SERVICING & STORMWATER MANAGEMENT IMPLEMENTATION REPORT

WYLDEWOOD CREEK

TOWN OF COLLINGWOOD

PREPARED FOR:

BRANDY LANE CORPORATION

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
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APRIL 2021

CFCA FILE NO. 1535-4897

CROZIER
CONSULTING ENGINEERS

Revision Number	Date	Comments
Rev. 0	February 4, 2019	Issued for First Submission SPA
Rev. 1	April 8, 2021	Issued for Second Submission SPA

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Note: All drawings have been prepared at half scale

1.0 INTRODUCTION

C.F. Crozier & Associates Inc. ("Crozier") has been retained by Brandy Lane Corporation to prepare a Servicing & Stormwater Management Implementation Report and detailed design to support the Site Plan Application (SPA) for the proposed Wyldewood Creek Development located in the Town of Collingwood.

The subject site is the south block of the Georgian Bay Hotel lands located at 10 Vacation Inn Drive and is bounded by the Cranberry Marsh located to the east and Cranberry Golf Course to the south and west. The site is legally described as part of Lots 47 and 48, Concession 11 in the Town of Collingwood, County of Simcoe.

According to the Town's Official Plan, the lands are currently designated as Resort Commercial and zoned C3-4. A zoning by-law amendment application has been submitted to rezone the southern block as Residential Fourth Density Exception (R4-3) on behalf of Georgian Bay Hotel (the current Owners). Crozier prepared a high-level Functional Servicing & Stormwater Management Report in July 2018 (FSSMR, 2018) and a Flood Study (September 2020) in support of the zoning By-Law and Official Plan Amendment Application.

Consultation with the Town and Nottawasaga Valley Conversation Authority (NVCA) has occurred as part of the OPA/ZBA submission. Additional pre-consultation has occurred with the Town on the Site Plan and a first SPA submission was made in February 2019.

This report has been prepared to provide details associated with the implementation of the servicing and stormwater management design for the proposed development and to address comments provided by the Town and NVCA on the OPA/ZBA application and on the first submission SPA. This report has been prepared based on the design framework established in the following reports:

- Servicing Report – Georgian Manor Resort & Country Club, prepared by Henderson, Paddon & Associates Ltd, dated April 2003.
- Compilation of Site Servicing Drawings (Existing Works) – Georgian Manor Resort & Country Club, prepared by Henderson, Paddon & Associates Ltd, dated April 2004.
- Regional Stormwater Management Update & Master SWM Strategy – Tanglewood at Cranberry Trail / Cranberry Creek Watershed – Tanglewood (Sierra Homes) Inc., prepared by Crozier, final dated May 2007.
- Servicing & Stormwater Management Implementation Report – Blue Fairway: Block 7 – Macpherson Builders (Cranberry Ltd.), prepared by C.F. Crozier & Associates, final dated May 2007.
- Functional Servicing & Stormwater Management Report – 10 Vacation Inn Drive – Georgian Bay Hotel, prepared by Crozier, final dated July 2018.
- Flood Study – Wyldewood Creek – Brandy Land Corporation/Georgian Bay Hotel, prepared by Crozier, dated September 2020.

2.0 BACKGROUND & SITE DESCRIPTION

The proposed development area is approximately 2.56 ha in size. The site is located south of Vacation Inn Drive and Trafalgar Road in the Town of Collingwood. To the west and south of the site is a golf course and to the east is Cranberry Marsh. Beyond the golf course south of the site is the unopened right-of-way (ROW) for Cranberry Trail which will connect Cranberry Trail East and West.

Currently this portion of Cranberry Trail is a construction access for the Blue Fairway development and the watermain has been constructed.

The site is covered with grass, trees, bushes and buildings. The existing maintenance buildings are proposed to be removed or relocated. At the south east corner of the Subject Site is an existing cell tower which will remain. Under existing conditions, the site drains to the east as sheet flow; there is also a 500 mm culvert which conveys external flows across the site and outlets at the east property line. This existing culvert and drainage works to the west of Cranberry Marsh have been referred to as the West Watercourse in the previous reports, this includes the conveyance features of the Subject Site and adjacent golf course lands. The site and surrounding area are characterized by relatively flat topography with good drainage conditions, which ultimately drains towards the Cranberry Marsh.

The proposed development consists of 6 mid-rise residential buildings (total of 165 units) with associated at grade parking spaces, a recreational facility, and a private road. It will also include storm sewers, water and sanitary sewer servicing, stormwater management infrastructure, an engineered drainage channel and typical utility servicing.

According the Soil Survey of Simcoe Country (1962), the soil on site is classified as Sargent soil of Hydrologic Soil Group 'A'. This was confirmed by a site specific geotechnical investigation completed by Soils Engineering Ltd. The geotechnical investigation determined that the site is underlain by shallow bedrock and high groundwater. With bedrock having been encountered at depths ranging from 0.7m to 2.4m and groundwater having been measured at depths between 0.8m to 1.5m at select borehole locations. Refer to the Geotechnical Report for further information regarding subsurface conditions.

3.0 ROADWAY & SERVICING CORRIDOR

Based on the proposed site plan, vehicular access to the site will be provided in one location from Georgian Bay Hotel. The access will be aligned with the existing intersection of Vacation Drive and Trafalgar Road. The proposed internal design consists of a 25 m servicing corridor with the following parameters:

- 3.35 m asphalt lanes at 2% cross fall;
- 600.040 OPSD standard mountable curb and gutter;
- Major Storm event to be conveyed within the ROW and discharged directly to designated overland flow routes;
- Parking on either side;
- Utility corridor with hydro and telecommunications parallel to the roadway;
- Sanitary alignment generally following the centerline;
- Storm sewer along the west side of the roadway; and
- Watermain along the east side of the roadway.

Road grades have been prepared to demonstrate that the site can be developed according to Town Standards for geometric design. The road design and site grading provide drainage for minor and major storm events as per Town Standards. The storm sewer is designed to capture and convey the 5-year (minor) storm event and the major storm events are conveyed overland via the road surface to appropriate outlets which drain to Cranberry Marsh.

The necessity for guiderails at the culvert crossing was evaluated and determined to not be required since the required clear zone of 3 metres is achieved with a maximum 4:1 slope. This slope is considered traversable and not deemed a hazard.

4.0 UTILITIES

The subject site will be serviced with natural gas, telephone, cable TV and hydro. Water, gas and hydro will be connected to the Cranberry Trail ROW within a 10 m wide servicing easement through the golf course lands. Gas lines will be installed at the rear of the buildings, while hydro and telecommunication lines will be installed in the servicing corridor parallel to private roadway.

5.0 SANITARY SEWAGE SYSTEM

5.1 Existing Sanitary Sewer Infrastructure

There are existing sanitary sewers located along the west side of the private roadways that cross through the yards of the Georgian Bay Hotel lands. These sewers collect and convey sewage flow from all buildings to a 750 mm diameter trunk sewer in Highway 26 Right-of-Way. These sewers are part of a private system, and the sewers range in size from 200 mm diameter (servicing the administration buildings) to 375 mm diameter sewer. There are approximately 1,400 m of existing sanitary sewers internal to the Hotel Lands. There is a sewage holding tank for the maintenance building on the subject property which will be decommissioned.

The capacity of the private internal sanitary sewer system is approximately 68 L/s with a residual capacity of 61.3 L/s, based on the Sanitary Sewer Evaluation prepared by Henderson, Paddon & Associates.

The existing internal sanitary sewer network traverses the developed sectors of the Site from a connection at Highway 26 to the Vacation Inn Drive/Trafalgar Road intersection just north of the southern sector. The sanitary sewer invert at the termination of the existing Hotel sanitary network is 178.05 m, which will be used as a connection for the subject development. The internal sewer connects to the municipal sanitary sewer within the Highway 26 ROW, where there is a downstream 750 mm diameter gravity trunk sewer.

The sanitary sewer within Cranberry Trail was also investigated for connection. However, the elevation of this sewer was not suitable to service the site via a gravity connection.

5.2 Proposed Sanitary Servicing Strategy

It is the intent for the entire Wyldewood Creek development is to be serviced by gravity sewers discharging to the existing 375 mm sanitary sewer located within the Georgian Bay Hotel property. The proposed routing of the internal sanitary sewers will follow the internal roadway. The design of this sewer is shown in DWG C103 and sanitary sewer calculations are included in Appendix A.

Sanitary flows for the site were computed using the following values, per the Town of Collingwood Standards and the Ontario Building Code (Table 8.2.1.3).

- Average Residential Flow Rate — 450 L/cap/day
- Average Recreational Flow Rate — 40 L/day/member
- Infiltration — 0.23 L/s/ha
- Residential Peaking Factor — 4.07 (Harmon)
- Recreational Peaking Factor — 4.47 (Harmon)
- Population Density — 1.9 Persons/Unit

Based on these values it is estimated that peak sanitary flow from the site will be **7.27 L/s**.

The sanitary sewer design sheet in Appendix A includes the downstream Georgian Bay Hotel network, confirming the available capacity.

6.0 POTABLE WATER SUPPLY

6.1 Existing Water Infrastructure

The existing developed sectors of Georgian Bay Hotel lands are serviced via a 200 mm diameter private watermain. The internal system connects to an existing 300 mm diameter watermain within the Highway 26 ROW. There is also an existing 300 mm diameter public watermain is located within the unopened ROW of Cranberry Trail on the south side of the roadway.

6.2 Proposed Water Servicing Strategy

The preferred connection for the watermain from the subject site is to the municipal watermain within Cranberry Trail. This connection allows the watermain within the proposed development to be a part of the public system. Therefore, the proposed water distribution system within the Wyldewood Creek development Is designed according to Town of Collingwood Standards and MOE Guidelines for Drinking Water (2008). The proposed watermain will also be connected to the private watermain system on the Georgian Bay Hotel lands with a backflow preventer to allow for a secondary connection for the Hotel Lands. Water modeling has been conducted by the Town's Consultant, Refer to Appendix A for the water modeling report. It is noted that since the Water Modeling Report has been prepared, there has been a reduction in the total unit count by three units and fire separations have been added to the building designs.

Individual service connections will be extended to the apartment buildings and the recreational facility from the local watermain, and will have backflow prevention per OBC requirements. Fire protection for the apartment buildings will be provided by a series of fire hydrants connected to the 300 mm watermain. The sizing of the internal watermain will be confirmed through Town updates to the Municipal water system model. Available pressures expected throughout the proposed development will likewise be confirmed.

Water demands for the site was determined using the following design figures:

- Average Residential Flow Rate 450 L/C-day
- Average Recreational Flow Rate 40 L/member/day
- Max Day/Peak Hour Factor 2.0/4.5

The water demand for the site was calculated using the values listed above, 165 proposed apartment units and one recreational facility. The water demands for the site are summarized below:

- Average Daily Flow 1.64 L/s
- Max Day 3.28 L/s
- Peak Hour 7.39 L/s

Refer to Appendix A for detailed calculations.

Preliminary fire flows required to service the subject site were determined to be **250 L/s** per the Fire Underwriter's Survey, and **150 L/s** required per Fire Marshal (OBC). The total design flow for the internal water distribution system is **174.1 L/s**. Refer to Appendix A for potable water servicing demand and fire flow demand calculations.

Based on the current practices in the Town of Collingwood, it is acknowledged that the Municipality will assume ownership of the watermain distribution network located in the privately held portions of the development. This typically includes all watermains, hydrants, valves and services up to and including curb stops. An easement in the name of the Municipality along the alignment of the watermain through the privately held portions of the development and golf course lands will be provided.

7.0 STORMWATER MANAGEMENT AND SITE DRAINAGE

7.1 Stormwater Management Criteria

The management of stormwater and site drainage for both the existing site and the future development must comply with the policies and standards of the various agencies including the Town, Nottawasaga Valley Conservation Authority (NVCA), and Ministry of Environment and Climate Change (MOECC).

The stormwater management criteria for the future development include:

- Water Quantity Control
  - Quantity Control is not required for future development within the Cranberry Creek Watershed per Regional Stormwater Management Update & Master SWM Strategy by C.F. Crozier & Associates (May 2007); and

- Water Quality Control
  - "Enhanced Protection" given Georgian Bay as the ultimate receivers.

- Erosion Control
  - First 5mm from any storm event retained on-site; and
  - Runoff from 25mm storm event detained for 48 hours or longer.

- Water Balance
  - Target of achieving pre-development annual infiltration volumes.

- Phosphorous Loading
  - "Best Efforts" to achieve pre-development phosphorous loading rates.

- Development Standard
  - Lot grading at 2% optimum grade; and,
  - Drainage system to convey runoff from frequent and infrequent rainfall events, respectively.

7.2 Existing Drainage Conditions

Currently the subject site is composed of a gravel access road, maintenance buildings and relatively flat ground covered in light vegetation. There are currently no stormwater controls in place. Stormwater runoff is conveyed overland to the West Watercourse and Cranberry Marsh.

The West Watercourse Drainage is conveyed via a 500 mm diameter culvert across Cranberry Golf Course Hole #10 which discharges to the west of the Subject Site where it is then conveyed across the southern sector via a 500 mm diameter culvert which discharges to Cranberry Marsh.

A hydrologic analysis for the Cranberry Creek Watershed was previously conducted by Crozier as part of the Regional Stormwater Management Update and SWM Strategy Report (Crozier, 2007). The analysis presented in the report included the assessment of the impacts of the South Georgian Bay Hotel South Block development. The Cranberry Marsh provides quantity control of stormwater runoff for the areas within its watershed, prior to discharging to the Cranberry Marsh and ultimately to the Georgian Bay (FSSWMR, 2018). Thus, the requirement for quantity control is determined by a development's proximity to the Marsh. Due to the location of the Wyldewood Creek with respect to the Cranberry Marsh, it was determined that quantity control is not required for the site.

The Master SWM Strategy report indicated that water quality controls would be required in all future residential developments in the watershed. The drainage area north of the Georgian Trail is characterized by shallow bedrock and high groundwater. Consequently, infiltration for the quality control is not recommended. It is recommended for oil/grit separators to be utilized for roads, parking lots and buildings.

The stormwater management strategy has been designed and assessed using the recommendations and conclusions presented in the Master SWM Strategy Report. In addition to adhering to the conclusions and recommendations made in the Master SWM Strategy report, the management of stormwater and site drainage for the proposed development must also comply with the policies and standards of the various agencies including the Town of Collingwood, Ministry of the Environment (MECP), and the Nottawasaga Valley Conservation Authority (NVCA).

7.3 Proposed Drainage Conditions

The major drainage for proposed development will be conveyed via overland flow routes along the alignment of the roadways. It will also convey flows from the larger storm events to Cranberry Marsh, which is directly adjacent to the east site of the subject site. The minor (5-year storm) system drainage from these areas will be conveyed via gutters above ground and intercepted by catch basins and storm sewers.

Quality treatment will be achieved through the use of two filter units, one will be constructed north of the channel and one will be constructed south of the channel. The water from the sidewalks, roofs and fronts yards of the apartments is considered clean water and will be discharged to the catch basins. These filter units also provide phosphorous removal from the stormwater runoff.

Overland flow will be conveyed along the internal roadway and parking areas to the catch basins at low points throughout the site. The downstream end of the storm sewer has been designed to capture and convey flows up to the five (5) year storm event. Stormwater that exceeds the capacity of the sewer in major events will by-pass the quality control units and be conveyed to the Cranberry Marsh. Refer to DWG C107 for the Storm Drainage Plan. The stormwater will be treated by filter units prior to discharging to Cranberry Marsh. Refer to Table 1 for filter sizing criteria.

Stormwater runoff from the roofs is to be intercepted and captured within landscape features for infiltration and evapotranspiration as a "best efforts" approach for the water balance and erosion control criteria.

External drainage will be conveyed through the site via an engineered channel. Refer to the Flood Study prepared by Crozier dated September 2020 for additional information regarding the hydraulic analysis of the engineered channel.

7.4 Stormwater Quality Controls

Runoff from the parking lots and roadways will be treated in end-of-pipe filter units prior to discharging to the engineered channel. Based on the 0.41 ha contributing area to the storm sewer north of the channel and an 83.5% impervious level, a filter unit was sized in order to provide sufficient water quality control to meet enhanced protection level. Similarly, for the 1.08 ha contributing area to the storm sewer south of the channel, with an impervious level of 80.4%; a filter unit was sized to provide sufficient water quality control to meet enhanced protection level.

A minimum 80% total suspended solids removal and 90% treatment of total annual runoff volume is provided in accordance with the Ministry of Environment Stormwater Management Planning & Design Manual (March 2003). Water will outlet from the filter units into the constructed watercourse. StormFilter units were selected for this development since there is shallow bedrock across the site and the StormFilter units can have shallow structures. Refer to Table 1 included below for a detailed breakdown of the required filter unit sizing. Refer to Appendix B for the detailed sizing calculations of the proposed filter units to provide water quality treatment.

Table 1: Recommended Filter Unit Sizing Criteria

Catchment	Contributing Drainage Area (ha)	% Impervious	Target Total Suspended Solids Removal (%)	Target Annual Runoff Volume Treated (%)	Filter Unit	Total Suspended Solids Removal (%)	Total Annual Runoff Volume Treated (%)
North of Channel	0.49	83.5	80	90	StormFilter SFPD0811	80	90
South of Channel	1.08	80.4	80	90	StormFilter SFPD0820	80	90

The filter systems will be privately owned and maintained. Once the filter systems are installed and operating accordingly to manufacturer's specifications, the Owner will be required to inspect and service the units on a regular basis to ensure long term efficiency. At a minimum, the unit should be inspected at least once every six months to measure the sediment depth and oil/floatable level. Once the sediment reaches a certain depth (as specified by the manufacturer) the unit shall be serviced by a vacuum truck company licensed to dispose of solid waste. If any large presence of oil / floatable materials is evident, the material should be removed and disposed.

7.5 Stormwater Erosion Control

Per the NVCA's comments, it is stated that the erosion control criteria for new developments within the NVCA's jurisdiction is that the first 5mm of precipitation from any storm event is required to be retained on-site and that the 25mm storm event is to be detained in a stormwater management facility for a minimum of 48 hours. It is generally accepted that these criteria are intended to mitigate the potential for increased erosion on downstream waterbodies caused by urbanization within the watershed. This erosion is typically associated with moving bodies of water such as streams, creeks, rivers, etc.

The Subject Site drains to the West Watercourse which then discharges to Cranberry Marsh which outlets to Georgian Bay via Cranberry Creek. The hydrologic properties of wetlands such as Cranberry Marsh provide natural peak flow control and mitigate downstream erosion. As such, the focus for applying the erosion control criteria is to mitigate the erosion potential of the West Watercourse and its point of discharge to Cranberry Marsh.

A review of the NVCA's Stormwater Technical Guide (December 2013) states the following:

> *"To deal with potential impacts of increased erosion in the receiving watercourses, the NVCA recommends that a rapid geomorphic assessment is completed for all development applications where the outlet is directly into a watercourse.*
>
> *NVCA staff may remove the requirement of geomorphic assessments for altered systems (e.g. ditches, municipal drains); however, this can only occur through preconsultation with appropriate technical staff to determine the level of impact to the receiving watercourse. If a watercourse is deemed sensitive based on the criteria below, then a minimum of 48-hour detention is required for the 25 mm storm event. There may also be a need to increase the amount of volume retained on-site based on the results of the detailed geomorphic assessment."*

Since the West Watercourse is to be realigned as an engineered channel from the Subject Site to Cranberry Marsh, it would not be considered sensitive. GEO Morphix has been retained to provide design guidance for the West Watercourse design to ensure that the engineered channel is not subject to aggradation, degradation, channel widening or planimetric form adjustment. Based on the above, retention of the 25mm storm event for a minimum of 48 hours is not applicable to the Subject Site.

With respect to the criterion regarding retaining 5mm of precipitation, the NVCA's Stormwater Technical Guide (December 2013) states the following:

> *"To deal with the issues resulting from additional volume of runoff produced as a result of urbanization, a minimum of the first 5 mm of rainfall should be retained on site. This requires Low-Impact-Development measures of sufficient size to store the volume of 5 mm across the entire development site. The volume of storage required should be calculated by multiplying the 5 mm depth over the entire area to be treated by the stormwater management treatment train. This could be done through infiltration, rainwater harvesting or evapotranspiration. In some sites the conditions make retention of 5mm impractical. For these sites the NVCA encourages a "best efforts" approach to try to meet this goal."*

Further, the NVCA's Stormwater Technical Guide (December 2013) provides standard initial abstraction/ depression storage (IA) depths for various land covers in Table 10.2. The minimum IA depth for pervious landcovers is 5mm. Therefore, the 5mm retention criterion is achieved for all pervious areas. The IA depth for the impervious areas is stated in Table 10.2 as 2mm and does not achieve this criterion.

The Subject Site is subject to shallow bedrock, high groundwater, non-native soils. Due to these constraints, a 'best efforts' approach to retain 5mm from the impervious areas through infiltration and evapotranspiration was implemented. Since groundwater separation could not be achieved for underground systems and site grading to match existing grades at the property lines did not allow for low-impact development methods that would retain 5mm through infiltration for the roadways and parking lots. Additionally, rainwater harvesting of stormwater runoff from these areas was deemed to be unsuitable since this runoff is likely to have a higher pollutant load from the paved surfaces which are subject to vehicular traffic.

The "best efforts" approach involves directing the stormwater runoff from the roofs of the residential buildings to river stone and planting landscape features. These features retain the stormwater runoff within the void spaces of the soil media and stones and allow for infiltration and evapotranspiration. These landscape features provide stormwater storage in excess of that required for 5mm across the impervious areas of the development, which is approximately equivalent to 10mm of stormwater runoff from the roofs. Storage volumes are summarized in Table 2 below. Refer to Appendix B for detailed calculations.

Table 2: Erosion Control Volume

Site Area (ha)	Pervious Area (ha)	Impervious Area (ha)	Erosion Control Volume (m^3)	[1]Available Storage (m^3)
2.56	1.27	1.29	64.5	89.8

1) Refers to storage available in void spaces of the river stone and planting features surrounding the buildings.

7.6 Water Balance

Per the NVCA comments, every effort to maintain pre-development annual infiltration rates should be applied. A water balance analysis was performed to determine the post-development changes in the water balance. It was determined that under post-development conditions, there is an infiltration deficit of 615 m^3/yr. As a "best effort" approach, the landscaping for the site has been developed in such a way that roof water is directed to river stone beds and planters surrounding the buildings. Additionally, it is recommended that increased topsoil soil depths be provided in all landscaped areas. Refer to the Landscape Plans prepared by Crozier (February 2021). The volume of stormwater captured and retained by the landscape features for infiltration and evapotranspiration is 1180 m^3/yr. The water balance analysis is summarized in Table 3 below. Refer to Appendix B for detailed calculations.

Table 3: Water Balance Summary

Characteristic	Pre-Development	Post-Development	Post-Development with Mitigation	Change (Pre to Post w/ Mitigation)
Volume (m^3/yr)				
Precipitation Surplus	12255	15501	15501	26%
Net Surplus	12255	15501	15501	26%
Evapotranspiration	13140	9894	9894	-25%
Infiltration	3524	3158	3158	-10%
Mitigation	0	0	**1180**	**-**
Total Infiltration & Mitigation	**3524**	3158	**4338**	23%
Runoff Pervious Areas	5286	2105	2105	-60%
Runoff Impervious Areas	3445	10237	9058	-
Total Runoff	8731	12343	11163	28%
Total Outputs	**25395**	**25395**	**25395**	0%

7.7 Phosphorous Loading

A Phosphorus Budget was completed using values from the Nottawasaga Valley Conservation Authority Phosphorus Tool which is consistent with the Hutchinson Environmental Sciences Ltd. Phosphorus Report. Per the NVCA's comments "best efforts" are required to achieve pre-development loading rates. The mitigation for the site consists of a proprietary filter system which removes 77% of the phosphorus load from the stormwater leaving the site. Table 4 summarizes the pre- and post-development, and post-development with mitigation phosphorus outputs from the site. Refer to Appendix B for phosphorus budget calculations and supporting documentation regarding the phosphorous removal efficiency of the filter systems.

Table 4: Phosphorus Budget Summary

	Land Use	Area (ha)	Phosphorus Coefficient (kg/ha)	Phosphorus Load (kg/yr)
Pre-Development	Transition	2.56	0.07	0.18
Post-Development	Residential	2.56	1.33	3.41
Post-Development (with mitigation)	Residential	2.56	0.35	0.89

8.0 EROSION & SEDIMENT CONTROLS

Erosion & sediment controls will be implemented prior to any on-site construction works. The controls will consist of a combination of silt fencing, mud mat and dust separation.

- Silt fencing

Silt fence will be constructed in accordance with NVCA's Typical Detail of Silt/Sediment Fence (BSD-23 Draft). It should be noted that additional silt fence may be added based on field decisions by the Engineer and Developer prior to, during and following the earth works. Double row silt fencing with straw bales is to be used along the western and southern property lines to provide additional protection for the natural heritage features.

- Mud Mat

A mud mad has been proposed at the entrance to the development from Vacation Drive and Trafalgar Drive. This mud mat will be maintained at the site until base asphalt is placed to limit mud tracking from the site onto the Georgian Bay Hotel property and the surrounding Municipal roadway network. The Contractor shall ensure mud mat maintenance (cleaning / additional stone) is completed on an as needed basis to ensure proper operation.

- Dust Suppression

During earthwork activities, the Contractor will be responsible for ensuring dust suppression is maintained by the use of water or calcium chloride, or other methods approved by the Engineer.

9.0 CONCLUSIONS AND RECOMMENDATIONS

The analysis presented above provides a comprehensive servicing and stormwater management assessment in support of the proposed Wyldewood Creek development.

- Sanitary Servicing of the Wyldewood Creek development will be provided by extension of sewers from Georgian Bay Hotel with laterals provided to each building.
- Potable water for drinking water and fire protection will be provided via connection to the existing 300 mm diameter watermain within the Cranberry Trail ROW with services to each building and hydrants located throughout the site.
- Backflow prevention is provided at the connection to the Georgian Bay Hotel's private watermain.
- Utilities for site servicing are available and will be extended to the subject development.
- Stormwater management objectives for water quality control have been addressed in the design of the Wyldewood Creek development.
- The proposed stormwater filter units specified in this report will provide water quality controls in accordance with the MOE Stormwater Management Manual (2003) to meet the Enhanced Level criterion.
- Phosphorous removal is provided via filter units as a "best effort" approach.
- A "best efforts" approach for water balance and erosion control have been implemented.
- Sediment and erosion controls as specified, will be effective in preventing and controlling sediment from migrating into nearby swales, ditches and watercourses.
- External drainage is conveyed through the site via an engineered channel and two concrete box culverts below the private roadway.

Therefore, we recommend approval of the Site Plan Application for the subject lands from the perspective of engineering servicing and stormwater management requirements.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.

Mathew Lemieux, E.I.T.

C.F. CROZIER & ASSOCIATES INC.

Rebecca Alexander, P. Eng.
Project Manager

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APPENDIX A

Sanitary & Potable Water Design Sheets

Sanitary Sewer Design Sheet
Potable Water Demand Calculations
Fire Flow Calculations
Watermain Hydraulic Assessment Report prepared by C3 Water Inc.

WYLDEWOOD CREEK

1535-4897

SANITARY SEWER DESIGN SHEET

CROZIER CONSULTING ENGINEERS

Unit Type	PPU
Single & Semi Detached	
Townhome & Appartment	1.90

Mannings "n":	0.013
Peak Factor (M):	1+(14/4+(P/1000)^0.5)
Residential Avg. Daily/Capita Flow (L/cap.d):	450
Commercial Avg. Daily/Capita Flow (m^3/ha.d):	28
Institutional (Recreation Facility) Avg. Daily/Capita Flow (L/day.person):	40
Infiltration Q (L/ha.s):	0.23

DESIGNED BY:	ML
CHECKED BY:	RA
DATE:	2019.02.30
REVISION NO.:	1
REVISED BY:	IB/ML
DATE:	2021.03.30

CATCHMENT I.D.	FROM MH NO	TO MH NO	AREA (Ha)	TOWNHOME/APARTMENT UNITS	INSTITUTIONAL POP.	TOTAL INST. TRIB. POP.	RESIDENTIAL POP.	TOTAL RES. TRIB. POP.	RESIDENTIAL PEAK FACTOR	RESIDENTIAL AVG. FLOW (l/s)	RESIDENTIAL MAX. FLOW (l/s)	INSTUTIONAL PEAK FACTOR	INSTITUTIONAL AVG. FLOW (l/s)	INSTITUTIONAL MAX. FLOW (l/s)	INFILT. (l/s)	TOTAL INFILT. (l/s)	TOTAL FLOW (l/s)	LENGTH (m)	PIPE DIAM. (mm)	UPPER INV. EL.	LOWER INV. EL.	UPPER OBV. EL.	LOWER OBV. EL.	SLOPE (%)	CAP. (l/s)	CAP. (%)	FULL FLOW VELOCITY (m/s)	GROUND UPPER	GROUND LOWER	COVER UPPER	COVER LOWER
13	SAMH6	SAMH5	0.23	18	0	0	34	34	4.35	0.18	0.77	0.00	0.00	0.00	0.05	0.05	**0.83**	12.3	200	179.56	179.44	179.76	179.64	1.00%	**32.80**	**2.52%**	1.04	182.92	182.77	3.16	3.13
9, 10, 12	SAMH5	SAMH4	0.54	33	0	0	63	97	4.25	0.50	2.14	0.00	0.00	0.00	0.12	0.18	**2.32**	48.8	200	179.36	179.16	179.56	179.36	0.41%	**21.00**	**11.05%**	0.67	182.77	182.39	3.21	3.03
8, 11	SAMH4	SAMH3	0.32	27	0	0	51	148	4.19	0.77	3.24	0.00	0.00	0.00	0.07	0.25	**3.49**	43.7	200	179.12	178.82	179.32	179.02	0.68%	**27.05**	**12.89%**	0.86	182.39	182.31	3.07	3.29
5, 6, 7	SAMH3	SAMH2	0.73	27	14	14	51	200	4.15	1.04	4.31	4.47	0.01	0.03	0.17	0.42	**4.76**	95.4	250	178.63	178.34	178.88	178.59	0.30%	**32.57**	**14.61%**	0.66	182.31	182.29	3.43	3.7
2, 3, 4	SAMH2	SAMH1	0.58	60	0	14	114	314	4.07	1.63	6.65	4.47	0.01	0.03	0.13	0.55	**7.23**	20.2	250	178.29	178.23	178.54	178.48	0.32%	**33.64**	**21.48%**	0.69	182.29	181.75	3.75	3.27
1	SAMH1	Ex. MH #8	0.18	0	0	14	0	314	4.07	1.63	6.65	4.47	0.01	0.03	0.04	0.59	**7.27**	19.1	250	178.18	178.12	178.43	178.37	0.30%	**32.57**	**22.31%**	0.66	181.75	-	3.32	-
*Low Rise Condo Units	Ex. MH #8	Ex. MH #6	0.6			14	32	346	4.05	1.80	7.29	4.47	0.01	0.03	0.14	0.73	**8.05**	75	375	-	-	-	-	0.32%	**99.18**	**8.12%**	0.90	-	-	-	-
*Administration Buildings	Ex. MH #10	Ex. MH #9	0.32			0	45	45	4.32	0.23	1.01	4.50	0.00	0.00	0.07	0.07	**1.09**	76	200	-	-	-	-	0.40%	**20.74**	**5.24%**	0.66	-	-	-	-
*Low Rise Condo Units	Ex. MH #9	Ex. MH #7	0.11			0	24	69	4.28	0.36	1.54	4.50	0.00	0.00	0.03	0.10	**1.64**	25	200	-	-	-	-	0.40%	**20.74**	**7.90%**	0.66	-	-	-	-
*Low Rise Condo Units	Ex. MH #7	Ex. MH #6	0.28			0	24	93	4.25	0.48	2.06	4.50	0.00	0.00	0.06	0.16	**2.22**	35	375	-	-	-	-	1.28%	**198.36**	**1.12%**	1.80	-	-	-	-
*Club House & Condo Units	Ex. MH #6	Ex. MH #5	0.44			14	16	455	4.00	2.37	9.46	4.47	0.01	0.03	0.10	1.00	**10.48**	55	375	-	-	-	-	0.24%	**85.89**	**12.20%**	0.78	-	-	-	-
*Low Rise Condo Units	Ex. MH #5	Ex. MH #4	0.47			14	114	569	3.94	2.96	11.68	4.47	0.01	0.03	0.11	1.10	**12.81**	59	375	-	-	-	-	0.14%	**65.60**	**19.53%**	**0.59**	-	-	-	-
*Low Rise Condo Units	Ex. MH #4	Ex. MH #3	0.69			14	48	617	3.93	3.21	12.61	4.47	0.01	0.03	0.16	1.26	**13.90**	86.5	375	-	-	-	-	0.20%	**78.41**	**17.72%**	0.71	-	-	-	-
*Hotel & Condo Units	Ex. MH #3	Ex. MH #2	0.75			14	389	1006	3.80	5.24	19.89	4.47	0.01	0.03	0.17	1.44	**21.36**	94.5	375	-	-	-	-	0.29%	**94.42**	**22.62%**	0.85	-	-	-	-
*To Hwy 26	Ex. MH #2	Ex. MH #1	0.72			14	24	1030	3.79	5.36	20.33	4.47	0.01	0.03	0.17	1.60	**21.96**	90	375	-	-	-	-	0.27%	**91.10**	**24.11%**	0.82	-	-	-	-
To Hwy 26	Ex. MH #1	Ex. MH #1A	0			14	0	1030	3.79	5.36	20.33	4.47	0.01	0.03	0.00	1.60	**21.96**	6.5	375	-	-	-	-	0.46%	**118.91**	**18.47%**	1.08	-	-	-	-

* Existing sanitary design values from Servicing Report: Georgian Manor Resort and Country Club (July 2003) prepared by Henderson, Paddon & associates Ltd.

CROZIER
CONSULTING ENGINEERS

File: 1535-4897
Date: March 30, 2021
By: ML
Updated by: IB

Wyldewood Creek - Future Development Water Demand

Southern Sector	2.56	ha
Total Area	2.56	ha
Number of Residential Units and Land Usage		
1) Apartment	**165**	**Units**
2) Recreational	**1**	**Facility**
Person Per Residential Unit		
1) High Density (per Town Engineering Comments on ZBA/OPA Application)	1.90	persons/unit
2) Recreational	14	person/facility
Total Residential Population	314	Persons
Total Recreational Complex Population	14	Persons
Recreational Equivalent Population	1	Persons
Domestic Water Design Flows		
Residential (Per Collingwood Engineering Standards, 2007)	450	L/C-day
Recreational (Per OBC Table 8.2.1.3.B.)	40	L/person-day
Total Domestic Water Design Flows		
Average Residential Daily Flow	1.64	L/sec
Average Recreational Daily Flow	0.01	L/sec
Total Daily Flow	1.64	L/sec
Max Day Peak Factor (Per Collingwood Engineering Standards, 2007)	2.00	
Max Day Demand Flow	**3.28**	L/sec
Peak Hour Factor (Per Collingwood Engineering Standards, 2007)	4.50	
Peak Hour Flow	**7.39**	L/sec

CROZIER & ASSOCIATES
Consulting Engineers

Project.: Wyldewood Creek
Project No.: 1535-4897
File.: Fire Flow Calcs
Date.: April 8, 2021

Fire Protection Volume Calculation Summary
Wyldewood Creek

WATER SUPPLY FOR PUBLIC FIRE PROTECTION (1999)
FIRE UNDERWRITER'S SURVEY

Unit Block #	Total Floor Area (m²)	Flow (L/min)	Reduction (L/min)	Exposure Surcharge (L/min)	Required Flow (L/min)	Required Storage Volume (m³)	Required Flow (L/s)
Building A, 3 Story Unit	1,398	12,000	-1,800	4,590	15,000	2,700	250.0
Building B, 3 Story Unit	1,167	11,000	-1,650	4,208	14,000	2,520	233.3
Building C, 3 Story Unit	1,161	11,000	-1,650	4,675	14,000	2,520	233.3
Building D, 3 Story Unit	1,128	11,000	-1,650	4,675	14,000	2,520	233.3
Building E, 3 Story Unit	1,182	11,000	-1,650	4,675	14,000	2,520	233.3
Building F, 3 Story Unit	1,668	13,000	-1,950	3,868	15,000	2,700	250.0

OFFICE OF FIRE MARSHAL
Part 3 of OBC

Unit Block #		K	Volume (m³)	S Tot	Required Flow (L/min)	Required Storage (OBC) (m³)	Required Flow (L/s)
Building A, 3 Story Unit		23	6,571	1.50	6,300	227	105.0
Building B, 3 Story Unit		23	5,485	1.50	5,400	189	90.0
Building C, 3 Story Unit		23	5,457	1.50	5,400	188	90.0
Building D, 3 Story Unit		23	5,302	1.00	3,600	122	60.0
Building E, 3 Story Unit		23	5,555	1.50	6,300	192	105.0
Building F, 3 Story Unit		23	7,840	1.50	9,000	270	150.0

SUMMARY:

1) Fire Flow required per FUS 250 L/s
2) Fire flow required per Fire Marshal (OBC) 150 L/s

Wyldewood Creek Building A
Fire Protection Volume Calculation
CFCA File: 1535-4897

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			Wood Frame
3	number of floors		1.5 C
466	sq.m. floor area	-> Fire Break	
1398	sq.m. total floor area		

Therefore F= 12,000 L/min (rounded to nearest 1000 L/min)
("Value obtained in No. 1")

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	-15% reduction

-1,800 L/min reduction

"Value obtained in No. 2" 10,200

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 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**		
North	Adjacent Dwelling	0	25%	2,550
South	Adjacent Dwelling	22	10%	1,020
East	Adjacent Dwelling	29	10%	1,020
West	Adjacent Dwelling	>45m	0%	0
				4,590 L/min Surcharge

Determine Required Fire Flow

No. 2	10,200		
No. 3	0	reduction	
No. 4	4,590	surcharge	
Required Flow:	**14,790**	**L/min**	
Rounded to nearest 1000l/min:	**15,000**	**L/min**	or 250.0 L/s
			3,963 USGPM

Determine Required Fire Storage Volume

Flow from above	15,000	L/min	
Required duration	3.00	hours	
Therefore:	2,700,000	Litres or	
	2,700	cu.m.	is the required 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

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

$$Q = KVS_{TOT}$$

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

K =	23	Group C building with combustible construction (Table 1)
V =	6571	Total building volume in cubic meters (14.1m tall)
S_{TOT} =	1.5	S_{TOT} Need Not Exceed 2.0

Q = 226686 L

Based on ranges listed in Table 2, the required minimum water supply flow rate is **6300 L/min**

105 L/s

Wyldewood Creek Building B
Fire Protection Volume Calculation
CFCA File: 1535-4897

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			Wood Frame
3	number of floors		1.5 C
389	sq.m. floor area	-> Fire Break	
1167	sq.m. total floor area		

Therefore F= 11,000 L/min (rounded to nearest 1000 L/min)
("Value obtained in No. 1")

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	-15% reduction

-1,650 L/min reduction

"Value obtained in No. 2" 9,350

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 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**		
North	Adjacent Dwelling	0	25%	2,338
South	Adjacent Dwelling	21	10%	935
East	Adjacent Dwelling	>45m	0%	0
West	Adjacent Dwelling	28	10%	935
				4,208 L/min Surcharge

Determine Required Fire Flow

No. 2	9,350		
No. 3	0	reduction	
No. 4	4,208	surcharge	
Required Flow:	**13,558**	**L/min**	
Rounded to nearest 1000l/min:	**14,000**	**L/min**	or 233.3 L/s, 3,698 USGPM

Determine Required Fire Storage Volume

Flow from above 14,000 L/min

Required duration 3.00 hours

Therefore: 2,520,000 Litres or
2,520 cu.m. is the required 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

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

$$Q = KVS_{TOT}$$

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

K =	23	Group C building with combustible construction (Table 1)
V =	5485	Total building volume in cubic meters (14.1m tall)
S_{TOT} =	1.5	S_{TOT} Need Not Exceed 2.0

Q = 189229 L

Based on ranges listed in Table 2, the required minimum water supply flow rate is **5400 L/min**

90 L/s

Wyldewood Creek Building C
Fire Protection Volume Calculation
CFCA File: 1535-4897

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			Wood Frame
3	number of floors		1.5 C
387	sq.m. floor area	-> Fire Break	
1161	sq.m. total floor area		

Therefore F= 11,000 L/min (rounded to nearest 1000 L/min)
("Value obtained in No. 1")

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	-15% reduction

-1,650 L/min reduction

"Value obtained in No. 2" 9,350

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 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**		
North	Adjacent Dwelling	0	25%	2,338
South	Adjacent Dwelling	13	15%	1,403
East	Adjacent Dwelling	28	10%	935
West	Adjacent Dwelling	>45	0%	0
				4,675 L/min Surcharge

Determine Required Fire Flow

No. 2	9,350			
No. 3	0	reduction		
No. 4	4,675	surcharge		
Required Flow:	**14,025**	**L/min**		
Rounded to nearest 1000l/min:	**14,000**	**L/min**	or	233.3 L/s
				3,698 USGPM

Determine Required Fire Storage Volume

Flow from above 14,000 L/min

Required duration 3.00 hours

Therefore: 2,520,000 Litres or
2,520 cu.m. is the required 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

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

$$Q = KVS_{TOT}$$

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

K =	23	Group C building with combustible construction (Table 1)
V =	5457	Total building volume in cubic meters (14.1m tall)
S_{TOT} =	1.5	S_{TOT} Need Not Exceed 2.0

Q = 188256 L

Based on ranges listed in Table 2, the required minimum water supply flow rate is **5400 L/min**

90 L/s

Wyldewood Creek Building D
Fire Protection Volume Calculation
CFCA File: 1535-4897

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			Wood Frame
3	number of floors		1.5 C
376	sq.m. floor area	-> Fire Break	
1128	sq.m. total floor area		

Therefore F= 11,000 L/min (rounded to nearest 1000 L/min)
("Value obtained in No. 1")

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	-15% reduction

-1,650 L/min reduction

"Value obtained in No. 2" 9,350

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 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**		
North	Adjacent Dwelling	27	10%	935
South	Adjacent Dwelling	>45m	0%	0
East	Adjacent Dwelling	13	15%	1,403
West	Adjacent Dwelling	0	25%	2,338
				4,675 L/min Surcharge

Determine Required Fire Flow

No. 2	9,350			
No. 3	0	reduction		
No. 4	4,675	surcharge		
Required Flow:	**14,025**	**L/min**		
Rounded to nearest 1000l/min:	**14,000**	**L/min**	or	233.3 L/s
				3,698 USGPM

Determine Required Fire Storage Volume

Flow from above 14,000 L/min

Required duration 3.00 hours

Therefore: 2,520,000 Litres or
2,520 cu.m. is the required 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

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

$$Q = KVS_{TOT}$$

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

K =	23	Group C building with combustible construction (Table 1)
V =	5302	Total building volume in cubic meters (14.1m tall)
S_{TOT} =	1	S_{TOT} Need Not Exceed 2.0

Q = 121937 L

Based on ranges listed in Table 2, the required minimum water supply flow rate is **3600 L/min**

60 L/s

Wyldewood Creek Building E
Fire Protection Volume Calculation
CFCA File: 1535-4897

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			Wood Frame
3	number of floors		1.5 C
394	sq.m. floor area	-> Fire Break	
1182	sq.m. total floor area		

Therefore F= 11,000 L/min (rounded to nearest 1000 L/min)
("Value obtained in No. 1")

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	-15% reduction

-1,650 L/min reduction

"Value obtained in No. 2" 9,350

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 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**		
North	Adjacent Dwelling	13	15%	1,403
South	Adjacent Dwelling	0	25%	2,338
East	Adjacent Dwelling	27	10%	935
West	Adjacent Dwelling	>45	0%	0
				4,675 L/min Surcharge

Determine Required Fire Flow

No. 2	9,350			
No. 3	0	reduction		
No. 4	4,675	surcharge		
Required Flow:	**14,025**	**L/min**		
Rounded to nearest 1000l/min:	**14,000**	**L/min**	or	233.3 L/s
				3,698 USGPM

Determine Required Fire Storage Volume

Flow from above 14,000 L/min

Required duration 3.00 hours

Therefore: 2,520,000 Litres or
2,520 cu.m. is the required 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

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

$$Q = KVS_{TOT}$$

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

K =	23	Group C building with combustible construction (Table 1)
V =	5555	Total building volume in cubic meters (14.1m tall)
S_{TOT} =	1.5	S_{TOT} Need Not Exceed 2.0

Q = 191661 L

Based on ranges listed in Table 2, the required minimum water supply flow rate is **6300 L/min**

105 L/s

Wyldewood Creek Building F
Fire Protection Volume Calculation
CFCA File: 1535-4897

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			Wood Frame
3	number of floors		1.5 C
556	sq.m. floor area	-> Fire Break	
1668	sq.m. total floor area		

Therefore F= 13,000 L/min (rounded to nearest 1000 L/min)
("Value obtained in No. 1")

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	-15% reduction

-1,950 L/min reduction

"Value obtained in No. 2" 11,050

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 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**		
North	Adjacent Dwelling	>45	0%	0
South	Adjacent Dwelling	0	25%	2,763
East	Adjacent Dwelling	>45	0%	0
West	Adjacent Dwelling	27	10%	1,105
				3,868 L/min Surcharge

Determine Required Fire Flow

No. 2	11,050			
No. 3	0	reduction		
No. 4	3,868	surcharge		
Required Flow:	**14,918**	**L/min**		
Rounded to nearest 1000l/min:	**15,000**	**L/min**	or	250.0 L/s
				3,963 USGPM

Determine Required Fire Storage Volume

Flow from above 15,000 L/min

Required duration 3.00 hours

Therefore: 2,700,000 Litres or
2,700 cu.m. is the required 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

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

$$Q = KVS_{TOT}$$

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

K =	23	Group C building with combustible construction (Table 1)
V =	7840	Total building volume in cubic meters (14.1m tall)
S_{TOT} =	1.5	S_{TOT} Need Not Exceed 2.0

Q = 270466 L

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

150 L/s

TECHNICAL MEMORANDUM

To:	**Peggy Slama, P.Eng.**	Company:	**Town of Collingwood**
	Manager, Environmental Services		
From:	**Sam Ziemann, P.Eng.**	Our File:	**75-41-171235**
Cc:		Date:	**May 24, 2019**
Subject:	**Watermain Hydraulic Assessment of the Proposed Wyldewood Creek Development**		

TOWN OF COLLINGWOOD

Watermain Hydraulic Assessment of the Proposed Wyldewood Creek Development

C3 WATER INC.

May 24, 2019

VERSION	DATE	DESCRIPTION OF REVISIONS	REVISED BY	REVIEWED BY
1	April 23, 2019	Draft 1	Michelle Scott	Emma Thompson Sam Ziemann
2	May 24, 2019	Final	Michelle Scott	Emma Thompson Sam Ziemann

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List of Appendices

1.0 INTRODUCTION AND BACKGROUND

C3 Water (C3W) has been asked to conduct a watermain hydraulic assessment of the proposed Wyldewood Creek development and its impacts on the existing distribution system. Figure 1-1 below provides an overview of the proposed development area. A detailed site plan with proposed watermains, roads and lot types developed by Crozier Consulting Engineers (Crozier) is included in Appendix A.

The proposed development is located in pressure Zone 1 in the south block of the Georgian Bay Hotel lands at 10 Vacation Inn Drive encompassing an area of approximately 2.56 ha. The development design includes six apartment buildings consisting of a total of 168 residential units as well as a recreational facility. Existing water distribution infrastructure near the development site consists of:

- 300 mm trunk watermain on Cranberry Trail
- 200 mm diameter water main on Trafalgar Road

The Georgian Bay Hotel (Hotel) is an existing development located on Vacation Inn Drive serviced by a private 200 mm watermain on Trafalgar Road which connects to an existing 300 mm watermain on Highway 26. To the south of the proposed development is an existing 300 mm watermain on the unopened extension of Cranberry Trail. There is an existing golf course located between the proposed development and the Cranberry Trail watermain. The existing Hotel watermains are not maintained by the Town, as such, water from the Hotel watermains into the public distribution system may need to be avoided. Therefore, four scenarios were assessed.

1. **Scenario 1:** connect the proposed development to the Cranberry Trail watermain to the south and have the Wyldewood Creek development watermain dead-end at the north end of the proposed development.
2. **Scenario 2:** connect the proposed development to both the Trafalgar Road watermain to the north and the Cranberry Trail watermain to the south to allow for flow into the proposed development from both directions (looped).
3. **Scenario 3:** connect the proposed development to both the Trafalgar Road watermain to the north and the Cranberry Trail watermain to the south with a backflow preventer (BFP) north of the development. The purpose of the BFP is to allow water to flow north out of the development to avoid stagnant conditions while also preventing water from the Hotel from flowing into the proposed development.
4. **Scenario 4:** same as scenario 3 with an additional BFP at the connection between Highway 26 and the Hotel private watermains. This would isolate the private watermains from the public distribution system.

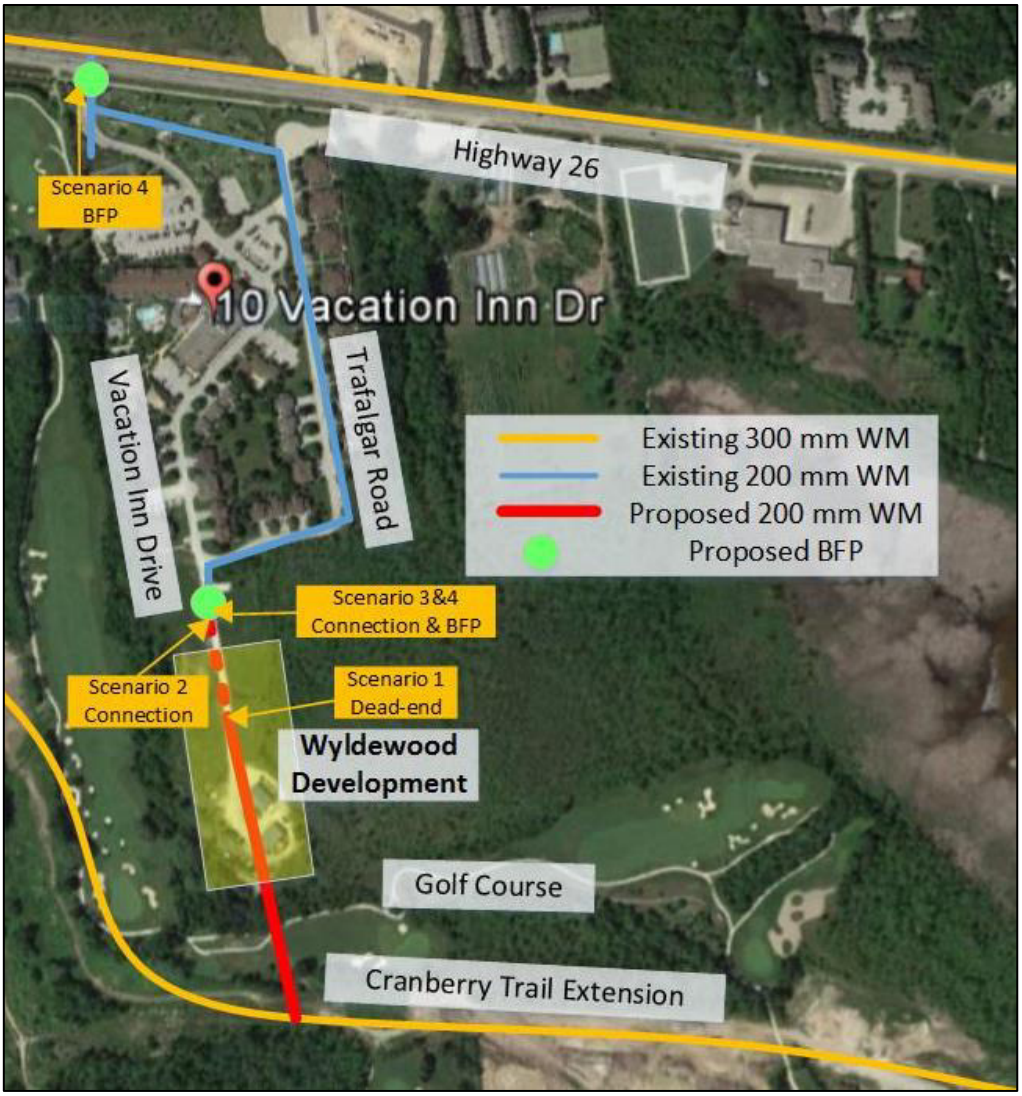


Figure 1-1: Proposed Development Area Site Overview (NTS)

1.1 Design Standards

The Town of Collingwood Development Standards provide design criteria for assessing the impact of proposed developments. The Town Standards recommend that watermains be designed to provide maximum day demands plus fire flows according to the land use type. The Town Standards also outline minimum pressure requirements, as shown in Table 1.2 below.

Table 1.2 Town of Collingwood Design Standards

	Minimum	Preferred
Fire Flow Requirements		
Single-Family Residential	57 L/s	76 L/s
Industrial/Commercial Subdivisions	136 L/s	154 L/s
Downtown Commercial	136 L/s	189 L/s
Pressure Requirements		
Maximum Day Demands + Fire Flows	20 psi	
Standard Operating Conditions	40 psi (Peak Hour)	50 - 80 psi

1.2 Demand and Fire Flow Calculations

Crozier completed calculations for the anticipated water demands for the development. The calculations are based on recommended values from the Ontario Ministry of the Environment and Climate Change (MOECC) Design Guidelines for Drinking Water Systems (2008) and the Town Standards. The Max Day Demands (MDD) and Peak Hour Demands (PHD) were calculated based on the average flows, and recommended peaking factors of 2.0 for MDD and 4.5 for PHD as per MOECC Design Guidelines for Drinking Water Systems 3.4.5.1 and Town Standards. There is a proposed future expansion of the Georgian Bay Hotel which will directly influence the available flows to the proposed Wyldewood development. Domestic demands to the Hotel were also calculated by Crozier and were added to the model. The domestic demands for the proposed development and Hotel expansion are summarized in Table 1.3 below and provided in Appendix B.

Table 1.3 Demand Calculated Values

Development	Wyldewood Creek		Georgian Bay Hotel Expansion	
Type of Units	Apartment	Recreational Facility	Apartment	Hotel
Number of Units	168	1	244	100
Average Day Demand (ADD)	1.66 L/s	0.01 L/s	2.93 L/s	
Maximum Day Demand (MDD)	3.35 L/s		5.86 L/s	
Peak Hour Demand (PHD)	7.53 L/s		3.19 L/s	

For modelling purposes, it was assumed that the Blue Fairways development Phase 1 and 2, located on Cranberry Trail east of the proposed Wyldewood development, is built and has active demands of a total of 1.78 L/s ADD and 3.16 L/s MDD.

Fire Flow calculations were also completed by Crozier using the Fire Underwriters Survey (FUS) Method and the Ontario Building Code (OBC) for buildings 1 and 4. The calculated fire flows for buildings 1 and 4 in

the proposed Wyldewood Creek development are summarized in Table 1.4 below and provided in Appendix B. For the purpose of this report, a required fire flow of 283 L/s was used.

Table 1.4 Fire Flow Calculated Values

Required Fire Flow	FUS	OBC
Building 1	283 L/s	150 L/s
Building 4	233 L/s	150 L/s

2.0 MODELLING RESULTS

The proposed development area was assessed using the model's existing (2016) and anticipated future (2020) Average Day Demand (ADD) and Maximum Day Demand (MDD). In the future scenario, the Carmichael BPS is expected to be upgraded with variable frequency drive (VFD) on the pumps and a new inlet configuration that allows water to be pumped to the Zone 1 West under normal conditions, and to the tower as needed. The valve on Cranberry Trail is currently open but would be set to sustain pressure to the west.

A new 200 mm watermain was added to the model to represent the proposed Wyldewood Creek development and demands were applied to new nodes. The model also included the proposed watermains and demands for Blue Fairway Phase 1 and 2 developments as well as the additional expected demands for the Georgian Bay Hotel expansion since these are expected to be completed in the near future.

Under each demand scenario, the development was modelled as:

1. A dead-end pipe connected only at Cranberry Trail.
2. A looped system with a connection at the Hotel
3. A looped system with a connection at Cranberry Trail and the Hotel with BFP
4. Scenario 3 with an additional BFP at the Highway 26 watermain connection

2.1 Existing Conditions

The area surrounding the proposed development was assessed excluding the Wydlewood Creek development pipes and demands to determine the existing conditions. Under current ADD conditions the minimum pressures in the surrounding area range from 40 – 60 psi. Under MDD conditions, the Georgian Bay hotel area had minimum pressures ranging from 40 – 60 psi while some developments connected to Cranberry Trail were found to be below 40 psi. Figures 2-1 and 2-2 show the existing minimum pressures under ADD and MDD, respectively.

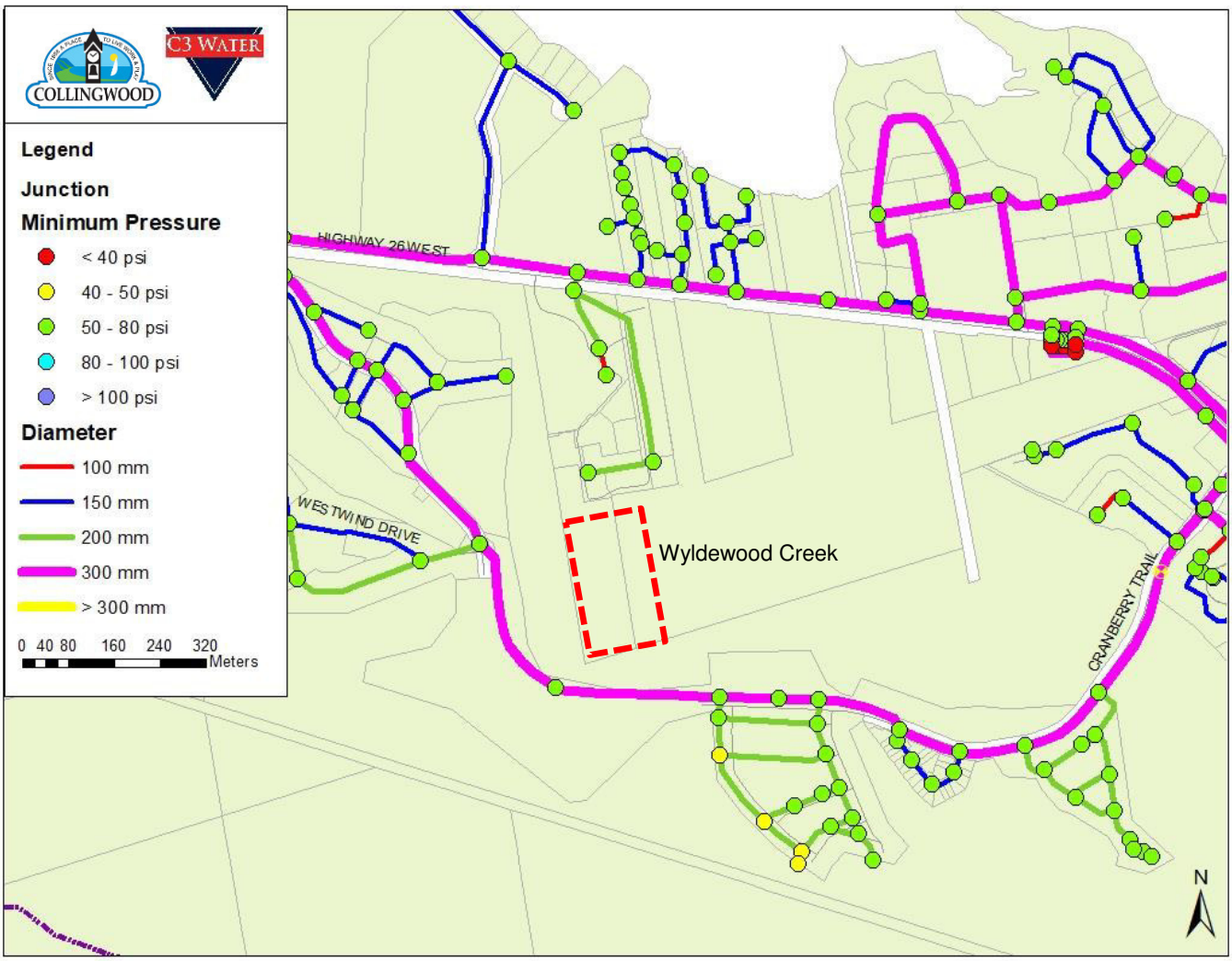


Figure 2-1 Existing Conditions ADD – Minimum Pressure – Excluding Wyldewood Creek

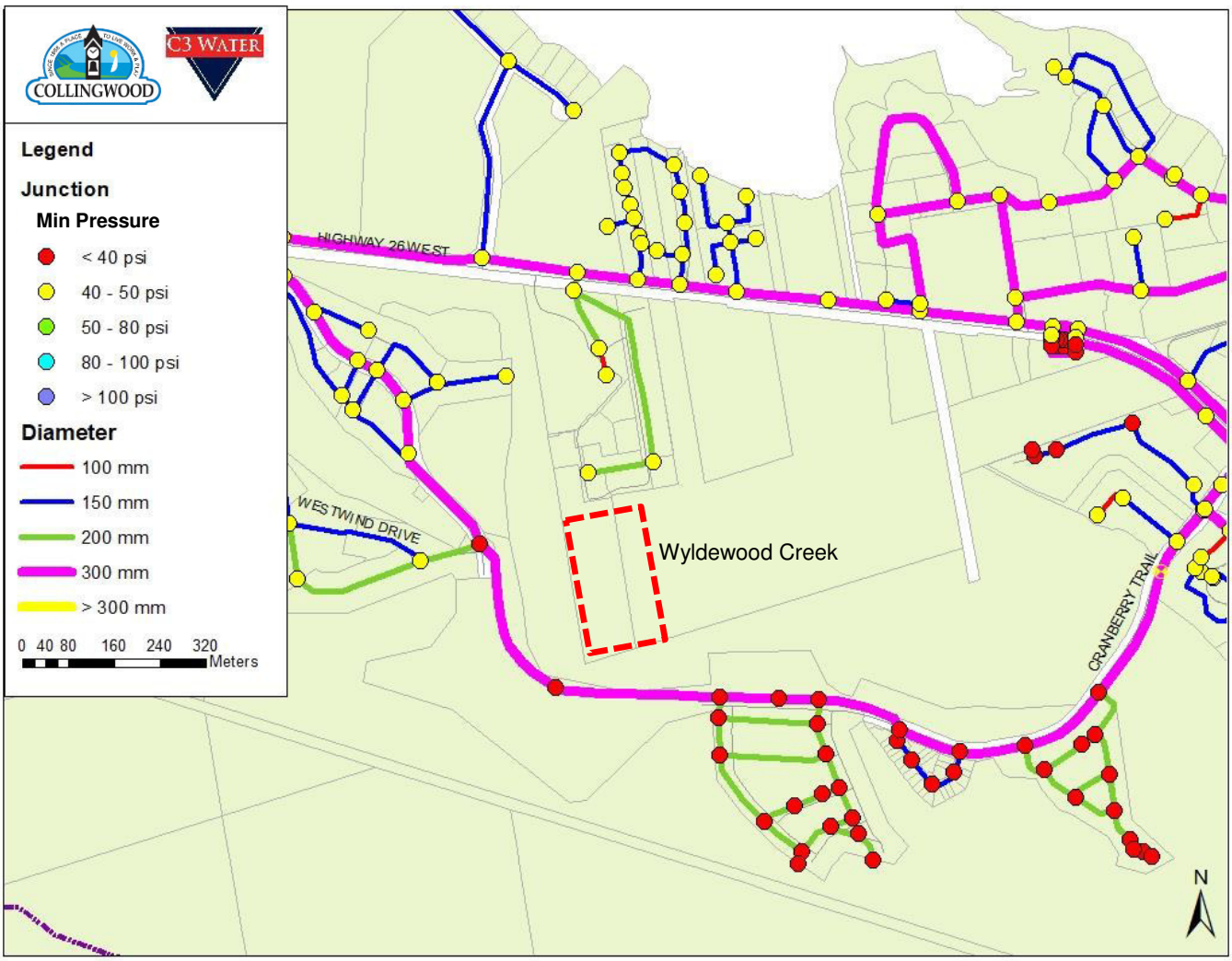


Figure 2-2 Existing Conditions MDD – Minimum Pressure – Excluding Wyldewood Creek

2.2 Development Conditions - Pressures

The range of ground elevations in the Wyldewood Creek development is approximately 181 - 182 mASL, which is within the preferred Zone 1 elevations of 171 – 192 m. Based on the Zone 1 hydraulic grade line (HGL) of approximately 227m, it is expected that static pressures in the development would be 45 – 46 m of head, or 64 - 65 psi.

The pressures in the development were tested in Zone 1 under ADD and MDD scenarios under current conditions, as well as MDD under expected future conditions. The ADD existing pressures were found to be 52 – 73 psi, which is within Town's preferred operating criteria of 50 – 80 psi. The minimum pressure during MDD was found to be 37 psi under existing conditions which is below the Town's minimum pressure standard of 40 psi. This low-pressure spike is a result of two conditions; a peak in demand at night potentially created by lawn watering and filling of the Carmichael reservoir. The Town is looking at solutions to reduce peak demands and modify operations at Carmichael under future conditions. Under future MDD conditions, the development pressures range from 61 – 63 psi which is within the Town's preferred operating range.

For each scenario, it was found that there was very little difference in pressure results between the four watermain configuration scenarios. The pressure results differed by less than 0.5 psi between each of the scenarios. Table 2.1 below summarizes the minimum, maximum and average pressures in the proposed development under the scenarios discussed. The minimum pressures under each scenario are shown in Figures 2-3 to 2-5.

Table 2.1 Pressure Results

Pressure (psi)	Existing ADD	Existing MDD	Future MDD
Minimum	53	37	61
Maximum	62	72	64
Average	58	54	62

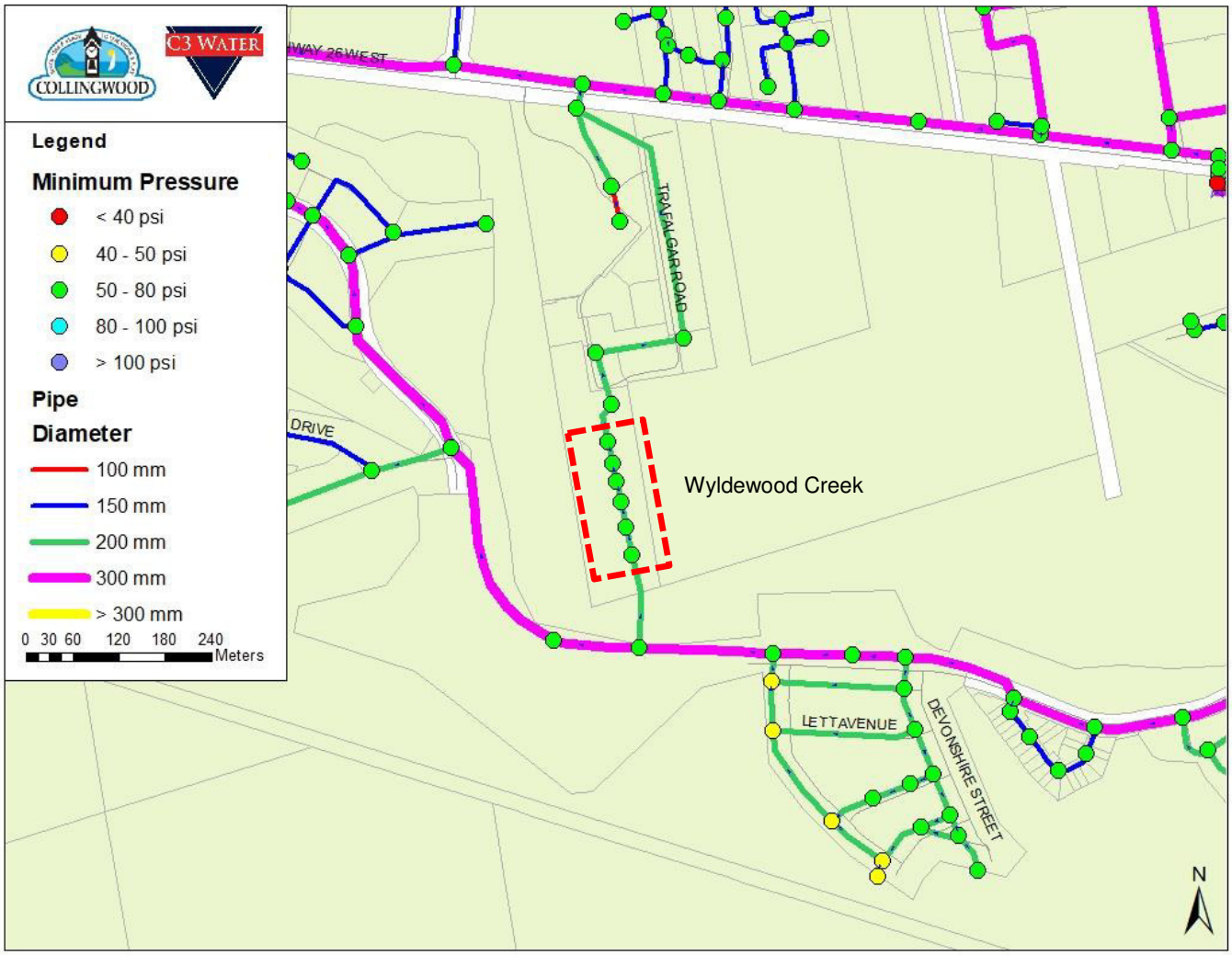


Figure 2-3 Minimum Pressure – Existing Conditions ADD

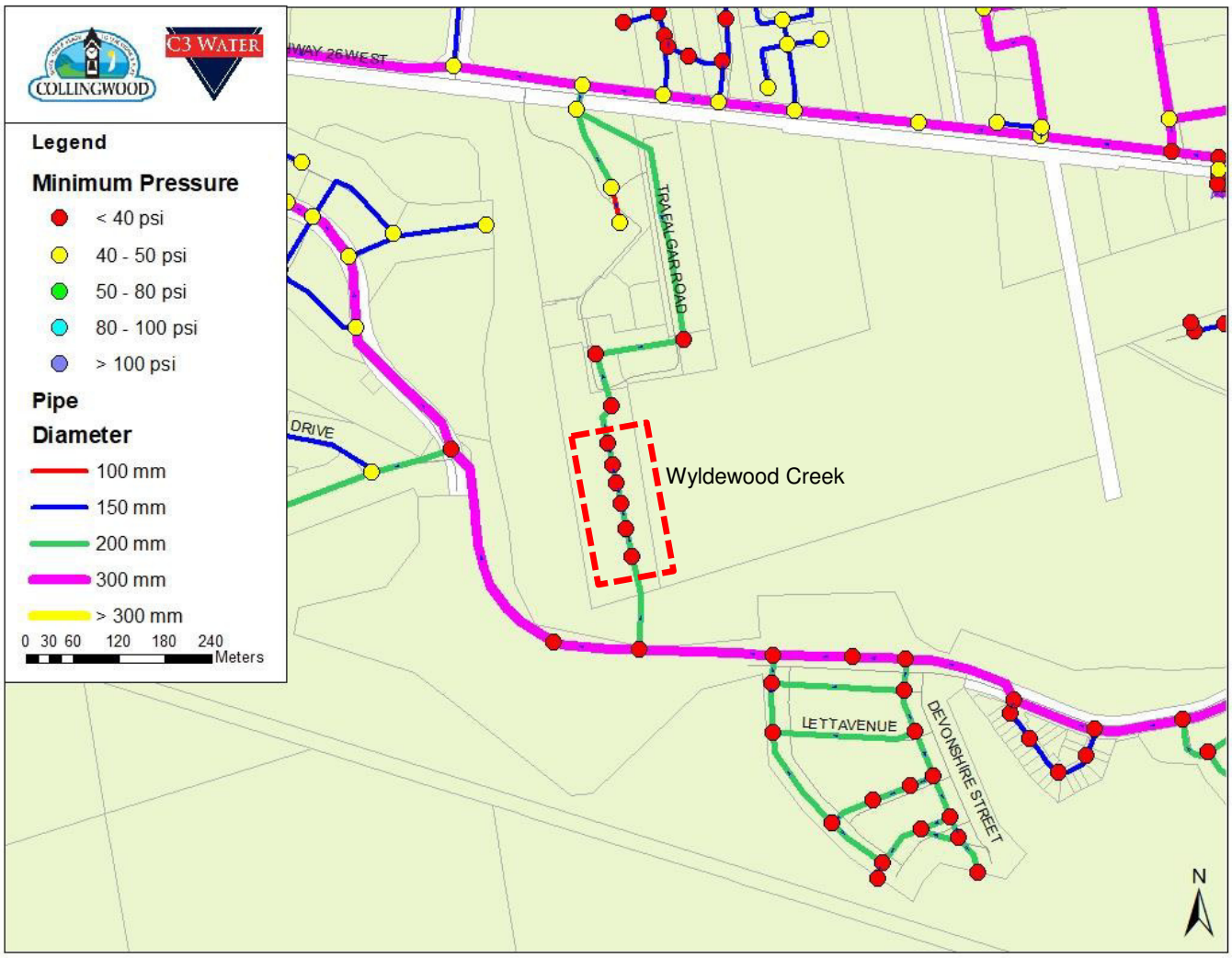


Figure 2-4 Minimum Pressure – Existing Conditions MDD

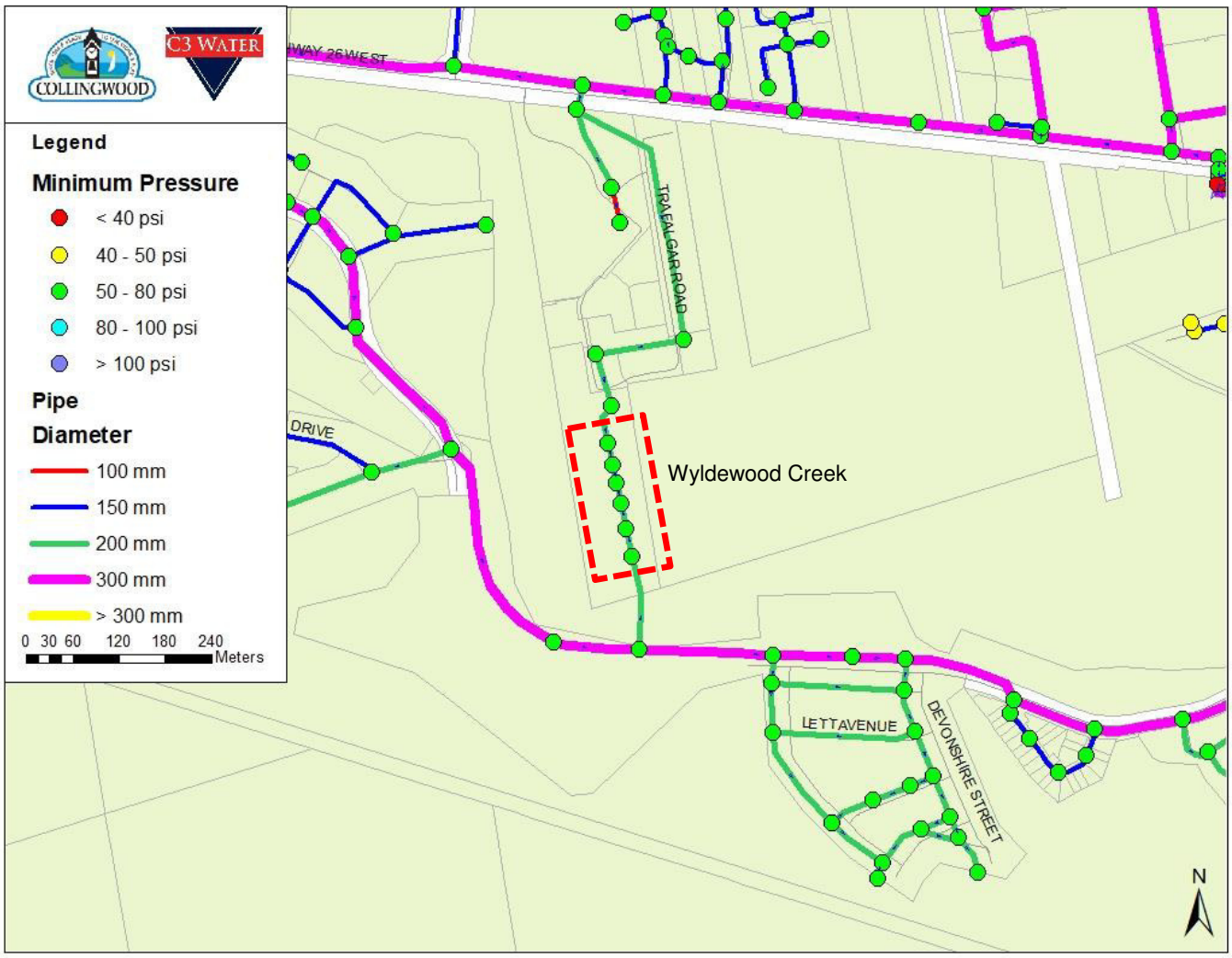


Figure 2-5 Minimum Pressure – Future Conditions MDD

2.3 Development Conditions - Fire Flows

Modelling was conducted to determine the available fire flows at a residual pressure of 20 psi for a 2-hour fire flow scenario at 12:00pm under MDD conditions. Results from the fire flow modelling are provided in Table 2.2.

The fire flow results predicted by the model are representative of the amount of water available in a watermain and not the extent of flow available from a hydrant. Several hydrants may need to be operated to provide the desired fire flows. For modelling purposes, it was assumed that fires would not occur at multiple locations simultaneously, and therefore the results demonstrate the available flow at each location.

There was found to be no change in available fire flows between scenarios 1, 3 and 4 given that under each of these scenarios, water is flowing into the development only via the Cranberry Trail connection. Under scenario 2, where there is a looped system with no BFPs, water flows into the development from both Cranberry Trail and Highway 26 through the Hotel private watermains. Therefore, the looped system under scenario 2 resulted in higher available fire flows within the proposed development.

Under existing MDD conditions the available fire flow ranged from 152 - 162 L/s for a looped system and 62 - 69 L/s for a dead-end or BFP at the Hotel connection. Under future MDD conditions the available fire flow

was found to be 114 - 116 L/s for a looped system and 78 - 87 L/s for a dead-end. The reduced fire flow for the looped option in the future scenario compared to existing is likely due to proposed changes at the Carmichael BPS, where more flow is available from Highway 26 but the valve on Cranberry Trail limits flow in order to maintain upstream pressure. The available flows do not meet the calculated FUS fire flow requirement of 283 L/s under existing or future conditions.

Table 2.2 Fire Flow Model Results MDD Scenario

Flow (L/s)	Existing MDD		Future MDD	
Scenario	**1, 3 & 4**	**2**	**1, 3 & 4**	**2**
Minimum	62	152	78	114
Maximum	69	162	87	116

Figures 2-6 and 2-7 below show the available fire flows under existing conditions for the dead end or BFP watermain configurations (scenarios 1, 3 and 4) and looped system (scenario 2), respectively.

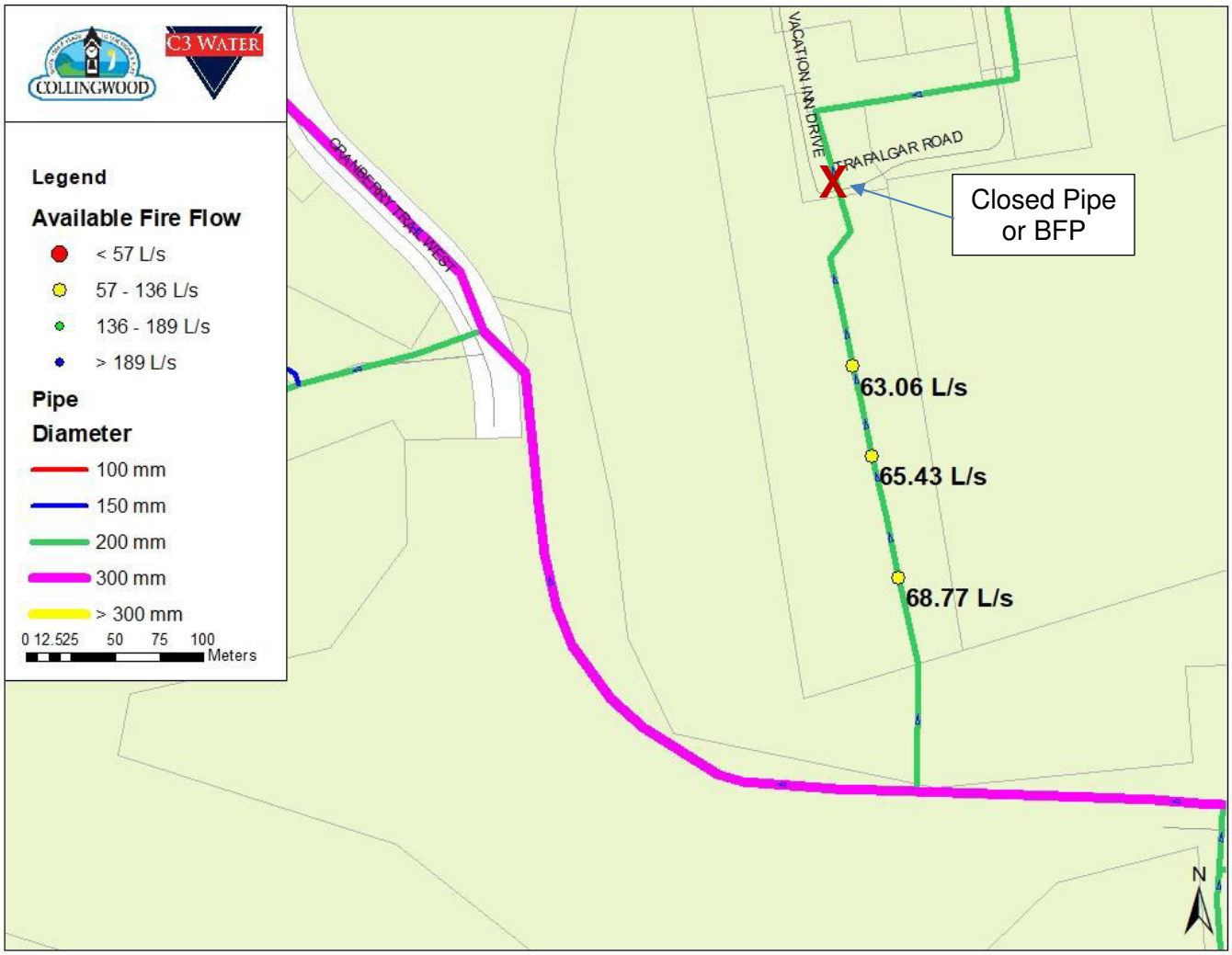


Figure 2-6 Available Fire Flow – MDD Existing Conditions – Dead end or BFP System (Scenarios 1, 3 & 4)

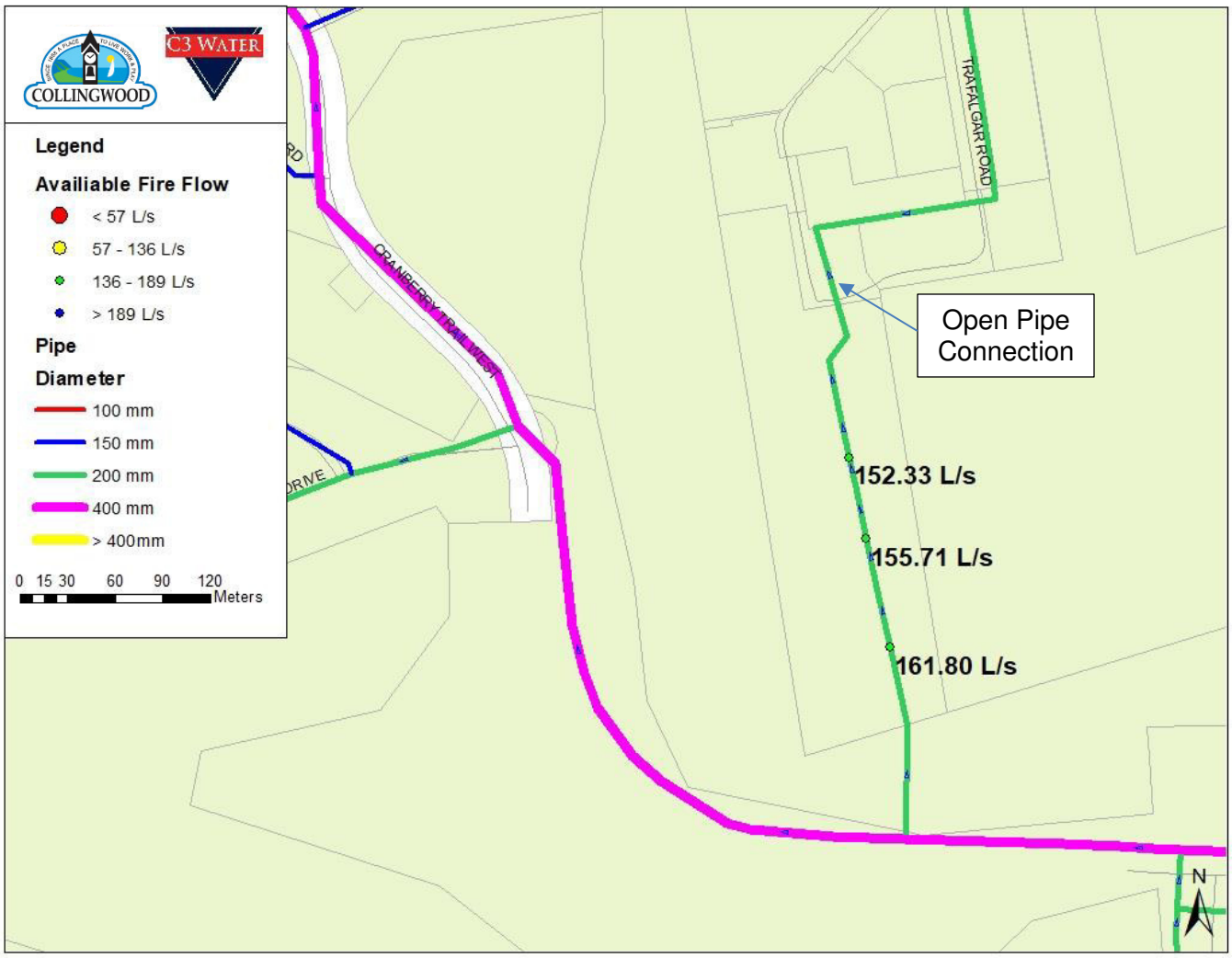
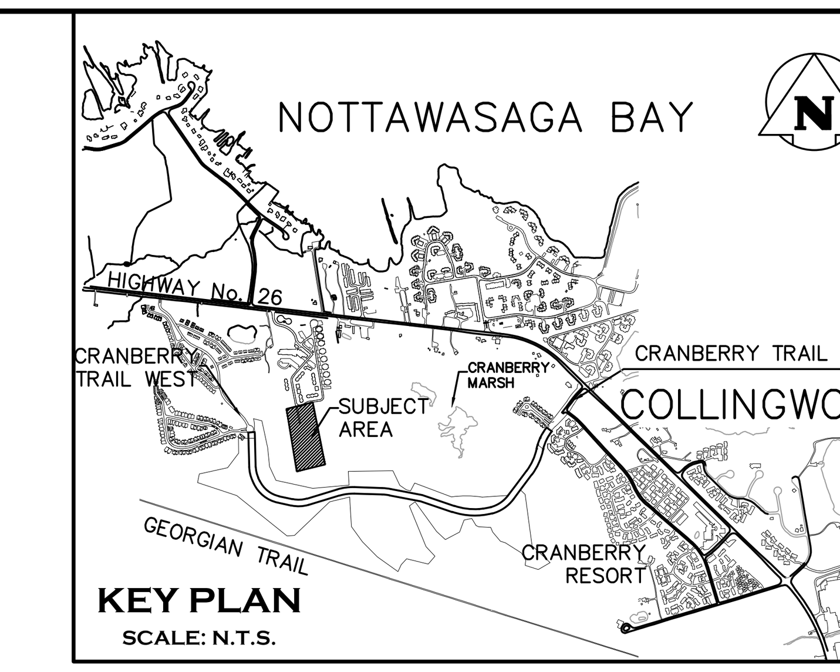


Figure 2-7 Available Fire Flow – MDD Existing Conditions – Looped System (Scenario 2)

3.0 SUMMARY AND RECOMMENDATIONS

1. The Wyldewood Creek Development is located in an area of pressure Zone 1 that currently experiences pressures below the Town's preferred standard under MDD conditions according to model results. Under current conditions, the development ADD pressures range from 53 – 62 psi and 37 – 72 psi under MDD. Under near-future MDD conditions, the pressures are expected to range from 61 – 63 psi. A looped connection had minimal impact on the pressure results compared to the dead-end for BFP option in the development. Although there is little pressure benefit to having a connection between the proposed development and the existing Hotel private watermains, allowing flow into the Hotel watermains is beneficial for water quality purposes as a dead-end pipe may result in stagnant conditions.
2. The looped connection versus a dead-end or BFP watermain configuration had an impact on available fire flows. Under existing MDD conditions, the available fire flows in the development ranged from 152 – 162 L/s for a looped system (scenario 2) and reached only 62 – 69 L/s for a dead-end or BFP system (scenarios 1, 3 and 4). Similarly, under future conditions, the available fire flows for a looped system ranged from 114-115 L/s for a looped system and 78 – 87 L/s for a dead-end.
3. The calculated FUS fire flow of 283 L/s for the development cannot be met by the proposed 200 mm watermain under existing of future MDD conditions. The available fire flow with a looped connection under existing conditions is expected to meet the OBC requirement of 150 L/s and the Town's minimum Industrial / Commercial standard of 136 L/s and Single Family Residential standard of 57 L/s. The pump settings at Carmichael BPS and valve setting on Cranberry Trail impact the available fire flows in the development under future conditions.

APPENDIX A - *Site Layout*



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2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.
3. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT.
4. DO NOT SCALE THE DRAWINGS.
5. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

BENCHMARKS

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE RELATED TO TOWN OF COLLINGWOOD BENCH MARK NO. 00172U311 HAVING AN ELEVATION OF 181.032 METRES.

TOPOGRAPHIC SURVEY COMPLETED BY KRCMAR SURVEYORS LTD., DATED AUGUST 25, 2018.

Town

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR 1st ENGINEERING SUBMISSION	02/04/2019

Engineer

Engineer

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project

WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

Drawing

GENERAL SITE SERVICING PLAN

CROZIER CONSULTING ENGINEERS

THE HARBOUREDGE BUILDING, 40 HURON STREET, SUITE 301, COLLINGWOOD, ON L9Y 4R3
705 446 3510 T
705 446 3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	L.W.	Design By	L.W.	Project	1535-4897
Check By	K.M.	Check By	R.A.	Scale 1:500	Drawing C101

J:\1500\1535-Brandy Lane Corp\4897-Georgian Bay Hotel South Block\CAD\Civil_Sheets\4897_C101 GEN.dwg, C101, 2/4/2019 12:49:37 PM, lwaters

APPENDIX B – *Demand and Fire Flow Calculations*

CROZIER CONSULTING ENGINEERS

File: 1535-4897
Date: December 17, 2018
By: ML
Updated by: SA

Wyldewood Creek - Future Development Water Demand

Southern Sector	2.43	ha
Total Area	2.43	ha
Number of Residential Units and Land Usage		
1) Apartment	**168**	**Units**
2) Recreational	**1**	**Facility**
Person Per Residential Unit		
1) High Density (per Town Engineering Comments on ZBA/OPA Application)	1.90	persons/unit
2) Recreational	14	person/facility
Total Residential Population	320	Persons
Total Recreational Complex Population	14	Persons
Recreational Equivalent Population	1	Persons
Domestic Water Design Flows		
Residential (Per Collingwood Engineering Standards, 2007)	450	L/C-day
Recreational (Per OBC Table 8.2.1.3.B.)	40	L/person-day
Total Domestic Water Design Flows		
Average Residential Daily Flow	1.67	L/sec
Average Recreational Daily Flow	0.01	L/sec
Total Daily Flow	1.67	L/sec
Max Day Peak Factor (Per Collingwood Engineering Standards, 2007)	2.00	
Max Day Demand Flow	**3.35**	L/sec
Peak Hour Factor (Per Collingwood Engineering Standards, 2007)	4.50	
Peak Hour Flow	**7.53**	L/sec

CROZIER & ASSOCIATES
Consulting Engineers

Project.: Wyldewood Creek
Project No.: 1535-4897
File.: Fire Flow Calcs
Date.: February 4, 2019

Fire Protection Volume Calculation Summary
Wyldewood Creek

WATER SUPPLY FOR PUBLIC FIRE PROTECTION (1999)
FIRE UNDERWRITER'S SURVEY

Unit Block #	Total Floor Area (m²)	Flow (L/min)	Reduction (L/min)	Exposure Surcharge (L/min)	Required Flow (L/min)	Required Storage Volume (m³)	Required Flow (L/s)
Building 1 3-Storey Unit	3,801	14,000	-2,100	4,760	17,000	3,570	283
Building 4 3-Storey Unit	3,045	12,000	-1,800	4,080	14,000	2,520	233

OFFICE OF FIRE MARSHAL
Part 3 of OBC

Unit Block #		K	Volume (m³)	S Tot	Required Flow (L/min)	Required Storage (OBC) (m³)	Required Flow (L/s)
Building 1 3-Storey Unit		23	17,865	1.00	9,000	411	150
Building 4 3-Storey Unit		23	42,935	1.00	9,000	987	150

SUMMARY:

1) Fire Flow required per FUS **283** L/s
2) Fire flow required per Fire Marshal (OBC) 150 L/s

CROZIER CONSULTING ENGINEERS

File: 1107-4134
Date: November 29, 2018
By: ML
Check By: RA

Georgian Bay Hotel - Future Development Water Demand

Southern Sector	2.03	ha
Northern Sector	0.78	ha
Total Area	2.81	ha

Number of Residential Units and Land Usage

1) Apartment (120 units/ha)	**244**	**Units**
2) Hotel Units	**100**	**units**

Person Per Residential Unit

1) High Density (per County of Simcoe Land Budget 2016)	1.90	persons/unit
2) Hotel	2.00	bed space/unit
Total Residential Population	463	Persons
Total Hotel Bed Spaces	200	Bed Spaces
Hotel Equivalent Residential Population	100	Persons

Domestic Water Design Flows

Residential (Per Collingwood Engineering Standards, 2007)	450	L/C-day
Hotel (Per MOECC Design Guidelines for Sewage Works, 2008)	225	L/Bed-day

Total Domestic Water Design Flows

Average Residential Daily Flow	2.41	L/sec
Average Daily Hotel Flow	0.52	L/sec
Total Daily Flow	2.93	L/sec
Max Day Peak Factor (Per Collingwood Engineering Standards, 2007)	2.00	
Max Day Demand Flow	**5.86**	L/sec
Peak Hour Factor (Per Collingwood Engineering Standards, 2007)	4.50	
Peak Hour Flow	**13.19**	L/sec

APPENDIX B

Stormwater Management and Water Quality Calculations

Storm Sewer System Design Sheet
Filter Sizing Report
Erosion Control Volume Calculation
Water Balance Calculations
Phosphorous Loading Calculation

WYLDEWOOD CREEK

1535-4897

STORM SEWER DESIGN SHEET

CROZIER CONSULTING ENGINEERS

FREQUENCY - 5 YEARS - Town of Collingwood - Development Standards (July 2007)					
Coef. A=	1135.4	Coef. B=	7.5	Coef. C=	0.841
FREQUENCY - 50 YEARS - Town of Collingwood - Development Standards (July 2007)					
Coef. A=	1973.1	Coef. B=	9	Coef. C=	0.868

MATERIAL	MANNINGS "n"
PVC/Conc.	0.013

DESIGNED BY: ML
CHECKED BY: RA
DATE: 2019.02.02
REVISION NO.: 1
UPDATED BY: IB/ML
DATE: 2021.03.30

INITIAL TIME OF CONCENTRATION 10.00

CATCHMENT I.D.	FR MH NO	TO MH NO	AREA (A) (Ha)	5 YEAR RUN-OFF COEFF (C_5)	DESIGN STORM	A x C	5 YEAR CUMMUL. A x C	TIME OF CONC. (min.)	5 YEAR I (mm/hr)	DESIGN FLOW (l/sec)	SLOPE (%)	PIPE DIA. (mm)	MANNING'S "n"	VEL. (m/sec)	LENGTH (m)	TIME OF FLOW (min)	PIPE CAPACITY (l/sec)	CAPACITY (%)	PIPE INV ELEV. UPPER END	PIPE INV ELEV. LOWER END	PIPE OBV ELEV. UPPER END	PIPE OBV ELEV. LOWER END	GROUND ELEV. UPPER END	GROUND ELEV. LOWER END	COVER UPPER END	COVER LOWER END
22	CB10	CBMH10	0.07	0.8	5 year	0.06	0.06	10.00	102.27	**15.92**	0.50%	250	0.013	0.9	6.2	0.12	**42.05**	**38%**	181.09	181.06	181.34	181.31	183.07	183.02	1.73	1.71
19	CBMH10	STMH9	0.06	0.60	5 year	0.04	0.09	10.12	101.68	**26.01**	0.50%	300	0.013	1.0	14.9	0.26	**68.38**	**38%**	180.98	180.90	181.28	181.20	183.02	182.75	1.75	1.55
	STMH9	STMH8	0	0.00	5 year	0.00	0.09	10.38	100.45	**25.69**	0.50%	300	0.013	1.0	8.9	0.15	**68.38**	**38%**	180.82	180.78	181.12	181.08	182.75	182.70	1.63	1.62
18	CB9	STMH8	0.08	0.60	5 year	0.05	0.05	10.00	102.27	**13.65**	1.00%	250	0.013	1.2	19.6	0.27	**59.47**	**23%**	180.98	180.78	181.23	181.03	183.14	182.70	1.91	1.67
	STMH8	CBMH7	0	0.00	5 year	0.00	0.14	10.53	99.73	**38.82**	0.50%	300	0.013	1.0	8.8	0.15	**68.38**	**57%**	180.70	180.66	181.00	180.96	182.70	182.52	1.70	1.56
21	CB8	CBMH7	0.04	0.70	5 year	0.03	0.03	10.00	102.27	**7.96**	1.01%	250	0.013	1.2	6.7	0.09	**59.76**	**13%**	180.73	180.66	180.98	180.91	182.52	182.52	1.54	1.61
20	CBMH7	STMH6	0.12	0.80	5 year	0.10	0.26	10.68	99.03	**72.68**	0.50%	375	0.013	1.1	55.1	0.82	**123.98**	**59%**	180.51	180.24	180.89	180.61	182.52	182.24	1.63	1.63
16	CB7	STMH6	0.04	0.80	5 year	0.03	0.03	10.00	102.27	**9.10**	1.00%	250	0.013	1.2	21.7	0.30	**59.47**	**15%**	180.61	180.39	180.86	180.64	182.15	182.24	1.29	1.60
	STMH6	CBMH4	0	0.00	5 year	0.00	0.30	11.50	95.44	**78.53**	0.50%	375	0.013	1.1	12.3	0.18	**123.98**	**63%**	180.21	180.15	180.58	180.52	182.24	182.18	1.66	1.66
13	CB6	CBMH5	0.03	0.90	5 year	0.03	0.03	10.00	102.27	**7.68**	1.00%	250	0.013	1.2	19.3	0.27	**59.47**	**13%**	180.43	180.24	180.68	180.49	182.12	182.18	1.44	1.69
14	CBMH5	CBMH4	0.19	0.80	5 year	0.15	0.18	10.27	100.98	**50.25**	0.50%	300	0.013	1.0	6.7	0.12	**68.38**	**73%**	180.21	180.18	180.51	180.48	182.18	182.18	1.67	1.70
15	CBMH4	Filter 2	0.24	0.80	5 year	0.19	0.67	11.68	94.67	**175.54**	0.50%	450	0.013	1.3	58.0	0.76	**201.60**	**87%**	179.92	179.63	180.37	180.08	182.18	182.20	1.81	2.12
11	CB5	Filter 2	0.09	0.80	5 year	0.07	0.07	10.00	102.27	**20.47**	2.00%	250	0.013	1.7	6.4	0.06	**84.10**	**24%**	180.13	180.00	180.38	180.25	182.20	182.20	1.82	1.95
10	Filter 2	S Culvert	0.12	0.80	5 year	0.10	0.84	12.45	91.62	**212.67**	0.50%	525	0.013	1.4	1.7	0.02	**304.10**	**70%**	179.60	179.59	180.12	180.12	182.20	-	2.08	-
1	CB2	STMH2	0.06	0.90	5 year	0.05	0.05	10.00	102.27	**15.35**	1.00%	250	0.013	1.2	31.2	0.43	**59.47**	**26%**	180.39	180.08	180.64	180.33	181.20	181.10	0.56	0.77
4	CB3	STMH2	0.04	0.90	5 year	0.04	0.04	10.00	102.27	**10.24**	1.00%	250	0.013	1.2	34.5	0.47	**59.47**	**17%**	180.43	180.08	180.68	180.33	181.05	181.10	0.38	0.77
3	CB1	CBMH1	0.07	0.70	5 year	0.05	0.05	10.00	102.27	**13.93**	0.40%	250	0.013	0.8	6.1	0.13	**37.61**	**37%**	180.11	180.09	180.36	180.34	180.67	180.78	0.31	0.44
2A	CBMH1	STMH2	0.07	0.70	5 year	0.05	0.10	10.13	101.62	**27.69**	0.50%	300	0.013	1.0	7.1	0.12	**68.38**	**40%**	180.07	180.03	180.37	180.33	180.78	181.10	0.41	0.77
	STMH2	CBMH2A	0	0.00	5 year	0.00	0.19	10.47	100.00	**52.26**	0.50%	375	0.013	1.1	15.0	0.22	**123.98**	**42%**	180.00	179.92	180.37	180.30	181.10	181.64	0.73	1.35
2B	CBMH2A	CBMH3	0.04	0.70	5 year	0.03	0.22	10.70	98.97	**60.43**	0.39%	450			15.7						0.45	0.45	181.64	182.15		
6	CB4	CBMH3	0.07	0.80	5 year	0.06	0.06	10.00	102.27	**15.92**	0.95%	250	0.013	1.2	6.7	0.09	**57.96**	**27%**	180.04	179.98	180.29	180.23	182.15	182.15	1.86	1.92
7	CBMH3	Filter 1	0.06	0.80	5 year	0.05	0.32	10.70	98.97	**88.04**	0.40%	375	0.013	1.0	37.4	0.62	**110.89**	**79%**	179.75	179.60	180.12	179.98	182.15	182.26	2.03	2.29
	Filter 1	N CULVERT	0	0.00	5 year	0.00	0.32	11.32	96.21	**85.59**	0.41%	375	0.013	1.0	4.9	0.08	**112.27**	**76%**	179.61	179.59	179.99	179.97	182.26	-	2.27	-

Determining Number of Cartridges for Flow Based Systems

Date	**4/6/2021**	**Black Cells =**	**Calculation**

Site Information

Project Name	**Wyldwood Creek**		
Project Location	**Collingwood, ON**		
OGS ID	**OGS - North**		
Drainage Area, Ad	**1.01**	ac	(0.41 ha)
Impervious Area, Ai	**0.84**	ac	(0.34 ha)
Pervious Area, Ap	**0.17**		
% Impervious	**83%**		
Runoff Coefficient, Rc	**0.79**		
Treatment storm flow rate, Q_{treat}	**0.41**	cfs	(11.69 L/s)
Peak storm flow rate, Q_{peak}	**TBD**	cfs	-

Filter System

Filtration brand	**StormFilter**	
Cartridge height	**18**	in
Specific Flow Rate	**1.67**	gpm/ft^2
Flow rate per cartridge	**12.53**	gpm

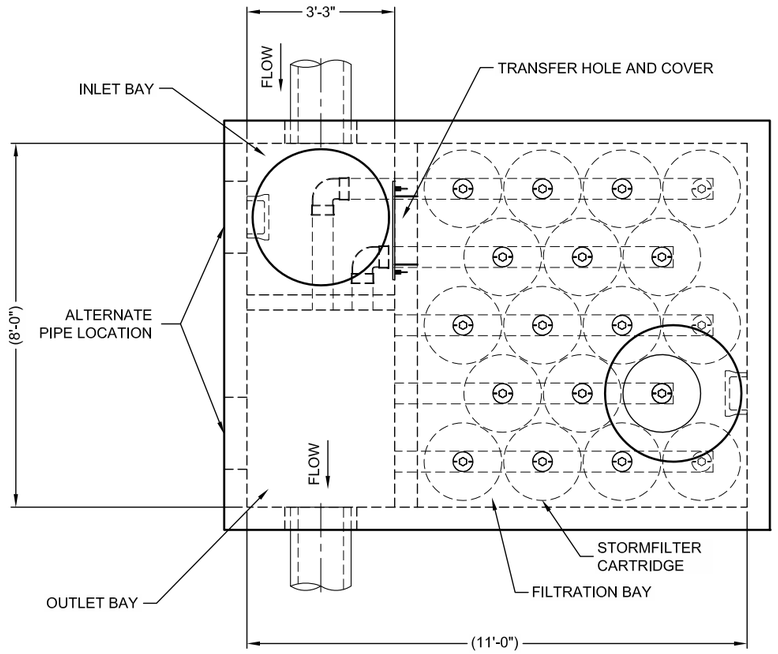
SUMMARY

Number of Cartridges	15
Media Type	Phosphosorb

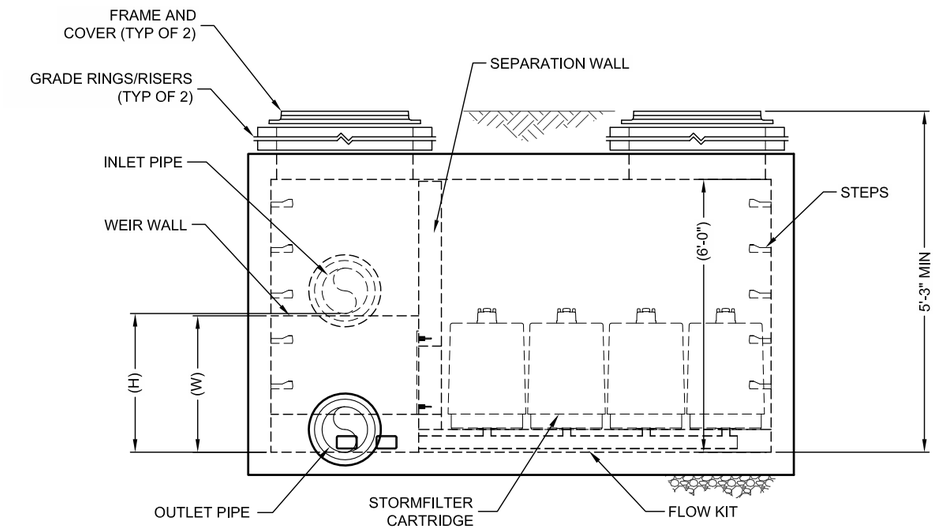
Event Mean Concentration (EMC)	**150**	mg/L
Annual TSS Removal	**80%**	
Percent Runoff Capture	**90%**	

Recommend one SFPD0811 vault

200 Enterprise Drive
Scarborough, ME 04074
Phone 877-907-8676
Fax 207-885-9825



PLAN



ELEVATION

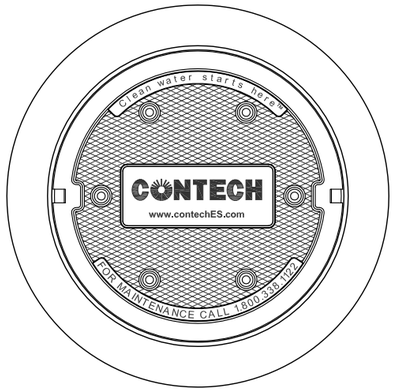
The Stormwater Management StormFilter®

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,322,629; 5,324,570; 5,707,527; 5,985,157; 6,027,639; 6,045,047; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

STORMFILTER DESIGN TABLE

- THE 8' x 11' PEAK DIVERSION STORMFILTER TREATMENT CAPACITY VARIES BY CARTRIDGE COUNT AND LOCALLY APPROVED SURFACE AREA SPECIFIC FLOW RATE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD.
- THE PEAK DIVERSION STORMFILTER IS AVAILABLE IN A LEFT INLET (AS SHOWN) OR RIGHT INLET CONFIGURATION.
- ALL PARTS AND INTERNAL ASSEMBLY PROVIDED BY CONTECH UNLESS OTHERWISE NOTED.

CARTRIDGE HEIGHT	27"		18"		LOW DROP	
SYSTEM HYDRAULIC DROP (H - REQ'D. MIN.)	3.05'		2.3'		1.8'	
HEIGHT OF WEIR (W)	3.00'		2.25'		1.75'	
TREATMENT BY MEDIA SURFACE AREA	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²
CARTRIDGE FLOW RATE (gpm)	22.5	11.25	15	7.5	10	5



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	*
WATER QUALITY FLOW RATE (cfs)	*
PEAK FLOW RATE (cfs)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
# OF CARTRIDGES REQUIRED	*
CARTRIDGE FLOW RATE	*
MEDIA TYPE (CSF, PERLITE, ZPG)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE	*	*	*
OUTLET PIPE	*	*	*

INLET BAY RIM ELEVATION	*
FILTER BAY RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

PERFORMANCE SPECIFICATION

FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. **RADIAL MEDIA DEPTH SHALL BE 7-INCHES**. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST **37 SECONDS**. SPECIFIC FLOW RATE SHALL BE **2 GPM/SF (MAXIMUM)**. SPECIFIC FLOW RATE IS THE MEASURE OF THE FLOW (GPM) DIVIDED BY THE MEDIA SURFACE CONTACT AREA (SF). MEDIA VOLUMETRIC FLOW RATE SHALL BE **6 GPM/CF OF MEDIA (MAXIMUM).**

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com
4. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
5. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH OUTLET PIPE INVERT WITH OUTLET BAY FLOOR.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
F. CONTRACTOR TO REMOVE THE TRANSFER HOLE COVER WHEN THE SYSTEM IS BROUGHT ONLINE.

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

THE STORMWATER MANAGEMENT STORMFILTER 8' x 11' PEAK DIVERSION STORMFILTER STANDARD DETAIL

Determining Number of Cartridges for Flow Based Systems

Date	**4/6/2021**	**Black Cells =**	**Calculation**

Site Information

Project Name	**Wyldwood Creek**		
Project Location	**Collingwood, ON**		
OGS ID	**OGS - South**		
Drainage Area, Ad	**2.67**	ac	(1.08 ha)
Impervious Area, Ai	**2.15**	ac	(0.87 ha)
Pervious Area, Ap	**0.52**		
% Impervious	**81%**		
Runoff Coefficient, Rc	**0.77**		
Treatment storm flow rate, Q_{treat}	**1.07**	cfs	(30.18 L/s)
Peak storm flow rate, Q_{peak}	**TBD**	cfs	-

Filter System

Filtration brand	**StormFilter**	
Cartridge height	**18**	in
Specific Flow Rate	**1.67**	gpm/ft^2
Flow rate per cartridge	**12.53**	gpm

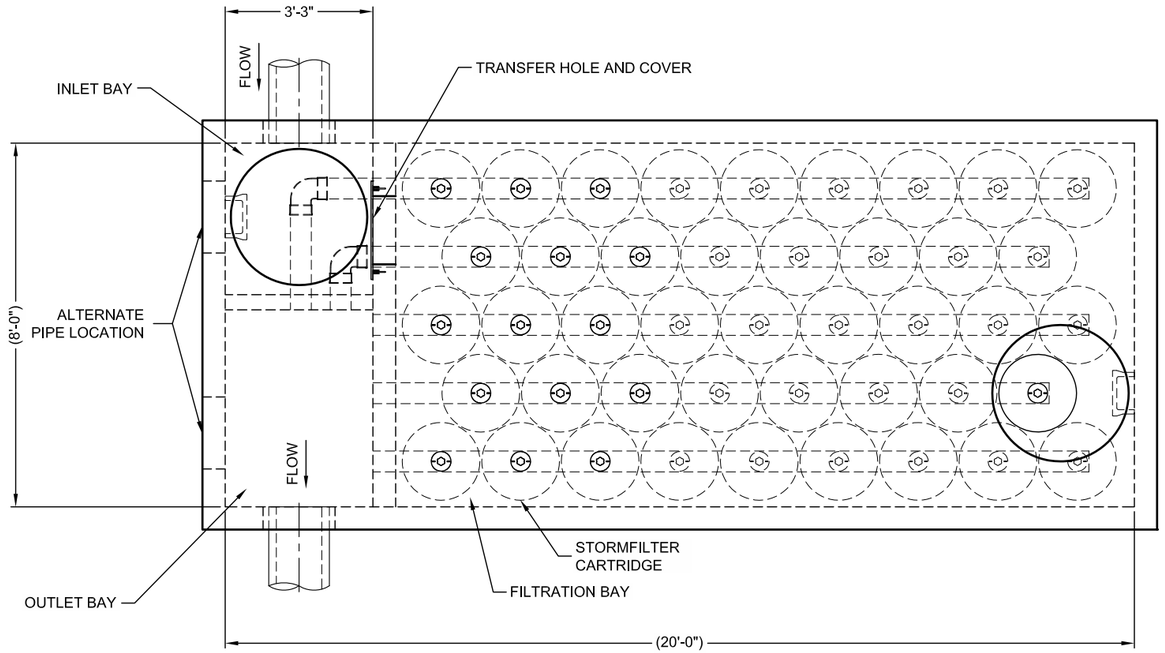
SUMMARY

Number of Cartridges	39
Media Type	Phosphosorb

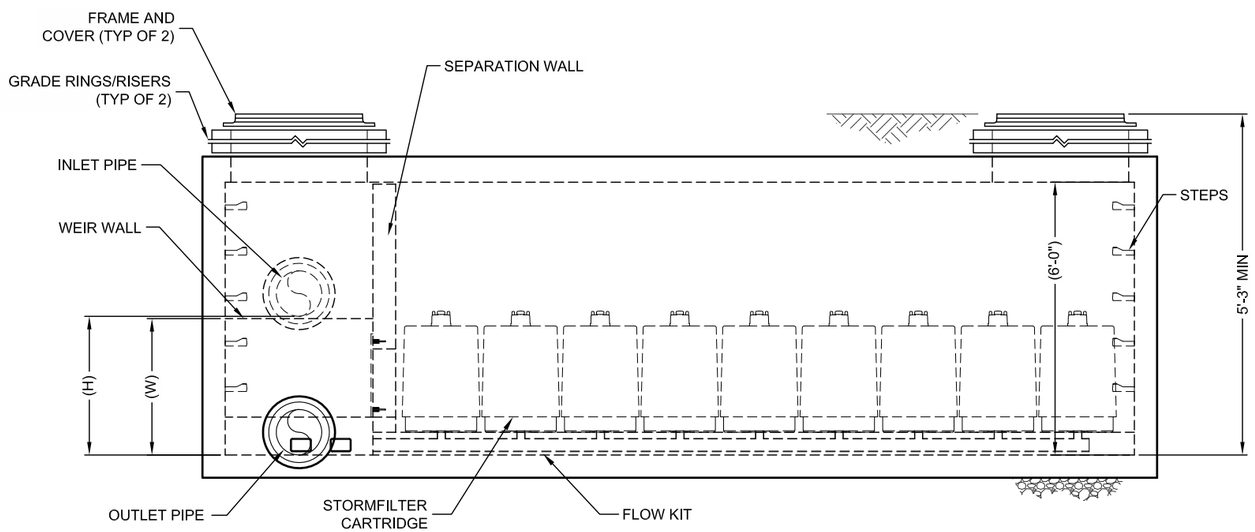
Event Mean Concentration (EMC)	**150**	mg/L
Annual TSS Removal	**80%**	
Percent Runoff Capture	**90%**	

Recommend one SFPD0820 vault

200 Enterprise Drive
Scarborough, ME 04074
Phone 877-907-8676
Fax 207-885-9825



PLAN



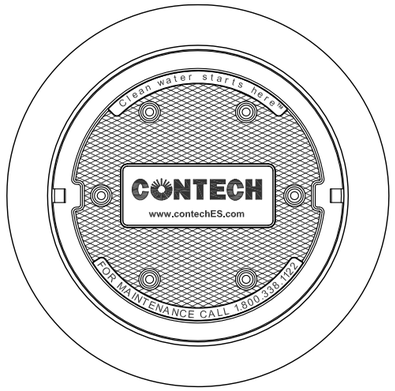
ELEVATION

The Stormwater Management StormFilter®

STORMFILTER DESIGN TABLE

- THE 8' x 20' PEAK DIVERSION STORMFILTER TREATMENT CAPACITY VARIES BY CARTRIDGE COUNT AND LOCALLY APPROVED SURFACE AREA SPECIFIC FLOW RATE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD.
- THE PEAK DIVERSION STORMFILTER IS AVAILABLE IN A LEFT INLET (AS SHOWN) OR RIGHT INLET CONFIGURATION.
- ALL PARTS AND INTERNAL ASSEMBLY PROVIDED BY CONTECH UNLESS OTHERWISE NOTED.

CARTRIDGE HEIGHT	27"		18"		LOW DROP	
SYSTEM HYDRAULIC DROP (H - REQ'D. MIN.)	3.05'		2.3'		1.8'	
HEIGHT OF WEIR (W)	3.00'		2.25'		1.75'	
TREATMENT BY MEDIA SURFACE AREA	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²
CARTRIDGE FLOW RATE (gpm)	22.5	11.25	15	7.5	10	5



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	*
WATER QUALITY FLOW RATE (cfs)	*
PEAK FLOW RATE (cfs)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
# OF CARTRIDGES REQUIRED	*
CARTRIDGE FLOW RATE	*
MEDIA TYPE (CSF, PERLITE, ZPG)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE	*	*	*
OUTLET PIPE	*	*	*

INLET BAY RIM ELEVATION	*
FILTER BAY RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

PERFORMANCE SPECIFICATION

FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. **RADIAL MEDIA DEPTH SHALL BE 7-INCHES**. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST **37 SECONDS**. SPECIFIC FLOW RATE SHALL BE **2 GPM/SF (MAXIMUM)**. SPECIFIC FLOW RATE IS THE MEASURE OF THE FLOW (GPM) DIVIDED BY THE MEDIA SURFACE CONTACT AREA (SF). MEDIA VOLUMETRIC FLOW RATE SHALL BE **6 GPM/CF OF MEDIA (MAXIMUM).**

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com
4. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
5. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH OUTLET PIPE INVERT WITH OUTLET BAY FLOOR.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
F. CONTRACTOR TO REMOVE THE TRANSFER HOLE COVER WHEN THE SYSTEM IS BROUGHT ONLINE.

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

THE STORMWATER MANAGEMENT STORMFILTER 8' x 20' PEAK DIVERSION STORMFILTER STANDARD DETAIL

CROZIER CONSULTING ENGINEERS

Project Name: Wyldewood Creek
Project No: 1535-4897
Modelled By: ML
Checked By: RA
Date: 2021.03.30

Wyldewood Creek - Erosion Control Volume

Total Impervious Area	1.29	ha
Target Precipitation Depth	5	mm
Precipitation Volume	64.5	m^3
Roof Area	0.70	ha
Equivalent Precipitation Depth	9	m

Building A	Area (m^2)	Precipitation Depth (mm)	Precipitation Volume (m^3)	Thickness (m)	Void Ratio	Storage Volume (m^3)
Building	1371	9	12.6	--	--	--
Riverstone	62	--	--	0.3	0.4	7.5
Planting	58	--	--	0.5	0.3	8.8
Total			**12.6**			**16.2**

Building B	Area (m^2)	Precipitation Depth (mm)	Precipitation Volume (m^3)	Thickness (m)	Void Ratio	Storage Volume (m^3)
Building	1134	9	10.4			
Riverstone	41	--	--	0.3	0.4	4.9
Planting	88	--	--	0.5	0.3	13.2
Total			**10.4**			**18.1**

Building C	Area (m^2)	Precipitation Depth (mm)	Precipitation Volume (m^3)	Thickness (m)	Void Ratio	Storage Volume (m^3)
Building	1133	9	10.4			
Riverstone	52	--	--	0.3	0.4	6.2
Planting	38	--	--	0.5	0.3	5.7
Total			**10.4**			**11.8**

Building D	Area (m^2)	Precipitation Depth (mm)	Precipitation Volume (m^3)	Thickness (m)	Void Ratio	Storage Volume (m^3)
Building	875	9	8.0			
Riverstone	24	--	--	0.3	0.4	2.9
Planting	41	--	--	0.5	0.3	6.1
Total			**8.0**			**9.0**

CROZIER CONSULTING ENGINEERS

Project Name: Wyldewood Creek
Project No: 1535-4897
Modelled By: ML
Checked By: RA
Date: 2021.03.30

Wyldewood Creek - Erosion Control Volume

Total Impervious Area	1.29	ha
Target Precipitation Depth	5	mm
Precipitation Volume	64.5	m^3
Roof Area	0.70	ha
Equivalent Precipitation Depth	9	m

Building E	Area (m^2)	Precipitation Depth (mm)	Precipitation Volume (m^3)	Thickness (m)	Void Ratio	Storage Volume (m^3)
Building	1131	9	10.4			
Riverstone	44	--	--	0.3	0.4	5.2
Planting	54	--	--	0.5	0.3	8.1
Total			**10.4**			**13.4**

Building F	Area (m^2)	Precipitation Depth (mm)	Precipitation Volume (m^3)	Thickness (m)	Void Ratio	Storage Volume (m^3)
Building	1386	9	12.7			
Riverstone	60	--	--	0.3	0.4	7.2
Planting	94	--	--	0.5	0.3	14.1
Total			**12.7**			**21.2**

Total Precipitation Volume = 64.5 m^3

Total Storage Volume = 89.8 m^3

NOTES:

1) Plantings considered above are the perennials, groundcover and shrubs identified on the landscaping plans.

2) Refer to the Landscaping Plans prepared by Crozier (April 2021) for river stone and planting details.

Project: Wyldewood Creek
Project No: 1535-4897
Modelled By: ML
Date: 2021/03/30

Wyldewood Creek - Water Balance
Water Balance/Water Budget Assessment

Overview

Climate Normals 1981-2010 Station Data

Metadata including Station Name, Province, Latitude, Longitude, Elevation, Climate ID, WMO ID, TC ID

STATION_NAME	PROVINCE	LATITUDE	LONGITUD	ELEVATION	CLIMATE_I	WMO_ID	TC_ID
THORNBURY SLAMA	ON	44°34'25.(	80°29'07.(	213.4 m	611HBEC		

Legend

A = WMO "3 and 5 rule" (i.e. no more than 3 consecutive and no more than 5 total missing for either temperature or precipitation)
B = At least 25 years
C = At least 20 years
D = At least 15 years

1981 to 2010 Canadian Climate Normals station data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Temperature														
Daily Average (°C)	-6.3	-5.4	-1.5	5.5	11.5	16.7	19.8	19.2	15.5	9.1	3.1	-2.7	7	C
Standard Deviation	2.8	2.5	1.9	1.6	1.8	1.4	1.4	1.3	1.4	1.3	1.7	2.6	1.6	C
Daily Maximum (°C)	-2.6	-1.5	2.9	10.2	16.6	22	24.8	24	20.1	13.2	6.5	0.6	11.4	C
Daily Minimum (°C)	-9.9	-9.3	-5.8	0.9	6.2	11.4	14.8	14.3	10.8	4.9	-0.3	-5.9	2.7	C
Extreme Maximum (°	15	18	24	30.5	32.8	34	35.5	36	33.5	28.9	22.5	20		
Date (yyyy/dd)	1995/14	2000/26	1990/14	2002/16	1977/21	1994/15	Aug-88	Apr-88	Oct-83	Jan-71	May-78	Mar-82		
Extreme Minimum (°	-30.6	-31.5	-28	-13.3	-3.3	0.6	5	3.9	-2	-5	-16.5	-26		
Date (yyyy/dd)	1977/18	1979/18	Feb-80	Jul-72	Feb-74	Jan-71	Apr-72	1977/19	1991/30	1975/31	1995/29	1980/25		
Precipitation														
Rainfall (mm)	20.9	19.4	36.7	57.4	82.7	79.1	72.1	78.2	95.9	84	70.4	28.5	725.3	C
Snowfall (cm)	79.1	49	27.4	7.9	0	0	0	0	0	3.3	29.2	70.8	266.6	C
Precipitation (mm)	100	68.4	64	65.3	82.7	79.1	72.1	78.2	95.9	87.3	99.6	99.4	991.9	C
Average Snow Depth (cm)				0	0	0	0	0	0	0	0			
Median Snow Depth (cm)				0	0	0	0	0	0	0	0			
Extreme Daily Rainfall	26.6	46	39	63.2	67.8	60	67.4	89.4	68	37.2	54.6	30.2		
Date (yyyy/dd)	May-98	1997/21	Nov-90	2000/20	2004/23	2001/21	1980/20	1968/19	May-85	2003/14	Dec-92	1979/24		
Extreme Daily Snowfa	32	23	22	17	1	0	0	0	0	17	31	32		
Date (yyyy/dd)	1979/13	Oct-95	1989/17	Oct-92	Jun-74	Jan-68	Jan-68	Jan-68	Jan-68	1997/22	1987/25	Oct-88		
Extreme Daily Precipi	32	50	39	63.2	67.8	60	67.4	89.4	68	37.2	54.6	32		
Date (yyyy/dd)	1979/13	1997/21	Nov-90	2000/20	2004/23	2001/21	1980/20	1968/19	May-85	2003/14	Dec-92	Oct-88		
Extreme Snow Depth	50	47	28	1	0	0	0	0	0	0	0	19		
Date (yyyy/dd)	2004/31	Jan-04	Jan-04	Jan-92	1983/23	Jan-83	Jan-83	Jan-83	Jan-83	Jan-83	Jan-91	1993/31		
Days with Maximum Temperature														
<= 0 °C	21.1	16.9	10.7	1.1	0	0	0	0	0	0.05	3.6	13.7	67.1	C
> 0 °C	9.9	11.4	20.3	28.9	31	30	31	31	30	31	26.4	17.3	298.1	C
> 10 °C	0.33	0.64	4.3	12.8	26.5	29.9	31	31	29.4	21.1	6.9	1.2	195.1	C
> 20 °C	0	0	0.48	2.5	8.4	18.9	27.3	25.9	14.4	3.3	0.09	0	101.2	C
> 30 °C	0	0	0	0.04	0.22	1.7	2.9	1.8	0.46	0	0	0	7.1	C
> 35 °C	0	0	0	0	0	0	0.09	0.09	0	0	0	0	0.18	C
Days with Minimum Temperature														
> 0 °C	1.5	1.9	4.5	14.7	28.7	30	31	31	29.8	26.9	12.6	3.7	216.3	C
<= 2 °C	30.5	27.5	28.9	20.2	6.2	0.09	0	0	0.67	10.1	22.8	29.6	176.6	C
<= 0 °C	29.5	26.3	26.5	15.3	2.3	0	0	0	0.21	4.1	17.4	27.3	148.9	C
< -2 °C	27.3	23.8	21.5	7.3	0.09	0	0	0	0	0.64	9.3	21.5	111.2	C
< -10 °C	15	12.1	7	0.28	0	0	0	0	0	0	0.61	7.4	42.4	C
< -20 °C	2.2	1.5	0.46	0	0	0	0	0	0	0	0	0.36	4.6	C
< - 30 °C	0.04	0	0	0	0	0	0	0	0	0	0	0	0.04	C
Days with Rainfall														
>= 0.2 mm	4.2	3.8	6.9	11.5	12	10.6	9.5	10.8	13.2	15.5	12.5	6.4	116.9	C
>= 5 mm	1.4	1.2	2.1	3.6	5.3	4.3	4	4.2	5.7	5.9	4.5	1.7	43.9	C
>= 10 mm	0.64	0.56	1.1	1.6	2.9	3	2.2	2.5	3	2.5	1.9	0.79	22.6	C
>= 25 mm	0.08	0.04	0.16	0.2	0.4	0.58	0.67	0.71	0.75	0.25	0.29	0.04	4.2	C
Days With Snowfall														
>= 0.2 cm	15.9	10.6	7	2.2	0	0	0	0	0	0.67	5	12.3	53.6	C
>= 5 cm	5.5	3.7	1.8	0.52	0	0	0	0	0	0.29	2	5.7	19.6	C
>= 10 cm	1.8	1.2	0.52	0.24	0	0	0	0	0	0.08	0.75	1.8	6.3	C
>= 25 cm	0.04	0	0	0	0	0	0	0	0	0	0.04	0.17	0.25	C
Days with Precipitation														
>= 0.2 mm	18.9	13.3	12.5	12.6	12	10.6	9.5	10.8	13.2	15.8	16.3	17.6	163	C
>= 5 mm	7.2	5.1	4.1	4.3	5.3	4.3	4	4.2	5.7	6.1	6.8	7.8	65	C
>= 10 mm	2.6	1.8	1.8	1.9	2.9	3	2.2	2.5	3	2.6	2.8	2.6	29.7	C
>= 25 mm	0.12	0.08	0.16	0.24	0.4	0.58	0.67	0.71	0.75	0.25	0.38	0.21	4.6	C
Days with Snow Depth														
>= 1 cm				0	0	0	0	0	0	0				
>= 5 cm				0	0	0	0	0	0	0				
>= 10 cm				0	0	0	0	0	0	0				
>= 20 cm				0	0	0	0	0	0	0				
Degree Days														
Above 24 °C	0	0	0	0	0.1	2.1	7.1	4.7	0.7	0	0	0	14.8	C
Above 18 °C	0	0	0.1	2.1	8.2	35	77.9	61.5	21.6	1.6	0	0	207.8	C
Above 15 °C	0	0	0.5	5.5	23.3	79.9	154.6	135	57.6	6.8	0	0.1	463.2	C
Above 10 °C	0	0	3.9	21.2	82.5	204.8	307.9	287.2	168.3	41.2	4.4	0.8	1122.4	C
Above 5 °C	0.7	1.9	15.9	67.4	202.7	353.3	462.9	442.2	313.6	133.4	30.9	5.3	2030	C
Above 0 °C	10.6	14.5	53.5	172.1	354.9	503.3	617.9	597.2	463.5	278.9	109.7	30	3206	C
Below 0 °C	208.7	166.8	99.2	8	0	0	0	0	0	0.1	18.3	110.2	611.4	C
Below 5 °C	353.8	295.3	216.6	53.2	2.8	0	0	0	0.1	9.6	89.6	240.6	1261.6	C
Below 10 °C	508.1	434.7	359.6	157.1	37.6	1.5	0	0.1	4.8	72.5	213.1	391.1	2180.2	C
Below 15 °C	663.1	575.9	511.2	291.3	133.4	26.6	1.7	2.8	44.1	193.1	358.7	545.4	3347.2	C
Below 18 °C	756.1	660.6	603.8	378	211.3	71.7	17.9	22.4	98.1	280.8	448.7	638.3	4187.5	C

1981 to 2010 Canadian Climate Normals station data (Frost-Free)

	Frost-Free:	Code
Average Date of Last S	11-May	D
Average Date of First	11-Oct	D
Average Length of Frc	152 Days	D

Probability of last ten	10%	25%	33%	50%	66%	75%	90%
Date	24-May	18-May	14-May	9-May	5-May	3-May	29-Apr
Probability of first ten	10%	25%	33%	50%	66%	75%	90%
Date	28-Sep	4-Oct	8-Oct	12-Oct	16-Oct	18-Oct	1-Nov
Probability of frost-fre	10%	25%	33%	50%	66%	75%	90%
Days	133	147	149	155	158	161	176

Project Name: Wyldewood Creek
Project No: 1535-4897
Modelled By: ML
Checked By: RA
Date: 2021/03/30

CROZIER CONSULTING ENGINEERS

Climatic Water Budget - Thornthwaite Method
Wyldewood Creek - Water Balance
THORNBURY SLAMA - Climate Normals 1981-2010 Station Data

	Degrees	Minutes	Seconds	
Insert Latitude:	**44**	**30**	**45.1**	***Only Applicable Between Latitudes 40° - 50°**

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	-6.3	0.0	0.49	0.0	0.76	0.0	100.0	100.0	0.0
February	-5.4	0.0	0.49	0.0	0.87	0.0	68.4	68.4	0.0
March	-1.5	0.0	0.49	0.0	0.99	0.0	64.0	64.0	0.0
April	5.5	1.2	0.51	25.7	1.12	28.7	65.3	36.6	0.0
May	11.5	3.5	0.55	56.0	1.24	69.2	82.7	13.5	0.0
June	16.7	6.2	0.60	83.0	1.30	107.9	79.1	0.0	28.8
July	19.8	8.0	0.63	99.4	1.28	126.7	72.1	0.0	54.6
August	19.2	7.7	0.63	96.2	1.18	113.2	78.2	0.0	35.0
September	15.5	5.5	0.59	76.7	1.05	80.5	95.9	15.4	0.0
October	9.1	2.5	0.54	43.7	0.92	40.1	87.3	47.2	0.0
November	3.1	0.5	0.50	14.0	0.80	11.2	99.6	88.4	0.0
December	-2.7	0.0	0.49	0.0	0.73	0.0	99.4	99.4	0.0
Totals		**35.1**	**1.06**			**577.6**	**992.0**	**532.9**	**118.4**

TOTAL WATER DEFICIT = **118.4 mm**
TOTAL WATER SURPLUS (SURPLUS - DEFICIT) = **414.4 mm**
Precipitation Adjustment Factor : **none**

NOTES:
1. Water budget adjusted for latitude and daylight.
2. (◦C) - Represents calculated mean of daily temperatures for the month.
3. Precipitation and Temperature data from the THORNBURY SLAMA (Station No.611HBEC) Environment Canada Station Data
4. Total Water Surplus (Thornthwaite, 1948) is calculated as total precipitation minus adjusted potential evapostranspiration.

CROZIER
CONSULTING ENGINEERS

Project Name: Wyldewood Creek
Project No: 1535-4897
Modelled By: ML
Checked By: RA
Date: 2021/03/30

Water Budget - Pre-Development
Wyldewood Creek - Water Balance
Water Balance/Water Budget Assessment

Catchment Designation	Site - Pre-Development		
	Pervious	Impervious	Totals
Area (m^2)	21259	4341	25600
Pervious Area (m^2)	21259	0	21259
Impervious Area (m^2)	0	4341	4341
Infiltration Factors			
Topography Infiltration Factor	0.20	0.20	
[1]Soil Infiltration Factor	0.10	0.10	
Land Cover Infiltration Factor	0.10	0.10	
MOE Infiltration Factor	0.40	0	
Actual Infiltration Factor	0.4	0	
Run-off Coefficient	0.25	0.90	
Runoff from Impervious Surfaces *	0	0.8	
Inputs (per Unit Area)			
Precipitation (mm/yr)	992	992	992
Run-On (mm/yr)	0	0	0
Other Inputs (mm/yr)	0	0	0
Total Inputs (mm/yr)	**992**	**992**	**992**
Outputs (per Unit Area)			
Precipitation Surplus (mm/yr)	414	794	479
Net Surplus (mm/yr)	414	794	479
Evapotranspiration (mm/yr) *	578	198	513
Infiltration (mm/yr)	166	0	138
Soakaway Infiltration (mm/yr)	0	0	0
Total Infiltration (mm/yr)	166	0	138
Runoff Pervious Areas (mm/yr)	249	0	206
Runoff Impervious Areas (mm/yr)	0	794	135
Total Runoff (mm/yr)	249	794	341
Total Outputs (mm/yr)	**992**	**992**	**992**
Difference (Inputs- Outputs)	**0**	**0**	**0**
Inputs (Volumes)			
Precipitation (m^3/yr)	21089	4306	25395
Run-On (m^3/yr)	0	0	0
Other Inputs (m^3/yr)	0	0	0
Total Inputs (m^3/yr)	**21089**	**4306**	**25395**
Outputs (Volumes)			
Precipitation Surplus (m^3/yr)	8810	3445	12255
Net Surplus (m^3/yr)	8810	3445	12255
Evapotranspiration (m^3/yr) *	12279	861	13140
Infiltration (m^3/yr)	3524	0	3524
Soakaway Infiltration (m^3/yr)	0	0	0
Total Infiltration (m^3/yr)	3524	0	3524
Runoff Pervious Areas (m^3/yr)	5286	0	5286
Runoff Impervious Areas (m^3/yr)	0	3445	3445
Total Runoff (m^3/yr)	5286	3445	8731
Total Outputs (m^3/yr)	**21089**	**4306**	**25395**
Difference (Inputs- Outputs)	**0**	**0**	**0**

NOTES:

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

CROZIER CONSULTING ENGINEERS

Project Name: Wyldewood Creek
Project No: 1535-4897
Modelled By: ML
Checked By: RA
Date: 2021/03/30

Water Budget - Post-Development *without Mitigation*
Wyldewood Creek - Water Balance
Water Balance/Water Budget Assessment

Note: site land use areas consistent with the Site Plan

Catchment Designation	Site - Post-Development		
	Pervious	Impervious	Totals
Area (m^2)	12700	12900	25600
Pervious Area (m^2)	12700	0	12700
Impervious Area (m^2)	0	12900	12900
Infiltration Factors			
Topography Infiltration Factor	0.20	0.20	
Soil Infiltration Factor	0.30	0.30	
Land Cover Infiltration Factor	0.10	0.10	
MOE Infiltration Factor	0.60	0	
Actual Infiltration Factor	0.60	0	
Run-off Coefficient	0.25	0.90	
Runoff from Impervious Surfaces *	0	0.80	
Inputs (per Unit Area)			
Precipitation (mm/yr)	992	992	992
Run-On (mm/yr)	0	0	0
Other Inputs (mm/yr)	0	0	0
Total Inputs (mm/yr)	**992**	**992**	**992**
Outputs (per Unit Area)			
Precipitation Surplus (mm/yr)	414	794	605
Net Surplus (mm/yr)	414	794	605
Evapotranspiration (mm/yr) *	578	198	387
Infiltration (mm/yr)	249	0	123
Soakaway Infiltration (mm/yr)	0	0	0
Total Infiltration (mm/yr)	249	0	123
Runoff Pervious Areas (mm/yr)	166	0	82
Runoff Impervious Areas (mm/yr)	0	794	400
Total Runoff (mm/yr)	166	794	482
Total Outputs (mm/yr)	**992**	**992**	**992**
Difference (Inputs- Outputs)	**0**	**0**	**0**
Inputs (Volumes)			
Precipitation (m^3/yr)	12598	12797	25395
Run-On (m^3/yr)	0	0	0
Other Inputs (m^3/yr)	0	0	0
Total Inputs (m^3/yr)	**12598**	**12797**	**25395**
Outputs (Volumes)			
Precipitation Surplus (m^3/yr)	5263	10237	15501
Net Surplus (m^3/yr)	5263	10237	15501
Evapotranspiration (m^3/yr) *	7335	2559	9894
Infiltration (m^3/yr)	3158	0	3158
Soakaway Infiltration (m^3/yr)	0	0	0
Total Infiltration (m^3/yr)	3158	0	3158
Runoff Pervious Areas (m^3/yr)	2105	0	2105
Runoff Impervious Areas (m^3/yr)	0	10237	10237
Total Runoff (m^3/yr)	2105	10237	12343
Total Outputs (m^3/yr)	**12598**	**12797**	**25395**
Difference (Inputs- Outputs)	**0**	**0**	**0**

Pre-Development Total Infiltration:
3524 m3/yr

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

CROZIER CONSULTING ENGINEERS

Project Name: Wyldewood Creek
Project No: 1535-4897
Modelled By: ML
Checked By: RA
Date: 2021/03/30

Water Budget - Post-Development *with Mitigation*
Wyldewood Creek - Water Balance
Water Balance/Water Budget Assessment

Catchment Designation	Site - Post-Development		
	Pervious	Impervious	Totals
Area (m^2)	12700	12900	25600
Pervious Area (m^2)	12700	0	12700
Impervious Area (m^2)	0	12900	12900
Infiltration Factors			
Topography Infiltration Factor	0.20	0.20	
Soil Infiltration Factor	0.30	0.30	
Land Cover Infiltration Factor	0.10	0.10	
MOE Infiltration Factor	0.60	0	
Actual Infiltration Factor	0.60	0	
Run-off Coefficient	0.25	0.90	
Runoff from Impervious Surfaces *	0	0.8	
Inputs (per Unit Area)			
Precipitation (mm/yr)	992	992	992
Run-On (mm/yr)	0	0	0
Other Inputs (mm/yr)	0	0	0
Total Inputs (mm/yr)	**992**	**992**	**992**
Outputs (per Unit Area)			
Precipitation Surplus (mm/yr)	414	893	655
Net Surplus (mm/yr)	414	893	655
Evapotranspiration (mm/yr) *	578	198	387
Infiltration (mm/yr)	249	0	123
Mitigation (mm/yr)	0	91	46
Total Infiltration (mm/yr)	249	91	169
Runoff Pervious Areas (mm/yr)	166	0	82
Runoff Impervious Areas (mm/yr)	0	702	354
Total Runoff (mm/yr)	166	702	436
Total Outputs (mm/yr)	**992**	**992**	**992**
Difference (Inputs- Outputs)	**0**	**0**	**0**
Inputs (Volumes)			
Precipitation (m^3/yr)	12598	12797	25395
Run-On (m^3/yr)	0	0	0
Other Inputs (m^3/yr)	0	0	0
Total Inputs (m^3/yr)	**12598**	**12797**	**25395**
Outputs (Volumes)			
Precipitation Surplus (m^3/yr)	5263	11517	16780
Net Surplus (m^3/yr)	5263	11517	16780
Evapotranspiration (m^3/yr) *	7335	2559	9894
Infiltration (m^3/yr)	3158	0	3158
Mitigation (m^3/yr)	0	1180	1180
Total Infiltration & Mitigation (m^3/yr)	3158	1180	**4338**
Runoff Pervious Areas (m^3/yr)	2105	0	2105
Runoff Impervious Areas (m^3/yr)	0	9058	9058
Total Runoff (m^3/yr)	2105	9058	11163
Total Outputs (m^3/yr)	**12598**	**12797**	**25395**
Difference (Inputs- Outputs)	**0**	**0**	**0**

Proposed Infiltration via Mitigation

Pre-Development Total Infiltration:
138 mm/yr

Pre-Development Total Infiltration:
3524 m^3/yr

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

Project: Wyldewood Creek
Project No: 1535-4897
Modelled By: ML
Date: 2021/03/30

Design Storm Determination & Mitigation Sizing
Wyldewood Creek - Water Balance
Water Balance/Water Budget Assessment

Design Storm Determination

Days with Precipitation (From Climate Data)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
>= 0.2 mm	12.6	12	10.6	9.5	10.8	13.2	15.8	85
>= 5 mm	4.3	5.3	4.3	4	4.2	5.7	6.1	34
>= 10 mm	1.9	2.9	3	2.2	2.5	3	2.6	18
>= 25 mm	0.24	0.4	0.58	0.67	0.71	0.75	0.25	4

Available Precipitation

Storm Event (mm)	Total Days Per Year	Incremental Precipitation (mm/yr)	Cummulative Precipitation (mm/yr)
0.2	85	16.9	16.9
5	34	169.5	186.4
10	18	181.0	367.4
25	4	90.0	457.4
Total	**140**	**457.4**	

10mm storm event from roof areas is directed to planters for infiltration & evapotranspiration.

5mm storm event	186.4	mm/year
Total Roof Area	0.70	ha
Runoff Coefficient	0.9	
Total Annual Infiltration & Evapotranspiration	1180	m^3/year
Impervious Area	1.29	ha
Mitigation	91.4	mm/year

Project: Wyldewood Creek
Project No: 1535-4897
Modelled By: ML
Checked By: RA
Date: 2021/03/30

Water Budget Summary
Wyldewood Creek - Water Balance
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)	25395	25395	25395	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)	**25395**	**25395**	**25395**	**0**	**0**
Outputs (Volumes)					
Precipitation Surplus (m^3/yr)	12255	15501	15501	26%	26%
Net Surplus (m^3/yr)	12255	15501	15501	26%	26%
Evapotranspiration (m^3/yr)	13140	9894	9894	-25%	-25%
Infiltration (m^3/yr)	3524	3158	3158	-10%	-10%
Mitigation (m^3/yr)	0	0	**1180**	-	**1180 m3/yr**
Total Infiltration & Mitigation (m^3/yr)	**3524**	3158	**4338**	-10%	23%
Runoff Pervious Areas (m^3/yr)	5286	2105	2105	-60%	-60%
Runoff Impervious Areas (m^3/yr)	3445	10237	9058	-	-
Total Runoff (m^3/yr)	8731	12343	11163	41%	28%
Total Outputs (m^3/yr)	**25395**	**25395**	**25395**	0%	0%

Project: Wyldwood Creek Development
Project No.: 1535-4897
Created By: IB
Checked By: ML
Date: 2021.03.30

Pre-Development Phosphorus Loading

Pre - Development Conditions						
Catchment	**Land Use**	**Area** (ha)	**Area** (m^2)	**P coeff** (kg/ha/yr)	**P Load** (kg/yr)	**P Load Total (kg/yr)**
Pre-Development Site	Transition	2.56	25,600	0.07	0.18	0.18
Total		**2.56**	**25,600**		**0.18**	**0.18**

Note:

1. Phosphorus Coefficient for Transition Area identified in NVCA Phosphorus Loading Tool & Hutchinson Report.

Project: Wyldwood Creek Development
Project No.: 1535-4897
Created By: IB
Checked By: ML
Date: 2021.03.30

Post-Development Phosphorus Loading

Parameter	North Area	South Area	Unit	
Total Phosphorus Concentration	0.41	0.41	kg/yr	(Per Hutchinson Report Table 8, residential)
Total Annual Precipitation	992	992	mm/yr	Water Balance Calculation
Total Precipitation Runoff	703	686	mm/yr	Water Balance Calculation
Fraction Runoff	0.71	0.69		
% Impervious	83%	80%		
Runoff Coefficient (Rv)	0.79	0.77		
Phosphorus Coefficient	**2.28**	**2.17**	kg/ha/yr	

$$TP\ export\ coef\left(\frac{kg}{\frac{ha}{yr}}\right) = TP \times Precip \times P_j \times R_V \times 10^{-2}$$

Post - Development Conditions					
Catchment	**Land Use**	**Area** (ha)	**Area** (m^2)	**P coeff (kg/ha)**	**P Load (kg/yr)**
Post Site-Developed (North Area)	Residential	0.41	4,100	2.28	0.93
Post Site-Landscape (South Area)	Residential	1.08	10,800	2.17	2.34
[2]Untreated Area	Low Intensity Residential	1.07	10,700	0.13	0.14
Total		**2.56**	**25,600**		**3.41**

Note:
1. Phosphorus Coefficient for Residential Development calculated per Equation 3 of the Hutchinson Phosphorus Report for the NVCA Phosphorus Tool.
2. Untreated Area consists primarily of untouched land or pervious grass with a portion of rooftop area

Project: Wyldwood Creek Development
Project No.: 1535-4897
Created By: IB
Checked By: ML
Date: 2021.03.30

Post-Development Phosphorus Loading with Mitigation

Parameter	North Area	South Area	Unit	
Total Phosphorus Concentration	0.41	0.41	kg/yr	(Per Hutchinson Report Table 8, residential)
Total Annual Precipitation	992	992	mm/yr	Water Balance Calculation
Total Precipitation Runoff	703	686	mm/yr	Water Balance Calculation
Fraction Runoff	0.71	0.69		
% Impervious	0.83	0.8		
Runoff Coefficient (Rv)	0.79	0.77		
Phosphorus Coefficient	**2.28**	**2.17**	kg/ha/yr	

Post - Development Conditions With Mitigation							
Catchment	**Land Use**	**Area** (ha)	**P coeff (kg/ha)**	**P Load (kg/yr)**	**Mitigation Applied**	**Reduction Factor**	**P Load With BMPs (kg/yr)**
Post Site-Developed (North Area)	Residential	0.41	2.28	0.93	Storm Filter	0.77	0.21
Post Site-Developed (South Area)	Residential	1.08	2.17	2.34	Storm Filter	0.77	0.54
Untreated Area	Low Intensity Residential	1.07	0.13	0.14	None	0.00	0.14
Total - Site		**2.56**		**3.41**			**0.89**

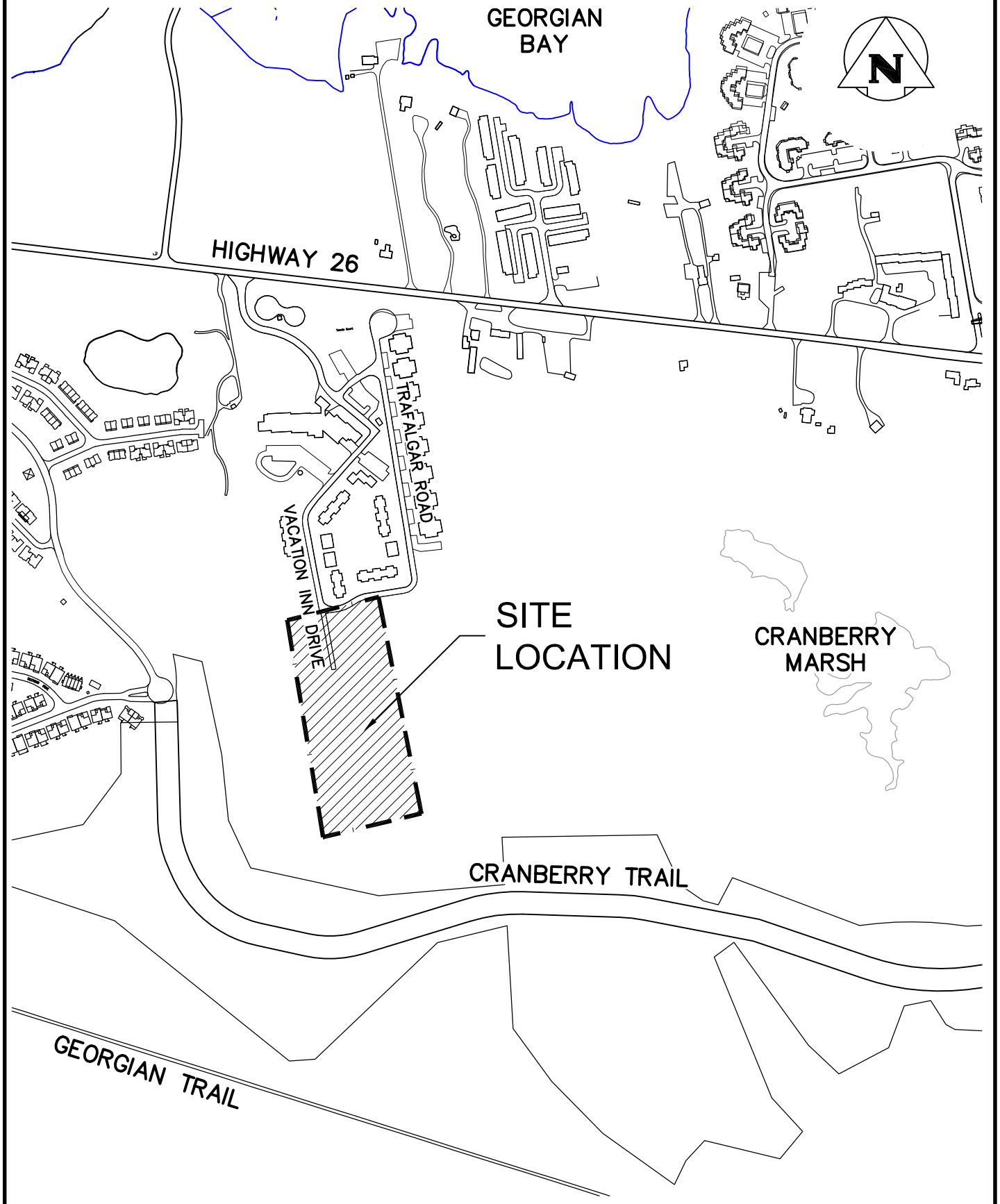
Total Post-Development Load Without BMPs **3.41 kg/yr**

Total Post-Development Load With BMPs **0.89 kg/yr**

Notes:

1. Phosphorus Coefficient for Residential Development calculated per Equation 3 of the Hutchinson Phosphorus Report for the NVCA Phosphorus Tool.
2. Phosphorus Coefficient for Low Intensity Residential identified in NVCA Phosphorus Loading Tool & Hutchinson Report. Used as the contributing area consists of rooftops and landscape areas.
3. Precipitaion values per water balance calculations.
4. Reduction factors identified in NVCA Phosphorus Loading Tool

FIGURES & DRAWINGS



Legend

= SUBJECT LANDS

Project

WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

Drawing

SITE LOCATION

CROZIER CONSULTING ENGINEERS
The HarbourEdge Building,
40 Huron Street, Suite 301,
Collingwood, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
www.cfcrozier.ca
info@cfcrozier.ca

Drawn By	Design By	Project
L.W.	L.W.	1519-4897

Scale	Date	Check By	Drawing
N.T.S.	01/29/2019	R.A.	FIG. 1

J:\1500\1535-Brandy Lane Corp\4897-Georgian Bay Hotel South Block\CAD\Civil_Sheets\4897_FIG.1.dwg, FIG. 1, 1/29/2019 12:03:43 PM, lwaters

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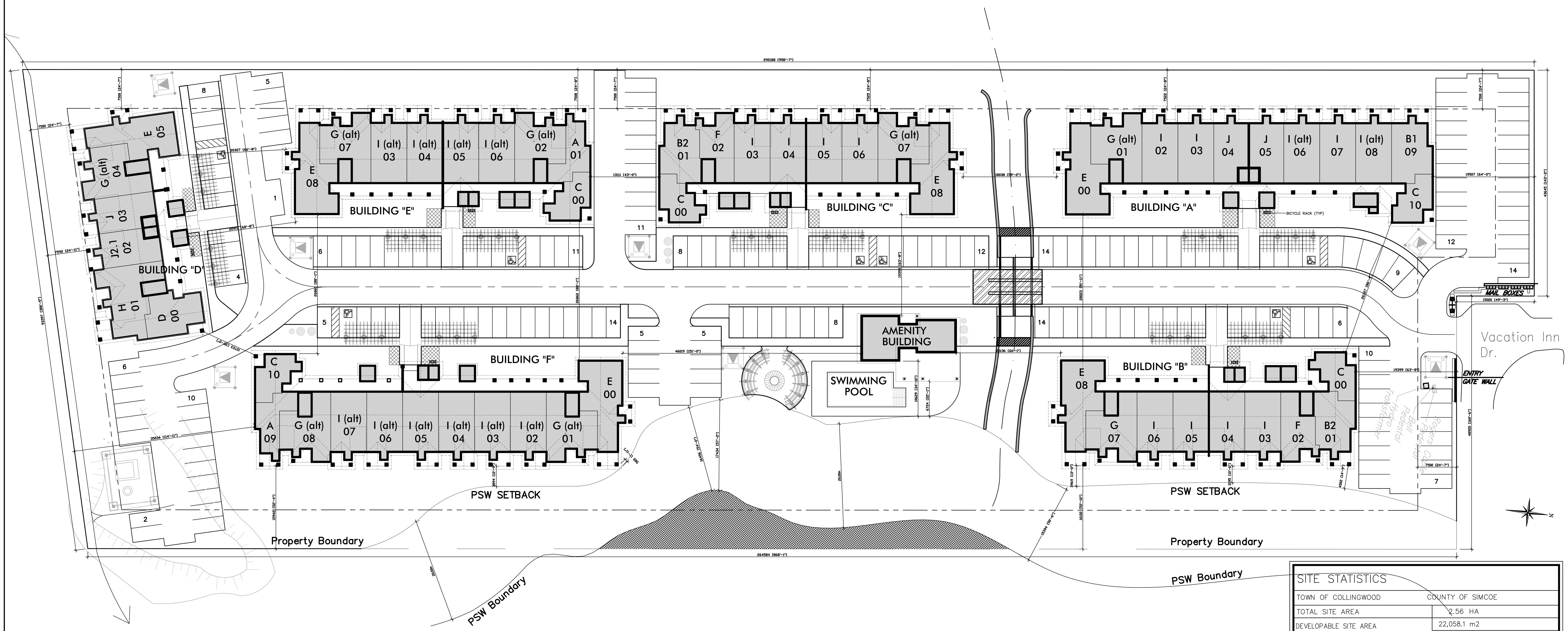
THE CONTRACTOR SHALL CHECK ALL DIMENSIONS AND REPORT DISCREPANCIES TO THE ARCHITECT.

ALL DIMENSIONS ARE GIVEN IN MILLIMETRES UNLESS OTHERWISE INDICATED.

DO NOT SCALE DRAWINGS.

REVISIONS AND DISTRIBUTION LOG

No.	Date	Note
1	2019/02/04	ISSUED FOR SITE PLAN APPROVAL
2	2021/04/05	RE-ISSUED FOR SITE PLAN APPROVAL
3		
4		
5		
6		
7		
8		



SITE STATISTICS

TOWN OF COLLINGWOOD	COUNTY OF SIMCOE	
TOTAL SITE AREA	2.56 HA	
DEVELOPABLE SITE AREA 41% of Developable Area is Landscape/ Open Space Revised Site Plan per Proposed Variable Buffer Zone and 16m Building Setback from East Property Line	22,058.1 m2	
VARIABLE BUFFER ZONE	2,988.4 m2	
EXISTING PSW	442.2m²	
BUILDING COVERAGE	5,520.53 m2	25.03%
LANDSCAPE AREA	8,221.24 m2	41%
OPEN SPACE	822.58 m2	
PAVED AREA	7,493.75 m2	33.97%
RECREATION BLOCK Amenity Space/Building (20m²/ Building) (Includes: Bench/Garbage Receptacle/Bike Rack)	782.0 m2	
GROSS BUILDING AREA	16,491.755 m2	
BUILDING HEIGHT (FROM FINISHED FRONT GRADE TO HIGHEST ROOF RIDGE)	13.580 m	
NUMBER OF UNITS	165	
BUILDING CODE CLASSIFICATION (3 STOREY BUILDING HEIGHT, BUILDING AREA NOT TO EXCEED 600 M2)	GROUP C RESIDENTIAL	
RESIDENT PARKING REQUIRED (1.00 x 165 UNITS) = 165 SPACES		
VISITOR PARKING REQUIRED (0.25 x 165 UNITS) = 41.25 SPACES		
TOTAL PARKING PROVIDED = 207 SPACES		
MINIMUM PARKING STALL SIZE 2.75M X 6.00M = 16.5 M2 BARRIER-FREE PARKING STALL SIZE 4.5M X 6.00M = 27 M2		
BICYCLE PARKING PROVIDED = 72 SPACES		

1 SITE PLAN
A100 SCALE: 1:300 REF DWG: N/A

WYLDEWOOD Creek

CMV GROUP architects

247 Spadina Avenue, 4th floor
Toronto, Ontario
M5T 3A8
www.smvarch.com

T 416.506.1600 F 416.506.0956

Seal: ONTARIO ASSOCIATION OF ARCHITECTS DANIEL L. COWLING LICENCE 5403

Project:
WYLDEWOOD CREEEK DESIGN DEVELOPMENT
WYLDEWOOD DEVELOPMENT CORPORATION

COLLINGWOOD ONTARIO

Drawing Title:
SITE PLAN

Drawn By:	Checked By:	Date Checked:	Project No.
	CMV		18A143

Date Plotted: Apr 06, 2021 - 12:36pm

Scale: AS NOTED

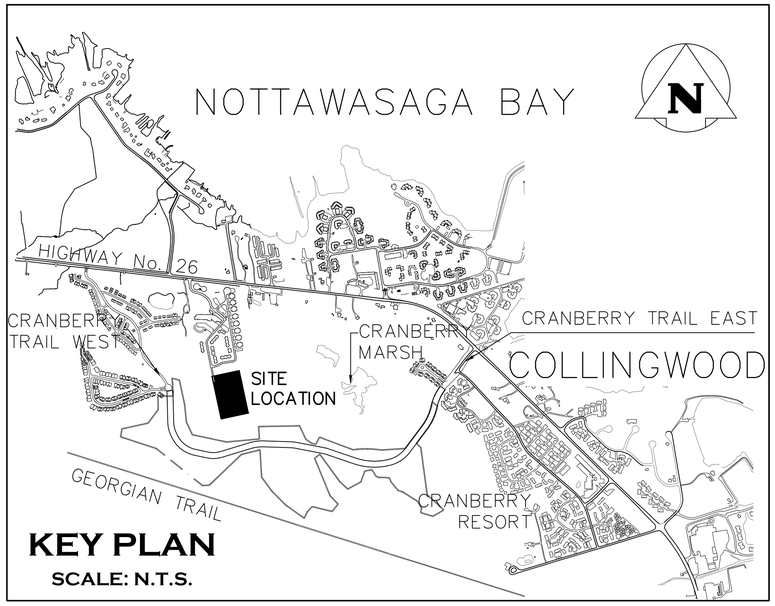
Drawing No.: A100

Revision No.: 2

WYLDEWOOD CREEK

TOWN OF COLLINGWOOD

COUNTY OF SIMCOE



DRAWING	TITLE
C100	COVER SHEET
C101	GENERAL SITE SERVICING PLAN
C102.A	OVERALL SITE GRADING PLAN (NORTH)
C102.B	OVERALL SITE GRADING PLAN (SOUTH)
C103.A	PLAN & PROFILE STREET 'A' (STA. 0+000 – 0+288.22)
C103.B	PLAN & PROFILE SERVICING EASEMENT
C104	CHANNEL PLAN & PROFILE AND GRADING DETAILS
C105	CULVERT CROSSING NOTES AND DETAILS
C106	SANITARY DRAINAGE PLAN
C107	STORM DRAINAGE PLAN
C108	EROSION AND SEDIMENT CONTROL PLAN
C109	CONSTRUCTION NOTES & STANDARD DETAILS
C110	COMPOSITE UTILITY PLAN
C111	CONSTRUCTION ACCESS ROAD PLAN
C112	WATER DISTRIBUTION PLAN
E100	SITE PLAN – PHOTOMETRIC
E101	SITE LIGHTING DETAILS
LP1–6	LANDSCAPE PLANS
LD1–2	LANDSCAPE DETAILS

MUNICIPALITY

TOWN OF COLLINGWOOD
97 HURONTARIO STREET, P.O. BOX 157
COLLINGWOOD, ONTARIO, L9Y 3Z5

DEVELOPER

BRANDY LANE CORPORATION
4580 DUFFERIN STREET, SUITE 307
TORONTO, ONTARIO, M3H 5Y2

DEVELOPER'S ENGINEER AND LANDSCAPE ARCHITECT

CROZIER CONSULTING ENGINEERS
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
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WWW.CFCROZIER.CA
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ARCHITECT

CMV GROUP ARCHITECTS
247 SPADINA AVENUE, 4TH FLOOR
TORONTO, ONTARIO, M5T 3A8

Town

MASTER LEGEND

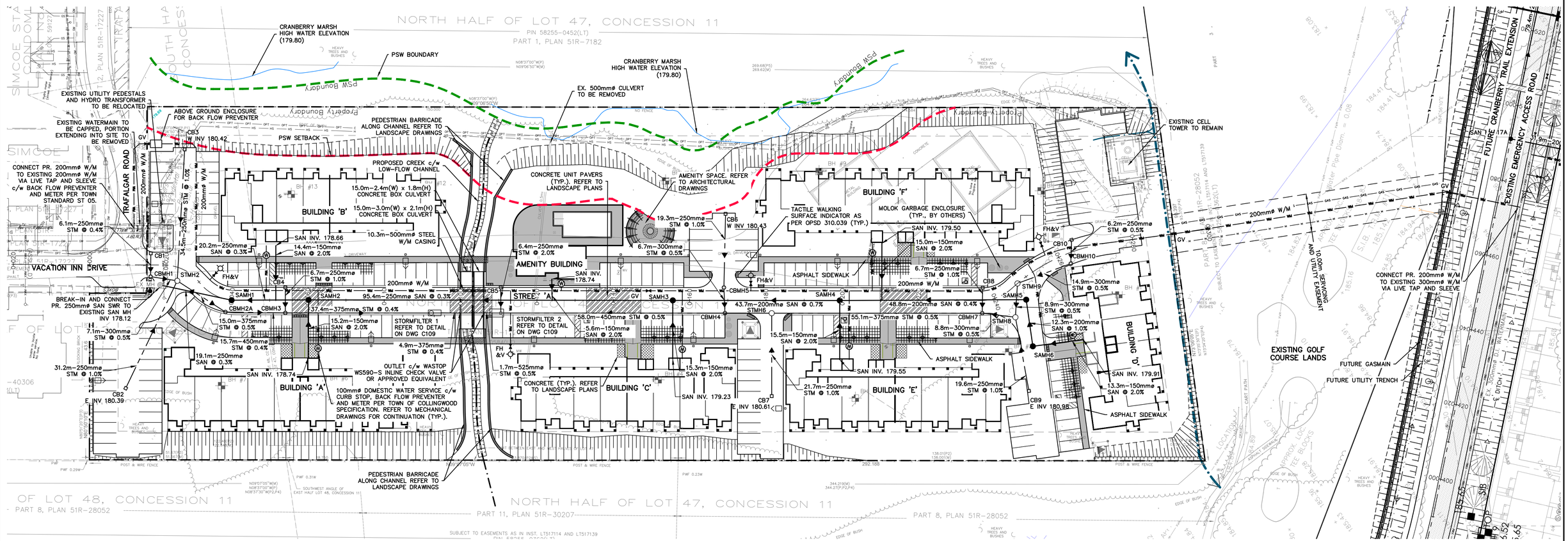
EXISTING FEATURES (EX.)

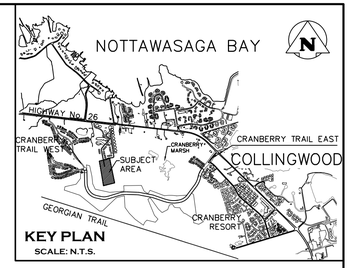
- EX. CONTOUR
- EX. GRADE
- EX. TREELINE
- EX. WATERCOURSE
- EX. DITCH
- EX. WATERMAIN
- EX. WATER SERVICE
- EX. FIRE HYDRANT & VALVE
- EX. SANITARY SEWER & MANHOLE
- EX. SANITARY FORCEMAIN
- EX. SANITARY SERVICE
- EX. STORM SEWER & MANHOLE
- EX. STORM CATCHBASIN
- EX. STORM DOUBLE CATCHBASIN
- EX. STORM CATCHBASIN MANHOLE
- EX. STORM DOUBLE CATCHBASIN MANHOLE
- EX. GAS MAIN
- EX. BELL LINE
- EX. BELL PEDESTAL
- EX. CABLE TELEVISION PEDESTAL
- EX. HYDRO POLE
- EX. LIGHT STANDARD
- EX. SIGN
- EX. BUILDING
- EX. BENCHMARK NUMBER & LOCATION
- EX. BOREHOLE NUMBER & LOCATION

PROPOSED FEATURES (PR.)

- PR. PROPERTY LIMITS
- PR. ELEVATION
- PR. ELEVATION (MATCH EX. ELEVATION)
- PR. SWALE & SLOPE
- PR. DITCH DRAINAGE
- PR. WATERMAIN & VALVE
- PR. WATER SERVICE
- PR. FIRE HYDRANT & VALVE
- PR. WATER VALVE CHAMBER
- PR. WATER QUALITY TESTING STATION
- PR. SANITARY SEWER & MANHOLE
- PR. SANITARY FORCEMAIN
- PR. SANITARY CATCHMENT
- CATCHMENT AREA ID
- AREA (ha)
- POPULATION (3.5 p.p.u.)
- PR. STORM SEWER & MANHOLE
- PR. CATCHBASIN
- PR. DOUBLE CATCHBASIN
- PR. CATCHBASIN MANHOLE
- PR. DOUBLE CATCHBASIN MANHOLE
- PR. STORM CATCHMENT
- CATCHMENT AREA ID
- RUNOFF COEFFICIENT
- DRAINAGE AREA (ha)
- PR. CURB CUT
- PR. CANADA POST COMMUNITY MAIL BOX
- PR. TRANSFORMER AND GROUNDING GRID
- PR. STREET LIGHT
- PR. STOP SIGN
- PR. NAME SIGN
- PR. NO PARKING SIGN
- PR. FENCE
- PR. BUILDING ENVELOPE
- PR. LIGHT DUTY SILT FENCE
- PR. HEAVY DUTY SILT FENCE
- PR. STRAW BALE CHECK FLOW
- PR. ROCK CHECK DAM
- PR. SLOPE (3:1 MAX.)
- PR. TREE PRESERVATION AREA
- PR. TOPSOIL STOCKPILE LOCATION

PROJECT No.: 1535-4897
2ND SUBMISSION





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BENCHMARKS

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE RELATED TO TOWN OF COLLINGWOOD BENCH MARK NO. 001720311 HAVING AN ELEVATION OF 181.032 METRES.

TOPOGRAPHIC SURVEY COMPLETED BY KRCMAR SURVEYORS LTD., DATED AUGUST 25, 2018.

Town

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR 1st ENGINEERING SUBMISSION	02/04/2019
2	ISSUED FOR DISCUSSION	02/10/2020
3	ISSUED FOR 2nd ENGINEERING SUBMISSION	04/08/2021

Engineer

Engineer

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Project
WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

Drawing
GENERAL SITE SERVICING PLAN

CROZIER CONSULTING ENGINEERS
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
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705 446-3520 F
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Drawn By	L.W.	Design By	L.W.	Project	1535-4897
Check By	K.M.	Check By	R.A.	Scale 1:500	Drawing C101

J:\1500\1535-Brandy Lane Corp\4897-Georgian Bay Hotel South Block\CAD\Civil_Sheets\4897_C101 GEN.dwg, C101, 2021-04-08 5:06:42 PM, jpereira

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BENCHMARKS

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE RELATED TO TOWN OF COLLINGWOOD BENCH MARK NO. 00172U311 HAVING AN ELEVATION OF 181.032 METRES.

TOPOGRAPHIC SURVEY COMPLETED BY KRCMAR SURVEYORS LTD., DATED AUGUST 25, 2018.

Town

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR 1st ENGINEERING SUBMISSION	02/04/2019
2	ISSUED FOR DISCUSSION	02/10/2020
3	ISSUED FOR 2nd ENGINEERING SUBMISSION	04/08/2021

Engineer

Engineer

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Project: WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

Drawing: OVERALL SITE GRADING PLAN
(NORTH)

CROZIER CONSULTING ENGINEERS
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
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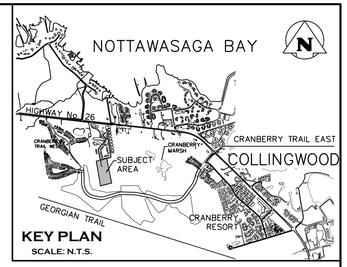
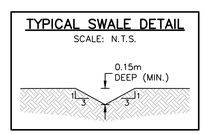
705 446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	L.W.	Design By	L.W.	Project	1535–4897
Check By	K.M.	Check By	R.A.	Scale 1:250	Drawing C102.A



TYPICAL SWALE DETAIL
SCALE: N.T.S.



NOTE:
ALL GRADE ELEVATIONS ARE BOTTOM OF CURB UNLESS OTHERWISE NOTED.

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BENCHMARKS

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE RELATED TO TOWN OF COLLINGWOOD BENCH MARK NO. 00172U311 HAVING AN ELEVATION OF 181.032 METRES.

TOPOGRAPHIC SURVEY COMPLETED BY KRCMAR SURVEYORS LTD., DATED AUGUST 25, 2018.

Town

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR 1st ENGINEERING SUBMISSION	02/04/2019
2	ISSUED FOR DISCUSSION	02/10/2020
3	ISSUED FOR 2nd ENGINEERING SUBMISSION	04/08/2021

Engineer

Engineer

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

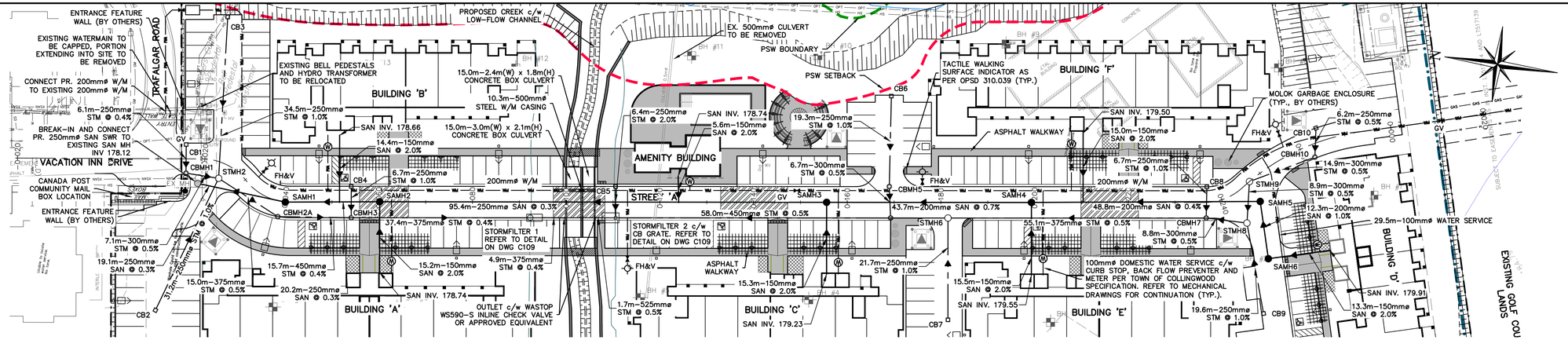
Project
WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

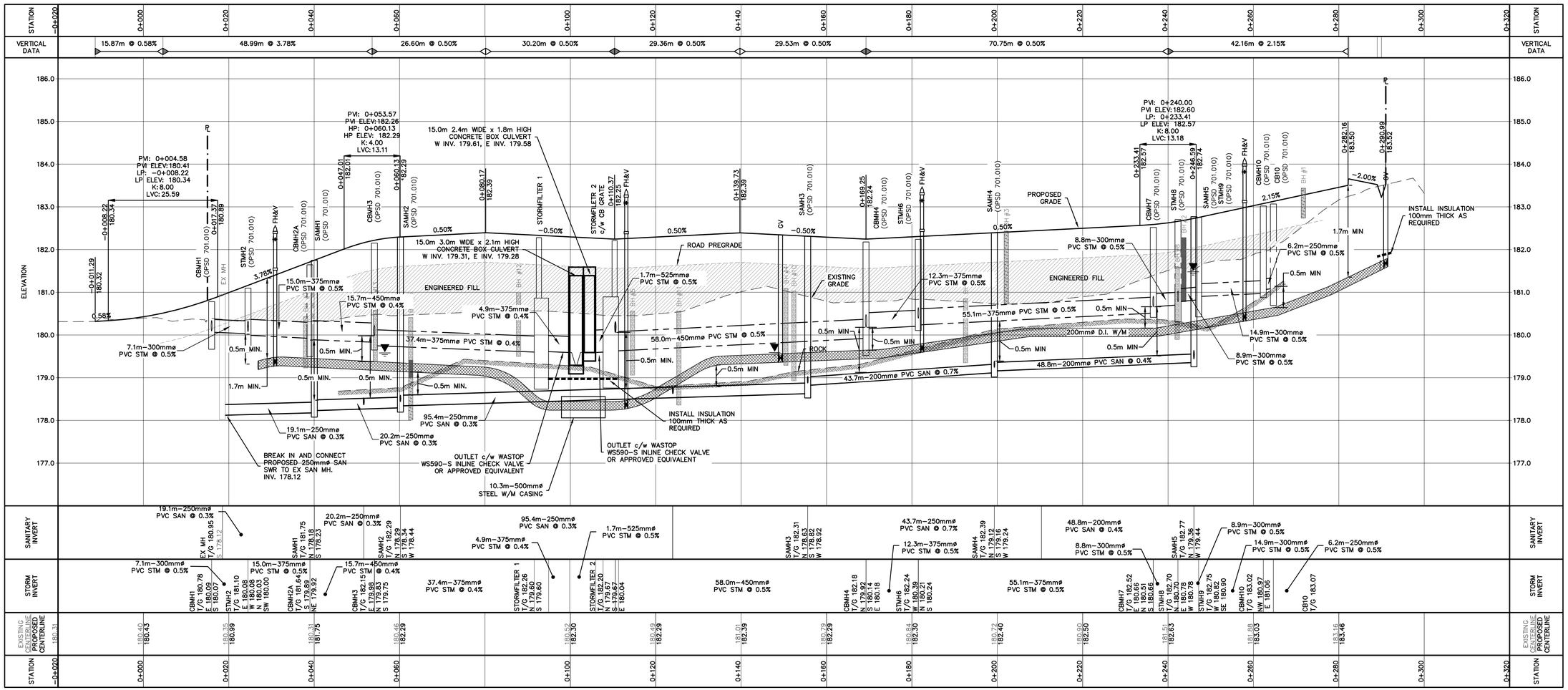
Drawing
OVERALL SITE GRADING PLAN
(SOUTH)

CROZIER
CONSULTING ENGINEERS
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	Design By	Project	
L.W.	L.W.		1535–4897
Check By	Check By	Scale	Drawing
K.M.	R.A.	1: 250	C102.B

J:\1500\1535-Brandy Lane Corp\4897-Georgian Bay Hotel South Block\CAD\Civil_Sheets\4897_C102 GRAD.dwg, C102.B, 2021-04-08 5:08:33 PM, jpereira





BOREHOLE LEGEND

- BH # — BOREHOLE I.D.
- TOPSOIL
- SAND
- APPROX. SEASONAL HIGH GROUND WATER LEVEL
- SILTY SAND TILL
- EARTH FILL

GEOTECHNICAL INVESTIGATION COMPLETED BY SOIL ENGINEERS LTD. DATED SEPTEMBER 2018.

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BENCHMARKS

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE RELATED TO TOWN OF COLLINGWOOD BENCH MARK NO. 00172U311 HAVING AN ELEVATION OF 181.032 METRES.

TOPOGRAPHIC SURVEY COMPLETED BY KRCMAR SURVEYORS LTD., DATED AUGUST 25, 2018.

Town

No.	ISSUE	DATE: MM/DD/YYYY
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3	ISSUED FOR 2nd ENGINEERING SUBMISSION	04/08/2021

Engineer

Engineer

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Project
WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

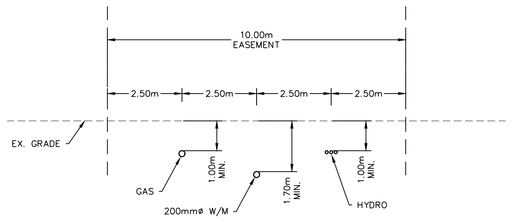
Drawing
PLAN & PROFILE STREET 'A'
(STA 0+000 – 0+288.22)

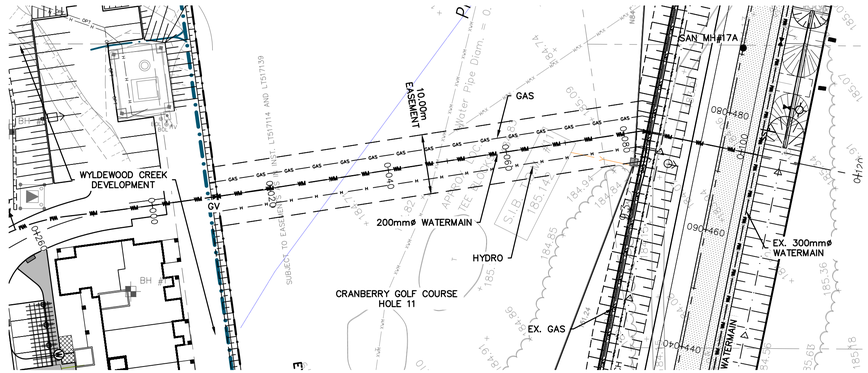
CROZIER CONSULTING ENGINEERS
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

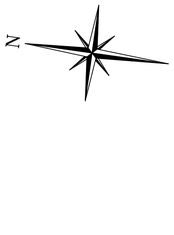
Drawn By	Design By	Project	
L.W.	L.W.		1535–4897
Check By	Check By	Scale H 1:500 V 1:50	Drawing C103.A
K.M.	R.A.		

J:\1500\1535-Brandy Lane Corp\4897-Georgian Bay Hotel South Block\CAD\Civil_Sheets\4897_C103 P&P.dwg, C103.A, 2021-04-08 5:10:36 PM, jpereira

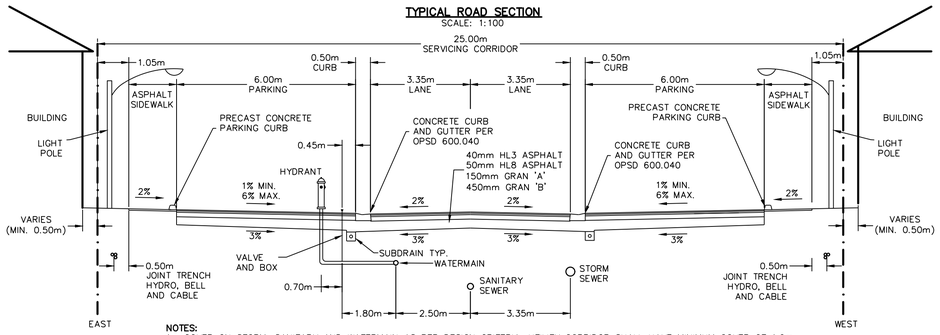
TYPICAL SERVICING EASEMENT CROSS SECTION
SCALE 1:100



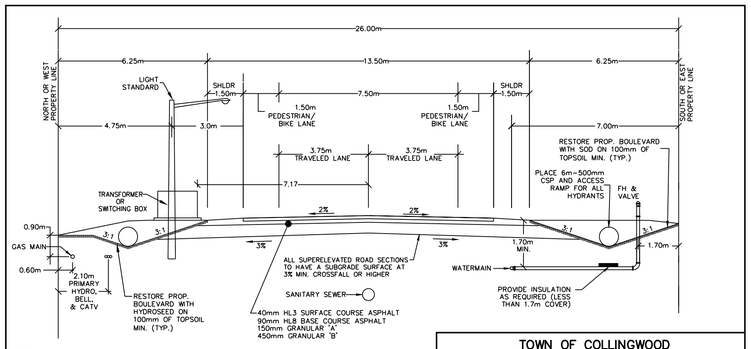




TYPICAL ROAD SECTION
SCALE: 1:100



NOTES:
1. COVER ON STORM, SANITARY AND WATERMAIN AS PER DESIGN CRITERIA. UTILITY CORRIDOR SHALL HAVE MINIMUM COVER OF 1.0m.
2. MINIMUM PAVEMENT AND ROAD STRUCTURE DESIGN AS PER TOWN DESIGN CRITERIA OR AS PER GEOTECHNICAL INVESTIGATION RECOMMENDATION.
3. TREES TO BE PLACED IN LOCATIONS AS PER APPROVED LANDSCAPE PLAN.
4. ACTIVELY GROWING NURSERY SOD TO BE LAID ON 150mm TOPSOIL PROPERLY GRADED AND ROLLED.
5. HYDRANTS AND WATERMAINS TO BE ON OPPOSITE SIDE OF ROAD FROM ELECTRICAL TRANSFORMERS.
6. SUBDRAINS TO BE INSTALLED AS PER OPSD 216.021.
7. ALL SERVICE LOCATIONS SHOWN ARE FOR GUIDELINE PURPOSES ONLY AND MAY DEVIATE AS PER THE DIRECTION OF THE TOWN WHEN STANDARD LOCATION CANNOT BE ACHIEVED.
8. GASMAIN TO BE INSTALL IN THE REAR OF THE BUILDINGS.
9. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN.

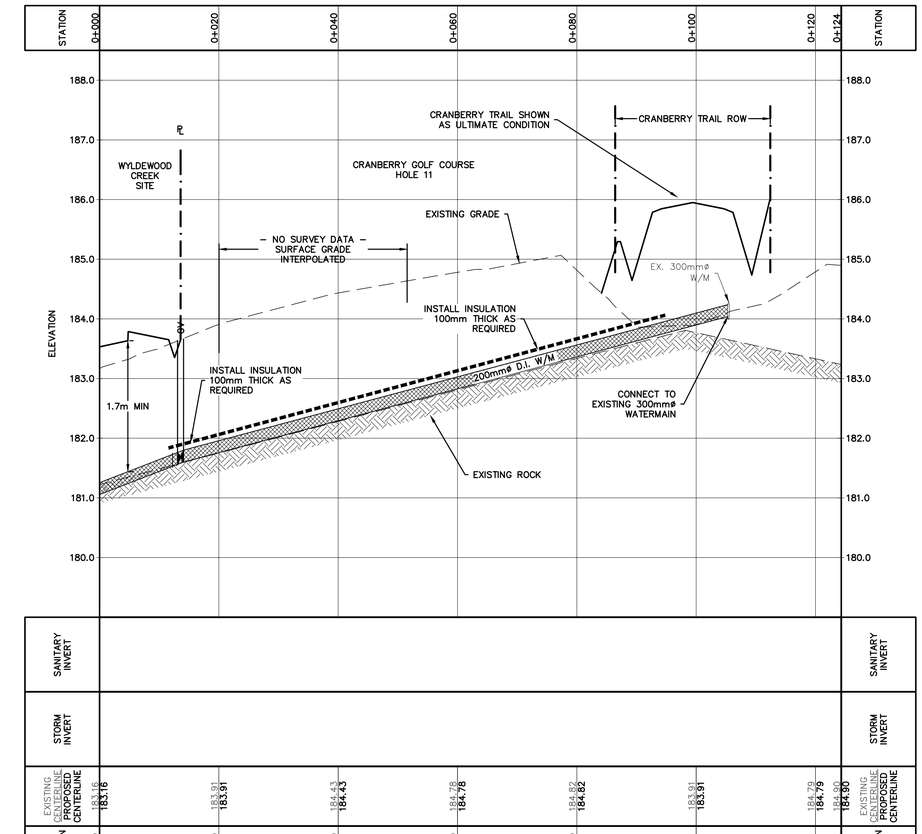


NOTES:
1. COVER ON STORM, SANITARY & WATERMAIN AS PER DESIGN CRITERIA. UTILITY CORRIDOR SHALL HAVE A MINIMUM COVER OF 0.9m.
2. THE SUPERELEVATION ROAD SECTIONS TO HAVE A MINIMUM 3% CROSS FALL SURFACE OR HIGHER.
3. MINIMUM PAVEMENT & ROAD STRUCTURE DESIGN AS PER TOWN DESIGN CRITERIA OR AS PER GEOTECHNICAL INVESTIGATION RECOMMENDATIONS.
4. TREES TO BE PLACED IN LOCATIONS AS PER APPROVED LANDSCAPE PLAN.
5. ACTIVELY GROWING NURSERY SOD TO BE LAID ON 100mm TOPSOIL PROPERLY GRADED AND ROLLED.
6. ALL SERVICE LOCATIONS SHOWN ARE FOR GUIDELINE PURPOSES ONLY AND MAY DEVIATE AS PER THE DIRECTION OF THE TOWN WHEN STANDARD LOCATION CANNOT BE ACHIEVED.
7. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN.
8. DELINEATION BETWEEN TRAVELED LANE AND BIKE PATH TO BE FINISHED WITH A 0.10m WIDE SOLID WHITE PAINTED LINE. ALL PAINT MARKINGS PER OTM – BOOK 11.
9. CENTERLINE OF TRAVELLED LANES TO BE 0.10m WIDE SOLID YELLOW PAINTED LINE PER OTM – BOOK 11.

TOWN OF COLLINGWOOD

CRANBERRY TRAIL
RURAL ROAD
MODIFIED 26m ROW CROSS-SECTION
STA 0+616 – 0+924

SCALE:	NTS	CHECKED: I.T.M.	DATE: SEPT. 2008
DRAWN:	J.R.S.	DRAWING: COLLINGWOOD–26m–CRANBERRY TRAIL	



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BENCHMARKS

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TOPOGRAPHIC SURVEY COMPLETED BY KRCMAR SURVEYORS LTD., DATED AUGUST 25, 2018.

Town

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Engineer

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

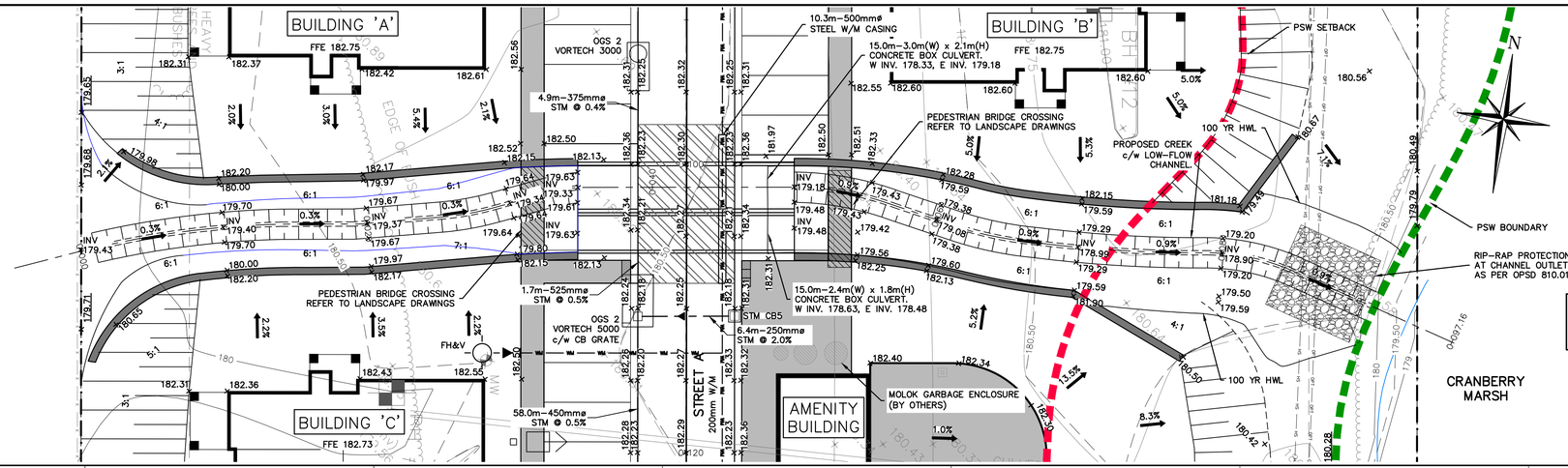
Engineer

Project: WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

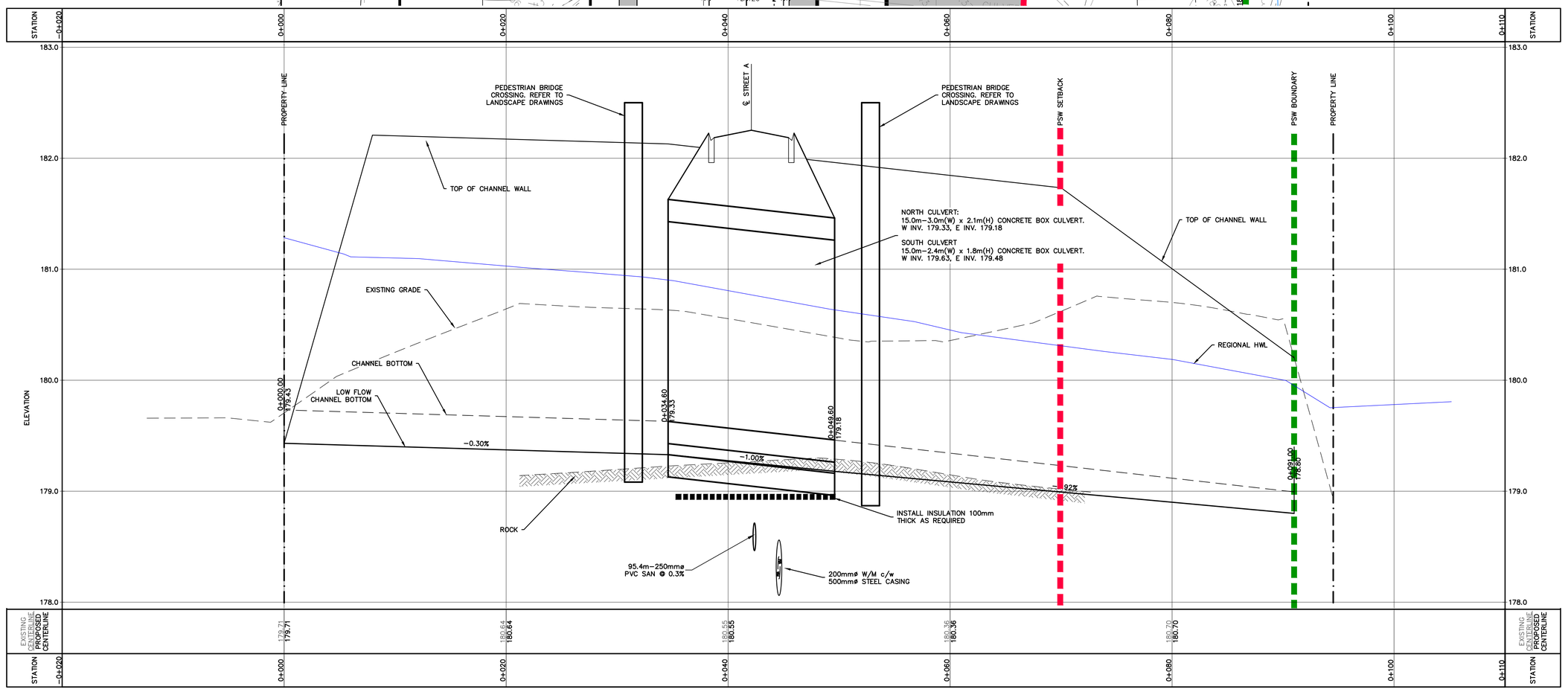
Drawing: PLAN & PROFILE
SERVICING EASEMENT

CROZIER CONSULTING ENGINEERS
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	Design By	Project	
L.W.	L.W.	1535–4897	
Check By	Check By	Scale H 1:500 V 1:50	Drawing C103.B
K.M.	R.A.		



NOTE:
GRADING AND RIP–RAP EROSION PROTECTION AT CHANNEL OUTLET TO BE FIELD FIT TO ENSURE POSITIVE DRAINAGE TO CRANBERRY MARSH



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Engineer

Engineer

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Project
WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

Drawing
CHANNEL PLAN & PROFILE
AND GRADING DETAILS

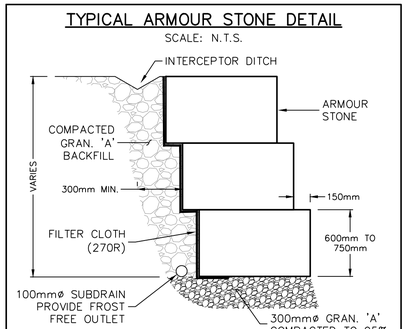
CROZIER CONSULTING ENGINEERS
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	Design By	Project	
L.W.	L.W.		1535–4897
Check By	Check By	Scale H 1: 200 V 1:20	Drawing
K.M.	R.A.		C104

J:\1500\1535-Brandy Lane Corp\4897-Georgian Bay Hotel South Block\CAD\Civil_Sheets\4897_C104 CREEK.dwg, C104, 2021-04-08 5:13:04 PM, jpereira

TYPICAL ARMOUR STONE DETAIL

SCALE: N.T.S.

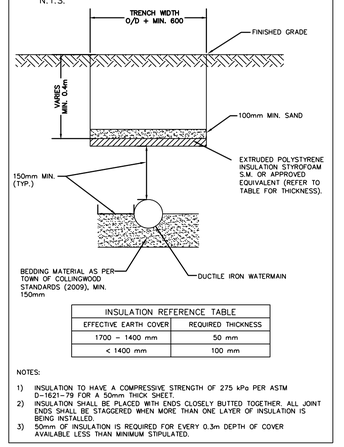


NOTES

1. CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR RETAINING WALL SYSTEM C/W STRUCTURAL ENGINEER'S SEAL

INSULATION FOR WATERMAIN

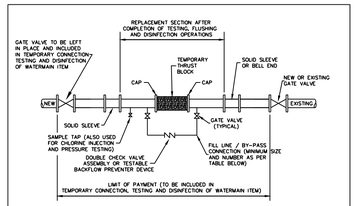
N.T.S.



INSULATION REFERENCE TABLE	
EFFECTIVE EARTH COVER	REQUIRED THICKNESS
1700 – 1400 mm	50 mm
< 1400 mm	100 mm

NOTES:

1) INSULATION TO HAVE A COMPRESSIVE STRENGTH OF 275 kPa PER ASTM D-1621-79 FOR A 50mm THICK SHEET.
2) INSULATION SHALL BE PLACED WITH ENDS CLOSELY BUTTED TOGETHER. ALL JOINT ENDS SHALL BE STAGGERED WHEN MORE THAN ONE LAYER OF INSULATION IS BEING INSTALLED.
3) 50mm OF INSULATION IS REQUIRED FOR EVERY 0.3m DEPTH OF COVER AVAILABLE LESS THAN MINIMUM STIPULATED.



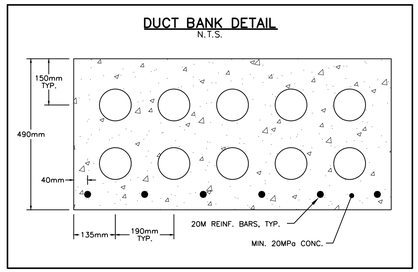
NTS

PIPE DIAMETER	FLOW REQUIRED TO PRODUCE 0.76m/s (APPROX) VELOCITY IN MAIN	SIZE OF TAP (mm)			NUMBER OF OPEN 64mm HYDRANT OUTLETS
		25	38	51	
mm	l/s	NUMBER OF TAPS ON PIPE			
100	6.3	1	–	–	1
150	12.6	–	1	–	1
200	25.2	–	2	1	1
250	37.9	–	3	2	1
300	56.8	–	–	2	2
400	109.9	–	–	4	2

REQUIRED FLOW AND OPENINGS TO FLUSH PIPELINES (276 kPa/40 PSI RESIDUAL PRESSURE IN WATERMAIN)

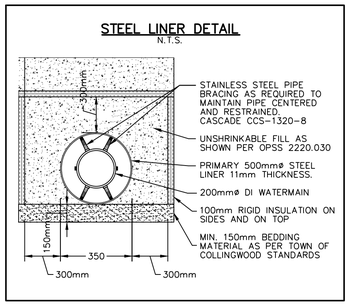
DUCT BANK DETAIL

N.T.S.



STEEL LINER DETAIL

N.T.S.

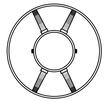


CASING SPACERS

- CASCADE: CCS – 1320-8 (OR APPROVED EQUAL)

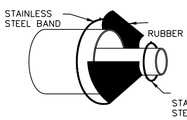
NOTES:

1. CONTRACTOR TO SUBMIT SHOP DRAWINGS OF MATERIAL AND INSTALLATION METHODOLOGY FOR REVIEW AND APPROVAL.
2. ALL CASING SPACERS ARE TO BE MADE OF T-304 STAINLESS STEEL.
3. BEARING SURFACES (RUNNERS) SHALL BE ULTRA HIGH MOLECULAR WEIGHT POLYMER OR EQUIVALENT.
4. POSITIONING OF SPACERS ALONG THE WATERMAIN IS TO BE AS PER MANUFACTURER'S SPECIFICATIONS.
5. POSITION OF WATERMAIN WITHIN LINER TO BE CENTERED AND RESTRAINED, SUFFICIENT ENOUGH TO PROVIDE NO LESS THAN 19mm (¾") CLEARANCE BETWEEN THE CASING PIPE AND THE OUTSIDE DIAMETER OF THE BELL.



CENTERED & RESTRAINED

6. WATERMAIN SHALL BE RESTRAINED LATERALLY FOR THE ENTIRE LENGTH OF THE LINER PLUS ONE FULL PIPE LENGTH BEYOND END OF CASING.
7. LINER TO BE SEALED USING WRAP AROUND RUBBER ENDS COMPLETE WITH STAINLESS STEEL (T-304) BANDING.



GENERAL CONSTRUCTION SCHEDULE

1. IN STREAM WORKS TO COMPLY WITH NVCA TIMING GUIDELINES AND ASSOCIATED PERMITTING.
2. MAINTAIN TEMPORARY WATER MANAGEMENT WORKS AND OVERLAND SPILL ROUTE PRIOR TO ANY EXCAVATION.
3. COMPLETE ASSOCIATED SEDIMENT CONTROLS, CULVERT AND UNDERGROUND SERVICES ENSURING WORKING IN THE DRY AT ALL TIMES.

GENERAL NOTES

1. ALL WORK TO BE PERFORMED IN DRY DEWATERED CONDITIONS USING APPROVED WATER MANAGEMENT PLAN.
2. NO MAINTENANCE OR REPAIR WORK ON CONSTRUCTION EQUIPMENT IS ALLOWED WITHIN 30 METRES OF WATERCOURSE.
3. ALL SEDIMENT & EROSION CONTROL FACILITIES AND WORKS ARE TO BE CONSTRUCTED AND IN PLACE TO THE APPROVAL OF THE SITE ENGINEER PRIOR TO EXCAVATION WORKS COMMENCING.
4. ALL TEMPORARY SOIL OR DIRT TO BE STOCKPILED PER DESIGNATED AREAS.
5. FLOW INFORMATION PROVIDED HEREIN CONCERNING CRANBERRY MARSH OUTLET FOR CONTRACTOR USE ONLY.
6. THE SEDIMENT & EROSION CONTROLS SPECIFIED HEREIN DO NOT NECESSARILY CONSTITUTE ALL MEASURES REQUIRED GIVEN FIELD CONDITIONS. CONTRACTOR TO PROVIDE ANY SUPPLEMENTARY SEDIMENT & EROSION CONTROL MEASURES AS REQUIRED TO ENSURE NO RELEASE OF DELETERIOUS SUBSTANCES TO WATERCOURSE.

GENERAL BRIDGE NOTES

1. FOOTING DETAILS (DIMENSIONS & REINFORCING) FOR MUNICIPAL APPROVAL PROCESS ONLY. ACTUAL SIZE OF FOOTINGS AND REINFORCING AS PER DESIGN BY CONTRACTOR.
2. FOOTINGS ARE ASSUMED TO BE FOUNDED ON BEDROCK; CONTRACTOR TO CONFIRM IN FIELD.
3. DESIGN IN ACCORDANCE WITH THE CANADIAN HIGHWAY BRIDGE DESIGN CODE (CAN/CSA-S6-06).
4. CONTRACTOR IS TO EXPOSE THE BEDROCK AROUND THE PROPOSED FOOTING FOR REVIEW BY GEOTECHNICAL ENGINEER. ANY LOOSE OR DELETERIOUS MATERIALS SHALL BE REMOVED AT THE DIRECTION OF THE GEOTECHNICAL ENGINEER.
5. CLASS OF CAST-IN-PLACE CONCRETE = 30 MPa.
6. CLEAR COVER TO REINFORCING:
   FOOTINGS = 100±25
   DISTRIBUTION SLAB = AS NOTED ON DWG.
7. BAR MARKS WITH SUFFIX 'C' DENOTE COATED BARS.
8. REINFORCING BARS SHALL BE GRADE 400 MPa.
9. CONTRACTOR TO PROVIDE MIN. 0.75m GRANULAR ABOVE CULVERT STRUCTURE DURING CONSTRUCTION.

REQUIREMENTS FOR THE CONTRACTOR

1. PROVIDE STAMPED SHOP DRAWINGS INDICATING THAT THE BRIDGE STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE CANADIAN HIGHWAY BRIDGE DESIGN CODE (CHBDC) (CAN/CSA-S6-06). CONTRACTOR TO ALSO PROVIDE COPIES OF ALL SHOP DRAWINGS TO THE TOWN FOR THEIR RECORDS.
2. SUBMISSION SHALL INCLUDE DETAILS ON REACTION LOADS, BOTH HORIZONTAL & VERTICAL, TO RE RESISTED BY FOUNDATION AS WELL AS DETAILS ON PROPOSED ANCHORAGE FOR CULVERT & FOOTINGS.
3. ENSURE THAT THE SHOP DRAWINGS ARE SPECIFIC TO THIS CONTRACT, AND REFERENCED TO CFCA PROJECT No. 1535-4897, AND NOT A "STOCK ITEM".
4. ENSURE THAT SHOP DRAWINGS SHOW AND SPECIFY ALL JOINT FILLERS, SEALS AND COMPOUNDS, GROUT, AND GEOTEXTILE INSTALLATIONS AND APPLICATIONS.

BENCHMARKS

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE RELATED TO TOWN OF COLLINGWOOD BENCH MARK NO. 00172U311 HAVING AN ELEVATION OF 181.032 METRES.

TOPOGRAPHIC SURVEY COMPLETED BY KRCMAR SURVEYORS LTD., DATED AUGUST 25, 2018.

Town

No.	ISSUE	DATE: MM/DD/YYYY
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3	ISSUED FOR 2nd ENGINEERING SUBMISSION	04/08/2021

Engineer

Engineer

FOR APPROVAL

NOT TO BE USED FOR CONSTRUCTION

Project

WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

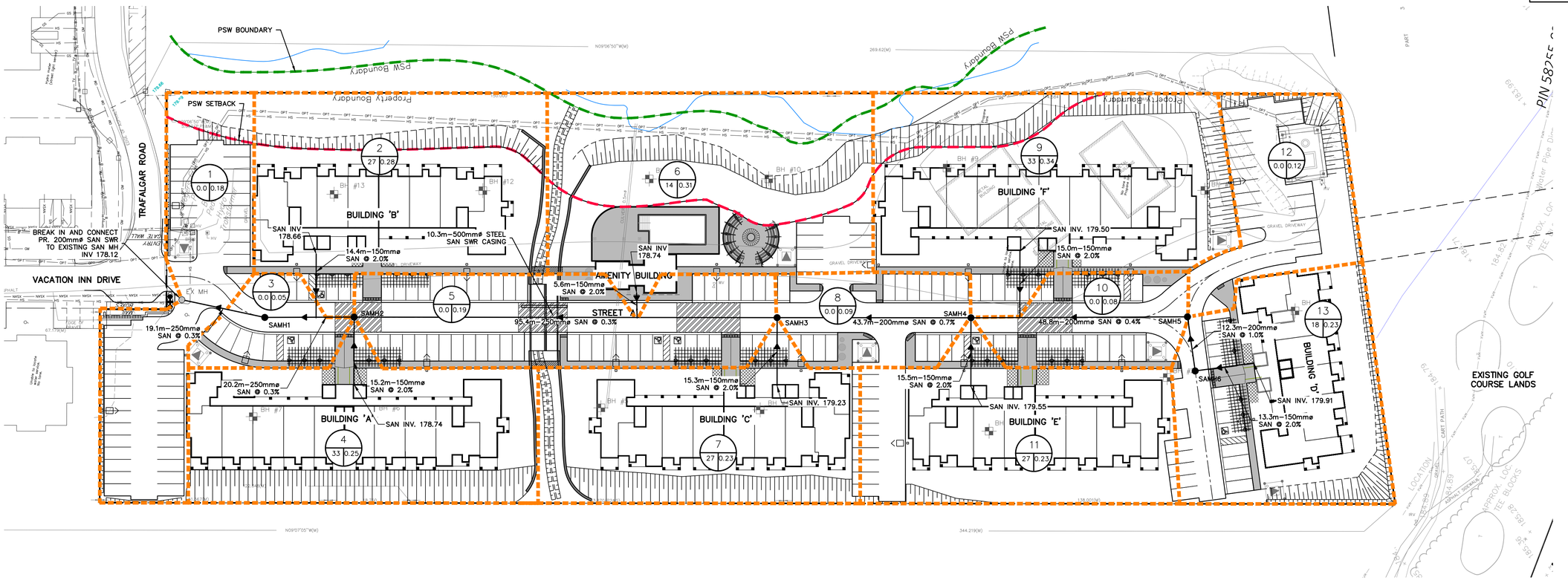
Drawing

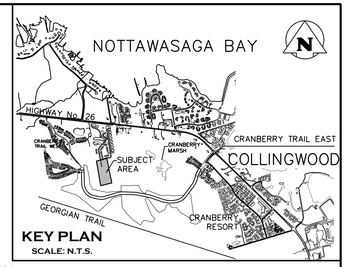
CULVERT CROSSING NOTES AND DETAILS

CROZIER CONSULTING ENGINEERS
THE HARBOUREDGE BUILDING, 40 HURON STREET, SUITE 301, COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	Design By	Project
L.W.	L.W.	1535-4897
Check By	Check By	Scale / Drawing
K.M.	R.A.	AS NOTED / C105

J:\1500\1535-Brandy Lane Corp\4897-Georgian Bay Hotel South Block\CAD\Civil_Sheets\4897_C105 CROSSING & DET.dwg, C105, 2021-04-08 5:13:41 PM, jpereira





10 0m 10 20 30 40
SCALE: 1:500

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2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.
3. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT.
4. DO NOT SCALE THE DRAWINGS.
5. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

BENCHMARKS

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE RELATED TO TOWN OF COLLINGWOOD BENCH MARK NO. 00172U311 HAVING AN ELEVATION OF 181.032 METRES.

TOPOGRAPHIC SURVEY COMPLETED BY KRCMAR SURVEYORS LTD., DATED AUGUST 25, 2018.

Town

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR 1st ENGINEERING SUBMISSION	02/04/2019
2	ISSUED FOR DISCUSSION	02/10/2020
3	ISSUED FOR 2nd ENGINEERING SUBMISSION	04/08/2021

Engineer

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Engineer

Project
WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

Drawing
SANITARY DRAINAGE PLAN

CROZIER CONSULTING ENGINEERS
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
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Drawn By	Design By	Project	
L.W.	L.W.		1535–4897
Check By	Check By	Scale	Drawing
K.M.	R.A.	1:500	C106

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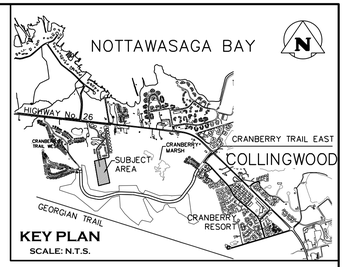
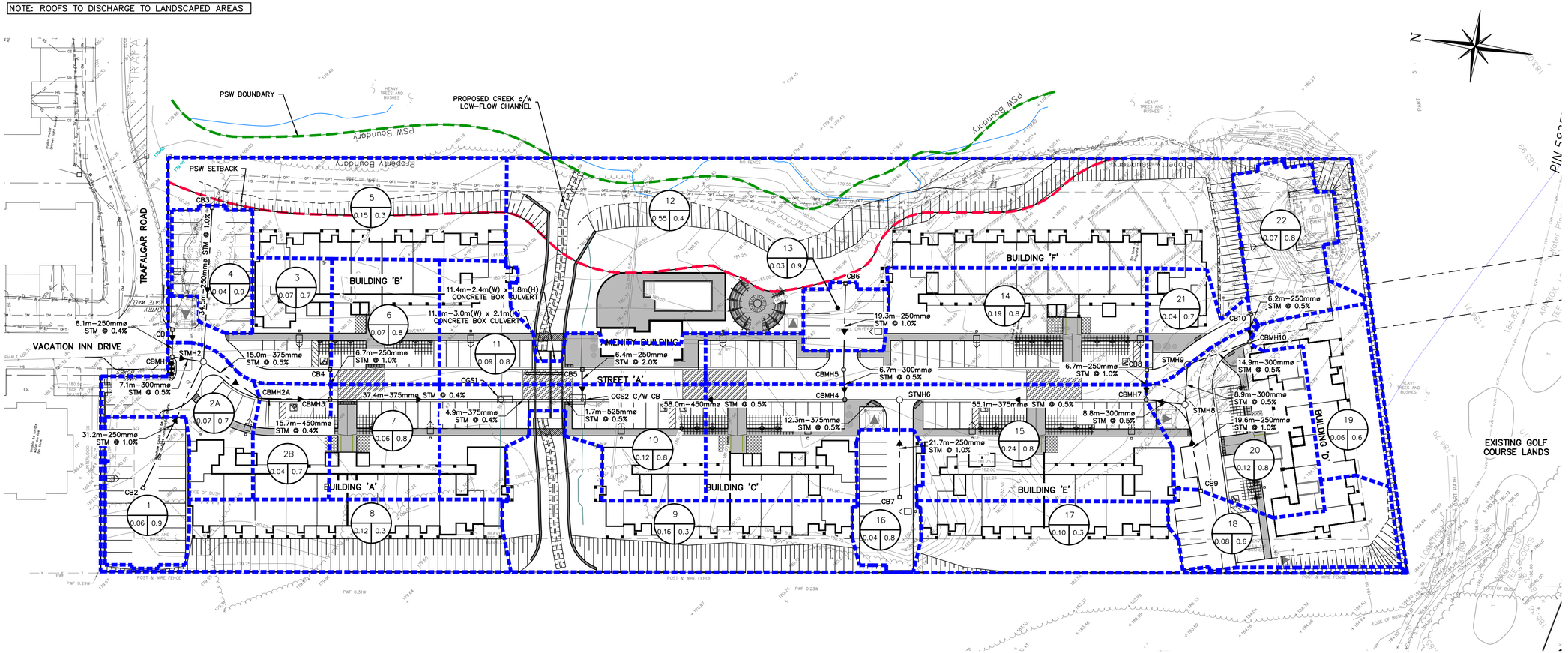


NOTE: ROOFS TO DISCHARGE TO LANDSCAPED AREAS



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SCALE: 1:500

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BENCHMARKS

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Engineer

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FOR APPROVAL
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WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

Drawing
STORM DRAINAGE PLAN

CROZIER CONSULTING ENGINEERS
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Drawn By	L.W.	Design By	L.W.	Project	1535-4897
Check By	K.M.	Check By	R.A.	Scale 1:500	Drawing C107

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GENERAL NOTES:

1. ALL CONSTRUCTION EQUIPMENT TO USE MAIN CONSTRUCTION ACCESS POINT LOCATED AT THE SOUTH END OF VACATION INN DRIVE VIA THE CONSTRUCTION ACCESS ROAD. REFER TO DRAWING C111 'CONSTRUCTION ACCESS ROAD PLAN' FOR DETAILS.
2. NO MAINTENANCE OR REPAIR WORK ON CONSTRUCTION EQUIPMENT IS ALLOWED WITHIN 30 METRES OF AN EXISTING WATER COURSE OR DITCH.
3. ALL SEDIMENT AND EROSION CONTROL FACILITIES AND WORKS ARE TO BE CONSTRUCTED AND IN PLACE TO THE APPROVAL OF THE SITE ENGINEER PRIOR TO ANY GRADING OPERATIONS COMMENCING. TYPICAL WORKS INCLUDE SILT FENCES, CONSTRUCTION ACCESS MUD MAT AND ROCK CHECK DAMS.
4. ALL TEMPORARY TOPSOIL STOCKPILES ARE TO BE PROVIDED WITH THE NECESSARY SEDIMENT AND EROSION CONTROL FEATURES. IF STOCKPILES ARE TO REMAIN FOR A PERIOD LONGER THAN 30 DAYS, STOCKPILES SHALL BE HYDROSEEDED AND SURROUNDED WITH SILT FENCE.
5. NO TREE CLEARING OR DISTURBANCE OF LANDS WILL OCCUR OUTSIDE OF WYLDEWOOD CREEK PROPERTY LIMITS.
6. THE SITE ENGINEER SHALL UNDERTAKE WEEKLY INSPECTIONS OF ALL SEDIMENT/EROSION CONTROL FACILITIES DURING THE EXTENT OF THE ENTIRE CONSTRUCTION PROJECT AS WELL AS AFTER ALL RAIN EVENTS 13mm OR GREATER. THE WEEKLY INSPECTIONS ARE TO BE COMPLETED ON AN EROSION AND SEDIMENT CONTROL INSPECTION REPORT.
7. THE SITE ENGINEER SHALL PROVIDE WEEKLY STATUS REPORTS TO THE MUNICIPALITY AND CONSERVATION AUTHORITY ADVISING OF THE CONDITION OF STRUCTURES AND MAINTENANCE WORKS THAT HAVE BEEN UNDERTAKEN.
8. DURING THE CONSTRUCTION PERIOD, WHEN INTERNAL BLOCKS HAVE INITIATED CONSTRUCTION, A STREET CLEANING SCHEDULE WILL BE UNDERTAKEN ON A MINIMUM WEEKLY BASIS, OR AS DIRECTED BY THE SITE ENGINEER, MUNICIPALITY OR CONSERVATION AUTHORITY.

CONSTRUCTION IMPLEMENTATION:

A) PRE-CONSTRUCTION
1. SITE ENGINEER TO ADVISE CONSERVATION AUTHORITY OF STAFF RESPONSIBLE FOR SITE SEDIMENT CONTROL SUPERVISION, INSPECTION AND MAINTENANCE, INCLUDING AFTER HOUR CONTACTS.
2. SITE ENGINEER TO PROVIDE WRITTEN INSPECTION AND MAINTENANCE SCHEDULE OF SEDIMENT CONTROL DEVICES.
3. CONTRACTOR TO INSTALL ALL SEDIMENT CONTROL DEVICES AS IDENTIFIED ON THE APPROVED EROSION CONTROL PLAN PRIOR TO EARTHWORKS OPERATIONS.

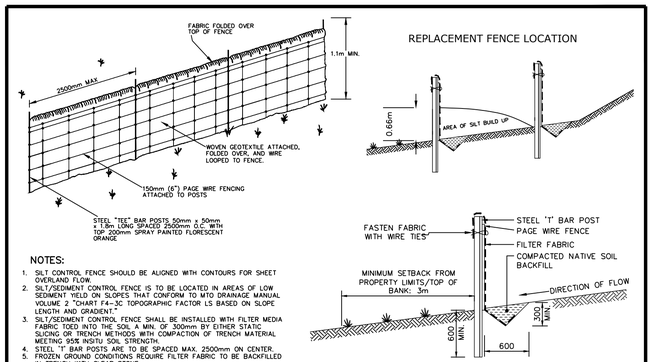
B) DURING CONSTRUCTION (SITE AND BUILDING WORKS)
1. CONTRACTOR TO ENSURE TOPSOIL STRIPPING, GRADING AND UNDERGROUND WORKS CONFORM TO APPROVED GRADING, SERVICING AND EROSION CONTROL PLANS.
2. SITE ENGINEER TO CONDUCT REQUIRED WEEKLY INSPECTION, MAINTENANCE AND REPORTING OF SEDIMENT CONTROLS TO THE CONSERVATION AUTHORITY.
3. CONTRACTOR TO STABILIZE SITE AS REQUIRED THROUGHOUT SITE CONSTRUCTION SCHEDULE.

C) POST CONSTRUCTION (INCLUDING BUILDING CONSTRUCTION)
1. CONTRACTOR TO COMPLETE FINAL SITE STABILIZATION AND REVEGETATION WORKS.
2. CONTRACTOR TO REMOVE ALL SEDIMENT CONTROL DEVICES AFTER THE SITE IS STABILIZED TO A CONDITION EQUAL TO, OR BETTER THAN, PRE-CONSTRUCTION CONDITIONS.

MAINTENANCE & OPERATIONS OF SEDIMENT CONTROLS

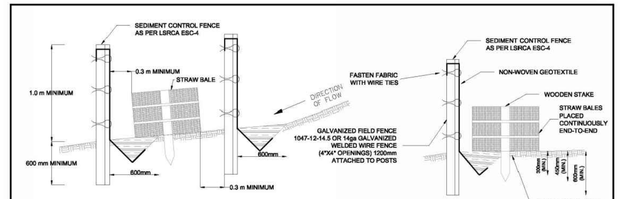
A) SILT FENCE
1. SILT FENCE TO BE LOCATED ON CRANBERRY TRAIL ROW LIMITS.
2. SILT FENCE MUST BE INSPECTED WEEKLY FOR RIPS OR TEARS, BROKEN STAKES, BLOW-OUTS AND ACCUMULATION OF SEDIMENT.
3. SILT FENCE MUST BE INSPECTED FOLLOWING ALL 13mm OR GREATER RAIN STORM EVENT OR AS DIRECTED BY SITE ENGINEER.
4. SEDIMENT MUST BE REMOVED FROM SILT FENCE WHEN ACCUMULATION REACHES 50% OF THE HEIGHT OF THE FENCE.
5. ALL SILT FENCES MUST BE REMOVED ONLY WHEN THE ENTIRE SITE IS STABILIZED AND AS DIRECTED BY THE SITE ENGINEER.

B) ROCK & STRAW BALE FLOW CHECK DAM
1. REMOVE ACCUMULATED SEDIMENT UP STREAM OF THE CHECK DAM IF GREATER THAN 50% OF DAM HEIGHT.
2. SILT REMOVAL MUST BE UNDERTAKEN WITH CARE TO MINIMIZE DOWN STREAM SEDIMENTATION IN SWALE OR DITCH.
3. CHECK DAMS AND ALL ACCUMULATED SEDIMENT MUST BE REMOVED WITH CARE ONCE THE CONSTRUCTION SITE IS STABILIZED AND AS DIRECTED BY THE SITE ENGINEER.



NOTES:
1. SILT CONTROL FENCE SHOULD BE ALIGNED WITH CONTOURS FOR SHEET OVERLAND FLOW.
2. SILT/SEDIMENT CONTROL FENCE IS TO BE LOCATED IN AREAS OF LOW SEDIMENT YIELD ON SLOPES THAT CONFORM TO MTO DRAINAGE MANUAL VOLUME 2 "CHART F4-3C TOPOGRAPHIC FACTOR LS BASED ON SLOPE LENGTH AND GRADIENT."
3. SILT/SEDIMENT CONTROL FENCE SHALL BE INSTALLED WITH FILTER MEDIA FABRIC TIED INTO THE SOIL A MIN. OF 300mm BY EITHER STATIC SLICING OR TRENCH METHODS WITH COMPACTION OF TRENCH MATERIAL MEETING 95% INSITU SOIL STRENGTH.
4. STEEL 'T' BAR POSTS ARE TO BE SPACED MAX. 2500mm ON CENTER.
5. FROZEN GROUND CONDITIONS REQUIRE FILTER FABRIC TO BE BACKFILLED IN TRENCH WITH CLEAR STONE.
6. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
7. GEOTEXTILE FABRIC TO BE TERRAFIX 270R GEOTEXTILE OR APPROVED EQUIVALENT. FABRIC TO BE FOLDED OVER TOP OF FENCE MIN. 300mm AND WIRE FASTENED.

Nottawasaga Valley Conservation Authority		APR'D:	DATE: 03.03.06
		DRAWN: A.S.C	SCALE: NTS
TYPICAL DETAIL OF SILT/SEDIMENT FENCE	NO. REVISION APR'D DATE		BSD-23 DRAFT



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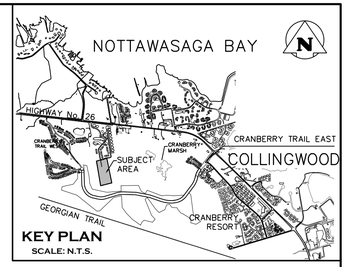
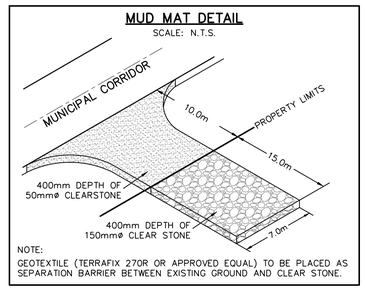
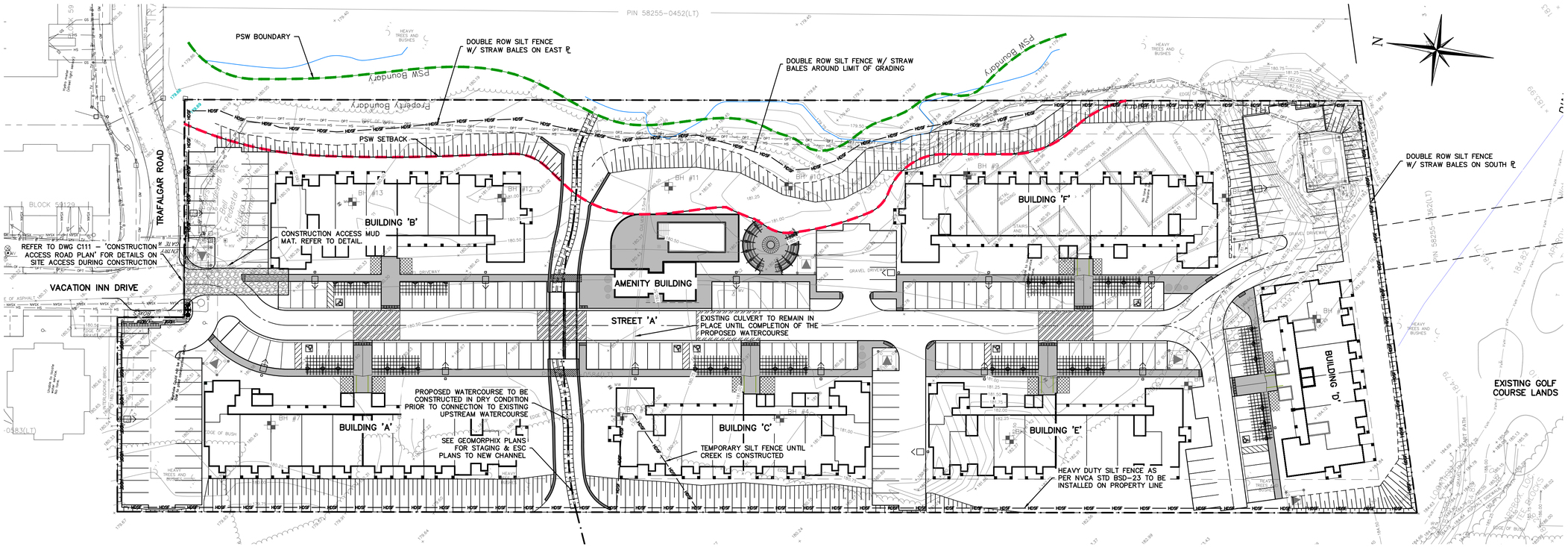
3. SEDIMENT CONTROL FENCE SHALL BE INSTALLED WITH FILTER MEDIA FABRIC TIED INTO THE SOIL A MINIMUM OF 300 mm BY EITHER STATIC SLICING OR TRENCH METHODS WITH COMPACTION OF TRENCH MATERIAL MEETING 95% STANDARD PROCTOR MAXIMUM DRY DENSITY.
4. STEEL 'T' BAR POSTS ARE TO BE SPACED A MAXIMUM DISTANCE OF 2000 mm ON CENTER.
5. STRAW BALES TO BE PLACED END-TO-END CONTINUOUSLY BETWEEN SEDIMENT CONTROL FENCES.
6. FROZEN GROUND CONDITIONS REQUIRE FILTER FABRIC TO BE BACKFILLED IN TRENCH WITH CLEAR STONE.
7. GEOTEXTILE FABRIC TO BE COMPRISED OF NON-WOVEN U.V. STABILIZED MATERIAL FABRIC TO BE FOLDED OVER TOP OF FENCE A MINIMUM OF 300 mm AND WIRE FASTENED.
8. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND WATER POLLUTION IS MINIMIZED.
9. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.

NO.	REVISION	DATE
1	SWM GUIDELINES UPDATE	06.2016

DOUBLE ROW SEDIMENT CONTROL FENCE	DATE: 06.2016
	SCALE: NTS
LSRCA ESC-5	







BENCHMARKS

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE RELATED TO TOWN OF COLLINGWOOD BENCH MARK NO. 00172U311 HAVING AN ELEVATION OF 181.032 METRES.

TOPOGRAPHIC SURVEY COMPLETED BY KRCMAR SURVEYORS LTD., DATED AUGUST 25, 2018.

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Engineer

Engineer

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Project
WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

Drawing
EROSION AND SEDIMENT CONTROL PLAN

CROZIER CONSULTING ENGINEERS
The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
www.cfcrozier.ca
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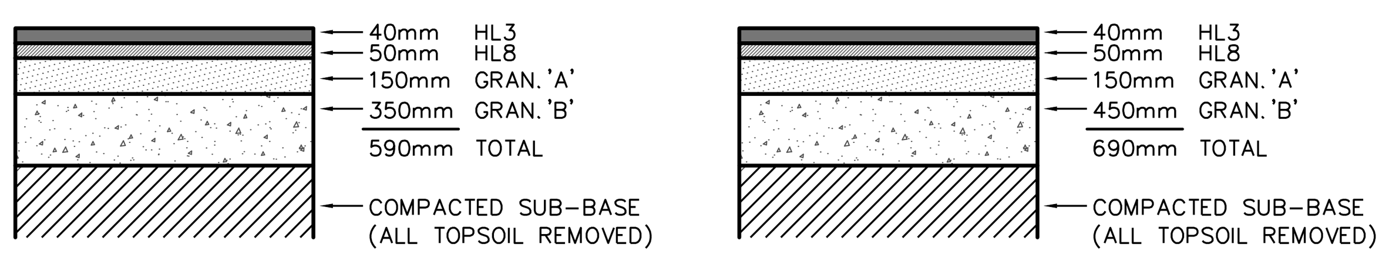
Drawn By	Design By	Project	
L.W.	L.W.		1535-4897
Check By	Check By	Scale	Drawing
K.M.	R.A.	1:500	C108

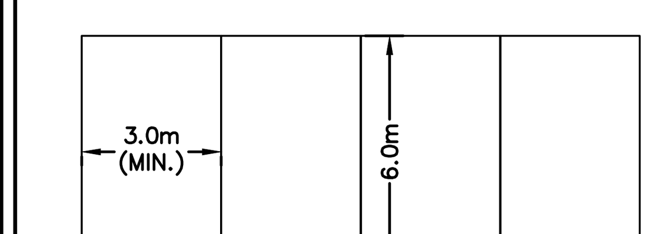
J:\1500\1535-Brandy Lane Corp\4897-Georgian Bay Hotel South Block\CAD\Civil_Sheets\4897_C108 ESC.dwg, C108, 2021-04-08 5:18:38 PM, jpereira

PAVEMENT STRUCTURE
SCALE: N.T.S.



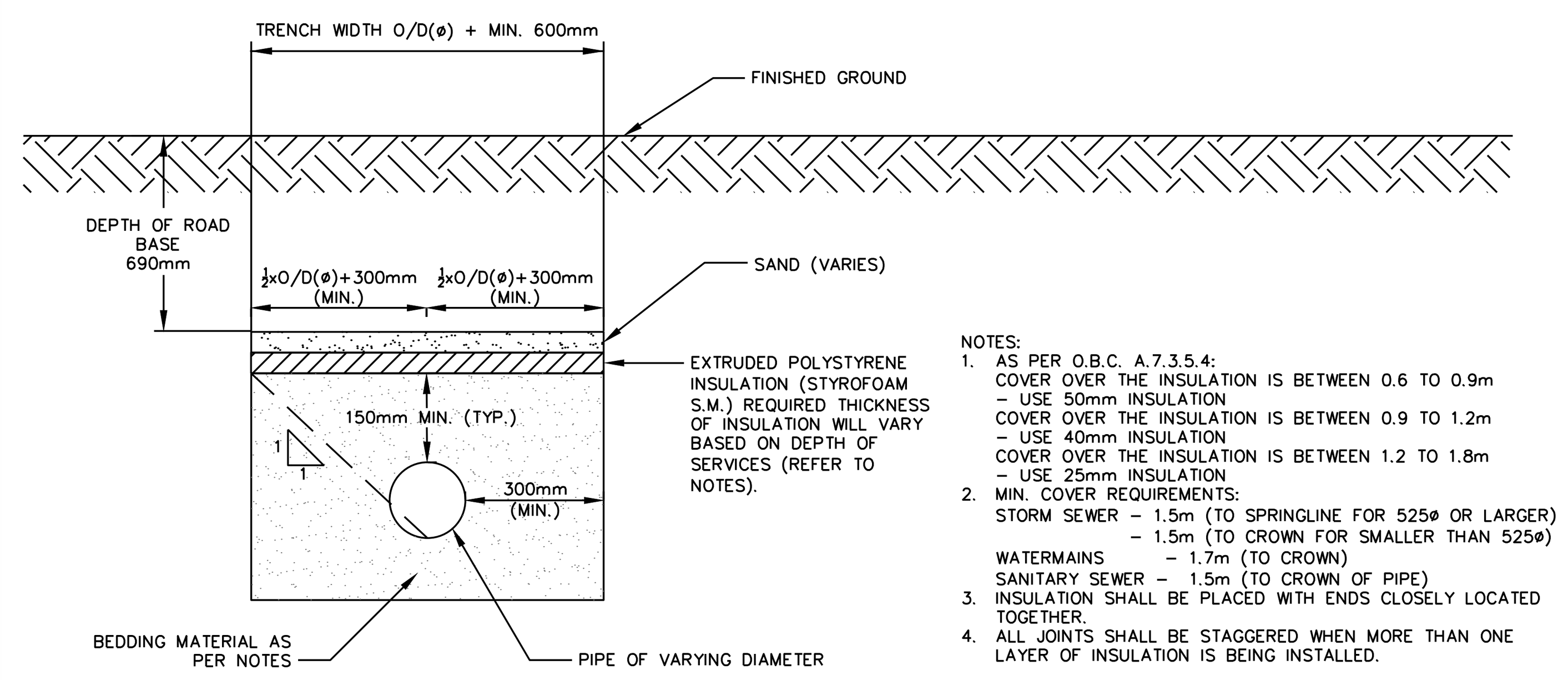
NOTE:
REFER TO CONSTRUCTION NOTES FOR DETAILS ON COMPACTION. PAVEMENT STRUCTURE BASED ON GEOTECHNICAL CONSULTANTS RECOMMENDATIONS.

TYPICAL PARKING STALL DETAIL
NTS



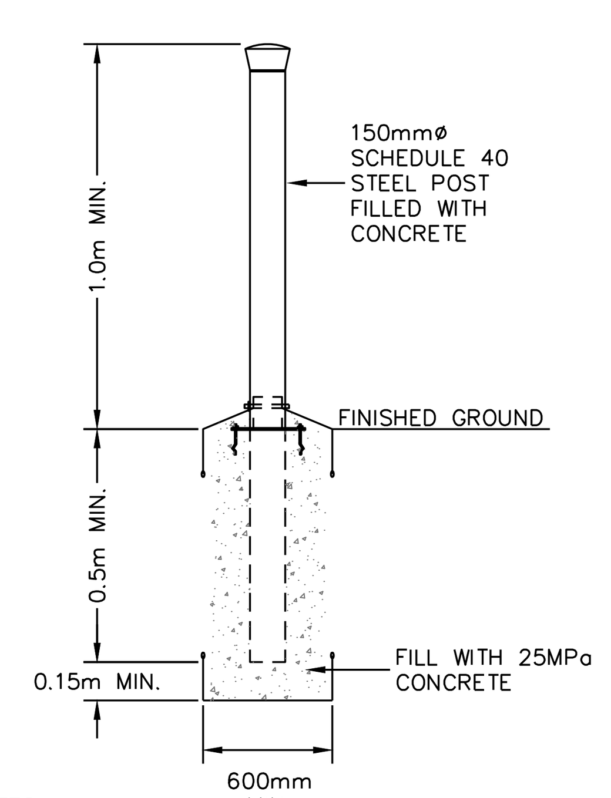
PARKING LINES TO BE PAINTED WHITE, 100mm THICK.

INSULATION FOR VARIOUS INFRASTRUCTURE
SCALE: N.T.S.



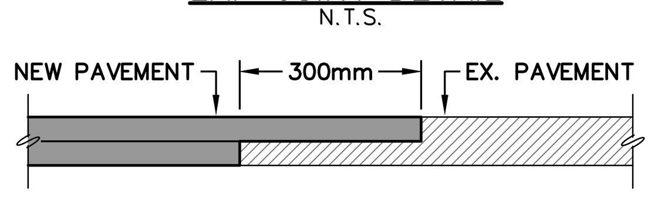
NOTES:
1. AS PER O.B.C. A.7.3.5.4:
   COVER OVER THE INSULATION IS BETWEEN 0.6 TO 0.9m – USE 50mm INSULATION
   COVER OVER THE INSULATION IS BETWEEN 0.9 TO 1.2m – USE 40mm INSULATION
   COVER OVER THE INSULATION IS BETWEEN 1.2 TO 1.8m – USE 25mm INSULATION
2. MIN. COVER REQUIREMENTS:
   STORM SEWER – 1.5m (TO SPRINGLINE FOR 525ø OR LARGER)
   – 1.5m (TO CROWN FOR SMALLER THAN 525ø)
   WATERMAINS – 1.7m (TO CROWN)
   SANITARY SEWER – 1.5m (TO CROWN OF PIPE)
3. INSULATION SHALL BE PLACED WITH ENDS CLOSELY LOCATED TOGETHER.
4. ALL JOINTS SHALL BE STAGGERED WHEN MORE THAN ONE LAYER OF INSULATION IS BEING INSTALLED.

TYPICAL BOLLARD DETAIL
SCALE: N.T.S.

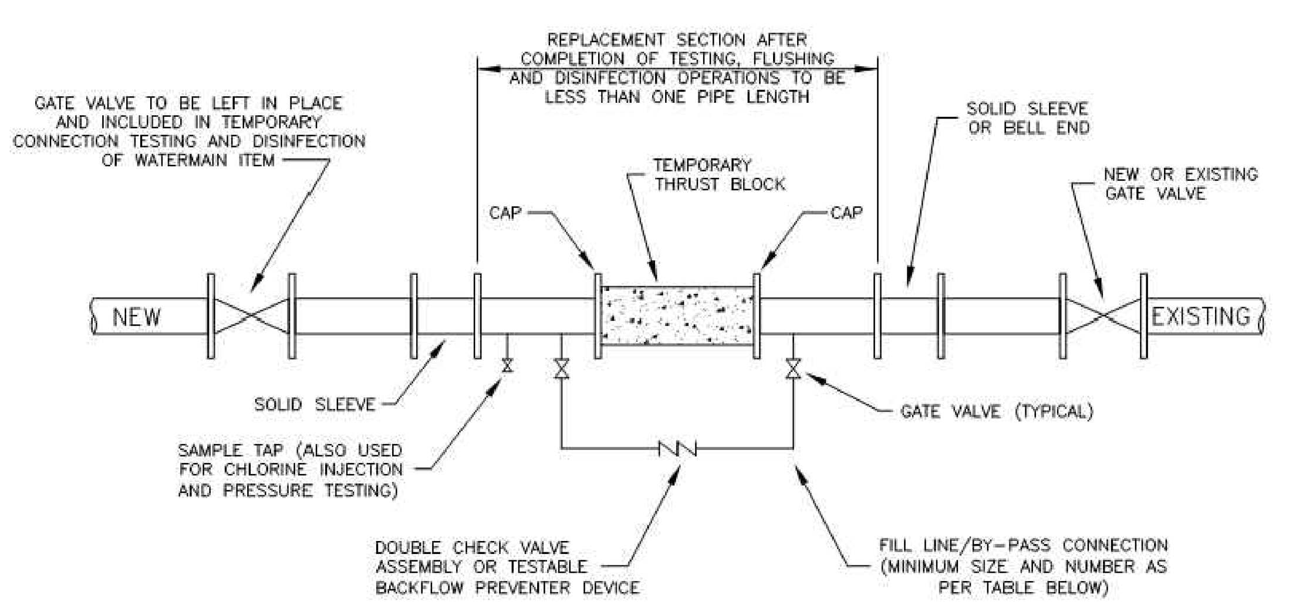


NOTES:
1. SCHEDULE 40 BOLLARDS TO BE PAINTED YELLOW.
2. CONCRETE TO BE 25MPa WITH 7.5% AIR ENTRAINMENT.
3. BOLLARD LOCATIONS TO BE CONFIRMED IN FIELD.

LAP JOINT DETAIL
N.T.S.



NOTE:
SAWCUT & COLD PLANE 300mm WIDE & 40mm DEEP WHERE NEW PAVEMENT MEETS EXISTING PAVEMENT, ROUTE & SEAL WITH HOT RUBBERIZED ASPHALT.



TYPICAL TEMPORARY CONNECTION FOR WATERMAINS
NTS

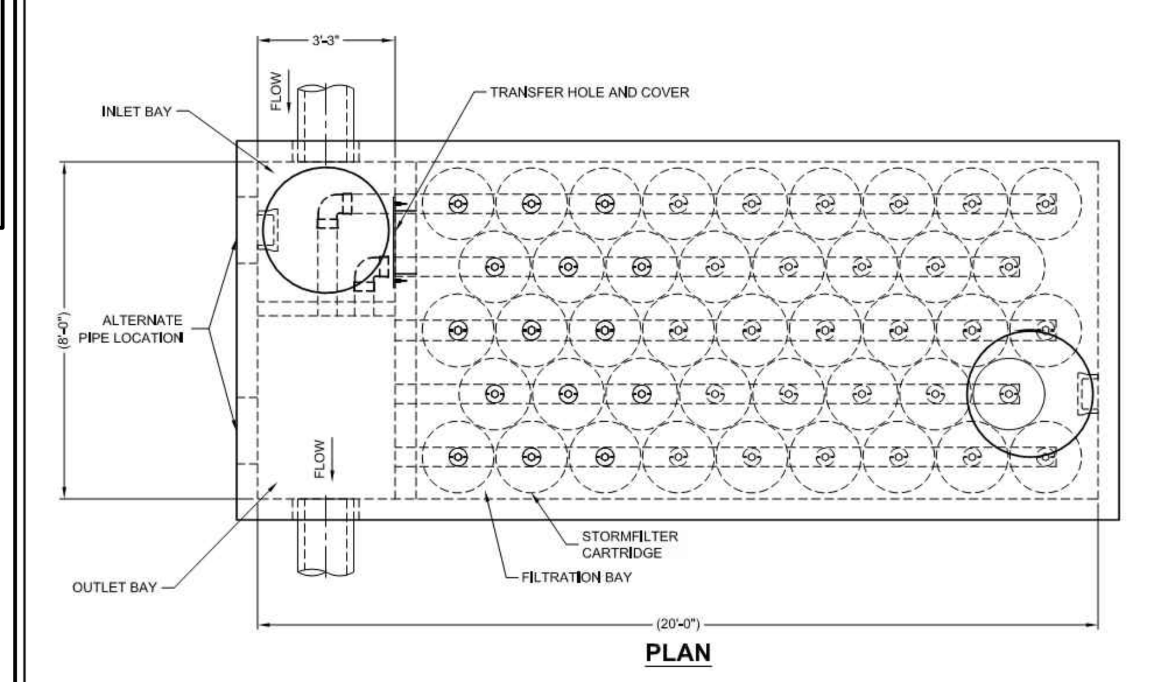
PIPE DIAMETER	FLOW REQUIRED TO PRODUCE 0.76m/s (APPROX) VELOCITY IN MAIN	SIZE OF TAP 25	38	51	NUMBER OF OPEN 64mm HYDRANT OUTLETS
mm	l/s	NUMBER OF TAPS ON PIPE			
100	6.3	1	—	—	1
150	12.6	—	1	—	1
200	25.2	—	2	1	1
250	37.9	—	2	2	1
300	56.8	—	—	3	2
400	109.9	—	—	4	2

REQUIRED FLOW AND OPENINGS TO FLUSH PIPELINES (276kPa/40 PSI RESIDUAL PRESSURE IN WATERMAIN)

NO.	REVISION	APR'D	DATE

TOWN OF COLLINGWOOD	APR'D: EDH	DATE: APR 07
	DRAWN:	SCALE: NTS
TEMPORARY CONNECTION FOR WATERMAINS	STD. No. 128	

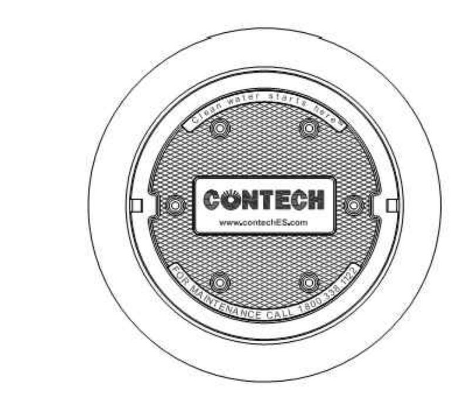
STORMFILTER 2
SCALE: N.T.S.



STORMFILTER DESIGN TABLE

- THE 8' x 20' PEAK DIVERSION STORMFILTER TREATMENT CAPACITY VARIES BY CARTRIDGE COUNT AND LOCALLY APPROVED SURFACE AREA SPECIFIC FLOW RATE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD.
- THE PEAK DIVERSION STORMFILTER IS AVAILABLE IN A LEFT INLET (AS SHOWN) OR RIGHT INLET CONFIGURATION.
- ALL PARTS AND INTERNAL ASSEMBLY PROVIDED BY CONTECH UNLESS OTHERWISE NOTED.

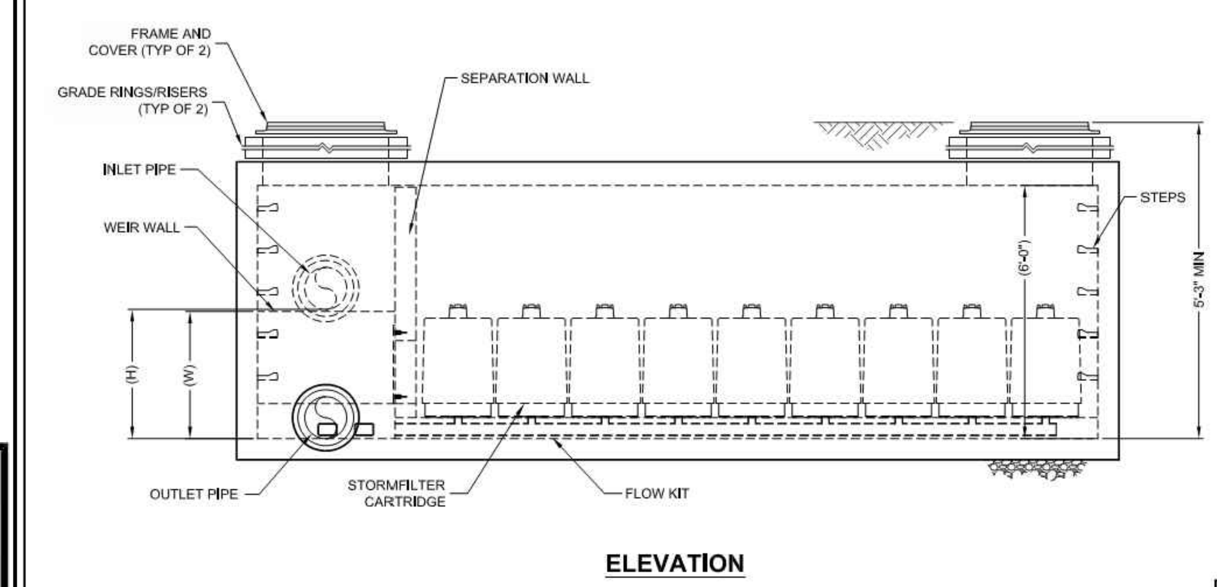
CARTRIDGE HEIGHT	27"		18"		LOW DROP	
SYSTEM HYDRAULIC DROP (H - REQ'D. MIN.)	3.05'		2.3'		1.8'	
HEIGHT OF WEIR (W)	3.00'		2.25'		1.75'	
TREATMENT BY MEDIA SURFACE AREA	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²
CARTRIDGE FLOW RATE (gpm)	22.5	11.25	15	7.5	10	5



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			*
WATER QUALITY FLOW RATE (cfs)			*
PEAK FLOW RATE (cfs)			*
RETURN PERIOD OF PEAK FLOW (yrs)			*
# OF CARTRIDGES REQUIRED			*
CARTRIDGE FLOW RATE			*
MEDIA TYPE (CSF, PERLITE, ZPG)			*
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE	*	*	*
OUTLET PIPE	*	*	*
INLET BAY RIM ELEVATION			*
FILTER BAY RIM ELEVATION			*
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		*	*
NOTES/SPECIAL REQUIREMENTS:			



PERFORMANCE SPECIFICATION
FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. **RADIAL MEDIA DEPTH SHALL BE 7-INCHES.** FILTER MEDIA CONTACT TIME SHALL BE AT LEAST **37 SECONDS.**
SPECIFIC FLOW RATE SHALL BE **2 GPM/SF (MAXIMUM).** SPECIFIC FLOW RATE IS THE MEASURE OF THE FLOW (GPM) DIVIDED BY THE MEDIA SURFACE CONTACT AREA (SF). MEDIA VOLUMETRIC FLOW RATE SHALL BE **6 GPM/CF OF MEDIA (MAXIMUM).**

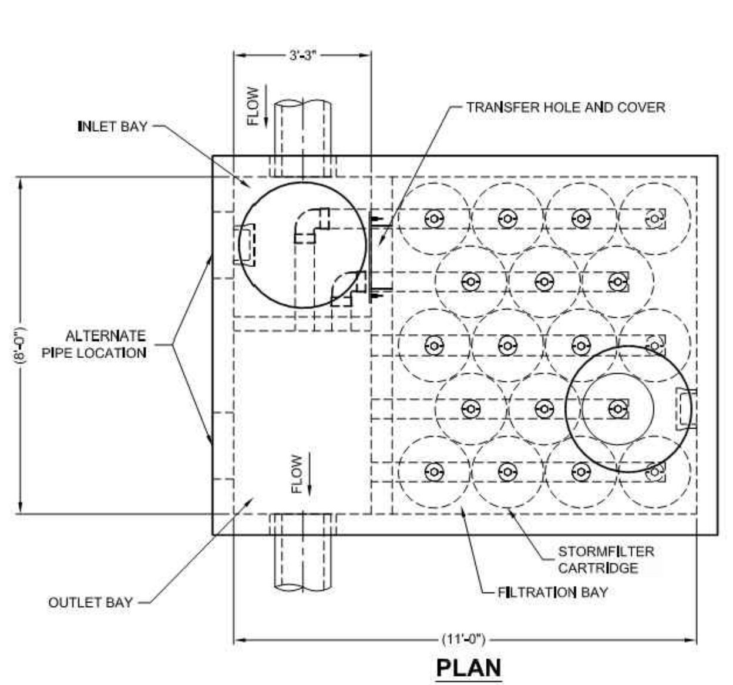
GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com
4. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
5. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH OUTLET PIPE INVERT WITH OUTLET BAY FLOOR.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
F. CONTRACTOR TO REMOVE THE TRANSFER HOLE COVER WHEN THE SYSTEM IS BROUGHT ONLINE.

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

THE STORMWATER MANAGEMENT STORMFILTER
8' x 20' PEAK DIVERSION STORMFILTER
STANDARD DETAIL

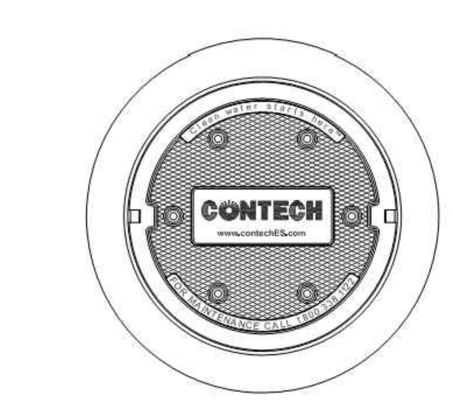
STORMFILTER 1
SCALE: N.T.S.



STORMFILTER DESIGN TABLE

- THE 8' x 11' PEAK DIVERSION STORMFILTER TREATMENT CAPACITY VARIES BY CARTRIDGE COUNT AND LOCALLY APPROVED SURFACE AREA SPECIFIC FLOW RATE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD.
- THE PEAK DIVERSION STORMFILTER IS AVAILABLE IN A LEFT INLET (AS SHOWN) OR RIGHT INLET CONFIGURATION.
- ALL PARTS AND INTERNAL ASSEMBLY PROVIDED BY CONTECH UNLESS OTHERWISE NOTED.

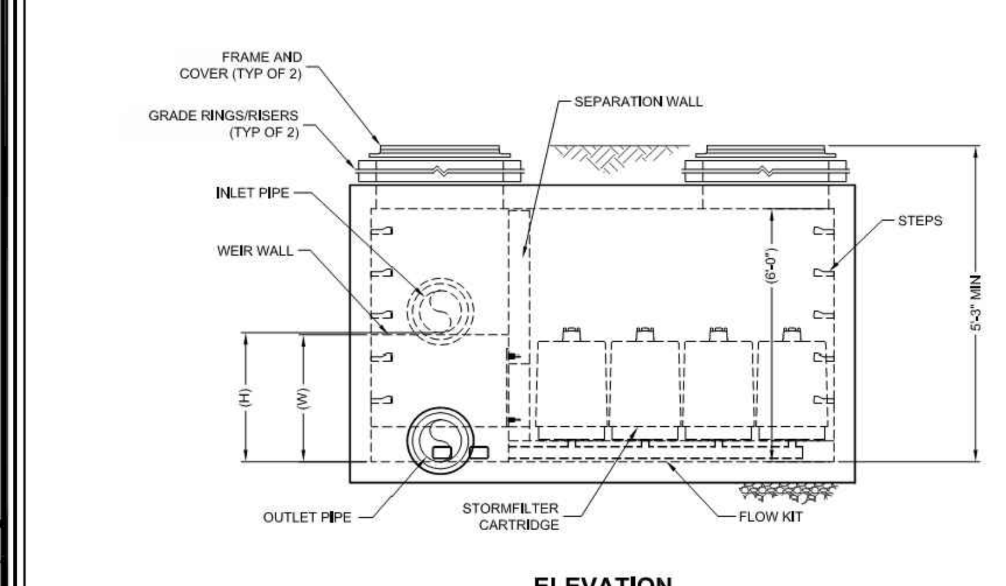
CARTRIDGE HEIGHT	27"		18"		LOW DROP	
SYSTEM HYDRAULIC DROP (H - REQ'D. MIN.)	3.05'		2.3'		1.8'	
HEIGHT OF WEIR (W)	3.00'		2.25'		1.75'	
TREATMENT BY MEDIA SURFACE AREA	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²
CARTRIDGE FLOW RATE (gpm)	22.5	11.25	15	7.5	10	5



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			*
WATER QUALITY FLOW RATE (cfs)			*
PEAK FLOW RATE (cfs)			*
RETURN PERIOD OF PEAK FLOW (yrs)			*
# OF CARTRIDGES REQUIRED			*
CARTRIDGE FLOW RATE			*
MEDIA TYPE (CSF, PERLITE, ZPG)			*
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE	*	*	*
OUTLET PIPE	*	*	*
INLET BAY RIM ELEVATION			*
FILTER BAY RIM ELEVATION			*
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		*	*
NOTES/SPECIAL REQUIREMENTS:			



PERFORMANCE SPECIFICATION
FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. **RADIAL MEDIA DEPTH SHALL BE 7-INCHES.** FILTER MEDIA CONTACT TIME SHALL BE AT LEAST **37 SECONDS.**
SPECIFIC FLOW RATE SHALL BE **2 GPM/SF (MAXIMUM).** SPECIFIC FLOW RATE IS THE MEASURE OF THE FLOW (GPM) DIVIDED BY THE MEDIA SURFACE CONTACT AREA (SF). MEDIA VOLUMETRIC FLOW RATE SHALL BE **6 GPM/CF OF MEDIA (MAXIMUM).**

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com
4. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
5. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING CLUTCHES PROVIDED).
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THE STORMWATER MANAGEMENT STORMFILTER
8' x 11' PEAK DIVERSION STORMFILTER
STANDARD DETAIL

CONSTRUCTION NOTES:

A) GENERAL – CONSTRUCTION
1. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH TOWN OF COLLINGWOOD STANDARDS (2009), OPSD AND OPSS. WHERE CONFLICT OCCURS, TOWN OF COLLINGWOOD STANDARDS (2009) TO GOVERN.
2. TRENCH BACKFILL (OPSD 802.010 & 802.013) TO BE SELECT NATIVE MATERIAL OR IMPORTED SELECT SUBGRADE TO OPSS 1010. BACKFILL TO BE PLACED IN MAXIMUM 200mm THICK LIFTS AND COMPACTED TO 95% OF THE MATERIAL'S STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD).
3. PIPE COVER AND BEDDING TO BE GRANULAR 'A' (MINIMUM 150mm DEPTH COMPACTED TO A MINIMUM 95% SPMDD).
4. ALL TOPSOIL AND EARTH EXCAVATION TO BE STOCK PILED OR REMOVED TO AN APPROVED SITE AS DIRECTED BY ENGINEER.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DETAILED LAYOUT OF THE WORK. THE DEVELOPER'S ENGINEER WILL CONFIRM ALL BENCH MARK ELEVATIONS AND HORIZONTAL ALIGNMENT FOR THE CONTRACTOR.
6. ALL PROPERTY BARS TO BE PRESERVED AND REPLACED BY O.L.S. AT CONTRACTOR'S EXPENSE IF REMOVED DURING CONSTRUCTION.
7. THE CONTRACTOR SHALL MAKE HIS OWN ARRANGEMENTS FOR THE SUPPLY OF TEMPORARY WATER AND POWER.
8. DEWATERING TO BE CARRIED OUT IN ACCORDANCE WITH OPSS-517 AND 518 TO MAINTAIN ALL TRENCHES IN A DRY CONDITION. CONTRACTOR RESPONSIBLE FOR OBTAINING M.O.E. PERMIT IF REQUIRED.
9. ALL ENGINE DRIVEN PUMPS TO BE ADEQUATELY SILENCED, SUITABLE FOR OPERATION IN A RESIDENTIAL DISTRICT.
10. DISTURBED AREAS OUTSIDE THE DEVELOPABLE LANDS TO BE REINSTATED TO PREVIOUS CONDITION OR BETTER.
11. THE CONTRACTOR IS RESPONSIBLE TO NOTIFY ALL UTILITY COMPANIES PRIOR TO COMMENCING WORK AND CO-ORDINATE CONSTRUCTION ACCORDINGLY.
12. ALL ROCK EXCAVATION PER OPSS-206.
13. ALL EXCAVATION MUST BE CARRIED OUT IN FULL COMPLIANCE WITH MOST RECENT GUIDELINES OF OHSA. NATIVE SOILS ARE CLASSIFIED AS TYPE 3 SOIL.

B) ROADS
1. SUBGRADE AND BOULEVARD MATERIAL TO BE COMPACTED TO A MINIMUM DRY DENSITY OF AT LEAST 95% SPMDD. SUBGRADE TO BE PROOF ROLLED AND CERTIFIED PRIOR TO PLACING GRANULAR 'B'.
2. GRANULAR 'A' AND 'B' ROAD BASE TO BE COMPACTED TO 100% OF THE MATERIAL'S RESPECTIVE SPMDD AND PLACED IN MAX. 150mm LIFTS. REFER TO GEOTECHNICAL REPORT FOR FURTHER DETAILS.
3. CONDO ROADWAYS TO BE CONSTRUCTED WITH MINIMUM 300mm GRANULAR 'B' TYPE 1, 150mm GRANULAR 'A', 50mm HL8 BASE COURSE ASPHALT, & 40mm HL3 SURFACE COURSE ASPHALT.
4. SELECT SUBGRADE MATERIAL, OR IMPORTED GRANULAR MATERIAL APPROVED BY THE ENGINEER, COMPACTED TO 98% SPMDD TO BE USED AS FILL IN ALL AREAS WHERE PROPOSED PIPE INVERTS ARE HIGHER THAN EXISTING GRADE OR AS INSTRUCTED BY THE ENGINEER.
5. ALL GRANULARS AND ASPHALT MATERIALS AND PLACEMENT TO BE IN ACCORDANCE WITH OPSS 314 AND OPSS 310.
6. JOINTS WITH EXISTING ASPHALT TO BE SAW CUT STRAIGHT WITH MIN. 1.0m LAP JOINT PRIOR TO PLACING NEW ASPHALT AND TACK COAT APPLIED TO EXISTING ASPHALT.
7. STOP SIGNS AND STREET SIGNS TO TOWN STANDARDS (DETAIL DWG No. 401).
8. REINSTATEMENT OF ALL DISTURBED BOULEVARDS TO INCLUDE REGRADING, 150mm TOPSOIL AND SOD TO OPSS 802 AND 803.
9. 100mm ø PIPE SUBDRAINS SHALL BE PROVIDED UNDER EDGE OF PAVEMENT ON LOWER (GUTTER) SIDE OF THE ROAD.
10. ALL SUBDRAINS TO BE CONSTRUCTED IN ACCORDANCE WITH OPSS 405. SUBDRAIN TO BE INSTALLED IN GRANULAR 'A' TRENCH AND CONNECTED TO EACH CB OR CBMH.
11. SUBDRAINS TO BE PERFORATED OTHER THAN THE 2m SECTION IMMEDIATELY UPSTREAM OF ALL STRUCTURES WHICH SHALL BE NON-PERFORATED.

C) SANITARY SEWERS
1. M.H.'S TO OPSD – 701.010, 701.030, & 704.010.
2. BENCHING TO OPSD – 701.021.
3. STEPS TO OPSD – 405.010.
4. BACKFILL AND EMBEDMENT TO OPSD – 802.010 CLASS 'B', GRANULAR 'A' BEDDING.
5. TRENCH BACKFILL TO BE SELECT NATIVE MATERIAL AS APPROVED BY ENGINEER OR IMPORTED GRANULAR MATERIAL.
6. FRAMES AND COVERS TO OPSD – 401.01 TYPE 'A' (CLOSED COVER).
7. SERVICE CONNECTIONS TO OPSD – 1006.020 (125mm), GRANULAR 'A' BEDDING, TERMINATE AT SERVICING CORRIDOR LIMITS, 125 x 100 REDUCER, PLUG AND 2x4 MARKER POST PAINTED GREEN. MINIMUM GRADE TO BE 2.0%.
8. RADIUS BENDS TO BE USED ON SANITARY SEWER CONNECTIONS WHERE THE ANGLE OF CONNECTION BETWEEN THE SERVICE AND SEWER EXCEEDS 90°.
9. BACKFILL AND EMBEDMENT MATERIAL TO BE COMPACTED TO A DRY DENSITY OF AT LEAST 95% OF THE MATERIAL'S STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD).
10. MANHOLES FRAMES TO BE SET TO BASE COURSE ASPHALT ELEVATION AND RAISED BY ADDING RISER RINGS PRIOR TO PLACING SURFACE COURSE ASPHALT.
11. PIPE SUPPORT AT MAINTENANCE HOLES AS PER OPSD 708.020.
12. ALL MAINTENANCE HOLES, UNLESS EXPRESSLY IDENTIFIED ARE 1200mm ø.
13. GENERAL INSTALLATION AND TESTING OF SEWERS AND APPURTENANCES TO BE IN ACCORDANCE WITH OPSS 407, 408, 409 (CCTV), 410, 421 AND ALL SPECIFICATIONS REFERENCED WITHIN THESE SECTIONS.
14. SANITARY SEWER – SDR 35 PVC.
15. SANITARY SERVICE – SDR 28 PVC – 125mm PER OPSD 1006.020 SEWER SERVICE CONNECTION FOR FLEXIBLE PIPE.
16. FROST STRAPS PER OPSD 701.100.
17. CLAY SEEPAGE PLUGS (0.5m THICK) TO BE PLACED ALONG PIPE BETWEEN MANHOLES.

D) WATERMAINS
1. BACKFILL AND EMBEDMENT TO OPSD – 802.010 CLASS 'B', GRANULAR 'A' EMBEDMENT.
2. TRENCH BACKFILL TO BE SELECT NATIVE MATERIAL AS APPROVED BY ENGINEER OR IMPORTED GRANULAR MATERIAL.
3. THRUST BLOCKS TO OPSD – 1103.010 AND 1103.020 WHERE SUITABLE SOILS ARE ENCOUNTERED.
4. SERVICE CONNECTIONS TO OPSD – 1104.010, 100mm GRANULAR 'A' EMBEDMENT AND COVER OVER PIPE. TERMINATE AT SERVICING CORRIDOR LIMITS C/W CURB STOP AND BOX.
5. HYDRANTS TO OPSD – 1105.010 DRAIN PLUGS SHALL BE INSTALLED WHERE HIGH WATER TABLE IS ENCOUNTERED.
6. BACKFILL AND EMBEDMENT MATERIAL TO BE COMPACTED TO A DRY DENSITY OF AT LEAST 95% OF THE MATERIAL'S STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD).
7. MINIMUM COVER ON WATERMAIN AND SERVICES TO BE 1.7m.
8. GATE VALVES, BENDS AND HYDRANT LEADS AND FITTINGS TO BE CONNECTED WITH ROLMAC GRIPPER RING RESTRAINING GLANDS.
9. CLEARANCE BETWEEN WATERMAINS AND SEWERS TO BE AS PER MOE GUIDELINES, MINIMUM 0.5m VERTICAL SEPARATION WHERE SEWER IS ABOVE WATERMAIN & 2.5m MINIMUM HORIZONTAL SEPARATION.
10. ALL SERVICES TO BE DIRECT TAPPED.
11. FOLLOWING TESTING, CONTRACTOR SHALL OPERATE EACH WATER SERVICE TO VERIFY FULL FLOW AND PRESSURE AT THE CURB STOP TO THE SATISFACTION OF THE ENGINEER.
12. GENERAL INSTALLATION AND TESTING OF WATERMAIN AND APPURTENANCES TO BE IN ACCORDANCE WITH OPSS 701 AND ALL SPECIFICATIONS REFERENCED WITHIN THESE SECTIONS. COMPLETE WATER SYSTEM SHALL BE DISINFECTED IN ACCORDANCE WITH REQUIREMENTS OF AWWA STANDARD C651-99. REFER TO TOWN OF COLLINGWOOD STD. NO. 128 'TEMPORARY CONNECTION FOR WATERMAINS'. ALL WATERMAIN TESTING & CHLORINATION WILL BE CONDUCTED BY CPU AT CONTRACTORS COST. WATERMAINS ARE NOT TO BE CONNECTED TO EXISTING WATERMAINS UNTIL BACTERIALOGICAL TESTING HAS BEEN SUCCESSFULLY COMPLETED & CERTIFIED BY CPU.
13. COMPLETE WATER SYSTEM SHALL BE DISINFECTED IN ACCORDANCE WITH REQUIREMENTS OF O. REG. 459/00 & SATISFACTION OF CPU.
14. WATERMAIN – CLASS 52 OR PRESSURE CLASS 350 CEMENT LINED DUCTILE IRON. CONDUCTIVITY CONNECTORS TO BE USED ON ALL JOINTS.
15. SINGLE WATERMAIN SERVICES – 19mm ø TYPE 'K' SOFT COPPER PIPE.
16. FOR DOUBLE WATER SERVICE, THE COMMON WATER SERVICE & MAIN STOP TO BE 25mmø TYPE K SOFT COPPER. SPLITTER FITTING SHOULD BE 'U' TYPE & LOCATED OUTSIDE OF DRIVEWAYS.
17. MAIN STOPS TO 301-A4H4, BALL STYLE, AWWA THREAD BY COMPRESSION CAMBRIDGE BRASS.
18. CURB STOPS TO 203-H3H3, BALL STYLE WITH DRAIN. COMPRESSION JOINT BY CAMBRIDGE BRASS.
19. A CURB STOP & EXTENSION SERVICE BOX & MAIN STOP MUST BE INSTALLED ON EACH SERVICE USING COMPRESSION JOINT FITTINGS.
20. ALL CURB STOPS FOR SERVICES WITHIN ASPHALT TO BE LOCATED IN VALVE BOXES INSTALLED FLUSH TO FINISHED GRADE OF ASPHALT. CAP FOR VALVE BOX TO BE MARKED WITH 'W' & PAINTED BLUE.
21. SERVICE BOXES TO BE NUMBER 7, D-I CLOW OR MUELLER, 36" STAINLESS STEEL ROD C/W CAP PAINTED BLUE.
22. ALL SERVICES SHALL BE METERED. METERS TO BE COMPLETE WITH REMOTE READOUT OR RADIO READ AS DETERMINED BY THE CPU.
23. HYDRANTS – CENTURY NUMBER 1, OPEN LEFT (O/L), 2 HOSE, 33B PLUMBER PORT. 6" MJ BASE, SELF-DRAINING YELLOW BASE WITH SILVER BONNET AND PORTS.
24. VALVES – RESILIENT SEATED, RSGV MECHANICAL JOINT, OPEN LEFT CLOW OR MUELLER WITH 5-SL-48 SLIDING VALVE BOX C/W CAP PAINTED BLUE.
25. MECHANICAL JOINT DUCTILE FITTINGS – AWWA/ANSI C153/A21.53.
26. HYDRANTS TO BE INSTALLED C/W HYDRANT MARKER STAKES PER TOWN WATER DEPARTMENT STANDARD "FLEX STAKE HYDRANT MARKER MODEL FHV804, 48" LONG, COLOUR YELLOW WITH REFLECTIVE HYDRANT GRAPHIC ON BOTH SIDES". MARKER TO BE POSITIONED ON THE RIGHT PORT AS VIEWED FROM STREET.
27. 50mmø WATERMAIN LOOP- TYPE 'K' COPPER.
28. ALL VALVES TO BE OPERATED BY THE TOWN WATER DEPARTMENT. CONTRACTOR TO PROVIDE MIN. 48hr NOTIFICATION FOR REQUEST.
29. HYDRANTS ARE TO BE 1.67m (5'6") LONG. MAKE-UP PIECES, IF REQUIRED, ARE TO BE INSTALLED BELOW THE HYDRANT.
30. ALL WATERMAIN FITTINGS TO BE LEAD FREE.
31. MECHANICAL JOINT RESTRAINTS TO BE USED DURING TRANSITION OF WATERMAIN INSTALLATION IN NATIVE SOILS TO ENGINEERED FILL. MECHANICAL JOINT RESTRAINTS TO BE ROLMAC GRIPPER RING RESTRAINING GLANDS FOR PIPES UP TO 300mmø AND SIGMA ONE LOCK RESTRAINING GLANDS FOR PIPES LARGER THAN 300mmø OR APPROVED EQUALS.

E) STORM SEWERS
1. MH TO OPSD 701.010 AND DCBMH TO OPSD – 701.011, 701.012, C/W SUMP UNLESS NOTED OTHERWISE.
2. STEPS TO OPSD 405.010.
3. M.H. FRAMES AND GRATES TO OPSD – 401.01 OPEN COVER.
4. DICB'S TO OPSD – 705.030, 705.040.
6. DCBMH FRAMES AND GRATES TO OPSD – 400.020
7. PIPE SUPPORT AT DCBMH'S TO OPSD – 708.020.
8. DCB LEADS – 300mm ø DOUBLE TO OPSD – 708.010, 708.030.
9. PROTECTION DURING CONSTRUCTION TO OPSD – 808.010.
10. BACKFILL AND EMBEDMENT TO OPSD – 802.010 (FLEXIBLE PIPE) CLASS 'B', GRANULAR 'A' EMBEDMENT OR OPSD – 802.030, 802.031 AND 802.032 (RIGID PIPE) GRANULAR 'A' EMBEDMENT.
11. BACKFILL AND EMBEDMENT MATERIAL TO BE COMPACTED TO A DRY DENSITY OF AT LEAST 95% OF THE MATERIAL'S SPMDD.
12. MAIN SEWERS OVER 450mmø SHALL BE CONCRETE PIPE (OPSS 1820), PIPE INSTALLED BENEATH THE ROADWAYS SHALL BE REINFORCED PER CSA A257.2, CLASS 50-D. MAIN SEWERS 450mmø AND UNDER SHALL BE PVC PIPE (OPSS 410), MIN. PIPE STIFFNESS SHALL BE 320 kPa. PIPE INSTALLED WITHIN LANDSCAPED AREAS CAN BE NON-REINFORCED PER CSA A257.1 CLASS 3. ALL PIPE TO BE JOINED WITH A GASKETTED BELL AND SPIGOT SYSTEM.
13. FROST STRAPS PER OPSD 701.100.

BENCHMARKS

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE RELATED TO TOWN OF COLLINGWOOD BENCH MARK NO. 00172U311 HAVING AN ELEVATION OF 181.032 METRES.

TOPOGRAPHIC SURVEY COMPLETED BY KRCMAR SURVEYORS LTD., DATED AUGUST 25, 2018.

Town

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR 1st ENGINEERING SUBMISSION	02/04/2019
2	ISSUED FOR DISCUSSION	02/10/2020
3	ISSUED FOR 2nd ENGINEERING SUBMISSION	04/08/2021

Engineer

Engineer

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

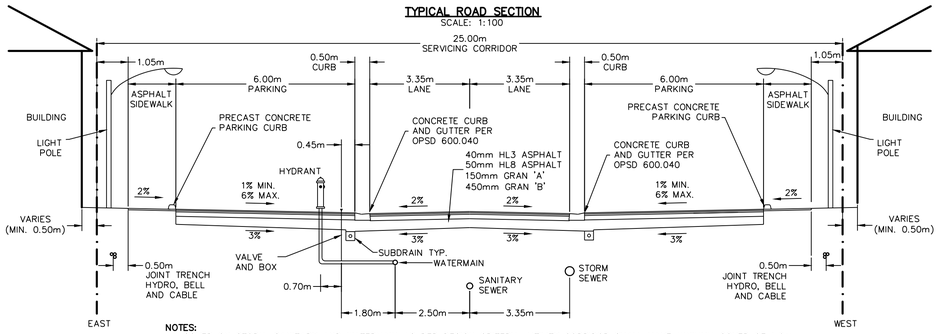
Project
WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

Drawing
CONSTRUCTION NOTES AND STANDARD DETAILS

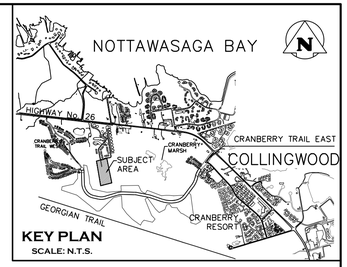
CROZIER CONSULTING ENGINEERS
THE HARBOUREDGE BUILDING, 40 HURON STREET, SUITE 301, COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By L.W.	Design By L.W.	Project 1535-4897	
Check By K.M.	Check By R.A.	Scale AS NOTED	Drawing C109

TYPICAL ROAD SECTION
SCALE: 1:100



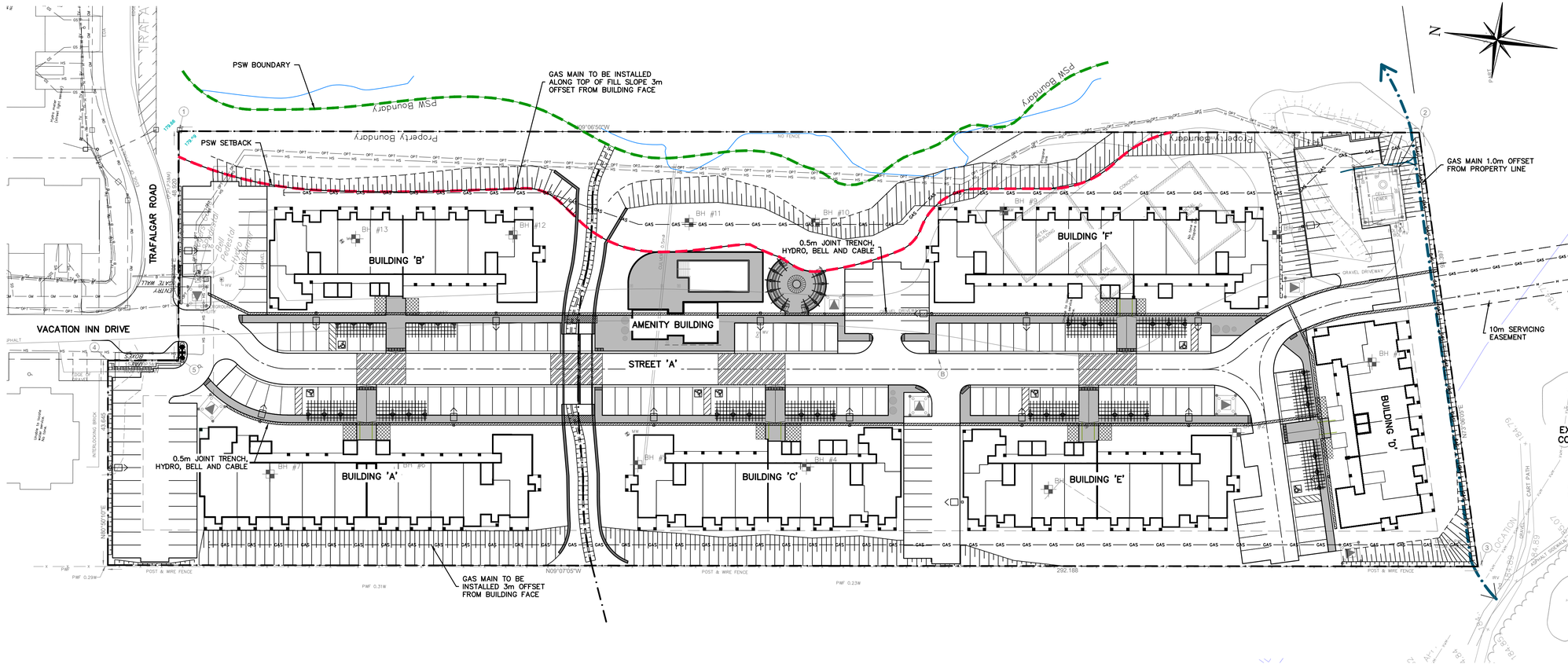
NOTES:
1. COVER ON STORM, SANITARY AND WATERMAIN AS PER DESIGN CRITERIA, UTILITY CORRIDOR SHALL HAVE MINIMUM COVER OF 1.0m.
2. MINIMUM PAVEMENT AND ROAD STRUCTURE DESIGN AS PER TOWN DESIGN CRITERIA OR AS PER GEOTECHNICAL INVESTIGATION RECOMMENDATION.
3. TREES TO BE PLACED IN LOCATIONS AS PER APPROVED LANDSCAPE PLAN.
4. ACTIVELY GROWING NURSERY SOD TO BE LAID ON 150mm TOPSOIL PROPERLY GRADED AND ROLLED.
5. HYDRANTS AND WATERMAINS TO BE ON OPPOSITE SIDE OF ROAD FROM ELECTRICAL TRANSFORMERS.
6. SUBDRAINS TO BE INSTALLED AS PER OPSD 216.021.
7. ALL SERVICE LOCATIONS SHOWN ARE FOR GUIDELINE PURPOSES ONLY AND MAY DEVIATE AS PER THE DIRECTION OF THE TOWN WHEN STANDARD LOCATION CANNOT BE ACHIEVED.
8. GASMAIN TO BE INSTALL IN THE REAR OF THE BUILDINGS.
9. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN.



KEY PLAN
SCALE: N.T.S.

COMPOSITE UTILITY PLAN
FOR INFORMATION PURPOSES ONLY

THIS PLAN HAS BEEN PREPARED BY C.F. CROZIER & ASSOCIATES INC. TO CONSOLIDATE THE DESIGNS COMPLETED BY THE RESPECTIVE UTILITIES. OUR FIRM HAS REVIEWED EACH UTILITY DESIGN TO CONFIRM IT COMPLIES WITH THE APPLICABLE MUNICIPAL GUIDELINES AND ROAD STANDARDS AND TO CONFIRM THERE ARE NO CONFLICTS WITH THE PROPOSED CIVIL SERVICING AND DRAINAGE SYSTEMS. WE HAVE NOT CHECKED NOR ACCEPT RESPONSIBILITY FOR THE ACCURACY AND VERACITY OF EACH UTILITY DESIGN. ANY USE WHICH A THIRD PARTY MAKES OF THIS PLAN, OR ANY RELIANCE ON OR DECISIONS BASED ON IT, ARE THE RESPONSIBILITIES OF SUCH THIRD PARTIES. IT IS RECOMMENDED THAT DURING CONSTRUCTION THE THIRD PARTY REFERENCE OR MAKE USE OF THE APPROVED FOR CONSTRUCTION PLANS PREPARED BY EACH RESPECTIVE UTILITY.



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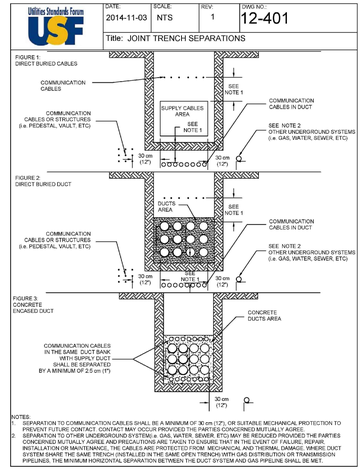

NOTES:
1. SEPARATION TO COMMUNICATION CABLES SHALL BE A MINIMUM OF 30 cm (12"), OR SUITABLE MECHANICAL PROTECTION TO PREVENT FUTURE CONTACT. CONTACT MAY OCCUR PROVIDED THE PARTIES CONCERNED MUTUALLY AGREE.
2. SEPARATION TO OTHER UNDERGROUND SYSTEMS (e.g. GAS, WATER, SEWER, ETC) MAY BE REDUCED PROVIDED THE PARTIES CONCERNED MUTUALLY AGREE AND PRECAUTIONS ARE TAKEN TO ENSURE THAT IN THE EVENT OF FAILURE, REPAIR, INSTALLATION OR MAINTENANCE, THE CABLES ARE PROTECTED FROM: MECHANICAL AND THERMAL DAMAGE. WHERE DUCT SYSTEM SHARE THE SAME TRENCH (INSTALLED IN THE SAME OPEN TRENCH) WITH GAS DISTRIBUTION OR TRANSMISSION PIPELINES. THE MINIMUM HORIZONTAL SEPARATION BETWEEN THE DUCT SYSTEM AND GAS PIPELINE SHALL BE MET.

NOTE:
1. FOR ELECTRICAL DESIGN OF PRIMARY AND SECONDARY POWER SYSTEM SEE EPCOR.
2. FOR STREET LIGHT LIGHTING DESIGN SEE C.F. CROZIER AND ASSOCIATES (DWG. E300–E301)
3. FOR TELECOMMUNICATION (CABLE, TELEPHONE) SEE ROGERS AND BELL RESPECTIVELY.
4. FOR NATURAL GAS SERVICING SEE ENBRIDGE.

BENCHMARKS

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE RELATED TO TOWN OF COLLINGWOOD BENCH MARK NO. 001720311 HAVING AN ELEVATION OF 181.032 METRES.

TOPOGRAPHIC SURVEY COMPLETED BY KRCMAR SURVEYORS LTD., DATED AUGUST 25, 2018.

Town

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR 1st ENGINEERING SUBMISSION	02/04/2019
2	ISSUED FOR DISCUSSION	02/10/2020
3	ISSUED FOR 2nd ENGINEERING SUBMISSION	04/08/2021

Engineer

Engineer

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Project
WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

Drawing
COMPOSITE UTLITY PLAN

CROZIER CONSULTING ENGINEERS
THE HARBOUREDGE BUILDING, 40 HURON STREET, SUITE 301, COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	L.W.	Design By	L.W.	Project	1535–4897
Check By	K.M.	Check By	R.A.	Scale 1: 500	Drawing C110

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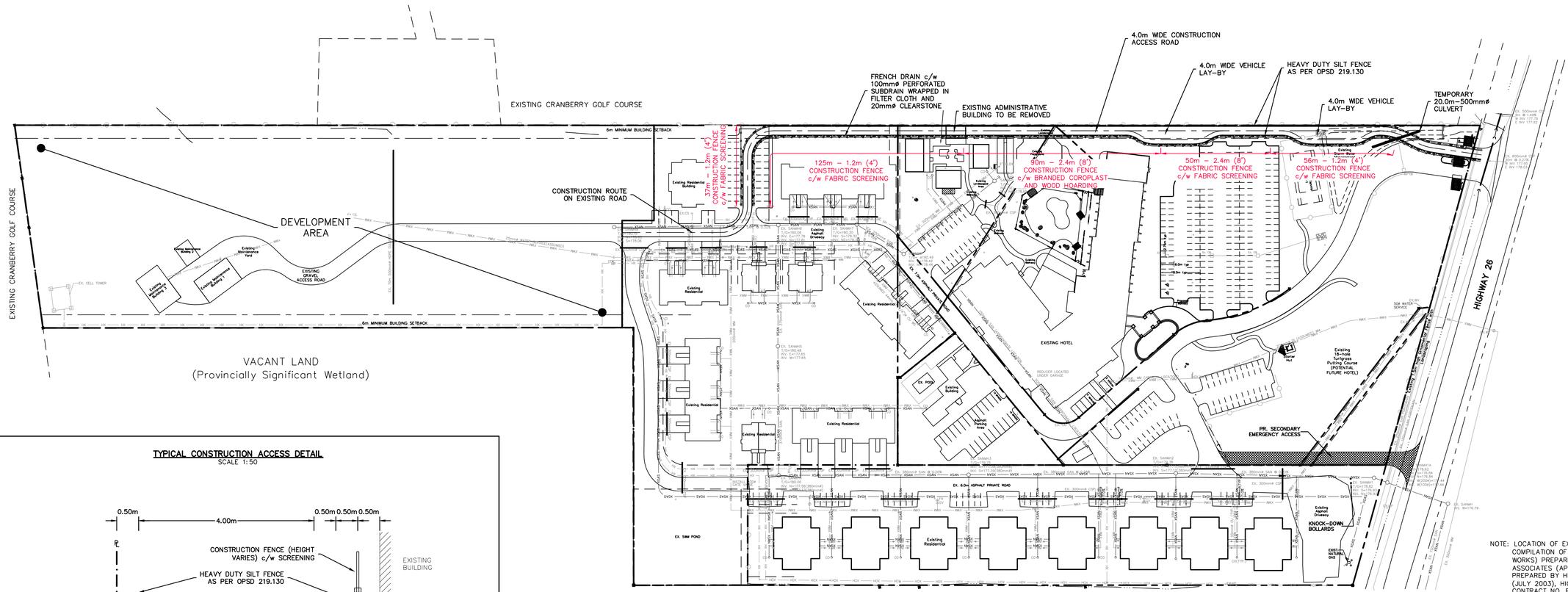
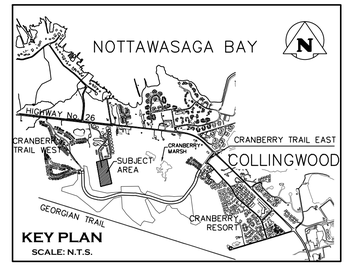
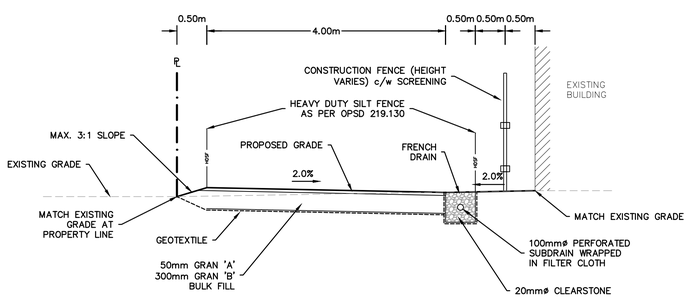




TYPICAL CONSTRUCTION ACCESS DETAIL
SCALE 1:50



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NOTE: LOCATION OF EXISTING SERVICES BASED ON COMPILATION OF SITE SERVICING DRAWINGS (EXISTING WORKS) PREPARED BY HENDERSON, PADDON & ASSOCIATES (APRIL 2004), SERVICING REPORT PREPARED BY HENDERSON, PADDON & ASSOCIATES (JULY 2003), HIGHWAY 26 WEST RECONSTRUCTION CONTRACT NO. PW 2015-11 AS-BUILT DRAWINGS (16/12/09) PREPARED BY R.J. BURNSIDE & ASSOCIATE LTD. AND MARK UPS PROVIDED BY THE RESPECTIVE UTILITY PROVIDERS.

LEGEND

- EX. FENCE
- EX. WATERMAIN
- EX. FIRE HYDRANT & VALVE
- EX. SANITARY SEWER & MANHOLE
- EX. OVERHEAD HYDRO
- EX. HYDRO
- EX. GAS MAIN
- EX. HYDRO POLE
- EX. CULVERT
- EX. SWALE
- PR. HEAVY DUTY SILT FENCE AS PER OPSD 219.130
- PR. CONSTRUCTION FENCE
- PR. 100mmø PERFORATED SUBDRAIN

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3. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT.
4. DO NOT SCALE THE DRAWINGS.
5. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

BENCHMARKS

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE RELATED TO TOWN OF COLLINGWOOD BENCH MARK NO. 00172U311 HAVING AN ELEVATION OF 181.032 METRES.

TOPOGRAPHIC SURVEY COMPLETED BY KRCMAR SURVEYORS LTD., DATED AUGUST 25, 2018.

Town

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3	ISSUED FOR 2nd ENGINEERING SUBMISSION	04/08/2021

Engineer

Engineer

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Project
WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

Drawing
CONSTRUCTION ACCESS ROAD PLAN

CROZIER CONSULTING ENGINEERS
THE HARBOUREDGE BUILDING, 40 HURON STREET, SUITE 301, COLLINGWOOD, ON L9Y 4R3
705 446 3510 T
705 446 3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	Design By	Project	
L.W.	L.W.		1535-4897
Check By	Check By	Scale	Drawing
K.M.	R.A.	1:1000	C111

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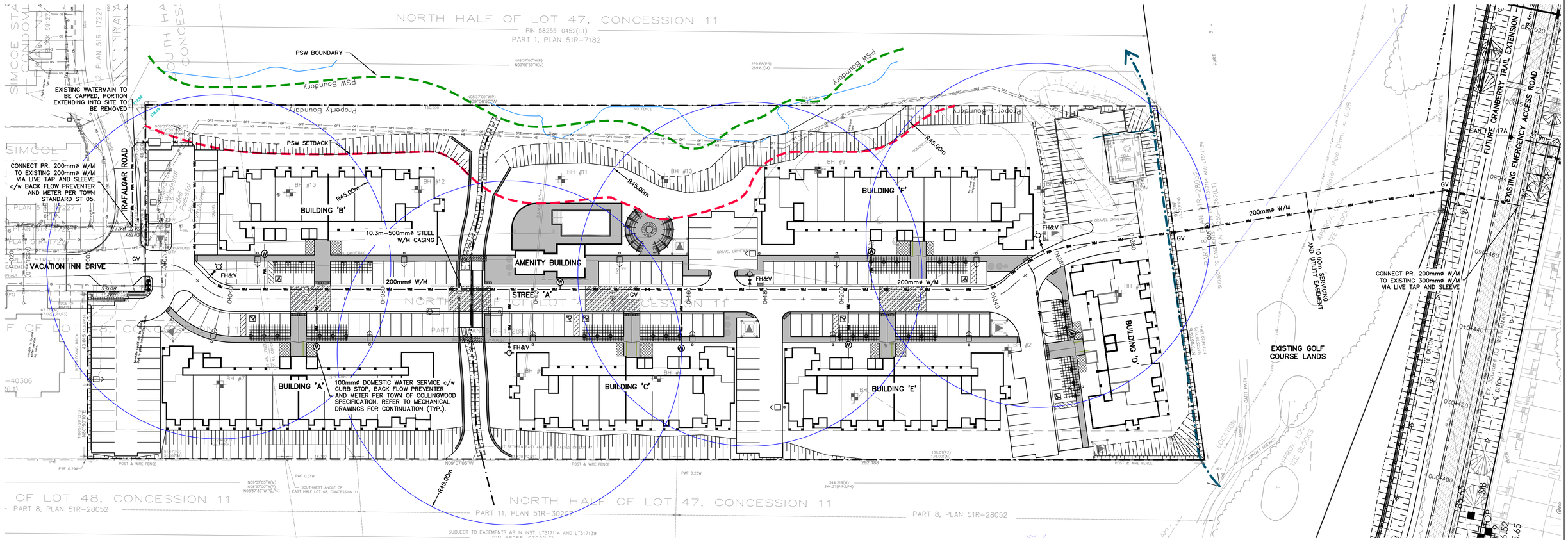

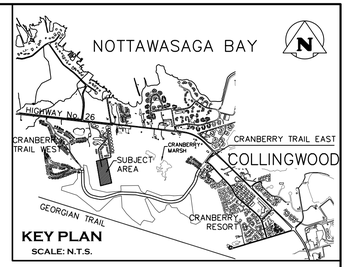

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BENCHMARKS

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TOPOGRAPHIC SURVEY COMPLETED BY KRCMAR SURVEYORS LTD., DATED AUGUST 25, 2018.

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Engineer

Engineer

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Project
WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

Drawing
WATER DISTRIBUTION PLAN

CROZIER CONSULTING ENGINEERS
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	Design By	Project	
L.W.	L.W.		1535-4897
Check By	Check By	Scale	Drawing
K.M.	R.A.	1:500	C112

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