FUNCTIONAL SERVICING & PRELIMINARY STORMWATER MANAGEMENT REPORT

18314 & 18309 HURONTARIO STREET RESIDENTIAL DEVELOPMENT

TOWN OF CALEDON
REGION OF PEEL

PREPARED FOR:

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CONSULTING ENGINEERS

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1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by Rizmi Holdings Limited to prepare a Functional Servicing & Preliminary Stormwater Management Report to support the Plan of Condominium and Zoning By-Law Amendment Application for the site located at 18314 & 18309 Hurontario Street in the Town of Caledon, Region of Peel.

The purpose of this report is to demonstrate that the proposed site can be developed in accordance with the Town of Caledon (Town), Region of Peel, and Credit Valley Conservation (CVC) guidelines from a functional servicing & preliminary stormwater management perspective.

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

- Town of Caledon Development Standards Manual, Version 5, 2019
- Region of Peel Watermain Design Criteria, Revised June 2010
- Region of Peel Sanitary Sewer Design Criteria, Revised July 2009, Modified March 2017
- Office of the Fire Marshall – Fire Protection Water Supply Guideline for Part 3 In the Ontario Building Code
- Fire Underwriters Survey – Water Supply for Public Fire Protection, 1999
- Ontario Building Code (OBC) O.Reg 191/14, January 1, 2016
- Credit Valley Conservation Stormwater Management Criteria, August 2012
- Ministry of the Environment Stormwater Management Planning and Design Manual, March 2003
- Ministry of the Environment Design Guidelines for Drinking-Water Systems, 2008
- Low Impact Development Stormwater Management Planning and Design Guide by the Credit Valley Conservation Authority and the Toronto and Region Conservation Authority, 2010
- Caledon Creek and Credit River Subwatershed Study (Subwatersheds 16 & 18) Phase I: Characterization Report, November 1998

2.0 Site Description

The lands are municipally known as 18314 and 18309 Hurontario Street in the Town of Caledon.

The subject property is approximately 1.37 ha and is located west of Hurontario Street (Highway 10) between James Street and Travelled Road. 18314 and 18309 Hurontario Street are both designated as residential in the Town of Caledon's Official Plan Schedule E.

The subject property consists of an existing residential heritage building and open/undeveloped land. The topography of the subject property slopes from northwest to east toward Hurontario Street. Per the Preliminary Geotechnical Investigation and Soil Percolation Tests Report by Sirati & Partners Consultants Ltd. (August 2, 2019), the native soils consist of sand, silt, and gravel. The Geotechnical Report also indicates the on-site groundwater level elevations vary between 412.4 and 413.9.

The property is bounded by:

- Hurontario Street (Highway 10) to the northeast
- Existing residential dwellings to the northwest
- Existing residential dwellings to the southeast
- Cultivated lands to the southwest

Based on the Site Plan prepared by Lucas & Associates (dated November 5, 2020), the proposed residential development consists of a seven (7) block, thirty (30) townhouse unit development with an internal roadway and ten (10) above-ground visitor parking spaces. It is understood that the existing heritage building will remain. As such, the proposed development will consist of thirty (30) townhouse units and one (1) heritage building for a total of thirty-one (31) units.

3.0 Road Standard

Two (2) access routes to the development will be provided from the proposed Brock Street roadway at the northwest limit of the property (Site Plan by Lucas & Associates dated November 5, 2020). The Brock Street road alignment and design will be determined by others. Based on the present configuration of the site plan, the proponent will have to verify a connection for Brock Road to the existing municipal right of way.

The internal roadway will be designed to provide emergency vehicle access routes and has a width of 6.0 m. Ten (10) above ground visitor parking spaces are provided.

4.0 Sanitary Servicing

4.1 Existing Sanitary Servicing

A review of the Hurontario Street as-constructed drawings, prepared by the Region of Peel (September, 2007, Plan No: 35299-D), indicate that no sanitary sewer infrastructure exists within the right-of-way. It is assumed that the existing heritage building on the subject property is serviced by a private onsite sewage system.

4.2 Design Sanitary Flow

Part 8 of the Ontario Building Code (2017) was referenced to estimate the sanitary design flows for the proposed development. **Table 1** presents a summary of the estimated design flows.

Table 1: Estimated Sanitary Sewage Design Flows

Unit Type	Number of Bedrooms	Finished Unit Floor Area	Number of Fixture Units	Base Flow (L/day)	Additional Flow – Floor Area (L/day)	Additional Flow – Fixture Units (L/day)	Total Number of Units	Total Flow (L/day)
TH-30-1	3	200	22	1,600	0	100	6	**59,100**
TH-30-2	3	225	25	1,600	300	250	24	
Existing Heritage Building*	3	370	25	1,600	1,700	250	1	

Per the Ontario Building Code, the sanitary sewage design flow from each unit type consists of the base flow allocated for the number of bedrooms and the greater additional flow generated by the gross floor area and number of fixture units. The additional flows for Unit TH-30-1 and TH-30-2 were calculated based on floor plans by RN Design Ltd. (October 23, 2018). It is assumed that the existing heritage building is a three-bedroom dwelling. The floor area was obtained from approximate measurements of the available topographic survey by RS Geomatics Ltd. (dated November 12, 2018), and is considered to be conservative. Thus, the total daily sanitary sewage design flow was calculated to be 59,100 L/day for the proposed development.

Properties with a total daily design sanitary sewage flow exceeding 10,000 L/day are subject to Section 53 of the Ontario Water Resources Act, and require an Environmental Compliance Approval (ECA) issued by the Ministry of Environment, Conservation and Parks (MECP). The ECA application will need to address all sewage flows from the property, including the existing heritage building. If the onsite sewage system for the existing heritage building is expected to be maintained a functional and condition assessment will be required prior to the ECA application.

Sanitary Design Flow Calculations can be found in **Appendix A**.

4.3 Proposed Sanitary Servicing

One (1) onsite sewage system is proposed to service the proposed development. The proposed onsite sewage system design includes a collection system, a sewage lift station and a centralized package sewage treatment system. Treated effluent will be discharged to a large subsurface disposal system constructed as a Type A Dispersal Bed.

As noted above, the proposed sewage treatment system will require an ECA issued by the Ministry of Environment. Large subsurface disposal systems must demonstrate that Reasonable Use guidelines can be met at the property boundary. The critical contaminant of concern for groundwater receivers is nitrate nitrogen. The maximum allowable concentration of nitrate-nitrogen at the property boundary is 2.5 mg/L. At this time, a detailed impact assessment of the proposed sewage system has not been completed. However, given the constraints of the site i.e. high flows and a small contaminant attenuation zone, it is expected that best available technology will be required to meet Reasonable Use. The following effluent criteria are proposed for the proposed sewage system.

Table 2: Proposed Effluent Objectives

Parameter	Proposed Effluent Objective
Carbonaceous Biochemical Oxygen Demand	10 mg/L
Total Suspended Solids	10 mg/L
Total Ammonia Nitrogen	< 1 mg/L
Total Nitrogen	< 5 mg/L
pH	6.5 – 8.5

Three (3) onsite sewage treatment system suppliers were contacted to obtain preliminary treatment schematics and footprints. The three manufacturers contacted were Waterloo Biofilter Systems, BNA Inc., and Newterra Ltd. All three manufacturers provide package onsite sewage treatment system components which can meet the effluent objectives noted above.

Given the constraints of the site, the recommended supplier is Newterra Ltd. Newterra package Membrane Bioreactor (MBR) plants have a very compact footprint. The proposed system consists of a below grade equalization tank, an above grade treatment module, and a below grade effluent dosing chamber. A schematic of the proposed Newterra MBR system dated March 22, 2019, can be found in **Appendix A**.

The sanitary flows will be collected and conveyed by a 250mm diameter PVC (polyvinyl chloride) gravity sewer, to the septic tanks and treatment system located within the landscaped area to the south of Unit 20. Treated effluent will discharge to effluent dosing chamber and be pumped to the leaching bed located at the center of the proposed development.

Gunnell Engineering supervised the excavation of seven (7) test pits over the northern portion of the property in 2018. Test pits were excavated to a depth of approximately 1.8 m below grade. Soils encountered consisted of approximately 0.3 m of topsoil, underlain by silty sand. The silty sand was underlain by sandy soils with cobbles. No groundwater was encountered. According to Gunnell, a grain size analysis classified the soils as a gravelly sand soil with little to no fines with an assigned percolation rate of 6 min/cm.

Sirati & Partners Consultants Ltd. Also completed a Geotechnical report for the entirety of the site (August 2, 2019), The results of their report are consistent with the Gunnell report. Native soils located beneath the proposed leaching bed location consist of well draining silty sand & sand and silt soils. The report indicates local infiltration rates of 3.51 and 4.38 min/cm can be anticipated within the proposed dispersal bed area.

Based on the two reports, a conservative T-time of 10 min/cm has been assigned for the purposes of preliminary leaching bed sizing.

A Type A dispersal bed is proposed as the leaching bed. A Type A dispersal bed consists of a layer of stone underlain by a layer of imported sand. Based on the total design flow of 59,100 L/day, the required Type A bed footprints for the stone and sand layer are 1182 m^2 and 695.3 m^2, respectively. The proposed disposal bed will consist of an approximately 1268.3 m^2 stone layer footprint and a 1305.0 m^2 sand layer footprint. Thus, the dispersal bed footprint requirements are met.

The onsite sewage system design calculations can be found in **Appendix A** and the Site Servicing Plan (**Drawing C101**) illustrates the location of the proposed onsite sewage system for sanitary servicing of the proposed development.

4.4 Proximity to Existing Wells

Part 8 of the Ontario Building Code requires a minimum horizontal separation distance of 15 m (50 ft) between wells with a watertight casing extend to 6 m below grade and onsite sewage system components. Using provincial well records, it was determined that the locations of the proposed treatment system and leaching bed satisfy the minimum separation distances required by the Province of Ontario.

5.0 Water Servicing

The Region of Peel is responsible for the distribution, treatment and storage of the municipal water supply surrounding the site.

5.1 Existing Water Servicing

A review of the Hurontario Street as-constructed drawings, prepared by Region of Peel (September, 2007, Plan No: 35299-D) indicate that the existing heritage building within the 18314 Hurontario Street property is serviced by connection to a 300 mm diameter watermain along the Hurontario Street roadway. In addition, a servicing stub has not been provided for the 18309 Hurontario Street property.

5.2 Design Water Demand

The design water demand for the proposed site can be expected to be of similar scale to the sanitary design flow, as summarized in **Section 4.2**. Through the application of peaking factors, which are included in the Region of Peel Watermain Design Criteria, the following peak flows can be determined for the development's water demand. **Table 3** summarizes the calculated maximum day and hour demand flows.

Table 3: Estimated Water Demand Flows

Design Flow (L/day)	**Design Flow** (L/s)	**Maximum Day Peak Factor**	**Maximum Day Demand Flow** (L/s)	**Maximum Hour Peak Factor**	**Maximum Hour Demand Flow** (L/s)
59,100	**0.68**	2.00	1.37	3.00	2.05

5.3 Fire Flow Demand

The Fire Underwriters Survey (FUS) was used to determine the fire flow requirements for the proposed development. The block containing units 25 to 30, at the northwest corner of the proposed development, is anticipated to require the largest fire flow and was used for calculations. The building block is anticipated to be of ordinary construction with a total unit floor area of 1250 m^2. **Table 4** summarizes the estimated fire flow and duration to meet fire protection requirements for the proposed development.

Table 4: Estimated Fire Demand Flows

Method	**Demand Flow** (L/s)	**Demand Flow** (L/min)
FUS	183.3	11,000

The proposed service is required to accommodate a design fire flow of 11,000 L/min, or 183.3 L/s at 20 psi residual pressure.

A hydrant flow test will be carried out during future submissions or the detailed design stages to confirm adequate flows and pressures are met.

The design water demand and fire flow calculations can be found in **Appendix B**.

5.4 Proposed Water Servicing

The development is proposed to be serviced by connection to the existing 300mm diameter watermain within the Hurontario Street right-of-way. A 300mm to 150mm diameter pipe reducer will

be installed near the property limits to provide an internal 150 mm diameter PVC water service throughout the proposed development. As per the latest version of the Ministry of the Environment Design Guidelines for Drinking-Water Systems, the water service mainline is required to maintain a minimum ground level pressure of 20 psi under maximum day demand and fire flow demand simultaneously. With a maximum demand day flow of 1.37 L/s and a fire demand flow of 183.3 L/s, the mainline will be required to maintain a pressure of 20 psi while supplying a total water flow of 183.3 L/s. The watermain, with individual service connections for each unit, will follow the alignment of the internal roadway and loop through the proposed Brock Street roadway. The preliminary watermain design is illustrated in the Preliminary Site Servicing Plan (**Drawing C101**).

6.0 Grading and Civil Design

Based on the Topographic Survey by RS Geomatics Ltd. dated November 12, 2018, the existing elevation across the southern four-fifths of the property are generally flat. However, a steep incline is observed near the north-western property limits that causes approximately 4.5m of longitudinal fall across the property. Given that access to the proposed development will be provided by connection to the proposed Brock Street roadway (alignment and design to be done by others) the internal roadway grades, and the associated proposed buildings grades, must be raised to match the existing grades along the northern-western property limits.

Retaining walls will be required to match existing grades along the north-western, southern and south-eastern property limits. Walk-out and Look-out townhouse units are proposed to reduce the amount of engineered fill required as well as reduce the height of the required retaining walls. 3:1 slopes are proposed South-east of Unit 20, between Units 24 and 25, and north-west of Unit 30 to transition the higher front yard grades to the lower rear-yard grades.

It is proposed to match the existing concrete sidewalk grades along Hurontario Street and to grade up 2% to establish new property line grades along the eastern property limits. This strategy will facilitate a smooth grade transition along the rear-yard of Units 4 to 12. The property limit grades to the east of Unit 12 will transition down to match existing grade.

Drawing C102 illustrates the proposed Preliminary Site Grading Plan.

7.0 Drainage Conditions

Based on previous correspondence with the CVC, it was confirmed that the subject site is not located in a CVC regulated area; however, the site plan must still adhere to the CVC guidelines. The drainage for pre-development and post-development conditions are outlined in the following sections.

7.1 Existing Drainage Conditions

The subject development site currently consists of two (2) properties. The 18314 Hurontario Street property includes an existing heritage building and empty, vegetated land. The 18309 Hurontario Street property is located to the southeast of the first property and consists of agricultural lands. The two properties have a collective area of 1.37 ha.

A review of the topographic survey indicates that stormwater runoff within the properties drains uncontrolled via sheet flow from the northwest to the east towards the drainage ditch that runs southerly along Hurontario Street. There is an elevation change of approximately 4.5 m across the developable portion of the property. Refer to the Pre-Development Drainage Plan (**Drawing C103**) for existing drainage patterns.

Table 5 summarizes the pre-development land areas and weighted runoff coefficients. The stormwater management calculations are included in **Appendix C**.

Table 5: Pre-Development Land Areas and Runoff Coefficients

Catchment ID	Description	Pervious Area (ha)	Impervious Area (ha)	Total Area (ha)	Weighted Runoff Coefficient
101	Pre-Development Site	1.35	0.02	1.37	0.26

7.2 Proposed Drainage Conditions

As previously noted, the proposed development consists of a seven (7) block, thirty (30) townhouse unit complex and an internal roadway with ten (10) above ground parking spaces. The heritage building will be preserved and is to remain in the proposed development conditions. The proposed grading and stormwater management strategy for the site has been designed to meet the drainage criteria of the Town of Caledon, Region of Peel and Credit Valley Conservation.

Stormwater runoff generated within the internal roadway, roofs, and other impervious areas will be captured by catch basin manholes within the reverse-crowned internal roadway. The flows will be conveyed by 1200 mm diameter concrete superpipes to a stormwater infiltration chamber located at the southeast corner of the property. Once the stormwater infiltration chamber is full, water within the orifice control manhole will spill at an elevation of 414.64 and be conveyed to the existing 900mm diameter storm sewer within the Hurontario Street Roadway. The conveyance of runoff from lawns will be facilitated by side-yard and rear-yard drainage swales. The drainage swales will convey flows overland to rear-yard catch basins and catch basin manholes within the internal roadway. Storm Catch Basin (STM CB) 1 and STM CB2 will convey captured flows to the superpipe storage system, while STM CB3 will convey captured flows to the proposed infiltration chamber.

Table 6 provides details of the catchment areas, and runoff coefficients for post-development conditions. **Appendix C** contains the stormwater management calculations.

Table 6: Post-Development Land Areas and Runoff Coefficients

Catchment ID	Description	Pervious Area (ha)	Impervious Area (ha)	Total Area (ha)	Weighted Runoff Coefficient
201	Post-Development Site	0.60	0.77	1.37	0.62

The Post-Development Drainage Plan (**Drawing C104)**, Preliminary Site Servicing Plan (**Drawing C01**), Preliminary Site Grading Plan (**Drawing C102**) illustrate the proposed drainage of the site and the internal storm sewer system.

In the event of a greater than 100-year storm, the overland flow route will follow the alignment of the internal roadway to STM CBMH1, pool and spill at a top of curb elevation of 417.76. The emergency overland flows will drain to the south-eastern property limits and discharge to the existing drainage ditch along Hurontario Street matching the pre-development emergency flow conditions.

The drainage along the rear-yard of units 20 to 30 will be captured by STM CB1 and STM CB2. In the event that STM CB1 and STM CB2 are clogged during a greater than 100-year storm, overland flows will spill over the southern retaining wall at an elevation of 416.80m.

8.0 Stormwater Management

Stormwater management design criteria were established through a review of the Credit Valley Conservation Stormwater Management Criteria (August 2012).

The stormwater management criteria are as follows:

- **Stormwater Quantity Control:** Provide post-development to pre-development peak flow control for all design storms (2, 5, 10, 25, 50 and 100-year)
- **Stormwater Quality Control:** "Enhanced" protection level for the developed portion of the site (80% Total Suspended Solids (TSS) Removal)
- **Water Balance/Volume Control:** At a minimum, retain onsite a stormwater runoff volume equivalent to 5 mm of rain over the total development site, and make every feasible effort to maintain pre-development annual infiltration volume

8.1 Stormwater Quantity Control

Stormwater quantity control requirements for the site include providing post-development to pre-development control for all storms including the 2, 5, 10, 25, 50 and 100-year design storm events. The Modified Rational Method and the Town of Caledon intensity-duration-frequency (IDF) data, as per the Town of Caledon General Standards (2000), were used to determine the pre-development and post-development peak flow rates for site stormwater runoff.

Weighted runoff coefficients were calculated based on the amount of impervious and pervious areas for both pre- and post-development conditions, and were determined to be 0.26 and 0.62, respectively.

Please refer to **Appendix C** for complete stormwater calculations, including the preliminary stormwater superpipe storage, orifice control, and infiltration chamber design. The detailed design of the orifice control and infiltration chamber will be completed during the detailed design stage. The Preliminary Site Servicing Plan (**Drawing C101**) illustrates the locations of the super pipe storage system, orifice control and infiltration chamber.

A summary of site flows and required storage volumes is provided in **Table 7**.

Table 7: Pre- and Post-Development Flow Rates and Required Storage Volumes

Storm	Pre-Development Uncontrolled Peak Flow Rate (m^3/s)	Post-Development Uncontrolled Peak Flow Rate (m^3/s)	Post-Development Controlled Peak Flow Rate (m^3/s)	Max. Storage Volume Required (m^3)	Max. Storage Volume Provided (m^3)
2-yr	0.086	0.203	0.086	87.9	88.9
5-yr	0.110	0.259	0.099	140.5	146.7
10-yr	0.135	0.317	0.109	187.3	193.5
25-yr	0.157	0.370	0.122	242.4	244.4
50-yr	0.177	0.417	0.137	277.1	277.4
100-yr	0.197	0.465	0.161	302.1	303.8

The results provided in **Table 7** demonstrate that the controlled post-development stormwater flow rates for all storm events up to and including the 100-year storm are less than the pre-development flow rates.

The proposed stormwater quantity control will be provided by a 215 mm diameter orifice plate with and invert of 414.78m and storm sewer superpipes. The proposed storm sewer superpipe system was sized to provide a total of 250.5 m^3 of storage within the pipes. An additional 55.6 m^3 of storage will be provided within the proposed 1800mm diameter catch basin manholes within the internal roadway at a maximum water level of 417.48m. Therefore, a total storage volume of 306.1 m^3 will be provided for the proposed development. Based on the Modified Rational Method, a total of 302.1 m^3 of storage is required for the 100-year storm event; therefore, the stormwater quantity volume requirement is achieved. Detailed storage calculations are provided in **Appendix C**.

8.2 Stormwater Quality Control

Stormwater quality control is required for the proposed development to meet the enhanced level of protection (80% total suspended solids removal) as per the 2003 MOE SWMPD Manual. Per the Credit Valley Conservation Authority and the Toronto and Region Conservation Authority dated 2010, the proposed stormwater infiltration chamber will provide 80% long-term suspended solids removal. The proposed development is 56% impervious and 1.37 ha in size, it was determined that an infiltration volume of 30.3 m^3 is required. This requirement was calculated using linear interpolation and the water quality storage requirements in Figure 7-1 of the CVC Stormwater Management Criteria. The proposed stormwater infiltration chamber was designed to provide a storage volume of 38 m^3 and the top of the chamber was set at the site outlet invert elevation. This ensures the stormwater chamber will be fully utilized prior to spilling at the outlet invert elevation and discharging from the site, thus water quality storage requirements are met. An isolator row will be included in the final design in order to provide pre-treatment for this system. The drawdown time calculations determined that a detention time of 2.2 hours will be required. Detailed drawdown time calculations are provided in **Appendix C**.

Per the Preliminary Geotechnical Investigation Report by Sirati & Partners Consultants Ltd. (August 2, 2019), the existing groundwater level is approximately 412.4m in the location of the proposed stormwater infiltration chamber. The proposed chamber is designed to have a bottom elevation of 413.5m, thus a groundwater separation of 1.1m is provided and the 1m minimum groundwater separation requirement is met.

8.3 Water Balance

As per the CVC stormwater management criteria, a site-specific water balance is required if the site is found within a medium, high, significant or ecologically significant groundwater recharge area. Figure 8.19 in the Caledon Creek and Credit River Subwatershed Study (Subwatersheds 16 & 18) Phase I: Characterization Report, dated November 1998, establishes that subcatchment 1614, which includes the proposed development site, is a significant groundwater recharge area. Due to the site's recharge status, a site-specific water balance is required.

The 6 mm storm event was determined to be the design storm event for the subject property. Retention of 6 mm of rainfall across the total roof areas amounts to a required infiltration volume of 29m^3. The CVC also requires retention of 5mm of rainfall across the total impervious areas, amounting to a required infiltration volume of 35m^3. The stormwater infiltration chamber provides an infiltration volume of 38m^3, thus water balance criteria are met.

Water balance calculations can be found in **Appendix C.**

9.0 Erosion and Sediment Controls During Construction

Erosion and sediment controls will be installed prior to the beginning of any construction activities. They will be maintained until the site is stabilized or as directed by the Site Engineer and/or Town of Caledon. Controls will be inspected after each significant rainfall event and maintained in proper working condition.

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

Heavy Duty Silt Fencing: Silt fencing will be installed on the perimeter of the site to intercept sheet flow. Additional silt fence may be added based on field decisions by the Site Engineer and Owner, prior to, during and following construction.

Rock Mud Mat: A rock mud mat will be installed at the entrance to the construction zone to prevent mud tracking from the site onto surrounding lands and the perimeter roadway network. All construction traffic will be restricted to this access only.

Sediment Control Devices: Sediment control devices will be installed on all catch basins along Hurontario Street adjacent to the subject property.

The proposed erosion and sediment controls are illustrated on **Drawing C105**.

10.0 Conclusions and Recommendations

The proposed development consists of a 7-block, 30-unit townhouse condominium with an internal private roadway connecting to the proposed Brock Street and associated surface parking areas. The existing heritage building is to remain on the site for a total of thirty-one (31) units.

Based on the information offered in this report, we provide the following conclusions:

- Water demand for the proposed development will be met using a 150 mm diameter water service. The proposed watermain will connect into the existing municipal watermain along Hurontario Street
- Municipal sanitary services do not exist within the proximity of the proposed development. The site will be serviced by a proposed 250 mm diameter internal sanitary sewer system that connects to an onsite sewage treatment and disposal system
- Stormwater Quantity controls are to be provided by oversized storm sewers and an orifice control
- Sufficient Stormwater Quality control and Water Balance are to be provided by an on-site infiltration chamber

Based on the above conclusions, we recommend the approval of the Zoning By-Law Amendment and Plan of Subdivision and Condominium, from the perspective of functional servicing and preliminary stormwater management.

Respectfully submitted,

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/jc/dp

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APPENDIX A

Sanitary Flow Calculations

CROZIER CONSULTING ENGINEERS

Project: 18314 & 18309 Hurontario Street, Town of Caledon
Project No.: 1610-5023

Created By: DP **Date:** 2020-12-10
Checked By: KR **Updated:** 2020-12-10

Residential Disposal Bed Design

Data Inputs:

	Unit Type	TH-30-1	TH-30-2	Existing Heritage Building		
	Number of Bedrooms	3	3	3		Number of bed rooms
	Finished Unit Floor Area	199.93	224.92	370.54	m^2	w/o finished basement and open areas
	Number of Fixture Units	22	25	25	units	See attached fixture unit worksheet
	Soil Percolation Rate ('T' Time)	10	10	10	min/cm	Design percolation rate

Design Flow, Q:

	Base Flow	1,600	1,600	1,600	L/day	
+	Additional Flow	0	0	0	Number of Bedrooms over 5	
		0	0	0	L/day	
or +	Additional Floor Area	0	300	1,700	L/day	sq.m above 200 sq.m, 100 L/d per 10 sq.m (Rounded to nearest 100)
		0	0	0	L/day	sq.m above 400 sq.m, 75 L/d per 10 sq.m (Rounded to nearest 100)
		0	0	0	L/day	sq.m above 600 sq.m, 50 L/d per 10 sq.m (Rounded to nearest 100)
		0	300	1,700	L/day	Total Additional Floor Area Flow L/d
or +	Additional Fixture Units	100	250	250	L/day	Fixtures above 20 Fixtures
	Q =	1,700	1,900	3,300	L/day	Each Unit Design Flow (Rounded to nearest 100)
	Total Number of Units	6	24	1	Σ 31	
	Total Q =		**59,100**		**L/day**	**Total Design Daily Flow for 31 Units**

Septic Tank Sizing:

Size for two times the daily flow of	59,100	L/day	**2X** sanitary flow for **residential** occupancy and **3X** sanitary flow for other occupancy per OBC 8.2.2.3
Required septic tank size	118,200	Litres	
	39,001	Imp. Gal.	

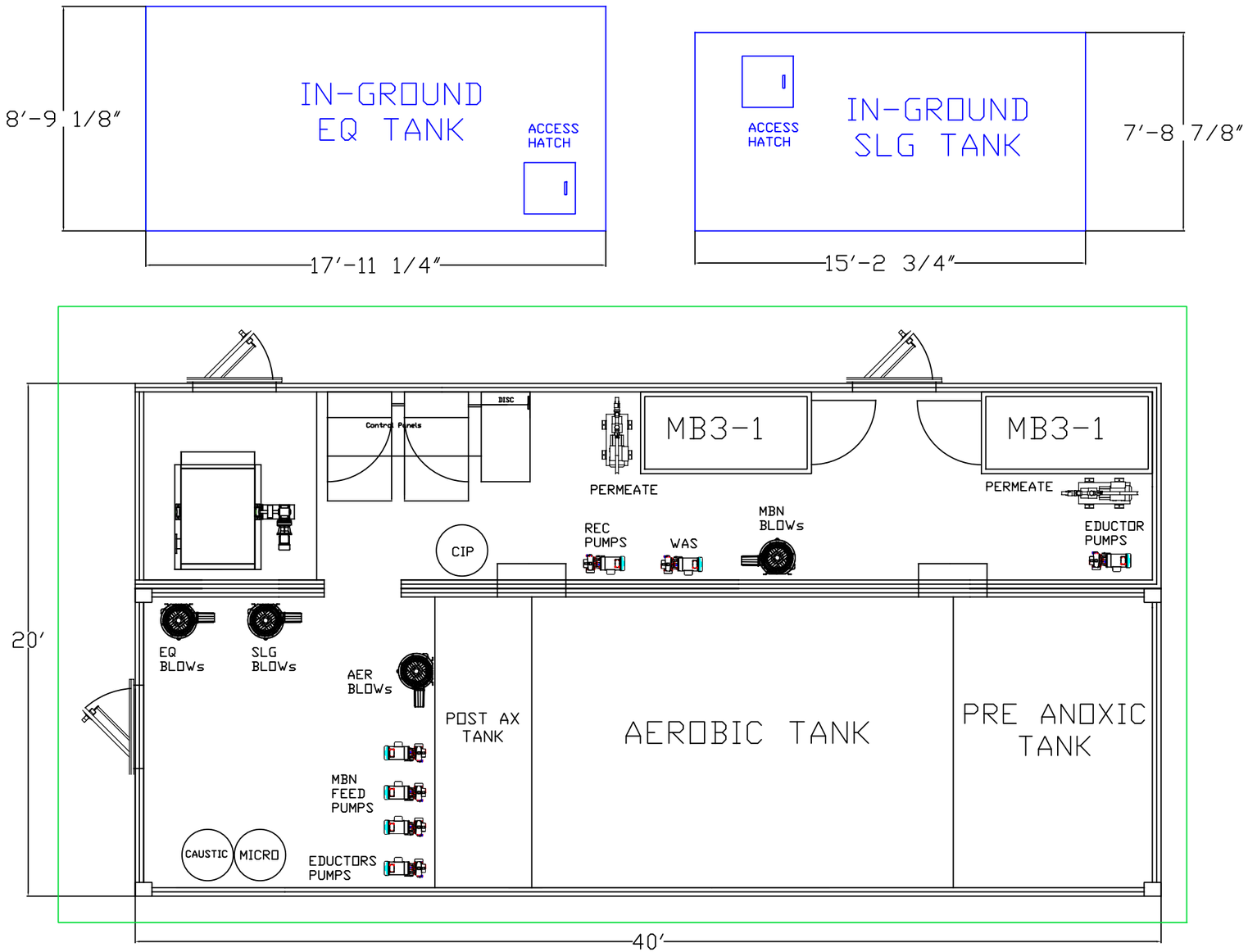
Disposal System

Stone Layer:

min. depth =	200	mm	
min. area =	Q/50		Based on Q>3,000L
=	1182.0	sq.m	
Provided:	44.0	m	Length
	28.0	m	Width
	1232.0	sq.m	Area

Sand Layer:

min. depth =	300	mm	
min. area =	QT/850		Since native T is 15 min/cm or less
	695.3	sq.m	Mantle need not be extended
Provided:	45.0	m	Length
	29.0	m	Width
	1305.0	sq.m	Area



NOTES

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LEVEL	REVISION	DATE (yyyy-mm-dd)	BY

PROJECT NUMBER	1905797
CUSTOMER	CROZIER
TITLE AND LOCATION	PRELIMINARY LAYOUT Hurontario St. WWTP
DRAWN BY	
DATE	2019-03-22
SHEET	1
SHEETS	1

APPENDIX B

Water & Fire Flow Demand Calculations

CROZIER
CONSULTING ENGINEERS

File: 1610-5023
Date: June 2, 2020
By: DP
Check By: GM

18314 & 18309 Hurontario Street Residential Water Demand

			References
Average Residential Daily Volume	59,100.00	L/day	The Total Daily Water Flow is anticipated to be of similar scale to the Total Daily Sanitary Flow
Total Domestic Water Design Flows			
Average Residential Daily Flow	0.68	L/sec	
Max Day Peak Factor	2.00		Region of Peel Watermain Design Criteria, 2009 (Section 2.3)
Max Day Demand Flow	**1.37**	L/sec	
Max Day Demand Volume	**118**	m^3/day	
Peak Hour Factor	3.00		Region of Peel Watermain Design Criteria, 2009 (Section 2.3)
Peak Hour Flow	**2.05**	L/sec	

18314 Hurontario Street Residential - Bungalows
Fire Protection Volume Calculation
CFCA File: 1610-5023

Water Supply for Public Fire Protection - 1999
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

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

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

where

F = the required fire flow in litres per minute
C = coefficient related to the type of construction
= 1.5 for wood frame construction (structure essentially all combustible)
= 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)
= 0.8 for non-combustible construction (unprotected metal structural components)
= 0.6 for fire-resistive construction (fully protected frame, floors, roof)

A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Buildings	**End Units**		**Middle Units**		**Ordinary Construction**
	2	number of units	4	number of units	1.0
	225	sq.m. floor area	199.93	sq.m. floor area	
	450	sq.m. total floor area	799.72	sq.m. total floor area	Average GFA for townhouse units per Michael Ferri e-mail dated March 9,2020

Therefore F= 8,000 L/min (rounded to nearest 1000 L/min)

Fire flow determined above shall not exceed:
30,000 L/min for wood frame construction
30,000 L/min for ordinary construction
25,000 L/min for non-combustible construction
25,000 L/min for fire-resistive construction

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Non-Combustible	-25%	Free Burning	15%
Limited Combustible	-15%	Rapid Buring	25%
Combustible	No Charge		

Low fire Hazard occupancy for dwellings 0% reduction

0 L/min reduction

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above maybe reduce by up to 50% for complete automatic sprinkler protection.

Buildings will not have automatic sprinklers (typical 30% reduction)

0 L/min reduction

Water Supply for Public Fire Protection - 1999
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 45 metres by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) esposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

Separation	Charge	Separation	Charge
0 to 3 m	25%	20.1 to 30 m	10%
3.1 to 10 m	20%	30.1 to 45 m	5%
10.1 to 20 m	15%		

Exposed buildings

Name		**Distance**			
Front	Adjacent Dwelling	12.87	15%	1200	
Back	Adjacent Dwelling	-	0%	0	
Left	Adjacent Dwelling	-	0%	0	
Right	Adjacent Dwelling	4.5	20%	1600	
				2,800	**L/min Surcharge**

Determine Required Fire Flow

No.1	8,000	
No. 2	0	reduction
No. 3	0	reduction
No. 4	2,800	surcharge
Required Flow:	**10,800**	**L/min**
Rounded to nearest 1000l/min:	**11,000**	**L/min** or 183.3 L/s, 2,906 USGPM

Determine Required Fire Storage Volume

Flow from above	11,000	L/min
Required duration	2.25	hours
Therefore:	1,485,000	Litres or
	1,485	cu.m. is the required fire storage volume.

Required Duration of Fire Flow

Flow Required L/min	Duration (hours)
2,000 or less	1.0
3,000	1.25
4,000	1.5
5,000	1.75
6,000	2.0
8,000	2.0
10,000	2.0
12,000	2.5
14,000	3.0
16,000	3.5
18,000	4.0
20,000	4.5
22,000	5.0
24,000	5.5
26,000	6.0
28,000	6.5
30,000	7.0
32,000	7.5
34,000	8.0
36,000	8.5
38,000	9.0
40,000 and over	9.5

APPENDIX C

Stormwater Management Calculations

CROZIER & ASSOCIATES
Consulting Engineers

Project: 18314 & 18309 Hurontario Street
Project No.: 1610-5023
File: Runoff Coef.
Date: 2020-06-02
Revised: 2020-06-02

PRE-DEVELOPMENT RUNOFF COEFFICIENT

Drainage Area	Land Use	Area (ha)	Runoff Coef.	A x C	Runoff Coef. Range
Total Site					
	Impervious	0.023	0.90	0.02	0.9
	Lawn (<2%)	1.35	0.25	0.34	0.25

Total Area (ha) = 1.37
Runoff Coef. = 0.26

POST-DEVELOPMENT RUNOFF COEFFICIENT

Drainage Area	Land Use	Area (ha)	Runoff Coef.	A x C	Runoff Coef. Range
Total Site					
	Impervious	0.77	0.90	0.69	0.9
	Lawn (<2%)	0.60	0.25	0.15	0.25

Total Area (ha) = 1.37
Runoff Coef. = 0.62

Note: 1) Runoff coefficients per Town of Caledon Development Standards Manual Version 5.0 dated 2019.

CROZIER & ASSOCIATES Consulting Engineers

Project: 18314 & 18309 Hurontario Street
Project No: 1610-5023
Created By: DP
Date: 6-2-2020
Revised: 6-2-2020

MODIFIED RATIONAL CALCULATIONS

Storm Data: Town of Caledon Intensity Parameters

Time of Concentration: T_c= 10 min

Return Period	A	B	C	i mm/hr
2 yr	1070.000	7.850	0.876	85.72
5 yr	1593.000	11.000	0.879	109.68
10 yr	2221.000	12.000	0.908	134.16
25 yr	3158.000	15.000	0.934	156.47
50 yr	3886.000	16.000	0.950	176.19
100 yr	4688.000	17.000	0.962	196.54

PRE-DEVELOPMENT/EXISTING CONDITIONS WEIGHTED RUNOFF COEFFICIENT

	C	A (ha)	Weight RC
Impervious	0.90	0.02	0.02
Lawn (<2%)	0.25	1.35	0.25
TOTAL		1.37	0.26

Return Period	Adjustment Factor[2]	Adjusted RC
2 yr	1.00	0.26
5 yr	1.00	0.26
10 yr	1.00	0.26
25 yr	1.00	0.26
50 yr	1.00	0.26
100 yr	1.00	0.26

POST-DEVELOPMENT WEIGHTED RUNOFF COEFFICIENT

	C	A (ha)	Weight RC
Impervious	0.90	0.77	0.51
Lawn (<2%)	0.25	0.60	0.11
TOTAL		1.37	0.62

Return Period	Adjustment Factor[2]	Adjsuted RC
2 yr	1.00	0.62
5 yr	1.00	0.62
10 yr	1.00	0.62
25 yr	1.00	0.62
50 yr	1.00	0.62
100 yr	1.00	0.62

Equations:

Intensity
$i_{(Td)}$ = A /(T+B) ^c

Notes 1) Runoff coefficients per Town of Caledon Development Standards Manual Version 5.0 dated 2019.

CROZIER & ASSOCIATES
Consulting Engineers

Project: 18314 & 18309 Hurontario Street
Project No: 1610-5023
Created By: DP
Date: 6-2-2020
Revised: 6-2-2020

MODIFIED RATIONAL CALCULATIONS

EXISTING CONDITIONS/PRE-DEVELOPMENT PEAK FLOW

Return Period	Peak flow, Q	
	m^3/s	L/s
2 yr	0.086	86.0
5 yr	0.110	110.0
10 yr	0.135	134.6
25 yr	0.157	156.9
50 yr	0.177	176.7
100 yr	0.197	197.1

PROPOSED CONDITIONS/POST-DEVELOPMENT PEAK FLOW

Return Period	Peak flow, Q	
	m^3/s	L/s
2 yr	0.203	202.7
5 yr	0.259	259.4
10 yr	0.317	317.3
25 yr	0.370	370.0
50 yr	0.417	416.6
100 yr	0.465	464.8

Equations:

Intensity

$i_{(Td)} = A / (T+B)\ ^{c}$

Peak Flow

$Q_{post} = 0.0028 \bullet C_{post} \bullet i_{(Td)} \bullet A$

CROZIER & ASSOCIATES
Consulting Engineers

Project: 18314 & 18309 Hurontario Street
Project No: 1610-5023
Created By: DP
Date: 6-2-2020
Revised: 6-2-2020

MODIFIED RATIONAL CALCULATIONS

POST-DEVELOPMENT

100 yr Uncontrolled Post-Development Flow:

Q_{post} = 0.465 m^3/s

100 yr Uncontrolled Pre-Development Flow

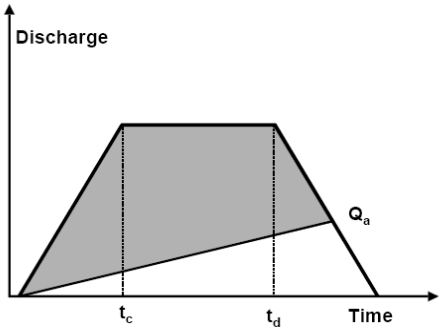
Q_{pre} = 0.197 m^3/s

100 yr Controlled Orifice Post-Development Flow:

Q_{pre} = 0.161 m^3/s

Storage Volume Determination (Detailed)

T_d min	i mm/hr	T_d sec	Q_{Uncont} m^3/s	S_d m^3
10	196.54	600	0.465	182.3
15	166.89	900	0.395	234.4
20	145.13	1200	0.343	266.9
25	128.46	1500	0.304	286.6
30	115.28	1800	0.273	297.5
35	104.59	2100	0.247	302.1
40	95.75	2400	0.226	301.9
45	88.31	2700	0.209	298.2
50	81.95	3000	0.194	291.6
55	76.47	3300	0.181	282.8
60	71.69	3600	0.170	272.2
65	67.47	3900	0.160	260.0
70	63.74	4200	0.151	246.6
75	60.40	4500	0.143	232.2
80	57.40	4800	0.136	216.8
85	54.69	5100	0.129	200.7



REQUIRED STORAGE VOLUME: 302.1 m^3

Equations:

Peak Flow

$Q_{post} = 0.0028 \bullet C_{post} \bullet i_{(Td)} \bullet A$

Storage

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

CROZIER & ASSOCIATES
Consulting Engineers

Project: 18314 & 18309 Hurontario Street
Project No: 1610-5023
Created By: DP
Date: 6-2-2020
Revised: 6-2-2020

MODIFIED RATIONAL CALCULATIONS

POST-DEVELOPMENT

50 yr Uncontrolled Post-Development Flow:

Q_{post} = 0.417 m^3/s

50 yr Uncontrolled Pre-Development Flow:

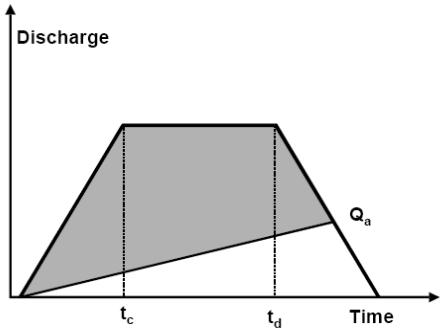
Q_{pre} = 0.177 m^3/s

50 yr Controlled Orifice Post-Development Flow:

Q = 0.137 m^3/s

Storage Volume Determination (Detailed)

T_d min	i mm/hr	T_d sec	Q_{Uncont} m^3/s	S_d m^3
10	176.19	600	0.417	167.8
15	149.09	900	0.353	214.6
20	129.36	1200	0.306	243.8
25	114.33	1500	0.270	261.7
30	102.50	1800	0.242	271.9
35	92.93	2100	0.220	276.5
40	85.04	2400	0.201	277.1
45	78.40	2700	0.185	274.5
50	72.75	3000	0.172	269.5
55	67.88	3300	0.161	262.5
60	63.63	3600	0.150	254.0
65	59.90	3900	0.142	244.1
70	56.58	4200	0.134	233.2
75	53.63	4500	0.127	221.3
80	50.97	4800	0.121	208.7
85	48.57	5100	0.115	195.4



REQUIRED STORAGE VOLUME: 277.1 m^3

Equations:

Peak Flow

$Q_{post} = 0.0028 \bullet C_{post} \bullet i_{(Td)} \bullet A$

Storage

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

CROZIER & ASSOCIATES
Consulting Engineers

Project: 18314 & 18309 Hurontario Street
Project No: 1610-5023
Created By: DP
Date: 6-2-2020
Revised: 6-2-2020

MODIFIED RATIONAL CALCULATIONS

POST-DEVELOPMENT

25 yr Uncontrolled Post-Development Flow:

Q_{post} = 0.37 m^3/s

25 yr Uncontrolled Pre-Development Flow:

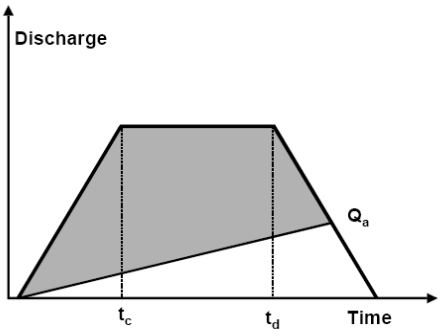
Q_{pre} = 0.157 m^3/s

25 yr Controlled Orifice Post-Development Flow:

Q = 0.122 m^3/s

Storage Volume Determination (Detailed)

T_d min	i mm/hr	T_d sec	Q_{Uncont} m^3/s	S_d m^3
10	156.47	600	0.370	148.8
15	131.98	900	0.312	189.4
20	114.29	1200	0.270	214.5
25	100.90	1500	0.239	229.8
30	90.39	1800	0.214	238.4
35	81.93	2100	0.194	242.1
40	74.95	2400	0.177	242.4
45	69.10	2700	0.163	239.9
50	64.13	3000	0.152	235.3
55	59.84	3300	0.142	229.1
60	56.11	3600	0.133	221.5
65	52.83	3900	0.125	212.7
70	49.92	4200	0.118	203.0
75	47.33	4500	0.112	192.5
80	45.00	4800	0.106	181.4
85	42.90	5100	0.101	169.6



REQUIRED STORAGE VOLUME: 242.4 m^3

Equations:

Peak Flow

$Q_{post} = 0.0028 \bullet C_{post} \bullet i_{(Td)} \bullet A$

Storage

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

CROZIER & ASSOCIATES
Consulting Engineers

Project: 18314 & 18309 Hurontario Street
Project No: 1610-5023
Created By: DP
Date: 6-2-2020
Revised: 6-2-2020

MODIFIED RATIONAL CALCULATIONS

POST-DEVELOPMENT

10 yr Uncontrolled Post-Development Flow:

Q_{post} = 0.317 m^3/s

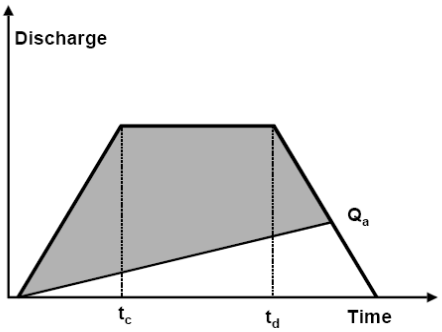
10 yr Uncontrolled Pre-Development Flow:

Q_{pre} = 0.135 m^3/s

10 yr Controlled Orifice Post-Development Flow:

Q = 0.109 m^3/s

Storage Volume Determination (Detailed)				
T_d min	i mm/hr	T_d sec	Q_{Uncont} m^3/s	S_d m^3
10	134.16	600	0.317	125.0
15	111.40	900	0.263	155.3
20	95.47	1200	0.226	172.8
25	83.68	1500	0.198	182.4
30	74.58	1800	0.176	186.7
35	67.34	2100	0.159	187.3
40	61.44	2400	0.145	185.2
45	56.52	2700	0.134	181.0
50	52.37	3000	0.124	175.3
55	48.81	3300	0.115	168.3
60	45.72	3600	0.108	160.3
65	43.01	3900	0.102	151.4
70	40.63	4200	0.096	141.9
75	38.50	4500	0.091	131.7
80	36.60	4800	0.087	121.1
85	34.88	5100	0.082	110.0



REQUIRED STORAGE VOLUME: 187.3 m^3

Equations:

Peak Flow

$Q_{post} = 0.0028 \bullet C_{post} \bullet i_{(Td)} \bullet A$

Storage

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

CROZIER & ASSOCIATES
Consulting Engineers

Project: 18314 & 18309 Hurontario Street
Project No: 1610-5023
Created By: DP
Date: 6-2-2020
Revised: 6-2-2020

MODIFIED RATIONAL CALCULATIONS

POST-DEVELOPMENT

5 yr Uncontrolled Post-Development Flow:

Q_{post} = 0.259 m^3/s

5 yr Uncontrolled Pre-Development Flow:

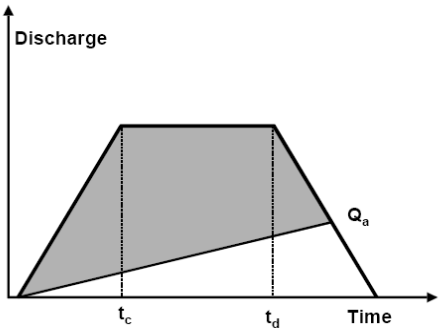
Q_{pre} = 0.110 m^3/s

5 yr Controlled Orifice Post-Development Flow:

Q = 0.099 m^3/s

Storage Volume Determination (Detailed)

T_d min	i mm/hr	T_d sec	Q_{Uncont} m^3/s	S_d m^3
10	109.68	600	0.259	96.2
15	90.91	900	0.215	119.2
20	77.89	1200	0.184	131.9
25	68.29	1500	0.161	138.3
30	60.92	1800	0.144	140.5
35	55.06	2100	0.130	139.8
40	50.28	2400	0.119	136.9
45	46.32	2700	0.110	132.4
50	42.96	3000	0.102	126.6
55	40.09	3300	0.095	119.8
60	37.60	3600	0.089	112.2
65	35.41	3900	0.084	103.8
70	33.48	4200	0.079	95.0
75	31.77	4500	0.075	85.6
80	30.23	4800	0.071	75.8
85	28.84	5100	0.068	65.7



REQUIRED STORAGE VOLUME: 140.5 m^3

Equations:

Peak Flow

$Q_{post} = 0.0028 \bullet C_{post} \bullet i_{(Td)} \bullet A$

Storage

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

CROZIER & ASSOCIATES
Consulting Engineers

Project: 18314 & 18309 Hurontario Street
Project No: 1610-5023
Created By: DP
Date: 6-2-2020
Revised: 6-2-2020

MODIFIED RATIONAL CALCULATIONS

POST-DEVELOPMENT

2 yr Uncontrolled Post-Development Flow:

Q_{post} = 0.203 m^3/s

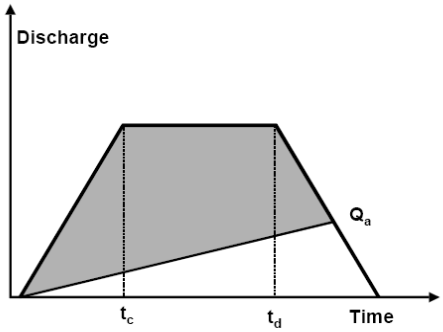
2 yr Uncontrolled Pre-Development Flow:

Q_{pre} = 0.086 m^3/s

2 yr Controlled Orifice Post-Development Flow:

Q_{pre} = 0.086 m^3/s

Storage Volume Determination (Detailed)				
T_d min	i mm/hr	T_d sec	Q_{Uncont} m^3/s	S_d m^3
10	85.72	600	0.203	70.0
15	69.05	900	0.163	82.4
20	58.06	1200	0.137	87.3
25	50.24	1500	0.119	87.9
30	44.38	1800	0.105	85.7
35	39.81	2100	0.094	81.6
40	36.14	2400	0.085	76.1
45	33.13	2700	0.078	69.6
50	30.60	3000	0.072	62.3
55	28.46	3300	0.067	54.4
60	26.62	3600	0.063	46.0
65	25.01	3900	0.059	37.1
70	23.60	4200	0.056	27.9
75	22.34	4500	0.053	18.5
80	21.23	4800	0.050	8.7
85	20.22	5100	0.048	-1.2



REQUIRED STORAGE VOLUME:	87.9	m^3

Equations:

Peak Flow

$Q_{post} = 0.0028 \bullet C_{post} \bullet i_{(Td)} \bullet A$

Storage

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

CROZIER CONSULTING ENGINEERS

18314 & 18309
Project: Hurontario Street
Project No.: 1610-5023
Date: 2020-06-02
Updated: 2020-06-02
Created By: DP
Checked By: RA

Orifice Rating Curve

Orifice Parameters

Diameter Ø (m) = 0.215
Area (A) (m^2) = 0.036
Coefficient (C) = 0.62
Orifice Invert = 414.78
Centroid (h) = 414.89
Control MH # = U/G SWM Storage

Orifice Tube

Discharge, Q = CA x sqrt(2gh)

A. Rating Table

Elevation (m)	Discharge (m^3/s)	Target Discharge (m3/s)	Active Storage Volume (m^3)		
			Provided[1]	Required	
414.78	0.000		0.0		
414.88	0.000		0.3		
414.98	0.030		2.1		
415.08	0.044		6.4		
415.18	0.054		12.9		
415.28	0.062		23.2		
415.38	0.070		36.8		
415.48	0.077		55.0		
415.58	0.083		75.6		
415.64	0.086	0.086	88.9	87.9	2-year
415.68	0.089		97.7		
415.78	0.094		121.9		
415.88	0.099	0.110	146.7	140.5	5-year
415.98	0.104		171.0		
416.08	0.109	0.135	193.5	187.3	10-year
416.18	0.113		212.9		
416.28	0.118		229.9		
416.38	0.122	0.157	244.4	242.4	25-year
416.48	0.126		255.8		
416.58	0.130		264.4		
416.68	0.133		271.2		
416.78	0.137	0.177	277.4	277.1	50-year
416.88	0.141		282.4		
416.98	0.144		286.6		
417.08	0.148		290.7		
417.18	0.151		294.6		
417.28	0.154		298.2		
417.38	0.157		301.3		
417.48	0.161	0.197	303.8	302.1	100-year
417.56	0.163		306.1		TOP OF GROUND

Notes:
1. Superpipe storage volume within each sewer leg is approximated by multiplying the average water-filled area along the sewer by the sewer length. Detailed calculations are provided in the Superpipe Storage Calculation sheet.

CROZIER CONSULTING ENGINEERS

Project: 18314 & 18309 Hurontario Street
Project No.: 1610-5023

Created By: DP
Checked By: RA

Date: 2020-06-02
Updated: 2020-06-02

Superpipe Storage Calculations - Page 1

Storm Sewer Network Parameters							
Sewer #	**To**	**From**	**Length (m)**	**Slope**	**DS Invert**	**US Invert**	**Size (mm)**
#1	CBMH8	CBMH4	6.6	0.5	414.86	414.89	1200
#2	CBMH4	CBMH5	25.9	0.5	414.90	415.03	1200
#3	CBMH 5	CBMH 6	35	0.5	415.16	415.34	1200
#4	CBMH6	CBMH7	57.3	0.5	415.36	415.65	1200
#5	CBMH5	CBMH9	16.3	0.5	416.16	416.24	1200
#6	CBMH 8	CBMH1	7.2	0.5	414.86	414.90	1200
#7	CBMH1	CBMH2	42.5	0.5	414.95	415.16	1200
#8	CBMH2	CBMH3	30.7	0.5	415.18	415.33	1200

Sewer #	**Water Depth at DS Invert of Sewer (m) for each Storm Event**						**Water Depth at US Invert of Sewer (m) for each Storm Event**					
Return Period	**2-yr**	**5-yr**	**10-yr**	**25-yr**	**50-yr**	**100-yr**	**2-yr**	**5-yr**	**10-yr**	**25-yr**	**50-yr**	**100-yr**
Elevation (m)	**415.64**	**415.88**	**416.08**	**416.38**	**416.78**	**417.48**	**415.64**	**415.88**	**416.08**	**416.38**	**416.78**	**417.48**
#1	0.78	1.02	1.22	1.52	1.92	2.62	0.75	0.99	1.19	1.49	1.89	2.59
#2	0.74	0.98	1.18	1.48	1.88	2.58	0.61	0.85	1.05	1.35	1.75	2.45
#3	0.48	0.72	0.92	1.22	1.62	2.32	0.30	0.54	0.74	1.04	1.44	2.14
#4	0.28	0.52	0.72	1.02	1.42	2.12	0.00	0.23	0.43	0.73	1.13	1.83
#5	0.00	0.00	0.00	0.22	0.62	1.32	0.00	0.00	0.00	0.14	0.54	1.24
#6	0.78	1.02	1.22	1.52	1.92	2.62	0.74	0.98	1.18	1.48	1.88	2.58
#7	0.69	0.93	1.13	1.43	1.83	2.53	0.48	0.72	0.92	1.22	1.62	2.32
#8	0.46	0.70	0.90	1.20	1.60	2.30	0.31	0.55	0.75	1.05	1.45	2.15

Note: Water Depth in each sewer is calculated as Storm Event Water Elevation - Invert Elevation (DS or US). In cases where the sewer invert is above the storm water elevation, the water depth is equal to 0.

CROZIER CONSULTING ENGINEERS

Project: 18314 & 18309 Hurontario Street
Project No.: 1610-5023

Created By: DP
Checked By: RA

Date: 2020-06-02
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Superpipe Storage Calculations - Page 2

Sewer #	Water-Filled Area at DS Invert of Sewer (m^2) for each Storm Event						Water-Filled Area at US Invert of Sewer (m^2) for each Storm Event					
Return Period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Elevation (m)	415.64	415.88	416.08	416.38	416.78	417.48	415.64	415.88	416.08	416.38	416.78	417.48
#1	0.78	1.02	1.13	1.13	1.13	1.13	0.74	1.00	1.13	1.13	1.13	1.13
#2	0.73	0.99	1.13	1.13	1.13	1.13	0.58	0.86	1.05	1.13	1.13	1.13
#3	0.42	0.71	0.93	1.13	1.13	1.13	0.23	0.50	0.74	1.05	1.13	1.13
#4	0.20	0.47	0.71	1.02	1.13	1.13	0.00	0.15	0.37	0.72	1.11	1.13
#5	0.00	0.00	0.00	0.14	0.59	1.13	0.00	0.00	0.00	0.07	0.49	1.13
#6	0.78	1.02	1.13	1.13	1.13	1.13	0.74	0.99	1.13	1.13	1.13	1.13
#7	0.67	0.94	1.10	1.13	1.13	1.13	0.42	0.71	0.93	1.13	1.13	1.13
#8	0.40	0.68	0.91	1.13	1.13	1.13	0.23	0.50	0.74	1.05	1.13	1.13

Note: Water-Filled Areas are calculated using the following equation, where R = Sewer radius (m) and h = Water depth in sewer (m):
In cases where the sewer cross-section is full, the Water-Filled Area is calculated as $\pi * R^2$.

$$\text{Area} = R^2 \cos^{-1}\left(\frac{R-h}{R}\right) - (R-h)\sqrt{2Rh-h^2}$$

Sewer #	Storage Volume in Sewer (m^3) for each Storm Event					
Return Period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Elevation (m)	415.64	415.88	416.08	416.38	416.78	417.48
#1	5.0	6.7	7.5	7.5	7.5	7.5
#2	17.0	23.9	28.2	29.3	29.3	29.3
#3	11.4	21.1	29.2	38.1	39.6	39.6
#4	5.7	17.9	30.9	50.1	64.1	64.8
#5	0.0	0.0	0.0	1.8	8.8	18.4
#6	5.5	7.3	8.1	8.1	8.1	8.1
#7	23.2	35.0	43.2	48.1	48.1	48.1
#8	9.6	18.2	25.3	33.4	34.7	34.7
TOTAL	**77.4**	**130.1**	**172.3**	**216.3**	**240.2**	**250.5**

Note: Storage Volume is calculated as the Sewer Length multiplied by the average of the DS and US Water-Filled Areas. Total Storage in the system is calculated as the sum of the storage volume in each sewer.

CROZIER CONSULTING ENGINEERS

Project: 18314 & 18309 Hurontario Street
Project No.: 1610-5023
Created By: DP
Checked By: RA
Date: 2020-06-02
Updated: 2020-06-02

Manhole Storage Calculations - Page 3

Storm Sewer Network Parameters				
Manhole #	**To**	**Size (mm)**	**Area (m^2)**	**Invert**
#1	CBMH8	1800	2.54	414.8
#2	CBMH4	1800	2.54	414.9
#3	CBMH5	1800	2.54	415.1
#4	CBMH6	1800	2.54	415.3
#5	CBMH7	1800	2.54	415.7
#6	CBMH9	1800	2.54	415.2
#7	CBMH1	1800	2.54	414.9
#8	CBMH2	1800	2.54	415.2
#9	CBMH3	1800	2.54	415.3

Manhole #	**Storage Volume in Manholes (m^3) for each Storm Event**					
Return Period	**2-yr**	**5-yr**	**10-yr**	**25-yr**	**50-yr**	**100-yr**
Elevation (m)	**415.64**	**415.88**	**416.08**	**416.38**	**416.78**	**417.48**
#1	2.2	2.8	3.3	4.1	5.1	6.9
#2	1.9	2.5	3.0	3.8	4.8	6.6
#3	1.4	2.0	2.5	3.3	4.3	6.1
#4	0.8	1.4	1.9	2.6	3.7	5.4
#5	0.0	0.6	1.1	1.9	2.9	4.7
#6	1.0	1.6	2.1	2.9	3.9	5.7
#7	1.9	2.5	3.0	3.8	4.8	6.6
#8	1.2	1.8	2.3	3.1	4.1	5.9
#9	0.8	1.4	1.9	2.7	3.7	5.5
TOTAL	**11.2**	**16.6**	**21.2**	**28.1**	**37.3**	**53.3**

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Project Name: 18314 Hurontario Street
Project No: 1610-5023
Modelled By: DP
Checked By: RA
Date: 2-Jun-2020

Climatic Water Budget - Thornthwaite Method

Project Name: 18314 Hurontario Street
ORANGEVILLE MOE - Climate Normals 1981-2010 Station Data

Month	Mean Temperature (◦C)	Heat index	" a "	PET - Potential Evapotranspiration (mm)	Daily Correction Value	Adjusted PET - Potential Evapotranspiration (mm)	Total Precipitation (mm)	Surplus (mm)	Deficit (mm)
January	-7.5	0.0	0.49	0.0	0.77	0.0	64.3	64.3	0.0
February	-6.5	0.0	0.49	0.0	0.88	0.0	54.5	54.5	0.0
March	-2.1	0.0	0.49	0.0	0.99	0.0	60.9	60.9	0.0
April	5.3	1.1	0.51	25.9	1.11	28.8	70.1	41.3	0.0
May	11.7	3.6	0.56	58.4	1.22	71.2	86.6	15.4	0.0
June	16.9	6.3	0.60	85.1	1.28	109.0	81.3	0.0	27.7
July	19.4	7.8	0.63	98.1	1.26	123.6	80.8	0.0	42.8
August	18.4	7.2	0.62	92.9	1.17	108.7	88.2	0.0	20.5
September	14.3	4.9	0.58	71.7	1.05	75.3	87.0	11.7	0.0
October	7.8	2.0	0.53	38.5	0.92	35.4	76.6	41.2	0.0
November	2.0	0.2	0.50	9.5	0.81	7.7	87.1	79.4	0.0
December	-4.1	0.0	0.49	0.0	0.75	0.0	64.2	64.2	0.0
Totals		**33.1**	**1.03**			**559.8**	**901.6**	**432.8**	**91.0**

TOTAL WATER DEFICIT = 91.0 mm
TOTAL WATER SURPLUS (SURPLUS - DEFICIT) = 341.8 mm
Precipitation Adjustment Factor : none

NOTES:

1. Water budget adjusted for latitude and daylight.
2. (◦C) - Represents calculated mean of daily temperatures for the month.
3. Precipitation and Temperature data from theORANGEVILLE MOE (Station No.6155790) Environment Canada Station Data
4. Total Water Surplus (Thornthwaite, 1948) is calculated as total precipitation minus adjusted potential evapostranspiration.

CROZIER & ASSOCIATES Consulting Engineers

Project Name: 18314 Hurontario Street
Project No: 1610-5023
Modelled By: DP
Checked By: RA
Date: 2-Jun-2020

Water Budget - Pre-Development
Project Name: 18314 Hurontario Street
Water Balance/Water Budget Assessment

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

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

Catchment Designation	Site - Pre-Development			
	Lawn & Trees	Impervious	Roof Area	Totals
Area (m^2)	13500	200	0	13700
Pervious Area (m^2)	13500	0	0	13500
Impervious Area (m^2)		200	0	200
Infiltration Factors				
Topography Infiltration Factor	0.2	0.2	0.2	
Soil Infiltration Factor	0.1	0.1	0.1	
Land Cover Infiltration Factor	0.1	0	0	
MOE Infiltration Factor	0.4	0	0	
Actual Infiltration Factor	0.4	0	0	
Run-off Coefficient	0.25	0.9	0.90	
Runoff from Impervious Surfaces *	0	0.8	0.8	
Inputs (per Unit Area)				
Precipitation (mm/yr)	902	902	902	902
Run-On (mm/yr)	0	0	0	0
Other Inputs (mm/yr)	0	0	0	0
Total Inputs (mm/yr)	**902**	**902**	**902**	**902**
Outputs (per Unit Area)				
Precipitation Surplus (mm/yr)	342	721	721	347
Net Surplus (mm/yr)	342	721	721	347
Evapotranspiration (mm/yr) *	560	180	180	554
Infiltration (mm/yr)	137	0	0	135
Soakaway Infiltration (mm/yr)	0	0	0	0
Total Infiltration (mm/yr)	137	0	0	135
Runoff Pervious Areas (mm/yr)	205	0	0	202
Runoff Impervious Areas (mm/yr)	0	721	721	11
Total Runoff (mm/yr)	205	721	721	213
Total Outputs (mm/yr)	**902**	**902**	**902**	**902**
Difference (Inputs- Outputs)	**0**	**0**	**0**	**0**
Inputs (Volumes)				
Precipitation (m^3/yr)	12172	180	0	12352
Run-On (m^3/yr)	0	0	0	0
Other Inputs (m^3/yr)	0	0	0	0
Total Inputs (m^3/yr)	**12172**	**180**	**0**	**12352**
Outputs (Volumes)				
Precipitation Surplus (m^3/yr)	4615	144	0	4759
Net Surplus (m^3/yr)	4615	144	0	4759
Evapotranspiration (m^3/yr) *	7557	36	0	7593
Infiltration (m^3/yr)	1846	0	0	1846
Soakaway Infiltration (m^3/yr)	0	0	0	0
Total Infiltration (m^3/yr)	1846	0	0	1846
Runoff Pervious Areas (m^3/yr)	2769	0	0	2769
Runoff Impervious Areas (m^3/yr)	0	144	0	144
Total Runoff (m^3/yr)	2769	144	0	2913
Total Outputs (m^3/yr)	**12172**	**180**	**0**	**12352**
Difference (Inputs- Outputs)	**0**	**0**	**0**	**0**

NOTES:
* Evaporation from impervious areas was assumed to be 20% of precipitation.

CROZIER & ASSOCIATES
Consulting Engineers

Project Name: 18314 Hurontario Street
Project No: 1610-5023
Modelled By: DP
Checked By: RA
Date: 2-Jun-2020

Water Budget - Post-Development *without Mitigation*
Project Name: 18314 Hurontario Street
Water Balance/Water Budget Assessment

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

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

Catchment Designation	Site - Post-Development			
	Lawn	Impervious	Roof Area	Totals
Area (m^2)	5988	2351	5361	13700
Pervious Area (m^2)	5988	0	0	5988
Impervious Area (m^2)	0	2351	5361	7712
Infiltration Factors				
Topography Infiltration Factor	0.2	0.2	0.2	
Soil Infiltration Factor	0.1	0.1	0.1	
Land Cover Infiltration Factor	0.1	0	0	
MOE Infiltration Factor	0.4	0	0	
Actual Infiltration Factor	0.4	0	0	
Run-off Coefficient	0.25	0.9	0.90	
Runoff from Impervious Surfaces *	0	0.8	0.8	
Inputs (per Unit Area)				
Precipitation (mm/yr)	902	902	902	902
Run-On (mm/yr)	0	0	0	0
Other Inputs (mm/yr)	0	0	0	0
Total Inputs (mm/yr)	**902**	**902**	**902**	**902**
Outputs (per Unit Area)				
Precipitation Surplus (mm/yr)	342	721	721	555
Net Surplus (mm/yr)	342	721	721	555
Evapotranspiration (mm/yr) *	560	180	180	346
Infiltration (mm/yr)	137	0	0	60
Soakaway Infiltration (mm/yr)	0	0	0	0
Total Infiltration (mm/yr)	137	0	0	60
Runoff Pervious Areas (mm/yr)	205	0	0	90
Runoff Impervious Areas (mm/yr)	0	721	721	406
Total Runoff (mm/yr)	205	721	721	496
Total Outputs (mm/yr)	**902**	**902**	**902**	**902**
Difference (Inputs- Outputs)	**0**	**0**	**0**	**0**
Inputs (Volumes)				
Precipitation (m^3/yr)	5399	2120	4834	12352
Run-On (m^3/yr)	0	0	0	0
Other Inputs (m^3/yr)	0	0	0	0
Total Inputs (m^3/yr)	**5399**	**2120**	**4834**	**12352**
Outputs (Volumes)				
Precipitation Surplus (m^3/yr)	2047	1696	3867	7609
Net Surplus (m^3/yr)	2047	1696	3867	7609
Evapotranspiration (m^3/yr) *	3352	424	967	4742
Infiltration (m^3/yr)	819	0	0	819
Soakaway Infiltration (m^3/yr)	0	0	0	0
Total Infiltration (m^3/yr)	819	0	0	819
Runoff Pervious Areas (m^3/yr)	1228	0	0	1228
Runoff Impervious Areas (m^3/yr)	0	1696	3867	5563
Total Runoff (m^3/yr)	1228	1696	3867	6791
Total Outputs (m^3/yr)	**5399**	**2120**	**4834**	**12352**
Difference (Inputs- Outputs)	**0**	**0**	**0**	**0**

Pre-Development Total Infiltration:
1846 m3/yr

NOTES:
* Evaporation from impervious areas was assumed to be 20% of precipitation.

CROZIER & ASSOCIATES
Consulting Engineers

Project Name: 18314 Hurontario Street
Project No: 1610-5023
Modelled By: DP
Checked By: RA
Date: 2-Jun-2020

Water Budget - Post-Development *with Mitigation*
Project Name: 18314 Hurontario Street
Water Balance/Water Budget Assessment

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

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

Remaining Impervious area (e.g. parking area)

Catchment Designation	Site - Post-Development			
	Lawn	Impervious	Roof Area	Totals
Area (m^2)	5988	2351	5361	13700
Pervious Area (m^2)	5988	0	0	5988
Impervious Area (m^2)	0	2351	5361	7712
Infiltration Factors				
Topography Infiltration Factor	0.2	0.2	0.2	
Soil Infiltration Factor	0.1	0.1	0.1	
Land Cover Infiltration Factor	0.1	0	0	
MOE Infiltration Factor	0.4	0	0	
Actual Infiltration Factor	0.4	0	0	
Run-off Coefficient	0.25	0.90	0.90	
Runoff from Impervious Surfaces *	0	0.8	0.8	
Inputs (per Unit Area)				
Precipitation (mm/yr)	902	902	902	902
Run-On (mm/yr)	0	0	0	0
Other Inputs (mm/yr)	0	0	0	0
Total Inputs (mm/yr)	**902**	**902**	**902**	**902**
Outputs (per Unit Area)				
Precipitation Surplus (mm/yr)	342	721	721	555
Net Surplus (mm/yr)	342	721	721	555
Evapotranspiration (mm/yr) *	560	180	180	346
Infiltration (mm/yr)	137	0	0	60
Soakaway Infiltration (mm/yr)	0	0	192	75
Total Infiltration (mm/yr)	137	0	192	135
Runoff Pervious Areas (mm/yr)	205	0	0	90
Runoff Impervious Areas (mm/yr)	0	721	529	331
Total Runoff (mm/yr)	205	721	529	421
Total Outputs (mm/yr)	**902**	**902**	**902**	**902**
Difference (Inputs- Outputs)	**0**	**0**	**0**	**0**
Inputs (Volumes)				
Precipitation (m^3/yr)	5399	2120	4834	12352
Run-On (m^3/yr)	0	0	0	0
Other Inputs (m^3/yr)	0	0	0	0
Total Inputs (m^3/yr)	**5399**	**2120**	**4834**	**12352**
Outputs (Volumes)				
Precipitation Surplus (m^3/yr)	2047	1696	3867	7609
Net Surplus (m^3/yr)	2047	1696	3867	7609
Evapotranspiration (m^3/yr) *	3352	424	967	4742
Infiltration (m^3/yr)	819	0	0	819
Soakaway Infiltration (m^3/yr)	0	0	1029	1029
Total Infiltration (m^3/yr)	819	0	1029	1848
Runoff Pervious Areas (m^3/yr)	1228	0	0	1228
Runoff Impervious Areas (m^3/yr)	0	1696	2838	4533
Total Runoff (m^3/yr)	1228	1696	2838	5761
Total Outputs (m^3/yr)	**5399**	**2120**	**4834**	**12352**
Difference (Inputs- Outputs)	**0**	**0**	**0**	**0**

Proposed Infiltration via Mitigation

Pre-Development Total Infiltration:
135 mm/yr

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

Pre-Development Total Infiltration:
1846 m3/yr

NOTES:
* Evaporation from impervious areas was assumed to be 20% of precipitation.

CROZIER & ASSOCIATES
Consulting Engineers

Project: 18314 Hurontario Street
Project No: 1610-5023
Modelled By: DP
Checked By: RA
Date: 2-Jun-2020

Water Budget Summary
Project Name: 18314 Hurontario Street
Water Balance/Water Budget Assessment

Characteristic	Site				
	Pre-Development	Post-Development	Post-Development *with Mitigation*	Change (Pre to Post)	Change (Pre to Post) *with Mititgation*
Inputs (Volumes)					
Precipitation (m^3/yr)	12352	12352	12352	0%	0%
Run-On (m^3/yr)	0	0	0	0%	0%
Other inputs (m^3/yr)	0	0	0	0%	0%
Total Inputs (m^3/yr)	**12352**	**12352**	**12352**	**0**	**0**
Outputs (Volumes)					
Precipitation Surplus (m^3/yr)	4759	7609	7609	60%	60%
Net Surplus (m^3/yr)	4759	7609	7609	60%	60%
Evapotranspiration (m^3/yr)	7593	4742	4742	-38%	-38%
Infiltration (m^3/yr)	1846	819	819	-56%	-56%
Soakaway Infiltration (m^3/yr)	0	0	**1029**	-	**1029 m3/yr**
Total Infiltration (m^3/yr)	**1846**	819	**1848**	-56%	0%
Runoff Pervious Areas (m^3/yr)	2769	1228	1228	-56%	-56%
Runoff Impervious Areas (m^3/yr	144	5563	4533	-	-
Total Runoff (m^3/yr)	2913	6791	5761	133%	98%
Total Outputs (m^3/yr)	**12352**	**12352**	**12352**	0%	0%

NOTES:

Months contributing to Water Balance (winter months not considered due to freezing effects) - April, May, June, July, August, September, October = 7 months

CROZIER & ASSOCIATES
Consulting Engineers

Project: 18314 Hurontario Street
Project No: 1610-5023
Modelled By: DP
Date: 6-2-2020

Design Storm Determination
Project Name: 18314 Hurontario Street
Water Balance/Water Budget Assessment

Days with Precipitation (From Climate Data)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
>= 0.2 mm	12.2	12.9	11.9	10.5	11.9	12.2	14.3	86
>= 5 mm	4.7	5.4	4.9	4.4	4.8	4.7	5.3	34
>= 10 mm	2.2	2.9	2.9	2.8	3.2	2.9	2.5	19
>= 25 mm	0.23	0.69	0.46	0.69	0.58	0.73	0.24	4

Available Precipitation

Storm Event (mm)	**Total Days Per Year**	**Incremental Precipitation (mm/yr)**	**Cummulative Precipitation (mm/yr)**
0.2	86	17.2	17.2
5	34	171.0	188.2
10	19	194.0	382.2
25	4	90.5	472.7
Total	**143**	**472.7**	

Infiltration Deficit Target: 192 mm/yr

Runoff Coefficient for Impervious Area: 0.90

Design Precipitation: 213 mm/yr (Design Infiltration / Contributing RC)

Therefore Design Storm: 6 mm

CROZIER & ASSOCIATES
Consulting Engineers

Project: 18314 Hurontario Street
Project No: 1610-5023
Modelled By: DP
Date: 6-2-2020

Mitigation Sizing
Project Name: 18314 Hurontario Street
Water Balance/Water Budget Assessment

Site Specific Water Balance Target

Total Contributing Drainage Area:	5361	m^2
Runoff Coefficient:	0.90	
Design Storm:	6	mm
Design Runoff/Infiltration Volume Required:	**29**	**m^3**

5mm Across the Impervious Area Water Balance Target

Total Contributing Drainage Area:	7712	m^2
Design Rainfall Depth	0.90	
Design Rainfall Depth	5	mm
Design Runoff/Infiltration Volume Required:	**35**	**m^3**
Design Runoff/Infiltration Volume Target:	**35**	
Design Runoff/Infiltration Volume Provided:	**38**	**m^3**

CROZIER CONSULTING ENGINEERS

Project: 18314 & 18309 Hurontario Street | **Created By:** DP | **Date:** 2020-06-02
Project No.: 1610-5023 | **Checked By:** RA | **Updated:** 2020-06-02

Infiltration Chamber Drawdown Time Calculations

Notes & References

Assume: Full infiltration.

A. Maximum Infiltration Depth

P = Percolation Rate (native soils)	360.7	mm/hr	Based on Soil Peroclation Tests Report, prepared by Sirati & Partners Consultants Ltd., August 2, 2019
T = Drawdown Time	48	hours	
d = Maximum allowable depth of infiltration	**17.3**	**m**	MOE SWMP Manual, Equation 4.2

$$d = \frac{PT}{1000}$$

B. Minimum Footprint Surface Area

V = Runoff Volume to be Infiltrated	35	m^3	Site Impervious area (ha) x 25mm
P = Percolation Rate (native soils)	360.7	mm/hr	
n = porosity of storage media	0.4		Storage provided by
T = Drawdown Time	48	hours	MOE SWMP Manual, Equation 4.3
Minimum footprint area	**5**	m^2	
Footprint Area	**112**	**m^2**	

$$A = \frac{1000V}{PnT}$$

C. Provided Design and Detention Time

Detention Time	**2.2**	**hr**

$$A = \frac{1000V}{PnT}$$

D. Design Summary

Required Infiltration Volume:	**35**	**m^3**
Provided Storage:	**38**	**m^3**

Storage Chamber Design

Project: **18314 & 18309 Hurontario Street**

Chamber Model - DC-780
Units - **Metric** Click Here for Imperial

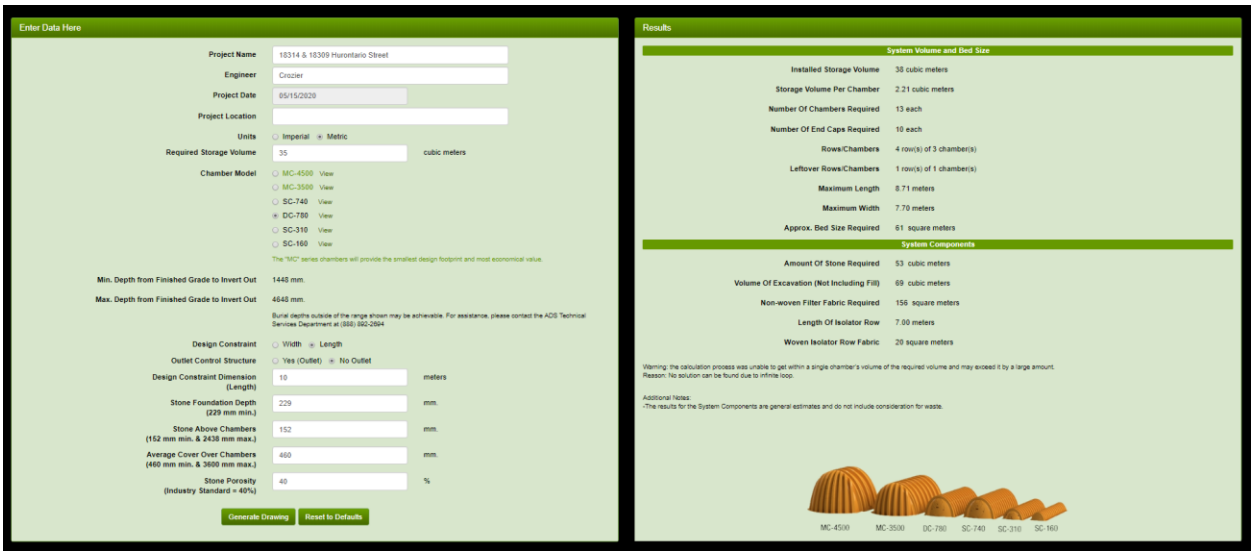
Number of chambers - 13
Voids in the stone (porosity) - 40 %
Base of Stone Elevation - 413.50 m
Amount of Stone Above Chambers - 152 mm
Amount of Stone Below Chambers - 230 mm

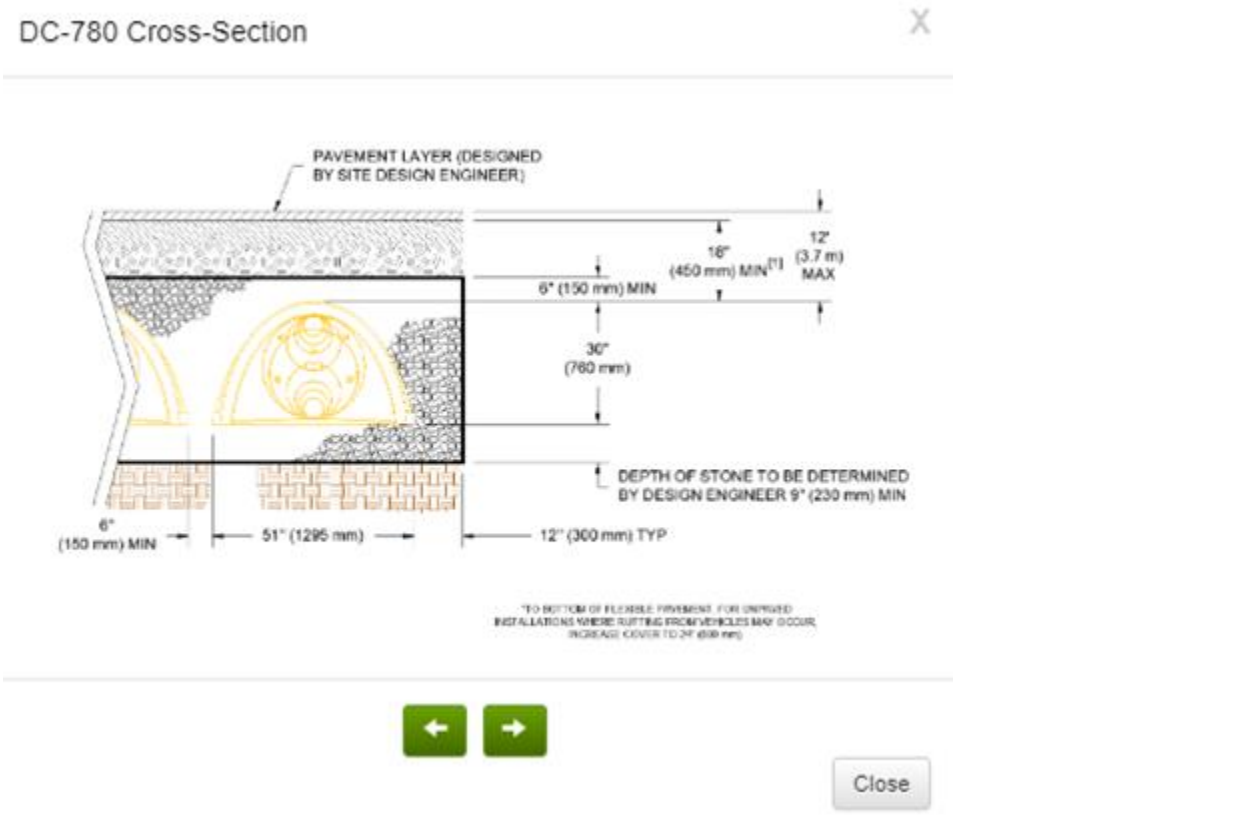
☑ Include Perimeter Stone in Calculations

61 sq.meters Min. Area - 40.82 sq.meters

StormTech DC-780 Cumulative Storage Volumes

Height of System *(mm)*	Incremental Single Chamber *(cubic meters)*	Incremental Total Chamber *(cubic meters)*	Incremental Stone *(cubic meters)*	Incremental Ch & St *(cubic meters)*	Cumulative Chamber *(cubic meters)*	Elevation *(meters)*
1143	0.00	0.00	0.62	0.62	38.126	414.64
1118	0.00	0.00	0.62	0.62	37.505	414.62
1092	0.00	0.00	0.62	0.62	36.885	414.59
1067	0.00	0.00	0.62	0.62	36.265	414.57
1041	0.00	0.00	0.62	0.62	35.645	414.54
1016	0.00	0.00	0.62	0.62	35.025	414.52
991	0.00	0.02	0.61	0.63	34.405	414.49
965	0.00	0.06	0.60	0.66	33.772	414.47
940	0.01	0.11	0.58	0.68	33.115	414.44
914	0.02	0.22	0.53	0.76	32.431	414.41
889	0.02	0.30	0.50	0.80	31.676	414.39
864	0.03	0.35	0.48	0.83	30.877	414.36
838	0.03	0.40	0.46	0.86	30.045	414.34
813	0.03	0.44	0.45	0.88	29.186	414.31
787	0.04	0.47	0.43	0.90	28.303	414.29
762	0.04	0.50	0.42	0.92	27.402	414.26
737	0.04	0.54	0.41	0.94	26.480	414.24
711	0.04	0.56	0.40	0.96	25.539	414.21
686	0.05	0.59	0.39	0.97	24.582	414.19
660	0.05	0.61	0.38	0.98	23.610	414.16
635	0.05	0.63	0.37	1.00	22.625	414.14
610	0.05	0.65	0.36	1.01	21.628	414.11
584	0.05	0.67	0.35	1.02	20.618	414.08
559	0.05	0.68	0.35	1.03	19.598	414.06
533	0.05	0.70	0.34	1.04	18.567	414.03
508	0.06	0.72	0.33	1.05	17.526	414.01
483	0.06	0.73	0.33	1.06	16.476	413.98
457	0.06	0.74	0.32	1.07	15.417	413.96
432	0.06	0.76	0.32	1.07	14.350	413.93
406	0.06	0.77	0.31	1.08	13.276	413.91
381	0.06	0.78	0.31	1.09	12.195	413.88
356	0.06	0.79	0.30	1.09	11.107	413.86
330	0.06	0.80	0.30	1.10	10.012	413.83
305	0.06	0.81	0.30	1.11	8.912	413.80
279	0.06	0.82	0.29	1.11	7.807	413.78
254	0.06	0.83	0.29	1.12	6.697	413.75
229	0.00	0.00	0.62	0.62	5.581	413.73
203	0.00	0.00	0.62	0.62	4.961	413.70
178	0.00	0.00	0.62	0.62	4.341	413.68
152	0.00	0.00	0.62	0.62	3.721	413.65
127	0.00	0.00	0.62	0.62	3.101	413.63
102	0.00	0.00	0.62	0.62	2.481	413.60
76	0.00	0.00	0.62	0.62	1.860	413.58
51	0.00	0.00	0.62	0.62	1.240	413.55
25	0.00	0.00	0.62	0.62	0.620	413.53





DRAWINGS

Drawing C101: Preliminary Site Servicing Plan

Drawing C102: Preliminary Site Grading Plan

Drawing C103: Pre-Development Drainage Plan

Drawing C104: Post-Development Drainage Plan

Drawing C105: Erosion & Sediment Control Plan

Drawing C106: Standard Details

TOWN OF CALEDON
PLANNING
RECEIVED
Jan 06, 2021

THE KING'S HIGHWAY No. 10
(HURONTARIO STREET) (ROAD ALLOWANCE)

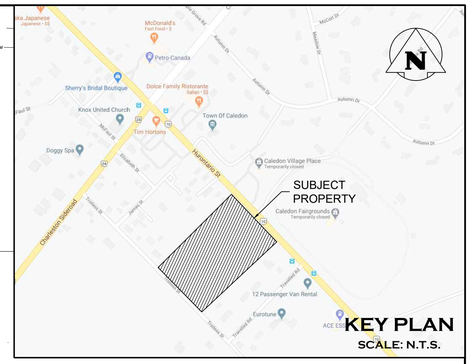
EX. 250mmø W/M

EX. 900mmø CONC STM SEWER

EX. 300mmø W/M

300x300x300 MANUFACTURED TEE, VALVE AND VALVE TOP ELEVATION TO MATCH EX. GROUND PER REGION OF PEEL STD. 1-6-4

PROPOSED CONNECTION TO EXISTING 900mmø STORM SEWER MATCH OBVERT ELEVATION 414.7m



SERVICE CROSSINGS SUMMARY

CROSSING NO.	GROUND ELEV (m)	SERVICE TYPE	INV. (m)	SERVICE TYPE	OBV. (m)	DIFFERENCE (m)
C1	418.06	EX. STM	415.77	PROP. SAN	413.93	1.84

PLAN 24609 (P-1573-21)

No. 18314
2 STOREY
FRAME DWELLING

1 STOREY ADDITION

DSE=419.80

TRE=423.33

35.75

48.2m – 300mmø PVC STM @ 0.5%

STM CB3 (PER DETAIL ON C106)
T/G 416.75
W INV 414.31

6.1m – 250mmø PVC STM @ 2.0%

STM CB4 (PER DETAIL ON C106)
T/G 415.21
TO BE DIRECTLY CONNECTED TO PROPOSED STORMTECH INFILTRATION CHAMBER

STORMTECH DC-780
SYSTEM FOR WATER BALANCE
FOOTPRINT = 61m²
PROVIDED VOLUME = 38m³
N INLET INV. 414.14
E INLET INV. 414.19
CHAMBER TOP ELEV. = 414.64
CHAMBER BOT ELEV. = 413.50
APPROX. GWL = 412.40

PROPOSED 300mm ø TO 150mm ø WM REDUCER

PROPOSED CHECK VALVE IN CHAMBER PER REGION STD. 1-1-5 & 1-3-1

17.9m – 300mmø PVC STM @ 0.5%

PROPOSED 215mm ø ORIFICE PLATE

3.1m – 300mmø PVC STM @ 0.5%

ORIFICE CONTROL MH
T/G 417.35
E INV 414.64
S INV 414.16
NW INV 414.69

SAN MH1
T/G 418.06
S INV 414.80

STM CBMH2
T/G 417.86
N INV 415.18
S INV 415.16

STM CBMH1
T/G 417.60
N INV 414.95
S INV. 414.90

SAN MH2
T/G 417.66
N INV 414.03
S INV 413.98

PROP. FIRE HYDRANT

76.7m – 250mmø PVC SAN @ 1.0%

STM CBMH3
T/G 418.04
S INV 415.33

30.7m – 1200mmø CONCRETE STM @ 0.5%

42.5m – 1200mmø CONCRETE STM @ 0.5%

45° WATERMAIN BEND

7.2m – 1200mmø CONCRETE STM @ 0.5%

45° WATERMAIN BEND

10.3m – 250mmø PVC SAN @ 0.5%

SAN MH3
T/G 417.62
N INV 413.93
S INV 413.88

6.3m – 250mmø PVC SAN @ 0.5%

SAN MH4
T/G 417.71
E INV 413.85
W INV 413.80

PROP. FIRE HYDRANT

STM CBMH8
T/G 417.56
N INV 414.86
W INV 414.86
SE INV. 414.78

6.6m – 1200mmø CONCRETE STM @ 0.5%

WATERMAIN TEE

45° WATERMAIN BEND

STM CBMH4
T/G 417.66
E INV 414.90
W INV 414.95

WATERMAIN TEE

PROP. FIRE HYDRANT

STM CBMH9
T/G 418.17
N INV 415.24
W INV 415.32

PROP. FIRE HYDRANT

PROPOSED RETAINING WALL C/W CHAIN-LINK-FENCE PER TOWN STANDARD DWG. NO.600

45° WATERMAIN BEND

TWO 45° WATERMAIN BENDS

PROPOSED STONE LAYER AREA
APPROX. FOOTPRINT = 1232m²

PROPOSED SAND LAYER AREA
APPROX. FOOTPRINT = 1305m²

PROPOSED TYPE A DISPERSAL BED AREA
APPROX. FOOTPRINT = 1320m²

AUTOMATIC DISTRIBUTION VALVES AND DISTRIBUTION PIPING TO BE CONFIRMED DURING DETAILED DESIGN

STM CBMH6
T/G 418.52
N INV 415.36
S INV 415.34
W INV 415.96

31.4m – 250mmø PVC SAN @ 1.0%

25.1m – 250mmø PVC SAN @ 0.5%

25.9m – 1200mmø CONCRETE STM @ 0.5%

150mmø PVC WM

STM CBMH7
T/G 419.31
S INV 415.65

57.3m – 1200mmø CONCRETE STM @ 0.5%

35.0m – 1200mmø CONCRETE STM @ 0.5%

16.3m – 1200mmø PVC STM @ 0.5%

50mmø PUMPED HDPE FORCEMAIN

3.1m

SAN MH7
T/G 419.45
E INV 415.74
S INV 415.66

108.0m – 250mmø PVC SAN @ 1.9%

PROP. FIRE HYDRANT

STM CBMH5
T/G 418.03
N INV 415.16
E INV 415.08
S INV 415.16

SAN MH5
T/G 418.10
E INV 413.67
S INV 413.59
N INV 413.61

TWO 45° WATERMAIN BENDS

26.5m – 250mmø PVC SAN @ 0.5%

SAN MH8
LIFT STATION
T/G 418.35
N INV 413.46
W INV TO BE CONFIRMED IN DETAILED DESIGN

PROPOSED SEWAGE TREATMENT SYSTEM
NEWTERRA MEMBRANE BIOREACTOR
FOOTPRINT = 209.25 m² (13.5m x 15.5m)
INVERT ELEVATIONS TO BE CONFIRMED IN DETAILED DESIGN

PROPOSED RETAINING WALL C/W CHAIN-LINK-FENCE PER TOWN STANDARD DWG. NO.600

26.8m – 250mmø PVC STM @ 2.0%

27.4m – 250mmø PVC STM @ 2.0%

STM CB1 (PER DETAIL ON C106)
T/G 417.05
E INV 416.49

PROPOSED RETAINING WALL C/W CHAIN-LINK-FENCE PER TOWN STANDARD DWG. NO.600

STM CB2 (PER DETAIL ON C106)
T/G 416.65
E INV 415.87

NORTH

BROCK STREET (PLAN CAL3)
(BY REGISTERED PLAN CAL3)

CONCESSION 1

LEGEND

EXISTING FEATURES (EX.)

- EX. CONTOUR
- EX. GRADE
- EX. TREELINE
- EX. DITCH
- EX. STORM CATCHBASIN
- EX. STORM SEWER & MANHOLE
- EX. GAS MAIN
- EX. BELL LINE
- EX. HYDRO POLE
- EX. WATERMAIN
- EX. WATER SERVICE
- EX. FIRE HYDRANT & VALVE
- EX. SANITARY SEWER & MANHOLE
- EX. BUILDING

PROPOSED FEATURES (PR.)

- PR. PROPERTY LIMITS
- PR. ELEVATION
- PR. ELEVATION (MATCH EX. ELEVATION)
- PR. SWALE & SLOPE
- PR. WATERMAIN & GATE VALVE
- PR. FIRE HYDRANT & GATE VALVE PER REGION STD. 1-6-1
- PR. CHECK VALVE IN CHAMBER PER REGION STD. 1-1-5 & 1-3-1
- PR. STORM SEWER & MANHOLE
- PR. SANITARY SEWER & MANHOLE
- PR. SANITARY FORCEMAIN
- PR. REAR-LOT CATCHBASIN PER TOWN STD. DWG. 503
- PR. CATCHBASIN MANHOLE
- PR. 1200mmø CONCRETE STORM SEWER
- CATCHMENT AREA ID
- RUNOFF COEFFICIENT
- DRAINAGE AREA (ha)
- EX. STORM DRAINAGE CATCHMENT
- PR. STORM CATCHMENT
- HEAVY-DUTY SILT FENCING
- SERVICE CROSSING LOCATION & ID
- MUD-MAT
- PR. RETAINING WALL
- PR. SLOPE (3:1 MAX)

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ELEVATION NOTE

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO TOWN OF CALEDON BENCH MARK NO. 728403 STATION NO. 00819728403, HAVING AN ELEVATION OF 412.106 METRES.

SURVEY COMPLETED BY RN GEOMATICS LTD. DATED NOVEMBER 12, 2018

TOWN OF CALEDON

No.	ISSUE	DATE: MM/DD/YYYY
0	ISSUED FOR 1st ZBA-APPLICATION SUBMISSION	12/10/2020

Engineer

Engineer

FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION

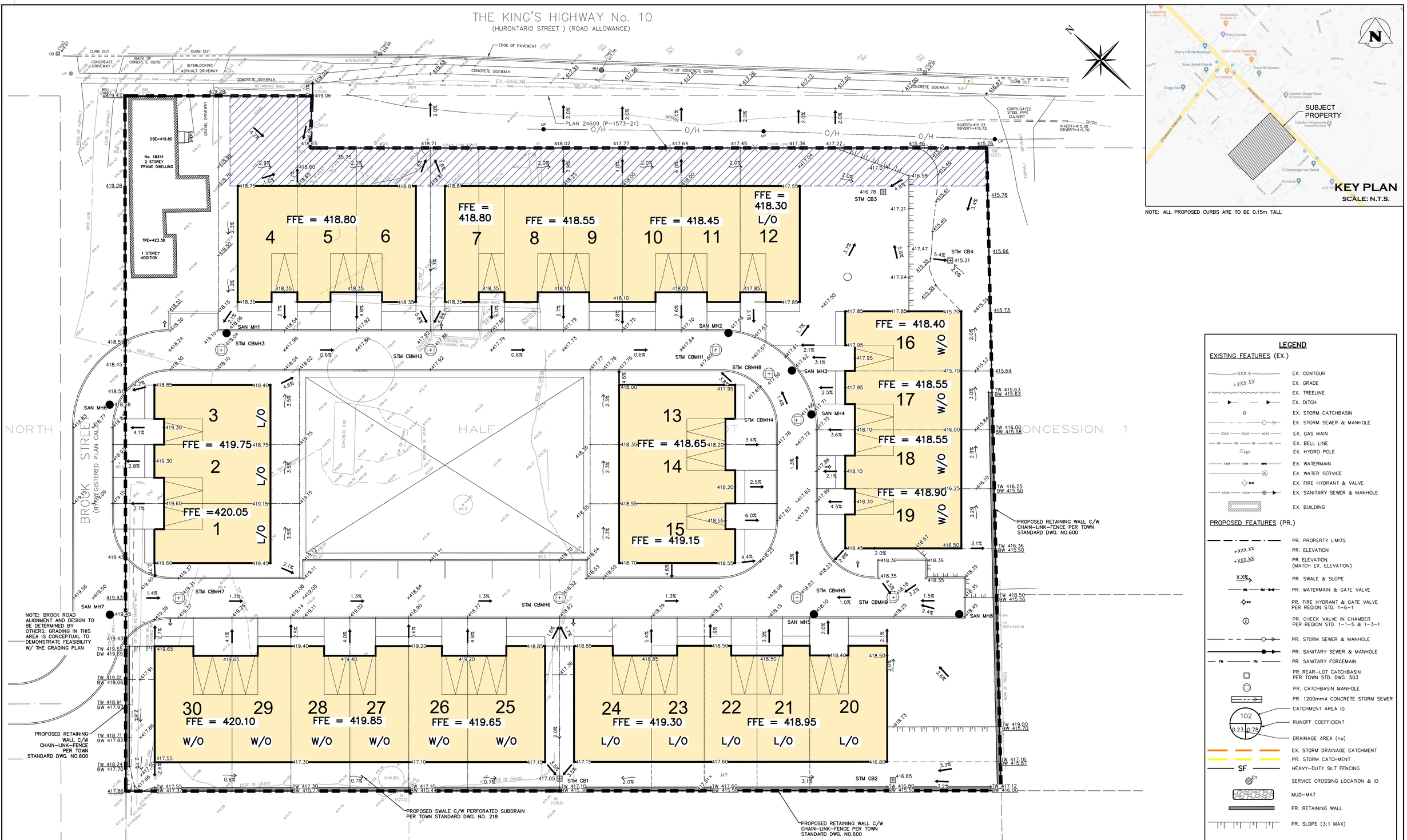
Project
18314 & 18309 HURONTARIO STREET
TOWN OF CALEDON

Drawing
PRELIMINARY SITE SERVICING PLAN

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

Drawn By	Design By	Project
D.P.	D.P.	1610-5023
Check By	Check By	Scale / Drawing
G.M.		1:250 / C101

THE KING'S HIGHWAY No. 10
(HURONTARIO STREET) (ROAD ALLOWANCE)



LEGEND

EXISTING FEATURES (EX.)

- EX. CONTOUR
- EX. GRADE
- EX. TREELINE
- EX. DITCH
- EX. STORM CATCHBASIN
- EX. STORM SEWER & MANHOLE
- EX. GAS MAIN
- EX. BELL LINE
- EX. HYDRO POLE
- EX. WATERMAIN
- EX. WATER SERVICE
- EX. FIRE HYDRANT & VALVE
- EX. SANITARY SEWER & MANHOLE
- EX. BUILDING

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- PR. SANITARY FORCEMAIN
- PR. REAR-LOT CATCHBASIN PER TOWN STD. DWG. 503
- PR. CATCHBASIN MANHOLE
- PR. 1200mmø CONCRETE STORM SEWER
- CATCHMENT AREA ID (102)
- RUNOFF COEFFICIENT (0.23 / 0.78)
- DRAINAGE AREA (ha)
- EX. STORM DRAINAGE CATCHMENT
- PR. STORM CATCHMENT
- HEAVY-DUTY SILT FENCING
- SERVICE CROSSING LOCATION & ID
- MUD-MAT
- PR. RETAINING WALL
- PR. SLOPE (3:1 MAX)

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SURVEY COMPLETED BY RN GEOMATICS LTD. DATED NOVEMBER 12, 2018

TOWN OF CALEDON

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0	ISSUED FOR 1st ZBA-APPLICATION SUBMISSION	12/10/2020

Engineer

Engineer

FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION

Project
18314 & 18309 HURONTARIO STREET
TOWN OF CALEDON

Drawing
PRELIMINARY SITE GRADING PLAN

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

Drawn By	Design By	Project
D.P.	D.P.	1610-5023
Check By	Check By	Scale
G.M.		1:250

Drawing C102

THE KING'S HIGHWAY No. 10
(HURONTARIO STREET) (ROAD ALLOWANCE)

NORTH HALF LOT 15, CONCESSION 1

BROCK STREET
(BY REGISTERED PLAN CAL3)

No. 18314
2 STOREY
FRAME DWELLING
DSE=419.80

1 STOREY
ADDITION
TRE=423.38

DAMAGED
FOUNDATION

FRAME SHED
(BASE)

SHRUBS

CONCRETE PAD

101
1.37 | 0.26

SUBJECT PROPERTY

KEY PLAN
SCALE: N.T.S.

LEGEND

EXISTING FEATURES (EX.)

- EX. CONTOUR
- EX. GRADE
- EX. TREELINE
- EX. DITCH
- EX. STORM CATCHBASIN
- EX. STORM SEWER & MANHOLE
- EX. GAS MAIN
- EX. BELL LINE
- EX. HYDRO POLE
- EX. WATERMAIN
- EX. WATER SERVICE
- EX. FIRE HYDRANT & VALVE
- EX. SANITARY SEWER & MANHOLE
- EX. BUILDING

PROPOSED FEATURES (PR.)

- PR. PROPERTY LIMITS
- PR. ELEVATION
- PR. ELEVATION (MATCH EX. ELEVATION)
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- PR. SANITARY SEWER & MANHOLE
- PR. SANITARY FORCEMAIN
- PR. REAR-LOT CATCHBASIN PER TOWN STD. DWG. 503
- PR. CATCHBASIN MANHOLE
- PR. 1200mmø CONCRETE STORM SEWER
- CATCHMENT AREA ID
- RUNOFF COEFFICIENT
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- EX. STORM DRAINAGE CATCHMENT
- PR. STORM CATCHMENT
- HEAVY-DUTY SILT FENCING
- SERVICE CROSSING LOCATION & ID
- MUD-MAT
- PR. RETAINING WALL
- PR. SLOPE (3:1 MAX)

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SURVEY COMPLETED BY RN GEOMATICS LTD. DATED NOVEMBER 12, 2018

TOWN OF CALEDON

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0	ISSUED FOR 1st ZBA-APPLICATION SUBMISSION	12/10/2020

Engineer

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NOT TO BE USED FOR CONSTRUCTION

Engineer

Project: 18314 & 18309 HURONTARIO STREET
TOWN OF CALEDON

Drawing: PRE-DEVELOPMENT DRAINAGE PLAN

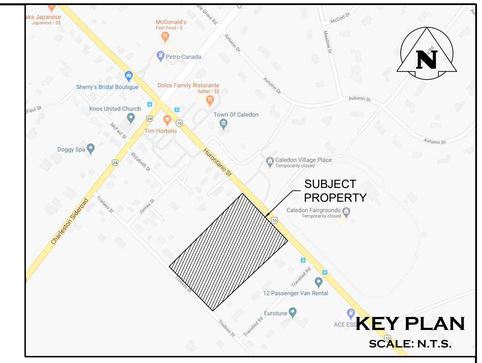
CROZIER CONSULTING ENGINEERS
57 JOHN STREET WEST
P.O. BOX 1011
BRADFORD, ON L3Z 2B4
905-952-3111 T
WWW.CFCROZIER.CA

Drawn By	Design By	Project
D.P.	D.P.	1610-5023
Check By	Check By	Scale
G.M.		1: 250

Drawing: C103

THE KING'S HIGHWAY No. 10

CURB CUT
CONCRETE DRIVEWAY
BACK OF CONCRETE CURB
CURB CUT
INTERLOCKING ASPHALT DRIVEWAY
CONCRETE SIDEWALK
EDGE OF PAVEMENT
CONCRETE SIDEWALK
BACK OF CONCRETE CURB
CONCRETE SIDEWALK
CURB CUT
EX. GASLINE
BELL CABLE BOX
GRAVEL DRIVEWAY
STEPS
DSE=419.80
No. 18314
2 STOREY
FRAME DWELLING
1 STOREY ADDITION
TRE=423.38
DITCH
CORRUGATED STEEL PIPE CULVERT
INVERT=415.33
OBVERT=415.73
INVERT=415.30
OBVERT=415.70
DITCH
O/H
UP
SIB (1253)
IB (1253)
CB (1253)
MH (1253)
16.75
10.39
10.08
9.93
29.55
28.87
FRAME
FRAME SHED
VINYL SHED
2 STOREY BRICK DWELLING
TRE=423.38
DSE=416.15
TH
TOP=416.16
HP
SAN MH1
SAN MH2
SAN MH3
SAN MH4
SAN MH5
SAN MH6
SAN MH7
SAN MH8
STM CBMH1
STM CBMH2
STM CBMH3
STM CBMH4
STM CBMH5
STM CBMH6
STM CBMH7
STM CBMH9
STM CB1
STM CB2
STM CB3
STM CB4
201
1.37
0.62
STORMTECH DC-780
SYSTEM FOR WATER BALANCE
FOOTPRINT = 61m²
PROVIDED VOLUME = 38m³
N INLET INV. 414.14
E INLET INV. 414.19
CHAMBER TOP ELEV. = 414.64
CHAMBER BOT ELEV. = 413.50
APPROX. GWL = 412.40
PROPOSED RETAINING WALL C/W CHAIN-LINK-FENCE PER TOWN STANDARD DWG. NO.600
PROPOSED RETAINING WALL C/W CHAIN-LINK-FENCE PER TOWN STANDARD DWG. NO.600
PROPOSED RETAINING WALL C/W CHAIN-LINK-FENCE PER TOWN STANDARD DWG. NO.600
BROCK STREET
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30



KEY PLAN
SCALE: N.T.S.

LEGEND

EXISTING FEATURES (EX.)

- EX. CONTOUR
- EX. GRADE
- EX. TREELINE
- EX. DITCH
- EX. STORM CATCHBASIN
- EX. STORM SEWER & MANHOLE
- EX. GAS MAIN
- EX. BELL LINE
- EX. HYDRO POLE
- EX. WATERMAIN
- EX. WATER SERVICE
- EX. FIRE HYDRANT & VALVE
- EX. SANITARY SEWER & MANHOLE
- EX. BUILDING

PROPOSED FEATURES (PR.)

- PR. PROPERTY LIMITS
- PR. ELEVATION
- PR. ELEVATION (MATCH EX. ELEVATION)
- PR. SWALE & SLOPE
- PR. WATERMAIN & GATE VALVE
- PR. FIRE HYDRANT & GATE VALVE PER REGION STD. 1-6-1
- PR. CHECK VALVE IN CHAMBER PER REGION STD. 1-1-5 & 1-3-1
- PR. STORM SEWER & MANHOLE
- PR. SANITARY SEWER & MANHOLE
- PR. SANITARY FORCEMAIN
- PR. REAR-LOT CATCHBASIN PER TOWN STD. DWG. 503
- PR. CATCHBASIN MANHOLE
- PR. 1200mmø CONCRETE STORM SEWER
- CATCHMENT AREA ID
- RUNOFF COEFFICIENT
- DRAINAGE AREA (ha)
- EX. STORM DRAINAGE CATCHMENT
- PR. STORM CATCHMENT
- HEAVY-DUTY SILT FENCING
- SERVICE CROSSING LOCATION & ID
- MUD-MAT
- PR. RETAINING WALL
- PR. SLOPE (3:1 MAX)

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ELEVATION NOTE

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SURVEY COMPLETED BY RN GEOMATICS LTD. DATED NOVEMBER 12, 2018

TOWN OF CALEDON

No.	ISSUE	DATE: MM/DD/YYYY
0	ISSUED FOR 1st ZBA-APPLICATION SUBMISSION	12/10/2020

Engineer

FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION

Engineer

Project
18314 & 18309 HURONTARIO STREET
TOWN OF CALEDON

Drawing
POST-DEVELOPMENT DRAINAGE PLAN

CROZIER
CONSULTING ENGINEERS
57 JOHN STREET WEST
P.O. BOX 1011
BRADFORD, ON L3Z 2B4
905-952-3111 T
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Drawn By	Design By	Project
D.P.	D.P.	1610-5023
Check By	Check By	Scale / Drawing
G.M.		1:250 / C104

THE KING'S HIGHWAY No. 10 (ONTARIO STREET) (ROAD ALLOWANCE)

SILT-SACK TO BE INSTALLED IN EX. CATCH BASINS PER DETAIL ON DWG. C106

SILT-SACK TO BE INSTALLED IN EX. CATCH BASINS PER DETAIL ON DWG. C106

EDGE OF PAVEMENT

CURB CUT

CONCRETE DRIVEWAY

BACK OF CONCRETE CURB

INTERLOCKING ASPHALT DRIVEWAY

CONCRETE SIDEWALK

BELL CABLE BOX

PILLAR

RETAINING WALL

EX. GASLINE

PLAN 24609 (P-1573-21)

DITCH

CORRUGATED STEEL PIPE CULVERT

INVERT=415.33
OBVERT=415.73

INVERT=415.30
OBVERT=415.70

CHAIN LINK FENCE

DSE=419.80

No. 18314
2 STOREY
FRAME DWELLING

GRAVEL DRIVEWAY

TRE=423.38

1 STOREY ADDITION

35.75

SILT-FENCING TO BE INSTALLED PER TOWN STD. DWG. 304 SEE DETAIL ON DWG. C106

EX. UTILITY POLES TO BE RELOCATED BY OTHERS

SILT-FENCING TO BE INSTALLED PER TOWN STD. DWG. 304 SEE DETAIL ON DWG. C106

SILT-FENCING TO BE INSTALLED PER TOWN STD. DWG. 304 SEE DETAIL ON DWG. C106

INSTALL MUD MAT PER DETAIL ON DWG. C106

SILT-FENCING TO BE INSTALLED PER TOWN STD. DWG. 304 SEE DETAIL ON DWG. C106

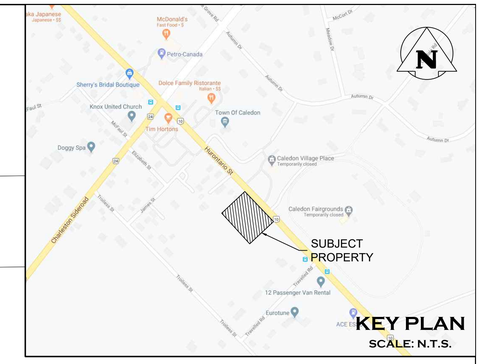
4 5 6 7 8 9 10 11 12

1 2 3 13 14 15 16 17 18 19

20 21 22 23 24 25 26 27 28 29 30

NORTH HALF CONCESSION 1

BROCK STREET
(BY REGISTERED PLAN CAL3)



KEY PLAN
SCALE: N.T.S.

LEGEND

EXISTING FEATURES (EX.)

- EX. CONTOUR
- EX. GRADE
- EX. TREELINE
- EX. DITCH
- EX. STORM CATCHBASIN
- EX. STORM SEWER & MANHOLE
- EX. GAS MAIN
- EX. BELL LINE
- EX. HYDRO POLE
- EX. WATERMAIN
- EX. WATER SERVICE
- EX. FIRE HYDRANT & VALVE
- EX. SANITARY SEWER & MANHOLE
- EX. BUILDING

PROPOSED FEATURES (PR.)

- PR. PROPERTY LIMITS
- PR. ELEVATION
- PR. ELEVATION (MATCH EX. ELEVATION)
- PR. SWALE & SLOPE
- PR. WATERMAIN & GATE VALVE
- PR. FIRE HYDRANT & GATE VALVE PER REGION STD. 1-6-1
- PR. CHECK VALVE IN CHAMBER PER REGION STD. 1-1-5 & 1-3-1
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- PR. REAR-LOT CATCHBASIN PER TOWN STD. DWG. 503
- PR. CATCHBASIN MANHOLE
- PR. 1200mmø CONCRETE STORM SEWER
- CATCHMENT AREA ID
- RUNOFF COEFFICIENT
- DRAINAGE AREA (ha)
- EX. STORM DRAINAGE CATCHMENT
- PR. STORM CATCHMENT
- HEAVY-DUTY SILT FENCING
- SERVICE CROSSING LOCATION & ID
- MUD-MAT
- PR. RETAINING WALL
- PR. SLOPE (3:1 MAX)

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SURVEY COMPLETED BY RN GEOMATICS LTD. DATED NOVEMBER 12, 2018

TOWN OF CALEDON

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR 1st ZBA-APPLICATION SUBMISSION	12/10/2020

Engineer

FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION

Engineer

Project
18314 & 18309 HURONTARIO STREET
TOWN OF CALEDON

Drawing
EROSION AND SEDIMENT CONTROLS PLAN

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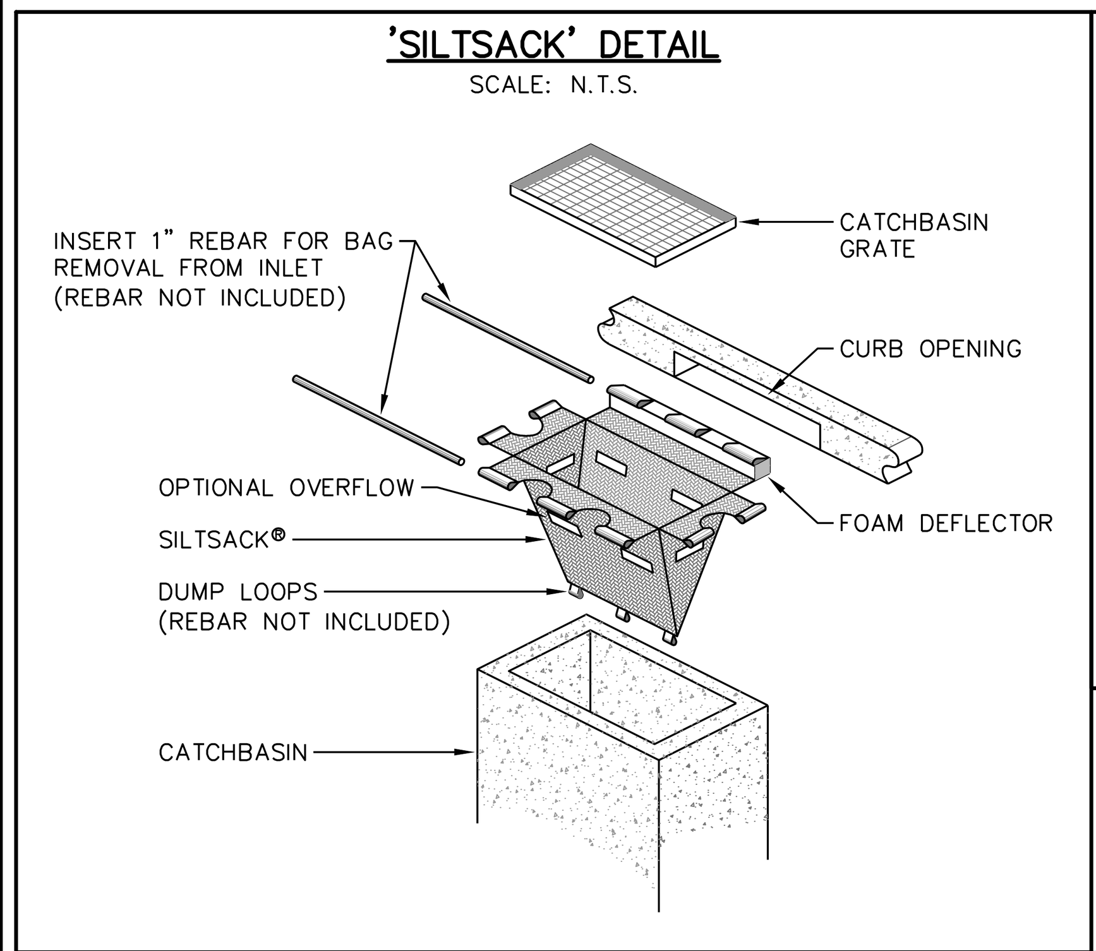
BRADFORD, ON L3Z 2B4
905-952-3111 T
WWW.CFCROZIER.CA

Drawn By	Design By	Project
D.P.	D.P.	1610-5023
Check By	Check By	Scale / Drawing
G.M.		1:250 / C105

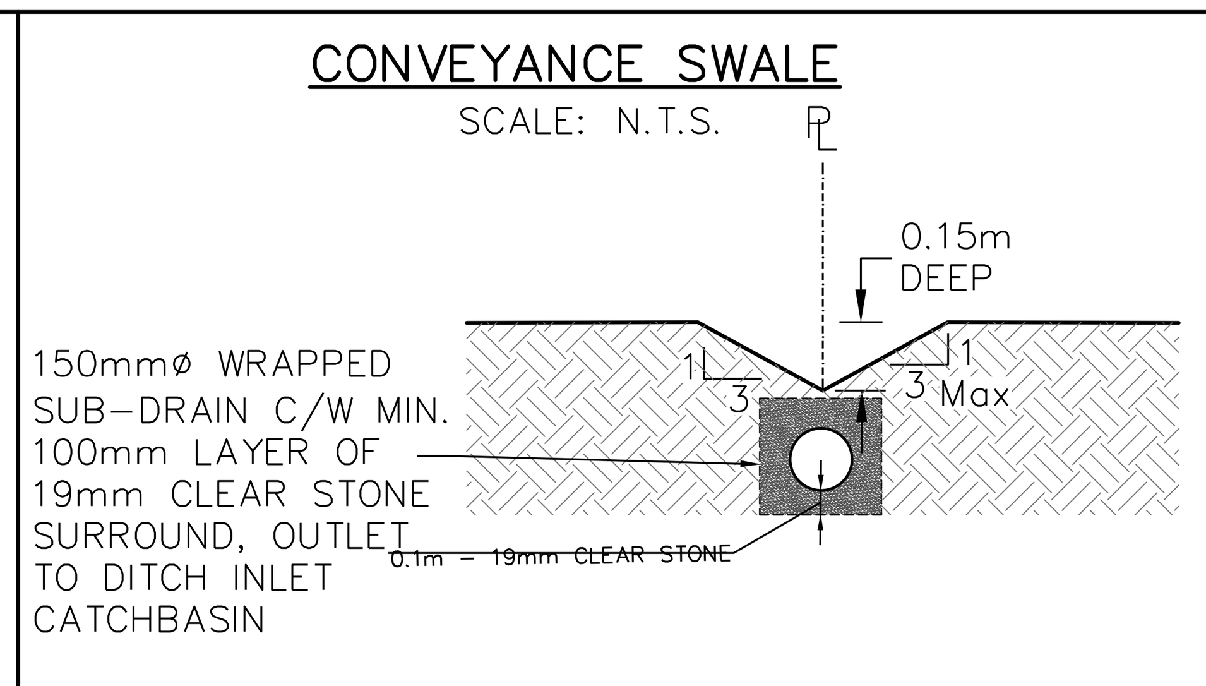
'SILTSACK' DETAIL

SCALE: N.T.S.



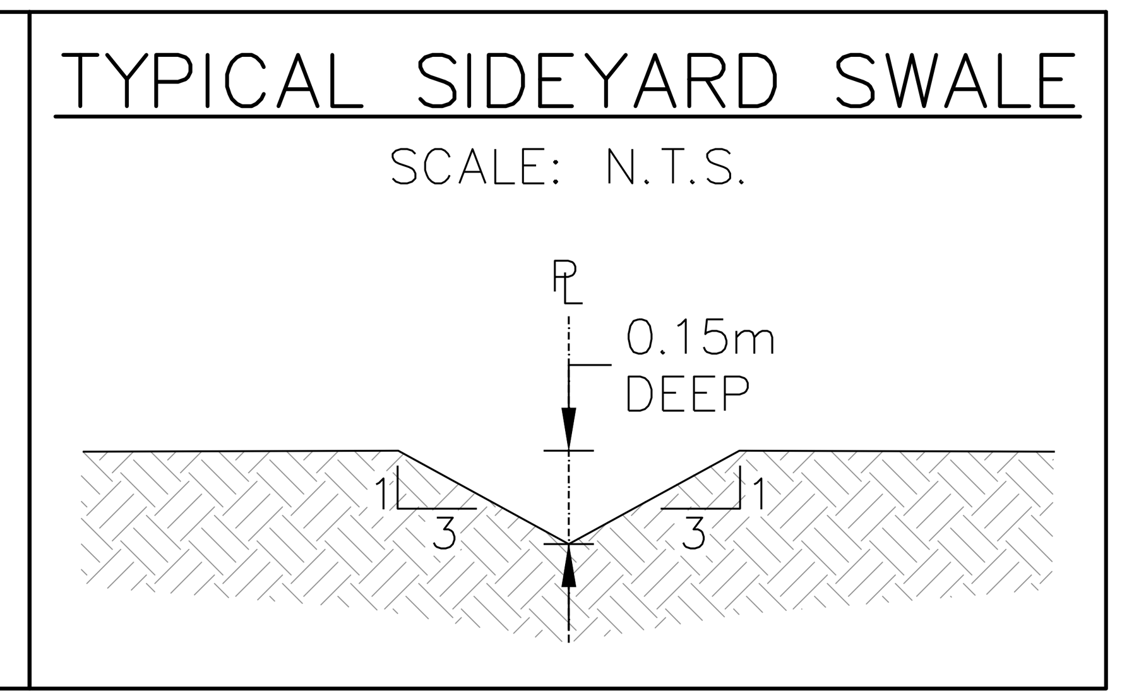
CONVEYANCE SWALE

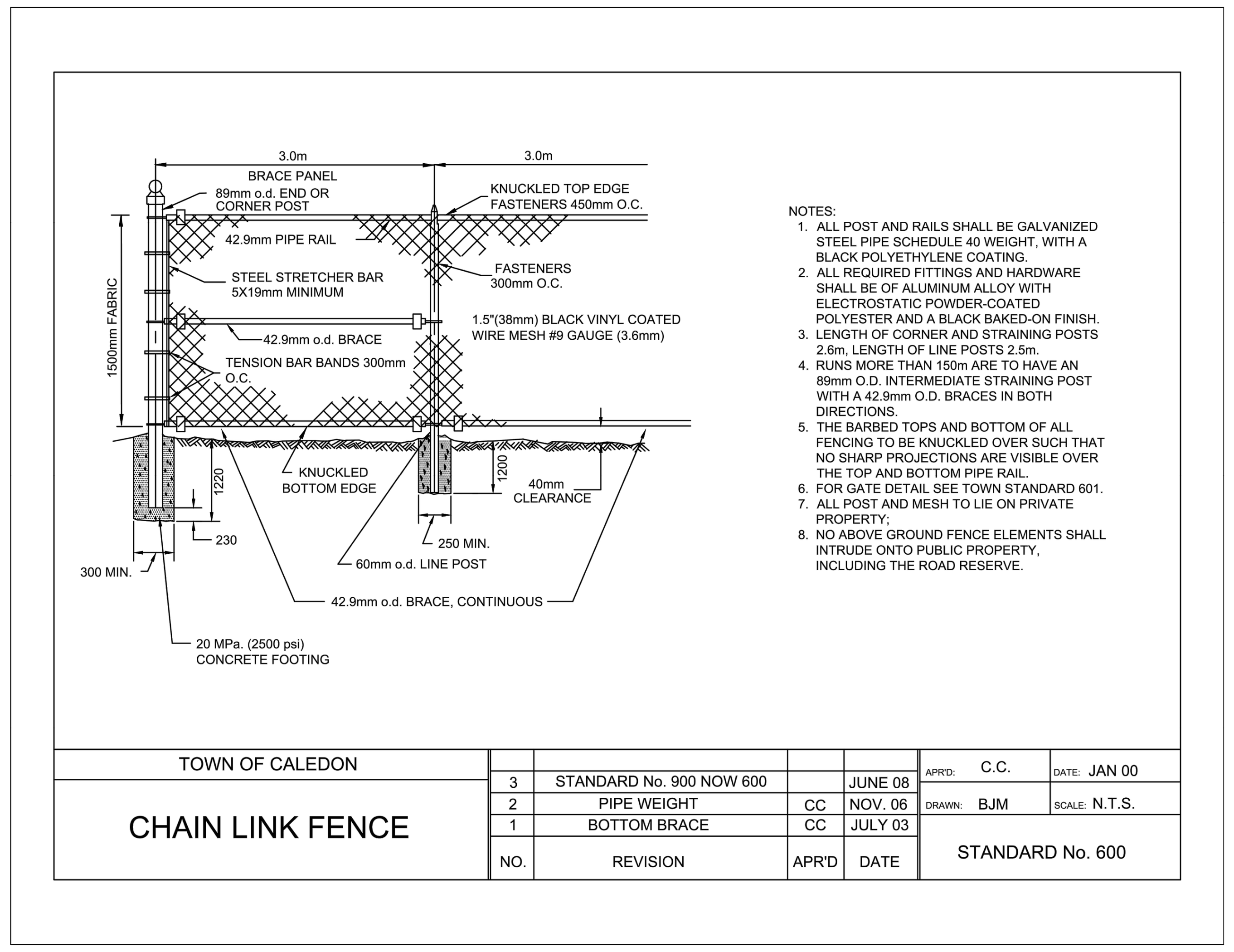
SCALE: N.T.S.

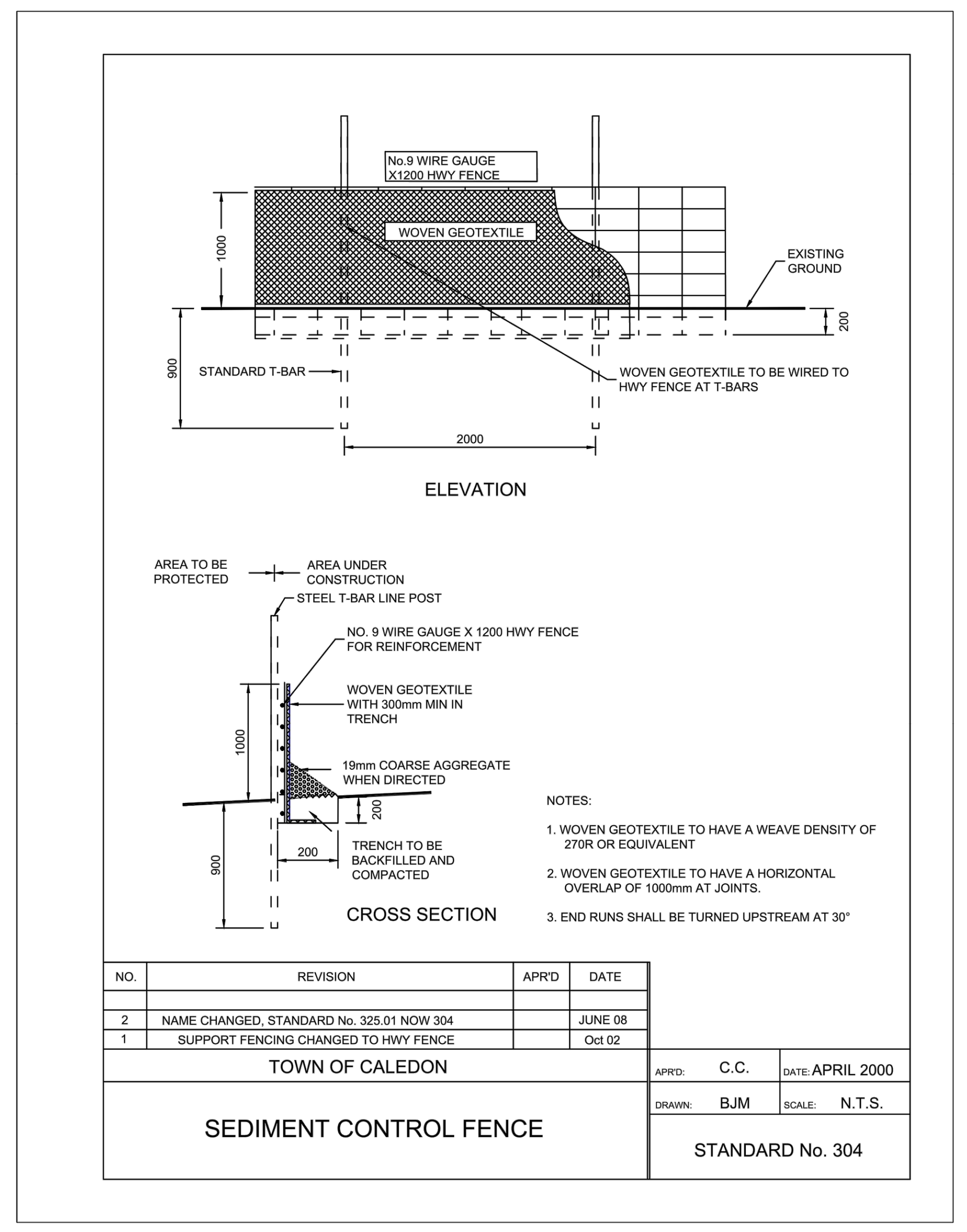


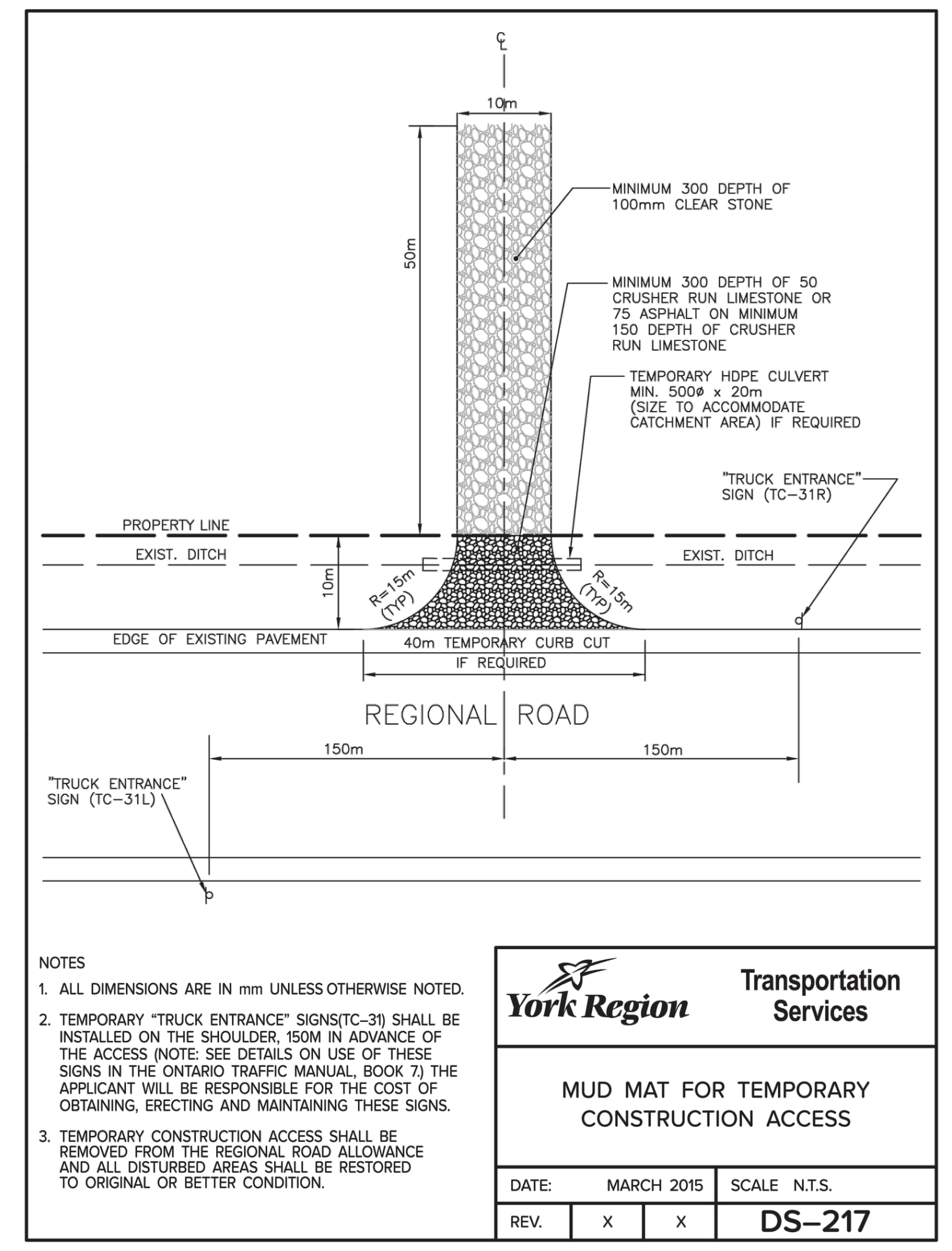
TYPICAL SIDEYARD SWALE

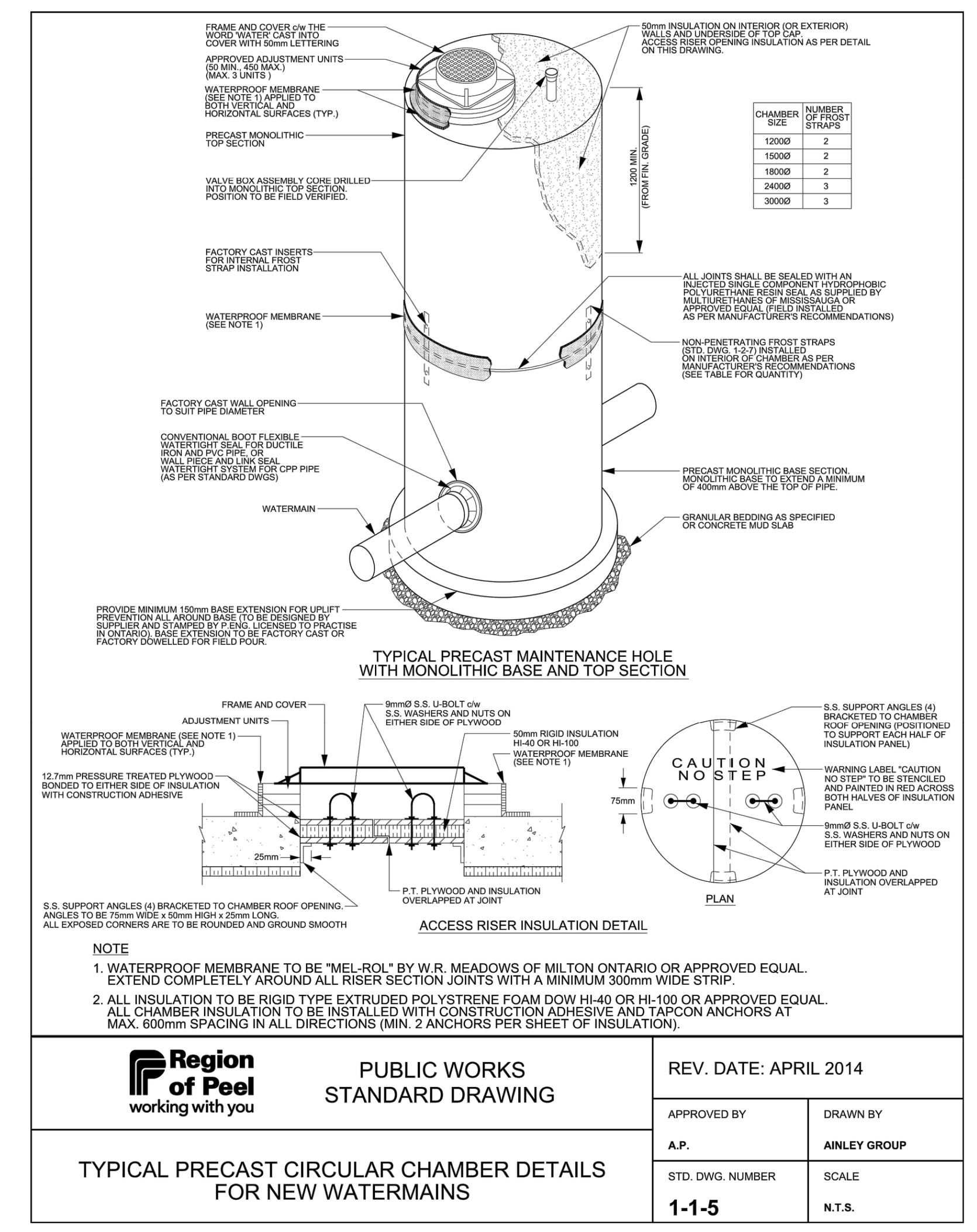
SCALE: N.T.S.

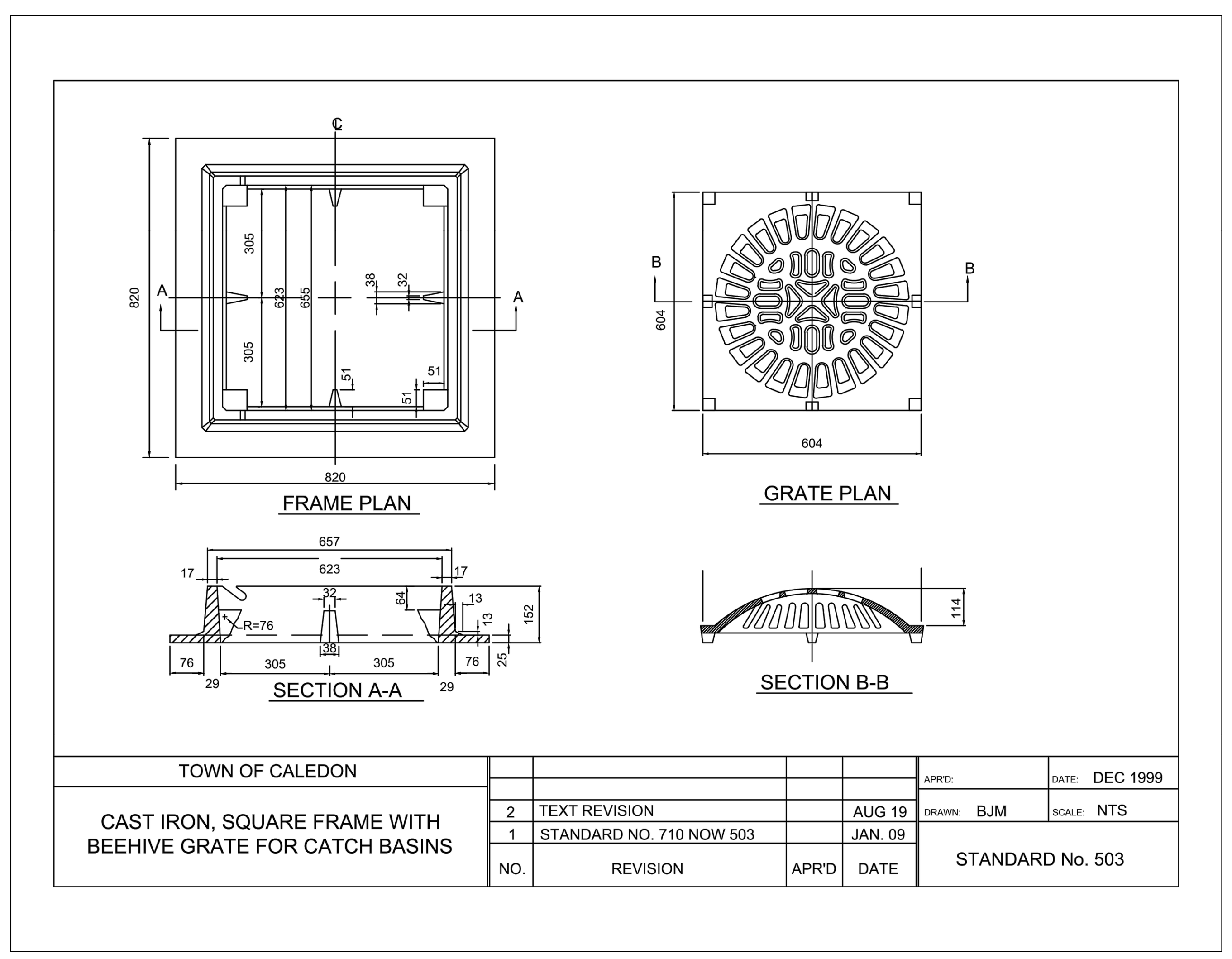


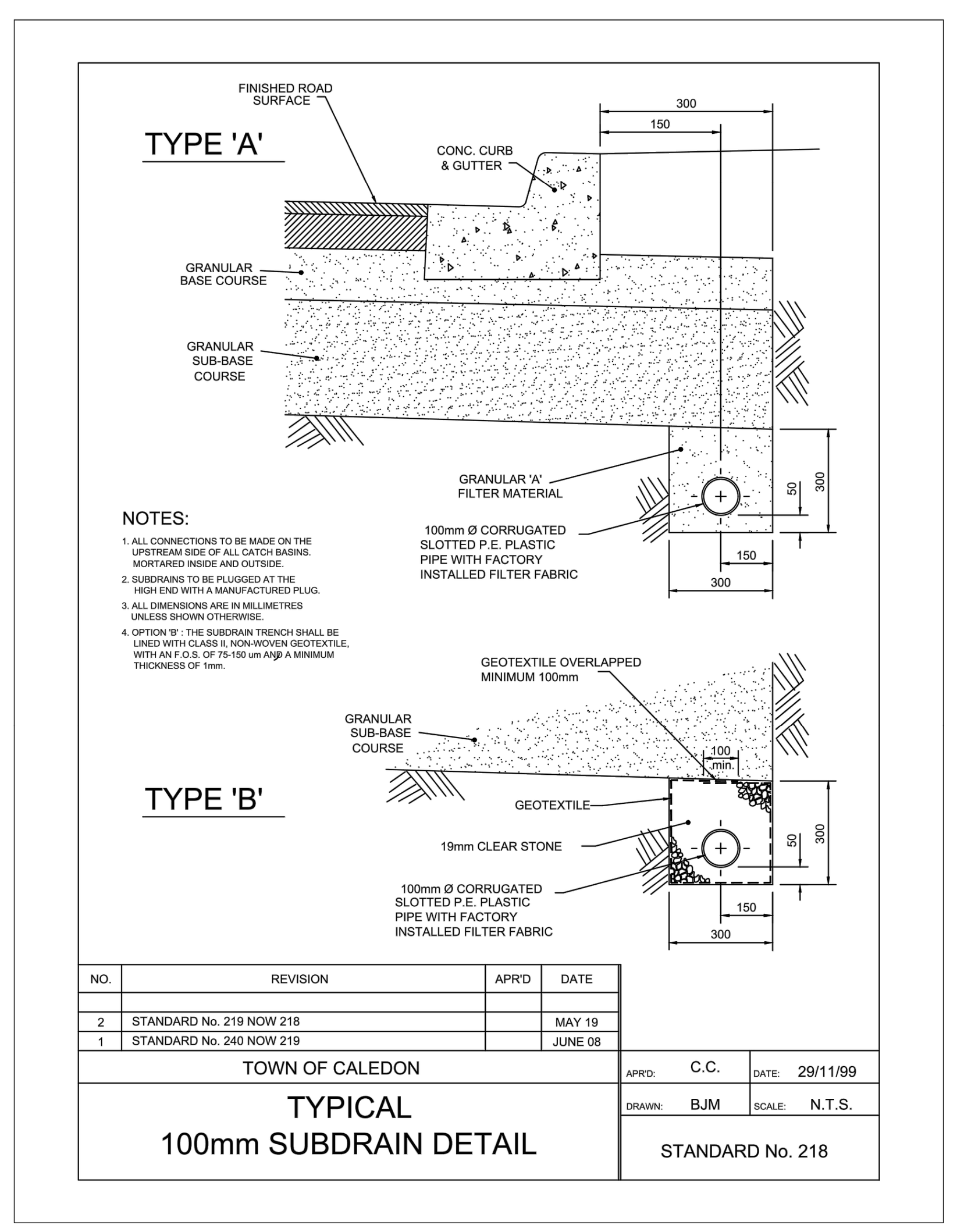

3.0m
3.0m
BRACE PANEL
KNUCKLED TOP EDGE FASTENERS 450mm O.C.
89mm o.d. END OR CORNER POST
42.9mm PIPE RAIL
STEEL STRETCHER BAR 5X19mm MINIMUM
FASTENERS 300mm O.C.
1.5"(38mm) BLACK VINYL COATED WIRE MESH #9 GAUGE (3.6mm)
42.9mm o.d. BRACE
TENSION BAR BANDS 300mm O.C.
1500mm FABRIC
KNUCKLED BOTTOM EDGE
40mm CLEARANCE
250 MIN.
60mm o.d. LINE POST
42.9mm o.d. BRACE, CONTINUOUS
300 MIN.
20 MPa. (2500 psi) CONCRETE FOOTING
NOTES:
1. ALL POST AND RAILS SHALL BE GALVANIZED STEEL PIPE SCHEDULE 40 WEIGHT, WITH A BLACK POLYETHYLENE COATING.
2. ALL REQUIRED FITTINGS AND HARDWARE SHALL BE OF ALUMINIUM ALLOY WITH ELECTROSTATIC POWDER-COATED POLYESTER AND A BLACK BAKED-ON FINISH.
3. LENGTH OF CORNER AND STRAINING POSTS 2.6m, LENGTH OF LINE POSTS 2.5m.
4. RUNS MORE THAN 150m ARE TO HAVE AN 89mm O.D. INTERMEDIATE STRAINING POST WITH A 42.9mm O.D. BRACES IN BOTH DIRECTIONS.
5. THE BARBED TOPS AND BOTTOM OF ALL FENCING TO BE KNUCKLED OVER SUCH THAT NO SHARP PROJECTIONS ARE VISIBLE OVER THE TOP AND BOTTOM PIPE RAIL.
6. FOR GATE DETAIL SEE TOWN STANDARD 601.
7. ALL POST AND MESH TO LIE ON PRIVATE PROPERTY.
8. NO ABOVE GROUND FENCE ELEMENTS SHALL INTRUDE ONTO PUBLIC PROPERTY, INCLUDING THE ROAD RESERVE.
TOWN OF CALEDON
CHAIN LINK FENCE
3 STANDARD No. 900 NOW 600 JUNE 08
2 PIPE WEIGHT CC NOV. 06
1 BOTTOM BRACE CC JULY 03
NO. REVISION APR'D DATE
APP'D: C.C. DATE: JAN 00
DRAWN: BJM SCALE: N.T.S.
STANDARD No. 600

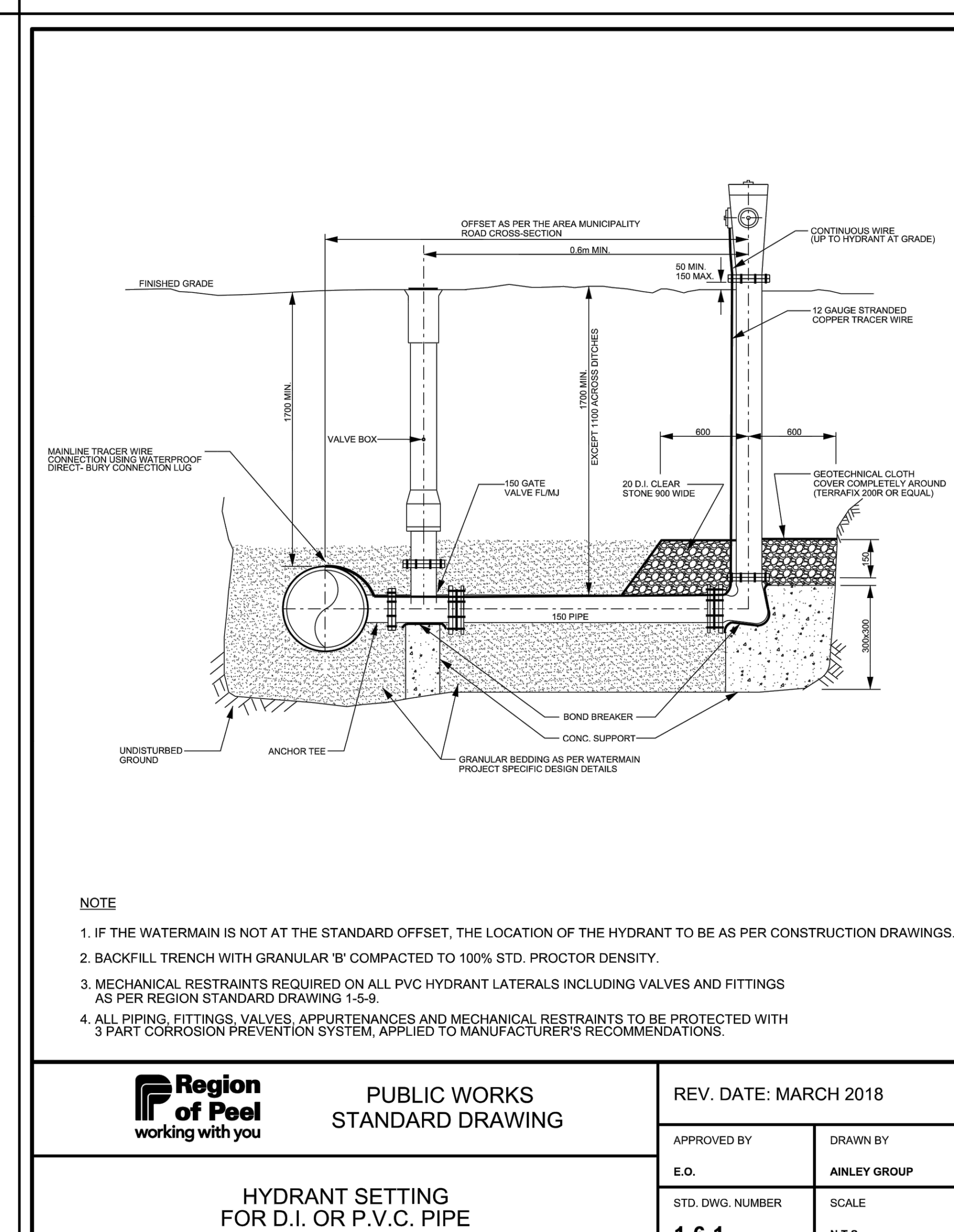

No.9 WIRE GAUGE X1200 HWY FENCE
WOVEN GEOTEXTILE
EXISTING GROUND
STANDARD T-BAR
WOVEN GEOTEXTILE TO BE WIRED TO HWY FENCE AT T-BARS
ELEVATION
CROSS SECTION
NOTES:
1. WOVEN GEOTEXTILE TO HAVE A WEAVE DENSITY OF 270R OR EQUIVALENT
2. WOVEN GEOTEXTILE TO HAVE A HORIZONTAL OVERLAP OF 1000mm AT JOINTS.
3. END RUNS SHALL BE TURNED UPSTREAM AT 30°
TOWN OF CALEDON
SEDIMENT CONTROL FENCE
STANDARD No. 304

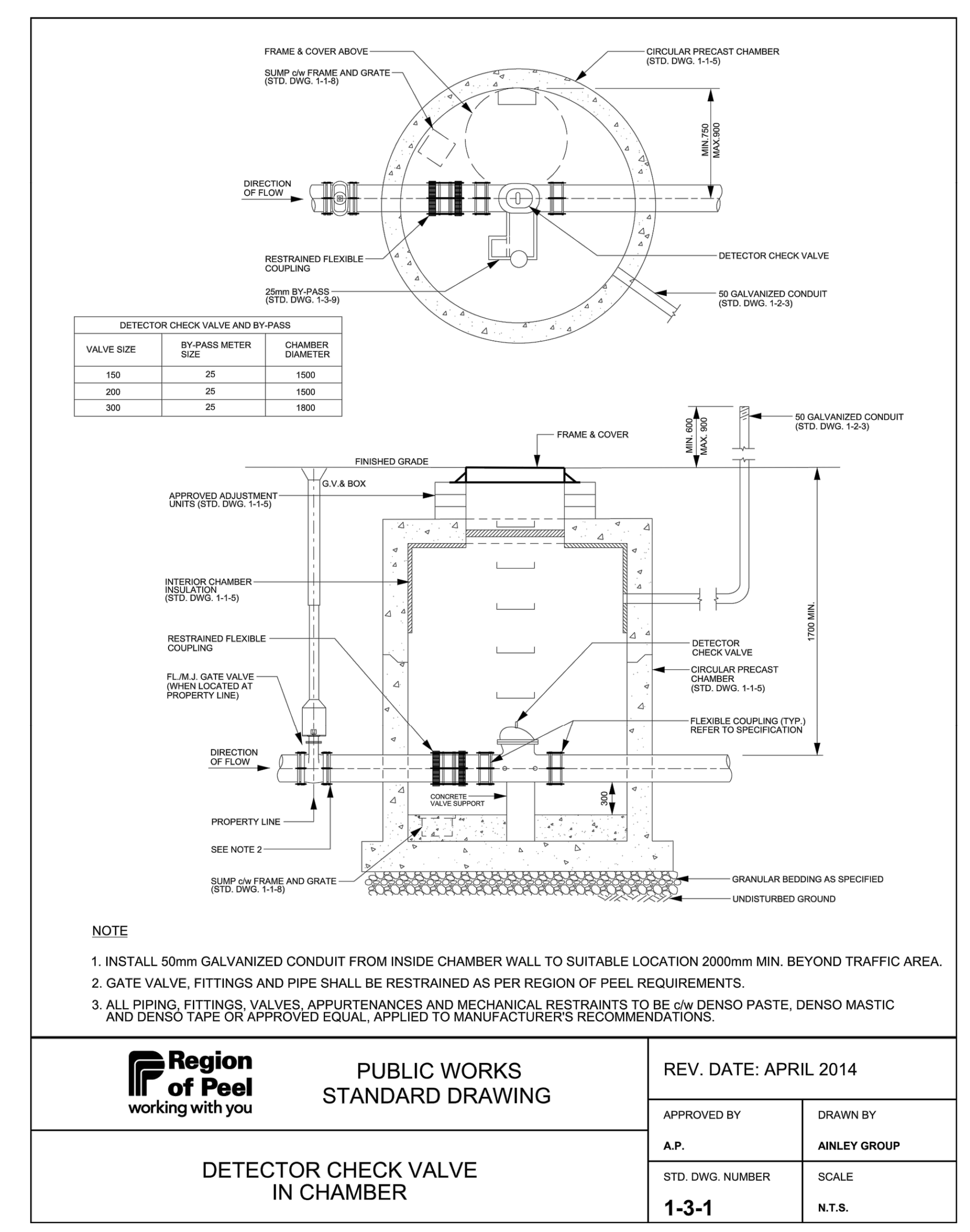

MINIMUM 300 DEPTH OF 100mm CLEAR STONE
PROPERTY LINE
EXIST. DITCH
EDGE OF EXISTING PAVEMENT
REGIONAL ROAD
"TRUCK ENTRANCE" SIGN (TC-31R)
"TRUCK ENTRANCE" SIGN (TC-31L)
NOTES
1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE NOTED.
York Region
Transportation Services
MUD MAT FOR TEMPORARY CONSTRUCTION ACCESS
DATE: MARCH 2015
SCALE: N.T.S.
DS-217


TYPICAL PRECAST MAINTENANCE HOLE WITH MONOLITHIC BASE AND TOP SECTION
ACCESS RISER INSULATION DETAIL
CAUTION NO STEP
Region of Peel working with you
PUBLIC WORKS STANDARD DRAWING
REV. DATE: APRIL 2014
TYPICAL PRECAST CIRCULAR CHAMBER DETAILS FOR NEW WATERMAINS
1-1-5
N.T.S.









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Engineer

Engineer

FOR REVIEW
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Project

18314 & 18309 HURONTARIO STREET
TOWN OF CALEDON

Drawing

STANDARD DETAILS

CROZIER CONSULTING ENGINEERS
57 JOHN STREET WEST
P.O. BOX 1011
BRADFORD, ON L3Z 2B4
905.952.3111 T
WWW.CFCROZIER.CA

Drawn By	D.P.	Design By	D.P.	Project	1610–5023
Check By	G.M.	Check By		Scale NTS	Drawing C106

Q:\1600\1610-Richard Nicholson\5023-18314 Hurontario St\CAD\Civil_Sheets\C105&106_ESC and Details.dwg, 2020-12-10 1:27:11 PM