

**SERVICING & STORMWATER
MANAGEMENT IMPLEMENTATION REPORT**

WYLDEWOOD CREEK

TOWN OF COLLINGWOOD

PREPARED FOR:

BRANDY LANE CORPORATION

PREPARED BY:

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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 for the proposed Wyldeewood 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) 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 Application.

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 during the pre-consultation process. 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

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 168 units) with associated 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 County (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 COORIDOR

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.

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

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 road way.

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 380 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 Wyldeewood 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 functional design of this sewers 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 **7.37 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 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 looped system.

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, 168 proposed apartment units and one recreational facility. The water demands for the site are summarized below:

- Average Daily Flow 1.67 L/s
- Max Day 3.35 L/s
- Peak Hour 7.53 L/s

Refer to Appendix A for detailed calculations.

Preliminary fire flows required to service the subject site were determined to be **283.3 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 **286.65 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 assumed 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
 - Provided during construction.
- 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 Wyldeewood 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 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 oil/grit separator 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 front yards of the apartments is considered clean water and will be discharged to the catch basins.

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 an Oil/Grit Separator (OGS) prior to discharging to Cranberry Marsh. Refer to Table 1 for OGS sizing criteria.

External drainage will be conveyed through the site via an engineered channel. The engineered channel traversing the site is herein referred to as Wyldeewood Creek.

7.4 Stormwater Quality Controls

Runoff from the parking lot and driveways will be treated in end-of-pipe oil/grit separators prior to discharging to Wyldeewood Creek. Based on the 0.51 ha contributing area to the storm sewer north of the channel and an 82.3% impervious level, an oil/grit separator unit was sized in order to provide sufficient water quality control to meet enhanced protection level. Similarly, for the 1.05 ha contributing area to the storm sewer south of the channel, with an impervious level of 63.8%; an oil/grit separator 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 oil/grit separators into the constructed watercourse. Vortech units were selected for this development since there is shallow bedrock across the site and the Vortech units have shallow structures. Refer to Table 1 included below for a detailed breakdown of the required oil/grit separator sizing. Refer to Appendix B for the detailed sizing calculations of the proposed OGS water quality treatment unit.

Table 1: Recommended Oil/Grit Sizing Criteria

Catchment	Contributing Drainage Area (ha)	% Impervious	Target Total Suspended Solids Removal (%)	Target Annual Runoff Volume Treated (%)	Oil/Grit Separator Unit	Total Suspended Solids Removal (%)	Total Annual Runoff Volume Treated (%)
North of Channel	0.51	82.3	80	90	Vortechs 3000	86	93.5
South of Channel	1.05	63.8	80	90	Vortechs 5000	89	93.5

The oil/grit separators will be privately owned. Once the oil/grit separators are installed and operating accordingly to manufacturer's specifications, the Owner will be required to inspect and service the unit 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.

8.0 WYLDEWOOD CREEK HYDROLOGIC & HYDRAULIC ANALYSIS

8.1 Hydrologic Analysis

The complete hydrologic analysis for the Cranberry creek watershed was conducted as part of the Regional Stormwater Management Update and SWM Strategy report (2007). From this analysis our office was able to discretize the model to determine the flows being conveyed across the subject site. The flows are summarized in Table 2.

Table 2: Peak Flow Summary for Wyldeewood Creek

Return Period	Peak Flow (m ³ /s)
2-Year	0.88
5-Year	1.71
10-Year	2.32
20-Year	3.14
50-Year	3.76
100-Year	4.44
Regional	12.83

The hydrologic analysis conducted is based on a total drainage area of 218.8 ha with the lands south of the Georgian Trail subject to full urban buildout assumed to be developed as low-density residential (i.e. 35% imperviousness).

It should be noted that for the Regional storm event, the sub-catchment areas were modelled in a manner such that there is no attenuation of flows beyond the 100-year event. With respect to the catchments to south of the Georgian Trail it is assumed that the trail will not be adequate to withstand the large volume of stormwater generated during the Regional storm event. This can be seen in the increase of peak flow rates between the 100-year and Regional storm events.

8.2 Hydraulic Analysis

A hydraulic analysis was previously conducted as part of the Servicing & Stormwater Management Implementation Report – Blue Fairway: Block 7 by Crozier (May 2007) for existing conditions in order to determine the flood elevations and limits across the neighbouring and subject lands based on the Regional storm event. This analysis was performed using HEC-RAS, which is the industry standard hydraulic model. Results from the analysis provide estimates of the water surface elevations, flow velocities and depths across the study area. A HEC-RAS model for the proposed creek has been prepared and compared to the previously completed model to ensure that there will be no increase to the upstream or downstream water surface elevations during the Regional Storm event on adjacent lands.

8.2.1 Existing Conditions

Under existing conditions, the flow is conveyed upstream via a 500 mm diameter culvert which crosses the relatively flat golf course adjacent to the Subject site. From this culvert the flow is conveyed across low laying heavily vegetated terrain where it is conveyed via a 500 mm diameter culvert which crosses the Subject Site. At both culvert locations, flow from the larger storm events overtop the culverts where it is conveyed overland to the adjacent marsh. The previous HEC-RAS model determined that the water surface elevation directly upstream of the Subject Site (Section 163) is 181.51 m. Refer to attached Pre-Development West Watercourse Conveyance Figure.

8.2.2 Proposed Conditions

In order to convey the flow from the Regional Storm event across the proposed development a channel has been designed to contain and convey the flow across the proposed development. The channel geometry varies throughout the reach and is generally composed of 1 H:1 V slopes or vertical walls. A low flow channel is proposed for aesthetic purposes. The design criteria that were used to size the culverts and the channel realignment are as follows:

- Maintain the existing Regional water surface elevation at the upstream limits of the works to prevent any or additional flooding to the upstream lands.
- Protect existing and future residences from flooding events up to and including the Regional Event.

Two concrete box culverts are specified to convey the flow beneath the proposed road way. The culverts vary in size with the larger culvert having 3.0 m span by 2.1 m depth and the smaller culvert having 2.4 m span and 1.8 m depth. Due to grading constraints these culverts were designed to convey the flow from the Regional Storm event without any overtopping flow. Therefore, safe ingress/egress in accordance with the NVCA Natural Hazards Technical Guide is achieved.

A hydraulic analysis using HEC-RAS was completed for the proposed watercourse alignment to confirm conveyance capacity of the channel geometry and the two box culverts. This model was also used to confirm that the proposed watercourse alignment will not increase upstream water surface elevations. The results of the HEC-RAS model and figure for the channel alignment and stationing can be found in Appendix C.

Table 3: Regional Water Surface Elevations for Wyldewood Creek

Section	Regional Water Surface Elevation (m)
*102.91	181.50
84.81	181.39
79.81	181.38
75.91	181.37
70.91	181.36
65.91	181.34
64.91	181.35
59.61	181.34
46.11	181.27
41.41	181.26
36.41	180.90
17.91	180.71
5	180.38
0	179.91

**Section geometry per section 163 of Servicing & Stormwater Management Implementation Report – Blue Fairway: Block 7 by Crozier (May 2007).*

9.0 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, flow check dams, 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.

- Flow Check Dams

Temporary straw bale and rock check dams will be utilized on-site in order to prevent any silt mitigation off site during and after construction activities. These dams will promote settling of suspended solids, and will reduce flow velocities. Sediment accumulation will be monitored and removed as necessary. The temporary rock check dams will be constructed in accordance with NVCA's Typical Rock Check Dam Erosion Control Device (BSD-24 Draft). Locations of the straw bale and rock check dams are also shown on Drawing C108. The need for additional flow check dams will be based on the field condition at the discretion of the Engineer and Developer and implemented as necessary.

- Mud Mat

A mud mat 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.

10.0 CONCLUSIONS AND RECOMMENDATIONS

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

- Sanitary Servicing of the Wyldeewood 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.
- 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 Wyldeewood Creek development.
- The proposed oil/grit separators specified in this report will provide water quality controls in accordance with the MOE Stormwater Management Manual (2003) to meet the Enhanced Level criterion.
- 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,

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APPENDIX A

Sanitary & Potable Water Design Sheets

Sanitary Demand Calculations
Internal Sanitary Sewer System Design
Potable Water Demand Calculations
Fire Flow Calculations

Wyldeewood Creek - Future Development Sanitary Demand

Southern Sector	2.43	ha
Total Area	2.43	ha
Number of Residential Units and Land Usage		
1) Apartment	168	Units
2) Recreational Facility	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 Spaces	14	Bed Spaces
Hotel Equivalent Residential Population	1	Persons
<u>Unit Sewage flows</u>		
Residential (Per Collingwood Engineering Standards, 2007)	450	L/C-day
Recreational (Per MOECC Design Guidelines for Sewage Works, 2008)	40	L/Bed-day
Infiltration (per Collingwood Engineering Standards, 2007)	0.23	L/s/ha
<u>Total Design Sewage Flows</u>		
Infiltration/Inflow Residential	0.56	L/sec
Average Daily Residential Flow	1.67	L/sec
Average Daily Hotel Flow	0.01	L/sec
Residential Peak Factor (Harmon Formula)	4.07	
Recreational Peak Factor (Harmon Formula)	4.47	
Total Peak Daily Flow	7.37	L/sec

WYLDEWOOD CREEK
1535-4897
SANITARY SEWER DESIGN SHEET



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 (m³/ha.d):	28
Institutional (Recreation Facility) Avg. Daily/Capita Flow (L/day.person):	40
Infiltration Q (L/ha.s):	0.23

DESIGNED BY:	ML/SA
CHECKED BY:	RA
DATE:	2019.02.04
REVISION NO.:	0
REVISED BY:	
DATE:	

CATCHMENT I.D.	FROM MH NO	TO MH NO	AREA (Ha)	TOWNHOME/A PARTMENT 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
12,13	MH 6A	MH 5A	0.34	0	14	14	0	0	0.00	0.00	0.00	4.47	0.01	0.03	0.08	0.08	0.11	24.8	200	179.53	179.41	179.73	179.61	1.00%	32.80	0.33%	1.04	182.92	182.60	3.19	2.99
9, 10	MH 5A	MH 4A	0.38	30	0	14	57	57	4.30	0.30	1.28	4.47	0.01	0.03	0.09	0.17	1.47	31.9	200	179.36	179.26	179.56	179.46	0.31%	18.26	8.06%	0.58	182.60	182.38	3.04	2.92
8, 11	MH 4A	MH 3A	0.27	24	0	14	46	103	4.24	0.54	2.27	4.47	0.01	0.03	0.06	0.23	2.53	73.1	200	179.23	178.82	179.43	179.02	0.56%	24.54	10.31%	0.78	182.38	182.36	2.95	3.34
2, 5, 6, 7	MH 3A	MH 2A	0.92	78	0	14	149	252	4.11	1.31	5.39	4.47	0.01	0.03	0.21	0.44	5.86	73.3	250	178.57	178.35	178.82	178.60	0.30%	32.57	18.00%	0.66	182.36	182.31	3.54	3.71
3, 4	MH 2A	MH 1A	0.34	36	0	14	69	321	4.07	1.67	6.80	4.47	0.01	0.03	0.08	0.52	7.34	31.3	250	178.30	178.20	178.55	178.45	0.32%	33.64	21.83%	0.69	182.31	181.46	3.76	3.01
1	MH 1A	Ex. MH #8	0.18	0	0	14	0	321	4.07	1.67	6.80	4.47	0.01	0.03	0.04	0.56	7.39	10.1	250	178.15	178.12	178.4	178.37	0.30%	32.57	22.67%	0.66	181.46	-	3.06	-
*Low Rise Condo Units	Ex. MH #8	Ex. MH #6	0.6			14	32	353	4.05	1.84	7.44	4.47	0.01	0.03	0.14	0.70	8.17	75	380	-	-	-	-	0.32%	102.75	7.95%	0.91	-	-	-	-
*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	2.12	4.50	0.00	0.00	0.06	0.16	2.28	35	380	-	-	-	-	1.28%	205.49	1.11%	1.81	-	-	-	-
*Club House & Condo Units	Ex. MH #6	Ex. MH #5	0.44			14	16	462	3.99	2.41	12.64	4.47	0.01	0.03	0.10	0.96	13.63	55	380	-	-	-	-	0.24%	88.98	15.32%	0.78	-	-	-	-
*Low Rise Condo Units	Ex. MH #5	Ex. MH #4	0.47			14	114	576	3.94	3.00	14.68	4.47	0.01	0.03	0.11	1.07	15.78	59	380	-	-	-	-	0.14%	67.96	23.22%	0.60	-	-	-	-
*Low Rise Condo Units	Ex. MH #4	Ex. MH #3	0.69			14	48	624	3.92	3.25	16.07	4.47	0.01	0.03	0.16	1.23	17.33	86.5	380	-	-	-	-	0.20%	81.23	21.33%	0.72	-	-	-	-
*Hotel & Condo Units	Ex. MH #3	Ex. MH #2	0.75			14	389	1013	3.80	5.28	23.15	4.47	0.01	0.03	0.17	1.40	24.58	94.5	380	-	-	-	-	0.29%	97.81	25.13%	0.86	-	-	-	-
*To Hwy 26	Ex. MH #2	Ex. MH #1	0.72			14	24	1037	3.79	5.40	25.66	4.47	0.01	0.03	0.17	1.57	27.26	94.5	380	-	-	-	-	0.27%	94.38	28.88%	0.83	-	-	-	-
To Hwy 26	Ex. MH #1	Ex. MH #1A	0			14	0	1037	3.79	5.40	28.77	4.47	0.01	0.03	0.00	1.57	30.37	6.5	380	-	-	-	-	0.46%	123.19	24.65%	1.09	-	-	-	-

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

Wyldeewood 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

**Fire Protection Volume Calculation Summary
Wyldewood Creek**
**WATER SUPPLY FOR PUBLIC FIRE PROTECTION (1999)
FIRE UNDERWRITER'S SURVEY**

Unit Block #	Total Floor Area (m ²)	Flow (L/min)	Reduction (L/min)	Exposure Surcharge (L/min)	Required Flow (L/min)	Required Storage Volume (m ³)	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 (m ³)	S Tot	Required Flow (L/min)	Required Storage (OBC) (m ³)	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 |

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

3 number of floors

1267 sq.m. floor area

3801 sq.m. total floor area

Ordinary construction

1.0 C

Therefore F= 14,000 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 Burning	25%
Combustible	No Charge		

Low fire Hazard occupancy for dwellings -15% reduction
-2,100 L/min reduction

"Value obtained in No. 2" 11,900

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) exposed, 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%	1,190	
South Adjacent Dwelling	10	20%	2,380	
East Adjacent Dwelling	30	10%	1,190	
West Adjacent Dwelling	>45m	0%	0	
4,760 L/min Surcharge				

Determine Required Fire Flow

No. 2	11,900		
No. 3	0 reduction		
No. 4	<u>4,760</u> surcharge		
Required Flow:	16,660 L/min		
Rounded to nearest 1000l/min:	17,000 L/min	or	283.3 L/s
			4,491 USGPM

Determine Required Fire Storage Volume

Flow from above	17,000 L/min
Required duration	3.50 hours
Therefore:	3,570,000 Litres or
	3,570 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 non-combustible construction (Table 1)

V = 17865 Total building volume in cubic meters (14.1m tall)

S_{TOT} = 1 S_{TOT} Need Not Exceed 2.0

$$Q = 410888 \text{ L}$$

Based on ranges listed in Table 2, the required minimum water supply flow rate is

9000 L/min

150 L/s

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

3 number of floors

1015 sq.m. floor area

3045 sq.m. total floor area

Ordinary Construction

1.0 C

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 Burning	25%
Combustible	No Charge		

Low fire Hazard occupancy for dwellings -15% reduction

-1,800 L/min reduction

"Value obtained in No. 2" 10,200 L/min

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

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

Building will not have sprinklers (typical 30% reduction)
0 L/min reduction

Wyldeewood Creek Building 4
Fire Protection Volume Calculation
CFCA File: 1535-4897

February 4, 2019

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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) exposed, 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	21	10%	1,020	
South Adjacent Dwelling	9	20%	2,040	
East Adjacent Dwelling	26	10%	1,020	
West Adjacent Dwelling	>45	0%	0	
4,080 L/min Surcharge				

Determine Required Fire Flow

No. 2	10,200		
No. 3	0 reduction		
No. 4	<u>4,080</u> surcharge		
Required Flow:	14,280 L/min		
Rounded to nearest 1000/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

Wyldeewood Creek Building 4
Fire Protection Volume Calculation
CFCA File: 1535-4897

February 4, 2019

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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 = 42935 Total building volume in cubic meters (14.1m height)

S_{TOT} = 1 S_{TOT} Need Not Exceed 2.0

Q = 987494 L

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

150 L/s

APPENDIX B

Stormwater Management and Water Quality Calculations

Storm Sewer System Design Sheet
Oil/Grit Separator Sizing Report

WYLDEWOOD CREEK 1535-4897 STORM SEWER DESIGN SHEET																																																									
C CROZIER CONSULTING ENGINEERS			<table><tr><th colspan="6">FREQUENCY - 5 YEARS - MTO LOOKUP TOOL</th></tr><tr><td>Coef. A=</td><td>1135.4</td><td>Coef. B=</td><td>7.5</td><td>Coef. C=</td><td>0.841</td></tr><tr><th colspan="6">FREQUENCY - 100 YEARS - MTO LOOKUP TOOL</th></tr><tr><td>Coef. A=</td><td>2193.1</td><td>Coef. B=</td><td>9.04</td><td>Coef. C=</td><td>0.871</td></tr></table>								FREQUENCY - 5 YEARS - MTO LOOKUP TOOL						Coef. A=	1135.4	Coef. B=	7.5	Coef. C=	0.841	FREQUENCY - 100 YEARS - MTO LOOKUP TOOL						Coef. A=	2193.1	Coef. B=	9.04	Coef. C=	0.871	<table><tr><th>MATERIAL</th><th>MANNINGS "n"</th></tr><tr><td>PVC/Conc.</td><td>0.013</td></tr><tr><td colspan="2"></td></tr></table>		MATERIAL	MANNINGS "n"	PVC/Conc.	0.013			DESIGNED BY: ML CHECKED BY: RA DATE: 2019.02.02 REVISION NO.: 0 UPDATED BY: SA DATE:														
			FREQUENCY - 5 YEARS - MTO LOOKUP TOOL																																																						
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PVC/Conc.	0.013																																																								
INITIAL TIME OF CONCENTRATIC			10.00																																																						
CATCHMENT I.D.	FR	TO	5 YEAR RUN-OFF		DESIGN	5 YEAR		TIME	5 YEAR	DESIGN FLOW	SLOPE	PIPE	MANNING'S "n"	VEL.	LENGTH	TIME	PIPE	CAPACITY	PIPE INV ELEV.		PIPE OBV ELEV.		GROUND ELEV.		COVER																																
	MH	MH	AREA (A)	COEFF	STORM	A x C	CUMMUL.	OF CONC.	I			DIA.				OF FLOW	CAPACITY		UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER																															
	NO	NO	(Ha)	(C _s)		A x C		(min.)	(mm/hr)			(mm)				(min)	(l/sec)		(%)	END	END	END	END	END	END	END	END																														
21	CB 10	CBMH 9	0.04	0.9	5 year	0.04	0.04	10.00	204.74	20.49	2.0%	300	0.013	1.9	10.9	0.09	136.76	15%	181.17	180.95	181.47	181.25	183.46	183.10	1.99	1.85																															
22	CBMH 9	CBMH 8	0.04	0.47	5 year	0.02	0.05	10.09	204.70	31.18	1.1%	300	0.013	1.4	31.6	0.37	99.56	31%	180.90	180.56	181.20	180.86	183.10	182.55	1.90	1.69																															
18	CB 9	CBMH 8	0.11	0.71	5 year	0.08	0.08	10.00	204.74	44.45	1.0%	300	0.013	1.4	21.5	0.26	96.70	46%	180.78	180.56	181.08	180.86	182.90	182.55	1.82	1.69																															
19	CB 8	CBMH 8	0.08	0.72	5 year	0.06	0.06	10.00	204.74	34.78	1.0%	300	0.013	1.4	6.7	0.08	96.70	36%	180.73	180.66	181.03	180.96	182.56	182.55	1.53	1.59																															
23	CBMH 8	CBMH 6	0.04	0.72	5 year	0.03	0.22	10.47	204.56	128.71	0.4%	450	0.013	1.1	62.2	0.91	180.32	71%	180.41	180.16	180.86	180.61	182.55	182.18	1.69	1.57																															
13	CB 6	CBMH 7	0.05	0.8	5 year	0.04	0.04	10.00	204.74	27.34	1.0%	300	0.013	1.4	33.1	0.40	96.70	28%	180.55	180.22	180.85	180.52	182.06	182.17	1.21	1.65																															
14	CBMH 7	CBMH 6	0.22	0.8	5 year	0.17	0.21	10.40	204.59	125.93	0.5%	450	0.013	1.3	6.3	0.08	201.60	62%	180.19	180.16	180.64	180.61	182.17	182.18	1.53	1.57																															
16	CB 7	CBMH 6	0.07	0.8	5 year	0.05	0.05	10.00	204.74	39.28	1.0%	300	0.013	1.4	25.2	0.31	96.70	41%	180.55	180.30	180.85	180.60	182.12	182.18	1.27	1.58																															
15	CBMH 6	OGS 2	0.23	0.7	5 year	0.17	0.65	11.38	204.22	381.05	0.4%	675	0.013	1.5	65.1	0.73	531.63	72%	179.93	179.67	180.61	180.35	182.18	182.20	1.57	1.85																															
11	CB 5	OGS 2	0.13	0.8	5 year	0.10	0.10	10.00	204.74	71.45	1.0%	300	0.013	1.4	5.8	0.07	96.70	74%	180.10	180.04	180.40	180.34	182.20	182.20	1.80	1.86																															
10	OGS 2	S Culvert	0.14	0.8	5 year	0.11	0.87	12.11	203.95	505.49	2.0%	675	0.013	3.3	1.5	0.01	1188.77	43%	179.67	179.64	180.35	180.32	182.20	-	1.85	-																															
1	CB 3	CBMH 3	0.06	0.9	5 year	0.05	0.05	10.00	204.74	47.74	0.4%	300	0.013	0.9	26.0	0.50	61.16	78%	180.12	180.02	180.12	180.40	181.21	181.10	1.09	0.71																															
4	CB 4	CBMH 4	0.03	0.9	5 year	0.03	0.03	10.00	204.74	34.37	0.4%	300	0.013	0.9	28.0	0.54	61.16	56%	180.22	180.11	180.52	180.49	181.08	181.11	0.56	0.62																															
3	CBMH 4	CBMH 3	0.07	0.7	5 year	0.05	0.08	10.54	204.53	63.61	0.4%	375	0.013	1.0	6.7	0.11	110.89	57%	180.12	180.09	180.49	180.40	181.11	181.10	0.62	0.71																															
2	CBMH 3	CBMH 2	0.11	0.7	5 year	0.08	0.21	10.65	204.49	141.33	0.4%	450	0.013	1.1	28.7	0.42	180.32	78%	179.95	179.83	180.40	180.27	181.10	182.16	0.71	1.89																															
6	CB 2	CBMH 2	0.06	0.8	5 year	0.05	0.05	10.00	204.74	50.30	1.0%	300	0.013	1.4	6.4	0.08	96.70	52%	180.04	179.98	180.34	180.27	182.15	182.16	1.81	1.89																															
7	CBMH 2	OGS 1	0.07	0.7	5 year	0.05	0.31	11.07	204.34	199.11	0.4%	525	0.013	1.3	37.3	0.49	272.00	73%	179.75	179.60	180.27	180.13	182.16	182.26	1.89	2.13																															
	OGS 1	N CULVERT	0	0.0	5 year	0.00	0.31	11.57	204.15	199.95	0.4%	525	0.013	1.3	3.0	0.04	272.00	74%	179.60	179.59	180.13	180.11	182.26	-	2.13	-																															

**VORTECHS SYSTEM® ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON AN AVERAGE PARTICLE SIZE OF 50 MICRONS**



**WYLDEWOOD CREEK
COLLINGWOOD, ON
MODEL 3000 IN-LINE
SITE DESIGNATION OGS 1**

Design Ratio¹ =
$$\frac{(0.51 \text{ hectares}) \times (0.82) \times (2.775)}{(1.8 \text{ m}^2)} = 0.63$$

Rainfall Intensity mm/hr	Operating Rate² % of capacity	Flow Treated (l/s)	% Total Rainfall Volume ³	Rmvl. Effic⁴ (%)	Rel. Effic⁴ (%)
0.5	0.5	0.6	8.7%	100.0%	8.7%
1.0	0.9	1.2	10.8%	100.0%	10.8%
1.5	1.4	1.8	9.5%	98.0%	9.3%
2.0	1.9	2.4	8.4%	98.0%	8.2%
2.5	2.3	3.0	6.8%	97.0%	6.6%
3.0	2.8	3.6	5.6%	97.0%	5.4%
3.5	3.3	4.2	5.1%	95.8%	4.9%
4.0	3.7	4.8	4.9%	95.8%	4.7%
4.5	4.2	5.4	4.1%	94.1%	3.8%
5.0	4.7	5.9	3.5%	94.1%	3.3%
6.0	5.6	7.1	4.9%	92.6%	4.6%
7.0	6.5	8.3	4.0%	91.2%	3.6%
8.0	7.5	9.5	3.2%	90.0%	2.9%
9.0	8.4	10.7	2.2%	88.3%	2.0%
10.0	9.3	11.9	2.0%	87.1%	1.7%
15.0	14.0	17.8	8.2%	80.3%	6.6%
20.0	18.7	23.8	3.4%	72.3%	2.4%
25.0	23.3	29.7	2.5%	65.4%	1.6%
30.0	28.0	35.7	1.4%	60.4%	0.9%
35.0	32.7	41.6	0.3%	55.0%	0.1%
40.0	37.3	47.6	0.6%	49.2%	0.3%
					92.5%

Predicted Annual Runoff Volume Treated = 93.5%
Assumed Removal Efficiency of remaining % = 0.0%
Removal Efficiency Adjustment⁵ = 6.5%
Predicted Net Annual Load Removal Efficiency = **86%**

1 - Design Ratio = (Total Drainage Area) x (Runoff Coefficient) x (Rational Method Conversion) / Grit Chamber Area

- The Total Drainage Area and Runoff Coefficient are specified by the site engineer.
- The rational method conversion based on the units in the above equation is 2.775.

2 - Operating Rate (% of capacity) = percentage of peak operating rate of 68 l/s/m².

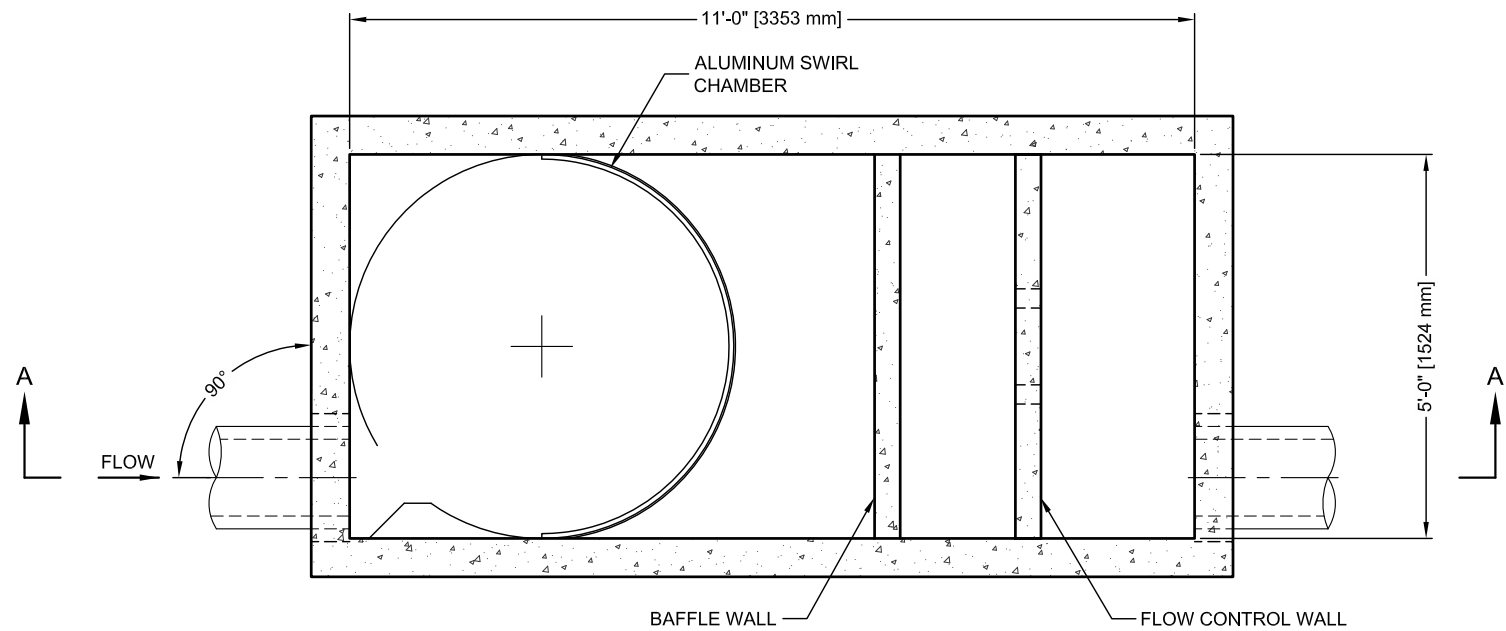
3 - Based on 27 years of hourly rainfall data from Canadian Station 6110557, Barrie, ON

4 - Based on Contech Construction Products laboratory verified removal of an average particle size of 50 microns (see Technical Bulletin #1).

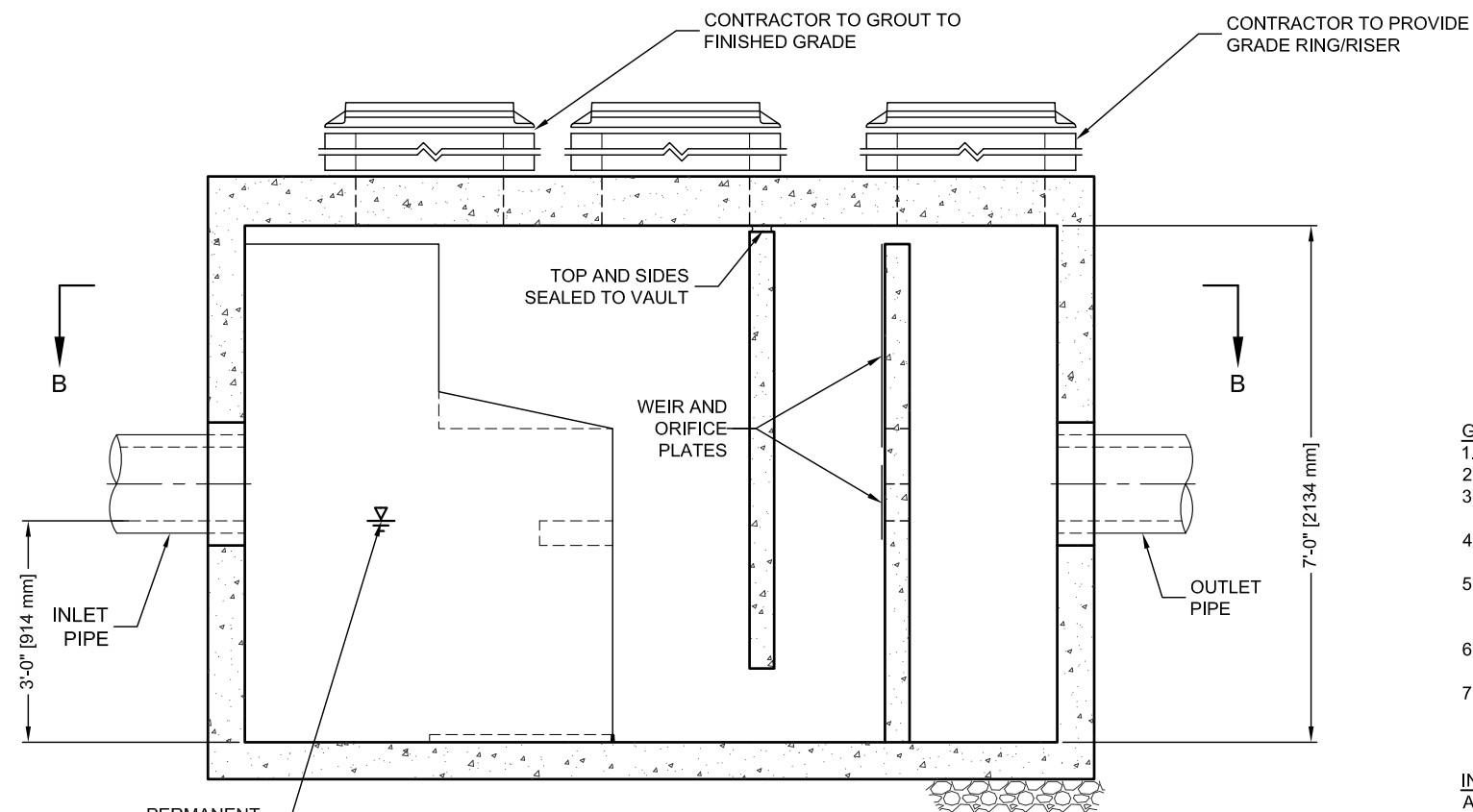
5- Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

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SECTION B-B



SECTION A-A

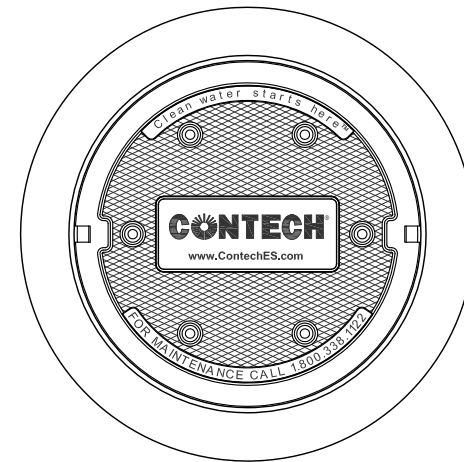


THIS PRODUCT MAY BE PROTECTED BY THE FOLLOWING
U.S. PATENT: 5,759,415; RELATED FOREIGN PATENTS.

VORTECHS 3000 DESIGN NOTES

VORTECHS 3000 RATED TREATMENT CAPACITY IS 4.5 CFS, OR PER LOCAL REGULATIONS. IF THE SITE CONDITIONS EXCEED RATED TREATMENT CAPACITY, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

THE STANDARD INLET/OUTLET CONFIGURATION IS SHOWN. FOR OTHER CONFIGURATION OPTIONS , PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com



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)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*

RIM ELEVATION	*
---------------	---

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES

- CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
- DIMENSIONS MARKED WITH () ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
- FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com
- VORTECHS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
- STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET AASHTO M306 LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
- INLET PIPE(S) MUST BE PERPEDICULAR TO THE VAULT AND AT THE CORNER TO INTRODUCE THE FLOW TANGENTIALLY TO THE SWIRL CHAMBER. DUAL INLETS NOT TO HAVE OPPOSING TANGENTIAL FLOW DIRECTIONS.
- OUTLET PIPE(S) MUST BE DOWN STREAM OF THE FLOW CONTROL BAFFLE AND MAY BE LOCATED ON THE SIDE OR END OF THE VAULT. THE FLOW CONTROL WALL MAY BE TURNED TO ACCOMODATE OUTLET PIPE KNOCKOUTS ON THE SIDE OF THE VAULT.

INSTALLATION NOTES

- ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
- CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE VORTECHS STRUCTURE (LIFTING CLUTCHES PROVIDED).
- CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
- CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
- CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com

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800-338-1122 513-645-7000 513-645-7993 FAX

VORTECHS 3000
STANDARD DETAIL

**VORTECHS SYSTEM® ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON AN AVERAGE PARTICLE SIZE OF 50 MICRONS**



**WYLDEWOOD CREEK
COLLINGWOOD, ON
MODEL 5000 IN-LINE
SITE DESIGNATION OGS 2**

Design Ratio¹ =
$$\frac{(1.05 \text{ hectares}) \times (0.49) \times (2.775)}{(3.6 \text{ m}^2)} = 0.4$$

Rainfall Intensity mm/hr	Operating Rate² % of capacity	Flow Treated (l/s)	% Total Rainfall Volume ³	Rmvl. Effic⁴ (%)	Rel. Effic⁴ (%)
0.5	0.3	0.7	8.7%	100.0%	8.7%
1.0	0.6	1.4	10.8%	100.0%	10.8%
1.5	0.9	2.1	9.5%	100.0%	9.5%
2.0	1.2	2.8	8.4%	98.0%	8.2%
2.5	1.5	3.5	6.8%	98.0%	6.7%
3.0	1.7	4.2	5.6%	98.0%	5.5%
3.5	2.0	4.9	5.1%	97.0%	4.9%
4.0	2.3	5.6	4.9%	97.0%	4.7%
4.5	2.6	6.3	4.1%	97.0%	4.0%
5.0	2.9	7.0	3.5%	97.0%	3.4%
6.0	3.5	8.4	4.9%	95.8%	4.7%
7.0	4.1	9.8	4.0%	94.1%	3.7%
8.0	4.7	11.2	3.2%	94.1%	3.1%
9.0	5.2	12.6	2.2%	92.6%	2.1%
10.0	5.8	14.0	2.0%	92.6%	1.8%
15.0	8.7	21.0	8.2%	88.3%	7.2%
20.0	11.7	28.1	3.4%	84.0%	2.8%
25.0	14.6	35.1	2.5%	79.1%	2.0%
30.0	17.5	42.1	1.4%	74.0%	1.1%
35.0	20.4	49.1	0.3%	69.7%	0.2%
40.0	23.3	56.1	0.6%	65.4%	0.4%
					95.4%

Predicted Annual Runoff Volume Treated = 93.5%
Assumed Removal Efficiency of remaining % = 0.0%
Removal Efficiency Adjustment⁵ = 6.5%
Predicted Net Annual Load Removal Efficiency = **89%**

1 - Design Ratio = (Total Drainage Area) x (Runoff Coefficient) x (Rational Method Conversion) / Grit Chamber Area

- The Total Drainage Area and Runoff Coefficient are specified by the site engineer.
- The rational method conversion based on the units in the above equation is 2.775.

2 - Operating Rate (% of capacity) = percentage of peak operating rate of 68 l/s/m².

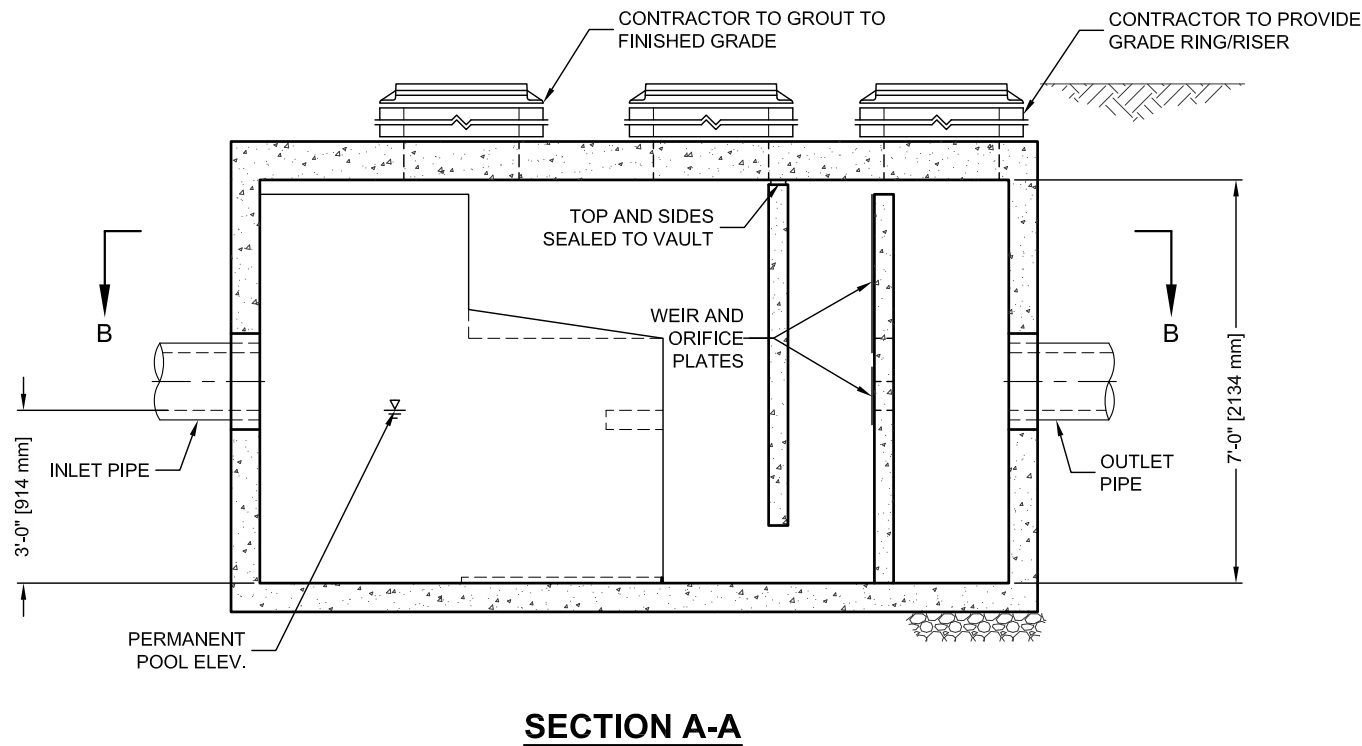
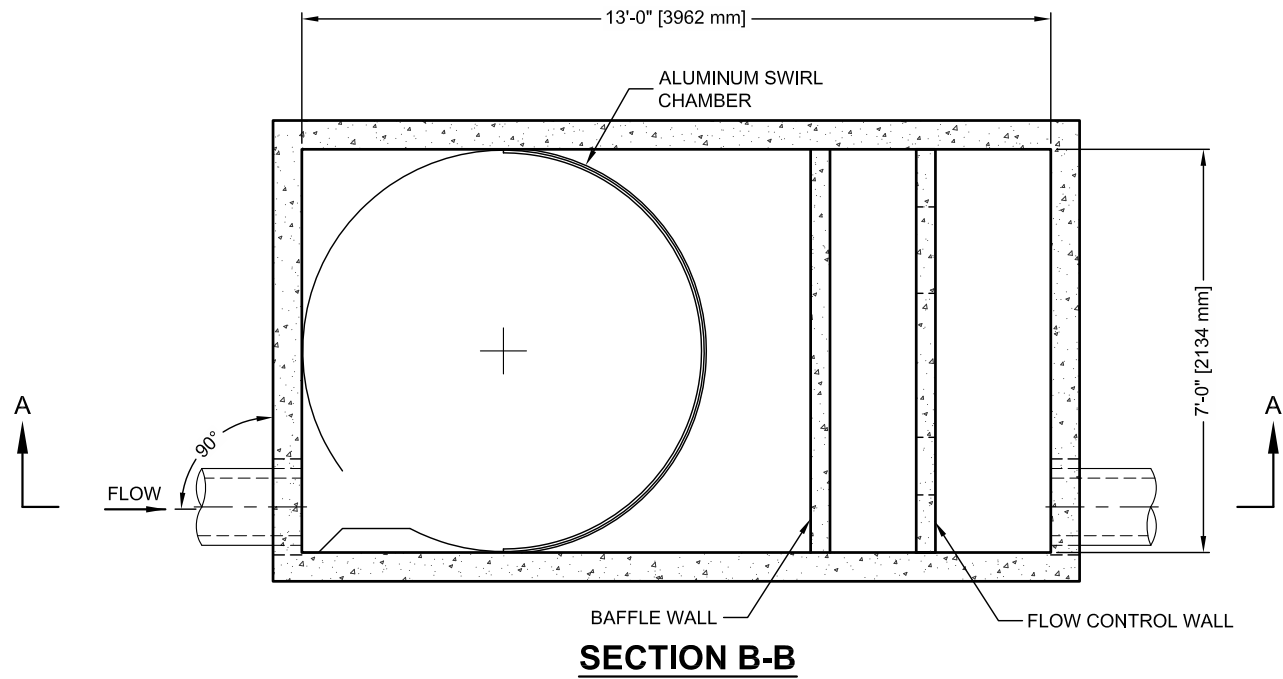
3 - Based on 27 years of hourly rainfall data from Canadian Station 6110557, Barrie, ON

4 - Based on Contech Construction Products laboratory verified removal of an average particle size of 50 microns (see Technical Bulletin #1).

5- Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Calculated by: JAK 2/1 Checked by:

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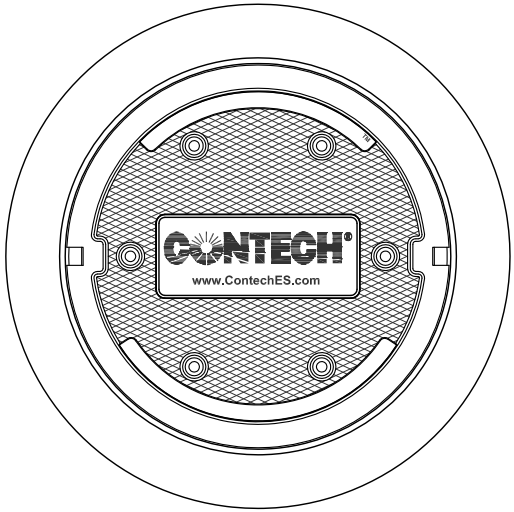


THIS PRODUCT MAY BE PROTECTED BY THE FOLLOWING
U.S. PATENT: 5,759,415; RELATED FOREIGN PATENTS.

VORTECHS 5000 DESIGN NOTES

VORTECHS 5000 RATED TREATMENT CAPACITY IS 8.5 CFS, OR PER LOCAL REGULATIONS. IF THE SITE CONDITIONS EXCEED RATED TREATMENT CAPACITY, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

THE STANDARD INLET/OUTLET CONFIGURATION IS SHOWN. FOR OTHER CONFIGURATION OPTIONS , PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com



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)			*
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*
RIM ELEVATION			*
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		*	*
NOTES/SPECIAL REQUIREMENTS:			
* PER ENGINEER OF RECORD			

GENERAL NOTES

- CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
- DIMENSIONS MARKED WITH () ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
- FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com
- VORTECHS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
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- CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
- CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH
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VORTECHS 5000
STANDARD DETAIL

APPENDIX C

Hydraulic Calculations for Wyldeewood Creek

HEC-RAS Sections and Profile
Summary Table
HEC-RAS Cross Sections Figure

HEC-RAS Plan: Post-Dev River: Wyldewood Creek Reach: R1 Profile: 2-Year

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
R1	102.91	2-Year	0.88	179.43	180.02		180.02	0.000270	0.18	5.04	15.42	0.10
R1	84.81	2-Year	0.88	179.38	179.98		180.01	0.005038	0.70	1.29	4.55	0.41
R1	79.81	2-Year	0.88	179.36	179.96		179.98	0.005522	0.72	1.26	4.53	0.42
R1	75.91	2-Year	0.88	179.35	179.94		179.96	0.004087	0.62	1.48	5.13	0.36
R1	70.91	2-Year	0.88	179.33	179.92		179.94	0.004666	0.64	1.42	5.13	0.38
R1	65.91	2-Year	0.88	179.32	179.89		179.91	0.006448	0.70	1.29	5.10	0.44
R1	64.91	2-Year	0.88	179.32	179.89		179.90	0.003875	0.56	1.63	6.10	0.34
R1	59.61	2-Year	0.88	179.30	179.86	179.73	179.88	0.004062	0.57	1.61	6.10	0.35
R1	58.61		Inl Struct									
R1	46.11	2-Year	0.88	179.25	179.86		179.87	0.002385	0.49	1.89	6.10	0.28
R1	41.41	2-Year	0.88	179.21	179.85		179.86	0.001773	0.44	2.08	6.10	0.24
R1	36.41	2-Year	0.88	179.13	179.77		179.83	0.011338	1.12	0.83	2.77	0.61
R1	17.91	2-Year	0.88	178.92	179.57		179.63	0.010121	1.08	0.86	2.81	0.58
R1	5	2-Year	0.88	178.77	179.35	179.32	179.44	0.022025	1.38	0.67	2.66	0.83
R1	0	2-Year	0.88	178.70	179.21	179.21	179.30	0.037878	1.29	0.68	4.01	1.00

HEC-RAS Plan: Post-Dev River: Wyldewood Creek Reach: R1 Profile: 5-Year

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
R1	102.91	5-Year	1.71	179.43	180.20		180.20	0.000249	0.23	7.81	16.14	0.10
R1	84.81	5-Year	1.71	179.38	180.15		180.19	0.004310	0.87	2.07	4.88	0.40
R1	79.81	5-Year	1.71	179.36	180.13		180.16	0.004379	0.87	2.06	4.87	0.41
R1	75.91	5-Year	1.71	179.35	180.12		180.15	0.003331	0.76	2.40	5.31	0.35
R1	70.91	5-Year	1.71	179.33	180.10		180.13	0.003475	0.77	2.37	5.31	0.36
R1	65.91	5-Year	1.71	179.32	180.08		180.11	0.003865	0.79	2.29	5.30	0.38
R1	64.91	5-Year	1.71	179.32	180.08		180.10	0.002525	0.65	2.83	6.10	0.30
R1	59.61	5-Year	1.71	179.30	180.07	179.80	180.09	0.002398	0.64	2.86	6.10	0.30
R1	58.61		Inf Struct									
R1	46.11	5-Year	1.71	179.25	180.05		180.07	0.001903	0.60	3.07	6.10	0.27
R1	41.41	5-Year	1.71	179.21	180.04		180.06	0.001594	0.57	3.27	6.10	0.25
R1	36.41	5-Year	1.71	179.13	179.93		180.02	0.011108	1.43	1.30	3.08	0.65
R1	17.91	5-Year	1.71	178.92	179.74		179.83	0.009463	1.36	1.37	3.15	0.60
R1	5	5-Year	1.71	178.77	179.45	179.45	179.63	0.027760	1.91	0.96	2.87	0.98
R1	0	5-Year	1.71	178.70	179.31	179.31	179.43	0.034279	1.53	1.12	4.77	1.01

HEC-RAS Plan: Post-Dev River: Wyldewood Creek Reach: R1 Profile: 10-Year

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
R1	102.91	10-Year	2.32	179.43	180.31		180.32	0.000232	0.25	9.68	16.62	0.10
R1	84.81	10-Year	2.32	179.38	180.26		180.30	0.003834	0.94	2.61	5.10	0.39
R1	79.81	10-Year	2.32	179.36	180.24		180.28	0.003819	0.94	2.62	5.10	0.39
R1	75.91	10-Year	2.32	179.35	180.23		180.26	0.003004	0.84	3.01	5.42	0.35
R1	70.91	10-Year	2.32	179.33	180.22		180.25	0.003073	0.84	2.99	5.43	0.35
R1	65.91	10-Year	2.32	179.32	180.20		180.23	0.003288	0.86	2.93	5.42	0.36
R1	64.91	10-Year	2.32	179.32	180.20		180.23	0.002244	0.71	3.56	6.10	0.30
R1	59.61	10-Year	2.32	179.30	180.19	179.85	180.21	0.002115	0.70	3.60	6.10	0.29
R1	58.61		Inf Struct									
R1	46.11	10-Year	2.32	179.25	180.16		180.18	0.001813	0.67	3.77	6.10	0.27
R1	41.41	10-Year	2.32	179.21	180.16		180.18	0.001585	0.65	3.98	6.10	0.26
R1	36.41	10-Year	2.32	179.13	180.02		180.14	0.011078	1.61	1.59	3.27	0.66
R1	17.91	10-Year	2.32	178.92	179.83		179.94	0.009758	1.54	1.67	3.33	0.63
R1	5	10-Year	2.32	178.77	179.53	179.53	179.74	0.025858	2.09	1.20	3.04	0.98
R1	0	10-Year	2.32	178.70	179.37	179.37	179.51	0.032454	1.64	1.42	5.22	1.00

HEC-RAS Plan: Post-Dev River: Wyldewood Creek Reach: R1 Profile: 25-Year

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
R1	102.91	25-Year	3.14	179.43	180.45		180.46	0.000213	0.27	12.05	17.20	0.10
R1	84.81	25-Year	3.14	179.38	180.39		180.44	0.003377	1.01	3.32	5.37	0.38
R1	79.81	25-Year	3.14	179.36	180.38		180.42	0.003322	1.01	3.33	5.37	0.38
R1	75.91	25-Year	3.14	179.35	180.37		180.41	0.002732	0.92	3.77	5.56	0.34
R1	70.91	25-Year	3.14	179.33	180.36		180.39	0.002762	0.92	3.76	5.57	0.35
R1	65.91	25-Year	3.14	179.32	180.34		180.38	0.002886	0.93	3.71	5.56	0.35
R1	64.91	25-Year	3.14	179.32	180.35		180.37	0.002066	0.79	4.43	6.10	0.30
R1	59.61	25-Year	3.14	179.30	180.34	179.90	180.36	0.001937	0.77	4.48	6.10	0.29
R1	58.61		Inf Struct									
R1	46.11	25-Year	3.14	179.25	180.30		180.32	0.001778	0.76	4.60	6.10	0.28
R1	41.41	25-Year	3.14	179.21	180.29		180.32	0.001613	0.74	4.80	6.10	0.27
R1	36.41	25-Year	3.14	179.13	180.13		180.27	0.011049	1.79	1.96	3.49	0.68
R1	17.91	25-Year	3.14	178.92	179.94		180.08	0.010027	1.73	2.03	3.54	0.65
R1	5	25-Year	3.14	178.77	179.63	179.63	179.87	0.023984	2.28	1.51	3.23	0.97
R1	0	25-Year	3.14	178.70	179.44	179.44	179.60	0.031195	1.76	1.78	5.73	1.01

HEC-RAS Plan: Post-Dev River: Wyldewood Creek Reach: R1 Profile: 50-Year

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
R1	102.91	50-Year	3.76	179.43	180.55		180.55	0.000204	0.29	13.71	17.59	0.10
R1	84.81	50-Year	3.76	179.38	180.48		180.54	0.003165	1.06	3.81	5.55	0.38
R1	79.81	50-Year	3.76	179.36	180.47		180.52	0.003103	1.06	3.84	5.56	0.38
R1	75.91	50-Year	3.76	179.35	180.46		180.51	0.002630	0.98	4.29	5.65	0.34
R1	70.91	50-Year	3.76	179.33	180.45		180.49	0.002650	0.98	4.29	5.66	0.35
R1	65.91	50-Year	3.76	179.32	180.44		180.48	0.002746	0.99	4.24	5.65	0.35
R1	64.91	50-Year	3.76	179.32	180.44		180.47	0.002022	0.85	5.01	6.10	0.30
R1	59.61	50-Year	3.76	179.30	180.43	179.94	180.46	0.001892	0.83	5.06	6.10	0.29
R1	58.61		Inf Struct									
R1	46.11	50-Year	3.76	179.25	180.39		180.42	0.001782	0.82	5.15	6.10	0.28
R1	41.41	50-Year	3.76	179.21	180.38		180.41	0.001648	0.80	5.36	6.10	0.27
R1	36.41	50-Year	3.76	179.13	180.20		180.36	0.011038	1.91	2.22	3.63	0.69
R1	17.91	50-Year	3.76	178.92	180.01		180.17	0.010137	1.86	2.29	3.68	0.67
R1	5	50-Year	3.76	178.77	179.70	179.70	179.97	0.023104	2.41	1.73	3.36	0.97
R1	0	50-Year	3.76	178.70	179.48	179.48	179.66	0.030444	1.83	2.05	6.08	1.01

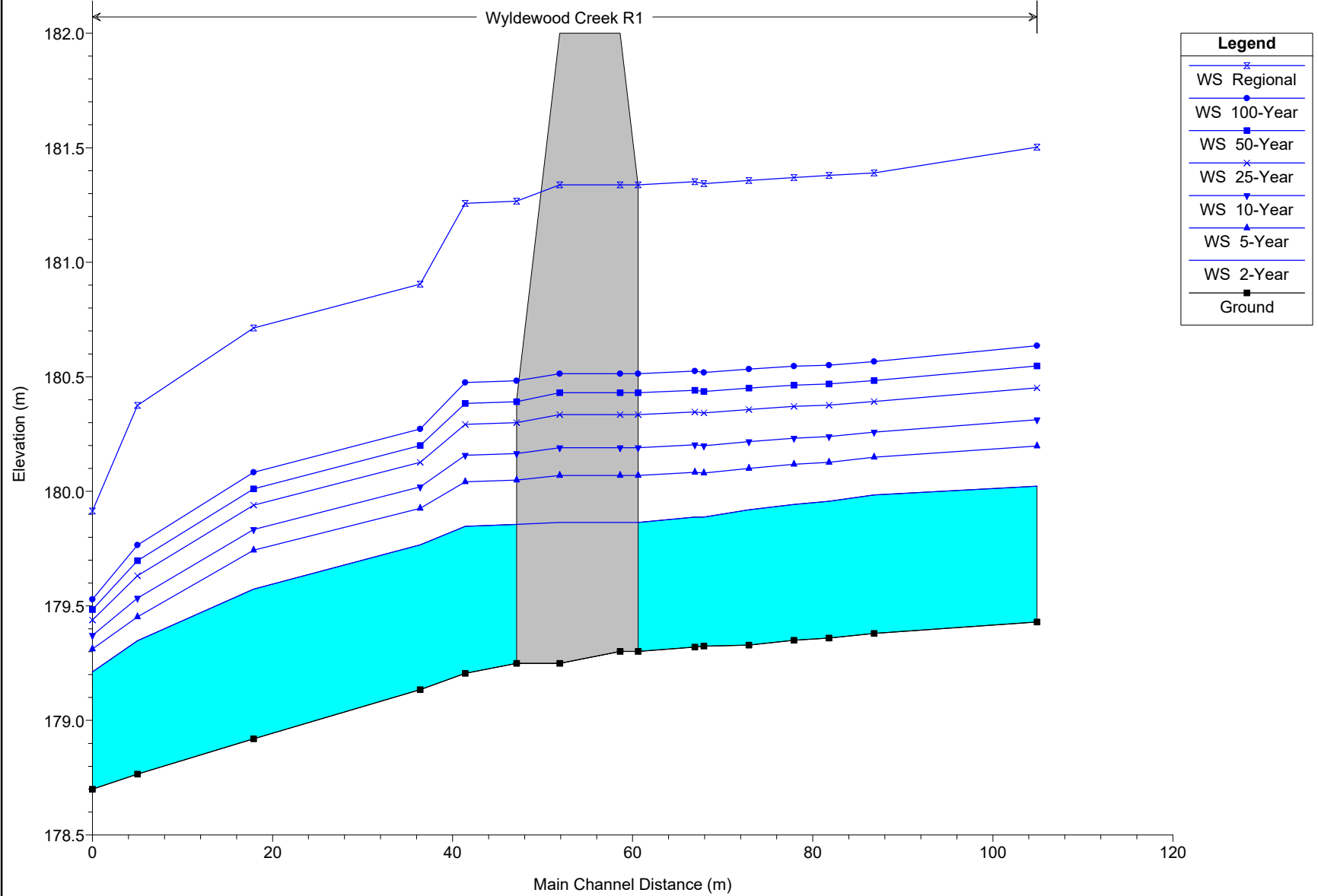
HEC-RAS Plan: Post-Dev River: Wyldewood Creek Reach: R1 Profile: 100-Year

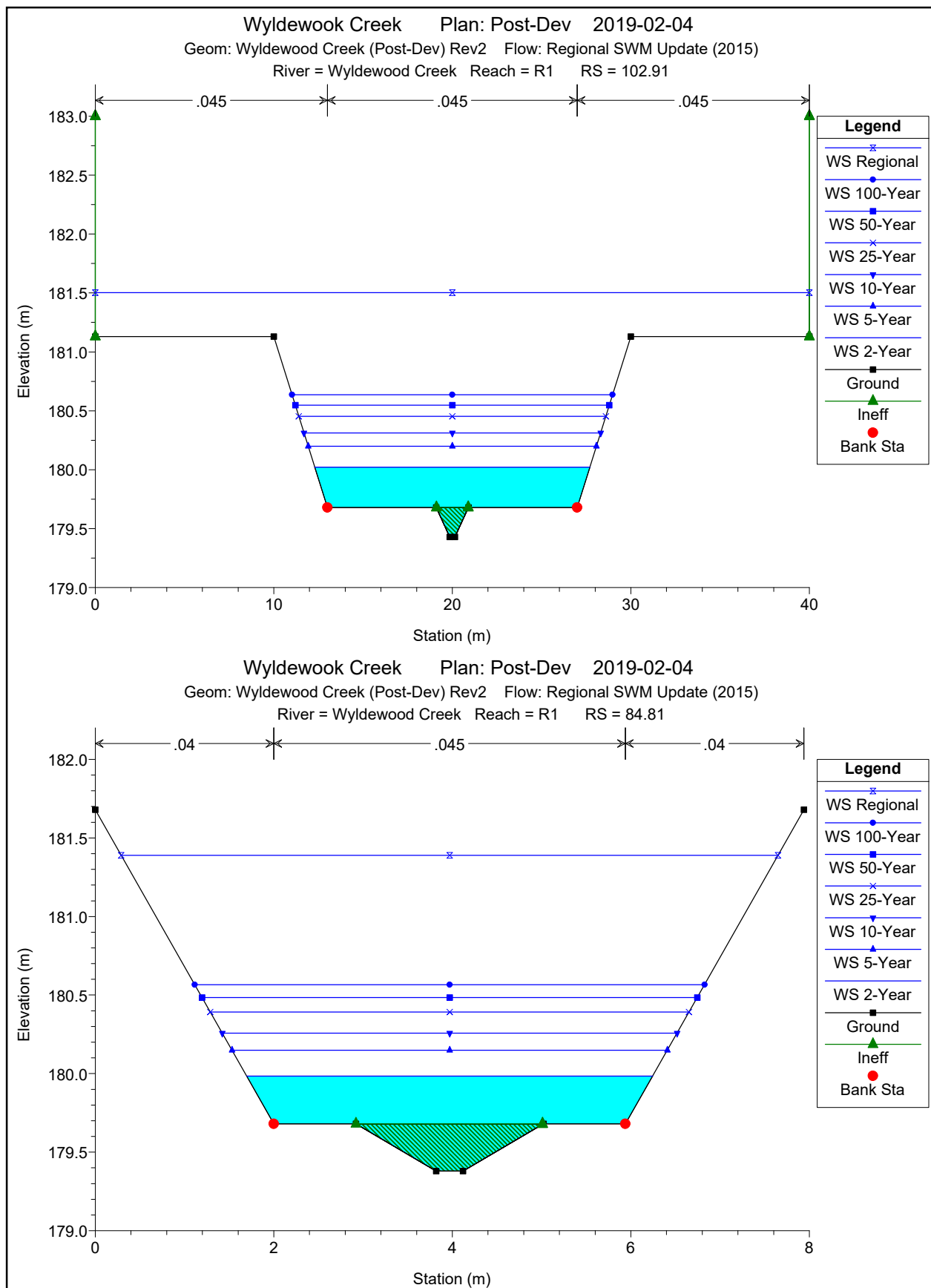
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
R1	102.91	100-Year	4.44	179.43	180.64		180.64	0.000203	0.31	15.28	17.96	0.10
R1	84.81	100-Year	4.44	179.38	180.57		180.63	0.003119	1.13	4.28	5.71	0.38
R1	79.81	100-Year	4.44	179.36	180.55		180.61	0.003060	1.12	4.30	5.72	0.38
R1	75.91	100-Year	4.44	179.35	180.55		180.59	0.002666	1.05	4.76	5.74	0.35
R1	70.91	100-Year	4.44	179.33	180.53		180.58	0.002685	1.05	4.76	5.74	0.35
R1	65.91	100-Year	4.44	179.32	180.52		180.57	0.002776	1.06	4.71	5.73	0.36
R1	64.91	100-Year	4.44	179.32	180.52		180.56	0.002093	0.92	5.52	6.10	0.31
R1	59.61	100-Year	4.44	179.30	180.51	179.98	180.55	0.001959	0.90	5.56	6.10	0.30
R1	58.61		Inf Struct									
R1	46.11	100-Year	4.44	179.25	180.48		180.51	0.001800	0.88	5.71	6.10	0.29
R1	41.41	100-Year	4.44	179.21	180.48		180.51	0.001694	0.87	5.91	6.10	0.28
R1	36.41	100-Year	4.44	179.13	180.27		180.46	0.011038	2.03	2.49	3.78	0.70
R1	17.91	100-Year	4.44	178.92	180.08		180.26	0.010240	1.98	2.56	3.83	0.68
R1	5	100-Year	4.44	178.77	179.77	179.77	180.06	0.022253	2.53	1.96	3.50	0.97
R1	0	100-Year	4.44	178.70	179.53	179.53	179.71	0.029639	1.90	2.33	6.42	1.01

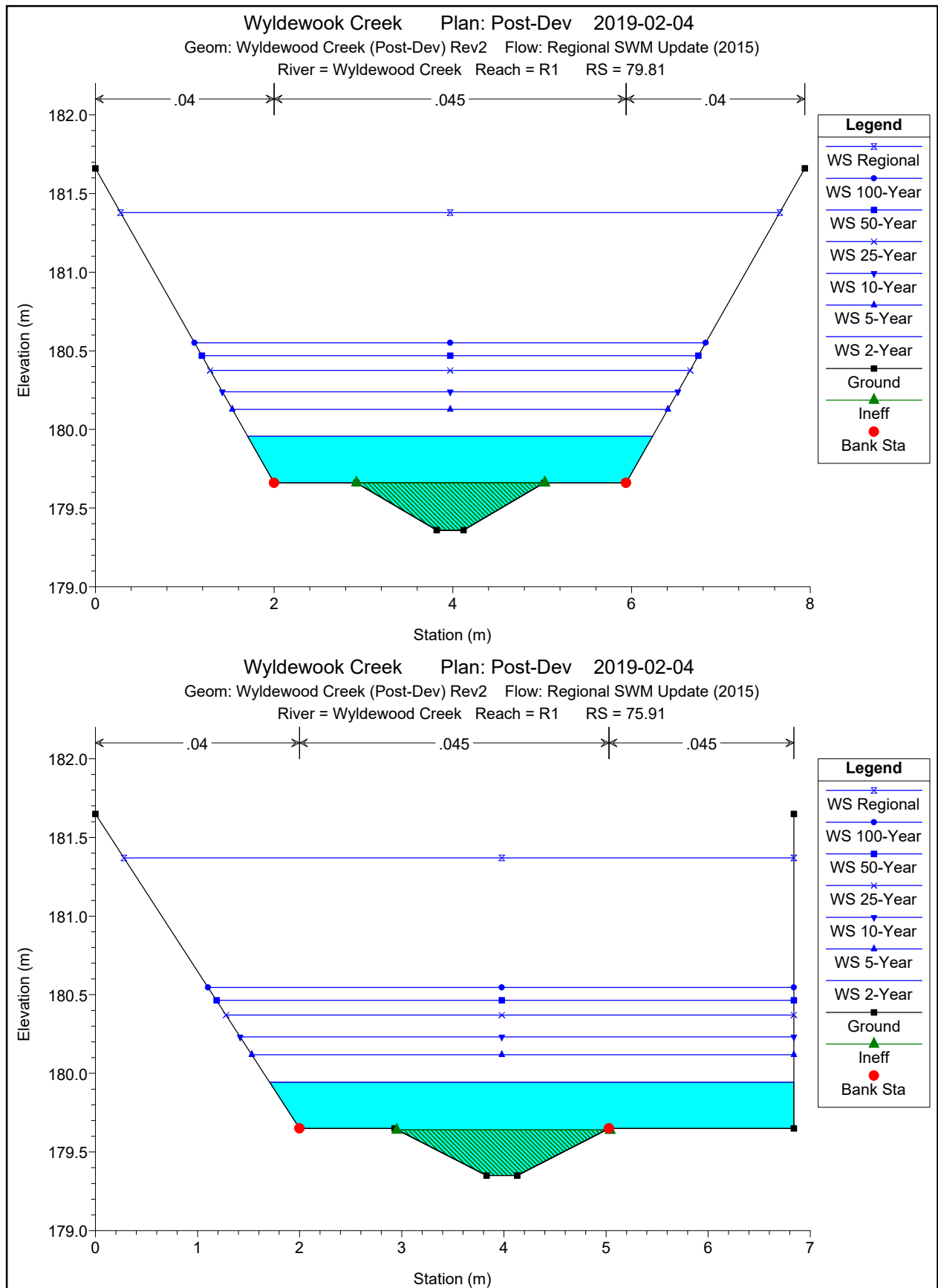
HEC-RAS Plan: Post-Dev River: Wyldewood Creek Reach: R1 Profile: Regional

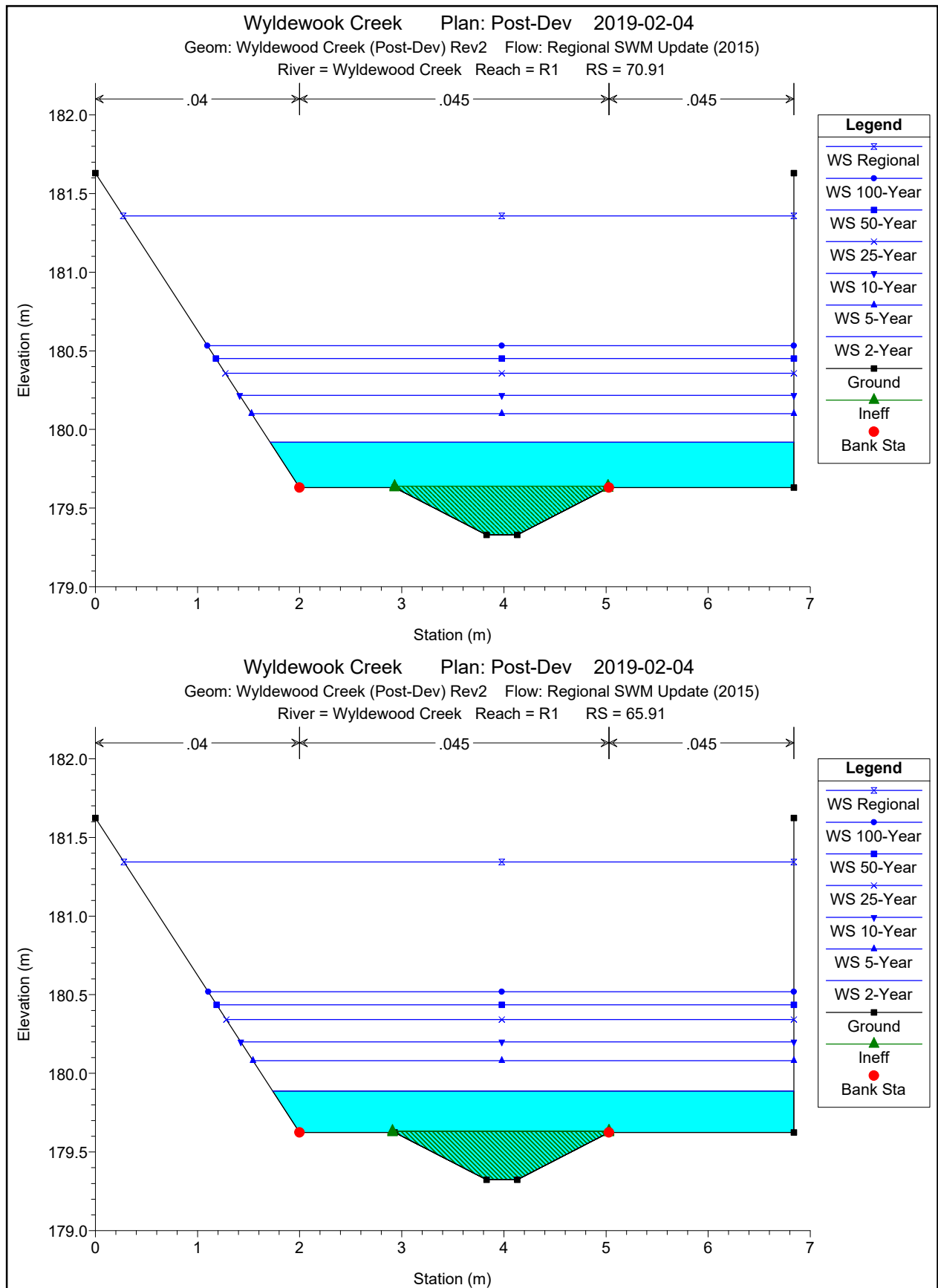
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
R1	102.91	Regional	12.83	179.43	181.50		181.51	0.000152	0.41	39.54	40.00	0.10
R1	84.81	Regional	12.83	179.38	181.39		181.49	0.002381	1.53	9.66	7.36	0.37
R1	79.81	Regional	12.83	179.36	181.38		181.48	0.002335	1.52	9.73	7.38	0.37
R1	75.91	Regional	12.83	179.35	181.37		181.47	0.002550	1.58	9.83	6.56	0.38
R1	70.91	Regional	12.83	179.33	181.36		181.46	0.002555	1.58	9.83	6.57	0.38
R1	65.91	Regional	12.83	179.32	181.34		181.44	0.002597	1.59	9.78	6.56	0.39
R1	64.91	Regional	12.83	179.32	181.35		181.44	0.002443	1.54	10.56	6.10	0.37
R1	59.61	Regional	12.83	179.30	181.34	180.37	181.42	0.002238	1.47	10.60	6.10	0.36
R1	58.61		Inf Struct									
R1	46.11	Regional	12.83	179.25	181.27		181.35	0.002297	1.49	10.50	6.10	0.36
R1	41.41	Regional	12.83	179.21	181.26		181.34	0.002361	1.52	10.68	6.10	0.37
R1	36.41	Regional	12.83	179.13	180.90		181.26	0.011056	2.94	5.27	5.04	0.77
R1	17.91	Regional	12.83	178.92	180.71		181.06	0.010584	2.90	5.36	5.09	0.76
R1	5	Regional	12.83	178.77	180.38	180.38	180.87	0.017648	3.43	4.46	4.72	0.96
R1	0	Regional	12.83	178.70	179.91	179.91	180.21	0.025346	2.39	5.37	9.35	1.01

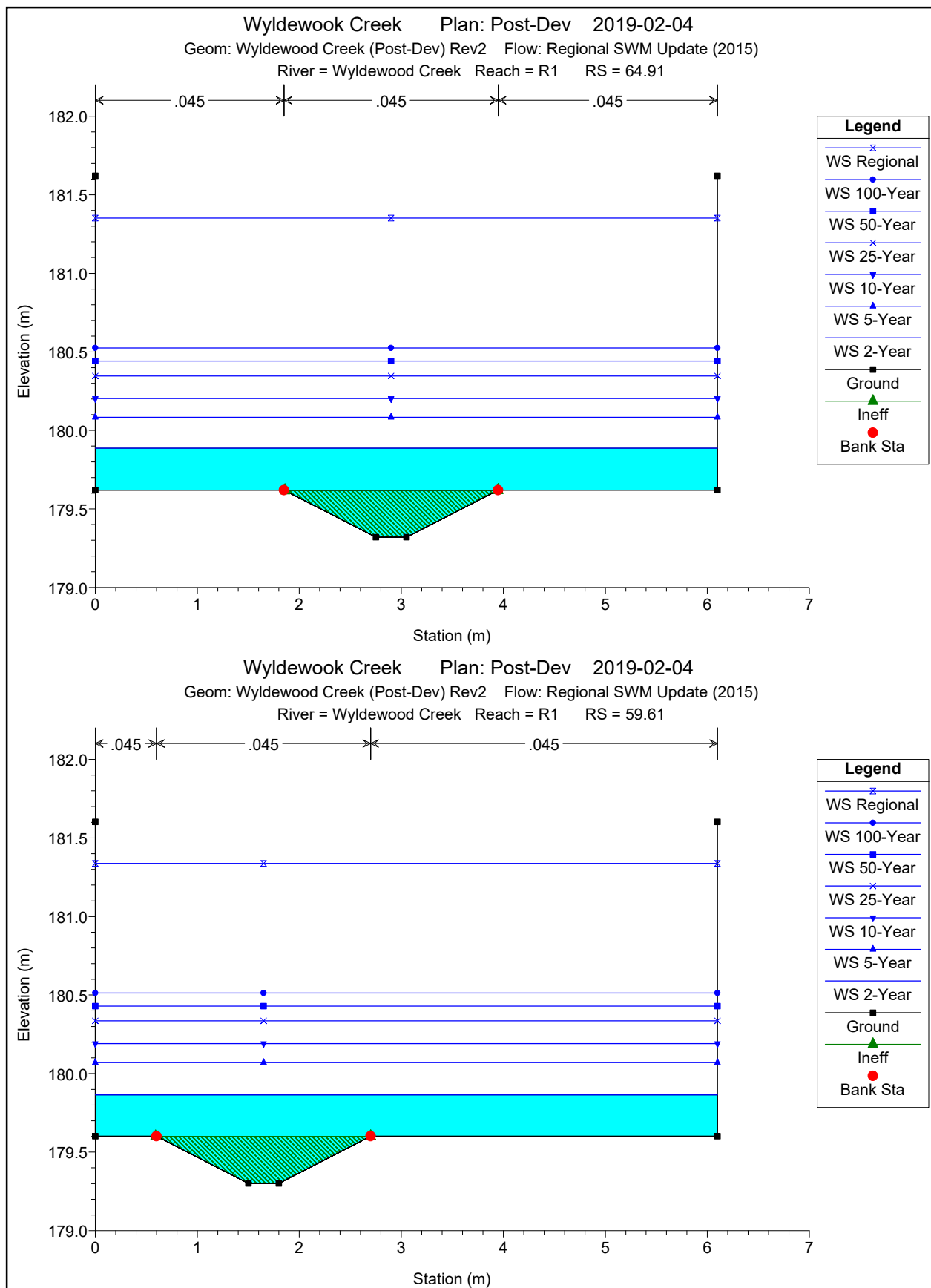
Wyldeewood Creek Plan: Post-Dev 2019-02-04
Geom: Wyldeewood Creek (Post-Dev) Rev2 Flow: Regional SWM Update (2015)

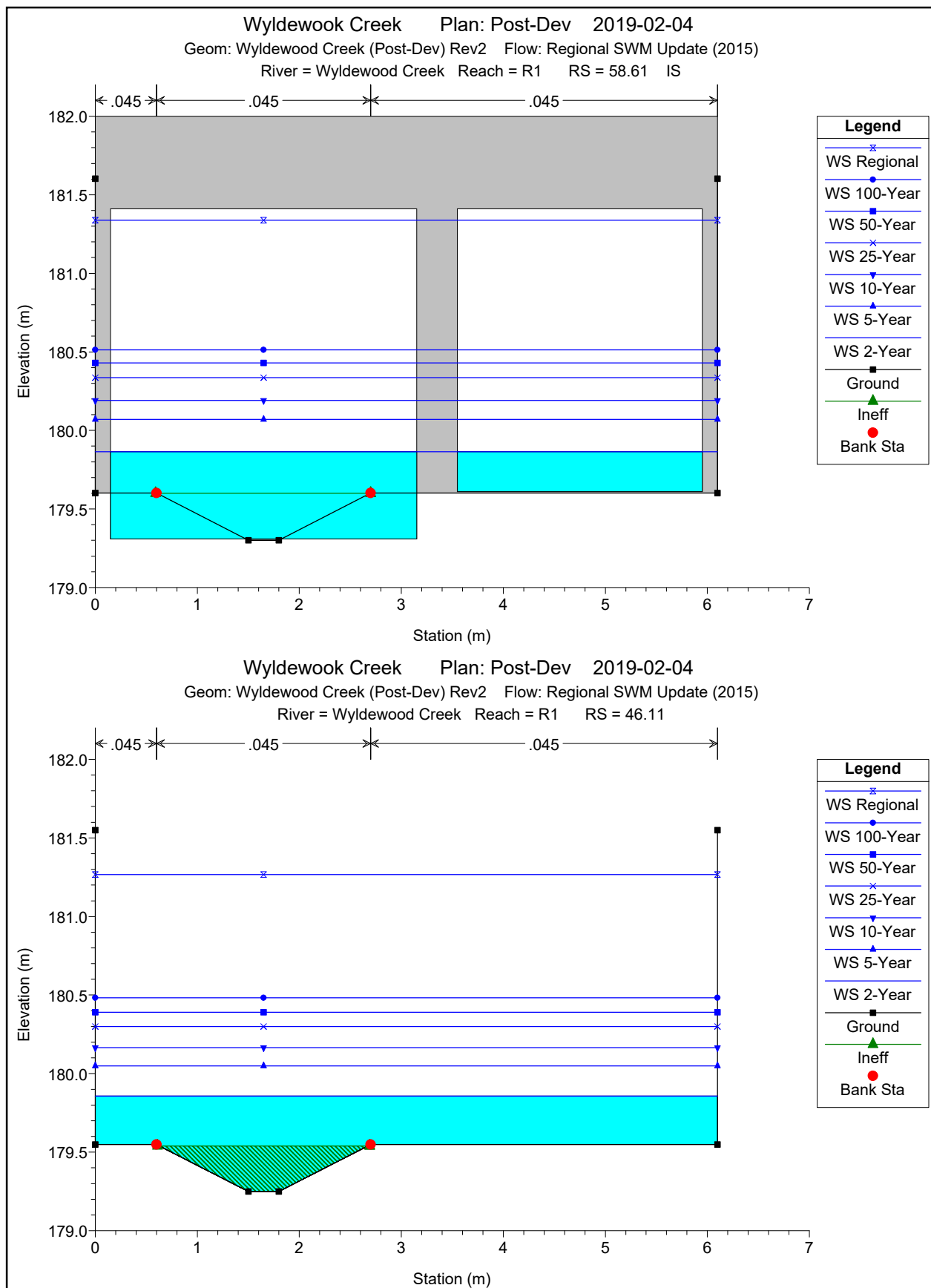


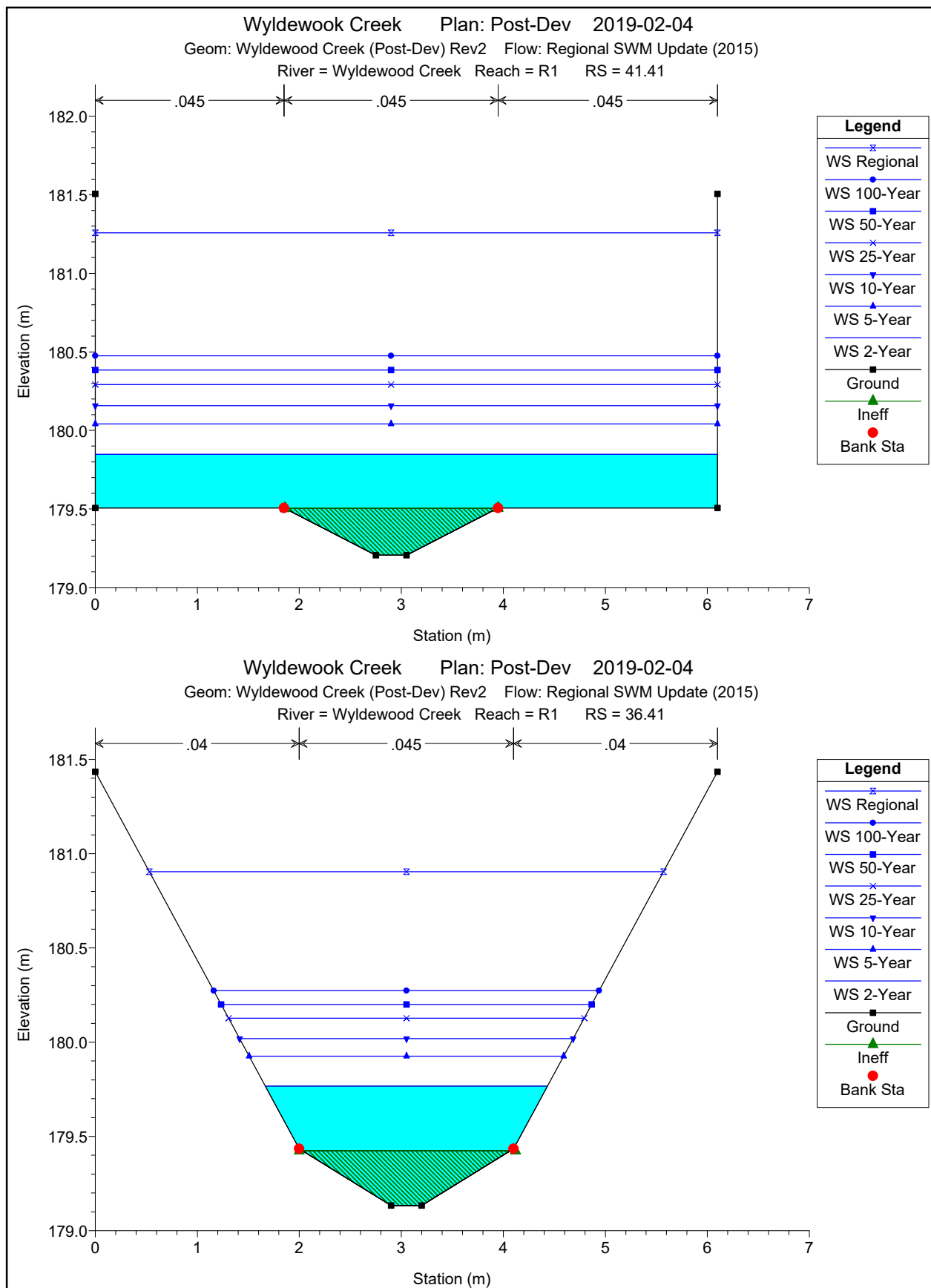












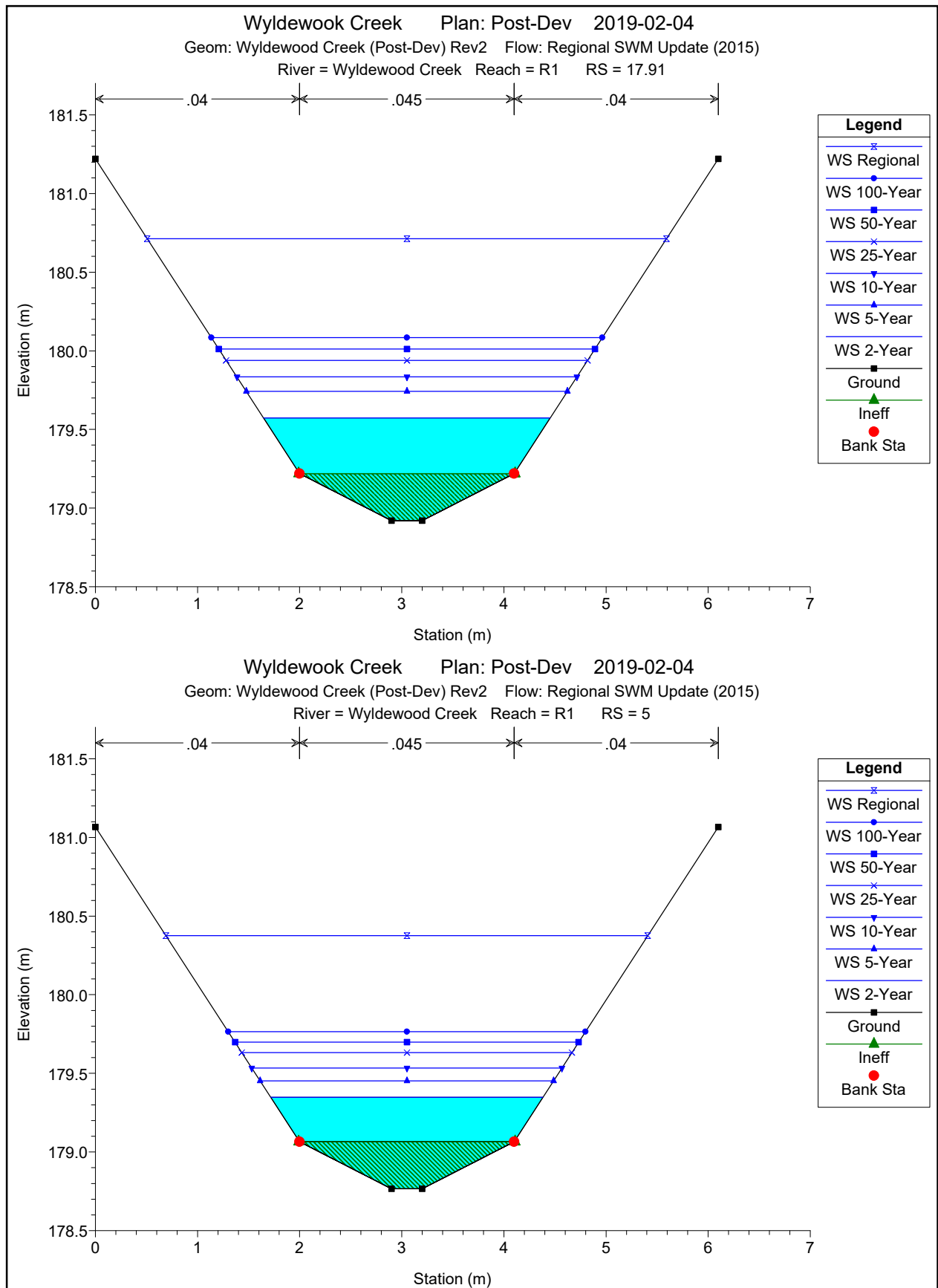
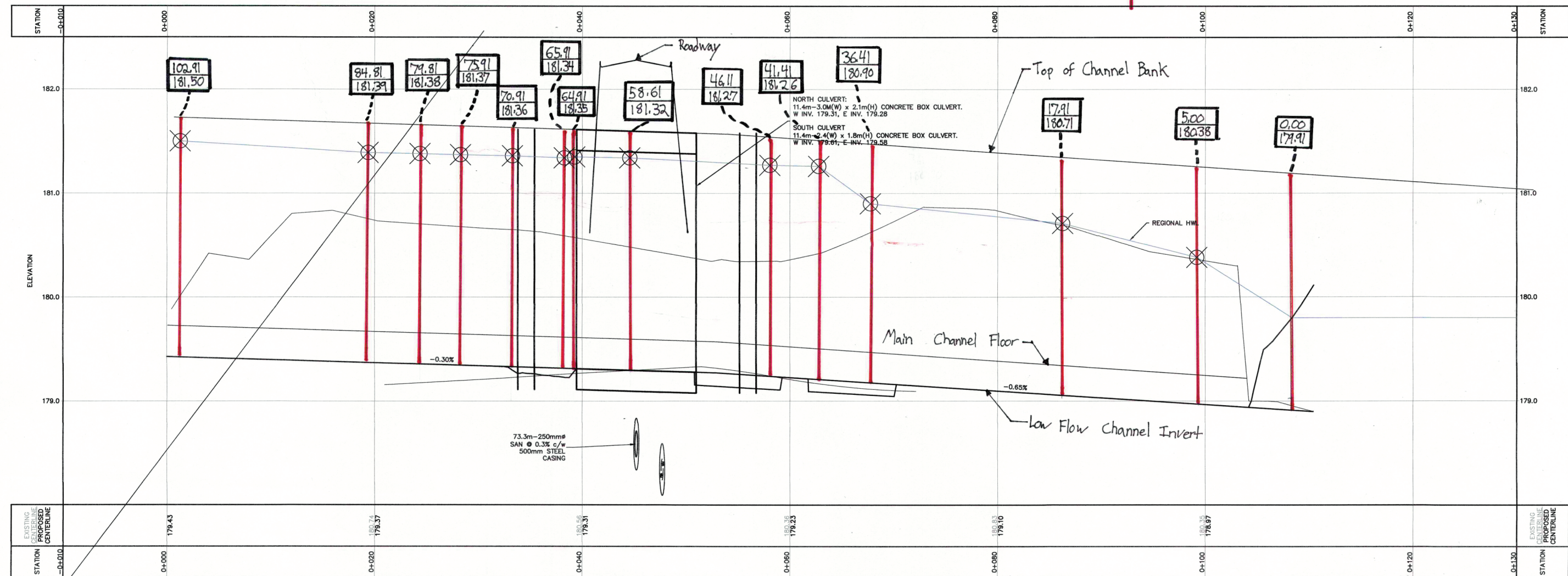
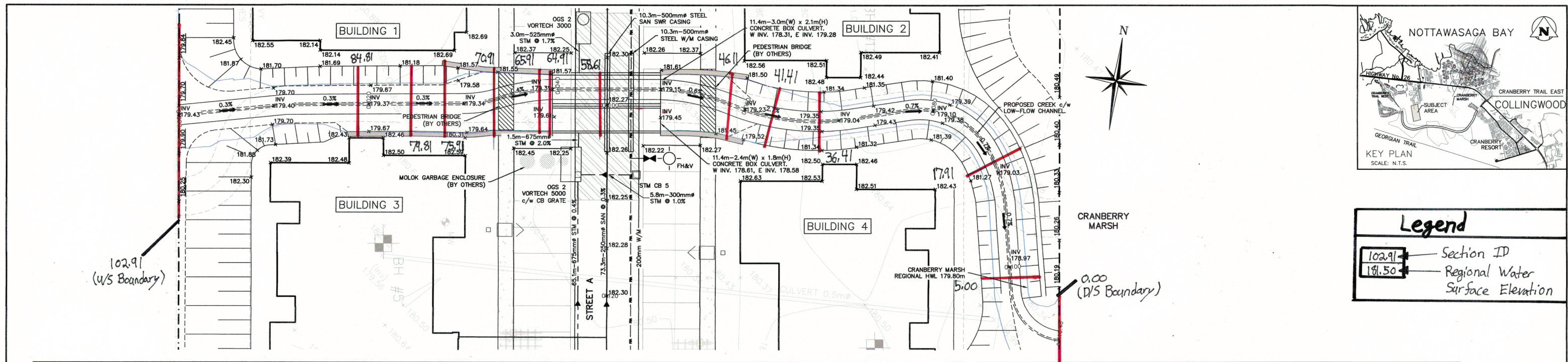


Figure 1 is a cross-section diagram of a river channel. The horizontal axis represents the Station (m) from 0 to 10, and the vertical axis represents Elevation (m) from 178.5 to 182.0. The diagram shows the ground profile (black line), the channel bed (hatched area), and various water surface elevations (WS) for different return periods. The legend identifies the following elements:

- WS Regional (blue cross)
- WS 100-Year (blue circle)
- WS 50-Year (blue square)
- WS 25-Year (blue cross)
- WS 10-Year (blue inverted triangle)
- WS 5-Year (blue triangle)
- WS 2-Year (black square)
- Ground (black line)
- Ineff (green triangle)
- Bank Sta (red circle)

The channel bed is shown as a hatched area below the 10-year WS. The ground profile is shown as a black line above the channel bed. The water surface elevations are shown as horizontal lines with markers at the channel boundaries and center. A dimension line at the top indicates a width of 0.045 units.



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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.

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

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

DRAFT

FOR DISCUSSION PURPOSES ONLY

Project: WYLDEWOOD CREEK TOWN OF COLLINGWOOD

Drawing: HEC-RAS Cross-Section Figure CREEK GRADING PLAN AND DETAILS

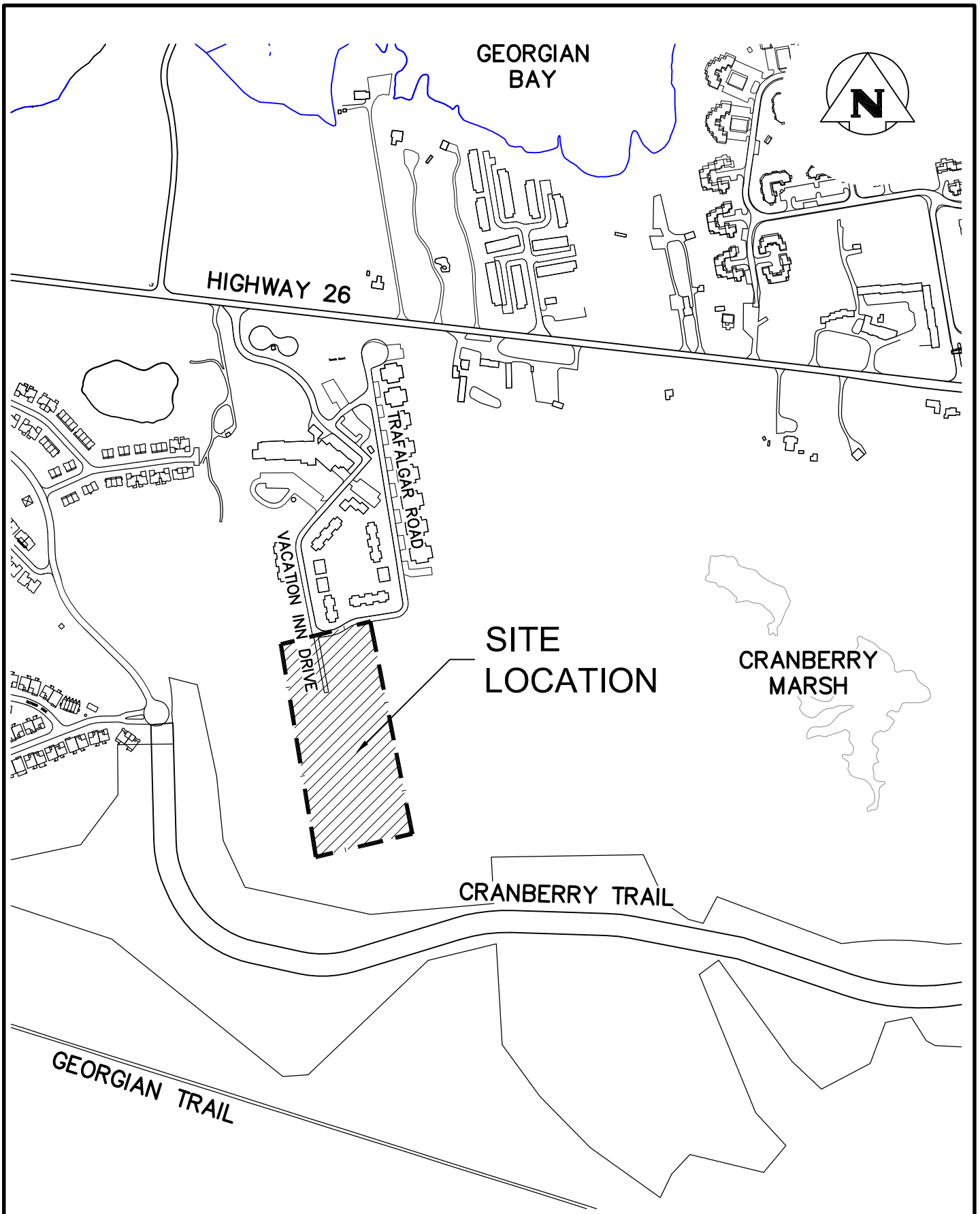
CROZIER CONSULTING ENGINEERS

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

Drawn By: L.W. Design By: L.W. Project: 1535-4897

Check By: K.M. Check By: R.A. Scale: H: 1:200 V: 1:20 Drawing: C104

FIGURES & DRAWINGS



Legend	Project	 = SUBJECT LANDS WYLDEWOOD CREEK TOWN OF COLLINGWOOD 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.CROZIER.CA INFO@CROZIER.CA Drawn By L.W. Design By L.W. Project 1519-4897 Scale N.T.S. Date 01/29/2019 Check By R.A. Drawing FIG. 1
	Drawing		



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Toronto, Ontario
M5T 3A8
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T 416.596.1600 F 416.596.1601

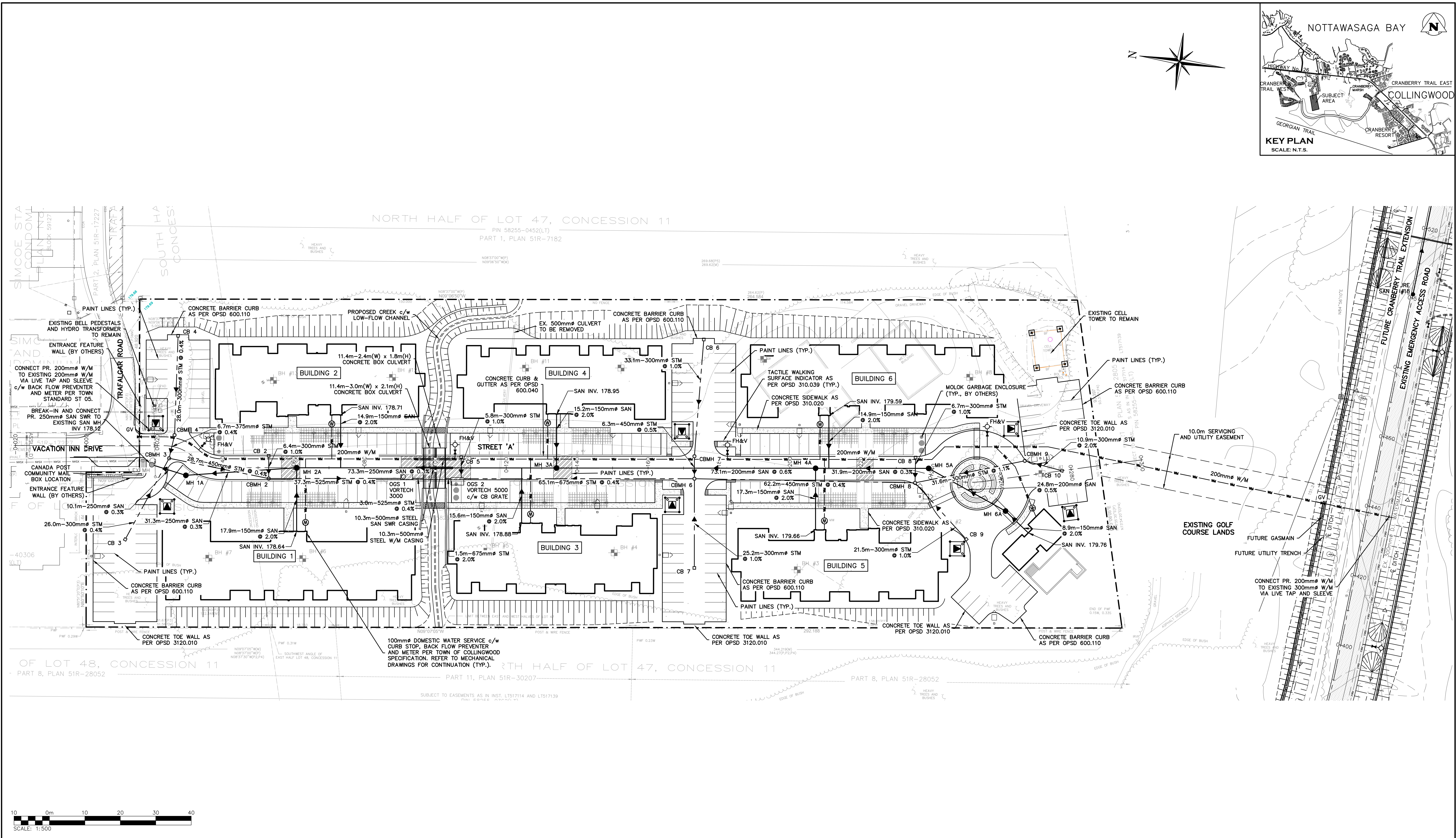


Drawn By:	Checked By:	Date Checked:	Project No.
	CMV		18A14

Date Plotted:	Scale:
Feb 04, 2019 - 1:15pm	AS NOTED

A100

C



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

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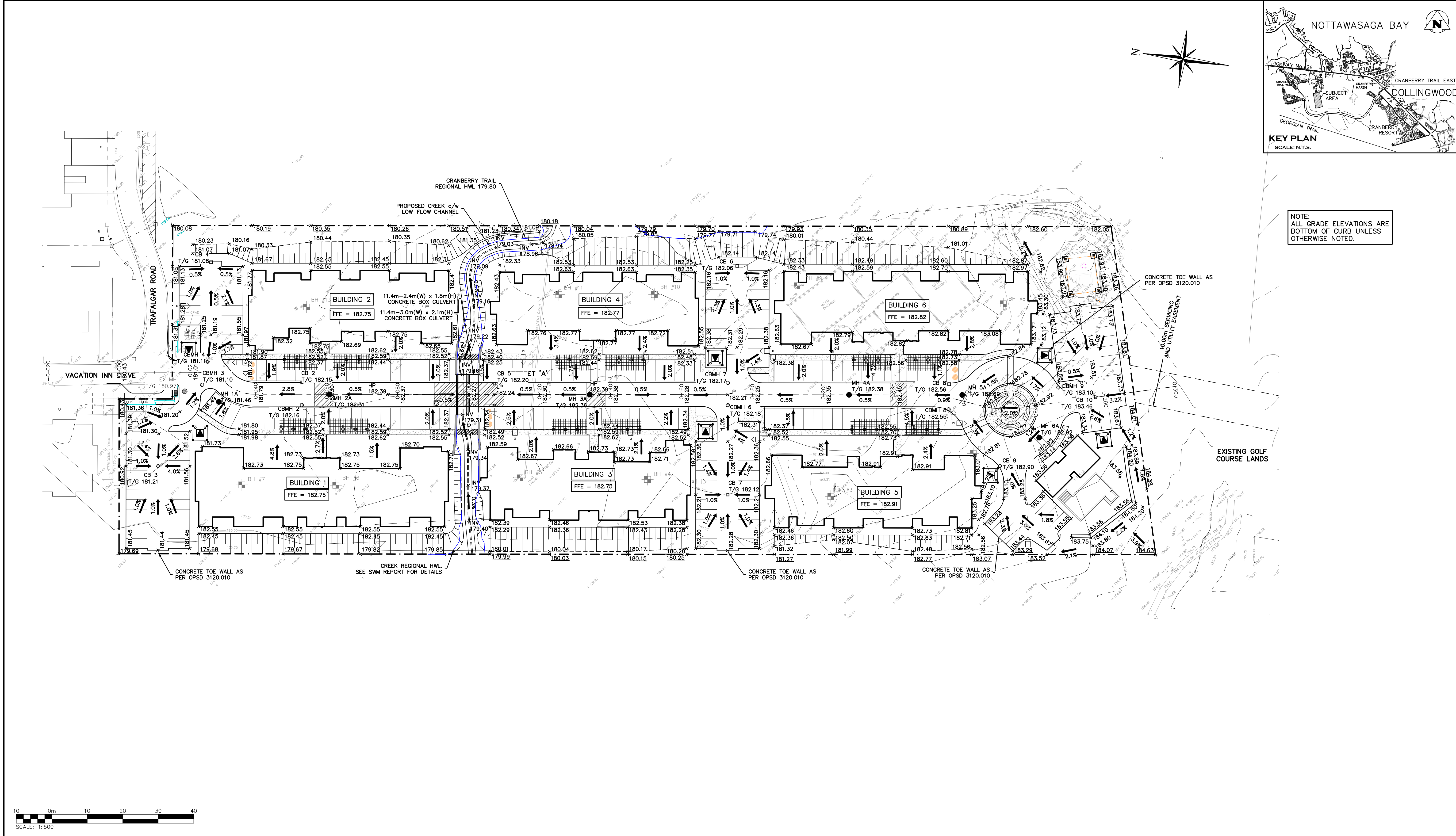
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Drawing		GENERAL SITE SERVICING PLAN	



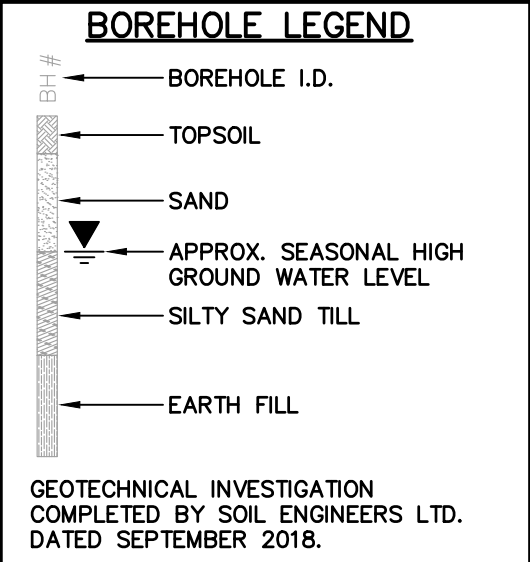
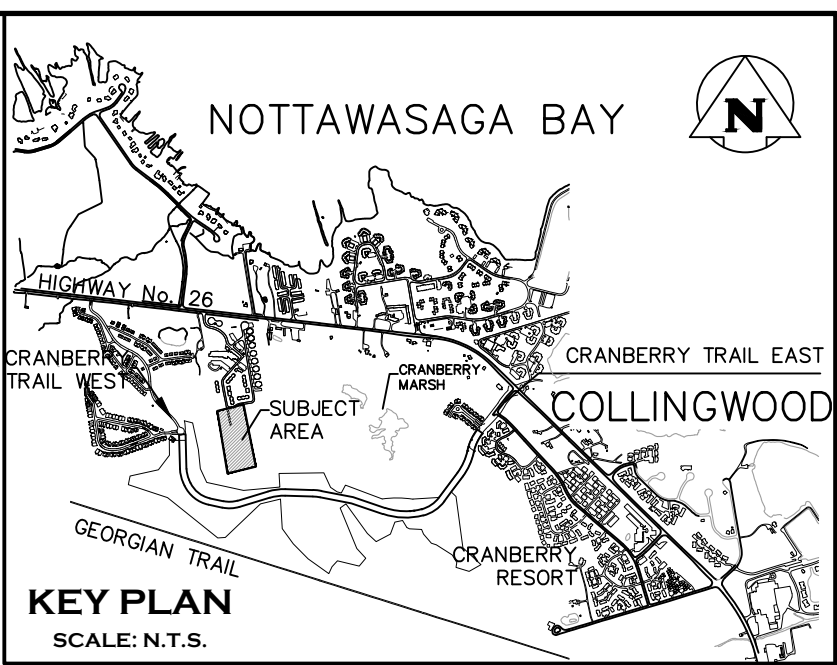
CROZIER
CONSULTING ENGINEERS

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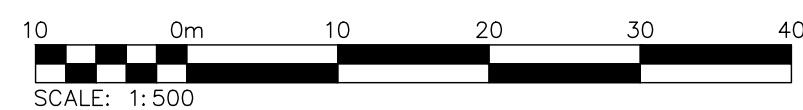
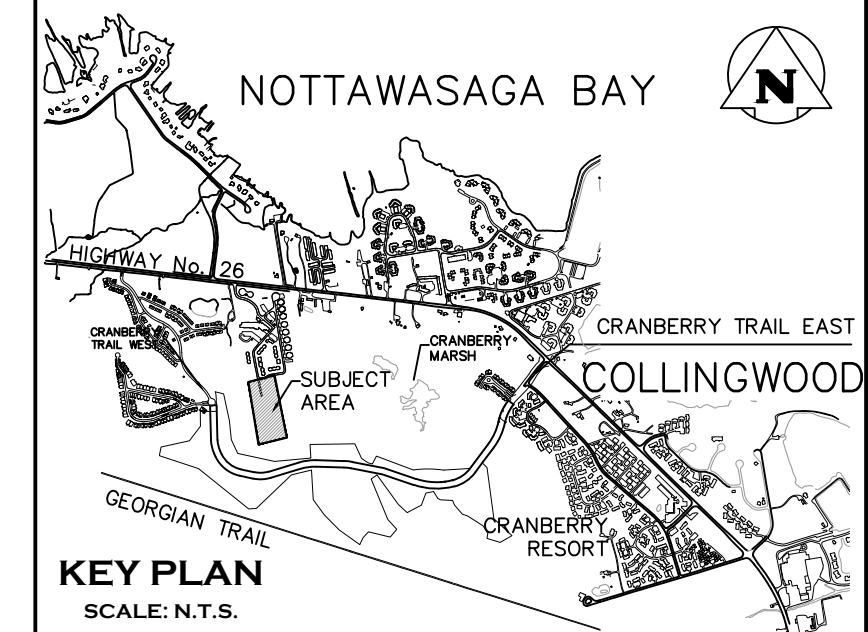
Drawn By	L.W.	Design By	L.W.	Project	1535-4897
Check By	K.M.	Check By	R.A.	Scale	1:500
				Drawing	C101



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

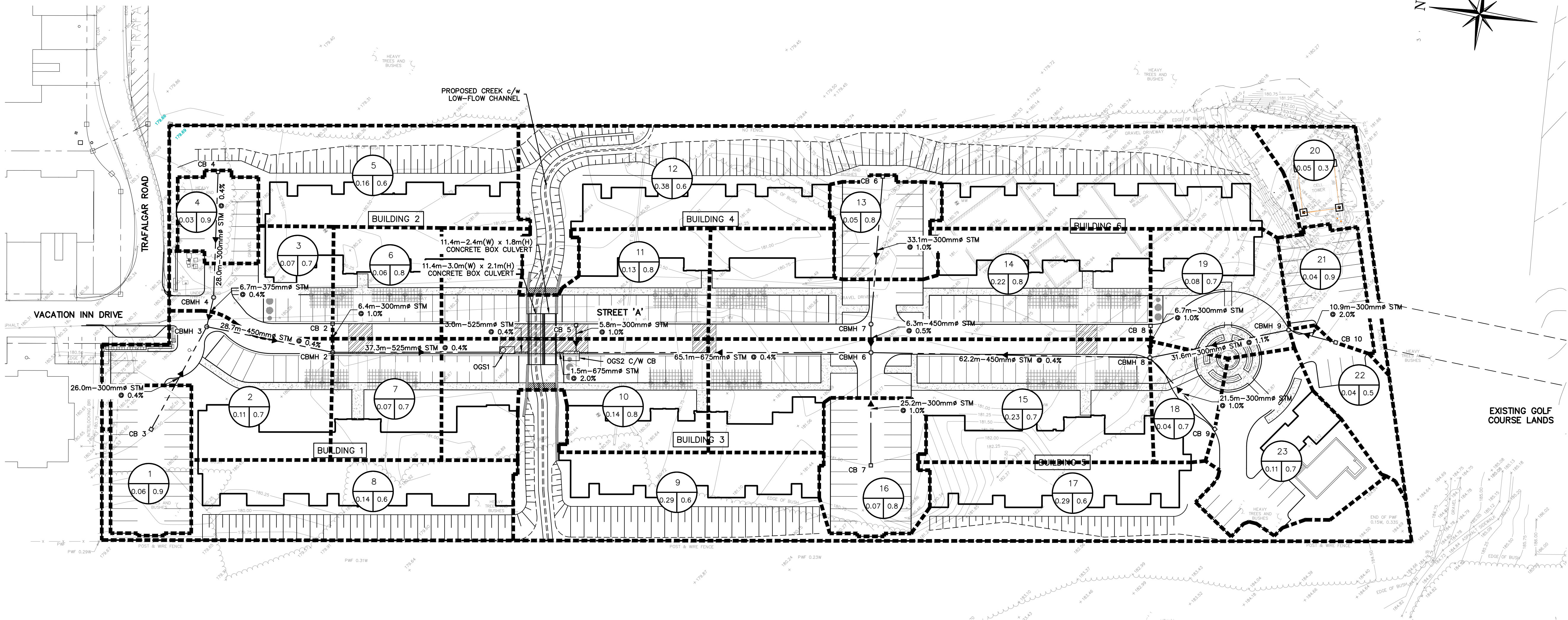
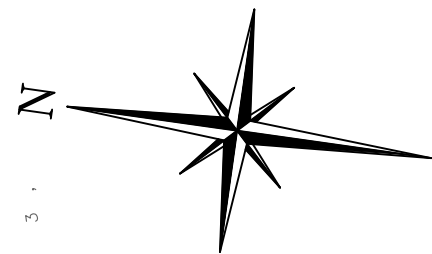
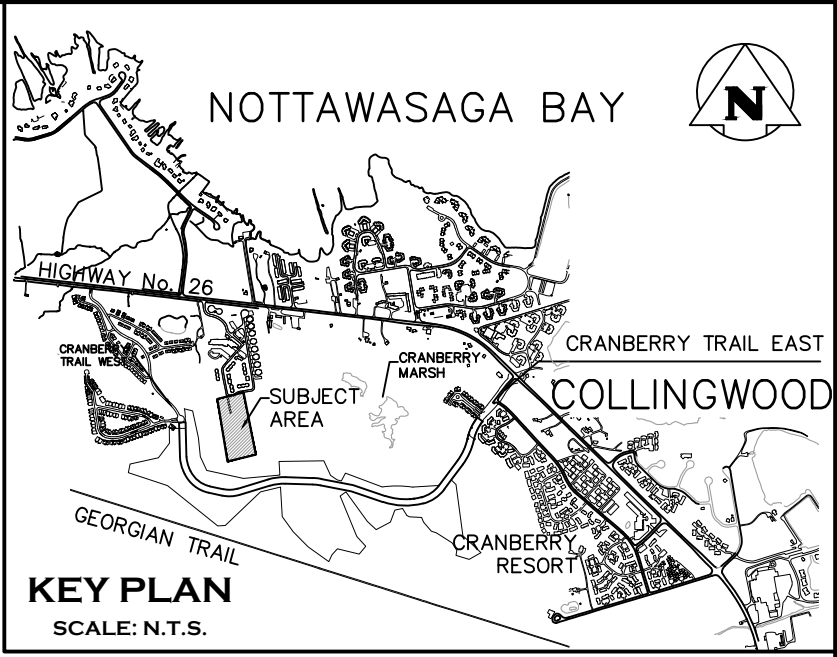


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Check By	K.M.	Check By	R.A.	Scale H 1:500 V 1:50	Drawing C103

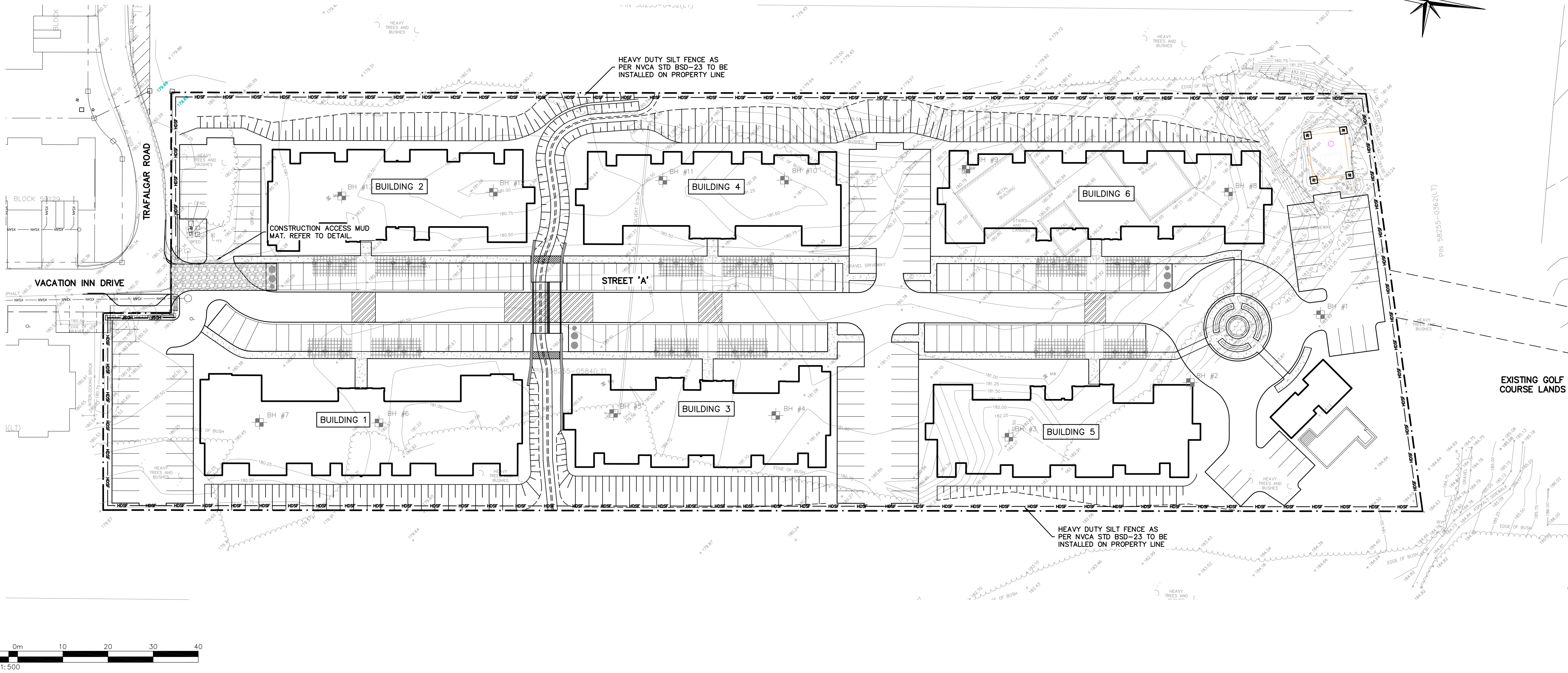
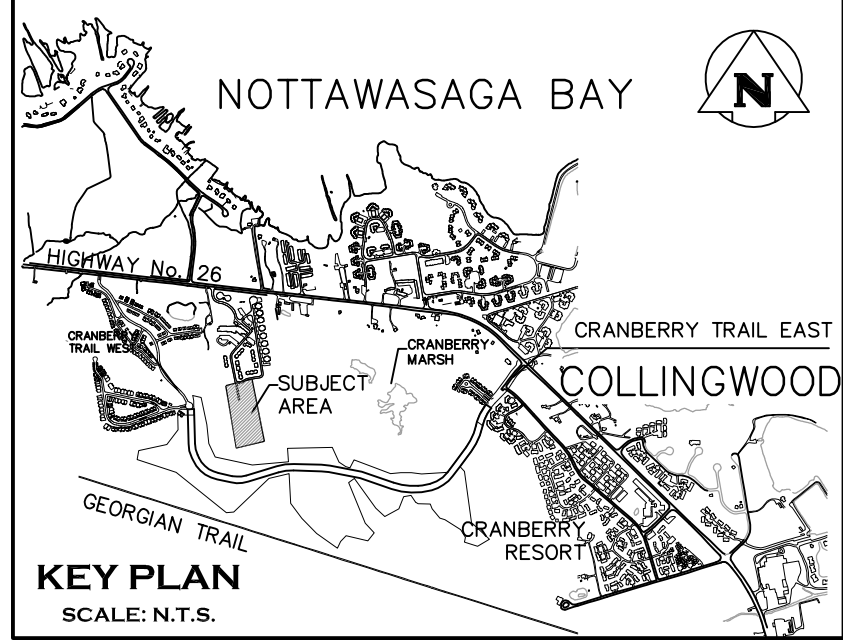
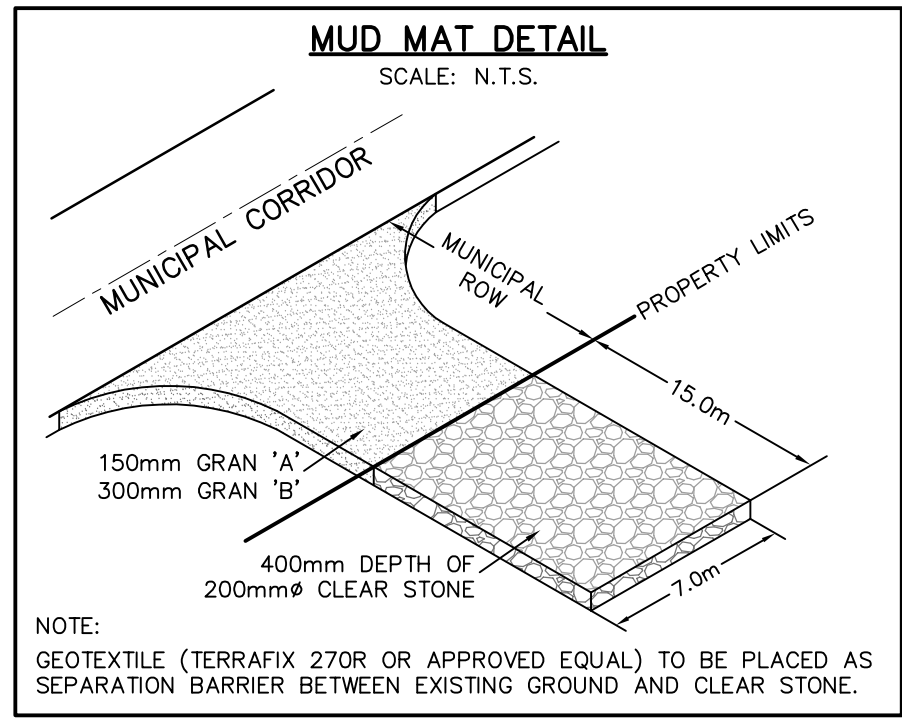
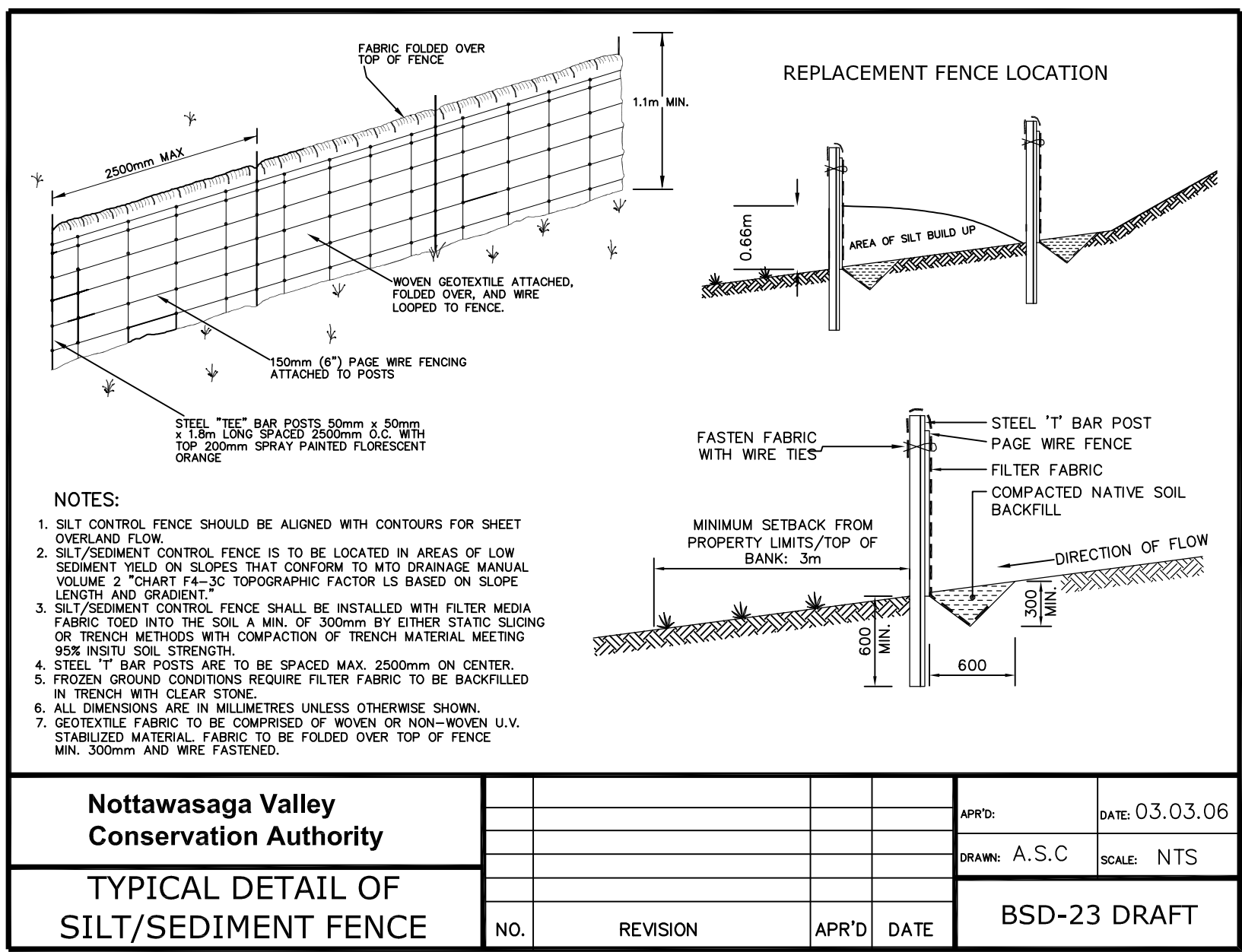
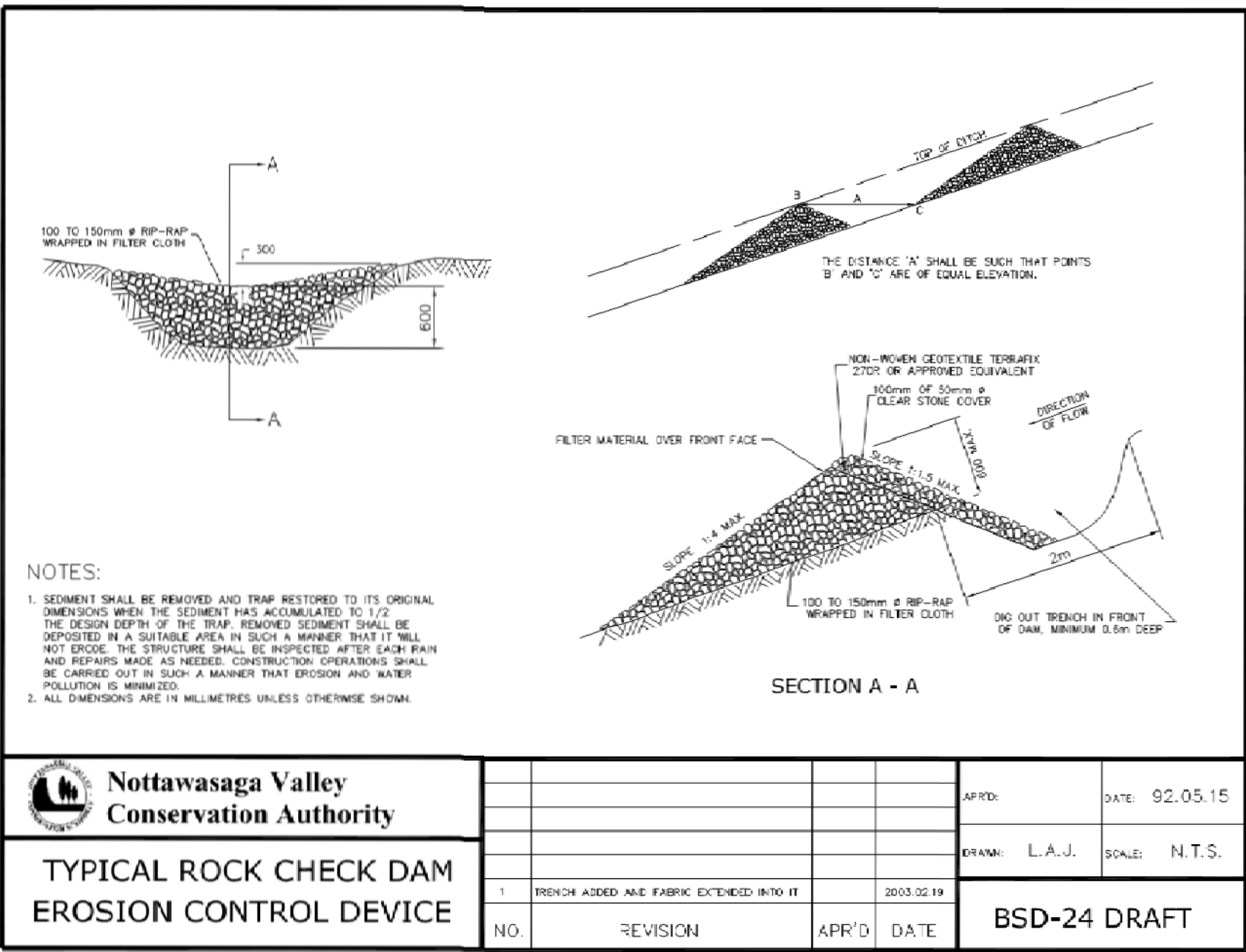


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|----------|------|-----------|------|---------|-----------|---------|
| Drawn By | L.W. | Design By | L.W. | Project | 1535-4897 | |
| Check By | K.M. | Check By | R.A. | Scale | 1:500 | Drawing |
| | | | | | | C106 |

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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

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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
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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	C108

CONSTRUCTION NOTES:

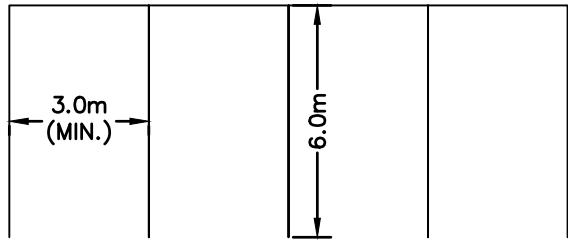
- A) GENERAL – CONSTRUCTION
- ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH TOWN OF COLLINGWOOD STANDARDS (2009), OPSPD AND OPSS. WHERE CONFLICT OCCURS, TOWN OF COLLINGWOOD STANDARDS (2009) TO GOVERN.
 - TRENCH BACKFILL (OPSPD 802.010 & 802.015) TO BE SELECT NATIVE MATERIAL OR IMPORTED SELECT SUBGRADE 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).
 - PIPE COVER AND BEDDING TO BE GRANULAR 'A' (MINIMUM 150mm DEPTH COMPACTED TO A MINIMUM 95% SPMDD).
 - ALL TOPSOIL AND EARTH EXCAVATION TO BE STOCK PILED OR REMOVED TO AN APPROVED SITE AS DIRECTED BY ENGINEER.
 - 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.
 - ALL PROPERTY BARS TO BE PRESERVED AND REPLACED BY O.L.S. AT CONTRACTOR'S EXPENSE IF REMOVED DURING CONSTRUCTION.
 - THE CONTRACTOR SHALL MAKE HIS OWN ARRANGEMENTS FOR THE SUPPLY OF TEMPORARY WATER AND POWER.
 - 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.
 - ALL ENGINE DRIVEN PUMPS TO BE ADEQUATELY SILENCED, SUITABLE FOR OPERATION IN A RESIDENTIAL DISTRICT.
 - DISTURBED AREAS OUTSIDE THE DEVELOPABLE LANDS TO BE REINSTATED TO PREVIOUS CONDITION OR BETTER.
 - THE CONTRACTOR IS RESPONSIBLE TO NOTIFY ALL UTILITY COMPANIES PRIOR TO COMMENCING WORK AND CO-ORDINATE CONSTRUCTION ACCORDINGLY.
 - ALL ROCK EXCAVATION PER OPSS-206.
 - 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
- 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'.
 - 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.
 - 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.
 - 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.
 - ALL GRANULARS AND ASPHALT MATERIALS AND PLACEMENT TO BE IN ACCORDANCE WITH OPSS 314 AND OPSS 310.
 - 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.
 - STOP SIGNS AND STREET SIGNS TO TOWN STANDARDS (DETAIL DWG No. 401).
 - REINSTATEMENT OF ALL DISTURBED BOULEVARDS TO INCLUDE REGRADING, 150mm TOPSOIL AND SOD TO OPSS 802 AND 803.
 - 100mm Ø PIPE SUBDRAINS SHALL BE PROVIDED UNDER EDGE OF PAVEMENT ON LOWER (GUTTER) SIDE OF THE ROAD.
 - 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.
 - SUBDRAINS TO BE PERFORATED OTHER THAN THE 2m SECTION IMMEDIATELY UPSTREAM OF ALL STRUCTURES WHICH SHALL BE NON-PERFORATED.

- C) SANITARY SEWERS
- M.H.'S TO OPSPD – 701.010, 701.030, & 704.010.
 - BENCHINGS TO OPSPD – 701.021.
 - STEPS TO OPSPD – 405.010.
 - BACKFILL AND EMBEDMENT TO OPSPD – 802.010 CLASS 'B', GRANULAR 'A' BEDDING.
 - TRENCH BACKFILL TO BE SELECT NATIVE MATERIAL AS APPROVED BY ENGINEER OR IMPORTED GRANULAR MATERIAL.
 - FRAMES AND COVERS TO OPSPD – 401.01 TYPE 'A' (CLOSED COVER).
 - SERVICE CONNECTIONS TO OPSPD – 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%.
 - RADIUS BENDS TO BE USED ON SANITARY SEWER CONNECTIONS WHERE THE ANGLE OF CONNECTION BETWEEN THE SERVICE AND SEWER EXCEEDS 90°.
 - 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).
 - MANHOLES FRAMES TO BE SET TO BASE COURSE ASPHALT ELEVATION AND RAISED BY ADDING RISER RINGS PRIOR TO PLACING SURFACE COURSE ASPHALT.
 - PIPE SUPPORT AT MAINTENANCE HOLES AS PER OPSPD 708.020.
 - ALL MAINTENANCE HOLES, UNLESS EXPRESSLY IDENTIFIED ARE 1200mm Ø.
 - 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.
 - SANITARY SEWER – SDR 35 PVC.
 - SANITARY SERVICE – SDR 28 PVC – 125mm PER OPSPD 1006.020 SEWER SERVICE CONNECTION FOR FLEXIBLE PIPE.
 - FROST STRAPS PER OPSPD 701.100.
 - CLAY SEEPAGE PLUGS (0.5m THICK) TO BE PLACED ALONG PIPE BETWEEN MANHOLES.

- D) WATERMAINS
- BACKFILL AND EMBEDMENT TO OPSPD – 802.010 CLASS 'B', GRANULAR 'A' EMBEDMENT.
 - TRENCH BACKFILL TO BE SELECT NATIVE MATERIAL AS APPROVED BY ENGINEER OR IMPORTED GRANULAR MATERIAL.
 - THRUST BLOCKS TO OPSPD – 1103.010 AND 1103.020 WHERE SUITABLE SOILS ARE ENCOUNTERED.
 - SERVICE CONNECTIONS TO OPSPD – 1104.010, 100mm GRANULAR 'A' EMBEDMENT AND COVER OVER PIPE. TERMINATE AT SERVICING CORRIDOR LIMITS C/W CURB STOP AND BOX.
 - HYDRANTS TO OPSPD – 1105.010 DRAIN PLUGS SHALL BE INSTALLED WHERE HIGH WATER TABLE IS ENCOUNTERED.
 - 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).
 - MINIMUM COVER ON WATERMAIN AND SERVICES TO BE 1.7m.
 - GATE VALVES, BENDS AND HYDRANT LEADS AND FITTINGS TO BE CONNECTED WITH ROLMAC GRIPPER RING RESTRAINING GLANDS.
 - 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.
 - ALL SERVICES TO BE DIRECT TAPPED.
 - FOLLOWING TESTING, CONTRACTOR SHALL OPERATE EACH WATER SERVICE TO VERIFY FULL FLOW AND PRESSURE AT THE CURB STOP TO THE SATISFACTION OF THE ENGINEER.
 - 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 SHANDARD C651-99. REFER TO DETAIL ON DWG 110 FOR TYPICAL TEMPORARY CONNECTION. 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.
 - COMPLETE WATER SYSTEM SHALL BE DISINFECTED IN ACCORDANCE WITH REQUIREMENTS OF O. REG. 459/00 & SATISFACTION OF CPU.
 - WATERMAIN CLASS 52 OR PRESSURE CLASS 350 CEMENT LINED DUCTILE IRON. CONDUCTIVITY CONNECTORS TO BE USED ON ALL JOINTS.
 - SINGLE WATERMAIN SERVICES – 19mm Ø TYPE 'K' SOFT COPPER PIPE.
 - 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.
 - MAIN STOPS TO 301-A4H4, BALL STYLE, AWWA THREAD BY COMPRESSION CAMBRIDGE BRASS.
 - CURB STOPS TO 203-H4H3, BALL STYLE WITH DRAIN, COMPRESSION JOINT BY CAMBRIDGE BRASS.
 - A CURB STOP & EXTENSION SERVICE BOX & MAIN STOP MUST BE INSTALLED ON EACH SERVICE USING COMPRESSION JOINT FITTINGS.
 - 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.
 - SERVICE BOXES TO NUMBER 7, D-I CLOW OR MUELLER, 24" BLACK ROADS STRAIGHT C/W CAP PAINTED BLUE.
 - ALL SERVICES SHALL BE METERED. METERS TO BE COMPLETE WITH REMOTE READOUT OR RADIO READ AS DETERMINED BY THE CPU.
 - 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.
 - VALVES – RESILIENT SEATED, RSGV MECHANICAL JOINT, OPEN LEFT CLOW OR MUELLER WITH 5-SL-48 SLIDING VALVE BOX C/W CAP PAINTED BLUE.
 - MECHANICAL JOINT DUCTILE FITTINGS – AWWA/ANSI C153/A21.53.
 - HYDRANTS TO BE INSTALLED C/W HYDRANT MARKER STAKES PER TOWN & CPU 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.
 - 50mmØ WATERMAIN LOOP– TYPE 'K' COPPER.
 - ALL VALVES TO BE OPERATED BY THE CPU OR TOWN. CONTRACTOR TO PROVIDE MIN. 48hr NOTIFICATION FOR REQUEST.
 - HYDRANTS ARE TO BE 1.67m (5'6") LONG. MAKE-UP PIECES, IF REQUIRED, ARE TO BE INSTALLED BELOW THE HYDRANT.
 - ALL WATERMAIN FITTINGS TO BE LEAD FREE.
 - MECHANICAL JOINT RESTRAINTS TO BE USED DURING TRANSITION OF WATERMAIN INSTALLATION IN NATIVE SOILS TO ENGINEERED FILL. MECHANICAL JOINT RESTRAINTS TO BE MEGA-LUG OR APPROVED EQUAL. REFER TO DWG 103 FOR LIMITS OF MECHANICAL JOINT RESTRAINTS. FINAL LIMITS TO BE FIELD DECISION.

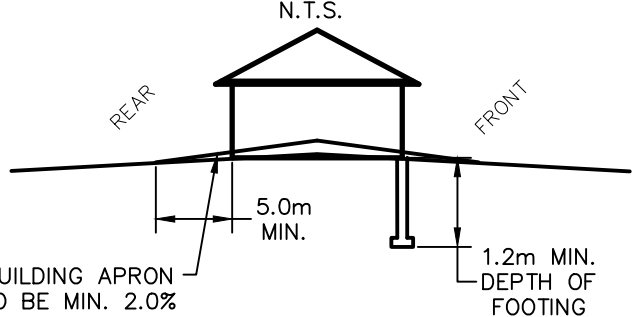
- E) STORM SEWERS
- MH TO OPSPD 701.010 AND DCBMH TO OPSPD – 701.011, 701.012, C/W SUMP UNLESS NOTED OTHERWISE.
 - STEPS TO OPSPD 405.010.
 - M.H. FRAMES AND GRATES TO OPSPD – 401.01 OPEN COVER.
 - DCB'S TO OPSPD – 705.030, 705.040.
 - DCBMH FRAMES AND GRATES TO OPSPD – 400.020.
 - PIPE SUPPORT AT DCBMH'S TO OPSPD – 708.020.
 - DCB LEADS – 300mm Ø DOUBLE TO OPSPD – 708.010, 708.030.
 - PROTECTION DURING CONSTRUCTION TO OPSPD – 802.010 (FLEXIBLE PIPE) CLASS 'B', GRANULAR 'A' EMBEDMENT OR OPSPD – 802.030, 802.031 AND 802.032 (RIGID PIPE) GRANULAR 'A' EMBEDMENT.
 - BACKFILL AND EMBEDMENT MATERIAL TO BE COMPACTED TO A DRY DENSITY OF AT LEAST 95% OF THE MATERIAL'S SPMDD.
 - 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.
 - FROST STRAPS PER OPSPD 701.100.

TYPICAL PARKING STALL DETAIL
N.T.S.



PARKING LINES TO BE PAINTED WHITE, 100mm THICK.

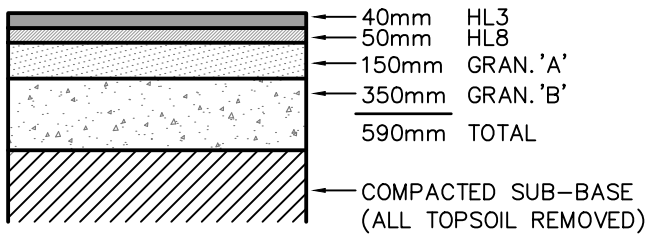
TYPICAL GRADING DETAILS
N.T.S.



- NOTE:
- ALL ROOF LEADER DRAINAGE TO BE DIRECTED AWAY FROM DWELLING AND DRAIN OVERLAND TO PROPOSED POSITIVE OUTLET.
 - DETAILED GRADING PLAN TO BE PREPARED FOR EACH LOT FOR APPROVAL OF TOWN.

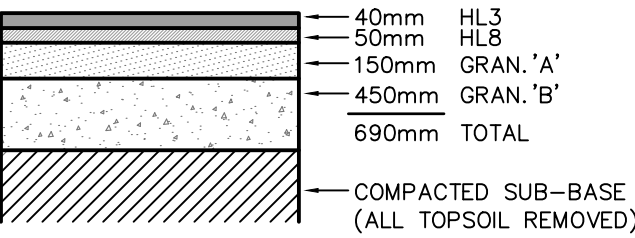
PAVEMENT STRUCTURE
SCALE: N.T.S.

(PARKING – LIGHT DUTY)

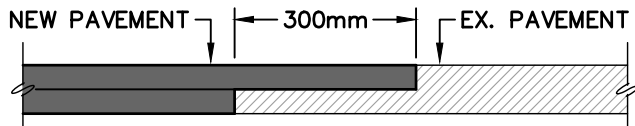


NOTE:
REFER TO CONSTRUCTION NOTES FOR DETAILS ON COMPACTION. PAVEMENT STRUCTURE BASED ON GEOTECHNICAL CONSULTANTS RECOMMENDATIONS.

(ROAD/FIRE ROUTE – HEAVY DUTY)

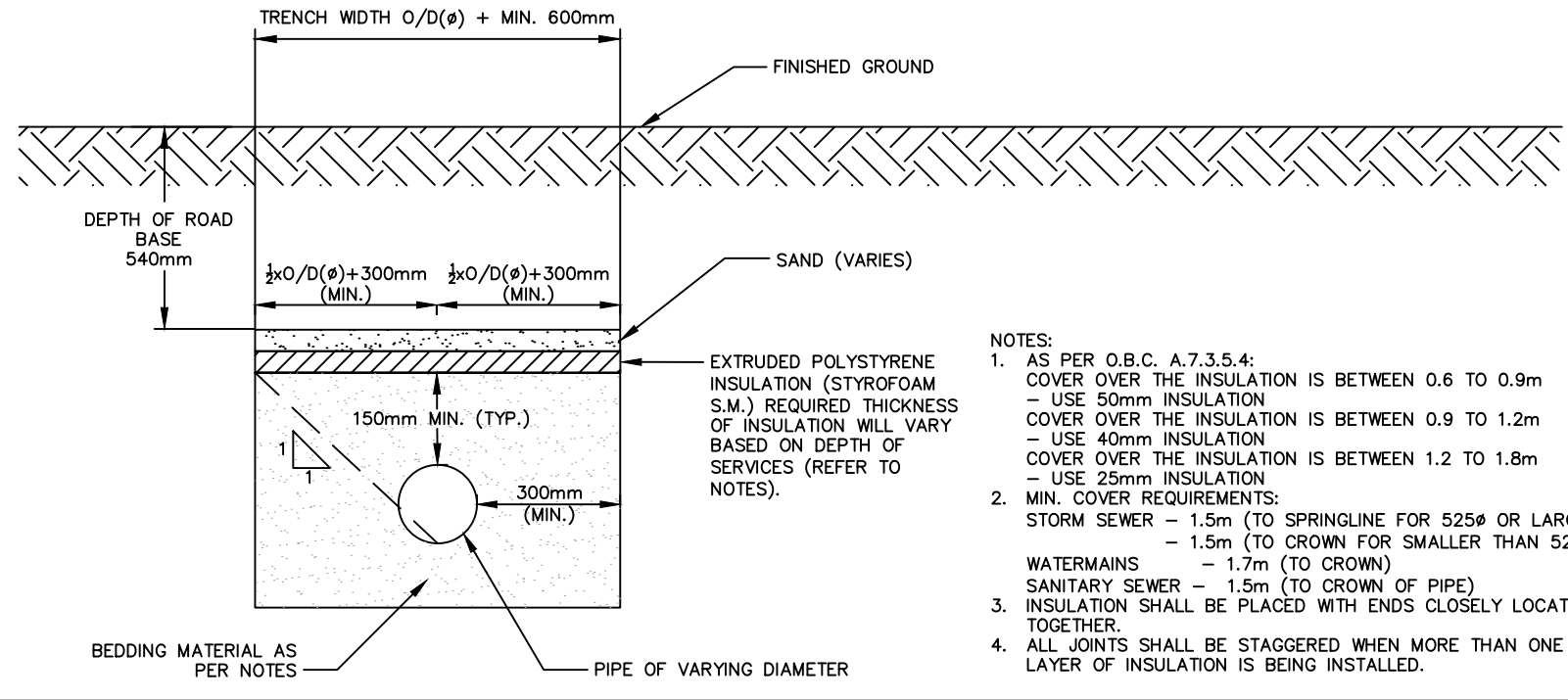


LAP JOINT DETAIL
N.T.S.



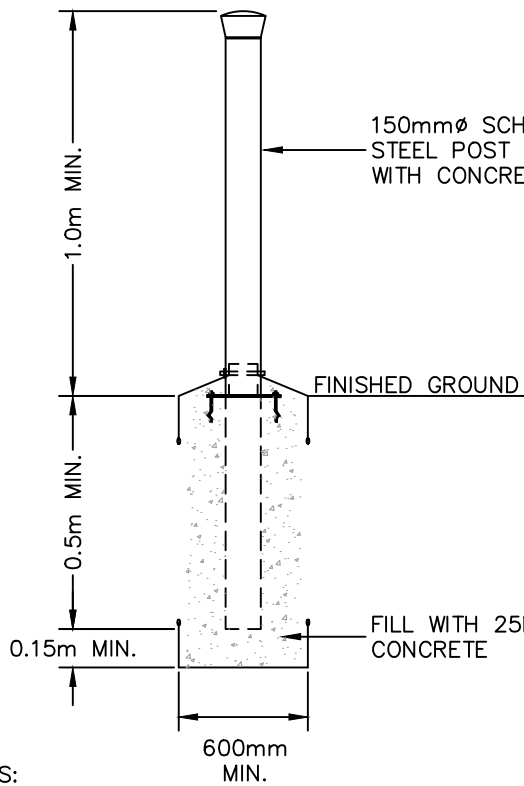
NOTE:
SAWCUT & COLD PLANE 300mm WIDE & 40mm DEEP WHERE NEW PAVEMENT MEETS EXISTING PAVEMENT, ROUTE & SEAL WITH HOT RUBBERIZED ASPHALT.

INSULATION FOR VARIOUS INFRASTRUCTURE
N.T.S.



- NOTES:
- 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
 - MIN. COVER REQUIREMENTS:
STORM SEWER – 1.5m (TO SPRINGLINE FOR 525Ø OR LARGER)
SEWER – 1.5m (TO CROWN FOR SMALLER THAN 525Ø)
WATERMAINS – 1.7m (TO CROWN)
SANITARY SEWER – 1.5m (TO CROWN OF PIPE)
 - INSULATION SHALL BE PLACED WITH ENDS CLOSELY LOCATED TOGETHER.
 - ALL JOINTS SHALL BE STAGGERED WHEN MORE THAN ONE LAYER OF INSULATION IS BEING INSTALLED.

TYPICAL BOLLARD DETAIL
SCALE: N.T.S.



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

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

Town

No.

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DATE: MM/DD/YYYY

Engineer

Engineer

Project

Drawing

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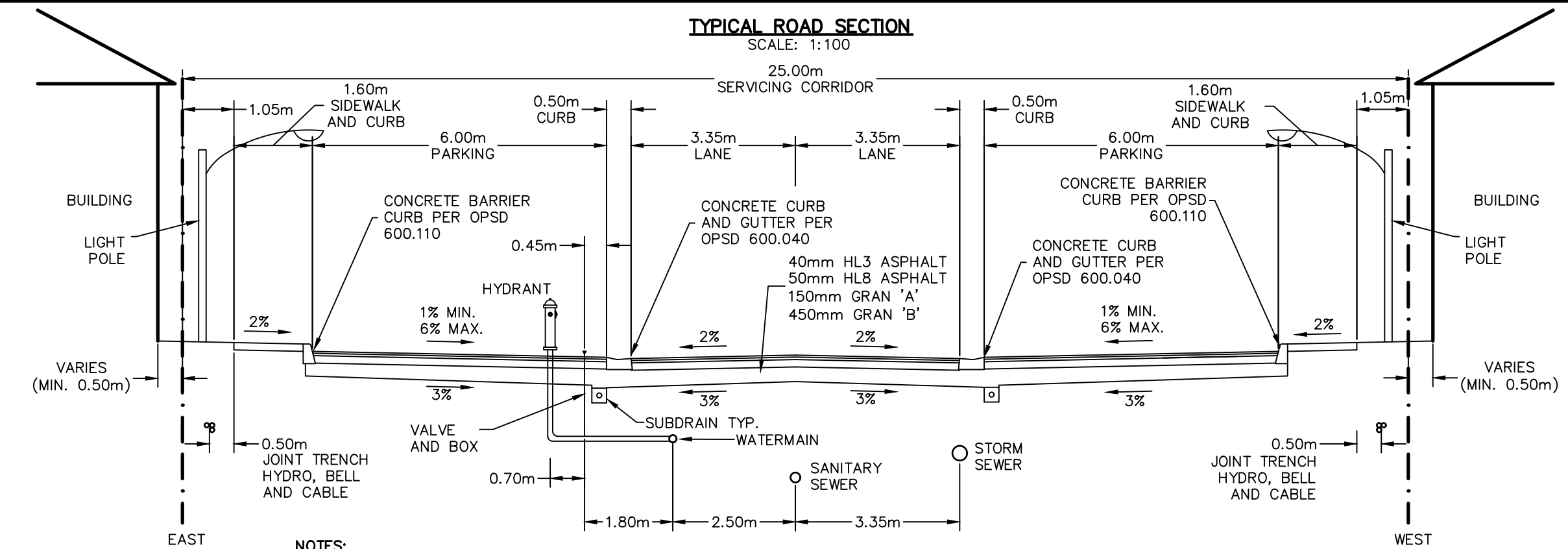
WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

CONSTRUCTION NOTES AND
STANDARD DETAILS



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

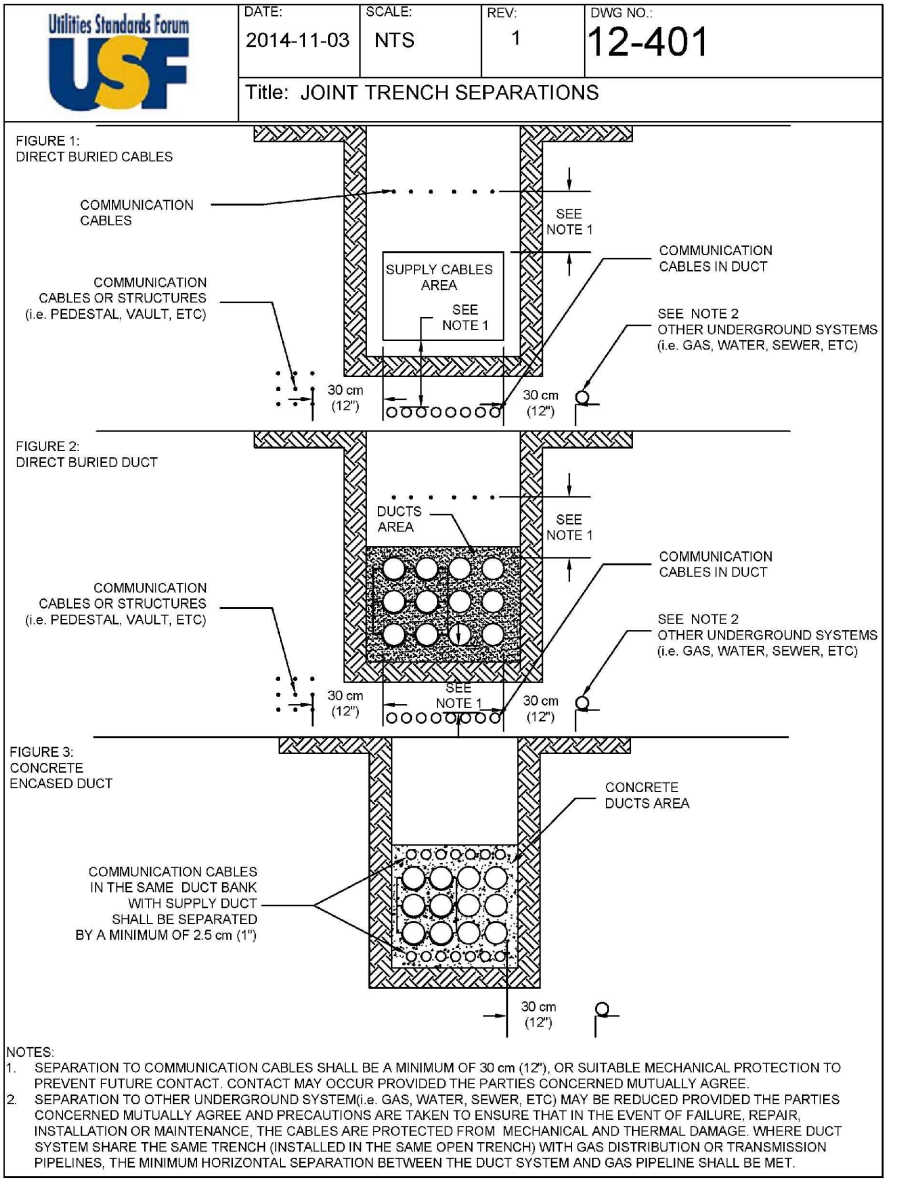
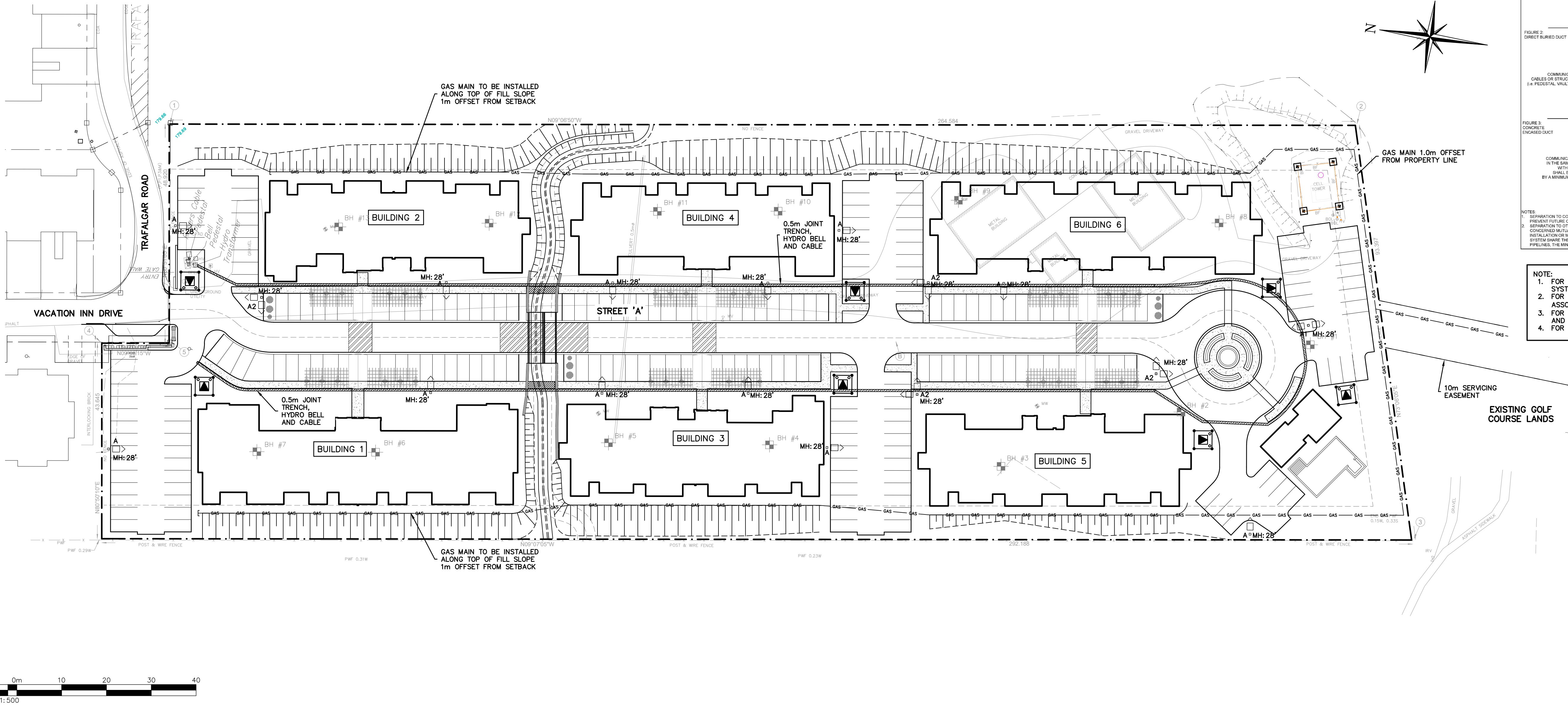
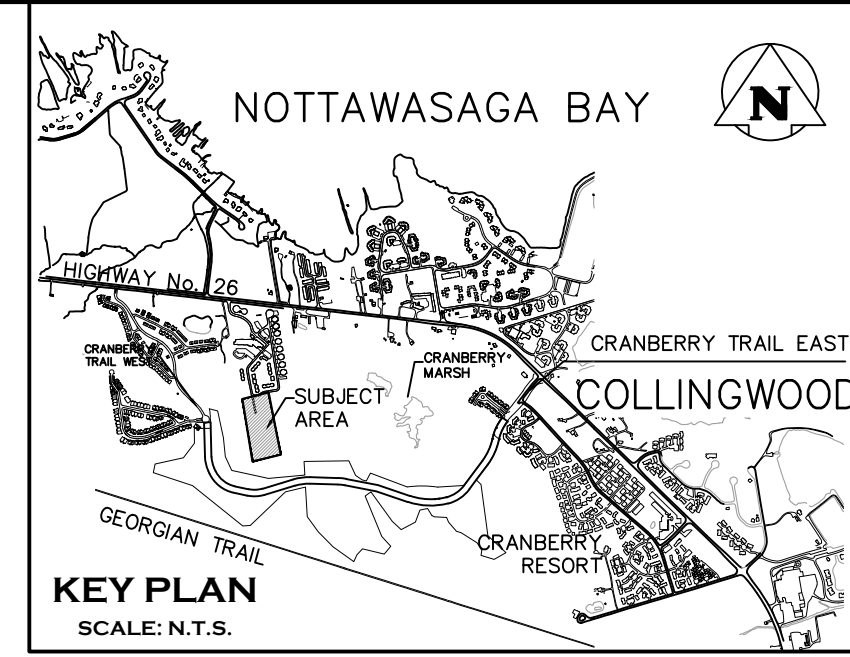
Drawn By L.W. Design By L.W. Project 1535-4897
Check By K.M. Check By R.A. Scale AS NOTED Drawing C109



- NOTES:**
1. COVER ON STORM, SANITARY AND WATERMAIN AS PER DESIGN CRITERIA, UTILITY CORRIDOR SHALL HAVE MINIMUM COVER OF 1.2m.
 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 TRANSFORMER.
 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.

**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 SERVING 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.



- 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 (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 SYSTEMS SHARE THE SAME TRENCH (INSTALLED IN THE SAME TRENCH WITH GAS DISTRIBUTION OR TRANSMISSION LINES), 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 EPOR.
 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 SERVING SEE ENBRIDGE.

1. THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.		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	<table><tr><th>No.</th><th>ISSUE</th><th>DATE: MM/DD/YYYY</th></tr><tr><td>1</td><td>ISSUED FOR 1st ENGINEERING SUBMISSION</td><td>02/04/2019</td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr></table>	No.	ISSUE	DATE: MM/DD/YYYY	1	ISSUED FOR 1st ENGINEERING SUBMISSION	02/04/2019																									Engineer	Engineer	Project	WYLDEWOOD CREEK TOWN OF COLLINGWOOD		 CROZIER CONSULTING ENGINEERS THE HARBOUREDGE BUILDING, 40 HURON STREET, SUITE 301, COLLINGWOOD, ON L9Y 4R3 705 446-3510 F 705 446-3520 F WWW.CFCROZIER.CA INFO@CFCROZIER.CA
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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.		PRELIMINARY NOT TO BE USED FOR CONSTRUCTION	Drawing	COMPOSITE UTILITY PLAN				Drawn By L.W.	Design By L.W.	Project	1535-4897																													
3. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT.				Check By K.M.	Check By R.A.	Scale 1:500	Drawing	C110																																
4. DO NOT SCALE THE DRAWINGS.																																								
5. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.																																								