



CHANNEL DESIGN AND FINAL DRAINAGE REPORT

FALCON MEADOWS AT BENT GRASS

El Paso County, Colorado

PREPARED FOR:
Challenger Communities
8605 Explorer Dr., Suite 250
Colorado Springs, CO 80920

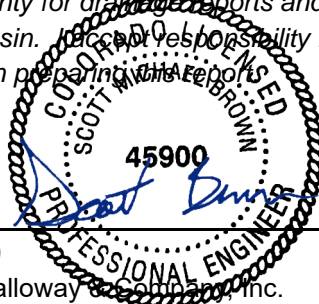
PREPARED BY:
Galloway & Company, Inc.
1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920

DATE:
December 2021
Revised March 2022
Revised June 2022
Revised August 2022



ENGINEER'S STATEMENT

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.



Scott Brown, PE 45900
For and on behalf of Galloway & Company, Inc.

Date

08/22/2022

DEVELOPER'S CERTIFICATION

I, The developer, have read and will comply with all of the requirements specified in this drainage report and plan.

By: Jim Byers

8/22/2022
Date

Address: Challenger Communities, LLC
8605 Explorer Dr., Suite 250
Colorado Springs, CO 80920

EL PASO COUNTY CERTIFICATION

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

Joshua Palmer, PE
County Engineer/ECM Administrator



Date

Conditions:

TABLE OF CONTENTS

I.	General Description	1
II.	Project Background	1
III.	Previous Reports	1
IV.	Site Description	2
V.	Hydraulics.....	3
	PRE PROJECT (EXISTING) CONDITION:	3
	POST PROJECT (PROPOSED) CONDITION:	4
VI.	Maintenance.....	5
VII.	Floodplain Statement	5
VIII.	Drainage/Bridge Fees and Credits/Reimbursements	5
IX.	Conclusion.....	7
X.	References	8

Appendices:

- Basin Fee Calculations and Summary
- A. Exhibits and Figures
- B. Hydraulic Computations (HEC-RAS Models)
- C. Allowable Rise Floodplain Permit

I. General Description

This report is to serve to summarize the design and proposed improvements to the West Tributary to the Falcon Basin (CHWS1400), which will be referred to as the Falcon Meadows Channel through the report. It is proposed to construct 11 grouted sloping boulder drop structures and realign portions of the channel to best work with proposed and future development in the area. The proposed work in the channel will begin at approximately at the north property line of the Falcon Meadows at Bent Grass development and end approximately 200' north of Woodmen Road. No other storm structures are anticipated for the channel design.

The project is located in the Falcon area of El Paso County, Colorado. The site is located in the Northwest $\frac{1}{4}$ and Southwest $\frac{1}{4}$ of Section 1, Township 13S, Range 65W, of the Sixth Principal Meridian, County of El Paso, State of Colorado. A Vicinity Map is included in Appendix A.

A portion of the channel has already been realigned along the north boundary line of the Falcon Meadows development, as well as the construction of the twin 16' x 6' concrete box culverts at Bent Grass Meadows Drive, which included a grouted sloping boulder drop structure upstream.

II. Project Background

Falcon Meadows Channel is currently a natural drainageway, running through the Falcon Meadows at Bent Grass development, south to Woodmen Road. The channel continues south under Woodmen Road, eventually entering existing Detention Pond WU in the Falcon Highlands development. The MDDP showed the channel remaining as a natural channel with grade control structures placed throughout to help control velocities and degradation throughout the channel. The channel was to remain as close to natural conditions as possible, with improvements only occurring in the vicinity of the drops/grade control structures.

Due to proposed and future development within the vicinity of the channel, it is now being proposed to add additional drop structures and realign the channel. The channel will be a trapezoidal section with 4:1 side slopes and maintaining an overall channel slope of 0.30% is used to keep the channel flow in a sub-critical flow. Due to the steepness of the site in relation to the 0.30% slope, it is being proposed to use sloping boulder drop structures in lieu of the rock vane grates which had been proposed in the Drainage Basin Planning Study which also showed the channel remaining in its current location.

III. Previous Reports

The proposed site has been included in multiple drainage studies in the past. The following is a composite list of the existing reports pertaining to this site analysis.

1. *Falcon Drainage Basin Planning Study*, by Matrix Design Group, September 2015.
2. *Master Development Drainage Plan – Bent Grass Residential Subdivision*, by Galloway & Company, February 2021 (In Review).
3. *Master Development Drainage Plan and Preliminary Drainage Plan – Bent Grass Subdivision*, by Kiowa Engineering Corporation, December 2006.
4. *Final Drainage Report for Bent Grass Residential (Filing No. 1)*, by Classic Consulting Engineers & Surveyors, LLC, August 2014.
5. *Final Drainage Report Addendum for Bent Grass Residential (Filing No. 1)*, by Classic Consulting Engineers & Surveyors, LLC, August 2015.

6. *Master Development Drainage Plan for The Ranch*, by Classic Consulting Engineers & Surveyors, LLC, November 2018.
7. *Falcon Highlands Master Development Drainage Plan & Preliminary Drainage Report & Final Drainage Report for Filing 1*, by URS, January 2005.
8. *Final Drainage Report and Erosion Control Plan – Latigo Business Center Filing No. 1 A Re-subdivision of a Portion of Latigo Business and Research Center Filing No. 1*, by Kiowa Engineering Corporation, November 2004.
9. *Final Drainage Letter Report for Lot 1, Latigo Business Center Filing No. 1*, by Colorado Design Concepts, April 2005.
10. *Final Drainage and Erosion Control for The Meadows Filing Three Subdivision*, by LADD Engineering, July 2000.
11. *Final Drainage Report Bent Grass Residential Subdivision, Filing No. 2*, Galloway & Company, March 2020.
12. *Preliminary Drainage Report Falcon Meadows at Bent Grass*, by Galloway & Company, February 2021.
13. *Final Drainage Report for Falcon Meadows at Bent Grass Filing No. 1*, by Galloway & Company, under review.

IV. Site Description

The Falcon Area DBPS made recommendations for the channels as they run through the project site. RWT202 was rerouted on the north property lone to convey flows to RWT204. Improvements were designed as part of the Bent Grass Residential Filing No. 2 development.

Existing RWT204 is grossly oversized for the pre-Bent Grass development flows expected through it, with a 5-year flow of 7 cfs and a 100-year flow for 43 cfs from the DBPS study. The future SCS calculations have a total flow of 181 cfs for the 5-year flow and 1029 cfs for the 100-year flow at DP 40, the location where offsite channel flow enters the Bent Grass development, upstream of the existing box culvert crossing at Bent Grass Meadows Drive in Reach RWT204. The FEMA flow reported in this section of channel is 1,400 cfs. Improvements to this section of the channel will adhere and be equivalent to the recommendations in the Falcon Basin DBPS. The HEC-HMS model prepared for the *Bent Grass Residential Subdivision Filing NO. 2 (SF-19-014)* was used to identify the 2-year flow for reach RWT210. This flow rate (70.6 cfs) was utilized to size the low flow portion of the channel.

RWT204 will generally stay in a location similar to where it is in existing conditions but will have new designed channel sections. The channels will have longitudinal slopes flattened to below 1% in order to reduce the scour potential of the channel. Grouted Sloping Boulder Drops will be utilized within the channel as grade controls (maximum height of 5' with 4:1 slope). Eleven total grade control structures will be utilized within the channel, all the way to Woodmen Road.

RWT210 is the section of the channel south of Bent Grass Meadows Drive and continues south to Woodmen Road. The channel location will shift slightly to the east and “straighten” out the overall flow path. It will be located within a drainage easement. The channel will have a design with a longitudinal slope less than 1%, a composite section including a low flow channel, and 4:1 side slopes. The Falcon DBPS recommendations for the channel are to remain as a natural drainage channel.

The West Trib Channel (RWT202, RWT204 & RWT210) will be maintained by the Bent Grass Metropolitan District. For channel improvements offsite of the Falcon Meadows at Bent Grass Filing No. 1 and Bent Grass Residential Filing 2 property, specifically south of the development, it is agreed that the

developer will be responsible for the channel improvements, south of the development, to the existing improvements north of Woodmen Road if the current property owners have not initiated the improvements themselves, or the developer will work with the current property owners to reach an agreement on design/construction, costs, and timing of the channel improvements. Channel improvements shall be complete within three years of the recordation of Falcon Meadows at Bent Grass Filing No. 4.

V. Hydraulics

Hydraulic analyses were performed to establish a corrected condition, Pre-Project (existing) and Post-Project (proposed) condition for the 100-year storm event. The goals of this evaluation were to document: a) that no existing insurable structures are impacted by the proposed project, and b) that the cumulative increase in the 100-year water surface elevation is below the allowable surcharge amount.

PRE PROJECT (EXISTING) CONDITION:

Description of Improvements:

The previously approved floodplain permit was submitted to accompany the Bent Grass Residential Filing No. 2 project, which is located to the east along a portion of the channel. The proposed condition for the previously approved floodplain permit took into account the twin culverts crossing under Bent Grass Meadows Drive, along with a drop structure just upstream of the structure. The remainder of the channel was left in existing condition with no improvements and ended at Cross Section 2605, just south of the Bent Grass property. This model the basis of the pre-project (existing) condition model for this report. The model was updated to include the relocation of the channel along the north property line and was extended to the south to Woodmen Road.

The Bent Grass Residential Filing No. 2 project was a private development subdivision north of East Woodmen Road in Falcon, Colorado. The project regraded portions of the West Tributary to Falcon Basin (CHWS1400) from a natural channel to a grass lined earthen channel and installed a new road crossing over the channel that conveys water through two 16 feet wide by 6 feet tall reinforced concrete box culverts. The location of these improvements is called out on Figure 1 at the end of this letter. The earthen channel was shown on separate design drawings included in the previously approved Floodplain permit report and construction drawings for the Bent Grass Residential Filing No. 2 project. The channel was designed to be approximately 5 feet deep with 4:1 side slopes and lined with native grass seed. Locations where the channel was to be regraded include Cross Section 5000 towards the northern end of the project area, as well as Cross Sections 4400 through 3800 which correspond to the location of the proposed roadway crossing. The roadway crossing also included a 7.6-foot drop structure upstream of the box culverts that has a 4:1 slope, riprap placed upstream of the drop and downstream of the culverts, and wingwalls at the downstream end. Other improvements that were part of the Bent Grass Residential Filing No. 2 Project include: a) a capture channel along the northern property line that collects upstream flows and convey them into the tributary, b) off-line detention ponds that will detain flows coming from the subdivision offsite.

Hydraulic Analysis:

The pre-project condition hydraulic analysis utilized the previous “proposed” HEC-RAS model from the approved floodplain permit to analyze the 100-year flood event in the existing channel and associated improvements on the Bent Grass Residential Filing No. 2 property. The model boundary condition was not changed from the effective condition model from 2003. In the study reach, a Manning’s n value of 0.035 was used in the channel. Sections of the overbank that are to be grass lined during this project were also assigned manning’s n values of 0.035, while undeveloped channel overbanks were assigned a Manning’s n of 0.050 corresponding to the effective condition model. The Bent Grass Meadows road crossing was modeled as a 16W’x6’H double barreled reinforced concrete box culvert.

POST PROJECT (PROPOSED) CONDITION:

Description of Improvements:

The Falcon Meadows at Bent Development includes three additional phases of single-family residential subdivisions, along the east and west sides of the existing channel. South of the Falcon Meadows site, there are 3 additional parcels of land, which have future development planned. The remaining entirety of the channel north of Woodmen Road, which has not previously been improved, will regrade the existing channel from a natural channel to a grass lined earthen channel, with 11 drop structures. The proposed earthen channel is shown on separate design drawings and is approximately 5 feet deep with 4:1 side slopes and lined with native grass seed. The alignment of the channel, once it leaves the Falcon Meadows development, was shifted to the east, to allow larger and more useable tracts of land for future development, and not leaving “slivers” of unusable land along the east side of the channel.

Hydraulic Analysis:

The post project condition hydraulic analysis utilized the pre-project HEC-RAS model to analyze the 100-year flood event in the proposed channel and associated improvements thru the West Tributary Channel, to Woodmen Road. The model boundary condition was not changed from the effective condition model from 2003. In the study reach, a Manning’s n value of 0.035 was used in the channel. Sections of the overbank that are to be grass lined during this project were also assigned manning’s n values of 0.035, while undeveloped channel overbanks were assigned a Manning’s n of 0.050 corresponding to the effective condition model. Manning’s n values of 0.04 were used for the channel section at the riprap drop structures and 0.045 at the drop structures overbank areas. See Table 1 for additional Channel Design parameters used in this project.

Table 1: Channel Design Parameters

Design Parameter	Design Value
Maximum 100-year Depth	5 ft
Maximum Velocity*	7 ft/s
Maximum Froude, 100-year*	0.8
Maximum Shear Stress, 100-year*	1.2 lb/sf
Maximum Longitudinal Slope*	0.61%
Side Slope	4:1

*Values are for normal channel section outside of drop structures

The channel has been designed with a composite section. The low flow has been designed to convey the 2-year storm event (70.6 cfs). This results in a 20’ wide low flow with 4:1 side slopes. The overbanks are 8’ wide on both sides of the low flow channel. The low flow has a standard depth of 1.25’ and a velocity less than 3 ft/s and a Froude less than 0.50. FlowMaster calculations for the low flow channel design have been included in the appendices. A shear stress analysis was performed on the low flow channel using North American Green ECMD5 software and it showed that the low flow channel remains stable with a significant safety factor. The calculations have been included in the appendices. The riprap protecting the channel through curves with a radius less than 3.0 times the top width will be extended to the toe of the low flow to protect the low flow banks as well as the main channel section. The HEC-RAS model was utilized to calculate the shear stress in the channel for a 100-year storm event. It shows that the channel maintains a normal shear stress less than the 1.2 lb/sf. At the drop structures increased shear stresses can be found on the section upstream of the crest and through the drop itself. The riprap pad upstream of the crest protects the channel from the increased shear in the draw down area of the channel entering the drop

structure. Where the existing channel transitions to a section with a low flow the existing riprap will be replaced through the transition to protect the channel.

VI. Maintenance

The channel is to be a private facility until all DBPS identified improvements are complete. Once the DBPS improvements are completed, maintenance for the channel will transition to El Paso County. After completion of construction and upon the Board of County Commissioners acceptance, all public drainage facilities within easements and public Right-of-Way will be owned and maintained by El Paso County.

Maintenance access to proposed drops and channel will be provided via a proposed access road on the west side of the channel, running parallel to the proposed channel, located along the top bank. Maintenance access is also provided along the east side of the channel via the existing sewer maintenance access road for the south channel. The north channel will not be able to provide maintenance access on the east side of the channel in conformance with the approved PUD SP-20-005. There will also be access from the north end of the future Lemon Grass cul-de-sac.

VII. Floodplain Statement

A portion of the project site lies within Zone AE Special Flood Hazard Area as defined by the FIRM Map number 08041C0553G effective December 7, 2018. A copy of the FIRM Panel is included in Appendix A.

The portion of channel that has a floodplain designation is only the RWT210 and RWT204 portions of the channel. It is unknown why the western channel, RWT202 is unmapped since it is the larger contributor regarding flow rates. Discussions have occurred with PPRBD and an allowable rise certificate has been submitted for review. A copy of this has been included in the Appendix.

VIII. Drainage/Bridge Fees and Credits/Reimbursements

As the Falcon Basin channel improvements are an improvement to public infrastructure that is being constructed by a private developer (Challenger Homes, LLC), the cost of the proposed improvements, or some portion of the cost, may be credited to the development and/or defer drainage basin fees. The 2019 basin fee for the Falcon Basin is \$29,622/acre of impervious land and the 2021 basin fee for the Falcon Basin is \$31,885/acre of impervious land. The 2019 bridge fee for the Falcon Basin is \$4,069/acre of impervious land and the 2021 bridge fee for the Falcon Basin is \$4,380/acre of impervious land. The platted acreage for the adjacent Bent Grass Residential Subdivision Filing No. 2 plat is 68.55 acres. The platted acreage for the adjacent Falcon Meadows at Bent Grass Filing No. 1 plat is 21.39 acres. The percent impervious for each of the platted areas are as follows:

The *Bent Grass Residential Subdivision Filing No. 2 subdivision* has a total area of 68.55 acres. The tracts (13.326 acres) and preservation area (4.36 acres) account for a total of 17.686 acres. Tract areas will pay fees when they are platted with future filings. This leaves a total area of 50.864 acres to assess fees for Bent Grass Residential Filing No. 2. The percent impervious for the subdivision has been calculated with this report to be approximately 46.1 percent.

$50.864 \text{ acres} \times 46.1\% = 23.45 \text{ Impervious Acres}$

Therefore, the drainage and bridge fees are:

Drainage: \$29,622 x 23.45 Imp. Acres = \$694,635.90

Bridge: \$4,069 x 23.45 Imp. Acres = \$95,418.05

The *Falcon Meadows at Bent Grass Filing No. 1* subdivision has a total area of 21.39 acres. The tracts account for a total of 12.55 acres, 71 residential lots are 6.37 acres and 2.47 acres of right-of-way. The following calculations for the imperviousness of this development have been computed as follows:

21.39 acres x 26.78% = 5.73 Impervious Acres

Therefore, the drainage and bridge fees are:

Drainage: \$31,885 x 5.73 Imp. Acres = \$182,701.05

Bridge: \$4,380 x 5.73 Imp. Acres = \$25,097.40

Falcon Meadows at Bent Grass Filing Nos. 2, 3, and 4 subdivisions have not yet been recorded. The **anticipated** impervious area calculations are as follow:

The *Falcon Meadows at Bent Grass Filing No. 2* subdivision has a total area of 36.40 acres. The tracts account for a total of 20.46 acres, 108 residential lots are 11.30 acres and 4.64 acres of right-of-way. The following calculations for the imperviousness of this development have been computed as follows:

36.40 acres x 26.36% = 9.60 Impervious Acres

Therefore, the drainage and bridge fees are:

Drainage: \$31,885 x 9.60 Imp. Acres = \$306,096.00

Bridge: \$4,380 x 9.60 Imp. Acres = \$42,048.00

The *Falcon Meadows at Bent Grass Filing No. 3* subdivision has a total area of 12.74 acres. The tracts account for a total of 0.66 acres, 49 residential lots are 9.50 acres and 2.58 acres of right-of-way. The following calculations for the imperviousness of this development have been computed as follows:

12.74 acres x 52.32% = 6.665 Impervious Acres

Therefore, the drainage and bridge fees are:

Drainage: \$34,117 x 6.665 Imp. Acres = \$227,389.81

Bridge: \$4,687 x 6.665 Imp. Acres = \$31,238.86

The *Falcon Meadows at Bent Grass Filing No. 4* subdivision has a total area of 10.42 acres. The tracts account for a total of 4.05 acres, 39 residential lots are 5.73 acres and 1.04 acres of right-of-way. The following calculations for the imperviousness of this development have been computed as follows:

10.42 acres x 33.63% = 3.5039 Impervious Acres

Therefore, the drainage and bridge fees are:

Drainage: \$34,117.00 x 3.5039 Imp. Acres = \$119,542.56

Bridge: \$4,687.00 x 3.5039 Imp. Acres = \$16,422.78

The proposed channel project lies within Basin WT210 and encompass Segment RWT210 in the 2015 Falcon Drainage Basin Planning Study (**DBPS**). The DBPS indicates that this segment was planned 2,132 LF of Natural Channel Design at a cost of \$278.15 per linear foot for a total estimated cost of \$593,015.80.

Due to the complexity of the summary of costs between multiple filings and projects being completed a Summary sheet has been included in the appendices along with breakdown of fees by Filing.

The information contained within the summary demonstrates that the proposed channel improvement costs along with Pond WU construction costs, should be more than adequate to defer the Falcon Basin drainage and bridge fees for *Falcon Meadows at Bent Grass Filing Nos. 1, 2, 3, & 4* and *Bent Grass Residential Subdivision Filing No. 2*.

The applicable pages from the 2015 Falcon DBPS are provided in Appendix A.

All drainage facilities within this report were sized according to the Drainage Criteria Manuals. Bent Grass Metropolitan District will own and maintain the channels until such a time that all final improvements have been constructed. At that time, channel corridors will become publicly owned and maintained and shall be the responsibility of El Paso County upon County acceptance. Upon development of future filings within the Bent Grass Residential Subdivision, separate Final Drainage Reports will be required to be submitted and approved by El Paso County.

IX. Conclusion

The Bent Grass Residential Subdivisions lie within the West Tributary of the Falcon Basin Area Watershed. Water quality for the existing and proposed developments are provided in two existing and one proposed on-site WQCV ponds to provide water quality for the entire tributary area. The channel is in general conformance with the DBPS and will safely convey runoff through the property. The proposed development will not have any adverse impacts on downstream developments or existing drainageways.

X. References

1. *City of Colorado Springs/County of El Paso Drainage Criteria Manual*, October 1991.
2. *Drainage Criteria Manual, Volume 2*, City of Colorado Springs, November 2002.
3. *Urban Storm Drainage Criteria Manual*, Urban Drainage and Flood Control District, January 2016 (with current revisions).
4. *Falcon Drainage Basin Planning Study*, by Matrix Design Group, September 2013/2015.
5. *Master Development Drainage Plan and Preliminary Drainage Plan – Bent Grass Subdivision*, by Kiowa Engineering Corporation, December 2006.
6. *Final Drainage Report for Bent Grass Residential (Filing No. 1)*, by Classic Consulting Engineers & Surveyors, LLC, August 2014.
7. *Final Drainage Report Addendum for Bent Grass Residential (Filing No. 1)*, by Classic Consulting Engineers & Surveyors, LLC, August 2015.
8. *Master Development Drainage Plan for The Ranch*, by Classic Consulting Engineers & Surveyors, LLC, November 2018.
9. *Falcon Highlands Master Development Drainage Plan & Preliminary Drainage Report & Final Drainage Report for Filing 1*, by URS, January 2005.
10. *Final Drainage Report and Erosion Control Plan – Latigo Business Center Filing No. 1 A Re-subdivision of a Portion of Latigo Business and Research Center Filing No. 1*, by Kiowa Engineering Corporation, November 2004.
11. *Final Drainage Report for Bent Grass Residential (Filing No. 2)*, by Galloway & Company, May 2020.
12. *Preliminary Drainage Report-Falcon Meadows at Bent Grass*, by Galloway & Company, February 2021.
13. *Final Drainage Report for Falcon Meadows at Bent Grass Filing No. 1*, by Galloway & Company, under review.

**BASIN FEE CALCULATIONS
AND SUMMARY**

(SF-19-014) Bent Grass Residential Filing No. 2 - Final Drainage Report

FALCON DRAINAGE BASIN

2019 Original Drainage and Bridge Fees

	Impervious Area (acres) *	Fee Per Impervious Acre	=	Total Fee	- (	Total Collateral from FAE	+	Remaining Fee Offset from Previous Filings	) =	Remaining Fee Offset	OR	Fee Due at Platting
Drainage Fee	23.45	\$ 29,622.00	=	\$ 694,635.90	- (	\$ 1,270,481.00	+	\$ -	) =	\$ 575,845.10		
Bridge Fee	23.45	\$ 4,069.00	=	\$ 95,418.05	- (	\$ 480,000.00	+	\$ -	) =	\$ 384,581.95		

(SF-21-020) Falcon Meadows at Bent Grass Filing No. 1 - Final Drainage Report

FALCON DRAINAGE BASIN

2021 Original Drainage and Bridge Fees

	Impervious Area (acres) *	Fee Per Impervious Acre	=	Total Fee	- (	Total Collateral from FAE	+	Remaining Fee Offset from Previous Filings	) =	Remaining Fee Offset	OR	Fee Due at Platting
Drainage Fee	5.73	\$ 31,885.00	=	\$ 182,701.05	- (	\$ -	+	\$ 575,845.10	) =	\$ 393,144.05		
Bridge Fee	5.73	\$ 4,380.00	=	\$ 25,097.40	- (	\$ -	+	\$ 384,581.95	) =	\$ 359,484.55		

(SF-21-034) Falcon Meadows at Bent Grass Filing No. 2 - Final Drainage Report

FALCON DRAINAGE BASIN

2021 Original Drainage and Bridge Fees

	Impervious Area (acres) *	Fee Per Impervious Acre	=	Total Fee	- (	Total Collateral from FAE	+	Remaining Fee Offset from Previous Filings	) =	Remaining Fee Offset	OR	Fee Due at Platting
Drainage Fee	9.6	\$ 31,885.00	=	\$ 306,096.00	- (	\$ -	+	\$ 393,144.05	) =	\$ 87,048.05		
Bridge Fee	9.6	\$ 4,380.00	=	\$ 42,048.00	- (	\$ -	+	\$ 359,484.55	) =	\$ 317,436.55		

(SF-22-016) Falcon Meadows at Bent Grass Filing No. 3 - Final Drainage Report

FALCON DRAINAGE BASIN

2022 Original Drainage and Bridge Fees

	Impervious Area (acres) *	Fee Per Impervious Acre	=	Total Fee	- (	Total Collateral from FAE	+	Remaining Fee Offset from Previous Filings	) =	Remaining Fee Offset	OR	Fee Due at Platting
Drainage Fee	6.665	\$ 34,117.00	=	\$ 227,389.81	- (	\$ -	+	\$ 87,048.05	) =			\$ (140,341.76)
Bridge Fee	6.665	\$ 4,687.00	=	\$ 31,238.86	- (	\$ -	+	\$ 317,436.55	) =	\$ 286,197.70		

(SF-22-023) Falcon Meadows at Bent Grass Filing No. 4 - Final Drainage Report

FALCON DRAINAGE BASIN

2022 Original Drainage and Bridge Fees

	Impervious Area (acres) *	Fee Per Impervious Acre	=	Total Fee	- (	Total Collateral from FAE	+	Remaining Fee Offset from Previous Filings	) =	Remaining Fee Offset	OR	Fee Due at Platting
Drainage Fee	3.504	\$ 34,117.00	=	\$ 119,542.56	- (	\$ -	+	\$ -	) =			\$ (119,542.56)
Bridge Fee	3.504	\$ 4,687.00	=	\$ 16,422.78	- (	\$ -	+	\$ 317,436.55	) =	\$ 301,013.77		

Collateral & Credit Summary - Bent Grass Development

Last Revised: Thursday, September 22

			Collateral & Fee Offsets from Financial Assurance Estimate		Collateral & Credit from Actual Construction Costs		Construction Complete?
Project Name	Fee Type	Total Fee from Final Drainage Report	Total Collateral from Financial Assurance Estimate	Remaining Fee Offsets	Construction Costs Spent To-Date on Collateral Improvements	Remaining Credit	
Bent Grass Residential Filing No. 2 (SF-19-014)	Drainage Fee	\$ 694,635.90	\$ 1,270,481.00 <i>(Channel Improvements) \$264,407.00</i> <i>(Rip Rap Improvements) \$635,264.00</i> <i>(Pond WU) \$370,810.00</i>	\$ 575,845.10	\$ 489,284.78	\$ (205,351.12)	NO
	Bridge Fee	\$ 95,418.05	\$ 480,000.00	\$ 384,581.95	\$ 489,284.78		NO
Falcon Meadows at Bent Grass Filing No. 1 (SF-21-020)	Drainage Fee	\$ 182,701.05	\$ -	\$ (182,701.05)			NO
	Bridge Fee	\$ 25,097.40	\$ -	\$ (25,097.40)			NO
Falcon Meadows at Bent Grass Filing No. 2 (SF-21-034)	Drainage Fee	\$ 306,096.00	\$ -	\$ (306,096.00)			NO
	Bridge Fee	\$ 42,048.00	\$ -	\$ (42,048.00)			NO
Falcon Meadows at Bent Grass Filing No. 3 (SF-22-016)	Drainage Fee	\$ 227,389.81	\$ -	\$ (227,389.81)			NO
	Bridge Fee	\$ 31,238.86	\$ -	\$ (31,238.86)			NO
Falcon Meadows at Bent Grass Filing No. 4 (SF-22-023)	Drainage Fee	\$ 119,542.56	\$ -	\$ (119,542.56)			NO
	Bridge Fee	\$ 16,422.78	\$ -	\$ (16,422.78)			NO
FM at BG Drainage Channel (CDR-21-014)	Drainage Fee	\$ -	\$ 1,558,171.10	\$ 1,558,171.10			NO
	Bridge Fee	\$ -					NO
Total:							
	Drainage Fee	\$ 1,530,365.31	\$ 2,828,652.10	\$ 1,298,286.79	\$ 489,284.78	\$ (205,351.12)	
	Bridge Fee	\$ 210,225.08	\$ 480,000.00	\$ 269,774.92	\$ -	\$ -	

Note: The collateral provided previously for channel construction is to be updated to the value provided with CDR-21-014

Falcon DBPS - Eligible Collateral - Bent Grass Development

Last Revised: Thursday, September 22

DEVELOPER COSTS	DRAINAGE FEES				
	Improvement	(	Cost (As Shown on Falcon DBPS) *	Inflation Factor	) = Cost (Present Value)
	RWT210 - Natural Channel Design		\$ 593,011.00	1.47	\$ 871,726.17
			Engineering/Construction Admin (15%)		\$ 130,758.93
			Contingency (20%)		\$ 174,345.23
			Ultimate Reimbursement		\$ 1,176,830.33
	BRIDGE FEES				
	Improvement	(	Cost (As Shown on Falcon DBPS) *	Inflation Factor	) = Cost (Present Value)
	-		\$ -	1.47	\$ -
			Engineering/Construction Admin (15%)		\$ -
		Contingency (20%)		\$ -	
		Ultimate Reimbursement		\$ -	
METROPOLITAN DISTRICT COSTS	DRAINAGE FEES				
	Improvement	(	Cost (As Shown on Falcon DBPS) *	Inflation Factor	) = Cost (Present Value)
	Regional Pond WU South		\$ 20,000.00	1.47	\$ 29,400.00
			Engineering/Construction Admin (15%)		\$ 4,410.00
			Contingency (20%)		\$ 5,880.00
			Ultimate Reimbursement		\$ 39,690.00
	BRIDGE FEES				
	Improvement	(	Cost (As Shown on Falcon DBPS) *	Inflation Factor	) = Cost (Present Value)
	Pond WU Inlet Structure		\$ 658,410.00	1.47	\$ 967,862.70
			Engineering/Construction Admin (15%)		\$ 145,179.41
		Contingency (20%)		\$ 193,572.54	
		Ultimate Reimbursement		\$ 1,306,614.65	

Metropolitan District Costs are not eligible for financial reimbursement. If the developer wishes to be reimbursed for the associated construction improvements of Pond WU, an amendment to the DBPS must be completed.

Final Comparison Table

Last Revised: Thursday, September 22

DRAINAGE FEES		
Total Fee As Specified in the Approved FDR's	Total Collateral Requested from Financial Assurance Estimate's	Total Eligible Reimbursement Cost As Specified in Falcon DBPS
\$ 1,530,365.31	\$ 2,828,652.10	\$ 1,176,830.33

BRIDGE FEES		
Total Fee As Specified in the Approved FDR's	Total Collateral Requested from Financial Assurance Estimate's	Total Eligible Reimbursement Cost As Specified in Falcon DBPS
\$ 210,225.08	\$ 480,000.00	\$ -

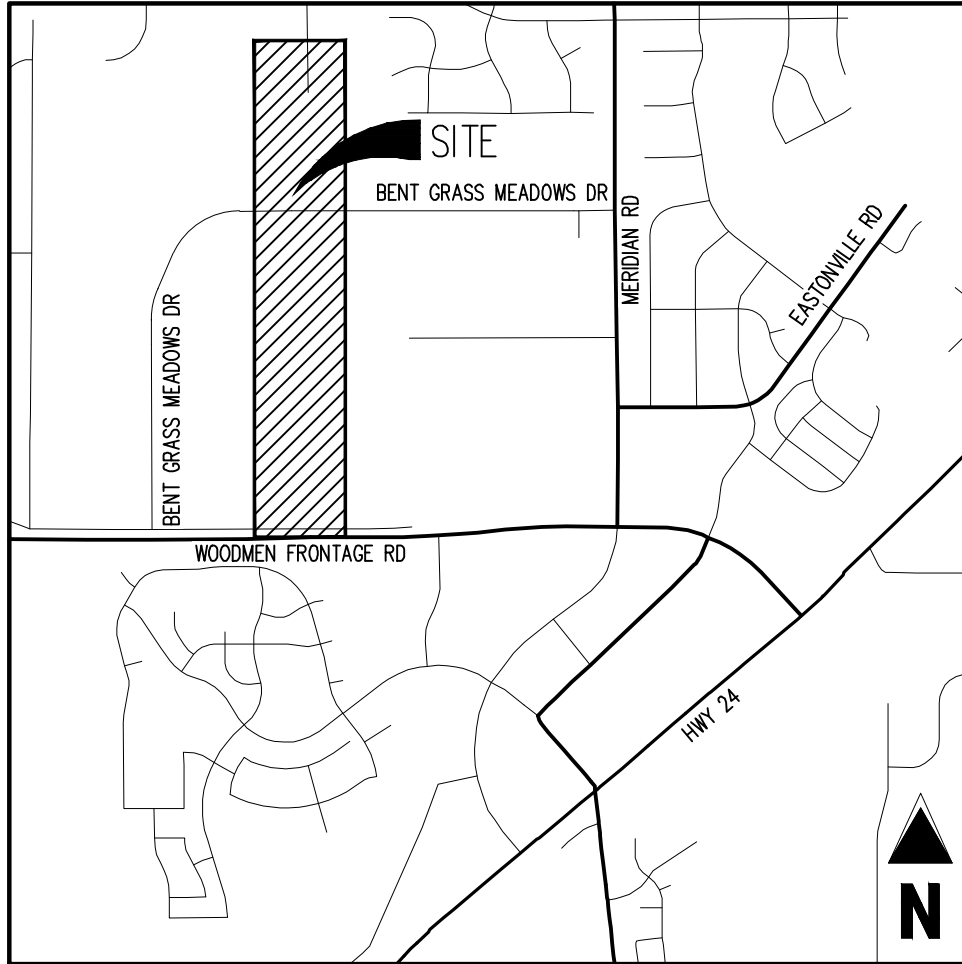
Drainage Fee: (Needs Action)

The "Total Collateral Requested from all Financial Assurance Estimate's" is greater than the "Total Fee As Specified in the Approved FDR's" for all 4 filings of Falcon Meadows at Bent Grass and Bent Grass Residential Filing No. 2. However, the "Total Eligible Reimbursement Cost As Specified in the Falcon DBPS" is less than the "Total Fee As Specified in the Approved FDR's". Therefore, the Developer will need approval from the drainage board to amend the costs specified in the DBPS.

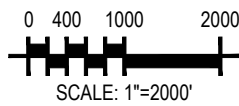
Bridge Fee: (Needs Action)

The "Total Collateral Requested from all Financial Assurance Estimate's" is greater than the "Total Fee As Specified in the Approved FDR's" for all 4 filings of Falcon Meadows at Bent Grass and Bent Grass Residential Filing No. 2. However, the "Total Eligible Reimbursement Cost As Specified in the Falcon DBPS" is less than the "Total Fee As Specified in the Approved FDR's". Therefore, the Developer will need approval from the drainage board to amend the costs specified in the DBPS.

APPENDIX A
Exhibits and Figures



VICINITY MAP



FALCON MEADOWS AT BENT GRASS
DRAINAGE CHANNEL IMPROVEMENTS

SCALE: 1"=1,000'
VICINITY MAP

Project No: CLH000023.20

Drawn By: TJE

Checked By: CMD

Date: 06/10/2021

Galloway

1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920
719.900.7220 • GallowayUS.com

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov/> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NNGS12
National Geodetic Survey
SSIMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at <http://www.ngs.noaa.gov/>.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, City of Fountain, Bureau of Land Management, National Oceanic and Atmospheric Administration, United States Geological Survey, and Anderson Consulting Engineers, Inc. These data are current as of 2006.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

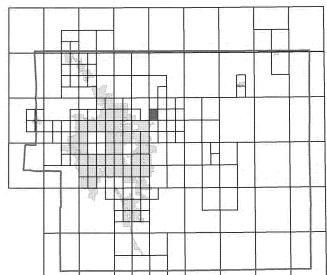
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact **FEMA Map Service Center (MSC)** via the FEMA Map Information eXchange (FMIX) 1-877-335-6227 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at <http://www.msc.fema.gov/>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/business/nfp>.

Flooding Source	Vertical Datum	Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION		

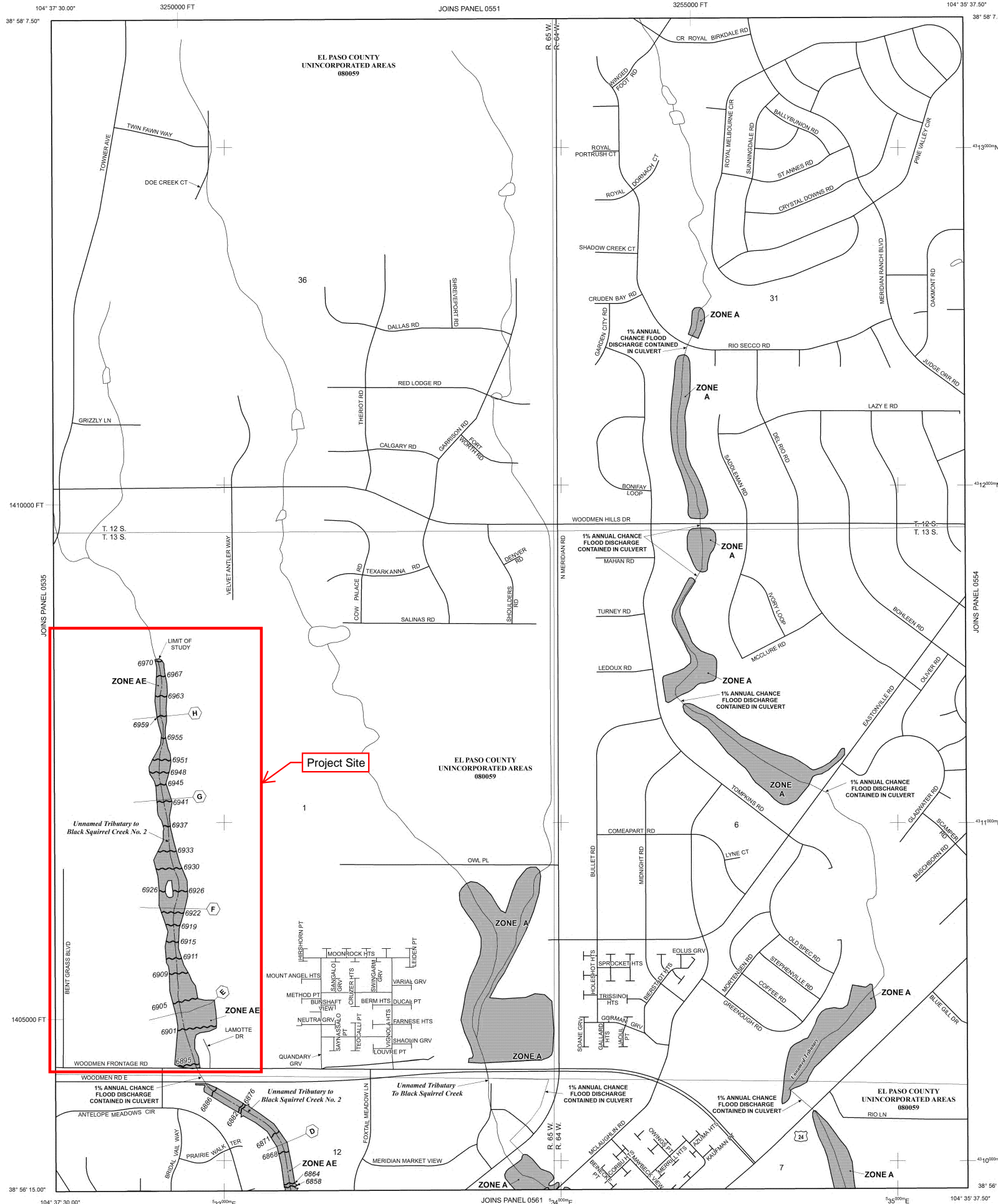
Panel Location Map



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).

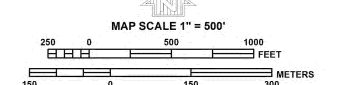


Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.



LEGEND

- SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD
- The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.
- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently derelict. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.
- FLOODWAY AREAS IN ZONE AE
- The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.
- OTHER FLOOD AREAS
- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- OTHER AREAS
- ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D** Areas in which flood hazards are undetermined, but possible.
- COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS
- OTHERWISE PROTECTED AREAS (OPAs)
- CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.
- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- Base Flood Elevation line and value; elevation in feet* (EL 987)
- Base Flood Elevation value where uniform within zone; elevation in feet*
- * Referenced to the North American Vertical Datum of 1988 (NAVD 88)
- Cross section line
- Transsect line
- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 100-meter Universal Transverse Mercator grid ticks, zone 13
- 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
- Bench mark (see explanation in Notes to Users section of this FIRM panel)
- River Mile
- MAP REPOSITORIES
- Refer to Map Repositories list on Map Index
- EFFECTIVE DATE OF COUNTY-WIDE FLOOD INSURANCE RATE MAP MARCH 17, 1987
- EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.
- For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.
- To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



NFP

PANEL 0553G

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 553 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:	NUMBER	PANEL	SUFFIX
COMMUNITY	08009	0553	G
EL PASO COUNTY			

Notice to User: The Map Number shown below should be used when placing map orders. The Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
08041C0553G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

FALCON DRAINAGE BASIN PLANNING STUDY
SELECTED PLAN REPORT
FINAL - SEPTEMBER 2015

Prepared for:



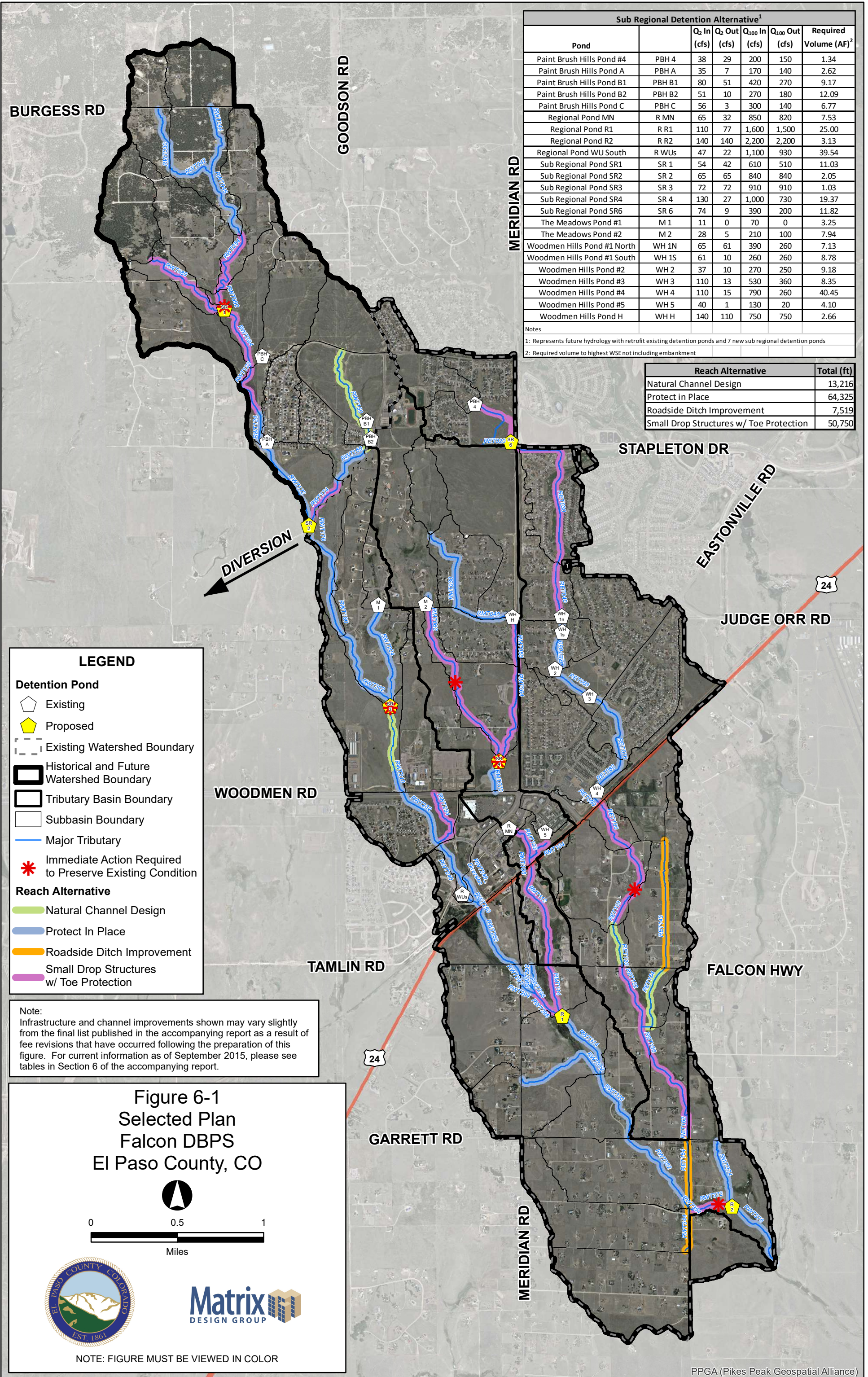
El Paso County Public Services Department
3275 Akers Drive
Colorado Springs, CO 80922

Prepared By:



Matrix Design Group
2435 Research Parkway, Suite 300
Colorado Springs, CO 80920

Matrix Project No. 10.122.003



Sub Regional Detention Alternative ¹						
Pond		Q ₂ In (cfs)	Q ₂ Out (cfs)	Q ₁₀₀ In (cfs)	Q ₁₀₀ Out (cfs)	Required Volume (AF) ²
Paint Brush Hills Pond #4	PBH 4	38	29	200	150	1.34
Paint Brush Hills Pond A	PBH A	35	7	170	140	2.62
Paint Brush Hills Pond B1	PBH B1	80	51	420	270	9.17
Paint Brush Hills Pond B2	PBH B2	51	10	270	180	12.09
Paint Brush Hills Pond C	PBH C	56	3	300	140	6.77
Regional Pond MN	R MN	65	32	850	820	7.53
Regional Pond R1	R R1	110	77	1,600	1,500	25.00
Regional Pond R2	R R2	140	140	2,200	2,200	3.13
Regional Pond WU South	R WUs	47	22	1,100	930	39.54
Sub Regional Pond SR1	SR 1	54	42	610	510	11.03
Sub Regional Pond SR2	SR 2	65	65	840	840	2.05
Sub Regional Pond SR3	SR 3	72	72	910	910	1.03
Sub Regional Pond SR4	SR 4	130	27	1,000	730	19.37
Sub Regional Pond SR6	SR 6	74	9	390	200	11.82
The Meadows Pond #1	M 1	11	0	70	0	3.25
The Meadows Pond #2	M 2	28	5	210	100	7.94
Woodmen Hills Pond #1 North	WH 1N	65	61	390	260	7.13
Woodmen Hills Pond #1 South	WH 1S	61	10	260	260	8.78
Woodmen Hills Pond #2	WH 2	37	10	270	250	9.18
Woodmen Hills Pond #3	WH 3	110	13	530	360	8.35
Woodmen Hills Pond #4	WH 4	110	15	790	260	40.45
Woodmen Hills Pond #5	WH 5	40	1	130	20	4.10
Woodmen Hills Pond H	WH H	140	110	750	750	2.66

Notes

1: Represents future hydrology with retrofit existing detention ponds and 7 new sub regional detention ponds

2: Required volume to highest WSE not including embankment

Reach Alternative	Total (ft)
Natural Channel Design	13,216
Protect in Place	64,325
Roadside Ditch Improvement	7,519
Small Drop Structures w/ Toe Protection	50,750

LEGEND

Detention Pond

- Existing
- Proposed

Boundary

- Existing Watershed Boundary
- Historical and Future Watershed Boundary
- Tributary Basin Boundary
- Subbasin Boundary

Major Tributary

- Major Tributary

Reach Alternative

- Natural Channel Design
- Protect In Place
- Roadside Ditch Improvement
- Small Drop Structures w/ Toe Protection

Immediate Action Required to Preserve Existing Condition

- Immediate Action Required to Preserve Existing Condition

Note:
Infrastructure and channel improvements shown may vary slightly from the final list published in the accompanying report as a result of fee revisions that have occurred following the preparation of this figure. For current information as of September 2015, please see tables in Section 6 of the accompanying report.

**Figure 6-1
Selected Plan
Falcon DBPS
El Paso County, CO**

0 0.5 1
Miles

NOTE: FIGURE MUST BE VIEWED IN COLOR

**Falcon DBPS
Developer Costs**

Drainage Fees			
Reach/Pond	Reach Length (ft)	Improvement	Cost
RWT354	16	Roadside Ditch	\$ 23,544
RMT106	226	Small Drop Structures w/Toe Protection	\$ 212,322
RMT114	1,667	Small Drop Structures w/Toe Protection	\$ 853,693
RWT150	3,741	Natural Channel Design	\$ 765,482
RWT210_upstream	2,132	Natural Channel Design	\$ 593,011
RWT124_upstream	1,246	Small Drop Structures w/Toe Protection	\$ 640,054
RWT174	1,871	Small Drop Structures w/Toe Protection	\$ 606,335
RWT234	2,129	Small Drop Structures w/Toe Protection	\$ 976,863
RET020	1,915	Small Drop Structures w/Toe Protection	\$ 1,169,444
RWT094	2,145	Natural Channel Design	\$ 246,213
RWT296	1,134	Small Drop Structures w/Toe Protection	\$ 223,458
RWT122	518	Natural Channel Design	\$ 71,367
Channel Subtotal			\$ 6,381,788
Engineering/Construction Admin (15%)			\$ 957,268
Contingency (20%)			\$ 1,276,358
Channel Total			\$ 8,615,414
WT 14	66	Crossing - Culvert	\$ 31,585
WT 13	53	Crossing - Culvert	\$ 28,525
MT 6-2	220	Crossing - Culvert	\$ 181,365
Culvert Subtotal			\$ 241,475
Engineering/Construction Admin (15%)			\$ 36,221
Contingency (20%)			\$ 48,295
Culvert Total			\$ 325,991
Paint Brush Hills Pond A		Detention Pond	\$ 20,000
Paint Brush Hills Pond C		Detention Pond	\$ 20,000
Regional Pond R1		Detention Pond	\$ 1,473,028
Regional Pond R2		Detention Pond	\$ 322,608
Sub Regional Pond SR2		Detention Pond	\$ 301,203
Sub Regional Pond SR3		Detention Pond	\$ 49,552
Sub Regional Pond SR4		Detention Pond	\$ 1,435,500
Sub Regional Pond SR6		Detention Pond	\$ 586,078
The Meadows Pond #1		Detention Pond	\$ 20,000
Woodmen Hills Pond H		Detention Pond	\$ -
Detention Subtotal			\$ 4,227,969
Engineering/Construction Admin (15%)			\$ 634,195
Contingency (20%)			\$ 845,594
Detention Total			\$ 5,707,758
Grand Total			\$ 14,649,163

Bridge Fees			
Reach/Pond	Reach Length (ft)	Improvement	Cost
WT 5-2	43	Crossing - Bridge	\$ 718,121
MT 7	58	Crossing - Bridge	\$ 207,465
MT 6	200	Crossing - Bridge	\$ 166,177
MT 1	45	Crossing - Bridge	\$ 433,032
Subtotal			\$ 1,524,796
Engineering/Construction Admin (15%)			\$ 228,719
Contingency (20%)			\$ 304,959
Total			\$ 2,058,474

**Falcon DBPS
Metro District Costs**

Drainage Fees			
Reach/Pond	Reach Length (ft)	Improvement	Cost
RET030	5,042	Small Drop Structures w/Toe Protection	\$ 1,405,908
RET040	1,820	Small Drop Structures w/Toe Protection	\$ 1,073,275
ET 19	39	Crossing - Culvert	\$ 63,340
Paint Brush Hills Pond #4		Detention Pond	\$ -
Paint Brush Hills Pond B1		Detention Pond	\$ -
Paint Brush Hills Pond B2		Detention Pond	\$ 20,000
Regional Pond MN		Detention Pond	\$ 20,000
Regional Pond WU South		Detention Pond	\$ 20,000
Woodmen Hills Pond #1 North		Detention Pond	\$ 20,000
Woodmen Hills Pond #1 South		Detention Pond	\$ 20,000
Woodmen Hills Pond #2		Detention Pond	\$ 20,000
Woodmen Hills Pond #3		Detention Pond	\$ 20,000
Woodmen Hills Pond #4		Detention Pond	\$ 240,000
Woodmen Hills Pond #5		Detention Pond	\$ 20,000
		Subtotal	\$ 2,942,524
		Engineering/Construction Admin (15%)	\$ 441,379
		Contingency (20%)	\$ 588,505
		Total	\$ 3,972,407

Bridge Fees			
Reach/Pond	Reach Length (ft)	Improvement	Cost
Pond WU Inlet Structure	74	Crossing - Bridge	\$ 658,410
MT 5-1	48	Crossing - Bridge	\$ 191,098
ET 31	302	Crossing - Bridge	\$ 525,026
		Subtotal	\$ 1,374,534
		Engineering/Construction Admin (15%)	\$ 206,180
		Contingency (20%)	\$ 274,907
		Total	\$ 1,855,620

Sheet 6-10

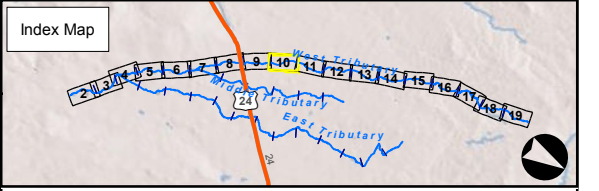
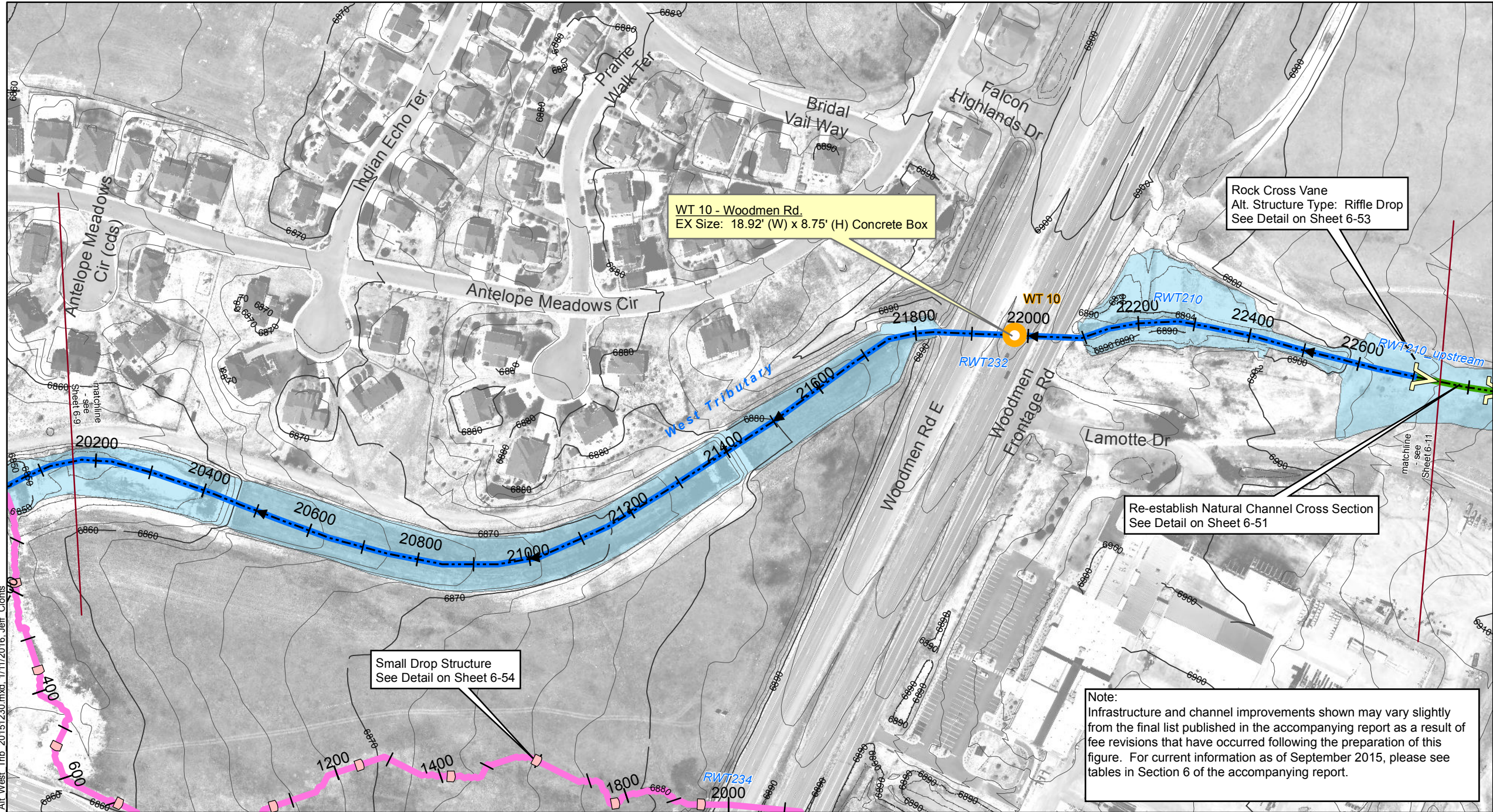
Falcon DBPS

Conceptual Plan

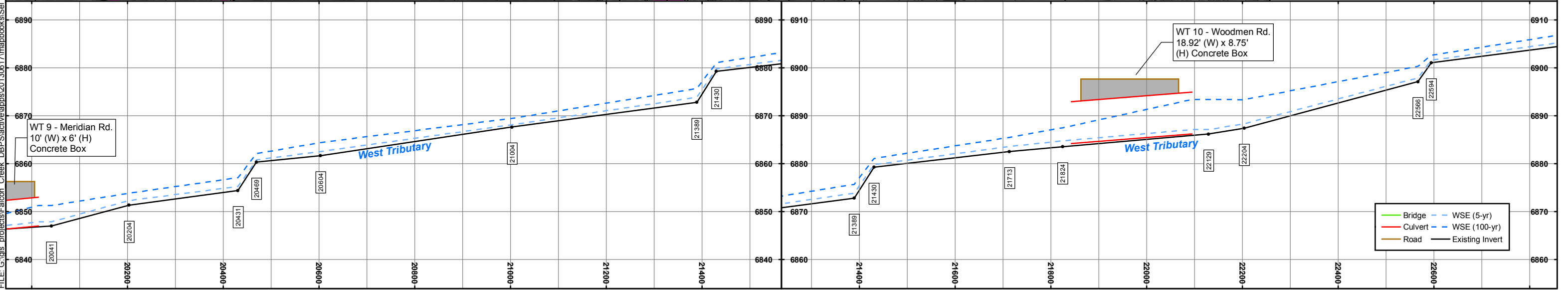
West Tributary

El Paso County, CO

- Drainageway Crossing
 - Stream Centerline
 - Existing Approximate 100-yr Floodplain*
 - Floodplain Study Limit
 - Storm Sewer**
 - Inlet
 - Manhole
 - Pipe
 - Reach Improvements**
 - Natural Channel Design
 - Protect In Place
 - Roadside Ditch Improvement
 - Small Drop Structures w/ Toe Protection
 - Existing Detention
 - Proposed Detention
 - Proposed Detention Grading
 - Small Drop Structure
 - Cross Vane
 - Immediate Action Required to Preserve Existing Condition
- 0 100 200 Feet



Note:
 Infrastructure and channel improvements shown may vary slightly from the final list published in the accompanying report as a result of fee revisions that have occurred following the preparation of this figure. For current information as of September 2015, please see tables in Section 6 of the accompanying report.



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Sheet 6-11

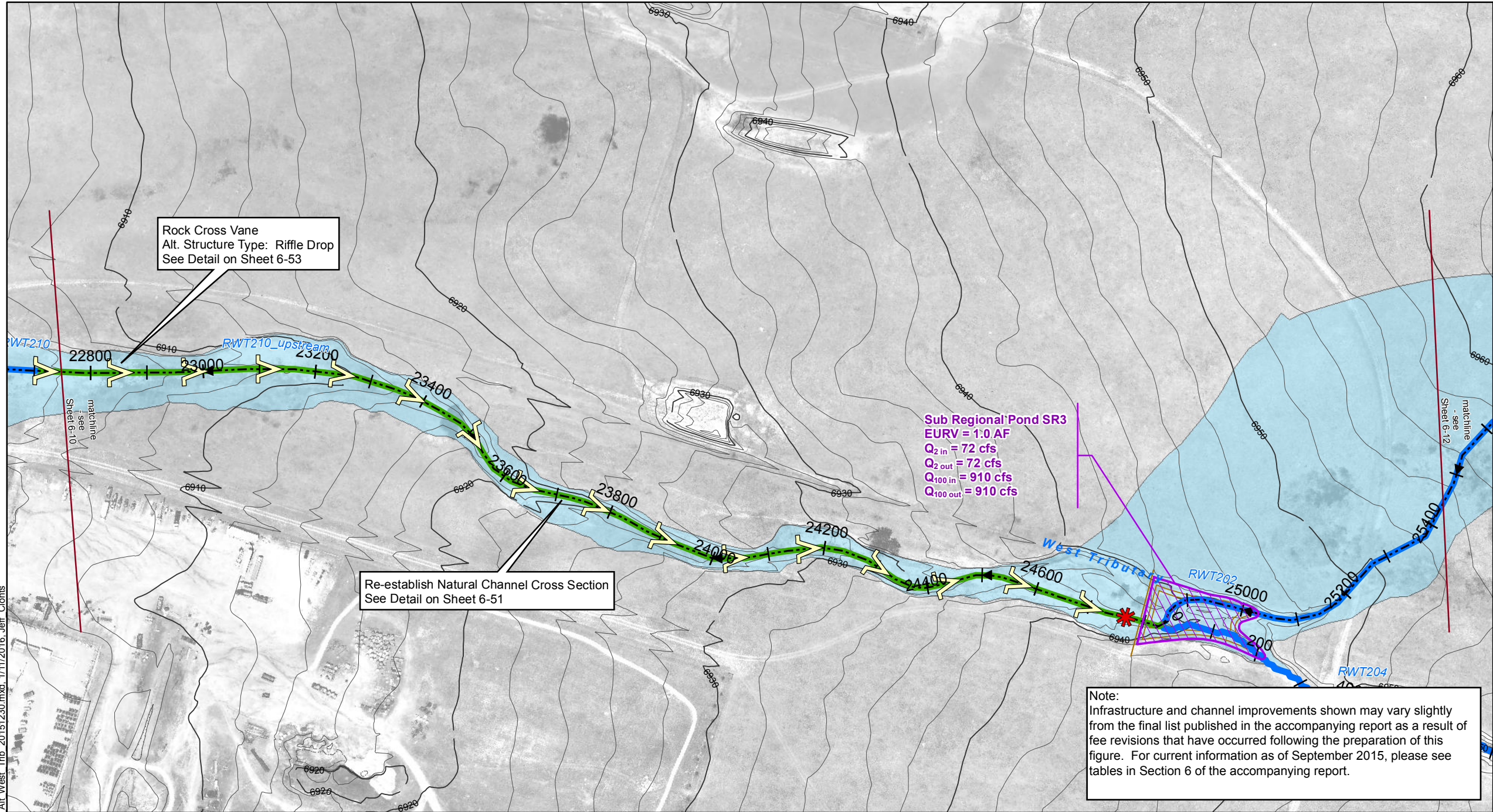
Falcon DBPS

Conceptual Plan

West Tributary

El Paso County, CO

- Drainageway Crossing
 - Stream Centerline
 - Existing Approximate 100-yr Floodplain*
 - Floodplain Study Limit
 - Storm Sewer**
 - Inlet
 - Manhole
 - Pipe
 - Reach Improvements**
 - Natural Channel Design
 - Protect In Place
 - Roadside Ditch Improvement
 - Small Drop Structures w/ Toe Protection
 - Existing Detention
 - Proposed Detention
 - Proposed Detention Grading
 - Small Drop Structure
 - Cross Vane
 - Immediate Action Required to Preserve Existing Condition
- 0 100 200 Feet



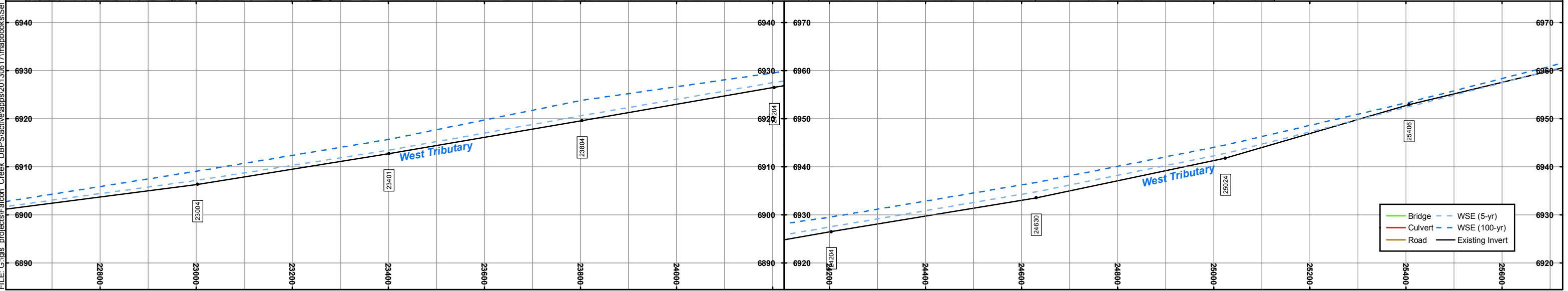
Rock Cross Vane
Alt. Structure Type: Riffle Drop
See Detail on Sheet 6-53

Sub Regional Pond SR3
EURV = 1:0 AF
Q_{2 in} = 72 cfs
Q_{2 out} = 72 cfs
Q_{100 in} = 910 cfs
Q_{100 out} = 910 cfs

Re-establish Natural Channel Cross Section
See Detail on Sheet 6-51

Note:
Infrastructure and channel improvements shown may vary slightly from the final list published in the accompanying report as a result of fee revisions that have occurred following the preparation of this figure. For current information as of September 2015, please see tables in Section 6 of the accompanying report.

* These approximate 100-yr floodplain boundaries are for planning purposes only. This information is not intended to replace the information provided on the FEMA Flood Insurance Rate Maps for this area.
** These are conceptual design drawings and are subject to change. These drawings are not intended for construction purposes.



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Falcon DBPS

Expansion & Contraction Coefficients

West Tributary		
River Station	Contraction	Expansion
28432.62	0.1	0.3
28032.62	0.1	0.3
27507.46	0.1	0.3
27232.62	0.1	0.3
26814.63	0.1	0.3
26425.04	0.1	0.3
25882.64	0.1	0.3
25406.2	0.1	0.3
25024.12	0.1	0.3
24630.32	0.1	0.3
24203.51	0.1	0.3
23803.51	0.1	0.3
23401.38	0.1	0.3
23003.51	0.1	0.3
22594.16	0.1	0.3
22566.37	0.1	0.3
22203.51	0.3	0.5
22188.6*	0.3	0.5
22173.7*	0.3	0.5
22158.9*	0.3	0.5
22144.0*	0.3	0.5
22129.18	0.3	0.5
21948.92	Culvert	
21824.12	0.3	0.5
21801.9*	0.1	0.3
21779.8*	0.1	0.3
21757.6*	0.1	0.3
21735.5*	0.1	0.3
21713.34	0.1	0.3
21430.2	0.1	0.3
21388.91	0.1	0.3
21003.51	0.1	0.3
20603.51	0.1	0.3
20469.47	0.1	0.3
20430.88	0.1	0.3
20203.51	0.1	0.3
20162.9*	0.1	0.3
20122.3*	0.1	0.3
20081.7*	0.3	0.5
20041.14	0.3	0.5
19961.38	Culvert	
19894.2	0.3	0.5

Middle Tributary		
River Station	Contraction	Expansion
2393.844	0.1	0.3
2000	0.1	0.3
1923.28*	0.3	0.5
1846.57*	0.3	0.5
1769.85*	0.3	0.5
1693.141	0.3	0.5
1661.946	Culvert	
1631.806	0.3	0.5
1489.711	0.1	0.3
1199.006	0.1	0.3
800	0.1	0.3
400	0.1	0.3

East Tributary		
River Station	Contraction	Expansion
20374.32	0.1	0.3
20291.07	0.1	0.3
20221.25	0.1	0.3
20200.42	0.1	0.3
20150.22	0.1	0.3
19810.83	0.1	0.3
19800.9*	0.1	0.3
19791.1*	0.1	0.3
19781.2*	0.1	0.3
19771.3*	0.1	0.3
19761.5*	0.1	0.3
19751.6*	0.1	0.3
19741.7*	0.1	0.3
19731.9*	0.1	0.3
19722.0*	0.1	0.3
19712.1*	0.1	0.3
19702.3*	0.1	0.3
19692.4*	0.1	0.3
19682.6	0.1	0.3
19619.02	0.1	0.3
19570.53	0.1	0.3
19557.19	0.1	0.3
19477	0.1	0.3
19350.22	0.1	0.3
18950.22	0.1	0.3
18550.22	0.1	0.3
18507.3*	0.1	0.3
18464.4*	0.3	0.5
18421.6*	0.3	0.5
18378.7*	0.3	0.5
18335.8*	0.3	0.5
18292.9*	0.3	0.5
18250.1	0.3	0.5
18205.02	Culvert	
18166.18	0.3	0.5
18119.34	0.3	0.5
18092.76	Culvert	
18065.8	0.3	0.5
18019.2*	0.1	0.3
17972.7*	0.1	0.3
17926.2*	0.1	0.3
17879.6*	0.1	0.3

**Falcon DBPS
Steady Flow Data**

West Tributary

Hydrologic Element	HEC-RAS Section	Existing Peak Flows (cfs)						Future Peak Flows (cfs)					
		2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
JWT 010	47452.3	9	21	32	58	73	89	9	21	32	58	73	89
JWT 042	47079.4	15	37	57	110	140	170	15	37	57	110	140	170
JWT 044	45564.8	24	59	89	170	210	260	24	59	89	170	210	260
JWT 050	42418.0	43	110	170	310	390	480	43	110	170	310	390	480
JWT 090	40018.0	67	160	250	470	600	740	68	160	250	480	610	730
JWT 120	36496.2	84	190	300	570	740	910	85	190	300	570	730	920
JWT 172	34399.0	90	210	320	600	760	930	99	210	320	600	760	960
JWT 180	31149.0	0	15	130	420	590	770	100	220	330	620	800	1000
JWT 200	27507.0	14	32	150	470	670	880	110	230	360	690	890	1200
JWT 210	24630.0	21	50	170	510	720	950	85	210	390	780	950	1100
JWT 234	21713.0	50	93	180	540	760	1000	130	270	420	810	1100	1400
Pond WU North Inflow	19803.0	65	120	186	548	769	1017	128	272	423	813	1054	1398
Pond WU South Inflow	18554.8	14	46	97	508	727	972	83	235	385	773	1013	1347
JWT 240	17784.0	26	54	86	410	670	890	83	200	380	770	940	1100
JWT 260	17399.7	47	92	130	420	690	910	86	210	390	790	970	1100
RWT 295	14577.8	49	97	130	430	690	910	86	210	390	790	970	1100
JWT 310	13268.4	120	230	370	730	1000	1300	160	420	640	1100	1400	1700
JWT 320	10574.0	120	250	370	740	1000	1300	160	410	630	1100	1400	1700
RWT 352 + WT350	8227.4	146	295	440	870	1170	1510	198	479	730	1290	1630	1980
JWT 352	5544.6	160	320	520	1000	1400	1900	210	530	820	1400	2000	2400
JWT 374_OUT	5379.9	190	400	600	1200	1500	1900	230	560	860	1500	2000	2500

Middle Tributary

Hydrologic Element	HEC-RAS Section	Existing Peak Flows (cfs)						Future Peak Flows (cfs)					
		2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
JMT 010	15477.3	1	11	25	62	120	160	1	11	25	62	120	160
RMT 62 + MT 60	14907.6	9	32	58	124	190	259	31	70	108	202	280	360
JMT 070	9628.6	61	180	280	510	630	760	150	350	490	800	980	1200
Reg Pond MN Inflow	6738.8	65	180	289	514	644	776	151	360	495	813	991	1184
JMT 080	6346.7	40	110	260	510	640	770	86	330	490	810	980	1200
RMT 102	6210.5	40	110	260	510	640	770	86	320	490	800	980	1200
JMT 106	5363	45	120	260	530	660	800	92	320	490	820	1000	1200
JMT 110	4905.9	46	120	260	540	680	820	94	320	500	830	1000	1200
RMT 114	1489.7	46	120	260	540	670	820	94	320	500	830	1000	1200

**Falcon DBPS
Manning's n Values**

West Tributary				
River Station	Frctn (n/K)	n #1	n #2	n #3
28432.62	n	0.08	0.03	0.08
28032.62	n	0.08	0.03	0.08
27507.46	n	0.08	0.05	0.08
27232.62	n	0.08	0.05	0.08
26814.63	n	0.08	0.05	0.08
26425.04	n	0.08	0.05	0.08
25882.64	n	0.08	0.05	0.08
25406.2	n	0.08	0.05	0.08
25024.12	n	0.08	0.05	0.08
24630.32	n	0.08	0.03	0.08
24203.51	n	0.08	0.03	0.08
23803.51	n	0.08	0.03	0.08
23401.38	n	0.08	0.03	0.08
23003.51	n	0.08	0.03	0.08
22594.16	n	0.08	0.03	0.08
22566.37	n	0.08	0.03	0.08
22203.51	n	0.08	0.03	0.08
22188.6*	n	0.08	0.03	0.08
22173.7*	n	0.08	0.03	0.08
22158.9*	n	0.08	0.03	0.08
22144.0*	n	0.08	0.03	0.08
22129.18	n	0.08	0.03	0.08
21948.92	Culvert			
21824.12	n	0.08	0.05	0.08
21801.9*	n	0.08	0.05	0.08
21779.8*	n	0.08	0.05	0.08
21757.6*	n	0.08	0.05	0.08
21735.5*	n	0.08	0.05	0.08
21713.34	n	0.08	0.05	0.08
21430.2	n	0.08	0.05	0.08
21388.91	n	0.08	0.05	0.08
21003.51	n	0.08	0.05	0.08
20603.51	n	0.08	0.05	0.08
20469.47	n	0.08	0.05	0.08
20430.88	n	0.08	0.05	0.08
20203.51	n	0.08	0.05	0.08
20162.9*	n	0.08	0.05	0.08
20122.3*	n	0.08	0.05	0.08
20081.7*	n	0.08	0.05	0.08
20041.14	n	0.08	0.05	0.08
19961.38	Culvert			
19894.2	n	0.08	0.05	0.08

Middle Tributary				
River Station	Frctn (n/K)	n #1	n #2	n #3
2393.844	n	0.15	0.07	0.15
2000	n	0.15	0.07	0.15
1923.28*	n	0.15	0.07	0.15
1846.57*	n	0.15	0.07	0.15
1769.85*	n	0.15	0.07	0.15
1693.141	n	0.15	0.07	0.15
1661.946	Culvert			
1631.806	n	0.08	0.05	0.08
1489.711	n	0.08	0.05	0.08
1199.006	n	0.08	0.05	0.08
800	n	0.08	0.05	0.08
400	n	0.08	0.05	0.08

East Tributary				
River Station	Frctn (n/K)	n #1	n #2	n #3
20374.32	n	0.08	0.07	0.08
20291.07	n	0.08	0.07	0.08
20221.25	n	0.08	0.07	0.08
20200.42	n	0.08	0.07	0.08
20150.22	n	0.08	0.07	0.08
19810.83	n	0.08	0.07	0.08
19800.9*	n	0.08	0.068	0.08
19791.1*	n	0.08	0.067	0.08
19781.2*	n	0.08	0.065	0.08
19771.3*	n	0.08	0.064	0.08
19761.5*	n	0.08	0.062	0.08
19751.6*	n	0.08	0.061	0.08
19741.7*	n	0.08	0.059	0.08
19731.9*	n	0.08	0.058	0.08
19722.0*	n	0.08	0.056	0.08
19712.1*	n	0.08	0.055	0.08
19702.3*	n	0.08	0.053	0.08
19692.4*	n	0.08	0.052	0.08
19682.6	n	0.08	0.05	0.08
19619.02	n	0.08	0.05	0.08
19570.53	n	0.08	0.05	0.08
19557.19	n	0.08	0.05	0.08
19477	n	0.08	0.05	0.08
19350.22	n	0.08	0.05	0.08
18950.22	n	0.08	0.05	0.08
18550.22	n	0.08	0.05	0.08
18507.3*	n	0.08	0.05	0.08
18464.4*	n	0.08	0.05	0.08
18421.6*	n	0.08	0.05	0.08
18378.7*	n	0.08	0.05	0.08
18335.8*	n	0.08	0.05	0.08
18292.9*	n	0.08	0.05	0.08
18250.1	n	0.08	0.05	0.08
18205.02	Culvert			
18166.18	n	0.08	0.05	0.08
18119.34	n	0.08	0.05	0.08
18092.76	Culvert			
18065.8	n	0.08	0.07	0.08
18019.2*	n	0.08	0.07	0.08
17972.7*	n	0.08	0.07	0.08
17926.2*	n	0.08	0.07	0.08
17879.6*	n	0.08	0.07	0.08

Falcon DBPS
West Tributary Existing Conditions HEC-RAS Outputs
Culverts

Reach	River Sta	Profile	E.G. US. (ft)	W.S. US. (ft)	E.G. IC (ft)	E.G. OC (ft)	Min El Weir Flow (ft)	Q Culv Group (cfs)	Q Weir (cfs)	Delta WS (ft)	Culv Vel US (ft/s)	Culv Vel DS (ft/s)
WestTrib	47262 Culvert #1	2-yr	7404.34	7404.34	7403.73	7404.34	7408.01	9		3.17	5.09	6.13
WestTrib	47262 Culvert #1	5-yr	7408.11	7408.11	7408.04	7408.11	7408.01	14.27	6.91	6.72	8.07	8.36
WestTrib	47262 Culvert #1	10-yr	7408.19	7408.19	7408.17	7408.19	7408.01	14.37	18.05	6.68	8.13	8.41
WestTrib	47262 Culvert #1	25-yr	7408.33	7408.33	7408.35	7408.33	7408.01	14.54	44.05	6.55	8.23	8.49
WestTrib	47262 Culvert #1	50-yr	7408.4	7408.4	7408.38	7408.4	7408.01	14.61	59.15	6.5	8.27	8.52
WestTrib	47262 Culvert #1	100-yr	7408.45	7408.45	7408.45	7408.45	7408.01	14.68	74.82	6.46	8.31	8.56
WestTrib	45766.17 Culvert #1	2-yr	7362.13	7362.13	7362.1	7362.13	7362.01	3.48	11.52	7.64	4.98	5.27
WestTrib	45766.17 Culvert #1	5-yr	7362.25	7362.25	7362.24	7362.25	7362.01	3.51	33.01	7.4	5.03	5.23
WestTrib	45766.17 Culvert #1	10-yr	7362.33	7362.33	7362.32	7362.33	7362.01	3.54	52.64	7.09	5.06	5.27
WestTrib	45766.17 Culvert #1	25-yr	7362.52	7362.51	7362.51	7362.52	7362.01	3.6	105.85	6.81	5.15	5.35
WestTrib	45766.17 Culvert #1	50-yr	7362.6	7362.6	7362.6	7362.6	7362.01	3.62	136.03	6.73	5.18	5.39
WestTrib	45766.17 Culvert #1	100-yr	7362.68	7362.68	7362.68	7362.68	7362.01	3.65	165.78	6.64	5.22	5.43
WestTrib	41441.59 Culvert #1	2-yr	7262.38	7262.38	7262.38	7262.38	7262.01	2.51	40.01	4.11	6.39	6.39
WestTrib	41441.59 Culvert #1	5-yr	7262.71	7262.7	7262.71	7262.71	7262.01	2.49	106.99	3.97	6.34	6.34
WestTrib	41441.59 Culvert #1	10-yr	7262.94	7262.91	7262.94	7262.94	7262.01	2.49	167.29	3.96	6.34	6.34
WestTrib	41441.59 Culvert #1	25-yr	7263.37	7263.29	7263.36	7263.37	7262.01	2.49	307.48	3.9	6.33	6.33
WestTrib	41441.59 Culvert #1	50-yr	7263.57	7263.47	7263.57	7263.57	7262.01	2.49	387.46	3.87	6.33	6.33
WestTrib	41441.59 Culvert #1	100-yr	7263.79	7263.64	7263.78	7263.79	7262.01	2.49	478.2	3.85	6.35	6.35
WestTrib	21948.92 Culvert #1	2-yr	6886.74	6886.66	6886.65	6886.74	6896.01	21		2.16	3.29	3.77
WestTrib	21948.92 Culvert #1	5-yr	6887.19	6887.09	6887.06	6887.19	6896.01	50		2.35	4.4	5.29
WestTrib	21948.92 Culvert #1	10-yr	6888.48	6888.4	6888.25	6888.48	6896.01	170		3.06	6.61	8.53
WestTrib	21948.92 Culvert #1	25-yr	6890.97	6890.9	6890.61	6890.97	6896.01	510		4.53	9.54	12.53
WestTrib	21948.92 Culvert #1	50-yr	6892.21	6892.14	6891.8	6892.21	6896.01	720		5.18	10.7	13.98
WestTrib	21948.92 Culvert #1	100-yr	6893.44	6893.37	6892.99	6893.44	6896.01	950		5.89	11.74	15.2
WestTrib	19961.38 Culvert #1	2-yr	6847.62	6847.57	6847.52	6847.61	6856.01	12.21		1.27	3.4	4.13
WestTrib	19961.38 Culvert #2	2-yr	6847.62	6847.57	6847.53	6847.62	6856.01	12.54		1.27	3.43	5.05
WestTrib	19961.38 Culvert #3	2-yr	6847.62	6847.57	6847.54	6847.62	6856.01	12.6		1.27	3.44	5.07
WestTrib	19961.38 Culvert #4	2-yr	6847.62	6847.57	6847.54	6847.63	6856.01	12.65		1.27	3.44	5.09
WestTrib	19961.38 Culvert #1	5-yr	6847.94	6847.87	6847.81	6847.92	6856.01	22.72		1.39	4.18	5.21
WestTrib	19961.38 Culvert #2	5-yr	6847.94	6847.87	6847.83	6847.94	6856.01	23.3		1.39	4.22	6.37
WestTrib	19961.38 Culvert #3	5-yr	6847.94	6847.87	6847.83	6847.94	6856.01	23.48		1.39	4.23	6.42
WestTrib	19961.38 Culvert #4	5-yr	6847.94	6847.87	6847.83	6847.95	6856.01	23.5		1.39	4.23	6.43
WestTrib	19961.38 Culvert #1	10-yr	6848.46	6848.35	6848.3	6848.45	6856.01	44.67		1.61	5.24	6.73
WestTrib	19961.38 Culvert #2	10-yr	6848.46	6848.35	6848.31	6848.46	6856.01	45.04		1.61	5.25	8
WestTrib	19961.38 Culvert #3	10-yr	6848.46	6848.35	6848.31	6848.46	6856.01	45.16		1.61	5.26	8.01
WestTrib	19961.38 Culvert #4	10-yr	6848.46	6848.35	6848.31	6848.46	6856.01	45.14		1.61	5.26	8.01
WestTrib	19961.38 Culvert #1	25-yr	6850.03	6849.81	6849.77	6850.01	6856.01	133.98		2.32	7.56	9.79

Falcon DBPS
West Tributary Future Conditions HEC-RAS Outputs
Culverts

Reach	River Sta	Profile	E.G. US. (ft)	W.S. US. (ft)	E.G. IC (ft)	E.G. OC (ft)	Min El Weir Flow (ft)	Q Culv Group (cfs)	Q Weir (cfs)	Delta WS (ft)	Culv Vel US (ft/s)	Culv Vel DS (ft/s)
WestTrib	47262 Culvert #1	2-yr	7404.34	7404.34	7403.73	7404.34	7408.01	9		3.17	5.09	6.13
WestTrib	47262 Culvert #1	5-yr	7408.11	7408.11	7408.04	7408.11	7408.01	14.27	6.91	6.72	8.07	8.36
WestTrib	47262 Culvert #1	10-yr	7408.19	7408.19	7408.17	7408.19	7408.01	14.37	18.05	6.68	8.13	8.41
WestTrib	47262 Culvert #1	25-yr	7408.33	7408.33	7408.35	7408.33	7408.01	14.54	44.05	6.55	8.23	8.49
WestTrib	47262 Culvert #1	50-yr	7408.4	7408.4	7408.38	7408.4	7408.01	14.61	59.15	6.5	8.27	8.52
WestTrib	47262 Culvert #1	100-yr	7408.45	7408.45	7408.45	7408.45	7408.01	14.68	74.82	6.46	8.31	8.56
WestTrib	45766.17 Culvert #1	2-yr	7362.13	7362.13	7362.1	7362.13	7362.01	3.48	11.52	7.64	4.98	5.27
WestTrib	45766.17 Culvert #1	5-yr	7362.25	7362.25	7362.24	7362.25	7362.01	3.51	33.01	7.4	5.03	5.23
WestTrib	45766.17 Culvert #1	10-yr	7362.33	7362.33	7362.32	7362.33	7362.01	3.54	52.64	7.09	5.06	5.27
WestTrib	45766.17 Culvert #1	25-yr	7362.52	7362.51	7362.51	7362.52	7362.01	3.6	105.85	6.81	5.15	5.35
WestTrib	45766.17 Culvert #1	50-yr	7362.6	7362.6	7362.6	7362.6	7362.01	3.62	136.03	6.73	5.18	5.39
WestTrib	45766.17 Culvert #1	100-yr	7362.68	7362.68	7362.68	7362.68	7362.01	3.65	165.78	6.64	5.22	5.43
WestTrib	41441.59 Culvert #1	2-yr	7262.38	7262.38	7262.38	7262.38	7262.01	2.51	40.01	4.11	6.39	6.39
WestTrib	41441.59 Culvert #1	5-yr	7262.71	7262.7	7262.71	7262.71	7262.01	2.49	106.99	3.97	6.34	6.34
WestTrib	41441.59 Culvert #1	10-yr	7262.94	7262.91	7262.94	7262.94	7262.01	2.49	167.29	3.96	6.34	6.34
WestTrib	41441.59 Culvert #1	25-yr	7263.37	7263.29	7263.36	7263.37	7262.01	2.49	307.48	3.9	6.33	6.33
WestTrib	41441.59 Culvert #1	50-yr	7263.57	7263.47	7263.57	7263.57	7262.01	2.49	387.46	3.87	6.33	6.33
WestTrib	41441.59 Culvert #1	100-yr	7263.79	7263.64	7263.78	7263.79	7262.01	2.49	478.2	3.85	6.35	6.35
WestTrib	21948.92 Culvert #1	2-yr	6887.62	6887.52	6887.46	6887.62	6896.01	85		2.57	5.25	6.54
WestTrib	21948.92 Culvert #1	5-yr	6888.83	6888.75	6888.58	6888.83	6896.01	210		3.28	7.1	9.19
WestTrib	21948.92 Culvert #1	10-yr	6890.19	6890.11	6889.86	6890.19	6896.01	390		4.11	8.72	11.59
WestTrib	21948.92 Culvert #1	25-yr	6892.55	6892.47	6892.12	6892.55	6896.01	780		5.37	10.99	14.32
WestTrib	21948.92 Culvert #1	50-yr	6893.44	6893.37	6892.99	6893.44	6896.01	950		5.89	11.74	15.2
WestTrib	21948.92 Culvert #1	100-yr	6894.19	6894.11	6893.72	6894.19	6896.01	1100		6.25	12.33	15.86
WestTrib	19961.38 Culvert #1	2-yr	6848.17	6848.09	6848.02	6848.16	6856.01	31.76		1.48	4.68	5.93
WestTrib	19961.38 Culvert #2	2-yr	6848.17	6848.09	6848.04	6848.17	6856.01	32.58		1.48	4.72	7.2
WestTrib	19961.38 Culvert #3	2-yr	6848.17	6848.09	6848.05	6848.18	6856.01	32.79		1.48	4.73	7.33
WestTrib	19961.38 Culvert #4	2-yr	6848.17	6848.09	6848.05	6848.18	6856.01	32.86		1.48	4.73	7.34
WestTrib	19961.38 Culvert #1	5-yr	6848.91	6848.77	6848.72	6848.9	6856.01	66.98		1.81	6	7.82
WestTrib	19961.38 Culvert #2	5-yr	6848.91	6848.77	6848.73	6848.91	6856.01	67.56		1.81	6.01	9.1
WestTrib	19961.38 Culvert #3	5-yr	6848.91	6848.77	6848.73	6848.91	6856.01	67.69		1.81	6.02	9.1
WestTrib	19961.38 Culvert #4	5-yr	6848.91	6848.77	6848.73	6848.91	6856.01	67.77		1.81	6.02	9.11
WestTrib	19961.38 Culvert #1	10-yr	6849.56	6849.38	6849.33	6849.55	6856.01	104.19		2.07	6.95	9.03
WestTrib	19961.38 Culvert #2	10-yr	6849.56	6849.38	6849.35	6849.56	6856.01	105.1		2.07	6.97	10.33
WestTrib	19961.38 Culvert #3	10-yr	6849.56	6849.38	6849.35	6849.57	6856.01	105.28		2.07	6.97	10.34
WestTrib	19961.38 Culvert #4	10-yr	6849.56	6849.38	6849.35	6849.57	6856.01	105.43		2.07	6.98	10.34
WestTrib	19961.38 Culvert #1	25-yr	6850.97	6850.7	6850.67	6850.95	6856.01	200.98		2.69	8.65	11.07

Falcon DBPS
West Tributary Existing Conditions HEC-RAS Outputs

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # XS	Headloss (ft)	Shear Total (lb/sq ft)
WestTrib	27507.46	5-yr		32		6993.21	6993.81		6993.85	0.011399	1.54	20.84	61.87	0.47	5.81	0.24
WestTrib	27507.46	10-yr		150		6993.21	6994.08	6994.05	6994.3	0.040068	3.82	39.25	76.16	0.94	5.3	1.29
WestTrib	27507.46	25-yr	0.3	469.7		6993.21	6994.7	6994.62	6995.06	0.02916	4.83	97.88	118.02	0.93	4.96	1.51
WestTrib	27507.46	50-yr	10.82	659.18		6993.21	6995	6994.88	6995.4	0.022858	5.12	139.06	150.35	0.93	4.85	1.32
WestTrib	27507.46	100-yr	34.26	845.74		6993.21	6995.26	6995.11	6995.7	0.020003	5.41	179.47	161.36	0.89	4.74	1.39
WestTrib	27232.62	2-yr		14		6987.13	6987.65	6987.65	6987.78	0.057863	2.91	4.81	18.45	1.01		0.94
WestTrib	27232.62	5-yr		32		6987.13	6987.85	6987.85	6988.04	0.05147	3.48	9.21	24.84	1.01	7.09	1.19
WestTrib	27232.62	10-yr	0.4	149.52	0.08	6987.13	6988.84		6988.99	0.01123	3.17	48	52.43	0.58	7.64	0.64
WestTrib	27232.62	25-yr	15.49	444.16	10.35	6987.13	6989.72	6989.31	6990.09	0.012263	5.03	107.49	82.91	0.76	8.05	0.99
WestTrib	27232.62	50-yr	33.44	614.31	22.24	6987.13	6990.04	6989.71	6990.55	0.013998	5.96	135.47	93.41	0.84	8.17	1.26
WestTrib	27232.62	100-yr	58.15	783.1	38.76	6987.13	6990.34	6990.05	6990.96	0.014909	6.69	164.86	103.29	0.89	8.33	1.48
WestTrib	26814.63	2-yr		14		6980.37	6980.66	6980.66	6980.73	0.070601	2.11	6.63	48	1		0.61
WestTrib	26814.63	5-yr	0.68	30.48	0.83	6980.37	6980.92	6980.76	6980.95	0.008266	1.4	25.56	90.79	0.45	7.13	0.15
WestTrib	26814.63	10-yr	8.69	132.8	8.51	6980.37	6981.14	6981.12	6981.35	0.034811	3.88	46.69	107.84	0.98	7.01	0.94
WestTrib	26814.63	25-yr	50.1	367.5	52.4	6980.37	6981.63	6981.6	6982.06	0.03442	5.8	110.6	153.63	1.09	7.03	1.55
WestTrib	26814.63	50-yr	80.9	493.99	95.1	6980.37	6981.91	6981.91	6982.37	0.029101	6.21	159.22	195.55	1.06	6.56	1.48
WestTrib	26814.63	100-yr	121.69	613.75	144.56	6980.37	6982.12	6982.12	6982.63	0.027717	6.68	203.49	223.21	1.06	6.45	1.58
WestTrib	26425.04	2-yr		14		6973.44	6973.63	6973.63	6973.7	0.073759	2.02	6.93	55.31	1.01		0.58
WestTrib	26425.04	5-yr		31.98	0.02	6973.44	6973.73	6973.73	6973.82	0.069505	2.47	12.98	74.42	1.04		0.76
WestTrib	26425.04	10-yr	7.35	138.89	3.77	6973.44	6974.26		6974.34	0.010871	2.38	71.52	132.69	0.55	9.21	0.37
WestTrib	26425.04	25-yr	42.69	402.09	25.22	6973.44	6974.86	6974.5	6975.04	0.010897	3.65	179.67	297.72	0.77	9.53	0.41
WestTrib	26425.04	50-yr	108.08	522.78	39.15	6973.44	6975.08		6975.28	0.010747	4.03	249.42	327.19	0.73	9.59	0.51
WestTrib	26425.04	100-yr	186.54	639.66	53.81	6973.44	6975.27	6974.69	6975.5	0.010766	4.38	314.8	353.24	0.71	9.65	0.6
WestTrib	25882.64	2-yr		14		6964.36	6964.57		6964.62	0.051175	1.75	7.99	60.09	0.85	12.2	0.42
WestTrib	25882.64	5-yr	0.13	31.87		6964.36	6964.72		6964.77	0.023484	1.81	17.94	77.22	0.66	12.29	0.34
WestTrib	25882.64	10-yr	23.31	126.29	0.4	6964.36	6964.99	6964.99	6965.14	0.031045	3.34	65.38	282.71	1.13		0.45
WestTrib	25882.64	25-yr	179.95	282.24	7.81	6964.36	6965.29	6965.29	6965.52	0.032874	4.69	167.82	364.34	0.99	10.71	0.95
WestTrib	25882.64	50-yr	290.41	365.49	14.1	6964.36	6965.42	6965.42	6965.69	0.03433	5.27	213.8	377.17	0.97	10.08	1.21
WestTrib	25882.64	100-yr	411.02	447.2	21.78	6964.36	6965.54	6965.54	6965.84	0.034798	5.74	258.33	389.2	0.96	9.69	1.44
WestTrib	25406.2	2-yr			14	6952.93	6952.4		6952.41	0.01849		21.32	169.66	0.33	9.81	0.15
WestTrib	25406.2	5-yr			32	6952.93	6952.48		6952.49	0.022962		36.96	256.53	0.4	9.63	0.21
WestTrib	25406.2	10-yr			150	6952.93	6952.7		6952.73	0.024037		114.68	374.61	0.42	9.21	0.46
WestTrib	25406.2	25-yr		4.54	465.46	6952.93	6953.08		6953.12	0.016185	0.86	278.47	494.32	0.4	8.65	0.57
WestTrib	25406.2	50-yr	0	19.19	650.81	6952.93	6953.25		6953.3	0.014184	1.27	364.38	522.7	0.39	8.39	0.62
WestTrib	25406.2	100-yr	0.63	44.23	835.14	6952.93	6953.4		6953.46	0.013154	1.74	443.81	547.49	0.39	8.14	0.67
WestTrib	25024.12	2-yr	1.69	12.31		6941.81	6942.5	6942.5	6942.61	0.037895	2.86	6.12	26.19	0.98	7.96	0.55

Falcon DBPS
West Tributary Existing Conditions HEC-RAS Outputs

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # XS	Headloss (ft)	Shear Total (lb/sq ft)
WestTrib	25024.12	5-yr	8.03	23.97		6941.81	6942.75		6942.87	0.027721	3.11	14.09	39.91	0.82	7.85	0.61
WestTrib	25024.12	10-yr	66.85	82.96	0.19	6941.81	6943.34		6943.54	0.026753	4.32	48.74	68.9	0.74	7.83	1.18
WestTrib	25024.12	25-yr	225.29	241.22	3.49	6941.81	6943.99	6943.85	6944.48	0.033518	6.93	98.19	82.67	0.9	7.82	2.47
WestTrib	25024.12	50-yr	328.73	334.54	6.73	6941.81	6944.25	6944.21	6944.91	0.037764	8.18	119.45	85.89	0.98	7.84	3.26
WestTrib	25024.12	100-yr	439.98	428.87	11.15	6941.81	6944.5	6944.5	6945.31	0.039216	9.14	141.36	88.71	1.01	7.7	3.88
WestTrib	24630.32	2-yr		21		6933.51	6934.41	6934.37	6934.6	0.014511	3.47	6.05	13.47	0.91	7.19	0.4
WestTrib	24630.32	5-yr		50		6933.51	6934.78	6934.77	6935.02	0.016508	3.96	12.64	25.57	0.99	7.34	0.51
WestTrib	24630.32	10-yr		170		6933.51	6935.35	6935.35	6935.71	0.015764	4.79	35.52	52.3	1.02	6.64	0.66
WestTrib	24630.32	25-yr		510		6933.51	6936.11	6936.11	6936.67	0.013484	6.01	84.8	78.78	1.02	5.38	0.9
WestTrib	24630.32	50-yr		720		6933.51	6936.43	6936.43	6937.07	0.012627	6.46	111.5	88.6	1.01	5.01	0.99
WestTrib	24630.32	100-yr		950		6933.51	6936.74	6936.74	6937.44	0.012005	6.69	142.1	103.21	1	4.73	1.02
WestTrib	24203.51	2-yr		21		6926.49	6927.22	6927.22	6927.42	0.019771	3.53	5.96	16.46	1.03		0.44
WestTrib	24203.51	5-yr		50		6926.49	6927.52	6927.52	6927.68	0.017791	3.26	15.35	44.19	0.97		0.38
WestTrib	24203.51	10-yr		170		6926.49	6927.93	6927.93	6928.32	0.015336	4.98	34.15	46.41	1.02	5.68	0.7
WestTrib	24203.51	25-yr		508.33	1.67	6926.49	6928.76	6928.76	6929.48	0.011721	6.83	76.4	58.29	1.05	4.63	0.95
WestTrib	24203.51	50-yr		713.21	6.79	6926.49	6929.16	6929.16	6930.02	0.010832	7.49	101.08	65.91	1.06	4.19	1.02
WestTrib	24203.51	100-yr		933.8	16.2	6926.49	6929.54	6929.54	6930.52	0.010147	8.02	127.79	73.3	1.06	3.68	1.09
WestTrib	23803.51	2-yr		21		6919.56	6920.31	6920.3	6920.51	0.015534	3.54	5.93	13.55	0.94	7.15	0.42
WestTrib	23803.51	5-yr		50		6919.56	6920.64	6920.64	6920.96	0.015928	4.6	10.88	17.07	1.01	6.86	0.63
WestTrib	23803.51	10-yr		170		6919.56	6921.46	6921.46	6922.02	0.013122	6.02	28.24	25.44	1.01	5.56	0.9
WestTrib	23803.51	25-yr		509.91	0.09	6919.56	6922.68	6922.68	6923.56	0.011363	7.53	67.93	41.2	1.03	4.6	1.15
WestTrib	23803.51	50-yr	1.18	716.45	2.37	6919.56	6923.18	6923.18	6924.21	0.010059	8.16	92.09	55.68	1.12	4.2	1.02
WestTrib	23803.51	100-yr	9.43	928.41	12.16	6919.56	6923.83	6923.83	6924.81	0.008353	8.02	137.19	101.13	1.2	3.57	0.7
WestTrib	23401.38	2-yr		21		6912.71	6913.22	6913.22	6913.35	0.020465	2.98	7.05	25.87	1	5.25	0.35
WestTrib	23401.38	5-yr		50		6912.71	6913.44	6913.44	6913.65	0.018142	3.76	13.31	31.45	1.02	5.24	0.48
WestTrib	23401.38	10-yr		170		6912.71	6913.97	6913.97	6914.38	0.014357	5.15	32.99	40.62	1.01	4.74	0.73
WestTrib	23401.38	25-yr		508.85	1.16	6912.71	6914.88	6914.88	6915.63	0.011302	6.96	74.34	51.49	1.02	4.51	1.01
WestTrib	23401.38	50-yr	0.53	715.56	3.91	6912.71	6915.28	6915.28	6916.19	0.010641	7.68	97.33	62.92	1.08	4.17	1.02
WestTrib	23401.38	100-yr	5.51	935.94	8.55	6912.71	6915.69	6915.69	6916.73	0.009399	8.24	126.38	80.52	1.15	3.78	0.92
WestTrib	23003.51	2-yr		21		6906.3	6906.95	6906.86	6907.03	0.009167	2.33	9.01	26.12	0.7	5.52	0.2
WestTrib	23003.51	5-yr		50		6906.3	6907.19	6907.09	6907.34	0.00993	3.09	16.16	32.49	0.77	5.61	0.31
WestTrib	23003.51	10-yr	0.81	169.01	0.19	6906.3	6907.73	6907.64	6908	0.009892	4.18	42.06	60.06	0.88	5.89	0.43
WestTrib	23003.51	25-yr	11.82	495.48	2.7	6906.3	6908.39	6908.39	6909.06	0.011269	6.68	86.26	77.09	1.1	5.39	0.78
WestTrib	23003.51	50-yr	26.74	687.45	5.81	6906.3	6908.75	6908.75	6909.56	0.010156	7.38	116.75	88.96	1.11	5.07	0.83
WestTrib	23003.51	100-yr	49.46	890.29	10.25	6906.3	6909.1	6909.1	6910.04	0.009435	8.01	149.82	100.26	1.12	4.77	0.88
WestTrib	22594.16	2-yr		21		6901.02	6901.42	6901.42	6901.52	0.021748	2.57	8.18	39.23	0.99	0.59	0.28

Falcon DBPS
West Tributary Existing Conditions HEC-RAS Outputs

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # XS	Headloss (ft)	Shear Total (lb/sq ft)
WestTrib	22594.16	5-yr		50		6901.02	6901.58	6901.58	6901.73	0.020138	3.12	16.04	54.26	1.01	0.54	0.37
WestTrib	22594.16	10-yr		170		6901.02	6901.94	6901.94	6902.1	0.02257	3.27	51.98	178.3	1.07	0.52	0.41
WestTrib	22594.16	25-yr		510		6901.02	6902.29	6902.29	6902.59	0.014886	4.43	115.23	183.66	0.98	0.41	0.58
WestTrib	22594.16	50-yr		719.99	0.01	6901.02	6902.44	6902.44	6902.83	0.01462	5.03	143.32	195.67	1.04	0.41	0.67
WestTrib	22594.16	100-yr		948.75	1.25	6901.02	6902.6	6902.6	6903.06	0.013803	5.5	174.67	202.17	1.04	0.4	0.74
WestTrib	22566.37	2-yr		21		6897.14	6897.66	6897.66	6897.8	0.020335	2.98	7.05	25.66	1	7.19	0.35
WestTrib	22566.37	5-yr		50		6897.14	6897.88	6897.88	6898.1	0.018016	3.76	13.28	31.07	1.01	6.18	0.48
WestTrib	22566.37	10-yr		170		6897.14	6898.42	6898.42	6898.88	0.014183	5.41	31.41	35.49	1.01	5.02	0.78
WestTrib	22566.37	25-yr		510		6897.14	6899.41	6899.41	6900.23	0.011438	7.27	70.11	43.07	1	2.52	1.15
WestTrib	22566.37	50-yr		720		6897.14	6899.86	6899.86	6900.85	0.010888	7.97	90.33	46.54	1.01	1.51	1.3
WestTrib	22566.37	100-yr		950		6897.14	6900.29	6900.29	6901.42	0.010374	8.53	111.35	49.89	1.01	1	1.42
WestTrib	22203.51	2-yr		21		6887.36	6888.02	6888.02	6888.21	0.019314	3.46	6.07	16.91	1.02	0.29	0.43
WestTrib	22203.51	5-yr		50		6887.36	6888.32	6888.32	6888.6	0.016077	4.29	11.65	20.49	1	0.25	0.57
WestTrib	22203.51	10-yr		170		6887.36	6889.03	6889.03	6889.55	0.013468	5.79	29.37	28.78	1.01	0.21	0.85
WestTrib	22203.51	25-yr		510		6887.36	6890.85		6891.25	0.004286	5.04	101.13	51.46	0.63	0.11	0.52
WestTrib	22203.51	50-yr	0.25	715.8	3.95	6887.36	6892.1		6892.37	0.001739	4.11	187.1	109.83	0.55	0.05	0.18
WestTrib	22203.51	100-yr	2.99	892.5	54.52	6887.36	6893.34		6893.53	0.00081	3.57	348.34	145.85	0.4	0.02	0.12
WestTrib	22188.6*	2-yr		21		6887.12	6887.74	6887.74	6887.92	0.01869	3.42	6.14	17.01	1	0.28	0.42
WestTrib	22188.6*	5-yr		50		6887.12	6888.03	6888.03	6888.3	0.016201	4.21	11.87	21.59	1	0.25	0.55
WestTrib	22188.6*	10-yr		170		6887.12	6888.73	6888.73	6889.22	0.013429	5.66	30.01	30.36	1	0.21	0.82
WestTrib	22188.6*	25-yr		510		6887.12	6890.87		6891.13	0.002496	4.13	123.35	56.45	0.49	0.07	0.34
WestTrib	22188.6*	50-yr		720		6887.12	6892.11		6892.31	0.001208	3.6	200.21	65.25	0.36	0.04	0.23
WestTrib	22188.6*	100-yr	0.81	937.91	11.27	6887.12	6893.34		6893.51	0.000673	3.33	315.82	121.34	0.36	0.02	0.11
WestTrib	22173.7*	2-yr		21		6886.88	6887.41	6887.41	6887.6	0.018825	3.52	5.97	15.93	1.01	0.28	0.44
WestTrib	22173.7*	5-yr		50		6886.88	6887.72	6887.72	6887.99	0.016692	4.18	11.97	22.57	1.01	0.25	0.55
WestTrib	22173.7*	10-yr		170		6886.88	6888.41	6888.4	6888.89	0.013162	5.53	30.75	31.83	0.99	0.23	0.79
WestTrib	22173.7*	25-yr		510		6886.88	6890.88		6891.06	0.001478	3.43	148.69	60.81	0.39	0.04	0.22
WestTrib	22173.7*	50-yr		720		6886.88	6892.12		6892.28	0.000809	3.13	229.72	68	0.3	0.03	0.17
WestTrib	22173.7*	100-yr	0.07	949.9	0.04	6886.88	6893.35		6893.49	0.000525	3.01	316.79	89.96	0.28	0.02	0.11
WestTrib	22158.9*	2-yr		21		6886.64	6887.1	6887.1	6887.28	0.018317	3.41	6.16	16.89	1	0.28	0.42
WestTrib	22158.9*	5-yr		50		6886.64	6887.39	6887.39	6887.67	0.016638	4.27	11.7	21.28	1.02	0.25	0.57
WestTrib	22158.9*	10-yr		170		6886.64	6888.4		6888.65	0.005863	4.05	41.99	37.82	0.68	0.12	0.4
WestTrib	22158.9*	25-yr		510		6886.64	6890.89		6891.02	0.000916	2.89	176.73	65.38	0.31	0.03	0.15
WestTrib	22158.9*	50-yr		720		6886.64	6892.13		6892.25	0.000555	2.75	262.26	71.3	0.25	0.02	0.13
WestTrib	22158.9*	100-yr		950		6886.64	6893.36		6893.47	0.000395	2.7	352.12	75.36	0.22	0.02	0.11
WestTrib	22144.0*	2-yr		21		6886.41	6886.81	6886.81	6886.98	0.018548	3.29	6.38	18.68	0.99	0.19	0.39

Falcon DBPS
West Tributary Existing Conditions HEC-RAS Outputs

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # XS	Headloss (ft)	Shear Total (lb/sq ft)
WestTrib	22144.0*	5-yr		50		6886.41	6887.11	6887.09	6887.35	0.01408	3.96	12.64	22.77	0.94	0.17	0.49
WestTrib	22144.0*	10-yr		170		6886.41	6888.39		6888.53	0.002888	3.01	56.56	46.87	0.48	0.06	0.22
WestTrib	22144.0*	25-yr		510		6886.41	6890.9		6890.99	0.000591	2.46	207.18	69.95	0.25	0.02	0.11
WestTrib	22144.0*	50-yr		720		6886.41	6892.14		6892.23	0.00039	2.42	297.46	74.83	0.21	0.01	0.09
WestTrib	22144.0*	100-yr		950		6886.41	6893.36		6893.45	0.000294	2.43	391.38	78.57	0.19	0.01	0.09
WestTrib	22129.18	2-yr		21		6886.17	6886.66	6886.51	6886.73	0.006032	2.18	9.65	22.61	0.59		0.16
WestTrib	22129.18	5-yr		50		6886.17	6887.09	6886.77	6887.18	0.003671	2.44	20.5	27.82	0.5		0.17
WestTrib	22129.18	10-yr		170		6886.17	6888.4	6887.46	6888.47	0.001351	2.26	75.21	54.05	0.34		0.12
WestTrib	22129.18	25-yr		510		6886.17	6890.9	6888.42	6890.97	0.000392	2.12	240.33	74.46	0.21		0.08
WestTrib	22129.18	50-yr		720		6886.17	6892.14	6888.81	6892.21	0.000274	2.15	335.18	78.55	0.18		0.07
WestTrib	22129.18	100-yr		950		6886.17	6893.37	6889.19	6893.44	0.000213	2.21	430.26	82.04	0.17		0.07
WestTrib	21948.92		Culvert													
WestTrib	21824.12	2-yr		21		6883.52	6884.5	6884.39	6884.56	0.018282	2.09	10.07	34.84	0.6	0.35	0.43
WestTrib	21824.12	5-yr		50		6883.52	6884.74	6884.59	6884.88	0.019319	3	16.67	35.09	0.67	0.37	0.75
WestTrib	21824.12	10-yr		170		6883.52	6885.33	6885.19	6885.75	0.024002	5.22	32.54	35.71	0.84	0.51	1.81
WestTrib	21824.12	25-yr		510		6883.52	6886.37	6886.37	6887.47	0.027208	8.42	60.59	36.71	0.99	0.76	3.82
WestTrib	21824.12	50-yr		720		6883.52	6886.96	6886.96	6888.34	0.025036	9.42	76.4	37.23	0.99	0.8	4.43
WestTrib	21824.12	100-yr		950		6883.52	6887.47	6887.47	6889.19	0.025047	10.53	90.21	37.68	1.01	0.87	5.24
WestTrib	21801.9*	2-yr		21		6883.32	6884.17	6884.02	6884.22	0.012669	1.7	12.39	34.21	0.5	0.28	0.29
WestTrib	21801.9*	5-yr		50		6883.32	6884.43	6884.22	6884.51	0.012834	2.32	21.54	37.38	0.54	0.29	0.46
WestTrib	21801.9*	10-yr		170		6883.32	6885.02	6884.73	6885.25	0.014536	3.8	44.77	40.43	0.64	0.34	0.99
WestTrib	21801.9*	25-yr		510		6883.32	6885.92	6885.64	6886.51	0.019275	6.18	82.51	43.78	0.79	0.45	2.21
WestTrib	21801.9*	50-yr		720		6883.32	6886.29	6886.08	6887.11	0.021736	7.26	99.16	44.99	0.86	0.51	2.9
WestTrib	21801.9*	100-yr		950		6883.32	6886.63	6886.51	6887.7	0.02432	8.3	114.5	46.07	0.93	0.58	3.64
WestTrib	21779.8*	2-yr		21		6883.13	6883.89		6883.93	0.012721	1.69	12.4	34.44	0.5	0.3	0.29
WestTrib	21779.8*	5-yr		50		6883.13	6884.13		6884.22	0.013659	2.32	21.56	39.42	0.55	0.3	0.47
WestTrib	21779.8*	10-yr		170		6883.13	6884.7		6884.91	0.015677	3.67	46.33	46.99	0.65	0.36	0.96
WestTrib	21779.8*	25-yr		510		6883.13	6885.53		6886.06	0.019762	5.84	87.3	52.01	0.79	0.45	2.04
WestTrib	21779.8*	50-yr		720		6883.13	6885.88		6886.6	0.022081	6.81	105.68	54.17	0.86	0.51	2.64
WestTrib	21779.8*	100-yr		950		6883.13	6886.19	6886.05	6887.11	0.024502	7.74	122.8	56.11	0.92	0.57	3.28
WestTrib	21757.6*	2-yr		21		6882.93	6883.58		6883.63	0.014219	1.7	12.33	36.93	0.52	0.16	0.3
WestTrib	21757.6*	5-yr		50		6882.93	6883.85		6883.92	0.012834	2.18	22.89	43.75	0.53	0.18	0.42
WestTrib	21757.6*	10-yr		170		6882.93	6884.35		6884.55	0.016573	3.53	48.15	54.17	0.66	0.33	0.92
WestTrib	21757.6*	25-yr		510		6882.93	6885.16		6885.61	0.018894	5.38	94.76	62.14	0.77	0.39	1.78
WestTrib	21757.6*	50-yr		720		6882.93	6885.48		6886.08	0.020939	6.24	115.48	65.48	0.83	0.43	2.28
WestTrib	21757.6*	100-yr		950		6882.93	6885.77	6885.59	6886.54	0.022951	7.03	135.17	68.5	0.88	0.47	2.79

Falcon DBPS
West Tributary Future Conditions HEC-RAS Outputs

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # XS	Headloss (ft)	Shear Total (lb/sq ft)
WestTrib	27507.46	5-yr		230		6993.21	6994.28	6994.23	6994.54	0.034034	4.09	56.25	87.22	0.9	5.21	1.37
WestTrib	27507.46	10-yr		360		6993.21	6994.54	6994.46	6994.85	0.031084	4.49	80.11	100.72	0.89	5.08	1.54
WestTrib	27507.46	25-yr	12.87	677.13		6993.21	6995.03	6994.91	6995.43	0.022318	5.13	143.48	151.6	0.92	4.85	1.32
WestTrib	27507.46	50-yr	35.99	854.01		6993.21	6995.28	6995.12	6995.72	0.01964	5.4	182.23	162.06	0.88	4.73	1.38
WestTrib	27507.46	100-yr	82.85	1117.15		6993.21	6995.62	6995.39	6996.1	0.017068	5.73	240.01	176.72	0.84	4.59	1.45
WestTrib	27232.62	2-yr	0.09	109.91	0	6987.13	6988.68		6988.8	0.010653	2.76	40.04	48.81	0.54	7.58	0.54
WestTrib	27232.62	5-yr	1.68	227.33	0.99	6987.13	6989.1	6988.73	6989.33	0.012014	3.83	62.85	61.15	0.66	7.76	0.77
WestTrib	27232.62	10-yr	7.38	347.71	4.91	6987.13	6989.46	6989.06	6989.77	0.01225	4.56	87.22	73.92	0.73	7.92	0.9
WestTrib	27232.62	25-yr	35.35	631.13	23.51	6987.13	6990.06	6989.74	6990.59	0.014244	6.06	137.76	94.22	0.85	8.2	1.3
WestTrib	27232.62	50-yr	59.18	791.37	39.45	6987.13	6990.34	6990.07	6990.98	0.015069	6.74	165.67	103.55	0.89	8.33	1.5
WestTrib	27232.62	100-yr	102.3	1028.38	69.3	6987.13	6990.71	6990.5	6991.5	0.016112	7.64	206.3	116.59	0.94	8.55	1.78
WestTrib	26814.63	2-yr	4.67	100.6	4.73	6980.37	6981.04	6981.02	6981.22	0.037369	3.54	36.29	99.97	1	6.99	0.85
WestTrib	26814.63	5-yr	18.07	194.29	17.64	6980.37	6981.3	6981.28	6981.56	0.032379	4.42	65.69	121.51	0.99	7.02	1.09
WestTrib	26814.63	10-yr	35.2	289.37	35.43	6980.37	6981.5	6981.49	6981.85	0.033048	5.21	91.32	138.94	1.03	7.04	1.36
WestTrib	26814.63	25-yr	84.8	505.23	99.97	6980.37	6981.93	6981.93	6982.4	0.028548	6.23	164.42	199	1.06	6.54	1.47
WestTrib	26814.63	50-yr	124.1	618.42	147.45	6980.37	6982.13	6982.13	6982.64	0.02731	6.67	206.66	225.06	1.05	6.33	1.57
WestTrib	26814.63	100-yr	191.9	778.44	229.66	6980.37	6982.39	6982.39	6982.95	0.026322	7.23	267.88	255.25	1.04	5.82	1.72
WestTrib	26425.04	2-yr	4.2	103.58	2.22	6973.44	6974.15		6974.22	0.010422	2.09	58.45	124.77	0.52	9.16	0.3
WestTrib	26425.04	5-yr	15.26	207.03	7.71	6973.44	6974.43	6974.17	6974.54	0.011351	2.83	95.37	145.43	0.59	9.28	0.46
WestTrib	26425.04	10-yr	31.8	312.09	16.11	6973.44	6974.67	6974.37	6974.82	0.011208	3.32	132.41	162.94	0.61	9.41	0.57
WestTrib	26425.04	25-yr	114.7	534.81	40.46	6973.44	6975.1	6974.68	6975.3	0.010818	4.08	255.19	329.75	0.73	9.61	0.52
WestTrib	26425.04	50-yr	192.2	643.12	54.67	6973.44	6975.29	6974.7	6975.51	0.010534	4.36	320.68	355.31	0.7	9.66	0.59
WestTrib	26425.04	100-yr	334	785.85	80.17	6973.44	6975.58		6975.8	0.009352	4.55	427.11	381.76	0.63	9.73	0.65
WestTrib	25882.64	2-yr	9.81	100.12	0.07	6964.36	6964.92	6964.92	6965.06	0.031871	3.07	47.09	239.31	1.17	12.21	0.39
WestTrib	25882.64	5-yr	58.65	169.44	1.91	6964.36	6965.11	6965.11	6965.27	0.028637	3.67	101.07	339.26	1.03	11.89	0.53
WestTrib	25882.64	10-yr	123.3	231.73	4.93	6964.36	6965.22	6965.22	6965.41	0.030297	4.23	141.59	356.32	0.98	10.54	0.75
WestTrib	25882.64	25-yr	302.2	372.97	14.83	6964.36	6965.43	6965.43	6965.7	0.034063	5.3	218.97	378.59	0.96	9.75	1.23
WestTrib	25882.64	50-yr	414.7	453.38	21.91	6964.36	6965.53	6965.53	6965.85	0.036269	5.84	256.62	388.74	0.98	9.81	1.49
WestTrib	25882.64	100-yr	579.5	587.8	32.67	6964.36	6965.61	6965.61	6966.06	0.047152	7.01	289.73	401.49	1.11	10.52	2.12
WestTrib	25406.2	2-yr			110	6952.93	6952.66		6952.68	0.020955		98.39	366.9	0.38	9.31	0.35
WestTrib	25406.2	5-yr			230	6952.93	6952.82		6952.85	0.021795		160.01	421.59	0.41	9.04	0.52
WestTrib	25406.2	10-yr		0.51	359.49	6952.93	6952.98		6953.02	0.016734	0.43	231.89	474.14	0.39	8.84	0.51
WestTrib	25406.2	25-yr	0.01	22.37	667.62	6952.93	6953.27		6953.32	0.013487	1.33	377.19	526.78	0.38	8.36	0.6
WestTrib	25406.2	50-yr	0.71	45.6	843.69	6952.93	6953.4		6953.47	0.013081	1.76	447.83	548.71	0.39	8.13	0.67
WestTrib	25406.2	100-yr	5.24	86.64	1108.1	6952.93	6953.58		6953.66	0.01256	2.24	549.1	566	0.39	7.8	0.76
WestTrib	25024.12	2-yr	46.45	63.5	0.06	6941.81	6943.22	6943.11	6943.38	0.024224	3.86	40.34	64.97	0.71	8.08	0.93

Falcon DBPS
West Tributary Future Conditions HEC-RAS Outputs

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # XS	Headloss (ft)	Shear Total (lb/sq ft)
WestTrib	25024.12	5-yr	107.7	121.61	0.73	6941.81	6943.57		6943.82	0.026855	4.93	65.34	74.26	0.76	7.97	1.47
WestTrib	25024.12	10-yr	171.9	186.25	1.87	6941.81	6943.78	6943.67	6944.18	0.033734	6.26	81.37	77.38	0.87	7.8	2.2
WestTrib	25024.12	25-yr	338.3	344.78	6.89	6941.81	6944.24	6944.24	6944.95	0.040653	8.46	118.86	85.81	1.01	7.76	3.49
WestTrib	25024.12	50-yr	445.2	433.41	11.36	6941.81	6944.51	6944.51	6945.33	0.039455	9.19	142.14	88.8	1.02	7.75	3.92
WestTrib	25024.12	100-yr	613.3	566.83	19.91	6941.81	6944.88	6944.88	6945.86	0.03754	10.08	176.4	92.96	1.01	7.82	4.42
WestTrib	24630.32	2-yr		85		6933.51	6935.02	6935.02	6935.29	0.016807	4.19	20.29	38.27	1.01	7	0.55
WestTrib	24630.32	5-yr		210		6933.51	6935.47	6935.47	6935.86	0.015392	5.02	41.8	56.2	1.03	6.36	0.71
WestTrib	24630.32	10-yr		390		6933.51	6935.9	6935.9	6936.39	0.013375	5.61	69.51	71.24	1	5.55	0.81
WestTrib	24630.32	25-yr		780		6933.51	6936.52	6936.52	6937.18	0.012192	6.48	120.4	92.74	1	4.88	0.98
WestTrib	24630.32	50-yr		950		6933.51	6936.74	6936.74	6937.44	0.012005	6.69	142.1	103.21	1	4.73	1.02
WestTrib	24630.32	100-yr		1100		6933.51	6936.89	6936.89	6937.65	0.011644	6.99	157.3	104.35	1	4.61	1.09
WestTrib	24203.51	2-yr		85		6926.49	6927.67	6927.67	6927.9	0.015963	3.87	21.97	44.98	0.98	6.12	0.48
WestTrib	24203.51	5-yr		210		6926.49	6928.05	6928.05	6928.49	0.014395	5.28	39.74	47.05	1.01	5.48	0.75
WestTrib	24203.51	10-yr		389.68	0.32	6926.49	6928.5	6928.5	6929.13	0.012564	6.36	61.85	53.31	1.04	4.88	0.9
WestTrib	24203.51	25-yr		771.12	8.88	6926.49	6929.26	6929.26	6930.16	0.01063	7.64	108.07	67.92	1.06	4.12	1.04
WestTrib	24203.51	50-yr		933.8	16.2	6926.49	6929.54	6929.54	6930.52	0.010147	8.02	127.79	73.3	1.06	3.68	1.09
WestTrib	24203.51	100-yr		1075.97	24.03	6926.49	6929.76	6929.76	6930.82	0.009912	8.35	144.39	78.1	1.07	3.48	1.13
WestTrib	23803.51	2-yr		85		6919.56	6920.93	6920.93	6921.35	0.014594	5.2	16.34	19.89	1.01	6.26	0.74
WestTrib	23803.51	5-yr		210		6919.56	6921.65	6921.65	6922.27	0.012989	6.32	33.21	27.57	1.02	5.49	0.96
WestTrib	23803.51	10-yr		390		6919.56	6922.33	6922.33	6923.12	0.011764	7.12	54.81	35.37	1.01	4.82	1.12
WestTrib	23803.51	25-yr	2.24	774.14	3.62	6919.56	6923.3	6923.3	6924.37	0.009879	8.34	99.09	58.67	1.13	4.09	1.03
WestTrib	23803.51	50-yr	9.43	928.41	12.16	6919.56	6923.83	6923.83	6924.81	0.008353	8.02	137.19	101.13	1.2	3.57	0.7
WestTrib	23803.51	100-yr	25.27	1051.91	22.82	6919.56	6924.12	6924.12	6925.09	0.007569	8.07	177.05	183.81	1.42	3.27	0.45
WestTrib	23401.38	2-yr		85		6912.71	6913.63	6913.63	6913.91	0.01641	4.26	19.98	36.28	1.01	5.21	0.56
WestTrib	23401.38	5-yr		210		6912.71	6914.09	6914.09	6914.56	0.014105	5.51	38.1	41.84	1.02	5.14	0.8
WestTrib	23401.38	10-yr		389.75	0.25	6912.71	6914.58	6914.58	6915.25	0.012022	6.56	59.83	46.6	1.02	4.81	0.96
WestTrib	23401.38	25-yr	1.17	773.9	4.93	6912.71	6915.39	6915.39	6916.34	0.01028	7.84	104.44	67.35	1.11	4.04	0.99
WestTrib	23401.38	50-yr	5.51	935.94	8.55	6912.71	6915.69	6915.69	6916.73	0.009399	8.24	126.38	80.52	1.15	3.78	0.92
WestTrib	23401.38	100-yr	11.41	1075.78	12.81	6912.71	6915.95	6915.95	6917.04	0.008671	8.5	149.73	109.46	1.27	3.57	0.74
WestTrib	23003.51	2-yr	0.01	84.99	0	6906.3	6907.42		6907.61	0.010574	3.44	24.78	46.12	0.83	5.69	0.35
WestTrib	23003.51	5-yr	1.3	208.4	0.3	6906.3	6907.79	6907.74	6908.15	0.011712	4.78	45.76	61.39	0.97	5.97	0.54
WestTrib	23003.51	10-yr	6.34	382.23	1.43	6906.3	6908.16	6908.16	6908.73	0.011999	6.14	69.39	69.65	1.07	6.02	0.74
WestTrib	23003.51	25-yr	32.15	740.96	6.89	6906.3	6908.85	6908.85	6909.69	0.009888	7.55	125.64	92.13	1.11	5.01	0.84
WestTrib	23003.51	50-yr	49.46	890.29	10.25	6906.3	6909.1	6909.1	6910.04	0.009435	8.01	149.82	100.26	1.12	4.77	0.88
WestTrib	23003.51	100-yr	65.95	1020.4	13.66	6906.3	6909.31	6909.31	6910.32	0.009133	8.38	171.33	108.86	1.13	4.6	0.89
WestTrib	22594.16	2-yr		85		6901.02	6901.74	6901.74	6901.91	0.019044	3.24	26.26	80.52	1	0.5	0.39

Falcon DBPS
West Tributary Future Conditions HEC-RAS Outputs

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # XS	Headloss (ft)	Shear Total (lb/sq ft)
WestTrib	22594.16	5-yr		210		6901.02	6902	6902	6902.17	0.018283	3.33	62.98	179.14	0.99	0.47	0.4
WestTrib	22594.16	10-yr		390		6901.02	6902.16	6902.16	6902.44	0.017853	4.22	92.48	181.66	1.04	0.45	0.57
WestTrib	22594.16	25-yr		779.85	0.15	6901.02	6902.48	6902.48	6902.89	0.014646	5.19	150.83	198.06	1.05	0.41	0.7
WestTrib	22594.16	50-yr		948.75	1.25	6901.02	6902.6	6902.6	6903.06	0.013803	5.5	174.67	202.17	1.04	0.4	0.74
WestTrib	22594.16	100-yr		1097.2	2.81	6901.02	6902.7	6902.7	6903.2	0.013172	5.73	195.08	205.63	1.04	0.39	0.78
WestTrib	22566.37	2-yr		85		6897.14	6898.07	6898.07	6898.37	0.01595	4.4	19.3	32.53	1.01	5.6	0.59
WestTrib	22566.37	5-yr		210		6897.14	6898.57	6898.57	6899.08	0.013437	5.72	36.71	36.62	1.01	4.84	0.83
WestTrib	22566.37	10-yr		390		6897.14	6899.11	6899.11	6899.82	0.011962	6.77	57.59	40.77	1	3.71	1.04
WestTrib	22566.37	25-yr		780		6897.14	6899.98	6899.98	6901	0.010701	8.12	96.04	47.47	1.01	1.32	1.33
WestTrib	22566.37	50-yr		950		6897.14	6900.29	6900.29	6901.42	0.010419	8.54	111.18	49.86	1.01	1	1.43
WestTrib	22566.37	100-yr	0	1099.96	0.04	6897.14	6900.62	6900.62	6901.76	0.010377	8.57	128.54	59.29	1.03	0.84	1.38
WestTrib	22203.51	2-yr		85		6887.36	6888.58	6888.58	6888.95	0.014904	4.9	17.33	23.54	1.01	0.23	0.68
WestTrib	22203.51	5-yr		210		6887.36	6889.2	6889.2	6889.78	0.013224	6.15	34.14	30.11	1.02	0.21	0.93
WestTrib	22203.51	10-yr		390		6887.36	6890.05	6889.85	6890.64	0.008697	6.15	63.38	40.72	0.87	0.21	0.83
WestTrib	22203.51	25-yr	0.67	765.96	13.37	6887.36	6892.44		6892.68	0.001373	3.94	225.55	118.95	0.5	0.04	0.16
WestTrib	22203.51	50-yr	2.99	892.5	54.52	6887.36	6893.34		6893.53	0.00081	3.57	348.34	145.85	0.4	0.02	0.12
WestTrib	22203.51	100-yr	6.02	995.84	98.15	6887.36	6894.1		6894.26	0.000575	3.37	465.49	165.85	0.34	0.01	0.1
WestTrib	22188.6*	2-yr		85		6887.12	6888.27	6888.27	6888.64	0.01546	4.87	17.46	24.67	1.02	0.24	0.68
WestTrib	22188.6*	5-yr		210		6887.12	6888.89	6888.89	6889.44	0.013092	5.96	35.24	32.41	1.01	0.24	0.88
WestTrib	22188.6*	10-yr		390		6887.12	6890.07		6890.42	0.004522	4.75	82.18	47.82	0.64	0.11	0.48
WestTrib	22188.6*	25-yr	0.02	779.98		6887.12	6892.45		6892.64	0.001023	3.51	222.18	67.1	0.34	0.03	0.21
WestTrib	22188.6*	50-yr	0.81	937.91	11.27	6887.12	6893.34		6893.51	0.000673	3.33	315.82	121.34	0.36	0.02	0.11
WestTrib	22188.6*	100-yr	2.65	1061.1	36.25	6887.12	6894.09		6894.24	0.000502	3.21	416.67	141.24	0.32	0.02	0.09
WestTrib	22173.7*	2-yr		85		6886.88	6887.97	6887.97	6888.32	0.015074	4.74	17.95	25.97	1	0.23	0.65
WestTrib	22173.7*	5-yr		210		6886.88	6888.74		6889.13	0.008473	5	42.03	36.36	0.82	0.17	0.61
WestTrib	22173.7*	10-yr		390		6886.88	6890.09		6890.31	0.00242	3.76	103.74	53.6	0.48	0.06	0.29
WestTrib	22173.7*	25-yr		780		6886.88	6892.45		6892.6	0.000712	3.09	252.49	69.3	0.29	0.03	0.16
WestTrib	22173.7*	50-yr	0.07	949.9	0.04	6886.88	6893.35		6893.49	0.000525	3.01	316.79	89.96	0.28	0.02	0.11
WestTrib	22173.7*	100-yr	0.8	1092.08	7.12	6886.88	6894.09		6894.23	0.000413	2.96	398.08	119.56	0.28	0.02	0.08
WestTrib	22158.9*	2-yr		85		6886.64	6887.66	6887.66	6888	0.015174	4.69	18.11	26.7	1	0.23	0.64
WestTrib	22158.9*	5-yr		210		6886.64	6888.74		6888.96	0.004207	3.74	56.17	44.46	0.59	0.09	0.33
WestTrib	22158.9*	10-yr		390		6886.64	6890.1		6890.25	0.001374	3.05	127.79	59.04	0.37	0.04	0.18
WestTrib	22158.9*	25-yr		780		6886.64	6892.46		6892.58	0.0005	2.73	286.09	72.46	0.24	0.02	0.12
WestTrib	22158.9*	50-yr		950		6886.64	6893.36		6893.47	0.000395	2.7	352.12	75.36	0.22	0.02	0.11
WestTrib	22158.9*	100-yr	0.08	1099.88	0.04	6886.64	6894.1		6894.21	0.00033	2.69	409.98	87.94	0.22	0.01	0.09
WestTrib	22144.0*	2-yr		85		6886.41	6887.53		6887.73	0.007506	3.59	23.66	30.72	0.72	0.12	0.36

Falcon DBPS

West Tributary Future Conditions HEC-RAS Outputs

Reach	River Sta	Profile	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # XS	Headloss (ft)	Shear Total (lb/sq ft)
WestTrib	22144.0*	5-yr		210		6886.41	6888.75		6888.87	0.002051	2.84	73.99	51.66	0.42	0.05	0.18
WestTrib	22144.0*	10-yr		390		6886.41	6890.11		6890.21	0.000821	2.53	154.32	64.29	0.29	0.02	0.12
WestTrib	22144.0*	25-yr		780		6886.41	6892.47		6892.56	0.000358	2.42	322.4	75.86	0.21	0.01	0.09
WestTrib	22144.0*	50-yr		950		6886.41	6893.36		6893.45	0.000294	2.43	391.38	78.57	0.19	0.01	0.09
WestTrib	22144.0*	100-yr		1100		6886.41	6894.1		6894.2	0.000258	2.44	450.57	80.7	0.18	0.01	0.09
WestTrib	22129.18	2-yr		85		6886.17	6887.52	6887.01	6887.62	0.002809	2.46	34.48	37.69	0.45		0.16
WestTrib	22129.18	5-yr		210		6886.17	6888.75	6887.61	6888.83	0.001043	2.21	95.14	58.33	0.3		0.11
WestTrib	22129.18	10-yr		390		6886.17	6890.11	6888.15	6890.18	0.00051	2.12	183.62	69.4	0.23		0.08
WestTrib	22129.18	25-yr		780		6886.17	6892.47	6888.91	6892.55	0.000254	2.16	360.82	79.49	0.18		0.07
WestTrib	22129.18	50-yr		950		6886.17	6893.37	6889.19	6893.44	0.000213	2.21	430.26	82.04	0.17		0.07
WestTrib	22129.18	100-yr		1100		6886.17	6894.11	6889.4	6894.19	0.00019	2.25	488.4	84.01	0.16		0.07
WestTrib	21948.92		Culvert													
WestTrib	21824.12	2-yr		85		6883.52	6884.96	6884.8	6885.18	0.020607	3.78	22.48	35.32	0.73	0.41	1.07
WestTrib	21824.12	5-yr		210		6883.52	6885.47	6885.36	6885.99	0.025565	5.79	36.25	35.85	0.88	0.56	2.15
WestTrib	21824.12	10-yr		390		6883.52	6886	6886	6886.92	0.02898	7.71	50.61	36.39	0.99	0.73	3.4
WestTrib	21824.12	25-yr		780		6883.52	6887.11	6887.11	6888.57	0.024845	9.71	80.34	37.36	0.99	0.81	4.63
WestTrib	21824.12	50-yr		950		6883.52	6887.47	6887.47	6889.19	0.025047	10.53	90.21	37.68	1.01	0.87	5.24
WestTrib	21824.12	100-yr		1100		6883.52	6887.86	6887.86	6889.72	0.023305	10.93	100.66	39.36	1	0.86	5.44
WestTrib	21801.9*	2-yr		85		6883.32	6884.64	6884.4	6884.77	0.013099	2.85	29.82	38.5	0.57	0.3	0.63
WestTrib	21801.9*	5-yr		210		6883.32	6885.16	6884.85	6885.43	0.015196	4.15	50.55	41.16	0.66	0.35	1.15
WestTrib	21801.9*	10-yr		390		6883.32	6885.66	6885.36	6886.12	0.017788	5.47	71.31	42.96	0.75	0.41	1.8
WestTrib	21801.9*	25-yr		780		6883.32	6886.38	6886.21	6887.27	0.022412	7.54	103.41	45.29	0.88	0.53	3.09
WestTrib	21801.9*	50-yr		950		6883.32	6886.63	6886.51	6887.7	0.024305	8.3	114.52	46.07	0.93	0.58	3.64
WestTrib	21801.9*	100-yr		1100		6883.32	6886.82	6886.78	6888.05	0.025795	8.9	123.62	46.7	0.96	0.62	4.1
WestTrib	21779.8*	2-yr		85		6883.13	6884.35		6884.47	0.014122	2.8	30.4	43.01	0.59	0.32	0.62
WestTrib	21779.8*	5-yr		210		6883.13	6884.84		6885.08	0.015994	3.98	52.7	47.88	0.67	0.35	1.09
WestTrib	21779.8*	10-yr		390		6883.13	6885.29		6885.71	0.018382	5.2	75.01	50.52	0.75	0.42	1.68
WestTrib	21779.8*	25-yr		780		6883.13	6885.96		6886.74	0.022748	7.07	110.36	54.71	0.88	0.53	2.81
WestTrib	21779.8*	50-yr		950		6883.13	6886.2	6886.05	6887.12	0.023986	7.68	123.68	56.21	0.91	0.55	3.23
WestTrib	21779.8*	100-yr		1100		6883.13	6886.42	6886.28	6887.43	0.024278	8.09	135.93	57.55	0.93	0.53	3.5
WestTrib	21757.6*	2-yr		85		6882.93	6884.04		6884.15	0.014011	2.65	32.08	49	0.58	0.22	0.57
WestTrib	21757.6*	5-yr		210		6882.93	6884.53		6884.73	0.014222	3.63	57.92	55.74	0.63	0.26	0.92
WestTrib	21757.6*	10-yr		390		6882.93	6884.93		6885.29	0.01764	4.81	81.06	59.82	0.73	0.36	1.48
WestTrib	21757.6*	25-yr		780		6882.93	6885.55		6886.21	0.021833	6.49	120.2	66.22	0.85	0.45	2.45
WestTrib	21757.6*	50-yr	0.01	949.99		6882.93	6885.87		6886.57	0.019895	6.69	141.98	70.7	0.83	0.39	2.46
WestTrib	21757.6*	100-yr	0.85	1099.15		6882.93	6886.22		6886.9	0.015915	6.6	167.31	73.26	0.77	0.32	2.24

APPENDIX B
Hydraulic Computations

Project: Aug15_Working_Falcon_DBPS_S Simulation Run: FU 2-yr

Start of Run: 01Jan2011, 00:00 Basin Model: Falcon_DBPS_Future
 End of Run: 02Jan2011, 00:00 Meteorologic Model: 2-yr
 Compute Time: 22Apr2022, 17:17:05 Control Specifications: 24-hr Storm

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
WT020	0.0671383	4.4	01Jan2011, 06:25	0.70
JWT020	0.0671383	4.4	01Jan2011, 06:25	0.70
RWT030	0.0671383	4.4	01Jan2011, 06:39	0.69
WT030	0.0764732	8.6	01Jan2011, 06:09	0.80
JWT030	0.1436115	8.7	01Jan2011, 06:09	1.49
RWT042	0.1436115	8.7	01Jan2011, 06:20	1.49
WT010	0.1353300	8.8	01Jan2011, 06:21	1.30
JWT010	0.1353300	8.8	01Jan2011, 06:21	1.30
RWT044	0.1353300	8.8	01Jan2011, 06:33	1.29
JWT042	0.2789415	15.1	01Jan2011, 06:26	2.78
RWT046	0.2789415	15.1	01Jan2011, 06:40	2.77
WT040	0.1850600	9.1	01Jan2011, 06:34	1.77
JWT044	0.4640015	23.9	01Jan2011, 06:39	4.54
RWT054	0.4640015	23.8	01Jan2011, 06:50	4.53
WT060	0.1956300	13.6	01Jan2011, 06:30	2.33
WT050	0.1899300	17.3	01Jan2011, 06:23	2.45
JWT050	0.8495615	42.8	01Jan2011, 06:47	9.31
RWT092	0.8495615	42.7	01Jan2011, 06:49	9.31
WT070	0.1711000	13.6	01Jan2011, 06:15	1.64
JWT070	0.1711000	13.6	01Jan2011, 06:15	1.64
RWT080	0.1711000	13.6	01Jan2011, 06:34	1.64
WT080	0.0691596	8.7	01Jan2011, 06:13	0.89
Sub Regional Pond SR1	1.0898211	41.9	01Jan2011, 07:03	10.37
JWT080	1.0898211	41.9	01Jan2011, 07:03	10.37
RWT094	1.0898211	41.9	01Jan2011, 07:14	10.32
WT100-REV	0.1292700	37.0	01Jan2011, 06:05	2.52

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
W26-REV	0.0720000	18.4	01Jan2011, 06:04	1.18
WS3-1	0.0720000	18.1	01Jan2011, 06:15	1.18
Paint Brush Hills Pond C	0.2012700	10.4	01Jan2011, 06:34	3.67
WT090	0.1533300	22.1	01Jan2011, 06:11	2.11
JWT090	1.4444211	54.5	01Jan2011, 07:12	16.10
RWT122	1.4444211	54.5	01Jan2011, 07:17	16.07
WT110	0.1942800	22.3	01Jan2011, 06:17	2.67
JWT110	1.6387011	58.6	01Jan2011, 07:16	18.74
RWT124	1.6387011	58.6	01Jan2011, 07:26	18.66
WT130-REV	0.1016250	24.0	01Jan2011, 06:13	2.27
Paint Brush Hills Pond A	0.1016250	4.8	01Jan2011, 06:53	2.26
WT120-REV	0.0430300	7.2	01Jan2011, 06:09	0.64
JWT120	1.7833561	63.9	01Jan2011, 07:26	21.56
RWT172	1.7833561	63.8	01Jan2011, 07:38	21.45
WT140-REV	0.1445300	35.7	01Jan2011, 06:14	3.56
JWT140	0.1445300	35.7	01Jan2011, 06:14	3.56
RWT150	0.1445300	35.5	01Jan2011, 06:25	3.55
WT150-REV	0.1308100	40.8	01Jan2011, 06:09	3.28
Paint Brush Hills Pond B	0.2753400	58.7	01Jan2011, 06:19	6.83
W34B2-REV	0.0935900	27.9	01Jan2011, 06:08	2.16
Paint Brush Hills Pond B	0.3689300	9.8	01Jan2011, 07:30	8.05
JWT150	0.3689300	9.8	01Jan2011, 07:30	8.05
RWT160	0.3689300	9.8	01Jan2011, 07:40	8.00
WT160-REV	0.0734800	19.7	01Jan2011, 06:07	1.48
JWT160	0.4424100	20.1	01Jan2011, 06:07	9.49
RWT174	0.4424100	19.8	01Jan2011, 06:23	9.41
WT170-REV	0.1060150	11.6	01Jan2011, 06:22	1.57
W34-CY-REV	0.0465469	5.2	01Jan2011, 06:19	0.64
JWT172	2.3783280	81.2	01Jan2011, 06:39	33.07
RWT176	2.3783280	81.1	01Jan2011, 06:40	33.06
Sub Regional Pond S	2.3783280	66.8	01Jan2011, 08:06	30.00

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
JWT174	2.3783280	66.8	01Jan2011, 08:06	30.00
RWT180	2.3783280	66.8	01Jan2011, 08:25	29.73
WT180-REV	0.0409400	3.4	01Jan2011, 06:22	0.49
JWT180	2.4192680	67.2	01Jan2011, 08:25	30.22
RWT202	2.4192680	67.1	01Jan2011, 08:51	29.90
WT200	0.3017100	25.3	01Jan2011, 06:34	4.44
WT190	0.0574561	11.3	01Jan2011, 06:07	0.85
The Meadows Pond #10	0.0574561	0.3	01Jan2011, 13:19	0.44
JWT190	0.0574561	0.3	01Jan2011, 13:19	0.44
RWT204	0.0574561	0.3	01Jan2011, 14:16	0.42
JWT200	2.7784341	70.6	01Jan2011, 08:50	34.77
RWT210	2.7784341	70.6	01Jan2011, 09:00	34.59
WT210	0.2654600	31.9	01Jan2011, 06:39	5.64
JWT210	3.0438941	74.5	01Jan2011, 08:59	40.23
RWT232	3.0438941	74.5	01Jan2011, 09:08	39.95
WT220	0.1895300	47.1	01Jan2011, 06:14	4.54
JWT220	0.1895300	47.1	01Jan2011, 06:14	4.54
RWT234	0.1895300	46.9	01Jan2011, 06:26	4.53
JWT232	3.2334241	76.6	01Jan2011, 09:08	44.49
RWT236	3.2334241	76.6	01Jan2011, 09:09	44.48
WT230	0.1981800	71.3	01Jan2011, 06:06	5.04
JWT234	3.4316041	84.5	01Jan2011, 06:43	49.52
RWT240	3.4316041	84.0	01Jan2011, 06:48	49.44
WT240	0.0761461	36.4	01Jan2011, 06:02	2.05
Regional Pond WU North	0.5077502	89.8	01Jan2011, 06:10	50.35
Regional Pond WU Diversion	0.5077502	62.4	01Jan2011, 06:10	27.47
Old Meridian	0.0335900	24.6	01Jan2011, 06:09	1.85
RWT-OM	0.0335900	24.3	01Jan2011, 06:16	1.85
Regional Pond WU South	0.5413402	48.4	01Jan2011, 09:41	20.42
RWT240_Diversion Reach	0.0000000	27.1	01Jan2011, 06:16	22.79
JWT240	3.5413402	72.8	01Jan2011, 09:38	43.21

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RWT250	3.5413402	72.8	01Jan2011, 09:39	43.17
WT250	0.1469500	63.0	01Jan2011, 06:03	3.74
JWT250	3.6882902	74.4	01Jan2011, 09:39	46.91
RWT260	3.6882902	74.4	01Jan2011, 09:59	46.55
WT260	0.1388002	9.9	01Jan2011, 06:38	1.90
JWT260	3.8270904	75.4	01Jan2011, 09:59	48.44
RWT291	3.8270904	75.4	01Jan2011, 10:03	48.33
WT270	0.0324738	11.3	01Jan2011, 06:05	0.74
JWT270	0.0324738	11.3	01Jan2011, 06:05	0.74
RWT292	0.0324738	11.2	01Jan2011, 06:11	0.74
JWT292	3.8595642	75.8	01Jan2011, 10:03	49.07
RWT295	3.8595642	75.8	01Jan2011, 10:05	49.01
WT280	0.2669500	33.4	01Jan2011, 06:15	3.67
JWT280	0.2669500	33.4	01Jan2011, 06:15	3.67
RWT294	0.2669500	33.4	01Jan2011, 06:18	3.67
JWT294	4.1265142	94.1	01Jan2011, 06:30	52.68
RWT296	4.1265142	91.9	01Jan2011, 06:40	52.36
MT040	0.3084200	94.6	01Jan2011, 06:13	8.77
MT030	0.1566300	39.0	01Jan2011, 06:06	2.81
MT020	0.0902033	25.8	01Jan2011, 06:05	1.72
JMT020	0.0902033	25.8	01Jan2011, 06:05	1.72
RMT030	0.0902033	25.4	01Jan2011, 06:20	1.72
JMT030	0.2468333	50.1	01Jan2011, 06:10	4.53
RMT040	0.2468333	49.3	01Jan2011, 06:16	4.52
Woodmen Hills Pond	0.5552533	107.8	01Jan2011, 06:25	13.18
JMT040	0.5552533	107.8	01Jan2011, 06:25	13.18
RMT050	0.5552533	107.4	01Jan2011, 06:28	13.17
MT050	0.1186100	17.0	01Jan2011, 06:21	2.12
JMT050	0.6738633	123.1	01Jan2011, 06:27	15.30
RMT064	0.6738633	121.2	01Jan2011, 06:40	15.24
MT010	0.2898900	27.9	01Jan2011, 06:27	4.28

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
The Meadows Pond #20	0.2898900	5.4	01Jan2011, 07:46	3.10
JMT010	0.2898900	5.4	01Jan2011, 07:46	3.10
RMT062	0.2898900	5.4	01Jan2011, 08:41	2.96
MT060	0.1941800	29.9	01Jan2011, 06:15	3.24
Sub Regional Pond SR#1	1.1579333	27.0	01Jan2011, 08:03	19.74
JMT060	1.1579333	27.0	01Jan2011, 08:03	19.74
RMT070	1.1579333	26.9	01Jan2011, 08:11	19.63
MT070	0.1994800	25.4	01Jan2011, 06:25	3.57
JMT070	1.3574133	30.5	01Jan2011, 08:10	23.20
RMT080	1.3574133	30.5	01Jan2011, 08:14	23.16
MT080	0.0638371	62.4	01Jan2011, 06:00	3.37
Regional Pond MN	1.4212504	31.5	01Jan2011, 08:17	24.06
JMT080	1.4212504	31.5	01Jan2011, 08:17	24.06
RMT102	1.4212504	31.5	01Jan2011, 08:28	23.94
MT090	0.0435103	39.9	01Jan2011, 06:00	2.07
Woodmen Hills Pond #5	0.0435103	1.4	01Jan2011, 08:02	1.53
JMT090	0.0435103	1.4	01Jan2011, 08:02	1.53
RMT090	0.0435103	1.4	01Jan2011, 08:02	1.53
JMT104	0.0435103	1.4	01Jan2011, 08:02	1.53
RMT104	0.0435103	1.4	01Jan2011, 08:09	1.53
JMT102	1.4647607	32.9	01Jan2011, 08:28	25.47
RMT106	1.4647607	32.8	01Jan2011, 08:30	25.42
MT100	0.0557682	16.5	01Jan2011, 06:06	1.19
JMT106	1.5205289	33.4	01Jan2011, 08:30	26.62
RMT112	1.5205289	33.3	01Jan2011, 09:07	26.00
MT110	0.1163900	18.9	01Jan2011, 06:19	2.21
JMT110	1.6369189	34.4	01Jan2011, 09:07	28.21
RMT114	1.6369189	34.4	01Jan2011, 09:17	28.04
WT290	0.1037800	15.0	01Jan2011, 06:11	1.43
Regional Pond R1	5.8672131	107.1	01Jan2011, 10:25	74.96
JWT296	5.8672131	107.1	01Jan2011, 10:25	74.96

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
RWT314	5.8672131	107.1	01Jan2011, 10:36	74.44
WT300	0.0970199	12.2	01Jan2011, 06:15	1.33
JWT300	0.0970199	12.2	01Jan2011, 06:15	1.33
RWT312	0.0970199	12.1	01Jan2011, 06:39	1.33
WT310	0.2774200	31.3	01Jan2011, 06:16	3.58
JWT310	6.2416530	109.4	01Jan2011, 10:36	79.35
RWT320	6.2416530	109.3	01Jan2011, 10:45	78.81
WT320	0.2061400	26.8	01Jan2011, 06:14	2.83
JWT320	6.4477930	110.5	01Jan2011, 10:45	81.64
RWT352	6.4477930	110.5	01Jan2011, 10:55	81.01
ET020	0.2131700	73.4	01Jan2011, 06:07	5.42
ET010	0.1451300	37.5	01Jan2011, 06:12	3.48
Paint Brush Hills Pond #4	0.1451300	29.4	01Jan2011, 06:21	3.48
JET010	0.1451300	29.4	01Jan2011, 06:21	3.48
RET020	0.1451300	29.3	01Jan2011, 06:37	3.46
Sub Regional Pond SR6	0.3583000	9.3	01Jan2011, 07:43	7.86
JET020	0.3583000	9.3	01Jan2011, 07:43	7.86
RET030	0.3583000	9.3	01Jan2011, 08:37	7.62
ET030	0.2042800	44.9	01Jan2011, 06:17	4.89
JET030	0.5625800	44.9	01Jan2011, 06:17	12.51
RET040	0.5625800	44.6	01Jan2011, 06:30	12.42
Woodmen Hills Pond #0.1	0.7117200	60.8	01Jan2011, 06:33	15.40
ET040	0.1491400	27.9	01Jan2011, 06:16	3.00
Woodmen Hills Pond #0.3	0.7117200	9.6	01Jan2011, 12:57	11.96
JET040	0.7117200	9.6	01Jan2011, 12:57	11.96
RET050	0.7117200	9.6	01Jan2011, 13:08	11.83
ET050	0.1171900	36.5	01Jan2011, 06:03	2.24
Woodmen Hills Pond #0.2	0.8289100	10.4	01Jan2011, 13:06	12.51
JET050	0.8289100	10.4	01Jan2011, 13:06	12.51
RET060	0.8289100	10.4	01Jan2011, 13:21	12.32
ET060	0.2854300	105.0	01Jan2011, 06:02	5.77

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Woodmen Hills Pond #3	1.1143400	12.6	01Jan2011, 13:03	15.73
JET060	1.1143400	12.6	01Jan2011, 13:03	15.73
RET070	1.1143400	12.6	01Jan2011, 13:18	15.50
ET070	0.2497500	93.5	01Jan2011, 06:03	5.67
JET070	1.3640900	93.6	01Jan2011, 06:03	21.17
RET080	1.3640900	64.9	01Jan2011, 06:31	20.74
ET080	0.2916400	113.3	01Jan2011, 06:08	8.69
Woodmen Hills Pond #4	1.6557300	9.8	02Jan2011, 00:00	12.03
JET080	1.6557300	9.8	02Jan2011, 00:00	12.03
RET090	1.6557300	9.8	02Jan2011, 00:00	11.93
ET090	0.1242400	26.0	01Jan2011, 06:24	3.33
JET090	1.7799700	29.2	01Jan2011, 06:25	15.26
RET100	1.7799700	29.1	01Jan2011, 06:30	15.18
ET100	0.0480615	11.4	01Jan2011, 06:02	0.66
JET100	1.8280315	30.6	01Jan2011, 06:30	15.84
RET110	1.8280315	30.6	01Jan2011, 06:38	15.68
ET110	0.2260300	24.0	01Jan2011, 06:15	2.71
JET110	2.0540615	41.4	01Jan2011, 06:32	18.39
RET120	2.0540615	41.4	01Jan2011, 06:39	18.22
ET120	0.1091300	10.7	01Jan2011, 06:17	1.31
JET120	2.1631915	49.7	01Jan2011, 06:21	19.53
RET152	2.1631915	49.5	01Jan2011, 06:29	19.36
ET130	0.1348100	10.9	01Jan2011, 06:31	1.85
JET130	0.1348100	10.9	01Jan2011, 06:31	1.85
RET140	0.1348100	10.9	01Jan2011, 07:06	1.83
ET140	0.2675900	15.9	01Jan2011, 06:51	3.64
JET140	0.4024000	25.8	01Jan2011, 07:01	5.48
RET154	0.4024000	25.7	01Jan2011, 07:27	5.43
JET152	2.5655915	53.7	01Jan2011, 07:01	24.79
RET156	2.5655915	53.5	01Jan2011, 07:06	24.67
ET150	0.1777300	17.0	01Jan2011, 06:21	2.29

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
JET154	2.7433215	62.3	01Jan2011, 06:34	26.96
RET162	2.7433215	59.6	01Jan2011, 07:07	26.43
ET160	0.1889200	18.6	01Jan2011, 06:26	2.79
JET160	2.9322415	66.8	01Jan2011, 07:06	29.22
RET164	2.9322415	66.5	01Jan2011, 07:12	29.07
WT350	0.3037700	38.3	01Jan2011, 06:17	4.49
JWT352	9.6838045	132.8	01Jan2011, 08:22	114.58
RWT354	9.6838045	132.8	01Jan2011, 08:22	114.57
WT330	0.3266800	32.2	01Jan2011, 06:23	4.48
JWT330	0.3266800	32.2	01Jan2011, 06:23	4.48
RWT344	0.3266800	32.0	01Jan2011, 06:34	4.47
WT340	0.2780000	18.9	01Jan2011, 06:42	3.80
JWT354	10.2884845	141.5	01Jan2011, 08:22	122.83
RWT372	10.2884845	141.4	01Jan2011, 08:27	122.38
WT360	0.0656830	6.9	01Jan2011, 06:18	0.85
JWT360	0.0656830	6.9	01Jan2011, 06:18	0.85
RWT374	0.0656830	6.9	01Jan2011, 06:36	0.84
Regional Pond R2	10.3541675	142.1	01Jan2011, 08:29	120.04
JWT372	10.3541675	142.1	01Jan2011, 08:29	120.04
RWT376	10.3541675	141.9	01Jan2011, 08:38	119.24
WT370	0.2147600	7.2	01Jan2011, 06:17	1.20
JWT374_OUTLET	10.5689275	142.7	01Jan2011, 08:38	120.44
FS010	0.1220000	6.3	01Jan2011, 06:20	0.98
JFS010_OUTLET	0.1220000	6.3	01Jan2011, 06:20	0.98

Low Flow Channel Design

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035
Channel Slope	0.30 %
Left Side Slope	4.00 ft/ft (H:V)
Right Side Slope	4.00 ft/ft (H:V)
Bottom Width	20.00 ft
Discharge	70.60 ft ³ /s

Results

Normal Depth	1.22 ft
Flow Area	30.23 ft ²
Wetted Perimeter	30.03 ft
Hydraulic Radius	1.01 ft
Top Width	29.73 ft
Critical Depth	0.69 ft
Critical Slope	0.02113 ft/ft
Velocity	2.34 ft/s
Velocity Head	0.08 ft
Specific Energy	1.30 ft
Froude Number	0.41
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.22 ft
Critical Depth	0.69 ft
Channel Slope	0.30 %

Low Flow Channel Design

GVF Output Data

Critical Slope 0.02113 ft/ft

Low Flow Channel Section

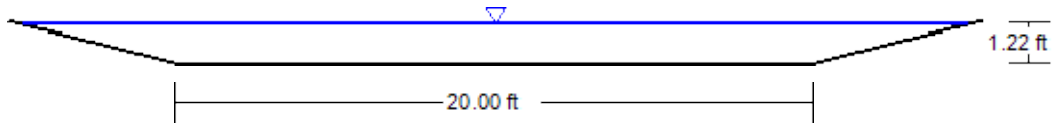
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035
Channel Slope	0.30 %
Normal Depth	1.22 ft
Left Side Slope	4.00 ft/ft (H:V)
Right Side Slope	4.00 ft/ft (H:V)
Bottom Width	20.00 ft
Discharge	70.60 ft ³ /s

Cross Section Image



V: 1
H: 1



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CHANNEL ANALYSIS

> > > low flow

Name low flow
 Discharge 70.6
 Channel Slope 0.003
 Channel Bottom Width 20
 Left Side Slope 4
 Right Side Slope 4
 Existing Bend Radius 130
 Low Flow Liner
 Retardence Class C 6-12 in
 Vegetation Type Bunch Type
 Vegetation Density Fair 50-64%
 Soil Type Sandy Loam (GM)

Unreinforced Vegetation

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	70.6 cfs	2.33 ft/s	1.21 ft	0.035	4 lbs/ft2	0.23 lbs/ft2	17.59	STABLE	--
Underlying Substrate	Straight	70.6 cfs	2.33 ft/s	1.21 ft	0.035	0.9 lbs/ft2	0.19 lbs/ft2	4.79	STABLE	--
Unreinforced Vegetation	Bend	70.6 cfs	2.33 ft/s	1.21 ft	0.035	4 lbs/ft2	0.37 lbs/ft2	10.87	STABLE	--
Underlying Substrate	Bend	70.6 cfs	2.33 ft/s	1.21 ft	0.035	0.9 lbs/ft2	0.3 lbs/ft2	2.96	STABLE	--



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ANALYSIS COMPUTATIONS

>>> [View Computation](#)

Inputs	
Channel Discharge (Q):	70.6 cfs
Peak Flow Period (H):	hours
Channel Slope (S0):	0.003 ft/ft
Bottom Width (B):	20 ft
Left Side Slope (ZL):	4 (H : V)
Right Side Slope (ZR):	4 (H : V)
Existing Channel Bend:	Yes
Bend Coefficient (Kb):	
Channel Bend Radius:	130 ft
Retardance Class of Vegetation:	C 6-12 in
Vegetation Type:	Bunch Type
Vegetation Density:	Fair 50-64%
Soil Type:	Sandy Loam (GM)
Channel Lining Options	

Basic Relationships
$A = \text{Cross sectional area, ft}^2 \text{ (m}^2\text{)} = (B * D) + (Z_L / 2 * D^2) + (Z_R / 2 * D^2)$
Where:
B = Base width of channel, ft (m)
D = Flow depth, ft (m)
Z _L = Left side bank slope (H : 1 V)
Z _R = Right side bank slope (H : 1 V)
$P = \text{Wetted perimeter, ft (m)} = B + Z_L * D + Z_R * D$
$R = \text{Hydraulic radius, ft (m)} = A / P$
$V = \text{Flow velocity, ft/s (m/s)} = Q / A$
Where:
Q = Channel discharge, cfs (cms)
$\text{Tau}_a \text{ Average bed shear stress, psf (Pa)} = 62.4 * R * S_0$
Where:
S ₀ = Gradient of channel, ft/ft (m/m)
$\text{Tau}_o = \text{Maximum bed shear stress, psf (Pa)} = 62.4 * D * S_o$

Unvegetated Conditions Computations:
$n = \text{Manning's } n = a * \text{Tau}_a^b$
<u>and (iteratively solved).</u>
$n = 1.486 / Q * A * R^{(2/3)} S_o^{0.5}$
Where:
n = Manning's n
a = Product specific coefficient from performance testing
b = Product specific coefficient from performance testing

SF _P = Product factor of safety = Tau _T / Tau ₀
Where:
Tau _T = Permissible shear stress from testing, psf (Pa)
Tau _p = In place permissible shear, psf (Pa) = Tau _T / alpha * (Tau _s + alpha / 4.3)
Where:
alpha = unit conversion constant, 0.14 English, 6.5 Metric
Tau _s = Permissible shear stress of soil
SFL = Factor of safety of installed liner = Tau _p / Tau _a

Vegetated Computations:
n = Manning's n = alpha * C _n * Tau _a -0.4
and (iteratively solved)
n = 1.486 / Q * A * R(2/3)S ₀ ^{0.5}
Where:
alpha = Unit conversion constant, 0.213 English, 1.0 Metric
C _n = Vegetation retardance coefficient
SF _P = Product factor of safety = Tau _{TV} / Tau ₀
Where:
Tau _{TV} = Permissible shear stress from testing, psf (Pa)
Tau _p = In place permissible shear, psf (Pa) = Tau _s / (1 - C _{TRM}) * (n / n _s) ²
Where:
C _{TRM} = Coefficient of TRM performance derived from testing Tau _s = Permissible shear stress of soil
n _s = Manning's of soil bed if left unprotected
SFL = Factor of safety of installed liner = Tau _p / Tau _a

Unreinforced Vegetation

Phase	Mannings N	Predicted flow depth (D)	Cross sectional area (A)	Wetted perimeter (P)	Hydraulic radius (R)	Flow velocity (V)	Froude number (FR)	Calculated Shear Stress	SFP/SFL
Unreinforced Vegetation	0.035	1.21 ft	30.2 ft ²	30.02 ft	1.01 ft	2.33 ft/s	0.41	0.23 lbs/ft ²	17.59 (SFL)
Underlying Substrate	0.035	1.21 ft	30.2 ft ²	30.02 ft	1.01 ft	2.33 ft/s	0.41	0.19 lbs/ft ²	4.79 (SFL)
Unreinforced Vegetation	0.035	1.21 ft	30.2 ft ²	30.02 ft	1.01 ft	2.33 ft/s	0.41	0.37 lbs/ft ²	10.87 (SFL)
Underlying Substrate	0.035	1.21 ft	30.2 ft ²	30.02 ft	1.01 ft	2.33 ft/s	0.41	0.3 lbs/ft ²	2.96 (SFL)

Boulder Calculations for Drop Structures

Drop Number	1	2	3	4	5	6	7	8	9	10	11
RAS Section	4847	4703	4570	3950	3700	3400	2975	2775	2400	2200	2000
V (fps)	8.22	9.07	9.07	9.12	9.11	9.12	9.12	9.10	9.12	9.44	8.75
S (ft/ft)	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Rp	4.90	5.37	5.37	5.40	5.39	5.40	5.40	5.38	5.40	5.58	5.18
Boulder Size (in)	24	24	24	24	24	24	24	24	24	24	24

Rp - From MHFD USDCM Equation 9-7 for rock sizing parameter

Boulder Size per MHFD USDCM Figure 9-4

1. If the vertical distance from the drop toe to the drop crest is less than or equal to six feet, determine the critical velocity for the design flow in both the low-flow channel and the overbanks. This velocity occurs just upstream of the drop crest. For drop structures up to six feet in height, gradually varied flow acceleration is considered negligible. If the vertical distance from the drop toe to the drop crest is greater than six feet, determine the actual velocity at the drop toe using S2 curve drawdown calculations for the design flow in both the low-flow channel and the overbanks. This can be done using either the standard step or the direct step method. If a detailed hydraulic analysis has been completed using HEC-RAS (see Section 2.3), then the actual velocity is provided in the HEC-RAS output and the critical velocity can be taken from the section just upstream of the drop structure.
2. Calculate rock-sizing parameter, R_p (dimensionless), for both segments of the cross section (overbanks and in the low-flow channel):

$$R_p = \frac{VS^{0.17}}{(S_s - 1)^{0.66}} \quad \text{Equation 9-7}$$

Where:

- V = critical velocity, V_c (for drop structure heights up to six feet) or drawdown velocity at the toe of the drop (for drop height exceeding six feet)
- S = slope along the face of the drop (ft/ft)
- S_s = specific gravity of the rock (Assume 2.55 unless the quarry certifies a higher value.)

Note that for drop heights exceeding six feet, Equation 9-7 becomes iterative, since Manning's roughness coefficient is a function of the boulder size, from Equation 9-1 or 9-2.

3. Select minimum boulder size for cross section segments within and outside the low-flow channel cross-section from Table 9-1. Use the larger boulder sizes for the low-flow channel and the overbank segments and use the smaller boulder sizes for the low-flow channel and the overbank segments during construction. Use only the larger sized boulders throughout the entire structure. Mistakes during construction are more common when specifying multiple rock sizes within the same structure.

2.55 was assumed
and used in the
calculations

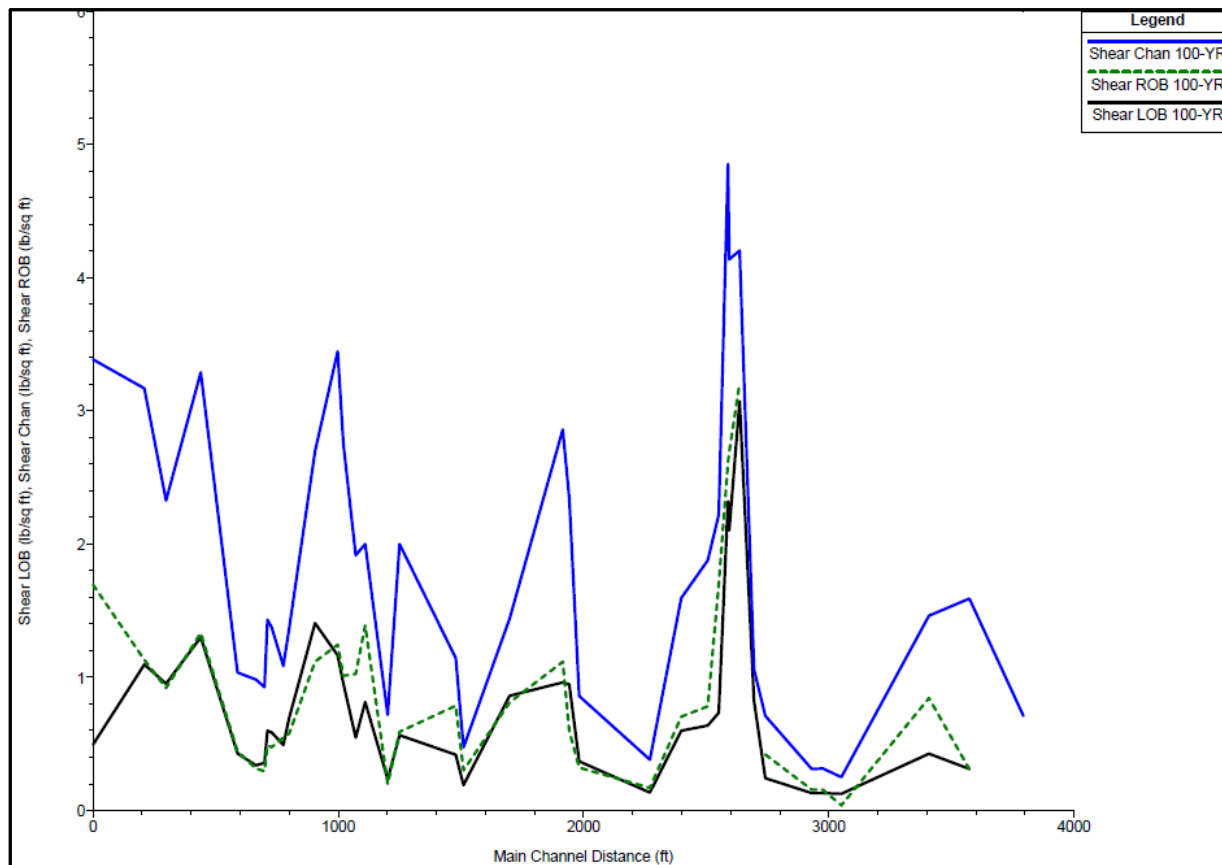


Figure 8-32. Example HEC-RAS general profile plot of shear stress

7.3 Evaluation of Erosion at Channel Bends

Special erosion control measures are often needed at bends. Riprap sizing should be based on locally higher velocities at the outside of a bend. An estimate of velocity along the outside of the bend can be made using the following equation.

$$V_a = (-0.147 \frac{r_c}{T} + 2.176) V \quad \text{Equation 8-10}$$

Where:

V_a = adjusted channel velocity for riprap sizing along the outside of channel bends (ft/sec)

V = mean channel velocity for the peak flow of the major design flow (ft/sec)

r_c = channel centerline radius (ft)

T = Top width of water during the major design flow (ft)

Riprap Calculations for Outter Banks of Channel Bends

Curve Number (From Survey Control Plan)	North Channel			South Channel		
	C1	C2	C3	C4	C6	C7
US Station	Offsite	43+11.68	42+39.91	36+30.91	30+79.36	26+43.39
HEC-RAS Section	5072	4339	4239	3587	3081	2662
Centerline Radius (ft)	130	200	160	500	300	250
Top Width (ft)	50.28	74.13	72.66	71.62	74.7	76.86
Channel Slope (%)	0.35	0.30	0.30	0.61	0.37	0.30
Mean Velocity (fps)	8.63	5.91	6.34	5.76	5.98	5.74
Adjusted Velocity = Va (fps) *	15.5	10.5	11.7	6.6	9.5	9.7
D50 (in) **	12	5	7	3	5	5
Superelevation (ft) ***	0.45	0.20	0.28	0.07	0.14	0.16

* Equation 8-10 from MHFD USDCM Chapter 8 for Evaluation of Erosion at Channel Bends

** Equation 8-11 from MHFD USDCM Chapter 8 for Riprap on Mild Slope Conditions

*** Equation MD-9 from UDFCD USDCM 2008 Chapter 7 Major Drainage

Note: Only Curves with radius to top width ratios less than 3.0 are included in these calculations.

Riprap protection is not required for appropriately sized channel radii.

8.1 Riprap Sizing

Procedures for sizing rock to be used in soil riprap, void-filled riprap, and riprap over bedding are the same.

8.1.1 Mild Slope Conditions

When subcritical flow conditions occur and/or slopes are mild (less than 2 percent), UDFCD recommends the following equation (Hughes, et al, 1983):

$$d_{50} \geq \left[\frac{VS^{0.17}}{4.5(G_s - 1)^{0.66}} \right]^2 \quad \text{Equation 8-11}$$

Where:

V = mean channel velocity (ft/sec)

S = longitudinal channel slope (ft/ft)

d_{50} = mean rock size (ft)

G_s = specific gravity of stone (minimum = 2.50, typically 2.5 to 2.7), Note: In this equation ($G_s - 1$) considers the buoyancy of the water, in that the specific gravity of water is subtracted from the specific gravity of the rock.

Note that Equation 8-11 is applicable for sizing riprap for channel lining with a longitudinal slope of no more than 2%. This equation **2.50 was assumed and used in the calculations** in sizing riprap for steep slopes (typically in excess of 2 percent), rundowns, or protection of culverts. Information on rundowns is provided in Section 7.0 of the *Hydraulic Structures* chapter, USDCM, and protection downstream of culverts is discussed in the *Culverts and Bridges* chapter. For channel slopes greater than 2% use one of the methods presented in 8.1.2.

Rock size does not need to be increased for steeper channel side slopes, provided the side slopes are no steeper than 2.5H:1V (UDFCD 1982). Channel side slopes steeper than 2.5H:1V are not recommended because of stability, safety, and maintenance considerations. See Figure 8-34 for riprap placement specifications. At the upstream and downstream termination of a riprap lining, the thickness should be increased 50% for at least 3 feet to prevent undercutting.

8.1.2 Steep Slope Conditions

Steep slope rock sizing equations are used for applications where the slope is greater than 2 percent and/or flows are in the supercritical flow regime. The following rock sizing equations may be referred to for riprap design analysis on steep slopes:

- CSU Equation, *Development of Riprap Design Criteria by Riprap Testing in Flumes: Phase II* (prepared by S.R. Abt, et al, Colorado State University, 1988). This method was developed for steep slopes from 2 to 20 percent.
- USDA- Agricultural Research Service Equations, *Design of Rock Chutes* (by K.M. Robinson, et al, USDA- ARS, 1998 Transactions of ASAE) and *An Excel Program to Design Rock Chutes for Grade*

3.2.3.2 Side Slopes

The flatter the side slopes, the more stable are the banks. For grassed channels, channels with wetland bottoms, and bioengineered channels, side slopes should not be steeper than 4H:1V. Under special conditions in areas of existing development (i.e., not new development) and where right-of-way is a problem, the slopes may be as steep as 3H:1V; however, the designer is cautioned that operation of mowing equipment may not be safe on side slopes that are steeper than 4H:1V. Channels that require minimal slope maintenance such as concrete channels may have side slopes as steep as 1.5H:1V, although public safety issues must be taken into account. For riprap-lined channels, side slopes should not be steeper than 2.5H:1V.

For vegetated channels with underlying riprap, slopes must accommodate maintenance. For example, a grassed channel with underlying riprap should have side slopes no steeper than 4H:1V, as required for a grassed channel.

Local standards or conditions may require flatter side slopes. Side slopes steeper than 3H:1V are not recommended in residential areas or areas with frequent foot traffic. Fencing or railings may need to be considered if side slopes will be steeper than 3H:1V in these areas.

3.2.4 Curvature and Transitions

Generally, the gentler the curves, the better the channel will function. Channel alignments should not be selected to maximize land-use opportunities for lot layout; instead, lot layouts should be selected based on channel alignment. The centerline curvature of the channel shall have a radius of at least twice the top width of the 100-year flow channel. The exception to this axiom is for concrete channels that may experience *supercritical* flow conditions. From a practical standpoint, it is generally not advisable to have any curvature in a channel conveying *supercritical* flow, since minor perturbations can be amplified as they move downstream.

Superelevation must also be considered with respect to curvature. Curves in a channel cause the flow velocity to be greater on the outside of the curve, and the depth of flow is also greater on the outside of a curve due to centrifugal force. This rise in water surface on the outside of a curve is referred to as superelevation. For *subcritical* flows, superelevation can be estimated by:

$$\Delta y = \frac{V^2 T}{2gr_c} \quad (\text{MD-9})$$

in which:

Δy = increase in water surface elevation above average elevation due to superelevation (ft)

V = mean flow velocity (ft/sec)

T = top width of the channel under design flow conditions (ft)

APPENDIX C
Allowable Rise Floodplain Permit

June 30, 2022

Mr. Keith Curtis
Floodplain Administrator
Pikes Peak Regional Building Department
2880 International Circle
Colorado Springs, CO 80910.

RE: Less Than One-Foot Rise Certification for Falcon Meadows at Bent Grass Channel Design on Unnamed Tributary to Black Squirrel Creek No. 2

Dear Mr. Curtis,

Galloway and Company Inc. is pleased to provide this letter and supporting documentation for the floodplain evaluation of the proposed channel design for the Falcon Meadows at Bent Grass Project along the Unnamed Tributary to Black Squirrel Creek No. 2 in the West Tributary Falcon Basin. Hydraulic analyses were performed to establish a corrected condition, Pre-Project (existing) and Post-Project (proposed) condition for the 100-year storm event. The goals of this evaluation were to document: a) that no existing insurable structures are impacted by the proposed project, and b) that the cumulative increase in the 100-year water surface elevation is below the allowable surcharge amount.

As the floodplain for the Unnamed Tributary to Black Squirrel Creek No. 2 is classified as ZONE AE on the Effective Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), and because there is no regulatory floodway associated with the creek, improvements that encroach on the tributary's floodplain meet the criteria to obtain a floodplain permit through a less than one-foot rise certification with the Pikes Peak Regional Building Department. This certification permits development within the Unnamed Tributary to Black Squirrel Creek No. 2 floodplain as long as the hydraulic study demonstrates that: "the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood elevation more than one-foot at any point within the community." However, in January 2014 the State of Colorado implemented a more stringent floodway surcharge of one-half foot. Therefore, per FEMA's and the Pikes Peak Regional Building Department's floodplain and stormwater regulations, the more stringent guideline governs. Submittal of a Conditional Letter of Map Revision (CLOMR) to FEMA is not anticipated for the current project assuming that the minimum guidelines are satisfied. Due to the drop in water surface elevations, it is a Letter of Map Revision (LOMR) will be submitted to FEMA upon construction of the channel improvements.

In January 2020, a floodplain permit was issued for the channel to include the construction of the box culvert under Bent Grass Meadows Drive and the relocation of the channel to run along the north property boundary before tying into the Unnamed Tributary to Black Squirrel Creek No. 2.

EFFECTIVE CONDITION:

The effective hydraulic and hydrologic conditions for our study reach along the Unnamed Tributary to Black Squirrel Creek No. 2 is documented in the 2003 FEMA approved 'Letter of Map Revision for the West Tributary Falcon Basin Zone A Conversion,' LOMR No.: 03-08-0385P. The study modeled the 100-year floodplain conditions along the Unnamed Tributary to Black Squirrel Creek No. 2 from approximately 200 feet upstream to East Woodmen Road. The current model for the Bent Grass Residential Filing No. 2 Project ties into the effective model at Cross Section 1517, which corresponds to section number 4 in the effective model as well as Cross Section F on the effective FIRM. The effective 100-year utilized peak discharges of 1,450 cfs between Cross Sections 5100 and 3900, and 1,482 cfs from Station 3900 to the downstream study limit of the model at Woodmen Road. LOMR 03-08-0385P and the associated model output file are provided at the end of this letter report. The corrected model in



the previously approved floodplain permit had the model ending at Cross Section 2605, at the southern boundary of the Falcon Meadows property. The corrected model has been expanded to extend all the way to Woodmen Road.

REVISED CORRECTED CONDITION:

The revised corrected condition hydraulic analysis was modeled using HEC-RAS version 5.0.7. The model utilized the effective model's results to establish the hydrology for the analysis. 100-year peak discharges were adopted from the effective results. Manning's *n* values of 0.035 and 0.050 were adopted from the effective model and used in the channel and overbanks. Contraction and expansion coefficients were also adopted from the effective model. The known water surface elevation from the effective model was used as the downstream boundary condition.

With the inclusion of three cross sections from the 2003 study (Sections F-H), the following changes were made in the revised corrected condition model:

1. The 2003 study had been modeled using HEC-2, which has limited modeling capabilities when compared to more recent versions of HEC-RAS. Thus, a new version of the model was created in HEC-RAS v. 5.0.3 and geo-rectified along the Unnamed Tributary to Black Squirrel Creek No. 2 into the NAD83 Colorado State Plane Central (FIPS 0502) projected coordinate system.
2. The 2003 study is comprised of 9 cross sections, 5 of which are located within the study area. Only 3 cross section orientations (4550, 3694, and 2605) were carried over from the 2003 study. Additional cross sections were cut in the revised corrected condition model.
3. Except for the cross sections downstream of the Falcon Meadows boundary (offsite sections), cross sections were cut using updated topographic data that was surveyed by Galloway in April 2019.

In general, revised corrected condition water surface elevations at cross sections corresponding to cross sections from the 2003 study tend to be a foot lower in elevation. This can likely be attributed to the current study utilizing more high-resolution topographic information as well as a more robust model. The 100-year water surface elevations from the revised corrected condition and effective condition are compared in Table 1.

PRE PROJECT (EXISTING) CONDITION:

Description of Improvements:

The previously approved floodplain permit was submitted to accompany the Bent Grass Residential Filing No. 2 project, which is located to the east along a portion of the channel. The proposed condition for the previously approved floodplain permit took into account the twin culverts crossing under Bent Grass Meadows Drive, along with a drop structure just upstream of the structure. The remainder of the channel was left in existing condition with no improvements and ended at Cross Section 2605, just south of the Bent Grass property. This model the basis of the pre-project (existing) condition model for this report. The model was updated to include the relocation of the channel along the north property line and was extended to the south to Woodmen Road.

The Bent Grass Residential Filing No. 2 project was a private development subdivision north of East Woodmen Road in Falcon, Colorado. The project regraded portions of the Unnamed Tributary to Black Squirrel Creek No.2 from a natural channel to a grass lined earthen channel and installed a new road crossing over the channel that conveys water through two 16 feet wide by 6 feet tall reinforced concrete box culverts. The location of these improvements is called out on Figure 1 at the end of this letter. The earthen channel was shown on separate design drawings included in the previously approved

Floodplain permit report and construction drawings for the Bent Grass Residential Filing No. 2 project. The channel was designed to be approximately 5 feet deep with 4:1 side slopes and lined with native grass seed. Locations where the channel was to be regraded include Cross Section 5000 towards the northern end of the project area, as well as Cross Sections 4400 through 3800 which correspond to the location of the proposed roadway crossing. The roadway crossing also included a 7.6-foot drop structure upstream of the box culverts that has a 4:1 slope, riprap placed upstream of the drop and downstream of the culverts, and wingwalls at the downstream end. Other improvements that were part of the Bent Grass Residential Filing No. 2 Project include: a) a capture channel along the northern property line that collects upstream flows and convey them into the tributary, b) off line detention ponds that will detain flows coming from the subdivision offsite.

Hydraulic Analysis:

The pre-project condition hydraulic analysis utilized the previous “proposed” HEC-RAS model from the approved floodplain permit to analyze the 100-year flood event in the existing channel and associated improvements on the Bent Grass Residential Filing No. 2 property. The model boundary condition was not changed from the effective condition model from 2003. In the study reach, a Manning’s *n* value of 0.035 was used in the channel. Sections of the overbank that are to be grass lined during this project were also assigned manning’s *n* values of 0.035, while undeveloped channel overbanks were assigned a Manning’s *n* of 0.050 corresponding to the effective condition model. The Bent Grass Meadows road crossing was modeled as a 16W’x6’H double barreled reinforced concrete box culvert.

The following changes were made to the pre-project condition model in order to evaluate the 100-year event associated with the post project condition:

1. Ancillary cross sections that were not close to proposed improvements were removed while additional cross sections were cut closer to the improvements.
2. Flow lengths were reassigned to accommodate the changes in cross section configurations.
3. Cross sections 4100 and 4050 were replaced with the 16’Wx6’H double barreled reinforced
4. concrete box culvert and associated design road with both low and high chords.
5. Cross section geometries were revised to reflect the proposed grade within the Unnamed Tributary to Black Squirrel Creek No. 2.
6. Cross sections were revised to better model and map back water areas.
7. Channel was extended to the south to Woodmen Road

POST PROJECT (PROPOSED) CONDITION:

Description of Improvements:

The Falcon Meadows at Bent Development includes three additional phases of single family residential subdivisions, along the east and west sides of the existing channel. South of the Falcon Meadows site, there are 3 additional parcels of land, which have future development planned. The remaining entirety of the channel north of Woodmen Road, which has not previously been improved, will regrade the existing channel from a natural channel to a grass lined earthen channel, with 11 drop structures. The proposed earthen channel is shown on separate design drawings and is approximately 5 feet deep with 4:1 side slopes and lined with native grass seed. The alignment of the channel, once it leaves the Falcon Meadows development, was shifted to the east, to allow larger and more useable

tracts of land for future development, and not leaving “slivers” of unusable land along the east side of the channel.

Hydraulic Analysis:

The post project condition hydraulic analysis utilized the pre-project HEC-RAS model to analyze the 100-year flood event in the proposed channel and associated improvements thru the Unnamed Tributary Channel, to Woodmen Road. The model boundary condition was not changed from the effective condition model from 2003. In the study reach, a Manning’s *n* value of 0.035 was used in the channel. Sections of the overbank that are to be grass lined during this project were also assigned manning’s *n* values of 0.035, while undeveloped channel overbanks were assigned a Manning’s *n* of 0.050 corresponding to the effective condition model. Manning’s *n* values of 0.04 were used for the channel section at the riprap drop structures and 0.045 at the drop structures overbank areas.

The following changes were made to the post-project condition model in order to evaluate the 100-year event associated with the post project condition:

1. Ancillary cross sections that were not close to proposed improvements were removed while additional cross sections were cut closer to the improvements.
2. Flow lengths were reassigned to accommodate the changes in cross section configurations.
3. Cross section geometries were revised to reflect the proposed grade within the Unnamed Tributary to Black Squirrel Creek No. 2.
4. Realignment of the offsite channel section, south of Falcon Meadows development, to allow for more useable parcels of land available for development.

Conclusions:

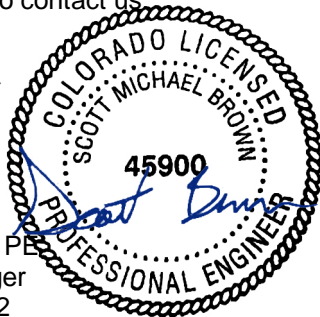
Based on the results depicted on Figure 1 and Table 1 the following conclusions are drawn:

1. The 100-year water surface elevations are generally lower from the corrected to the proposed condition.
2. The maximum increase of 0.3 is noted at Cross Section 4152, which is within the maximum increase of 0.5 feet allowed by the State of Colorado.
3. The indicated rises in the 100-year water surface elevations do not impact any insurable structures.

If you have any questions or comments about any of the information presented in this letter, please do not hesitate to contact us

Sincerely,
GALLOWAY

Scott Brown, PE
Project Manger
303-962-8522



06/30/2022

Attachments:

- A. Allowable Rise Certification
- B. Table 1: Summary of Model Water Surface Elevations
- C. Effective Firm Panel
- D. Work Maps
- E. Construction drawings
- F. Corrected Model Results Table
- G. Corrected Water Surface Profiles
- H. Corrected Cross Sections
- I. Pre-Project Model Results Table
- J. Pre-Project Water Surface Profiles
- K. Pre-Project Cross Sections
- L. Post Project Model Results Table
- M. Post Project Water Surface Profiles
- N. Post Project Cross Sections
- O. Cover Page of LOMR No.: 03-08-0385P
- P. HEC-2 Output File From Effective Study

PIKES PEAK REGIONAL FLOODPLAIN MANAGEMENT OFFICE

Floodplain Development Permit Application

Date 12/23/2021

This application is required for authorization of any construction or modification within a designated floodplain. If you need further information regarding this application and regulations, call 719-327-2898. Submit application and attachments to the Regional Floodplain Administration at Pikes Peak Regional Building Department.

OFFICE USE ONLY

F.P. Permit #

Building Permit #

Property Owner

Challenger Communities, LLC

Address 8605 Explorer Dr., Suite 250

City Colorado Springs

State CO

Zip Code 80920

email Jim@MyChallengerhomes.com

Phone 719-598-5190

Contact Jim Beyers

Phone 719-598-5190

email Jim@MyChallengerhomes.com

Project Address/Location Bent Grass Meadows Drive

Community # 080059

Zip Code 80831

Creek Unnamed Tributary to Black Squirrel Creek No. 2

Parcel # 5301000020

FIRM # 08041C0553G

Base Flood Elevation**Contractor**

Phone Number

email

Fax Number

Project Type: (Check all that apply to your project.) New Construction Addition/Remodel Repair Single Family Multi-Family Manufactured Unit Non-Residential Use Water course modification Fill/Excavation Bridge Culvert Other

Project Description: Channel improvements along Unnamed Tributary to Black Squirrel Creek No. 2 including channelization and drop structures, and riprap protection.

Requirements of construction plans include:

- Label mean sea level elevations of proposed lowest floor. Flood proofing level must be noted on plans for new structures.
- All structural elements must be designed to withstand the effects of flooding by an engineer licensed by the state of Colorado.
- A state of Colorado licensed engineer must certify that construction in a *floodway* will not increase of flood elevations.
- Plans must be drawn to scale and include applicable items (listed in box).

- Drawn to Scale
- Dimensions
- Elevations
- Located correctly on site
- All structures on plan
- Fill areas indicated
- Drainage Plan

- Preliminary Elevation Certificate
- Finished Elevation Certificate

Created by

Galloway & Co

Office Use Only: FEMA Submittals

- CLOMR Approved Date
- CLOMR-F Approved Date
- LOMR Approved Date
- LOMR-F Approved Date

ATTACHMENT A
Allowable Rise Certification



Allowable Rise Certification

I certify that I am a duly qualified registered Professional Engineer licensed in the state of Colorado.

Using standard Engineering practice, I have evaluated the floodplain in the area of the proposed project, and I have determined pre-project 100-year flood depths. I certify that the cumulative effects of the proposed Bent Grass Residential Filing No. 2 Project as detailed in the associated construction drawings will result in less than a half-foot rise in the 100-year flood elevations that I have determined for Unnamed Tributary to Black Squirrel Creek No. 2 which is shown on FEMA FIRM 08041C0553G. This certification is intended as proof of meeting the requirements set forth in the Federal Code 44CFR Chp. 1, 60.3.c.10.

I offer the following documentation in accordance with standard Engineering practice to support my findings:

- a) The Effective Firm Panel
- b) The Current Study



Scott Brown, PE
Project Manger [06/30/2022](#)
303-962-8522



ATTACHMENT B

Table 1: Summary of Model Water Surface Elevations



TABLE 1: SUMMARY OF MODEL WATER SURFACE ELEVATIONS

FEMA Effective Section	Corrected Station	Existing Stream Station	Corresponding Proposed Stream Station	100 Year Water Surface Elevation (ft, NGVD29)				Differences		
				Effective	Corrected	Existing	Proposed	Effective vs. Corrected	Corrected vs. Existing	Existing vs. Proposed
	N/A	6057	6057		--	6973.7	6973.3		--	-0.4
	N/A	6007	6007		--	6973.2	6973.2		--	0.0
	N/A	5956	5956		--	6973.1	6973.1		--	0.0
	N/A	5906	5906		--	6972.9	6972.9		--	0.0
	N/A	5856	5856		--	6972.7	6972.7		--	0.0
	N/A	5806	5806		--	6972.5	6972.5		--	0.0
	N/A	5756	5756		--	6972.3	6972.3		--	0.0
	N/A	5706	5706		--	6972.2	6972.2		--	0.0
	N/A	5656	5656		--	6972.0	6972.0		--	0.0
	N/A	5606	5606		--	6971.8	6971.8		--	0.0
	N/A	5556	5556		--	6971.6	6971.6		--	0.0
	N/A	5506	5506		--	6971.4	6971.4		--	0.0
	N/A	5456	5456		--	6971.2	6971.2		--	0.0
	N/A	5406	5406		--	6971.0	6971.0		--	0.0
	N/A	5356	5356		--	6970.8	6970.8		--	0.0
	N/A	5306	5306		--	6970.5	6970.5		--	0.0
	N/A	5256	5256		--	6970.3	6970.3		--	0.0
	N/A	5206	5206		--	6970.0	6970.0		--	0.0
	N/A	5156	5156		--	6969.7	6969.7		--	0.0
	N/A	5106	5106		--	6969.2	6969.2		--	0.0
	N/A	5088	5088		--	6968.8	6968.8		--	0.0
	N/A	5083	5083		--	6968.4	6968.4		--	0.0
	N/A	5072	5072		--	6965.8	6965.8		--	0.0
	N/A	5062	5062		--	6964.0	6964.1		--	0.1
	N/A	5056	5056		--	6964.0	6964.1		--	0.1
	N/A	5006	5006		--	6963.8	6963.5		--	-0.4
	N/A	4955	4955		--	6962.7	6962.6		--	-0.1
	4900	4900	4740		6960.8	6960.8	6957.4		0.0	-3.4
	4850	4850	4690		6959.6	6959.6	6957.0		0.0	-2.6
	4750	4750	4590		6957.6	6957.6	6954.0		0.0	-3.6
	4650	4650	4489		6955.7	6955.7	6948.8		0.0	-6.9
	4600	4600	4477		6954.1	6954.2	6949.0		0.0	-5.1
H	4550	4550	4440	6955	6954.0	6954.1	6948.9	-1.01	0.1	-5.2
	4500	4500	4390		6952.6	6952.8	6948.7		0.2	-4.1
	4400	4400	4289		6950.9	6949.1	6948.2		-1.8	-0.8
	4300	4300	4167		6949.0	6948.3	6946.8		-0.7	-1.5
	4250	4250	4152		6948.0	6943.1	6943.4		-4.9	0.3
		4212.47	4136		--	6943.7	6943.6		--	-0.1
	4200	4200	4089		6946.6	6943.6	6943.6		-3.0	0.0
		4151.92	4072			6943.4	6943.4		--	0.0
	4150	4150	4056		6946.1	6943.3	6943.3		-2.8	0.0
	4050	4010.56	3931		6944.0	6939.9	6940.0		-4.1	0.0
		4001.57	3923		--	6940.3	6940.0		--	-0.2
	4000	4000	3887		6942.8	6939.6	6939.5		-3.2	-0.1
	3900	3900	3803		6940.4	6939.4	6935.9		-1.0	-3.4
	3850	3850	3764		6939.4	6938.8	6935.7		-0.5	-3.1
	3800	3800	3725		6938.4	6938.0	6935.5		-0.4	-2.4
G	3694	3694	3620	6936.8	6935.9	6935.5	6931.5	-0.9	-0.4	-4.0
	3600	3600	3523		6934.1	6934.1	6931.2		0.0	-3.0
	3500	3500	3375		6933.1	6933.1	6930.6		0.0	-2.5
	3450	3450	3369		6932.2	6932.0	6930.3		-0.2	-1.6
	3350	3350	3302		6930.3	6930.3	6925.7		0.0	-4.6

FEMA Effective Section	Corrected Station	Existing Stream Station	Corresponding Proposed Stream Station	100 Year Water Surface Elevation (ft, NGVD29)				Differences		
				Effective	Corrected	Existing	Proposed	Effective vs. Corrected	Corrected vs. Existing	Existing vs. Proposed
	3300	3300	3237		6929.5	6929.5	6925.5		0.0	-4.0
	3250	3250	3178		6928.7	6928.7	6925.3		0.0	-3.4
	3200	3200	3130		6927.9	6927.9	6925.1		0.0	-2.8
	3150	3150	3086		6926.8	6926.8	6924.9		0.0	-1.9
	3100	3100	3050		6925.7	6925.6	6924.7		-0.1	-0.9
	3050	3050	2994		6925.8	6925.7	6924.4		0.0	-1.3
	3000	3000	2940		6924.9	6924.6	6924.0		-0.3	-0.6
	2900	2900	2848		6923.1	6923.1	6920.2		0.0	-3.0
	2800	2800	2741		6921.9	6921.9	6919.5		0.0	-2.4
	2650	2650	2594		6919.1	6919.2	6915.6		0.1	-3.6
F	2605	2605	2544	6918.9	6918.1	6918.1	6915.4	-0.76	0.0	-2.7
	2550	2550	2490		6916.4	6916.6	6915.2		0.2	-1.4
	2500	2500	2407		6915.6	6915.9	6914.7		0.2	-1.2
	2450	2450	2298		6915.0	6915.0	6910.6		0.0	-4.4
	2400	2400	2290		6913.8	6913.8	6910.6		0.0	-3.2
	2300	2300	2238		6911.7	6911.7	6910.3		0.0	-1.3
	2200	2200	2142		6909.6	6909.6	6909.5		0.0	-0.2
	2100	2100	2098		6906.9	6906.9	6905.9		0.0	-1.0
	2000	2000	2039		6906.0	6906.0	6905.4		0.0	-0.6
	1900	1900	1957		6904.6	6904.6	6904.9		0.0	0.2
	1800	1800	1808		6903.2	6903.2	6902.0		0.0	-1.2
	1700	1700	1712		6902.2	6902.2	6901.4		0.0	-0.8
	1600	1600	1606		6900.9	6900.9	6900.9		0.0	-0.1
E	1517	1517	1498	6900.2	6899.0	6900.1	6899.9	-1.18	1.1	-0.2
		1474	1474		--	6899.3	6899.4		--	0.1
	1450	1453	1453		6898.9	6898.6	6898.4		-0.3	-0.2
		1428	1428		--	6898.1	6898.2		--	0.0
	1350	1386	1386		6897.4	6897.9	6898.0		0.5	0.1
		1329	1329		--	6897.0	6897.0		--	0.0
		1317	1317		--	6894.0	6894.0		--	0.0
	1300	1286	1286		6893.6	6893.7	6893.7		0.1	0.0
		1243	1243		--	6893.4	6893.4		--	0.0
	1200	1179	1179		6892.1	6892.5	6892.5		0.4	0.0
	1150	1169	1169		6890.9	6890.9	6890.9		0.0	0.0
		1126	1126		--	6890.8	6890.8		--	0.0
	1050	1050	1050		6890.7	6890.7	6890.7		0.1	0.0
	1000	1000	1000		6888.6	6888.6	6888.6		0.0	0.0

Table 1: Comparative water surface table between the Effective, Corrected, Pre-Project, and Post Project Condition Models.

ATTACHMENT C
Effective FIRM Panel



NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov/> or contact the National Geodetic Survey at the following address:

NGS Information Services
 NOAA, NINGS12
 National Geodetic Survey
 SSMC-3, #9202
 1315 East-West Highway
 Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at <http://www.ngs.noaa.gov/>.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, City of Fountain, Bureau of Land Management, National Oceanic and Atmospheric Administration, United States Geological Survey, and Anderson Consulting Engineers, Inc. These data are current as of 2006.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

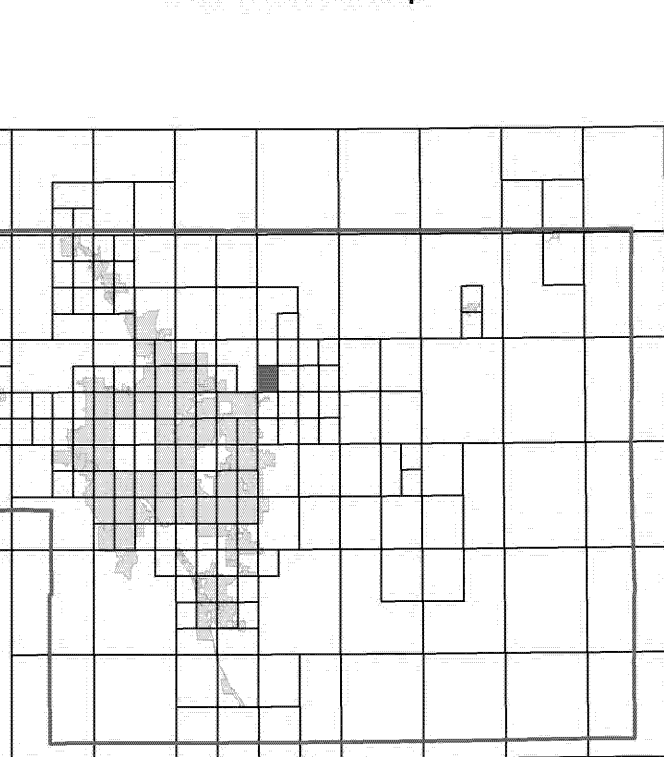
Contact **FEMA Map Service Center (MSC)** via the FEMA Map Information eXchange (FIMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at <http://www.msc.fema.gov/>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/business/nfp>.

El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

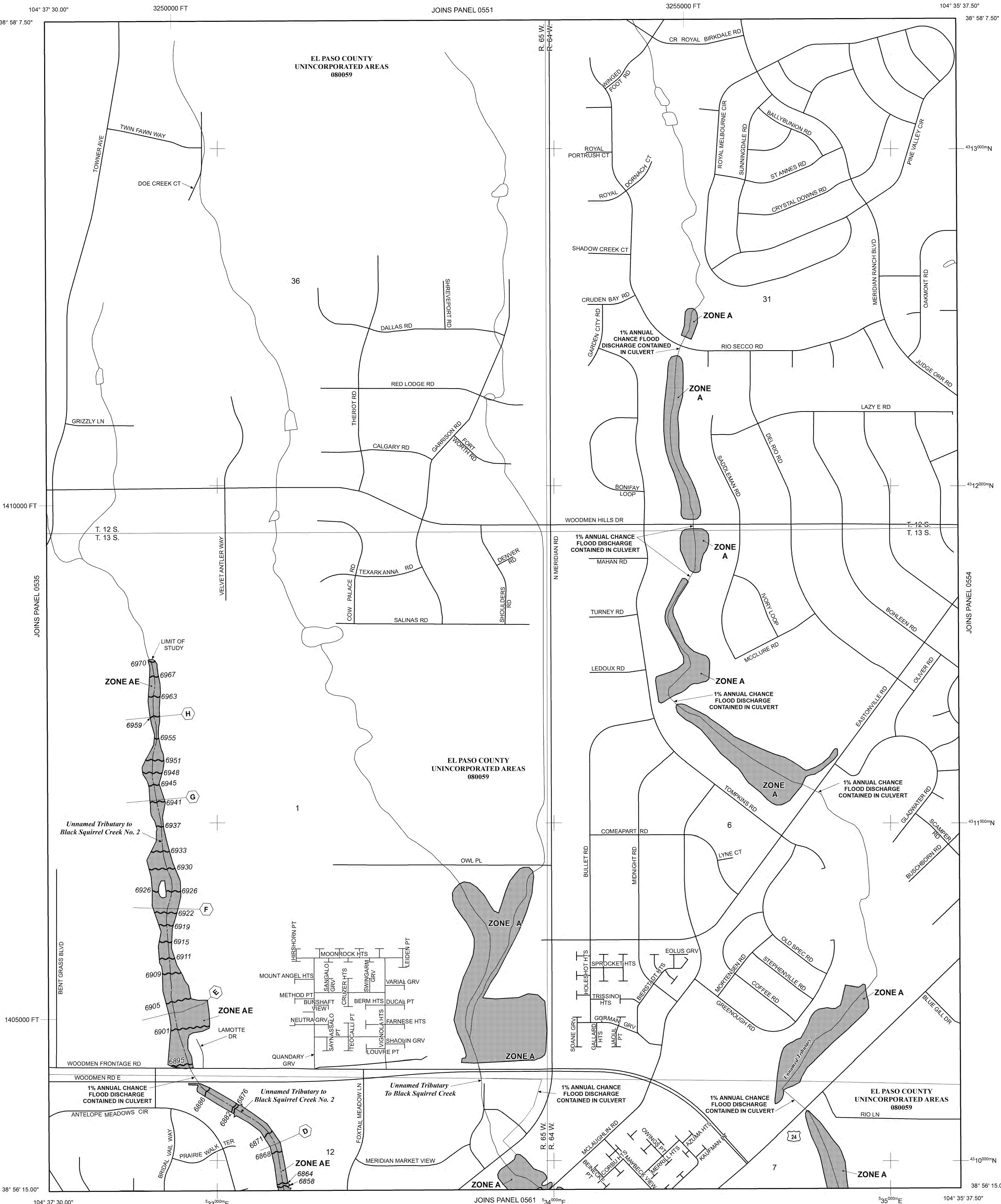
Panel Location Map



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).



Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equalled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain boundary

Floodway boundary

Zone D Boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513 Base Flood Elevation line and value; elevation in feet* (EL 987)

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A-A Cross section line

23-23 Transsect line

97° 07' 30.00" 32° 22' 30.00" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

4750000N 1000-meter Universal Transverse Mercator grid ticks, zone 13

6000000 FT 5000-foot grid ticks; Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection

DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)

M1.5 River Mile

MAP REPOSITORIES Refer to Map Repositories list on Map Index

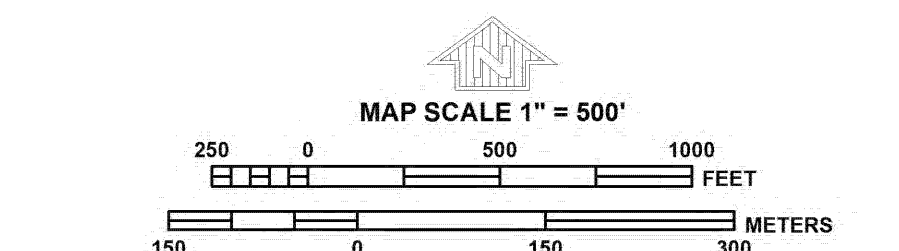
EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



NFP

PANEL 053G

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 53 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	053G	G

Notice to User: The Map Number shown below should be used when placing map orders. The Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER 08041C053G

MAP REVISED DECEMBER 7, 2018

Federal Emergency Management Agency

ATTACHMENT D

Work Maps



ATTACHMENT E
Construction Drawings

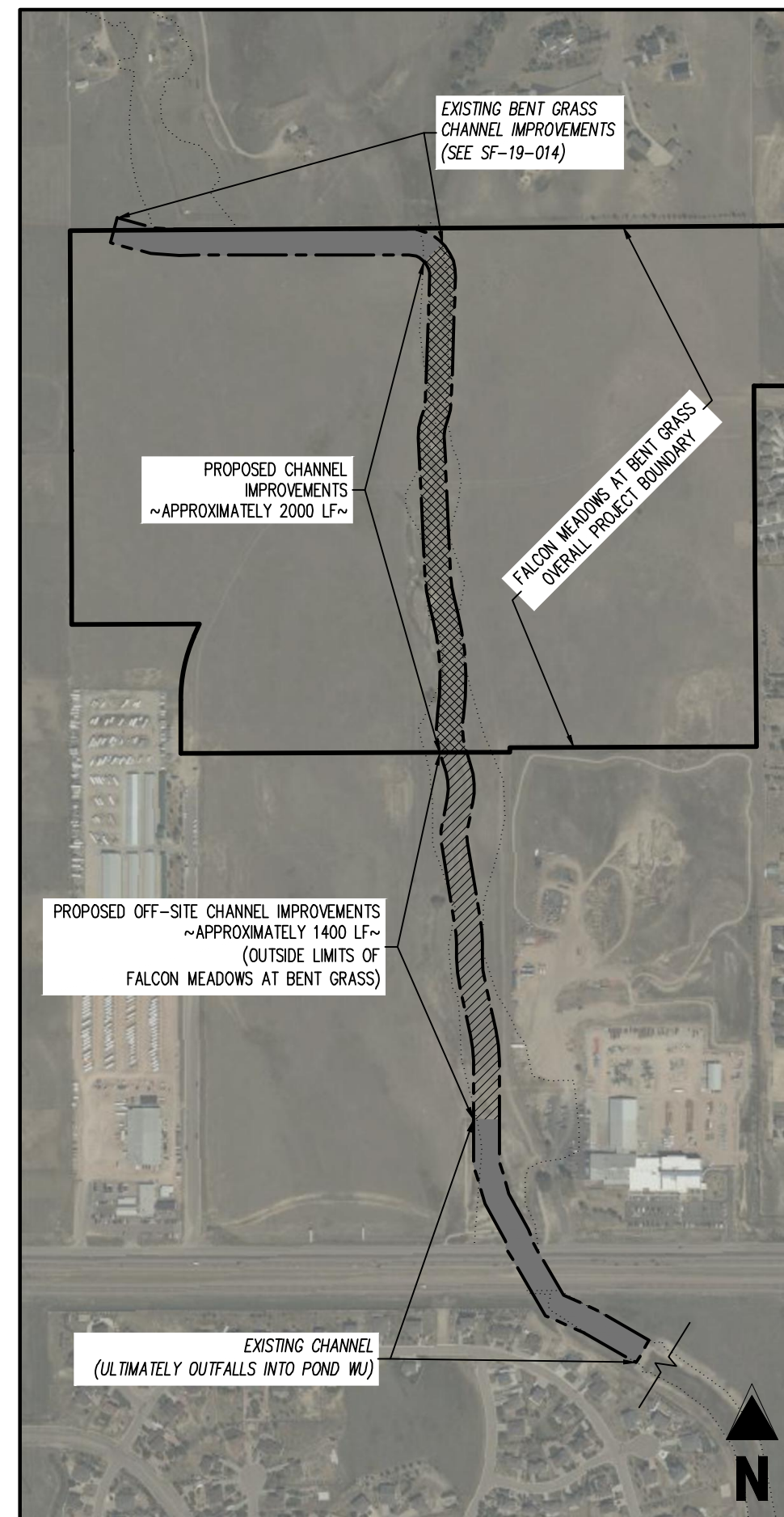
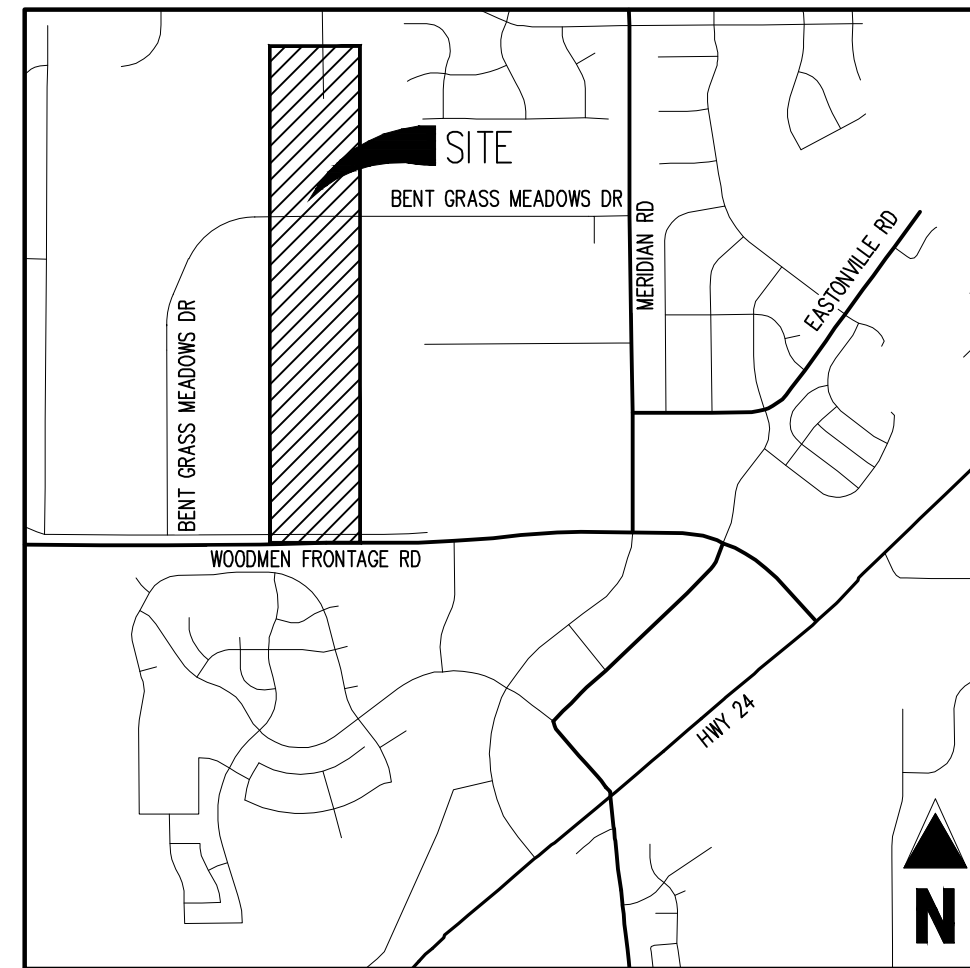


FALCON MEADOWS AT BENT GRASS DRAINAGE CHANNEL

A PARCEL OF LAND, BEING A PORTION OF THE WEST HALF OF SECTION 1, TOWNSHIP 13 SOUTH, RANGE 65 WEST, OF THE 6TH PRINCIPAL MERIDIAN
 COLORADO SPRINGS, EL PASO COUNTY, STATE OF COLORADO
 BENT GRASS MEADOWS DRIVE & EAST WOODMEN ROAD

CONSTRUCTION DRAWINGS (PLAN & PROFILE)

CDR-21-014



SHEET INDEX		
SHEET NUMBER	SHEET DESCRIPTION	SHEET TITLE
1	C0.0	COVER SHEET
2	C0.1	NOTES & TYPICAL SECTIONS
3	C1.1	PROJECT COST RESPONSIBILITY EXHIBIT
4	C2.1	EXISTING CONDITIONS
5	C3.1	HORIZONTAL CONTROL
6	C4.0	CHANNEL KEY MAP
7	C4.1	CHANNEL NORTH - PLAN & PROFILE
8	C4.2	CHANNEL SOUTH - PLAN & PROFILE
9	C4.3	CHANNEL SOUTH - PLAN & PROFILE
10	C4.4	CHANNEL SOUTH - PLAN & PROFILE
11	C5.0	DROP STRUCTURE KEY MAP
12	C5.1	DROP STRUCTURE DETAILS (
13	C5.2	DROP STRUCTURE DETAILS (
14	C5.3	DROP STRUCTURE DETAILS (
15	C5.4	DROP STRUCTURE DETAILS (
16	C5.5	DROP STRUCTURE DETAILS (
17	C5.6	DROP STRUCTURE GENERAL DETAILS
18	C6.0	CHANNEL SECTIONS KEY MAP
19	C6.1	NORTH CHANNEL SECTIONS
20	C6.2	SOUTH CHANNEL SECTIONS
21	C6.3	SOUTH CHANNEL SECTIONS
22	C6.4	SOUTH CHANNEL SECTIONS

- PROJECT CONTACTS**
- PROPERTY OWNER - DEVELOPER**
 CHALLENGER COMMUNITIES, LLC
 8605 EXPLORER DR., SUITE 250
 COLORADO SPRINGS, CO 80920
 TEL: (719) 598-5192
 ATTN: JIM BYERS
 EMAIL: JIMBYERS@CHALLENGERHOMES.COM
- APPLICANT**
 GALLOWAY & CO., INC.
 1155 KELLY JOHNSON BLVD., SUITE 305
 COLORADO SPRINGS, CO 80920
 TEL: (719) 900-7220
 ATTN: GRANT DENNIS, P.E.
 EMAIL: GRANTDENNIS@GALLOWAYUS.COM
- CIVIL ENGINEER**
 GALLOWAY & CO., INC.
 1155 KELLY JOHNSON BLVD., SUITE 305
 COLORADO SPRINGS, CO 80920
 TEL: (719) 337-1282
 ATTN: BRIAN DENNIS
 EMAIL: BRIANDENNIS@GALLOWAYUS.COM
- SURVEYOR**
 GALLOWAY & CO., INC.
 1155 KELLY JOHNSON BLVD., SUITE 305
 COLORADO SPRINGS, CO 80920
 TEL: (719) 337-1282
 ATTN: BRIAN DENNIS
 EMAIL: BRIANDENNIS@GALLOWAYUS.COM
- TRAFFIC ENGINEER**
 LSC TRANSPORTATION CONSULTANTS, INC.
 545 EAST PINES PEAK AVENUE, SUITE 210
 COLORADO SPRINGS, CO 80903
 TEL: (719) 633-2868
 ATTN: JEFFREY C. HUDSON, P.E.
 EMAIL: JEFFREY@LSCINC.COM
- GEOTECHNICAL ENGINEER**
 ROCKY MOUNTAIN GROUP
 2910 JUSTIN BLUFFS PKWY
 COLORADO SPRINGS, CO 80918
 TEL: (719) 394-3072
 ATTN: TONY MUNGER, P.E.
 EMAIL: TMUNGER@RMG-ENGINEERS.COM

- EL PASO COUNTY & UTILITY CONTACTS**
- EL PASO COUNTY - PLANNING REVIEW**
 PLANNING AND DEVELOPMENT
 2880 INTERNATIONAL CIRCLE, SUITE 110
 COLORADO SPRINGS, CO 80910
 TEL: (719) 520-6300
 CONTACT: -
 EMAIL: -
- EL PASO COUNTY - ENGINEERING REVIEW**
 PLANNING AND DEVELOPMENT
 2880 INTERNATIONAL CIRCLE, SUITE 110
 COLORADO SPRINGS, CO 80910
 TEL: (719) 520-6300
 CONTACT: -
 EMAIL: -
- WATER & WASTEWATER**
 WOODMEN HILLS METRO DISTRICT
 8046 EASTONVILLE ROAD
 FALCON, CO 80831
 TEL: (719) 495-2500
 ATTN: JERRY JACOBSON
 EMAIL: JERRY@WMHD.ORG
- ELECTRIC**
 MOUNTAIN VIEW ELECTRIC
 1140 E WOODMEN RD
 FALCON, CO 80831
 TEL: (719) 495-2283
 CATHY HANSEN-LEE
 EMAIL: CATHY@HMVEA.COOP
- NATURAL GAS**
 COLORADO SPRINGS UTILITIES (CSU)
 7710 DURANT DRIVE, P.O. BOX 1103, MAIL CODE 2150
 COLORADO SPRINGS, CO 80947-2150
 TEL: (719) 668-5573
 ATTN: AARON CASSIO
 EMAIL: ACASSIO@CSU.ORG
- FIRE DEPARTMENT**
 FALCON FIRE PROTECTION DISTRICT
 7030 OLD MERIDIAN ROAD
 PEYTON, CO 80831
 TEL: (719) 495-4050
 EMAIL: FALCONFIRE@FALCONFIREPD.ORG

- LIST OF ABBREVIATIONS**
- SHT - SHEET
 Δ - DEFLECTION ANGLE
 L - LENGTH
 R - RADIUS
 CB - CHORD BEARING
 C - CHORD LENGTH
 N - NORTH/NORTHING
 W - WEST
 E - EAST/EASTING
 S - SOUTH
 DET - DETAIL
 EX - EXISTING
 W/- WITH
 PC - POINT OF CURVATURE/PORTLAND CEMENT
 M/F - MELTED WIRE FABRIC
 VERT - VERTICAL
 OC - ON CENTER
 FDC - FIRE DEPARTMENT CONNECTION
 CT - COURT
 DR - DRIVE
 TYP - TYPICAL
 REC - RECEPTION NUMBER
 Ø, DIA - DIAMETER
 PT - POINT OF TANGENCY
 MIN - MINIMUM
 MAX - MAXIMUM
 HDPE - HIGH DENSITY POLYETHYLENE

BENCHMARK
 ELEVATIONS ARE BASED ON THE SOUTHWEST CORNER OF LOT, WOODMEN HILLS FILING NO. 4, MONUMENTED BY NO. 4 REBAR WITH A YELLOW PLASTIC CAP, STAMPED L5# 24954. ELEVATION = 6947.67

BASIS OF BEARING
 ALL BEARINGS ARE GRID BEARINGS OF THE COLORADO STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICAN DATUM 1983. THE BEARING OF THE LINE BETWEEN THE SOUTHWEST CORNER OF SECTION 1, T13S, R65W AND THE WEST QUARTER CORNER SECTION 1, T13S, R65W IS N0013°46'W AND MONUMENT AS SHOWN.

NOTE: CONTRACTOR SHALL PROTECT ALL EXISTING SURVEY MONUMENTATION. CONTRACTOR SHALL HAVE LICENSED SURVEYOR REPLACE ANY DAMAGED OR DISTURBED MONUMENTATION AT THEIR COST.

SURVEYOR TO OBTAIN AUTOCAD FILE FROM ENGINEER AND VERIFY ALL HORIZONTAL CONTROL DIMENSIONING PRIOR TO CONSTRUCTION STAKING. SURVEYOR MUST VERIFY ALL BENCHMARK, BASIS OF BEARING AND DATUM INFORMATION TO ENSURE IMPROVEMENTS WILL BE AT THE SAME HORIZONTAL AND VERTICAL LOCATIONS SHOWN ON THE DESIGN CONSTRUCTION DRAWINGS. PRIOR TO CONSTRUCTION STAKING ANY DISCREPANCY MUST BE REPORTED TO OWNER AND ENGINEER PRIOR TO CONTINUATION OF ANY FURTHER STAKING OR CONSTRUCTION WORK.

CAUTION - NOTICE TO CONTRACTOR

- ALL UTILITY LOCATIONS SHOWN ARE BASED ON MAPS PROVIDED BY THE APPROPRIATE UTILITY COMPANY AND FIELD SURFACE EVIDENCE AT THE TIME OF SURVEY AND IS TO BE CONSIDERED AN APPROXIMATE LOCATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION OF ALL UTILITIES, PUBLIC OR PRIVATE, WHETHER SHOWN ON THE PLANS OR NOT, PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.
- WHERE A PROPOSED UTILITY CROSSES AN EXISTING UTILITY, IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF SUCH EXISTING UTILITY, EITHER THROUGH POT-HOLING OR ALTERNATIVE METHOD. REPORT INFORMATION TO THE ENGINEER PRIOR TO CONSTRUCTION.

ENGINEER'S STATEMENT
 THESE DETAILED PLANS AND SPECIFICATIONS WERE PREPARED UNDER MY DIRECTION AND SUPERVISION. SAID PLANS AND SPECIFICATIONS HAVE BEEN PREPARED ACCORDING TO THE CRITERIA ESTABLISHED BY THE COUNTY FOR DETAILED ROADWAY, DRAINAGE, GRADING AND EROSION CONTROL PLANS AND SPECIFICATIONS, AND SAID PLANS AND SPECIFICATIONS ARE IN CONFORMITY WITH APPLICABLE MASTER DRAINAGE PLANS AND MASTER TRANSPORTATION PLANS. SAID PLANS AND SPECIFICATIONS MEET THE PURPOSES FOR WHICH THE PARTICULAR ROADWAY AND DRAINAGE FACILITIES ARE DESIGNED AND ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. I ACCEPT RESPONSIBILITY FOR ANY LIABILITY CAUSED BY ANY NEGLIGENT ACTS, ERRORS OR OMISSIONS ON MY PART IN PREPARATION OF THESE DETAILED PLANS AND SPECIFICATIONS.

SCOTT M. BROWN, COLORADO P.E. 45900
 08/22/2022

OWNER'S STATEMENT
 I, THE OWNER/DEVELOPER HAVE READ AND WILL COMPLY WITH THE REQUIREMENTS OF THE GRADING AND EROSION CONTROL PLAN AND ALL OF THE REQUIREMENT SPECIFIED IN THESE DETAILED PLANS AND SPECIFICATIONS.
 JIM BYERS
 CHALLENGER COMMUNITIES, LLC
 8/22/2022
 DATE

EL PASO COUNTY
 COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT, FILED IN ACCORDANCE WITH THE REQUIREMENTS OF THE EL PASO COUNTY LAND DEVELOPMENT CODE, DRAINAGE CRITERIA MANUAL, VOLUMES 1 AND 2, AND ENGINEERING CRITERIA MANUAL AS AMENDED.

JOSHUA PALMER, P.E.
 INTERM COUNTY ENGINEER / ECOM ADMINISTRATOR
 DATE



COPYRIGHT
 THESE PLANS ARE AN INSTRUMENT OF SERVICE AND ARE THE PROPERTY OF GALLOWAY, AND MAY NOT BE DUPLICATED, DISCLOSED, OR REPRODUCED WITHOUT THE WRITTEN CONSENT OF GALLOWAY. COPYRIGHTS AND INFRAINGEMENTS WILL BE ENFORCED AND PROSECUTED.



CONSTRUCTION DOCUMENTS
 FALCON MEADOWS AT BENT GRASS
 FOR
 CHALLENGER COMMUNITIES, LLC
 BENT GRASS MEADOWS DRIVE & MERIDIAN ROAD
 FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No:	CLH000023
Drawn By:	CMVJ
Checked By:	RGD
Date:	8/19/2022

COVER SHEET

GENERAL CONSTRUCTION NOTES

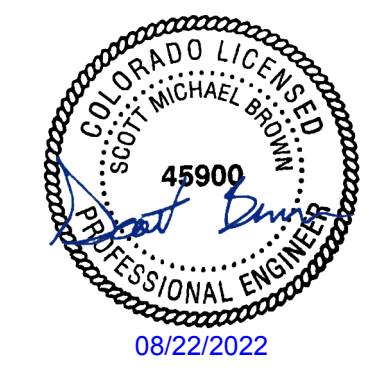
1. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE EXISTENCE AND LOCATION OF ALL UNDERGROUND UTILITIES ALONG THE ROUTE OF THE WORK. THE OMISSION FROM OR THE INCLUSION OF UTILITY LOCATIONS ON THE PLANS IS NOT TO BE CONSIDERED AS THE NONEXISTENCE OF OR A DEFINITE LOCATION OF EXISTING UNDERGROUND UTILITIES.
2. THE CONTRACTOR SHALL TAKE THE NECESSARY PRECAUTIONS TO PROTECT EXISTING UTILITIES FROM DAMAGE DUE TO THIS OPERATION. ANY DAMAGE TO THE UTILITIES WILL BE REPLACED AT THE CONTRACTORS EXPENSE AND ANY SERVICE DISRUPTION WILL BE SETTLED BY THE CONTRACTOR.
3. ADDITIONAL EROSION CONTROL STRUCTURES MAY BE REQUIRED AT THE TIME OF CONSTRUCTION.
4. ALL BACKFILL, SUB-BASE AND / OR BASE COURSE (CLASS 6) MATERIAL SHALL BE COMPACTED TO THE SOILS ENGINEERS RECOMMENDATIONS, AND APPROVED BY EL PASO COUNTY DEVELOPMENT SERVICES ENGINEERING DIVISION.
5. ALL STATIONING IS CENTERLINE UNLESS OTHERWISE INDICATED. ALL ELEVATIONS ARE FLOW LINE UNLESS OTHERWISE INDICATED.
6. ALL DISTURBED PAVEMENT EDGES SHALL BE CUT TO NEAT LINES. REPAIR SHALL CONFORM TO THE EPC ECM APPENDIX K – 1.2C.
7. ALL INTERSECTION ACCESSSES TO BE CONSTRUCTED WITH A 25 FOOT SIGHT VISIBILITY TRIANGLES AND THERE SHALL BE NO OBSTRUCTIONS GREATER THAN 18" IN THIS AREA.
8. ALL CULVERT AND STORM PIPES SHALL BE SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE (HOPF), OR REINFORCED CONCRETE PIPE (RCP). ALL CULVERTS SHALL BE PLACED COMPLETE WITH FLARED END SECTIONS. ADEQUACY OF MATERIAL THICKNESS FOR ANY CDP INSTALLED SHALL BE VERIFIED BY OWNERS GEOTECHNICAL ENGINEER TO SUPPORT MINIMUM 50 YEAR DESIGN LIFE. CULVERTS MUST CONFORM TO EPC ECM SECTION 3.32 – CULVERTS.
9. ASPHALT THICKNESS AND BASE COURSE THICKNESS (COMPACTED FOR ROADS SHALL BE PER DESIGN REPORT BY OWNERS GEOTECHNICAL ENGINEER. OWNERS GEOTECHNICAL ENGINEER TO BE ON SITE AT TIME OF ROAD CONSTRUCTION TO EVALUATE SOIL CONDITIONS AND DETERMINE IF ADDITIONAL MEASURES ARE NECESSARY TO ASSURE STABILITY OF THE NEW ROADS. PAVEMENT DESIGN SHALL BE APPROVED BY EL PASO COUNTY DEVELOPMENT SERVICES ENGINEERING DIVISION PRIOR TO CONSTRUCTION.
10. TYPE M RAP WITH 4" OF TYPE II GRANULAR BEDDING AND MIRAFI 180N OR EQUAL MAY BE SUBSTITUTED WHERE TYPE L RAP WITH MIRAFI FW 700 OR EQUAL IS SPECIFIED.
11. ALL MATERIALS AND INSTALLATION PROCEDURES SHALL BE IN COMPLIANCE WITH ANY AND ALL APPLICABLE EL PASO COUNTY STANDARDS AND WITH WOODMAN HILLS METRO DISTRICT CONSULTING ENGINEER APPROVAL.
12. ALL POTABLE WATER MAINS SHALL BE ANWA C900–SR18 PVC WITH PUSH-ON SINGLE GASKET TYPE JOINTS AND SHALL MEET THE REQUIREMENTS OF ANSI / NSF 61.
13. ALL WATER MAIN FITTINGS SHALL BE MADE FROM GRAY-IRON OR DUCTILE IRON AND FURNISHED WITH MECHANICAL JOINT ENDS. ALL FITTINGS SHALL HAVE A PRESSURE RATING OF 250 PSI AND SHALL MEET THE REQUIREMENTS OF ANSI / NSF 61.
14. ALL WATER LINE BENDS, TEES, BLOW-OFFS AND PLUGS AT DEAD-END MAINS SHALL BE PROTECTED FROM THRUST BY USING CONCRETE THRUST BLOCKS AND / OR RODDING AND RESTRAINED PIPE PER THE PAINT BRUSH HILLS METRO DISTRICT CONSULTING ENGINEER APPROVAL.
15. MAXIMUM DEFLECTION OF 8" OR 12" PVC WATER MAIN JOINTS IS 4 DEGREES. CORRESPONDING MINIMUM CURVE RADIUS IS 286'. ADDITIONAL 11.25' OR 22.5' BENDS MAY BE REQUIRED FOR PROPER ALIGNMENT.
16. CONTRACTOR IS RESPONSIBLE FOR PROVIDING DETAILED AS-BUILTS OF ALL WATER MAIN, STORM SEWER AND SANITARY SEWER MAIN INSTALLATIONS, INCLUDING ACCURATE DISTANCES OF MAIN LINES, VALVES, FITTINGS, MANHOLES AND LOCATIONS OF WATER AND SEWER SERVICES.
17. SANITARY SEWER PIPE AND FITTINGS: PVC 4" – 8" ASTM D3034, TYPE PSM, SDR 35; PUSH-ON JOINTS AND MOLDED RUBBER GASKETS MAXIMUM HORIZONTAL DEFLECTIONS, AFTER INSTALLATION AND BACK FILLING SHALL NOT EXCEED 3% OF THE PIPE DIAMETER. (MINIMUM CURVE RADIUS IS 100' FOR 8" PVC SANITARY SEWER MAIN)

STANDARD NOTES FOR EPC CONSTRUCTION PLAN

1. ALL DRAINAGE AND ROADWAY CONSTRUCTION SHALL MEET THE STANDARDS AND SPECIFICATIONS OF THE CITY OF COLORADO SPRINGS/EL PASO COUNTY DRAINAGE CRITERIA MANUAL, VOLUMES 1 AND 2, AND THE EL PASO COUNTY ENGINEERING CRITERIA MANUAL.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR THE NOTIFICATION AND FIELD NOTIFICATION OF ALL EXISTING UTILITIES, WHETHER SHOWN ON THE PLANS OR NOT, BEFORE BEGINNING CONSTRUCTION. LOCATION OF EXISTING UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. CALL 811 TO CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO (UNCC).
3. CONTRACTOR SHALL KEEP A COPY OF THESE APPROVED PLANS, THE GRADING AND EROSION CONTROL PLAN, THE STORMWATER MANAGEMENT PLAN (SWMP), THE SOILS AND GEOTECHNICAL REPORT, AND THE APPROPRIATE DESIGN AND CONSTRUCTION STANDARDS AND SPECIFICATIONS AT THE JOB SITE AT ALL TIMES, INCLUDING THE FOLLOWING:
 - A. EL PASO COUNTY ENGINEERING CRITERIA MANUAL (ECM)
 - B. CITY OF COLORADO SPRINGS/EL PASO COUNTY DRAINAGE CRITERIA MANUAL, VOLUMES 1 AND 2
 - C. COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION
 - D. CDOT M & S STANDARDS
4. NOTWITHSTANDING ANYTHING DEPICTED IN THESE PLANS IN WORDS OR GRAPHIC REPRESENTATION, ALL DESIGN AND CONSTRUCTION RELATED TO ROADS, STORM DRAINAGE AND EROSION CONTROL SHALL CONFORM TO THE STANDARDS AND REQUIREMENTS OF THE MOST RECENT VERSION OF THE RELEVANT ADOPTED EL PASO COUNTY STANDARDS, INCLUDING THE LAND DEVELOPMENT CODE, THE ENGINEERING CRITERIA MANUAL, THE DRAINAGE CRITERIA MANUAL, AND THE DRAINAGE CRITERIA MANUAL VOLUME 2. ANY DEVIATIONS FROM REGULATIONS AND STANDARDS MUST BE REQUESTED, AND APPROVED, IN WRITING. ANY MODIFICATIONS NECESSARY TO MEET CRITERIA AFTER-THE-FACT WILL BE ENTIRELY THE DEVELOPER'S RESPONSIBILITY TO RECTIFY.
5. IT IS THE DESIGN ENGINEER'S RESPONSIBILITY TO ACCURATELY SHOW EXISTING CONDITIONS, BOTH ON-SITE AND OFF-SITE, ON THE CONSTRUCTION PLANS. ANY MODIFICATIONS NECESSARY DUE TO CONFLICTS, OMISSIONS, OR CHANGED CONDITIONS WILL BE ENTIRELY THE DEVELOPER'S RESPONSIBILITY TO RECTIFY.
6. CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING WITH EL PASO COUNTY PLANNING AND COMMUNITY DEVELOPMENT (PCD) – INSPECTIONS, PRIOR TO STARTING CONSTRUCTION.
7. IT IS THE CONTRACTOR'S RESPONSIBILITY TO UNDERSTAND THE REQUIREMENTS OF ALL JURISDICTIONAL AGENCIES AND TO OBTAIN ALL REQUIRED PERMITS, INCLUDING BUT NOT LIMITED TO EL PASO COUNTY EROSION AND STORMWATER QUALITY CONTROL PERMIT (ESQCP), REGIONAL BUILDING FLOODPLAIN DEVELOPMENT PERMIT, U.S. ARMY CORPS OF ENGINEERS-ISSUED 401 AND/OR 404 PERMITS, AND COUNTY AND STATE FUGITIVE DUST PERMITS.
8. CONTRACTOR SHALL NOT DEVIATE FROM THE PLANS WITHOUT FIRST OBTAINING WRITTEN APPROVAL FROM THE DESIGN ENGINEER AND PCD. CONTRACTOR SHALL NOTIFY THE DESIGN ENGINEER IMMEDIATELY UPON DISCOVERY OF ANY ERRORS OR INCONSISTENCIES.
9. ALL STORM DRAIN PIPE SHALL BE CLASS III RCP UNLESS OTHERWISE NOTED AND APPROVED BY PCD.
10. CONTRACTOR SHALL COORDINATE GEOTECHNICAL TESTING PER ECM STANDARDS. PAVEMENT DESIGN SHALL BE APPROVED BY EL PASO COUNTY PCD PRIOR TO PLACEMENT OF CURB AND GUTTER AND PAVEMENT.
11. ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE AT APPROVED CONSTRUCTION ACCESS POINTS.
12. SIGHT VISIBILITY TRIANGLES AS IDENTIFIED IN THE PLANS SHALL BE PROVIDED AT ALL INTERSECTIONS. OBSTRUCTIONS GREATER THAN 18 INCHES ABOVE FLOWLINE ARE NOT ALLOWED WITHIN SIGHT TRIANGLES.
13. SIGNING AND STRIPING SHALL COMPLY WITH EL PASO COUNTY DOT AND MUTCD CRITERIA. [IF APPLICABLE, ADDITIONAL SIGNING AND STRIPING NOTES WILL BE PROVIDED.]
14. CONTRACTOR SHALL OBTAIN ANY PERMITS REQUIRED BY EL PASO COUNTY DOT, INCLUDING WORK WITHIN THE RIGHT-OF-WAY AND SPECIAL TRANSPORT PERMITS.
15. THE LIMITS OF CONSTRUCTION SHALL REMAIN WITHIN THE PROPERTY LINE UNLESS OTHERWISE NOTED. THE OWNER/DEVELOPER SHALL OBTAIN WRITTEN PERMISSION AND EASEMENTS, WHERE REQUIRED, FROM ADJOINING PROPERTY OWNER(S) PRIOR TO ANY OFF-SITE DISTURBANCE, GRADING, OR CONSTRUCTION.



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 Colorado Springs, CO 80920
 719.900.7220
 GallowayUS.com



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CONSTRUCTION DOCUMENTS
 FALCON MEADOWS AT BENT GRASS
 FOR
 CHALLENGER COMMUNITIES, LLC
 BENT GRASS MEADOWS DRIVE & MERIDAN ROAD
 FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No: CLH000023
 Drawn By: CMWJ
 Checked By: RGD
 Date: 8/19/2022

NOTES & TYPICAL SECTIONS

C0.1
 Sheet 2 of 23

CHALLENGER COMMUNITIES, LLC - DRAWN BY: SCOTT MICHAEL BUNN, P.E. (NO. 45900) 08/19/2022



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PROJECT COST RESPONSIBILITY EXHIBIT

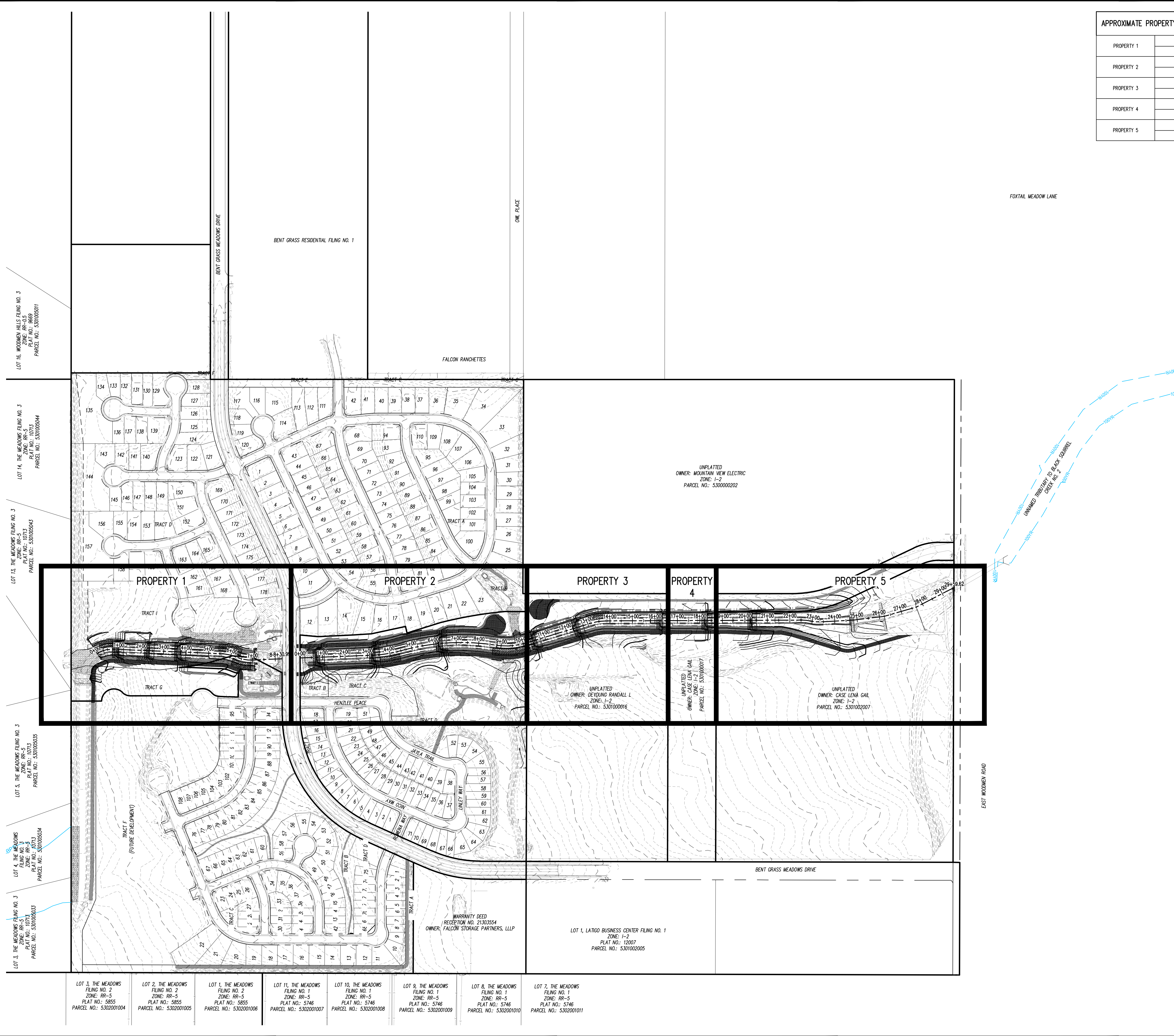
C1.1
Sheet 3 of 23

APPROXIMATE PROPERTY QUANTITIES (REFER TO FAE FOR DETAILED QUANTITY BREAKDOWN)

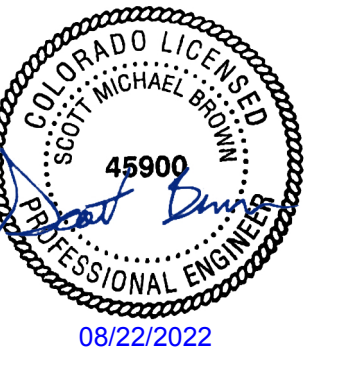
PROPERTY	CHANNEL IMPROVEMENTS (LF)	DROP STRUCTURES (EA)
PROPERTY 1	700	3
PROPERTY 2	950	3
PROPERTY 3	650	3
PROPERTY 4	210	1
PROPERTY 5	590	1

NOTES:
1. IT IS THE INTENTION OF CHALLENGER COMMUNITIES, LLC TO CONSTRUCT THE ENTIRE CHANNEL AT ONE TIME IN A SINGLE PHASE.

CAUTION - NOTICE TO CONTRACTOR
1. ALL UTILITY LOCATIONS SHOWN ARE BASED ON MAPS PROVIDED BY THE APPROPRIATE UTILITY COMPANY AND FIELD SURFACE EVIDENCE AT THE TIME OF SURVEY AND IS TO BE CONSIDERED AN APPROXIMATE LOCATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION OF ALL UTILITIES, PUBLIC OR PRIVATE, WHETHER SHOWN ON THE PLANS OR NOT, PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.
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 Plot Scale: 1"=40'-0"
 Plot Area: 30.00 x 42.00
 Plot Date: 8/19/2022 10:58:55 AM
 Plot Time: 10:58:55 AM
 Plot User: michael.galloway
 Plot Title: Falcon Meadows at Bent Grass - C1.1



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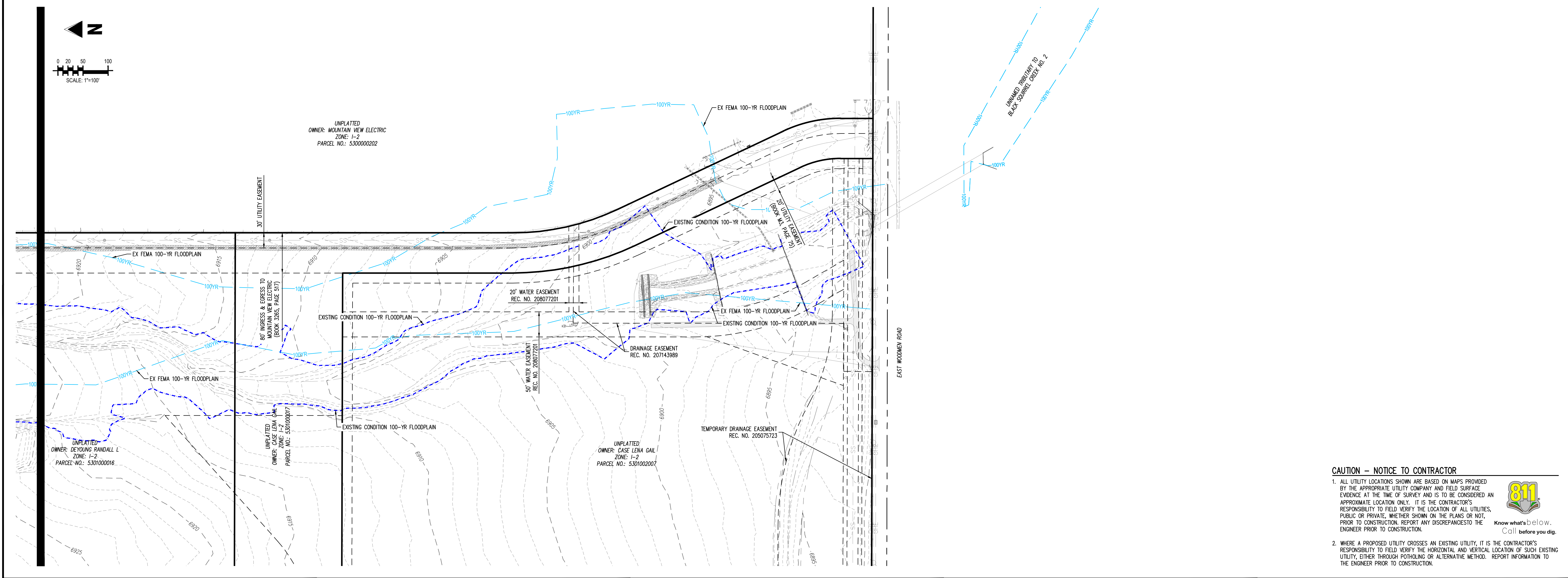
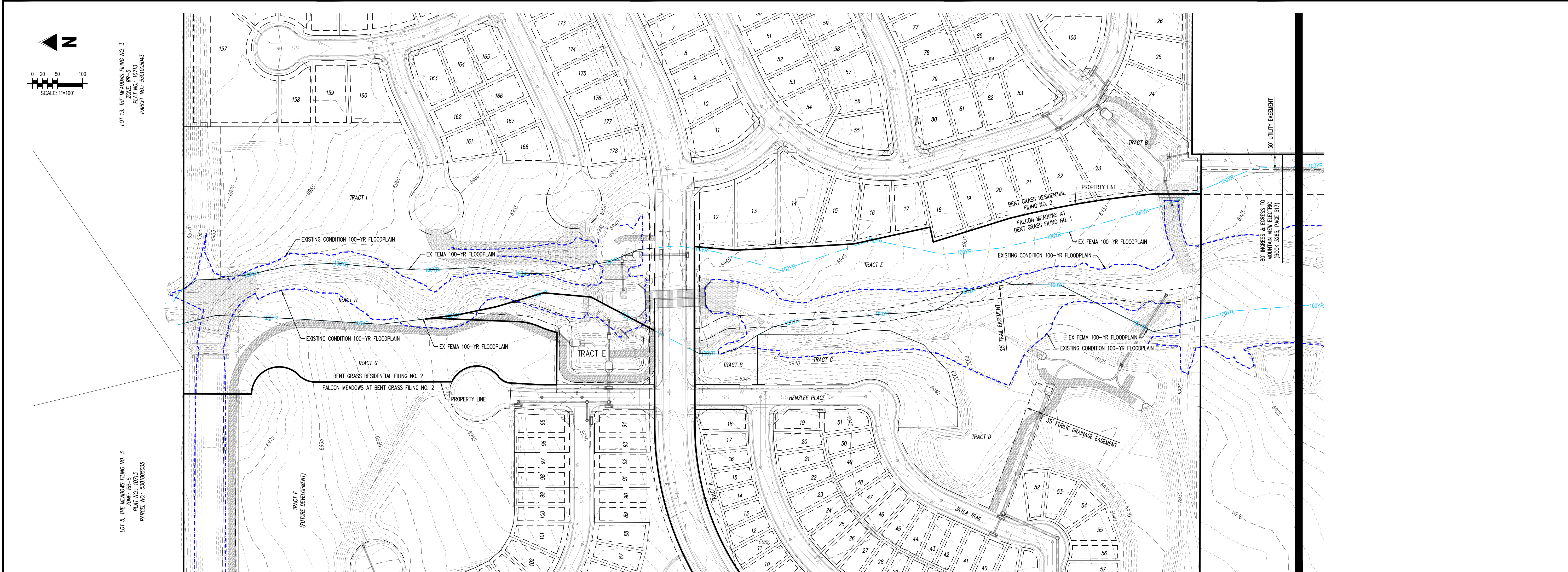
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 Date: 8/19/2022

EXISTING CONDITIONS

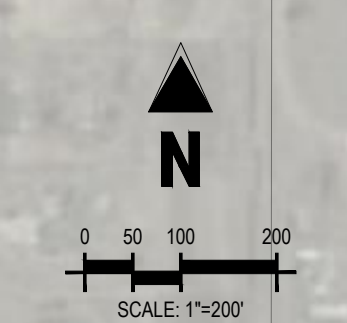
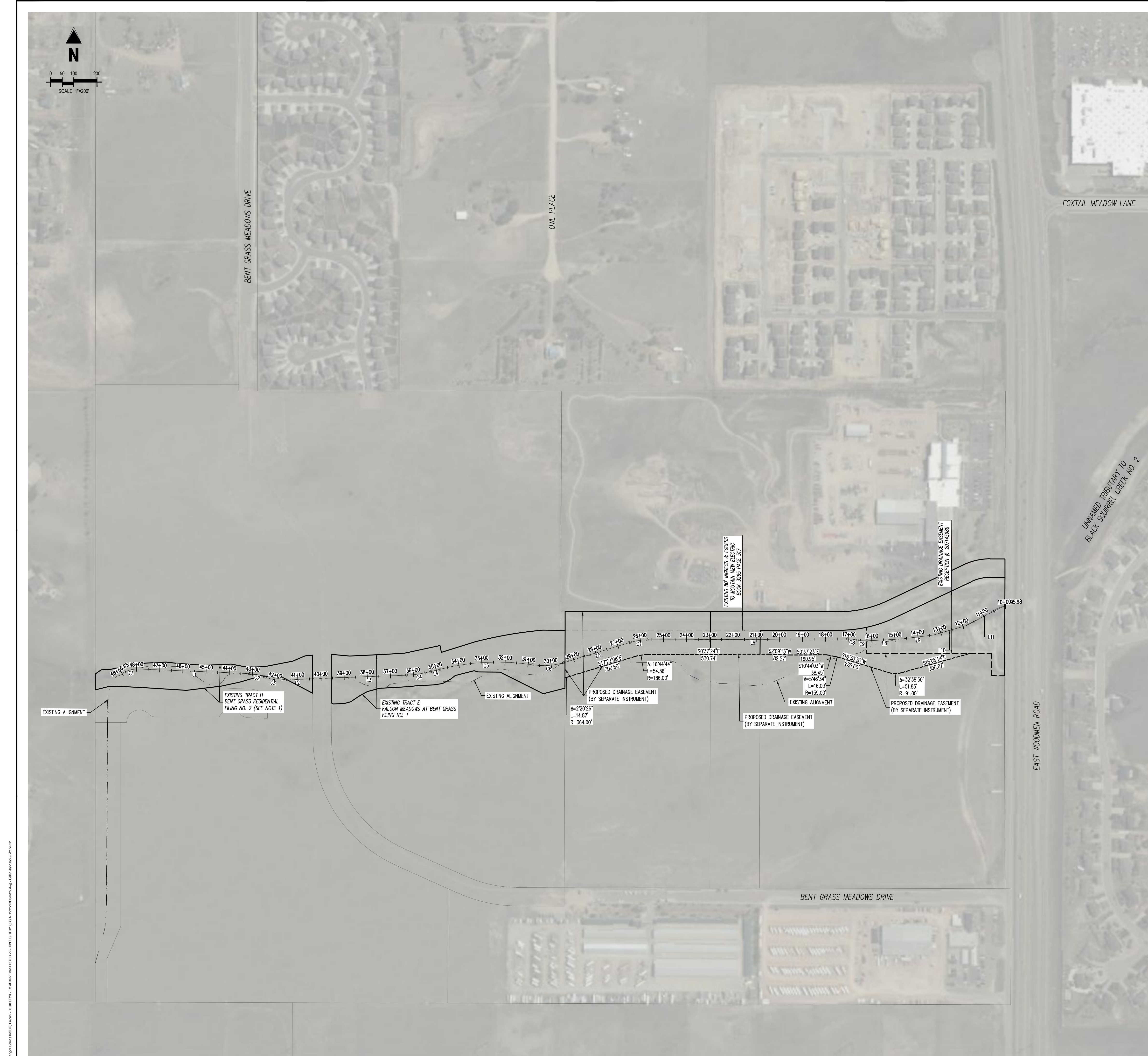
C2.1
 Sheet 4 of 23



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811
 Know what's below.
 Call before you dig.

2. WHERE A PROPOSED UTILITY CROSSES AN EXISTING UTILITY, IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF SUCH EXISTING UTILITY, EITHER THROUGH POTHOLING OR ALTERNATIVE METHOD. REPORT INFORMATION TO THE ENGINEER PRIOR TO CONSTRUCTION.



PARCEL CURVE SEGMENT TABLE

CURVE TAG #	DELTA	LENGTH (FT)	RADIUS (FT)	CHORD BEARING	CHORD LENGTH (FT)
C1	33°56'51"	77.02	130.00	S14°50'12"E	75.90
C2	20°33'31"	71.76	200.00	S12°15'59"W	71.38
C3	25°19'53"	70.74	160.00	S9°52'48"W	70.16
C4	12°06'00"	105.59	500.00	S8°30'32"E	105.40
C5	23°11'33"	404.78	1000.00	S3°06'46"E	402.03
C6	25°51'08"	135.36	300.00	S4°26'33"E	134.22
C7	16°44'44"	73.07	250.00	S8°58'46"E	72.81
C8	12°35'08"	43.93	200.00	S8°40'10"W	43.84
C9	15°22'27"	40.25	150.00	S4°16'31"W	40.13

PARCEL LINE SEGMENT TABLE

LINE TAG #	BEARING	LENGTH (FT)
L1	S1°58'13"W	477.95
L2	S2°47'09"E	133.51
L3	S2°36'32"E	324.69
L4	S14°42'32"E	41.18
L5	S17°22'08"E	300.60
L6	S03°37'23"E	864.53
L8	S3°24'42"E	152.32
L9	S7°25'28"E	135.84
L10	S16°35'35"E	147.63
L11	S27°46'10"E	178.05



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FOR
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BENT GRASS MEADOWS DRIVE & MERIDAN ROAD
FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No: CLH000023
Drawn By: CMWJ
Checked By: RGD
Date: 8/19/2022
HORIZONTAL CONTROL

NOTES:

- THE PROPOSED CHANNEL NORTH OF BENT GRASS MEADOWS DRIVE WILL BE REPLACED WITH FALCON MEADOWS AT BENT GRASS FILING NO. 4.
- ALL UTILITY LOCATIONS SHOWN ARE BASED ON MAPS PROVIDED BY THE APPROPRIATE UTILITY COMPANY AND FIELD SURFACE EVIDENCE AT THE TIME OF SURVEY AND IS TO BE CONSIDERED AN APPROXIMATE LOCATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION OF ALL UTILITIES, PUBLIC OR PRIVATE, WHETHER SHOWN ON THE PLANS OR NOT, PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.
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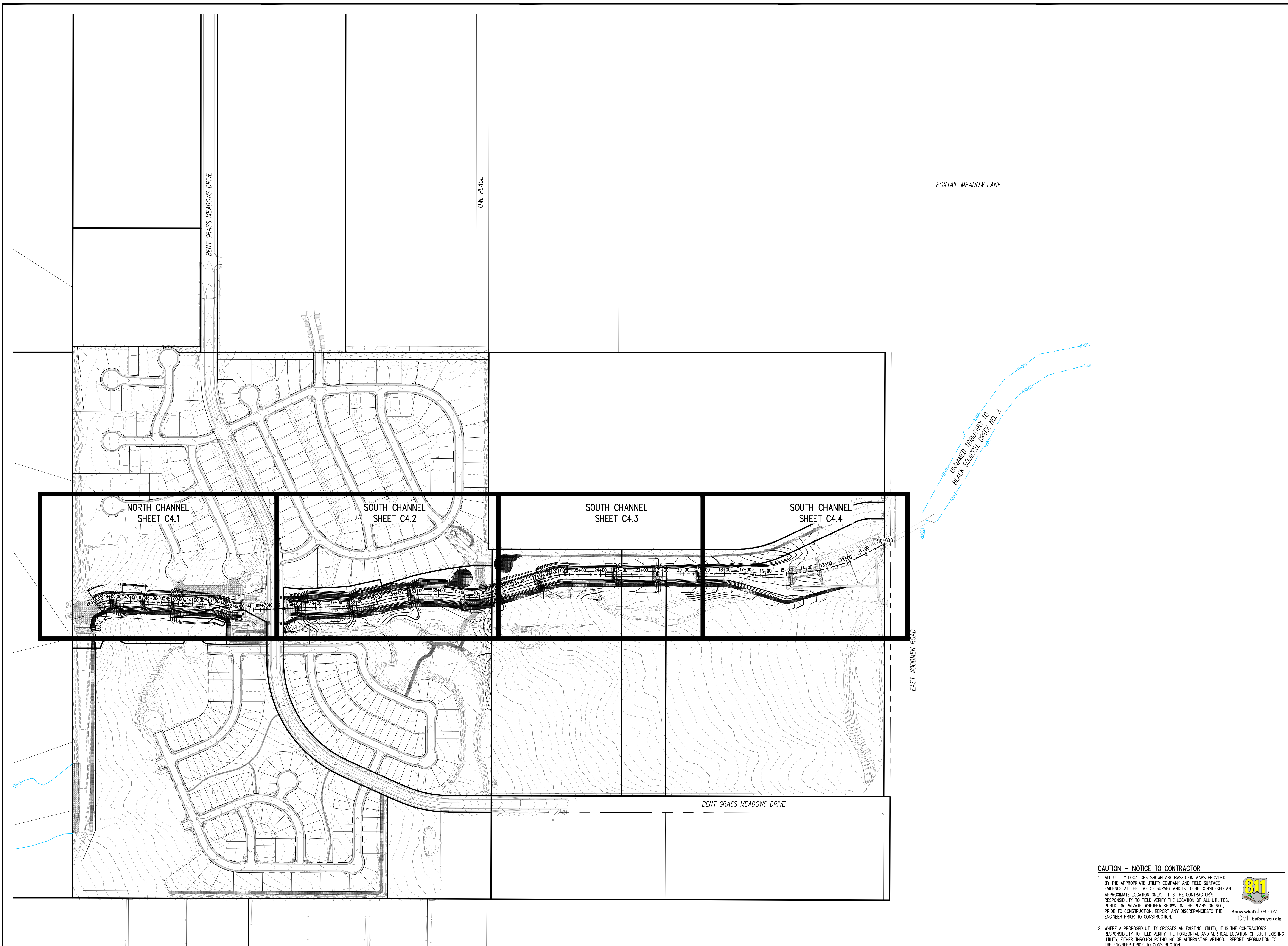


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CHANNEL KEY MAP

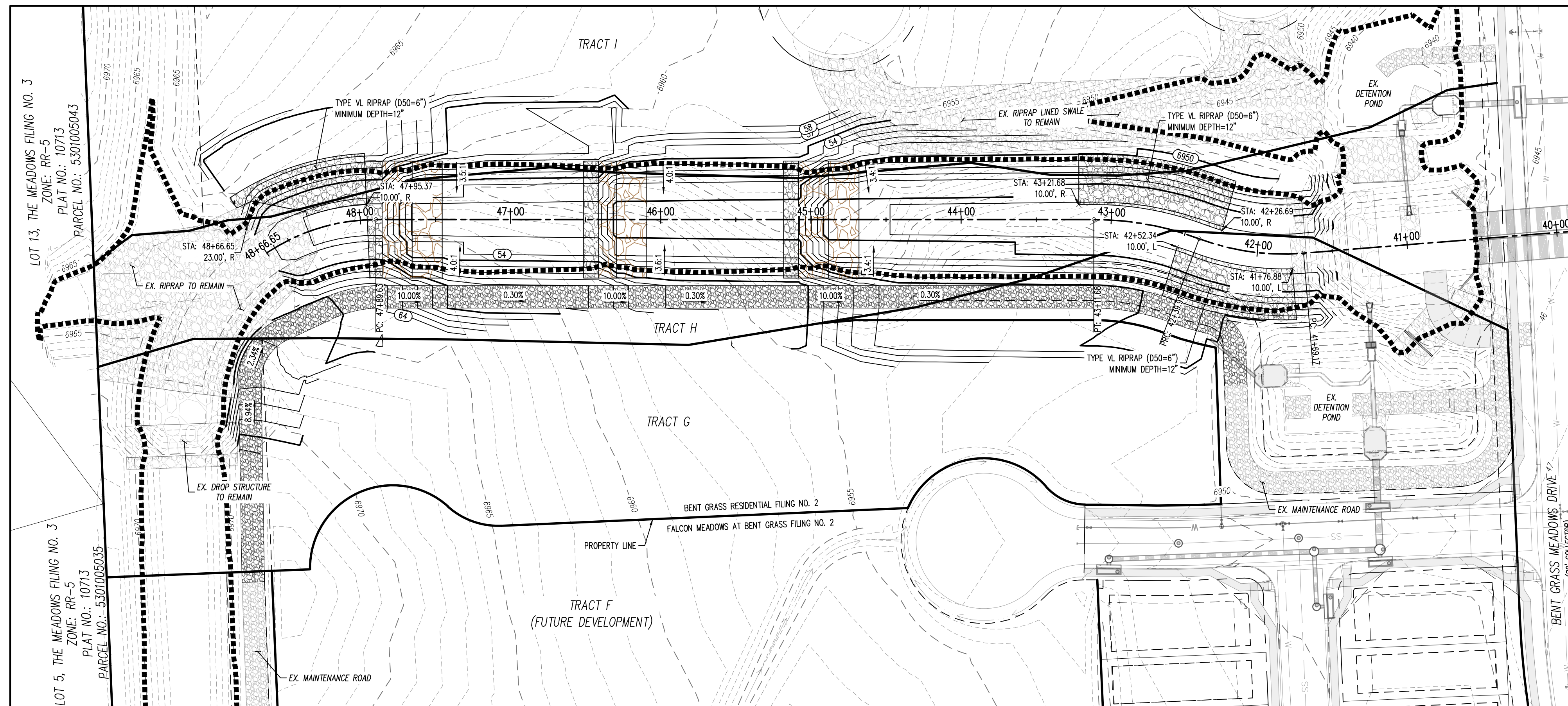
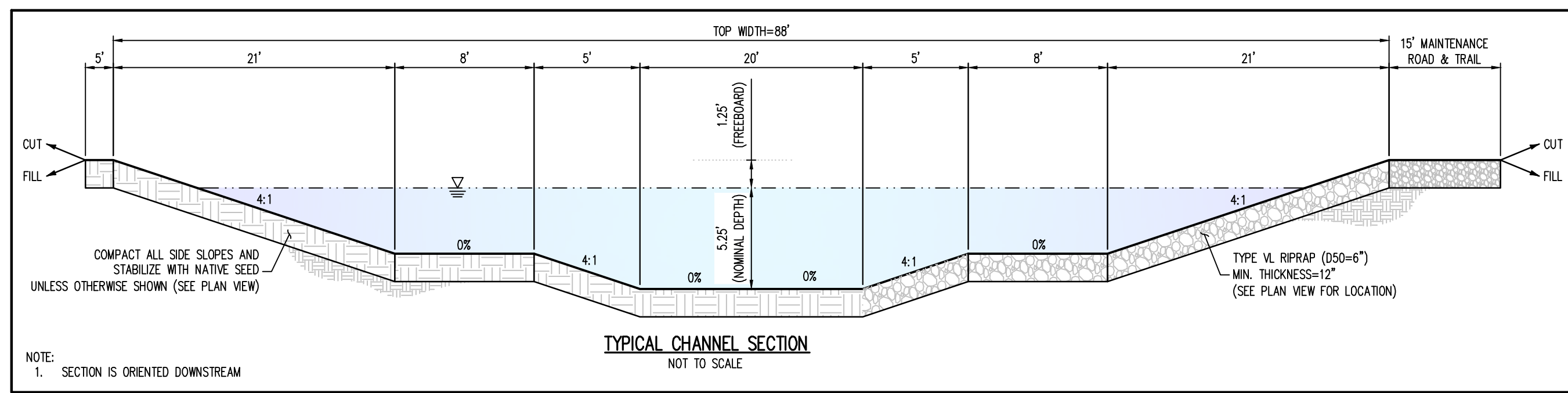


CAUTION - NOTICE TO CONTRACTOR

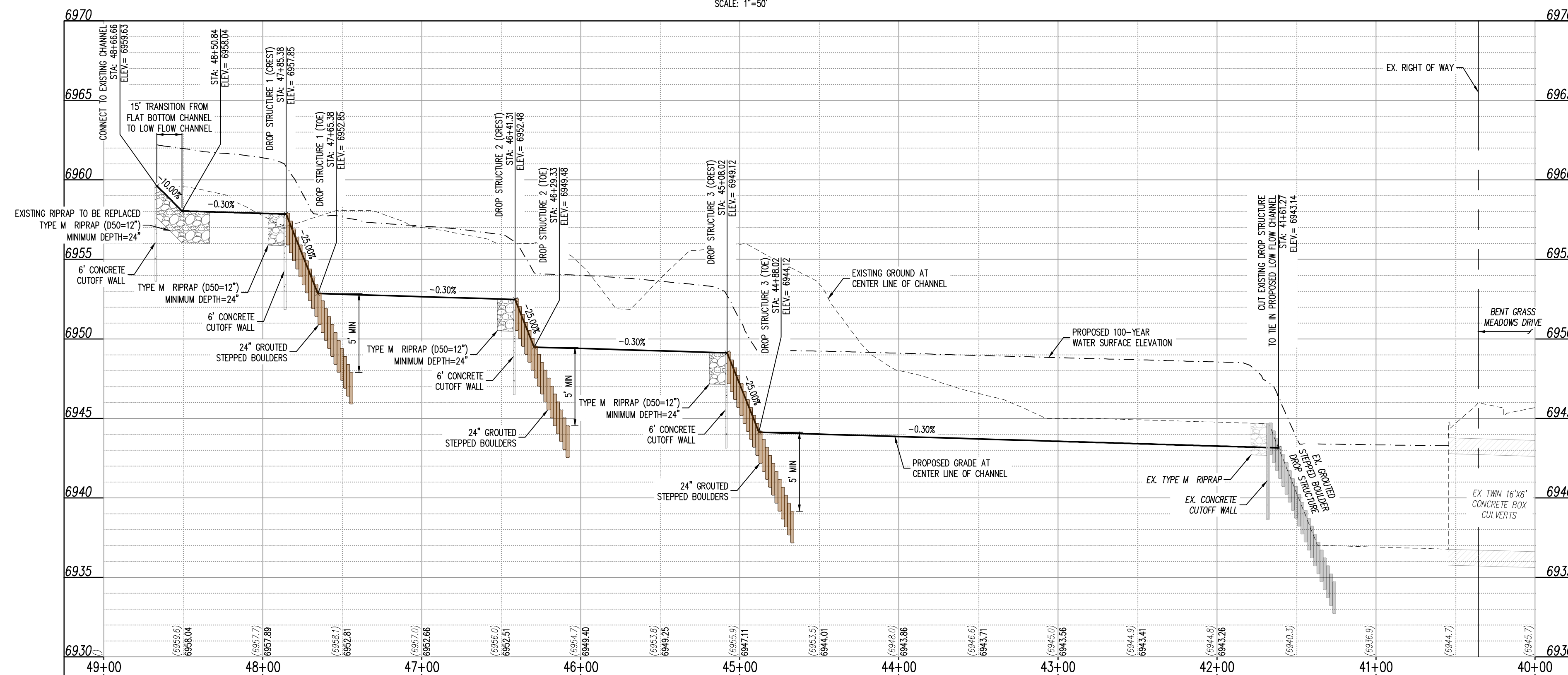
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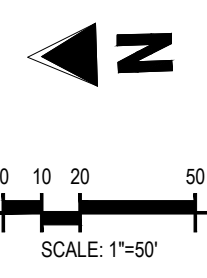
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PLAN VIEW - NORTH CHANNEL (STA: 40+00 - 48+66.65)
SCALE: 1"=50'



PROFILE VIEW - NORTH CHANNEL (STA: STA: 40+00 - 48+66.65)
SCALE: 1"=20'



GRADING LEGEND

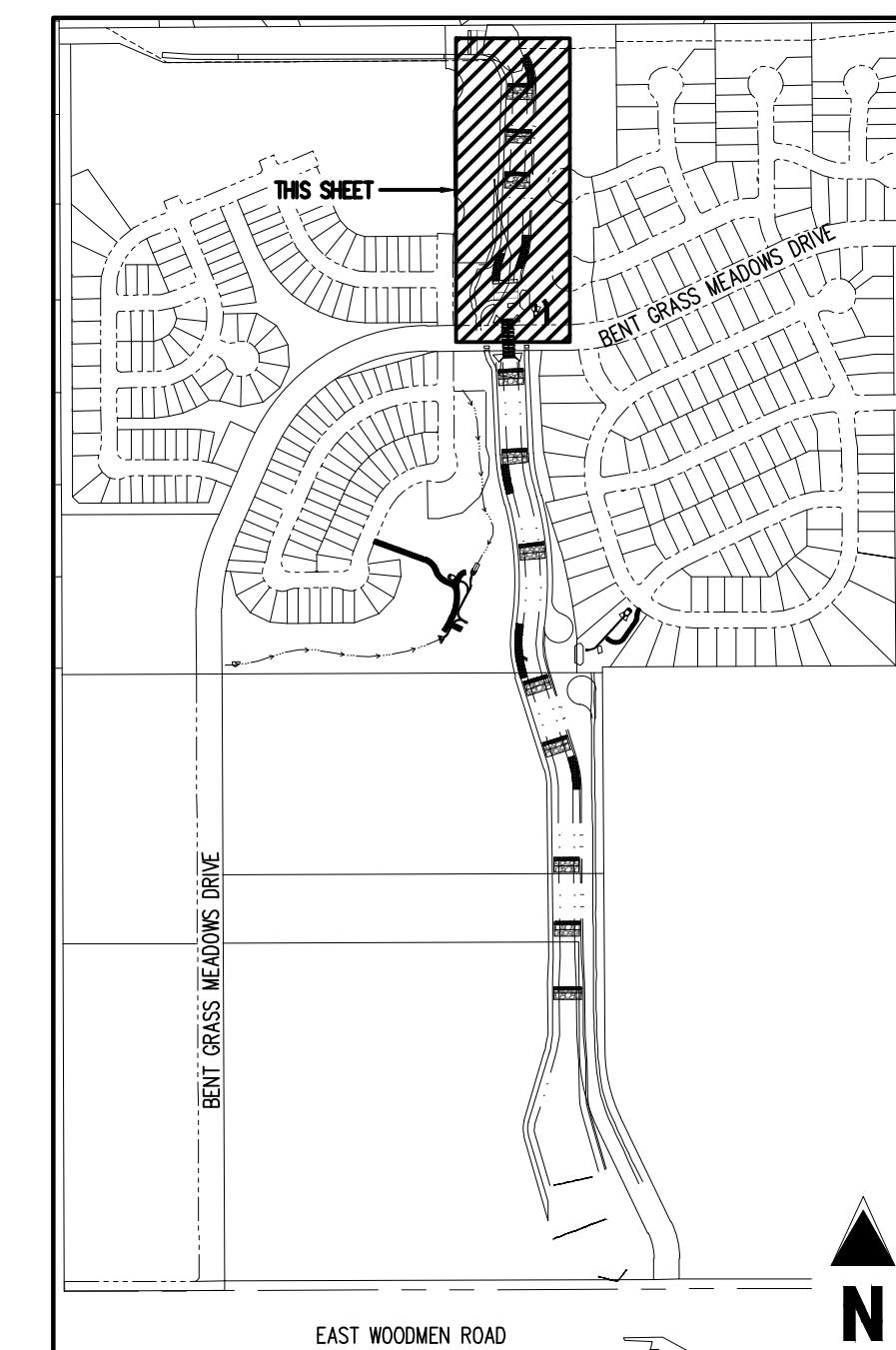
---	EXISTING MAJOR CONTOUR
---	EXISTING MINOR CONTOUR
---	PROPOSED MAJOR CONTOUR
---	PROPOSED MINOR CONTOUR
---	EXISTING SLOPE - PERCENT
---	EXISTING SLOPE - RISE/RUN
---	PROPOSED SLOPE - PERCENT
---	PROPOSED SLOPE - RISE/RUN
---	PROPOSED SPOT ELEVATION - FINISHED GROUND
---	PROPOSED SPOT ELEVATION - CENTER LINE
---	PROPOSED SPOT ELEVATION - TOP OF BANK

UTILITY LEGEND

---	EXISTING WATER LINE
---	PROPOSED WATER LINE
---	EXISTING SANITARY SEWER
---	EXISTING FIBER OPTIC LINE
---	EXISTING GAS LINE
---	EXISTING UNDERGROUND TELEPHONE
---	EXISTING UNDERGROUND ELECTRICAL
---	EXISTING OVERHEAD TELEPHONE
---	EXISTING OVERHEAD ELECTRICAL
---	EXISTING STORM SEWER
---	EXISTING ELECTRICAL BOX
---	EXISTING PAD MOUNTED TRANSFORMER
---	EXISTING TRAFFIC POLE
---	PROPOSED SITE LIGHTING
---	EXISTING SANITARY SEWER MANHOLE
---	EXISTING STORM SEWER MANHOLE
---	EXISTING WATER METER
---	EXISTING WATER VALVE
---	EXISTING FIRE HYDRANT
---	PROPOSED FIRE HYDRANT

SITE LEGEND

---	PROPERTY BOUNDARY LINE
---	RIGHT OF WAY BOUNDARY LINE
---	EXISTING EASEMENT LINE
---	PROPOSED 100-YEAR FLOODPLAIN
---	EXISTING CURB AND GUTTER
---	EXISTING CONCRETE
---	EXISTING CDOT CLASS 6 GRAVEL
---	EXISTING RIPRAP
---	EXISTING BOULDERS
---	PROPOSED CDOT CLASS 6 GRAVEL
---	PROPOSED RIPRAP
---	PROPOSED BOULDERS
---	EXISTING SIGN
---	REFERENCE TO DETAIL AND SHEET NUMBER



KEY MAP
SCALE: 1"=600'



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NOTE: CONTRACTOR SHALL PROTECT ALL EXISTING SURVEY MONUMENTATION. CONTRACTOR SHALL HAVE LICENSED SURVEYOR REPLACE ANY DAMAGED OR DISTURBED MONUMENTATION AT THEIRS COST.

SURVEYOR TO OBTAIN AUTOCAD FILE FROM ENGINEER AND VERIFY ALL HORIZONTAL CONTROL DIMENSIONING PRIOR TO CONSTRUCTION STAKING. SURVEYOR MUST VERIFY ALL BENCHMARK, BASIS OF BEARING AND DATUM INFORMATION TO ENSURE IMPROVEMENTS WILL BE AT THE SAME HORIZONTAL AND VERTICAL LOCATIONS SHOWN ON THE DESIGN CONSTRUCTION DRAWINGS. PRIOR TO CONSTRUCTION STAKING ANY DISCREPANCY MUST BE REPORTED TO OWNER AND ENGINEER PRIOR TO CONTINUATION OF ANY FURTHER STAKING OR CONSTRUCTION WORK.

BENCHMARK
ELEVATIONS ARE BASED ON THE SOUTHWEST CORNER OF LOT 1, WOODMEN HILLS FILING NO. 4, MONUMENTED BY NO. 4 REBAR WITH A YELLOW PLASTIC CAP, STAMPED L5# 24954. ELEVATION = 6947.67

CAUTION - NOTICE TO CONTRACTOR

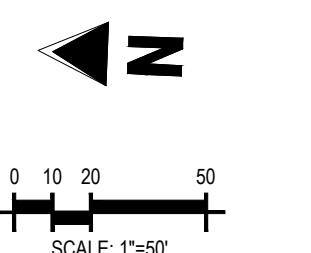
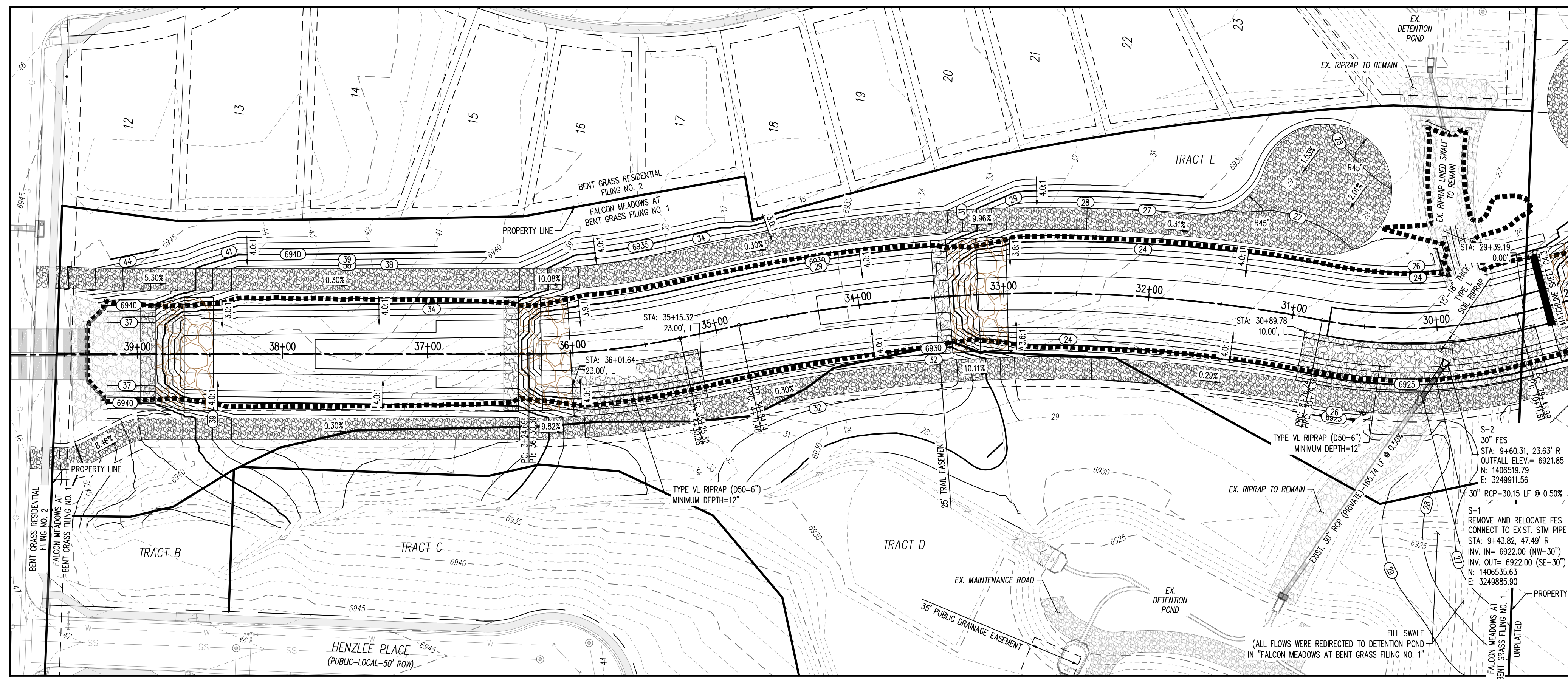
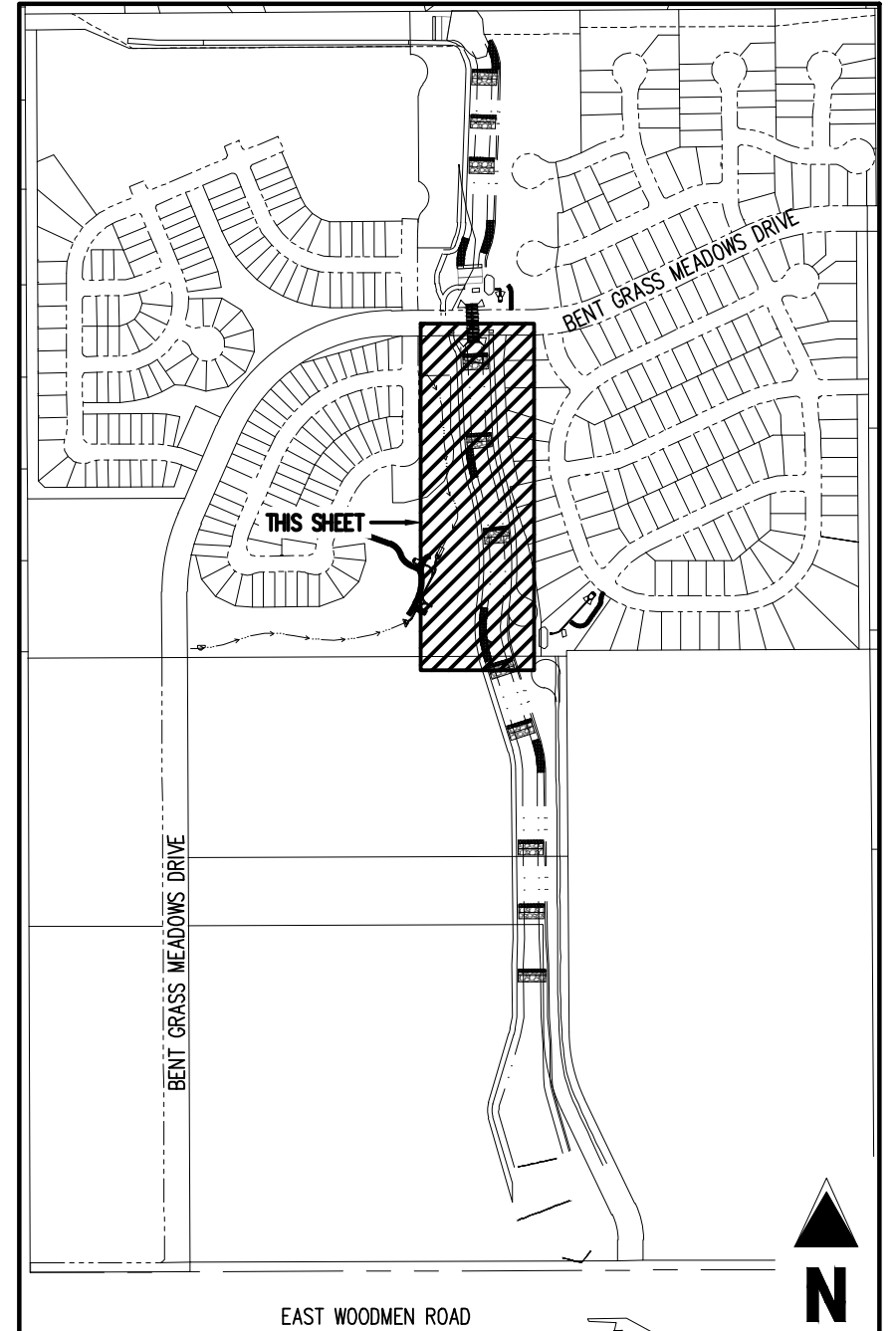
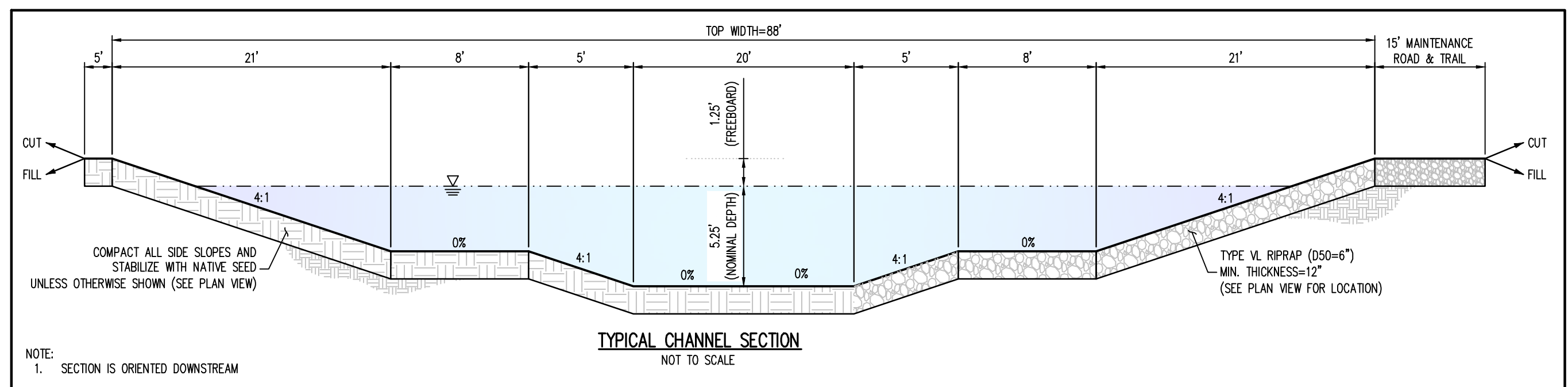
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CHANNEL NORTH - PLAN & PROFILE



GRADING LEGEND

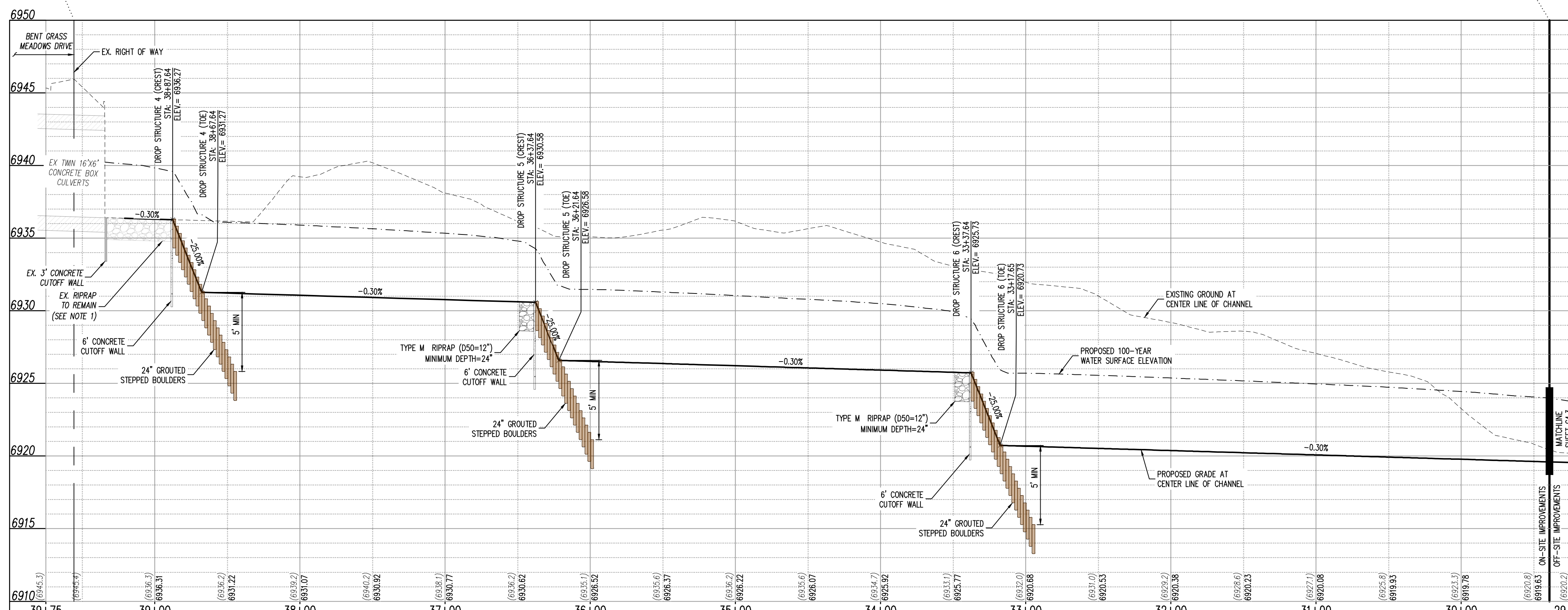
- S460- EXISTING MAJOR CONTOUR
- S2 EXISTING MINOR CONTOUR
- S485- PROPOSED MAJOR CONTOUR
- S66 PROPOSED MINOR CONTOUR
- S2.00% EXISTING SLOPE - PERCENT
- S4:1 EXISTING SLOPE - RISE/RUN
- S2.00% PROPOSED SLOPE - PERCENT
- S4:1 PROPOSED SLOPE - RISE/RUN
- S55.00 FG PROPOSED SPOT ELEVATION - FINISHED GROUND
- S55.00 CL PROPOSED SPOT ELEVATION - CENTER LINE
- S55.00 TOL PROPOSED SPOT ELEVATION - TOP OF BANK

SITE LEGEND

- S- PROPERTY BOUNDARY LINE
- S- RIGHT OF WAY BOUNDARY LINE
- S- EXISTING EASEMENT LINE
- S- PROPOSED 100-YEAR FLOODPLAIN
- S- EXISTING CURB AND GUTTER
- S- EXISTING CONCRETE
- S- EXISTING CDOT CLASS 6 GRAVEL
- S- EXISTING RIPRAP
- S- EXISTING BOULDERS
- S- PROPOSED CDOT CLASS 6 GRAVEL
- S- PROPOSED RIPRAP
- S- PROPOSED BOULDERS
- S- EXISTING SIGN
- S- REFERENCE TO DETAIL AND SHEET NUMBER

UTILITY LEGEND

- S- EXISTING WATER LINE
- S- PROPOSED WATER LINE
- S- EXISTING SANITARY SEWER
- S- EXISTING FIBER OPTIC LINE
- S- EXISTING GAS LINE
- S- EXISTING UNDERGROUND TELEPHONE
- S- EXISTING UNDERGROUND ELECTRICAL
- S- EXISTING OVERHEAD TELEPHONE
- S- EXISTING OVERHEAD ELECTRICAL
- S- EXISTING STORM SEWER
- S- EXISTING ELECTRICAL BOX
- S- EXISTING PAD MOUNTED TRANSFORMER
- S- EXISTING TRAFFIC POLE
- S- PROPOSED SITE LIGHTING
- S- EXISTING SANITARY SEWER MANHOLE
- S- EXISTING STORM SEWER MANHOLE
- S- EXISTING WATER METER
- S- EXISTING WATER VALVE
- S- EXISTING FIRE HYDRANT
- S- PROPOSED FIRE HYDRANT



NOTES:

1. MAINTAIN FLAT BOTTOM CHANNEL AFTER THE EXISTING 16"x6" CONCRETE BOX CULVERTS AND IMMEDIATELY BEFORE DROP STRUCTURE #4. TRANSITION CHANNEL FROM FLAT BOTTOM TO LOW FLOW WITHIN DROP STRUCTURE #4.

NOTE: CONTRACTOR SHALL PROTECT ALL EXISTING SURVEY MONUMENTATION. CONTRACTOR SHALL HAVE LICENSED SURVEYOR REPLACE ANY DAMAGED OR DISTURBED MONUMENTATION AT THEIR COST.

SURVEYOR TO OBTAIN AUTOCAD FILE FROM ENGINEER AND VERIFY ALL HORIZONTAL CONTROL DIMENSIONING PRIOR TO CONSTRUCTION STAKING. SURVEYOR MUST VERIFY ALL BENCHMARK, BASIS OF BEARING AND DATUM INFORMATION TO ENSURE IMPROVEMENTS WILL BE AT THE SAME HORIZONTAL AND VERTICAL LOCATIONS SHOWN ON THE DESIGN CONSTRUCTION DRAWINGS. PRIOR TO CONSTRUCTION STAKING ANY DISCREPANCY MUST BE REPORTED TO OWNER AND ENGINEER PRIOR TO CONTINUATION OF ANY FURTHER STAKING OR CONSTRUCTION WORK.

BENCHMARK
ELEVATIONS ARE BASED ON THE SOUTHWEST CORNER OF LOT 1, WOODMEN HILLS FILING NO. 4, MONUMENTED BY A 4" REBAR WITH A YELLOW PLASTIC CAP, STAMPED L5# 24954, ELEVATION = 6947.87

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2. WHERE A PROPOSED UTILITY CROSSES AN EXISTING UTILITY, IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF SUCH EXISTING UTILITY, EITHER THROUGH POT-Holing OR ALTERNATIVE METHOD. REPORT INFORMATION TO THE ENGINEER PRIOR TO CONSTRUCTION.



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CONSTRUCTION DOCUMENTS
FALCON MEADOWS AT BENT GRASS
FOR
CHALLENGER COMMUNITIES, LLC
BENT GRASS MEADOWS DRIVE & MERIDAN ROAD
FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No: CLH000023
 Drawn By: CMW/J
 Checked By: RGD
 Date: 8/19/2022

CHANNEL SOUTH - PLAN & PROFILE



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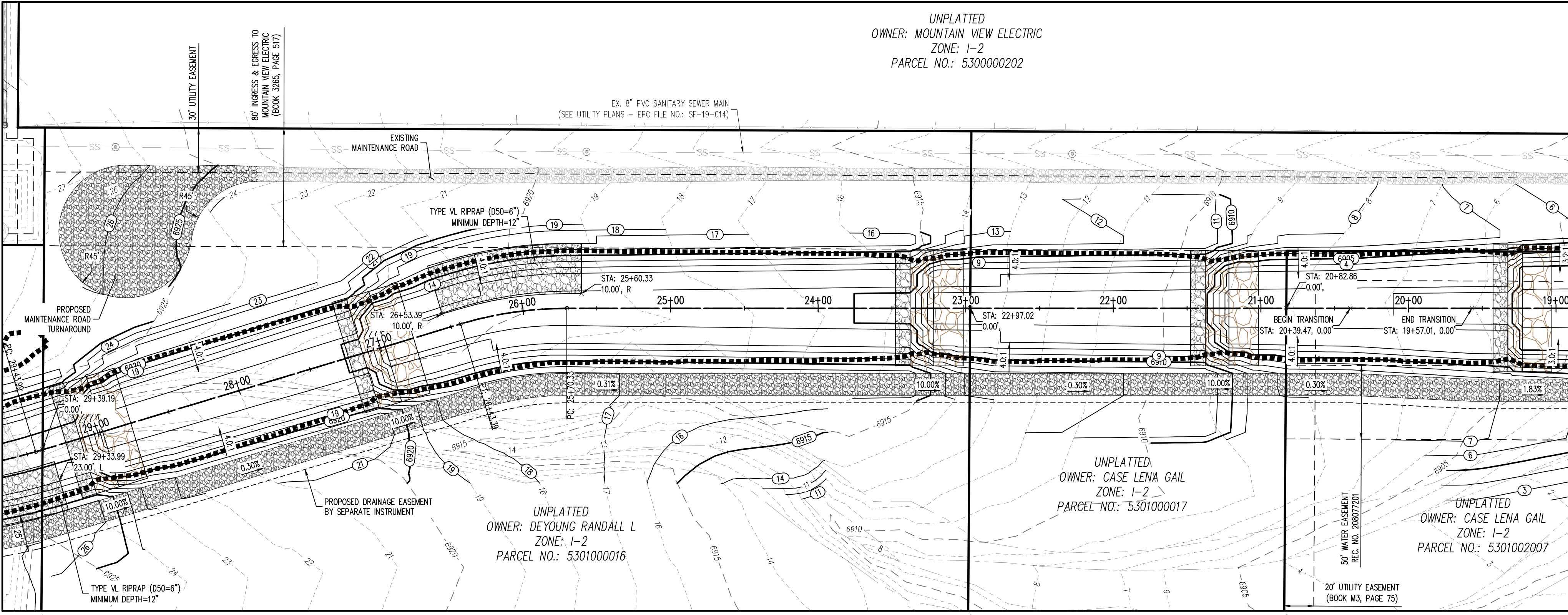
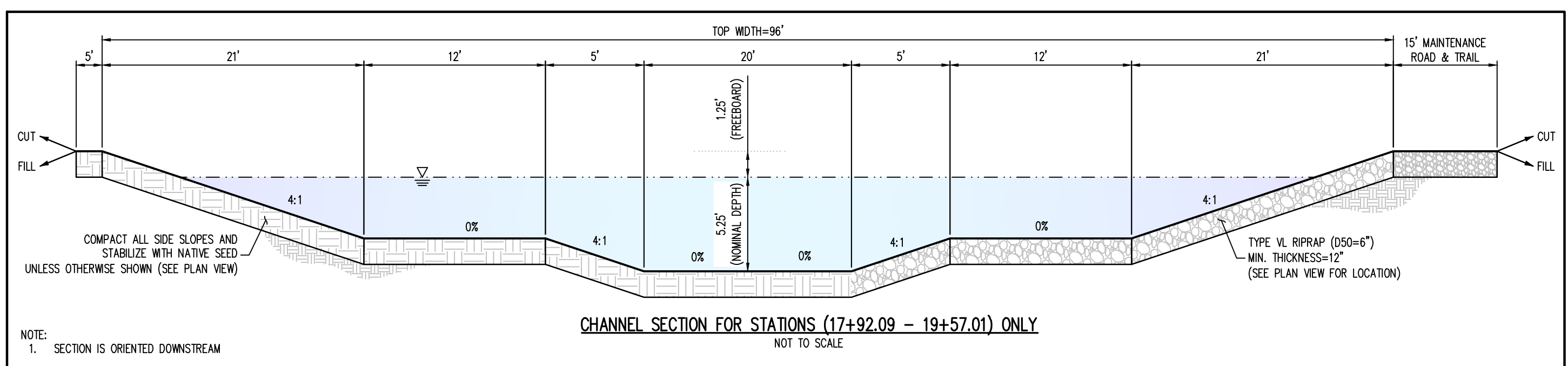
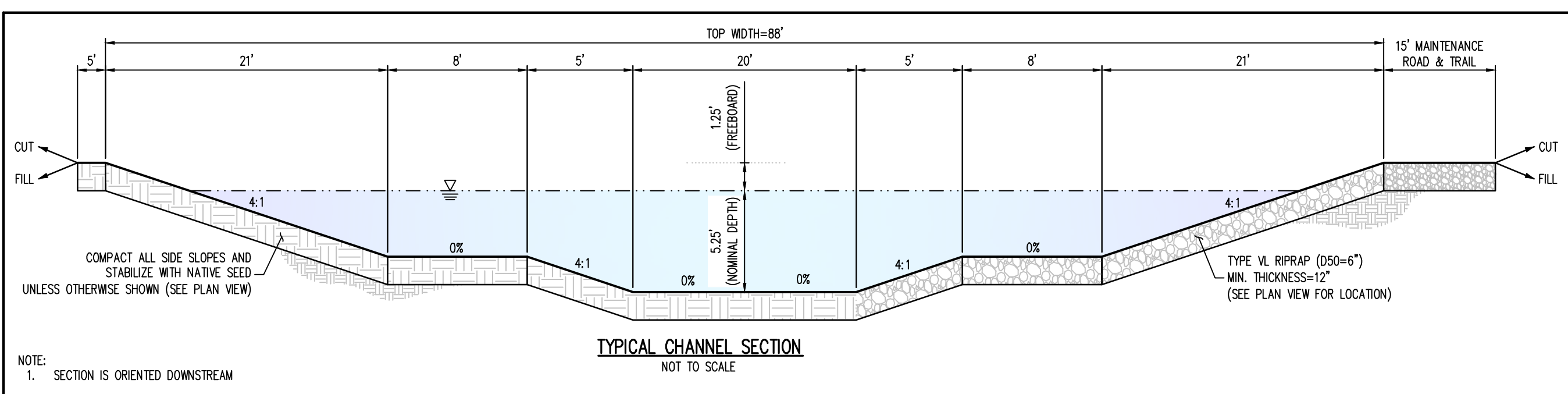


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BENT GRASS MEADOWS DRIVE & MERIDAN ROAD
FALCON, CO 80831 - EL PASO COUNTY

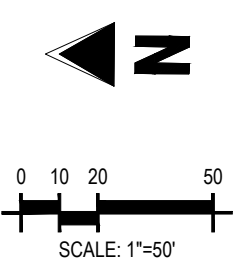
#	Date	Issue / Description	Init.

Project No: CLH000023
Drawn By: CMVJ
Checked By: SMB
Date: 8/19/2022

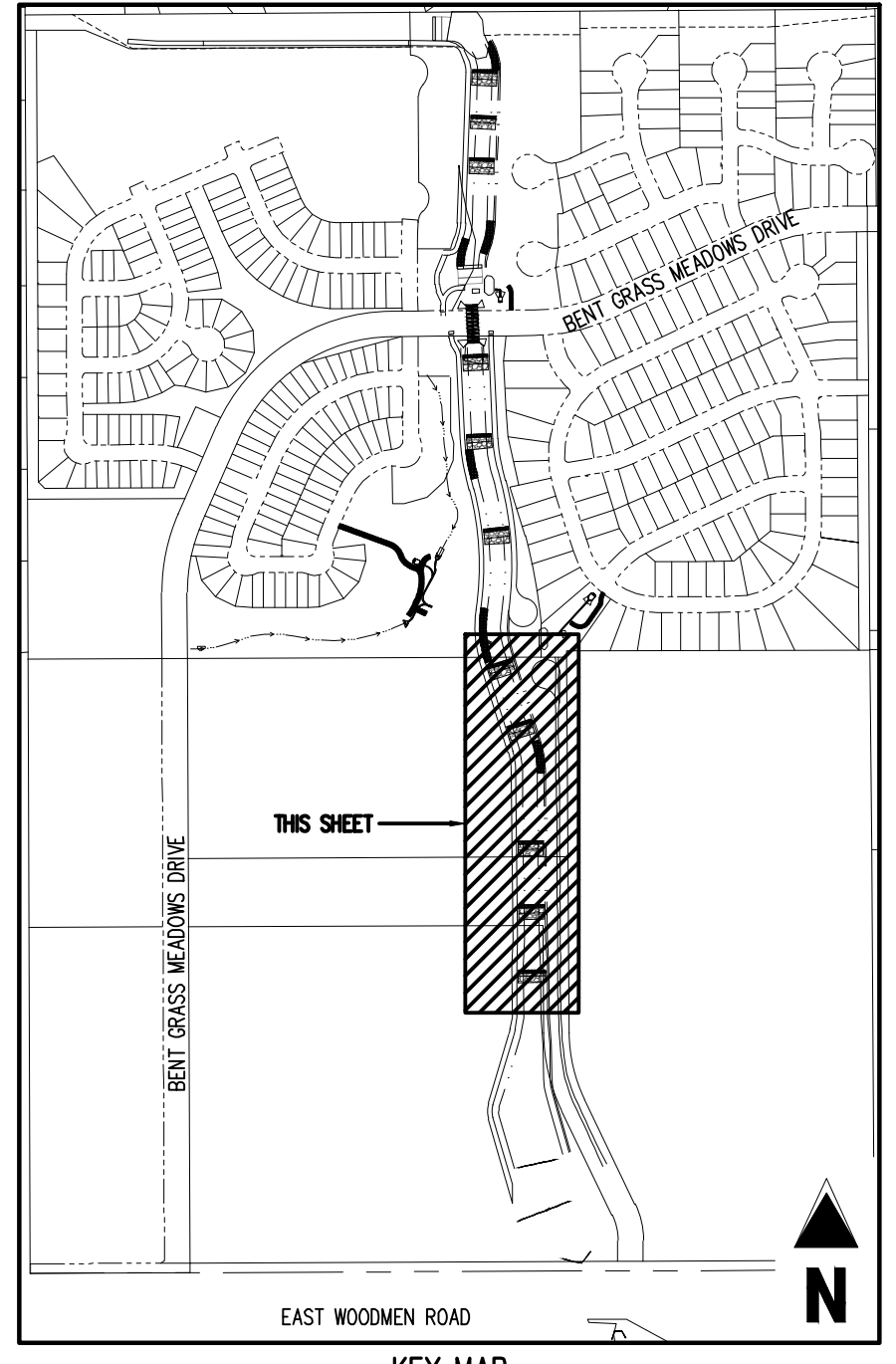
CHANNEL SOUTH - PLAN & PROFILE



PLAN VIEW - SOUTH CHANNEL (STA: 19+00.00 - 29+50.00)
SCALE: 1"=50'

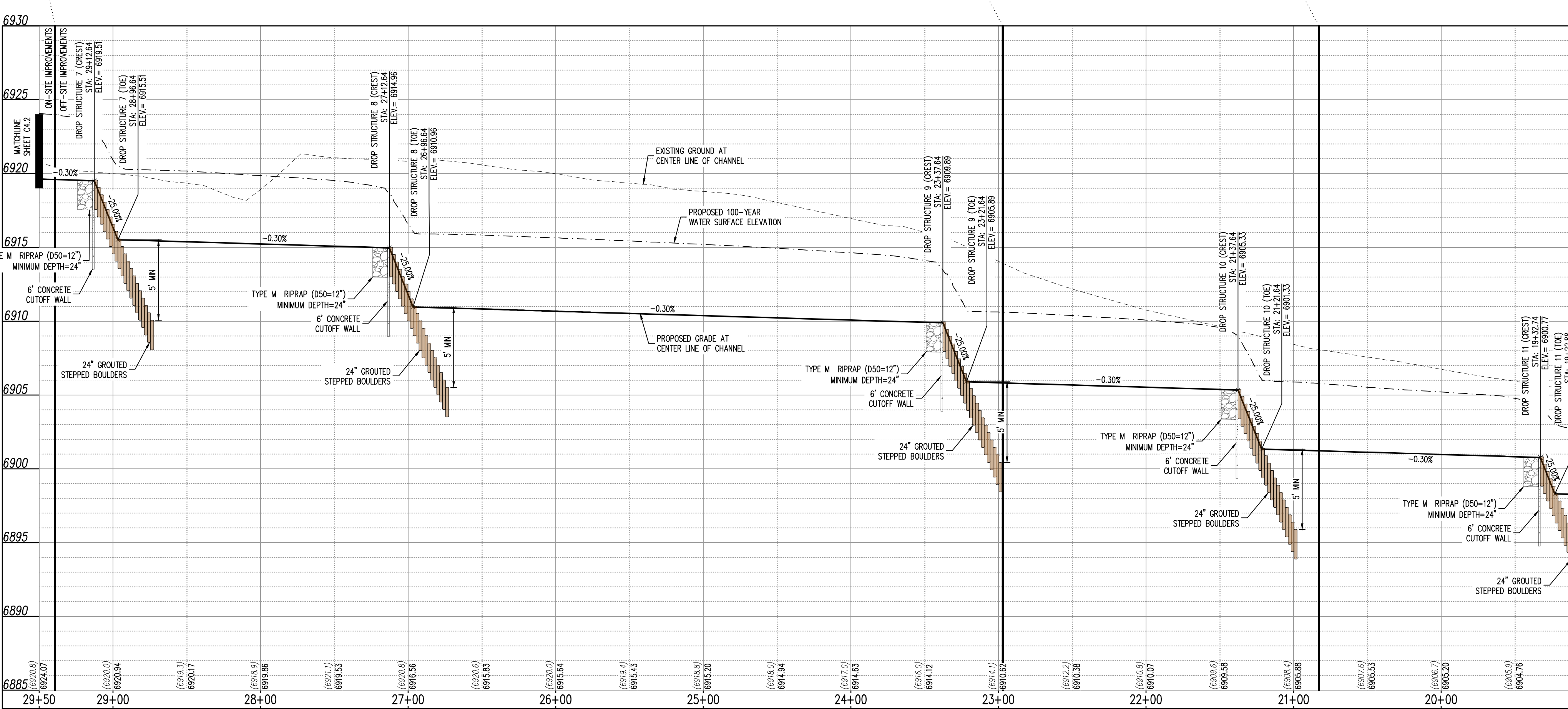


- GRADING LEGEND**
 - 5460 - EXISTING MAJOR CONTOUR
 - 52 - EXISTING MINOR CONTOUR
 - 5485 - PROPOSED MAJOR CONTOUR
 - 66 - PROPOSED MINOR CONTOUR
 - 2.00% - EXISTING SLOPE - PERCENT
 - 4:1 - EXISTING SLOPE - RISE/RUN
 - 2.00% - PROPOSED SLOPE - PERCENT
 - 4:1 - PROPOSED SLOPE - RISE/RUN
 - 55.00 FG - PROPOSED SPOT ELEVATION - FINISHED GROUND
 - 55.00 CL - PROPOSED SPOT ELEVATION - CENTER LINE
 - 55.00 TOB - PROPOSED SPOT ELEVATION - TOP OF BANK
- UTILITY LEGEND**
 - - - - - EXISTING WATER LINE
 - - - - - PROPOSED WATER LINE
 - - - - - EXISTING SANITARY SEWER
 - - - - - EXISTING FIBER OPTIC LINE
 - - - - - EXISTING GAS LINE
 - - - - - EXISTING STORM SEWER
 - - - - - EXISTING ELECTRICAL BOX
 - - - - - EXISTING PAD MOUNTED TRANSFORMER
 - - - - - EXISTING TRAFFIC POLE
 - - - - - PROPOSED SITE LIGHTING
 - - - - - EXISTING SANITARY SEWER MANHOLE
 - - - - - EXISTING STORM SEWER MANHOLE
 - - - - - EXISTING WATER METER
 - - - - - EXISTING WATER VALVE
 - - - - - EXISTING FIRE HYDRANT
 - - - - - PROPOSED FIRE HYDRANT



KEY MAP
SCALE: 1"=600'

- SITE LEGEND**
 - PROPERTY BOUNDARY LINE
 - RIGHT OF WAY BOUNDARY LINE
 - - - - - EXISTING EASEMENT LINE
 - PROPOSED 100-YEAR FLOODPLAIN
 - EXISTING CURB AND GUTTER
 - EXISTING CONCRETE
 - EXISTING CDOT CLASS 6 GRAVEL
 - EXISTING RIPRAP
 - EXISTING BOULDERS
 - PROPOSED CDOT CLASS 6 GRAVEL
 - PROPOSED RIPRAP
 - PROPOSED BOULDERS
 - EXISTING SIGN
 - X CLX REFERENCE TO DETAIL AND SHEET NUMBER



PROFILE VIEW - SOUTH CHANNEL (STA: 19+00.00 - 29+50.00)
SCALE: H: 1"=50', V: 1"=5'

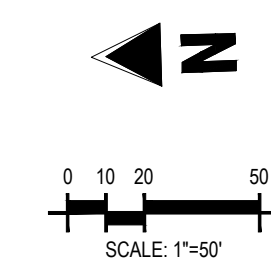
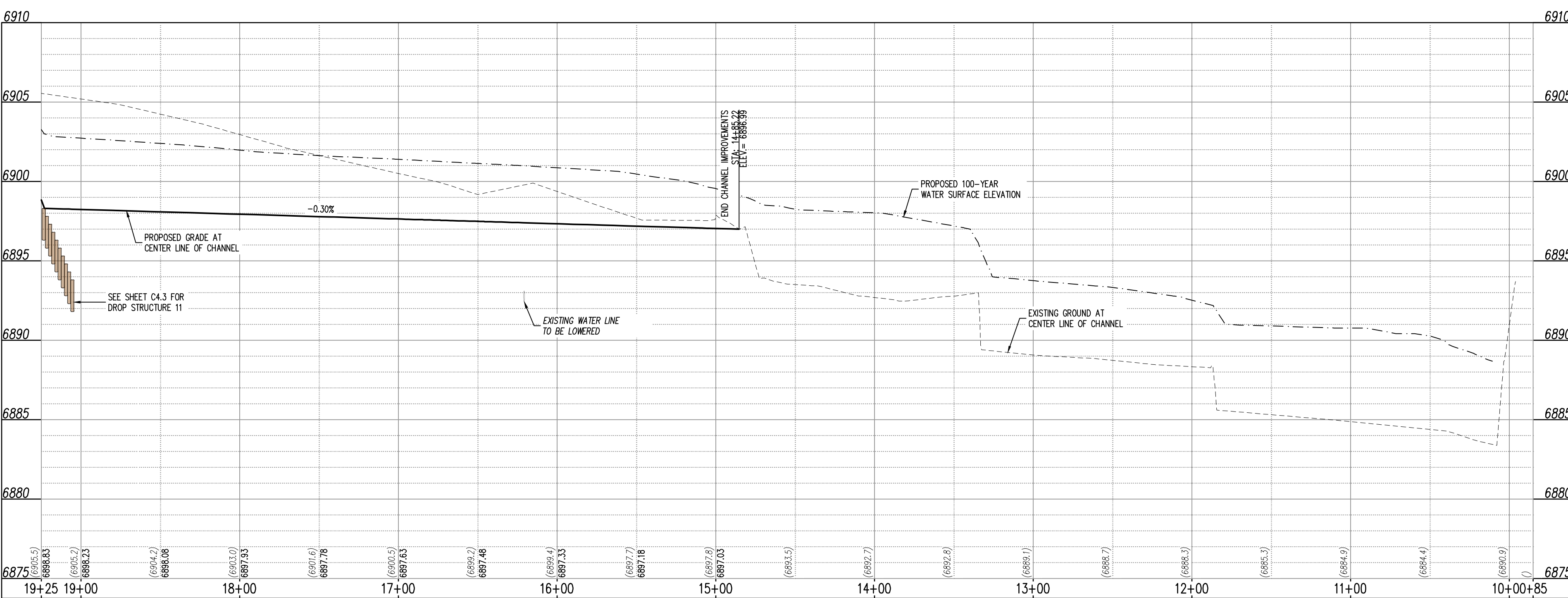
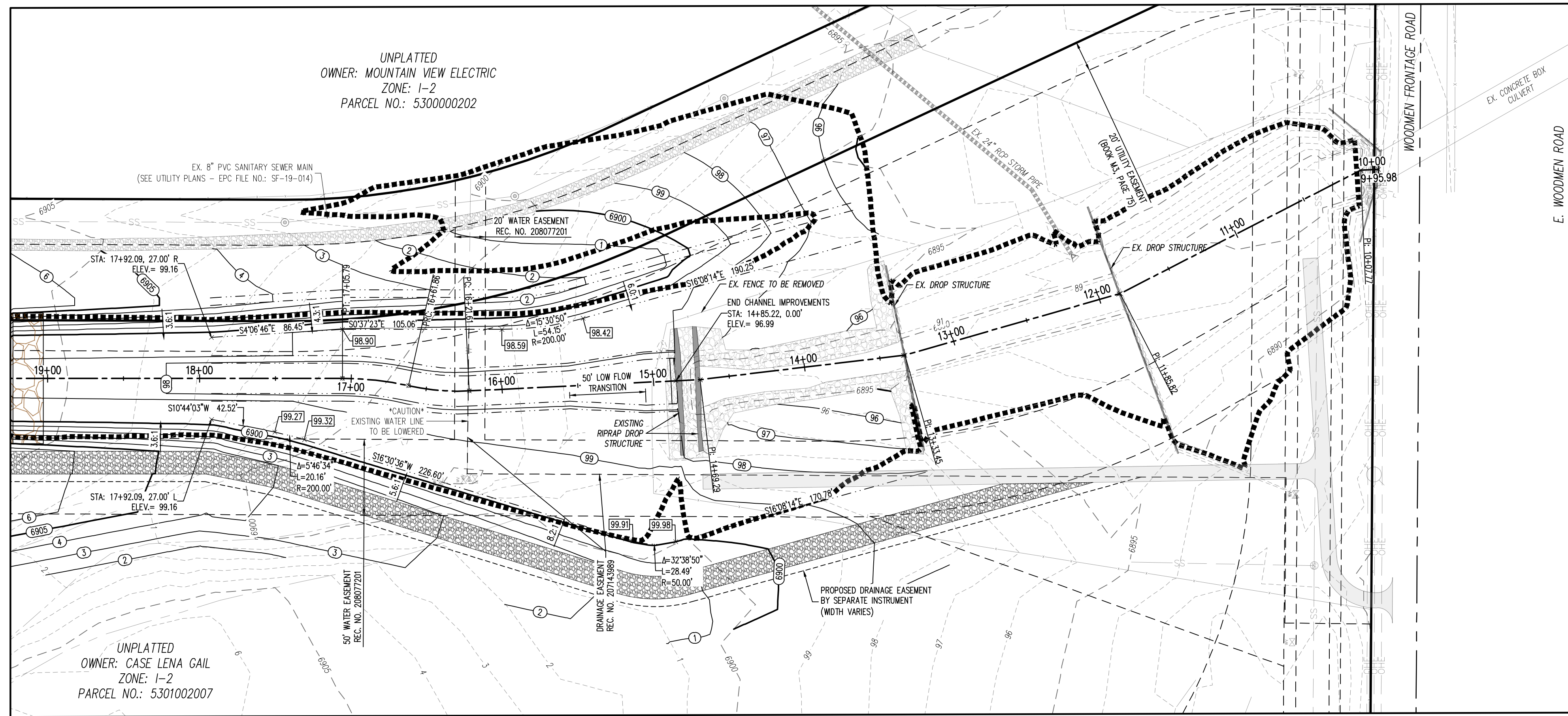
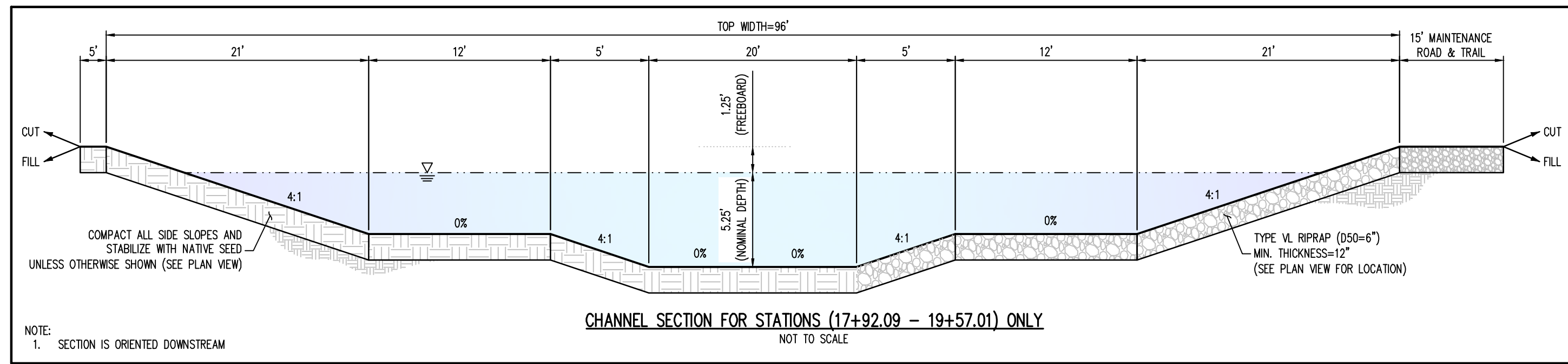
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BENCHMARK
ELEVATIONS ARE BASED ON THE SOUTHWEST CORNER OF LOT 1, WOODMEN HILLS FILING NO. 4, MONUMENTED BY N. 4 REBAR WITH A YELLOW PLASTIC CAP, STAMPED L5# 24954. ELEVATION = 6947.67

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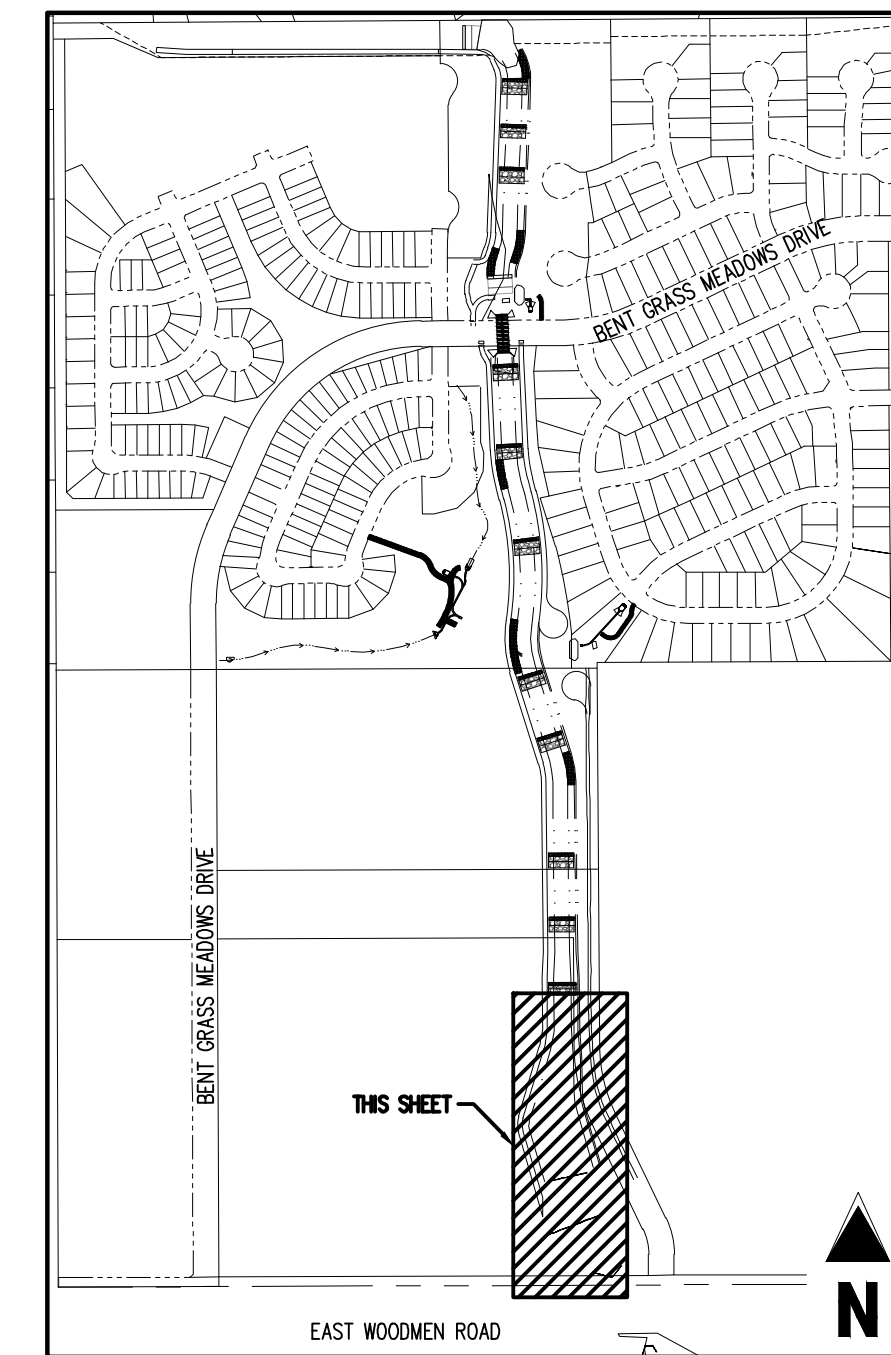


GRADING LEGEND

- 5460 - EXISTING MAJOR CONTOUR
- 52 - EXISTING MINOR CONTOUR
- 5485 - PROPOSED MAJOR CONTOUR
- 65 - PROPOSED MINOR CONTOUR
- 2.00% - EXISTING SLOPE - PERCENT
- 4:1 - EXISTING SLOPE - RISE/RUN
- 2.00% - PROPOSED SLOPE - PERCENT
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- 55.00 FG - PROPOSED SPOT ELEVATION - FINISHED GROUND
- 55.00 CL - PROPOSED SPOT ELEVATION - CENTER LINE
- 55.00 TOB - PROPOSED SPOT ELEVATION - TOP OF BANK

UTILITY LEGEND

- W - EXISTING WATER LINE
- W - PROPOSED WATER LINE
- SS - EXISTING SANITARY SEWER
- FO - EXISTING FIBER OPTIC LINE
- G - EXISTING GAS LINE
- UT - EXISTING UNDERGROUND TELEPHONE
- UE - EXISTING UNDERGROUND ELECTRICAL
- OH-T - EXISTING OVERHEAD TELEPHONE
- OHE - EXISTING OVERHEAD ELECTRICAL
- S - EXISTING STORM SEWER
- E - EXISTING ELECTRICAL BOX
- T - EXISTING PAD MOUNTED TRANSFORMER
- P - EXISTING TRAFFIC POLE
- L - PROPOSED SITE LIGHTING
- M - EXISTING SANITARY SEWER MANHOLE
- S - EXISTING STORM SEWER MANHOLE
- M - EXISTING WATER METER
- V - EXISTING WATER VALVE
- H - EXISTING FIRE HYDRANT
- H - PROPOSED FIRE HYDRANT



SITE LEGEND

- - - - - PROPERTY BOUNDARY LINE
- - - - - RIGHT OF WAY BOUNDARY LINE
- - - - - EXISTING EASEMENT LINE
- - - - - PROPOSED 100-YEAR FLOODPLAIN
- - - - - EXISTING CURB AND GUTTER
- - - - - EXISTING CONCRETE
- - - - - EXISTING CDOT CLASS 6 GRAVEL
- - - - - EXISTING RIPRAP
- - - - - EXISTING BOULDERS
- - - - - PROPOSED CDOT CLASS 6 GRAVEL
- - - - - PROPOSED RIPRAP
- - - - - PROPOSED BOULDERS
- X - EXISTING SIGN
- X - REFERENCE TO DETAIL AND SHEET NUMBER



#	Date	Issue / Description	Init.

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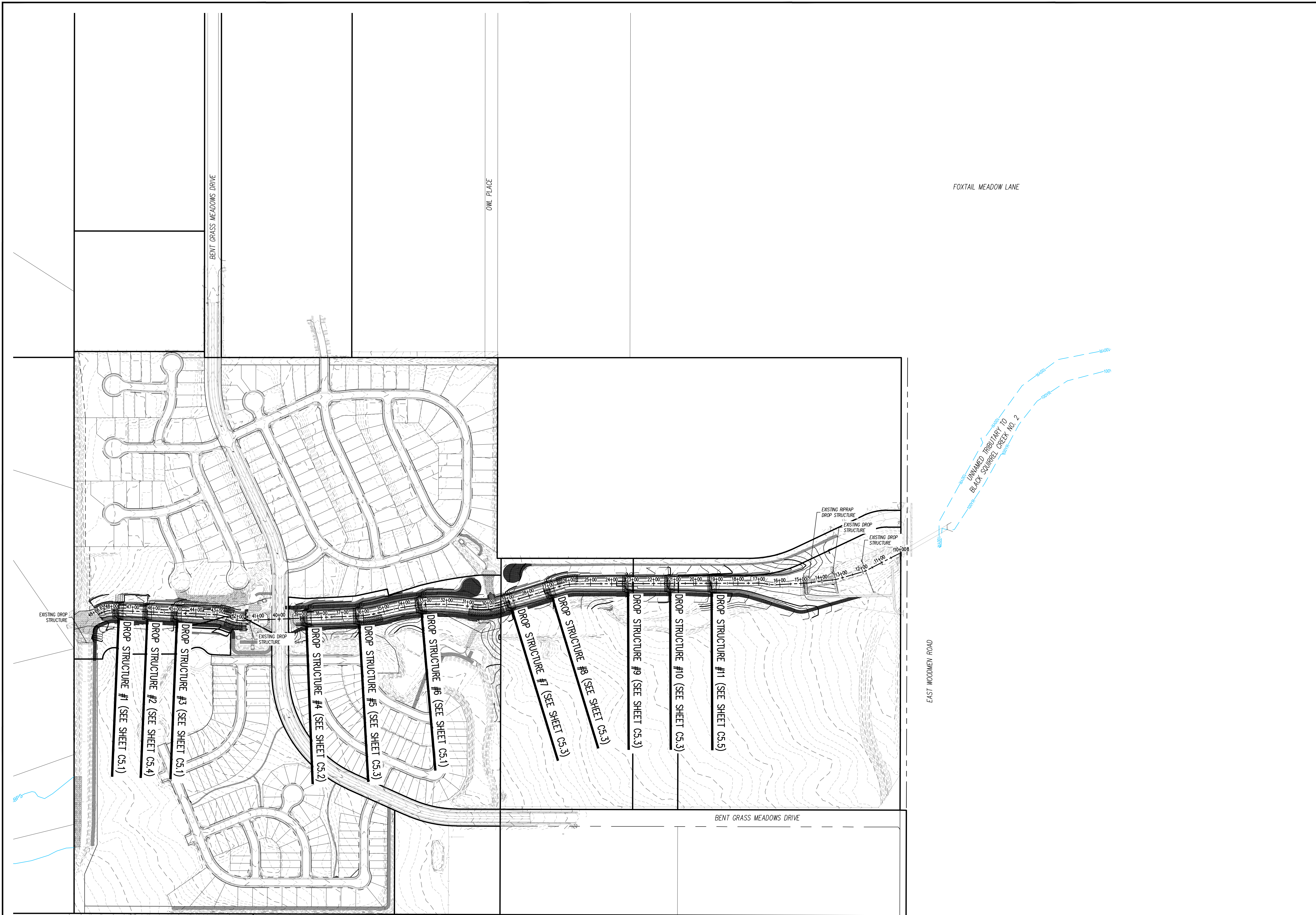
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Project No: CLH000023
Drawn By: CMWJ
Checked By: RGD
Date: 8/19/2022



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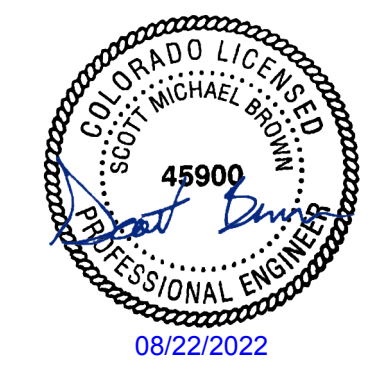
CONSTRUCTION DOCUMENTS
FALCON MEADOWS AT BENT GRASS
FOR
CHALLENGER COMMUNITIES, LLC

BENT GRASS MEADOWS DRIVE & MERIDAN ROAD
 FALCON, CO 80831 - EL PASO COUNTY

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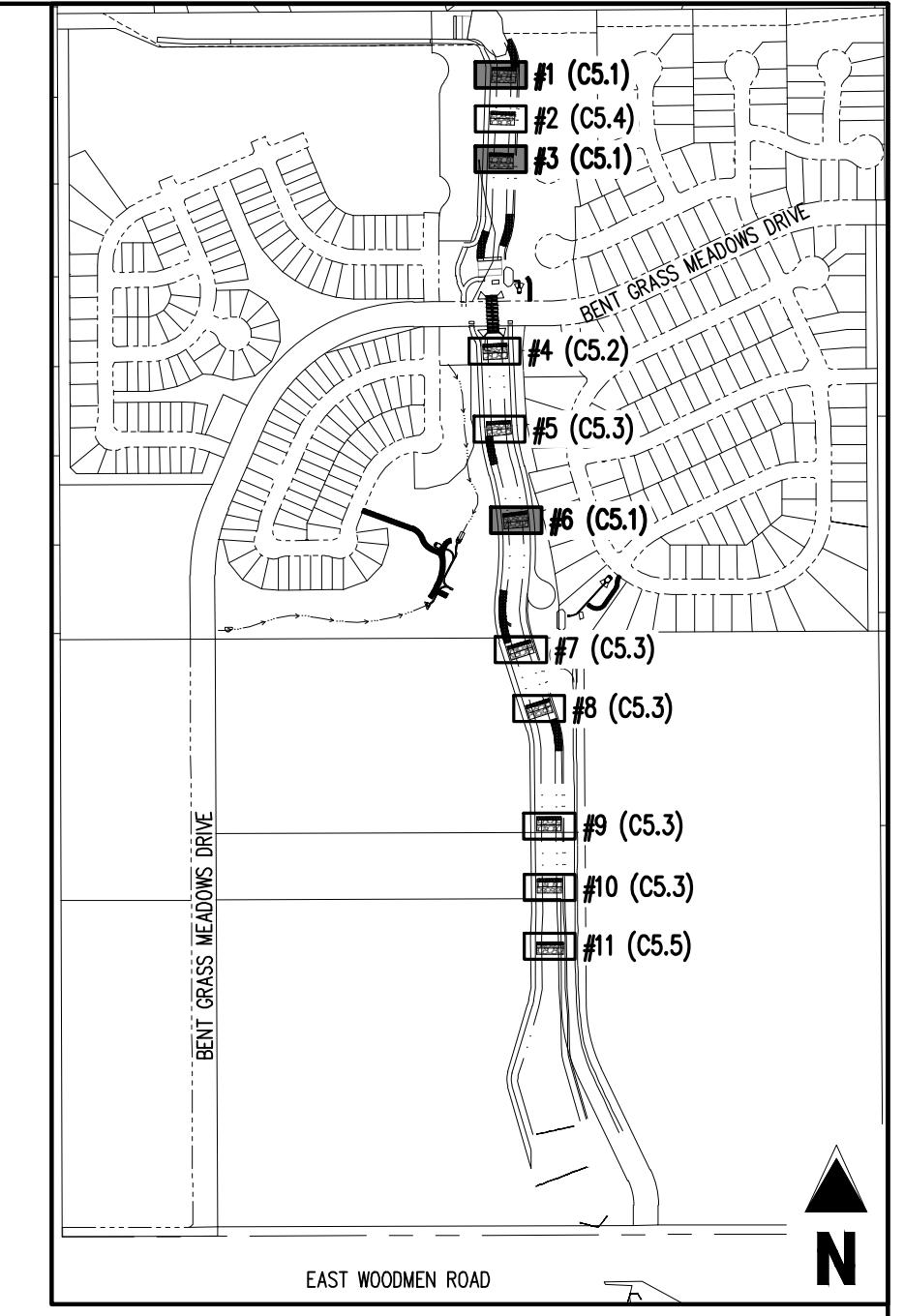
DROP STRUCTURE KEY
MAP



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CHALLENGER HOMES

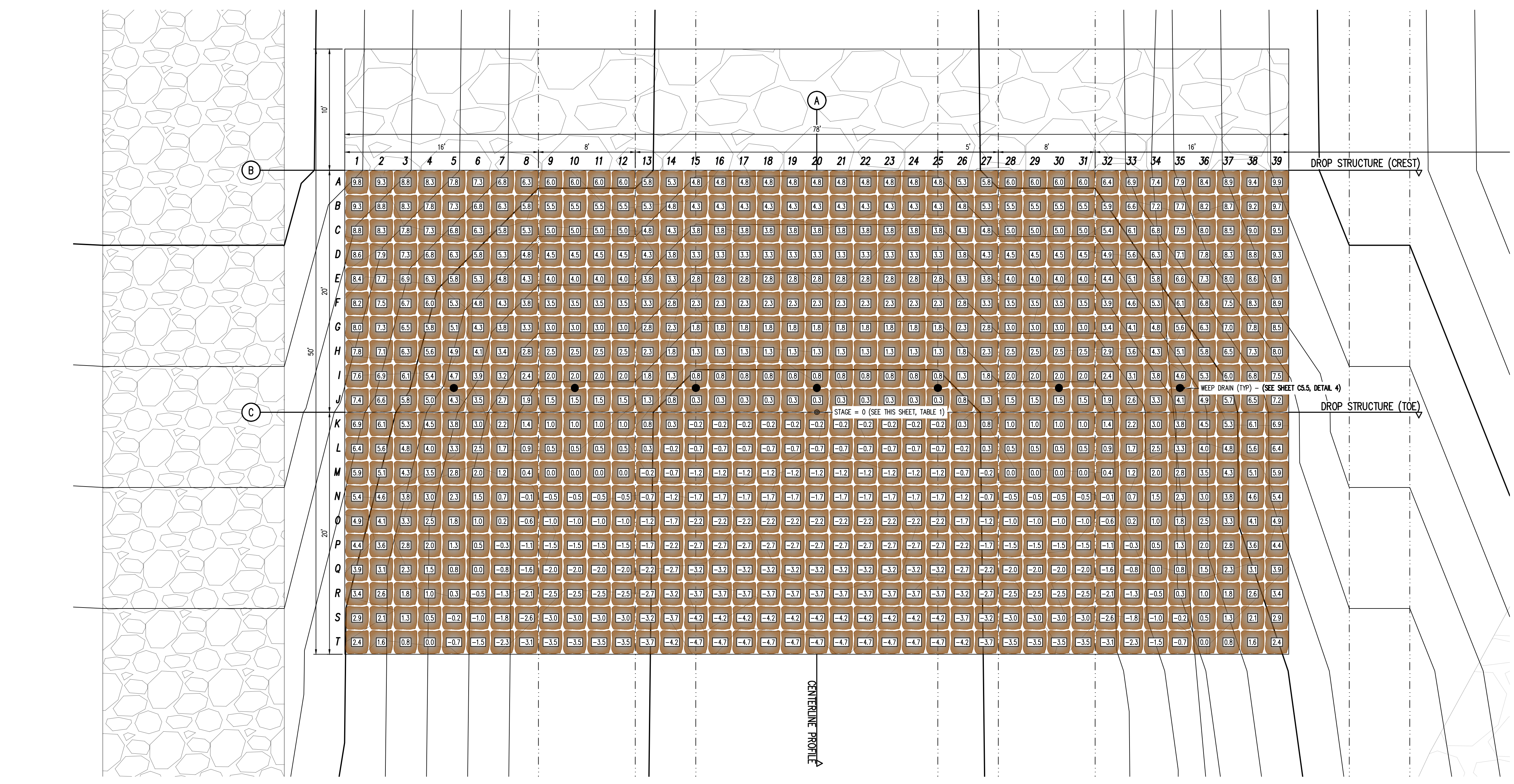
CONSTRUCTION DOCUMENTS
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 BENT GRASS MEADOWS DRIVE & MERIDAN ROAD
 FALCON, CO 80831 - EL PASO COUNTY



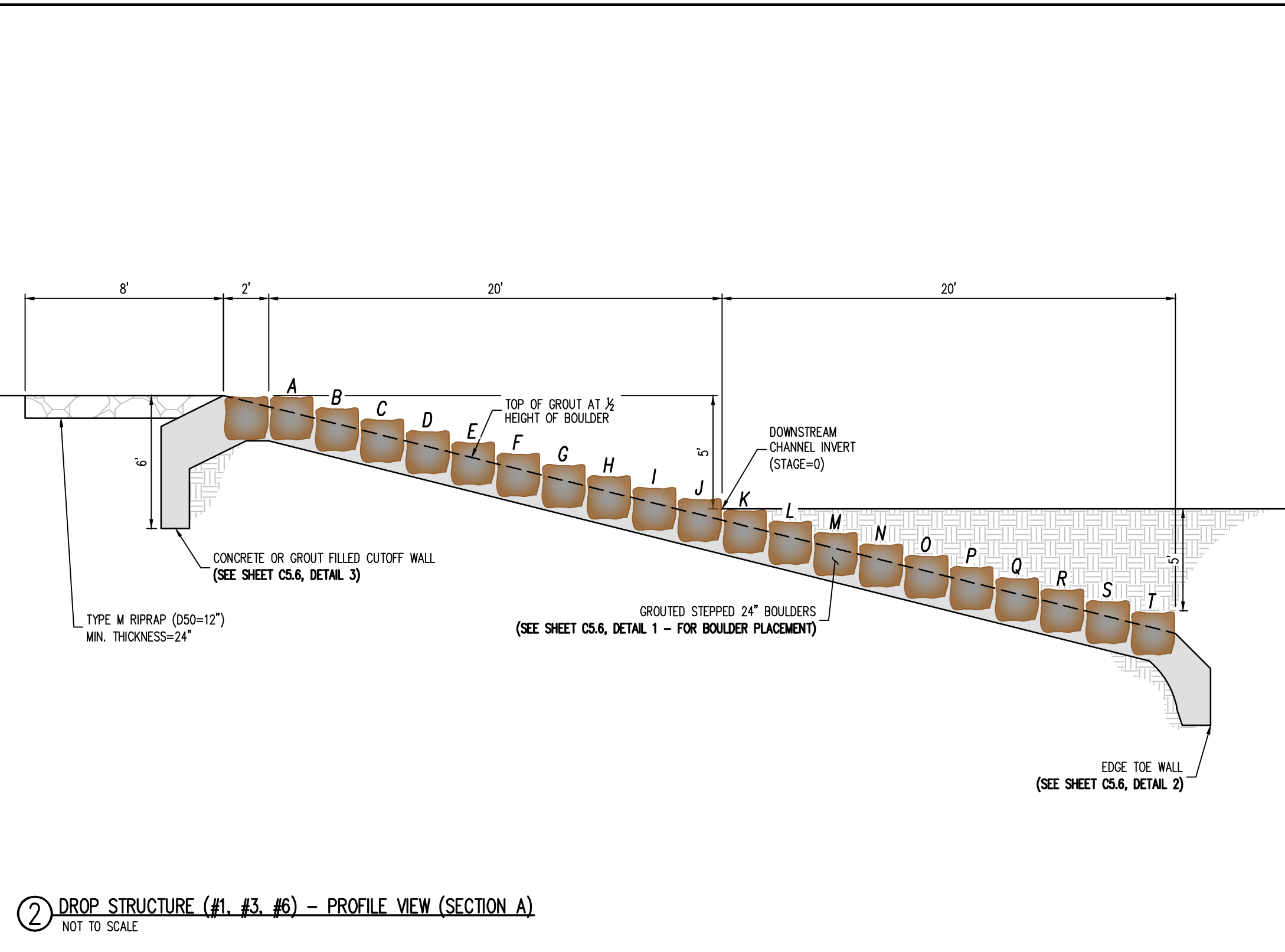
DROP STRUCTURE #1	6952.85
DROP STRUCTURE #3	6944.12
DROP STRUCTURE #6	6920.73

NOTE: STAGE=0 IS LOCATED AT THE TOE OF CHANNEL ALONG THE CENTER LINE ALIGNMENT. CONTRACTOR SHALL ENSURE ELEVATIONS ABOVE MATCH THE ELEVATIONS SHOWN ON PLAN & PROFILE SHEETS (C4.1-C4.4)

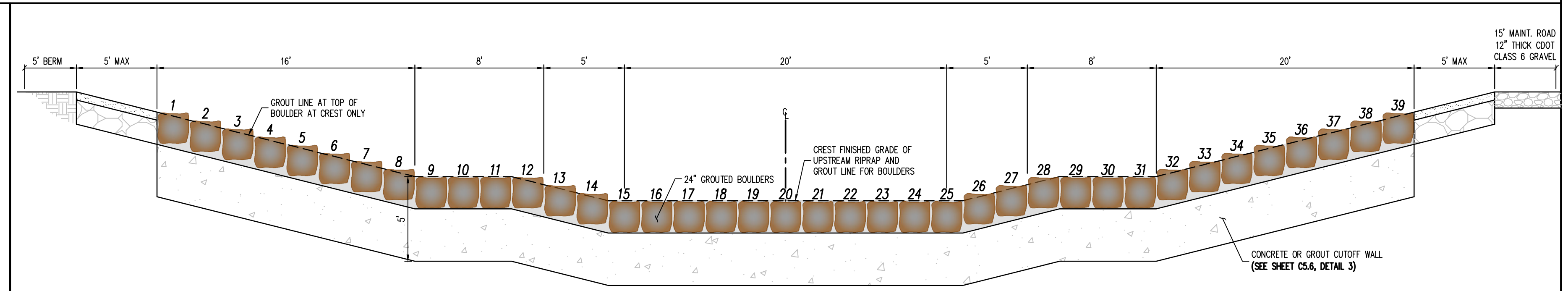
- NOTES:**
- PLACE BOULDERS AS TIGHTLY TOGETHER AS POSSIBLE (WITHOUT TOUCHING) WHILE PROVIDING ENOUGH ROOM BETWEEN THEM TO THOROUGHLY VIBRATE THE GROUT AND TO ENSURE NO GAPS IN THE GROUT. THE SMALL DIMENSION OF A 2'X4 CAN BE USED AS A GUIDE TO CHECK MINIMUM SPACING.
 - BEFORE GROUTING, CLEAN ALL DIRT AND MATERIAL FROM ROCK THAT COULD PREVENT THE GROUT FROM BINDING TO THE ROCK. KEEP BOULDERS FROM TOUCHING. AVOID SLOING BOULDERS AGAINST SUBGRADE TO PROPERLY POSITION.
 - DU TO VARIABILITY IN BOULDER SIZES, THE LAYOUT PROVIDED ON THIS DETAIL MAY NOT MATCH THE COMPLETED LAYOUT IN CONSTRUCTION.
 - REFER TO SHEET C5.6 FOR ADDITIONAL GROUTED BOULDER PLACEMENT NOTES AND SPECIFICATIONS.



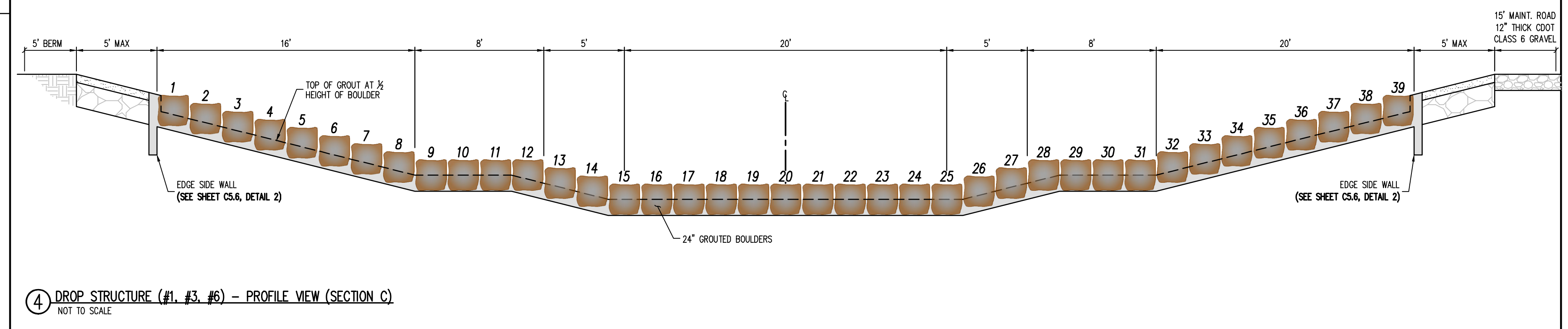
1 DROP STRUCTURE (#1, #3, #6) - PLAN VIEW
 SCALE: 1"=5'



2 DROP STRUCTURE (#1, #3, #6) - PROFILE VIEW (SECTION A)
 NOT TO SCALE



3 DROP STRUCTURE (#1, #3, #6) - PROFILE VIEW (SECTION B)
 NOT TO SCALE



4 DROP STRUCTURE (#1, #3, #6) - PROFILE VIEW (SECTION C)
 NOT TO SCALE

#	Date	Issue / Description	Init.

Project No: CLH000023
 Drawn By: CMVWJ
 Checked By: SMB
 Date: 8/19/2022

DROP STRUCTURE
 DETAILS (#1, #3, #6)

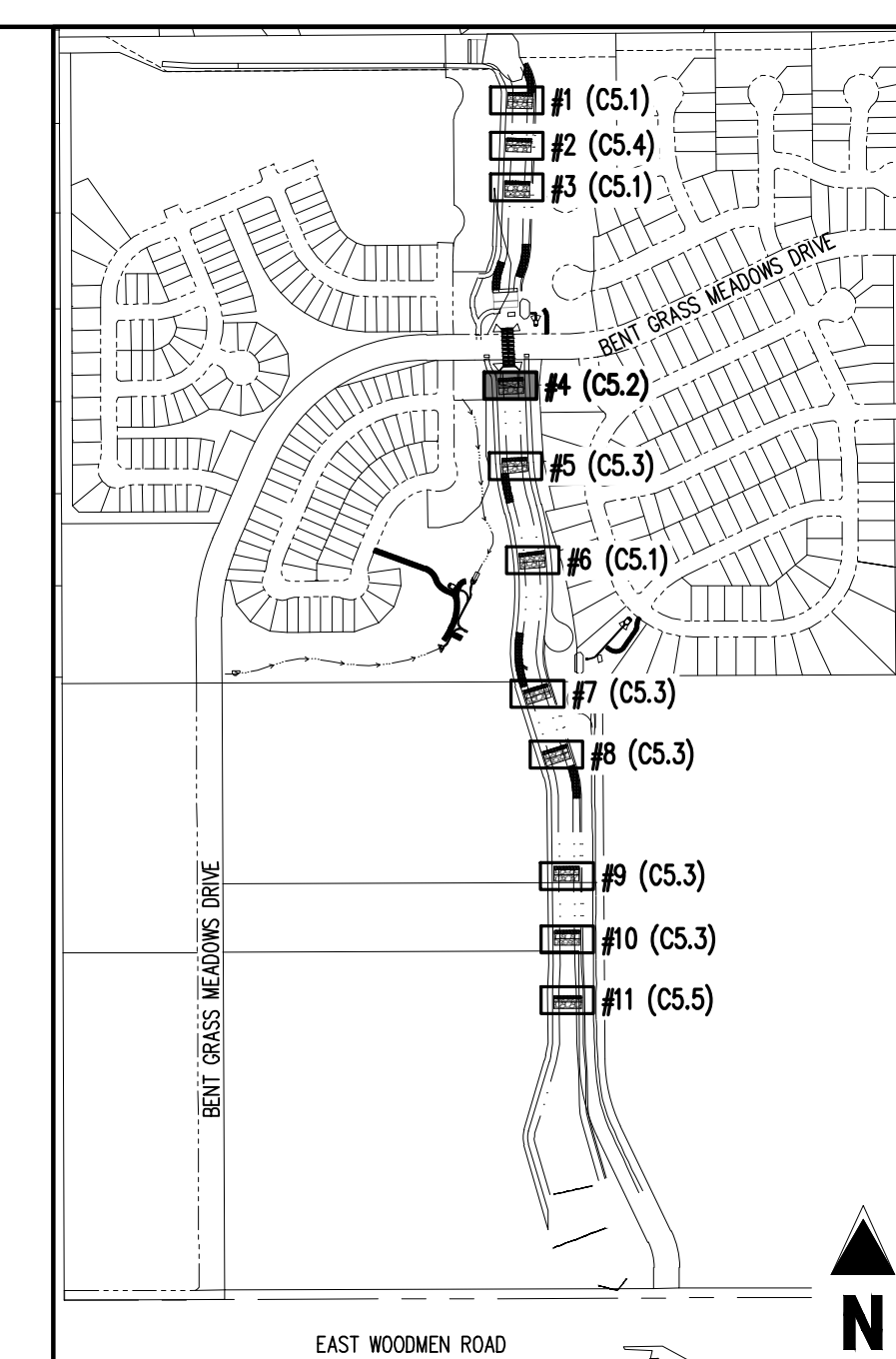
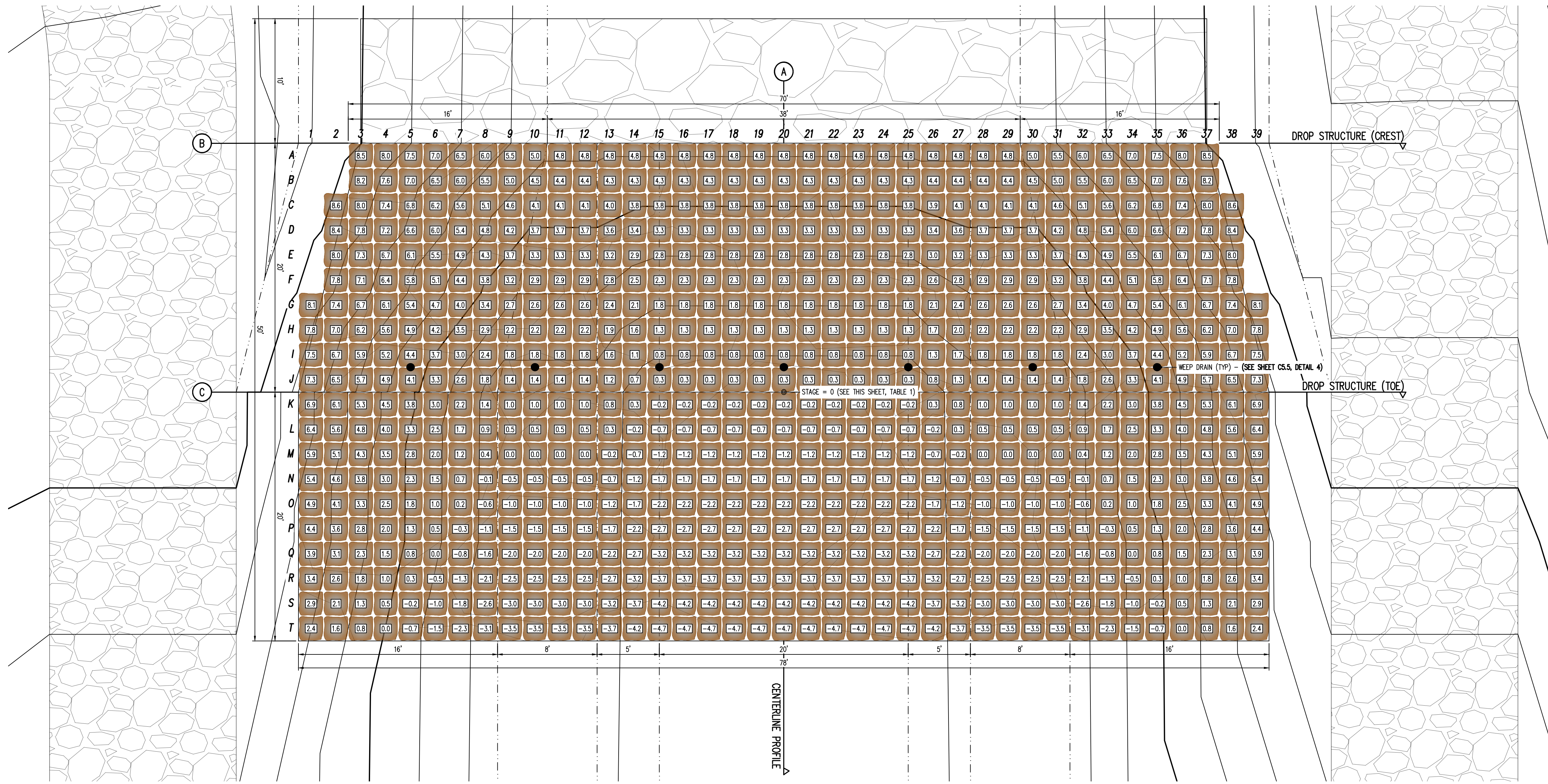


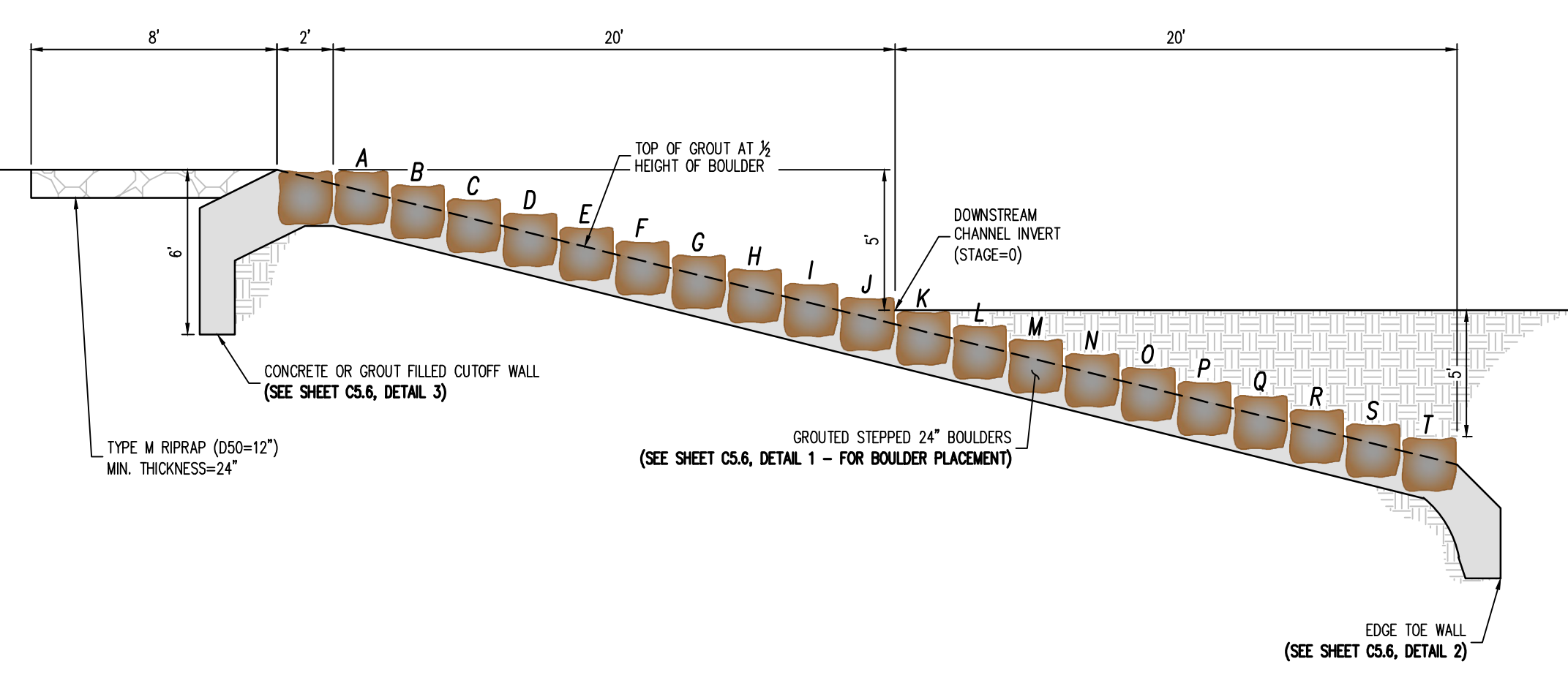
TABLE 1: DROP STRUCTURE STAGE ELEVATIONS

DROP STRUCTURE #4 6931.27

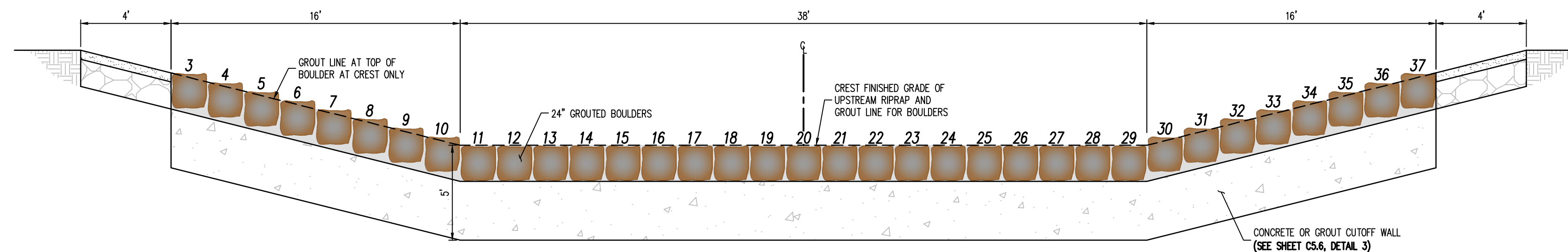
NOTE: STAGE=0 IS LOCATED AT THE TOE OF CHANNEL ALONG THE CENTER LINE ALIGNMENT. CONTRACTOR SHALL ENSURE ELEVATIONS ABOVE MATCH THE ELEVATIONS SHOWN ON PLAN & PROFILE SHEETS (C4.1-C4.4)

- NOTES:**
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 - BEFORE GROUTING, CLEAN ALL DIRT AND MATERIAL FROM ROCK THAT COULD PREVENT THE GROUT FROM BINDING TO THE ROCK. KEEP BOULDERS FROM TOUCHING. AVOID SLIDING BOULDERS AGAINST SUBGRADE TO PROPERLY POSITION.
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 - REFER TO SHEET CS.6 FOR ADDITIONAL GROUTED BOULDER PLACEMENT NOTES AND SPECIFICATIONS.

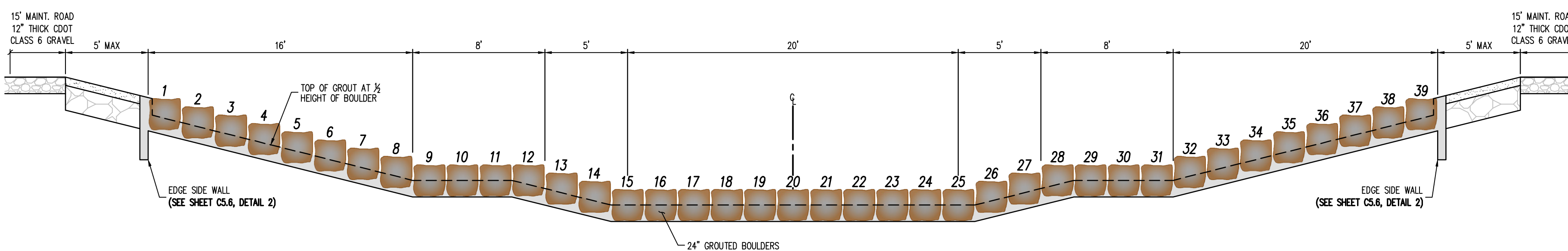
1 DROP STRUCTURE (#4) - PLAN VIEW
SCALE: 1"=5'



2 DROP STRUCTURE (#4) - PROFILE VIEW (SECTION A)
NOT TO SCALE



3 DROP STRUCTURE (#4) - PROFILE VIEW (SECTION B)
NOT TO SCALE



4 DROP STRUCTURE (#4) - PROFILE VIEW (SECTION C)
NOT TO SCALE



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DROP STRUCTURE DETAILS (#4)



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CHALLENGER HOMES

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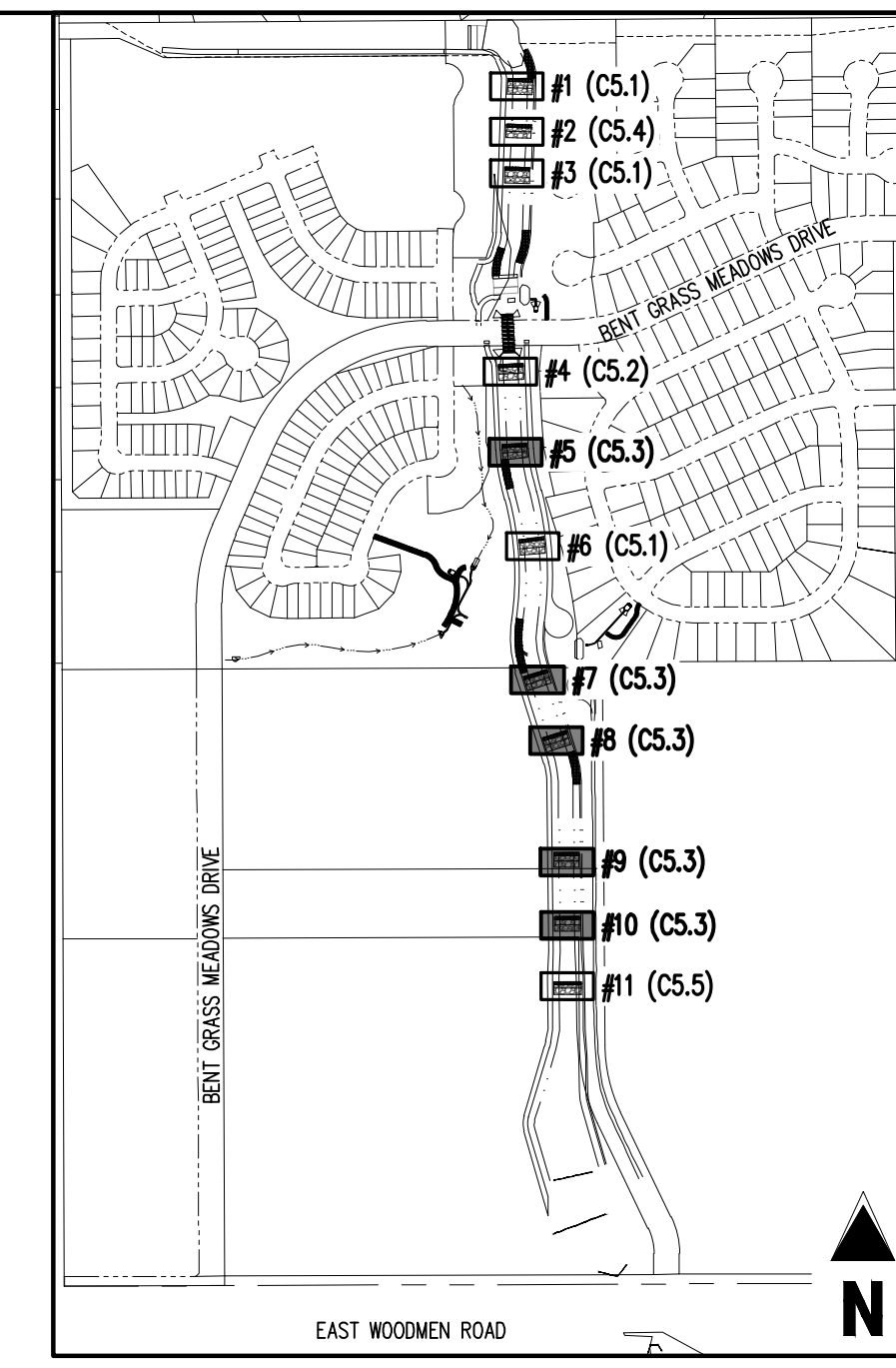
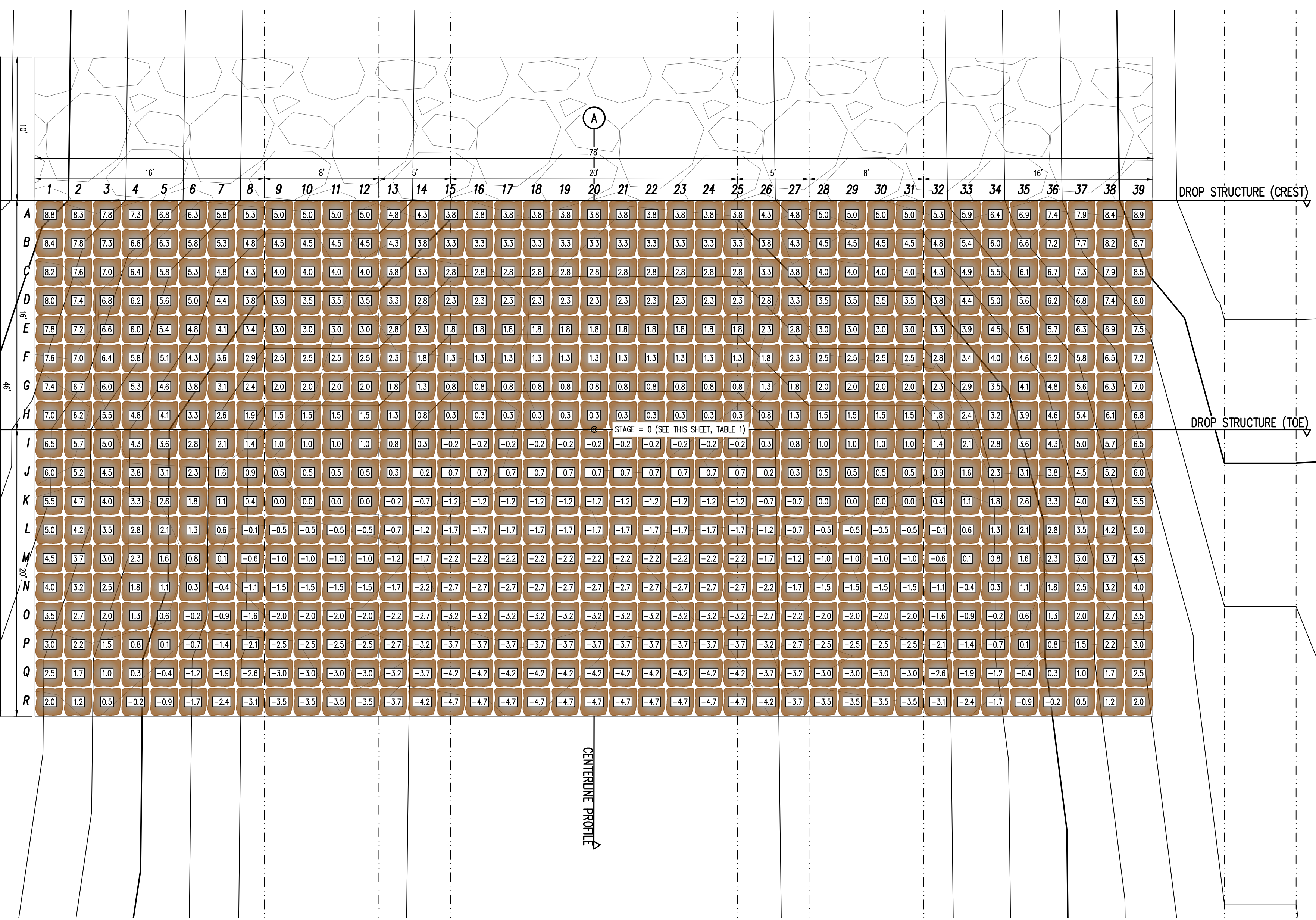


TABLE 1: DROP STRUCTURE STAGE ELEVATIONS

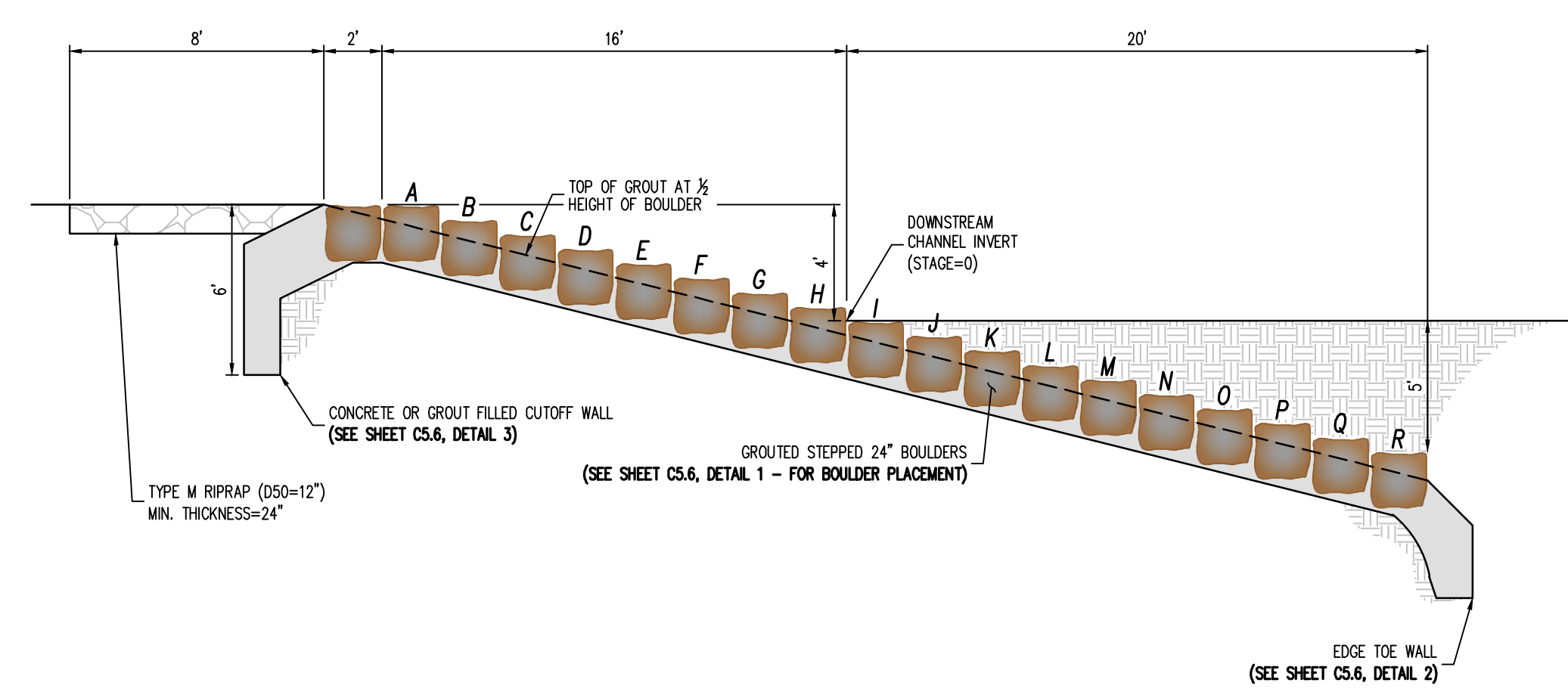
DROP STRUCTURE #	ELEVATION
DROP STRUCTURE #5	6926.58
DROP STRUCTURE #7	6915.51
DROP STRUCTURE #8	6910.96
DROP STRUCTURE #9	6905.89
DROP STRUCTURE #10	6901.33

NOTE: STAGE=0 IS LOCATED AT THE TOE OF CHANNEL ALONG THE CENTER LINE ALIGNMENT. CONTRACTOR SHALL ENSURE ELEVATIONS ABOVE MATCH THE ELEVATIONS SHOWN ON PLAN & PROFILE SHEETS (C41-C44)

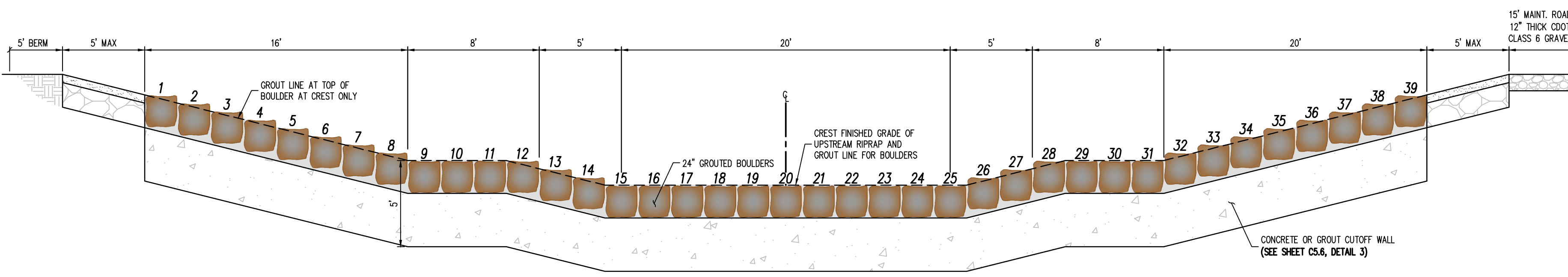
- NOTES:**
- PLACE BOULDERS AS TIGHTLY TOGETHER AS POSSIBLE (WITHOUT TOUCHING) WHILE PROVIDING ENOUGH ROOM BETWEEN THEM TO THOROUGHLY VIBRATE THE GROUT AND TO ENSURE NO GAPS IN THE GROUT. THE SMALL DIMENSION OF A 2X4 CAN BE USED AS A GUIDE TO CHECK MINIMUM SPACING.
 - BEFORE GROUTING, CLEAN ALL DIRT AND MATERIAL FROM ROCK THAT COULD PREVENT THE GROUT FROM BINDING TO THE ROCK. KEEP BOULDERS FROM TOUCHING. AVOID SLIDING BOULDERS AGAINST SUBGRADE TO PROPERLY POSITION.
 - DUE TO VARIABILITY IN BOULDER SIZES, THE LAYOUT PROVIDED ON THIS DETAIL MAY NOT MATCH THE COMPLETED LAYOUT IN CONSTRUCTION.
 - REFER TO SHEET C5.6 FOR ADDITIONAL GROUTED BOULDER PLACEMENT NOTES AND SPECIFICATIONS.



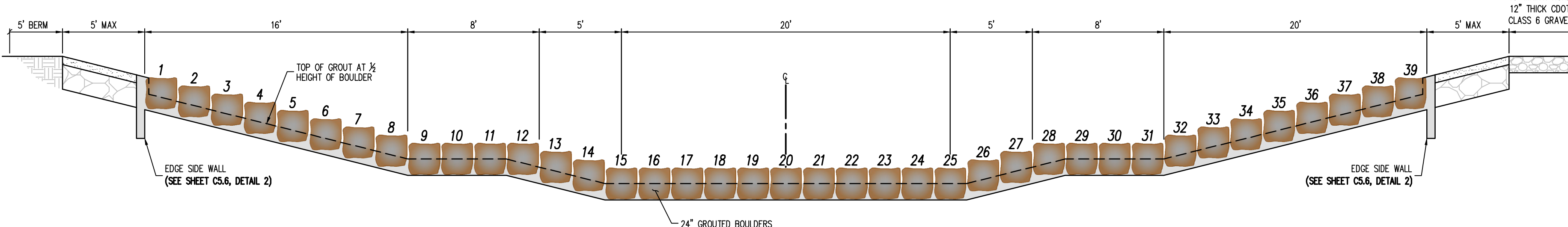
1 DROP STRUCTURE (#5, #7, #8, #9, #10) - PLAN VIEW
SCALE: 1"=5'



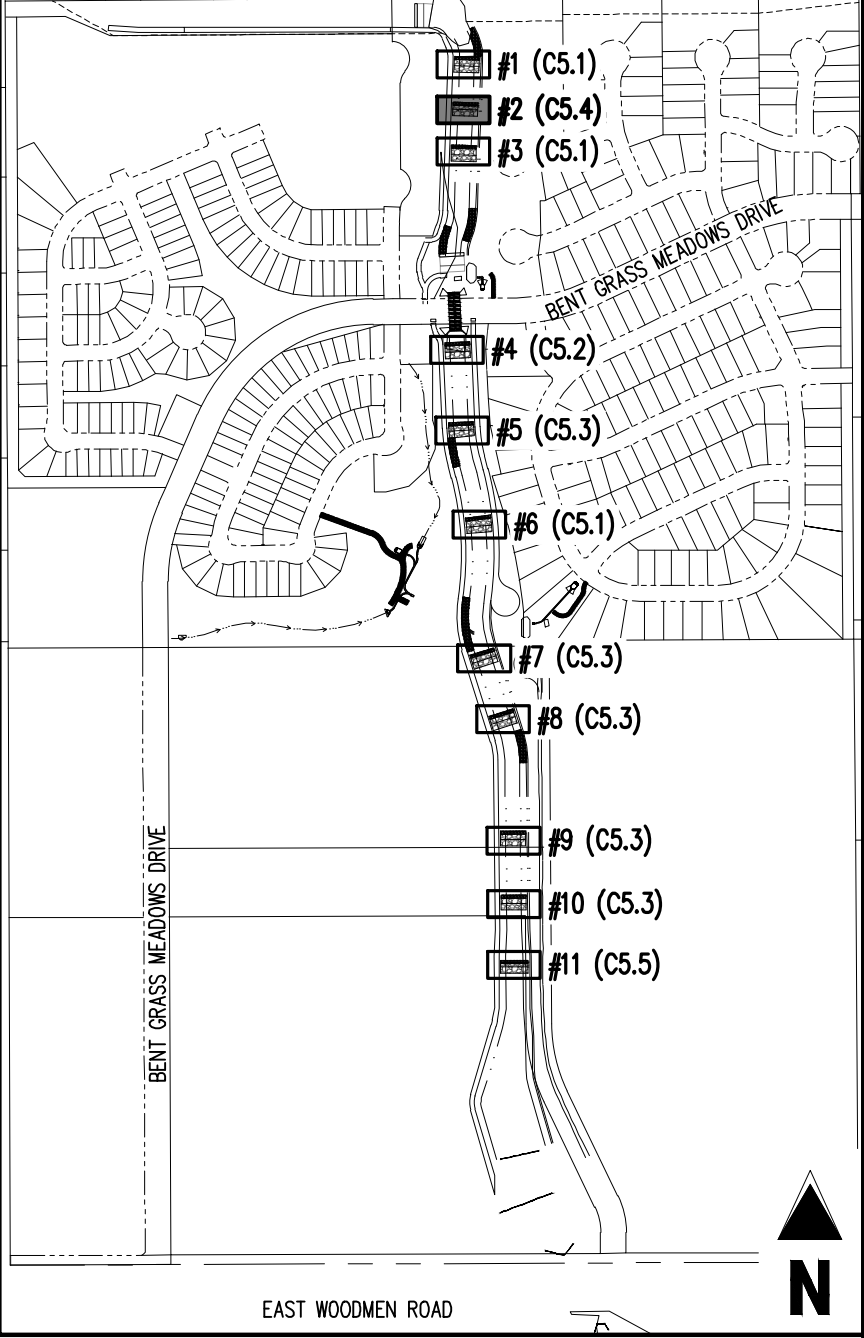
2 DROP STRUCTURE (#5, #7, #8, #9, #10) - PROFILE VIEW (SECTION A)
NOT TO SCALE



3 DROP STRUCTURE (#5, #7, #8, #9, #10) - PROFILE VIEW (SECTION B)
NOT TO SCALE



4 DROP STRUCTURE (#5, #7, #8, #9, #10) - PROFILE VIEW (SECTION C)
NOT TO SCALE



KEY MAP
SCALE: 1"=600'

DROP STRUCTURE #2	6949.48
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NOTE: STAGE=0 IS LOCATED AT THE TOE OF CHANNEL ALONG THE CENTER LINE ALIGNMENT. CONTRACTOR SHALL ENSURE ELEVATIONS ABOVE MATCH THE ELEVATIONS SHOWN ON PLAN & PROFILE SHEETS (C4.1-C4.4)

- NOTES:
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 4. REFER TO SHEET C5.6 FOR ADDITIONAL GROUTED BOULDER PLACEMENT NOTES AND SPECIFICATIONS.

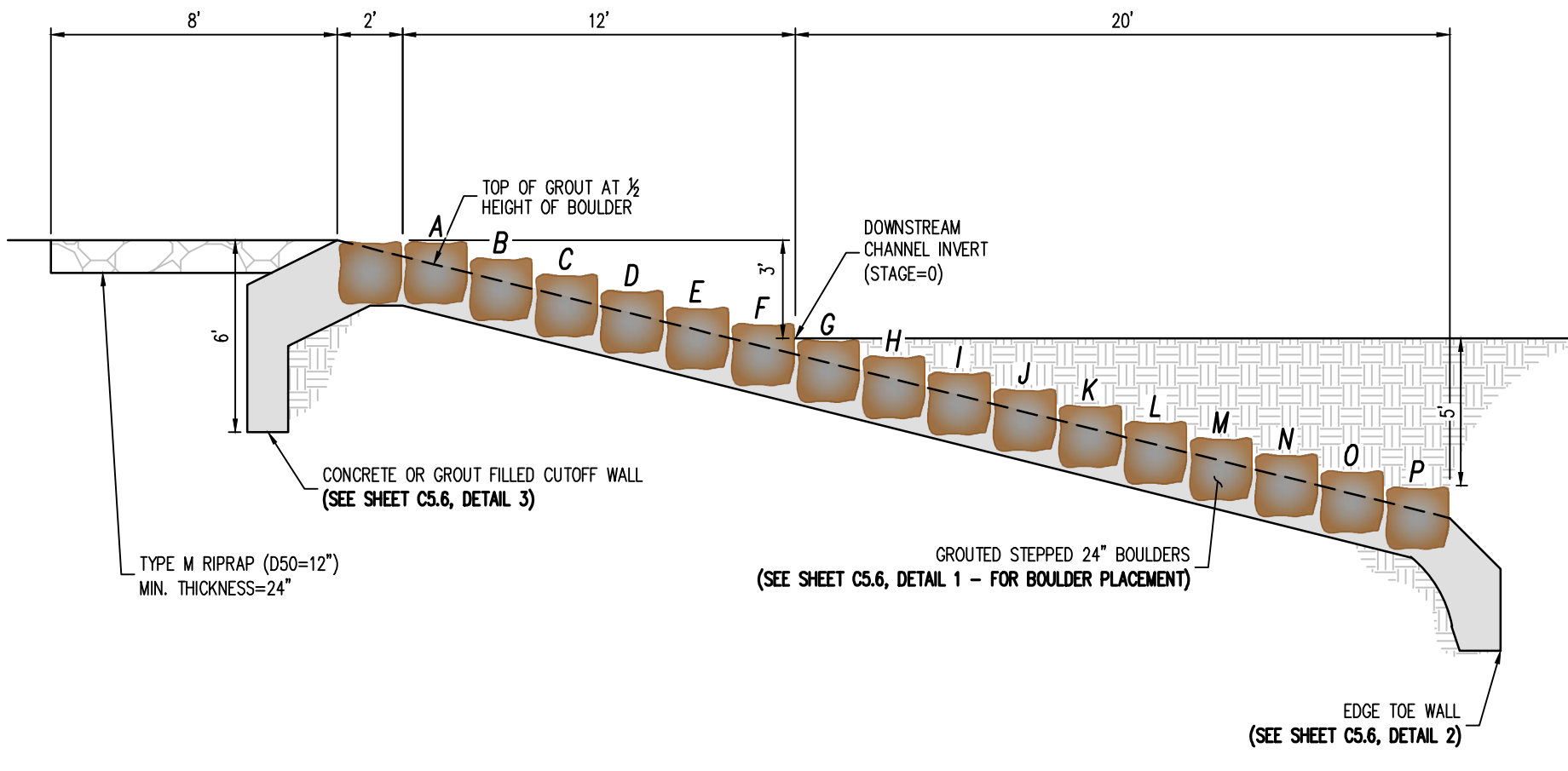
DROP STRUCTURE (CREST)

DROP STRUCTURE (TOE)

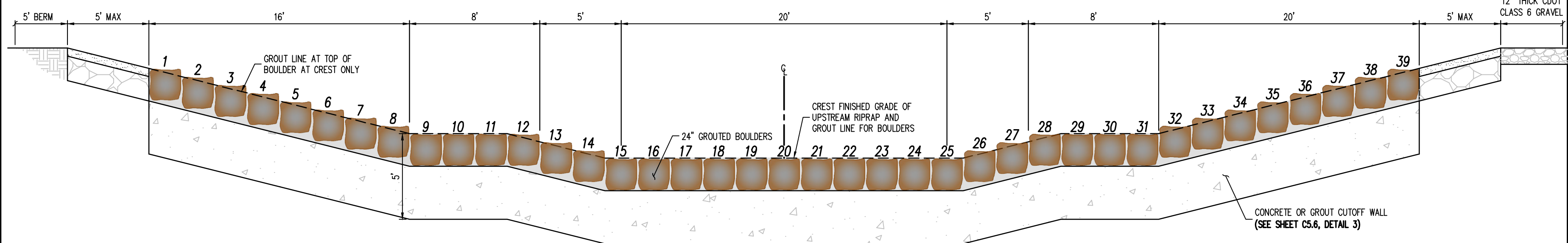
CENTRELINE PROFILE

1 DROP STRUCTURE (#2) - PLAN VIEW
SCALE: 1"=5'

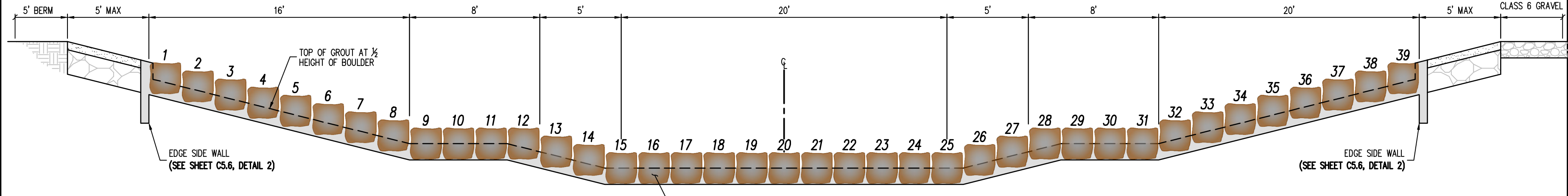
2 DROP STRUCTURE (#2) - PROFILE VIEW (SECTION A)
NOT TO SCALE



3 DROP STRUCTURE (#2) - PROFILE VIEW (SECTION B)
NOT TO SCALE



4 DROP STRUCTURE (#2) - PROFILE VIEW (SECTION C)
NOT TO SCALE



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CONSTRUCTION DOCUMENTS
FALCON MEADOWS AT BENT GRASS
FOR
CHALLENGER COMMUNITIES, LLC
BENT GRASS MEADOWS DRIVE & MERIDAN ROAD
FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No: CLH000023
Drawn By: CMW/JJ
Checked By: SMB
Date: 8/19/2022



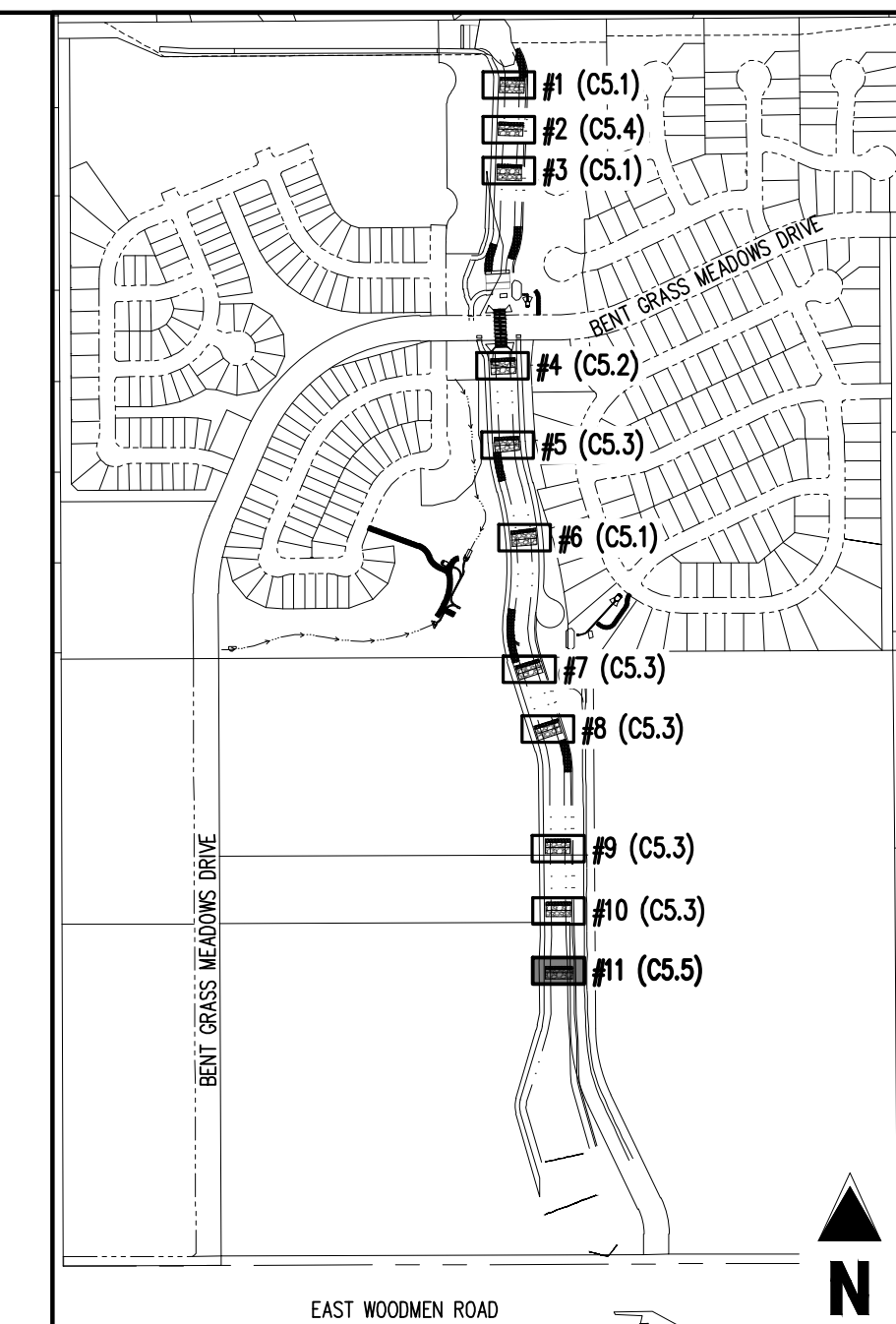
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 FOR
 FALCON MEADOWS AT BENT GRASS
 CHALLENGER COMMUNITIES, LLC
 BENT GRASS MEADOWS DRIVE & MERIDAN ROAD
 FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No: CLH000023
 Drawn By: CMVJW
 Checked By: SMB
 Date: 8/19/2022

DROP STRUCTURE DETAILS (#11)



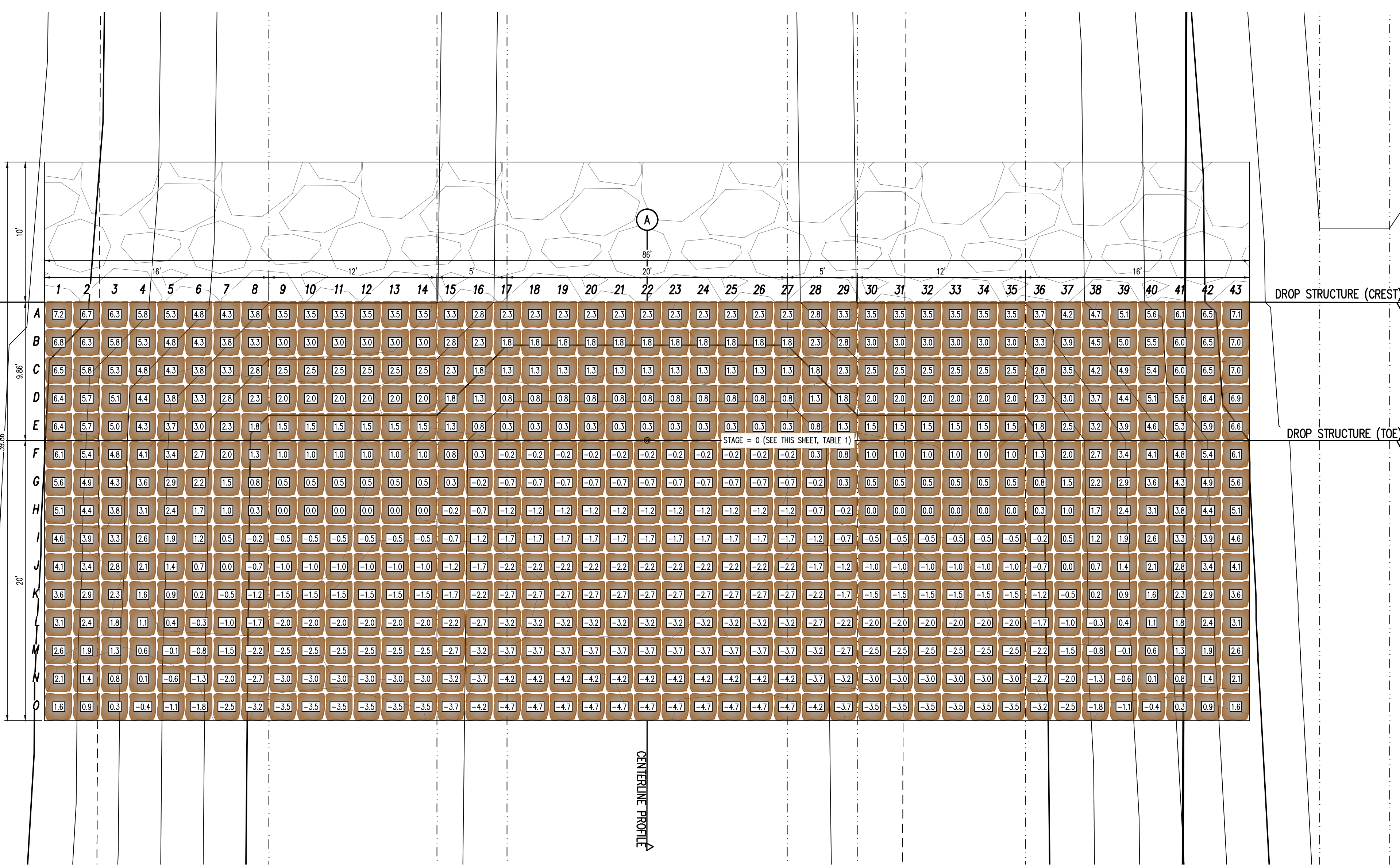
KEY MAP
 SCALE: 1"=600'

TABLE 1: DROP STRUCTURE STAGE ELEVATIONS

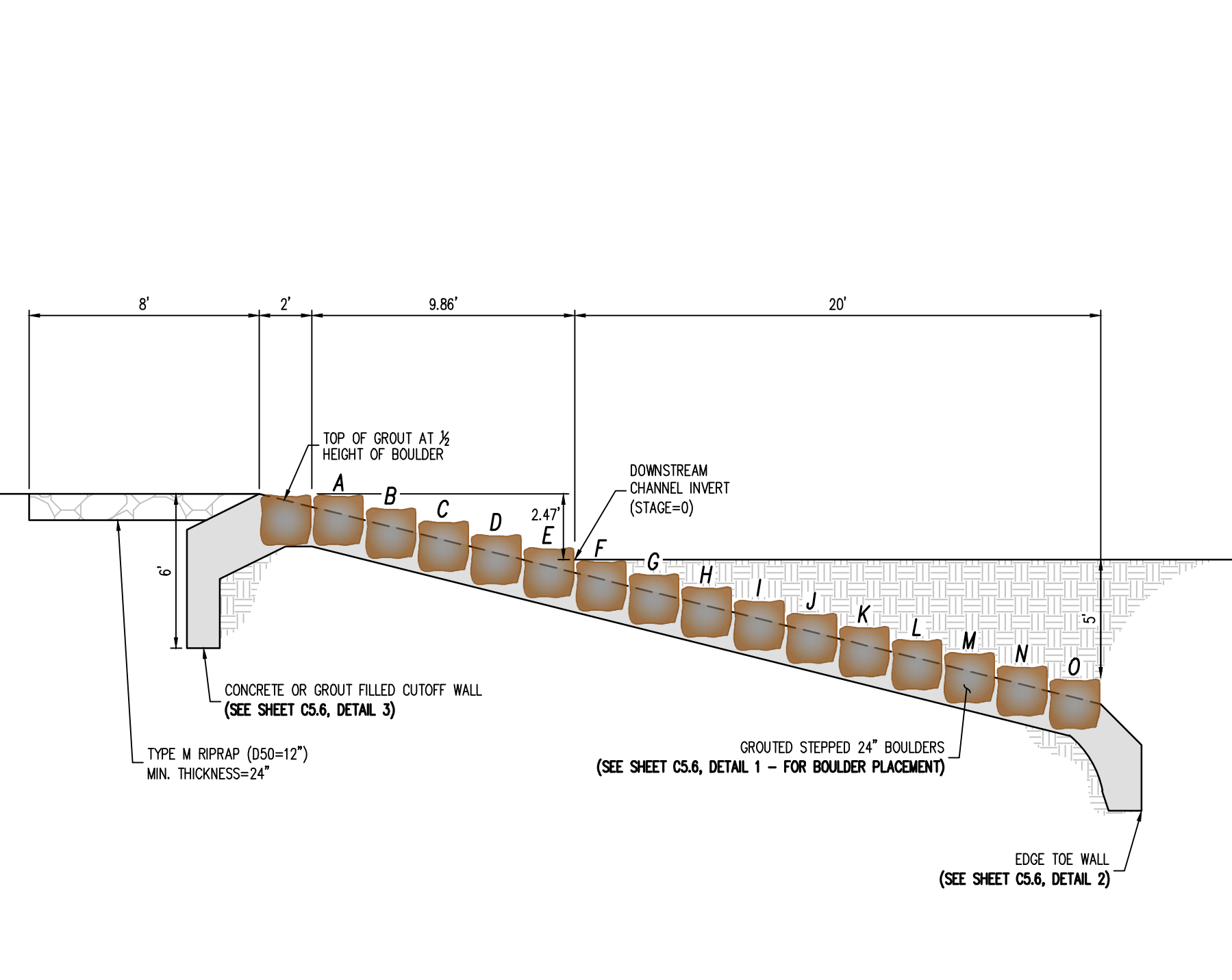
DROP STRUCTURE #11
 6888.30

NOTE: STAGE=0 IS LOCATED AT THE TOE OF CHANNEL ALONG THE CENTER LINE ALIGNMENT. CONTRACTOR SHALL ENSURE ELEVATIONS ABOVE MATCH THE ELEVATIONS SHOWN ON PLAN & PROFILE SHEETS (C4.1-C4.4)

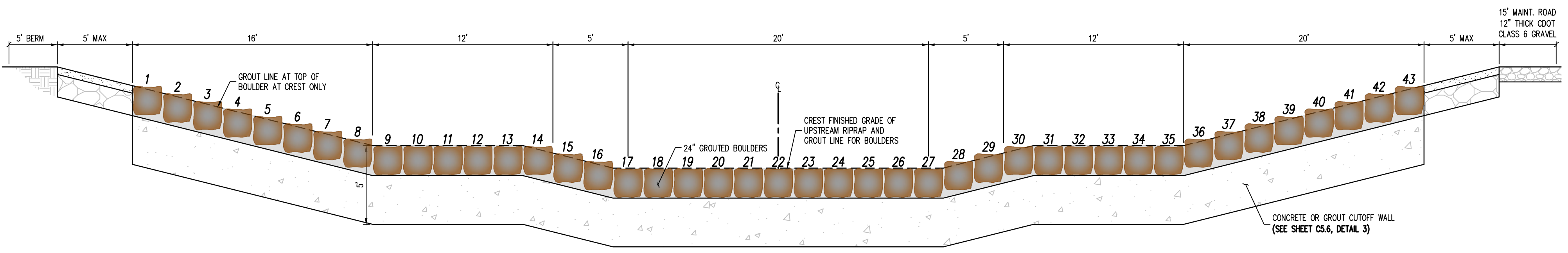
- NOTES:**
1. PLACE BOULDERS AS TIGHTLY TOGETHER AS POSSIBLE (WITHOUT TOUCHING) WHILE PROVIDING ENOUGH ROOM BETWEEN THEM TO THOROUGHLY VIBRATE THE GROUT AND TO ENSURE NO GAPS IN THE GROUT. THE SMALL DIMENSION OF A 2'x4' CAN BE USED AS A GUIDE TO CHECK MINIMUM SPACING.
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 3. DUE TO VARIABILITY IN BOULDER SIZES, THE LAYOUT PROVIDED ON THIS DETAIL MAY NOT MATCH THE COMPLETED LAYOUT IN CONSTRUCTION.
 4. REFER TO SHEET C5.6 FOR ADDITIONAL GROUTED BOULDER PLACEMENT NOTES AND SPECIFICATIONS.



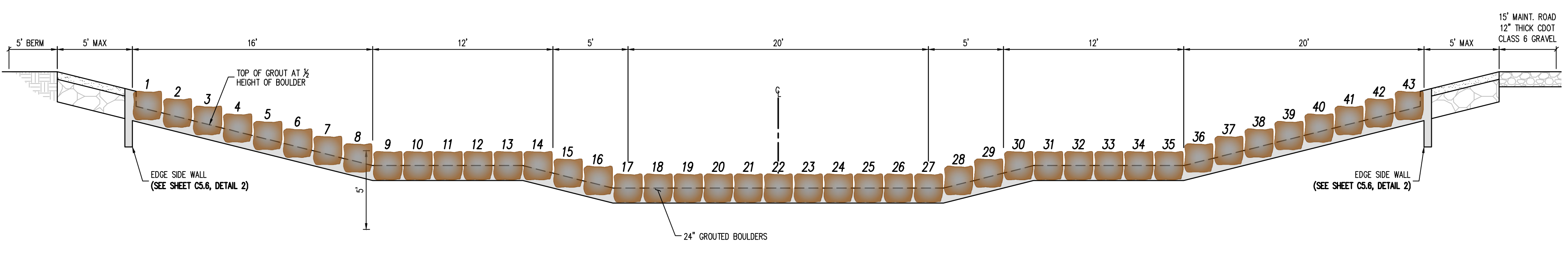
① DROP STRUCTURE (#11) - PLAN VIEW
 SCALE: 1"=5'



② DROP STRUCTURE (#11) - PROFILE VIEW (SECTION A)
 NOT TO SCALE



③ DROP STRUCTURE (#11) - PROFILE VIEW (SECTION B)
 NOT TO SCALE



④ DROP STRUCTURE (#11) - PROFILE VIEW (SECTION C)
 NOT TO SCALE

CHALLENGER COMMUNITIES, LLC, DRAWN BY CMVJW, CHECKED BY SMB, DATE 8/19/2022, PROJECT NO CLH000023, SHEET C5.5 OF 23, FALCON MEADOWS AT BENT GRASS, CHALLENGER COMMUNITIES, LLC, 1155 KELLY JOHNSON BLVD., SUITE 305, COLORADO SPRINGS, CO 80920



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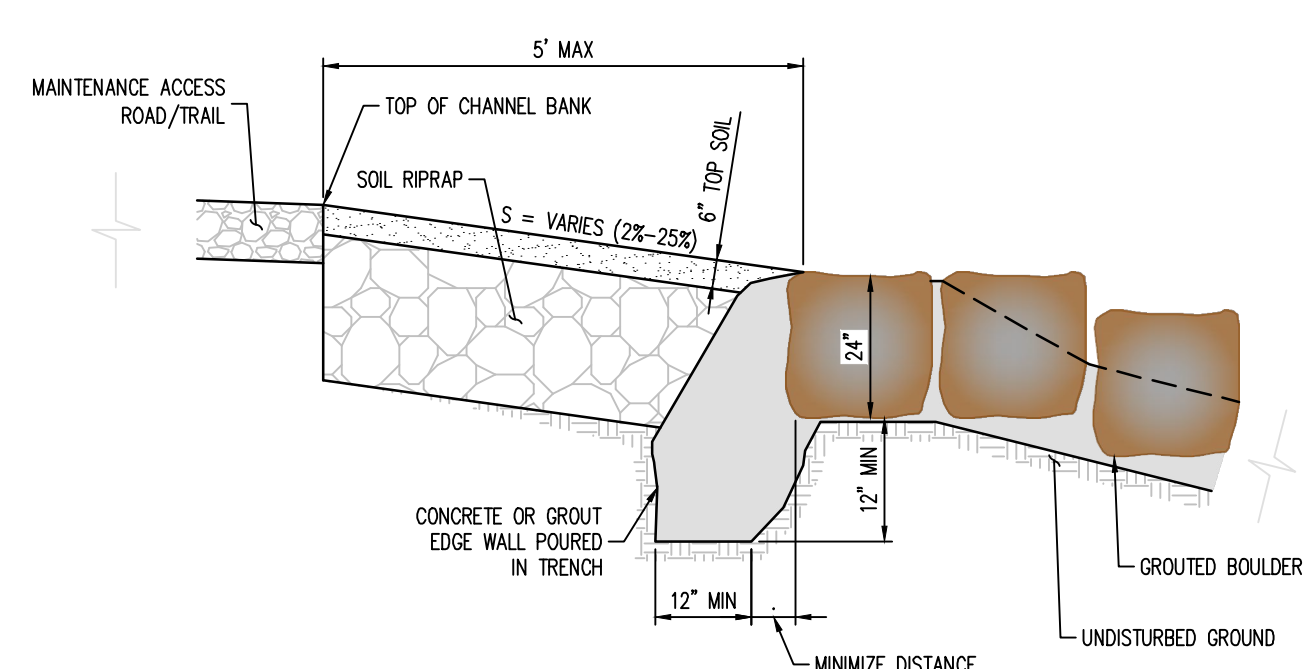
#	Date	Issue / Description	Init.

Project No: CLH000023
 Drawn By: CMVJ
 Checked By: SMB
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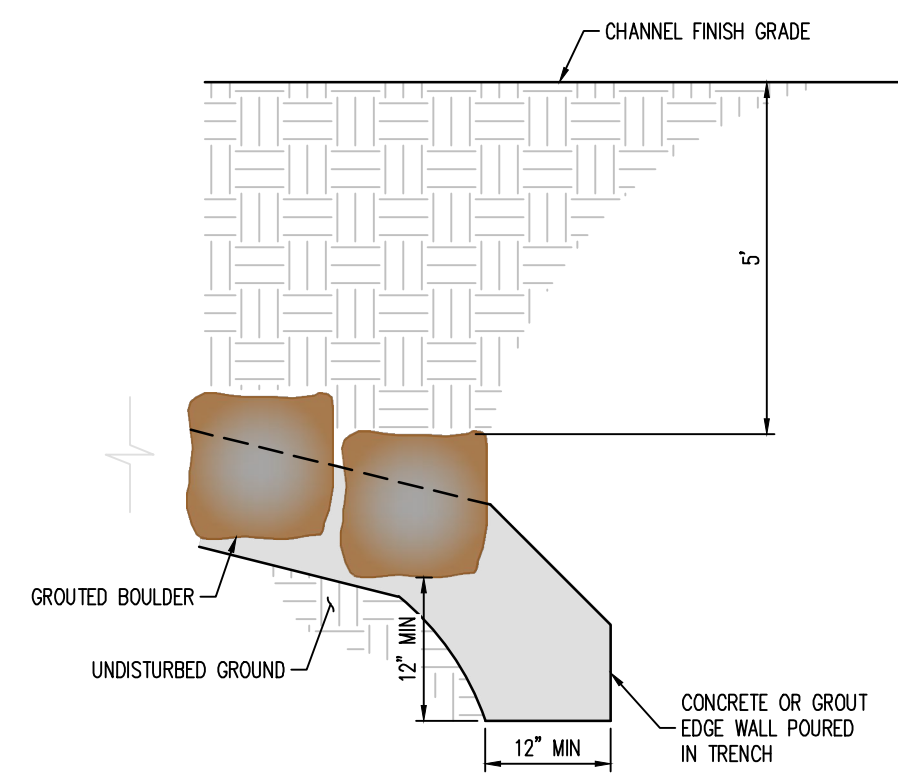
DROP STRUCTURE
 GENERAL DETAILS

SOIL RIPRAP SPECIFICATIONS:

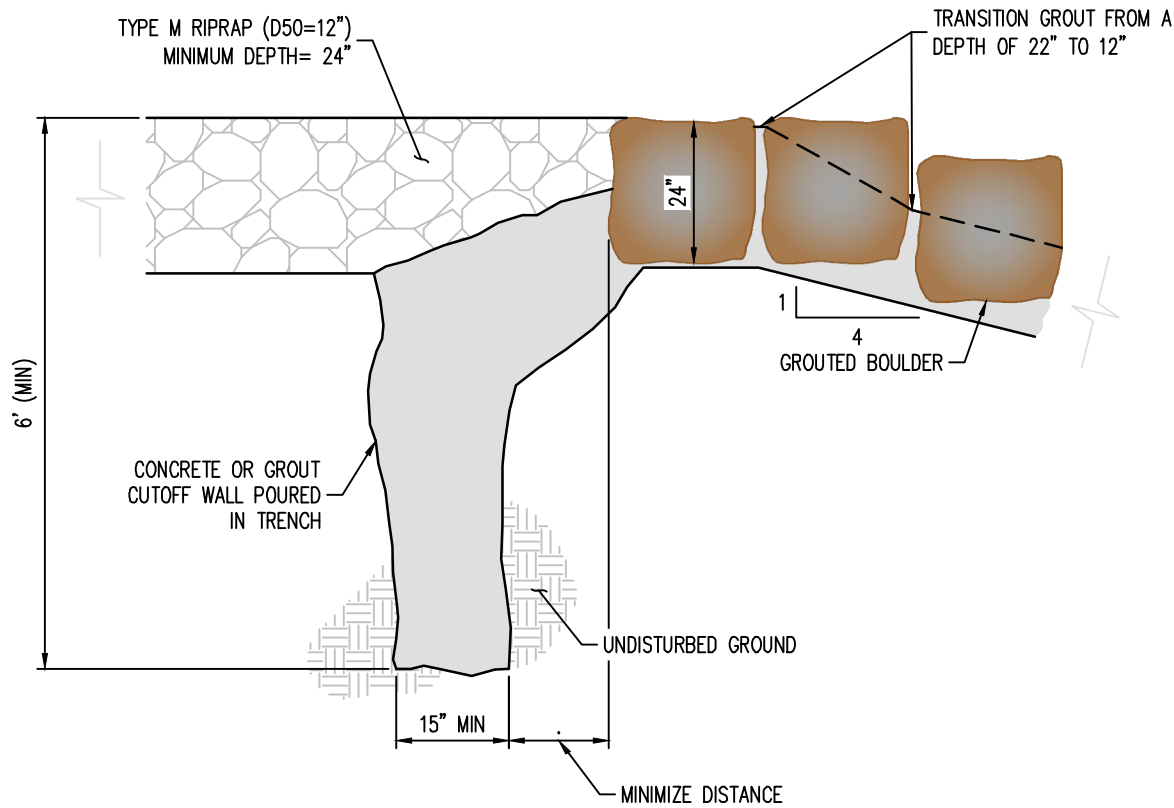
- CONTRACTOR SHALL EXCAVATE AREAS TO RECEIVE SOIL RIPRAP TO THE SPECIFIED DEPTH.
- SUBGRADE SHOULD BE COMPACTED TO NINETY-FIVE PERCENT (95%) MAXIMUM DENSITY.
- NO BEDDING MATERIAL IS REQUIRED FOR SOIL RIPRAP.
- RIPRAP SHALL BE PLACED ON THE PREPARED SLOPE OR CHANNEL BOTTOM AREAS IN A MANNER WHICH WILL PRODUCE A REASONABLY WELL GRADED MASS OF STONE WITH THE MINIMUM PRACTICABLE PERCENTAGE OF VOIDS.
- RIPRAP SHALL BE MACHINE PLACED.
- IT IS THE INTENT OF THESE SPECIFICATIONS TO PRODUCE A FAIRLY COMPACT RIPRAP PROTECTION IN WHICH ALL SIZES OF MATERIAL ARE PLACED IN THEIR PROPER PROPORTIONS.
- WHEN RIPRAP IS PLACED ON SLOPE, PLACEMENT SHALL COMMENCE AT THE BOTTOM OF THE SLOPE WORKING UP THE SLOPE.
- ALL MATERIAL USED FOR RIPRAP PROTECTION FOR CHANNEL SLOPE OR BOTTOM SHALL BE PLACED AND DISTRIBUTED SUCH THAT THERE SHALL BE NO LARGE ACCUMULATIONS OF EITHER THE LARGER OR SMALLER SIZES OF STONE. SOME HAND PLACEMENT MAY BE REQUIRED TO ACHIEVE THIS DISTRIBUTION.
- SMALLER ROCK SHALL BE SECURELY LOCKED BETWEEN THE LARGER STONE. IT IS ESSENTIAL THAT THE MATERIAL BETWEEN THE LARGER STONES NOT BE LOOSE OR EASILY DISPLACED BY FLOW.
- THE SOIL MATERIAL SHALL BE NATIVE OR TOPSOIL AND MIXED WITH SIXTY-FIVE PERCENT (65%) RIPRAP AND THIRTY-FIVE PERCENT (35%) SOIL BY VOLUME.
- SOIL RIPRAP SHALL CONSIST OF A UNIFORM MIXTURE OF SOIL AND RIPRAP WITHOUT VOIDS.
- SOIL RIPRAP SHALL BE FREE OF BRUSH, TREES, STUMPS, AND OTHER OBJECTIONABLE MATERIAL, AND BE GRADED TO A SMOOTH, COMPACTED SURFACE.
- MIXING OF SOIL AND RIPRAP SHOULD BE DONE AT THE STOCKPILE LOCATION, NOT AT THE LOCATION WHERE SOIL RIPRAP IS TO BE PLACED.
- MIX THIRTY-FIVE PERCENT (35%) SOIL BY VOLUME WITH STOCKPILED RIPRAP USING ADDITIONAL MOISTURE AND CONTROL PROCEDURES THAT ENSURE A HOMOGENEOUS MIXTURE; WHERE THE SOIL FILLS THE INHERENT VOIDS IN THE RIPRAP WITHOUT DISPLACING RIPRAP. LAYERING THE RIPRAP AND SOIL INSTEAD OF PREMIXING MAY BE ALLOWED IF THE NATIVE SOIL IS GRANULAR.
- PLACE A FIRST LAYER OF SMALLER SOIL RIPRAP OF APPROXIMATE D50 THICKNESS. THEN PLACE THE TOP LAYER WITH THE SURFACE ROCKS THAT ARE LARGELY D50 OR GREATER, FILLING VOIDS AS NECESSARY WITH THE SMALLER PLANTED RIPRAP.
- THE MIXTURE SHALL BE CONSOLIDATED BY LARGE VIBRATORY EQUIPMENT OR BACKHOE BUCKET TO CREATE A TIGHT, DENSE INTERLOCKING MASS.
- THE SOIL SHALL BE FURTHER WETTED TO ENCOURAGE VOID FILLING WITH SOIL.
- ANY LARGE VOIDS SHALL BE FILLED WITH ROCK AND SMALL VOIDS FILLED WITH SOIL.
- THE TOP SURFACE SHALL BE COVERED WITH FOUR (4) INCHES OF TOPSOIL SUCH THAT NO ROCK POINTS ARE PROTRUDING.
- THE FINAL SURFACE SHALL BE THOROUGHLY WETTED FOR GOOD COMPACTION, SMOOTHED AND COMPACTED BY VIBRATING EQUIPMENT.



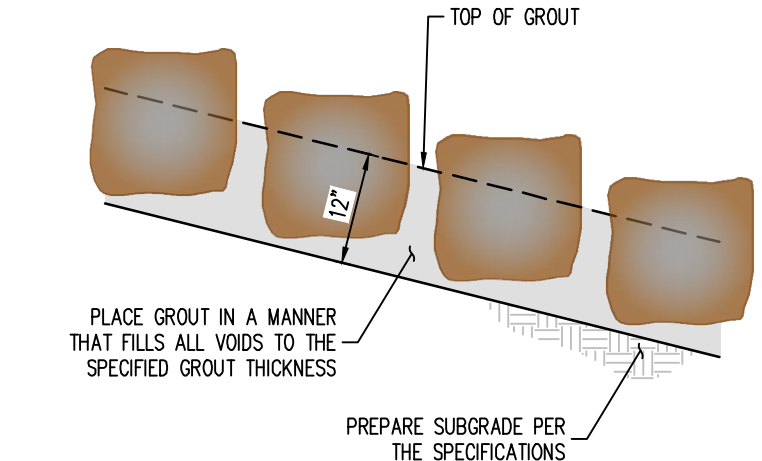
EDGE SIDE WALL DETAIL



EDGE TOE WALL DETAIL



CUT-OFF WALL DETAIL
 NOT TO SCALE



BOULDER PLACEMENT NOTES:

- PLACE BOULDERS WITH THE REQUIRED BOULDER HEIGHT VERTICAL. PLACE BOULDERS AS TIGHTLY TOGETHER AS POSSIBLE (WITHOUT TOUCHING) WHILE PROVIDING ENOUGH ROOM BETWEEN THEM TO THOROUGHLY VIBRATE THE GROUT AND TO ENSURE NO GAPS IN THE GROUT. THE SMALL DIMENSION OF A 2X4 CAN BE USED AS A GUIDE TO CHECK MINIMUM SPACING.
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MATERIAL SPECIFICATIONS:

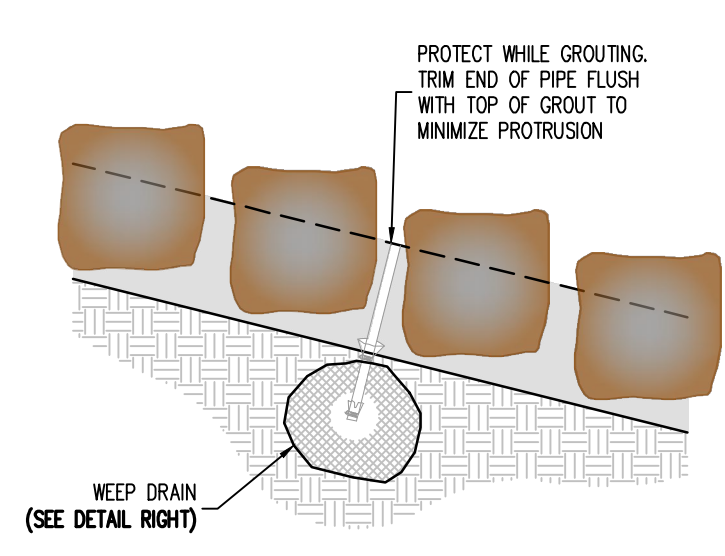
- ALL GROUT SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH EQUAL TO 3200 PSI.
- ONE CUBIC YARD OF GROUT SHALL HAVE A MINIMUM OF SIX (6) SACKS OF TYPE II PORTLAND CEMENT.
- A MAXIMUM OF 25% TYPE F FLY ASH MAY BE SUBSTITUTED FOR THE PORTLAND CEMENT.
- THE AGGREGATE SHALL BE COMPRISED OF 70% NATURAL SAND (FINES) AND 30% 3/8" ROCK (COARSE).
- THE GROUT SLUMP SHALL BE BETWEEN 4-INCHES TO 6-INCHES.
- AIR ENTRAINMENT SHALL BE BETWEEN 5.5% AND 7.5%.
- TO CONTROL SHRINKAGE AND CRACKING, 1.5 POUNDS OF FIBERMESH, OR EQUIVALENT, SHALL BE USED PER CUBIC YARD OF GROUT.
- COLOR ADDITIVE IN REQUIRED AMOUNTS SHALL BE USED WHEN SO SPECIFIED BY CONTRACT.

GROUT PLACEMENT SPECIFICATIONS:

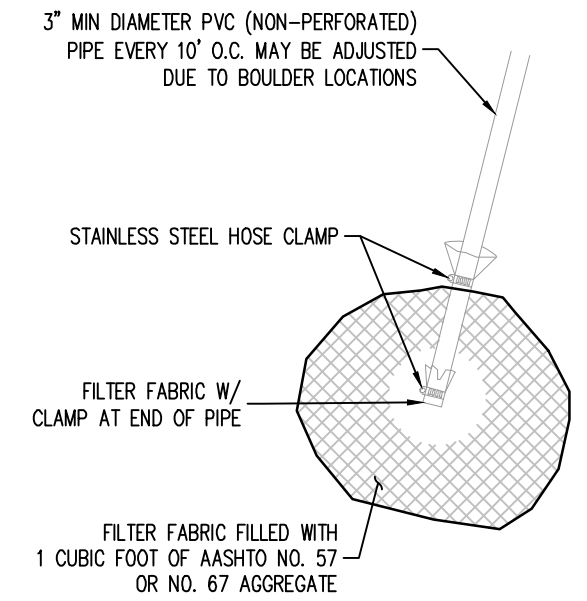
- SPECIAL PROCEDURES SHALL BE REQUIRED FOR GROUT PLACEMENT WHEN THE AIR TEMPERATURES ARE LESS THAN 40° OR GREATER THAN 90°. CONTRACTOR SHALL OBTAIN PRIOR APPROVAL FROM THE DESIGN ENGINEER OF THE PROCEDURES TO BE USED FOR PROTECTING THE GROUT.
- GROUT SHALL BE DELIVERED BY MEANS OF A LOW PRESSURE (LESS THAN 10 PSI) GROUT PUMP USING A 2-INCH DIAMETER (MAXIMUM) NOZZLE.
- FULL DEPTH PENETRATION OF THE GROUT INTO THE BOULDER VOIDS SHALL BE ACHIEVED BY INJECTING GROUT STARTING WITH THE NOZZLE NEAR THE BOTTOM AND RAISING IT AS THE GROUT FILLS. WHILE VIBRATING GROUT INTO PLACE USING A FENCH VIBRATOR.
- ALL GROUT BETWEEN BOULDERS SHALL BE TREATED WITH A BROOM FINISH.
- AFTER GROUT PLACEMENT, EXPOSED BOULDER FACES SHALL BE CLEANED AND FREE OF GROUT.
- ALL FINISHED GROUT SURFACES SHALL BE SPRAYED WITH A CLEAR LIQUID MEMBRANE CURING COMPOUND AS SPECIFIED IN ASTM C309.

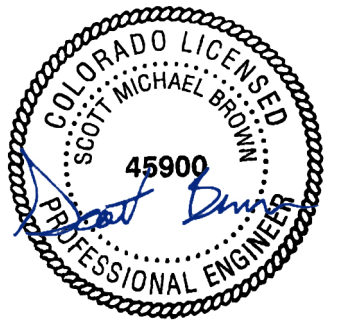
EDGE WALL DETAIL
 NOT TO SCALE

GROUTED BOULDER PLACEMENT DETAIL
 NOT TO SCALE



WEEP DRAIN DETAIL
 NOT TO SCALE





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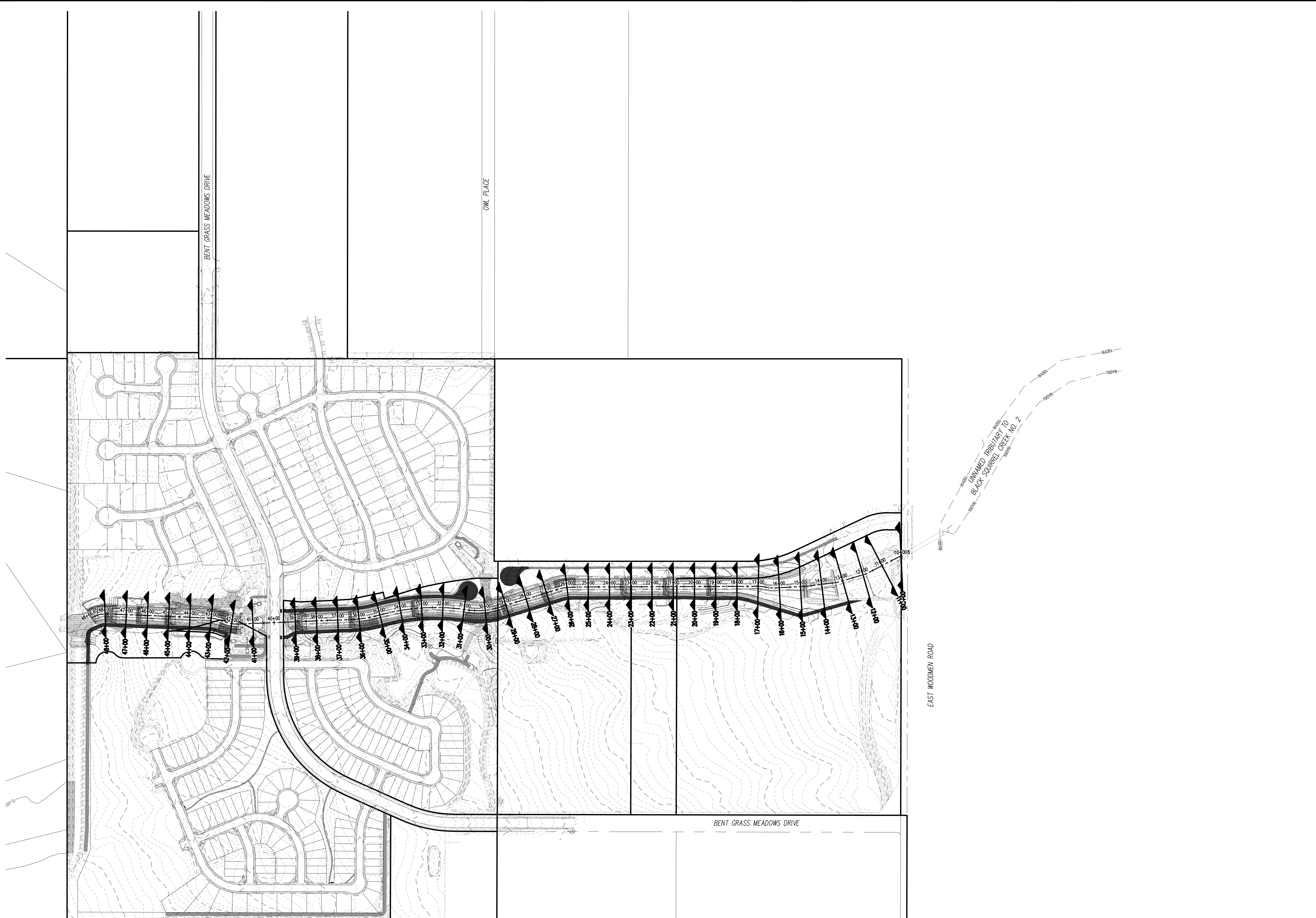


CONSTRUCTION DOCUMENTS
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 BENT GRASS MEADOWS DRIVE & MERIDAN ROAD
 FALCON, CO 80831 - EL PASO COUNTY

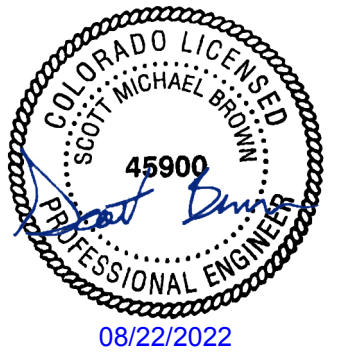
#	Date	Issue / Description	Init.

Project No: CLH000023
 Drawn By: CMWJ
 Checked By: RGD
 Date: 8/19/2022

CHANNEL SECTIONS KEY
 MAP



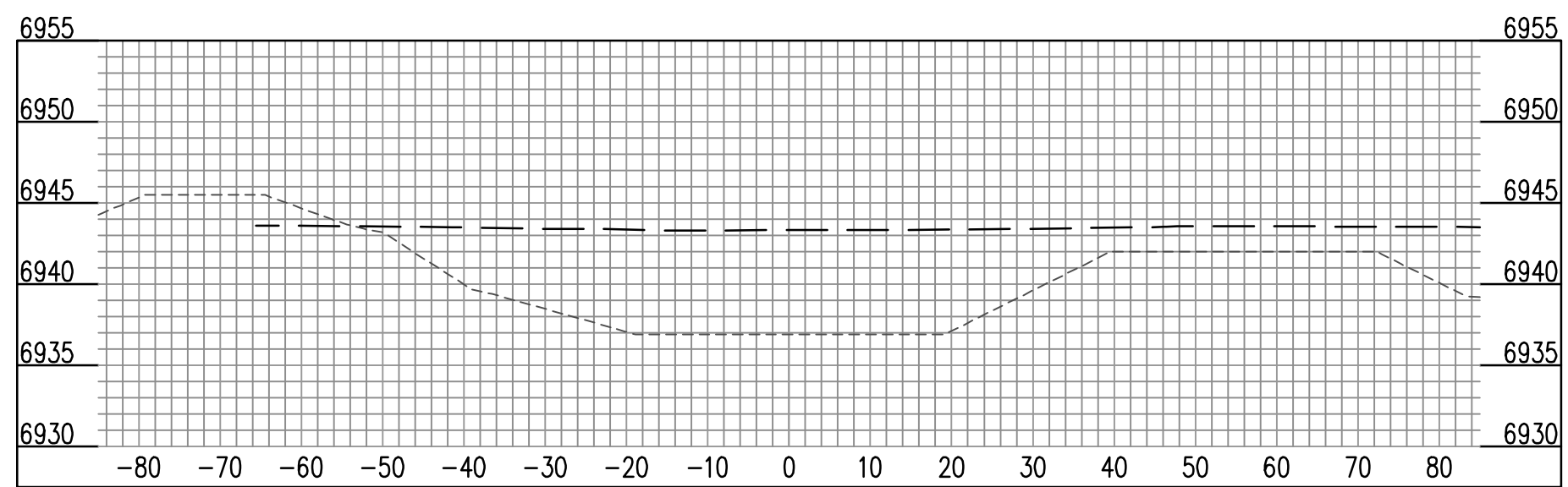
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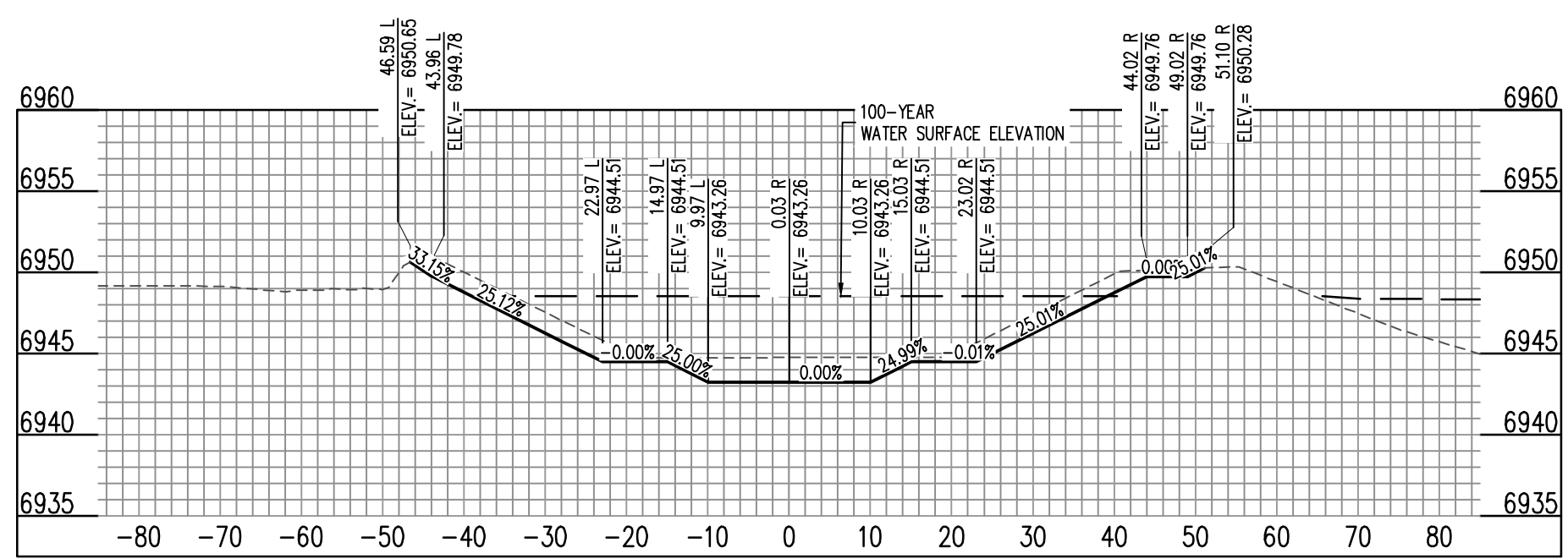
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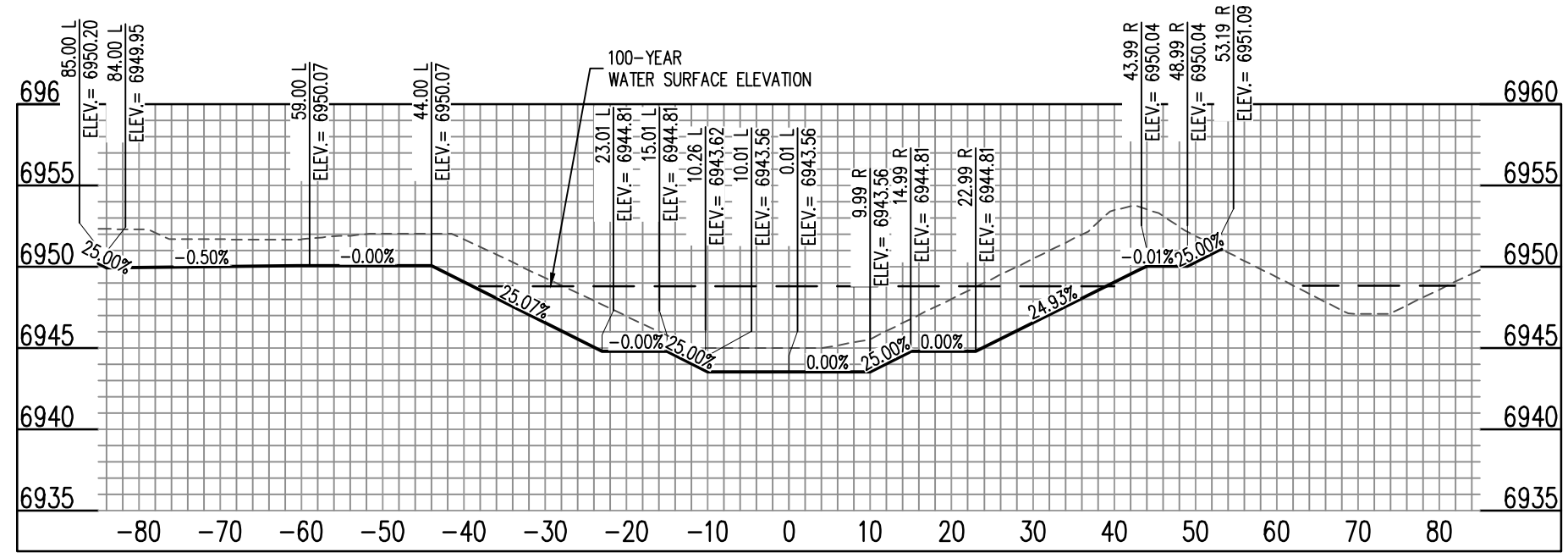
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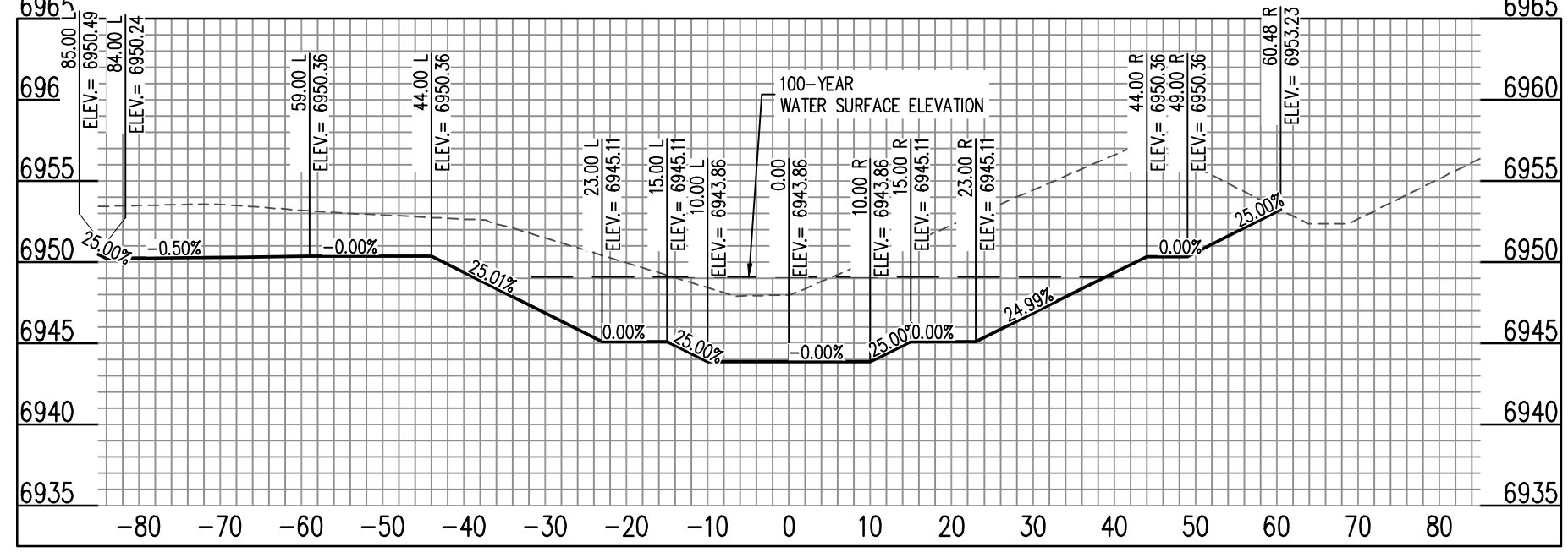
CHANNEL (41+00) - SCALE: H: 1"=20' V: 1"=10'



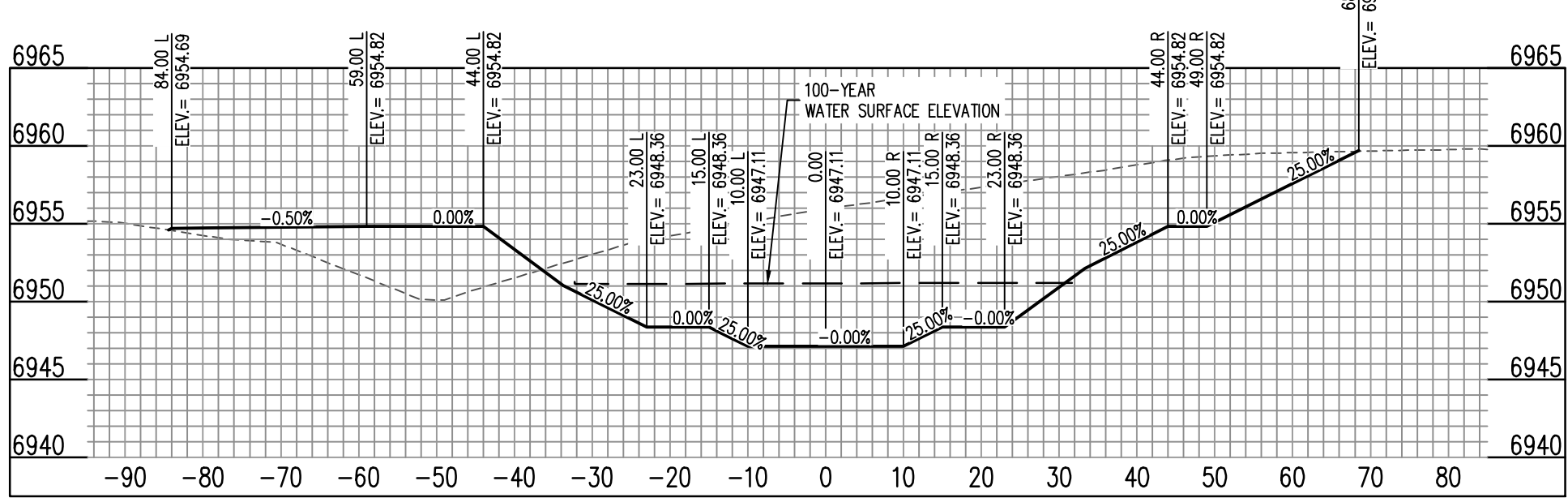
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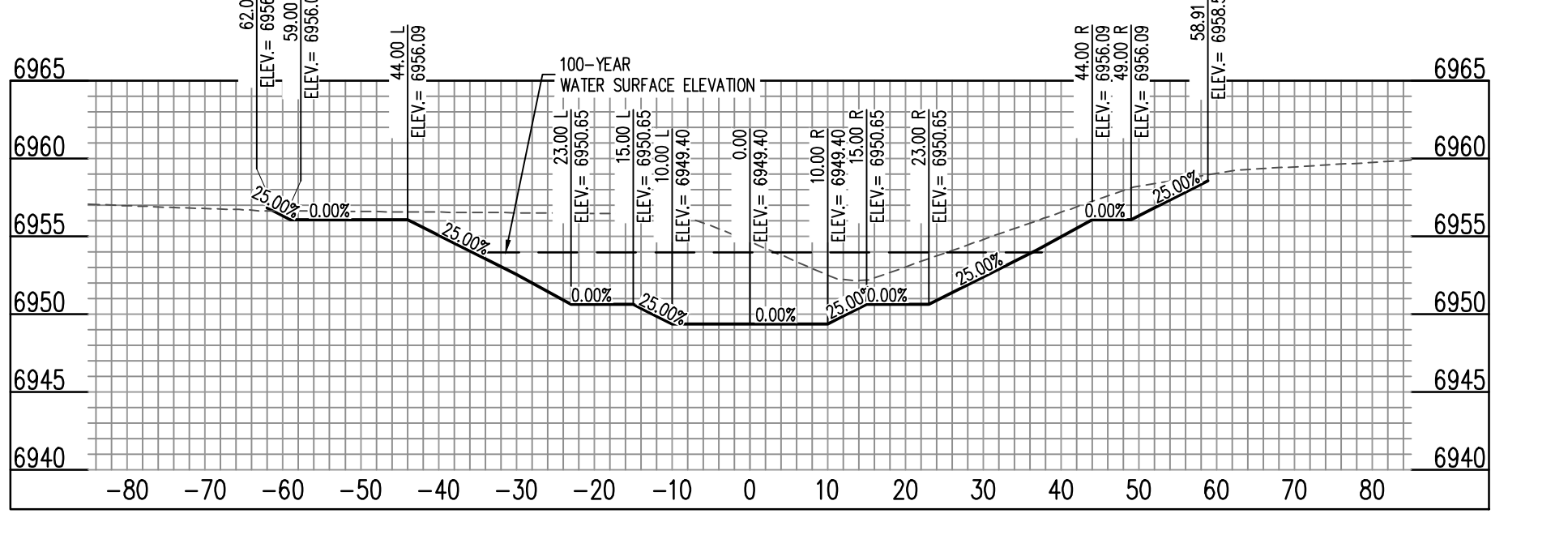
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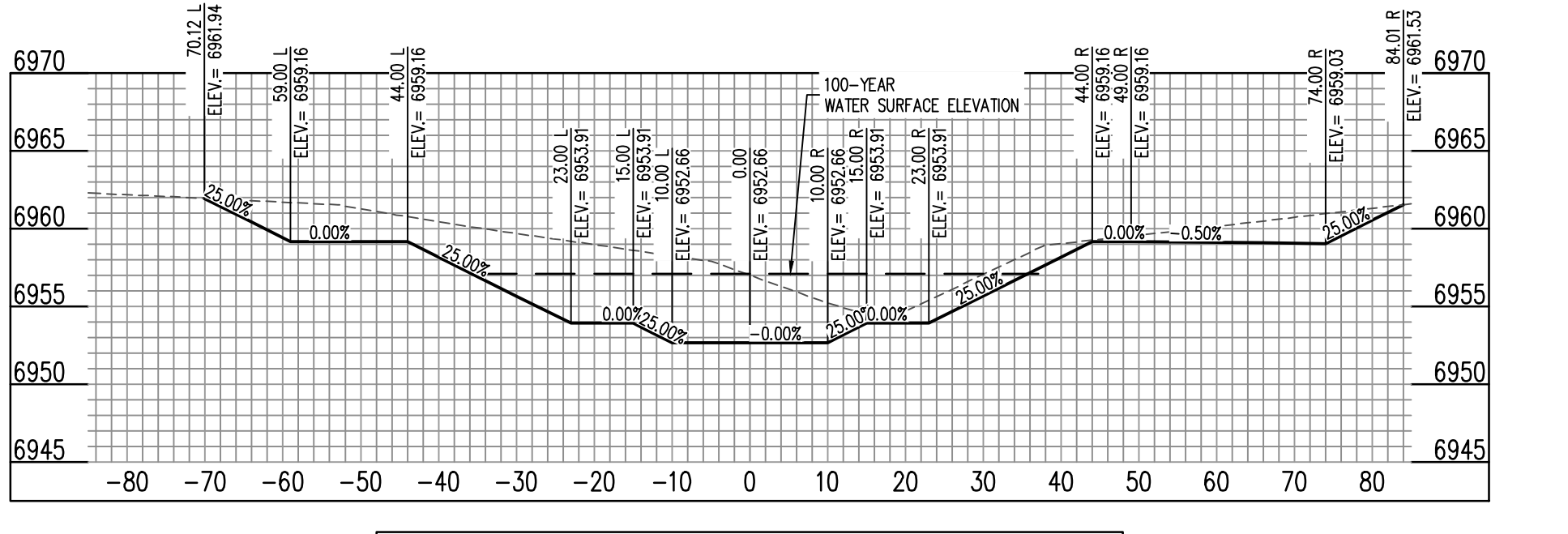
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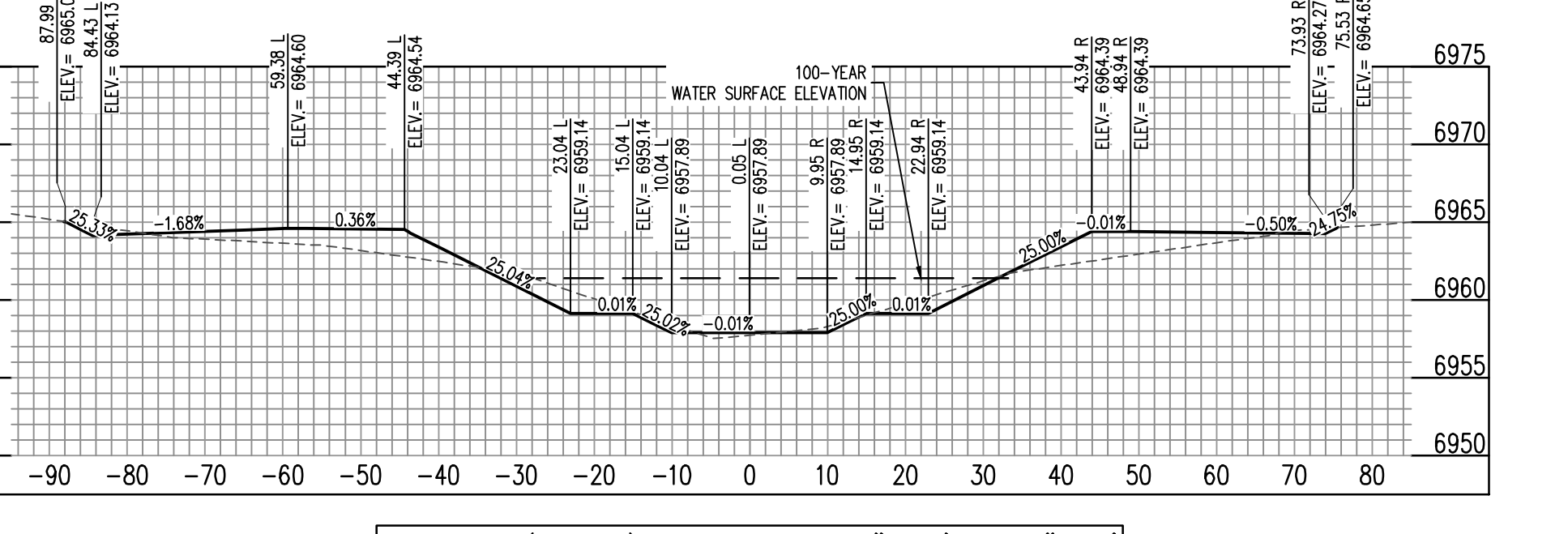
CHANNEL (45+00) - SCALE: H: 1"=20' V: 1"=10'



CHANNEL (46+00) - SCALE: H: 1"=20' V: 1"=10'



CHANNEL (47+00) - SCALE: H: 1"=20' V: 1"=10'

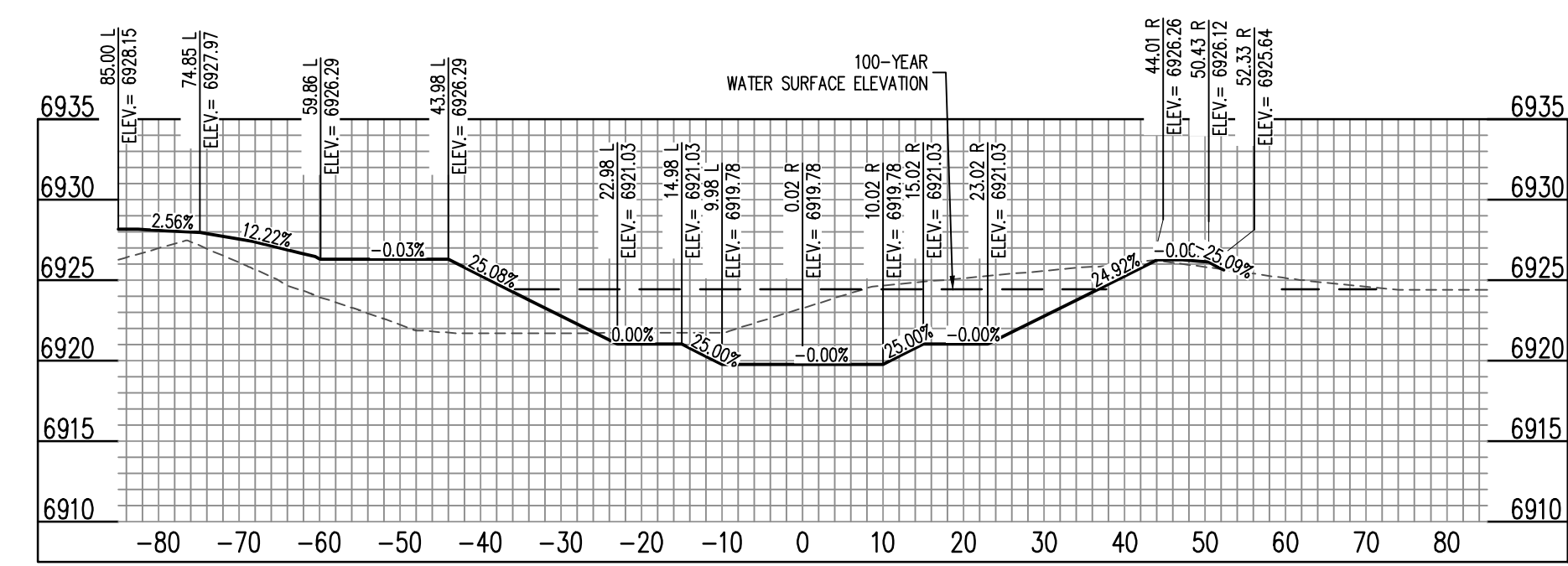


CHANNEL (48+00) - SCALE: H: 1"=20' V: 1"=10'

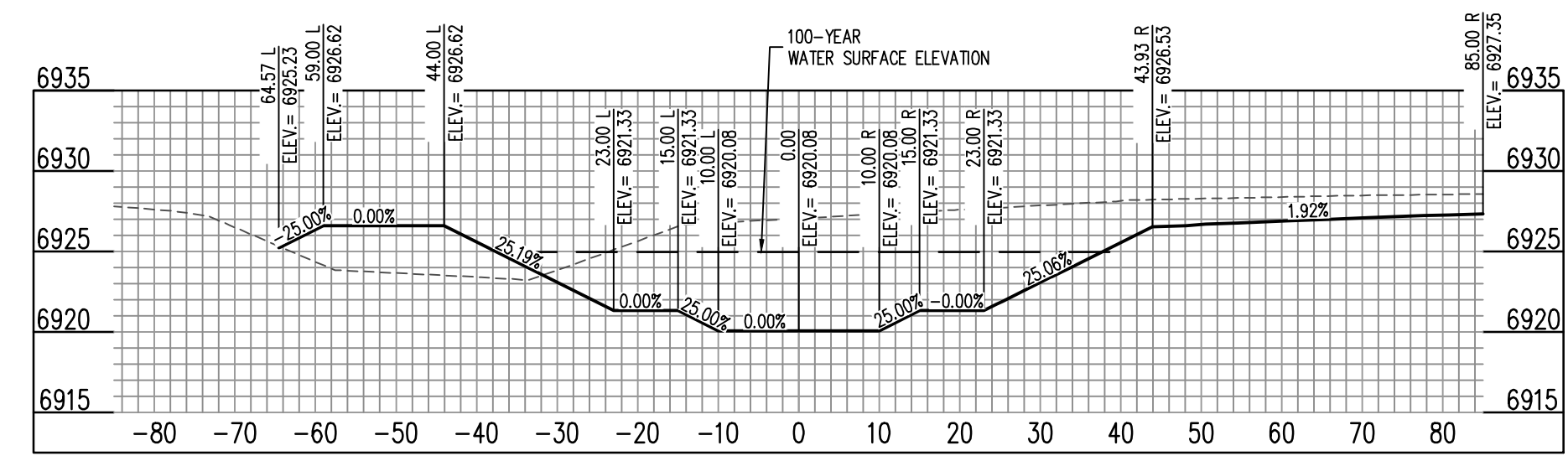
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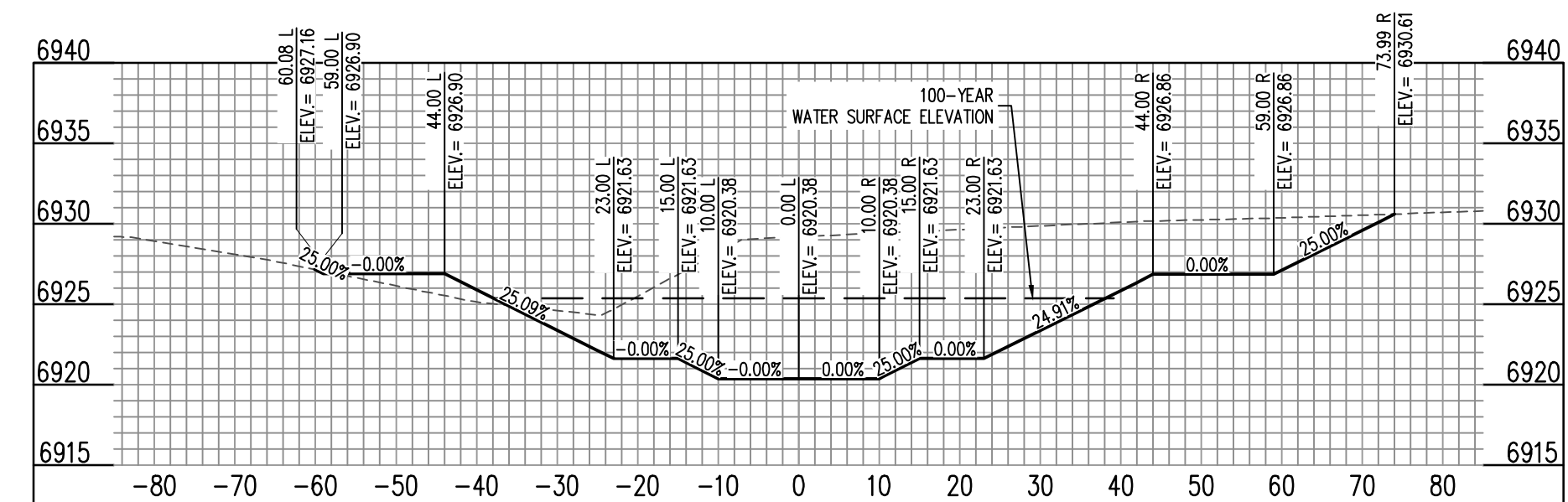
NORTH CHANNEL SECTIONS



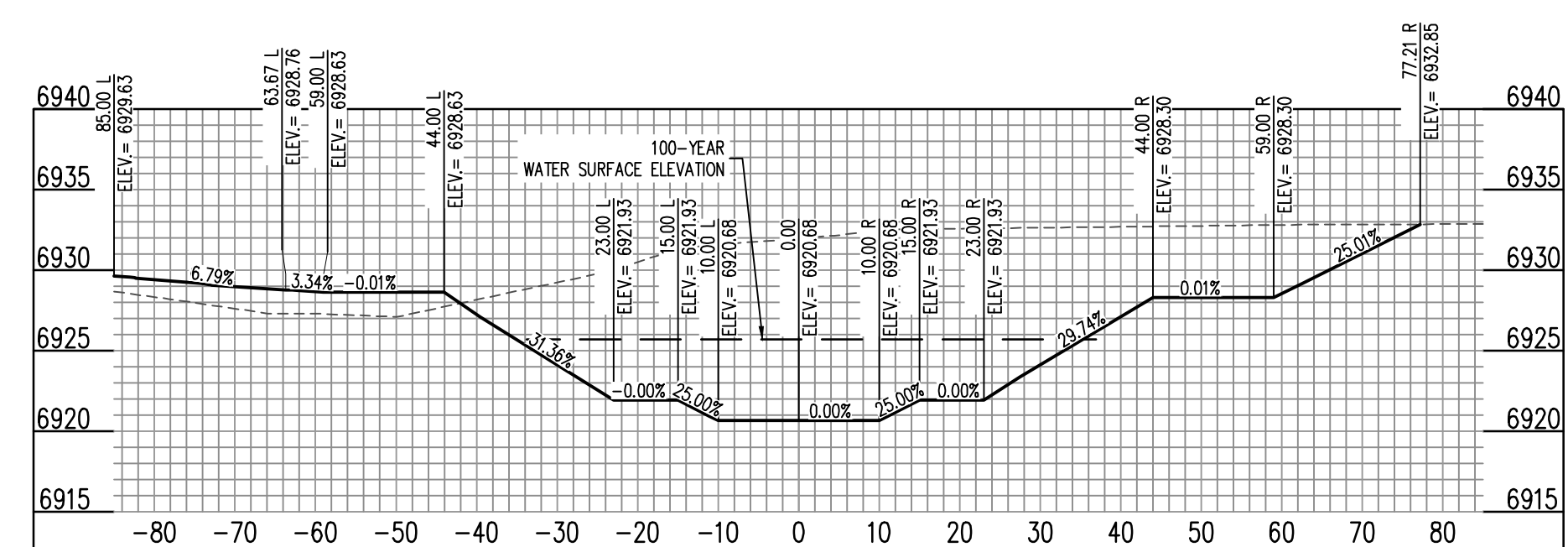
CHANNEL (30+00) - SCALE: H: 1"=20' V: 1"=10'



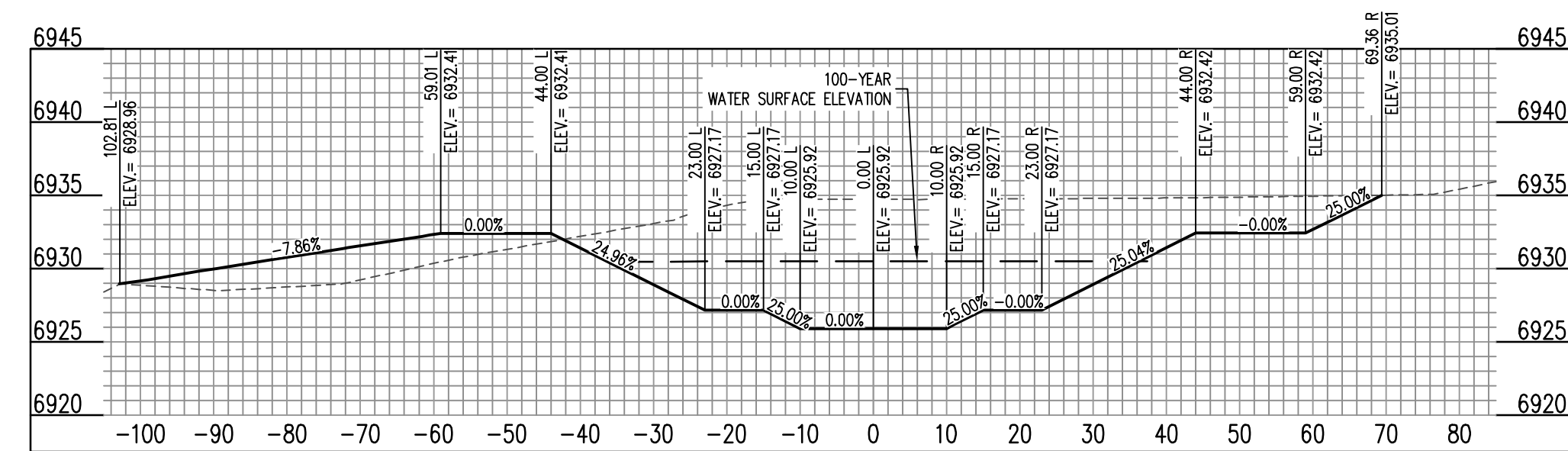
CHANNEL (31+00) - SCALE: H: 1"=20' V: 1"=10'



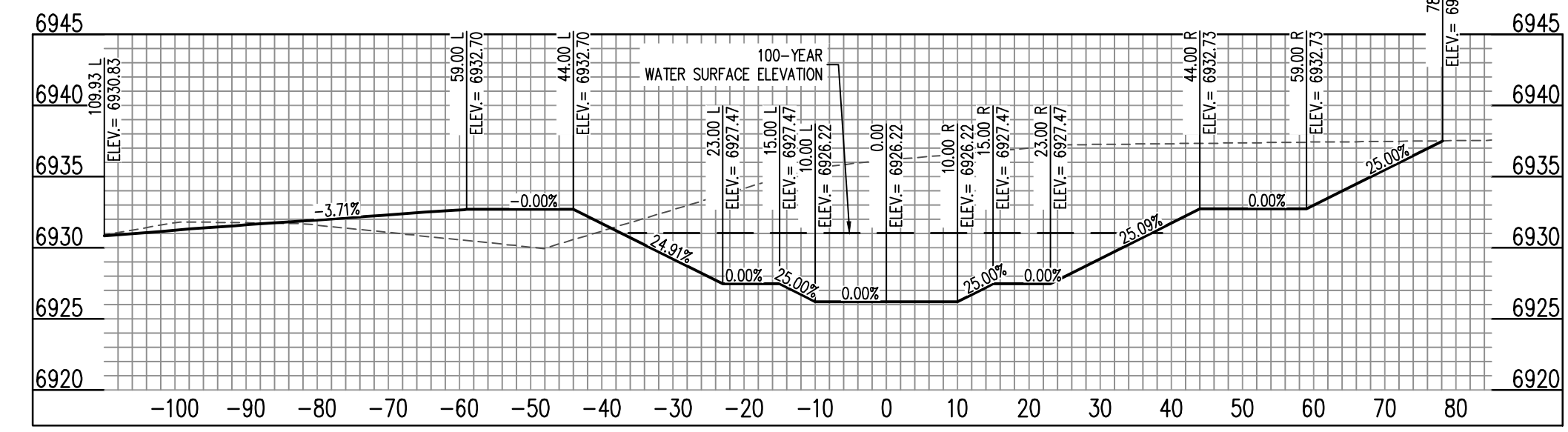
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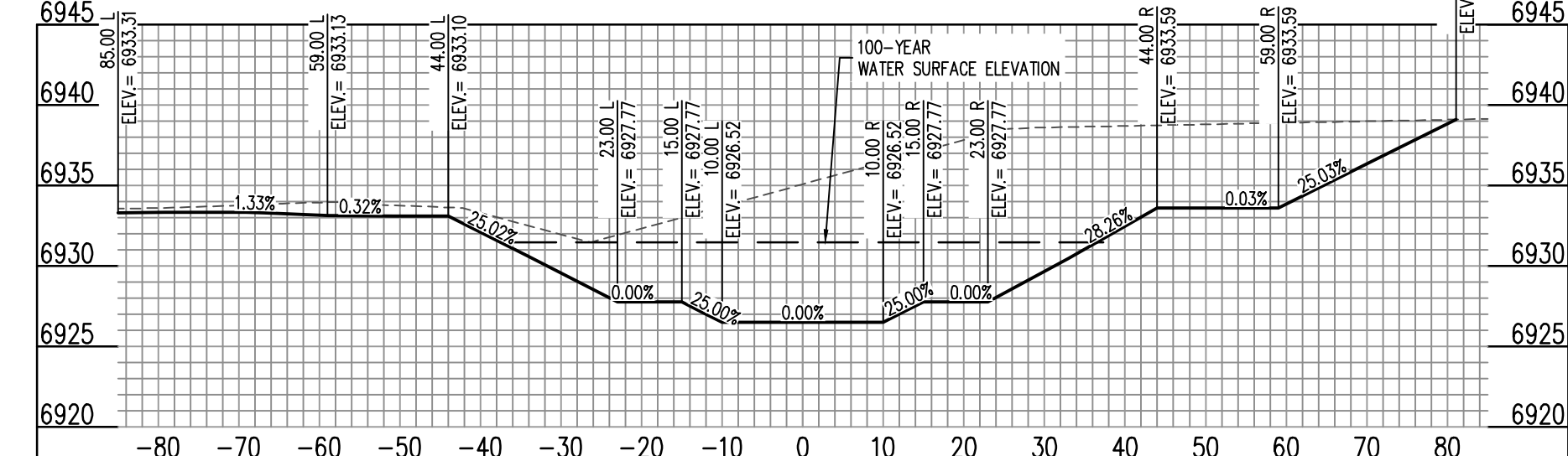
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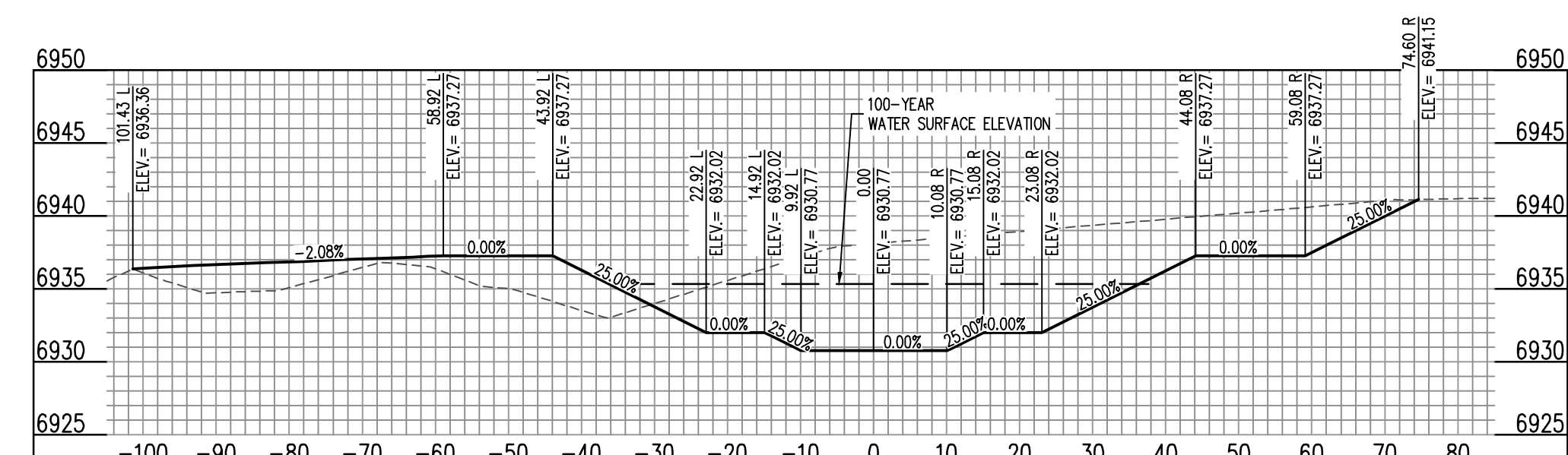
CHANNEL (34+00) - SCALE: H: 1"=20' V: 1"=10'



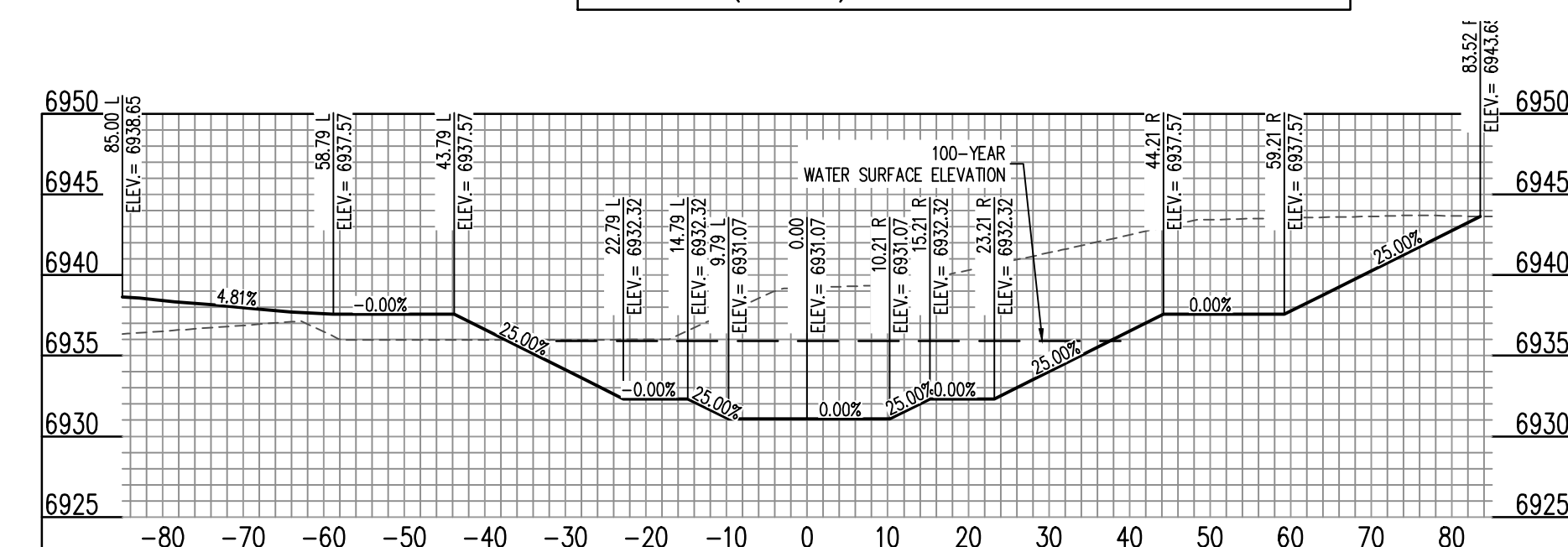
CHANNEL (35+00) - SCALE: H: 1"=20' V: 1"=10'



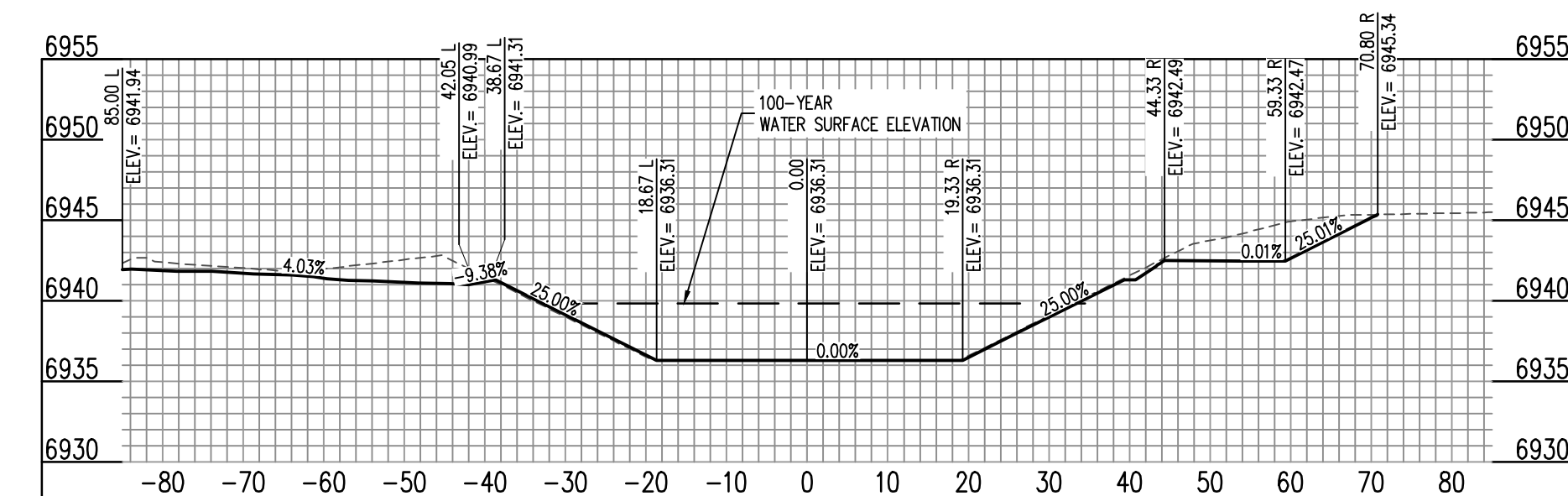
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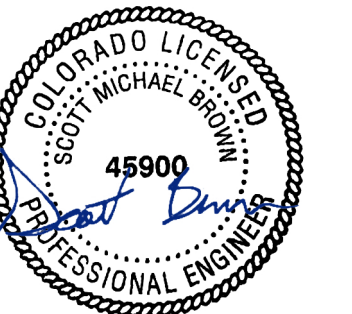
CHANNEL (37+00) - SCALE: H: 1"=20' V: 1"=10'



CHANNEL (38+00) - SCALE: H: 1"=20' V: 1"=10'



CHANNEL (39+00) - SCALE: H: 1"=20' V: 1"=10'



08/22/2022

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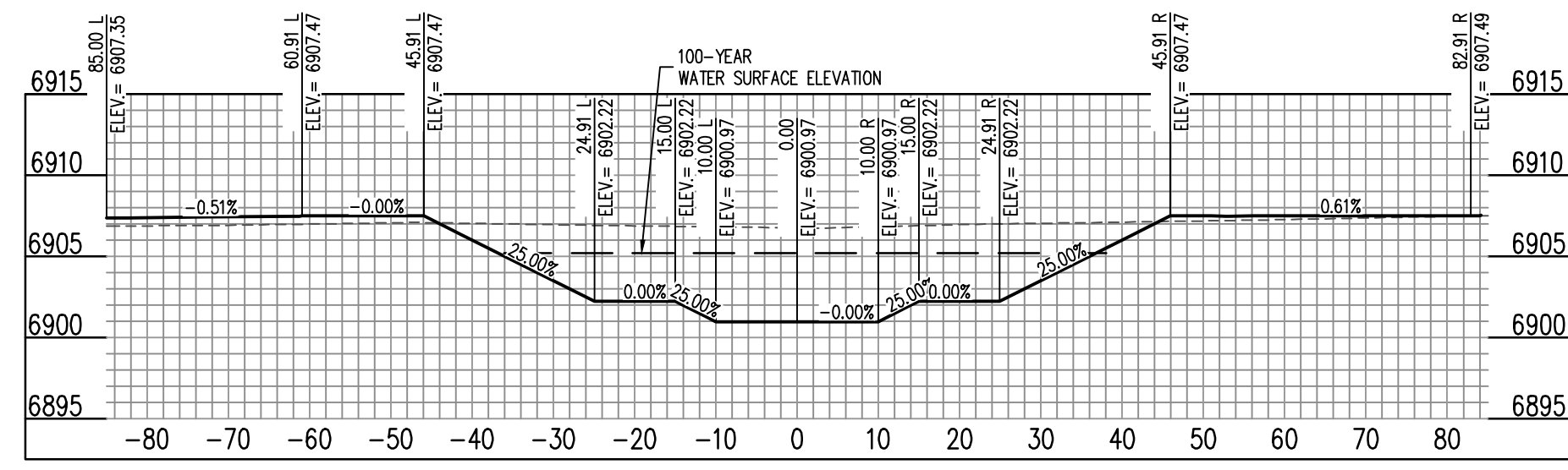


CONSTRUCTION DOCUMENTS
FALCON MEADOWS AT BENT GRASS
FOR
CHALLENGER COMMUNITIES, LLC
BENT GRASS MEADOWS DRIVE & MERIDAN ROAD
FALCON, CO 80831 - EL PASO COUNTY

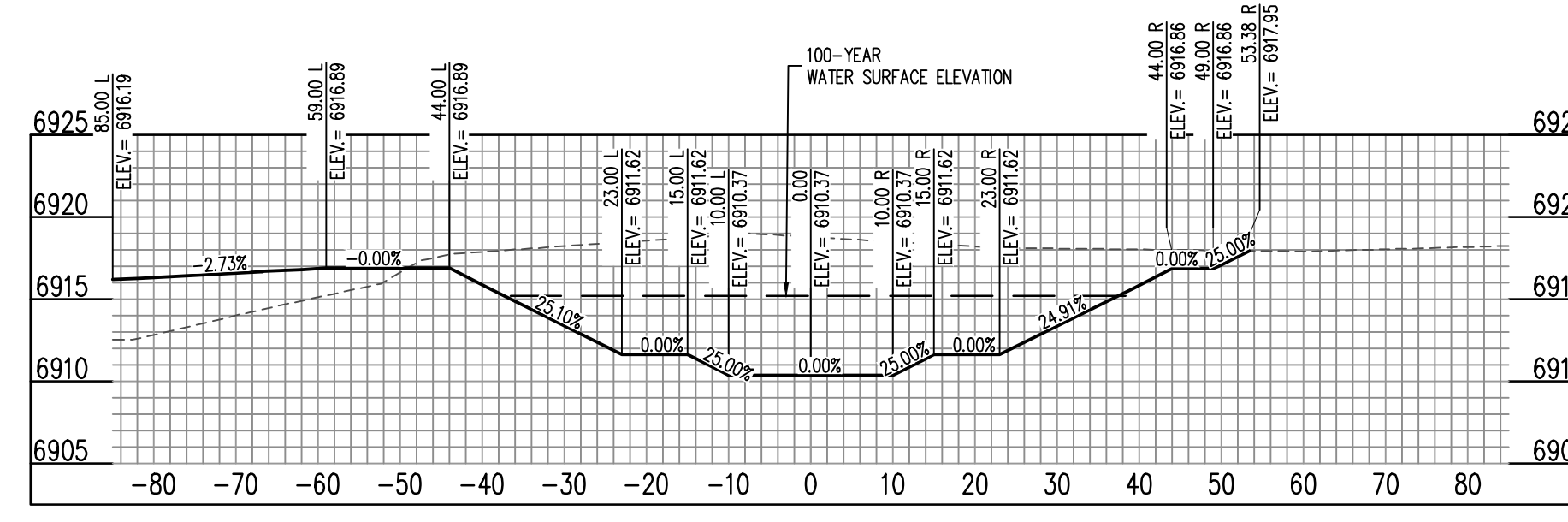
#	Date	Issue / Description	Init.

Project No: CLH000023
Drawn By: CMWJ
Checked By: RGJ
Date: 8/19/2022

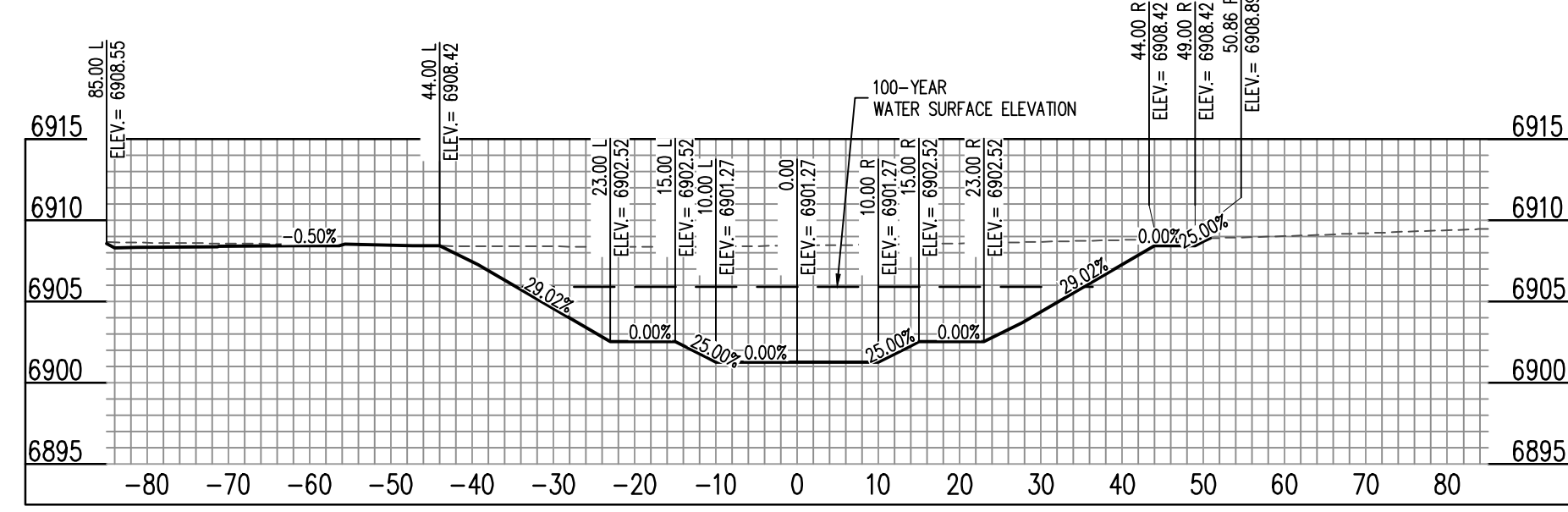
SOUTH CHANNEL SECTIONS



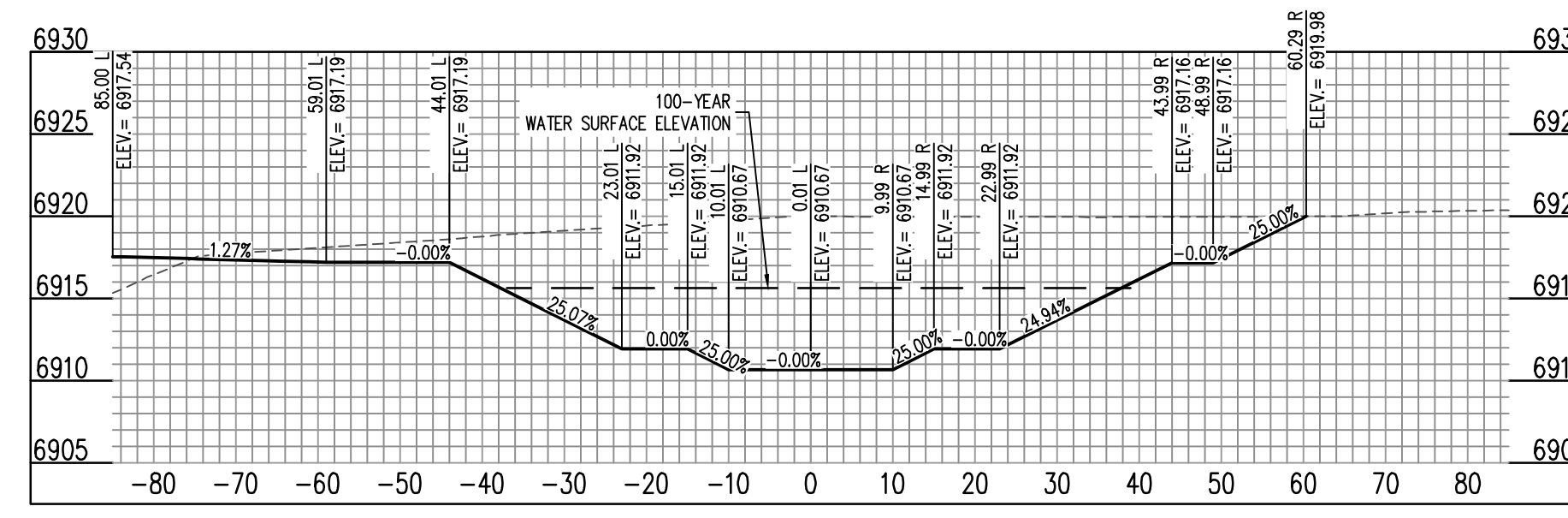
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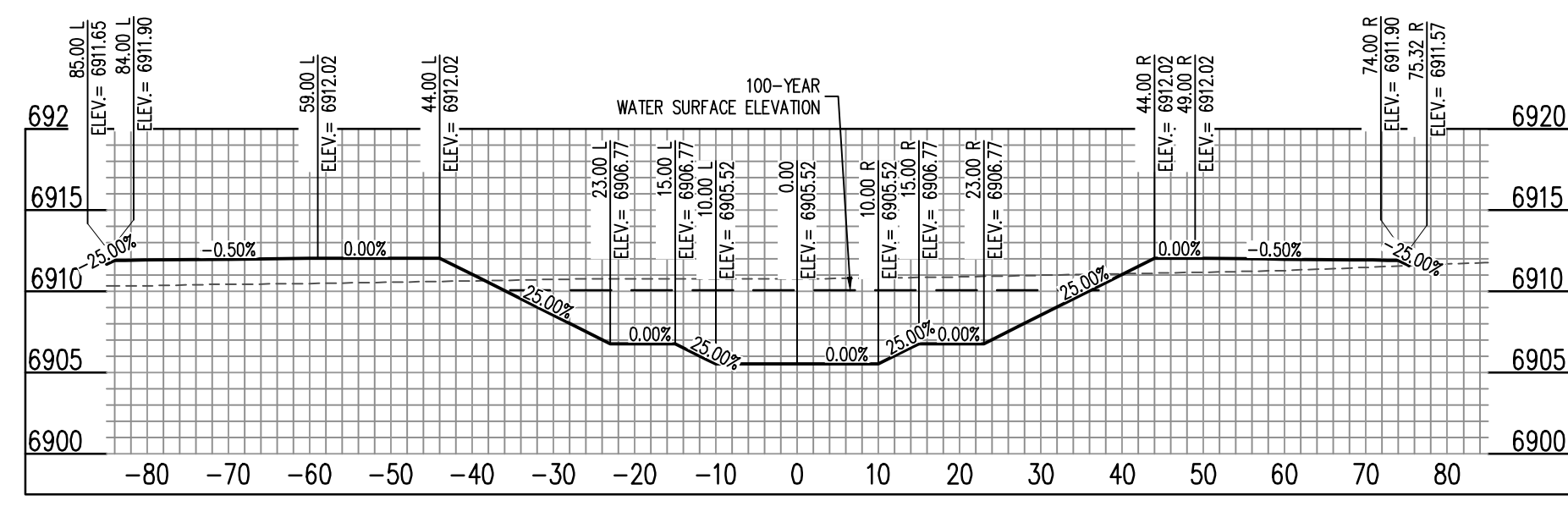
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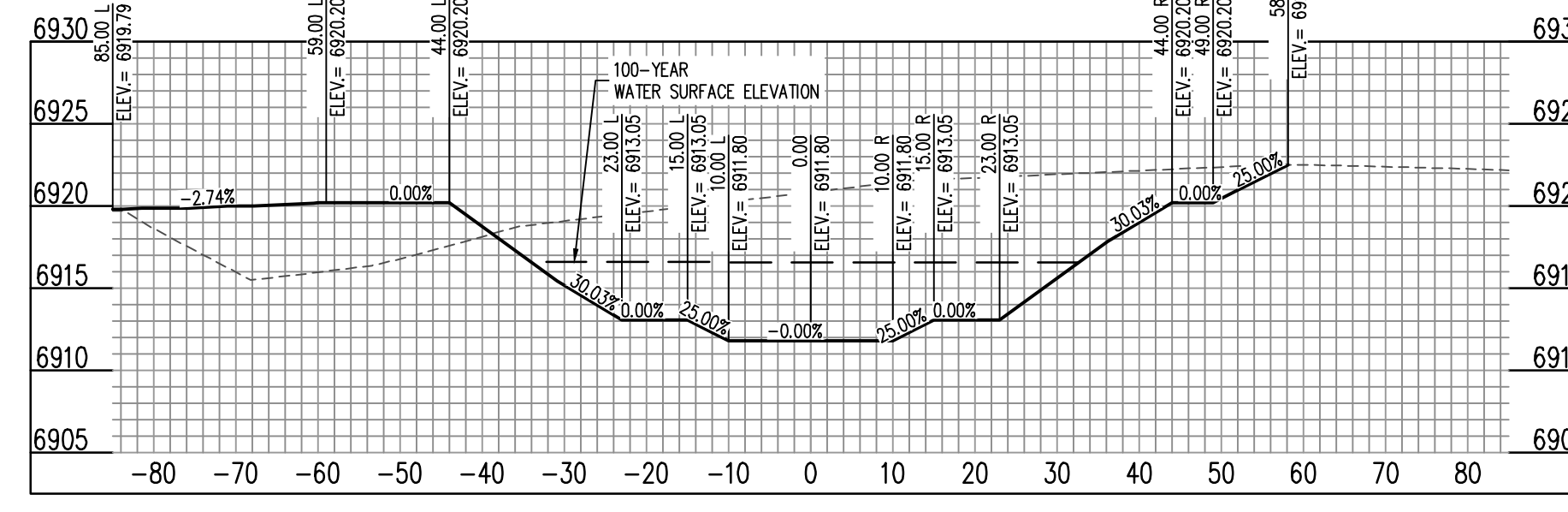
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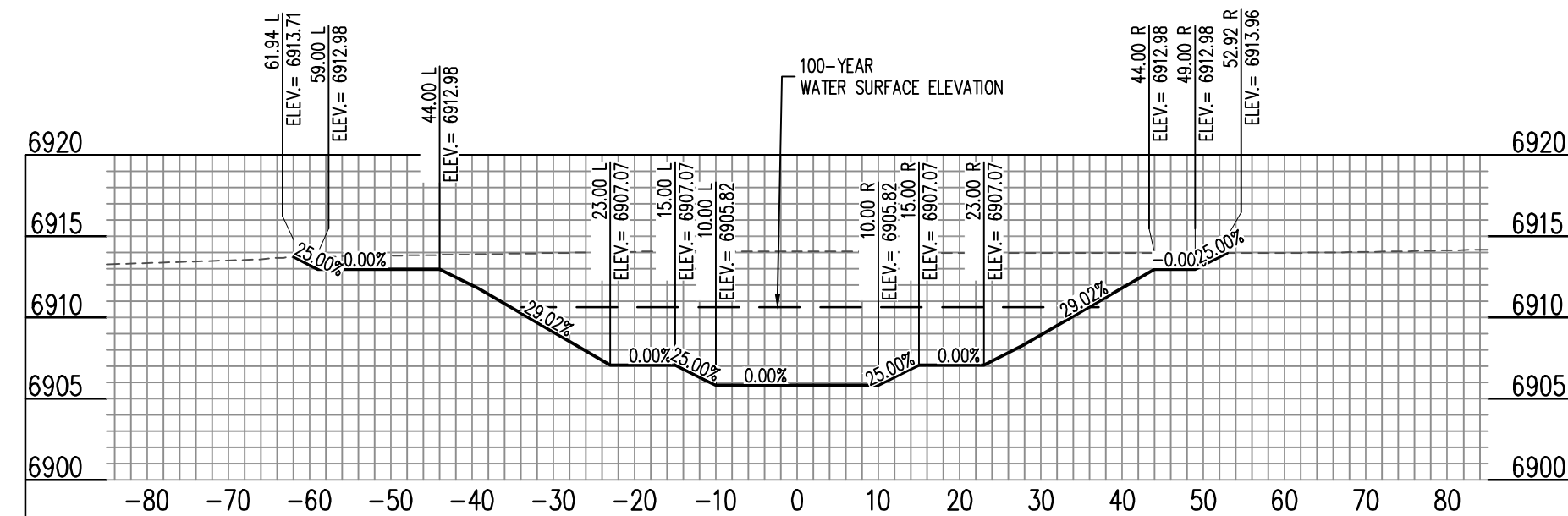
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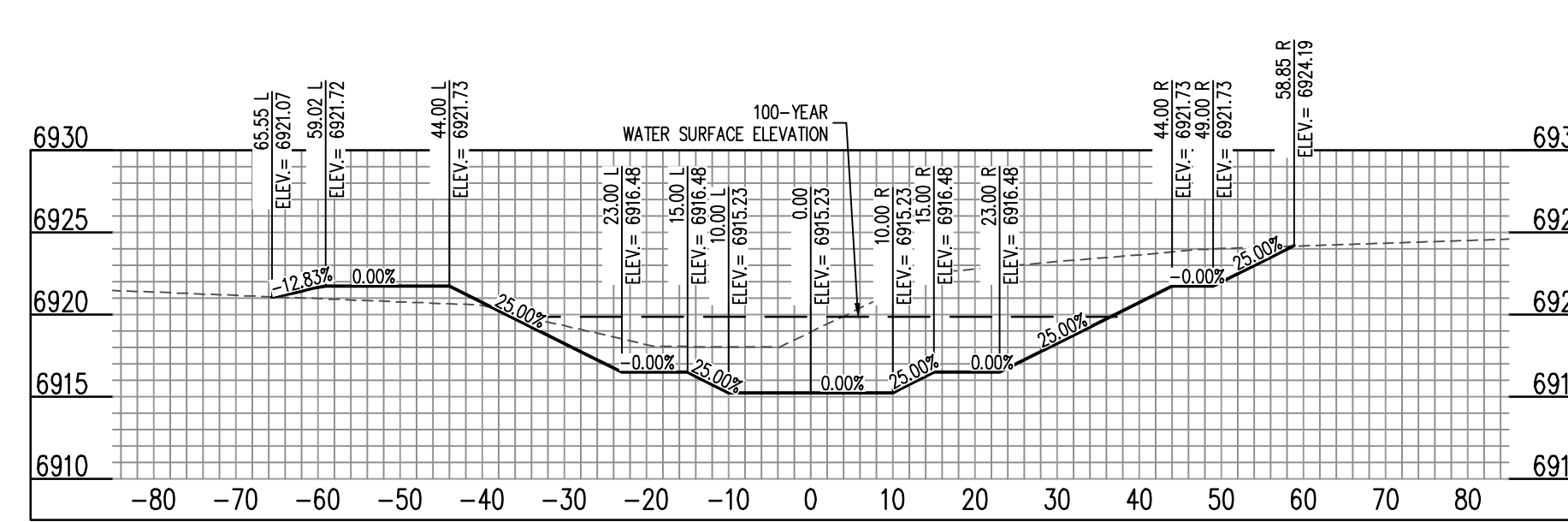
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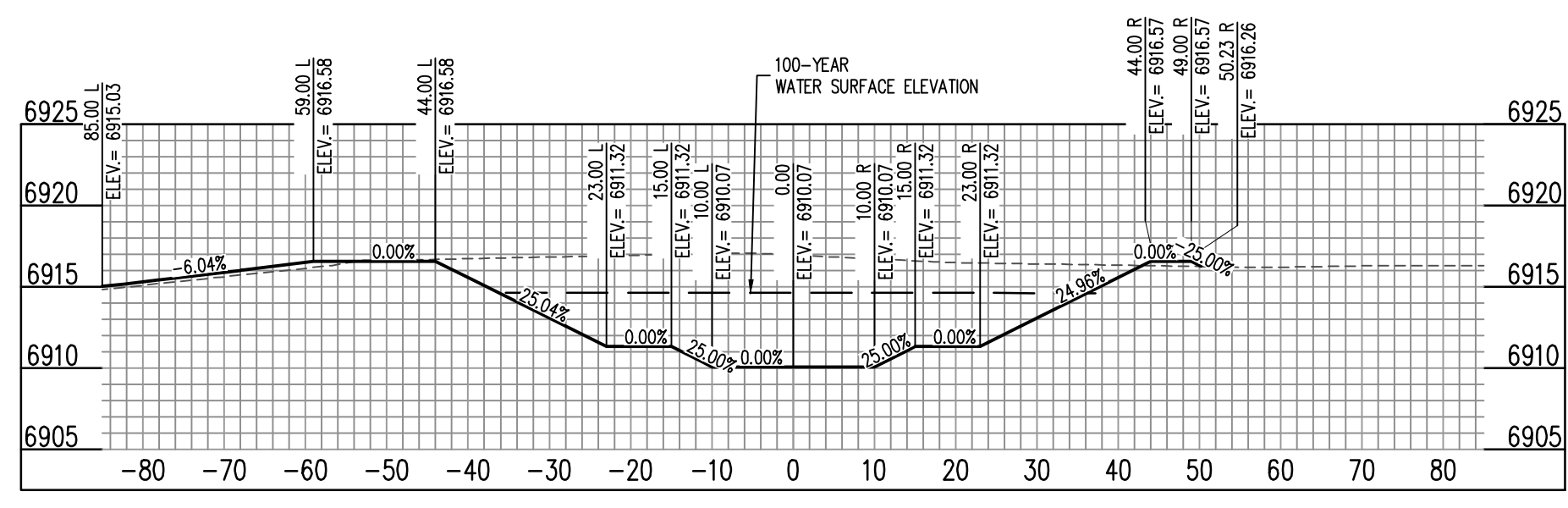
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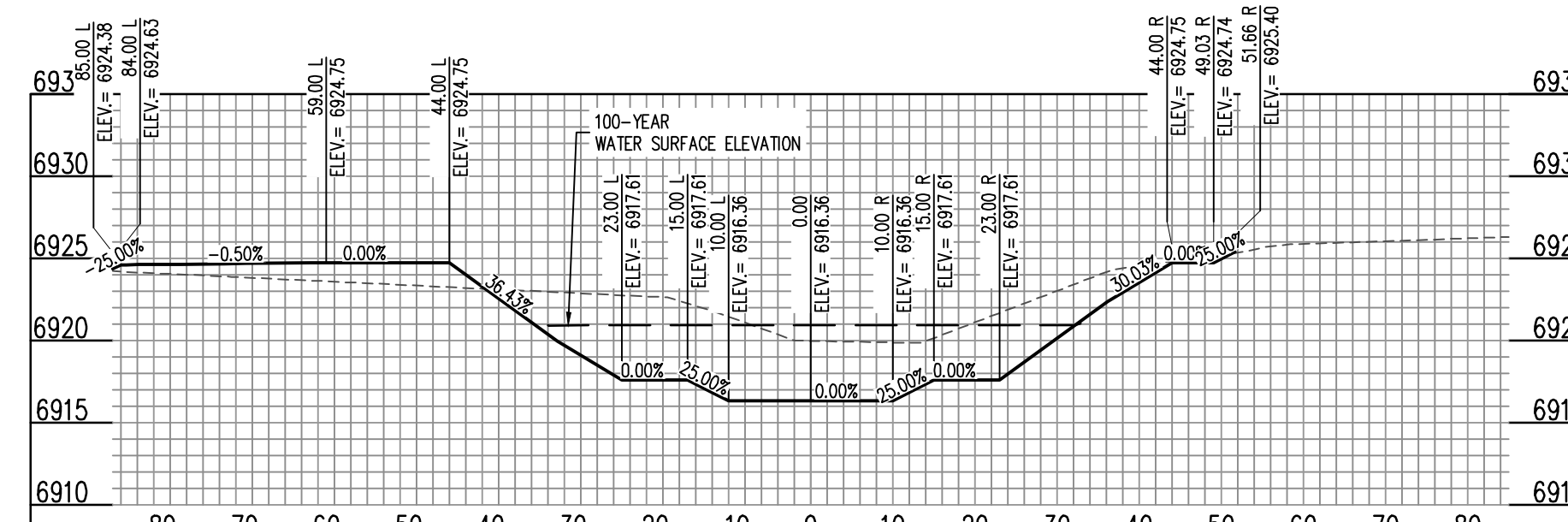
CHANNEL (23+00) - SCALE: H: 1"=20' V: 1"=10'



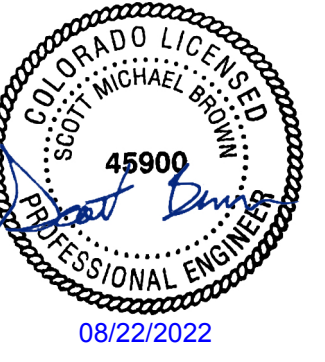
CHANNEL (28+00) - SCALE: H: 1"=20' V: 1"=10'



CHANNEL (24+00) - SCALE: H: 1"=20' V: 1"=10'



CHANNEL (29+00) - SCALE: H: 1"=20' V: 1"=10'



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 FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No: CLH000023
 Drawn By: CMWJ
 Checked By: RGD
 Date: 8/19/2022

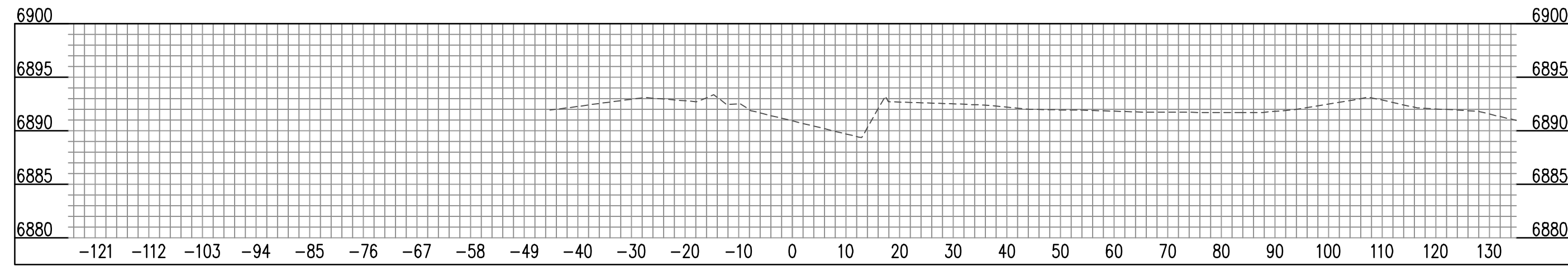
SOUTH CHANNEL
 SECTIONS



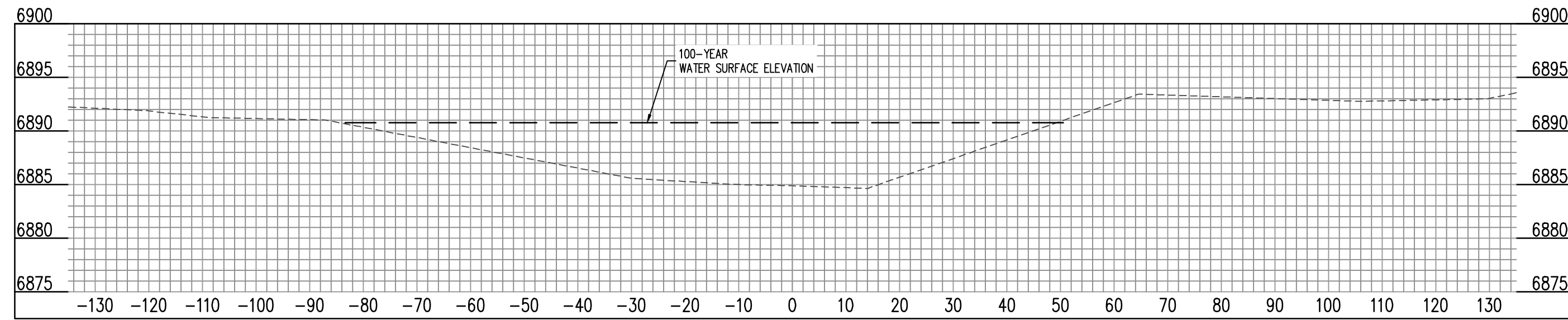
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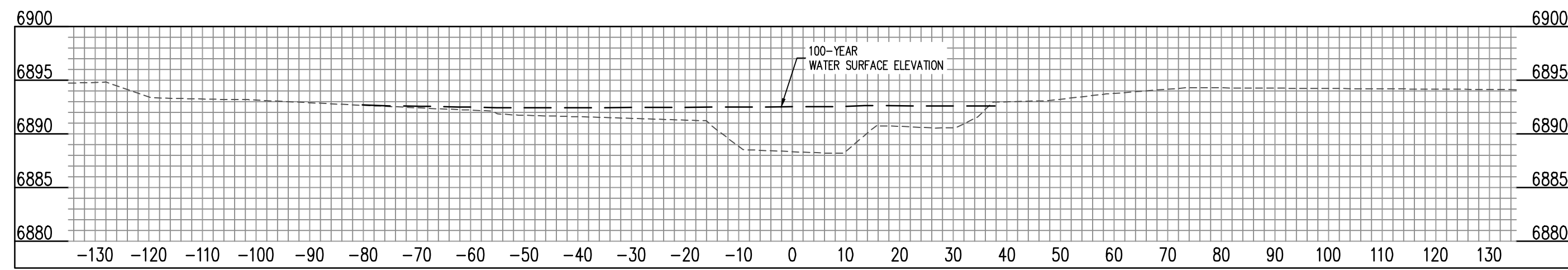
CONSTRUCTION DOCUMENTS
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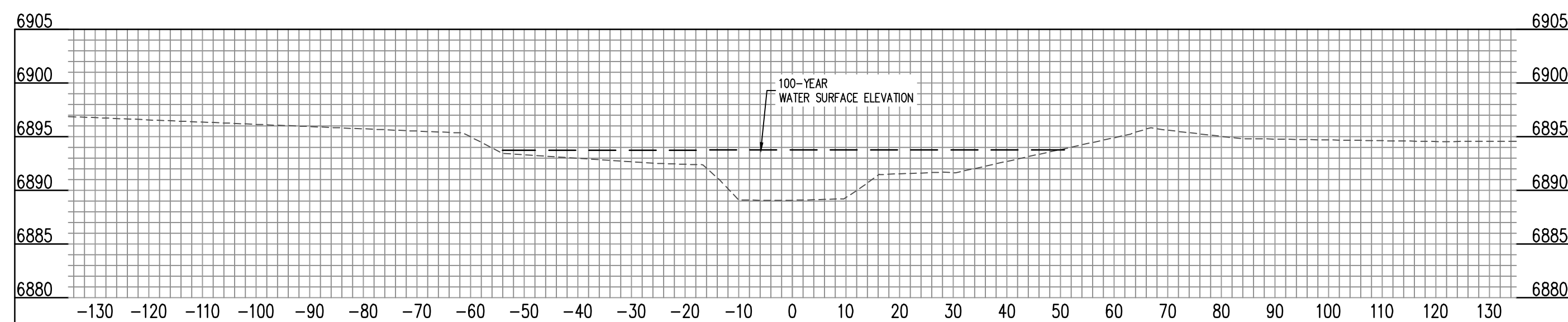
CHANNEL (10+00) - SCALE: H: 1"=20' V: 1"=10'



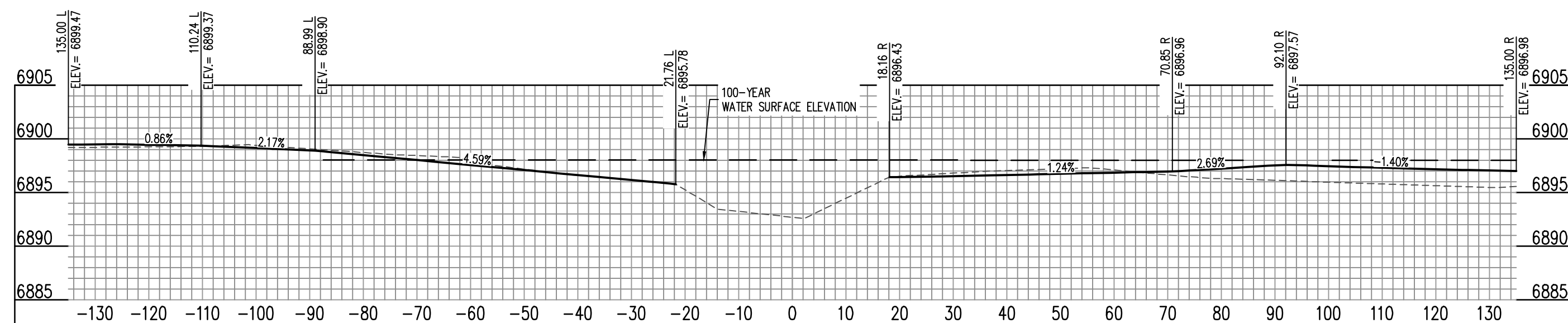
CHANNEL (11+00) - SCALE: H: 1"=20' V: 1"=10'



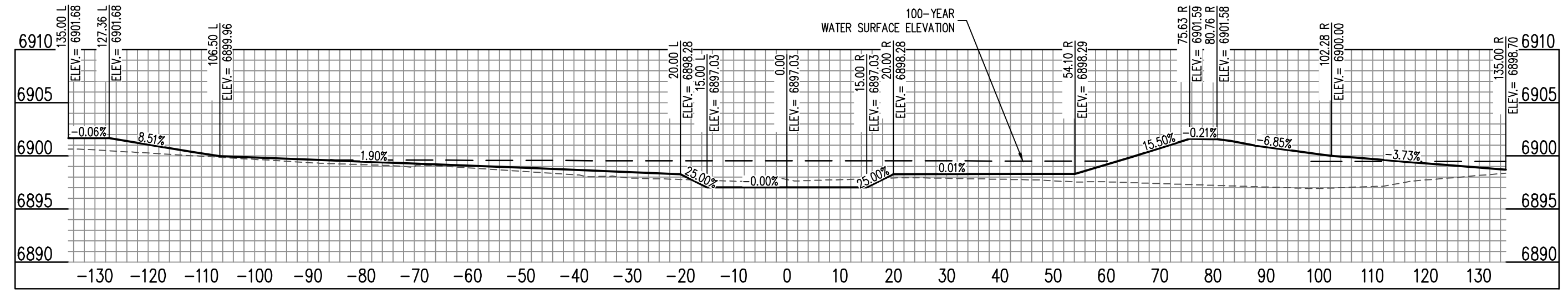
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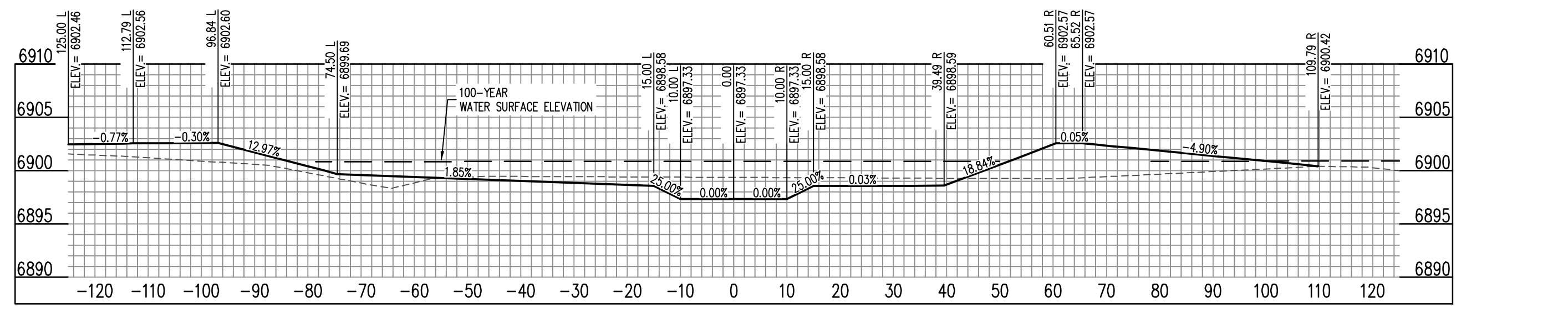
CHANNEL (13+00) - SCALE: H: 1"=20' V: 1"=10'



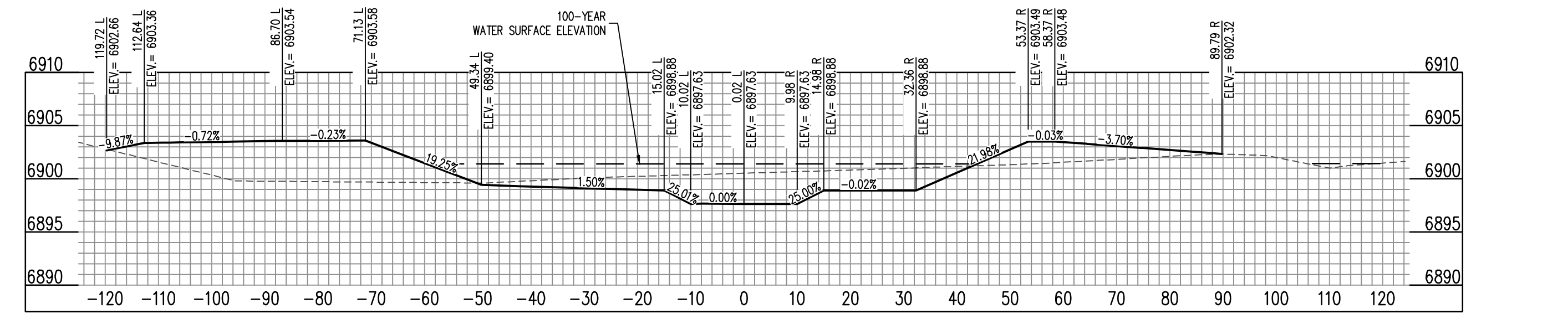
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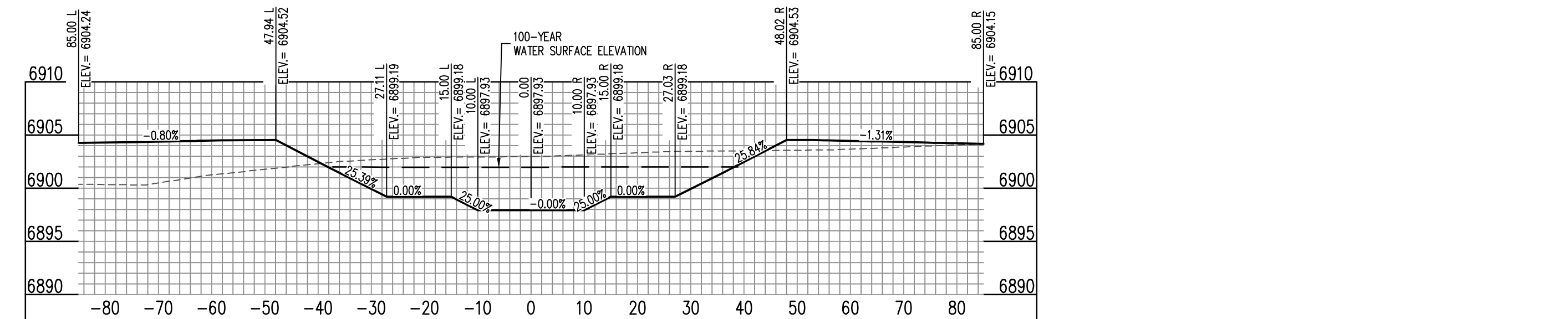
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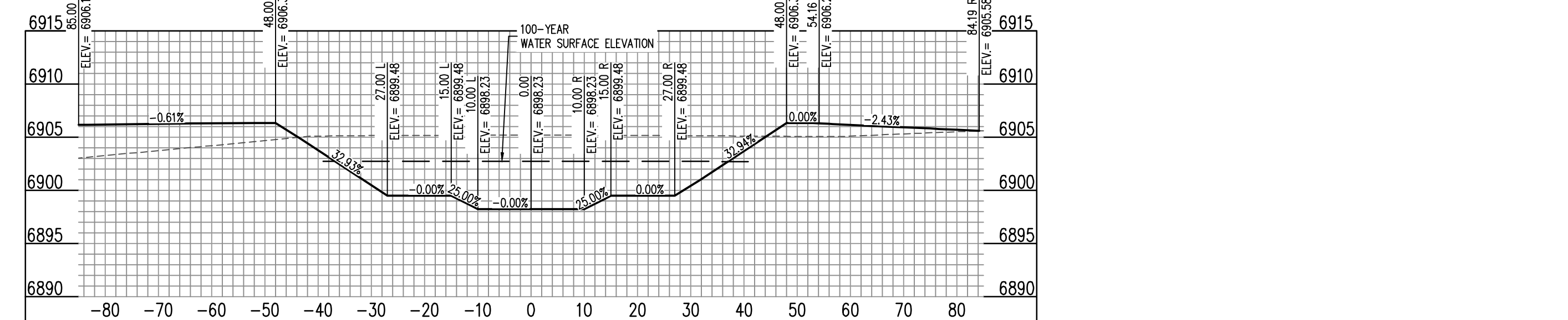
CHANNEL (16+00) - SCALE: H: 1"=20' V: 1"=10'



CHANNEL (17+00) - SCALE: H: 1"=20' V: 1"=10'



CHANNEL (18+00) - SCALE: H: 1"=20' V: 1"=10'

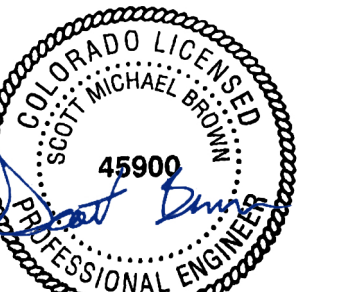


CHANNEL (19+00) - SCALE: H: 1"=20' V: 1"=10'

#	Date	Issue / Description	Init.

Project No:	CLH000023
Drawn By:	CMWJ
Checked By:	RGD
Date:	8/19/2022

SOUTH CHANNEL SECTIONS



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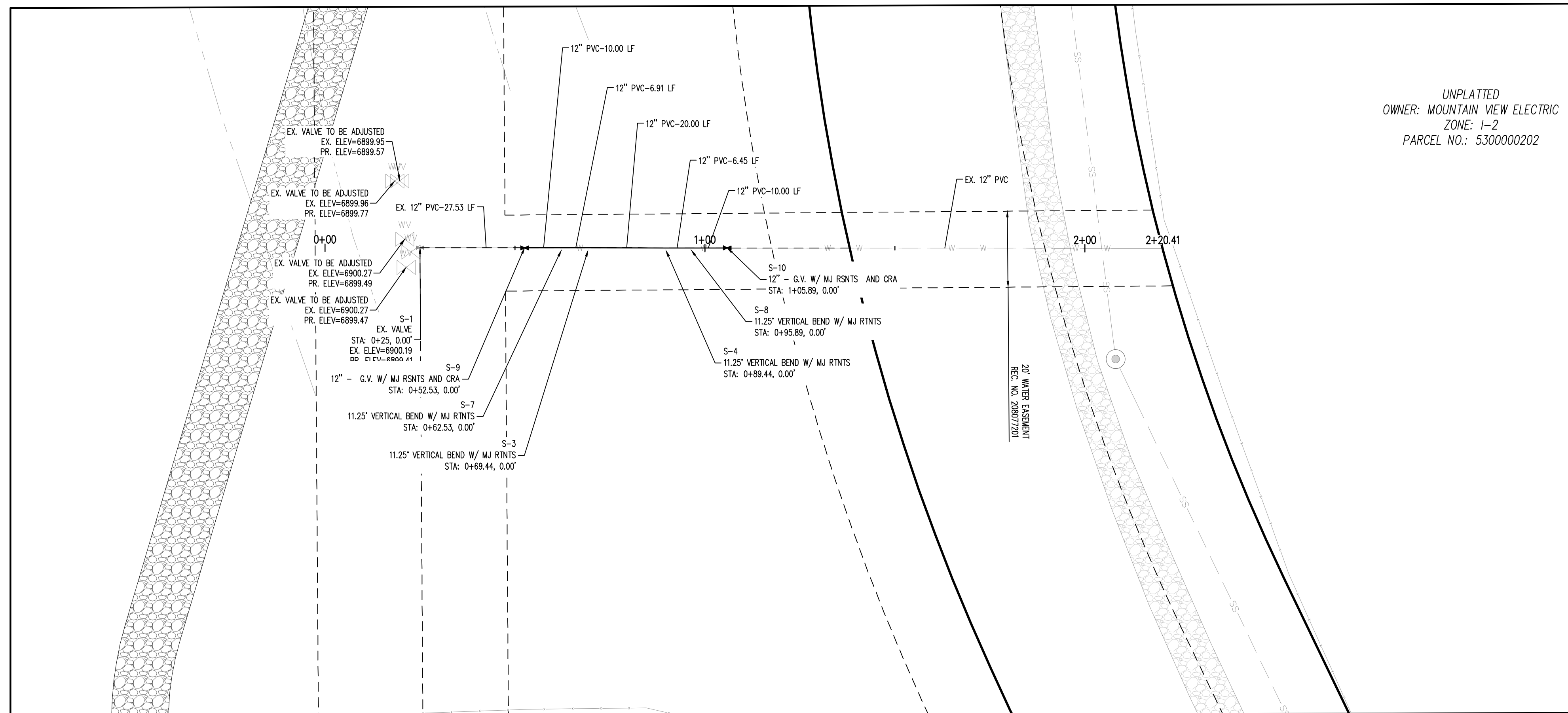
#	Date	Issue / Description	Init.

Project No: CLH000023
 Drawn By: CMW/J
 Checked By: RGD
 Date: 8/19/2022

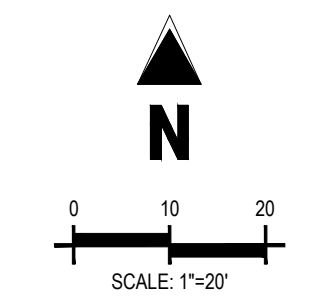
WATER LOWERING

C7.1

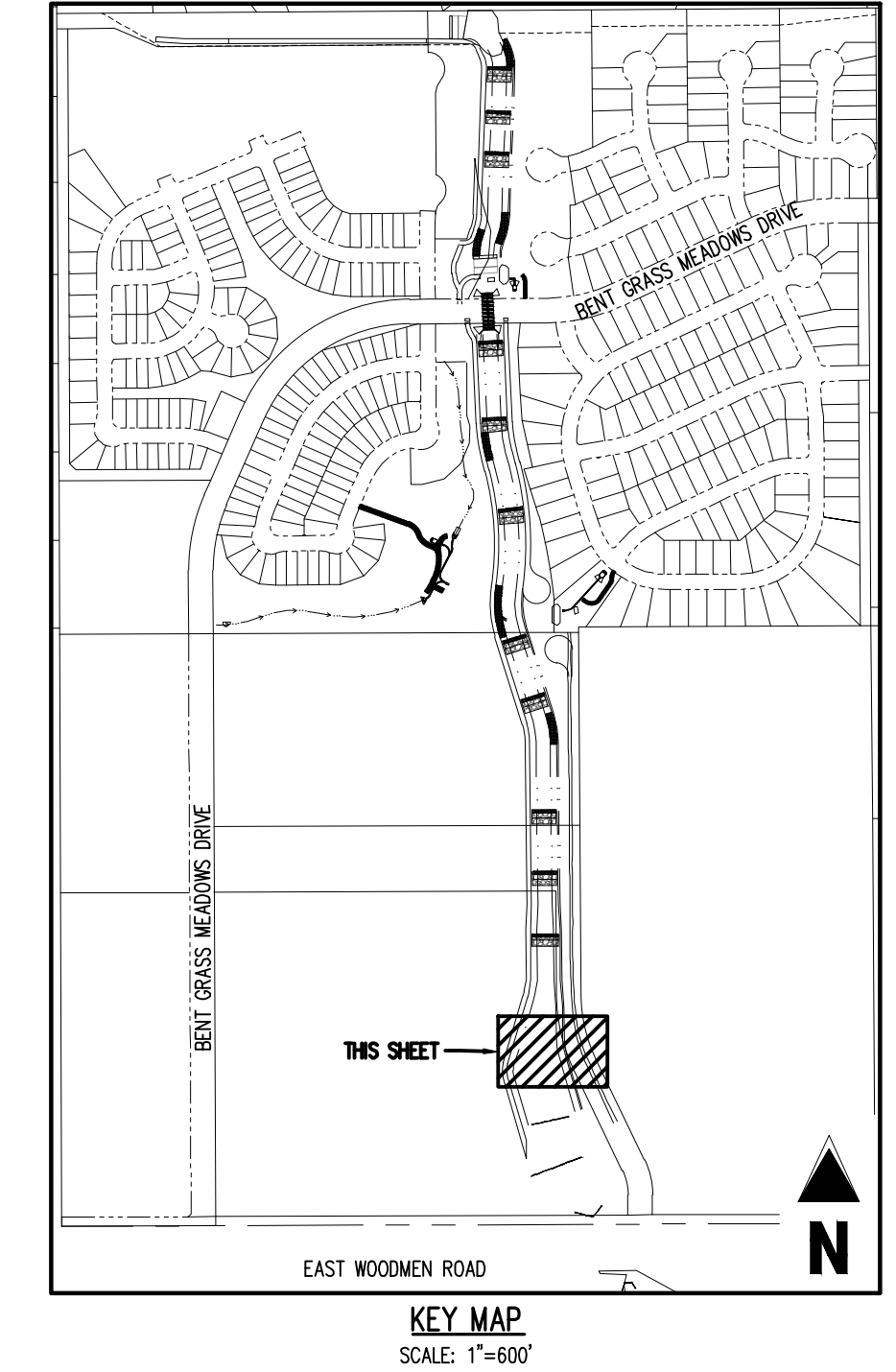
Sheet 23 of 23



PLAN VIEW - EXISTING WATER LOWERING (STA: 0+0.00 - 2+20.41)
SCALE: 1"=20'



UNPLATTED
 OWNER: MOUNTAIN VIEW ELECTRIC
 ZONE: I-2
 PARCEL NO.: 5300000202



KEY MAP
SCALE: 1"=600'

GRADING LEGEND

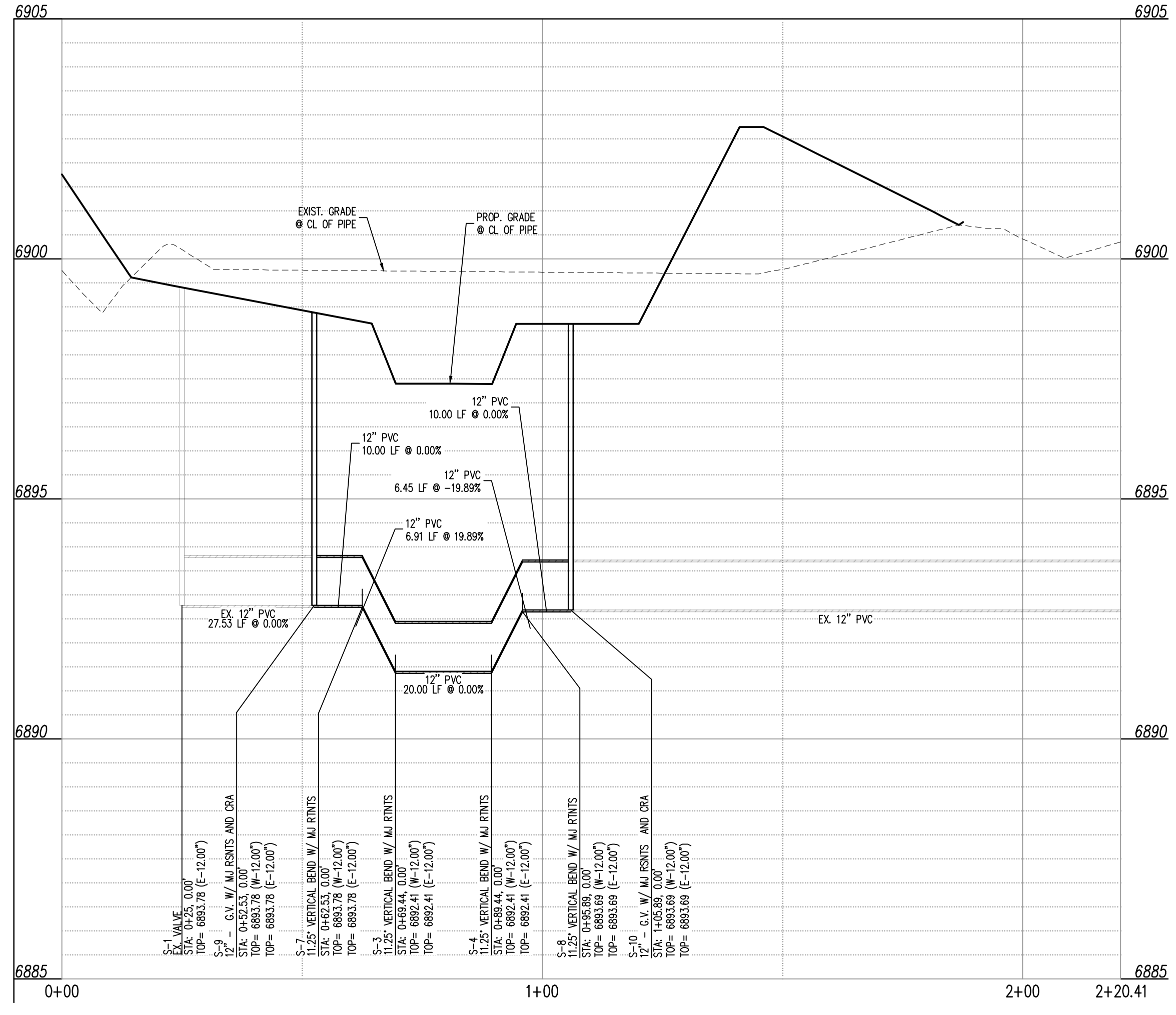
- - - - - 5460	EXISTING MAJOR CONTOUR
- - - - - 52	EXISTING MINOR CONTOUR
○ 5485	PROPOSED MAJOR CONTOUR
○ 66	PROPOSED MINOR CONTOUR
↘ 2.00%	EXISTING SLOPE - PERCENT
↘ 4:1	EXISTING SLOPE - RISE/RUN
↘ 2.00%	PROPOSED SLOPE - PERCENT
↘ 4:1	PROPOSED SLOPE - RISE/RUN
55.00 FG	PROPOSED SPOT ELEVATION - FINISHED GROUND
55.00 CL	PROPOSED SPOT ELEVATION - CENTER LINE
55.00 TOB	PROPOSED SPOT ELEVATION - TOP OF BANK

UTILITY LEGEND

- - - - - W	EXISTING WATER LINE
- - - - - W	PROPOSED WATER LINE
- - - - - SS	EXISTING SANITARY SEWER
- - - - - FO	EXISTING FIBER OPTIC LINE
- - - - - G	EXISTING GAS LINE
- - - - - UT	EXISTING UNDERGROUND TELEPHONE
- - - - - UE	EXISTING UNDERGROUND ELECTRICAL
- - - - - OHT	EXISTING OVERHEAD TELEPHONE
- - - - - OHE	EXISTING OVERHEAD ELECTRICAL
- - - - -	EXISTING STORM SEWER
□	EXISTING ELECTRICAL BOX
T	EXISTING PAD MOUNTED TRANSFORMER
○	EXISTING TRAFFIC POLE
○	PROPOSED SITE LIGHTING
○	EXISTING SANITARY SEWER MANHOLE
○	EXISTING STORM SEWER MANHOLE
○	EXISTING WATER METER
○	EXISTING WATER VALVE
○	EXISTING FIRE HYDRANT
○	PROPOSED FIRE HYDRANT

SITE LEGEND

---	PROPERTY BOUNDARY LINE
---	RIGHT OF WAY BOUNDARY LINE
- - - - -	EXISTING EASEMENT LINE
-----	PROPOSED 100-YEAR FLOODPLAIN
---	EXISTING CURB AND GUTTER
---	EXISTING CONCRETE
---	EXISTING CDOT CLASS 6 GRAVEL
---	EXISTING RIPRAP
---	EXISTING BOULDERS
---	PROPOSED CDOT CLASS 6 GRAVEL
---	PROPOSED RIPRAP
---	PROPOSED BOULDERS
---	EXISTING SIGN
X CLX	REFERENCE TO DETAIL AND SHEET NUMBER



PROFILE VIEW - EXISTING WATER LOWERING (STA: 0+0.00 - 2+20.41)
SCALE: H: 1"=20', V: 1"=2'

DISTRICT APPROVALS:

THE WOODMEN HILLS METROPOLITAN DISTRICT RECOGNIZES THE DESIGN ENGINEER AS HAVING RESPONSIBILITY FOR THE DESIGN AND HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

WOODMEN HILLS METROPOLITAN DISTRICT
WATER DESIGN APPROVAL

DATE: _____ BY: _____
 PROJECT NO. _____

IN CASE OF ERRORS OR OMISSIONS WITH THE WATER DESIGN AS SHOWN ON THIS DOCUMENT THE STANDARDS AS DEFINED IN THE RULES AND REGULATIONS FOR INSTALLATION OF WATER MAINS AND SERVICES SHALL RULE.

APPROVAL EXPIRES 180 DAYS FROM DESIGN APPROVAL.

NOTE: CONTRACTOR SHALL PROTECT ALL EXISTING SURVEY MONUMENTATION. CONTRACTOR SHALL HAVE LICENSED SURVEYOR REPLACE ANY DAMAGED OR DISTURBED MONUMENTATION AT THEIR COST.

SURVEYOR TO OBTAIN AUTOCAD FILE FROM ENGINEER AND VERIFY ALL HORIZONTAL CONTROL, DIMENSIONING PRIOR TO CONSTRUCTION STAKING. SURVEYOR MUST VERIFY ALL BENCHMARK, BASIS OF BEARING AND DATUM INFORMATION TO ENSURE IMPROVEMENTS WILL BE AT THE SAME HORIZONTAL AND VERTICAL LOCATIONS SHOWN ON THE DESIGN CONSTRUCTION DRAWINGS. PRIOR TO CONSTRUCTION STAKING ANY DISCREPANCY MUST BE REPORTED TO OWNER AND ENGINEER PRIOR TO CONTINUATION OF ANY FURTHER STAKING OR CONSTRUCTION WORK.

BENCHMARK
 ELEVATIONS ARE BASED ON THE SOUTHWEST CORNER OF LOT 1, WOODMEN HILLS FILING NO. 4, MONUMENTED BYA NO. 4 REBAR WITH A YELLOW PLASTIC CAP, STAMPED L5# 24954. ELEVATION = 6947.67

CAUTION - NOTICE TO CONTRACTOR

- ALL UTILITY LOCATIONS SHOWN ARE BASED ON MAPS PROVIDED BY THE APPROPRIATE UTILITY COMPANY AND FIELD SURFACE EVIDENCE AT THE TIME OF SURVEY AND IS TO BE CONSIDERED AN APPROXIMATE LOCATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION OF ALL UTILITIES, PUBLIC OR PRIVATE, WHETHER SHOWN ON THE PLANS OR NOT, PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.
- WHERE A PROPOSED UTILITY CROSSES AN EXISTING UTILITY, IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF SUCH EXISTING UTILITY, EITHER THROUGH POT-HOLING OR ALTERNATIVE METHOD. REPORT INFORMATION TO THE ENGINEER PRIOR TO CONSTRUCTION.



ATTACHMENT F
Corrected Model Results Table



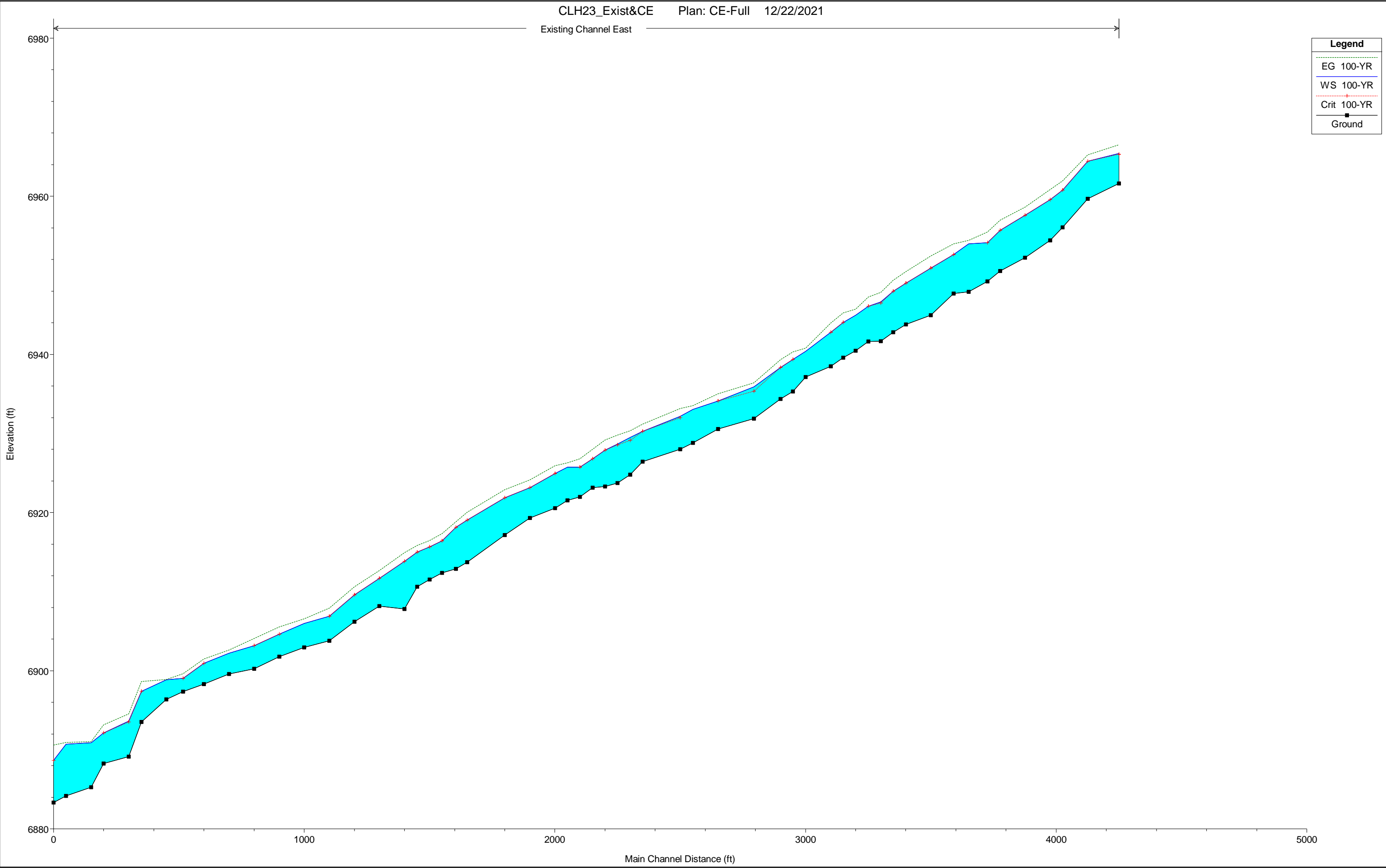
HEC-RAS Plan: CE-Full River: Existing Channel Reach: East Profile: 100-YR

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
East	5100	100-YR	1450.00	6961.61	6965.44	6965.30	6966.52	0.011582	8.37	173.33	69.36	0.93
East	5000	100-YR	1450.00	6959.70	6964.44	6964.44	6965.25	0.008065	7.85	249.03	150.00	0.80
East	4900	100-YR	1450.00	6956.08	6960.79	6960.79	6961.95	0.013766	8.64	167.91	72.92	1.00
East	4850	100-YR	1450.00	6954.44	6959.57	6959.57	6960.85	0.011955	9.11	164.48	76.47	0.96
East	4750	100-YR	1450.00	6952.24	6957.61	6957.61	6958.64	0.009194	8.42	202.35	106.55	0.85
East	4650	100-YR	1450.00	6950.54	6955.69	6955.69	6956.99	0.009734	9.44	180.55	88.71	0.90
East	4600	100-YR	1450.00	6949.23	6954.14	6954.14	6955.50	0.011212	9.39	162.26	72.27	0.95
East	4550	100-YR	1450.00	6947.92	6953.99		6954.44	0.003636	5.85	299.78	108.98	0.55
East	4500	100-YR	1450.00	6947.69	6952.62	6952.62	6953.98	0.012698	9.36	156.36	63.97	0.99
East	4400	100-YR	1450.00	6944.96	6950.91	6950.91	6952.44	0.012996	9.93	145.97	48.16	1.01
East	4300	100-YR	1450.00	6943.79	6949.03	6949.03	6950.47	0.013076	9.63	150.65	52.85	1.01
East	4250	100-YR	1450.00	6942.82	6947.98	6947.98	6949.38	0.013214	9.48	152.90	55.39	1.01
East	4200	100-YR	1450.00	6941.68	6946.64	6946.50	6947.85	0.011256	8.82	165.69	68.05	0.93
East	4150	100-YR	1450.00	6941.65	6946.09	6946.09	6947.25	0.011968	8.69	172.72	93.27	0.95
East	4100	100-YR	1450.00	6940.48	6944.95		6945.73	0.006607	7.16	214.04	87.34	0.73
East	4050	100-YR	1450.00	6939.60	6944.04	6944.04	6945.24	0.012970	8.80	166.68	75.86	0.98
East	4000	100-YR	1450.00	6938.49	6942.81	6942.81	6943.97	0.013747	8.63	167.95	72.77	1.00
East	3900	100-YR	1482.00	6937.13	6940.40		6940.79	0.004893	4.97	298.20	137.20	0.59
East	3850	100-YR	1482.00	6935.31	6939.38	6939.38	6940.33	0.015218	7.83	189.31	102.79	1.02
East	3800	100-YR	1482.00	6934.35	6938.37	6938.37	6939.35	0.014818	7.97	185.87	95.62	1.01
East	3694	100-YR	1482.00	6931.87	6935.90	6935.35	6936.40	0.006339	5.66	261.92	120.28	0.68
East	3600	100-YR	1482.00	6930.58	6934.13	6934.13	6935.02	0.015261	7.59	195.27	111.20	1.01
East	3500	100-YR	1482.00	6928.81	6933.06		6933.53	0.004466	5.49	269.94	99.40	0.59
East	3450	100-YR	1482.00	6928.02	6932.16	6931.98	6933.14	0.011213	7.97	185.96	78.07	0.91
East	3350	100-YR	1482.00	6926.42	6930.26	6930.26	6931.20	0.014860	7.79	190.26	102.64	1.01
East	3300	100-YR	1482.00	6924.78	6929.52	6929.13	6930.36	0.008627	7.33	203.28	90.23	0.81
East	3250	100-YR	1482.00	6923.75	6928.65	6928.57	6929.81	0.012281	8.65	172.15	77.55	0.96
East	3200	100-YR	1482.00	6923.28	6927.89	6927.89	6929.18	0.012805	9.12	164.05	69.81	1.00
East	3150	100-YR	1482.00	6923.15	6926.80	6926.80	6928.02	0.011835	8.92	173.15	89.33	0.96
East	3100	100-YR	1482.00	6921.98	6925.73	6925.73	6926.80	0.010846	8.32	189.46	115.29	0.91
East	3050	100-YR	1482.00	6921.56	6925.75		6926.28	0.003812	5.90	276.01	119.52	0.56
East	3000	100-YR	1482.00	6920.57	6924.94	6924.94	6925.93	0.010696	8.09	198.14	120.81	0.90
East	2900	100-YR	1482.00	6919.31	6923.14	6923.14	6924.13	0.009679	8.40	217.59	125.92	0.87
East	2800	100-YR	1482.00	6917.16	6921.89	6921.89	6922.89	0.007415	8.47	228.01	129.53	0.79
East	2650	100-YR	1482.00	6913.71	6919.05	6919.05	6920.05	0.007453	8.52	233.99	140.11	0.79
East	2605	100-YR	1482.00	6912.90	6918.14	6918.14	6918.84	0.007050	7.18	291.71	257.53	0.74
East	2550	100-YR	1482.00	6912.38	6916.42	6916.42	6917.34	0.009885	8.11	231.50	159.50	0.87
East	2500	100-YR	1482.00	6911.54	6915.64	6915.64	6916.45	0.015320	7.20	205.95	127.95	1.00
East	2450	100-YR	1482.00	6910.62	6915.01	6915.01	6915.85	0.007581	7.87	249.73	150.00	0.78
East	2400	100-YR	1482.00	6907.81	6913.82	6913.82	6914.92	0.008446	8.64	206.08	128.30	0.83
East	2300	100-YR	1482.00	6908.18	6911.66	6911.66	6912.68	0.010513	8.50	214.19	134.14	0.90
East	2200	100-YR	1482.00	6906.18	6909.60	6909.60	6910.63	0.014373	8.16	181.72	89.13	1.01
East	2100	100-YR	1482.00	6903.79	6906.88	6906.88	6907.90	0.014545	8.13	182.20	90.63	1.01
East	2000	100-YR	1482.00	6902.93	6905.98		6906.57	0.007178	6.12	242.21	108.75	0.72
East	1900	100-YR	1482.00	6901.77	6904.63	6904.63	6905.54	0.014740	7.62	194.43	107.89	1.00
East	1800	100-YR	1482.00	6900.25	6903.16	6903.16	6904.07	0.014494	7.69	194.04	114.37	1.00
East	1700	100-YR	1482.00	6899.58	6902.20		6902.60	0.007757	5.09	291.31	183.38	0.71
East	1600	100-YR	1482.00	6898.29	6900.92	6900.92	6901.47	0.017393	5.95	249.03	232.59	1.00
East	1517	100-YR	1482.00	6897.37	6899.02	6899.02	6899.62	0.017218	6.20	238.99	203.41	1.01
East	1450	100-YR	1482.00	6896.35	6898.86		6898.89	0.000429	1.20	1144.29	467.39	0.17
East	1350	100-YR	1482.00	6893.53	6897.38	6897.38	6898.64	0.010449	9.83	200.13	97.33	0.93
East	1300	100-YR	1482.00	6889.13	6893.61	6893.53	6894.55	0.013276	7.75	191.17	94.56	0.96
East	1200	100-YR	1482.00	6888.27	6892.12	6892.12	6893.15	0.014656	8.14	182.05	88.89	1.00
East	1150	100-YR	1482.00	6885.25	6890.89		6891.02	0.000976	2.96	505.40	160.45	0.29
East	1050	100-YR	1482.00	6884.18	6890.69		6890.91	0.001169	3.75	395.65	94.20	0.32
East	1000	100-YR	1482.00	6883.33	6888.64	6888.64	6890.60	0.012887	11.22	132.13	34.10	1.00

ATTACHMENT G
Corrected Water Surface Profiles

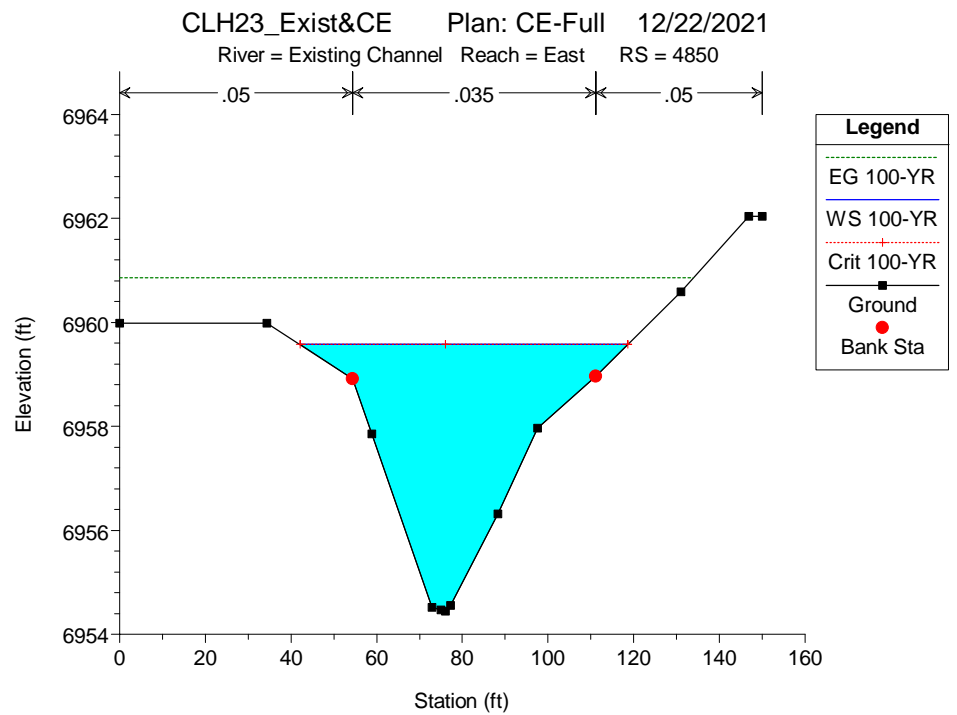
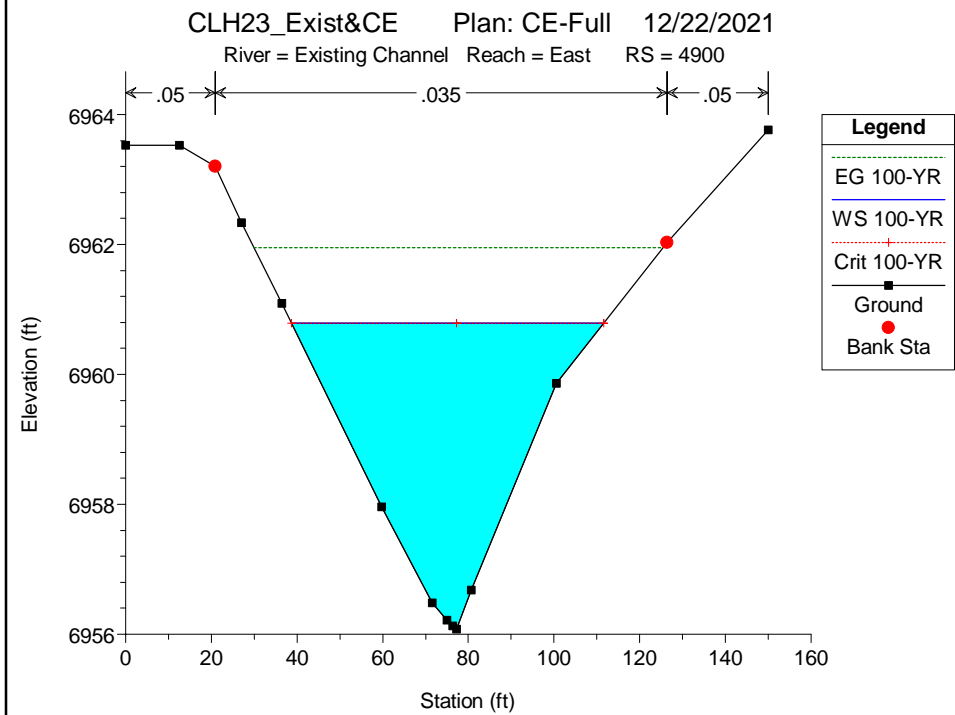
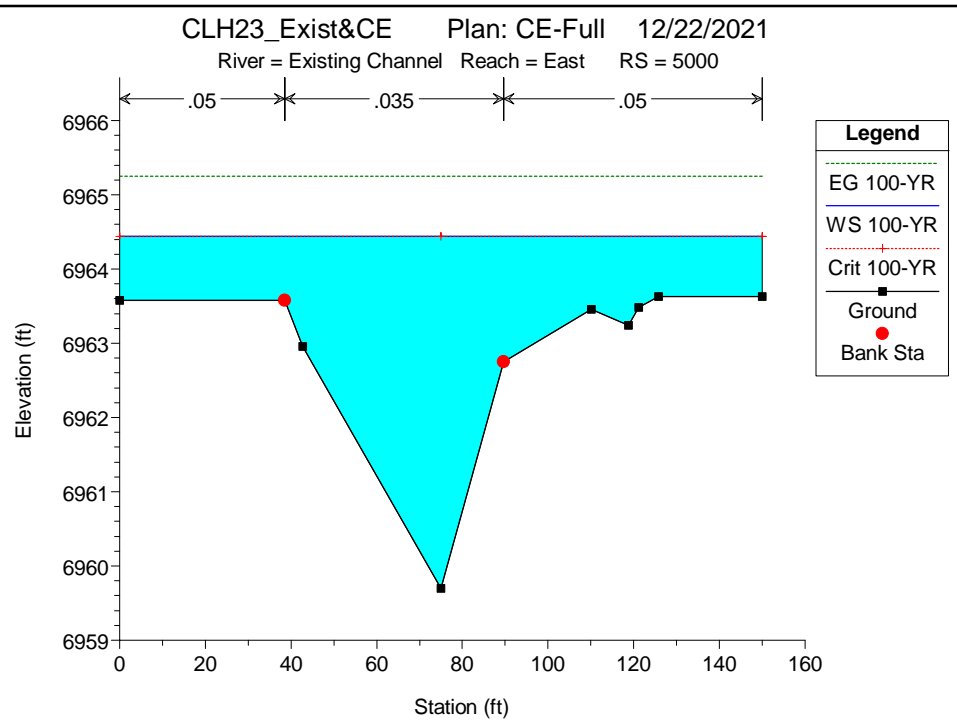
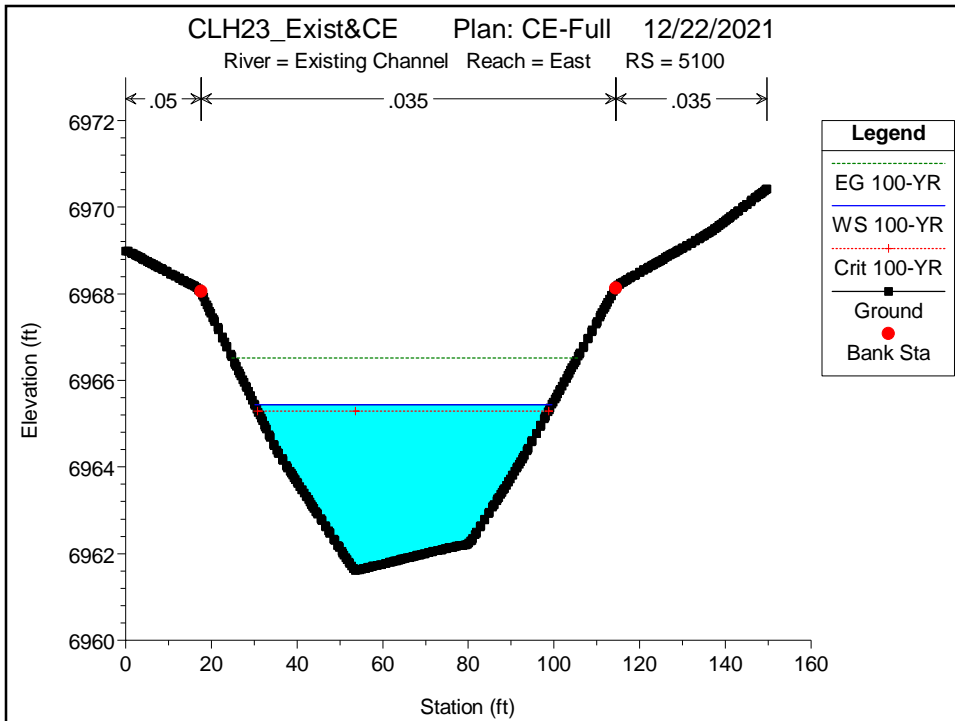


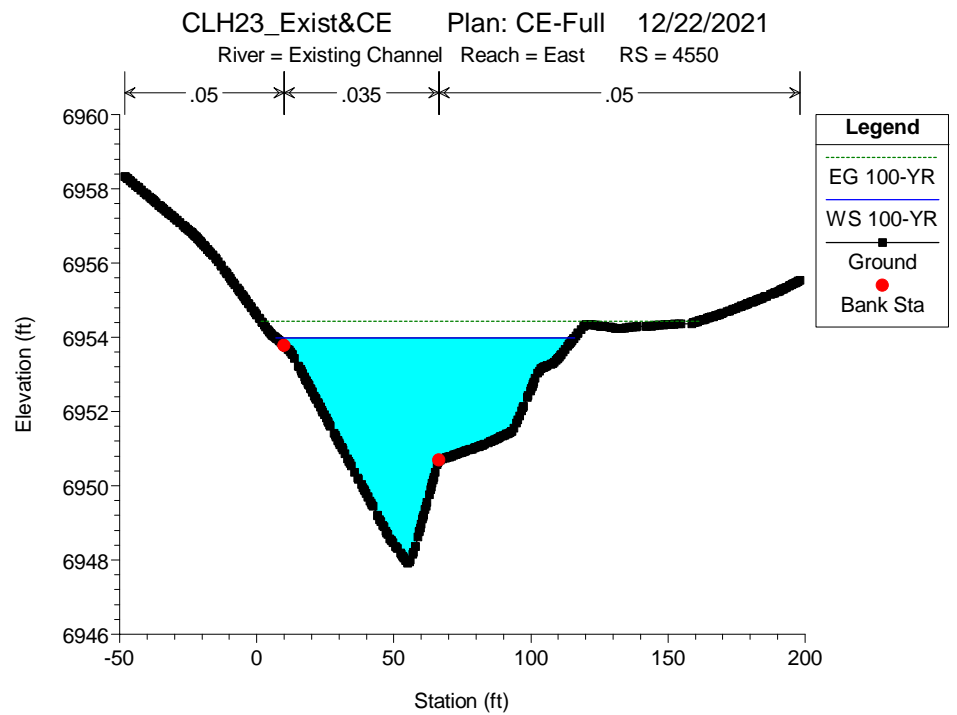
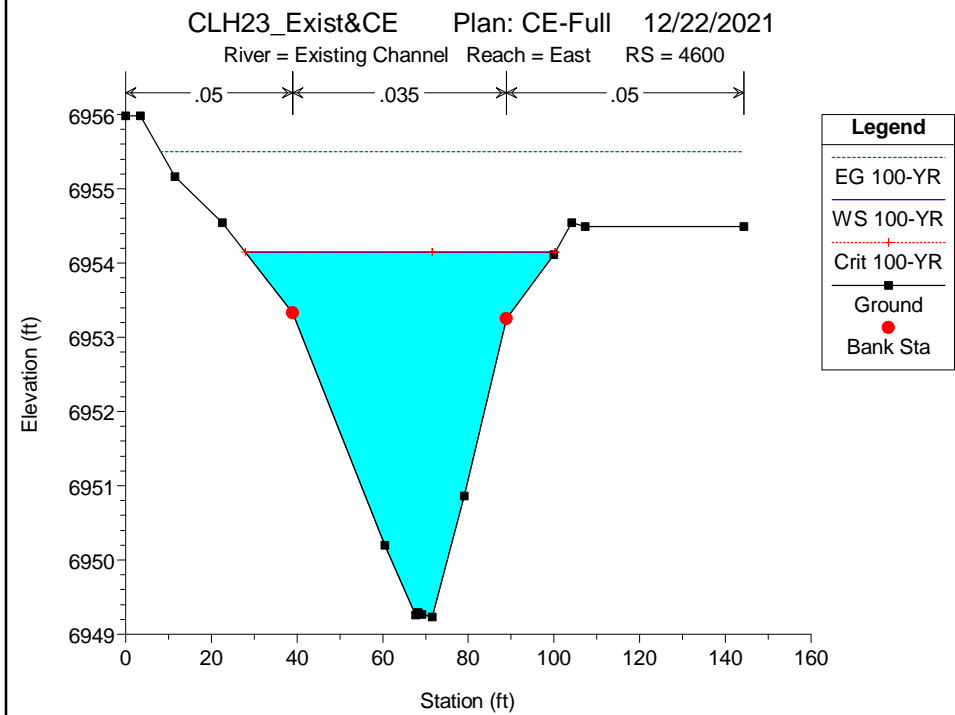
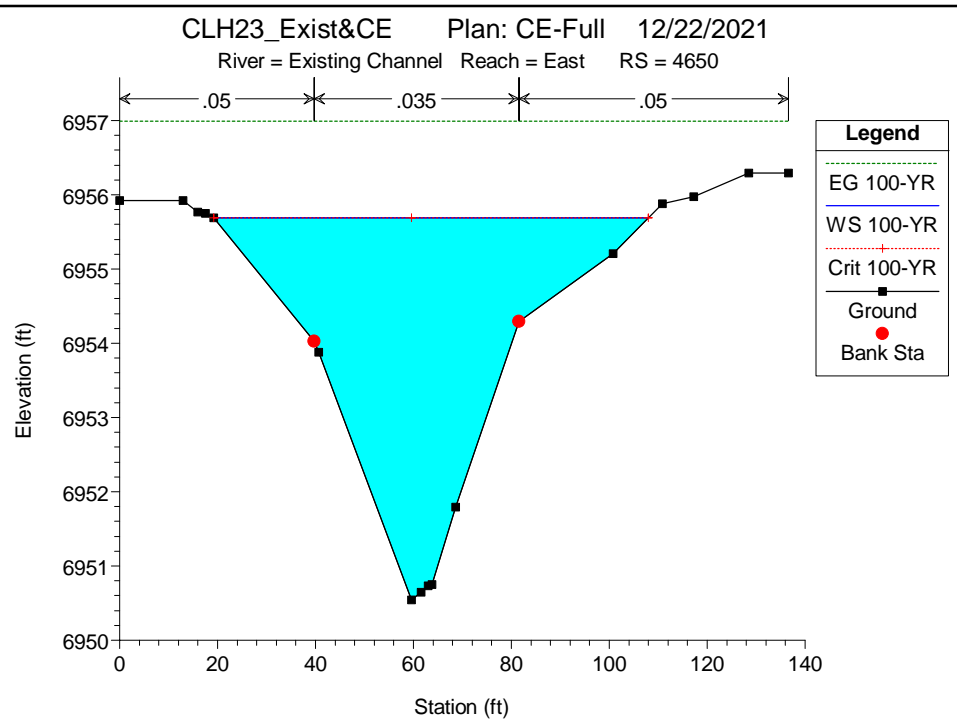
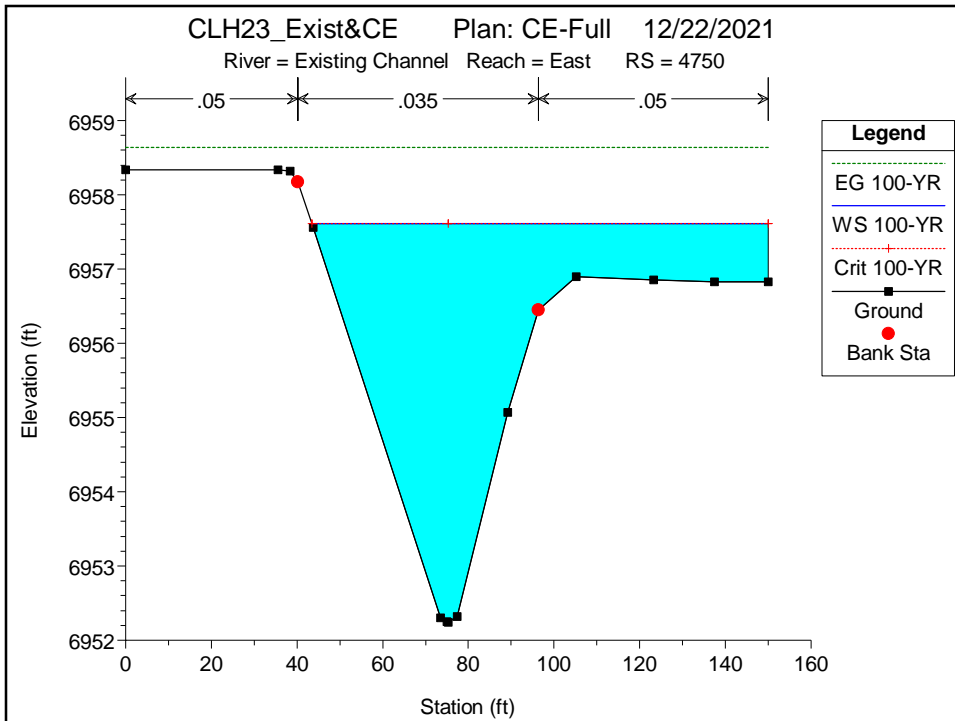
Legend	
EG 100-YR	
WS 100-YR	
Crit 100-YR	
Ground	

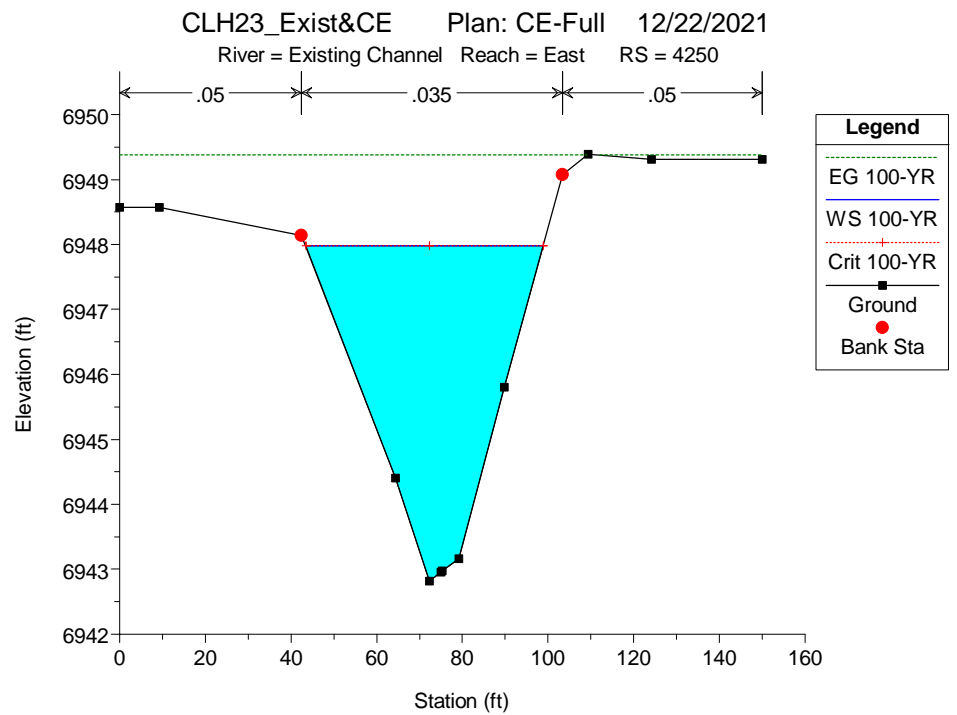
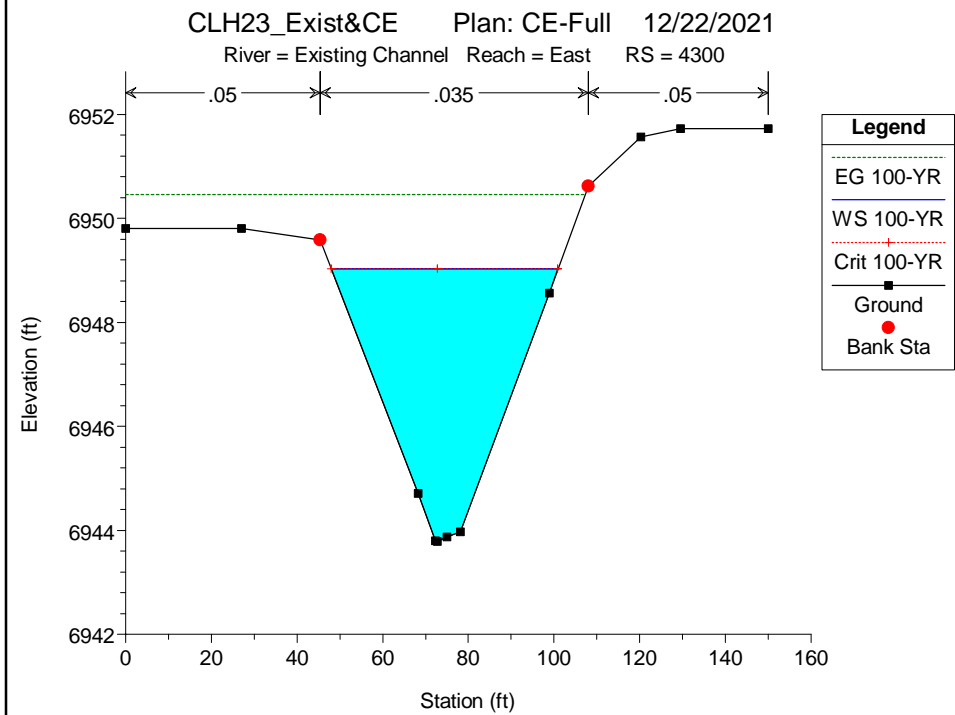
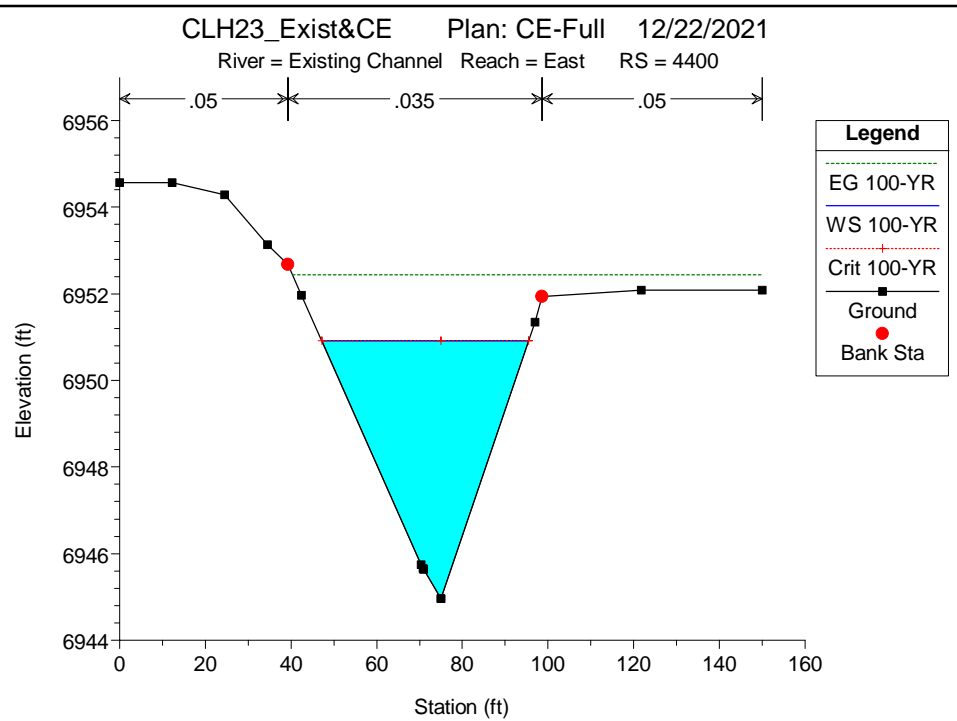
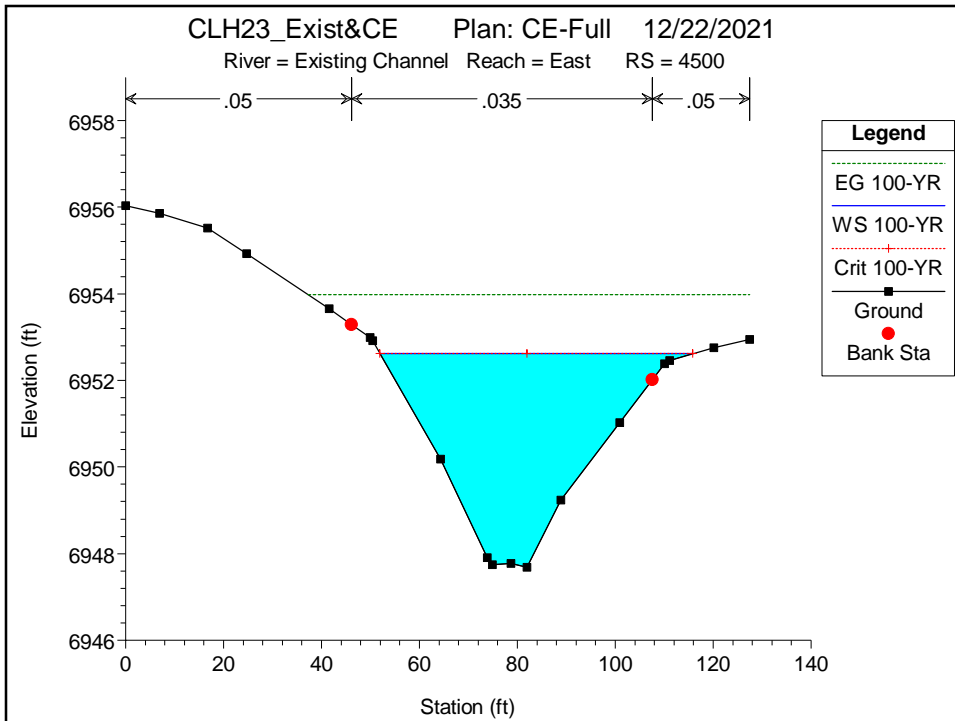


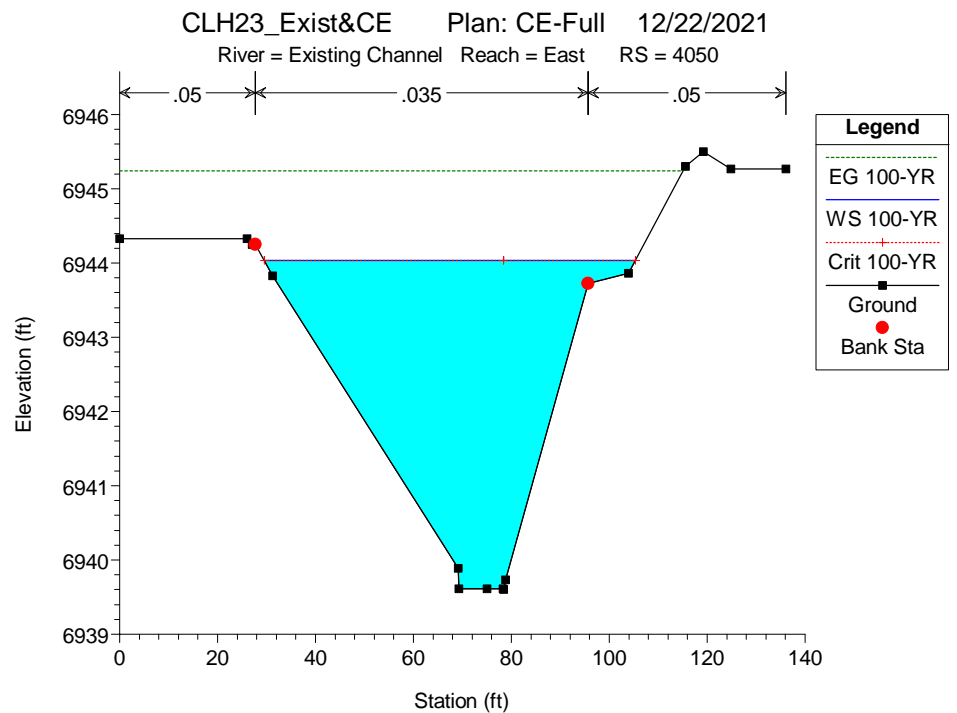
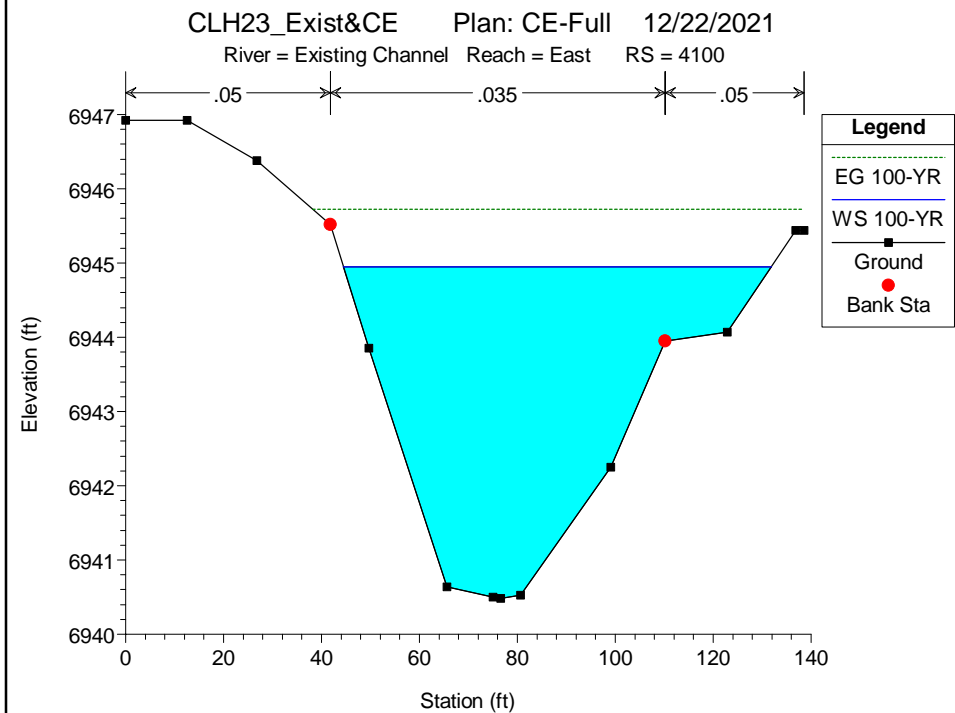
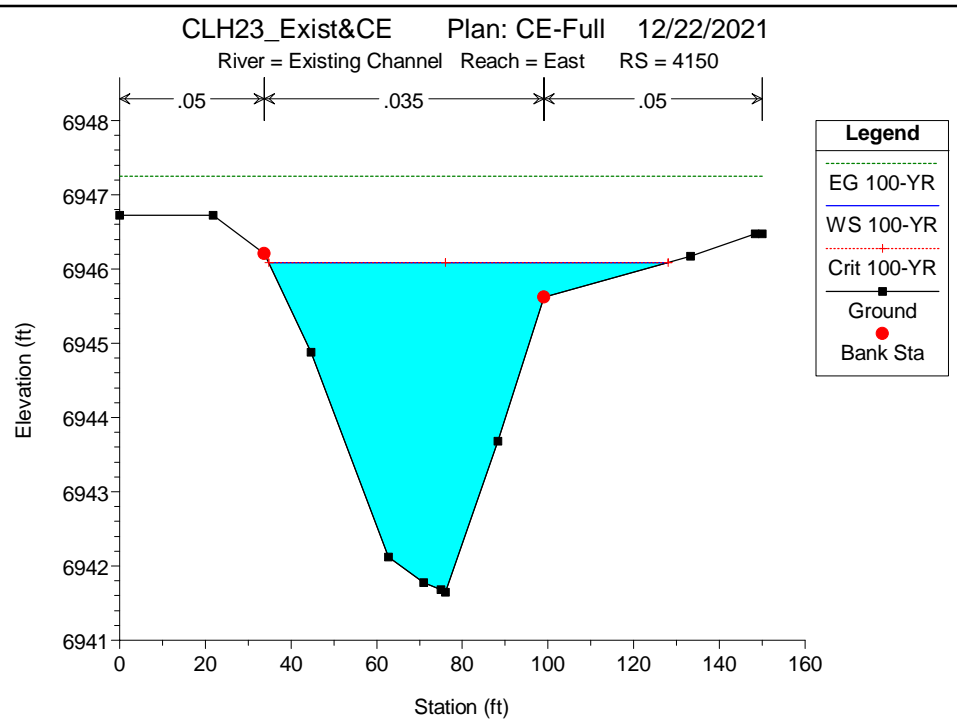
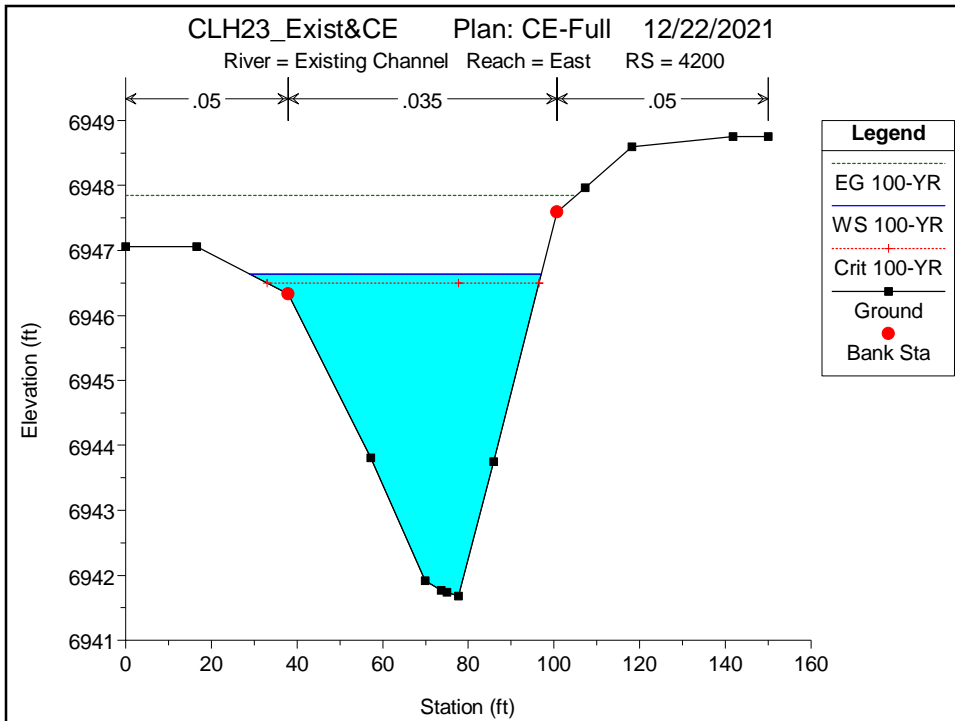
ATTACHMENT H
Corrected Cross Sections

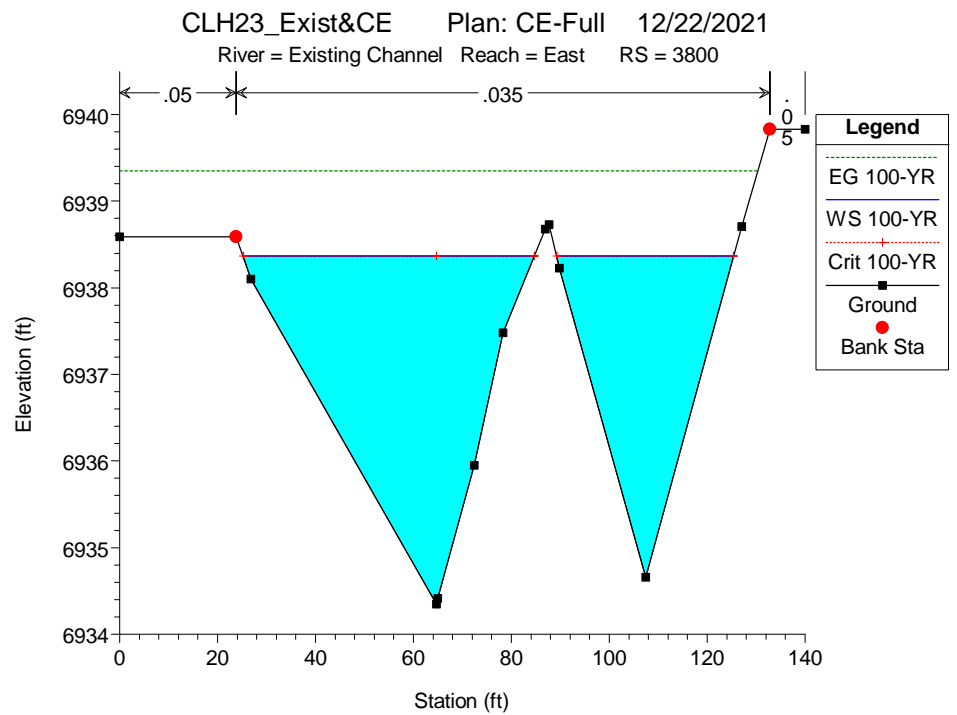
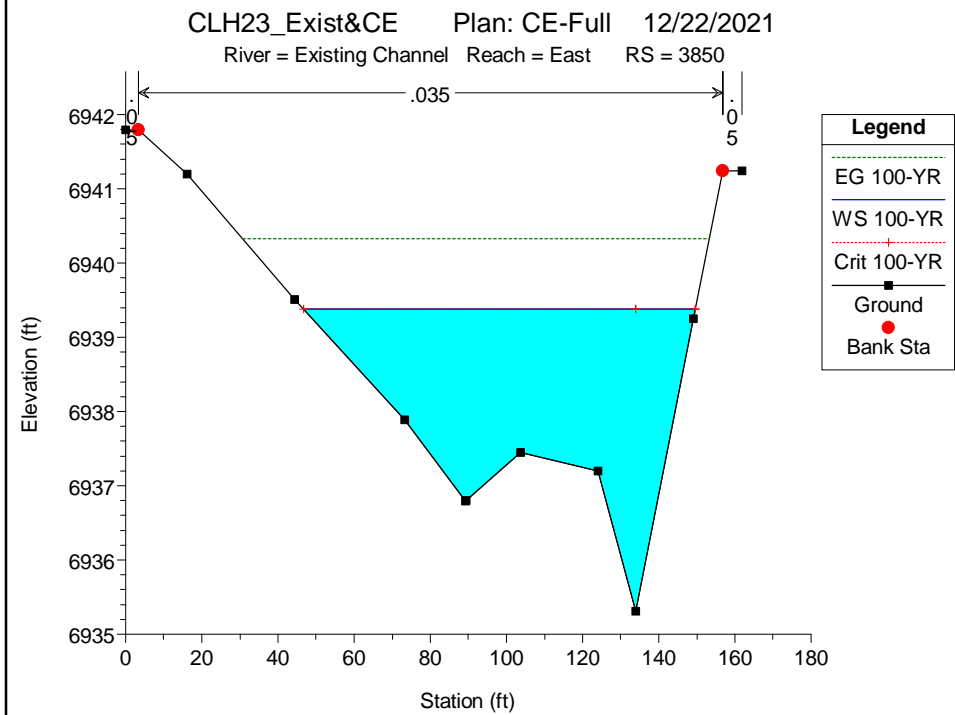
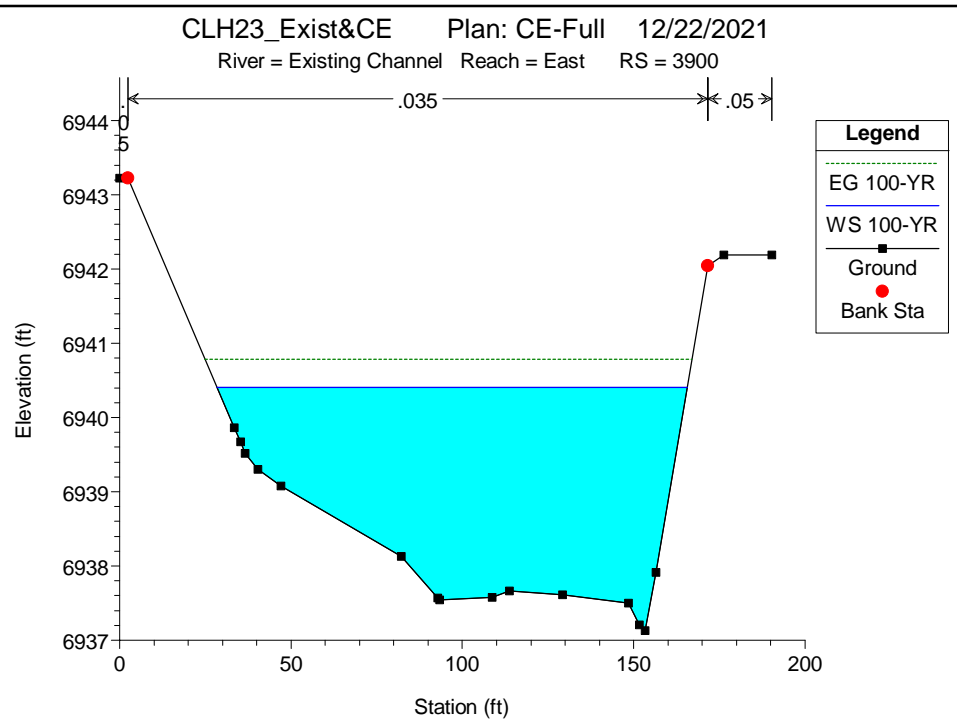
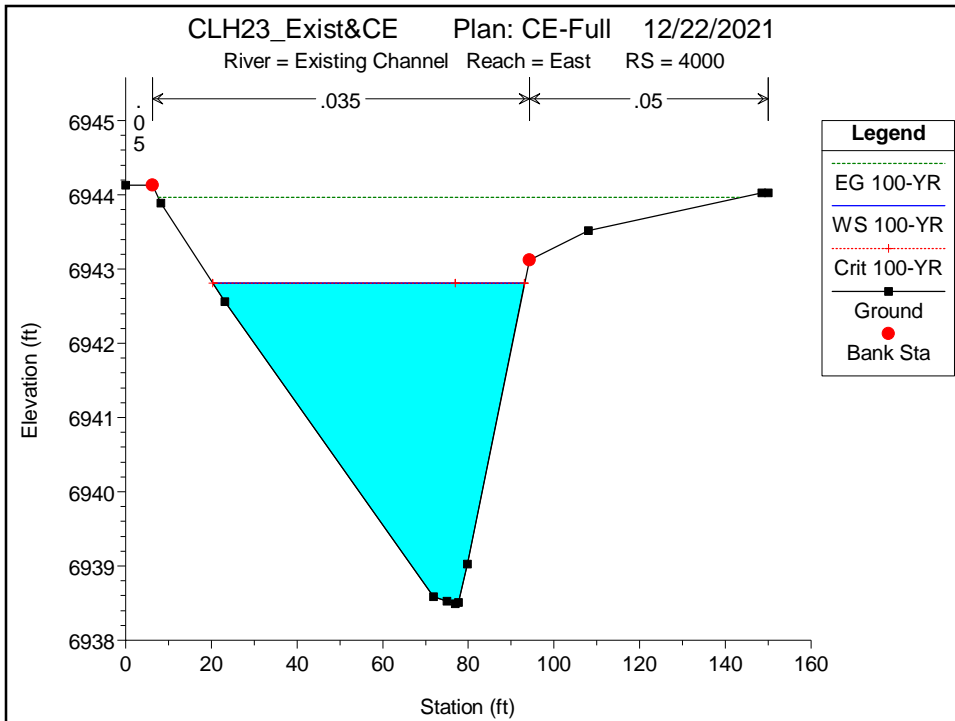


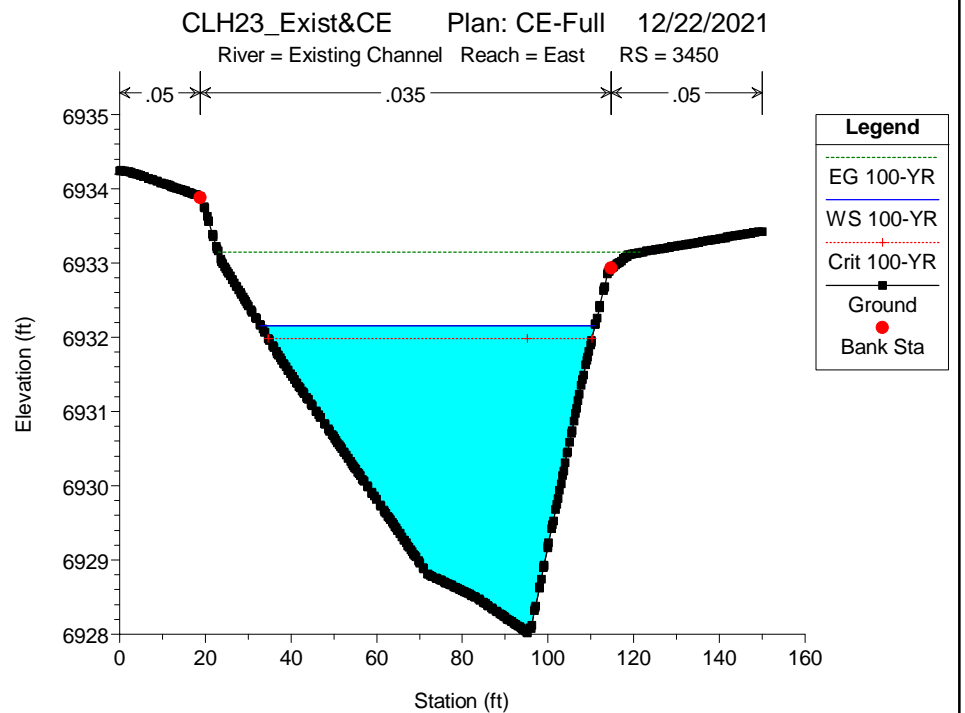
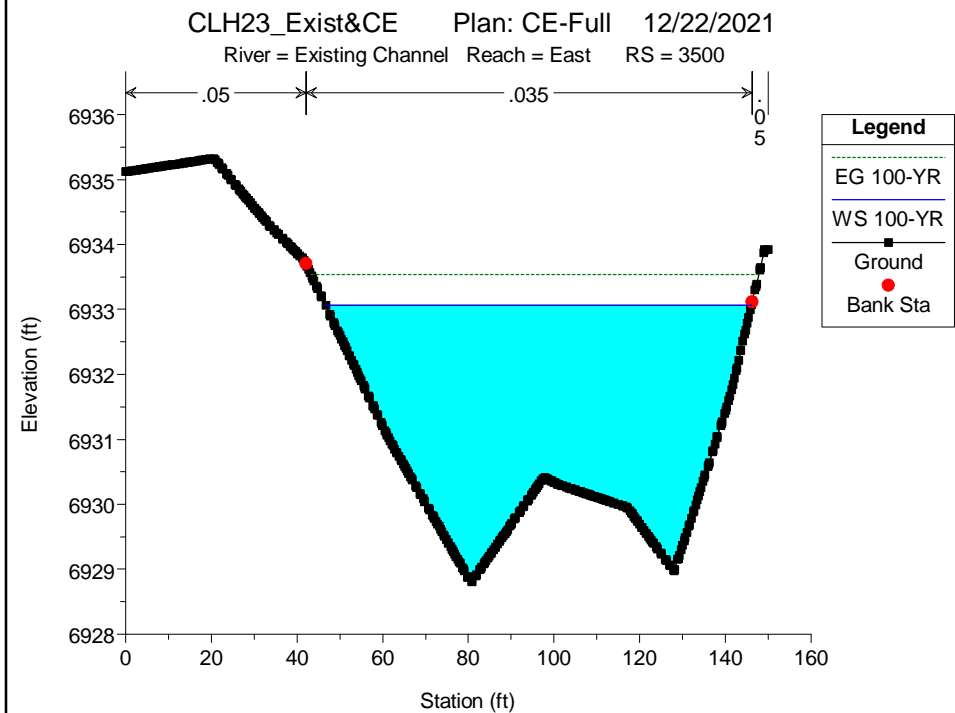
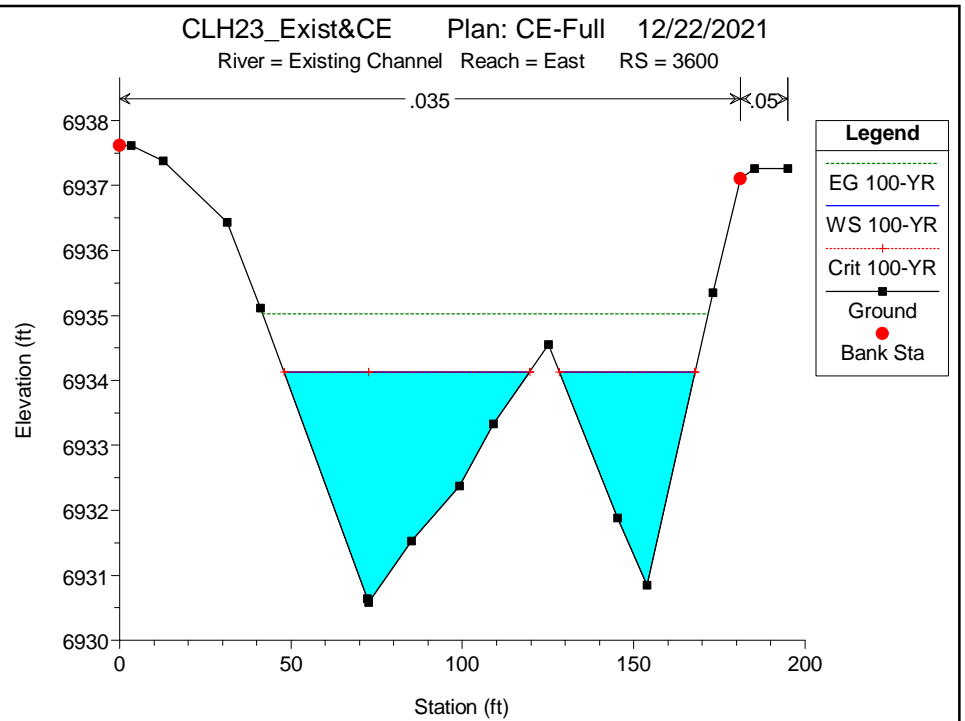
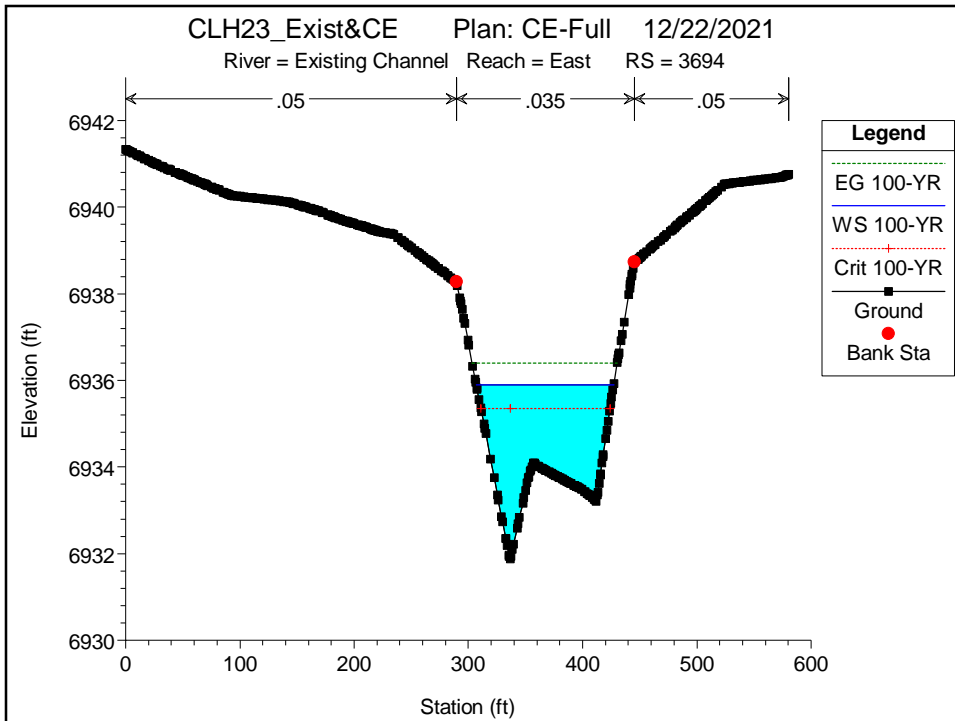


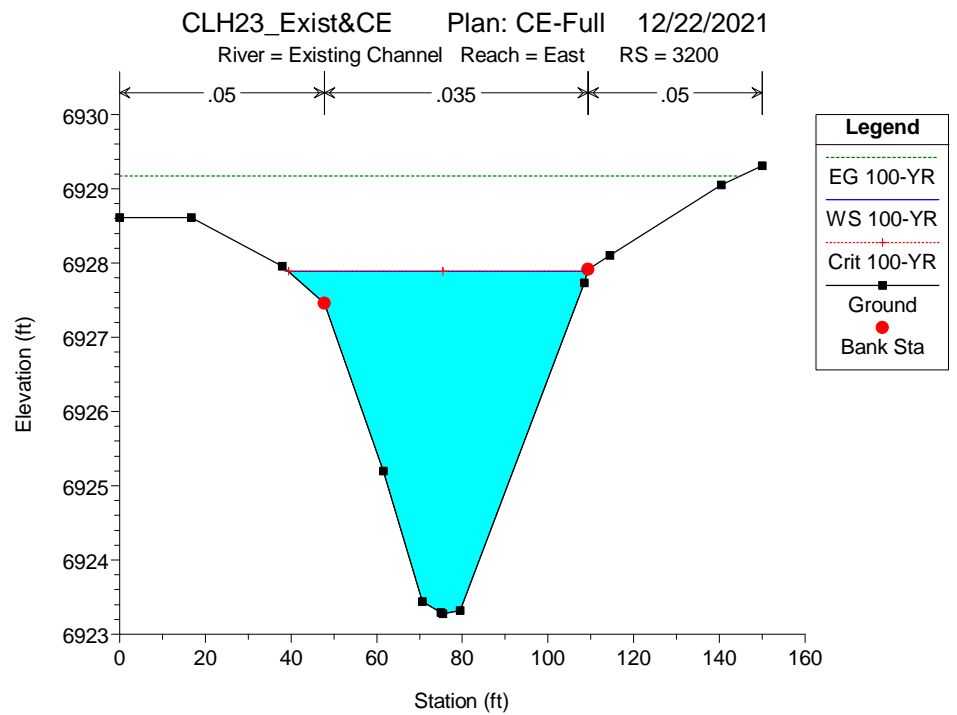
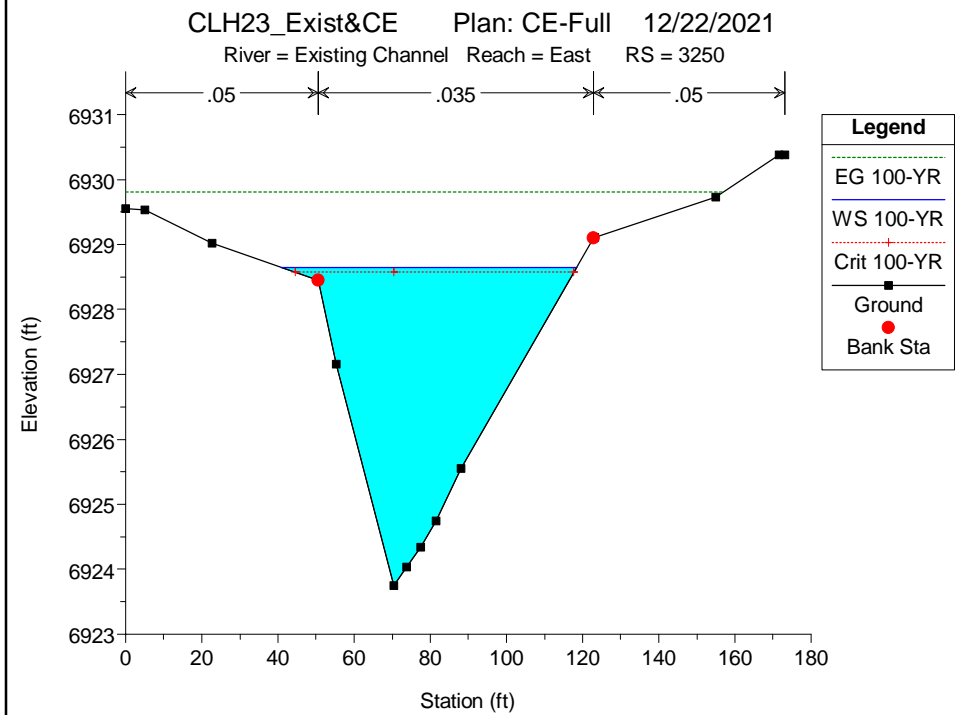
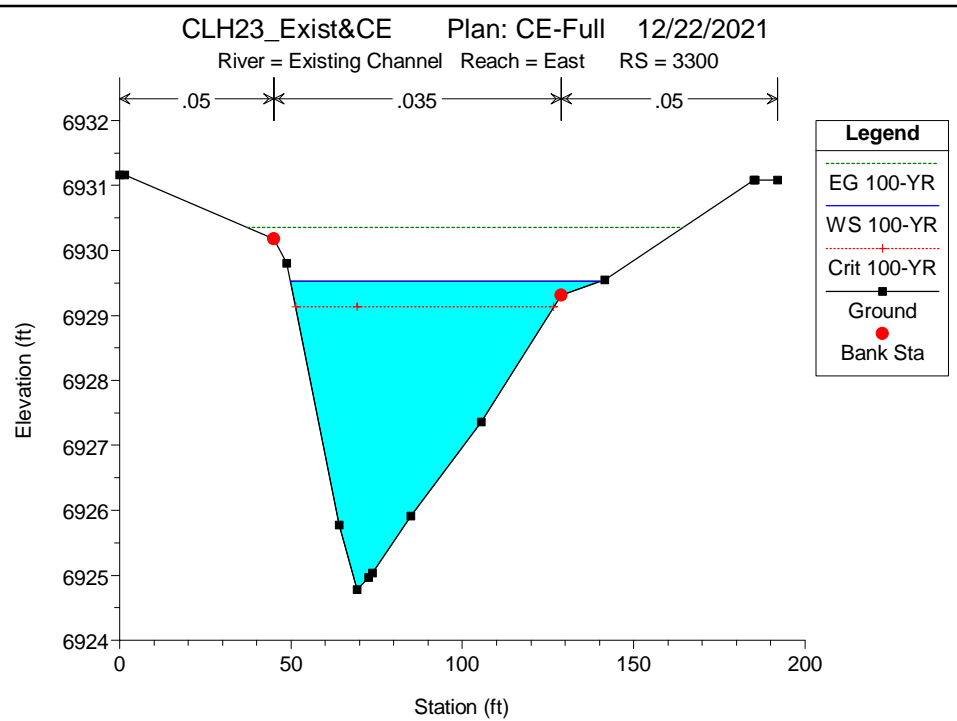
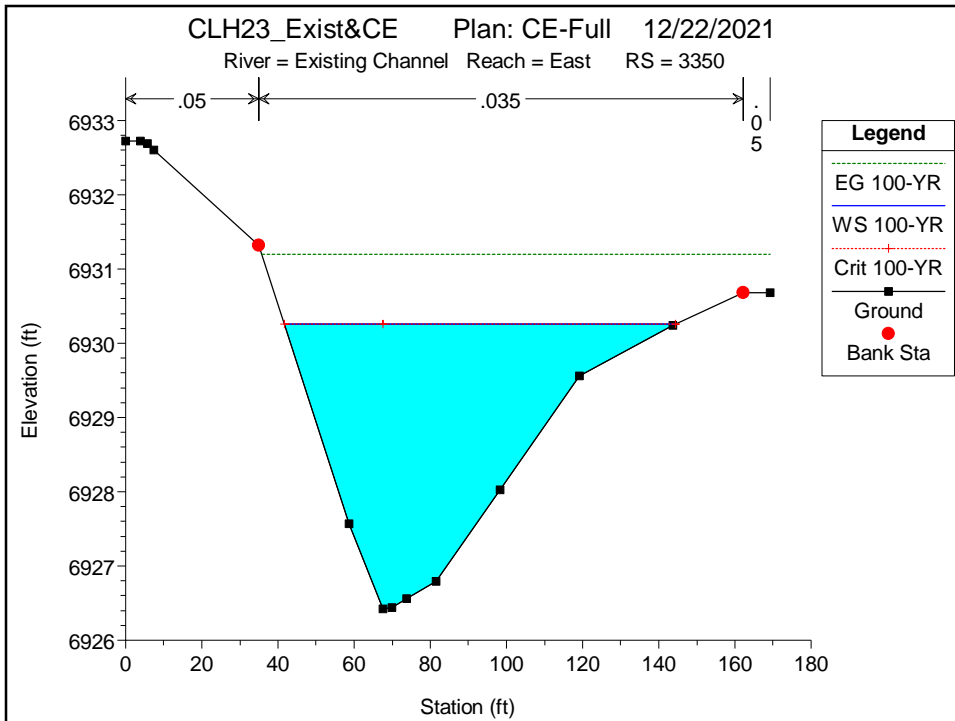


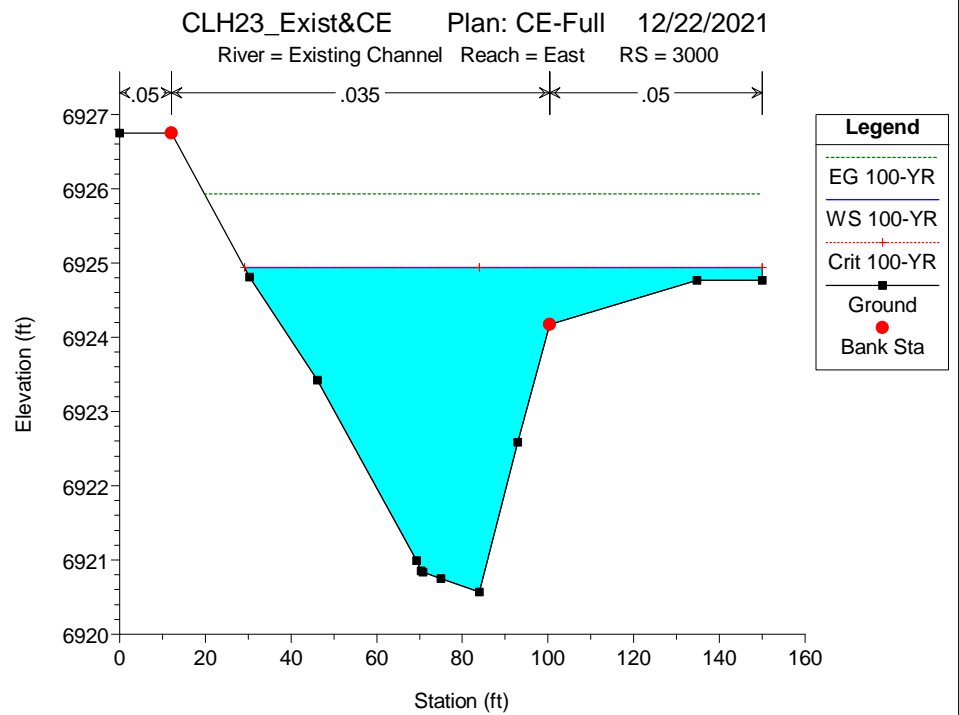
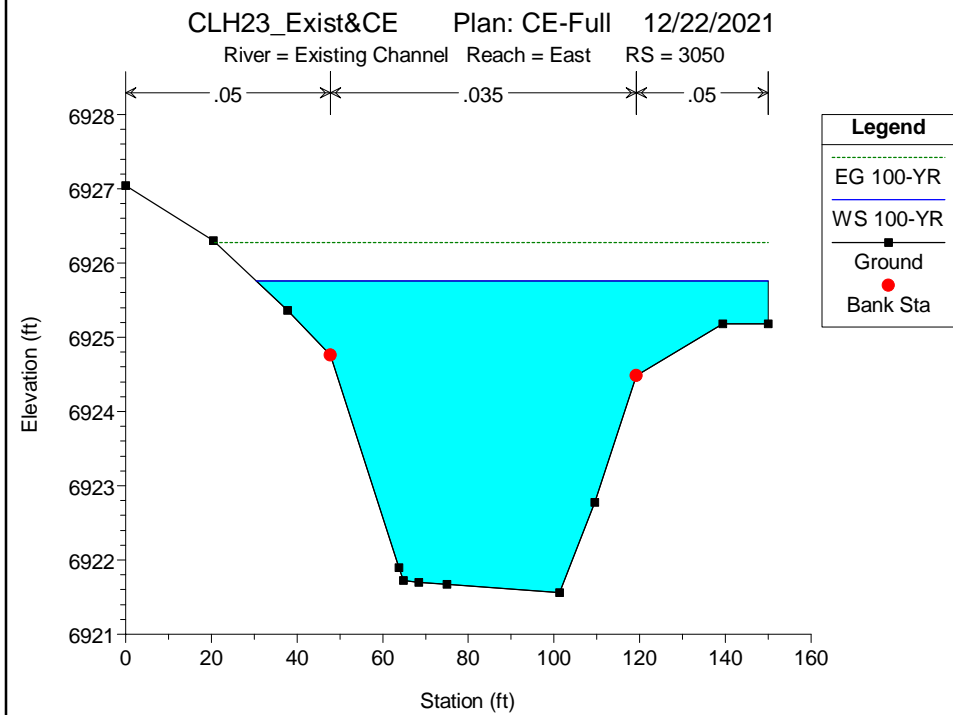
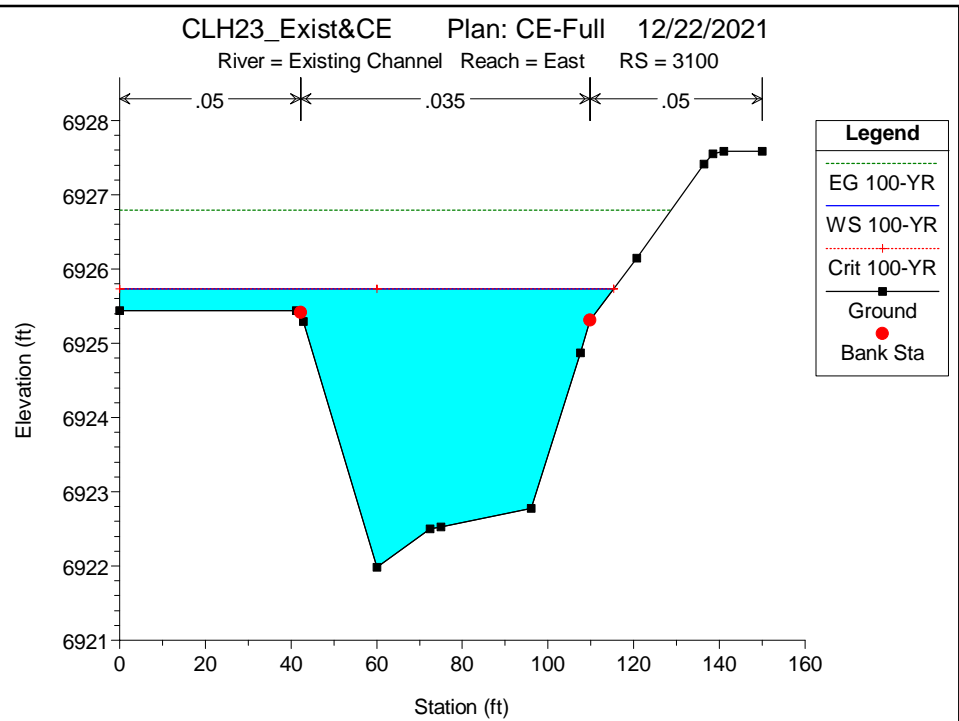
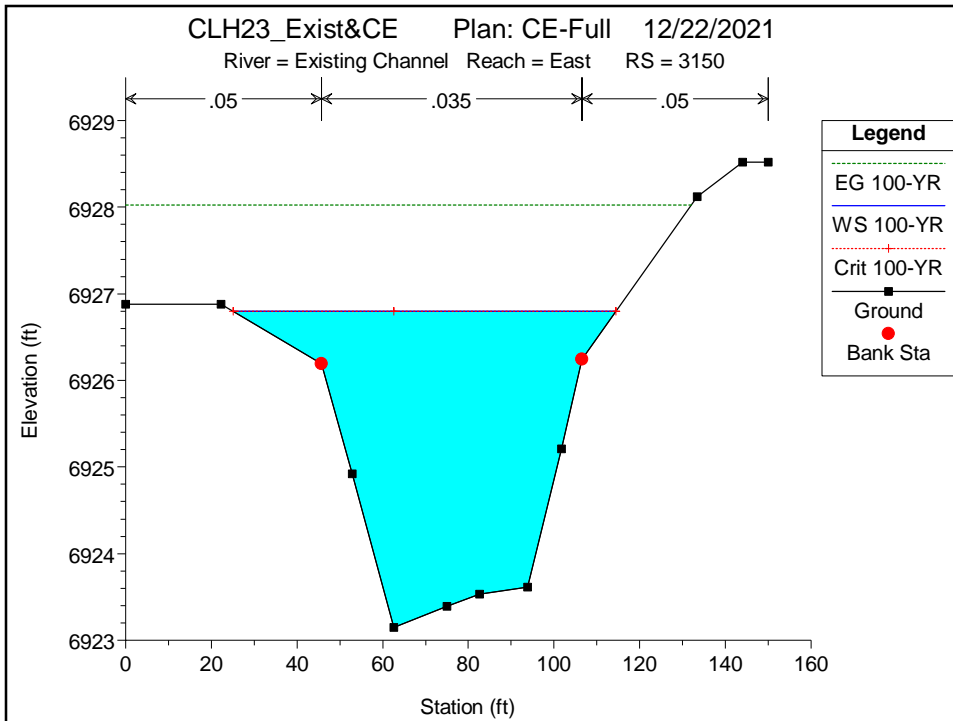


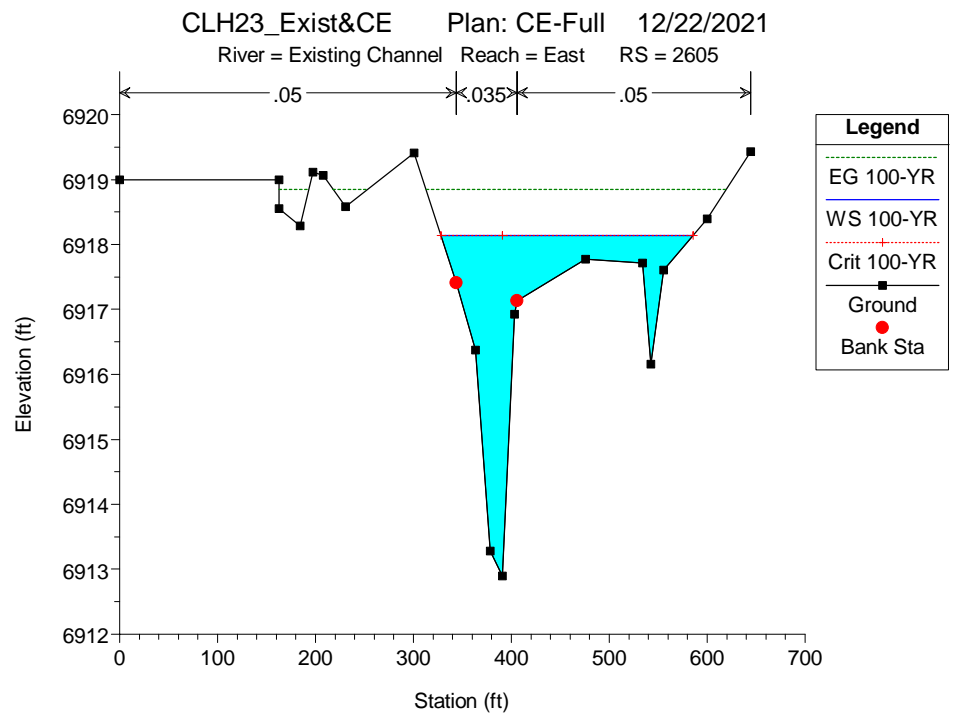
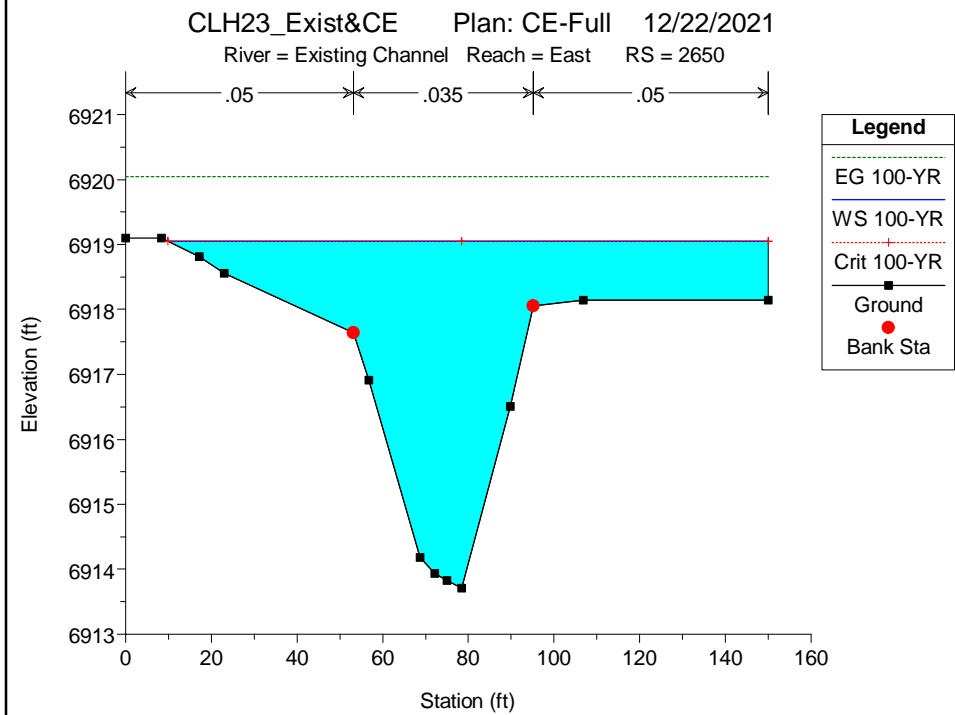
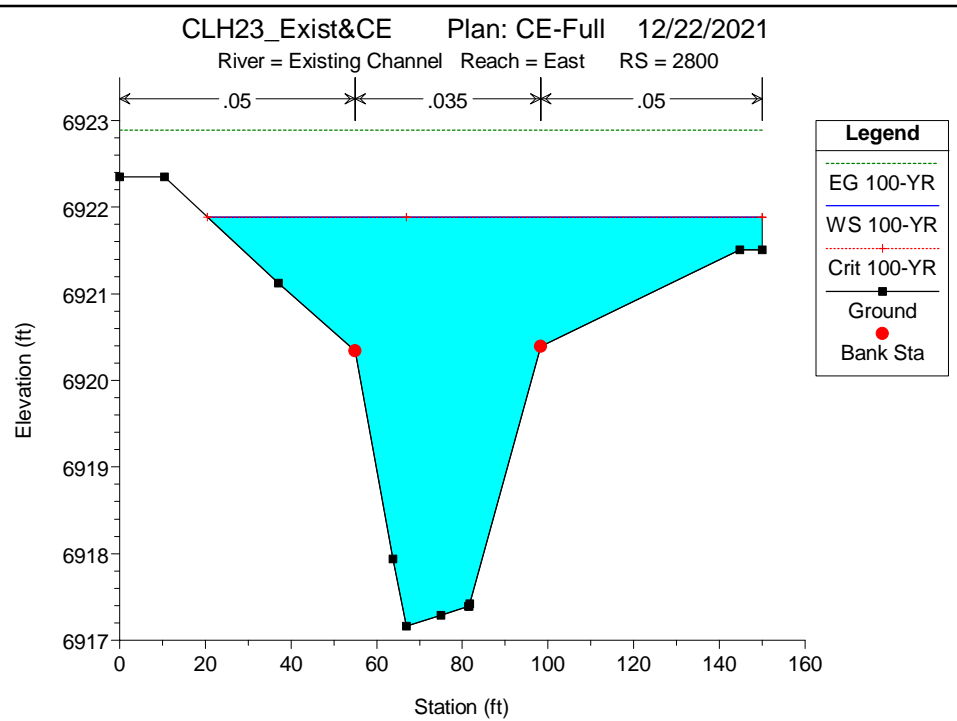
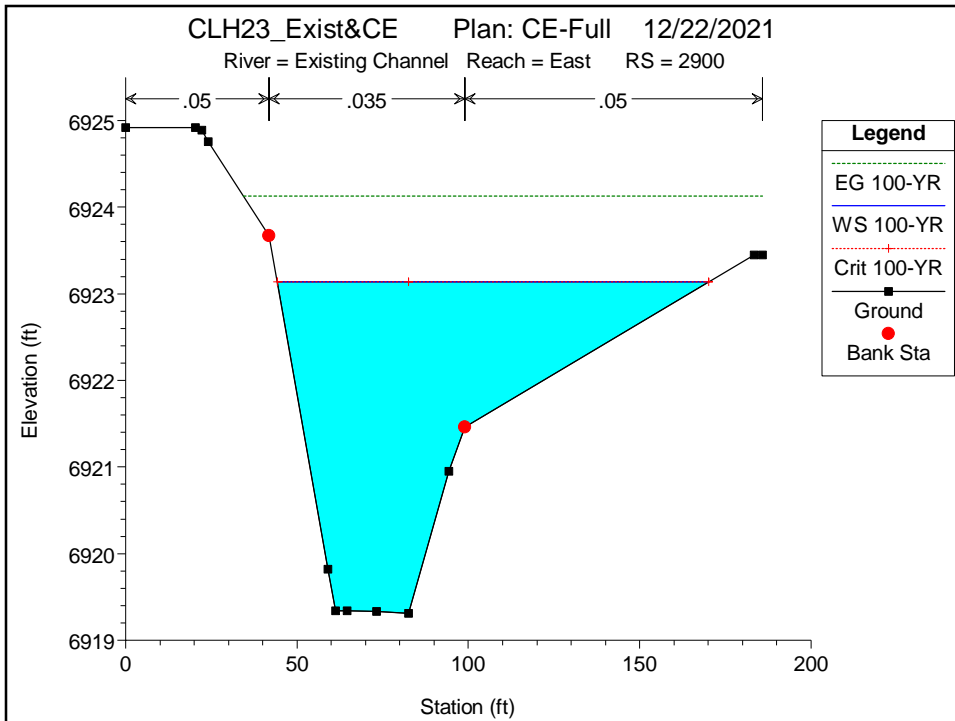


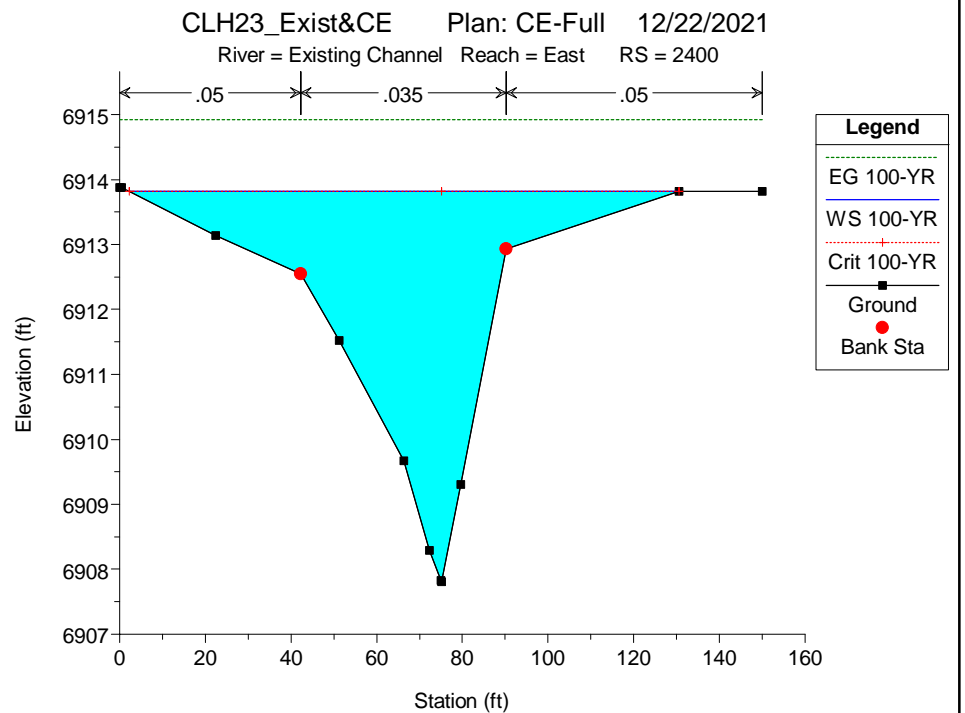
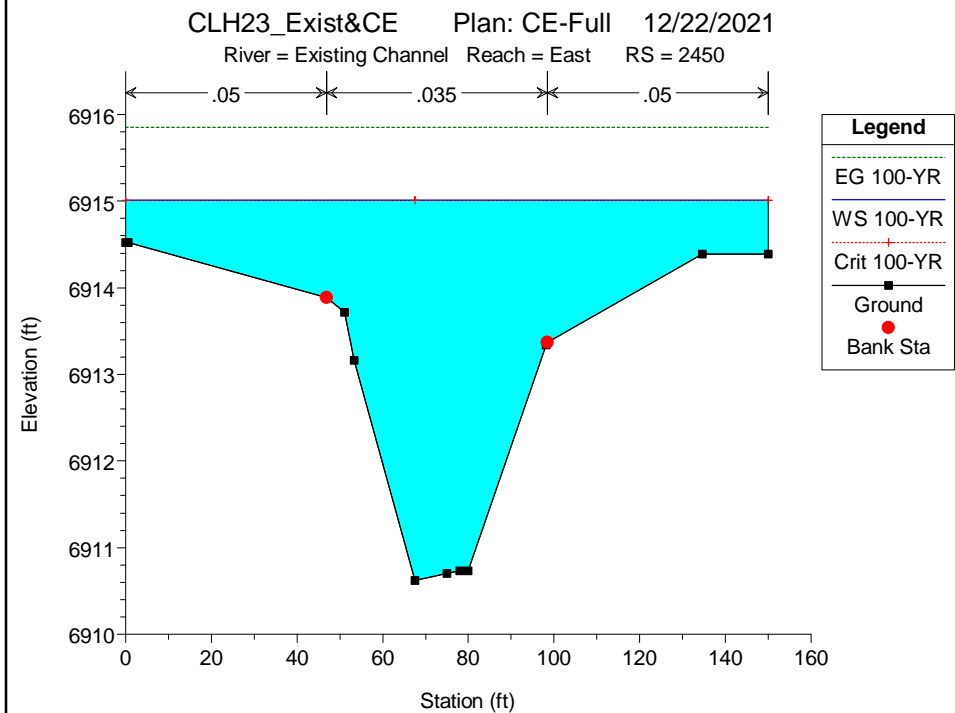
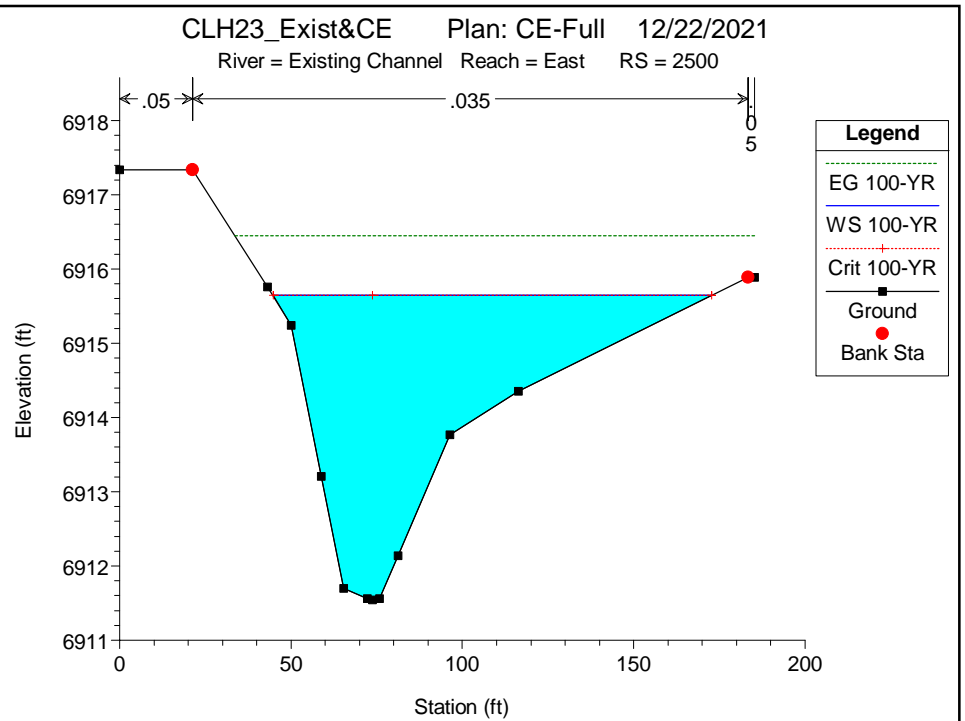
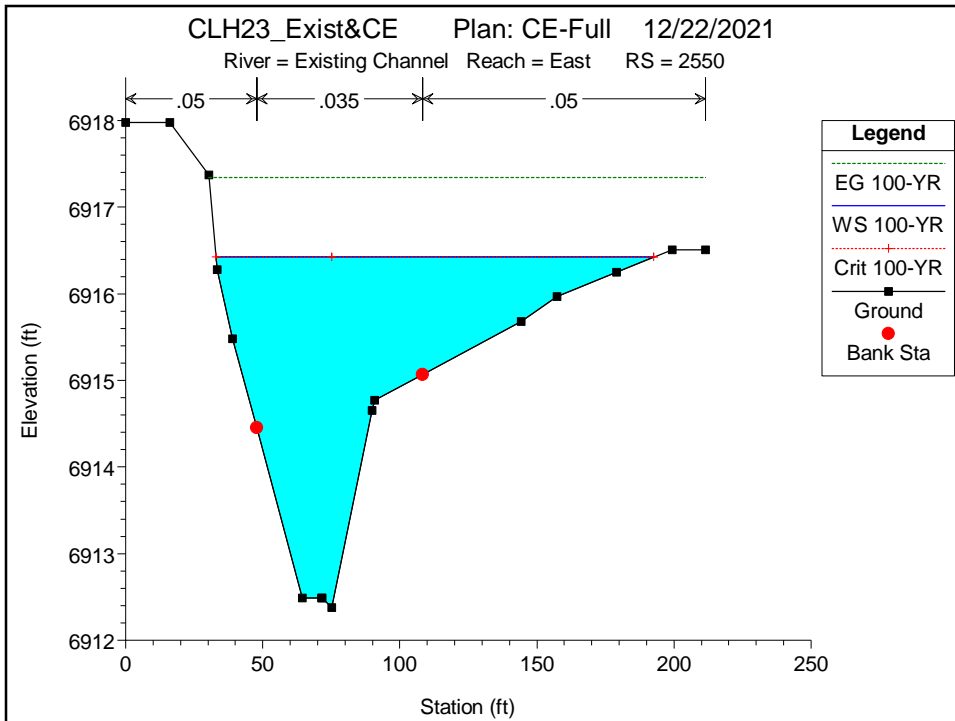


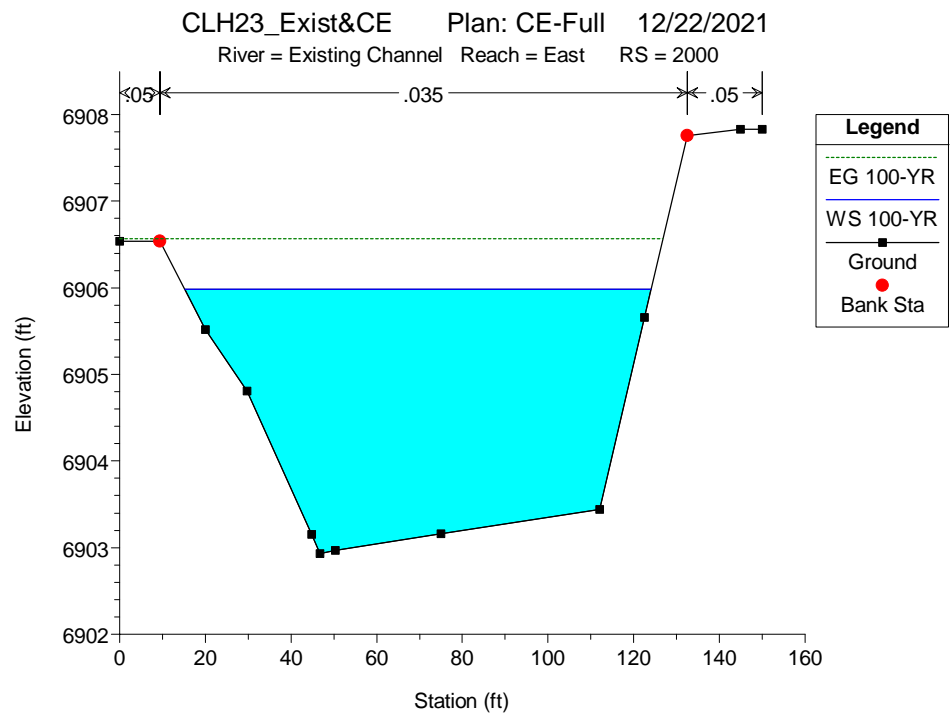
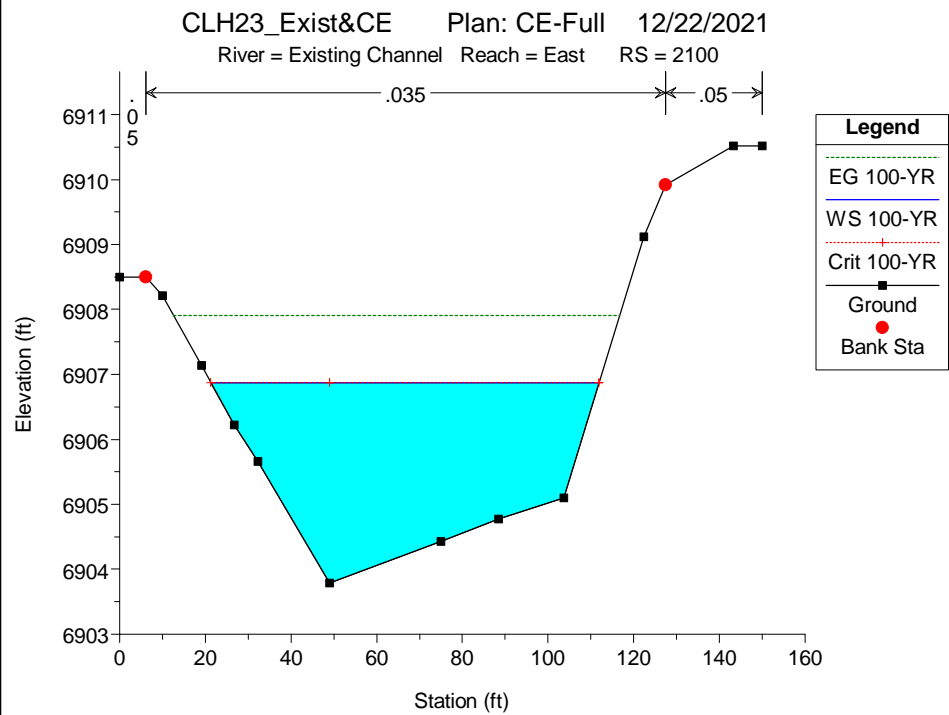
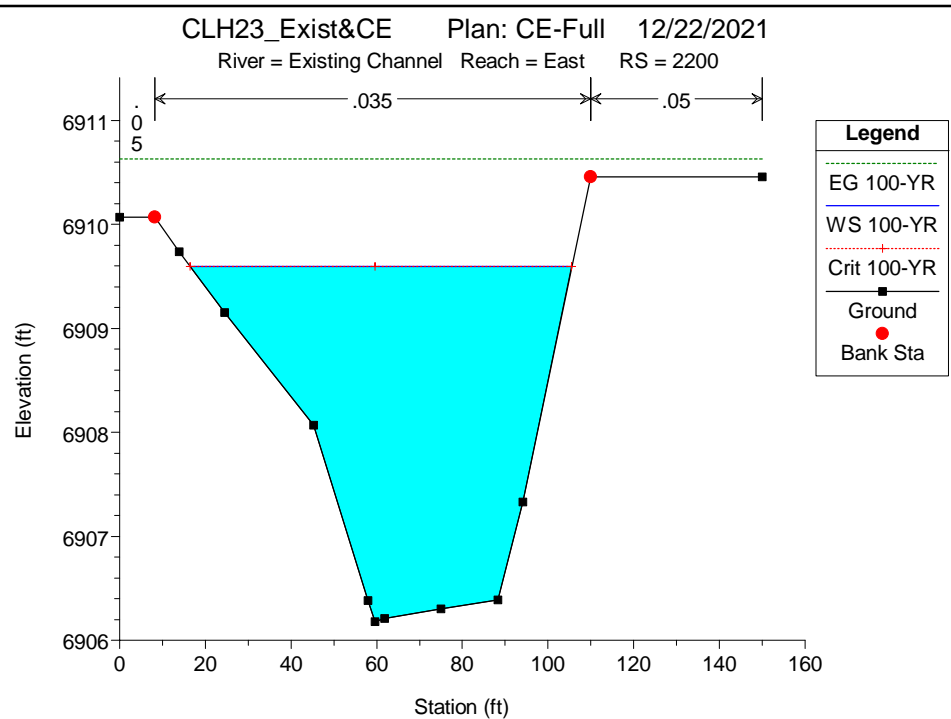
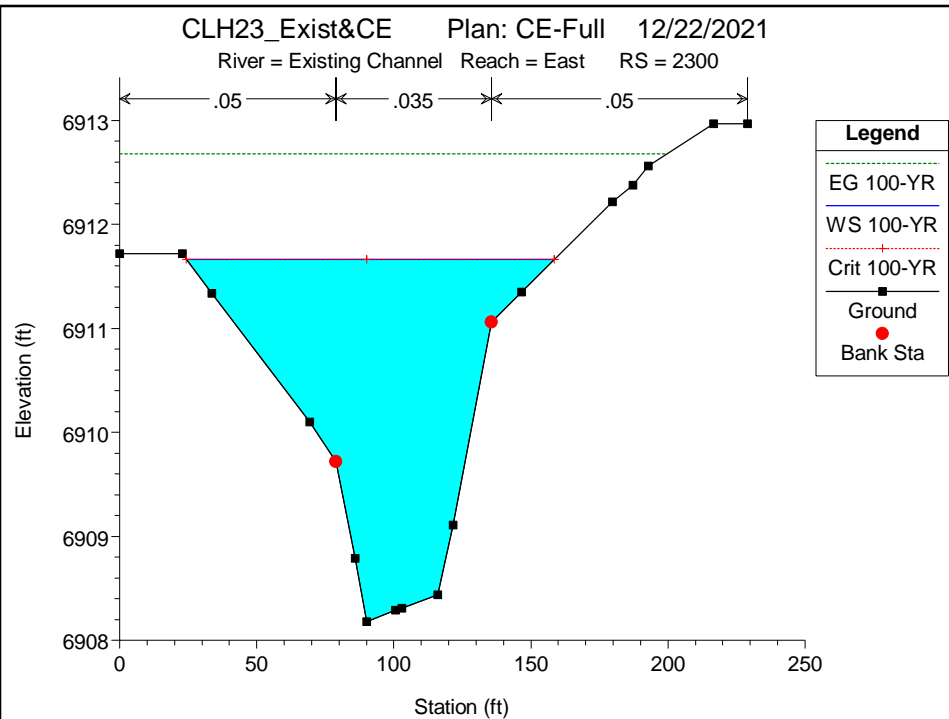


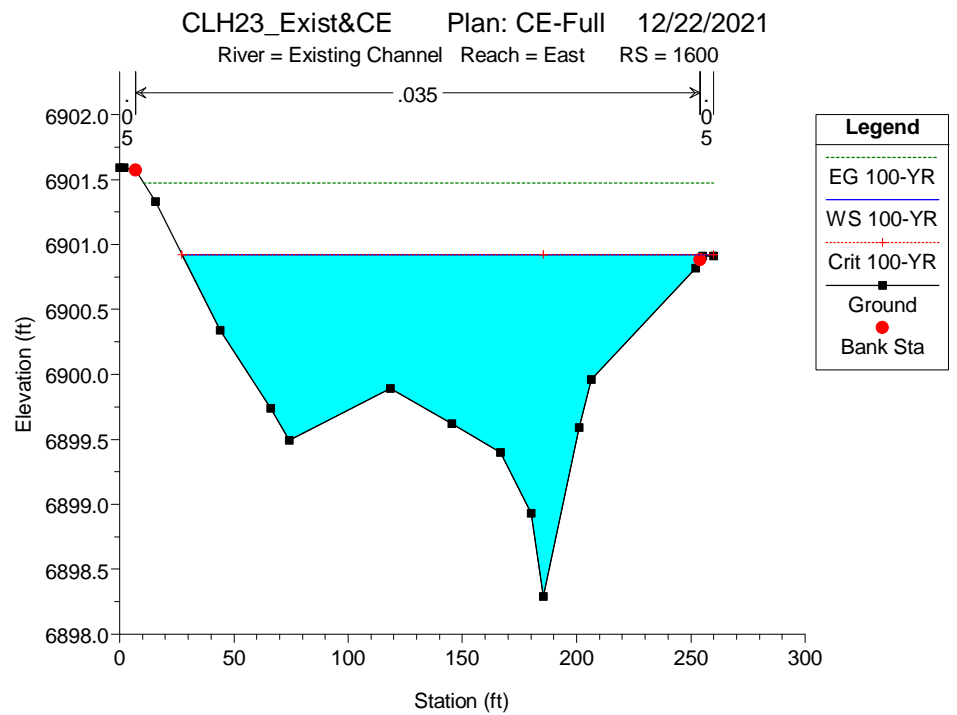
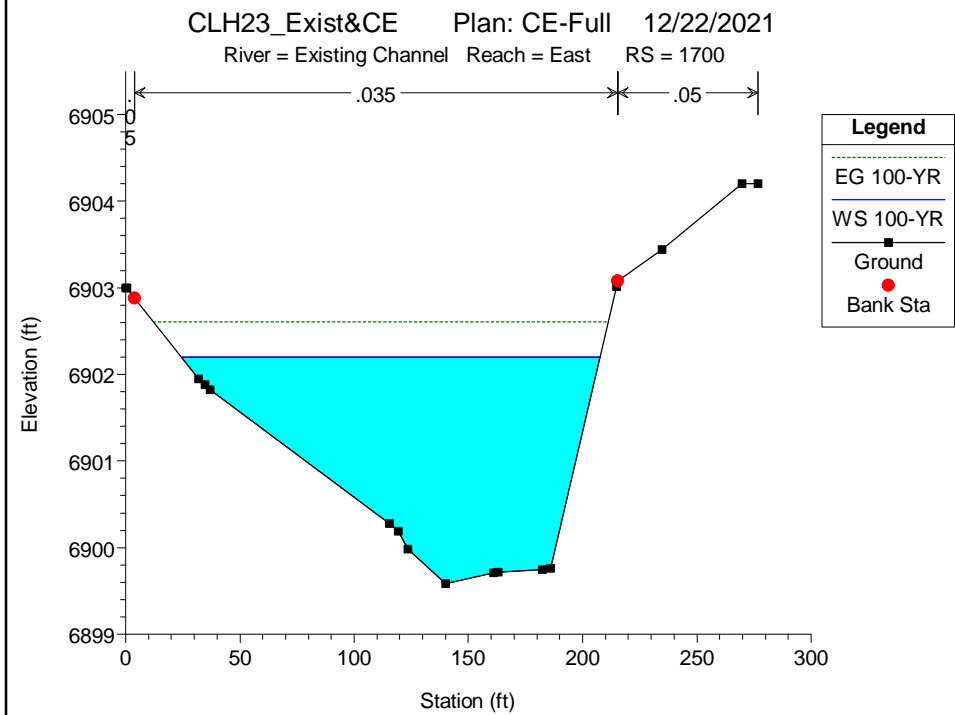
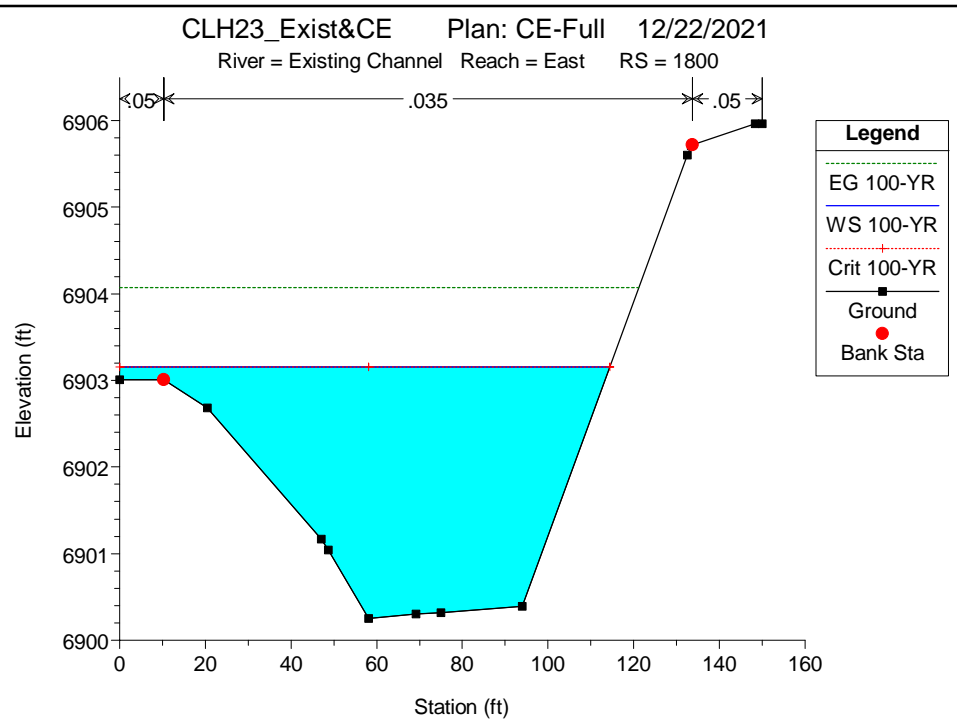
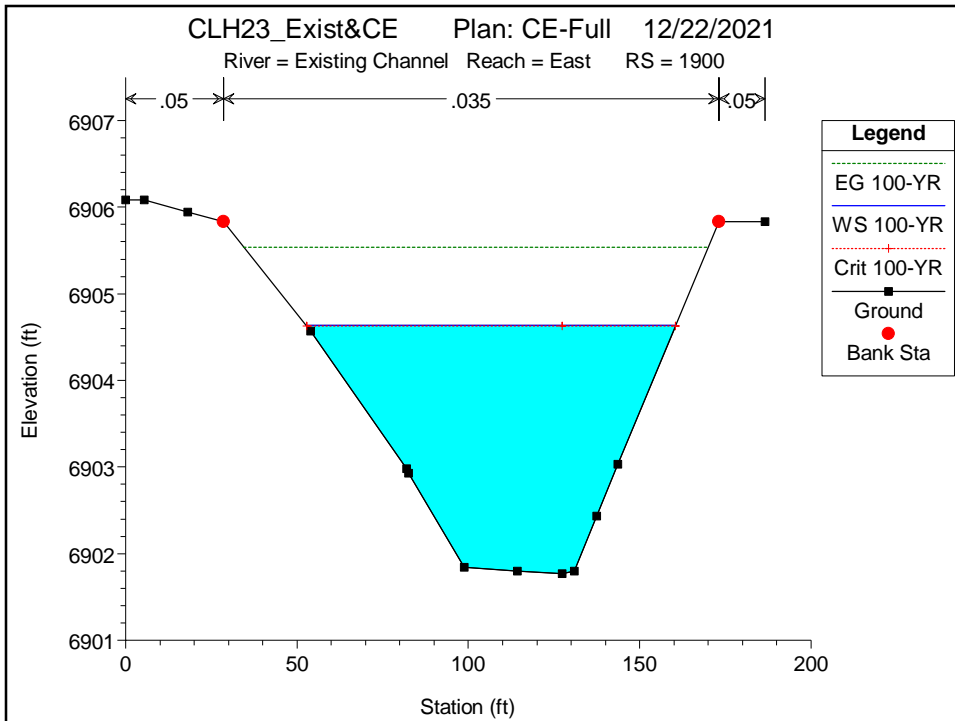


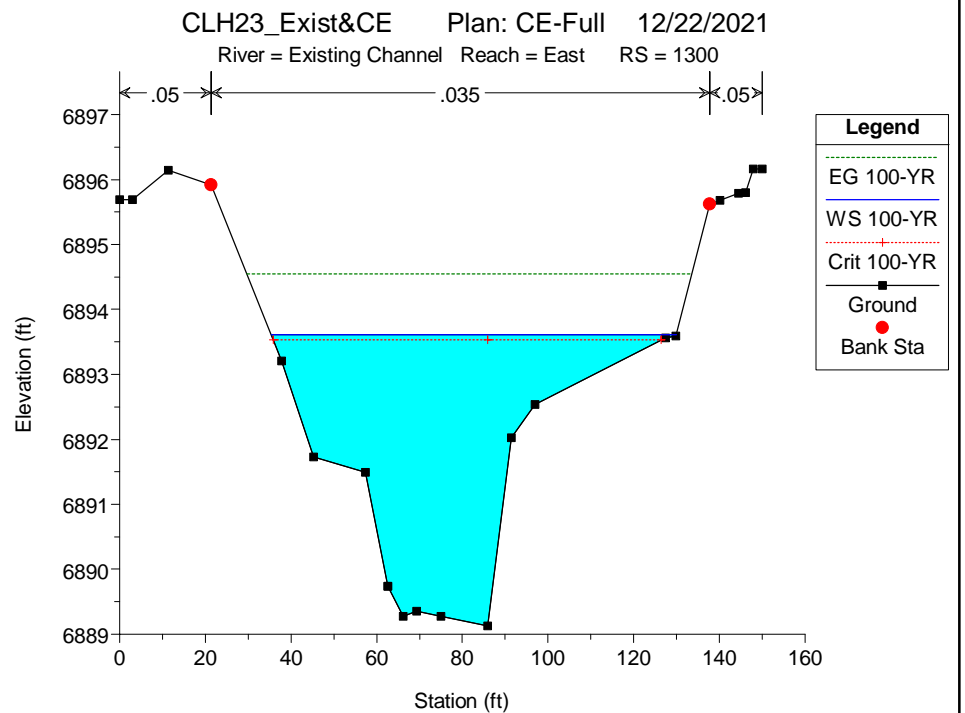
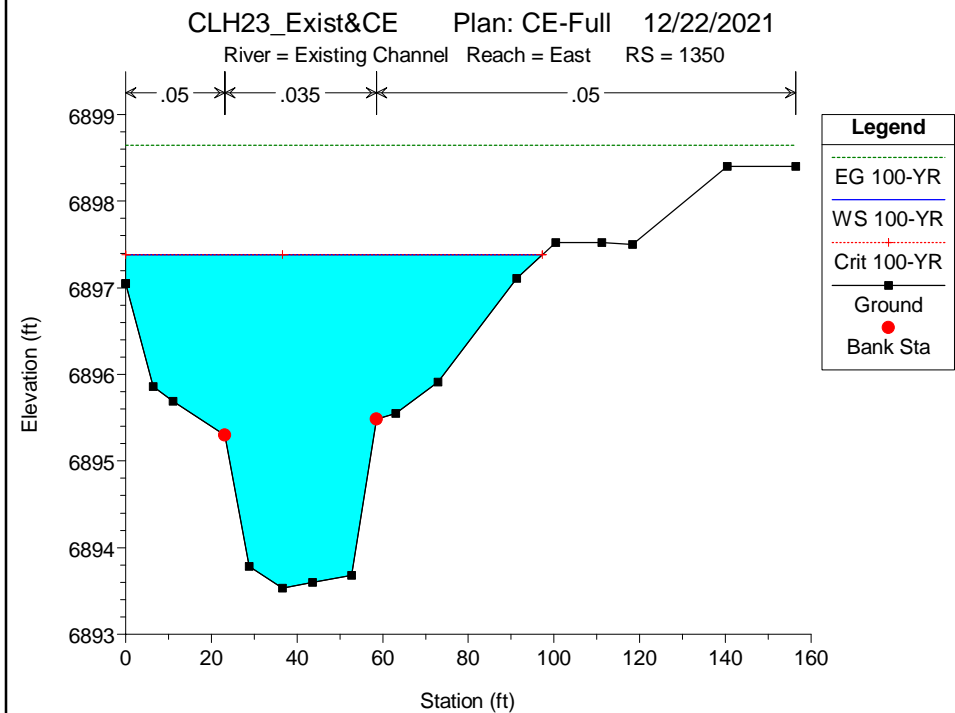
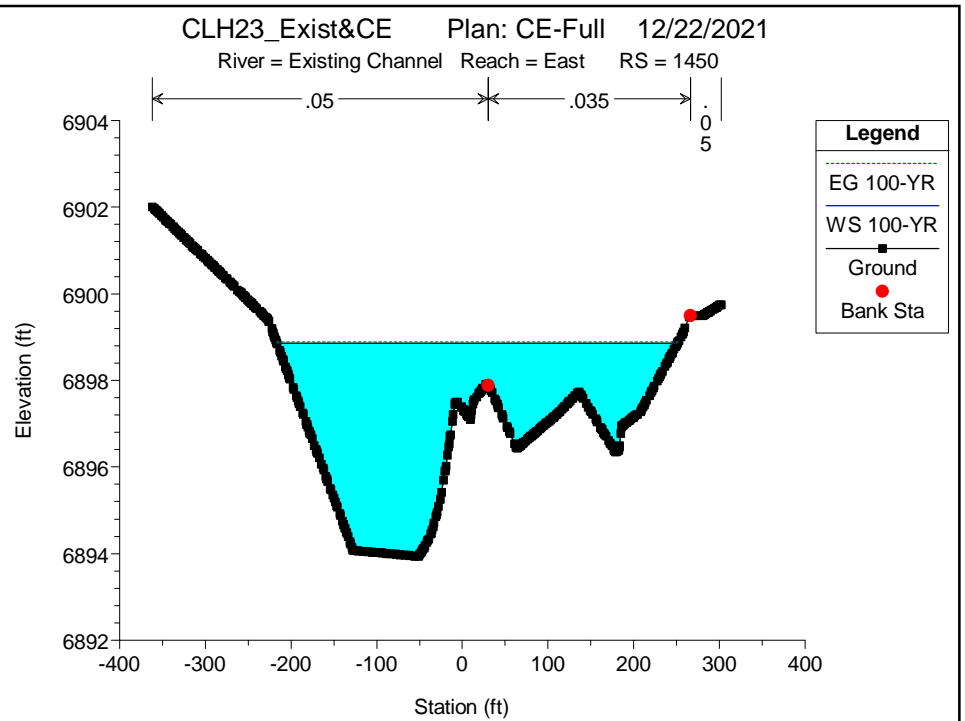
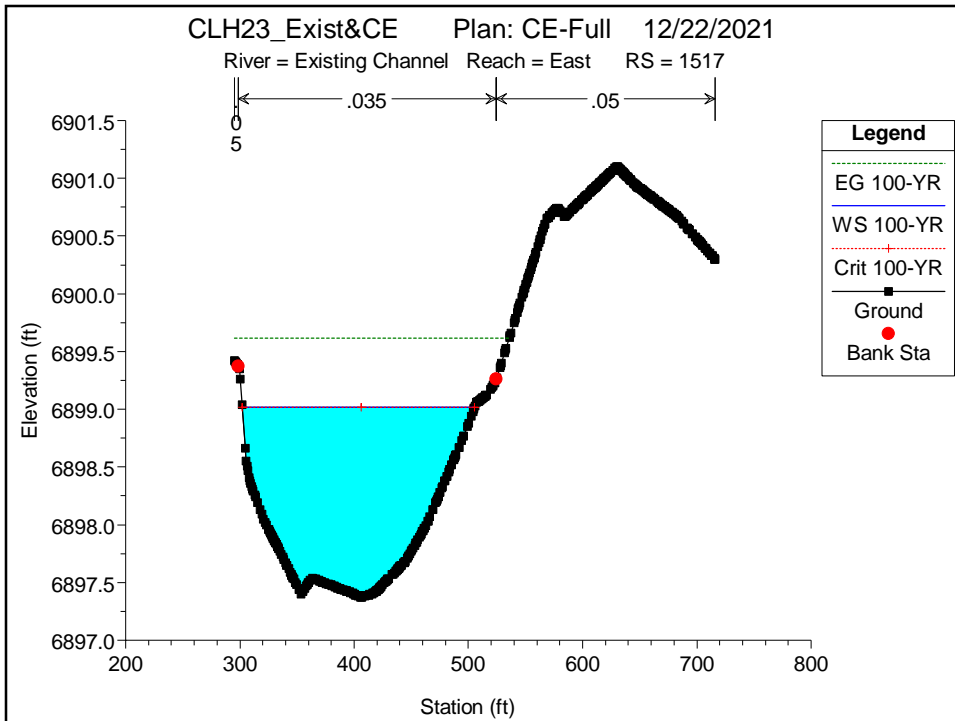


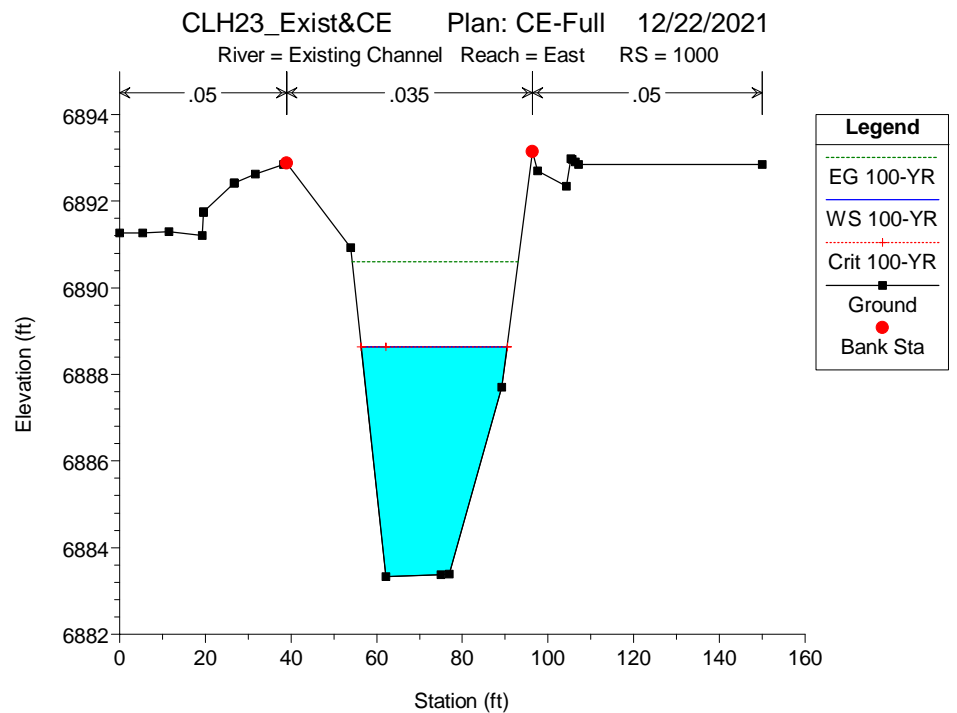
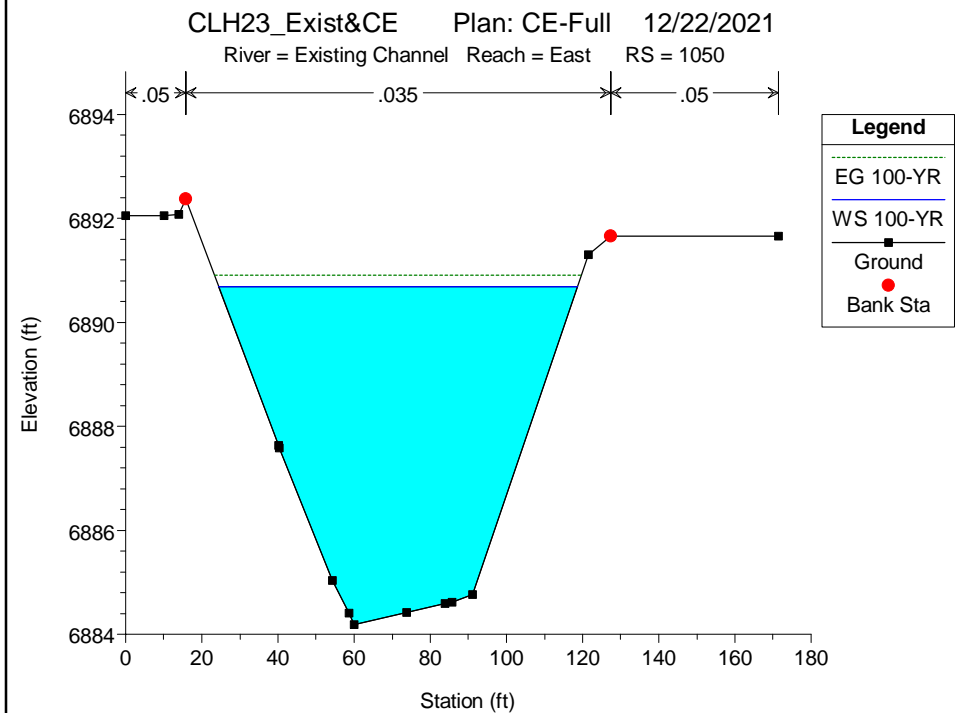
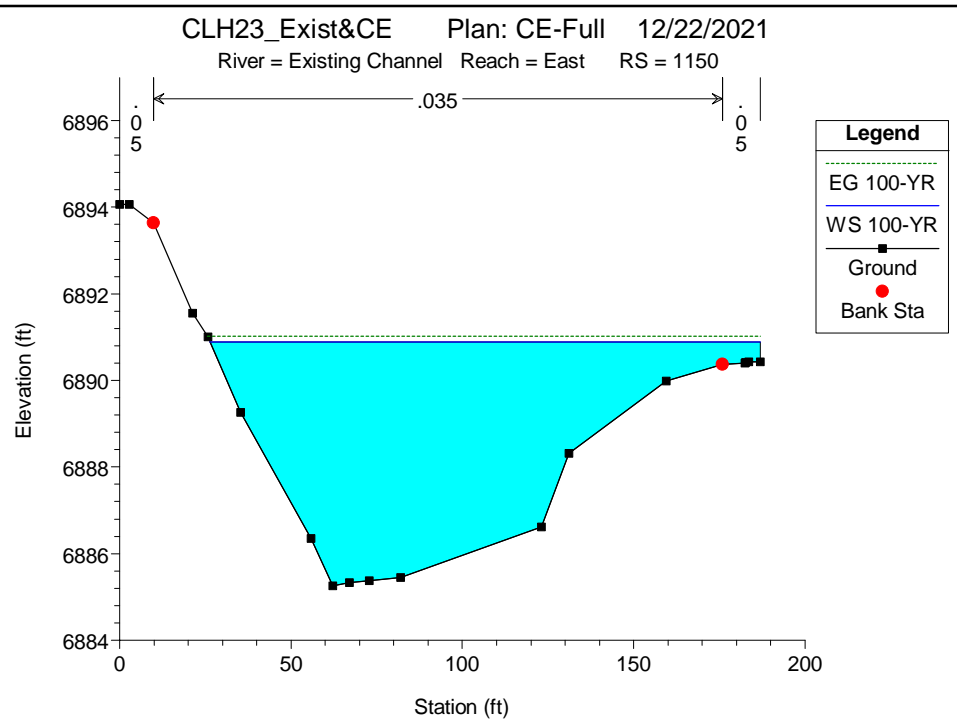
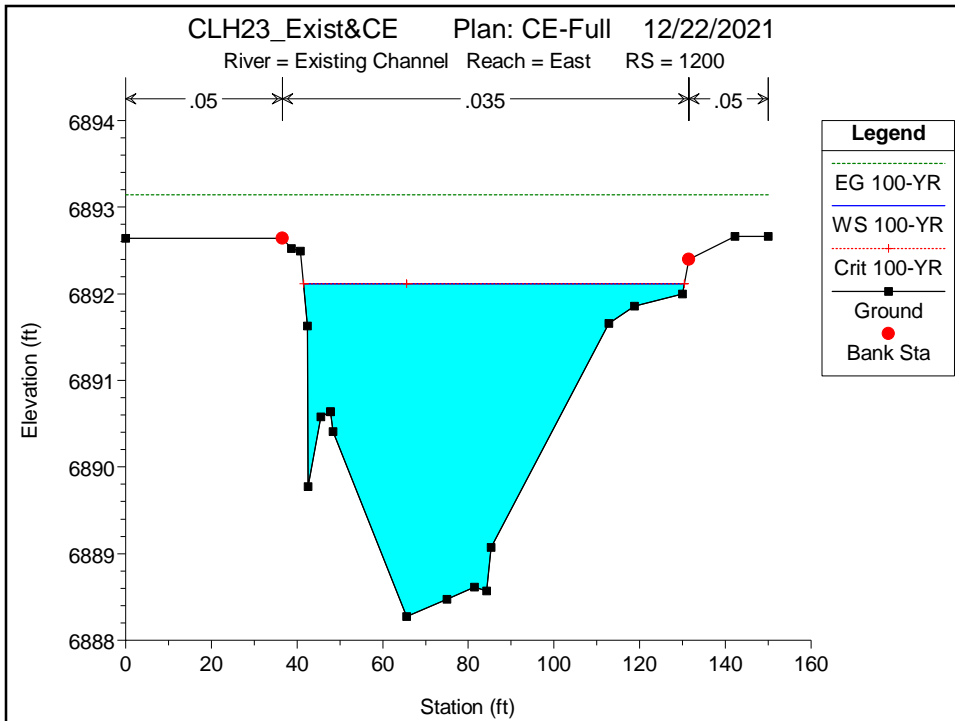












ATTACHMENT I
Pre-Project Model Results Table



Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
NCONFL-BGM	6057	100-YR	1000.00	6969.55	6973.72	6973.72	6975.04	0.018034	9.22	108.42	41.89	1.01
NCONFL-BGM	6007	100-YR	1000.00	6968.59	6973.23		6973.59	0.003560	4.83	206.96	63.16	0.47
NCONFL-BGM	5956	100-YR	1000.00	6968.41	6973.05		6973.42	0.003569	4.84	206.71	63.08	0.47
NCONFL-BGM	5906	100-YR	1000.00	6968.23	6972.88		6973.24	0.003560	4.83	206.93	63.14	0.47
NCONFL-BGM	5856	100-YR	1000.00	6968.06	6972.69		6973.06	0.003587	4.85	206.37	63.07	0.47
NCONFL-BGM	5806	100-YR	1000.00	6967.88	6972.51		6972.88	0.003593	4.85	206.26	63.05	0.47
NCONFL-BGM	5756	100-YR	1000.00	6967.71	6972.33		6972.70	0.003627	4.86	205.57	62.97	0.47
NCONFL-BGM	5706	100-YR	1000.00	6967.53	6972.15		6972.52	0.003639	4.87	205.30	62.93	0.48
NCONFL-BGM	5656	100-YR	1000.00	6967.36	6971.96		6972.33	0.003679	4.89	204.50	62.84	0.48
NCONFL-BGM	5606	100-YR	1000.00	6967.18	6971.78		6972.15	0.003714	4.91	203.80	62.74	0.48
NCONFL-BGM	5556	100-YR	1000.00	6967.01	6971.58		6971.96	0.003780	4.94	202.53	62.58	0.48
NCONFL-BGM	5506	100-YR	1000.00	6966.83	6971.39		6971.77	0.003827	4.96	201.62	62.46	0.49
NCONFL-BGM	5456	100-YR	1000.00	6966.66	6971.19		6971.58	0.003926	5.01	199.78	62.23	0.49
NCONFL-BGM	5406	100-YR	1000.00	6966.48	6970.98		6971.38	0.004028	5.05	197.92	61.98	0.50
NCONFL-BGM	5356	100-YR	1000.00	6966.31	6970.76		6971.17	0.004186	5.12	195.23	61.65	0.51
NCONFL-BGM	5306	100-YR	1000.00	6966.13	6970.54		6970.96	0.004370	5.20	192.23	61.51	0.52
NCONFL-BGM	5256	100-YR	1000.00	6965.96	6970.29		6970.73	0.004680	5.33	187.54	60.64	0.53
NCONFL-BGM	5206	100-YR	1000.00	6965.78	6970.01		6970.48	0.005121	5.51	181.57	59.85	0.56
NCONFL-BGM	5156	100-YR	1000.00	6965.61	6969.67		6970.20	0.006003	5.83	171.53	58.50	0.60
NCONFL-BGM	5106	100-YR	1000.00	6965.43	6969.18		6969.84	0.008144	6.50	153.79	56.00	0.69
NCONFL-BGM	5088	100-YR	1000.00	6965.37	6968.83	6968.41	6969.65	0.011018	7.24	138.13	53.75	0.80
NCONFL-BGM	5083	100-YR	1000.00	6965.35	6968.38	6968.38	6969.54	0.018231	8.65	115.56	50.25	1.01
NCONFL-BGM	5072	100-YR	1000.00	6962.72	6965.75	6965.75	6966.92	0.018224	8.65	115.58	50.25	1.01
NCONFL-BGM	5062	100-YR	1000.00	6960.10	6964.00		6964.60	0.007164	6.22	160.71	56.76	0.65
NCONFL-BGM	5056	100-YR	1000.00	6960.08	6963.97		6964.56	0.007096	6.19	161.57	57.13	0.65
NCONFL-BGM	5006	100-YR	1000.00	6959.90	6963.81		6964.19	0.005112	5.27	230.73	127.77	0.55
NCONFL-BGM	4955	100-YR	1000.00	6959.72	6962.68	6962.68	6963.66	0.019315	7.93	126.09	65.58	1.01
NCONFL-BGM	4900	100-YR	1450.00	6956.08	6960.79	6960.79	6961.95	0.013751	8.63	167.98	72.94	1.00
NCONFL-BGM	4850	100-YR	1450.00	6954.44	6959.58	6959.58	6960.85	0.011886	9.09	164.84	76.61	0.96
NCONFL-BGM	4750	100-YR	1450.00	6952.25	6957.61	6957.61	6958.68	0.009513	8.52	197.20	106.64	0.87
NCONFL-BGM	4650	100-YR	1450.00	6950.54	6955.70	6955.70	6956.99	0.009615	9.40	181.50	89.06	0.89
NCONFL-BGM	4600	100-YR	1450.00	6949.23	6954.15	6954.15	6955.50	0.011109	9.36	162.85	72.45	0.94
NCONFL-BGM	4550	100-YR	1450.00	6947.92	6954.07	6953.08	6954.72	0.004367	6.54	245.57	120.32	0.61
NCONFL-BGM	4500	100-YR	1450.00	6947.90	6952.81	6952.81	6954.22	0.012766	9.55	152.99	63.02	0.99
NCONFL-BGM	4400	100-YR	1450.00	6945.00	6949.07	6948.94	6950.40	0.011001	9.29	158.71	56.31	0.94
NCONFL-BGM	4300	100-YR	1450.00	6944.70	6948.29	6947.84	6949.23	0.007971	7.78	188.38	66.98	0.80
NCONFL-BGM	4275	100-YR	1450.00	6944.60	6947.78	6947.78	6949.05	0.013610	9.03	160.56	64.47	1.01
NCONFL-BGM	4250	100-YR	1450.00	6939.95	6943.08	6943.08	6944.38	0.012851	9.19	159.61	63.34	0.99
NCONFL-BGM	4212.47	100-YR	1450.00	6937.01	6943.68		6943.85	0.000760	3.40	443.50	98.79	0.27
NCONFL-BGM	4200	100-YR	1450.00	6936.87	6943.62		6943.82	0.000677	3.55	408.59	108.11	0.26
NCONFL-BGM	4151.92	100-YR	1450.00	6936.82	6943.43		6943.79	0.001073	4.84	299.84	90.43	0.33
NCONFL-BGM	4150	100-YR	1450.00	6936.78	6943.33	6940.13	6943.76	0.000177	5.31	276.92	83.75	0.37
NCONFL-BGM	4073		Culvert									
NCONFL-BGM	4010.56	100-YR	1450.00	6936.40	6939.94	6939.76	6941.45	0.001399	9.87	149.14	42.54	0.93
NCONFL-BGM	4001.57	100-YR	1450.00	6936.38	6940.28		6941.06	0.005502	7.09	205.72	68.34	0.68
NCONFL-BGM	4000	100-YR	1450.00	6936.28	6939.59	6939.45	6940.73	0.011364	8.54	169.70	79.70	0.93
NCONFL-BGM	3900	100-YR	1450.00	6936.02	6939.36		6939.87	0.005695	5.75	257.56	122.54	0.65
NCONFL-BGM	3850	100-YR	1450.00	6935.31	6938.84		6939.51	0.008202	6.58	220.49	97.40	0.77
NCONFL-BGM	3800	100-YR	1450.00	6934.35	6937.95	6937.95	6938.94	0.014759	7.95	182.42	94.05	1.01
NCONFL-BGM	3694	100-YR	1482.00	6931.81	6935.53	6935.35	6936.24	0.010872	6.76	219.11	115.41	0.87
NCONFL-BGM	3600	100-YR	1482.00	6930.58	6934.13	6934.13	6935.02	0.015245	7.59	195.35	111.22	1.01
NCONFL-BGM	3500	100-YR	1482.00	6928.80	6933.06		6933.52	0.004225	5.39	274.81	99.77	0.57
NCONFL-BGM	3450	100-YR	1482.00	6927.99	6931.95	6931.95	6933.09	0.013780	8.59	172.56	75.61	1.00
NCONFL-BGM	3350	100-YR	1482.00	6926.42	6930.26	6930.26	6931.20	0.014757	7.76	190.87	102.92	1.01
NCONFL-BGM	3300	100-YR	1482.00	6924.78	6929.52	6929.14	6930.36	0.008680	7.34	202.85	89.96	0.81
NCONFL-BGM	3250	100-YR	1482.00	6923.75	6928.66	6928.57	6929.81	0.012179	8.63	172.72	77.97	0.96
NCONFL-BGM	3200	100-YR	1482.00	6923.28	6927.88	6927.88	6929.18	0.012816	9.12	164.00	69.79	0.99
NCONFL-BGM	3150	100-YR	1482.00	6923.15	6926.80	6926.80	6928.02	0.011701	8.89	173.92	89.73	0.95
NCONFL-BGM	3100	100-YR	1482.00	6921.99	6925.61	6925.61	6926.83	0.013162	8.86	168.32	77.51	0.99
NCONFL-BGM	3050	100-YR	1482.00	6921.38	6925.73		6926.31	0.004324	6.12	250.03	97.99	0.60
NCONFL-BGM	3000	100-YR	1482.00	6920.36	6924.59	6924.59	6925.73	0.013102	9.05	198.96	133.53	1.00
NCONFL-BGM	2900	100-YR	1482.00	6919.31	6923.13	6923.13	6924.13	0.009768	8.43	216.67	125.57	0.88
NCONFL-BGM	2800	100-YR	1482.00	6917.18	6921.86	6921.86	6922.91	0.007828	8.65	224.60	139.68	0.81
NCONFL-BGM	2650	100-YR	1482.00	6913.71	6919.18	6919.18	6919.89	0.005569	7.53	323.45	268.13	0.69
NCONFL-BGM	2605	100-YR	1482.00	6912.88	6918.10	6918.10	6918.83	0.006506	7.36	295.36	255.68	0.72
NCONFL-BGM	2550	100-YR	1482.00	6912.38	6916.58	6916.58	6917.36	0.008613	7.70	256.77	166.76	0.82
NCONFL-BGM	2500	100-YR	1482.00	6911.54	6915.86	6915.86	6916.81	0.008681	8.47	234.75	140.20	0.84
NCONFL-BGM	2450	100-YR	1482.00	6910.68	6915.01	6915.01	6915.97	0.008539	8.28	225.43	138.27	0.83
NCONFL-BGM	2400	100-YR	1482.00	6907.81	6913.81	6913.81	6914.92	0.008583	8.69	204.38	127.31	0.83
NCONFL-BGM	2300	100-YR	1482.00	6908.18	6911.66	6911.66	6912.68	0.010554	8.51	213.90	134.11	0.91
NCONFL-BGM	2200	100-YR	1482.00	6906.18	6909.60	6909.60	6910.63	0.014318	8.14	181.98	89.19	1.01
NCONFL-BGM	2100	100-YR	1482.00	6903.79	6906.88	6906.88	6907.90	0.014434	8.11	182.69	90.71	1.01
NCONFL-BGM	2000	100-YR	1482.00	6902.93	6905.98		6906.56	0.007214	6.13	241.81	108.71	0.72
NCONFL-BGM	1900	100-YR	1482.00	6901.77	6904.64	6904.63	6905.54	0.014585	7.59	195.23	108.14	1.00
NCONFL-BGM	1800	100-YR	1482.00	6900.25	6903.16	6903.16	6904.08	0.014520	7.69	193.61	114.37	1.00
NCONFL-BGM	1700	100-YR	1482.00	6899.58	6902.20		6902.60	0.007750	5.09	291.40	183.40	0.71
NCONFL-BGM	1600	100-YR	1482.00	6898.29	6900.92	6900.92	6901.47	0.017355	5.95	249.16	229.12	1.00
NCONFL-BGM	1517	100-YR	1482.00	6897.37	6900.13		6900.27	0.001829	3.03	500.36	256.40	0.36
NCONFL-BGM	1474	Ex. Drop Crest	100-YR	6897.10	6899.26	6899.26	6900.02	0.020626	7.00	211.81	142.62	1.01
NCONFL-BGM	1453	Ex. Drop Toe	100-YR	6893.69	6898.55		6899.01	0.008216	5.44	272.58	125.01	0.65
NCONFL-BGM	1428	100-YR	1482.00	6893.40	6898.10		6898.75	0.011000	6.47	228.90	128.68	0.86
NCONFL-BGM	1386	100-YR	1482.00	6892.51	6897.90		6898.33	0.006512	5.25	282.47	152.05	0.67
NCONFL-BGM	1329	Ex. Drop Top	100-YR	6892.85	6896.96	6896.96	6897.79	0.012085	7.39	212.91	149.10	0.92
NCONFL-BGM	1317	Ex. Drop Toe	100-YR	6889.26	6893.98	6893.75	6894.80	0.010956	7.27	203.73	96.01	0.88
NCONFL-BGM	1286	100-YR	1482.00	6889.05	6893.72		6894.45	0.009902	6.82	217.37	104.86	0.83

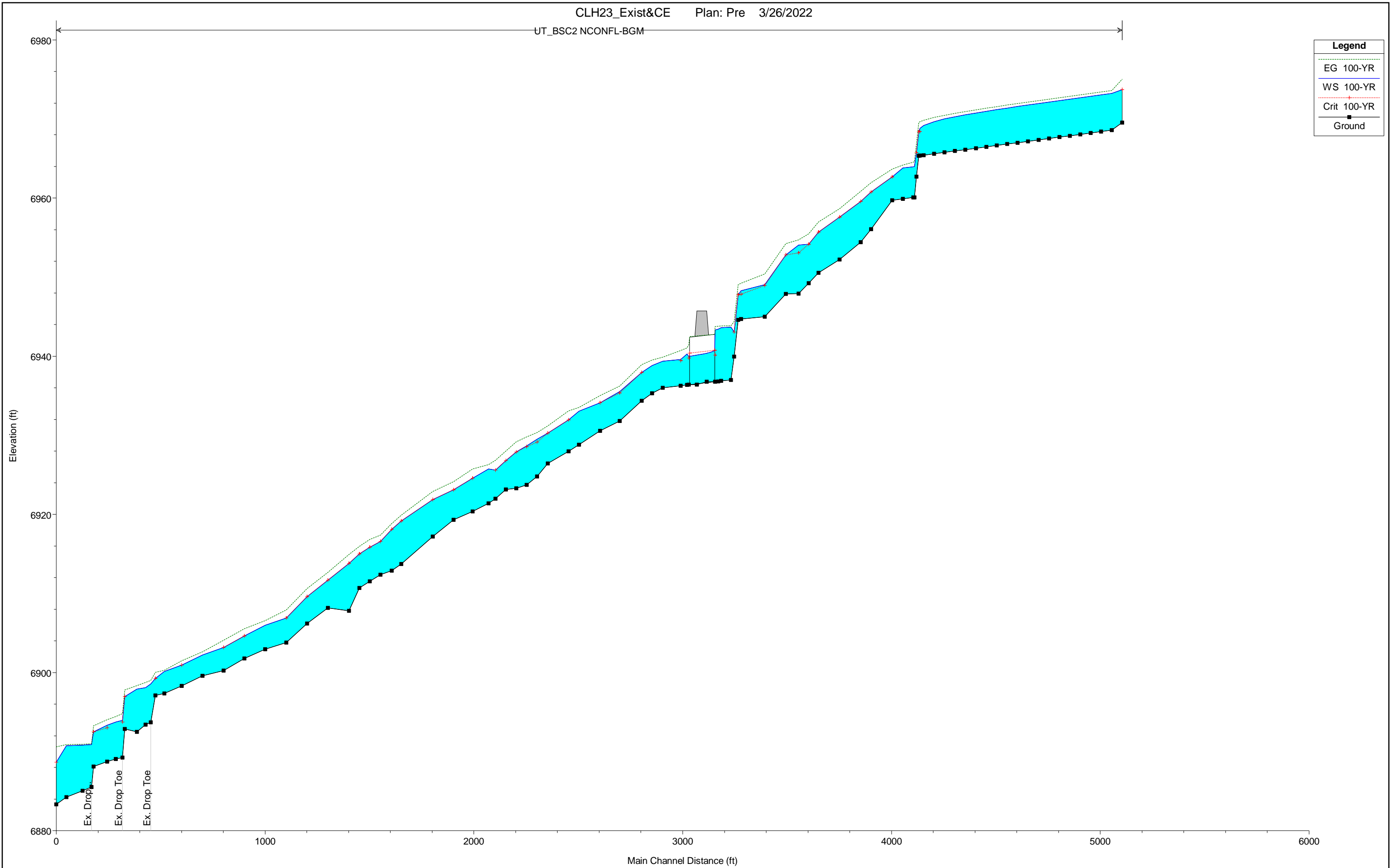
HEC-RAS Plan: Pre River: UT_BSC2 Reach: NCONFL-BGM Profile: 100-YR (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
NCONFL-BGM	1243	100-YR	1482.00	6888.75	6893.35	6893.02	6894.03	0.009078	6.59	224.85	106.90	0.80
NCONFL-BGM	1179 Ex. Drop Top	100-YR	1482.00	6888.12	6892.48	6892.48	6893.27	0.015379	7.15	207.16	129.58	1.00
NCONFL-BGM	1169 Ex. Drop Toe	100-YR	1482.00	6885.50	6890.87		6890.98	0.000817	2.66	563.25	192.89	0.26
NCONFL-BGM	1126	100-YR	1482.00	6885.05	6890.81		6890.94	0.000843	2.96	510.34	157.18	0.27
NCONFL-BGM	1050	100-YR	1482.00	6884.24	6890.74		6890.88	0.000796	2.94	503.45	129.74	0.26
NCONFL-BGM	1000	100-YR	1482.00	6883.33	6888.64	6888.64	6890.60	0.012887	11.22	132.13	34.10	1.00

ATTACHMENT J
Pre-Project Water Surface Profiles

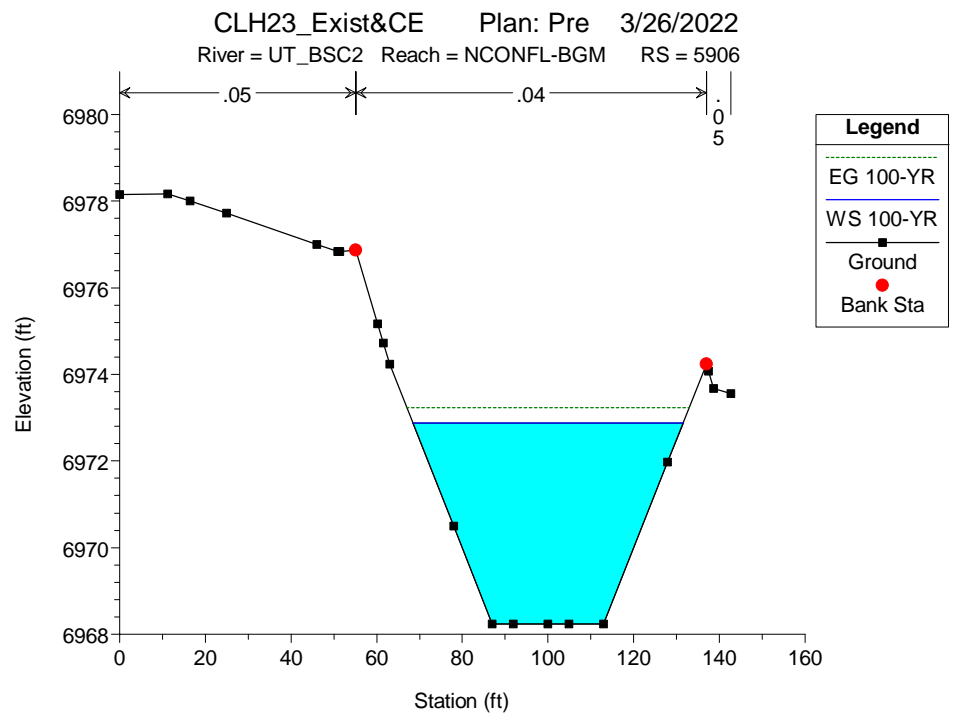
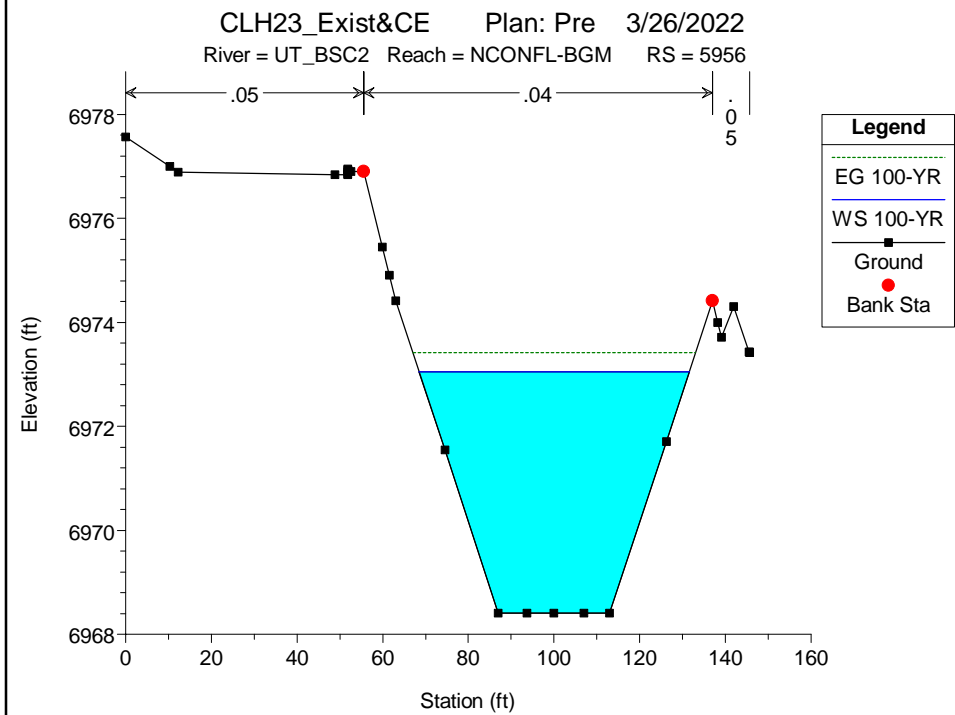
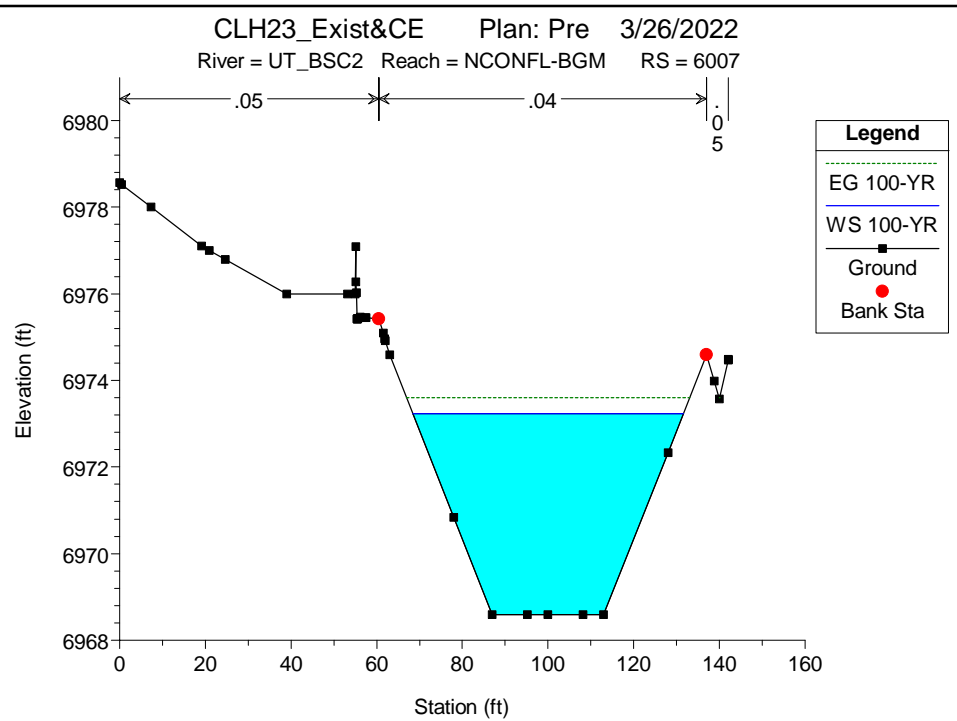
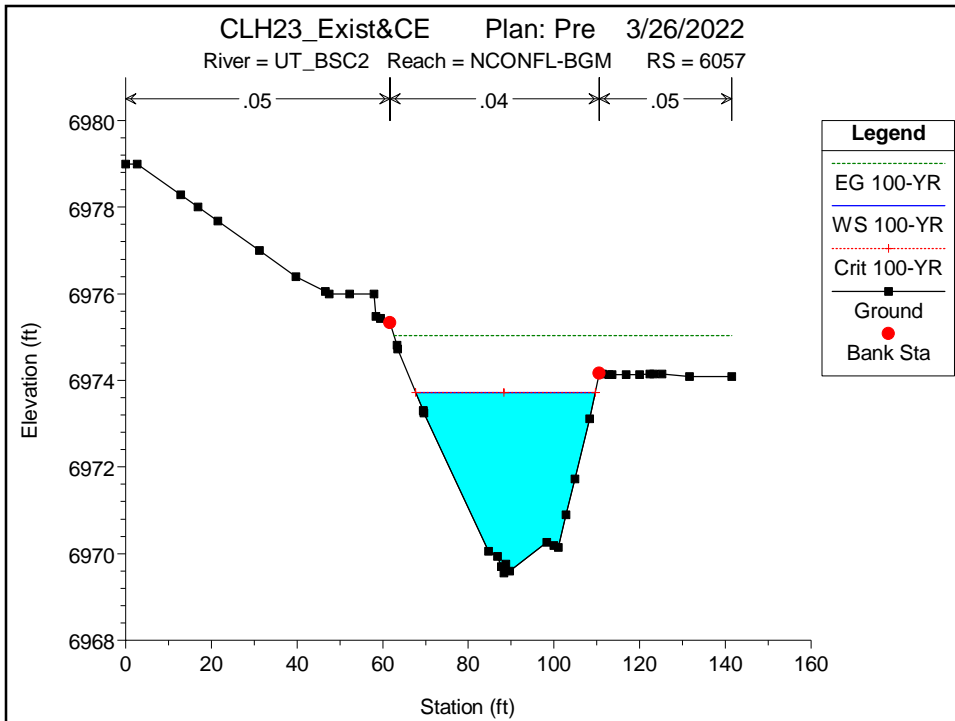


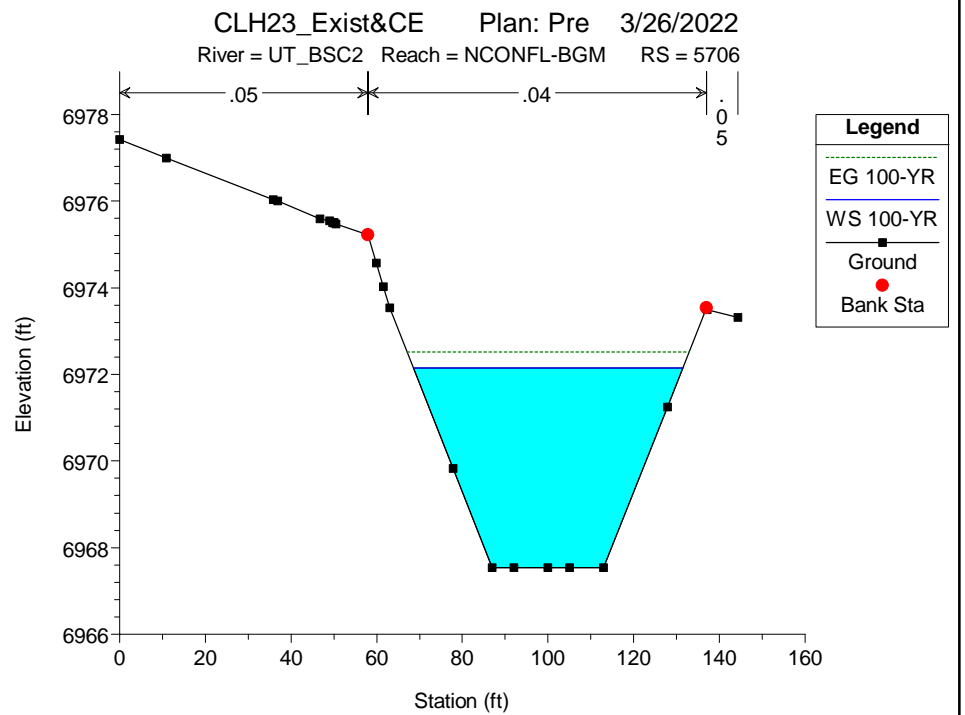
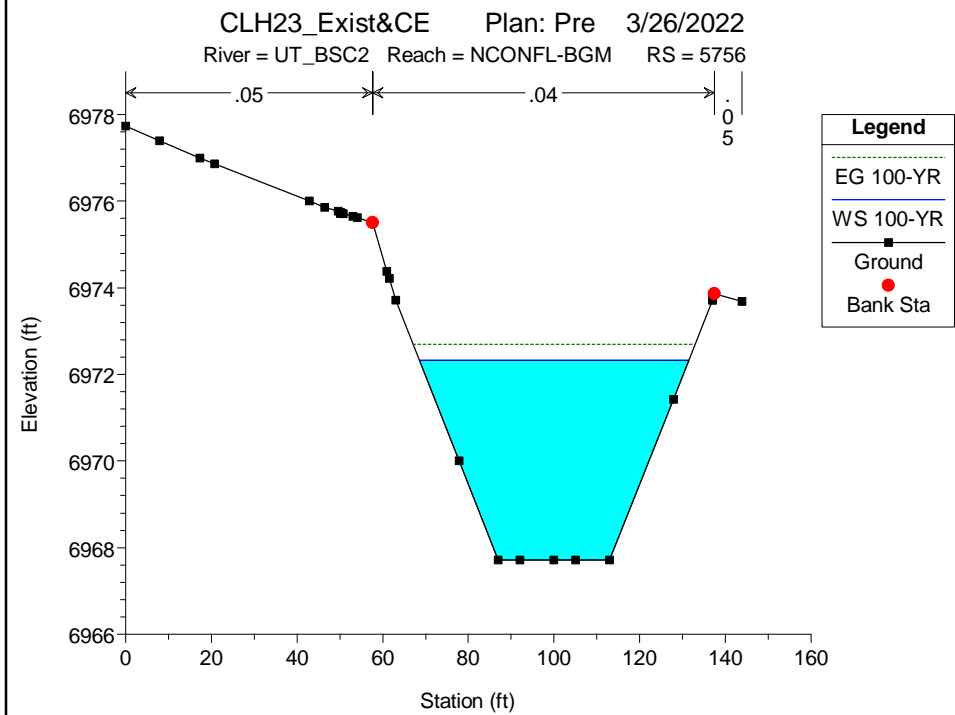
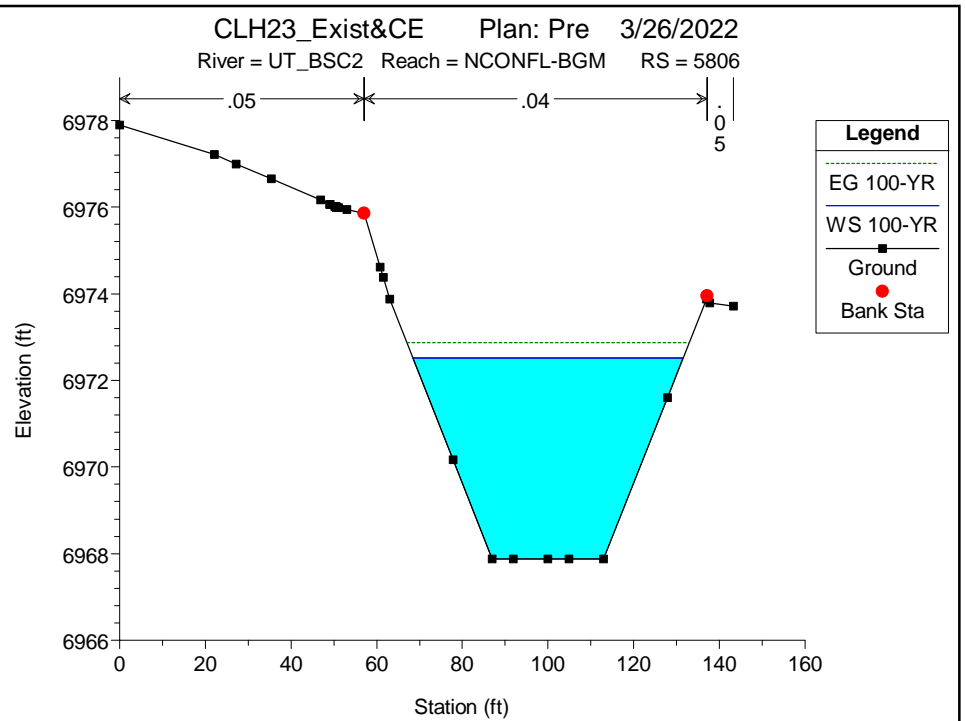
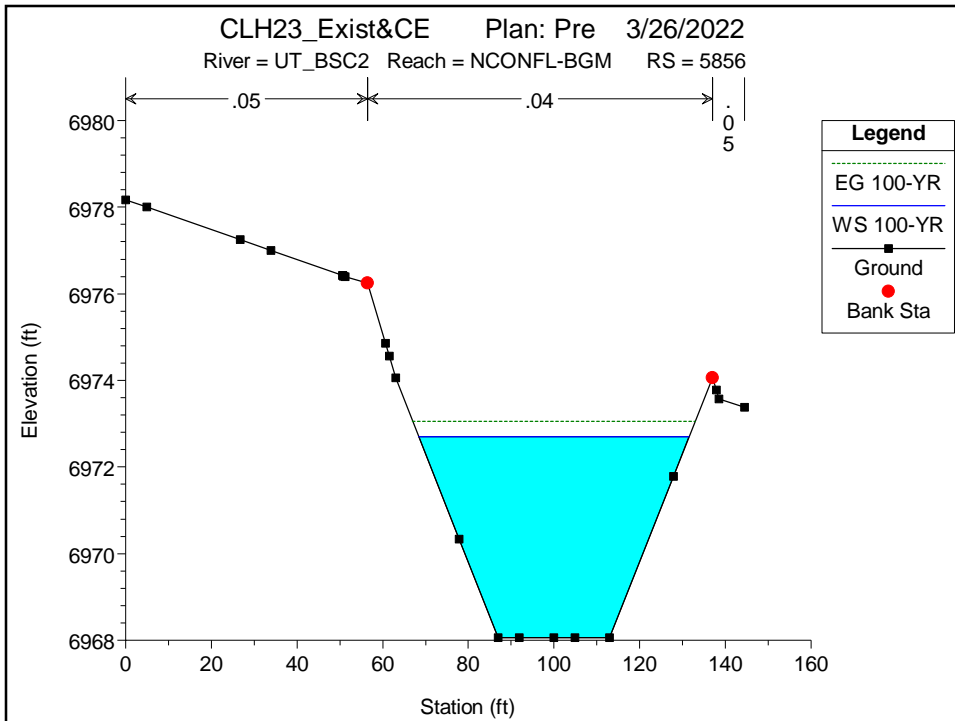
Legend	
EG 100-YR	
WS 100-YR	
Crit 100-YR	
Ground	

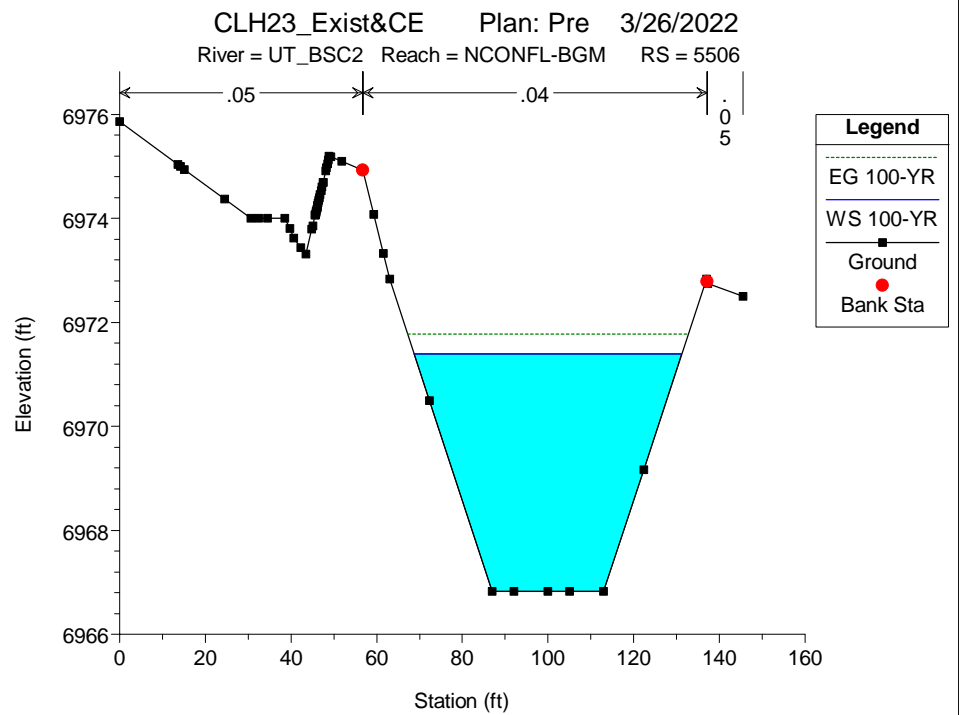
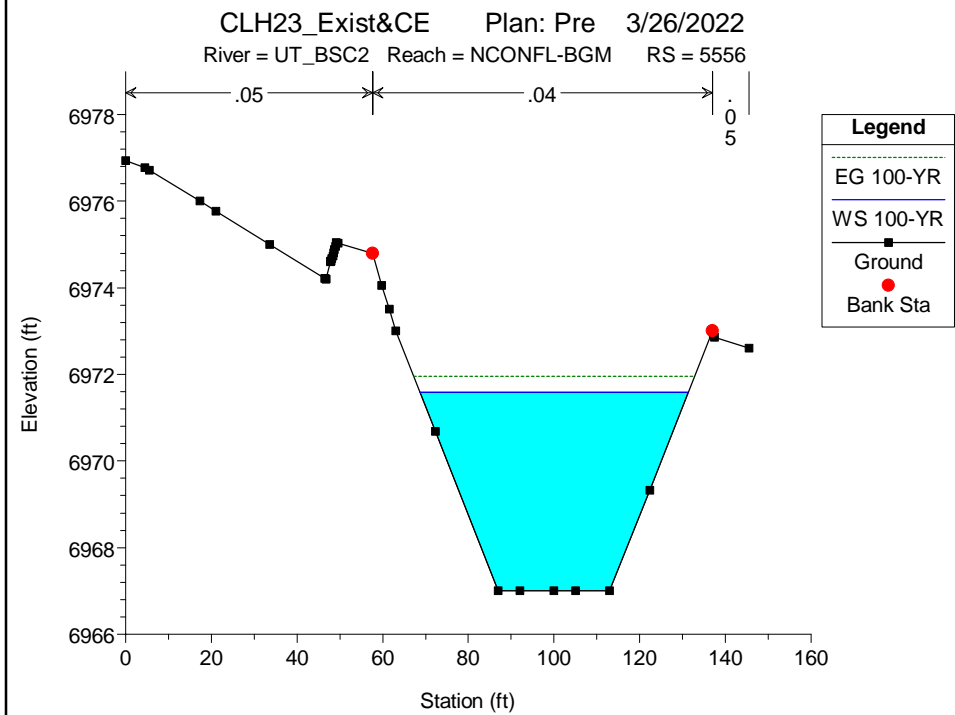
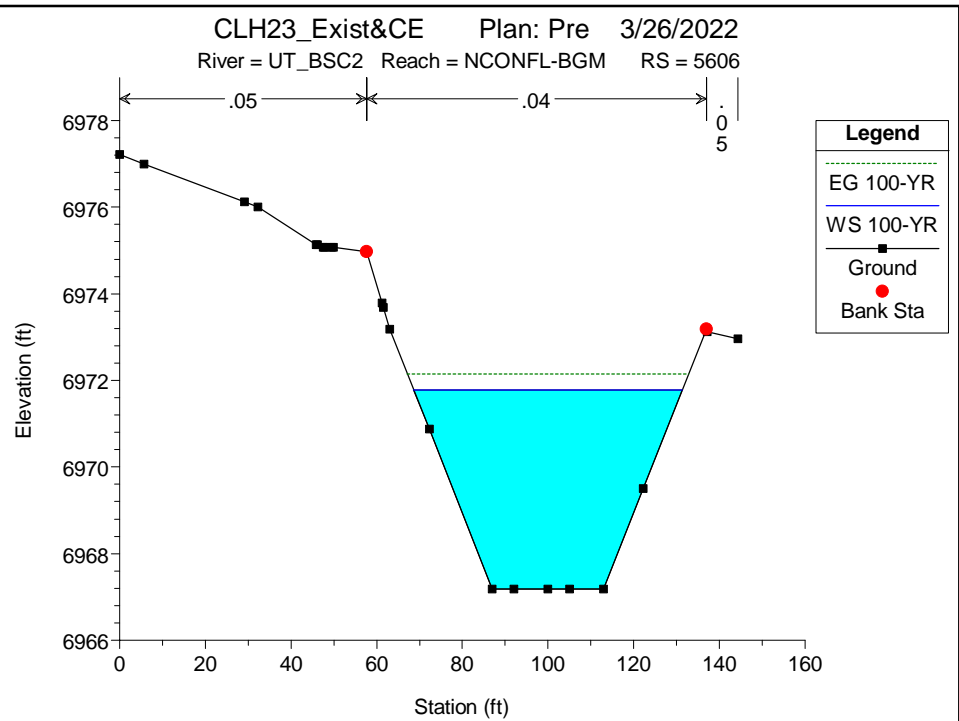
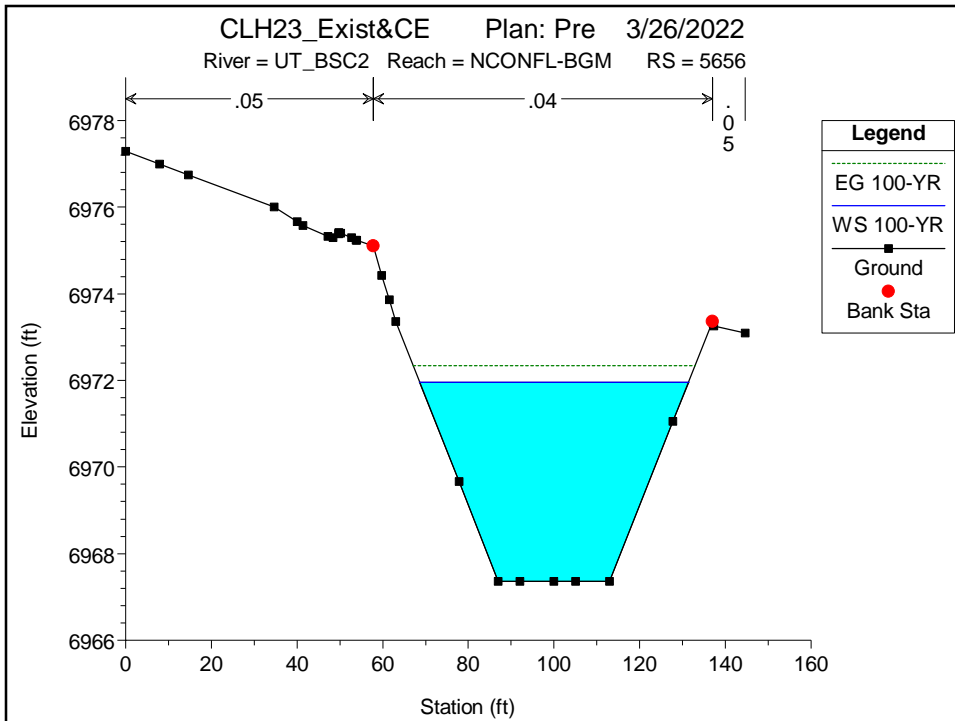


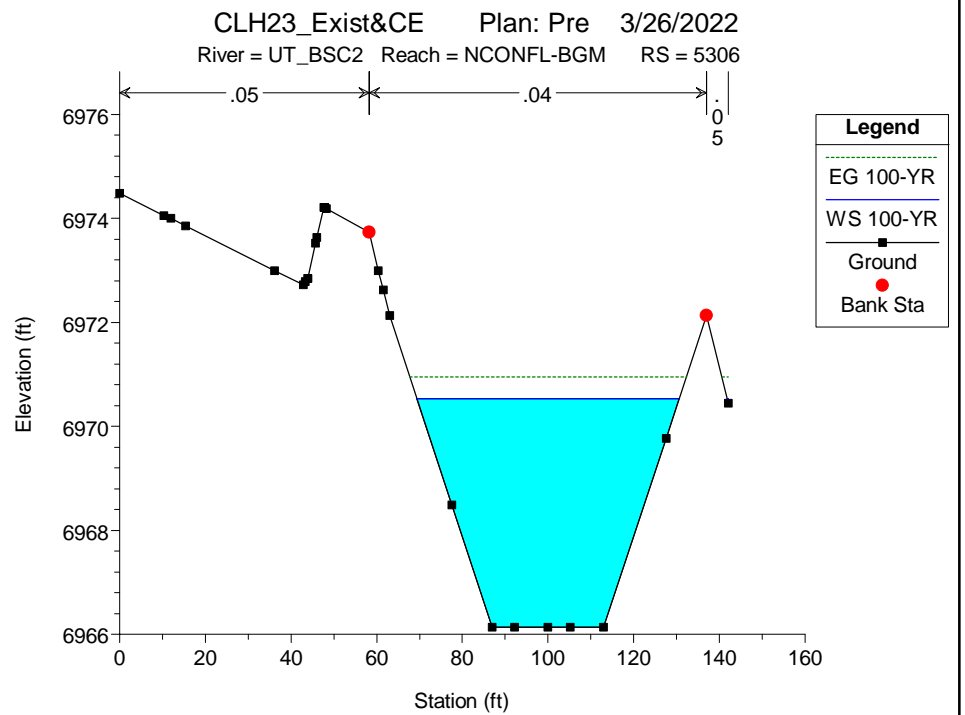
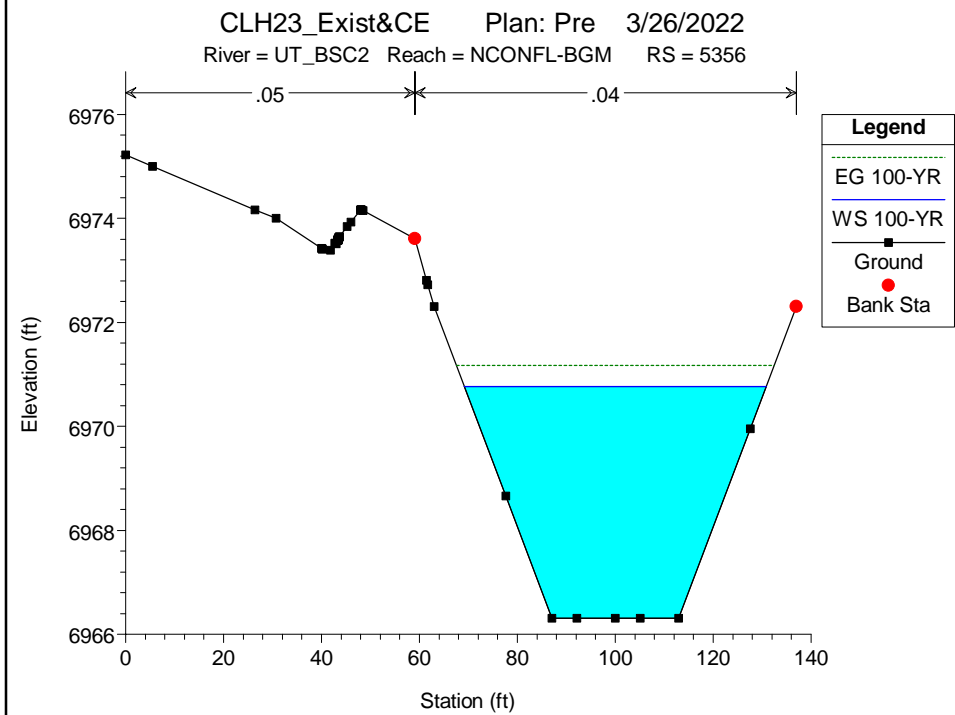
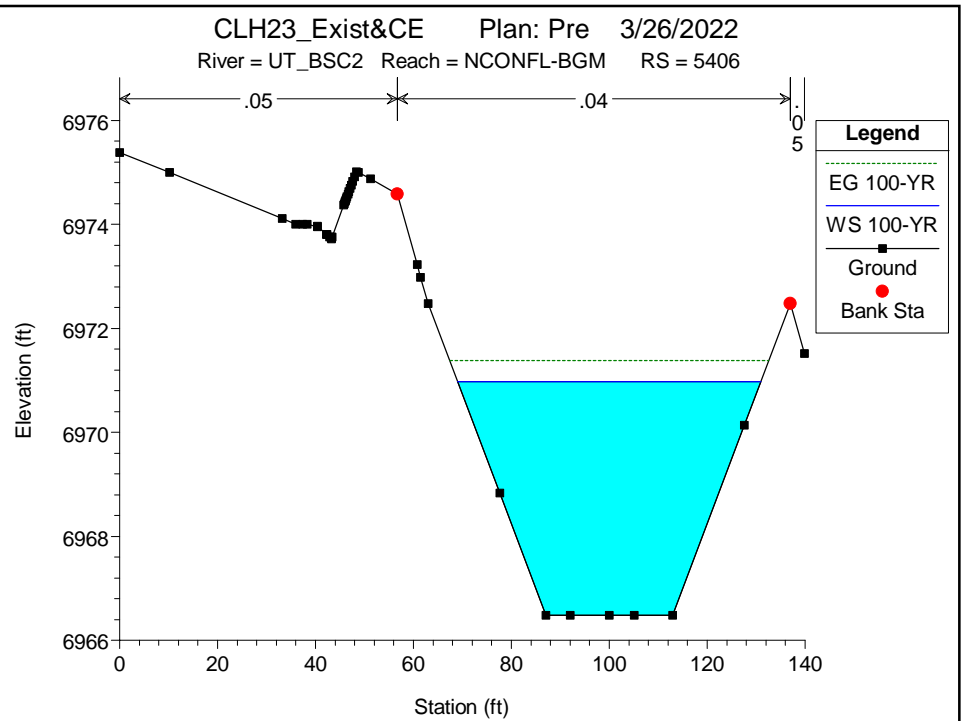
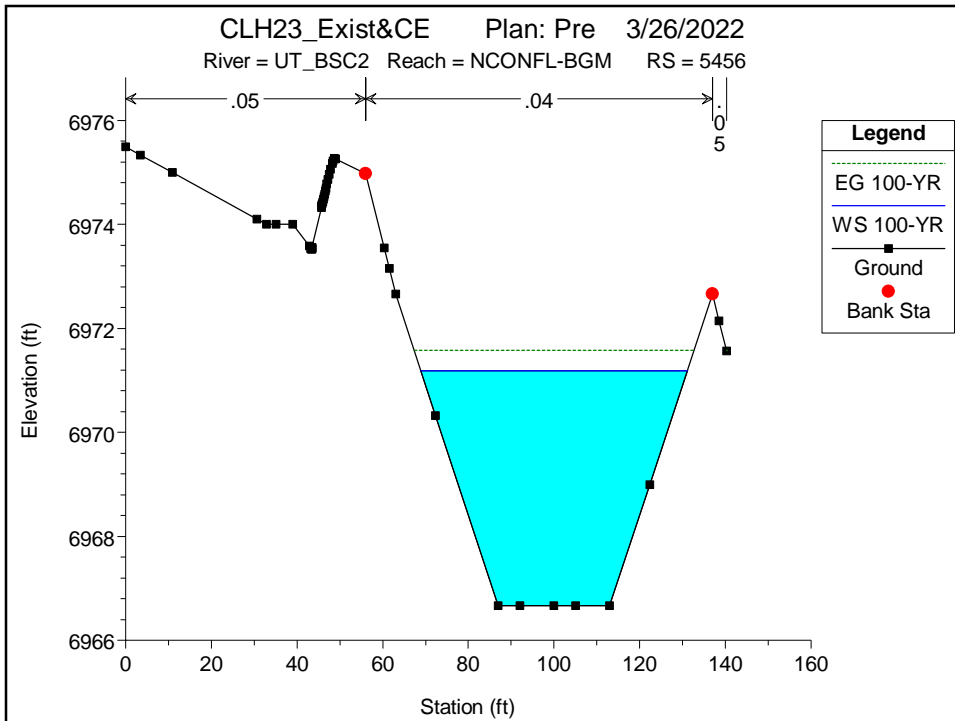
ATTACHMENT K
Pre-Project Cross Sections

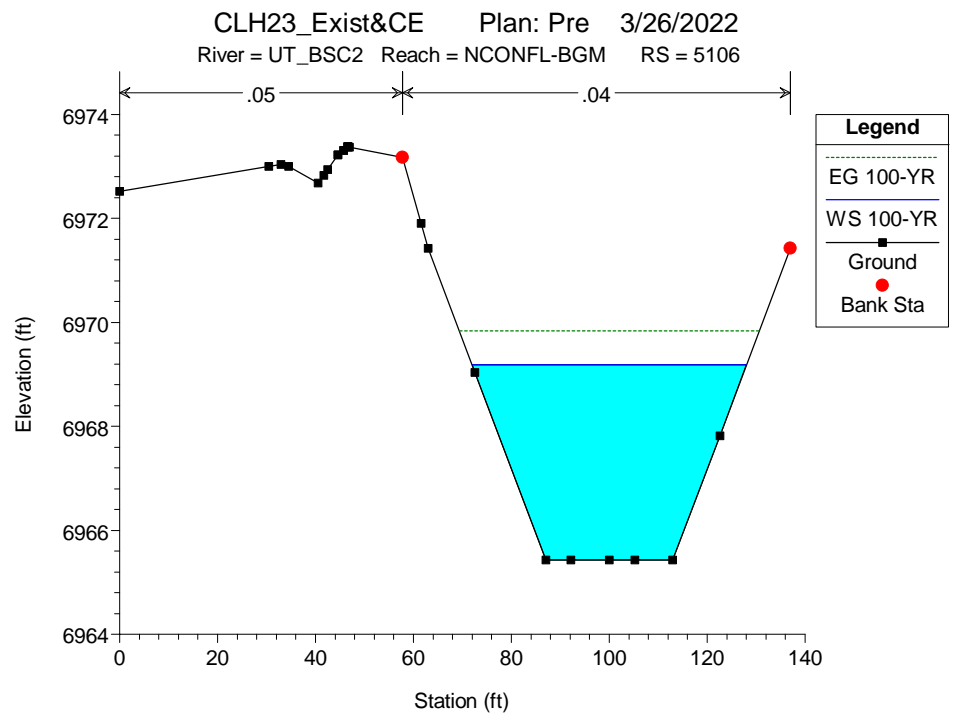
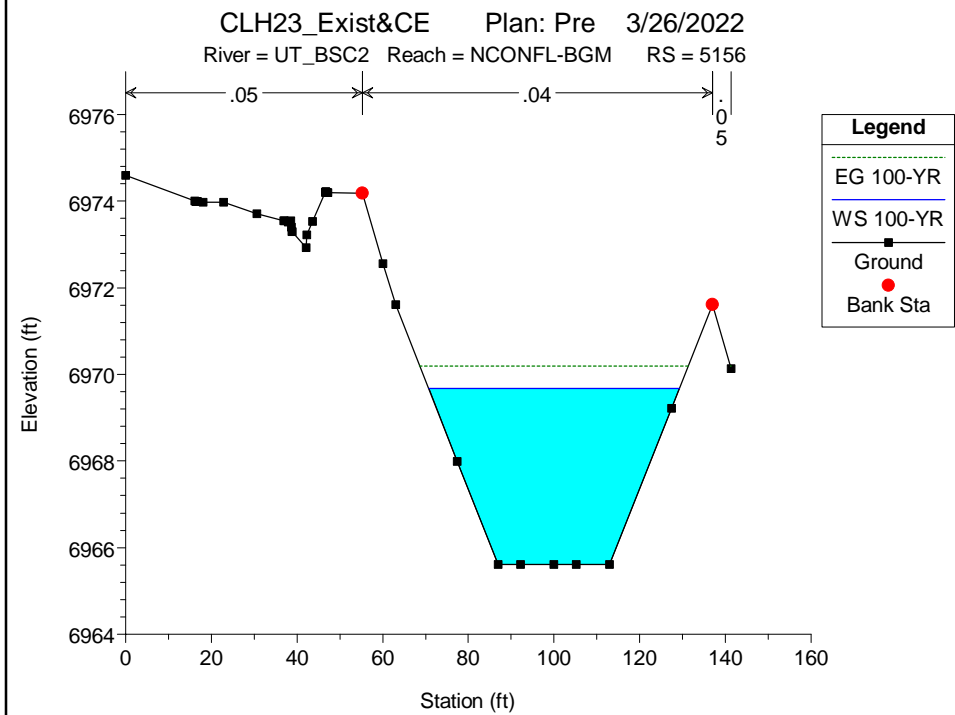
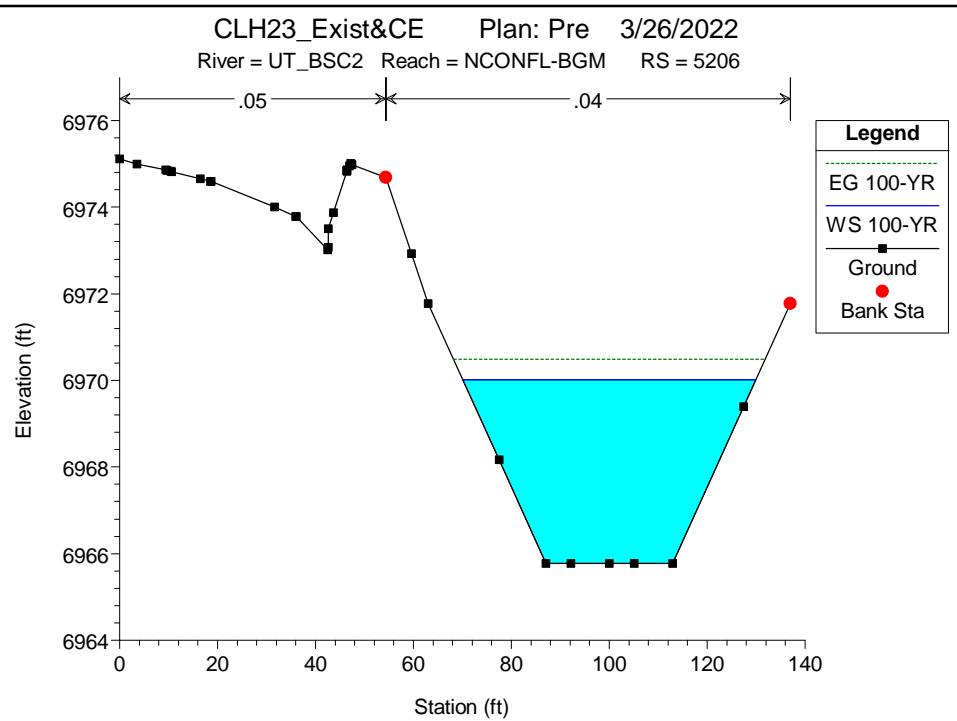
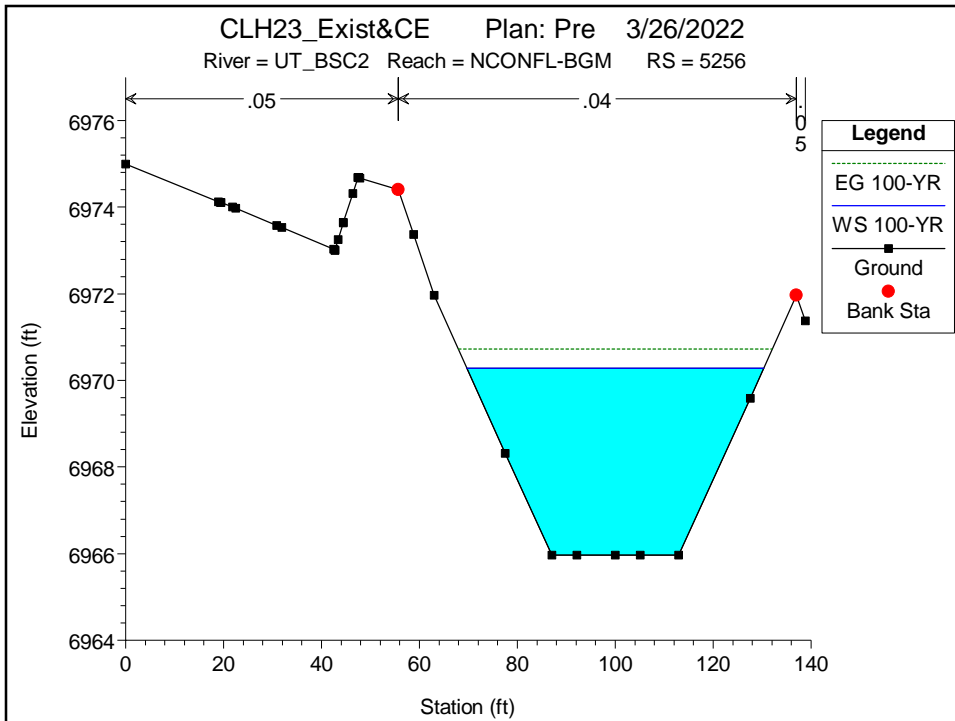


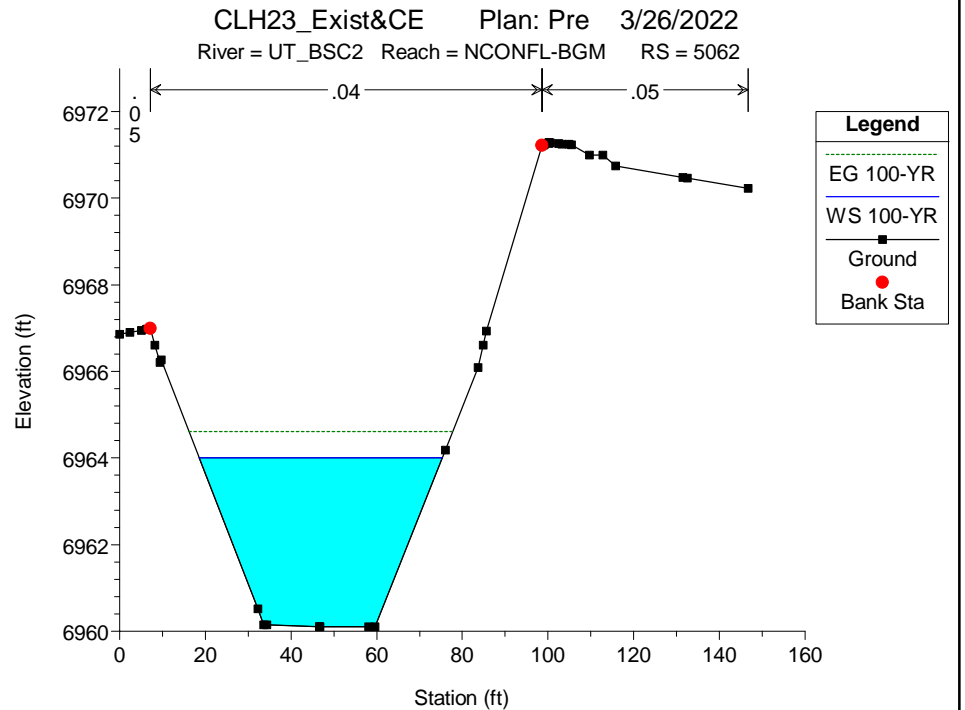
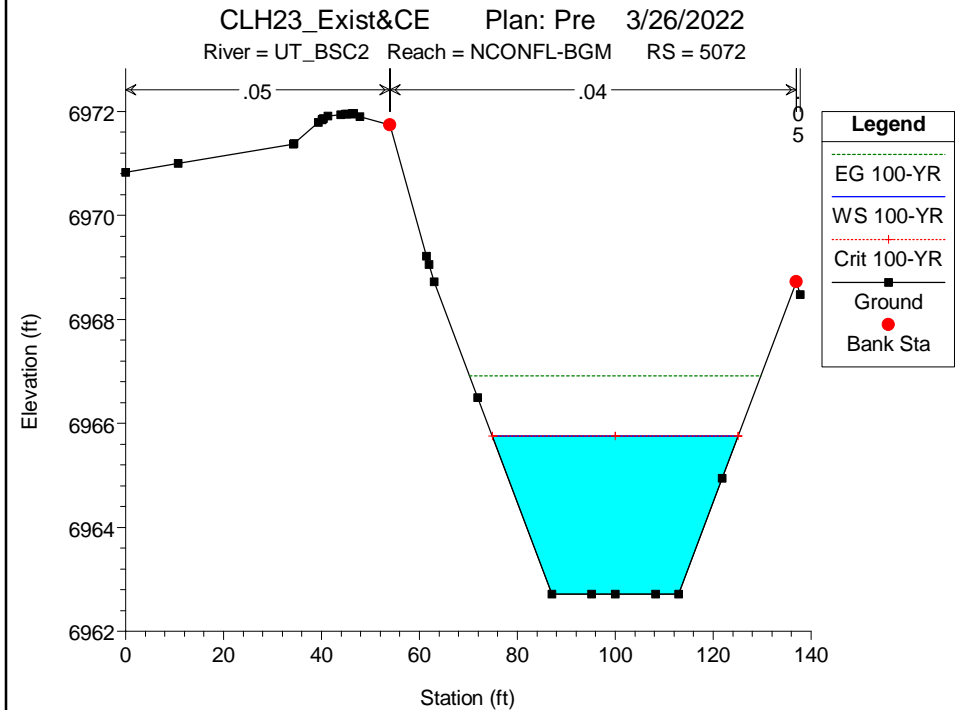
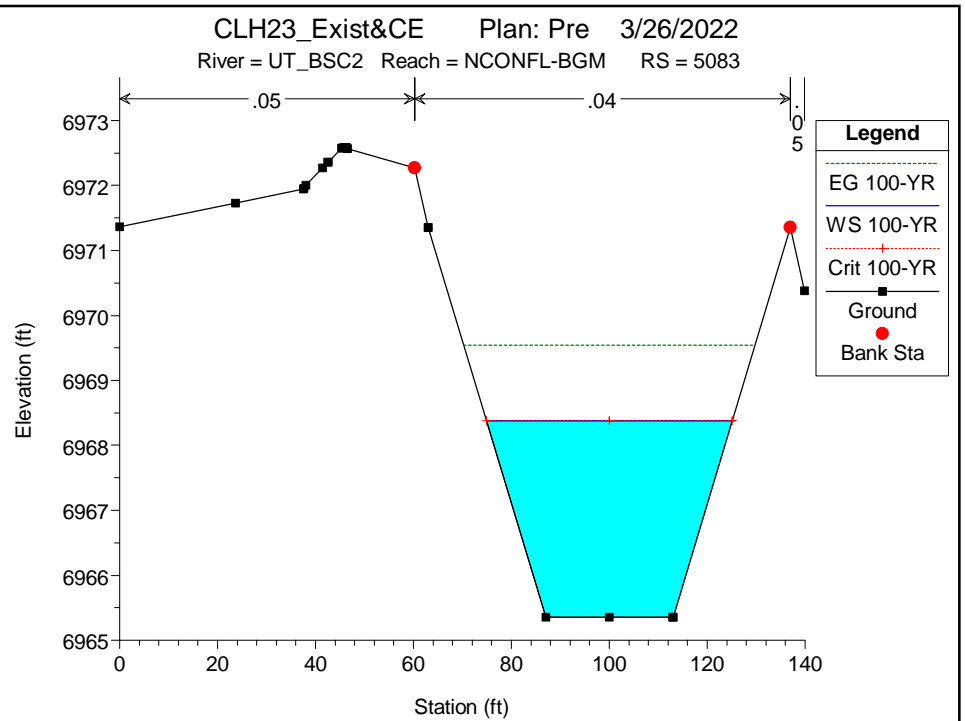
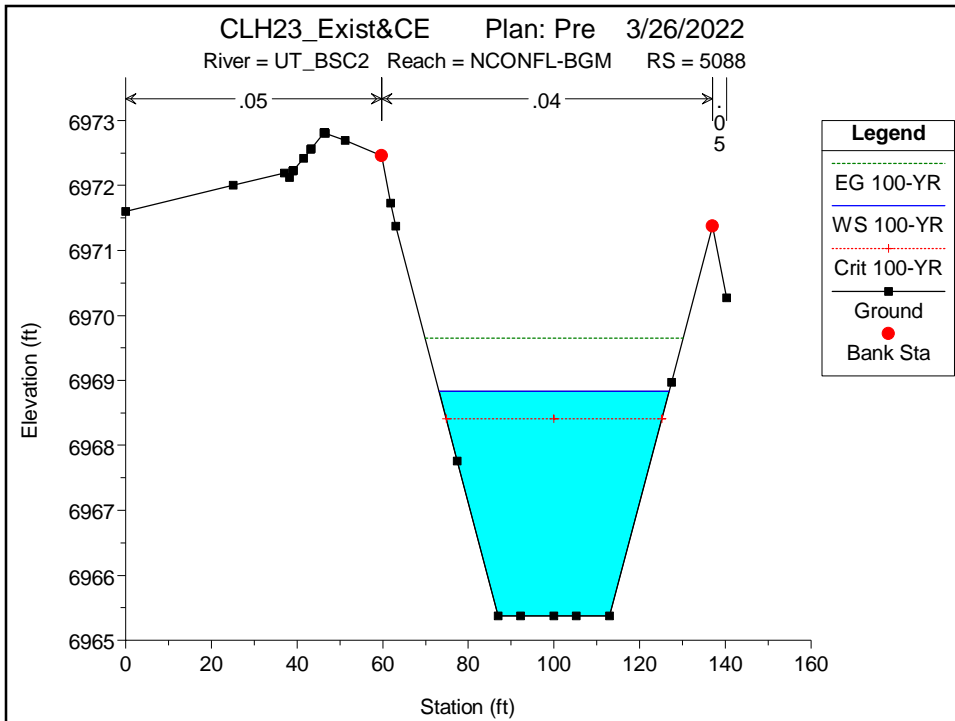


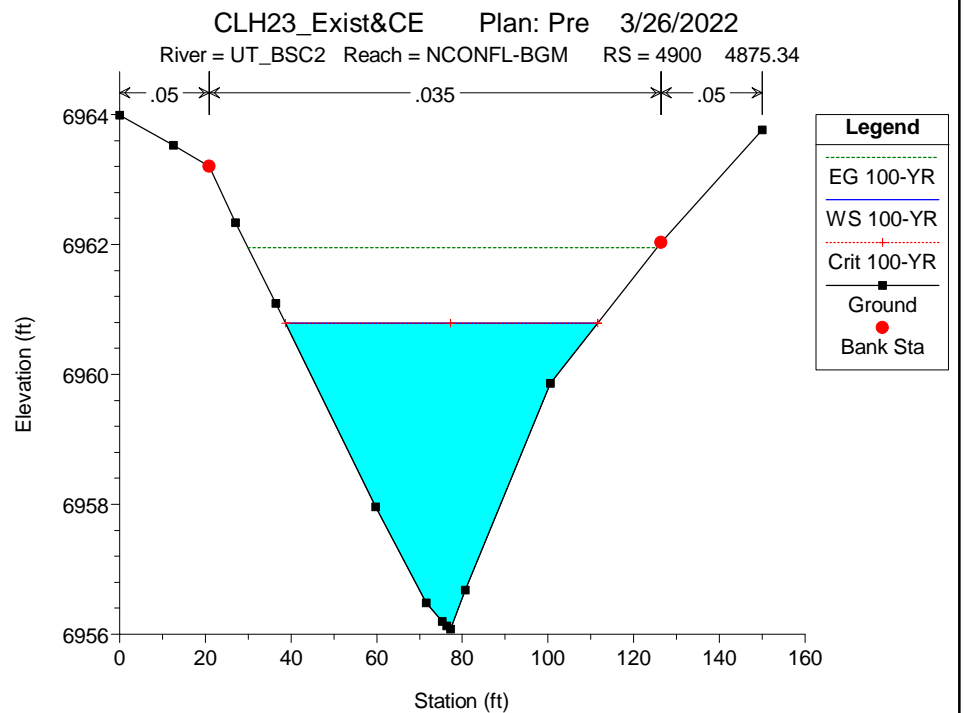
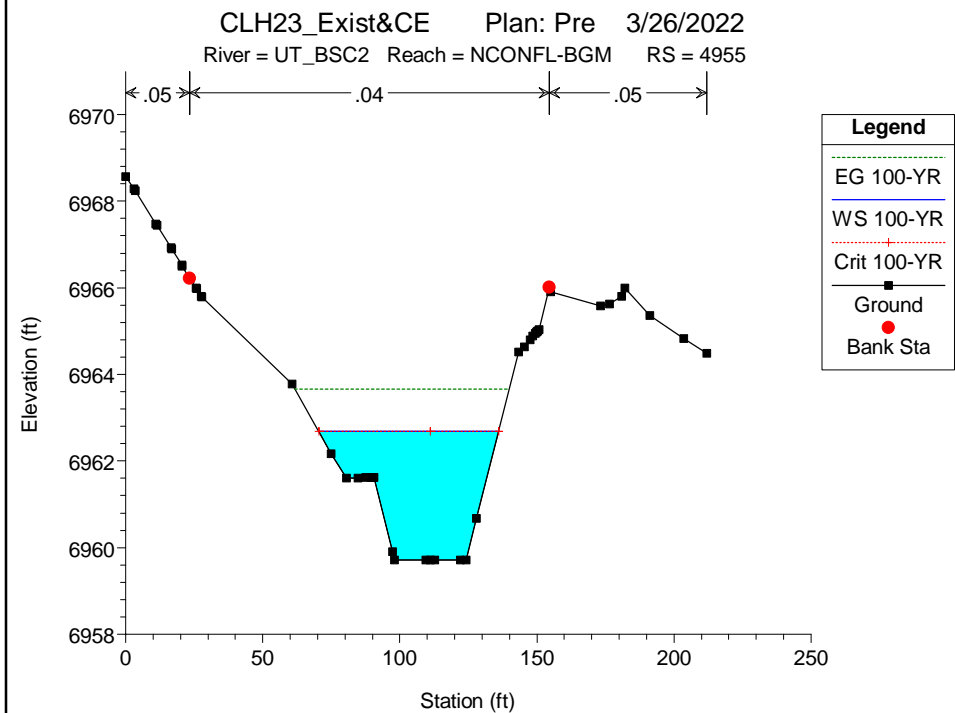
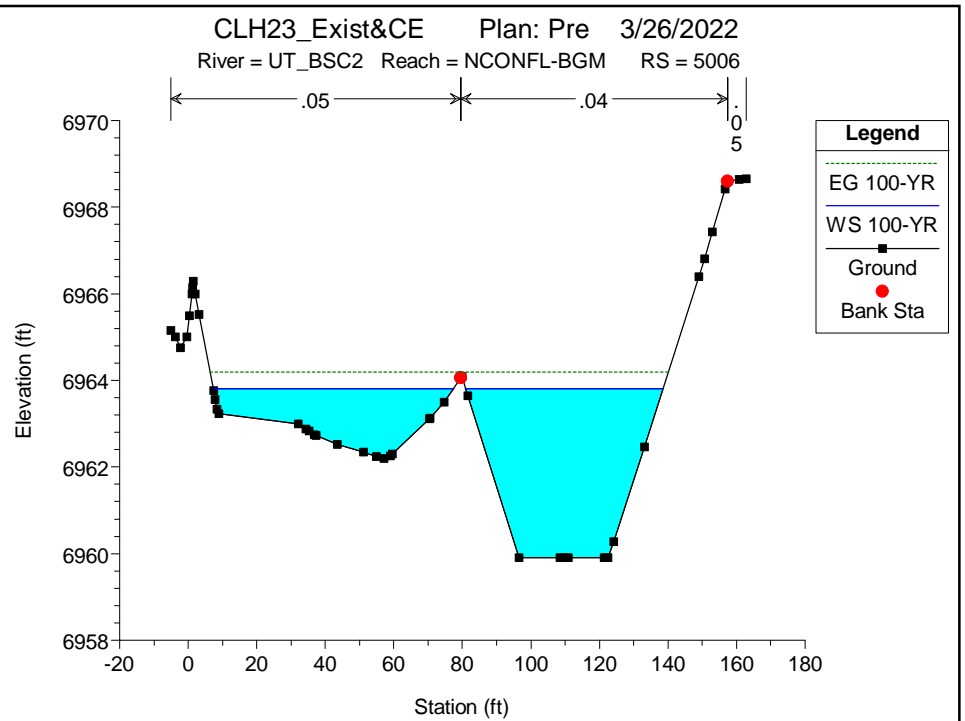
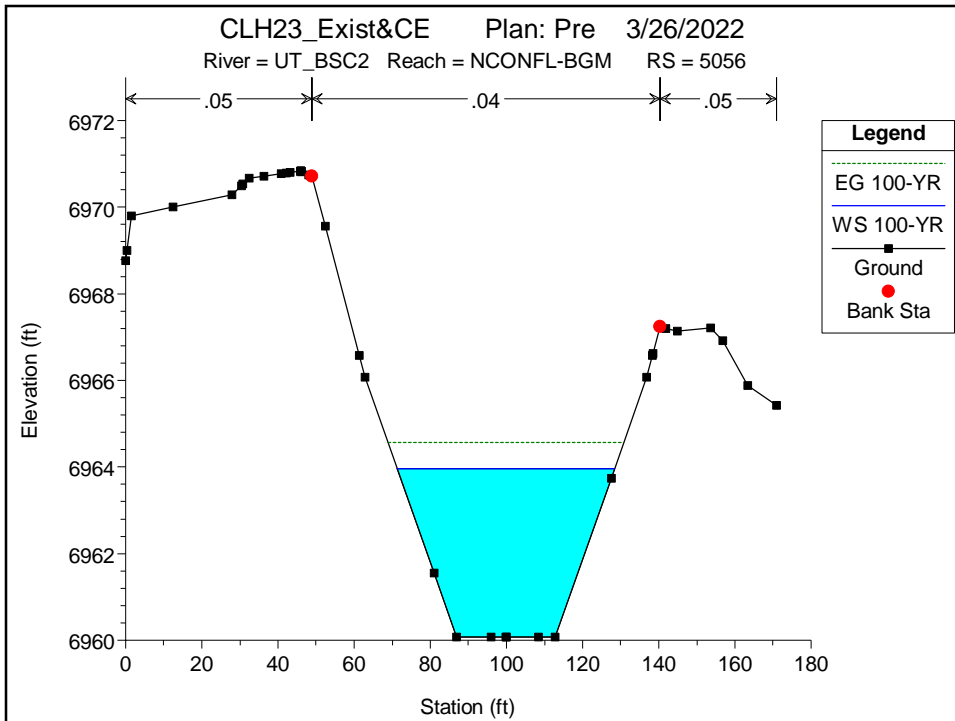


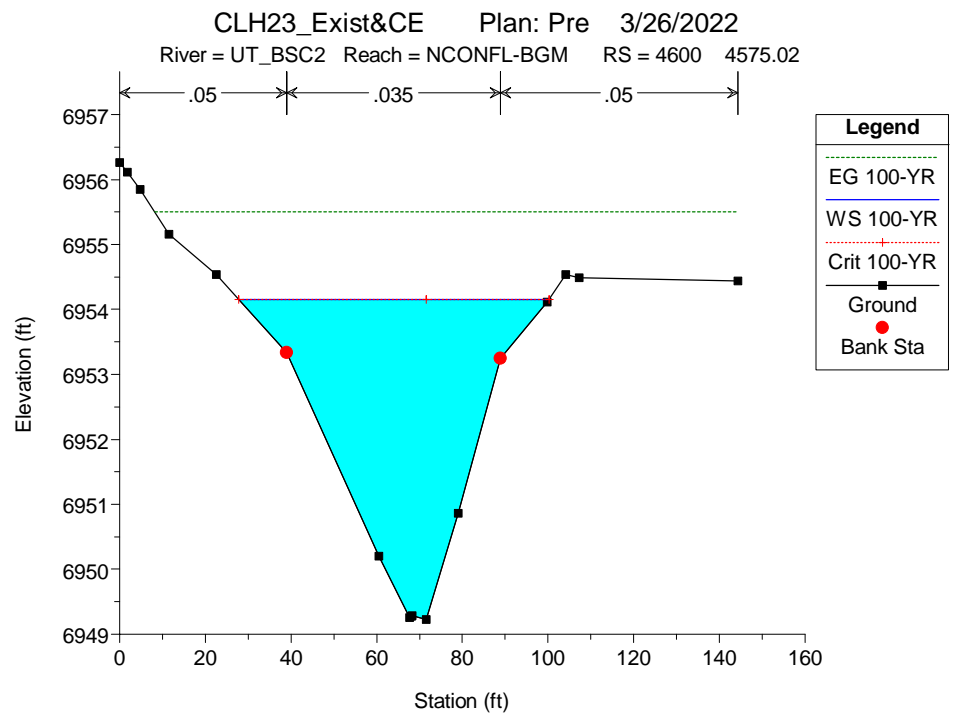
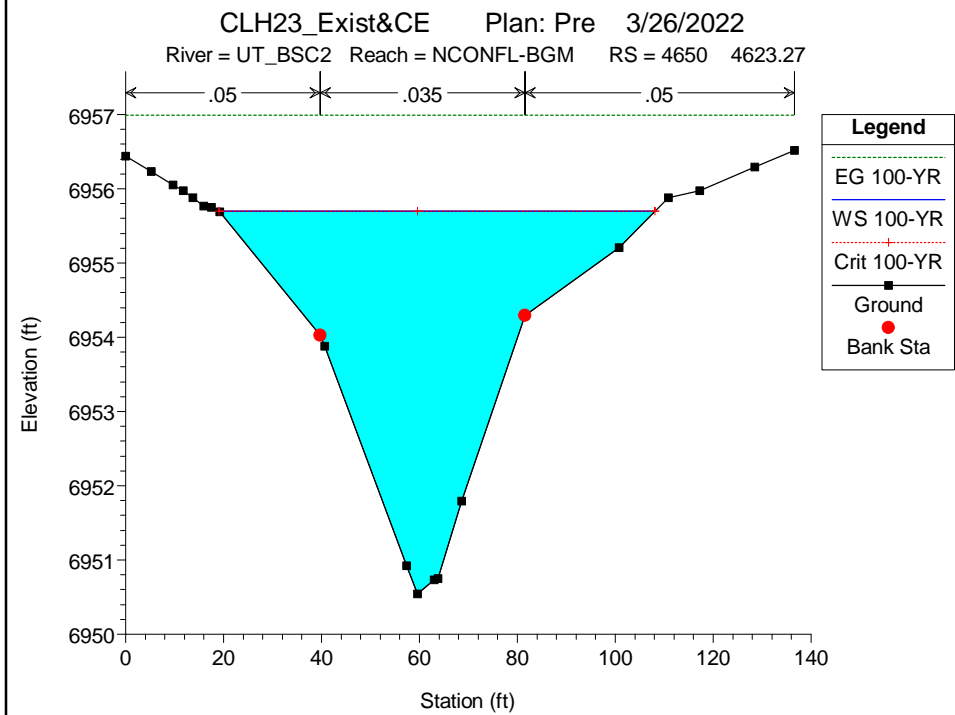
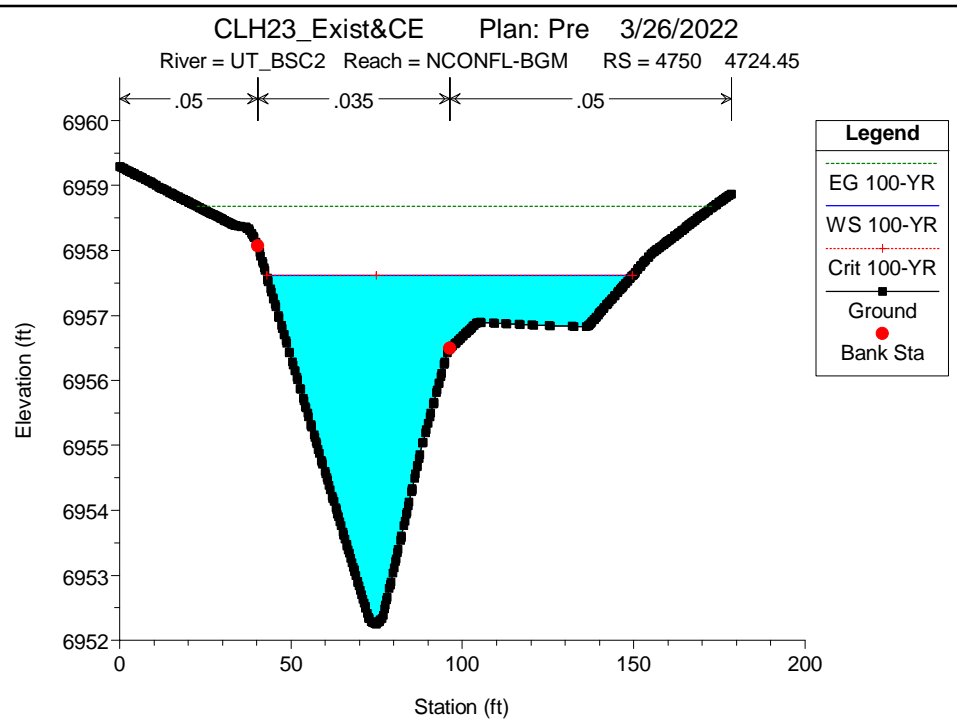
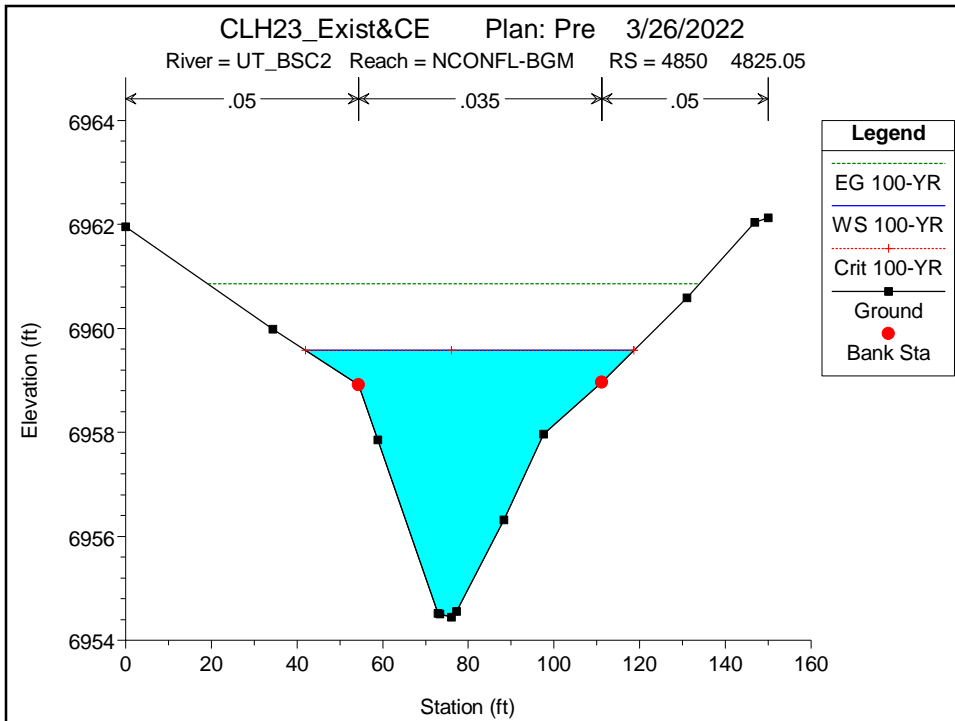


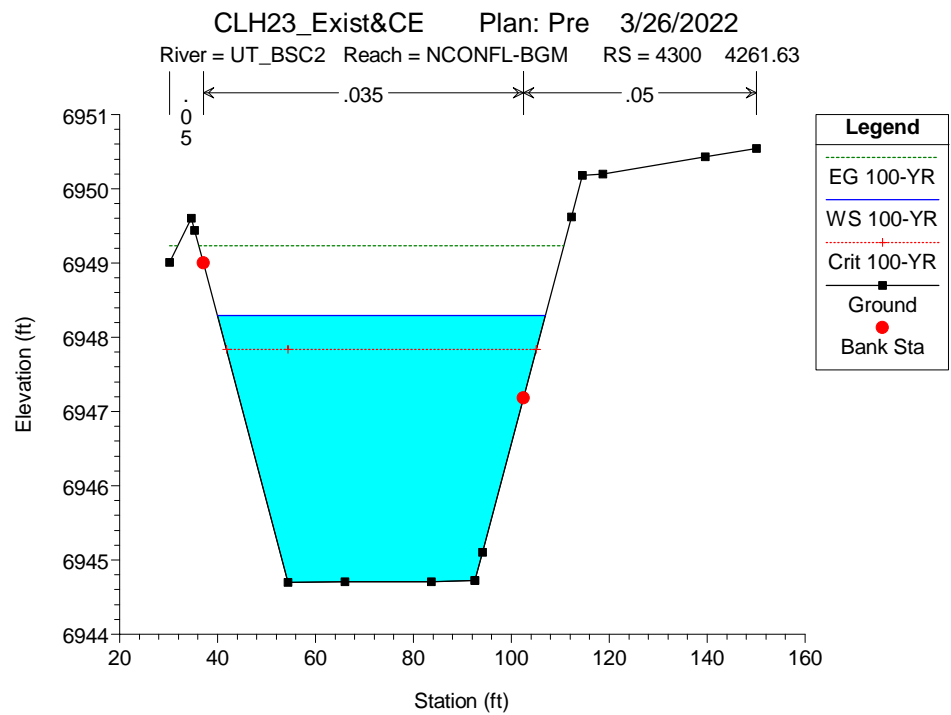
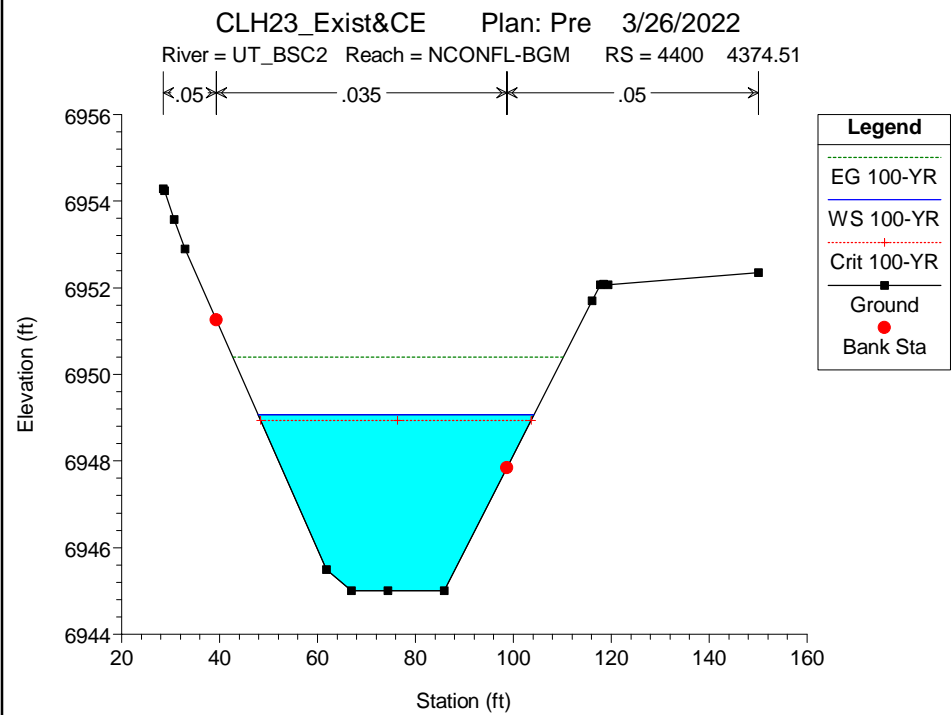
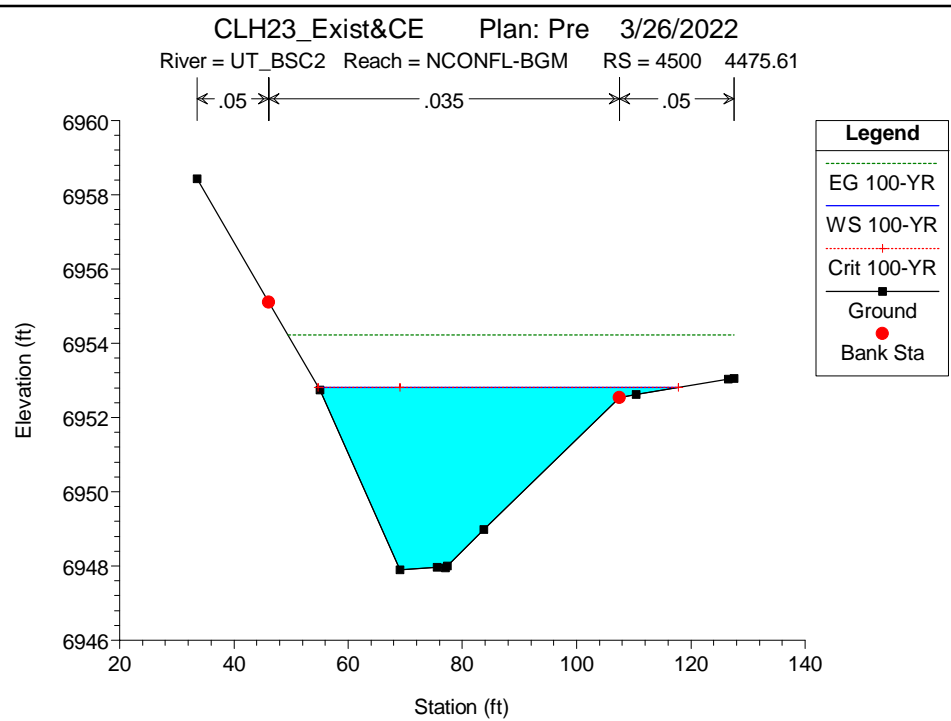
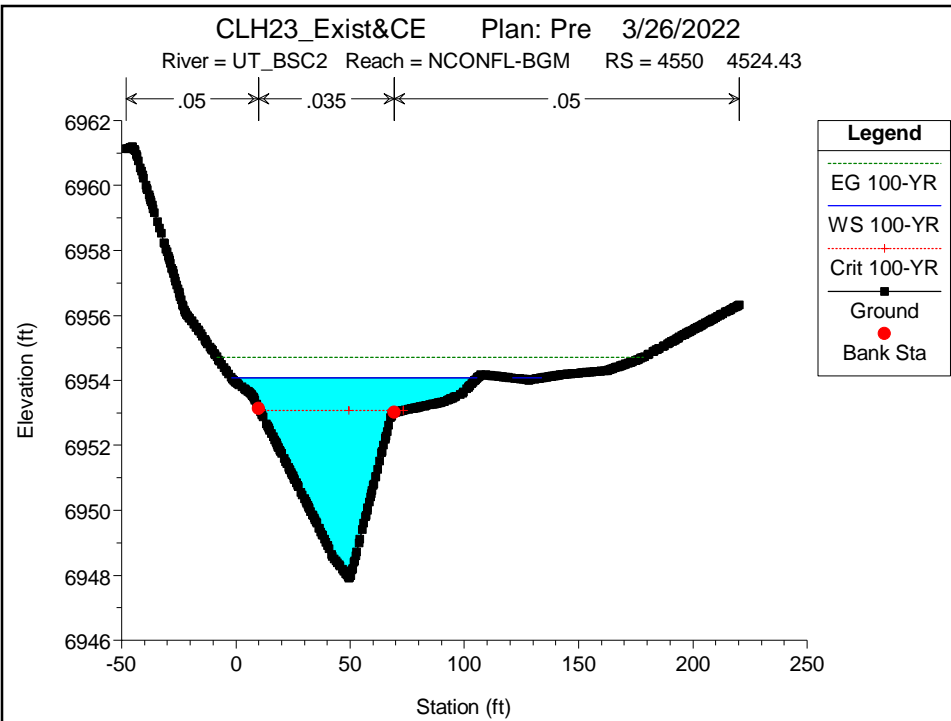


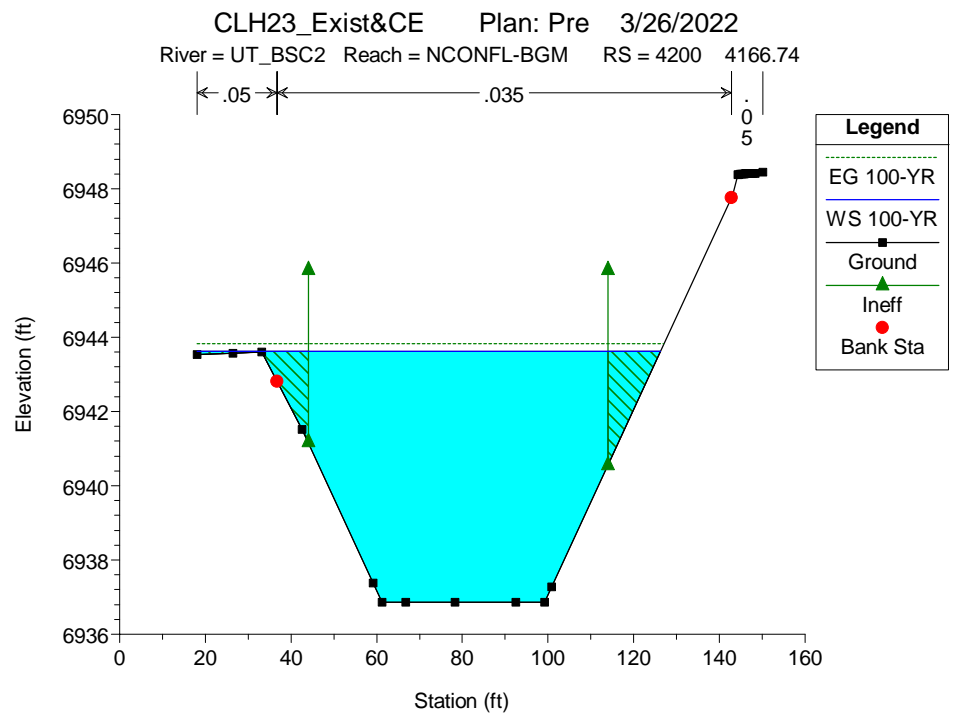
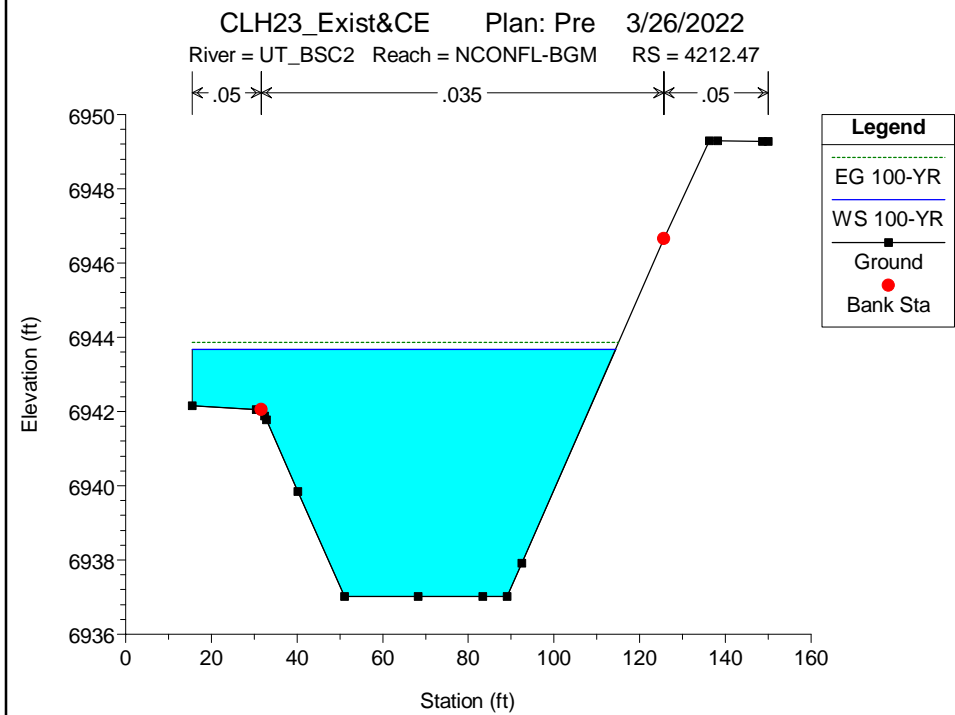
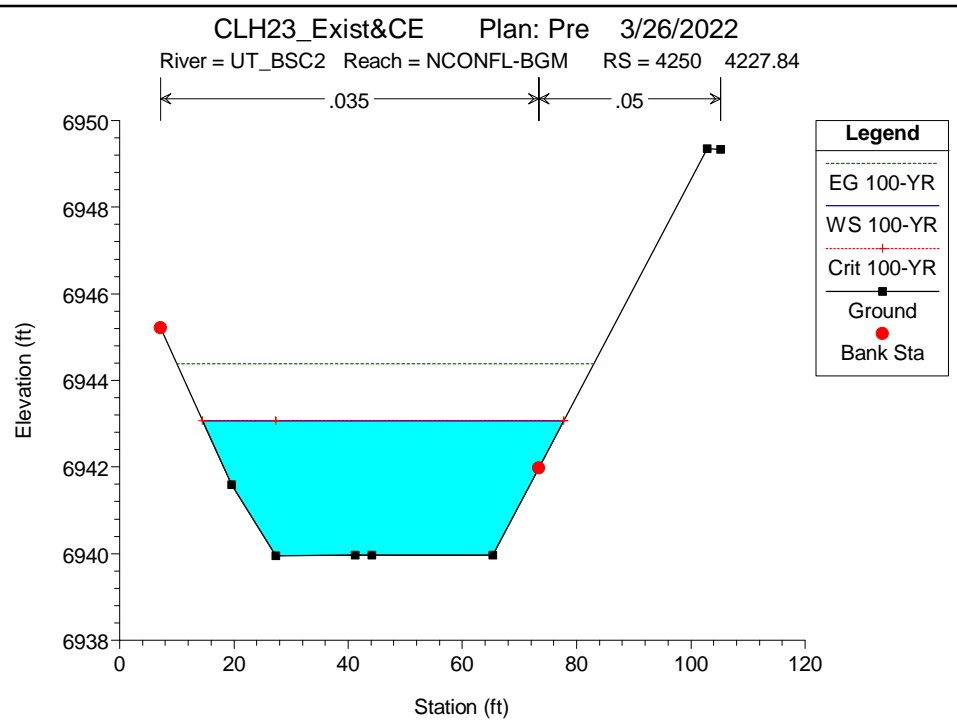
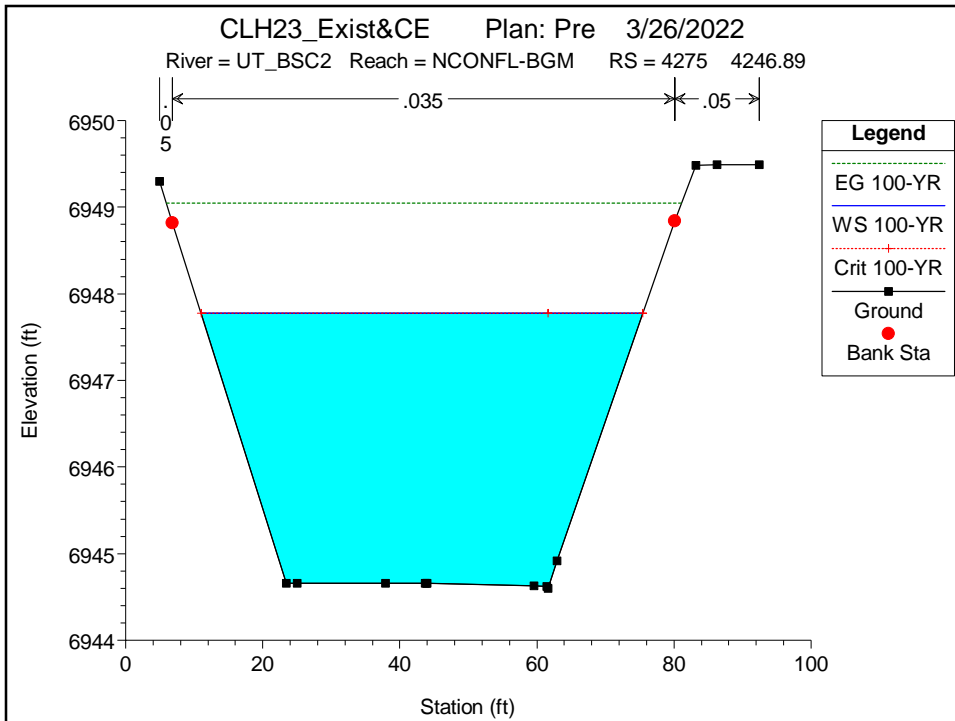


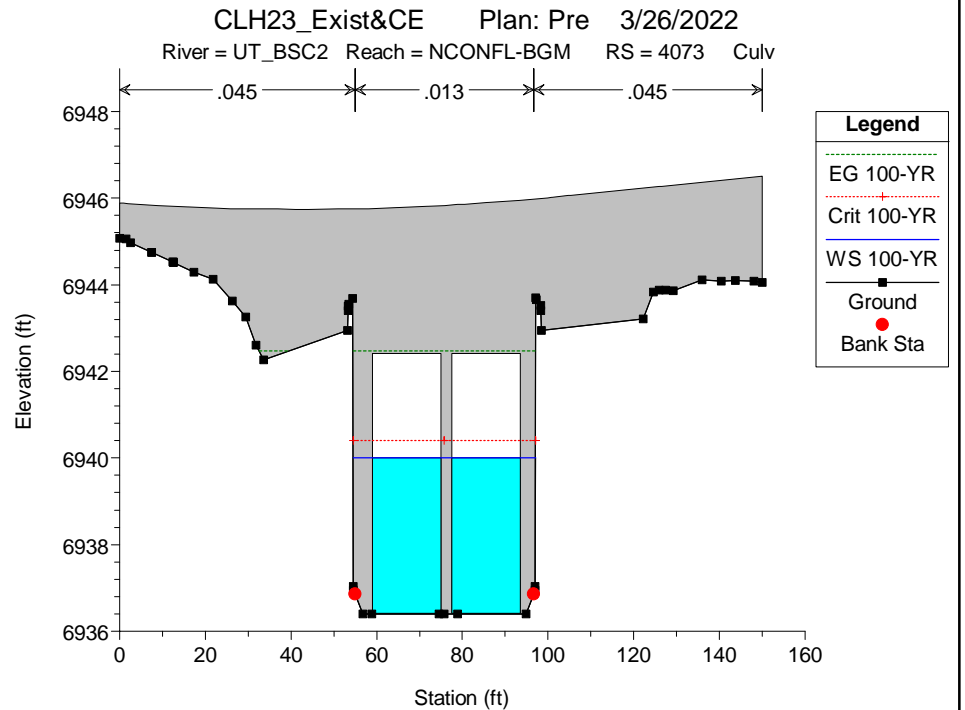
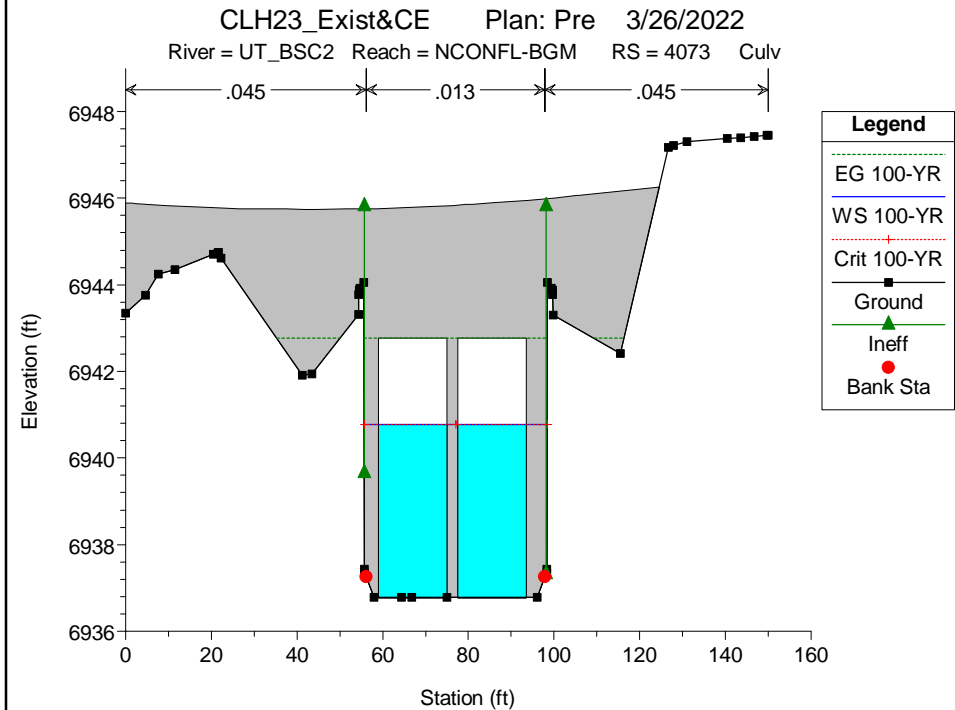
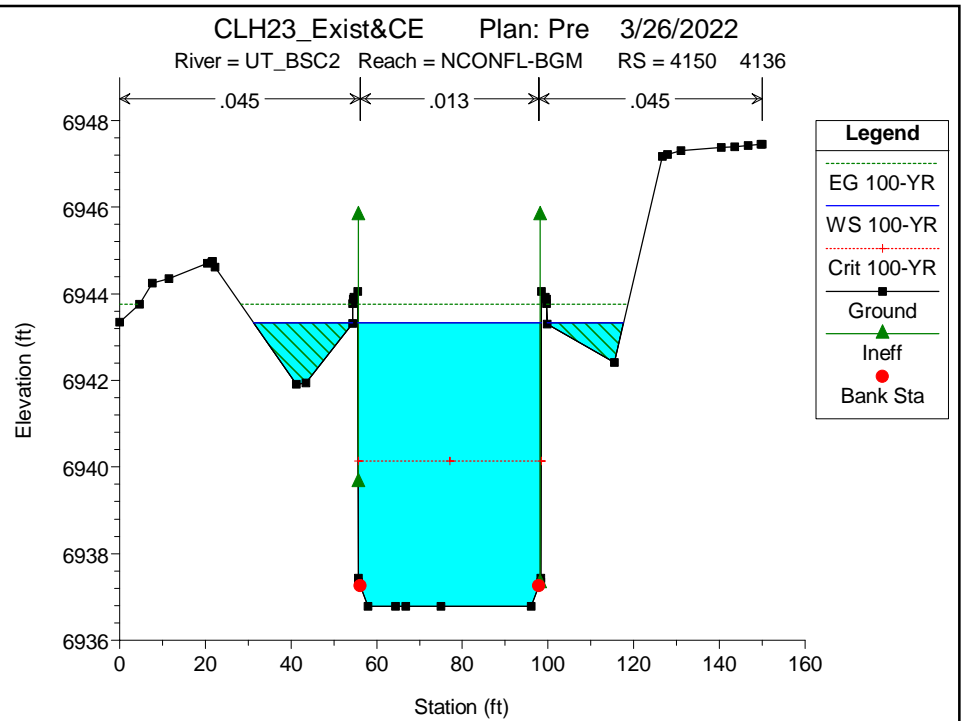
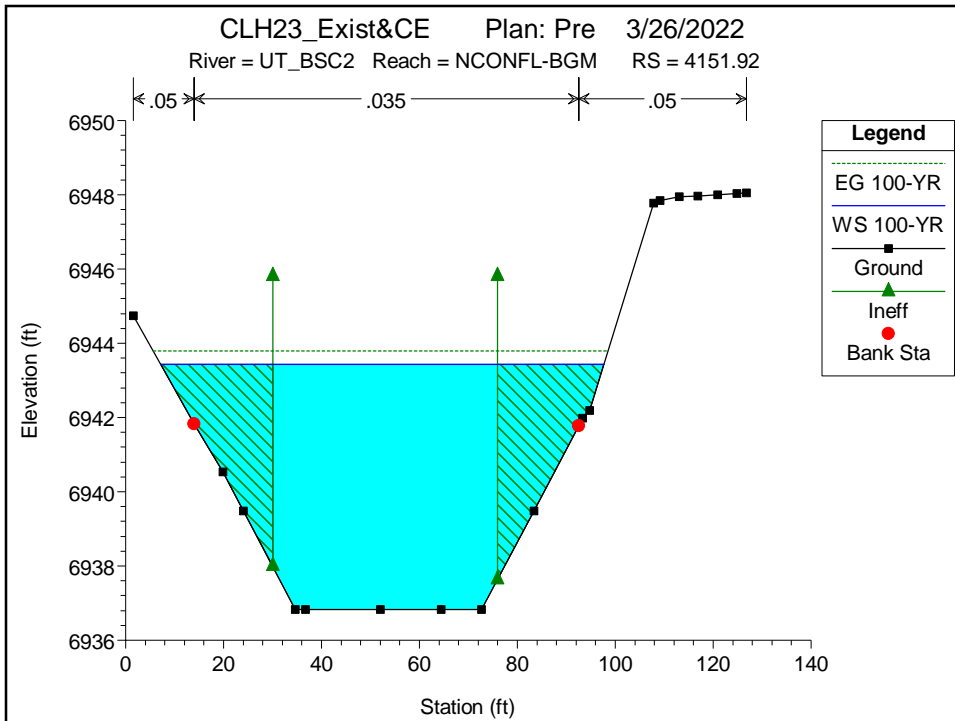


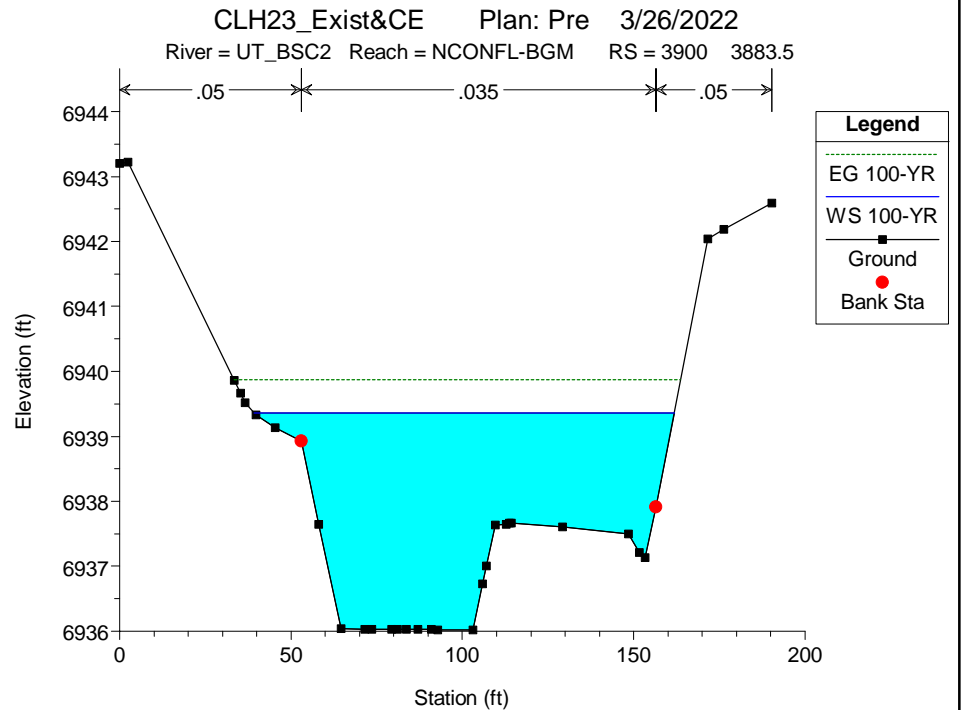
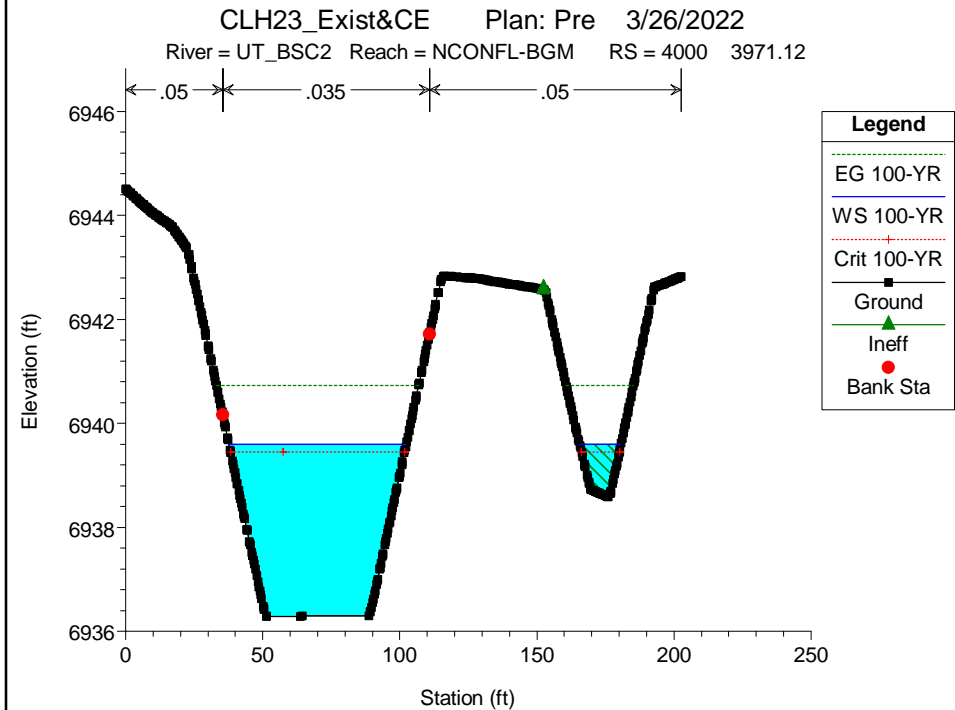
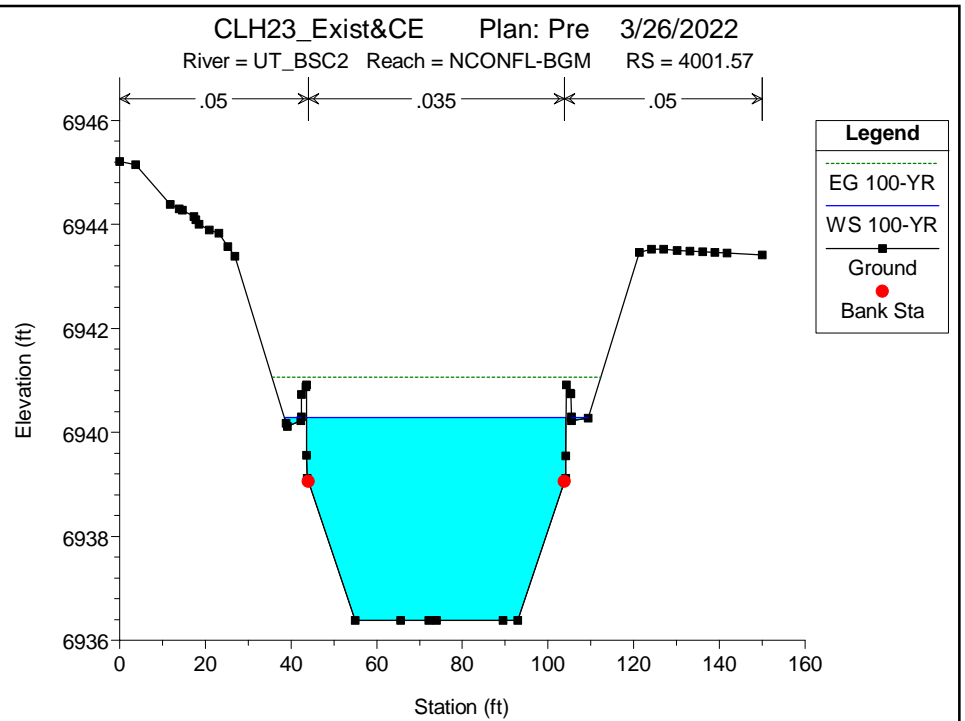
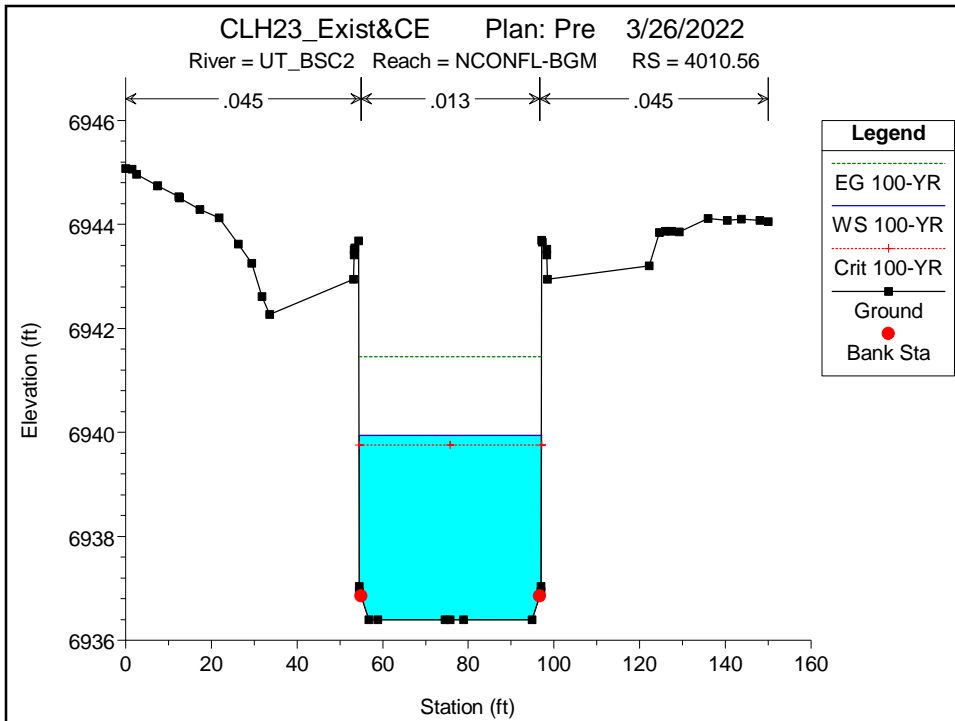


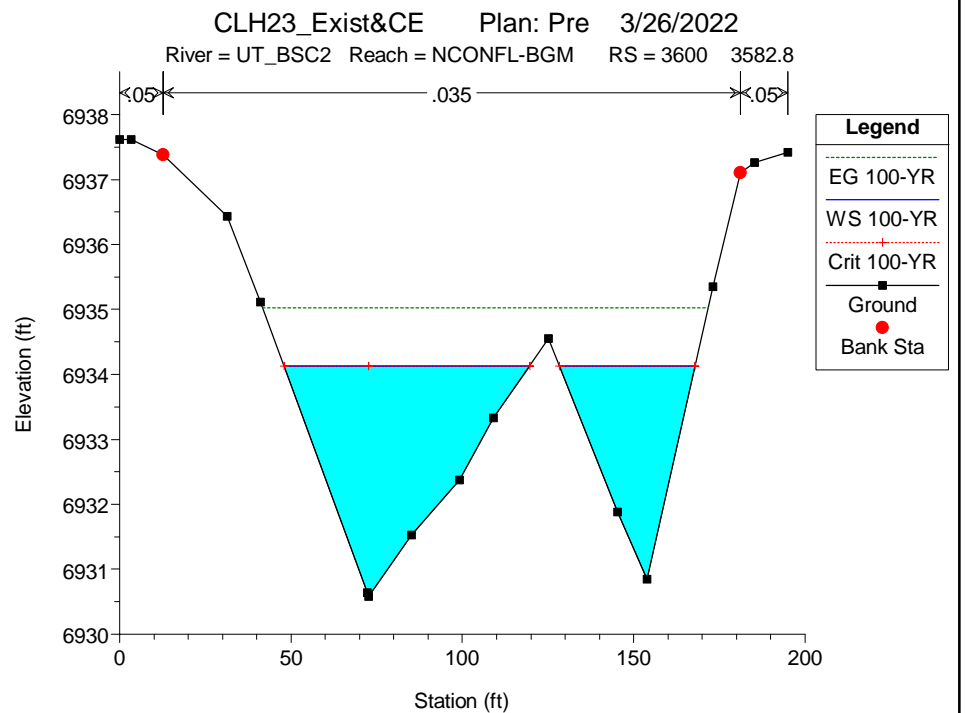
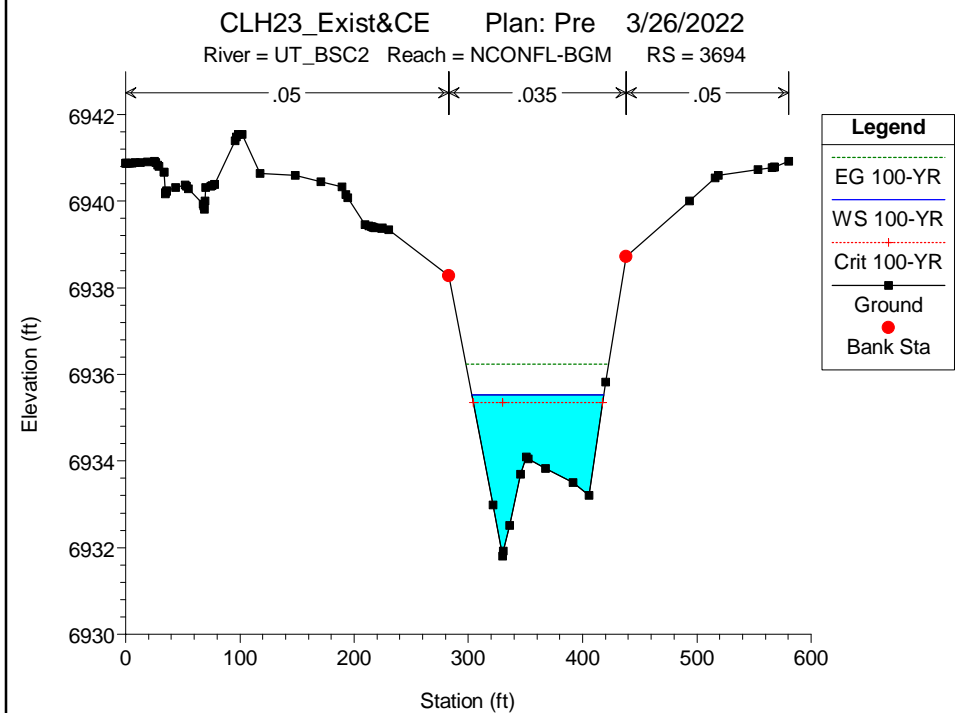
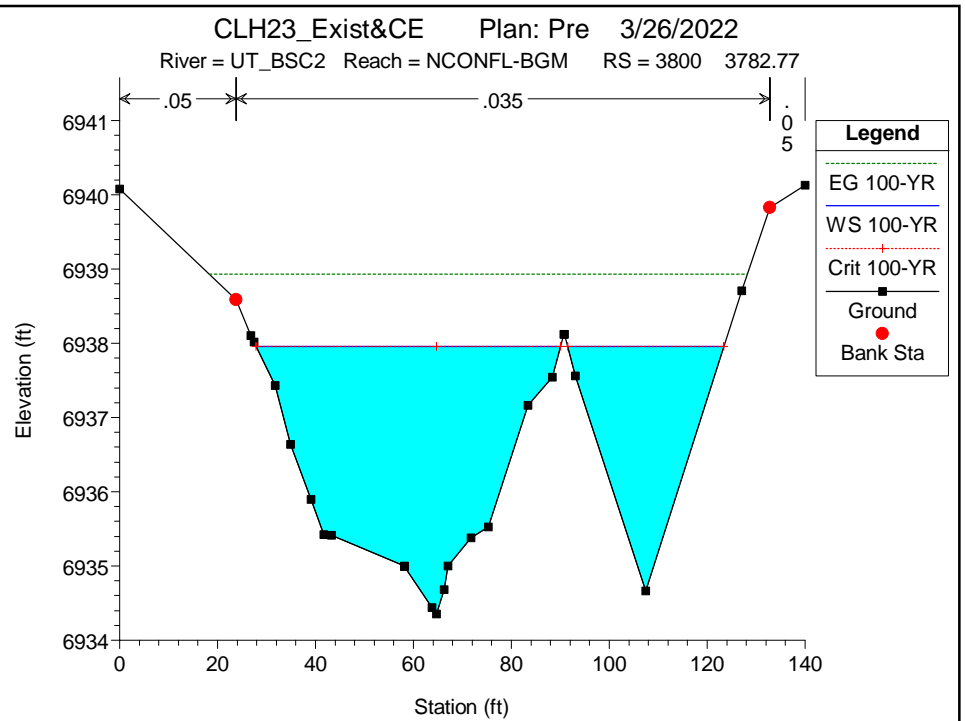
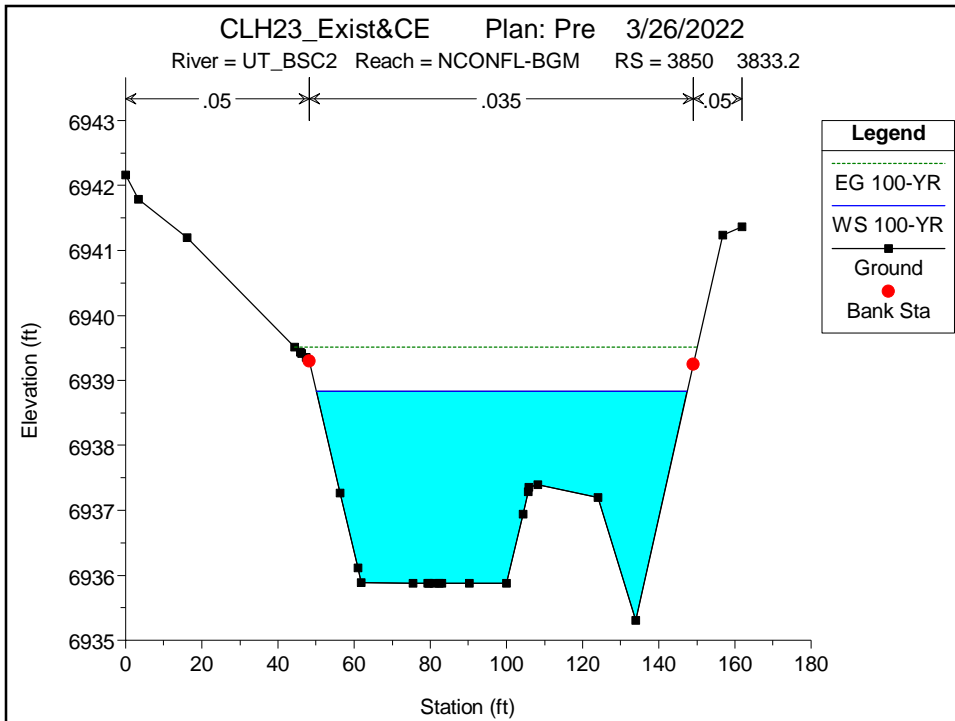


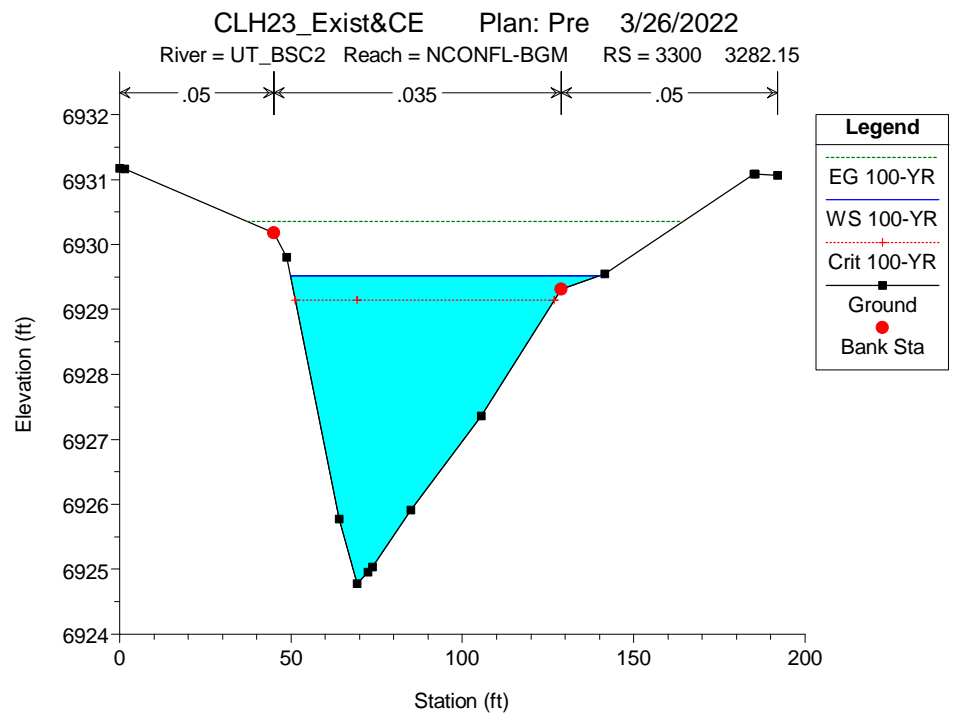
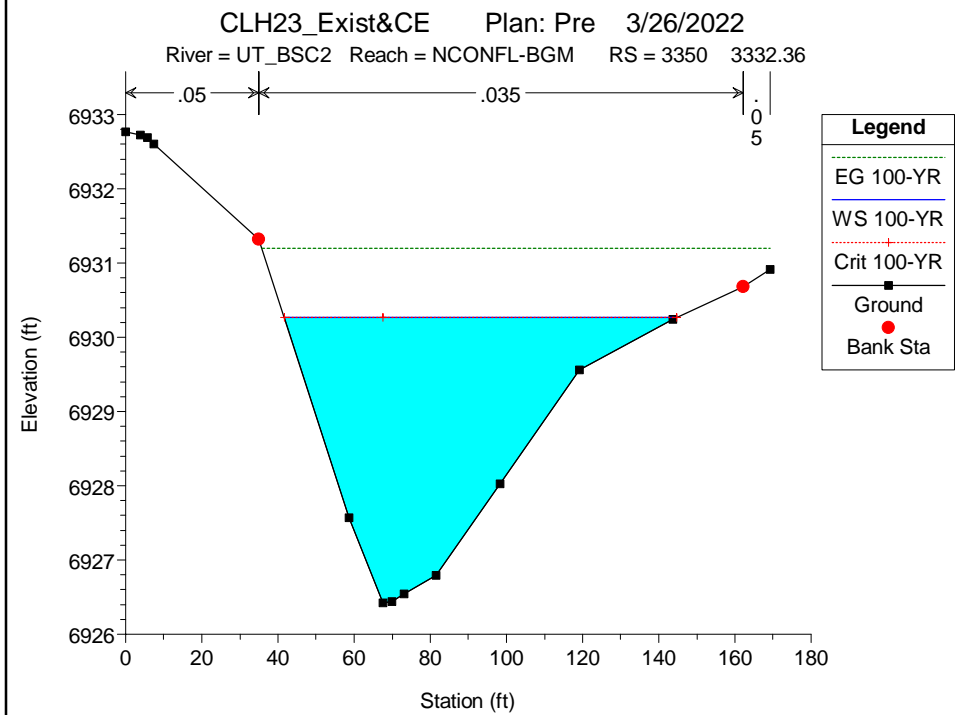
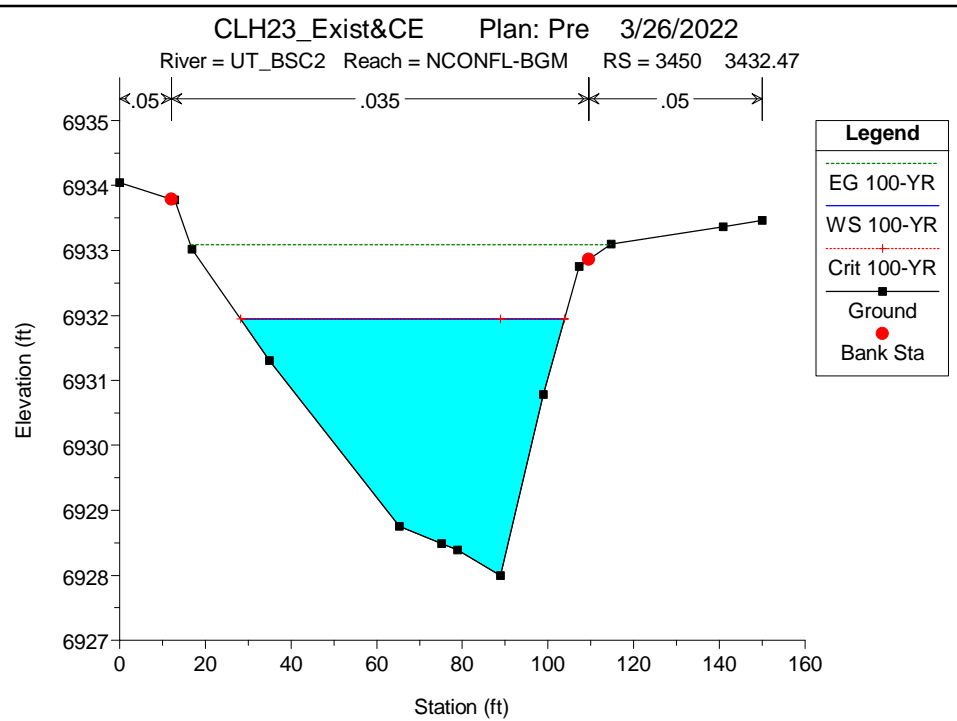
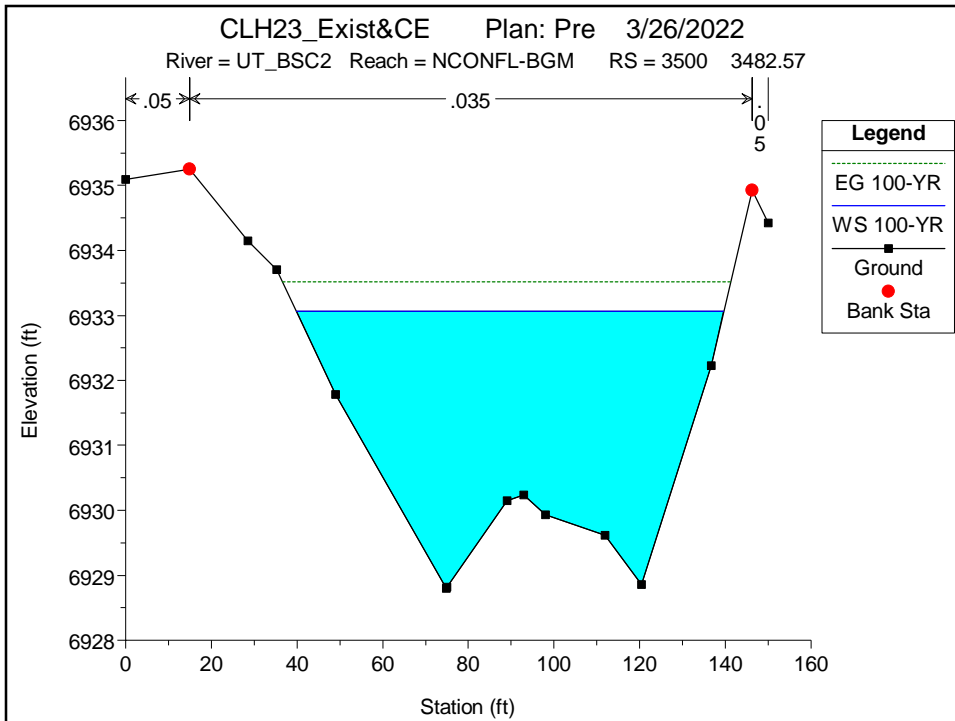


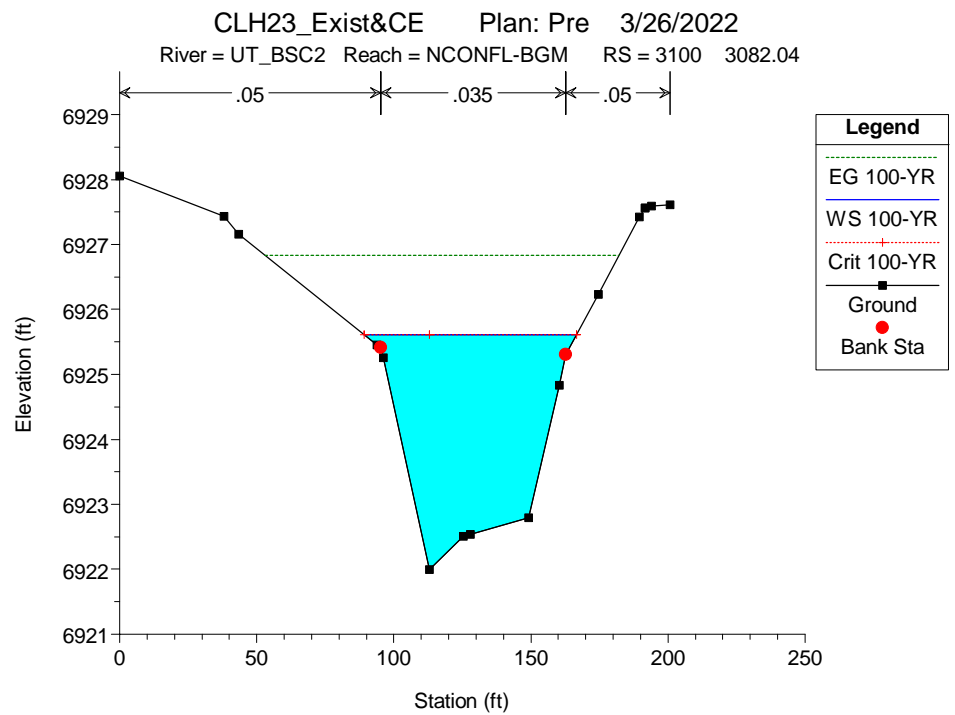
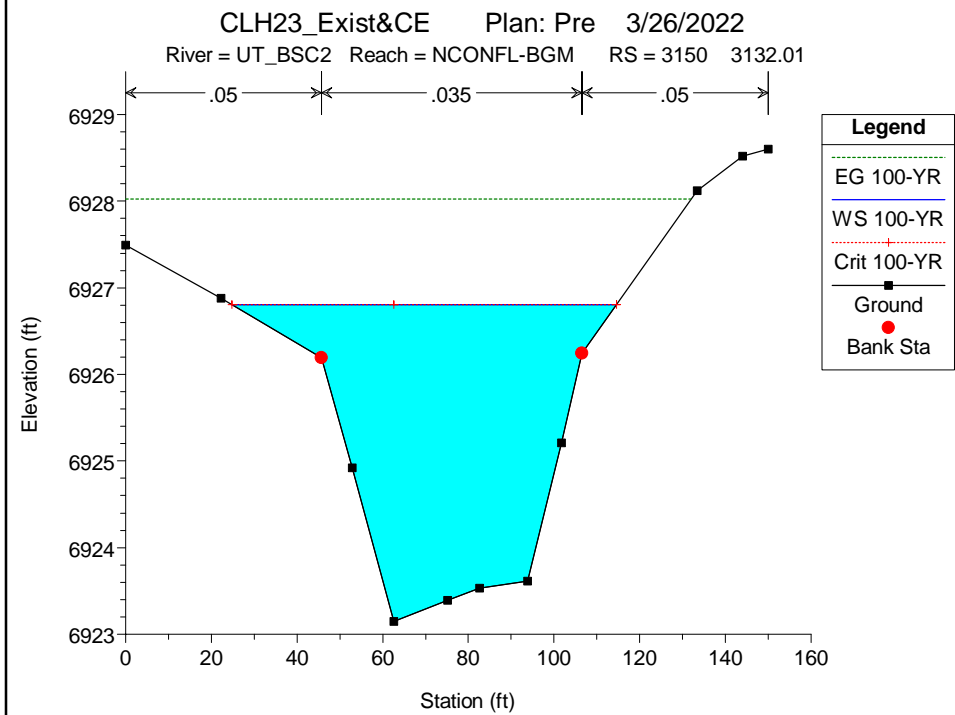
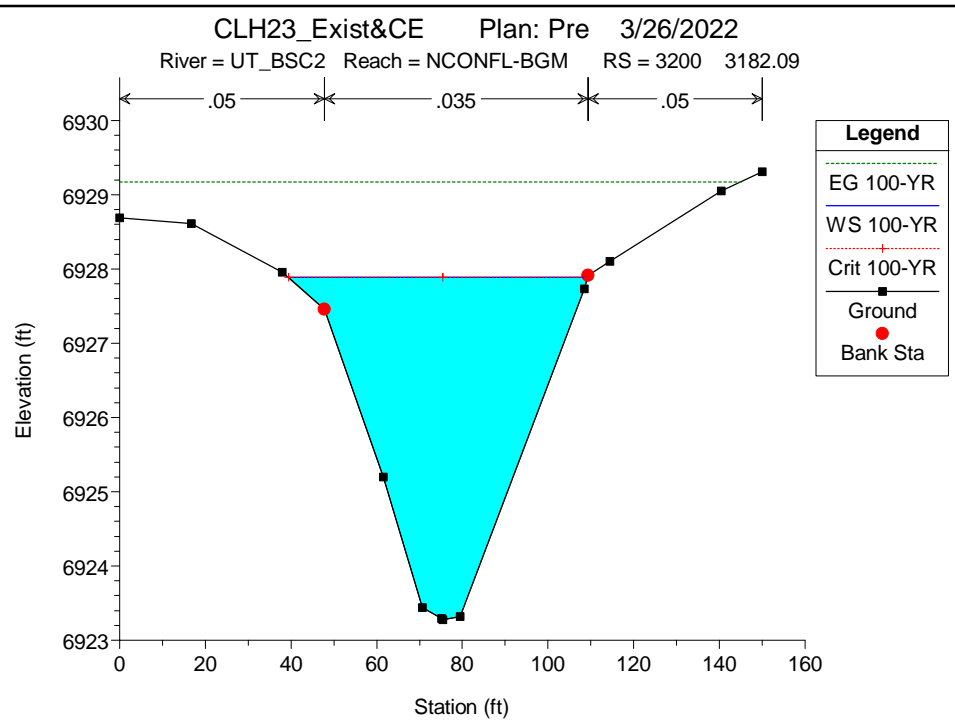
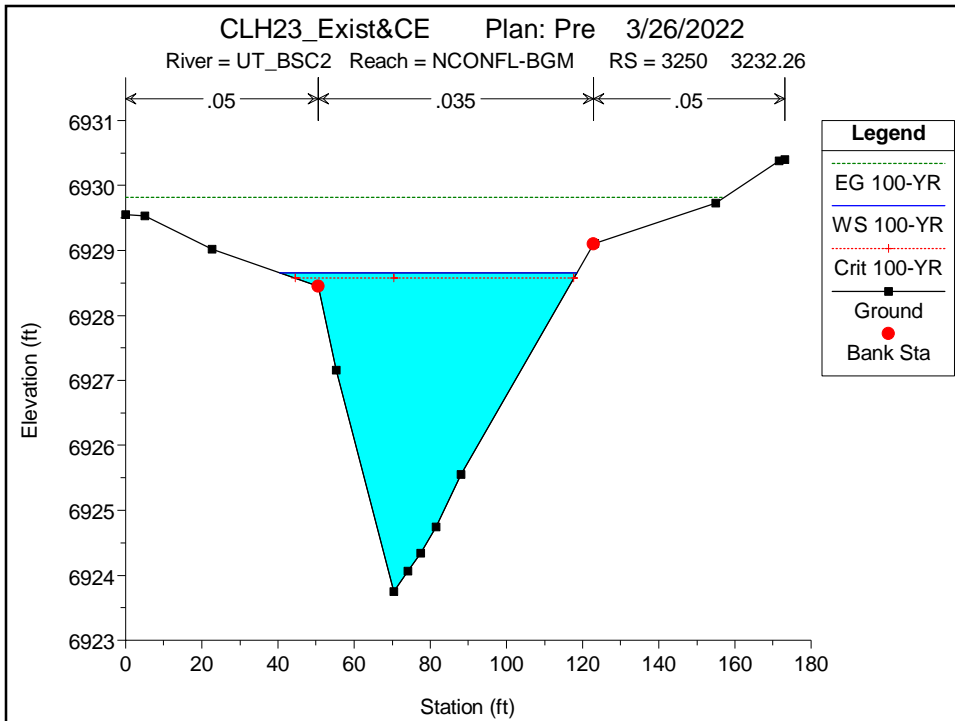


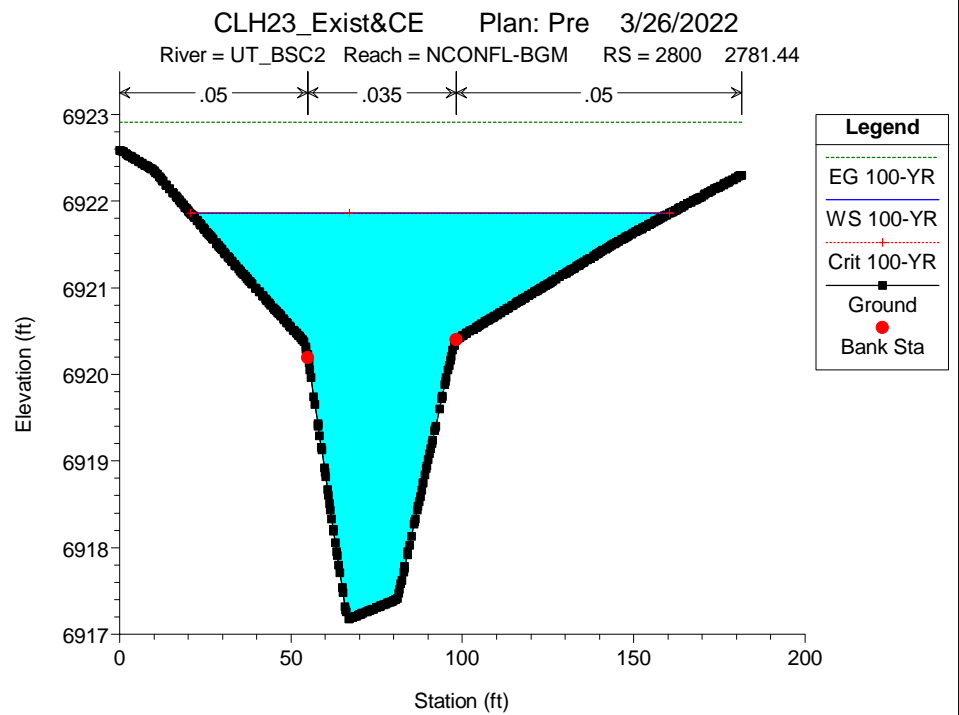
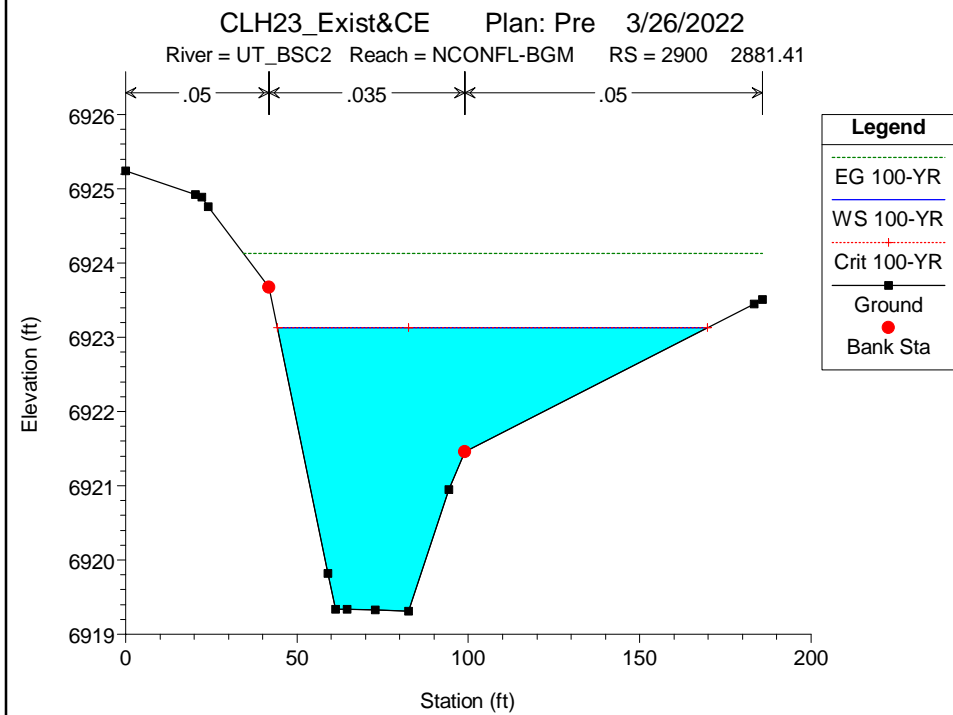
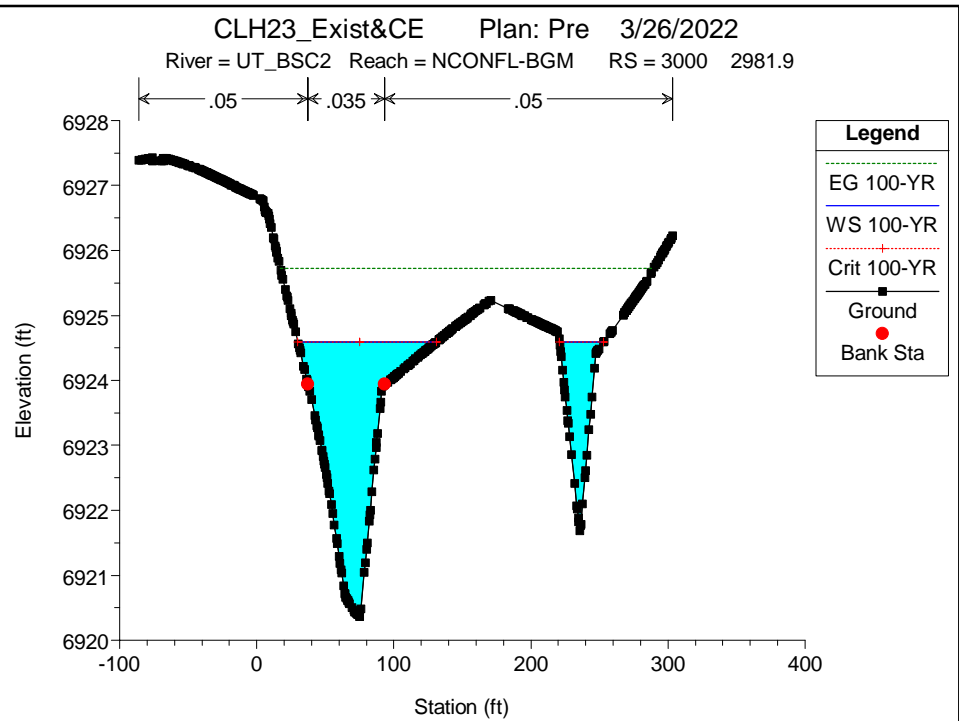
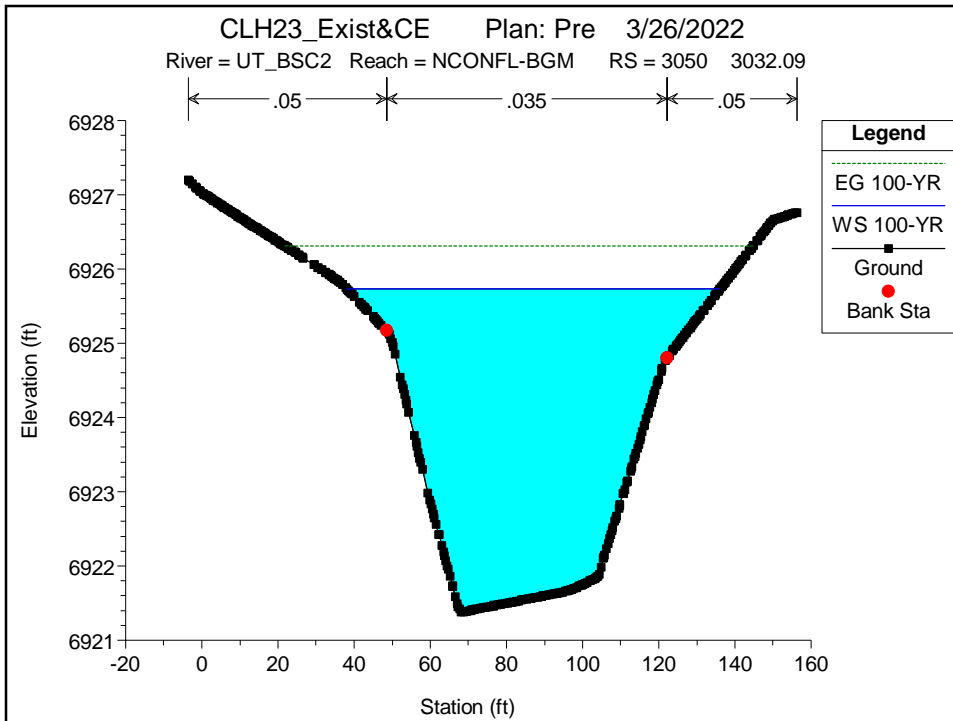


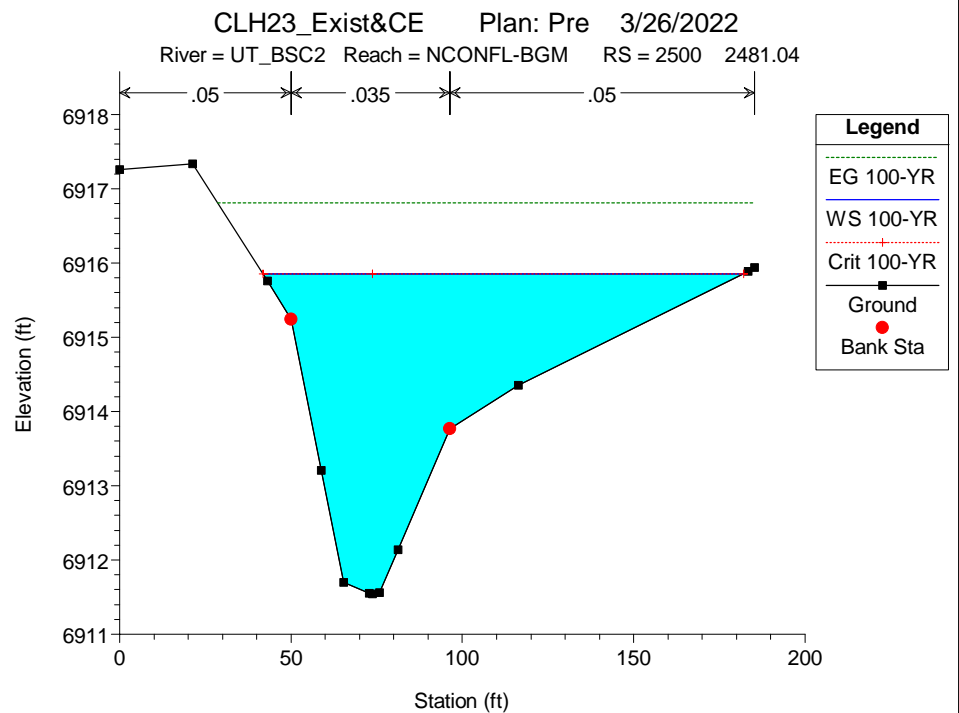
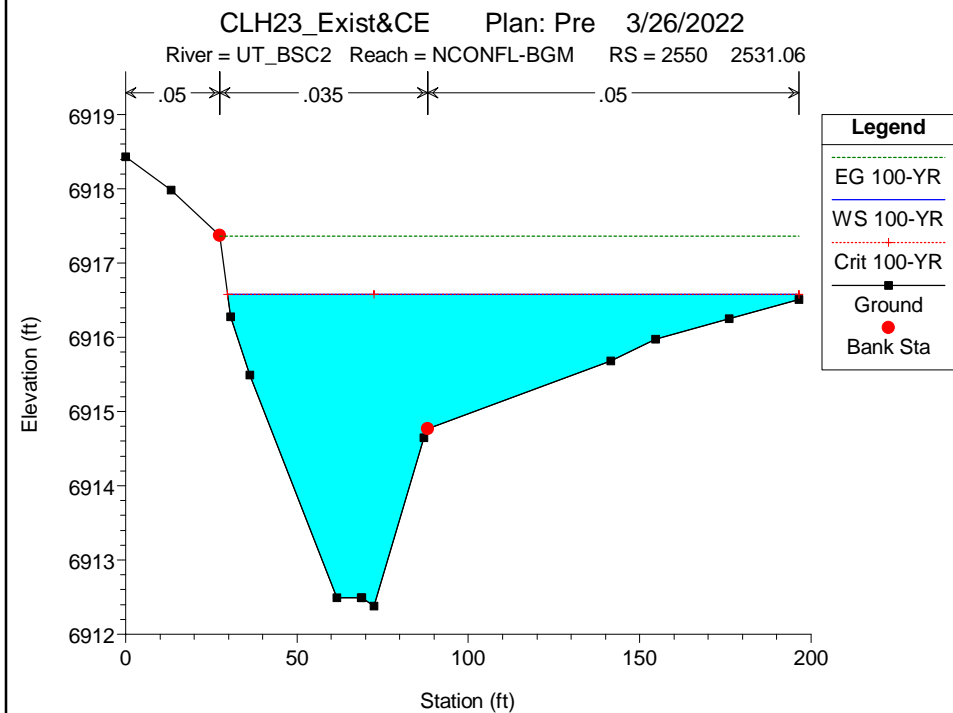
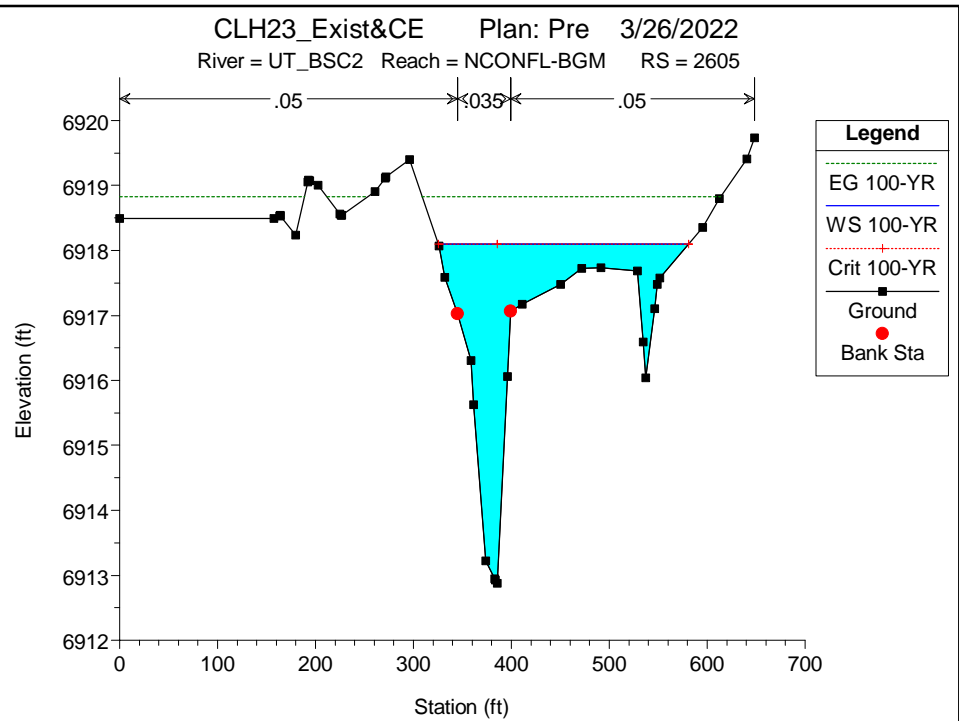
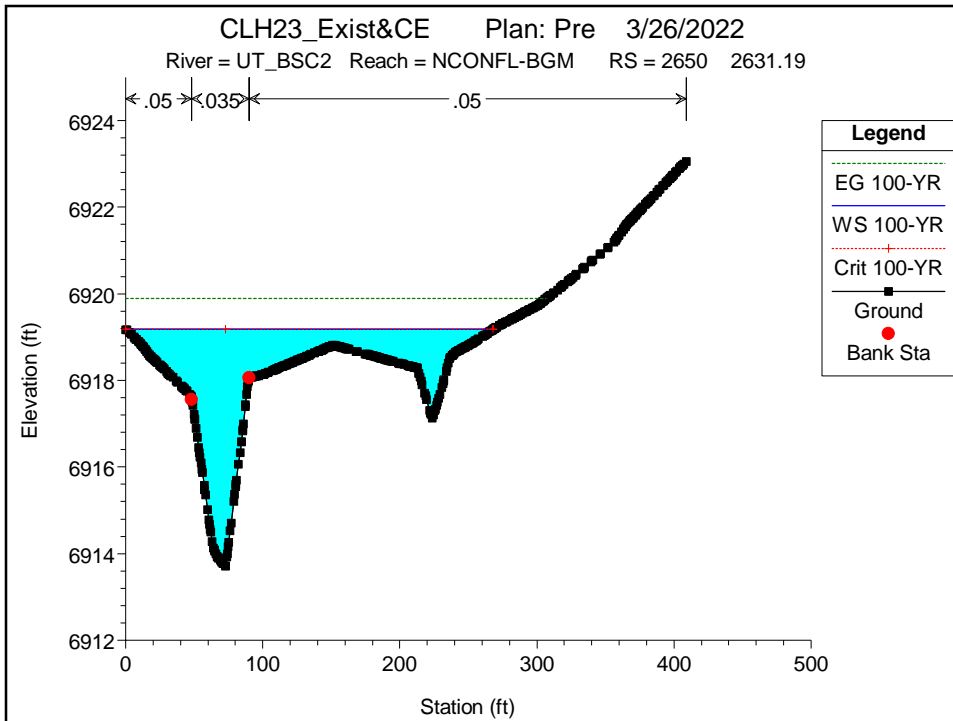


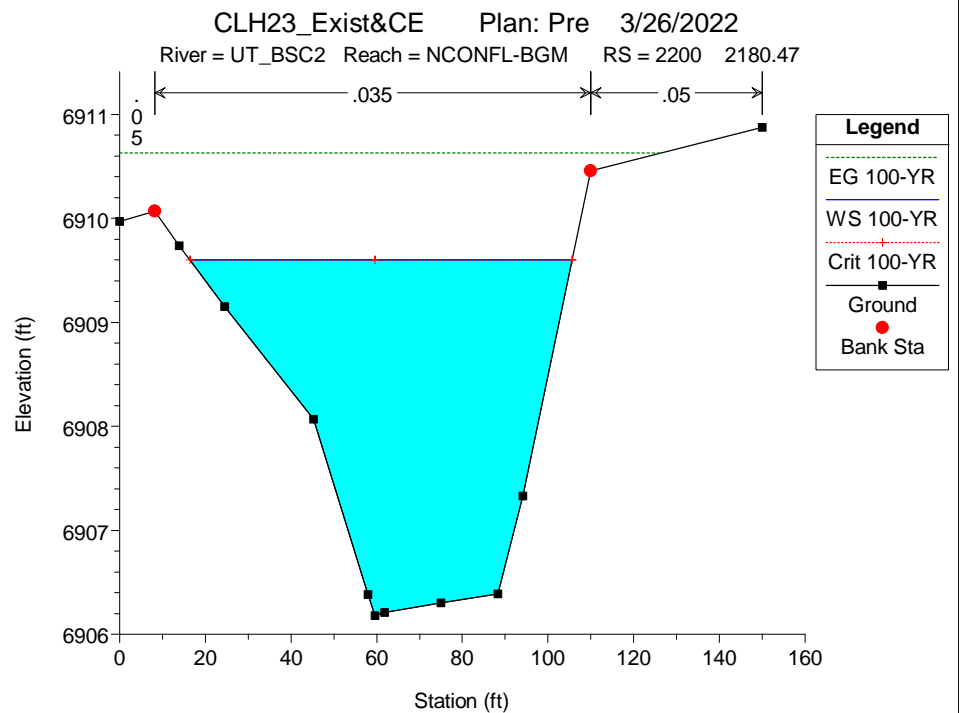
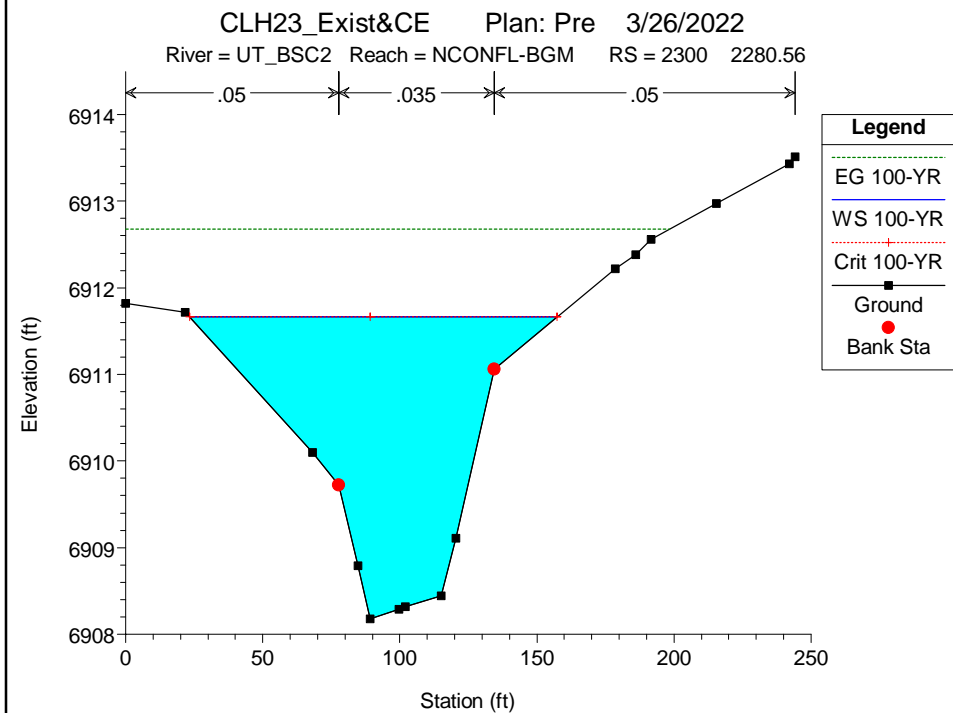
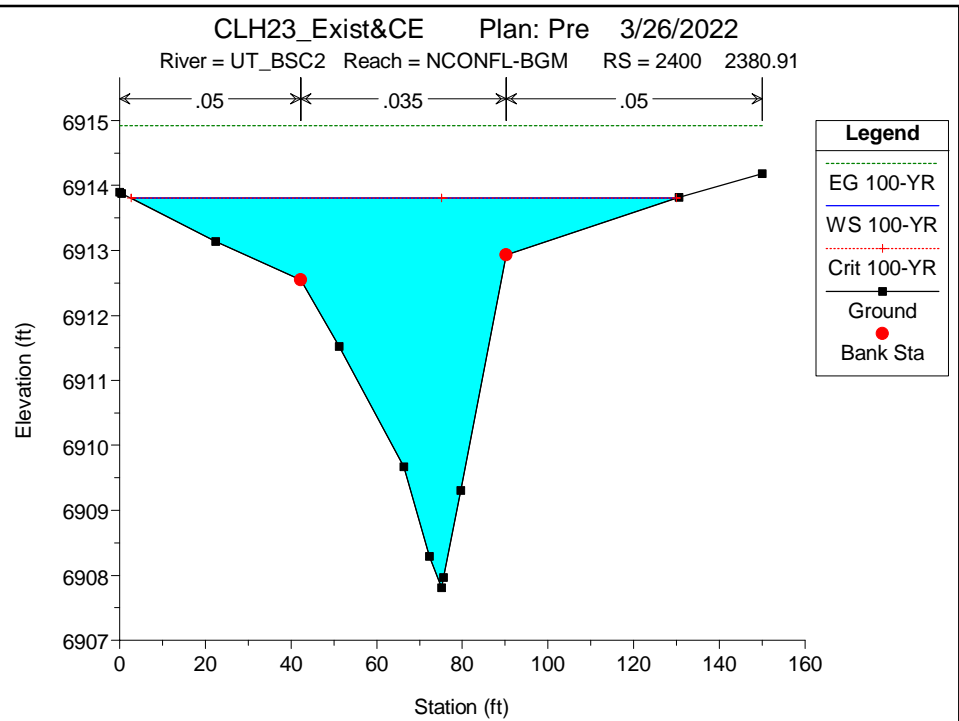
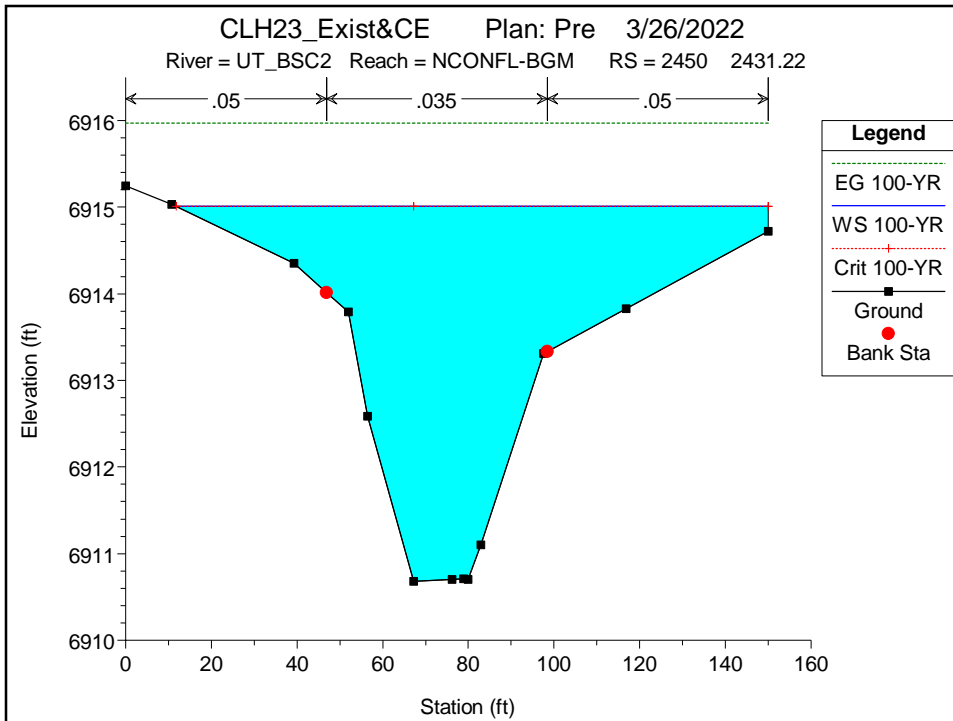


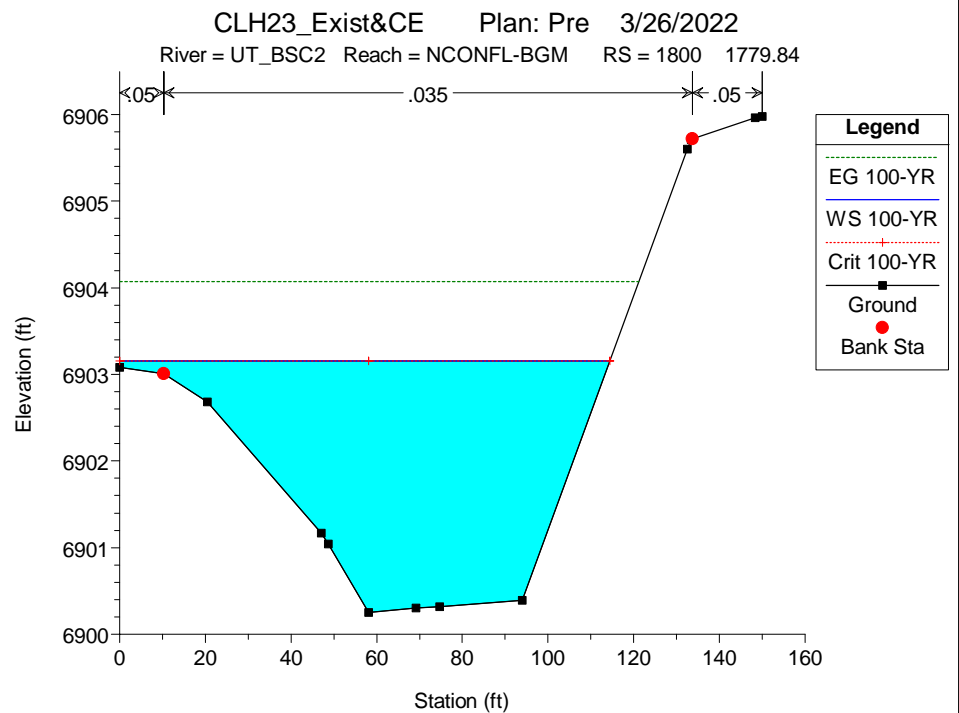
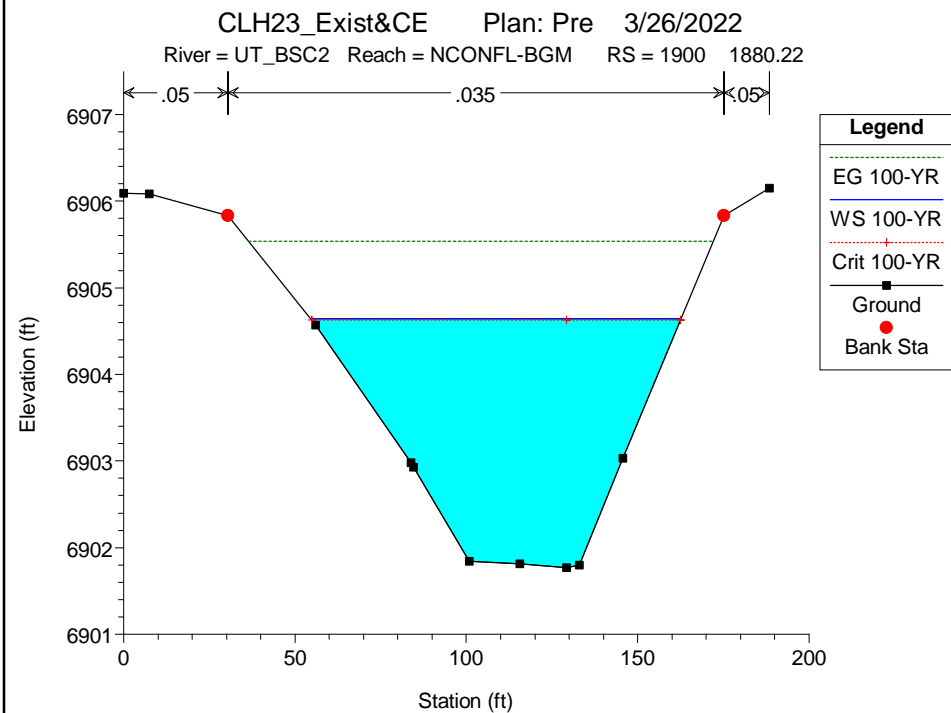
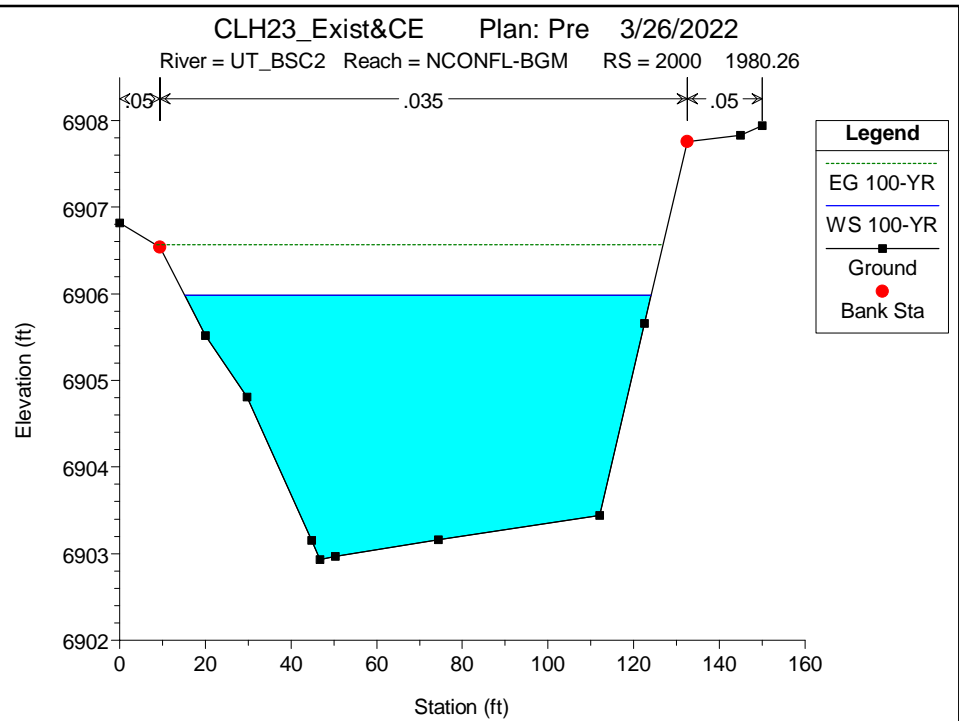
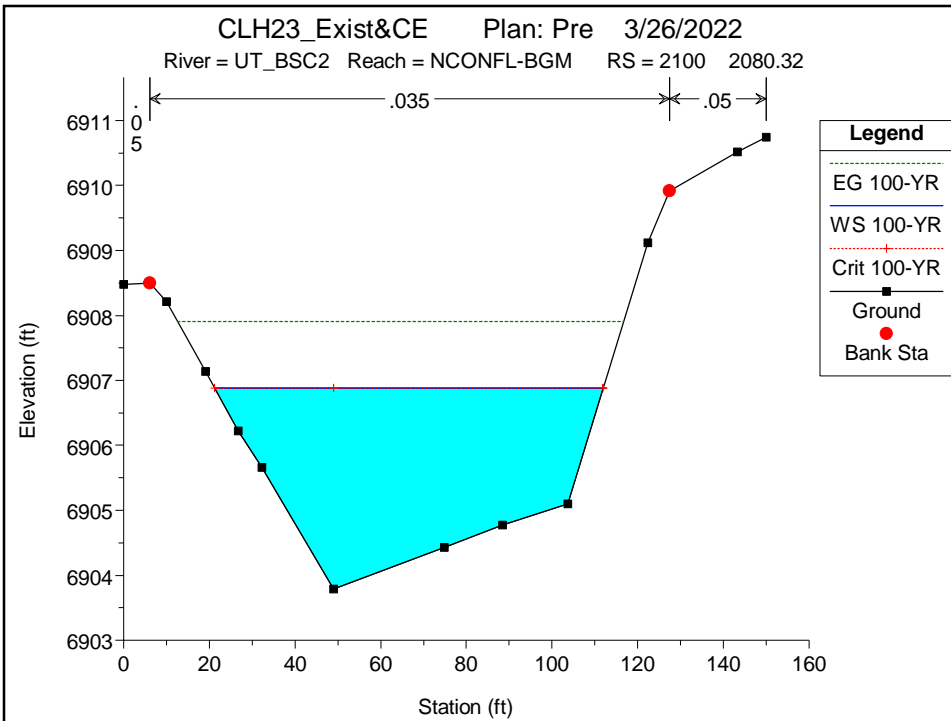


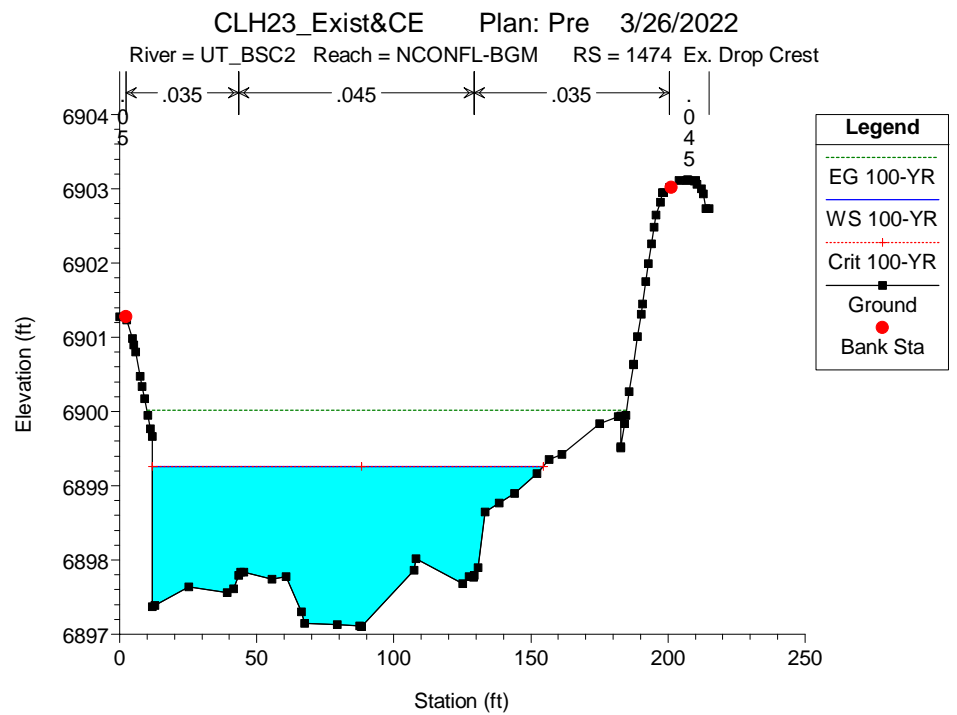
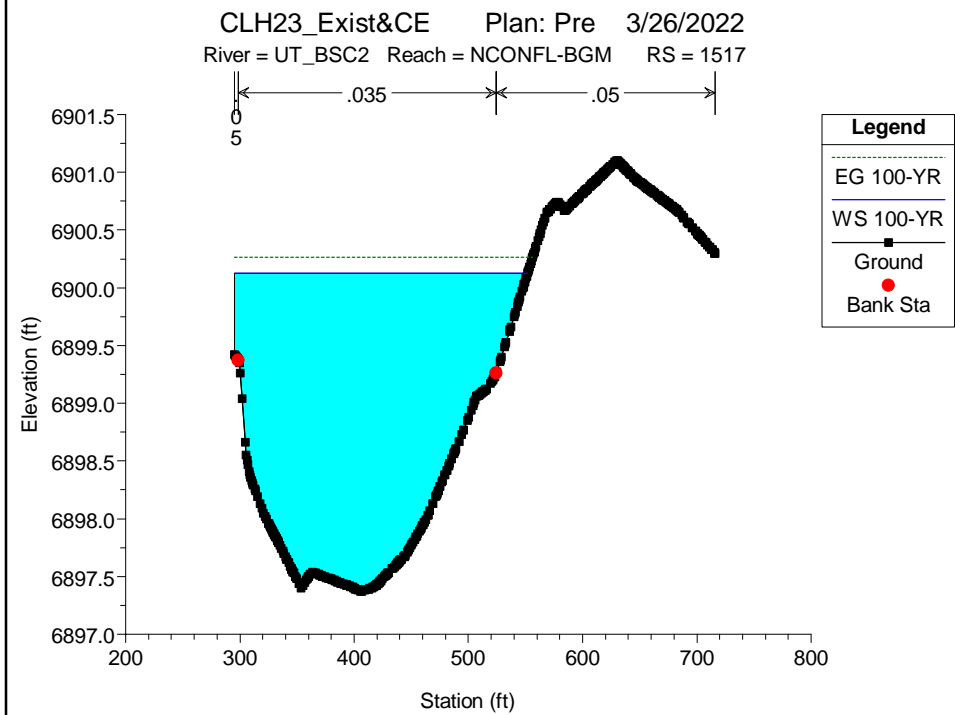
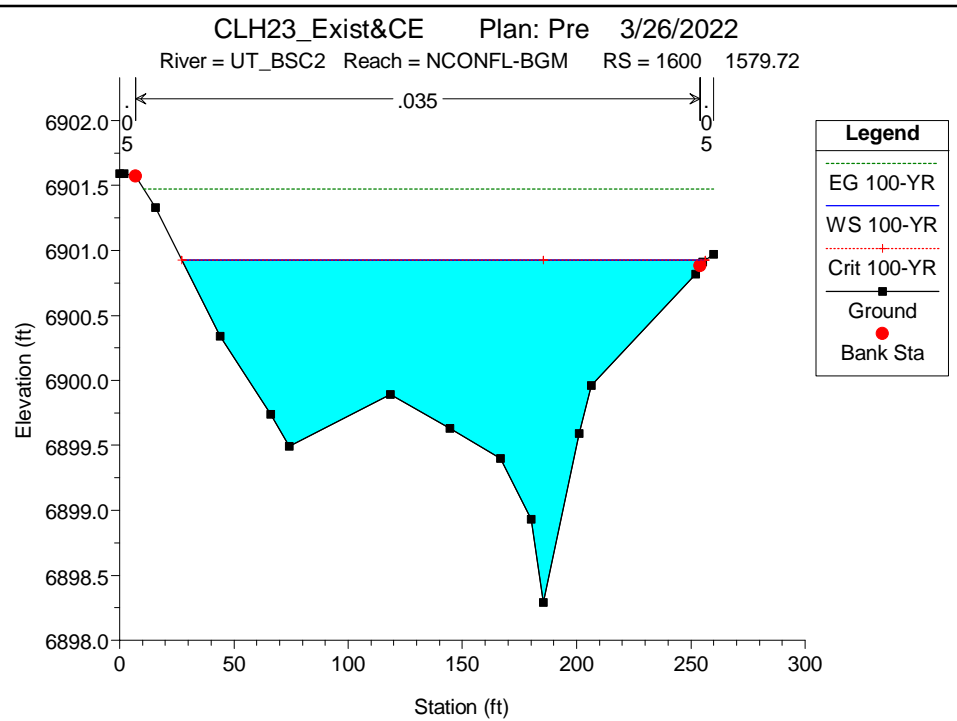
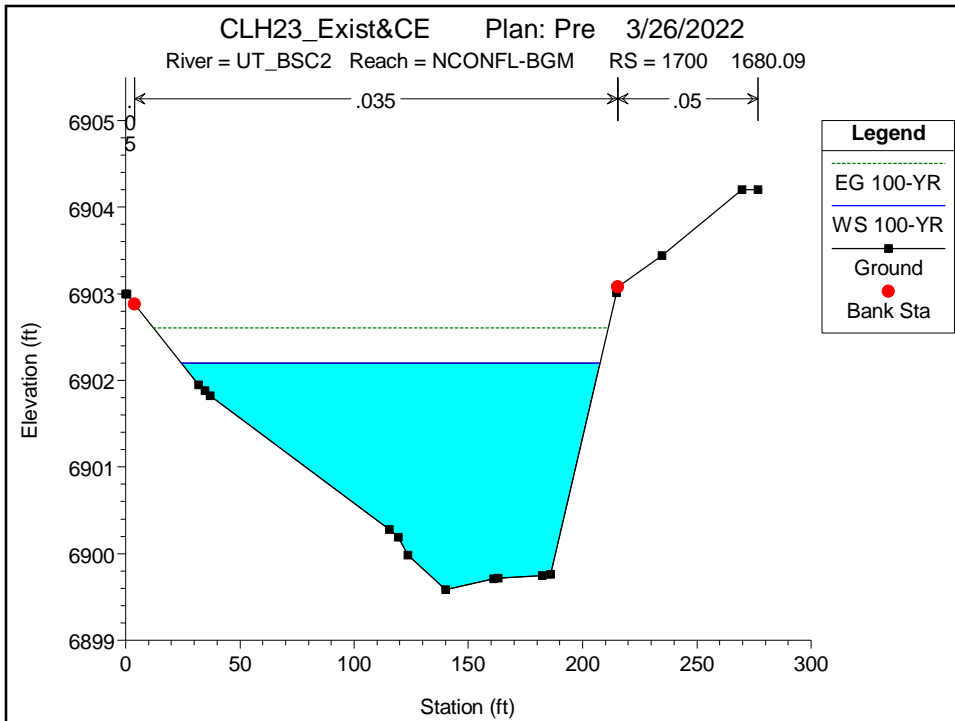


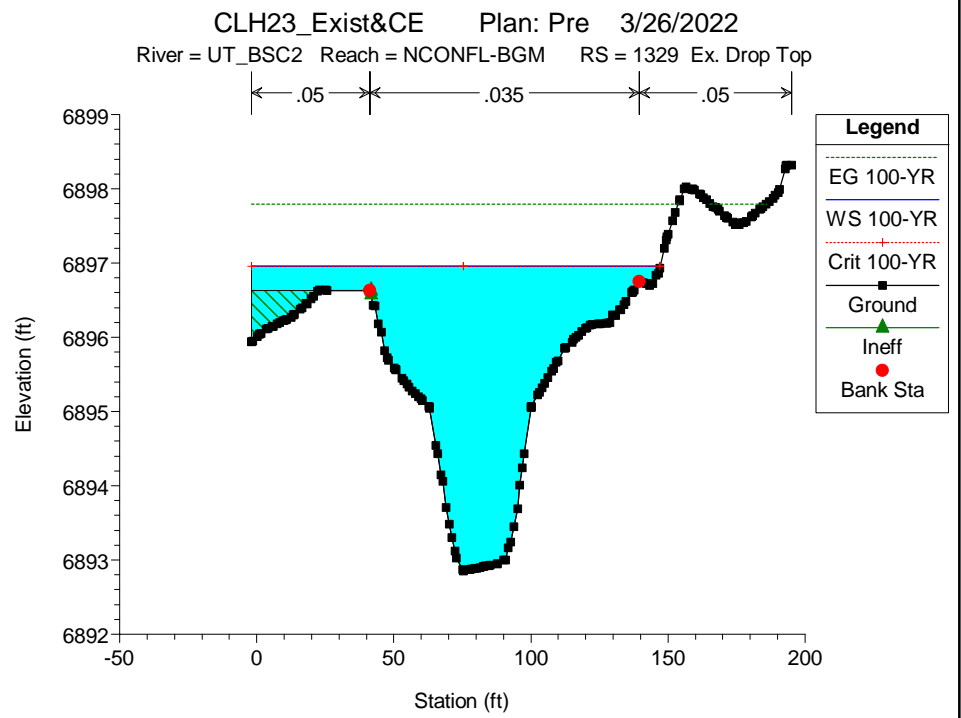
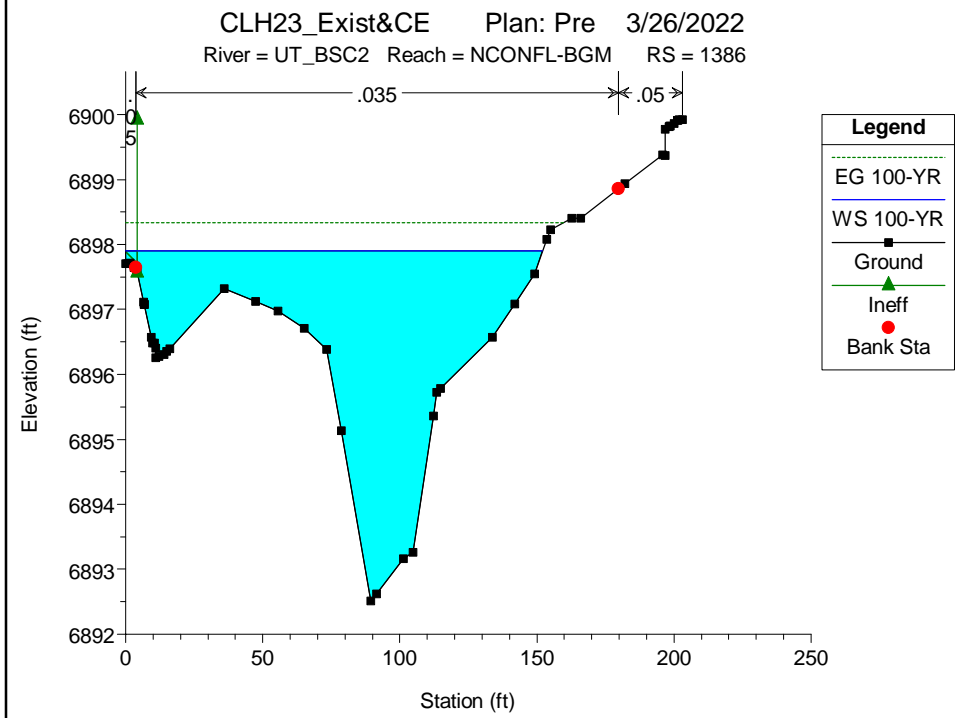
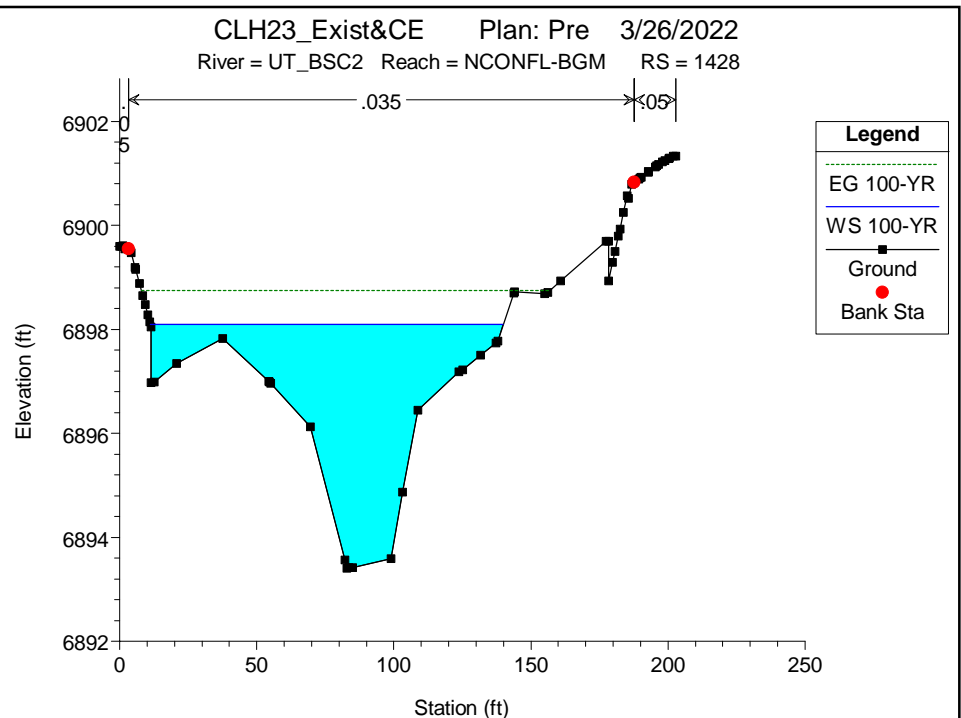
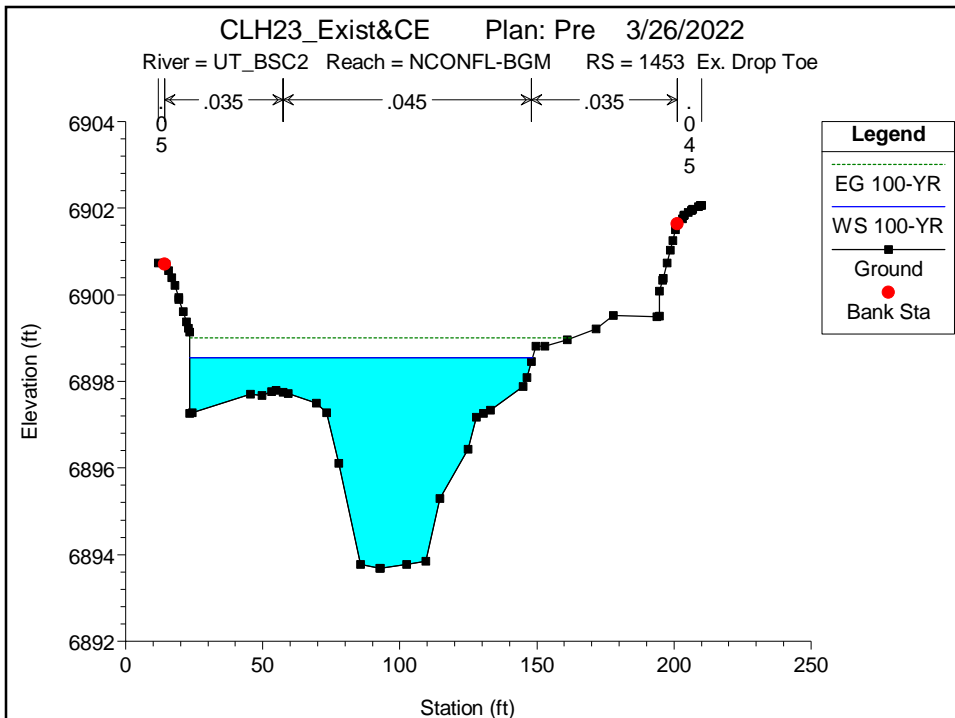


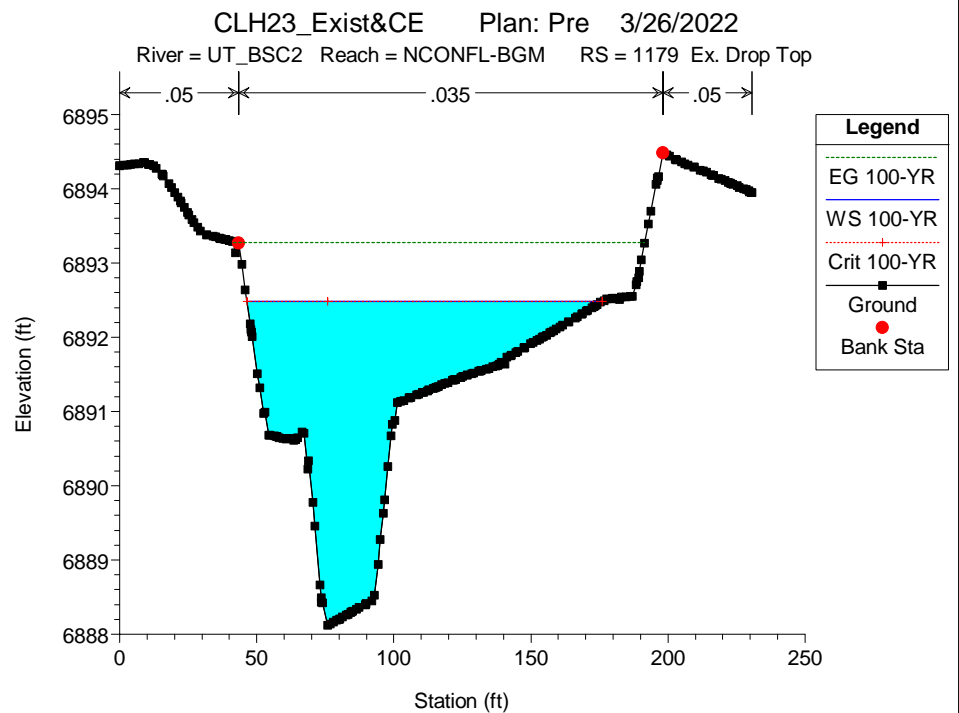
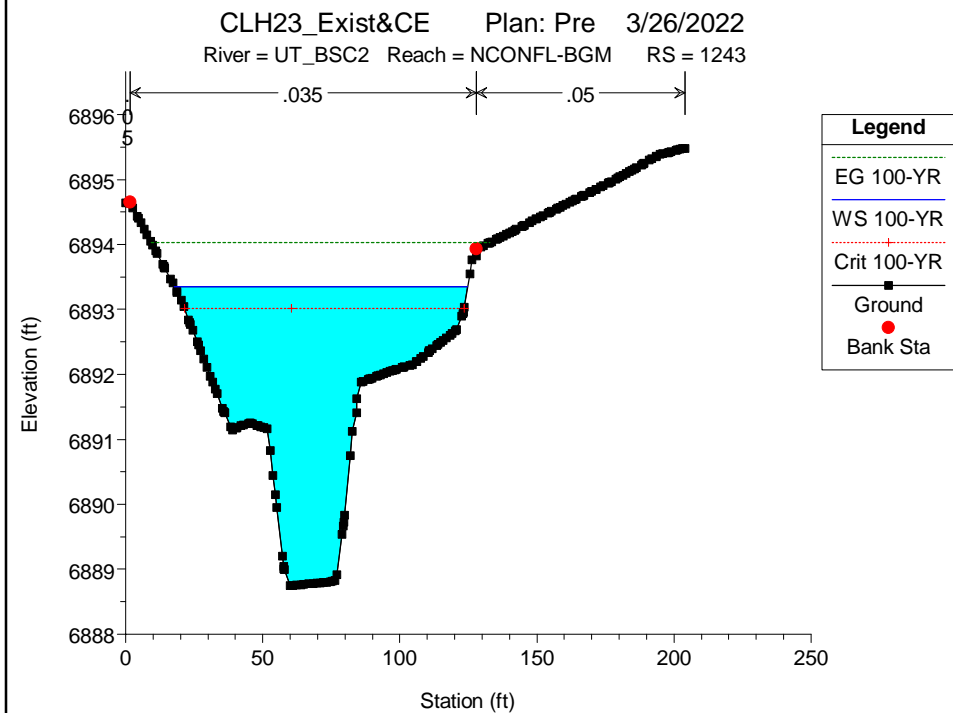
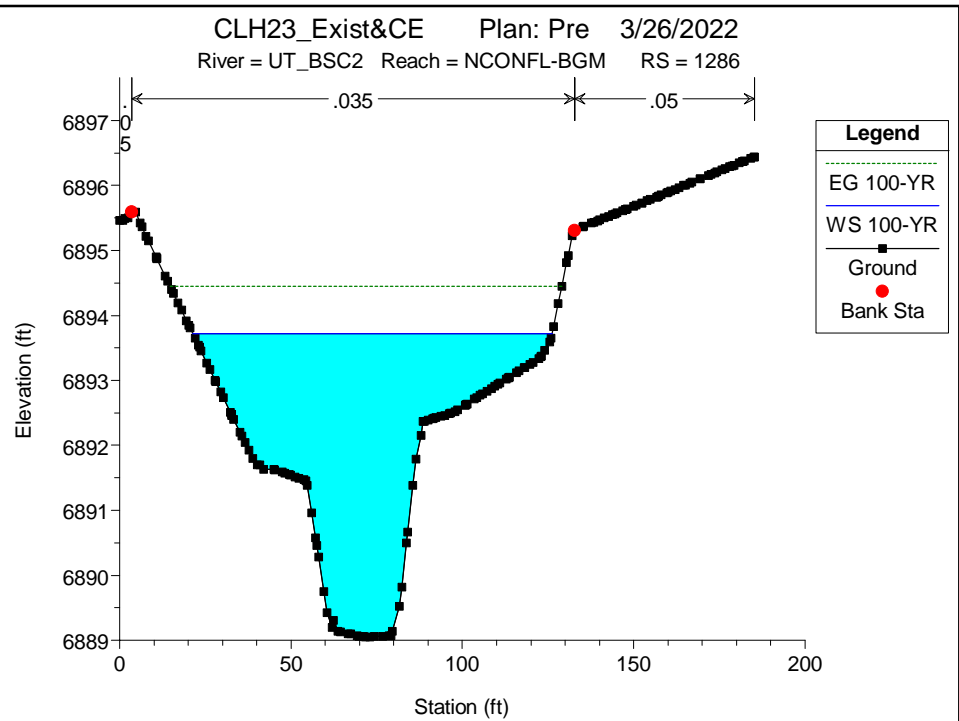
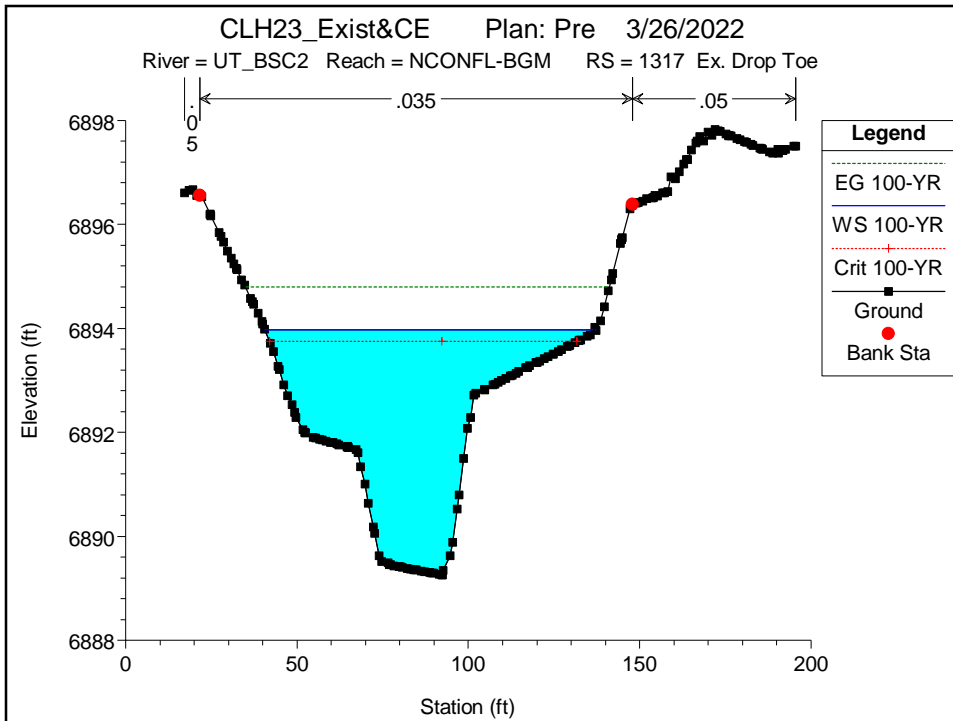


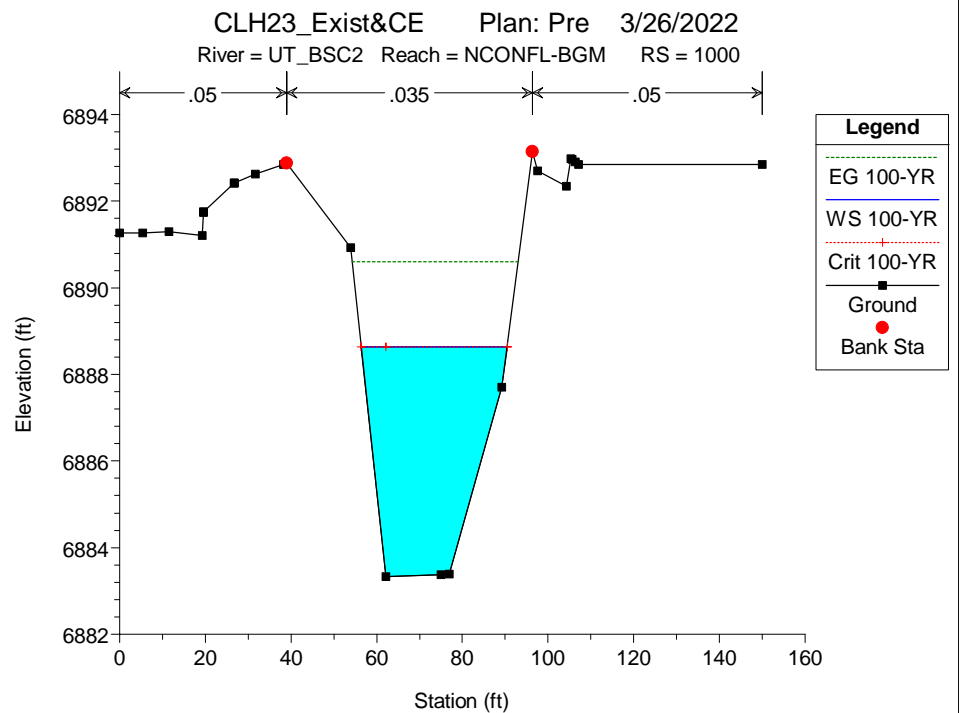
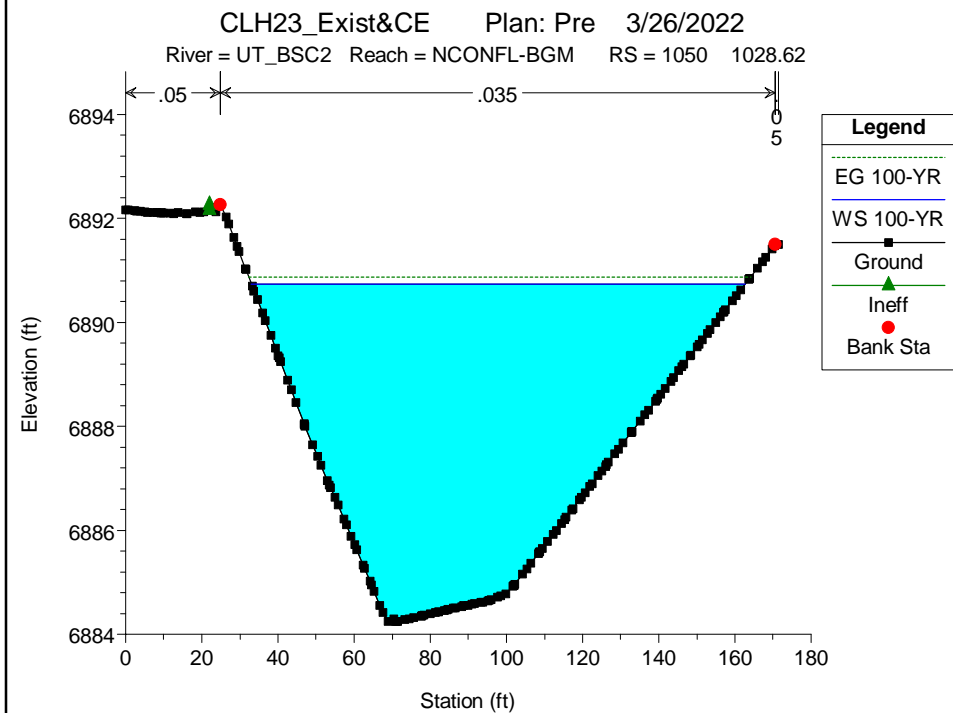
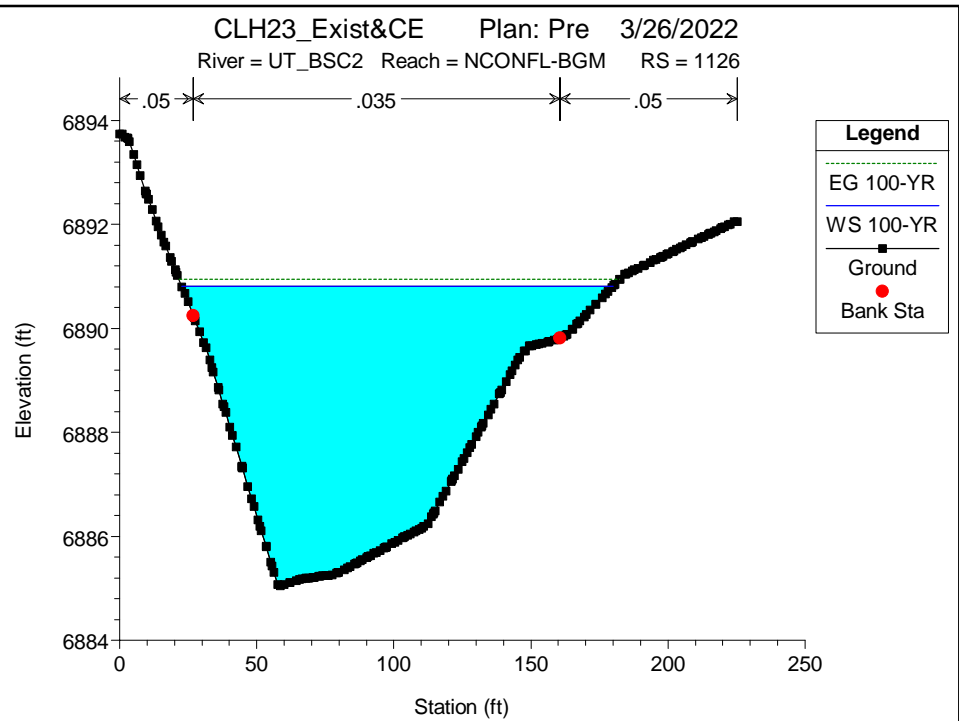
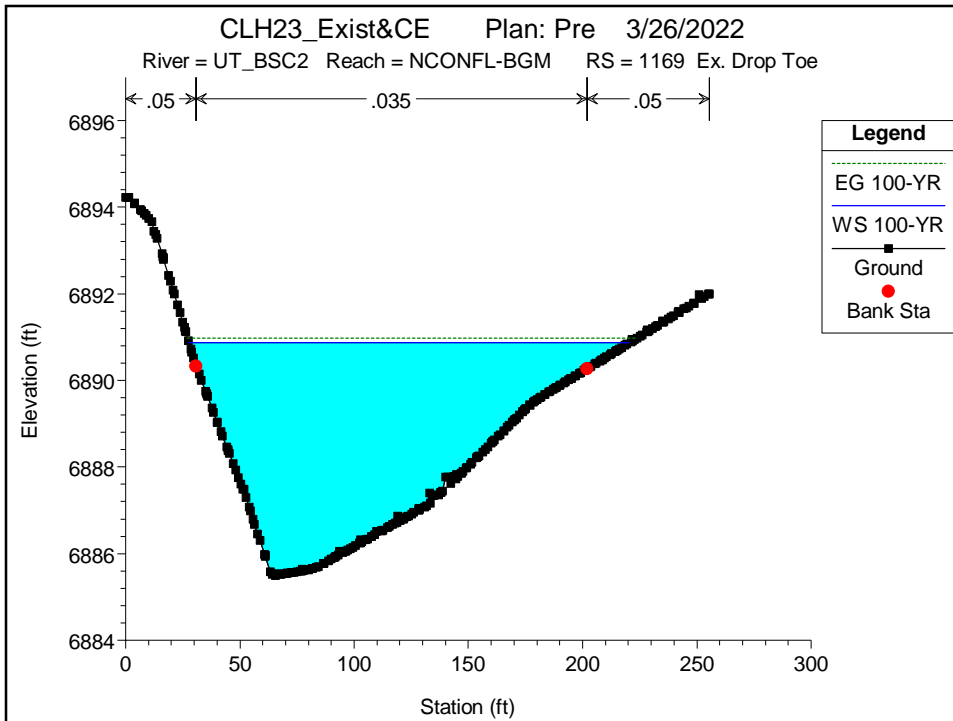












ATTACHMENT L
Post Project Model Results Table



Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl	Shear Total (lb/sq ft)
Channel-Rev Stat	6057	PF 1	1000.00	6969.00	6973.28		6973.93	0.007304	6.78	159.55	54.75	0.67	1.3
Channel-Rev Stat	6007	PF 1	1000.00	6968.59	6973.23		6973.59	0.003560	4.83	206.96	63.16	0.47	0.7
Channel-Rev Stat	5956	PF 1	1000.00	6968.41	6973.05		6973.42	0.003569	4.84	206.71	63.08	0.47	0.7
Channel-Rev Stat	5906	PF 1	1000.00	6968.23	6972.88		6973.24	0.003560	4.83	206.93	63.14	0.47	0.7
Channel-Rev Stat	5856	PF 1	1000.00	6968.06	6972.69		6973.06	0.003587	4.85	206.37	63.07	0.47	0.7
Channel-Rev Stat	5806	PF 1	1000.00	6967.88	6972.51		6972.88	0.003593	4.85	206.26	63.05	0.47	0.7
Channel-Rev Stat	5756	PF 1	1000.00	6967.71	6972.33		6972.70	0.003627	4.86	205.57	62.97	0.47	0.7
Channel-Rev Stat	5706	PF 1	1000.00	6967.53	6972.15		6972.52	0.003639	4.87	205.30	62.93	0.48	0.7
Channel-Rev Stat	5656	PF 1	1000.00	6967.36	6971.96		6972.33	0.003679	4.89	204.50	62.84	0.48	0.7
Channel-Rev Stat	5606	PF 1	1000.00	6967.18	6971.78		6972.15	0.003714	4.91	203.80	62.74	0.48	0.7
Channel-Rev Stat	5556	PF 1	1000.00	6967.01	6971.58		6971.96	0.003780	4.94	202.53	62.58	0.48	0.8
Channel-Rev Stat	5506	PF 1	1000.00	6966.83	6971.39		6971.77	0.003827	4.96	201.62	62.46	0.49	0.8
Channel-Rev Stat	5456	PF 1	1000.00	6966.66	6971.19		6971.58	0.003926	5.01	199.78	62.23	0.49	0.8
Channel-Rev Stat	5406	PF 1	1000.00	6966.48	6970.98		6971.38	0.004028	5.05	197.92	61.98	0.50	0.8
Channel-Rev Stat	5356	PF 1	1000.00	6966.31	6970.76		6971.17	0.004186	5.12	195.23	61.65	0.51	0.8
Channel-Rev Stat	5306	PF 1	1000.00	6966.13	6970.54		6970.96	0.004370	5.20	192.23	61.51	0.52	0.8
Channel-Rev Stat	5256	PF 1	1000.00	6965.96	6970.29		6970.73	0.004685	5.33	187.48	60.63	0.53	0.9
Channel-Rev Stat	5206	PF 1	1000.00	6965.78	6970.01		6970.48	0.005126	5.51	181.51	59.84	0.56	1.0
Channel-Rev Stat	5156	PF 1	1000.00	6965.61	6969.67		6970.20	0.006005	5.83	171.50	58.49	0.60	1.1
Channel-Rev Stat	5106	PF 1	1000.00	6965.43	6969.18		6969.84	0.008140	6.50	153.81	56.01	0.69	1.4
Channel-Rev Stat	5088	Ex. Drop Crest	1000.00	6965.37	6968.84	6968.40	6969.65	0.010977	7.23	138.31	53.77	0.79	1.7
Channel-Rev Stat	5083	PF 1	1000.00	6965.35	6968.38	6968.38	6969.55	0.018331	8.67	115.34	50.21	1.01	2.6
Channel-Rev Stat	5072	PF 1	1000.00	6962.72	6965.76	6965.76	6966.92	0.018115	8.63	115.82	50.29	1.00	2.6
Channel-Rev Stat	5062	Ex. Drop Toe	1000.00	6960.10	6964.09		6964.66	0.006549	6.03	165.95	57.49	0.63	1.2
Channel-Rev Stat	5056	PF 1	1000.00	6960.08	6964.06		6964.62	0.006486	5.99	166.85	57.86	0.62	1.1
Channel-Rev Stat	5006	PF 1	1000.00	6959.78	6963.46	6962.90	6964.21	0.009775	6.92	144.54	54.55	0.75	1.6
Channel-Rev Stat	4955	End Ex. Imp.	1000.00	6959.62	6962.57	6962.57	6963.51	0.019509	7.79	128.32	69.07	1.01	2.2
Channel-Rev Stat	4833	Begin Prop. Imp.	1000.00	6958.00	6961.75		6962.28	0.005432	5.85	170.95	65.97	0.64	0.9
Channel-Rev Stat	4817	PF 1	1000.00	6957.95	6961.62		6962.18	0.005918	6.02	166.00	65.38	0.67	0.9
Channel-Rev Stat	4794	PF 1	1000.00	6957.88	6961.30		6961.99	0.010389	6.67	150.00	63.40	0.76	1.5
Channel-Rev Stat	4789	PF 1	1000.00	6957.86	6961.21		6961.95	0.011458	6.90	145.03	62.73	0.80	1.6
Channel-Rev Stat	4788	PF 1	1000.00	6957.86	6961.19	6960.84	6961.94	0.011714	6.95	143.98	62.63	0.81	1.7
Channel-Rev Stat	4785	Drop 1 Crest	1000.00	6957.84	6960.82	6960.82	6961.86	0.018850	8.16	122.50	59.78	1.01	2.4
Channel-Rev Stat	4784	PF 1	1000.00	6957.63	6960.61	6960.61	6961.65	0.018962	8.20	121.92	59.30	1.01	2.4
Channel-Rev Stat	4768	PF 1	1000.00	6953.64	6957.72		6958.18	0.005077	5.43	184.28	61.50	0.55	0.9
Channel-Rev Stat	4765	Drop 1 Toe	1000.00	6952.97	6957.83		6958.12	0.002580	4.34	230.57	64.56	0.40	0.6
Channel-Rev Stat	4756	PF 1	1000.00	6952.83	6957.84		6958.09	0.001686	4.07	245.76	67.32	0.38	0.4
Channel-Rev Stat	4740	PF 1	1450.00	6952.78	6957.35		6958.01	0.005061	6.50	223.19	69.55	0.64	1.0
Channel-Rev Stat	4735	PF 1	1450.00	6952.76	6957.33		6957.98	0.005031	6.47	224.03	69.92	0.64	1.0
Channel-Rev Stat	4731	PF 1	1450.00	6952.75	6957.31		6957.96	0.005060	6.47	224.07	70.27	0.64	1.0
Channel-Rev Stat	4690	PF 1	1450.00	6952.63	6957.03		6957.73	0.005798	6.71	216.18	71.25	0.68	1.1
Channel-Rev Stat	4672	PF 1	1450.00	6952.58	6956.87		6957.62	0.006472	6.97	208.01	70.32	0.71	1.2
Channel-Rev Stat	4655	PF 1	1450.00	6952.52	6956.66		6957.50	0.007504	7.34	197.58	69.09	0.77	1.3
Channel-Rev Stat	4649	PF 1	1450.00	6952.51	6956.53		6957.44	0.011075	7.65	189.46	68.21	0.81	1.9
Channel-Rev Stat	4645	PF 1	1450.00	6952.49	6956.44		6957.40	0.012071	7.89	183.87	67.52	0.84	2.0
Channel-Rev Stat	4644	PF 1	1450.00	6952.49	6956.40	6956.09	6957.39	0.012530	7.99	181.50	67.22	0.86	2.1
Channel-Rev Stat	4640	Drop 2 Crest	1450.00	6952.41	6956.05	6956.05	6957.31	0.017791	9.01	160.96	64.77	1.01	2.7
Channel-Rev Stat	4629	Drop 2 Toe	1450.00	6949.60	6954.09		6954.82	0.007313	6.85	211.66	65.50	0.67	1.4
Channel-Rev Stat	4616	PF 1	1450.00	6949.45	6954.08		6954.71	0.004800	6.36	227.81	70.38	0.62	1.0
Channel-Rev Stat	4604	PF 1	1450.00	6949.41	6954.03		6954.65	0.004810	6.33	228.98	71.40	0.62	0.9
Channel-Rev Stat	4595	PF 1	1450.00	6949.38	6953.98		6954.61	0.004877	6.33	229.12	72.36	0.63	0.9
Channel-Rev Stat	4590	PF 1	1450.00	6949.37	6953.96		6954.58	0.004892	6.32	229.37	72.74	0.63	0.9
Channel-Rev Stat	4557	PF 1	1450.00	6949.27	6953.73		6954.41	0.005509	6.59	220.04	71.68	0.66	1.0
Channel-Rev Stat	4539	PF 1	1450.00	6949.22	6953.57		6954.30	0.006088	6.82	212.53	70.87	0.69	1.1
Channel-Rev Stat	4537	PF 1	1450.00	6949.21	6953.56		6954.28	0.006129	6.84	211.98	70.76	0.70	1.1
Channel-Rev Stat	4515	PF 1	1450.00	6949.14	6953.22		6954.09	0.010460	7.51	193.19	68.59	0.79	1.8
Channel-Rev Stat	4512	PF 1	1450.00	6949.14	6953.15		6954.07	0.011216	7.69	188.58	68.06	0.81	1.9
Channel-Rev Stat	4510	PF 1	1450.00	6949.13	6953.09	6952.72	6954.04	0.011810	7.83	185.27	67.69	0.83	2.0
Channel-Rev Stat	4508	Drop 3 Crest	1450.00	6949.12	6952.72	6952.72	6953.98	0.017737	9.00	161.05	64.76	1.01	2.7
Channel-Rev Stat	4505	PF 1	1450.00	6948.63	6952.25	6952.25	6953.52	0.017667	9.04	160.35	63.81	1.01	2.7
Channel-Rev Stat	4489	Drop 3 Toe	1450.00	6944.63	6948.84		6949.74	0.009590	7.61	190.62	61.65	0.76	1.8
Channel-Rev Stat	4477	PF 1	1450.00	6944.09	6949.00		6949.57	0.003869	6.07	238.96	67.08	0.57	0.8
Channel-Rev Stat	4457	PF 1	1450.00	6944.03	6948.96		6949.48	0.003681	5.82	249.14	72.03	0.55	0.8
Channel-Rev Stat	4453	PF 1	1450.00	6944.02	6948.94		6949.47	0.003699	5.80	249.81	72.85	0.55	0.8
Channel-Rev Stat	4440	PF 1	1450.00	6943.98	6948.91		6949.41	0.003643	5.70	254.27	75.40	0.55	0.8
Channel-Rev Stat	4390	PF 1	1450.00	6943.83	6948.70		6949.22	0.003809	5.79	250.31	74.99	0.56	0.8
Channel-Rev Stat	4339	PF 1	1450.00	6943.68	6948.48		6949.03	0.004038	5.91	245.27	74.44	0.57	0.8
Channel-Rev Stat	4289	PF 1	1450.00	6943.53	6948.24		6948.82	0.004390	6.09	238.17	73.65	0.60	0.9
Channel-Rev Stat	4239	PF 1	1450.00	6943.38	6947.96		6948.58	0.004934	6.34	228.76	72.70	0.63	1.0
Channel-Rev Stat	4189	PF 1	1450.00	6943.23	6947.55		6948.29	0.006304	6.91	209.92	70.51	0.71	1.2
Channel-Rev Stat	4183	PF 1	1450.00	6943.21	6947.48		6948.24	0.006499	6.97	208.00	70.54	0.72	1.2
Channel-Rev Stat	4167	Ex. Drop Crest	1450.00	6943.16	6946.75	6946.75	6948.02	0.022504	9.01	160.92	64.74	1.01	3.4
Channel-Rev Stat	4152	PF 1	1450.00	6940.35	6943.35	6943.35	6944.58	0.022503	8.88	163.28	67.36	1.01	3.4
Channel-Rev Stat	4136	Ex. Drop Toe	1450.00	6937.01	6943.62		6943.81	0.000798	3.48	416.55	98.86	0.27	0.2
Channel-Rev Stat	4089	PF 1	1450.00	6936.87	6943.62		6943.80	0.000086	3.47	417.86	121.95	0.25	0.0
Channel-Rev Stat	4072	PF 1	1450.00	6936.83	6943.42		6943.78	0.000150	4.86	298.52	102.52	0.34	0.1
Channel-Rev Stat	4056	PF 1	1450.00	6936.78	6943.34	6940.11	6943.76	0.000184	5.23	277.42	83.87	0.36	0.1
Channel-Rev Stat	3992	BG Meadows Dr	Culvert										
Channel-Rev Stat	3931	PF 1	1450.00	6936.40	6939.95	6939.95	6941.75	0.015441	10.74	134.95	42.55	1.01	3.4
Channel-Rev Stat	3923	PF 1	1450.00	6936.38	6940.04	6939.63	6941.30	0.013664	9.01	161.00	59.83	0.84	3.0
Channel-Rev Stat	3887	Drop 4 Crest	1482.00	6936.26	6939.46	6939.46	6940.76	0.017586	9.13	162.31	63.53	1.01	2.8
Channel-Rev Stat	3867	Drop 4 Toe	1482.00	6931.40	6936.14		6936.82	0.006175	6.61	224.10	64.09	0.62	1.3
Channel-Rev Stat	3837	PF 1	1482.00	6931.18	6936.05		6936.62	0.004157	6.07	244.17	72.70	0.58	0.9
Channel-Rev Stat	3803	PF 1	1482.00	6931.08	6935.92		6936.47	0.004107	5.99	247.57	74.68	0.58	

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	Shear Total
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
Channel-Rev Stat	3642	PF 1	1482.00	6930.60	6934.68	6934.23	6935.59	0.010890	7.66	193.44	68.64	0.80	1.9
Channel-Rev Stat	3637 Drop 5 Crest	PF 1	1482.00	6930.57	6934.21	6934.21	6935.49	0.017681	9.06	163.62	65.03	1.01	2.7
Channel-Rev Stat	3620 Drop 5 Toe	PF 1	1482.00	6926.73	6931.50		6932.16	0.006050	6.52	227.28	65.52	0.62	1.3
Channel-Rev Stat	3587	PF 1	1482.00	6926.48	6931.45		6931.96	0.003677	5.76	257.33	75.72	0.55	0.8
Channel-Rev Stat	3523	PF 1	1482.00	6926.29	6931.17		6931.71	0.003954	5.91	250.94	75.06	0.57	0.8
Channel-Rev Stat	3375	PF 1	1482.00	6925.96	6930.59		6931.22	0.004935	6.38	232.16	73.02	0.63	1.0
Channel-Rev Stat	3369	PF 1	1482.00	6925.84	6930.31		6931.01	0.005713	6.72	220.54	71.70	0.68	1.1
Channel-Rev Stat	3342	PF 1	1482.00	6925.74	6929.83	6929.38	6930.74	0.010827	7.65	193.83	68.68	0.80	1.9
Channel-Rev Stat	3337 Drop 6 Crest	PF 1	1482.00	6925.70	6929.36	6929.36	6930.63	0.017694	9.05	163.69	65.08	1.01	2.7
Channel-Rev Stat	3317 Drop 6 Toe	PF 1	1482.00	6920.87	6925.70		6926.35	0.005825	6.49	228.41	64.35	0.61	1.3
Channel-Rev Stat	3302	PF 1	1482.00	6920.69	6925.69		6926.26	0.003752	6.01	246.66	68.71	0.56	0.8
Channel-Rev Stat	3287	PF 1	1482.00	6920.64	6925.68		6926.19	0.003521	5.72	258.99	74.36	0.54	0.8
Channel-Rev Stat	3237	PF 1	1482.00	6920.49	6925.50		6926.00	0.003535	5.68	260.93	76.09	0.54	0.7
Channel-Rev Stat	3178	PF 1	1482.00	6920.31	6925.28		6925.79	0.003683	5.76	257.21	75.71	0.55	0.8
Channel-Rev Stat	3130	PF 1	1482.00	6920.17	6925.08		6925.61	0.003855	5.85	253.13	75.28	0.56	0.8
Channel-Rev Stat	3086	PF 1	1482.00	6920.04	6924.88		6925.44	0.004081	5.97	248.12	74.75	0.58	0.8
Channel-Rev Stat	3081	PF 1	1482.00	6920.02	6924.86		6925.42	0.004095	5.98	247.84	74.72	0.58	0.8
Channel-Rev Stat	3076	PF 1	1482.00	6920.01	6924.84		6925.40	0.004133	6.00	247.04	74.64	0.58	0.8
Channel-Rev Stat	3060	PF 1	1482.00	6919.96	6924.76		6925.33	0.004224	6.05	245.12	74.43	0.59	0.9
Channel-Rev Stat	3050	PF 1	1482.00	6919.93	6924.72		6925.29	0.004290	6.08	243.85	74.30	0.59	0.9
Channel-Rev Stat	2994	PF 1	1482.00	6919.76	6924.40		6925.03	0.004886	6.36	232.95	73.09	0.63	1.0
Channel-Rev Stat	2962	PF 1	1482.00	6919.67	6924.14		6924.86	0.005389	6.79	218.98	73.35	0.66	1.1
Channel-Rev Stat	2944	PF 1	1482.00	6919.61	6924.02		6924.75	0.006011	6.84	216.74	71.32	0.69	1.1
Channel-Rev Stat	2940	PF 1	1482.00	6919.60	6923.99		6924.73	0.006147	6.89	215.04	71.11	0.70	1.1
Channel-Rev Stat	2917	PF 1	1482.00	6919.53	6923.64	6923.18	6924.53	0.010588	7.59	195.36	68.88	0.79	1.8
Channel-Rev Stat	2912 Drop 7 Crest	PF 1	1482.00	6919.51	6923.15	6923.15	6924.43	0.017713	9.06	163.60	65.08	1.01	2.7
Channel-Rev Stat	2896 Drop 7 Toe	PF 1	1482.00	6915.67	6920.30		6921.02	0.006762	6.77	218.87	64.81	0.65	1.4
Channel-Rev Stat	2862	PF 1	1482.00	6915.41	6920.22		6920.80	0.004305	6.11	242.57	73.45	0.59	0.9
Channel-Rev Stat	2848	PF 1	1482.00	6915.37	6920.16		6920.73	0.004273	6.07	244.14	74.30	0.59	0.9
Channel-Rev Stat	2762	PF 1	1482.00	6915.11	6919.62		6920.31	0.005481	6.62	223.81	72.09	0.66	1.0
Channel-Rev Stat	2744	PF 1	1482.00	6915.06	6919.48		6920.20	0.005980	6.83	217.09	71.34	0.69	1.1
Channel-Rev Stat	2741	PF 1	1482.00	6915.05	6919.45		6920.18	0.006077	6.86	215.88	71.20	0.70	1.1
Channel-Rev Stat	2717	PF 1	1482.00	6914.98	6919.07	6918.61	6919.98	0.010764	7.63	194.27	68.77	0.80	1.9
Channel-Rev Stat	2712 Drop 8 Crest	PF 1	1482.00	6914.95	6918.59	6918.59	6919.87	0.017798	9.07	163.32	65.02	1.01	2.8
Channel-Rev Stat	2696 Drop 8 Toe	PF 1	1482.00	6911.11	6915.92		6916.56	0.005829	6.44	230.19	65.77	0.61	1.2
Channel-Rev Stat	2662	PF 1	1482.00	6910.86	6915.87		6916.39	0.003607	5.74	258.08	75.11	0.55	0.8
Channel-Rev Stat	2594	PF 1	1482.00	6910.66	6915.62		6916.14	0.003694	5.77	256.94	75.27	0.55	0.8
Channel-Rev Stat	2544	PF 1	1482.00	6910.51	6915.41		6915.95	0.003872	5.86	252.71	75.24	0.56	0.8
Channel-Rev Stat	2490	PF 1	1482.00	6910.35	6915.17		6915.73	0.004170	6.02	246.21	74.53	0.58	0.8
Channel-Rev Stat	2407	PF 1	1482.00	6910.10	6914.69		6915.34	0.005081	6.45	229.79	72.75	0.64	1.0
Channel-Rev Stat	2387	PF 1	1482.00	6910.04	6914.55		6915.23	0.005482	6.62	223.77	72.09	0.66	1.0
Channel-Rev Stat	2369	PF 1	1482.00	6909.98	6914.41		6915.13	0.005944	6.81	217.53	71.39	0.69	1.1
Channel-Rev Stat	2342	PF 1	1482.00	6909.90	6914.00	6913.54	6914.90	0.010655	7.60	194.90	68.80	0.80	1.9
Channel-Rev Stat	2337 Drop 9 Crest	PF 1	1482.00	6909.89	6913.52	6913.52	6914.80	0.017739	9.06	163.59	65.13	1.01	2.7
Channel-Rev Stat	2321 Drop 9 Toe	PF 1	1482.00	6905.99	6910.66		6911.36	0.006621	6.73	220.26	64.83	0.64	1.4
Channel-Rev Stat	2298	PF 1	1482.00	6905.82	6910.62		6911.21	0.004277	6.17	240.32	71.35	0.59	0.9
Channel-Rev Stat	2290	PF 1	1482.00	6905.79	6910.59	6909.48	6911.18	0.004303	6.14	241.55	72.66	0.59	0.9
Channel-Rev Stat	2287	PF 1	1482.00	6905.79	6910.58		6911.16	0.004356	6.14	241.47	73.32	0.60	0.9
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Channel-Rev Stat	2142	PF 1	1482.00	6905.35	6909.45	6908.99	6910.35	0.010689	7.61	194.72	68.79	0.80	1.9
Channel-Rev Stat	2137 Drop 10 Crest	PF 1	1482.00	6905.34	6908.97	6908.97	6910.25	0.017695	9.05	163.69	65.12	1.01	2.7
Channel-Rev Stat	2121 Drop 10 Toe	PF 1	1482.00	6901.46	6905.93		6906.72	0.007854	7.13	207.86	63.83	0.70	1.6
Channel-Rev Stat	2098	PF 1	1482.00	6901.26	6905.87		6906.53	0.005068	6.54	226.51	69.92	0.64	1.0
Channel-Rev Stat	2087	PF 1	1482.00	6901.23	6905.81		6906.48	0.005240	6.55	226.27	71.59	0.65	1.0
Channel-Rev Stat	2039	PF 1	1482.00	6901.09	6905.42		6906.19	0.006494	7.02	210.99	70.68	0.72	1.2
Channel-Rev Stat	1987	PF 1	1482.00	6900.93	6905.09		6905.84	0.006680	6.95	213.20	74.20	0.72	1.2
Channel-Rev Stat	1966	PF 1	1482.00	6900.87	6904.94		6905.70	0.006907	6.97	212.66	75.62	0.73	1.2
Channel-Rev Stat	1957	PF 1	1482.00	6900.84	6904.86		6905.63	0.007092	7.01	211.49	76.09	0.74	1.2
Channel-Rev Stat	1942	PF 1	1482.00	6900.80	6904.60	6904.24	6905.49	0.011710	7.55	196.18	75.27	0.82	1.9
Channel-Rev Stat	1932 Drop 11 Crest	PF 1	1482.00	6900.77	6904.21	6904.21	6905.39	0.018028	8.72	170.01	72.80	1.01	2.6
Channel-Rev Stat	1922 Drop 11 Toe	PF 1	1482.00	6898.40	6902.80		6903.44	0.006599	6.44	230.25	72.61	0.64	1.3
Channel-Rev Stat	1892	PF 1	1482.00	6898.21	6902.63		6903.25	0.004935	6.35	233.26	73.75	0.63	1.0
Channel-Rev Stat	1887	PF 1	1482.00	6898.20	6902.60		6903.23	0.005031	6.39	232.03	73.85	0.64	1.0
Channel-Rev Stat	1854	PF 1	1482.00	6898.10	6902.38		6903.05	0.005516	6.54	226.64	74.74	0.66	1.0
Channel-Rev Stat	1808	PF 1	1482.00	6897.96	6902.00		6902.76	0.006972	7.00	211.86	75.39	0.74	1.2
Channel-Rev Stat	1754	PF 1	1482.00	6897.80	6901.61		6902.35	0.007821	6.91	214.40	85.02	0.77	1.2
Channel-Rev Stat	1712	PF 1	1482.00	6897.67	6901.44		6902.01	0.006130	6.04	245.46	99.50	0.68	0.9
Channel-Rev Stat	1674	PF 1	1482.00	6897.55	6901.26		6901.76	0.005728	5.67	261.43	110.86	0.65	0.8
Channel-Rev Stat	1606	PF 1	1482.00	6897.34	6900.87		6901.32	0.006165	5.38	275.28	133.52	0.66	0.8
Channel-Rev Stat	1551	PF 1	1482.00	6897.20	6900.56		6901.01	0.007357	5.39	275.21	152.51	0.71	0.8
Channel-Rev Stat	1498	PF 1	1482.00	6897.06	6899.94	6899.85	6900.55	0.013919	6.28	236.12	167.89	0.93	1.2
Channel-Rev Stat	1474 Ex. Drop Crest	PF 1	1482.00	6896.91	6899.38	6899.38	6900.13	0.020340	6.92	214.12	146.18	1.01	1.9
Channel-Rev Stat	1453 Ex. Drop Toe	PF 1	1482.00	6893.69	6898.39		6898.96	0.011177	6.10	242.97	131.78	0.79	1.3
Channel-Rev Stat	1428	PF 1	1482.00	6893.40	6898.15		6898.70	0.009100	5.94	249.65	139.94	0.78	1.0
Channel-Rev Stat	1386	PF 1	1482.00	6892.53	6898.00		6898.35	0.005347	4.80	314.21	174.75	0.61	0.6
Channel-Rev Stat	1329 Ex. Drop Top	PF 1	1482.00	6892.88	6896.97	6896.97	6897.85	0.012686	7.56	205.25	142.30	0.94	1.1
Channel-Rev Stat	1317 Ex. Drop Toe	PF 1	1482.00	6889.23	6893.97	6893.71	6894.76	0.010662	7.15	207.38	98.21	0.87	1.4
Channel-Rev Stat	1286	PF 1	1482.00	6889.03	6893.71		6894.42	0.009764	6.78	218.50	104.96	0.83	1.3
Channel-Rev Stat	1243	PF 1	1482.00	6888.72	6893.36	6892.99	6894.01	0.008749	6.50	228.08	107.66	0.79	1.1
Channel-Rev Stat	1179 Ex. Drop Top	PF 1	1482.00	6888.12	6892.48								

ATTACHMENT M
Post Project Water Surface Profiles



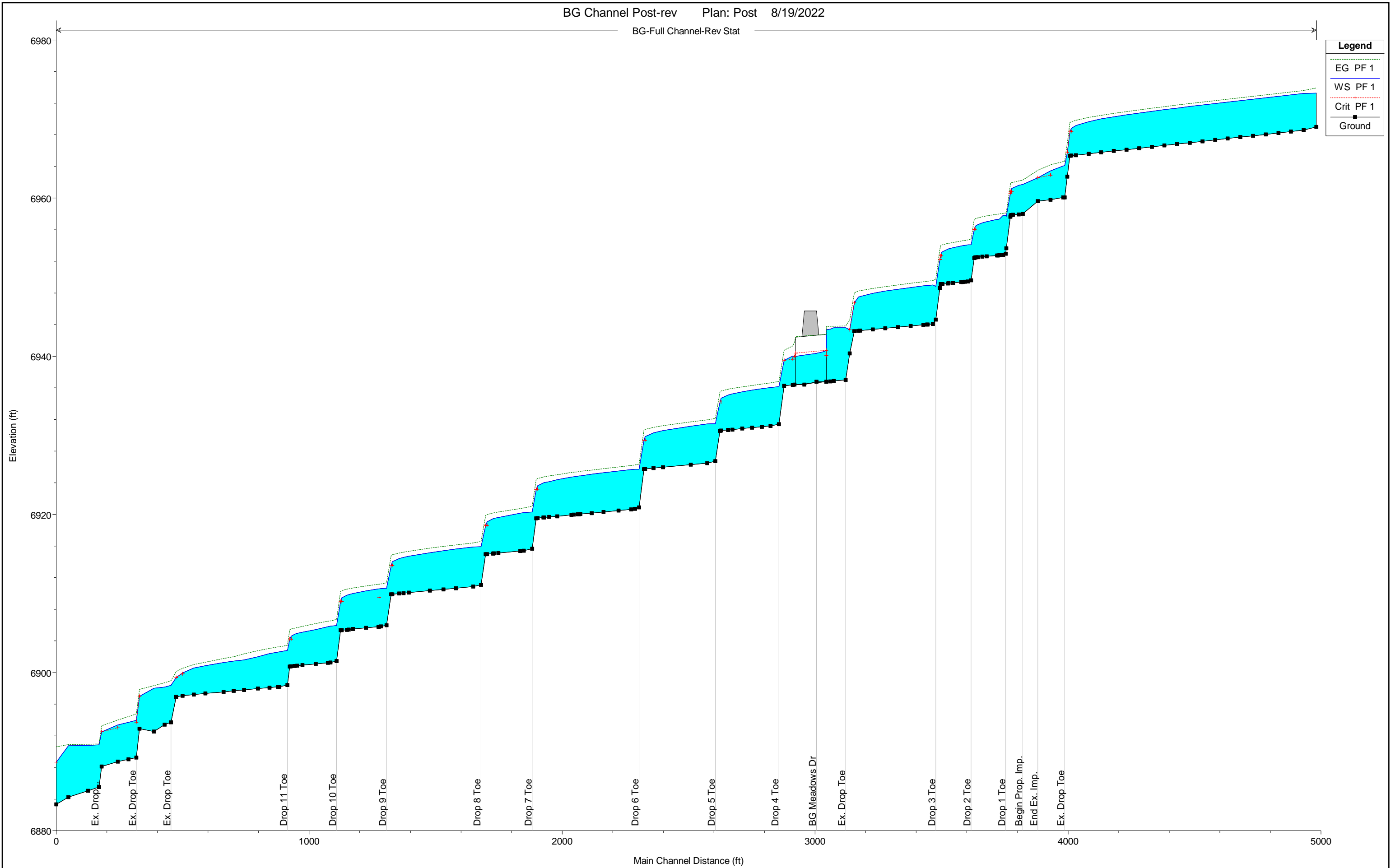
Legend

EG PF 1

WS PF 1

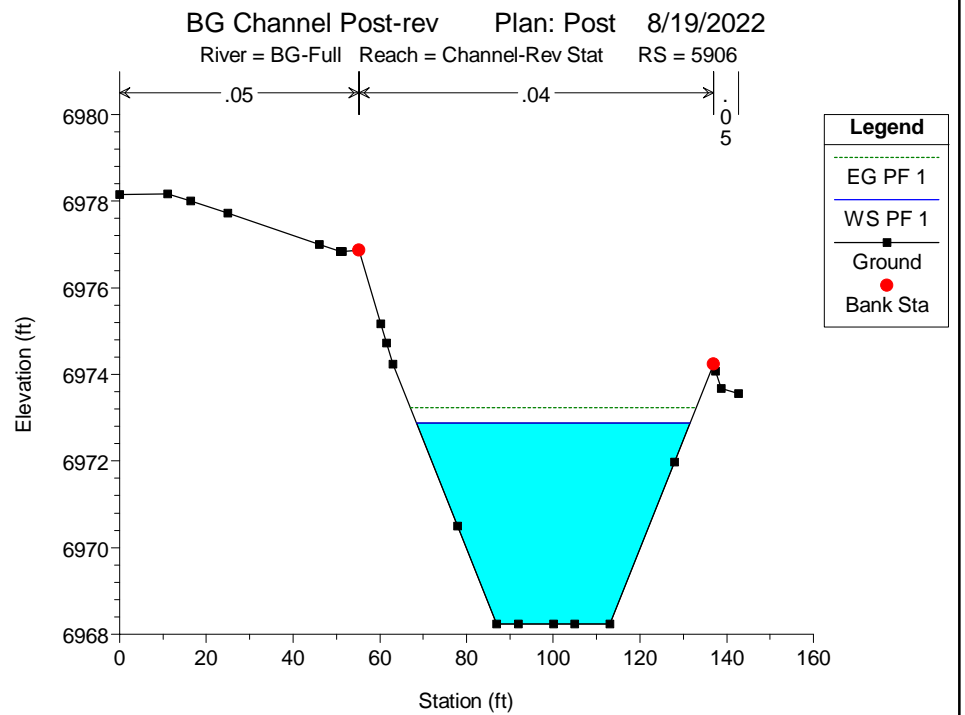
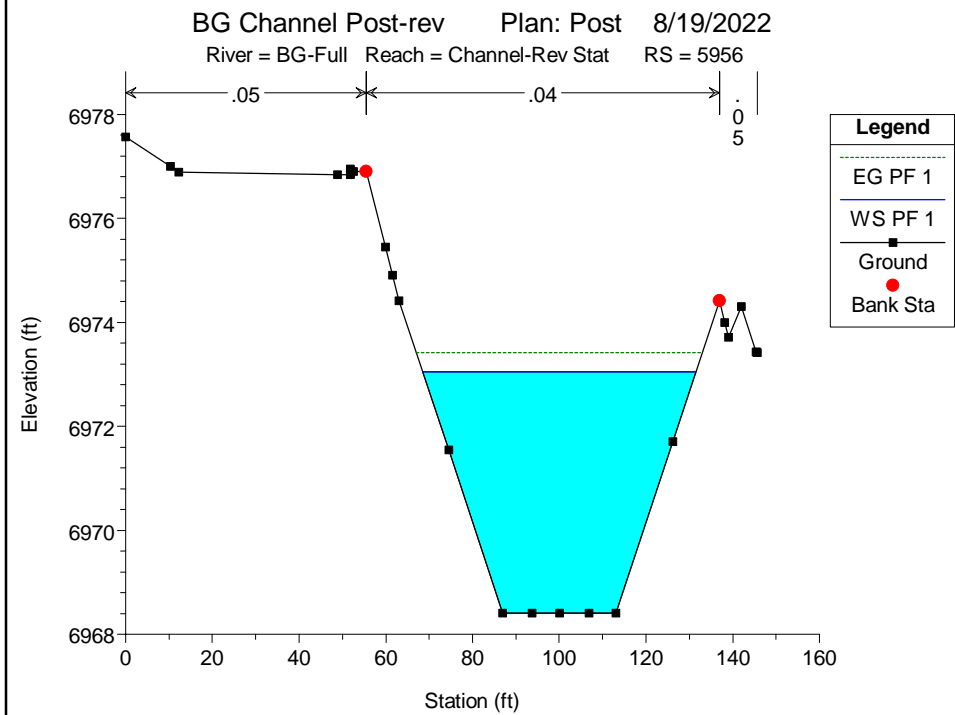
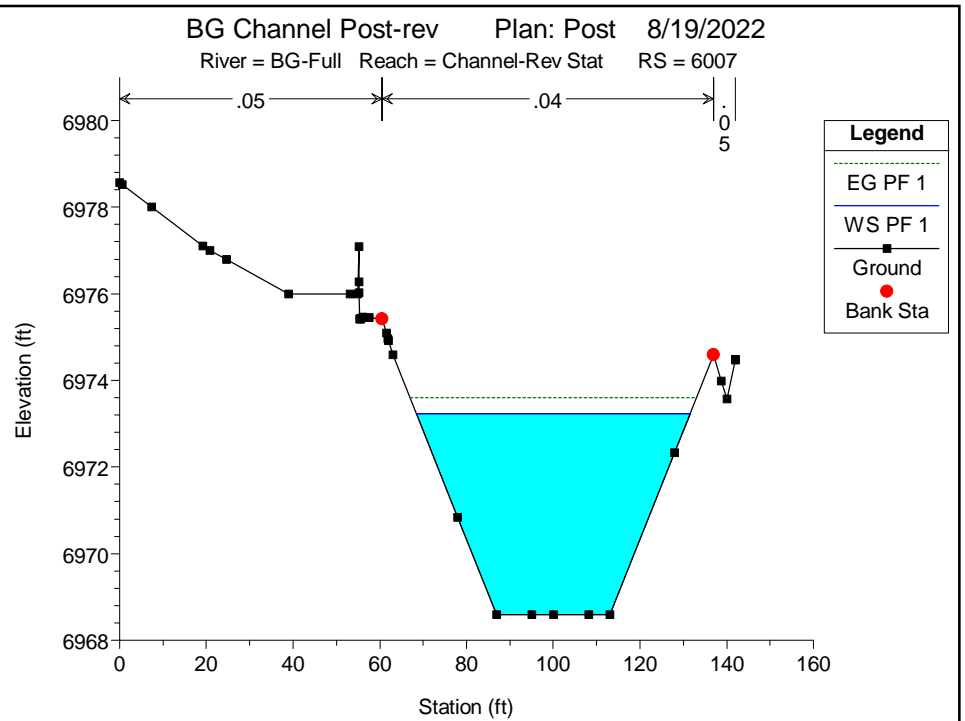
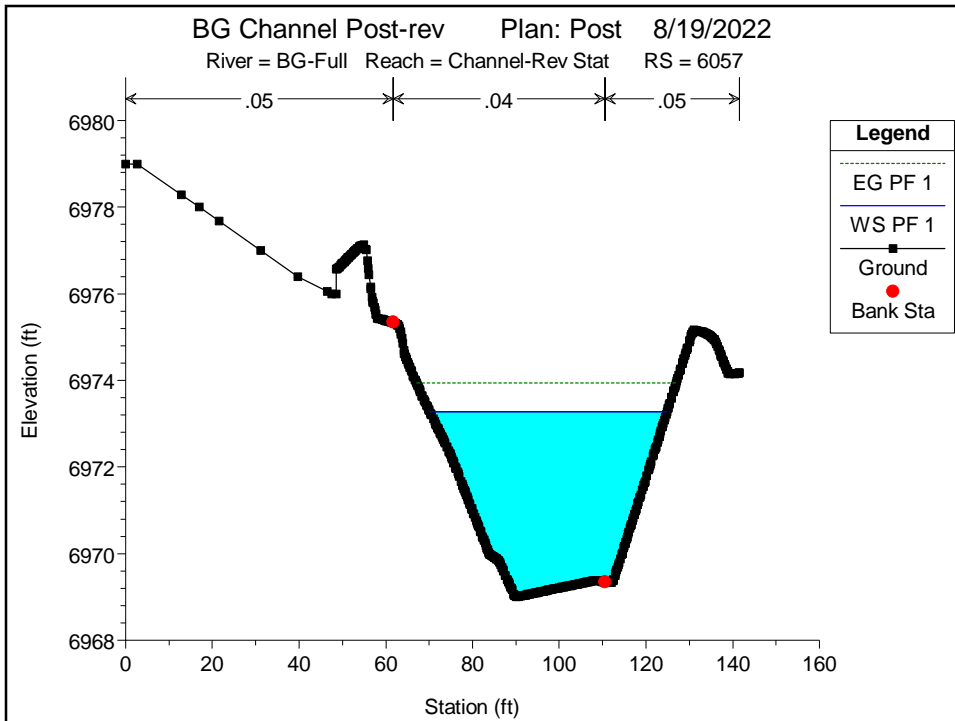
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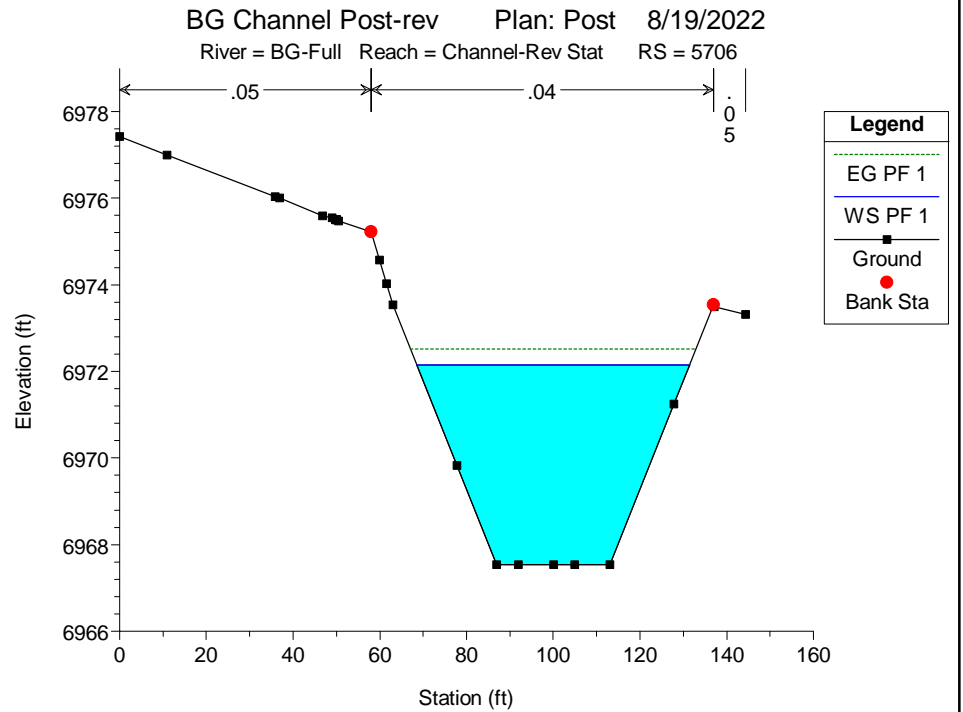
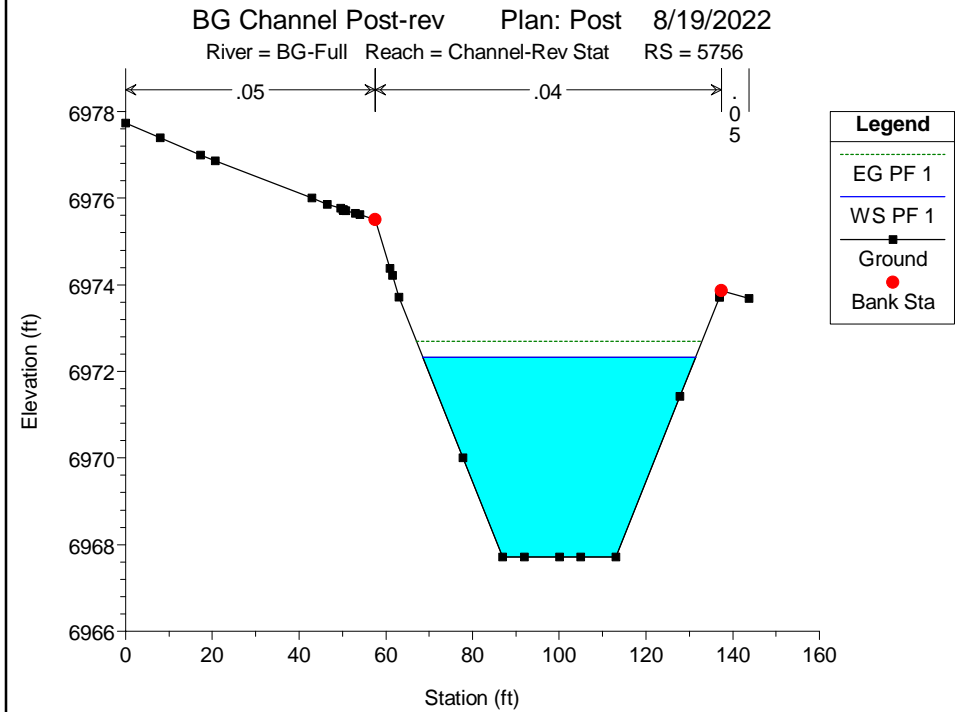
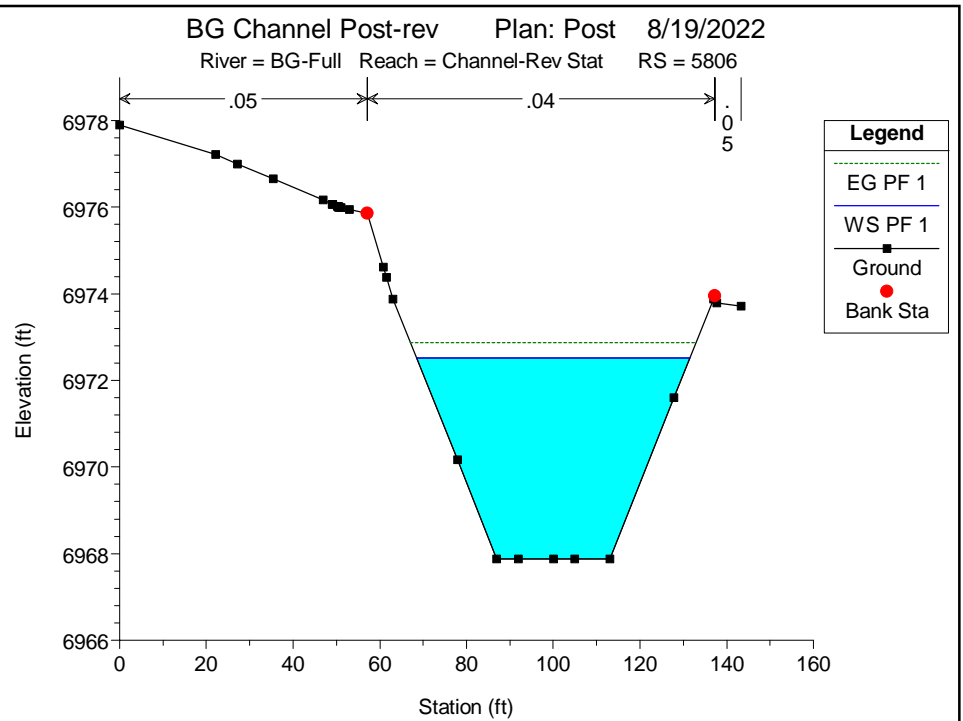
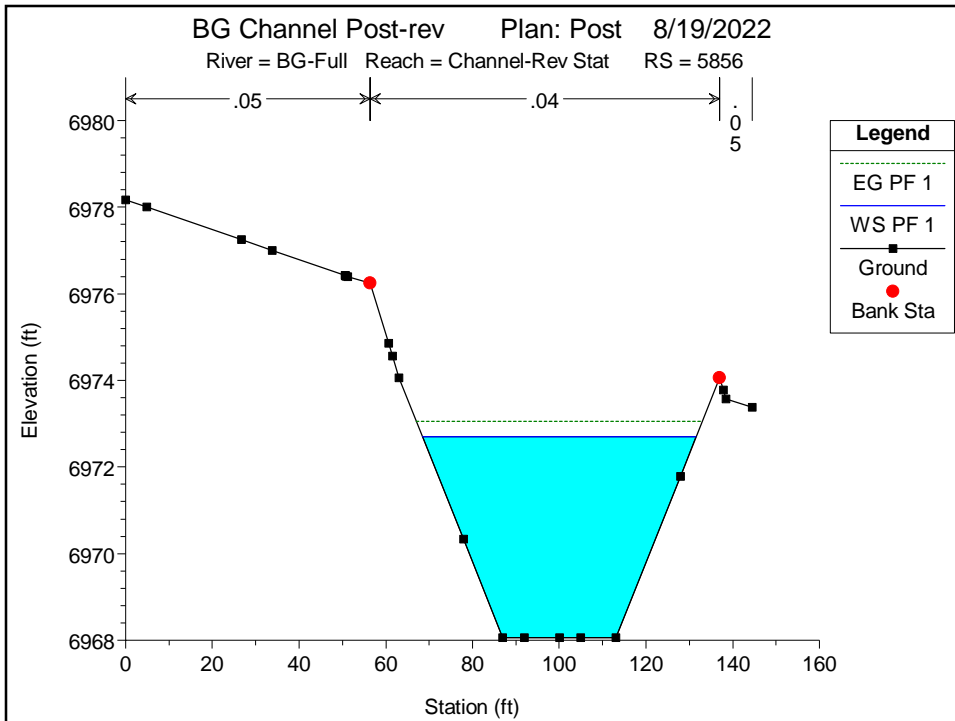
Ground

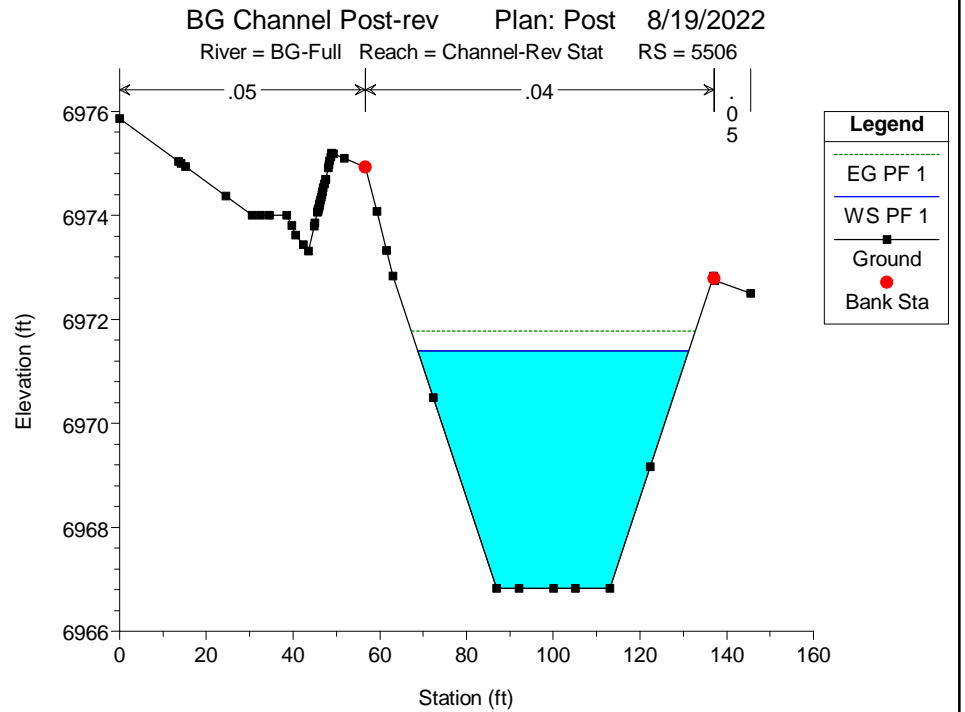
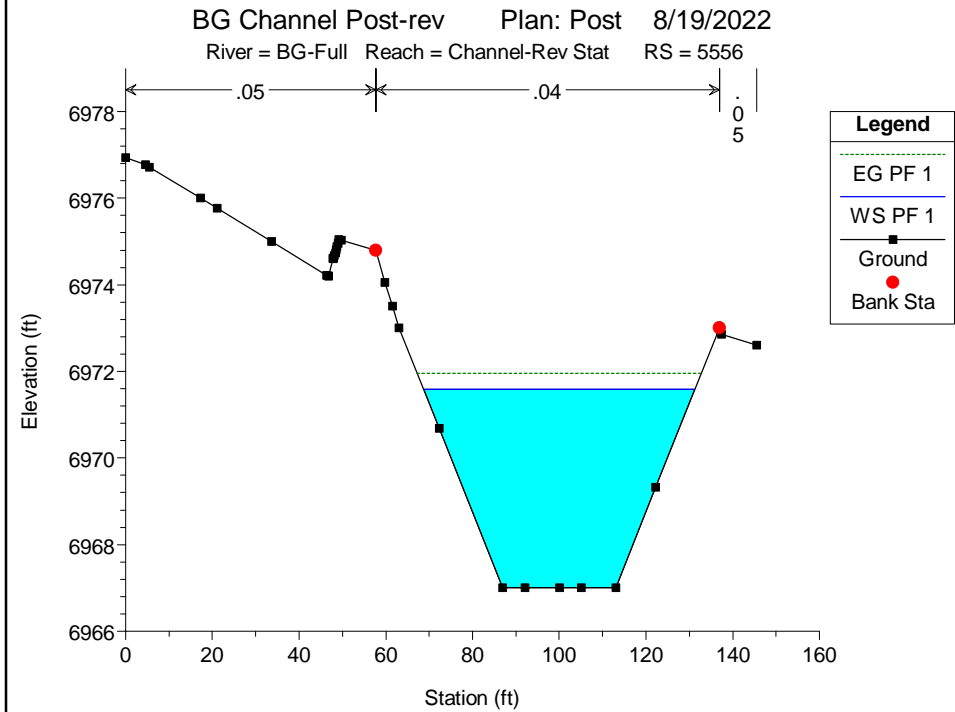
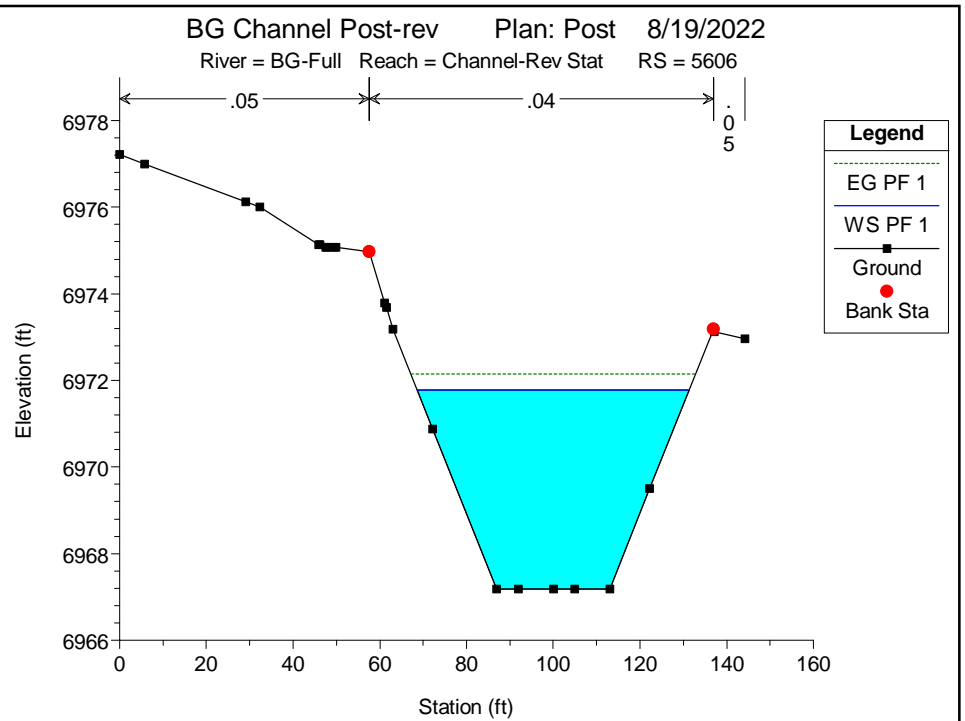
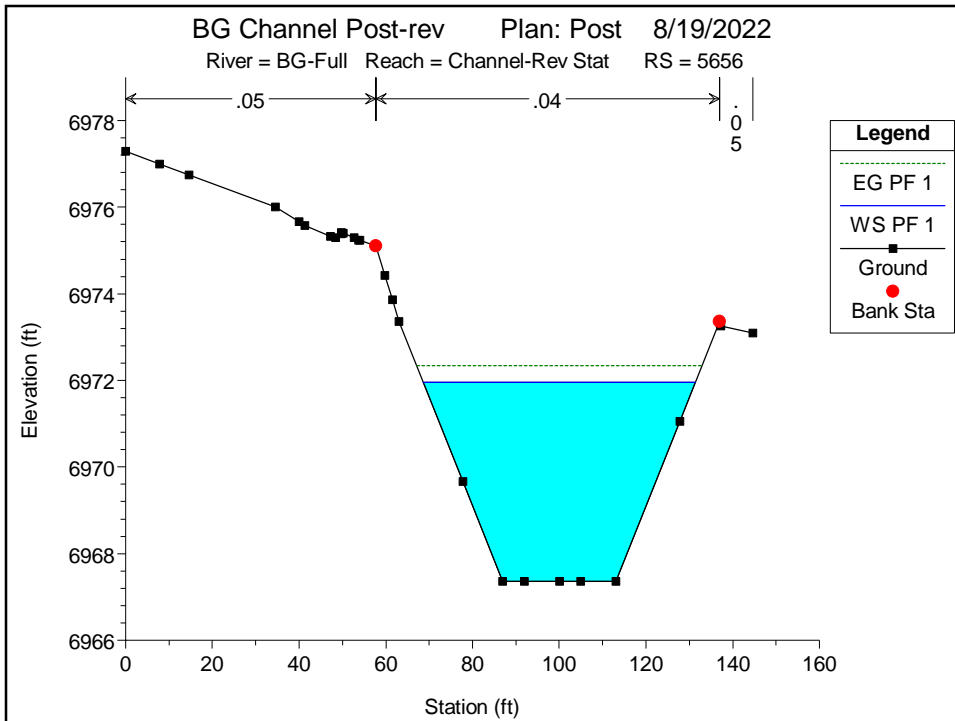


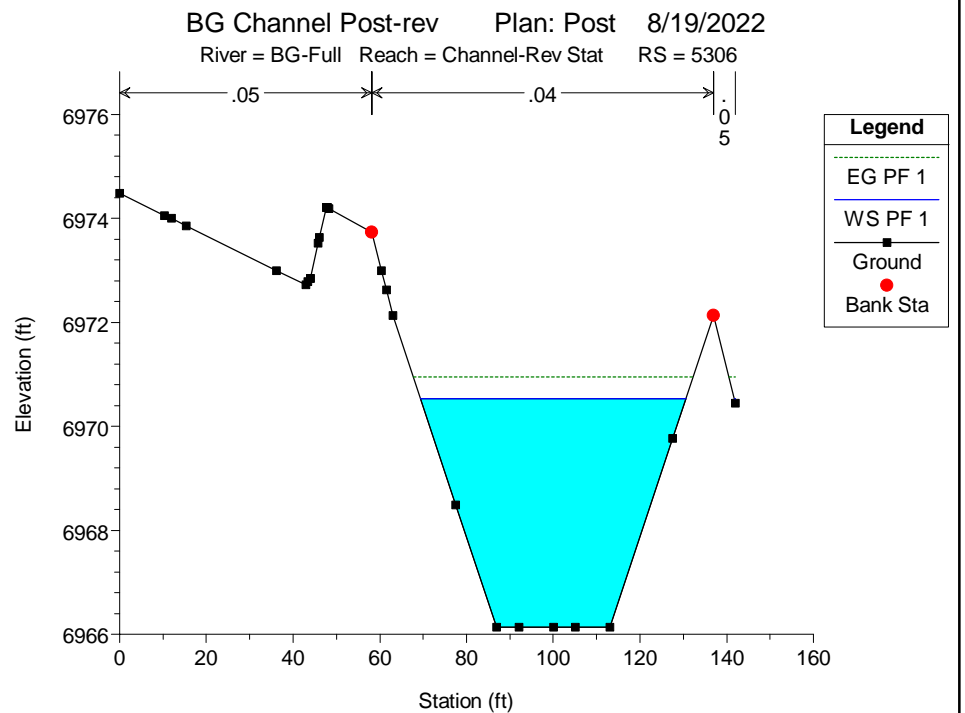
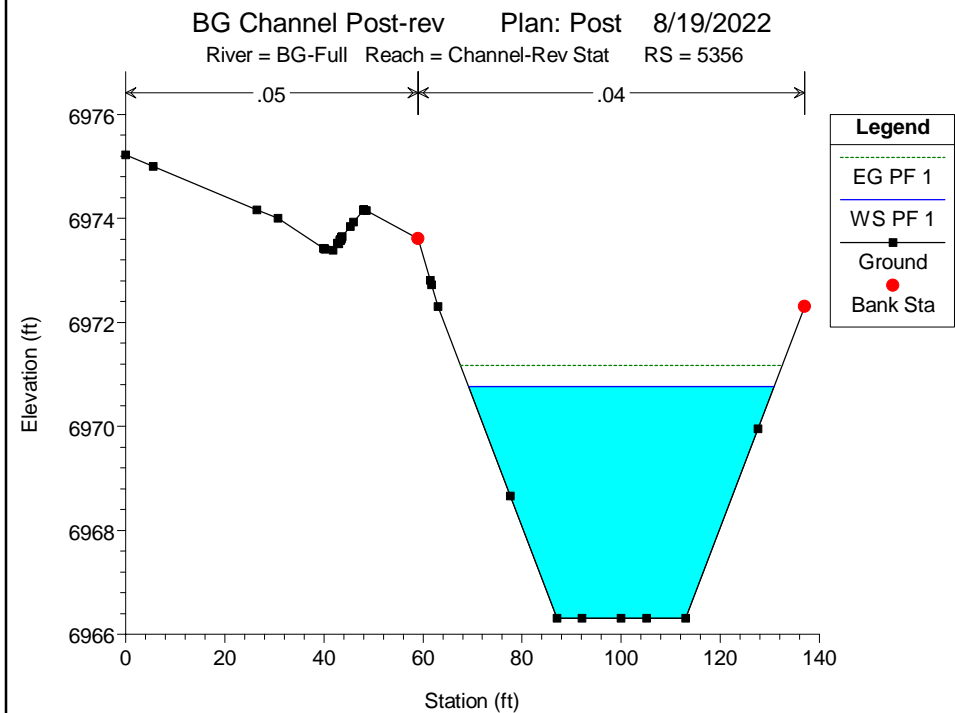
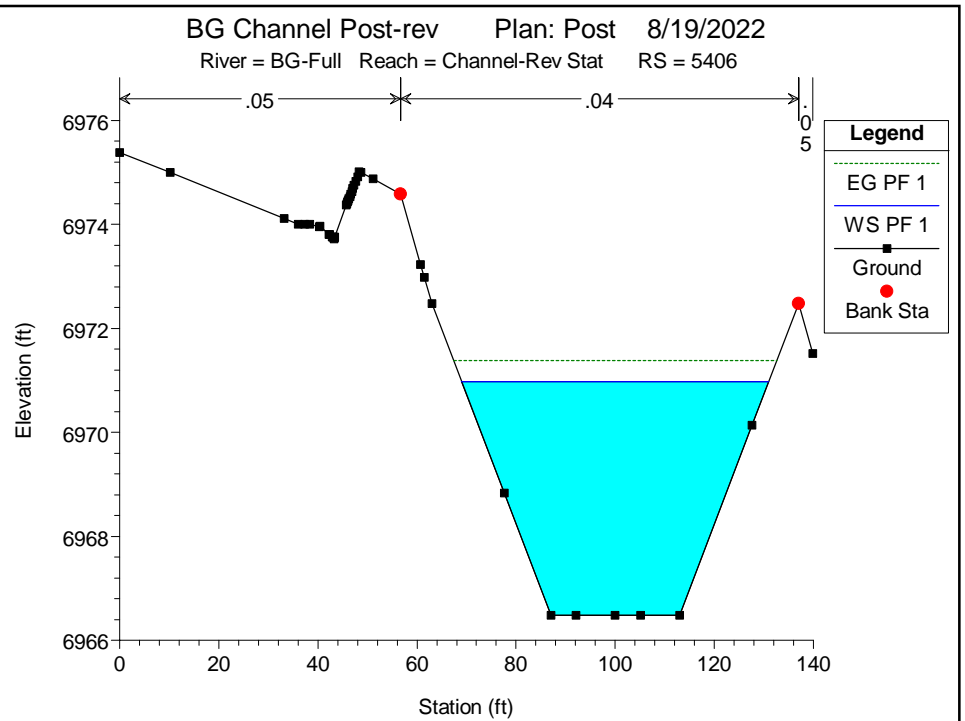
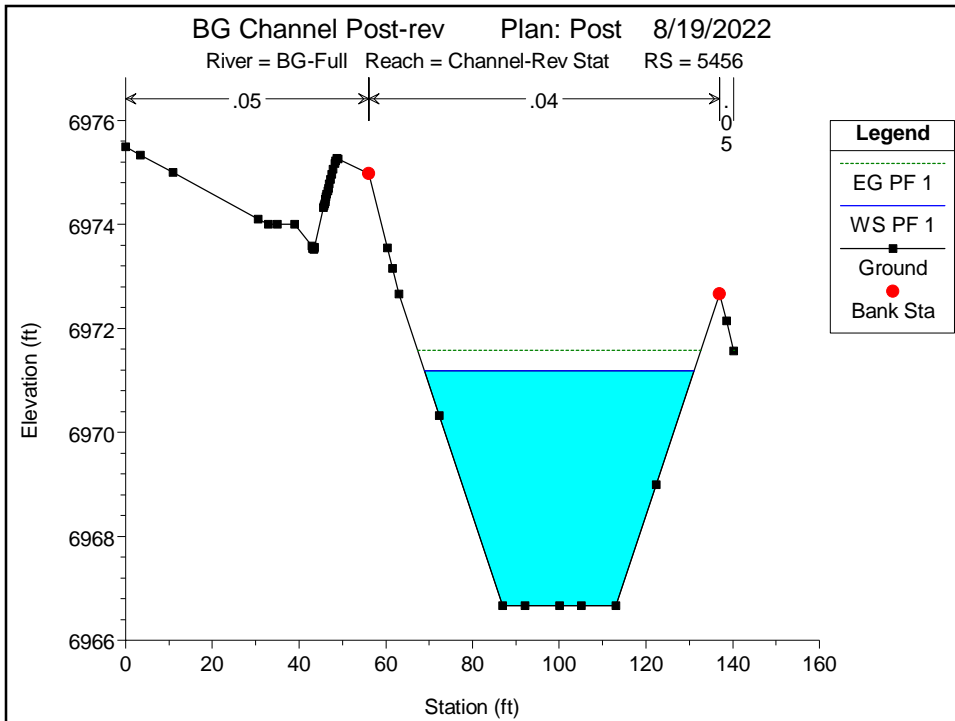
ATTACHMENT N
Post Project Cross Sections

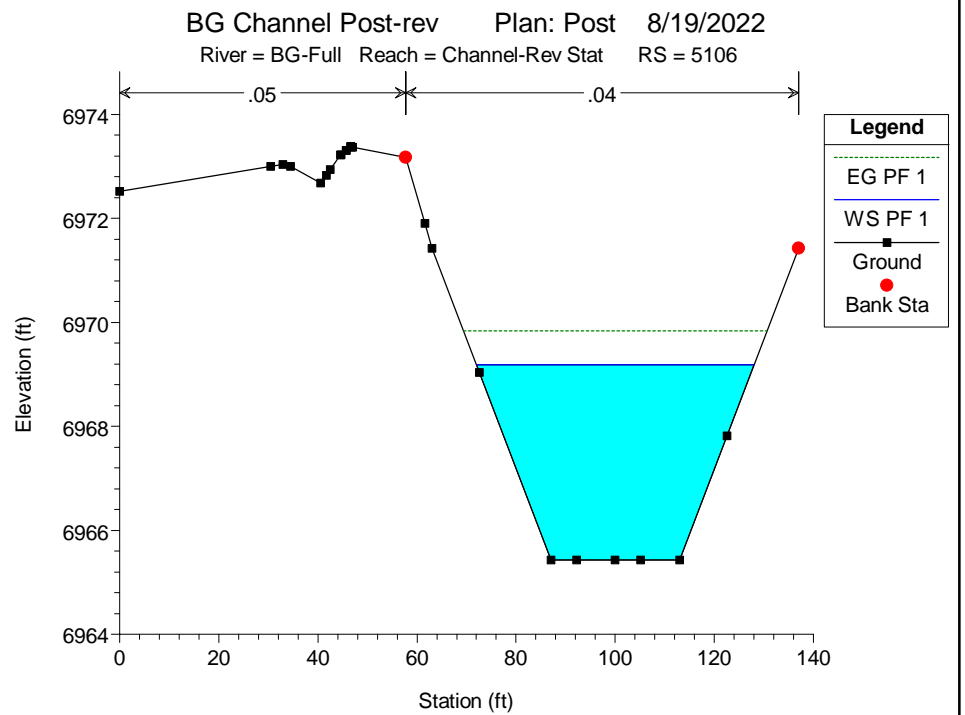
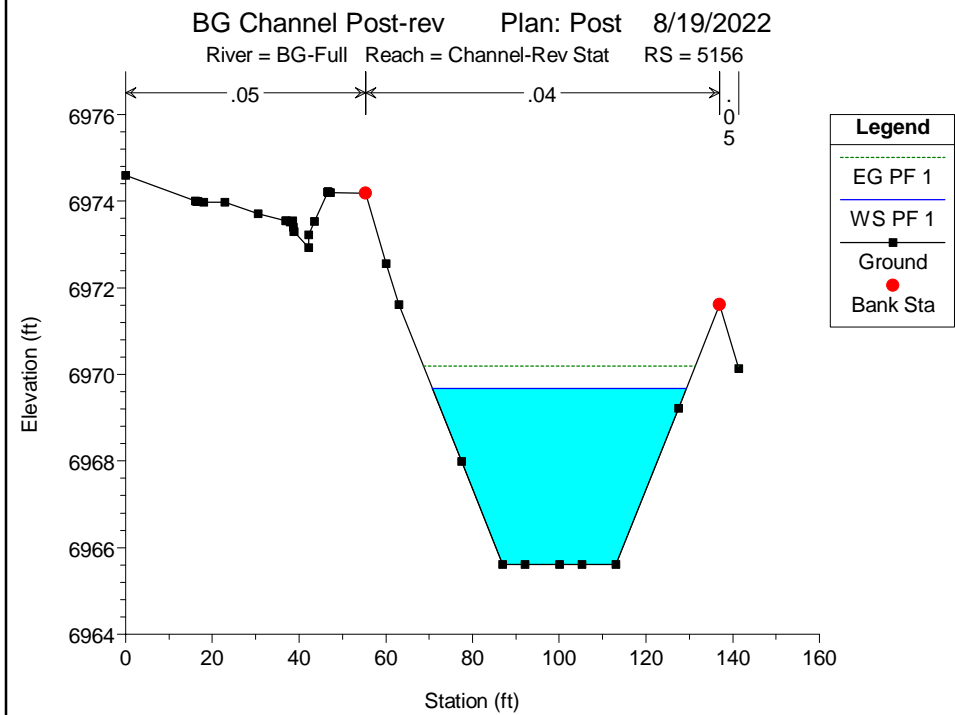
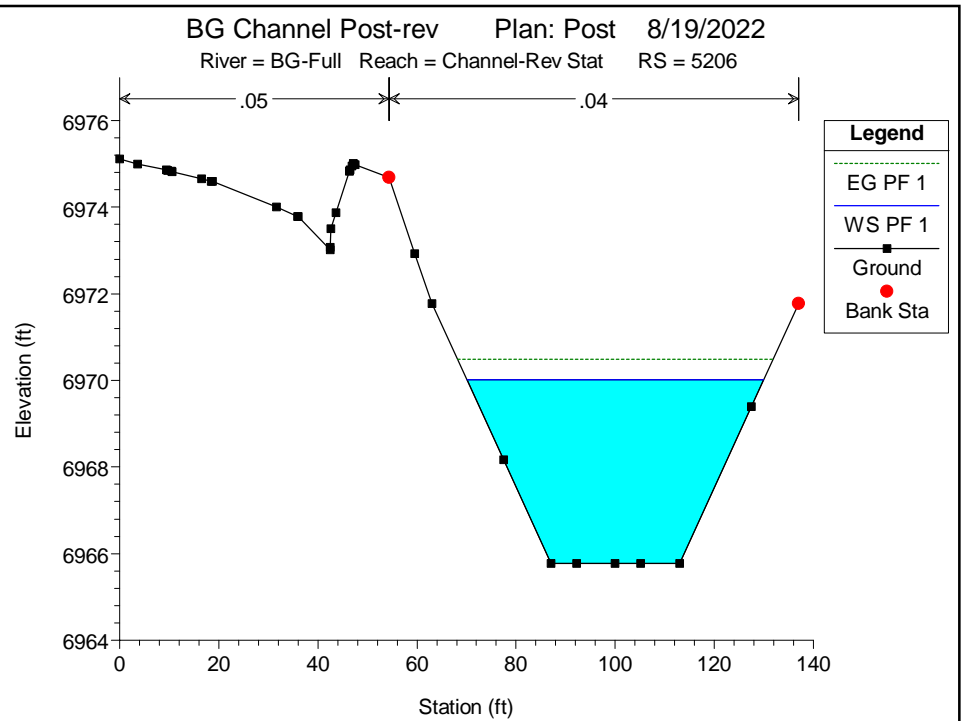
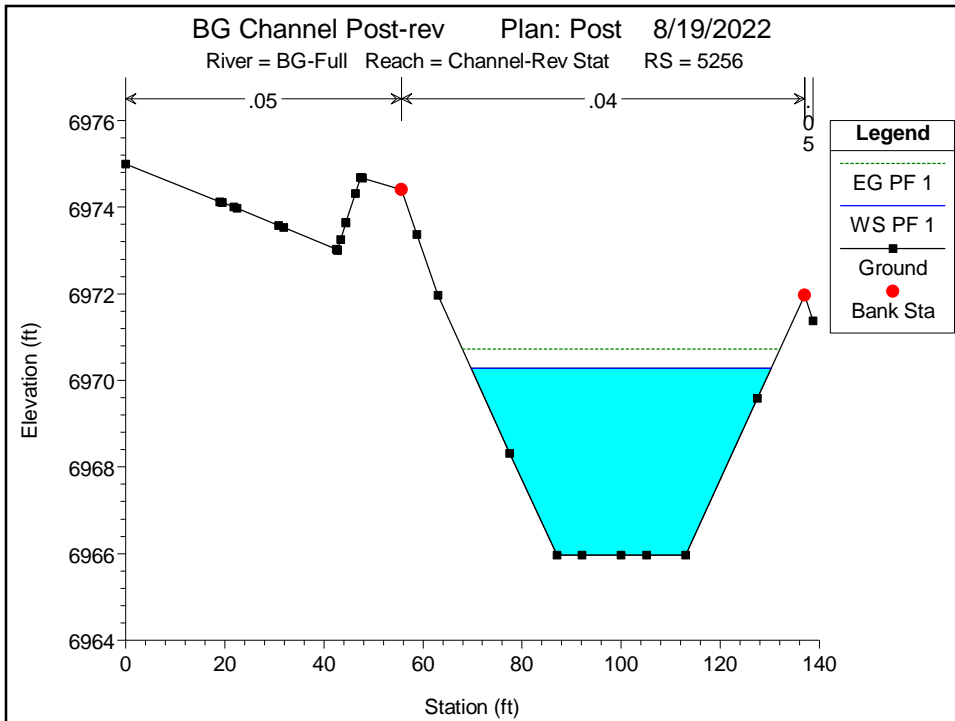


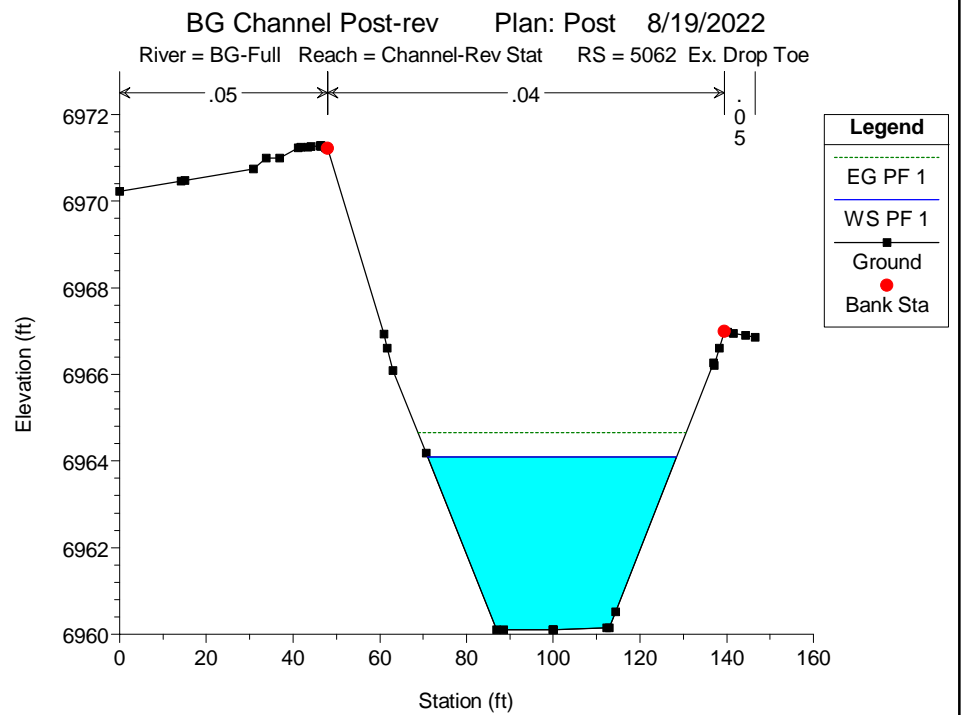
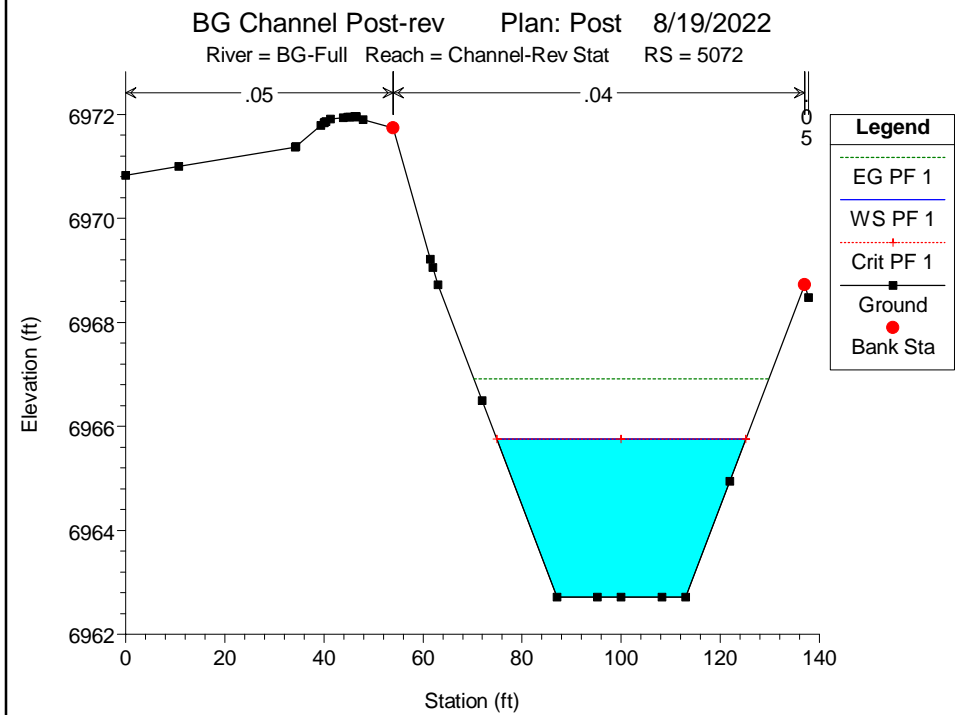
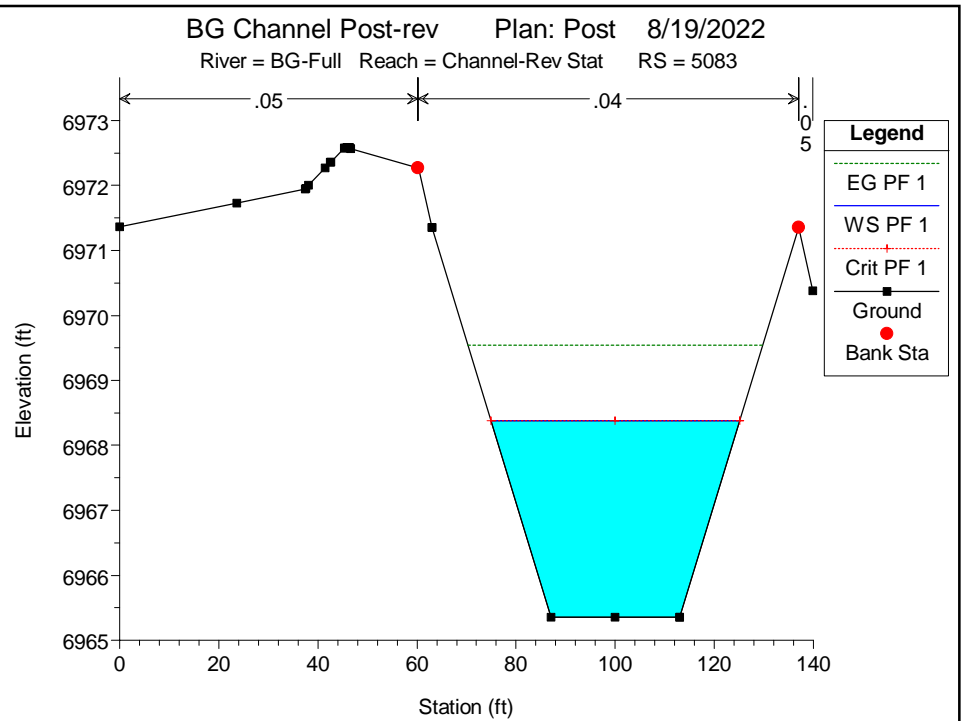
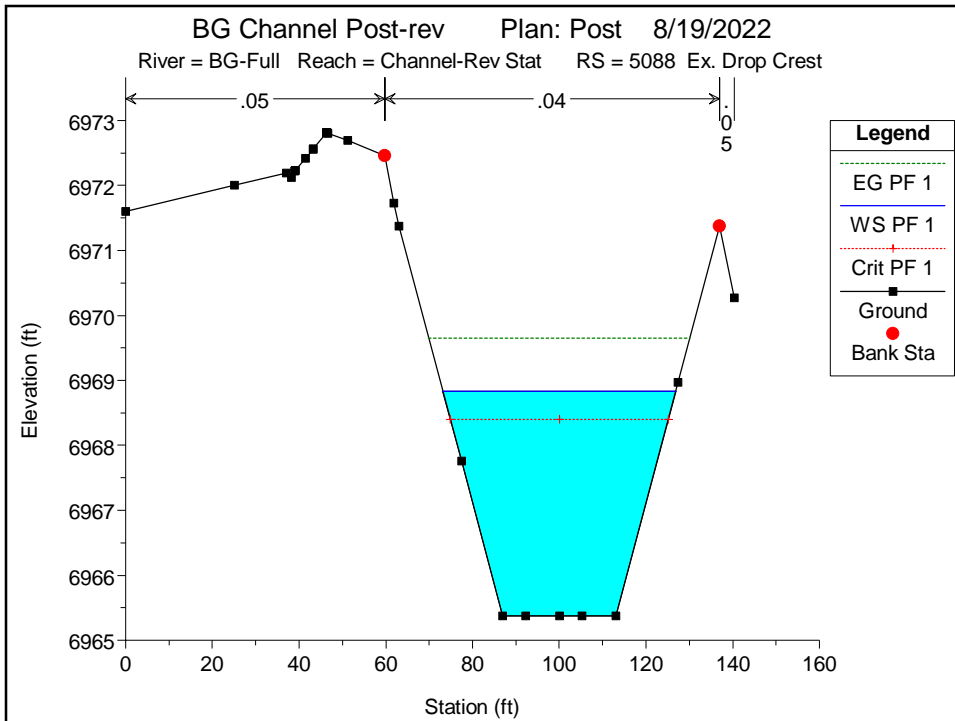


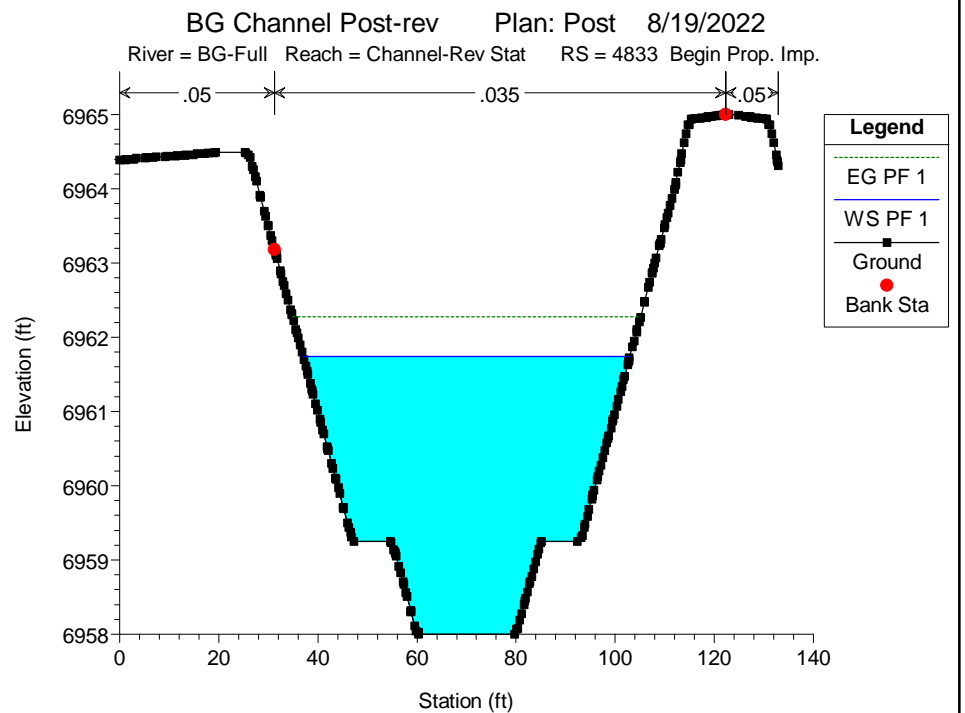
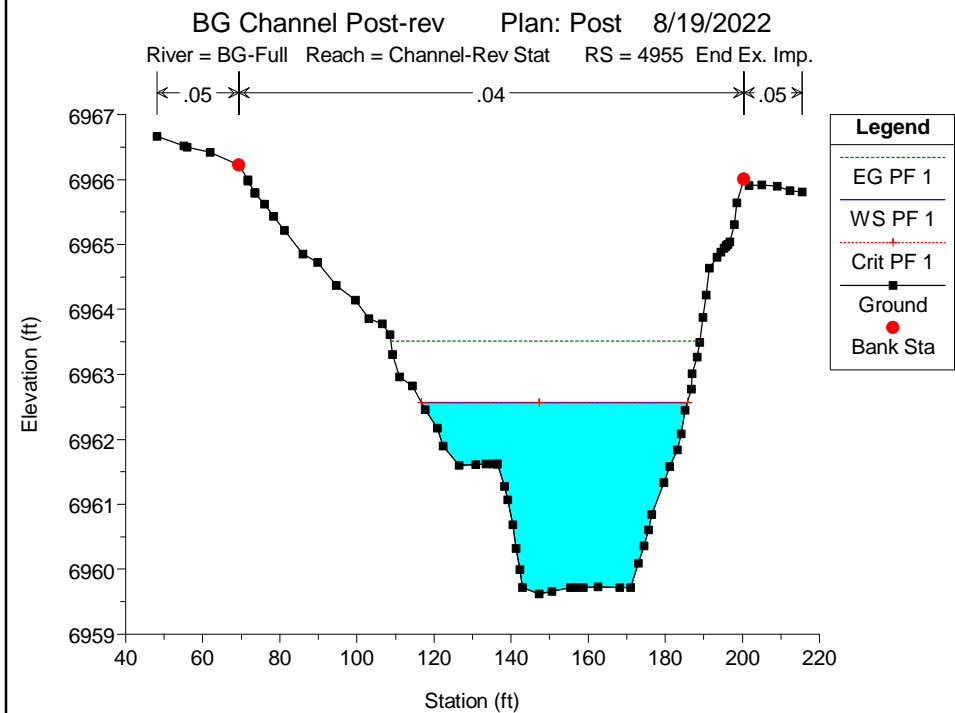
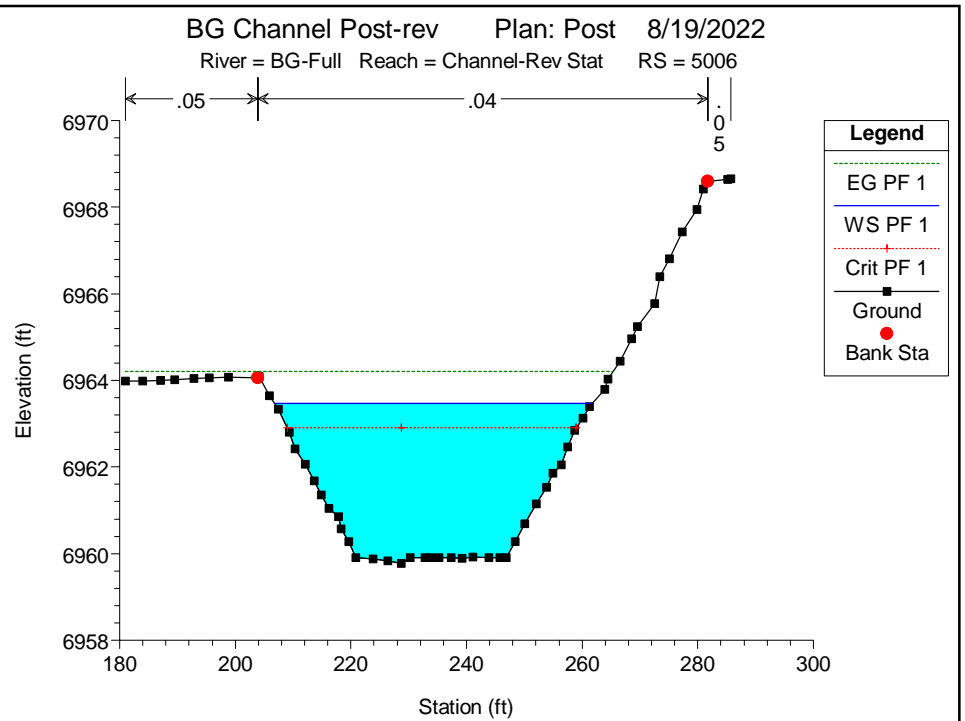
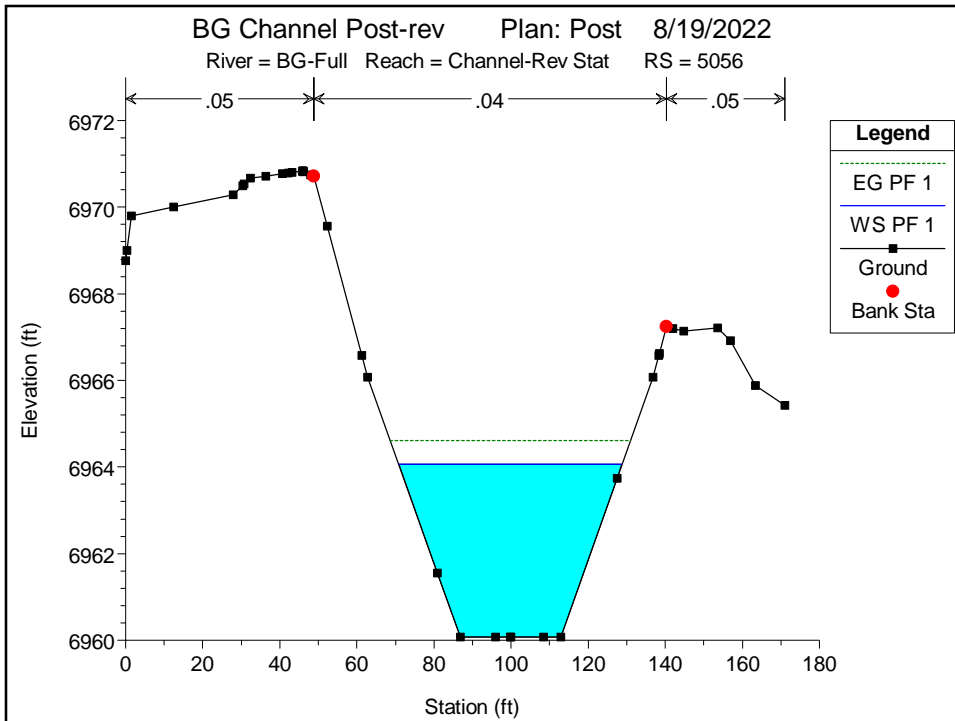


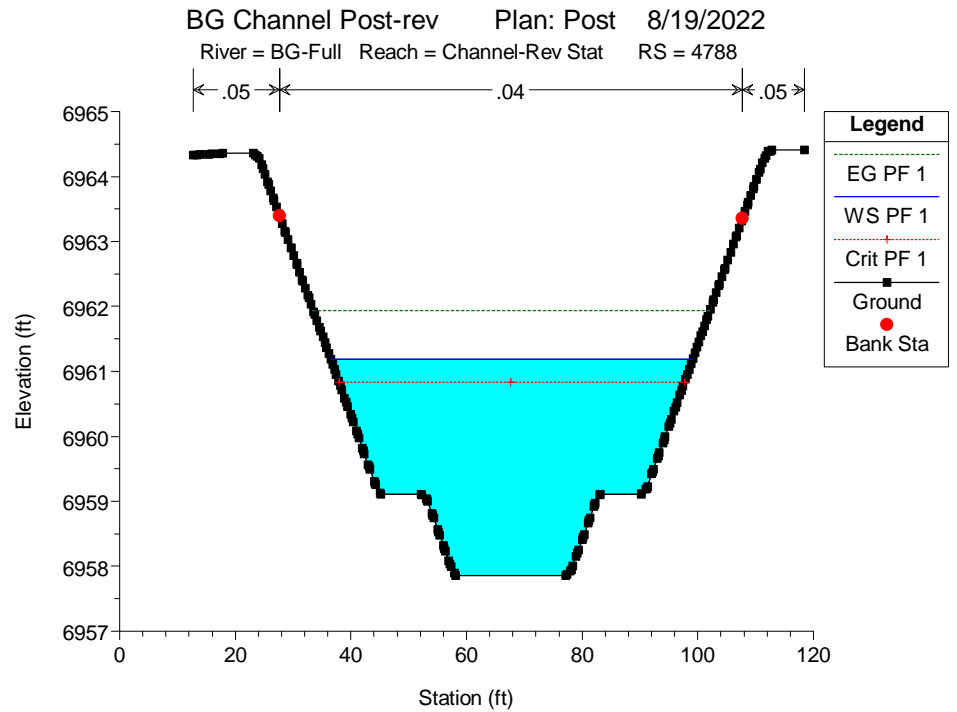
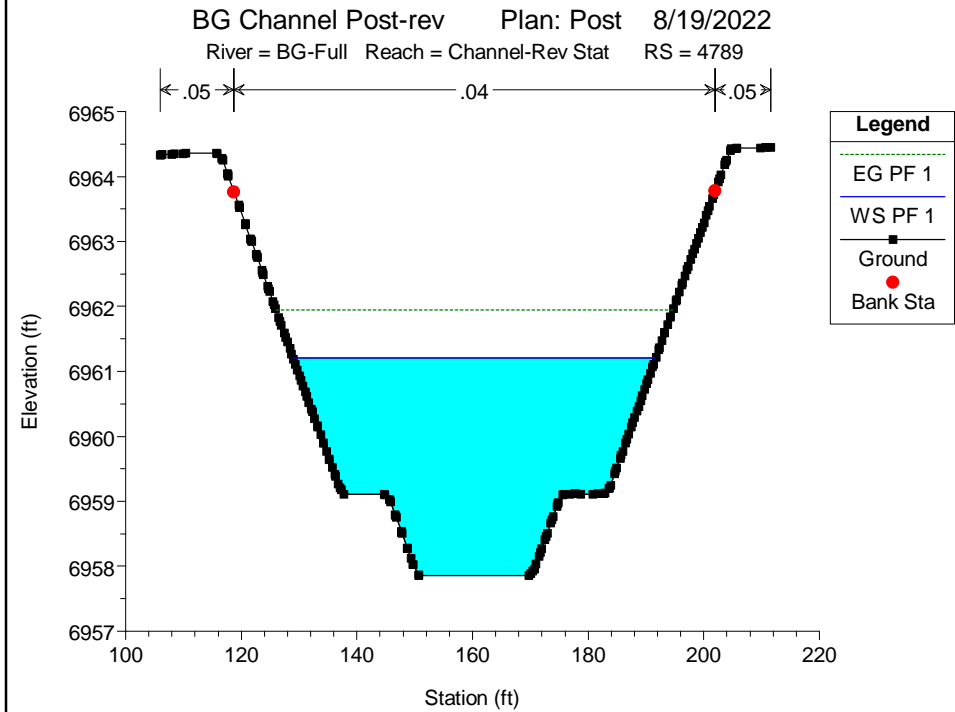
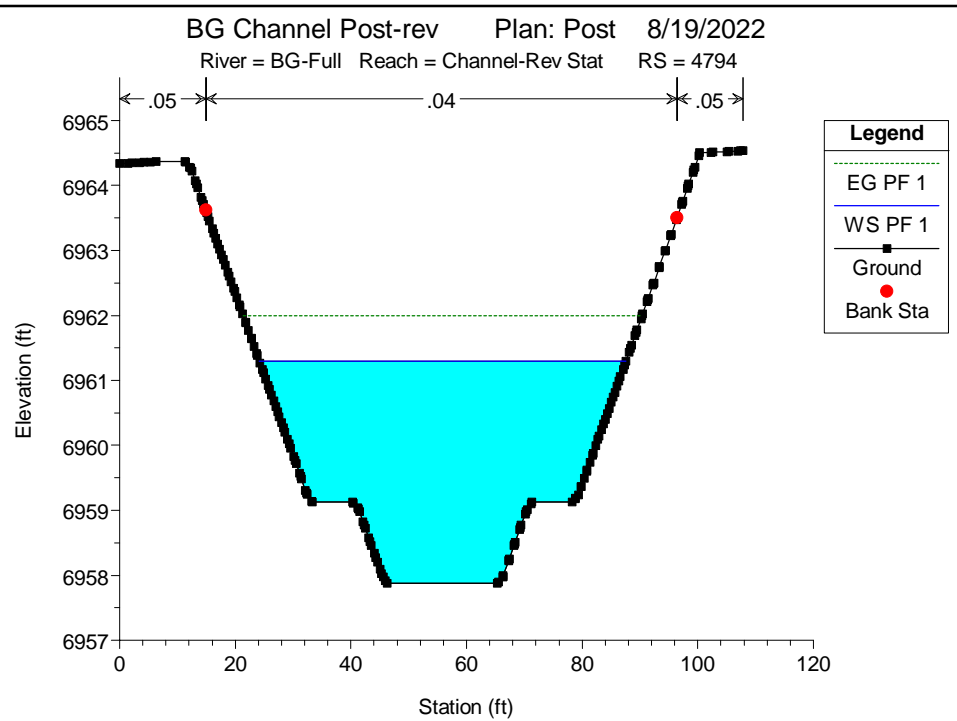
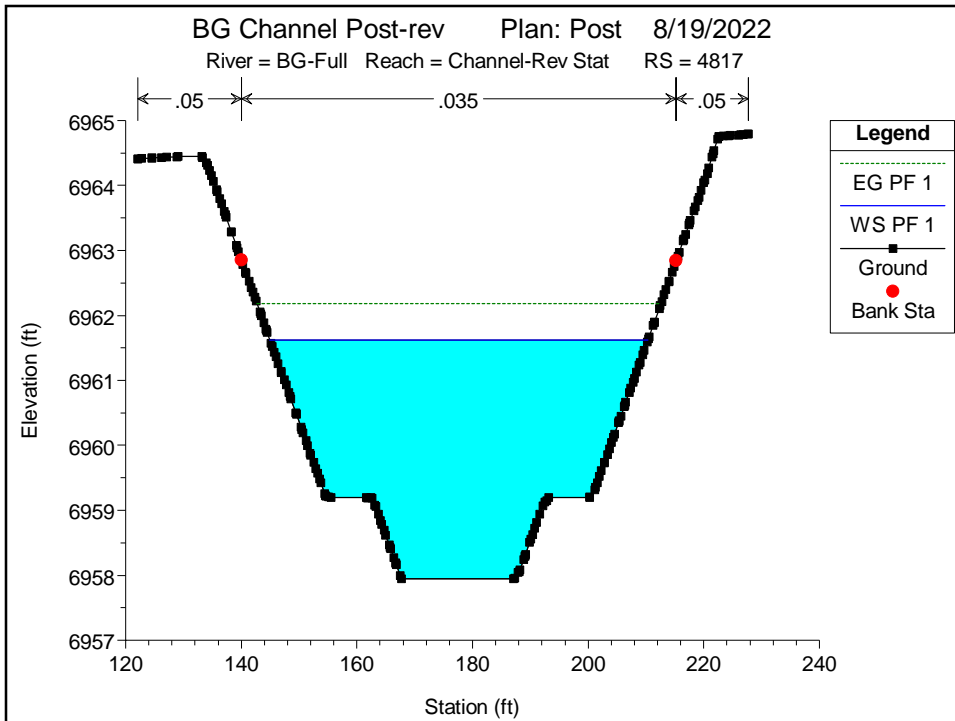


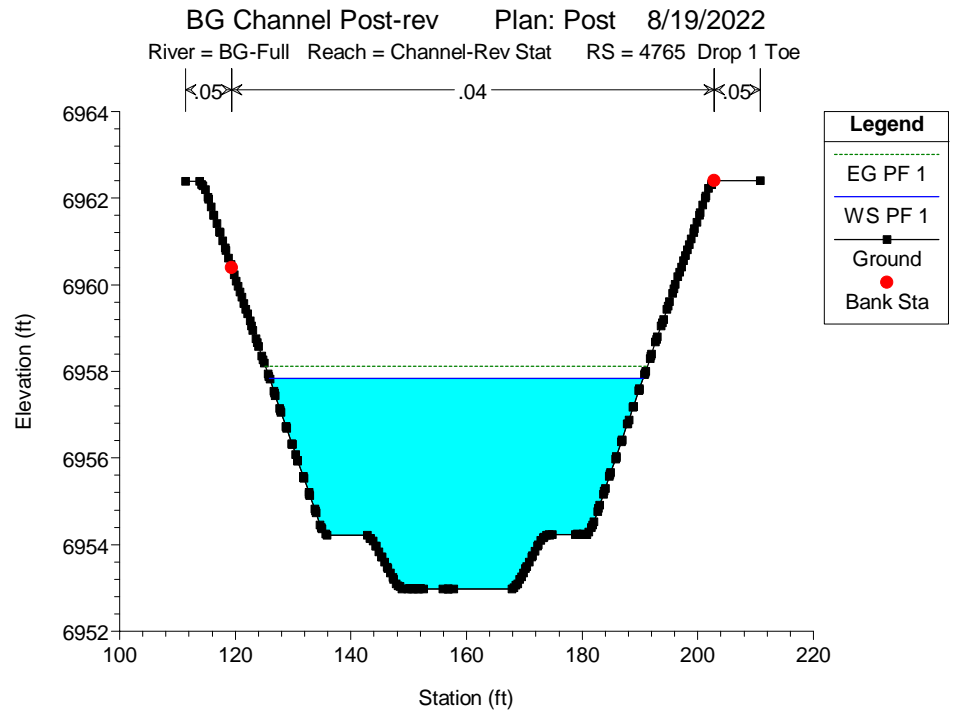
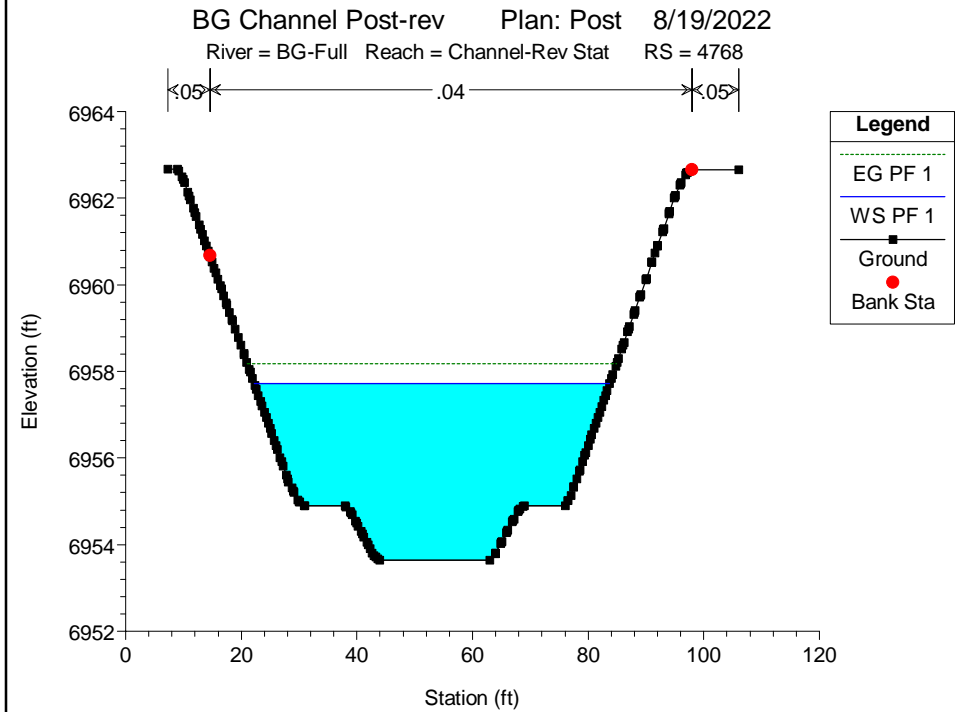
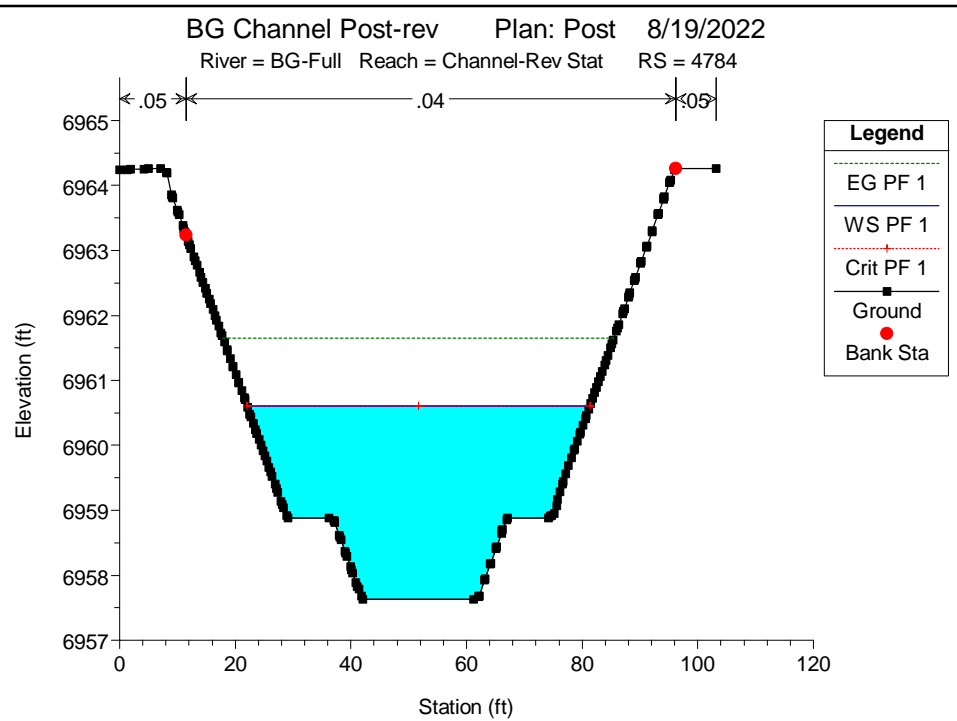
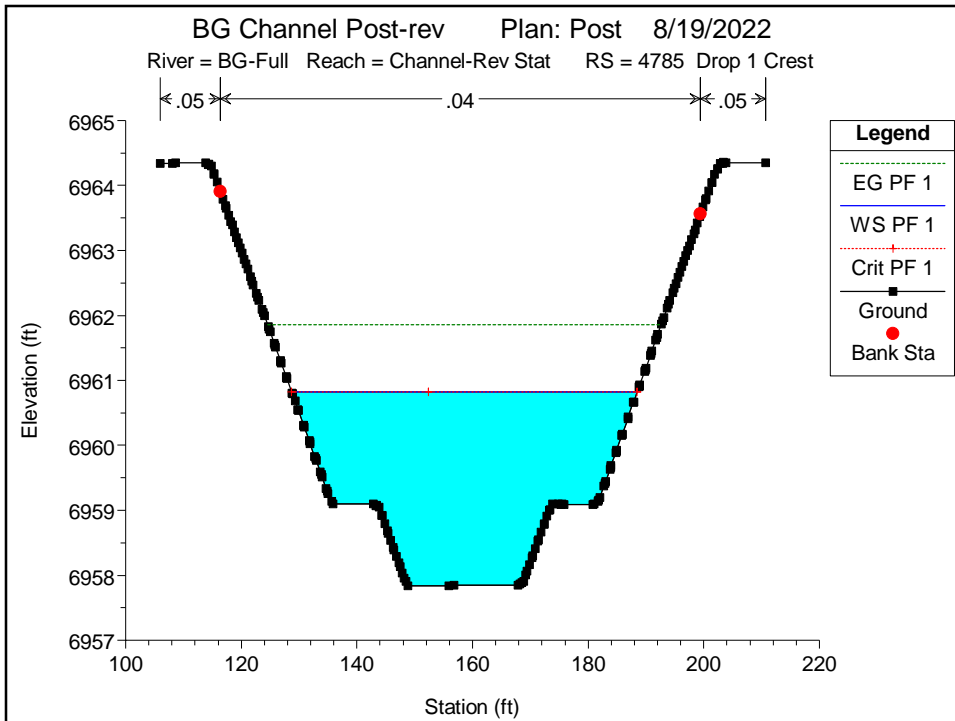


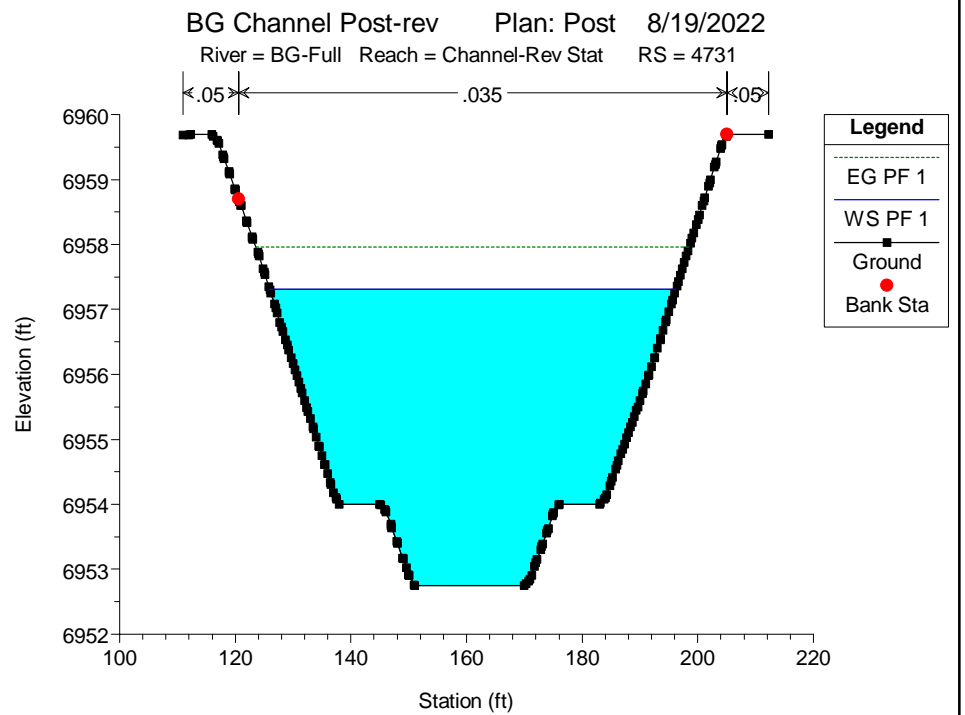
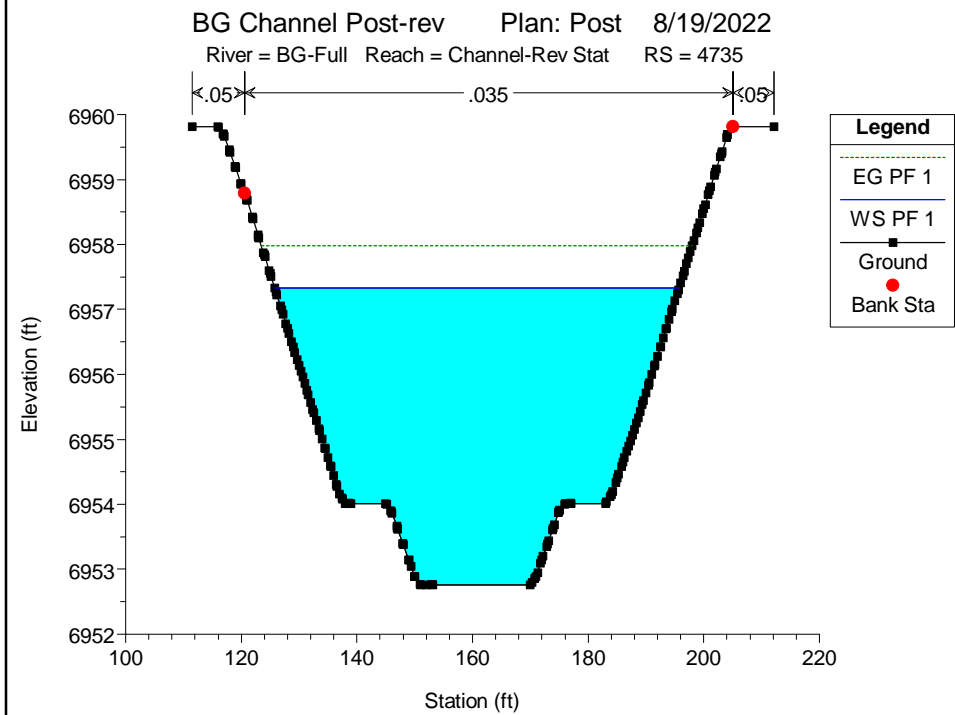
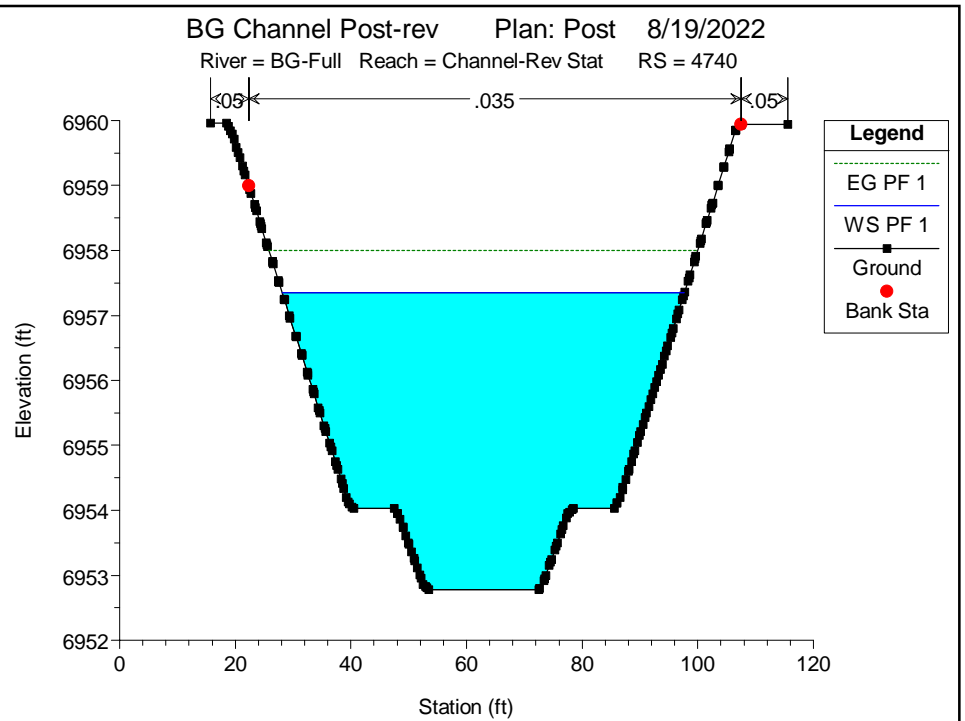
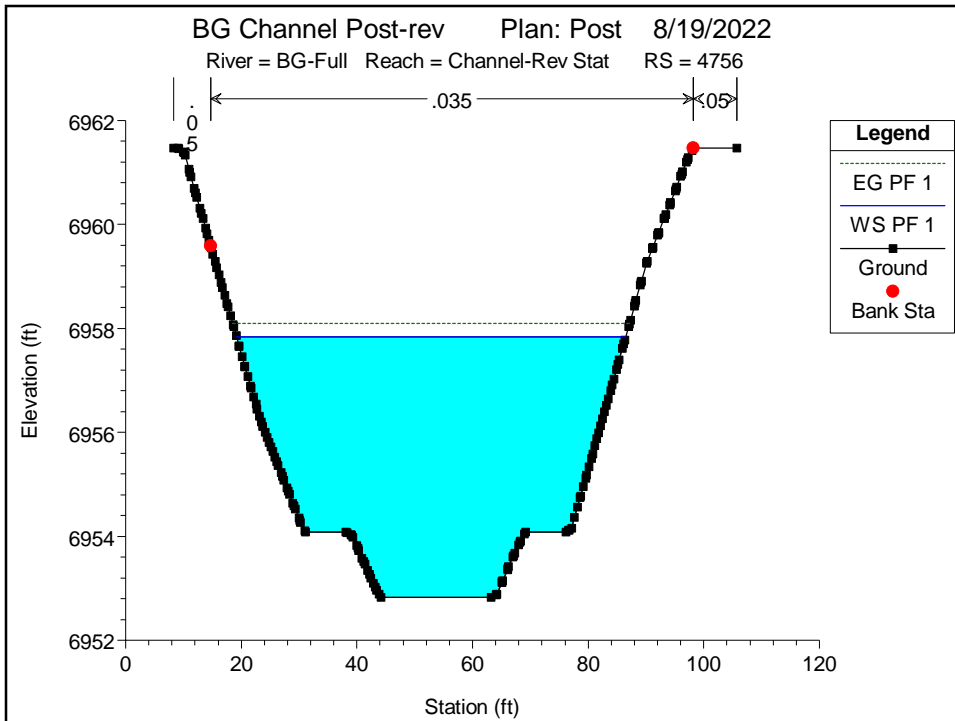


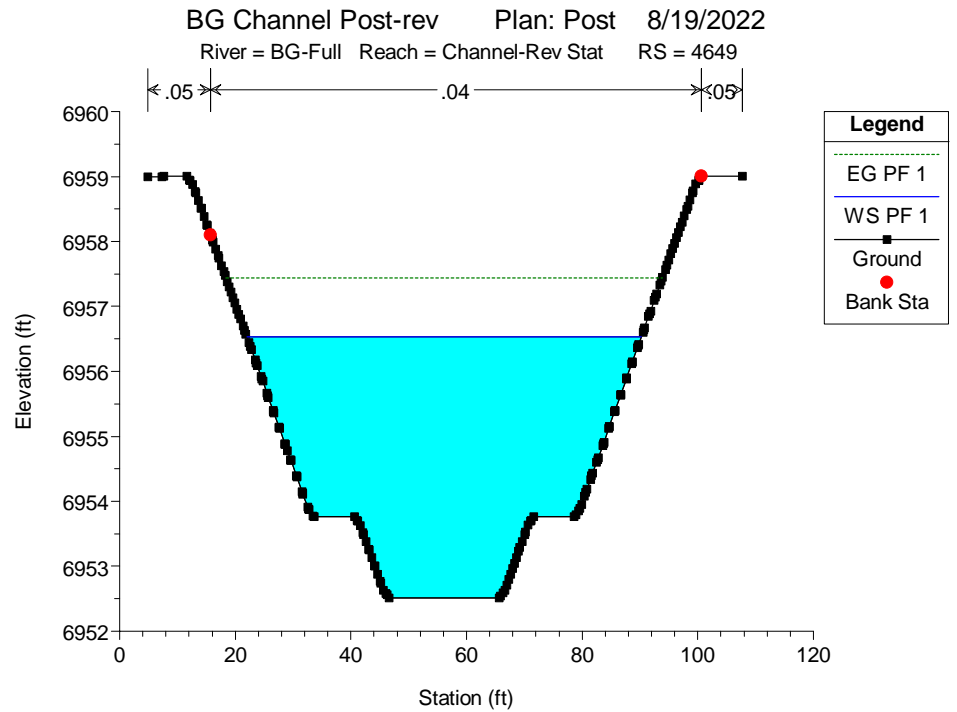
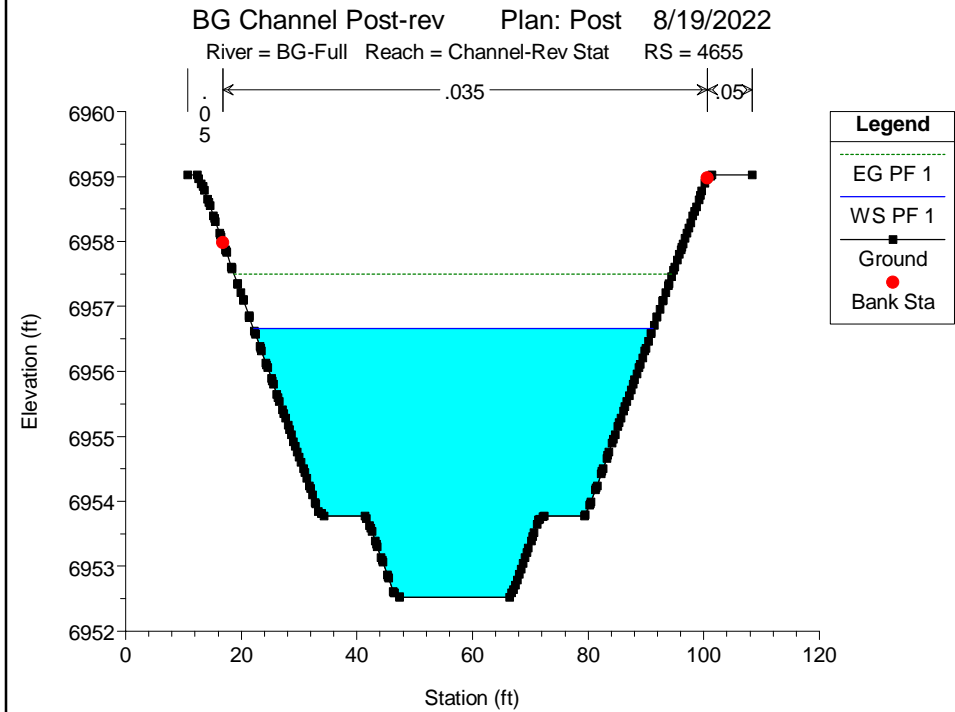
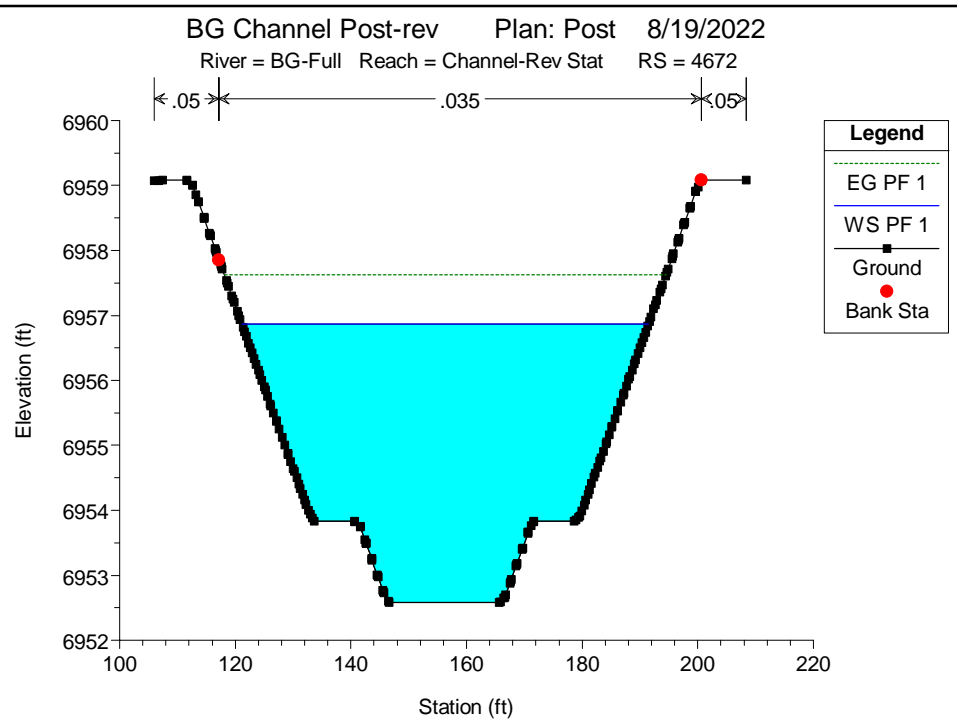
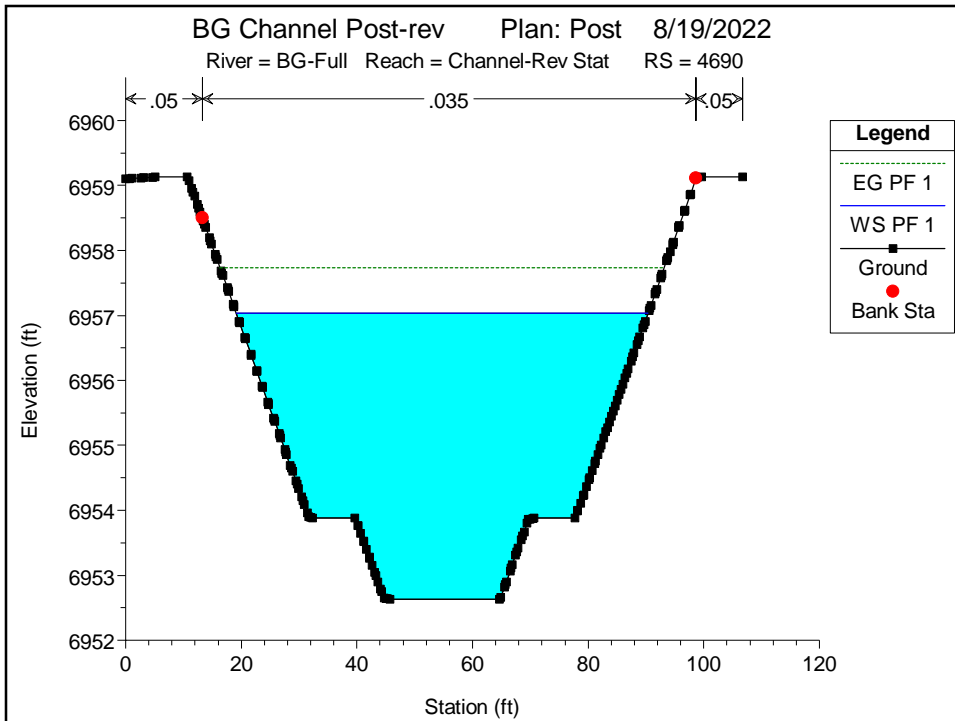


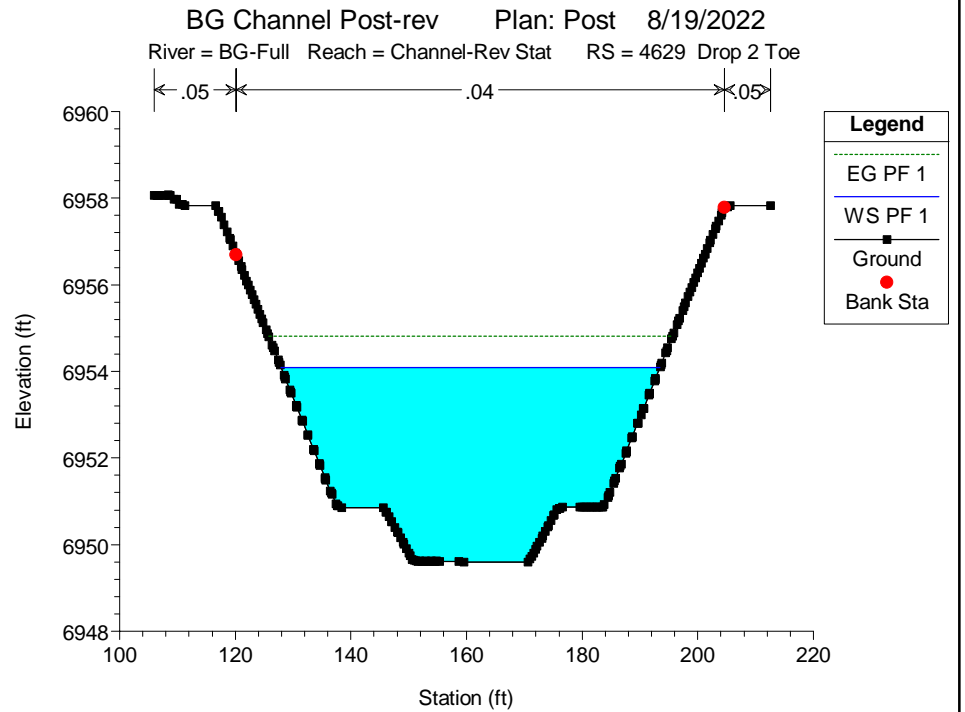
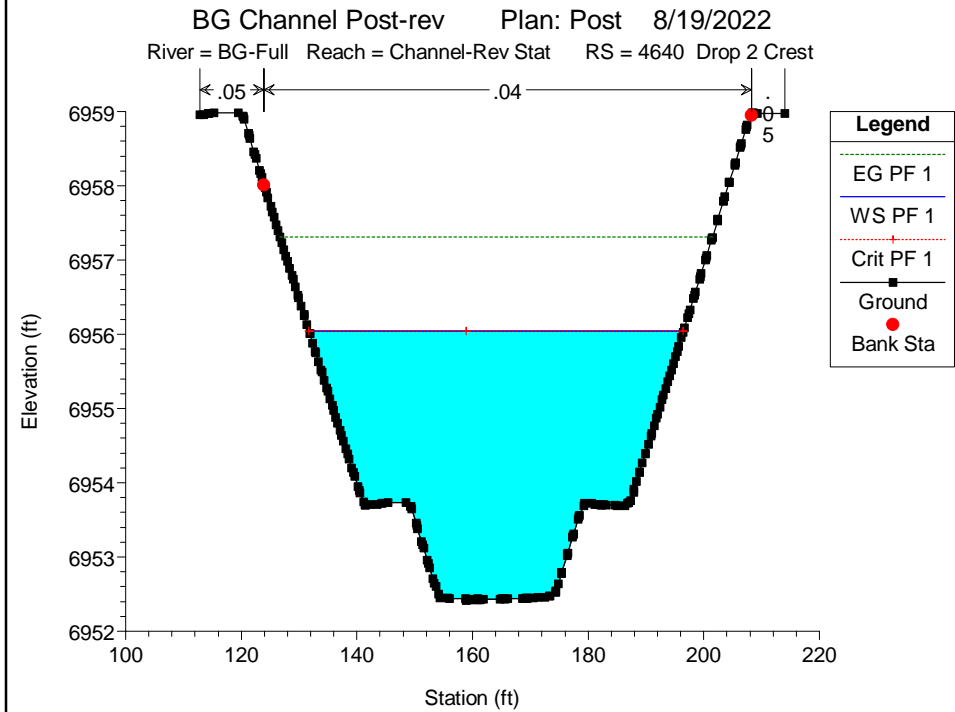
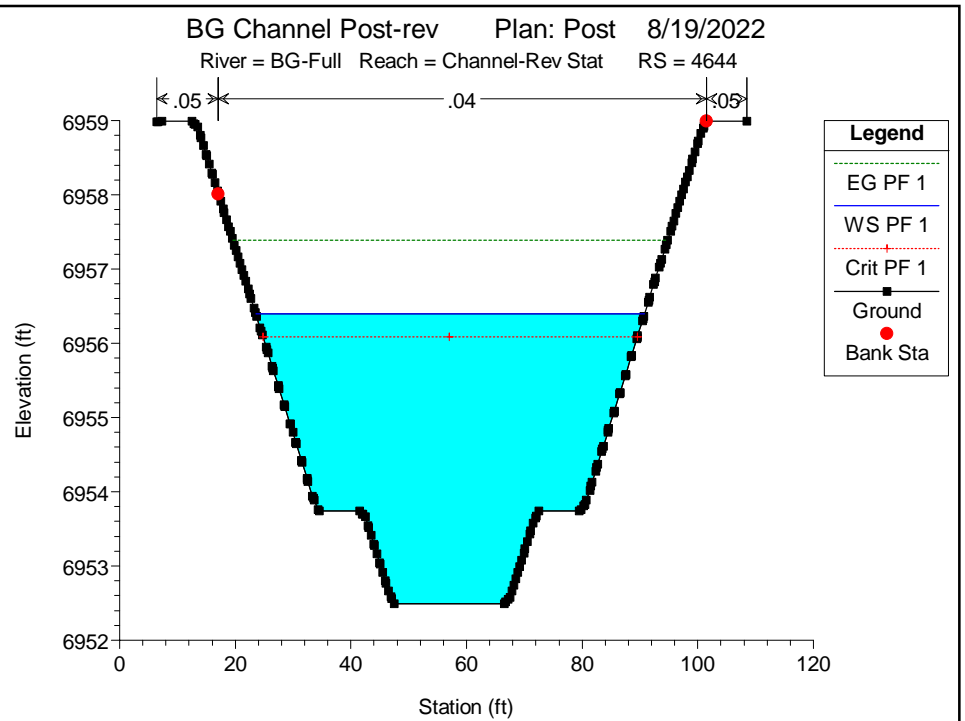
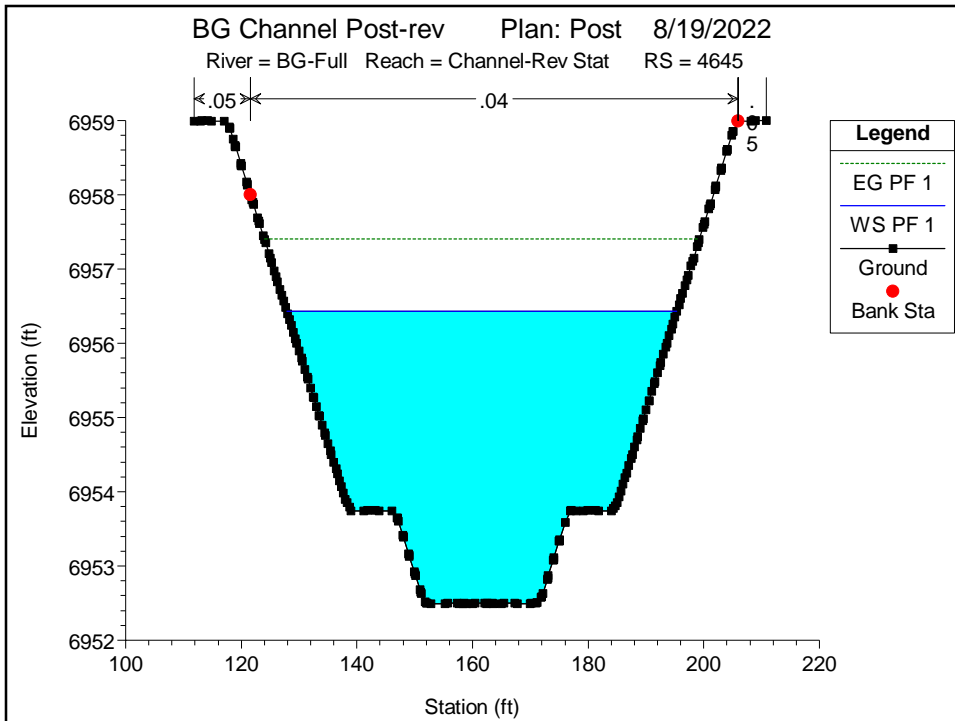


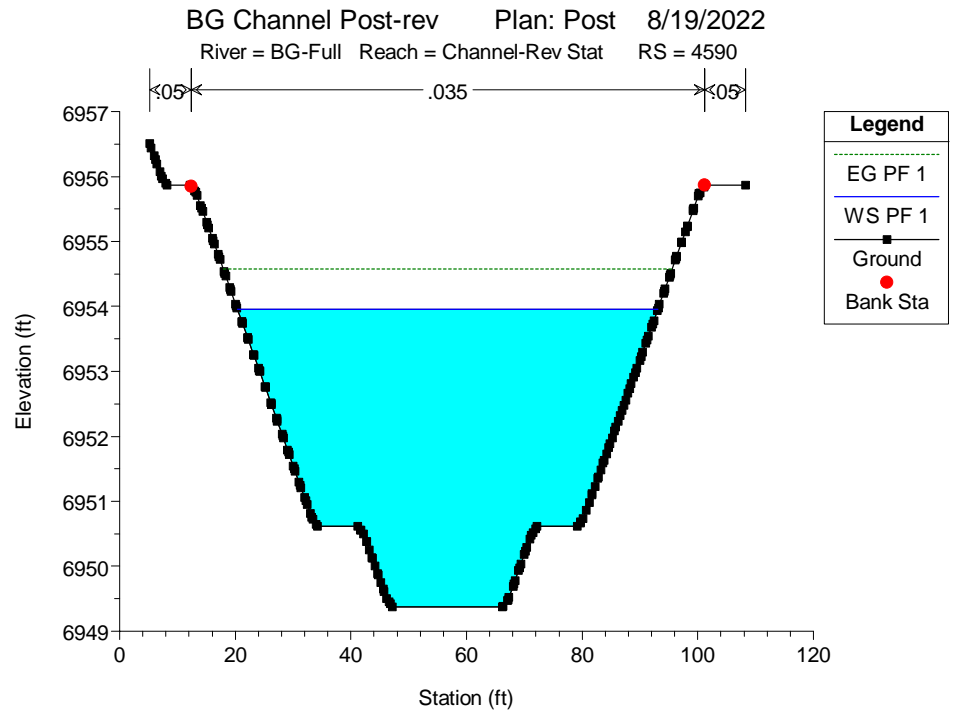
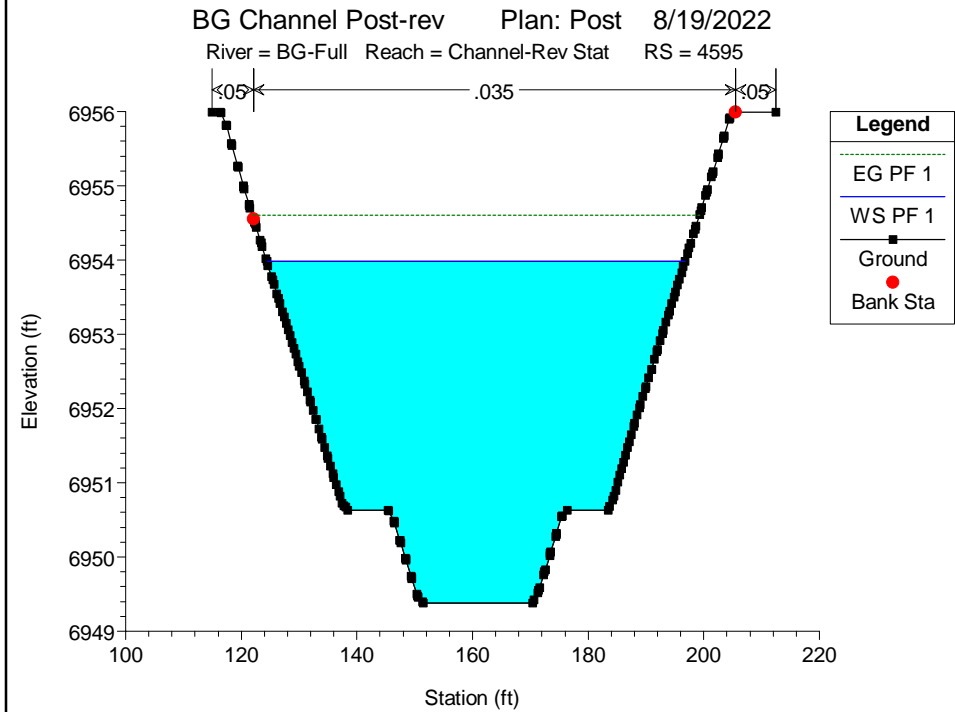
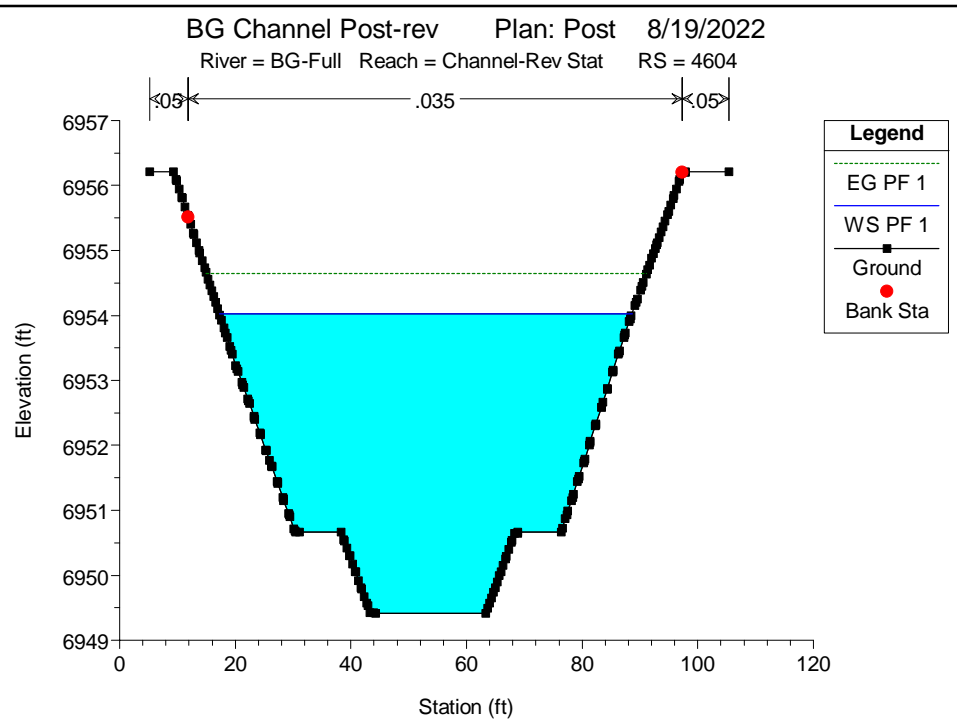
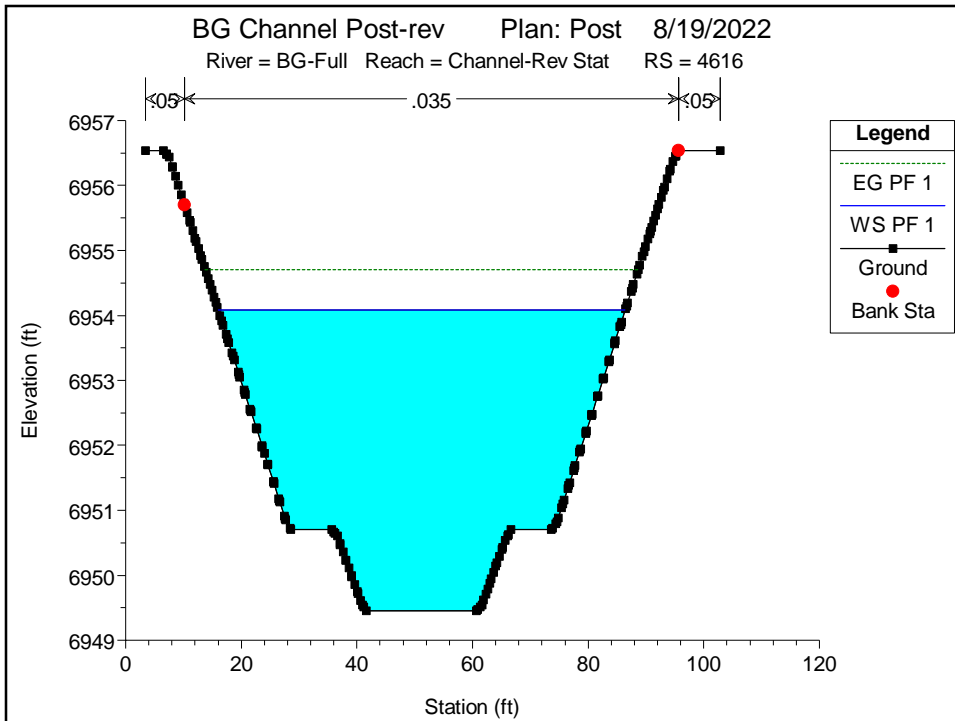


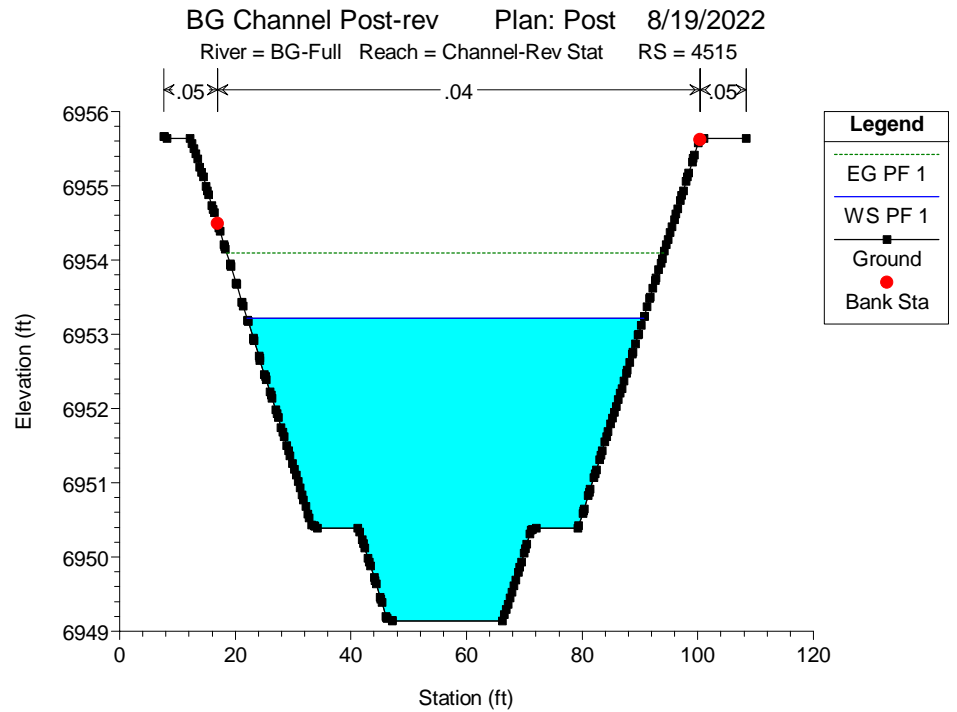
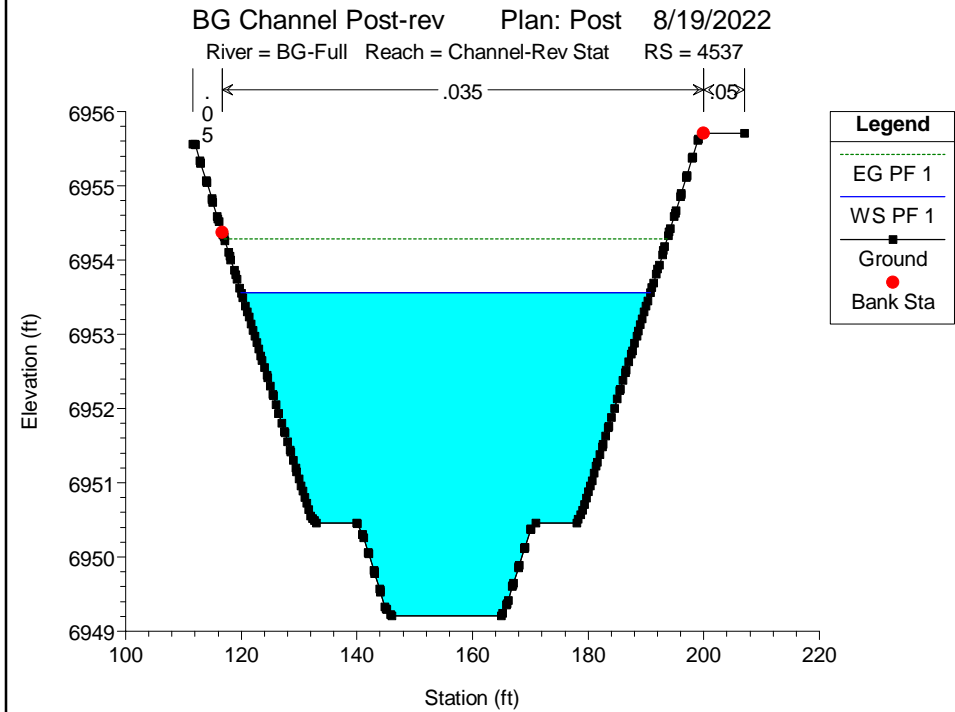
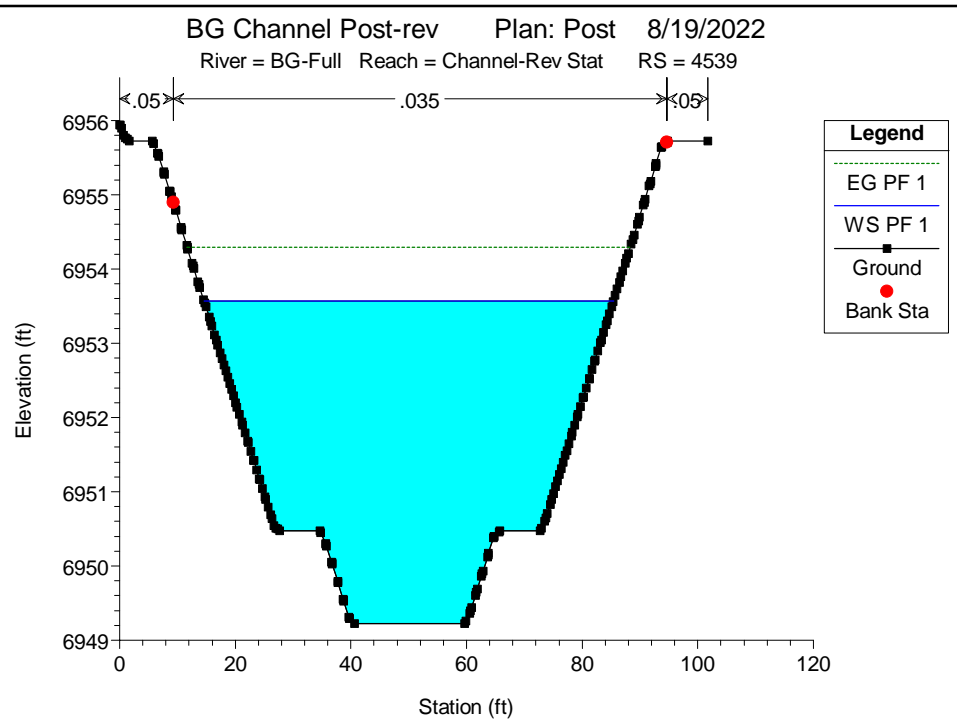
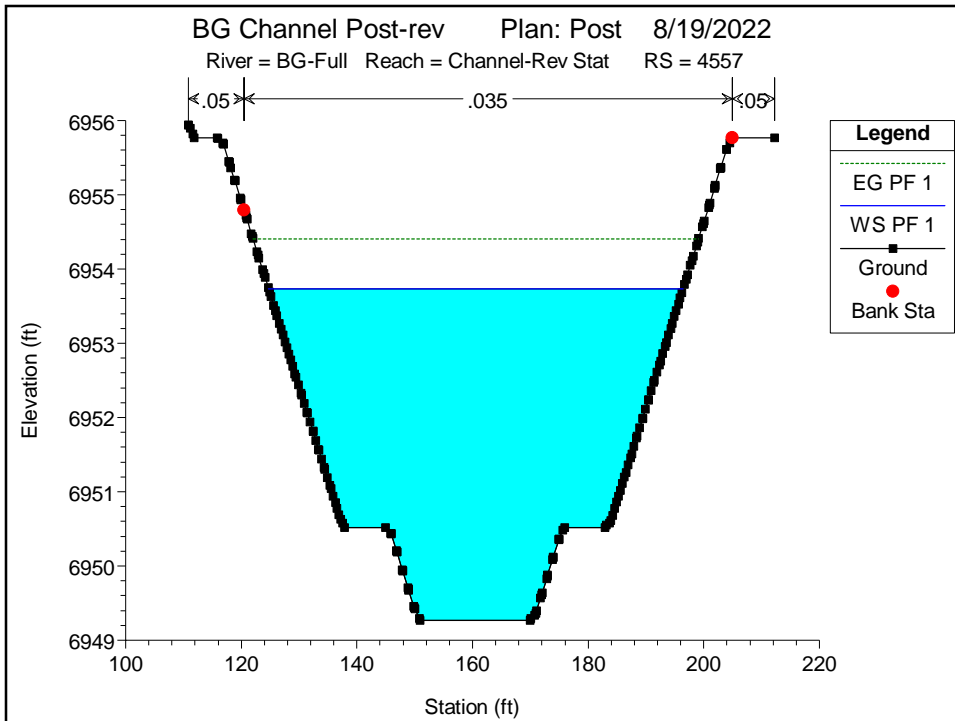


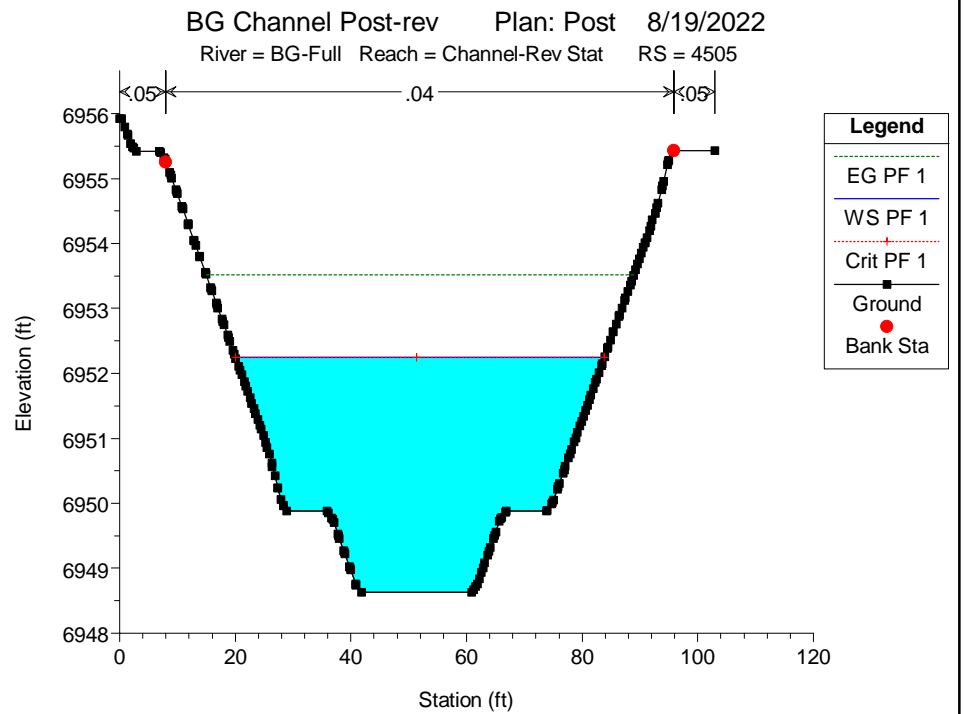
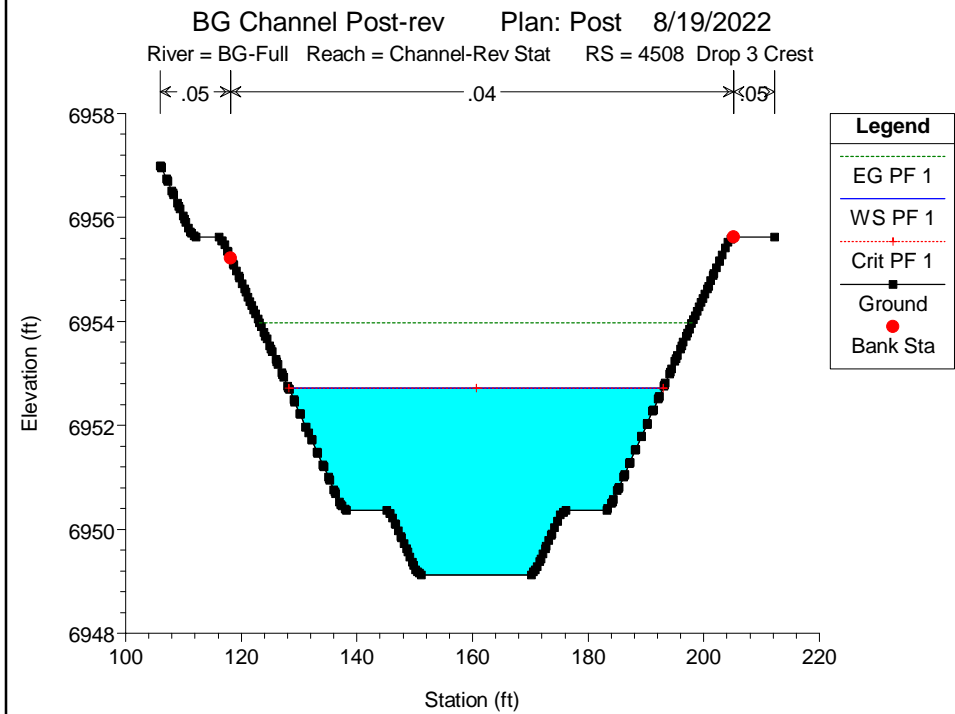
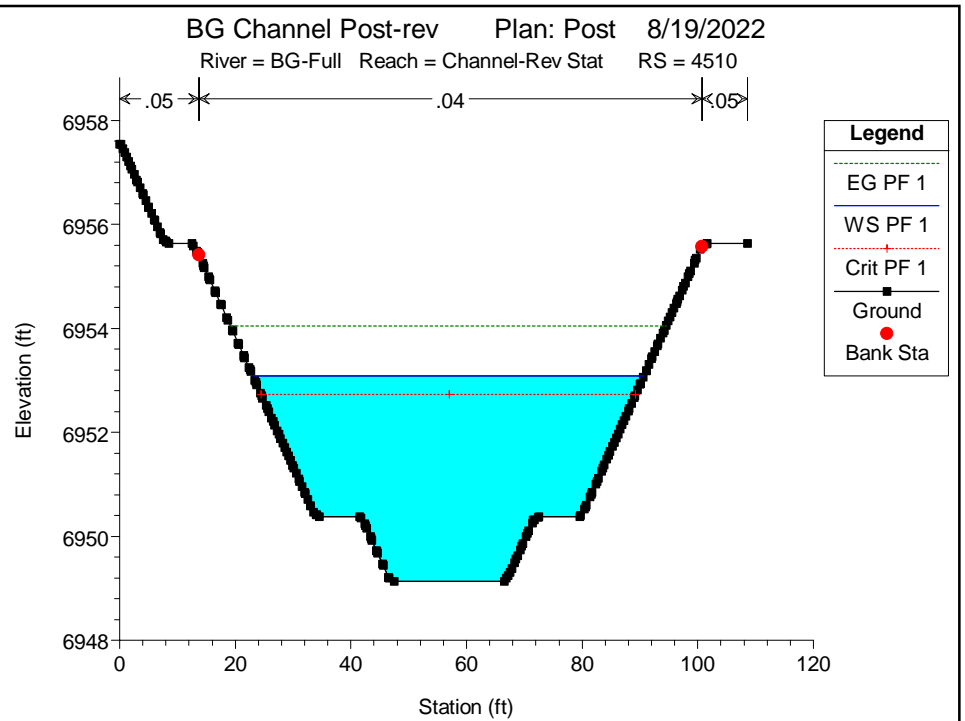
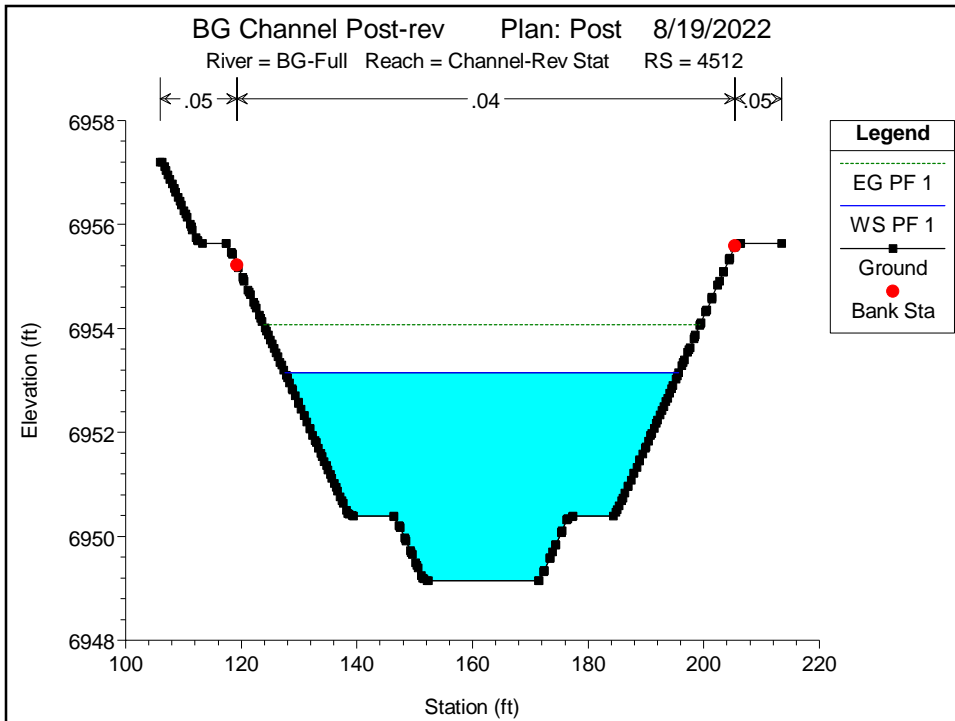


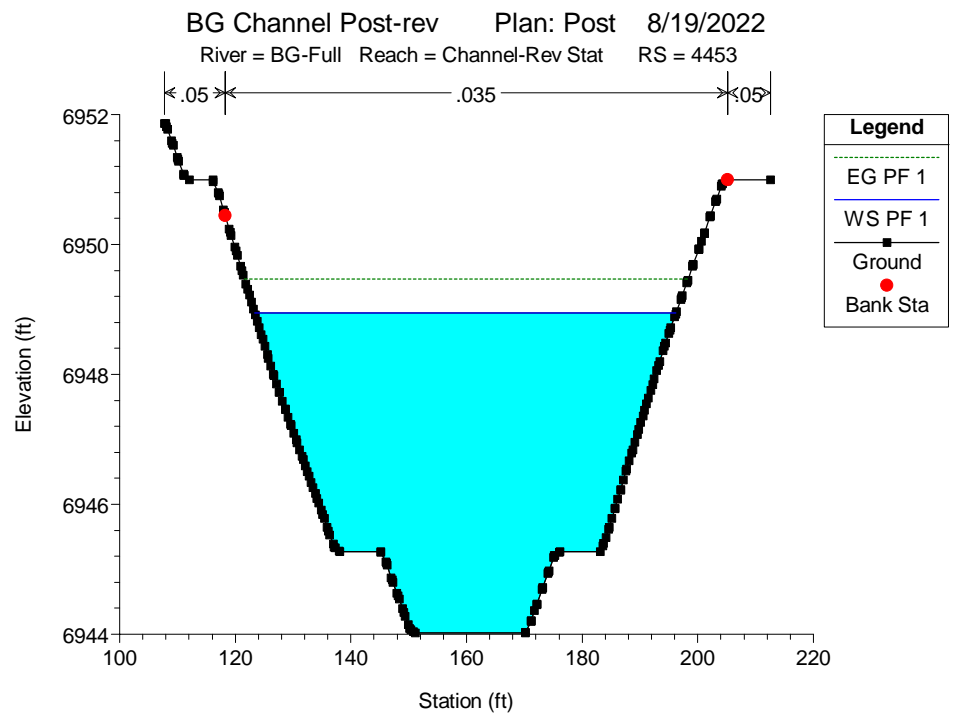
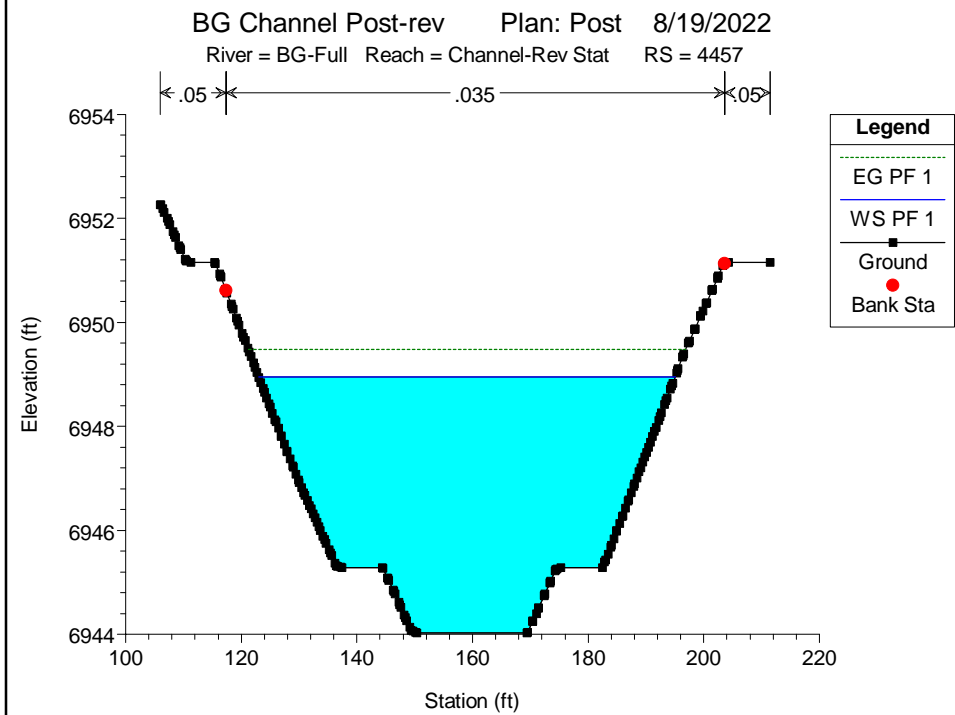
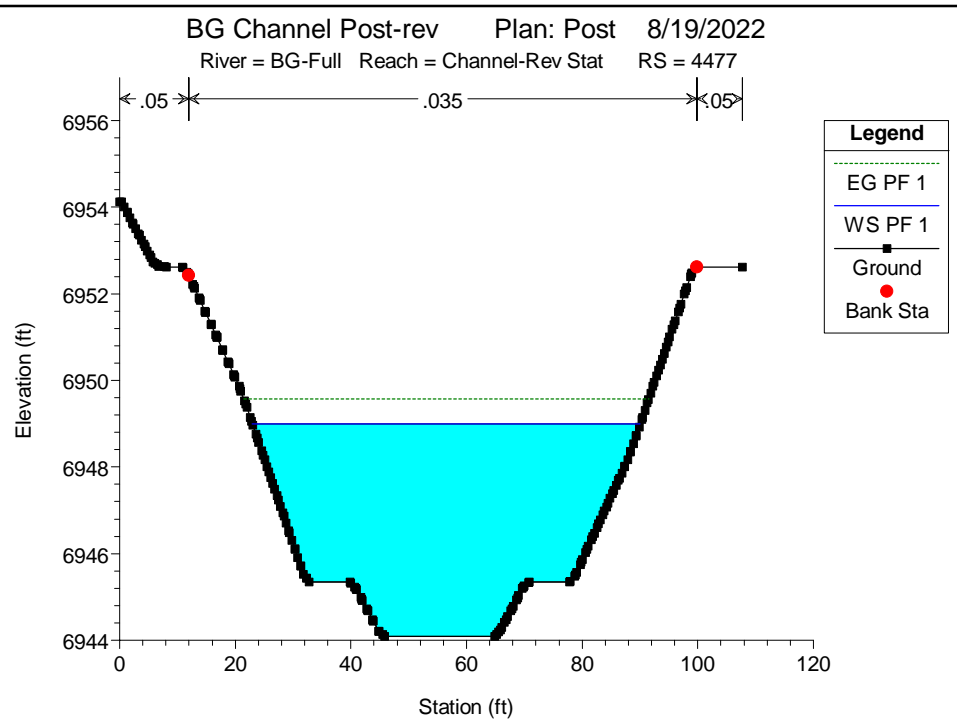
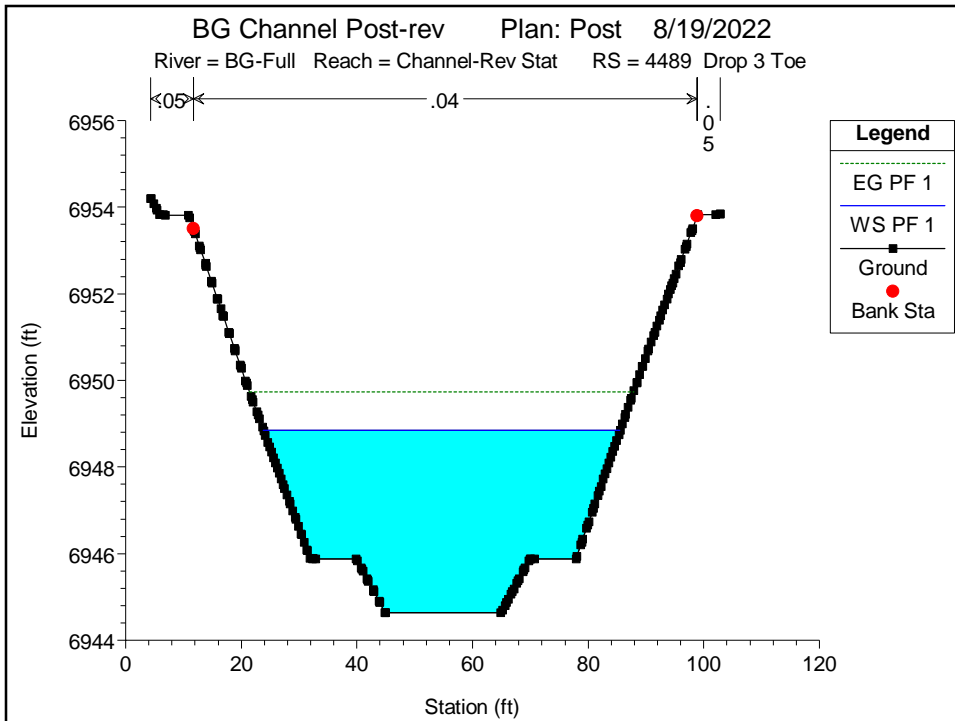


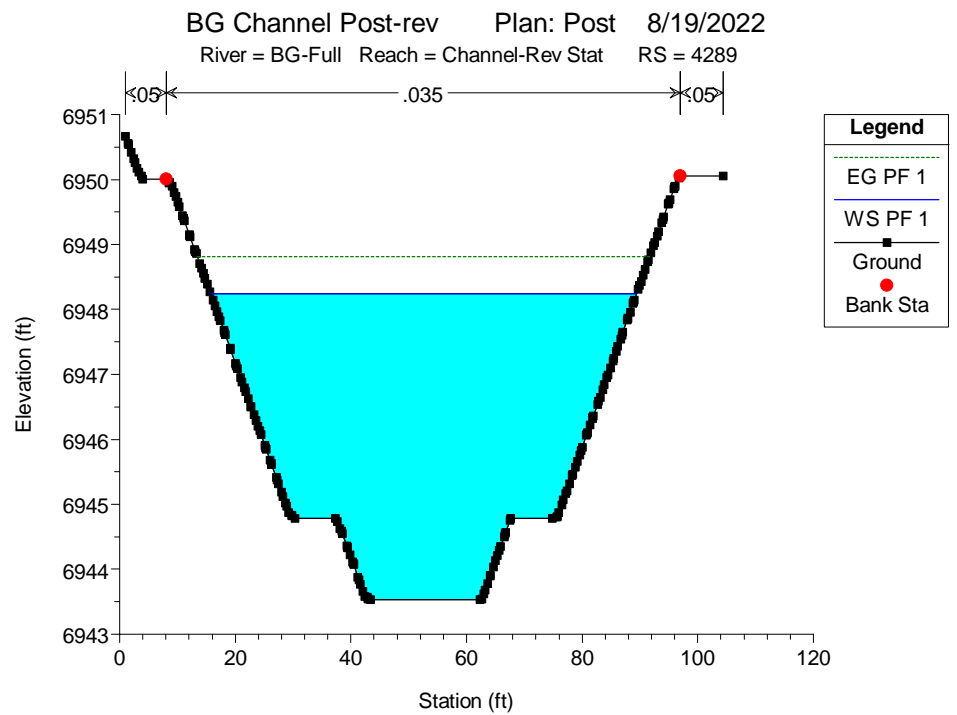
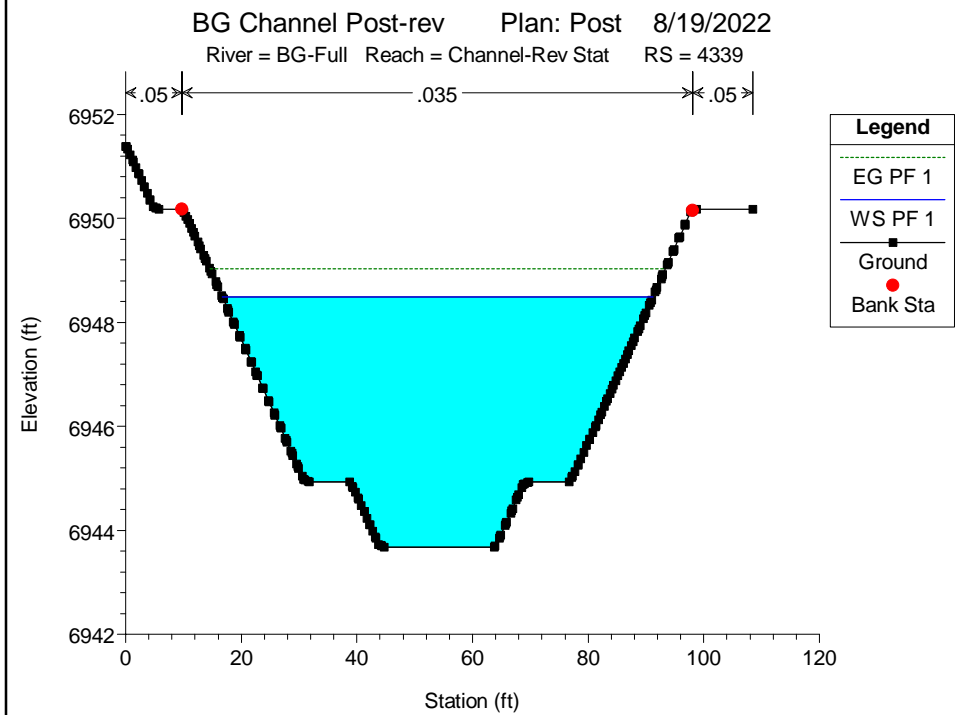
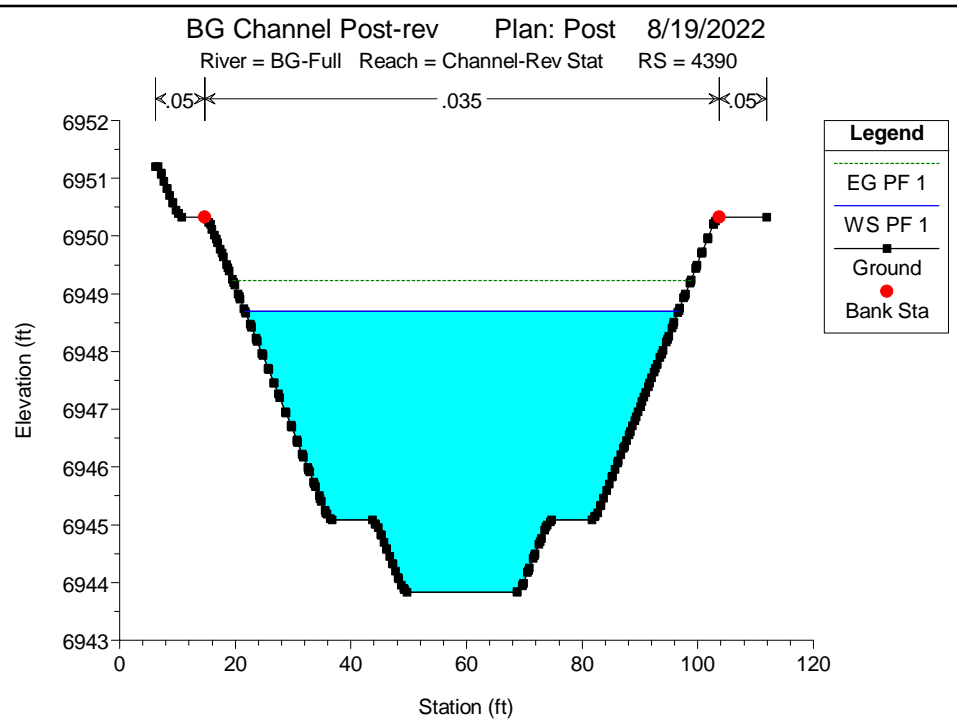
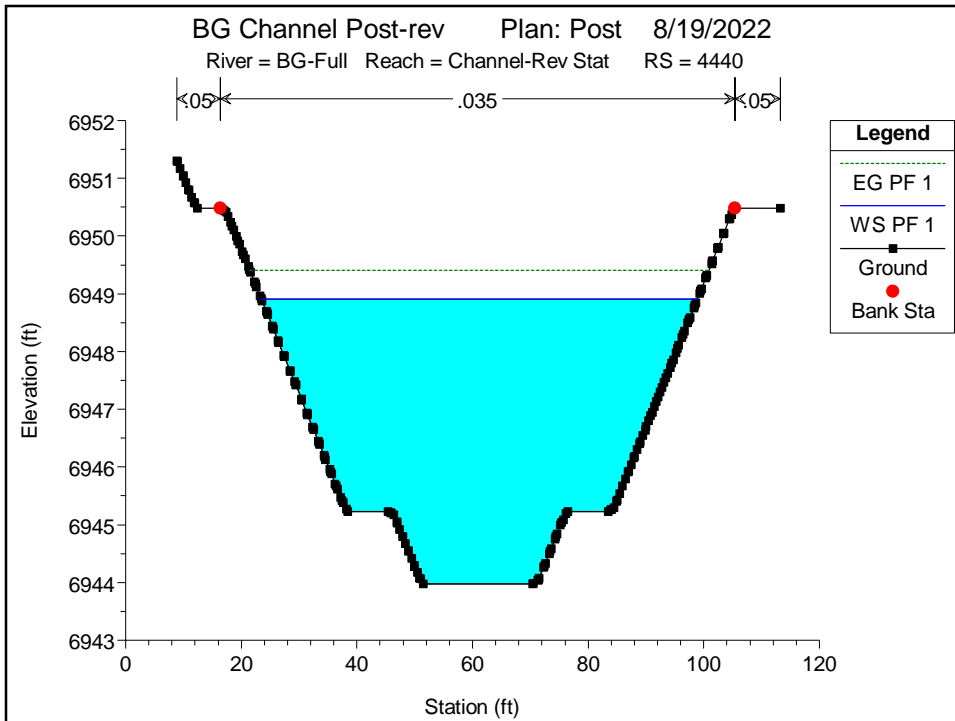


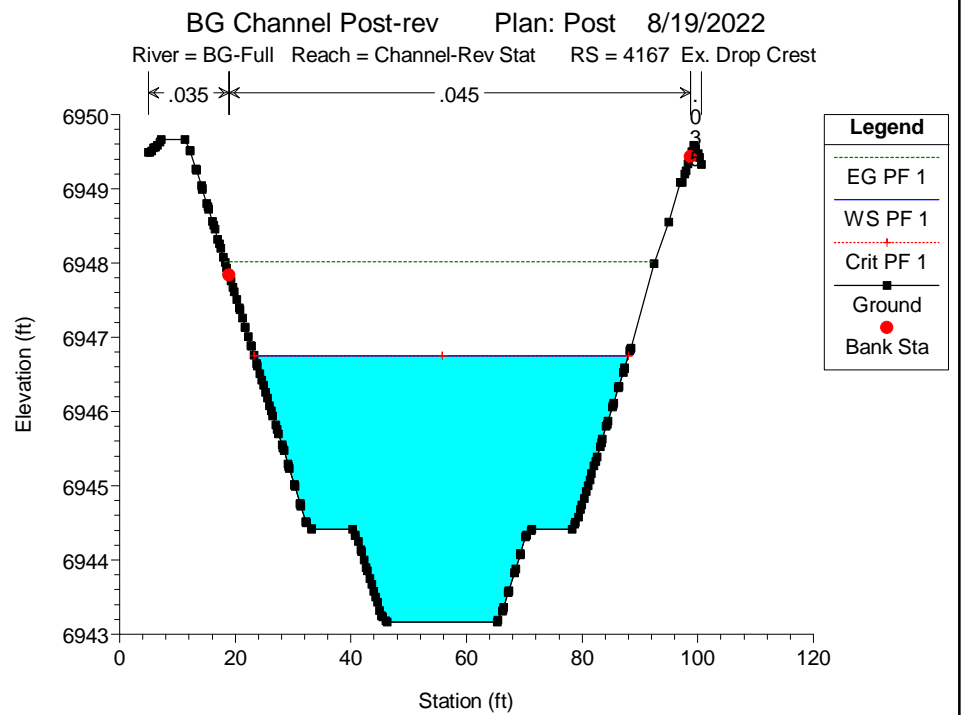
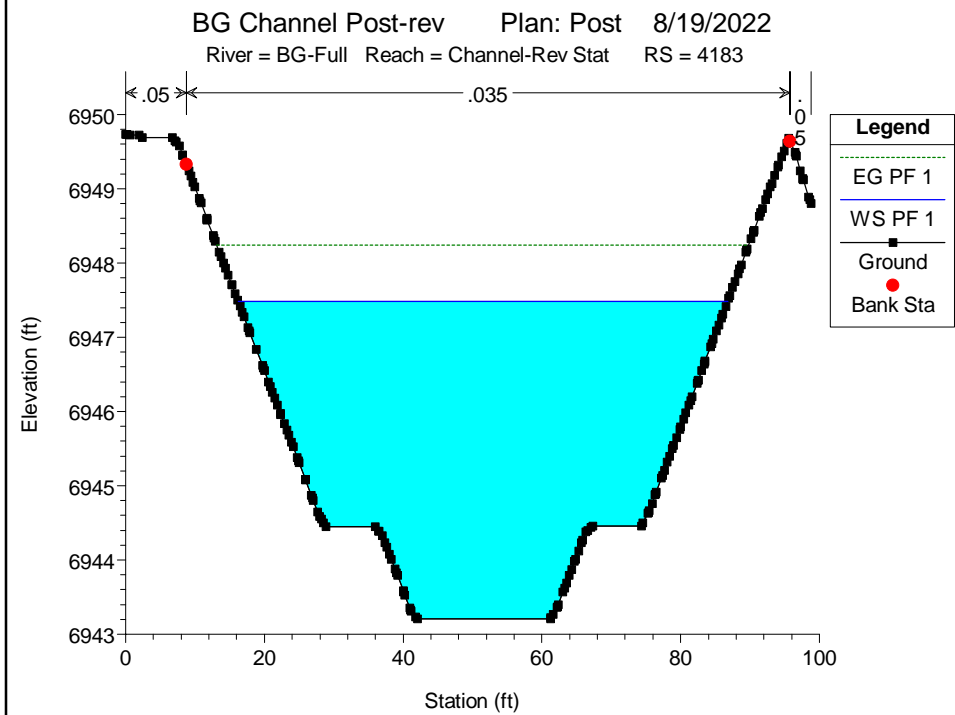
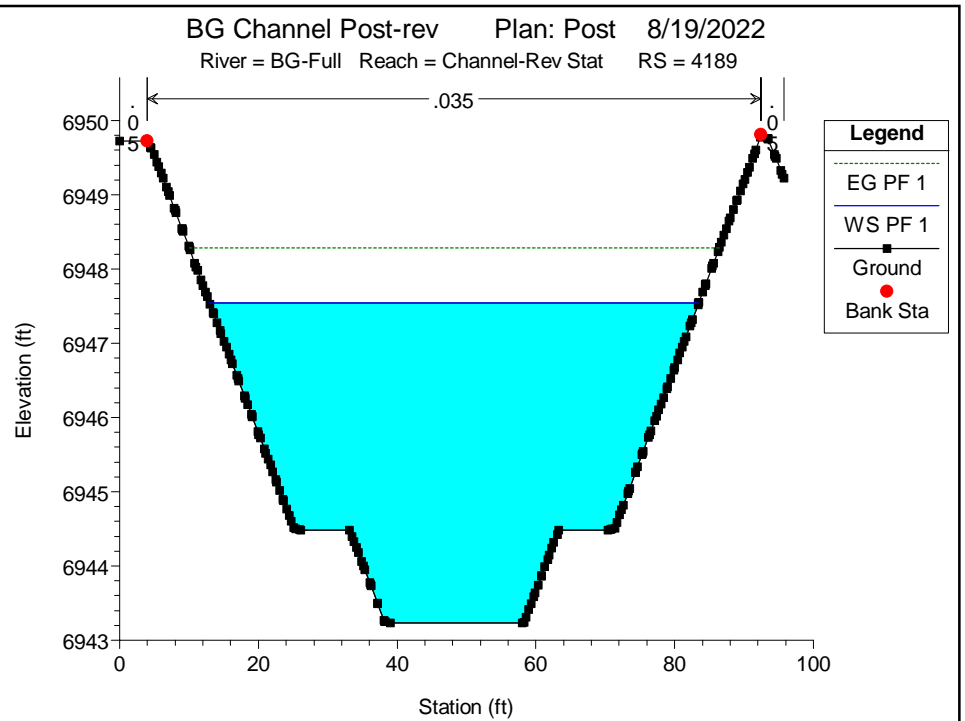
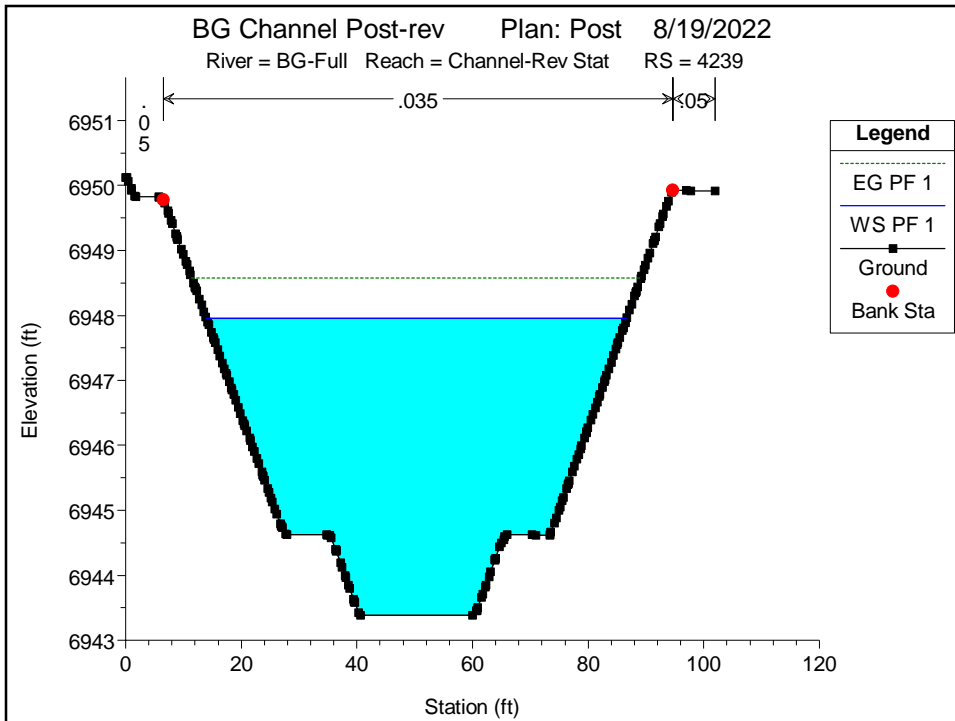


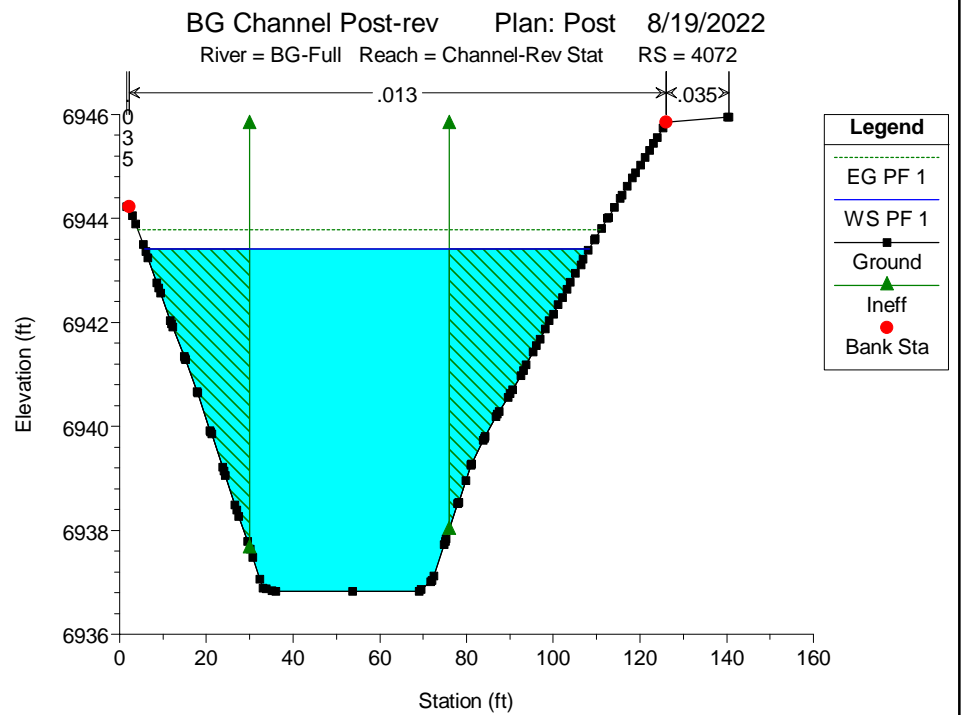
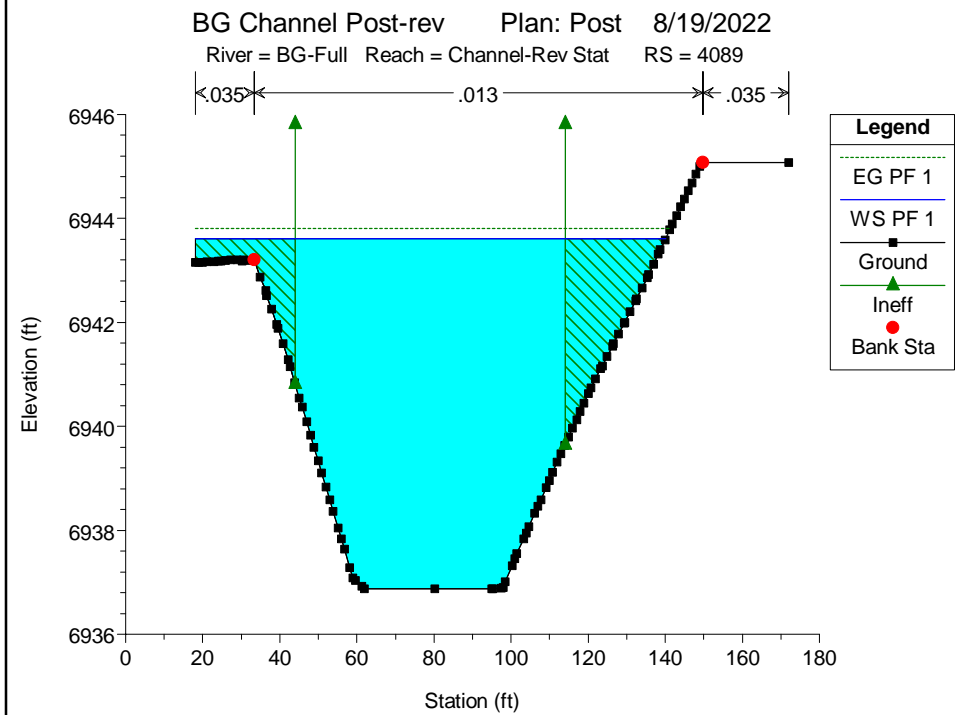
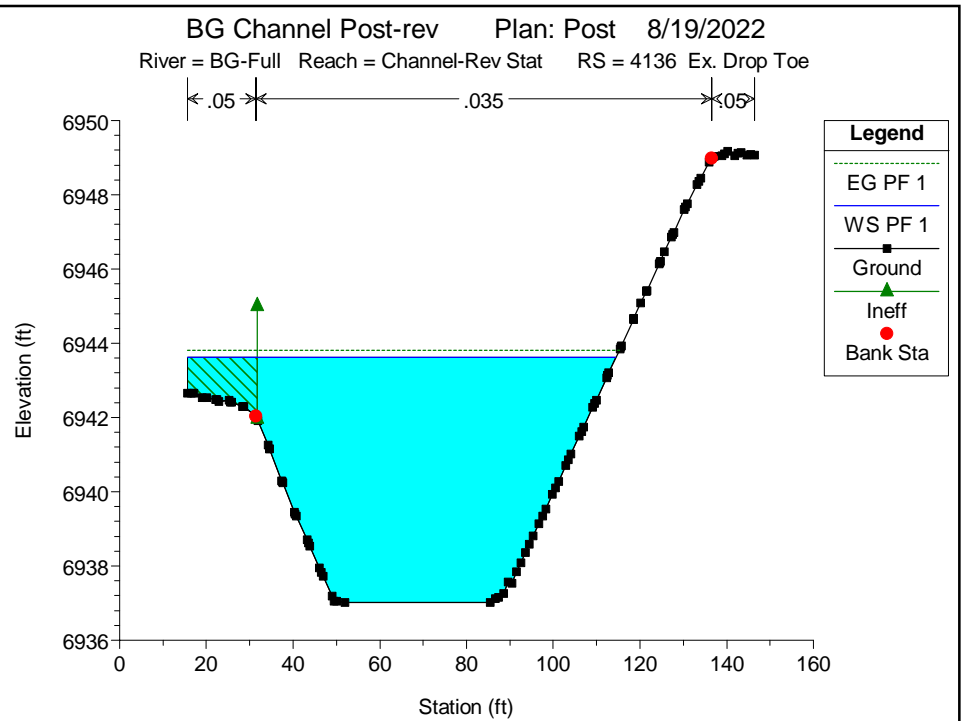
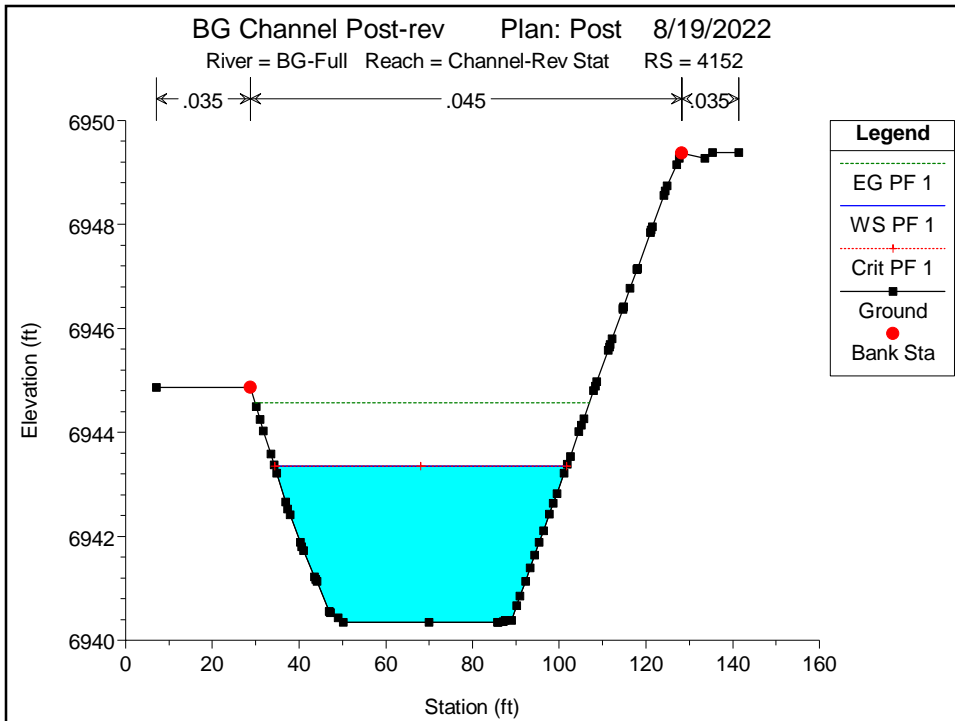


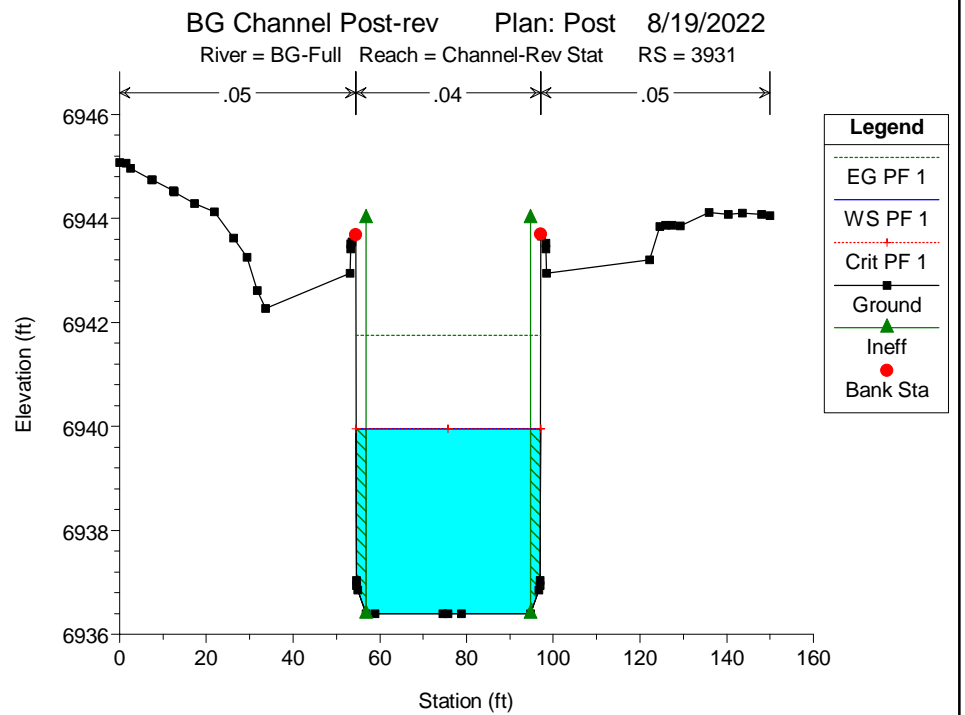
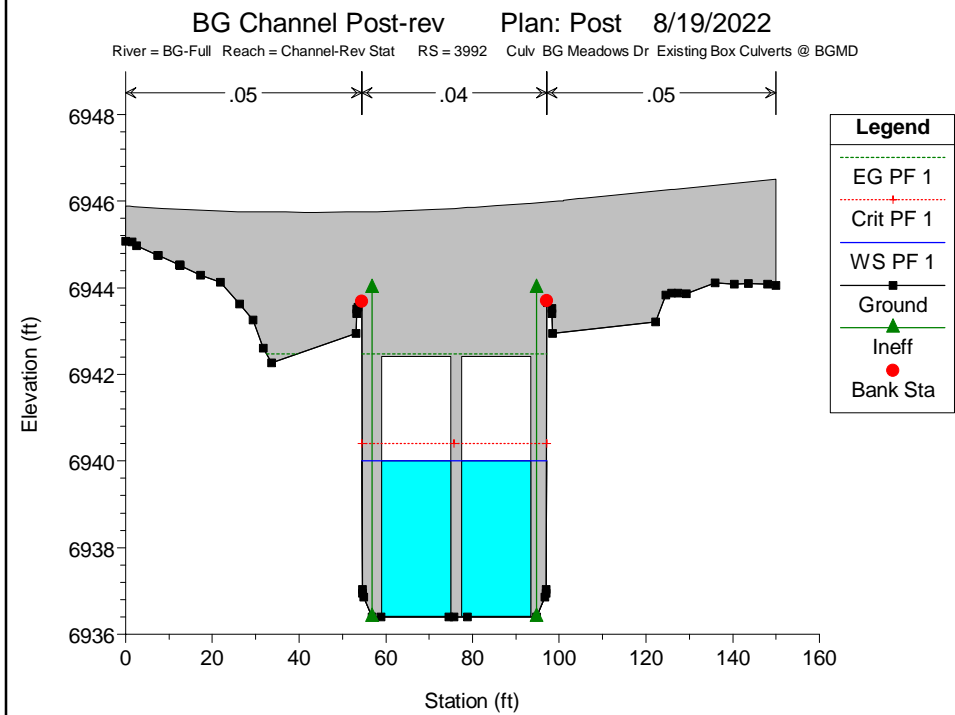
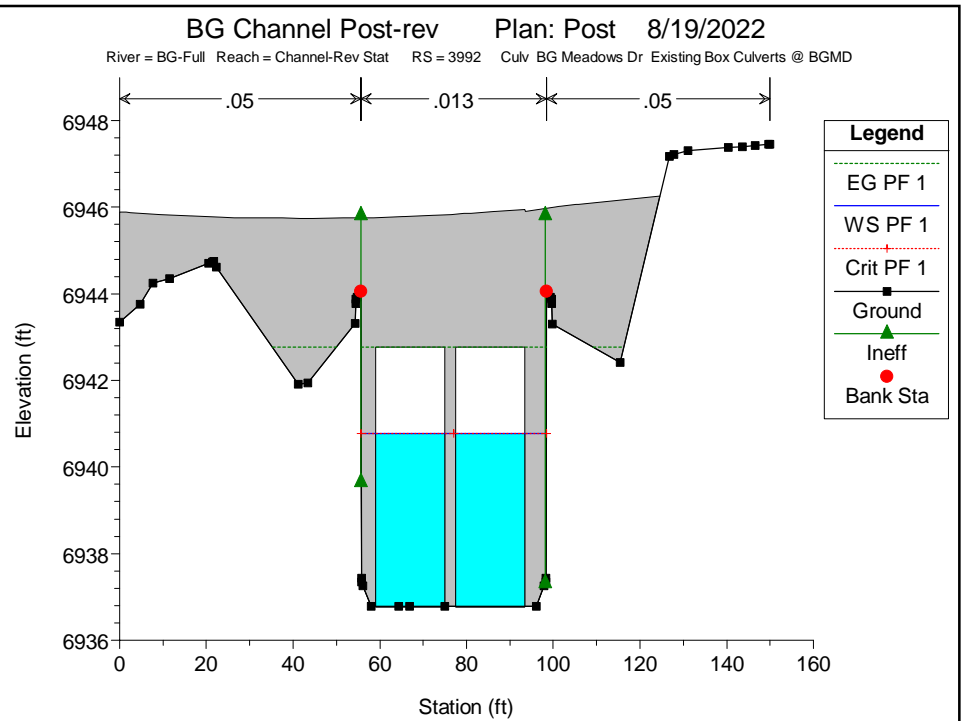
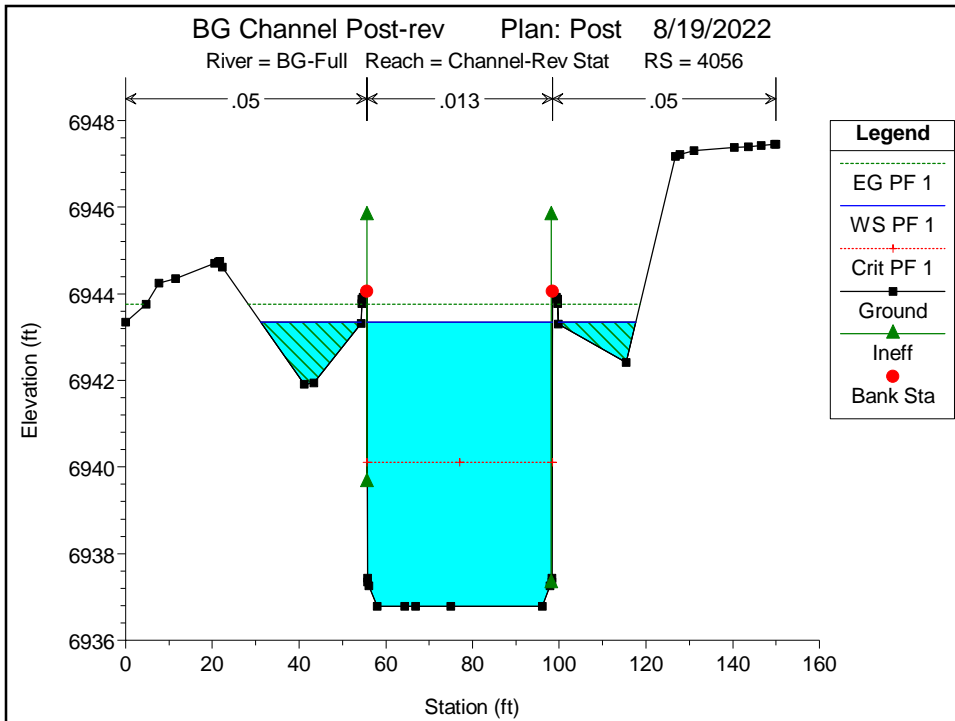


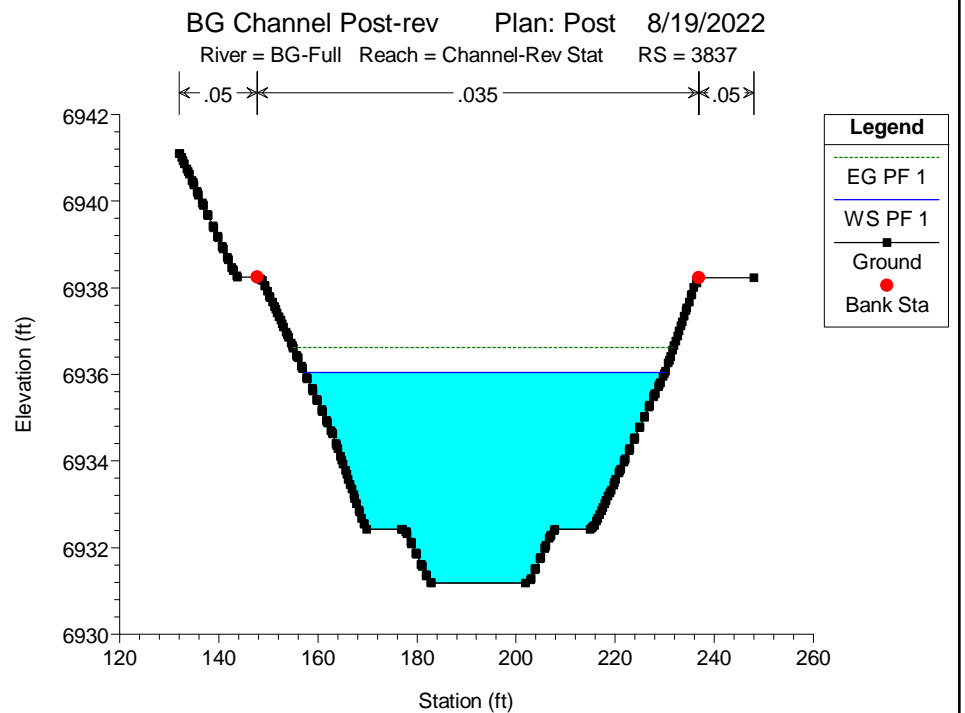
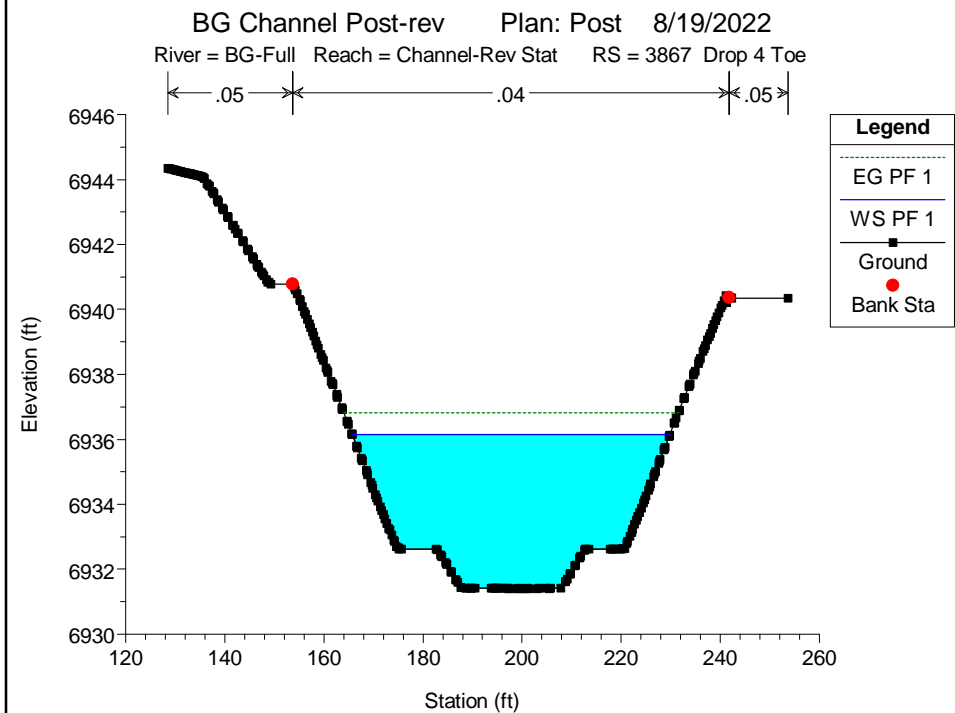
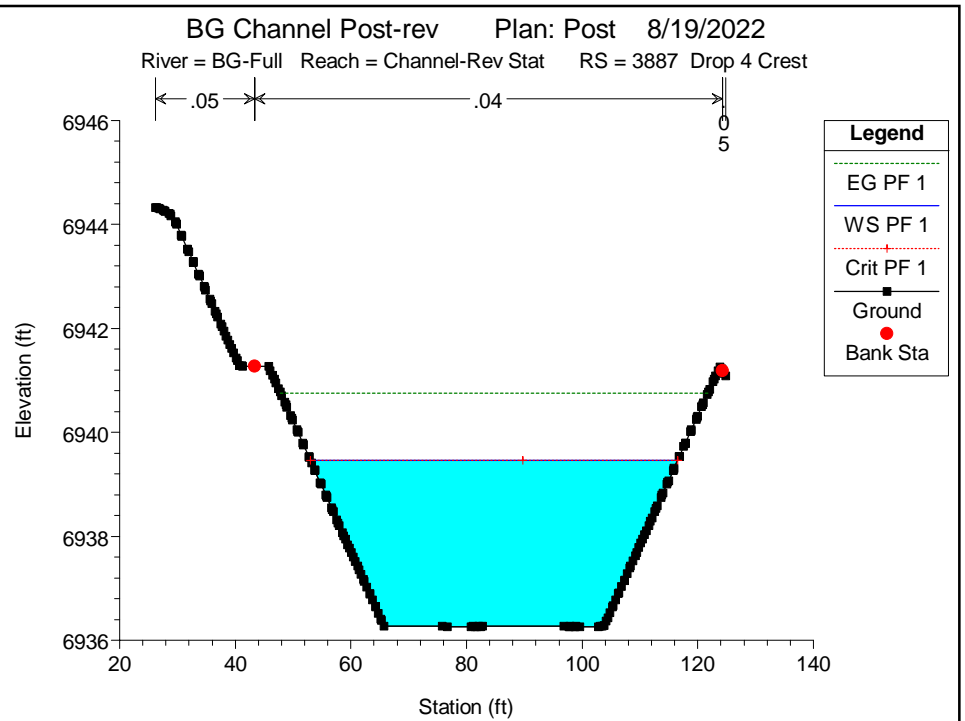
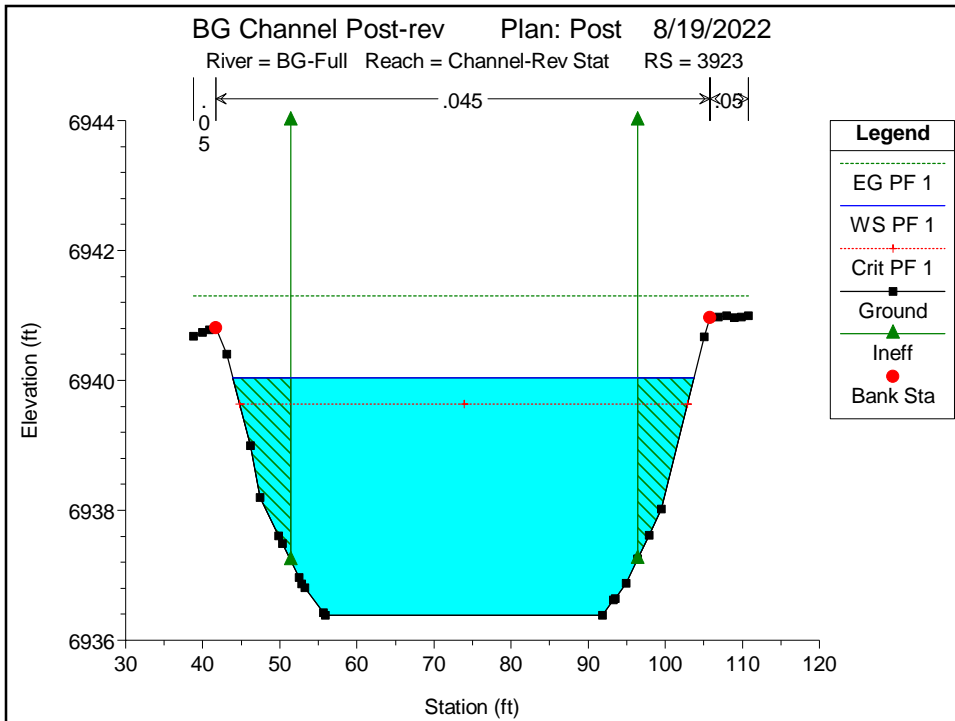


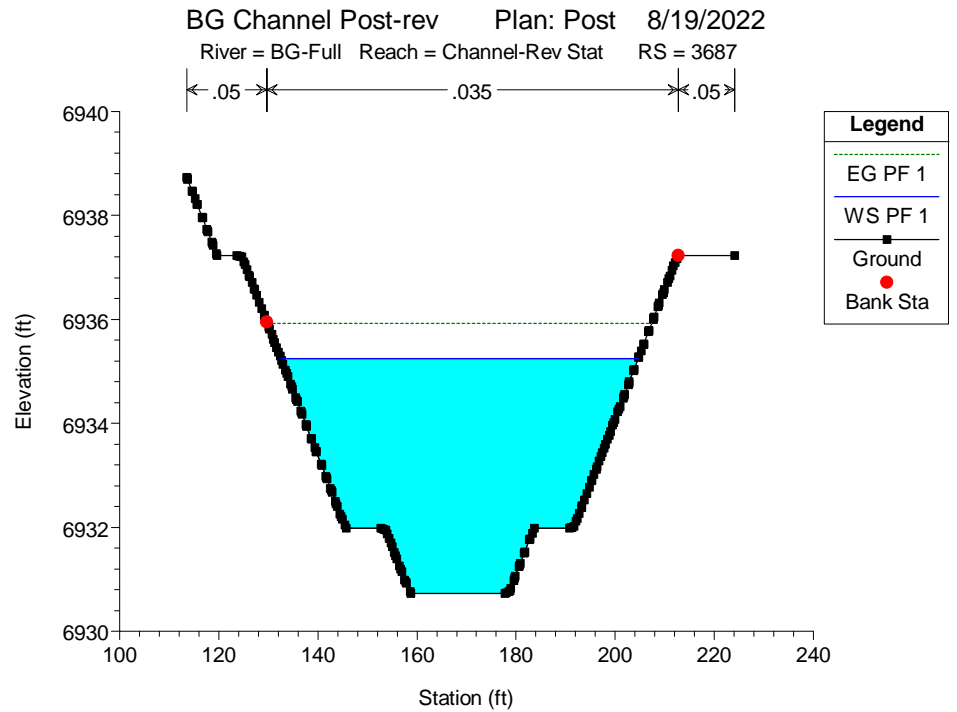
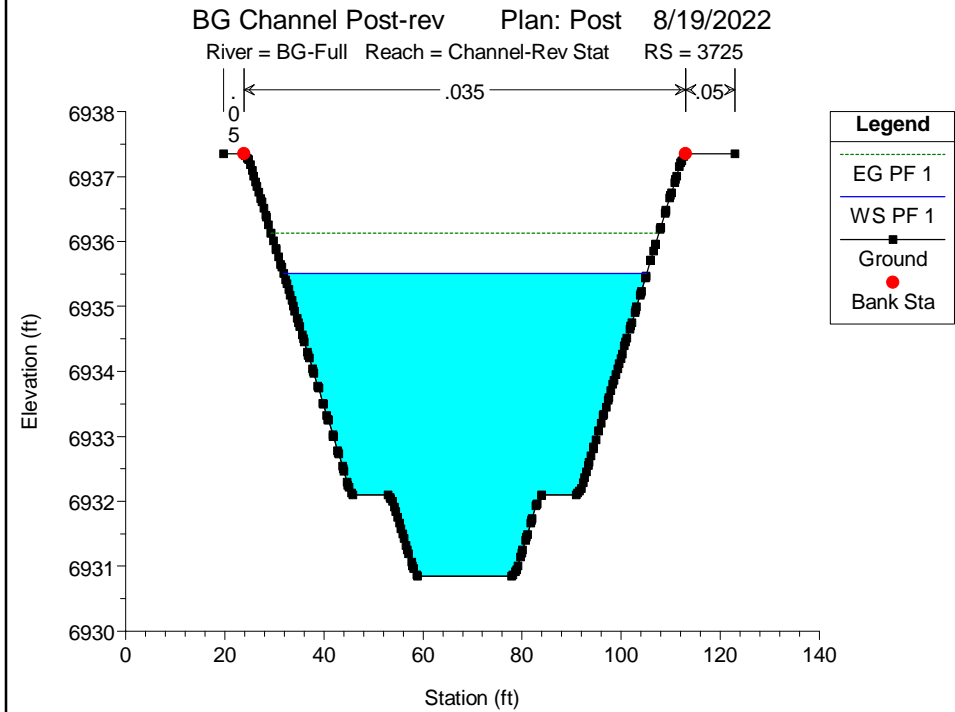
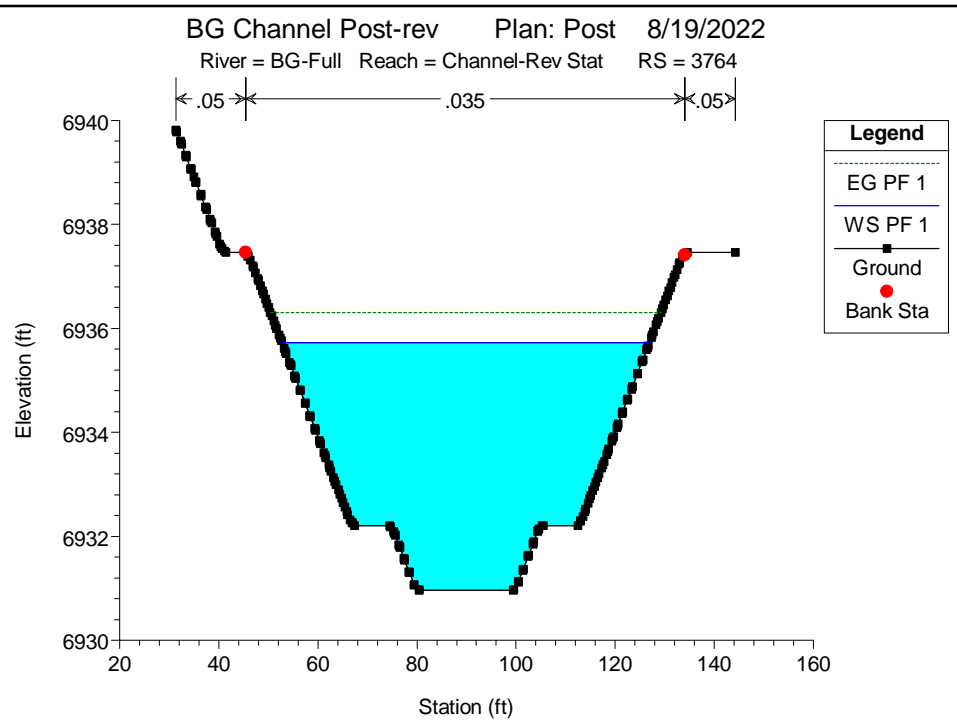
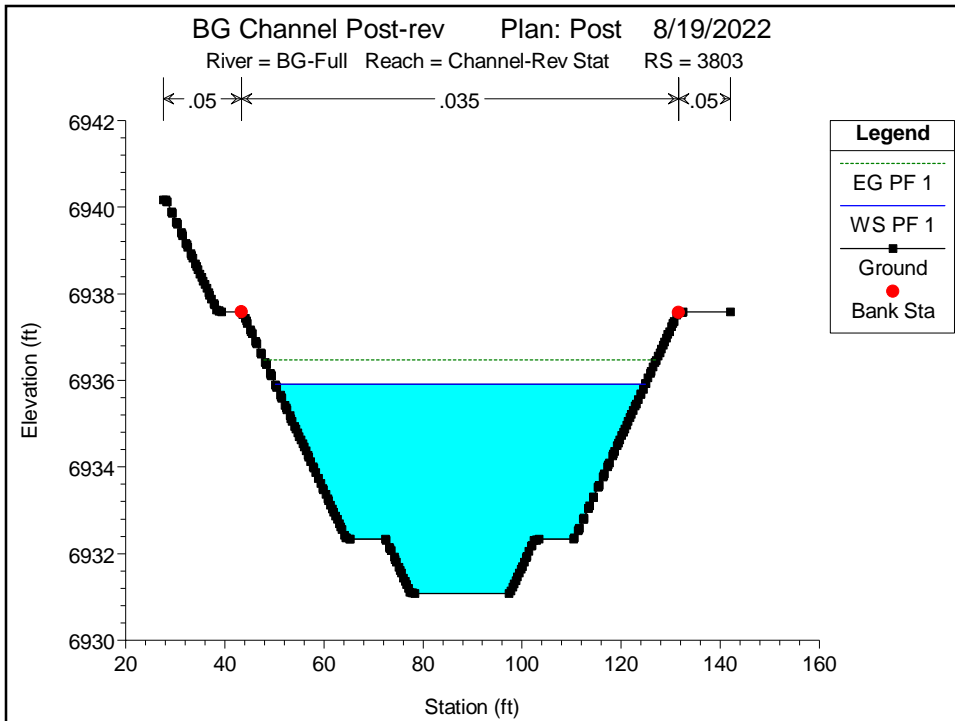


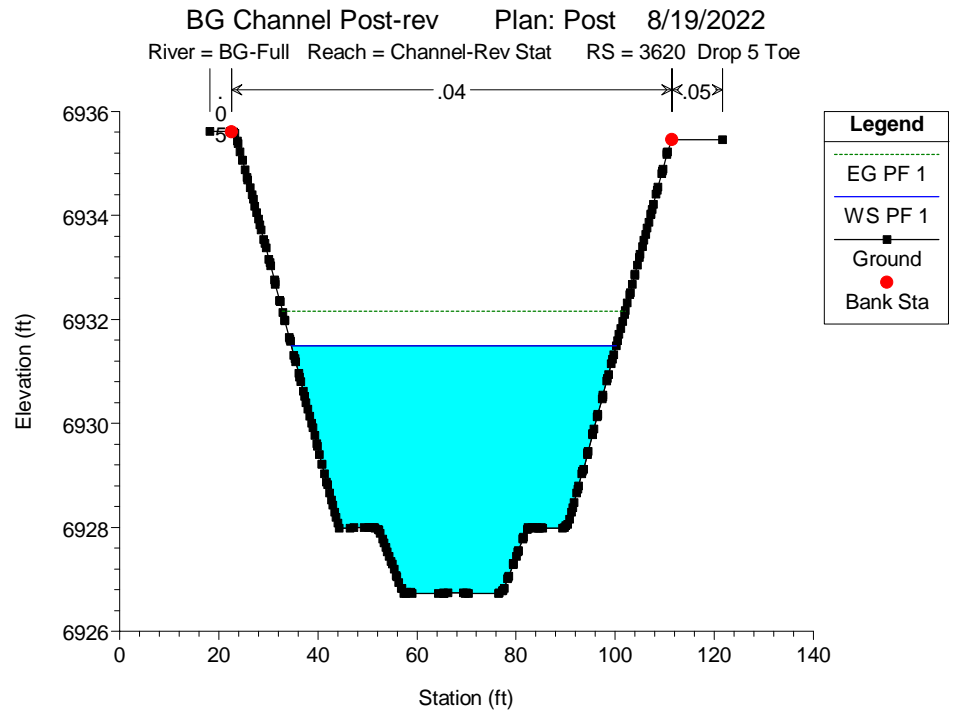
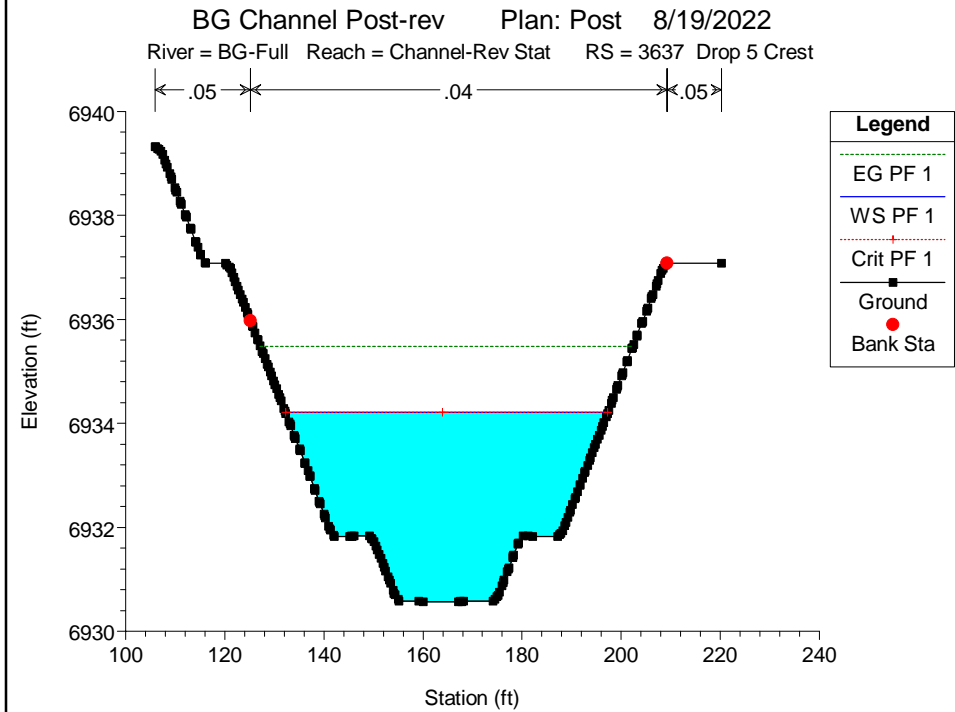
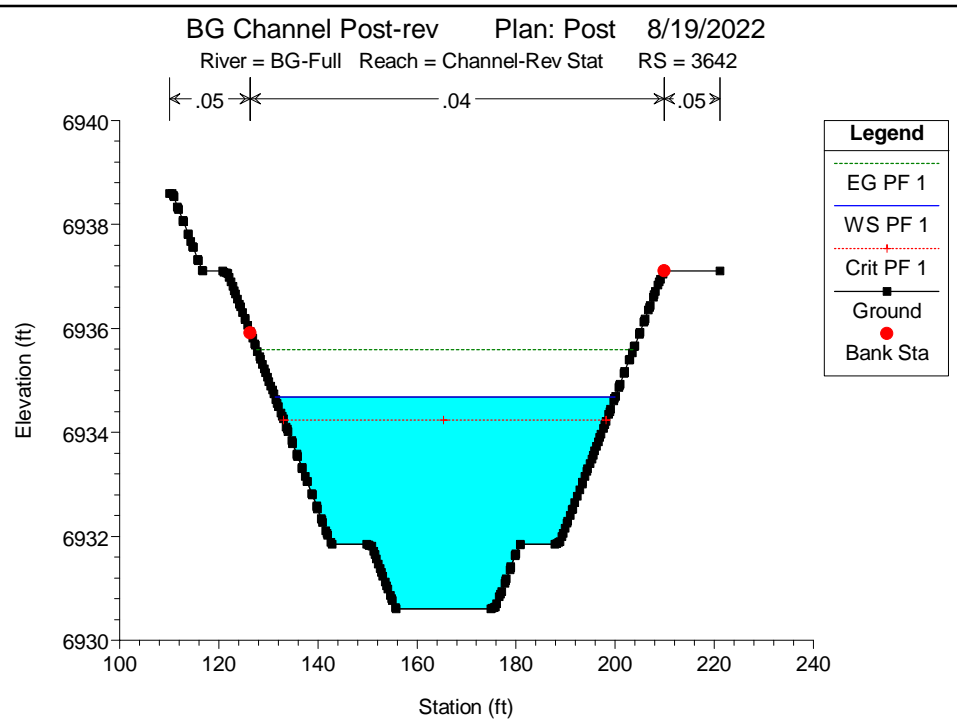
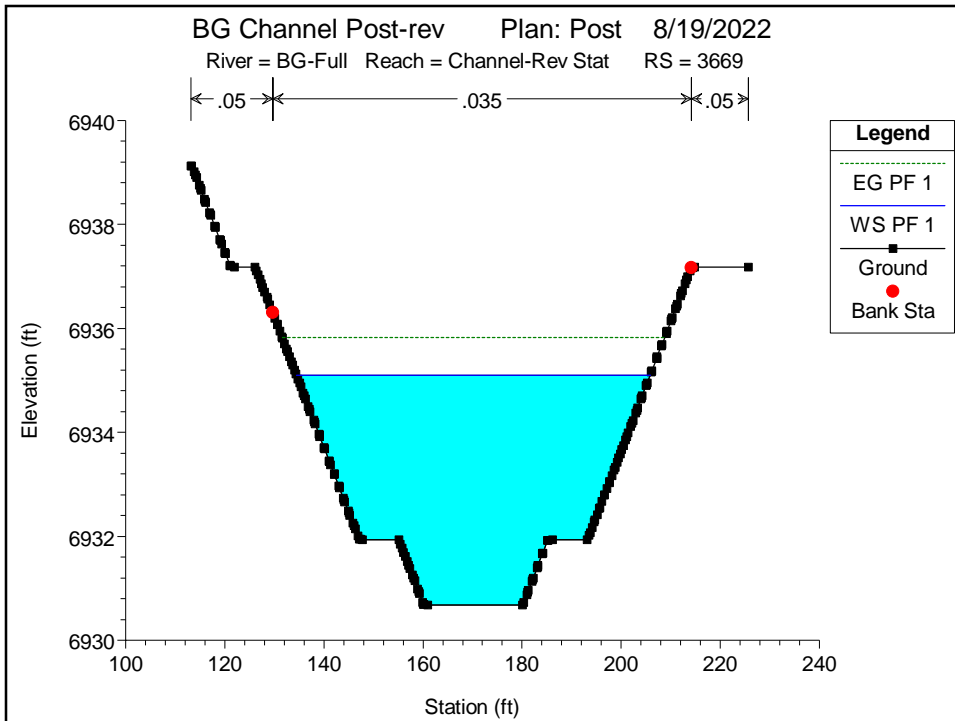


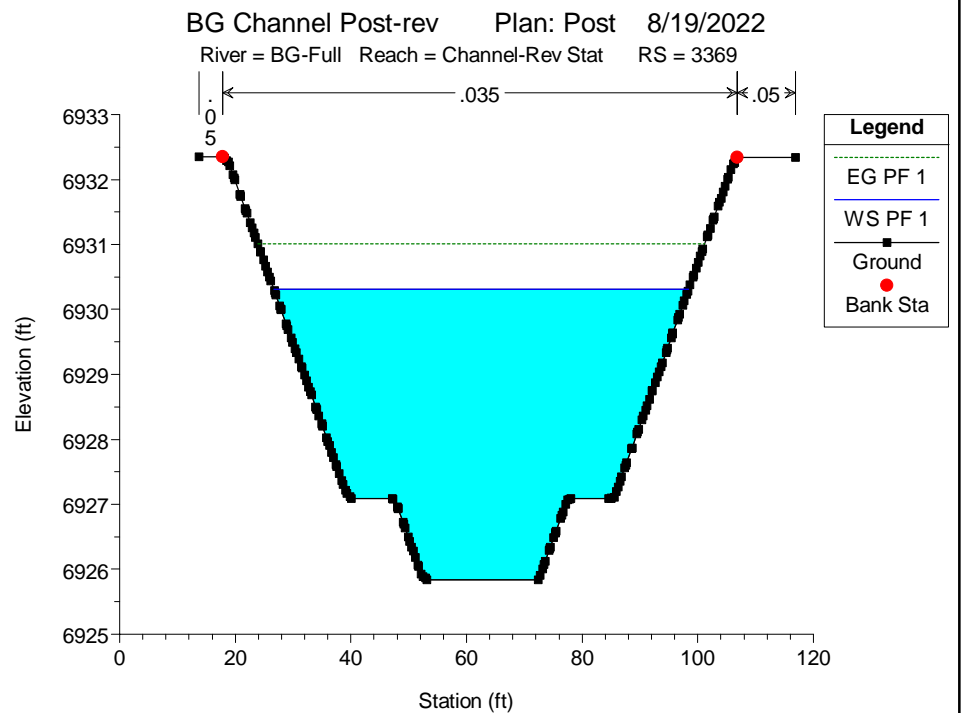
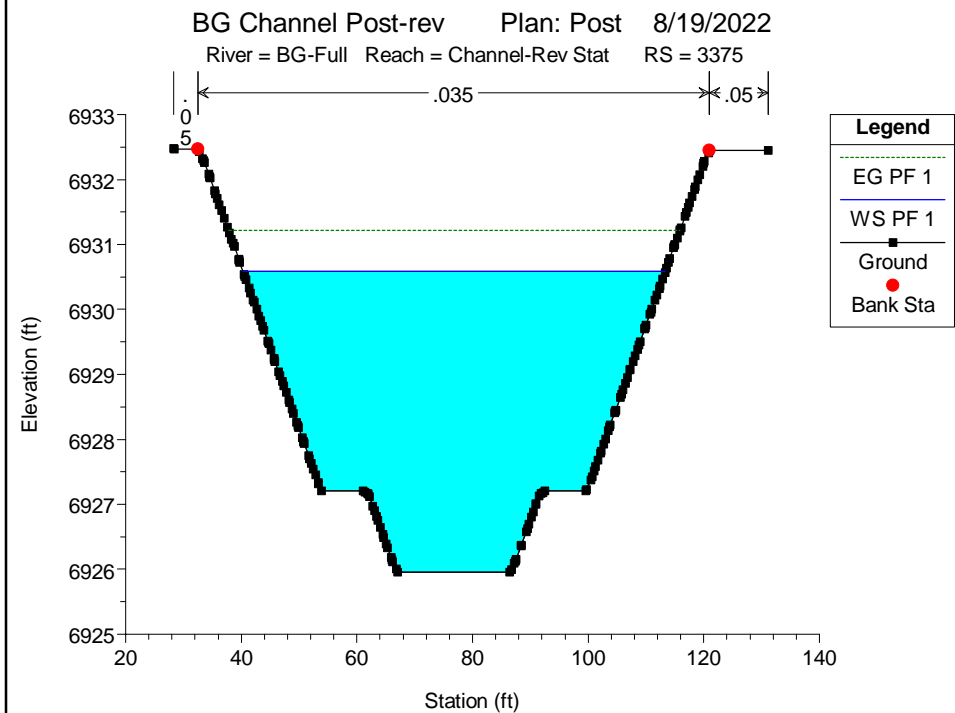
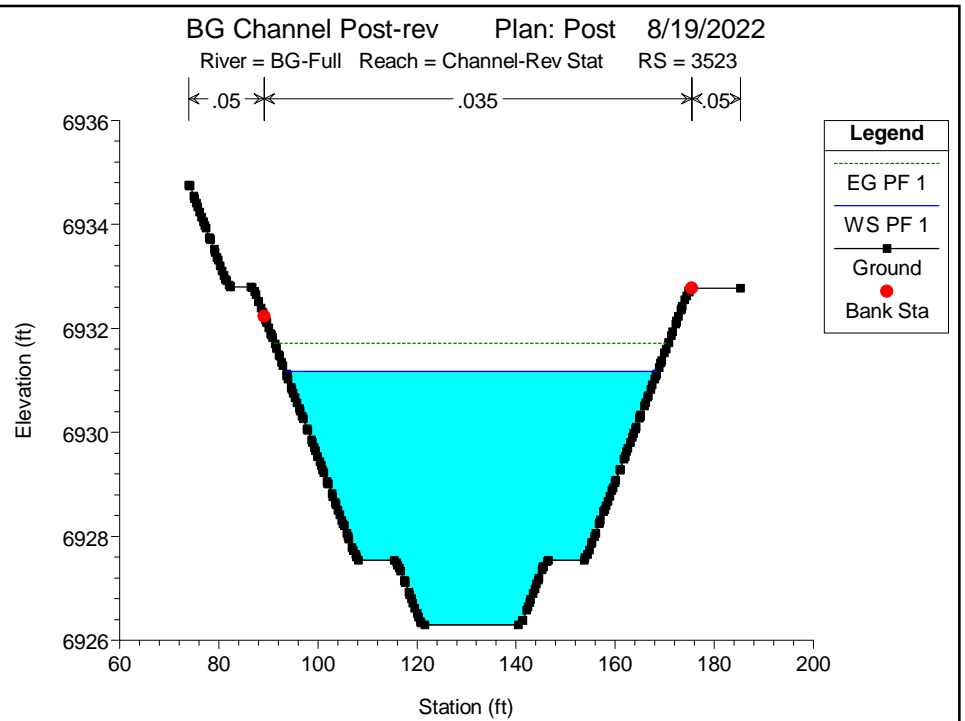
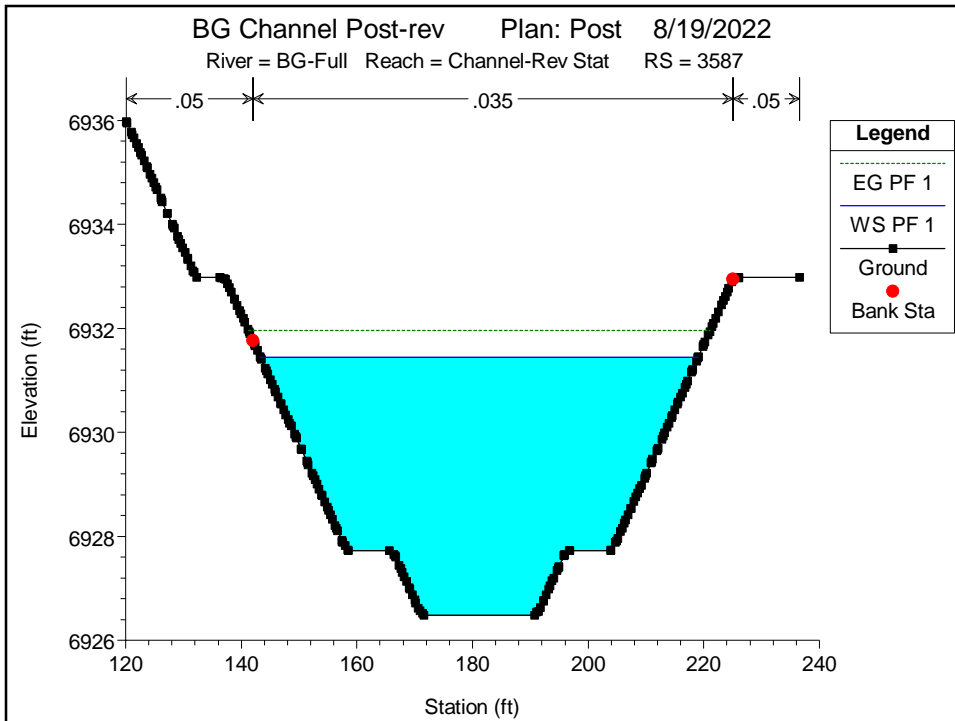


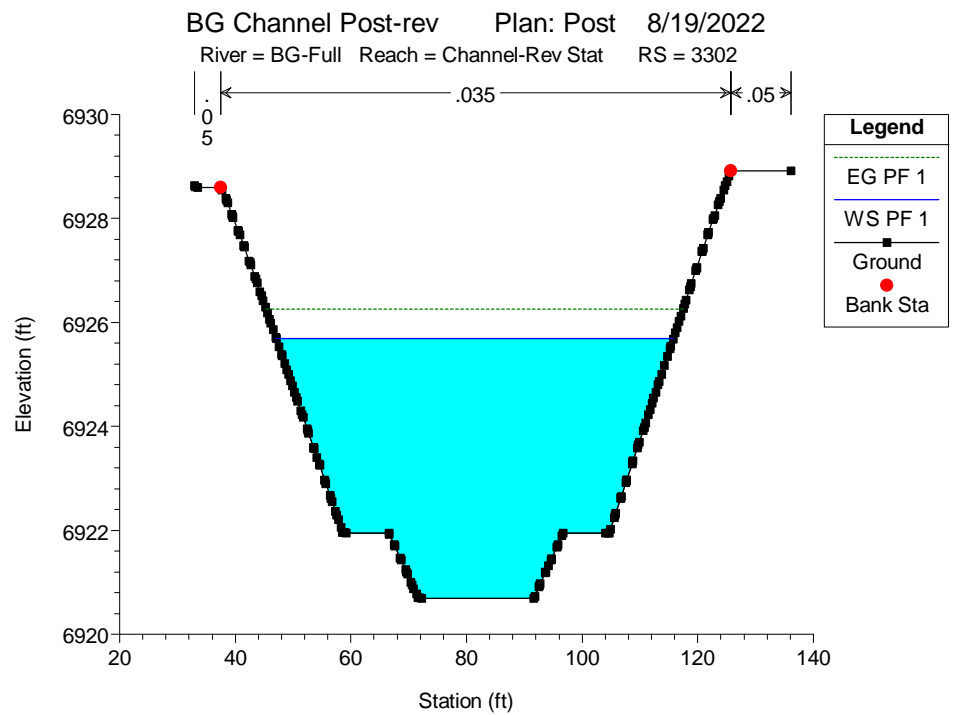
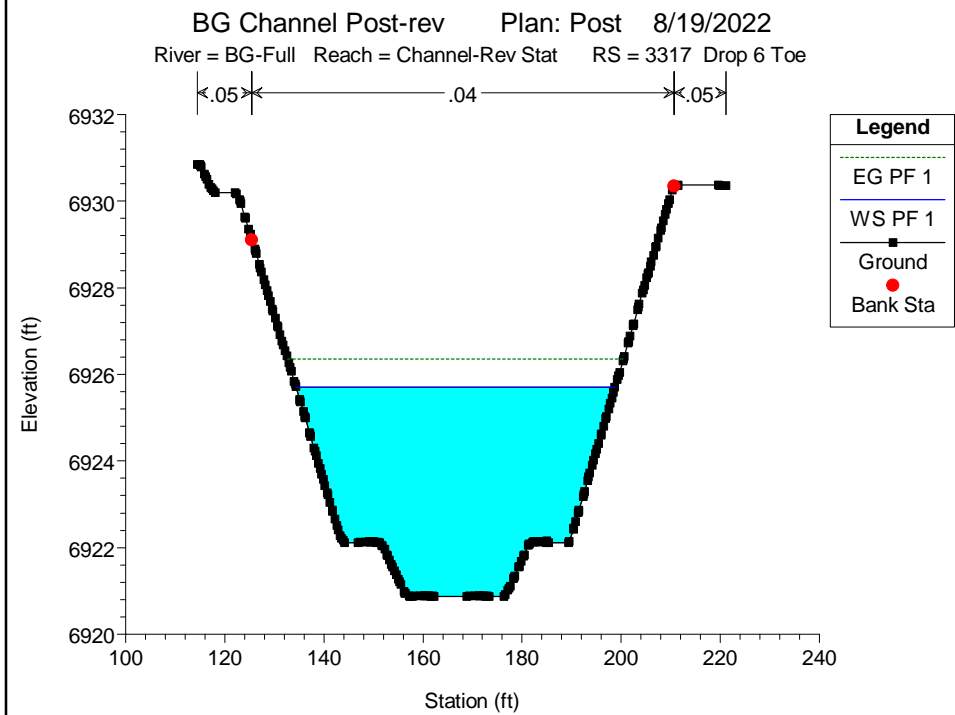
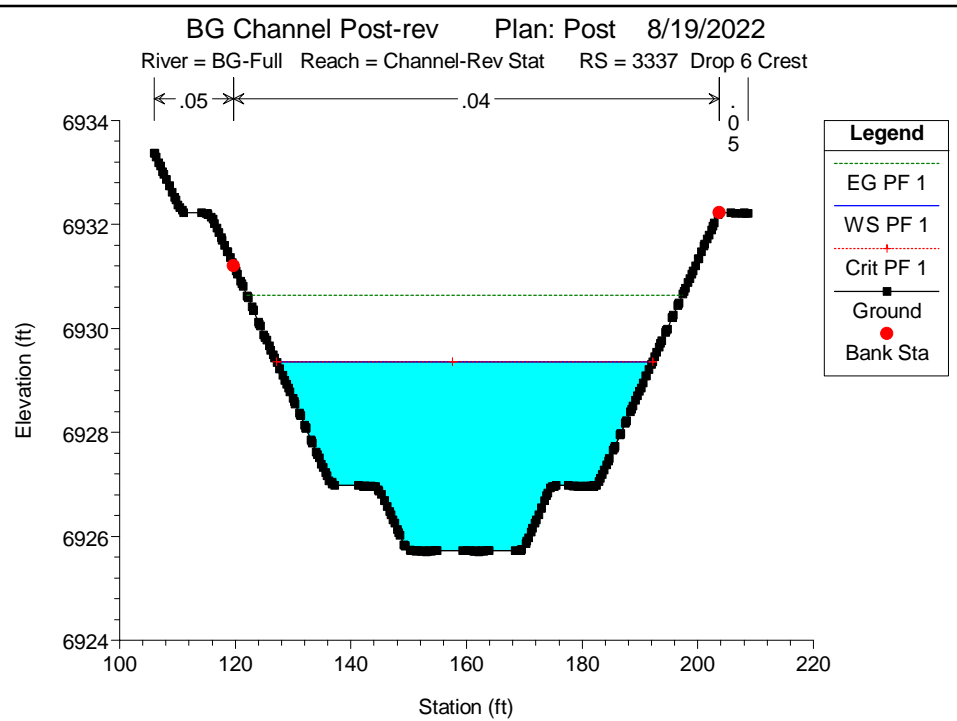
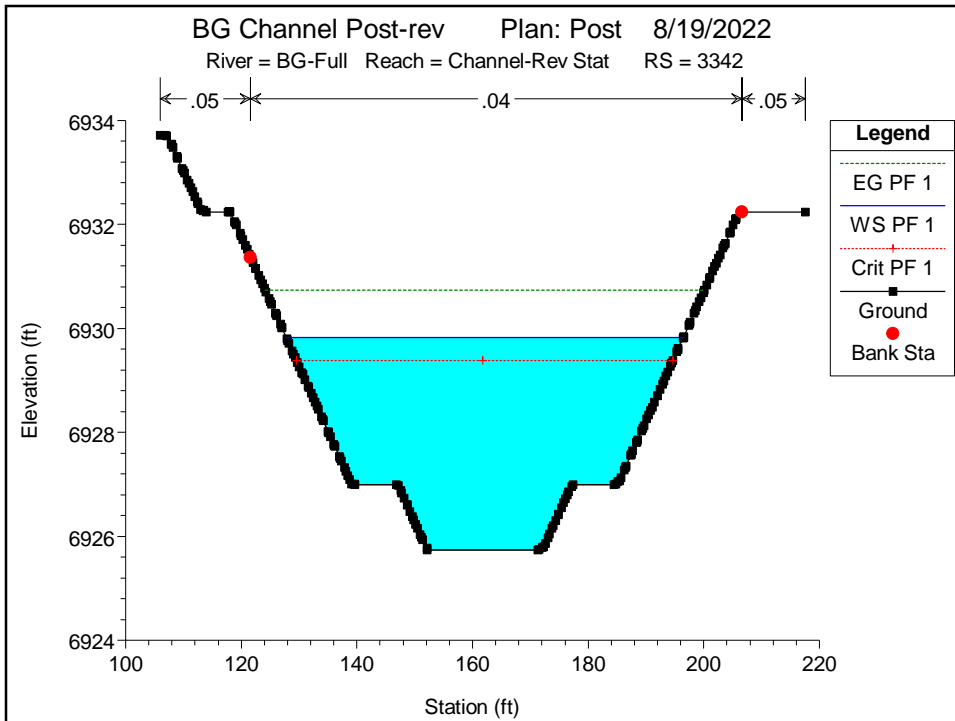


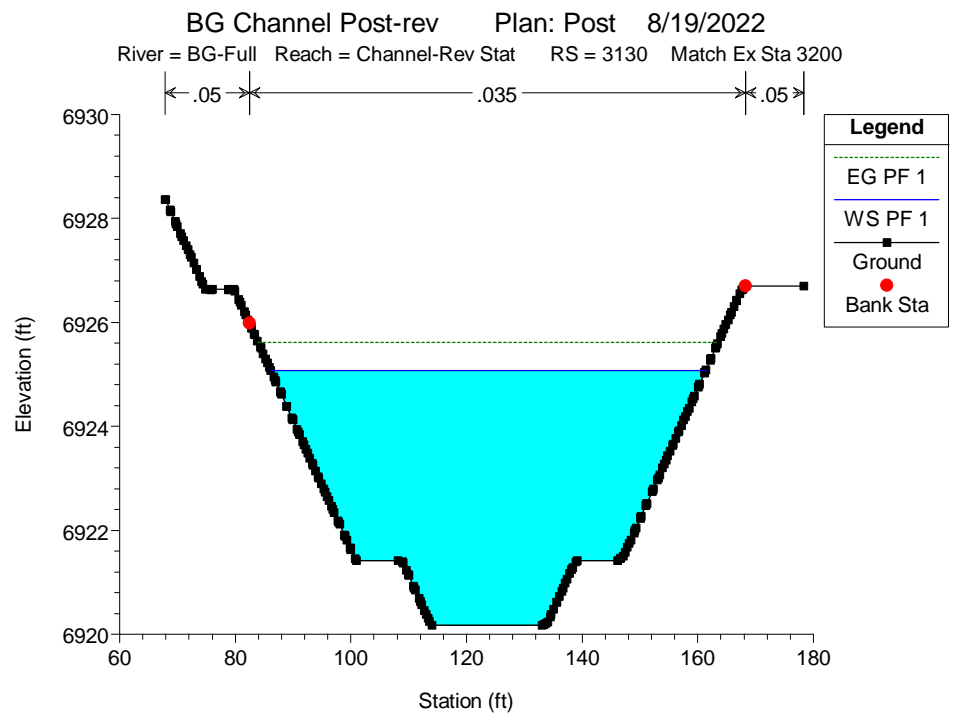
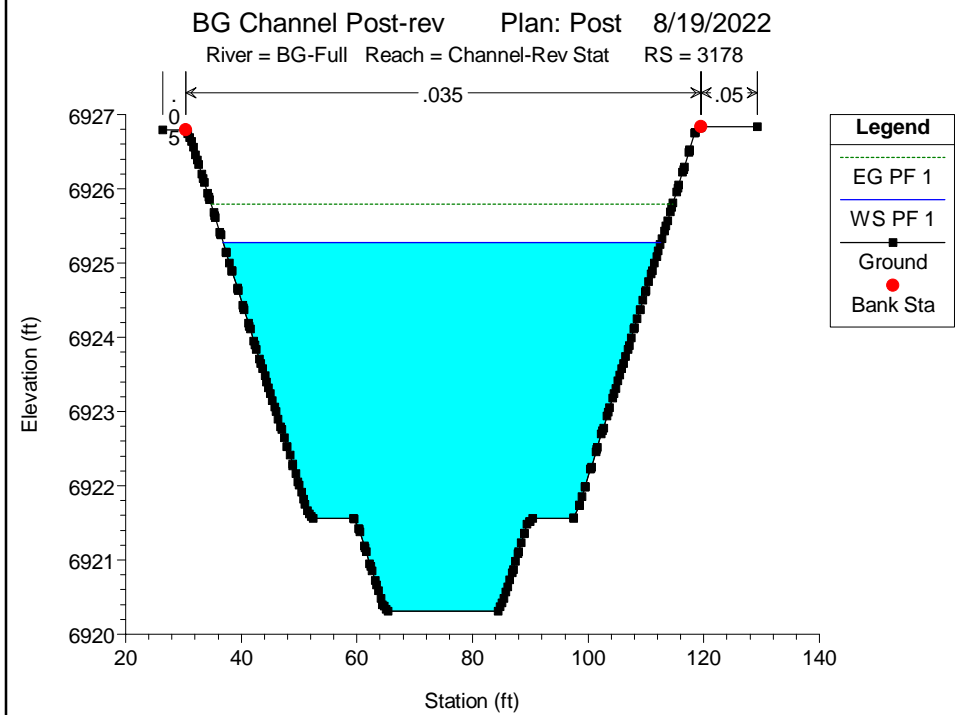
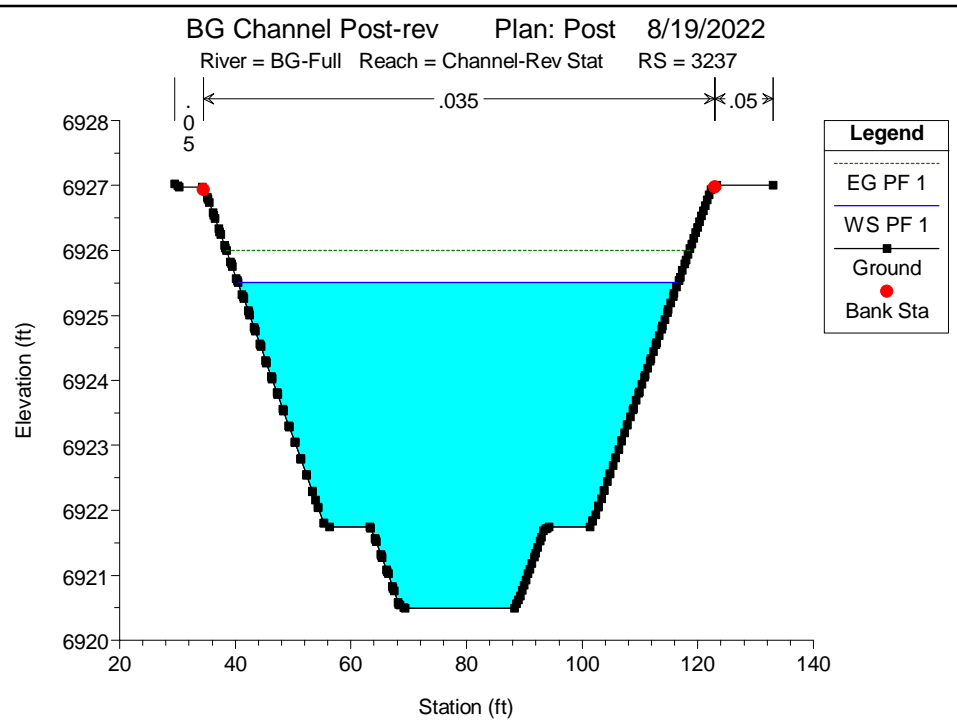
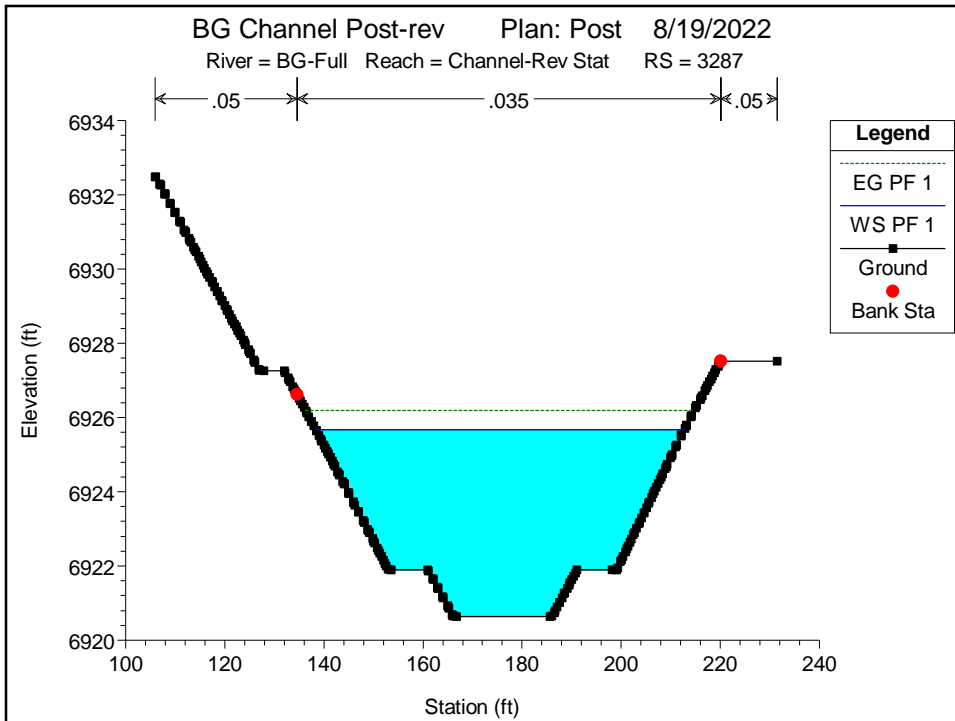


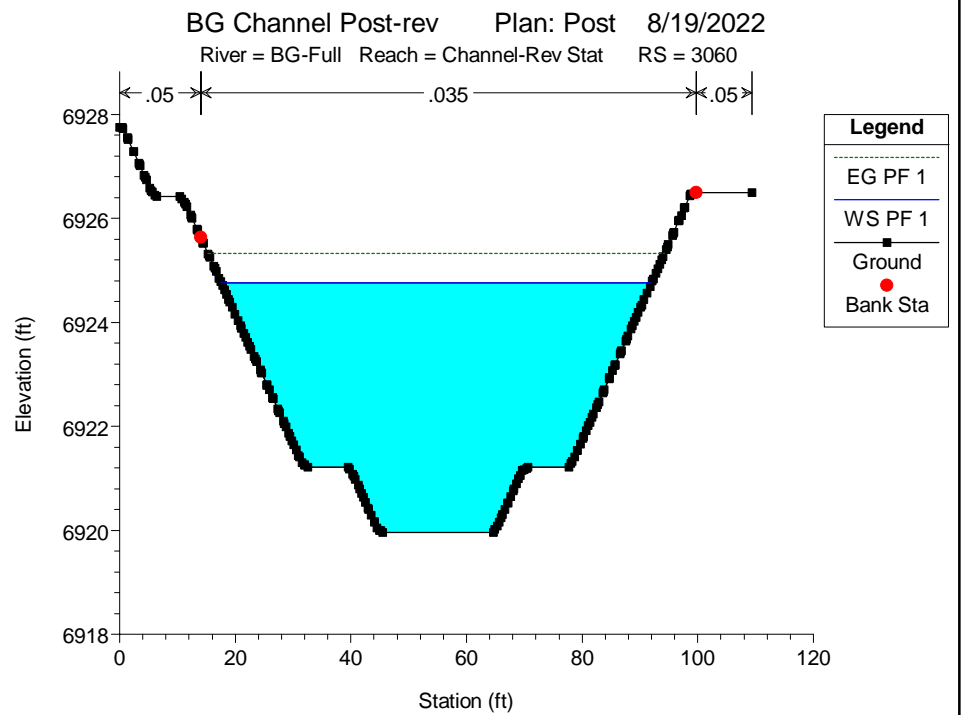
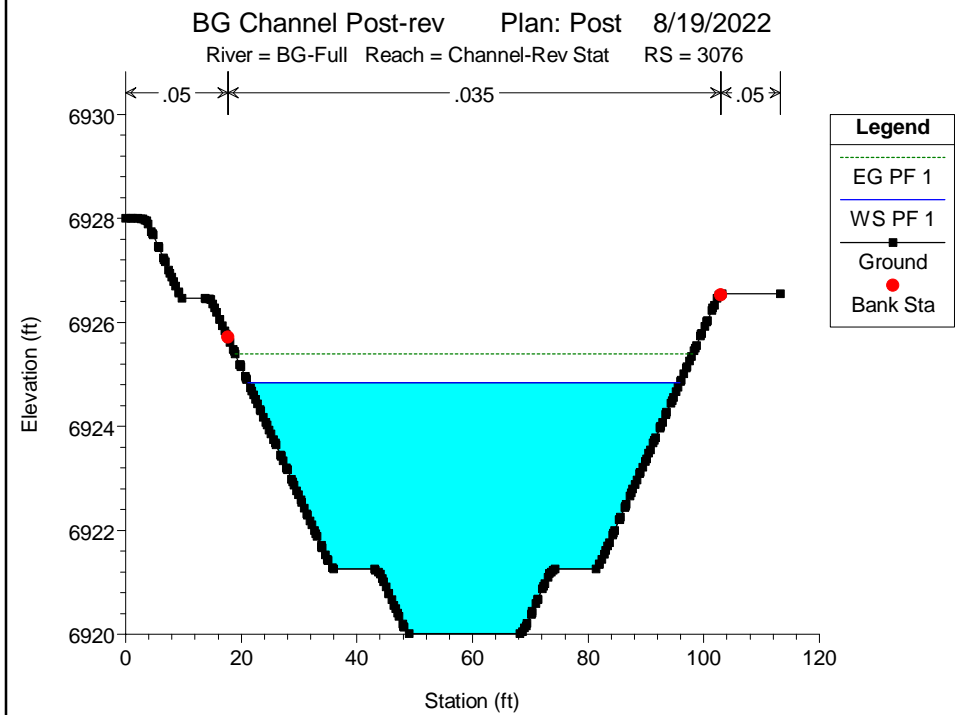
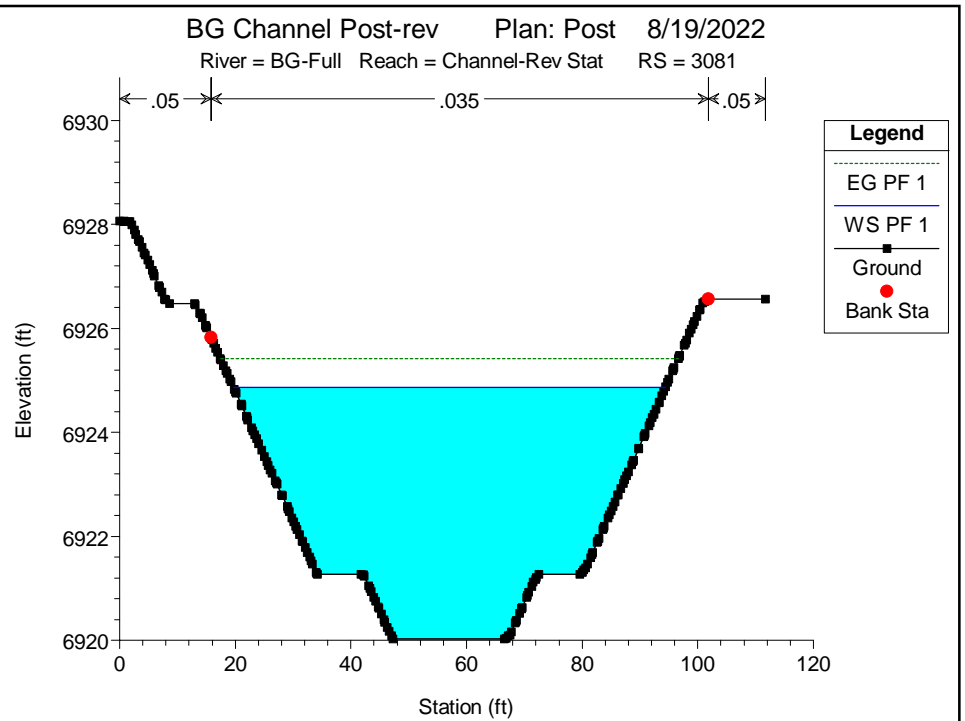
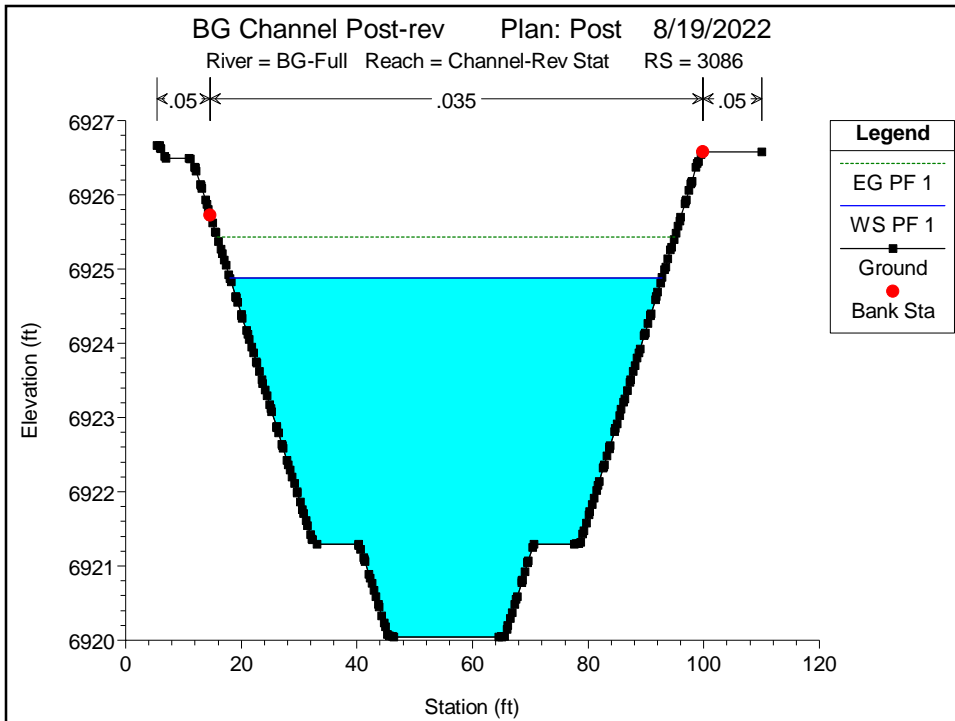


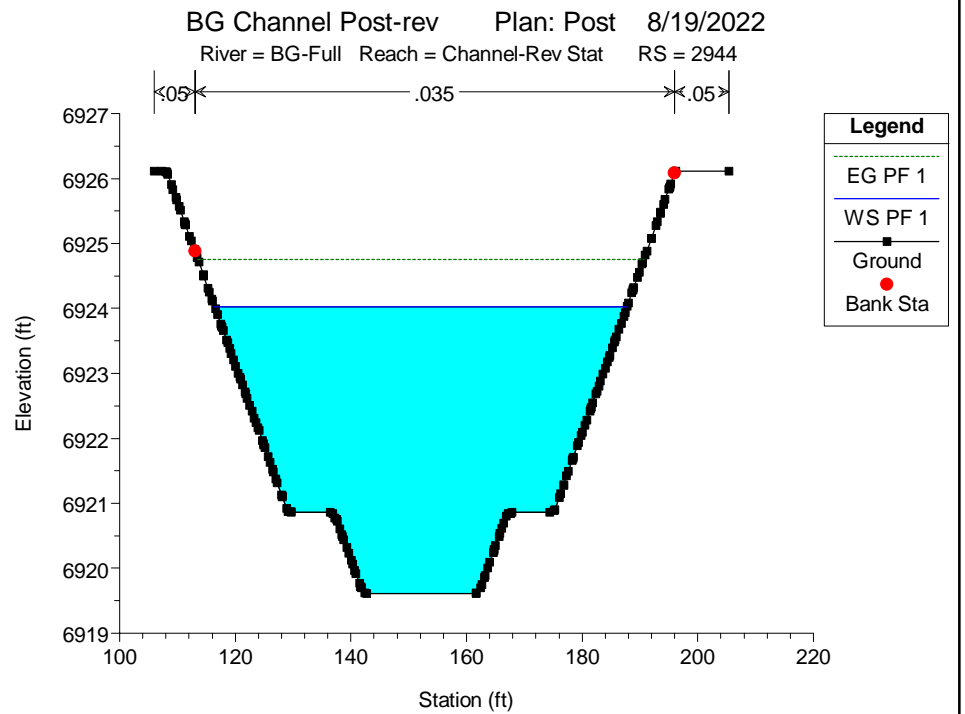
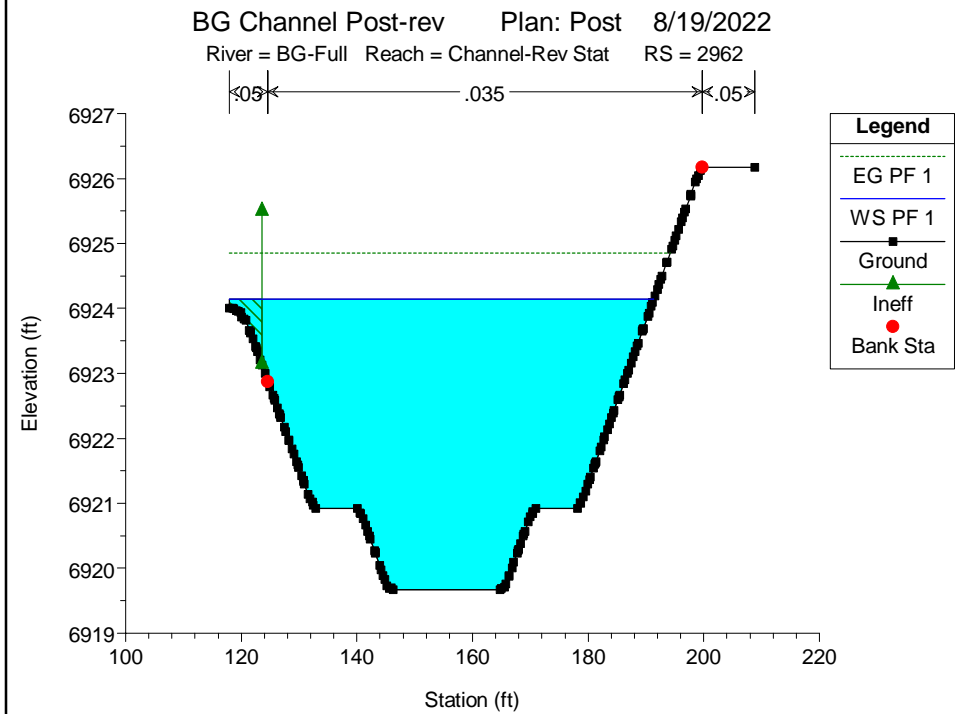
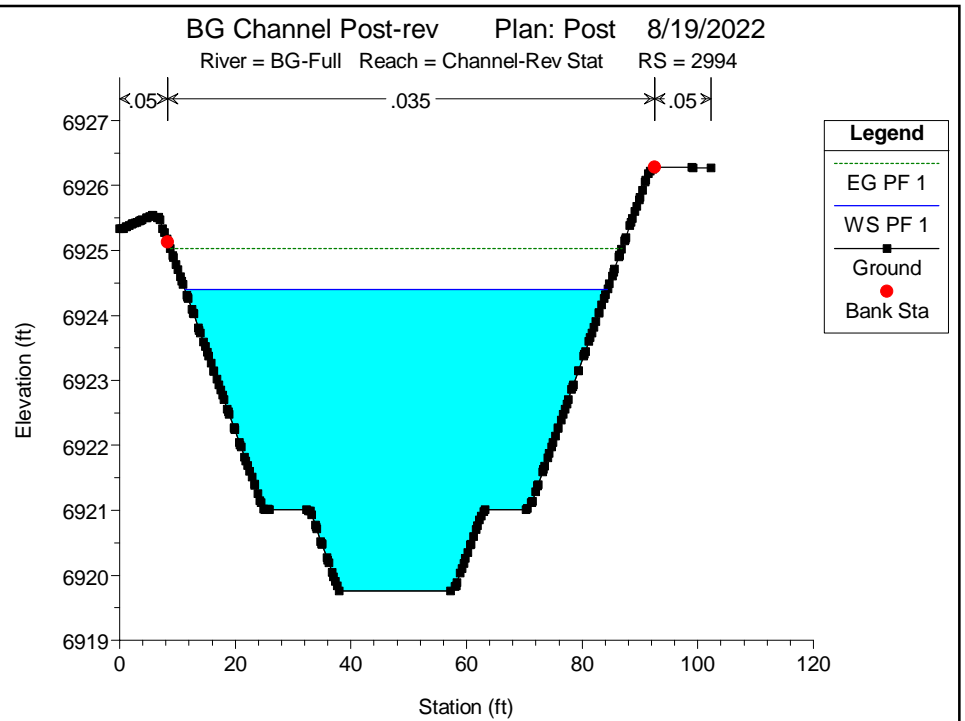
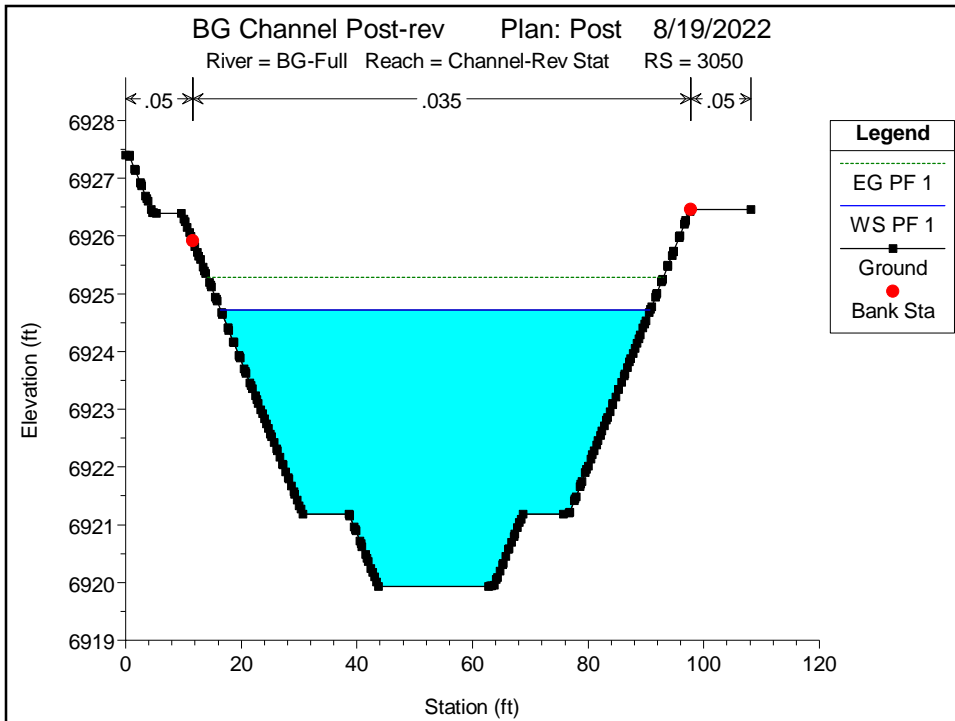


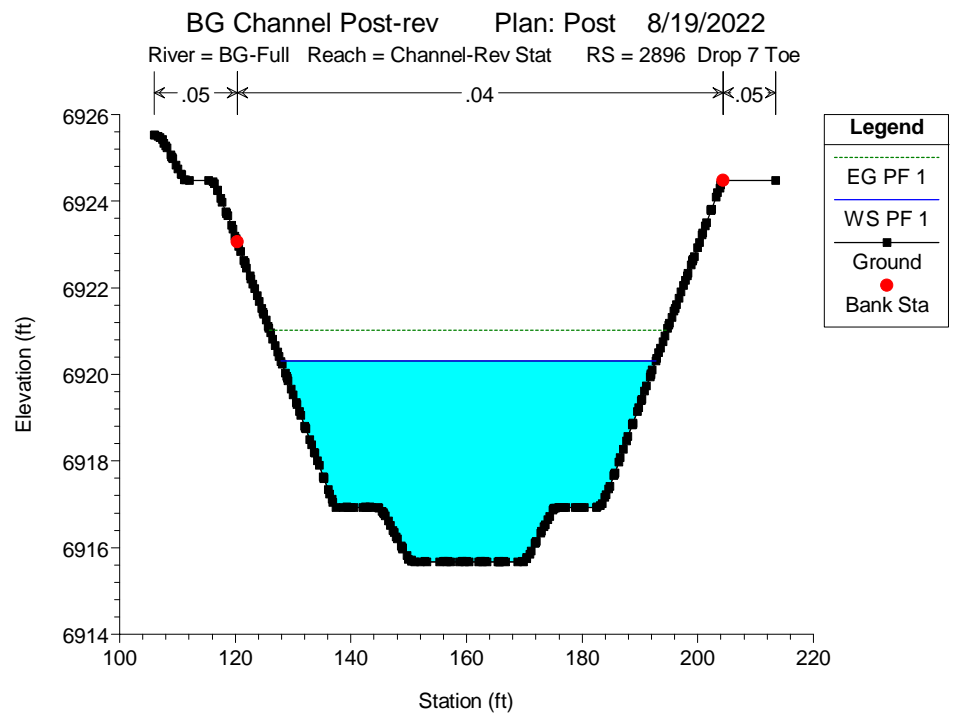
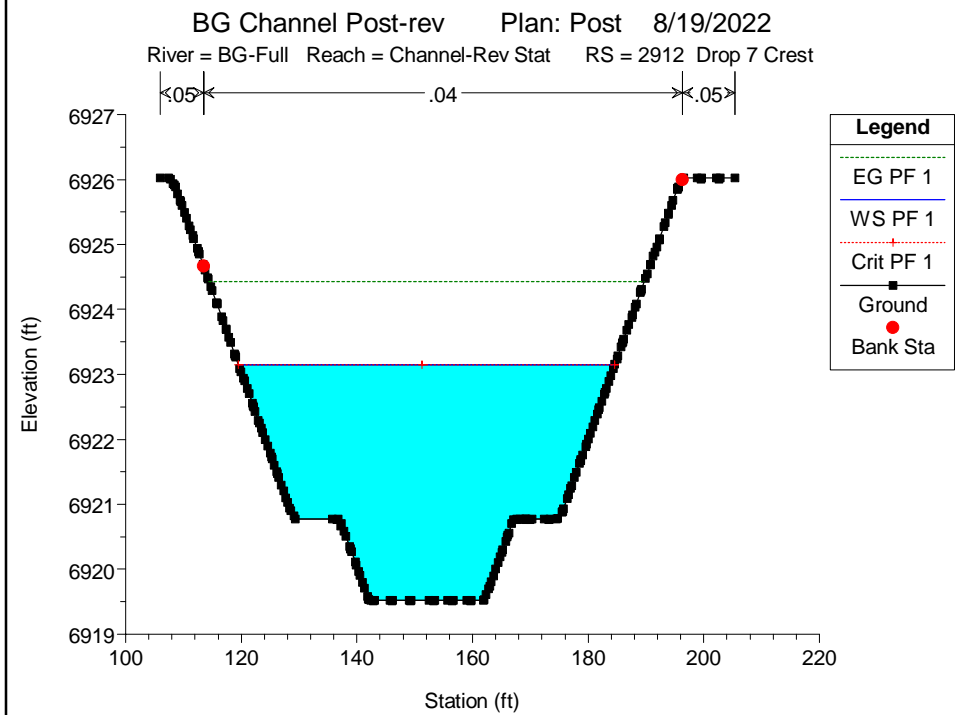
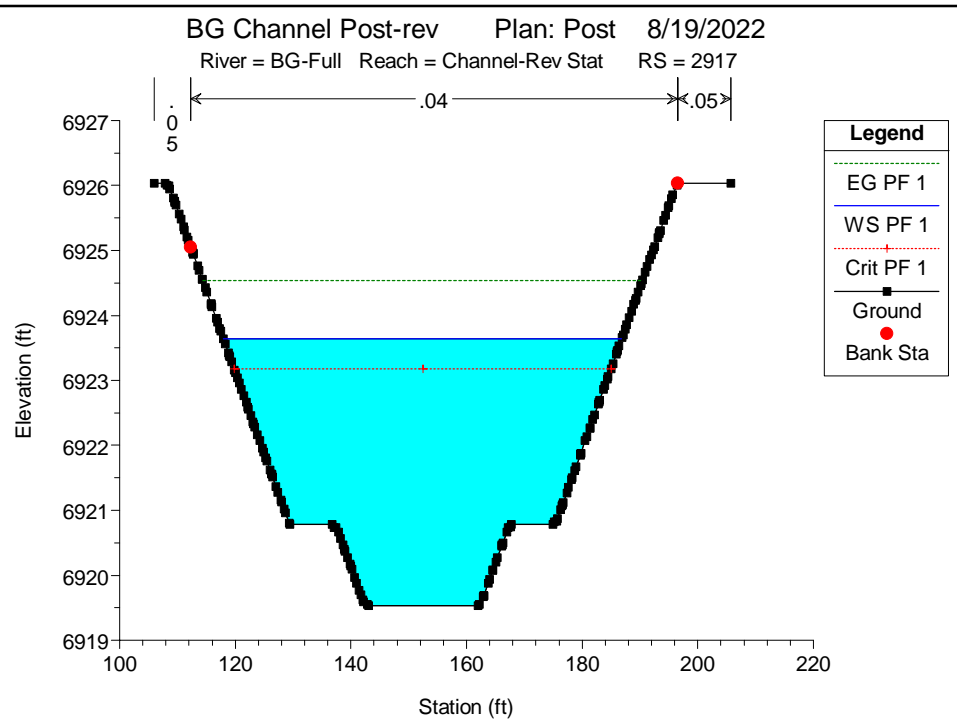
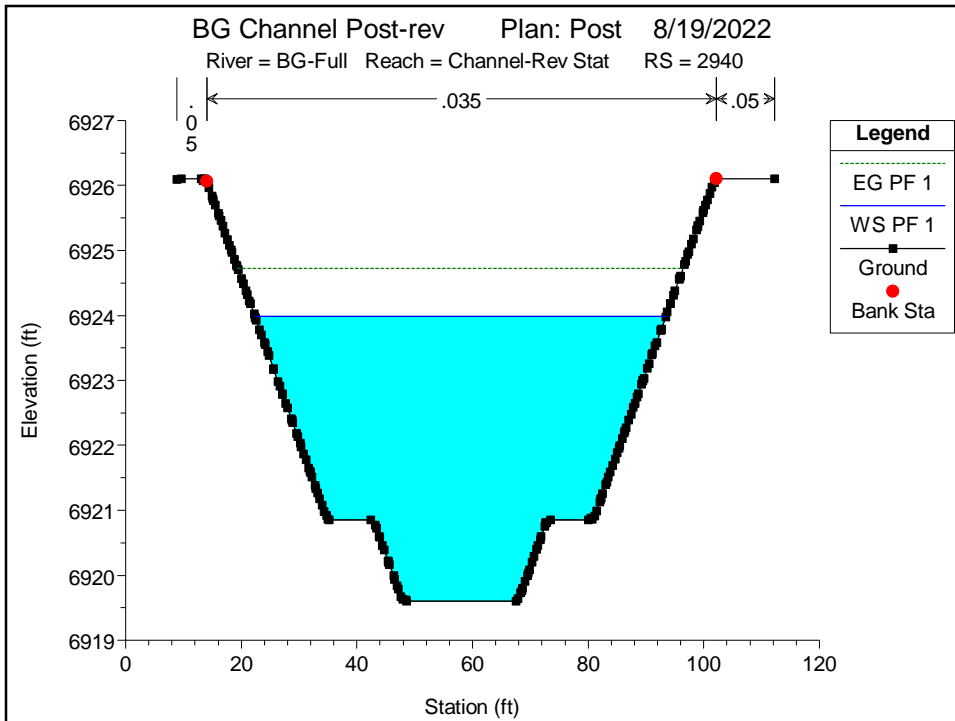


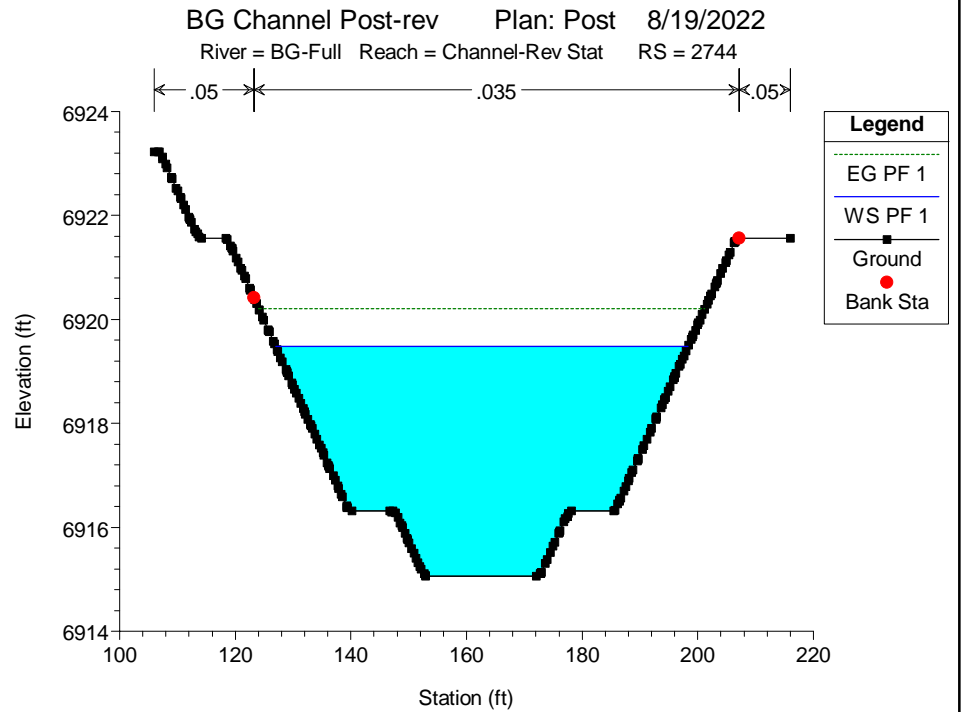
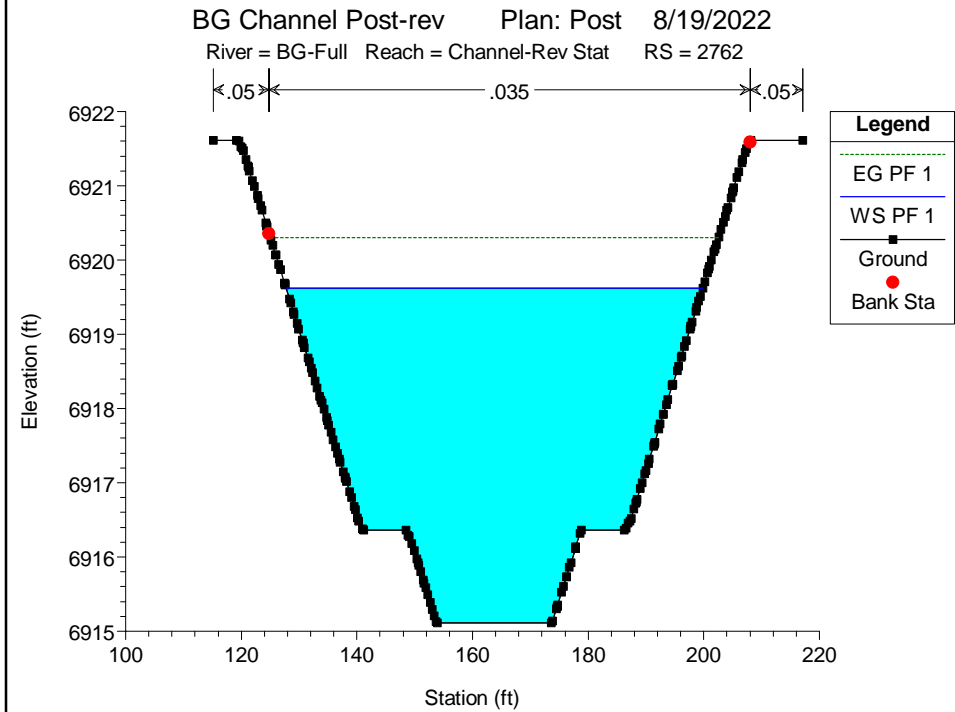
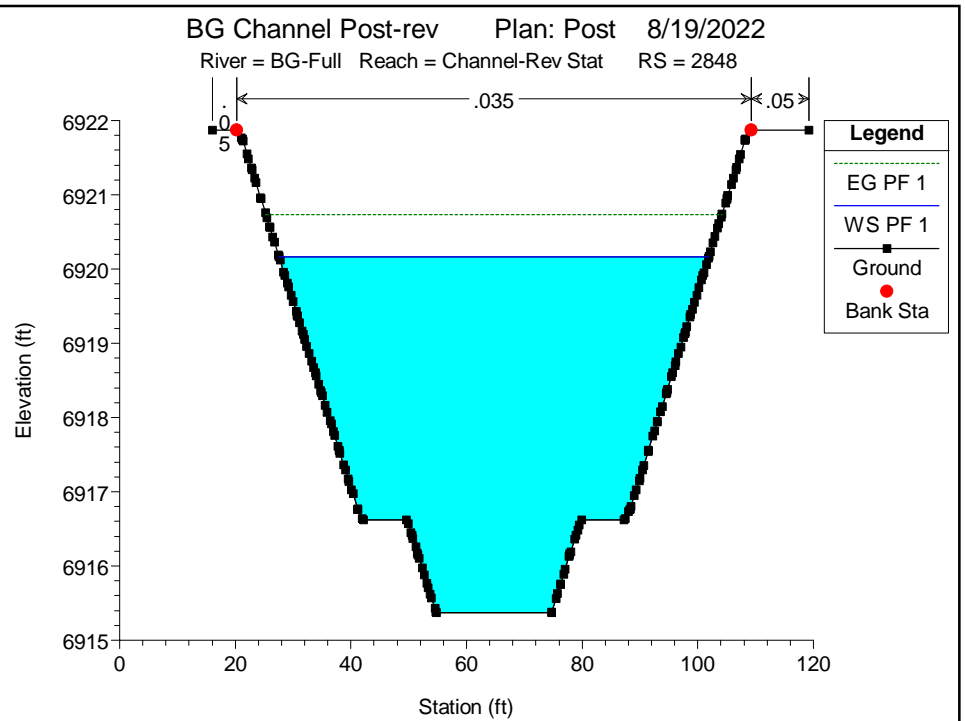
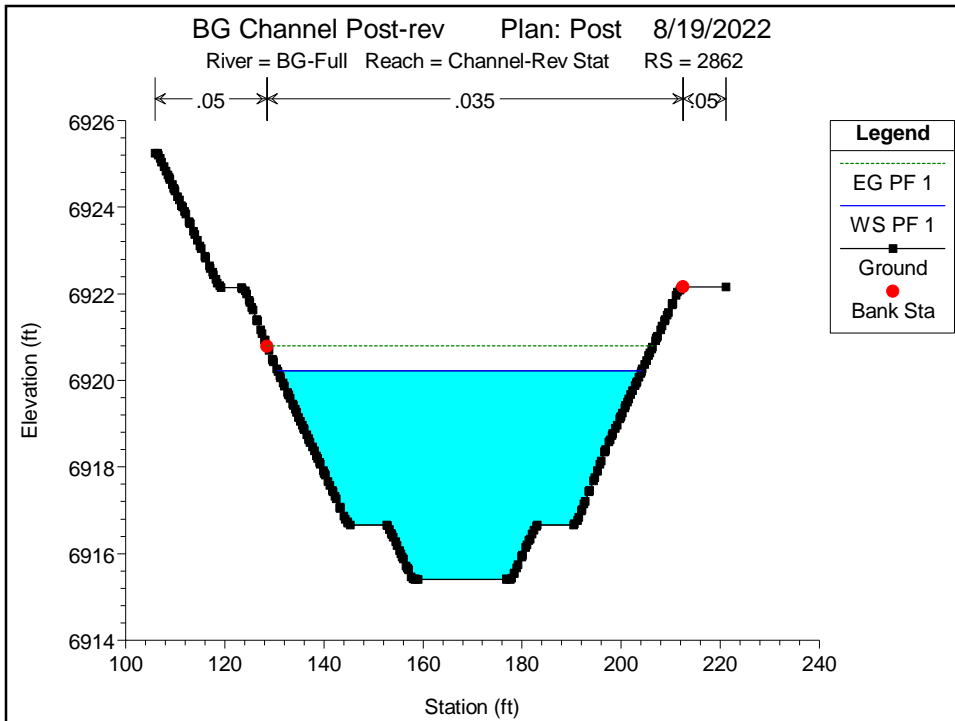


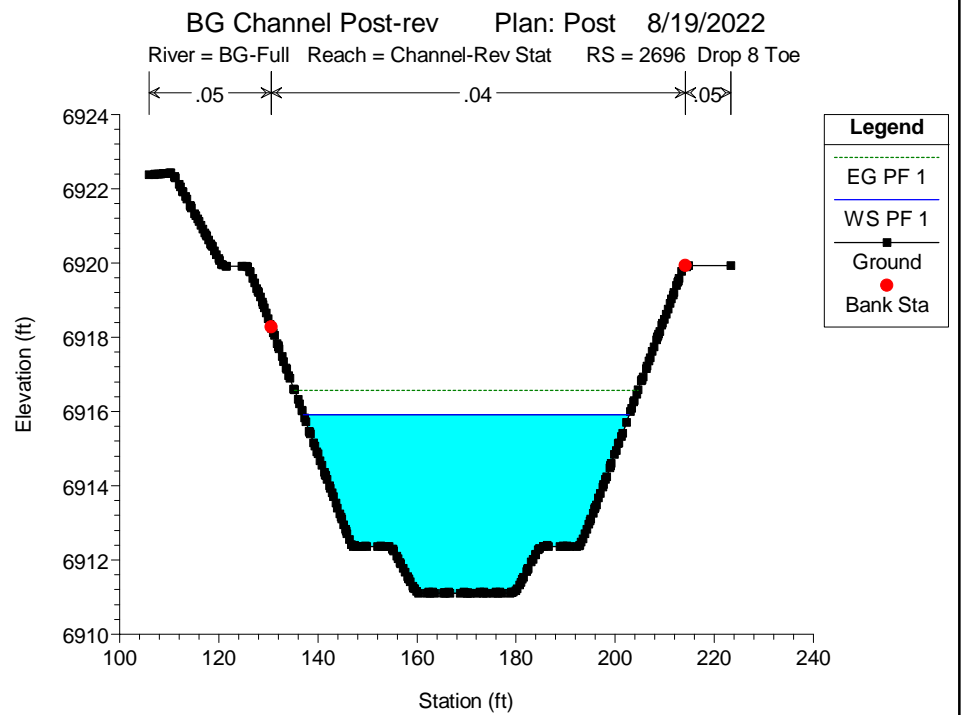
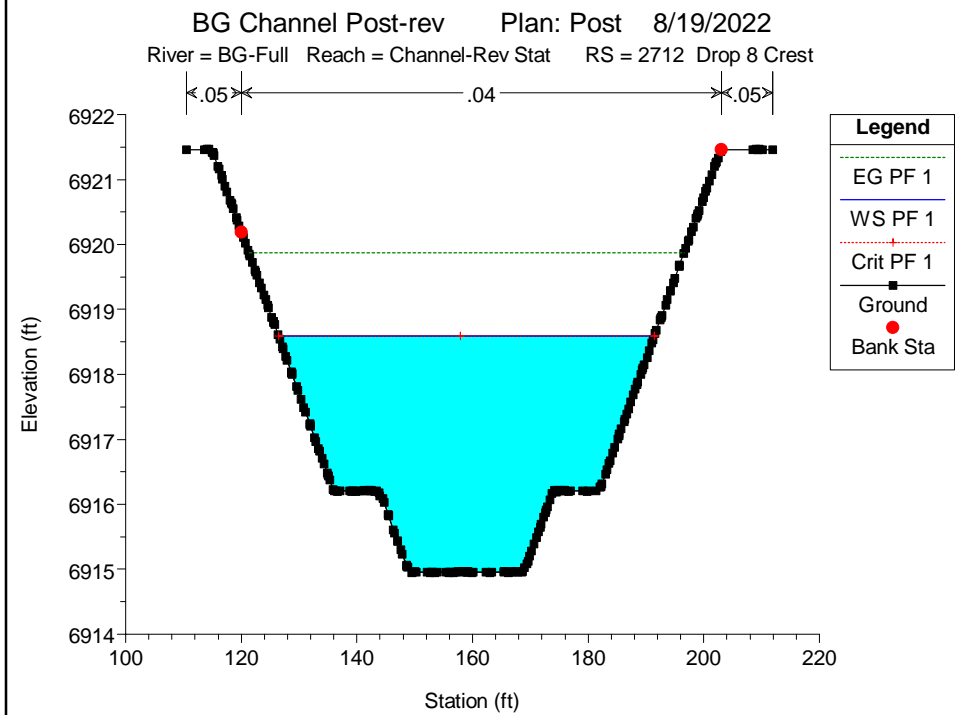
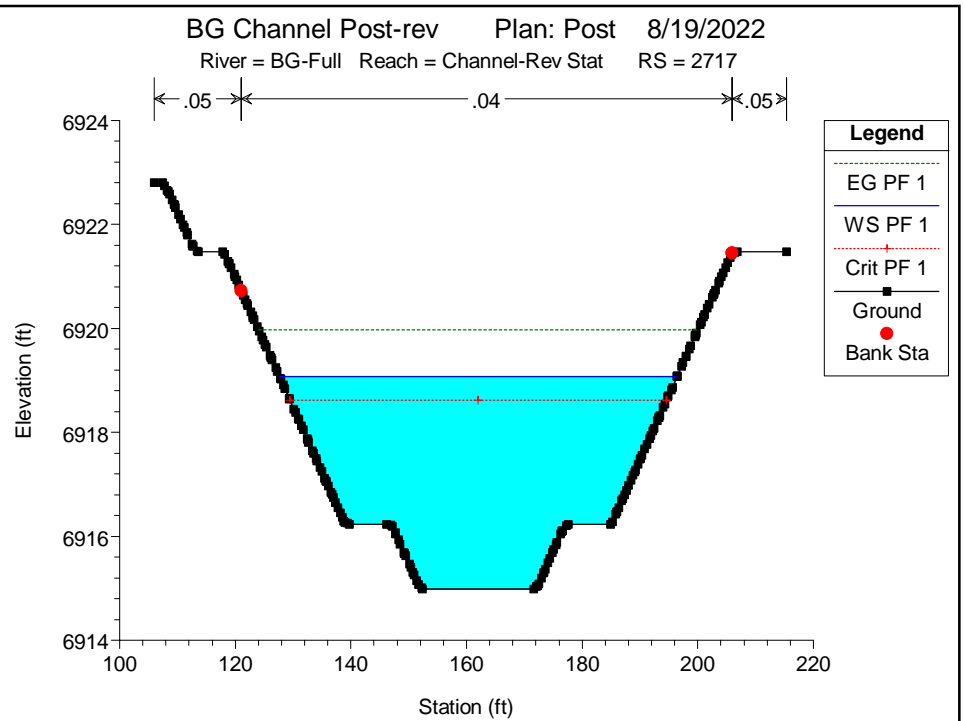
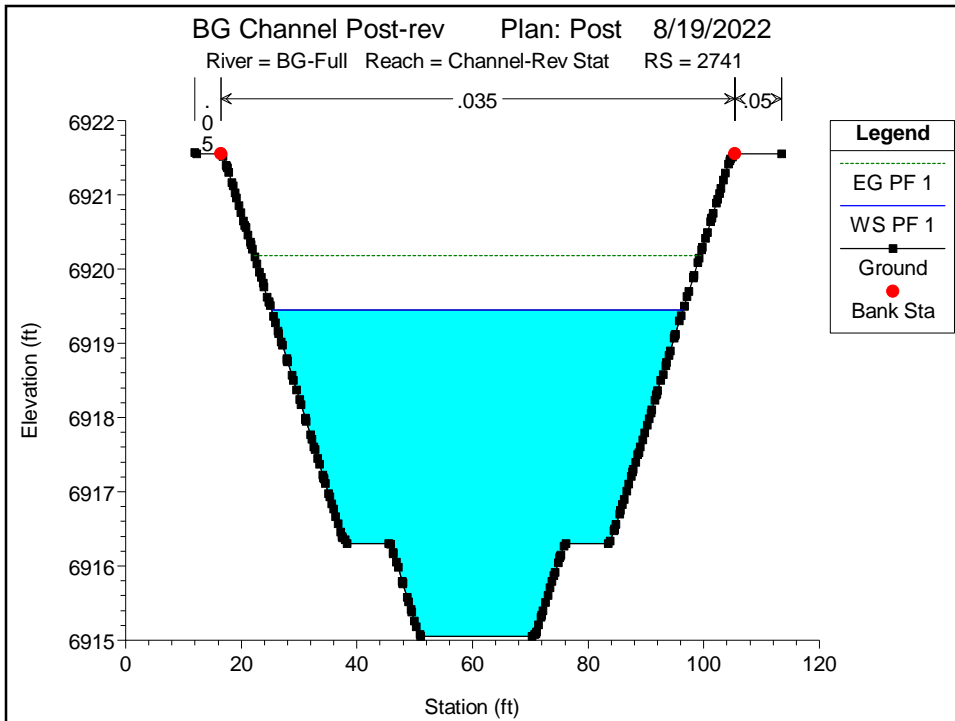


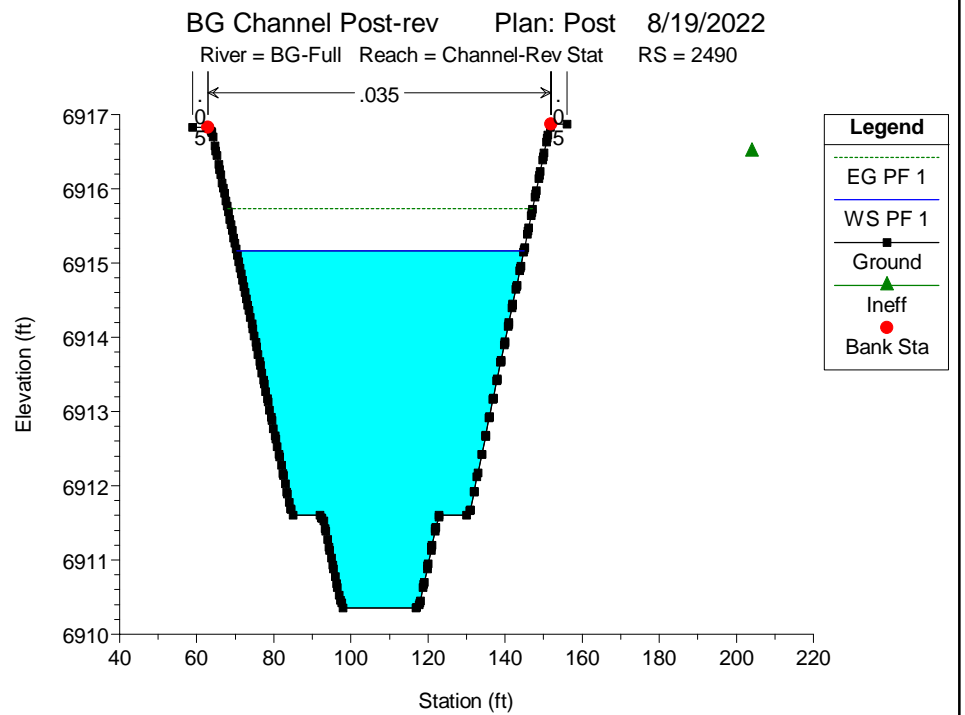
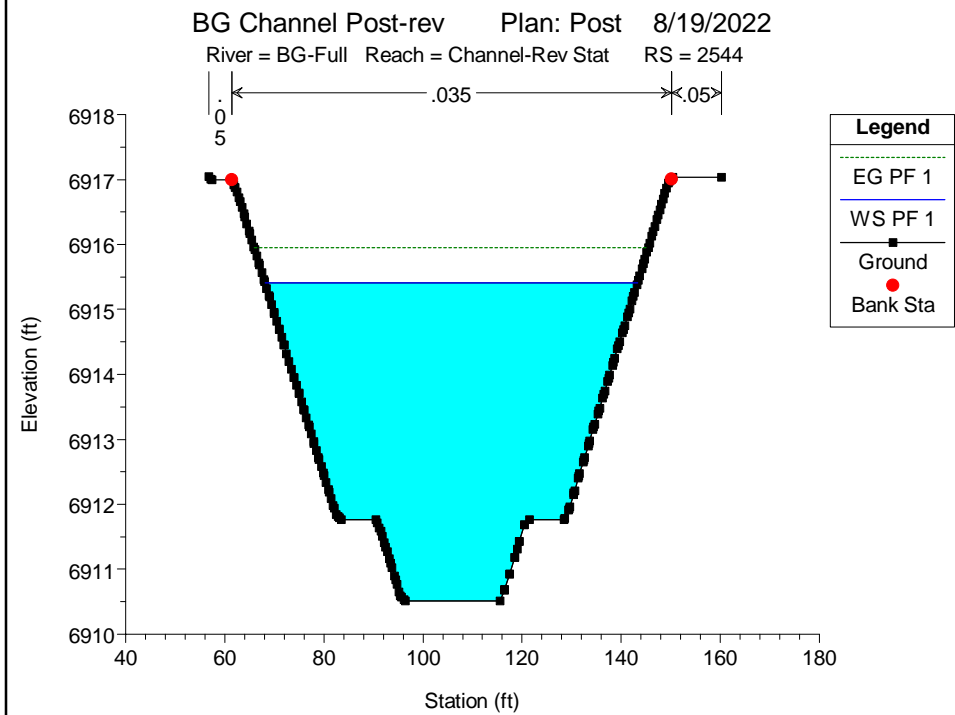
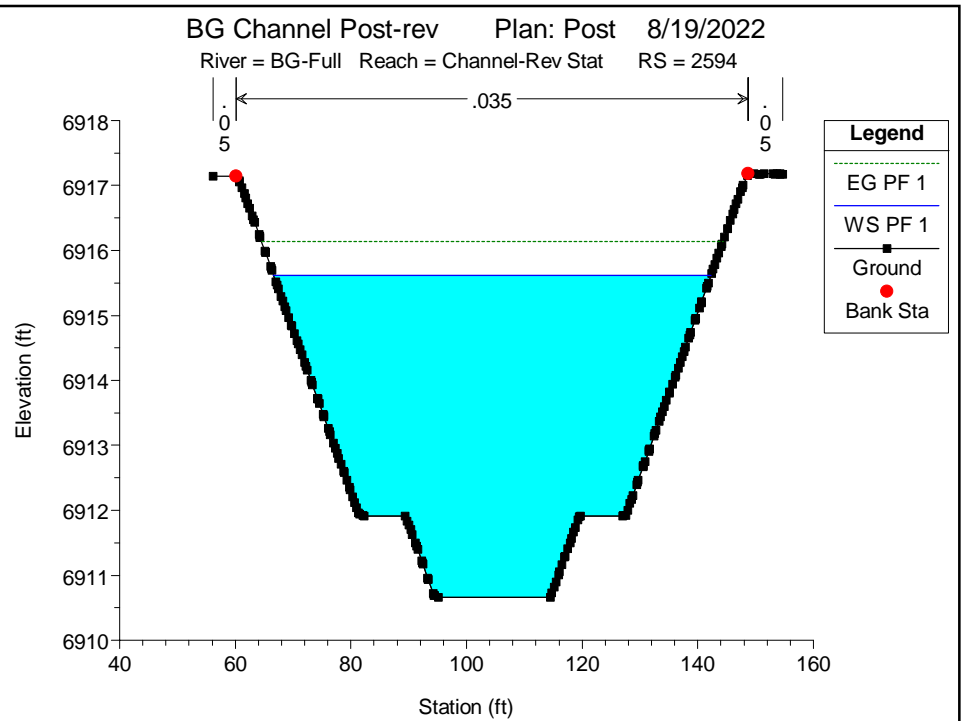
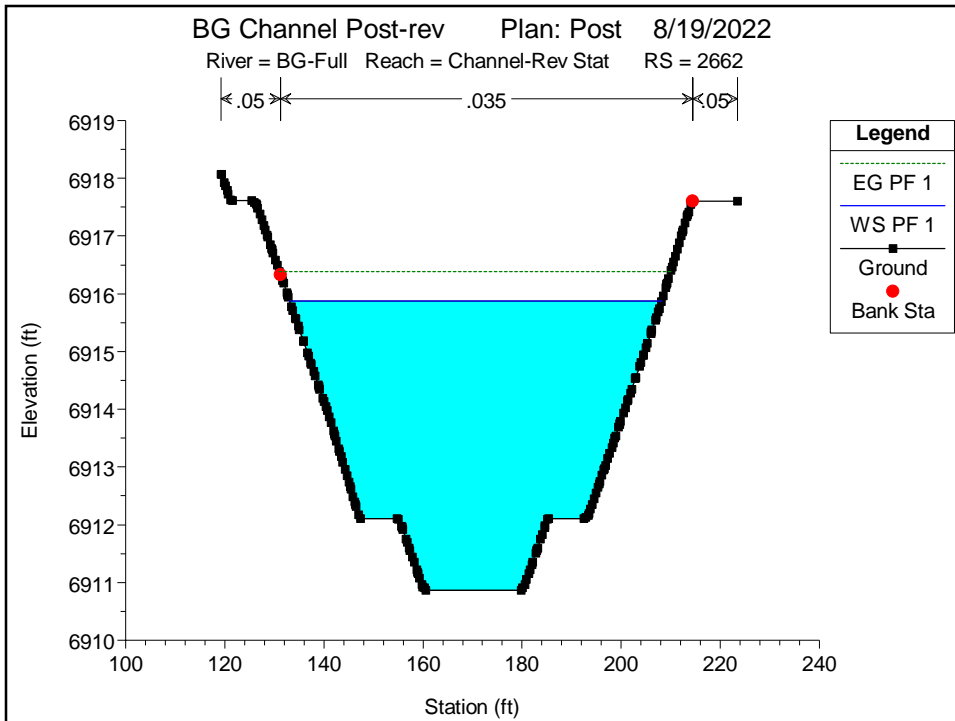


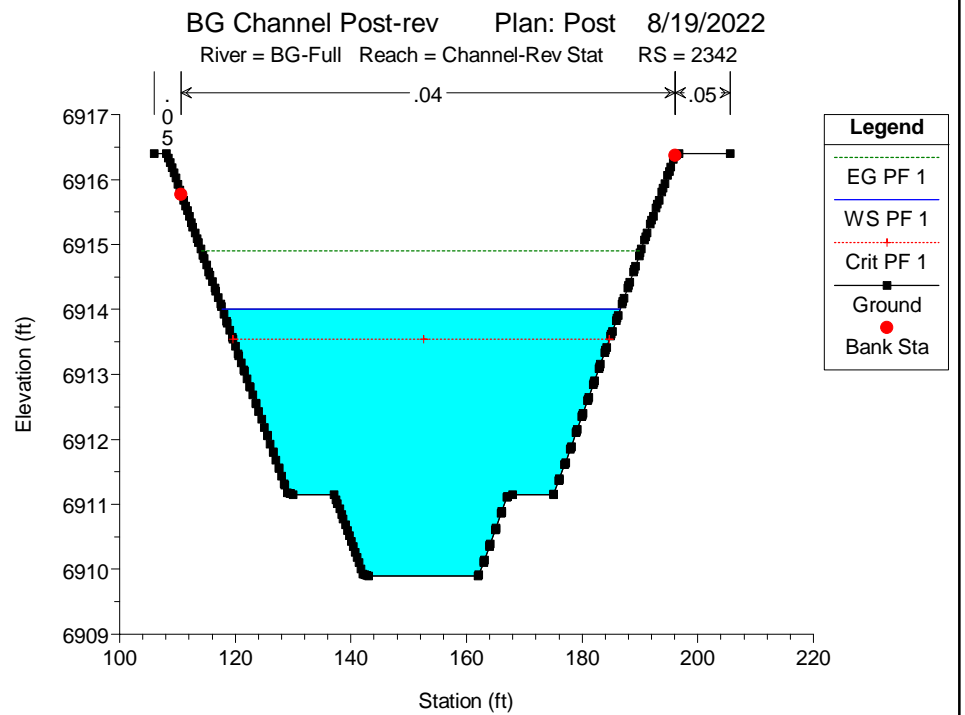
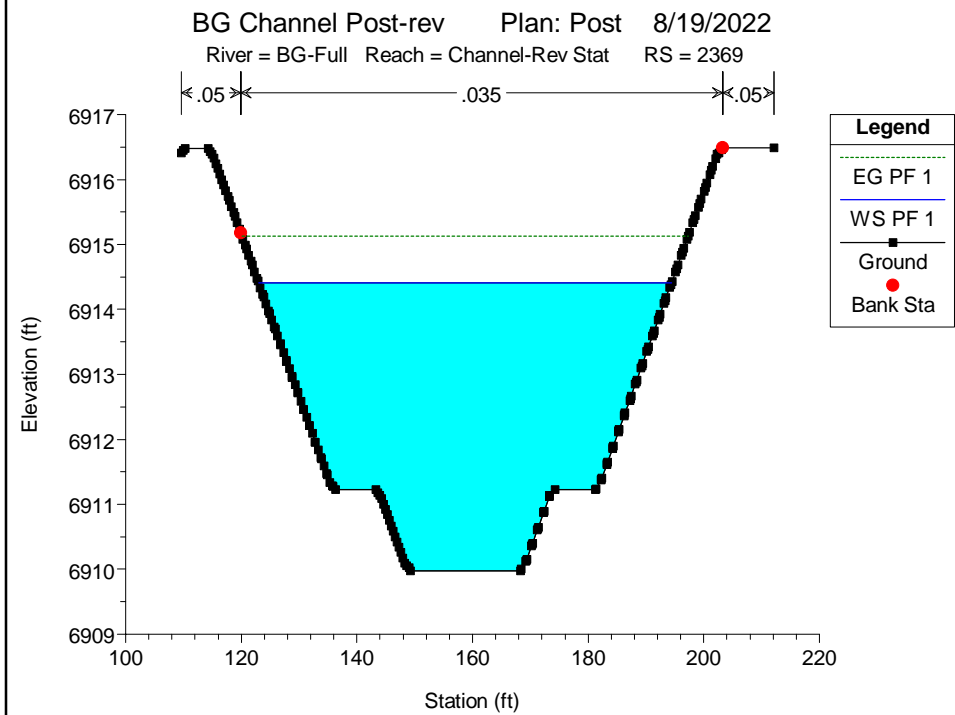
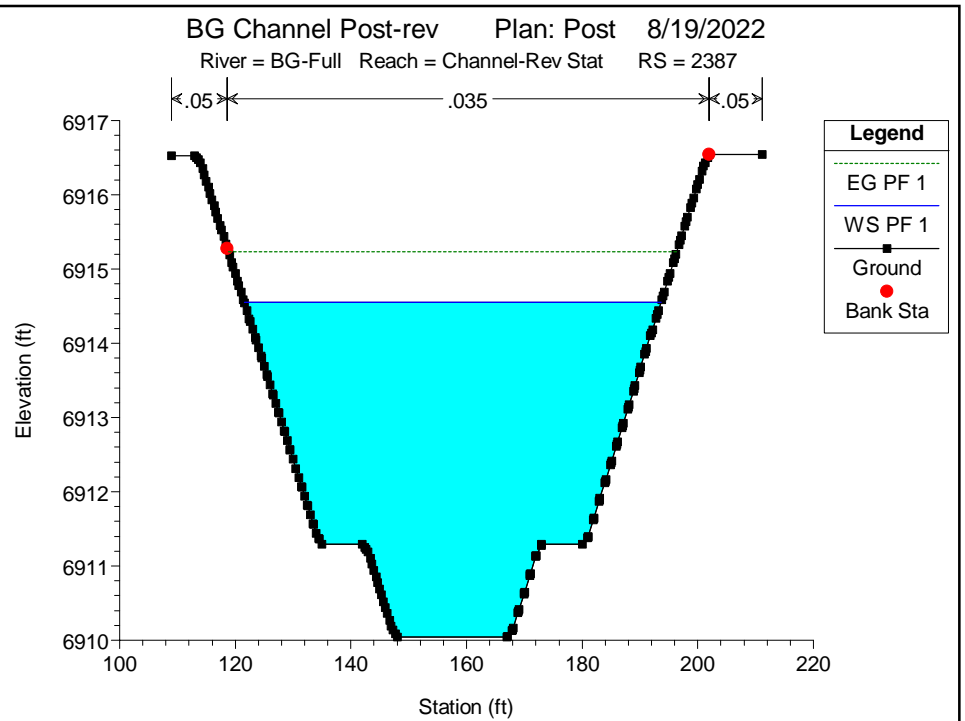
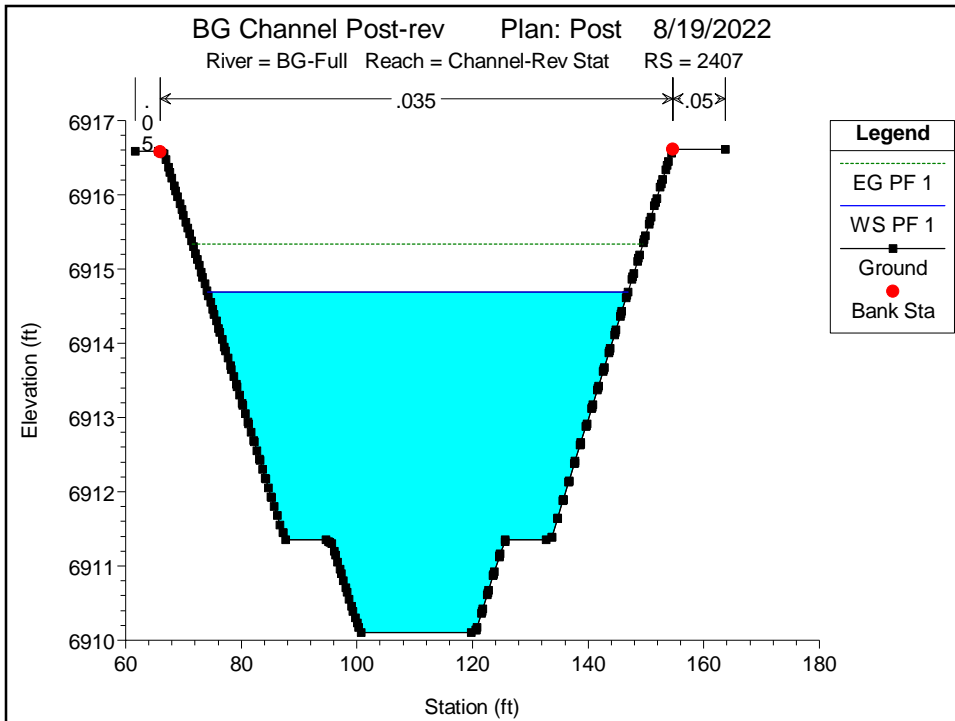


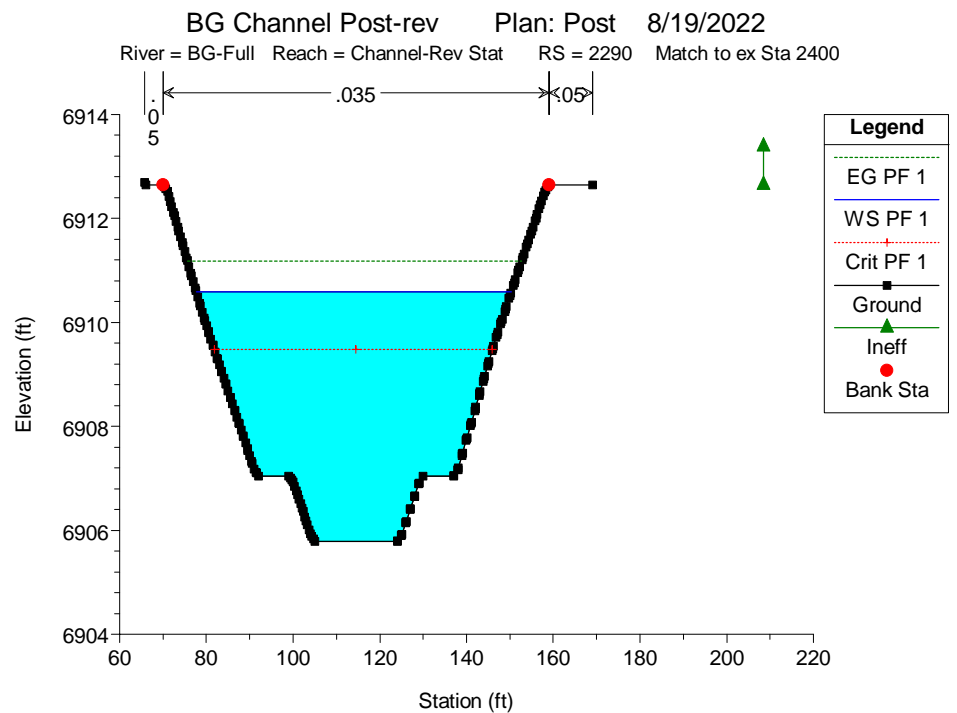
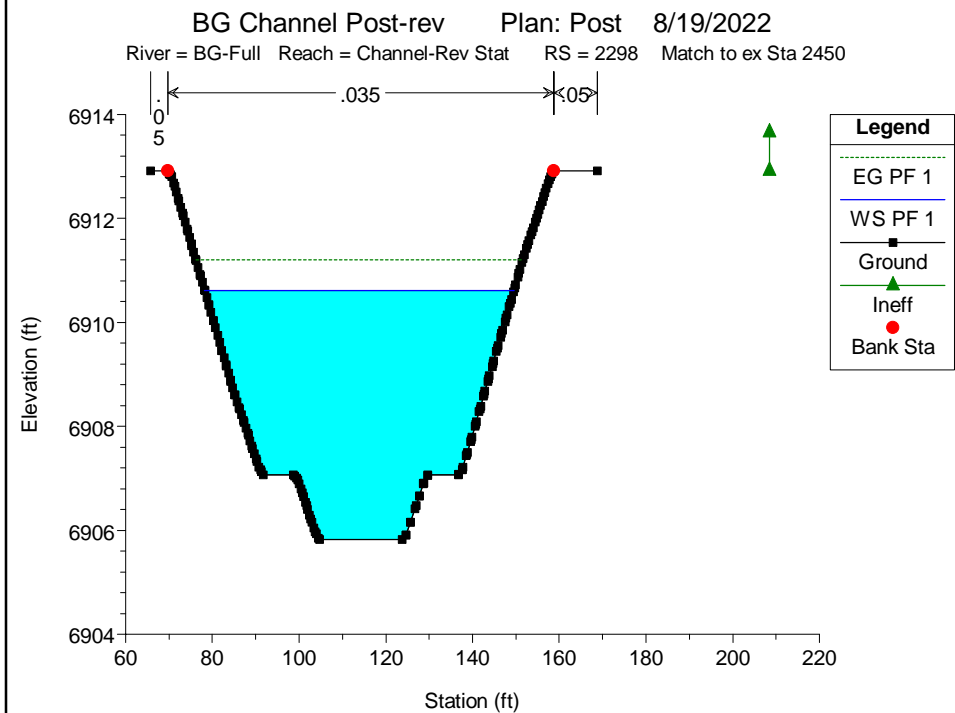
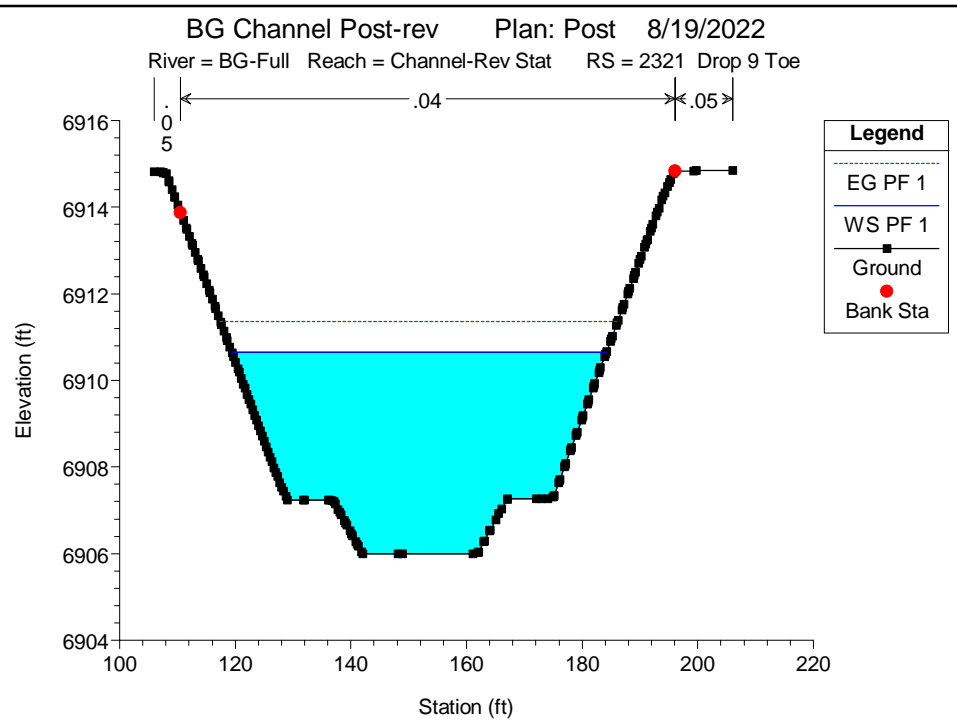
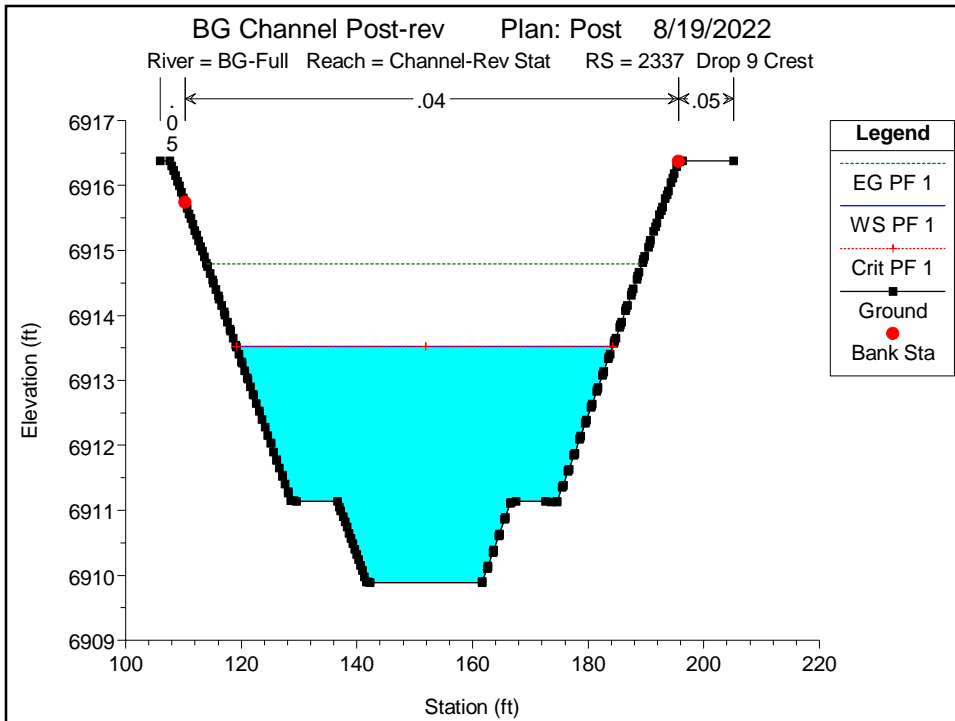


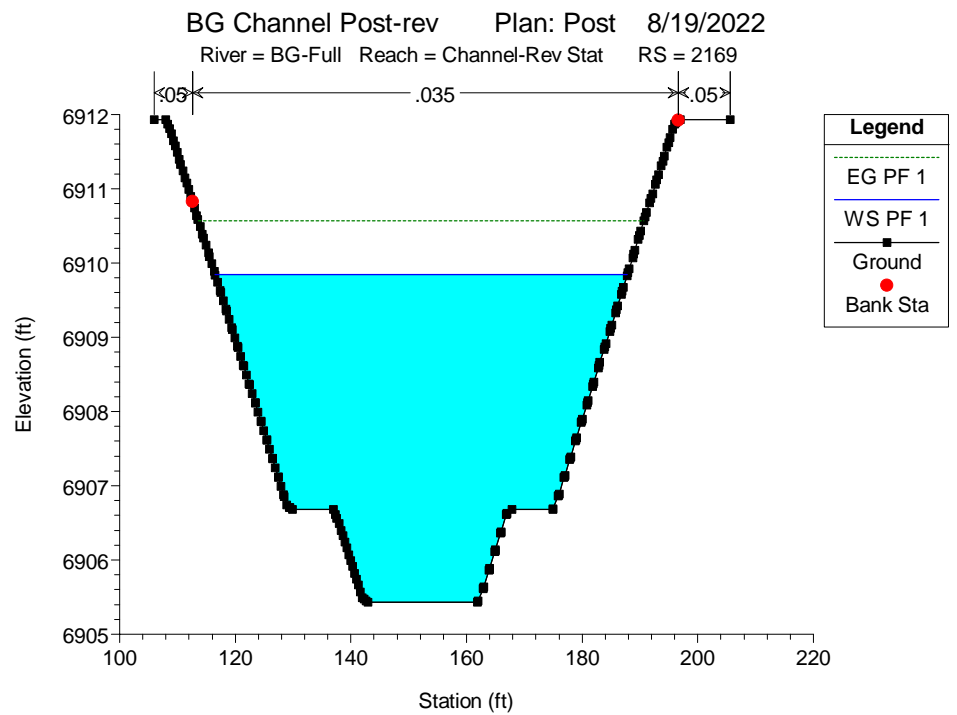
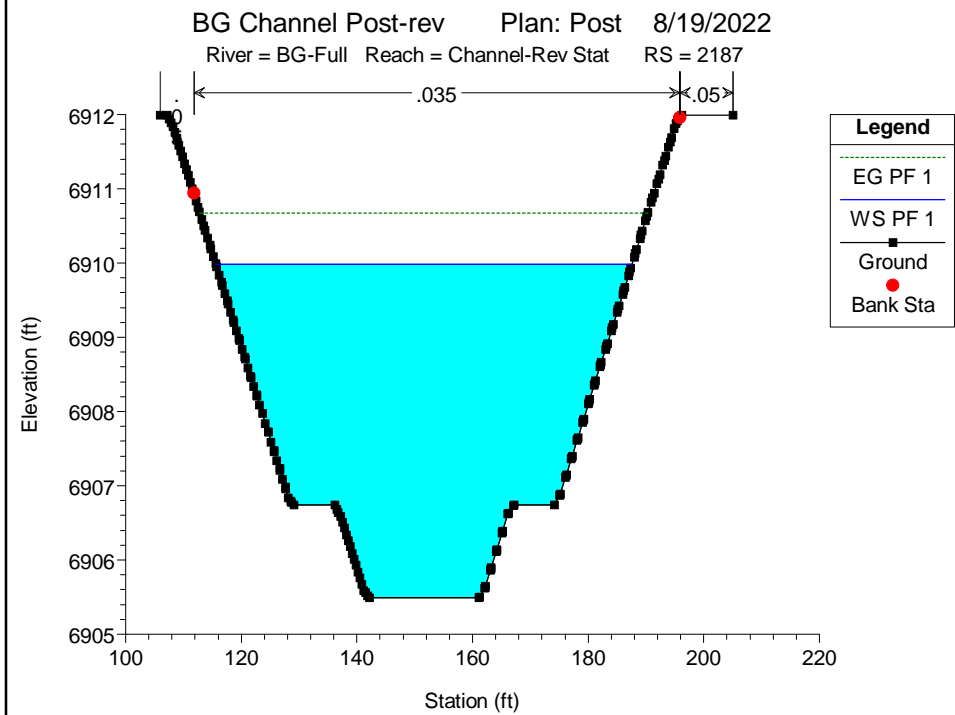
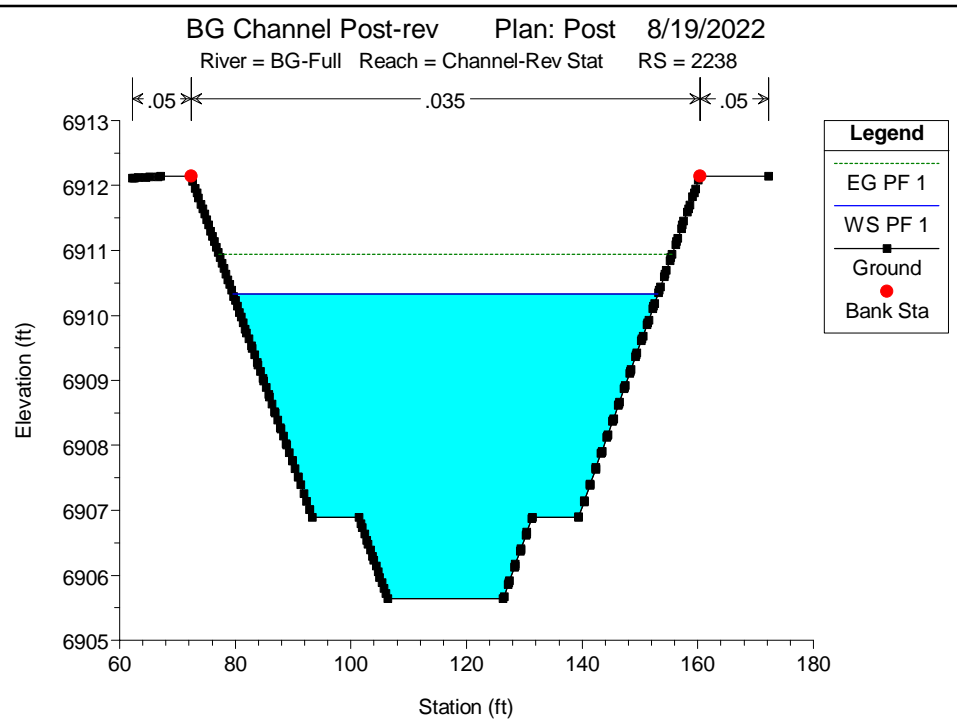
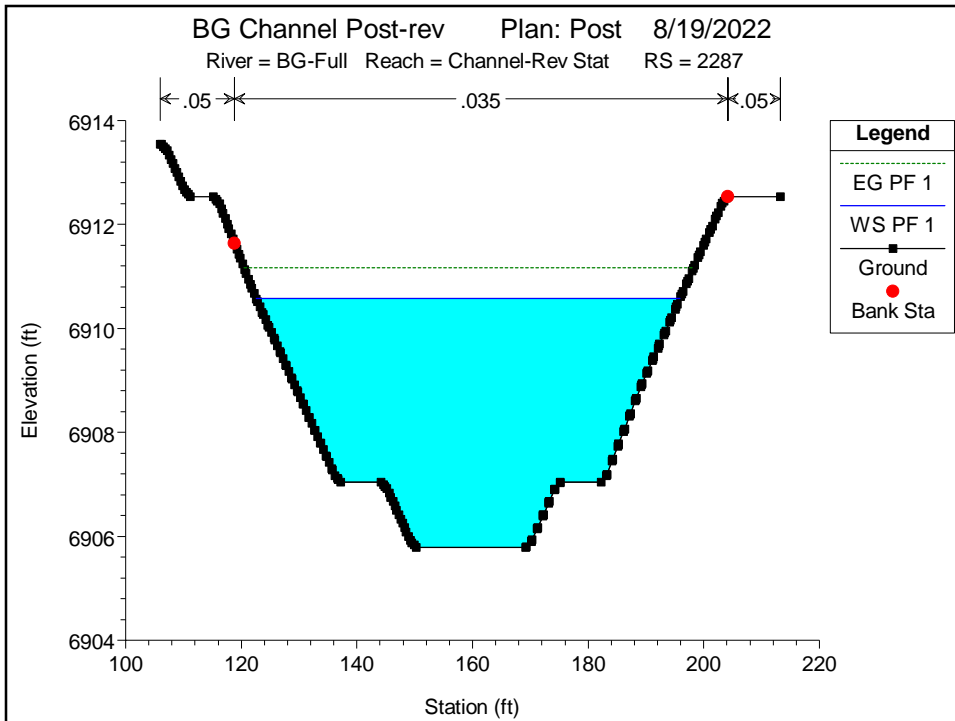


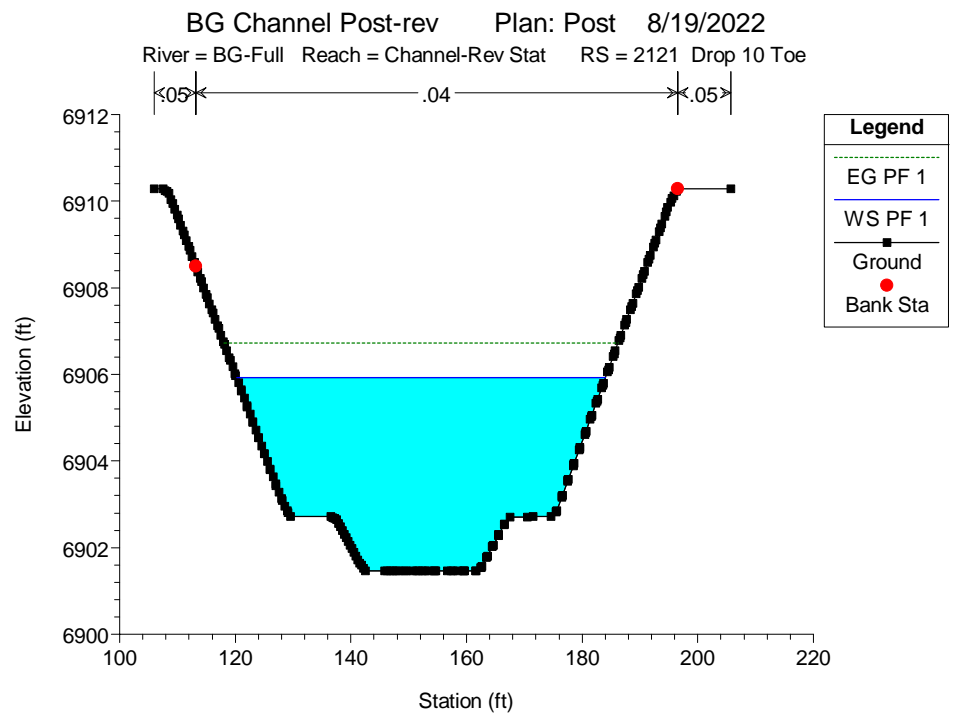
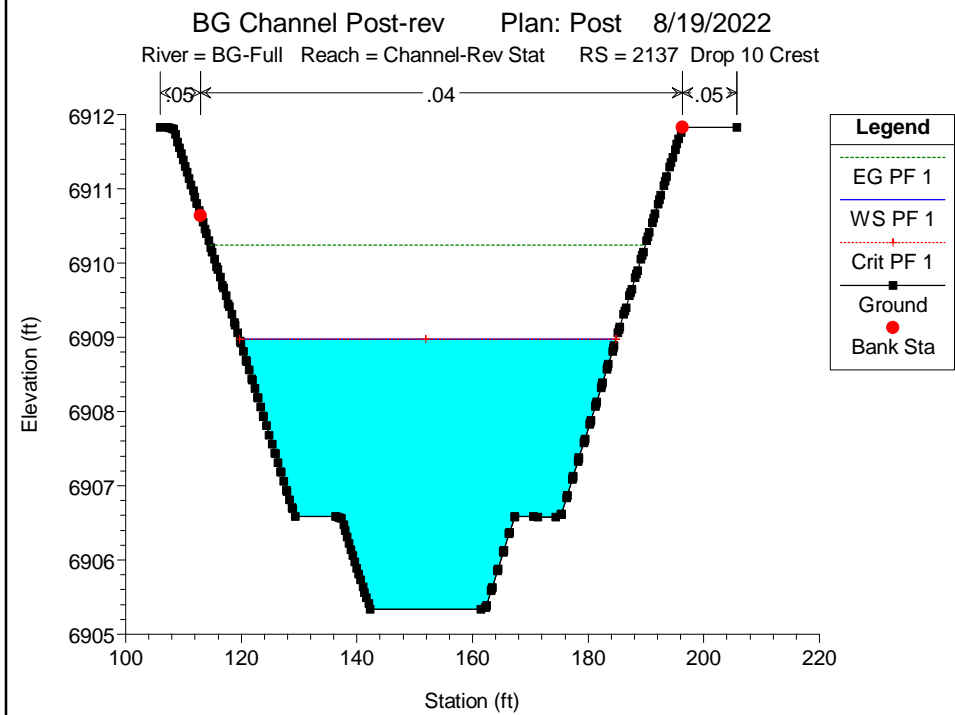
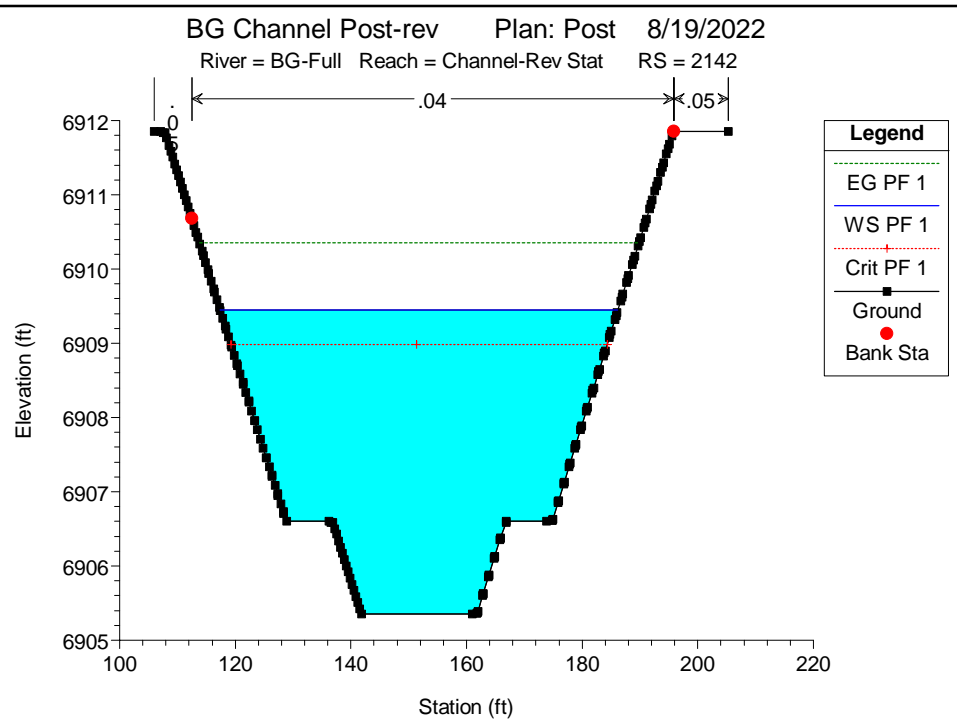
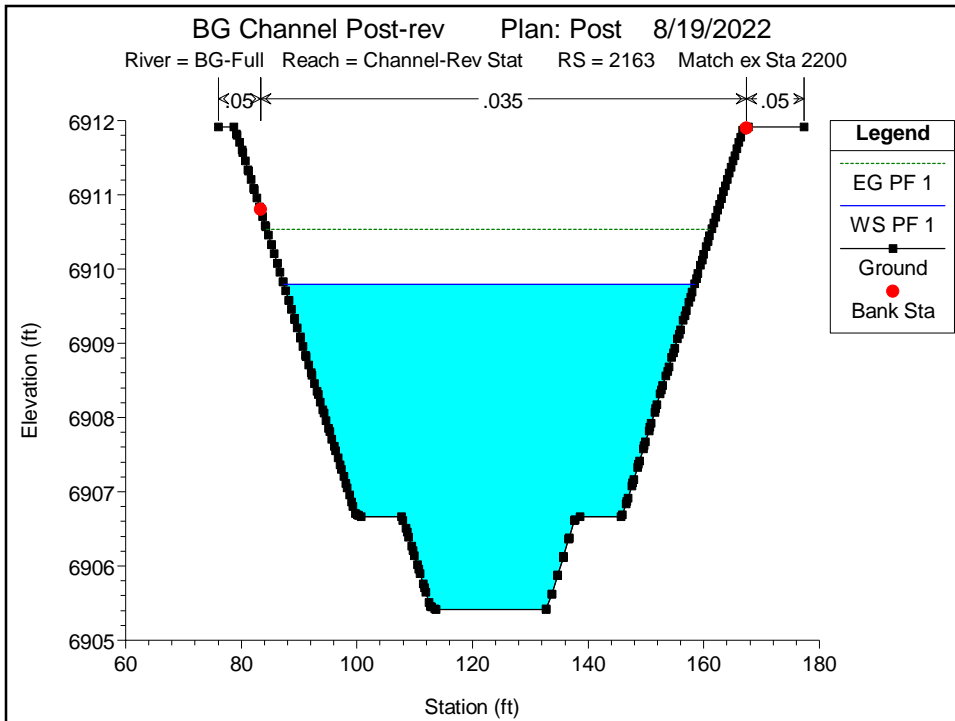


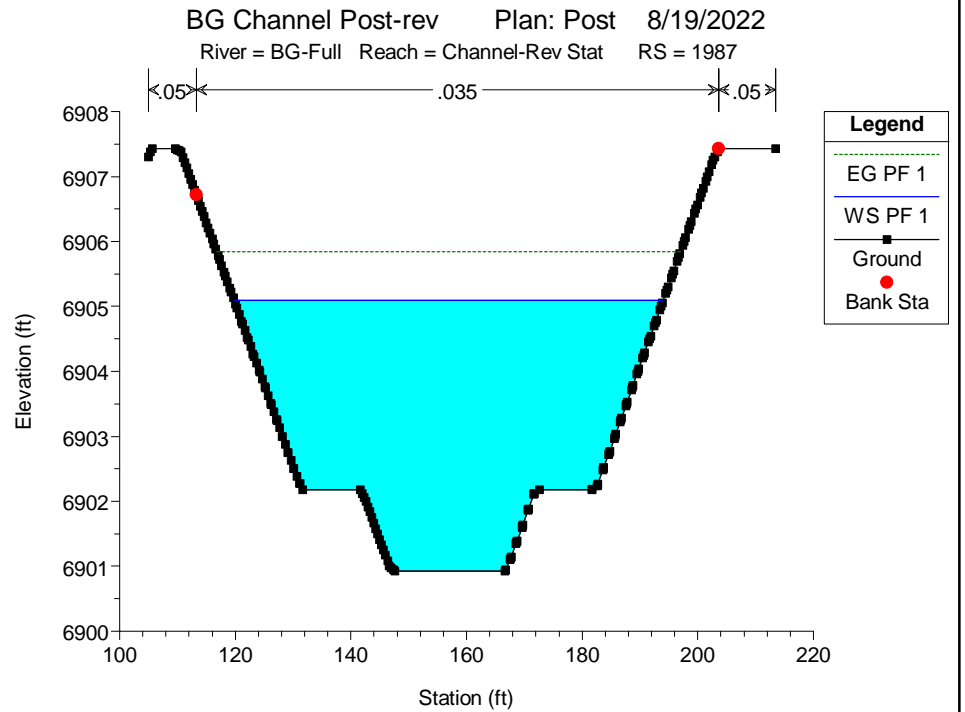
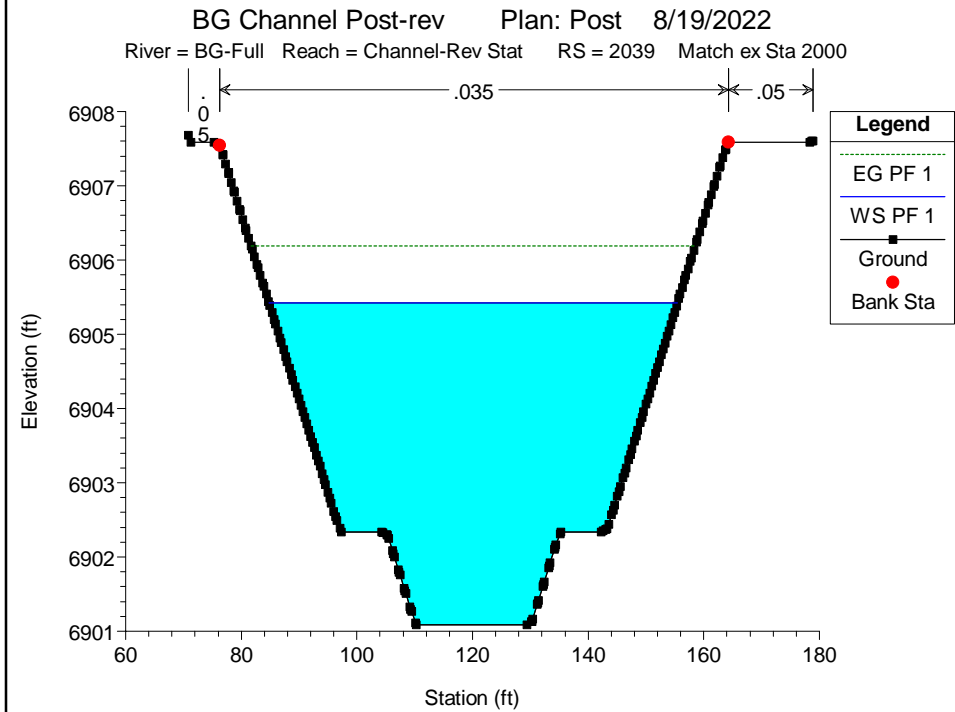
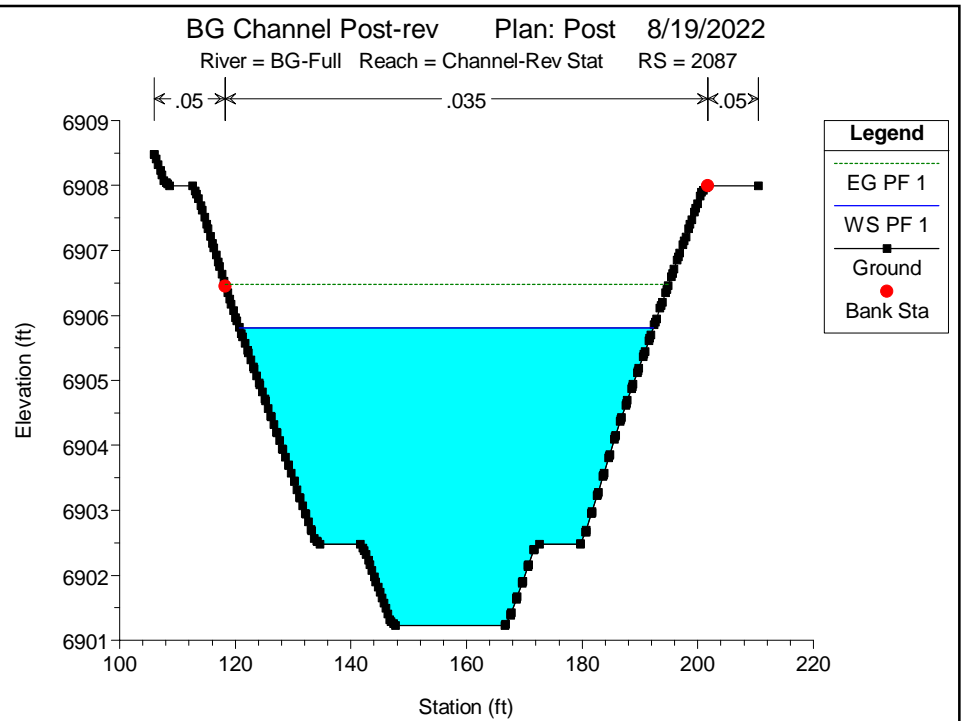
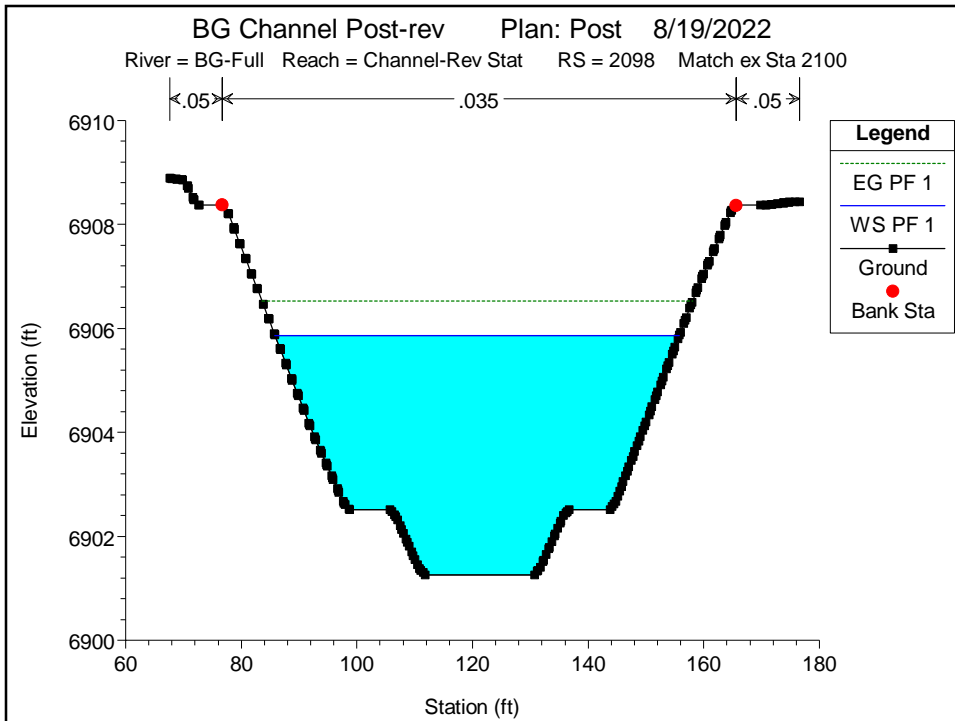


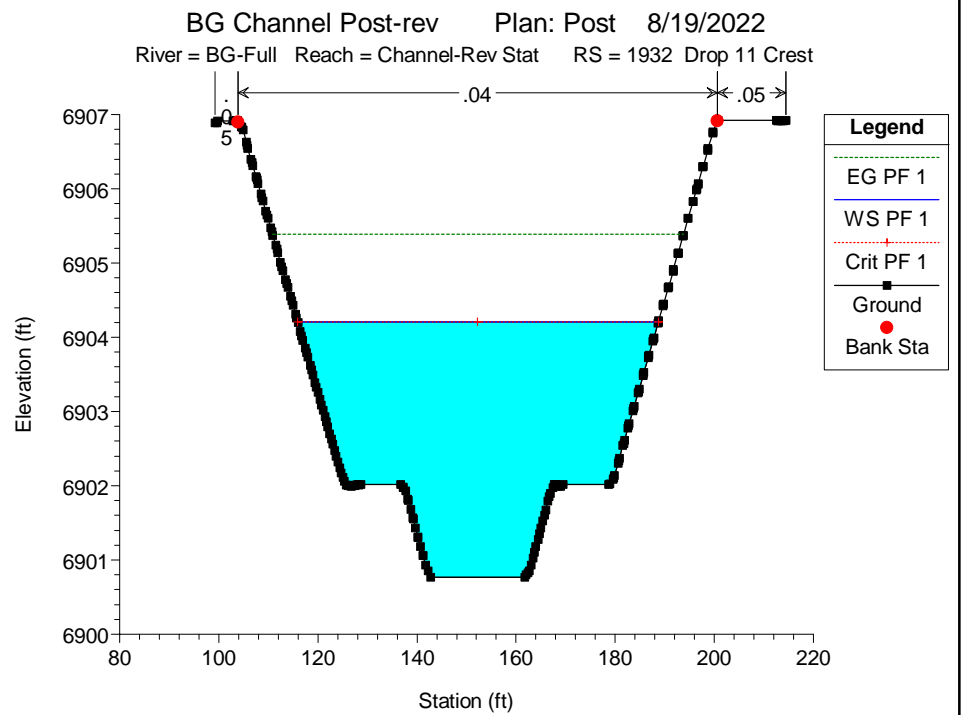
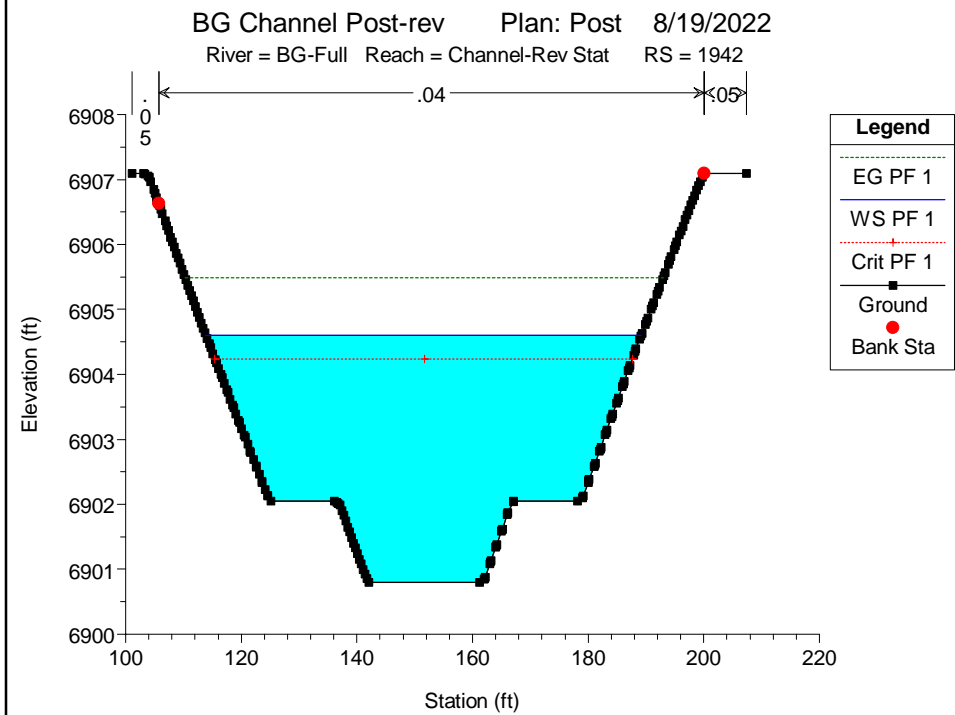
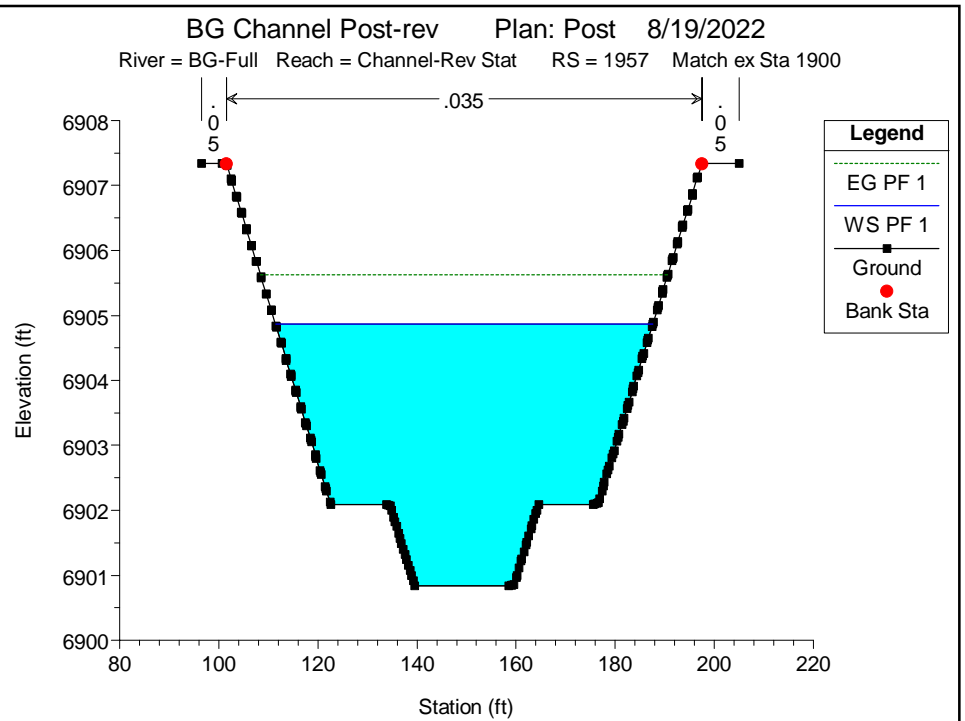
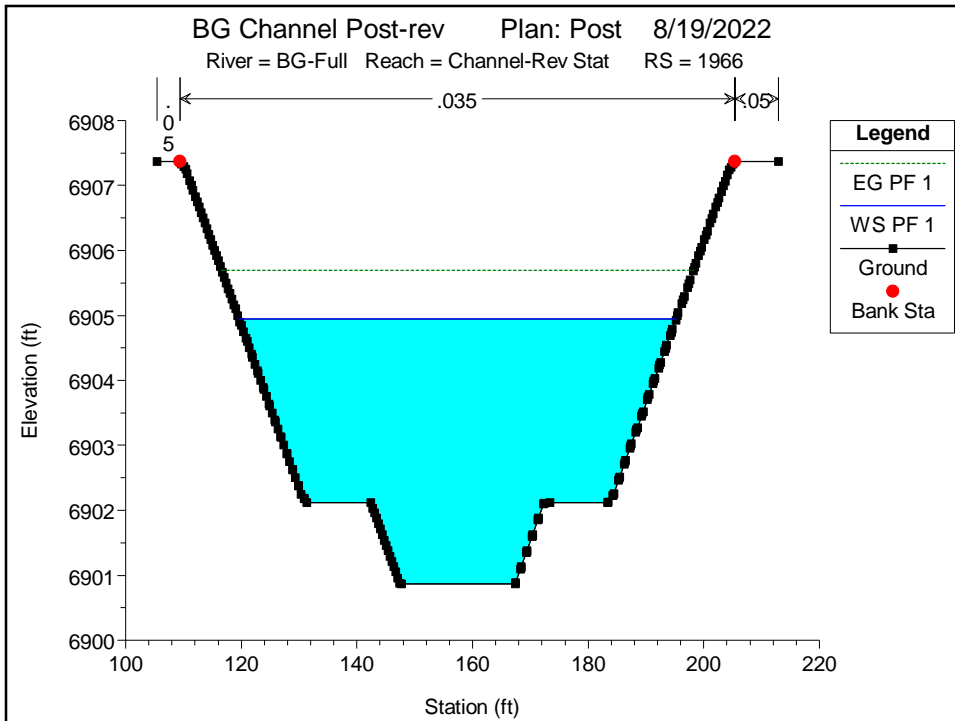


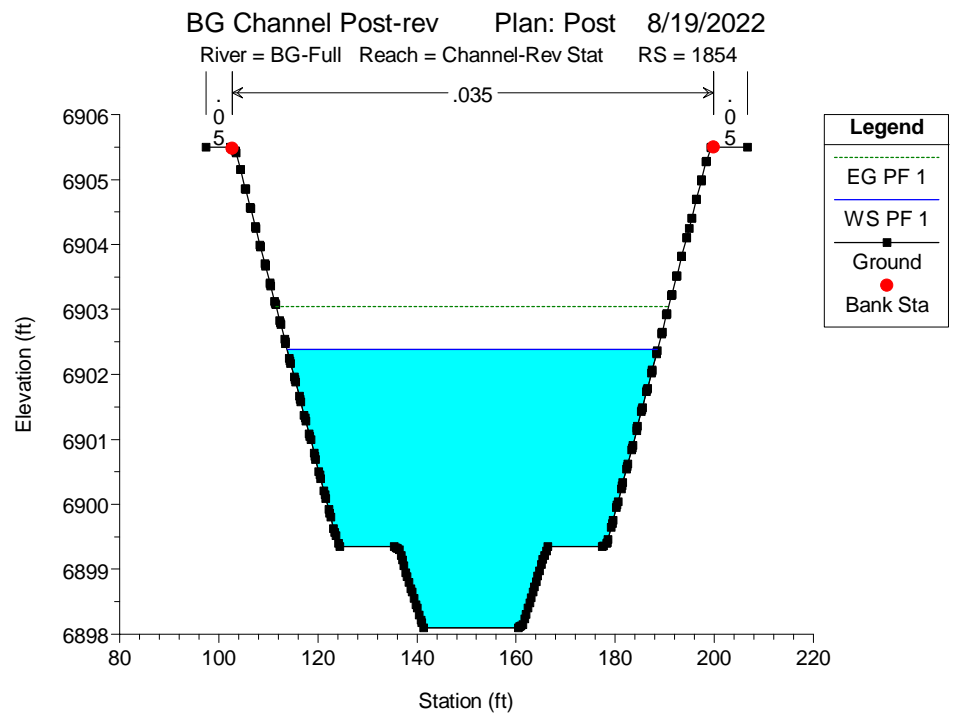
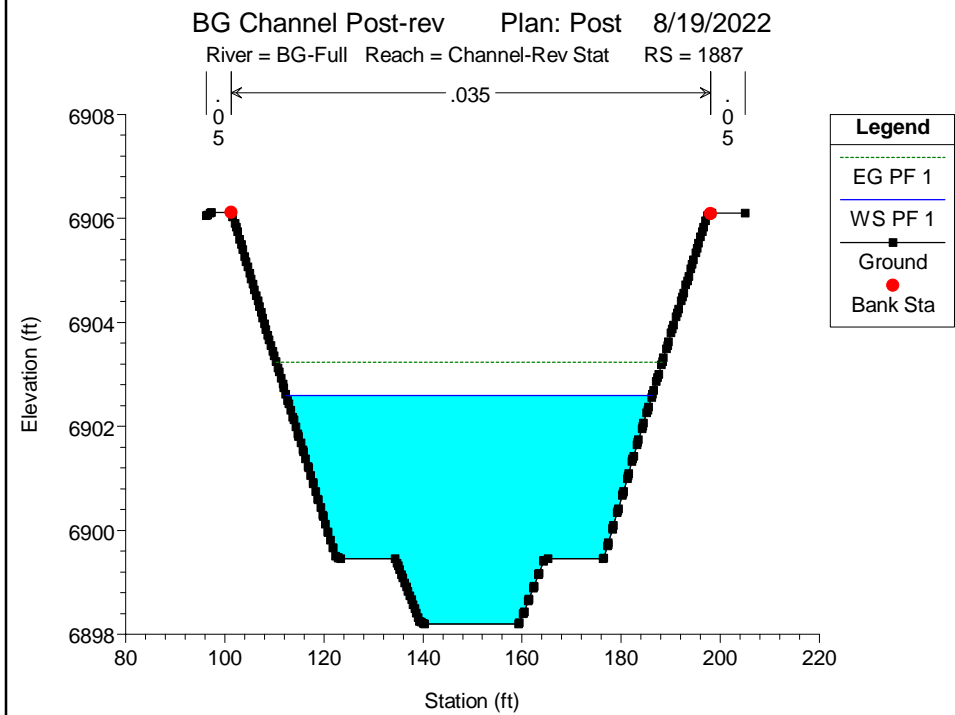
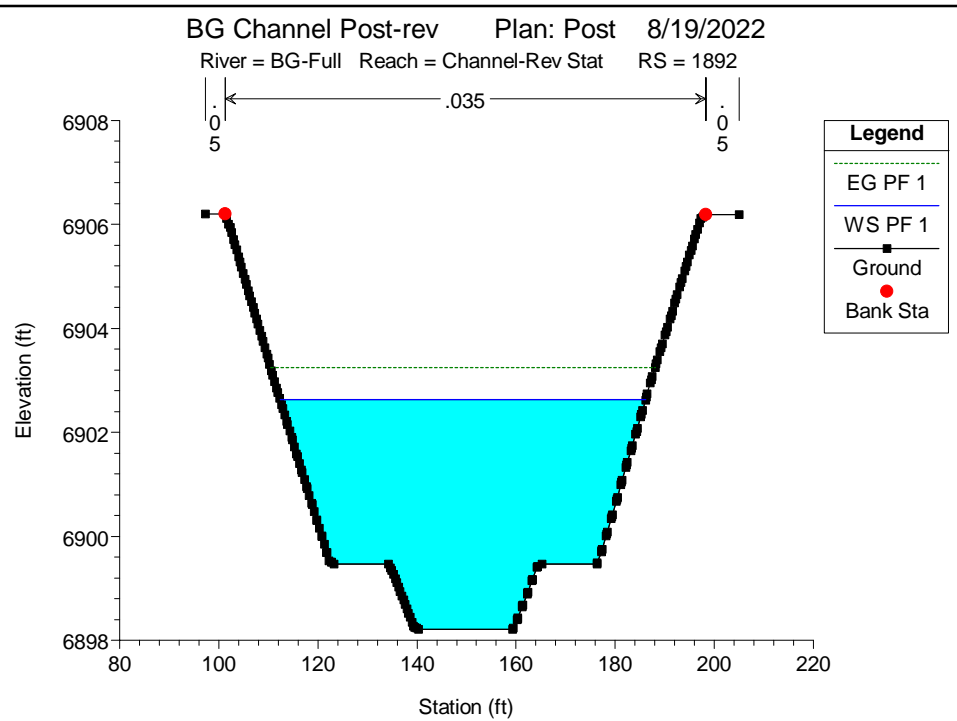
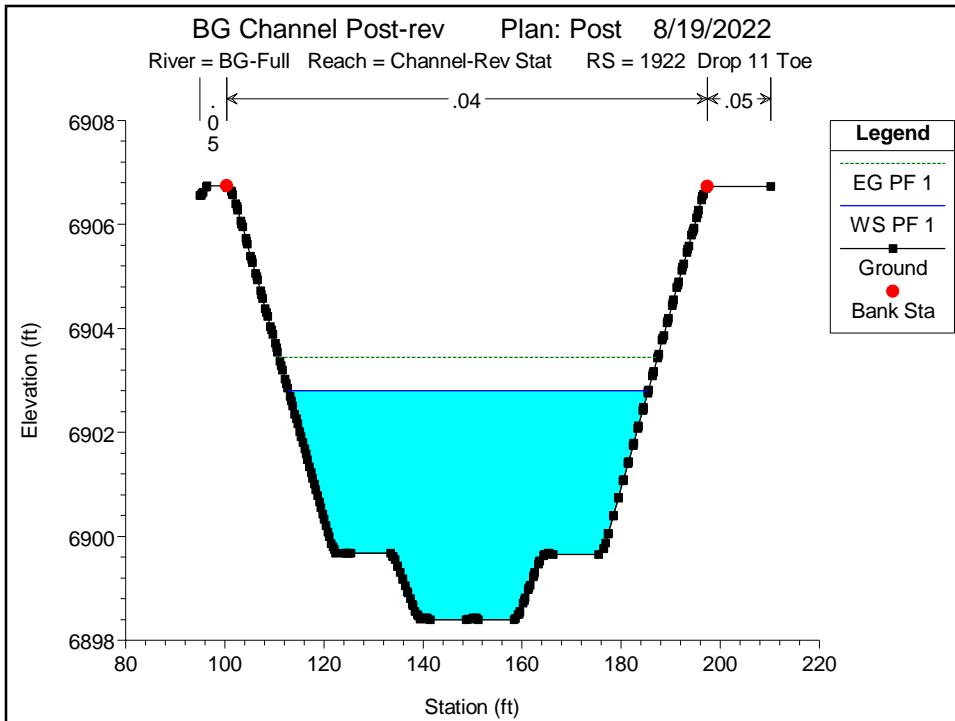


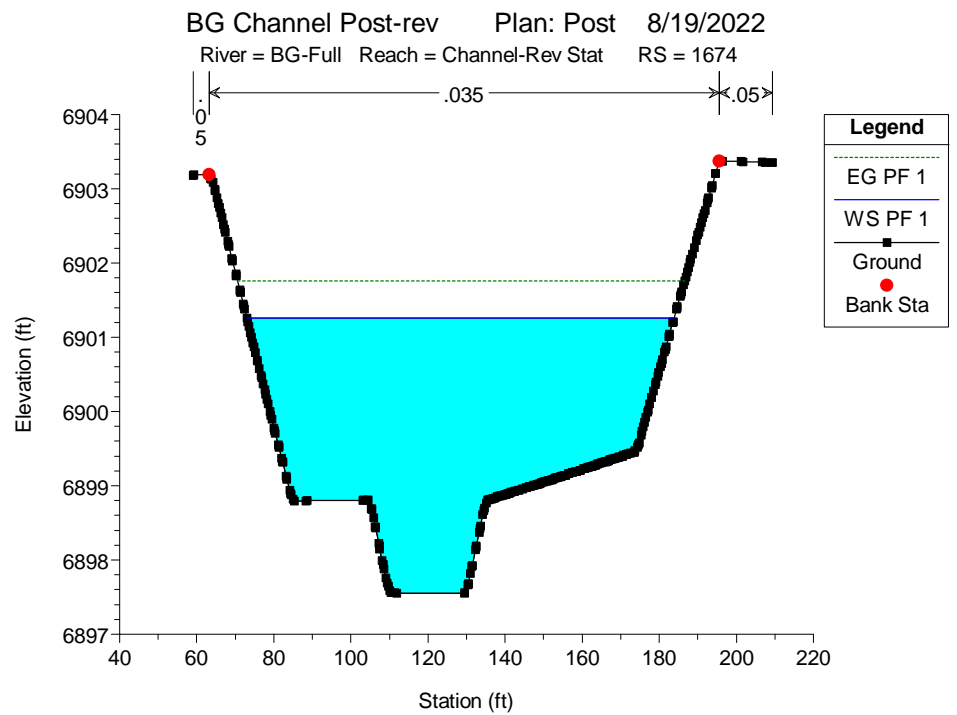
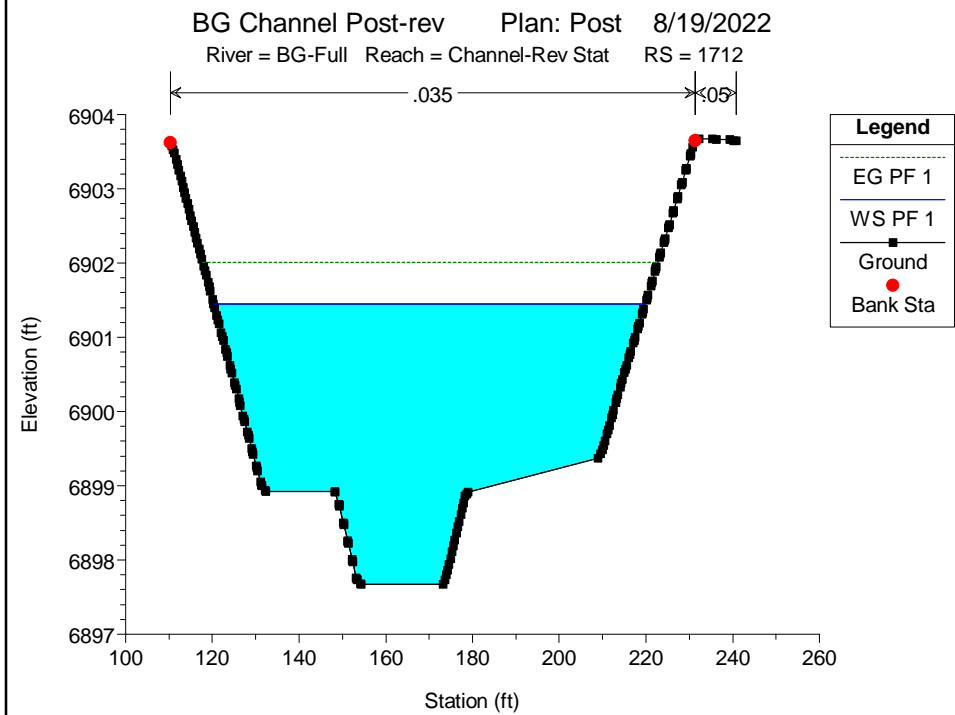
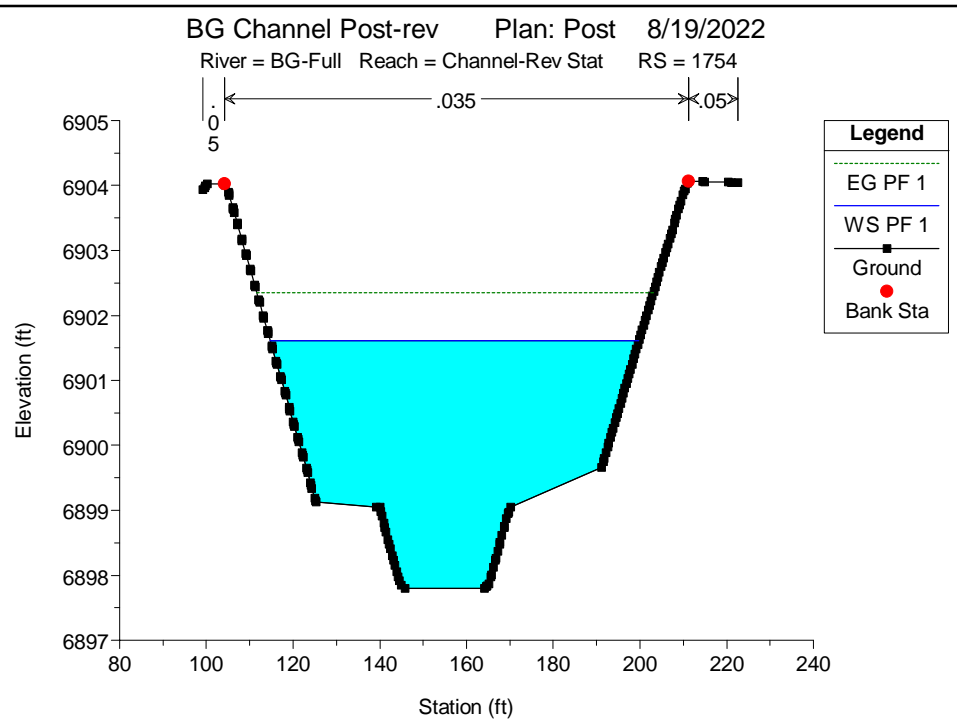
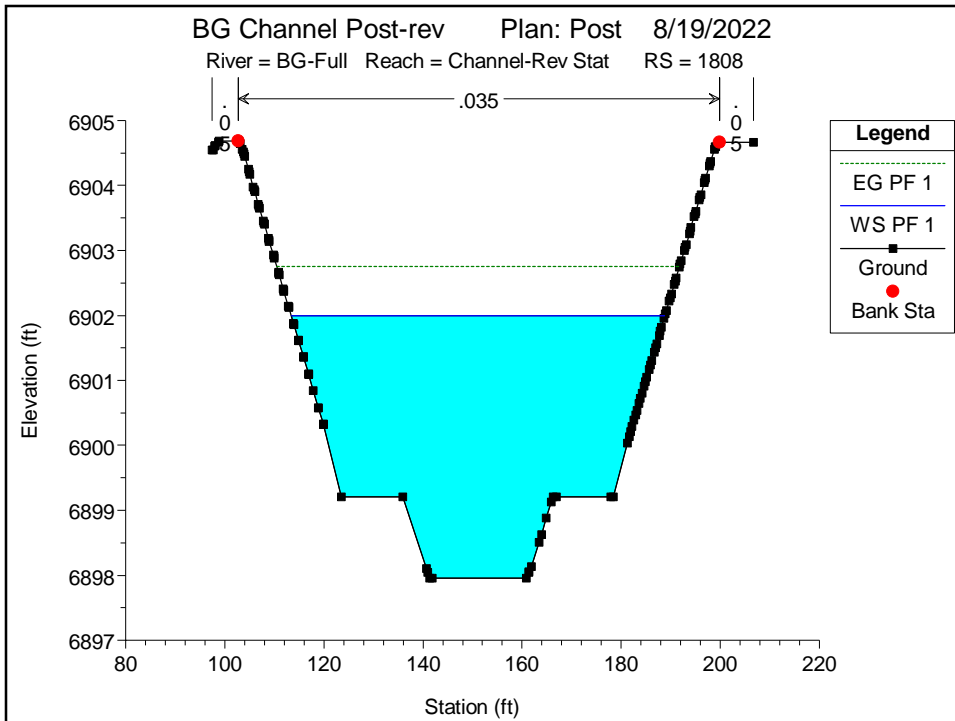


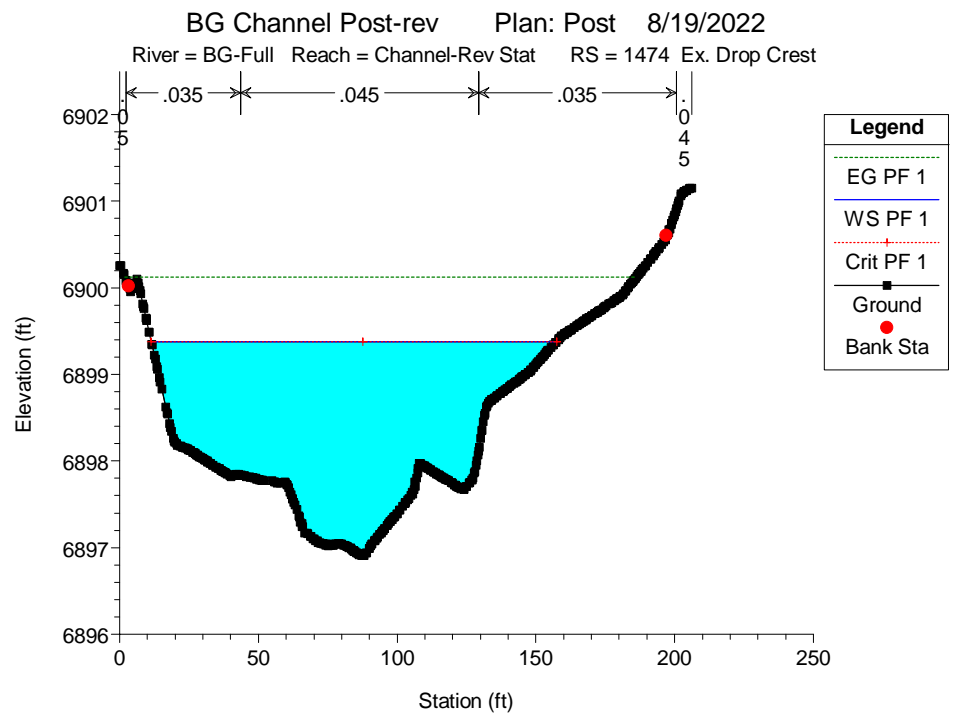
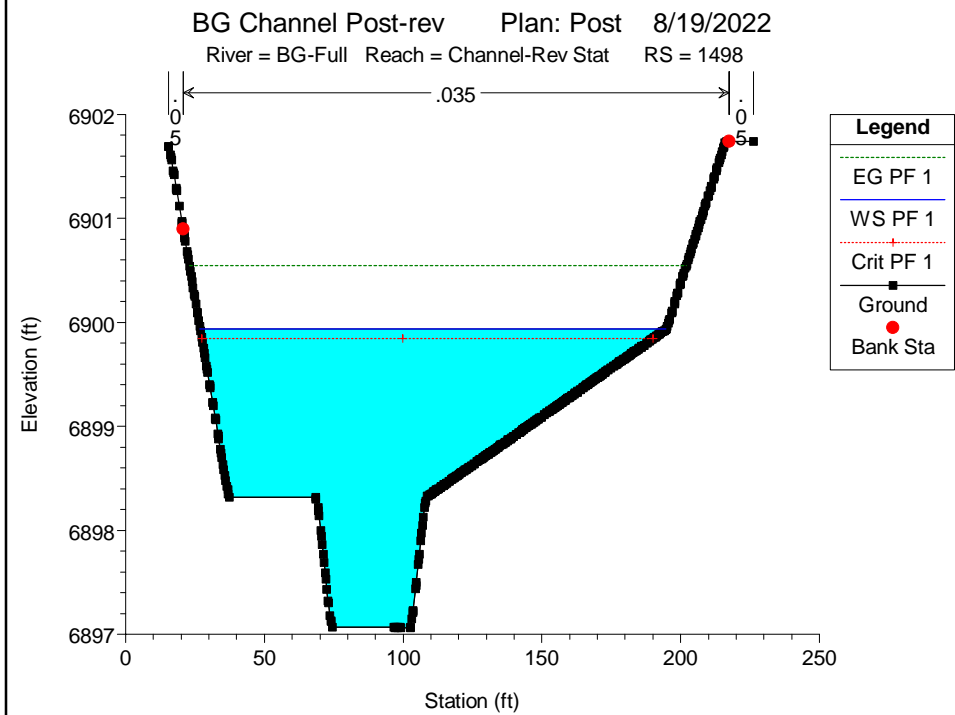
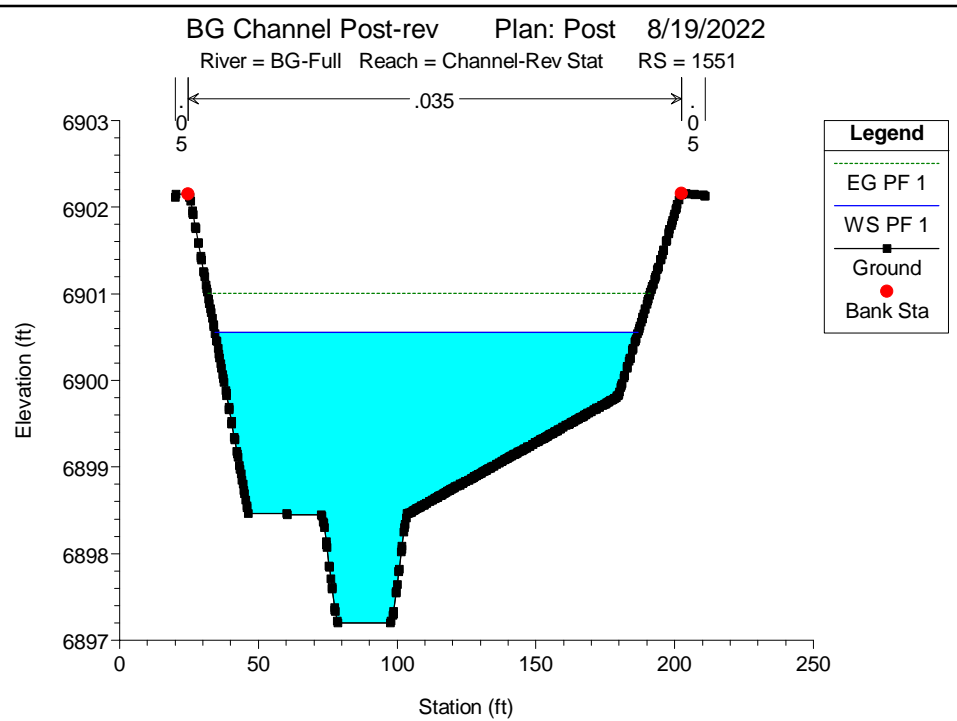
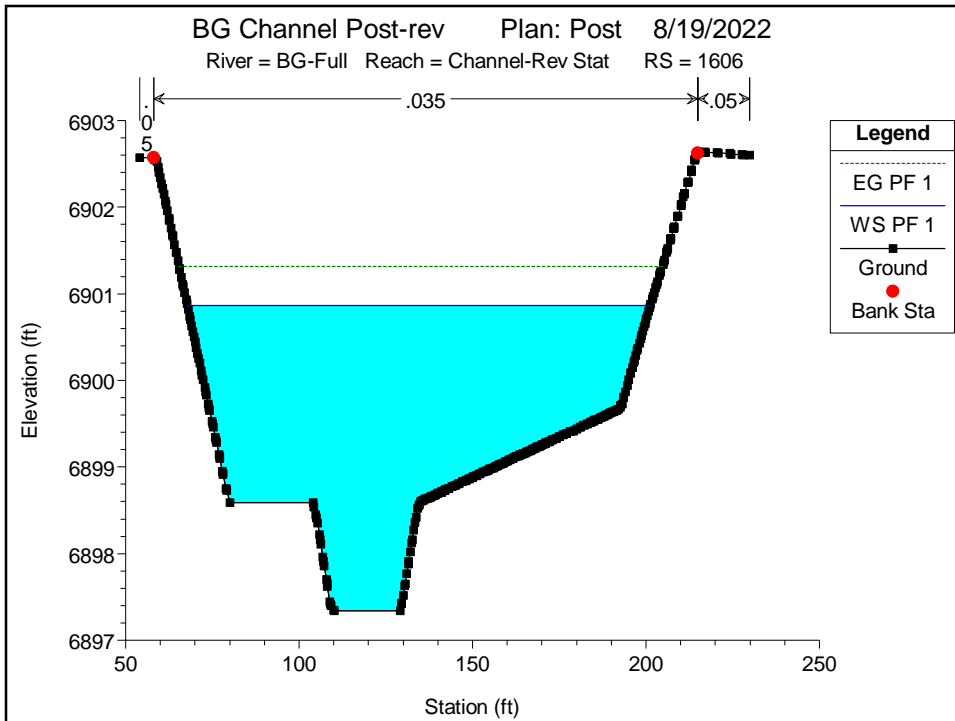


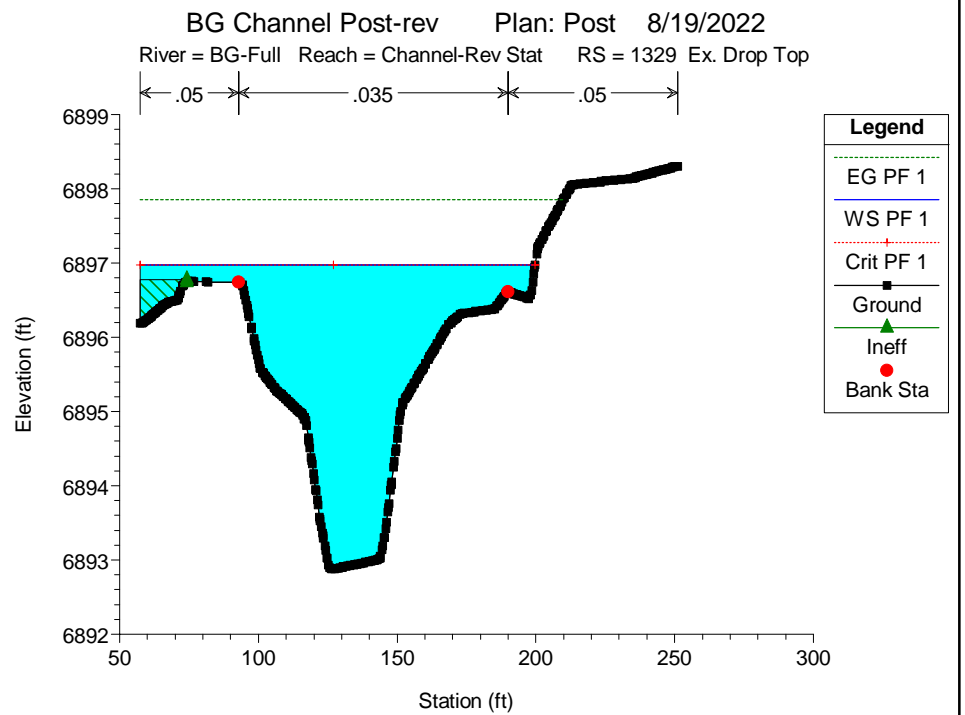
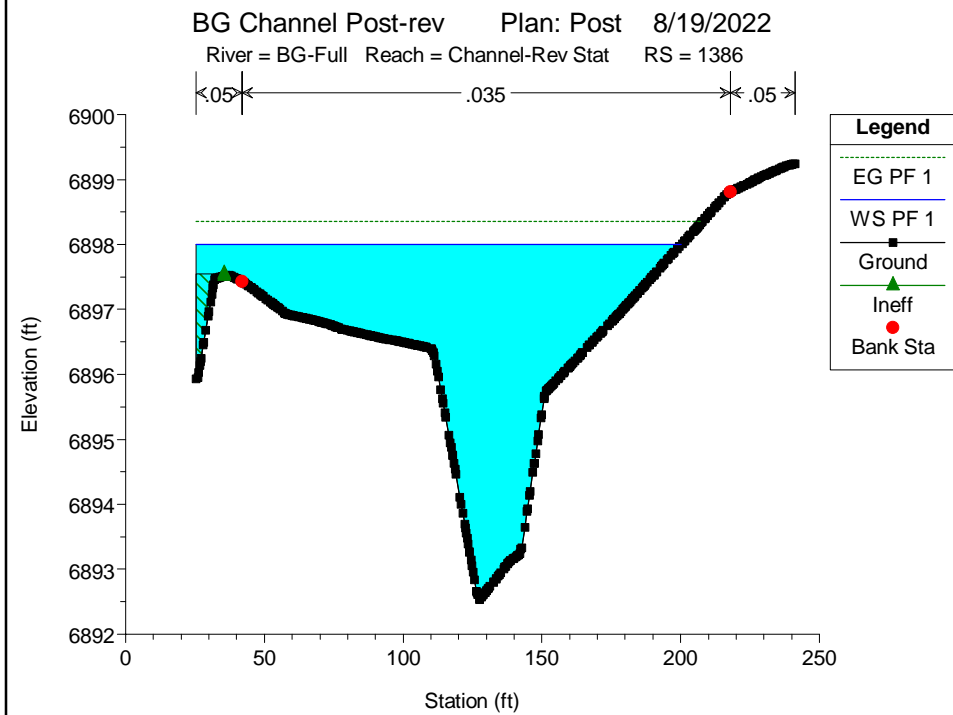
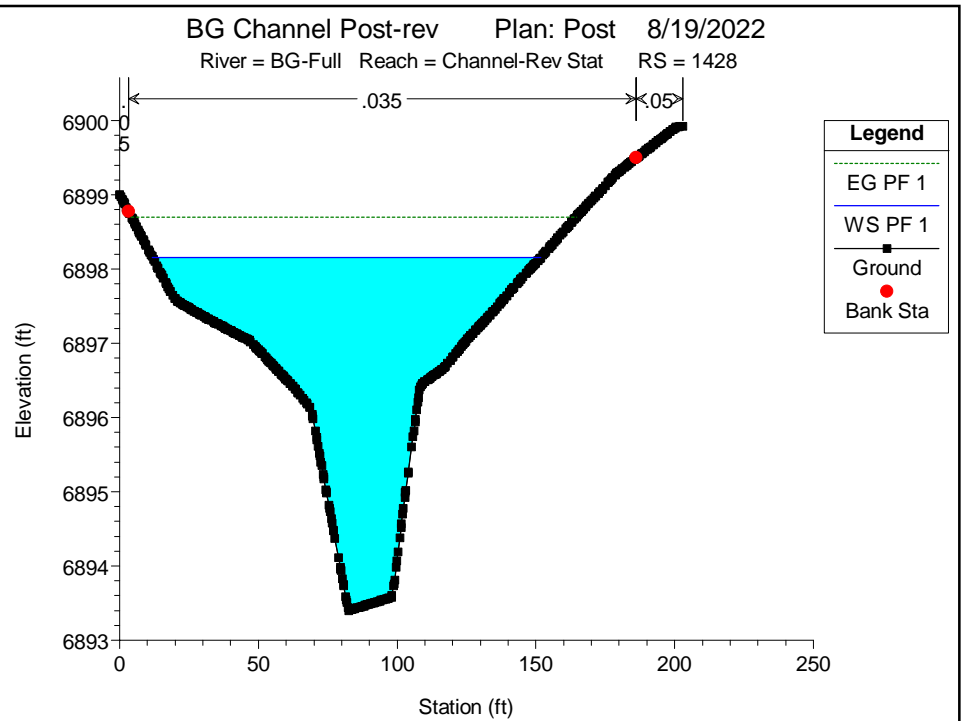
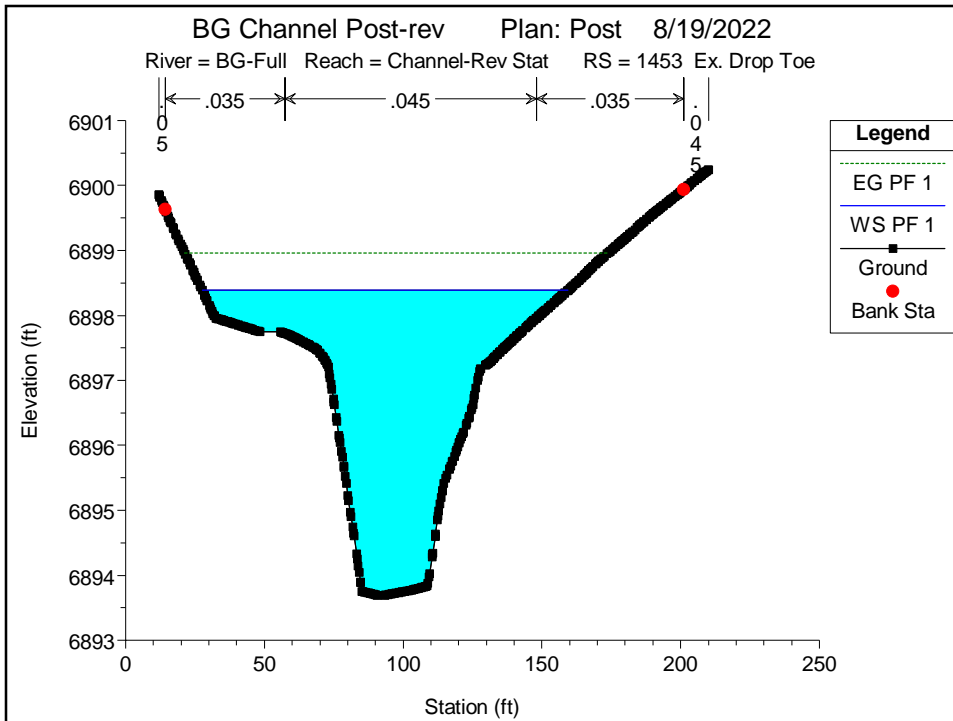


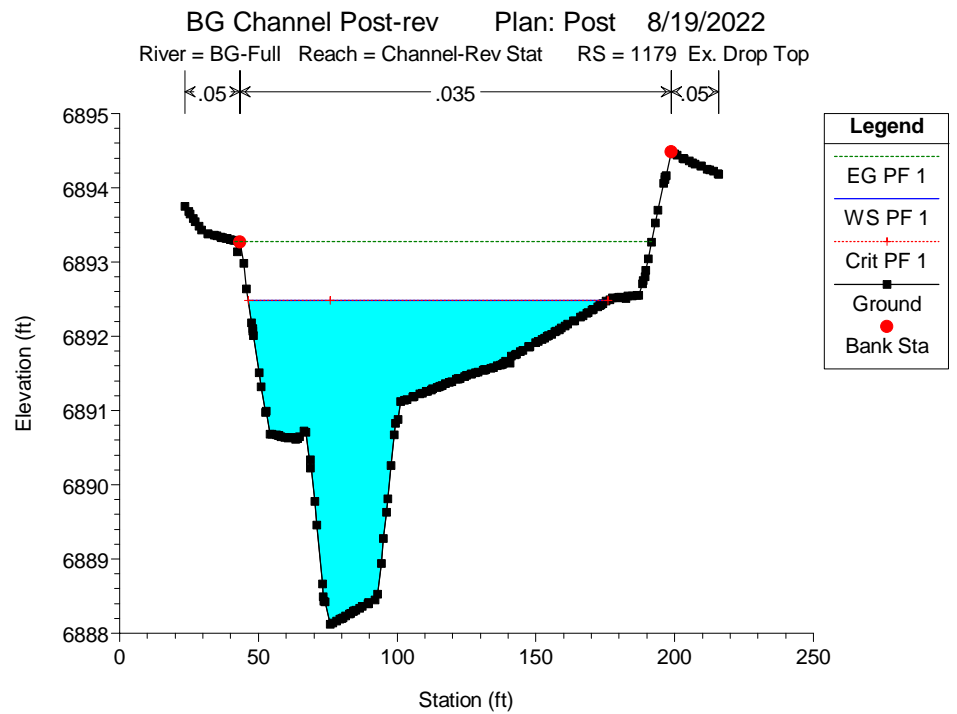
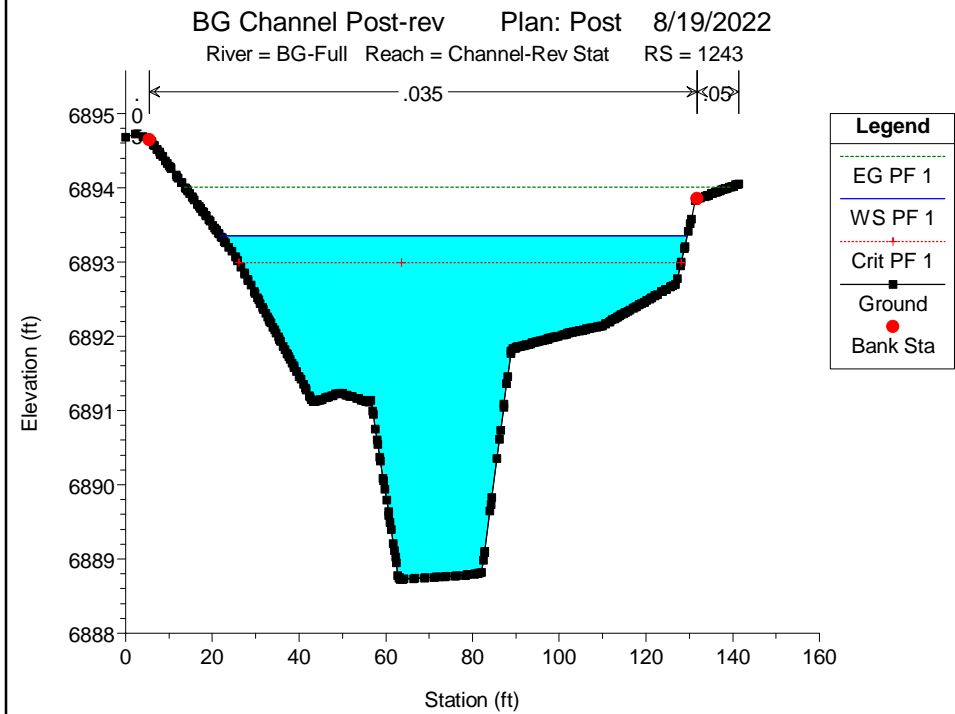
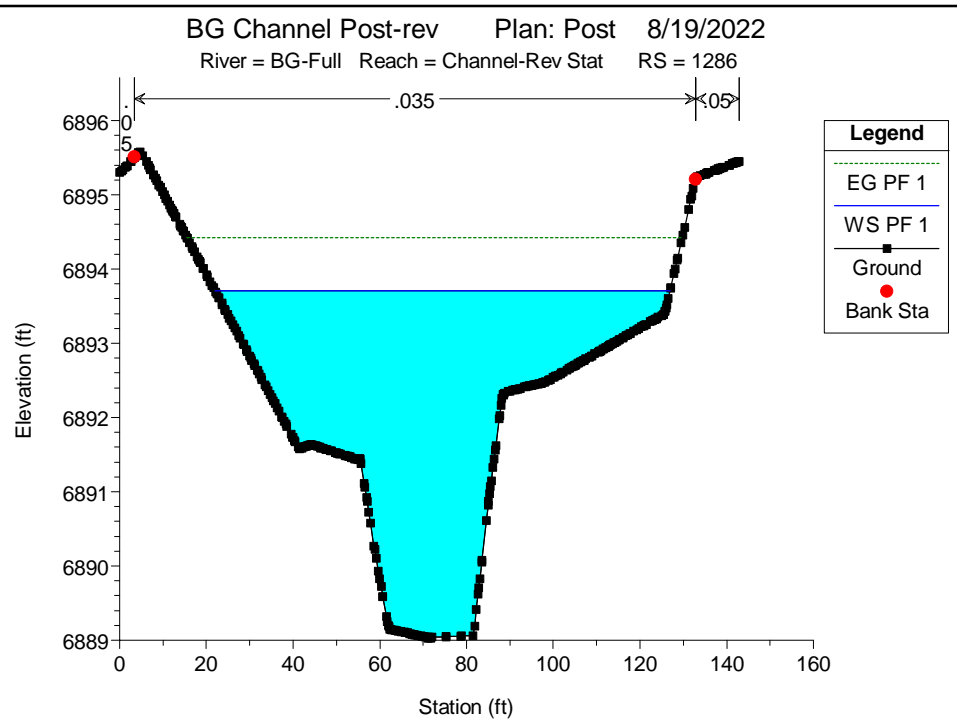
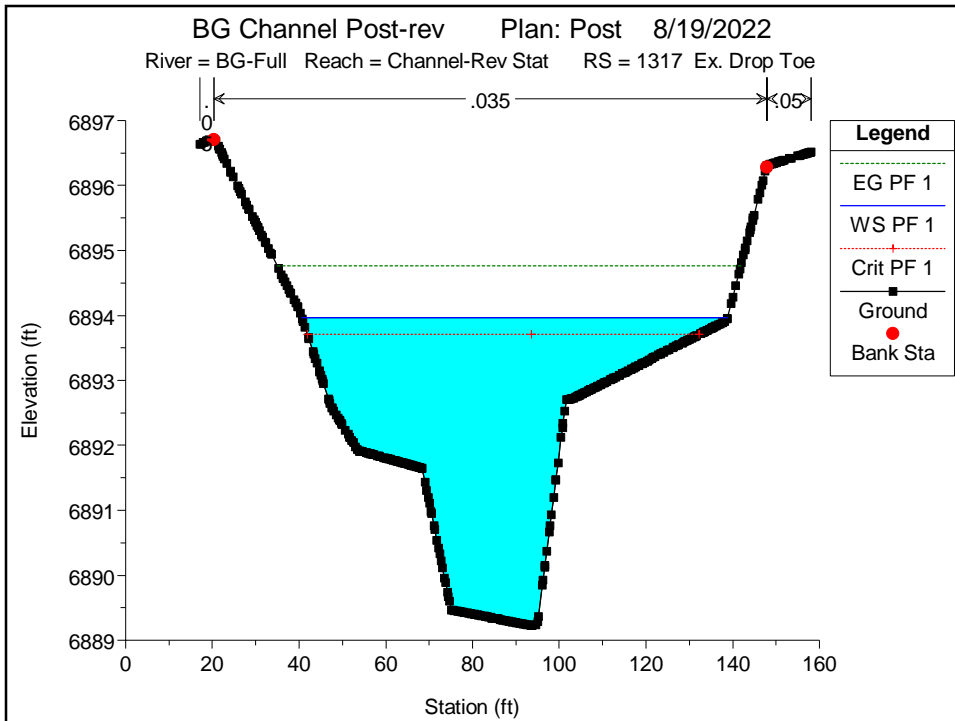


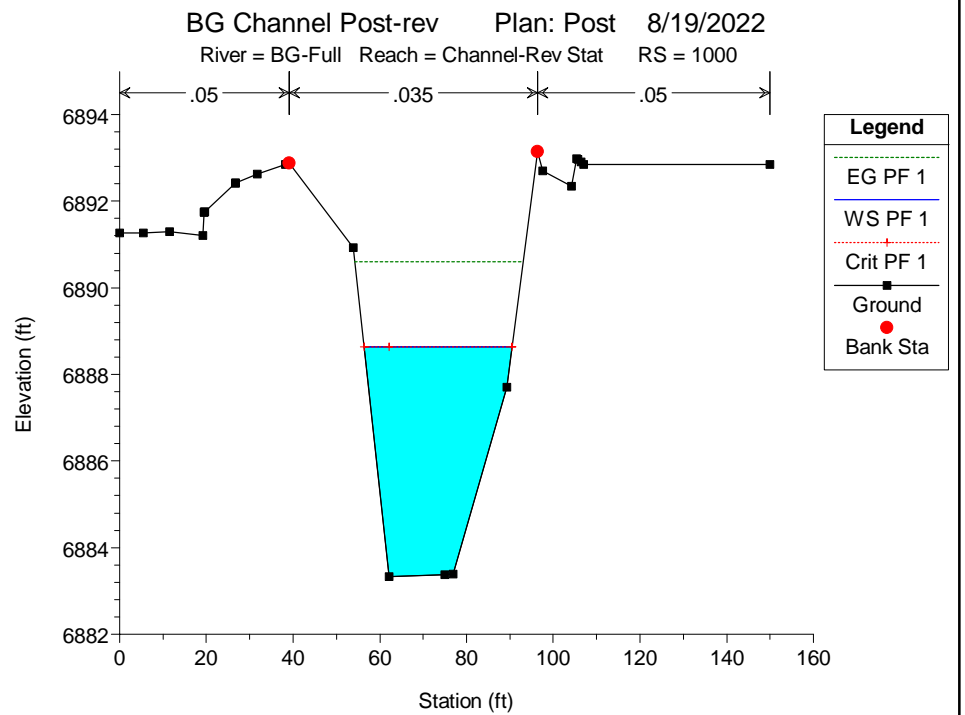
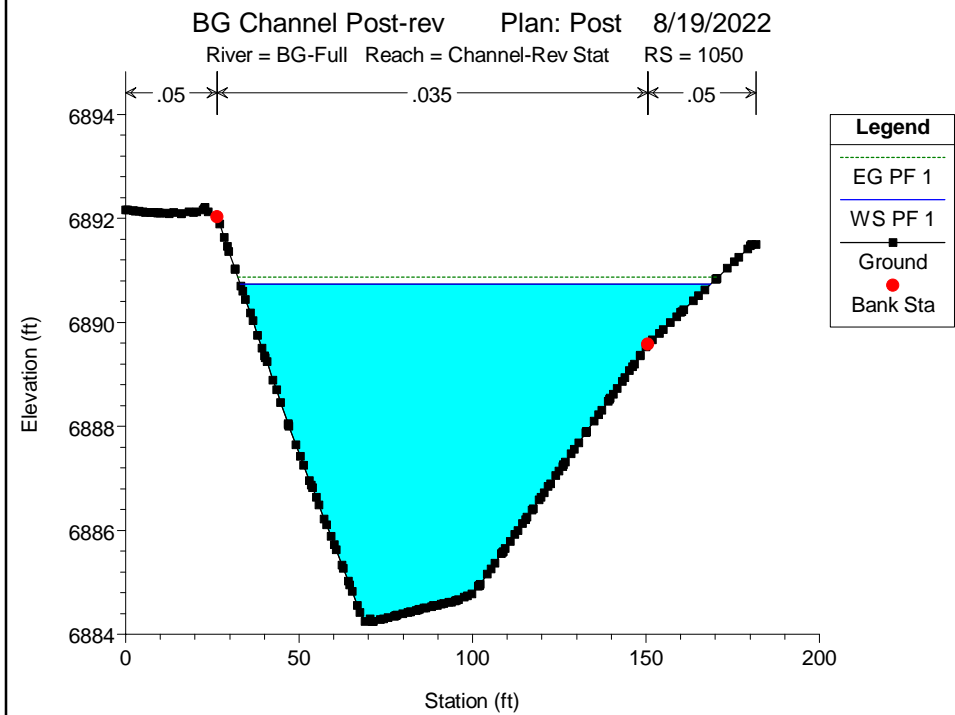
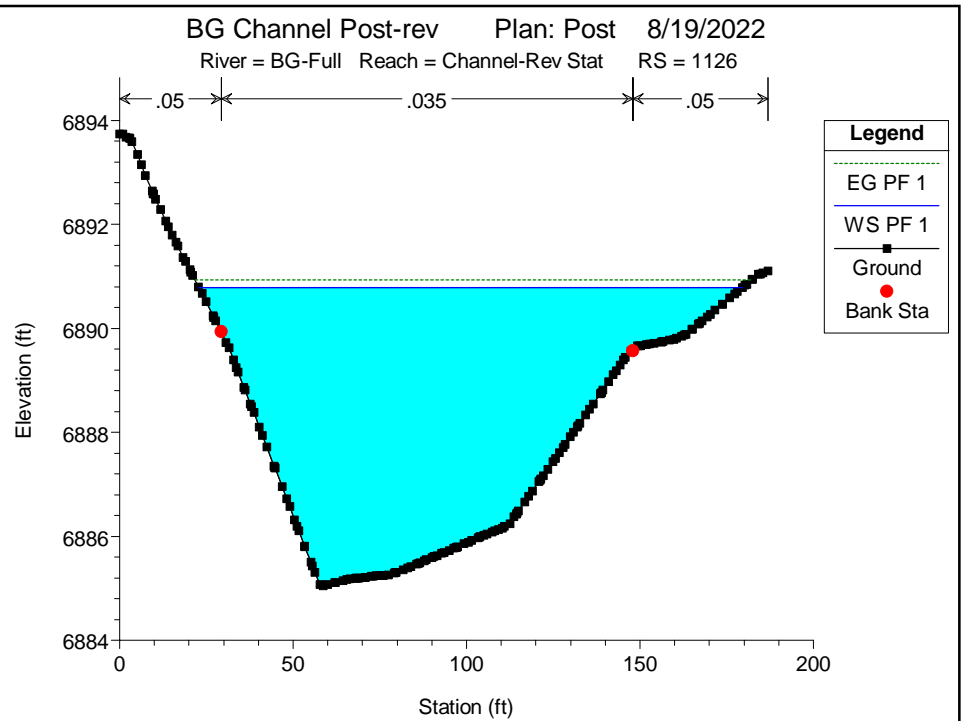
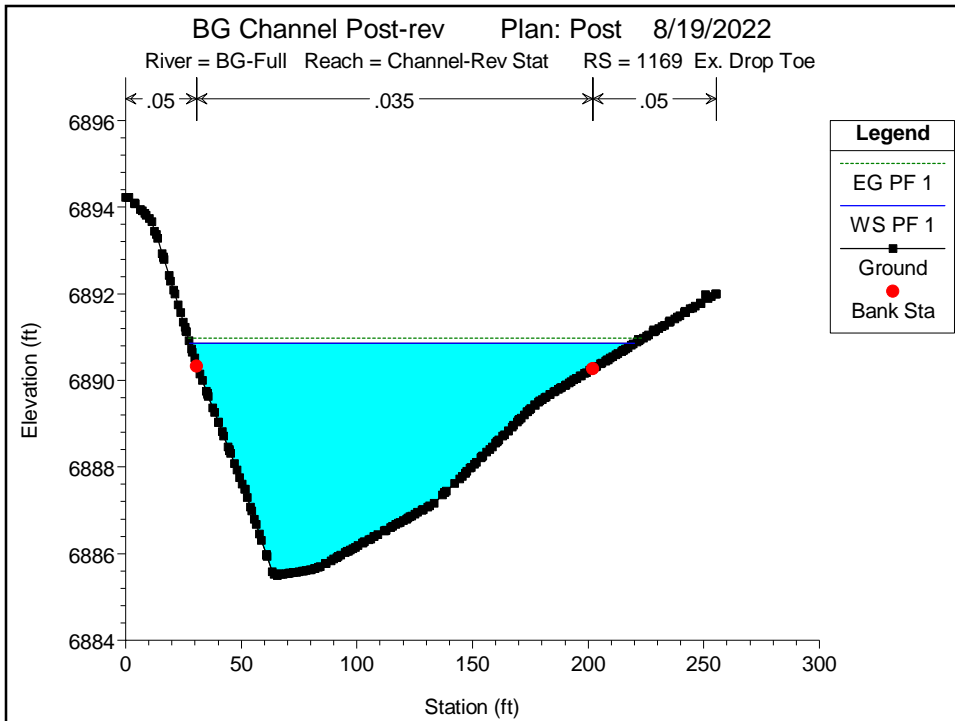












ATTACHMENT O
Cover Page of LOMR No.: 03-08-0385P





Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT**

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	EL PASO COUNTY COLORADO (UNINCORPORATED AREAS)	NO PROJECT	HYDROLOGIC ANALYSIS HYDRAULIC ANALYSIS NEW TOPOGRAPHIC DATA BASE MAP CHANGES
	COMMUNITY NO.: 080059		
IDENTIFIER	West Tributary Falcon Basin Zone A Conversion	APPROXIMATE LATITUDE & LONGITUDE: 38.941, -104.619 SOURCE: USGS QUADRANGLE DATUM: NAD 27	

FLOODING SOURCE(S) & REVISED REACH(ES)	Unnamed Tributary to Black Squirrel Creek No. 2 – from approximately 200 feet upstream to approximately 4,300 feet upstream of Woodmen Road
--	---

SUMMARY OF REVISIONS		
Effective Flooding:	Zone A	No BFEs*
Revised Flooding:	Zone AE	BFEs*
Increases:	YES	YES
Decreases:	YES	NONE

ANNOTATED MAPPING ENCLOSURES	ANNOTATED STUDY ENCLOSURES
TYPE: FIRM* NO: 08041C0575 F Date: March 17, 1997	PROFILE: 343P SUMMARY OF DISCHARGES TABLE

* FIRM – Flood Insurance Rate Map; ** FBFM – Flood Boundary and Floodway Map; *** FHBM – Flood Hazard Boundary Map

DETERMINATION

This document provides the determination from the Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2677 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Doug Bellomo, P.E., Acting Chief
Hazard Study Branch
Emergency Preparedness and Response Directorate

ATTACHMENT P
HEC-2 Output File From Effective Study



```

1*****
* WATER SURFACE PROFILES *
* VERSION OF SEPTEMBER 1988 *
* ERROR: 01,02 *
* UPDATED: 4 APRIL 1989 *
* RUN DATE 4/14/ 3 TIME 13: 5:15 *
*****
* U.S. ARMY CORPS OF ENGINEERS *
* THE HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET, SUITE D *
* DAVIS, CALIFORNIA 95616-4687 *
* (916) 756-1104, (916) 551-1748 *
*****

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X X XXXXXXX XXXXX XXXXX
X X X X X X X X
X X X X X X X
XXXXXXXX XXXX X XXXXX XXXXX
X X X X X X
X X X X X X
X X XXXXXXX XXXXX

```

END OF BANNER
1 4/14/ 3 13: 5:15 PAGE 1

THIS RUN EXECUTED 4/14/ 3 13: 5:15

HEC2 RELEASE DATED SEP 88 UPDATED APR 1989

ERROR CORR - 01,02
MODIFICATION -

T1 WEST TRIBUTARY FALCON BASIN ZONE A CONVERSION
T2 PROJECT NUMBER 03016 FILENAME WTRB100.DAT
T3 100-YEAR FREQUENCY EX. COND XSEC L TO R FACING UPSTREAM

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
0		3	0	0	.01	0	0	0	6895	

J2	NPROF	IPLLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
1		0	-1							

QT	2	111	1482							
NC	.05	.05	.035	.1	.3					
X1	1	14	1130	1240	0	0		0		
GR	6896	1000	6894	1090	6894	1130	6893	1162	6894	1240
GR	6894.2	1255	6894	1270	6893.7	1275	6894	1280	6895	1300
GR	6894	1310	6893.5	1340	6894	1355	6896	1450		
X1	2	6	1080	1220	165	155	367			
GR	6901.5	1000	6900	1080	6898	1130	6899	1220	6900	1290
GR	6900.7	1308								
X1	3	7	1120	1205	525	522	525			
GR	6912	1000	6910	1102	6906	1110	6904	1172	6906	1205
GR	6908	1230	6910	1420						
X1	4	17	1242	1270	560	515	571			
GR	6920	1000	6918	1090	6916.2	1100	6918	1108	6918.2	1115
GR	6918	1127	6917.5	1138	6918	1150	6918	1182	6917.6	1190
GR	6918	1200	6918.4	1222	6918	1242	6914	1258	6916	1270
GR	6918	1305	6919.8	1325						
X1	5	13	1150	1195	535	535	551			
GR	6930	1000	6928	1055	6926.2	1065	6928	1072	6929.4	1100
GR	6928	1122	6927.6	1132	6928	1142	6926	1150	6924	1172
GR	6926	1195	6928	1205	6930	1355				
QT	2	108	1450							
X1	6	9	1014	1070	560	565	600			
GR	6940	1000	6936	1014	6934	1055	6935.8	1070	6934	1080
GR	6933.8	1088	6934	1096	6936	1105	6940	1138		

1 4/14/ 3 13: 5:15 PAGE 2

X1	7	9	1365	1420	370	375	390			
GR	6950	1000	6948	1090	6946	1365	6944	1375	6942	1385
GR	6944	1410	6946	1420	6948	1490	6950	1620		
X1	8	12	1320	1375	470	470	475			
X4	1	6955.5	1250							
GR	6958	1000	6956	1120	6954	1320	6952	1330	6950	1340
GR	6952	1355	6954	1375	6956	1405	6958	1440	6960	1470
GR	6960	1510	6960	1710						
X1	9	13	1110	1150	530	620	600			
GR	6976	1000	6974	1055	6972	1080	6970	1090	6968	1100
GR	6966	1110	6964	1135	6964	1150	6966	1180	6968	1190
GR	6970	1220	6972	1275	6974	1325				

1 4/14/ 3 13: 5:15 PAGE 3

SECNO	DEPTH	CWSEL	CRISW	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

CCHV= .100 CEHV= .300

*SECNO 1.000
 1.00 2.01 6895.01 .00 6895.00 6895.36 .35 .00 .00 6894.00
 1482. 164. 932. 386. 63. 166. 135. 0. 0. 6894.00
 .00 2.60 5.62 2.87 .050 .035 .050 .000 6893.00 1044.67
 .010134 0. 0. 0. 0 0 3 .00 358.18 1402.85

0

*SECNO 2.000
 7185 MINIMUM SPECIFIC ENERGY
 3720 CRITICAL DEPTH ASSUMED
 2.00 2.17 6900.17 6900.17 .00 6900.78 .61 3.75 .08 6900.00
 1482. 1. 1356. 125. 1. 209. 47. 2. 2. 6899.00
 .01 .67 6.50 2.65 .050 .035 .050 .000 6898.00 1070.96
 .013758 165. 367. 155. 2 8 0 .00 223.39 1294.36

0

*SECNO 3.000
 3.00 3.00 6907.00 6906.98 .00 6907.92 .91 7.05 .09 6906.00
 1482. 2. 1467. 13. 1. 190. 6. 5. 4. 6906.00
 .03 1.99 7.71 2.14 .050 .035 .050 .000 6904.00 1108.00
 .013101 525. 525. 522. 7 11 0 .00 109.52 1217.52

0

*SECNO 4.000
 3685 20 TRIALS ATTEMPTED WSEL,CWSEL
 3693 PROBABLE MINIMUM SPECIFIC ENERGY
 3720 CRITICAL DEPTH ASSUMED
 4.00 4.85 6918.85 6918.85 .00 6919.51 .66 5.85 .03 6918.00
 1482. 432. 778. 273. 161. 92. 69. 8. 6. 6916.00
 .06 2.67 8.46 3.96 .050 .035 .050 .000 6914.00 1051.59
 .008404 560. 571. 515. 20 14 0 .00 262.89 1314.48

0

*SECNO 5.000
 3265 DIVIDED FLOW
 3685 20 TRIALS ATTEMPTED WSEL,CWSEL
 3693 PROBABLE MINIMUM SPECIFIC ENERGY
 3720 CRITICAL DEPTH ASSUMED

1 4/14/ 3 13: 5:15 PAGE 4

SECNO	DEPTH	CWSEL	CRIS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNGH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	TRIAL	IDC	ICONT	CORAR	TOPWID	ENDST
5.00	4.41	6928.41	6928.41	.00	6929.39	.98	4.40	.10	6926.00
1482.	133.	1297.	52.	51.	154.	20.	12.	9.	6926.00
.08	2.60	8.45	2.52	.050	.035	.050	.000	6924.00	1043.67
.007746	535.	551.	535.	20	11	0	.00	156.96	1235.91

0

*SECNO 6.000
 7185 MINIMUM SPECIFIC ENERGY
 3720 CRITICAL DEPTH ASSUMED
 6.00 2.97 6936.77 6936.77 .00 6937.76 .99 6.74 .00 6936.00
 1450. 2. 860. 588. 1. 100. 83. 14. 10. 6935.80
 .10 2.09 8.56 7.10 .050 .035 .050 .000 6933.80 1011.32
 .018718 560. 600. 565. 10 19 0 .00 100.01 1111.32

0

*SECNO 7.000
 7185 MINIMUM SPECIFIC ENERGY
 3720 CRITICAL DEPTH ASSUMED
 7.00 4.87 6946.87 6946.87 .00 6947.76 .89 4.35 .01 6946.00
 1450. 77. 1353. 20. 52. 173. 13. 16. 12. 6946.00
 .11 1.48 7.83 1.48 .050 .035 .050 .000 6942.00 1245.22
 .007498 370. 390. 375. 10 14 0 .00 205.26 1450.49

0

*SECNO 8.000
 3685 20 TRIALS ATTEMPTED WSEL,CWSEL
 3693 PROBABLE MINIMUM SPECIFIC ENERGY
 3720 CRITICAL DEPTH ASSUMED
 8.00 5.02 6955.02 6955.02 .00 6956.13 1.11 4.10 .07 6954.00
 1450. 46. 1390. 15. 24. 161. 8. 18. 13. 6954.00
 .13 1.90 8.63 1.89 .050 .035 .050 .000 6950.00 1272.54
 .010031 470. 475. 470. 20 8 0 .00 117.72 1390.26

0

*SECNO 9.000
 7185 MINIMUM SPECIFIC ENERGY
 3720 CRITICAL DEPTH ASSUMED
 9.00 3.28 6967.28 6967.28 .00 6968.43 1.15 7.05 .01 6966.00
 1450. 10. 1016. 424. 4. 106. 72. 21. 15. 6964.00
 .15 2.56 9.57 5.86 .050 .035 .050 .000 6964.00 1103.61
 .013882 530. 600. 620. 10 14 0 .00 82.77 1186.39

1 4/14/ 3 13: 5:15 PAGE 5

***** THIS RUN EXECUTED 4/14/ 3 13: 5:15 *****
 HEC2 RELEASE DATED SEP 88 UPDATED APR 1989

ERROR CORR - 01,02
 MODIFICATION -

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

100-YEAR FREQUENCY EX. C
 SUMMARY PRINTOUT TABLE 150

SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIS	EG	10*KS	VCH	AREA	.01K
1.000	.00	.00	.00	6893.00	1482.00	6895.01	.00	6895.36	101.34	5.62	363.62	147.22

*	2.000	367.00	.00	.00	6898.00	1482.00	6900.17	6900.17	6900.78	137.58	6.50	256.72	126.35
	3.000	525.00	.00	.00	6904.00	1482.00	6907.00	6906.98	6907.92	131.01	7.71	197.41	129.48
*	4.000	571.00	.00	.00	6914.00	1482.00	6918.85	6918.85	6919.51	84.04	8.46	322.19	161.66
*	5.000	551.00	.00	.00	6924.00	1482.00	6928.41	6928.41	6929.39	77.46	8.45	225.25	168.39
*	6.000	600.00	.00	.00	6933.80	1450.00	6936.77	6936.77	6937.76	187.18	8.56	184.32	105.98
*	7.000	390.00	.00	.00	6942.00	1450.00	6946.87	6946.87	6947.76	74.98	7.83	238.36	167.45
*	8.000	475.00	.00	.00	6950.00	1450.00	6955.02	6955.02	6956.13	100.31	8.63	192.84	144.78
*	9.000	600.00	.00	.00	6964.00	1450.00	6967.28	6967.28	6968.43	138.82	9.57	182.57	123.07

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4/14/ 3 13: 5:15

PAGE 6

100-YEAR FREQUENCY EX. C

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	1.000	1482.00	6895.01	.00	.00	.01	358.18	.00
*	2.000	1482.00	6900.17	.00	5.16	.00	223.39	367.00
	3.000	1482.00	6907.00	.00	6.83	.00	109.52	525.00
*	4.000	1482.00	6918.85	.00	11.85	.00	262.89	571.00
*	5.000	1482.00	6928.41	.00	9.56	.00	156.96	551.00
*	6.000	1450.00	6936.77	.00	8.35	.00	100.01	600.00
*	7.000	1450.00	6946.87	.00	10.10	.00	205.26	390.00
*	8.000	1450.00	6955.02	.00	8.15	.00	117.72	475.00
*	9.000	1450.00	6967.28	.00	12.26	.00	82.77	600.00

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4/14/ 3 13: 5:15

PAGE 7

SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO= 2.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 2.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 4.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 4.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 4.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 5.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 5.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 5.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 6.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 6.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 7.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 7.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 8.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 8.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 8.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 9.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 9.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY