

FLOOD STUDY
WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

PREPARED FOR:
BRANDY LANE CORPORATION /
GEORGIAN BAY HOTEL

PREPARED BY:
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SEPTEMBER 2020

CFCA FILE NO. 1535-4897 / 1107-4134

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Revision Number	Date	Comments
Rev. 0	September 2020	Issued for OPA/ZBA Submission

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1.0 INTRODUCTION

C.F. Crozier & Associates Inc. ("Crozier") has been retained by Brandy Lane Corporation to prepare a Flood Study for the watercourse generally referred to as the West Watercourse of Cranberry Marsh (West Watercourse). This flood study has been prepared to support the development applications for the proposed Wyldeewood Creek Development located in the Town of Collingwood including the active Zoning By-Law Amendment and Official Plan Amendment applications for the Georgian Bay Hotel Lands.

This report has been prepared to provide details associated with the flood study analysis and results for the West Watercourse and the proposed engineered channel works within the development lands.

2.0 BACKGROUND

The subject site is the south block of the Georgian Bay Hotel lands, approximately 2.56 ha in size, 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. The site currently consists of grass cover, trees, bushes and buildings. The existing maintenance buildings are proposed to be removed or relocated. There is an existing cell at the south east corner of the Subject Site.

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.

The West Watercourse traverses the proposed Wyldeewood Creek Development lands and discharges to Cranberry Marsh, located adjacent to the Subject Site. Upstream of the Subject Site is Cranberry Golf course and the Blue Fairway residential development. This report has been prepared based on the framework established in the following reports:

- 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 2016;
- Functional Servicing & Stormwater Management Report – 10 Vacation Inn Drive – Georgian Bay Hotel, prepared by Crozier, final dated July 2018; and
- Servicing & Stormwater Management Report – Wyldeewood Creek – Brandy Lane Corporation, prepared by Crozier, dated February 2019.

The hydrology for the West Watercourse was analyzed in the Master SWM Report (Crozier, May 2007) prepared for the Tanglewood Development. Using the flows determined in the Master SWM Report, Crozier prepared hydraulic modeling of the West Watercourse under existing and proposed conditions for the Blue Fairway development (Crozier, May 2016). The proposed conditions presented in the Blue Fairway Report include channel improvements and crossings. This proposed condition was used as the existing conditions model for the Wyldeewood Creek Flood Study outlined in this report. The proposed works outlined in the Blue Fairway Report are anticipated to be constructed prior or shortly thereafter to the Wyldeewood Creek works. The previous studies are further described in the sections below.

This report builds upon the flood study previously contained in the Servicing & Stormwater Management Report (Crozier, February 2019) which was specific to the Subject Site and has been prepared to address the NVCA's comments and request for a stand-alone flood study. These comments and responses prepared by Crozier are included in Appendix A.

3.0 HYDROLOGIC ANALYSIS

As previously stated, the complete hydrologic analysis for the Cranberry creek watershed was conducted as part of the Regional Stormwater Management Update and SWM Strategy Report (Crozier, May 2007). This report established the peak flow rates being conveyed within the West Watercourse across the Subject Site. The peak flow rates are summarized in Table 1. These flow rates are consistent with the West Watercourse flood study prepared for the Blue Fairway Development (Crozier, May 2016). Refer to Appendix C for key inputs and outputs from the previously completed SWMHYMO modeling and catchment area figure.

Table 1: Peak Flow Rate Summary for Wyldeewood Creek

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

The hydrologic analysis is based on a total drainage area of 218.8 ha with the lands south of the Georgian Trail identified for urban buildout and was assumed to be developed as low-density residential (i.e. 35% imperviousness). The lands north of the Georgian Trail are composed of the Cranberry Golf Course Lands and the Blue Fairway development lands.

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 exceeding 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.

4.0 HYDRAULIC ANALYSIS

A hydraulic analysis was previously conducted by Crozier using HEC-RAS as part of the *Servicing & Stormwater Management Implementation Report – Blue Fairway: Block 7 (May 2016)* for existing and proposed conditions of the West Watercourse. The proposed conditions model included channel improvements and crossings to support the development of the Blue Fairway lands.

The proposed model prepared for the Blue Fairway development was used as the existing conditions model to support the Subject Development. It has been assumed that all channel and crossing works associated with the Blue Fairway development will be completed prior to the works proposed for the Wyldeewood Creek Development. It is noted that the NVCA has approved the HEC-RAS model prepared in support of the Blue Fairway development.

Results from the hydraulic analysis provide estimates of the water surface elevations, flow velocities and depths across the study area. A comparison of existing and proposed model results aids in the determination of impacts upstream and downstream of the Subject Site with the proposed channel works. The proposed conditions model is also used to determine if the NVCA's risk criteria is met which includes safe ingress and egress and floodproofing of the proposed structures.

4.1 Boundary Conditions

The known water surface elevation of Cranberry Marsh is used in the HEC-RAS model as the downstream boundary condition. This water surface reflects the elevation of Cranberry Marsh during the various storm events. It is noted that the lower elevation of 179.65 masl was approved for Cranberry Marsh based on additional analysis prepared in support of another development adjacent to Cranberry Marsh, further east of the Subject Property. For the analysis of the West Watercourse, the Regional water surface elevation of 179.80 masl was used since this elevation is conservative and consistent with the previous modeling conducted for the West Watercourse. The Cranberry Marsh water surface elevations are based on the analysis conducted as part of the Master SWM Report (Crozier, May 2007) and are summarized in Table 2 below.

Table 2: Cranberry Marsh Water Surface Elevations

Return Period	Water Surface Elevation (masl)
2-Year	179.07
5-Year	179.07
10-Year	179.07
25-Year	179.07
50-Year	179.07
100-Year	179.36
Regional	179.80

4.2 Existing Conditions

Under existing conditions, the West Watercourse becomes concentrated at the Georgian Trail culvert and flows generally northeast towards the Subject Site. From the Georgian trail, the West Watercourse traverses the Cranberry Golf course and the Blue Fairway development to the extension of Cranberry Trail. Downstream of the Cranberry Trail crossing, the West Watercourse flow is conveyed via a 500 mm diameter culvert through Hole #10 of the Cranberry Golf Course. When the flow exceeds the culvert's conveyance capacity, the culvert is overtopped, and the flow is conveyed over the relatively flat terrain. From Hole #10 the flow is conveyed across low laying heavily vegetated terrain where it is conveyed via a 500 mm diameter culvert across the Subject Site and discharges to Cranberry Marsh located immediately downstream of the Subject Site. During large storm events the existing culvert on the Subject Site is overtopped.

The existing condition geometry file is based on the proposed conditions geometry file from the approved Blue Fairway HEC-RAS model. The source for the elevation data used in the approved Blue Fairway HEC-RAS model is stated on pages 11 and 12 of the Blue Fairway Report (Crozier, May 2016). Refer to Appendix B. The Manning's n values used for this model are outlined in Table 6 on page 11 of the Blue Fairway Report. The proposed condition geometry file from the approved Blue Fairway model was revised to include the following:

- extended cross-section immediately upstream of the Georgian Bay Hotel Lands (Section 199);
- a cross-section at the western property line of the Georgian Bay Hotel lands;
- updated culvert data for the culvert across the Georgian Bay Hotel lands;
- updated cross-sections through the Georgian Bay Hotel lands to reflect the site-specific topographic surveys; and
- ineffective flow for cross-sections within the golf course and the Subject Site were reviewed and revised.

Refer to Appendix D for the existing conditions HEC-RAS cross-sections and output results.

4.3 Proposed Conditions

The proposed condition geometry file is based on the existing conditions geometry file described above with the cross-section geometry within the Subject Property revised to reflect the proposed channel and culverts. Under proposed conditions the 500 mm diameter culvert crossing the Subject Site will be removed and an engineered channel will be constructed.

The proposed channel will generally be a rectangular channel approximately 6 metres wide by 1.75 metres deep with a trapezoidal low flow channel approximately 0.3 metres deep. The low flow channel is proposed for aesthetic purposes, as such, it has been modeled as ineffective flow. Two concrete box culverts are specified to convey the flow beneath the proposed roadway. 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. The cross-section elevation data was determined using the most recent version of the Site Plan and the most recent Site Grading prepared by Crozier. The proposed condition model will be updated as the detailed design progresses for the approval of the Site Plan Application.

4.3.1 Manning's n

Table 3.4 from the NVCA Natural Hazards Technical Guide (December 2013) was used to guide the determination of the Manning's n values. Where necessary, the MTO's Drainage Management Manual (1997) was consulted. Many of the sections consisted of various land covers in the overbanks and channel sections, therefore a Manning's n value for the composite land cover was selected with

consideration of the recommended Manning's n value for the individual land cover types. Table 3 below outlines the Manning's n value used for the various land cover combinations.

Table 3: West Watercourse Manning's n

Location	Cover	Manning's n
Overbank	Woods	0.08
	Lawn & Vegetated Area	0.05
	Lawn	0.04
	Asphalt & Vegetation	0.035
Channel	River Stone, Armour Stone & Vegetation	0.045
	Natural	0.05

4.3.2 Upstream Impact

A comparison of the water surface elevations upstream of the Subject Site and the proposed channel works was conducted to determine the upstream impacts. It is noted for all storm event up to the 100-year event has a decrease in water surface elevation upstream of the Subject Site. During the Regional storm event a slight increase of a maximum 0.02 m is noted for upstream of the Subject Site. The water surface elevations for the 100-year and Regional Events for the sections upstream of the proposed channel are summarized in Table 4 below for the proposed channel and the existing conditions.

Table 4: Water Surface Elevations Upstream of Property

Event Section	Existing Condition		Proposed Channel		Difference	
	100-yr (masl)	Regional (masl)	100-yr (masl)	Regional (masl)	100-yr (masl)	Regional (masl)
416	184.15	184.34	184.15	184.34	0	0
413	183.88	184.23	183.88	184.23	0	0
383	183.17	183.63	183.17	183.63	0	0
363	182.71	183.27	182.71	183.27	0	0
343	182.48	183.15	182.48	183.16	0	+0.01
323	182.27	183.06	182.27	183.07	0	+0.01
313	182.12	183.03	182.11	183.04	-0.01	+0.01
303	182.03	182.94	182.01	182.95	-0.02	+0.01
277	181.41	181.82	181.4	181.82	-0.01	0
261	181.38	181.80	181.36	181.8	-0.02	0
254	181.37	181.78	181.36	181.78	-0.01	0
249	181.37	181.79	181.36	181.79	-0.01	0
208	181.14	181.29	180.6	181.28	-0.54	-0.01
199	181.14	181.29	180.59	181.31	-0.55	+0.02
168	181.14	181.29	180.56	181.29	-0.58	0

4.4 Proposed Conditions with Culvert Blockage

The HEC-RAS model has been prepared to determine the implications under the 50% blockage scenario. The HEC-RAS model with 50% blockage of the proposed culvert shows that there is no overtopping of the proposed roadway. The highest water surface elevation within the Subject Site with the culvert having 50% blockage is 182.13 masl at the property line (Section 168). The water surface elevation is contained within the proposed constructed channel and is greater than 0.3 m below the lowest first finished floor elevation (182.73 masl) of the six proposed buildings per the first submission grading plan.

5.0 SAFE INGRESS/EGRESS

The modeling of the proposed conditions and proposed conditions with culvert blockage was used to confirm if safe ingress/egress is provided per the NVCA's Guidelines. Upon review of the proposed conditions model and the proposed conditions model with 50% blockage of the culverts, it was determined that overtopping of the road is not anticipated to occur in the Regional Storm event. Since overtopping of the road is not anticipated to occur the safe ingress/egress requirement is achieved.

6.0 FLOODPROOFING

Floodproofing is provided following the NVCA Guidelines by ensuring that the minimum opening elevations are to be a minimum of 0.3 m above the Regulatory storm flood elevation. The Regulatory flood in this situation is the Regional Storm event. Per the proposed condition model, the highest water surface elevations within the Subject Site are 182.13 masl during the Regional Event with the culvert having 50% blockage and 181.29 masl during the Regional Event. Both water surface elevations are at the western property line (Section 168). The water surface elevation is contained within the proposed constructed channel and is greater than 0.3 m below the first finished floor elevation of the proposed buildings with the lowest finished first floor elevation per the first submission grading plan being 182.73 masl. It is noted that the finished first floor elevations may change slightly throughout the approval process for the Site Plan Application. However, the floodproofing requirement will be maintained throughout the detailed engineering design.

7.0 EROSION ACCESS ALLOWANCE

The following letters were prepared to address the NVCA's request for a 6-metre erosion access allowance from the engineered channel and a 6-metre setback from the Regulatory floodline:

- Daylighting and Corridor Design for Unnamed Tributary Letter prepared by GEO Morphix, dated January 31, 2020;
- Buffer and Access Maintenance Letter prepared by GEO Morphix, dated June 16, 2020;
- Erosion Access Allowance Letter prepared by Crozier, dated January 29, 2020; and
- Constraints Mapping Letter prepared by Crozier, dated June 22, 2020.

The letters listed above provide reference to the policies and intent for the erosion access allowance as well as a description of how the proposed engineering channel will be accessed for maintenance activities. It is noted that the a 6-metre setback from the proposed channel will be provided based on the revised Site Plan prepared for the Brandy Lane Corporation.

8.0 SPILL FLOW

The previous modeling of the West Watercourse prepared for the Blue Fairway development indicated that there were areas of spill flow throughout the Cranberry Golf Course lands. To date an analysis regarding the spill flow has not occurred as it is largely ineffective for this watercourse. It was determined that the downstream channel should be modeled using the entire peak flow identified for the West Watercourse as this would be the more conservative approach. This approach also aligns with the possibility of the West Watercourse being channelized across the Cranberry Golf Course in the future.

The modeling assumption that the entire Regional Flow is to be conveyed across Hole #10 of the Cranberry Golf Course and that there is no loss due to spill indicates that there is currently a flooding condition at the quad building located immediately to the northwest of the Wyldeewood Creek Parcel on the Georgian Bay Hotel lands. However, it is anticipated that a portion of the flow will spill along the western property line of the Georgian Bay Hotel lands out north to Highway 26 prior to flooding the quad building. Further analysis was not conducted with respect to the spill flow since the focus of this Flood Study was for the design of watercourse traversing the Subject Property to convey the entire flow from the Regional storm Event.

9.0 CONCLUSIONS AND RECOMMENDATIONS

The HEC-RAS analysis conducted shows that the proposed channel can safely convey the flows across the Subject Site, provides safe access/egress and can convey large flows within the engineered channel. The Regional flow rate used in this analysis is based on conservative estimates for future building of the watershed. The NVCA's Natural Hazards Technical Guidelines specify requirements for areas subject to flood hazards which includes safe access/egress criteria, flooding risk criteria and floodproofing. The HEC-RAS analysis has demonstrated that safe access/egress is provided since there is no overtopping of the culverts at the private road crossing during the Regional storm event. The flood risk criteria has also been met since the Regional storm event is contained in the engineered channel with freeboard in excess of the required 0.3 m. Floodproofing of the proposed buildings is provided by having the minimum openings 0.3 m above the water surface elevation during the Regional storm event.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.



Mathew Lemieux, E.I.T.

C.F. CROZIER & ASSOCIATES INC.



Rebecca Alexander, P. Eng
Project Manager

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APPENDIX A

NVCA Comments

NVCA Email dated April 28, 2020
Comment Response Matrix

Mathew Lemieux

From: Rebecca Alexander
Sent: Tuesday, April 28, 2020 4:23 PM
To: Mathew Lemieux
Subject: FW: 10 Vacation Inn - Wydewood Creek - OPA/ZBA items outstanding

Follow Up Flag: Follow up
Flag Status: Flagged

Rebecca Alexander P.Eng. | Project Manager
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tel: 705.446.3510 | direct: 705.719.3458

From: Emma Perry <eperry@nvca.on.ca>
Sent: April 28, 2020 3:31 PM
To: Rebecca Alexander <ralexander@cfcrozier.ca>
Cc: Mike Hensel <mhensel@cfcrozier.ca>; Alison Edwards <aedwards@nvca.on.ca>; 'Lindsay Ayers' <layers@collingwood.ca>
Subject: 10 Vacation Inn - Wydewood Creek - OPA/ZBA items outstanding

Hi Rebecca,
Per your request, Alison and I have gone through and separated out the comments pertaining to setting the limits of development for the purposes of proceeding with the OPA/ZBA application.

Below I've included our comments which are outstanding to provide support for the OPA/ZBA application. We have also prepared comments to address at the site plan stage, which focus on SWM, ESC and Ecology details. I will send these in a separate email to keep things organized.

In preparing these comments the following documents were reviewed:

Current Material Reviewed 24-APRIL-2020:

- REPORT: C.F. Crozier, "Functional Servicing & Stormwater Management Report", dated July 11, 2018
- REPORT: C.F. Crozier, "Servicing & Stormwater Management Implementation Report", dated February 2019

Outstanding comments for OPA/ZBA:

1. Stand-alone Flood Study:

Please submit a stand-alone flood study, for the unnamed tributary, that follows NVCA's *Natural Hazards Technical Guide (December 2013)*.

Once the study has taken into consideration the following comments, please submit the study and updated Hec Ras model for further review and potential commenting.

2. **Flows:**

It is understood the drainage area and flows were determined in the *Regional Stormwater Management Update & Master SWM Strategy report* prepared by Crozier (May 2007).

The West Watercourse Drainage Area (Figure 5 provided in the July 2018 SWM report, page 48/48) shows the catchment area of 218.8ha.

Please provide excerpts from the *Regional Stormwater Management Update & Master SWM Strategy report* demonstrating the flows presented in Table 1 (page 9/48) represent the ultimate build-out scenario.

Table 1: Peak Flow

Return Period	Peak Flow (l/s)
2-Year	0.88
5-Year	1.71
10-Year	2.32
20-Year	3.14
50-Year	3.76

3. **Source of Elevations**

Please clarify which data (mapping) source was used to generate the ELEVATIONS for cross-section 102.91.

There may be a need to compute an adjustment factor depending on the source of the data points (i.e. elevations).

4. **Blue Fairway Hec Ras Model:**

Please explain why the proposed channel design, through the subject site, was not incorporated into the Hec Ras model previously conducted as part of the *Servicing & Stormwater Management Implementation Report – Blue Fairway: Block 7 by Crozier (May 2007)*.

5. **Manning's 'n' used in the hydraulic model:**

Please justify the Manning's 'n' value used for the LOB/ROB and the Channel. These values are currently modelled as 0.04 for LOB/ROB and 0.045 for the channel.

Please refer to *NVCA's Natural Hazards Technical Guide, (December 2013)*, table 3.4 for typical Manning's 'n' values.

Please make the appropriate adjustments to the Hec Ras model and the necessary resultant tables and floodline mapping, if deemed necessary.

6. Cross section ELEVATIONS:

NVCA staff is comparing the cross section's ELEVATIONS in the Hec Ras model to those shown on Figure C104 (Hec-Ras Cross-Section – page 49/60).

It appears the sources don't match hundred percent. However, NVCA staff understand there is limited elevations provided on Figure C104.

Please submit a scalable channel design drawing. The design drawing must display, but not limited to: the proposed elevations, dimensions, low-flow channel, etc.

The channel design drawing will be used to ensure the cross-sections have been generated appropriately throughout the subject site.

7. Figure C104 (Hec-Ras Cross-Section Figure):

Figure C104 is currently stamped "DRAFT for discussion purposes only".

Please finalize Figure C104 and resubmit.

8. Upstream Impacts:

The proposed condition Hec Ras model terminates at the western property limit (cross section 102.91).

There is a need to determine upstream floodlines are not negatively impacted by the proposed channel works and proposed development.

Please explain how this need will be demonstrated.

9. Constraints Mapping

Once the hydraulic model has been finalized a constraints map will need to be produced.

In order to accurately determine the appropriate limits to development, NVCA request that a scaleable drawing be provided (using surveyed data points) which illustrates the following items:

- The Cranberry Marsh high-water elevation of 179.80m + 6m buffer
- The Regional storm elevation associated with the engineered channel + 6m buffer (i.e. flood hazard access allowance)
- The delineated boundary of the PSW, plus variable buffer (averaged 30m) per latest concept plan.

The constraints mapping should feature a complete legend. Constraint lines, access allowances, and buffer setbacks should be labelled. Please confirm that all works are outside of the limits of development. The limits to development will be determined by the furthest extent of the hazard plus the required access allowance or the natural heritage feature and appropriate buffer; whichever is the greatest constraint.

We can address any questions you may have during our call tomorrow. Talk to you then,
Emma

Emma Perry | Planner III

Nottawasaga Valley Conservation Authority

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IMPORTANT NOTE

I am currently working remotely as the Nottawasaga Valley Conservation Authority is taking preventative measures to limit the spread of COVID-19. You may experience some delays or disruptions as we follow recommendations of health professionals to slow the virus from spreading.

This e-mail message, including any attachments, is for the sole use of the intended recipient(s) and may contain confidential and privileged information. Any unauthorized review, use, disclosure or distribution is prohibited. If you are not the intended recipient, please contact the sender and destroy all copies of the original message.

Wyldeewood Creek - Comment Response Matrix		
Comment #	Nottawasaga Valley Conservation Authority Comments (April 28, 2020)	Crozier Responses (September, 2020)
1	Stand-alone Flood Study: Please submit a stand-alone flood study, for the unnamed tributary, that follows NVCA's Natural Hazards Technical Guide (December 2013). Once the study has taken into consideration the following comments, please submit the study and updated Hec Ras model for further review and potential commenting.	A stand-alone flood study has been prepared by Crozier for the unnamed tributary. This study and the HEC-RAS model have been provided to the NVCA for further review and potential commenting.
2	Flows: It is understood the drainage area and flows were determined in the Regional Stormwater Management Update & Master SWM Strategy report prepared by Crozier (May 2007). The West Watercourse Drainage Area (Figure 5 provided in July 2018 SWM report, page 48/48) shows the catchment area of 218.8ha. Please provide excerpts from the Regional Stormwater Management Update & Master SWM Strategy report demonstrating the flows presented in Table 1 (page 9/48) represents the ultimate build-out scenario.	In the Flood Study Report prepared by Crozier an additional explanation of the flows is provided. The SWMHYMO results from the Regional Stormwater Management Update & Master SWM Strategy report are appended in the Flood Study Report.
3	Source of Elevations Please clarify which data (mapping) source was used to generate the ELEVATIONS for cross-section 102.91. There may be a need to compute an adjustment factor depending on the source of the data points (i.e. elevations).	Clarification regarding the elevations used for the creation of the West Watercourse HEC-RAS model prepared for the Blue Fairway development is provided in the Flood Study Report. Elevations for the existing condition sections within the Georgian Bay Hotel lands have been derived from site-specific topographic survey. Since the elevation data for the HEC-RAS section geometry is primarily from site-specific topographic surveys, it was determined that an adjustment factor was not necessary.
4	Blue Fairway Hec Ras Model: Please explain why the proposed channel design, through the subject site, was not incorporated into the Hec Ras model previously conducted as part of the Servicing & Stormwater Management Implementation Report - Blue Fairway: Block 7 by Crozier (May 2007).	The updated HEC-RAS model has been incorporated with the modelling previously conducted for the Blue Fairway development. At the time the Blue Fairway model was prepared there was no planned development on the Subject Property. Further details are provided in the Flood Study Report.
5	Manning's 'n' used in the hydraulic model: Please justify the Manning's 'n' value used for the LOB/ROB and the Channel. These values are currently modelled as 0.04 for LOB/ROB and 0.045 for the channel. Please refer to NVCA's Natural Hazards Technical Guide, (December 2013), table 3.4 for typical Manning's 'n' values. Please make the appropriate adjustments to the Hec Ras model and the necessary resultant tables and floodline mapping, if deemed necessary.	The Manning's 'n' values have been reviewed and revised. Further details regarding the selection of the Manning's 'n' values are provided in the Flood Study Report.

Wyldeewood Creek - Comment Response Matrix		
Comment #	Nottawasaga Valley Conservation Authority Comments (April 28, 2020)	Crozier Responses (September, 2020)
6	Cross section ELEVATIONS: NVCA staff is comparing the cross section's ELEVATIONS in the Hec Ras model to those shown on Figure C104 (Hec Ras Cross-Section - page 49/60). It appears the sources don't match hundred percent. However, NVCA staff understand that there is limited elevations provided on Figure C104. Please submit a scalable channel design drawing. The design drawing must display, but not limited to: the proposed elevations, dimensions, low-flow channel, etc. The channel design drawing will be used to ensure the cross-sections have been generated appropriately throughout the subject site.	Detailed drawings will be provided with the second submission documents provided for the complete Site Plan Application submission. At this time the channel design is guided by the current concept plan and site specific topographic survey to confirm the channel inverts upstream and downstream of the engineered channel. The detailed design of the channel will be guided by the current HEC-RAS model of the channel. The current HEC-RAS model has been prepared in support of the Zoning By-Law Amendment and Official Plan Amendment applications for approval in order to proceed to detailed design of the proposed development and channel works. Further details and modeling will be provided to the NVCA as the detailed design proceed for Site Plan Approval.
7	Figure C104 (Hec Ras Cross-Section Figure): Figure C104 is currently stamped "DRAFT for discussion purposes only". Please finalize Figure C104 and resubmit.	Detailed drawings will be provided with the second submission documents provided for the complete Site Plan Application submission.
8	Upstream Impacts: The proposed condition Hec Ras model terminates at the western property limit (cross section 102.91). There is a need to determine upstream floodlines are not negatively impacted by the proposed channel works and proposed development. Please explain how this need will be demonstrated.	The HEC-RAS model has been incorporated into the Blue Fairway HEC-RAS model for the West Watercourse to determine changes to the water surface elevation upstream of the Subject Site to ensure that there are no negative impacts created by the proposed engineered channel.

Wyldeewood Creek - Comment Response Matrix		
Comment #	Nottawasaga Valley Conservation Authority Comments (April 28, 2020)	Crozier Responses (September, 2020)
9	Constraints Mapping Once the hydraulic model has been finalized a constraints map will need to be produced. In order to accurately determine the appropriate limits to development, NVCA request that a scalable drawing be provided (using surveyed data points) which illustrates the following items: - The Cranberry Marsh high-water elevation of 179.80m + 6m buffer - The Regional storm elevation associated with the engineered channel + 6m buffer (i.e. flood hazard access allowance) - The delineated boundary of the PSW, plus variable buffer (averaged 30m) per latest concept plan. The constraints mapping should feature a complete legend. Constraint lines, access allowances, and buffer setbacks should be labelled. Please confirm that all works are outside of the limits of development. The limits to development will be determined by the furthest extent of the hazard plus the required access allowance or the natural heritage feature and appropriate buffer; whichever is the greatest constraint.	A constraints map has been prepared by Crozier and submitted to the NVCA enclosed in the letter dated June 22, 2020 which has also been appended in the Flood Study Report.

APPENDIX B

Report Excerpts

Servicing & Stormwater Management Implementation Report – Blue Fairway: Block
7 – MacPherson Builders (Cranberry) Ltd., prepared by Crozier (May 2016)
Pages 11- 12

6.3.1 Existing Conditions

The existing condition analysis was used to establish the existing Regional water surface elevation (WSEL) upstream of the proposed realignment.

The existing West Watercourse runs from Cranberry Golf Hole #7 eastward across future development lands, including the future extension of Cranberry Trail. East of the Cranberry Trail ROW, it crosses a Cranberry Golf Resort fairway via a 500mm diameter culvert. East of the fairway, the watercourse drains through additional development lands, ultimately draining to the Cranberry Marsh.

The existing conditions steady-state HEC-RAS model was developed using survey data provided by ACT Field Services (2015), LAW Development Group (1993), and Collingwood base mapping. Supplementary information such as low-flow channel measurements were collected by CFCA staff. The existing conditions cross sections locations are illustrated on Figure 4B. Cross-sections were generated from the most recent survey data available (ACT, 2015) where possible, and supplemented with data from past surveys and other data sources (LAW Development Group, 1993; and Collingwood base mapping) as required. Note that Collingwood base mapping was used exclusively in areas downstream of the proposed works; while site specific survey was used in the area of Cranberry Trail.

Manning's "n" values for the model are given in Table 6, and were determined through site observation and examination of aerial photography.

Table 6: Manning's "n" Used for Hydraulic Modeling

Location	Description	Manning's "n" Value Used
Overbank	Maintained golf course lands	0.030
	Wooded areas	0.080
Main Channel	Channelized/maintained areas	0.045
	Natural channel areas (weedy with pools)	0.050

Peak flow rates for the various design events were obtained from the "Regional Stormwater Management Update & Master SWM Strategy" (Crozier, 2007), using the ultimate conditions scenario, as this provided the most conservative Regional event flow (see Table 7). The reach boundary condition was set to a known downstream water surface elevation of 179.8m per the Regional water surface for Cranberry Marsh presented in the Master SWM Strategy (Crozier, 2007). Cross sections were extended sufficiently downstream of the area of proposed works such that the model onsite was not sensitive to downstream WSEL. The model was run in the subcritical flow regime to provide the most conservative WSELs.

Table 7: Peak Flow Rates Used for Hydraulic Modeling

Return Period	Discharge (m ³ /s)
2 year	0.88
5 year	1.71
10 year	2.32
25 year	3.14
50 year	3.76
100 year	4.44
Regional	12.83

It is evident from the results of the model that the Regional event floodplain contains several ineffective flow zones, most notably to the north of the channel. In this area, the north overbank area falls away from the main channel to a low-lying area north of Greenbriar Drive. It is anticipated that floodwaters will breach the main channel overbank at this location, flow northward over Greenbriar Drive and along the adjacent fairway. Floodwaters that breach the main channel to the north will pond in the low lying area, representing a large ineffective flood storage area. The effective floodway is contained roughly south of the existing golf course cart path. As such, the cross sections were truncated at this northern boundary within the Block 5 area to conservatively model the effective floodway.

In the Regional event, the fairway downstream of the Cranberry Trail ROW overtops, leading to another possible breach to the north. The ineffective boundary from Block 5 was extended eastward to define the northern limit of the floodway in this region. The cross sections were truncated at this boundary.

Downstream of the fairway, the watercourse traverses additional development lands that have been historically filled. The modeled Regional event flow was found to exceed the capacity of the drainage system through this filled area. Similar to the areas of breach noted above, the ineffective boundary was extended eastward to delineate the effective floodway. It should be noted that this area has been modeled simply to establish a conservative starting water surface elevation for the model, results of modeling in this area (downstream of cross section 249) are not intended to be interpreted for floodline delineation.

The effective and ineffective flow zones, as well as potential areas of breach are illustrated on Figure 4B.

Based on the existing conditions hydraulic model, the Regional WSEL at cross section 413, which is located immediately upstream of the Block 5/Cranberry Golf Course property line is 184.32m.

6.3.2 Proposed Conditions

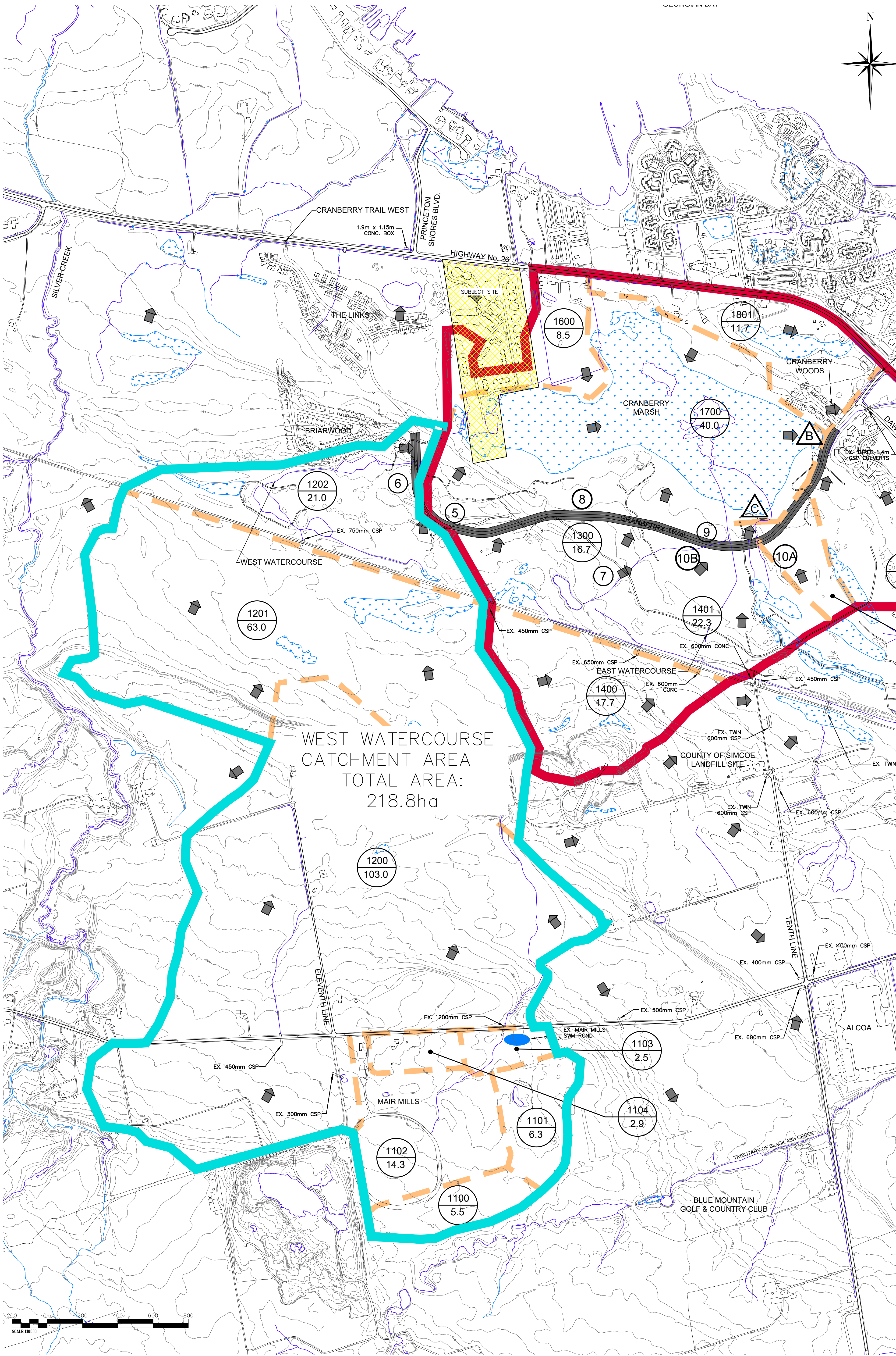
The proposed conditions HEC-RAS model was consistent with the existing conditions model, save for the geometry of the channel through Block 5 to the fairway downstream (between cross section 413 and cross section 249). The proposed conditions cross section locations are illustrated on Figure 5. The modifications made in this reach are described below:

- The channel was realigned north of the existing channel to avoid future development on Block 5, aligned with the downstream channel east of Cranberry Trail, and provide additional flood protection for existing development in the area.
- A flood conveyance channel was provided, exhibiting minimum 1 m depth, minimum 4.2m base width and maximum 3:1 side slopes. It was assumed that the Block 5 lands south of the watercourse would be filled in future to accommodate development, similar to previous phases.
- A trapezoidal low flow channel of base width 0.4m, side slopes of 3:1, and depth of 0.3m was created in the base of the flood conveyance channel to convey base flows and small storm events. Sizing was based upon field observation of the existing channel dimensions.
- A culvert and bridge deck were inserted into the model to represent the proposed Cranberry Trail profile and crossing culvert. A proposed open bottom bridge (3.6m x 1.6m) will convey flow from

APPENDIX C

Hydrologic & Hydraulic Modeling from Previous Reports

Georgian Bay Hotel – West Watercourse Drainage Plan
Tanglewood Report – SWMHYMO
Blue Fairway Existing Conditions HEC-RAS
Blue Fairway Proposed Conditions HEC-RAS
Blue Fairway Pre-Development West Watercourse Conveyance
Blue Fairway Pre-Development West Watercourse Floodplain Characteristics
Plan
Blue Fairway Post-Development West Watercourse Conveyance



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

TEMPORARY BENCHMARKS

- TBM#1—
- TBM#2—
- TBM#3—

Engineer

Project

GEORGIAN BAY HOTEL
COLLINGWOOD

Drawing

WEST WATERCOURSE DRAINAGE AREA



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
S.C.

Design By
S.C./M.L.

Project
R.A.

Scale
1:10000

Drawing
1107-4134

FIG 5


```

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00138* FFSLOPE=[0.91](%),
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00145* [3,0.75]
00146* [4,1.25]
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00148* %*****|*****|
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00266* Impervious surfaces: IArea=[2](m), SLPF=[0.5](%),
00267* LGI=[325](m), MNI=[0.013], SCT=[0.00](m)
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00297> [ 1.57 , 2.28 ]
00298> [ 1.96 , 2.96 ]
00299> [ 2.17 , 3.45 ]
00300> [ 2.51 , 4.46 ]
00301> [ 9.10 , 17.74 ]
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00319> LGI=[600] (m), RRI=[0.013], SCI=[0.00] (m)
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```

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001370 [ADT= 6.00] OUTC= 04:004000 11.60 .093 No date 13:18 11.96 n/a
001380 [MaxStalled= 6053E-02]
001390 *****
001400 Area 1102 - Single Family Residential
001410 *****
001420 001:0009 -ID-NHYD--AREA-- QPEAK-TpeakDate hh:mm--R.V.-R.C.
001430 CALIB STANDHYD 01:1102 20.00 .724 No date 12:06 18.47 .395
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001480 001:0010 -ID-NHYD--AREA-- QPEAK-TpeakDate hh:mm--R.V.-R.C.
001490 ADD HYD 03:004000 11.60 .724 No date 12:06 18.47 n/a
001500 [L/S/N= 2400.7 :107.0450]
001510 [DT= 6.00] SUM= 03:003101 31.00 .736 No date 12:06 16.05 n/a
001520 *****
001530 Area 1103 - Temporary Flood Area
001540 Area 1103 ADDED 0.3 ha AREA 1105 PER NVCA
001550 Area 1103 - ADDED 2.9 ha AREA 1104 PER NVCA
001560 *****
001570 Area 1104 - Flow From Existing Residence Area and Green Space Along Mountain Rd
001580 Area 1104 ADDED 2.9 ha AREA 1103 PER NVCA
001590 *****
001600 Area 1105 - Mountain Road Ditch 0.3 ha AREA MOVED TO AREA 1103 PER NVCA
001610 *****
001620 *****
001630 *****
001640 001:0011 -ID-NHYD--AREA-- QPEAK-TpeakDate hh:mm--R.V.-R.C.
001650 ROUTE RESERVOIR > 03:001101 31.00 .736 No date 12:06 16.05 n/a
001660 ROUTE RESERVOIR > 03:004001 31.00 .062 No date 16:24 16.05 n/a
001670 [MaxStUsed= 3108E+00]
001680 001:0012 -ID-NHYD--AREA-- QPEAK-TpeakDate hh:mm--R.V.-R.C.
001690 ROUTE CHANNEL > 05:001001 31.00 .067 No date 16:24 16.05 n/a
001700 [RDT= 6.00] OUTC= 03:004002 31.00 .060 No date 16:06 16.05 n/a
001710 [L/S/N= 2400.7 :107.0450]
001720 [Vmax= .393:Vmax= .251]
001730 *****
001740 FEND HAIR HILLS
001750 *****
001760 001:0013 -ID-NHYD--AREA-- QPEAK-TpeakDate hh:mm--R.V.-R.C.
001770 CALIB STANDHYD 09:1200 103.00 2.170 No date 12:12 16.78 .359
001780 [XHP= 21.71TMP= .35]
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001800 [Previous area: IArea= 5.00:SLPP= 2.00:LG= 45.0HP= .250:SCP= .0]
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001830 ROUTE RESERVOIR > 08:001200 103.00 2.170 No date 12:12 16.78 n/a
001840 [RDT= 6.00] OUTC= 08:000120 103.00 .490 No date 13:46 16.78 n/a
001850 [MaxStUsed= 7845E+00]
001860 001:0015 -ID-NHYD--AREA-- QPEAK-TpeakDate hh:mm--R.V.-R.C.
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001880 [RDT= 6.00] OUTC= 03:004003 103.00 .483 No date 14:18 16.78 n/a
001890 [L/S/N= 1100.7 :7307.045]
001900 [Vmax= .707:Vmax= .400]
001910 001:0016 -ID-NHYD--AREA-- QPEAK-TpeakDate hh:mm--R.V.-R.C.
001920 CALIB STANDHYD 09:1201 63.00 1.603 No date 12:12 18.54 .397
001930 [XHP= 21.71TMP= .35]
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001960 [Impervious area: IArea= 2.00:SLPI= .50:LG= 900.0HNI= .013:SCI= .0]
001970 001:0017 -ID-NHYD--AREA-- QPEAK-TpeakDate hh:mm--R.V.-R.C.
001980 ROUTE RESERVOIR > 09:1201 63.00 1.603 No date 12:12 18.54 n/a
001990 [RDT= 6.00] OUTC= 08:000121 63.00 .260 No date 14:06 18.54 n/a
002000 [MaxStUsed= 6075E+00]
002010 001:0018 -ID-NHYD--AREA-- QPEAK-TpeakDate hh:mm--R.V.-R.C.
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002070 CALIB HADHYD 05:1202 21.00 .134 No date 13:18 10.03 .215
002080 [CN= 68.0: N= 3.00]
002090 [Tpw= 1.24:DT= 6.00]
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002120 [XHP= 15.71TMP= .25]
002130 [LOSS= 2 :CN= 65.0]
002140 [Previous area: IArea= 5.00:SLPP= 2.00:LG= 40.0HP= .250:SCP= .0]
002150 [Impervious area: IArea= 2.00:SLPI= .50:LG= 1200.0HNI= .013:SCI= .0]
002160 001:0021 -ID-NHYD--AREA-- QPEAK-TpeakDate hh:mm--R.V.-R.C.
002170 ROUTE RESERVOIR > 09:1200 17.00 .103 No date 13:46 11.55 n/a
002180 [RDT= 6.00] OUTC= 08:000140 17.00 .103 No date 13:46 11.55 n/a
002190 [XHP= 15.71TMP= .25]
002200 [LOSS= 2 :CN= 65.0]
002210 [Previous area: IArea= 6.00:SLPP= .50:LG= 45.0HP= .250:SCP= .0]
002220 [Impervious area: IArea= 2.00:SLPI= .50:LG= 1300.0HNI= .013:SCI= .0]
002230 CALIB STANDHYD 09:1200 17.00 .375 No date 12:12 16.32 .392
002240 [XHP= 21.71TMP= .35]
002250 [LOSS= 2 :CN= 65.0]
002260 [Previous area: IArea= 6.00:SLPP= .50:LG= 40.0HP= .250:SCP= .0]
002270 [Impervious area: IArea= 2.00:SLPI= .50:LG= 1200.0HNI= .013:SCI= .0]
002280 001:0023 -ID-NHYD--AREA-- QPEAK-TpeakDate hh:mm--R.V.-R.C.
002290 ROUTE RESERVOIR > 09:1200 17.00 .375 No date 12:12 16.32 n/a
002300 [RDT= 6.00] OUTC= 08:000140 17.00 .103 No date 13:46 11.55 n/a
002310 [XHP= 15.71TMP= .25]
002320 [LOSS= 2 :CN= 65.0]
002330 001:0024 -ID-NHYD--AREA-- QPEAK-TpeakDate hh:mm--R.V.-R.C.
002340 ROUTE CHANNEL > 08:000140 17.00 .103 No date 13:46 11.55 n/a
002350 [RDT= 6.00] OUTC= 08:000140 17.00 .103 No date 14:18 19.32 n/a
002360 [L/S/N= 450.7 :6707.045]
002370 [Vmax= .496:Vmax= .320]
002380 001:0025 -ID-NHYD--AREA-- QPEAK-TpeakDate hh:mm--R.V.-R.C.
002390 CALIB HADHYD 09:1201 22.30 .224 No date 12:48 11.55 .247
002400 [CN= 70.0: N= 3.00]
002410 [Tpw= .64:DT= 6.00]
002420 001:0026 -ID-NHYD--AREA-- QPEAK-TpeakDate hh:mm--R.V.-R.C.
002430 CALIB 03:004005 17.00 .112 No date 12:00 18.74 .401
002440 [XHP= 15.71TMP= .30]
002450 [LOSS= 2 :CN= 73.0]
002460 [Previous area: IArea= 7.00:SLPP= .50:LG= 45.0HP= .250:SCP= .0]
002470 [Impervious area: IArea= 2.00:SLPI= .50:LG= 1300.0HNI= .013:SCI= .0]
002480 001:0027 -ID-NHYD--AREA-- QPEAK-TpeakDate hh:mm--R.V.-R.C.
002490 ADD HYD 02:000002 16.70 .260 No date 12:12 15.70 n/a
002500 [XHP= 15.71TMP= .30]
002510 [LOSS= 2 :CN= 73.0]
002520 [Previous area: IArea=
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00271> ROUTE RESERVOIR -> 07:000002 328.40 1.355 No_date 13:10 14.99 n/a
00272> [RDP= 6.00] out<- 01:000003 328.40 .897 No_date 17:06 14.99 n/a
00273> [MaxStoUsed=.1091E+01]
00274> 001:0032-----ID:MHYD-----AREA-----QPEAK-TpeakDate hh:mm-----R.V.-R.C.
00275> CALIB STANBYD 02:1600 27.70 .378 No_date 12:00 14.82 .317
00276> [XIMP=.12:TIME=.21]
00277> [LOSS= 2 :CN= 66.0]
00278> [Previous area: IApex= 6.00:SLFP= .25:LGP= 95:MMF=.250:SCP= .0]
00279> [Previous area: IALpex= 2.00:SLFP= .50:LGI= 500:MMF= 613:SCI= .0]
00280> 001:0033-----ID:MHYD-----AREA-----QPEAK-TpeakDate hh:mm-----R.V.-R.C.
00281> CALIB STANBYD 03:1601 11.70 .211 No_date 12:06 16.00 .343
00282> [XIMP=.15:TIME=.25]
00283> [LOSS= 2 :CN= 66.0]
00284> [Previous area: IApex= 6.00:SLFP= .50:LGP= 65:MMF=.250:SCP= .0]
00285> [Previous area: IALpex= 2.00:SLFP= .50:LGI= 690:MMF= 613:SCI= .0]
00286> 001:0034-----ID:MHYD-----AREA-----QPEAK-TpeakDate hh:mm-----R.V.-R.C.
00287> ADD HYD 02:1600 27.70 .378 No_date 12:00 14.82 n/a
00288> # 03:1601 11.70 .211 No_date 12:06 16.00 n/a
00289> [DT= 6.00] SUM= 04:000004 39.40 .587 No_date 12:06 15.17 n/a
00290> 001:0035-----ID:MHYD-----AREA-----QPEAK-TpeakDate hh:mm-----R.V.-R.C.
00291> ADD HYD 01:000003 328.40 .897 No_date 17:06 14.99 n/a
00292> # 01:000004 39.40 .587 No_date 12:06 15.17 n/a
00293> [DT= 6.00] SUM= 05:000005 367.80 .982 No_date 16:06 15.01 n/a
00294> 001:0036-----
00295> FINISH
00296> -----
00297> *****
00298> WARNINGS / ERRORS / NOTES
00299> -----
0300> Simulation ended on 2007-05-21 at 16:21:06
0301> *****
0302>
0303>

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00271> ROUTE RESERVOIR -> 07:000002 328.40 2.498 No_date 13:24 21.79 n/a
00272> [RDT= 6.00] out= 01:000003 328.10 1.345 No_date 16:24 21.79 n/a
00273> [RstUsed= 17898.01]
00274> 001:0032-----ID:NIHYD-----AREA-----QPEAK-TpeakDate_hh:mm-----R.V.-R.C.
00275> CALIB STANDHYD 02:1800 27.70 .532 No_date 12:06 21.60 360
00276> [XIMP= 12:TIMP= 21]
00277> [LOSS= 2:ICN= 56.0]
00278> [Previous area: IApex= 6.00:SLPF= .25:LGP= 95.:MNP= .250:SCP= .0]
00279> [Impervious area: IAlmp= 2.00:SLPI= .50:LGI= 500.:MNI= .013:SCI= .0]
00280> 001:0033-----ID:NIHYD-----AREA-----QPEAK-TpeakDate_hh:mm-----R.V.-R.C.
00281> CALIB STANDHYD 03:1801 11.70 .318 No_date 12:06 23.22 .392
00282> [XIMP= 15:TIMP= 25]
00283> [LOSS= 2:ICN= 66.0]
00284> [Previous area: IApex= 6.00:SLPF= .50:LGP= 65.:MNP= .250:SCP= .0]
00285> [Impervious area: IAlmp= 2.00:SLPI= .50:LGI= 600.:MNI= .013:SCI= .0]
00286> 001:0034-----ID:NIHYD-----AREA-----QPEAK-TpeakDate_hh:mm-----R.V.-R.C.
00287> ADD HYD 02:1800 27.70 .532 No_date 12:06 21.60 n/a
00288> [DT= 6.00] SUM= 04:000004 39.40 .850 No_date 12:06 22.22 n/a
00289> 001:0035-----ID:NIHYD-----AREA-----QPEAK-TpeakDate_hh:mm-----R.V.-R.C.
00290> ADD HYD 01:000003 328.40 1.345 No_date 16:24 21.79 n/a
00291> [DT= 6.00] SUM= 04:000004 39.40 .850 No_date 12:06 22.22 n/a
00292> 001:0036-----ID:NIHYD-----AREA-----QPEAK-TpeakDate_hh:mm-----R.V.-R.C.
00293> FINISH
00294>
00295>
00296>
00297>
00298> WARNINGS / ERRORS / NOTES
00299>
00300> Simulation ended on 2007-05-21 at 16:21:19
00301>
00302>
00303>

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001363 ROUTE STANHYD --> 02:002101 11.80 .220 No date 13:00 23.62 n/a
001364 [RDT= 6.00] outC= 04:004000 11.80 .170 No date 13:36 23.62 n/a
001365 [XIMP= 15-TIMP=35] --> 001364 --> 001365
001366 [LOSS= 2 :CIN 65.2] --> 001365
001367 [Previous area: IArea= 5.00:SLPP= 2.00:LG= 40.0:HP= 050:SCP= .0]
001368 [Impervious area: IArea= 1.50:SLP= 50.0:LG= 700.0:HP= 013:SCI= .0]
001369 00100115 ADD HYD --> 03:000002 20.00 1.332 No date 12:06 31.81 470
001370 [XIMP= 15-TIMP=35] --> 001369
001371 [LOSS= 2 :CIN 65.2] --> 001370
001372 [Previous area: IArea= 5.00:SLPP= 2.00:LG= 40.0:HP= 050:SCP= .0]
001373 [Impervious area: IArea= 1.50:SLP= 50.0:LG= 700.0:HP= 013:SCI= .0]
001374 00100115 ADD HYD --> 03:000002 20.00 1.332 No date 12:05 31.84 n/a
001375 [RDT= 6.00] SUM= 03:000101 31.80 1.364 No date 12:06 26.79 n/a
001376 [XIMP= 15-TIMP=35] --> 001375
001377 [LOSS= 2 :CIN 65.2] --> 001376
001378 [Previous area: IArea= 5.00:SLPP= 2.00:LG= 40.0:HP= 050:SCP= .0]
001379 [Impervious area: IArea= 1.50:SLP= 50.0:LG= 700.0:HP= 013:SCI= .0]
001380 00100115 ADD HYD --> 03:000002 20.00 1.332 No date 12:05 31.84 n/a
001381 [RDT= 6.00] SUM= 03:000101 31.80 1.364 No date 12:06 26.79 n/a
001382 [XIMP= 15-TIMP=35] --> 001381
001383 [LOSS= 2 :CIN 65.2] --> 001382
001384 [Previous area: IArea= 5.00:SLPP= 2.00:LG= 40.0:HP= 050:SCP= .0]
001385 [Impervious area: IArea= 1.50:SLP= 50.0:LG= 700.0:HP= 013:SCI= .0]
001386 00100115 ADD HYD --> 03:000002 20.00 1.332 No date 12:05 31.84 n/a
001387 [RDT= 6.00] SUM= 03:000101 31.80 1.364 No date 12:06 26.79 n/a
001388 [XIMP= 15-TIMP=35] --> 001387
001389 [LOSS= 2 :CIN 65.2] --> 001388
001390 [Previous area: IArea= 5.00:SLPP= 2.00:LG= 40.0:HP= 050:SCP= .0]
001391 [Impervious area: IArea= 1.50:SLP= 50.0:LG= 700.0:HP= 013:SCI= .0]
001392 00100115 ADD HYD --> 03:000002 20.00 1.332 No date 12:05 31.84 n/a
001393 [RDT= 6.00] SUM= 03:000101 31.80 1.364 No date 12:06 26.79 n/a
001394 [XIMP= 15-TIMP=35] --> 001393
001395 [LOSS= 2 :CIN 65.2] --> 001394
001396 [Previous area: IArea= 5.00:SLPP= 2.00:LG= 40.0:HP= 050:SCP= .0]
001397 [Impervious area: IArea= 1.50:SLP= 50.0:LG= 700.0:HP= 013:SCI= .0]
001398 00100115 ADD HYD --> 03:000002 20.00 1.332 No date 12:05 31.84 n/a
001399 [RDT= 6.00] SUM= 03:000101 31.80 1.364 No date 12:06 26.79 n/a
001400 [XIMP= 15-TIMP=35] --> 001399
001401 [LOSS= 2 :CIN 65.2] --> 001400
001402 [Previous area: IArea= 5.00:SLPP= 2.00:LG= 40.0:HP= 050:SCP= .0]
001403 [Impervious area: IArea= 1.50:SLP= 50.0:LG= 700.0:HP= 013:SCI= .0]
001404 00100115 ADD HYD --> 03:000002 20.00 1.332 No date 12:05 31.84 n/a
001405 [RDT= 6.00] SUM= 03:000101 31.80 1.364 No date 12:06 26.79 n/a
001406 [XIMP= 15-TIMP=35] --> 001405
001407 [LOSS= 2 :CIN 65.2] --> 001406
001408 [Previous area: IArea= 5.00:SLPP= 2.00:LG= 40.0:HP= 050:SCP= .0]
001409 [Impervious area: IArea= 1.50:SLP= 50.0:LG= 700.0:HP= 013:SCI= .0]
001410 00100115 ADD HYD --> 03:000002 20.00 1.332 No date 12:05 31.84 n/a
001411 [RDT= 6.00] SUM= 03:000101 31.80 1.364 No date 12:06 26.79 n/a
001412 [XIMP= 15-TIMP=35] --> 001411
001413 [LOSS= 2 :CIN 65.2] --> 001412
001414 [Previous area: IArea= 5.00:SLPP= 2.00:LG= 40.0:HP= 050:SCP= .0]
001415 [Impervious area: IArea= 1.50:SLP= 50.0:LG= 700.0:HP= 013:SCI= .0]
001416 00100115 ADD HYD --> 03:000002 20.00 1.332 No date 12:05 31.84 n/a
001417 [RDT= 6.00] SUM= 03:000101 31.80 1.364 No date 12:06 26.79 n/a
001418 [XIMP= 15-TIMP=35] --> 001417
001419 [LOSS= 2 :CIN 65.2] --> 001418
001420 [Previous area: IArea= 5.00:SLPP= 2.00:LG= 40.0:HP= 050:SCP= .0]
001421 [Impervious area: IArea= 1.50:SLP= 50.0:LG= 700.0:HP= 013:SCI= .0]
001422 00100115 ADD HYD --> 03:000002 20.00 1.332 No date 12:05 31.84 n/a
001423 [RDT= 6.00] SUM= 03:000101 31.80 1.364 No date 12:06 26.79 n/a
001424 [XIMP= 15-TIMP=35] --> 001423
001425 [LOSS= 2 :CIN 65.2] --> 001424
001426 [Previous area: IArea= 5.00:SLPP= 2.00:LG= 40.0:HP= 050:SCP= .0]
001427 [Impervious area: IArea= 1.50:SLP= 50.0:LG= 700.0:HP= 013:SCI= .0]
001428 00100115 ADD HYD --> 03:000002 20.00 1.332 No date 12:05 31.84 n/a
001429 [RDT= 6.00] SUM= 03:000101 31.80 1.364 No date 12:06 26.79 n/a
001430 [XIMP= 15-TIMP=35] --> 001429
001431 [LOSS= 2 :CIN 65.2] --> 001430
001432 [Previous area: IArea= 5.00:SLPP= 2.00:LG= 40.0:HP= 050:SCP= .0]
001433 [Impervious area: IArea= 1.50:SLP= 50.0:LG= 700.0:HP= 013:SCI= .0]
001434 00100115 ADD HYD --> 03:000002 20.00 1.332 No date 12:05 31.84 n/a
001435 [RDT= 6.00] SUM= 03:000101 31.80 1.364 No date 12:06 26.79 n/a
001436 [XIMP= 15-TIMP=35] --> 001435
001437 [LOSS= 2 :CIN 65.2] --> 001436
001438 [Previous area: IArea= 5.00:SLPP= 2.00:LG= 40.0:HP= 050:SCP= .0]
001439 [Impervious area: IArea= 1.50:SLP= 50.0:LG= 700.0:HP= 013:SCI= .0]
001440 00100115 ADD HYD --> 03:000002 20.00 1.332 No date 12:05 31.84 n/a
001441 [RDT= 6.00] SUM= 03:000101 31.80 1.364 No date 12:06 26.79 n/a
001442 [XIMP= 15-TIMP=35] --> 001441
001443 [LOSS= 2 :CIN 65.2] --> 001442
001444 [Previous area: IArea= 5.00:SLPP= 2.00:LG= 40.0:HP= 050:SCP= .0]
001445 [Impervious area: IArea= 1.50:SLP= 50.0:LG= 700.0:HP= 013:SCI= .0]
001446 00100115 ADD HYD --> 03:000002 20.00 1.332 No date 12:05 31.84 n/a
001447 [RDT= 6.00] SUM= 03:000101 31.80 1.364 No date 12:06 26.79 n/a
001448 [XIMP= 15-TIMP=35] --> 001447
001449 [LOSS= 2 :CIN 65.2] --> 001448
001450 [Previous area: IArea= 5.0
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00271> ROUTE RESERVOIR -> 071000002 328.40 3.365 No_date 13118 26.75 n/a
00272> [RDT= 6.00] out= 011000003 328.40 1.646 No_date 16124 26.75 n/a
00273> [MxStoUsed=,24236+011]
00274> 001:0032-----ID:NEYD-----AREA-----QPEAK-TpeakDate_hh:mm-----R.V.-R.C.
00275> CALIB STANDHYD 02:1800 27.70 666 No_date 12106 26.89 397
00276> [XIMP= 12:TIMP=,21]
00277> [LOSS= 2 :CN= 66.0]
00278> [Previous area: Iaper= 6.00:SLPP= .25:LGP= 95.:MNP=.250:SCP= .0]
00279> [Previous area: Iaper= 2.00:SLPP= .50:LGI= 500.:MNI= 013:SCI= .0]
00280> 001:0053-----ID:NEYD-----AREA-----QPEAK-TpeakDate_hh:mm-----R.V.-R.C.
00281> CALIB STANDHYD 03:1801 11.70 307 No_date 12106 28.47 420
00282> [XIMP= 15:TIMP=,25]
00283> [LOSS= 2 :CN= 66.0]
00284> [Previous area: Iaper= 6.00:SLPP= .50:LGP= 65.:MNP=.250:SCP= .0]
00285> [Previous area: Iaper= 2.00:SLPP= .50:LGI= 600.:MNI= 013:SCI= .0]
00286> 001:0034-----ID:NEYD-----AREA-----QPEAK-TpeakDate_hh:mm-----R.V.-R.C.
00287> ADD HYD 02:1800 27.70 666 No_date 12106 26.89 n/a
00288> + 03:1801 11.70 307 No_date 12106 28.47 n/a
00289> [DT= 6.00] SUM= 04.000004 39.40 1.053 No_date 12106 27.36 n/a
00290> 001:0035-----ID:NEYD-----AREA-----QPEAK-TpeakDate_hh:mm-----R.V.-R.C.
00291> ADD HYD 01:000003 320.40 1.646 No_date 16124 26.75 n/a
00292> + 04:000004 39.40 1.053 No_date 12106 27.36 n/a
00293> [DT= 6.00] SUM= 05.000005 367.80 1.602 No_date 16100 26.81 n/a
00294> 001:0036-----
00295> FINISH
00296>
00297>
00298> WARNINGS / ERRORS / NOTES
00299>
00300> Simulation ended on 2007-05-21 at 16:21:26
00301>
00302>
00303>
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001372 ROUTE RESERVOIR -> 02:000101 11.80 .293 No date 12:54 30.35 n/a
001373 [RDT= 6.00] out= 04:004000 11.80 .172 No date 11:00 30.35 n/a
001383 [RcstUsed= 5358E-01]
001393
001400 Area 1103 - Single Family Residential
001401
001425 001:0009 - ID:NIHYD -AREA- OPEAK-TpeakDate h:m:m --- R.V.-R.C.
001435 CALIB STANDHYD ID:11102 20.09 1.196 No date 12:06 39.21 .501
001445 [XIMP= 21:TIMP= 35]
001455 [LOSS= 2 CH= 65.2]
001465 [Previous area: IApex= 5.00:SLP= 2.00:LGP= 40.0:HPM= 250:SCP= .0]
001475 [Impervious area: IApex= 1.50:SLP1= .50:LGI= 700.0:INI= .013:SCI= .0]
001485 001:0010 - ID:NIHYD -AREA- OPEAK-TpeakDate h:m:m --- R.V.-R.C.
001495 ADD HYD + 01:004000 11.80 .172 No date 14:00 30.35 n/a
001505 [DT= 6.00] SUM 03:003101 31.80 1.344 No date 12:06 35.96 n/a
001525
001535 Area 1103 - Townhouses and Ponds --- ADDED 0.3 ha AREA 1105 PER NVCA
001545 Area 1103 - 2.5 ha AREA 1105 PER NVCA
001555 Area 1103 ADDED 2.9 ha AREA 1104 PER NVCA
001565
001575 Area 1104 - Flow From Existing Residence Area and Green Space Along Mountain
001585
001595
001605 Area 1105 - Mountain Road Ditch 0.3 ha AREA MOVED TO AREA 1103 PER NVCA
001615
001625 RFOND
001635
001645 001:0011 - ID:NIHYD -AREA- OPEAK-TpeakDate h:m:m --- R.V.-R.C.
001655 ROUTE RESERVOIR -> 03:003101 31.80 1.844 No date 12:06 35.96 n/a
001665 [RDT= 6.00] out= 09:004001 31.80 .150 No date 13:36 35.96 n/a
001675 [RcstUsed= 6707E-00]
001685 001:0012 - ID:NIHYD -AREA- OPEAK-TpeakDate h:m:m --- R.V.-R.C.
001695 ROUTE CHANNEL -> 02:004001 31.80 .150 No date 13:36 35.96 n/a
001705 [RDT= 6.00] out= 04:004002 31.80 .150 No date 21:30 35.96 n/a
001715 [L/S=N= 2400.7 / 310.0]
001725 [Vmax= .615:Dmax= .349]
001735
001745 FEND HAIN HILLS
001755
001765 001:0013 - ID:NIHYD -AREA- OPEAK-TpeakDate h:m:m --- R.V.-R.C.
001775 CALIB STANDHYD ID:12000 103.00 5.312 No date 12:12 35.30 .451
001785 [XIMP= 21:TIMP= 35]
001795 [LOSS= 2 CH= 58.8]
001805 [Previous area: IApex= 5.00:SLP= 2.00:LGP= 45.0:HPM= 250:SCP= .0]
001815 [Impervious area: IApex= 2.00:SLP1= .50:LGI= 1300.0:INI= .013:SCI= .0]
001825 001:0014 - ID:NIHYD -AREA- OPEAK-TpeakDate h:m:m --- R.V.-R.C.
001835 ROUTE RESERVOIR ID:12000 103.00 5.312 No date 12:12 35.30 n/a
001845 [RDT= 6.00] out= 08:000120 103.00 1.785 No date 13:06 35.30 n/a
001855 [RcstUsed= .1470E+01]
001865 001:0015 - ID:NIHYD -AREA- OPEAK-TpeakDate h:m:m --- R.V.-R.C.
001875 ROUTE CHANNEL ID:000120 103.00 1.785 No date 13:12 35.30 n/a
001885 [L/S=N= 2400.7 / 310.0]
001895 [Vmax= 1100.7 / .307(.345)
001905 [Vmax= .977:Dmax= .179]
001915 001:0016 - ID:NIHYD -AREA- OPEAK-TpeakDate h:m:m --- R.V.-R.C.
001925 CALIB STANDHYD ID:12001 63.00 4.114 No date 12:06 39.12 .500
001935 [XIMP= 21:TIMP= 35]
001945 [LOSS= 2 CH= 64.7]
001955 [Previous area: IApex= 5.00:SLP= 2.00:LGP= 45.0:HPM= 250:SCP= .0]
001965 [Impervious area: IApex= 2.00:SLP1= .50:LGI= 900.0:INI= .013:SCI= .0]
001975 001:0017 - ID:NIHYD -AREA- OPEAK-TpeakDate h:m:m --- R.V.-R.C.
001985 ROUTE RESERVOIR -> 09:1201 63.00 4.114 No date 12:06 39.12 n/a
001995 [RDT= 6.00] out= 08:000121 63.00 .978 No date 13:06 39.12 n/a
002005 [RcstUsed= .1151E+01]
002015 001:0018 - ID:NIHYD -AREA- OPEAK-TpeakDate h:m:m --- R.V.-R.C.
002025 ROUTE CHANNEL -> 08:000121 63.00 .978 No date 13:06 39.12 n/a
002035 [RDT= 6.00] out= 02:004005 63.00 .962 No date 13:18 39.12 n/a
002045 [L/S=N= 700.7 / 710.7]
002055 [Vmax= .632:Dmax= .625]
002065 001:0019 - ID:NIHYD -AREA- OPEAK-TpeakDate h:m:m --- R.V.-R.C.
002075 CALIB HASHYD ID:1202 21.00 .374 No date 13:12 26.87 .343
002085 [CH= 68.0 N= 3.00]
002095 [T= 1.24:DT= .60]
002105 001:0020 - ID:NIHYD -AREA- OPEAK-TpeakDate h:m:m --- R.V.-R.C.
002115 ADD HYD 02:004005 63.00 .962 No date 13:18 39.12 n/a
002125 [RDT= 6.00] out= 03:004003 103.00 1.710 No date 13:24 35.30 n/a
002135 [CH= 70.0 N= 3.00]
002145 [T= 05:12:02 21.00 .374 No date 13:12 26.82 n/a
002155 [DT= 6.00] SUM 01:000001 .16 90 3.144 No date 13:24 35.68 n/a
002165 001:0021 - ID:NIHYD -AREA- OPEAK-TpeakDate h:m:m --- R.V.-R.C.
002175 CALIB STANDHYD ID:12030 16.70 .705 No date 12:12 34.84 .445
002185 [XIMP= 15:TIMP= 25]
002195 [LOSS= 2 CH= 65.0]
002205 [Previous area: IApex= 6.00:SLP= 50:1LGP= 45.0:HPM= 250:SCP= .0]
002215 [Impervious area: IApex= 2.00:SLP1= .50:LGI= 700.0:INI= .013:SCI= .0]
002225 001:0022 - ID:NIHYD -AREA- OPEAK-TpeakDate h:m:m --- R.V.-R.C.
002235 CALIB STANDHYD ID:13100 17.70 .906 No date 12:12 36.90 .497
002245 [XIMP= 21:TIMP= 35]
002255 [LOSS= 2 CH= 65.0]
002265 [Previous area: IApex= 6.00:SLP= 50:1LGP= 40.0:HPM= 250:SCP= .0]
002275 [Impervious area: IApex= 2.00:SLP1= .50:LGI= 1200.0:INI= .013:SCI= .0]
002285 001:0023 - ID:NIHYD -AREA- OPEAK-TpeakDate h:m:m --- R.V.-R.C.
002295 ROUTE RESERVOIR -> 09:1400 17.70 .506 No date 12:12 36.90 n/a
002305 [RDT= 6.00] out= 03:000910 17.70 .306 No date 13:12 30.30 n/a
002315 [RcstUsed= 2706E-00]
002325 001:0024 - ID:NIHYD -AREA- OPEAK-TpeakDate h:m:m --- R.V.-R.C.
002335 ROUTE CHANNEL -> 08:000140 17.70 .306 No date 13:12 38.90 n/a
002345 [RDT= 6.00] out= 04:000404 17.70 .304 No date 13:24 38.90 n/a
002355 [L/S=N= 450.4 / 670.4]
002365 [Vmax= .653:Dmax= .482]
002375 001:0025 - ID:NIHYD -AREA- OPEAK-TpeakDate h:m:m --- R.V.-R.C.
002385 CALIB BASHYD ID:1400 22.30 .591 No date 12:48 29.50 .377
002395 [CH= 70.0 N= 3.00]
002405 [T= .84:DT= 6.00]
002415 001:0026 - ID:NIHYD -AREA- OPEAK-TpeakDate h:m:m --- R.V.-R.C.
002425 CALIB STANDHYD ID:15100 4.40 .288 No date 12:00 41.28 .527
002435 [XIMP= 15:TIMP= 30]
002445 [LOSS= 2 CH= 73.0]
002455 [Previous area: IApex= 7.00:SLP= 50:1LGP= 45.0:HPM= 250:SCP= .0]
002465 [Impervious area: IApex= 2.00:SLP1= .50:LGI= 325.0:INI= .013:SCI= .0]
002475 001:0027 - ID:NIHYD -AREA- OPEAK-TpeakDate h:m:m --- R.V.-R.C.
002485 ADD HYD + 02:000002 16.70 .705 No date 12:12 34.84 n/a
002495 [RDT= 6.00] out= 03:004004 17.70 .303 No date 13:24 38.90 n/a
002505 [L/S=N= 05:15:00 22.30 .591 No date 12
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00271> ROUTE RESERVOIR > 07:000007 328.40 4.554 No_date 13:06 33.40 n/a
00272> [RUT= 6.00] out= 01:000003 328.40 2.074 No_date 16:18 33.40 n/a
00273> [HsStoUsed= .32558101]
00274> 001:0032-----ID:NIHYD-----AREA-----QPEAK-TpeakDate_hh:mm-----R.V.-R.C.
00275> CALIB STANDHYD 02:1800 27.70 .897 No_date 12:00 33.73 431
00276> [XIMP= 12:TIMP=.21]
00277> [LOSS= 2 :CN= 66.0]
00278> [Previous area: IApex= 6.00:SLPF= .25:LGP= .95:MNP=.250:SCP=.0]
00279> [Iservious area: IApex= 2.00:SLPF= .50:LGI= 500:MNI=.013:SCI=.0]
00280> 001:0033-----ID:NIHYD-----AREA-----QPEAK-TpeakDate_hh:mm-----R.V.-R.C.
00281> CALIB STANDHYD 03:1801 11.70 .514 No_date 12:06 35.48 453
00282> [XIMP= .15:TIMP=.25]
00283> [LOSS= 2 :CN= 66.0]
00284> [Previous area: IApex= 6.00:SLPF= .50:LGP= .65:MNP=.250:SCP=.0]
00285> [Iservious area: IApex= 2.00:SLPF= .50:LGI= 600:MNI=.013:SCI=.0]
00286> 001:0034-----ID:NIHYD-----AREA-----QPEAK-TpeakDate_hh:mm-----R.V.-R.C.
00287> ADD HYD 02:1800 27.70 .897 No_date 12:00 33.73 n/a
00288> [DT= 6.00] SUM= 04:000004 39.40 1.371 No_date 12:00 34.25 n/a
00289> 001:0035-----ID:NIHYD-----AREA-----QPEAK-TpeakDate_hh:mm-----R.V.-R.C.
00290> ADD HYD 01:000003 328.40 2.074 No_date 16:18 33.40 n/a
00291> [DT= 6.00] SUM= 04:000004 39.40 1.371 No_date 12:00 34.25 n/a
00292> 001:0036-----ID:NIHYD-----AREA-----QPEAK-TpeakDate_hh:mm-----R.V.-R.C.
00293> FINISH
00294>
00295>
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00297>
00298> WARNINGS / ERRORS / NOTES
00299>
00300> Simulation ended on 2007-05-21 at 16:21:33
00301>
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00271> ROUTE RESERVOIR -> 07:000002 328.40 5.449 No date 13:06 38.55 n/a
00272> [RDI= 6.00] cuts= 01:000003 328.40 2.331 No date 16:24 38.55 n/a
00273> [MaxUsed= 39296401]
00274> 001:0032-----10:NNYD-----AREA---QPEAK-TpeakDate hh:mm---R.V.-R.C.
00275> CALIB STANDHYD 02:1800 27.70 1.056 No date 12:00 39.02 .453
00276> [XINF= 12:TIME= 21]
00277> [LOSS= 2 :CN= 66.0]
00278> [Previous area: IApex= 6.00:SLPP= .25:LGP= 95.:MNP=.250:SCP= .0]
00279> [Impervious area: IAlmp= 2.00:SLPI= 50:LGI= 500.:MNI= .013:SCI= .0]
00280> 001:0033-----10:NNYD-----AREA---QPEAK-TpeakDate hh:mm---R.V.-R.C.
00281> CALIB STANDHYD 03:1801 11.70 .596 No date 12:06 40.89 .475
00282> [XINF= 15:TIME= 25]
00283> [LOSS= 2 :CN= 66.0]
00284> [Previous area: IApex= 6.00:SLPP= .50:LGP= 65.:MNP=.250:SCP= .0]
00285> [Impervious area: IAlmp= 2.00:SLPI= 50:LGI= 600.:MNI= .013:SCI= .0]
00286> 001:0034-----10:NNYD-----AREA---QPEAK-TpeakDate hh:mm---R.V.-R.C.
00287> ADD HYD 02:1800 27.70 1.056 No date 12:00 39.02 n/a
00288> + 03:1801 11.70 .596 No date 12:06 40.89 n/a
00289> [DT= 6.00] SUM= 04:000004 39.40 1.603 No date 12:00 39.58 n/a
00290> 001:0035-----10:NNYD-----AREA---QPEAK-TpeakDate hh:mm---R.V.-R.C.
00291> ADD HYD 01:000003 328.40 2.331 No date 16:24 38.55 n/a
00292> + 04:000004 39.40 1.603 No date 12:00 39.58 n/a
00293> [DT= 6.00] SUM= 05:000005 367.80 2.535 No date 16:00 38.66 n/a
00294> 001:0036-----
00295> FINISH
00296>
00297>
00298> WARNINGS / ERRORS / NOTES
00299>
00300> Simulation ended on 2007-05-21 at 16:21:40
00301>
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00271> ROUTE RESERVOIR -> 07:000002 326.40 6.435 No_date 13:00 43.88 n/a
00272> [RUT= 6.00] out<- 01:000003 326.40 2.614 No_date 16:30 43.88 n/a
00273> [RtStoUsed=, #670E+01]
00274> 001:0032-----ID:RHYD-----AREA-----PEAK-Tpeakdate hh:mm-----R.V.-R.C.
00275> CALIB STANDHYD 07:1800 27.70 1.193 No_date 12:00 44.50 .474
00276> [XIMP= 12:TIMP=.21]
00277> [LOSS= 2 :CN= 66.0]
00278> [Previous area: IAPER= 6.00:SLFP= .25:LGP= 95.:MNP=.250:SCP= .0]
00279> [Impervious area: IAPER= 2.00:SLFP= .50:LGI= 500.:MNP=.013:SCP= .0]
00280> 001:0033-----ID:RHYD-----AREA-----PEAK-Tpeakdate hh:mm-----R.V.-R.C.
00281> CALIB STANDHYD 03:1801 11.70 .719 No_date 12:00 46.49 .495
00282> [XIMP= 15:TIMP=.25]
00283> [LOSS= 2 :CN= 66.0]
00284> [Previous area: IAPER= 6.00:SLFP= .50:LGP= 65.:MNP=.250:SCP= .0]
00285> [Impervious area: IAPER= 2.00:SLFP= .50:LGI= 600.:MNP=.013:SCP= .0]
00286> 001:0034-----ID:RHYD-----AREA-----PEAK-Tpeakdate hh:mm-----R.V.-R.C.
00287> ADD HYD 02:1800 27.70 1.193 No_date 12:00 44.50 n/a
00288> + 03:1801 11.70 .719 No_date 12:00 46.49 n/a
00289> [DT= 6.00] SUM= 04:000004 39.40 1.913 No_date 12:00 45.09 n/a
00290> 001:0035-----ID:RHYD-----AREA-----PEAK-Tpeakdate hh:mm-----R.V.-R.C.
00291> ADD HYD 01:000003 326.40 2.614 No_date 16:30 43.88 n/a
00292> + 04:000004 39.40 1.913 No_date 12:00 45.09 n/a
00293> [DT= 6.00] SUM= 05:000005 367.80 2.834 No_date 16:00 44.01 n/a
00294> 001:0036-----
00295> FINISH
00296>
00297> *****
00298> WARNINGS / ERRORS / NOTES
00299> *****
00300> 001:0026 CALIB STANDHYD
00301> *** WARNING: Storage Coefficient is smaller than DT!
00302> Use a smaller DT or a larger area.
00303> Simulation ended on 2007-05-21 at 16:21:53
00304>
00305>
00306>

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00271> PGUTE RESERVOIR -> 07:000002 328.40 17.950 No_date 7:10 127.02 n/a
00272> [RDI= 5.00] out= 01:000003 328.40 8.514 No_date 12:10 122.02 n/a
00273> [M>StoUsed=.1656E+02]
00274> 001:0032-----ID:NIHD-----AREA-----QPEAK-TpeakDate hh:mm-----R.V.-R.C.
00275> CALIB STANDHYD 02:1800 27.70 1.740 No_date 7:05 124.45 .645
00276> [XIMP= 12:TIME=.21]
00277> [LOSS= 2 :CN= 86.0]
00278> [Previous area: IApex= 6.00:SLFP= .25:LGP= 95.:MNP=.250:SCP= .0]
00279> [Impervious area: IApex= 2.00:SLFP= .50:LGI= 500.:MNI=.013:SCI= .0]
00280> 001:0033-----ID:NIHD-----AREA-----QPEAK-TpeakDate hh:mm-----R.V.-R.C.
00281> CALIB STANDHYD 03:1801 11.70 .859 No_date 7:05 127.44 .660
00282> [XIMP= 15:TIME=.25]
00283> [LOSS= 2 :CN= 86.0]
00284> [Previous area: IApex= 6.00:SLFP= .50:LGP= 65.:MNP=.250:SCP= .0]
00285> [Impervious area: IApex= 2.00:SLFP= .50:LGI= 600.:MNI=.013:SCI= .0]
00286> 001:0034-----ID:NIHD-----AREA-----QPEAK-TpeakDate hh:mm-----R.V.-R.C.
00287> ADD HYD 02:1800 27.70 1.740 No_date 7:05 124.45 n/a
00288> * 03:1801 11.70 .859 No_date 7:05 127.44 n/a
00289> [DT= 5.00] SUM= 04:000004 39.40 2.599 No_date 7:05 125.34 n/a
00290> 001:0035-----ID:NIHD-----AREA-----QPEAK-TpeakDate hh:mm-----R.V.-R.C.
00291> ADD HYD 01:000003 328.40 8.514 No_date 12:10 122.02 n/a
00292> * 04:000004 39.40 2.599 No_date 7:05 125.34 n/a
00293> [DT= 5.00] SUM= 05:000005 367.80 9.576 No_date 11:10 122.37 n/a
00294> 001:0036-----
00295> FINISH
00296>
00297>
00298> WARNINGS / ERRORS / NOTES
00299>
00300> Simulation ended on 2007-05-21 at 16:22:02
00301>
00302>
00303>
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00001 2 Metric Units
00002 *
00003 * Project Name: [TANGLEWOOD] Project Number: [146-2632]
00004 * Date: 05-02-2007
00005 * Modeler: [N.HOCNM]
00006 * Company: [C.F. Crozier & Associates Inc.]
00007 * License #: 3737016
00008 *
00009 * Scenario: ULTIMATE CONDITIONS
00010 *
00011 * Updates March 2007 as follows:
00012 * a) CHICAGO rainfall per Collinswood IDF (own Sound MGR Station)
00013 * b) Update CN values from HIO to NVCA guidelines
00014 * c) Lumped Hair Mills (Tatham) catchments
00015 * d) Catchments u/s of Georgian Trail routed to Cranberry Marsh
00016 * e) Update rating curve of Marsh outlet per revised HEC-RAS
00017 * f) Partial overcontrol of catchments south of Georgian Trail
00018 *
00019 *
00020 * START
00021 * ZEROS=[0.0], HEIGHT=[2], NSFORM=[0], NAUM=[0]
00022 * I = c-storm fillcode, one per line for NFORM time
00023 *
00024 * 002 YEAR
00025 *
00026 * CHICAGO STORM
00027 * UNITS=[2], TD=[4] (ha), TPAY=[0.33], CSUT=[5] (min),
00028 * CASKE=[1],
00029 * A=[0.07, 4.4], B=[6.75], and C=[0.028].
00030 *
00031 *
00032 * HAIR MILLS CATCHMENTS
00033 *
00034 * Area 1100 - Golf Course & rear yards
00035 *
00036 * CALIB NASHYD
00037 * ID=[1], NYID=[1100], DT=[5.0] (min), AREA=[5.5] (ha),
00038 * DWF=[0] (cms), CH/C=[71], IA=[5] (mm),
00039 * R=[3], TP=[0.71] hrs,
00040 * RAINFALL=[ , , , ] (mm/hr), END=-1
00041 *
00042 * ROUTE CHANNEL
00043 * IDout=[2], NYID=[2100], IDin=[1],
00044 * RDT=[5] (min),
00045 * CHLGT=[450] (m), CHSLOPE=[0.05] (%),
00046 * FFSLOPE=[0.5] (%),
00047 * SECNUM=[1], NSEG=[3]
00048 * ( SEGROUGH, SEGDIST (m))=[0.060, 9.0 -0.040, 11.0 0.060, 16.0]
00049 * ( DISTANCE (m), ELEVATION (m))=[0.1, 9]
00050 * [4.0, 1.3]
00051 * [9.0, 0.01]
00052 * [11.0, 0.01]
00053 * [16.0, 1.3]
00054 * [20.0, 1.9]
00055 *
00056 * Area 1101 - Golf Course & rear yards
00057 *
00058 * CALIB NASHYD
00059 * ID=[1], NYID=[1101], DT=[5.0] (min), AREA=[6.3] (ha),
00060 * DWF=[0] (cms), CH/C=[71], IA=[5] (mm),
00061 * R=[3], TP=[0.63] hrs,
00062 * RAINFALL=[ , , , ] (mm/hr), END=-1
00063 *
00064 * ADD HYD
00065 * IDsum=[3], NYID=[3100], IDs to add=[1,2]
00066 *
00067 * ROUTE CHANNEL
00068 * IDout=[2], NYID=[2101], IDin=[5],
00069 * RDT=[5] (min),
00070 * CHLGT=[300] (m), CHSLOPE=[0.05] (%),
00071 * FFSLOPE=[0.5] (%),
00072 * SECNUM=[1], NSEG=[3]
00073 * ( SEGROUGH, SEGDIST (m))=[0.060, 9.0 -0.040, 11.0 0.060, 16.0]
00074 * ( DISTANCE (m), ELEVATION (m))=[0.1, 9]
00075 * [4.0, 1.3]
00076 * [9.0, 0.01]
00077 * [11.0, 0.01]
00078 * [16.0, 1.3]
00079 * [20.0, 1.9]
00080 *
00081 * #525mm dia. pipe from golf course to development
00082 *
00083 * ROUTE RESERVOIR
00084 * IDout=[4], NYID=[4000], IDin=[2],
00085 * RDT=[5] (min),
00086 * TABLE of ( OUTFLOW-STORAGE ) values
00087 * (cms) - (ha-m)
00088 * [ 0.0, 0.0 ]
00089 * [ 0.060, 0.001 ]
00090 * [ 0.060, 0.005 ]
00091 * [ 0.070, 0.012 ]
00092 * [ 0.060, 2.382 ]
00093 * [ 0.300, 2.747 ]
00094 * END -1
00095 *
00096 * Area 1102 - Single Family Residential
00097 *
00098 * CALIB STANDHYD
00099 * ID=[1], NYID=[1102], DT=[5.0] (min), AREA=[20] (ha),
00100 * XIMP=[0.19], TIMP=[0.35], DWF=[0.00] (cms), LOSS=[2],
00101 * SCS curve number CN=[65],
00102 * Pervious surfaces: IAPer=[5.0] (mm), SLPP=[2.0] (%),
00103 * LGP=[40] (m), MNP=[0.050], SCP=[0.00] (m)
00104 * Impervious surfaces: IAIMp=[1.5] (mm), SLPI=[0.5] (%),
00105 * LGI=[700] (m), MNI=[0.013], SCI=[0.00] (m)
00106 * RAINFALL=[ , , , ] (mm/hr), END=-1
00107 *
00108 * ADD HYD
00109 * IDsum=[3], NYID=[3101], IDs to add=[1,4]
00110 *
00111 * Area 1103 - Townhouses and Pond ***** ADDED 0.3 ha AREA 1105 PER NVCA
00112 *
00113 * Area 1103 - ADDED 0.3 ha AREA 1104 PER NVCA
00114 *
00115 * Area 1103 - ADDED 2.9 ha AREA 1104 PER NVCA
00116 *
00117 * Area 1104 - Flow From Existing Residence Area and Green Space Along Mountain Rd
00118 *
00119 * Area 1104 - 2.9 ha AREA MOVED TO AREA 1103 PER NVCA
00120 *
00121 * Area 1105 - Mountain Road Ditch 0.3 ha AREA MOVED TO AREA 1103 PER NVCA
00122 *
00123 * FOND
00124 *
00125 * ROUTE RESERVOIR
00126 * IDout=[9], NYID=[4001], IDin=[3],
00127 * RDT=[5] (min),
00128 * TABLE of ( OUTFLOW-STORAGE ) values
00129 * (cms) - (ha-m)
00130 * [ 0.0, 0.0 ]
00131 * [ 0.0047, 0.0322 ]
00132 * [ 0.0123, 0.112 ]
00133 * [ 0.0155, 0.2243 ]
00134 * [ 0.0601, 0.3141 ]
00135 * [ 0.1325, 0.4582 ]
00136 * [ 0.1500, 0.5605 ]
00137 * [ 0.1500, 0.7802 ]
00138 * [ 0.1500, 0.8383 ]
00139 * [ 1.2887, 1.1717 ]
00140 * [ 2.1500, 1.3098 ]
00141 * [ 4.1200, 1.4506 ]
00142 * END -1
00143 *

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00144 * ROUTE CHANNEL
00145 * IDout=[4], NYID=[4002], IDin=[9],
00146 * RDT=[5] (min),
00147 * CHLGT=[2400] (m), CHSLOPE=[0.91] (%),
00148 * FFSLOPE=[0.91] (%),
00149 * SECNUM=[1], NSEG=[3]
00150 * ( SEGROUGH, SEGDIST (m))=[0.060, 0.75 -0.045, 2.25 0.060, 3.0]
00151 * ( DISTANCE (m), ELEVATION (m))=[0.1, 25]
00152 * [1.0, 75]
00153 * [2.0, 25]
00154 * [3.0, 75]
00155 * [4.1, 25]
00156 *
00157 * END HAIR MILLS
00158 *
00159 * CALIB STANDHYD
00160 * ID=[9], NYID=[1200], DT=[5.0] (min), AREA=[103] (ha),
00161 * XIMP=[0.21], TIMP=[0.35], DWF=[0.00] (cms), LOSS=[2],
00162 * SCS curve number CN=[58],
00163 * Pervious surfaces: IAPer=[5] (mm), SLPP=[2] (%),
00164 * LGP=[45] (m), MNP=[0.250], SCP=[0.00] (m)
00165 * Impervious surfaces: IAIMp=[2] (mm), SLPI=[0.5] (%),
00166 * LGI=[1300] (m), MNI=[0.013], SCI=[0.00] (m)
00167 * RAINFALL=[ , , , ] (mm/hr), END=-1
00168 *
00169 * ROUTE RESERVOIR
00170 * IDout=[8], NYID=[0120], IDin=[9],
00171 * RDT=[5] (min),
00172 * TABLE of ( OUTFLOW-STORAGE ) values
00173 * (cms) - (ha-m)
00174 * [ 0.00, 0.0 ]
00175 * [ 0.5, 0.9 ]
00176 * [ 3.0, 2.1 ]
00177 * [ 8.00, 2.65 ]
00178 * END -1
00179 *
00180 * ROUTE CHANNEL
00181 * IDout=[3], NYID=[4003], IDin=[8],
00182 * RDT=[5] (min),
00183 * CHLGT=[1100] (m), CHSLOPE=[0.73] (%),
00184 * FFSLOPE=[0.73] (%),
00185 * SECNUM=[1], NSEG=[1]
00186 * ( SEGROUGH, SEGDIST (m))=[0.045, 9]
00187 * ( DISTANCE (m), ELEVATION (m))=[0.2, 5]
00188 * [4.5, 1]
00189 * [9.2, 5]
00190 *
00191 * CALIB STANDHYD
00192 * ID=[9], NYID=[1201], DT=[5.0] (min), AREA=[63] (ha),
00193 * XIMP=[0.21], TIMP=[0.35], DWF=[0.00] (cms), LOSS=[2],
00194 * SCS curve number CN=[64.7],
00195 * Pervious surfaces: IAPer=[5] (mm), SLPP=[2] (%),
00196 * LGP=[45] (m), MNP=[0.250], SCP=[0.00] (m)
00197 * Impervious surfaces: IAIMp=[2] (mm), SLPI=[0.5] (%),
00198 * LGI=[900] (m), MNI=[0.013], SCI=[0.00] (m)
00199 * RAINFALL=[ , , , ] (mm/hr), END=-1
00200 *
00201 * ROUTE RESERVOIR
00202 * IDout=[6], NYID=[0121], IDin=[9],
00203 * RDT=[5] (min),
00204 * TABLE of ( OUTFLOW-STORAGE ) values
00205 * (cms) - (ha-m)
00206 * [ 0.00, 0.0 ]
00207 * [ 0.25, 0.6 ]
00208 * [ 1.50, 1.55 ]
00209 * [ 4.65, 1.65 ]
00210 * END -1
00211 *
00212 * ROUTE CHANNEL
00213 * IDout=[2], NYID=[4005], IDin=[8],
00214 * RDT=[5] (min),
00215 * CHLGT=[700] (m), CHSLOPE=[0.71] (%),
00216 * FFSLOPE=[0.71] (%),
00217 * SECNUM=[1], NSEG=[1]
00218 * ( SEGROUGH, SEGDIST (m))=[0.045, 9]
00219 * ( DISTANCE (m), ELEVATION (m))=[0.2, 5]
00220 * [4.5, 1]
00221 * [9.2, 5]
00222 *
00223 * CALIB NASHYD
00224 * ID=[5], NYID=[1202], DT=[5] (min), AREA=[21] (ha),
00225 * DWF=[0] (cms), CH/C=[68], IA=[6.7] (mm),
00226 * R=[3], TP=[1.24] hrs,
00227 * RAINFALL=[ , , , ] (mm/hr), END=-1
00228 *
00229 * ADD HYD
00230 * IDsum=[1], NYID=[0001], IDs to add=[2,3,4,5]
00231 *
00232 * CALIB STANDHYD
00233 * ID=[2], NYID=[1300], DT=[5.0] (min), AREA=[16.7] (ha),
00234 * XIMP=[0.15], TIMP=[0.25], DWF=[0.00] (cms), LOSS=[2],
00235 * SCS curve number CN=[65],
00236 * Pervious surfaces: IAPer=[6] (mm), SLPP=[0.5] (%),
00237 * LGP=[45] (m), MNP=[0.250], SCP=[0.00] (m)
00238 * Impervious surfaces: IAIMp=[2] (mm), SLPI=[0.5] (%),
00239 * LGI=[1200] (m), MNI=[0.013], SCI=[0.00] (m)
00240 * RAINFALL=[ , , , ] (mm/hr), END=-1
00241 *
00242 * CALIB STANDHYD
00243 * ID=[9], NYID=[1400], DT=[5.0] (min), AREA=[17.7] (ha),
00244 * XIMP=[0.21], TIMP=[0.35], DWF=[0.00] (cms), LOSS=[2],
00245 * SCS curve number CN=[65],
00246 * Pervious surfaces: IAPer=[6] (mm), SLPP=[0.5] (%),
00247 * LGP=[40] (m), MNP=[0.250], SCP=[0.00] (m)
00248 * Impervious surfaces: IAIMp=[2] (mm), SLPI=[0.5] (%),
00249 * LGI=[1200] (m), MNI=[0.013], SCI=[0.00] (m)
00250 * RAINFALL=[ , , , ] (mm/hr), END=-1
00251 *
00252 * ROUTE RESERVOIR
00253 * IDout=[8], NYID=[0140], IDin=[9],
00254 * RDT=[5] (min),
00255 * TABLE of ( OUTFLOW-STORAGE ) values
00256 * (cms) - (ha-m)
00257 * [ 0.00, 0.0 ]
00258 * [ 0.11, 0.14 ]
00259 * [ 0.50, 0.4 ]
00260 * [ 5.18, 0.60 ]
00261 * END -1
00262 *
00263 * ROUTE CHANNEL
00264 * IDout=[3], NYID=[4004], IDin=[8],
00265 * RDT=[5] (min),
00266 * CHLGT=[450] (m), CHSLOPE=[0.67] (%),
00267 * FFSLOPE=[0.67] (%),
00268 * SECNUM=[1], NSEG=[3]
00269 * ( SEGROUGH, SEGDIST (m))=[0.060, 0.75 -0.045, 2.25 0.060, 3.0]
00270 * ( DISTANCE (m), ELEVATION (m))=[0.1, 25]
00271 * [1.0, 75]
00272 * [2.0, 25]
00273 * [3.0, 75]
00274 * [4.1, 25]
00275 *
00276 * CALIB NASHYD
00277 * ID=[4], NYID=[1401], DT=[5] (min), AREA=[22.3] (ha),
00278 * DWF=[0] (cms), CH/C=[70], IA=[5] (mm),
00279 * R=[3], TP=[0.84] hrs,
00280 * RAINFALL=[ , , , ] (mm/hr), END=-1
00281 *
00282 * CALIB STANDHYD
00283 * ID=[5], NYID=[1500], DT=[5.0] (min), AREA=[4.4] (ha),
00284 * XIMP=[0.15], TIMP=[0.35], DWF=[0.00] (cms), LOSS=[2],
00285 * SCS curve number CN=[73],
00286 * Pervious surfaces: IAPer=[7] (mm), SLPP=[0.5] (%),
00287 * LGP=[45] (m), MNP=[0.250], SCP=[0.00] (m)
00288 * Impervious surfaces: IAIMp=[2] (mm), SLPI=[0.5] (%),
00289 * LGI=[1325] (m), MNI=[0.013], SCI=[0.00] (m)
00290 * RAINFALL=[ , , , ] (mm/hr), END=-1
00291 *

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00271> ADD HYD IDsum=[2], NHYD=[0002], IDS to add=[2,3,4,5]
00272> *
00273> CALIB STANDHYD ID=[6], NHYD=[1600], DT=[5.0] (min), AREA=[8.5] (ha),
XIMP=[0.15], TINF=[0.35], DMF=[0.00] (cms), LOSS=[2],
SCS curve number CN=[73],
Pervious surfaces: Iaper=[5.5] (mm), SLPP=[0.5] (%),
LGF=[45] (m), MNP=[0.250], SCP=[0.00] (m)
Imperious surfaces: IAsp=[2] (mm), SLPI=[0.5] (%),
LGI=[300] (m), MNI=[0.013], SCI=[0.00] (m)
RAINFALL=[ , , , ] (mm/hr), END=-1
00280> *
00281> CALIB NASHHYD ID=[8], NHYD=[1700], DT=[5.0] (min), AREA=[40.0] (ha),
DMF=[0] (cms), CN/C=[50], IAs=[13.1] (mm),
N=[3], TF=[2.59] hrs,
RAINFALL=[ , , , ] (mm/hr), END=-1
00285> *
00286> *
00287> ADD HYD IDsum=[7], NHYD=[0002], IDS to add=[1,2,6,8]
00288> *
00289> * 1.11 X 1.74 CSFA
00290> ROUTE RESERVOIR IDout=[1], NHYD=[0003], IDin=[7],
RUT=[5] (min),
TABLE of ( OUTFLOW-STORAGE ) values
(cms) - (ha-m)
00291> [ 0.0, 0.0 ]
00292> [ 0.45, 0.65 ]
00293> [ 0.61, 0.74 ]
00294> [ 1.19, 1.45 ]
00295> [ 1.57, 2.28 ]
00296> [ 1.90, 2.90 ]
00297> [ 2.17, 3.45 ]
00298> [ 2.51, 4.45 ]
00299> [ 9.10, 17.74 ]
00300> END -1
00301> *
00302> *
00303> *
00304> *
00305> CALIB STANDHYD ID=[2], NHYD=[1800], DT=[5.0] (min), AREA=[27.7] (ha),
XIMP=[0.12], TINF=[0.21], DMF=[0.00] (cms), LOSS=[2],
SCS curve number CN=[66],
Pervious surfaces: Iaper=[6.0] (mm), SLPP=[.25] (%),
LGF=[95] (m), MNP=[0.250], SCP=[0.00] (m)
Imperious surfaces: IAsp=[2] (mm), SLPI=[.5] (%),
LGI=[500] (m), MNI=[0.013], SCI=[0.00] (m)
RAINFALL=[ , , , ] (mm/hr), END=-1
00313> *
00314> CALIB STANDHYD ID=[3], NHYD=[1601], DT=[5.0] (min), AREA=[11.7] (ha),
XIMP=[0.15], TINF=[0.25], DMF=[0.00] (cms), LOSS=[2],
SCS curve number CN=[66],
Pervious surfaces: Iaper=[6.0] (mm), SLPP=[.51] (%),
LGF=[65] (m), MNP=[0.250], SCP=[0.00] (m)
Imperious surfaces: IAsp=[2] (mm), SLPI=[.5] (%),
LGI=[600] (m), MNI=[0.013], SCI=[0.00] (m)
RAINFALL=[ , , , ] (mm/hr), END=-1
00322> *
00323> ADD HYD IDsum=[4], NHYD=[0004], IDS to add=[2,3]
00324> *
00325> ADD HYD IDsum=[5], NHYD=[0005], IDS to add=[1,4]
00326> *
00327> FINISH
00328> *
00329> *
00330> *
00331> *
00332> *
00333> *
00334> *
00335> *
00336> *
00337> *
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00360> *
00361> *
00362> *
00363> *
00364> *
00365> *
00366> *
00367> *
00368> *
00369> *
00370> *

```

001363	[RDT= 5.0] outc= 04:004000	11.80	.064 No date	3.05	6.24 n/a
001364	[HxStoUsed= 1951E-02]				
001365					
001399	Area 1102 Single Family Residential				
001412	001-0009	ID-NHVD	AREA	QPEAK-TpeakDate h:m:s	R-V-R-C
001419	CALIB STANDHYD	01:1102	20.00	.706 No date	1:30 11.38 .337
001430	[XIMP= 15.TIMP= 35]				
001440	[LOSS= 2 C= 64.7]				
001450	[Previous area: IArea= 5.00:SLPP= 2.00:LGFP= 45. HMF= 250:SCP= .0]				
001460	[Impervious area: IArea= 1.50:SLPI= .50:LG1= 700. HMI= .013:SC1= .0]				
001470	001-0010	ID-NHVD	AREA	QPEAK-TpeakDate h:m:s	R-V-R-C
001480	ADD HYD	04:005000	11.80	.064 No date	3:05 6.24 n/a
001490	[RDT= 5.0] outc= 03:00101	31.80	.707 No date	1:30 9.48 n/a	
001500	[DT= 5.00] SUM= 03:00101	31.80	.707 No date	1:30 9.48 n/a	
001510					
001520	Area 1103 - Townhouses and Pond				
001530	Area 1103 - Added 9.3 ha AREA 1105 PER NYCA				
001540	Area 1103 - ADDED 2.9 ha AREA 1104 PER NYCA				
001550					
001560	Area 1104 - Flow From Existing Residence Area and Green Space Along Mountain Rd				
001570	Area 1104 - 5 ha AREA NYCA				
001580	Area 1105 - Mountain Road Ditch 0.3 ha AREA MOVED TO AREA 1103 PER NYCA				
001590	Area 1105 - Mountain Road Ditch 0.3 ha AREA MOVED TO AREA 1103 PER NYCA				
001600					
001610	POND				
001620					
001630	001-0011	ID-NHVD	AREA	QPEAK-TpeakDate h:m:s	R-V-R-C
001640	ROUTE RESERVOIR	03:00101	31.80	.707 No date	1:30 9.48 n/a
001650	[RDT= 5.00] outc= 04:004001	11.80	.031 No date	5:00 9.48 n/a	
001660	[LOSS= 2 C= 64.7]				
001670	001-0012	ID-NHVD	AREA	QPEAK-TpeakDate h:m:s	R-V-R-C
001680	ROUTE CHANNEL	09:004001	31.80	.031 No date	5:00 9.48 n/a
001690	[R/5/n= 5.00] outc= 04:004002	31.80	.027 No date	5:00 9.48 n/a	
001700	[L/S/n= 2400 / Dmax= 3511]				
001710	[Vmax= 412:Dmax= .193]				
001720					
001730	ROAD MAIN MILLS				
001740					
001750	001-0013	ID-NHVD	AREA	QPEAK-TpeakDate h:m:s	R-V-R-C
001760	CALIB STANDHYD	09:1200	103.00	2.250 No date	1:35 10.50 .311
001770	[XIMP= 21.TIMP= 35]				
001780	[LOSS= 2 C= 64.7]				
001790	[Previous area: IArea= 5.00:SLPP= 2.00:LGFP= 45. HMF= 250:SCP= .0]				
001800	[Impervious area: IArea= 2.00:SLPI= .50:LG1= 1300. HMI= .013:SC1= .0]				
001810	001-0014	ID-NHVD	AREA	QPEAK-TpeakDate h:m:s	R-V-R-C
001820	ROUTE RESERVOIR	09:1200	103.00	2.250 No date	1:35 10.50 n/a
001830	[RDT= 5.00] outc= 08:000120	103.00	.427 No date	3:30 10.50 n/a	
001840	[HxStoUsed= 66.3E-06]				
001850	001-0015	ID-NHVD	AREA	QPEAK-TpeakDate h:m:s	R-V-R-C
001860	ROUTE CHANNEL	08:000120	103.00	.427 No date	3:30 10.50 n/a
001870	[RDT= 5.00] outc= 03:001003	103.00	.420 No date	3:00 10.50 n/a	
001880	[L/S/n= 1100 / Dmax= .453]				
001890	[Vmax= 680:Dmax= .453]				
001900	001-0016	ID-NHVD	AREA	QPEAK-TpeakDate h:m:s	R-V-R-C
001910	CALIB STANDHYD	09:1201	63.00	1.677 No date	1:30 11.50 .341
001920	[XIMP= 21.TIMP= 35]				
001930	[LOSS= 2 C= 64.7]				
001940	[Previous area: IArea= 5.00:SLPP= 2.00:LGFP= 45. HMF= 250:SCP= .0]				
001950	[Impervious area: IArea= 2.00:SLPI= .50:LG1= 900. HMI= .013:SC1= .0]				
001960	001-0017	ID-NHVD	AREA	QPEAK-TpeakDate h:m:s	R-V-R-C
001970	ROUTE RESERVOIR	09:1201	63.00	1.677 No date	1:30 11.50 n/a
001980	[RDT= 5.00] outc= 08:000121	63.00	.216 No date	3:50 11.50 n/a	
001990	[HxStoUsed= 517E-06]				
002000	001-0018	ID-NHVD	AREA	QPEAK-TpeakDate h:m:s	R-V-R-C
002010	ROUTE CHANNEL	08:000121	63.00	.216 No date	3:50 11.50 n/a
002020	[RDT= 5				

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00271> [RDT= 5.00] out<- 01:000003 328.40 .686 No_date 5:55 8.95 n/a
00272> [PksScalUsed=.8330E+00]
00273> 001:0032-----ID:MHYD-----AREA-----QPEAK-TpeakDate_hh:mm-----R.V.-R.C.
00274> CALIB STANDHYD 02:1800 27.70 .505 No_date 1:25 8.67 .257
00275> [XIMP= 12:TIME= 21]
00276> [LOSS= 2 :CN= 66.0]
00277> [Previous area: TApex= 6.00:SLPP= .75:LGP= 95.:MNP= 250:SCP= .0]
00278> [Superficus area: TAlp= 2.00:SLPI= .50:LGI= 600.:MNI=.013:SCI= .0]
00279> 001:0033-----ID:MHYD-----AREA-----QPEAK-TpeakDate_hh:mm-----R.V.-R.C.
00280> CALIB STANDHYD 03:1801 11.70 .255 No_date 1:25 9.55 .283
00281> [XIMP= 15:TIME= 25]
00282> [LOSS= 2 :CN= 66.0]
00283> [Previous area: TApex= 6.00:SLPP= .50:LGP= 65.:MNP= 250:SCP= .0]
00284> [Superficus area: TAlp= 2.00:SLPI= .50:LGI= 600.:MNI=.013:SCI= .0]
00285> 001:0034-----ID:MHYD-----AREA-----QPEAK-TpeakDate_hh:mm-----R.V.-R.C.
00286> ADD HYD 02:1800 27.70 .505 No_date 1:25 8.67 n/a
00287> 4 03:1801 11.70 .255 No_date 1:25 9.55 n/a
00288> [DT= 5.00] SUM= 04:000004 39.40 .761 No_date 1:25 8.93 n/a
00289> 001:0035-----ID:MHYD-----AREA-----QPEAK-TpeakDate_hh:mm-----R.V.-R.C.
00290> ADD HYD 01:000003 328.40 .686 No_date 5:55 8.95 n/a
00291> 4 04:000004 39.40 .761 No_date 1:25 8.93 n/a
00292> [DT= 5.00] SUM= 05:000005 367.80 .785 No_date 1:25 8.95 n/a
00293> 001:0036-----
00294> FINISH
00295> -----
00296> -----
00297> WARNINGS / ERRORS / NOTES
00298> -----
00299> Simulation ended on 2007-05-21 at 16:34:24
00300> -----
00301> -----
00302> -----
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001369	[PDT= 5.00] outc= 04:040000	11.80	.173	No date	3:55	26.15	n/a
001370	[MStcUsed= 9430E-01]						
001371							
001399	Area 1102 - Single Family Residential						
001400							
001401	001:0009	ID:NYHY	AREA	-----	-----	-----	R.V.-R.C.
001429	CALIB STANDBYD	01:1102	70.00	2.699	No date	1:25	34.65 483
001430	[XIMP= 15-TIMP= 35]						
001440	[LOSS= 2-CN= 65.0]						
001441	[Previous area: IApwr= 5.00;SLPP= 2.00;LGP= 40.;HNP=.050;SCP= .0]						
001460	[Impervious area: IAlpwr= 1.50;SLFP= .50;LGI= 700.;HNI=.013;SCI= .0]						
001470	001:0010	ID:NYHY	AREA	-----	-----	-----	R.V.-R.C.
001480	ADD HYD	01:1102	70.00	2.699	No date	1:25	34.65 n/a
001490	[L/S/in= 700.; Vmax= 880;Dmax= 690]						
001500	[DT= 5.00] SUM	03:000101	31.80	2.700	No date	1:25	31.49 n/a
001510							
001520	Area 1103 - Townhouses and Ponds ***** ADDED 0.3 ha AREA 1105 PER NVCA						
001530	Area 1103 - ADDED 0.3 ha AREA 1105 PER NVCA						
001540	Area 1103 - ADDED 2.9 ha AREA 1105 PER NVCA						
001550							
001560	Area 1104 - Flow From Existing Residence Area and Green Space Along Mountain Rd						
001570	Area 1104 - 2.9 ha AREA MOVED TO AREA 1103 PER NVCA						
001580							
001590	Area 1105 - Mountain Road Ditch 0.3 ha AREA MOVED TO AREA 1103 PER NVCA						
001600							
001610	PCUHD						
001620							
001630	001:0011	ID:NYHY	AREA	-----	-----	-----	R.V.-R.C.
001640	ROUTE RESERVOIR	09:030101	31.80	2.700	No date	1:25	31.49 n/a
001650	[PDT= 5.00] outc= 09:004001	31.80	.150	No date	2:25	31.49 n/a	
001660	[MStcUsed= 7820E-01]						
001670	001:0012	ID:NYHY	AREA	-----	-----	-----	R.V.-R.C.
001680	ROUTE CHANNEL	09:004001	31.80	.150	No date	2:25	31.49 n/a
001690	[PDT= 5.00] outc= 04:004002	31.80	.150	No date	9:45	31.49 n/a	
001700	[L/S/in= 2400.; Vmax= 2400;Dmax= 1491]						
001710	[DT= 5.00] SUM	03:000101	31.80	.150	No date	9:45	31.49 n/a
001720							
001730	REND MAIR MILLS						
001740							
001750	001:0013	ID:NYHY	AREA	-----	-----	-----	R.V.-R.C.
001760	CALIB STANDBYD	09:1200	103.00	8.025	No date	1:35	31.16 433
001770	[XIMP= 21-TIMP= 35]						
001780	[LOSS= 2-CN= 58.0]						
001790	[Previous area: IApwr= 5.00;SLPP= 2.00;LGP= 45.;HNP=.250;SCP= .0]						
001800	[Impervious area: IAlpwr= 2.00;SLFP= .50;LGI= 1300.;HNI=.013;SCI= .0]						
001810	001:0014	ID:NYHY	AREA	-----	-----	-----	R.V.-R.C.
001820	ROUTE RESERVOIR	09:1200	103.00	8.025	No date	1:35	31.16 n/a
001830	[PDT= 5.00] outc= 09:000120	103.00	2.513	No date	2:30	31.16 n/a	
001840	[MStcUsed= 1796E-01]						
001850	001:0015	ID:NYHY	AREA	-----	-----	-----	R.V.-R.C.
001860	ROUTE CHANNEL	08:000120	103.00	2.413	No date	2:30	31.16 n/a
001870	[PDT= 5.00] outc= 08:000103	103.00	2.315	No date	2:50	31.16 n/a	
001880	[L/S/in= 1100.; Vmax= 1055;Dmax= .873]						
001890							
001900	001:0016	ID:NYHY	AREA	-----	-----	-----	R.V.-R.C.
001910	CALIB STANDBYD	09:1201	63.00	6.027	No date	1:35	34.56 481
001920	[XIMP= 21-TIMP= 35]						
001930	[LOSS= 2-CN= 64.7]						
001940	[Previous area: IApwr= 5.00;SLPP= 2.00;LGP= 45.;HNP=.250;SCP= .0]						
001950	[Impervious area: IAlpwr= 2.00;SLFP= .50;LGI= 900.;						

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00271> [KDT= 5.00] out<- 01:000003 328.40 2.347 No date 5:20 29.25 n/a
00272> [MAXUSED=3962E+01]
00273> 001:0032-----ID:HHYD-----AREA-----QPEAK-TpeakDate hh:mm-----R.V.-R.C.
00274> CALIB STANDHYD 02:1800 27.70 1.427 No_date 1:20 29.47 .411
00275> [XIMP= 12:TIME= 21]
00276> [LOSS= 2 :CN= 66.0]
00277> [Previous area: IAPex= 6.00:SLFP= 25:LGP= 95:MMF=.250:SCP= .0]
00278> [Imperious area: IALep= 2.00:SLFI= 50:LGI= 600:MMF=.013:SCI= .0]
00279> 001:0033-----ID:HHYD-----AREA-----QPEAK-TpeakDate hh:mm-----R.V.-R.C.
00280> CALIB STANDHYD 03:1801 11.70 .738 No_date 1:20 31.11 .433
00281> [XIMP= 15:TIME= 25]
00282> [LOSS= 2 :CN= 66.0]
00283> [Previous area: IAPex= 6.00:SLFP= 50:LGP= 65:MMF=.250:SCP= .0]
00284> [Imperious area: IALep= 2.00:SLFI= 50:LGI= 600:MMF=.013:SCI= .0]
00285> 001:0034-----ID:HHYD-----AREA-----QPEAK-TpeakDate hh:mm-----P.V.-R.C.
00286> ADD HYD 02:1800 27.70 1.427 No_date 1:20 29.47 n/a
00287> + 03:1801 11.70 .738 No_date 1:20 31.11 n/a
00288> [DT= 5.00] SUM= 04:000004 39.40 2.145 No_date 1:20 29.96 n/a
00289> 001:0035-----ID:HHYD-----AREA-----QPEAK-TpeakDate hh:mm-----R.V.-R.C.
00290> ADD HYD 01:000003 328.40 2.342 No_date 5:20 29.25 n/a
00291> + 04:000004 39.40 2.145 No_date 1:20 29.96 n/a
00292> [DT= 5.00] SUM= 05:000005 367.80 2.556 No_date 4:00 29.33 n/a
00293> 001:0036-----
00294> FINISH
00295> -----
00296> -----
00297> WARNINGS / ERRORS / NOTES
00298> -----
00299> 001:0026 CALIB STANDHYD
00300> *** WARNING: Storage Coefficient is smaller than DT!
00301> Use a smaller DT or a larger area.
00302> 001:0028 CALIB STANDHYD
00303> *** WARNING: Storage Coefficient is smaller than DT!
00304> Use a smaller DT or a larger area.
00305> Simulation ended on 2007-05-21 at 16:33:36
00306> -----
00307> -----
00308> -----

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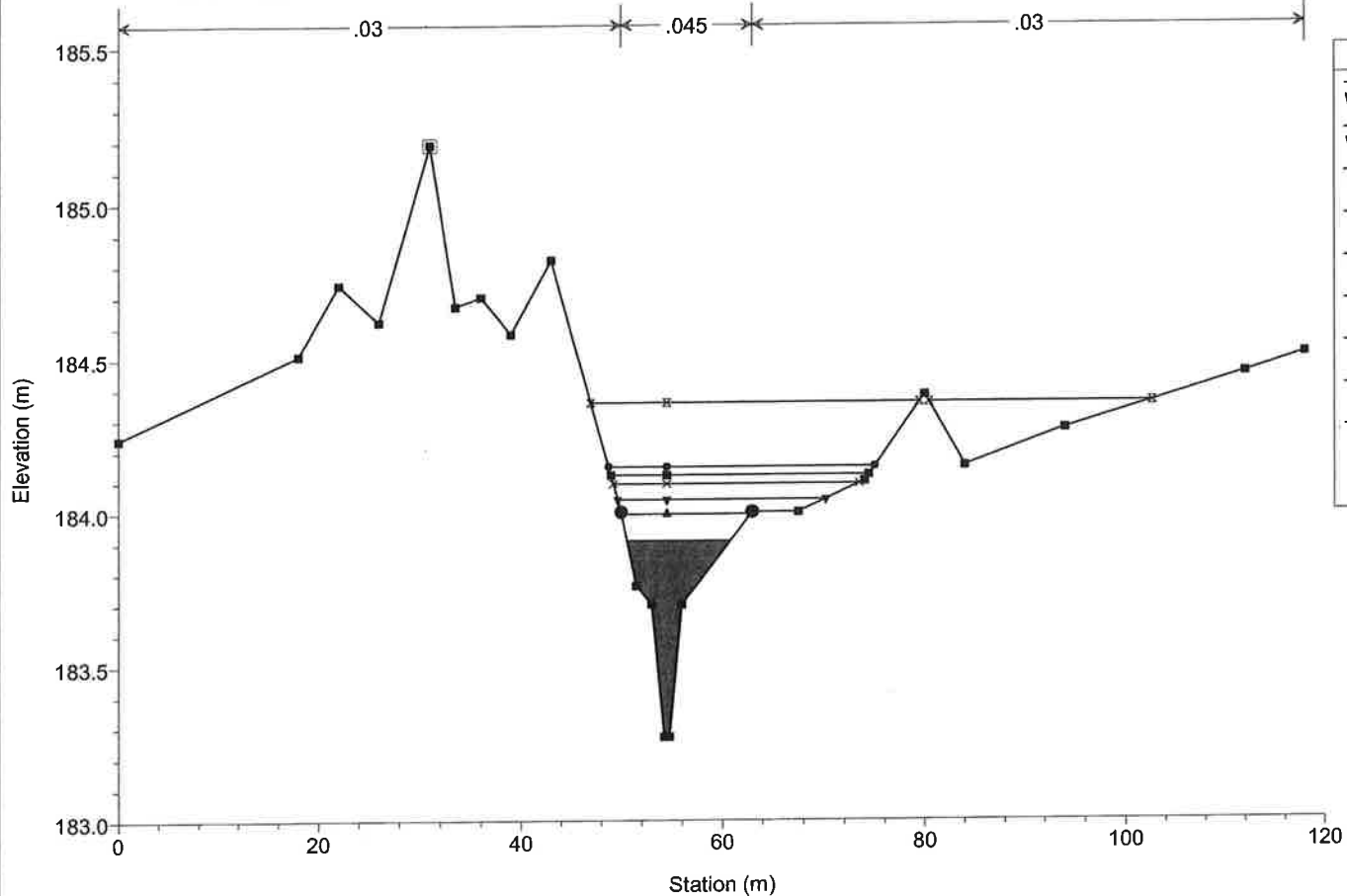
HEC-RAS Plan: Existing River: Channel Reach: Channel Profile: Regional

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
Channel	416	Regional	12.83	183.27	184.36	184.21	184.40	0.003896	0.99	14.98	54.81	0.40
Channel	415		Bridge									
Channel	413	Regional	12.83	183.13	184.32	184.05	184.34	0.001814	0.82	28.41	75.45	0.26
Channel	394	Regional	12.83	183.22	184.28		184.30	0.003723	1.07	29.18	93.66	0.37
Channel	377	Regional	12.83	183.23	184.22		184.24	0.003030	0.88	29.05	87.92	0.33
Channel	355	Regional	12.83	183.14	183.99	183.99	184.10	0.020355	2.06	13.28	79.71	0.83
Channel	350		Culvert									
Channel	346	Regional	12.83	182.58	183.70	183.69	183.84	0.012845	2.13	13.09	66.23	0.70
Channel	318	Regional	12.83	182.33	183.49		183.56	0.007238	1.48	19.09	67.29	0.51
Channel	287	Regional	12.83	182.16	183.04	183.04	183.19	0.020692	2.15	10.97	111.43	0.85
Channel	257	Regional	12.83	181.39	182.24	182.24	182.39	0.020042	2.27	10.84	33.11	0.85
Channel	249	Regional	12.83	180.29	181.68	181.48	181.78	0.008857	1.57	10.72	16.69	0.56
Channel	230		Culvert									
Channel	208	Regional	12.83	179.80	181.53		181.53	0.000083	0.22	43.72	40.00	0.06
Channel	199	Regional	12.83	179.75	181.52		181.53	0.000187	0.36	49.90	42.40	0.09
Channel	163	Regional	12.83	179.68	181.51	180.12	181.52	0.000210	0.43	39.98	40.00	0.10
Channel	147	Regional	12.83	179.63	181.49	180.76	181.52	0.000677	0.88	22.09	40.00	0.20
Channel	129	Regional	12.83	179.58	181.48	180.72	181.50	0.000699	0.90	21.80	40.00	0.21
Channel	123	Regional	12.83	179.57	181.48	180.71	181.50	0.000712	0.91	21.66	40.00	0.21
Channel	116		Culvert									
Channel	110	Regional	12.83	179.53	180.99	180.67	181.17	0.004913	2.01	6.92	7.48	0.53
Channel	100	Regional	12.83	179.50	180.65	180.65	181.03	0.014243	2.91	4.73	6.23	0.87

EXISTING CONDITIONS

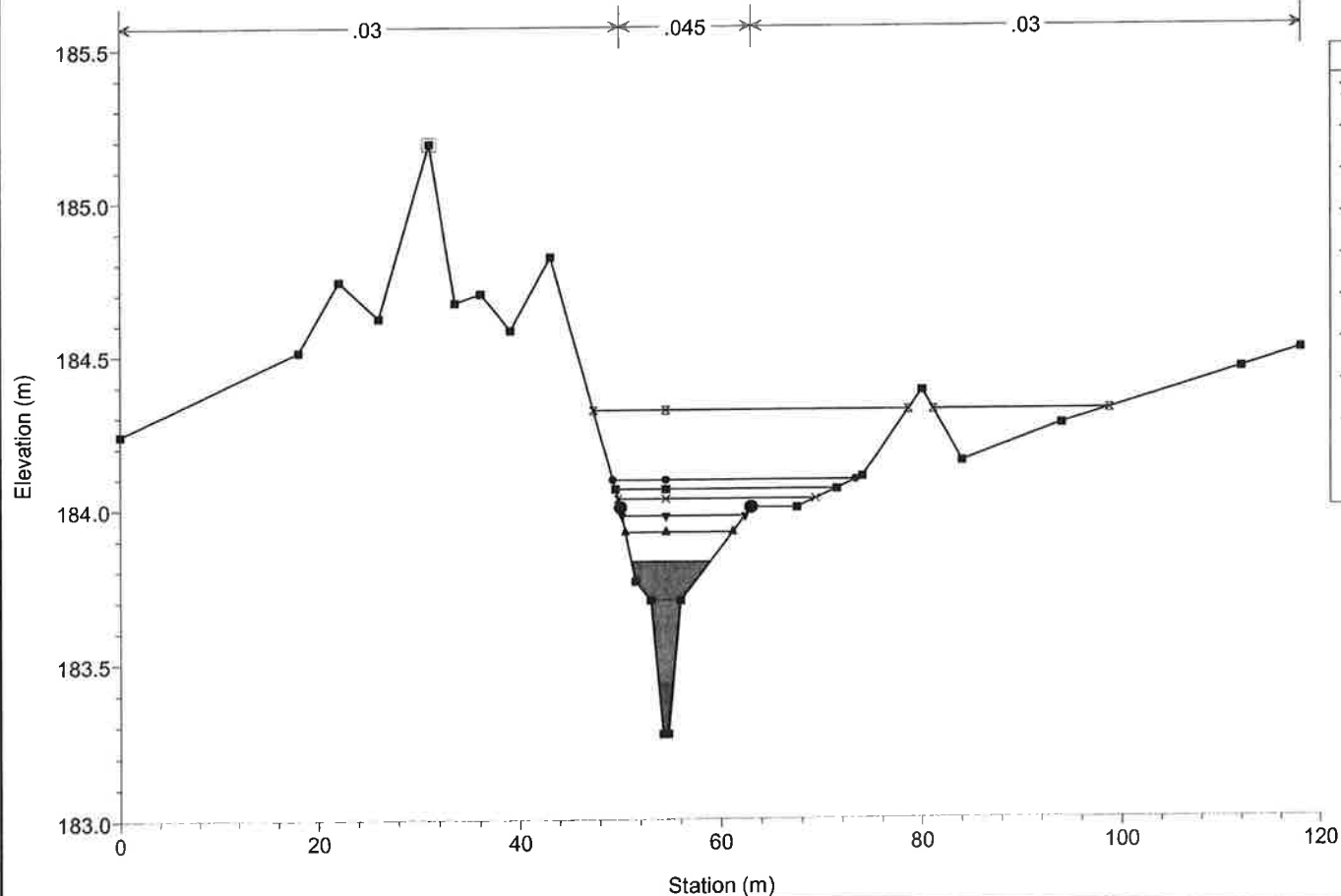
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 416 Downstream of constructed channel - prev RS 4 - Upstream face of



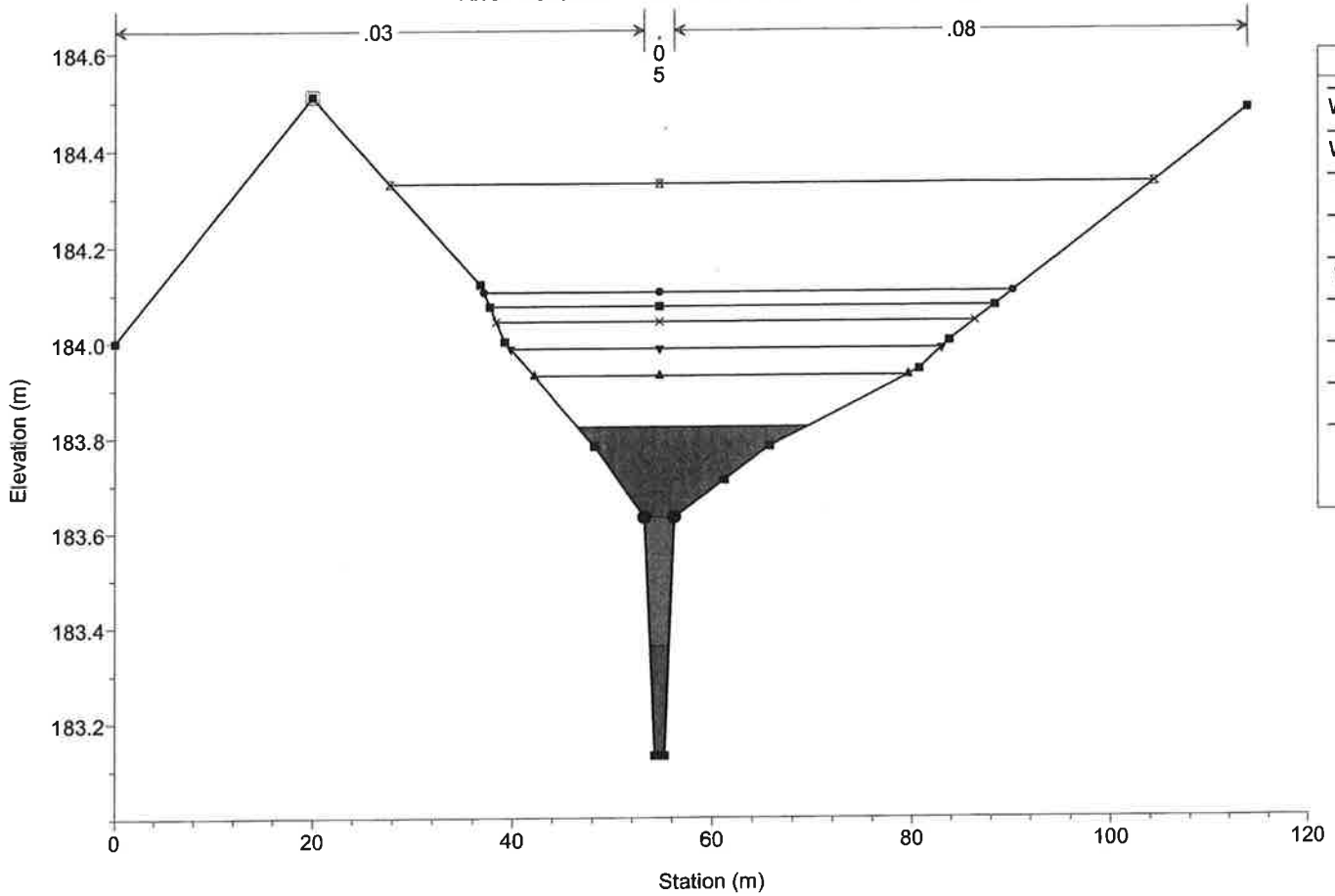
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 415 BR



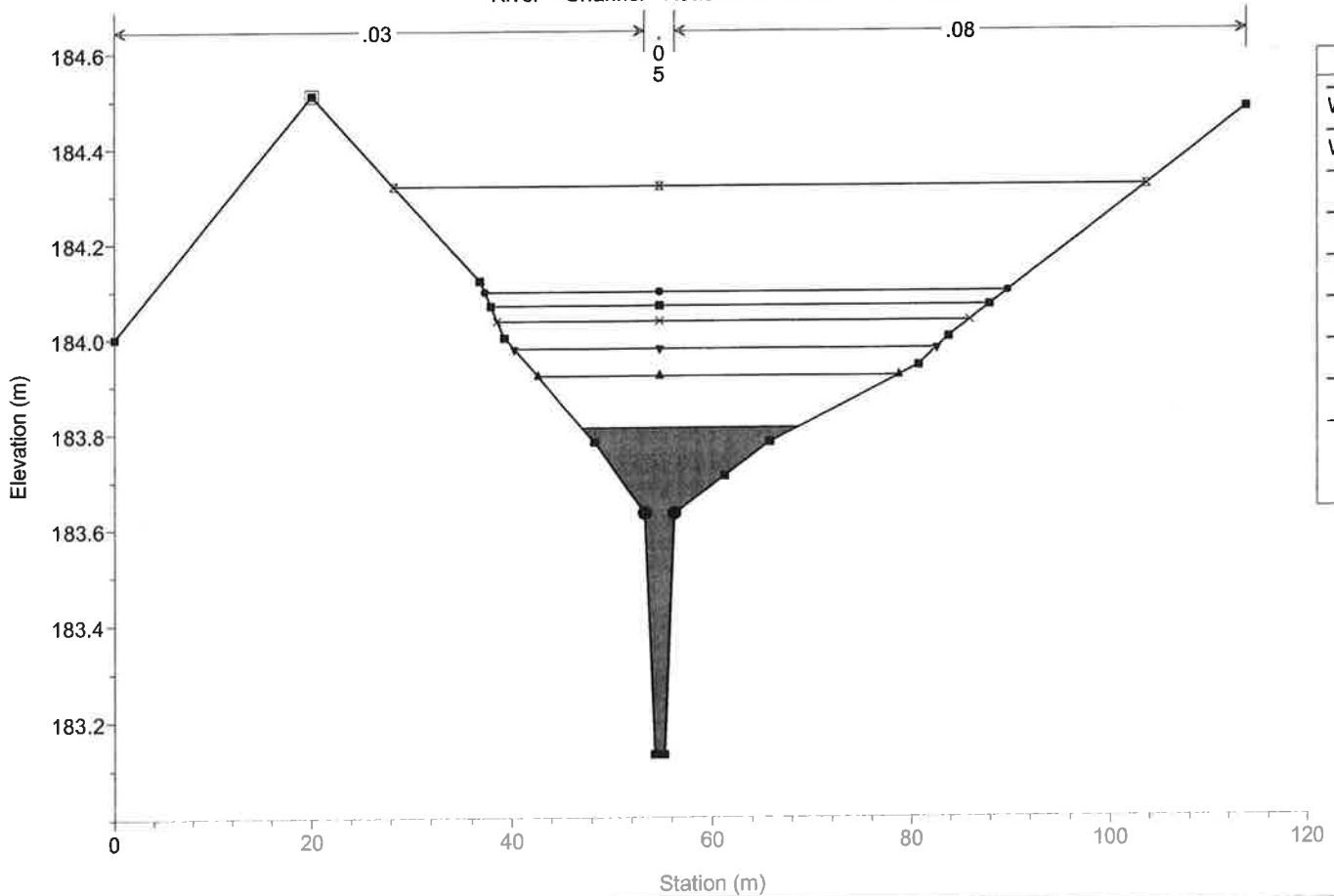
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 415 BR



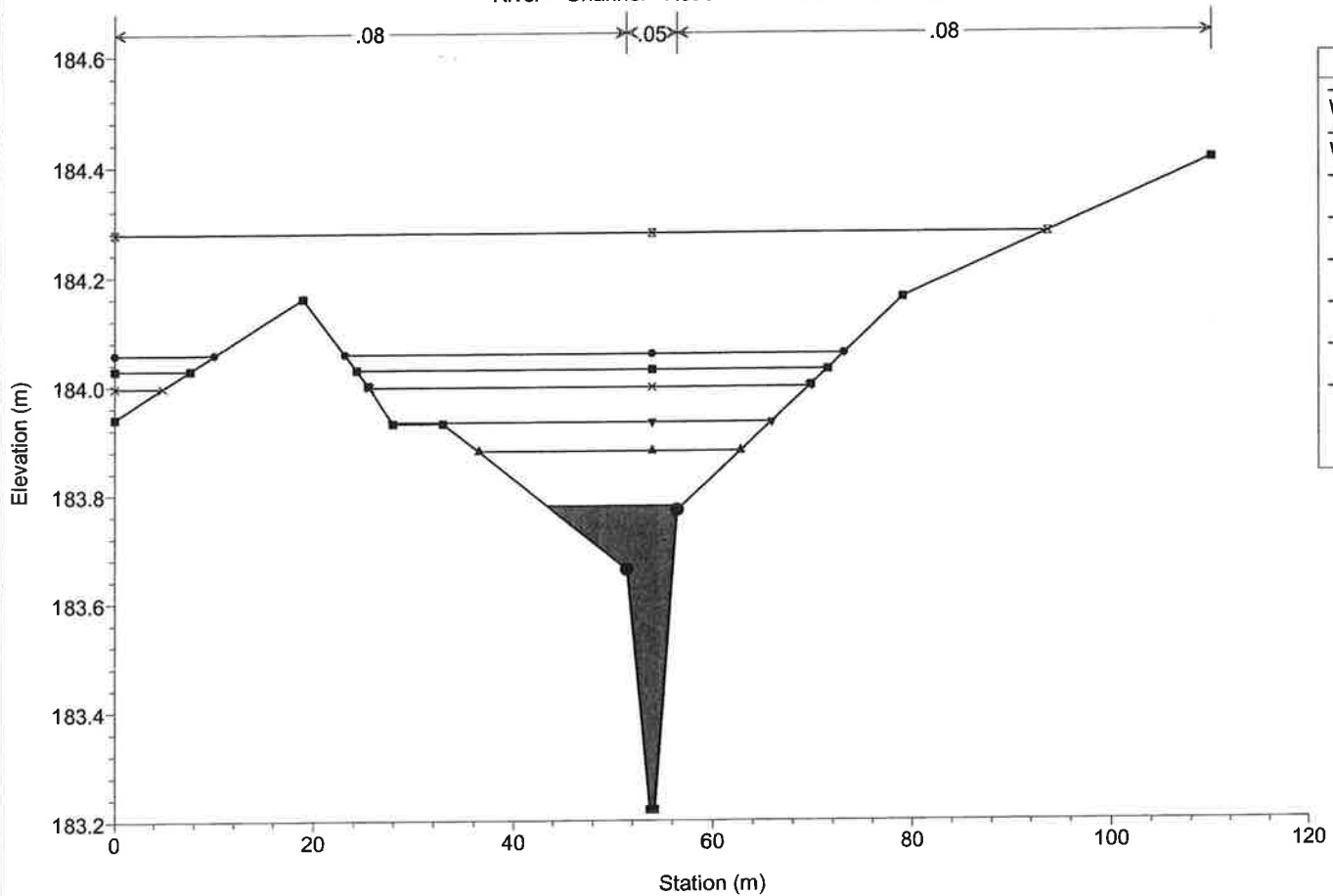
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 413



2015.08.13BlueFairway Plan: Existing 8/13/2015

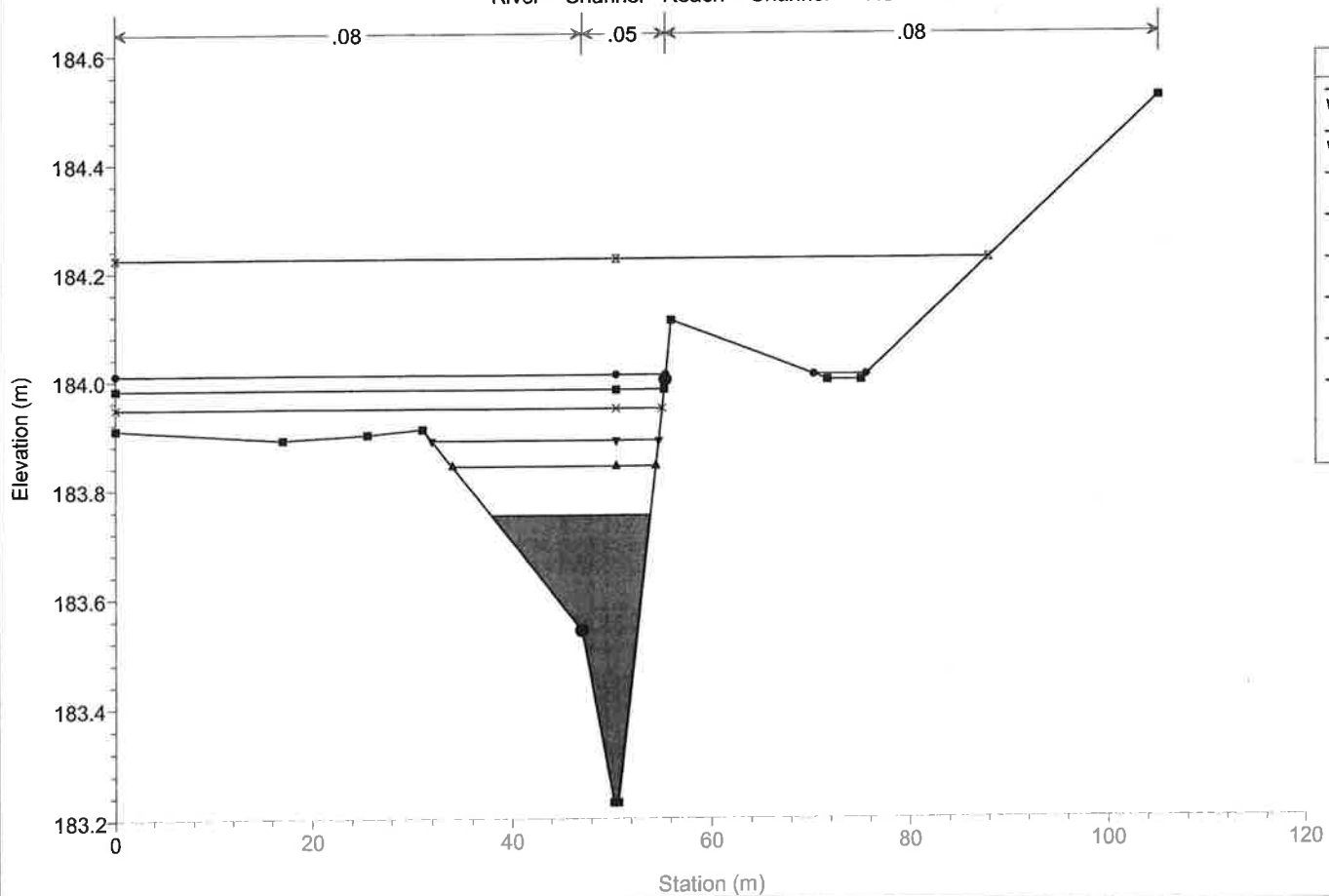
River = Channel Reach = Channel RS = 394



Legend	
WS Regional	■
WS 100 year	●
WS 50 year	■
WS 25 year	×
WS 10 year	▼
WS 5 year	▲
WS 2 year	■
Ground	—
Bank Sta	●

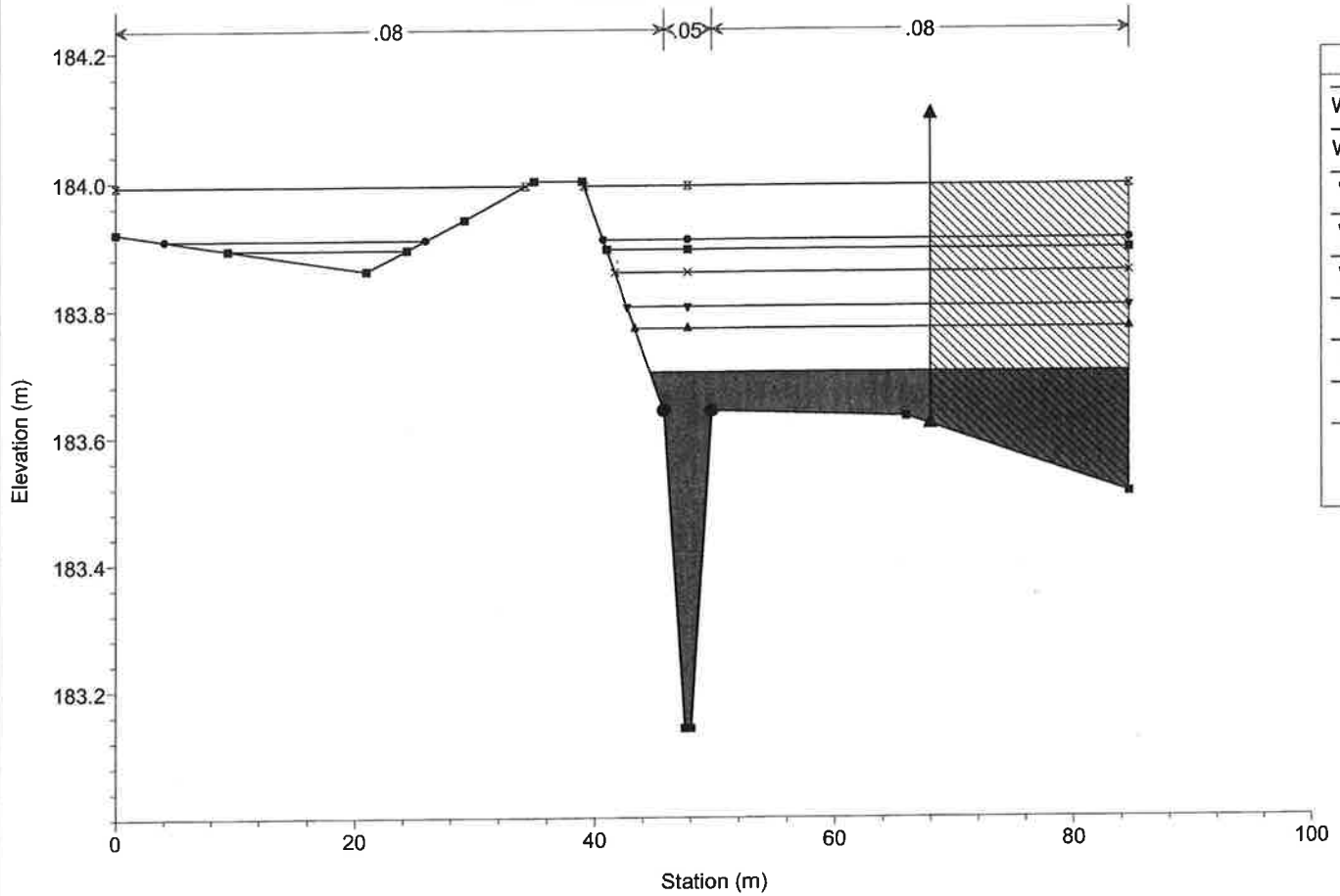
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 377

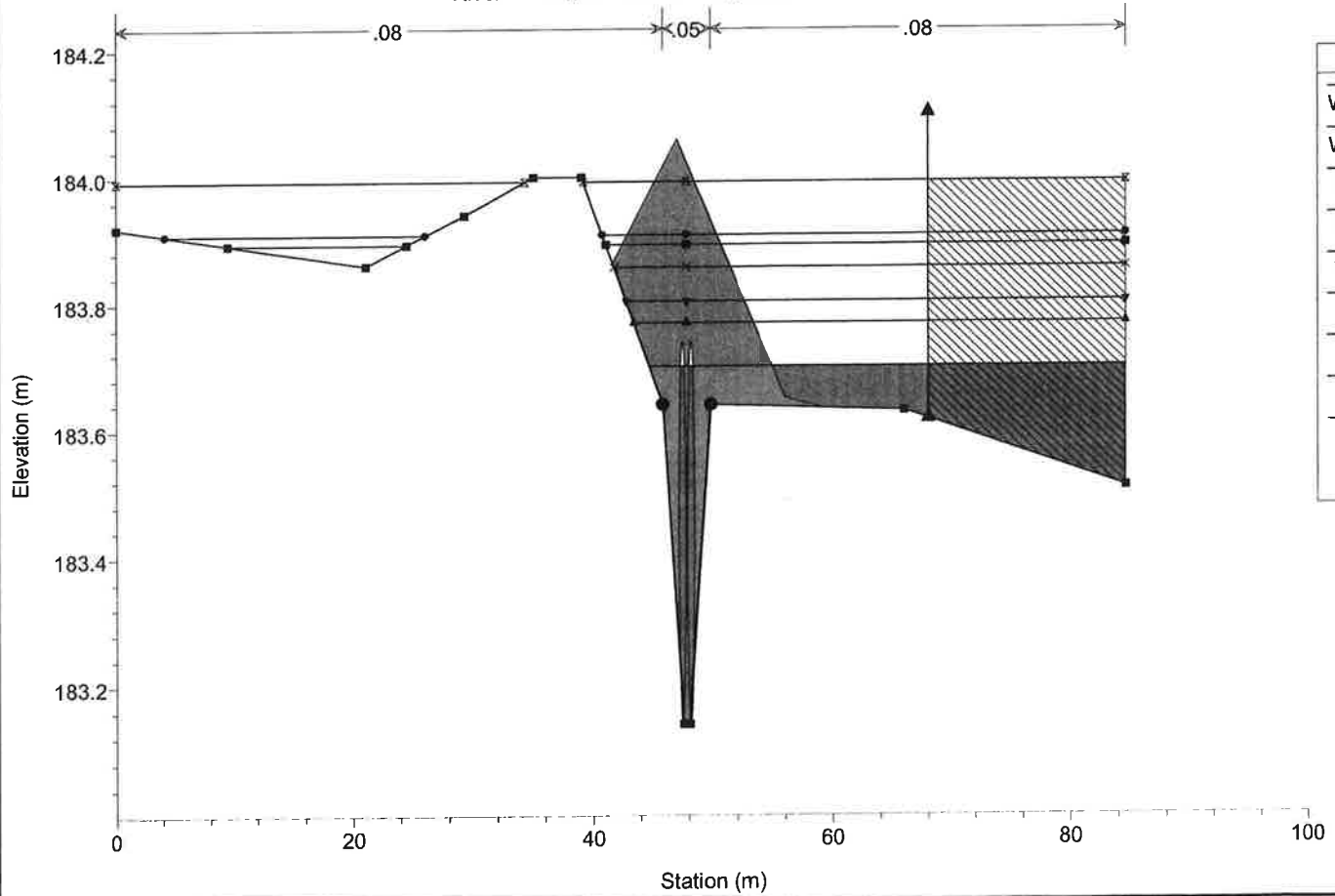


Legend	
WS Regional	■
WS 100 year	●
WS 50 year	■
WS 25 year	×
WS 10 year	▼
WS 5 year	▲
WS 2 year	■
Ground	—
Bank Sta	●

2015.08.13BlueFairway Plan: Existing 8/13/2015
 River = Channel Reach = Channel RS = 355

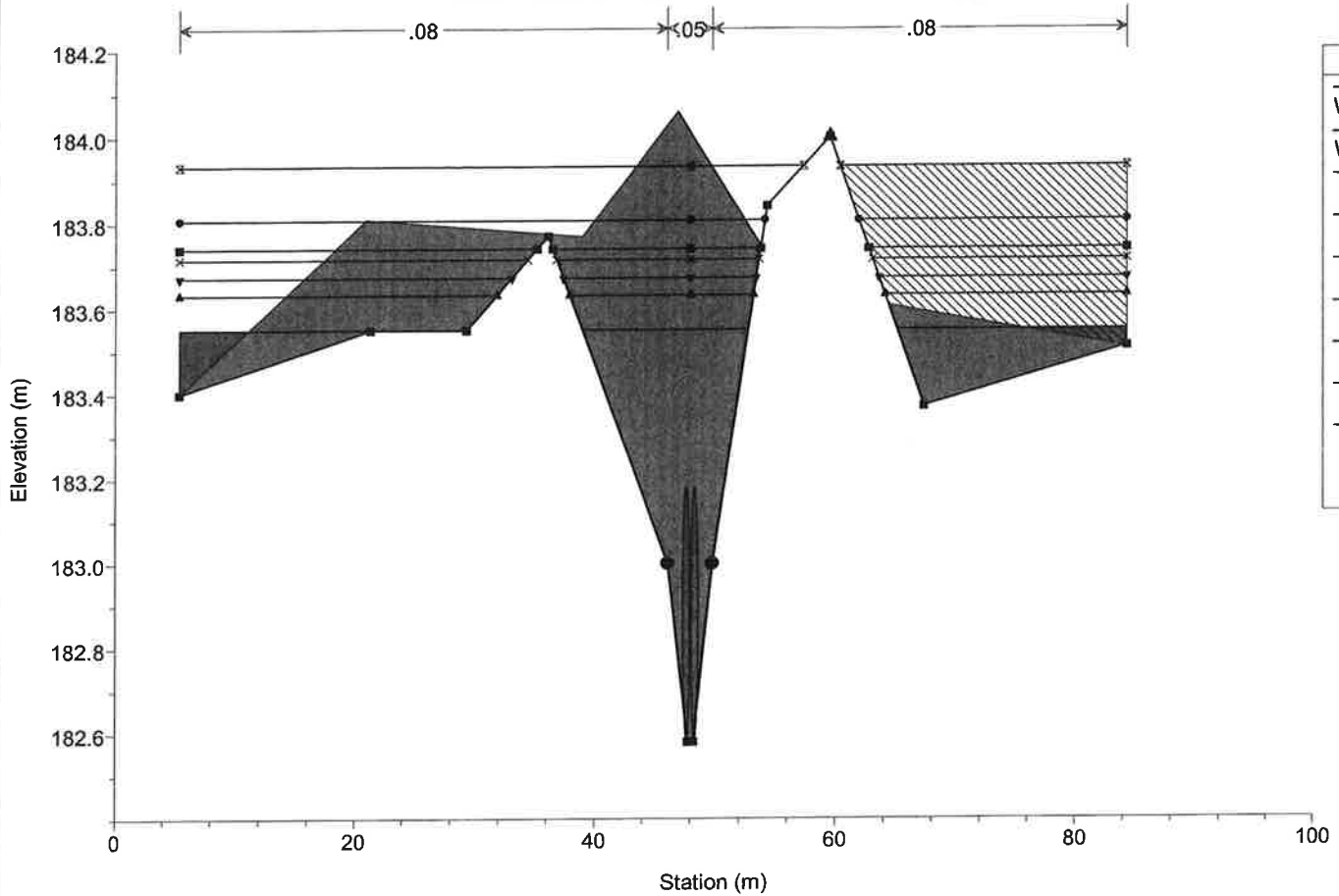


2015.08.13BlueFairway Plan: Existing 8/13/2015
 River = Channel Reach = Channel RS = 350 Culv



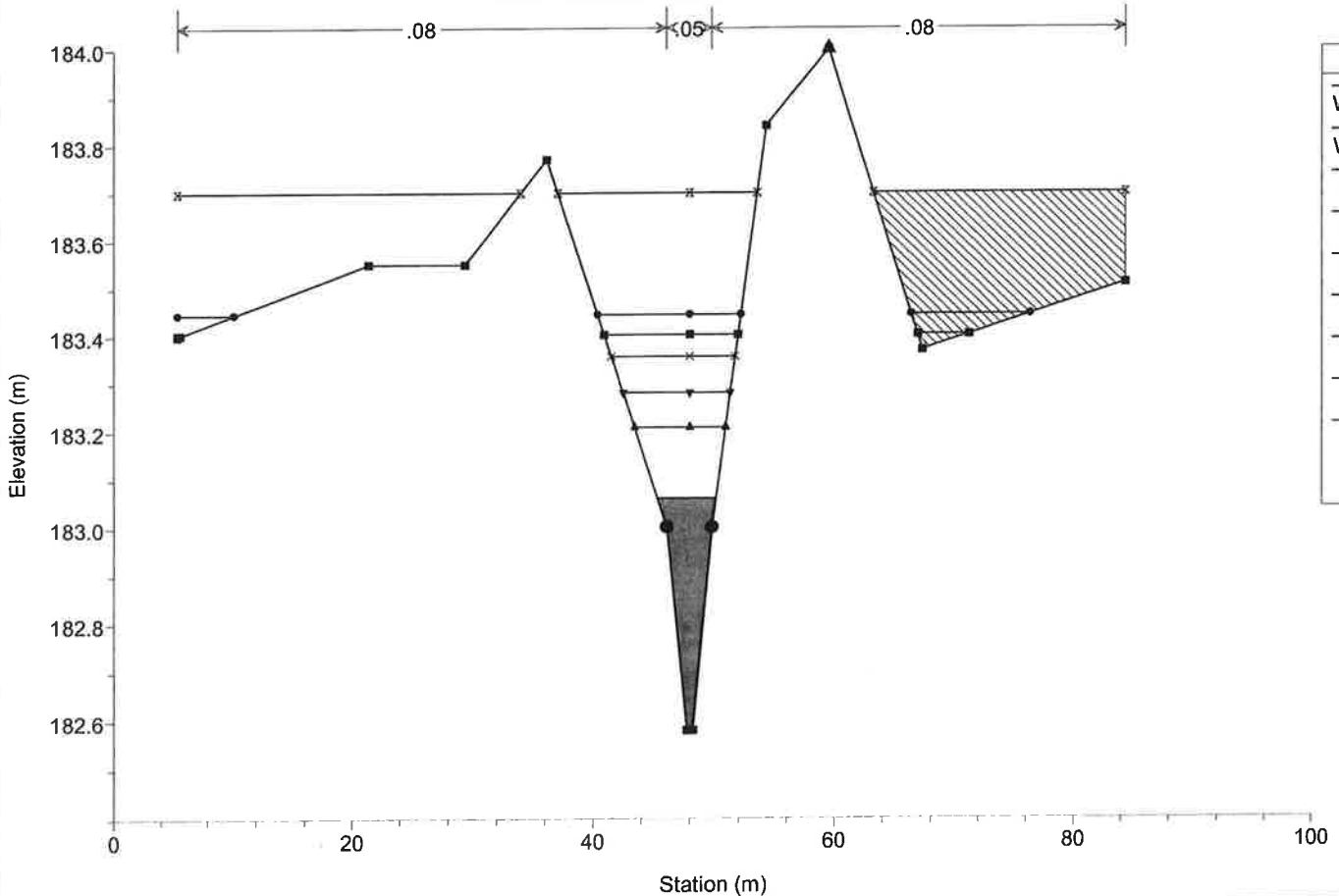
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 350 Culv



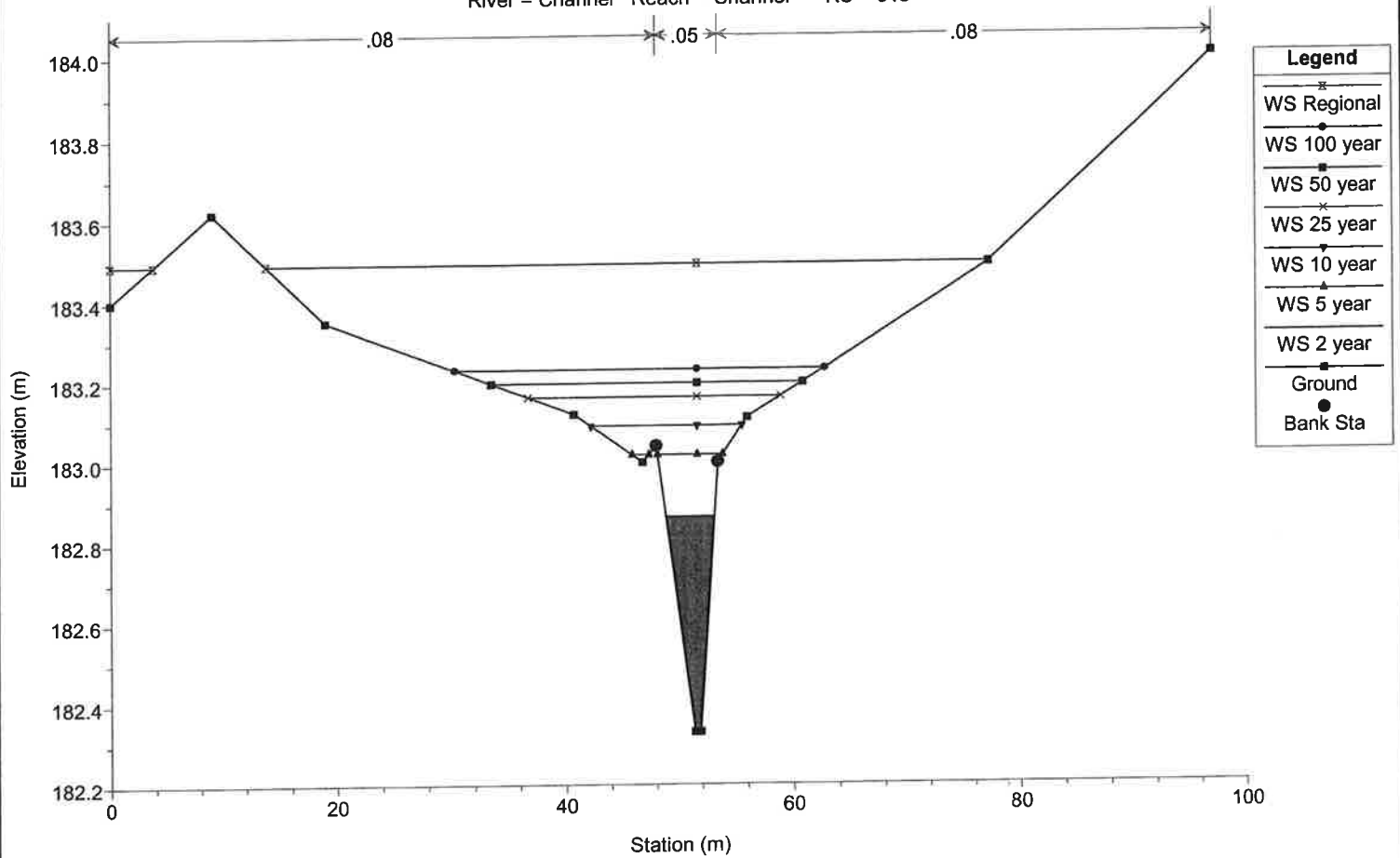
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 346



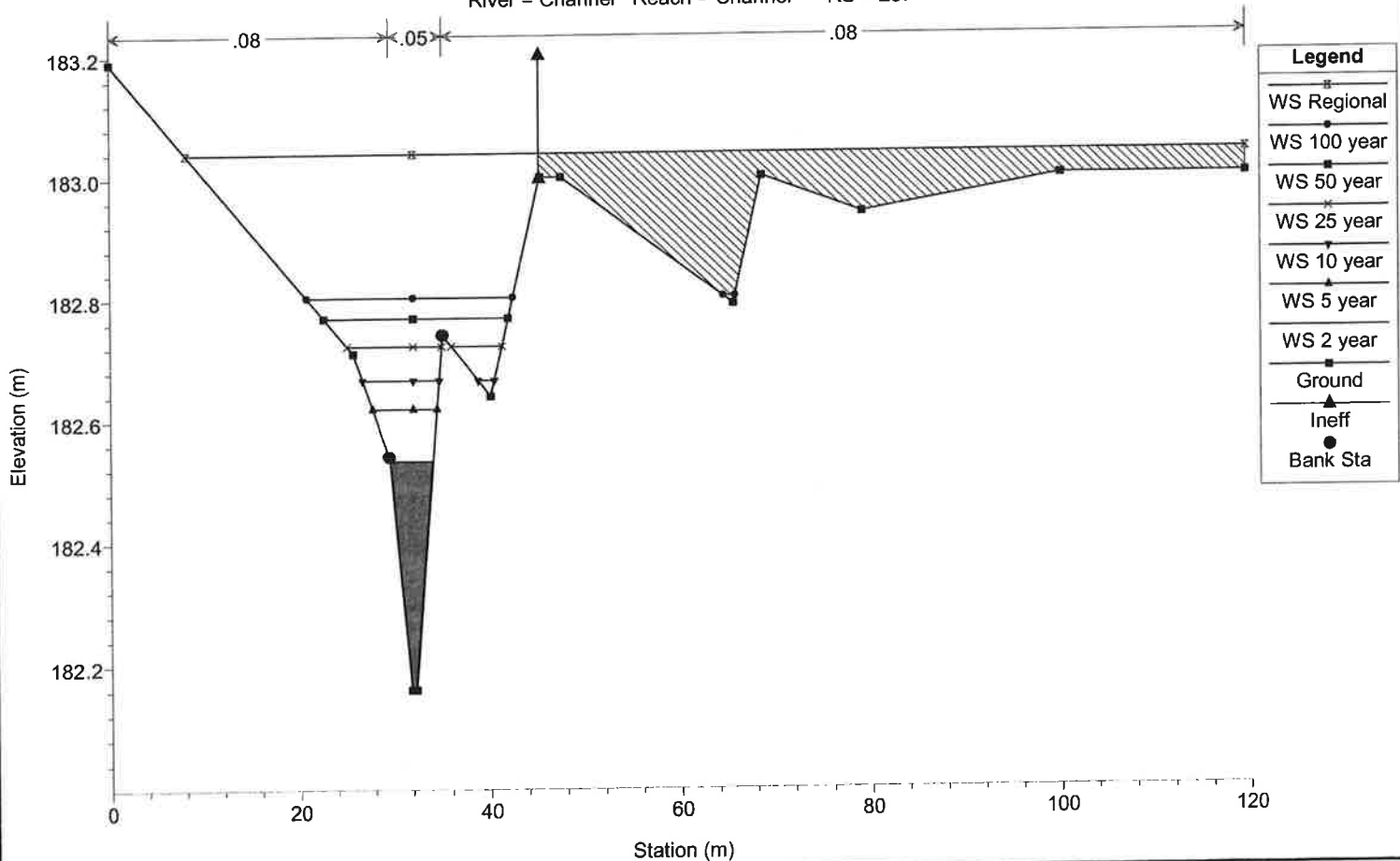
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 318



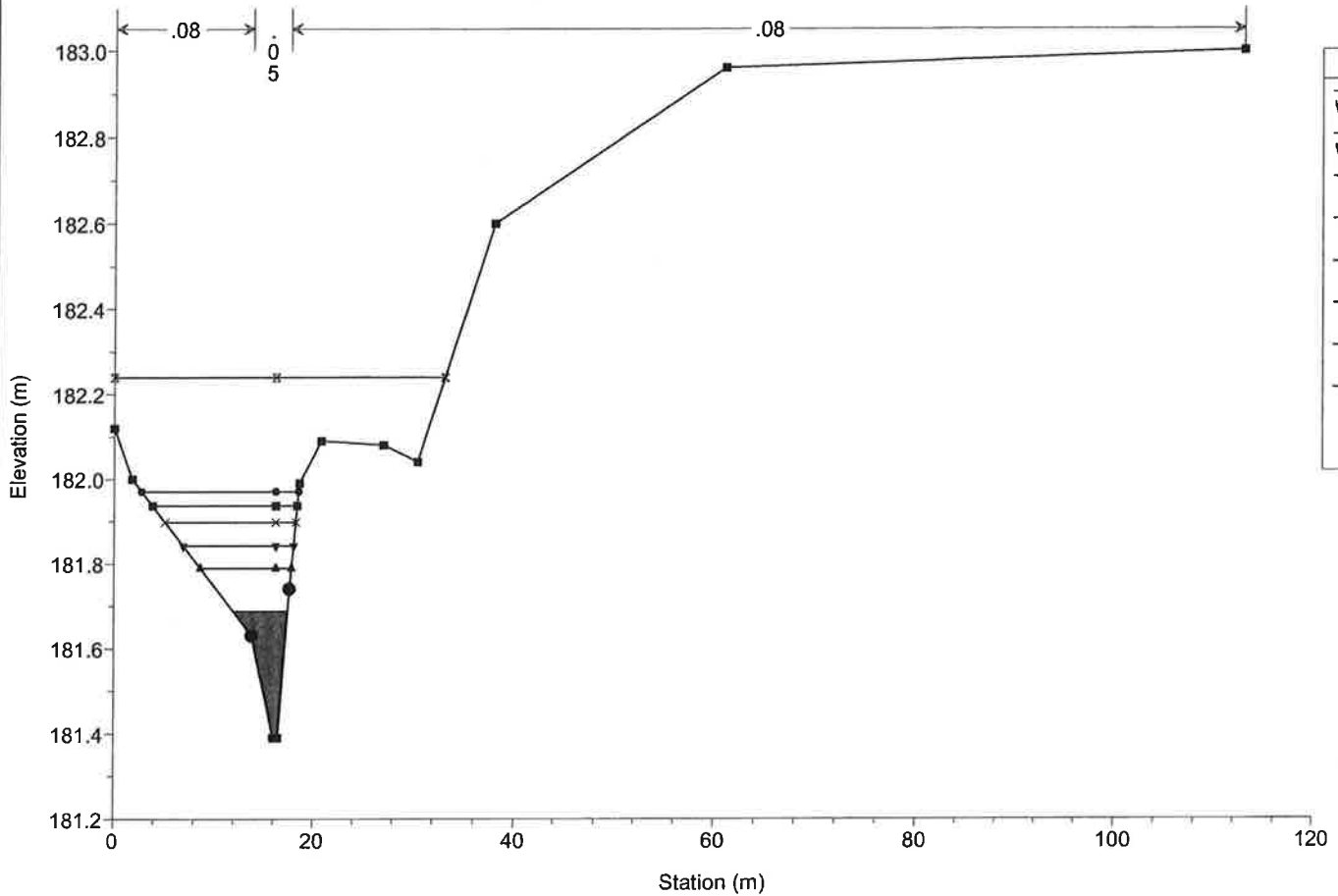
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 287



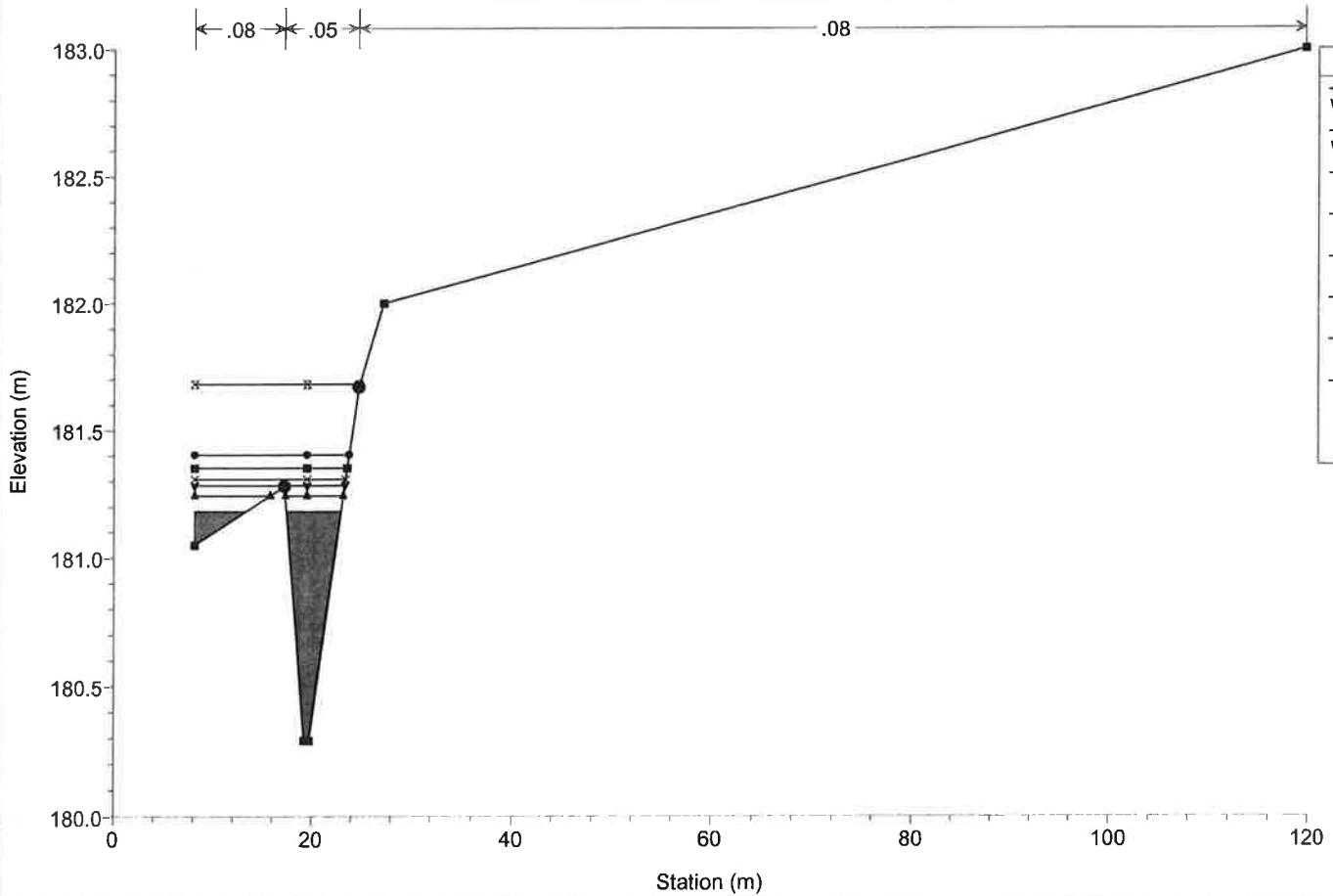
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 257



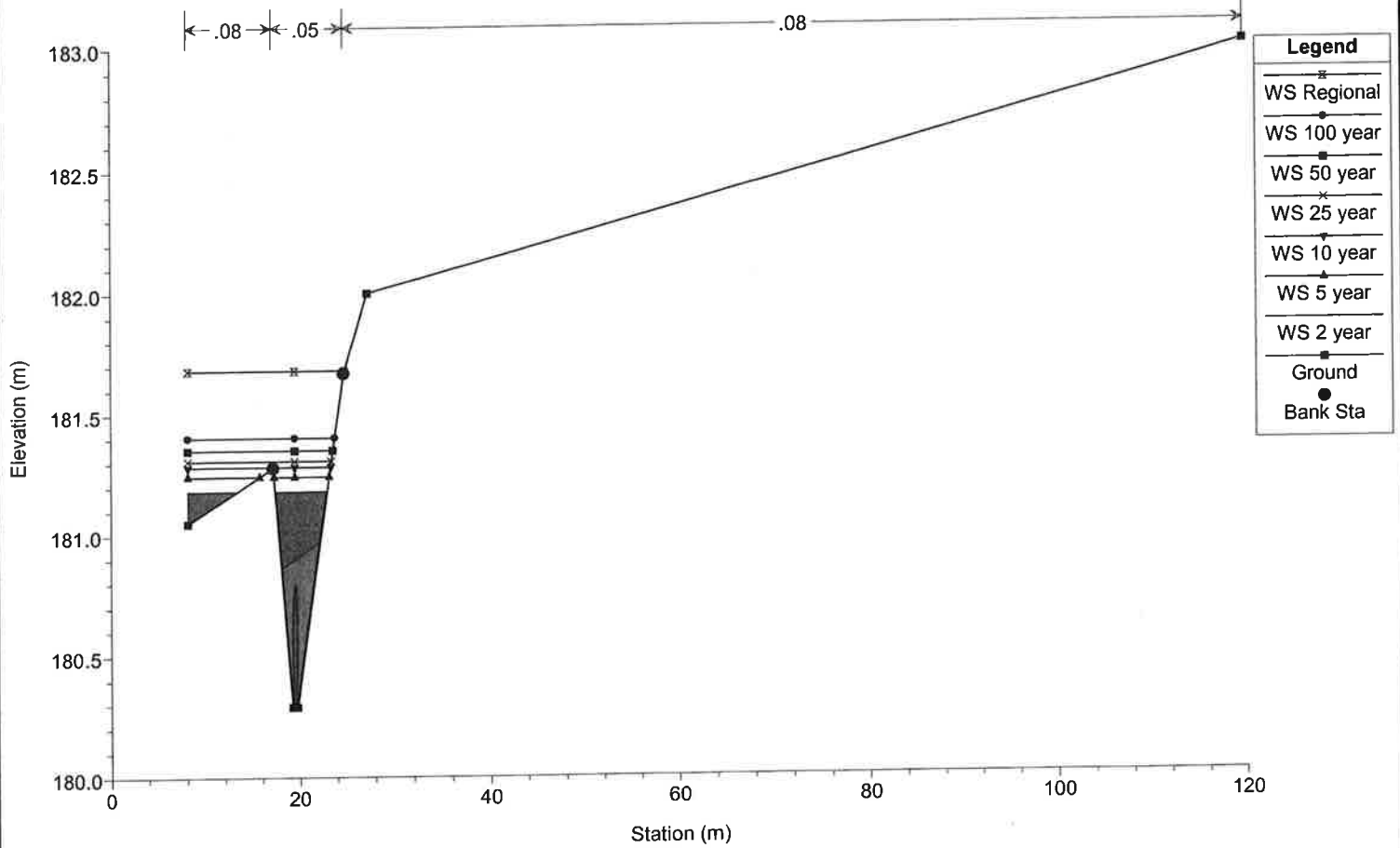
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 249



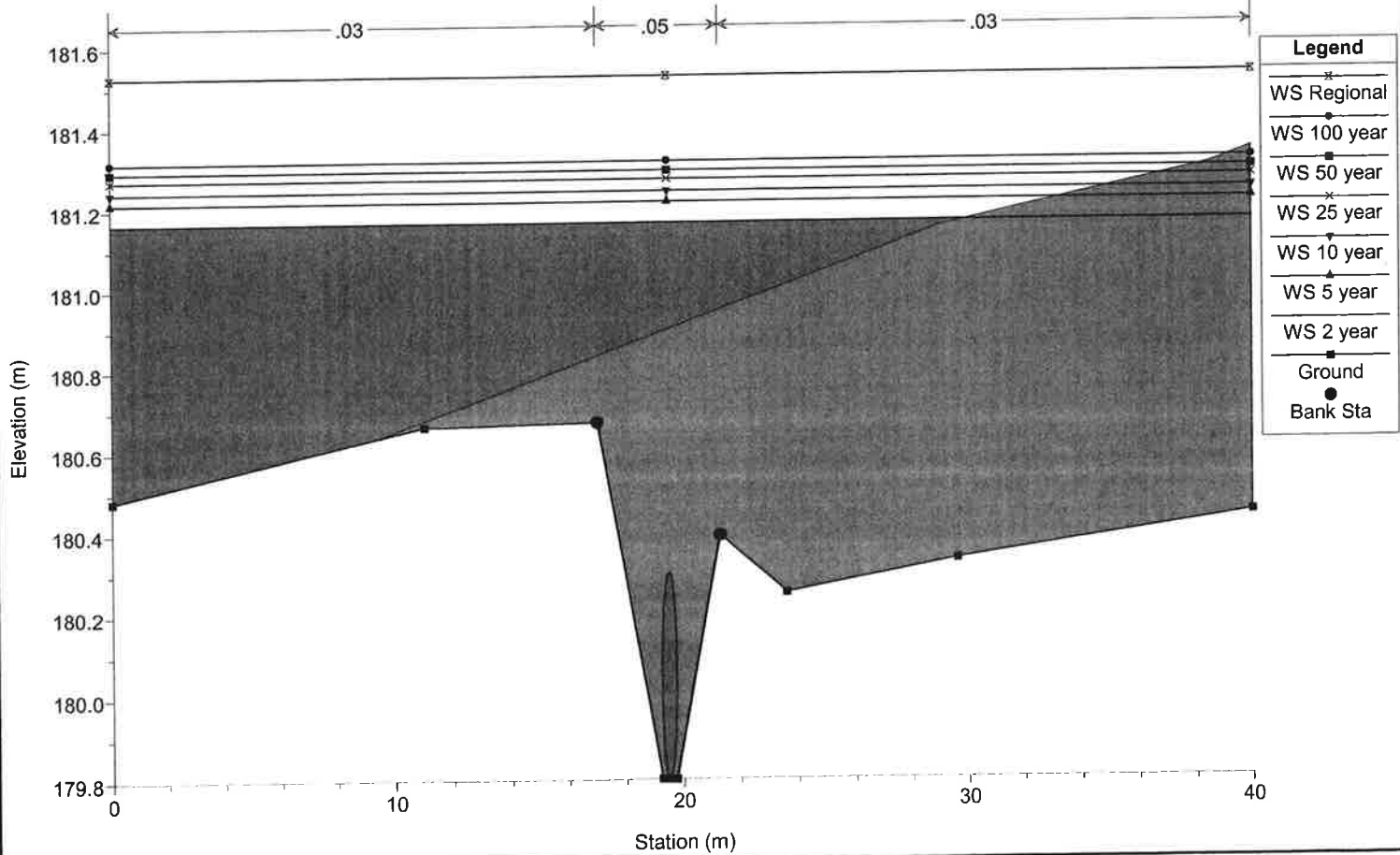
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 230 Culv



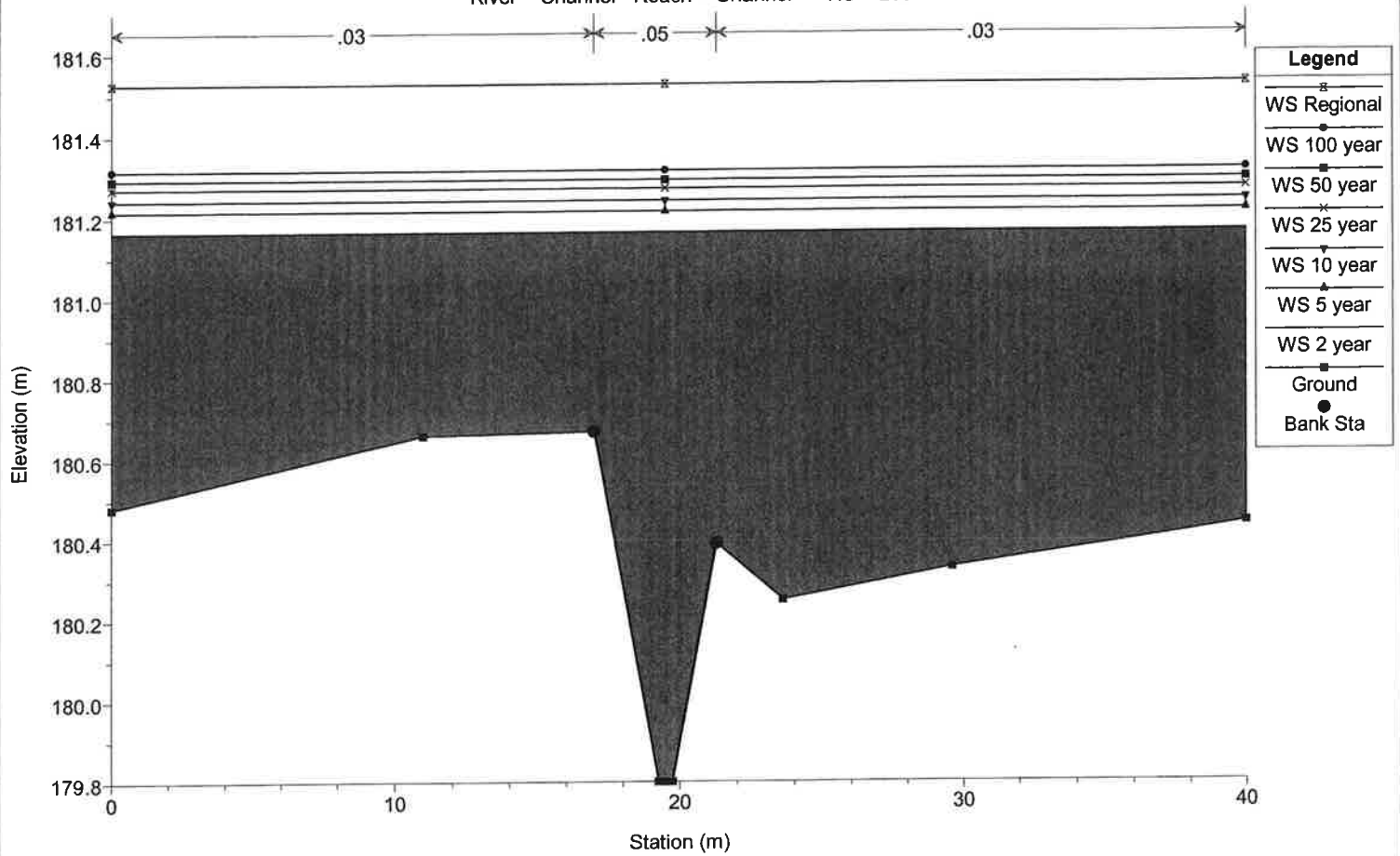
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 230 Culv



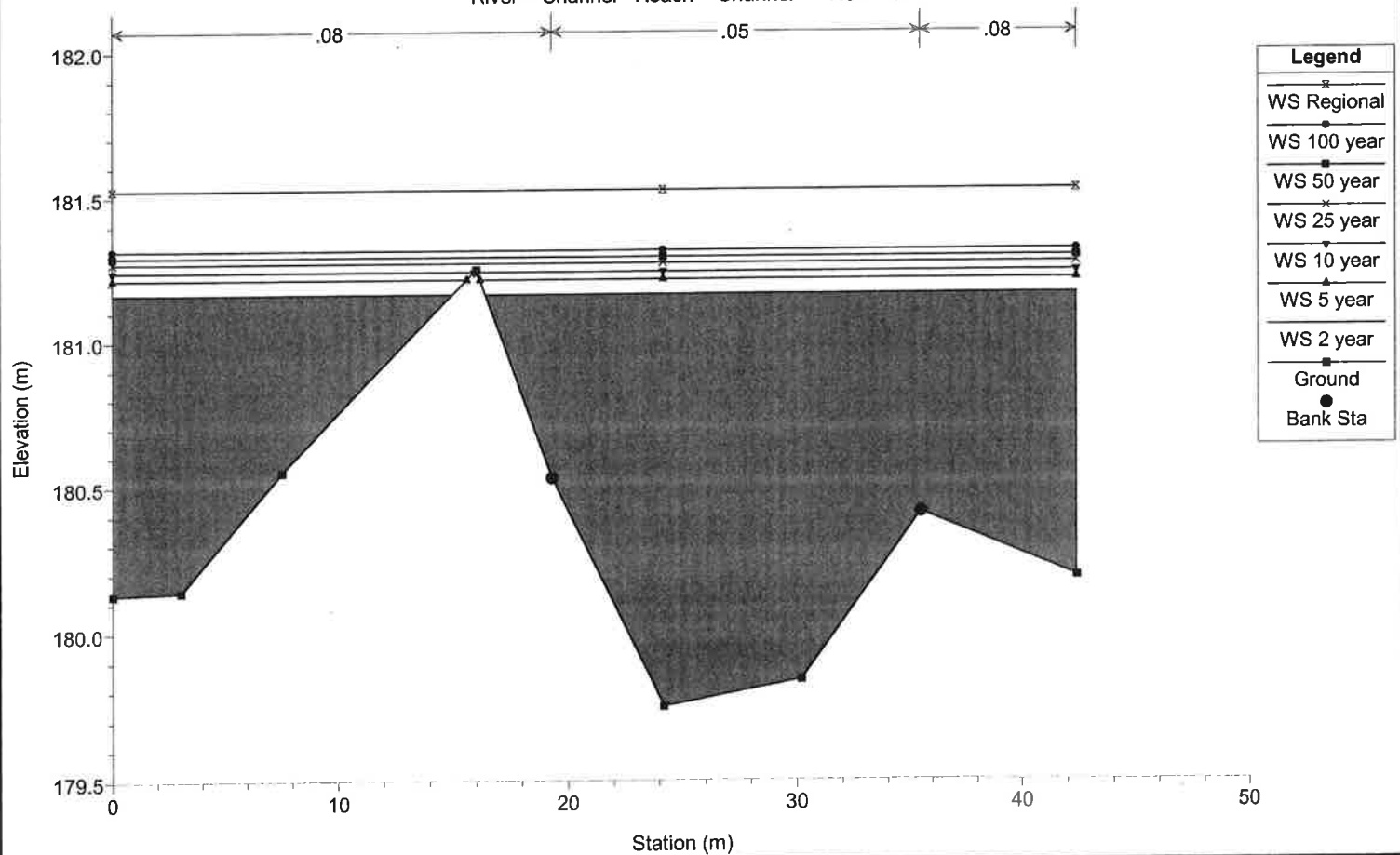
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 208



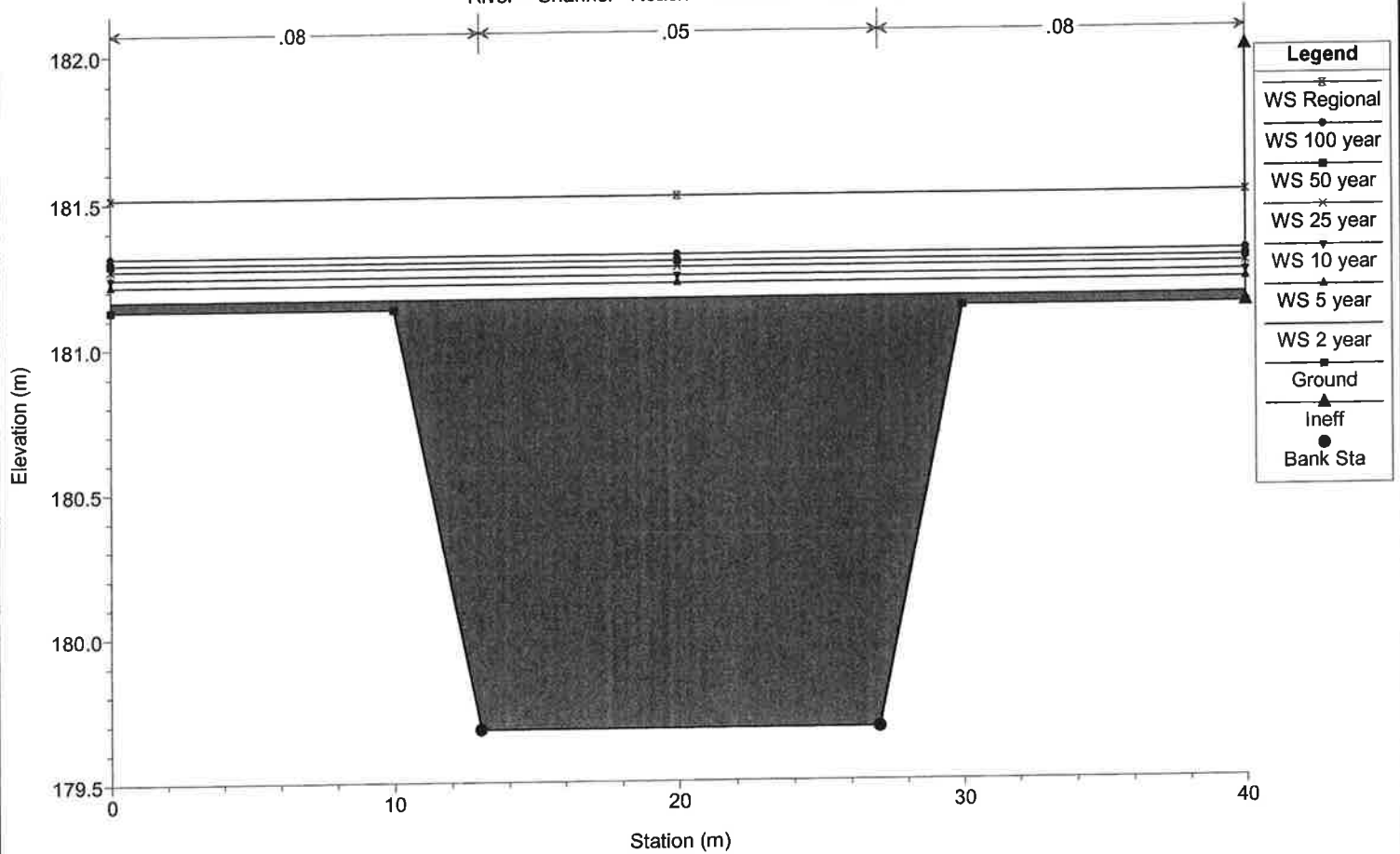
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 199



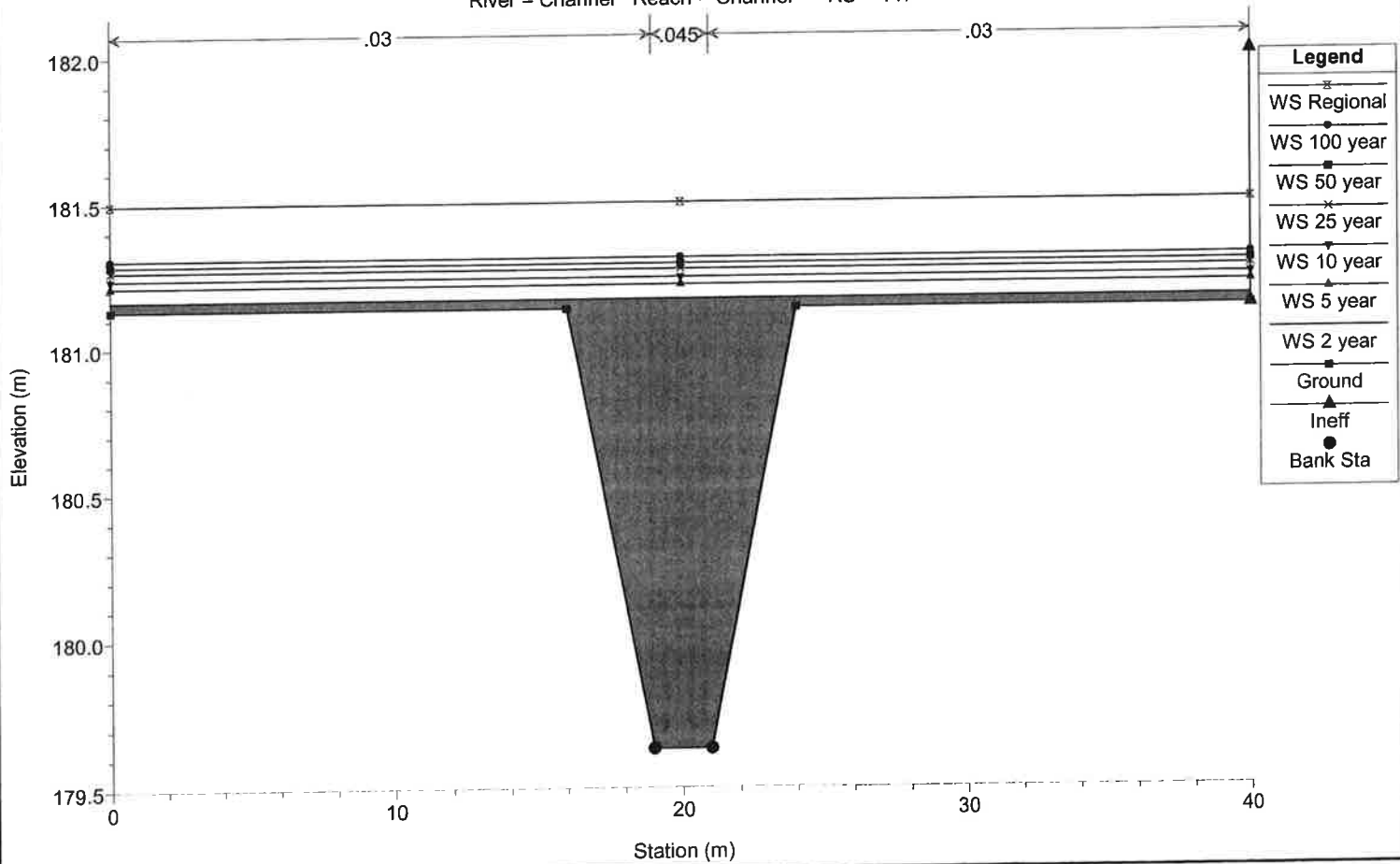
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 163



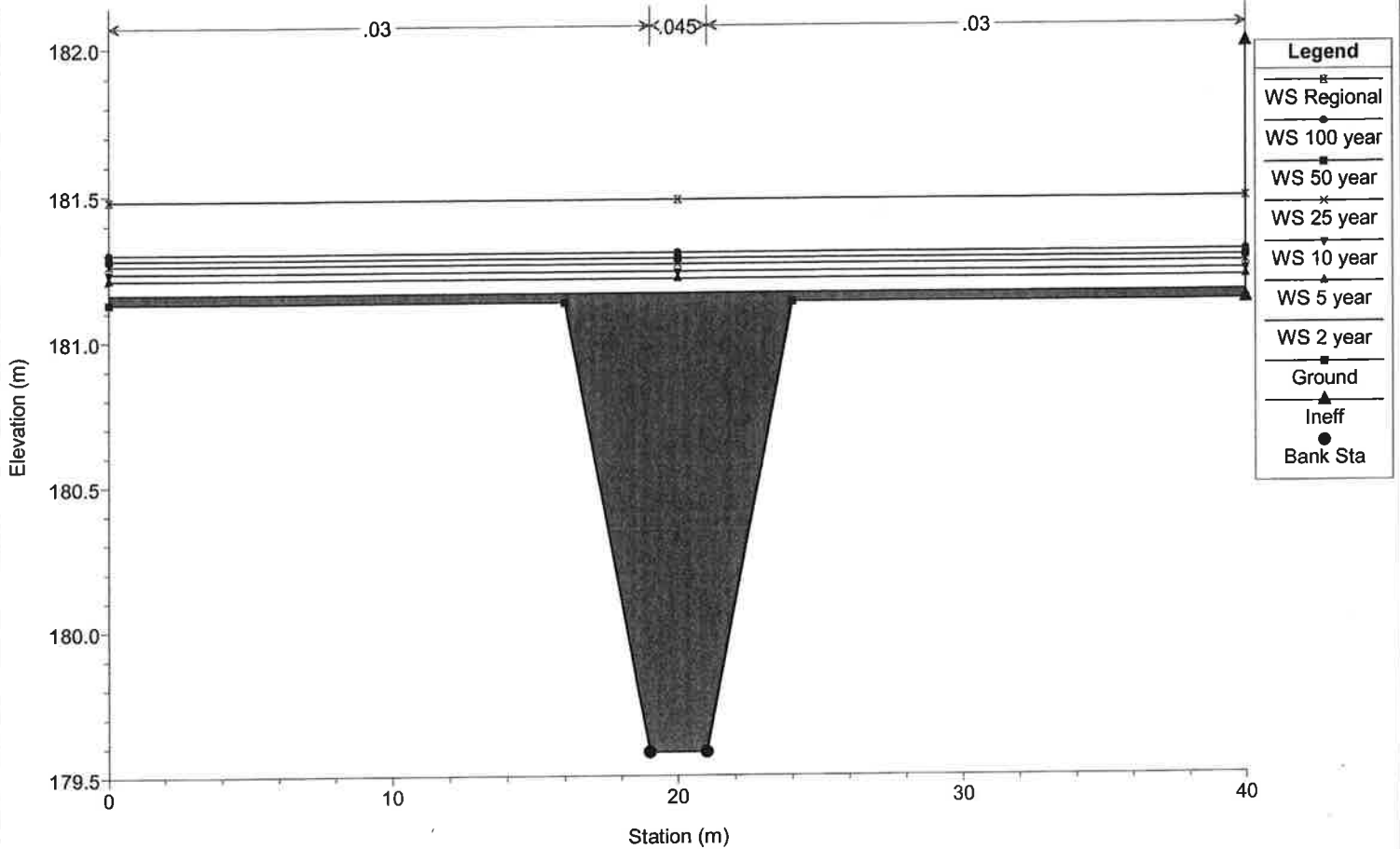
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 147



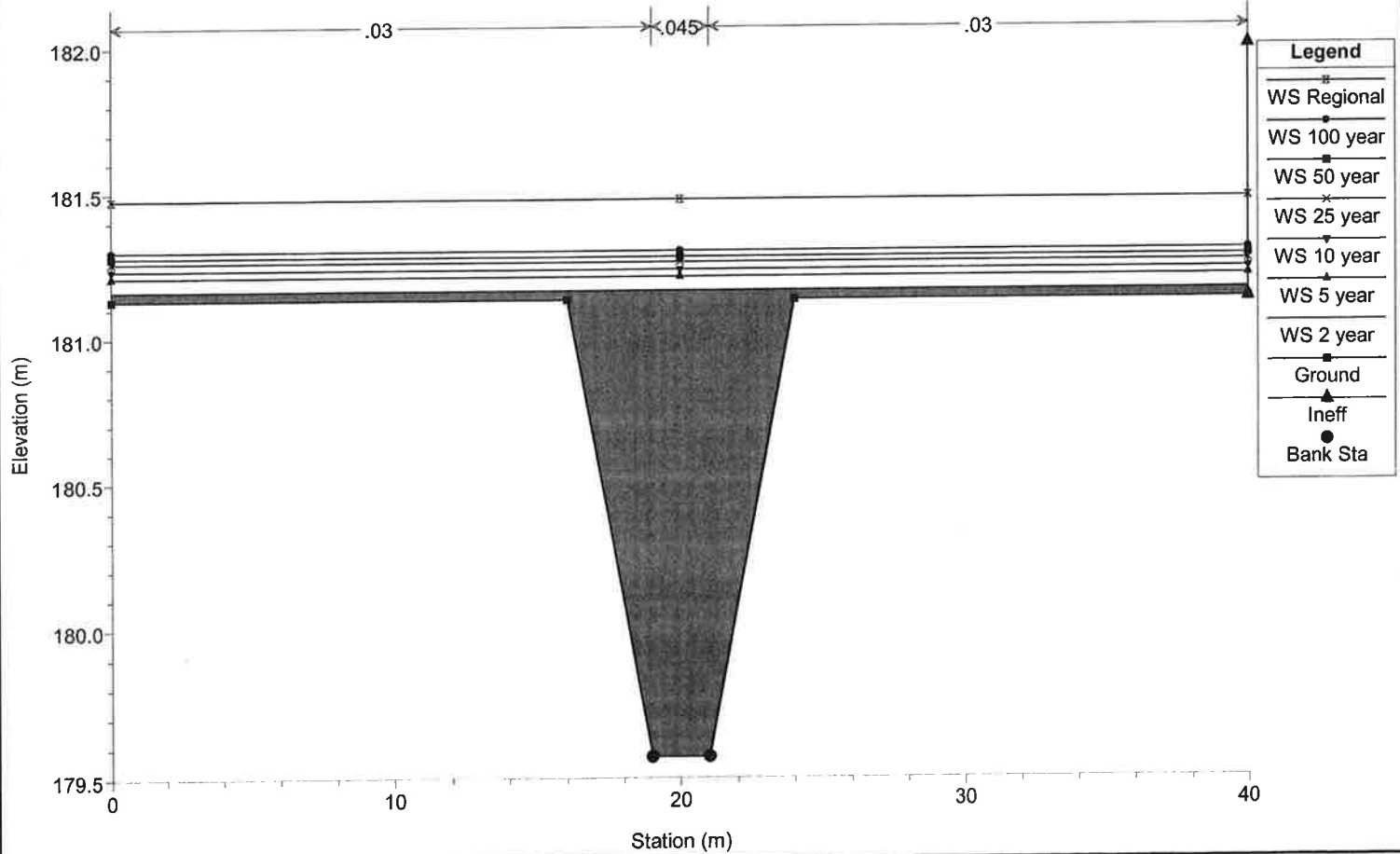
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 129



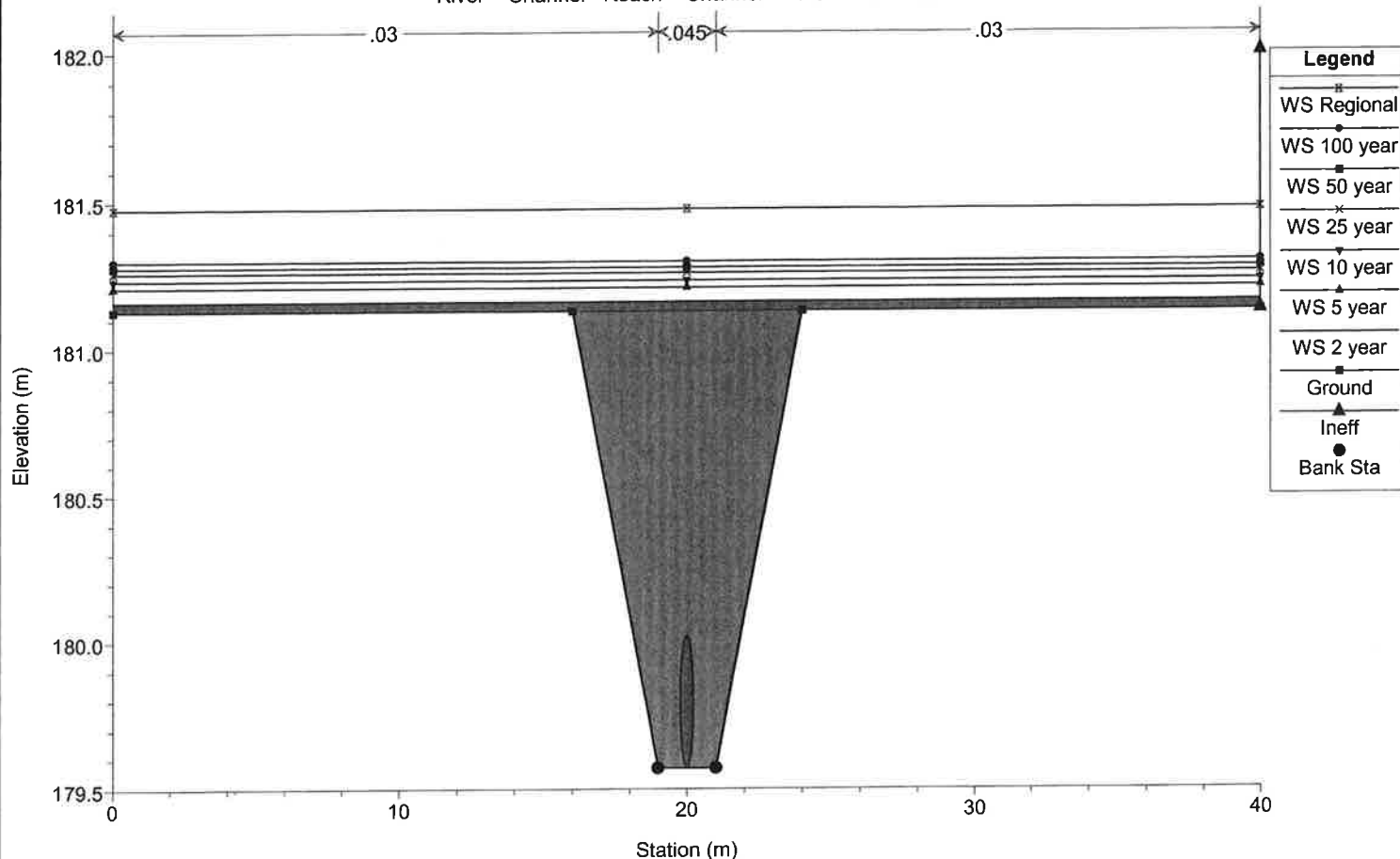
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 123



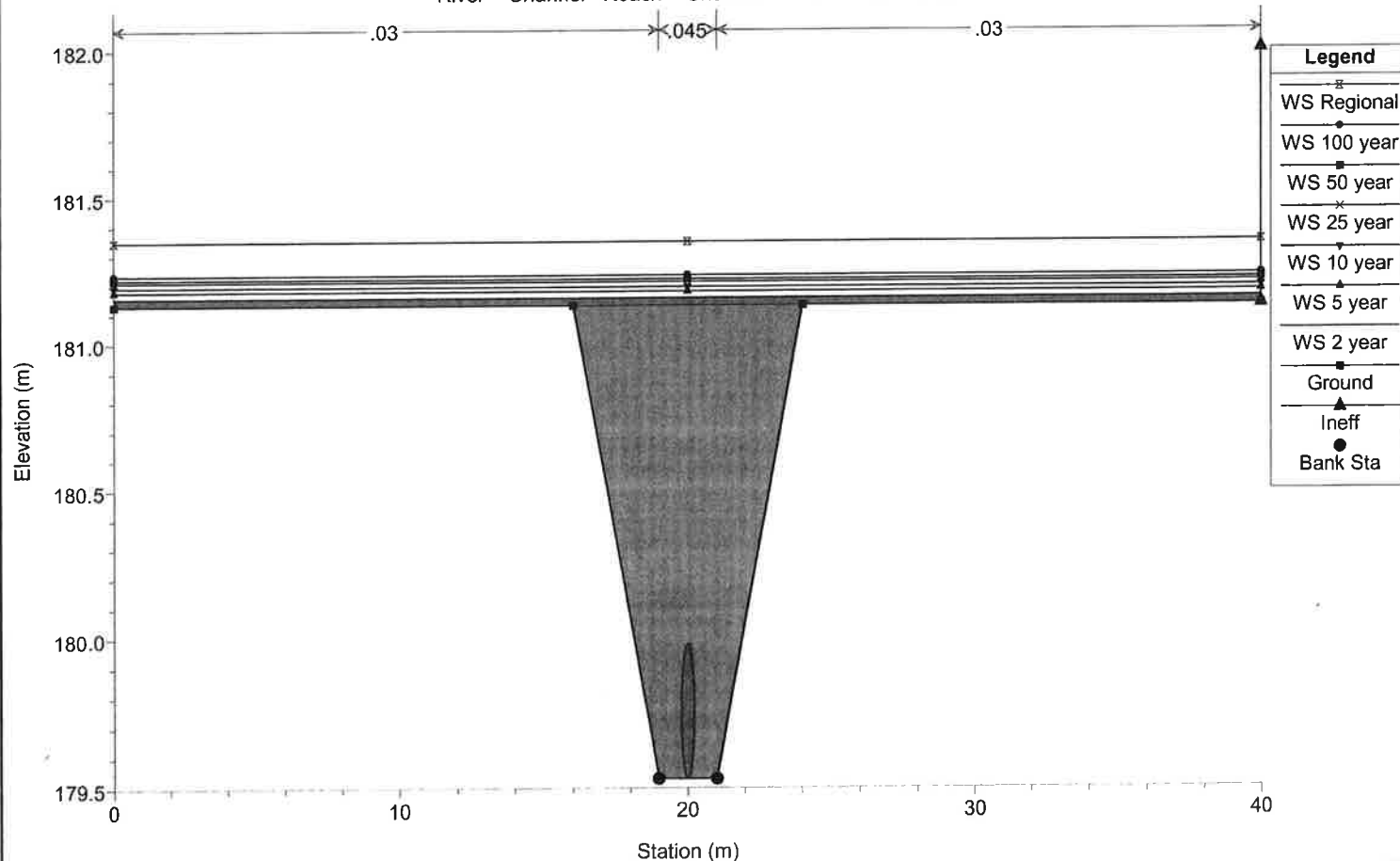
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 116 Culv



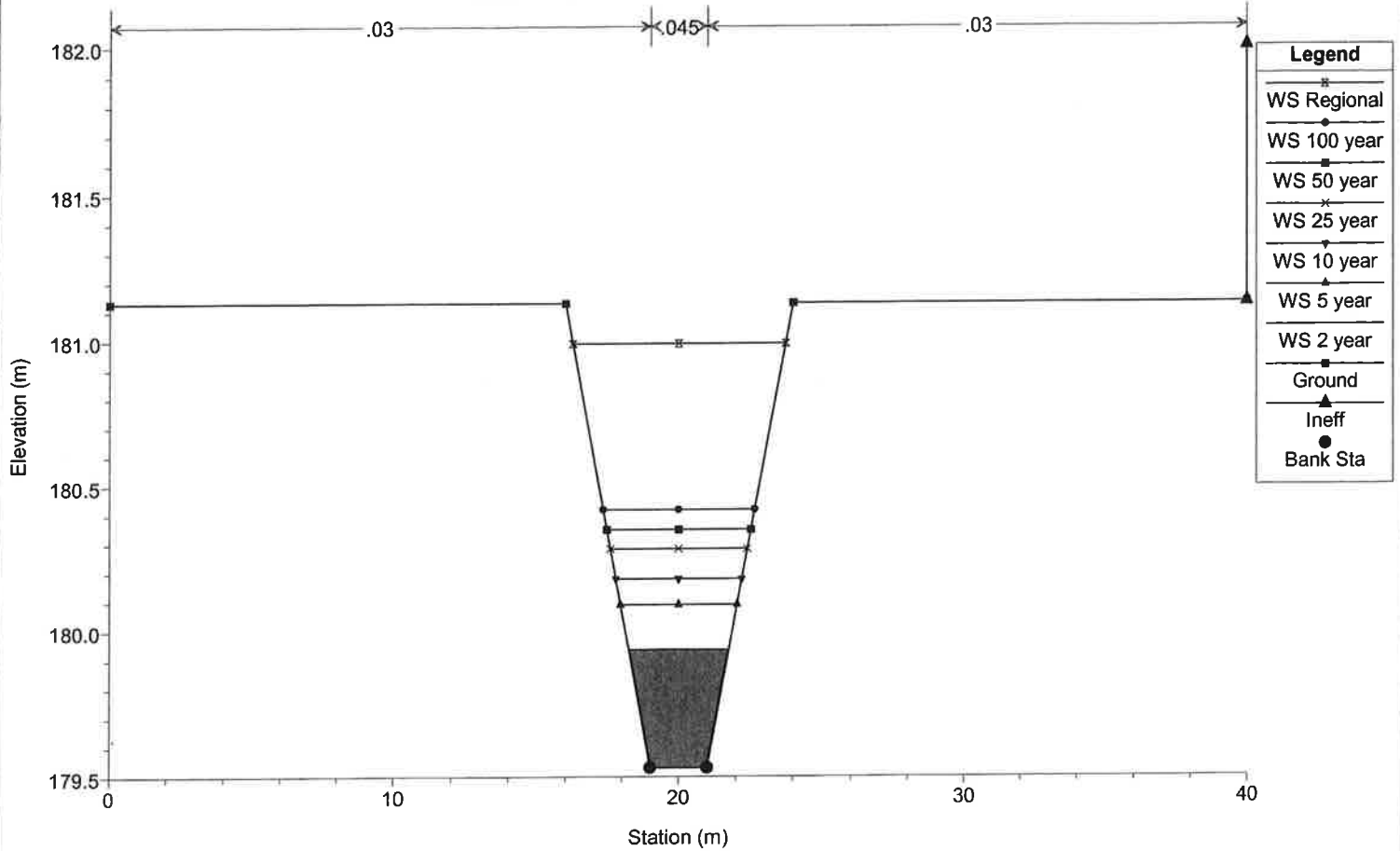
2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 116 Culv



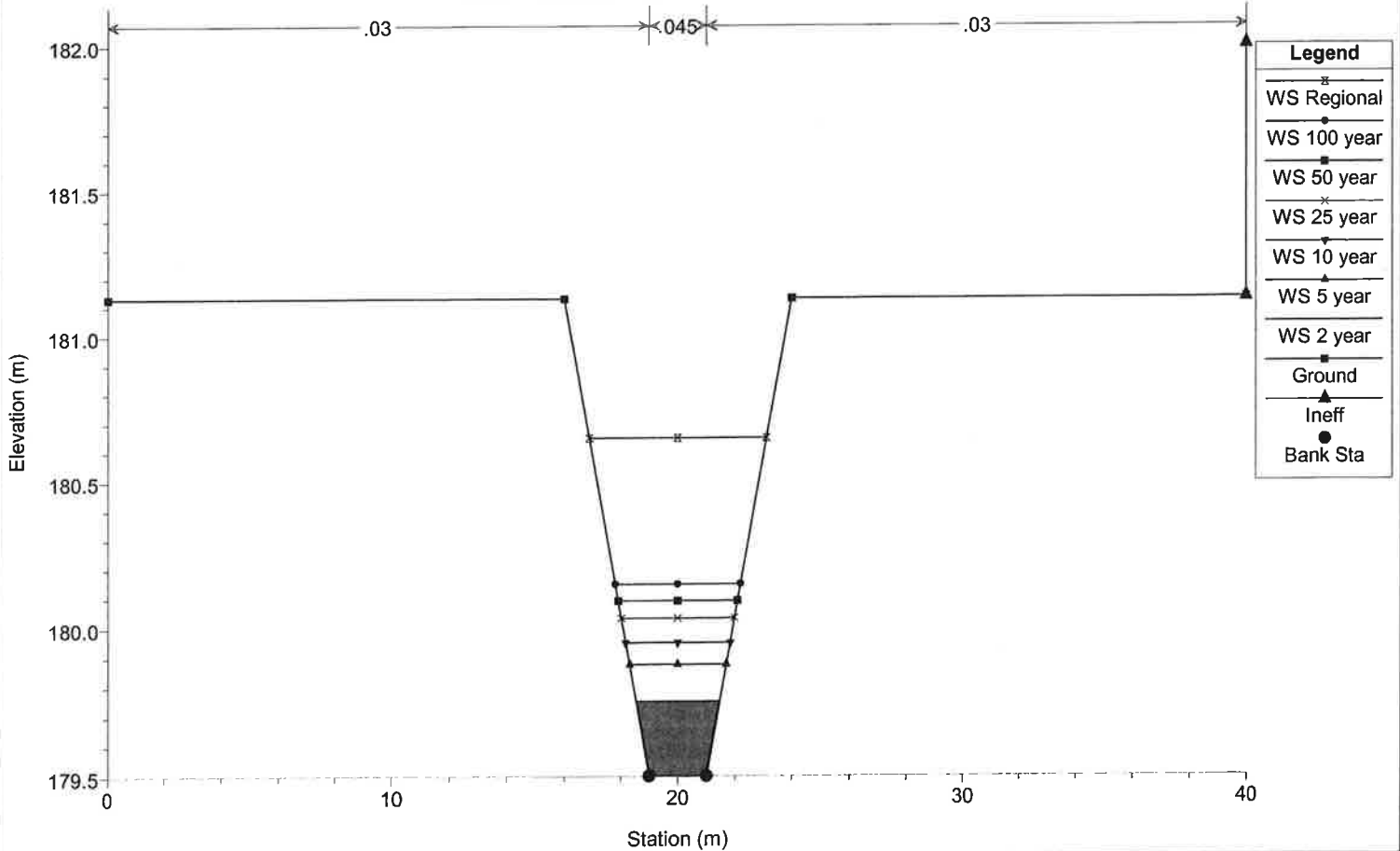
2015.08.13BlueFairway Plan: Existing 8/13/2015

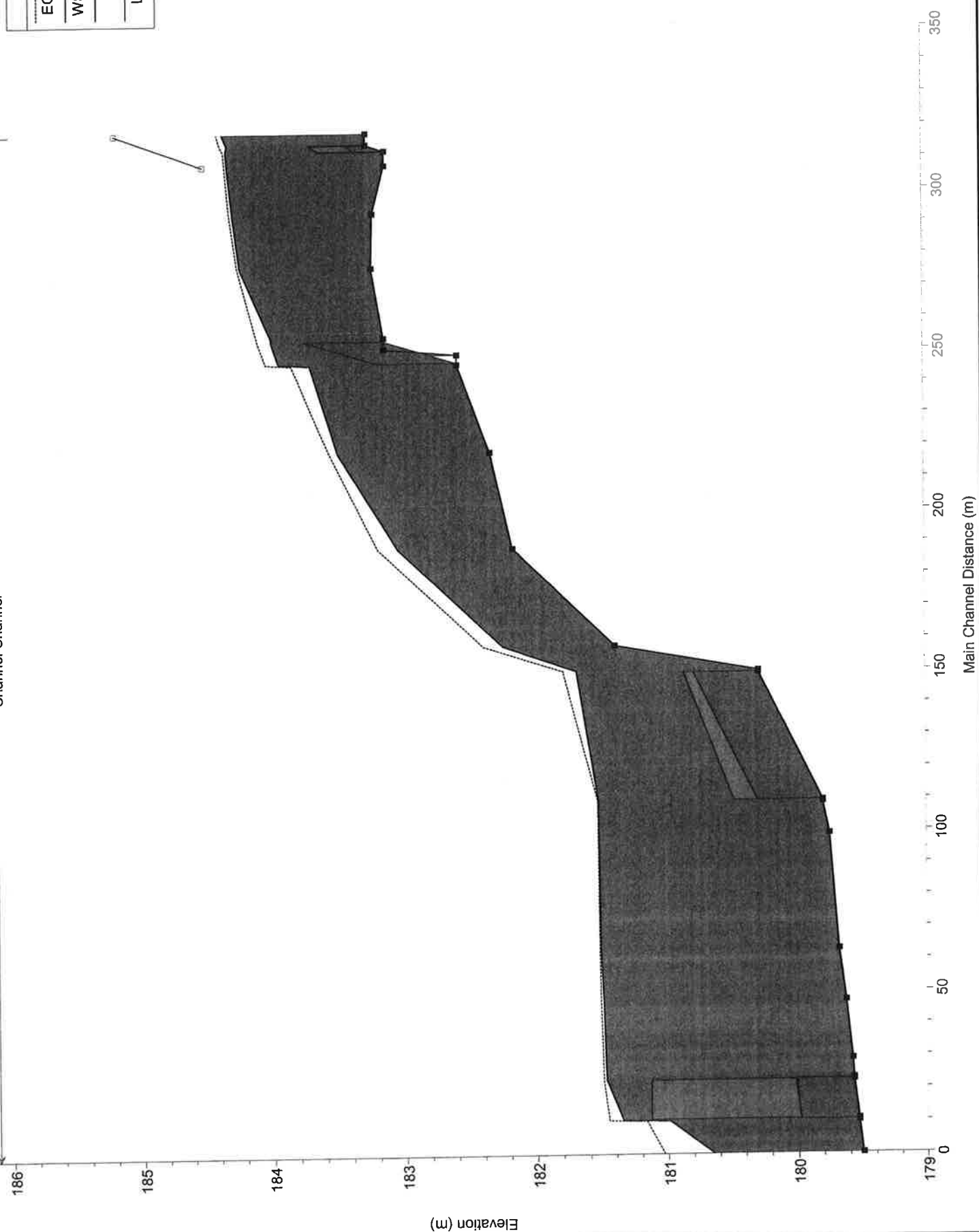
River = Channel Reach = Channel RS = 110



2015.08.13BlueFairway Plan: Existing 8/13/2015

River = Channel Reach = Channel RS = 100



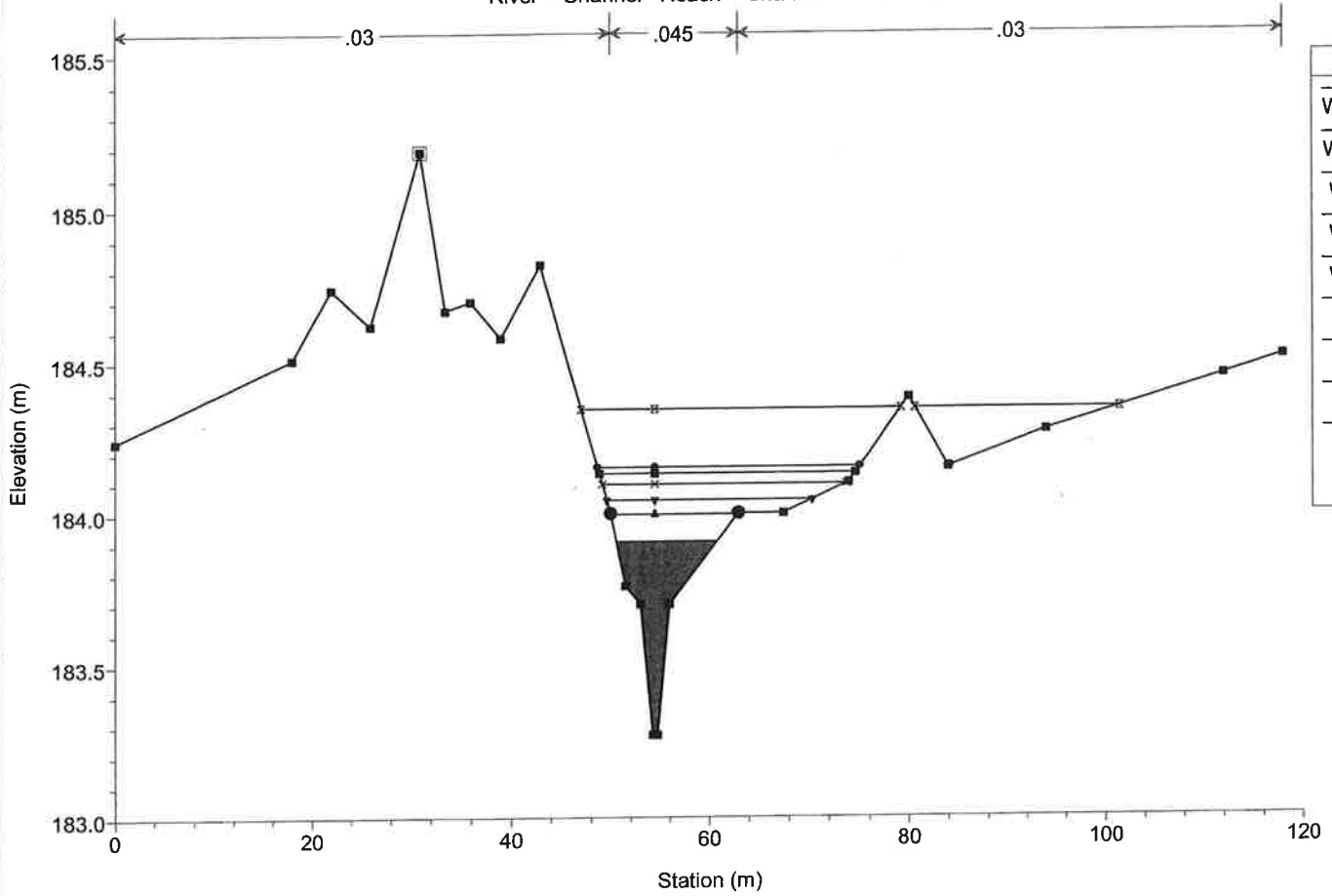


Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Channel	416	Regional	12.83	183.27	184.34	184.21	184.39	0.004346	1.03	14.33	53.02	0.43
Channel	415		Bridge									
Channel	413	Regional	12.83	183.13	184.23		184.29	0.004181	1.31	14.44	65.28	0.43
Channel	383	Regional	12.83	182.43	183.63	183.63	183.99	0.021049	3.28	6.55	9.57	1.01
Channel	363	Regional	12.83	181.95	183.27		183.53	0.013553	2.83	7.78	10.31	0.83
Channel	343	Regional	12.83	181.58	183.16		183.30	0.006067	2.16	10.64	11.86	0.57
Channel	323	Regional	12.83	181.40	183.07		183.19	0.004725	1.98	11.74	12.40	0.51
Channel	313	Regional	12.83	181.31	183.04		183.14	0.004027	1.88	12.50	12.77	0.47
Channel	303	Regional	12.83	181.22	182.95	182.33	183.10	0.004548	2.04	8.66	12.78	0.51
Channel	280		Culvert									
Channel	277	Regional	12.83	180.80	181.72	181.59	182.01	0.013219	2.41	5.32	22.36	0.80
Channel	261	Regional	12.83	180.51	181.67		181.80	0.005761	1.86	11.04	14.99	0.55
Channel	254	Regional	12.83	180.39	181.64		181.76	0.004717	1.77	11.40	14.20	0.51
Channel	249	Regional	12.83	180.29	181.66	181.11	181.72	0.002336	1.11	13.47	15.88	0.34
Channel	230		Culvert									
Channel	208	Regional	12.83	179.80	181.53		181.53	0.000083	0.22	43.73	40.00	0.06
Channel	199	Regional	12.83	179.75	181.52		181.53	0.000187	0.36	49.91	42.40	0.09
Channel	163	Regional	12.83	179.68	181.51		181.52	0.000210	0.43	39.99	40.00	0.10
Channel	147	Regional	12.83	179.63	181.50		181.52	0.000676	0.88	22.10	40.00	0.20
Channel	129	Regional	12.83	179.58	181.48		181.50	0.000699	0.90	21.81	40.00	0.21
Channel	123	Regional	12.83	179.57	181.48	180.71	181.50	0.000711	0.91	21.67	40.00	0.21
Channel	116		Culvert									
Channel	110	Regional	12.83	179.53	180.99	180.67	181.17	0.004894	2.00	6.93	7.48	0.53
Channel	100	Regional	12.83	179.50	180.65	180.65	181.03	0.014236	2.91	4.73	6.23	0.87

PROPOSED CONDITIONS

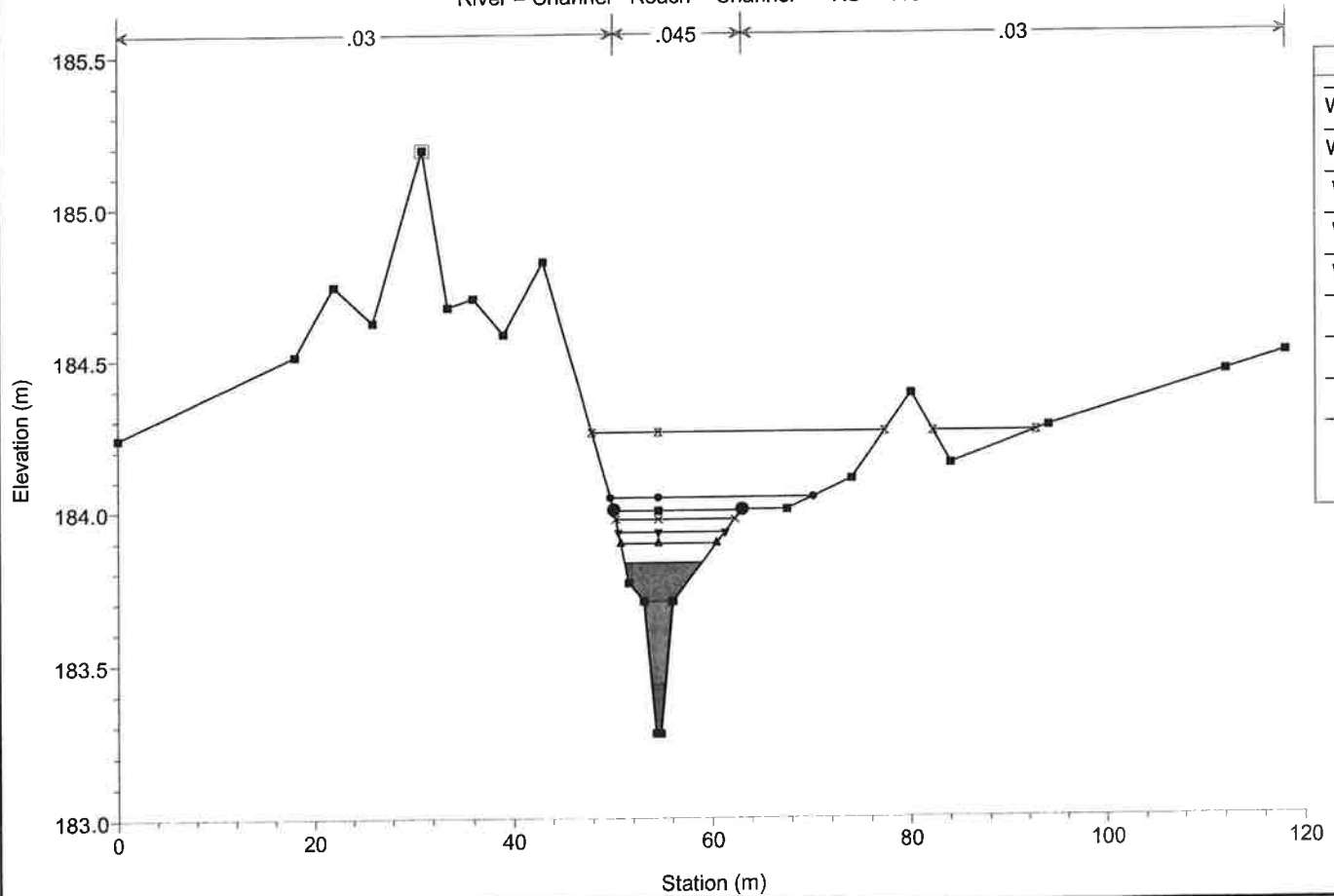
2015.08.13BlueFairway Plan: Proposed 8/13/2015

River = Channel Reach = Channel RS = 416



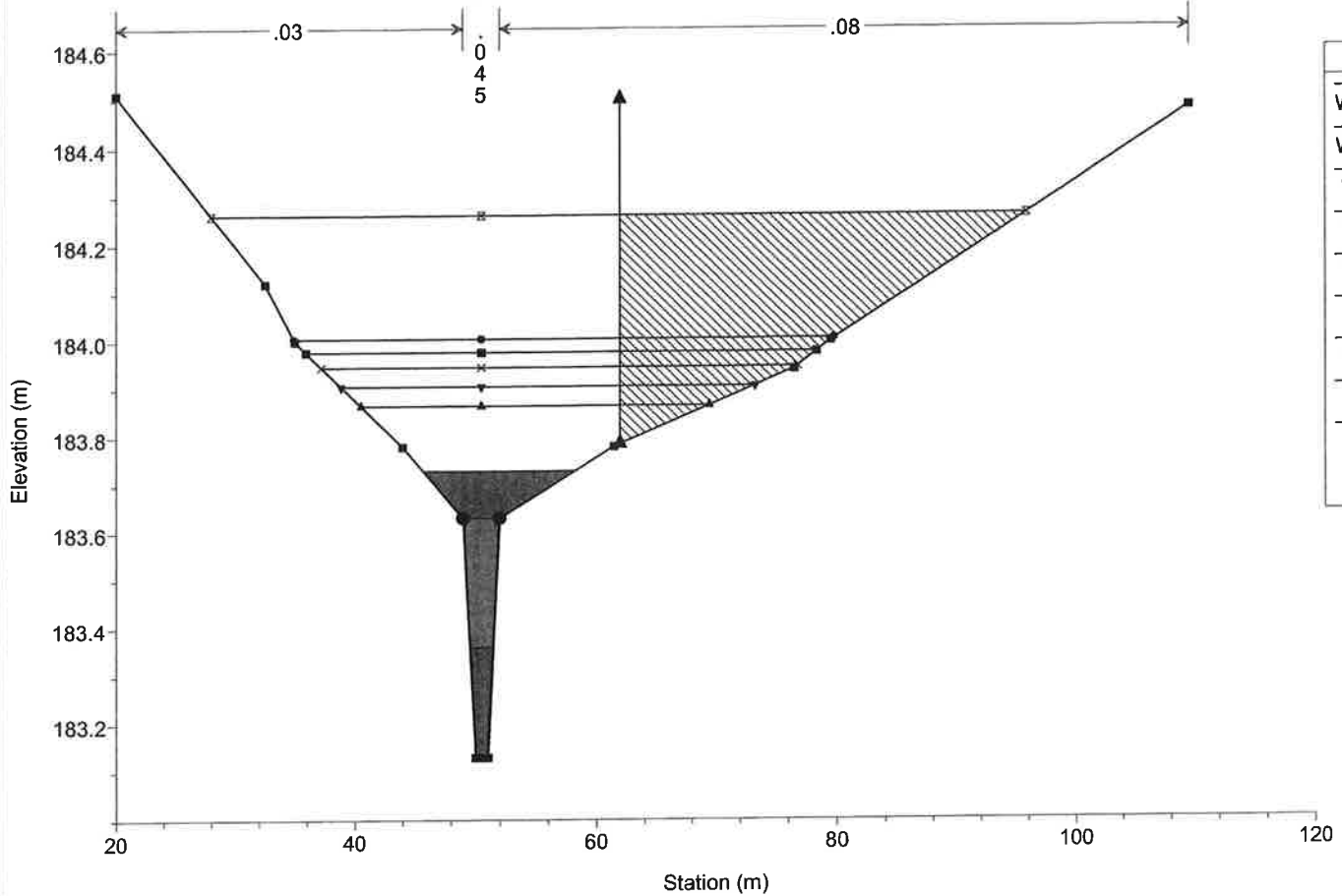
2015.08.13BlueFairway Plan: Proposed 8/13/2015

River = Channel Reach = Channel RS = 415 BR



2015.08.13BlueFairway Plan: Proposed 8/13/2015

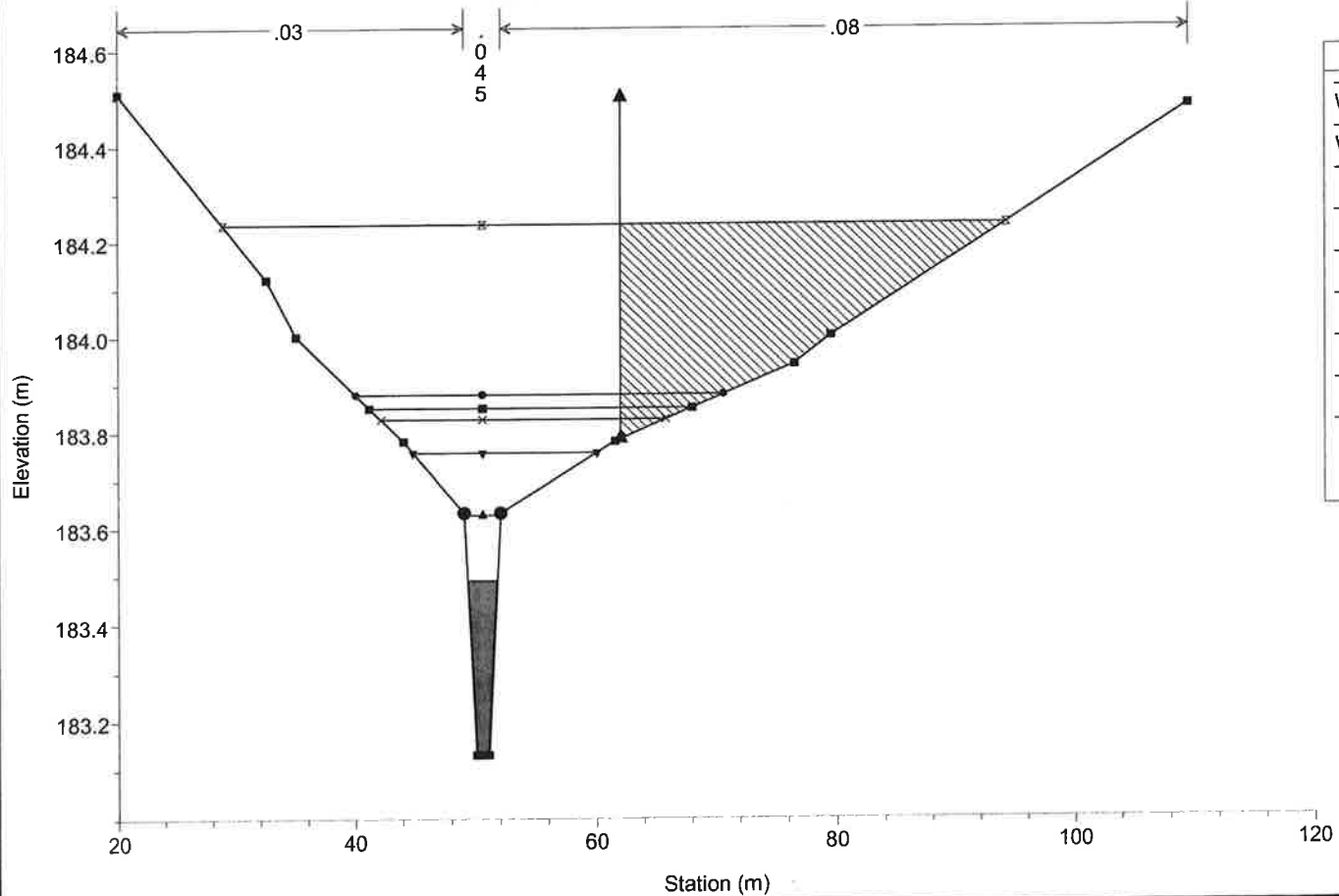
River = Channel Reach = Channel RS = 415 BR



Legend	
WS Regional	—x—
WS 100 year	—●—
WS 50 year	—■—
WS 25 year	—x—
WS 10 year	—▲—
WS 5 year	—▲—
WS 2 year	—■—
Ground	—■—
Ineff	—▲—
Bank Sta	—●—

2015.08.13BlueFairway Plan: Proposed 8/13/2015

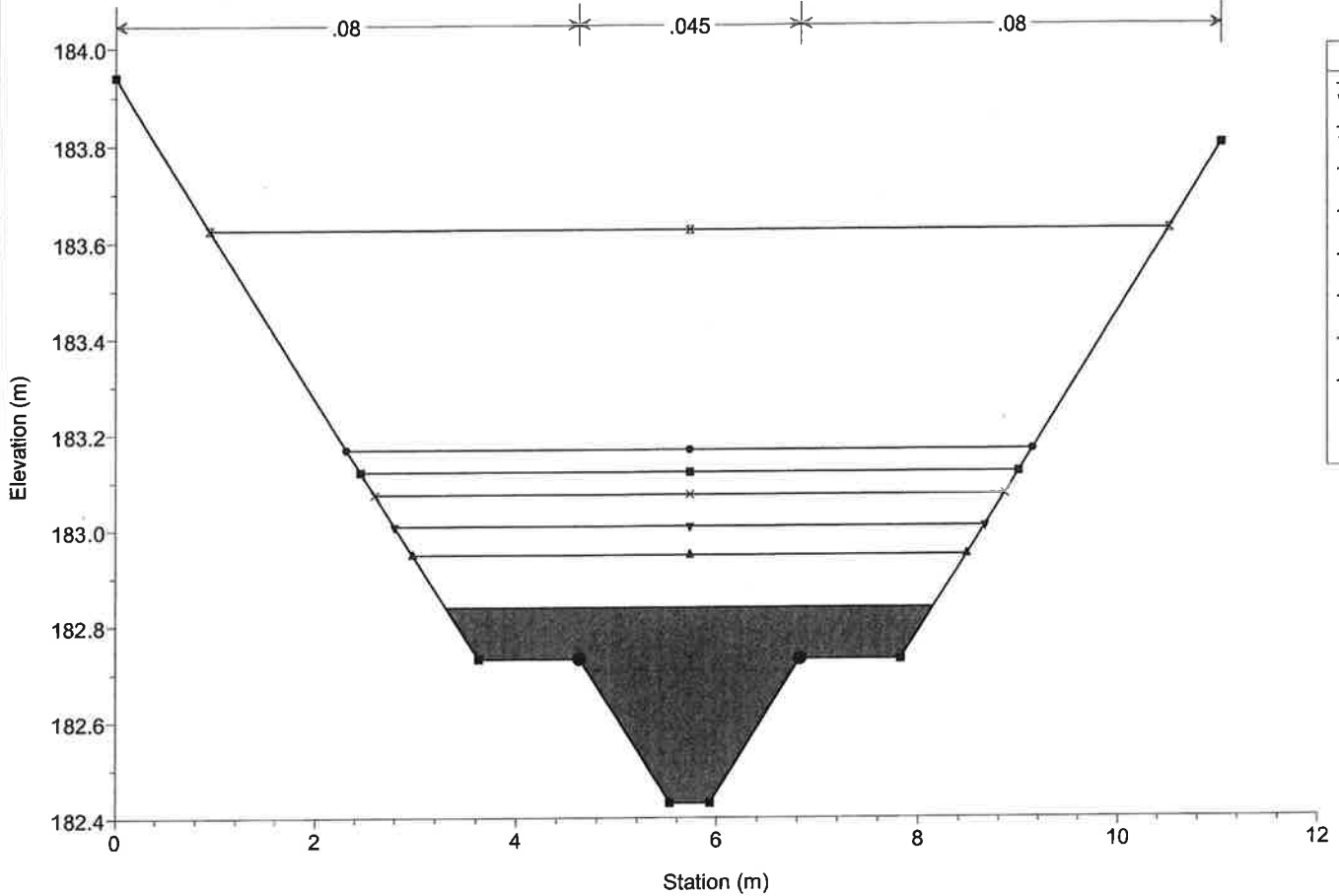
River = Channel Reach = Channel RS = 413



Legend	
WS Regional	—x—
WS 100 year	—●—
WS 50 year	—■—
WS 25 year	—x—
WS 10 year	—▲—
WS 5 year	—▲—
WS 2 year	—■—
Ground	—■—
Ineff	—▲—
Bank Sta	—●—

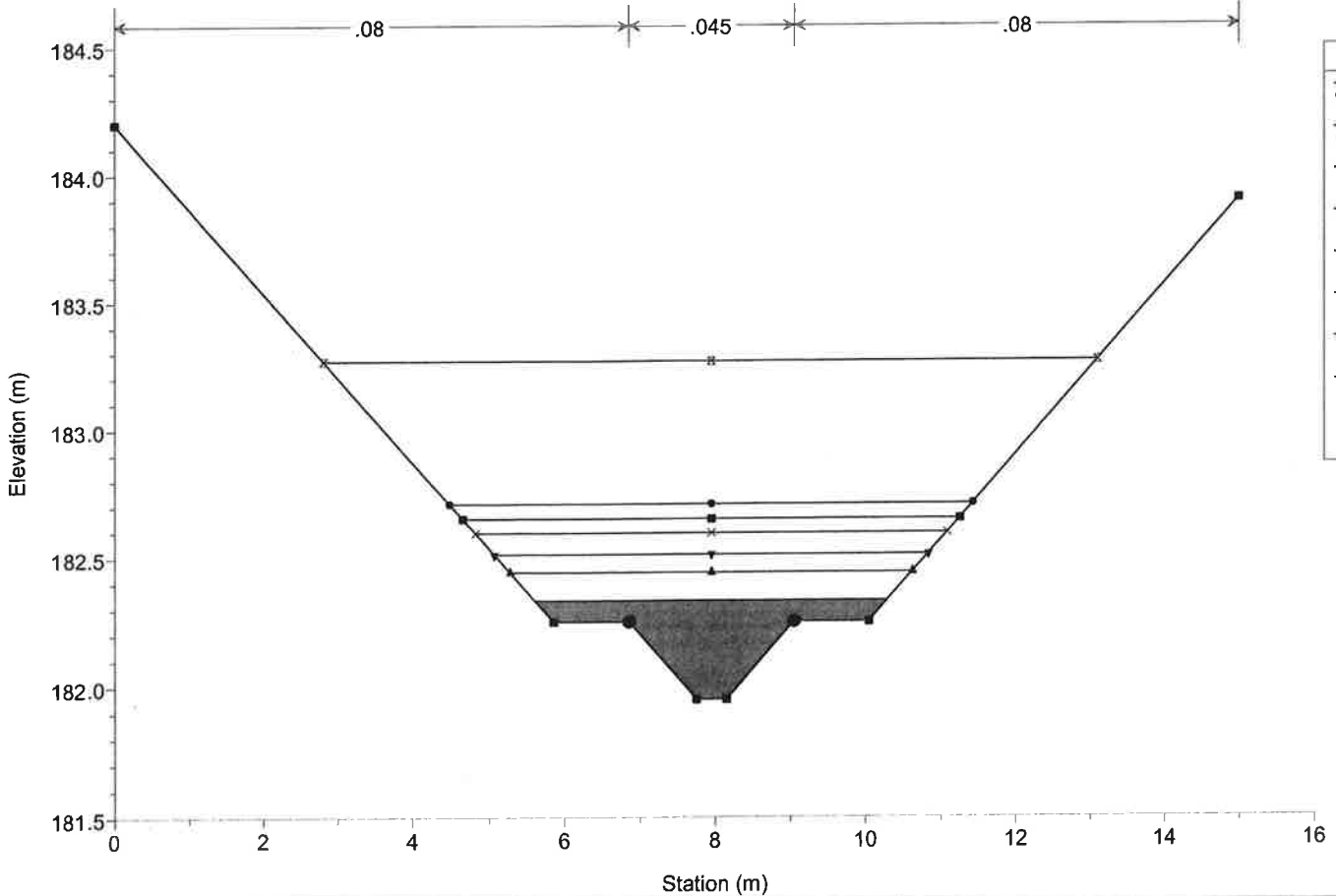
2015.08.13BlueFairway Plan: Proposed 8/13/2015

River = Channel Reach = Channel RS = 383



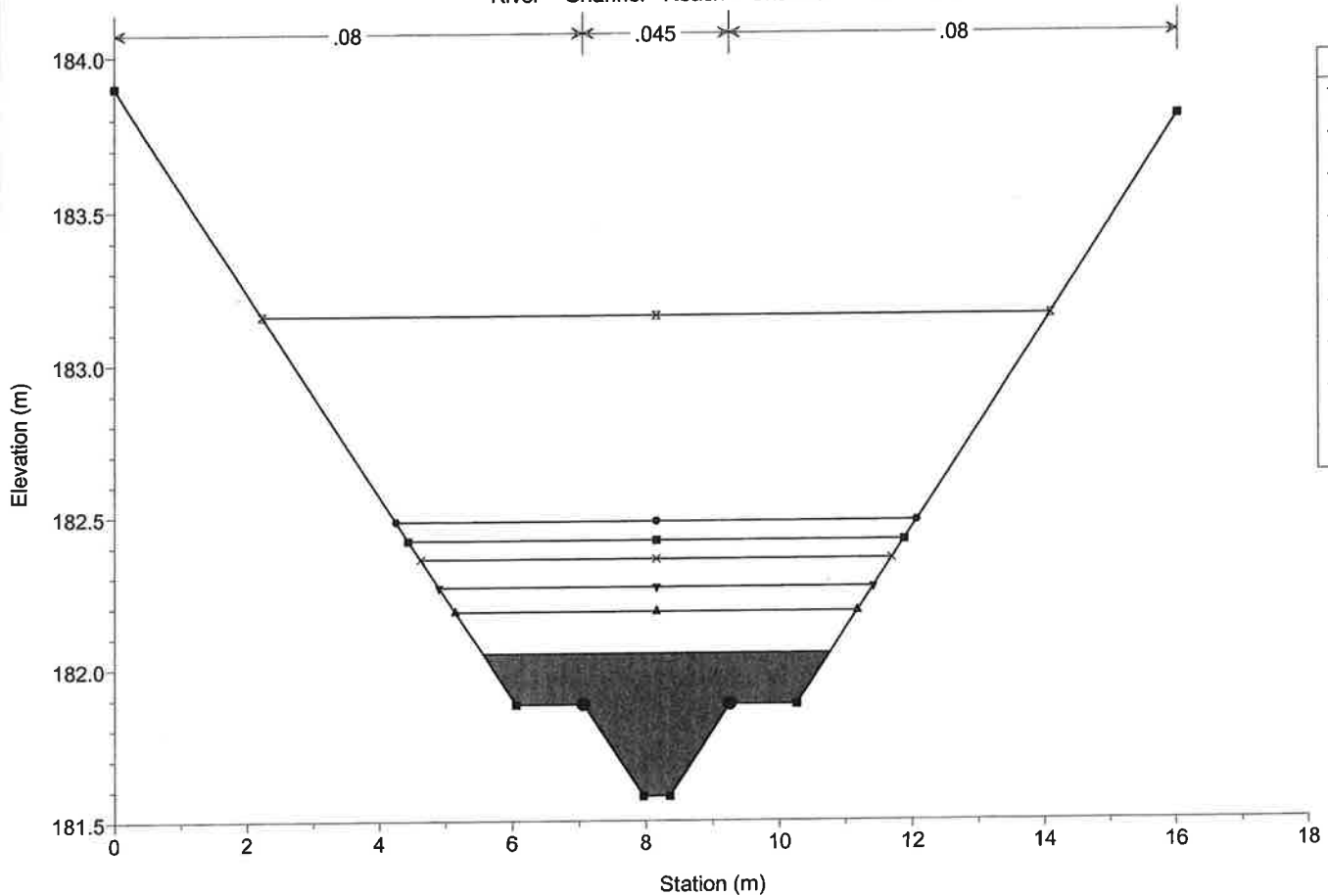
2015.08.13BlueFairway Plan: Proposed 8/13/2015

River = Channel Reach = Channel RS = 363



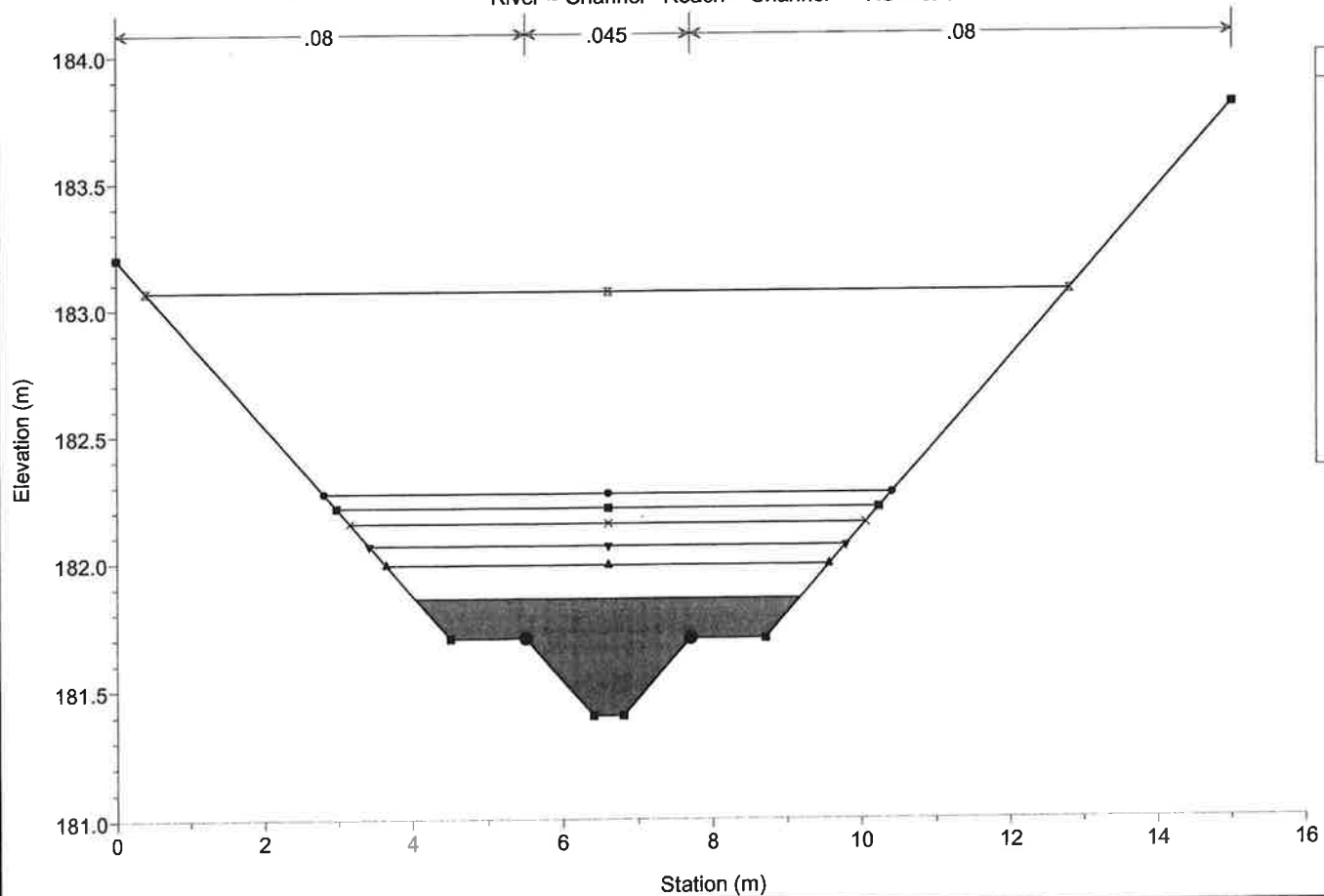
2015.08.13BlueFairway Plan: Proposed 8/13/2015

River = Channel Reach = Channel RS = 343



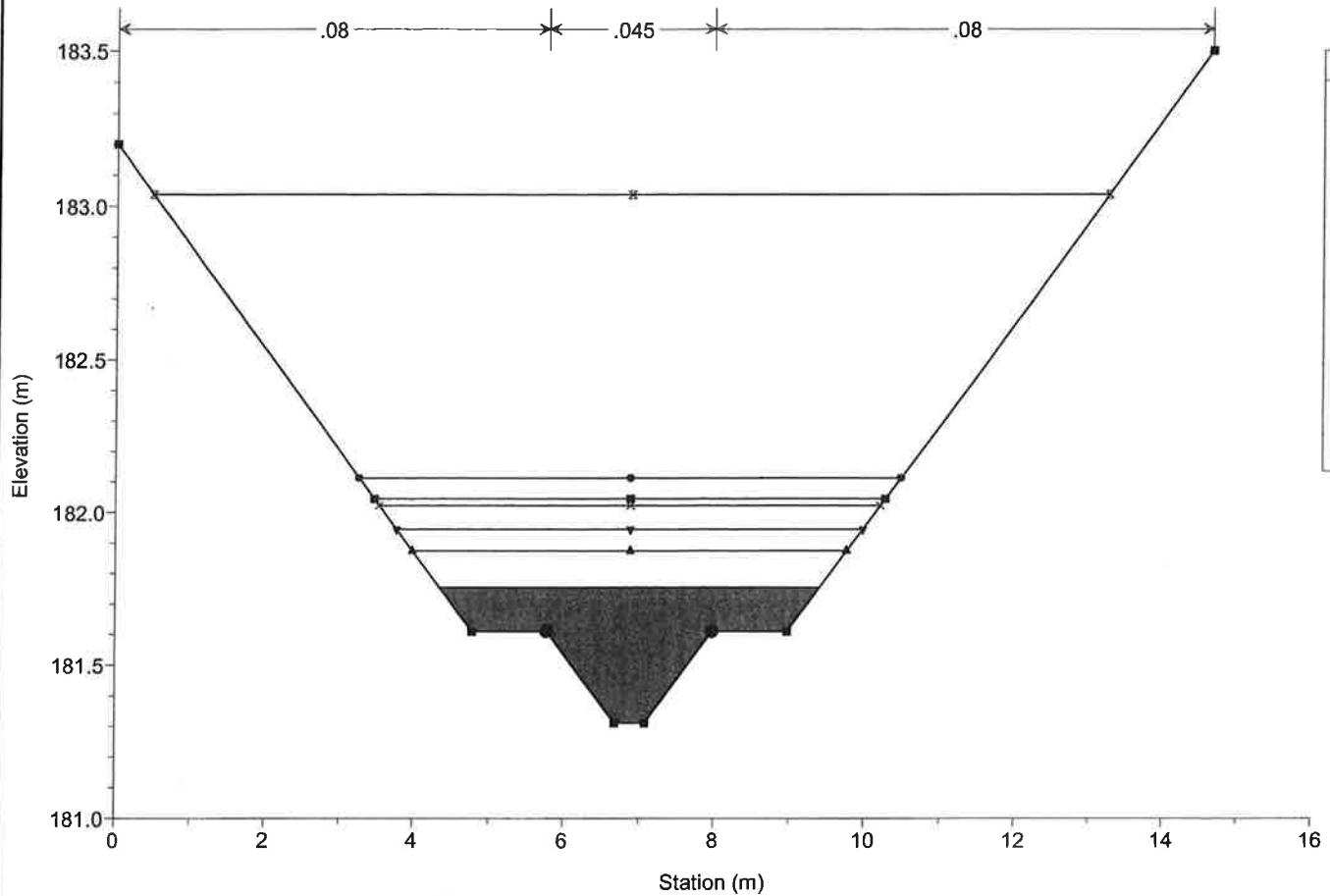
2015.08.13BlueFairway Plan: Proposed 8/13/2015

River = Channel Reach = Channel RS = 323



2015.08.13BlueFairway Plan: Proposed 8/13/2015

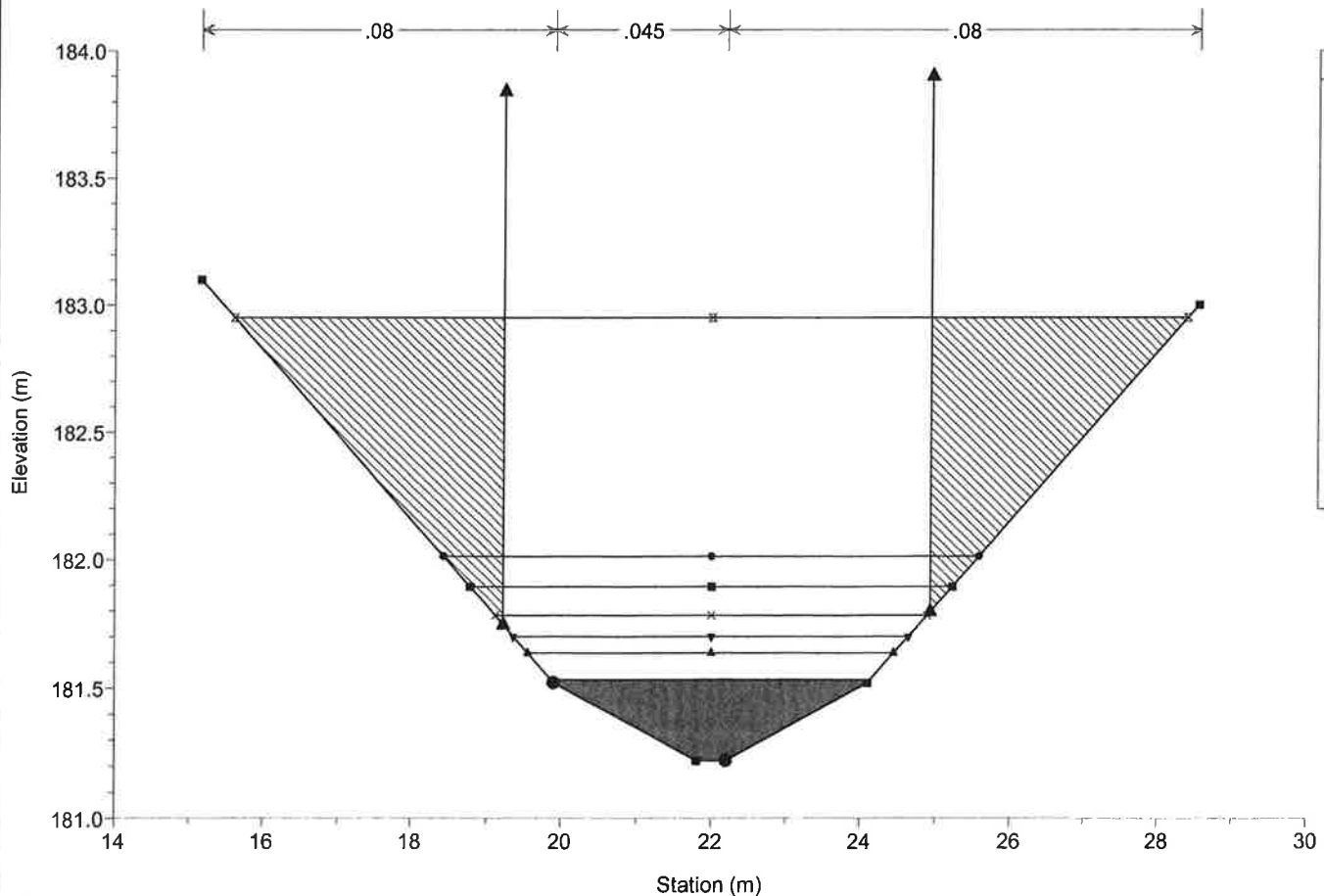
River = Channel Reach = Channel RS = 313



Legend	
WS Regional	✕
WS 100 year	●
WS 50 year	■
WS 25 year	✕
WS 10 year	▼
WS 5 year	▲
WS 2 year	■
Ground	—
Bank Sta	●

2015.08.13BlueFairway Plan: Proposed 8/13/2015

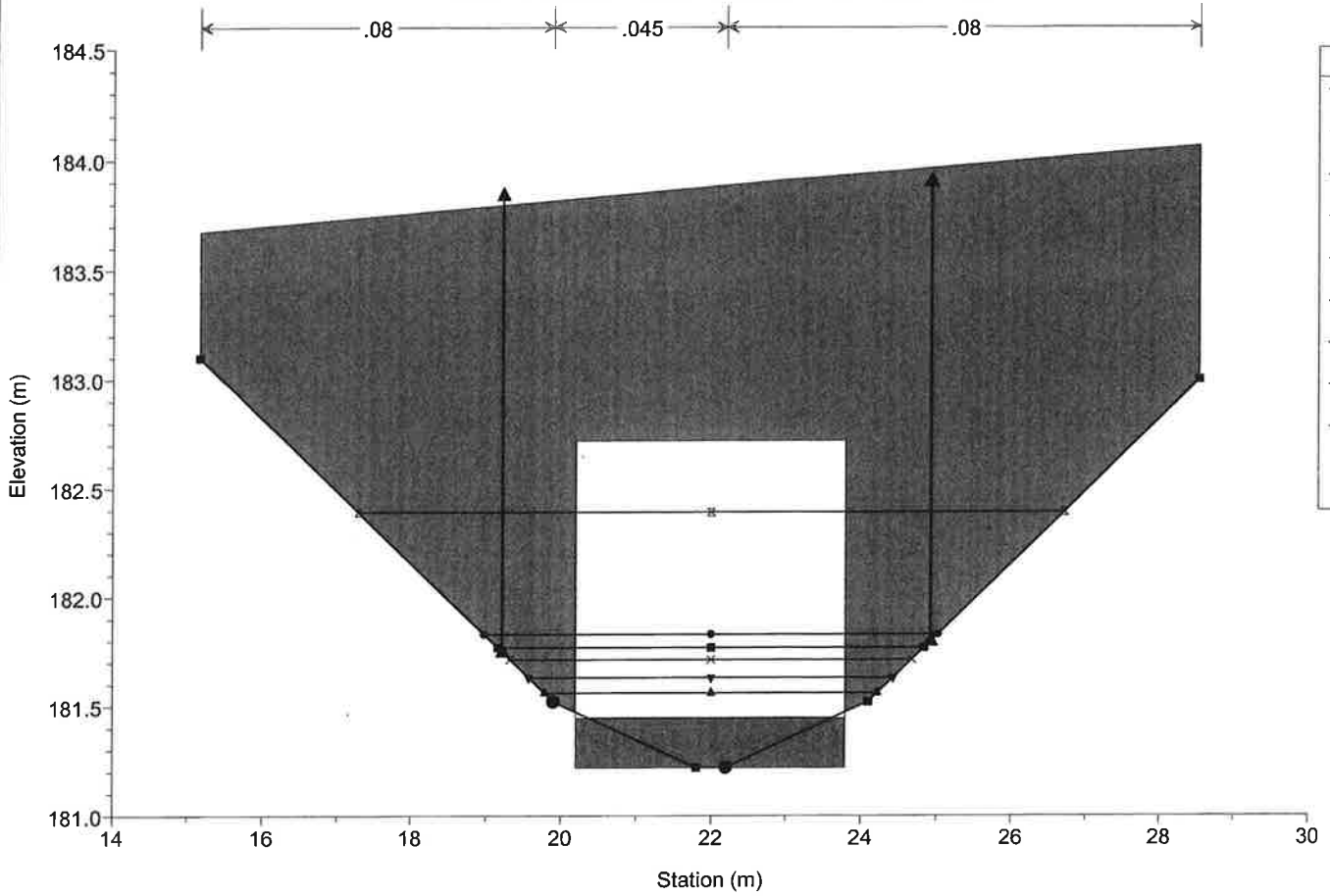
River = Channel Reach = Channel RS = 303



Legend	
WS Regional	✕
WS 100 year	●
WS 50 year	■
WS 25 year	✕
WS 10 year	▼
WS 5 year	▲
WS 2 year	■
Ground	—
Ineff	▲
Bank Sta	●

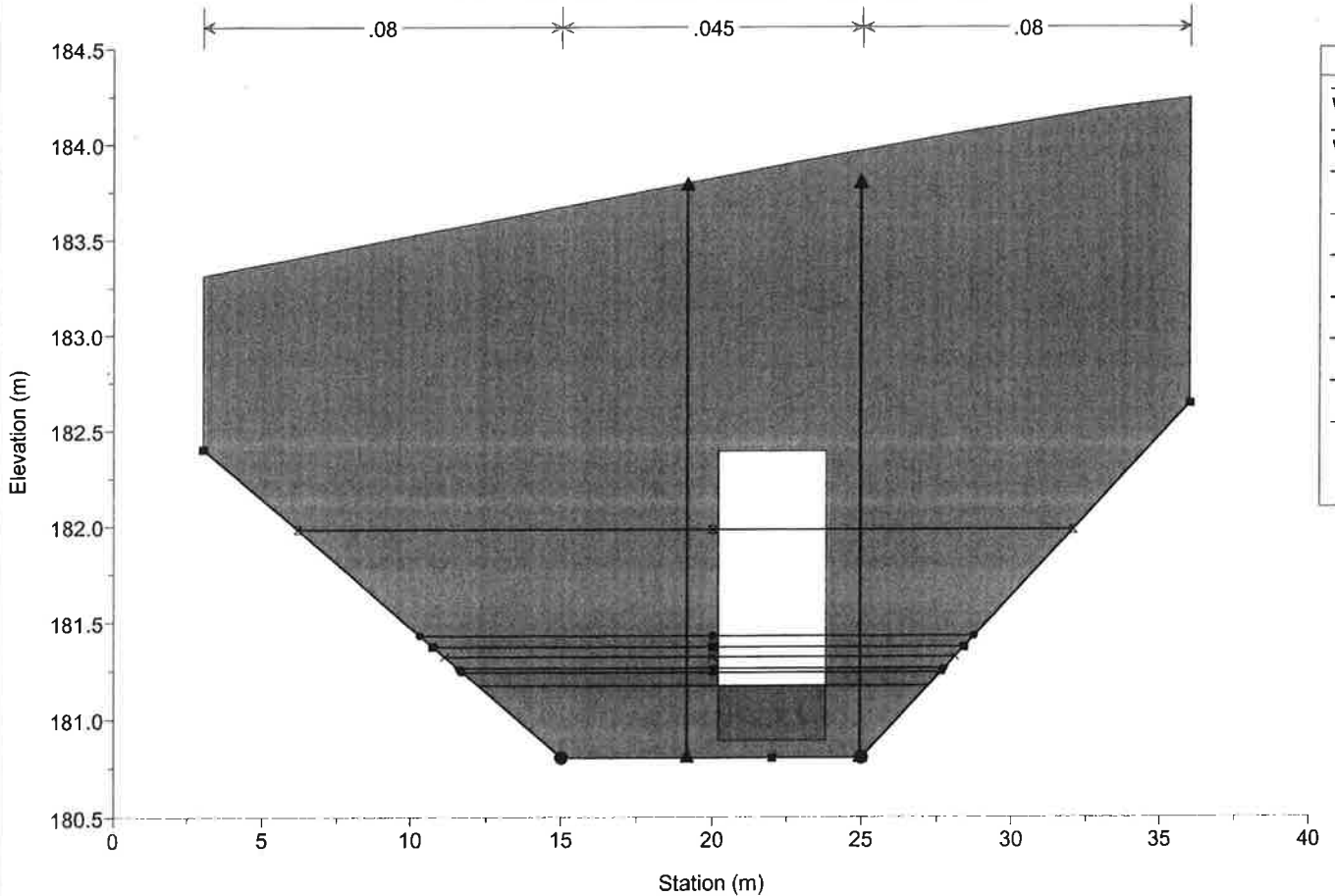
2015.08.13BlueFairway Plan: Proposed 8/13/2015

River = Channel Reach = Channel RS = 280 Culv



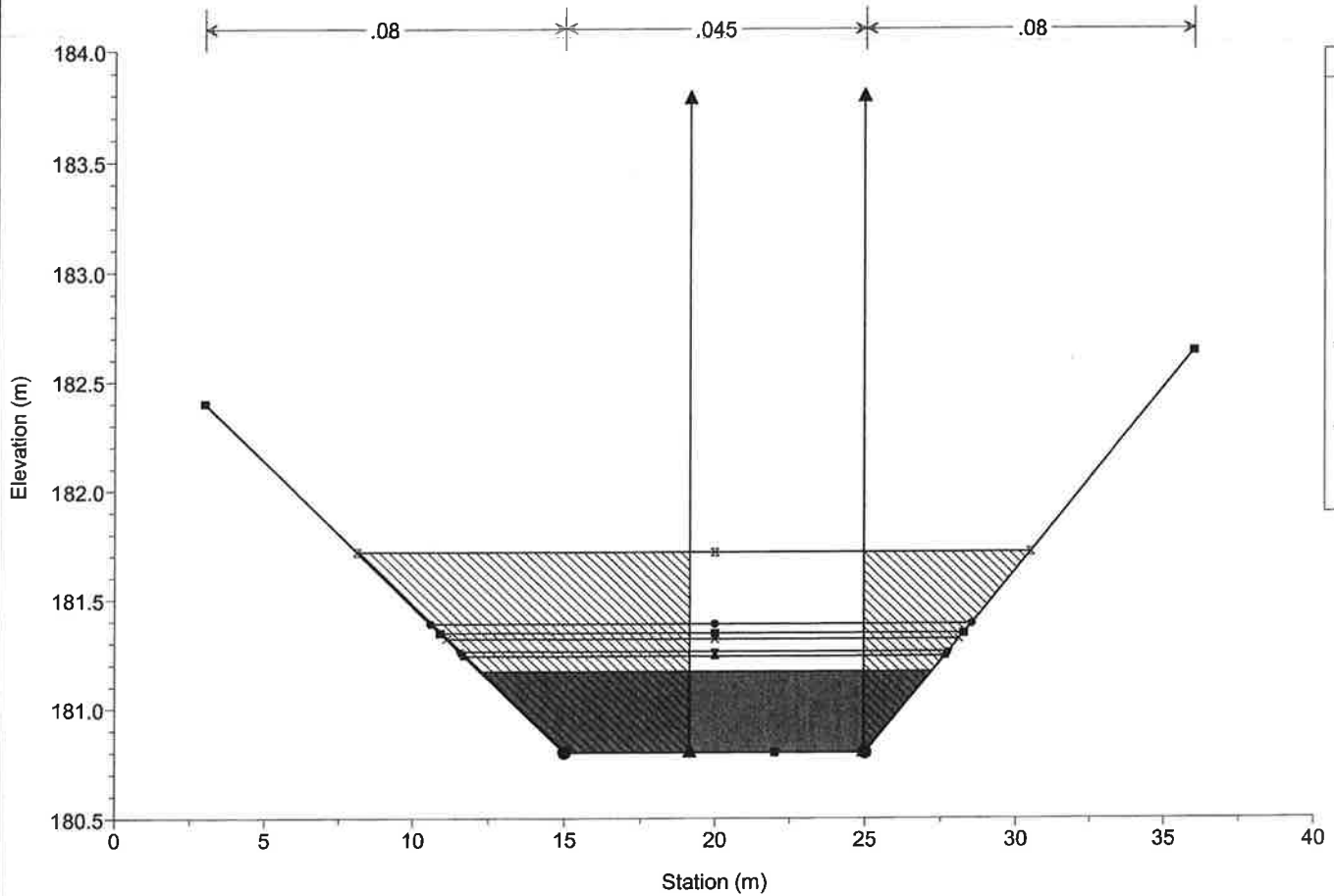
2015.08.13BlueFairway Plan: Proposed 8/13/2015

River = Channel Reach = Channel RS = 280 Culv



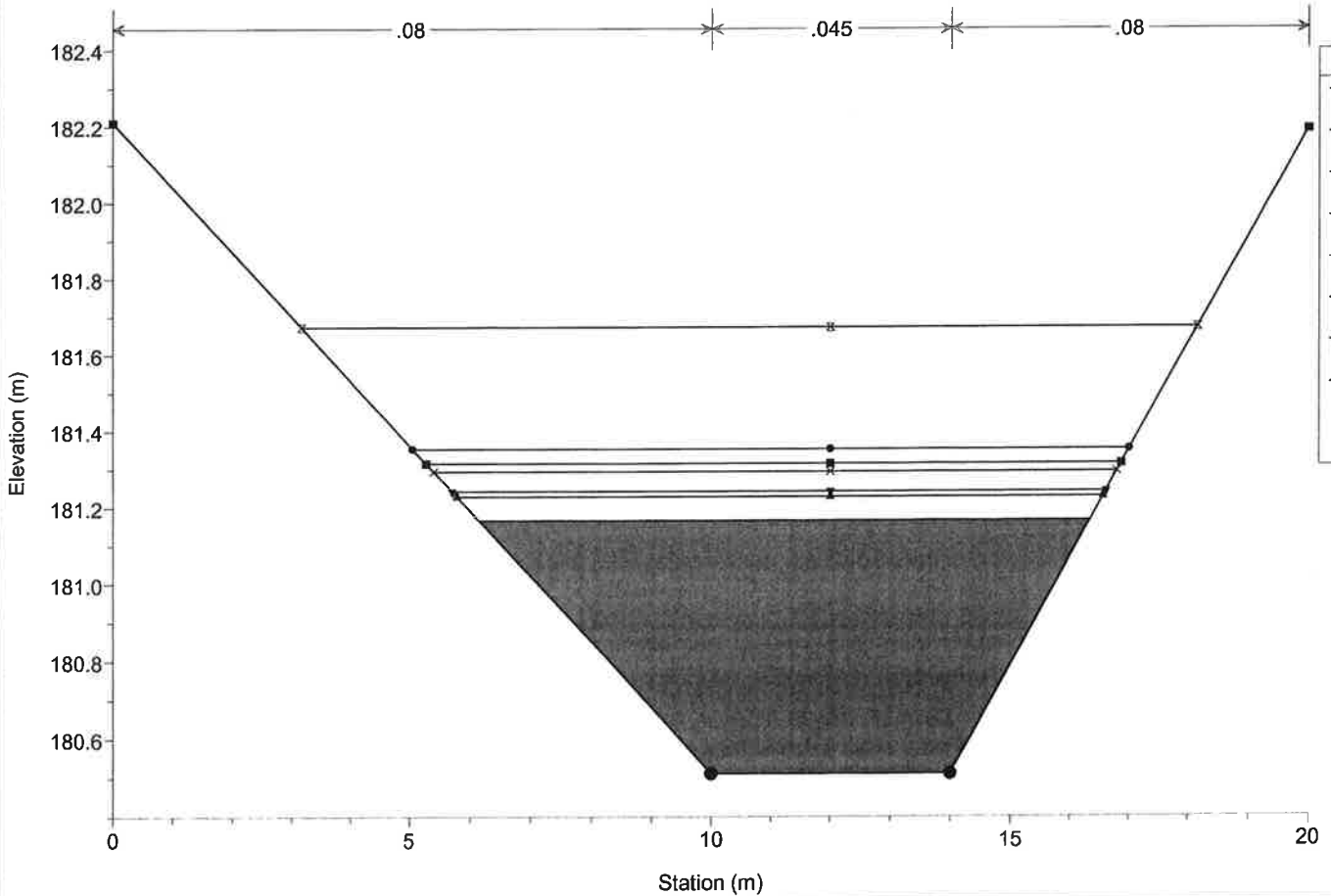
2015.08.13BlueFairway Plan: Proposed 8/13/2015

River = Channel Reach = Channel RS = 277



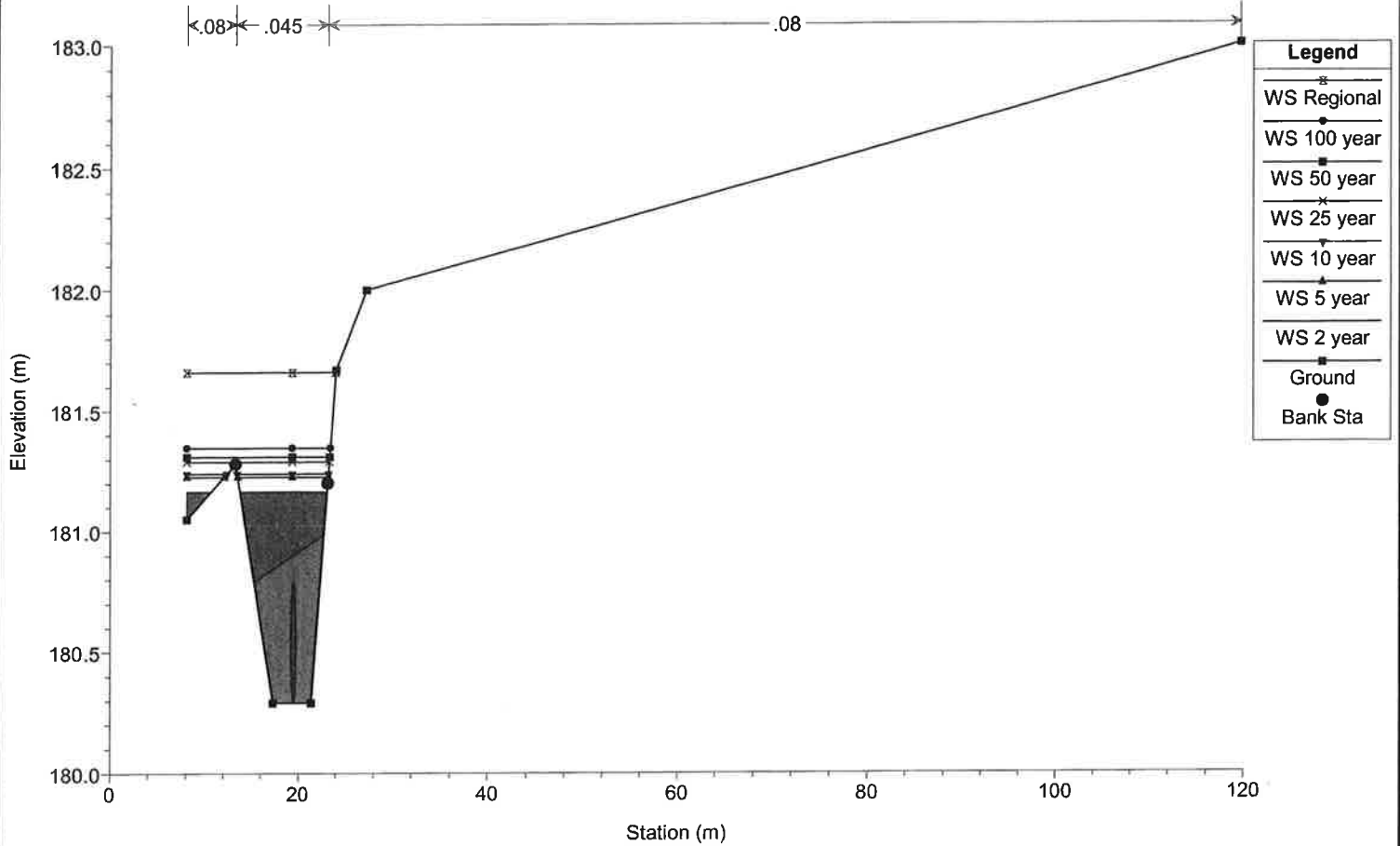
2015.08.13BlueFairway Plan: Proposed 8/13/2015

River = Channel Reach = Channel RS = 261



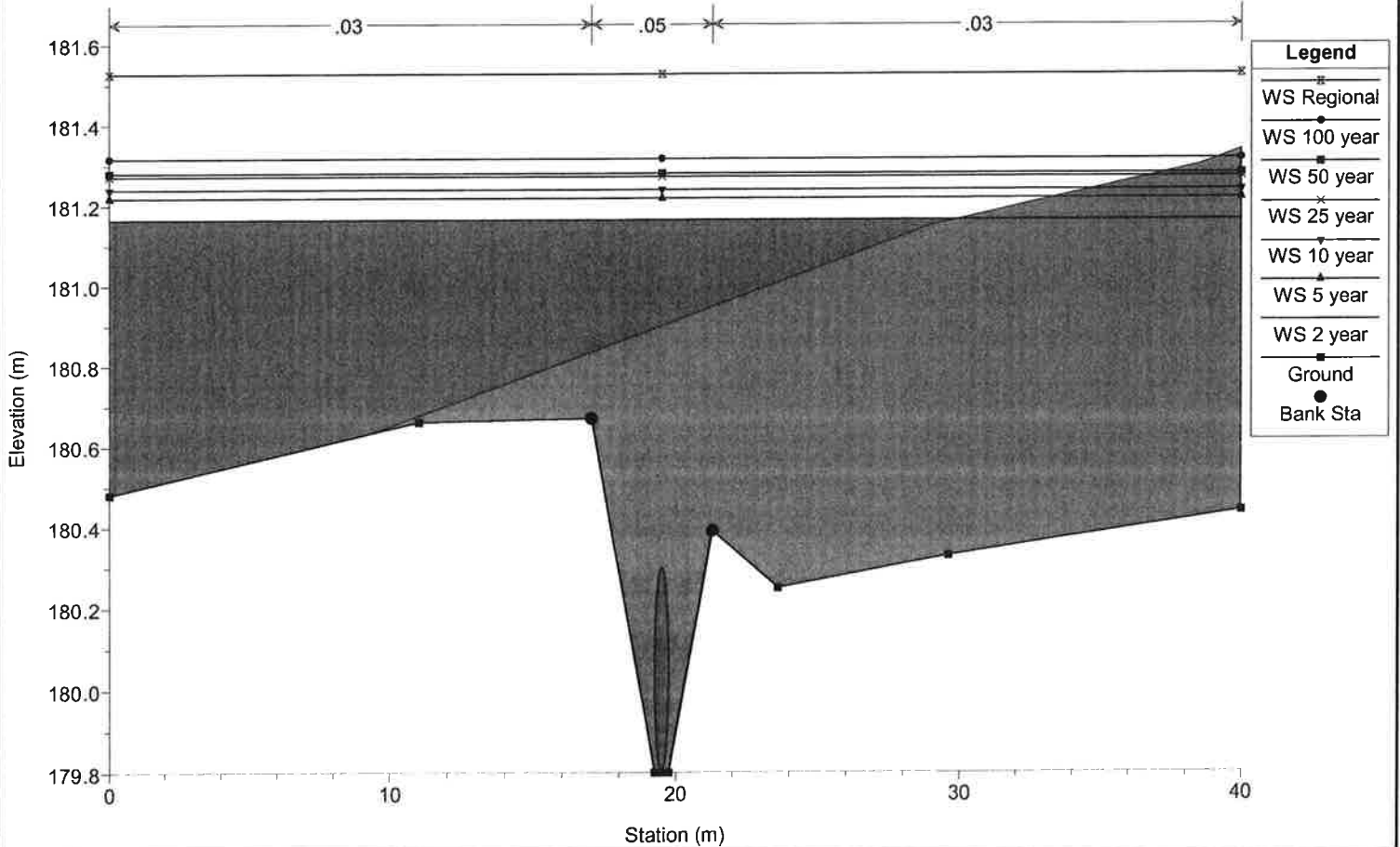
2015.08.13BlueFairway Plan: Proposed 8/13/2015

River = Channel Reach = Channel RS = 230 Culv



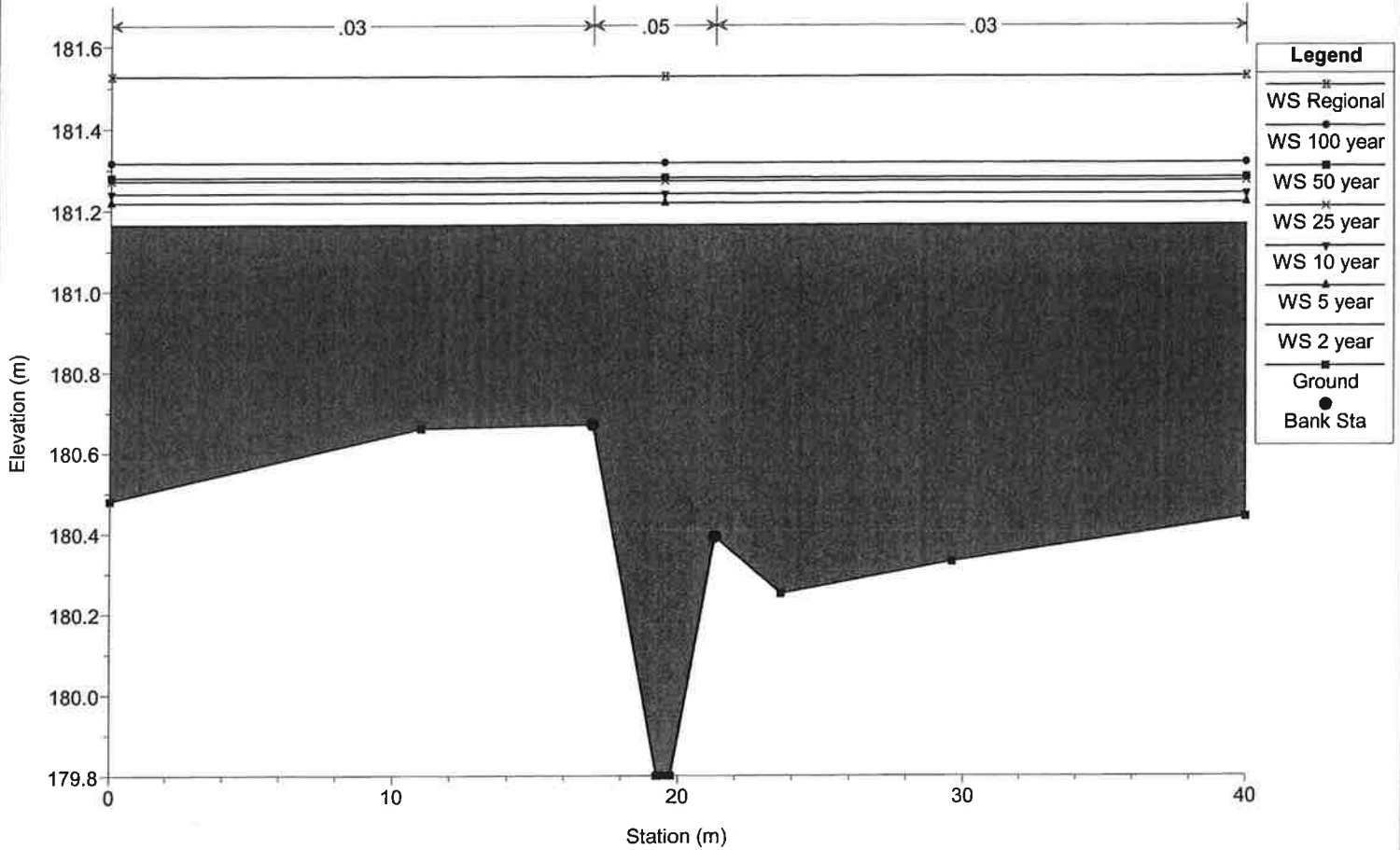
2015.08.13BlueFairway Plan: Proposed 8/13/2015

River = Channel Reach = Channel RS = 230 Culv



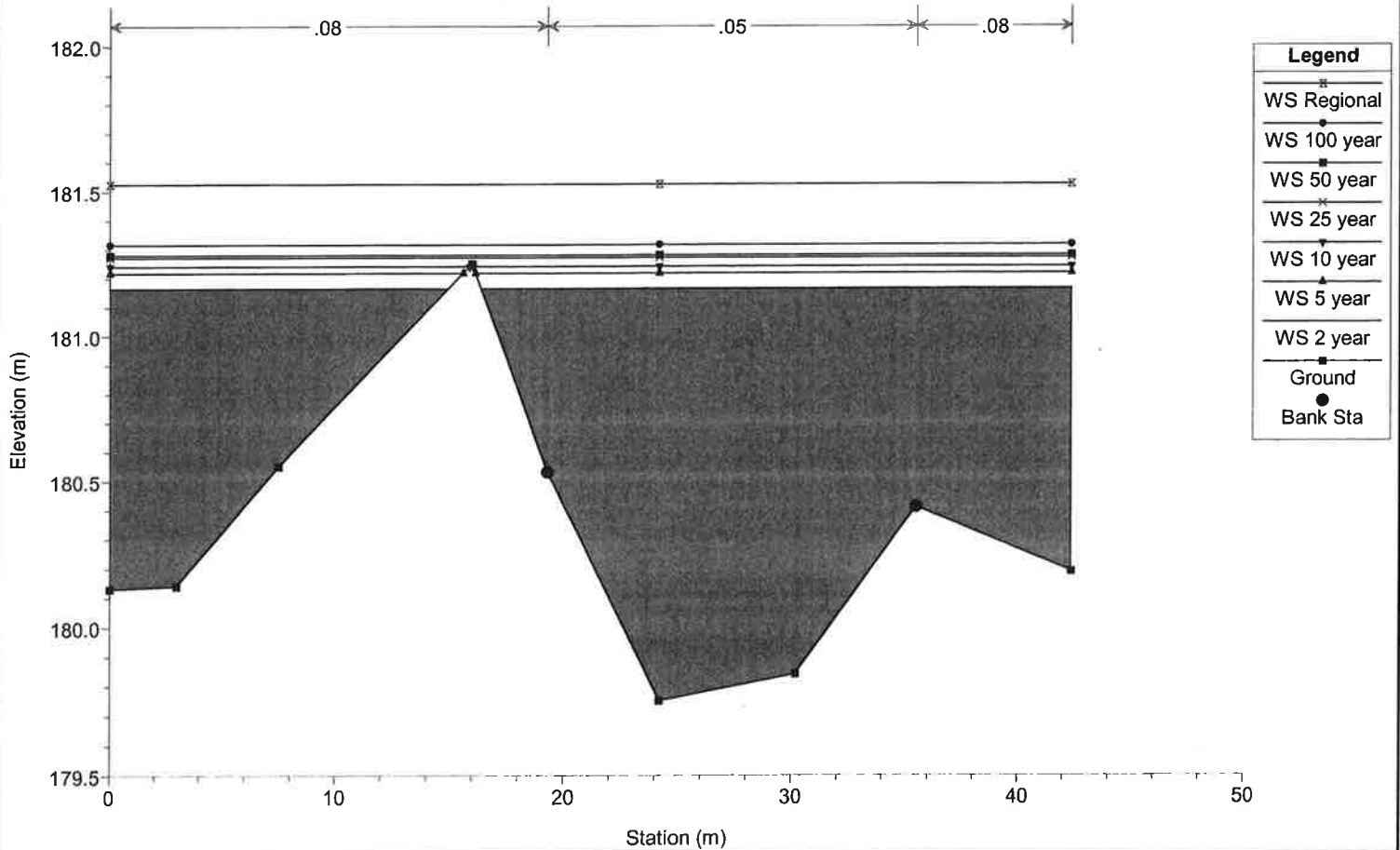
2015.08.13BlueFairway Plan: Proposed 8/13/2015

River = Channel Reach = Channel RS = 208



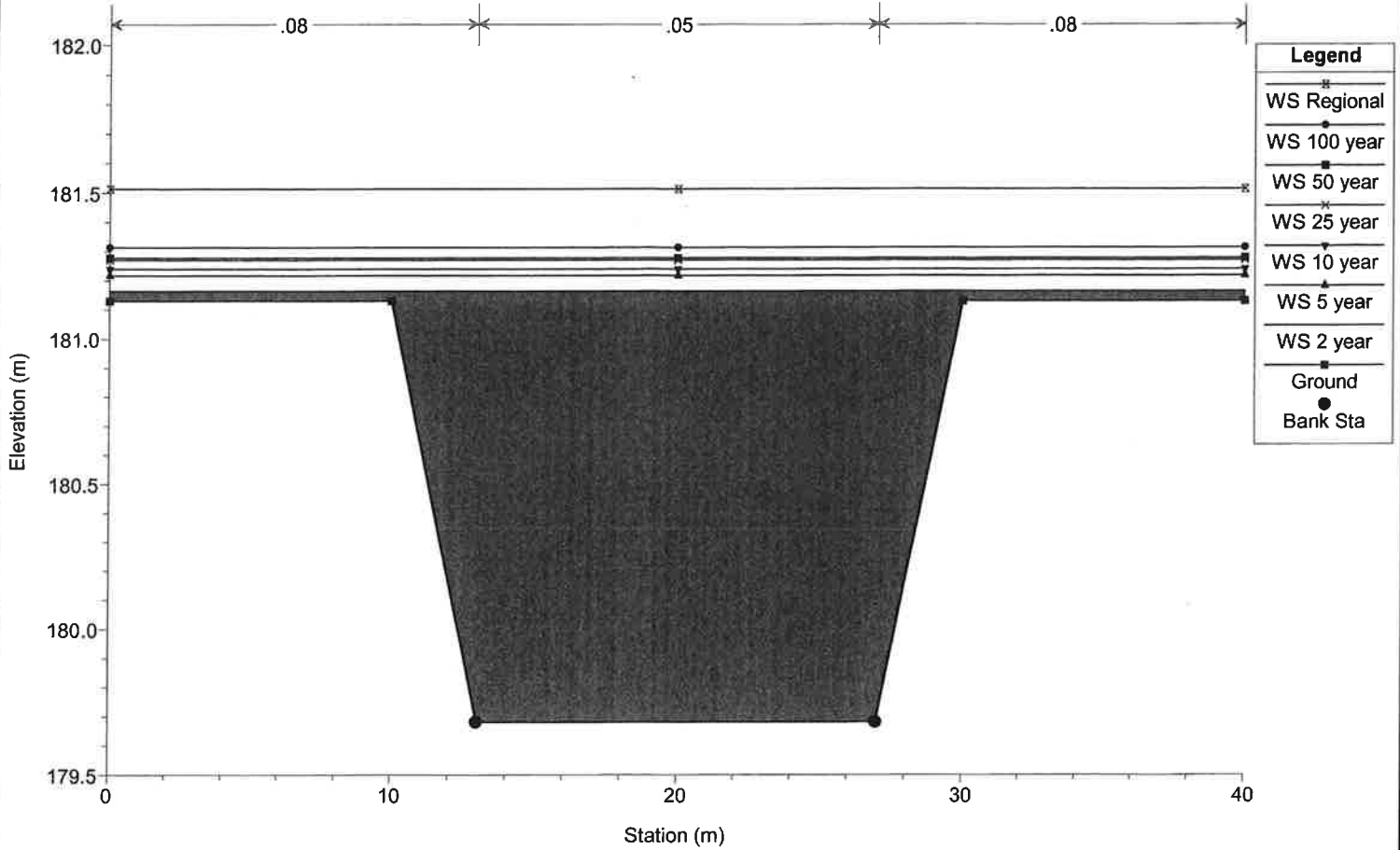
2015.08.13BlueFairway Plan: Proposed 8/13/2015

River = Channel Reach = Channel RS = 199



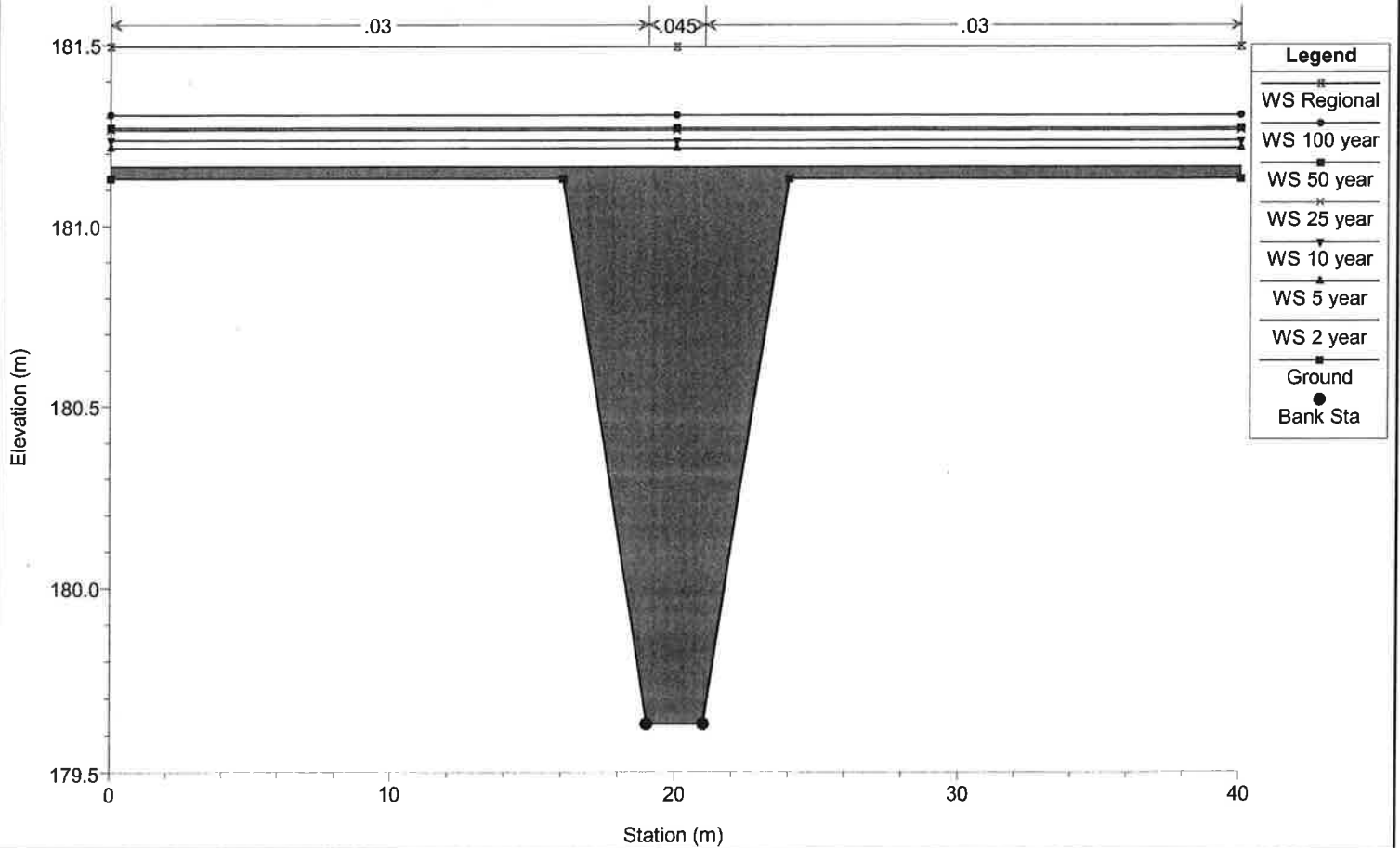
2015.08.13BlueFairway Plan: Proposed 8/13/2015

River = Channel Reach = Channel RS = 163



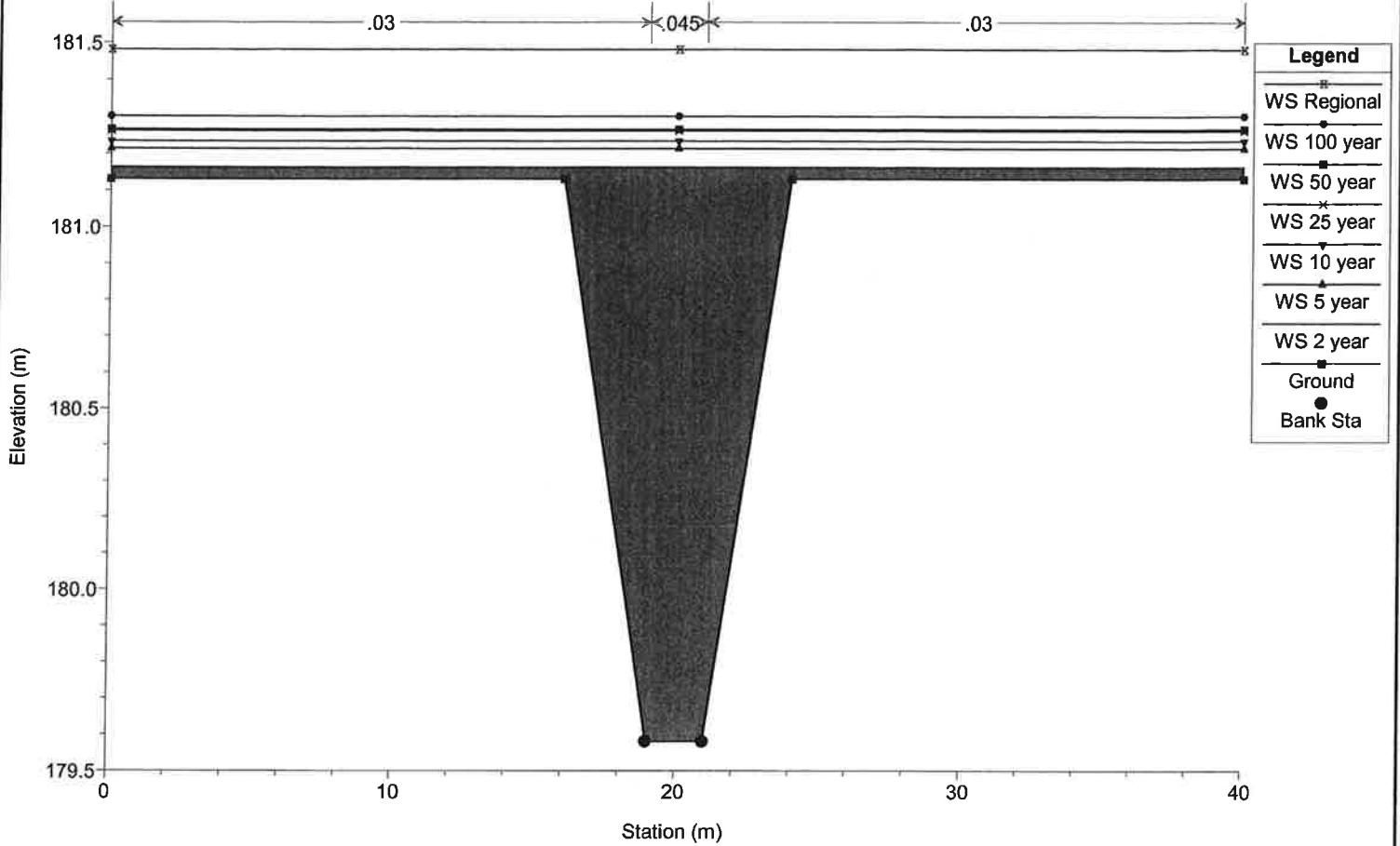
2015.08.13BlueFairway Plan: Proposed 8/13/2015

River = Channel Reach = Channel RS = 147



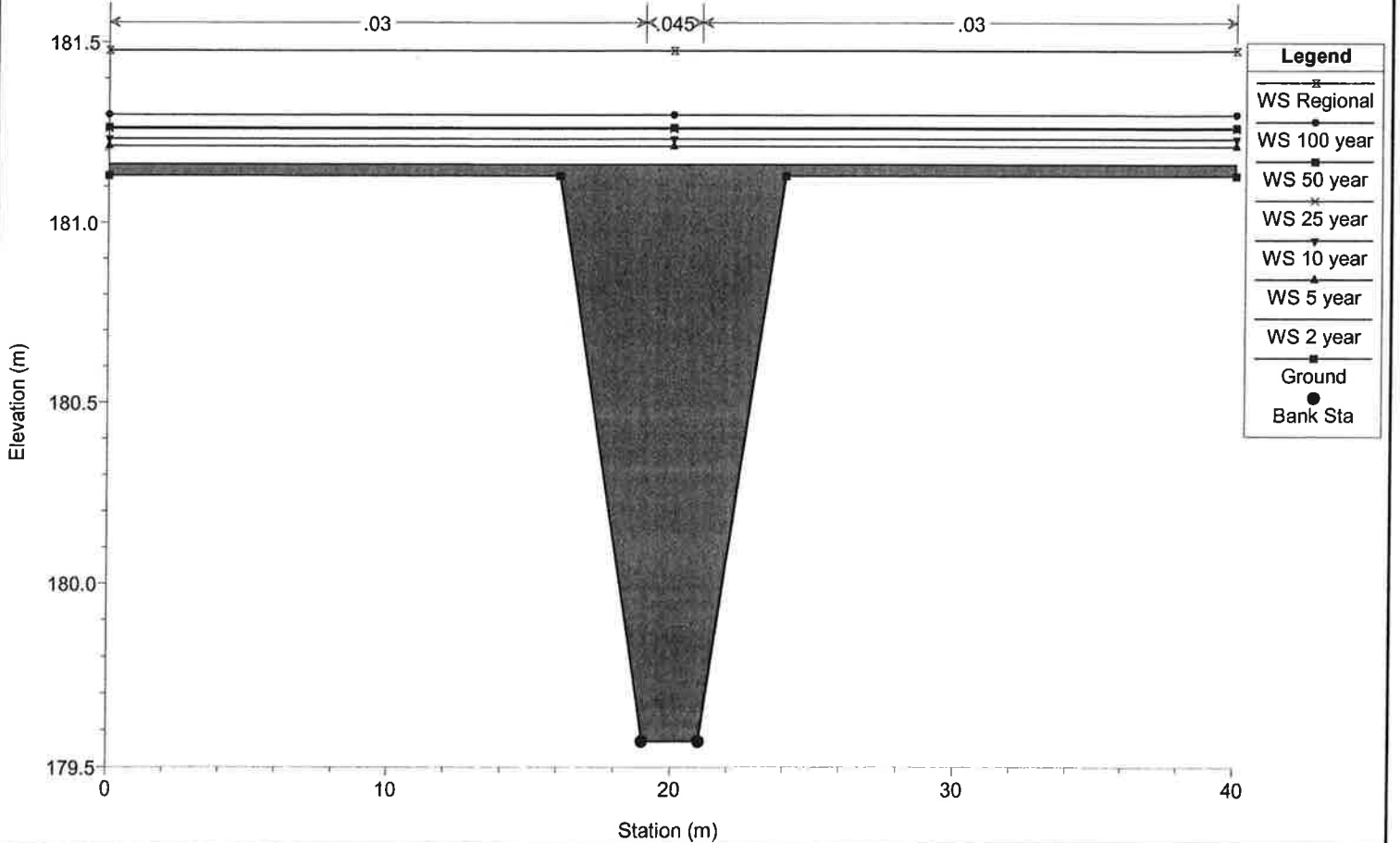
2015.08.13BlueFairway Plan: Proposed 8/13/2015

River = Channel Reach = Channel RS = 129

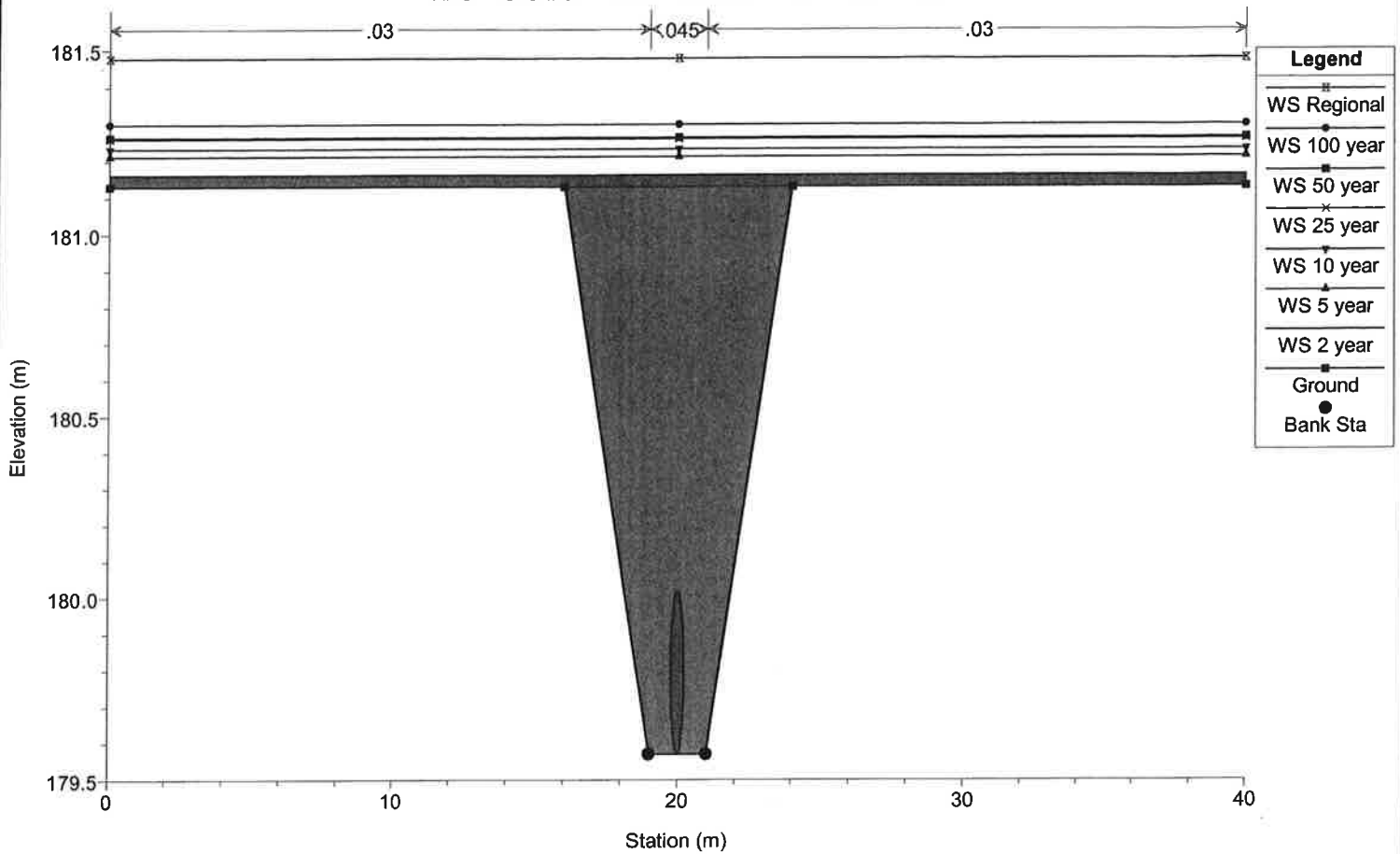


2015.08.13BlueFairway Plan: Proposed 8/13/2015

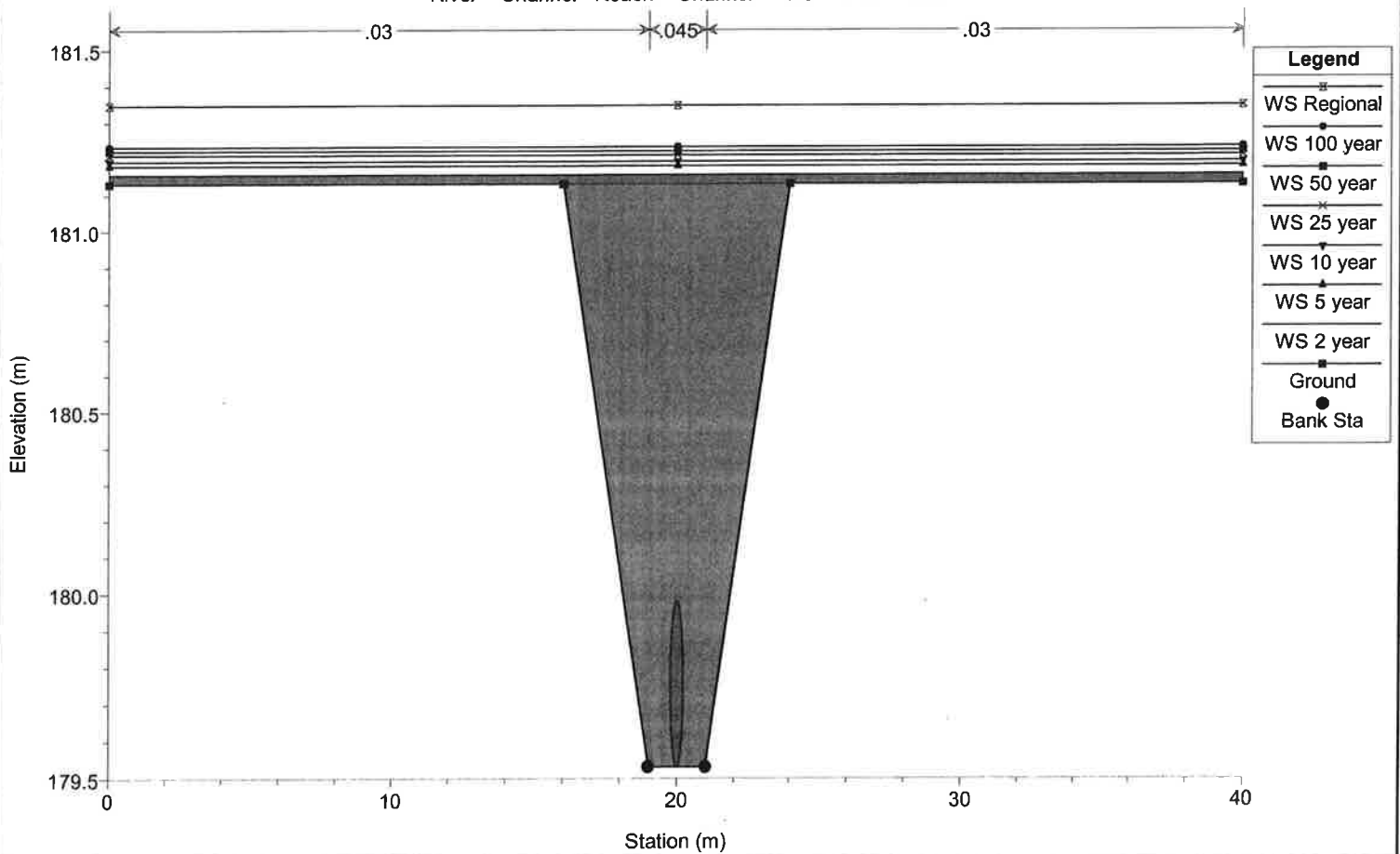
River = Channel Reach = Channel RS = 123



2015.08.13BlueFairway Plan: Proposed 8/13/2015
 River = Channel Reach = Channel RS = 116 Culv

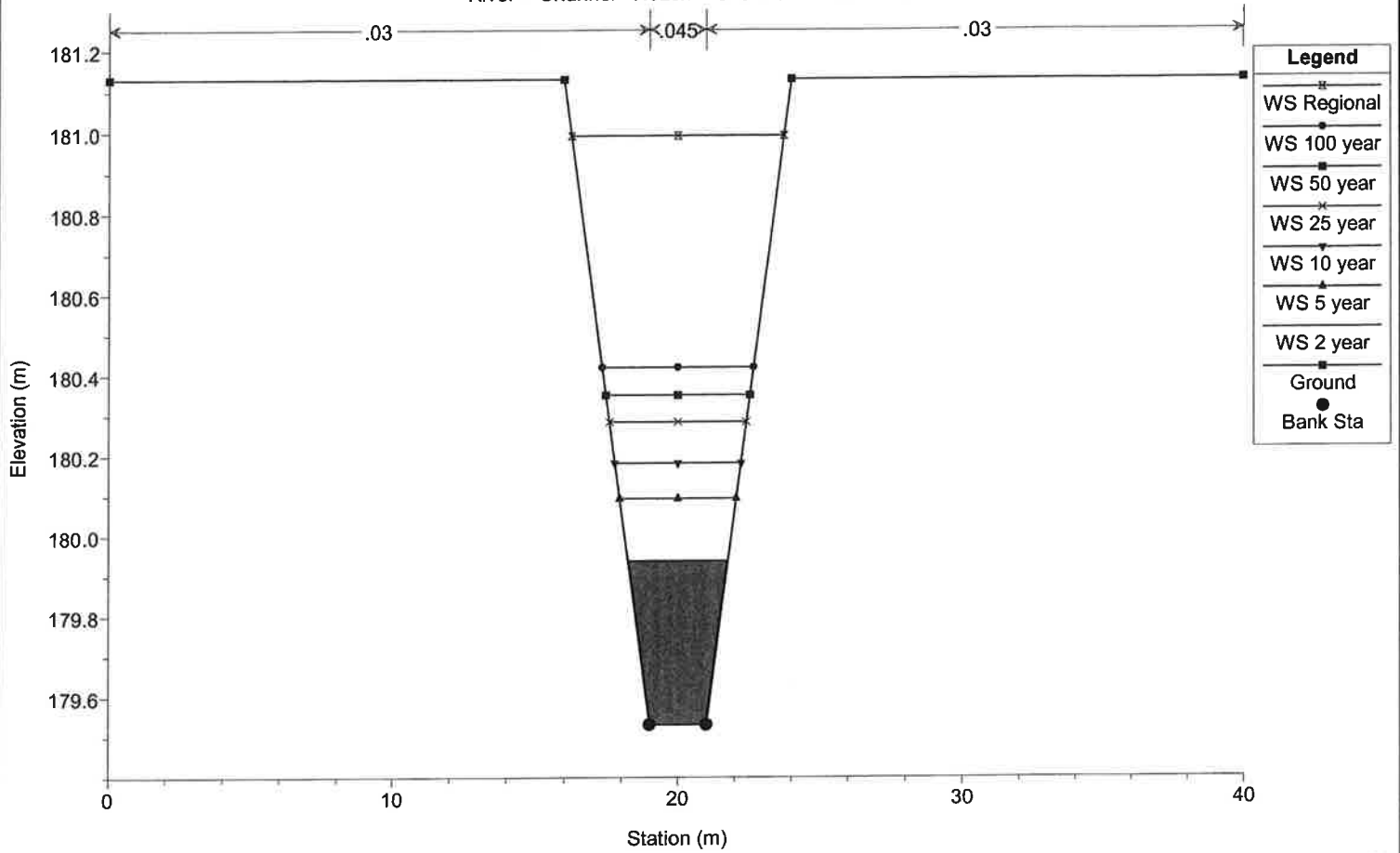


2015.08.13BlueFairway Plan: Proposed 8/13/2015
 River = Channel Reach = Channel RS = 116 Culv



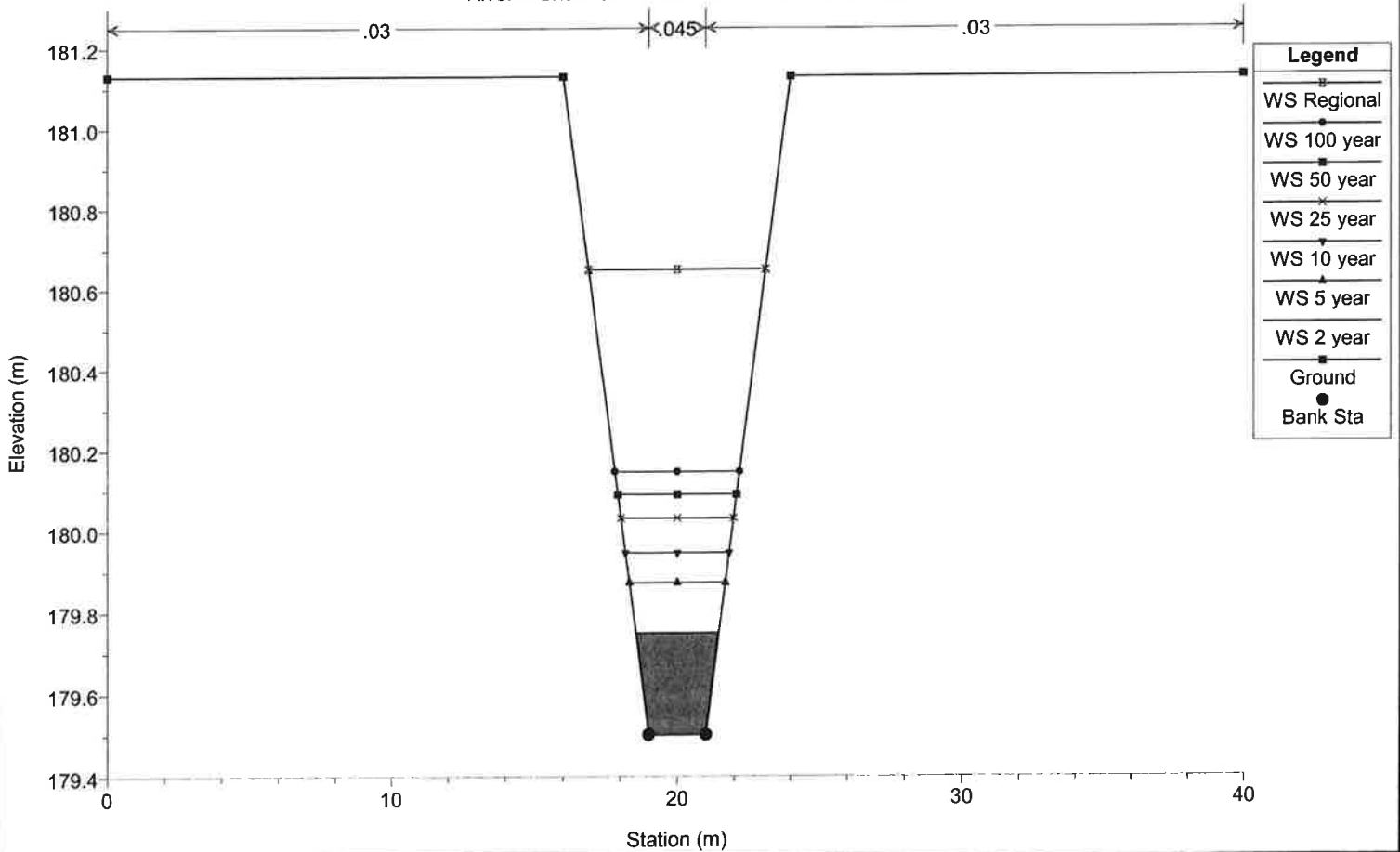
2015.08.13BlueFairway Plan: Proposed 8/13/2015

River = Channel Reach = Channel RS = 110



2015.08.13BlueFairway Plan: Proposed 8/13/2015

River = Channel Reach = Channel RS = 100



307. Blockage from side.

721-3505
Blue Fairways
West Watercourse
307. Blockage

Forwarded
to NVCA
May 21
2016
JMP

HEC-RAS Plan: CulBlock 13Side River: Channel Reach: Channel

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
Channel	416	2 year	0.88	183.27	183.91	183.65	183.92	0.002550	0.40	2.21	10.25	0.27
Channel	416	5 year	1.71	183.27	184.00	183.80	184.01	0.003586	0.53	3.25	12.91	0.33
Channel	416	10 year	2.32	183.27	184.04	183.85	184.06	0.003589	0.59	4.12	20.71	0.34
Channel	416	25 year	3.14	183.27	184.10	183.90	184.12	0.003384	0.64	5.32	24.61	0.34
Channel	416	50 year	3.76	183.27	184.13	183.94	184.15	0.003183	0.66	6.21	25.80	0.34
Channel	416	100 year	4.44	183.27	184.15	183.97	184.18	0.003511	0.71	6.75	26.65	0.36
Channel	416	Regional	12.83	183.27	184.35	184.21	184.39	0.004040	1.00	14.76	54.21	0.41
Channel	415		Bridge									
Channel	413	2 year	0.88	183.13	183.49	183.47	183.59	0.027989	1.42	0.62	2.44	0.90
Channel	413	5 year	1.71	183.13	183.63	183.61	183.78	0.029448	1.73	0.99	2.98	0.96
Channel	413	10 year	2.32	183.13	183.76	183.76	183.86	0.013780	1.48	2.15	15.21	0.70
Channel	413	25 year	3.14	183.13	183.83	183.83	183.91	0.011108	1.46	3.39	23.59	0.64
Channel	413	50 year	3.76	183.13	183.85	183.85	183.94	0.011942	1.56	3.88	26.83	0.67
Channel	413	100 year	4.44	183.13	183.88	183.88	183.97	0.012076	1.62	4.47	30.56	0.68
Channel	413	Regional	12.83	183.13	184.21		184.27	0.004992	1.40	13.58	62.77	0.47
Channel	383	2 year	0.88	182.43	182.84	182.81	182.91	0.018409	1.27	0.88	4.84	0.76
Channel	383	5 year	1.71	182.43	182.95	182.92	183.06	0.019430	1.62	1.44	5.50	0.82
Channel	383	10 year	2.32	182.43	183.01	182.99	183.15	0.020544	1.83	1.78	5.86	0.87
Channel	383	25 year	3.14	182.43	183.08	183.06	183.25	0.021695	2.06	2.20	6.27	0.91
Channel	383	50 year	3.76	182.43	183.12	183.11	183.31	0.022061	2.21	2.51	6.56	0.93
Channel	383	100 year	4.44	182.43	183.17	183.16	183.38	0.022702	2.36	2.81	6.84	0.96
Channel	383	Regional	12.83	182.43	183.80		184.03	0.011575	2.68	8.27	10.59	0.77
Channel	363	2 year	0.88	181.95	182.33	182.33	182.43	0.026238	1.42	0.76	4.70	0.89
Channel	363	5 year	1.71	181.95	182.44	182.44	182.58	0.024983	1.76	1.31	5.35	0.92
Channel	363	10 year	2.32	181.95	182.51	182.51	182.66	0.023233	1.90	1.70	5.78	0.92
Channel	363	25 year	3.14	181.95	182.59	182.58	182.77	0.022038	2.07	2.19	6.26	0.92
Channel	363	50 year	3.76	181.95	182.65	182.63	182.83	0.021458	2.19	2.53	6.58	0.92
Channel	363	100 year	4.44	181.95	182.71	182.68	182.90	0.020512	2.28	2.92	6.93	0.91
Channel	363	Regional	12.83	181.95	183.78		183.86	0.003131	1.72	13.80	13.36	0.42
Channel	343	2 year	0.88	181.58	182.05		182.09	0.008847	1.00	1.17	5.20	0.54
Channel	343	5 year	1.71	181.58	182.18		182.25	0.008863	1.25	1.95	6.03	0.57
Channel	343	10 year	2.32	181.58	182.26		182.34	0.008955	1.39	2.45	6.50	0.59
Channel	343	25 year	3.14	181.58	182.36		182.45	0.008633	1.52	3.12	7.10	0.60

HEC-RAS Plan: CulBlock 13Side River: Channel Reach: Channel (Continued)

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
Channel	343	50 year	3.76	181.58	182.44		182.53	0.007929	1.57	3.70	7.58	0.58
Channel	343	100 year	4.44	181.58	182.54		182.63	0.006934	1.59	4.43	8.13	0.56
Channel	343	Regional	12.83	181.58	183.76		183.81	0.001411	1.31	18.88	15.48	0.29
Channel	323	2 year	0.88	181.40	181.86		181.91	0.009630	1.02	1.13	5.15	0.56
Channel	323	5 year	1.71	181.40	181.99		182.06	0.010209	1.31	1.84	5.92	0.61
Channel	323	10 year	2.32	181.40	182.08		182.16	0.009501	1.42	2.39	6.45	0.61
Channel	323	25 year	3.14	181.40	182.21		182.29	0.007354	1.44	3.32	7.27	0.56
Channel	323	50 year	3.76	181.40	182.32		182.39	0.005982	1.43	4.13	7.91	0.51
Channel	323	100 year	4.44	181.40	182.44		182.51	0.004806	1.41	5.10	8.61	0.47
Channel	323	Regional	12.83	181.40	183.74		183.78	0.001003	1.16	21.06	14.83	0.25
Channel	313	2 year	0.88	181.31	181.73	181.69	181.80	0.014918	1.18	0.95	4.94	0.69
Channel	313	5 year	1.71	181.31	181.87		181.95	0.012783	1.41	1.69	5.77	0.68
Channel	313	10 year	2.32	181.31	182.00		182.07	0.008806	1.38	2.46	6.52	0.59
Channel	313	25 year	3.14	181.31	182.16		182.23	0.005922	1.34	3.61	7.50	0.50
Channel	313	50 year	3.76	181.31	182.28		182.34	0.004665	1.32	4.54	8.21	0.46
Channel	313	100 year	4.44	181.31	182.41		182.46	0.003717	1.29	5.64	8.98	0.42
Channel	313	Regional	12.83	181.31	183.74		183.77	0.000836	1.09	22.40	14.64	0.23
Channel	303	2 year	0.88	181.22	181.57	181.53	181.63	0.022919	1.24	0.90	4.49	0.83
Channel	303	5 year	1.71	181.22	181.81	181.63	181.86	0.007193	1.12	1.91	5.93	0.53
Channel	303	10 year	2.32	181.22	181.95	181.69	182.00	0.005405	1.16	2.50	6.78	0.48
Channel	303	25 year	3.14	181.22	182.12	181.77	182.18	0.004297	1.22	3.22	7.80	0.44
Channel	303	50 year	3.76	181.22	182.24	181.82	182.30	0.003816	1.27	3.72	8.51	0.43
Channel	303	100 year	4.44	181.22	182.36	181.87	182.43	0.003452	1.31	4.23	9.25	0.42
Channel	303	Regional	12.83	181.22	183.64	182.41	183.75	0.001883	1.67	9.62	13.38	0.35
Channel	280		Culvert									
Channel	277	2 year	0.88	180.80	181.17	180.93	181.18	0.001261	0.41	2.16	14.99	0.21
Channel	277	5 year	1.71	180.80	181.24	181.01	181.26	0.002679	0.66	2.57	15.92	0.32
Channel	277	10 year	2.32	180.80	181.26	181.05	181.30	0.004195	0.86	2.70	16.22	0.40
Channel	277	25 year	3.14	180.80	181.32	181.11	181.37	0.005192	1.03	3.04	17.00	0.46
Channel	277	50 year	3.76	180.80	181.35	181.15	181.42	0.006245	1.17	3.20	17.37	0.51
Channel	277	100 year	4.44	180.80	181.39	181.19	181.47	0.006823	1.29	3.44	17.93	0.54
Channel	277	Regional	12.83	180.80	181.72	181.59	182.01	0.012906	2.39	5.38	22.39	0.79

HEC-RAS Plan: CulBlock 13Side River: Channel Reach: Channel (Continued)

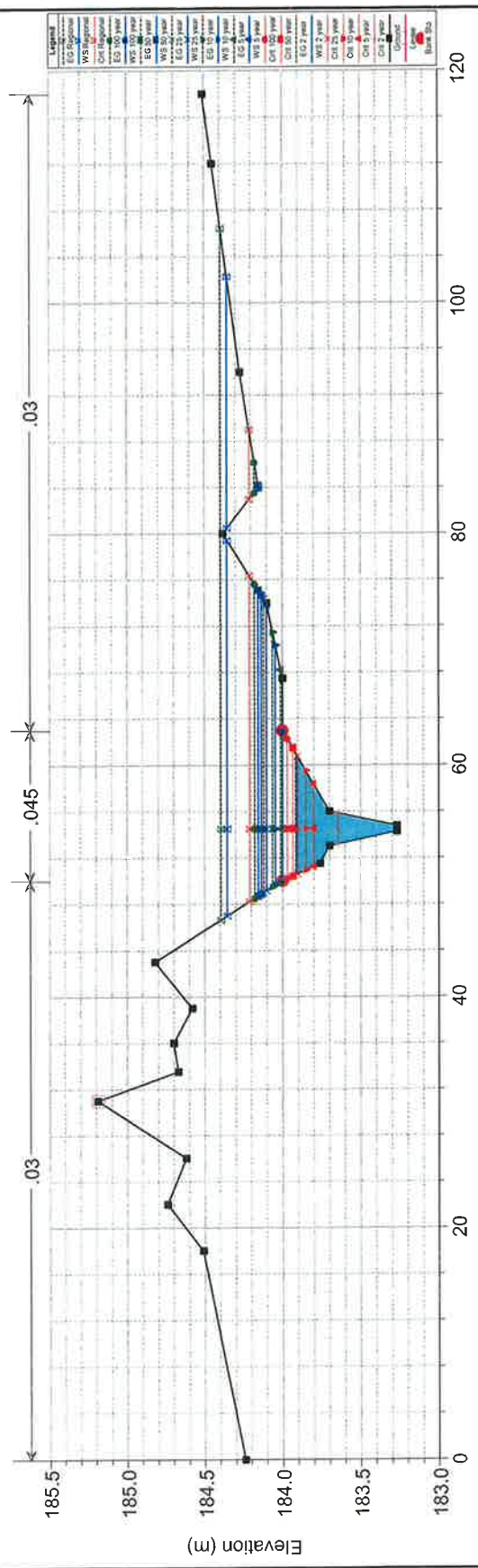
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Channel	261	2 year	0.88	180.51	181.17		181.17	0.000248	0.26	4.65	10.20	0.10
Channel	261	5 year	1.71	180.51	181.23		181.24	0.000664	0.46	5.31	10.79	0.17
Channel	261	10 year	2.32	180.51	181.24		181.26	0.001136	0.61	5.46	10.92	0.23
Channel	261	25 year	3.14	180.51	181.29		181.32	0.001607	0.76	6.04	11.41	0.27
Channel	261	50 year	3.76	180.51	181.31		181.35	0.002079	0.88	6.28	11.61	0.31
Channel	261	100 year	4.44	180.51	181.35		181.39	0.002429	0.98	6.73	11.97	0.34
Channel	261	Regional	12.83	180.51	181.67		181.80	0.005761	1.86	11.04	14.99	0.55
Channel	254	2 year	0.88	180.39	181.16		181.17	0.000142	0.22	5.54	10.30	0.08
Channel	254	5 year	1.71	180.39	181.23		181.23	0.000401	0.39	6.19	10.80	0.14
Channel	254	10 year	2.32	180.39	181.24		181.25	0.000697	0.53	6.32	10.90	0.18
Channel	254	25 year	3.14	180.39	181.29		181.31	0.001029	0.66	6.87	11.31	0.22
Channel	254	50 year	3.76	180.39	181.31		181.33	0.001358	0.77	7.10	11.47	0.26
Channel	254	100 year	4.44	180.39	181.34		181.37	0.001631	0.87	7.52	11.76	0.28
Channel	254	Regional	12.83	180.39	181.64		181.76	0.004717	1.77	11.40	14.20	0.51
Channel	249	2 year	0.88	180.29	181.16	180.45	181.17	0.000088	0.15	6.01	11.90	0.06
Channel	249	5 year	1.71	180.29	181.23	180.53	181.23	0.000251	0.26	6.80	13.65	0.10
Channel	249	10 year	2.32	180.29	181.24	180.59	181.25	0.000435	0.35	6.97	14.01	0.14
Channel	249	25 year	3.14	180.29	181.29	180.65	181.30	0.000633	0.44	7.71	15.20	0.17
Channel	249	50 year	3.76	180.29	181.31	180.69	181.32	0.000822	0.51	8.02	15.24	0.19
Channel	249	100 year	4.44	180.29	181.35	180.73	181.36	0.000960	0.57	8.59	15.31	0.21
Channel	249	Regional	12.83	180.29	181.66	181.11	181.72	0.002336	1.11	13.47	15.88	0.34
Channel	230	Culvert										
Channel	208	2 year	0.88	179.80	181.16		181.16	0.000001	0.02	29.25	40.00	0.01
Channel	208	5 year	1.71	179.80	181.22		181.22	0.000004	0.04	31.38	40.00	0.01
Channel	208	10 year	2.32	179.80	181.24		181.24	0.000007	0.06	32.32	40.00	0.02
Channel	208	25 year	3.14	179.80	181.27		181.27	0.000012	0.07	33.55	40.00	0.02
Channel	208	50 year	3.76	179.80	181.28		181.28	0.000016	0.09	33.87	40.00	0.03
Channel	208	100 year	4.44	179.80	181.32		181.32	0.000020	0.10	35.32	40.00	0.03
Channel	208	Regional	12.83	179.80	181.53		181.53	0.000083	0.22	43.73	40.00	0.06
Channel	199	2 year	0.88	179.75	181.16		181.16	0.000003	0.03	34.69	40.97	0.01
Channel	199	5 year	1.71	179.75	181.22		181.22	0.000008	0.06	36.90	41.86	0.02
Channel	199	10 year	2.32	179.75	181.24		181.24	0.000014	0.08	37.87	42.25	0.02
Channel	199	25 year	3.14	179.75	181.27		181.27	0.000023	0.11	39.18	42.40	0.03

HEC-RAS Plan: CulBlock 13Side River: Channel Reach: Channel (Continued)

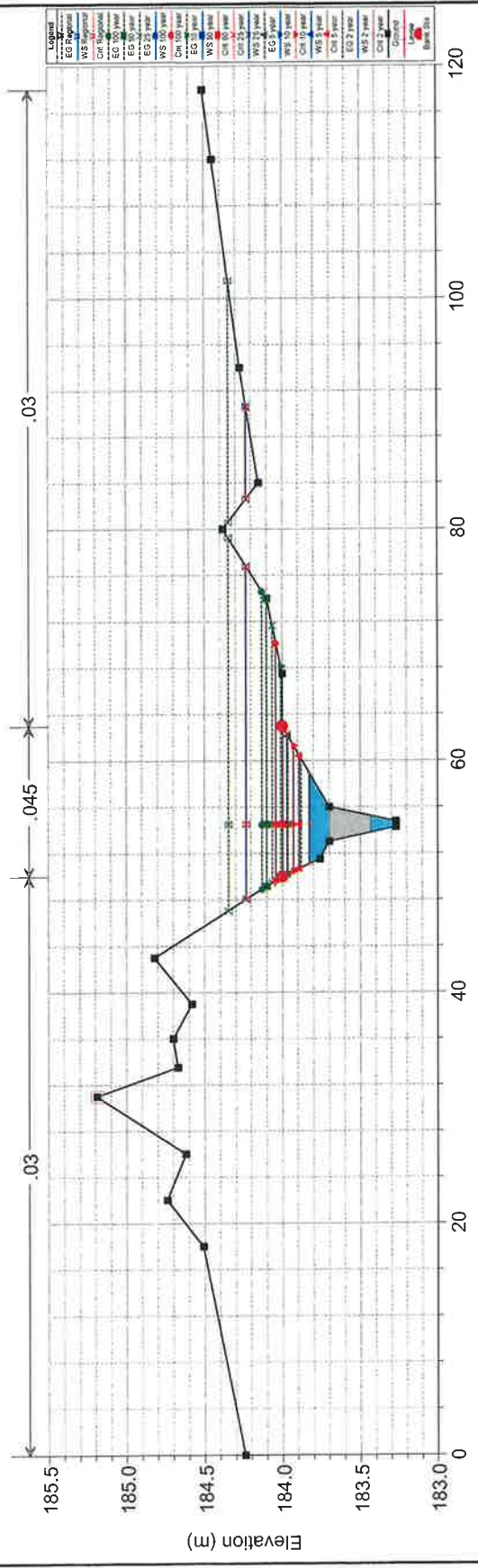
HEC-RAS Plan: CulBlock 13Side River: Channel Reach: Channel (Continued)

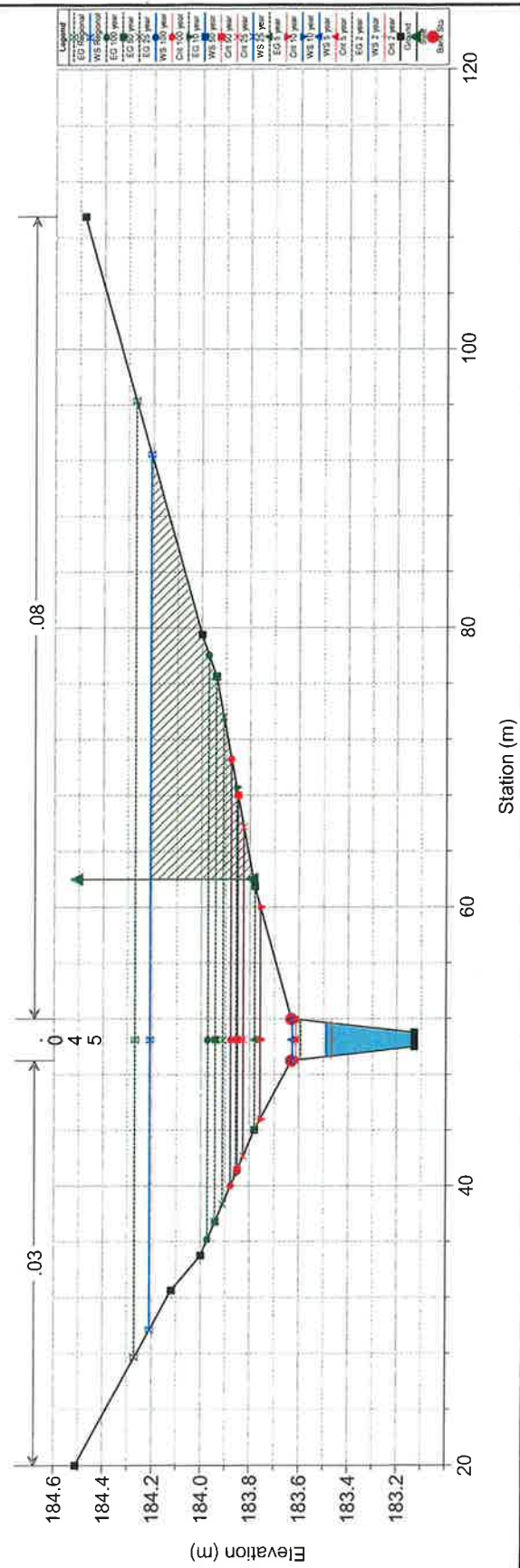
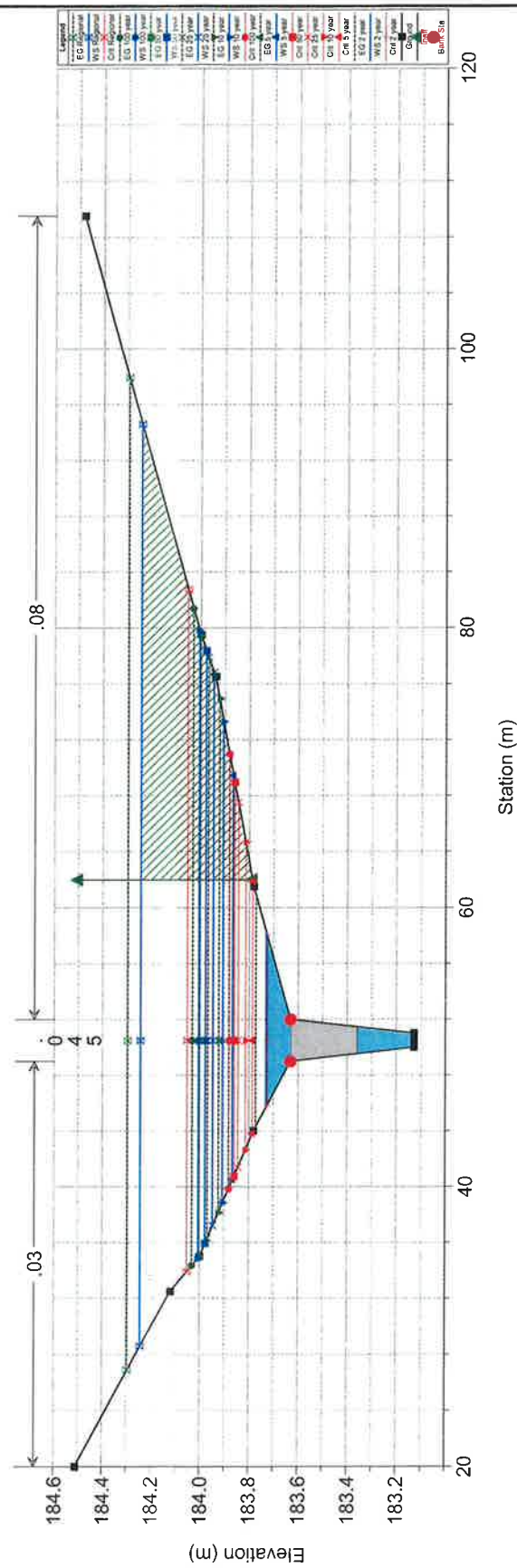
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Channel	110	2 year	0.88	179.53	179.94	179.78	179.97	0.004425	0.81	1.12	3.53	0.41
Channel	110	5 year	1.71	179.53	180.09		180.14	0.004739	1.04	1.72	4.11	0.44
Channel	110	10 year	2.32	179.53	180.18		180.24	0.004849	1.16	2.10	4.44	0.46
Channel	110	25 year	3.14	179.53	180.28		180.36	0.004911	1.29	2.57	4.83	0.47
Channel	110	50 year	3.76	179.53	180.35		180.44	0.004964	1.37	2.90	5.08	0.48
Channel	110	100 year	4.44	179.53	180.42		180.52	0.004958	1.45	3.26	5.33	0.49
Channel	110	Regional	12.83	179.53	180.99	180.67	181.17	0.004894	2.00	6.93	7.48	0.53
Channel	100	2 year	0.88	179.50	179.75	179.75	179.86	0.028120	1.47	0.61	2.92	0.94
Channel	100	5 year	1.71	179.50	179.87	179.87	180.02	0.023750	1.77	1.00	3.37	0.93
Channel	100	10 year	2.32	179.50	179.95	179.95	180.12	0.021833	1.92	1.26	3.64	0.92
Channel	100	25 year	3.14	179.50	180.03	180.03	180.23	0.020291	2.08	1.58	3.96	0.91
Channel	100	50 year	3.76	179.50	180.09	180.09	180.31	0.019168	2.17	1.82	4.17	0.90
Channel	100	100 year	4.44	179.50	180.15	180.15	180.39	0.018603	2.27	2.06	4.38	0.90
Channel	100	Regional	12.83	179.50	180.65	180.65	181.03	0.014236	2.91	4.73	6.23	0.87

2015.08.13BlueFairway Plan: Proposed - Culvert 1/3 Side Blocked $R_s = 4/6$

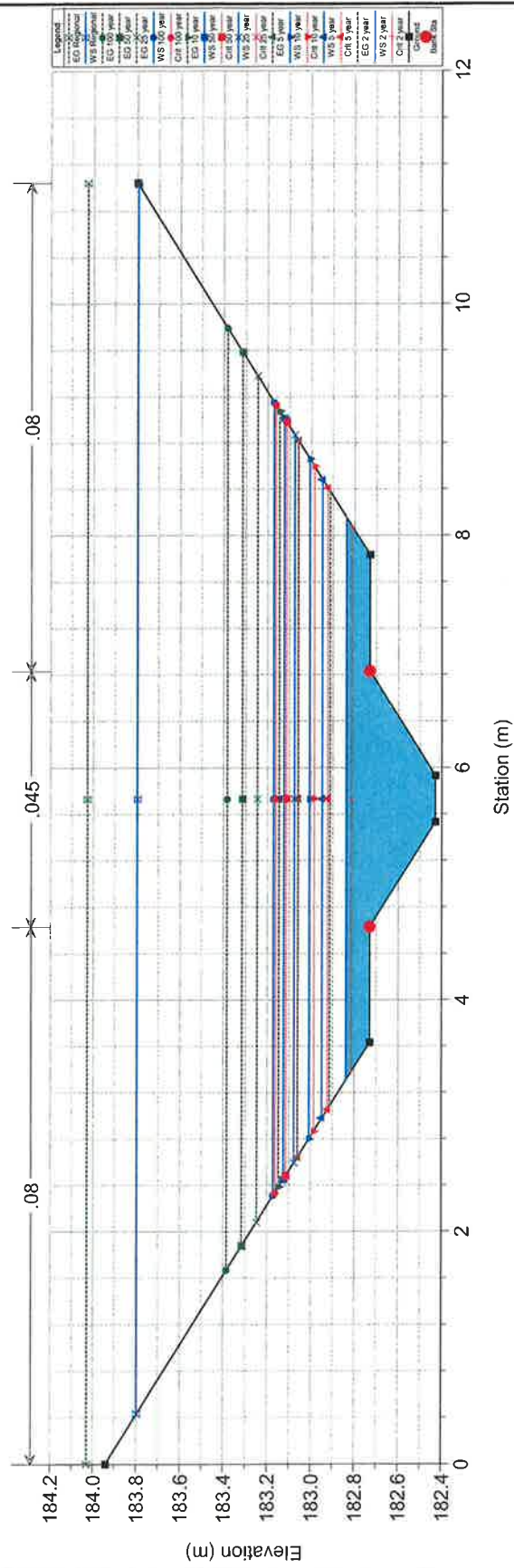


2015.08.13BlueFairway Plan: Proposed - Culvert 1/3 Side Blocked $R_s = 4/5$

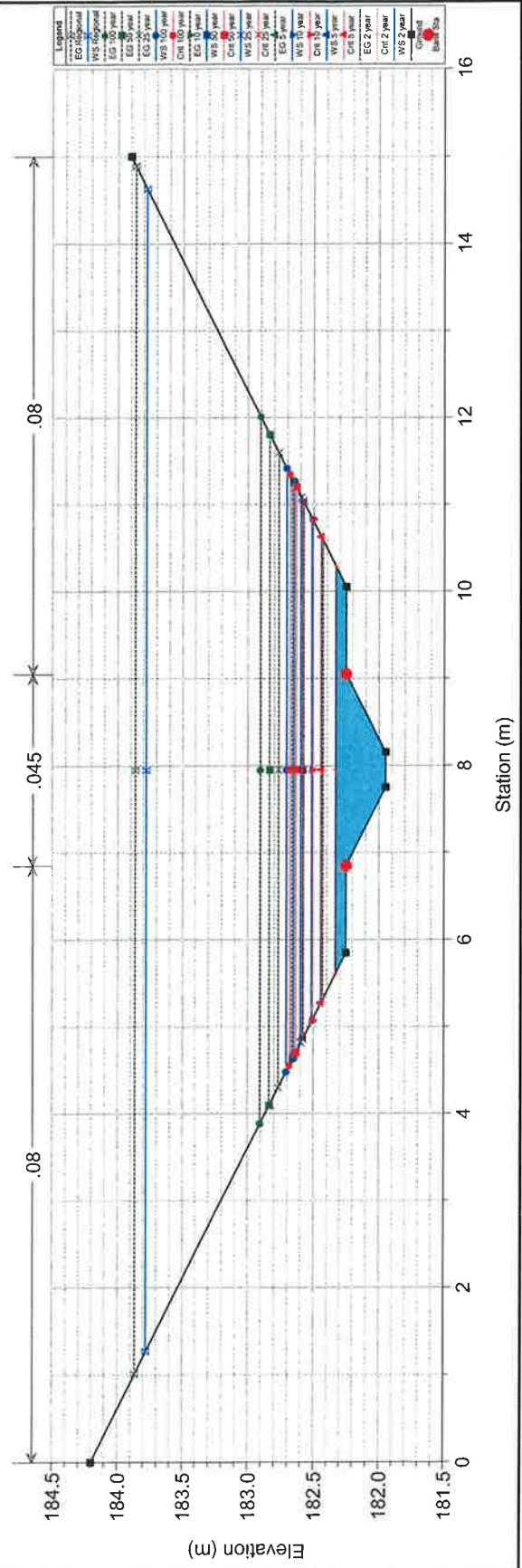




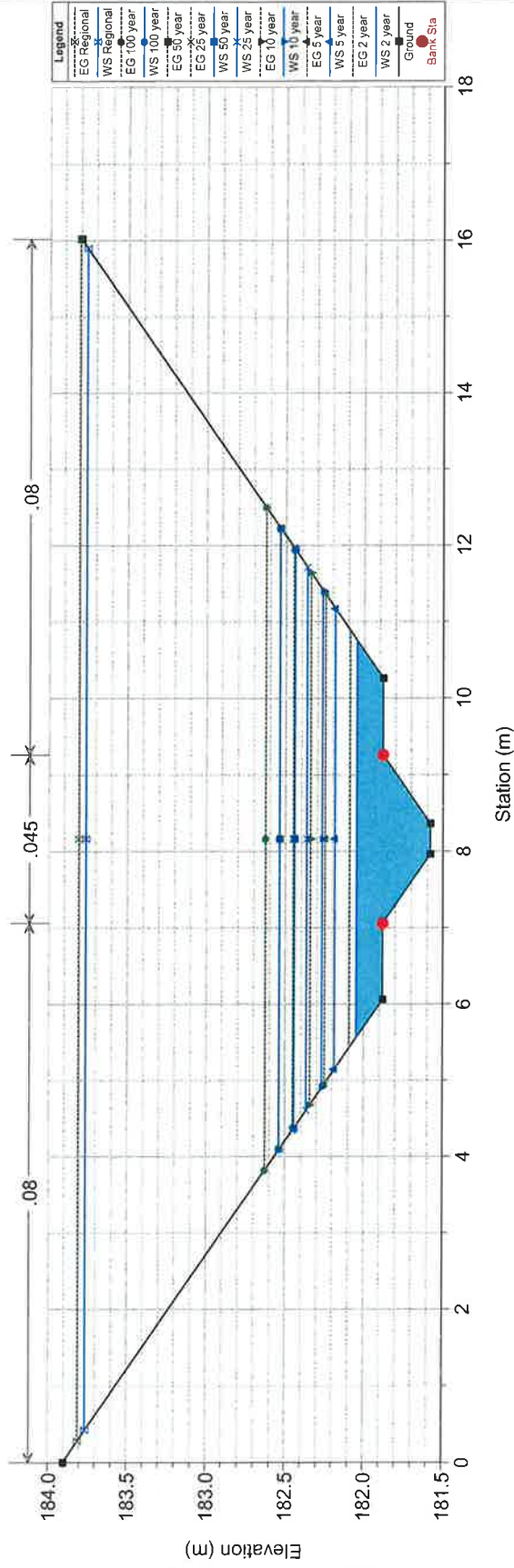
2015.08.13BlueFairway	Plan: Proposed - Culvert 1/3 Side Blocked	4/4/2016	RS = 363
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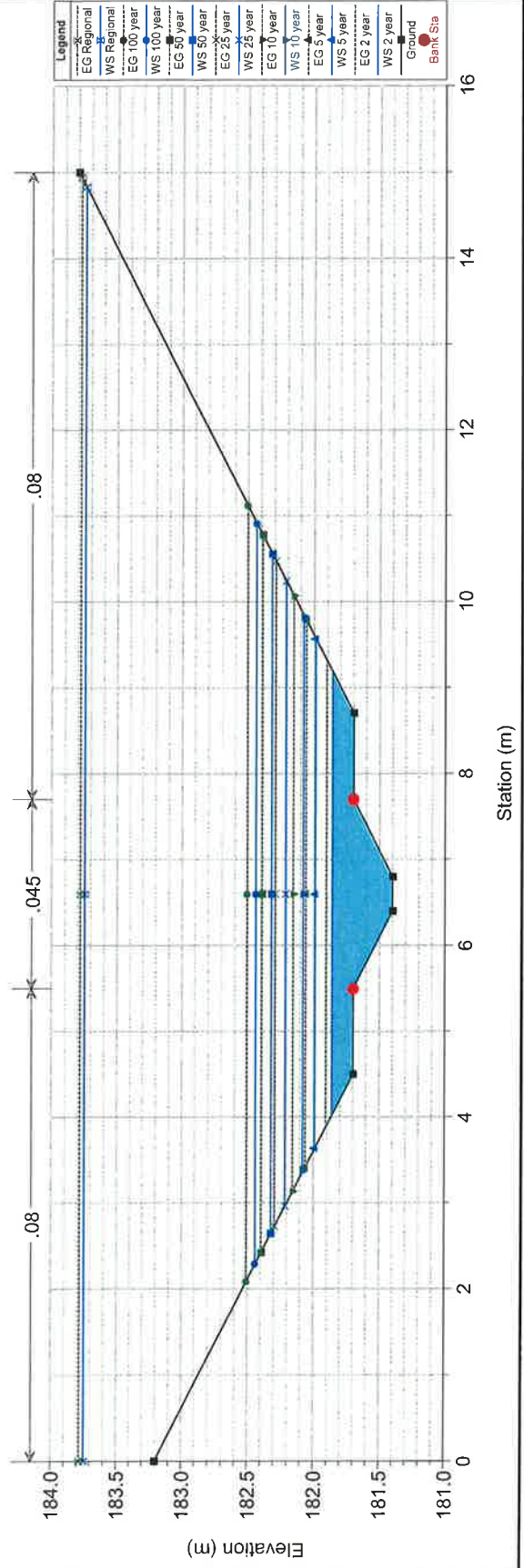
2015.08.13	BlueFairway	Plan: Proposed - Culvert 1/3 Side Blocked	4/4/2016	RS = 363
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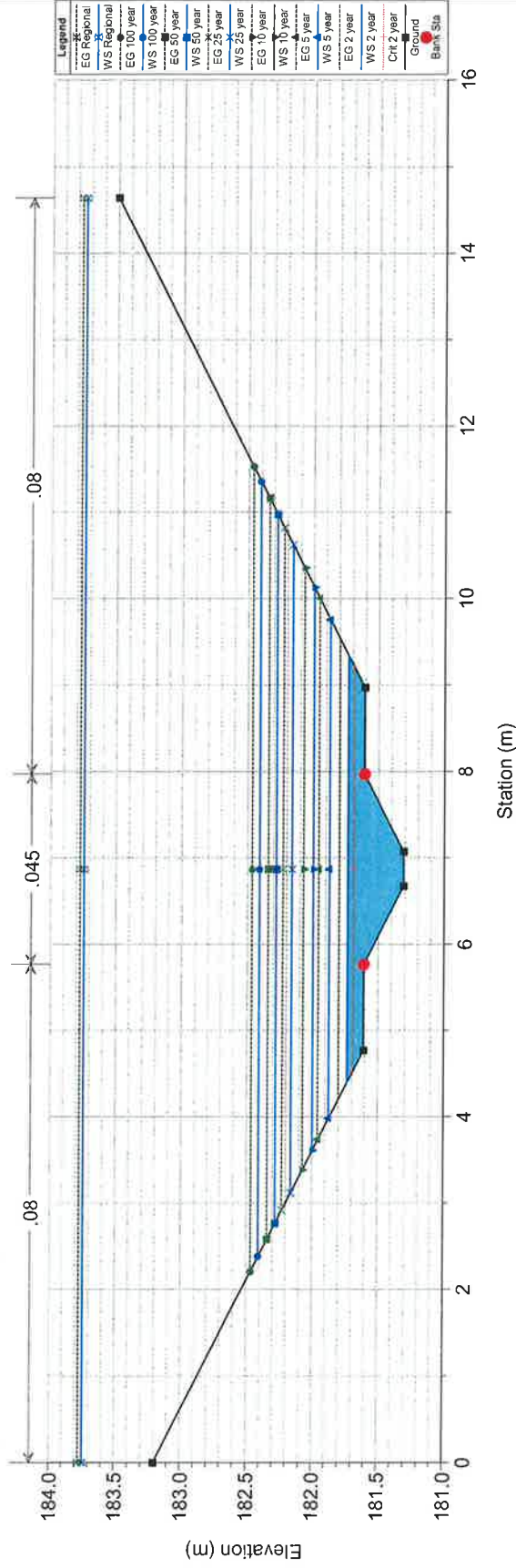
2015.08.13BlueFairway Plan: Proposed - Culvert 1/3 Side Blocked $RS = 343$ 4/4/2016



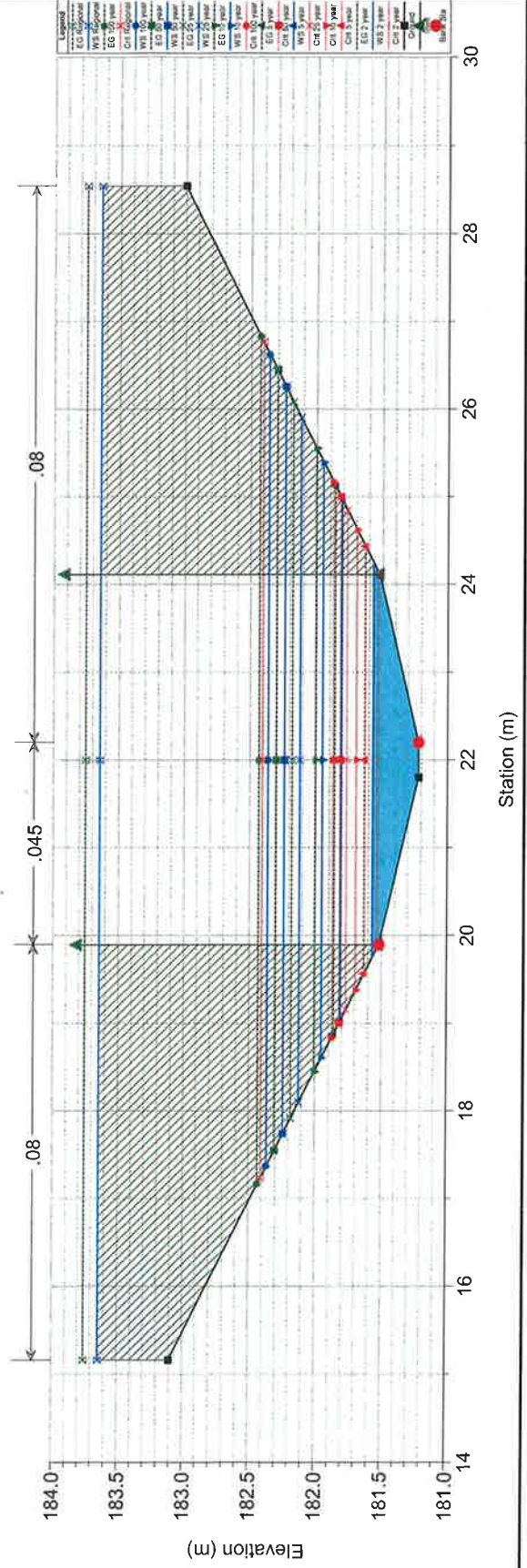
2015.08.13BlueFairway Plan: Proposed - Culvert 1/3 Side Blocked $RS = 323$ 4/4/2016

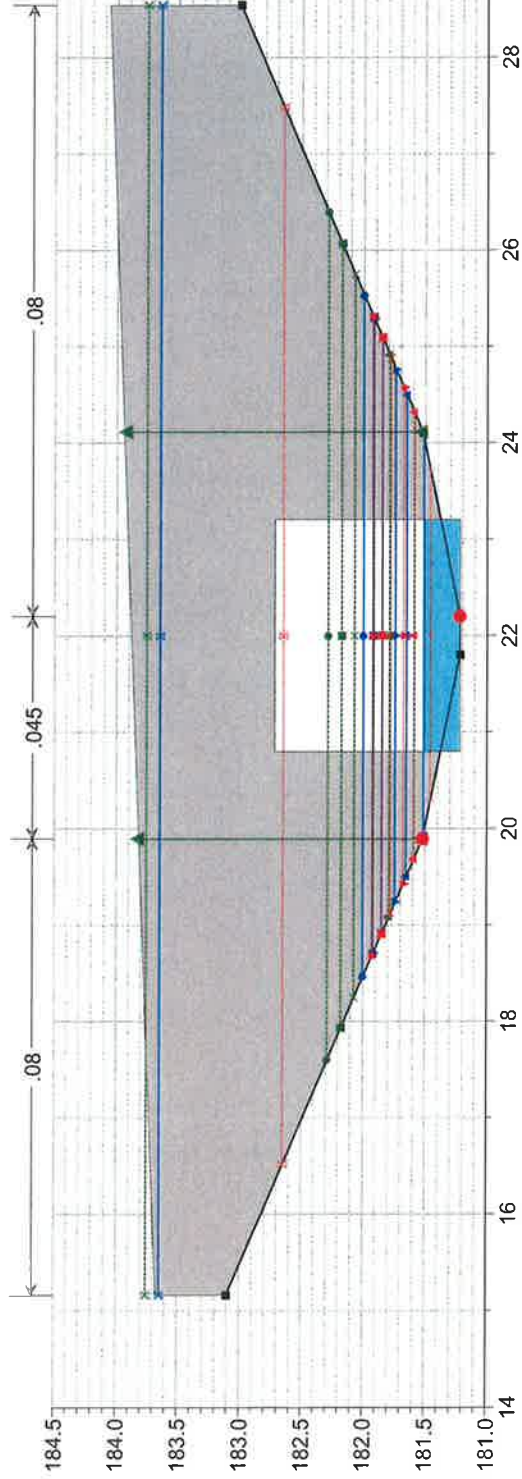


2015.08.13BlueFairway Plan: Proposed - Culvert 1/3 Side Blocked RS = 313

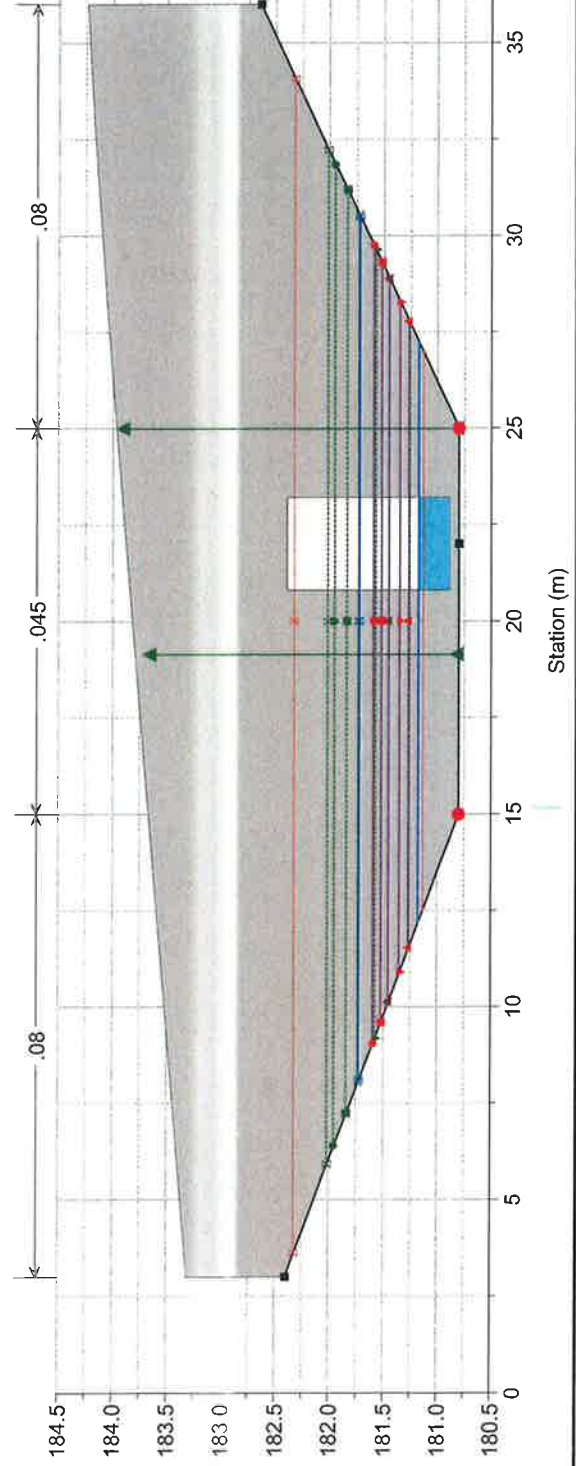


2015.08.13BlueFairway Plan: Proposed - Culvert 1/3 Side Blocked RS = 303

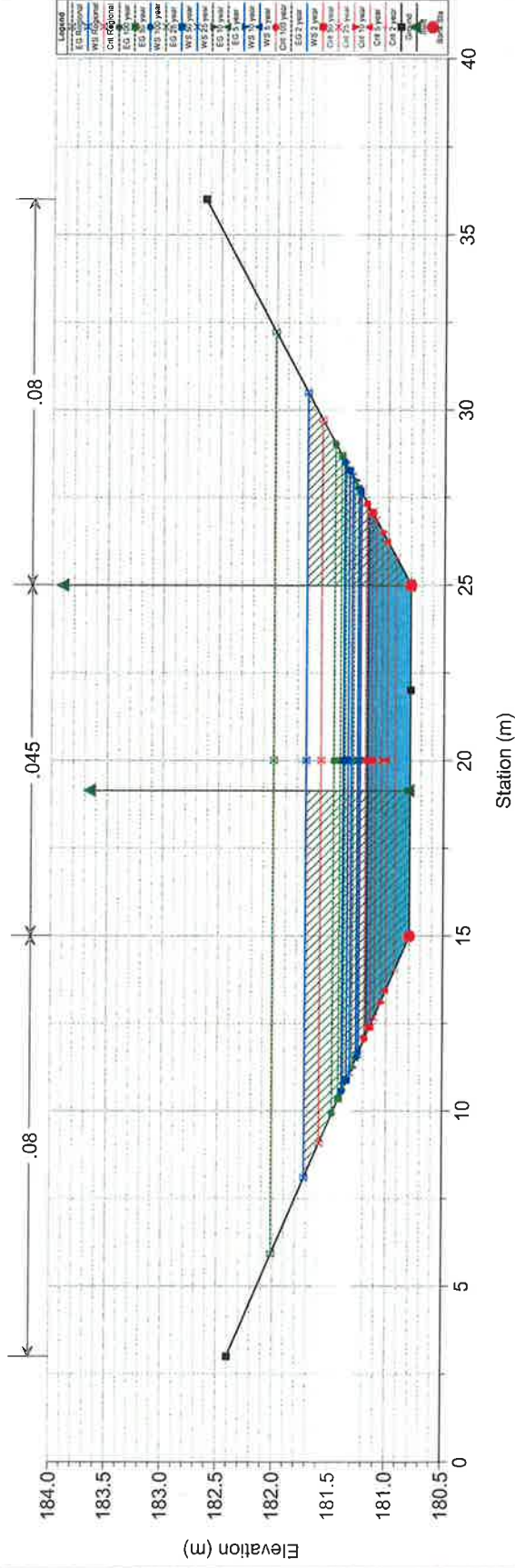


$$R_S = 280 \Omega$$


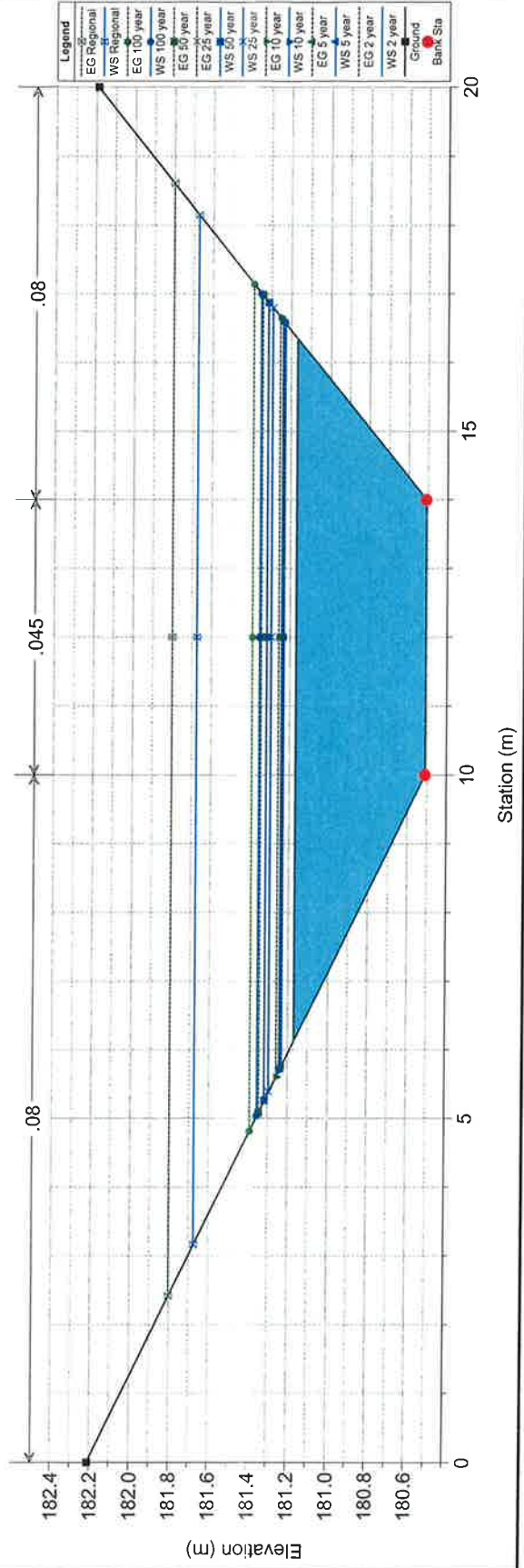
Station (m)

$$RS = 2800$$


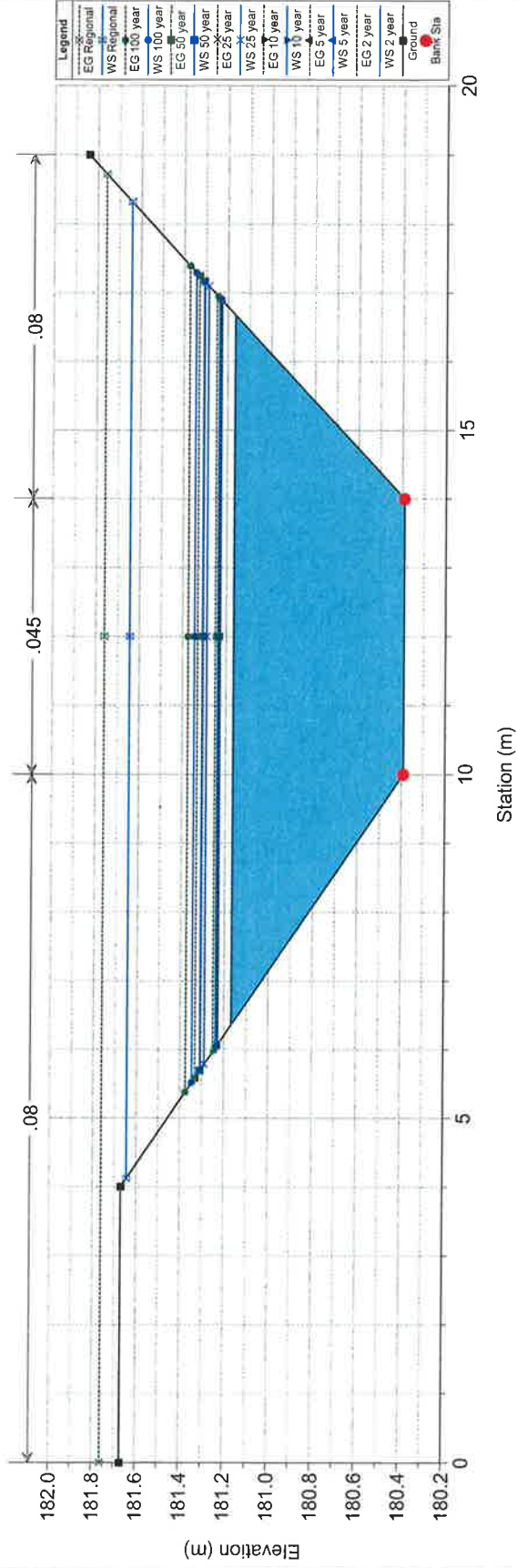
2015.08.13BlueFairway Plan: Proposed - Culvert 1/3 Side Blocked RS = 277



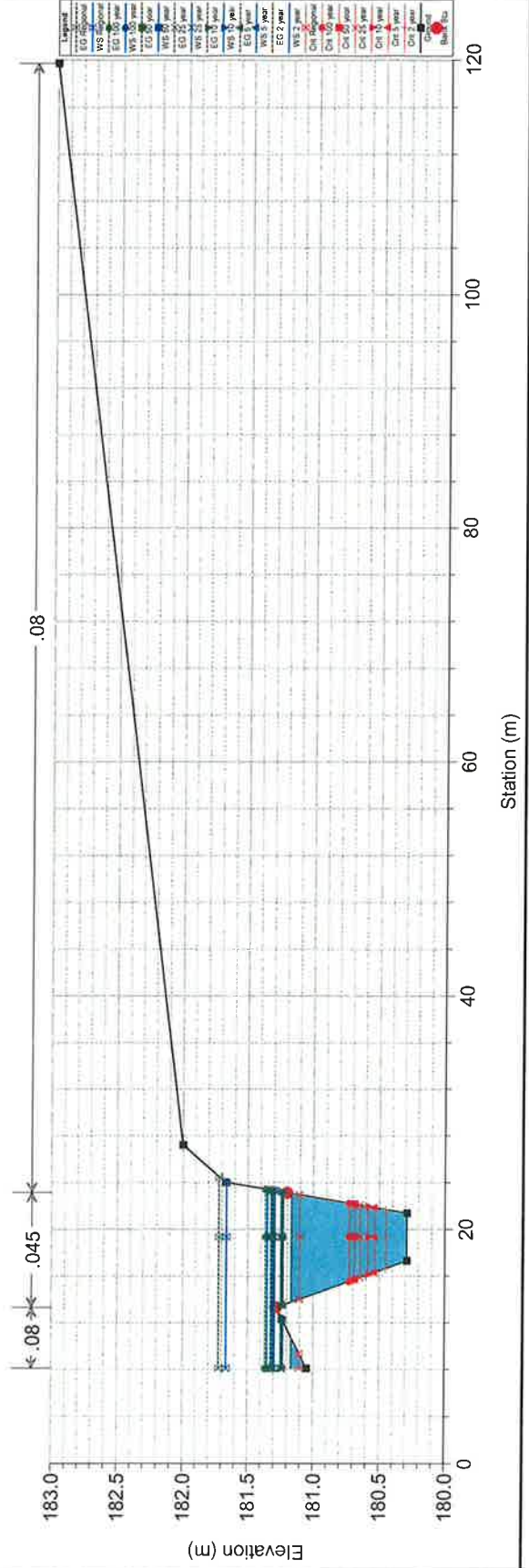
2015.08.13BlueFairway Plan: Proposed - Culvert 1/3 Side Blocked RS = 261



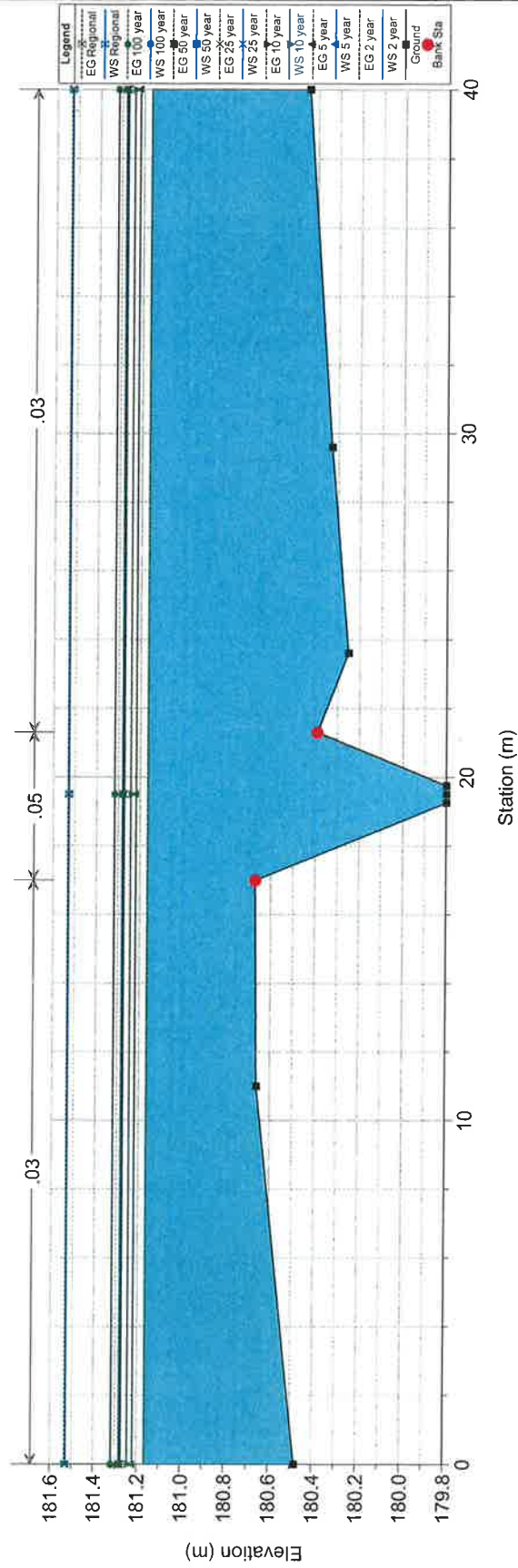
2015.08.13BlueFairway Plan: Proposed - Culvert 1/3 Side Blocked $RS = 254$ 4/4/2016



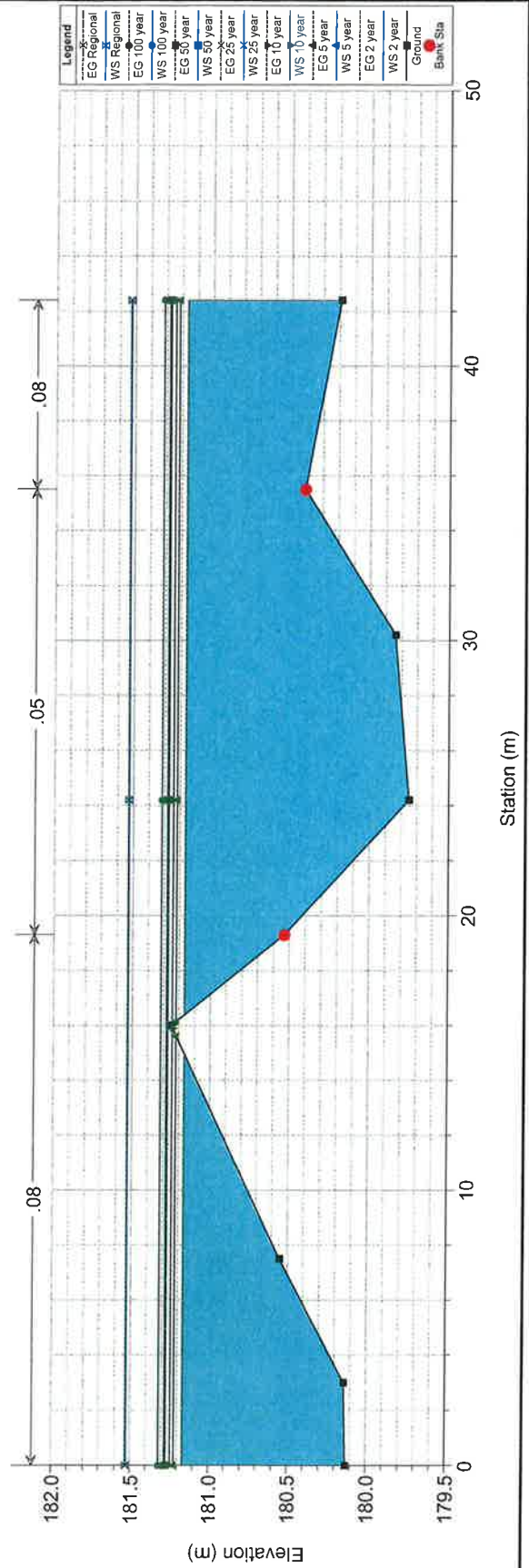
2015.08.13BlueFairway Plan: Proposed - Culvert 1/3 Side Blocked $RS = 249$ 4/4/2016



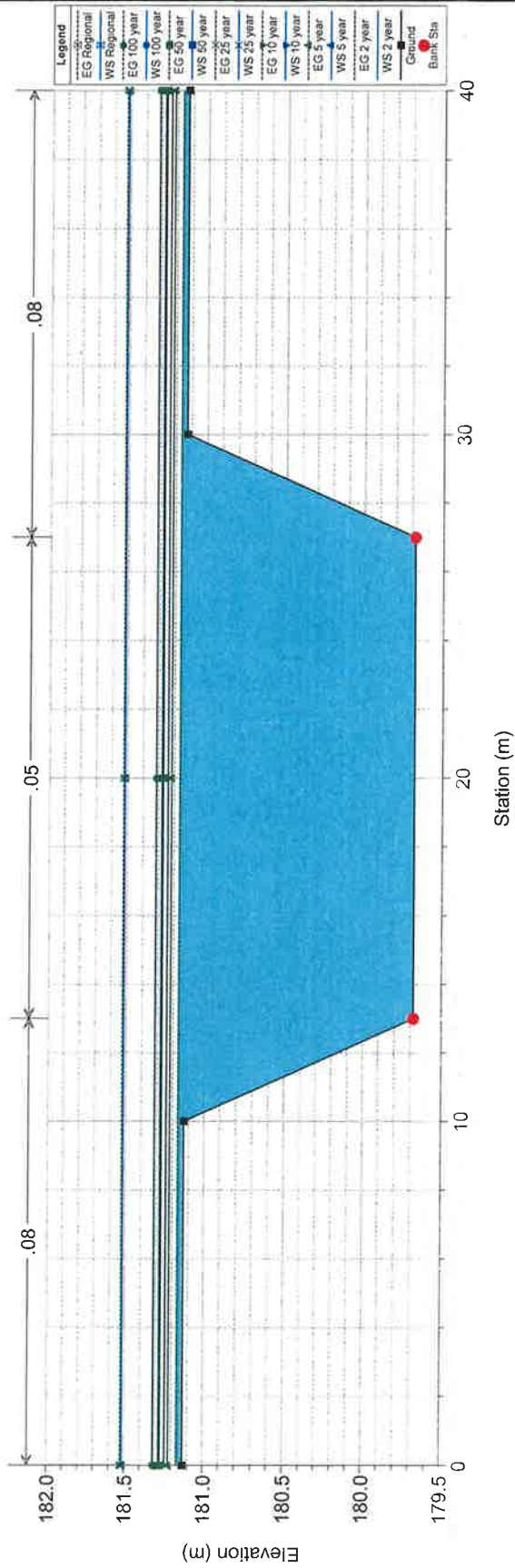
2015.08.13BlueFairway Plan: Proposed - Culvert 1/3 Side Blocked RS = 20%



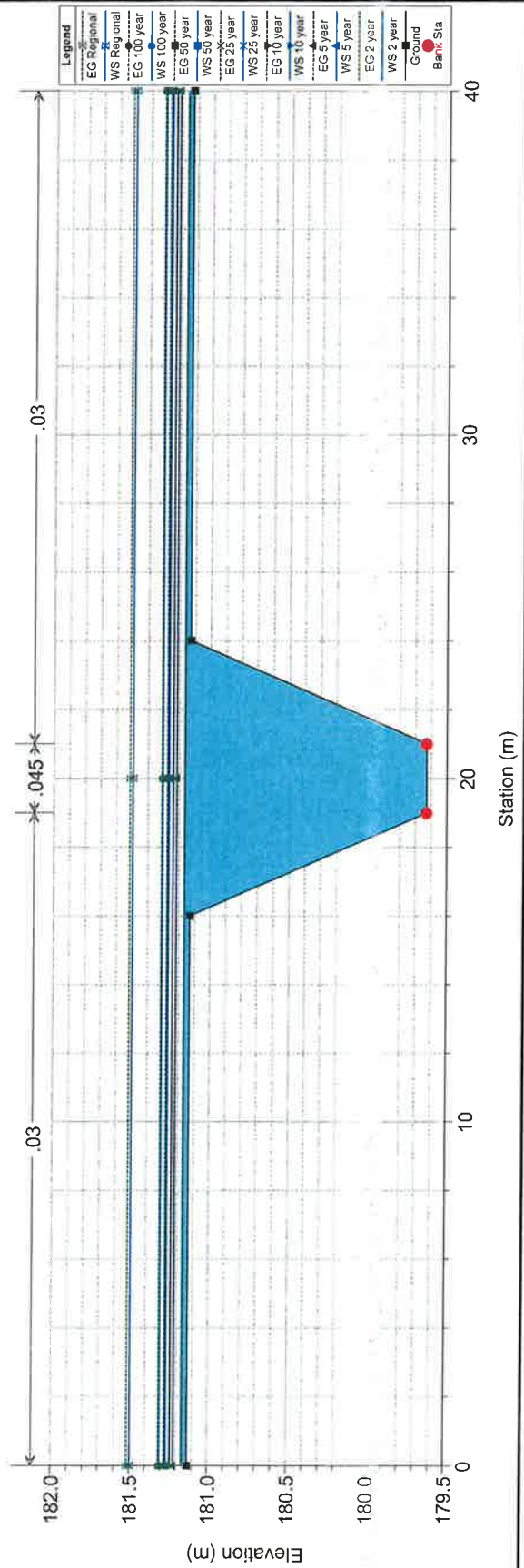
2015.08.13BlueFairway Plan: Proposed - Culvert 1/3 Side Blocked RS = 19%



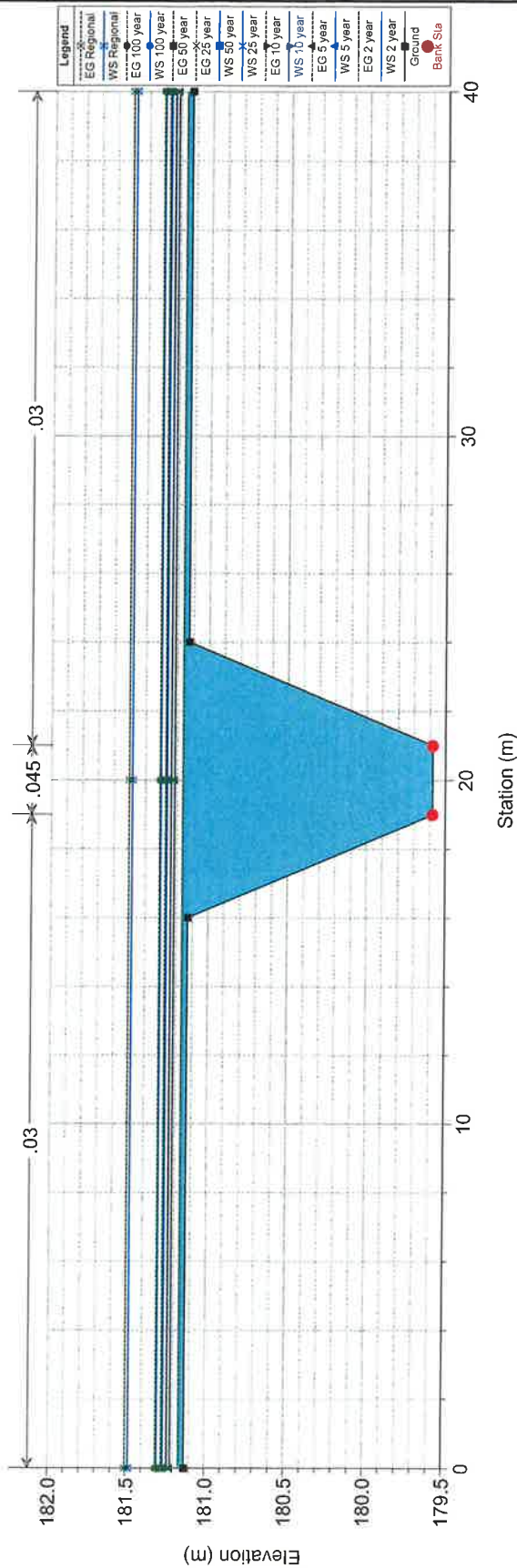
2015.08.13BlueFairway Plan: Proposed - Culvert 1/3 Side Blocked $RS = 1/63$ 4/4/2016



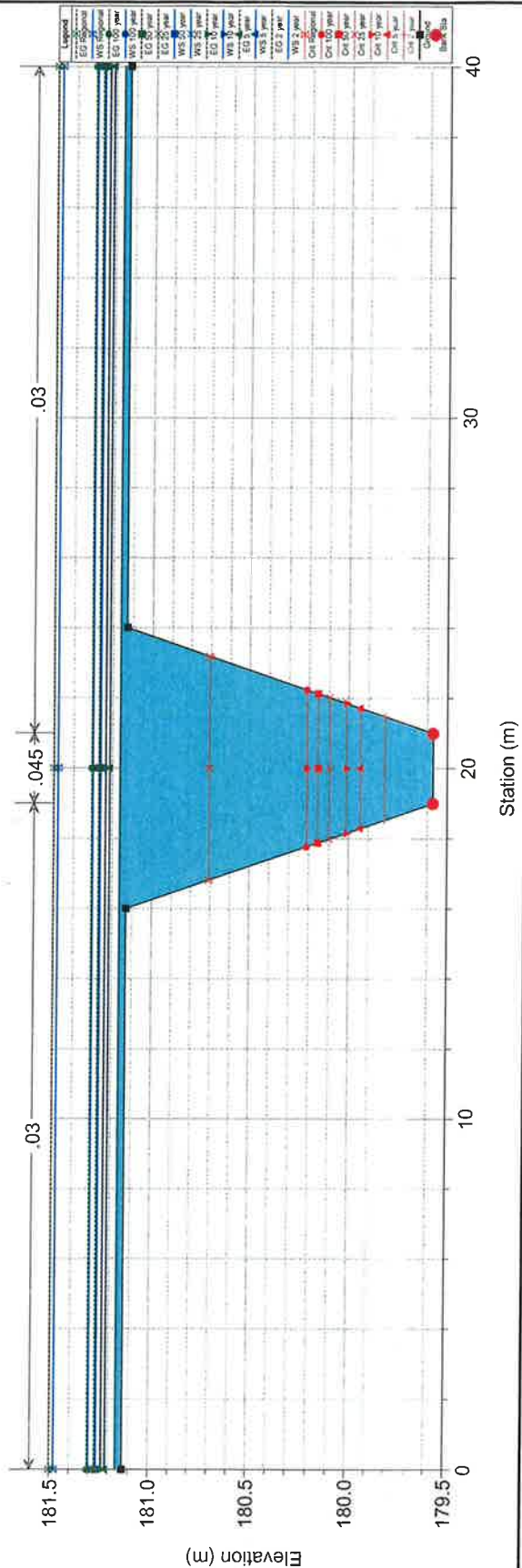
2015.08.13BlueFairway Plan: Proposed - Culvert 1/3 Side Blocked $RS = 1/47$ 4/4/2016

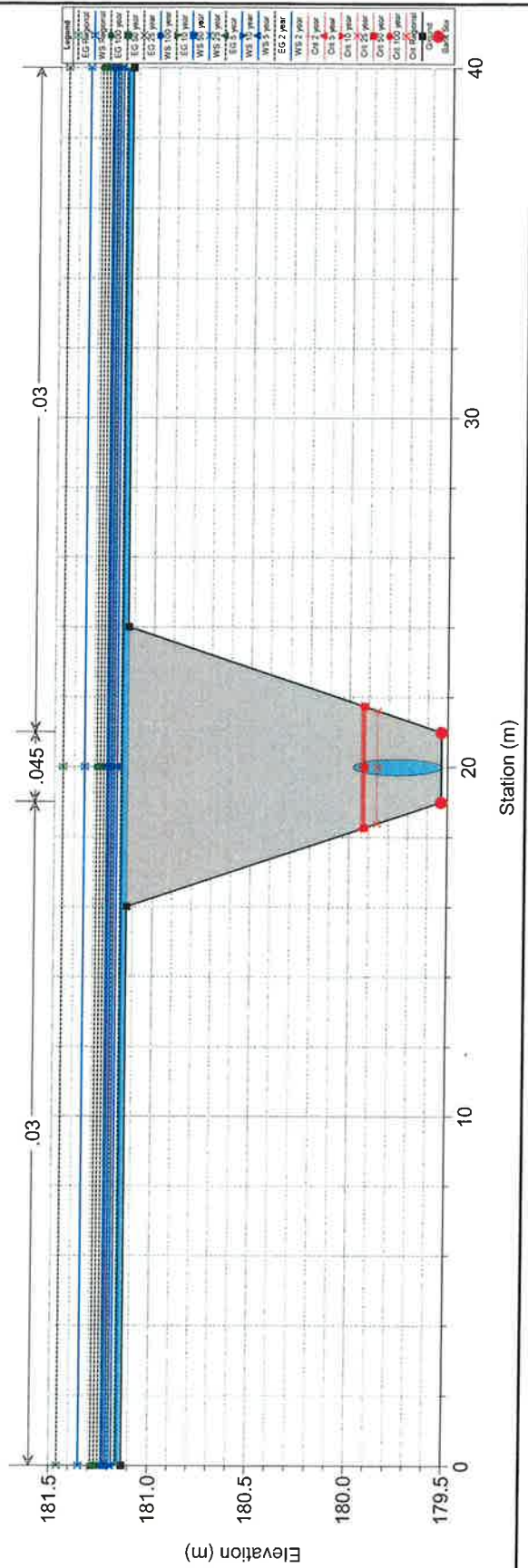
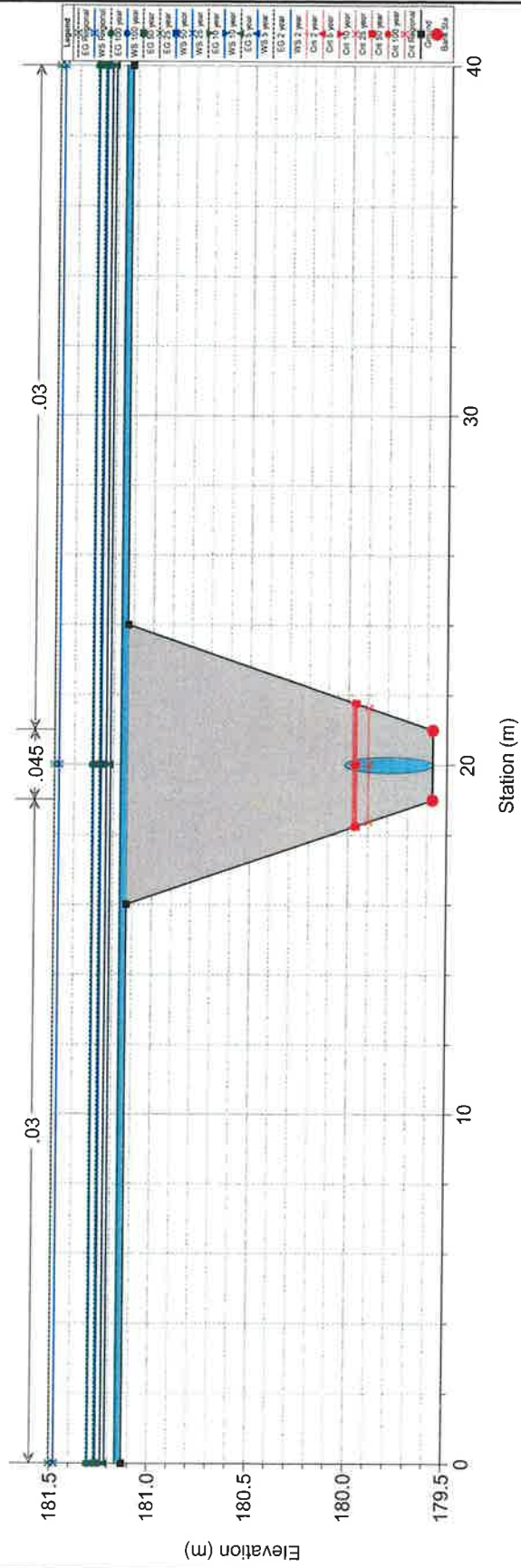


2015.08.13BlueFairway Plan: Proposed - Culvert 1/3 Side Blocked RS = 129

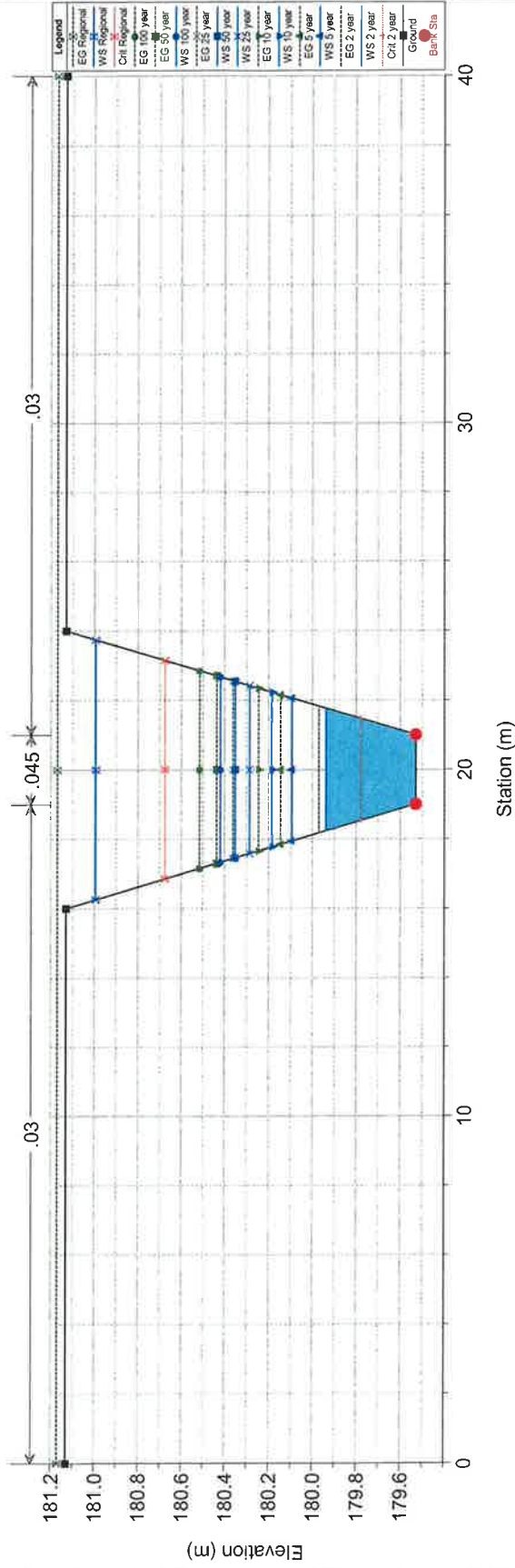


2015.08.13BlueFairway Plan: Proposed - Culvert 1/3 Side Blocked RS = 123

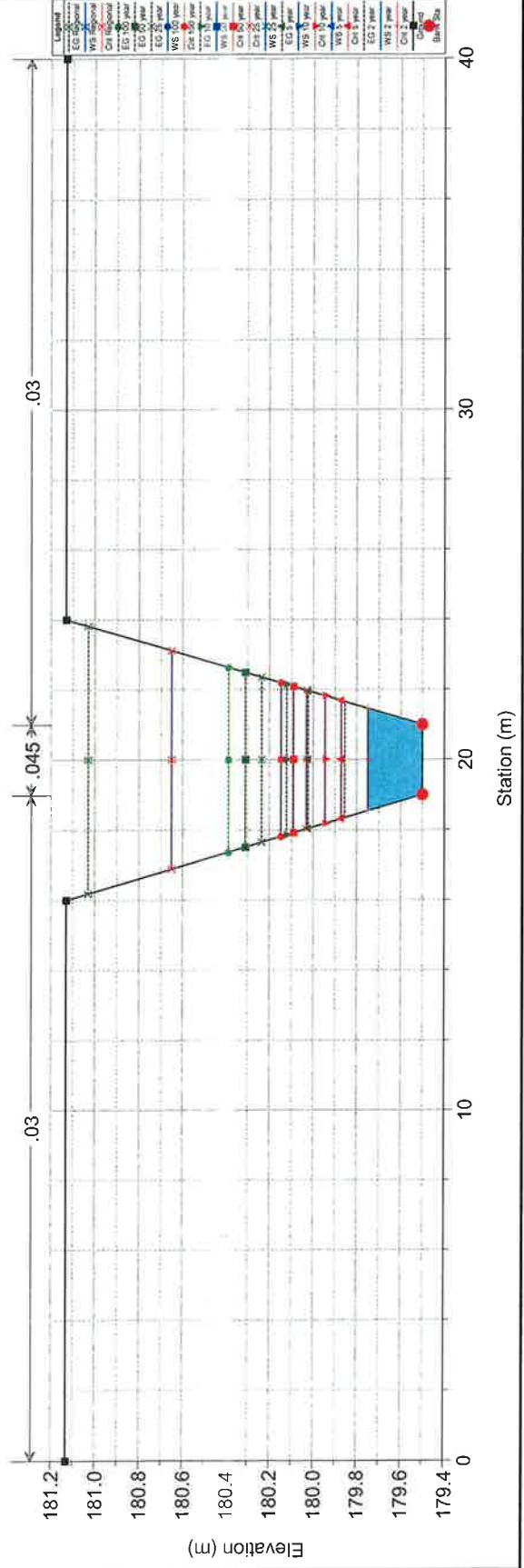


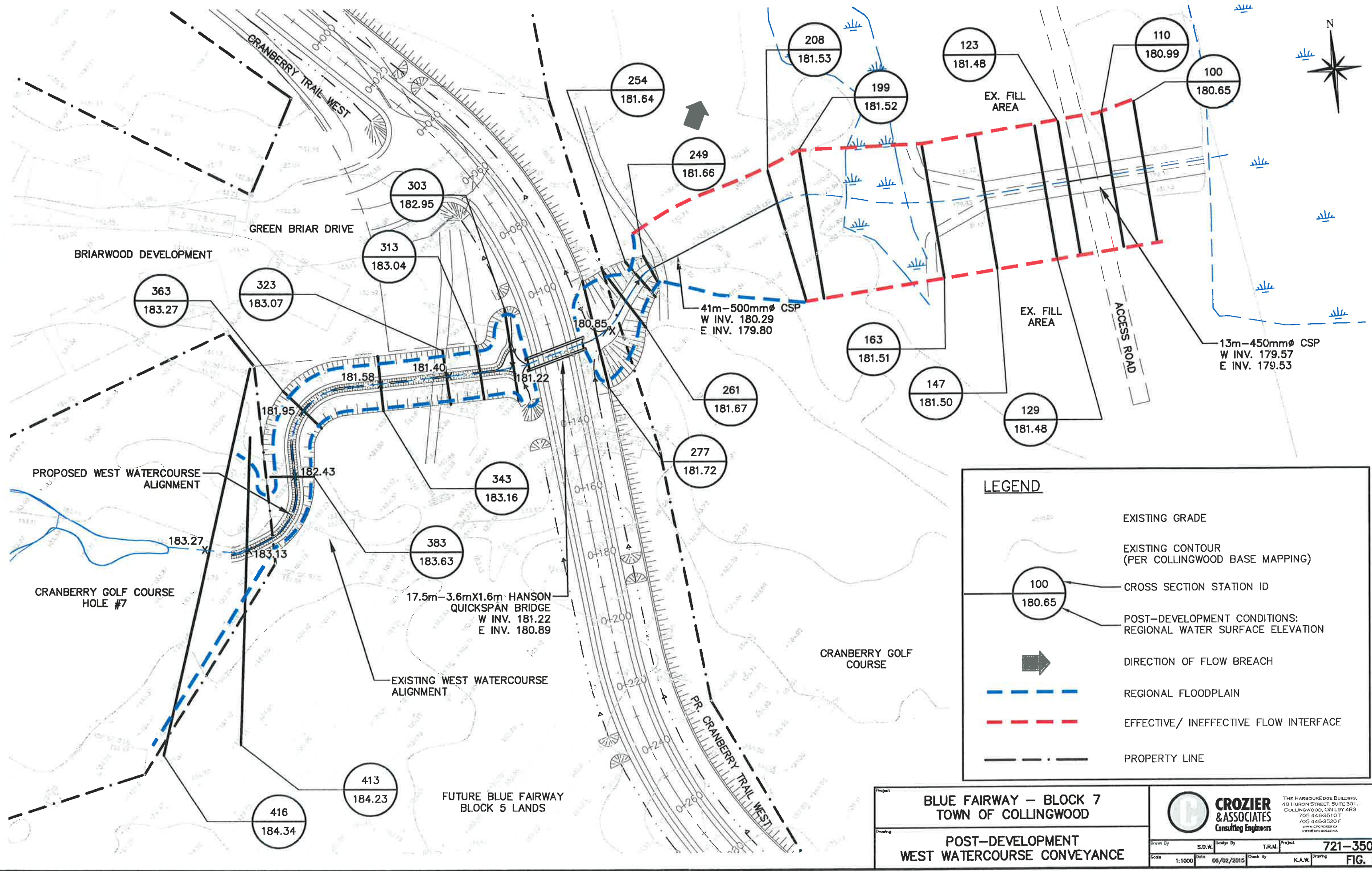
$$RS = 116.0$$


2015.08.13BlueFairway Plan: Proposed - Culvert 1/3 Side Blocked $Rs = 110$ 4/4/2016

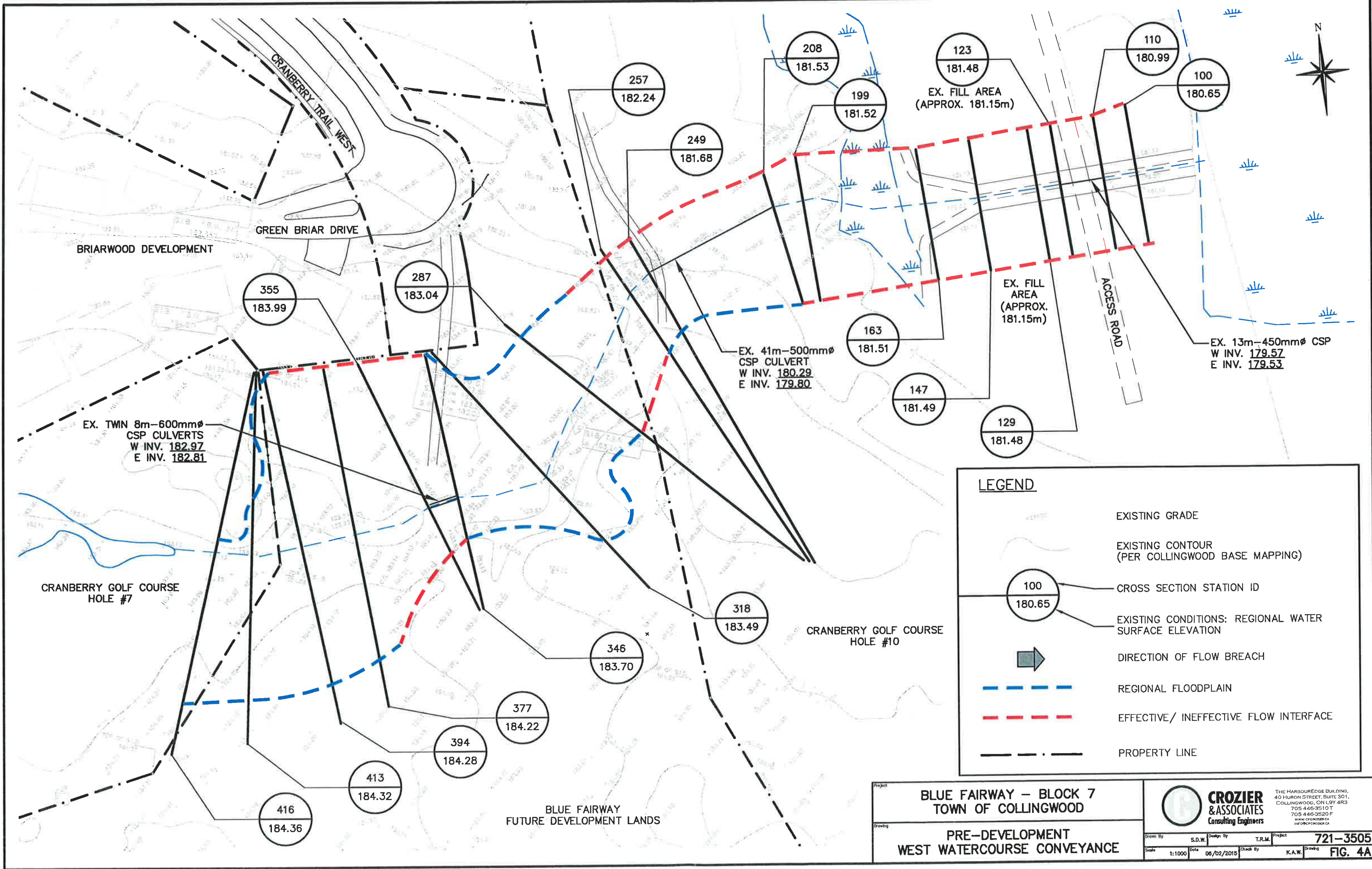


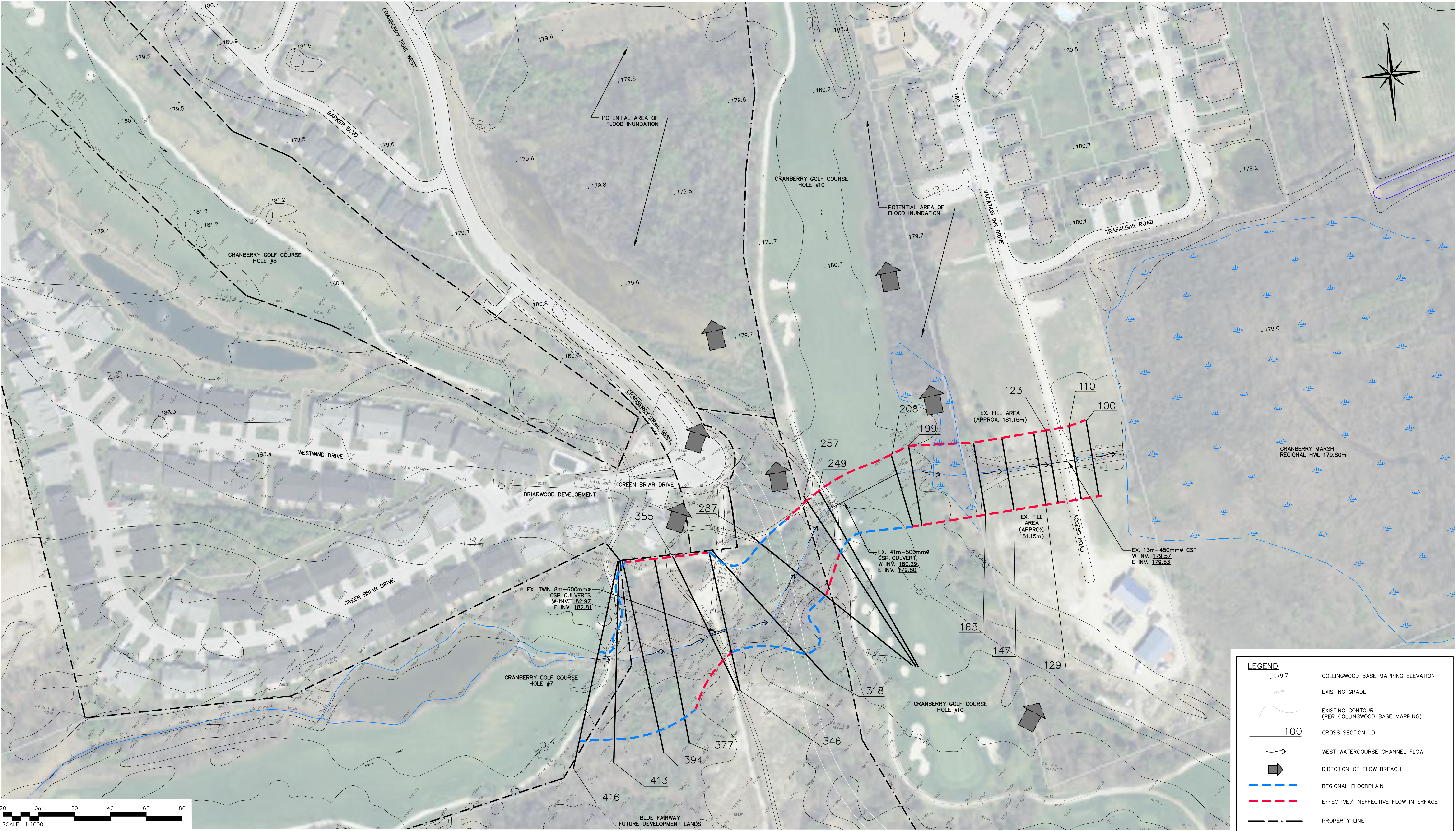
2015.08.13BlueFairway Plan: Proposed - Culvert 1/3 Side Blocked $Rs = 100$ 4/4/2016





J:\700\721 - MacPherson Builders\3505 - Blue Fairway\CAD\CIVIL\1SHEET\3505-201-2XX SWM.dwg, Fig. 4A, 8/13/2015 12:57:14 PM, swest





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Town

No.	ISSUE / REVISION	DATE: MM/DD/YYYY
0	ISSUED FOR REVIEW	08/13/2015

Engineer

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Engineer

Project

**BLUE FAIRWAY – BLOCK 7
TOWN OF COLLINGWOOD**

**PRE DEVELOPMENT WEST WATERCOURSE
FLOODPLAIN CHARACTERISTICS PLAN**

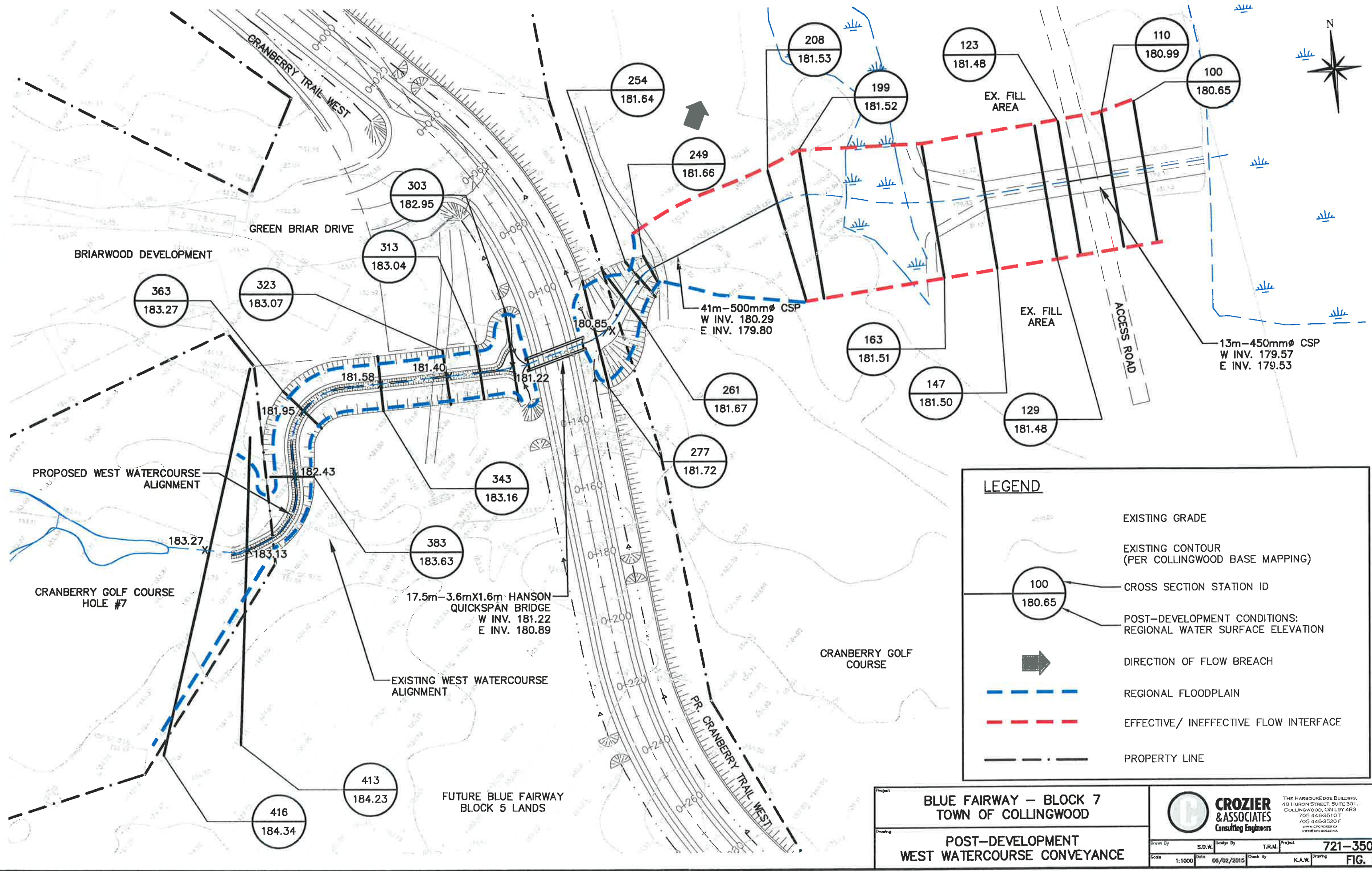


CROZIER & ASSOCIATES
Consulting Engineers

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705 446-3520 F
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Drawn By S.D.W. Design By T.R.M. Project **721-3505**

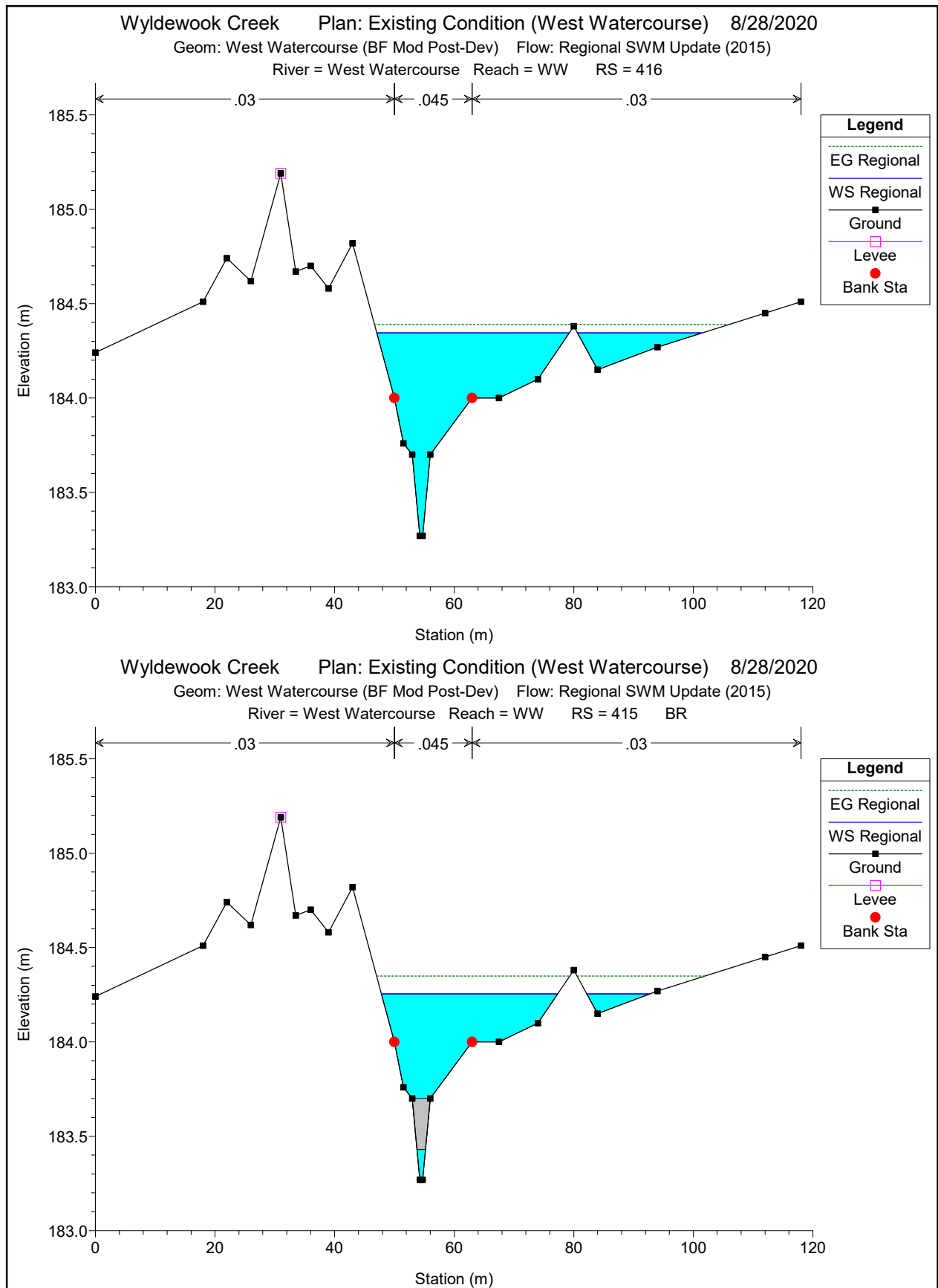
Scale 1:1000 Date 06/02/2015 Check By K.A.W. Drawing **FIG. 4B**

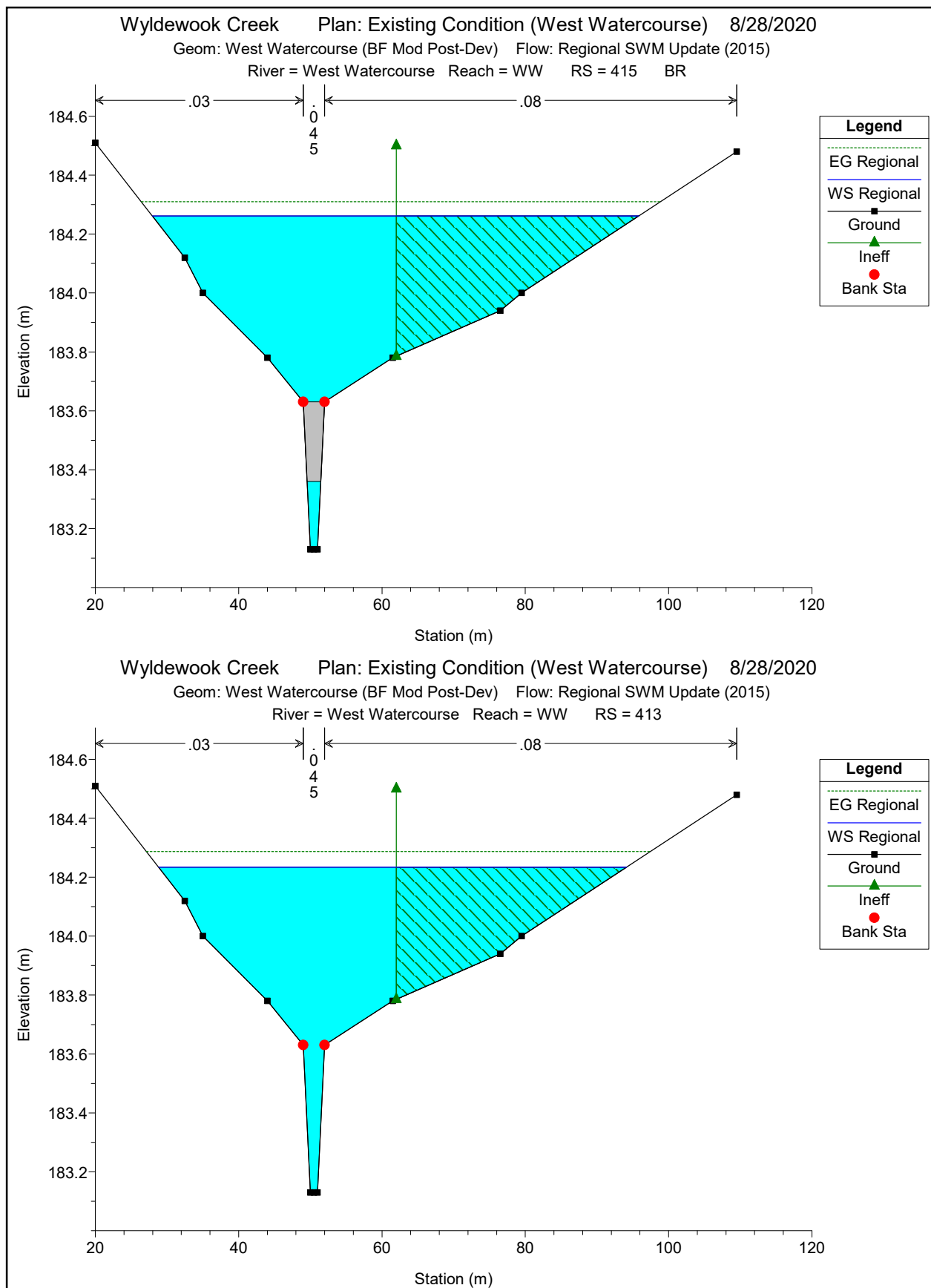


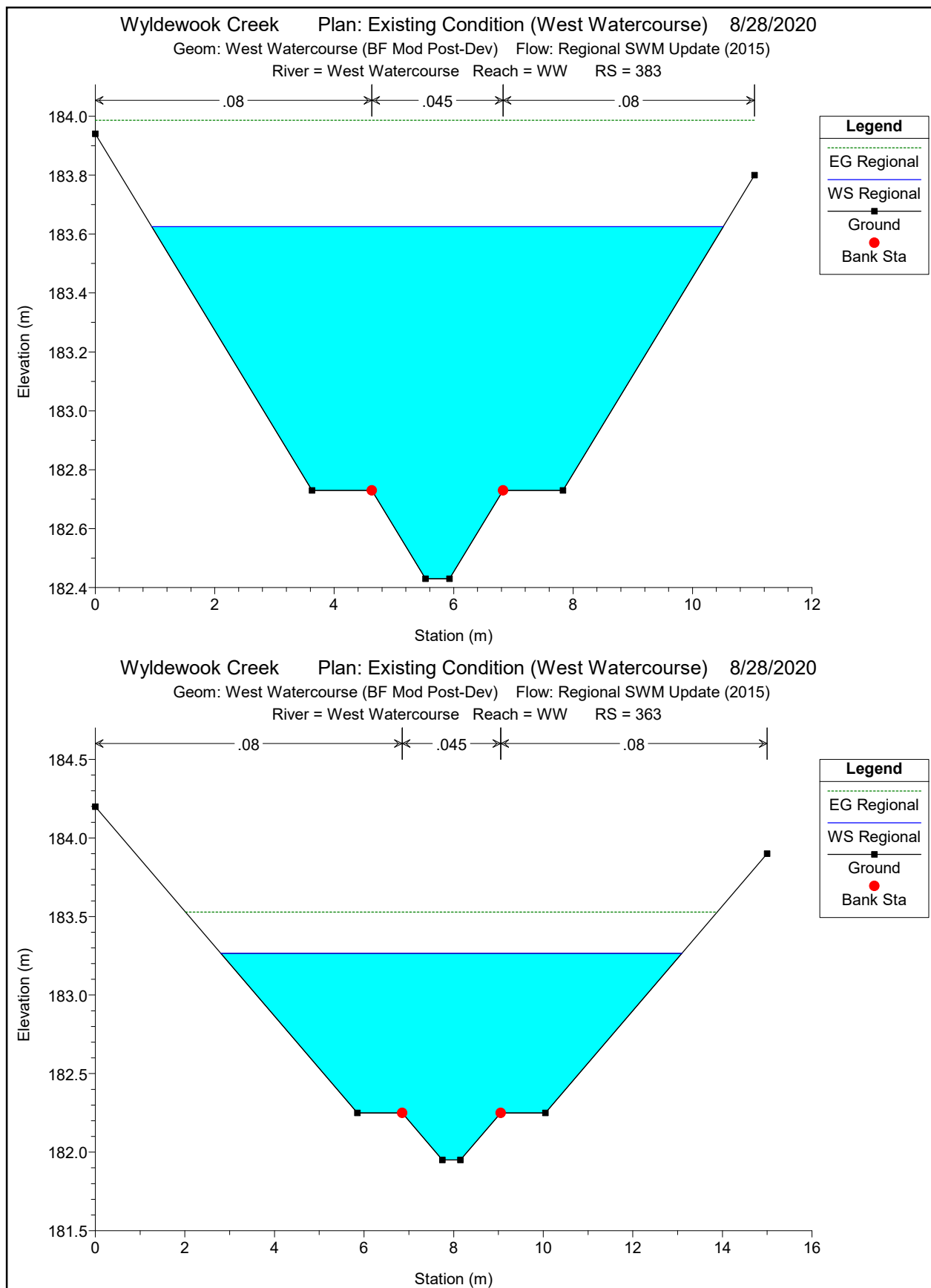
APPENDIX D

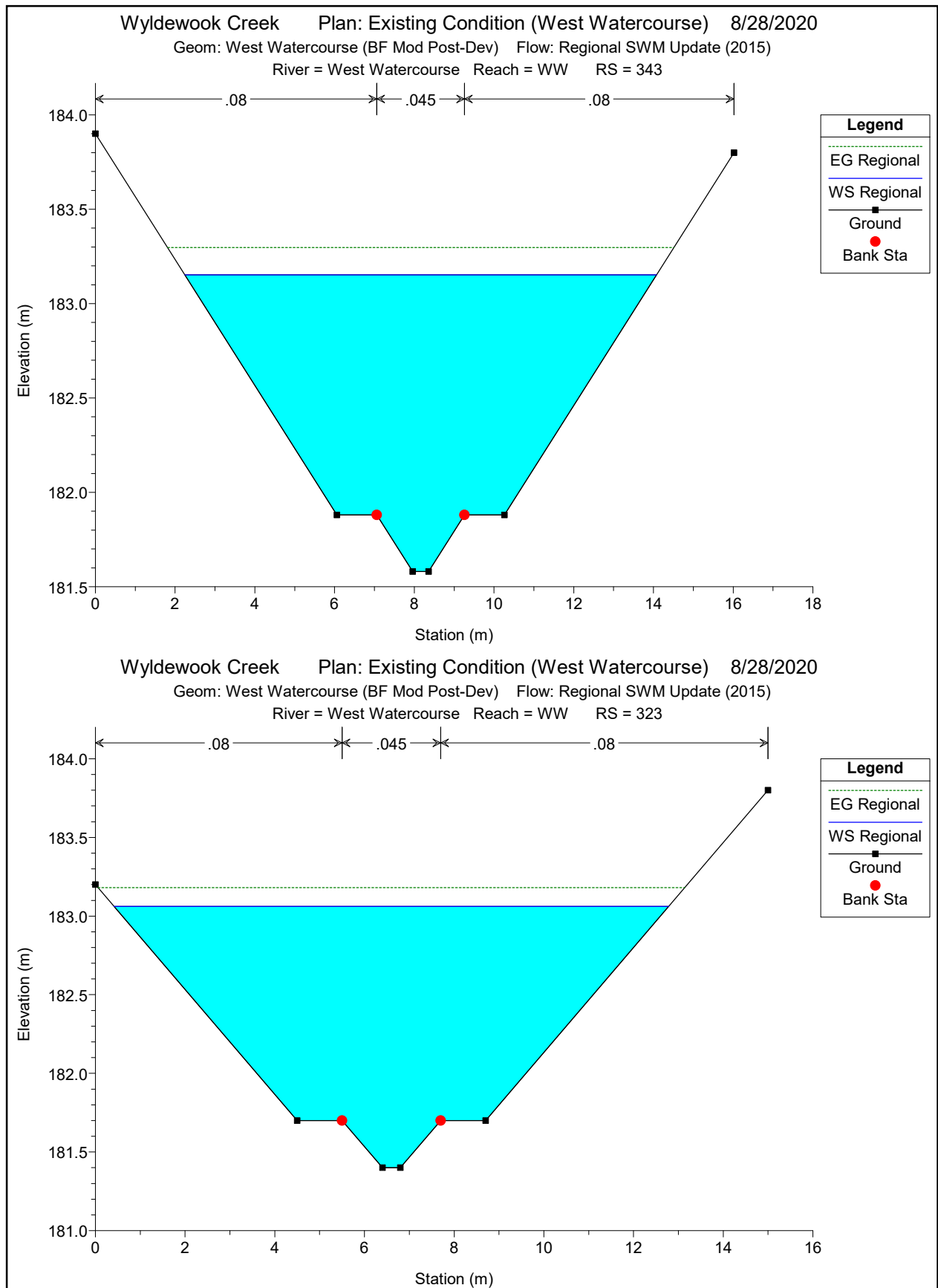
Existing Conditions HEC-RAS Model

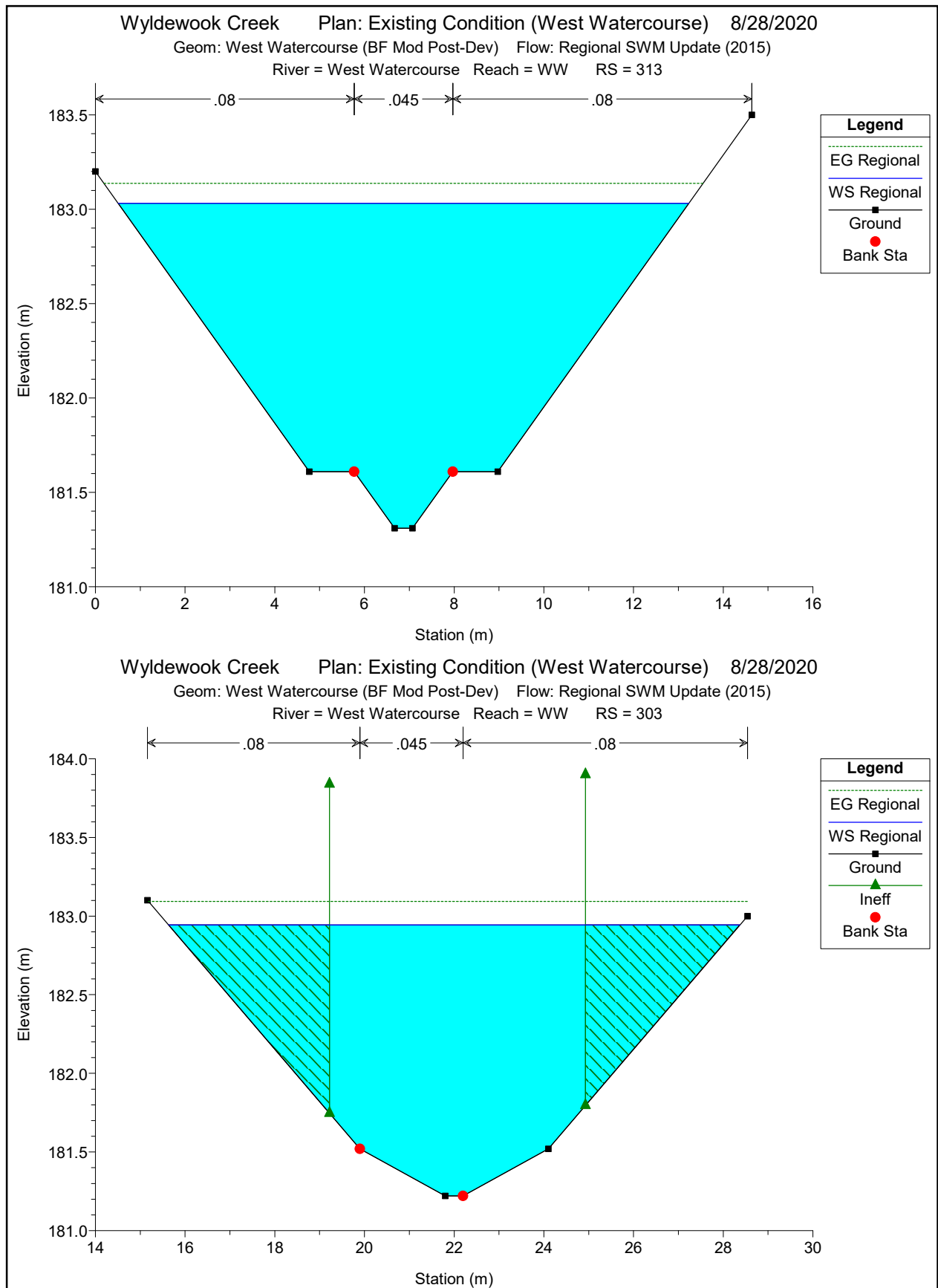
HEC-RAS Cross-Section Output
HEC-RAS Output Summary Table







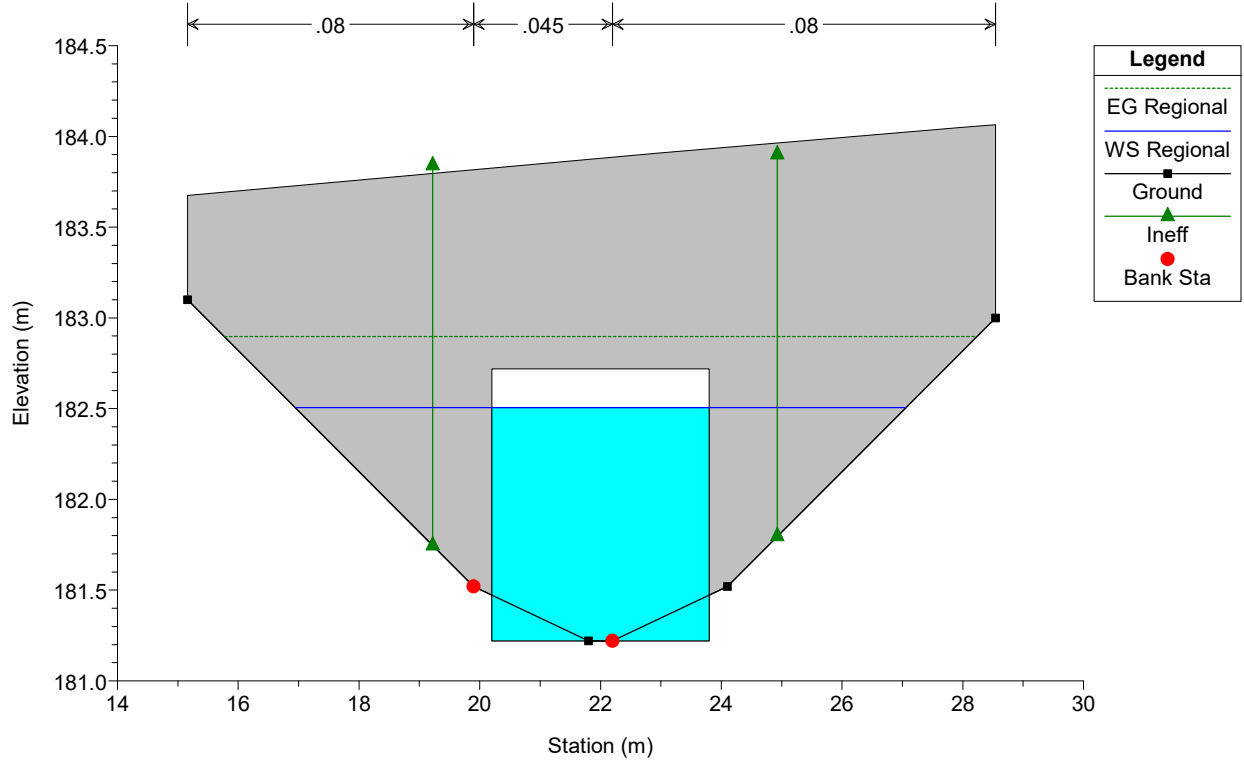




Wyldewook Creek Plan: Existing Condition (West Watercourse) 8/28/2020

Geom: West Watercourse (BF Mod Post-Dev) Flow: Regional SWM Update (2015)

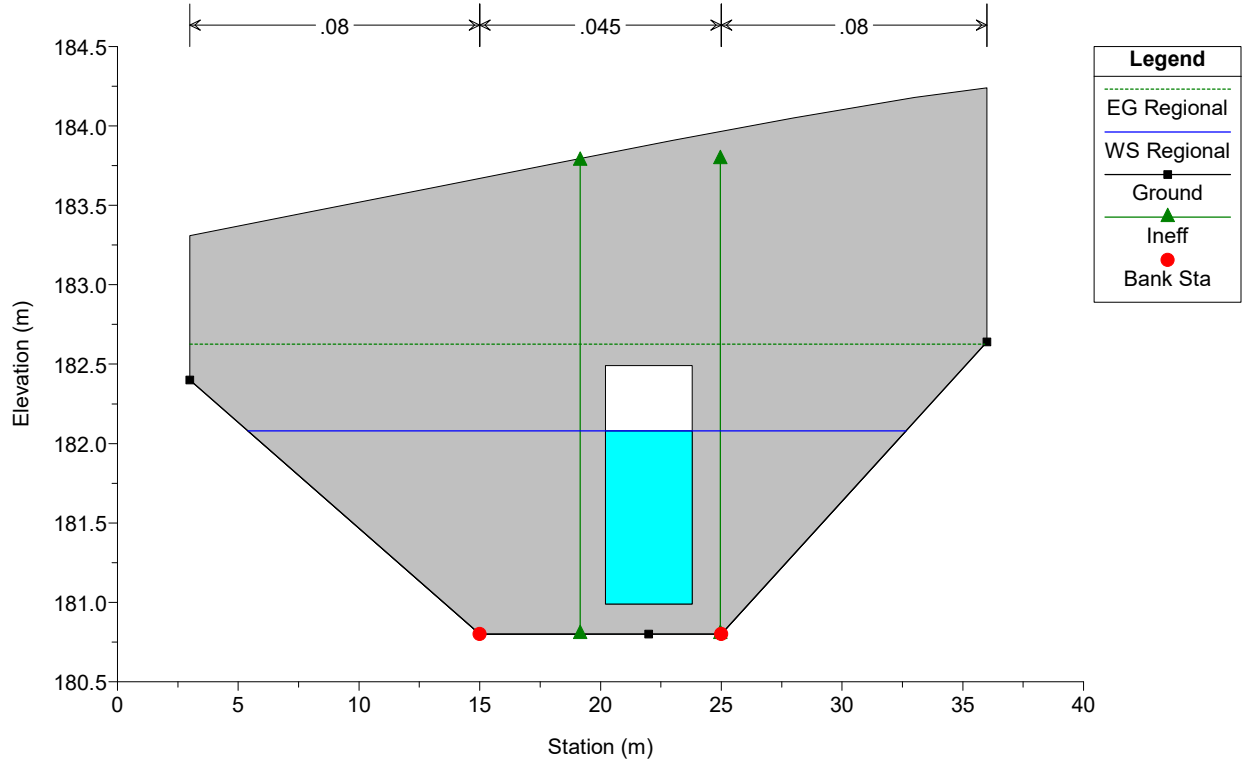
River = West Watercourse Reach = WW RS = 280 Culv

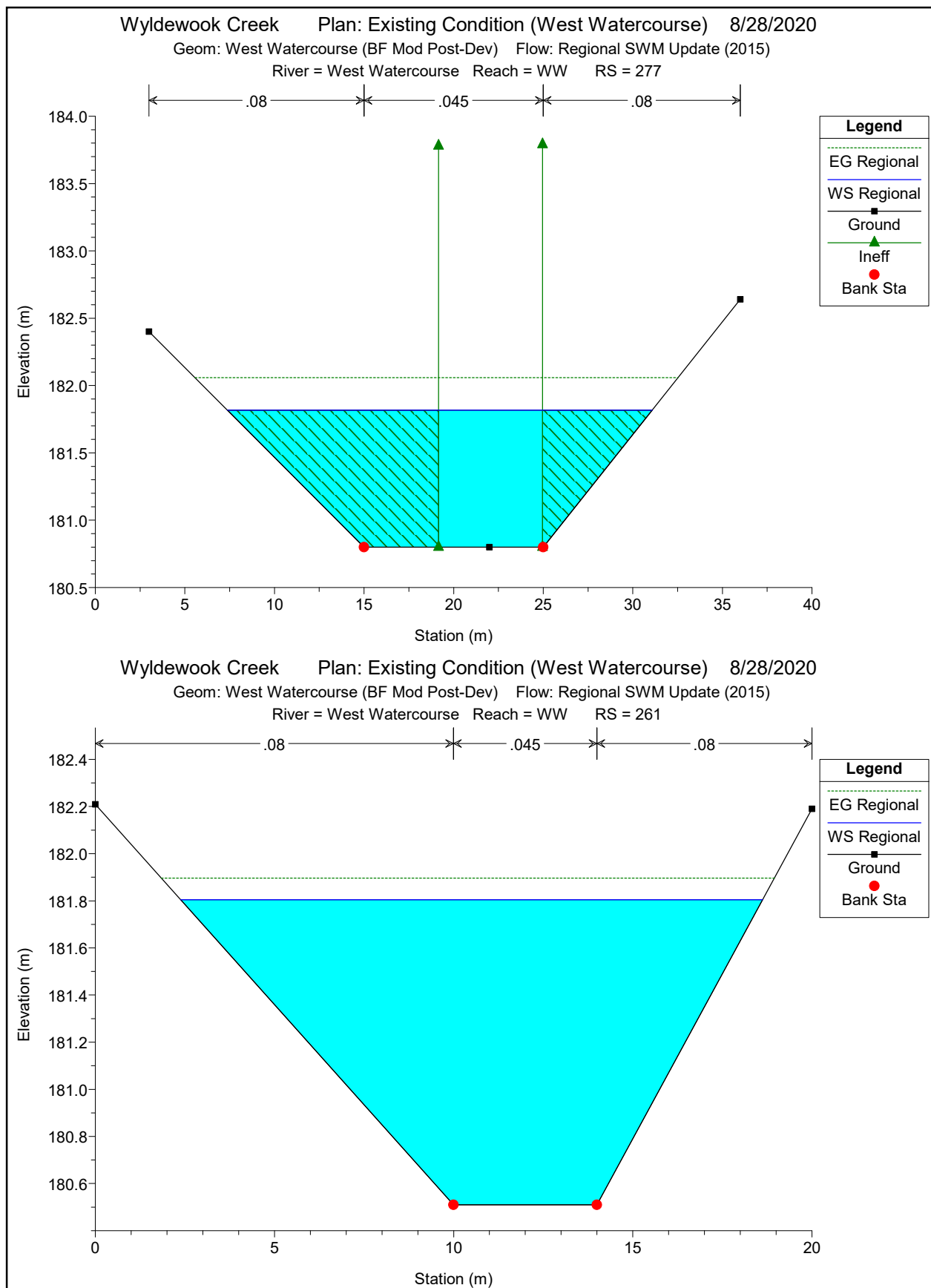


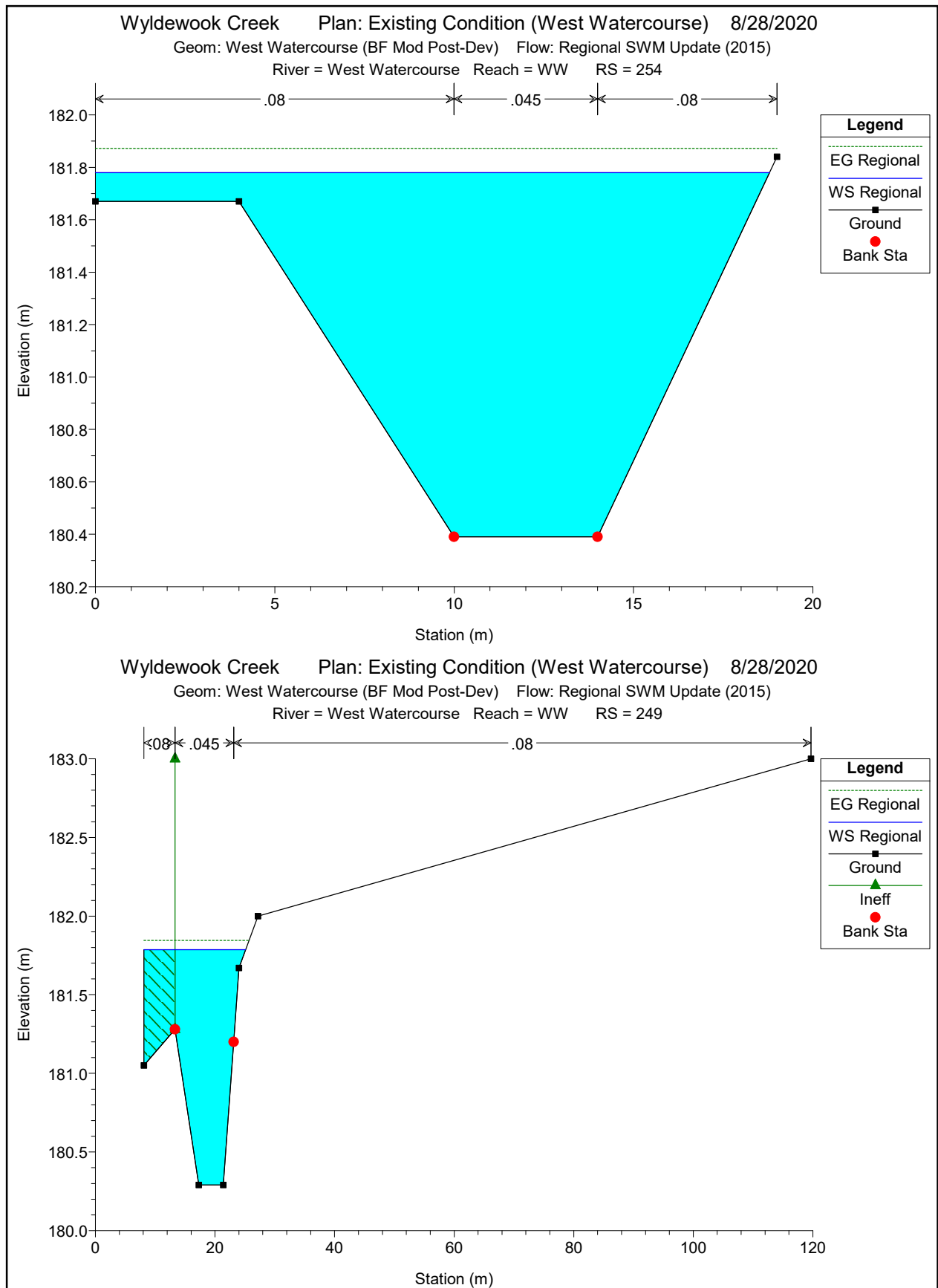
Wyldewook Creek Plan: Existing Condition (West Watercourse) 8/28/2020

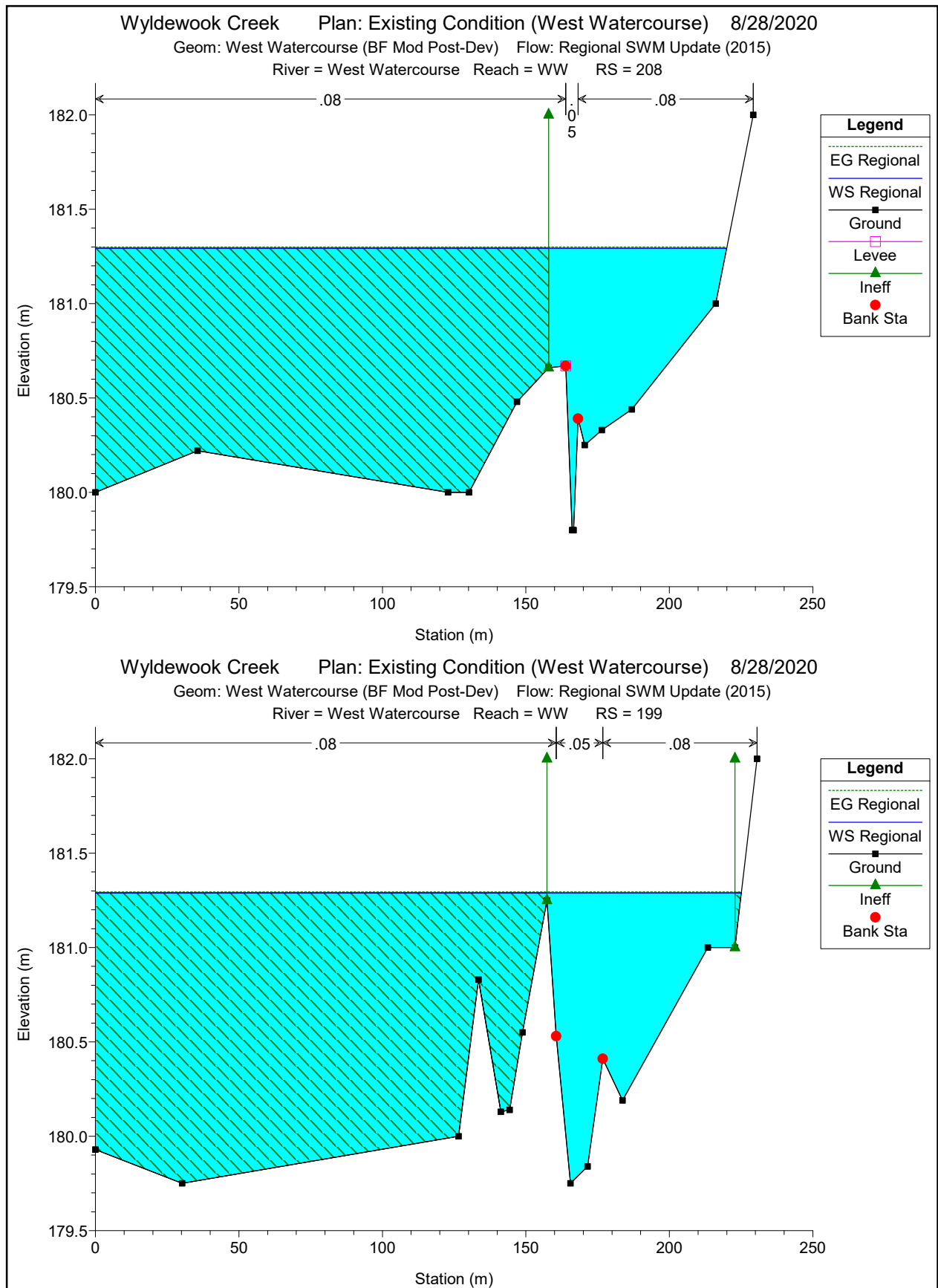
Geom: West Watercourse (BF Mod Post-Dev) Flow: Regional SWM Update (2015)

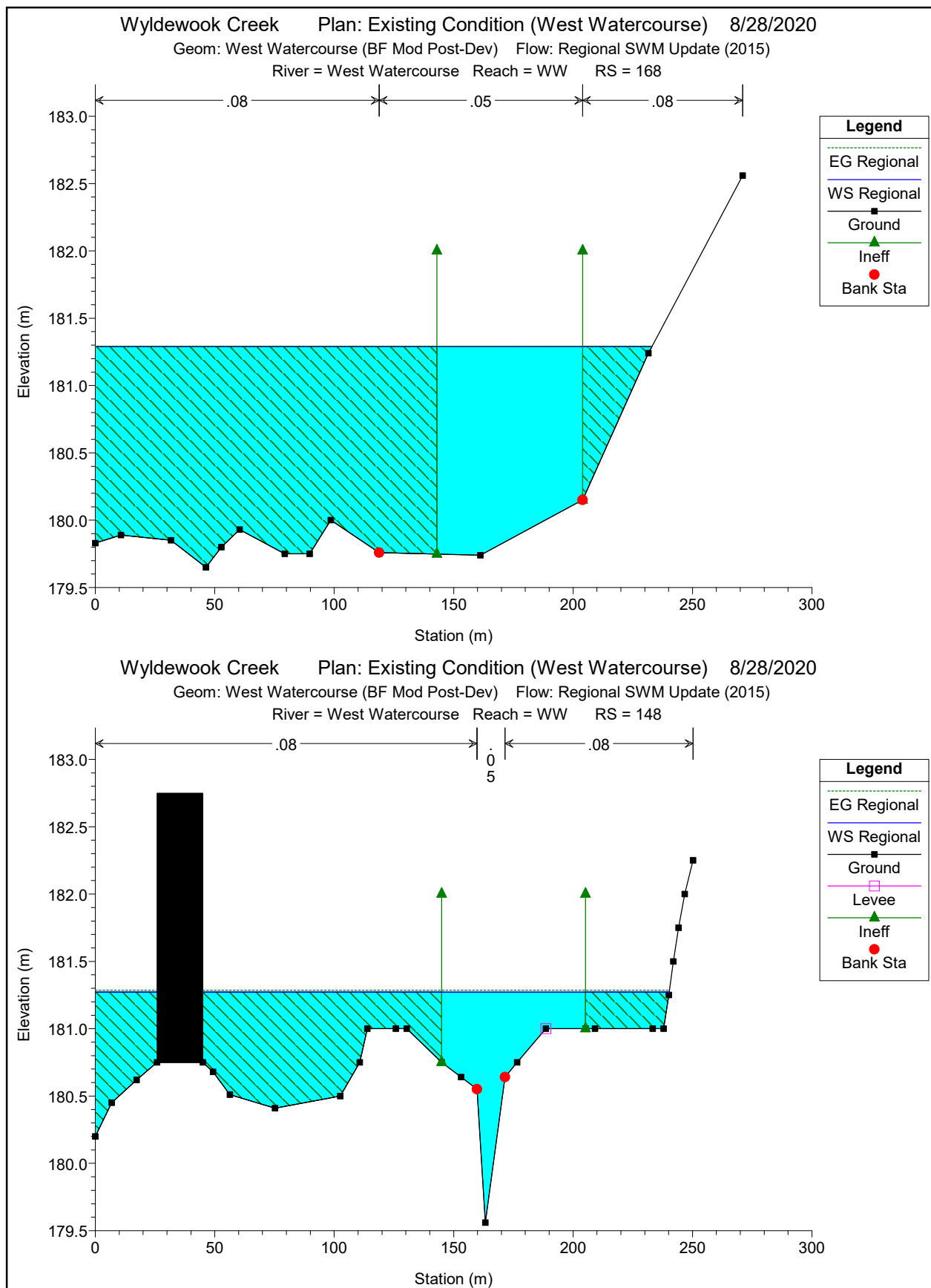
River = West Watercourse Reach = WW RS = 280 Culv

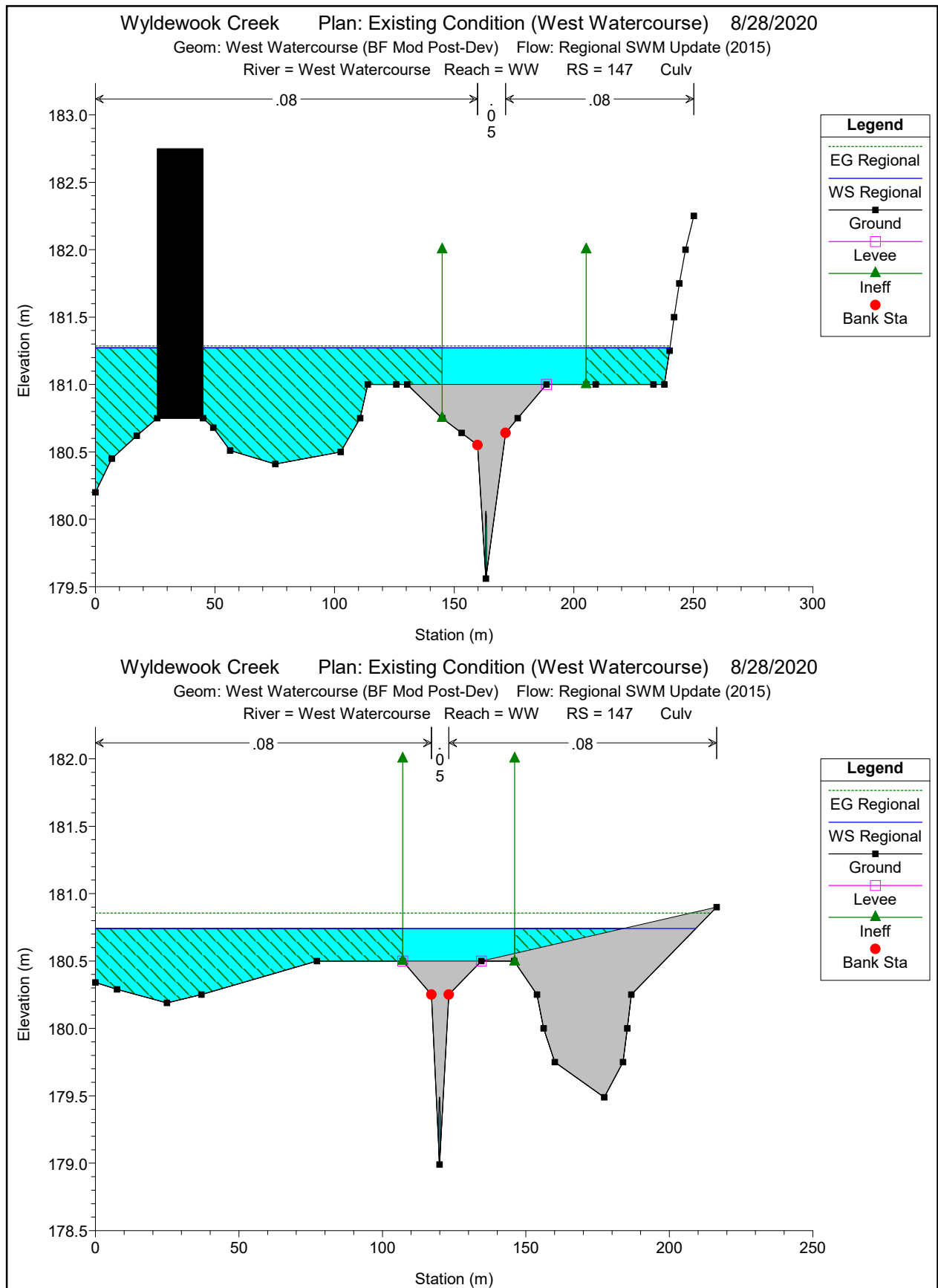


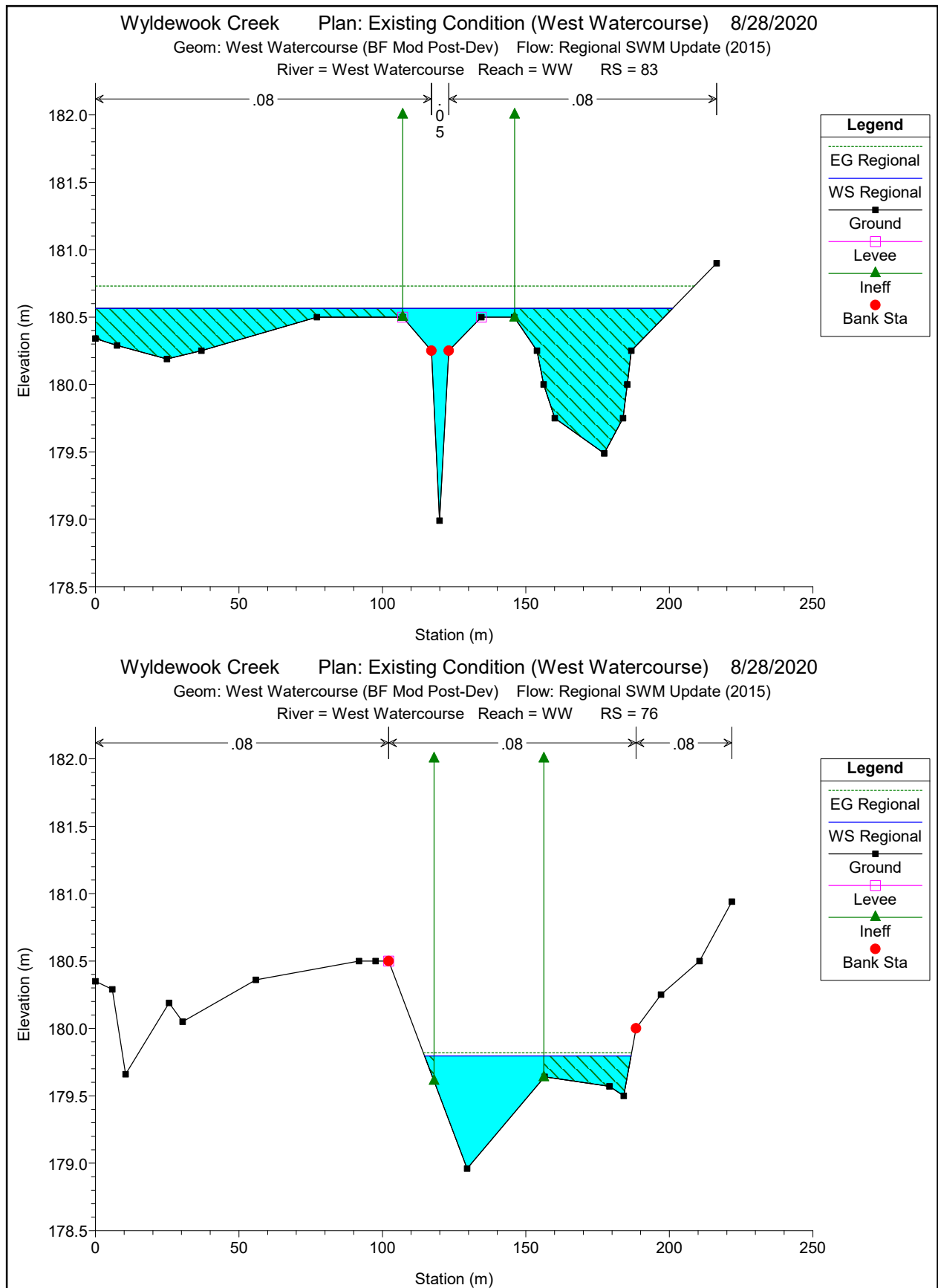








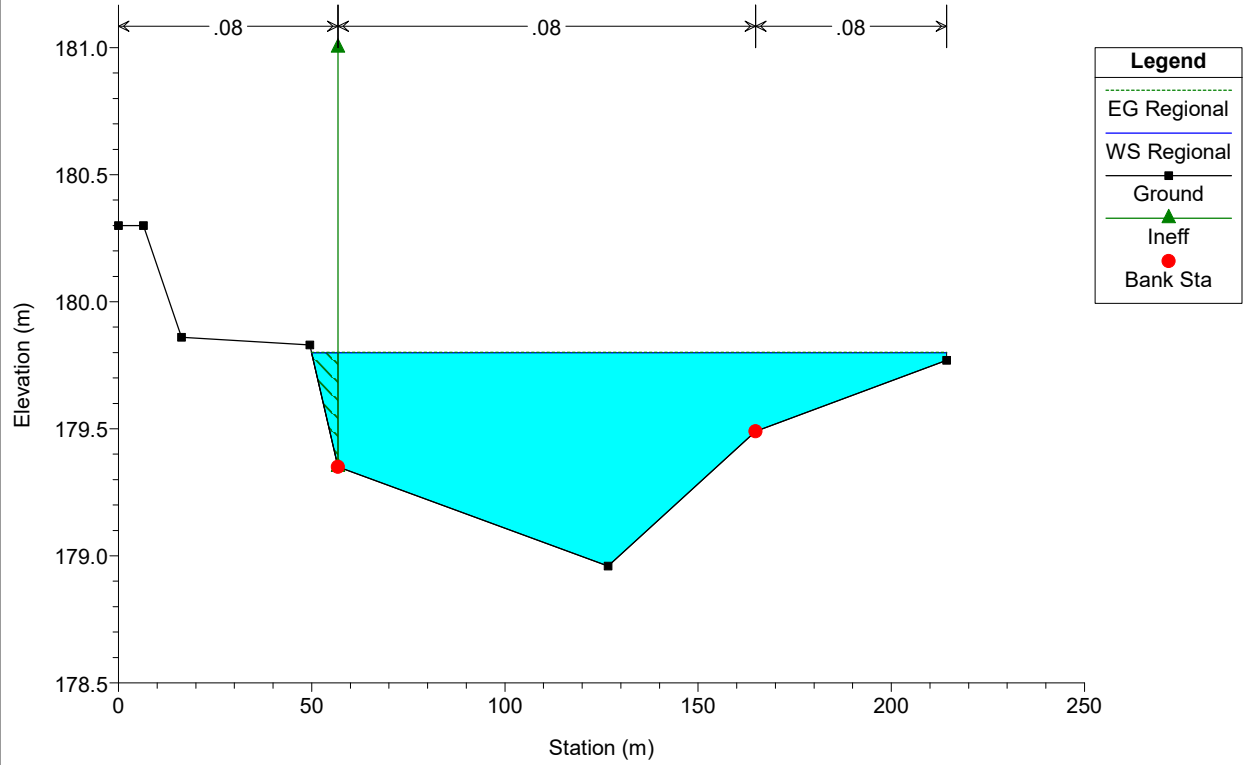




Wyldewook Creek Plan: Existing Condition (West Watercourse) 8/28/2020

Geom: West Watercourse (BF Mod Post-Dev) Flow: Regional SWM Update (2015)

River = West Watercourse Reach = WW RS = 66



HEC-RAS Plan: EX River: West Watercourse Reach: WW 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
WW	416	2-Year	0.88	183.27	183.91	183.65	183.92	0.002549	0.40	2.21	10.25	0.27
WW	415		Bridge									
WW	413	2-Year	0.88	183.13	183.49	183.47	183.59	0.027955	1.42	0.62	2.44	0.90
WW	383	2-Year	0.88	182.43	182.84	182.81	182.91	0.018442	1.27	0.87	4.84	0.76
WW	363	2-Year	0.88	181.95	182.33	182.33	182.43	0.026180	1.42	0.76	4.70	0.89
WW	343	2-Year	0.88	181.58	182.05		182.09	0.008746	0.99	1.17	5.20	0.54
WW	323	2-Year	0.88	181.40	181.86		181.90	0.009976	1.04	1.12	5.13	0.57
WW	313	2-Year	0.88	181.31	181.75	181.69	181.81	0.011627	1.09	1.05	5.06	0.61
WW	303	2-Year	0.88	181.22	181.53	181.53	181.62	0.042839	1.50	0.74	4.27	1.10
WW	280		Culvert									
WW	277	2-Year	0.88	180.80	181.08		181.10	0.003192	0.54	1.63	13.79	0.32
WW	261	2-Year	0.88	180.51	181.07		181.08	0.000441	0.32	3.74	9.31	0.14
WW	254	2-Year	0.88	180.39	181.07		181.07	0.000230	0.26	4.61	9.54	0.10
WW	249	2-Year	0.88	180.29	181.07	180.45	181.07	0.000137	0.18	5.01	9.22	0.07
WW	230		Culvert									
WW	208	2-Year	0.88	179.80	181.04	180.19	181.04	0.000013	0.06	28.29	216.58	0.02
WW	199	2-Year	0.88	179.75	181.04		181.04	0.000004	0.04	35.82	219.52	0.01
WW	168	2-Year	0.88	179.74	181.04		181.04	0.000000	0.01	70.26	226.38	0.00
WW	148	2-Year	0.88	179.56	181.04	179.91	181.04	0.000011	0.06	21.13	219.02	0.02
WW	147		Culvert									
WW	83	2-Year	0.88	178.99	179.48	179.48	179.60	0.042165	1.53	0.58	2.34	0.98
WW	76	2-Year	0.88	178.96	179.27	179.14	179.28	0.007549	0.31	2.80	17.92	0.25
WW	66	2-Year	0.88	178.96	179.07	179.06	179.09	0.102376	0.58	1.52	27.65	0.79

HEC-RAS Plan: EX River: West Watercourse Reach: WW 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
WW	416	5-Year	1.71	183.27	184.00	183.80	184.01	0.003585	0.53	3.25	12.91	0.33
WW	415		Bridge									
WW	413	5-Year	1.71	183.13	183.63	183.61	183.78	0.029461	1.73	0.99	2.98	0.96
WW	383	5-Year	1.71	182.43	182.95	182.92	183.06	0.019416	1.62	1.44	5.50	0.82
WW	363	5-Year	1.71	181.95	182.44	182.44	182.58	0.024998	1.76	1.31	5.35	0.92
WW	343	5-Year	1.71	181.58	182.18		182.25	0.008860	1.25	1.95	6.03	0.57
WW	323	5-Year	1.71	181.40	181.99		182.06	0.010209	1.31	1.84	5.92	0.61
WW	313	5-Year	1.71	181.31	181.87	181.80	181.96	0.012469	1.40	1.71	5.78	0.67
WW	303	5-Year	1.71	181.22	181.64	181.64	181.77	0.036223	1.85	1.21	4.89	1.09
WW	280		Culvert									
WW	277	5-Year	1.71	180.80	181.17		181.21	0.004709	0.79	2.16	15.03	0.41
WW	261	5-Year	1.71	180.51	181.15		181.17	0.001002	0.52	4.54	10.09	0.21
WW	254	5-Year	1.71	180.39	181.15		181.16	0.000571	0.44	5.40	10.19	0.16
WW	249	5-Year	1.71	180.29	181.15	180.53	181.16	0.000355	0.30	5.74	11.51	0.12
WW	230		Culvert									
WW	208	5-Year	1.71	179.80	181.07	180.37	181.07	0.000039	0.12	30.05	216.98	0.04
WW	199	5-Year	1.71	179.75	181.07		181.07	0.000012	0.07	37.75	220.25	0.02
WW	168	5-Year	1.71	179.74	181.07		181.07	0.000001	0.02	72.09	227.13	0.01
WW	148	5-Year	1.71	179.56	181.07	180.02	181.07	0.000036	0.12	22.90	219.28	0.04
WW	147		Culvert									
WW	83	5-Year	1.71	178.99	179.63	179.63	179.79	0.039381	1.76	0.97	3.04	0.99
WW	76	5-Year	1.71	178.96	179.35	179.20	179.36	0.008701	0.39	4.36	22.39	0.28
WW	66	5-Year	1.71	178.96	179.09	179.09	179.12	0.154362	0.80	2.15	32.84	1.00

HEC-RAS Plan: EX River: West Watercourse Reach: WW 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
WW	416	10-Year	2.32	183.27	184.04	183.85	184.06	0.003586	0.59	4.12	20.71	0.34
WW	415		Bridge									
WW	413	10-Year	2.32	183.13	183.76	183.76	183.86	0.013774	1.48	2.15	15.21	0.70
WW	383	10-Year	2.32	182.43	183.01	182.99	183.15	0.020466	1.83	1.78	5.86	0.86
WW	363	10-Year	2.32	181.95	182.51	182.51	182.66	0.023326	1.91	1.70	5.77	0.92
WW	343	10-Year	2.32	181.58	182.27		182.34	0.008895	1.39	2.45	6.51	0.59
WW	323	10-Year	2.32	181.40	182.06		182.15	0.010354	1.46	2.31	6.38	0.63
WW	313	10-Year	2.32	181.31	181.94	181.87	182.04	0.012838	1.57	2.13	6.21	0.70
WW	303	10-Year	2.32	181.22	181.70	181.70	181.86	0.033251	2.02	1.54	5.28	1.08
WW	280		Culvert									
WW	277	10-Year	2.32	180.80	181.22		181.27	0.005719	0.95	2.45	15.70	0.46
WW	261	10-Year	2.32	180.51	181.20		181.21	0.001449	0.66	4.97	10.49	0.25
WW	254	10-Year	2.32	180.39	181.19		181.21	0.000863	0.56	5.82	10.53	0.20
WW	249	10-Year	2.32	180.29	181.19	180.59	181.20	0.000545	0.38	6.12	12.69	0.15
WW	230		Culvert									
WW	208	10-Year	2.32	179.80	181.08	180.42	181.09	0.000066	0.15	31.10	217.21	0.05
WW	199	10-Year	2.32	179.75	181.08		181.08	0.000020	0.09	38.89	220.68	0.03
WW	168	10-Year	2.32	179.74	181.08		181.08	0.000002	0.03	73.16	227.58	0.01
WW	148	10-Year	2.32	179.56	181.08	180.07	181.08	0.000060	0.15	23.93	219.43	0.05
WW	147		Culvert									
WW	83	10-Year	2.32	178.99	179.71	179.71	179.89	0.038715	1.88	1.23	3.42	1.00
WW	76	10-Year	2.32	178.96	179.39	179.23	179.40	0.009671	0.44	5.27	24.61	0.30
WW	66	10-Year	2.32	178.96	179.11	179.11	179.14	0.154526	0.86	2.70	36.81	1.01

HEC-RAS Plan: EX River: West Watercourse Reach: WW 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
WW	416	25-Year	3.14	183.27	184.10	183.90	184.12	0.003381	0.64	5.32	24.61	0.34
WW	415		Bridge									
WW	413	25-Year	3.14	183.13	183.83	183.83	183.91	0.011086	1.45	3.40	23.61	0.64
WW	383	25-Year	3.14	182.43	183.07	183.06	183.25	0.022003	2.07	2.19	6.26	0.92
WW	363	25-Year	3.14	181.95	182.60	182.58	182.77	0.021750	2.07	2.20	6.27	0.91
WW	343	25-Year	3.14	181.58	182.36		182.45	0.008963	1.54	3.08	7.07	0.61
WW	323	25-Year	3.14	181.40	182.15		182.25	0.010519	1.63	2.90	6.91	0.65
WW	313	25-Year	3.14	181.31	182.02	181.94	182.14	0.013475	1.76	2.64	6.68	0.73
WW	303	25-Year	3.14	181.22	181.78	181.78	181.97	0.029332	2.18	1.99	5.77	1.05
WW	280		Culvert									
WW	277	25-Year	3.14	180.80	181.31		181.37	0.005696	1.07	2.94	16.84	0.48
WW	261	25-Year	3.14	180.51	181.28		181.30	0.001720	0.77	5.88	11.28	0.28
WW	254	25-Year	3.14	180.39	181.27		181.29	0.001093	0.68	6.72	11.19	0.23
WW	249	25-Year	3.14	180.29	181.27	180.65	181.29	0.000697	0.45	6.92	15.03	0.17
WW	230		Culvert									
WW	208	25-Year	3.14	179.80	181.11	180.47	181.11	0.000106	0.19	32.42	217.50	0.06
WW	199	25-Year	3.14	179.75	181.11		181.11	0.000033	0.12	40.32	221.22	0.04
WW	168	25-Year	3.14	179.74	181.11		181.11	0.000003	0.04	74.51	228.13	0.01
WW	148	25-Year	3.14	179.56	181.10	180.14	181.11	0.000099	0.20	25.21	219.62	0.06
WW	147		Culvert									
WW	83	25-Year	3.14	178.99	179.80	179.80	180.01	0.036750	1.99	1.58	3.87	1.00
WW	76	25-Year	3.14	178.96	179.43	179.26	179.44	0.010811	0.49	6.35	27.00	0.33
WW	66	25-Year	3.14	178.96	179.13	179.13	179.17	0.148202	0.91	3.44	41.56	1.01

HEC-RAS Plan: EX River: West Watercourse Reach: WW 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
WW	416	50-Year	3.76	183.27	184.13	183.94	184.15	0.003177	0.66	6.21	25.81	0.34
WW	415		Bridge									
WW	413	50-Year	3.76	183.13	183.85	183.85	183.94	0.012348	1.58	3.82	26.45	0.68
WW	383	50-Year	3.76	182.43	183.12	183.11	183.31	0.022458	2.22	2.49	6.54	0.94
WW	363	50-Year	3.76	181.95	182.65	182.63	182.84	0.020888	2.17	2.56	6.61	0.91
WW	343	50-Year	3.76	181.58	182.42		182.52	0.009011	1.64	3.53	7.44	0.62
WW	323	50-Year	3.76	181.40	182.21		182.32	0.010535	1.73	3.32	7.27	0.66
WW	313	50-Year	3.76	181.31	182.05	181.99	182.20	0.016536	2.01	2.80	6.82	0.82
WW	303	50-Year	3.76	181.22	181.92	181.83	182.05	0.015148	1.88	2.78	6.60	0.79
WW	280		Culvert									
WW	277	50-Year	3.76	180.80	181.36		181.43	0.006027	1.17	3.22	17.49	0.50
WW	261	50-Year	3.76	180.51	181.33		181.36	0.001972	0.86	6.41	11.71	0.30
WW	254	50-Year	3.76	180.39	181.32		181.34	0.001295	0.76	7.23	11.56	0.25
WW	249	50-Year	3.76	180.29	181.32	180.69	181.33	0.000813	0.51	7.38	15.26	0.19
WW	230		Culvert									
WW	208	50-Year	3.76	179.80	181.11	180.49	181.12	0.000146	0.23	32.90	217.60	0.07
WW	199	50-Year	3.76	179.75	181.11		181.12	0.000046	0.14	40.83	221.41	0.04
WW	168	50-Year	3.76	179.74	181.11		181.11	0.000005	0.05	74.99	228.33	0.01
WW	148	50-Year	3.76	179.56	181.11	180.18	181.11	0.000137	0.24	25.63	219.68	0.07
WW	147		Culvert									
WW	83	50-Year	3.76	178.99	179.86	179.86	180.08	0.036056	2.07	1.82	4.16	1.00
WW	76	50-Year	3.76	178.96	179.46	179.28	179.47	0.011491	0.53	7.10	28.56	0.34
WW	66	50-Year	3.76	178.96	179.14	179.14	179.18	0.145054	0.95	3.97	44.64	1.02

HEC-RAS Plan: EX River: West Watercourse Reach: WW 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
WW	416	100-Year	4.44	183.27	184.15	183.97	184.18	0.003529	0.72	6.73	26.59	0.36
WW	415		Bridge									
WW	413	100-Year	4.44	183.13	183.88	183.88	183.97	0.012071	1.62	4.48	30.56	0.68
WW	383	100-Year	4.44	182.43	183.17	183.16	183.38	0.022965	2.37	2.80	6.83	0.96
WW	363	100-Year	4.44	181.95	182.71	182.68	182.90	0.020160	2.27	2.94	6.95	0.91
WW	343	100-Year	4.44	181.58	182.48		182.59	0.009052	1.74	4.00	7.81	0.63
WW	323	100-Year	4.44	181.40	182.27		182.39	0.010715	1.84	3.75	7.61	0.68
WW	313	100-Year	4.44	181.31	182.12		182.28	0.015019	2.06	3.29	7.25	0.79
WW	303	100-Year	4.44	181.22	182.03	181.88	182.15	0.011392	1.82	3.38	7.23	0.71
WW	280		Culvert									
WW	277	100-Year	4.44	180.80	181.41		181.49	0.006273	1.26	3.52	18.18	0.52
WW	261	100-Year	4.44	180.51	181.38		181.41	0.002187	0.94	7.01	12.19	0.32
WW	254	100-Year	4.44	180.39	181.37		181.40	0.001483	0.84	7.81	11.96	0.27
WW	249	100-Year	4.44	180.29	181.37	180.73	181.39	0.000916	0.57	7.88	15.35	0.20
WW	230		Culvert									
WW	208	100-Year	4.44	179.80	181.14	180.52	181.14	0.000181	0.26	34.23	217.90	0.08
WW	199	100-Year	4.44	179.75	181.14		181.14	0.000058	0.16	42.27	221.95	0.05
WW	168	100-Year	4.44	179.74	181.14		181.14	0.000006	0.06	76.34	228.89	0.02
WW	148	100-Year	4.44	179.56	181.13	180.22	181.14	0.000172	0.27	26.92	219.87	0.08
WW	147		Culvert									
WW	83	100-Year	4.44	178.99	179.93	179.93	180.16	0.034618	2.13	2.09	4.46	0.99
WW	76	100-Year	4.44	178.96	179.40	179.30	179.43	0.029918	0.79	5.62	25.40	0.54
WW	66	100-Year	4.44	178.96	179.36	179.15	179.36	0.002616	0.22	20.08	98.87	0.16

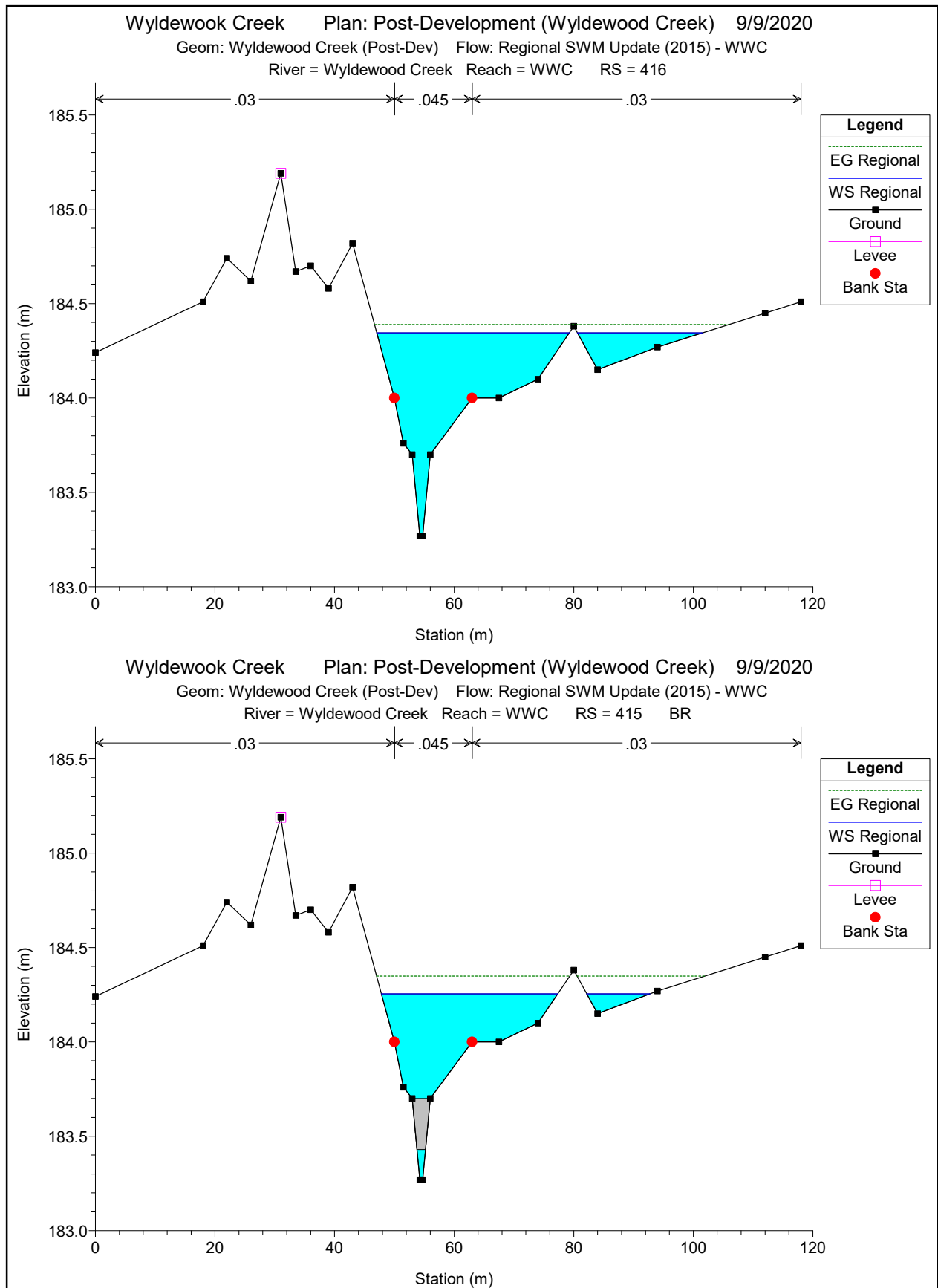
HEC-RAS Plan: EX River: West Watercourse Reach: WW Profile: Regional

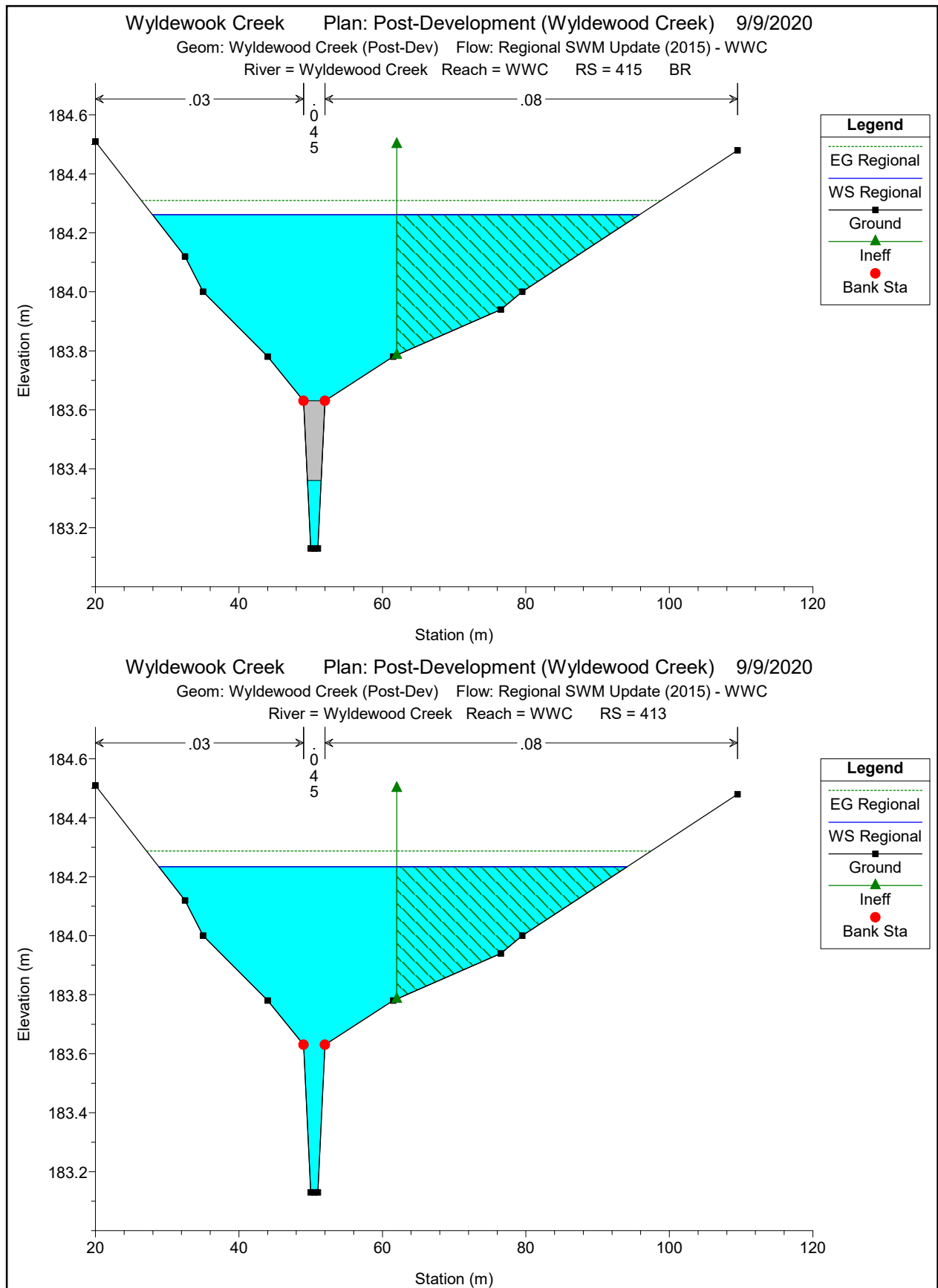
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
WW	416	Regional	12.83	183.27	184.34	184.21	184.39	0.004342	1.03	14.33	53.03	0.43
WW	415		Bridge									
WW	413	Regional	12.83	183.13	184.23		184.29	0.004178	1.31	14.45	65.29	0.43
WW	383	Regional	12.83	182.43	183.63	183.63	183.99	0.021031	3.28	6.55	9.57	1.01
WW	363	Regional	12.83	181.95	183.27		183.53	0.013670	2.84	7.75	10.29	0.83
WW	343	Regional	12.83	181.58	183.15		183.30	0.006141	2.17	10.59	11.84	0.57
WW	323	Regional	12.83	181.40	183.06		183.18	0.004800	1.99	11.67	12.37	0.51
WW	313	Regional	12.83	181.31	183.03		183.14	0.004095	1.89	12.42	12.73	0.48
WW	303	Regional	12.83	181.22	182.94	182.33	183.09	0.004619	2.05	8.62	12.74	0.52
WW	280		Culvert									
WW	277	Regional	12.83	180.80	181.82		182.06	0.009378	2.18	5.90	23.70	0.69
WW	261	Regional	12.83	180.51	181.80		181.90	0.003748	1.62	13.10	16.24	0.45
WW	254	Regional	12.83	180.39	181.78		181.87	0.003297	1.59	13.82	18.79	0.43
WW	249	Regional	12.83	180.29	181.79	181.10	181.84	0.001864	1.07	12.33	17.03	0.31
WW	230		Culvert									
WW	208	Regional	12.83	179.80	181.29	180.70	181.30	0.000724	0.57	43.73	219.94	0.17
WW	199	Regional	12.83	179.75	181.29		181.30	0.000269	0.39	52.28	225.03	0.11
WW	168	Regional	12.83	179.74	181.29		181.29	0.000036	0.15	85.71	233.00	0.04
WW	148	Regional	12.83	179.56	181.27	180.58	181.29	0.000747	0.61	35.34	221.07	0.18
WW	147		Culvert									
WW	83	Regional	12.83	178.99	180.57	180.57	180.73	0.011326	1.94	10.50	201.15	0.64
WW	76	Regional	12.83	178.96	179.80	179.49	179.82	0.007134	0.67	19.24	71.96	0.30
WW	66	Regional	12.83	178.96	179.80	179.25	179.80	0.000400	0.18	75.44	164.35	0.07

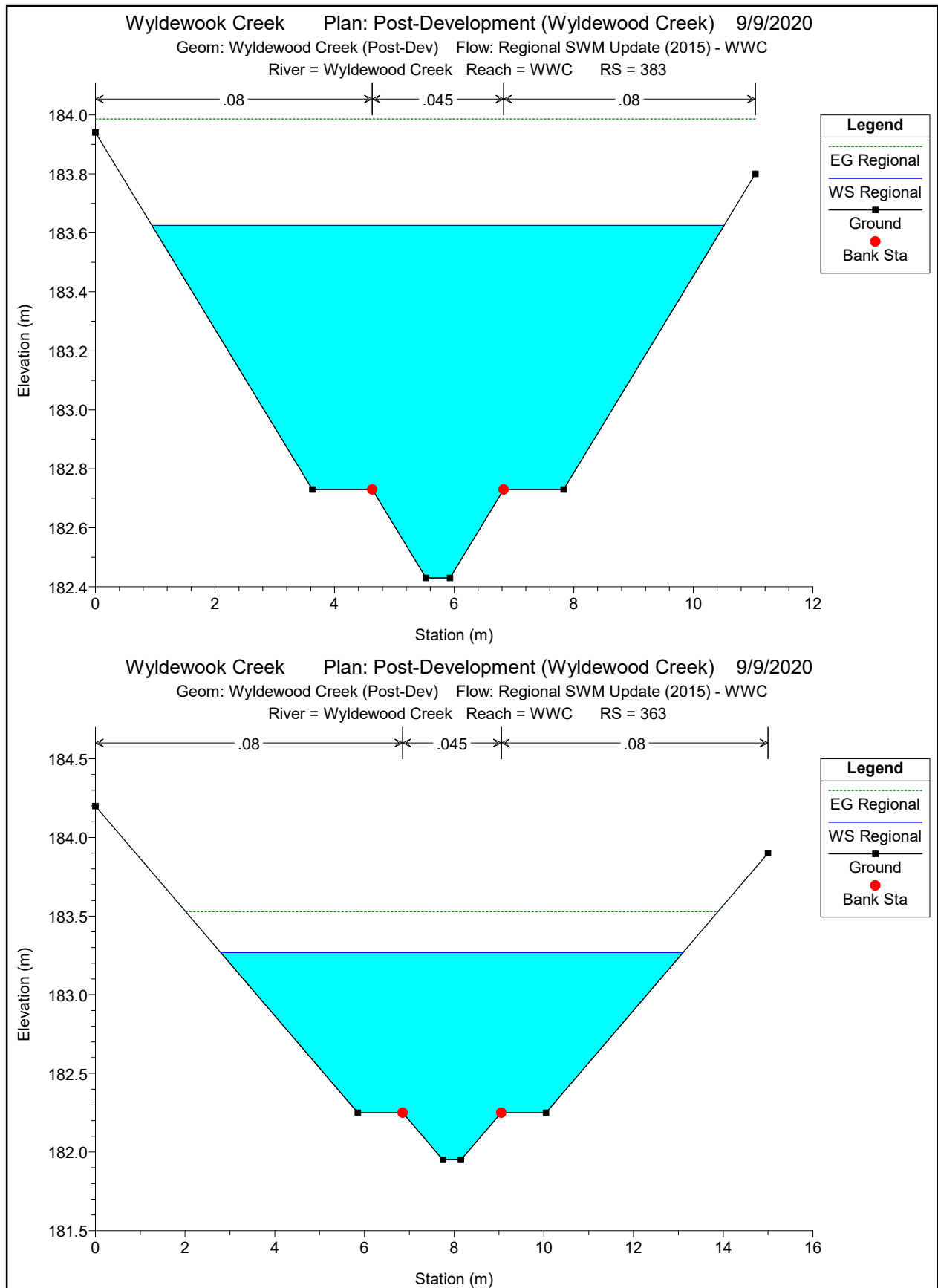
APPENDIX E

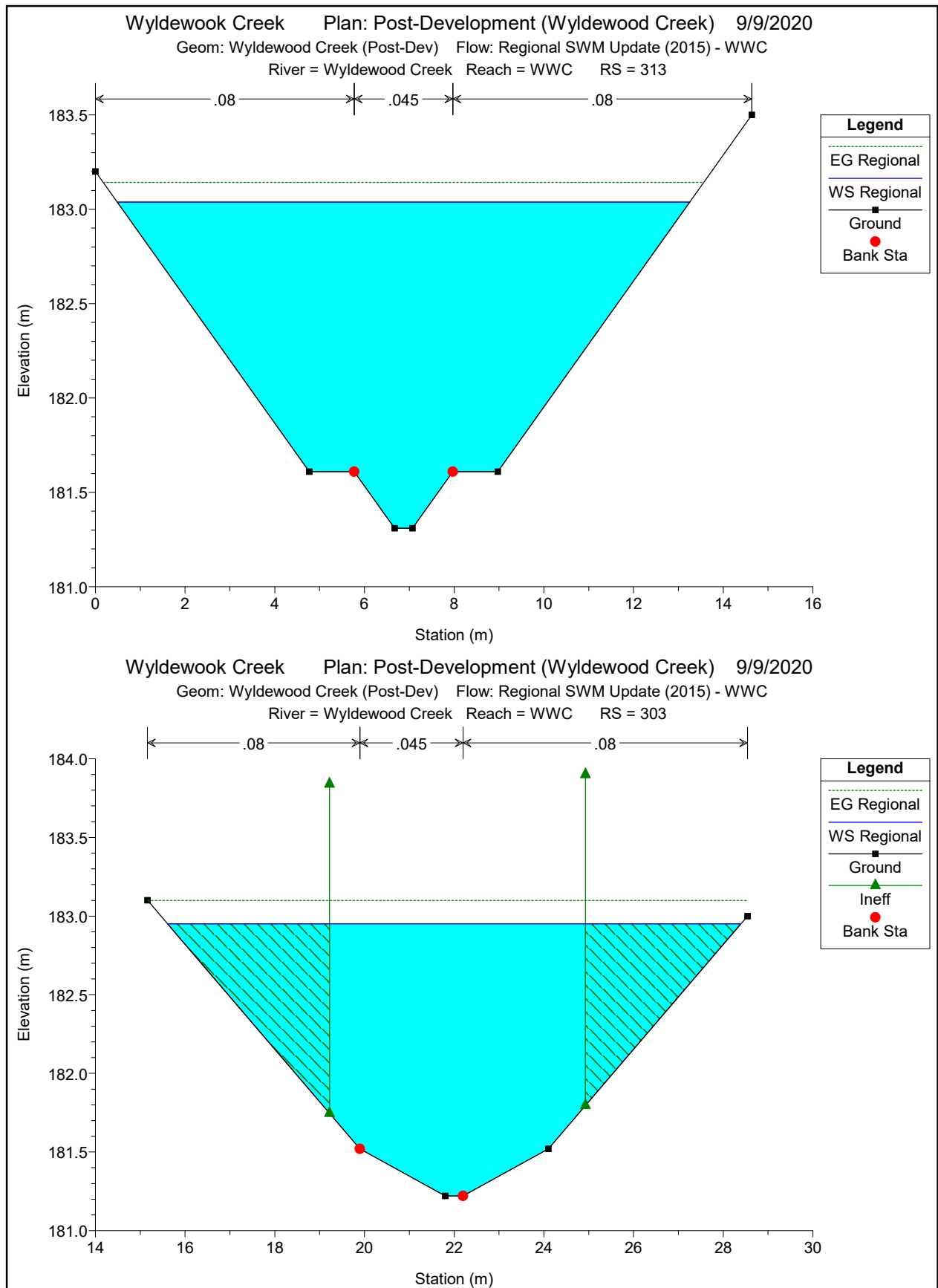
Proposed Conditions HEC-RAS Model

HEC-RAS Cross-Section Output
HEC-RAS Output Summary Table
HEC-RAS Cross-Section Output (50% Blockage)
HEC-RAS Output Summary Table (50% Blockage)





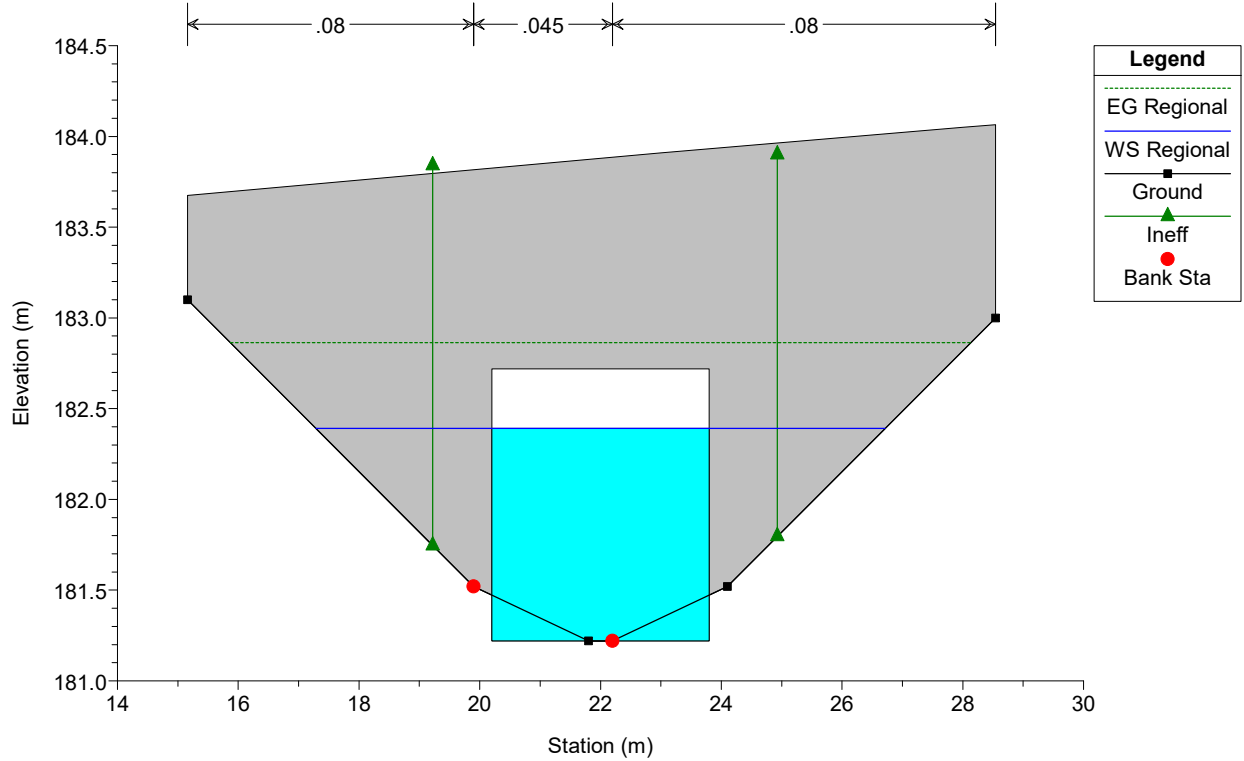




Wyldewook Creek Plan: Post-Development (Wyldewood Creek) 9/9/2020

Geom: Wyldewood Creek (Post-Dev) Flow: Regional SWM Update (2015) - WWC

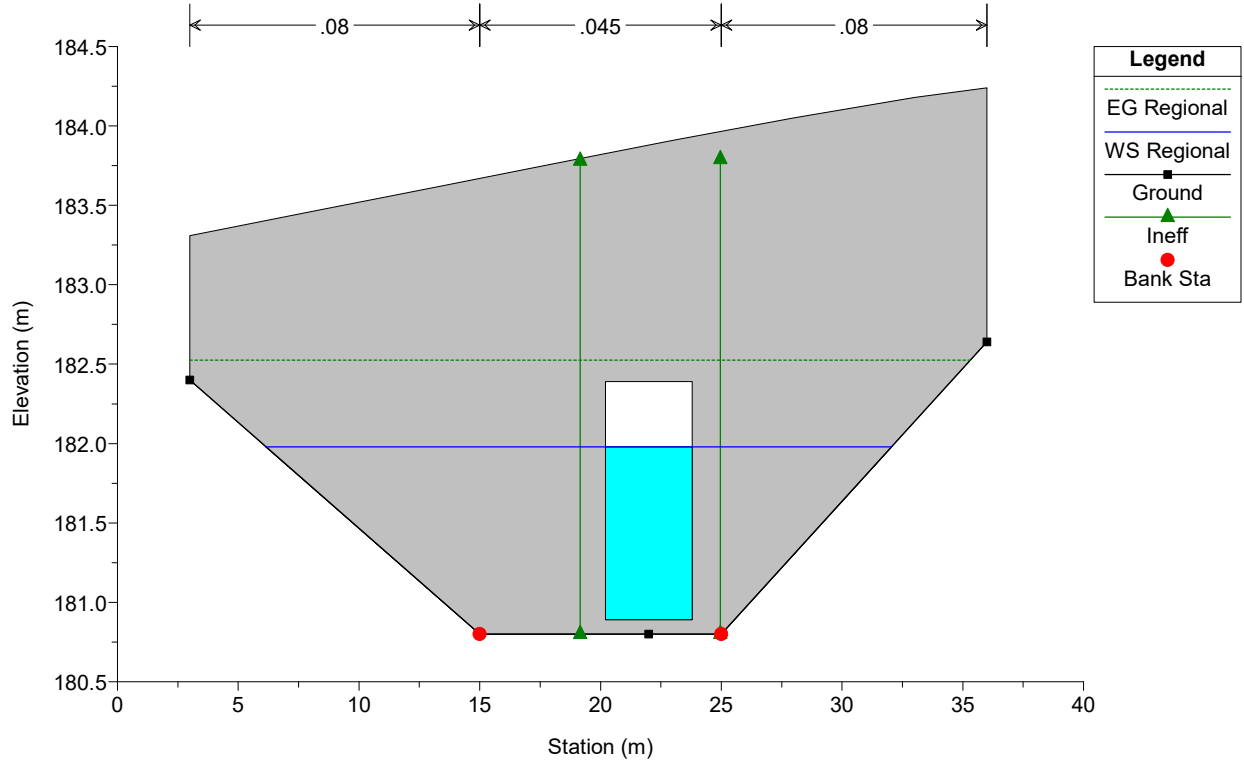
River = Wyldewood Creek Reach = WWC RS = 280 Culv

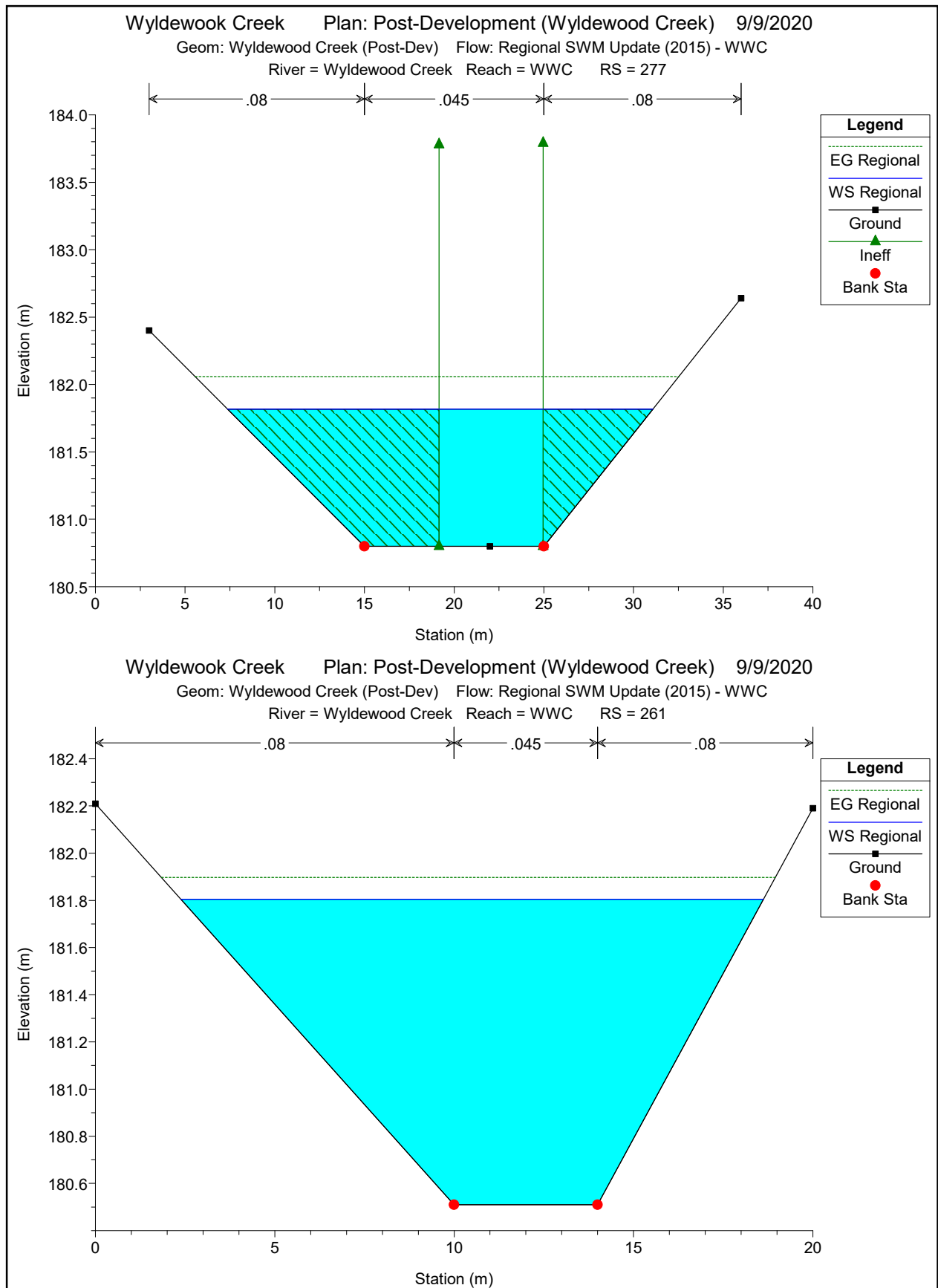


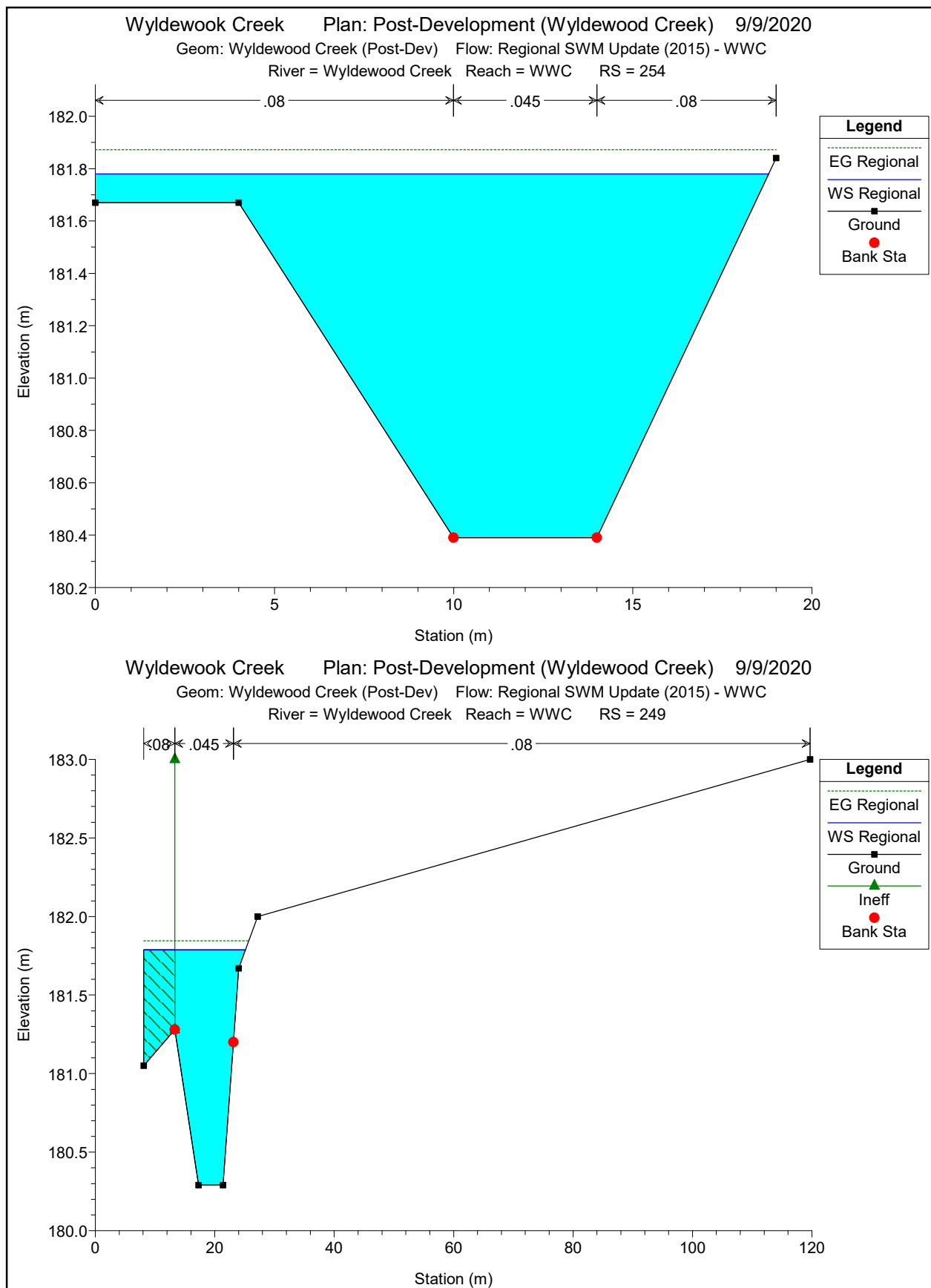
Wyldewook Creek Plan: Post-Development (Wyldewood Creek) 9/9/2020

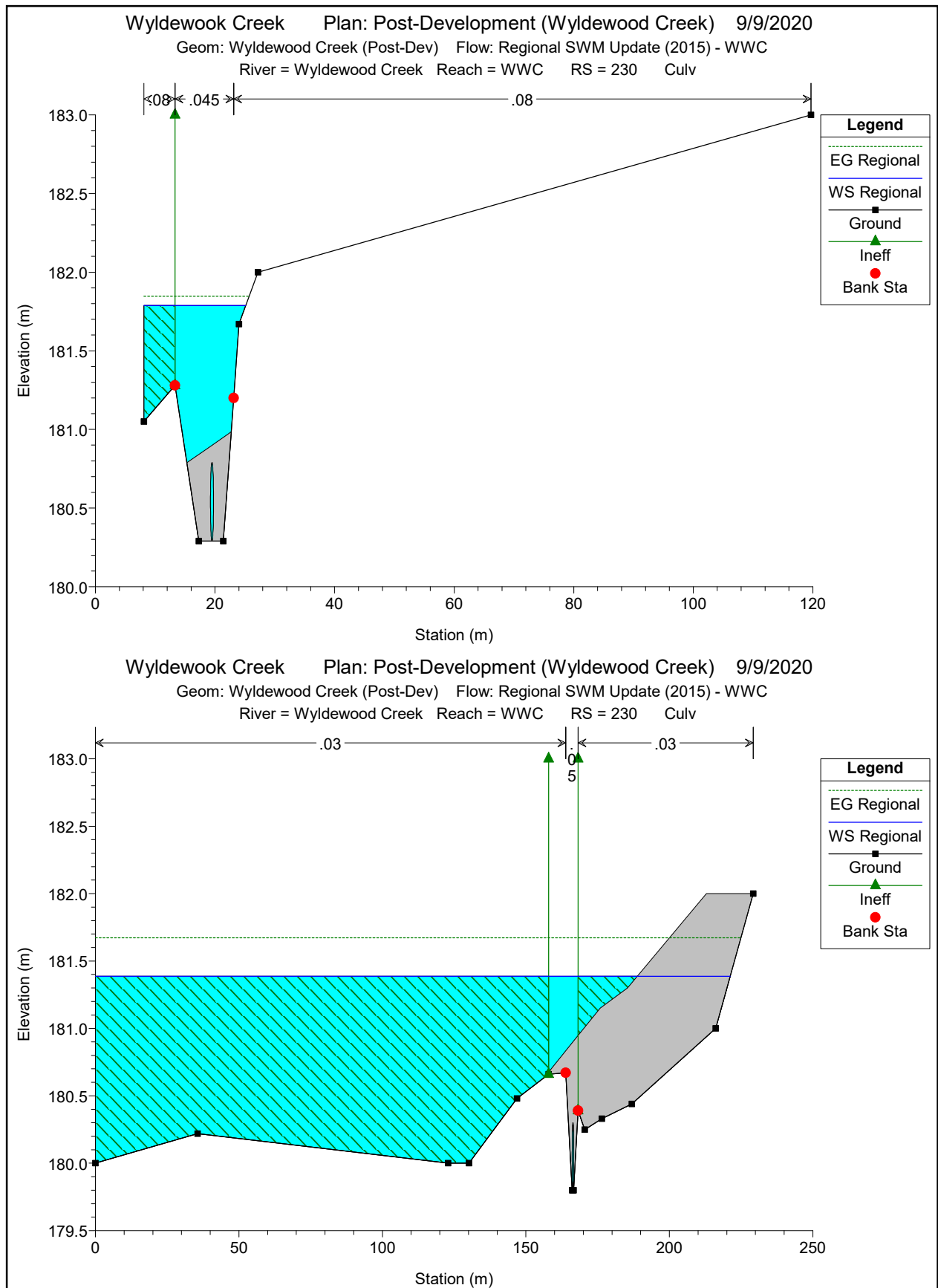
Geom: Wyldewood Creek (Post-Dev) Flow: Regional SWM Update (2015) - WWC

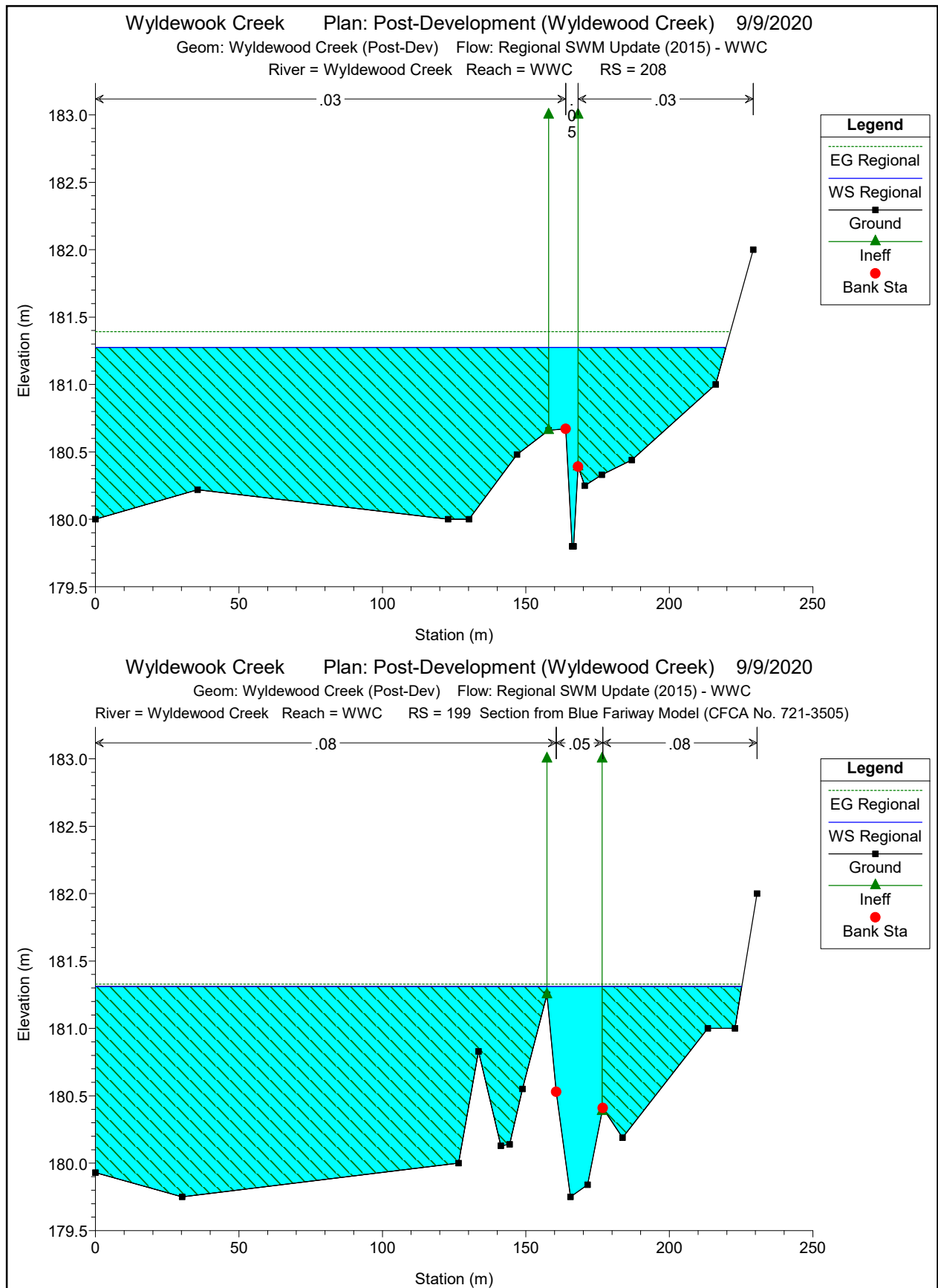
River = Wyldewood Creek Reach = WWC RS = 280 Culv

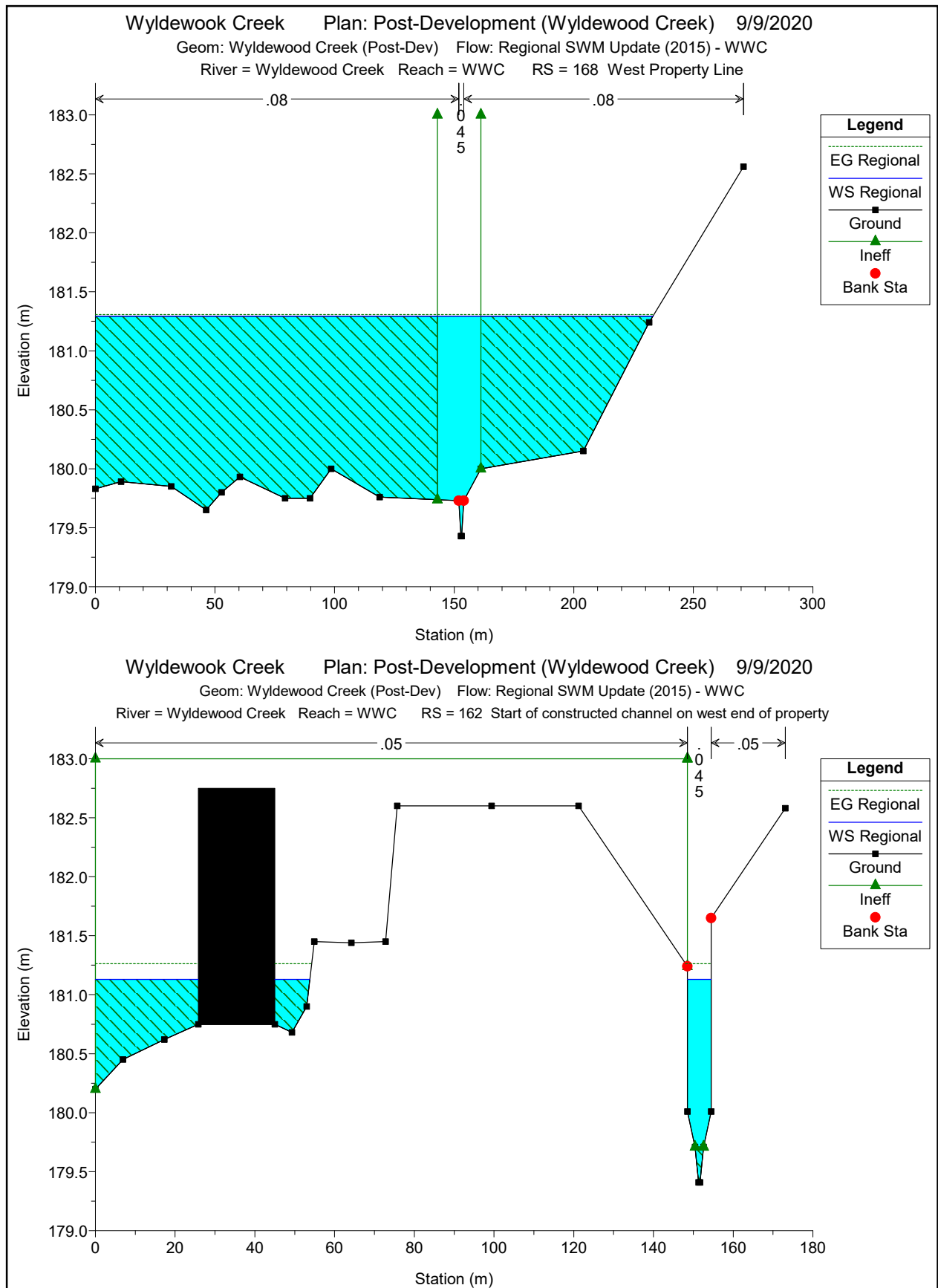


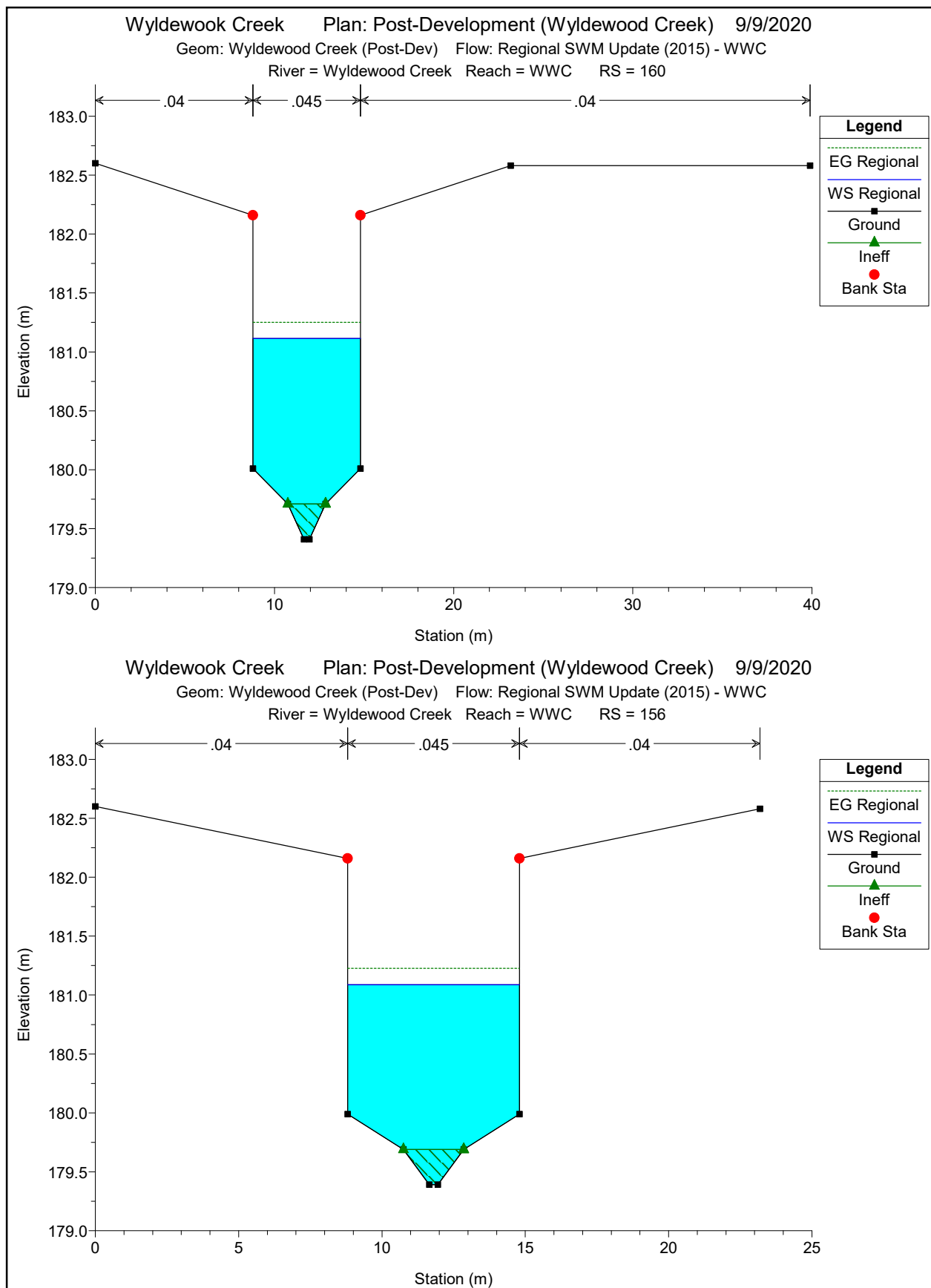


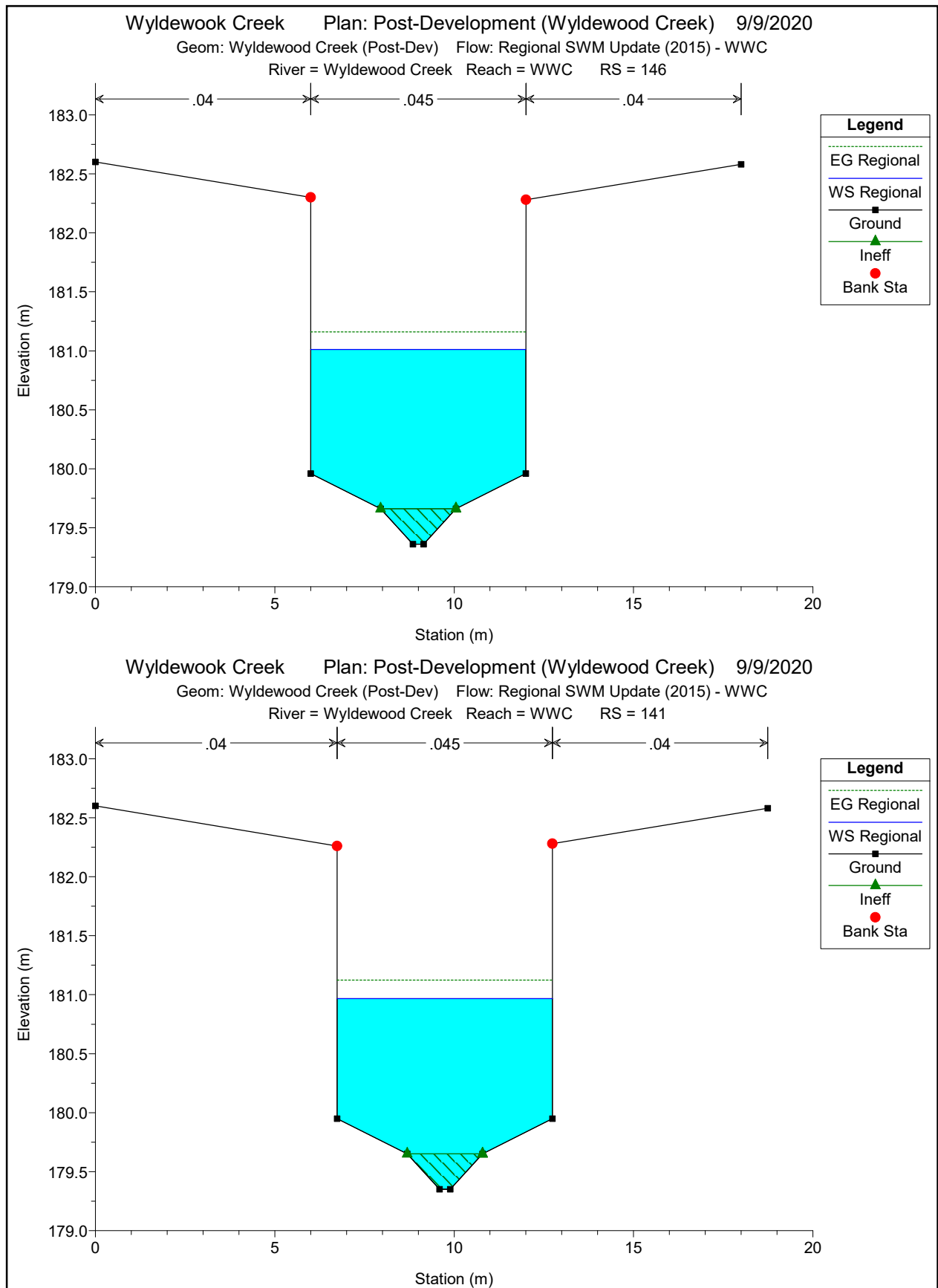


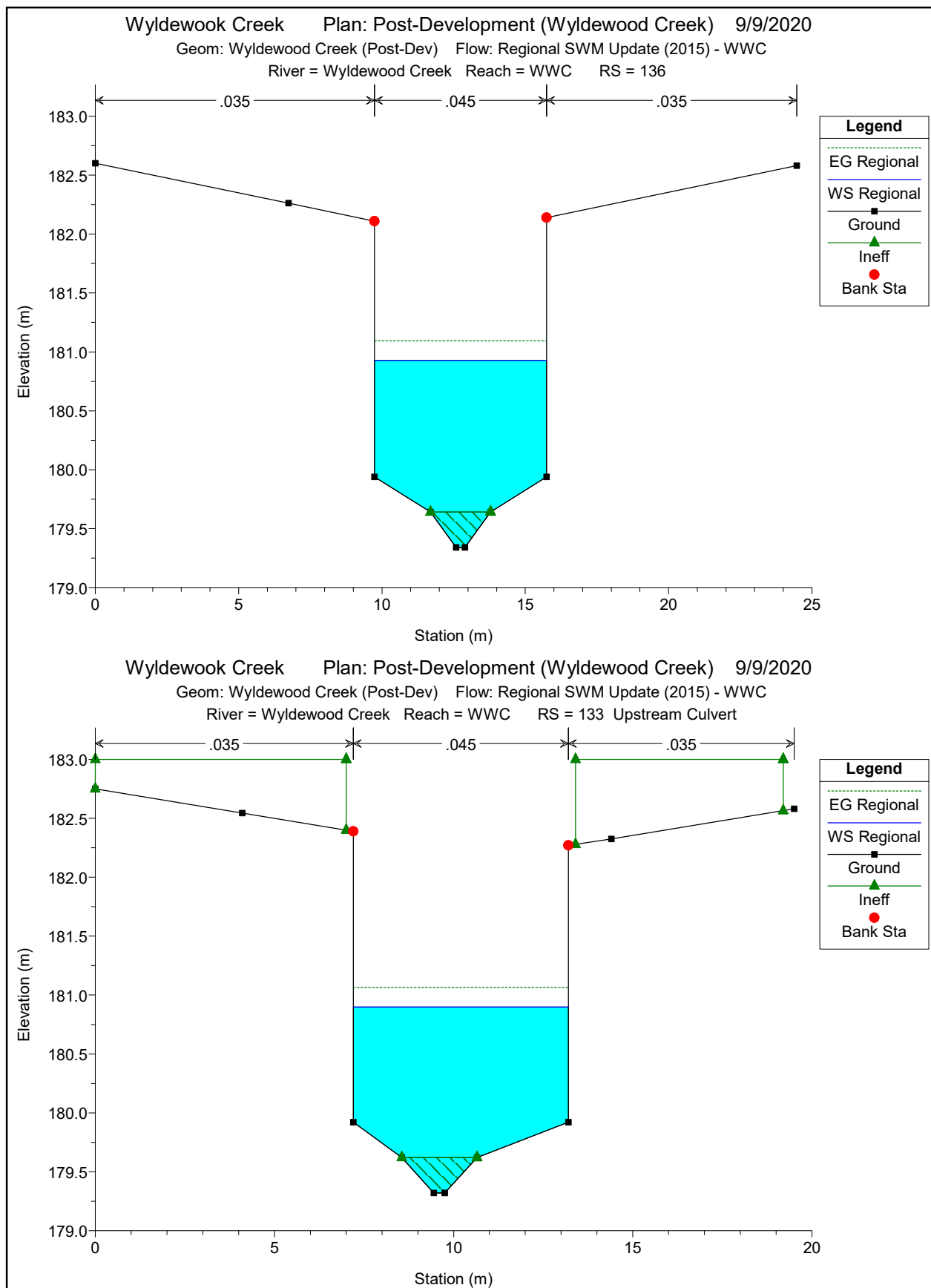


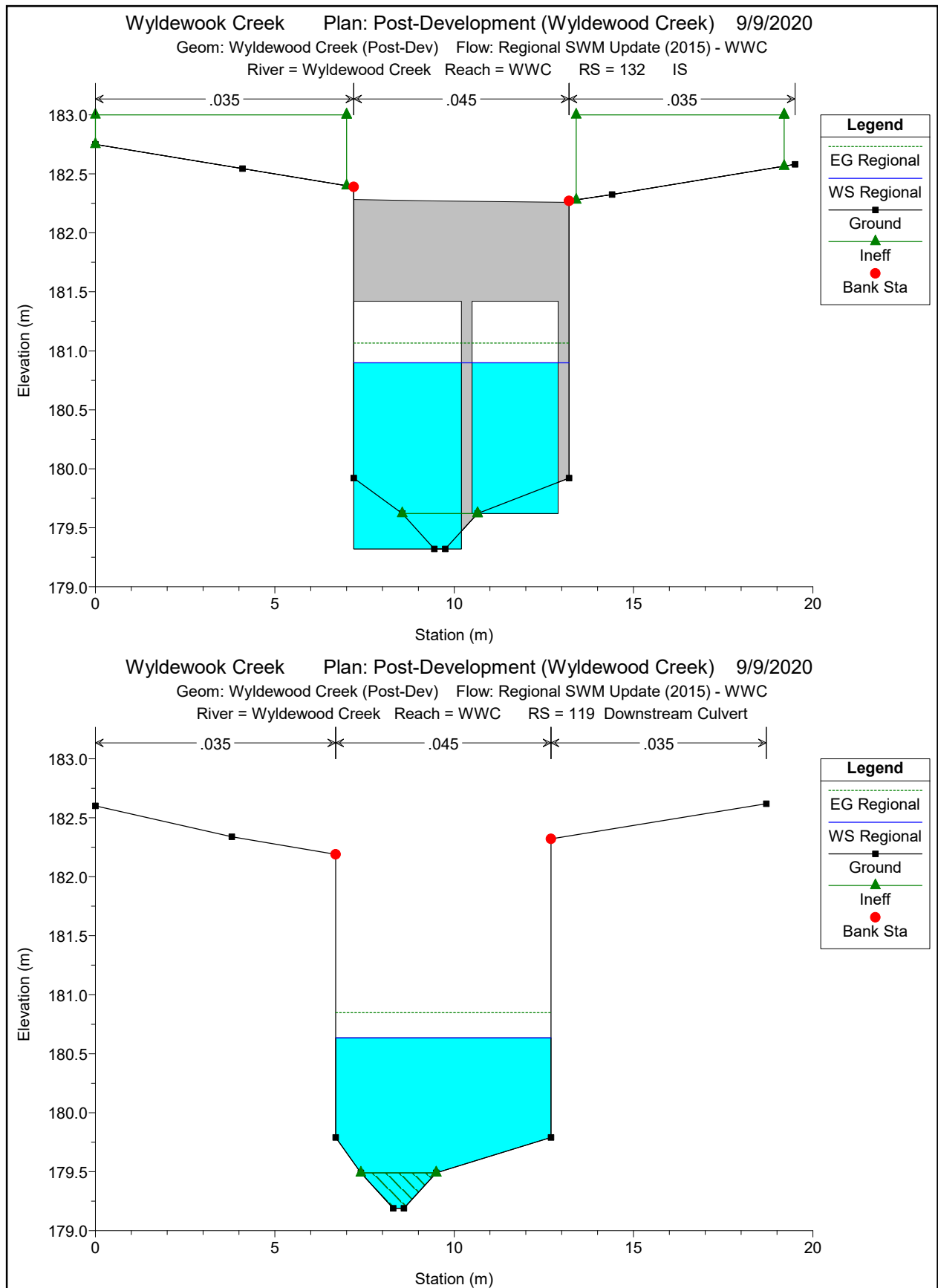


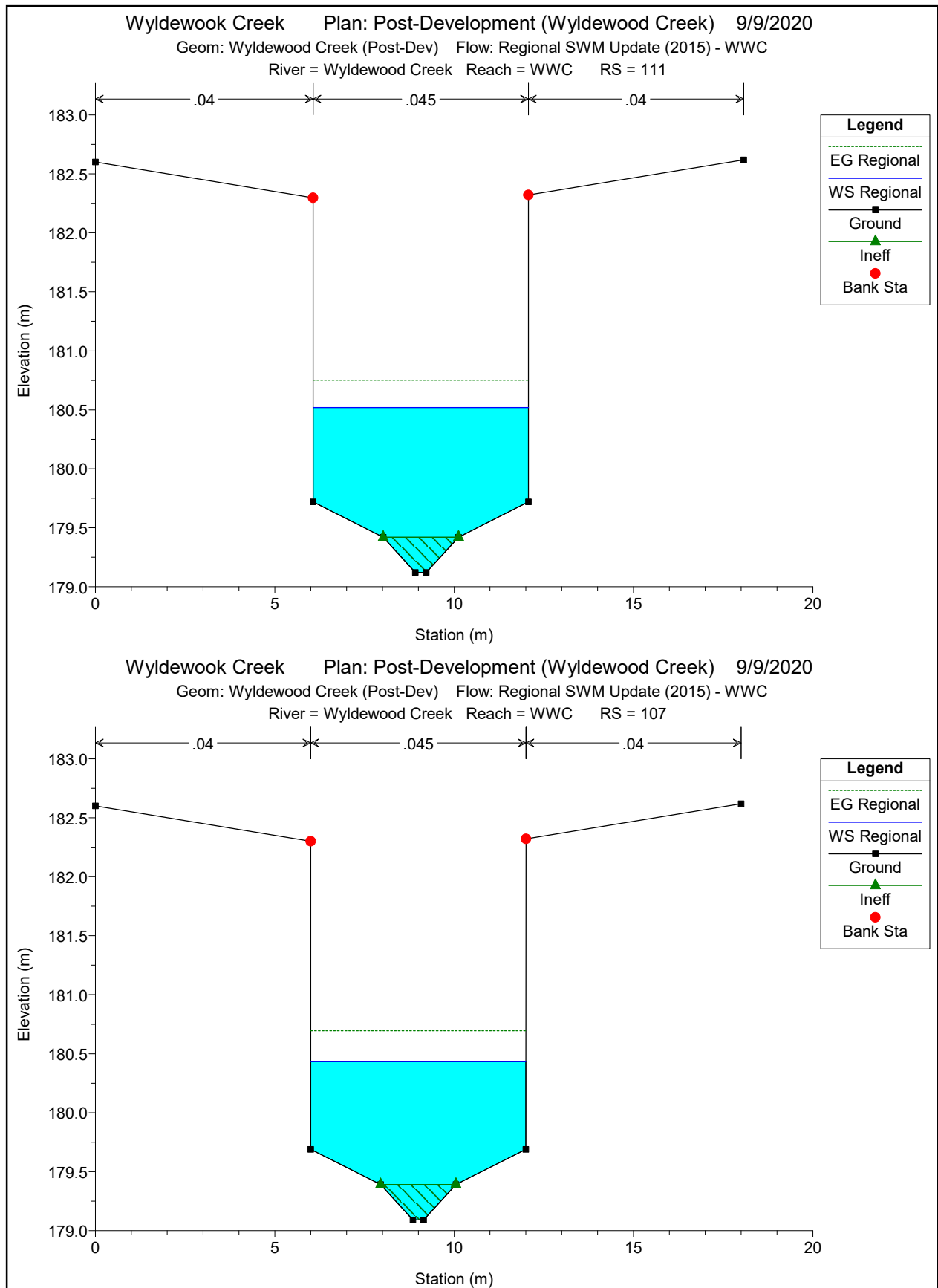


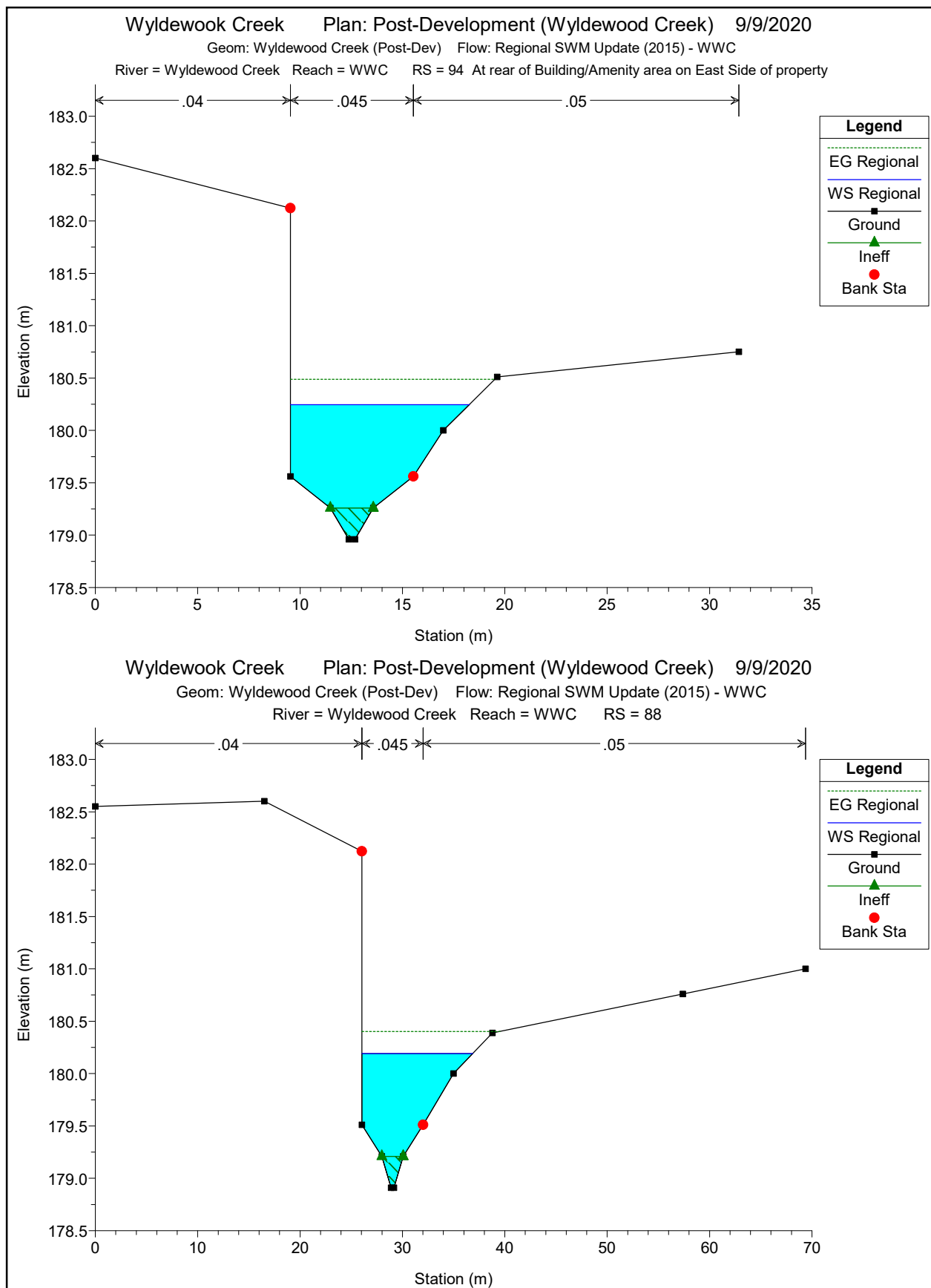


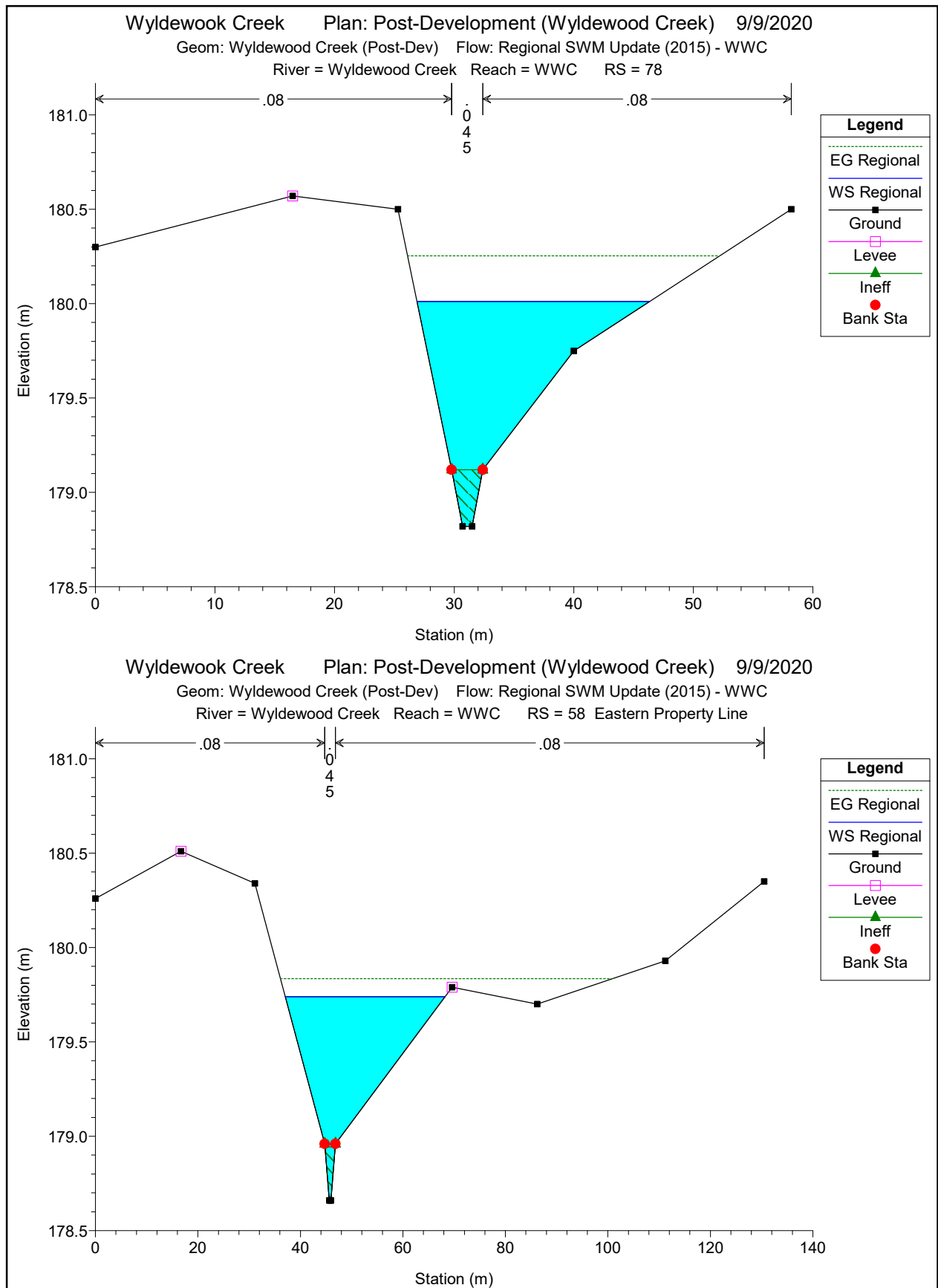








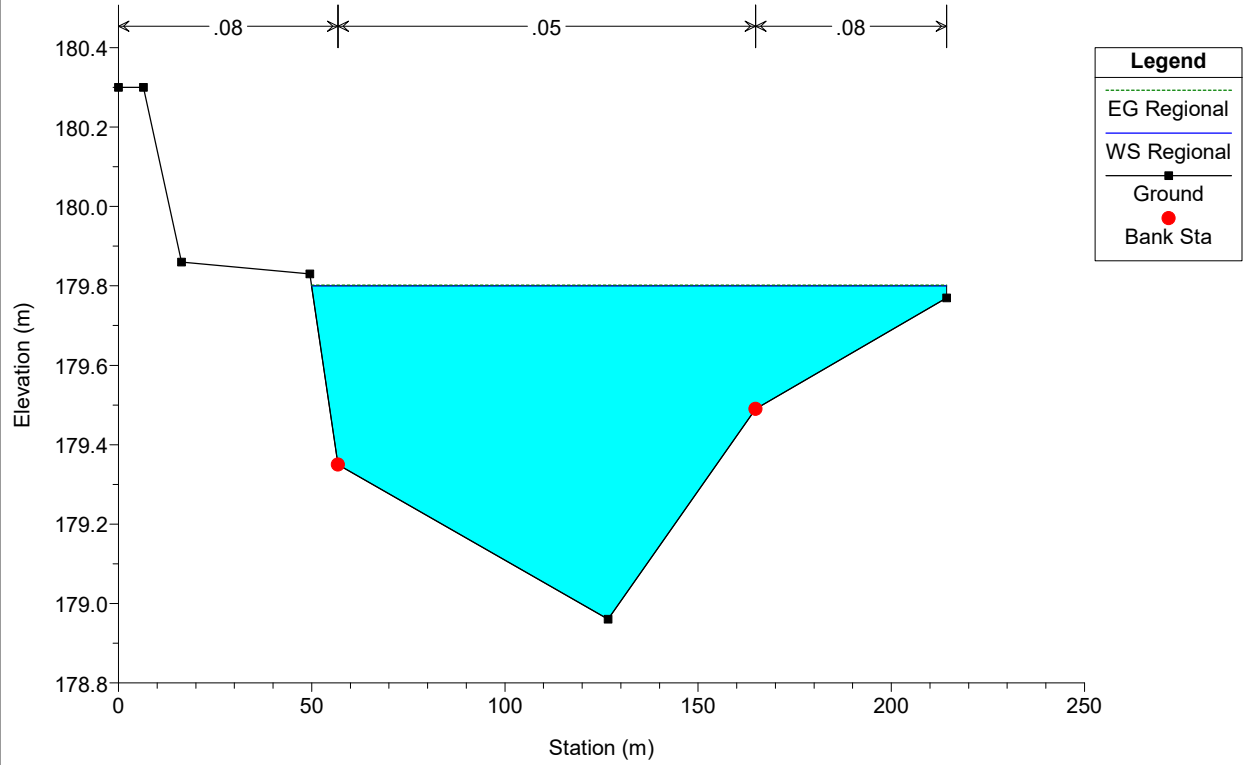




Wyldewook Creek Plan: Post-Development (Wyldewood Creek) 9/9/2020

Geom: Wyldewood Creek (Post-Dev) Flow: Regional SWM Update (2015) - WWC

River = Wyldewood Creek Reach = WWC RS = 48



HEC-RAS Plan: Post-Develop River: Wyldewood Creek Reach: WWC Profile: 2-Year

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
WWC	416	2-Year	0.88	183.27	183.91	183.65	183.92	0.002549	0.40	2.21	10.25	0.27
WWC	415		Bridge									
WWC	413	2-Year	0.88	183.13	183.49	183.47	183.59	0.027955	1.42	0.62	2.44	0.90
WWC	383	2-Year	0.88	182.43	182.84	182.81	182.91	0.018442	1.27	0.87	4.84	0.76
WWC	363	2-Year	0.88	181.95	182.33	182.33	182.43	0.026180	1.42	0.76	4.70	0.89
WWC	343	2-Year	0.88	181.58	182.05		182.09	0.008746	0.99	1.17	5.20	0.54
WWC	323	2-Year	0.88	181.40	181.86		181.90	0.009976	1.04	1.12	5.13	0.57
WWC	313	2-Year	0.88	181.31	181.75	181.69	181.81	0.011627	1.09	1.05	5.06	0.61
WWC	303	2-Year	0.88	181.22	181.53	181.53	181.62	0.042839	1.50	0.74	4.27	1.10
WWC	280		Culvert									
WWC	277	2-Year	0.88	180.80	181.04		181.06	0.005199	0.62	1.41	13.28	0.40
WWC	261	2-Year	0.88	180.51	181.03		181.04	0.000588	0.35	3.36	8.91	0.15
WWC	254	2-Year	0.88	180.39	181.03		181.03	0.000292	0.28	4.21	9.19	0.11
WWC	249	2-Year	0.88	180.29	181.03	180.45	181.03	0.000169	0.19	4.65	8.49	0.08
WWC	230		Culvert									
WWC	208	2-Year	0.88	179.80	180.19	180.19	180.30	0.043526	1.52	0.58	120.06	1.01
WWC	199	2-Year	0.88	179.75	180.12		180.12	0.001637	0.32	2.74	138.43	0.20
WWC	168	2-Year	0.88	179.43	180.10		180.10	0.000377	0.28	6.10	189.95	0.12
WWC	162	2-Year	0.88	179.41	180.08		180.09	0.003582	0.54	1.63	6.00	0.33
WWC	160	2-Year	0.88	179.41	180.07		180.09	0.004006	0.56	1.57	6.00	0.35
WWC	156	2-Year	0.88	179.39	180.05		180.07	0.003813	0.55	1.60	6.00	0.34
WWC	146	2-Year	0.88	179.36	180.01		180.03	0.004634	0.59	1.50	6.00	0.37
WWC	141	2-Year	0.88	179.35	179.98		180.00	0.006104	0.64	1.38	6.00	0.42
WWC	136	2-Year	0.88	179.34	179.94		179.97	0.009073	0.72	1.22	6.00	0.51
WWC	133	2-Year	0.88	179.32	179.83	179.83	179.90	0.039320	1.22	0.72	4.81	1.01
WWC	132		Inl Struct									
WWC	119	2-Year	0.88	179.19	179.79		179.82	0.009188	0.72	1.22	6.00	0.51
WWC	111	2-Year	0.88	179.12	179.72		179.75	0.008543	0.71	1.24	6.00	0.50
WWC	107	2-Year	0.88	179.09	179.69		179.72	0.009537	0.73	1.20	5.97	0.52
WWC	94	2-Year	0.88	178.96	179.56		179.59	0.009184	0.72	1.22	6.00	0.51
WWC	88	2-Year	0.88	178.91	179.51		179.53	0.009646	0.74	1.20	5.95	0.52
WWC	78	2-Year	0.88	178.82	179.39	179.32	179.43	0.011802	0.98	1.25	6.72	0.60
WWC	58	2-Year	0.88	178.66	179.23	179.15	179.25	0.008441	0.83	1.93	12.17	0.51
WWC	48	2-Year	0.88	178.96	179.07	179.06	179.09	0.039991	0.58	1.52	27.65	0.79

HEC-RAS Plan: Post-Develop River: Wyldewood Creek Reach: WWC 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
WWC	416	5-Year	1.71	183.27	184.00	183.80	184.01	0.003585	0.53	3.25	12.91	0.33
WWC	415		Bridge									
WWC	413	5-Year	1.71	183.13	183.63	183.61	183.78	0.029461	1.73	0.99	2.98	0.96
WWC	383	5-Year	1.71	182.43	182.95	182.92	183.06	0.019416	1.62	1.44	5.50	0.82
WWC	363	5-Year	1.71	181.95	182.44	182.44	182.58	0.024998	1.76	1.31	5.35	0.92
WWC	343	5-Year	1.71	181.58	182.18		182.25	0.008860	1.25	1.95	6.03	0.57
WWC	323	5-Year	1.71	181.40	181.99		182.06	0.010209	1.31	1.84	5.92	0.61
WWC	313	5-Year	1.71	181.31	181.87	181.80	181.96	0.012469	1.40	1.71	5.78	0.67
WWC	303	5-Year	1.71	181.22	181.64	181.64	181.77	0.036223	1.85	1.21	4.89	1.09
WWC	280		Culvert									
WWC	277	5-Year	1.71	180.80	181.16		181.19	0.005526	0.83	2.06	14.79	0.44
WWC	261	5-Year	1.71	180.51	181.13		181.15	0.001131	0.55	4.33	9.89	0.22
WWC	254	5-Year	1.71	180.39	181.13		181.14	0.000634	0.46	5.19	10.02	0.17
WWC	249	5-Year	1.71	180.29	181.13	180.53	181.13	0.000390	0.31	5.54	10.91	0.13
WWC	230		Culvert									
WWC	208	5-Year	1.71	179.80	180.33	180.33	180.48	0.039820	1.73	0.99	151.80	1.01
WWC	199	5-Year	1.71	179.75	180.26		180.27	0.001579	0.38	4.44	152.47	0.21
WWC	168	5-Year	1.71	179.43	180.24		180.24	0.000494	0.37	8.62	206.25	0.14
WWC	162	5-Year	1.71	179.41	180.20		180.23	0.004079	0.72	2.37	6.07	0.37
WWC	160	5-Year	1.71	179.41	180.19		180.22	0.004442	0.74	2.31	6.00	0.38
WWC	156	5-Year	1.71	179.39	180.17		180.20	0.004380	0.74	2.32	6.00	0.38
WWC	146	5-Year	1.71	179.36	180.12		180.15	0.005412	0.79	2.17	6.00	0.42
WWC	141	5-Year	1.71	179.35	180.08		180.12	0.006931	0.85	2.00	6.00	0.47
WWC	136	5-Year	1.71	179.34	180.04		180.08	0.009609	0.94	1.81	6.00	0.55
WWC	133	5-Year	1.71	179.32	179.92	179.92	180.02	0.035379	1.42	1.21	5.98	1.01
WWC	132		Inl Struct									
WWC	119	5-Year	1.71	179.19	179.89		179.94	0.009173	0.93	1.84	6.00	0.54
WWC	111	5-Year	1.71	179.12	179.83		179.87	0.008837	0.92	1.86	6.00	0.53
WWC	107	5-Year	1.71	179.09	179.79		179.83	0.009668	0.95	1.81	6.00	0.55
WWC	94	5-Year	1.71	178.96	179.66		179.71	0.008893	0.93	1.86	6.35	0.53
WWC	88	5-Year	1.71	178.91	179.61		179.66	0.008762	0.92	1.88	6.64	0.53
WWC	78	5-Year	1.71	178.82	179.49	179.42	179.55	0.013100	1.28	2.01	8.26	0.67
WWC	58	5-Year	1.71	178.66	179.31	179.23	179.34	0.010774	1.11	2.97	15.04	0.60
WWC	48	5-Year	1.71	178.96	179.09	179.09	179.12	0.060298	0.80	2.15	32.84	1.00

HEC-RAS Plan: Post-Develop River: Wyldewood Creek Reach: WWC 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
WWC	416	10-Year	2.32	183.27	184.04	183.85	184.06	0.003586	0.59	4.12	20.71	0.34
WWC	415		Bridge									
WWC	413	10-Year	2.32	183.13	183.76	183.76	183.86	0.013774	1.48	2.15	15.21	0.70
WWC	383	10-Year	2.32	182.43	183.01	182.99	183.15	0.020466	1.83	1.78	5.86	0.86
WWC	363	10-Year	2.32	181.95	182.51	182.51	182.66	0.023326	1.91	1.70	5.77	0.92
WWC	343	10-Year	2.32	181.58	182.27		182.34	0.008895	1.39	2.45	6.51	0.59
WWC	323	10-Year	2.32	181.40	182.06		182.15	0.010354	1.46	2.31	6.38	0.63
WWC	313	10-Year	2.32	181.31	181.94	181.87	182.04	0.012838	1.57	2.13	6.21	0.70
WWC	303	10-Year	2.32	181.22	181.70	181.70	181.86	0.033251	2.02	1.54	5.28	1.08
WWC	280		Culvert									
WWC	277	10-Year	2.32	180.80	181.22		181.27	0.005690	0.94	2.46	15.71	0.46
WWC	261	10-Year	2.32	180.51	181.20		181.22	0.001443	0.66	4.98	10.50	0.25
WWC	254	10-Year	2.32	180.39	181.19		181.21	0.000860	0.56	5.83	10.53	0.20
WWC	249	10-Year	2.32	180.29	181.19	180.59	181.20	0.000543	0.38	6.13	12.71	0.15
WWC	230		Culvert									
WWC	208	10-Year	2.32	179.80	180.40	180.40	180.58	0.038191	1.85	1.25	163.12	1.01
WWC	199	10-Year	2.32	179.75	180.35		180.36	0.001515	0.41	5.62	162.18	0.21
WWC	168	10-Year	2.32	179.43	180.32		180.33	0.000544	0.42	10.15	208.37	0.15
WWC	162	10-Year	2.32	179.41	180.28		180.31	0.004359	0.82	2.81	8.11	0.38
WWC	160	10-Year	2.32	179.41	180.26		180.30	0.004713	0.85	2.74	6.00	0.40
WWC	156	10-Year	2.32	179.39	180.24		180.28	0.004709	0.85	2.74	6.00	0.40
WWC	146	10-Year	2.32	179.36	180.18		180.23	0.005850	0.91	2.56	6.00	0.44
WWC	141	10-Year	2.32	179.35	180.14		180.19	0.007442	0.98	2.38	6.00	0.50
WWC	136	10-Year	2.32	179.34	180.10	179.98	180.16	0.010167	1.08	2.15	6.00	0.57
WWC	133	10-Year	2.32	179.32	179.96	179.96	180.09	0.033969	1.57	1.48	6.00	1.01
WWC	132		Inl Struct									
WWC	119	10-Year	2.32	179.19	179.96		180.01	0.009244	1.04	2.22	6.00	0.55
WWC	111	10-Year	2.32	179.12	179.89		179.94	0.009030	1.04	2.23	6.00	0.54
WWC	107	10-Year	2.32	179.09	179.85		179.91	0.009794	1.07	2.18	6.00	0.56
WWC	94	10-Year	2.32	178.96	179.73		179.78	0.008955	1.04	2.25	6.55	0.55
WWC	88	10-Year	2.32	178.91	179.68		179.73	0.008741	1.03	2.30	7.01	0.54
WWC	78	10-Year	2.32	178.82	179.55	179.48	179.62	0.013906	1.45	2.49	9.12	0.71
WWC	58	10-Year	2.32	178.66	179.34	179.27	179.39	0.012676	1.28	3.56	16.42	0.66
WWC	48	10-Year	2.32	178.96	179.11	179.11	179.14	0.060362	0.86	2.70	36.81	1.01

HEC-RAS Plan: Post-Develop River: Wyldewood Creek Reach: WWC 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
WWC	416	25-Year	3.14	183.27	184.10	183.90	184.12	0.003381	0.64	5.32	24.61	0.34
WWC	415		Bridge									
WWC	413	25-Year	3.14	183.13	183.83	183.83	183.91	0.011086	1.45	3.40	23.61	0.64
WWC	383	25-Year	3.14	182.43	183.07	183.06	183.25	0.022003	2.07	2.19	6.26	0.92
WWC	363	25-Year	3.14	181.95	182.60	182.58	182.77	0.021750	2.07	2.20	6.27	0.91
WWC	343	25-Year	3.14	181.58	182.36		182.45	0.008963	1.54	3.08	7.07	0.61
WWC	323	25-Year	3.14	181.40	182.15		182.25	0.010519	1.63	2.90	6.91	0.65
WWC	313	25-Year	3.14	181.31	182.02	181.94	182.14	0.013475	1.76	2.64	6.68	0.73
WWC	303	25-Year	3.14	181.22	181.78	181.78	181.97	0.029332	2.18	1.99	5.77	1.05
WWC	280		Culvert									
WWC	277	25-Year	3.14	180.80	181.30		181.36	0.005999	1.08	2.90	16.73	0.49
WWC	261	25-Year	3.14	180.51	181.27		181.30	0.001804	0.79	5.77	11.19	0.29
WWC	254	25-Year	3.14	180.39	181.26		181.28	0.001140	0.69	6.61	11.11	0.23
WWC	249	25-Year	3.14	180.29	181.26	180.65	181.28	0.000727	0.46	6.82	14.75	0.18
WWC	230		Culvert									
WWC	208	25-Year	3.14	179.80	180.49	180.49	180.69	0.036716	2.02	1.55	172.08	1.01
WWC	199	25-Year	3.14	179.75	180.45		180.46	0.001373	0.44	7.12	172.12	0.21
WWC	168	25-Year	3.14	179.43	180.42		180.43	0.000589	0.48	11.97	210.89	0.16
WWC	162	25-Year	3.14	179.41	180.36		180.41	0.004683	0.94	3.34	10.51	0.40
WWC	160	25-Year	3.14	179.41	180.35		180.40	0.005032	0.96	3.26	6.00	0.42
WWC	156	25-Year	3.14	179.39	180.33		180.38	0.005082	0.97	3.25	6.00	0.42
WWC	146	25-Year	3.14	179.36	180.26		180.32	0.006343	1.04	3.03	6.00	0.47
WWC	141	25-Year	3.14	179.35	180.22		180.28	0.007993	1.12	2.81	6.00	0.52
WWC	136	25-Year	3.14	179.34	180.16	180.04	180.24	0.010774	1.23	2.56	6.00	0.60
WWC	133	25-Year	3.14	179.32	180.02	180.02	180.17	0.032237	1.73	1.81	6.00	1.01
WWC	132		Inl Struct									
WWC	119	25-Year	3.14	179.19	180.03		180.10	0.009319	1.17	2.68	6.00	0.56
WWC	111	25-Year	3.14	179.12	179.96		180.03	0.009273	1.17	2.68	6.00	0.56
WWC	107	25-Year	3.14	179.09	179.92		180.00	0.010068	1.20	2.61	6.00	0.58
WWC	94	25-Year	3.14	178.96	179.80		179.87	0.009178	1.18	2.72	6.79	0.57
WWC	88	25-Year	3.14	178.91	179.75		179.81	0.008888	1.16	2.81	7.44	0.56
WWC	78	25-Year	3.14	178.82	179.61	179.54	179.70	0.014886	1.64	3.08	10.06	0.75
WWC	58	25-Year	3.14	178.66	179.38	179.32	179.44	0.014933	1.49	4.24	17.91	0.73
WWC	48	25-Year	3.14	178.96	179.13	179.13	179.17	0.057891	0.91	3.44	41.56	1.01

HEC-RAS Plan: Post-Develop River: Wyldewood Creek Reach: WWC Profile: 50-Year

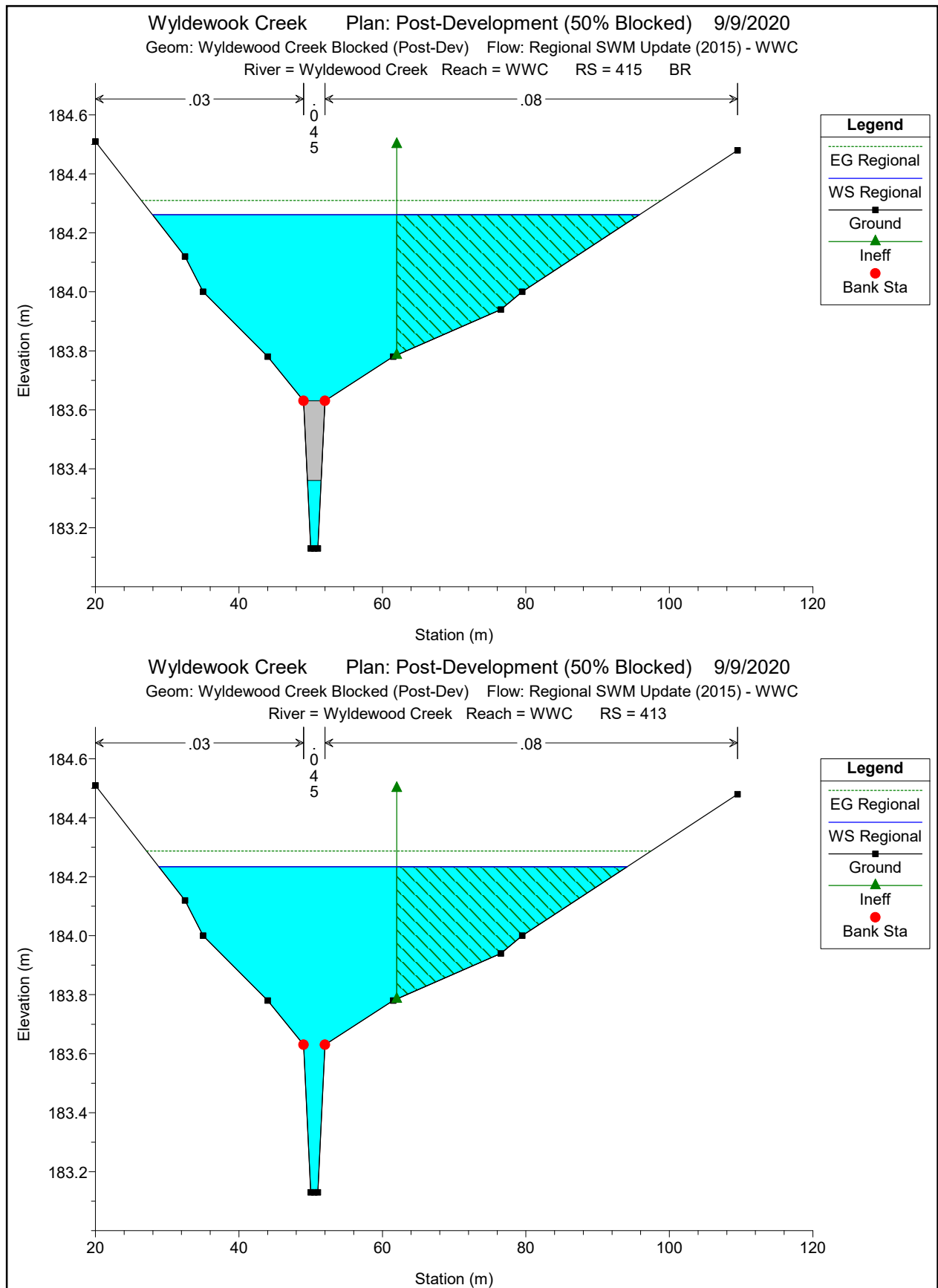
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
WWC	416	50-Year	3.76	183.27	184.13	183.94	184.15	0.003177	0.66	6.21	25.81	0.34
WWC	415		Bridge									
WWC	413	50-Year	3.76	183.13	183.85	183.85	183.94	0.012348	1.58	3.82	26.45	0.68
WWC	383	50-Year	3.76	182.43	183.12	183.11	183.31	0.022458	2.22	2.49	6.54	0.94
WWC	363	50-Year	3.76	181.95	182.65	182.63	182.84	0.020888	2.17	2.56	6.61	0.91
WWC	343	50-Year	3.76	181.58	182.42		182.52	0.009011	1.64	3.53	7.44	0.62
WWC	323	50-Year	3.76	181.40	182.21		182.32	0.010520	1.73	3.32	7.27	0.66
WWC	313	50-Year	3.76	181.31	182.04	181.99	182.20	0.016758	2.01	2.78	6.81	0.82
WWC	303	50-Year	3.76	181.22	181.89	181.83	182.04	0.017915	1.98	2.64	6.45	0.85
WWC	280		Culvert									
WWC	277	50-Year	3.76	180.80	181.35		181.42	0.006334	1.18	3.18	17.38	0.51
WWC	261	50-Year	3.76	180.51	181.32		181.35	0.002069	0.88	6.29	11.62	0.31
WWC	254	50-Year	3.76	180.39	181.31		181.33	0.001352	0.77	7.11	11.48	0.26
WWC	249	50-Year	3.76	180.29	181.31	180.69	181.32	0.000852	0.52	7.27	15.24	0.19
WWC	230		Culvert									
WWC	208	50-Year	3.76	179.80	180.54	180.54	180.77	0.035423	2.12	1.78	178.71	1.01
WWC	199	50-Year	3.76	179.75	180.51		180.52	0.001285	0.46	8.19	177.11	0.20
WWC	168	50-Year	3.76	179.43	180.49		180.50	0.000617	0.51	13.20	212.60	0.17
WWC	162	50-Year	3.76	179.41	180.42		180.47	0.004934	1.02	3.69	12.12	0.42
WWC	160	50-Year	3.76	179.41	180.41		180.46	0.005275	1.04	3.60	6.00	0.43
WWC	156	50-Year	3.76	179.39	180.39		180.44	0.005362	1.05	3.59	6.00	0.43
WWC	146	50-Year	3.76	179.36	180.31		180.38	0.006737	1.13	3.33	6.00	0.48
WWC	141	50-Year	3.76	179.35	180.26		180.34	0.008509	1.22	3.09	6.00	0.54
WWC	136	50-Year	3.76	179.34	180.20		180.30	0.011665	1.34	2.80	6.00	0.63
WWC	133	50-Year	3.76	179.32	180.10	180.06	180.24	0.021651	1.63	2.30	6.00	0.84
WWC	132		Inl Struct									
WWC	119	50-Year	3.76	179.19	180.09		180.17	0.009403	1.25	3.00	6.00	0.57
WWC	111	50-Year	3.76	179.12	180.02		180.10	0.009466	1.26	2.99	6.00	0.57
WWC	107	50-Year	3.76	179.09	179.97		180.06	0.010274	1.29	2.91	6.00	0.59
WWC	94	50-Year	3.76	178.96	179.84		179.92	0.009419	1.27	3.04	6.94	0.58
WWC	88	50-Year	3.76	178.91	179.79		179.87	0.009083	1.25	3.15	7.71	0.57
WWC	78	50-Year	3.76	178.82	179.65	179.58	179.76	0.015478	1.76	3.50	10.67	0.77
WWC	58	50-Year	3.76	178.66	179.41	179.35	179.47	0.016739	1.63	4.68	18.80	0.78
WWC	48	50-Year	3.76	178.96	179.14	179.14	179.18	0.056662	0.95	3.97	44.64	1.02

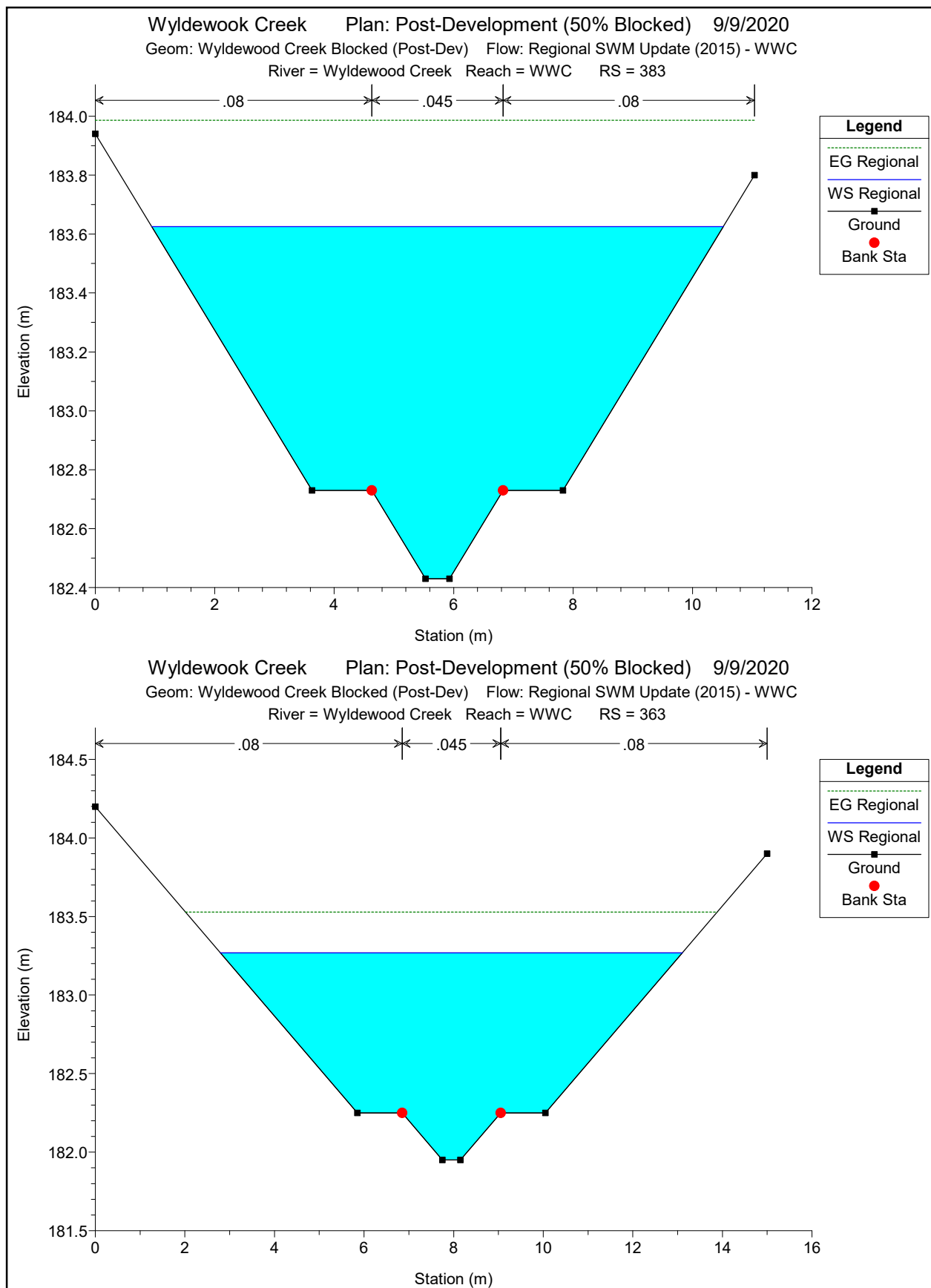
HEC-RAS Plan: Post-Develop River: Wyldewood Creek Reach: WWC Profile: 100-Year

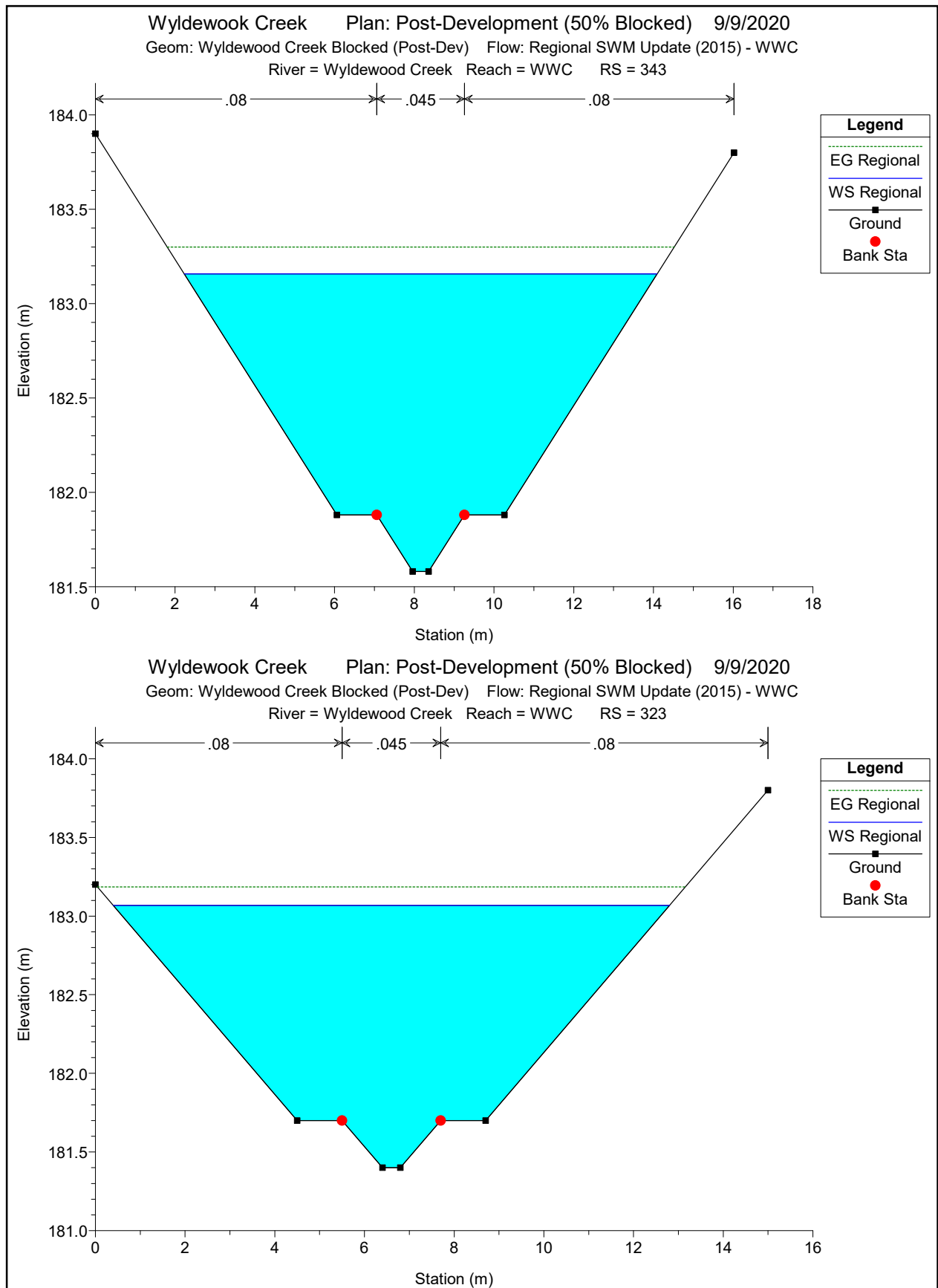
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
WWC	416	100-Year	4.44	183.27	184.15	183.97	184.18	0.003529	0.72	6.73	26.59	0.36
WWC	415		Bridge									
WWC	413	100-Year	4.44	183.13	183.88	183.88	183.97	0.012071	1.62	4.48	30.56	0.68
WWC	383	100-Year	4.44	182.43	183.17	183.16	183.38	0.022965	2.37	2.80	6.83	0.96
WWC	363	100-Year	4.44	181.95	182.71	182.68	182.90	0.020160	2.27	2.94	6.95	0.91
WWC	343	100-Year	4.44	181.58	182.48		182.59	0.009052	1.74	4.00	7.81	0.63
WWC	323	100-Year	4.44	181.40	182.27		182.39	0.010703	1.84	3.75	7.61	0.68
WWC	313	100-Year	4.44	181.31	182.11		182.27	0.015459	2.08	3.26	7.22	0.80
WWC	303	100-Year	4.44	181.22	182.01	181.88	182.14	0.012250	1.87	3.31	7.15	0.73
WWC	280		Culvert									
WWC	277	100-Year	4.44	180.80	181.40		181.48	0.006612	1.28	3.46	18.05	0.53
WWC	261	100-Year	4.44	180.51	181.36		181.40	0.002306	0.96	6.87	12.08	0.33
WWC	254	100-Year	4.44	180.39	181.36		181.39	0.001556	0.86	7.66	11.86	0.28
WWC	249	100-Year	4.44	180.29	181.36	180.73	181.37	0.000964	0.57	7.75	15.33	0.21
WWC	230		Culvert									
WWC	208	100-Year	4.44	179.80	180.60	180.60	180.85	0.033865	2.20	2.02	185.70	1.00
WWC	199	100-Year	4.44	179.75	180.59		180.60	0.001172	0.48	9.33	182.28	0.20
WWC	168	100-Year	4.44	179.43	180.56		180.57	0.000634	0.54	14.51	214.41	0.17
WWC	162	100-Year	4.44	179.41	180.48		180.55	0.005095	1.09	4.06	14.97	0.42
WWC	160	100-Year	4.44	179.41	180.47		180.53	0.005437	1.12	3.98	6.00	0.44
WWC	156	100-Year	4.44	179.39	180.45		180.51	0.005541	1.12	3.95	6.00	0.44
WWC	146	100-Year	4.44	179.36	180.37		180.45	0.006903	1.21	3.68	6.00	0.49
WWC	141	100-Year	4.44	179.35	180.32		180.41	0.008555	1.29	3.43	6.00	0.55
WWC	136	100-Year	4.44	179.34	180.26		180.36	0.011185	1.41	3.15	6.00	0.62
WWC	133	100-Year	4.44	179.32	180.19	180.10	180.32	0.015464	1.56	2.84	6.00	0.72
WWC	132		Inl Struct									
WWC	119	100-Year	4.44	179.19	180.14		180.23	0.009532	1.34	3.32	6.00	0.57
WWC	111	100-Year	4.44	179.12	180.07		180.16	0.009720	1.35	3.30	6.00	0.58
WWC	107	100-Year	4.44	179.09	180.02		180.12	0.010575	1.38	3.21	6.00	0.60
WWC	94	100-Year	4.44	178.96	179.89		179.98	0.009711	1.36	3.36	7.09	0.60
WWC	88	100-Year	4.44	178.91	179.84		179.93	0.009328	1.34	3.51	7.99	0.59
WWC	78	100-Year	4.44	178.82	179.72	179.63	179.82	0.012936	1.75	4.29	11.75	0.72
WWC	58	100-Year	4.44	178.66	179.38	179.38	179.50	0.031618	2.14	4.14	17.71	1.06
WWC	48	100-Year	4.44	178.96	179.36	179.15	179.36	0.001022	0.22	20.08	98.87	0.16

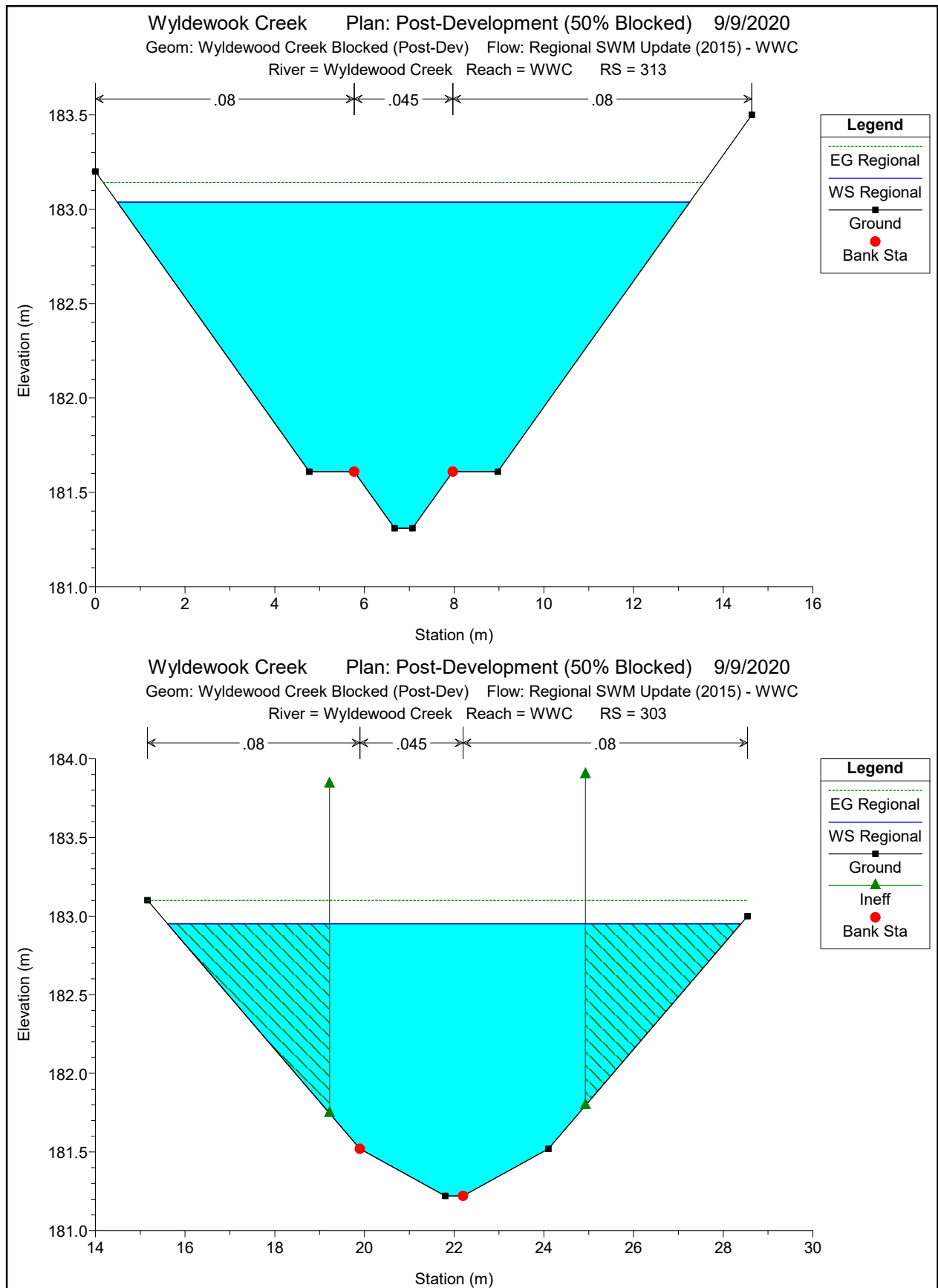
HEC-RAS Plan: Post-Develop River: Wyldewood Creek Reach: WWC Profile: Regional

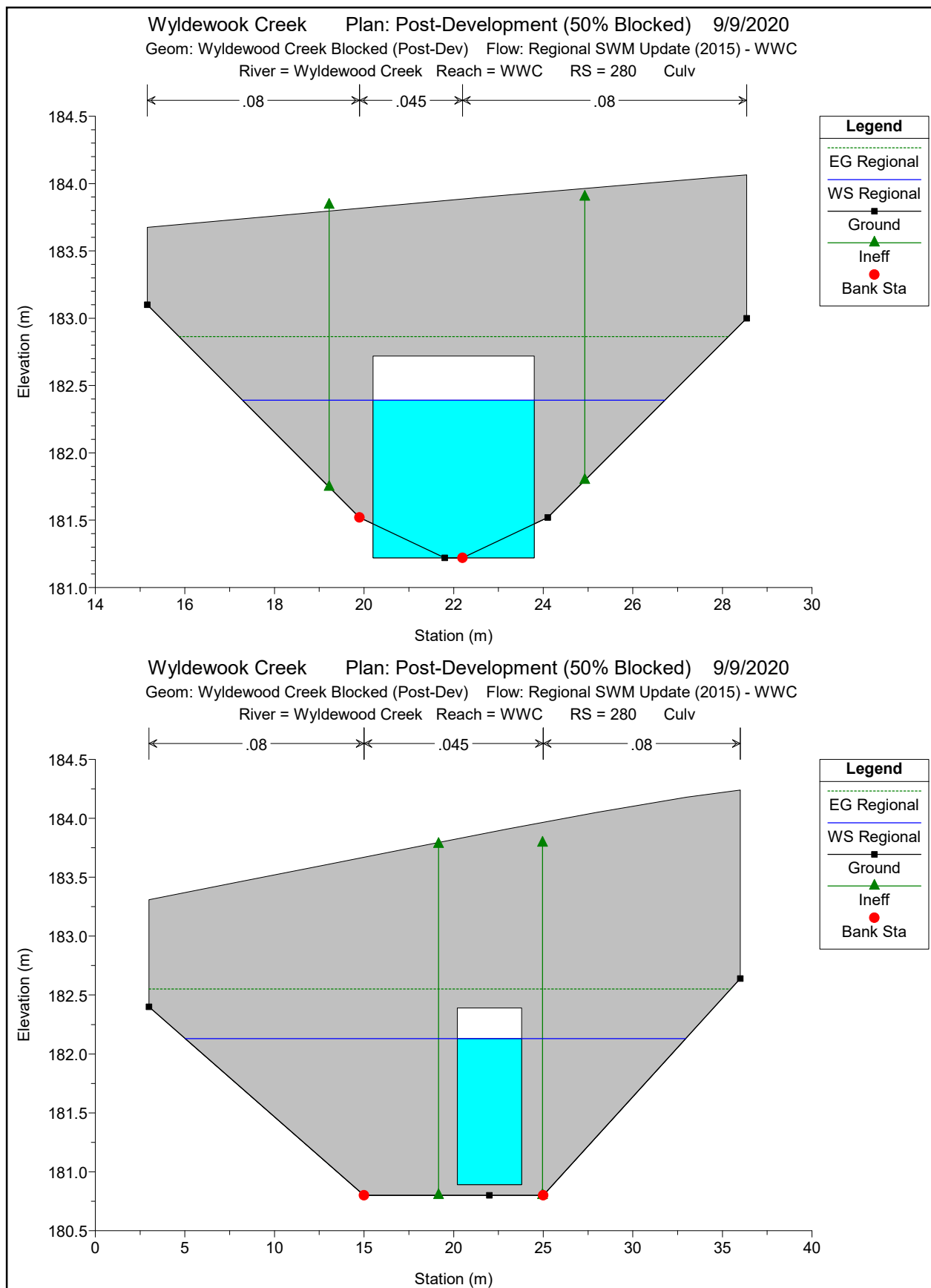
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
WWC	416	Regional	12.83	183.27	184.34	184.21	184.39	0.004342	1.03	14.33	53.03	0.43
WWC	415		Bridge									
WWC	413	Regional	12.83	183.13	184.23		184.29	0.004178	1.31	14.45	65.29	0.43
WWC	383	Regional	12.83	182.43	183.63	183.63	183.99	0.021031	3.28	6.55	9.57	1.01
WWC	363	Regional	12.83	181.95	183.27		183.53	0.013548	2.83	7.78	10.31	0.83
WWC	343	Regional	12.83	181.58	183.16		183.30	0.006061	2.16	10.65	11.86	0.57
WWC	323	Regional	12.83	181.40	183.07		183.19	0.004719	1.98	11.75	12.41	0.51
WWC	313	Regional	12.83	181.31	183.04		183.14	0.004022	1.88	12.51	12.77	0.47
WWC	303	Regional	12.83	181.22	182.95	182.33	183.10	0.004543	2.04	8.67	12.78	0.51
WWC	280		Culvert									
WWC	277	Regional	12.83	180.80	181.82		182.06	0.009367	2.18	5.90	23.71	0.69
WWC	261	Regional	12.83	180.51	181.80		181.90	0.003743	1.62	13.10	16.24	0.45
WWC	254	Regional	12.83	180.39	181.78		181.87	0.003291	1.59	13.83	18.79	0.43
WWC	249	Regional	12.83	180.29	181.79	181.10	181.85	0.001861	1.07	12.33	17.04	0.31
WWC	230		Culvert									
WWC	208	Regional	12.83	179.80	181.28		181.39	0.004510	1.41	8.58	219.72	0.42
WWC	199	Regional	12.83	179.75	181.31		181.33	0.000638	0.60	22.29	225.19	0.17
WWC	168	Regional	12.83	179.43	181.29		181.31	0.000633	0.78	27.82	233.12	0.19
WWC	162	Regional	12.83	179.41	181.13		181.26	0.005689	1.62	7.94	40.60	0.45
WWC	160	Regional	12.83	179.41	181.11		181.25	0.005895	1.64	7.84	6.00	0.46
WWC	156	Regional	12.83	179.39	181.09		181.23	0.005978	1.64	7.80	6.00	0.46
WWC	146	Regional	12.83	179.36	181.01		181.16	0.006658	1.71	7.52	6.00	0.49
WWC	141	Regional	12.83	179.35	180.97		181.12	0.007214	1.75	7.32	6.00	0.51
WWC	136	Regional	12.83	179.34	180.93		181.09	0.007729	1.79	7.15	6.00	0.52
WWC	133	Regional	12.83	179.32	180.90	180.49	181.07	0.007943	1.81	7.09	6.00	0.53
WWC	132		Inl Struct									
WWC	119	Regional	12.83	179.19	180.64		180.85	0.011375	2.04	6.29	6.00	0.64
WWC	111	Regional	12.83	179.12	180.52		180.75	0.012922	2.13	6.01	6.00	0.68
WWC	107	Regional	12.83	179.09	180.43		180.69	0.015372	2.26	5.67	6.00	0.74
WWC	94	Regional	12.83	178.96	180.25		180.49	0.014139	2.24	6.17	8.74	0.76
WWC	88	Regional	12.83	178.91	180.19		180.40	0.012895	2.13	6.78	10.84	0.72
WWC	78	Regional	12.83	178.82	180.01	180.01	180.25	0.020598	2.88	8.82	19.44	0.97
WWC	58	Regional	12.83	178.66	179.74	179.62	179.84	0.014790	2.22	12.98	31.19	0.80
WWC	48	Regional	12.83	178.96	179.80	179.25	179.80	0.000160	0.18	76.98	164.35	0.07

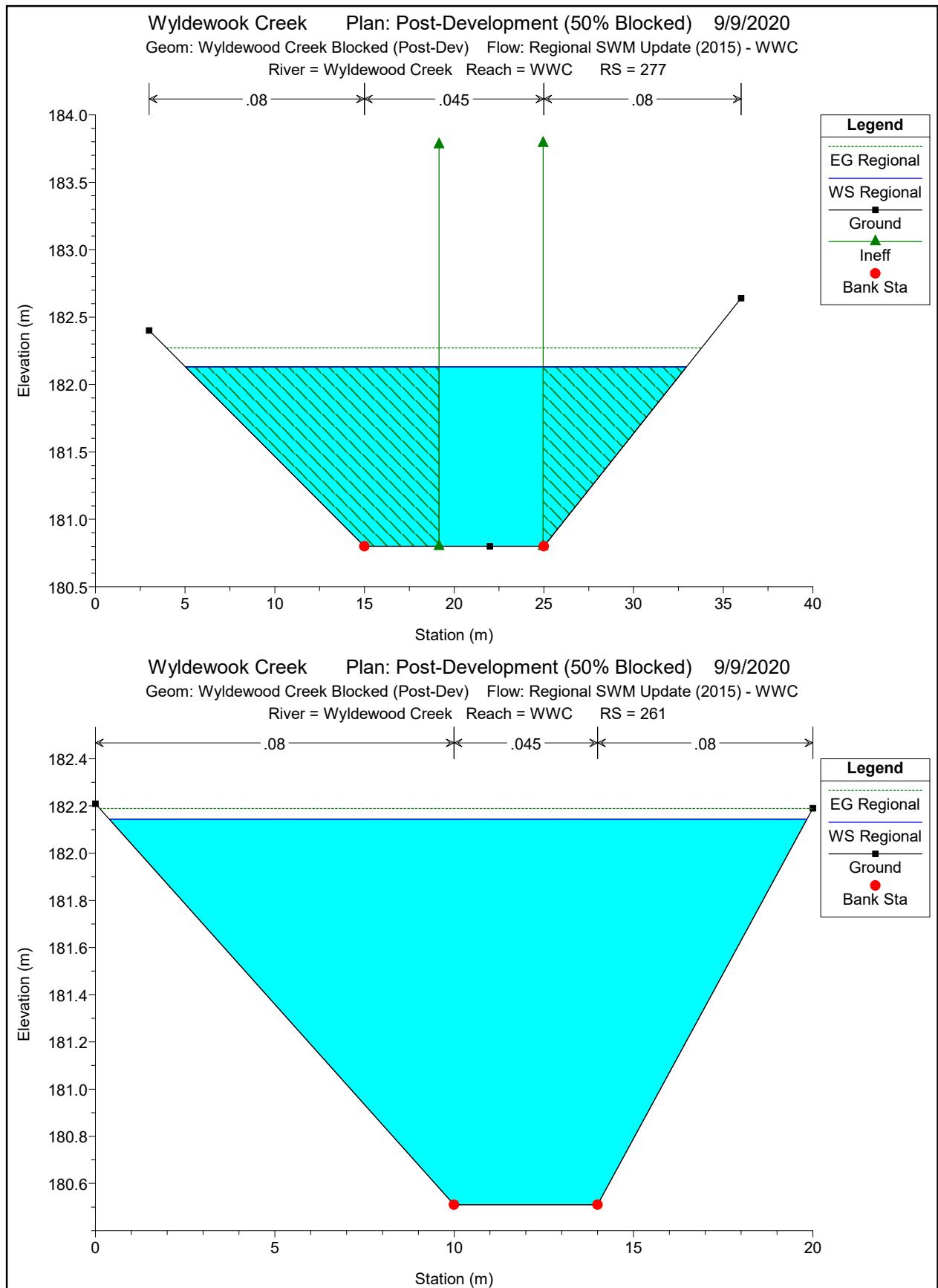


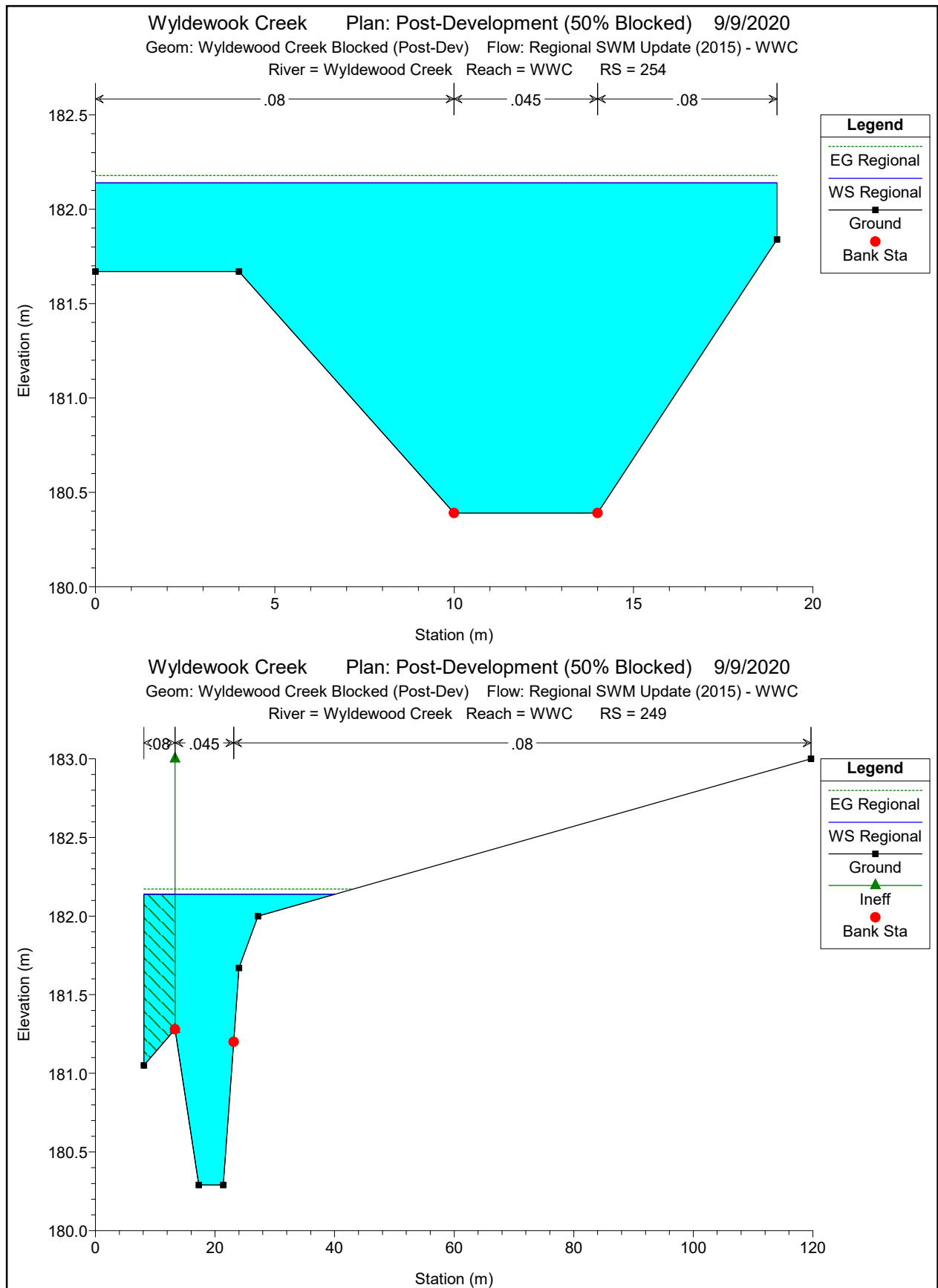


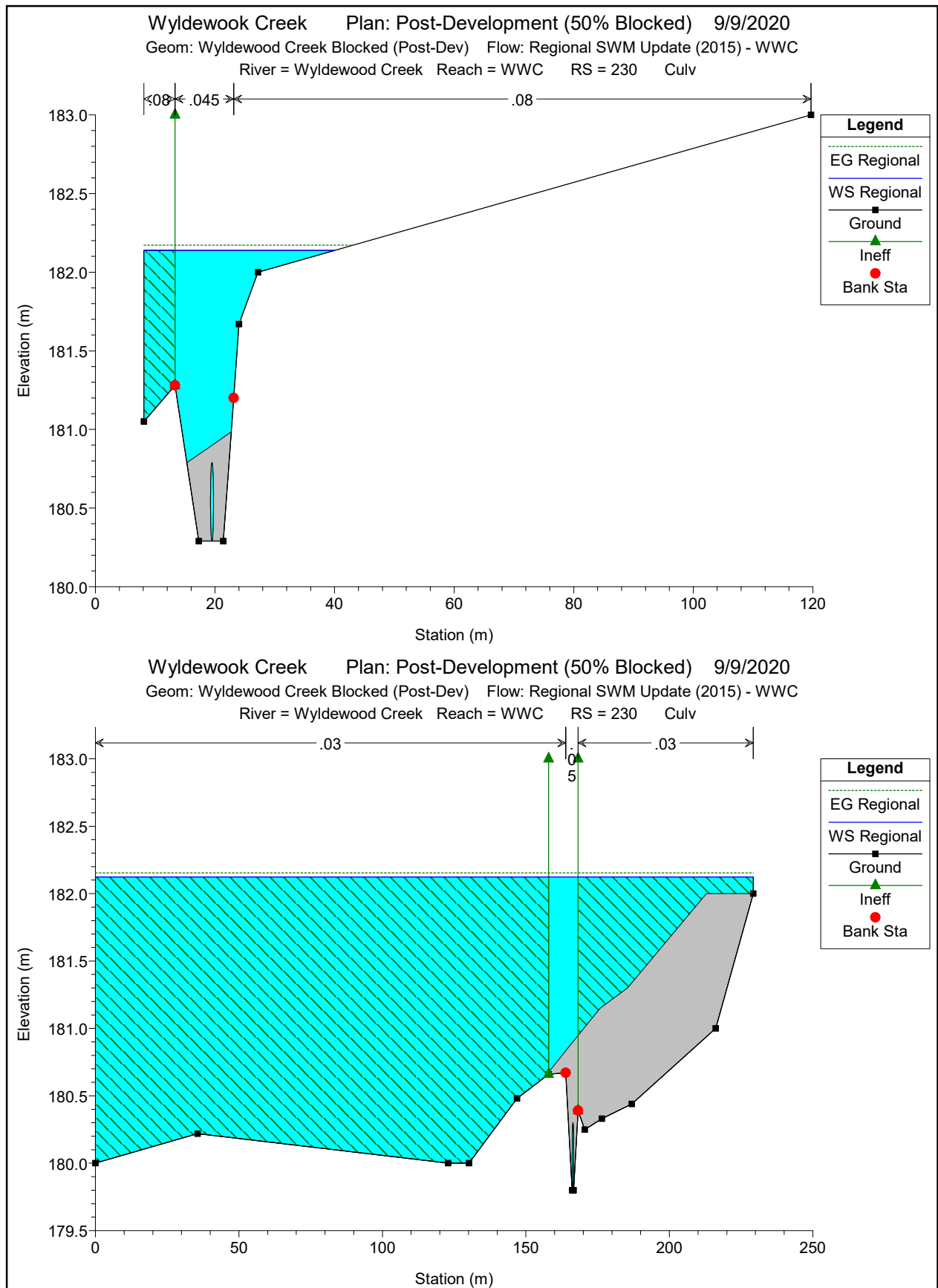


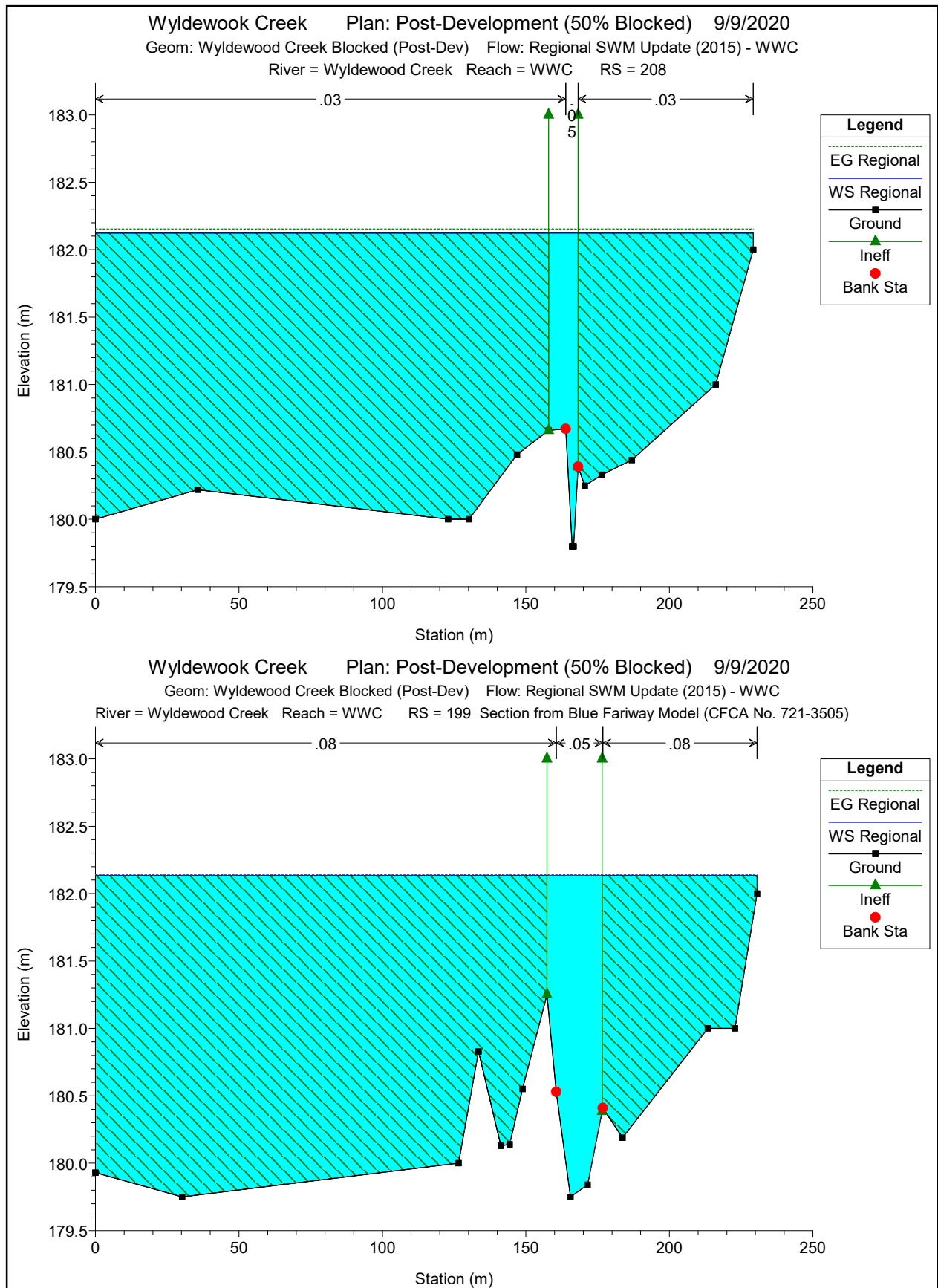


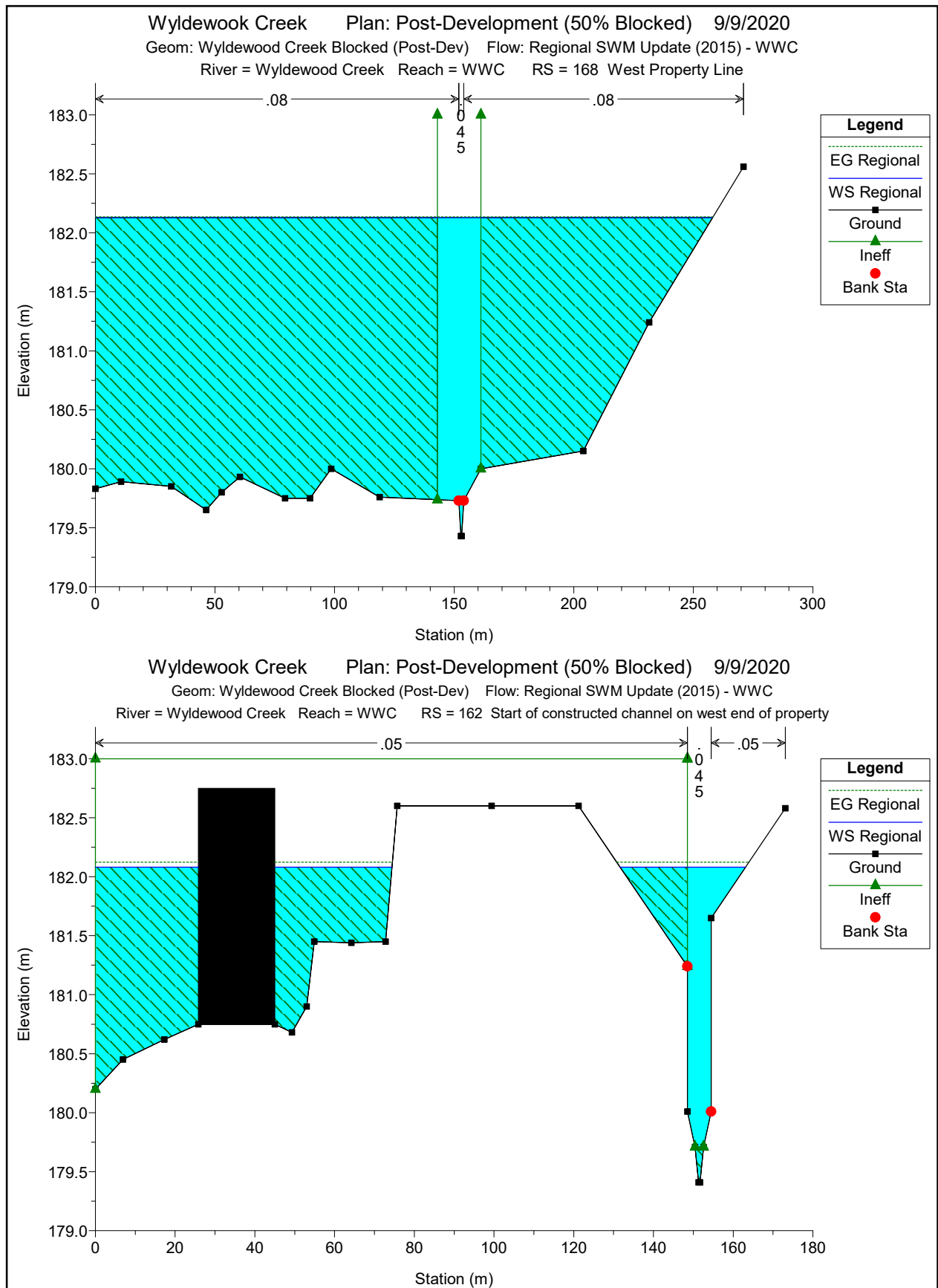


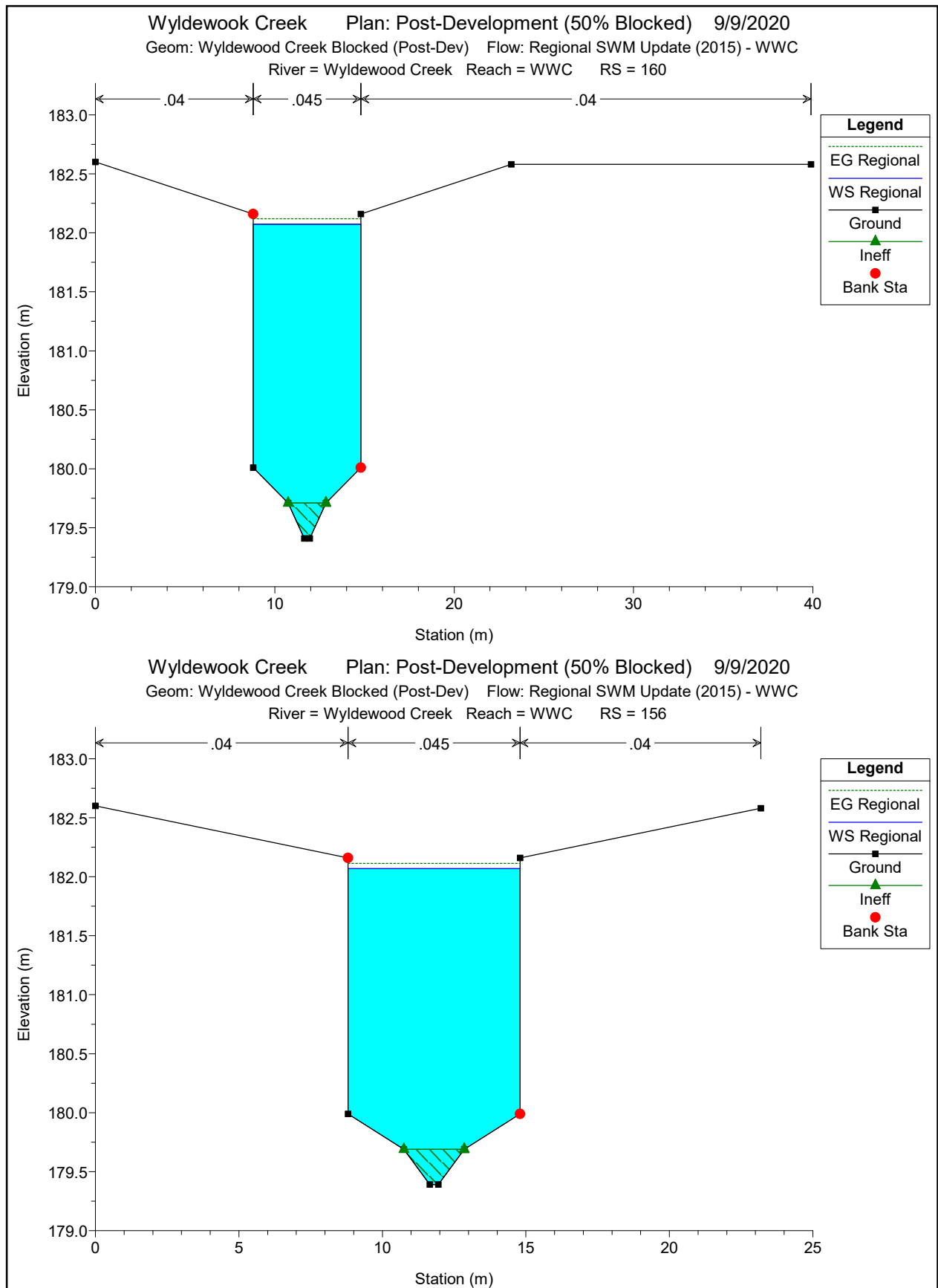


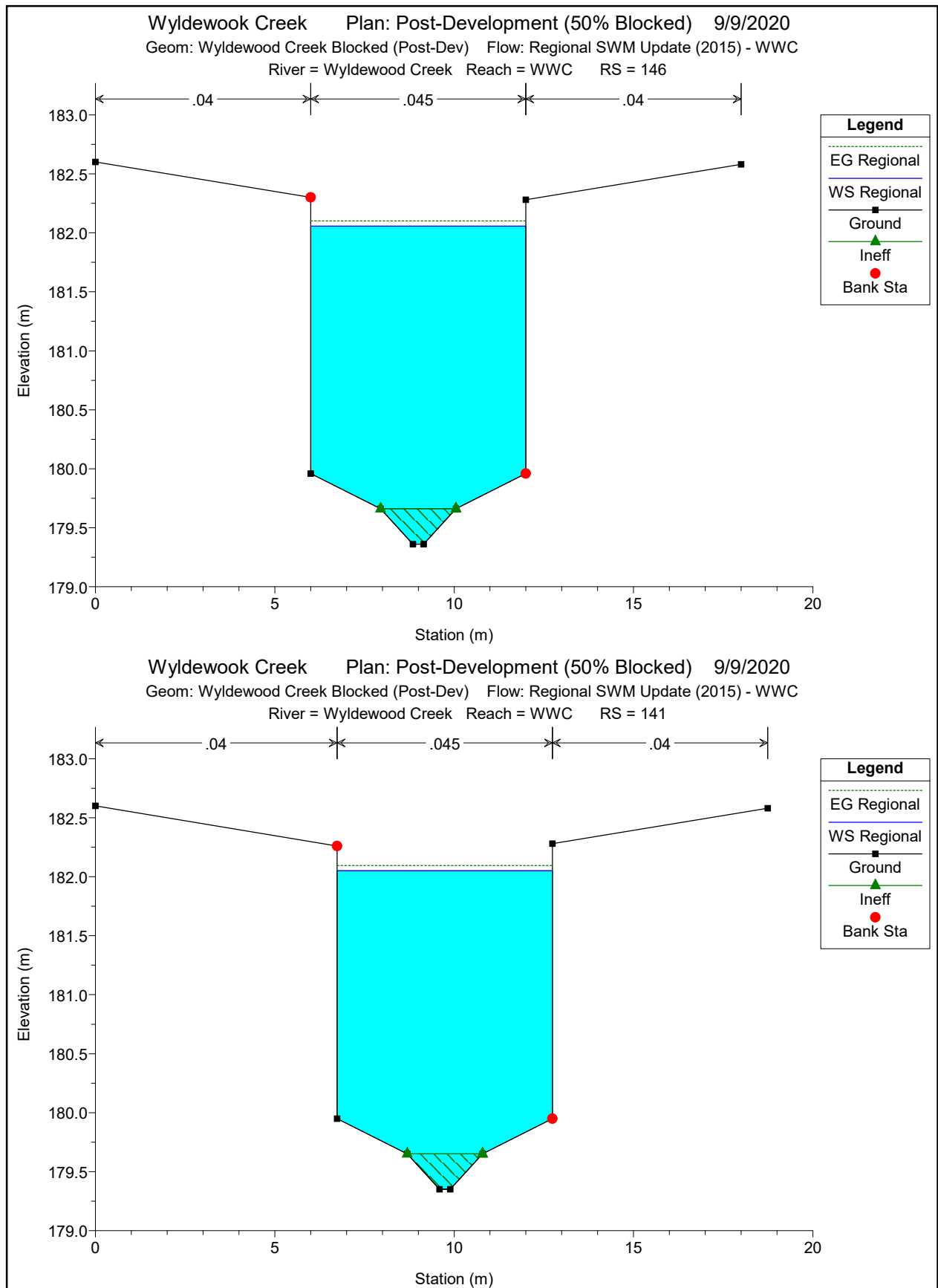


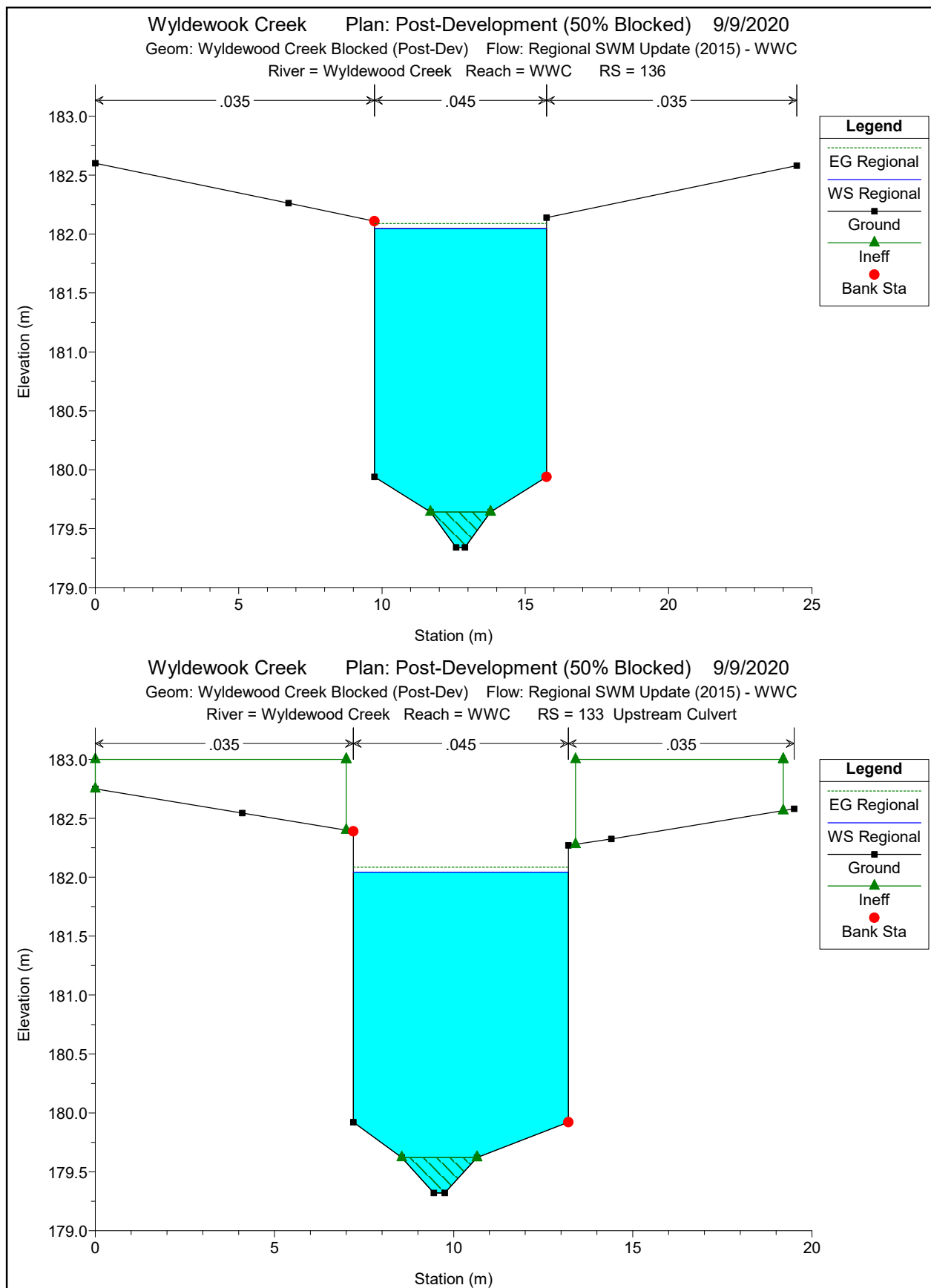


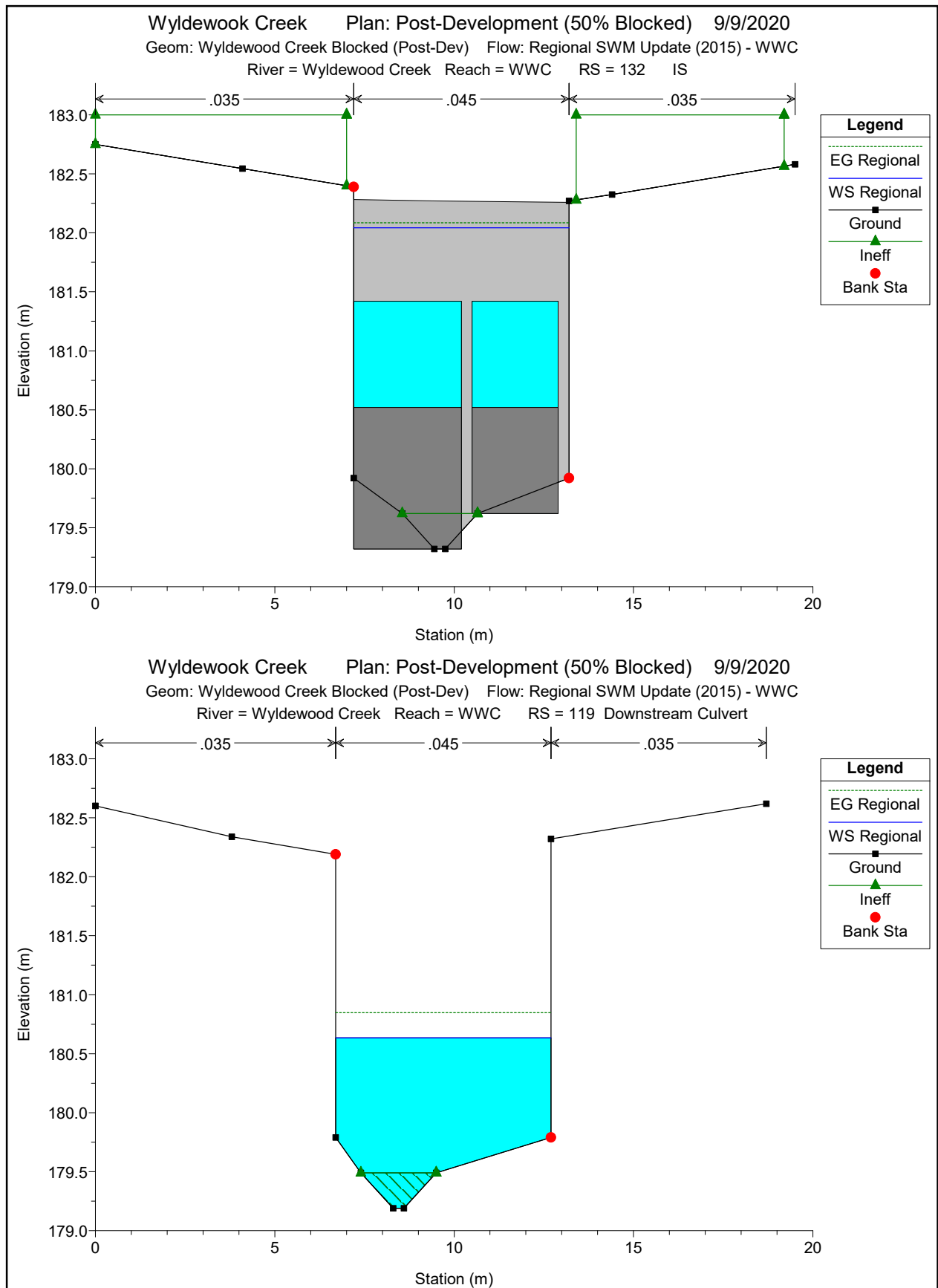


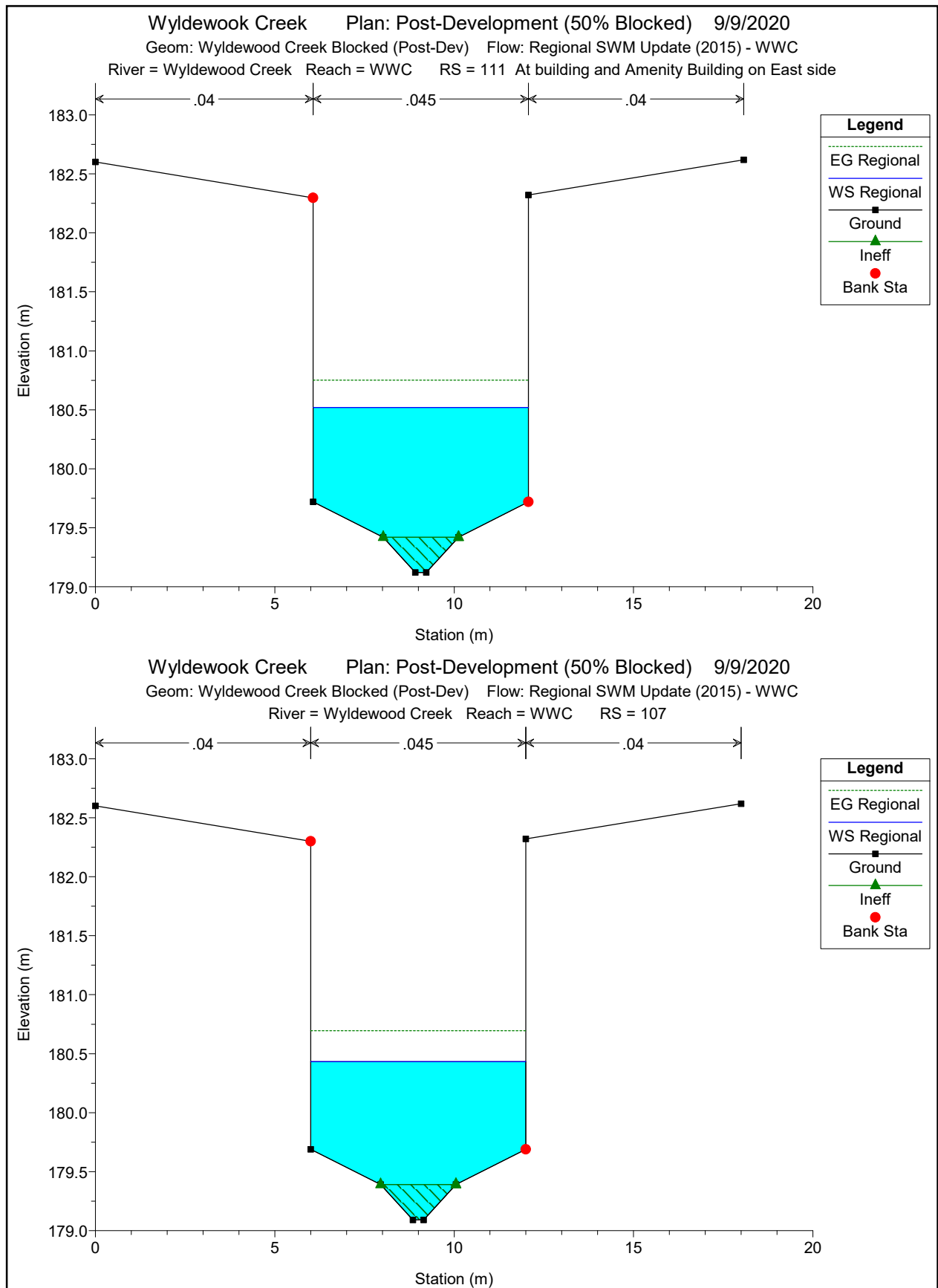


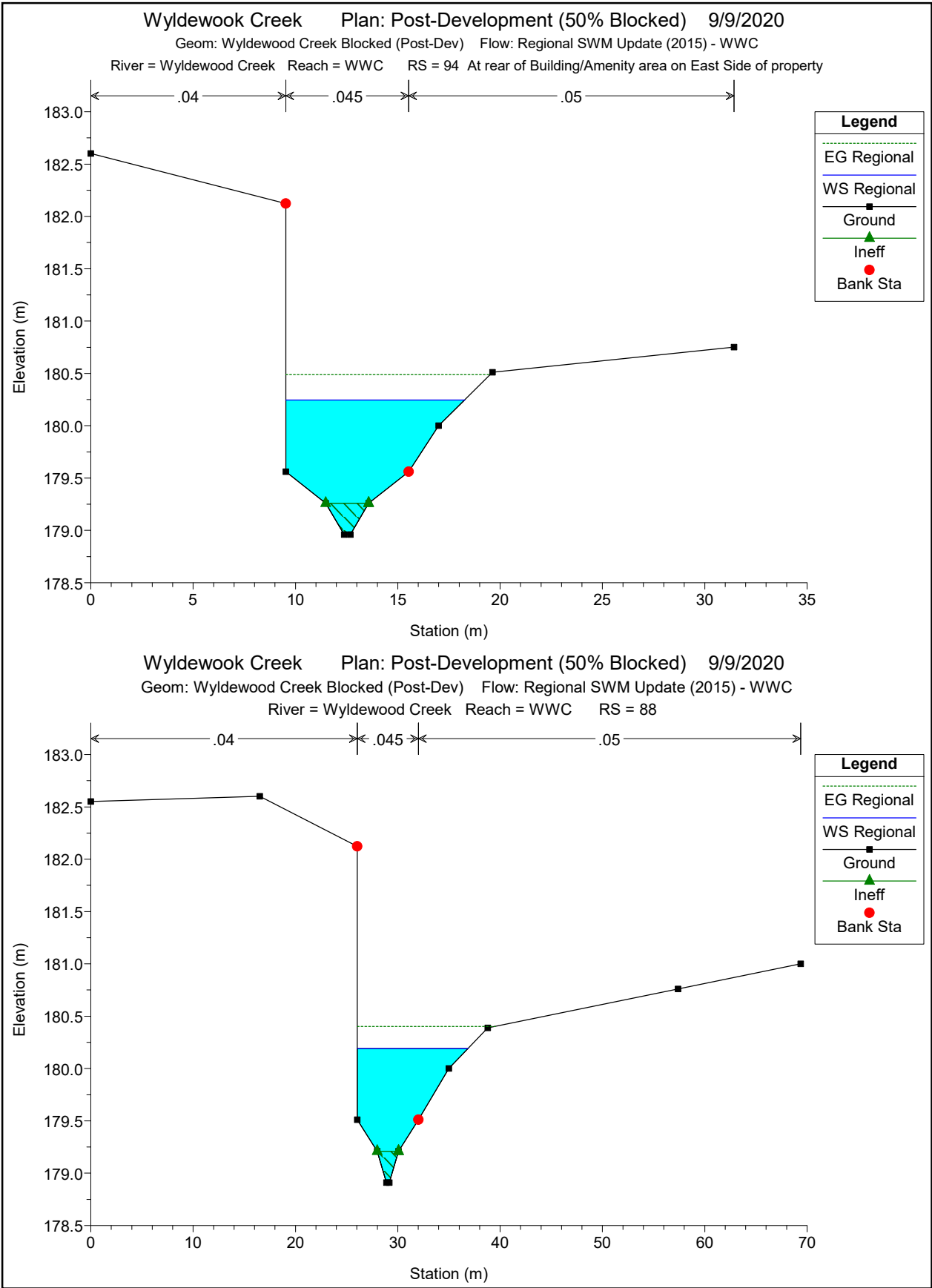


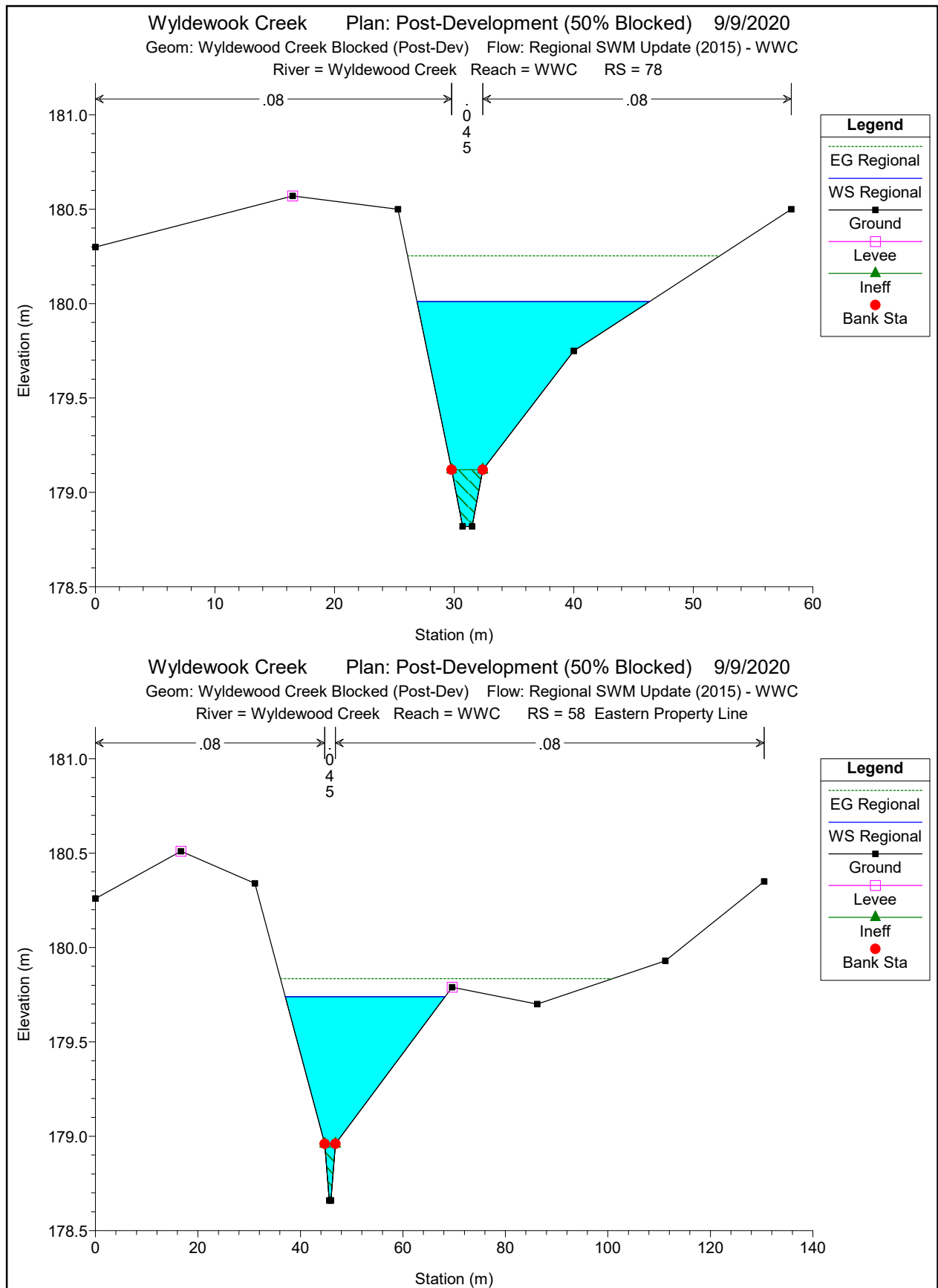




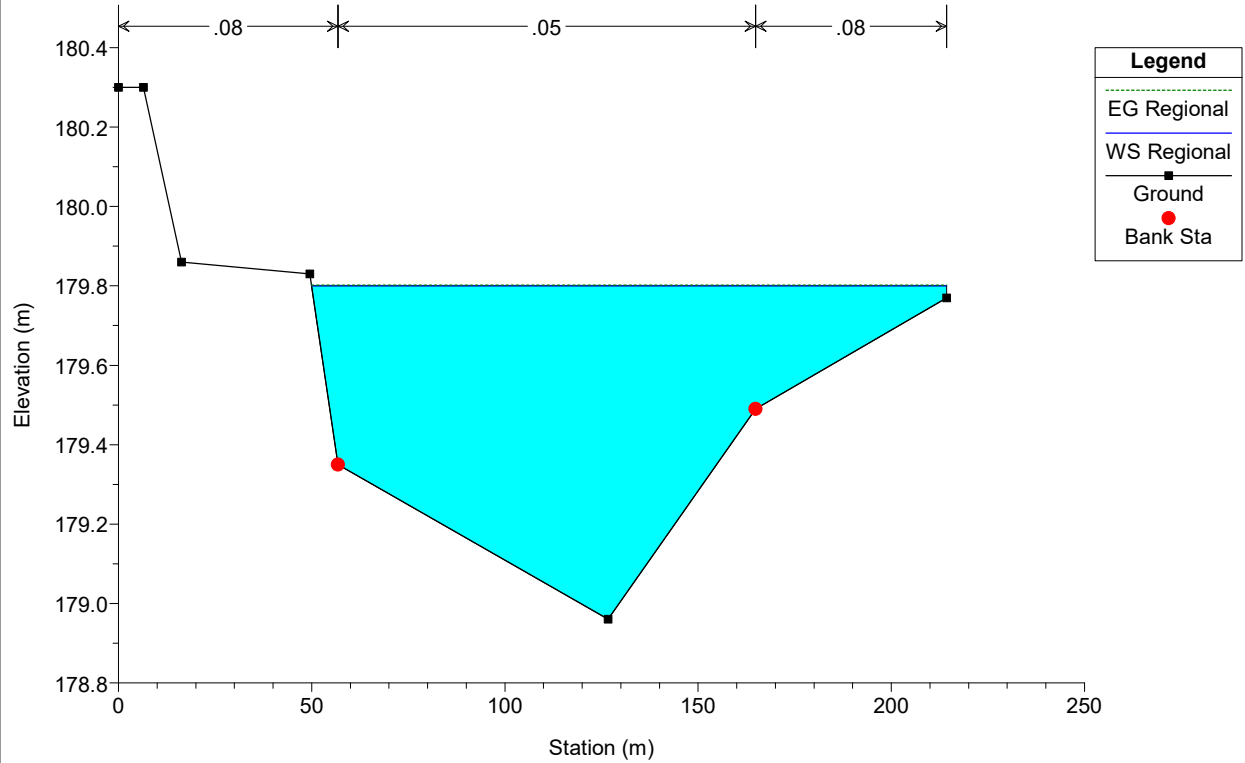








Wyldehook Creek Plan: Post-Development (50% Blocked) 9/9/2020
Geom: Wyldehook Creek Blocked (Post-Dev) Flow: Regional SWM Update (2015) - WWC
River = Wyldehook Creek Reach = WWC RS = 48



HEC-RAS Plan: Block River: Wyldewood Creek Reach: WWC 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
WWC	416	2-Year	0.88	183.27	183.91	183.65	183.92	0.002549	0.40	2.21	10.25	0.27
WWC	415		Bridge									
WWC	413	2-Year	0.88	183.13	183.49	183.47	183.59	0.027955	1.42	0.62	2.44	0.90
WWC	383	2-Year	0.88	182.43	182.84	182.81	182.91	0.018442	1.27	0.87	4.84	0.76
WWC	363	2-Year	0.88	181.95	182.33	182.33	182.43	0.026180	1.42	0.76	4.70	0.89
WWC	343	2-Year	0.88	181.58	182.05		182.09	0.008746	0.99	1.17	5.20	0.54
WWC	323	2-Year	0.88	181.40	181.86		181.90	0.009976	1.04	1.12	5.13	0.57
WWC	313	2-Year	0.88	181.31	181.75	181.69	181.81	0.011627	1.09	1.05	5.06	0.61
WWC	303	2-Year	0.88	181.22	181.53	181.53	181.62	0.042839	1.50	0.74	4.27	1.10
WWC	280		Culvert									
WWC	277	2-Year	0.88	180.80	181.05		181.07	0.004449	0.60	1.48	13.43	0.38
WWC	261	2-Year	0.88	180.51	181.04		181.05	0.000537	0.34	3.47	9.04	0.15
WWC	254	2-Year	0.88	180.39	181.04		181.04	0.000270	0.27	4.33	9.30	0.11
WWC	249	2-Year	0.88	180.29	181.04	180.45	181.04	0.000158	0.18	4.76	8.57	0.08
WWC	230		Culvert									
WWC	208	2-Year	0.88	179.80	180.76		180.77	0.000428	0.29	3.31	203.82	0.12
WWC	199	2-Year	0.88	179.75	180.77		180.77	0.000019	0.07	12.33	195.46	0.03
WWC	168	2-Year	0.88	179.43	180.77		180.77	0.000012	0.08	18.20	219.53	0.02
WWC	162	2-Year	0.88	179.41	180.76		180.77	0.000070	0.15	5.74	37.51	0.05
WWC	160	2-Year	0.88	179.41	180.76		180.77	0.000070	0.15	5.74	6.00	0.05
WWC	156	2-Year	0.88	179.39	180.76		180.76	0.000066	0.15	5.86	6.00	0.05
WWC	146	2-Year	0.88	179.36	180.76		180.76	0.000060	0.15	6.03	6.00	0.05
WWC	141	2-Year	0.88	179.35	180.76		180.76	0.000058	0.14	6.09	6.00	0.05
WWC	136	2-Year	0.88	179.34	180.76		180.76	0.000057	0.14	6.15	6.00	0.05
WWC	133	2-Year	0.88	179.32	180.76	179.83	180.76	0.000054	0.14	6.27	6.00	0.04
WWC	132		Inl Struct									
WWC	119	2-Year	0.88	179.19	179.79		179.82	0.009186	0.72	1.22	6.00	0.51
WWC	111	2-Year	0.88	179.12	179.72		179.75	0.008543	0.71	1.24	6.00	0.50
WWC	107	2-Year	0.88	179.09	179.69		179.72	0.009537	0.73	1.20	5.97	0.52
WWC	94	2-Year	0.88	178.96	179.56		179.59	0.009184	0.72	1.22	6.00	0.51
WWC	88	2-Year	0.88	178.91	179.51		179.53	0.009646	0.74	1.20	5.95	0.52
WWC	78	2-Year	0.88	178.82	179.39	179.32	179.43	0.011802	0.98	1.25	6.72	0.60
WWC	58	2-Year	0.88	178.66	179.23	179.15	179.25	0.008441	0.83	1.93	12.17	0.51
WWC	48	2-Year	0.88	178.96	179.07	179.06	179.09	0.039991	0.58	1.52	27.65	0.79

HEC-RAS Plan: Block River: Wyldewood Creek Reach: WWC 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
WWC	416	5-Year	1.71	183.27	184.00	183.80	184.01	0.003585	0.53	3.25	12.91	0.33
WWC	415		Bridge									
WWC	413	5-Year	1.71	183.13	183.63	183.61	183.78	0.029461	1.73	0.99	2.98	0.96
WWC	383	5-Year	1.71	182.43	182.95	182.92	183.06	0.019416	1.62	1.44	5.50	0.82
WWC	363	5-Year	1.71	181.95	182.44	182.44	182.58	0.024998	1.76	1.31	5.35	0.92
WWC	343	5-Year	1.71	181.58	182.18		182.25	0.008860	1.25	1.95	6.03	0.57
WWC	323	5-Year	1.71	181.40	181.99		182.06	0.010209	1.31	1.84	5.92	0.61
WWC	313	5-Year	1.71	181.31	181.87	181.80	181.96	0.012469	1.40	1.71	5.78	0.67
WWC	303	5-Year	1.71	181.22	181.64	181.64	181.77	0.036223	1.85	1.21	4.89	1.09
WWC	280		Culvert									
WWC	277	5-Year	1.71	180.80	181.17		181.20	0.004841	0.80	2.15	14.99	0.42
WWC	261	5-Year	1.71	180.51	181.15		181.16	0.001023	0.53	4.50	10.05	0.21
WWC	254	5-Year	1.71	180.39	181.15		181.16	0.000582	0.45	5.36	10.16	0.16
WWC	249	5-Year	1.71	180.29	181.15	180.53	181.15	0.000361	0.30	5.70	11.41	0.12
WWC	230		Culvert									
WWC	208	5-Year	1.71	179.80	180.90		180.91	0.000570	0.38	4.74	211.05	0.14
WWC	199	5-Year	1.71	179.75	180.91		180.91	0.000040	0.12	14.75	204.16	0.04
WWC	168	5-Year	1.71	179.43	180.90		180.90	0.000029	0.14	20.73	223.04	0.04
WWC	162	5-Year	1.71	179.41	180.90		180.90	0.000177	0.26	6.56	39.80	0.08
WWC	160	5-Year	1.71	179.41	180.90		180.90	0.000178	0.26	6.55	6.00	0.08
WWC	156	5-Year	1.71	179.39	180.90		180.90	0.000169	0.26	6.67	6.00	0.08
WWC	146	5-Year	1.71	179.36	180.90		180.90	0.000156	0.25	6.84	6.00	0.07
WWC	141	5-Year	1.71	179.35	180.90		180.90	0.000153	0.25	6.90	6.00	0.07
WWC	136	5-Year	1.71	179.34	180.90		180.90	0.000149	0.25	6.95	6.00	0.07
WWC	133	5-Year	1.71	179.32	180.90	179.92	180.90	0.000142	0.24	7.07	6.00	0.07
WWC	132		Inl Struct									
WWC	119	5-Year	1.71	179.19	179.89		179.94	0.009179	0.93	1.84	6.00	0.54
WWC	111	5-Year	1.71	179.12	179.83		179.87	0.008842	0.92	1.86	6.00	0.53
WWC	107	5-Year	1.71	179.09	179.79		179.83	0.009669	0.95	1.81	6.00	0.55
WWC	94	5-Year	1.71	178.96	179.66		179.71	0.008893	0.93	1.86	6.35	0.53
WWC	88	5-Year	1.71	178.91	179.61		179.66	0.008762	0.92	1.88	6.64	0.53
WWC	78	5-Year	1.71	178.82	179.49	179.42	179.55	0.013100	1.28	2.01	8.26	0.67
WWC	58	5-Year	1.71	178.66	179.31	179.23	179.34	0.010774	1.11	2.97	15.04	0.60
WWC	48	5-Year	1.71	178.96	179.09	179.09	179.12	0.060298	0.80	2.15	32.84	1.00

HEC-RAS Plan: Block River: Wyldewood Creek Reach: WWC 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
WWC	416	10-Year	2.32	183.27	184.04	183.85	184.06	0.003586	0.59	4.12	20.71	0.34
WWC	415		Bridge									
WWC	413	10-Year	2.32	183.13	183.76	183.76	183.86	0.013774	1.48	2.15	15.21	0.70
WWC	383	10-Year	2.32	182.43	183.01	182.99	183.15	0.020466	1.83	1.78	5.86	0.86
WWC	363	10-Year	2.32	181.95	182.51	182.51	182.66	0.023326	1.91	1.70	5.77	0.92
WWC	343	10-Year	2.32	181.58	182.27		182.34	0.008895	1.39	2.45	6.51	0.59
WWC	323	10-Year	2.32	181.40	182.06		182.15	0.010354	1.46	2.31	6.38	0.63
WWC	313	10-Year	2.32	181.31	181.94	181.87	182.04	0.012838	1.57	2.13	6.21	0.70
WWC	303	10-Year	2.32	181.22	181.70	181.70	181.86	0.033251	2.02	1.54	5.28	1.08
WWC	280		Culvert									
WWC	277	10-Year	2.32	180.80	181.23		181.28	0.005212	0.92	2.52	15.86	0.45
WWC	261	10-Year	2.32	180.51	181.21		181.23	0.001340	0.64	5.13	10.63	0.24
WWC	254	10-Year	2.32	180.39	181.21		181.22	0.000806	0.55	5.98	10.65	0.19
WWC	249	10-Year	2.32	180.29	181.21	180.59	181.21	0.000511	0.37	6.26	13.11	0.15
WWC	230		Culvert									
WWC	208	10-Year	2.32	179.80	180.99		181.00	0.000594	0.42	5.66	215.72	0.15
WWC	199	10-Year	2.32	179.75	181.00		181.00	0.000054	0.15	16.36	208.96	0.05
WWC	168	10-Year	2.32	179.43	180.99		180.99	0.000042	0.18	22.36	225.29	0.05
WWC	162	10-Year	2.32	179.41	180.99		180.99	0.000260	0.33	7.08	40.10	0.10
WWC	160	10-Year	2.32	179.41	180.99		180.99	0.000261	0.33	7.07	6.00	0.10
WWC	156	10-Year	2.32	179.39	180.99		180.99	0.000249	0.32	7.19	6.00	0.09
WWC	146	10-Year	2.32	179.36	180.98		180.99	0.000233	0.32	7.35	6.00	0.09
WWC	141	10-Year	2.32	179.35	180.98		180.99	0.000228	0.31	7.41	6.00	0.09
WWC	136	10-Year	2.32	179.34	180.98		180.99	0.000223	0.31	7.46	6.00	0.09
WWC	133	10-Year	2.32	179.32	180.98	179.96	180.99	0.000213	0.31	7.58	6.00	0.09
WWC	132		Inl Struct									
WWC	119	10-Year	2.32	179.19	179.96		180.01	0.009244	1.04	2.22	6.00	0.55
WWC	111	10-Year	2.32	179.12	179.89		179.94	0.009029	1.04	2.23	6.00	0.54
WWC	107	10-Year	2.32	179.09	179.85		179.91	0.009793	1.06	2.18	6.00	0.56
WWC	94	10-Year	2.32	178.96	179.73		179.78	0.008955	1.04	2.25	6.55	0.55
WWC	88	10-Year	2.32	178.91	179.68		179.73	0.008741	1.03	2.30	7.01	0.54
WWC	78	10-Year	2.32	178.82	179.55	179.48	179.62	0.013906	1.45	2.49	9.12	0.71
WWC	58	10-Year	2.32	178.66	179.34	179.27	179.39	0.012676	1.28	3.56	16.42	0.66
WWC	48	10-Year	2.32	178.96	179.11	179.11	179.14	0.060362	0.86	2.70	36.81	1.01

HEC-RAS Plan: Block River: Wyldewood Creek Reach: WWC 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
WWC	416	25-Year	3.14	183.27	184.10	183.90	184.12	0.003381	0.64	5.32	24.61	0.34
WWC	415		Bridge									
WWC	413	25-Year	3.14	183.13	183.83	183.83	183.91	0.011086	1.45	3.40	23.61	0.64
WWC	383	25-Year	3.14	182.43	183.07	183.06	183.25	0.022003	2.07	2.19	6.26	0.92
WWC	363	25-Year	3.14	181.95	182.60	182.58	182.77	0.021750	2.07	2.20	6.27	0.91
WWC	343	25-Year	3.14	181.58	182.36		182.45	0.008963	1.54	3.08	7.07	0.61
WWC	323	25-Year	3.14	181.40	182.15		182.25	0.010519	1.63	2.90	6.91	0.65
WWC	313	25-Year	3.14	181.31	182.02	181.94	182.14	0.013475	1.76	2.64	6.68	0.73
WWC	303	25-Year	3.14	181.22	181.78	181.78	181.97	0.029332	2.18	1.99	5.77	1.05
WWC	280		Culvert									
WWC	277	25-Year	3.14	180.80	181.30		181.36	0.005878	1.08	2.92	16.77	0.49
WWC	261	25-Year	3.14	180.51	181.27		181.30	0.001770	0.78	5.81	11.22	0.29
WWC	254	25-Year	3.14	180.39	181.27		181.29	0.001121	0.68	6.65	11.14	0.23
WWC	249	25-Year	3.14	180.29	181.27	180.65	181.28	0.000715	0.46	6.86	14.86	0.17
WWC	230		Culvert									
WWC	208	25-Year	3.14	179.80	181.10		181.11	0.000615	0.46	6.72	217.36	0.15
WWC	199	25-Year	3.14	179.75	181.10		181.10	0.000070	0.18	18.27	221.05	0.05
WWC	168	25-Year	3.14	179.43	181.10		181.10	0.000060	0.22	24.25	227.91	0.06
WWC	162	25-Year	3.14	179.41	181.09		181.10	0.000376	0.41	7.68	40.45	0.12
WWC	160	25-Year	3.14	179.41	181.09		181.10	0.000376	0.41	7.67	6.00	0.12
WWC	156	25-Year	3.14	179.39	181.09		181.09	0.000361	0.40	7.79	6.00	0.11
WWC	146	25-Year	3.14	179.36	181.08		181.09	0.000340	0.40	7.94	6.00	0.11
WWC	141	25-Year	3.14	179.35	181.08		181.09	0.000334	0.39	8.00	6.00	0.11
WWC	136	25-Year	3.14	179.34	181.08		181.09	0.000327	0.39	8.05	6.00	0.11
WWC	133	25-Year	3.14	179.32	181.08	180.02	181.09	0.000315	0.38	8.16	6.00	0.11
WWC	132		Inl Struct									
WWC	119	25-Year	3.14	179.19	180.03		180.10	0.009319	1.17	2.68	6.00	0.56
WWC	111	25-Year	3.14	179.12	179.96		180.03	0.009273	1.17	2.68	6.00	0.56
WWC	107	25-Year	3.14	179.09	179.92		180.00	0.010068	1.20	2.61	6.00	0.58
WWC	94	25-Year	3.14	178.96	179.80		179.87	0.009178	1.18	2.72	6.79	0.57
WWC	88	25-Year	3.14	178.91	179.75		179.81	0.008888	1.16	2.81	7.44	0.56
WWC	78	25-Year	3.14	178.82	179.61	179.54	179.70	0.014886	1.64	3.08	10.06	0.75
WWC	58	25-Year	3.14	178.66	179.38	179.32	179.44	0.014933	1.49	4.24	17.91	0.73
WWC	48	25-Year	3.14	178.96	179.13	179.13	179.17	0.057891	0.91	3.44	41.56	1.01

HEC-RAS Plan: Block River: Wyldewood Creek Reach: WWC 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
WWC	416	50-Year	3.76	183.27	184.13	183.94	184.15	0.003177	0.66	6.21	25.81	0.34
WWC	415		Bridge									
WWC	413	50-Year	3.76	183.13	183.85	183.85	183.94	0.012348	1.58	3.82	26.45	0.68
WWC	383	50-Year	3.76	182.43	183.12	183.11	183.31	0.022458	2.22	2.49	6.54	0.94
WWC	363	50-Year	3.76	181.95	182.65	182.63	182.84	0.020888	2.17	2.56	6.61	0.91
WWC	343	50-Year	3.76	181.58	182.42		182.52	0.009011	1.64	3.53	7.44	0.62
WWC	323	50-Year	3.76	181.40	182.21		182.32	0.010520	1.73	3.32	7.27	0.66
WWC	313	50-Year	3.76	181.31	182.04	181.99	182.20	0.016758	2.01	2.78	6.81	0.82
WWC	303	50-Year	3.76	181.22	181.89	181.83	182.04	0.017915	1.98	2.64	6.45	0.85
WWC	280		Culvert									
WWC	277	50-Year	3.76	180.80	181.36		181.43	0.005812	1.15	3.26	17.57	0.49
WWC	261	50-Year	3.76	180.51	181.33		181.36	0.001904	0.85	6.50	11.79	0.30
WWC	254	50-Year	3.76	180.39	181.33		181.35	0.001255	0.75	7.32	11.62	0.25
WWC	249	50-Year	3.76	180.29	181.33	180.69	181.34	0.000786	0.51	7.46	15.27	0.19
WWC	230		Culvert									
WWC	208	50-Year	3.76	179.80	181.17		181.18	0.000610	0.49	7.50	218.35	0.15
WWC	199	50-Year	3.76	179.75	181.18		181.18	0.000080	0.20	19.70	222.91	0.06
WWC	168	50-Year	3.76	179.43	181.17		181.18	0.000071	0.25	25.63	229.83	0.06
WWC	162	50-Year	3.76	179.41	181.16		181.17	0.000458	0.46	8.12	40.70	0.13
WWC	160	50-Year	3.76	179.41	181.16		181.17	0.000459	0.46	8.11	6.00	0.13
WWC	156	50-Year	3.76	179.39	181.16		181.17	0.000441	0.46	8.22	6.00	0.12
WWC	146	50-Year	3.76	179.36	181.15		181.16	0.000418	0.45	8.38	6.00	0.12
WWC	141	50-Year	3.76	179.35	181.15		181.16	0.000411	0.45	8.42	6.00	0.12
WWC	136	50-Year	3.76	179.34	181.15		181.16	0.000404	0.44	8.47	6.00	0.12
WWC	133	50-Year	3.76	179.32	181.15	180.06	181.16	0.000389	0.44	8.59	6.00	0.12
WWC	132		Inl Struct									
WWC	119	50-Year	3.76	179.19	180.09		180.17	0.009406	1.25	3.00	6.00	0.57
WWC	111	50-Year	3.76	179.12	180.02		180.10	0.009464	1.26	2.99	6.00	0.57
WWC	107	50-Year	3.76	179.09	179.97		180.06	0.010271	1.29	2.91	6.00	0.59
WWC	94	50-Year	3.76	178.96	179.84		179.92	0.009419	1.27	3.04	6.94	0.58
WWC	88	50-Year	3.76	178.91	179.79		179.87	0.009083	1.25	3.15	7.71	0.57
WWC	78	50-Year	3.76	178.82	179.65	179.58	179.76	0.015478	1.76	3.50	10.67	0.77
WWC	58	50-Year	3.76	178.66	179.41	179.35	179.47	0.016739	1.63	4.68	18.80	0.78
WWC	48	50-Year	3.76	178.96	179.14	179.14	179.18	0.056662	0.95	3.97	44.64	1.02

HEC-RAS Plan: Block River: Wyldewood Creek Reach: WWC 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
WWC	416	100-Year	4.44	183.27	184.15	183.97	184.18	0.003529	0.72	6.73	26.59	0.36
WWC	415		Bridge									
WWC	413	100-Year	4.44	183.13	183.88	183.88	183.97	0.012071	1.62	4.48	30.56	0.68
WWC	383	100-Year	4.44	182.43	183.17	183.16	183.38	0.022965	2.37	2.80	6.83	0.96
WWC	363	100-Year	4.44	181.95	182.71	182.68	182.90	0.020160	2.27	2.94	6.95	0.91
WWC	343	100-Year	4.44	181.58	182.48		182.59	0.009052	1.74	4.00	7.81	0.63
WWC	323	100-Year	4.44	181.40	182.27		182.39	0.010703	1.84	3.75	7.61	0.68
WWC	313	100-Year	4.44	181.31	182.11		182.27	0.015459	2.08	3.26	7.22	0.80
WWC	303	100-Year	4.44	181.22	182.01	181.88	182.14	0.012250	1.87	3.31	7.15	0.73
WWC	280		Culvert									
WWC	277	100-Year	4.44	180.80	181.40		181.49	0.006380	1.27	3.50	18.14	0.52
WWC	261	100-Year	4.44	180.51	181.37		181.41	0.002224	0.95	6.96	12.15	0.33
WWC	254	100-Year	4.44	180.39	181.36		181.39	0.001506	0.85	7.76	11.93	0.27
WWC	249	100-Year	4.44	180.29	181.37	180.73	181.38	0.000931	0.57	7.84	15.34	0.20
WWC	230		Culvert									
WWC	208	100-Year	4.44	179.80	181.24		181.26	0.000617	0.51	8.25	219.30	0.15
WWC	199	100-Year	4.44	179.75	181.25		181.25	0.000090	0.22	21.10	224.69	0.06
WWC	168	100-Year	4.44	179.43	181.25		181.25	0.000084	0.28	26.95	231.69	0.07
WWC	162	100-Year	4.44	179.41	181.23		181.24	0.000553	0.52	8.53	40.94	0.14
WWC	160	100-Year	4.44	179.41	181.23		181.24	0.000554	0.52	8.53	6.00	0.14
WWC	156	100-Year	4.44	179.39	181.23		181.24	0.000534	0.51	8.63	6.00	0.14
WWC	146	100-Year	4.44	179.36	181.22		181.23	0.000508	0.51	8.78	6.00	0.13
WWC	141	100-Year	4.44	179.35	181.22		181.23	0.000501	0.50	8.83	6.00	0.13
WWC	136	100-Year	4.44	179.34	181.22		181.23	0.000493	0.50	8.88	6.00	0.13
WWC	133	100-Year	4.44	179.32	181.22	180.10	181.23	0.000476	0.49	8.99	6.00	0.13
WWC	132		Inl Struct									
WWC	119	100-Year	4.44	179.19	180.14		180.23	0.009533	1.34	3.32	6.00	0.57
WWC	111	100-Year	4.44	179.12	180.07		180.16	0.009720	1.35	3.30	6.00	0.58
WWC	107	100-Year	4.44	179.09	180.02		180.12	0.010578	1.38	3.21	6.00	0.60
WWC	94	100-Year	4.44	178.96	179.89		179.98	0.009711	1.36	3.36	7.09	0.60
WWC	88	100-Year	4.44	178.91	179.84		179.93	0.009328	1.34	3.51	7.99	0.59
WWC	78	100-Year	4.44	178.82	179.72	179.63	179.82	0.012936	1.75	4.29	11.75	0.72
WWC	58	100-Year	4.44	178.66	179.38	179.38	179.50	0.031618	2.14	4.14	17.71	1.06
WWC	48	100-Year	4.44	178.96	179.36	179.15	179.36	0.001022	0.22	20.08	98.87	0.16

HEC-RAS Plan: Block River: Wyldewood Creek Reach: WWC 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
WWC	416	Regional	12.83	183.27	184.34	184.21	184.39	0.004342	1.03	14.33	53.03	0.43
WWC	415		Bridge									
WWC	413	Regional	12.83	183.13	184.23		184.29	0.004178	1.31	14.45	65.29	0.43
WWC	383	Regional	12.83	182.43	183.63	183.63	183.99	0.021031	3.28	6.55	9.57	1.01
WWC	363	Regional	12.83	181.95	183.27		183.53	0.013548	2.83	7.78	10.31	0.83
WWC	343	Regional	12.83	181.58	183.16		183.30	0.006061	2.16	10.65	11.86	0.57
WWC	323	Regional	12.83	181.40	183.07		183.19	0.004719	1.98	11.75	12.41	0.51
WWC	313	Regional	12.83	181.31	183.04		183.14	0.004022	1.88	12.51	12.77	0.47
WWC	303	Regional	12.83	181.22	182.95	182.33	183.10	0.004543	2.04	8.67	12.78	0.51
WWC	280		Culvert									
WWC	277	Regional	12.83	180.80	182.13		182.27	0.003826	1.66	7.72	27.93	0.46
WWC	261	Regional	12.83	180.51	182.14		182.19	0.001447	1.17	19.16	19.45	0.29
WWC	254	Regional	12.83	180.39	182.14		182.18	0.001146	1.09	20.65	19.00	0.26
WWC	249	Regional	12.83	180.29	182.14	181.10	182.17	0.000777	0.82	17.88	31.90	0.21
WWC	230		Culvert									
WWC	208	Regional	12.83	179.80	182.12		182.15	0.000409	0.61	17.30	229.20	0.14
WWC	199	Regional	12.83	179.75	182.13		182.14	0.000118	0.36	38.14	230.50	0.08
WWC	168	Regional	12.83	179.43	182.13		182.13	0.000150	0.50	43.02	258.11	0.10
WWC	162	Regional	12.83	179.41	182.08		182.12	0.000964	0.91	15.51	86.72	0.19
WWC	160	Regional	12.83	179.41	182.07		182.12	0.001240	0.94	13.60	6.00	0.20
WWC	156	Regional	12.83	179.39	182.07		182.11	0.001218	0.94	13.69	6.00	0.20
WWC	146	Regional	12.83	179.36	182.06		182.10	0.001192	0.93	13.80	6.00	0.20
WWC	141	Regional	12.83	179.35	182.05		182.09	0.001186	0.93	13.82	6.00	0.20
WWC	136	Regional	12.83	179.34	182.05		182.09	0.001179	0.93	13.85	6.00	0.19
WWC	133	Regional	12.83	179.32	182.04	180.49	182.09	0.001157	0.92	13.95	6.00	0.19
WWC	132		Inl Struct									
WWC	119	Regional	12.83	179.19	180.64		180.85	0.011372	2.04	6.29	6.00	0.64
WWC	111	Regional	12.83	179.12	180.52		180.75	0.012920	2.13	6.01	6.00	0.68
WWC	107	Regional	12.83	179.09	180.43		180.69	0.015376	2.26	5.67	6.00	0.74
WWC	94	Regional	12.83	178.96	180.25		180.49	0.014139	2.24	6.17	8.74	0.76
WWC	88	Regional	12.83	178.91	180.19		180.40	0.012895	2.13	6.78	10.84	0.72
WWC	78	Regional	12.83	178.82	180.01	180.01	180.25	0.020598	2.88	8.82	19.44	0.97
WWC	58	Regional	12.83	178.66	179.74	179.62	179.84	0.014790	2.22	12.98	31.19	0.80
WWC	48	Regional	12.83	178.96	179.80	179.25	179.80	0.000160	0.18	76.98	164.35	0.07

APPENDIX F

Letters to the NVCA

Constraints Mapping Letter prepared by Crozier, dated June 22, 2020
Daylighting and Corridor Design for Unnamed Tributary Letter prepared by
GEO Morphix, dated January 31, 2020
Erosion Access Allowance Letter prepared by Crozier, dated January 29,
2020
Buffer and Access Maintenance Letter prepared by GEO Morphix, dated
June 16, 2020

JUNE 22, 2020

PROJECT NO: 1535-4897

SENT VIA: EMAIL

Nottawasaga Valley Conservation Authority
8195 8th Line
Utopia, ON L0M 1T0

Attention: Emma Perry, Planner II

**RE: CONSTRAINTS MAPPING
WYLDEWOOD CREEK PROPOSED RESIDENTIAL DEVELOPMENT
TOWN OF COLLINGWOOD, COUNTY OF SIMCOE**

Dear Emma,

This letter has been prepared to address the NVCA's request for Constraints Mapping as part of the OPA/ZBA application for the Georgian Bay Hotel and SPA Application for the Wyldewood Creek Development. The request was outlined in the comments provided by yourself via e-mail on April 28th, 2020.

1. INTRODUCTION

The subject property is bounded by the Cranberry Marsh along the eastern property boundary, as well as bisected by the 'West Watercourse' tributary into the Marsh. The Cranberry Marsh has natural hazard constraints associated with it, including a Regulated Flood Hazard and areas of 'Provincially Significant Wetland'. The West Watercourse has a contributing drainage area of greater than 125 ha and therefore is also has a Regulated Flood Hazard associated with it. Both the West Watercourse and the Cranberry Marsh are also subject to Erosion Hazard Constraints. Further information regarding each of these constraints can be found in the following sections.

As part of the April 28th, 2020 comments the NVCA requested:

"That a scaleable drawing be provided (using surveyed data points) which illustrates the following items:

- *The Cranberry Marsh high-water elevation of 179.80m + 6m buffer*
- *The Regional storm elevation associated with the engineered channel + 6m buffer (i.e. flood hazard access allowance)*
- *The delineated boundary of the PSW, plus variable buffer (averaged 30m) per latest concept plan.*

The constraints mapping should feature a complete legend. Constraint lines, access allowances, and buffer setbacks should be labelled. Please confirm that all works are outside of the limits of development. The limits to development will be determined by the furthest extent of the hazard plus the required access allowance or the natural heritage feature and appropriate buffer; whichever is the greatest constraint."

In addition to the comments provided, there has been ongoing communication between the consultant team and NVCA staff regarding the details associated with both the natural hazards and the associated setbacks that have been requested to be shown on the Constraints Plan. Specifically, there has been discussion regarding the requirement for a 6m buffer from the engineered channel, which is further built upon in the remainder of this letter.

At this time, a Preliminary Constraints Plan has been prepared and is enclosed within this letter. The Constraints Plan will be subject to refinement through additional design and analysis, as well as the outcome of the discussion regarding the 6m buffer from the engineered channel.

2. CRANBERRY MARSH

2.1. PSW Boundary & Variable Buffer

The boundary of the Provincially Significant Wetland was staked in 2018. It is proposed to maintain this boundary and as such it has been incorporated directly into the Site Plan.

In addition to maintaining the PSW boundary, a variable buffer has been proposed to be incorporated into the Site Plan and shown on the enclosed Constraints Plan. Limits of this buffer have been discussed with NVCA staff and accepted, pending additional planting details being provided during detailed design of the site.

2.2. Highwater Elevation plus 6m Erosion Access Allowance

The Cranberry Marsh has a Regulated High Water Elevation of 179.80 masl, associated with the Regional Storm Event. The limits of the Regional Flood Event for the Cranberry Marsh have been delineated on the site based on the topographic survey completed by KRCMAR. Refer to the enclosed Constraints Plan.

As the Marsh is a natural drainage system, it has the potential for erosion during larger storm events. In accordance with MNRF and NVCA Guidelines, a 6m erosion access allowance will be provided from the HWL. For the subject property, this 6m access buffer is less restrictive than the variable buffer from the PSW Boundary and therefore does not impact the limits of the Development.

3. ENGINEERED CHANNEL

Under existing conditions, the West Watercourse for the Cranberry Marsh is conveyed through the site via a 0.5m diameter culvert. As part of the proposed development, it is proposed to daylight this feature using an Engineered Channel. The proposed channel is to be generally rectangular in shape, with a width of 6m, depth of over 1.75m and complete with a trapezoidal low flow channel within the base. There will also be dual box culverts under the road crossing.

3.1. Regional Water Surface Elevation

Preliminary Hydraulic analysis of this channel has been completed in HEC-RAS to confirm that it could convey the discharge from the Regional Storm event in accordance with safe access and floodproofing requirements.

While detailed Hydraulic Analysis will be provided to the NVCA in a stand-alone Flood Study for the West Watercourse as requested by the NVCA, this analysis is subject to an agreement on the

buffer from the water elevation. The Flood Study will outline the previously approved sources of the Hydrologic Analysis as well as speak to the sources of all elevation data.

The preliminary hydraulic analysis found that with the proposed channel design and building elevations, there will be approximately 1 – 2m of freeboard between the Regional Water Surface Elevation and any opening within the residential dwellings. This freeboard is greater than the 0.3m freeboard as required by the MNRF and NVCA. Additionally, the culverts proposed under the roadway convey the Regional storm event without overtopping. As such, safe access is maintained throughout the site as required by MNRF and NVCA standards.

To address the concern about increased risk of flooding due to blockages or obstructions within the channel, the HEC-RAS model was also run under the scenario in which there was 50% blockage in the culverts. While this scenario is unlikely due to the size of the culverts and the fact that the channel will be maintained by the proposed Condo Corporation, the required freeboard and safe access are maintained during this event.

3.2. Access Allowance

A letter prepared by Crozier dated January 29, 2020 was provided to the NVCA which spoke to the request for an erosion access setback and the associated policy. Based on conversations and correspondence with the NVCA, it was determined that a 6m setback was not required for erosion hazard access. The watercourse is proposed to be an engineered channel located on private property and will be maintained by a Condominium Corporation.

The NVCA has now requested a 6m setback from the Regional floodline. However, it is the Development Team's position that the proposed variable buffer meets the intent behind the request for the 6m buffer. The attached letter prepared by Dr. Paul Villard of GEO Morphix outlines how access to the channel is provided to allow for maintenance of the channel to occur. Additionally, a previously submitted letter prepared by Dr. Villard outlined that a 0m Erosion Setback would be applicable for this channel, as the chosen construction materials will be sized in accordance to the flow. From a Flood Hazard perspective, safe access is maintained throughout the development during a Flood Event. There will not be overtopping of the main road and pedestrians can still navigate around the buildings within the landscaped areas if needed. Freeboard in excess of the 0.3m is provided between the Regional high water level and any openings within the buildings, meeting the MNRF and NVCA floodproofing requirements. To address the NVCA's concern regarding climate change and safety factors within the modeling, the hydraulic analysis found that due to the site grading constraints, the channel has a capacity of over 20 m³/s and that floodproofing requirements can still be achieved if there is 50% blockage within the culvert.

Based on the above, the proposed channel and culverts meet the NVCA's requirements for safe access/egress and are within the NVCA's acceptable risk. The constructed channel provides sufficient vertical separation from the buildings to protect from flooding. The constructed channel can convey much larger flows (up to double the Regional Event) before putting the buildings at risk of flooding and still maintain safe access/egress.

CONCLUSION AND RECOMMENDATIONS

The enclosed Preliminary Constraints Mapping depicts the natural hazards and associated setbacks for the property. The limits of Development being proposed are outside of these

hazards. With the exception of remedial work and minor infrastructure installation within the PSW buffer, the limits of development also respect the proposed setbacks from the natural hazards.

A variable setback from the Engineered channel is proposed as HEC-RAS analysis conducted shows that the proposed channel can safely convey the flows across the Subject Site, provide safe access/egress and can convey large flows while maintain acceptable risk from flooding for the proposed buildings. Through documents prepared by this office and GEO Morphix, it has also been shown that an erosion setback is not required and that maintenance of the channel can be maintained by the Condo Corporation.

Upon confirmation of the NVCAs acceptance of the variable buffer from the Channel, the requested stand alone Flood Study will be finalized and submitted as part of the next submission. Should you have any questions or require any further information, please do not hesitate to contact the undersigned.

Sincerely,

CROZIER CONSULTING ENGINEERS



Rebecca Alexander, P.Eng.
Project Manager
/ra

CROZIER CONSULTING ENGINEERS



Mike Hensel, OALA, CSLA
Senior Development Consultant

c.c. Lindsay Ayers (Town of Collingwood)
Colin Travis (Travis & Associates)
David Hirsch (Brandy Lane Corporation)
Peter Levoy (Georgian Bay Hotel)

Enclosures Wyldeewood Creek Site Plan, prepared by Crozier and dated June 4, 2020
Preliminary Constraints Plan, prepared by Crozier and dated June 4, 2020
Wyldeewood Creek Access Memo, prepared by GEO Morphix and dated June 16, 2020
Wyldeewood Creek Access Figure, prepared by Crozier and dated June 19, 2020

J:\1500\1535-Brandy Lane Corp\4897-Georgian Bay Hotel South Block\Letters\2020.06.16_Constraints Mapping.docx

FUTURE CONNECTION TO
COMMUNITY TRAIL SYSTEM

EXISTING GOLF COURSE
LANDS

FUTURE CONNECTION TO
COMMUNITY TRAIL SYSTEM

10 0m 10 20 30
SCALE: 1:400

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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	Engineer
1	ISSUED FOR 1st ENGINEERING SUBMISSION	02/04/2019	
2	ISSUED PER SITE PLAN REVISIONS	10/21/2019	
3	ISSUED PER SITE PLAN REVISIONS	10/31/2019	
4	ISSUED PER SITE PLAN REVISIONS	11/27/2019	
5	ISSUED PER SITE PLAN REVISIONS	12/05/2019	
6	ISSUED PER SITE PLAN REVISIONS	12/10/2019	
7	ISSUED PER SITE PLAN REVISIONS	06/04/2020	

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Engineer

WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

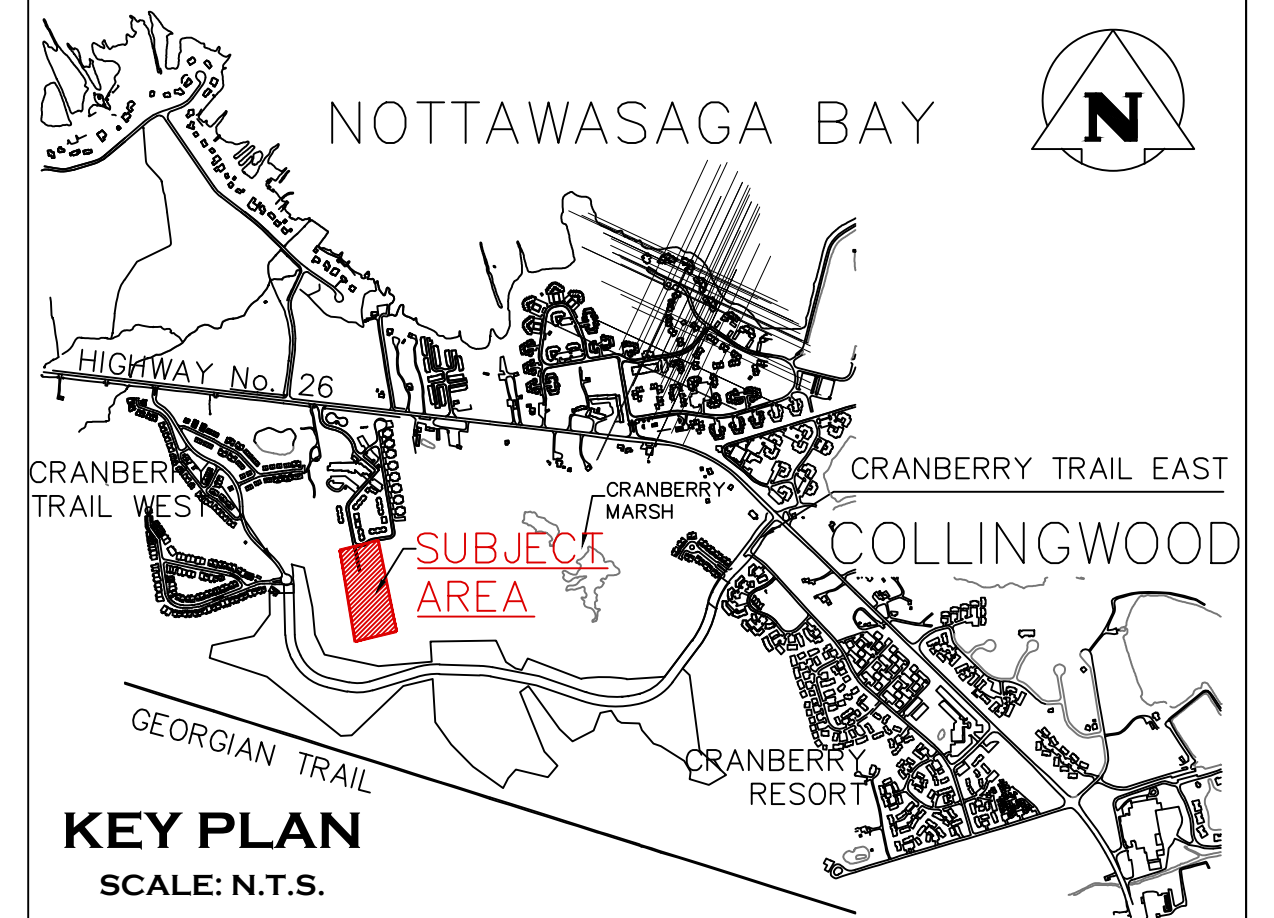
Drawing

PROPOSED SITE PLAN AND
VARIABLE ENHANCED BUFFER ZONE

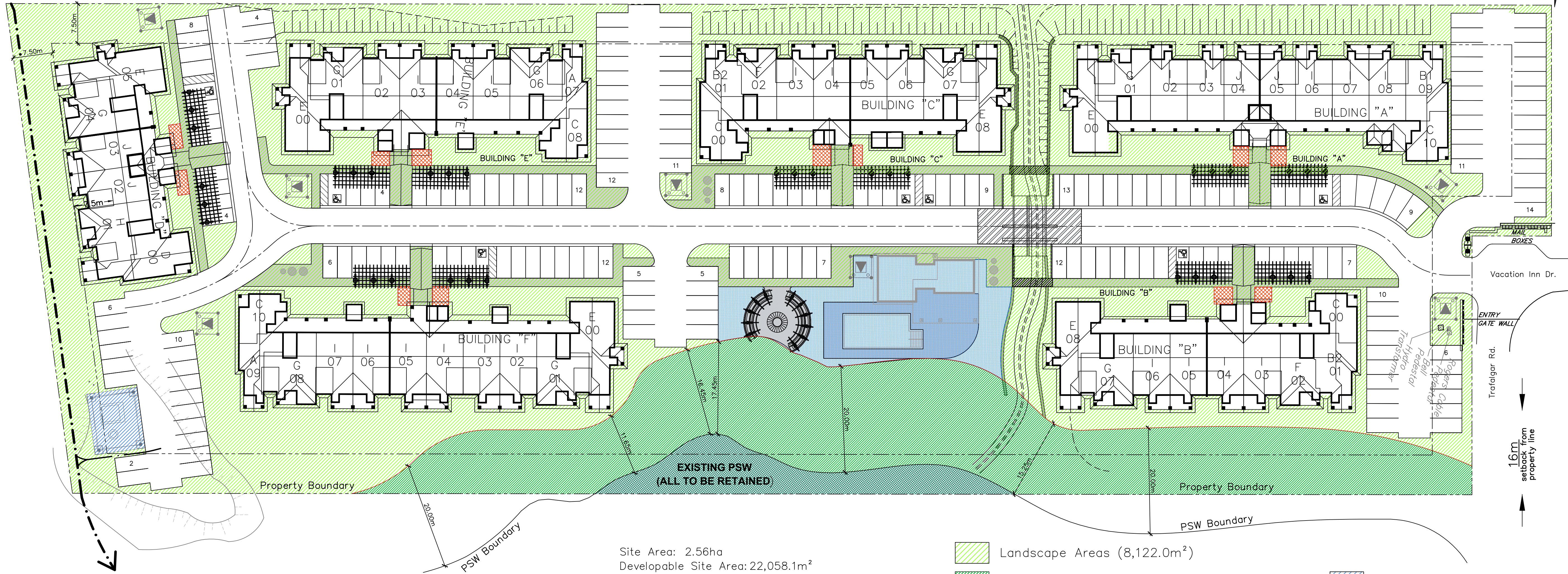


THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	K.W.	Design By	M.H. & K.W.	Project	1535-4897
Check By	M.H.	Check By	R.A.	Scale	1:400
				Drawing	WYLDEWOOD_SP-2019.10.31



KEY PLAN
SCALE: N.T.S.

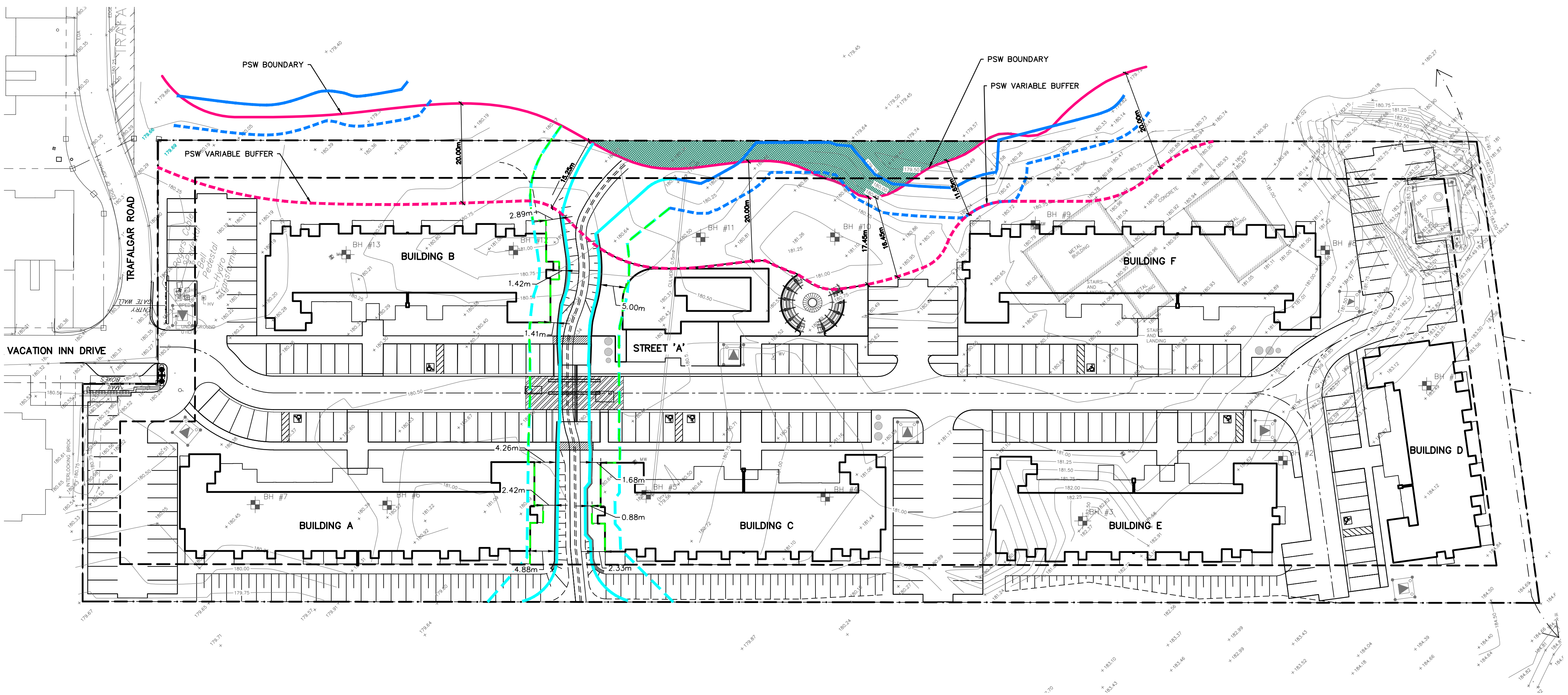
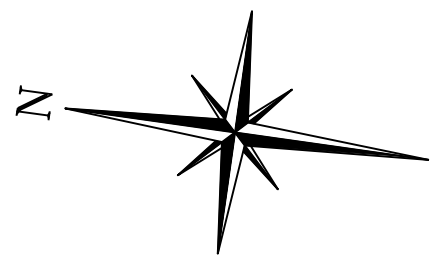
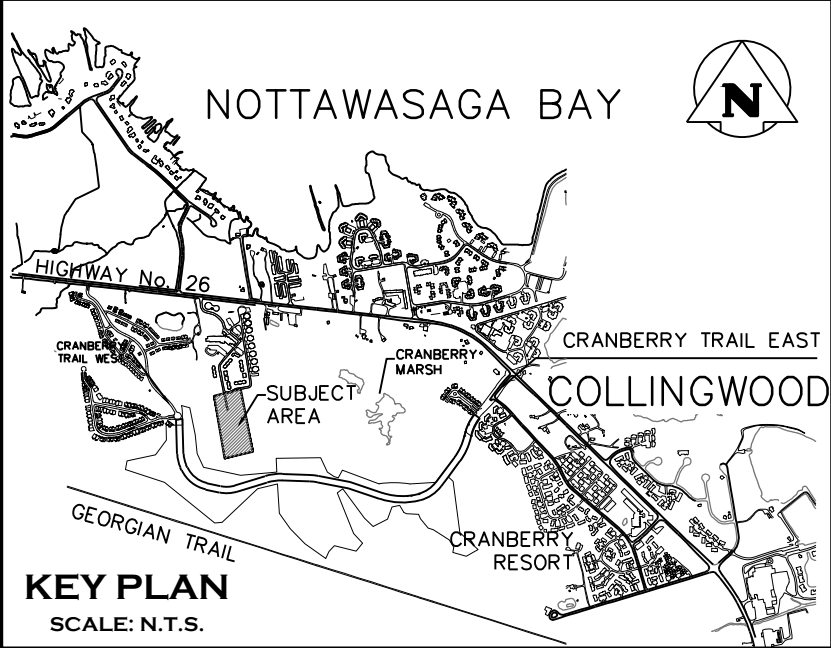


Site Area: 2.56ha
Developable Site Area: 22,058.1m²

41% of Developable Area is Landscape/ Open Space

Revised Site Plan per Proposed Variable
Buffer Zone and 16m Building Setback from
East Property Line
Total Units 165 / Total Parking Spaces 207

- Landscape Areas (8,122.0m²)
- Variable Buffer Zone (2,988.4m²)
- Existing PSW (442.2m²)
- Recreation Block (856.6m²)
- Amenity Space/Building (20m²/ Building)
(Includes: Bench/Garbage Receptacle/Bike Rack)
- Ex. Cell Tower (111.3m²)



- LEGEND
- 7.5m SETBACK
 - CRANBERRY MARSH HIGH WATER LEVEL ELEVATION (179.80)
 - CRANBERRY MARSH HIGH WATER LEVEL ELEVATION + 6m OFFSET
 - PSW BOUNDARY
 - PSW VARIABLE BUFFER
 - ENGINEERED CHANNEL REGIONAL HIGH WATER ELEVATION (ELEVATION VARIES)
 - ENGINEERED CHANNEL REGIONAL HIGH WATER ELEVATION + 6m OFFSET
 - ENGINEERED CHANNEL REGIONAL HIGH WATER ELEVATION + VARIABLE OFFSET



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

Town

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR COORDINATION	06/04/2020

Engineer

DRAFT
FOR DISCUSSION PURPOSES ONLY

Engineer

Project

WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

Drawing

CONSTRAINTS PLAN



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	J.P.	Design By	L.W.	Project	1535-4897
Check By	K.M.	Check By	R.A.	Scale	1:500
				Drawing	C001

June 16, 2020

C.F. Crozier & Associates Consulting Engineers
40 Huron Street, Suite 301
Collingwood, Ontario L9Y 4R3

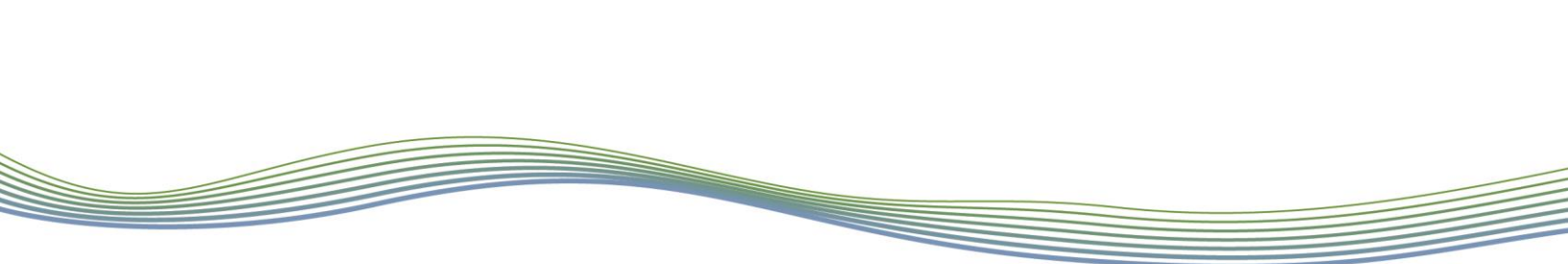
Attention: Mike Hensel OALA, CSLA
Senior Development Consultant

**Re: Buffer and Access Maintenance
Wyldeewood Creek Proposed Residential Development
Town of Collingwood, Ontario
GEO Morphix Project No. PN20002**

This letter provides a greater description related to maintenance access for a section of Wyldeewood Creek in association with the proposed residential development in the Town of Collingwood, Ontario. I understand that a natural area block was requested as part of the Nottawasaga Valley Conservation Authority (NVCA) OPA/ZBA review for this site. Furthermore, I understand that NVCA has noted a concern with regards to erosion/flooding access allowance for the channel corridor. GEO Morphix previously provided support for the realignment and daylighting of a minor tributary within the Wyldeewood Creek Development. It was agreed that an erosion setback was not required given the proposed stabilization. A setback or access has been requested by NVCA from the flood line. Crozier Consulting Engineers asked that I review the proposed channel corridor in the context of potential access and provide examples of other locations where similar approaches have been permitted.

A daylighting approach is proposed that provides geomorphological and ecological benefits, while also addressing potential erosion and flooding. It is understood that the corridor dimensions were previously established as part of completing the functional engineering design for the property. For the majority of development sites, a setback is generally provided for either erosion or access allowance to address potential maintenance requirements associated with flooding or erosion. This is outlined under the Provincial Policy for defining erosion hazards (MNRF, 2002) and is applied to existing stream corridors. I note in this case the channel is being daylighted, as such it is a constructed feature. This component of the hazard policy statement is to address access in areas with multiple landowners. In that a contiguous block allows access with multiple landowners. There have been sites within the Toronto and Region Conservation Authority jurisdiction, where this is allowed specifically the Diversicare Site in Stouffville, Ontario. There are similar erosion maintenance requirements, which can be binding through the Condominium Agreement. The Wyldeewood Creek property is unique because it is a multi-unit condominium block owned by a single landowner. As such, access can be facilitated through the Condominium Agreement.

With regards to access there are several locations for egress and access along the extent of the corridor. On the east side of the site, there is direct access to the north side of the watercourse behind Building "B". Alternatively, the southern side of the watercourse in this location can also be accessed via the central Recreation Block. Within the central area of the site, there is access available at the bridge crossing structure. There is parking on both sides and a road network which allows for easy access to the bridge structure itself and the channel sections immediately



upstream and downstream. On the west side of the site, there is a 3:1 slope behind Building "C" or Building "A" which can be easily traversed by vehicles and therefore allow access to the upstream portion of the channel corridor. A standard excavator is approximately 3 m wide and can reach 7.7 m, which suggests that most of the channel can be reached from one bank. A 3.5 m distance provides room for access. The swing radius is approximately 2.5 m and 1.2 m. A figure is provided in **Appendix A**.

I anticipate that any required erosion repair, although unlikely, can be completed by removing small sections of armourstone from the corridor to allow access for vehicles down to the channel. This would be completed during the summer season during periods of low or no flow conditions. The only location where access could be required during high flows or flooding conditions would be for clearance of debris at the bridge crossing structure to remove debris. As outlined, there is good access on both sides of the bridge structure for emergency maintenance during high flows. I have experience working on the Diversicare Site in Stouffville, where in lieu of providing an access setback, an easement was placed over a section of adjacent parking lot to provide access for erosion and repairs, if required. This is similar to the situation in this case.

Given this is a daylighting activity, the flooding and erosion could have been addressed through piping. Instead, a corridor is being proposed in support of channel daylighting with erosion and flooding are being addressed through design. Given that all sections can be accessed through a number of locates, and that this is a single landowner, I suggest that the hazard and future access for any potential works are provided through the current design and development layout. The Condominium Agreement can be used to assume future access and long-term maintenance. This approach is consistent with the spirit of the Provincial Policy Statement of Hazards.

I trust this memo meets your current requirements. Should you have any questions, please contact the undersigned.

Respectfully submitted,



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



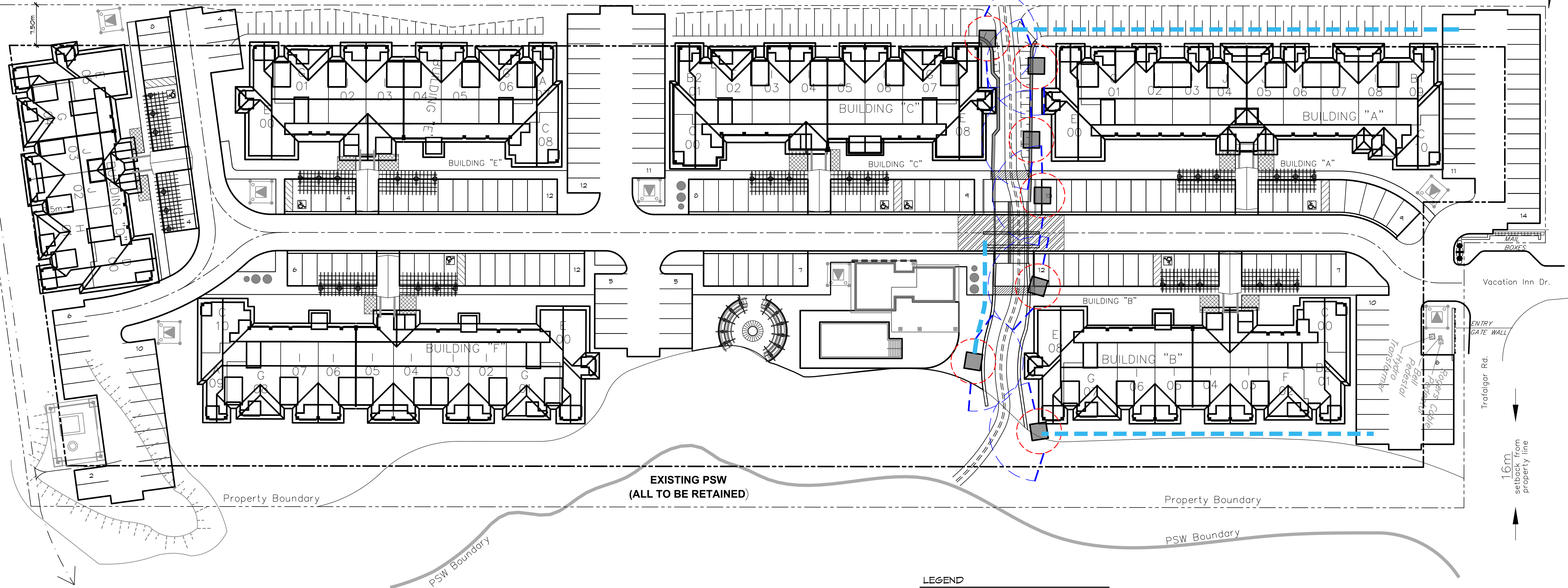
Appendix A



**ACCESS FOR
WYLDEWOOD CREEK**
NTS

FUTURE CONNECTION TO
COMMUNITY TRAIL SYSTEM

EXISTING GOLF COURSE
LANDS



10 0m 10 20 30
SCALE: 1:400

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4. DO NOT SCALE THE DRAWINGS.
5. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

BENCHMARKS

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE RELATED TO TOWN OF COLLINGWOOD BENCH MARK NO. 00172U311 HAVING AN ELEVATION OF 181.032 METRES.
TOPOGRAPHIC SURVEY COMPLETED BY KRCMAR SURVEYORS LTD., DATED AUGUST 25, 2018.

Town

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR REVIEW	06/19/2020

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project

WYLDEWOOD CREEK
TOWN OF COLLINGWOOD

Drawing

PROPOSED EQUIPMENT ACCESS ROUTES

CROZIER
CONSULTING ENGINEERS

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

Drawn By	K.W.	Design By	M.H. & K.W.	Project	1535-4897
Check By	M.H.	Check By	R.A.	Scale	1:400
				Drawing	FIG-1

JANUARY 29, 2020

PROJECT NO: 1535-4897

SENT VIA: EMAIL

Nottawasaga Valley Conservation Authority
8195 8th Line
Utopia, ON L0M 1T0

Attention: Emma Perry, Planner II

**RE: EROSION ACCESS ALLOWANCE
WYLDEWOOD CREEK PROPOSED RESIDENTIAL DEVELOPMENT
TOWN OF COLLINGWOOD, COUNTY OF SIMCOE**

Dear Emma,

It is understood based on verbal comments that the NVCA is requesting that a 6m Erosion Access Allowance be provided for the proposed drainage channel that bisects the Wyldewood Creek Development. It is our assumption that this comment is based on NVCA Planning and Regulation Guidelines - Section 4.3.32: Defining River or Stream Valleys – Regulation Allowances, which states:

'To provide access and protection against unforeseen conditions, provincial guidelines recommend that development should generally be setback a minimum of 6 metres adjacent to erosion and flooding hazards (Sections 3.0 and 3.4, Erosion Access Allowance, Technical Guide – River and Stream Systems: Erosion Hazard Limit, MNR, 2002b). MNR recommends that this setback not only be applied to the erosion hazards discussed in the sections above but also adjacent to the flooding hazard because of the potential for erosion throughout the flooding hazard as a result of the flow of water during significant runoff events. For those situations where additional study is warranted to determine the development setback required providing the required public safety and access, a study should be undertaken using accepted scientific, geotechnical and engineering principles.'

The NVCA requirement for Erosion Access Allowance is further outlined in the NVCA Natural Hazards Technical Guide - Section 2.4, which states that this allowance is supported by the following three principles:

1. *Providing for emergency access to erosion prone areas;*
2. *Providing for construction access for regular maintenance and access to the site in the event of an erosion event or failure of a structure;*
3. *Providing protection against unforeseen or predicted external conditions which could have an adverse effect on the natural conditions or processes acting on or within an erosion prone area of provincial interest.*

In the case of the proposed Wyldewood Creek Development, the currently proposed drainage channel is to be an engineered and armoured channel designed to convey the discharge for all design storm events. The design flows were determined in the Regional Stormwater Management Update & Master SWM Strategy for the Cranberry Creek Watershed prepared by C.F. Crozier & Associates dated May 2007 and are summarized below in Table 1.

Table 1: Peak Flow

Return Period	Peak Flow (m³/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 was based on a total upstream drainage area of 218.80 ha with the lands south of the Georgian Trail subject to full urban buildout assumed to be developed as low-density residential (i.e. total imperviousness of 35%). Additionally, 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 south of the Georgian Trail, it is assumed that the trail will not be adequate to withhold 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.

The proposed channel is to be generally rectangular in shape, with a width of 6m and depth of 1.75m and complete with a trapezoidal low flow channel within the base. There will also be dual box culverts under the road crossing. Hydraulic analysis of this channel was completed in HEC-RAS to confirm that it could convey the discharge from the Regional Storm event in accordance with safe access and floodproofing requirements. The results of this hydraulic analysis have been attached for reference.

The first principle for the Erosion Access Allowance is to provide emergency access to erosion prone areas. Based on current site conditions, the watercourse traversing the subject lands does not have any indication of an erosion hazard. In addition, the proposed watercourse is to be an engineered channel constructed with materials that would not be prone to erosion. The detailed design of the engineered channel is to be conducted in concert with a Fluvial Geomorphologist. A preliminary letter of design intent has been provided by this Expert for reference. Additional details will be provided as part of the detailed design submission for the Site Plan and associated Drainage Channel works.

The second principle is to provide access for maintenance and repairs. The proposed engineered channel is to be constructed on private property which will be owned by a condominium corporation who will be responsible for the maintenance and any required repairs to the channel. The condominium corporation will have access to the channel from the banks for all areas other than the locations where the buildings are adjacent to the channel. For these areas, maintenance can occur from within the channel. This is facilitated by the channel's bottom width. General, the channel will be conveying low flow rates, as seen in Table 1.

The third principle is to protect against unforeseen natural conditions. As described above, the channel is to be designed to convey a large flow rate for the Regional storm event based on conservative assumptions.

Based on the above, it is our opinion that a 6m Erosion Access Allowance is not necessary for the proposed drainage channel as the principles for the Allowance have been satisfied in the following ways:

1. The engineered channel will be designed in concert with a fluvial geomorphologist such that it will not be prone to erosion as a result of the flood hazard.
2. Maintenance and repairs can be completed on the channel through access from the road crossing, or from within the channel itself.
3. The determination of the design peak flow has included many conservative assumptions as can be seen through a comparison of the 100-year and Regional peak flow rates.

Should you have any questions or require any further information, please do not hesitate to contact the undersigned.

Sincerely,

C.F. CROZIER & ASSOCIATES INC.



Rebecca Alexander, P.Eng.
Project Manager
RA/ml

C.F. CROZIER & ASSOCIATES INC.



Mike Hensel, OALA, CSLA
Senior Development Consultant

c.c. Lindsay Ayers (Town of Collingwood)
John Velick (Town of Collingwood)
Adam Farr (Town of Collingwood)
David Hirsch (Brandy Lane Corporation)
Colin Travis (Travis & Associates)

Enclosure

J:\1500\1535-Brandy Lane Corp\4897-Georgian Bay Hotel South Block\Letters\2019.12.19_Erosion Access Allowance.docx

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		Ini 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

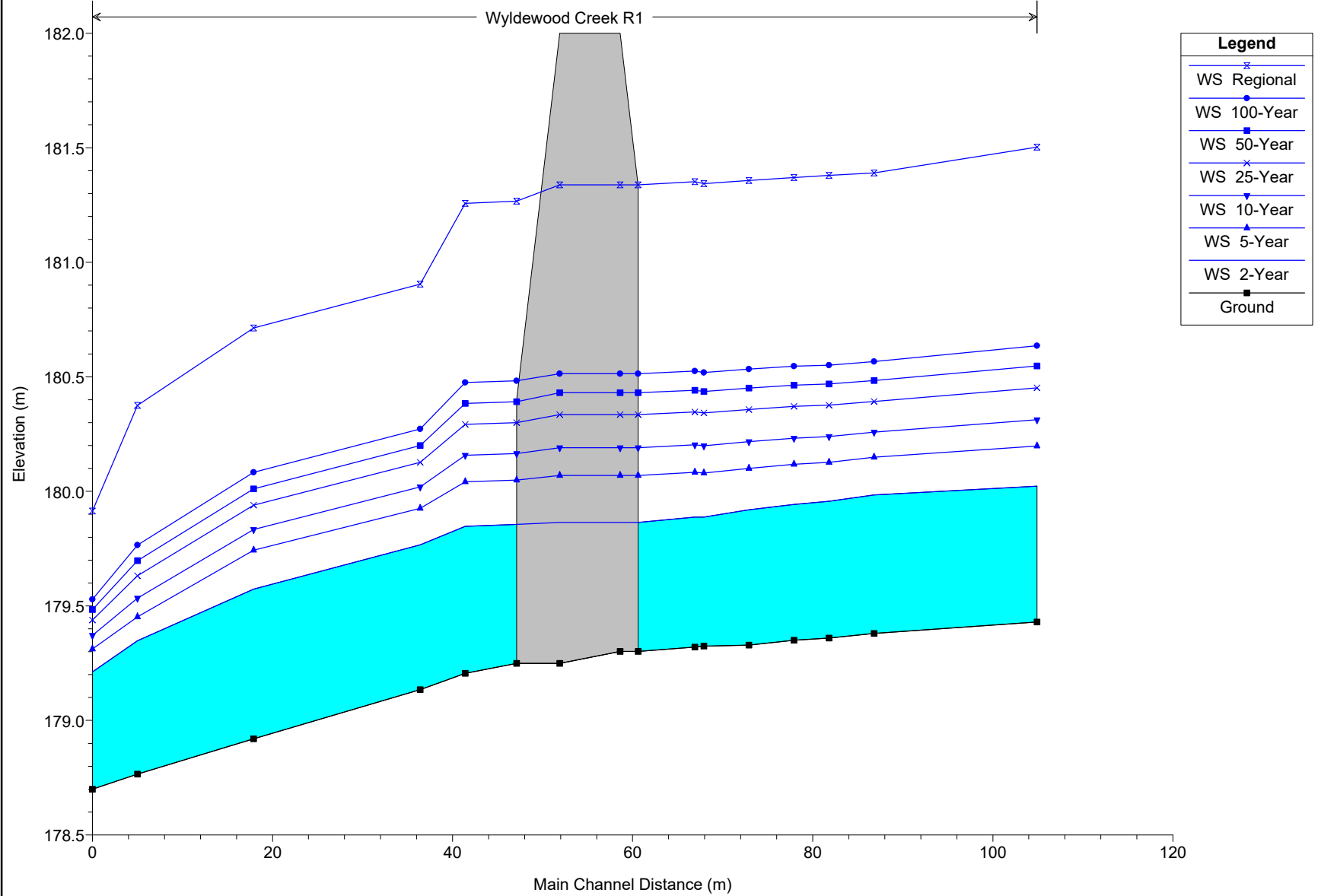
HEC-RAS Plan: Post-Dev River: Wyldewood Creek Reach: R1 Profile: 100-Year

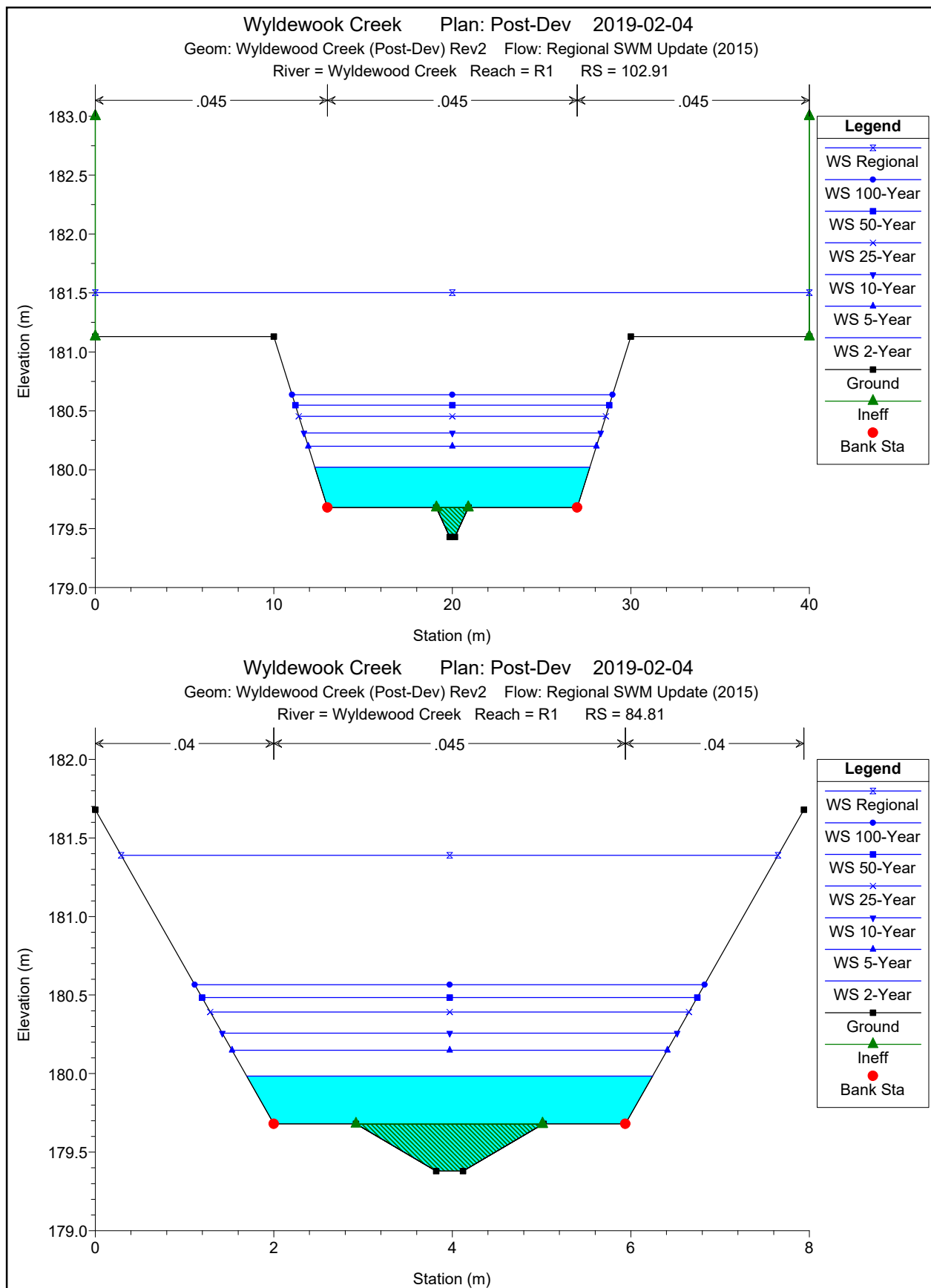
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
R1	102.91	100-Year	4.44	179.43	180.64		180.64	0.000203	0.31	15.28	17.96	0.10
R1	84.81	100-Year	4.44	179.38	180.57		180.63	0.003119	1.13	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

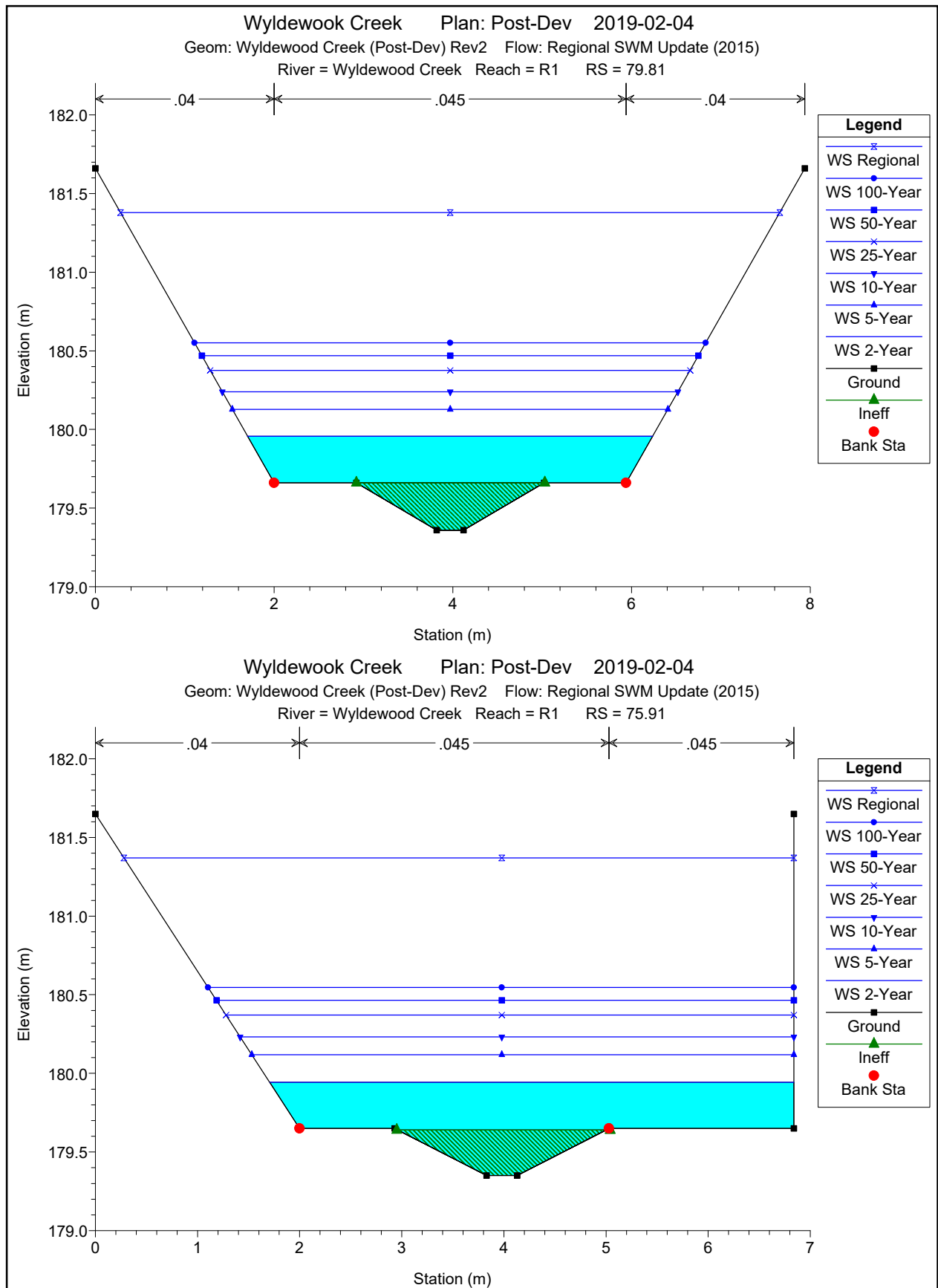
HEC-RAS Plan: Post-Dev River: Wyldewood Creek Reach: R1 Profile: Regional

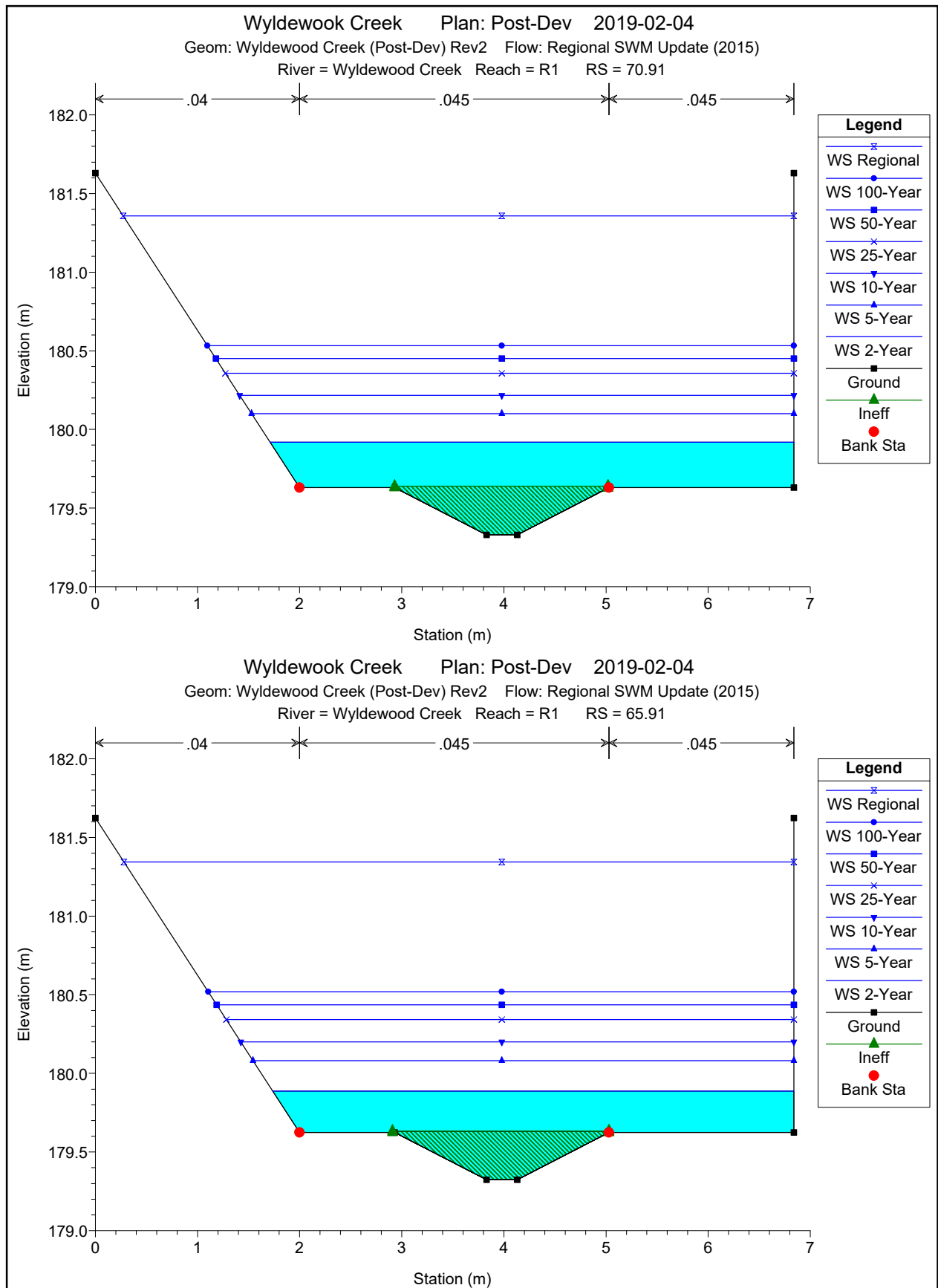
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
R1	102.91	Regional	12.83	179.43	181.50		181.51	0.000152	0.41	39.54	40.00	0.10
R1	84.81	Regional	12.83	179.38	181.39		181.49	0.002381	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

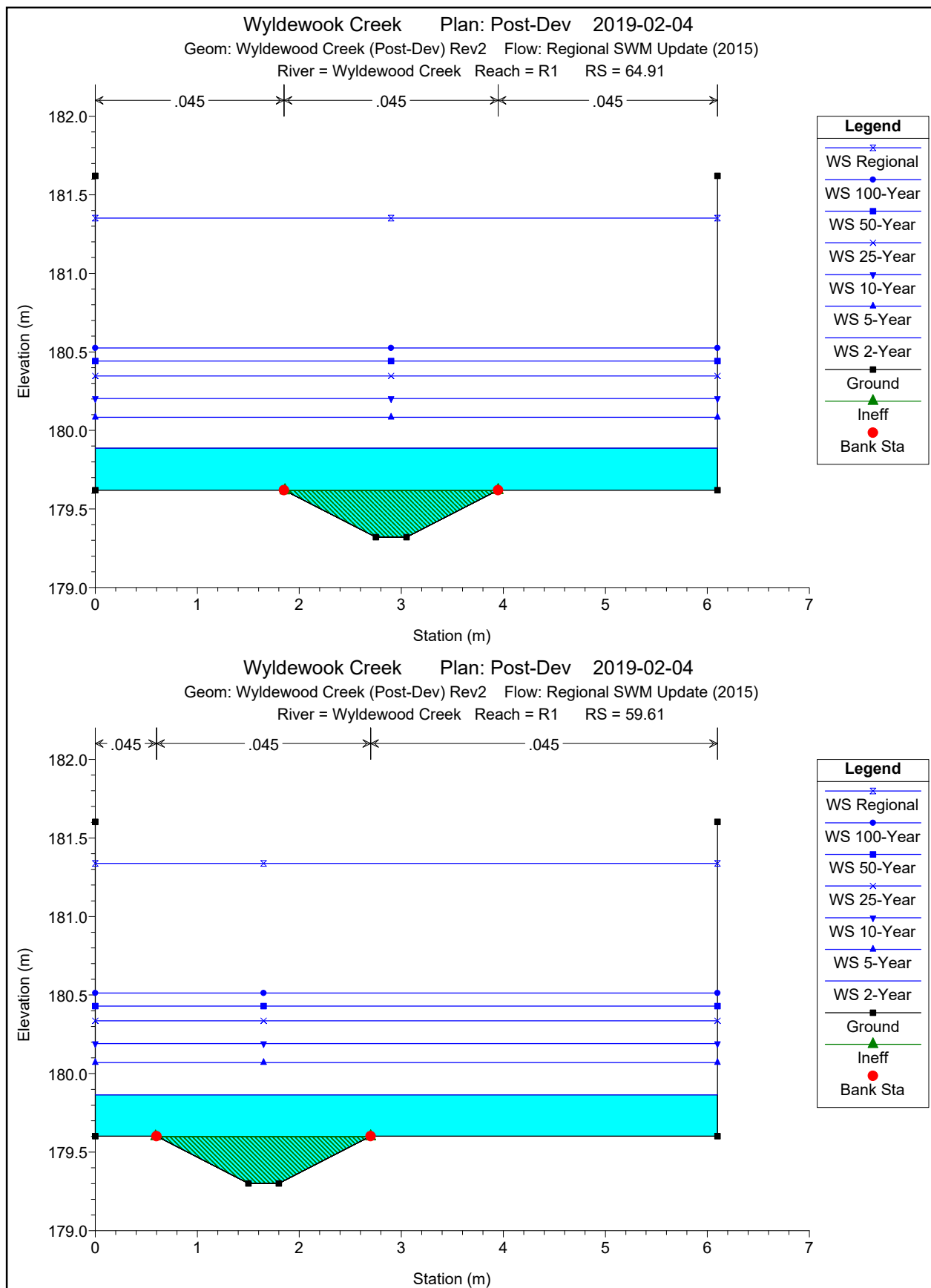
Wyldeewood Creek Plan: Post-Dev 2019-02-04
Geom: Wyldeewood Creek (Post-Dev) Rev2 Flow: Regional SWM Update (2015)

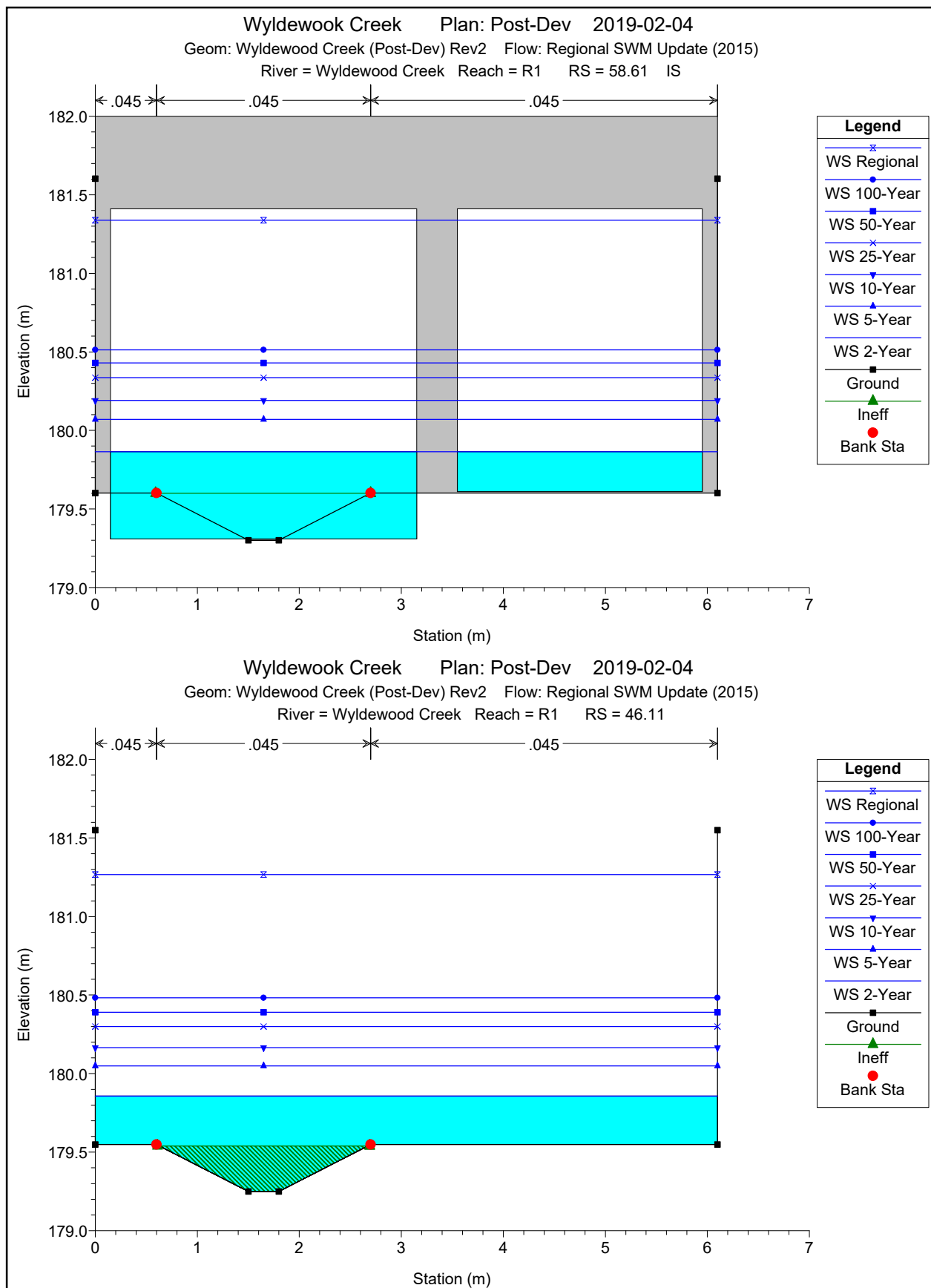


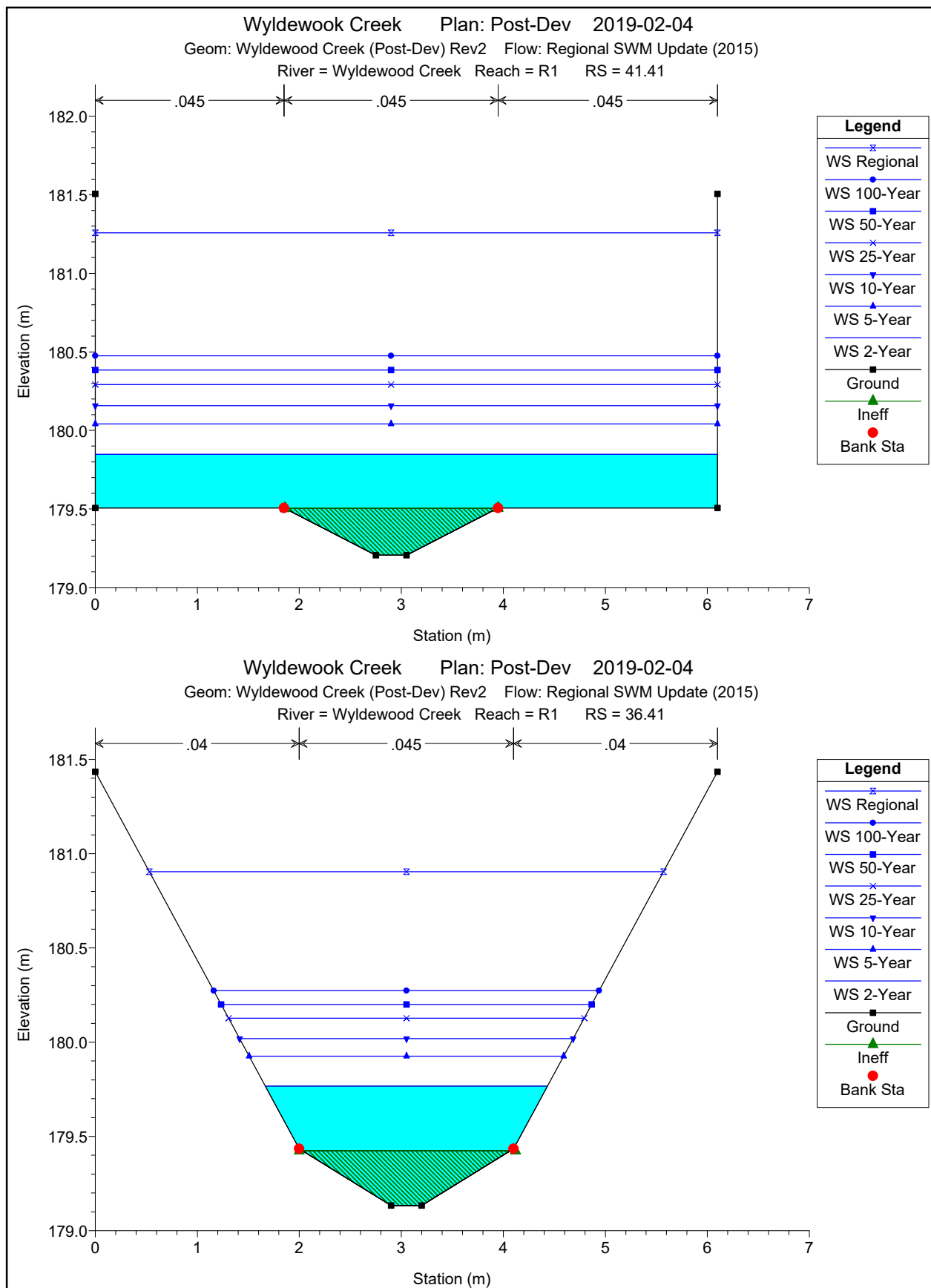


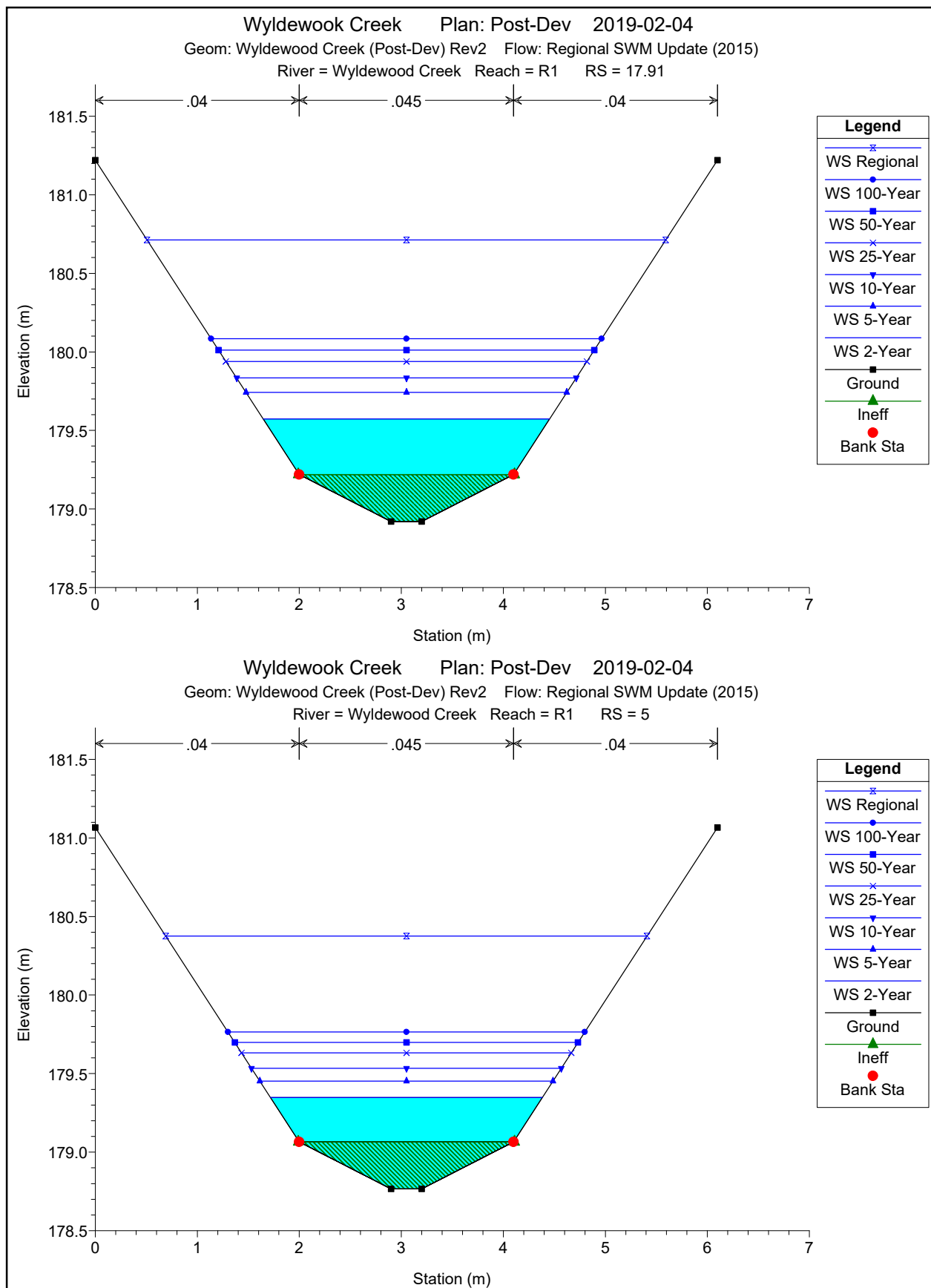




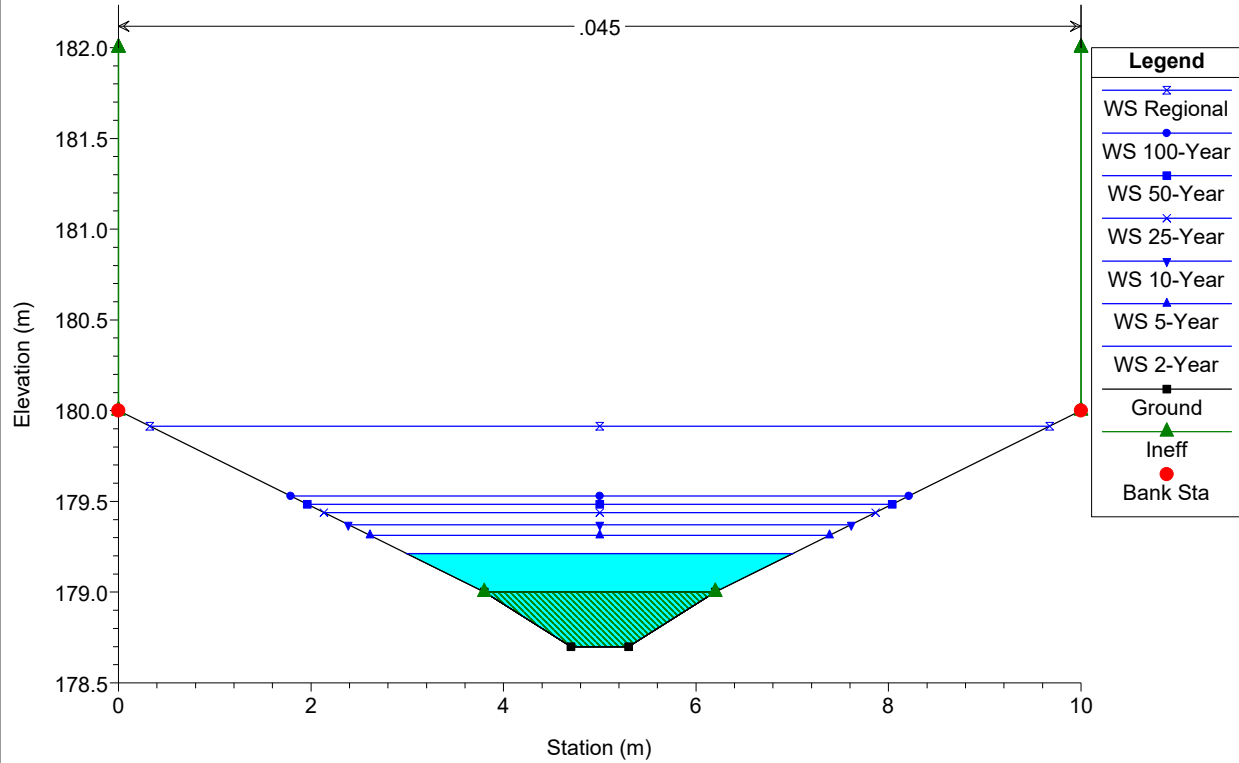


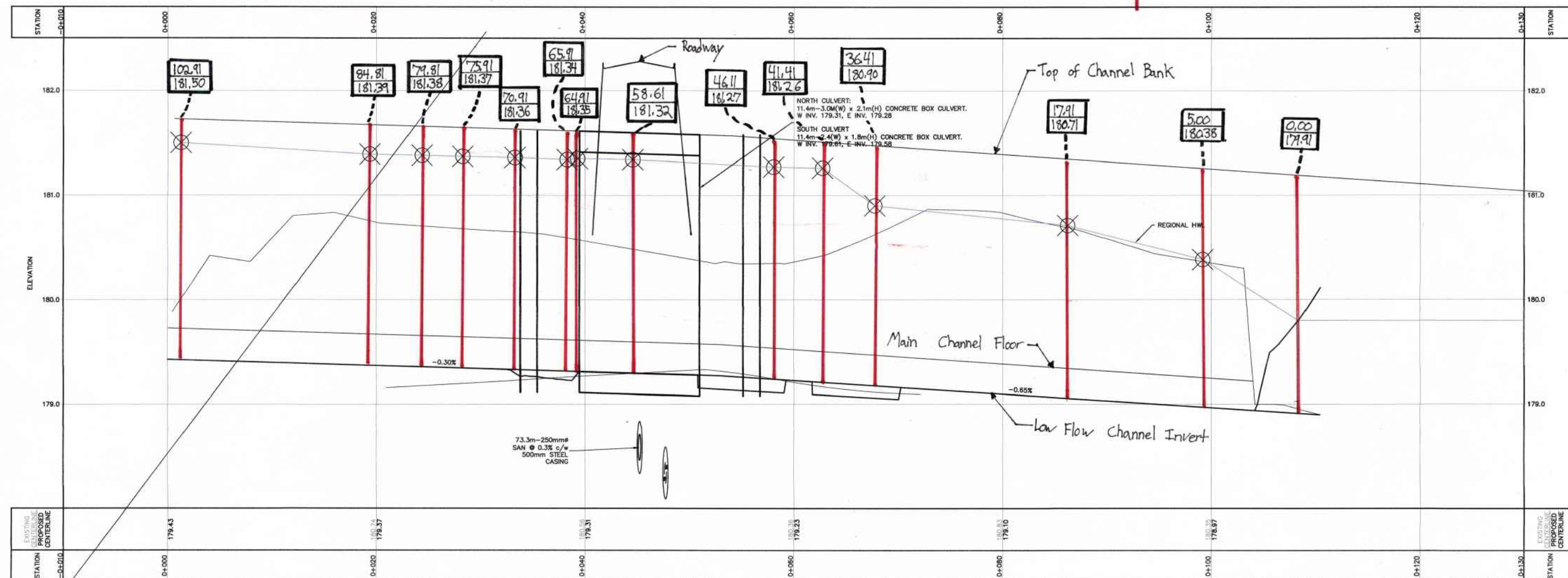
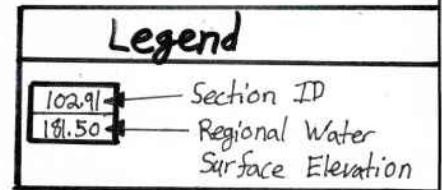
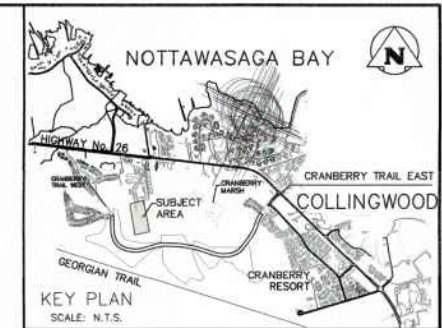
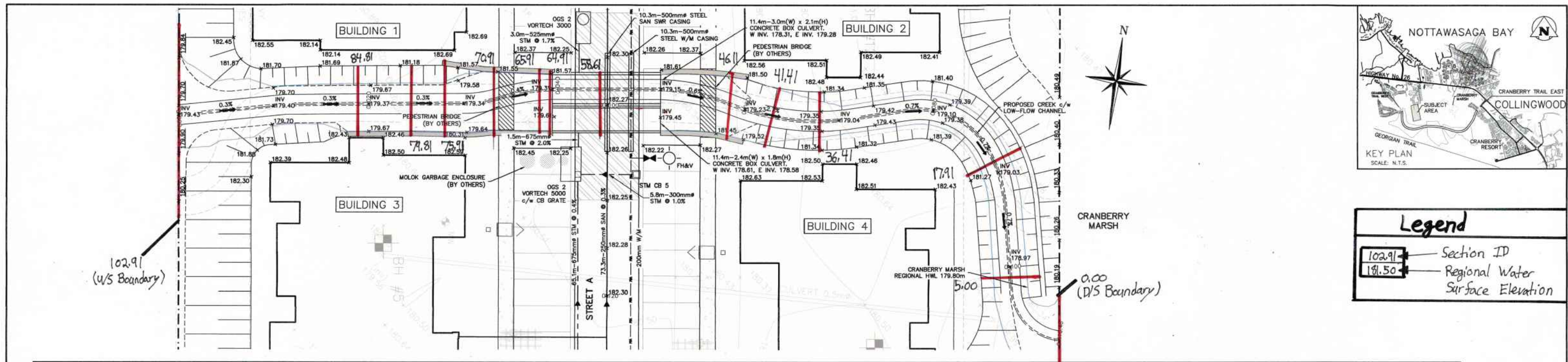






Wyldebrook Creek Plan: Post-Dev 2019-02-04
Geom: Wyldebrook Creek (Post-Dev) Rev2 Flow: Regional SWM Update (2015)
River = Wyldebrook Creek Reach = R1 RS = 0





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3. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT.

4. DO NOT SCALE THE DRAWINGS.

5. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

BENCHMARKS

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

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

Town

No.	ISSUE	DATE: MM/DD/YYYY	Engineer
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
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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

January 31, 2020

C.F. Crozier & Associates Consulting Engineers
40 Huron Street, Suite 301
Collingwood, Ontario
L9Y 4R3

Attention: Mike Hensel OALA, CSLA
Senior Development Consultant

**Re: Daylighting and Corridor Design for Unnamed Tributary
Georgian Bay Hotel Lands
Town of Collingwood, Ontario
GEO Morphix Project No. PN20002
Draft for Discussion**

This letter provides support related to the daylighting and naturalization of a section of an unnamed tributary, which is currently enclosed within a 500 mm CSP culvert. Channel stabilization and flood corridor management is proposed for this section of the tributary within the Georgian Bay Hotel Lands in Collingwood, Ontario. We understand that a natural area block was requested as part of the Nottawasaga Valley Conservation Authority (NVCA) OPA/ZBA review. This would include daylighting of the unnamed tributary. We further understand that NVCA has noted a concern with regards to potential channel erosion during large events, and that further information is needed to satisfy that a 6 m erosion access allowance is not required for the channel corridor. As requested by Crozier Consulting Engineers, we have reviewed options that will provide a fully armoured channel that addresses erosion concerns while conveying the Regional storm event. The final armoured channel design will also include a 30 cm "freeboard" allowance above the Regional storm conveyance elevation in the channel so that erosion potential is fully ameliorated.

A channel design is proposed that provides geomorphological and ecological benefits, while also addressing potential erosion. It is understood that the corridor dimensions were previously established as part of completing the functional engineering design for the property. As such, the best approach would be to provide a hybrid design consisting of hard engineering with geomorphological and ecological design elements that does not allow future channel migration and erosion.

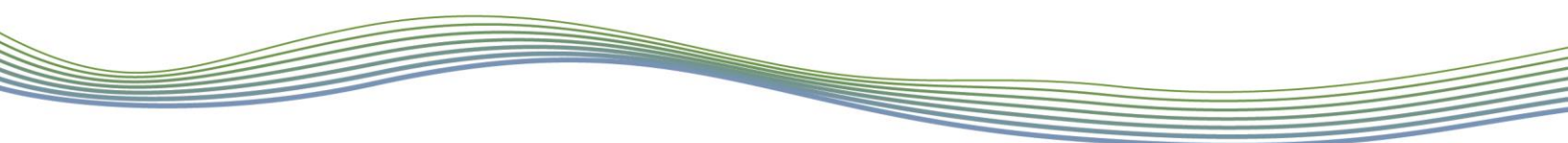
The proposed hybrid design will provide an open watercourse that is cognizant of existing constraints and offers habitat benefits and improvements to channel form and function. The design proposes a vortex rock weir and pool system within armourstone retaining walls. The proposed retaining walls will protect infrastructure from channel migration. As such, the hard engineering approach and capping along the hybrid channel restoration adequately addresses any erosion hazard associated with the channel works.

The proposed vortex rock weir and pool system provides grade control to minimize mobilization of existing sediments. The aquatic habitat conditions are improved with increased variability in channel morphology and substrate and further enhanced through the installation of woody plantings along the vortex rock weir edges. The woody vegetation will reduce velocities, provide opportunities for foraging, and provide a source of organic matter.

At detailed design, channel materials would be hydraulically sized to be stable through the range of proposed flows, up to the Regional storm event ($12.8 \text{ m}^3/\text{s}$). It is our understanding from discussions with Crozier staff and review of hydraulic modelling, that velocities will generally be below 1 m/s . An example of a similar design previously installed in the City of Toronto is shown in **Figure 1** below (the design was developed for more significant hydraulic conditions). Based on the hydraulics proposed for the unnamed tributary, erosion is easily addressed through hydraulic sizing of materials. Given the typically low flow conditions and proposed corridor width, any maintenance could be completed by accessing areas through the channel during low flow, removing the requirement for a 6 m erosion access allowance. Through discussions with Crozier staff, it is understood that access to the channel is also available at the road crossing, trail system, and through rear yards.



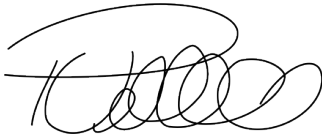
Figure 1. Example of previously installed vortex rock weir and pool system with armoured stone retaining walls



Given that this is a daylighting project, I am of the opinion that the proposed approach provides geomorphic and ecological improvements to the existing enclosed system.

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

Respectfully submitted,



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

FIGURES