Project No. 60114062). Prepared for the Region of Halton by AECOM, Markham, Ontario. (12 September 2011)

transfer option. This would see the site transferred to the lake based water supply that was extended into Milton to service new development.

AECOM states "*the Milton Well Water Supply System supplies water to the core area of the Town of Milton which sits on the Halton Clay plain, which is underlain by low permeability shale bedrock. The portion of Milton's water supply derived from groundwater is obtained at two well fields outside of town. These are the Kelso well field (4 km outside of Milton) and the Walker's Line wells (approximately 6 km outside of Milton). There are four wells from the well field in the Kelso aquifer and two wells in the well field in the Walkers Line aquifer*" (AECOM 2011, page 71).

"*The recommended water servicing strategy for Milton is described below.*

Milton Lake-Based Water Servicing

- *"Milton lake-based service area includes existing areas outside the central core of the community and is serviced by Zone M4L and M5L*
- *"Water supply is from the existing and proposed expansions of the WPPs at Lake Ontario and pumped through a series of pumping stations and reservoirs north to Milton*
- *"Additional areas of the existing groundwater serviced area will need to be transferred to lake-based supply to ensure sustainable groundwater and lake-based service areas"* (AECOM 2011, page 96)

As shown on Drawings M-5101 - Water and Wastewater Trunk Mains – Regional Road 25 (From Sta 12+380 TO Sta 12+750) and M-5102 - Water and Wastewater Trunk Mains – Derry Road (From Sta 12+750 TO Sta 13+000), an existing 900mm supply main is located on the east side of the Regional Road 25 ROW and on the south side of the Derry Road ROW. The Region of Halton will not generally allow direct connections to such a supply main. There is a 150mm watermain located on the west side of the Regional Road ROW. This serves the service station on the southwest corner of the intersection. A 300mm diameter watermain is also located on the north side of the Derry Road ROW. An interconnection between the supply main and the local distribution mains is shown on Drawing M-5101.

The above information has been shown on Drawing SS-1 through SS-3 for the proposed development and is appended hereto.

3.5 Sanitary Sewers

As shown on Plan S-388-79 - Ontario Street – Derry Road to Laurier Ave and Plan M-994 - Grading, Pavement & Sanitary Sewer – Derry Road – Hwy 25 to Thompson Road – Sta 0+010 TO Sta 0+315, a 250mm diameter sanitary sewer exists on the north side of Derry Road. It services properties on the north side of the road and drains west to the east side of Regional Road 25 (Ontario Street). From there it drains northward. The service station in the southwest quadrant of the intersection was also connected to the first maintenance hole located on Regional Road 25.

The sewer is reasonably shallow (elevation 191.262m or 3.9m of cover). From the maintenance hole, the sewer has a slope of 0.60%. This provides a capacity of 42.1L/s.

The existing sewer has been shown on Drawing SS-2 for the proposed development and appended hereto.

3.6 Storm Drainage

There is only a 600mm Ø storm sewer located along the east curb line of Regional Road 25. This drains runoff from the ROW and from a short distance east of Regional Road 25 (via a 375mm diameter sewer) from the ditch located east of the former site building. Drawings available from the Region of Halton show the sewer crossing to the west side of Regional Road 25 and to the tributary. They do not indicate any water quality measures.

3.7 Utilities

A higher voltage aerial hydro line is located on the east side of Regional Road 25 and on the south side of Derry Road.

Bell Services are located in association with the electrical cables.

Natural gas lines are constructed along the north boundary of the proposed development.

3.8 Environmental Features

Kuntz Forestry Consulting Inc. (KFCI) was retained by Briarwood (Milton Greenfields) Ltd. to complete a Scoped Environmental Impact Assessment (EIA) in support of a development application for the Subject Property.

There are no open water, wetlands or other significant natural heritage resource apparent on the Subject Site. A drainage feature that is tributary to the Sixteen Mile Creek is located approximately 25m south and east of the site.

The woodland associated with the watercourse valley is identified as “Significant Woodland” in the Region of Halton Official Plan (ROP). A portion of the subject property is in a Conservation Halton Regulated Area under Ontario Regulation 162/06. As the proposed development is located within 120m of the Regional Natural Heritage System, an EIA is required as per Section 118(3.1) c) of the Halton Region Official Plan. This is further discussed by Kuntz Forestry (2020).

A site walk was completed by the Conservation Halton on 15 June 2016. The top of bank was staked and surveyed. Additional dripline surveys were completed on 6 July 2020 with the Town of Milton in the vicinity of the proposed outfall storm pipe. KFCI also mapped the limit of Significant Vegetation.

4 PROPOSED SERVICING

There are no specific MESP or other environmental studies that dictate the design of the site. Conservation Halton has indicated that criteria set out in the Sixteen Mile Creek Area 2 and 7 Subwatershed Study completed by Phillips Planning and Engineering Limited in 2000[4] should still be applied to the development of the site. Subsequently, the Wood's peer review (Wood 2020)[5] indicated that the criteria set out in the Sixteen Mile Creek Subwatershed Update Study completed by AMEC et al in 2015[6] should be used for this development site.

The proposed free-hold townhouses will be serviced from the new, common element, access. Proposed condominium apartments and the stacked townhouses within the plan will also be serviced from the common element access. The water system will be looped through the development and connected to both Regional Road 25 and to Derry Road. Internal sanitary sewers will connect to the existing sanitary sewer near the northeast corner of Regional Road 25 and Derry Road. The storm drainage system will collect runoff from the site and drain it southwestward toward to the Regional Road 25 entrance. A storm detention tank will help to control the discharge southward to the tributary to Sixteen Mile Creek. On–site treatment will be provided within the storage tank. This is functionally illustrated on Drawing No. SS-1, SS-2 and SS-3, attached hereto. The individual services are described in more detail hereinafter.

4.1 Grading

The grading plan matches the existing site grades at the boundary of the site. The grading for the roads and site is indicated on the Drawing G-1 through G-3 and submitted with the site plan application.

The existing gutter elevation is approximately 195.02m at the proposed entrance to Derry Road. The existing gutter grade is 193.15m at the proposed entrance to Regional Road 25. It is proposed to slope up from Derry Road at 1.82% to a high point of 195.26m at the new property line. It is also proposed to grade the access road up at 2.0% to 5.7%, from Regional Road 25, to elevation 193.88m at the new property line. Between these two points, the common access roadway will be graded at approximately 0.66% to 1.24%.

It is proposed that a constant cross fall of 2.0% be used on the access road. This will drain runoff away from the driveways and allow catch basin maintenance holes to be used to capture surface runoff in the north gutter.

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[4] Phillips. 2000. *Sixteen Mile Creek, Areas 2 and 7 Subwatershed Planning Study*. Prepared by Phillips Planning and Engineering Ltd. (January 2000)

[5] Wood. 2020. *Hydrologic Verification of the Proposed Stormwater Management Plan for Briarwood (Milton Towers) Site Plan Application, 6791 Regional Road 25 & 2230-2252 Derry Road, Town of Milton (File TP98053E)*. Memorandum prepared for the Town of Milton by Wood Environment & Infrastructure Solutions. Burlington, Ontario. (3 June 2020)

[6] AMEC et al. 2015. *Sixteen Mile Creek, Areas 2 & 7, Subwatershed Update Study (Sus), Town Of Milton, (Draft Final).* Prepared by AMEC et al for Town of Milton. Milton, Ontario. 2015

The other internal crescent road will be sloped at a nominal 0.8% from the connecting roadway. A high point of approximately 195.35m will be provided south of the Building C entrance.

The finished floor elevations of the buildings have been set to reflect the elevations internal to the site as well as the existing elevations on both Derry Road and Regional Road 25. The grades for the freehold townhouses allows for 2.0% to 5.0% grades to the rear face of the building. Most of the townhouses will have direct access out from the main floor to the rear decks. A number of stairs will then access the rear yards. The rear yards will have 2.0% to 5.0% slope to match the existing ground.

The grading around the stacked townhouses will drain will drain away from the units and will have access from both the street and internally.

4.2 Water Table Concerns

The existing water table can impact the development in several ways. Constructing the structures into the water table will require considerations in the design, due to dewatering or water proofing. The infiltration structures used to satisfy water balance concerns must be constructed above the final water table. Even during the construction of the project, consideration of the water table elevations is required for dewatering during construction. Several of these concerns is discussed below.

4.2.1 Water Table Observations

Sirati & Partners (2020) undertook a Hydrogeological Investigation for the Subject Site. They employed five monitoring wells to investigate the ground water levels over a period of time. Several of the monitoring wells relate to the structures of interest on the site.

In general, the water table slopes to the south or southeast. The EIS report for the site indicated there was no evidence of discharges from the valley slopes observed. The toe of the valley slope varies from 184.5m near the proposed storm outfall to approximately 189m near the watercourse crossing at Derry Road.

The following table summarizes the water table elevations observed by Sirati (2020).

Monitoring Well	**MW-1**	**MW-2**	**MW-A**	**MW-B**	**MW-C**
Relation to site	Located at NE corner of UG parking	Located at freehold town house TH-C	Located at proposed Building A	Located at western end of central park	Located at proposed Building C
Surface elevation	196.1	195.6	195.0	195.70	196.0
	Water Table Monitoring				
Short term	188.21 to 188.48	188.21 to 188.57	190.23 to 190.36	188.57 to 189.65	188.81 to 189.17
Longer term	188.64 to 189.13	188.24 to 189.37	190.10 to 190.41	188.39 to 188.85	188.83 to 189.85

Reported average	188.76	188.66	190.07	188.64	189.23

4.2.2 Underground Parking Structure

The underground parking structure varies in elevation from a low point of approximately 188.35m in Building A, near the southwest corner of the parking structure to approximately 190.00m at the east end of Building C near the access ramp.

Monitoring well MW-A is located near the Building A location at the southwest corner of the parking structure. The average water table will be 1.9m above the garage elevation or approximately 2.5m below the footing. After Sirati (2020), the Sichardt Method of calculating the radius of influence,

$$Ro = 3000 \times S_w \times k^{0.5}, \quad \text{where } S_w = 2.5m \text{ and } k = 1.36 \times 10^{-7}$$
$$= 2.8m$$

suggests the impact will be limited to less than three metres from the structure.

Monitoring well MW-C is located near the Building C access point. The average water table elevation will be below the garage footing elevation. Even the high water elevation recorded at this location is below the P2 floor elevation.

The above observation suggests the long term dewatering estimate presented by Sirati (2019) is very conservative.

4.2.3 SWM Storage Tank

The footing of the SWM storage tank would have an elevation of approximately 185.80m. Monitoring well MW-C is located the closest to the tank's location. Conservatively the footing of the tank would be located 4.5 m below water table. This is a conservative estimate as the water table will be sloped down in proximity of the valley wall.

A subdrain has been proposed beneath the SWM storage tank. This will locally lower the water table. The radius of influence (based on the Sichardt Method) will be 5.3m. The subdrain will be directed to MH 11, down gradient of the tank. The subdrain can also be extended under the access road to serve the parking structure as well.

4.2.4 Infiltration Trenches

The base of the infiltration trenches vary from 190.65m at the west end of the townhouses to 192.60m at the east end.

Based on the water table levels at Building A, the westerly trench will be conservatively 0.4m or more above the average water table. At monitoring well MW-2, near TH-C, the bottom of the infiltration trenches will be 2.2 m above the recorded high water table elevations.

4.3 Proposed Watermain

As shown on Drawing SS-1 through SS-3, the Subject Development will be serviced by extending a 200mm diameter watermain along the common element road. This watermain will connect to the 300mm diameter watermain on the north side of Derry Road. The watermain will also tie into the 150mm diameter watermain on the west side of Regional Road 25.

Individual 25mm Ø water services will be provided to the freehold townhouses, while larger services will be extended to each phase of the apartment structures and stacked townhouses

An existing water service at the existing daylight triangle will be removed, as required by the Region. There is an existing domestic and fire service crossing Derry Road approximately 70m east of the intersection. The tee and valves will be removed from this watermain. The 200mm Ø service will be extended to Building B to provide a fire main to the structure. It is proposed to branch off a 150mm Ø domestic service. A new fire hydrant and valve will be added in order to provide fire coverage for the new development.

Building A will have a 200mm Ø fire main and a 150mm Ø domestic main teed off the access road just east of Regional Road 25. Each will have valves and boxes on the line, at a location 3.0m from the building.

Building C and D (stacked townhouses) will also have a 200mm Ø fire main and a 150mm Ø domestic main teed off the access road at the intersection of the internal site accesses. Again each service connection will have valves and boxes on the line, just external to the underground parking structure.

4.4 Proposed Sanitary

As shown on Drawing SS-3, the Subject Site will be serviced by extending a 250mm diameter sanitary sewer westward from the east end of the freehold townhouses. At the Regional Road 25 entrance, the sanitary sewer will be extended north, to the daylight triangle. It is proposed to extend the sewer by way of jack and bore to the existing sanitary manhole on the north side of Derry Road.

The sanitary sewer will be laid at reasonable shallow grades (i.e. 0.50% grades). As the pipes will only have 1.06m of cover at the west entrance (i.e. MH 5A), the free hold townhouses will have no basements. The sanitary sewer facilitates flows from the condominium residents, but levels below grade (i.e. parking areas) will need to be pumped to the sewer system.

The total anticipated sewerage from the development is estimated as:

Development Proposal

- Condo Apartments 614 units @ 2.5ppu = 1536
- Freehold Townhouses 34 units @ 3.5ppu = 119

• Stacked townhouses	27 units @3.5 ppu=	95
• Total Population =	1750	
Sewage rate =	275 Lpcd	Source: Halton 2017
Total average sewage =	**481.25 m^3/d, or 5.57 L/s**	
Infiltration Rate =	0.286 L/s/ha	Source: Halton 2017
Area =	1.99 ha	(excl. buffer and ROW widening)
Total Infiltration =	**0.57 L/s**	
Total Average Flow =	**6.14 L/s**	
Total Peak Flow =	20.79 L/s	Based on Harmon Peaking Formula (PF=3.63)

The townhouses will be individually connected to the sewer main. Building C will be connected to the main at the east intersection of the internal access roads. Building A will be connected to the sewer main at the west intersection of the internal access roads. Building D (stacked townhouses) will be connected to the MH at the east end of the site. Building B will be connected to the sewer maintenance hole immediately before flowing under the Derry Road West pavement.

The sewer sanitary design sheet is appended to this report.

4.5 Storm Drainage and Stormwater Management

The storm drainage system consists of storm sewers for the minor storm runoff and a major overland storm system which will facilitate the major flow. The Subject Site is designed without the benefit of a foundation drain collector (FDC), since there are no basements contemplated for the freehold portions of the development. The foundation drain for the parking garage will be pumped to a footing drain under the SWM tank and then flowing to the first maintenance hole downstream of the SWM tank.

4.5.1 Criteria

The storm sewers will be designed to meet the Town of Milton criteria for storm sewer design, based on the 5-year Return Rainfall Intensity equations:

Rainfall intensity (mm/hr) = $i = A/(t_d + b)^c = 959 / (t_d + 5.7)^{0.8024}$

Where: i = rainfall intensity (mm/hr)
A, b & c = constants based on IDF curve
t_d = duration of the storm

and utilizes an initial time of concentration of ten (10) minutes.

Stormwater management is designed to meet the following criteria as set out by AMEC et al.(2015):

1. **Water Quality**: Enhanced Treatment (i.e. 80% TSS removal) for storm discharges
2. **Erosion Control**: Flow restricted to 0.002 m^3/s/ha and storage provided for 400 m^3/imp.ha
3. **25 year Quantity Control**: Flow restricted to 0.015 m^3/s/ha and storage provided for 650 m^3/imp.ha.
4. **100 year Quantity Control:** Flow restricted to 0.035 m^3/s/ha and storage provided for 800 m^3/imp.ha.
5. **Low Impact Development Strategies:** LID measures will be used to help balance groundwater infiltration.

4.5.2 Storm Drainage

Overview:

The proposed storm drainage system is shown on Drawing SS-1 through SS-3. The existing site is composed of two principal drainage areas. Approximately 0.76ha of the existing site drains to the two adjacent streets. The remaining 2.08ha drains directly to the adjacent watercourse. This is shown on Figure PD-1, appended hereto.

It is proposed to service the site with storm sewers that follow the proposed common element access. Figure SD-1, attached hereto, illustrates the proposed, post-development drainage pattern. An area from approximately the centre of the freehold townhouses to the south and east limits of the site, will drain to rear yard swales that flow to a series of Rear Lot Catch Basins (RLCB). These catch basins will be connected to the storm sewer on the common element access. An infiltration trench will be fed from the rear roofs of the townhouses and from the rear lot swales. The remainder of the site will be retained on site or collected and conveyed to the watercourse through the storm sewer.

Storm Sewers:

The storm sewer will employ a series of catch basin maintenance holes located along the north gutter line of the common element road. South of the west access point, the sewers will drain into a storm detention tank with an orifice control. An Oil / Grit Separator (OGS) would be constructed as part of the outlet from storage tank prior to discharging across the buffer to the outfall in the existing tributary.

Inlets at the Regional Road 25 access point, will capture any runoff from the site up to and including the 100-year major flow, before the runoff can discharge to Regional Road 25. The outlet to the unnamed tributary to Sixteen Mile Creek will be designed to incorporate a pocket wetland and a naturalize channel to mitigate the release of the storm flows and to provide an enhancement for water quality and habitat considerations.

The design of the sewers was completed and is appended hereto along with a copy of drawing SS-1 through SS-3, illustrating the storm sewer servicing for the site. The outfall sewer is illustrated on drawing P-3. The capture of the 100-year runoff was reviewed based on methods set out in the MTO Drainage Manual. This analysis is provided in the appendix.

The outfall storm sewer has been located as far west as possible (i.e. less than two metres from the property line) to minimize the impact on the valley slope. The bank of the valley has already been reworked to create the road crossing of the un-named tributary. The alignment aims to work with existing grades to avoid the most sensitive slopes. From the property line, the ground falls from 193.2m to 187.75m at the proposed maintenance hole (i.e. 1:3 slope) along the alignment of the proposed pipe. The land over the last leg of the sewer falls at approximately 1:7.5 slope. These slopes allow the work to proceed and facilitates the restoration efforts. The last leg has been located south of a localized swale at the bottom of the steeper slope so as to avoid undermining the steeper bank area. The outfall has been directed to a small existing drainage feature located at the bottom of the steeper sections of the slope.

The outfall sections of the sewer will be constructed using directional drilling to minimize the areas disturbed. Sirati reviewed the outfall and indicated "*Construction of the storm pipe from the SWM tank to MH9 and then to the outlet requires a trench be excavated through the slope and then backfilled as per the specifications provided in the geotechnical investigation report. It must be noted that the exposed backfill surface on the slope should not be constructed with a slope steeper than 3H:1V. If steeper slopes are to be constructed, the backfill shall be reinforced with geogrids, such as Sierra Slope System™*" (Meysam Najari, pers. corres. 2018)[7]. Any disturbed area will need to be stabilized by erosion mats and revegetated as per EIS guidelines for restoration of naturalized areas.

4.5.3 Stormwater Management

The stormwater management design will be accommodated by temporary storage, infiltration and controlled releases of the storm runoff. The water quality aspect of the stormwater management (SWM) for this site will employ measures to achieve quality objectives prior to the release of the stormwater. Where possible, LID design features are also included in the design of the development.

Criteria, Policy and Guidelines:

[7] Meysam Najari (Sirati & Partners Consulting Limited), Personal email correspondence regarding Briarwood Residential Development. 14 December 2018.

The Town's Terms of Reference for Stormwater Management Studies (Milton 2019)[8] was considered in the preparation of this document. Portions of the Sixteen Mile Creek, Areas 2 & 7, Subwatershed Planning Study (Phillips 2000) and the Sixteen Mile Creek, Areas 2 & 7, Subwatershed Planning Study (SUS) (AMEC 2015) was consulted with respect to SWM objectives. The MOECC's Stormwater Management Planning and Design Manual (MOECC 2003)[9] has also consulted regarding design standards and approaches.

Sixteen Mile Creek, Areas 2 & 7, Subwatershed Planning Study

The Subwatershed Planning Study (Phillips 2000) provided ecological and stormwater management guidelines for portions of the Sixteen Mile Creek Watershed. It was first prepared in 1996 and approved in 2000. The study provides strategies for various land use activities within the Sixteen Mile Creek Watershed. The Subject Site is located in the Phase 1 portion of the plan, also known as the Bristol Survey Area. The Subject Site is located at the extreme northwest corner of that plan.

The study modelled the watershed and developed storage-discharge relationships for the proposed SWM facilities within each planning area. These were itemized in Table 2.13 of the study. Similarly the requirements for erosion control was modelled and criteria itemized in Table 2.14 of the study document. Although the Subject Site is part of the Phase 1 Planning Area it is isolated by topography from the SWM ponds incorporated into the plan. The following stormwater management criteria was set out in that plan:

1. **Water Quality**: Enhanced Treatment (i.e. 80% TSS removal) for storm discharges
2. **Erosion Control**: Flow restricted to 0.0005 m^3/s/ha and storage provided for 550 m^3/imp.ha
3. **25 year Quantity Control**: Flow restricted to 0.0015 m^3/s/ha and storage provided for 195 m^3/imp.ha over the Extended Detention.
4. **100 year Quantity Control:** Flow restricted to 0.018 m^3/s/ha and storage provided for 245 m^3/imp.ha over the Extended Detention.

Inherent in the criteria is the understanding that centralized SWM facilities will be employed for the majority of new development. The criteria do not recommend separate strategies to deal with smaller isolated / infill development. The small restricted flows may be influence by the practical considerations of the physical design of the SWM facilities (i.e. minimum orifice sizes).

Sixteen Mile Creek, Areas 2 & 7, Subwatershed Update Study

[8] Milton. 2019. *Engineering and Parks Standards, Appendix C - Terms of Reference for Stormwater Management Studies*. Milton, Ontario. 2010.
[9] MOECC. 2003. Stormwater Management Planning and Design Manual. Prepared by Ontario Ministry of the Environment. Queen's Printer for Ontario. Toronto, Ontario. 2003

The Subwatershed Update Study (SUS) (AMEC 2015) reviewed the original Sixteen Mile Creek Watershed Plan that was first prepared in 1996. The study provides strategies for various land use activities within the Sixteen Mile Creek Watershed. These were presented under the following heading:

- Natural Heritage System
- Modifications to Urban Form
- Subwatershed Planning
- Flood Plain Management
- Milton Wastewater Treatment Plant
- Stormwater Management Facilities Sizing Criteria

Only some of these topics impact the SWM plans for the site. Other considerations are considered in the Environmental Impact Assessment (EIA) prepared by Kuntz Forestry Consulting Inc. that forms part of the planning submission.

The SUS described the adjacent reach of the Sixteen Mile Creek as having "*bankfull dimensions along Reach 2-II ranged from 11 to 20 m wide and 0.25 to 0.70 deep. The channel flowed through a well-defined valley system, with scrub forest dominating the riparian corridor, beyond which a mixture of agriculture and urban development represented the dominant forms of land use*" (AMEC 2015, page 48).

In considering the management and strategies for the subwatershed, the SUS indicates, "*as indicated in the original Sixteen Mile Creek Areas 2 & 7 Subwatershed Planning Study, hydrologic processes are considered central to many of the natural functions and features within the subwatershed. Therefore, maintaining hydrologic function after land use changes is considered important to preserve existing resources*" (AMEC 2015, page 161).

The SUS set out the following criteria (Wood 2020, Table 3, page 3):

1. **Water Quality** : Enhanced Treatment (i.e. 80% TSS removal) for storm discharges
2. **Erosion Control**: Flow restricted to 0.002 m^3/s/ha and storage provided for
3. 400 m^3/imp.ha
4. **25 year Quantity Control**: Flow restricted to 0.015 m^3/s/ha and storage provided for 650 m^3/imp.ha
5. **100 year Quantity Control**: Flow restricted to 0.035 m^3/s/ha and storage provided for 800 m^3/imp.ha

From a hydrological perspective, the SUS also indicated, "*flow rates along the major tributaries of the Sixteen Mile Creek … were essentially insensitive to the impacts of future development for the less frequent storm events …; nevertheless, peak flow rates during the more frequent storm events were shown to increase as a result of future development. Additional analyses indicated that these impacts could be successfully mitigated through the implementation of stormwater quantity control measures within the future development areas*" (AMEC 2015, page 162).

The SUS established several objectives for SWM related consideration, including:

"*d) Stormwater Management practices should, to the greatest extent possible, preserve the existing hydrologic regime, including surface and groundwater flows.*

"e) Land Use, proposed for the urban area, should complement the recharge/discharge characteristics of the subwatersheds, enhance and protect terrestrial resources (including corridors) and stream systems" (AMEC 2015, page 170).

With respect to hydrology, the SUS recommends "*construction of stormwater management facilities for all new development in order to control post-development flows to pre-development levels*" (AMEC 2015, page 171).

For erosion protection, the SUS recommends:

- "*Increase extended detention storage and drawdown times within stormwater management facilities.*
- *"Application of Low Impact Development (LID) within existing and/or future development areas in order to reduce runoff volumes and promote infiltration, in combination with increased extended detention storage and drawdown times within the end-of-pipe facilities.*
- *"Implement instream works to stabilize channels against erosion*" (AMEC 2015, page 172).

The SUS goes on the recommend measures in order to maintain baseflow/low flow conditions within the regulated receiving watercourses. The report suggests that baseflow/low flow conditions may be maintained or enhanced through any combination of the following techniques:

- "*Increase extended detention storage and drawdown times within stormwater management facilities.*
- *"Application of Low Impact Development (LID) within existing and/or future development areas in order to reduce surface runoff volumes and promote infiltration.*
- *"Importation of water from offsite and recharge to the groundwater regime*" (AMEC 2015, page 172).

As the SUS points out, the choice of SWM strategies must take into consideration the size of the contributing drainage area. As the area of this development is limited (i.e. 2.29 ha), major end-of-pipe treatments are not practical. Furthermore, the necessity to under lay a major portion of the site with two levels of parking limits the range of LID options that can be employed to encourage infiltration.

The development does border a patch of significant forest and valley lands; however, this reach is limited particularly in light of the density of residential units compared to normal subdivisions in the area. The bank of the valley is fairly pronounced and does not facilitate many options with respect to storm runoff. The installation of a structured drop to release the storm runoff to the watercourse will prevent the concentration of runoff and further erosion of the bank.

This project is isolated by the adjacent watercourses which does not permit the use of more centralized SWM end of pipe treatments.

Low Impact Development Initiatives:

As indicated above, LID initiatives are being promoted to reduce surface runoff and promote infiltration. The characteristics of the proposed development make implementation of LID initiatives more difficult. A large portion of the site is occupied by a two storey underground parking structure that limits the infiltration of runoff by LID features. The private roadway has a limited width, with the underground parking located less than two metres from the travel lanes. The road must also provide space for services and utilities. The space between the freehold townhouses and the buffer area is limited.

LID initiatives provided in the CVC's Low Impact Development Stormwater Management Planning and Design Guide (CVC 2010)[10]. The following discusses the application to this project.

LID Practice	Discussion
Rain Barrel :	Small scale practice, with limited utility on this form of development. There are limited lots where this can be applied. Roof downspouts will not necessarily be available for each individual unit. Rear yard locations are limited and front yards are already cramped for space. Runoff in the rear yards of the freehold townhouses can be more effectively managed using infiltration measures.
Cistern :	There is limited space available in the underground complex to facilitate a cistern. There is a concern regarding leakage from a cistern into the parking structure. The turf areas that could benefit from a cistern is primarily located within the central green space, which is more isolated from the possible roof collection areas.
Green Roof :	The architectural styling of the roofs for the stacked and freehold townhouses is not compatible with the use of 'Green Roof' installations. The roof areas for the high rise towers are interspersed with active use areas. The available space for implementation of 'green roofs' is therefore limited and patchy.
Roof Downspout Disconnection :	Roof downspouts from rear of freehold units will help feed the infiltration trench and will be better conveyed to ground water recharge than discharged to the surface.
Soakaway, Infiltration Trench or Chamber :	Infiltration can be used in rear yards of freehold townhouses. Limited room is available in front yards of freehold townhouses. Areas surrounding high

[10] CVC. 2010. *Low Impact Development Stormwater Management Planning and Design Guide (Version 1.0*). Prepared by Credit Valley Conservation and Toronto and Region Conservation Authority.

LID Practice	Discussion
	rise and stacked townhouses is underlain by the underground parking structure and is not compatible with induced infiltration.
Bioretention :	Bioretention is normally used to treat, detain, infiltrate and control the release of storm runoff. Areas surrounding high rise and stacked townhouses is underlain by the underground parking structure and is not compatible with induced infiltration. The possible discharge points of collected and treated runoff to the surrounding storm infrastructure is also limited.
Vegetative Filter Strip :	The buffer strip provides a vegetative buffer. The Town and conservation authority has indicated its preference not to discharge stormwater from site to this area. The discharge across the buffer will not allow on-site controls of storm quantity from the site.
Permeable Pavement :	Permeable pavement is viable for the driveways associated with the freehold townhouses. The pavements associate with the high rise and stacked town houses are located over the underground parking garage structure. There is limited opportunities to infiltrate water to the deeper water table. The use of permeable paving materials for the walkways crossing the central amenity area can employ
Enhanced Grass Swale :	There is limited space for surface drainage systems.
Dry Swale :	There is limited space for surface drainage systems.
Perforated Pipe System :	Storm sewers on common element road is located close to wall of underground garage and most of the infiltrated water is likely to be collected by foundation drain. Remainder of the site is underlain parking garage.

It is proposed to employ increased topsoil depth (minimum 300mm) on the site. This will help to promote the infiltration of rainfall on the site.

Walkway structures internal to the site will employ permeable construction technical to reduce runoff and promote infiltration. The driveways of the freehold townhouses will also employ permeable surfaces.

Infiltration trenches will be used in the rear yards of the freehold townhouses. These will receive the runoff from the rear roofs of the townhouses. They will also be designed to receive the initial runoff from the rear yard areas. Connections to the RLCBs will direct runoff initially to the infiltration trenches. Only after the trenches are full, will runoff be conveyed to the storm sewers.

Water Quality:

The SUS indicated that "*Level 1 (currently referred to as Enhanced) Habitat Protection facility performance (i.e. 80% removal of suspended sediment) would be required based on the existing fishery resources of the Sixteen Mile Creek…*" (AMEC 2015, page 11).

The net site area amounts to approximately 2.29 ha. This is less than the feasible drainage area for a SWM pond.

The most feasible measure of quality control will be the use of an Oil / Grit Separator (OGS) prior to discharge to the existing drainage course. The OGS should be supplement with additional treatment by discharging to an enhanced swale or a constructed wetland. There is; however, limited space for such treatments. The topography also restricts the available options.

Based on the receiving watercourse and the Sub-Watershed Planning Study guidelines, an enhanced water quality criteria (i.e. 80% TSS removal) was used in designing the treatment train. The conservation authority requires the OGS feature to be ETV ISO 14034 verified.

It is proposed to employ a membrane filtration treatment system to meet the water quality objective. Irbrium's Jellyfish® system (Model JF8-9-2) will be incorporated into the outfall portion of the storage tank (see appendix).

At the outfall, a small pocket wetland will be constructed. The design for the receiving pool and connecting channel were completed by GeoMorphix (2018)[11]. Their report and drawings are appended to this report.

Water temperature concerns will be mitigated by the underground storage tank. Although the initial flush of water will be warmed by the pavement areas, several elements of the site design will minimize temperature effects:

- Rear yards and roof areas from the free-hold town houses will be captured by the RLCB system and the first flush will be infiltrated, thus reducing the temperatures released runoff.
- The releases from the roof areas of the buildings will be controlled. Although this can result in raising the temperature of the runoff, the period of runoff will be extended and the runoff will be mixed with cooler runoff from the remainder of the site.
- Large portions of the central site will be landscaped areas that will not warm runoff at the darker asphalt areas.
- The captured runoff will be conveyed and storage underground before release; thus limiting the amount of warming.

Water Quantity:

[11] GeoMorphix. 2018. *Design memo for Stormwater Management Outfall and Erosion Mitigation for Sixteen Mile Creek Tributary, Briarwood (Milton Greenfield) Property, Town of Milton, Ontario (Project No. PN17153).* Letter report prepared by GeoMorphix for Briarwood (Milton Greenfield) Ltd. Milton, Ontario. (5 July 2018)

The release of stormwater from the development assumes that peak discharge rates will be restricted to the prescribed release rates, despite these rates being based on larger centralized SWM facilities. These rates are:

Criteria	**Release Rate (L/s)**	**Minimum Storage (m^3)**
Erosion Control	(0.002m^3/s/ha x 2.303ha =) 0.0046m^3/s or **4.6L/s**	(1.972imp.ha x 400m^3/imp.ha =) 788.6m^3
25 year Quantity Control	(0.015m^3/s/ha x 2.303ha =) 0.0345m^3/s or **34.5L/s**	(1.972imp.ha x 650m^3/imp.ha =) 1,281.5m^3
100 year Quantity Control	(0.035m^3/s/ha x 2.303ha =) 0.0806m^3/s or **80.6L/s**	(1.972imp.ha x 800m^3/imp.ha =) 1,577.3m^3

Based on 19,720m^2 impervious area

The design sheets indicate that the anticipated peak flows will be greater than the target flows. From the developable portion of the site the anticipated unmitigated 5-year storm discharge is estimated to be 401L/s and the 100-year discharge is estimated to be 664L/s (see design sheet). The 1:100 year target release rate is only 12.2% of the current 1:100 year discharge from the existing site.

To achieve the require targets a combination of approaches is proposed, including:

- Storage and controlled release of runoff from buildings on the site.
- Storage of runoff in the storm sewer system.
- Storage and controlled release from underground storage associated with sewer system.

The storage for the site has been calculated employing the Modified Rational Method. This method is suitable for relatively smaller sites, where it produces results that tend to be conservative. The method work best where the majority of the storage is controlled with contained in a single storage volume with one discharge point. The storage volume associated with the roof storage is low in comparison to the remainder of storage on the site: therefore a more robust stormwater model was not considered warranted.

a) Controlled Release from Available Roof Areas:

There are flat roof areas on buildings within the site plan where some storage and controlled release can be achieved. The free-hold townhouse units will all have sloped roofs and will not allow roof-top detention. No rooftop storage is proposed for the stacked townhouses. Only the top levels of the residential high-rises will have compatible roof areas. Roof areas at lower levels of the structure will provide outdoor amenity areas where standing water is not compatible with the use of the surface. Roof drain design drawings for Buildings A and B are included in the Appendix I.

A total of approximately 2,232.2 m^2 of roof area can be used for storm runoff mitigation. The following table shows the distribution of the areas and detention storage available. A figure showing the available storage areas is provided in the appendix.

Structure	Building A	Building B	Building C
Area (m^2)	577.5	750	904.7
Storage (m^3)	28.9	37.5	45.2
Discharge (L/s)	2.2 (7 drains)	3.2 (10 drains)	1.9 (6 drains)

Note: Storage based on 150mm maximum depth
Discharge based on 0.315 L/sec x No. of Drains

In summary, the roof areas can provide 111.6m^3 of temporary storage. The discharge will be reduced from 99.8L/s for the 100-year storm event to approximately 7.3L/s.

The roof storage is less than 7.1% of the total required storage. The calculate drawdown for this storage volume is 6 to 8 hours, which is less than the calculated drawdown for the storage tank / sewer system. It will therefore flatten the peak runoff as the remainder of the system drains off.

b) Storage in Sewer System:

The sewer system can be flooded to an elevation of 193.76 m before it will start ponding on the internal street. The intermediate high point in the street is only 193.79 m before runoff will flow onto Regional Road 25. The normal sewer system does not provide sufficient capacity to match the target release rate, but with flooding to elevation 192.53m it does provide 49.2m^3 of storage within the system (see calculations appended hereto).

c) Provision of Additional Underground Storage Volumes:

Additional storage is provided in an underground storage facility at the downstream leg of the storm sewer system. The tank provides a total of 1,437.7 m^3 of storage in a 228.20m^2 storage tank, 6.30 metres high. This is located adjacent to the freehold townhouse units, near the west access point. The OGS filter unit will be incorporated into the discharge from the storage facility.

To achieve the target discharge for the extended detention criteria a 17mm diameter orifice would be required. The minimum practical size to avoid risk of clogging is 75mm. This produces a peak release rate of 21.01L/s at the prescribed Erosion Control Storage volume. The same arrangement satisfies the target 25-year release rate (i.e. 31.9 vs 34.5L/s). Installing a 145mm diameter orifice at approximately the 25-year storage elevation will allow the 100-year release rate to be satisfied at the specified storage volume.

The actual required storage volumes for the 25-year and 100-year storm events was checked for the site based on the Modified Rational Method. This showed a storage volume of only 904.4m^3 and 1,037.3m^3 would be required for the 25- and 100-year storm events, respectively.

d) Alternate Storage Configurations:

The design reviewed the depth of flow required to meet the prescribed flow targets, given the minimum orifice size. To achieve the erosion target of 4.6L/s, a maximum depth of 181mm over the orifice invert could be permitted. The prescribed volume (789 m^3) would require a storage area of (789m^3 ÷ 181mm =) 4,359 m^2, which is not practical.

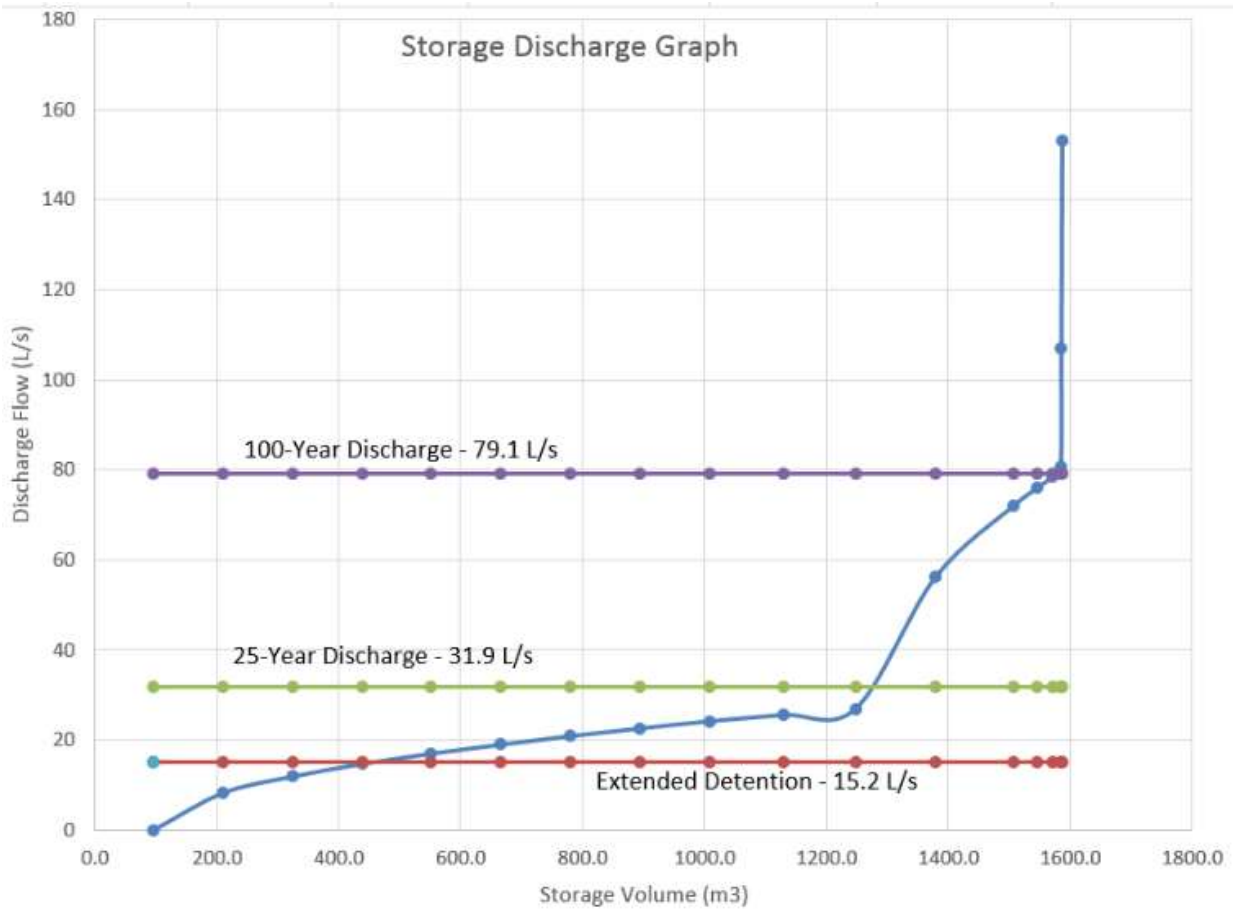
Other configurations of the storage tank are possible between the proposed design and the configurations described above; however, it is noted that the estimated pre-development release rate to the natural water course from the entire site (including buffer), is 347L/s, 472L/s and 575L/s for the 5-year storm, the 25-year storm and the 100-year storm events, respectively (Candevcon 2018, page 18). This implies the proposed discharges with the proposed measures is only 7.3% of the current 25-year flows and 11.1% of the current 100-year flows.

e) Proposed Design:

A summary of the proposed design is tabulated below:

Option	**Uncontrolled** (excl. buffer)	**Roof top controls, storage in sewers, plus storage tank**
Target Flows (L/s):		
Erosion Control Release	4.6	
1:25 year release	34.5	
1:100 year release	80.6	
Design Flows (L/s):		
Extended Detention		15.2
1:5 year release	498.2	n/a
1:25 year release	677.7	31.9
1:100 year release	824.7	79.1
Storage (m^3)		
Required by Sub-Watershed Study		788.6 m^3 – Erosion Control 1281.5 m^3 – 25-year 1577.3 m^3 – 100-year
Provided		464.3 m^3 – Extended – Elev 187.87m 788.6 m^3 – Erosion – Elev 189.29m 1281.5 m^3 – 25-year – Elev 191.38m 1577.3 m^3 – 100-year – Elev 192.53m

The Storage – Discharge relationship for the SWM Storage Tank is illustrated on the following figure.



4.5.4 Water Balance

First 5mm Criteria:

Currently some conservation authorities are requiring the development to capture the first 5mm of rainfall from new impervious surfaces and infiltrate that volume into the groundwater system.

Roof down spouts for the townhouses will not be connected to the storm sewer, but will be directed to the surface or infiltration features. In addition, increased topsoil thickness (i.e. 300mm) will be specified.

To further achieve the infiltration criteria, rear yard infiltration trenches are proposed along the buffer. An estimate of the amount of impervious area was completed for the development and is shown on Figures PD-1 and SD-1.

Based on the development concept, the impervious surfaces are estimated to have increased from 6,497m^2 (11,565m^2 when counting the hard packed gravel area) to 19,542m^2 with the subject development. This assumes that all areas over the parking garage are impervious. Approximately 2,050m^2 of this area is, however, soft landscape areas.

The capture of 5mm over this area requires the storing and infiltrating of ((19,716 – 6,497m^2) x 5mm =) 66.1m^3 of runoff. On the basis of a 1.25 x 0.8m infiltration trenches filled with 50mm clear stone (i.e. 40% voids), 165.2m of infiltration trenches would be required to accommodate the volume of runoff. Drawings SS-1 and SS-3 show approximately 216m of trenches, which exceed the calculated requirements. Calculations indicate that some 86.4m^3 of water can be accommodated in the infiltration trench located south of the free hold townhouses. Approximately 1,505m^3 of townhouse roof area can be directed to the trenches. This implies the storms up to 57.4mm of runoff can be accommodated in fully drained trenches.

The bottom of the infiltration trenches are located approximately 1.67m below the catch basin grates or approximately two metres below the existing ground elevations along the rear of the townhouses. As noted in Section 3.3 – Geotechnical Information, the ground water in the borehole closest to the bank, was recorded to be six to seven metres below the current ground elevation. The proposed infiltration trenches are therefore well above the ground water table.

Annual Water Balance:

Sirati & Partners completed a hydrogeological assessment of the development (SPC 2019). The study suggested a pre- to post-development deficit of 1,774m^3/year in groundwater infiltration based on the Thornthwaite methodology (see Table 13.5 of SPC (2020)).

Connecting the rear half of the roofs from the townhouses will promote infiltration. SPC indicates *"… diversion of 25% of the roof water for infiltration would maintain a balanced infiltration after the development*" (SPC 2020, page 25). If all the water draining off the rear roof areas (i.e. 1,505m^2) could be infiltrated, some (6124 / 9001 x 1505 =) 1,024m^3 of runoff could be infiltrated.

TRCA LID guidelines note that draining impervious areas (i.e. roof areas) over 8 to 15m of surfaces with type HSG C or D soils will infiltrate 25% of the rainfall. Utilizing the 34 front halves of the freehold townhouses, this could increase the infiltration by a further (6124 / 9001 x 1505 x 25% =) 256m^3/yr. The total is nearly equivalent to the calculated deficit.

SPC suggests the water table elevation fluctuates from 188.24m to 189.17m. The bottom elevation of the underground structure is approximately 187.3m. This elevation compares to an elevation of approximately 184.30m along the watercourse. SPC indicates that that they anticipate groundwater will be pumped from the foundation of the underground garage. This water originates from the top one to one and a half metres of the ground water table. SPC further notes that the water table slopes from the north to the south. It is highly likely that the water table contributes to the base flow of the water course, by flowing out the existing valley bank to the water course. The natural hydrologic regime can, in part, be retained by conveying the intercepted water back to the watercourse rather than pumping to the sanitary sewer.

5 SEDIMENT AND EROSION CONTROL

Appropriate Erosion and Sediment Control Plans have been prepared in compliance with the Erosion and Sediment Control Guidelines for Urban Construction (GGHA CAs 2006)[12]. The ESC Plans follow the recommendations of the Scoped Environmental Impact Assessment (Kuntz 2020).

Objectives for the Erosion and Sediment Control Strategy include:

- Provide appropriate sediment control measures to minimize the off-site transport of sediment.
- Provide interim erosion control measures where permanent restoration is not feasible.
- Provide vegetation protection along the southern boundary of the development site.
- Provide permanent restoration to eliminate future erosion.

The development will be staged. The ESC works will be staged with the anticipated building program. The following considerations will be incorporated into the development of ESC measures for each phase of the development.

5.1 Phase One – Building 'A' Construction

The first phase of the building program will include Building 'A' and approximately 40% of the underground structure. The common element road segment from Regional Road 25 to Derry Road will be constructed as part of the first phase. The SWM tank and the storm outfall will also be constructed.

The ESC plan (see Drawing ESC-1) proposes the following:

- Tree protection fencing will be installed at the following "… *at the new southeast property line, located at the greatest of a 15m setback from the staked top-of-bank and the long-term stable top of slope, with the exception of two small areas near the underground stormwater tank and rear yard area within the eastern portion of Building TH-C to accommodate minor grading and excavation*" (Kuntz 2020, page 20). The criteria is illustrated in Figure 1 of the Scoped EIA (Kuntz 2020). In conjunction with the tree protection fence, a double silt barrier (incorporating straw bales) will be installed along the tree line at the north edge of the buffer.
- Construction hoarding will be installed along the east and south border of the existing multi-use trail and along the south boundary of the sales office access.
- A construction access will be use the existing driveway connections to Derry Road during the first phase of construction.

[12] GGHA CAs. 2006. "*Erosion and Sediment Control Guidelines for Urban Construction*" prepared by Greater Golden Horseshoe Area Conservation Authorities. Toronto, Ontario. (December 2006)

- Special consideration will need to be given to the ESC measures required for constructing the storm outfall, as it will require work adjacent to the woodlot and diversion of the flows in the roadside ditch. Due the proximity to the watercourse, double barrier protection should be incorporated near the watercourse. A silt fence will be used to delineate the construction corridor for the outfall pipe. A coir check dam will be used across the outfall channel until the area is stabilized. The disturbed areas will be stabilized with "*a short-term biodegradable erosion control blanket … on the any slopes to stabilize the soil prior to vegetation establishment and prior to the spring freshet*" (Kuntz 2020, page 28).
- A diversion ditch will be employed along the buffer block to protect the trees and bank. These will drain to a sediment trap before release through the SWM Tank, once it is completed.
- The sediment trap is sized for the maximum area draining to the trap in Phase One and will be retained through subsequent phases, until the freehold town houses are constructed. The trap will drain through the permanent catch basin connection to the SWM tank.
- Topsoil will be stripped from the site and stockpiled in a designated location south of the sales center. A silt fence will be used to enclose the stockpile. The stockpile will be seeded to stabilize it during the construction period.
- Excavated material will be removed immediately from site.
- Dewatering of the excavation will be directed to the sediment trap before release. Dewatering is anticipated during the parking structure excavation and may be used until permanent dewatering is constructed.

The sediment trap will be constructed following the construction of the out fall storm sewer to the SWM Tank. The sediment trap will discharge to the sewer to avoid flows that could disturb the bank of the valley. The maximum area draining to the sediment trap occurs during Phase 1 of the site development. It has therefore been designed to accommodate the area draining to it and uses a standard of 125 m^3/ha storage. The overflow has been design to handle the 100-year storm on a disturbed site (see calculations in the appendix).

5.2 Phase Two – Building 'B' Construction

The second phase of the building program will include Building 'B' and approximately 30% more of the underground structure. The remainder of the common access road north of the main site access road will be constructed as part of the second phase.

The ESC plan (see Drawing ESC-2) proposes the following:

- Tree protection, the double silt fence, sediment trap and cut-off swale constructed as part of Phase One ESC works will be kept in place during the second phase of building.
- Construction hoarding will be installed along the east and south border of the existing multi-use trail north of Building 'A' as well as along the boundary of the sales office parking. It will also follow the north side of the site access road.

- A construction access will be use the future access road intersection with Derry Road during the second phase of construction.
- Topsoil will be stripped from the site and stockpiled in a designated location south of the access road. A silt fence will be used to enclose the stockpile. The stockpile will be seeded to stabilize it during the construction period.
- Excavated material will be removed immediately from site.
- Dewatering of the excavation will be directed to the sediment trap before release. Dewatering is anticipated during the parking structure excavation and may be used until permanent dewatering is connected.

5.3 Phase Three – Building 'C and D' Construction

The third phase of the building program will include Building 'C and D' and the remainder of the underground structure. The removal of the sales centre also included in this third phase of the development.

The ESC plan (see Drawing ESC-3) proposes the following:

- Tree protection, the double silt fence, sediment trap and cut-off swale constructed as part of Phase One ESC works will be kept in place during the third phase of building.
- Construction hoarding will be installed along the south border of the existing multi-use trail east of Building 'B' as well as along the boundary of the site access constructed in phase two and around the contractor's area on the central park area.
- A construction access will be use the future access road to an entrance gate central to the site.
- Topsoil will be stripped from the site and stockpiled in a designated location south of the access road. A silt fence will be used to enclose the stockpile. The stockpile will be seeded to stabilize it during the construction period.
- Excavated material will be removed immediately from site.
- Dewatering of the excavation will be directed to the sediment trap before release. Dewatering is anticipated during the parking structure excavation and may be used until permanent dewatering is connected.

5.4 Phase Four – Freehold Townhouse Construction

The fourth phase of the building program will include the freehold townhouses. Following the construction of the homes, construction of the central amenity areas will be completed along with the remainder of the surface visitor parking areas. The final course of top asphalt will be applied over all the roads and parking at the conclusion of this phase.

The ESC plan (see Drawing ESC-4) proposes the following:

- Tree protection, the double silt fence, sediment trap and cut-off swale constructed as part of Phase One ESC works will be modified during the final phase of building. New tree protection fences will follow the limit of the fill area and buffer boundary.
- Tree clearing will be completed and the double silt barrier will be installed along the boundary of the fill area.
- Construction hoarding will be left in place around the contractor's area on the central park area.
- A construction access will be use the future access road to an entrance gate central to the site.
- Topsoil will be stripped from the site and immediately used on site or removed from the site.
- Excavated material will be used on site, if required, or removed immediately from site.

5.5 Monitoring and Maintenance

Inherent in the Erosion and Sediment Control Plan will be a monitoring program with an Action Plan to implement remedial measures in a timely manner where required. As required by the conservation authority, monitoring during construction shall be incorporated into the final erosion control plan. The plans also shall include the following notes:

- The inspectors used on the project to be qualified professionals trained in sediment and erosion controls (Certified Inspector of Sediment and Erosion Control (CISEC), Certified Professional in Erosion and Sediment Controls (CPESC) or approved equivalent).
- The Developer is responsible for ensuring that the erosion and sediment controls are maintained and operating as intended, including making field adjustments as necessary, to the satisfaction of the Town of Milton and Conservation Halton, to ensure adequate erosion and sediment control protection.
- The Contractor shall be responsible for the proper installation, maintenance and removal of all temporary erosion and sediment control measures during construction, as directed by the Engineer.
- Additional erosion and sediment control measures may be required and shall be determined by the Engineer.
- No construction activity or machinery shall intrude beyond the silt fence or limit of development. All construction vehicles shall leave the site at the designated location shown on the plan.
- Servicing of construction equipment on site is prohibited, except in approved areas. These shall be located no closer than 30metres to any watercourse.
- Materials to repair damaged ESC measures must be kept on-site at all times.
- Sediment accumulation in the temporary sediment trap must be measured a minimum of once every 6 months. The trap will require cleaning when sediment accumulation reaches 50% of the forebay design capacity.

- Accumulated sediment to be used onsite or removed offsite prior to the removal of the silt fence.

6 CONCLUSIONS AND COMPLIANCE DECLARATION

Milteron Developments Ltd.. is proposing to develop a residential development on the east side of Regional Road 25, south of Derry Road, in the Town of Milton. This Functional Servicing and Stormwater Management Study reviewed the municipal infrastructure for this site. The findings of that study concluded:

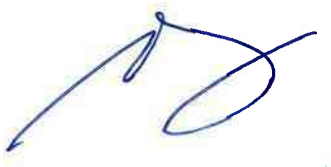
1. The existing site has a relatively flat tableland which drops off steeply to an environmentally sensitive watercourse valley, south and east of the property. The site was formerly used for a car dealership.
2. Current storm drainage primarily drains from north to south. Only 27% of the existing site drains to the two adjoining roadways. The remainder drains to a tributary of the Sixteen Mile Creek.
3. The site has a layer of topsoil overlying the native soil, which consists primarily of silty clay till with occasional sandy clay till layers. Groundwater was found to be five to six metres below the existing ground levels.
4. There are existing water and sanitary services available on Regional Road 25 and Derry Road, bordering the site. There is also electrical, communication and gas utilities on the existing rights-of-way.
5. A plan was developed to service the site from the Regional Road 25 and Derry Road rights-of way. The freehold townhouses will be serviced from sanitary sewers constructed on the new common element roadway. A new watermain will be extended south from the Derry Road and also connect to the existing 150mm watermain on Regional Road 25.
6. Analysis of the sanitary flows shows there will be approximately 1,750 persons contributing flow to the sanitary sewer system under the development proposal. Although the existing sewer is relatively shallow, a connection can be made and the downstream pipe appears to have capacity to accommodate the Subject Development.
7. The functional design indicates that water quality criteria can achieved through the use of an OGS filter unit sized to accommodate the design flows.
8. Water quantity criteria set by the Subwatershed Planning Study cannot be achieve for the erosion control and 25-year storm since the required orifice control would be too small (i.e. prone to clogging). The flow and storage of the major storms (i.e. 1:100-year storm event) can be achieved be achieved by temporarily storing and then controlling the release of runoff from the roofs of the high rise buildings, storing water in the sewers and in an underground structure.
9. Rear yard infiltration trenches can be used to mitigate reductions in groundwater infiltration by capturing the first 5mm of runoff from impervious surfaces. In addition, 300mm of topsoil placement will be required. The use of an infiltration gallery along the south boundary will help to reduce any groundwater infiltration imbalance in the development.
10. Site grading can reasonably match the existing ground elevations around the borders of the site. Overland drainage routes can direct major storms to inlets on the storm sewer

system that will be designed to capture the 100-year off the site with depths of water not exceeding 300mm (as per the development standards).

11. A Sediment and Erosion Control Plan has been proposed to reflect the staged construction of the site. This shall include a monitoring program to adjust ESC works to match prevailing conditions.
12. The addition of the stacked townhouses will not negatively affect the previously approved servicing and Storm Water Management design.

Based on our review of existing conditions and the design of grading and servicing for this proposed development, we conclude that the servicing of this site is technically feasible and can be completed in general conformance with the design standards of the Town of Milton, Region of Halton and the Halton Conservation. The target flows prescribed by the Subwatershed Planning Study cannot be fully meet for the Erosion Control and 25-year events due to the practical limits consideration for the discharge orifices.

Report Prepared by:



Scott Lang, P.Eng.

APPENDIX "A"

Hydraulic Calculations (Water and Sanitary Sewers)

Fire Flow were based on the Fire Underwriters Survey formula[13]:

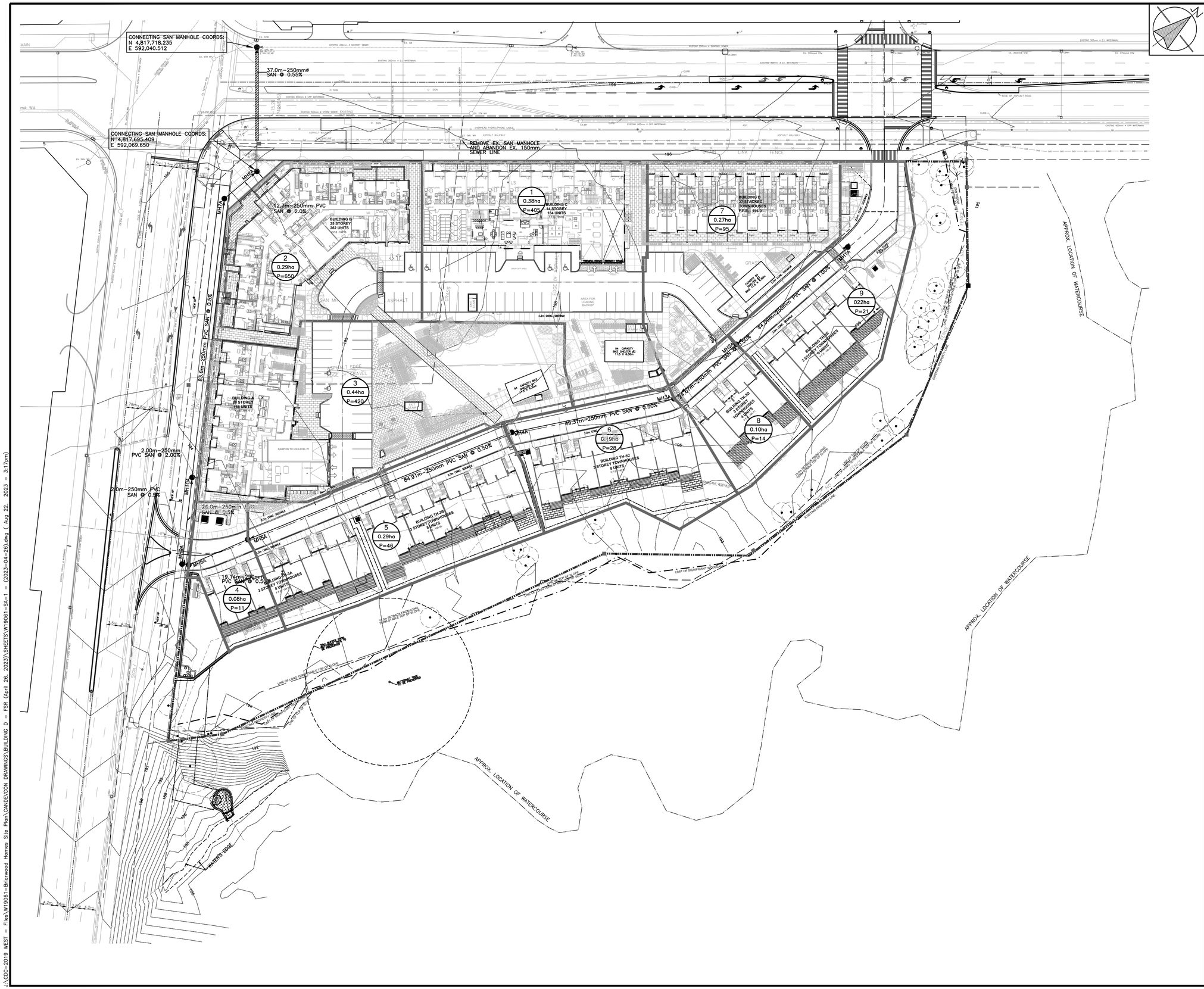
$$F = 220C\sqrt{A}$$

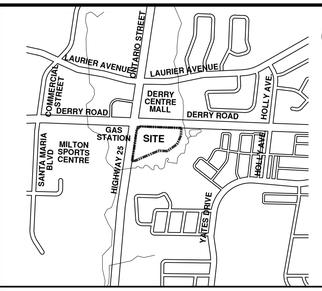
Where: F = the required fire flow in litres per minute.
C = Coefficient related to the type of construction.
A = Total Floor Area (m^2) ï including all storeys

An estimate was made for largest structure within the development to determine the critical flows. This case is set out below:

Type of Construction =	0.6	Fire-restrictive construction
Total Floor Area =	19,493m^2	Block B Area
Base fire flow =	**18,000 L/min**	Based on the above formula **(300 L/s)**
Additional Exposures =	50%	Based on two sides exposed to structures 0 to 3m away
Additional Flow =	9,000 L/min	
Total Fire Flow =	**27,000 L/min**	**Say 27,000 L/min (450 L/s)**

[13] CGI. 1999. Water Supply for Public Fire Protection. CGI Risk management Service, Fie Underwriters Survey. As found at **http://scm-rms.ca/docs/Fire%20Underwriters%20Survey%20-%201999%20Water%20Supply%20for%20Public%20Fire%20Protection.pdf**





KEY PLAN
N.T.S.

LEGEND

- LIMIT OF SITE
- LIMIT OF CONSTRUCTION (WHERE NOT COINCIDENT WITH LIMIT OF SUBDIVISION)
- PROPOSED SANITARY MANHOLE
- DRAINAGE AREA BOUNDARY
- FUTURE DRAINAGE AREA BOUNDARY
- 1 / 0.15ha / P=50 — DENOTES AREA NUMBER, DENOTES AREA IN HECTARES, DENOTES POPULATION
- LINE OF LONG TERM STABLE SLOPE
- LINE OF TOP OF SLOPE
- LIMIT OF SIGNIFICANT WOODLANDS (KFCI)
- PROPOSED EASEMENTS

APPROVED LAND-USE/ZONING DESIGNATION:
RHD*261*H33

BENCHMARK INFO:

ELEVATIONS SHOWN ON THIS PLAN ARE DERIVED FROM MINISTRY OF TRANSPORTATION ONTARIO
BENCHMARK No. 008198281S9
ELEVATION = 206.569m
CONCRETE AND STEEL BRIDGE CARRYING CNR OVER HWY 25, 0.9 km SOUTH OF THE OVERPASS AT INTERSECTION OF HWY 25 AND HWY 401. TABLET IS SET HORIZONTALLY IN WEST FACE OF EAST ABUTMENT, 10.5 m EAST OF CENTRELINE OF HWY 25, 63 cm SOUTH OF NORTHEAST END OF ABUTMENT, 37cm ABOVE GROUND.

SUBMISSION:

1st	X	Date 8 AUG. 2019		Pre-Serv	____	Date ____
2nd	X	Date 10 JAN. 2020		Interim	____	Date ____
3rd	X	Date 31 JUL. 2020		Final	____	Date ____
4th	X	Date 20 NOV. 2020		Issued For Construction	X	Date 21 MAY 2021
5th	X	Date 20 APR. 2021				

	By	Date	Revision	Checked
4	A.B.	21 APR. 2021	REVISED BUILDING 'C', ADDED BUILDING 'D'.	
3	D.K.H.	16 SEP. 2021	REVISED PROPOSED MEDIAN ON REGION ROAD 25. EXISTING PAVEMENT MARKINGS TO REMAIN.	
2	T.M.J.	02 JUN 2021	COORDINATES ADDED TO SANITARY MH8A	
1	T.M.J.	24 FEB 2021	ADDED CONNECTING MH COORDINATES AND APPROVED LAND USE ZONING DESIGNATION	

MILTON — Halton REGION

CONSTRUCTION NORTH

Project — Dwg. No.

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
9369 GOREWAY DRIVE
BRAMPTON ON. L6P-0M7
TEL (905) 794-0600
FAX (905) 794-0611

PROJECT NUMBER W20191

MILTERON DEVELOPMENTS LTD.
CONNECTT RESIDENTIAL DEVELOPMENT
DERRY ROAD / HIGHWAY 25
TOWN OF MILTON
SITE PLAN No.: SP - 21-19

SANITARY DRAINAGE AREA PLAN

Region File No. DM-1036				City File No. SP-21-19	
Drawn By:	S.C.	Checked By:	C.R.M	Drawing No.	Sheet No. SA-1
Designed By:	T.M.J.	Checked By:	D.K.H.		
Scale:	1:500	Date:	MAY 2019		

J:\CDC-2019 WEST - Files\W19061-Briarwood Homes Site Plan\CANDEVCON DRAWINGS\BUILDING D - FSR (April 26, 2023)\SHEETS\W19061-SA-1 - (2023-04-26).dwg (Aug 22, 2023 - 3:17pm)

SANITARY DESIGN
Site Residential Development
6791 Regional Road 25

CANDEVCON LIMITED
CONSULTING ENGINEERS & PLANNERS

LOCATION				POPULATION				FLOWS					SEWER DESIGN						REMARKS
STREET	MANHOLES FROM	MANHOLES TO	AREA No.	SECT. AREA (ha)	UNITS	POP.	ACCUM. POP.	PEAK FACTOR	ACCUM. AREA (ha)	PK. DAY FLOW (m^3/s)	INFILT. (m^3/s)	***TOTAL FLOW*** **(m^3/s)**	LENGTH (m)	SIZE (mm)	SLOPE (%)	**CAPACITY** (m^3/s)	**VELOCITY** FULL FLOW (m/s)	**VELOCITY** ACT. FLOW (m/s)	DESIGN FLOW / FULL FLOW %
1	3	4	5	6	7	8	9	10	11	12	**13**	14	15	16	17	18	19	20	21
Common Element Road																			
Branch 1		Freehold Townhouses =			6	21													
		Stack TH =			27	95													
	1A	2A	9, 7	0.22	**33**	**116**	**116**	4.23	0.22	0.002	**0.000**	**0.00162**	44.1	250	1.00%	**0.060**	**1.21**	0.40	2.7%
Branch 2		Condo Apartment =			**184**	460													
	Stub	2A	1	0.38	**184**	**460**	**460**	3.99	0.38	0.006	**0.000**	**0.00595**	4.0	250	1.00%	**0.060**	**1.21**	0.95	10.0%
Branch 1 (cont'd)																			
	From Branch 1						**116**		0.22										
	From Branch 2						**460**		0.38										
		Freehold Townhouses =			4	14													
	2A	3A	8	0.10	**4**	**14**	**590**	3.94	0.70	0.007	**0.000**	**0.00759**	24.7	250	0.50%	**0.042**	**0.86**	0.75	18.0%
		Freehold Townhouses =			8	28													
	3A	4A	6	0.19	**8**	**28**	**618**	3.93	0.89	0.008	**0.000**	**0.00798**	49.4	250	0.50%	**0.042**	**0.86**	0.75	19%
		Freehold Townhouses =			13	46													
	4A	5A	5	0.29	**13**	**46**	**664**	3.91	1.18	0.008	**0.000**	**0.00860**	84.9	250	0.50%	**0.042**	**0.86**	0.79	20.4%
Branch 3		Condo Apartment 1 =			**168**	420													
	Stub	2A	3	0.44	**168**	**420**	**420**	4.01	0.44	0.005	**0.000**	**0.00549**	10.9	250	1.00%	**0.060**	**1.21**	0.95	9.2%
Branch 1 (cont'd)																			
	From Branch 1						**664**		1.18										
	From Branch 3						**420**		0.44										
		Freehold Townhouses =			3	11													
	5A	6A	4	0.08	**3**	**11**	**1095**	3.77	1.70	0.013	**0.000**	**0.01364**	18.6	250	0.50%	**0.042**	**0.86**	0.91	32.4%
	6A	7A					**1095**	3.77	1.70	0.013	**0.000**	**0.01364**	100.1	250	0.50%	**0.042**	**0.86**	0.91	32.4%
	7A	8A					**1095**	3.77	1.70	0.013	**0.000**	**0.01364**	12.7	250	2.00%	**0.084**	**1.72**	1.51	16.2%

SANITARY DESIGN
Site Residential Development
6791 Regional Road 25

CANDEVCON LIMITED
CONSULTING ENGINEERS & PLANNERS

LOCATION				POPULATION				FLOWS					SEWER DESIGN						REMARKS
STREET	MANHOLES FROM	MANHOLES TO	AREA No.	SECT. AREA (ha)	UNITS	POP.	ACCUM. POP.	PEAK FACTOR	ACCUM. AREA (ha)	PK. DAY FLOW (m^3/s)	INFILT. (m^3/s)	***TOTAL FLOW*** **(m^3/s)**	LENGTH (m)	SIZE (mm)	SLOPE (%)	**CAPACITY** (m^3/s)	**VELOCITY** FULL FLOW (m/s)	**VELOCITY** ACT. FLOW (m/s)	DESIGN FLOW / FULL FLOW %
1	3	4	5	6	7	8	9	10	11	12	**13**	14	15	16	17	18	19	20	21
Branch 4		Condo Apartment 2 =			**262**	655													
	Stub	8A	2	0.29	**262**	**655**	**655**	3.91	0.29	0.008	**0.000**	**0.00824**	5.0	250	1.00%	**0.060**	**1.21**	1.01	13.8%
Branch 1 (cont'd)																			
	From Branch 1						**1095**		1.70										
	From Branch 4						**655**		0.29										
	8A	Ex MH					**1750**	3.63	1.99	0.020	**0.001**	**0.02079**	37.0	250	0.55%	**0.044**	**0.90**	1.07	47.1%

Flow = 0.00318 L/cap/s
Infiltration = 0.286 L/s/ha
Mannings = 0.013

APPENDIX "B"

Hydraulic Calculations (Storm Sewers)

STORM DESIGN
Site Residential Development
6791 Regional Road 25

CANDEVCON LIMITED
CONSULTING ENGINEERS & PLANNERS

Upstream	Downstream	Area No.	Contributing Area (ha)			No. of hectares			Area x Storm Co-eff			Total	Time	I_5	I_{100}	Q= 2.78ACI/1000		Length	Size	Grade	Capacity		Velocity	Time
			Parkland	Townhouses	Appartments	Total Area	Up-Stream	Total	0.25	0.75	0.9	A x C	min			Q_5	Q_{100}	(m)	mm	%	m^3/sec	% of Capacity	m/s	min
SEWER DISCHARGE WITHOUT CONTROLS FROM HIGH RISE BUILDINGS																								
Branch 1																								
CBMH1	MH2	24		0.080		0.080	0.000	0.080	0	0.060	0	0.0599	10.00	105.3	174.1	**0.018**	0.029	27.3	300	1.00	**0.097**	18%	1.37	0.33
Branch 2																								
CB13	CBMH3	26		0.035		0.035	0.000	0.035	0	0.0263	0	0.0263	10.00	105.3	174.1	**0.008**	0.013	18.9	250	0.55	**0.044**	17%	0.90	0.35
CBMH3	MH2	25		0.013		0.013	0.035	0.048	0	0.010	0.000	0.0360	10.35	103.4	171.1	**0.010**	0.017	21.9	300	0.50	**0.068**	15%	0.97	0.38
Branch 1 (cont'd)																								
	From Branch 1							0.080				0.0599	10.33											
	From Branch 2							0.048				0.0360	10.73											
MH2	MH4					0.000	0.128	0.128	0	0	0	0.0959	10.73	101.5	167.9	**0.027**	0.045	39.2	300	0.50	**0.068**	40%	0.97	0.68
Branch 3																								
CB12	MH4	23		0.031		0.031	0.000	0.031	0	0.0235	0	0.0235	10.00	105.3	174.1	**0.007**	0.011	34.0	250	0.50	**0.042**	16%	0.86	0.66
Branch 4																								
	Inlet 7	17			0.052	0.052	0.000	0.052	0	0	0.047	0.0472	10.00	105.3	174.1	**0.014**	0.023							
Building D & Building C	MH4	2 + 16 + 21			0.326	0.326	0.052	0.378	0	0	0.293	0.3406	10.00	105.3	174.1	**0.100**	0.165	2.0	300	1.50	**0.118**	84%	1.68	0.02
Branch 1 (cont'd)																								
	From Branch 1							0.128				0.0959	11.40											
	From Branch 3							0.031				0.0235	10.66											
	From Branch 4							0.378				0.3406	10.66											
MH4	MH5	18 + 22 + 19		0.122	0.102	0.224	0.538	0.761	0	0.0915	0.092	0.6429	11.40	98.3	162.6	**0.176**	0.291	25.0	300	1.00	**0.097**	182%	1.37	0.30
Branch 5																								
CB11	CBMH6	15		0.088		0.088	0.000	0.088	0	0.0663	0	0.0663	10.00	105.3	174.1	**0.019**	0.032	15.0	250	0.50	**0.042**	46%	0.86	0.29
CBMH6	MH5	20		0.059		0.059	0.088	0.147	0	0.044	0	0.1103	10.29	103.7	171.6	**0.032**	0.053	35.2	300	0.50	**0.068**	47%	0.97	0.61
Branch 1 (cont'd)																								
	From Branch 1							0.761				0.6429	11.71											
	From Branch 4							0.147				0.1103	10.90											
MH5	DCBMH7					0.000	0.908	0.908	0	0	0	0.7532	11.71	96.9	160.3	**0.203**	0.336	48.5	450	0.50	**0.202**	101%	1.27	0.64
DCBMH7	CBMH8	14		0.108	0.165	0.273	0.908	1.181	0	0.081	0.148	0.9825	12.35	94.1	155.8	**0.257**	0.425	38.7	450	0.50	**0.202**	128%	1.27	0.51
CBMH8	MH9	10		0.077	0.036	0.113	1.181	1.294	0	0.0575	0.032	1.0724	12.85	92.0	152.4	**0.274**	0.454	19.0	525	0.50	**0.304**	90%	1.40	0.23
Branch 6																								
CB10	MH9	11		0.065		0.065	0.000	0.065	0	0.0488	0	0.0488	10.00	105.3	174.1	**0.014**	0.024	31.6	250	3.60	**0.113**	13%	2.30	0.23

STORM DESIGN
Site Residential Development
6791 Regional Road 25

CANDEVCON LIMITED
CONSULTING ENGINEERS & PLANNERS

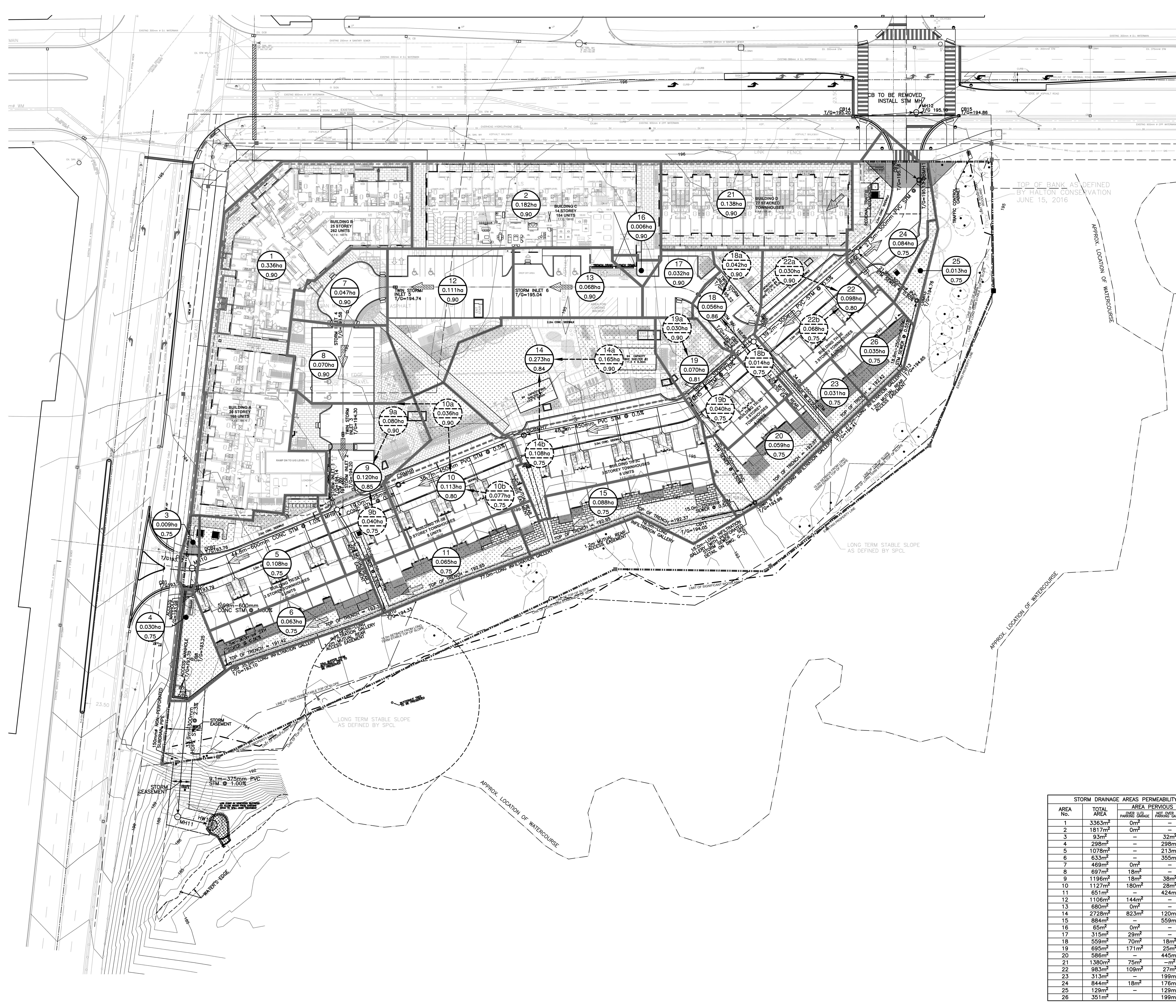
Upstream	Downstream	Area No.	Contributing Area (ha)			No. of hectares			Area x Storm Co-eff			Total	Time	I_5	I_{100}	Q= 2.78ACI/1000		Length	Size	Grade	Capacity		Velocity	Time
			Parkland	Townhouses	Appartments	Total Area	Up-Stream	Total	0.25	0.75	0.9	A x C	min			Q_5	Q_{100}	(m)	mm	%	m^3/sec	% of Capacity	m/s	min
Branch 7																								
	Inlet 6	13			0.068	0.068	0.000	0.068	0	0	0.061	0.0612	10.00	105.3	174.1	**0.018**	0.030							
	Inlet 5	12			0.111	0.111	0.000	0.111	0	0	0.100	0.0995	10.00	105.3	174.1	**0.029**	0.048							
	Inlet 4	7			0.047	0.047	0.000	0.047	0	0	0.042	0.0422	10.00	105.3	174.1	**0.012**	0.020							
	Inlet 3	8			0.070	0.070	0.000	0.070	0	0	0.063	0.0628	10.00	105.3	174.1	**0.018**	0.030							
	Inlets 1 & 2	9		0.040	0.080	0.120	0.000	0.120	0	0.03	0.072	0.1016	10.00	105.3	174.1	**0.030**	0.049							
	Bldg A & B	1			0.336	0.336	0.000	0.336	0	0	0.303	0.3027	10.00	105.3	174.1	**0.089**	0.146							
		Subtotal	**0.000**	**0.040**	**0.711**	**0.751**		**0.751**	**0**	**0.03**	**0.64**	**0.6701**	**10.00**	**105.3**	**174.1**	**0.196**	**0.324**	**3.0**	**450**	**1.00**	**0.285**	**69%**	1.79	**0.03**
Branch 1 (cont'd)																								
	From Branch 1							1.294				1.0724	13.08											
	From Branch 6							0.065				0.0488	10.23											
	From Branch 7							0.751				0.6701	10.03											
MH9	MH10	5		0.108		0.108	2.110	2.218	0	0.0809	0	1.8722	13.08	91.2	150.9	**0.474**	0.785	44.8	600	1.00	**0.614**	77%	2.17	0.34
MH10	Storage Tank	3		0.009		0.009	2.218	2.227	0	0.007	0	1.8791	13.42	89.8	148.7	**0.469**	0.777	6.0	600	1.00	**0.614**	76%	2.17	0.05
Branch 8																								
CB9	Storage Tank	6		0.063		0.063	0.000	0.063	0	0.0475	0	0.0475	10.00	105.3	174.1	**0.014**	0.023	1.5	300	0.50	**0.068**	20%	0.97	0.03
Branch 1 (cont'd)																								
	From Branch 1							2.227				1.8791	13.47											
	From Branch 8							0.063				0.0475	10.03											
Storage Tank	MH11	4		0.030		0.030	2.290	2.320	0	0.0224	0	1.9490	13.47	89.7	148.5	**0.486**	0.804							
																100-Year Controlled Flow =		33.9	300	2.30	**0.147**	54%	2.08	0.27
																Groundwater Flow (21771 L/day) =	0.000							
MH11	OUTFALL					0.000	2.320	2.320									0.079	9.1	375	1.00	**0.175**	45%	1.59	0.10

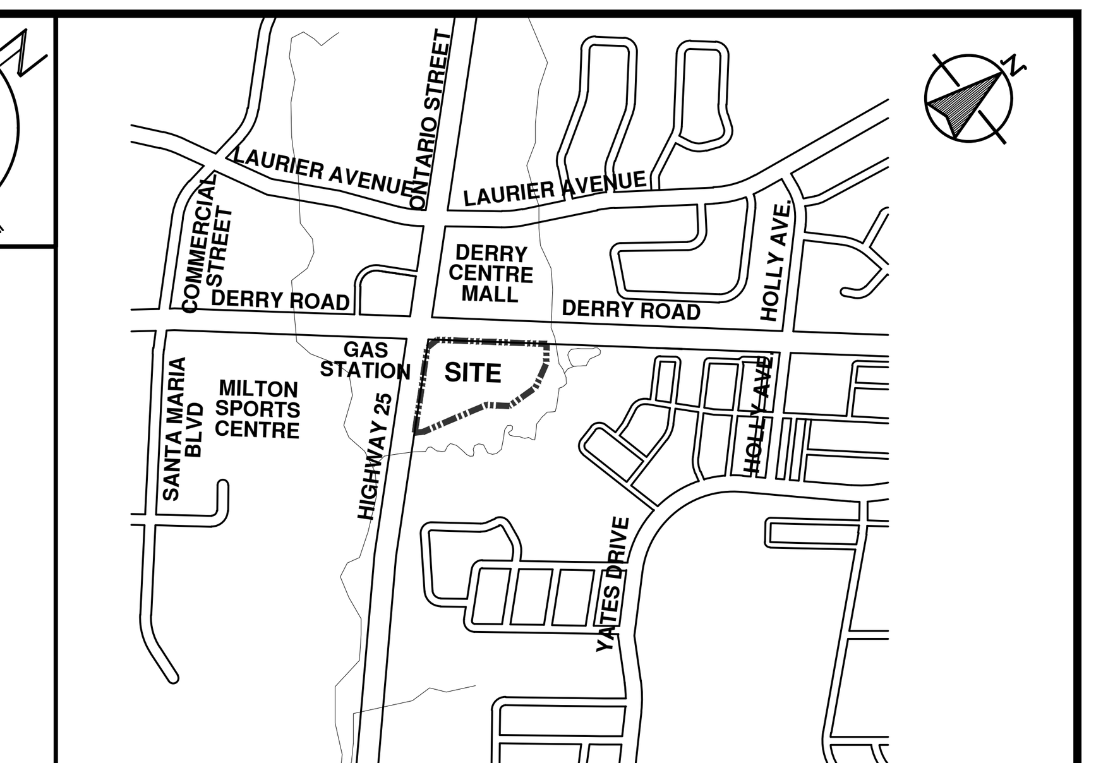
For 5-yr storm $I_5 = 959/(t_d+5.7)^{0.8024}$

For 100-yr storm $I_{100} = 1435/(t_d+5.2)^{0.7751}$

Initial Time of Concentration use = 10 minutes

Mannings 'n' = 0.013 for all Pipe





KEY PLAN
N.T.S.

LEGEND

- LIMIT OF SITE
- PROPOSED EASEMENT
- 254 EX. CONTOUR
- MH19 PROPOSED STORM MANHOLE
- CBMH PROPOSED CATCHBASIN MANHOLE
- CB PROPOSED SINGLE CATCHBASIN
- DCB PROPOSED DOUBLE CATCHBASIN
- OVERLAND FLOW ROUTE
- PROPOSED INFILTRATION TRENCH
- DRAINAGE AREA BOUNDARY
- 1 — DENOTES AREA NUMBER
- 0.516ha — DENOTES AREA IN HECTARES
- 0.90 — DENOTES RUN-OFF COEFFICIENT
- 1a / 0.353ha / 0.75 — COMPONENT OF DRAINAGE AREA
- PERMEABLE AREA
- LINE OF LONG TERM STABLE SLOPE
- LINE OF TOP OF SLOPE
- LIMIT OF SIGNIFICANT WOODLANDS (KFCI)
- PROPOSED EASEMENTS

STORM DRAINAGE AREAS PERMEABILITY TABLE

AREA No.	TOTAL AREA	AREA PERVIOUS: OVER U/G PARKING GARAGE	AREA PERVIOUS: NOT OVER U/G PARKING GARAGE	AREA IMPERVIOUS
1	3363m²	0m²	–	3363m²
2	1817m²	0m²	–	1817m²
3	93m²	–	32m²	61m²
4	298m²	–	298m²	0m²
5	1078m²	–	213m²	865m²
6	633m²	–	355m²	278m²
7	469m²	0m²	–	469m²
8	697m²	18m²	–	679m²
9	1196m²	18m²	38m²	1140m²
10	1127m²	180m²	28m²	919m²
11	651m²	–	424m²	227m²
12	1106m²	144m²	–	962m²
13	680m²	0m²	–	680m²
14	2728m²	823m²	120m²	1785m²
15	884m²	–	559m²	325m²
16	65m²	0m²	–	65m²
17	315m²	29m²	–	286m²
18	559m²	70m²	18m²	471m²
19	695m²	171m²	25m²	499m²
20	586m²	–	445m²	141m²
21	1380m²	75m²	–m²	1305m²
22	983m²	109m²	27m²	847m²
23	313m²	–	199m²	114m²
24	844m²	18m²	176m²	650m²
25	129m²	–	129m²	0m²
26	351m²		199m²	152m²

BENCHMARK INFO:

ELEVATIONS SHOWN ON THIS PLAN ARE DERIVED FROM MINISTRY OF TRANSPORTATION ONTARIO BENCHMARK No. 00819828159
ELEVATION = 206.569m
CONCRETE AND STEEL BRIDGE CARRYING CNR OVER HWY 25, 0.9 km SOUTH OF THE OVERPASS AT INTERSECTION OF HWY 25 AND HWY 401. TABLET IS SET HORIZONTALLY IN WEST FACE OF EAST ABUTMENT, 10.5 m EAST OF CENTRELINE OF HWY 25, 63 cm SOUTH OF NORTHEAST END OF ABUTMENT, 37cm ABOVE GROUND.

SUBMISSION:

1st	X	Date	8 AUG. 2019	Pre-Serv		Date	
2nd	X	Date	10 JAN. 2020	Interim		Date	
3rd	X	Date	31 JUL. 2020	Final		Date	
4th	X	Date	20 NOV. 2020	Issued For Construction	X	Date	21 MAY 2021
5th	X	Date	20 APR. 2021				

	By	Date	Revision	Checked
2	A.B.	21 APR. 2023	REVISED BUILDING 'C', ADDED BUILDING 'D'.	
1	D.K.H.	16 SEP. 2021	REVISED PROPOSED MEDIAN ON REGION ROAD 25. EXISTING PAVEMENT MARKINGS TO REMAIN	

MILTON
Halton REGION

Project Dwg. No.

CONSTRUCTION NORTH
TRUE NORTH

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
9358 GOREWAY DRIVE
BRAMPTON ON. L6P-0M7
TEL (905) 794-0600
FAX (905) 794-0611

PROJECT NUMBER W20191

MILTERON DEVELOPMENTS LTD.
CONNECTT RESIDENTIAL DEVELOPMENT
DERRY ROAD / HIGHWAY 25
TOWN OF MILTON
SITE PLAN No.: SP - 21-19

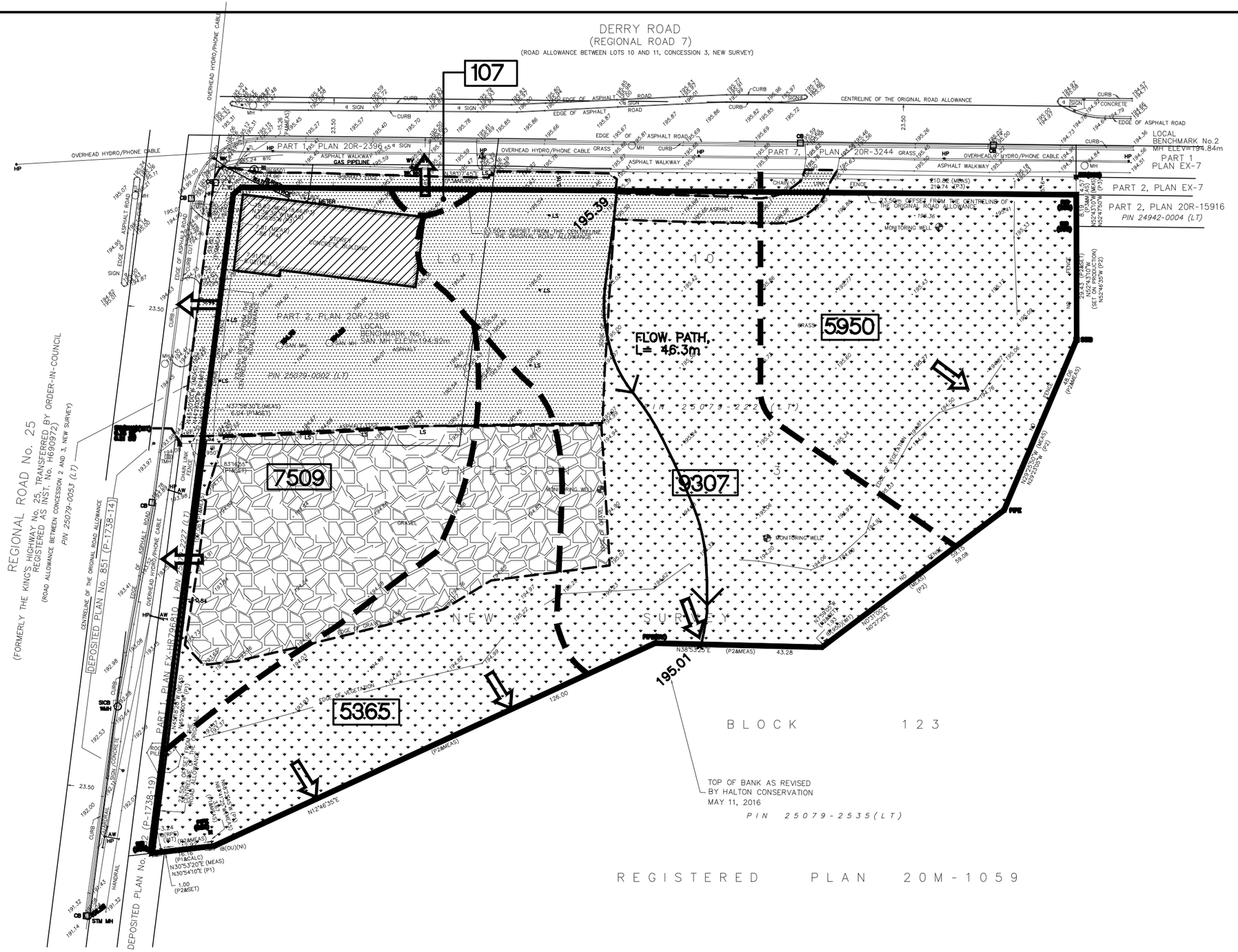
STORM DRAINAGE AREA PLAN

Region File No.	DM-1036	Town File No.	SP-21-19		
Drawn By:	S.C.	Checked By:	C.R.M	Drawing No.	Sheet No. SD-1 (2)
Designed By:	T.M.J.	Checked By:	D.K.H.		
Scale:	1:500	Date:	MAY 2019		

J:\CDC-2019 WEST - Files\W19061-Briarwood Homes Site Plan\CANDEVCON DRAWINGS\BUILDING D - FSR (April 26, 2023)\SHEETS\W19061-SD-1 - (2023-06-29).dwg (Aug 22, 2023 - 3:22pm)

APPENDIX "C"

Stormwater Management Calculations



LEGEND:

- GRASSED AREA (16,588sq.m.)
- BUILDING AREA (834sq.m.)
- GRAVEL SURFACE AREA (5,068sq.m.)
- ASPHALT SURFACE AREA (5,663sq.m.)
- 1000 CATCHMENT SIZE (sq.m.)
- FLOW DIRECTION
- APPROXIMATE DRAINAGE BOUNDARY

PROPOSED RESIDENTIAL DEVELOPMENT
SOUTHWEST CORNER OF DERRY ROAD
AND HIGHWAY 25
FOR

BRIARWOOD HOMES

TOWN OF MILTON
ONTARIO

PRE- DEVELOPMENT DRAINAGE

CONSTRUCTION NORTH

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
9358 GOREWAY DRIVE, BRAMPTON, ONTARIO L6P 0M7
TEL. (905) 794-0600 FAX (905) 794-0611

DRAWN BY: D.R.	PROJECT No. W17091
CHECKED BY: T.J.	FIGURE No. PD-1
SCALE: N.T.S.	
DATE: SEPT. 27th. 2017	

Infiltration Mitigation Calculations

DEVELOPMENT CHANGES

Pre-Development :

In the pre-development scenario the complete site is vacant land with a number of surfaces.

Permeable Area

Grass/turf	16580	m^2
Gravel	5068	m^2

Impermeable Area

Building	834	m^2
Asphalt	5663	m^2
Total Area (m^2)	28145	m^2

Source: Candevcon drawing PD-1

Post-Development :

Catchment	Pervious Area (not over underground)	Pervious Area (over underground)	Impervious Area	Total Area (m^2)
1	0	0	3363	3363
2	0	0	1817	1817
3	32	0	61	93
4	298	0	0	298
5	213	0	865	1078
6	355	0	278	633
7	0	0	469	469
8	0	18	679	697
9	38	18	1140	1196
10	28	180	919	1127
11	424	0	227	651
12	0	144	962	1106
13	0	0	680	680
14	120	823	1785	2728
15	559	0	325	884
16	0	0	65	65
17	0	0	320	320
18	18	70	471	559
19	25	171	499	695
20	445	0	141	586
21	0	401	979	1380
22	27	109	847	983
23	199	0	114	313
24	205	8	585	798
25	129	0	0	129
26	199	0	152	351
Sub-Total	**3314**	**1942**	**17743**	**22999**
116	5225	0	0	5225
Total	**8539**	**1942**	**17743**	**28224**

Source: Candevcon drawing SD-1

Impervious Areas

Pre Devlopment	6497	m^2	23.1%
Post Devlopment	19685	m^2	62.9%
Change	13188	m^2	46.9%

FIRST 5mm INFILTRATION

Increased Impervious Area = 13188 m^2

Volume to be infiltrated = 65.9 m^3 required

Based on 5 mm

ANNUAL WATER BALANCE CALCULATIONS

Assumptions for Trench Infiltration

- Roof directed to infiltration trenches: 1505 m^2
- Assume 100% of rear roof runoff is directed to landscape areas.
- Length of trench available = 216 m
- Dimensions width = 1.25 m
  depth = 0.8 m
- Assume clear stone core with 40% pore space
- Capacity of trench = 86.4 m^3

The available volume of trench can accommodate 57.4 mm
of rainfall from the adjacent roof areas.

Volumes

Storm Events	Average	No. of Events	Landscape Area			Total
			Infilt. Depth per event	Infilt. Volume per event	Swale overflow	Infiltration Volume per year
			mm	(m^3)	mm	(m^3)
1 - 4 mm	2	18.4	2.00	3.0	0.00	55.4
4 - 8 mm	6	10.9	6.00	9.0	0.00	98.4
8 - 12 mm	10	5.1	10.00	15.1	0.00	76.8
12 - 16 mm	14	2.9	14.00	21.1	0.00	61.1
16 - 20 mm	18	2	18.00	27.1	0.00	54.2
20 - 24 mm	22	1.8	22.00	33.1	0.00	59.6
24 - 28 mm	26	1.2	26.00	39.1	0.00	47.0
>28 mm	33	2.7	33.00	49.7	0.00	134.1
				Total		586.5 m^3

Summary:

Annual Infiltration in Trenches = 586.5 m^3

STORMWATER MANAGEMENT CALCULATIONS

1.0 SITE DESCRIPTION

1.1 Predevelopment Condition

External Catchment Area		0.000	ha
Site Development Area		2.815	ha
Total Catchment Area		**2.815**	**ha**

Site Area Drainage

	Runoff Coeff.		
Paved/Building Areas	0.90	0.650	ha
Gravel Areas	0.75	0.506	ha
Landscape/Field Areas	0.25	1.659	ha
Subtotal		**2.815**	**ha**
(Avg. R =	0.49)		

TOTAL **2.815 ha** (Avg. R = 0.49)

1.2 Post-Development Condition

The buffer area will be dedicated to the Town as open space land. No development will take place in the buffer. The SWM design therefore has excluded the area from the calculations.

Attenuated Drainage Areas:

	Runoff Coeff.			
External (ROW)	0.90	0.010	ha	
Paved/Building Areas	0.90	1.961	ha	(including all areas over parking garage)
Landscape Areas	0.25	0.331	ha	
Subtotal		**2.303**	**ha**	**with C =** 0.81

Unattenuated Drainage Areas: (0% of the site is unattenuated)

To Valley & Street			
Paved/Building Areas	0.90	0.000	ha
Landscape Areas	0.25	0.000	ha
Subtotal		**0.000**	**ha**
Total		**2.303**	**ha**
(Avg. R =	0.81)		

TOTAL **2.303 ha** (Avg. R = 0.81)

2.0 ALLOWABLE POST DEVELOPMENT FLOWS

Runoff analysis is based on Town of Milton Rainfall Intensities.

$I=A / (t_d + b)^c$ Where: I = Intensity (mm/hr), t_d = Time (min)

for 5 year :	A = 959.0	b = 5.7	c = 0.8024
for 25 year :	A = 1234.0	b = 5.5	c = 0.7863
for 100 year :	A = 1435.0	b = 5.2	c = 0.7751

Post development flows from the site during the post development 25 and 100 year storm events are to be controlled to target flow rates.
with initial Tc = 10.0 minutes. The Post-Development Tc = 13.47 minutes for the sewer system.

2.1 Target Release Rate

The criteria for the Target Release Rate as set by the AMEC (2015) Subwatershed Update Study is:

1. Erosion Control: Flow restricted to 0.002 m^3/s/ha and storage provided for 400 m^3/imp.ha
2. 25 year Quantity Control: Flow restricted to 0.015 m^3/s/ha and storage provided for 650 m^3/imp.ha.
3. 100 year Quantity Control: Flow restricted to 0.035m^3/s/ha and storage provided for 800 m^3/imp.ha.

Therefore, the Target Release Rates will be:

Storm	Flow (m^3/s)	Storage (m^3)
Erosion Control	0.0046	788.6
25-Year Event	0.0345	1281.5
100-Year Event	0.0806	1577.3

Based on Net Development Area = 2.303 ha **(excluding buffer area)**
Impervious Area = 1.972 ha

2.2 Unattenuated Runoff

Composite Runoff Coefficient = 0.000
Catchment Area = 0.000 ha

Storm rainfall intensity			Peak Storm Runoff Flows (2.78 A C I)	
5-Year Storm	89.7	mm/hr	5-Year Storm	0.0 L/s
25-Year Storm	122.0	mm/hr	25-Year Storm	0.0 L/s
100-Year Storm	148.5	mm/hr	100-Year Storm	0.0 L/s

3.0 STORAGE PROVISIONS

3.1 Storm System Storage

The detention volume available within the ponding areas based on an assumed elevation of 192.53 m.

The detention volume available within the storm sewer pipes are as follows:

From	To	Diameter	Length	Volume (cu.m.)	
CB7	CBMH1	250 mm	8.5	0.0	(assume NO STORAGE)
CBMH1	MH2	300 mm	27.3	0.0	(assume NO STORAGE)
CB13	CBMH3	250 mm	18.9	0.0	(assume NO STORAGE)
CBMH3	MH2	300 mm	21.9	0.0	(assume NO STORAGE)
MH2	MH4	300 mm	39.2	0.6	(assume 21% FULL pipe)
CB12	MH4	250 mm	34.0	0.4	(assume 26% FULL pipe)
CB6	Pipe	250 mm	1.5	0.0	(assume NO STORAGE)
CB5	Pipe	250 mm	1.5	0.0	(assume NO STORAGE)
MH4	MH5	300 mm	25.0	1.3	(assume 71% FULL pipe)
CB11	CBMH6	250 mm	15.0	0.6	(assume 80% FULL pipe)
CBMH6	MH5	300 mm	35.2	2.4	(assume 98% FULL pipe)
MH5	DCBMH7	450 mm	48.5	7.7	(assume 100% FULL pipe)
DCBMH7	CBMH8	450 mm	38.7	6.2	(assume 100% FULL pipe)
CBMH8	MH9	525 mm	19.0	4.1	(assume 100% FULL pipe)
CB10	MH9	250 mm	31.6	0.8	(assume 50% FULL pipe)
MH9	MH10	600 mm	45.7	12.9	(assume 100% FULL pipe)
DCB1	Pipe	300 mm	3.0	0.2	(assume 100% FULL pipe)
DCB2	Pipe	300 mm	3.0	0.2	(assume 100% FULL pipe)
CB1	Pipe	250 mm	1.5	0.1	(assume 100% FULL pipe)
CB2	Pipe	250 mm	1.5	0.1	(assume 100% FULL pipe)
MH10	Tank	600 mm	5.6	1.6	(assume 100% FULL pipe)
CB9	Tank	250 mm	1.5	0.1	(assume 100% FULL pipe)
Total Pipe Storage =				39.2	cu.m.

Structure	Invert Elev. Elevation	T/G Elevation	Ponding Elevation	Area	Depth	Volume				
CBMH1	193.14	195.13	192.53	1.1	0.00	0.0		assumes	1200	Dia Manhole
MH2	192.79	195.65	192.53	1.1	0.00	0.0		assumes	1200	Dia Manhole
CBMH3	192.98	194.76	192.53	1.1	0.00	0.0		assumes	1200	Dia Manhole
MH4	192.40	195.20	192.53	1.1	0.13	0.1		assumes	1200	Dia Manhole
MH5	191.91	195.00	192.53	1.1	0.62	0.7		assumes	1200	Dia Manhole
CBMH6	192.24	193.96	192.53	1.1	0.29	0.3		assumes	1200	Dia Manhole
DCBMH7	191.60	194.57	192.53	1.1	0.93	1.0		assumes	1200	Dia Manhole
CBMH8	191.34	194.31	192.53	1.1	1.19	1.3		assumes	1201	Dia Manhole
MH9	191.16	194.18	192.53	1.8	1.37	2.4		assumes	1500	Dia Manhole
MH10	190.32	193.87	192.53	1.8	2.21	3.9		assumes	1500	Dia Manhole
CB1	192.14	193.79	192.53	0.4	0.39	0.1		assumes	600	Square Structu
CB2	192.12	193.77	192.53	0.4	0.41	0.1		assumes	600	Square Structu
CB5	193.47	195.12	192.53	0.4	0.00	0.0		assumes	600	Square Structu
CB6	193.57	195.22	192.53	0.4	0.00	0.0		assumes	600	Square Structu
CB7	193.31	195.18	192.53	0.4	0.00	0.0		assumes	600	Square Structu
CB9	191.45	193.10	192.53	0.4	1.08	0.4		assumes	600	Square Structu
CB10	192.64	194.33	192.53	0.4	0.00	0.0		assumes	600	Square Structu
CB11	192.38	194.05	192.53	0.4	0.15	0.1		assumes	600	Square Structu
CB12	192.77	194.40	192.53	0.4	0.00	0.0		assumes	600	Square Structu
CB13	193.20	194.65	192.53	0.4	0.00	0.0		assumes	600	Square Structu
DCB1	192.11	193.79	192.53	0.7	0.42	0.3		assumes	600 x 1200	Rectangular S
DCB2	192.14	193.76	192.53	0.7	0.39	0.3		assumes	600 x 1200	Rectangular S
Total Structure Storage =						11.2	cu.m.			
Sub-total Storage - Pipes/Structure						**50.4**	**cu.m.**			

3.2 Controlled Release from Roof of Highrise Buildings.

Available Roof Storage Area:		Number of controls	Approx Area per Drain	Max Depth (mm)	Storage Volume (m^3)	Approximate Flow (L/s)
Building A						
Building A	577.5 m^2	7	82.5	150	28.9	2.2
Building B	750.0 m^2	10	75.0	150	37.5	3.2
Building C	904.7 m^2	6	150.8	150	45.2	1.9
Total	**2232.2 m^2**				**111.6**	**7.2**

Roof Top Controls: Control flow roof drains will be used which will detain storm rainfall on the roof area and allow water to discharge over a period of time. The control

3.3 Storage in Underground Tanks

The storage available in underground storage units is:

bottom elevation =	186.25 m			
top interior elevation =	192.55 m			
overflow elevation =	192.60 m	flood depth =	6.28	m
flooding elevation =	192.53 m			
Area of tank =	228.20 m^2			
Depth =	6.30 m			
Storage Capacity =	1437.7 m^3	Amount of Storage Used =	1432.6	m^3

Sub-total Storage - Pipes/Structure	**50.4 cu.m.**	
Sub-total Storage - Roof Areas	**111.6 cu.m.**	
Sub-total Storage - Underground	**1432.6 cu.m.**	
Total Storage =	**1594.7 cu.m.**	(required = 1577.3 cu.m.)

(as per Sub-Watershed Update Study)

4.0 ORIFICE CONTROL CALCULATIONS

An orifice plate will be installed over the discharge prior to leaving the site that will control peak flows during the various storm events to the target flow rates.

4.1 Orifice Calculation - Erosion Control Flow

Determine the diameter of the orifice requried to control the flow from the site during the extended detention period to 4.6 L/sec.

Invert at controlled outlet =	186.25	m
Erosion Control Elevation =	189.29	m
Centreline Orifice Elevation =	186.29	m
Maximum Head on Orifice (H)	3.00	m

Orifice Equation: $Qa = CA*(2gh)^{1/2}$

WHERE **C** is the co-efficient of discharge (-) **g** is the gravitational constant (m/s^2)
A is the cross-sectional area (sq.m.) **h** is the distance between the orifice centreline and the HWL
Qa is the orifice discharge flow (m^3/s)

Head (H) =	3.00 m	**Area (A) =**	0.0044 m^2	Gravitational Constant (g) =	9.81
Discharge (Q) =	0.02101 m^3/s	**Diameter (mm)**	75 mm.	Discharge Coefficient (c) =	0.62

Therefore, a 75 mm orifice will control post development flows to approximately 21.01 L/sec.
which is greater than the target erosion control release flow of 4.6 L/sec. and 788.6 m^3 storage
75mm is the minimum size of orifice the conservation authority and MECP will accept.

The draw down time for this event is:

$\mathbf{t} = 2A_p (h_1^{0.5} - h_2^{0.5}) / CA_o(2g)^{0.5}$ = **64517 seconds or 17.9 hours**

(source: MOE Equation 4.10)

where :	t =	drawdown time (s)		
	Ap =	228.2	m^2	Surface area of pond
	C =	0.63		Discharge Coefficient
	A_o =	0.0044	m^2	Cross-sectional Area of Orifice
	g =	9.81	m/s^2	Gravitational Acceleration Constrant
	h_1 =	3.04	m	Starting Elevation
	h_2 =	0	m	Ending Elevation (invert of orfice)

This assumes the storage is largely defined by the underground storage tank with a constant surface area.

4.2 Orifice Calculation - 25-Year Flow

Determine the flow from Extended Detention orifice:

Invert at controlled outlet =	186.25	m
Ponding Elev. during 25-year storm =	191.38	m
Centreline Orifice Elevation =	186.29	m
Maximum Head on Orifice (H)	5.095	m

Orifice Equation: $Qa = CA*(2gh)^{1/2}$

WHERE **C** is the co-efficient of discharge (-) **g** is the gravitational constant (m/s^2)
A is the cross-sectional area (sq.m.) **h** is the distance between the orifice centreline and the HWL
Qa is the orifice discharge flow (m^3/s)

Head (H) =	5.10 m	**Area (A) =**	0.0044 m^2	Gravitational Constant (g) =	9.81
Discharge (Q) =	0.02739 m^3/s	**Diameter (mm)**	75 mm.	Discharge Coefficient (c) =	0.62

Therefore, a 75 mm orifice will control post development flows to approximately 27.4 L/sec.
which is less than the target erosion control release flow of 34.5 L/sec.

Therefore consider a second orifice near the 25 year flood elevation to control the flow during the 25-Year Storm

Invert at controlled outlet =	191.30	m
Ponding Elev. during 25-Year storm =	191.38	m
Centreline Orifice Elevation =	191.37	m
Maximum Head on Orifice (H)	0.010	m

Orifice Equation: $Qa = CA*(2gh)^{1/2}$

WHERE **C** is the co-efficient of discharge (-) **g** is the gravitational constant (m/s^2)
A is the cross-sectional area (sq.m.) **h** is the distance between the orifice centreline and the HWL
Qa is the orifice discharge flow (m^3/s)

Head (H) =	0.01 m	**Area (A) =**	0.0165 m^2	Gravitational Constant (g) =	9.81
Discharge (Q) =	0.00453 m^3/s	**Diameter (mm)**	145 mm.	Discharge Coefficient (c) =	0.62

The total site discharges will be:

Attenuated Release =	27.4	L/sec. (lower orifice)			
	4.5	L/sec. (upper orifice)			
Uncontrolled Release =	0.0	L/sec.			
Total =	31.9	L/sec.	(target =	34.5	L/sec.)

4.3 Orifice Calculation - 100 Year Flow

Determine the flow from Extended Detention orifice:

Invert at controlled outlet =	186.25	m.
Ponding Elev. during 1:100 yr. storm =	192.53	m
Centreline Orifice Elevation =	186.29	m
Maximum Head on Orifice (H)	6.24	m

Head (H) =	6.24 m	**Area (A) =**	0.0044 m^2	**Gravitational Constant (g) =**	9.81
Discharge (Q) =	0.03031 m^3/s	**Diameter (mm)**	75 mm.	**Discharge Coefficient (c) =**	0.62

Therefore, a 75 mm orifice will control post development flows to approximately 30.3 L/sec. which is less than the calculated 100 year target flow rate of 80.6 L/sec.
Therefore consider a second orifice near the 25 year flood elevation to control the flow during the 100-Year Storm

Determine the diameter of the orifice requried to control the flow from the site during the 100-year storm

Invert at controlled outlet =	191.30	m
Ponding Elev. during 100-Year storm =	192.53	m
Centreline Orifice Elevation =	191.37	m
Maximum Head on Orifice (H)	1.155	m

Orifice Equation: $Qa = CA*(2gh)^{1/2}$

WHERE
C is the co-efficient of discharge (-)
A is the cross-sectional area (sq.m.)
Qa is the orifice discharge flow (m^3/s)
g is the gravitational constant (m/s^2)
h is the distance between the orifice centreline and the HWL

Head (H) =	1.16 m	**Area (A) =**	0.0165 m^2	Gravitational Constant (g) =	9.81
Discharge (Q) =	0.04875 m^3/s	**Diameter (mm)**	145 mm.	Discharge Coefficient (c) =	0.62

The total site discharges will be:

Attenuated Release =	30.3	L/sec. (lower orifice)		
	48.7	L/sec. (upper orifice)		
Uncontrolled Release =	0.0	L/sec.		
Total =	79.1	L/sec.	(target = 80.6	L/sec.)

The draw down time for this event is approximately:

From Flood Elevation to Invert of Upper Orifice:

$\mathbf{t} = 2A_p (h_1^{0.5} - h_2^{0.5}) / CA_o(2g)^{0.5}$ = **8659 seconds or 2.4 hours**

(source: MOE Equation 4.10)

where :	t =	drawdown time (s)		
	Ap =	228.2	m^2	Surface area of pond
	C =	0.63		Discharge Coefficient
	A_o =	0.0209	m^2	Cross-sectional Area of Both Orifices
	g =	9.81	m/s^2	Gravitational Acceleration Constrant
	h_1 =	1.23	m	Starting Elevation
	h_2 =	0	m	Ending Elevation (invert of orfice)

From Invert of Upper Orifice to Invert of Lower Orifice:

$\mathbf{t} = 2A_p (h_1^{0.5} - h_2^{0.5}) / CA_o(2g)^{0.5}$ = **83193 seconds or 23.1 hours**

(source: MOE Equation 4.10)

where :	t =	drawdown time (s)		
	Ap =	228.2	m^2	Surface area of pond
	C =	0.63		Discharge Coefficient
	A_o =	0.0044	m^2	Cross-sectional Area of Lower Orifice
	g =	9.81	m/s^2	Gravitational Acceleration Constrant
	h_1 =	5.05	m	Starting Elevation
	h_2 =	0	m	Ending Elevation (invert of orfice)

Both calculations assume the storage is largely defined by the underground storage tank with a constant surface area.

Time to drain upper portion =	2.4	hours
Time to drain lower portion =	23.1	hours
Total estimated draw down =	25.5	hours

5.0 CHECK ON STORAGE VOLUMES REQUIRED

The Extended Detention storage is based on a 25mm storm event. The total runoff can therefore be estimated as

Quantity = 25 mm x Area x Runoff Coefficient
= 25 mm x 2.303 ha x 81%
= 464.3 m^3

For 25 year storm evenet the runoff coefficients are to be incresed by 10%
For 100 year storm evenet the runoff coefficients are to be incresed by 25%

Calculation of storage required to control flows during the 25 year storm event to design release rate

Rainfall Duration min.	s	25 Year Rainfall Intensity (I) mm/h	Attenuated Flow From Site m^3/s	Unattenuated Flow From Site m^3/s	Total Runoff Volume m^3	Allowable Release Rate m^3/s	Allowable Release Volume m^3	Aprox. Detention Volumes m^3	
125.0	7500	26.8	0.1520	0.0000	1139.8	0.0319	239.4	900.4	
130.0	7800	26.0	0.1476	0.0000	1150.9	0.0319	249.0	901.9	
135.0	8100	25.3	0.1434	0.0000	1161.6	0.0319	258.6	903.0	
140.0	8400	24.6	0.1395	0.0000	1171.9	0.0319	268.1	903.8	
145.0	8700	23.9	0.1359	0.0000	1182.0	0.0319	277.7	904.3	
150.0	**9000**	**23.3**	**0.1324**	**0.0000**	**1191.7**	**0.0319**	**287.3**	**904.4**	**<-- Control**
155.0	9300	22.8	0.1292	0.0000	1201.2	0.0319	296.9	904.3	
160.0	9600	22.2	0.1261	0.0000	1210.4	0.0319	306.4	903.9	
165.0	9900	21.7	0.1232	0.0000	1219.3	0.0319	316.0	903.3	
170.0	10200	21.2	0.1204	0.0000	1228.0	0.0319	325.6	902.4	
175.0	10500	20.8	0.1178	0.0000	1236.5	0.0319	335.2	901.4	
180.0	10800	20.3	0.1153	0.0000	1244.8	0.0319	344.7	900.1	
185.0	11100	19.9	0.1129	0.0000	1252.9	0.0319	354.3	898.6	

The maximum detention volume required when the 25 year post development flow is controlled to the design post-development flow is **904.4 cu.m** which compares to the prescribed volume of 1281.5 cu.m

Calculation of storage required to control flows during the 100 year storm event to target release rate

Rainfall Duration min.	s	100 Year Rainfall Intensity (I) mm/h	Attenuated Flow From Site m^3/s	Unattenuated Flow From Site m^3/s	Total Runoff Volume m^3	Allowable Release Rate m^3/s	Allowable Release Volume m^3	Aprox. Detention Volumes m^3	
50	3000	64.1	0.4132	0.0000	1239.6	0.0806	241.8	997.8	
55	3300	59.9	0.3863	0.0000	1274.9	0.0791	260.9	1014.0	
60	3600	56.3	0.3632	0.0000	1307.4	0.0791	284.6	1022.8	
65	3900	53.2	0.3430	0.0000	1337.5	0.0791	308.3	1029.2	
70	4200	50.4	0.3251	0.0000	1365.6	0.0791	332.0	1033.6	
75	4500	48.0	0.3093	0.0000	1392.0	0.0791	355.8	1036.2	
80	**4800**	**45.8**	**0.2952**	**0.0000**	**1416.8**	**0.0791**	**379.5**	**1037.3**	**<-- Control**
85	5100	43.8	0.2824	0.0000	1440.2	0.0791	403.2	1037.0	
90	5400	42.0	0.2708	0.0000	1462.5	0.0791	426.9	1035.6	
95	5700	40.4	0.2603	0.0000	1483.7	0.0791	450.6	1033.1	
100	6000	38.9	0.2507	0.0000	1503.9	0.0791	474.3	1029.6	
105	6300	37.5	0.2418	0.0000	1523.3	0.0791	498.1	1025.2	
110	6600	36.2	0.2336	0.0000	1541.9	0.0791	521.8	1020.1	

The maximum detention volume required when the 100 year post development flow is controlled to the design post-development flow is **1037.3 cu.m** which compares to the prescribed volume of 1577.3 cu.m and the provided volume of 1594.7 cu.m

APPENDIX "D"

Hydrological Verification

Memo

To: Jennifer Simpson, Town of Milton
Rachel Ellerman, Town of Milton
Martin Bateson, Town of Milton

From: Aaron Ferrell/Abhijeet Patel

Date: June 3, 2020

File: TP98053E.

Re: **Hydrologic Verification of the Proposed Stormwater Management Plan for Biarwood (Milton Towers) Site Plan Application, 6791 Regional Road 25 & 2230-2252 Derry Road, Town of Milton**

1. INTRODUCTION

As requested by the Town of Milton (ref: correspondence Simpson-Farrell, April 7, 2020; authorization to proceed received April 16, 2020), Wood has completed hydrologic analyses of the proposed stormwater management facility for the above site plan application, located at the southeast corner of Derry Road and RR25, to verify whether the proposed stormwater management plan would satisfy the design and functional criteria for erosion and flood control for the Sixteen Mile Creek Main Branch and the eastern tributary. The analyses have been completed based upon the design information provided in the Functional Servicing and Stormwater Management Report for the Proposed Residential Development (Candevcon Ltd., October 2017; Revised January 2020), and applying the guidance from the Sixteen Mile Creek Subwatershed Planning Study Areas 2&7 (Philips Planning and Engineering Limited, January 2000) as well as the Sixteen Mile Creek Areas 2&7 Subwatershed Update Study (Amec, November 2015). The following summarizes the results of this assessment.

2. PROPOSED DEVELOPMENT AND FACILITY RATING CURVE

The proposed development is located south Derry Road, east of Regional Road 25 (Ontario Street) and is bounded toward the south and east by the eastern tributary discharging toward the Sixteen Mile Creek. The site measures a total drainage area of 2.3 ha. One (1) stormwater management facility is proposed by Candevcon Ltd. to be constructed to address stormwater management requirements for the site draining toward the Sixteen Mile Creek Tributary. The size and impervious coverage of the contributing drainage area to the facility previously proposed by Candevcon Ltd.

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and the size and impervious coverage currently proposed by Candevcon Ltd. are summarized in Table 1.

Table 1: Comparison of the Drainage Aarea Under Proposed Land use Conditions as per Functional Servicing and Stormwater Management Report (Candevcon Ltd., January 2020)

Subcatchment Number / Description	Existing Conditions		Candevcon Ltd., January 2020	
	Drainage Area (ha)	Imperviousness (%)	Drainage Area (ha)	Imperviousness (%)
Total External Drainage Area toward East Tributary	423.86	48.4	423.86	48.4
Developed Area of Site	1.74	41.4	2.3	85.5
Area Contributing to NHS	8.36	3.0	7.80	3.0
Total Drainage area of East Branch of Sixteen Mile Creek Tributary	**433.96**	**47.5**	**433.96**	**47.8**
Total Drainage area of West Branch of Sixteen Mile Creek Tributary Upstream of Confluence with East Tributary	15170.1	N.A.	15170.1	N.A.
Total Drainage area of Sixteen Mile Creek Tributary Downstream of Confluence with East Tributary	**15604.1**	**N.A.**	**15604.1**	**N.A.**

The information in Table 1 indicates that the proposed redevelopment of the site would increase the total developed area from 1.74 ha to 2.3 ha and the impervious coverage would increase from 41.4% to 85.5%. The information in Table 1 also indicates that the site represents a small proportion of the total drainage area toward the east tributary (i.e. 0.5%), a far smaller portion of the total drainage area toward the Sixteen Mile Creek (i.e. 0.01%).

The storage discharge relationship for stormwater management facility as proposed by Candevcon Ltd., is presented in Table 2.

Ta le 2: Storage-Discharge Relationship for SWM Facility as per Candevcon Ltd., January 2020

Facility Operating Level	Storage (m^3)	Discharge (m^3 s)
Permanent Pool	0	0.0000
Extended Detention	464	0.0146
25-year Storm	999	0.0231
100-year Storm	1298	0.0415

Stormwater management facility sizing criteria for erosion and flood control for areas discharging toward the Sixteen Mile Creek Main Branch are currently provided in the Sixteen Mile Creek Subwatershed Study Areas 2 & 7 (Phillips Planning and Engineering Ltd., January 2000), as well as the Sixteen Mile Creek Areas 2 & 7 Subwatershed Update Study (AMEC et. al., November 2015).

Each study provides different unitary sizing criteria for erosion and flood control to the 100-year frequency flow condition, for areas discharging toward the Sixteen Mile Creek Main Branch. While the November 2015 Subwatershed Update Study provides unitary sizing criteria for areas discharging toward the Sixteen Mile Creek Main Branch under both pre-development and post-development conditions (ref. sizing criteria for SIS Area 5A), the sizing criteria advanced in the January 2000 Subwatershed Study was developed for a diversion strategy, whereby runoff from lands discharging toward the Omagh Tributary have been diverted toward the Sixteen Mile Creek Main Branch to address grading and servicing constraints in that area. Given that the subject property discharges toward the east tributary and Sixteen Mile Creek Main Branch under existing and proposed land use conditions, the stormwater management facility sizing criteria for erosion and flood control established per the November 2016 Subwatershed Update Study is considered to be more appropriate and applicable. The currently applicable unitary storage and discharge criteria for the stormwater management facility are presented in Table 3.

Ta le 3: Stormwater Management Facility Sizing Criteria for Boyne SIS Area 5A Maintaining Discharge Toward Si teen Mile Cree Main Branch

uantity Component	Cumulative Unitary Volume (m^3 Impervious ha)	Unitary Discharge (m^3 s ha)
Erosion	400	0.002
25-year	650	0.015
100-year	800	0.035
Regional	N/A	N/A

The storage-discharge relationship for the SWM Facility, as proposed by Candevcon, has been compared with the required storage discharge relationship in accordance with the applicable unitary sizing criteria, in order to verify that the currently proposed storage-discharge relationships comply with the outlined requirements. The results of this review are presented in Table 4.

Ta le 4: Comparison of Proposed and Required Storage-Discharge Relationships for SWM Facility

uantity Component	Storage (m^3)		Discharge (m^3 s)	
	Proposed	Required	Proposed	Required
Erosion	464	788	0.0146	0.0046
25-year	999	1280	0.0231	0.0345
100-year	1298	1575	0.0415	0.0806

The information in Table 4 indicates that the storage volumes proposed by Candevcon for the SWM facility are significantly lower (i.e. up to 41% lower) than that required in accordance with the applicable sizing criteria for all operating stages of the facility, particularly for the extended detention component of the facility. The information in Table 4 further indicates that the release rates from facility, as proposed by Candevcon, would be significantly lower than that required in accordance with the applicable sizing criteria for the 25 year and the 100-year storm event of the

facility (i.e. -33% and -49% respectively). However, the proposed release rate for the erosion control would be significantly higher than the required release rate (i.e. +217%).

3. HYDROLOGIC ASSESSMENT

Flooding

The HSP-F hydrologic model which was applied for the Bristol (Phase1) area of Milton Area has been updated to assess the performance of stormwater management facility for the subject property development proposed by Candevcon, per the Functional Servicing and Stormwater Management Report (January 2020). The storage discharge relationship, drainage area and impervious coverage for the property has been incorporated into the modified HSP-F hydrologic model, as per the information presented in Tables 1 and 2.

Consistent with the practice applied for the previous hydrologic verifications in Town of Milton, the HSP-F model has been executed for a 42-year continuous simulation period, and frequency analyses have been completed using the simulated annual maximum flow rates at facility outlet as well as at key flow nodes downstream of the subject property development, using the Log Pearson Type III Distribution. In addition, the Regional Storm event has been simulated as a discrete storm event and the simulated peak flows have been extracted from the model results accordingly. The simulated frequency flows are summarized in Table 5 for the existing and proposed development land use conditions, and the percentage differences compared to pre-development flows are presented in Table 6.

Table 5: Simulated Frequency Flows and Regional Storm Event Flows (m^3/s)

Flow Node/Location	Frequency (Years)							Regional
	1.25	2	5	10	20	50	100	
Existing Land Use Conditions								
16 MC At Derry Road (ref. Node 3)	3.07	4.36	6.19	7.42	8.61	10.2	11.4	30.28
East Tributary at RR25 (ref. Node 4)	3.13	4.46	6.33	7.59	8.8	10.4	11.6	30.75
Confluence of 16 MC and East Tributary (ref. Node 5)	17.7	26.4	39.4	48.4	57.3	69.3	78.6	378.17
Proposed Development and Stormwater Management as per Candevcon, March 2020								
SWM Facility Outlet	0.012	0.014	0.02	0.025	0.031	0.042	0.054	0.01
16 MC At Derry Road (ref. Node 3)	3.07	4.36	6.19	7.42	8.61	10.2	11.4	30.28
East Tributary at RR25 (ref. Node 4)	3.11	4.42	6.27	7.51	8.72	10.3	11.5	30.57
Confluence of 16 MC and East Tributary (ref. Node 5)	17.7	26.4	39.3	48.4	57.3	69.3	78.6	377.99

Table 6: Percent Change in Frequency Flows For Future Land Use and Stormwater Management Proposed by CDC Compared to Existing Conditions (%)								
Flow Node/Location	Frequency (Years)							Regional
	1.25	2	5	10	20	50	100	
Proposed Development and Stormwater Management as per Candevcon, March 2020								
16 MC At Derry Road (ref. Node 3)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
East Tributary at RR25 (ref. Node 4)	-0.6%	-0.9%	-0.9%	-1.1%	-0.9%	-1.0%	-0.9%	-0.6%
Confluence of 16 MC and East Tributary (ref. Node 5)	0.0%	0.0%	-0.3%	0.0%	0.0%	0.0%	0.0%	0.0%

The results in Tables 5 and 6 indicate the following:

- The frequency flows at key locations (i.e. Node 4 and 5) downstream of the proposed stormwater management facility would be lower than existing conditions (i.e. between 0.6-1.1% lower, and between 0%-0.3% lower respectively). Hence, the SWM facility design proposed by Candevcon would adequately control post-development flows to pre-development levels for all events up to, and including, the 100 year frequency flow condition.
- The 100-year frequency flow at the outlet of SWM facility (i.e. 0.054 m^3/s) would be significantly higher than the designed 100-year release rate from the facilities as proposed by Candevcon (i.e. 0.0415 m^3/s), hence the SWM facility design proposed by CDC is considered to provide insufficient capacity up to, and including, the 100-year frequency flow condition.
- The Regional Storm flows at key locations (i.e. Node 4, and Node 5) downstream of the proposed stormwater management facility would be lower than existing conditions. Hence the SWM facility design proposed by Candevcon would provide the requisite flood protection for all downstream properties for the Regional Storm.

Erosion

Erosion analyses have been completed, based upon the results of the continuous hydrologic simulation, in order to verify that the stormwater management facility design proposed by Candevcon for the subject property development would satisfy requirements to provide erosion control along the receiving watercourses. Consistent with the approach applied in the November 2015 Subwatershed Update Study, these analyses have been completed at site R71X along the Sixteen Mile Creek, and have applied the methods developed by MacCrae and Rowney (ref. *The role of Moderate Flow Events and Bank Structure in the Determination of Channel Response to Urbanization*, 1992) and shear force relationships outlined by Lorant (ref. *Vulnerability of Natural Watercourses to Erosion due to Different Flow Rates*, 1982). The results of the assessment are presented in Table 7.

Table 7: Erosion Assessment Summary at Erosion Site R7IX (kg/m^2 x hours)			
Channel Bed/Bank Station	Land Use Condition Within Boyne Survey		Percent Difference Compared to Existing Conditions
	Existing	Future with SWM as per Candevcon	
Channel Bed	1958	1957	-0.1%
Total Bank Shear	995	995	0.0%
0.2 x bankfull depth	756	756	0.0%
0.5 x bankfull depth	457	457	0.0%
0.8 x bankfull depth	76	76	0.0%
1.0 x bankfull depth	17	17	0.0%

The results presented in the Table 7 indicate that the erosion potential for the channel bed and total bank shear would be controlled to existing levels (i.e. ±0.1% change) under the proposed conditions for the subject property developments, hence the stormwater management plan proposed by CDC is considered to satisfy requirements for erosion protection for the subject property development. This is considered attributable to the small size of the development relative to the total contributing drainage area along the Sixteen Mile Creek Main Branch as noted previously. While the extended detention storage and release rates would satisfy the functional requirements to provide erosion control along the Sixteen Mile Creek Main Branch, it is recognized that the drawdown time for the stormwater management the SWM facility would be approximately 17.6 hours, which is less than the minimum 24 hour drawdown time typically applied within the Town of Milton.

4. SUGGESTED REVISIONS TO FACILITY OUTLET STRUCTURE

In an effort to facilitate the review of the Subject Area Property development, Wood has reviewed the SWM Pond design provided by Candevcon to confirm the sizing criteria which would provide adequate capacity to convey the 100 year frequency flow from the facility, as well as to address the applicable erosion control criteria for areas discharging toward the Sixteen Mile Creek main Branch. In the absence of further details regarding functional constraints and criteria for the site and stormwater management plan, this assessment has been completed to verify whether the unitary sizing criteria advanced in the November 2015 Subwatershed Update Study would satisfactorily address the flood and erosion control requirements for the receiving watercourses and would also provide adequate capacity up to and including the 100 year frequency flow condition; it is suggested that Candevcon verify the feasibility of applying this sizing criteria for the given type of facility for the site. The storage-discharge relationship for the SWM facility, per the applicable sizing criteria, is summarized in Table 8.

Ta le 8: Suggested Storage-Discharge Relationship for SWM Facility as per Wood		
Facility Operating Level	**Storage (m^3)**	**Discharge (m^3 s)**
Permanent Pool	0	0.0000
Extended Detention	788	0.0046
25-year Storm	1280	0.0345
100-year Storm	1575	0.0806

The HSP-F hydrologic model has been revised to incorporate the revised storage-discharge relationship for the stormwater management facility, as presented in Table 8. The HSP-F model has been executed for a 42-year continuous simulation period, and frequency analyses have been completed using the simulated annual maximum flow rates at facility outlet as well as at key flow nodes, using the Log Pearson Type III Distribution. In addition, the Regional Storm event has been simulated as a discrete storm event and the simulated peak flows have been extracted from the model results accordingly. The proposed land use simulated frequency flows are summarized in Table 9 along with the frequency flows reported earlier for existing land use conditions, and the percentage differences compared to pre-development flows are presented in Table 10.

Ta le 9: Simulated Frequency Flows and Regional Storm Event Flows (m^3 s)								
Flow Node/Location	**Frequency (Years)**							**Regional**
	1.25	**2**	**5**	**10**	**20**	**50**	**100**	
Existing Land Use Conditions								
16 MC At Derry Road (ref. Node 3)	3.07	4.36	6.19	7.42	8.61	10.2	11.4	30.28
East Tributary at RR25 (ref. Node 4)	3.13	4.46	6.33	7.59	8.8	10.4	11.6	30.75
Confluence of 16 MC and East Tributary (ref. Node 5)	17.7	26.4	39.4	48.4	57.3	69.3	78.6	378.17
Proposed Development per Candevcon and Revised Stormwater Management Facility								
SWM Facility Outlet	0.004	0.008	0.016	0.024	0.035	0.054	0.074	0.01
16 MC At Derry Road (ref. Node 3)	3.07	4.36	6.19	7.42	8.61	10.2	11.4	30.28
East Tributary at RR25 (ref. Node 4)	3.1	4.41	6.26	7.5	8.71	10.3	11.5	30.57
Confluence of 16 MC and East Tributary (ref. Node 5)	17.7	26.5	39.3	48.4	57.3	69.3	78.6	377.99

Table 10: Percent Change in Frequency Flows For Future Land Use and Stormwater Management Proposed Compared to Existing Conditions (%)								
Flow Node/Location	Frequency (Years)							Regional
	1.25	2	5	10	20	50	100	
Proposed Development per Candevcon and Revised Stormwater Management Facility								
16 MC At Derry Road (ref. Node 3)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
East Tributary at RR25 (ref. Node 4)	-1.0%	-1.1%	-1.1%	-1.2%	-1.0%	-1.0%	-0.9%	-0.6%
Confluence of 16 MC and East Tributary (ref. Node 5)	0.0%	0.4%	-0.3%	0.0%	0.0%	0.0%	0.0%	0.0%

The results in Tables 9 and 10 indicate the following:

- The 100-year frequency flow at the outlet of SWM Facility (i.e. 0.074 m^3/s) is slightly lower than the designed 100-year release rate from the facility (i.e. 0.08 m^3/s), hence the storage-discharge relationship suggested above would provide sufficient capacity up to, and including, the 100-year frequency flow condition for the drainage area and impervious coverage specified by Candevcon.
- The frequency flows and Regional Storm flows at key locations downstream of the proposed stormwater management facility would be lower than or equal to existing conditions (≤ 1.2%), hence the stormwater management plan for the Subject Property area, refined as per the development proposed by CDC and with the suggested modifications to the storage-discharge relationship as provided above would provide adequate flood protection for downstream properties for all events up to and including the 100-year frequency flow condition, as well as the Regional Storm.

Erosion

Erosion analyses have been completed, based upon the results of the continuous hydrologic simulation, in order to verify that the revised stormwater management facility storage-discharge relationship would satisfy requirements to provide erosion control along the receiving watercourses. Consistent with the approach applied in the Subwatershed Update Study, these analyses have been completed at site R7IX along the Sixteen Mile Creek, and have applied the methods developed by MacCrae and Rowney (ref. *The role of Moderate Flow Events and Bank Structure in the Determination of Channel Response to Urbanization*, 1992) and shear force relationships outlined by Lorant (ref. *Vulnerability of Natural Watercourses to Erosion due to Different Flow Rates*, 1982). The results of the assessment are presented in Table 11.

Table 11: Erosion Assessment Summary at Erosion Site R7IX (kg/m^2 x hours)			
Channel Bed/Bank Station	Land Use Condition Within Boyne Survey		Percent Difference Compared to Existing Conditions
	Existing	Future with SWM	
Channel Bed	1958	1957	-0.1%
Total Bank Shear	995	995	0.0%
0.2 x bankfull depth	756	756	0.0%
0.5 x bankfull depth	457	457	0.0%
0.8 x bankfull depth	76	76	0.0%
1.0 x bankfull depth	17	17	0.0%

The results presented in the Table 11 indicate that development and stormwater management for the Subject Area Property, as proposed by Candevcon and the suggested revisions to the stormwater management facility storage-discharge relationship provided above, would control the erosion potential for the channel bed and bank to within acceptable levels (i.e. ±0.1% change). It should be noted that for the suggested revised discharge rate for the extended detention, the drawdown time for the stormwater management the SWM facility is expected to be approximately 4 days, which is within the range previously acceptable to the Town of Milton.

5. CONCLUSIONS

In summary:

(i) The storage discharge relationship for the SWM facility as proposed by Candevcon does not satisfy the applicable the unitary storage and discharge design criteria for development areas discharging toward the Sixteen Mile Creek Main Branch under existing and proposed land use conditions.

(ii) The stormwater management facility design proposed by Candevcon would address requirements to provide flood control at all key locations for all storm events up to and including the 100-year frequency flow condition.

(iii) The stormwater management facility design proposed by Candevcon would fully address requirements to provide flood control at all key locations for the Regional Storm event.

(iv) The storage-discharge relationship for the SWM facility as proposed by Candevcon would fail to provide sufficient capacity for the 100-year frequency flow condition, for the drainage area and impervious coverage currently proposed. Hence, modifications to the facility rating curve are considered warranted.

(v) The development and stormwater management plan proposed by Candevcon would satisfy erosion requirements for the Sixteen Mile Creek Main Branch.

(vi) The extended detention drawdown time for the facility (i.e. 17.6 hours) is less than the 24 hour minimum drawdown time typically required within the Town of Milton.

(vii) The storage-discharge relationship for the SWM facility, modified per the applicable unitary criteria developed for Boyne SIS Area 5A would satisfy requirements for flood and

erosion control, and would provide sufficient capacity for events up to and including the 100 year frequency flow condition

It is recommended that CDC review the foregoing and confirm the feasibility of implementing the suggested revisions to the stormwater management facility rating curve, as provided herein, and incorporate the revisions into the design drawing as appropriate as part of the Engineering Submission to the Town of Milton.

We trust that the foregoing satisfies your current requirements. Feel free to contact our office should you have any questions or wish to discuss.

AF/AP/ap/af

PROJECT:	Briarwood Residential Development	DATE:	21 October 2020
PROJECT NO.	W19061	PREPARED BY:	Tonny Johansen
SUBJECT:	Request to Authorize Woods Consulting to Re-Review the Hydrology Related to the SWM System		

1. STORMWATER MANAGEMENT PEER REVIEW

As part of the original submission the Town of Milton and Conservation Halton required the developer to have the stormwater management strategy prepared by Candevcon Limited peer reviewed by Wood Environmental & Infrastructure Solutions (Wood) for the Town and specifically to model the output for the proposed development on the watershed system using a hydrological model developed for the municipality.

Briarwood Homes agreed to the review and paid for that review. Wood produced an analysis memo, dated 3 June 2020. For the basis of the analysis, Wood used the Candevcon SWM report dated January 2020, as submitted to the Town. They applied ñ*the guidance from the Sixteen Mile Creek Subwatershed Planning Study Areas 2&7 (Philips Planning and Engineering Limited, January 2000) as well as the Sixteen Mile Creek Areas 2&7 Subwatershed Update Study (Amec, November 2015)"* (Wood 2020, page 1).

Based on directions for the Town, Candevcon designed the SWM strategy based on Sixteen Mile Creek Subwatershed Study Areas 2 & 7 (prepared in 2000 by Phillips Planning and Engineering Ltd.).

1.1. RESULTS OF THE PEER REVIEW

Wood noted ñg*iven that the subject property discharges toward the east tributary and Sixteen Mile Creek Main Branch under existing and proposed land use conditions, the stormwater management facility sizing criteria for erosion and flood control established per the November 2016 Subwatershed Update Study is considered to be more appropriate and applicable*ò (Wood 2020, page 3). As a result of this, Wood noted ñé t*hat the storage volumes proposed by Candevcon for the SWM facility are significantly lower … than that required in accordance with the applicable sizing criteria for all operating stages of the facility, particularly for the extended detention component of the facility*ò (Wood 2020, page 3).

Wood (2020) indicates ñ*the storage discharge relationship, drainage area and impervious coverage for the property has been incorporated into the modified HSP-F hydrologic model*é ò (page 4). Wood summarized their findings of the Candevcon SWM strategy in their Table 6, reproduced below.

Table 6: Percent Change in Frequency Flows For Future Land Use and Stormwater Management Proposed by CDC Compared to Existing Conditions (%)

Flow Node/Location	Frequency (Years)							Regional
	1.25	2	5	10	20	50	100	
Proposed Development and Stormwater Management as per Candevcon, March 2020								
16 MC At Derry Road (ref. Node 3)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
East Tributary at RR25 (ref. Node 4)	-0.6%	-0.9%	-0.9%	-1.1%	-0.9%	-1.0%	-0.9%	-0.6%
Confluence of 16 MC and East Tributary (ref. Node 5)	0.0%	0.0%	-0.3%	0.0%	0.0%	0.0%	0.0%	0.0%

Wood (2020) concludes:

- With respect to Nodes 4 and 5, ñé *the SWM facility design proposed by Candevcon would adequately control post-development flows to pre-development levels for all events up to, and including, the 100 year frequency flow condition*ò (page 5).
- ñé *the SWM facility design proposed by CDC is considered to provide insufficient* (storage) *capacity up to, and including, the 100-year frequency flow condition*ò (page 5).
- With respect to the Regional Storm at Nodes 4 and 5, ñé *the SWM facility design proposed by Candevcon would provide the requisite flood protection for all downstream properties for the Regional Storm*ò (page 5).
- ñé *the drawdown time for the stormwater management the SWM facility would be approximately 17.6 hours, which is less than the minimum 24 hour drawdown time typically applied within the Town of Milton*ò (page 6).
- ñé *the erosion potential for the channel bed and total bank shear would be controlled to existing levels … under the proposed conditions for the subject property developments, hence the stormwater management plan proposed by CDC is considered to satisfy requirements for erosion protection for the subject property development*ò (page 6). This was summarized in Table 7, reproduced below.

Table 7: Erosion Assessment Summary at Erosion Site R7IX (kg/m^2 x hours)

Channel Bed/Bank Station	Land Use Condition Within Boyne Survey		Percent Difference Compared to Existing Conditions
	Existing	Future with SWM as per Candevcon	
Channel Bed	1958	1957	-0.1%
Total Bank Shear	995	995	0.0%
0.2 x bankfull depth	756	756	0.0%
0.5 x bankfull depth	457	457	0.0%
0.8 x bankfull depth	76	76	0.0%
1.0 x bankfull depth	17	17	0.0%

1.2. REVISIONS TO SWM DESIGN

In response to the comments presented by the Peer review, Candevcon revised the design to reflect the criteria provided in the November 2015 Subwatershed Update Study. This included increasing the storage in the tank and storm sewer system from $1298m^3$ to $1577m^3$. We noted that our calculations using the Modified Rational Method estimates that only $1120m^3$ of volume will be required during the 1:100 year storm event. It is generally accepted that the Modified Rational Method provides conservative volumetric estimates.

1.3. COMMENTARY ON A FURTHER PEER REVIEW

We respectfully submit that the original design was shown by the peer review to having no negative impact on neither the flows nor the erosion risks for the downstream water course system. The peer review concluded the flows would be equal or slightly less than the existing situation at the downstream nodes.

We have adjusted the design to incorporate additional storage capacity in accordance with the updated criteria, despite an indication from the conservative, Modified Rational Method that the volume from the 1:100 year storm is likely to be considerably less than the criteria suggests.

We are still of the opinion that the Sub-Watershed criteria is appropriate to larger drainage systems where a neighbourhood SWM facility is provided, but should not be blindly applied to smaller sites (i.e. 2.3ha). We point to the fact that the targets for the erosion flows cannot be achieved with the minimum approved orifice size of 75mm diameter.

We believe the peer review was useful in correcting the criteria initially required of the SWM strategy. It showed that the design would have no negative impacts on the water resources system. We have demonstrated that we have complied with the volumetric requirements and have demonstrated that the revised design will achieve the minimum 24 hour draw-down objective. We respectfully suggest that the changes can be verified by the Townôs engineering staff and a further iteration of the peer review is not required.

APPENDIX "E"

Storm Runoff Treatment

STANDARD OFFLINE
Jellyfish Filter Sizing Report

Project Information

Date	Friday, December 20, 2019
Project Name	Derry Rd
Project Number	
Location	Milton

Jellyfish Filter Design Overview

This report provides information for the sizing and specification of the Jellyfish Filter. When designed properly in accordance to the guidelines detailed in the Jellyfish Filter Technical Manual, the Jellyfish Filter will exceed the performance and longevity of conventional horizontal bed and granular media filters.

Please see ***www.ImbriumSystems.com*** *for more information.*

Jellyfish Filter System Recommendation

The Jellyfish Filter model JF8-10-2 is recommended to meet the water quality objective by treating a flow of 50.5 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 34 years of HAMILTON A rainfall data for this site. This model has a sediment capacity of 626 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF8-10-2	10	2	2.4	50.5	626

The Jellyfish Filter System

The patented Jellyfish Filter is an engineered stormwater quality treatment technology featuring unique membrane filtration in a compact stand-alone treatment system that removes a high level and wide variety of stormwater pollutants. Exceptional pollutant removal is achieved at high treatment flow rates with minimal head loss and low maintenance costs. Each lightweight Jellyfish Filter cartridge contains an extraordinarily large amount of membrane surface area, resulting in superior flow capacity and pollutant removal capacity.

Maintenance

Regular scheduled inspections and maintenance is necessary to assure proper functioning of the Jellyfish Filter. The maintenance interval is designed to be a minimum of 12 months, but this will vary depending on site loading conditions and upstream pretreatment measures. Quarterly inspections and inspections after all storms beyond the 5-year event are recommended until enough historical performance data has been logged to comfortably initiate an alternative inspection interval.

Please see ***www.ImbriumSystems.com*** *for more information.*

Thank you for the opportunity to present this information to you and your client.

Performance

Jellyfish efficiently captures a high level of Stormwater pollutants, including:

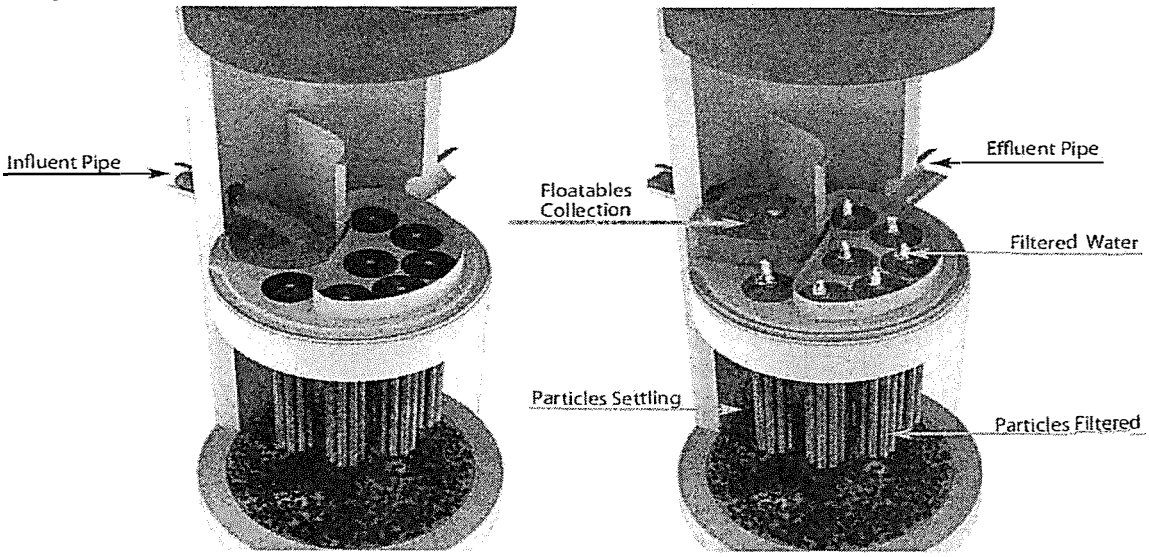
- ☑ 89% of the total suspended solids (TSS) load, including particles less than 5 microns
- ☑ 59% TP removal & 51% TN removal
- ☑ 90% Total Copper, 81% Total Lead, 70% Total Zinc
- ☑ Particulate-bound pollutants such as nutrients, toxic metals, hydrocarbons and bacteria
- ☑ Free oil, Floatable trash and debris

Field Proven Peformance

The Jellyfish filter has been field-tested on an urban site with 25 TARP qualifying rain events and field monitored according to the TARP field test protocol, demonstrating:

- A median TSS removal efficiency of 89%, and a median SSC removal of 99%;
- The ability to capture fine particles as indicated by an effluent d50 median of 3 microns for all monitotred storm events, and a median effluent turbidity of 5 NTUs;
- A median Total Phosphorus removal of 59%, and a median Total Nitrogen removal of 51%.

Jellyfish Filter Treatment Functions



Pre-treatment and Membrane Filtration

Jellyfish® Filter

Project Information

Date:	Friday, December 20, 2019
Project Name:	Derry Rd
Project Number:	
Location:	Milton

Designer Information

Company:	
Contact:	
Phone #:	

Notes

Rainfall

Name:	HAMILTON A
State:	ON
ID:	3194
Record:	1970 to 2003
Co-ords:	43°10.N'N, 79°56.W'N

Drainage Area

Total Area:	2.303 ha
Imperviousness:	85.5%

Upstream Detention

Peak Release Rate:	n/a
Pretreatment Credit:	n/a

Design System Requirements

Flow Loading	90% of the Average Annual Runoff based on 34 years of HAMILTON A rainfall data:	**7.4 L/s**
Sediment Loading	Treating 90% of the average annual runoff volume, 9889 m³, with a suspended sediment concentration of 60 mg/L.	**593 kg***

** Indicates that sediment loading is the limiting parameter in the sizing of this Jellyfish system*

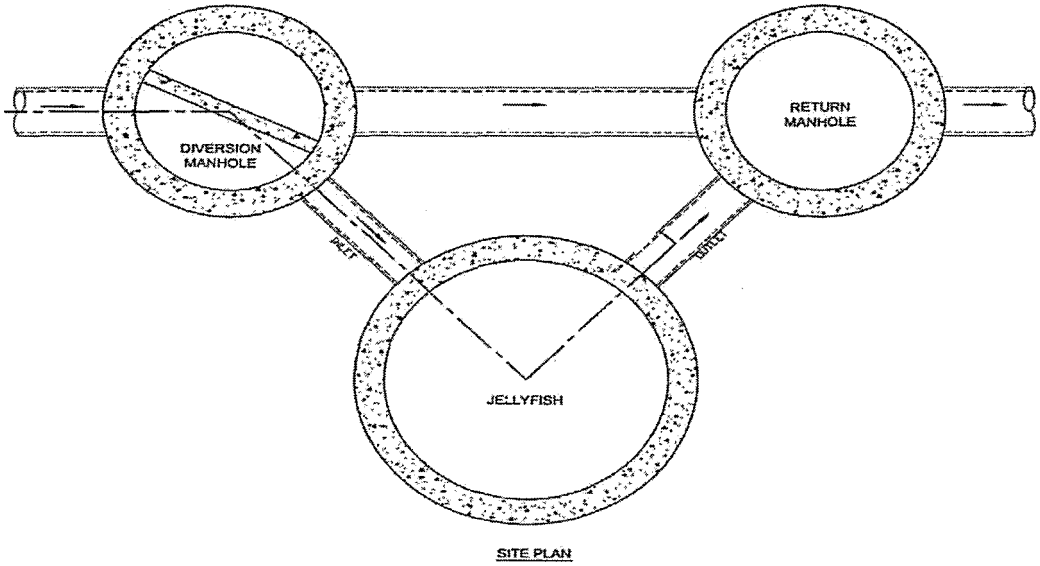
Recommendation

The Jellyfish Filter model JF8-10-2 is recommended to meet the water quality objective by treating a flow of 50.5 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 34 years of HAMILTON A rainfall data for this site. This model has a sediment capacity of 626 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Wet Vol Below Deck (L)	Sump Storage (m³)	Oil Capacity (L)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF4-1-1	1	1	1.2	2313	0.34	379	7.6	85
JF4-2-1	2	1	1.2	2313	0.34	379	12.6	142
JF6-3-1	3	1	1.8	5205	0.79	848	17.7	199
JF6-4-1	4	1	1.8	5205	0.79	848	22.7	256
JF6-5-1	5	1	1.8	5205	0.79	848	27.8	313
JF6-6-1	6	1	1.8	5205	0.79	848	28.6	370
JF8-6-2	6	2	2.4	9252	1.42	1469	35.3	398
JF8-7-2	7	2	2.4	9252	1.42	1469	40.4	455
JF8-8-2	8	2	2.4	9252	1.42	1469	45.4	512
JF8-9-2	9	2	2.4	9252	1.42	1469	50.5	569
JF8-10-2	**10**	**2**	**2.4**	**9252**	**1.42**	**1469**	**50.5**	**626**
JF10-11-3	11	3	3.0	14456	2.21	2302	63.1	711
JF10-12-3	12	3	3.0	14456	2.21	2302	68.2	768
JF10-12-4	12	4	3.0	14456	2.21	2302	70.7	796
JF10-13-4	13	4	3.0	14456	2.21	2302	75.7	853
JF10-14-4	14	4	3.0	14456	2.21	2302	78.9	910
JF10-15-4	15	4	3.0	14456	2.21	2302	78.9	967
JF10-16-4	16	4	3.0	14456	2.21	2302	78.9	1024
JF10-17-4	17	4	3.0	14456	2.21	2302	78.9	1081
JF10-18-4	18	4	3.0	14456	2.21	2302	78.9	1138
JF10-19-4	19	4	3.0	14456	2.21	2302	78.9	1195
JF12-20-5	20	5	3.6	20820	3.2	2771	113.6	1280
JF12-21-5	21	5	3.6	20820	3.2	2771	113.7	1337
JF12-22-5	22	5	3.6	20820	3.2	2771	113.7	1394
JF12-23-5	23	5	3.6	20820	3.2	2771	113.7	1451
JF12-24-5	24	5	3.6	20820	3.2	2771	113.7	1508
JF12-25-5	25	5	3.6	20820	3.2	2771	113.7	1565
JF12-26-5	26	5	3.6	20820	3.2	2771	113.7	1622
JF12-27-5	27	5	3.6	20820	3.2	2771	113.7	1679

Jellyfish Filter Design Notes

- Typically the Jellyfish Filter is designed in an offline configuration, as all stormwater filter systems will perform for a longer duration between required maintenance services when designed and applied in off-line configurations. Depending on the design parameters, an optional internal bypass may be incorporated into the Jellyfish Filter, however note the inspection and maintenance frequency should be expected to increase above that of an off-line system. Speak to your local representative for more information.



Jellyfish Filter Typical Layout

- Typically, 18 inches (457 mm) of driving head is designed into the system, calculated as the difference in elevation between the top of the diversion structure weir and the invert of the Jellyfish Filter outlet pipe. Alternative driving head values can be designed as 12 to 24 inches (305 to 610mm) depending on specific site requirements, requiring additional sizing and design assistance.
- Typically, the Jellyfish Filter is designed with the inlet pipe configured 6 inches (150 mm) above the outlet invert elevation. However, depending on site parameters this can vary to an optional configuration of the inlet pipe entering the unit below the outlet invert elevation.
- The Jellyfish Filter can accommodate multiple inlet pipes within certain restrictions.
- While the optional inlet below deck configuration offers 0 to 360 degree flexibility between the inlet and outlet pipe, typical systems conform to the following:

Model Diameter (m)	Minimum Angle Inlet / Outlet Pipes	Minimum Inlet Pipe Diameter (mm)	Minimum Outlet Pipe Diameter (mm)
1.2	62º	150	200
1.8	59º	200	250
2.4	**52º**	**250**	**300**
3.0	48º	300	450
3.6	40º	300	450

- The Jellyfish Filter can be built at all depths of cover generally associated with conventional stormwater conveyance systems. For sites that require minimal depth of cover for the stormwater infrastructure, the Jellyfish Filter can be applied in a shallow application using a hatch cover. The general minimum depth of cover is 36 inches (915 mm) from top of the underslab to outlet invert.
- If driving head caclulations account for water elevation during submerged conditions the Jellyfish Filter will function effectively under submerged condtions.
- Jellyfish Filter systems may incorporate grated inlets depending on system configuration.
- For sites with water quality treatment flow rates or mass loadings that exceed the design flow rate of the largest standard Jellyfish Filter manhole models, systems can be designed that hydraulically connect multiple Jellyfish Filters in series or alternatively Jellyfish Vault units can be designed.

Tonny Johansen

From: Kent S Campbell <Kent.Campbell@forterrabp.com>
Sent: December-20-19 12:33 PM
To: Tonny Johansen
Cc: Brandon O'Leary; Fausto Saponara (fausto.s200@gmail.com); Diarmuid Horgan; Davidson, Reagan; Kahlenberg, Jordan (jkahlenberg@imbriumsystems.com)
Subject: RE: Briarwood Residential Dev, Milton - OGS/Filter Installation (CDC File W19061)
Attachments: 122019 Derry Rd Milton Candevcon Jellyfish Sizing Sheet ISO 14034_licenseem.pdf; W19061-M-1-2-v2007-M-1.pdf

Hello Tonny,
Please see the updated Jellyfish sizing report attached. The JF8-10-2 is $117,369. We have reviewed the configuration in the attached drawing and it is suitable for this application.

Regards,

FORTERRA

Kent Campbell
Stormwater Specialist
Cambridge Plant
Cell 519 588-7473
kent.campbell@forterrabp.com
Stormceptor
Protecting the water for future generations
For the newest version of PCSWMM please visit the Imbrium website at
www.imbriumsystems.com

From: Tonny Johansen <tonny@candevcon.com>
Sent: Thursday, December 19, 2019 4:09 PM
To: Kent S Campbell <Kent.Campbell@forterrabp.com>
Cc: Brandon O'Leary <Brandon.OLeary@forterrabp.com>; Fausto Saponara (fausto.s200@gmail.com) <fausto.s200@gmail.com>; Diarmuid Horgan <dhorgan@candevcon.com>
Subject: RE: Briarwood Residential Dev, Milton - OGS/Filter Installation (CDC File W19061)

Kent:

Please find the details of the storm flow condition and the tank storage characteristics.

Site Location:	Derry Road, Milton, Ontario		
Total Catchment draining to unit:	2.303 ha		
Runoff Coefficient:	0.839		
% Impervious:	85.5%		
Upstream Storage:	Yes		
Stage – Storage Relation:	0 m 1.00 m	0 m^3 345.9 m^3	0 L/s 11.9 L/s

	2.00 m	586.3 m^3	17.0 L/s
	3.00 m	827.7 m^3	20.9 L/s
	4.00 m	1081.1 m^3	30.9 L/s
	5.00 m	1351.5 m^3	41.2 L/s
	5.05 m	1352.8 m^3	41.6 L/s
Peak Flow (1:100 year)	41.3 L/s		
Pipe Size (inlet):	150mm diameter		
Pipe Size (outlet):	600mm diameter		
Inlet Elevation:	187.25m		
Rim Elevation:	193.70m		
Quality Target:	80% TSS removal of ETV particle size		

As I noted on the telephone, the configuration of the tank is such that the two orifice will control the release rate to the Jellyfish to 41.6 L/s. After that flow the runoff spills across a rectangular wier into the receiving chamber, bypassing the treatment unit.

Regards,

Tonny

From: Tonny Johansen
Sent: December-18-19 4:24 PM
To: Kent Campbell (kent.campbell@forterrabp.com) <kent.campbell@forterrabp.com>
Cc: Brandon O'Leary (Brandon.OLeary@forterrabp.com) <Brandon.OLeary@forterrabp.com>; Fausto Saponara (fausto.s200@gmail.com) <fausto.s200@gmail.com>; Diarmuid Horgan (dhorgan@candevcon.com) <dhorgan@candevcon.com>
Subject: Briarwood Residential Dev, Milton - OGS/Filter Installation (CDC File W19061)

Kent:

Further to our telephone conversation, please find a draft drawing of how we propose to incorporate the jellyfish filters into the discharge from our SWM tank. The information from the site development was sent previously, but I have provide again below.

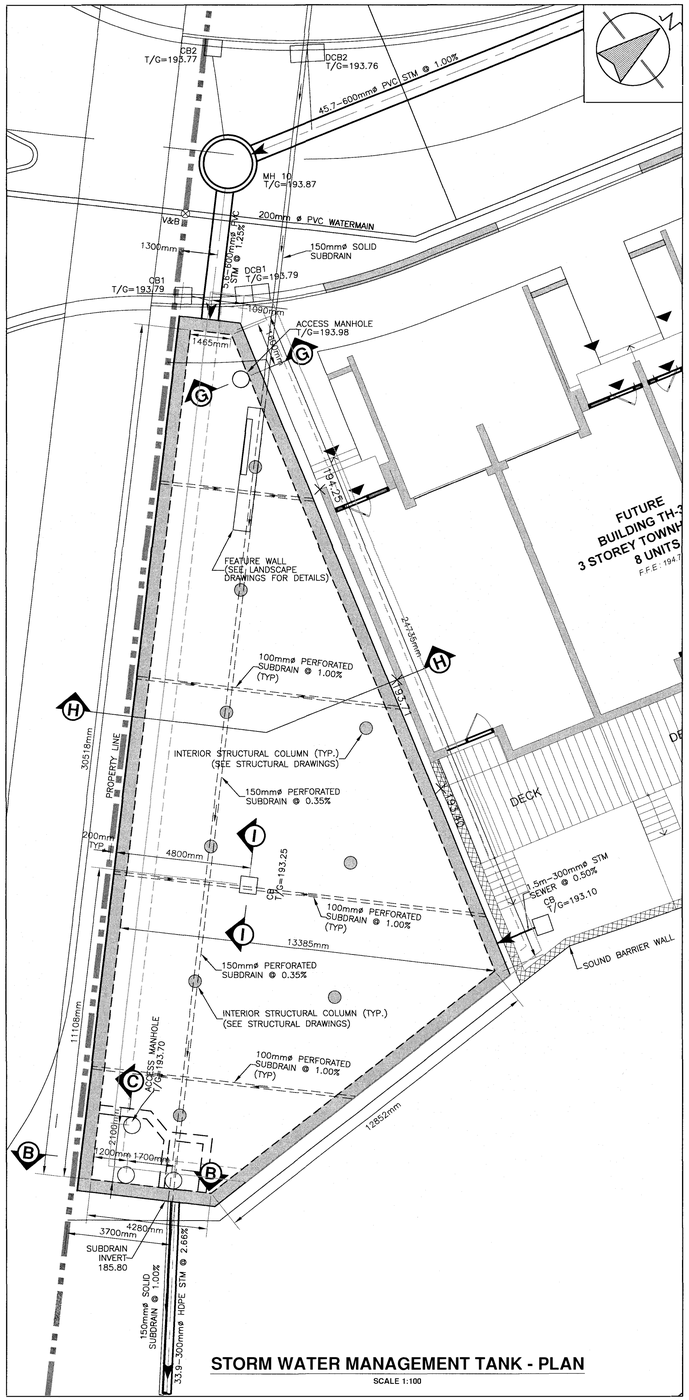
I'd ask if you would verify your previous recommendation for the JF-8 Jellyfish installation. Can you also look at the configuration shown on the plan. During our call, you mentioned the need to provide a bypass for flows when the water depth in the chamber exceeds 18". Can you please indicate how this would fit into the design?

We would then ask you to confirm the application, if it is adequate.

Regards,

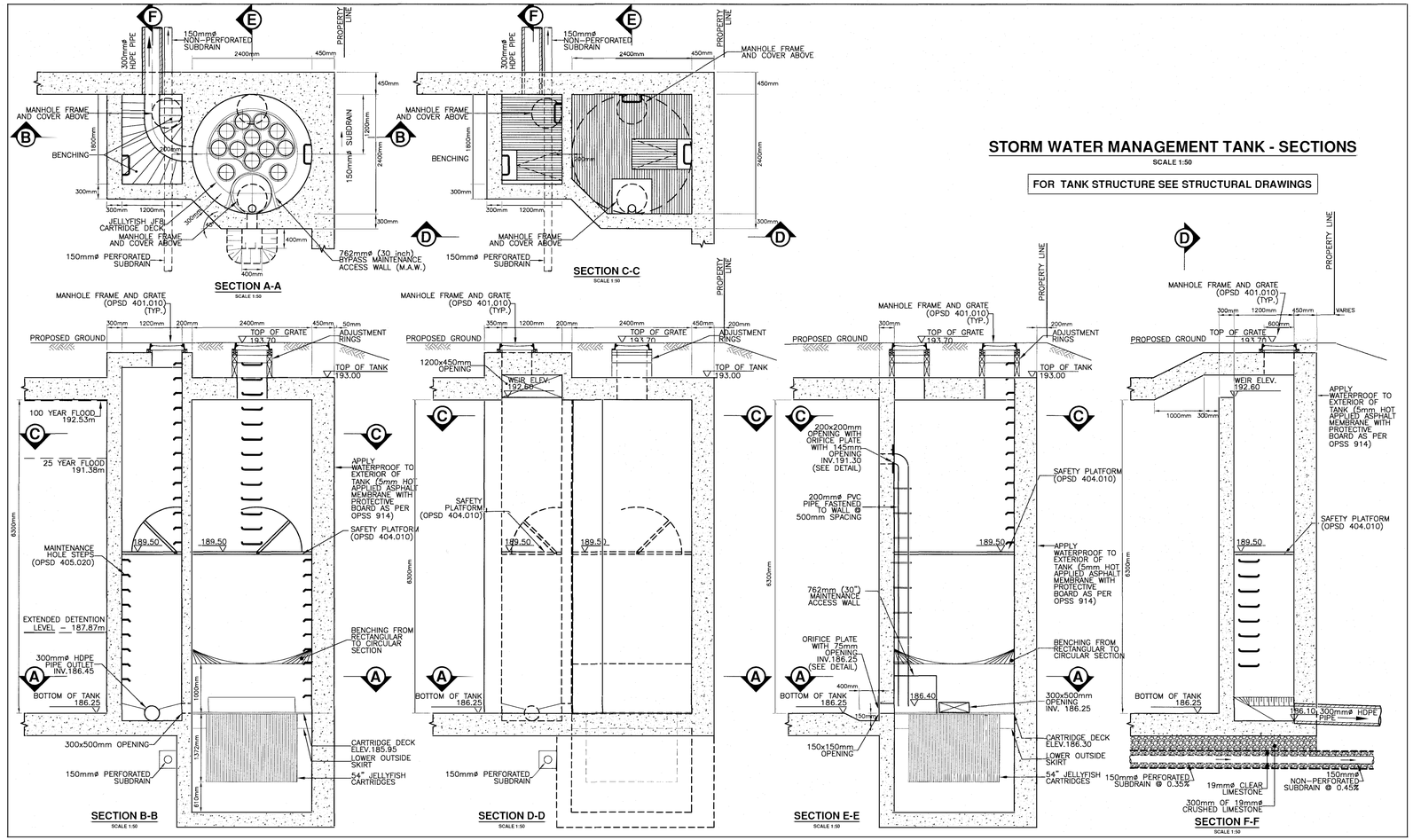
Tonny Johansen, P. Eng.
CANDEVCON LIMITED
CONSULTING ENGINEERS & PLANNERS
GTA WEST OFFICE (CORPORATE)

9358 Goreway Drive, Brampton, Ontario, L6P 0M7
Tel.: (905)794-0600
Fax: (905)794-0611
Email: tonny@candevcon.com



STORM WATER MANAGEMENT TANK - PLAN

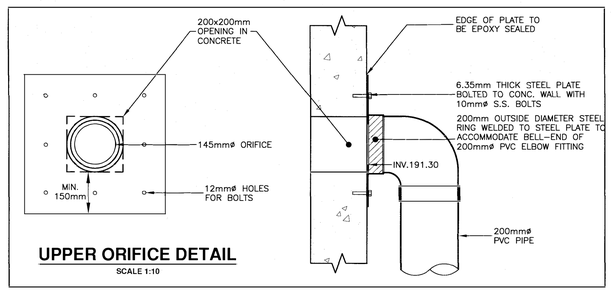
SCALE 1:100



STORM WATER MANAGEMENT TANK - SECTIONS

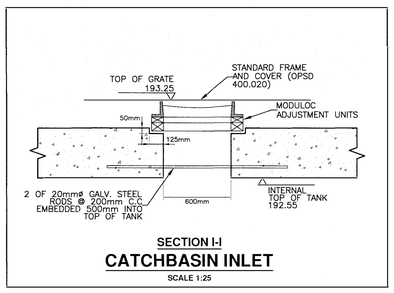
SCALE 1:50

FOR TANK STRUCTURE SEE STRUCTURAL DRAWINGS



UPPER ORIFICE DETAIL

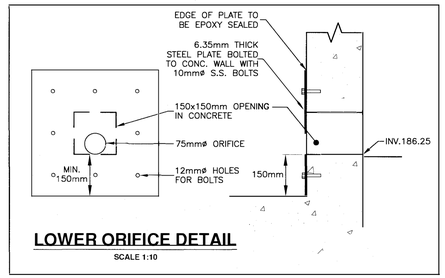
SCALE 1:10



SECTION I-I

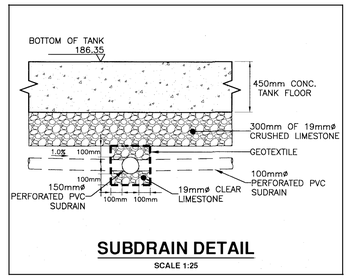
CATCHBASIN INLET

SCALE 1:25



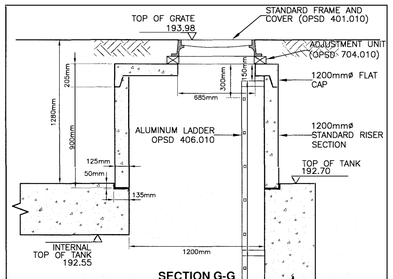
LOWER ORIFICE DETAIL

SCALE 1:10



SUBDRAIN DETAIL

SCALE 1:25



SECTION G-G

ACCESS MANHOLE

SCALE 1:25

SUBMISSION:

1st	X	Date	8 AUG. 2019	Pre-Serv		Date
2nd	X	Date	10 JAN. 2020	Interim		Date
3rd	X	Date	31 JUL. 2020	Final		Date
4th	X	Date	20 NOV. 2020			

No.	By	Date	Revision	Checked

REGION OF HALTON
TOWN OF MILTON
DEVELOPMENT SERVICES

LICENSED PROFESSIONAL ENGINEER
T.M. JOHANSEN
22140016
PROVINCE OF ONTARIO

Project | Dwg. No.

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
8258 GOREWAY DRIVE, BRAMPTON ON. L6P 0M7
TEL (905) 794-0600
FAX (905) 794-0611

PROJECT NUMBER W20191

BRIARWOOD HOMES
RESIDENTIAL DEVELOPMENT
DERRY ROAD / HIGHWAY 25
TOWN OF MILTON
SITE PLAN No.: SP - 21-19

STORM WATER MANAGEMENT TANK DETAILS

Region File No.				City File No. -	
Drawn By:	S.C.	Checked By:	C.R.M	Drawing No.	Sheet No.
Designed By:	T.M.J.	Checked By:	D.K.H.		M-1
Scale:	AS NOTED	Date:	MAY 2019		

J:\CDC-2019 WEST - Files\W19061-Briarwood Homes Site Plan\CANDEVCON DRAWINGS\SHEETS\W19061-M-1-2.dwg (Mar 31, 2021 - 4:38pm)

APPENDIX "F"

Erosion and Sediment Control Design

Briarwood Residential Development

Temporary Sedimentation Trap - Sizing Calculations

Criteria

Pools sized for 125 m^3/ha

Required Storage

Trap	1	Proposed Design 2	3	4	5	6	7
Catchment (ha)	1.77	1.77					
Required Volume (m^3)	221.3	221.3					

(See drainage area illustrated hereafter)

Design

depth =	1.0	1.0
length =	21.5	21.5
width =	10.8	11.0
volume =	231.125	236.5

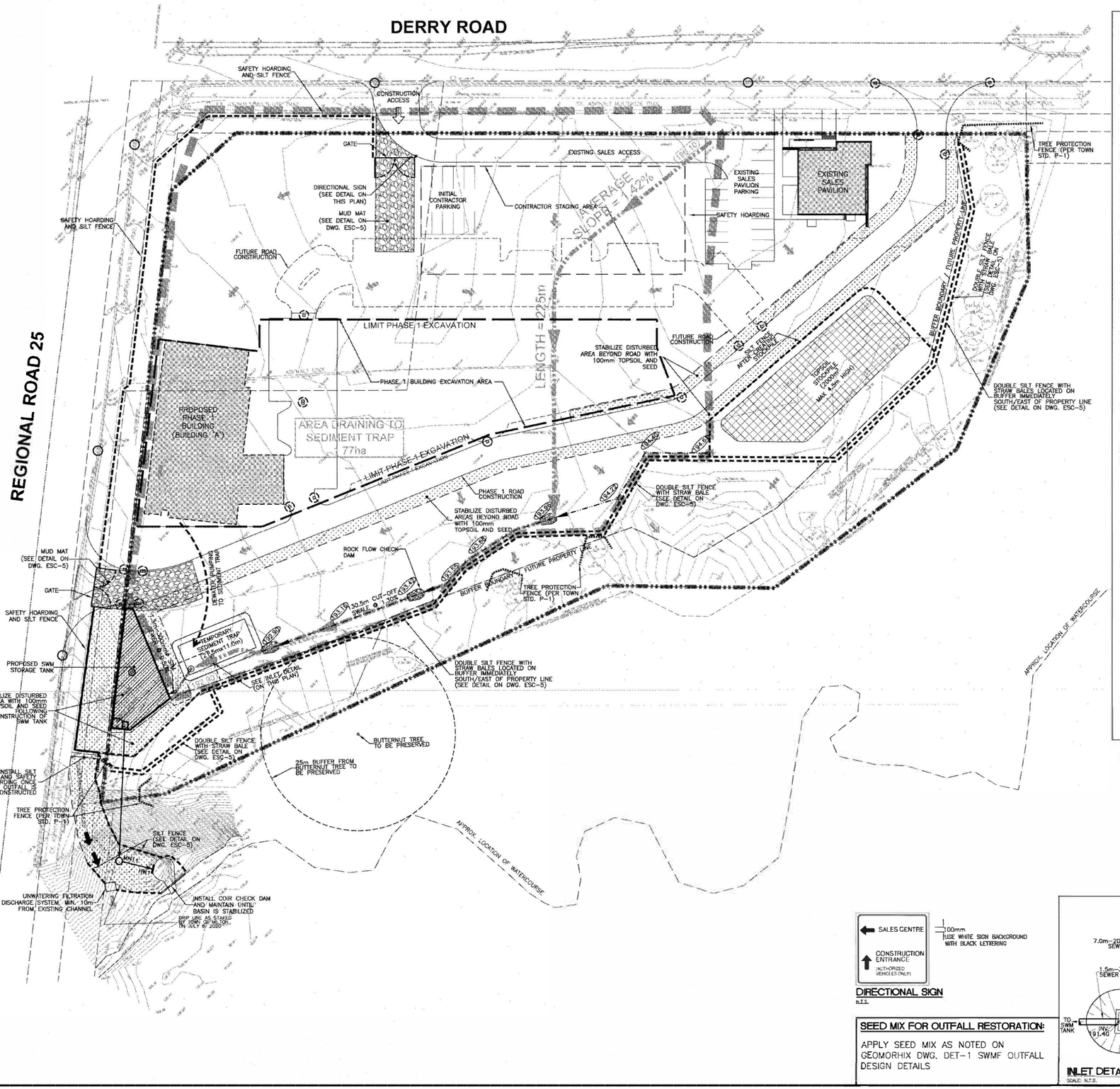
Emergency Overflow

100-yr Flow

C =	0.25	0.25
C_{100} =	0.3125	0.3125
L =	225	225
S_w (%) =	1.42	1.42
Tc =	37.0	37.0
I_{100} =	78.9	78.9
Q_{100} =	0.121	0.121

Channel Design

n =	0.033	0.033
Slope, s =	1.25%	1.25%
Bottom =	1.5	1.5
Side Slope =	2	2
Depth flow =	0.1	0.1
Cross-sectonal Area, A =	0.1700	0.1700
Wetted perimeter =	1.947	1.947
Hyd Radius =	0.087	0.087
Q =	0.113	0.113
V =	0.67	0.67



PHASE 1 - CONSTRUCTION SEQUENCING NOTES:

THE OUTFALL SEWER SHALL BE CONSTRUCTED BEFORE ANY OTHER WORKS ARE BEGUN.

STAGE I - OUTFALL SEWER

1. COMPLETION OF TREE INVENTORY AND ASSESSMENT OF THE AREA TO BE DISTURBED BY OUTFALL CONSTRUCTION.
2. DELINEATION OF THE WORK ZONE FOR TREE CLEARING AND GRADING.
3. INSTALLATION OF SILT FENCES ALONG OUTFALL PIPE AND AROUND SWM TANK CONSTRUCTION SITE.
4. REMOVAL OF TREES WITHIN THE WORK ZONE.
5. REVIEW BY ENVIRONMENTAL MONITOR.
6. EXCAVATE AND STABILIZE OUTFALL POOL AND CHANNEL.
7. CONSTRUCT OUTFALL PIPE, HEADWALL AND APPURTENANCES TO SWM TANK SITE.
8. PLACE MIN. 150mm TOPSOIL OVER DISTURBED AREAS.
9. SEED AREA AS SOON AS POSSIBLE.
10. CONSTRUCT SWM TANK.
11. BACKFILL SWM TANK AND COVER WITH 300m TOPSOIL.
12. SEED AREA AS SOON AS POSSIBLE.

STAGE II - PRE-CONSTRUCTION + TOPSOIL STRIPPING:

PRE-CONSTRUCTION

1. COMPLETION OF TREE INVENTORY AND ASSESSMENT OF THE AREA TO BE DISTURBED BY CONSTRUCTION.
2. DELINEATION OF THE WORK ZONE FOR TREE CLEARING AND GRADING.
3. INSTALL TREE PROTECTION FENCING PER TOWN STD. P-1
4. INSTALLATION OF ALL REMAINING PERIMETER SEDIMENT AND SAFETY FENCES FOR PHASE 1 CONSTRUCTION.
5. REMOVAL OF TREES WITHIN THE WORK ZONE.
6. REVIEW BY ENVIRONMENTAL MONITOR.

TOPSOIL STRIPPING

1. PROVIDE ADEQUATE MUD MAT AT THE PROPOSED CONSTRUCTION ACCESS.
2. EXCAVATE AND CONSTRUCT THE REQUIRED SEDIMENT TRAP AND MAKE CONNECTION TO SWM TANK.
3. EXCAVATE THE REQUIRED TEMPORARY CUT-OFF SWALES AND INSTALL ROCK DAMS AND STABILIZE SWALES.
4. STRIP TOPSOIL AND STOCKPILE IN DESIGNATED AREA.
5. INSTALL SILT FENCE AROUND TOP SOIL STOCKPILE.

STAGE III - PRE-GRADING + UNDERGROUND SERVICING:

PRE-GRADING

1. COMPLETE THE REQUIRED EXCAVATION OPERATION.
2. RESTORE AND STABILIZE ALL DISTURBED AREAS, OUTSIDE NOTED LIMITS, WITH 100mm TOPSOIL & SEED AS SOON AS PRACTICAL.
3. WHERE REQUIRED, CONSTRUCT ADDITIONAL TEMPORARY DRAINAGE SWALES AS AREAS ARE COMPLETED.
4. SPREAD REQUIRED TOPSOIL AND SEED. WHERE NOTED, IN AREAS THAT ARE TO REMAIN INACTIVE FOR MORE THAN 30 DAYS.

UNDERGROUND SERVICING

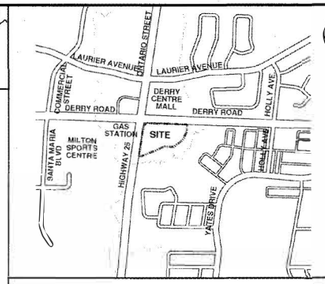
1. EXCAVATE AND CONSTRUCT BUILDING TO GROUND LEVEL.
2. INSTALL UNDERGROUND SERVICES.
3. CONTINUE BUILDING STRUCTURE.
4. CONSTRUCT BASE ROADWORKS AND PAVING.
5. INSTALL SEDIMENT TRAPS AT CBs AND INLETS AS THEY ARE CONSTRUCTED.

STAGE IV - POST SERVICING:

1. SEED AREAS ADJACENT TO ACCESS ROAD AS SOON AS PRACTICAL.
2. MAINTAIN SEDIMENT CONTROL DEVICES AS REQUIRED.
3. MAINTAIN ROADS IN CLEAN CONDITION.
4. REMOVE SILT FENCES ALONG OUTFALL SEWER ONCE AREA IS STABILIZED.
5. MONITOR SITE CONDITION DURING BUILDING CONSTRUCTION
6. REMOVE SAFETY HOARDING AS SITE IS BEING COMPLETED AND LANDSCAPED.
7. INSTALL SITE LANDSCAPING AS BUILDING COMPLETED.
8. INSPECT AND CLEAN SWM TANK AND JELLYFISH FILTERS FOLLOWING COMPLETION OF LANDSCAPE WORKS.

NOTE:

INITIAL CONTRACTOR PARKING AREA WILL BE ON CONTRACTOR STAGING AREA. ONCE STRUCTURE FOR UNDERGROUND PARKING IS IN PLACE PARKING FOR CONSTRUCTION CREWS WILL BE UNDERGROUND AND INITIAL PARKING WILL BE USED FOR VISITORS.



KEY PLAN
N.T.S.

LEGEND

- LIMIT OF DEVELOPMENT
- 254 EX. CONTOUR
- EX. SPOT ELEVATION
- PROPOSED STORM MANHOLE
- CBMH PROPOSED CATCHBASIN MANHOLE
- DCBMH PROPOSED DOUBLE CATCHBASIN MANHOLE
- CB PROPOSED SINGLE CATCHBASIN
- RLCB PROPOSED REAR LOT CATCHBASIN
- DCB PROPOSED DOUBLE CATCHBASIN
- PROPOSED SILT FENCE AS PER DETAIL SHOWN ON DWG. ESC-5
- PROPOSED TREE PROTECTION FENCE AS PER TOWN STD. P-1
- PROPOSED SAFETY HOARDING
- PROPOSED CUT-OFF SWALE
- PROPOSED CUT-OFF SWALE ELEVATION
- PROPOSED ROCK FLOW CHECK AS PER OPSD 219.210
- PROPOSED ROCK FLOW CHECK AS PER OPSD 219.211
- PROPOSED CONSTRUCTION ACCESS MUD MAT (SEE DETAIL ON DWG. ESC-5)
- EXISTING DRAINAGE DIRECTION
- PROPOSED CATCHBASIN SEDIMENT PROTECTION BEFORE CONSTRUCTION (SEE DETAIL ON DWG. ESC-5)
- PROPOSED CATCHBASIN SEDIMENT PROTECTION FOLLOWING CONSTRUCTION (SEE DETAIL ON DWG. ESC-5)
- CONTRACTOR STAGING AREA
- LIMIT OF SIGNIFICANT WOODLANDS (KFCI)
- AREA DRAINING TO SEDIMENT TRAP

BENCHMARK INFO:

ELEVATIONS SHOWN ON THIS PLAN ARE DERIVED FROM MINISTRY OF TRANSPORTATION ONTARIO BENCHMARK No. 00819828159
ELEVATION = 206.59m
CONCRETE AND STEEL BRIDGE CARRYING CNR OVER HWY 25, 0.9 km SOUTH OF THE OVERPASS AT INTERSECTION OF HWY 25 AND HWY 401. TABLET IS SET HORIZONTALLY IN WEST FACE OF EAST ABUTMENT, 10.5 m EAST OF CENTRELINE OF HWY 25, 83 cm SOUTH OF NORTHEAST END OF ABUTMENT. 37cm ABOVE GROUND.

SUBMISSION:

1st	X	Date	8 AUG. 2019	Pre-Serv	Date
2nd	X	Date	10 JAN. 2020	Interim	Date
3rd	X	Date	31 JUL. 2020	Final	Date
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By	Date	Revision	Checked

REGION OF HALTON
TOWN OF MILTON
DEVELOPMENT SERVICES

CONSTRUCTION NORTH

LICENSED PROFESSIONAL ENGINEER
K.M. JOHANSEN
22140016
PROVINCE OF ONTARIO

Project Dwg. No.

CANDEVCON LIMITED
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9368 DOHERTY DRIVE, BRAMPTON ON L6P 0A6
TEL: (905) 794-9600 FAX: (905) 794-9611

PROJECT NUMBER W20191

BRIARWOOD HOMES
RESIDENTIAL DEVELOPMENT
DERRY ROAD / HIGHWAY 25
TOWN OF MILTON
SITE PLAN No.: SP - 21-19

EROSION AND SEDIMENT CONTROL PLAN
PHASE 1 CONSTRUCTION

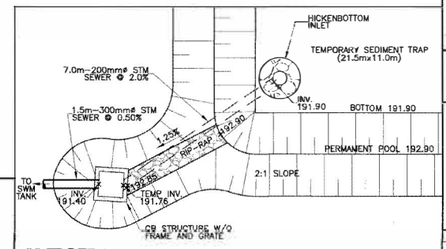
Region File No.		City File No.	
Drawn By: S.C.	Checked By: C.R.M.	Drawing No.	Sheet No. ESC-1
Designed By: T. M.J.	Checked By: D.J.K.H.		
Scale: 1:500	Date: MAY 2019		

SALES CENTRE
CONSTRUCTION ENTRANCE (AUTHORIZED VEHICLES ONLY)
100mm HIGH WHITE SIGN BACKGROUND WITH BLACK LETTERING

DIRECTIONAL SIGN
N.T.S.

SEED MIX FOR OUTFALL RESTORATION:

APPLY SEED MIX AS NOTED ON GEOMORHIX DWG. DET-1 SWMF OUTFALL DESIGN DETAILS



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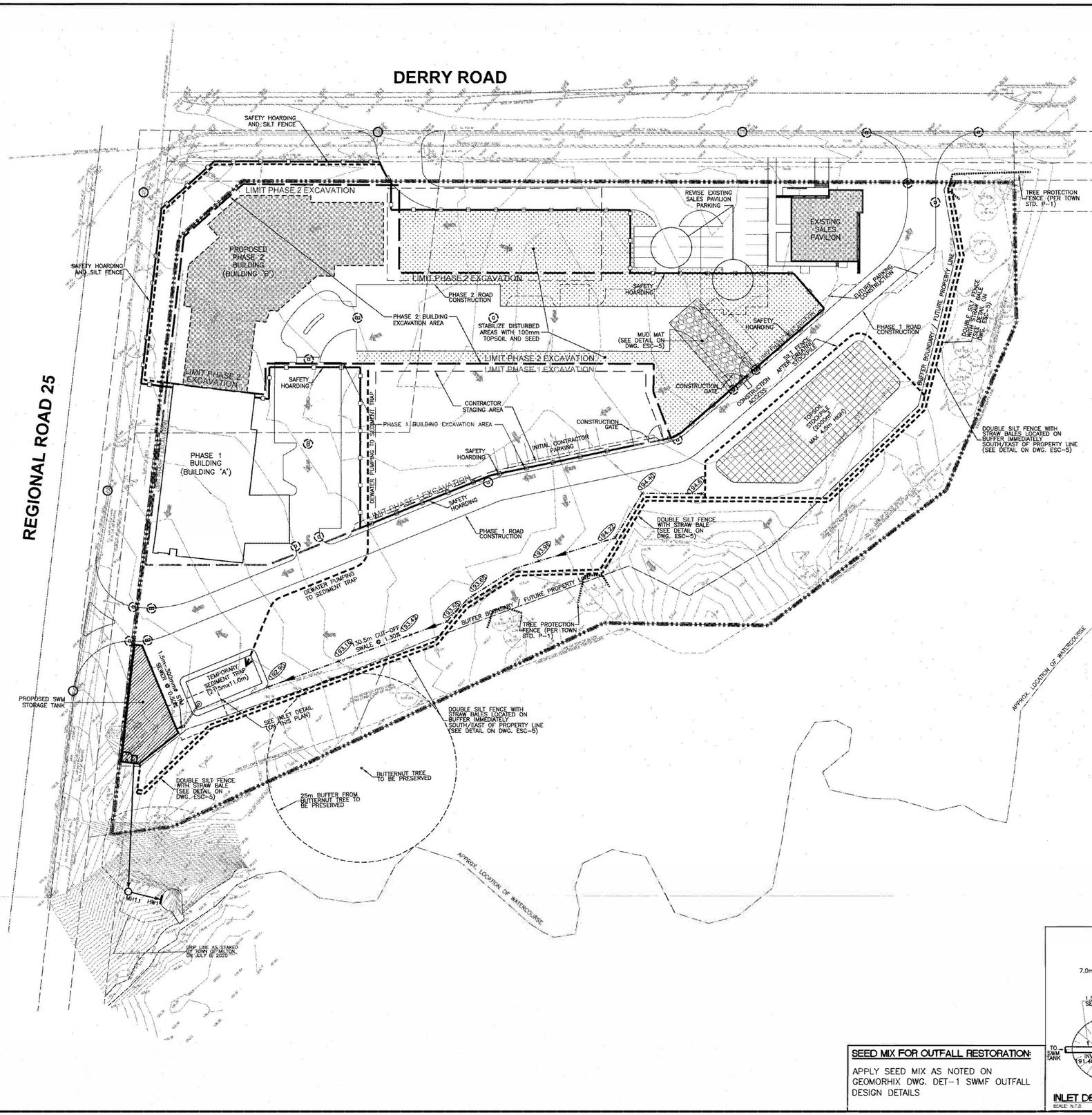
SCALE: N.T.S.



PHASE 2 - CONSTRUCTION SEQUENCING NOTES:

STAGE I - PRE-CONSTRUCTION + TOPSOIL STRIPPING:

PRE-CONSTRUCTION

1. DELINEATION OF THE WORK ZONE FOR GRADING.
2. INSTALLATION OF ALL PERIMETER SEDIMENT FENCES, SAFETY HOARDING AND TREE PROTECTION FENCING (TOWN STD. P-1).
3. REVIEW BY ENVIRONMENTAL MONITOR.

TOPSOIL STRIPPING

1. PROVIDE ADEQUATE MUD MAT AT THE PROPOSED CONSTRUCTION ACCESS.
2. RE-ESTABLISH THE REQUIRED TEMPORARY CUT-OFF SWALES AND INSTALL ROCK CHECK DAMS AND STABILIZE SWALES.
3. STRIP TOPSOIL AND STOCKPILE IN DESIGNATED AREA.
4. INSTALL SILT FENCE AROUND TOP SOIL STOCKPILE.

STAGE II - PRE-GRADING + UNDERGROUND SERVICING:

PRE-GRADING

1. COMPLETE THE REQUIRED EXCAVATION OPERATION.
2. RESTORE AND STABILIZE ALL DISTURBED AREAS, OUTSIDE NOTED LIMITS, WITH 100mm TOPSOIL & SEED AS SOON AS PRACTICAL.
3. WHERE REQUIRED, CONSTRUCT ADDITIONAL TEMPORARY DRAINAGE SWALES AS AREAS ARE COMPLETED.
4. SPREAD REQUIRED TOPSOIL AND SEED, WHERE NOTED, IN AREAS THAT ARE TO REMAIN INACTIVE FOR MORE THAN 30 DAYS.

UNDERGROUND SERVICING

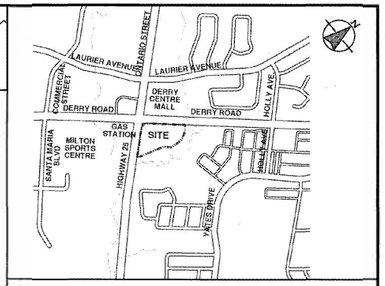
1. EXCAVATE AND CONSTRUCT BUILDING TO GROUND LEVEL.
2. INSTALL UNDERGROUND SERVICES.
3. CONTINUE BUILDING STRUCTURE.
4. CONSTRUCT BASE ROADWORKS AND PAVING.
5. INSTALL SEDIMENT TRAPS AT CBs AND INLETS AS THEY ARE CONSTRUCTED.

STAGE III - POST SERVICING:

1. SEED DISTURBED AREAS AS SOON AS PRACTICAL.
2. MAINTAIN SEDIMENT CONTROL DEVICES AS REQUIRED.
3. MAINTAIN ROADS IN CLEAN CONDITION.
4. MONITOR SITE CONDITIONS DURING BUILDING CONSTRUCTION.
5. REMOVE SAFETY HOARDING AS SITE IS BEING COMPLETED AND LANDSCAPED.

NOTE:

INITIAL CONTRACTOR PARKING AREA WILL BE ON CONTRACTOR STAGING AREA. ONCE STRUCTURE FOR UNDERGROUND PARKING IS IN PLACE PARKING FOR CONSTRUCTION CREWS WILL BE UNDERGROUND AND INITIAL PARKING WILL BE USED FOR VISITORS.



KEY PLAN
N.T.S.

LEGEND

- LIMIT OF DEVELOPMENT
- 254 EX. CONTOUR
- EX. SPOT ELEVATION
- PROPOSED STORM MANHOLE
- CBMH PROPOSED CATCHBASIN MANHOLE
- DCBMH PROPOSED DOUBLE CATCHBASIN MANHOLE
- CB PROPOSED SINGLE CATCHBASIN
- R.C.B. PROPOSED REAR LOT CATCHBASIN
- DCB PROPOSED DOUBLE CATCHBASIN
- PROPOSED SILT FENCE AS PER DETAIL SHOWN ON DWG. ESC-5
- PROPOSED TREE PROTECTION FENCE AS PER TOWN STD. P-1
- PROPOSED SAFETY HOARDING
- PROPOSED CUT-OFF SWALE
- PROPOSED CUT-OFF SWALE ELEVATION
- PROPOSED ROCK FLOW CHECK AS PER OPSD 219.210
- PROPOSED ROCK FLOW CHECK AS PER OPSD 219.211
- PROPOSED CONSTRUCTION ACCESS MUD MAT (SEE DETAIL ON DWG. ESC-5)
- EXISTING DRAINAGE DIRECTION
- PROPOSED CATCHBASIN SEDIMENT PROTECTION BEFORE CONSTRUCTION (SEE DETAIL ON DWG. ESC-5)
- PROPOSED CATCHBASIN SEDIMENT PROTECTION FOLLOWING CONSTRUCTION (SEE DETAIL ON DWG. ESC-5)
- CONTRACTOR STAGING AREA
- LIMIT OF SIGNIFICANT WOODLANDS (KFCI)

BENCHMARK INFO:

ELEVATIONS SHOWN ON THIS PLAN ARE DERIVED FROM MINISTRY OF TRANSPORTATION ONTARIO BENCHMARK No. #0819828159
ELEVATION = 206.569m
CONCRETE AND STEEL BRIDGE CARRYING CNR OVER HWY 25, 0.9 km SOUTH OF THE OVERPASS AT INTERSECTION OF HWY 25 AND HWY 401. TABLET IS SET HORIZONTALLY IN WEST FACE OF EAST ABUTMENT, 10.5 m EAST OF CENTRELINE OF HWY 25, 63 cm SOUTH OF NORTHEAST END OF ABUTMENT, 37cm ABOVE GROUND.

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By	Date	Revision	Checked

REGION OF HALTON
TOWN OF MILTON
DEVELOPMENT SERVICES

LICENSED PROFESSIONAL ENGINEER — T.M. JOHANSEN — 22140016 — PROVINCE OF ONTARIO

CONSTRUCTION NORTH

Project | Dwg. No.

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
5358 EDGEWAY DRIVE, BRAMPTON ON L6P 0J7
TEL (905) 794-0009 FAX (905) 794-0411

PROJECT NUMBER W19061

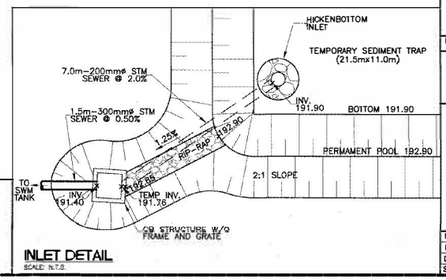
BRIARWOOD HOMES
RESIDENTIAL DEVELOPMENT
DERRY ROAD / HIGHWAY 25
TOWN OF MILTON
SITE PLAN No.: SP - 21-19

EROSION AND SEDIMENT CONTROL PLAN
PHASE 2 CONSTRUCTION

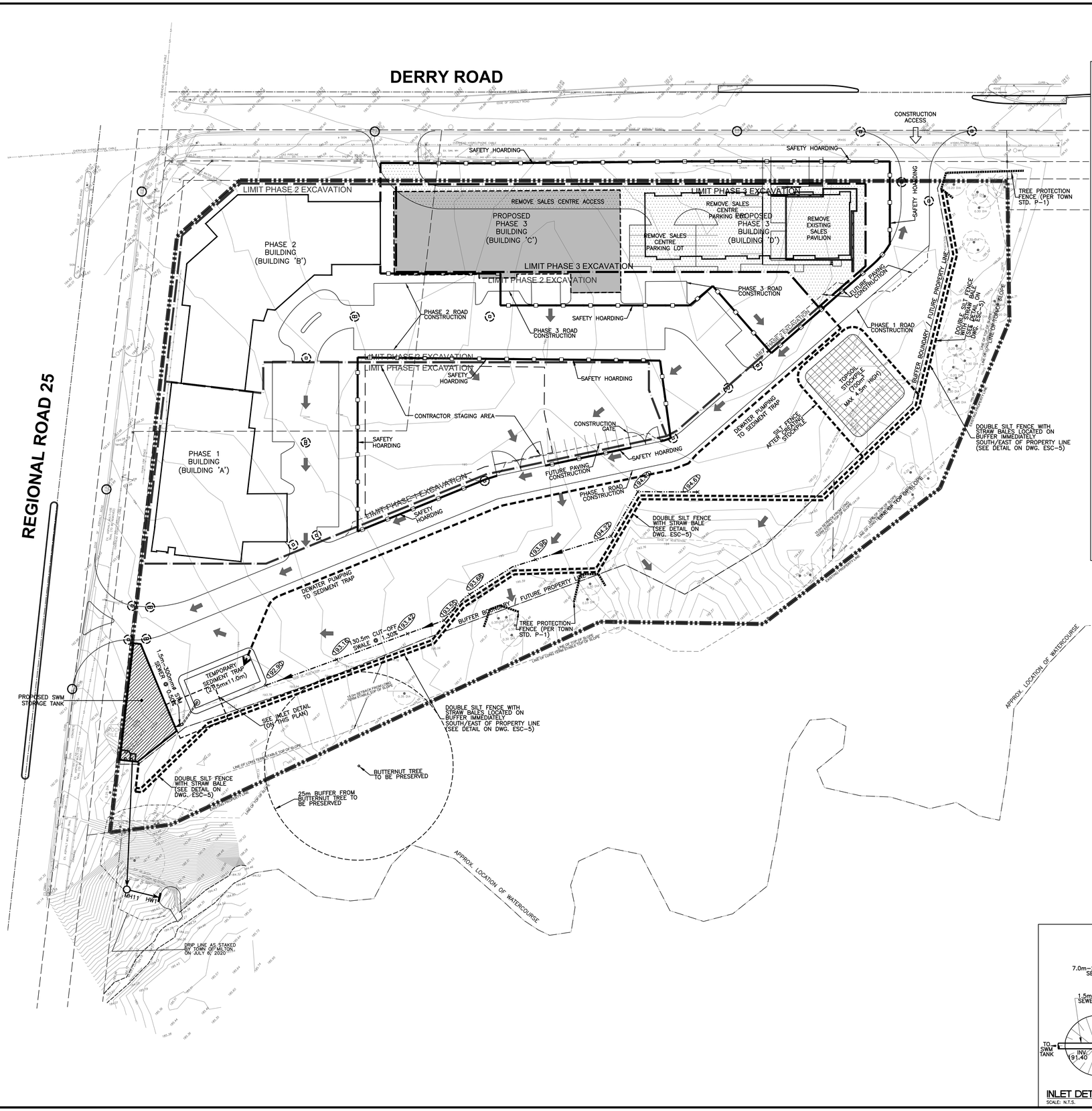
Region File No.				City File No.	
Drawn By:	S.C.	Checked By:	C.R.M	Drawing No.	Sheet No.
Designed By:	T.M.J.	Checked By:	D.K.L.		ESC-2
Scale:	1:500	Date:	MAY 2019		

SEED MIX FOR OUTFALL RESTORATION:

APPLY SEED MIX AS NOTED ON GEOMORHIX DWG. DET-1 SWMF OUTFALL DESIGN DETAILS



INLET DETAIL
SCALE: N.T.S.



PHASE 3 - CONSTRUCTION SEQUENCING NOTES:

STAGE I - PRE-CONSTRUCTION + TOPSOIL STRIPPING:

PRE-CONSTRUCTION

1. DELINEATION OF THE WORK ZONE FOR GRADING.
2. INSTALLATION OF ALL PERIMETER SEDIMENT FENCES, SAFETY HOARDING AND TREE PROTECTION FENCING (TOWN STD. P-1).
3. REVIEW BY ENVIRONMENTAL MONITOR.

TOPSOIL STRIPPING

1. PROVIDE ADEQUATE MUD MAT AT THE PROPOSED CONSTRUCTION ACCESS.
2. RE-ESTABLISH THE REQUIRED TEMPORARY CUT-OFF SWALES AND INSTALL ROCK CHECK DAMS AND STABILIZE SWALES.
3. RE-ESTABLISH THE REQUIRED TEMPORARY CUT-OFF SWALES AND INSTALL ROCK CHECK DAMS AND STABILIZE SWALES.
4. STRIP TOPSOIL AND STOCKPILE IN DESIGNATED AREA.
5. INSTALL SILT FENCE AROUND TOP SOIL STOCKPILE.

STAGE II - PRE-GRADING + UNDERGROUND SERVICING:

PRE-GRADING

1. COMPLETE THE REQUIRED EXCAVATION OPERATION.
2. RESTORE AND STABILIZE ALL DISTURBED AREAS, OUTSIDE NOTED LIMITS, WITH 100mm TOPSOIL & SEED AS SOON AS PRACTICAL.
3. WHERE REQUIRED, CONSTRUCT ADDITIONAL TEMPORARY DRAINAGE SWALES AS AREAS ARE COMPLETED.
4. SPREAD REQUIRED TOPSOIL AND SEED, WHERE NOTED, IN AREAS THAT ARE TO REMAIN INACTIVE FOR MORE THAN 30 DAYS.

UNDERGROUND SERVICING

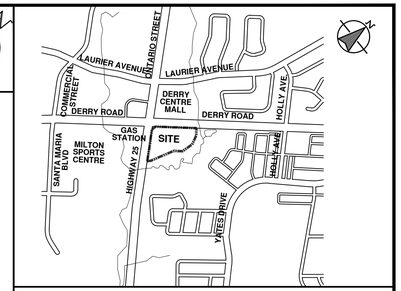
1. EXCAVATE AND CONSTRUCT BUILDING TO GROUND LEVEL.
2. CONNECT TO UNDERGROUND SERVICES.
3. CONTINUE BUILDING STRUCTURE.
4. CONSTRUCT BASE ROADWORKS AND PAVING.
5. INSTALL SEDIMENT TRAPS AT CBs AND INLETS AS THEY ARE CONSTRUCTED.

STAGE III - POST SERVICING:

1. SEED AND SOD DISTURBED AREAS AS SOON AS PRACTICAL.
2. MAINTAIN SEDIMENT CONTROL DEVICES AS REQUIRED.
3. MAINTAIN ROADS IN CLEAN CONDITION.
4. MONITOR SITE CONDITION DURING CONSTRUCTION.
5. REMOVE SAFETY HOARDING AS SITE IS BEING COMPLETED AND LANDSCAPED.
6. INSTALL SITE LANDSCAPING AS BUILDINGS COMPLETED.
7. INSPECT AND CLEAN SWM TANK AND JELLY FISH FILTERS FOLLOWING COMPLETION OF LANDSCAPE WORKS.

NOTE:

INITIAL CONTRACTOR PARKING AREA WILL BE ON CONTRACTOR STAGING AREA. ONCE STRUCTURE FOR UNDERGROUND PARKING IS IN PLACE PARKING FOR CONSTRUCTION CREWS WILL BE UNDERGROUND AND INITIAL PARKING WILL BE USED FOR VISITORS.



KEY PLAN
N.T.S.

LEGEND

- LIMIT OF DEVELOPMENT
- 254 EX. CONTOUR
- EX. SPOT ELEVATION
- PROPOSED STORM MANHOLE
- CBMH PROPOSED CATCHBASIN MANHOLE
- DCBMH PROPOSED DOUBLE CATCHBASIN MANHOLE
- CB PROPOSED SINGLE CATCHBASIN
- RLCB PROPOSED REAR LOT CATCHBASIN
- DCB PROPOSED DOUBLE CATCHBASIN
- PROPOSED SILT FENCE AS PER DETAIL SHOWN ON DWG. ESC-5
- PROPOSED TREE PROTECTION FENCE AS PER TOWN STD. P-1
- PROPOSED SAFETY HOARDING
- PROPOSED CUT-OFF SWALE
- 184.50 PROPOSED CUT-OFF SWALE ELEVATION
- PROPOSED ROCK FLOW CHECK AS PER OPSD 219.210
- PROPOSED ROCK FLOW CHECK AS PER OPSD 219.211
- PROPOSED CONSTRUCTION ACCESS MUD MAT (SEE DETAIL ON DWG. ESC-5)
- EXISTING DRAINAGE DIRECTION
- PROPOSED CATCHBASIN SEDIMENT PROTECTION BEFORE CONSTRUCTION (SEE DETAIL ON DWG. ESC-5)
- PROPOSED CATCHBASIN SEDIMENT PROTECTION FOLLOWING CONSTRUCTION (SEE DETAIL ON DWG. ESC-5)
- CONTRACTOR STAGING AREA
- LIMIT OF SIGNIFICANT WOODLANDS (KFCI)

BENCHMARK INFO:

ELEVATIONS SHOWN ON THIS PLAN ARE DERIVED FROM MINISTRY OF TRANSPORTATION ONTARIO
BENCHMARK No. 00819828159
ELEVATION = 206.569m
CONCRETE AND STEEL BRIDGE CARRYING CNR OVER HWY 25, 0.9 km SOUTH OF THE OVERPASS AT INTERSECTION OF HWY 25 AND HWY 401. TABLET IS SET HORIZONTALLY IN WEST FACE OF EAST ABUTMENT, 10.5 m EAST OF CENTRELINE OF HWY 25, 63 cm SOUTH OF NORTHEAST END OF ABUTMENT, 37cm ABOVE GROUND.

SUBMISSION:

1st	X	Date	8 AUG. 2019	Pre-Serv		Date	
2nd	X	Date	10 JAN. 2020	Interim		Date	
3rd	X	Date	31 JUL. 2020	Final		Date	
4th	X	Date	20 NOV. 2020	Issued For Construction	X	Date	21 MAY 2021
5th	X	Date	20 APR. 2021				

By	Date	Revision	Checked

MILTON | Halton REGION

CONSTRUCTION NORTH

Project | Dwg. No.

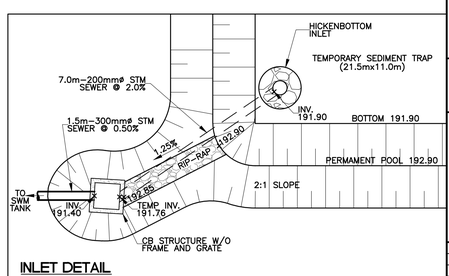
CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
8058 GOREWAY DRIVE, BRAMPTON ON. L4P-0M7
TEL (905) 794-0600
FAX (905) 794-0611

PROJECT NUMBER W20191

MILTERON DEVELOPMENTS LTD.
CONNECTT RESIDENTIAL DEVELOPMENT
DERRY ROAD / HIGHWAY 25
TOWN OF MILTON
SITE PLAN No.: SP - 21-19

EROSION AND SEDIMENT CONTROL PLAN
PHASE 3 CONSTRUCTION

Region File No.	DM-1036			City File No.	SP-21-19
Drawn By:	S.C.	Checked By:	C.R.M	Drawing No.	Sheet No. ESC-3
Designed By:	T.M.J.	Checked By:	D.K.H.		
Scale:	1:500	Date:	MAY 2019		



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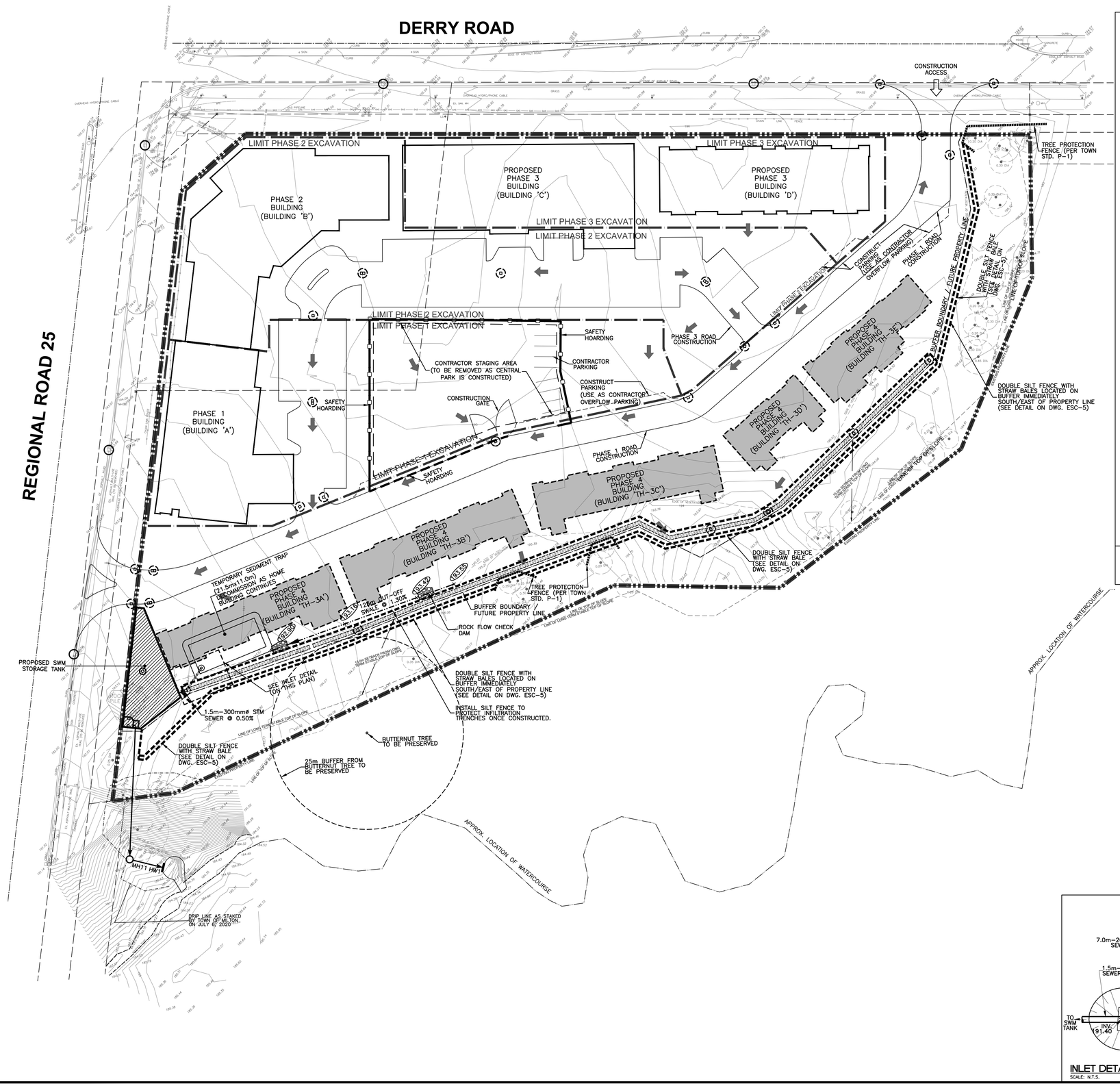
SCALE: N.T.S.



PHASE 4 - CONSTRUCTION SEQUENCING NOTES:

STAGE I - PRE-CONSTRUCTION + TOPSOIL STRIPPING:

PRE-CONSTRUCTION

1. COMPLETE TREE INVENTORY AND ASSESSMENT OF THE AREA TO BE DISTURBED BY CONSTRUCTION.
2. DELINEATE OF THE WORK ZONE FOR TREE CLEARING AND GRADING.
3. INSTALL ALL PERIMETER SEDIMENT FENCES. SAFETY HOARDING AND TREE PROTECTION FENCING (TOWN STD. P-1).
4. REMOVE TREES WITHIN THE WORK ZONE.
5. REVIEW BY ENVIROMENTAL MONITOR.

TOPSOIL STRIPPING

1. RE-ESTABLISH THE REQUIRED TEMPORARY CUT-OFF SWALES AND INSTALL ROCK CHECK DAMS AND STABILIZE SWALES.
2. STRIP TOPSOIL AND REMOVE FROM SITE.

STAGE II - PRE-GRADING + UNDERGROUND SERVICING:

PRE-GRADING

1. COMPLETE THE REQUIRED EXCAVATION OPERATION.
2. RESTORE AND STABILIZE ALL DISTURBED AREAS, OUTSIDE NOTED LIMITS, WITH 100mm TOPSOIL & SEED AS SOON AS PRACTICAL.
3. WHERE REQUIRED, CONSTRUCT ADDITIONAL TEMPORARY DRAINAGE SWALES AS AREAS ARE COMPLETED.
4. SPREAD REQUIRED TOPSOIL AND SEED, WHERE NOTED, IN AREAS THAT ARE TO REMAIN INACTIVE FOR MORE THAN 30 DAYS.

UNDERGROUND SERVICING

1. EXCAVATE AND CONSTRUCT BUILDINGS.
2. INSTALL UNDERGROUND SERVICES AND CONNECT HOMES.
2. DECOMMISSIONING/REMOVAL/FILLING OF CUT-OFF SWALES, OUTLETS AND TRAPS ETC. AS DRAINAGE WORKS REPLACE TEMPORARY WORKS.
3. CONSTRUCT BASE ROAD WORKS AND PAVING.
4. INSTALL SEDIMENT TRAPS AT CBs AND RLCBs AS THEY ARE INSTALLED.
5. INSTALL SILT FENCE AROUND INFILTRATION TRENCH UPON CONSTRUCTION.

STAGE III - POST SERVICING:

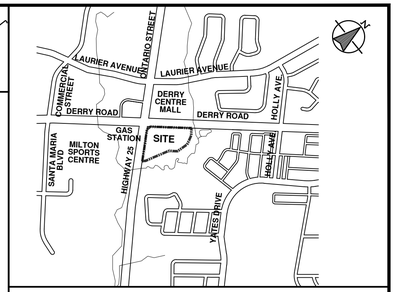
1. FILL AND LEVEL LOTS TO IT'S FINAL GRADES, REMOVING REMAINING SWALES AND CHECK STRUCTURES AS REQUIRED.
2. DECOMMISSION SEDIMENT TRAP AS HOUSE CONSTRUCTION PROCEEDS.
3. SOD LOTS AS SOON AS PRACTICAL.
4. MAINTAIN SEDIMENT CONTROL DEVICES AS REQUIRED.
5. MAINTAIN ROADS IN CLEAN CONDITION.
6. REMOVE CB SILTATION CONTROLS WHEN TOP COURSE ASPHALT IS LAID.
7. MONITOR SITE CONDITION DURING HOUSE CONSTRUCTION.
8. REMOVE REAR YARD SILT FENCE AS SOD IS PLACED.
9. INSPECT AND CLEAN SWM TANK AND JELLYFISH FILTERS FOLLOWING COMPLETION OF LANDSCAPE WORKS.

NOTE:

FREEHOLD TOWNHOME LOTS TO RECEIVE 300mm OF APPROVED TOPSOIL PRIOR TO PLACEMENT OF SOD.

PARKING:

LIMITED PARKING PROVIDED IN CONTRACTOR STAGING AREA. TRADES USE DRIVEWAYS IN FRONT OF TOWN HOMES AND GRAVEL PADS ON STREET PARKING LAYBYS.



KEY PLAN
N.T.S.

LEGEND

- LIMIT OF DEVELOPMENT
- 254 EX. CONTOUR
- EX. SPOT ELEVATION
- PROPOSED STORM MANHOLE
- CBMH PROPOSED CATCHBASIN MANHOLE
- DCBMH PROPOSED DOUBLE CATCHBASIN MANHOLE
- CB PROPOSED SINGLE CATCHBASIN
- RLCB PROPOSED REAR LOT CATCHBASIN
- DCB PROPOSED DOUBLE CATCHBASIN
- PROPOSED SILT FENCE AS PER DETAIL SHOWN ON DWG. ESC-5
- PROPOSED TREE PROTECTION FENCE AS PER TOWN STD. P-1
- PROPOSED SAFETY HOARDING
- PROPOSED CUT-OFF SWALE
- CUT-OFF PROPOSED CUT-OFF SWALE ELEVATION
- PROPOSED ROCK FLOW CHECK AS PER OPSD 219.210
- PROPOSED ROCK FLOW CHECK AS PER OPSD 219.211
- PROPOSED CONSTRUCTION ACCESS MUD MAT (SEE DETAIL ON DWG. ESC-5)
- EXISTING DRAINAGE DIRECTION
- PROPOSED CATCHBASIN SEDIMENT PROTECTION BEFORE CONSTRUCTION (SEE DETAIL ON DWG. ESC-5)
- PROPOSED CATCHBASIN SEDIMENT PROTECTION FOLLOWING CONSTRUCTION (SEE DETAIL ON DWG. ESC-5)
- CONTRACTOR STAGING AREA
- LIMIT OF SIGNIFICANT WOODLANDS (KFCI)
- INFILTRATION TRENCH

BENCHMARK INFO:

ELEVATIONS SHOWN ON THIS PLAN ARE DERIVED FROM MINISTRY OF TRANSPORTATION ONTARIO BENCHMARK No. 00819828159
ELEVATION = 206.589m
CONCRETE AND STEEL BRIDGE CARRYING CNR OVER HWY 25, 0.9 km SOUTH OF THE OVERPASS AT INTERSECTION OF HWY 25 AND HWY 401. TABLET IS SET HORIZONTALLY IN WEST FACE OF EAST ABUTMENT, 10.5 m EAST OF CENTRELINE OF HWY 25, 63 m SOUTH OF NORTHEAST END OF ABUTMENT, 37cm ABOVE GROUND.

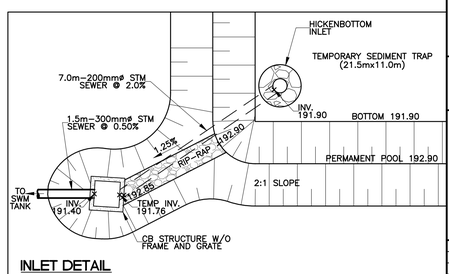
SUBMISSION:

1st	X	Date	8 AUG. 2019	Pre-Serv		Date	
2nd	X	Date	10 JAN. 2020	Interim		Date	
3rd	X	Date	31 JUL. 2020	Final		Date	
4th	X	Date	20 NOV. 2020	Issued For Construction	X	Date	21 MAY 2021
5th	X	Date	20 APR. 2021				

By	Date	Revision	Checked

CONSTRUCTION NORTH

Project Dwg. No.



INLET DETAIL
SCALE: N.T.S.

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
9358 GOREWAY DRIVE, BRAMPTON, ON. L6P-0M7
TEL (905) 794-0600
FAX (905) 794-0611

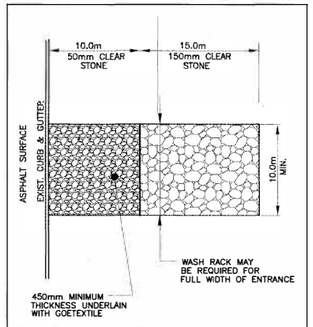
PROJECT NUMBER W20191

MILTERON DEVELOPMENTS LTD.
CONNECTT RESIDENTIAL DEVELOPMENT
DERRY ROAD / HIGHWAY 25
TOWN OF MILTON
SITE PLAN No.: SP - 21-19

EROSION AND SEDIMENT CONTROL PLAN
PHASE 4 CONSTRUCTION

Region File No.	DM-1036			City File No.	SP-21-19
Drawn By:	S.C.	Checked By:	C.R.M	Drawing No.	Sheet No. ESC-4
Designed By:	T.M.J.	Checked By:	D.K.H.		
Scale:	1:500	Date:	MAY 2019		

J:\CDC-2019 WEST - Files\W19061-Bridgewood Homes Site Plan\CANDEVCON DRAWINGS\SHEETS\W19061-ESC-4.dwg (May 02, 2023 - 10:05am)



CONSTRUCTION ACCESS MUD MAT DETAIL
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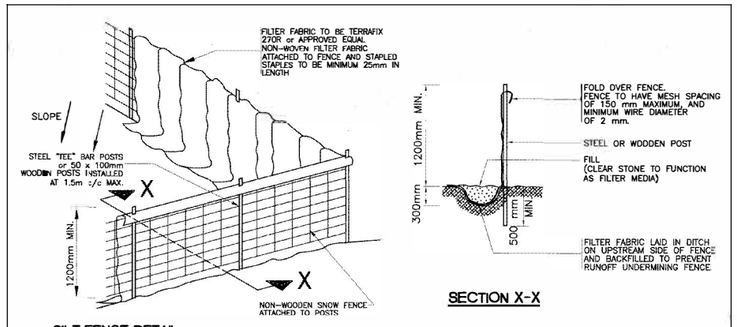

SILT FENCE DETAIL
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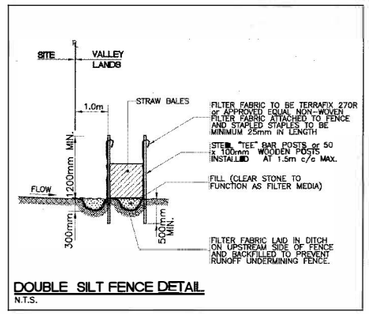

DOUBLE SILT FENCE DETAIL
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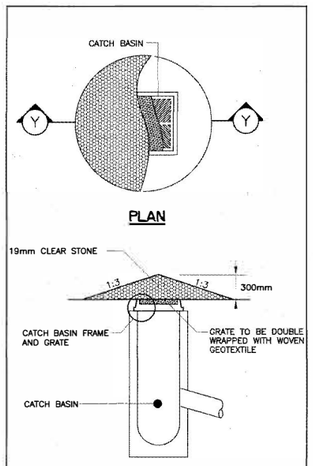
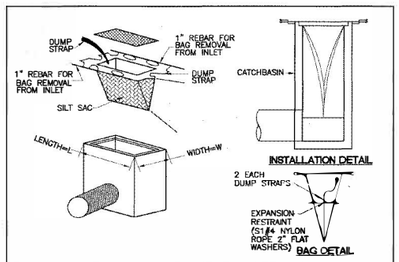


NOTES:
1. CATCH BASIN LIFT HOLES TO BE PARGED WITH CONCRETE.
2. WOVEN GEOTEXTILE TO HAVE A MINIMUM EQUIVALENT OPENING SIZE OF 0.15mm AND A MAXIMUM EQUIVALENT OPENING SIZE OF 0.25mm.

CATCH BASIN SEDIMENT BARRIER
N.T.S.



EXISTING CATCH BASIN SEDIMENT PROTECTION DETAIL DURING CONSTRUCTION PHASE
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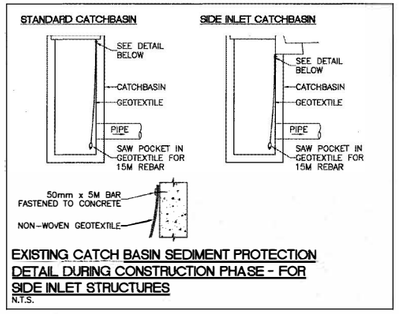
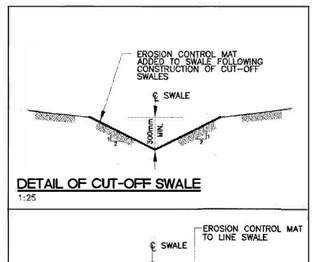
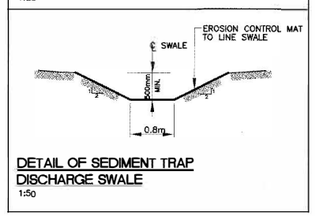


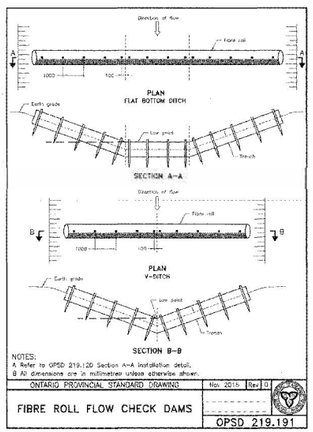
EXISTING CATCH BASIN SEDIMENT PROTECTION DETAIL DURING CONSTRUCTION PHASE - FOR SIDE INLET STRUCTURES
N.T.S.



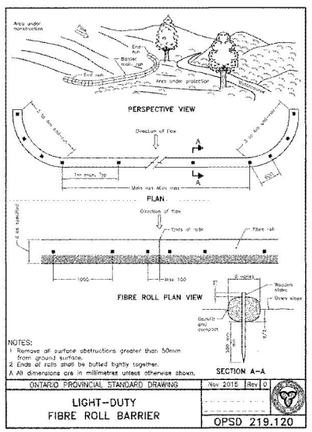
DETAIL OF CUT-OFF SWALE
1:25



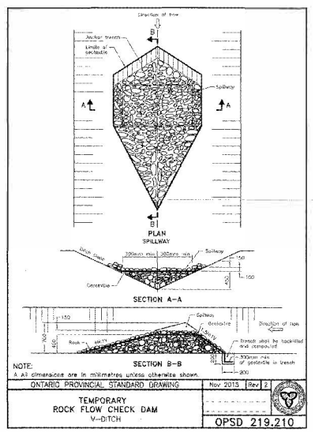
DETAIL OF SEDIMENT TRAP DISCHARGE SWALE
1:50



ONTARIO PROVINCIAL STANDARD DRAWING	Nov. 2015	Rev. 0
FIBRE ROLL FLOW CHECK DAMS		OPSD 219.191



ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 0
LIGHT-DUTY FIBRE ROLL BARRIER		OPSD 219.120



ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
TEMPORARY ROCK FLOW CHECK DAM V-DITCH		OPSD 219.210

GENERAL NOTES:

SEDIMENT AND EROSION CONTROL MEASURES:

1. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE INSTALLED AND IN PROPER WORKING ORDER PRIOR TO THE REMOVAL OF ANY TOPSOIL, THE EXACT LOCATION OF THE SEDIMENT CONTROL MEASURES SHALL BE CONFIRMED IN THE FIELD.
2. NO PLASTIC MESH SHALL BE INCORPORATED INTO SEDIMENT FENCING.
3. TEMPORARY CONSTRUCTION ACCESS ROAD AND MUD MAT TO BE INSTALLED PRIOR TO CONSTRUCTION TO PREVENT MUD TRACKING ON ADJACENT EXTERNAL ROADS. CONSULTING ENGINEER TO PROVIDE CONFIRMATION AND PHOTOGRAPHIC DOCUMENTATION TO CONFIRM CONSTRUCTION ACCESS IS BUILT IN ACCORDANCE WITH APPROVED DRAWINGS.
4. MACHINE IS TO ARRIVE ON SITE IN A CLEAN CONDITION (INCLUDING FREE OF MUD/SOIL/DIRT/VEGETATION FROM OTHER LOCATIONS) AND SHALL BE MAINTAINED FREE OF FLUID LEAKS.
5. CUT-OFF SWALES TO BE ESTABLISHED AT THE START OF SITE GRADING (AS SHOWN). NEW CUT-OFF SWALE TO BE ESTABLISHED FOLLOWING INTERIM GRADING.
6. THE EROSION AND SEDIMENT CONTROL STRATEGIES OUTLINED ON THE PLANS ARE NOT STATIC AND MAY NEED TO BE UPGRADED/AMENDED AS SITE CONDITIONS CHANGE TO PREVENT SEDIMENT RELEASES TO THE NATURAL ENVIRONMENT.
7. ALL SEDIMENT CONTROL MEASURES ARE TO BE MAINTAINED IN GOOD REPAIR DURING ALL PHASES OF CONSTRUCTION. ALL DEFICIENCES ARE TO BE RECTIFIED WITHIN 48 HOURS OF INSPECTION.
8. STRIPPING AND GRADING OF THE FUTURE GRASSED AREAS SHALL NOT BE CARRIED OUT UNTIL THE RELATED RESTORATION (i.e. SEEDING AND SODDING) CAN BE CARRIED OUT IMMEDIATELY THEREAFTER (i.e. WORK TO BE CARRIED OUT DURING THE PERIOD MAY 1st. TO SEPTEMBER 15th.).
9. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED WEEKLY OR IN THE EVENT OF A MAJOR STORM AND REPAIRS SHALL BE CONDUCTED WITHIN 48 HOURS.
10. ALL CONSTRUCTION VEHICLES SHALL EXIT THE SITE VIA THE TEMPORARY CONSTRUCTION ACCESS.
11. ALL TOPSOIL STOCKPILES SHALL BE SURROUNDED WITH SEDIMENT CONTROL FENCING. ALL PILES WHICH ARE STOCKPILED FOR MORE THAN 30 DAYS SHALL BE SEEDED.
12. SEDIMENT WHICH COLLECTS IN THE TEMPORARY SEDIMENT CONTROL FACILITIES SHALL BE REMOVED WHEN THE FACILITY IS HALF FULL.
13. ALL SEDIMENT TRAPS ARE TO BE CLEANED PERIODICALLY AS DIRECTED BY THE SITE ENGINEER AND OR AS REQUIRED BY THE MANAGER OF ENGINEERING. TRAPPED SEDIMENT (i.e. FLOW CHECK DAMS) MUST BE CLEARED OUT ONCE THE SEDIMENT ACCUMULATION REACHES 50% OF THEIR HEIGHT.
14. CLEAN ADJACENT ROADS OF ANY TOPSOIL OR MUD ON A REGULAR BASIS AND/OR IMMEDIATELY UPON NOTIFICATION BY AFFECTED AUTHORITY.
15. ALL IN-WATER AND NEAR WATER WORK WILL BE CONDUCTED IN THE DRY WITH APPROPRIATE EROSION AND SEDIMENT CONTROLS.
16. NO IN-WATER OR NEAR WATER WORK SHALL BE CONDUCTED DURING THE PERIOD FROM MARCH 31 TO JULY 1 OF ANY YEAR.
17. DURING CONSTRUCTION AND UNTIL SUCH TIME AS THE SITE HAS BEEN PAVED AND SODDED, THE SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED IN GOOD OPERATING CONDITION. THE CONTRACTOR SHALL PREVENT STORM WATER RUNOFF FROM DIRECTLY ENTERING THE MUNICIPAL STORM SEWER SYSTEM AND THE ADJOINING PROPERTY BY INSTALLING AND MAINTAINING SEDIMENT CONTROL FACILITIES AT ALL CATCHBASINS AND BY INSTALLING AND MAINTAINING THE SILT FENCE AS SHOWN ON THE DRAWING.
18. ANY TREES SELECTED BY LANDSCAPE ARCHITECT FOR PRESERVATION TO BE PROTECTED BY TREE PROTECTION FENCING (TOWN STD. P-1). LANDSCAPE ARCHITECT TO INDICATE ANY TREES THAT ARE TO BE TRANSPLANTED.
19. ADDITIONAL EROSION AND SEDIMENT CONTROL MATERIALS (i.e. SILT FENCES, STRAW BALES, CLEAR STONE ETC.) ARE TO BE KEPT ON SITE FOR EMERGENCIES AND REPAIR.
20. ALL ACTIVITIES, INCLUDING MAINTENANCE PROCEDURES, WILL BE CONTROLLED TO PREVENT THE ENTRY OF PETROLEUM PRODUCTS, DEBRIS, RUBBLE, CONCRETE OR OTHER DELETERIOUS SUBSTANCES IN THE WATER. VEHICULAR REFUELLING AND MAINTENANCE WILL BE CONDUCTED A MINIMUM OF 30 METRES FROM THE WATER.

MONITORING OF SEDIMENT CONTROL MEASURES:

1. AFTER THE CONTRACTOR HAS INSTALLED THE SEDIMENT CONTROLS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND THE ENVIRONMENTAL MONITOR FOR A REVIEW OF THE INSTALLED MEASURES BEFORE ANY EARTHWORKS CAN BEGIN.
2. THE CONTRACTOR SHALL, ON A DAILY BASIS, INSPECT EROSION AND SEDIMENT CONTROL MEASURES IN PLACE. ANY DAMAGED OR INEFFECTIVE MEASURE SHALL BE RECTIFIED WITHIN 48 HOURS.
3. DURING EARTH MOVING AND SERVICING OPERATIONS, THE ENVIRONMENTAL MONITOR SHALL REVIEW THE EROSION AND SEDIMENT CONTROL MEASURES ON THE FOLLOWING FREQUENCY:
   - ON A WEEKLY BASIS.
   - BEFORE AND AFTER ALL SIGNIFICANT RAINFALL EVENTS.
   - AFTER ALL SIGNIFICANT SNOW MELT EVENTS.
   - DAILY DURING EXTENDED RAIN OR SNOW MELT EVENTS.

   NOTES FROM THE ENVIRONMENTAL MONITOR SHALL BE DISTRIBUTED IMMEDIATELY TO THE CONTRACTOR AND ENGINEER. COPIES SHALL BE MAINTAINED ON SITE FOR DURATION OF CONSTRUCTION. COPIES SHALL ALSO BE DISTRIBUTED TO TOWN AND HRCA.
4. THE ENGINEER'S REPRESENTATIVE SHALL REVIEW THE EROSION AND SEDIMENT MEASURES, DAILY, WHEN ON SITE, AND SHALL COORDINATE WITH THE ENVIRONMENTAL MONITOR DURING THEIR WEEKLY REVIEWS.
5. DURING INACTIVE CONSTRUCTION PERIODS (FOR EARTHWORKS AND SERVICING), THE ENVIRONMENTAL MONITOR SHALL INSPECT THE EROSION AND SEDIMENT MEASURES ON A MONTHLY SCHEDULE.

TEMPORARY SEDIMENT TRAP DECOMMISSIONING:

1. STANDING WATER TO BE PUMPED OUT OF TRAP TO INLET TO SWM TANK. PUMP TO DISCHARGE INTO A GEOTEXTILE SEDIMENT BAG.
2. ACCUMULATED SEDIMENTS TO BE REMOVED AND SPREAD OVER LOTS, NOT CLOSER THAN 30m TO OPEN WATERCOURSES IN THIN LAYERS TO PERMIT SOILS TO DRY. IF NECESSARY, SEDIMENTS SHALL BE DISCED TO MIX WITH EARTH MATERIAL AND TO ENHANCE DRYING PROCESS.
3. UNLESS OTHERWISE NOTED, HICKENBOTTOM RISERS AND OUTLET PIPES SHALL BE REMOVED AND DISPOSED OFF SITE. DISTURBED AREAS TO BE FILLED AND COMPACTED TO 98% SPMDD.
4. CHECK DAMS, OVERFLOW WEIRS AND ROCK SPILLWAYS TO BE DISASSEMBLED. GEOTEXTILE TO BE REMOVED AND DISPOSED OFF SITE. STONE MATERIAL SHALL BE SPREAD IN EXCAVATION AND MIXED WITH FINER EARTH MATERIAL.
5. CLEAN, DRY, SUITABLE EARTH FILL SHALL BE PLACED IN EXCAVATION AND COMPACTED TO 98% SPMDD.
6. SURFACE SHALL BE COMPLETED TO MATCH ADJACENT AREA, BARRING OTHER TREATMENT, 100mm OF TOPSOIL SHALL BE SPREAD OVER AREA AND AREA SEEDED TO STABILIZE FROM EROSION.

SUBMISSION:

1st	X	Date	8 AUG. 2019	Pre-Serv	Date
2nd	X	Date	10 JAN. 2020	Interim	Date
3rd	X	Date	31 JUL. 2020	Final	Date
4th	X	Date	20 NOV. 2020		

No.	By	Date	Revision	Checked

REGION OF HALTON
TOWN OF MILTON
DEVELOPMENT SERVICES

LICENSED PROFESSIONAL ENGINEER
T.M. JOHANSEN
22140016
PROVINCE OF ONTARIO

Project | Dwg. No.

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
5264 GORDAWAY DRIVE
BRAMPTON, ON. L6P 0M7
TEL (905) 794-0606
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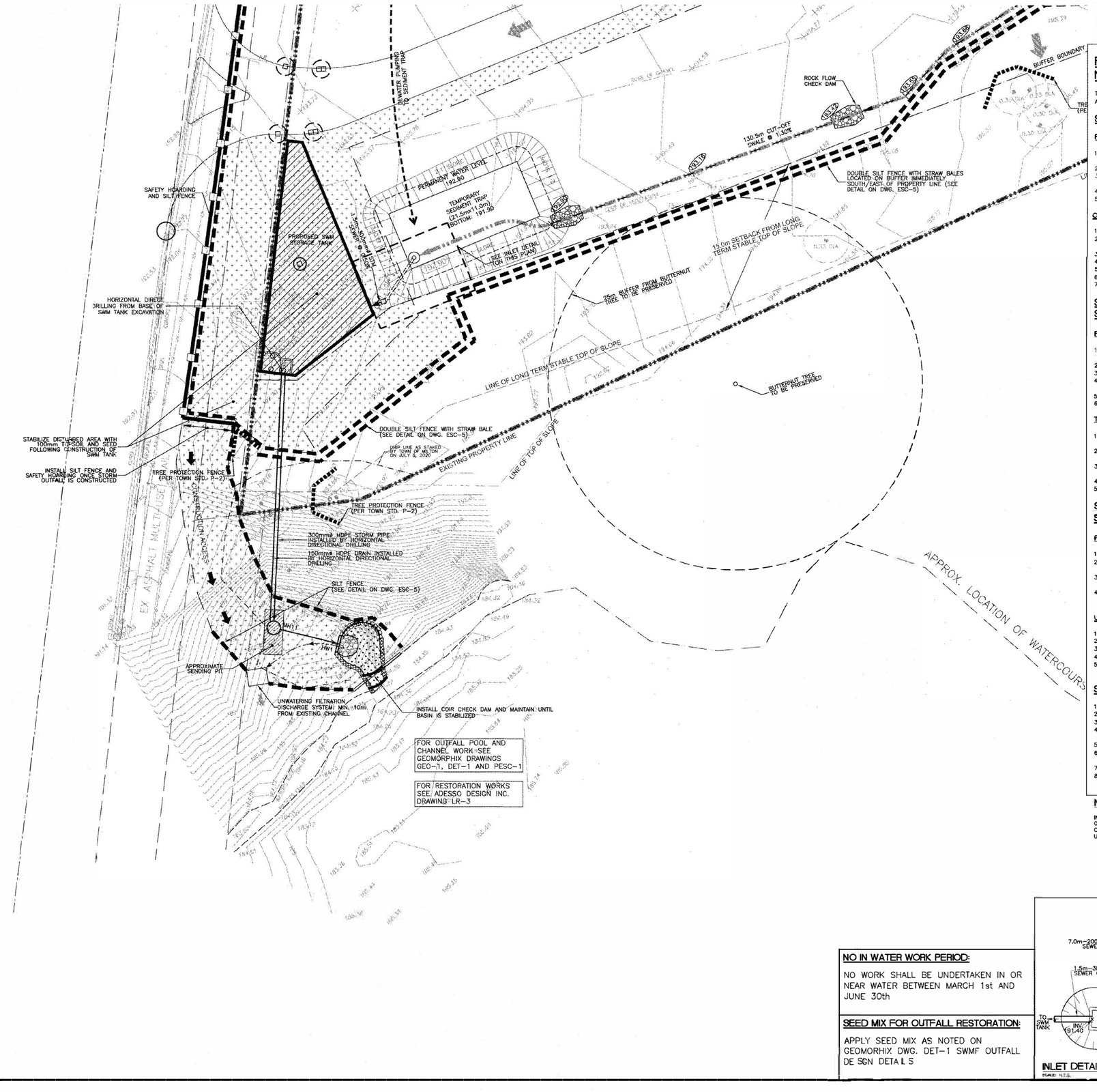
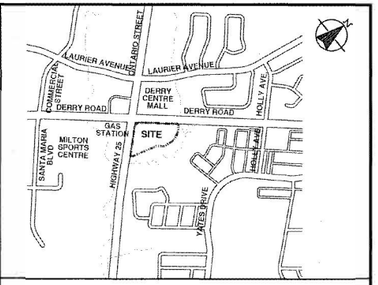
PROJECT NUMBER W19061

BRIARWOOD HOMES
RESIDENTIAL DEVELOPMENT
DERRY ROAD / HIGHWAY 25
TOWN OF MILTON
SITE PLAN No.: SP - 21-19

EROSION AND SEDIMENT CONTROL PLAN
DETAILS

Region File No.			City File No.		
Drawn By: S.C.	Checked By: C.R.M		Drawing No.	Sheet No.	
Designed By: T.M.J.	Checked By: D.K.H.			ESC-5	
Scale: AS NOTED	Date: MAY 2019				





KEY PLAN
N.T.S.

PHASE 1 - CONSTRUCTION SEQUENCING NOTES:

THE OUTFALL SEWER SHALL BE CONSTRUCTED BEFORE ANY OTHER WORKS ARE BEGUN.

STAGE I - OUTFALL SEWER

PRE-CONSTRUCTION

1. COMPLETION OF TREE INVENTORY ANO ASSESSMENT OF THE AREA TO BE DISTURBED BY OUTFALL CONSTRUCTION.
2. DELINEATION OF THE WORK ZONE FOR TREE CLEARING AND GRADING.
3. INSTALLATION OF SILT FENCES ALONG OUTFALL PIPE AND AROUND SWM TANK CONSTRUCTION SITE.
4. REMOVAL OF TREES WITHIN THE WORK ZONE.
5. REVIEW BY ENVIRONMENTAL MONITOR.

OUTFALL CONSTRUCTION

1. EXCAVATE AND STABILIZE OUTFALL POOL AND CHANNEL.
2. CONSTRUCT OUTFALL PIPE, HEADWALL AND APPURTENANCES TO SWM TANK SITE.
3. PLACE MIN. 150mm TOPSOIL OVER DISTURBED AREAS.
4. SEED AREA AS SOON AS POSSIBLE.
5. CONSTRUCT SWM TANK.
6. BACKFILL SWM TANK AND COVER WITH 300m TOPSOIL.
7. SEED AREA AS SOON AS POSSIBLE.

STAGE II - PRE-CONSTRUCTION + TOPSOIL STRIPPING:

PRE-CONSTRUCTION

1. COMPLETION OF TREE INVENTORY AND ASSESSMENT OF THE AREA TO BE DISTURBED BY CONSTRUCTION.
2. DELINEATION OF THE WORK ZONE FOR TRBE CLEARING AND GRADING.
3. INSTALL TREE PROTECTION FENCING PER TOWN STD. P-1
4. INSTALLATION OF ALL REMAINING PERIMETER SEDIMENT AND SAFETY FENCES FOR PHASE 1 CONSTRUCTION.
5. REMOVAL OF TREES WITHIN THE WORK ZONE.
6. REVIEW BY ENVIRONMENTAL MONITOR.

TOPSOIL STRIPPING

1. PROVIDE ADEQUATE MUD MAT AT THE PROPOSED CONSTRUCTION ACCESS.
2. EXCAVATE AND CONSTRUCT THE REQUIRED SEDIMENT TRAP AND MAKE CONNECTION TO SWM TANK.
3. EXCAVATE THE REQUIRED TEMPORARY CUT-OFF SWALES AND INSTALL ROCK CHECK DAMS AND STABILIZE SWALES.
4. STRIP TOPSOIL AND STOCKPILE IN DESIGNATED AREA.
5. INSTALL SILT FENCE AROUND TOP SOIL STOCKPILE.

STAGE III - PRE-GRADING + UNDERGROUND SERVICING:

PRE-GRADING

1. COMPLETE THE REQUIRED EXCAVATION OPERATION.
2. RESTORE AND STABILIZE ALL DISTURBED AREAS, OUTSIDE NOTED LIMITS, WITH 100mm TOPSOIL & SEED AS SOON AS PRACTICAL.
3. WHERE REQUIRED, CONSTRUCT ADDITIONAL TEMPORARY DRAINAGE SWALES AS AREAS ARE COMPLETED.
4. SPREAD REQUIRED TOPSOIL AND SEED, WHERE NOTED, IN AREAS THAT ARE TO REMAIN INACTIVE FOR MORE THAN 30 DAYS.

UNDERGROUND SERVICING

1. EXCAVATE AND CONSTRUCT BUILDING TO GROUND LEVEL.
2. INSTALL UNDERGROUND SERVICES.
3. CONTINUE BUILDING STRUCTURE.
4. CONSTRUCT BASE ROADWORKS AND PAVING.
5. INSTALL SEDIMENT TRAPS AT CBs AND INLETS AS THEY ARE CONSTRUCTED.

STAGE IV - POST SERVICING:

1. SEED AREAS ADJACENT TO ACCESS ROAD AS SOON AS PRACTICAL.
2. MAINTAIN SEDIMENT CONTROL DEVICES AS REQUIRED.
3. MAINTAIN ROADS IN CLEAN CONDITION.
4. REMOVE SILT FENCES ALONG OUTFALL SEWER ONCE AREA IS STABILIZED.
5. MONITOR SITE CONDITION DURING BUILDING CONSTRUCTION
6. REMOVE SAFETY HOARDING AS SITE IS BEING COMPLETED AND LANDSCAPED.
7. INSTALL SITE LANDSCAPING AS BUILDING COMPLETED.
8. INSPECT AND CLEAN SWM TANK AND JELLYFISH FILTERS FOLLOWING COMPLETION OF LANDSCAPE WORKS.

NOTE:

INITIAL CONTRACTOR PARKING AREA WILL BE ON CONTRACTOR STAGING AREA. ONCE STRUCTURE FOR UNDERGROUND PARKING IS IN PLACE PARKING FOR CONSTRUCTION CREWS WILL BE UNDERGROUND AND INITIAL PARKING WILL BE USED FOR VISITORS.

LEGEND

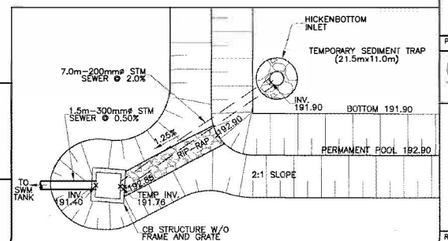
- LIMIT OF DEVELOPMENT
- 254 EX. CONTOUR
- EX. SPOT ELEVATION
- PROPOSED STORM MANHOLE
- CBMH PROPOSED CATCHBASIN MANHOLE
- DCBMH PROPOSED DOUBLE CATCHBASIN MANHOLE
- CB PROPOSED SINGLE CATCHBASIN
- RLCB PROPOSED REAR LOT CATCHBASIN
- DCB PROPOSED DOUBLE CATCHBASIN
- PROPOSED SILT FENCE AS PER DETAIL SHOWN ON DWG. ESC-5
- PROPOSED TREE PROTECTION FENCE AS PER TOWN STD. P-1
- PROPOSED SAFETY HOARDING
- PROPOSED CUT-OFF SWALE
- 194.40 PROPOSED CUT-OFF SWALE ELEVATION
- PROPOSED ROCK FLOW CHECK AS PER OPS@ 219.210
- PROPOSED ROCK FLOW CHECK AS PER OPSD 219.211
- PROPOSED CONSTRUCTION ACCESS MUD MAT (SEE DETAIL ON DWG. ESC-5)
- EXISTING DRAINAGE DIRECTION
- PROPOSED CATCHBASIN SEDIMENT PROTECTION BEFORE CONSTRUCTION (SEE DETAIL ON DWG. ESC-5)
- PROPOSED CATCHBASIN SEDIMENT PROTECTION FOLLOWING CONSTRUCTION (SEE DETAIL ON DWG. ESC-5)
- CONTRACTOR STAGING AREA
- LIMIT OF SIGNIFICANT WOODLANDS (KFC)

NO IN WATER WORK PERIOD:

NO WORK SHALL BE UNDERTAKEN IN OR NEAR WATER BETWEEN MARCH 1st AND JUNE 30th

SEED MIX FOR OUTFALL RESTORATION:

APPLY SEED MIX AS NOTED ON GEOMORHIX DWG. DET-1 SWMF OUTFALL DESIGN DETAILS



INLET DETAIL
SCALE: N.T.S.

BENCHMARK INFO:

ELEVATIONS SHOWN ON THIS PLAN ARE DERIVED FROM MINISTRY OF TRANSPORTATION ONTARIO BENCHMARK No. 00819828159
ELEVATION = 206.569m
CONCRETE AND STEEL BRIDGE CARRYING CNR OVER HWY 25, 0.9 km SOUTH OF THE OVERPASS AT INTERSECTION OF HWY 25 AND HWY 401. TABLET IS SET HORIZONTALLY IN WEST FACE OF EAST ABUTMENT, 10.5 m EAST OF CENTRELINE OF HWY 25, 63 cm SOUTH OF NORTHEAST END OF ABUTMENT, 37cm ABOVE GROUND.

SUBMISSION:

1st	X	Date 8 AUG. 2019	Pre-Serv	Date	
2nd	X	Date 10 JAN. 2020	Interim	Date	
3rd	X	Date 31 JUL. 2020	Final	Date	
4th	X	Date 20 NOV. 2020			

By	Date	Revision	Checked

REGION OF HALTON
TOWN OF MILTON
DEVELOPMENT SERVICES

LICENSED PROFESSIONAL ENGINEER
T.H. JOHANSEN
22140018
PROVINCE OF ONTARIO

CONSTRUCTION NORTH

Project Dwg. No.

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
8321 DERRY ROAD, BRAMPTON, ON. L6P 0W7
TEL: (905) 761-2520
FAX: (905) 794-0611

PROJECT NUMBER W20191

BRIARWOOD HOMES
RESIDENTIAL DEVELOPMENT
DERRY ROAD / HIGHWAY 25
TOWN OF MILTON
SITE PLAN No.: SP - 21-19

EROSION AND SEDIMENT CONTROL PLAN
PHASE 1 CONSTRUCTION

Region File No.				City File No.	
Drawn By:	S.C.	Checked By:	D.P.M.	Drawing No.	Sheet No.
Designed By:	T.M.J.	Check ed By:	D.K.H.		ESC-6
Scale:	1:250	Date:	MAY 2019		

J:\CDC-20'9 WEST - Files\W19061-Briarwood Homes Site Plan\CANDEVCON DRAWINGS\SHEETS\W19061-ESC-6.dwg (Apr 14, 2021 - 4:37pm)

APPENDIX "G"

Storm Outfall Design (GeoMorphix)

GEO Morphix Ltd.

Head Office
PO Box 205, 36 Main St. N.
Campbellville, ON, Canada L0P 1B0
T 416.920.0926

Ottawa Office
PO Box 336, Woodlawn PO
Dunrobin, ON, Canada K0A 1T0
T 613.979.7303

April 15, 2021

Milteron Developments Limited
3625 Dufferin Street, Suite 200
Toronto, Ontario M3K 1Z2

Attention: Nik Mracic, MCIP, RPP
Senior Vice President, Land

Re: Design Memo for Stormwater Management Outfall and Erosion Mitigation for Sixteen Mile Creek Tributary
Connectt Residential Development, Town of Milton, Ontario
GEO Morphix Project No. PN17153b

Introduction

This memo provides recommendations for the end-of-pipe treatments associated with the stormwater management outlet within the Connectt Residential Development, in the Town of Milton, Ontario. The outlet discharges to an existing ditch that flows into an unnamed tributary of Sixteen Mile Creek. A pocket wetland feature is proposed at the outlet and will improve water quality, address allochthonous input, provide canopy coverage, and sediment control. The wetland is appropriately sized based on the flows at the pond outlets. The accompanying drawings provide details and direction for implementation of the proposed wetland feature. The drawings are consistent with the recommendations provided herein.

In developing the design, the following activities were completed:

- Review of the available background materials
- Site reconnaissance consisting of general observations of channel morphology, bed and bank substrate, and riparian vegetation
- Development of a detailed design for the pocket wetland, and is cognizant of recommendations provided in the background materials

Existing Conditions

This letter and associated appendices provide information that addresses the requirements of Conservation Halton for permitting of the outfalls, in accordance with the complete application checklist for *Storm Sewer Outfalls and Connecting Outfall Channels* (January 2016). Specifically, this memo addresses the requirements under the fluvial geomorphic assessment section and aquatic habitat assessment section that states:

> *"Detailed description and habitat map of in-stream and bank habitat features including bankfull width, pools, riffles, undercut banks, eroding banks, root wads and large woody debris, thalweg/ low flow location, backwater areas, substrate type, etc. See the Environmental Guide for Fish and Fish Habitat (MTO, June 2009) for further guidance."*

Following Conservation Halton's requirements for installation of storm sewer outfalls and connection outfall channels the following tasks were completed as part of the assessment:

- A reach-scale habitat sketch map based on Newson and Newson (2000) outlining substrate, flow behavior, and riparian vegetation on the day
- Measurements of feature width and depth
- General reach characteristics to assess channel and geomorphological stability

Reach observations and channel measurements were collected on December 21, 2017. **Appendix A** provides a photographic record of the feature. Field notes, including a detailed reach sketch are also provided as additional background information in **Appendix B.**

The unnamed tributary is a low-gradient, single-threaded channel. The surrounding land use was predominantly forest. Riffle substrate within the tributary consisted of gravel, cobbles, and boulders. Bank materials ranged from clay/silt to cobbles. Average bankfull width and depth are 7.25 m and 0.65 m. Wetted width and depth were 2.25 m and 0.20 m. Smooth surface flow and rippled flow conditions were observed. Bank erosion was present along the channel upstream of the proposed outfall location. Undercuts ranging from 0.10 m – 0.20 m were present. Downstream of the proposed outfall location the channel has been restored using a riffle-pool sequence and no bank erosion was present. Riparian vegetation was continuous and consisted of trees and grasses. Woody debris was present in the natural channel upstream of the proposed outfall location.

The proposed outfall is located adjacent to a newly constructed channel, approximately 9 m from the channel banks. It is expected that newly constructed channel was designed to be stable at the anticipated flows within the unnamed tributary. Given the recently completed channel works, there is minimal erosion risk to the proposed outfall.

Pocket Wetland Design

The proposed pocket wetland will provide a treatment train that complements the site-level stormwater management plan. Benefits include organic inputs, temperature regulation, polishing, energy dissipation, and dispersion of flows. Additionally, by retaining flows, the wetland can provide opportunities for infiltration, evapotranspiration, and detention. Given the local soil conditions substantial infiltration is expected. This should provide subsurface temperature mitigation.

The proposed outlet will discharge to a small ditch that drains into the unnamed tributary. The pocket wetland will tie into the existing ditch and should be constructed as an over-excavated depression, which is lined with a mix of soil and granular materials, to provide both depressional and subsurface storage (within the interstitial space of the sediment and soil). Filtration is provided as a result of flow through the soil medium between the pocket wetland and the unnamed tributary. Level spreaders are proposed downstream of the wetland and will be constructed using 100% biodegradable Filtrexx® SiltSoxx™. The level spreader will guide flow, provide water quality benefits and infiltration. The Filtrexx® SiltSoxx™ will biodegrade overtime and will not remain as a permanent feature. However, they will provide a level of immediate erosion protection while the vegetation establishes. The short-term water retention function of these wetlands helps to polish the water and moderate the discharge of water into the unnamed tributary (in addition to the functions provided by the SWMFs).

The north side of the wetland is proposed to be reinforced with a vegetated rock buttress, which consists of 0.35 m diameter stone, and woody vegetation in the form of potted plants. The

buttress, which will have its strength augmented through the establishment of the vegetation, will provide long-term stability. The overhanging vegetation will provide thermal regulation by shading, while also providing coarse organic inputs. A low point should be installed on the buttress to allow water from the existing ditch to flow over the stones (see drawing **GEO-1** for details).

The proposed stone core is expected to be stable under the predicted flow conditions in the wetlands. The substrate within the stone core will be comprised of a mix of 100 mm – 150 mm diameter stone with 30% granular 'b' (see drawing **GEO-1** for details). A layer of topsoil will be installed on top of the stone core to improve vegetation establishment. The stone was hydraulically sized to limit entrainment. A range of techniques were utilized to determine the appropriate stone size, as summarized in the National Engineering Handbook (NRCS, 2007). These techniques are provided in **Table 1**. The maximum pond outflow velocities for the 100-year return event were used to determine the appropriate stone for both pond outlets. The maximum outflow velocity is 1.59 m/s, corresponding to a discharge of 0.079 m^3/s provided by Candevcon Limited. The stone size includes a factor of safety to provide additional stability. The larger stone size provides increased stability at the 100-year event, while allowing for storage and infiltration at lower flows.

Table 1. Substrate sizes for the stone core wetland, based on a range of techniques

Model	Formula	Velocity (m/s)	Stone Size* (mm)
Isbash Method (Isbash, 1936)	$D_{50} = \left(\frac{V_c}{C * \left(2 * g * \frac{\gamma_S - \gamma_w}{\gamma_w}\right)^{0.5}}\right)^2$	1.59	127
USBR Method (Peterka, 1958)	$D_{50} = 0.0122 * V^{2.06}$	1.59	134

*Includes 50% factor of safety

The Isbash method (Isbash, 1936) was developed for the construction of dams by placing rock into moving water. This model predicts the median stone size (D_{50}; ft) under the given flow conditions, given by:

$$D_{50} = \left(\frac{V_c}{C*(2*g*\frac{\gamma_S-\gamma_w}{\gamma_w})^{0.5}}\right)^2 \quad \text{[Eq.2]}$$

Where:

V_c = critical velocity (ft/s)
C = Isbash constant (dimensionless)
g = gravity (ft/s)
γ_s = stone density (lb/ft^3)
γ_w = water density (lb/ft^3)

The USBR Method (Peterka, 1958) was developed for sizing riprap below a stilling basin. This model predicts the median stone size (D_{50}; ft) under the given flow conditions, given by:

$$D_{50} = 0.0122 * V^{2.06} \quad \text{[Eq.3]}$$

Where:

V = average channel velocity (ft/s)

The values used for each variable in the Isbash method, and USBR method are provided in **Table 2**.

Table 2. Variables and values associated with sizing stone in wetland

Variable	Value*
Isbash Method	
Critical velocity (V_c) (ft/s)	5.21
Isbash constant (C) (unitless)	0.86
Gravity (g) (ft/s^2)	32.2
Stone density (γ_s) (lb/ft^3)	165.43
Water density (γ_w) (lb/ft^3)	62.43
USBR Method	
Velocity (V) (ft/s)	5.21

*Note: Values used in modelling are in imperial units. Final values for stone size have been converted to SI units.

The estimates of total volumetric storage of the proposed wetland features for the SWMP outfall is 14 m^3, based on the following assumptions:

- All capacity is available
- Porosity of 0.3 and 0.2 for the stone layer and soil layer, respectively
- Inclusion of open depressional storage, interstitial storage within the soil and in the granular layer
- Grading of the margins of the stone core wetland and wet meadow is a 3-to-1 slope

A summary of the storage capacity for the wetland is provided in **Table 3**.

Table 3. Characteristics of the wetland volumetric storage

Wetland	Length (m)	Width (m)	Depth (m)	Porosity	Total Volume ellipse (m^3)
Depressional Storage	9	5	0.55	1	11
Granular Layer	3	3	0.9	0.3	2
Soil Layer	9	5	0.15	0.2	1

An aggressive landscape restoration plan, which consists of live staking, is recommended around the periphery of the outlet to provide shading over the feature. The planting plan will also help to reduce erosion. The live stake plantings will provide additional thermal mitigation through shade, and will also provide a source of coarse organic matter. Live vegetated layering is also proposed around the wetland. This will provide additional shading and thermal regulation as well as provide a source of coarse organic material. Topsoil is proposed within the wetland, which will be seeded with an appropriate seed mix.

Given the proposed configuration of the outlet and pocket wetland, one or two trees will require removal as well as some additional saplings. During detailed design the number of trees to be removed should be confirmed and the landscaping plan should include any necessary replacement plantings.

Recommendations for Implementation

- Construction should be carried out on the floodplain only during low-flow conditions.
- The design elements are unique and as such, the designer or representative should be part of construction supervision to ensure proper installation and function of the design elements. On-site supervision will ensure a rapid response to construction issues.
- The constructed wetland should be deemed stable by the designer, prior to flow introduction.
- All works within the perimeter of the constructed wetland feature should be isolated from the natural watercourse in order to mitigate against impacts, such as sediment loading. The perimeter of the constructed wetland should be stabilized using the prescribed combination of biodegradable erosion control blankets, live staking and seed. It is to be stable prior to the introduction of flows from the outfall.
- If required, unwatering discharge should be pumped at least 10 m from the channel through a filter bag prior to release on the floodplain. The water should be dispersed across the floodplain through straw bales or Filtrexx® SiltSoxx™.
- All materials and equipment will be stored and operated in such a manner that prevents any deleterious substances from entering the water. Vehicle and equipment refuelling and/or maintenance will be conducted away from the watercourse, and be free of fluid leaks and externally cleaned/degreased to prevent the release of deleterious substances.
- Machinery should arrive on site in a clean condition (including free of mud/soil/dirt from other locations; including clean wheels/tires/tracks) and should be maintained free of fluid leaks.
- In order to reduce the spread of invasive species, equipment should be cleaned before being brought onsite and before leaving site. For guidance in this regard, please refer to the Clean Equipment Protocol for Industry available online: (https://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/Clean-Equipment-Protocol_June2016_D3_WEB-1.pdf).
- Monitoring of the wetland will allow issues to be identified and addressed promptly. The wetland should be monitored for a period of two years after construction. Monitoring should include monumented photographs and a yearly survey of prescribed plant materials.

We trust this memo meets your current requirements. Should you have any questions, please contact us.

Respectfully submitted,

Paul Villard Ph.D., P.Geo., CAN-CISEC, EP, CERP
Director, Principal Geomorphologist

Lindsay Davis, M.Sc., P. Geo., CAN-CISEC
Geomorphologist

References

Conservation Halton. 2016. Storm Sewer Outfalls and Connection Outfall Channels.

Isbash, S.V. 1936. Construction of dams by depositing rock in running water. Transactions, Second Congress on Large Dams. Washington, D.C.

Ministry of Transportation Ontario (MTO). 2009. Environmental Guide for Fish and Fish Habitat.

Natural Resources Conservation Service (NRCS). 2007. Stone Sizing Criteria, Technical Supplement 14C, Part 654, National Engineering Handbook. U.S. Department of Agriculture.

Newson, M.D., Newson, C.L, & NE, T. 2000. Geomorphology, ecology and river channel habitat: mesoscale approaches to basin-scale challenges, 2, 195-217.

Peterka, A.J. 1958. Hydraulic Design of Stilling Basins and Bucket Energy Dissipators. USBR Engineering Monograph 25. U.S. Department of the Interior, Bureau of Reclamation, Denver.

Appendix A
Photographic Record

Photo 1	
	Looking at approximate outfall location for the stormwater management outlet.
Photo 2	
	Looking at channel downstream of outfall location. Note the newly constructed channel with riffle-pool sequences.

Photo 3	
	Looking upstream of unnamed tributary. Note the stable channel banks. No erosion was present along the tributary downstream of the proposed outlet.
Photo 4	
	Looking upstream at proposed outfall location (see red arrow). Note the riparian vegetation consists mainly of trees and grasses.

Appendix B
Field Observations

GEO MORPHIX
Geomorphology Earth Science Observations

Reach Characteristics

Project Code/Phase: PN 17153

Date:	Dec 21/17	**Stream/Reach:**	Briarwood Property
Weather:	cloudy 0°C	**Location:**	Highway 25 @ Derry Rd
Field staff:	LG LD	**Watershed/Subwatershed:**	Sixteen Mile Creek
UTM (Upstream)	592189.43 mE 4817871.27 mN	**UTM (Downstream)**	592226.36 mE 4817532.3 mN

Land Use (Table 1): 1 | **Valley Type** (Table 2): 3 | **Channel Type** (Table 3): 7 | **Channel Zone** (Table 4): 2 | **Flow Type** (Table 5): 1 | ☐ Groundwater | Evidence: _____

Riparian Vegetation

Dominant Type: (Table 6): 1
Species: _____

Coverage:
- ☐ None
- ☐ Fragmented
- ☒ Continuous

Channel widths
- ☐ 1-4
- ☐ 4-10
- ☒ > 10

Age Class (yrs):
- ☒ Immature (<5)
- ☒ Established (5-30)
- ☒ Mature (>30)

Encroachment: (Table 7): 1

Aquatic/Instream Vegetation

Type (Table8): 6 | Coverage of Reach (%): 20

Woody Debris
- ☐ Present in Cutbank
- ☒ Present in Channel
- ☐ Not Present

Density of WD:
- ☒ Low
- ☐ Moderate
- ☐ High

WDJ/50m: 0

Water Quality

Odour (Table 16): 1

Turbidity (Table 17): 1, 2

Channel Characteristics

Sinuosity (Type) (Table 9): 2 | **Sinuosity (Degree)** (Table 10): 3 | **Gradient** (Table 11): 2 | **Number of Channels** (Table 12): 1

Entrenchment (Table 13): 2 | **Type of Bank Failure** (Table 14): 2 | **Downs's Classification** (Table 15): M - wooded area, S - restored area

	Clay/Silt	Sand	Gravel	Cobble	Boulder	Parent	Rootlets
Riffle Substrate	☐	☐	☒	☒	☒	☐	☐
Pool Substrate	☐	☒	☐	☒	☐	☐	☐
Bank Material	☒	☒	☒	☒	☐	☐	☐

	R	P	R				
Bankfull Width (m)	4	6	4.5	**Wetted Width (m)**	1.2	2.5	3
Bankfull Depth (m)	0.6	1	0.3	**Wetted Depth (m)**	0.1	0.4	0.15

Riffle/Pool Spacing (m): 10 | **% Riffles:** 40 | **% Pools:** 40 | **Meander Amplitude:** /

Pool Depth (m): 0.4 | **Riffle Length (m):** 5-10 | **Undercuts (m):** 0.1-0.2

Velocity (m/s): / / / **Wiffle ball / ADV / Estimated**

Bank Angle
- ☐ 0 – 30
- ☒ 30 – 60
- ☒ 60 – 90
- ☒ Undercut

Bank Erosion
- ☐ < 5%
- ☐ 5 – 30%
- ☒ 30 – 60%
- ☐ 60 – 100%

Comments: U/C on outside bends of forested area, restored area stable

Notes: DS extent restored, US forested riparian.

attached algae

Completed by: LG | Checked by: _____

GEO MORPHIX

General Site Characteristics

Project Code: PN 17153

Date:	Dec 21/17	**Stream/Reach:**	Briarwood Property
Weather:	cloudy, 0°C	**Location:**	Highway 25 @ Derry Rd
Field Staff:	LG LD	**Watershed/Subwatershed:**	Sixteen Mile Creek

Features

- Reach break
- Cross-section
- Flow direction
- Riffle
- Pool
- Medial bar
- Eroded bank
- Undercut bank
- Rip rap/stabilization/gabion
- Leaning tree
- Fence
- Culvert/outfall
- Swamp/wetland
- Grasses
- Tree
- Instream log/tree
- Woody debris
- Station location
- Vegetated island

Flow Type

H1	Standing water
H2	Scarcely perceptible flow
H3	Smooth surface flow
H4	Upwelling
H5	Rippled
H6	Unbroken standing wave
H7	Broken standing wave
H8	Chute
H9	Free fall

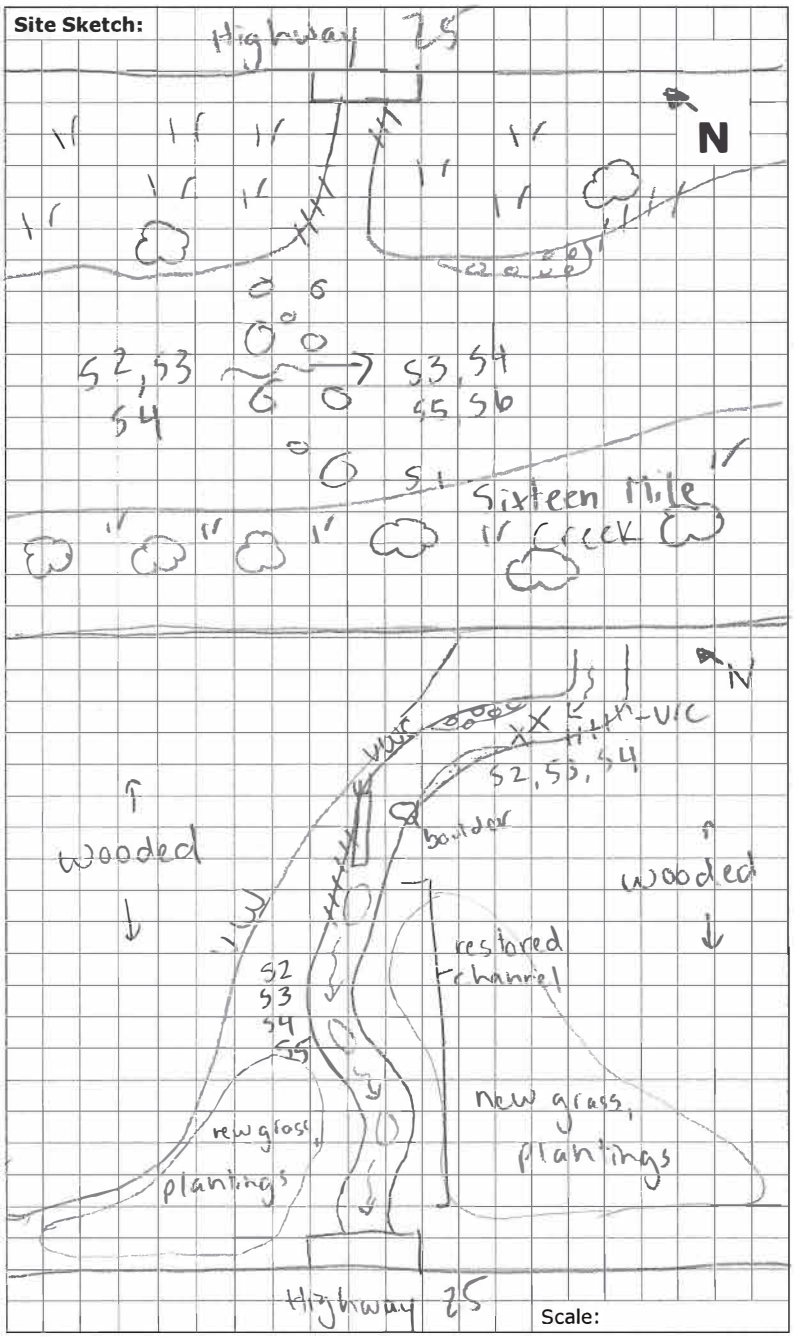
Substrate

S1	Silt	**S6**	Small boulder
S2	Sand	**S7**	Large boulder
S3	Gravel	**S8**	Bimodal
S4	Small cobble	**S9**	Bedrock/till
S5	Large cobble		

Other

BM	Benchmark	**EP**	Erosion pin
BS	Backsight	**RB**	Rebar
DS	Downstream	**US**	Upstream
WDJ	Woody debris jam	**TR**	Terrace
VWC	Valley wall contact	**FC**	Flood chute
BOS	Bottom of slope	**FP**	Flood plain
TOS	Top of slope	**KP**	Knick point

Site Sketch:



Scale:

Additional Notes:

Completed by: LG Checked by: _____

APPENDIX "H"

Geotechnical Information

BH ID	Easting (m E)	Northing (m N)
MW-A	592113	4817646
MW-B	592127	4817682
MW-C	592131	4817765
BH-D	592188	4817763
BH-E	592146	4817649

Sirati & Partners Consultants Ltd.
Geotechnical & Environmental Services
Engineering Solutions

750 Millway Avenue, Unit-8,
Vaughan, ON L4K 0M7
Phone#905-669-4477, Fax#905-669-4488

North:

Legend:

Property Boundary

Monitoring Well
MW-C

Borehole Location
BH-D

Notes:

Previous Monitoring Wells:
#1 to #2

New Monitoring Wells/Boreholes:
A to E

Project Title:
Hydrogeological Investigation

Site Location:
6791 Derry Road 25, Milton, ON

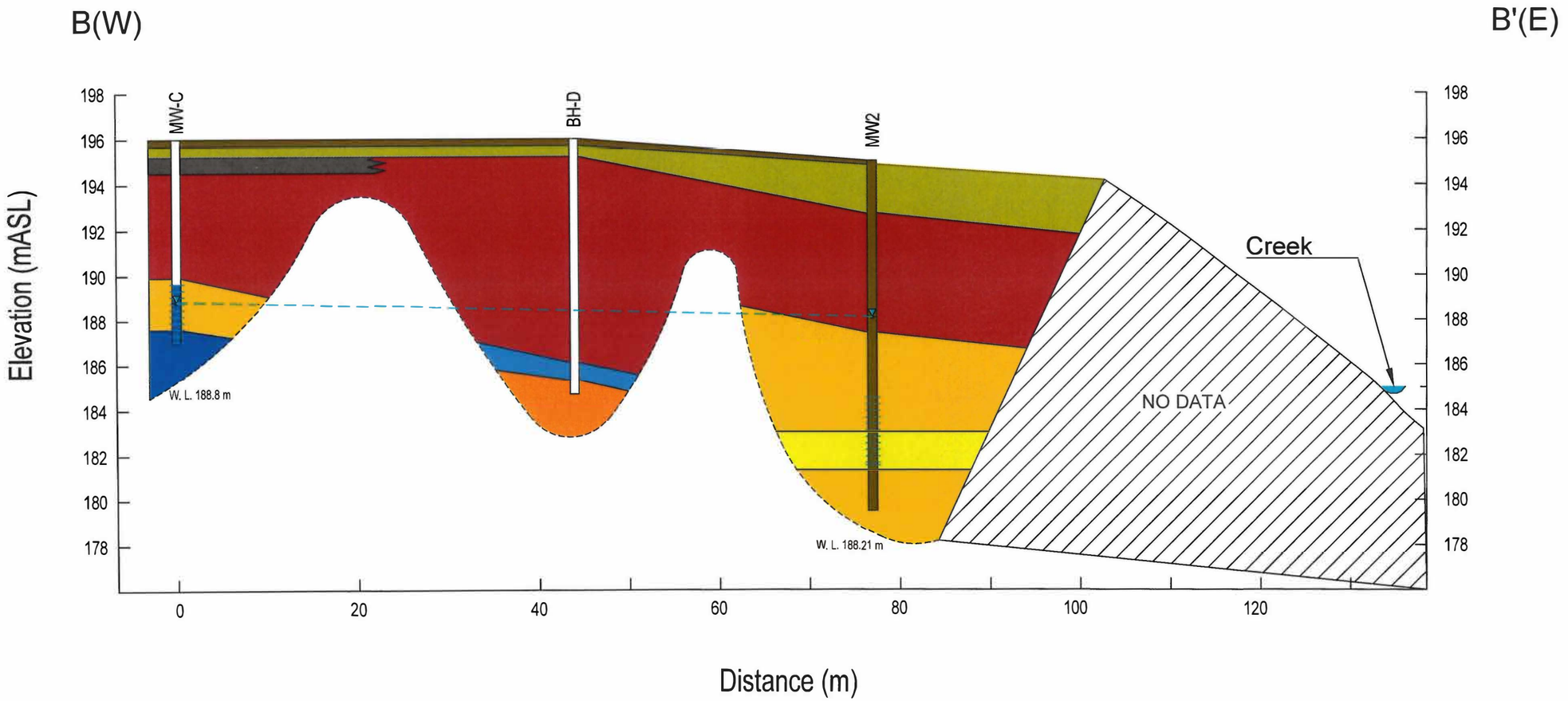
Figure Title:
SPCL Borehole Location Plan

Scale: 0m 40m

Project Number: SP17-219-30

Date: August 2017

Figure Number: 8-1



SIRATI & PARTNERS

12700- Keele Street
King City, ON. L7B 1H5
Phone# 905 833 1582, Fax#905 833 5360

Legend:

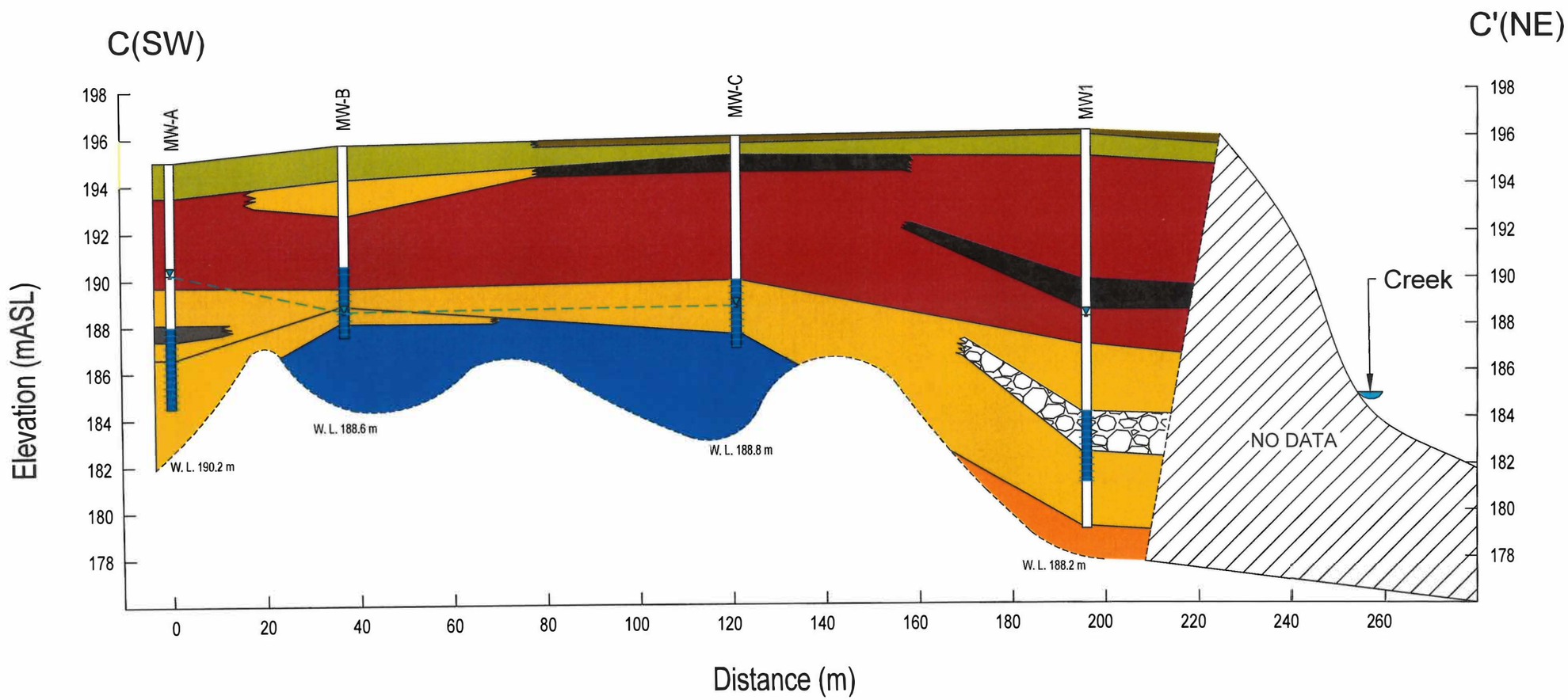
- Water Level
- Top Soil
- Fill
- Silty Sand / Sandy Silt
- Clayey Silt / Silty Clay
- Clayey Silt Till / Silty Clay Till
- Sandy Silt Till / Silty Sand Till
- Silt
- Shale/Limestone
- Gravelly sand and silt
- MW1 — Borehole / Well ID
- Water Level
- Well Screen

Project Title:
Hydrogeological Investigation

Site Location:
6791 Regional Road 25, Milton, ON

Figure Title:
SPCL Borehole Cross Section B-B'

Scale:	Project Number:
As Shown	SP17-219-30
Date:	**Figure Number:**
July 2019	8-2



SIRATI & PARTNERS
12700- Keele Street
King City, ON. L7B 1H5
Phone# 905 833 1582, Fax#905 833 5360

Legend:

- Water Level
- Top Soil
- Fill
- Clayey Silt / Silty Clay
- Clayey Silt Till / Silty Clay Till
- Sandy Silt Till / Silty Sand Till
- Shale
- Gravelly sand and silt
- Sand and Gravel

MW1 — Borehole / Well ID
Water Level
Well Screen

Project Title:
Hydrogeological Investigation

Site Location:
6791 Regional Road 25, Milton, ON

Figure Title:
SPCL Borehole Cross Section C-C'

Scale:	Project Number:
As Shown	SP17-219-30
Date:	**Figure Number:**
July 2019	8-3

LOG OF BOREHOLE MW-1

PROJECT: Geotechnical/Slope Stability Investigation
CLIENT: Gilbach Real Estate Development
PROJECT LOCATION: Derry Road West & RR25, Milton, ON
DATUM: Geodetic
BH LOCATION: Davis Drilling N 4817830 E 592182

DRILLING DATA
Method: Solid Stem Augers
Diameter: 150mm
Date: Jul/04/2016

REF. NO.: SP17-219-20
ENCL NO.: 1

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
196.1					196
196.0 / 0.2	**TOPSOIL:** 200mm	1	SS	10	
195.0 / 1.1	**FILL:** silty clay, trace topsoil/organics, greyish brown, moist, stiff	2	SS	9	195
	SILTY CLAY TILL: some sand, trace gravel, brown, moist, stiff to very stiff	3	SS	23	
	hard below 2.3m	4	SS	39	194
		5	SS	41	193
189.8 / 6.3	**CLAYEY SILT:** trace sand, layer of wet silt, brown, moist, hard	6	SS	33	192
188.5 / 7.6	**SILTY CLAY TILL:** sandy, trace to some gravel, brown, moist, hard	7	SS	55	191
187.0 / 9.1	**SANDY SILT TILL:** some clay, trace gravel, occasional cobble/boulder, reddish brown, moist to very moist, very dense	8	SS	50/ 25mm	190
	wet silt layer at 10.9m	9	SS	90	189
184.1 / 12.0	**SAND & GRAVEL:** trace silt, trace shale fragments, reddish grey, wet, very dense	10	SS	50/ 25mm	188
182.4 / 13.7	**SANDY SILT TILL:** some clay, trace gravel, occasional cobble/boulder, reddish brown, moist to very moist, very dense	11	SS	50/ 25mm	187
		12	SS	50/ 75mm	186
		13	SS	50/ 100mm	185
179.2 / 16.9	shale fragments below 16.8m	14	SS	50/ 100mm	184
179.1 / 17.0	**SHALE BEDROCK:** Queenston Formation, reddish brown				183
	END OF BOREHOLE				182
	Notes: 1) Monitoring well installed in the borehole upon completion.				181
					180

GROUND WATER CONDITIONS: W. L. 185.6 m, Jul 17, 2016

Soil Head Space Vapors: PID (ppm) 20 40 60 80; CGD (% LEL) 5 10 15 20

PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT (w_P / w / w_L); WATER CONTENT (%) 10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS CHEMICAL TESTING AND GRAIN SIZE DISTRIBUTION (%)	GR	SA	SI	CL
	4	23	45	28
	10	21	40	29
	9	28	49	14
wet spoon @ 10.7 m				

0~100 PPM AND 0~25% LEL-2016 SP17-219-20 DERRY ROAD&RR25 MILTON (ENVIRONMENTAL).GPJ SPC_GDT 8/17/17

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; O ε=3% Strain at Failure

LOG OF BOREHOLE MW-2

PROJECT: Geotechnical/Slope Stability Investigation
CLIENT: Gilbach Real Estate Development
PROJECT LOCATION: Derry Road West & RR25, Milton, ON
DATUM: Geodetic
BH LOCATION: Davis Drilling N 4817746 E 592219

DRILLING DATA
Method: Solid Stem Augers
Diameter: 150mm
Date: Jul/04/2016

REF. NO.: SP17-219-20
ENCL NO.: 2

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	PID (ppm)	CGD (% LEL)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS CHEMICAL TESTING AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
195.6								20 40 60 80	5 10 15 20	10 20 30			
195.4	**TOPSOIL:** 175mm												
0.2	**FILL:** sand & gravel limestone pieces, trace to some silt, grey, moist, dense		1	SS	31		195			o			
194.8													
1 0.8	**FILL:** clayey silt, trace shale fragments, greyish brown, moist, very stiff		2	SS	16					o			
2							194						
193.3	mixed with topsoil below 1.5m		3	SS	7					o			
2.3	**SILTY CLAY TILL:** some sand, trace gravel, brown, moist, very stiff to hard		4	SS	25		193			o			
3			5	SS	47		192			o			
4													
			6	SS	50/ 50mm		191			o			
5													
6							190						
			7	SS	50/ 25mm					o			wetspoon @ 6.1 m
	wet sand layer at 6.4m						189						
7													
188.0							188						
7.6	**SANDY SILT TILL:** trace to some clay, trace gravel, occasional wet sand seams/layers, occasional cobble/boulder, reddish brown, moist to very moist, very dense		8	SS	50/ 25mm					o			
8							187						
9			9	SS	77					o			
							186						
10						▽							
			10	SS	50/ 25mm					o			
11							184						
183.6													
12.0	**SILTY SAND:** trace clay, reddish grey, wet, very dense		11	SS	50/ 100mm		183			o			
13													
181.9							182						
13.7	**SANDY SILT TILL:** some clay, trace gravel, occasional cobble/boulder, reddish brown, moist, very dense		12	SS	50/ 25mm					o			
14							181						
15													
180.1	trace shale fragments below 15.2m		13	SS	50/ 5mm					o			
15.5	**END OF BOREHOLE**												

W. L. 185.2 m
Jul 17, 2016

Notes:
1) Auger refusal at 15.5m on possible shale bedrock.
2) Monitoring well installed in the borehole upon completion.

0-100 PPM AND 0-25% LEL-2016 SP17-219-20 DERRY ROAD & RR25 MILTON (ENVIRONMENTAL).GPJ SPCL.GDT 8/17/17

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; O ε=3% Strain at Failure

LOG OF BOREHOLE MW-A

PROJECT: Geotechnical/Slope Stability Investigation
CLIENT: Gilbach Real Estate Development
PROJECT LOCATION: Deny Road West & RR25, Milton, ON
DATUM: Geodetic
BH LOCATION: Davis Drilling N 4817644 E 592120

DRILLING DATA
Method: Hollow Stem Augers
Diameter: 150mm
Date: Jul/06/2017

REF. NO.: SP17-219-20
ENCL NO.: 3

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	Soil Head Space Vapors PID (ppm)	CGD (% LEL)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS CHEMICAL TESTING AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
195.0								20 40 60 80	5 10 15 20	10 20 30			
0.0	**FILL:**clayey silt, some sand, trace gravel, brown, moist, compact		1	SS	14								
1	becoming very moist		2	SS	11		194						SS2: M&I
193.5													
1.5	**SILTY CLAY TILL:**some sand, trace gravel, brown, moist, compact to dense		3	SS	21		193						
2	becoming reddish brown		4	SS	25								
3			5	SS	31		192						
4			6	SS	36		191						
190.4													
4.6	**CLAYEY SILT TILL:** some sand, trace gravel, greyish brown, moist. very stiff		7	SS	24								
5								W. L. 190.3 m Jul 19, 2017					
189.7													
5.3	**SANDY SILT TILL:**trace clay, reddish brown, very moist, dense		8	SS	38		189						
6	becoming greyish brown		9	SS	32								
188.1													
6.9	**SILTY CLAY:** trace gravel, grey, very moist, hard		10	SS	38		188						SS11: PHCs, VOCs, PCBs, Dup.1 (PCBs)
187.4													
7.6	**SANDY SILT TILL:**trace clay, trace shale fragments, trace gravel, reddish brown, moist, dense		11	SS	44		187						
8													
186.6													
8.4	**SILTY CLAY TILL:** some sand and gravel, reddish brown, moist, hard		12	SS	50/ 75mm		186						
9			13	SS	82								
10			14	SS	15-50/ 25mm		185						
184.5													
10.5	**END OF BOREHOLE**												

Notes:
1) Monitoring well was installed upon completion of drilling.
2) Water level in the well was measured to be at 4.7 m depth on July 19, 2017

0-100 PPM AND 0-25% LEL-2016 SP17-219-20, DERRY ROAD&RR25, MILTON (ENVIRONMENTAL).GPJ SPCL.GDT 8/17/17

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
O ε=3% Strain at Failure

LOG OF BOREHOLE MW-B

PROJECT: Geotechnical/Slope Stability Investigation
CLIENT: Gilbach Real Estate Development
PROJECT LOCATION: Derry Road West & RR25, Milton, ON
DATUM: Geodetic
BH LOCATION: Davis Drilling N 4817682 E 592141

DRILLING DATA
Method: Hollow Stem Augers
Diameter: 150mm
Date: Jul/06/2017

REF. NO.: SP17-219-20
ENCL NO.: 4

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	PID (ppm)	CGD (% LEL)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L (WATER CONTENT %)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS CHEMICAL TESTING AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
195.7								20 40 60 80	5 10 15 20	10 20 30			
195.6	**GRANULAR FILL:** 25mm												
195.4	**FILL:** silty clay, some sand, trace gravel, brown, moist, compact		1	SS	11		195						
194.2			2	SS	16								
1.5	**SANDY SILT TILL:** some clay, trace gravel, reddish brown, moist, compact		3	SS	17		194						
192.7			4	SS	23		193						SS4: M&I
3.0	**SILTY CLAY TILL:** some sand, trave gravel, reddish brown, moist, very stiff to hard		5	SS	32		192						
			6	SS	33								
	becoming greyish brown below 4.6		7	SS	25		191						
190.4													
5.3	**CLAYEY SILT TILL:** some sand, trace gravel, reddish brown, moist, hard		8	SS	80/ 50mm		190						
189.6													
6.1	**SANDY SILT TILL:** some gravel, couble fragments, moist, very dense		9	SS	61								SS9: PHCs, VOCs, PCBs
188.8							189						
6.9	**SILTY CLAY TILL:** some gravel, trace sand, reddish brown, wet, hard		10	SS	70								
188.1							W. L. 188.6 m Jul 19, 2017						
7.6	**SAND AND GRAVEL:** trace clay, reddish brown, wet, very dense		11	SS	91/ 00mm		188						
187.5													
8.2	**END OF BOREHOLE**												

Notes:
1) Monitoring well was installed upon completion of drilling.
2) Water level in the well was measured to be at 7.1 m depth on July 19, 2017

0~100 PPM AND 0~25% LEL-2016 SP17-219-20 DERRY ROAD&RR25 MILTON (ENVIRONMENTAL).GPJ SPCL GDT 8/7/17

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES $+^3$, $\times^3$: Numbers refer to Sensitivity; O ε=3% Strain at Failure

LOG OF BOREHOLE MW-C

PROJECT: Geotechnical/Slope Stability Investigation
CLIENT: Gilbach Real Estate Development
PROJECT LOCATION: Derry Road West & RR25, Milton, ON
DATUM: Geodetic
BH LOCATION: Davis Drilling N 4817764 E 592140

DRILLING DATA
Method: Hollow Stem Augers
Diameter: 150mm
Date: Jul/06/2017

REF. NO.: SP17-219-20
ENCL NO.: 5

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	Soil Head Space Vapors PID (ppm) 20 40 60 80	CGD (% LEL) 5 10 15 20	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 10 20 30	POCKET PEN. C_u (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS CHEMICAL TESTING AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
196.0													
196.0	**TOPSOIL** 300 mm												
0.3 195.2	**FILL:** clayey silt, trace sand, some gravel, brown, moist, loose		1	SS	8					o			SS1B: M&I
0.8 194.5	**SILT TO CLAYEY SILT:** brown, moist, loose		2	SS	7		195			o			
1.5	**SILTY CLAY TILL:** some sand, trace gravel, reddish brown, reddish brown, moist, stiff to very stiff		3	SS	14		194			o			
			4	SS	22		193			o			
			5	SS	31					o			
	becoming hard 3.8 m		6	SS	53		192			o			
	pieces of boulder		7	SS	47-50 25mm		191			o			
189.9	pieces of boulder		8	SS	43-50 25mm								
6.1	**SANDY SILT TILL:** trace clay, trace gravel, trace shale fragments, greyish brown, moist, compact		9	SS	29		190			c			
			10	SS	26		W. L. 189.2 m Jul 19, 2017			o			SS10: PHCs, VOCs, Dup. 2(VOCs)
	becoming dense below 7.6 m		11	SS	41		188			o			
187.6 8.4 187.0	**SAND AND GRAVEL:** some clay, reddish brown, wet, dense		12	SS	39		187			o			
9.0	**END OF BOREHOLE**												

Notes:
1) Monitoring well was installed upon completion of drilling.
2) Water level in the well was measured to be at 6.8 m depth on July 19, 2017

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES $+^3$, $\times^3$: Numbers refer to Sensitivity; O ε=3% Strain at Failure

LOG OF BOREHOLE BH-D

PROJECT: Geotechnical/Slope Stability Investigation
CLIENT: Gilbach Real Estate Development
PROJECT LOCATION: Derry Road West & RR25, Milton, ON
DATUM: Geodetic
BH LOCATION: Davis Drilling N 4817775 E 592188

DRILLING DATA
Method: Hollow Stem Augers
Diameter: 150mm
Date: Jul/06/2017

REF. NO.: SP17-219-20
ENCL NO.: 6

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	Soil Head Space Vapors: PID (ppm)	CGD (% LEL)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%)	POCKET PEN. (C_u) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS: CHEMICAL TESTING AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
196.0								20 40 60 80	5 10 15 20	10 20 30			
196.0	**TOPSOIL** 300 mm		1	SS	11								SS1B: M&I
0.3 / 195.2	**FILL:** silty clay, some sand, trace gravel, brown, moist, compact												
0.8	**SILTY CLAY TILL:** some sand, trace gravel, greyish brown, moist, firm		2	SS	6		195						
			3	SS	7		194						
	becoming very stiff to hard below 2.3 m		4	SS	19								
			5	SS	26		193						
			6	SS	50		192						
191.4													
4.6	**CLAYEY SILT TILL:** some sand, trace gravel, greyish brown, moist, very stiff to hard		7	SS	30		191						
			8	SS	34								
			9	SS	27		190						
	grey below 6.9 m		10	SS	17		189						
			11	SS	94/ 200mm		188						
	reddish brown below 8.2 m		12	SS	29-50/ 75mm								
			13	SS	49-50/ 50mm		187						
186.1													
9.9	**SILT:** trace sand, reddish brown, wet, very dense		14	SS	97/ 175mm		186						SS14: PHCs, VOCs
185.3													
10.7	**BEDROCK:** limestone, weathered, grey		15	SS	50/ 00mm		185						
184.7													
11.3	**END OF BOREHOLE**												

0~100 PPM AND 0~25% LEL-2016 SP17-219-20 DERRY ROAD&RR25 MILTON (ENVIRONMENTAL).GPJ SPCL.GDT 8/17/17

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
$+^3$, $\times^3$: Numbers refer to Sensitivity
O ε=3% Strain at Failure

LOG OF BOREHOLE BH-E

PROJECT: Geotechnical/Slope Stability Investigation
CLIENT: Gilbach Real Estate Development
PROJECT LOCATION: Derry Road West & RR25, Milton, ON
DATUM: Geodetic
BH LOCATION: Davis Drilling N 4817632 E 592165

DRILLING DATA
Method: Hollow Stem Augers
Diameter: 150mm
Date: Jul/06/2017

REF. NO.: SP17-219-20
ENCL NO.: 7

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	Soil Head Space Vapors PID (ppm) 20 40 60 80	CGD (% LEL) 5 10 15 20	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS CHEMICAL TESTING AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
194.0													
193.2	**TOPSOIL:** 50 mm **FILL:** silty clay, trace gravel, trace sand, brown, moist, loose		1	SS	6								
0.8	**SILTY CLAY TILL:** some sand, trace gravel, brown, moist, very stiff reddish brown below 1.5 m		2	SS	21		193						SS2: M&I
			3	SS	20		192						
			4	SS	23								
	no recovery		5	SS			191						
189.4			6	SS			190						
4.6	**CLAYEY SILT TILL:** some sand, trace gravel, reddish brown, moist		7	SS	24		189						
			8	SS	47		188						
187.1			9	SS	37								
6.9	**SANDY SILT TILL:** trace clay, some gravel, greyish brown, moist, dense		10	SS	46		187						
			11	SS	17-50 50mm		186						
	wet below 8.4 m		12	SS	86/ 00mm								
184.1			13	SS	56		185						
9.9	**SAND AND GRAVEL:** trace clay, reddish brown, wet, dense		14	SS	45-50 50mm		184						SS14: PHCs, VOCs
183.3													
10.7	**SANDY SILT TILL:** trace clay, reddish brown, very moist, dense		15	SS	50/ 50mm		183						
182.6													
11.4	**CLAYEY SILT TILL:** reddish brown, trace limestone fragments, hard		16	SS	50/ 75mm								
182.0							182						
12.0	**END OF BOREHOLE**												

Notes:
1) Water level at 10.05 m depth upon completion of drilling

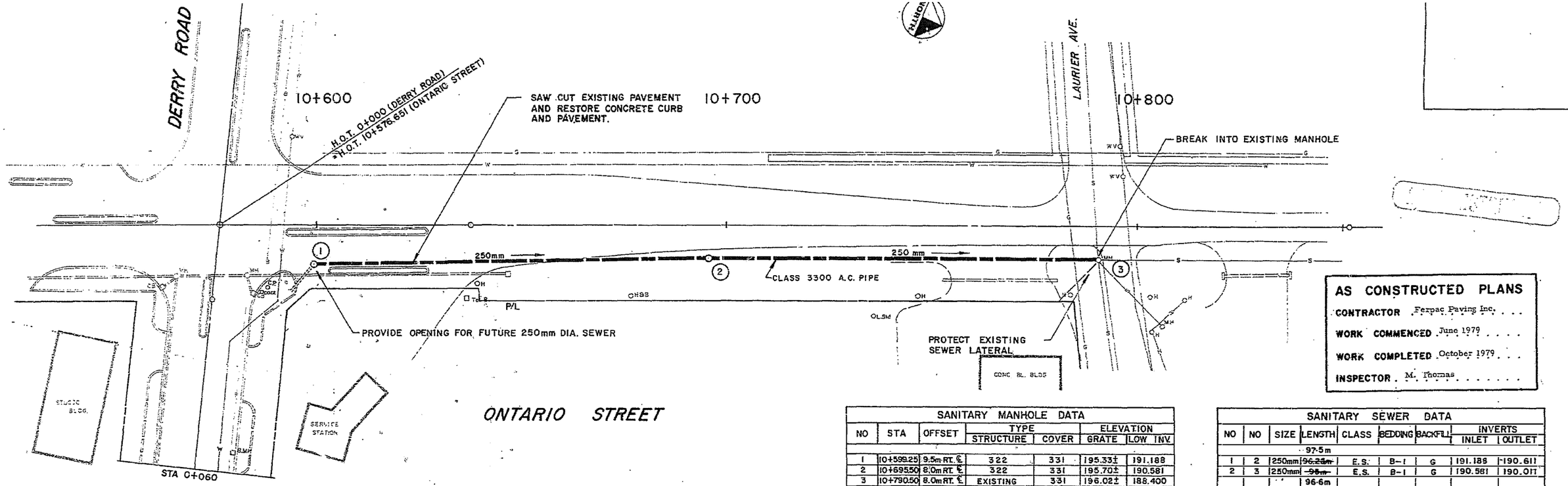
0~100 PPM AND 0~25% LEL-2016 SP17-219-20 DERRY ROAD&RR25 MILTON (ENVIRONMENTAL).GPJ SPCL.GDT 6/7/17

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +³ ×³ Numbers refer to Sensitivity; O ε=3% Strain at Failure

APPENDIX "I"

Reference Drawings



AS CONSTRUCTED PLANS

CONTRACTOR Ferpac Paving Inc.

WORK COMMENCED June 1979

WORK COMPLETED October 1979

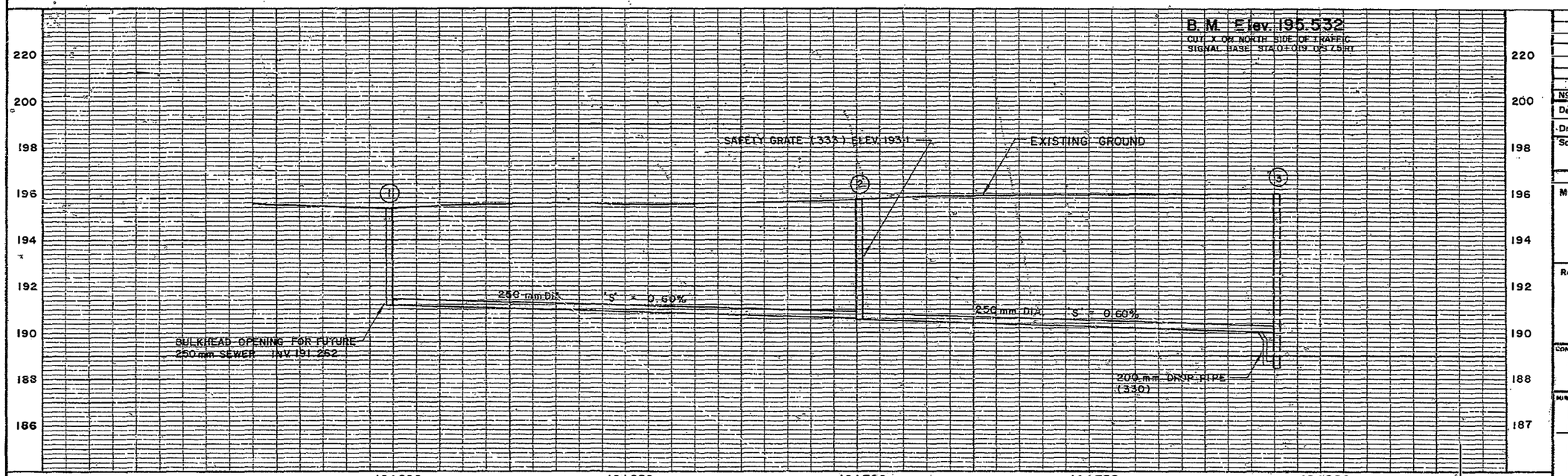
INSPECTOR M. Thomas

SANITARY MANHOLE DATA

NO	STA	OFFSET	TYPE STRUCTURE	TYPE COVER	ELEVATION GRATE	ELEVATION LOW INV.
1	10+599.25	9.5m RT. ℄	322	331	195.33±	191.188
2	10+695.50	8.0m RT. ℄	322	331	195.70±	190.581
3	10+790.50	8.0m RT. ℄	EXISTING	331	196.02±	188.400

SANITARY SEWER DATA

NO	NO	SIZE	LENGTH	CLASS	BEDDING	BACKFILL	INVERTS INLET	INVERTS OUTLET
			97.5m					
1	2	250mm	~~96.28m~~	E.S.	B-1	G	191.188	190.611
2	3	250mm	~~98m~~ 96.6m	E.S.	B-1	G	190.581	190.011



STATIONS	10+600	10+650	10+700	10+750	10+800
ORIGINAL GROUND ELEVATION	195.4		195.7		196.2
INVERT	191.188		190.611		190.011

No	Date	By	REVISIONS		Date
Design		R.I.R.	Checked	J.L.M.	FEB. 1979
Drawn		B.J.H.	Checked	J.L.M.	

Scale HORIZ. 1:500 VERT. 1:100

REFERENCES

APPROVALS

Municipal

Regional

FIELD NOTES

STAMP: REGISTERED PROFESSIONAL ENGINEER J. L. MALCOLM PROVINCE OF ONTARIO

CONSULTANT
McCORMICK RANKIN
CONSULTING ENGINEERS

MUNICIPALITY
REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

TITLE
ONTARIO STREET
DERRY ROAD TO LAURIER AVE.

250 mm DIA. SANITARY SEWER

LIMIT OF CONTRACT
STA 0+010

EDGAR HOWDEN & SONS LTD

REMOVE TEMPORARY BULKHEAD

CONCRETE CURB & GUTTER (201)

CONNECT EXISTING GREASE SEPARATOR DRAIN TO SANITARY SEWER

B.P. SERVICE STATION

L. CHUNG

T. & M. BRINKE

HOUSE REMOVED

F. MARSHALL

HOUSE REMOVED

ENTRANCE NOT PAVED

NOTE: LOCATION & ELEVATION OF 125 mm DIA. SERVICE CONNECTION TO BE DETERMINED IN THE FIELD

E. & W. TARDIFF

SR. NO.

E. McELHINNEY

RELOCATE FIRE HYDRANT

3 CABLE GUIDE RAIL (DD-913-A)

RANDOM R AP (0.6 DEEP

0+000 0+100 0+200 0+300

450 mm DIA. STA. 0+174 10.0m long 16 Ga. Pg.

450 mm DIA. STA. 0+199 11.0 m long 16 Ga. Pg. No 515

450 mm DIA. STA. 0+216 16.0 m long 16 Ga. Pg.

450 mm DIA. STA. 0+189 11.0 m long 16 Ga. Pg.

P/L — 57.930m

N39°09'30"E

30.480m

30.480m

30.480

30.448m

93.568m

N39°11'10"E

P/L

160.920m

N39°11'10"E

72.408m

150.772 N39°09'30"E

FENCE (DD 901)

GATE

SAWCUT EXISTING PAVEMENT

RICHARDSON CHEV. OLDS.

DERRY ROAD

G. TARQUINI & M. CECCARELLI

PRECAST CONCRETE CULVERT STA 0+263 FOR DETAILS SEE SHEET No. 15

18.29

22.66

1	0+223	~~5.5~~m LT.	322	331	194.87±	192.~~980~~
2	0+122	~~5.5~~m LT.	322	331	196.17±	192.~~088~~
3	0+0~~31~~ 19	~~5.5~~m LT.	322	331	195.56±	191.~~430~~

	.62
	.08
	.48

HIGHWAY 25 — HOLLY AVE — THOMPSON

AS CONSTRUCTED PLANS

CONTRACTOR . Bramall & Co. . . . . .

WORK COMMENCED . June '81 . . . . .

WORK COMPLETED . Nov. '81 . . . . .

INSPECTOR . . G. Kitagawa . . . . . .

500 mm

3:1

600mm

RANDOM RIP-RAP DETAIL

NOTE:

1. ALL MEASUREMENTS IN METRES UNLESS STATED OTHERWISE.
2. THE LOCATION OF UTILITIES IS APPROXIMATE ONLY AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE.

NOTE:

FROM STA. 0+007 TO STA. 0+134 CONTRACTOR SHALL SAWCUT EXISTING PAVEMENT & RESTORE CURB & GUTTER (201), PRECAST CURBS, PAVEMENT, SOD, GRANULAR SHOULDER, STORM SEWER CROSSING, ETC.

Cut X in top N.W. Bolt traffic base sign

H.O.T. 0+012.288

8.427'

℄ CONST.

7.533'

10.061'

Cut X on top N side Conc. Tr. sign base

1" S.I.B.

Bottom screw in cast handwell plate in W. face Conc. H.P.

8.565

℄ of Const

H.O.T. 0+202.673

24°48'45"

17°18'0"

1" R.I.P.

1" R.I.P.

LIMIT OF GRADING
STA 0+134

SANITARY SEWER DATA									
NO	NO	SIZE	LENGTH	CLASS	BEDDING	BACKFILL	INVERTS INLET	INVERTS OUTLET	
1	2	250mm	101 m	3300AC	B	G	~~192.700~~	~~192.094~~	192.62 – 192.15
2	3	250mm	91 m	3300AC	B	G	~~192.052~~	~~191.506~~	192.08 – 191.56
3	EXIST.	250mm	28 m	3300AC	B	G	~~191.430~~	~~191.262~~	191.48 – 191.31

B.M. 2A Elev. ~~195.989~~ 196.544

TOP OF S.E. CORNER OF CONC. PORCH OF HOUSE, O/S LT. OF STA 0+225

REMOVE TEMPORARY BULKHEAD

EXISTING PAVEMENT

TOP OF PAVEMENT (GRADE CONTROL)
BOTTOM OF GRANULAR 'B'

K=140
L.V.C.=156

K=-35
L.V.C.=74

S = 0.10%

2.26'

S = 0.85% 250mm DIA. 84.8 m LONG

S = 0.85% 250mm DIA. 38m LONG

S = 0.55% 250mm DIA. 92m LONG

HO. No. 494 BASEMENT ELEV. 194.57

BASEMENT ELEV. 194.59 HO. No. 515

BASEMENT ELEV. 194.25 HO. No. 525

GRADE POINT TREATMENT

ELEV. 197.843

PRECAST CONCRETE CULVERT FOR DETAILS SEE SHEET No. 15

ELEV. 193.368

EXISTING 300mm DIA. WATERMAIN

EXISTING CONCRETE ENCASEMENT

STATIONS	0+000	0+050	0+100	0+150	0+200	0+250	0+300			
℄ PAVEMENT ELEVATIONS				196.102	196.014	195.812	195.487	195.078	194.679	194.379	194.179	194.079
DITCH ELEVATIONS LEFT				195.05	194.95	194.75	194.45	194.03	190.60	189.60	189.60	192.50

No.	Date	By	REVISIONS

Design	R.I.R.	Checked	J.L.M.	Date FEB. 1979
Drawn	B.J.H.	Checked	J.L.M.	

Scale 0 10m 20m 30m (0 1m 2m 3m)

REFERENCES

FIELD NOTES

APPROVALS

Municipal

Regional

MANAGER OF DESIGN

DIRECTOR OF PUBLIC WORKS

STAMP: REGISTERED PROFESSIONAL ENGINEER — J. L. MALCOLM — PROVINCE OF ONTARIO

CONSULTANT
McCORMICK RANKIN
CONSULTING ENGINEERS

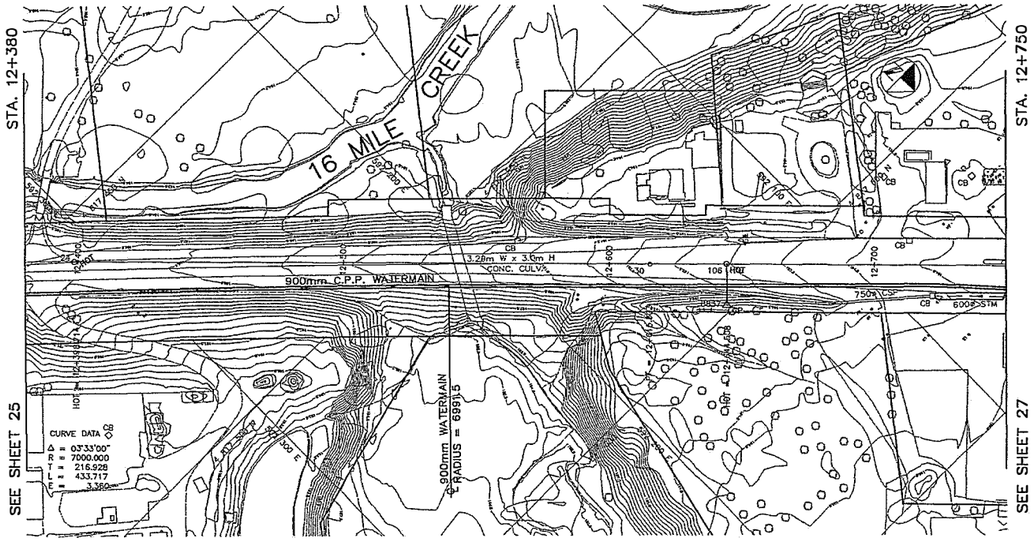
MUNICIPALITY
REGIONAL MUNICIPALITY OF HALTON
PUBLIC WORKS DEPARTMENT

TITLE
DERRY ROAD
HWY. 25 TO THOMPSON ROAD
STA 0+010 TO STA 0+315

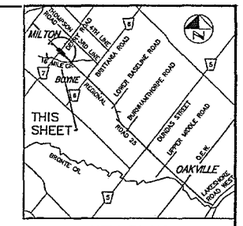
GRADING, PAVEMENT & SANITARY SEWER

MUNICIPAL DRAWING No.

REGIONAL DRAWING No.



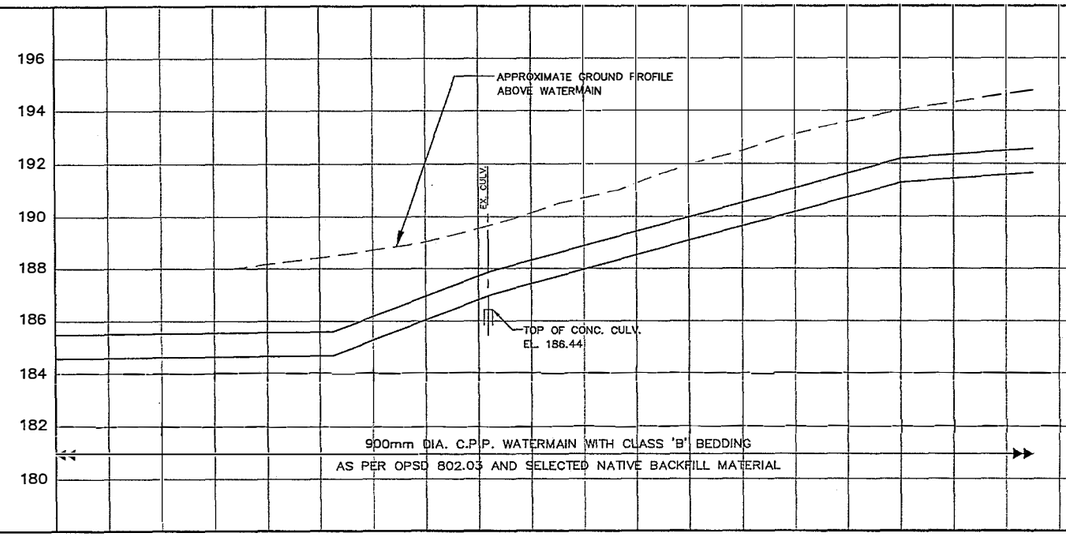
REGIONAL ROAD 25



KEY PLAN

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. HORIZONTAL CONTROL LINES AND STATIONS ARE DERIVED FROM DATA SUPPLIED BY THE REGIONAL MUNICIPALITY OF HALTON.
3. THE LOCATIONS OF ALL EXISTING UTILITIES ENCOUNTERED DURING CONSTRUCTION ARE APPROXIMATE. CONTACT THE APPLICABLE UTILITY OWNER FOR EXACT LOCATIONS.
4. TRACE-O-FLEX MARKERS WERE PROVIDED FOR WATERMAIN LOCATING PURPOSES.



2	06/15/01	GDH	RECORD DRAWING	
1	07/20/00	GDH	ISSUED FOR CONSTRUCTION	
0	04/06/00	GDH	ISSUED FOR COMMENT	
NO	Date	By	REVISIONS	MANUCAD

Design	HJG	Ch'kd	WAB	Date MARCH 2000
Drawn	JC/CLC	Ch'kd	HJG	
Scale Horiz. 20 10 0 20				References APPENDIX VI
Vert. 2 1 0 2				

APPROVALS

Municipal

Regional

Director, Engineering Services

Manager, Design Services

Field Notes

Stamp

D'ORAZIO / WALTER JOINT VENTURE

Halton

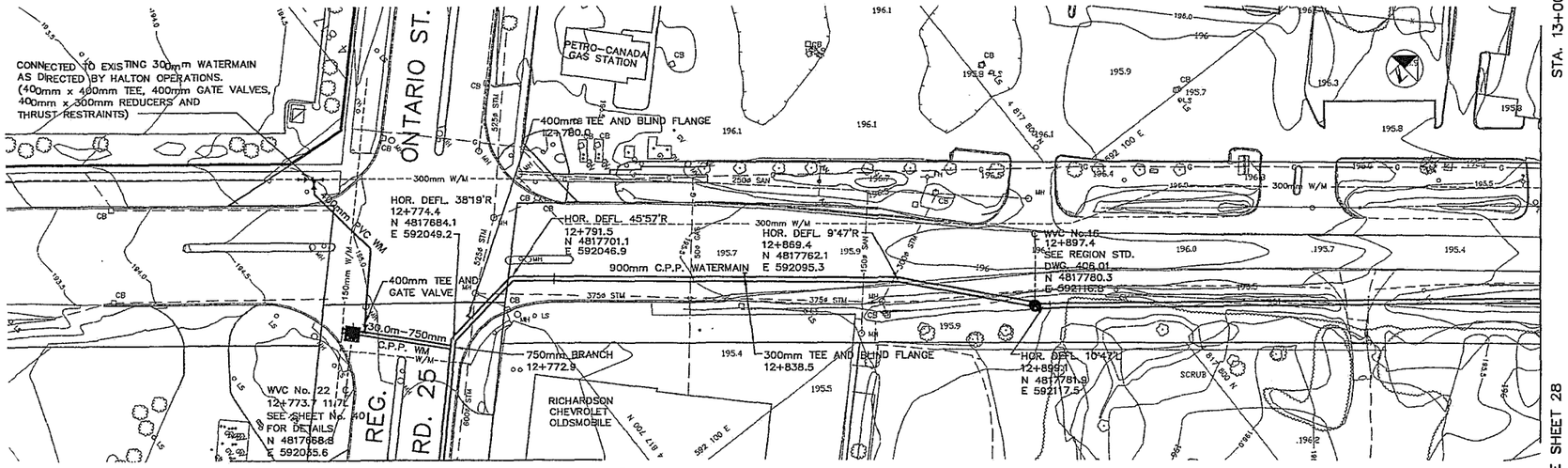
CENTRELINE ELEVATIONS	
WATERMAIN INVERTS	139.1 @ +0.13% CLASS 16 AWWA C301(L) — 184.72 — 58.6 @ +3.83% CLASS 16 AWWA C301(L) — 187.13 — 154.3 @ +2.51% CLASS 16 AWWA C301(L) — 191.00 — 78.7 @ +0.58% CLASS 16 AWWA C301(L)
SANITARY SEWER INVERTS	
CHAINAGE	12+380, 12+400, 12+463, 12+500, 12+542, 12+600, 12+698, 12+700, 12+750

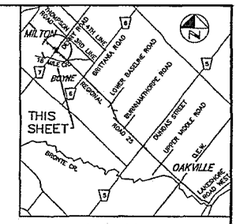
TITLE
WATER AND WASTEWATER TRUNK MAINS
REGIONAL ROAD 25
FROM STA. 12+380 TO STA. 12+750
IN THE TOWN OF MILTON

Consultant File NO 99-6749-06	Regional Drawing NO M- 5101
CONTRACT NO PR-1823	Drawing no. SHEET 26 OF 43

PR-1823-XX 26 of 43 M- 5101

M- 5102



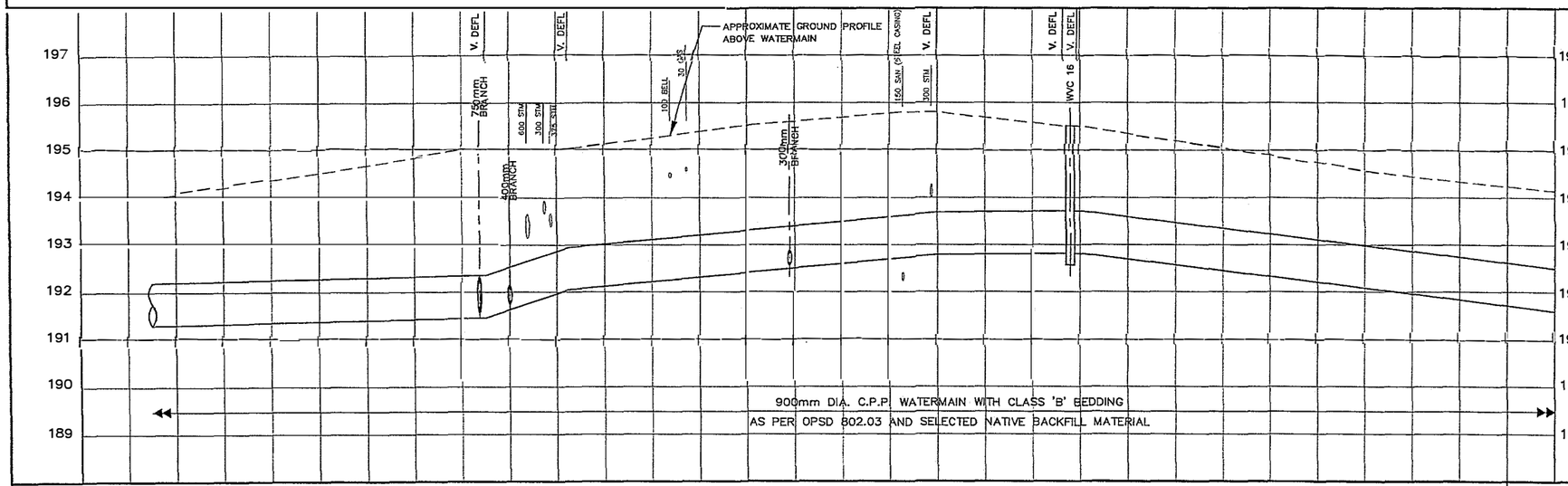


KEY PLAN

DERRY ROAD

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. HORIZONTAL CONTROL LINES AND STATIONS TO 12+775 ARE DERIVED FROM DATA SUPPLIED BY THE REGIONAL MUNICIPALITY OF HALTON. SUBSEQUENT STATIONS ARE ALONG THE 900mm WATERMAIN CENTERLINE.
3. THE LOCATIONS OF ALL EXISTING UTILITIES ENCOUNTERED DURING CONSTRUCTION ARE APPROXIMATE. CONTACT THE APPLICABLE UTILITY OWNER FOR EXACT LOCATIONS.
4. TRACE-O-FLEX MARKERS WERE PROVIDED FOR WATERMAIN LOCATING PURPOSES.



NO	Date	By	REVISIONS
2	08/15/01	GDH	RECORD DRAWING
1	07/20/00	GDH	ISSUED FOR CONSTRUCTION
0	04/12/00	GDH	ISSUED FOR COMMENT

MANUCAD

Design	HJG	Ch'kd	WAB	Date APRIL 2000
Drawn	CLC/JC	Ch'kd	HJG	

Scale Horiz. 10 5 0 10
Vert. 5 4

References APPENDIX VI

APPROVALS

Municipal

Field Notes

Regional

Director, Engineering Services

Manager, Design Services

Stamp

D'ORAZIO / WALTER JOINT VENTURE

Halton

TITLE
WATER AND WASTEWATER TRUNK MAINS
DERRY ROAD
FROM STA. 12+750 TO STA. 13+000
IN THE TOWN OF MILTON

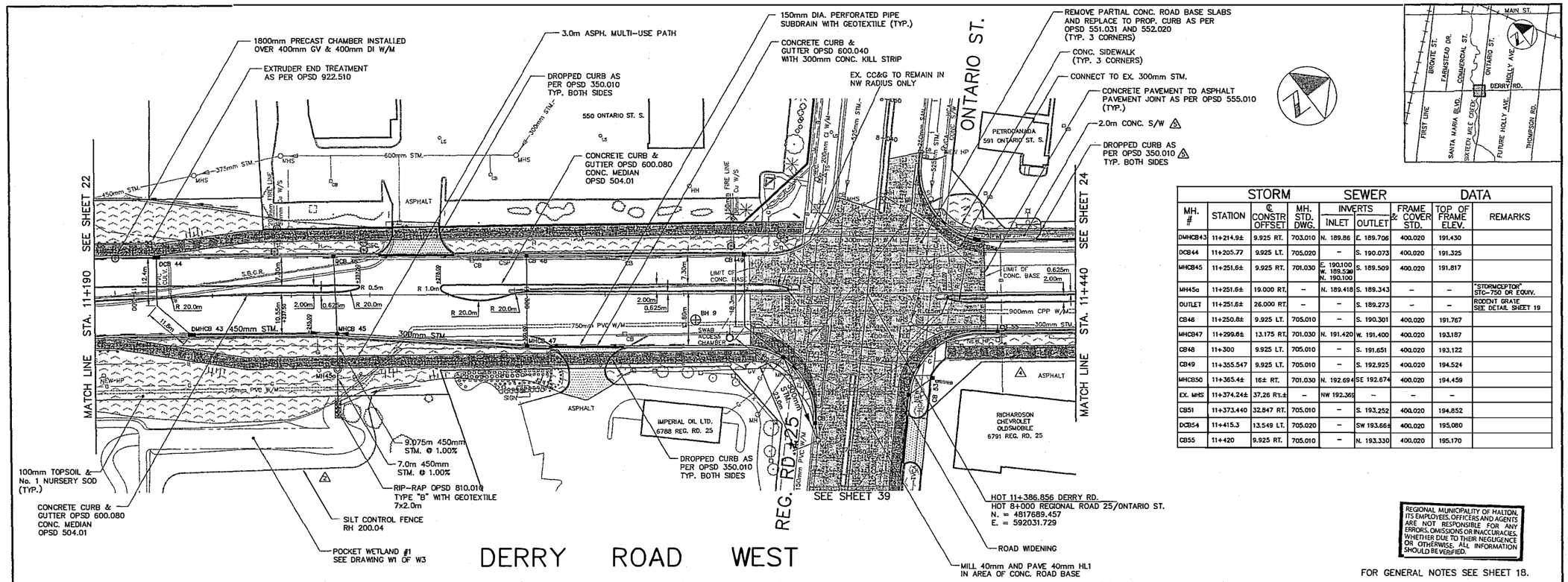
Consultant File NO 99-6749-06

Re M- 5102

CONTRACT NO PR-1823

Drawing NO SHEET 27 OF 43

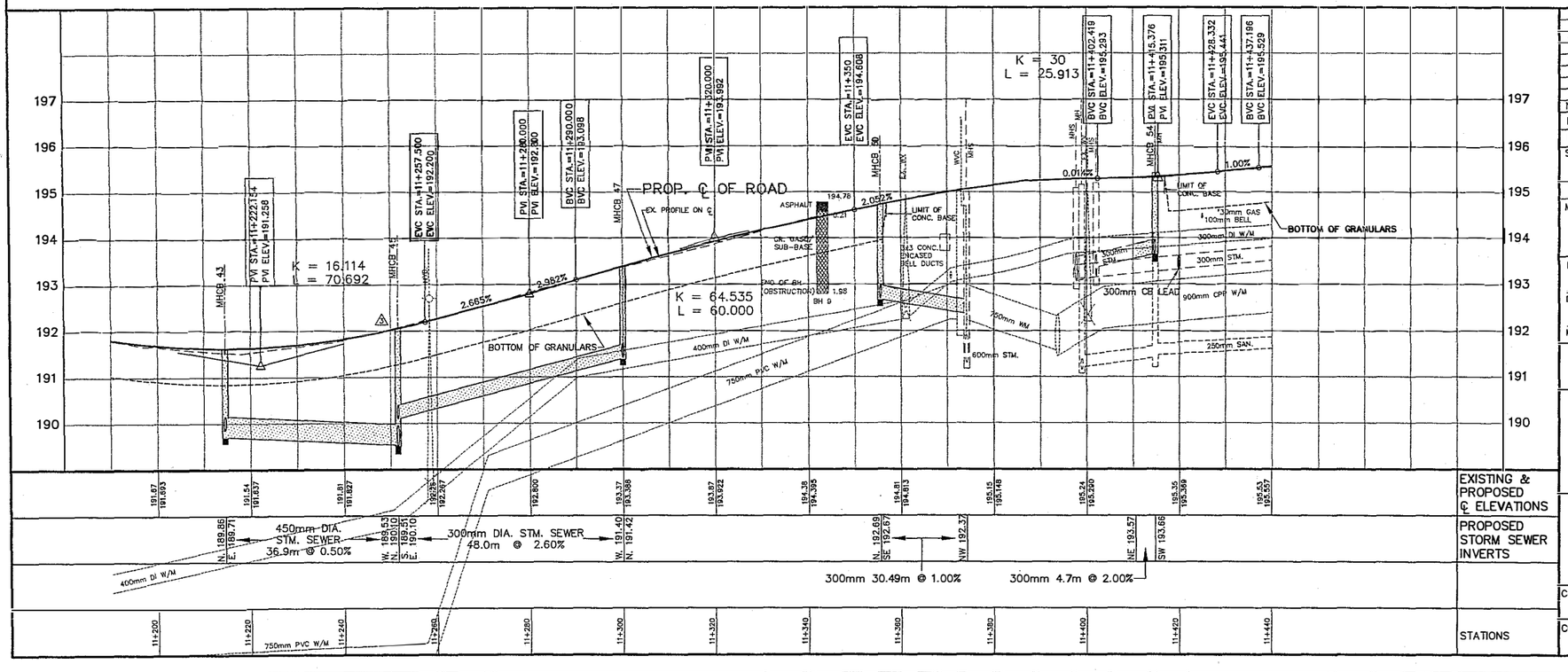
PR-1823-XX 27 of 43



STORM SEWER DATA								
MH. #	STATION	℄ CONSTR OFFSET	MH. STD. DWG.	INVERTS INLET	INVERTS OUTLET	FRAME & COVER STD.	TOP OF FRAME ELEV.	REMARKS
DMHCB43	11+214.9±	9.925 RT.	703.010	N. 189.86	E. 189.706	400.020	191.430	
DCB44	11+205.77	9.925 LT.	705.020	–	S. 190.073	400.020	191.325	
MHCB45	11+251.6±	9.925 RT.	701.030	E. 190.100 W. 189.540 N. 190.100	S. 189.509	400.020	191.817	
MH45a	11+251.6±	19.000 RT.	–	N. 189.418	S. 189.343	–	–	"STORMCEPTOR" STC-750 OR EQUIV.
OUTLET	11+251.6±	26.000 RT.	–	–	S. 189.273	–	–	RODDIT GRATE SEE DETAIL SHEET 19
CB46	11+250.8±	9.925 LT.	705.010	–	S. 190.301	400.020	191.767	
MHCB47	11+299.6±	13.175 RT.	701.030	N. 191.420	W. 191.400	400.020	193.187	
CB48	11+300	9.925 LT.	705.010	–	S. 191.651	400.020	193.122	
CB49	11+355.547	9.925 LT.	705.010	–	S. 192.925	400.020	194.524	
MHCB50	11+365.4±	16± RT.	701.030	N. 192.694	SE 192.674	400.020	194.459	
EX. MHS	11+374.24±	37.26 RT.±	–	NW 192.366	–	–	–	
CB51	11+373.440	32.847 RT.	705.010	–	S. 193.252	400.020	194.852	
DCB54	11+415.3	13.549 LT.	705.020	–	SW 193.664	400.020	195.080	
CB55	11+420	9.925 RT.	705.010	–	N. 193.330	400.020	195.170	

REGIONAL MUNICIPALITY OF HALTON, ITS EMPLOYEES, OFFICERS AND AGENTS ARE NOT RESPONSIBLE FOR ANY ERRORS, OMISSIONS OR INACCURACIES, WHETHER DUE TO THEIR NEGLIGENCE OR OTHERWISE. ALL INFORMATION SHOULD BE VERIFIED.

FOR GENERAL NOTES SEE SHEET 18.



6	10/03/11	E.W.S.	AS CONSTRUCTED
5	03/05/07	E.W.S.	CONC. SIDEWALK MOVED, CURB ADDED
4	06/06/06	E.W.S.	RETAINING WALL REMOVED
3	09/05/06	E.W.S.	V. ALIGNMENT OF N. & S. LANES
2	04/01/06	E.W.S.	SILT FENCE
1	OCT. 7/05	E.W.S.	VERT. ALIGNMENT CHANGED, CB MOVED

NO	Date	By	REVISIONS	MANUCAD

Design	B.K.	Ch'kd	Date: MARCH 2005
Drawn	E.W.S.	Ch'kd	

Scale: 1:500 Horiz. 10 5 0 10; 1:50 Vert. 1 0.5 0 — References

APPROVALS — Field Notes

Municipal — Stamp

Regional

Director, Engineering Services

Manager, Design Services

M-09483

Halton

SOUTH ROAD ALIGNMENT DERRY ROAD (REG. RD. 7)

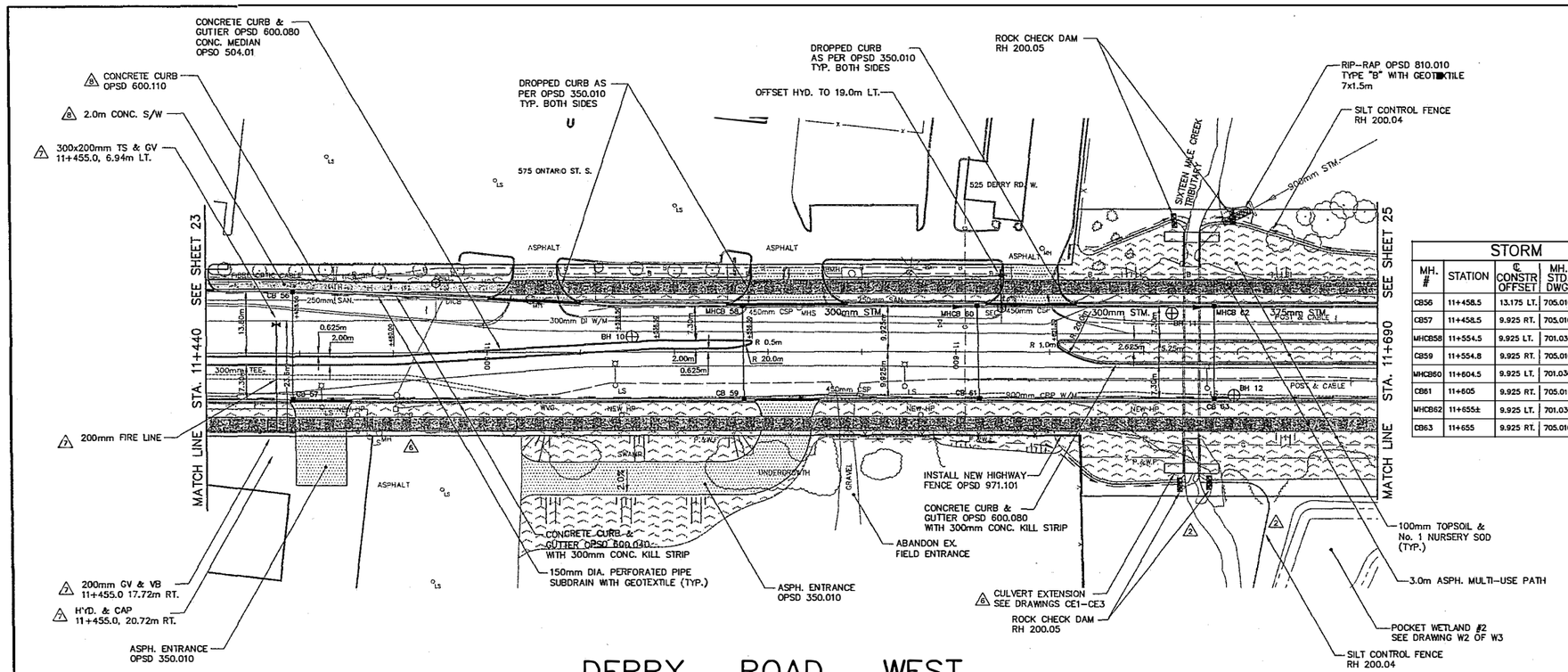
FROM 200m WEST TO 50m EAST OF ONTARIO ST./REG. RD. 25
11+190 TO 11+440
IN THE TOWN OF MILTON

Consultant File NO — Regional Drawing NO

CONTRACT NO: R-2047B-05

Drawing NO — SHEET 23a OF 62

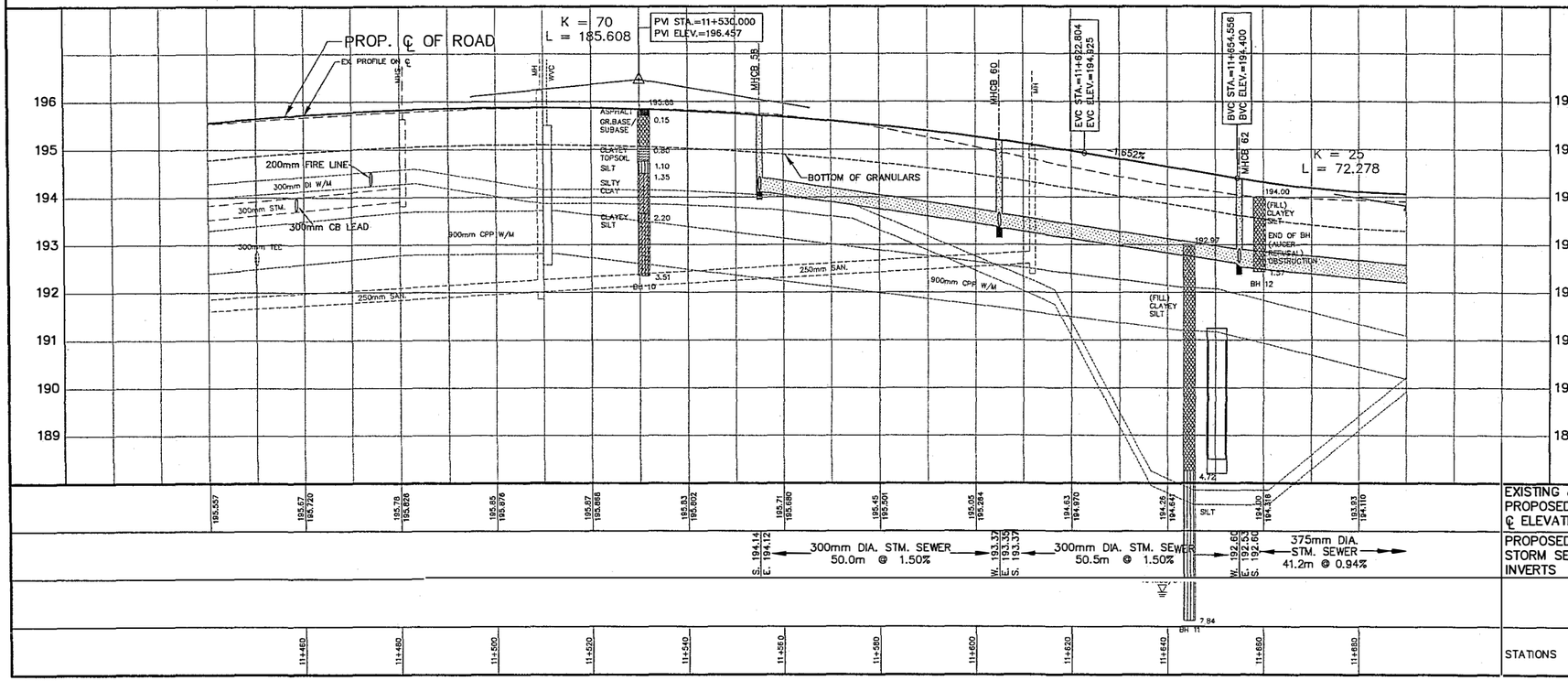
PR-2047B-05 23a of 62



STORM SEWER DATA								
MH. #	STATION	℄ CONSTR OFFSET	MH. STD. DWG.	INVERTS INLET	INVERTS OUTLET	FRAME & COVER STO.	TOP OF FRAME ELEV.	REMARKS
CB56	11+458.5	13.175 LT.	705.010	–	S. 194.520	400.020	195.447	
CB57	11+458.5	9.925 RT.	705.010	–	S. 194.222	400.020	195.512	
MHCB58	11+554.5	9.925 LT.	701.030	S. 194.140	E. 194.120	400.020	195.518	
CB59	11+554.8	9.925 RT.	705.010	–	N. 194.339	400.020	195.518	
MHCB60	11+604.5	9.925 LT.	701.030	W. 193.373 S. 193.373	E. 193.353	400.020	194.998	
CB61	11+605	9.925 RT.	705.010	–	N. 193.572	400.020	194.998	
MHCB62	11+655±	9.925 LT.	701.030	W. 192.603 S. 192.603	E. 192.528	400.020	194.195	
CB63	11+655	9.925 RT.	705.010	–	N. 192.802	400.020	194.195	

DERRY ROAD WEST

FOR GENERAL NOTES SEE SHEET 18.



NO	Date	By	REVISIONS	MAN	CAD
9	02/01/12	E.W.S.	AS CONSTRUCTED		X
8	03/05/07	E.W.S.	CONC. SIDEWALK MOVED, CURB ADDED		X
7	17/01/06	E.W.S.	W/S TO CAR DEALER MOVED		X
6	06/06/06	E.W.S.	ADD CULV. EXT., REMOVE RET. WALL		X
5	25/05/06	E.W.S.	HYD. TO CAR DEALER MOVED		X
4	25/04/06	E.W.S.	CULVERT RETAINING WALL ADDED		X
3	18/04/06	E.W.S.	W/S TO CAR DEALER MOVED		X
2	04/01/06	E.W.S.	ROCK CHECK DAM, SILT FENCE	X	X
1	OCT. 7/05	E.W.S.	VERT. ALIGNMENT CHANGED		X

Design	B.K.	Ch'kd	Date MARCH 2005
Drawn	E.W.S.	C hk'd	
Scale 1:500 Horiz. 10 5 0 10; 1:50 Vert. 1 0.5 0 1			References

APPROVALS

Municipal

Regional

Director, Engineering Services

Manager, Design Services

Field Notes

Stamp

M-09484

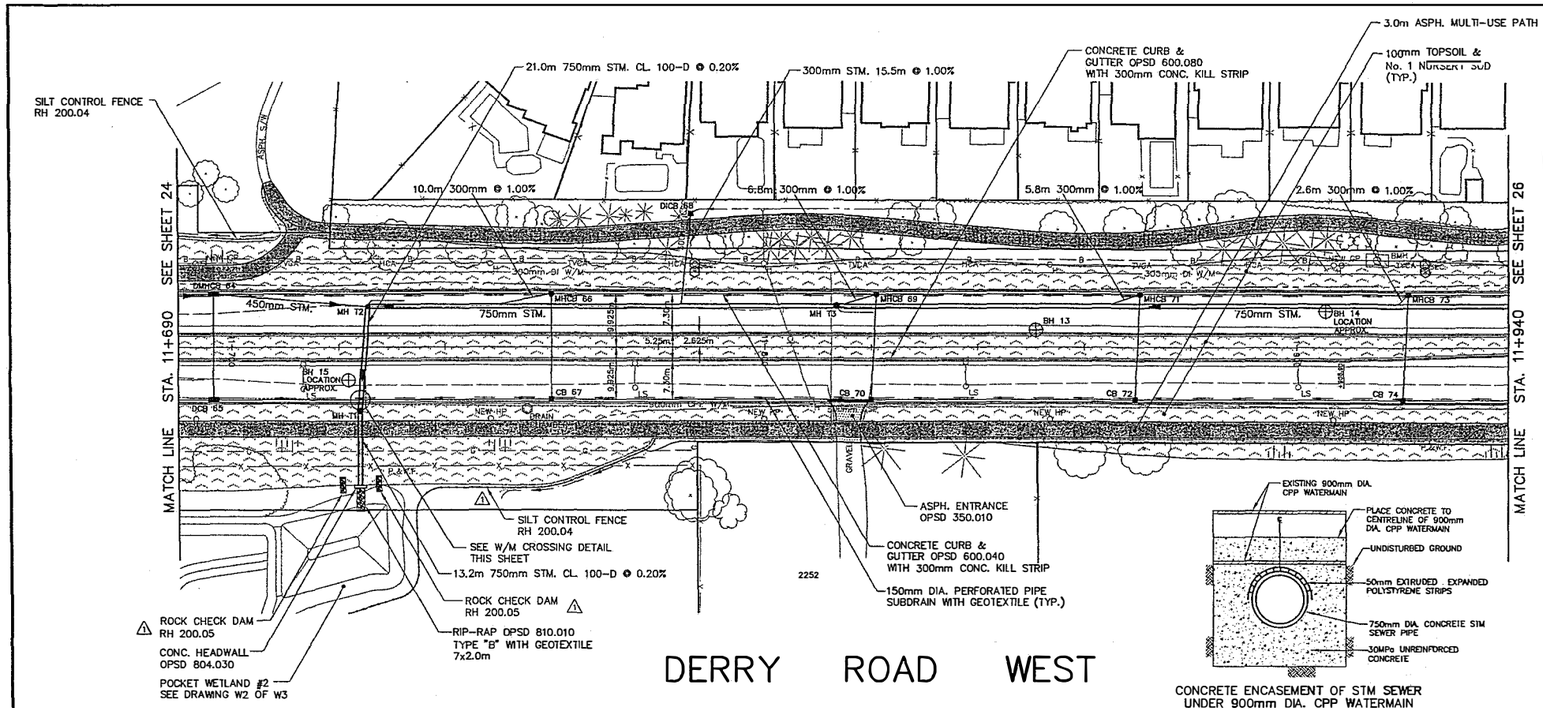
Halton

PROPOSED RECONSTRUCTION DERRY ROAD (REG. RD. 7)

FROM 50m EAST OF ONTARIO ST./REG. RD. 25 TO 40m EAST OF SIXTEEN MILE CREEK TRIBUTARY
11+440 TO 11+690
IN THE TOWN OF MILTON

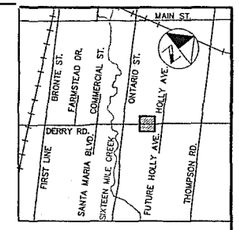
Consultant File NO	Regional Drawing NO
CONTRACT NO R-2047B-05	Drawing NO SHEET 24 OF 62

PR-2047B-05 24 of 62



CONCRETE ENCASEMENT OF STM SEWER UNDER 900mm DIA. CPP WATERMAIN
N.T.S.

NOTE: CONTRACTOR TO PROVIDE TEMPORARY SUPPORT TO THE EXISTING 900mm DIA. CPP WATERMAIN DURING EXCAVATION AND INSTALLATION OF THE 750mm DIA. STORM SEWER. CONTRACTOR TO SUBMIT DRAWINGS AND DESIGN CALCULATIONS FOR THE SUPPORT SYSTEM, STAMPED AND SIGNED BY A PROFESSIONAL ENGINEER, FOR REVIEW AND APPROVAL BY THE UNDERSIGNED ENGINEER.

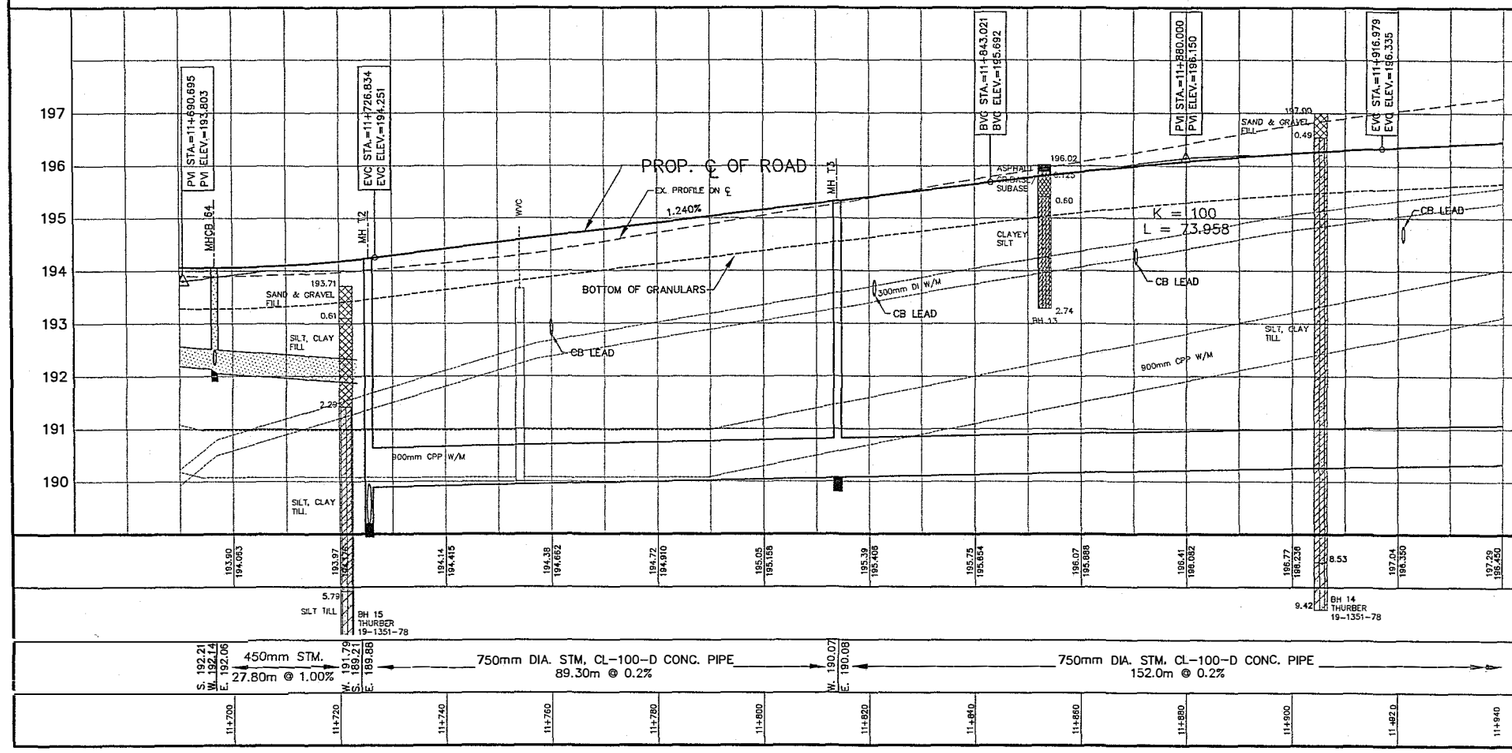


REGIONAL MUNICIPALITY OF HALTON, ITS EMPLOYEES, OFFICERS AND AGENTS ARE NOT RESPONSIBLE FOR ANY ERRORS, OMISSIONS OR INACCURACIES, WHETHER DUE TO THEIR NEGLIGENCE OR OTHERWISE. ALL INFORMATION SHOULD BE VERIFIED.

STORM SEWER DATA								
MH. #	STATION	℄ CONSTR OFFSET	MH. STD. DWG.	INVERTS INLET	INVERTS OUTLET	FRAME & COVER STD.	TOP OF FRAME ELEV.	REMARKS
DMHCB64	11+695.5±	9.925 LT.	703.010	W. 192.135 S. 192.210	E. 192.060	400.020	193.862	
DCB65	11+696.6	9.925 RT.	705.020	N. 192.409	–	400.020	193.862	
MHCB66	11+760±	9.925 LT.	701.030	S. 192.770	SW 192.710	400.020	194.464	
CB67	11+759.7±	9.925 RT.	705.010	–	N. 192.969	400.020	194.464	
DICB68	11+786.5	25.000 LT.	705.030	–	S. 193.225	400.120	193.900	BIRDCAGE FRAME & GRATE
MHCB69	11+821.0	9.925 LT.	701.030	S. 193.510	SW 193.450	400.020	195.208	
CB70	11+820±	9.925 RT.	705.010	–	N. 193.709	400.020	195.208	
MHCB71	11+870.5±	9.925 LT.	701.030	S. 194.130	SW 194.090	400.020	195.792	
CB72	11+869.6±	9.925 RT.	705.010	–	N. 194.329	400.020	195.792	
MHCB73	11+921.0±	9.925 LT.	701.030	S. 194.550	SW 194.490	400.020	195.954	
CB74	11+920	9.925 RT.	705.010	–	N. 194.549	400.020	195.954	

STORM SEWER DATA								
MH. #	STATION	℄ CONSTR OFFSET	MH. STD. DWG.	INVERTS INLET	INVERTS OUTLET	FRAME & COVER STD.	TOP OF FRAME ELEV.	REMARKS
OUTLET	11+724	26.0 RT.	701.011	–	S. 189.132	401.010	–	
MH T1	11+724		701.011	N. 189.170	S. 189.160	401.010	195.991	
MH T2	11+725.5	7.625 LT.	701.012	E. 189.884 W. 191.786	S. 189.209	401.010	193.929	
MH T3	11+813.5	7.625 LT.	701.011	E. 190.076	W. 190.066	401.010	195.199	

FOR GENERAL NOTES SEE SHEET 18.



NO	Date	By	REVISIONS	MANU CAD
2	02/01/12	E.W.S.	AS CONSTRUCTED	X X
1	04/01/06	E.W.S.	ROCK CHECK DAM, SILT FENCE	X X

Design B.K. | Ch'kd | Date MARCH 2005
Drawn E.W.S. | Ch'kd | References
Scale 1:500 Horiz. 10 5 0 10; 1:50 Vert. 1 0.5 0 1

APPROVALS
Municipal
Regional
Director, Engineering Services
Manager, Design Services

Field Notes

Stamp

M-09485

Halton

PROPOSED RECONSTRUCTION
DERRY ROAD (REG. RD. 7)
FROM 40m EAST OF SIXTEEN MILE CREEK TRIBUTARY TO 150m WEST OF HOLLY AVE.
11+690 TO 11+940
IN THE TOWN OF MILTON

Consultant File NO | Regional Drawing NO
CONTRACT NO R-2047B-05 | Drawing NO SHEET 25 OF 62

PR-2047B-05 25 of 62

DRAWINGS

8010-8150 DERRY ROAD WEST
Milton, Ontario
Proposed Residential Development

Project Statistics -Area D- Stacked TH-Reduced Occupant-1.0 & Visitor .20
August 17, 2023 Project No. 21-011

1.0 Site Area

	sq.m	sq.ft
1.1 **Net Lot Area**	**22,926.97**	**246,784**

	sq.m.	sq.ft
1.2 Total Site Area	29,704.70	319,739
Future Road Widening Allowance	1,553.23	16,719
Conservation Area	5,224.50	56,236
Net Lot Area	22,926.97	246,784

2.0 GFA

2.1 **Proposed GFA - Residential Condominium Buildings** *(Total floor area of each floor, exclusive of basement and storage areas.)*

	floors		sq.m.	sq.ft.
BUILDING A - 20 Storey				
Level 1	1	x	1,040.46	11,199
Level 1 TH	1	x	409.87	4,412
Level 2	1	x	934.97	10,064
Level 3	1	x	962.76	10,363
Level 4	1	x	758.19	8,161
Levels 5 to 15	11	x	702.60	83,190
Levels 16 to 20	5	x	577.52	31,082
Total Building A			**14,722.45**	**158,471**
BUILDING B - 25 Storey				
Level 1	1	x	1,436.89	15,467
Level 2	1	x	1,506.45	16,215
Level 3	1	x	1,544.31	16,623
Level 4	1	x	765.26	8,237
Levels 5 to 25	21	x	750.00	15,750.00 169,532
Total Building B			**21,002.91**	**226,446**
BUILDING C - 14 Storey				
Level 1	1	x	1,226.24	13,199
Level 2	1	x	1,200.79	12,925
Level 3	1	x	1,195.65	12,870
Level 4	1	x	908.11	9,775
Levels 5 to 8	4	x	957.54	3,830.16 41,227
Levels 9 to 10	2	x	904.68	1,809.36 19,476
Levels 11 to 13	3	x	957.54	2,872.62 30,921
Level 14	1	x	904.68	904.68 9,738
Total Building C			**13,947.61**	**150,131**
2.2 **Total GFA - Residential Condominium Buildings**			**49,672.97**	**535,048**

2.3 **Proposed GFA - 3 Storey Townhouses**

Townhouse- TH-A				
2 Townhouse Units - Type A1/2	2	x	201.88	403.75 4,346
6 Townhouse Units - Type B	6	x	169.06	1,014.36 10,918
Total Building TH-A			**1,418.11**	**15,264**
Townhouse- TH-B				
2 Townhouse Units - Type A1/2	2	x	201.88	403.75 4,346
6 Townhouse Units - Type B	6	x	169.06	1,014.36 10,918
Total Building TH-B			**1,418.11**	**15,264**
Townhouse- TH-C				
2 Townhouse Units - Type A1/2	2	x	201.88	403.75 4,346
6 Townhouse Units - Type B	6	x	169.06	1,014.36 10,918
Total Building TH-C			**1,418.11**	**15,264**
Townhouse- TH-D				
2 Townhouse Units - Type A1/A2	2	x	201.88	403.75 4,346
2 Townhouse Units - Type B	2	x	169.06	338.12 3,639
Total Building TH-D			**741.87**	**7,985**
Townhouse- TH-E				
4 Townhouse Units - Type A1/2	4	x	201.88	807.51 8,692
2 Townhouse Units - Type C	2	x	164.24	328.48 3,536
Total Building TH-E			**1,135.99**	**12,228**
2.4 **Total GFA - 3 Storey Townhouses**			**6,132.20**	**66,006**

2.5 **Proposed GFA - 3 Storey Stacked Condominium Townhouses**

Townhouse- TH-3F				
Type A - with patio	9	x	84.66	761.94 8,201
Type B - with roof terrace	9	x	103.66	932.94 10,042
Type C - with roof terrace	9	x	110.12	991.08 10,668
Total Building TH-3F			**2,685.96**	**28,911**
2.6 **Total Overall GFA**			**58,491.13**	**629,966**

3.0 Density

Total FSI	*Total GFA*	*Site Area*	*FSI*
	58,491.13 sq.m. ÷ 22,926.97 sq.m.		**2.55**

Total Units per Hectare- Phase 1- Building A	*Total Units*	*Site Area*	*UPH*
	168	2.29	**73**

Total Units per Hectare- Phase 2- Building B	*Total Units*	*Site Area*	*UPH*
	262	2.29	**114**

Total Units per Hectare- Phase 3- Building C	*Total Units*	*Site Area*	*UPH*
	184	2.29	**80**

Total Units per Hectare- Phase 4- Freehold Townhouses	*Total Units*	*Site Area*	*UPH*
	34	2.29	**15**

Total Units per Hectare- Phase 5- Stacked Townhouses	*Total Units*	*Site Area*	*UPH*
	27	2.29	**12**

Total Units per Hectare	*Total Units*	*Site Area*	*UPH*
	675	2.29	**295**

4.0 Unit Count

Proposed Condominium Buildings

4.1 Floors			*1 BR/ST*	*1 BR+D*	*2 BR*	*2 BR+DEN*	*2L-TH*	*Units*
BUILDING A								
Level 1	1	x	0	0	0	0	7	7
Level 2	1	x	3	4	2	3	0	12
Level 3	1	x	3	3	2	3	0	11
Level 4	1	x	0	4	2	3	0	9
Levels 5 to 15	11	x	1	3	3	2	0	99
Levels 16 to 20	5	x	0	1	0	5	0	30
Total Units Building A			17	49	39	56	7	**168**
			10.12%	*29.17%*	*23.21%*	*33.33%*	*4.17%*	*100%*
BUILDING B								
Level 1	1	x	3	1	5	0	0	9
Level 2	1	x	5	4	5	3	0	17
Level 3	1	x	8	4	4	4	0	20
Level 4	1	x	0	2	2	2	0	6
Levels 5 to 25	21	x	1	5	3	1	0	210
Total Units Building B			37	116	79	30	0	**262**
			14.1%	*44.3%*	*30.2%*	*11.5%*	*0.0%*	*100%*
BUILDING C								
Level 1	1	x	0	0	0	0	9	9
Level 2	1	x	2	4	1	1	0	8
Level 3	1	x	3	11	2	1	0	17
Level 4	1	x	7	3	2	1	0	13
Levels 5 to 8	4	x	7	3	1	3	0	56
Levels 9 to 10	2	x	5	5	2	1	0	26
Levels 11 to 13	3	x	7	3	1	3	0	42
Level 14	1	x	5	5	2	1	0	13
Total Units Building C			76	54	18	27	9	**184**
			41%	*29%*	*10%*	*15%*	*5%*	*100%*
4.2 **Total Condominium Units**			130	219	136	113	16	**614**
			21%	36%	22%	18%	3%	100%

Proposed Townhouse Buildings

4.3	*Units*
3 Storey Townhouses w/ Garage	34
Building D- 3 Storey Stacked TH Block	27
Total Townhouse Units	**61**
4.4 **Total Overall Units**	**675**

5.0 Vehicular Parking

Parking - Condominium

5.1		*No. of Units*	*Ratio*	*Occupant Spaces*	*Visitor Spaces*	*Total Parking Spaces*
Residential Parking	*STUDIO / 1BR*	349	x1.00/unit	349		
	2BR / 3BR	265	x1.00/unit	265		
Visitor Parking		614	x0.20/unit		123	
Car Share Parking		1			1	
Total Parking:				614		**738**

Parking - Stacked Townhouses

5.2	*No. of Units*	*Ratio*	*Occupant Spaces*	*Visitor Spaces*	*Total Parking Spaces*
Residential Parking	27	x1.00/unit	27		
Visitor Parking	27	x0.20/unit		6	
Total Parking:					**33**
5.3 **Total Parking Required for the Condominium & Building D**			641	130	**771**

Parking - Townhouses w/ Garage

5.4	*No. of Units*	*Ratio*	*Occupant Spaces*	*Visitor Spaces*	*Total Parking Spaces*
Residential Parking	34	x2.00/unit	68		
Visitor Parking	34	x0.20/unit		7	
Total Parking:					**75**
5.5 **Total Parking Required for the Development**			709	137	**846**

5.6 **Accessible Parking Required as per Milton Bylaw 016-2014**

			Parking Spaces
Occupant spaces- 2 + 2% of the total number of parking spaces when the parking count is between 201-1000 (709 spaces)	2+15=		**17**
Visitor spaces- 1 + 3% of the total number of parking spaces when the parking count is between 101-200 parking spaces (137 spaces)	1+5=		**6**
Total Accessible Parking Required			**23**

Proposed Parking Spaces -Condominium Bldgs & Building D

5.7	*Occupant Spaces*	*Occupant Access.*	*Visitor spaces*	*Visitor Access.*	*Car Share*	*Parking Spaces*
Level P1	277	8	57	0		342
Level P2	353	9	0	0		362
Level 1 On-Street Parking	0	0	8	0		8
Level 1 Surface Parking Lot	0	0	60	6	1	67
Total Proposed Parking Spaces -Condominium Bldgs & Building D	630	17	125	6		**779**
	647		131			

Proposed Parking Spaces -TH w/ garage

5.8	*Occupant Spaces*	*Occupant Access.*	*Visitor spaces*	*Visitor Access.*	*Parking Spaces*
Level 1 On-Street Parking	0	0	9	0	9
Garage / Driveway Parking -Townhouses	88			0	88
Total Proposed Parking Spaces -TH w/ garage	88	0	9	0	**97**

5.9					
	718	17	134	6	
Total Parking Provided	735		140	1	**876**

6.0 Bicycle Parking

6.1 **Required Bicycle Parking as per Milton Bylaw 063-2019**

	Short- Term	*Long-Term*	*Parking Spaces*
Bicycle Parking Required	23	363	**386**

6.2 **Proposed Bicycle Parking**

	Short Term-GL	*LT-Bike Shelters*	*Long Term-GL*	*Long Term-PT*	*Parking Spaces*
Building "A"	12	0	84	16	112
Building "B"	14	141	0	0	155
Building "C"	10	141	0	0	151
Total Proposed Bicycle Parking	**36**	**282**	**84**	**16**	**418**

7.0 Amenity Area

7.1 **Proposed Indoor Amenity**

	sq.m	*sq.ft*
Building "A"	178.81	1,925
Building "B"	496.23	5,341
Building "C"	148.79	1,602
Total Proposed Indoor Amenity	**823.83**	**8,868**

7.2 **Proposed Outdoor Amenity**

	sq.m	*sq.ft*
Building "A,B & C" (Outdoor Amenity 2)	460.28	4,954
Building "A,B& C" (Outdoor Amenity 3)	453.36	4,880
Building "A" (Outdoor Amenity 1)	81.94	882
Open Central Space	2,392.00	25,747
Open Green Space	74.50	802
Total Proposed Outdoor Amenity	**3,462.08**	**37,266**

7.3 **Total Proposed Indoor & Outdoor Amenity Area**

	sq.m	*sq.ft*
Total Proposed Indoor Amenity	823.83	8,868
Total Proposed Outdoor Amenity	3,462.08	37,266
Total Proposed Indoor & Outdoor Amenity Area	**4,285.91**	**46,133**

8.0 Lot Coverage

	%	*sq.m*	*sq.ft*
Building Coverage	30.3	6,955.94	74,873
Paved Area	27.4	6,292.00	67,727
Landscaped Area	42.2	9,679.03	104,184
Site Area	100.0	**22,926.97**	**246,784**

OVERALL PROJECT STATISTICS 1 dA1.1
NTS

8010-8150 DERRY ROAD WEST
Building 'D'- 3 Storey Stacked Townhouse Block
Milton, Ontario
Proposed Residential Development

Project Statistics
April 28, 2023 Project No. 21-011

1.0 Site Area

	sq.m	sq.ft
1.1 **Building D Site Area**	**2,374.50**	**25,559**

2.0 GFA

2.1 **Proposed GFA - 3 Storey Stacked Condominium Townhouses**

Townhouse- Building D				
Type A - *Ground Floor*	9	x	84.66	761.94 8,201
Type B - *2-3rd floors with roof terrace*	9	x	103.66	932.94 10,042
Type C - *2-3rd floors with roof terrace*	9	x	110.12	991.08 10,668
Total Building			**2,685.96**	**28,911**
2.2 **Total GFA - 3 Storey Stacked Condominium Townhouses**			**2,685.96**	**28,911**

2.2 **Proposed GFA- U/G GARAGE - (Not in This Phase)**

Level P1	1	x	0.00	0.00 0
Level P2	1	x	0.00	0.00 0
Total Parking Area			**0.00**	**0**

3.0 Density

Total FSI	*Total GFA*	*Site Area*	*FSI*
	2,685.96 sq.m.	÷ 2,374.50 sq.m.	**1.13**

4.0 Unit Count

4.1 **Building D- Stacked Townhouse Block**

	Floors		*Type A*	*Type B*	*Type C*	*Units*
BUILDING D						
Level 1	1	x	9	0	0	9
Level 2 & 3	1	x	0	9	9	18
Total Units Building D			9	9	9	**27**
			33.33%	*33.33%*	*33.33%*	*100%*

5.0 Vehicular Parking

Vehicular Parking OPA Amended parking rates

5.1 **Building D-Stacked Townhouses (Amended parking rates)**

	No. of Units	*Ratio*	*Occupant Spaces*	*Visitor Spaces*	*Total Parking Spaces*
Residential Parking	27	x1.00/unit	27		
Visitor Parking	27	x0.20/unit		6	
Total Parking:					**33**

5.2 **Building 'D' Proposed Parking**

	Occupant Spaces	*Occupant Access. Spaces*	*Visitor Spaces*	*Visitor Access. Spaces*	*Car Share*	*Total Parking Spaces*
Level P2	0	0	0	0		0
Level P1	27	0	0	0		27
Surface	0	0	6	0	0	6
Total Units Building B	**27**	**0**	**6**	**0**		**33**

6.0 Bicycle Parking

6.1 **Required Bicycle Parking as per Milton Bylaw 016-2014**

	No. of Units	*Ratio*	*Parking Spaces*
Bicycle Parking- Condo- Building 'D'	27	x0.20/unit	6
			6

6.2 **Proposed Bicycle Parking**

	floors	*Short Term-GL*	*Long Term-Surface*	*Parking Spaces*
Building 'B'	Surface	8	0	8
Total Proposed Bicycle Parking		**8**	**0**	**8**

7.0 Amenity Area

7.1 **Proposed Indoor Amenity**

		sq.	*sq.ft*
Level 1		0.00	0
Total Proposed Indoor Amenity		**0.00**	**0**

7.2 **Proposed Outdoor Amenity**

		sq.m	*sq.ft*
Level 1	*GF- Patio Area*	169.45	1,824
Terrace	*Rooftop Terrace*	709.87	7,641
Surface Park		170.00	1,830
Total Proposed Outdoor Amenity		**1,049.32**	**11,295**

7.3 **Total Proposed Indoor & Outdoor Amenity Area**

	sq.m	*sq.ft*
Total Proposed Indoor Amenity	0.00	0
Total Proposed Outdoor Amenity	1,049.32	11,295
Total Proposed Indoor & Outdoor Amenity Area	**1,049.32**	**11,295**

BUILDING D STATISTICS 2 dA1.1
NTS

Date:

KIRKOR
ARCHITECTS AND PLANNERS
20 De Boers Drive Suite 400
Toronto, ON M3J 0H1

No.:	Revision:	Date:
15	LOPA & ZBA SUB #2 - BLDG D	AUG 17, 2023
14	LOPA & ZBA SUB - BLDG D	MAY 03, 2023
13	SPA RESUB #10 - BLDG B	DEC 12, 2022
12	SPA RESUB #9 - BLDG B	OCT 18, 2022
11	SPA RESUB #8 - BLDG B	JUNE 21, 2022
10	SPA RESUBMISSION #7	SEPT 10, 2021
09	SPA RESUBMISSION #6	JULY 8, 2021
08	SPA RESUBMISSION #5	APR. 15, 2021
07	SPA RESUBMISSION #4	NOV. 20, 2020
06	SPA RESUBMISSION #3	AUG. 20, 2020
05	SPA RESUBMISSION #2	JAN. 17, 2020
04	SPA SUBMISSION	AUG. 9, 2019
03	LOPA & ZBA RE-SUBMISSION	DEC 19, 2018
02	LOPA & ZBA RE-SUBMISSION	JULY 24, 2018
01	LOPA & ZBA SUBMISSION	OCT 2, 2017

No:	Issued For:	Date:

Drawing Title:
STATISTICS

Project:
Lindvest

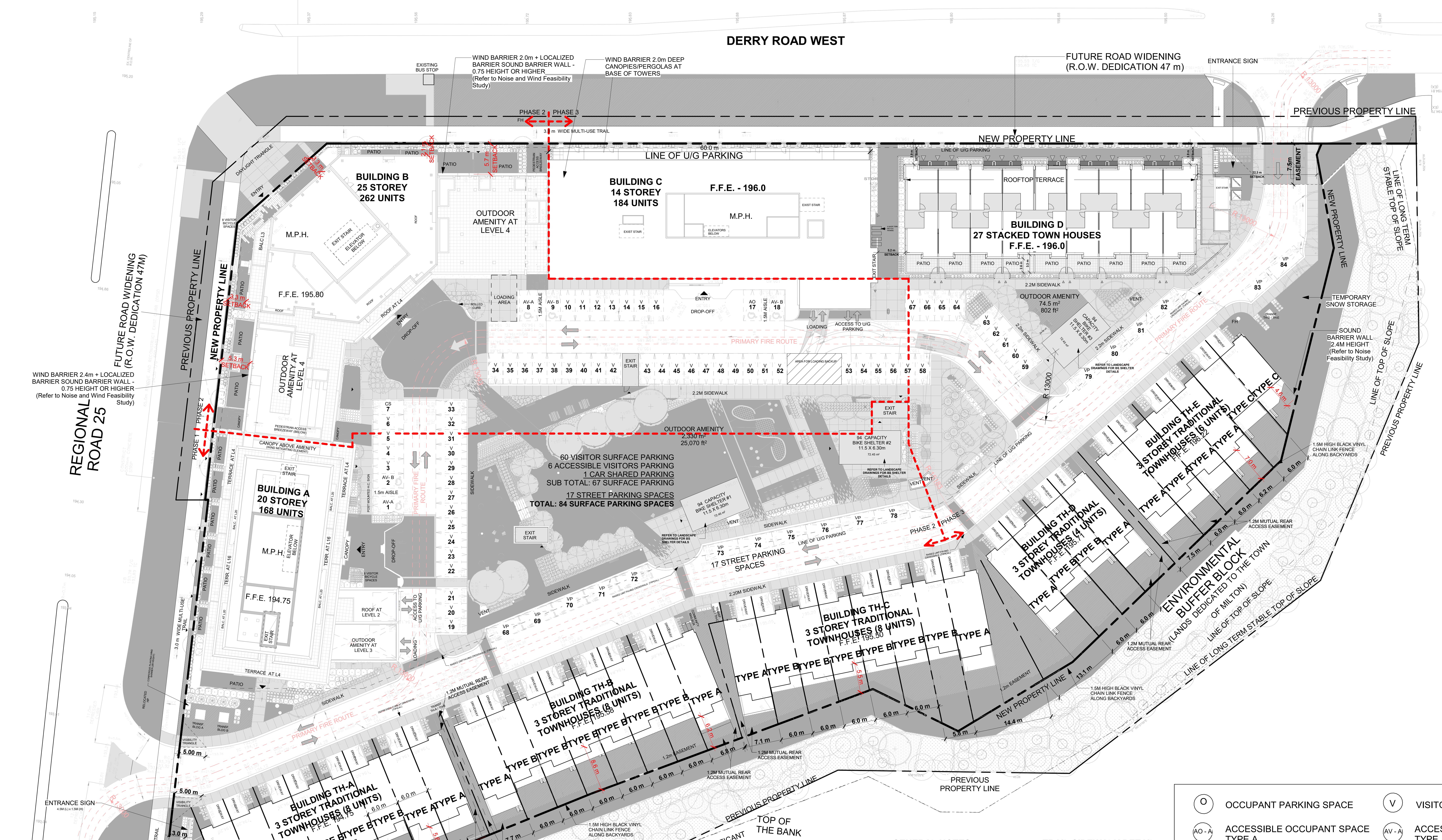
8010, 8020, 8030, 8110, 8120, 8130, 8140 & 8150 Derry Road West

Connectt Condo - Building D

Scale:

N

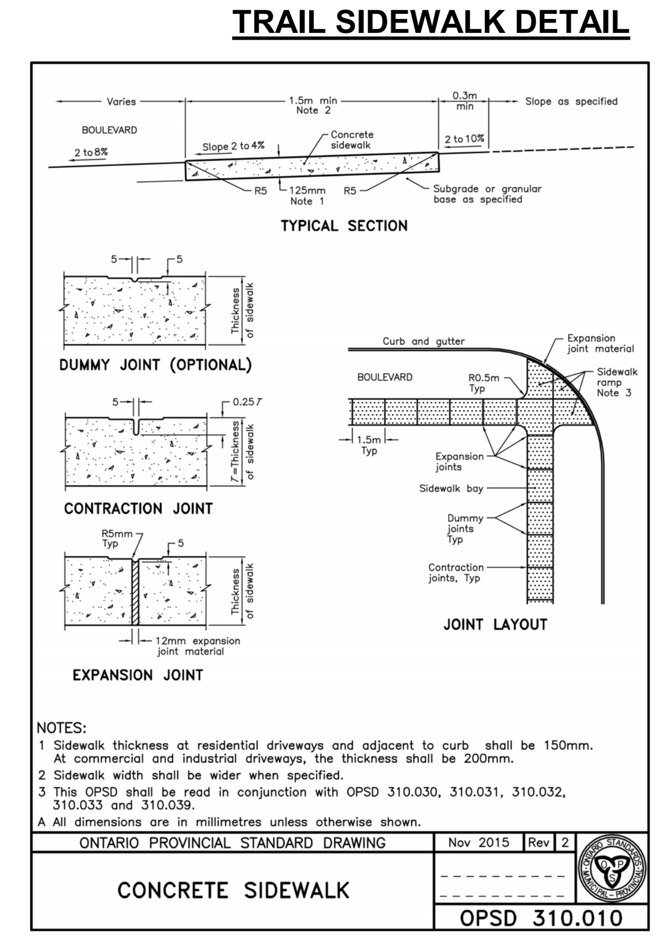
Drawn by: NB
Checked by: MC
Project No.: 21-011
Date: AUG 17, 2023
Drawing No.: dA1.1



GENERAL NOTES

1. "REFER TO THE DRAWINGS BY ADESSO DESIGNS INC. FOR LANDSCAPE PLANS"
2. TACTILE PLATES WILL BE PROVIDED IN A YELLOW COLOUR, OR A COLOUR THAT IS HIGHLY VISIBLE
3. "PARKING STALL DELINEATION SHALL BE WITH 100MM WIDE WHITE OR YELLOW MARKINGS"
4. "THE OWNER TO REMOVE SNOW OFF-SITE AND MAINTAIN REQUIRED PARKING UNENCUMBERED BY SNOW DURING MAJOR SNOW EVENTS."
5. 1.2M ACCESS EASEMENT AT TOWNHOUSE BACKYARDS
6. "PAVEMENT MARKINGS AND SIGNAGE ARE TO BE IMPLEMENTED AS PER THE SIGNAGE AND PAVEMENT MARKING PLAN (TCP-1) BY GHD"
7. TOWNHOUSE ENTRANCES RECESSED

TRAIL SIDEWALK DETAIL



PARKING LEGEND

- O — OCCUPANT PARKING SPACE
- V — VISITOR PARKING SPACE
- AO - A — ACCESSIBLE OCCUPANT SPACE TYPE A
- AV - A — ACCESSIBLE VISITOR SPACE TYPE A
- AO - B — ACCESSIBLE OCCUPANT SPACE TYPE B
- AV - B — ACCESSIBLE VISITOR SPACE TYPE B
- OP — OCCUPANT PARALLEL PARKING SPACE
- VP — VISITOR PARALLEL PARKING SPACE
- OS — OCCUPANT CAR SHARE PARKING SPACE
- CS — CAR SHARE PARKING SPACE
- 1200 x 600 — VERTICAL BIKE SPACE
- 1900 x 600 — HORIZONTAL STACKED BIKE SPACE
- 5800 x 2750 — PARKING SPACE
- 5800 x 3400, 1.5M AISLE MIN. — ACCESSIBLE PARKING SPACE TYPE A
- 6500 x 2750 — PARALLEL PARKING SPACE
- 2750 — ACCESSIBLE PARKING SPACE TYPE B

NOTE: 6M TYPICAL DRIVEWAY WIDTH IS MAINTAINED THROUGHOUT THE DEVELOPMENT

SITE PLAN 1 dA1.4
Scale: 1 : 400

KIRKOR
ARCHITECTS AND PLANNERS
20 De Boers Drive Suite 400
Toronto, ON M3J 0H1

No.:	Revision:	Date:

No:	Issued For:	Date:
15	LOPA & ZBA SUB #2 - BLDG D	JUL 21, 2023
14	LOPA & ZBA SUB - BLDG D	MAY 03, 2023
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01	LOPA & ZBA SUBMISSION	OCT 2, 2017

Drawing Title:
OVERALL SITE PLAN _ Hybrid

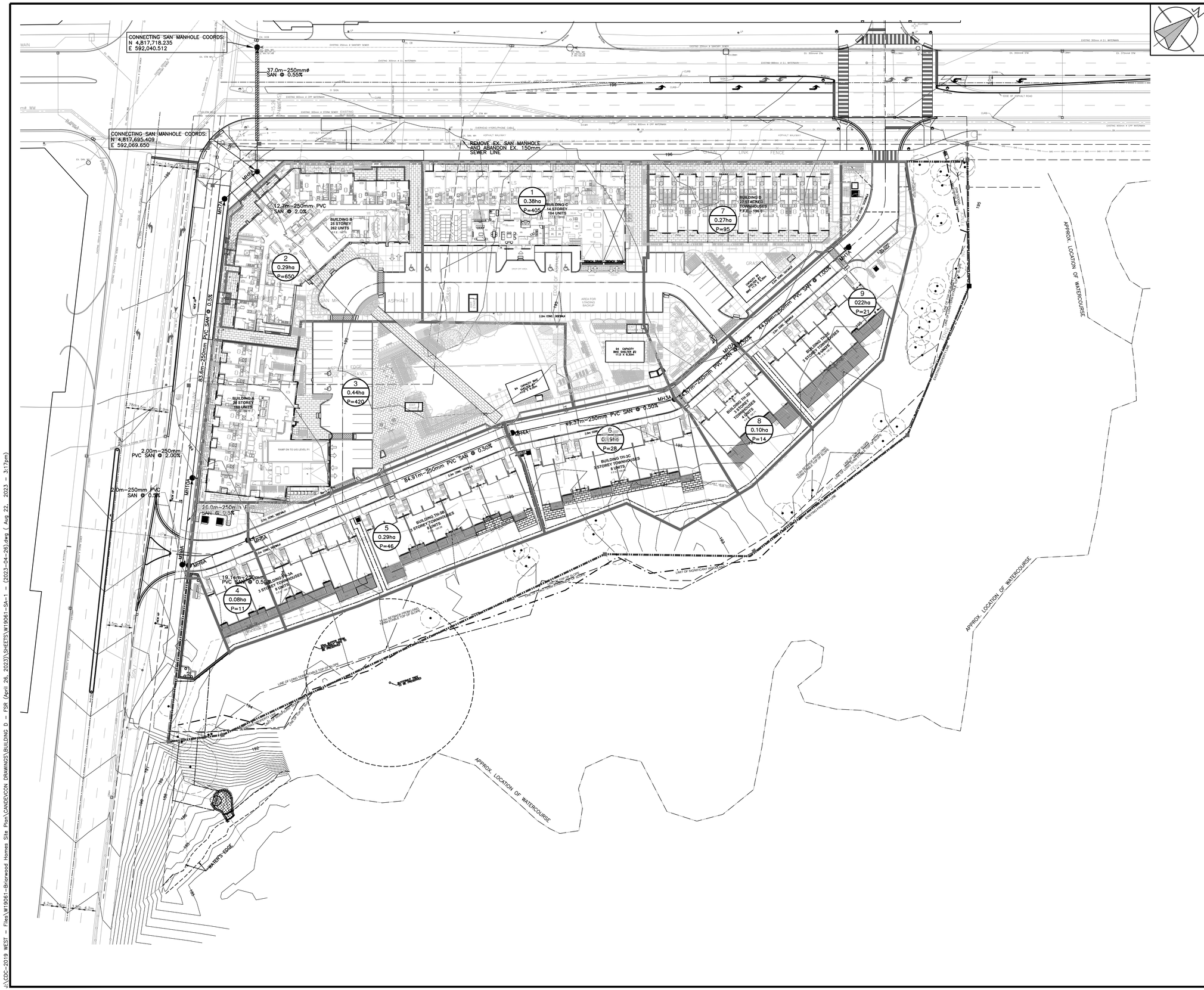
Project:
Lindvest

8010, 8020, 8030, 8110, 8120, 8130, 8140 & 8150 Derry Road West

Connectt Condo - Building D

Scale: As indicated
Drawn by: NB
Checked by: MC
Project No.: 21-011
Date: 08/16/23
Drawing No.:
dA1.4

Plot Date: 8/16/2023 10:14:30 AM File Path: C:\Revit\2021\21011P11-Model-Stacked Townhomes_RVT2021_Apr 08, 2023_nboctor.rvt


CONNECTING SAN MANHOLE COORDS:
N 4,817,718.235
E 592,040.512
37.0m–250mmø SAN @ 0.55%
CONNECTING SAN MANHOLE COORDS:
N 4,817,695.409
E 592,069.650
REMOVE EX. SAN MANHOLE AND ABANDON EX. 150mm SEWER LINE
12.7m–250mm PVC SAN @ 2.0%
83.6m–250mm PVC SAN @ 0.55%
2.00m–250mm PVC SAN @ 2.00%
2.0m–250mm PVC SAN @ 0.5%
26.0m–250mm PVC SAN @ 0.55%
84.91m–250mm PVC SAN @ 0.50%
89.31m–250mm PVC SAN @ 0.50%
84.45m–250mm PVC SAN @ 1.00%
19.16m–250mm PVC SAN @ 0.50%
1 0.38ha P=40
2 0.29ha P=65
3 0.44ha P=42
4 0.08ha P=11
5 0.29ha P=46
6 0.19ha P=28
7 0.27ha P=95
8 0.10ha P=14
9 022ha P=21
BUILDING B 25 STOREY 262 UNITS
BUILDING C 14 STOREY 154 UNITS
BUILDING D 27 STACKED TOWNHOUSES F.F.E.= 196.0
BUILDING A 28 STOREY 198 UNITS
BUILDING TH-1A 3 STOREY TOWNHOUSES 6 UNITS
BUILDING TH-2A 3 STOREY TOWNHOUSES 6 UNITS
BUILDING TH-3A 3 STOREY TOWNHOUSES 6 UNITS
BUILDING TH-3B 3 STOREY TOWNHOUSES 6 UNITS
BUILDING TH-3C 3 STOREY TOWNHOUSES 8 UNITS
BUILDING TH-4 3 STOREY TOWNHOUSES 6 UNITS
84 CAPACITY BIKE SHELTER #1 11.0 X 8.0m
84 CAPACITY BIKE SHELTER #2 11.0 X 8.0m
MH1A
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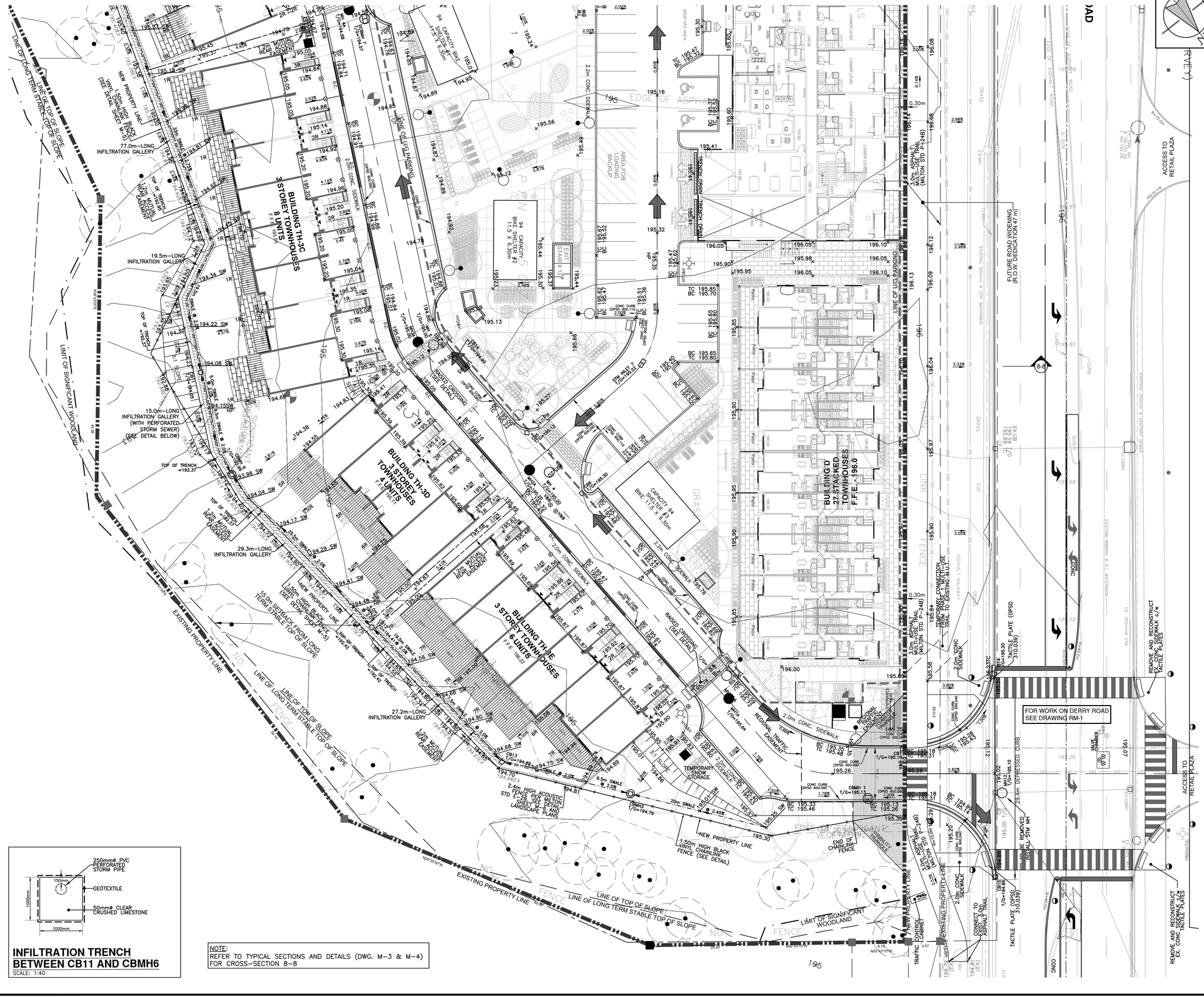
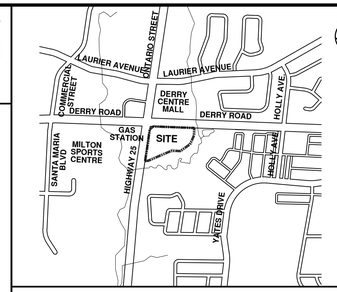
APPROX. LOCATION OF WATERCOURSE
APPROX. LOCATION OF WATERCOURSE
WATER'S EDGE
LIMIT OF LONG TERM STABLE TOP OF SLOPE
LIMIT OF SIGNIFICANT WOODLANDS (KFCI)
EXISTING EASEMENT
PROPOSED EASEMENT
LIMIT OF SITE
LIMIT OF CONSTRUCTION
PROPOSED SANITARY MANHOLE
DRAINAGE AREA BOUNDARY
FUTURE DRAINAGE AREA BOUNDARY
LINE OF LONG TERM STABLE TOP OF SLOPE
LINE OF TOP OF SLOPE
LIMIT OF SIGNIFICANT WOODLANDS (KFCI)
PROPOSED EASEMENTS
MAIN
m8 WM
LAURIER AVENUE
ONTARIO STREET
COMMERCIAL STREET
DERRY ROAD
DERRY CENTRE MALL
HOLLY AVE
MILLS AVE
GAS STATION
SITE
SANTA MARIA BLVD
MILTON SPORTS CENTRE
HIGHWAY 25
YATES DRIVE
KEY PLAN
N.T.S.
LEGEND
LIMIT OF SITE
LIMIT OF CONSTRUCTION (WHERE NOT COINCIDENT WITH LIMIT OF SUBDIVISION)
PROPOSED SANITARY MANHOLE
DRAINAGE AREA BOUNDARY
FUTURE DRAINAGE AREA BOUNDARY
1 0.15ha P=50
DENOTES AREA NUMBER
DENOTES AREA IN HECTARES
DENOTES POPULATION
LINE OF LONG TERM STABLE SLOPE
LINE OF TOP OF SLOPE
LIMIT OF SIGNIFICANT WOODLANDS (KFCI)
PROPOSED EASEMENTS
APPROVED LAND–USE/ZONING DESIGNATION:
RHD*261*H33
BENCHMARK INFO:
ELEVATIONS SHOWN ON THIS PLAN ARE DERIVED FROM MINISTRY OF TRANSPORTATION ONTARIO
BENCHMARK No. 00819828159
ELEVATION = 206.569m
CONCRETE AND STEEL BRIDGE CARRYING CNR OVER HWY 25, 0.9 km SOUTH OF THE OVERPASS AT INTERSECTION OF HWY 25 AND HWY 401. TABLET IS SET HORIZONTALLY IN WEST FACE OF EAST ABUTMENT, 10.5 m EAST OF CENTRELINE OF HWY 25, 63 cm SOUTH OF NORTHEAST END OF ABUTMENT, 37cm ABOVE GROUND.
SUBMISSION:
1st X Date 8 AUG. 2019
2nd X Date 10 JAN. 2020
3rd X Date 31 JUL. 2020
4th X Date 20 NOV. 2020
5th X Date 20 APR. 2021
Pre-Serv ____ Date ____
Interim ____ Date ____
Final ____ Date ____
Issued For Construction X Date 21 MAY 2021
A. A.B. 21 APR. 2022 REVISED BUILDING 'C', ADDED BUILDING 'D'.
3. D.K.H. 16 SEP. 2021 REVISED PROPOSED MEDIAN ON REGION ROAD 25. EXISTING PAVEMENT MARKINGS TO REMAIN.
2. T.M.J. 02 JUN 2021 COORDINATES ADDED TO SANITARY MH8A
1. T.M.J. 24 FEB 2021 ADDED CONNECTING MH COORDINATES AND APPROVED LAND USE ZONING DESIGNATION
By Date Revision Checked
MILTON
Halton REGION
REGISTERED PROFESSIONAL ENGINEER S. D. LANG AUGUST 23, 2023 PROVINCE OF ONTARIO
CONSTRUCTION NORTH
CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
9369 GOREWAY DRIVE BRAMPTON ON. L6P-0M7
TEL (905) 794-0800 FAX (905) 794-0611
PROJECT NUMBER W20191
MILTERON DEVELOPMENTS LTD.
CONNECTT RESIDENTIAL DEVELOPMENT
DERRY ROAD / HIGHWAY 25
TOWN OF MILTON
SITE PLAN No.: SP - 21-19
SANITARY DRAINAGE AREA PLAN
Region File No. DM-1036
City File No. SP-21-19
Drawn By: S.C.
Checked By: C.R.M
Designed By: T.M.J.
Checked By: D.K.H.
Scale: 1:500
Date: MAY 2019
Drawing No.
Sheet No. SA-1 A
J:\CDC-2019 WEST - Files\W19061-Briarwood Homes Site Plan\CANDEVCON DRAWINGS\BUILDING D - FSR (April 26, 2023)\SHEETS\W19061-SA-1 - (2023-04-26).dwg (Aug 22, 2023 - 3:17pm)





KEY PLAN
N.T.S.

LEGEND

MH19 ○	PROPOSED STORM MANHOLE
MH19A ●	PROPOSED SANITARY MANHOLE
CB □	PROPOSED SINGLE CATCHBASIN
DCB HYDA&V	PROPOSED DOUBLE CATCHBASIN
	PROPOSED FIRE HYDRANT AND VALVE
V&B •	PROPOSED VALVE & BOX
	PROPOSED TRANSFORMER PAD
	PROPOSED STREETLIGHT
	PROPOSED TRAFFIC SIGNAL POLE
CMB	PROPOSED CANADA POST COMMUNITY MAILBOX
	LIMIT OF SITE
	PROPOSED EASEMENT
×194.97	EXISTING SPOT ELEVATION
×195.85	PROPOSED SPOT ELEVATION
2.00%	PROPOSED SLOPE
194.68 SW	PROPOSED SWALE GRADE
	PROPOSED SWALE
	PROPOSED INFILTRATION TRENCH
	PROPOSED DEPRESSED CURB
D.C.	OVERLAND FLOW ROUTE
	LINE OF LONG TERM STABLE SLOPE
	LINE OF TOP OF SLOPE
	LIMIT OF SIGNIFICANT WOODLANDS (KFCI)
	LINE OF PROPOSED U/G PARKING
	PROPOSED ACOUSTIC FENCE
	PROPOSED 1.5m BLACK VINYL CHAINLINK FENCE
	PROPOSED DEPRESSED CURB WITH TACTILE PLATE FOR PEDESTRIAN CROSSING

NO CONSTRUCTION IS TO TAKE PLACE ON ADJACENT LANDS WITHOUT WRITTEN PERMISSION FROM THE RESPECTIVE LANDOWNER

NOTES:
- PRIOR TO THE COMMENCEMENT OF ANY WORKS ON THE SITE SNOW FENCE, OR OTHER ACCEPTABLE HOARDING, IS TO BE INSTALLED ON THE PERIMETER OF THE PROPERTY AND AT LOCATIONS AS DETERMINED BY THE DIRECTOR, DEVELOPMENT ENGINEERING, AND THE FENCING SHALL REMAIN IN PLACE UNTIL SUCH TIME AS OTHERWISE DIRECTED BY THE DIRECTOR, DEVELOPMENT ENGINEERING.
- EROSION AND SEDIMENT CONTROLS ARE TO BE IN PLACE PRIOR TO THE START OF SITE WORKS, AND BE MAINTAINED FOR THE DURATION OF CONSTRUCTION.
- ALL FILL SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY AND THAT A SUFFICIENT NUMBER OF TESTS ARE UNDERTAKEN TO THE SATISFACTION OF THE DIRECTOR OF ENGINEERING SERVICES.
- PRIOR TO THE COMMENCEMENT OF ANY WORKS WITHIN THE MUNICIPAL ROAD ALLOWANCE THE OWNER IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS FROM THE ENGINEERING SERVICES DEPARTMENT, TOWN OF MILTON, FOR THE PURPOSES OF VEHICULAR ACCESS TO THE PROPERTY, (ENTRANCE PERMIT), AND FOR SERVICING EXCAVATIONS WITHIN THE MUNICIPAL ROAD ALLOWANCE, (ROAD OCCUPANCY PERMIT). THE OWNER SHALL ALSO BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS FROM REGION OF HALTON FOR WORK ON REGIONAL ROADWAYS (i.e. DERRY ROAD AND REGIONAL ROAD 25).

BENCHMARK INFO:

ELEVATIONS SHOWN ON THIS PLAN ARE DERIVED FROM MINISTRY OF TRANSPORTATION ONTARIO
BENCHMARK No. 008196B159
ELEVATION = 206.569m
CONCRETE AND STEEL BRIDGE CARRYING CNR OVER HWY 25, 0.9 km SOUTH OF THE OVERPASS AT INTERSECTION OF HWY 25 AND HWY 401. TABLET IS SET HORIZONTALLY IN WEST FACE OF EAST ABUTMENT, 10.5 m EAST OF CENTRELINE OF HWY 25, 63 cm SOUTH OF NORTHEAST END OF ABUTMENT, 37cm ABOVE GROUND.

SUBMISSION:

1st	X	Date	8 AUG. 2019	Pre-Serv		Date
2nd	X	Date	10 JAN. 2020	Interim		Date
3rd	X	Date	31 JUL. 2020	Final		Date
4th	X	Date	20 NOV. 2020	Issued For Construction	X	Date 21 MAY 2021
5th	X	Date	20 APR. 2021			

No.	By	Date	Revision	Checked
5	A.B.	21 APR. 2021	REVISED BUILDING 'G' ROOF RETAINING 'G' REVISED AND ENG. AREAS FOR LANDSCAPE PLAN RELOCATED INTERLOCK AND ENG.	
4	A.B.	22 NOV. 2021	RELOCATED INLET 3 & 4. REVISED GRADING IN ACCESS ROAD.	
3	A.B.	02 FEB. 2021	REVISED GRADING AROUND BUILDING 'B' AND ACCESS ROAD	
2	D.K.H.	16 SEP. 2021	REVISED PROPOSED MEDIAN ON REGION ROAD 25. EXISTING PAVEMENT MARKINGS TO REMAIN	
1	T.M.J.	03 MAR. 2021	NEW POLE LOCATIONS ALONG RR25 BY MILTON HYDRO	

MILTON | Halton REGION

CONSTRUCTION NORTH

REGISTERED PROFESSIONAL ENGINEER S. D. LANG AUGUST 23, 2023 PROVINCE OF ONTARIO

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
9358 GOREWAY DRIVE, BRAMPTON ON L6P-0M7
TEL (905) 794-0600 FAX (905) 794-0611

PROJECT NUMBER W20191

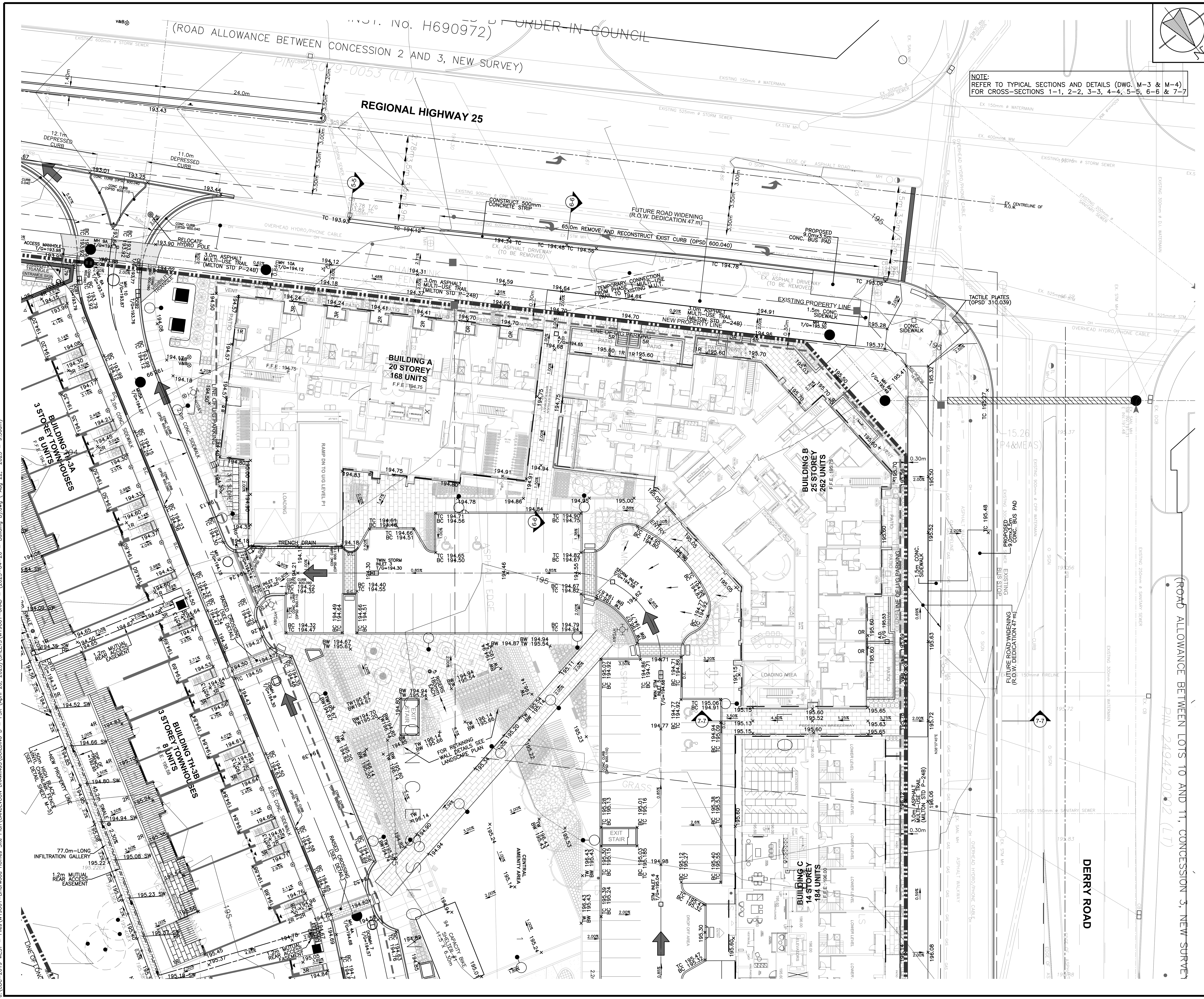
MILTERON DEVELOPMENTS LTD.
CONNECTT RESIDENTIAL DEVELOPMENT
DERRY ROAD / HIGHWAY 25
TOWN OF MILTON
SITE PLAN No.: SP - 21-19

GRADING PLAN

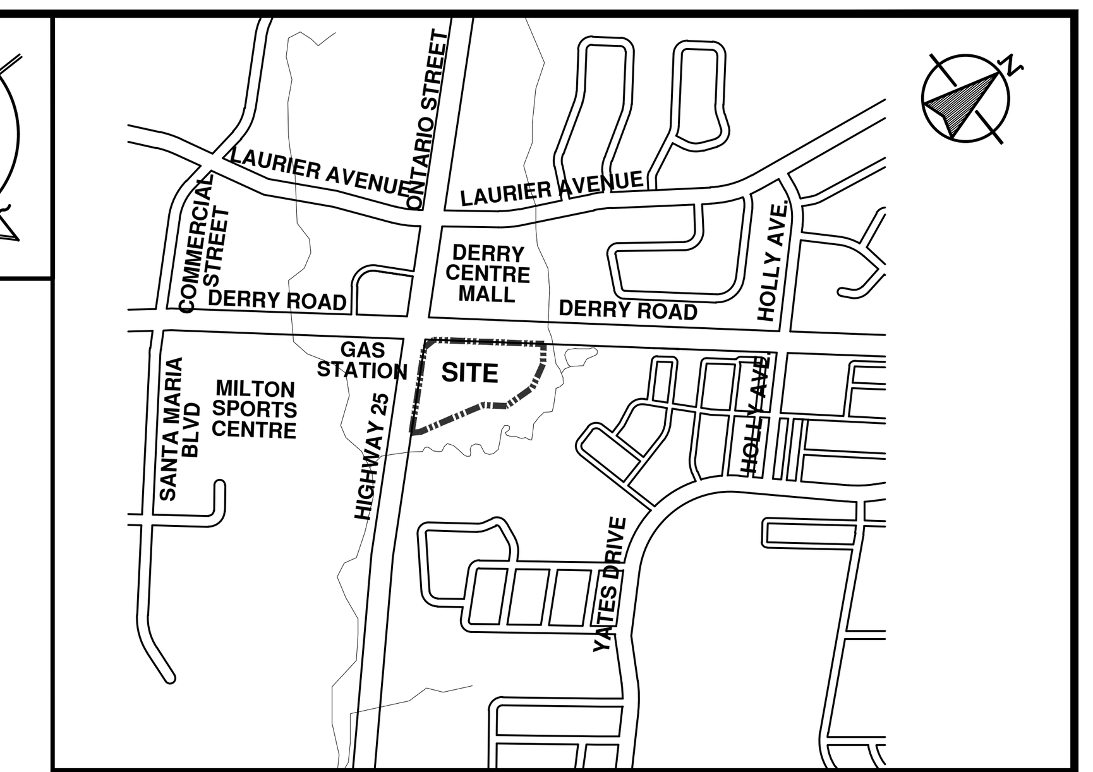
Region File No.	DM-1036		City File No.	SP-21-19	
Drawn By:	S.C.	Checked By:	C.R.M	Drawing No.	Sheet No. G-3
Designed By:	T.M.J.	Checked By:	D.K.H.		
Scale:	1:250	Date:	MAY 2019		

INFILTRATION TRENCH BETWEEN CB11 AND CBMH6
SCALE: 1:40

J:\CDC-2019 WEST - Files\W19061-Briarwood Homes Site Plan\CANDEVCON DRAWINGS\BUILDING D - FSR (April 26, 2023)\SHEETS\W19061-GRAD - (2023-04-26 - Building D).dwg (Aug 22, 2023 - 9.36am)



NOTE:
REFER TO TYPICAL SECTIONS AND DETAILS (DWG. M-3 & M-4) FOR CROSS-SECTIONS 1-1, 2-2, 3-3, 4-4, 5-5, 6-6 & 7-7



KEY PLAN
N.T.S.

LEGEND

- MH19 — PROPOSED STORM MANHOLE
- MH19A — PROPOSED SANITARY MANHOLE
- CB — PROPOSED SINGLE CATCHBASIN
- DCB — PROPOSED DOUBLE CATCHBASIN
- HYD&V — PROPOSED FIRE HYDRANT AND VALVE
- V&B — PROPOSED VALVE & BOX
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- PROPOSED STREETLIGHT
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- CMB — PROPOSED CANADA POST COMMUNITY MAILBOX
- LIMIT OF SITE
- PROPOSED EASEMENT
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- 2.00% — PROPOSED SLOPE
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- PROPOSED SWALE
- PROPOSED INFILTRATION TRENCH
- D.C. — PROPOSED DEPRESSED CURB
- OVERLAND FLOW ROUTE
- LINE OF LONG TERM STABLE SLOPE
- LINE OF TOP OF SLOPE
- LIMIT OF SIGNIFICANT WOODLANDS (KFCI)
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- PROPOSED DEPRESSED CURB WITH TACTILE PLATE FOR PEDESTRIAN CROSSING

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BENCHMARK INFO:

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1st	X	Date 8 AUG. 2019	Pre–Serv		Date
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3rd	X	Date 31 JUL. 2020	Final		Date
4th	X	Date 20 NOV. 2020	Issued For Construction	X	Date 21 MAY 2021
5th	X	Date 20 APR. 2021			

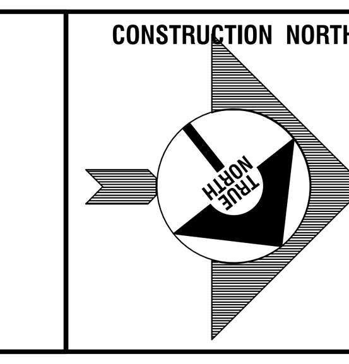
No.	By	Date	Revision	Checked
5	A.B.	21 APR. 2023	REVISED BUILDING 'C', ADDED BUILDING 'D', REVISED AMENITY AREAS PER LANDSCAPE PLAN RELOCATED HYDRANTS AND CB6.	
4	A.B.	06 MAR. 2023	RELOCATED INLET 3 & 4. REVISED GRADING IN ACCESS ROAD. REMOVED MEDIAN AT ENTRANCE BLDG B. REVISIONS PER REVISED ARCHITECT BLDG B INTERIOR AND PATIOS. REVISIONS TO AMMENITY AREA PER LANDSCAPE PLAN.	
3	A.B.	02 FEB. 2022	REVISED GRADING AROUND BUILDING 'B' AND ACCESS ROAD	
2	D.K.H.	16 SEP. 2021	REVISED PROPOSED MEDIAN ON REGION ROAD 25. EXISTING PAVEMENT MARKINGS TO REMAIN	
1	T.M.J.	03 MAR. 2021	NEW POLE LOCATIONS ALONG RR25 BY MILTON HYDRO	

MILTON

Halton REGION

REGISTERED PROFESSIONAL ENGINEER
S D. LANG
AUGUST 23, 2023
PROVINCE OF ONTARIO

CONSTRUCTION NORTH



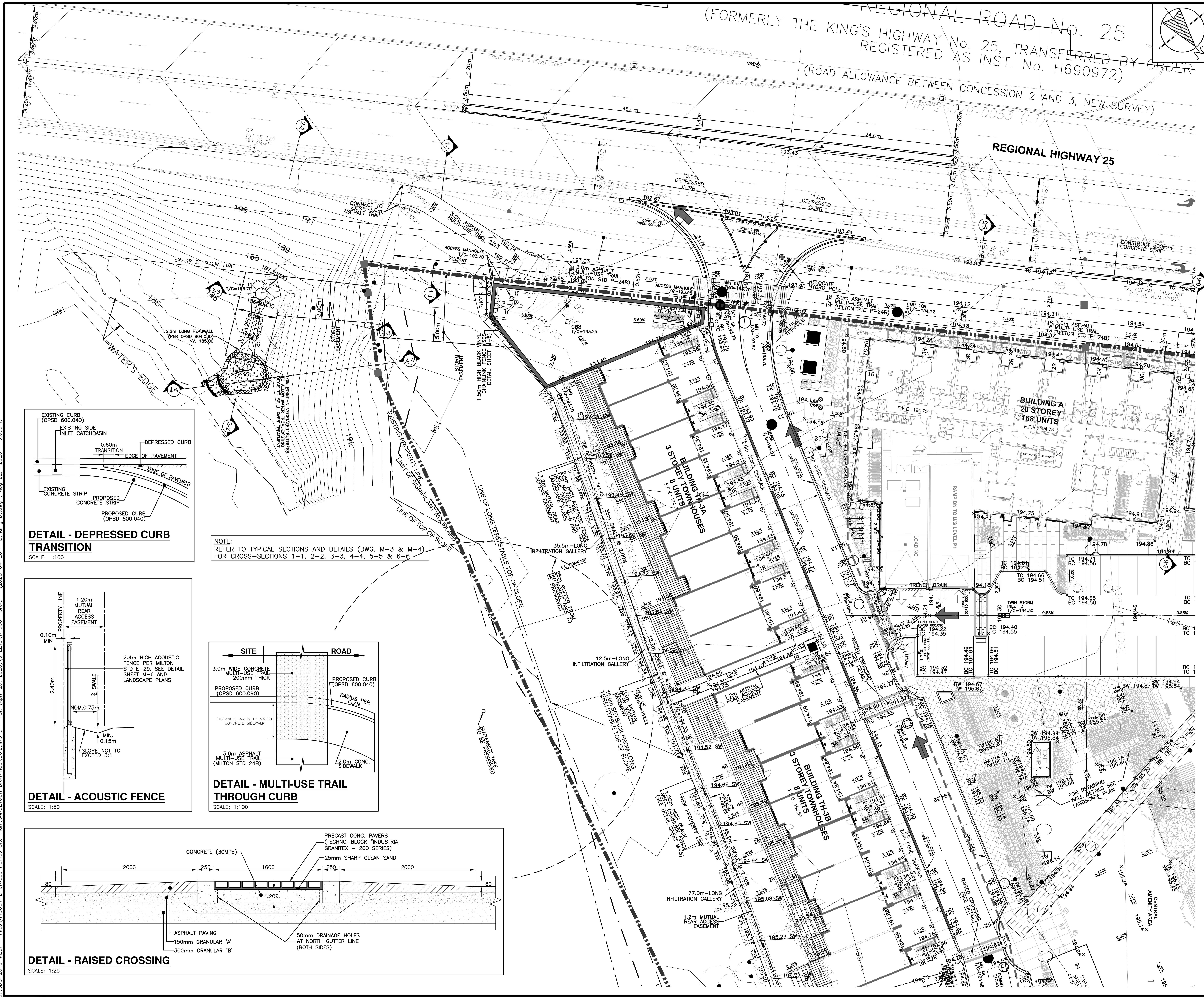
CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
9358 GOREWAY DRIVE
BRAMPTON ON. L6P-0M7
TEL (905) 794-0600
FAX (905) 794-0611

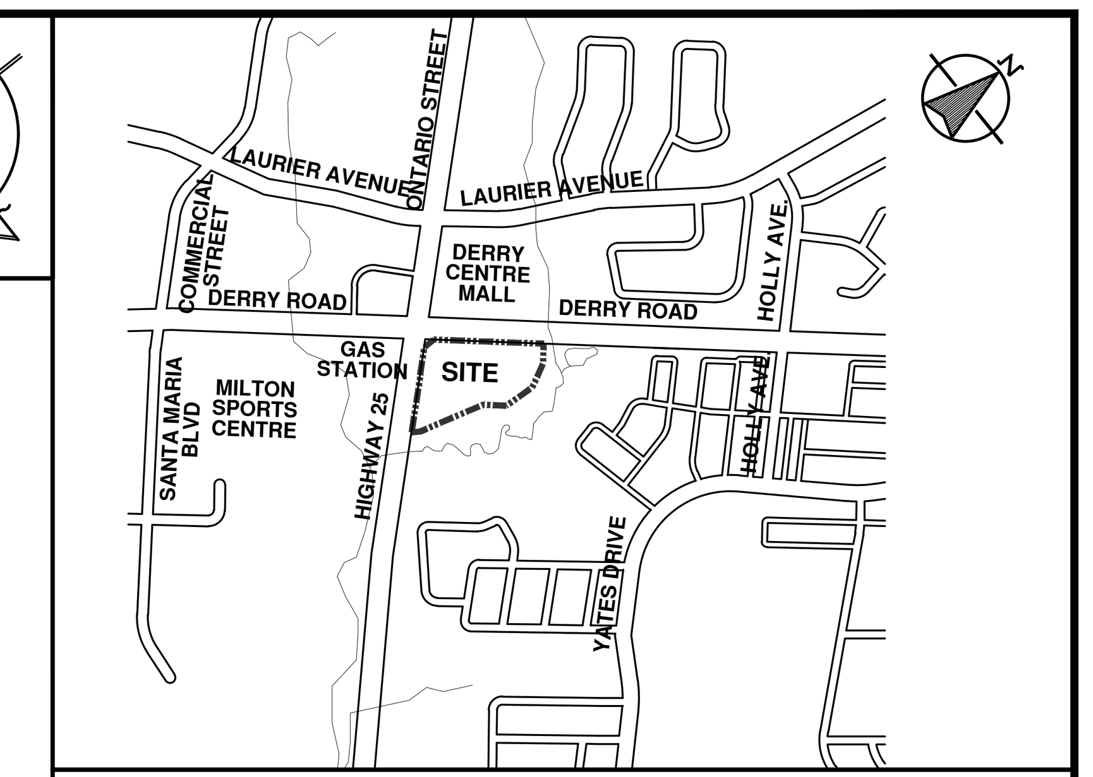
PROJECT NUMBER W20191

MILTERON DEVELOPMENTS LTD.
CONNECTT RESIDENTIAL DEVELOPMENT
DERRY ROAD / HIGHWAY 25
TOWN OF MILTON
SITE PLAN No.: SP - 21-19

GRADING PLAN

Region File No. DM–1036		City File No. SP–21–19		
Drawn By: S.C.	Checked By: C.R.M	Drawing No.		Sheet No. G-2 (5)
Designed By: T.M.J.	Checked By: D.K.H.			
Scale: 1:250	Date: MAY 2019			





KEY PLAN
N.T.S.

LEGEND

Symbol	Description
MH19	PROPOSED STORM MANHOLE
MH19A	PROPOSED SANITARY MANHOLE
CB	PROPOSED SINGLE CATCHBASIN
DCB	PROPOSED DOUBLE CATCHBASIN
HYD&V	PROPOSED FIRE HYDRANT AND VALVE
V&B	PROPOSED VALVE & BOX
	PROPOSED TRANSFORMER PAD
	PROPOSED STREETLIGHT
	PROPOSED TRAFFIC SIGNAL POLE
CMB	PROPOSED CANADA POST COMMUNITY MAILBOX
	LIMIT OF SITE
	PROPOSED EASEMENT
x194.97	EXISTING SPOT ELEVATION
x195.85	PROPOSED SPOT ELEVATION
2.00%	PROPOSED SLOPE
	PROPOSED SWALE GRADE
	PROPOSED SWALE
	PROPOSED INFILTRATION TRENCH
D.C.	PROPOSED DEPRESSED CURB
	OVERLAND FLOW ROUTE
	LINE OF LONG TERM STABLE SLOPE
	LINE OF TOP OF SLOPE
	LIMIT OF SIGNIFICANT WOODLANDS (KFCI)
	LINE OF PROPOSED U/G PARKING
	PROPOSED ACOUSTIC FENCE
	PROPOSED 1.5m BLACK VINYL CHAINLINK FENCE
	PROPOSED DEPRESSED CURB WITH TACTILE PLATE FOR PEDESTRIAN CROSSING

NO CONSTRUCTION IS TO TAKE PLACE ON ADJACENT LANDS WITHOUT WRITTEN PERMISSION FROM THE RESPECTIVE LANDOWNER

NOTES:

- PRIOR TO THE COMMENCEMENT OF ANY WORKS ON THE SITE SNOW FENCE, OR OTHER ACCEPTABLE HOARDING, IS TO BE INSTALLED ON THE PERIMETER OF THE PROPERTY AND AT LOCATIONS AS DETERMINED BY THE DIRECTOR, DEVELOPMENT ENGINEERING, AND THE FENCING SHALL REMAIN IN PLACE UNTIL SUCH TIME AS OTHERWISE DIRECTED BY THE DIRECTOR, DEVELOPMENT ENGINEERING.
- EROSION AND SEDIMENT CONTROLS ARE TO BE IN PLACE PRIOR TO THE START OF SITE WORKS, AND BE MAINTAINED FOR THE DURATION OF CONSTRUCTION.
- ALL FILL SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY AND THAT A SUFFICIENT NUMBER OF TESTS ARE UNDERTAKEN TO THE SATISFACTION OF THE DIRECTOR OF ENGINEERING SERVICES.
- PRIOR TO THE COMMENCEMENT OF ANY WORKS WITHIN THE MUNICIPAL ROAD ALLOWANCE THE OWNER IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS FROM THE ENGINEERING SERVICES DEPARTMENT, TOWN OF MILTON, FOR THE PURPOSES OF VEHICULAR ACCESS TO THE PROPERTY, (ENTRANCE PERMIT), AND FOR SERVICING EXCAVATIONS WITHIN THE MUNICIPAL ROAD ALLOWANCE, (ROAD OCCUPANCY PERMIT). THE OWNER SHALL ALSO BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS FROM REGION OF HALTON FOR WORK ON REGIONAL ROADWAYS (i.e. DERRY ROAD AND REGIONAL ROAD 25).

BENCHMARK INFO:

ELEVATIONS SHOWN ON THIS PLAN ARE DERIVED FROM MINISTRY OF TRANSPORTATION ONTARIO BENCHMARK No. 00819828159
ELEVATION = 206.569m
CONCRETE AND STEEL BRIDGE CARRYING CNR OVER HWY 25, 0.9 km SOUTH OF THE OVERPASS AT INTERSECTION OF HWY 25 AND HWY 401. TABLET IS SET HORIZONTALLY IN WEST FACE OF EAST ABUTMENT, 10.5 m EAST OF CENTRELINE OF HWY 25, 63 cm SOUTH OF NORTHEAST END OF ABUTMENT, 37cm ABOVE GROUND.

SUBMISSION:

1st	X	Date	8 AUG. 2019	Pre-Serv		Date	
2nd	X	Date	10 JAN. 2020	Interim		Date	
3rd	X	Date	31 JUL. 2020	Final		Date	
4th	X	Date	20 NOV. 2020	Issued For Construction	X	Date	21 MAY 2021
5th	X	Date	20 APR. 2021				

No.	By	Date	Revision	Checked
4	A.B.	22 NOV. 2022	RELOCATED INLET 3 & 4. REVISED GRADING IN ACCESS ROAD.	
3	A.B.	02 FEB. 2022	REVISED GRADING AROUND BUILDING 'B' AND ACCESS ROAD	
2	D.K.H.	16 SEP. 2021	REVISED PROPOSED MEDIAN ON REGION ROAD 25. EXISTING PAVEMENT MARKINGS TO REMAIN	
1	T.M.J.	03 MAR. 2021	NEW POLE LOCATIONS ALONG RR25 BY MILTON HYDRO	

MILTON

Halton REGION

REGISTERED PROFESSIONAL ENGINEER
S. D. LANG
AUGUST 23, 2023
PROVINCE OF ONTARIO

CONSTRUCTION NORTH
TRUE NORTH

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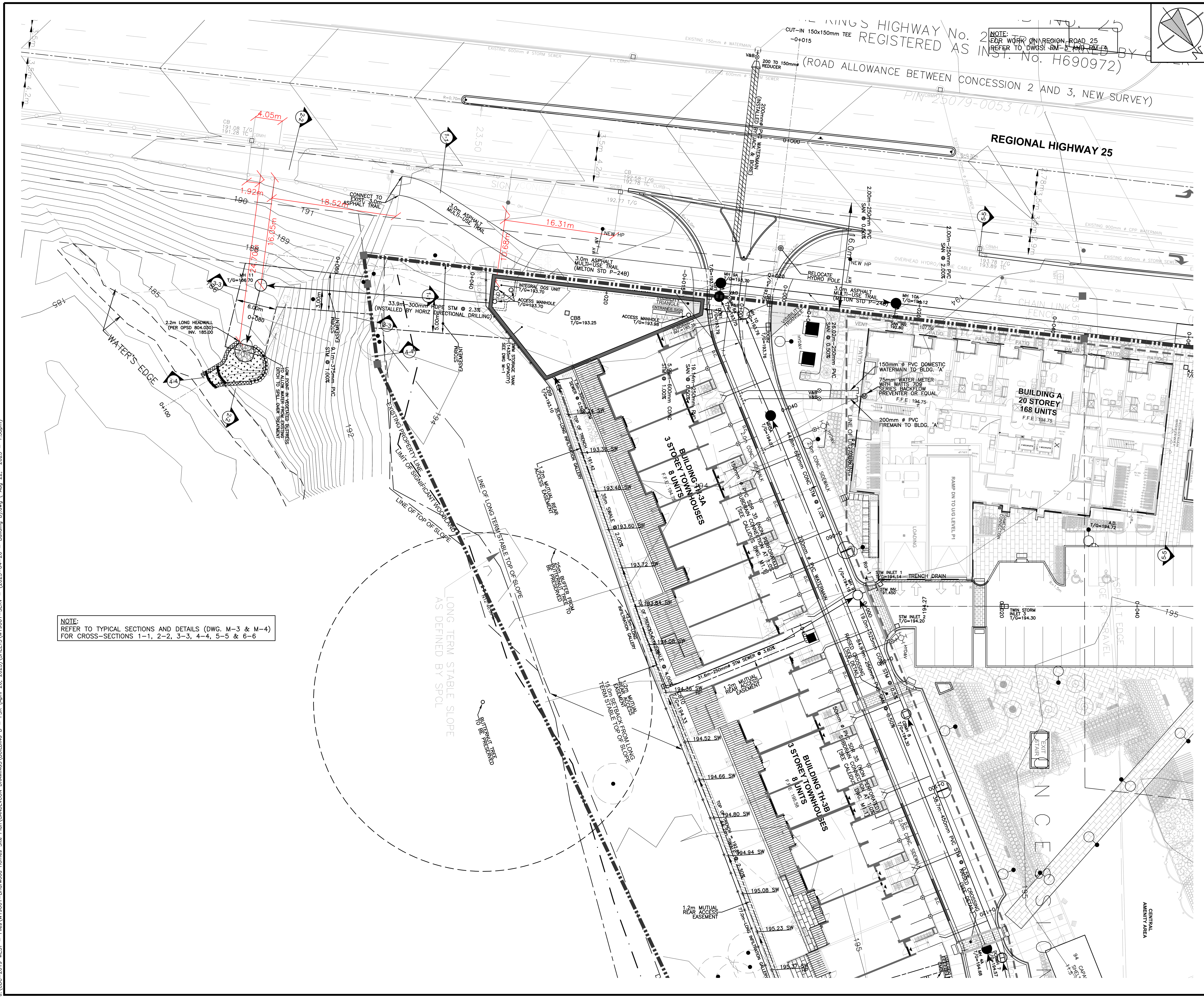
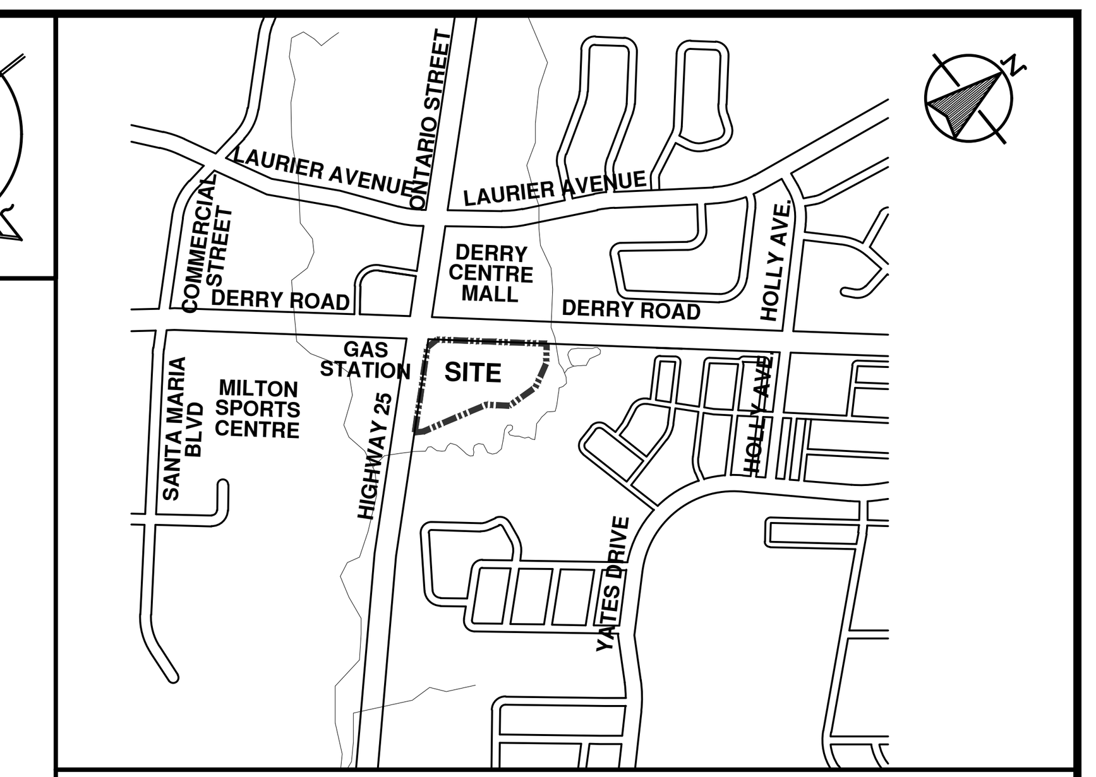
MILTERON DEVELOPMENTS LTD.
CONNECTT RESIDENTIAL DEVELOPMENT
DERRY ROAD / HIGHWAY 25
TOWN OF MILTON
SITE PLAN No.: SP - 21-19

GRADING PLAN

Region File No. DM–1036		City File No. SP–21–19	
Drawn By: S.C.	Checked By: C.R.M	Drawing No.	Sheet No. G-1 (4)
Designed By: T.M.J.	Checked By: D.K.H.		
Scale: 1:250	Date: MAY 2019		





KEY PLAN
N.T.S.

LEGEND

- MH19 ○ PROPOSED STORM MANHOLE
- MH19A ● PROPOSED SANITARY MANHOLE
- CB PROPOSED SINGLE CATCHBASIN
- DCB PROPOSED DOUBLE CATCHBASIN
- PROPOSED DOUBLE STORM SERVICE CONNECTION
- PROPOSED SINGLE STORM SERVICE CONNECTION
- PROPOSED DOUBLE SANITARY SERVICE CONNECTION
- PROPOSED SINGLE SANITARY SERVICE CONNECTION
- PROPOSED WATER SERVICE CONNECTION
- HYD&V PROPOSED FIRE HYDRANT AND VALVE
- V&B PROPOSED VALVE & BOX
- PROPOSED TRANSFORMER PAD
- PROPOSED STREETLIGHT
- PROPOSED TRAFFIC SIGNAL POLE
- CMB PROPOSED CANADA POST COMMUNITY MAILBOX
- LIMIT OF SITE
- PROPOSED INFILTRATION TRENCH
- D.C. PROPOSED DEPRESSED CURB
- LINE OF LONG TERM STABLE SLOPE
- LINE OF TOP OF SLOPE
- LIMIT OF SIGNIFICANT WOODLANDS (KFCI)
- LINE OF PROPOSED U/G PARKING
- PROPOSED ACOUSTIC FENCE
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- 900mmø TRANSMISSION MAIN SHALL BE EXPOSED BY HYDROVAC TO DETERMINE ELEVATION BEFORE JACK & BORE WORK. TO BE WITNESSED BY HALTON STAFF.

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No.	By	Date	Revision	Checked
6	D.K.H.	08 NOV. 2021	SUBDRAIN FROM U/G PARKING GARAGE RELOCATED.	
5	D.K.H.	15 OCT. 2021	REVISED SANITARY SEWER LAYOUT	
4	D.K.H.	16 SEP. 2021	REVISED PROPOSED MEDIAN ON REGION ROAD 25. EXISTING PAVEMENT MARKINGS TO REMAIN	
3	T.M.J.	08 JUN 2021	WATER SERVICE TO BLDG B REVISED EXIST SAN SERVICE REMOVED	
2	T.M.J.	21 MAY 2021	METER AND BACKFLOW PREVENTER ADDED	
1	T.M.J.	03 MAR. 2021	NEW POLE LOCATIONS ALONG RR25 BY MILTON HYDRO	

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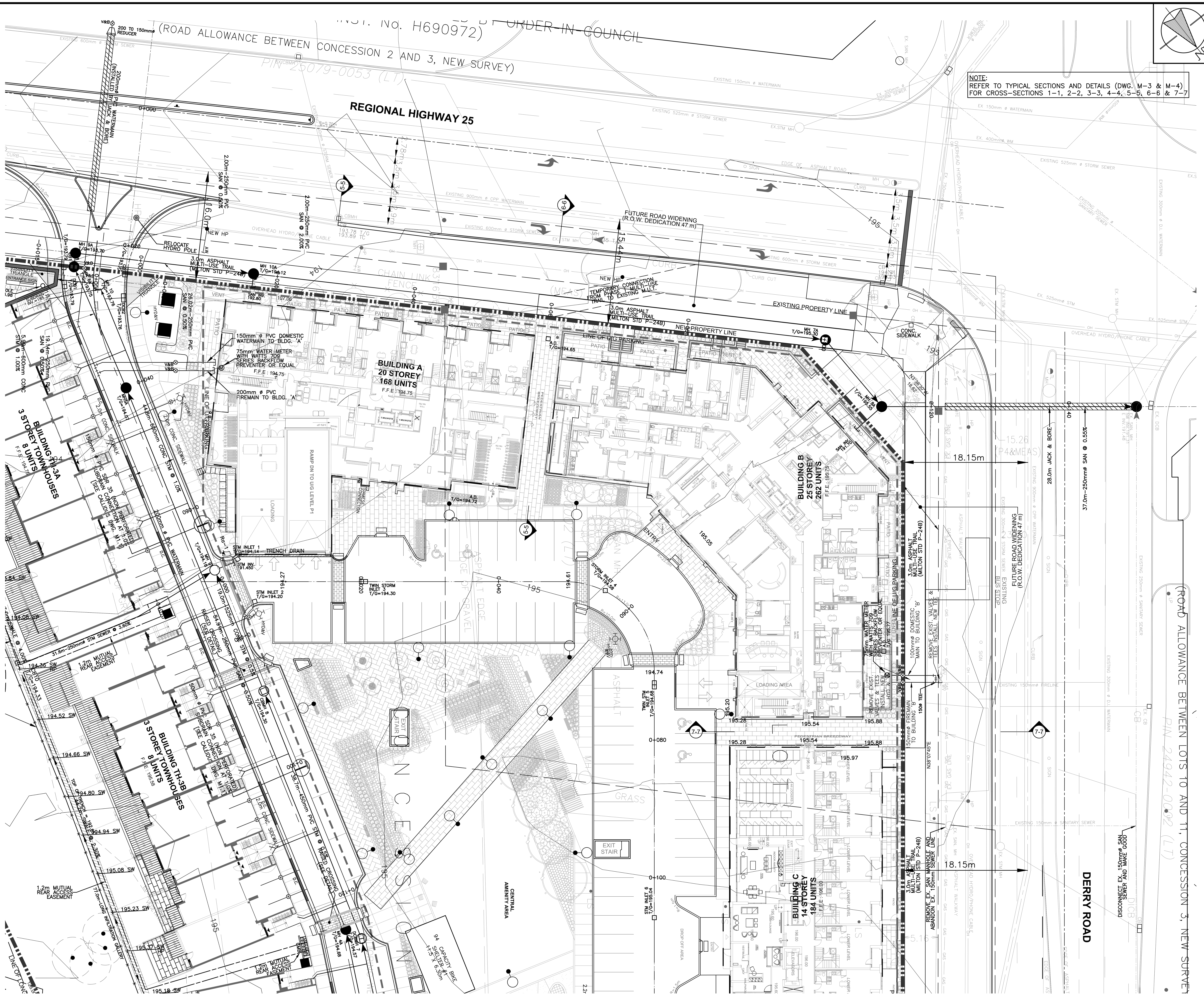
PROJECT NUMBER W20191

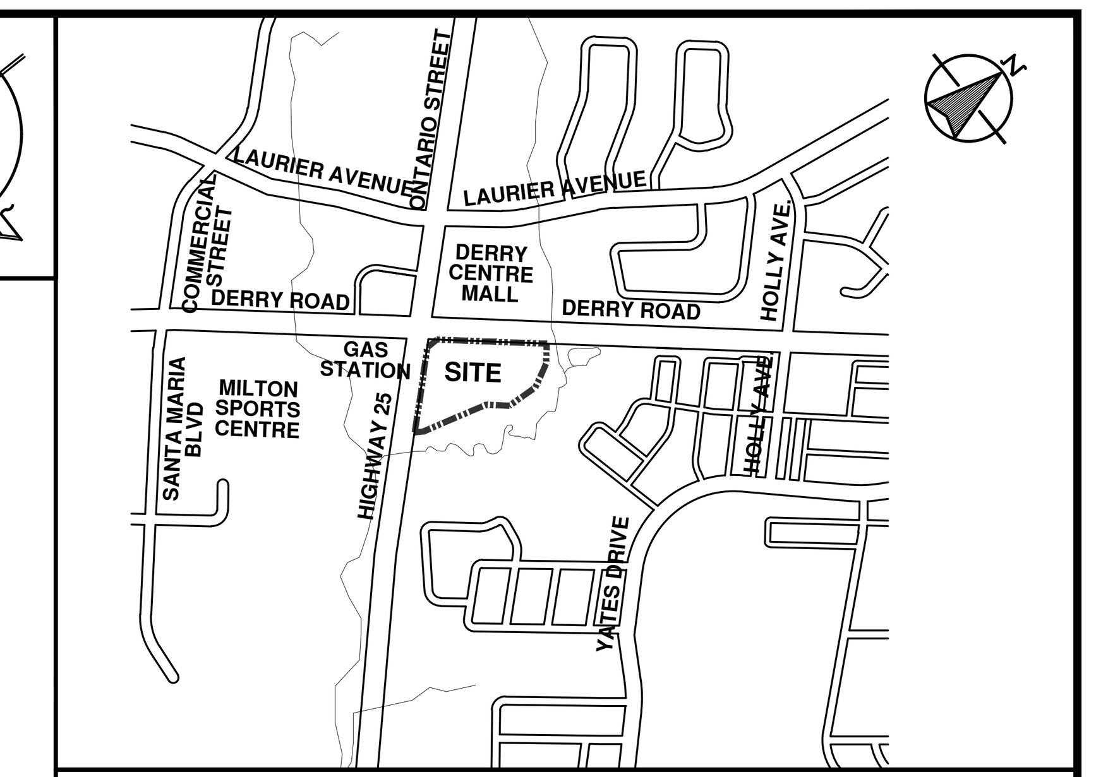
MILTERON DEVELOPMENTS LTD.
CONNECTT RESIDENTIAL DEVELOPMENT
DERRY ROAD / HIGHWAY 25
TOWN OF MILTON
SITE PLAN No.: SP - 21-19

UNDERGROUND SERVICING PLAN

Region File No.	DM–1036	City File No.	SP–21–19		
Drawn By:	S.C.	Checked By:	C.R.M	Drawing No.	Sheet No. SS1 (6)
Designed By:	T.M.J.	Checked By:	D.K.H.		
Scale:	1:250	Date:	MAY 2019		

J:\CDC-2019 WEST – Files\W19061-Briarwood Homes Site Plan\CANDEVCON DRAWINGS\BUILDING D – FSR (April 26, 2023)\SHEETS\W19061-SERV – (2023-04-26 – Building D).dwg (Aug 22, 2023 – 1:38pm)





KEY PLAN
N.T.S.

LEGEND

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5th	X	Date 20 APR. 2021				

No.	By	Date	Revision	Checked
7	A.B.	21 APR. 2023	REVISED BUILDING 'C', ADDED BUILDING 'D', REVISED AMENITY AREAS PER LANDSCAPE PLAN RELOCATED HYDRANTS AND CB6.	
6	D.K.H.	08 NOV. 2021	SUBDRAIN FROM U/G PARKING GARAGE RELOCATED.	
5	D.K.H.	15 OCT. 2021	REVISED SANITARY SEWER LAYOUT	
4	D.K.H.	16 SEP. 2021	REVISED PROPOSED MEDIAN ON REGION ROAD 25. EXISTING PAVEMENT MARKINGS TO REMAIN	
3	T.M.J.	08 JUN 2021	WATER SERVICE TO BLDG B REVISED EXIST SAN SERVICE REMOVED	
2	T.M.J.	21 MAY 2021	METER AND BACKFLOW PREVENTER ADDED	
1	T.M.J.	03 MAR. 2021	NEW POLE LOCATIONS ALONG RR25 BY MILTON HYDRO	

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AUGUST 23, 2023
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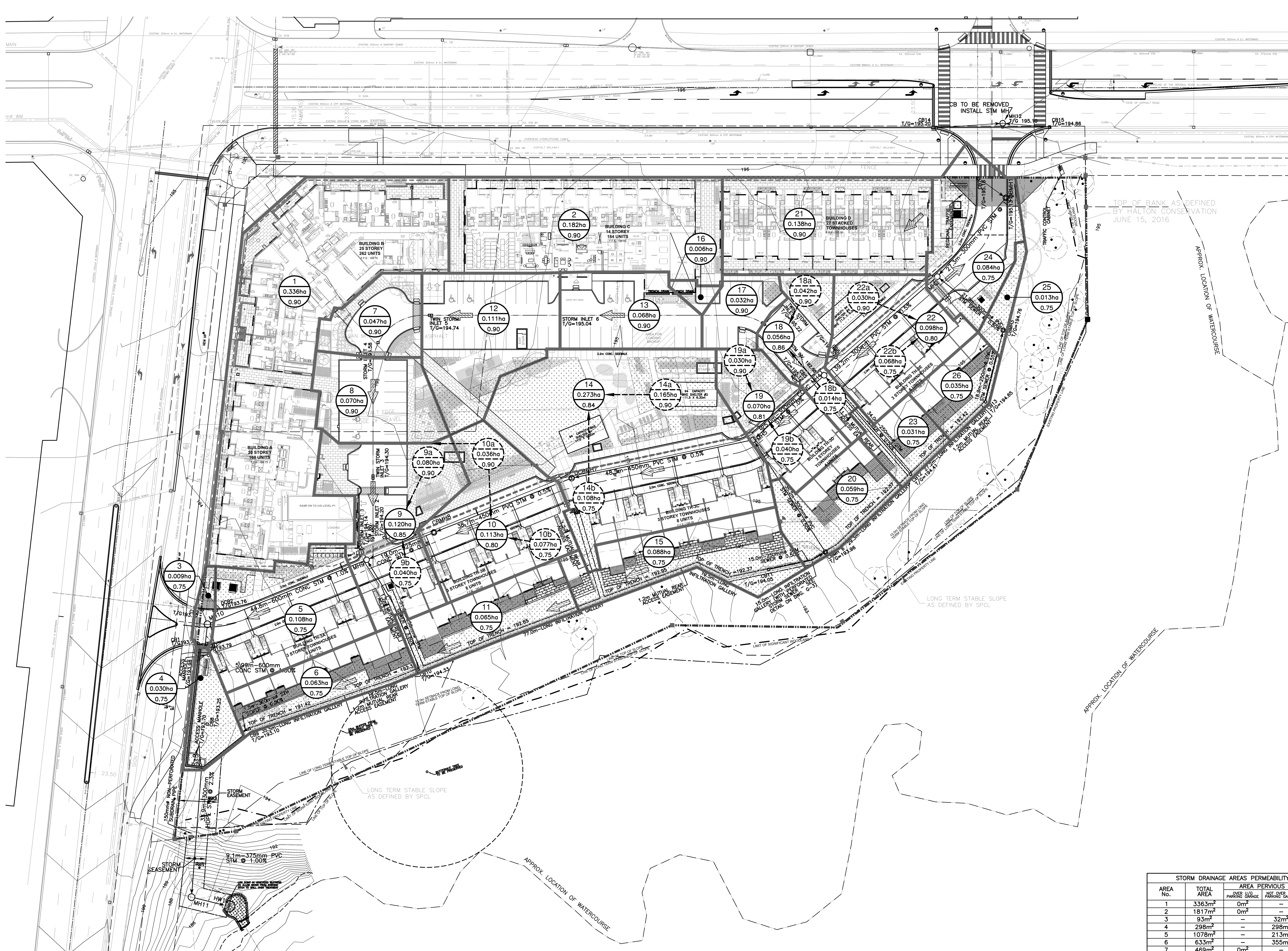
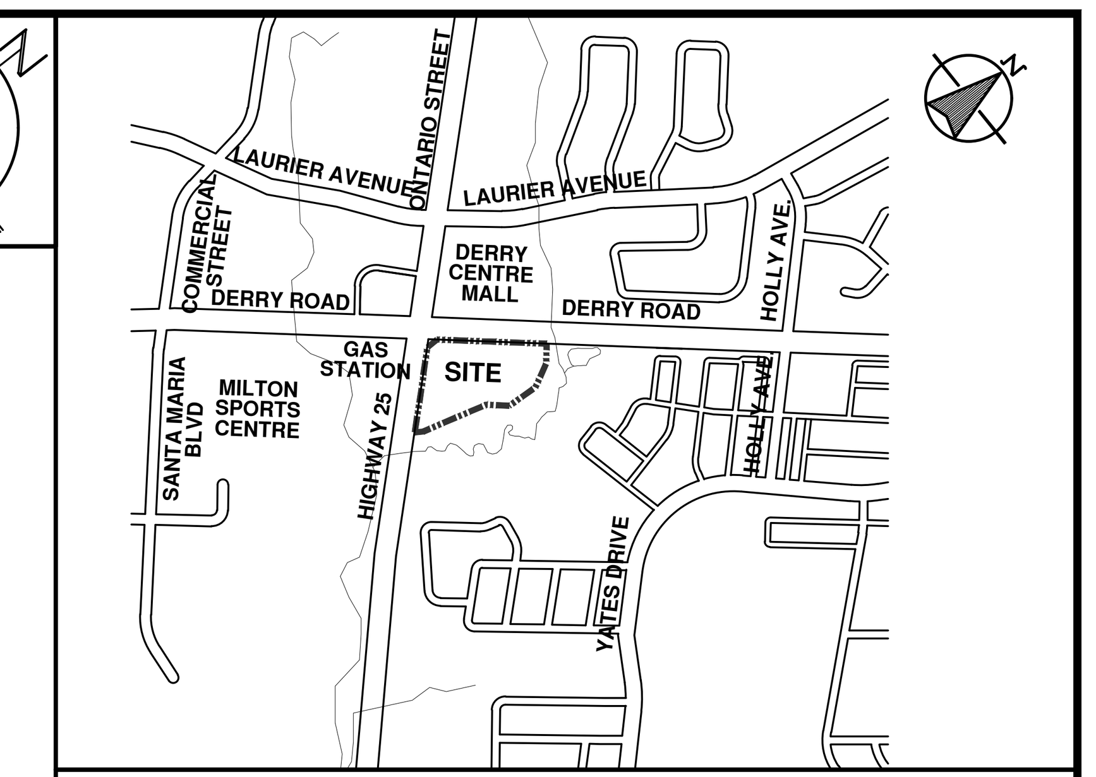
DERRY ROAD / HIGHWAY 25
TOWN OF MILTON
SITE PLAN No.: SP - 21-19

UNDERGROUND SERVICING PLAN

Region File No.	DM–1036	City File No.	SP–21–19		
Drawn By:	S.C.	Checked By:	C.R.M	Drawing No.	Sheet No. SS-2 (7)
Designed By:	T.M.J.	Checked By:	D.K.H.		
Scale:	1:250	Date:	MAY 2019		





KEY PLAN
N.T.S.

LEGEND

- LIMIT OF SITE
- PROPOSED EASEMENT
- 254 EX. CONTOUR
- MH19 PROPOSED STORM MANHOLE
- CBMH PROPOSED CATCHBASIN MANHOLE
- CB PROPOSED SINGLE CATCHBASIN
- DCB PROPOSED DOUBLE CATCHBASIN
- OVERLAND FLOW ROUTE
- PROPOSED INFILTRATION TRENCH
- DRAINAGE AREA BOUNDARY
- 1 — DENOTES AREA NUMBER; 0.516ha — DENOTES AREA IN HECTARES; 0.90 — DENOTES RUN-OFF COEFFICIENT
- 1a / 0.353ha / 0.75 — COMPONENT OF DRAINAGE AREA
- PERMEABLE AREA
- LINE OF LONG TERM STABLE SLOPE
- LINE OF TOP OF SLOPE
- LIMIT OF SIGNIFICANT WOODLANDS (KFCI)
- PROPOSED EASEMENTS

STORM DRAINAGE AREAS PERMEABILITY TABLE

AREA No.	TOTAL AREA	AREA PERVIOUS OVER U/G PARKING GARAGE	AREA PERVIOUS NOT OVER U/G PARKING GARAGE	AREA IMPERVIOUS
1	3363m²	0m²	–	3363m²
2	1817m²	0m²	–	1817m²
3	93m²	–	32m²	61m²
4	298m²	–	298m²	0m²
5	1078m²	–	213m²	865m²
6	633m²	–	355m²	278m²
7	469m²	0m²	–	469m²
8	697m²	18m²	–	679m²
9	1196m²	18m²	38m²	1140m²
10	1127m²	180m²	28m²	919m²
11	651m²	–	424m²	227m²
12	1106m²	144m²	–	962m²
13	680m²	0m²	–	680m²
14	2728m²	823m²	120m²	1785m²
15	884m²	–	559m²	325m²
16	65m²	0m²	–	65m²
17	315m²	29m²	–	286m²
18	559m²	70m²	18m²	471m²
19	695m²	171m²	25m²	499m²
20	586m²	–	445m²	141m²
21	1380m²	75m²	–m²	1305m²
22	983m²	109m²	27m²	847m²
23	313m²	–	199m²	114m²
24	844m²	18m²	176m²	650m²
25	129m²	–	129m²	0m²
26	351m²		199m²	152m²

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	By	Date	Revision	Checked
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1	D.K.H.	16 SEP. 2021	REVISED PROPOSED MEDIAN ON REGION ROAD 25. EXISTING PAVEMENT MARKINGS TO REMAIN	

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STORM DRAINAGE AREA PLAN

Region File No. DM–1036		Town File No. SP–21–19	
Drawn By: S.C.	Checked By: C.R.M	Drawing No.	Sheet No. SD-1 (2)
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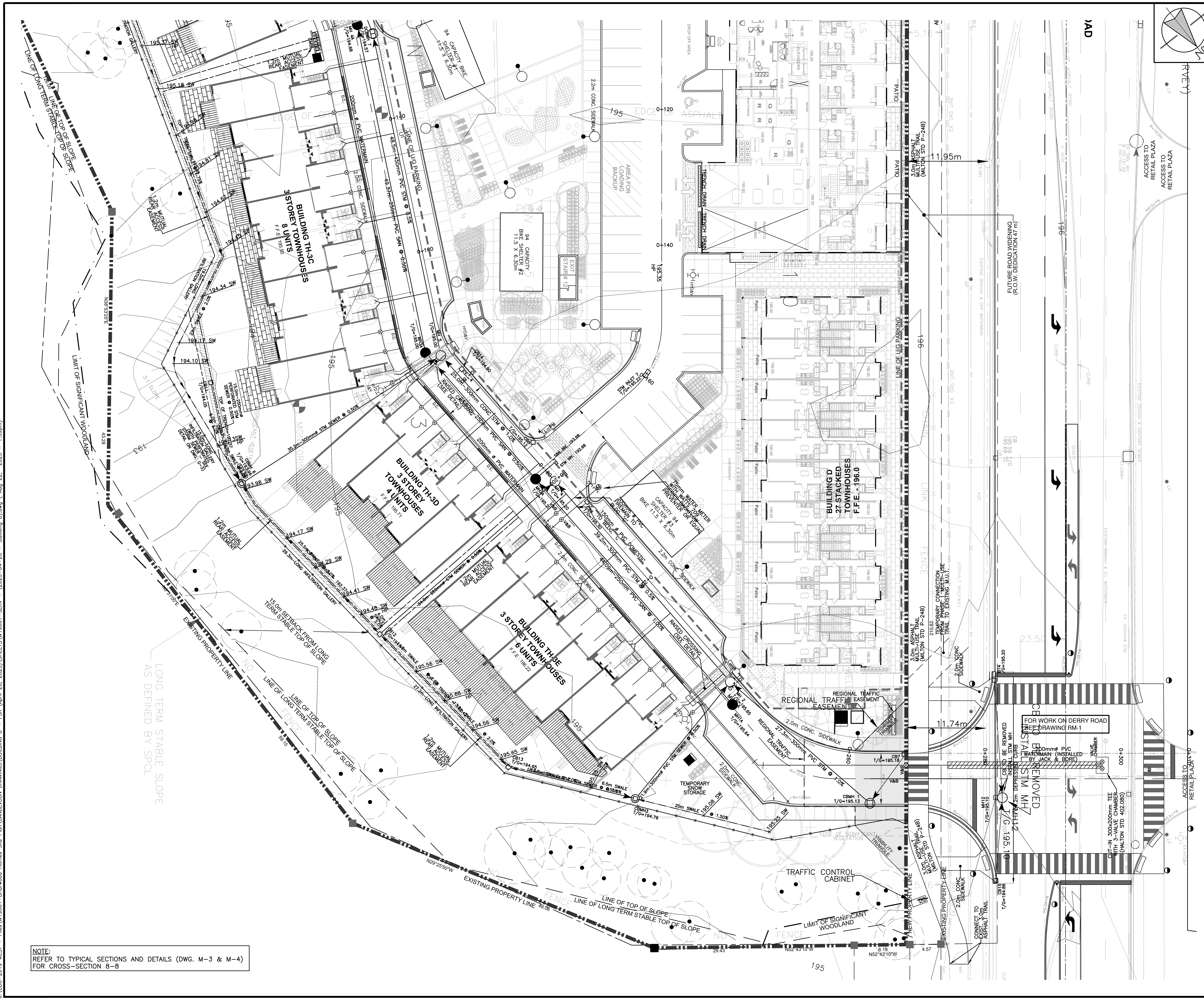

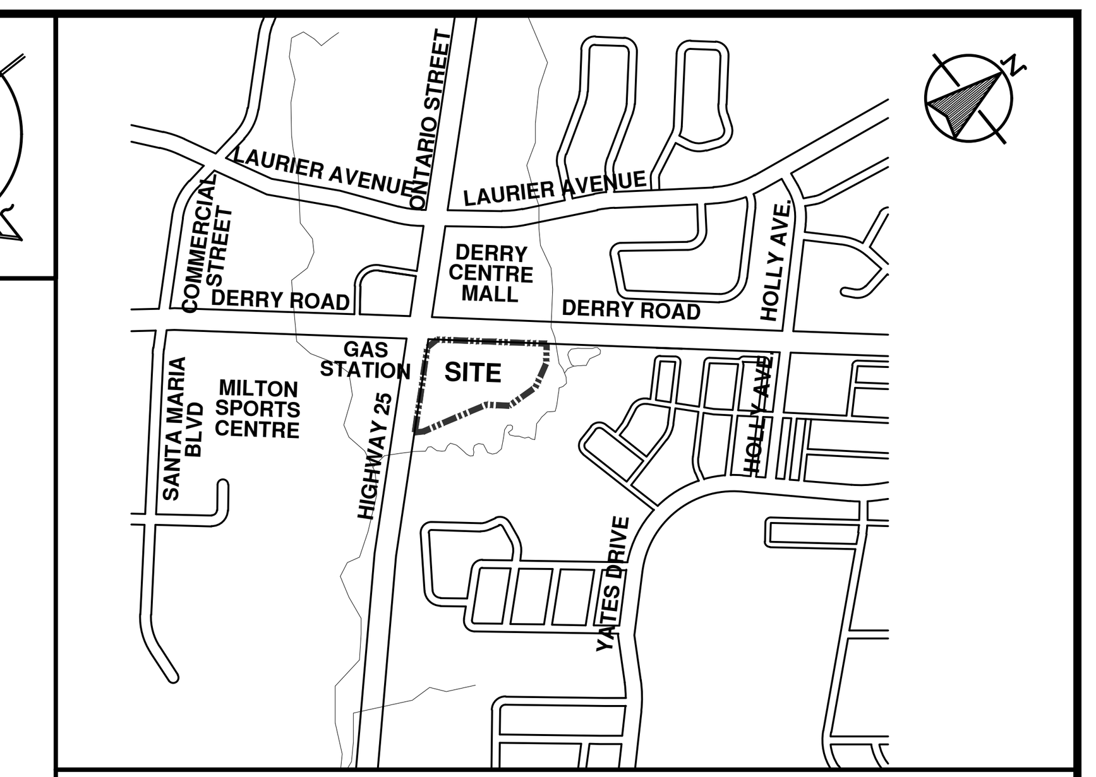

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- LIMIT OF SIGNIFICANT WOODLANDS (KFCI)
- LINE OF PROPOSED U/G PARKING
- PROPOSED ACOUSTIC FENCE
- PROPOSED 1.5m BLACK VINYL CHAINLINK FENCE
- PROPOSED DEPRESSED CURB WITH TACTILE PLATE FOR PEDESTRIAN CROSSING

NO CONSTRUCTION IS TO TAKE PLACE ON ADJACENT LANDS WITHOUT WRITTEN PERMISSION FROM THE RESPECTIVE LANDOWNER

NOTES:

- PRIOR TO THE COMMENCEMENT OF ANY WORKS ON THE SITE SNOW FENCE, OR OTHER ACCEPTABLE HOARDING, IS TO BE INSTALLED ON THE PERIMETER OF THE PROPERTY AND AT LOCATIONS AS DETERMINED BY THE DIRECTOR, DEVELOPMENT ENGINEERING, AND THE FENCING SHALL REMAIN IN PLACE UNTIL SUCH TIME AS OTHERWISE DIRECTED BY THE DIRECTOR, DEVELOPMENT ENGINEERING.
- EROSION AND SEDIMENT CONTROLS ARE TO BE IN PLACE PRIOR TO THE START OF SITE WORKS, AND BE MAINTAINED FOR THE DURATION OF CONSTRUCTION.
- ALL FILL SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY AND THAT A SUFFICIENT NUMBER OF TESTS ARE UNDERTAKEN TO THE SATISFACTION OF THE DIRECTOR OF ENGINEERING SERVICES.
- PRIOR TO THE COMMENCEMENT OF ANY WORKS WITHIN THE MUNICIPAL ROAD ALLOWANCE THE OWNER IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS FROM THE ENGINEERING SERVICES DEPARTMENT, TOWN OF MILTON, FOR THE PURPOSES OF VEHICULAR ACCESS TO THE PROPERTY, (ENTRANCE PERMIT), AND FOR SERVICING EXCAVATIONS WITHIN THE MUNICIPAL ROAD ALLOWANCE, (ROAD OCCUPANCY PERMIT). THE OWNER SHALL ALSO BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS FROM REGION OF HALTON FOR WORK ON REGIONAL ROADWAYS (i.e. DERRY ROAD AND REGIONAL ROAD 25).
- 900mmø TRANSMISSION MAIN SHALL BE EXPOSED BY HYDROVAC TO DETERMINE ELEVATION BEFORE JACK & BORE WORK. TO BE WITNESSED BY HALTON STAFF.

BENCHMARK INFO:

ELEVATIONS SHOWN ON THIS PLAN ARE DERIVED FROM MINISTRY OF TRANSPORTATION ONTARIO BENCHMARK No. 00819828159 ELEVATION = 206.569m
CONCRETE AND STEEL BRIDGE CARRYING CNR OVER HWY 25, 0.9 km SOUTH OF THE OVERPASS AT INTERSECTION OF HWY 25 AND HWY 401. TABLET IS SET HORIZONTALLY IN WEST FACE OF EAST ABUTMENT, 10.5 m EAST OF CENTRELINE OF HWY 25, 63 cm SOUTH OF NORTHEAST END OF ABUTMENT, 37cm ABOVE GROUND.

SUBMISSION:

1st	X	Date	8 AUG. 2019	Pre–Serv		Date	
2nd	X	Date	10 JAN. 2020	Interim		Date	
3rd	X	Date	31 JUL. 2020	Final		Date	
4th	X	Date	20 NOV. 2020	Issued For Construction	X	Date	21 MAY 2021
5th	X	Date	20 APR. 2021				

No.	By	Date	Revision	Checked
7	A.B.	21 APR. 2023	REVISED BUILDING 'C', ADDED BUILDING 'D', REVISED AMENITY AREAS PER LANDSCAPE PLAN RELOCATED HYDRANTS AND CB6.	
6	D.K.H.	08 NOV. 2021	SUBDRAIN FROM U/G PARKING GARAGE RELOCATED.	
5	D.K.H.	15 OCT. 2021	REVISED SANITARY SEWER LAYOUT	
4	D.K.H.	16 SEP. 2021	REVISED PROPOSED MEDIAN ON REGION ROAD 25. EXISTING PAVEMENT MARKINGS TO REMAIN	
3	T.M.J.	08 JUN 2021	WATER SERVICE TO BLDG B REVISED EXIST SAN SERVICE REMOVED	
2	T.M.J.	21 MAY 2021	METER AND BACKFLOW PREVENTER ADDED	
1	T.M.J.	03 MAR. 2021	NEW POLE LOCATIONS ALONG RR25 BY MILTON HYDRO	

MILTON
Halton REGION

REGISTERED PROFESSIONAL ENGINEER
S. D. LANG
AUGUST 23, 2023
PROVINCE OF ONTARIO

CONSTRUCTION NORTH
TRUE NORTH

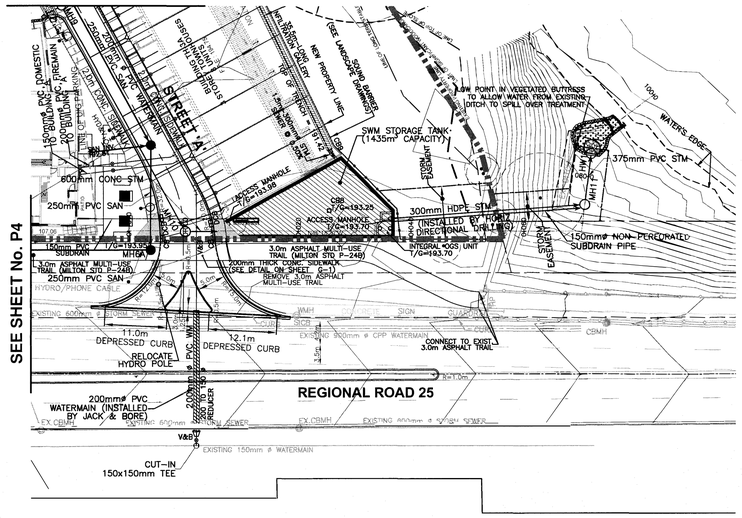
CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
9358 GOREWAY DRIVE
BRAMPTON ON. L6P-0M7
TEL (905) 794-0600
FAX (905) 794-0611

PROJECT NUMBER W20191

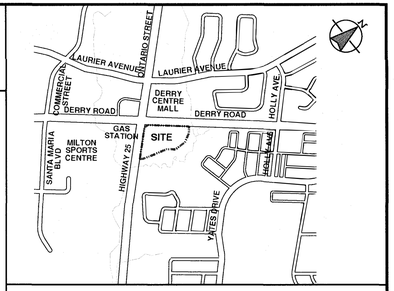
MILTERON DEVELOPMENTS LTD.
CONNECTT RESIDENTIAL DEVELOPMENT
DERRY ROAD / HIGHWAY 25
TOWN OF MILTON
SITE PLAN No.: SP - 21-19

UNDERGROUND SERVICING PLAN

Region File No.	DM–1036	City File No.	SP–21–19
Drawn By: S.C.	Checked By: C.R.M	Drawing No.	Sheet No. SS-3 (7)
Designed By: T.M.J.	Checked By: D.K.H.		
Scale: 1:250	Date: MAY 2019		



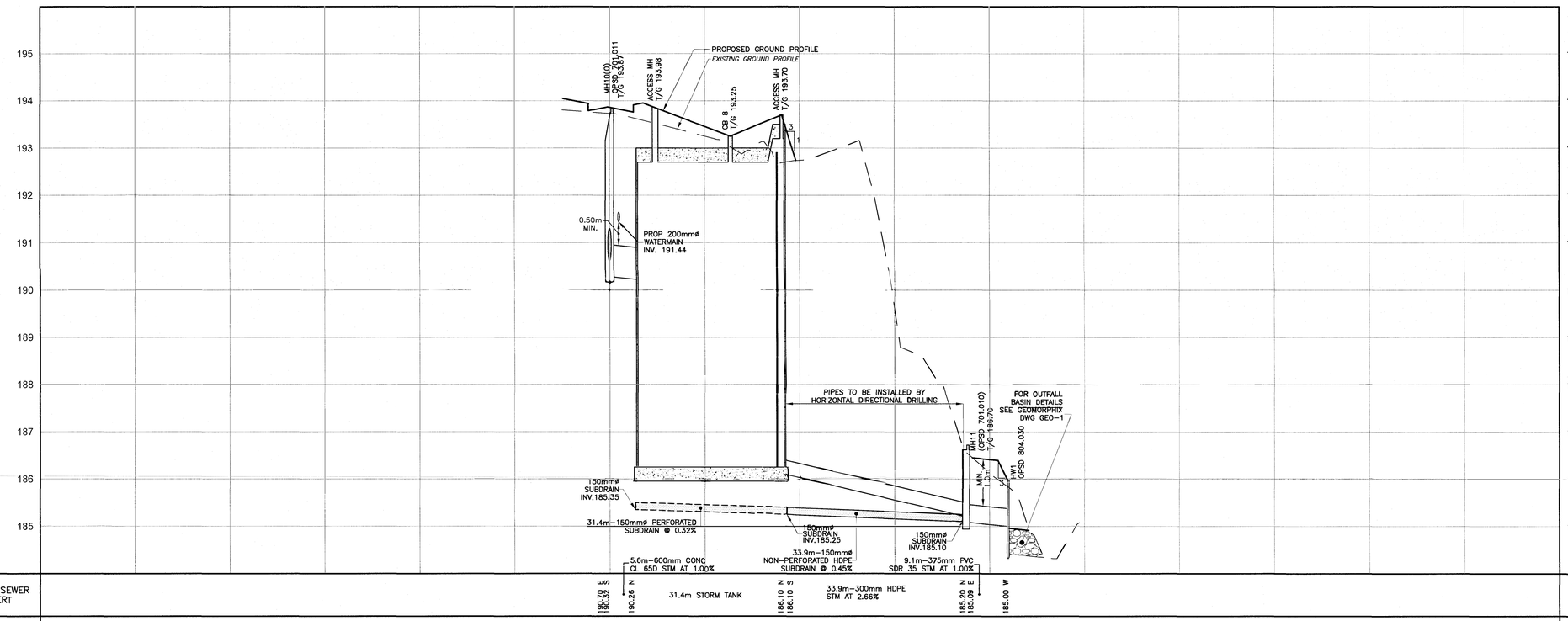
PAVEMENT STRUCTURE:
40mm HL3 TOP COURSE
65mm HL8 BASE COURSE
150mm GRANULAR 'A' COMPACTED TO 98% M.S.P.D.D.
300mm GRANULAR 'B' COMPACTED TO 98% M.S.P.D.D.



KEY PLAN
N.T.S.

LEGEND

- MH19 — PROPOSED STORM MANHOLE
- MH19A — PROPOSED SANITARY MANHOLE
- CB — PROPOSED SINGLE CATCHBASIN
- DCB — PROPOSED DOUBLE CATCHBASIN
- PROPOSED DOUBLE STORM SERVICE CONNECTION
- PROPOSED SINGLE STORM SERVICE CONNECTION
- PROPOSED DOUBLE SANITARY SERVICE CONNECTION
- PROPOSED SINGLE SANITARY SERVICE CONNECTION
- PROPOSED WATER SERVICE CONNECTION
- HYD&V — PROPOSED FIRE HYDRANT AND VALVE
- V&B — PROPOSED VALVE & BOX
- PROPOSED INFILTRATION TRENCH
- PROPOSED TRANSFORMER PAD
- PROPOSED STREETLIGHT
- CMB — PROPOSED CANADA POST COMMUNITY MAILBOX
- LIMIT OF SITE
- LINE OF LONG TERM STABLE SLOPE
- LINE OF TOP OF SLOPE
- LIMIT OF SIGNIFICANT WOODLANDS (KFCI)
- LINE OF PROPOSED U/G PARKING
- PROPOSED SOUND BARRIER (SEE LANDSCAPE DRAWINGS)
- PROPOSED 1.5m BLACK VINYL CHAINLINK FENCE
- PROPOSED DEPRESSED CURB WITH TACTILE PLATE FOR PEDESTRIAN CROSSING



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No.	By	Date	Revision	Checked

REGION OF HALTON
TOWN OF MILTON
DEVELOPMENT SERVICES

LICENSED PROFESSIONAL ENGINEER
T.M. JOHANSEN
22140016
PROVINCE OF ONTARIO
CONSTRUCTION MONTH

Project | Dwg. No.

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
3358 GOREWAY DRIVE, BRAMPTON, ON. L6P 0M7
TEL (905) 794-0600
FAX (905) 794-0611

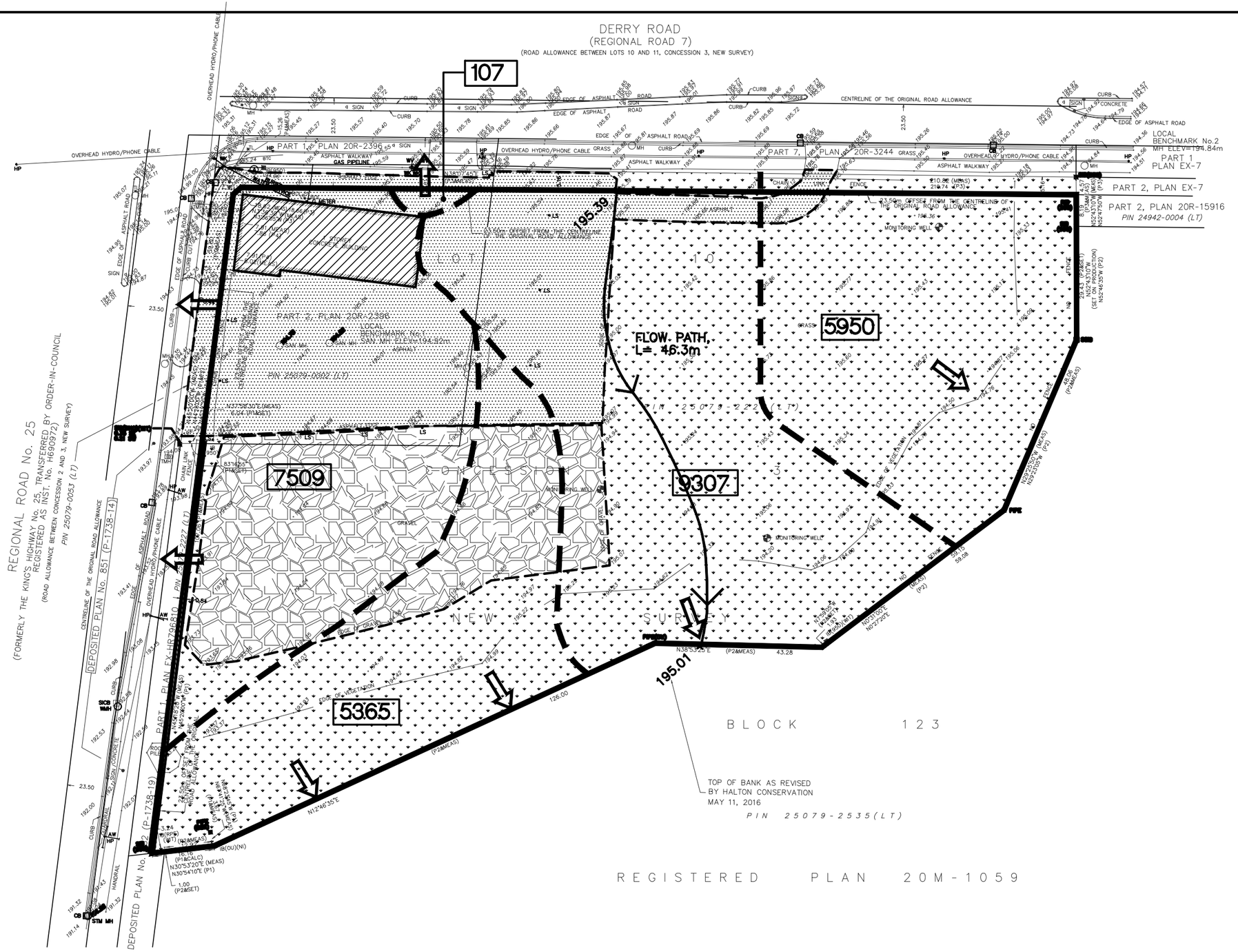
PROJECT NUMBER W19061

BRIARWOOD HOMES
RESIDENTIAL DEVELOPMENT
DERRY ROAD / HIGHWAY 25
TOWN OF MILTON
SITE PLAN No.: SP - 21-19

STORM OUTFALL
STA. -0+010 TO STA. 0+100

Region File No.				City File No. -	
Drawn By: S.C.	Checked By: C.R.M	Drawing No.	Sheet No.		
Designed By: T.M.J.	Checked By: D.K.H.		P3		
Scale: V: 1:50 Hz: 1:500	Date: MAY 2019				

J:\CDC-2019 WEST - Files\W19061-Briarwood Homes Site Plan\CANDEVCON DRAWINGS\SHEETS\W19061-P3 - STORM OUTFALL.dwg (Nov 26, 2020 - 10:25am)



LEGEND:

- GRASSED AREA (16,588sq.m.)
- BUILDING AREA (834sq.m.)
- GRAVEL SURFACE AREA (5,068sq.m.)
- ASPHALT SURFACE AREA (5,663sq.m.)
- 1000 CATCHMENT SIZE (sq.m.)
- FLOW DIRECTION
- APPROXIMATE DRAINAGE BOUNDARY

PROPOSED RESIDENTIAL DEVELOPMENT
SOUTHWEST CORNER OF DERRY ROAD
AND HIGHWAY 25
FOR

BRIARWOOD HOMES

TOWN OF MILTON
ONTARIO

PRE- DEVELOPMENT DRAINAGE

CONSTRUCTION NORTH

CANDEVCON LIMITED
CONSULTING ENGINEERS AND PLANNERS
9358 GOREWAY DRIVE, BRAMPTON, ONTARIO L6P 0M7
TEL. (905) 794-0600 FAX (905) 794-0611

DRAWN BY: D.R.	PROJECT No. W17091
CHECKED BY: T.J.	FIGURE No. PD-1
SCALE: N.T.S.	
DATE: SEPT. 27th. 2017	