



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



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

DEVELOPER'S CERTIFICATION

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

By: _____

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.

Jennifer Irvine, P.E.
County Engineer/ECM Administrator

Date

Conditions:

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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.

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%, bottom width of 38', 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.

Provide channel design attributes. Table similar to Falcon Meadows at Bent Grass Channel Design Report UDFCD Table 8-3 is preferred.

Address low-flow channel

POST PROJECT (PROPOSED) CONDITION:

Description of Improvements:

The Falcon Meadows at Bent Development includes residential subdivisions, along the east and west sides of Meadows site, there are 3 additional parcels of land, which remaining entirety of the channel north of Woodmen Road, regrade the existing channel from a natural channel to riprap structures. The proposed earthen channel is shown on sheets 100 feet deep with 4:1 side slopes and lined with native grass see the Falcon Meadows development, was shifted to the east, for future development, and not leaving "slivers" of unusable

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.

Table 8-3. Design parameters for naturalized channels

| Design Parameter | Design Value |
|---|---|
| Maximum 100-year depth outside of bankfull channel | 5 ft |
| Roughness values | Per Table 8-5 |
| Maximum 5-year velocity, main channel (within bankfull channel width) (ft/s) | 5 ft/s |
| Maximum 100-year velocity, main channel (within bankfull channel width) (ft/s) | 7 ft/s |
| Froude No., 5-year, main channel (within bankfull channel width) | 0.7 |
| Froude No., 100-year, main channel (within bankfull channel width) | 0.8 |
| Maximum shear stress, 100-year, main channel (within bankfull channel width) | 1.2 lb/sf |
| Minimum bankfull capacity of bankfull channel (based on future development conditions) | 70% of 2-year discharge or 10% of 100-yr discharge, whichever is greater ¹ |
| Minimum bankfull channel geometry | Per Table 8-2 |
| Minimum bankfull channel width/depth ratio (Equation 8-3) | 9 |
| Minimum entrenchment ratio (Equation 8-4) | 3 |
| Maximum longitudinal slope of low flow channel (assuming unlined, unvegetated low flow channel) | 0.2 percent |
| Bankfull channel sinuosity (Equation 8-5) | 1.1 to 1.3 |
| Maximum overbank side slope | 4(H):1(V) |
| Maximum bankfull side slope | 2.5(H):1(V) |
| Minimum radius of curvature | 2.5 times top width |

¹Roughly equivalent to a 1.5-year event based on extrapolation of regional data.

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, running parallel to the proposed channel, located along the top bank.


roads (one on each side) 

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:

$$\text{Drainage: } \$29,622 \times 23.45 \text{ Imp. Acres} = \underline{\$694,635.90}$$

$$\text{Bridge: } \$4,069 \times 23.45 \text{ Imp. Acres} = \underline{\$95,418.05}$$

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:

$$21.39 \text{ acres} \times 26.78\% = 5.73 \text{ Impervious Acres}$$

Therefore, the drainage and bridge fees are:

$$\text{Drainage: } \$31,885 \times 5.73 \text{ Imp. Acres} = \underline{\$182,701.05}$$

$$\text{Bridge: } \$4,380 \times 5.73 \text{ Imp. Acres} = \underline{\$25,097.40}$$

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

The *Falcon Meadows at Bent Grass Filing No. 2 subdivision* has a total area of 21.37 acres. The tracts account for a total of 2.77 acres, 108 residential lots are 11.48 acres and 7.12 acres of right-of-way. The following calculations for the imperviousness of this development have been computed as follows:

$$21.37 \text{ acres} \times 56.5\% = 12.08 \text{ Impervious Acres}$$

Therefore, the drainage and bridge fees are:

$$\text{Drainage: } \$31,885 \times 12.08 \text{ Imp. Acres} = \underline{\$385,170.80}$$

$$\text{Bridge: } \$4,380 \times 12.08 \text{ Imp. Acres} = \underline{\$52,910.40}$$

The *Falcon Meadows at Bent Grass Filing No. 3* subdivision has a total area of 12.76 acres. The tracts account for a total of 0.66 acres, 49 residential lots are 9.50 acres and 2.60 acres of right-of-way. The following calculations for the imperviousness of this development have been computed as follows:

$$12.76 \text{ acres} \times 38.0\% = 4.85 \text{ Impervious Acres}$$

Therefore, the drainage and bridge fees are:

Drainage: \$31,885 x 4.85 Imp. Acres = \$54,643.00

Bridge: \$4,380 x 4.85 Imp. Acres = \$21,243.00

154

The *Falcon Meadows at Bent Grass Filing No. 4* subdivision has a total area of 14.68 acres. The tracts account for a total of 8.20 acres, 39 residential lots are 5.44 acres and 1.04 acres of right-of-way. The following calculations for the imperviousness of this development have been computed as follows:

$$14.68 \text{ acres} \times 19.29\% = 2.83 \text{ Impervious Acres}$$

Therefore, the drainage and bridge fees are:

Drainage: \$31,885 x 2.83 Imp. Acres = \$90,234.55

Bridge: \$4,380 x 2.83 Imp. Acres = \$12,395.40

Please see the drainage basin fee calculation table at end of section.

Phases 1 through 5 of the proposed channel project lie 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.

Anticipated and historic fees in the area of these proposed Falcon Basin West Tributary Channel Improvements are summarized below:

| <u>Area Filings</u> | <u>Basin Fees Paid or Deferred, or Reconciled by Project</u> |
|---|---|
| Falcon Meadows at Bent Grass Filing No. 1 | \$182,701.05 Deferred with Drainage Fee Pre-credit for the Channel Improvements (\$0.00 Confirmed Paid to County as part of the plat) |
| Bent Grass Residential Sub. Filing No. 2 | \$489,284.78 Reconciled with construction of Pond WU (\$489,284.78 Confirmed Paid to Contractor for construction of Pond WU). \$790,035.95 Deferred with Drainage Fee Pre-credit of \$694,635.90 and Bridge Fee Pre-credit of \$95,418.05 |

An opinion of probable construction cost was completed for Phase 1 through Phase 5 of the proposed improvements (Combined phases totaling roughly 3100 LF of channel improvements). Unit costs developed with the County, regional sources and recently completed similar projects were used.

Projected Construction Costs:

| Engineer's Estimate of Probable Construction Costs | | | | |
|--|----------|------|-----------|----------------------|
| Falcon Meadows at Bent Grass Channel Improvements | | | | |
| Phase 1 Public Reimbursable | | | | |
| Item | Quantity | Unit | Unit Cost | Cost |
| Drainage Chan. Const. (38' x 5') | 700 | LF | \$ 278.15 | \$194,705.00 |
| Phase 2 Public Reimbursable | | | | |
| Item | Quantity | Unit | Unit Cost | Cost |
| Drainage Chan. Const. (38' x 5') | 950 | LF | \$ 278.15 | \$264,242.50 |
| Phase 3 Public Reimbursable | | | | |
| Item | Quantity | Unit | Unit Cost | Cost |
| Drainage Chan. Const. (38' x 5') | 650 | LF | \$ 278.15 | \$180,797.50 |
| Phase 4 Public Reimbursable | | | | |
| Item | Quantity | Unit | Unit Cost | Cost |
| Drainage Chan. Const. (38' x 5') | 210 | LF | \$ 278.15 | \$58,411.50 |
| Phase 5 Public Reimbursable | | | | |
| Item | Quantity | Unit | Unit Cost | Cost |
| Drainage Chan. Const. (38' x 5') | 590 | LF | \$ 278.15 | \$164,108.50 |
| Subtotal | | | | \$ 862,265.00 |
| Total (Private) | | | | \$ 862,265.00 |
| Contingency | | | 10% | \$ 86,226.50 |
| Grand Total (Private) | | | | \$ 948,491.50 |

These cost values do not include permitting, engineering, construction administration/ management, wetlands mitigation, right-of-way acquisition or other "non-construction" costs.

Summary

- Available Cost Credit for Falcon Basin West Tributary Channel Improvements Per **2021** DBPS: \$593,015.80
- Total Estimated Cost of Channel Improvements: \$948,491.50
- Estimated Future Plat Fee Costs for *Falcon Meadows at Bent Grass Filing Nos. 2, 3, and 4*: \$616,597.15
- Plat Fees **Previously Collected** (Falcon Meadows at Bent Grass Filing No. 1): \$182,701.05 Drainage Pre-credit
- Plat Fees **Previously Collected** (Bent Grass Residential Subdivision Filing No. 2): \$790,035.95 Drainage and Bridge Pre-credits
- Construction of Pond WU: \$489,284.78
- Estimated Channel Construction Costs: \$948,491.50
- Estimated Channel Construction Costs less Estimated Drainage and Bridge Fee Costs for *Falcon Meadows at Bent Grass Filing Nos. 2, 3, and 4*: \$331,894.35 (Excess Credit)

2013/2015

keep drainage and bridge fees separate

offset

The above information demonstrates that the proposed channel improvement costs along with Pond WU construction costs, should be more than adequate to defer the Falcon Basin fees for *Falcon Meadows at Bent Grass Filing Nos. 1, 2, 3, & 4* and *Bent Grass Residential Subdivision Filing No. 2*. Falcon Meadows at Bent Grass Channel Improvements will give an excess credit in the amount of \$331,894.35 as described in the tables at the end of this section.

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

--

| Bent Grass Residential Subdivision Filing No. 2 | | | | | | |
|--|-----------------------|------------------|--------------|---------------------------|---------------------|---------------------|
| Final Drainage Report | | | | | | |
| 2019 Original Drainage and Bridge Fees | | | | | | |
| | Impervious Area (Ac.) | Fee/Platted Acre | Fee Due | Reimbursable Const. Costs | Fee Due at Platting | Drainage Fee Credit |
| Falcon Drainage Fee Basin | | | | | | |
| Drainage Fee | 23.45 | \$29,622 | \$694,635.90 | \$489,284.78 | \$205,351.12 | \$0.00 |
| Bridge Fee | 23.45 | \$4,069 | \$95,418.05 | \$0.00 | \$95,418.05 | \$0.00 |
| | | | | \$489,284.78 | \$300,769.17 | \$0.00 |

| Falcon Meadows at Bent Grass Filing No. 1 | | | | | | |
|--|-----------------------|------------------|--------------|---------------------------|---------------------|---------------------|
| Final Drainage Report | | | | | | |
| 2021 Original Drainage and Bridge Fees | | | | | | |
| | Impervious Area (Ac.) | Fee/Platted Acre | Fee Due | Reimbursable Const. Costs | Fee Due at Platting | Drainage Fee Credit |
| Falcon Drainage Fee Basin | | | | | | |
| Drainage Fee | 5.73 | \$31,885 | \$182,701.05 | \$948,491.50 | \$0.00 | \$765,790.45 |
| Bridge Fee | 5.73 | \$4,380 | \$25,097.40 | \$0.00 | \$0.00 | \$740,693.05 |
| | | | | \$948,491.50 | \$0.00 | \$740,693.05 |

| Falcon Meadows at Bent Grass Filing No. 2 | | | | | | |
|--|-----------------------|------------------|--------------|---------------------------|---------------------|---------------------|
| Final Drainage Report | | | | | | |
| 2021 Original Drainage and Bridge Fees | | | | | | |
| | Impervious Area (Ac.) | Fee/Platted Acre | Fee Due | Reimbursable Const. Costs | Fee Due at Platting | Drainage Fee Credit |
| Falcon Drainage Fee Basin | | | | | | |
| Drainage Fee | 9.60 | \$31,885 | \$306,096.00 | \$0.00 | \$0.00 | \$434,597.05 |
| Bridge Fee | 9.60 | \$4,380 | \$42,048.00 | \$0.00 | \$0.00 | \$392,549.05 |
| | | | | \$0.00 | \$0.00 | \$392,549.05 |

Bridge fees need to be paid unless the culverts have been approved by drainage board and bridge fees adjusted

pre-

| Falcon Meadows at Bent Grass Filing No. 3 | | | | | | |
|---|-----------------------|------------------|-------------|---------------------------|---------------------|---------------------|
| Final Drainage Report | | | | | | |
| 2021 Original Drainage and Bridge Fees | | | | | | |
| | Impervious Area (Ac.) | Fee/Platted Acre | Fee Due | Reimbursable Const. Costs | Fee Due at Platting | Drainage Fee Credit |
| Falcon Drainage Fee Basin | | | | | | |
| Drainage Fee | 4.85 | \$31,885 | \$54,643.00 | \$0.00 | \$0.00 | \$337,906.05 |
| Bridge Fee | 4.85 | \$4,380 | \$21,243.00 | \$0.00 | \$0.00 | \$316,663.05 |
| | | | | \$0.00 | \$0.00 | \$316,663.05 |

| Falcon Meadows at Bent Grass Filing No. 4 | | | | | | |
|---|-----------------------|------------------|-------------|---------------------------|---------------------|---------------------|
| Final Drainage Report | | | | | | |
| 2021 Original Drainage and Bridge Fees | | | | | | |
| | Impervious Area (Ac.) | Fee/Platted Acre | Fee Due | Reimbursable Const. Costs | Fee Due at Platting | Drainage Fee Credit |
| Falcon Drainage Fee Basin | | | | | | |
| Drainage Fee | 2.83 | \$31,885 | \$90,234.55 | \$0.00 | \$0.00 | \$226,428.50 |
| Bridge Fee | 2.83 | \$4,380 | \$12,395.40 | \$0.00 | \$0.00 | \$214,033.10 |
| | | | | \$0.00 | \$0.00 | \$214,033.10 |

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 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. Detention 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 proposed development will not have any adverse impacts on downstream developments or existing drainageways.

Add conclusions about the proposed channel design

water quality

upon County acceptance

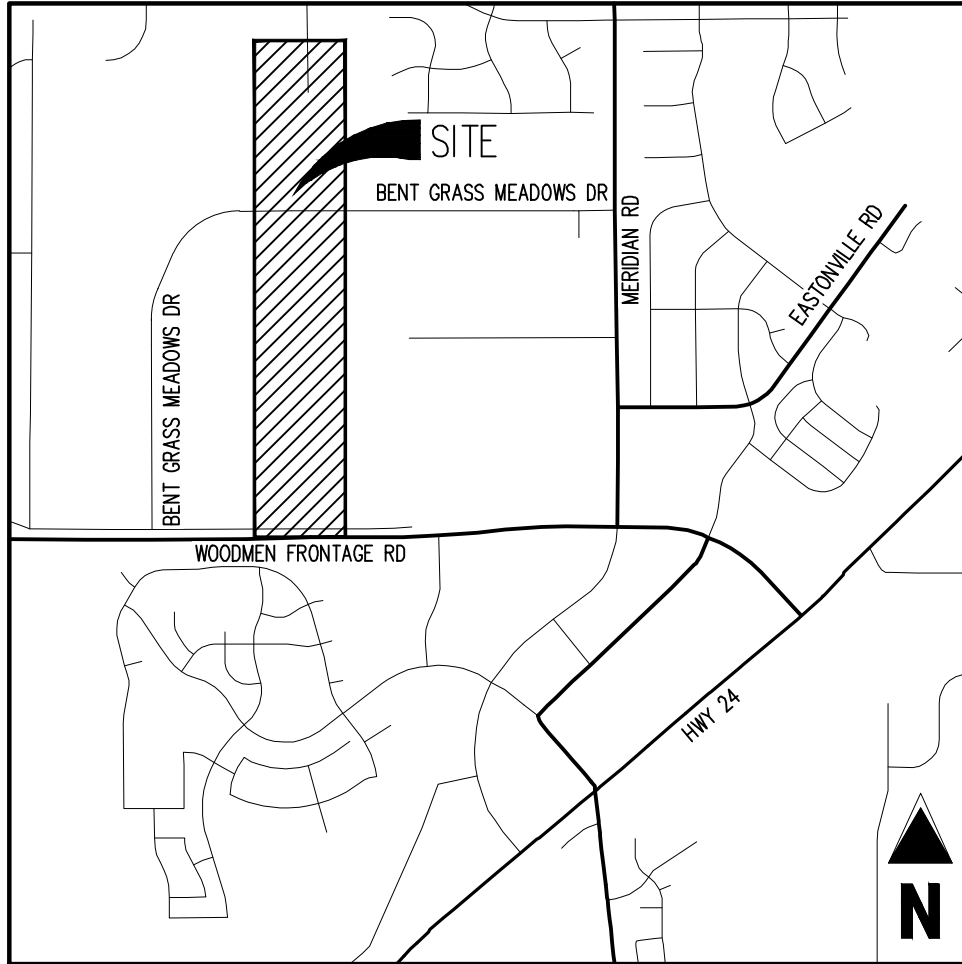
2013/2015



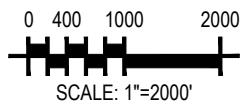
X. References

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 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.

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.

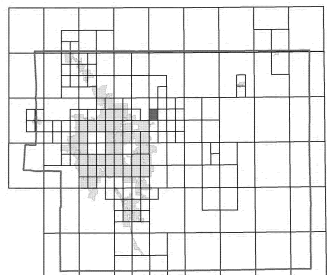
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which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

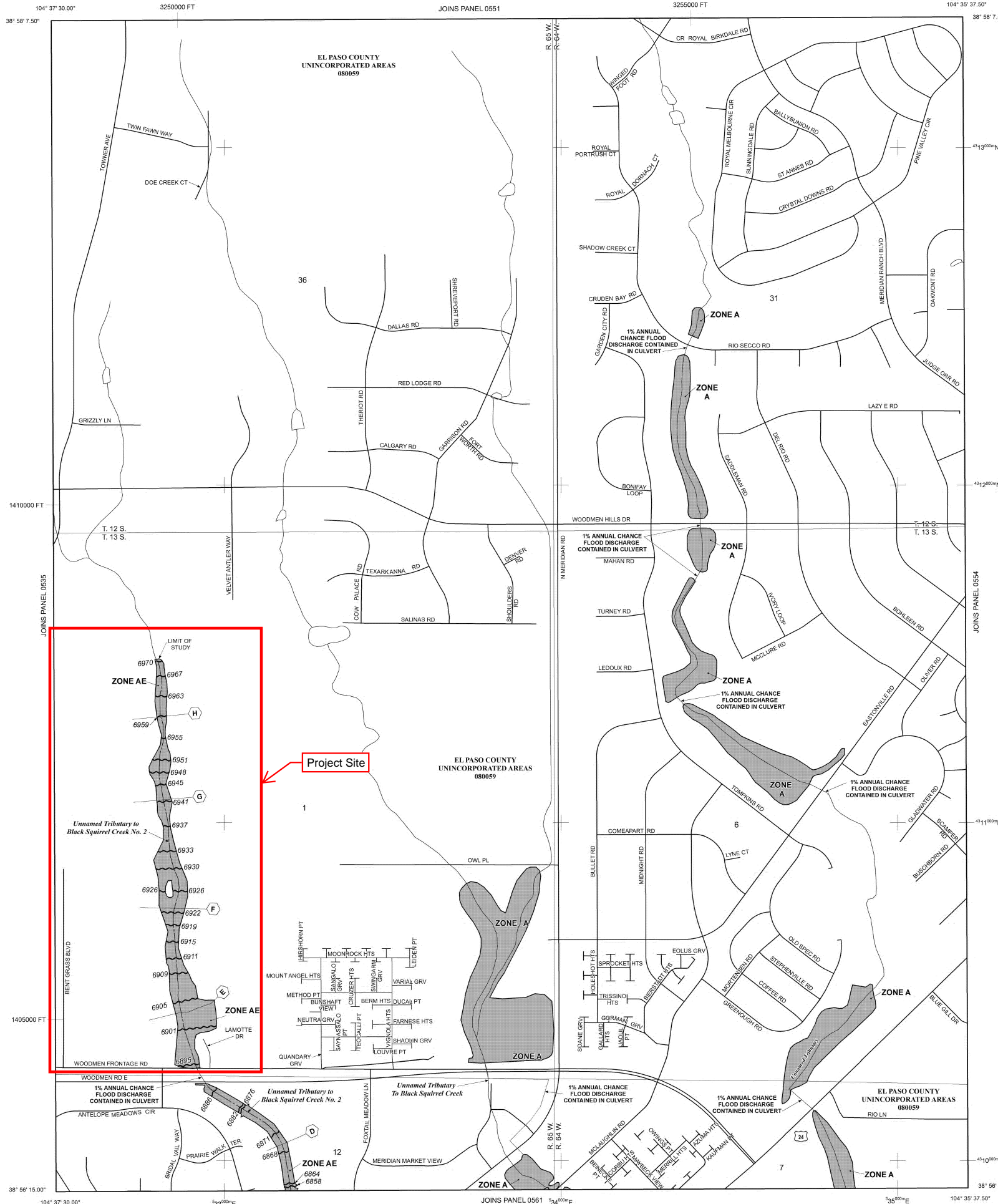
Panel Location Map



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.
- 513 Base Flood Elevation line and value; elevation in feet* (EL 513)
- Base Flood Elevation value where uniform within zone; elevation in feet*

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

A A Cross section line

23 23 Transsect line

67° 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, X Bench mark (see explanation in Notes to Users section of this FIRM panel)

M1.5 River Mile

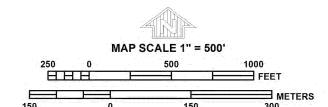
MAP REPOSITORIES Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF 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.



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 | 080059 | 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:



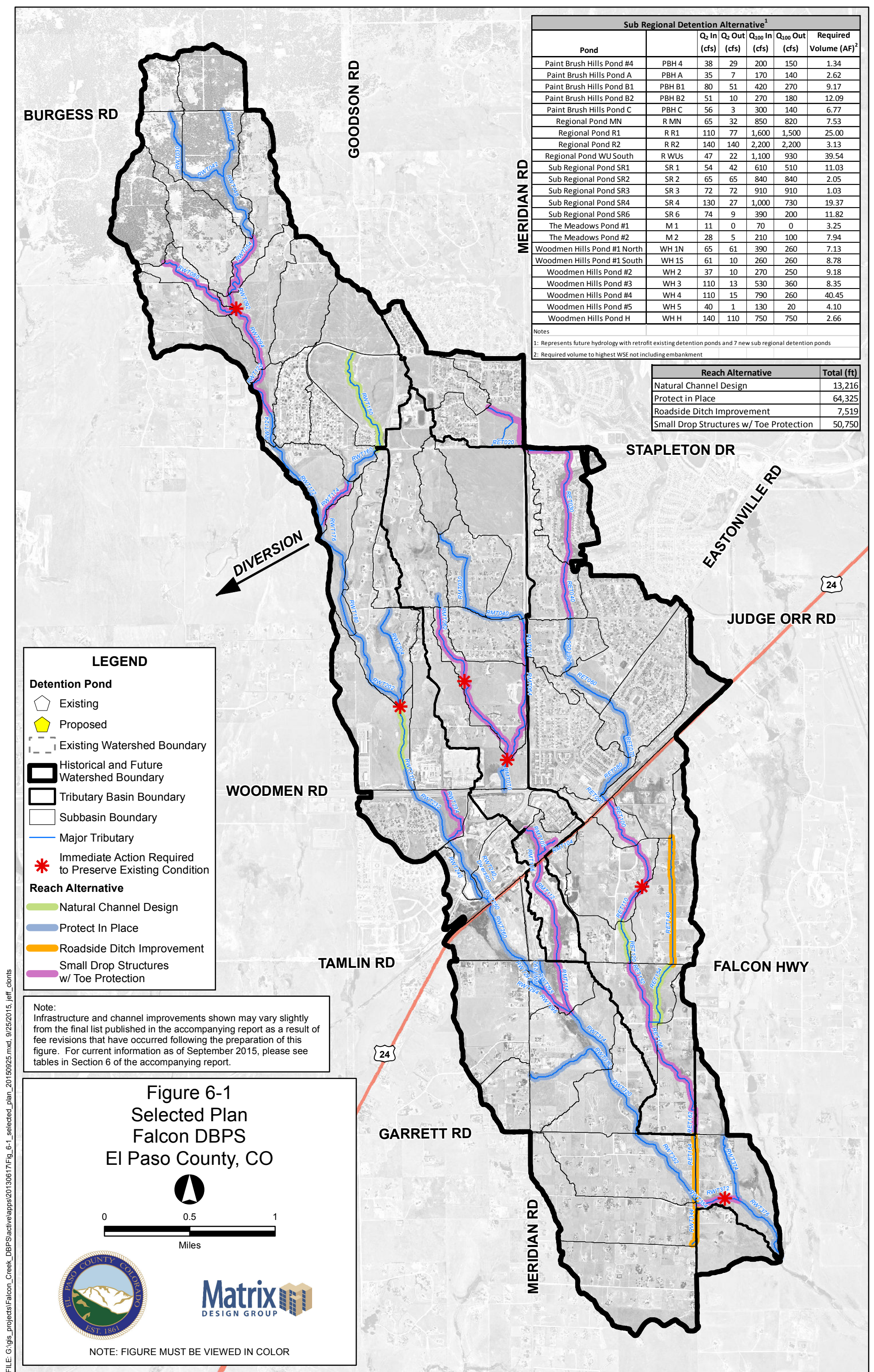
El Paso County Public Services Department
3275 Akers Drive
Colorado Springs, CO 80922

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 |

| 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 |

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

LEGEND

Detention Pond
 Existing (pentagon symbol)
 Proposed (yellow pentagon symbol)

Existing Watershed Boundary (dashed line)
 Historical and Future Watershed Boundary (thick black line)
 Tributary Basin Boundary (thin black line)
 Subbasin Boundary (thin grey line)

Major Tributary (blue line)
 Immediate Action Required to Preserve Existing Condition (red asterisk symbol)

Reach Alternative
 Natural Channel Design (green line)
 Protect In Place (blue line)
 Roadside Ditch Improvement (orange line)
 Small Drop Structures w/ Toe Protection (purple line)

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

Better version available

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Sheet 6-10

Falcon DBPS

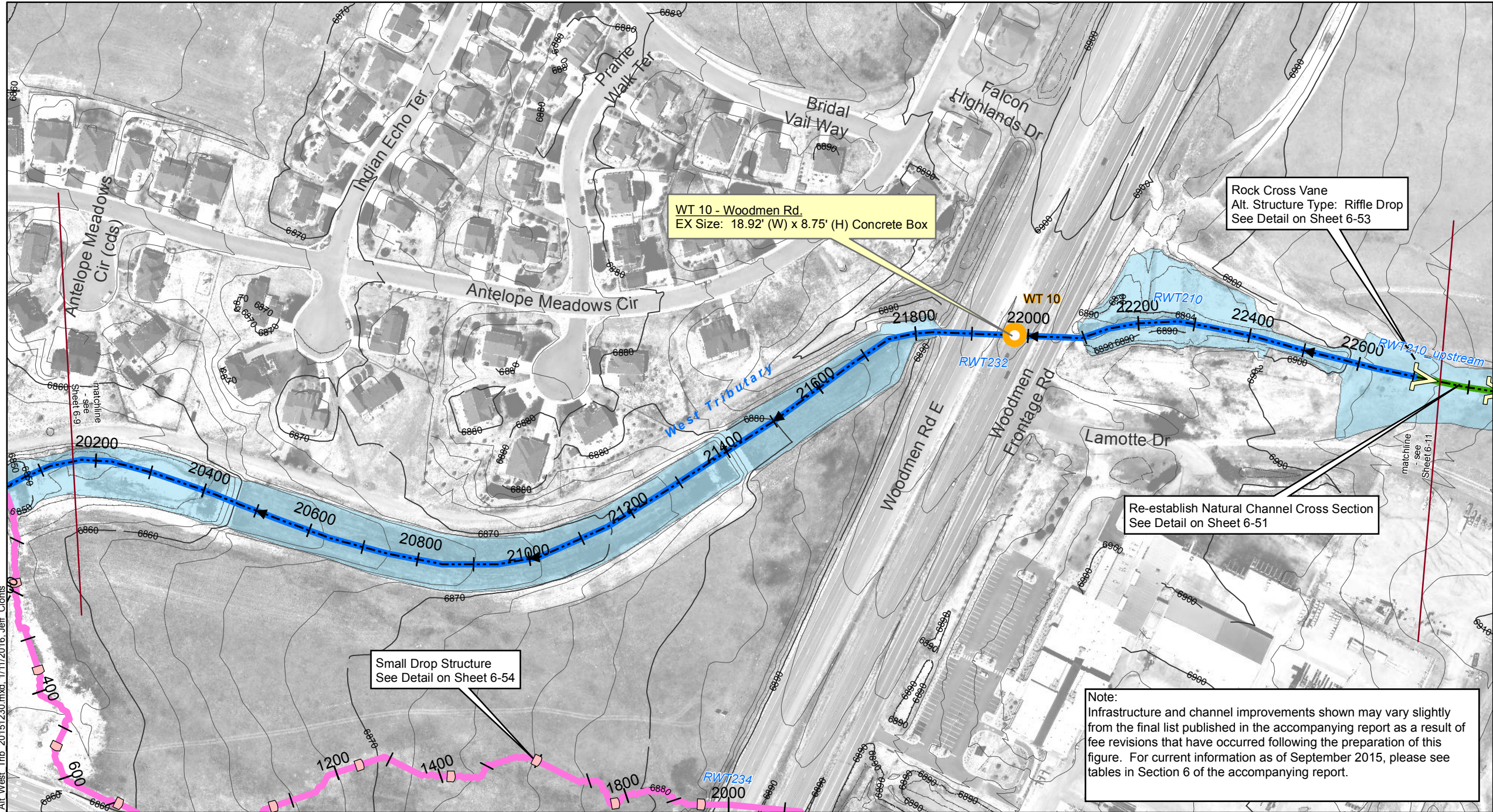
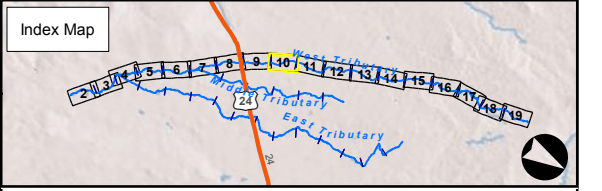
Conceptual Plan

West Tributary

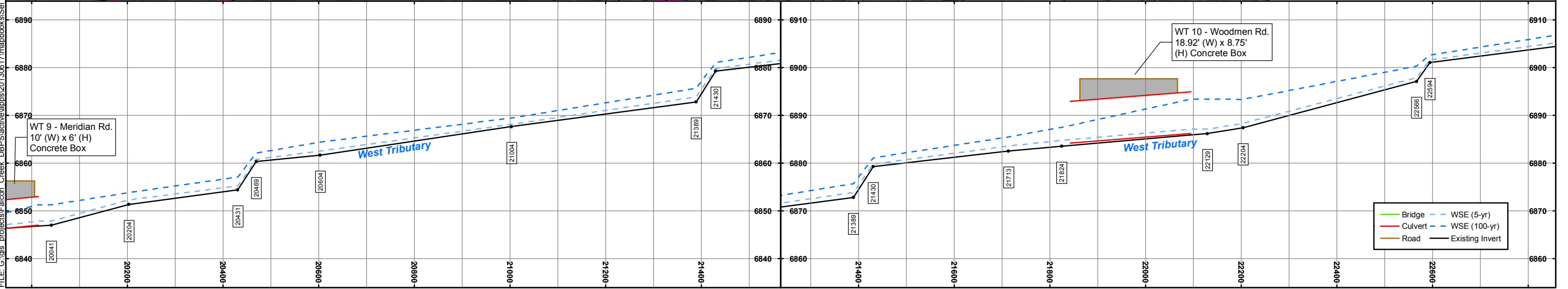
El Paso County, CO

- 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

* 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.



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.



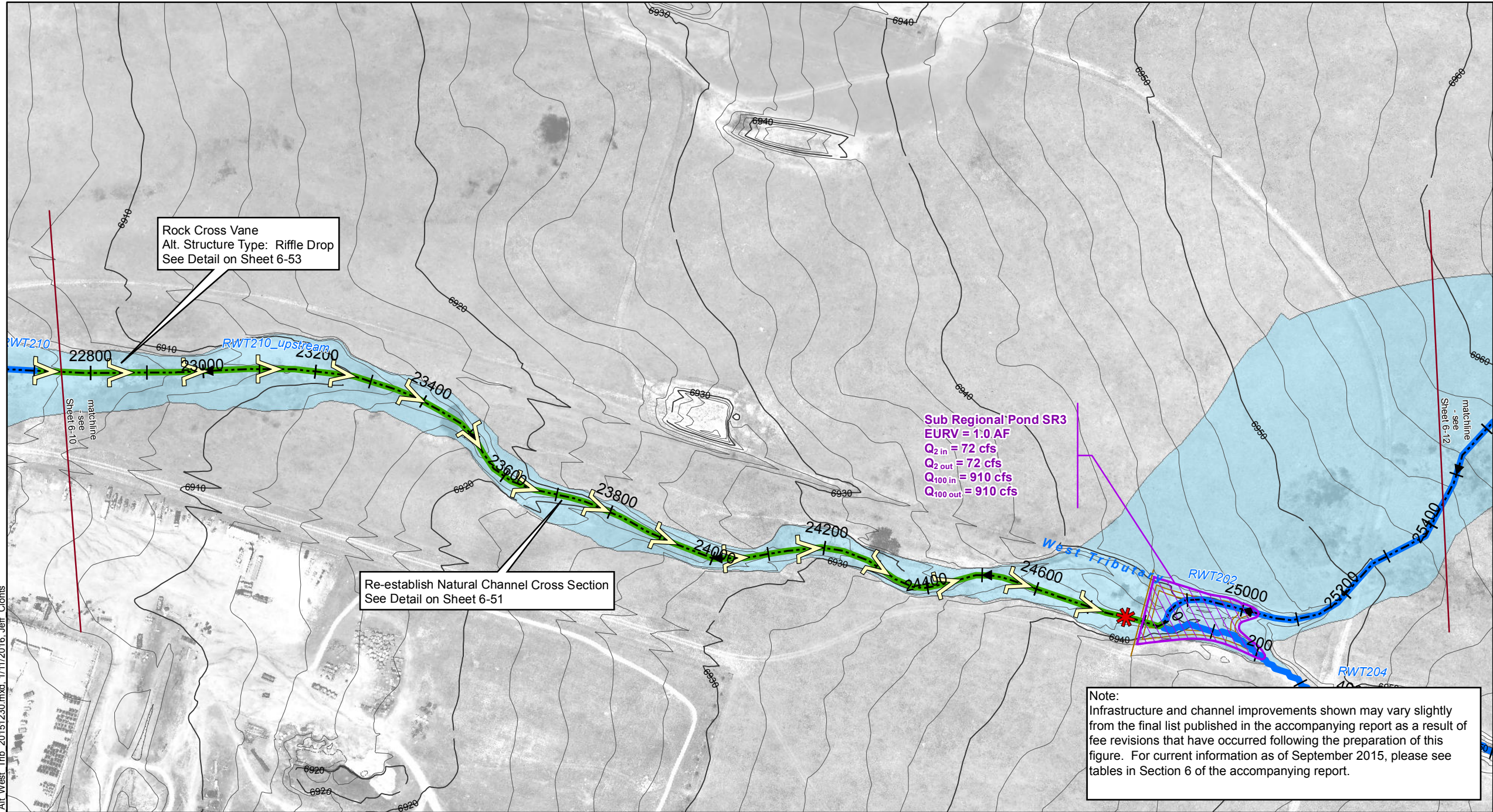
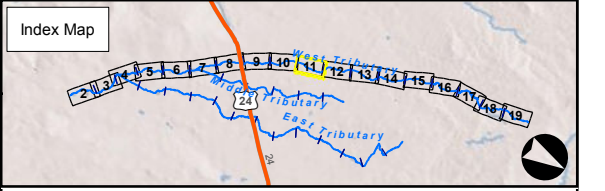
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Sheet 6-11
Falcon DBPS
Conceptual Plan
West Tributary
El Paso County, CO

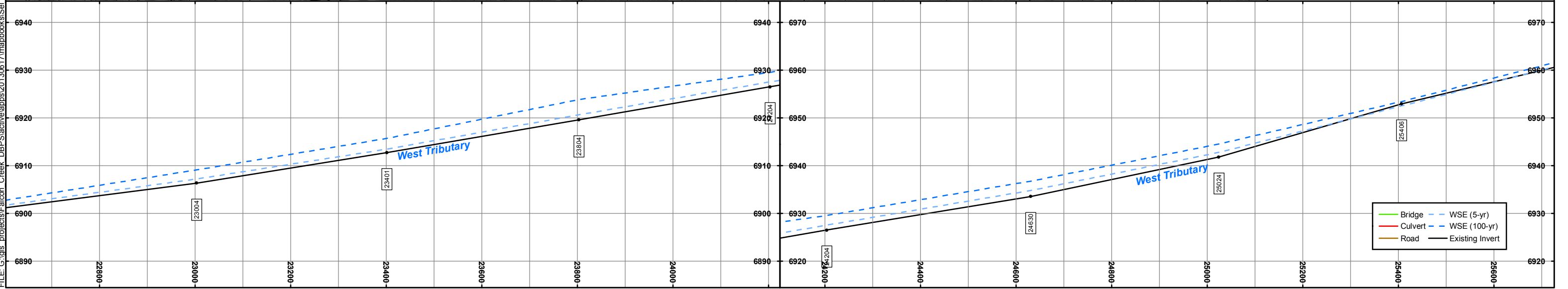
- | | |
|---|--|
| Drainageway Crossing | Reach Improvements |
| Stream Centerline | Natural Channel Design |
| Existing Approximate 100-yr Floodplain* | Protect In Place |
| Floodplain Study Limit | Roadside Ditch Improvement |
| Storm Sewer | Small Drop Structures w/ Toe Protection |
| Inlet | Existing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

0 100 200 Feet

* 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.



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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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

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 remaining segments. **2.55 was assumed and used in the calculations** using only the larger sized boulders throughout the entire structure. Mistakes during construction are more common when specifying multiple rock sizes within the same structure.

Table 9-4. Boulder sizes for various rock sizing parameters

| Rock Sizing Parameter, R_p | Grouted Boulders ¹ |
|------------------------------|-------------------------------------|
| | Boulder Classification ² |
| Less than 5.00 | B24 |
| 5.00 to 5.59 | B24 |
| 5.60 to 6.99 | B36 |
| 7.00 to 8.00 | B48 |

¹ Grouted to no less than $\frac{1}{3}$ the height (+1" / - 0"), no more than $\frac{1}{2}$ (+0" / - 1") of boulder height.

² See *Open Channels* chapter.

Grout

Grout all boulders to a depth of one-half their height through the approach, sloping face, and basin areas. Grout should extend near full depth of the rock at the upstream crest and around the perimeter of the structure where it is adjoining the earth in order to provide stability of the approach channel. See Figure 9-15 for grout placement and material specifications.

Edge Wall

Construct a wall that extends roughly 3 feet below the top surface of the structure around the entire perimeter of the GSB drop structure. See Figure 9-22 for an edge wall detail. An edge wall is especially necessary for structures designed to convey less than the 100-year flow but is also beneficial for structures that do span the 100-year flow. In addition, use buried riprap around the perimeter of the structure when this is the case. The transition between soil and the grouted boulders can become a problem if not properly addressed during design and construction. Ensure compaction around the perimeter of the structure and grade this area higher than the structure to promote sheet flow onto the structure.

Additional Design Guidance

Grouted boulders must cover the crest and cutoff and extend downstream through the stilling basin (when applicable), or through the embedded toe of the drop structure when a stilling basin is not included. Place boulders to create a stepped appearance, which helps to increase roughness. Additional information regarding riprap and boulders is in the *Open Channels* chapter.

2.6.4 Construction Guidance

Grouted boulder drop structures require significant construction oversight. During placement of the rock and construction in general, disturb the subgrade as little as possible to reduce the potential for piping under the structure. Good subgrade preparation, careful rock placement, and removal of loose materials will reduce potential piping. Do not place granular bedding (or subgrade fill using granular materials) between subgrade and the boulders. This can cause piping. Place boulders directly on undisturbed subgrade where possible. Where the design requires over excavation and/or fill or where wet or poor subgrade exists onsite, ensure proper density and compaction. See Division 31 specifications available at www.udfcd.org. When fill is required, it is best to fill and compact to a set elevation (or sloped surface)

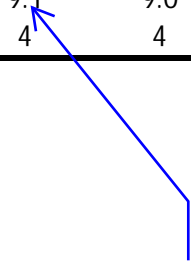
Riprap Calculations for Outter Banks of Channel Bends

| Curve Number (From Survey Control Plan) | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 |
|--|---------|---------|---------|---------|---------|---------|----------|----------|----------|
| US Station | Offsite | 5+54.98 | 6+26.74 | 3+24.69 | 4+71.46 | 8+76.24 | 13+12.21 | 22+49.81 | 23+63.16 |
| HEC-RAS Section | 5072 | 4402 | 4302 | 3684 | 3580 | 3193 | 2725 | 1700 | 1600 |
| Centerline Radius (ft) | 130 | 500 | 160 | 500 | 1000 | 300 | 250 | 200 | 150 |
| Top Width (ft) | 50.28 | 74.13 | 72.66 | 71.62 | 72.97 | 74.7 | 76.86 | 105.73 | 162.09 |
| Channel Slope (%) | 0.35 | 0.30 | 0.30 | 0.61 | 0.61 | 0.37 | 0.30 | 0.10 | 0.10 |
| Mean Velocity (fps) | 8.64 | 5.73 | 6.06 | 6.45 | 6.11 | 5.73 | 5.31 | 6.44 | 5.35 |
| Adjusted Velocity = V_a (fps) * | 15.5 | 6.8 | 11.2 | 7.4 | 1.0 | 9.1 | 9.0 | 12.2 | 10.9 |
| D50 (in) ** | 12 | 2 | 6 | 3 | 0 | 4 | 4 | 5 | 4 |

* 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

How do these velocities compare to the model?



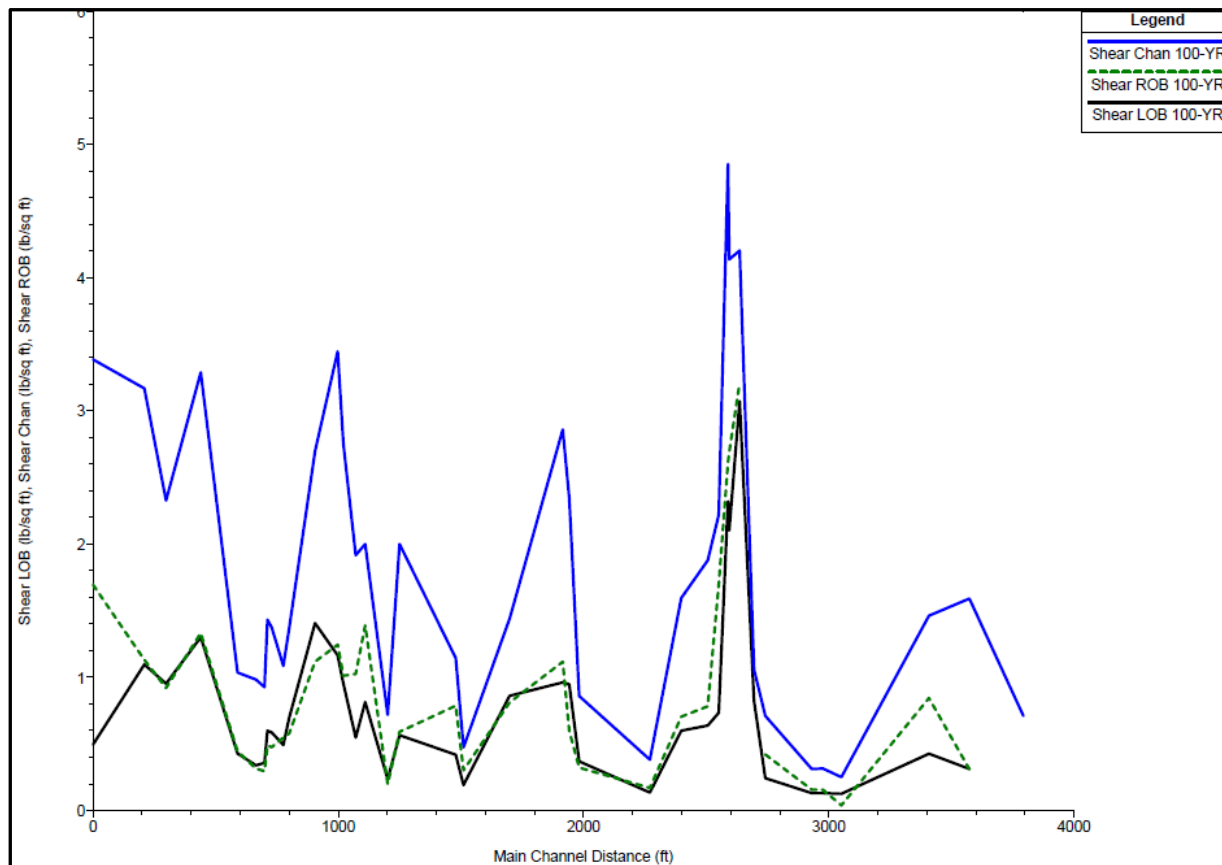


Figure 8-32. Example HEC-RAS general profile plot of shear stress

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.

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

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)

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*

APPENDIX C
Allowable Rise Floodplain Permit

December 21, 2021

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 5.0.3. 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:

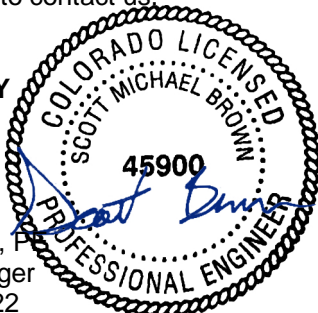
Based on the results depicted on Figure 1 and Table 1 the following conclusions are drawn:

1. The 100-year water surface elevations are generally lower from the corrected to the proposed condition.
2. The maximum increase of 0.5 is noted at Cross Section 4955 & 1900, 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



12/23/2021

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

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

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 [12/22/2021](#)
Project Manger
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 | 6973.7 | | -- | 0.0 |
| | 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 | 6964.0 | | -- | 0.0 |
| | N/A | 5056 | 5056 | | -- | 6964.0 | 6963.9 | | -- | 0.0 |
| | N/A | 5006 | 5006 | | -- | 6963.8 | 6963.8 | | -- | -0.1 |
| | N/A | 4955 | 4955 | | -- | 6962.7 | 6963.2 | | -- | 0.5 |
| | 4900 | 4900 | 4802 | | 6960.8 | 6960.8 | 6958.7 | | 0.0 | -2.1 |
| | 4850 | 4850 | 4752 | | 6959.6 | 6959.6 | 6958.5 | | 0.0 | -1.1 |
| | 4750 | 4750 | 4652 | | 6957.6 | 6957.6 | 6955.1 | | 0.0 | -2.5 |
| | 4650 | 4650 | 4551 | | 6955.7 | 6955.7 | 6949.9 | | 0.0 | -5.8 |
| | 4600 | 4600 | 4539 | | 6954.1 | 6954.2 | 6950.0 | | 0.0 | -4.1 |
| H | 4550 | 4550 | 4502 | 6955 | 6954.0 | 6954.1 | 6949.9 | -1.01 | 0.1 | -4.1 |
| | 4500 | 4500 | 4452 | | 6952.6 | 6952.8 | 6949.9 | | 0.2 | -2.9 |
| | 4400 | 4400 | 4352 | | 6950.9 | 6949.1 | 6949.4 | | -1.8 | 0.3 |
| | 4300 | 4300 | 4230 | | 6949.0 | 6948.3 | 6947.8 | | -0.7 | -0.5 |
| | 4250 | 4250 | 4214 | | 6948.0 | 6943.1 | 6943.1 | | -4.9 | 0.0 |
| | | 4212.47 | 4200 | | | 6943.7 | 6943.7 | | -- | 0.0 |
| | 4200 | 4200 | 4152 | | 6946.6 | 6943.6 | 6943.6 | | -3.0 | 0.0 |
| | | 4151.92 | 4118 | | | 6943.4 | 6943.4 | | -- | 0.0 |
| | 4150 | 4150 | 4102 | | 6946.1 | 6943.3 | 6943.3 | | -2.8 | 0.0 |
| | 4050 | 4010.56 | 4002 | | 6944.0 | 6939.9 | 6940.0 | | -4.1 | 0.0 |
| | | 4001.57 | 3980 | | | 6940.3 | 6940.0 | | -- | -0.3 |
| | 4000 | 4000 | 3950 | | 6942.8 | 6939.6 | 6939.5 | | -3.2 | -0.1 |
| | 3900 | 3900 | 3860 | | 6940.4 | 6939.4 | 6936.7 | | -1.0 | -2.6 |
| | 3850 | 3850 | 3821 | | 6939.4 | 6938.8 | 6936.3 | | -0.5 | -2.5 |
| | 3800 | 3800 | 3782 | | 6938.4 | 6938.0 | 6936.1 | | -0.4 | -1.8 |
| G | 3694 | 3694 | 3684 | 6936.8 | 6935.9 | 6935.5 | 6931.7 | -0.9 | -0.4 | -3.8 |
| | 3600 | 3600 | 3580 | | 6934.1 | 6934.1 | 6931.3 | | 0.0 | -2.8 |
| | 3500 | 3500 | 3475 | | 6933.1 | 6933.1 | 6930.5 | | 0.0 | -2.6 |
| | 3450 | 3450 | 3432 | | 6932.2 | 6932.0 | 6929.5 | | -0.2 | -2.4 |
| | 3350 | 3350 | 3359 | | 6930.3 | 6930.3 | 6926.4 | | 0.0 | -3.9 |

| 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 | 3294 | | 6929.5 | 6929.5 | 6926.2 | | 0.0 | -3.3 |
| | 3250 | 3250 | 3235 | | 6928.7 | 6928.7 | 6926.0 | | 0.0 | -2.7 |
| | 3200 | 3200 | 3193 | | 6927.9 | 6927.9 | 6925.7 | | 0.0 | -2.1 |
| | 3150 | 3150 | 3138 | | 6926.8 | 6926.8 | 6925.6 | | 0.0 | -1.2 |
| | 3100 | 3100 | 3100 | | 6925.7 | 6925.6 | 6924.9 | | -0.1 | -0.7 |
| | 3050 | 3050 | 3050 | | 6925.8 | 6925.6 | 6925.1 | | -0.2 | -0.5 |
| | 3000 | 3000 | 3000 | | 6924.9 | 6924.6 | 6924.5 | | -0.4 | -0.1 |
| | 2900 | 2900 | 2900 | | 6923.1 | 6923.1 | 6920.6 | | 0.0 | -2.5 |
| | 2800 | 2800 | 2800 | | 6921.9 | 6921.9 | 6919.9 | | 0.0 | -1.9 |
| | 2650 | 2650 | 2650 | | 6919.1 | 6919.2 | 6916.4 | | 0.1 | -2.8 |
| F | 2605 | 2605 | 2605 | 6918.9 | 6918.1 | 6918.1 | 6915.7 | -0.76 | 0.0 | -2.4 |
| | 2550 | 2550 | 2550 | | 6916.4 | 6916.6 | 6915.4 | | 0.2 | -1.2 |
| | 2500 | 2500 | 2470 | | 6915.6 | 6915.9 | 6915.2 | | 0.2 | -0.7 |
| | 2450 | 2450 | 2355 | | 6915.0 | 6915.0 | 6911.1 | | 0.0 | -3.9 |
| | 2400 | 2400 | 2353 | | 6913.8 | 6913.8 | 6911.1 | | 0.0 | -2.8 |
| | 2300 | 2300 | 2300 | | 6911.7 | 6911.7 | 6910.8 | | 0.0 | -0.8 |
| | 2200 | 2200 | 2205 | | 6909.6 | 6909.6 | 6910.0 | | 0.0 | 0.4 |
| | 2100 | 2100 | 2160 | | 6906.9 | 6906.9 | 6906.2 | | 0.0 | -0.7 |
| | 2000 | 2000 | 2100 | | 6906.0 | 6906.0 | 6905.7 | | 0.0 | -0.3 |
| | 1900 | 1900 | 2019 | | 6904.6 | 6904.6 | 6905.1 | | 0.0 | 0.45 |
| | 1800 | 1800 | 1800 | | 6903.2 | 6903.2 | 6901.2 | | 0.0 | -1.9 |
| | 1700 | 1700 | 1700 | | 6902.2 | 6902.2 | 6900.6 | | 0.0 | -1.6 |
| | 1600 | 1600 | 1600 | | 6900.9 | 6900.9 | 6899.9 | | 0.0 | -1.0 |
| E | 1517 | 1517 | 1517 | 6900.2 | 6899.0 | 6899.0 | 6899.3 | -1.18 | 0.0 | 0.3 |
| | 1450 | 1450 | 1450 | | 6898.9 | 6898.9 | 6898.8 | | 0.0 | -0.1 |
| | 1350 | 1350 | 1350 | | 6897.4 | 6897.4 | 6897.3 | | 0.0 | -0.1 |
| | 1300 | 1300 | 1300 | | 6893.6 | 6893.6 | 6893.6 | | 0.0 | 0.0 |
| | 1200 | 1200 | 1200 | | 6892.1 | 6892.1 | 6892.1 | | 0.0 | 0.0 |
| | 1150 | 1150 | 1150 | | 6890.9 | 6890.9 | 6890.9 | | 0.0 | 0.0 |
| | 1050 | 1050 | 1050 | | 6890.7 | 6890.7 | 6890.7 | | 0.0 | 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.

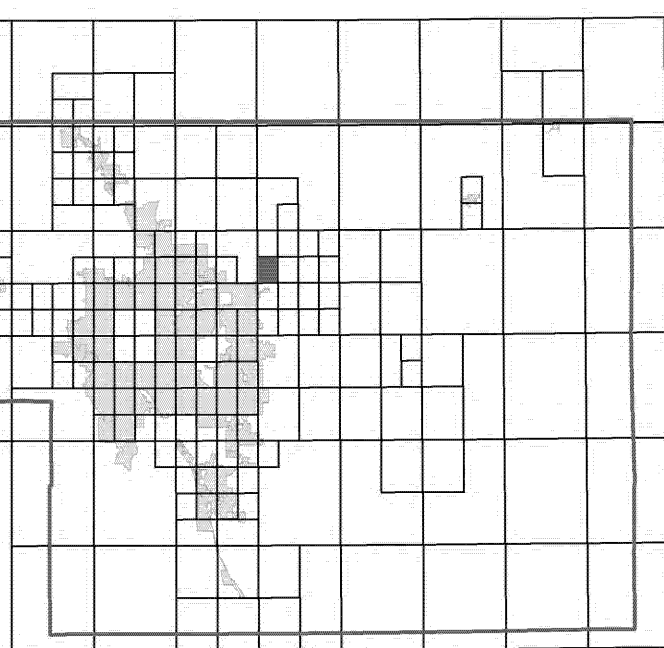
Contact **FEMA Map Service Center (MSC)** via the FEMA Map Information eXchange (FIMX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this 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>.

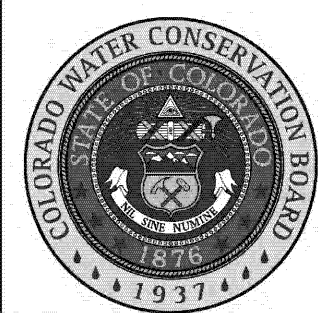
El Paso County Vertical Datum Offset Table

| 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 | |

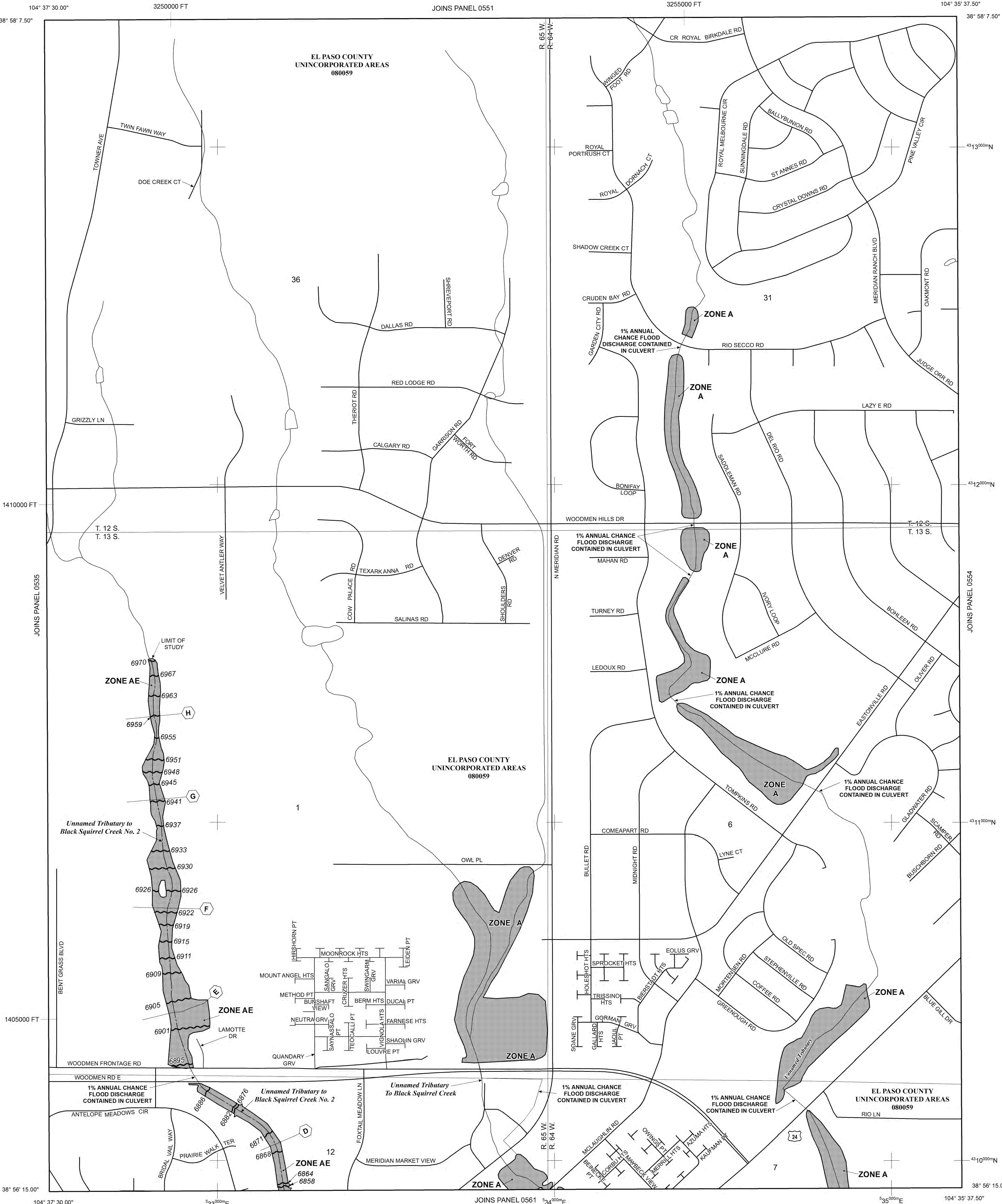
Panel Location Map



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.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS



PANEL 053G

FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY,
COLORADO
AND INCORPORATED AREAS

PANEL 553 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

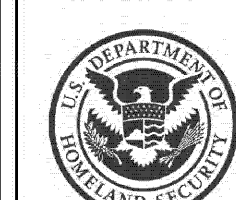
| CONTAINS: | COMMUNITY | NUMBER | PANEL | SUFFIX |
|-----------|----------------|--------|-------|--------|
| | EL PASO COUNTY | 080059 | 053G | 0 |

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

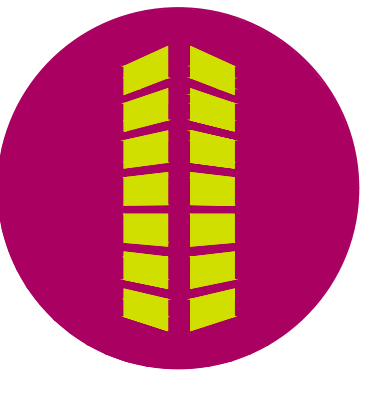
Federal Emergency Management Agency



ATTACHMENT D
Work Maps



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

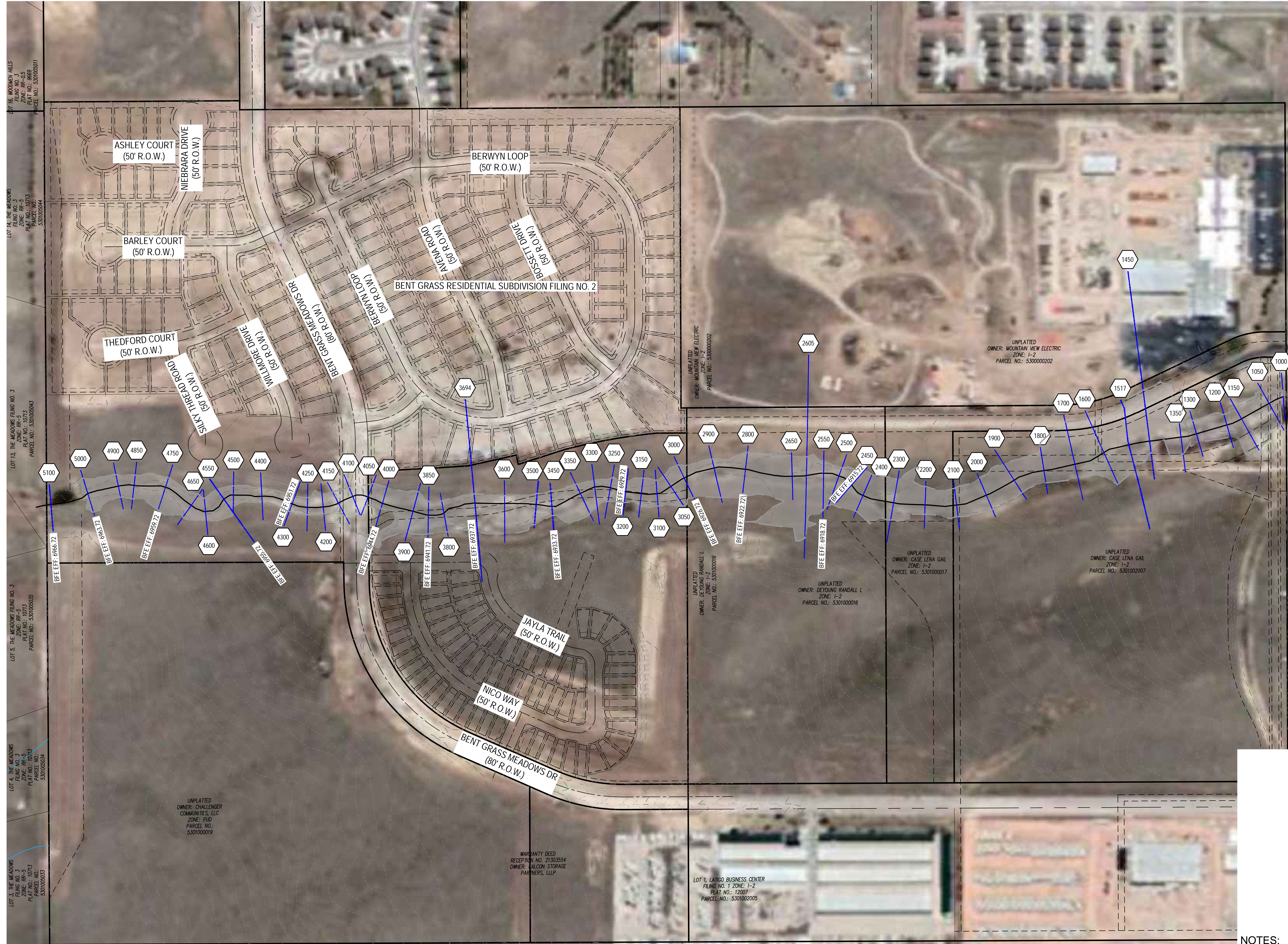
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Project No: CLH23
 Drawn By: SMB
 Checked By: SMB
 Date: 12/21/2021

CORRECTED EFFECTIVE WORK MAP

LEGEND

- 5284 EXISTING CONTOUR (MINOR)
- 5285 EXISTING CONTOUR (MAJOR)
- EFFECTIVE 100-YEAR FLOODPLAIN CROSS SECTION
- 33883 MODEL SECTION ID

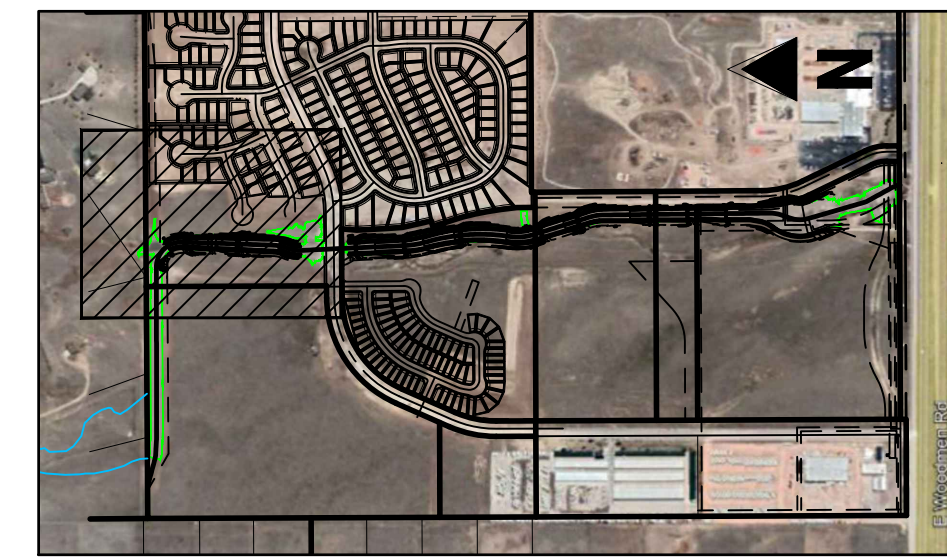


- NOTES:**
- EXISTING SURVEY DATA IS PER TOPOGRAPHIC SURVEY PERFORMED BY GALLOWAY & COMPANY, INC.
 - PROPOSED TOPOGRAPHY IS PER DESIGN BY GALLOWAY & COMPANY, INC., DECEMBER 2021.
 - ALL WATER SURFACE ELEVATIONS LISTED ARE BASED ON THE 1.0% ANNUAL CHANCE FLOOD UNLESS OTHERWISE NOTED.
 - THE HORIZONTAL COORDINATE SYSTEM IS THE NAD 83/92 AND STATE PLANE COORDINATE SYSTEM COLORADO NORTH ZONE.

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

| | | | | | | | |
|---|---|---|--|--|---|---|---|
| LOT 3, THE MEADOWS FILING NO. 2 ZONE: RR-5 PLAT NO.: S855 PARCEL NO.: 530201004 | LOT 2, THE MEADOWS FILING NO. 2 ZONE: RR-5 PLAT NO.: S855 PARCEL NO.: 530201005 | LOT 1, THE MEADOWS FILING NO. 2 ZONE: RR-5 PLAT NO.: S855 PARCEL NO.: 530201006 | LOT 11, THE MEADOWS FILING NO. 1 ZONE: RR-5 PLAT NO.: S746 PARCEL NO.: 530201007 | LOT 10, THE MEADOWS FILING NO. 1 ZONE: RR-5 PLAT NO.: S746 PARCEL NO.: 530201008 | LOT 9, THE MEADOWS FILING NO. 1 ZONE: RR-5 PLAT NO.: S746 PARCEL NO.: 530201009 | LOT 8, THE MEADOWS FILING NO. 1 ZONE: RR-5 PLAT NO.: S746 PARCEL NO.: 530201010 | LOT 7, THE MEADOWS FILING NO. 1 ZONE: RR-5 PLAT NO.: S746 PARCEL NO.: 530201011 |
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C:\workspace\new\mcd\mcd - 121808231 - Falcon Meadows at Bent Grass\0201011001 - 121808231 - Falcon Meadows at Bent Grass\0201011001.dwg, 12/21/2021, 1:00:00 PM



KEY MAP
 SCALE: 1" = 100'

- LEGEND**
- 5284 EXISTING CONTOUR (MINOR)
 - 5285 EXISTING CONTOUR (MAJOR)
 - 5284 PROPOSED CONTOUR (MINOR)
 - 5285 PROPOSED CONTOUR (MAJOR)
 - PROPOSED 100-YEAR FLOODPLAIN
 - CROSS SECTION BASED ON CITY LOMR
- 33883 MODEL SECTION ID

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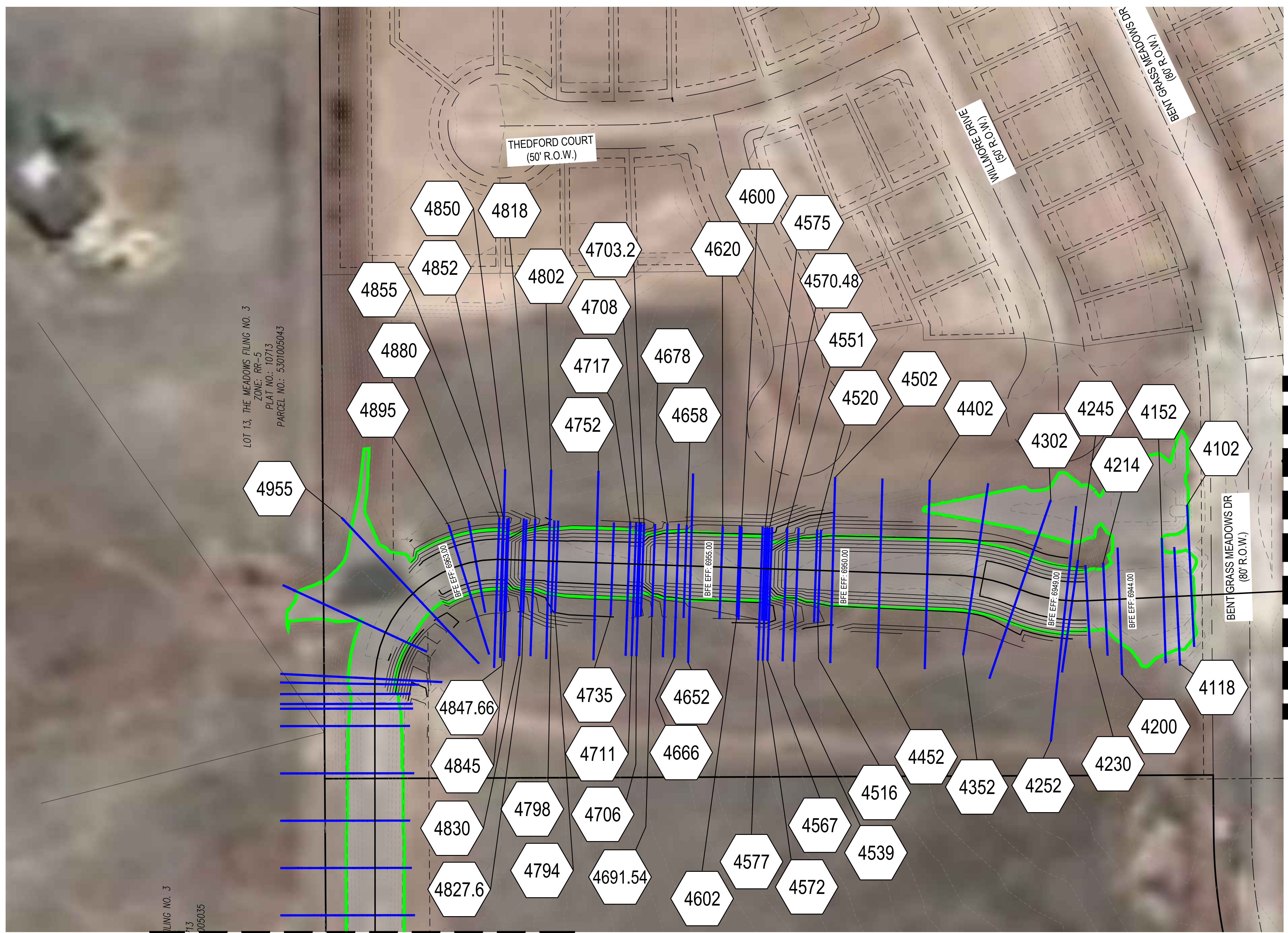


**FLOODPLAIN WORKMAP
 FALCON MEADOWS AT BENT GRASS
 FOR
 CHALLENGER COMMUNITIES, LLC
 BENT GRASS MEADOWS DRIVE & MERIDIAN ROAD
 FALCON, CO 80831 - EL PASO COUNTY**

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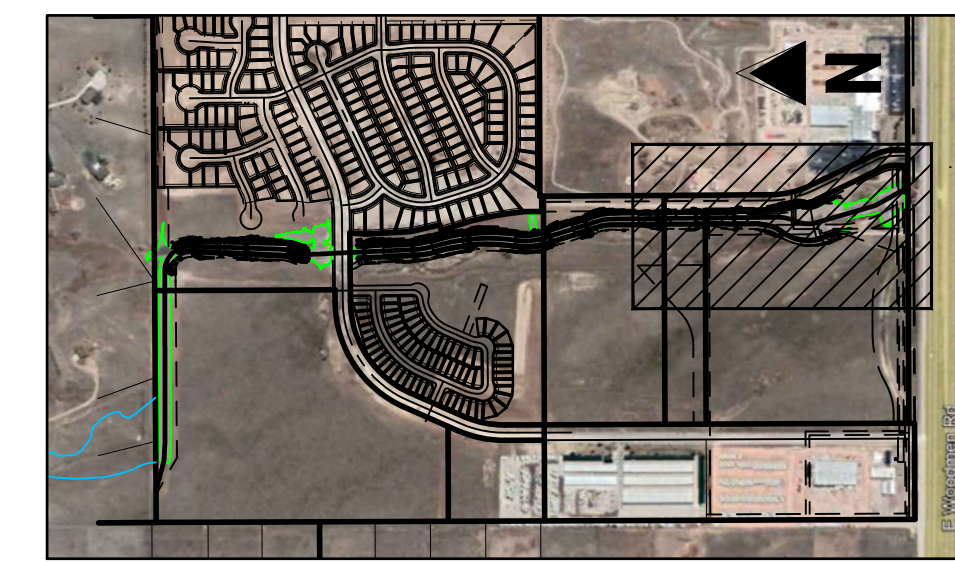
Project No: CL123
 Drawn By: SMB
 Checked By: SMB
 Date: 12/21/2021

PROPOSED CONDITION WORK MAP



- NOTES:**
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 - THE HORIZONTAL COORDINATE SYSTEM IS THE NAD 83/92 AND STATE PLANE COORDINATE SYSTEM COLORADO NORTH ZONE.

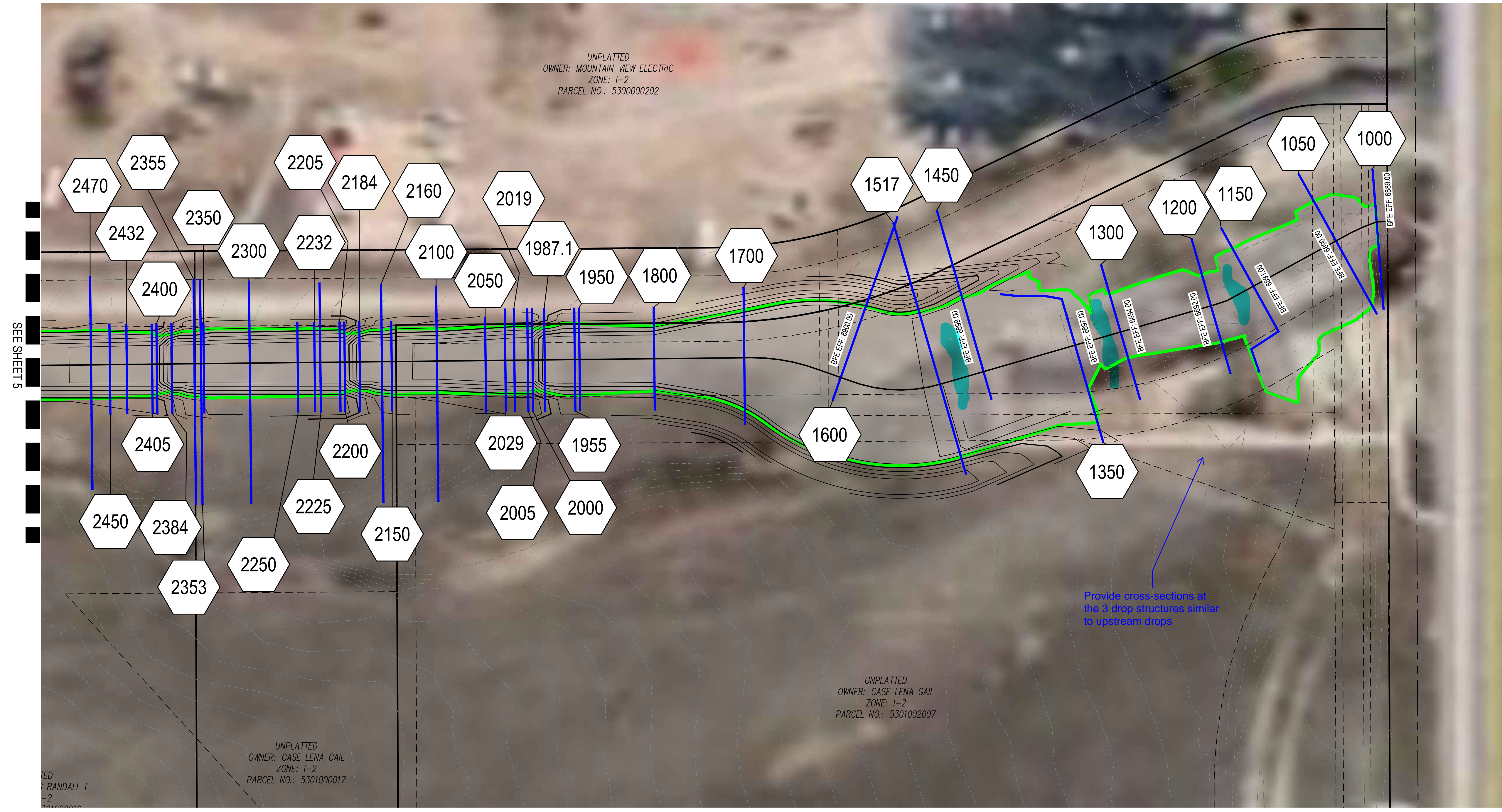
BENCHMARK
 ELEVATIONS ARE BASED ON THE SOUTHWEST CORNER OF LOT 1, WOODMEN HILLS FILING NO. 4, MONUMENTED BY A NO. 4 REBAR WITH A YELLOW PLASTIC CAP, STAMPED LS# 24954, ELEVATION = 6947.67



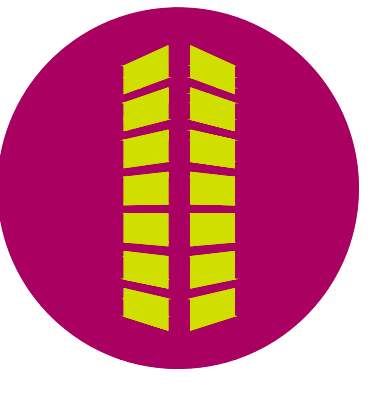
KEY MAP
SCALE: 1" = 100'

| LEGEND | |
|-----------|----------------------------------|
| - - - - - | EXISTING CONTOUR (MINOR) |
| - - - - - | EXISTING CONTOUR (MAJOR) |
| - - - - - | PROPOSED CONTOUR (MINOR) |
| - - - - - | PROPOSED CONTOUR (MAJOR) |
| — | PROPOSED 100-YEAR FLOODPLAIN |
| — | CROSS SECTION BASED ON CITY LOMR |
| 33883 | MODEL SECTION ID |

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



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

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Project No: CLH23
 Drawn By: SMB
 Checked By: SMB
 Date: 12/21/2021

PROPOSED CONDITION WORKMAP

- NOTES:**
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 3. ALL WATER SURFACE ELEVATIONS LISTED ARE BASED ON THE 1.0% ANNUAL CHANCE FLOOD UNLESS OTHERWISE NOTED.
 4. THE HORIZONTAL COORDINATE SYSTEM IS THE NAD 83/92 AND STATE PLANE COORDINATE SYSTEM COLORADO NORTH ZONE.

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

ATTACHMENT E
Construction Drawings

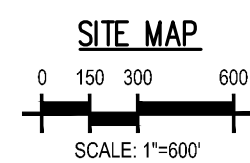
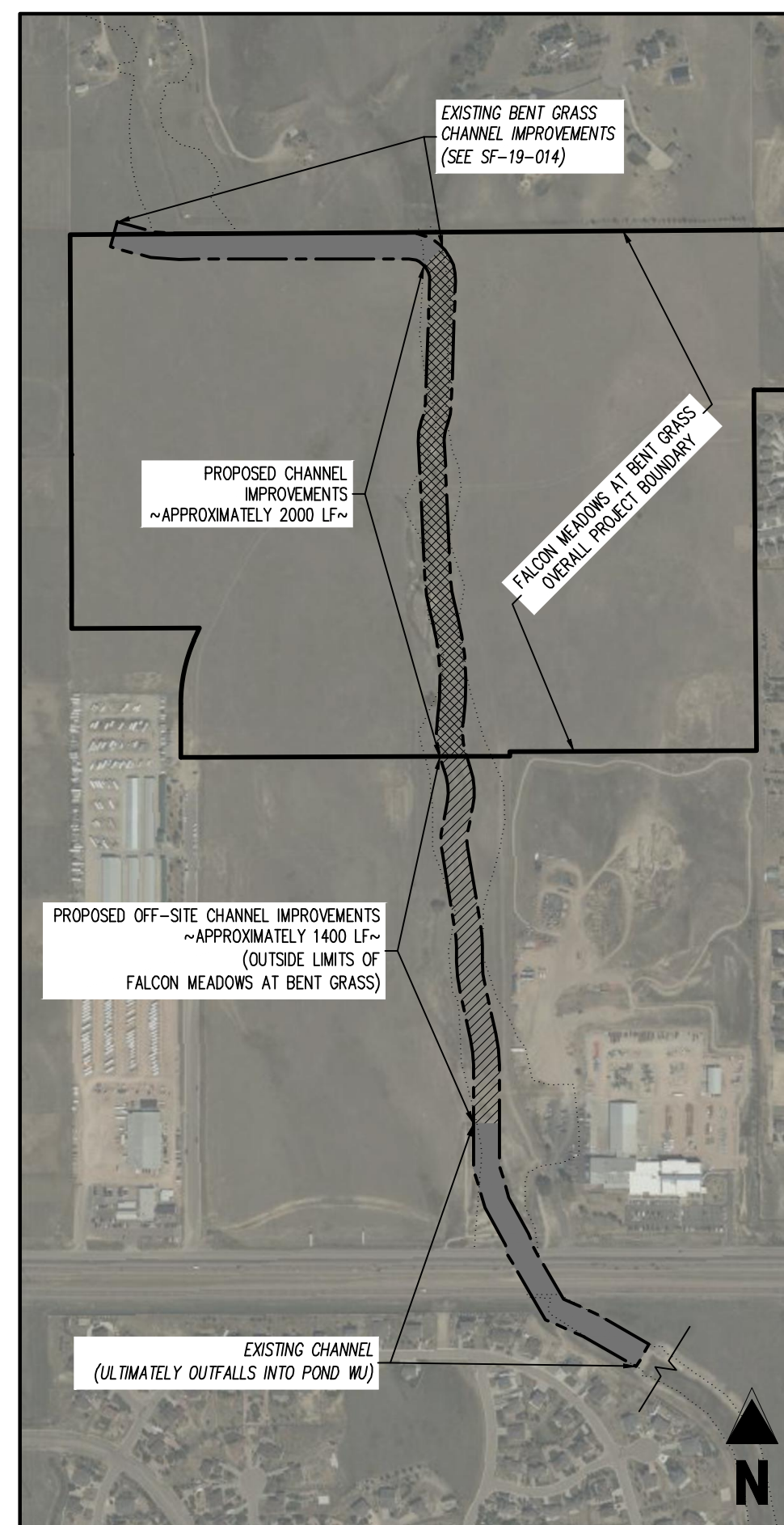
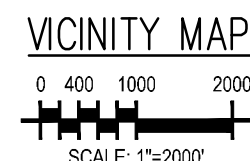
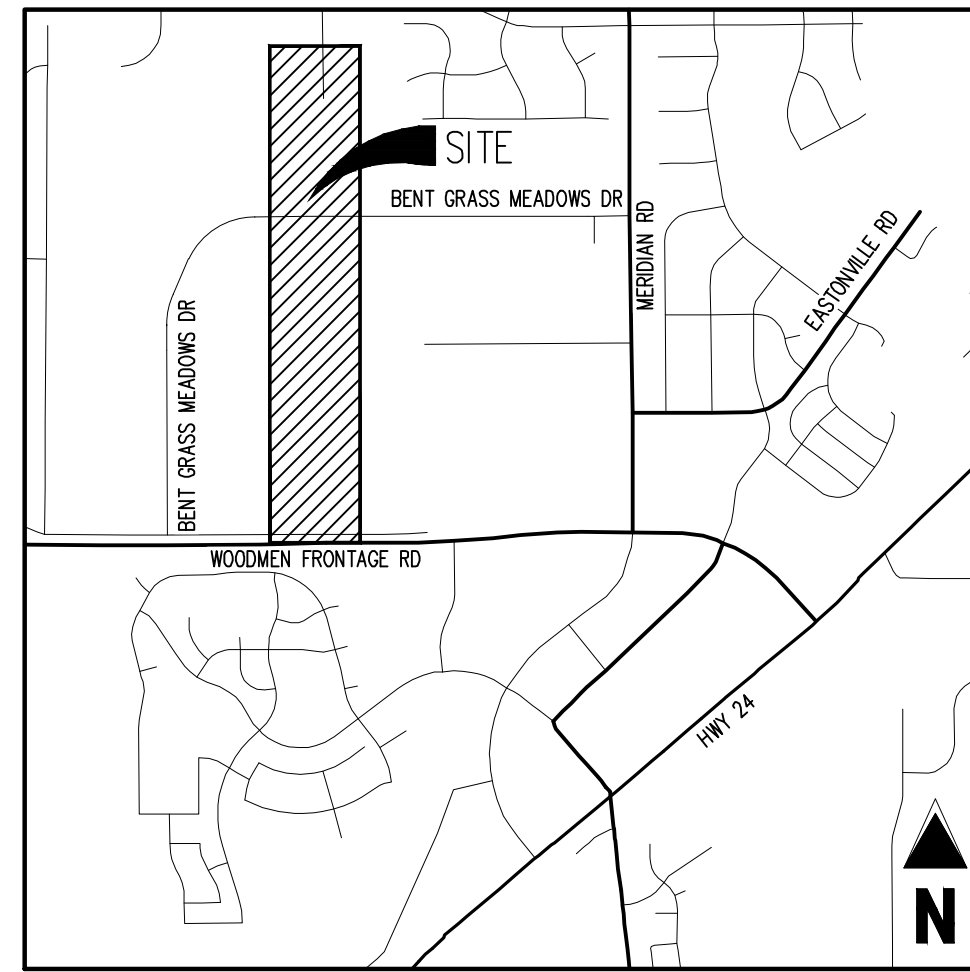


FALCON MEADOWS AT BENT GRASS DRAINAGE CHANNEL

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 XX-XXX



SHEET INDEX table with columns: SHEET NUMBER, SHEET DESCRIPTION, SHEET TITLE. Rows include: 1 CO.0 COVER SHEET, 2 CO.1 NOTES & TYPICAL SECTIONS, 3 C1.1 PHASING SHEET, 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 GENERAL DETAILS, 17 C6.0 CHANNEL SECTIONS KEY MAP, 18 C6.1 NORTH CHANNEL SECTIONS, 19 C6.2 SOUTH CHANNEL SECTIONS, 20 C6.3 SOUTH CHANNEL SECTIONS, 21 C6.4 SOUTH CHANNEL SECTIONS

PROJECT CONTACTS

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8605 EXPLORER DR., SUITE 250
COLORADO SPRINGS, CO 80920
TEL: (719) 598-5192
ATTN: JIM BYERS
EMAIL: JIMBYERS@CHALLENGERHOMES.COM

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SURVEYOR

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COLORADO SPRINGS, CO 80920
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ATTN: BRIAN DENNIS
EMAIL: BRIANDENNIS@GALLOWAYUS.COM

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LSC TRANSPORTATION CONSULTANTS, INC.
545 EAST PINES PEAK AVENUE, SUITE 210
COLORADO SPRINGS, CO 80903
TEL: (719) 633-2888
ATTN: JEFFREY C. HUDSON, P.E.
EMAIL: JEFFREY@LSC.COM

GEOTECHNICAL ENGINEER

ROCKY MOUNTAIN GROUP
2910 JUSTIN BLUFFS PKWY
COLORADO SPRINGS, CO 80916
TEL: (719) 394-3072
ATTN: TONY MUMFORD, P.E.
EMAIL: TMUMFORD@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@WHMD.ORG

ELECTRIC

MOUNTAIN VIEW ELECTRIC
1140 E WOODMEN RD
FALCON, CO 80831
TEL: (719) 495-2283
ATTN: 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: AACASSIO@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
MWF - MELTED WIRE FABRIC
VERT - VERTICAL
OC - ON CENTER
FDC - FIRE DEPARTMENT CONNECTION
CT - CURB
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 1, WOODMEN HILLS FILING NO. 4, MONUMENTED BY NO. 4 REBAR WITH A YELLOW PLASTIC CAP, STAMPED LSF# 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 N0073.46°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

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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.

IN ACCORDANCE WITH EDCM SECTION 1.12, THESE CONSTRUCTION DOCUMENTS WILL BE VALID FOR CONSTRUCTION FOR A PERIOD OF 2 YEARS FROM THE DATE SIGNED BY THE EL PASO COUNTY ENGINEER. IF CONSTRUCTION HAS NOT STARTED WITHIN THOSE 2 YEARS, THE PLANS WILL NEED TO BE RESUBMITTED FOR APPROVAL, INCLUDING PAYMENT OF REVIEW FEES AT THE PLANNING AND COMMUNITY DEVELOPMENT DIRECTORS DISCRETION.

JENNIFER IRVINE, P.E.
COUNTY ENGINEER / EDCM ADMINISTRATOR
DATE

OWNER'S STATEMENT

I, THE OWNER/DEVELOPER HAVE READ AND WILL COMPLY WITH THE REQUIREMENTS OF THE GRADING AND EROSION CONTROL PLAN.

PAUL HOWARD
4 SITE INVESTMENTS, LLC
DATE

ENGINEER'S CERTIFICATION

THESE CONSTRUCTION PLANS FOR FALCON MEADOWS AT BENT GRASS WERE PREPARED BY ME (OR UNDER MY DIRECT SUPERVISION) IN ACCORDANCE WITH THE REQUIREMENTS OF THE COUNTY OF EL PASO.

RONALD G. DENNIS
GALLOWAY & COMPANY, INC.
P.E. NUMBER: 0051822



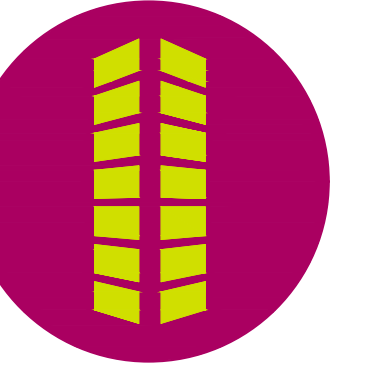
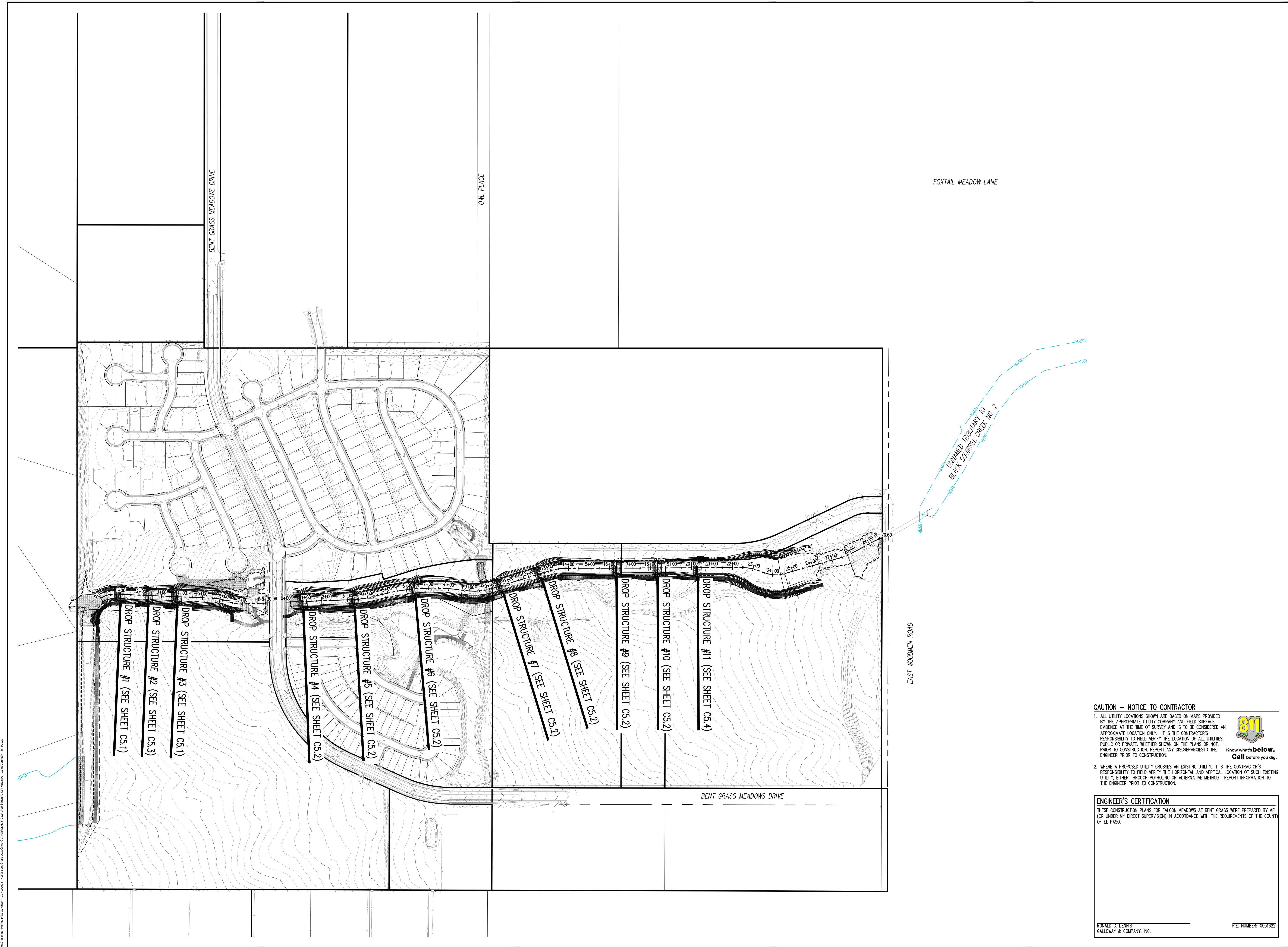
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CONSTRUCTION DOCUMENTS
FALCON MEADOWS AT BENT GRASS
FOR
CHALLENGER COMMUNITIES, LLC
BENT GRASS MEADOWS DRIVE & MERIDIAN ROAD
FALCON, CO 80831 - EL PASO COUNTY

Table with 4 columns: #, Date, Issue / Description, Init. Rows 1-10.

Project No: CLH000023
Drawn By: CMWJ
Checked By: RGD
Date: 01/14/2022

COVER SHEET



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

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Know what's below.
 Call before you dig.

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Project No: CLH000023
 Drawn By: CMWJ
 Checked By: RGD
 Date: 01/14/2022

DROP STRUCTURE KEY MAP

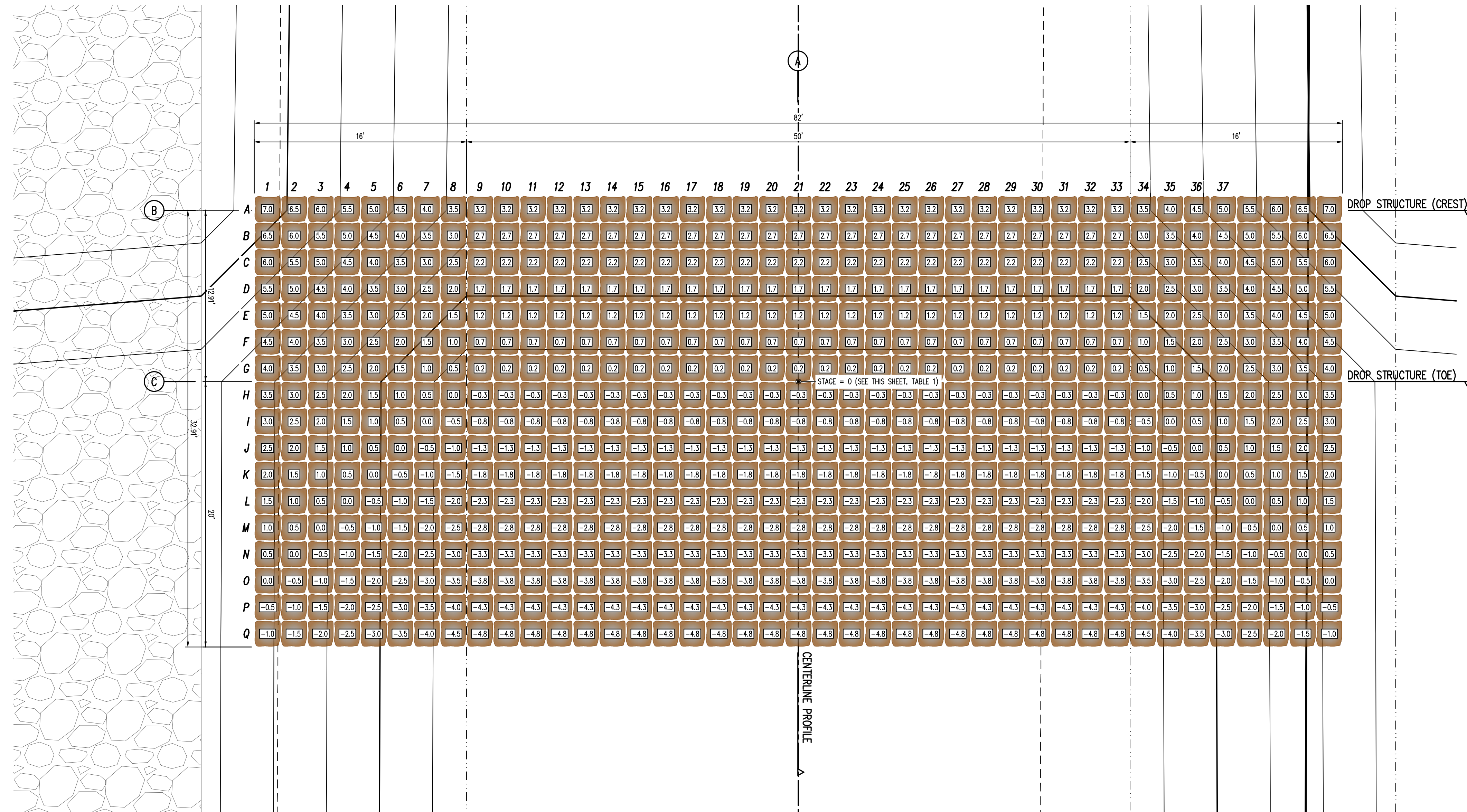
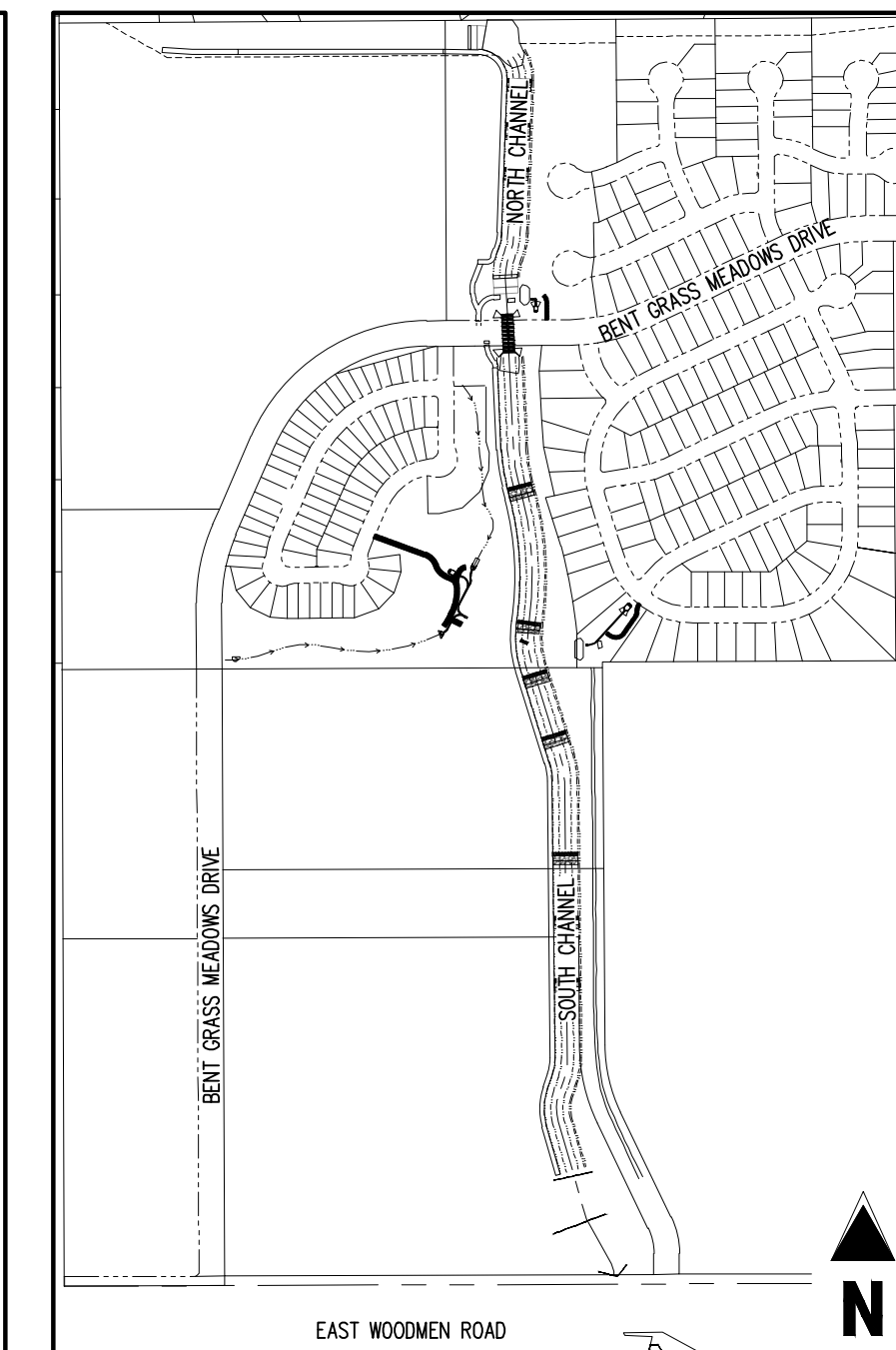


TABLE 1: DROP STRUCTURE STAGE ELEVATIONS

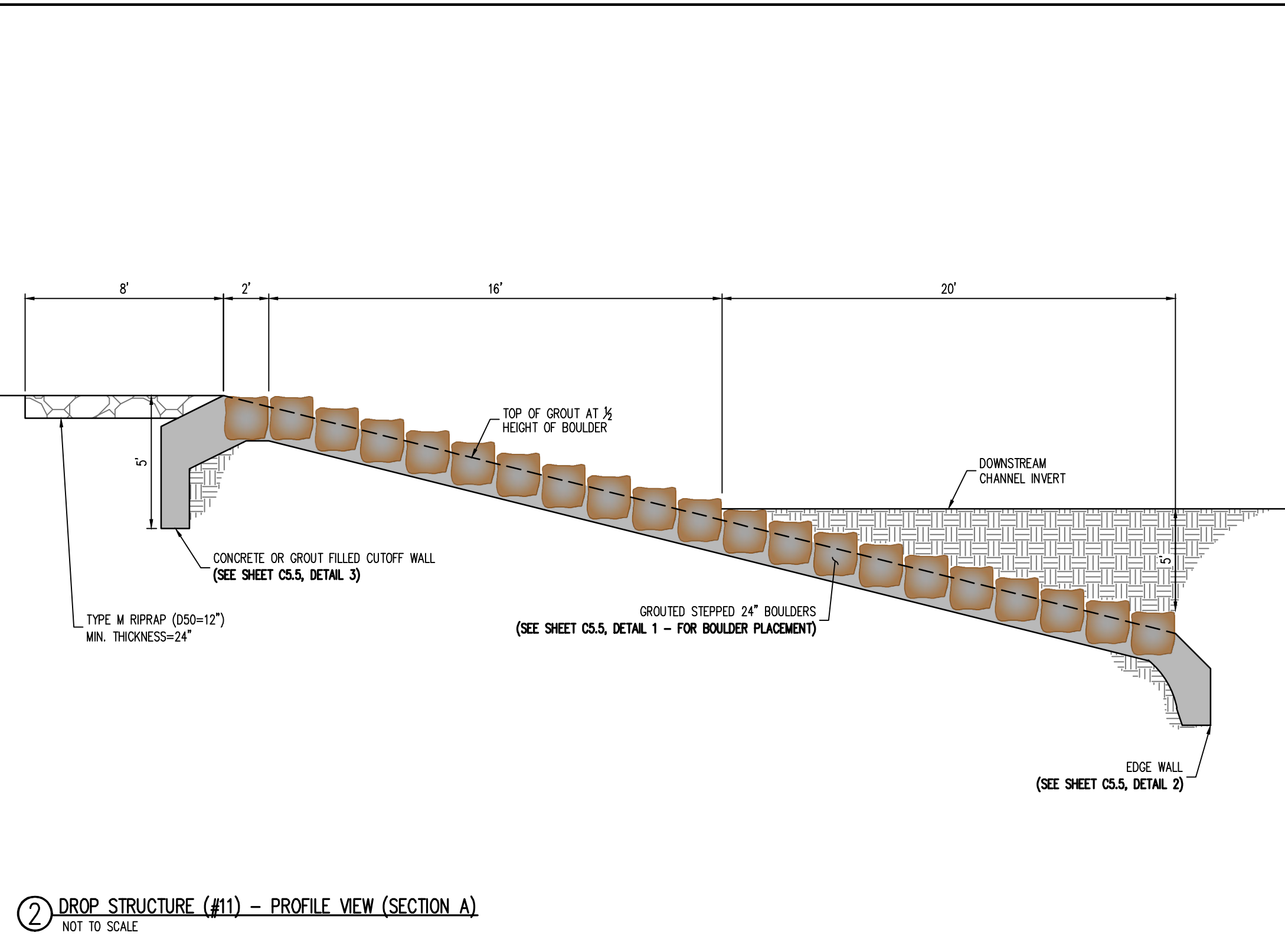
| DROP STRUCTURE #11 | 6898.39 |
|--|---------|
| NOTE: STAGE=0 IS LOCATED AT THE TOE OF CHANNEL ALONG THE CENTER LINE ALIGNMENT. CONTRACTOR SHALL ENSURE ELEVATIONS ABOVE MATCH THE ELEVATIONS SHOWN ON PLAN & PROFILE SHEETS (C4.1-C4.4) | |



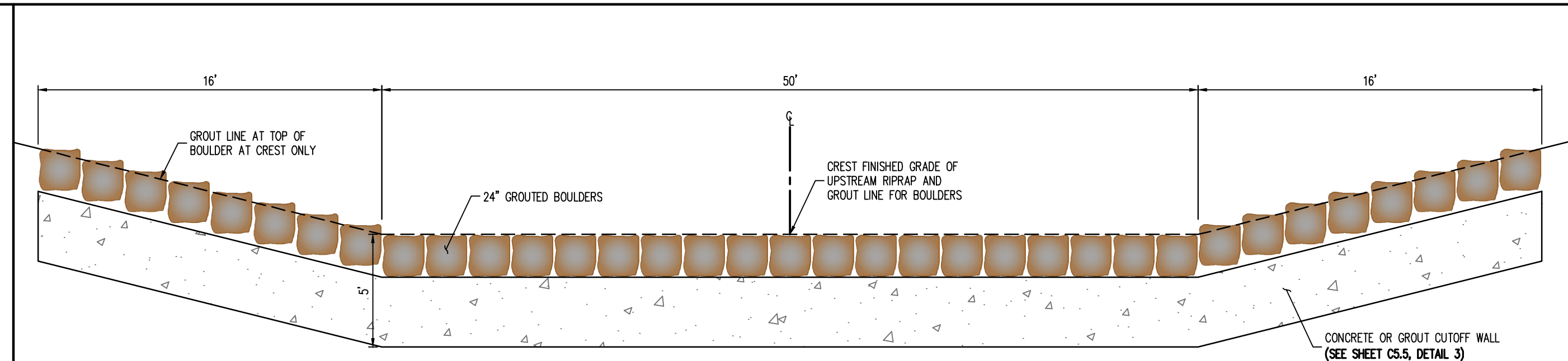
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CHALLENGER HOMES

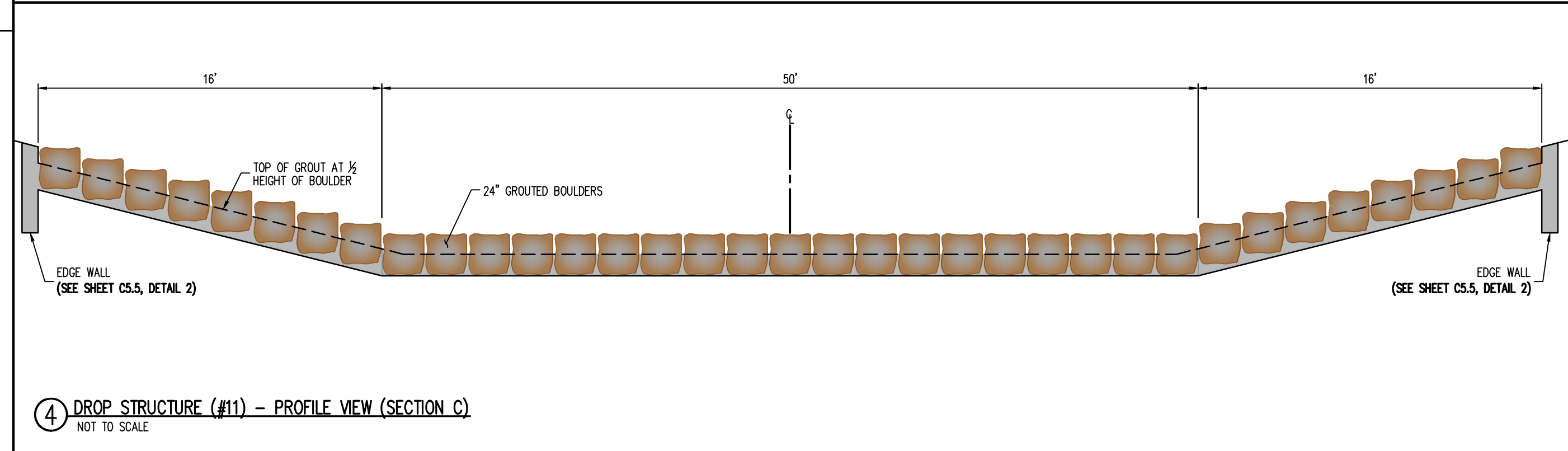
1 DROP STRUCTURE (#11) - PLAN VIEW
 SCALE: 1"=5'



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

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ENGINEER'S CERTIFICATION
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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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Project No: CLH000023
 Drawn By: CMWJ
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 Date: 01/14/2022

DROP STRUCTURE DETAILS (#11)



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CHALLENGER HOMES

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

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Project No: CLH000023
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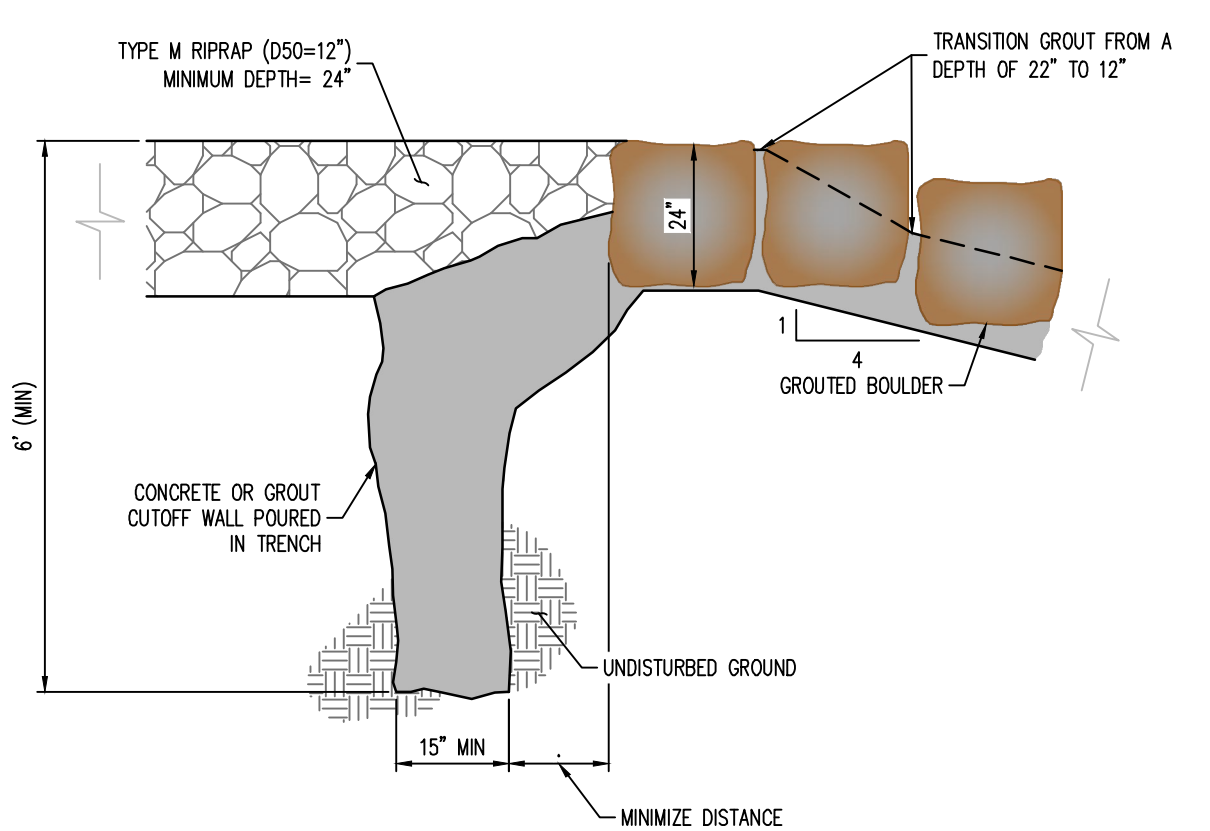
DROP STRUCTURE
GENERAL DETAILS

C5.5
Sheet 16 of 21

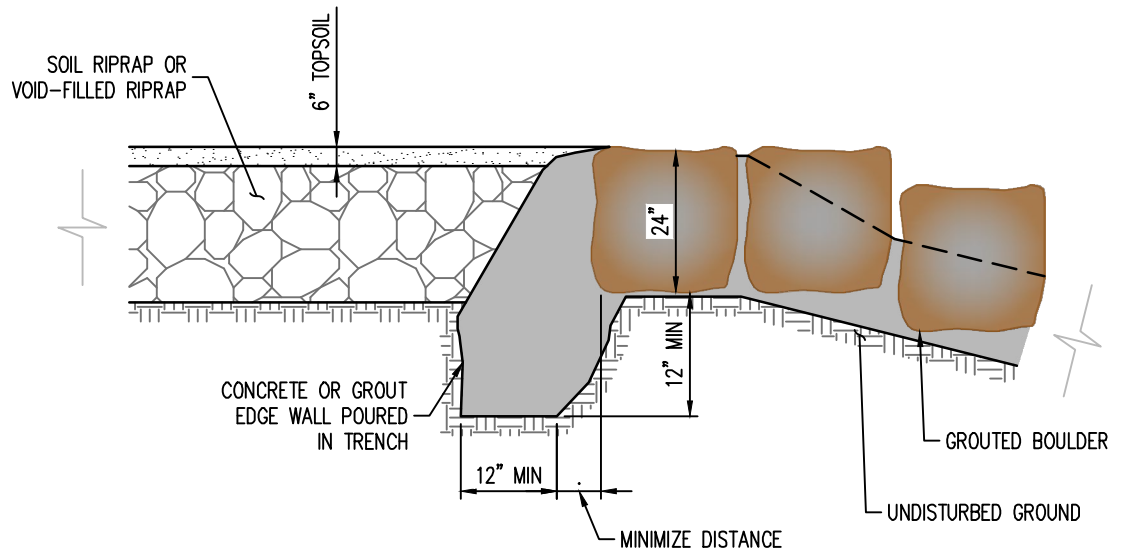
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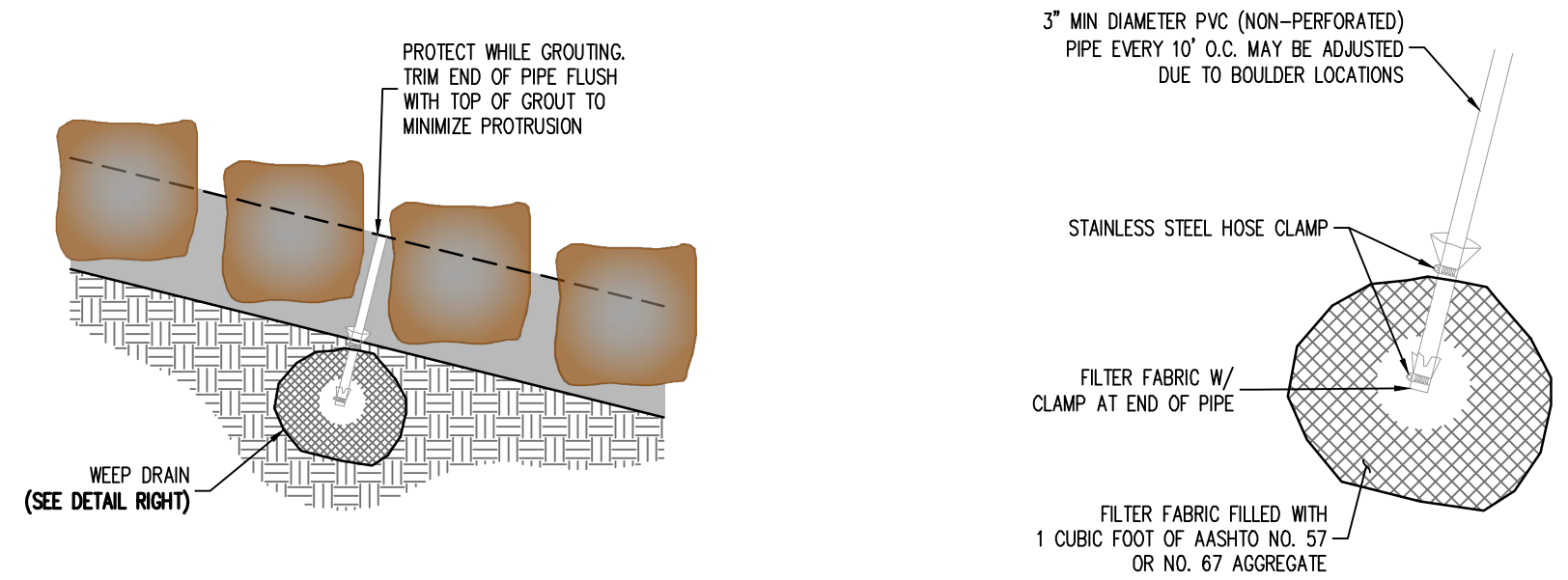
RONALD G. DENNIS
GALLOWAY & COMPANY, INC. P.E. NUMBER: 0051822



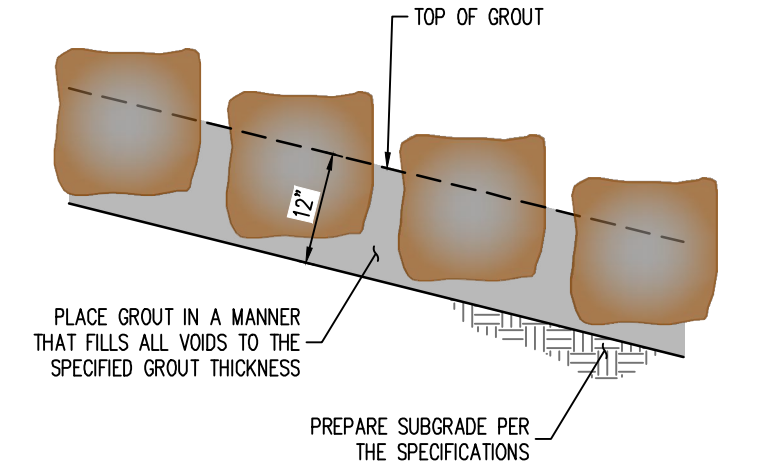
3 CUT-OFF WALL DETAIL
NOT TO SCALE



2 EDGE WALL DETAIL
NOT TO SCALE



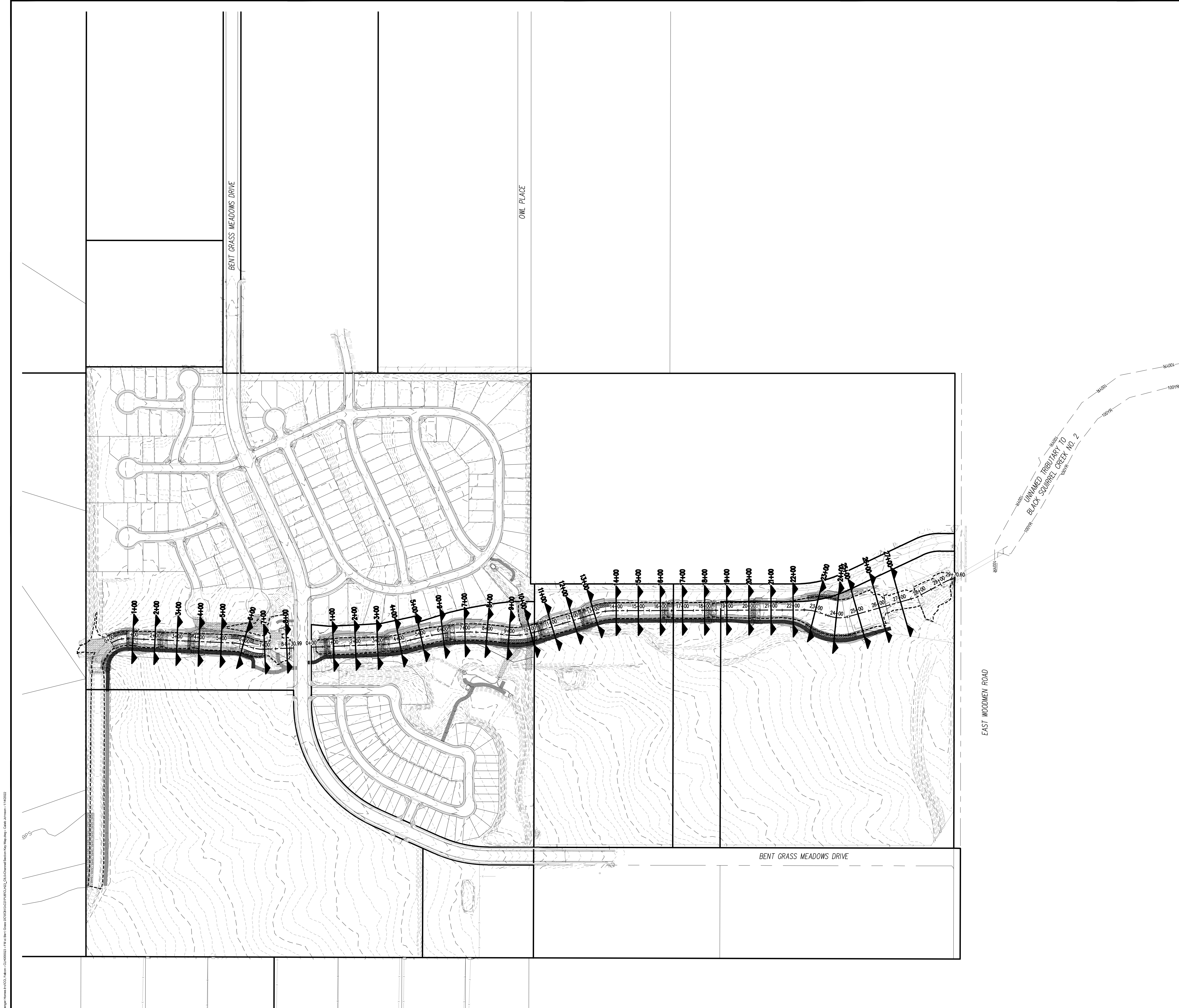
4 WEEP DRAIN DETAIL
NOT TO SCALE



1 GROUDED BOULDER PLACEMENT DETAIL
NOT TO SCALE

- BOULDER PLACEMENT NOTES:**
1. 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.
 2. 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.
- MATERIAL SPECIFICATIONS:**
1. ALL GROUT SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH EQUAL TO 3200 PSI.
 2. ONE CUBIC YARD OF GROUT SHALL HAVE A MINIMUM OF SIX (6) SACKS OF TYPE II PORTLAND CEMENT.
 3. A MAXIMUM OF 25% TYPE F FLY ASH MAY BE SUBSTITUTED FOR THE PORTLAND CEMENT.
 4. THE AGGREGATE SHALL BE COMPRISED OF 70% NATURAL SAND (FINES) AND 30% 3/8" ROCK (COARSE).
 5. THE GROUT SLUMP SHALL BE BETWEEN 4-INCHES TO 6-INCHES.
 6. AIR ENTRAINMENT SHALL BE BETWEEN 5.5% AND 7.5%.
 7. TO CONTROL SHRINKAGE AND CRACKING, 1.5 POUNDS OF FIBERMESH, OR EQUIVALENT, SHALL BE USED PER CUBIC YARD OF GROUT.
 8. COLOR ADDITIVE IN REQUIRED AMOUNTS SHALL BE USED WHEN SO SPECIFIED BY CONTRACT.
- GROUT PLACEMENT SPECIFICATIONS:**
1. 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.
 2. GROUT SHALL BE DELIVERED BY MEANS OF A LOW PRESSURE (LESS THAN 10 PSI) GROUT PUMP USING A 2-INCH DIAMETER (MAXIMUM) NOZZLE.
 3. 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 ROU FILLS, WHILE VIBRATING GROUT INTO PLACE USING A FENCIL VIBRATOR.
 4. ALL GROUT BETWEEN BOULDERS SHALL BE TREATED WITH A BROOM FINISH.
 5. AFTER GROUT PLACEMENT, EXPOSED BOULDER FACES SHALL BE CLEANED AND FREE OF GROUT.
 6. ALL FINISHED GROUT SURFACES SHALL BE SPRAYED WITH A CLEAR LIQUID MEMBRANE CURING COMPOUND AS SPECIFIED IN ASTM C309.

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ENGINEER'S CERTIFICATION

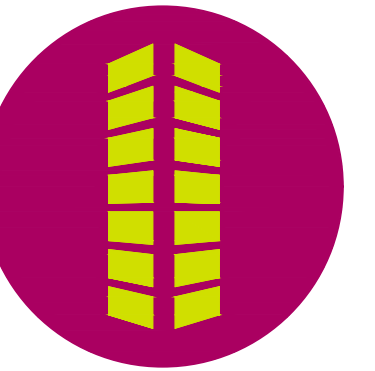
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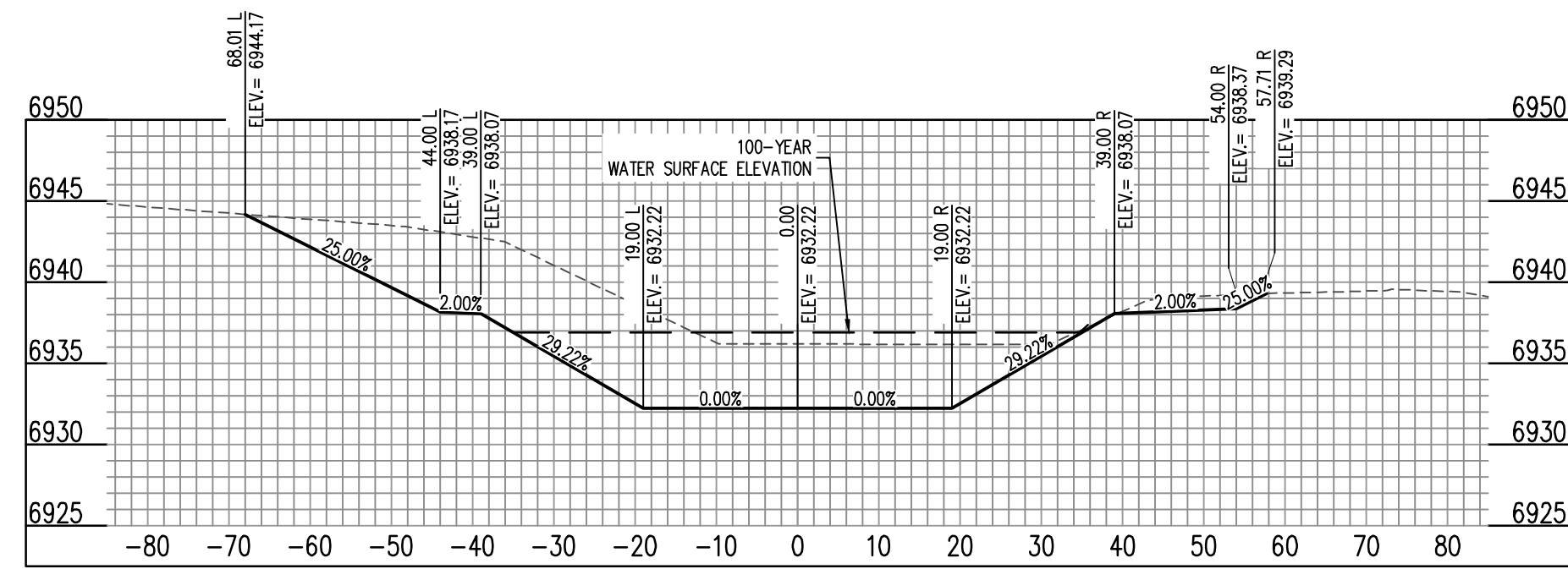
CHANNEL SECTIONS KEY
 MAP



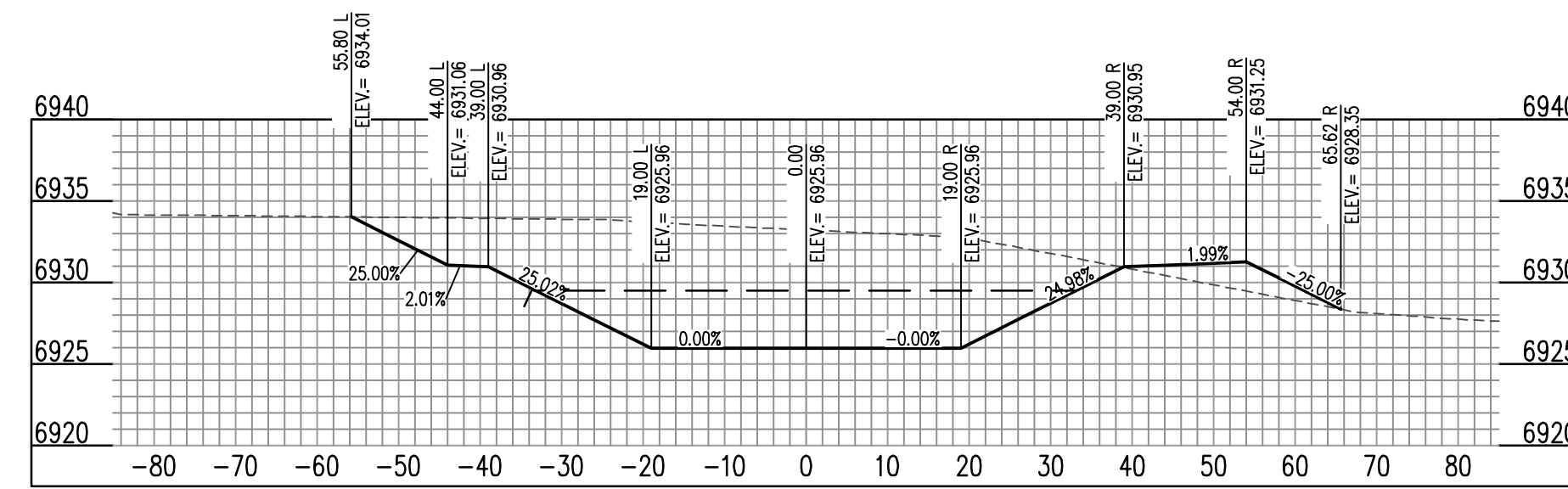
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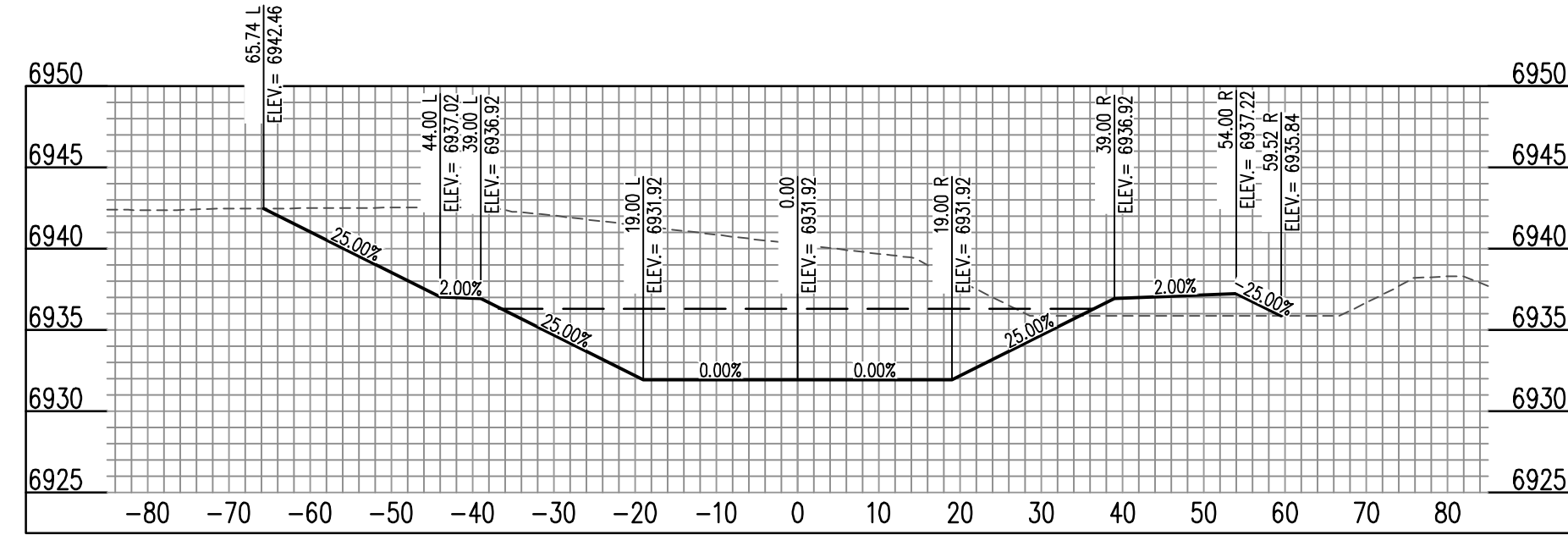
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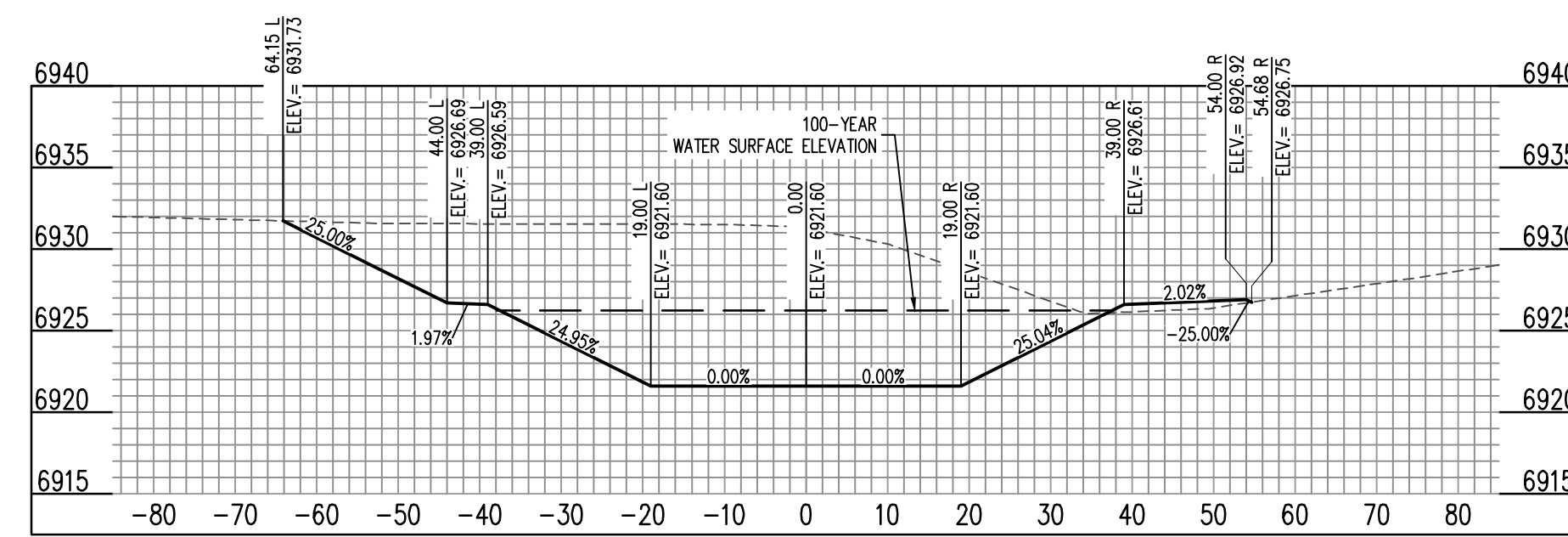
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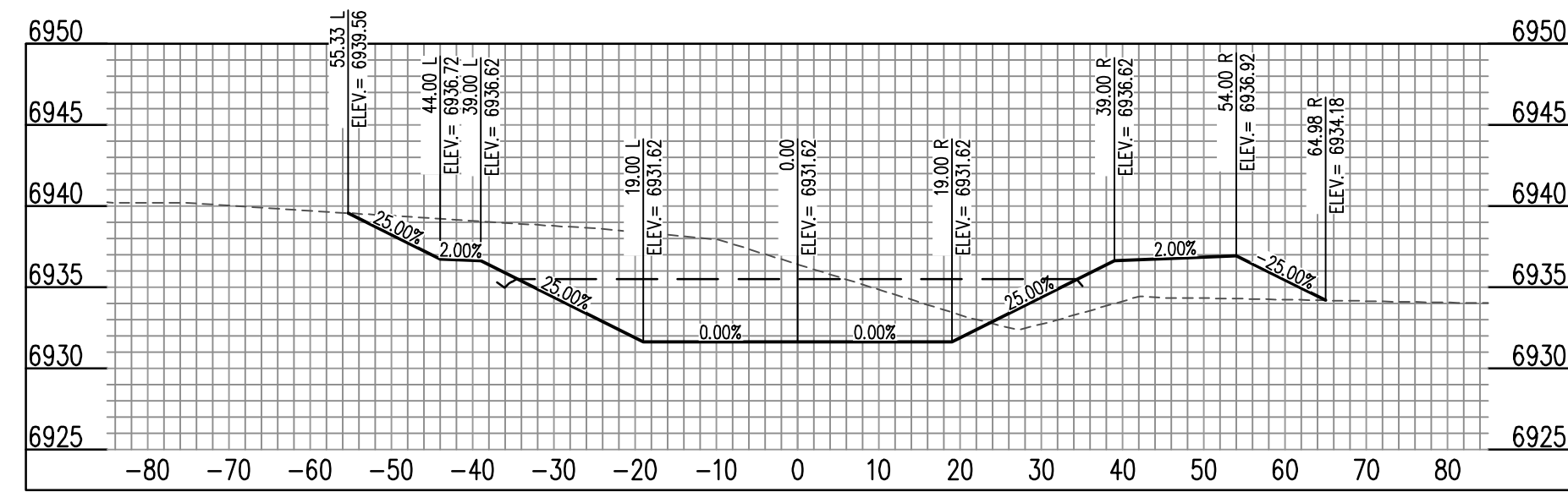
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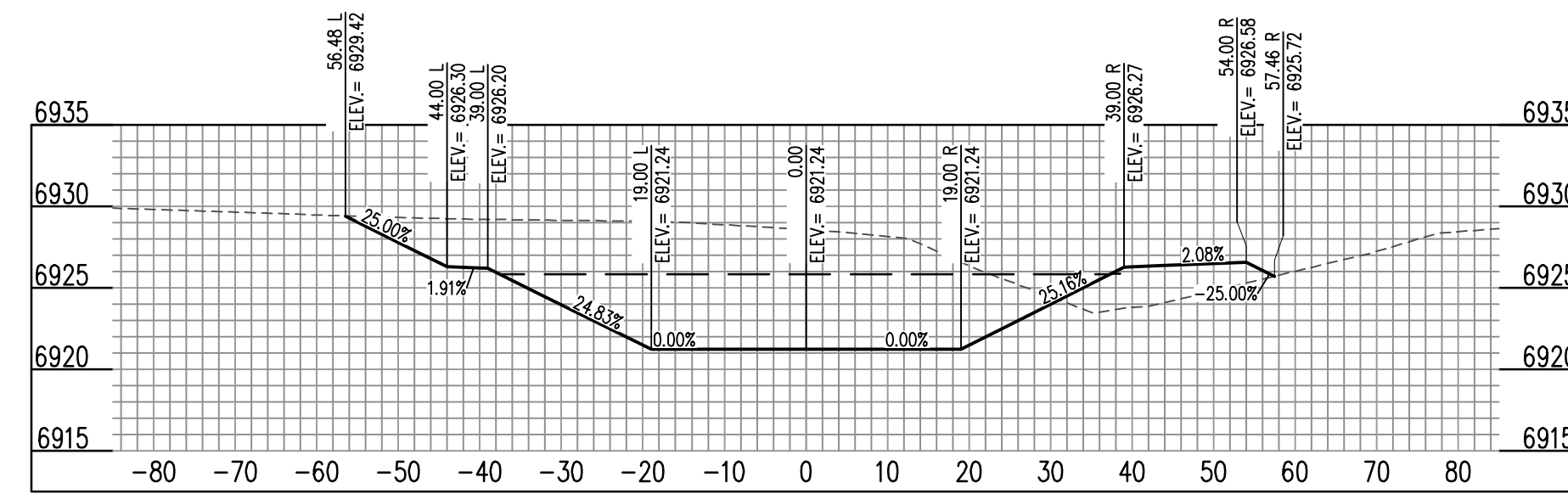
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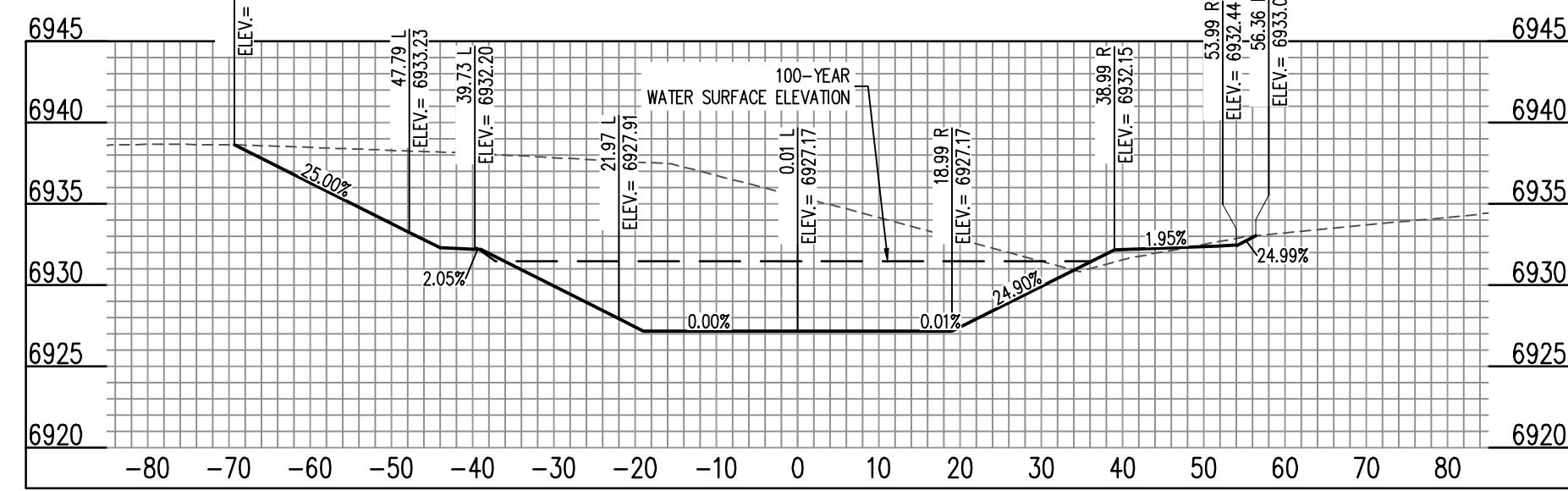
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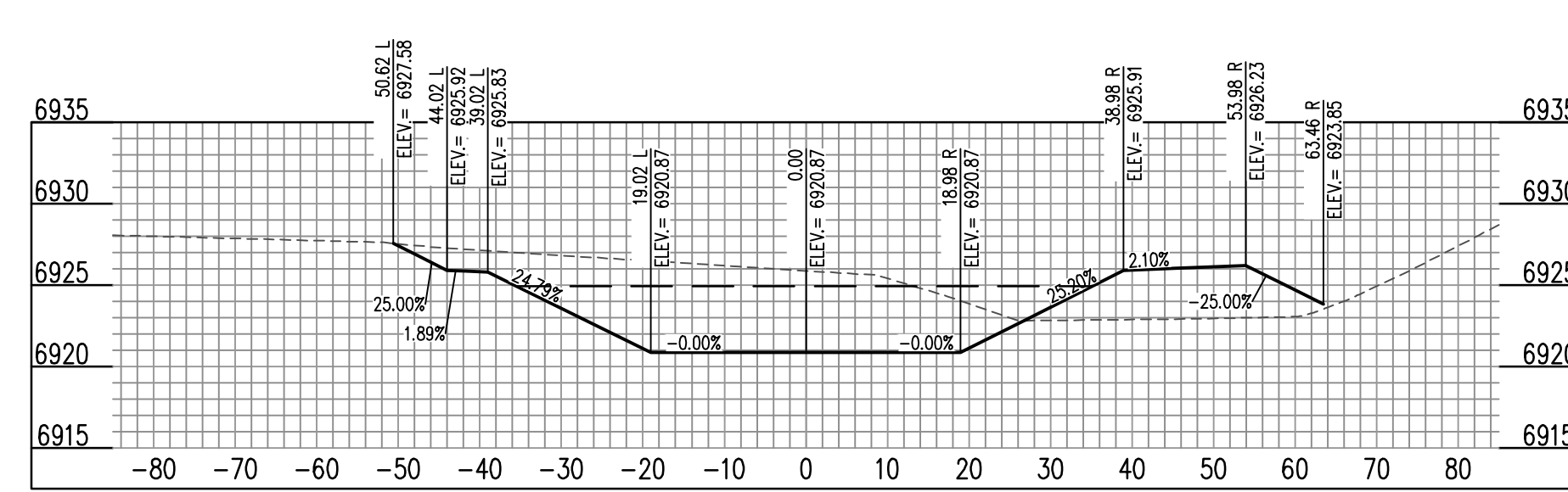
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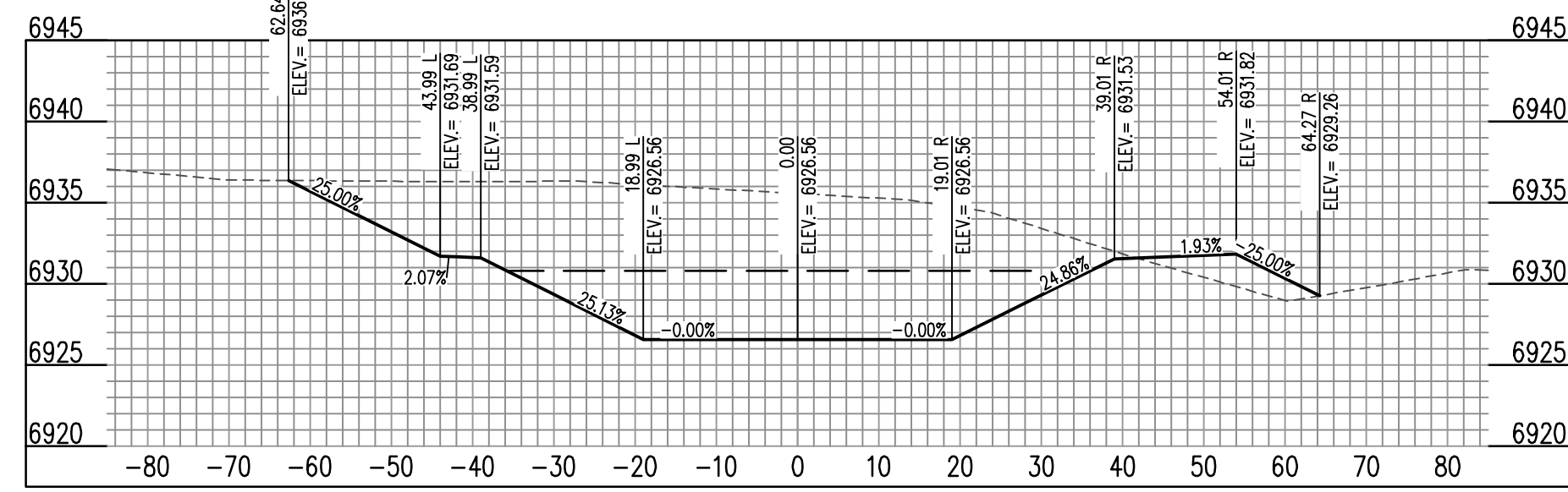
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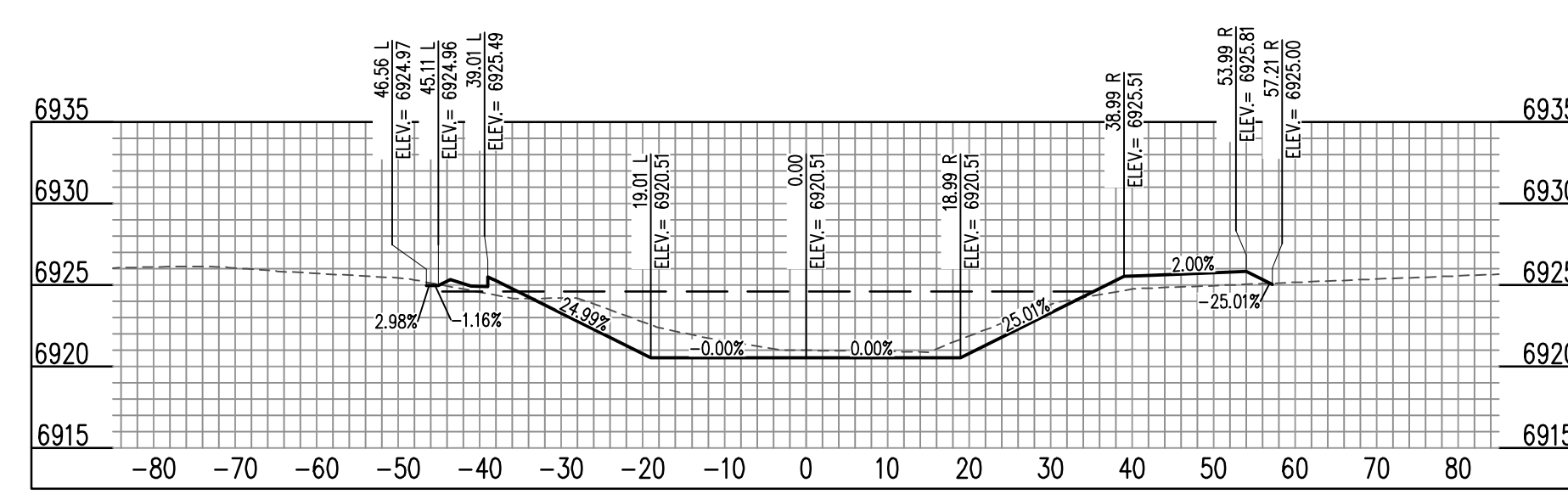
SOUTH CHANNEL (4+00) - SCALE: H: 1"=20' V: 1"=10'



SOUTH CHANNEL (9+00) - SCALE: H: 1"=20' V: 1"=10'




SOUTH CHANNEL (5+00) - SCALE: H: 1"=20' V: 1"=10'



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

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ENGINEER'S CERTIFICATION

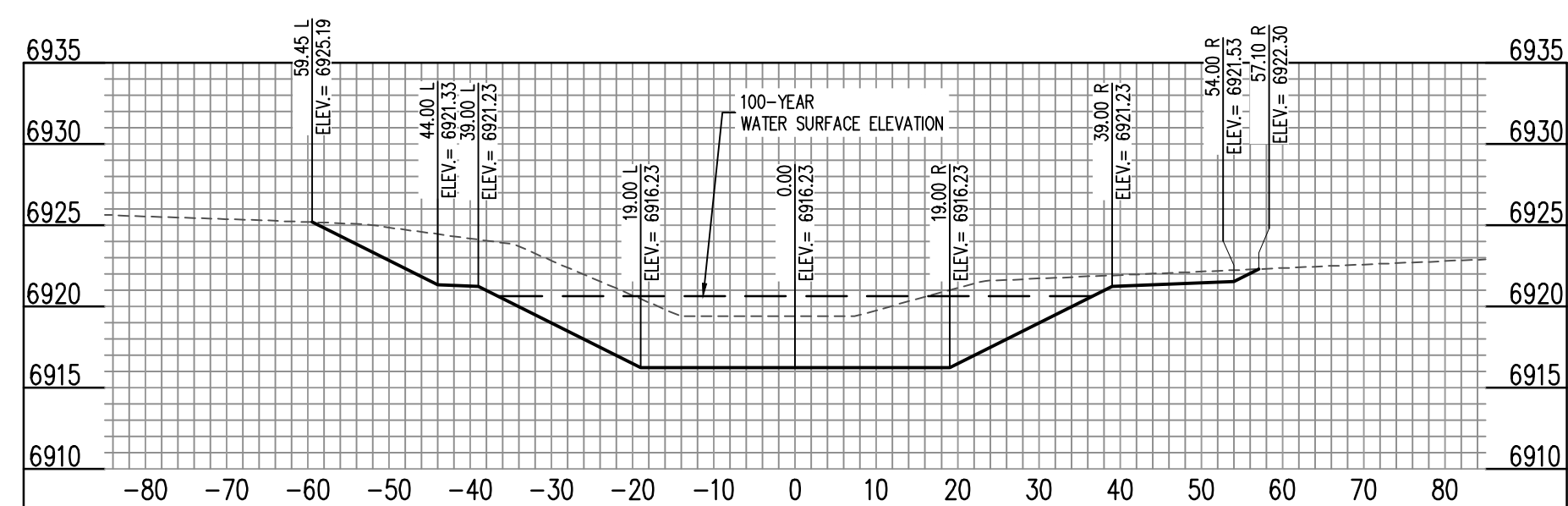
THESE CONSTRUCTION PLANS FOR FALCON MEADOWS AT BENT GRASS WERE PREPARED BY ME (OR UNDER MY DIRECT SUPERVISION) IN ACCORDANCE WITH THE REQUIREMENTS OF THE COUNTY OF EL PASO.

RONALD G. DENNIS
GALLOWAY & COMPANY, INC. P.E. NUMBER: 0051822

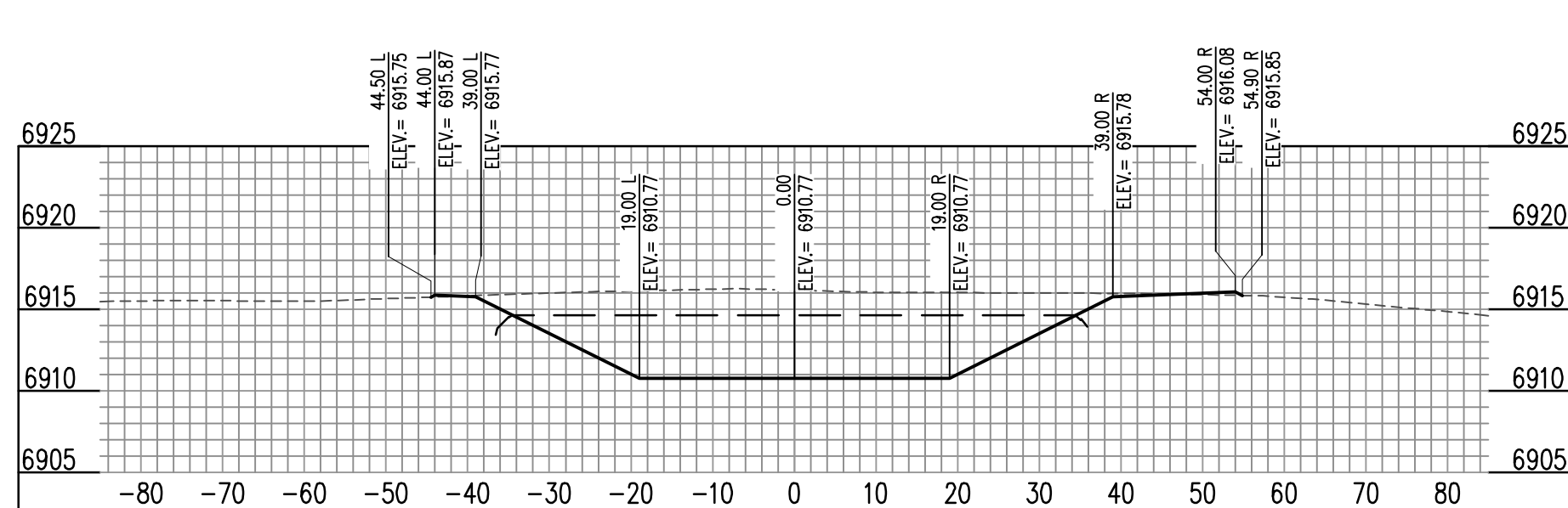
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| Project No: | CLH000023 |
| Drawn By: | CMWJ |
| Checked By: | RGD |
| Date: | 01/14/2022 |

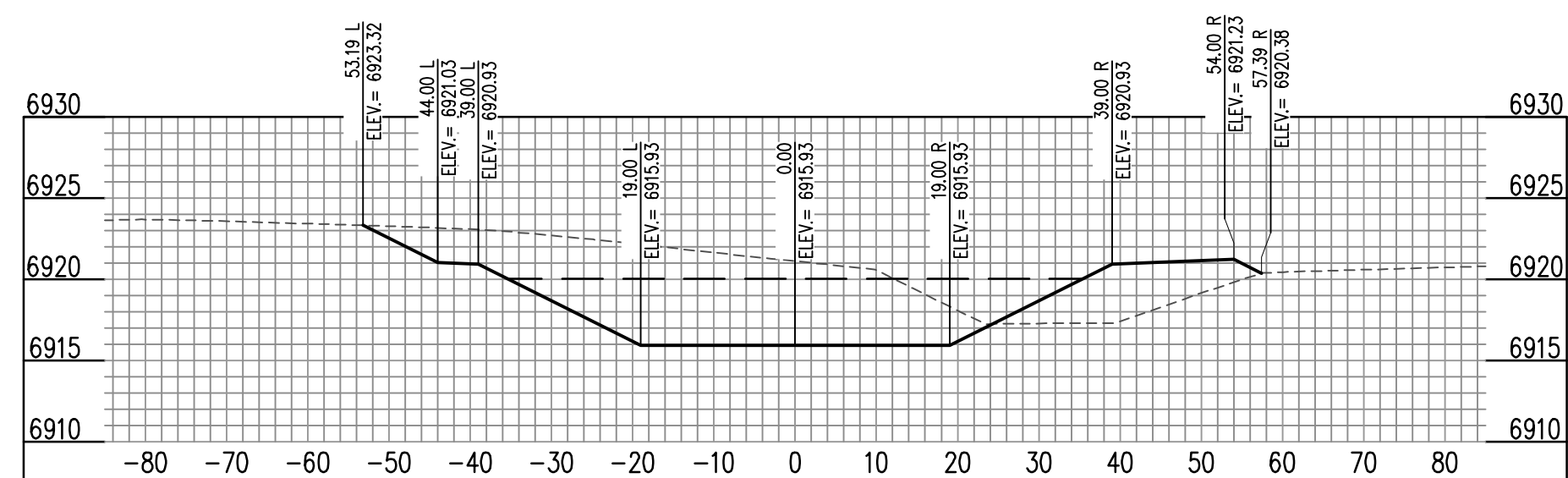
SOUTH CHANNEL SECTIONS



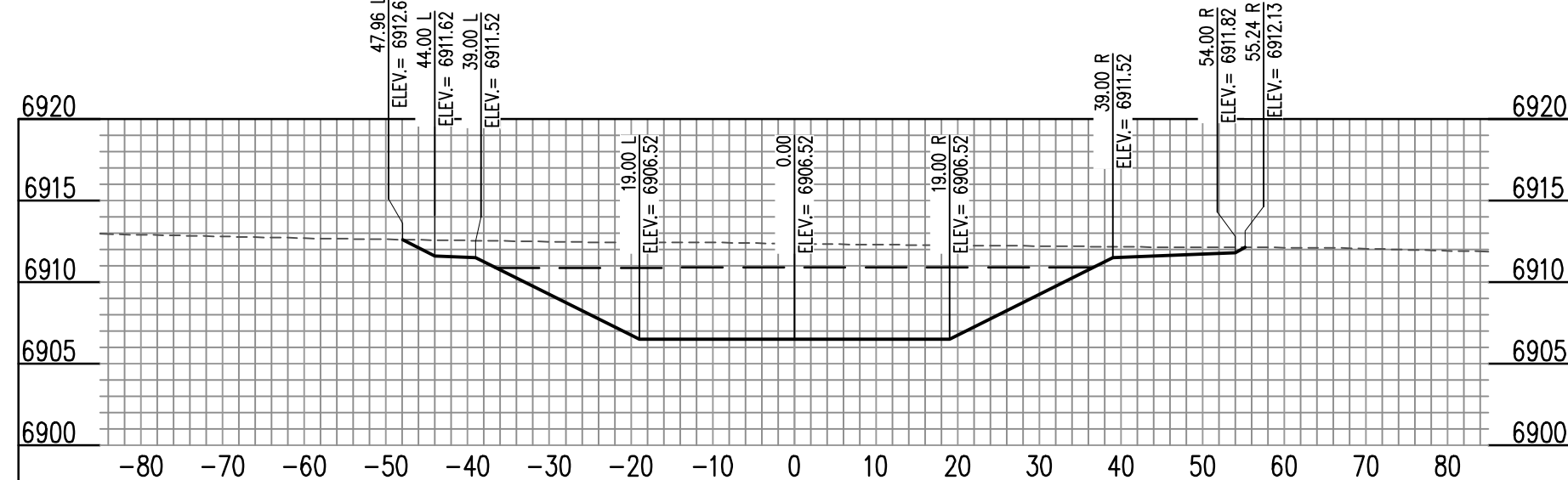
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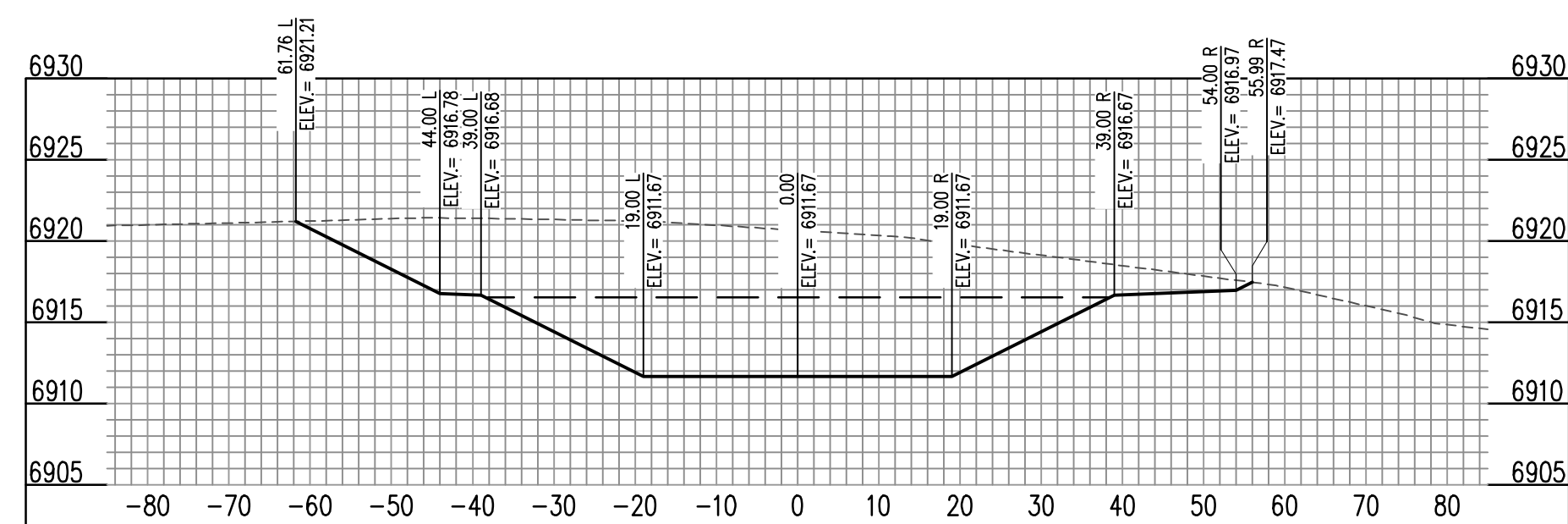
SOUTH CHANNEL (16+00) - SCALE: H: 1"=20' V: 1"=10'



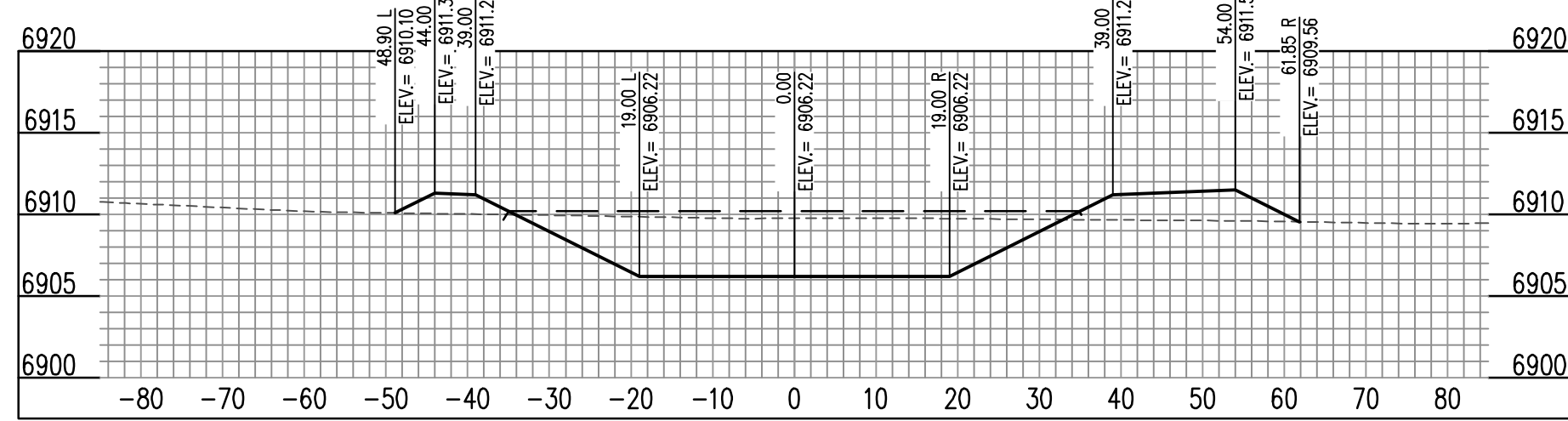
SOUTH CHANNEL (12+00) - SCALE: H: 1"=20' V: 1"=10'



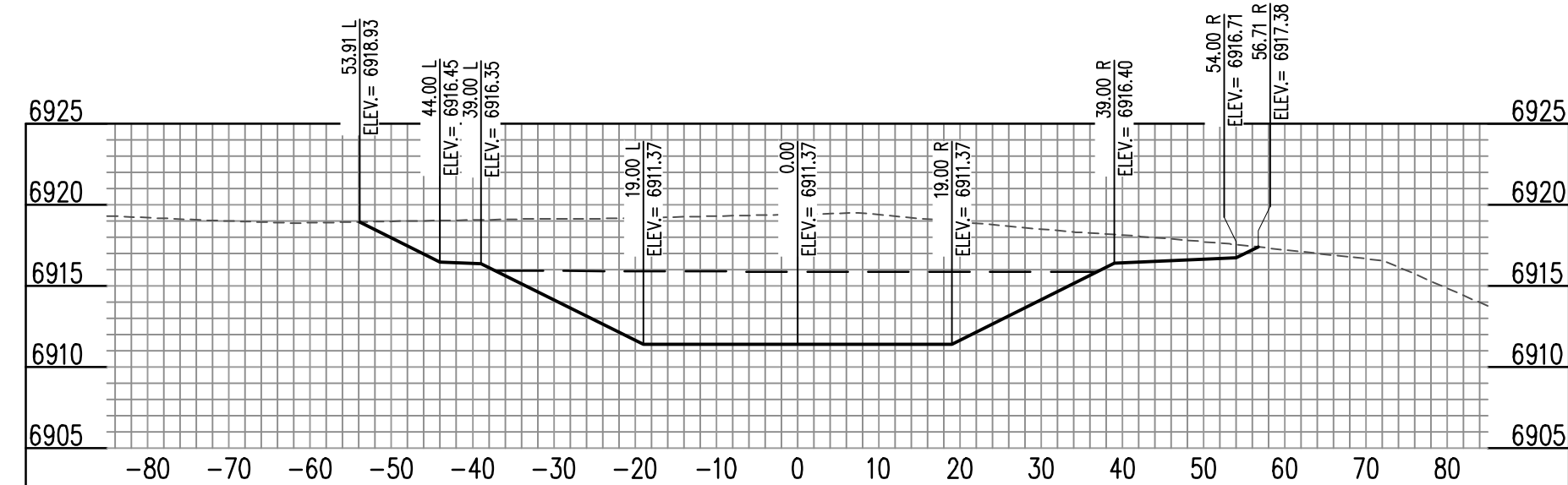
SOUTH CHANNEL (17+00) - SCALE: H: 1"=20' V: 1"=10'



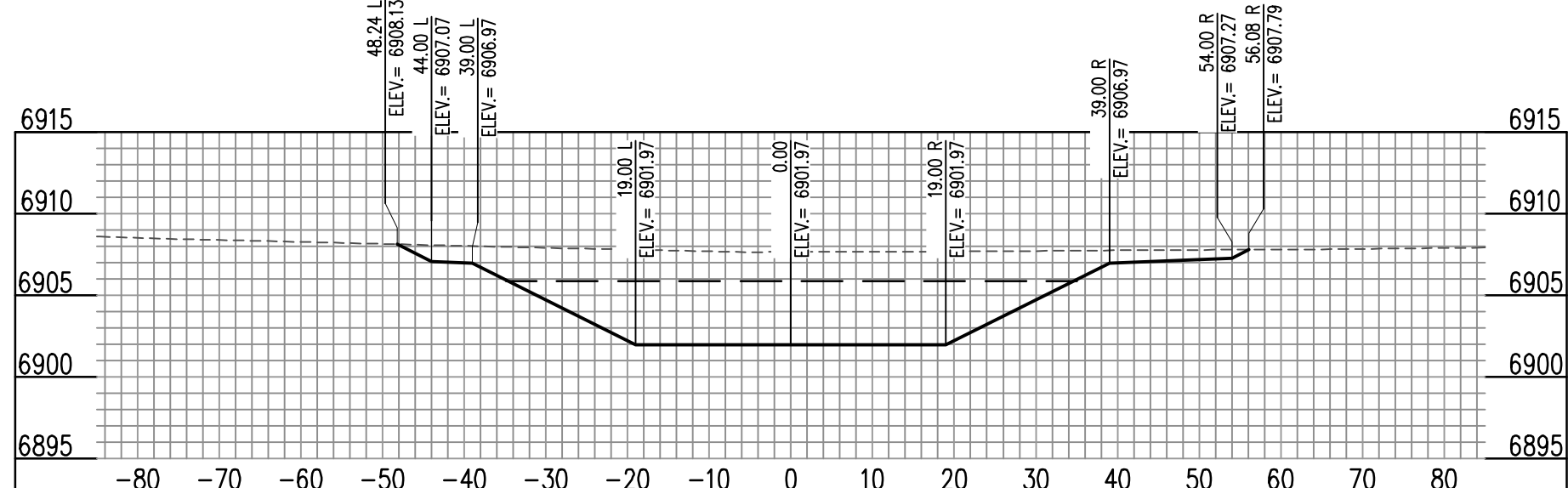
SOUTH CHANNEL (13+00) - SCALE: H: 1"=20' V: 1"=10'



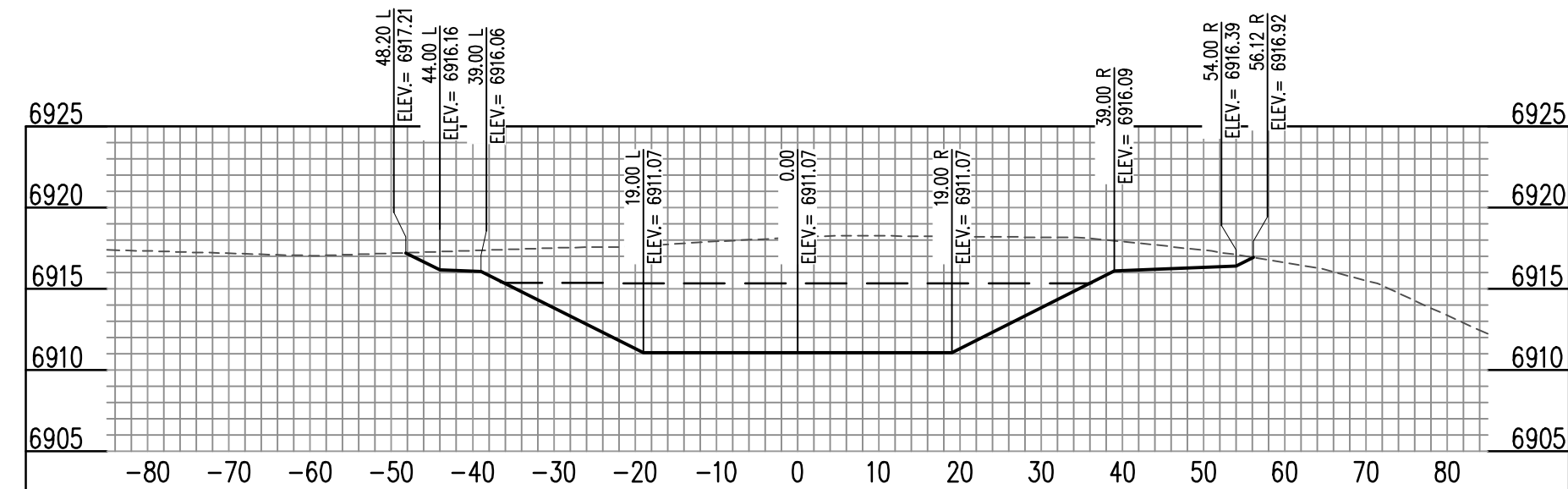
SOUTH CHANNEL (18+00) - SCALE: H: 1"=20' V: 1"=10'



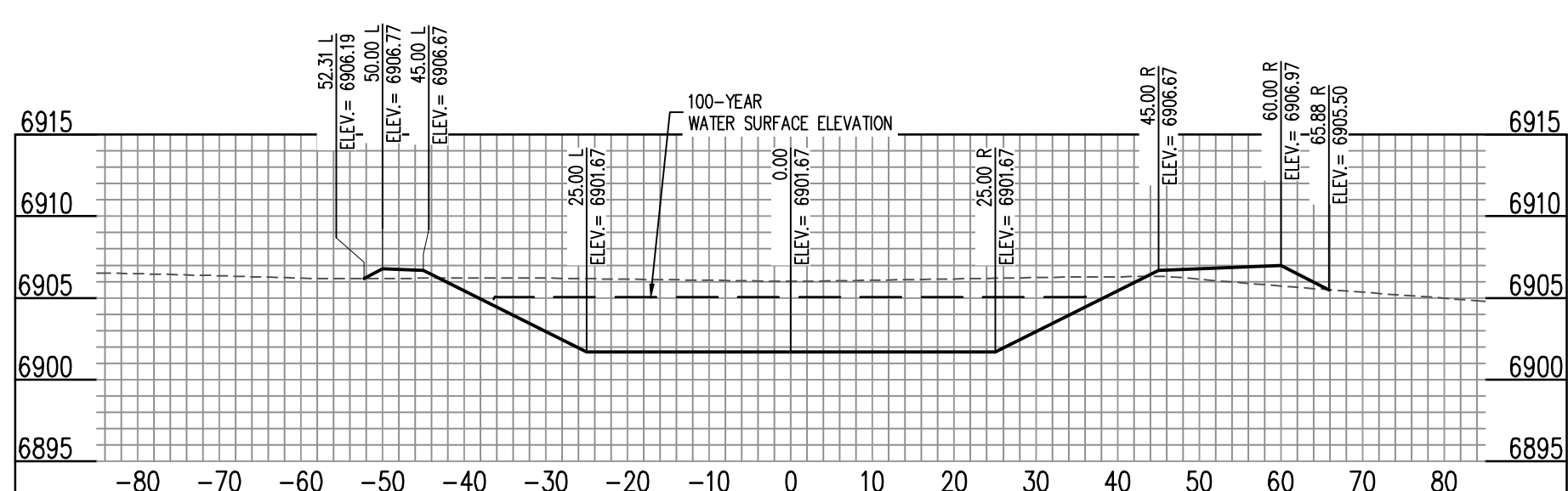
SOUTH CHANNEL (14+00) - SCALE: H: 1"=20' V: 1"=10'



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



SOUTH CHANNEL (15+00) - SCALE: H: 1"=20' V: 1"=10'



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



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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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RONALD G. DENNIS
 GALLOWAY & COMPANY, INC. P.E. NUMBER: 0051622

Project No: CLH000023
 Drawn By: CMWJ
 Checked By: RGD
 Date: 01/14/2022

SOUTH CHANNEL SECTIONS

C6.3
 Sheet 20 of 21

ATTACHMENT F
Corrected Model Results Table

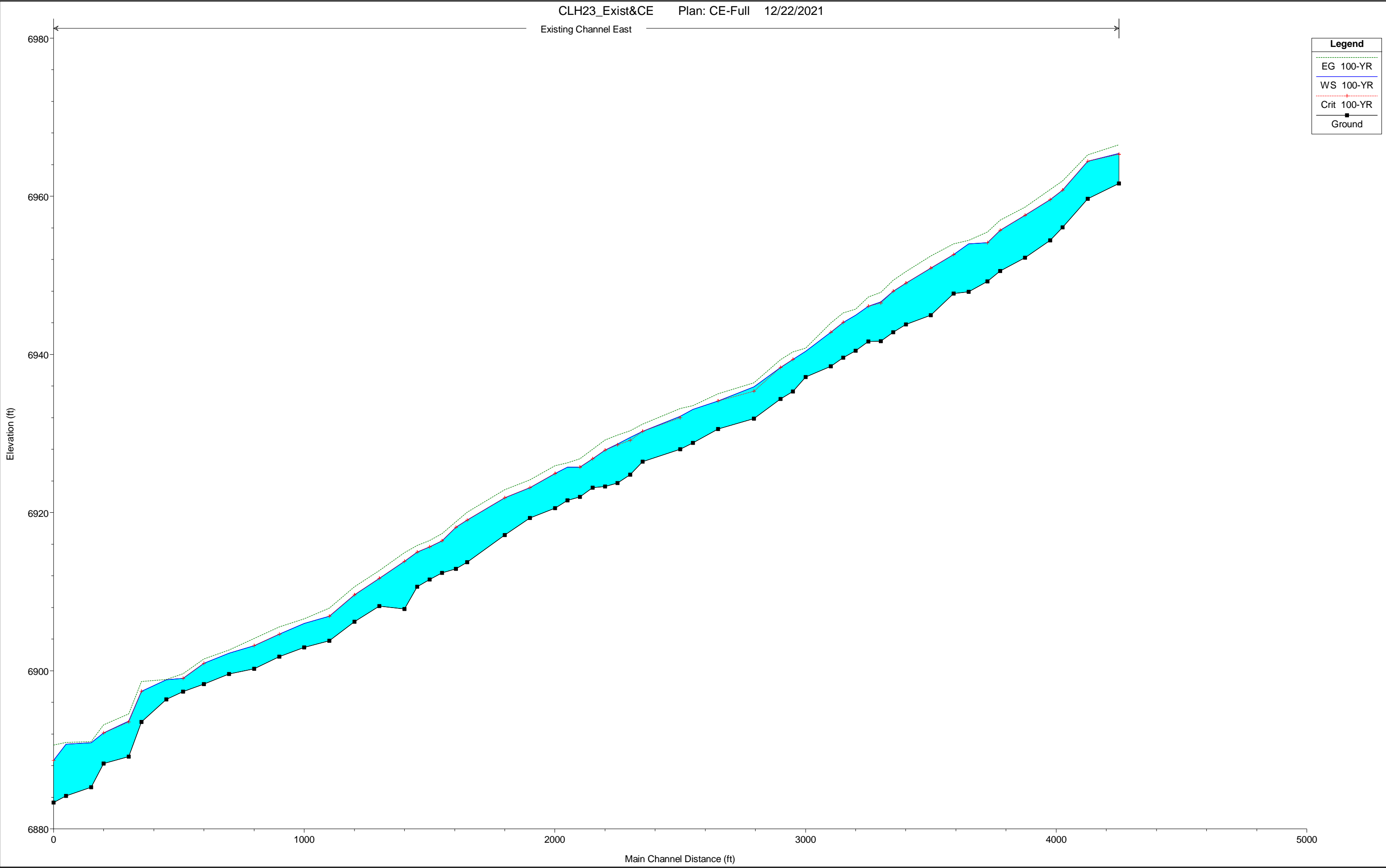


| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|-------|-----------|---------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| 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

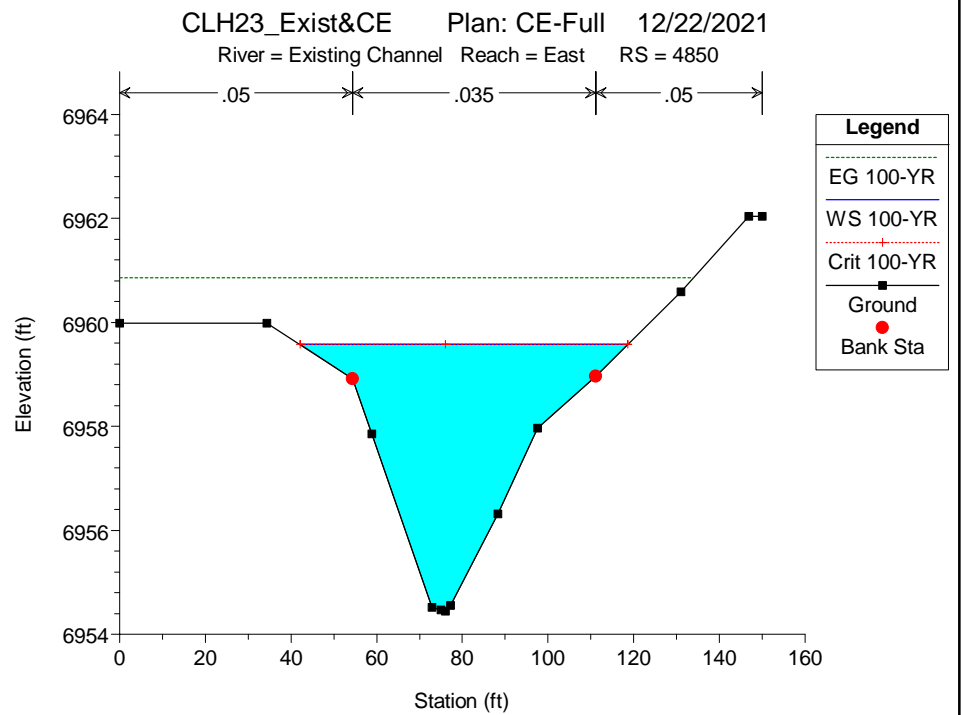
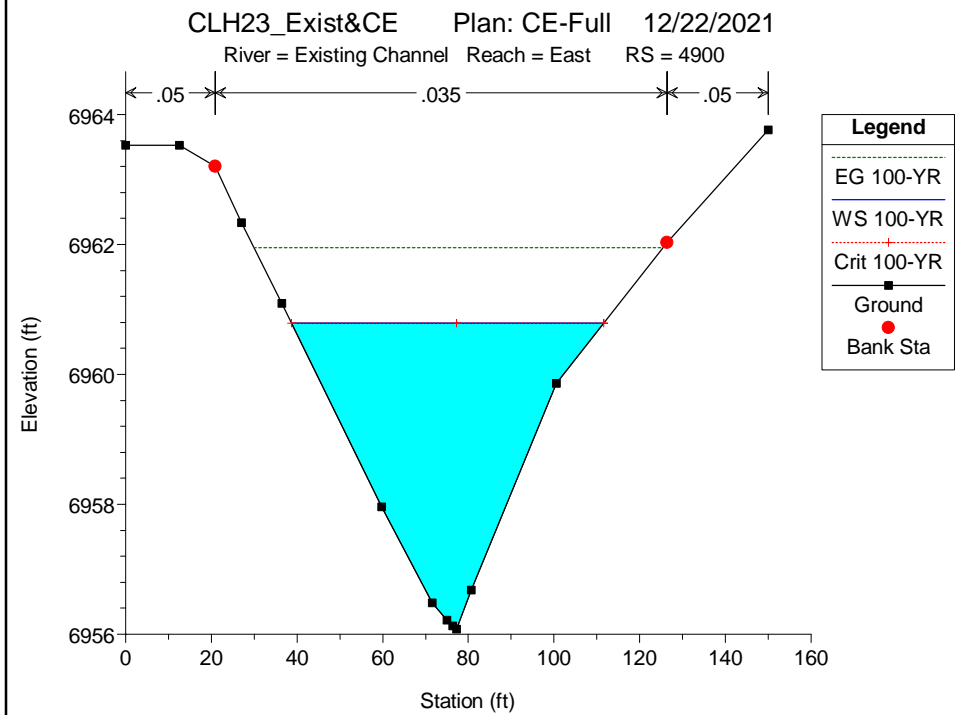
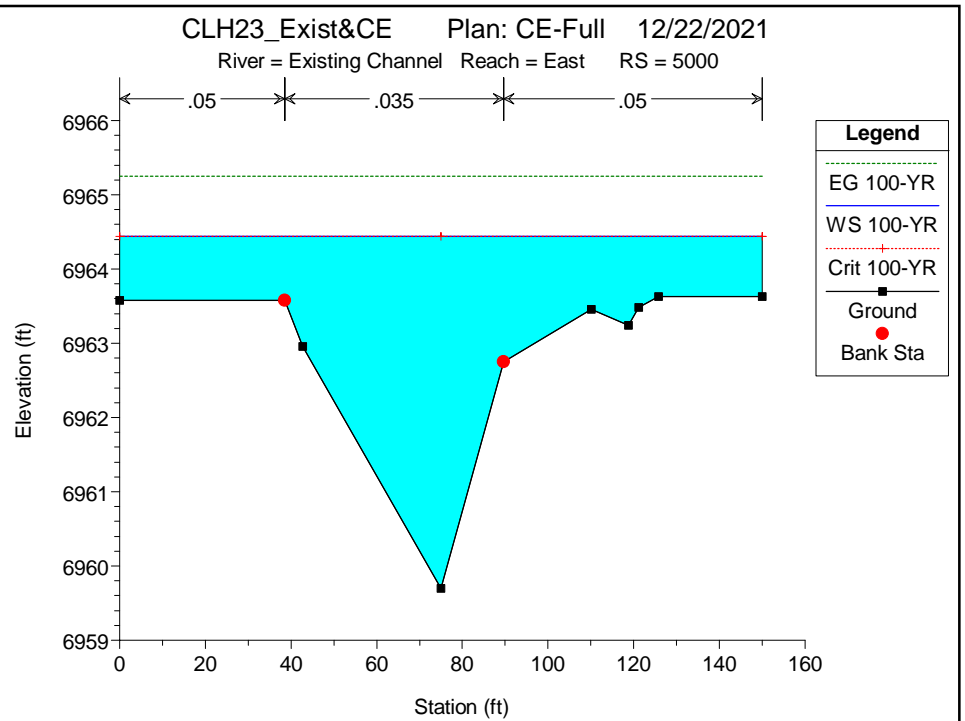
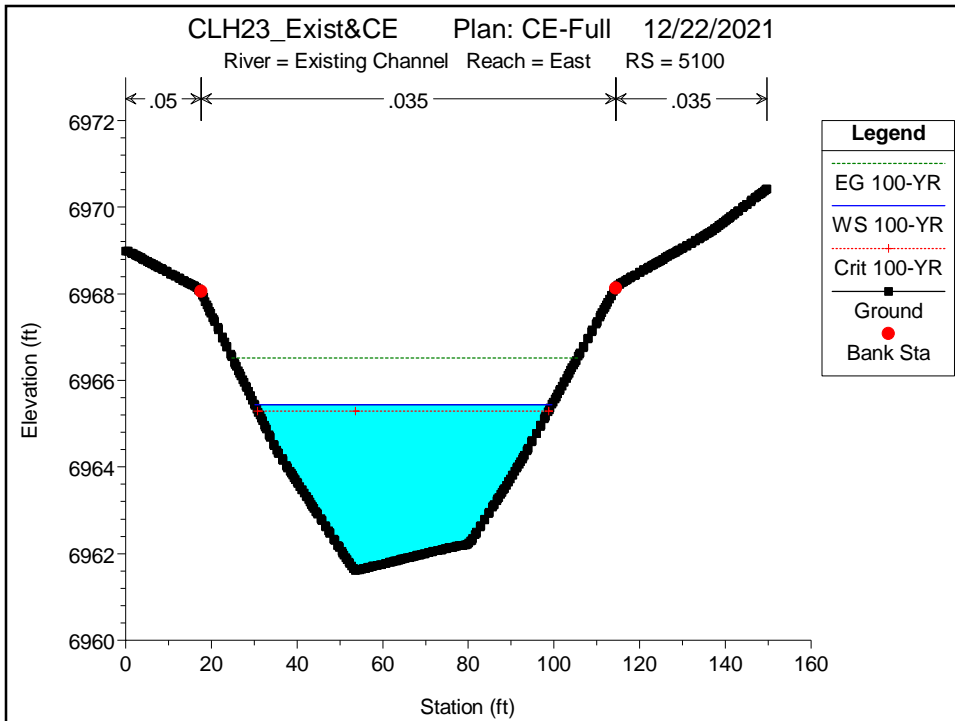


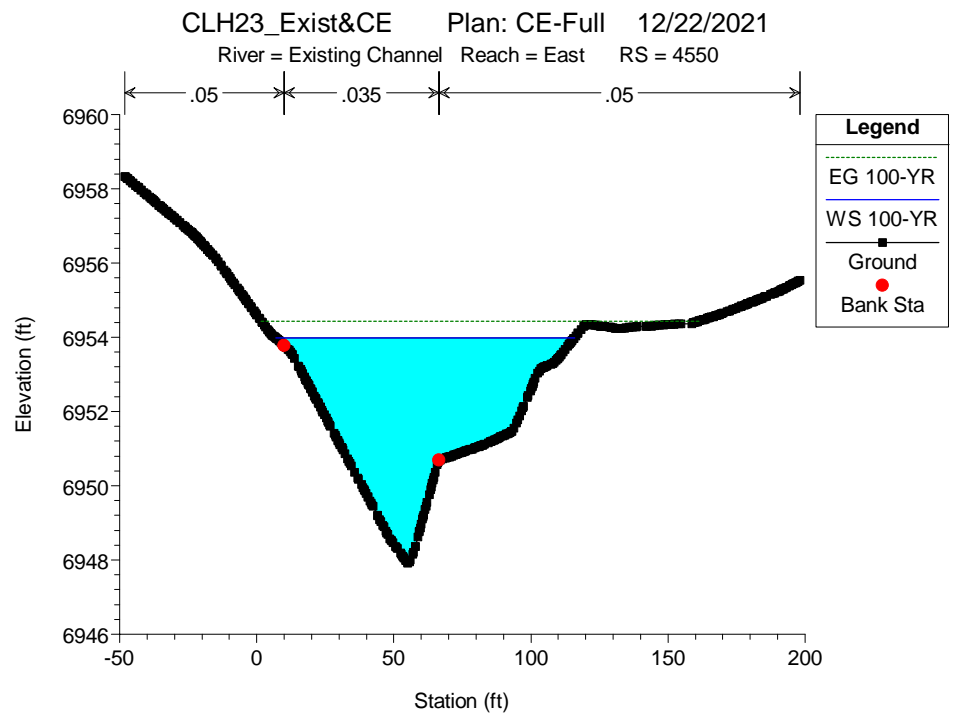
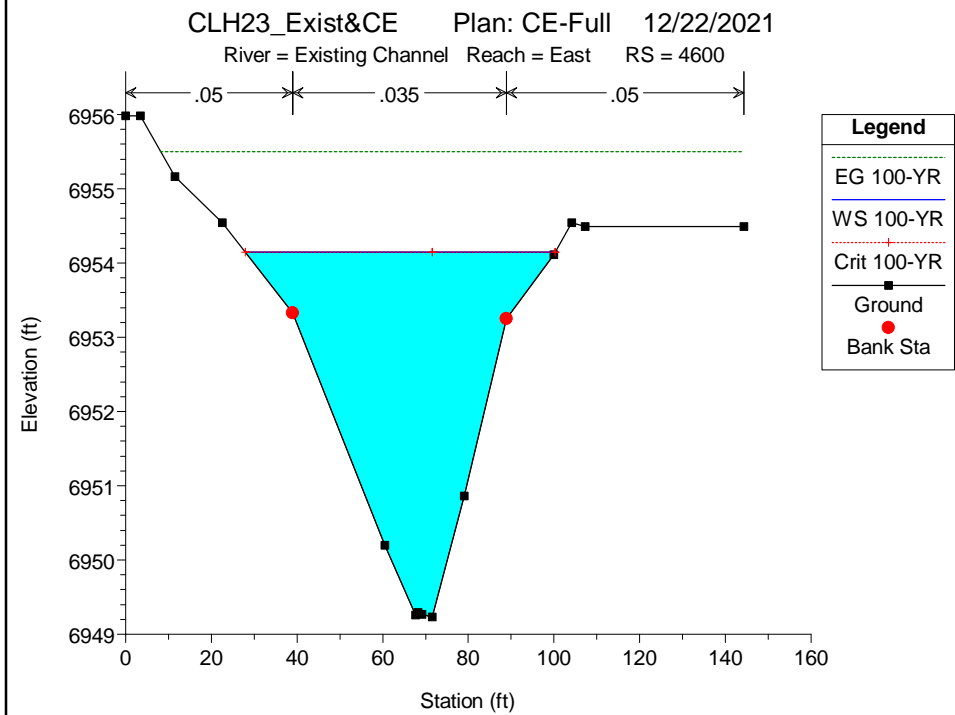
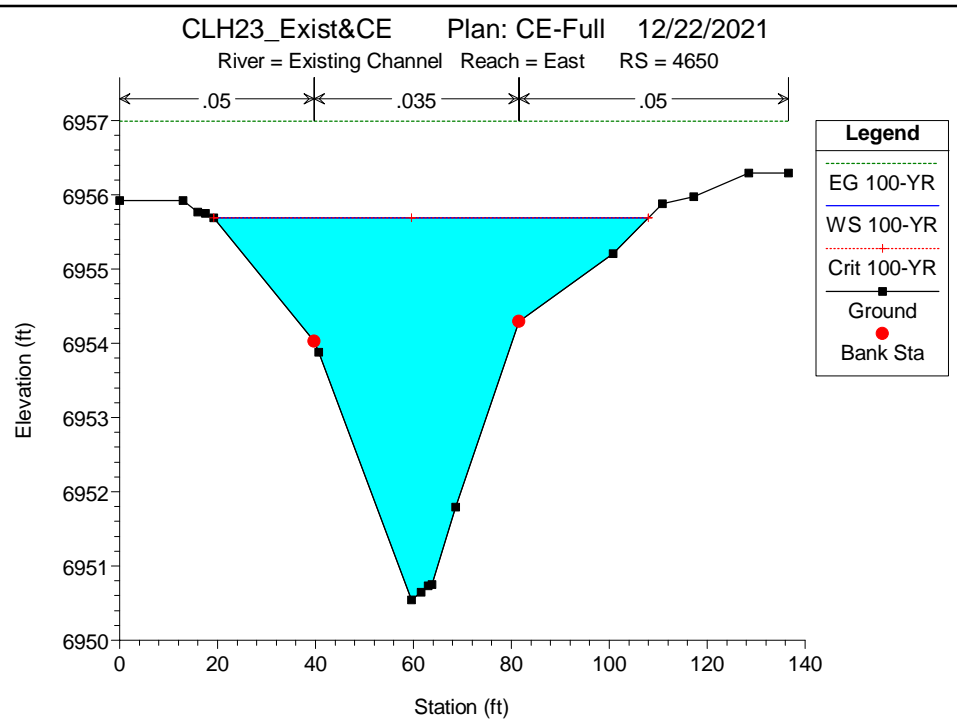
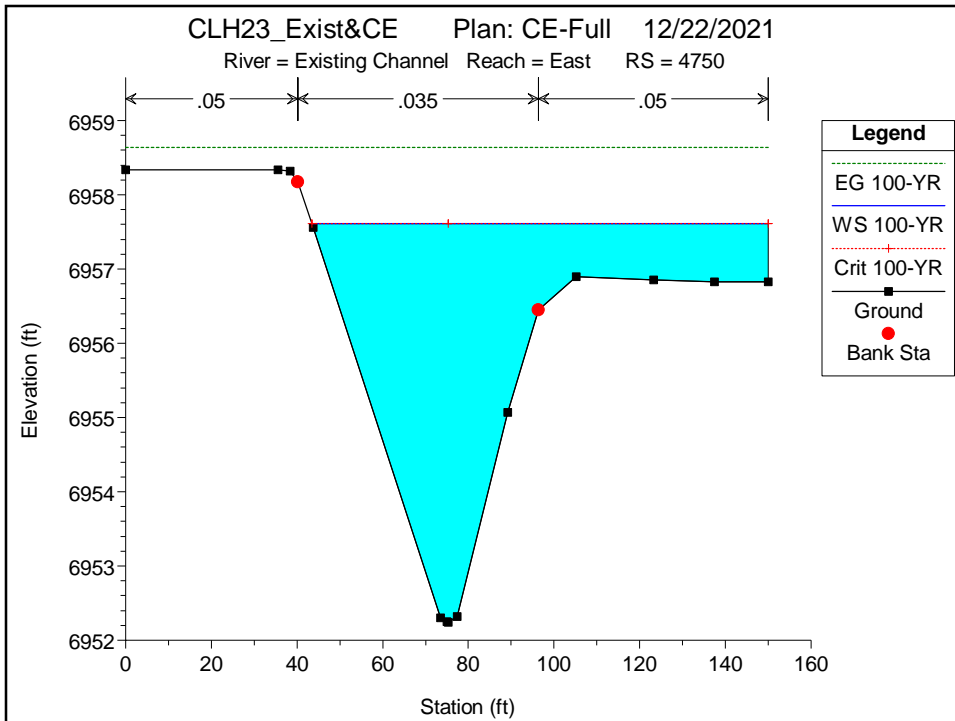
| Legend | |
|-------------|--|
| EG 100-YR | |
| WS 100-YR | |
| Crit 100-YR | |
| Ground | |

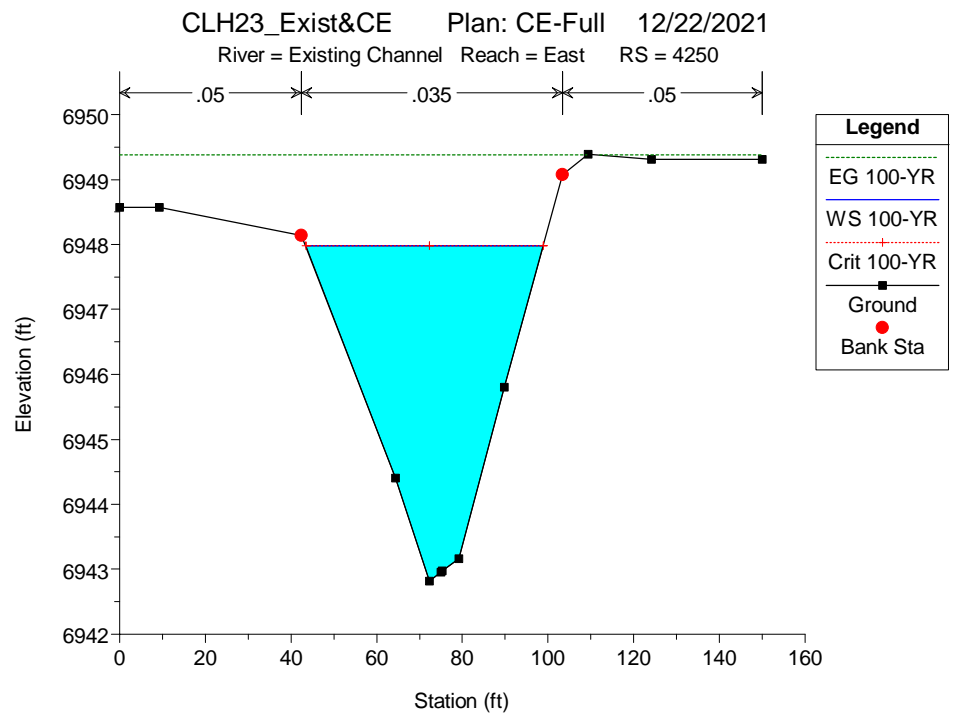
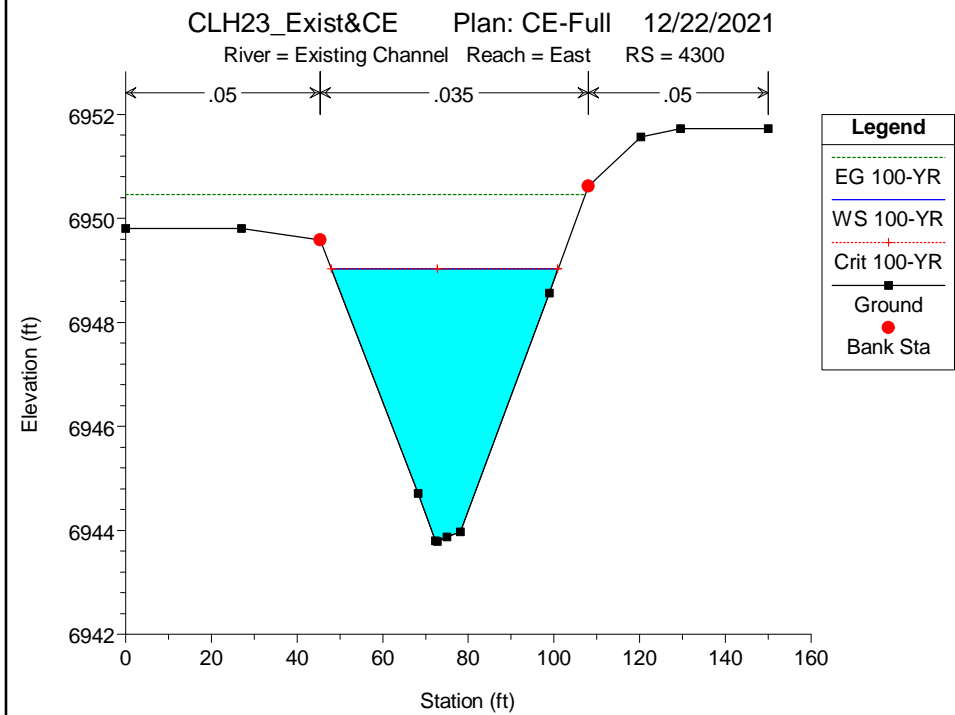
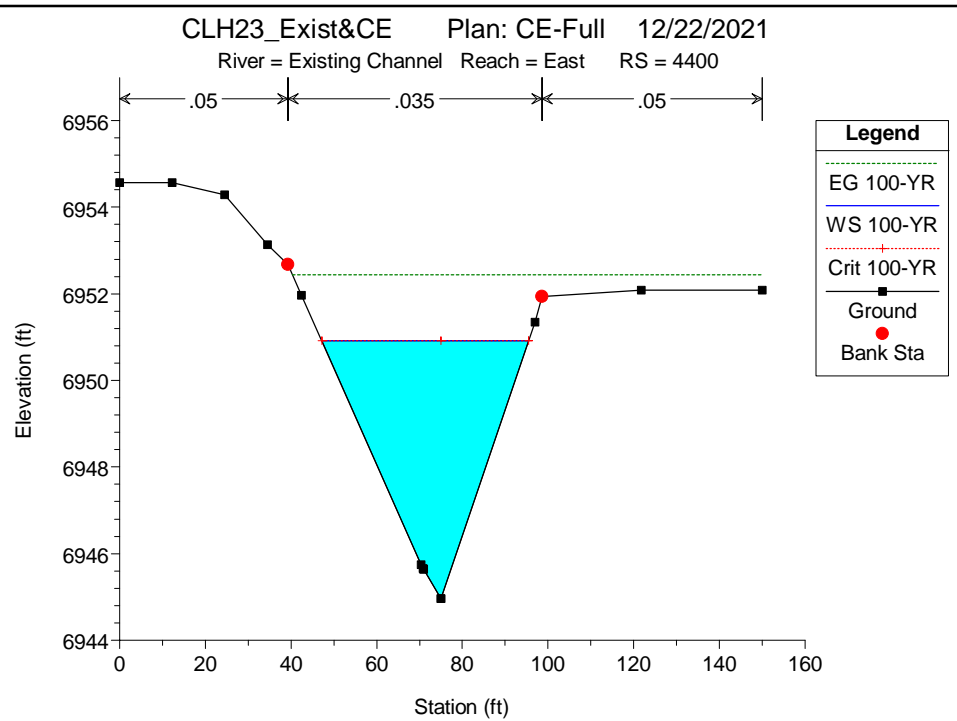
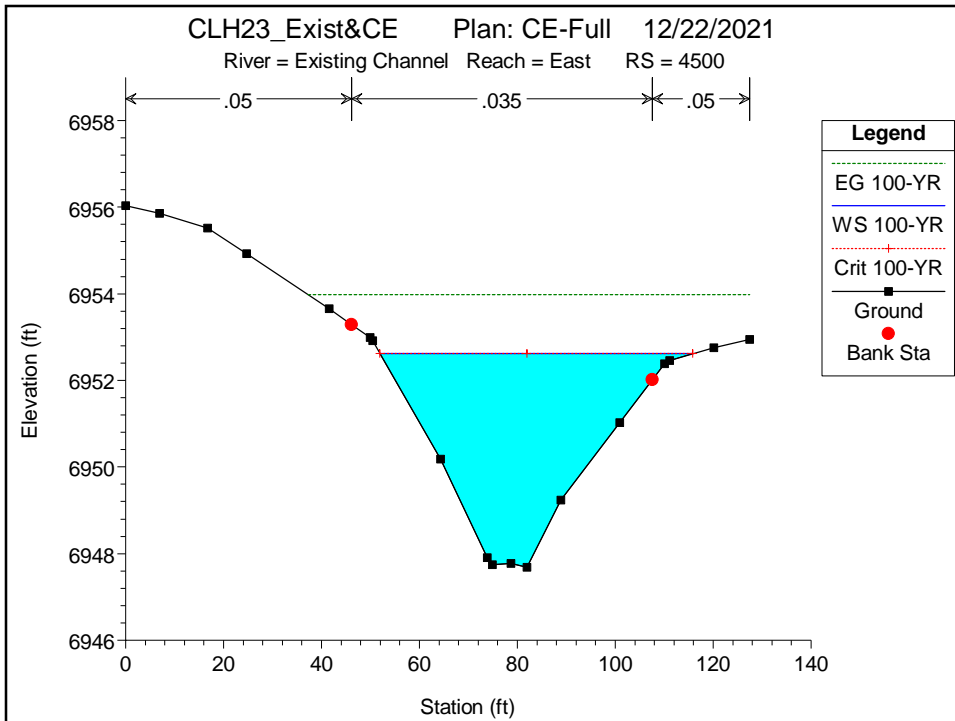


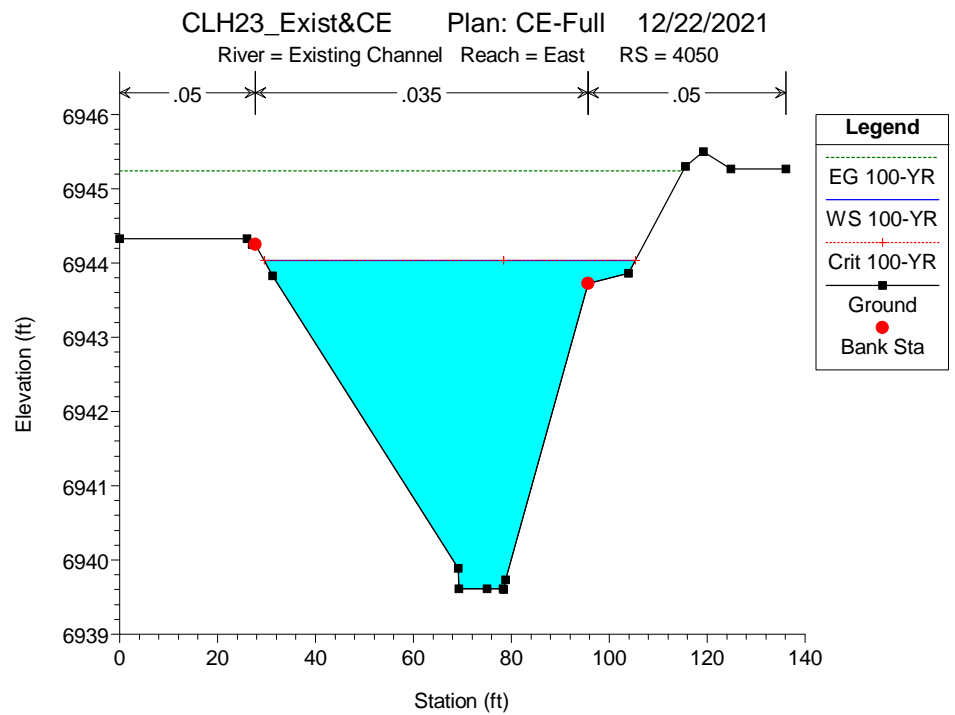
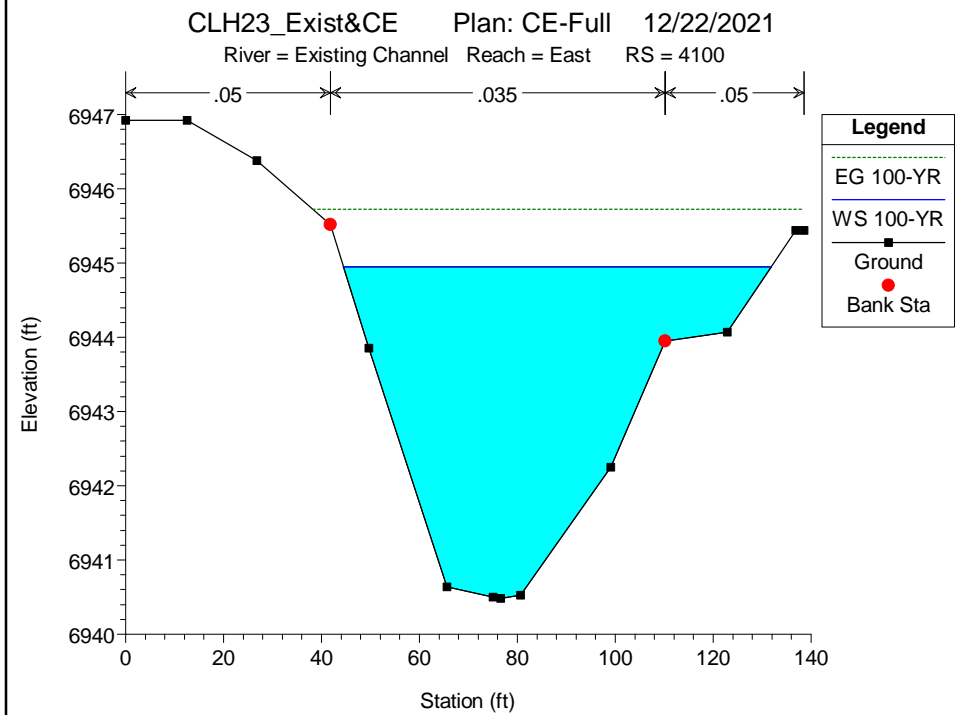
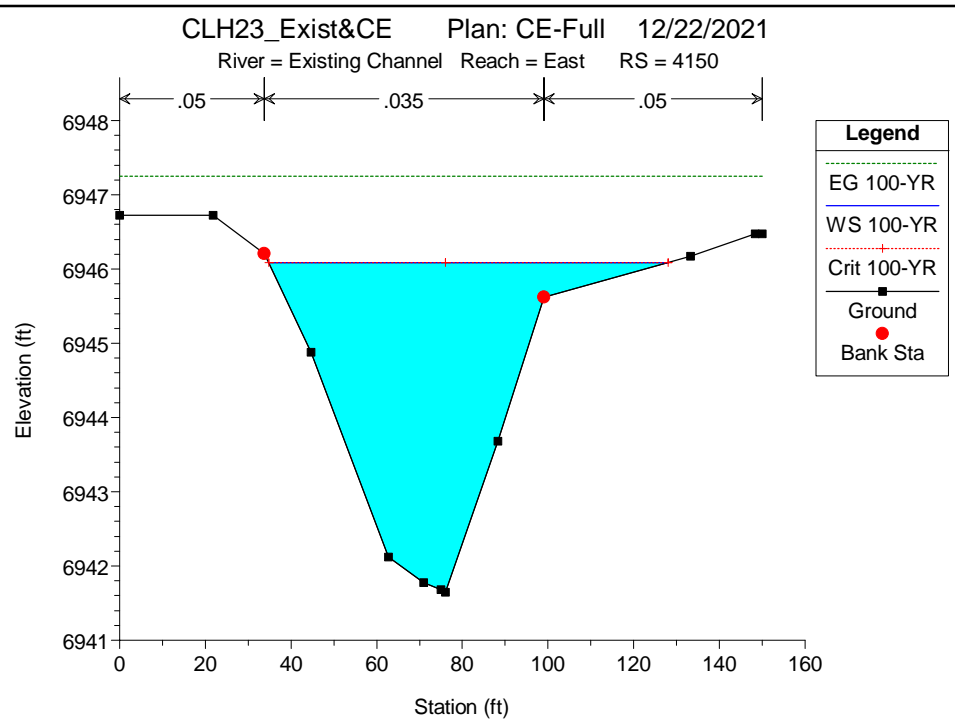
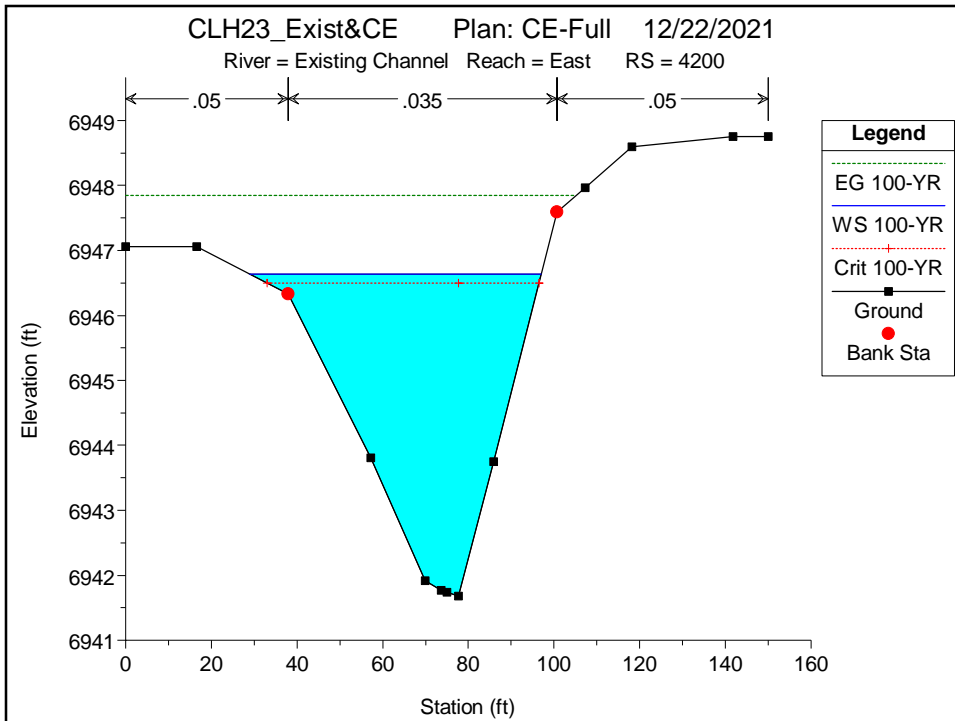
ATTACHMENT H
Corrected Cross Sections

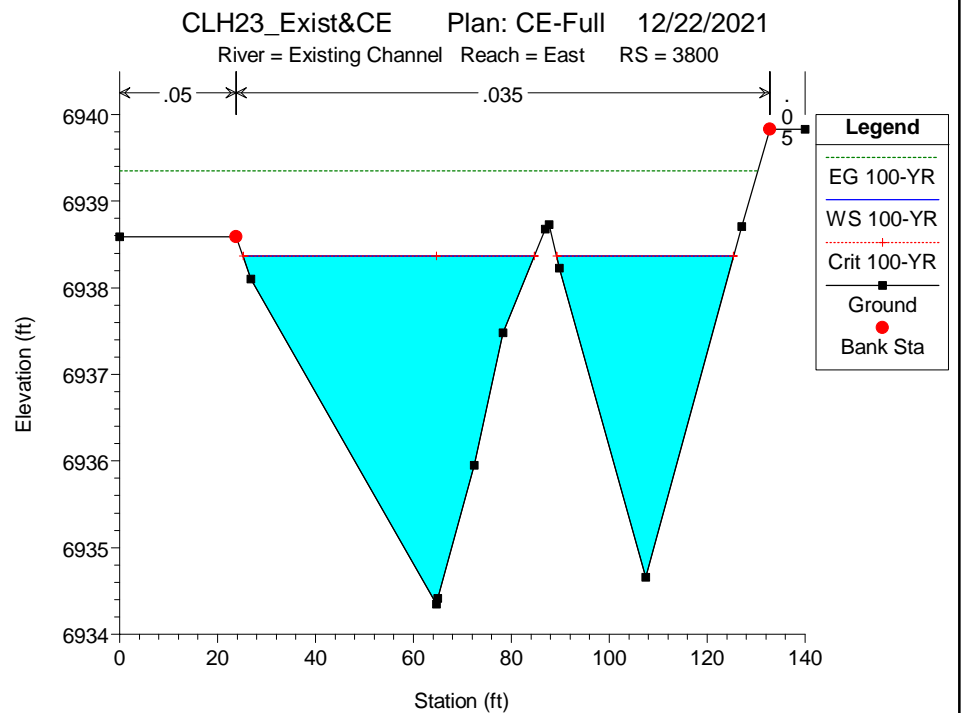
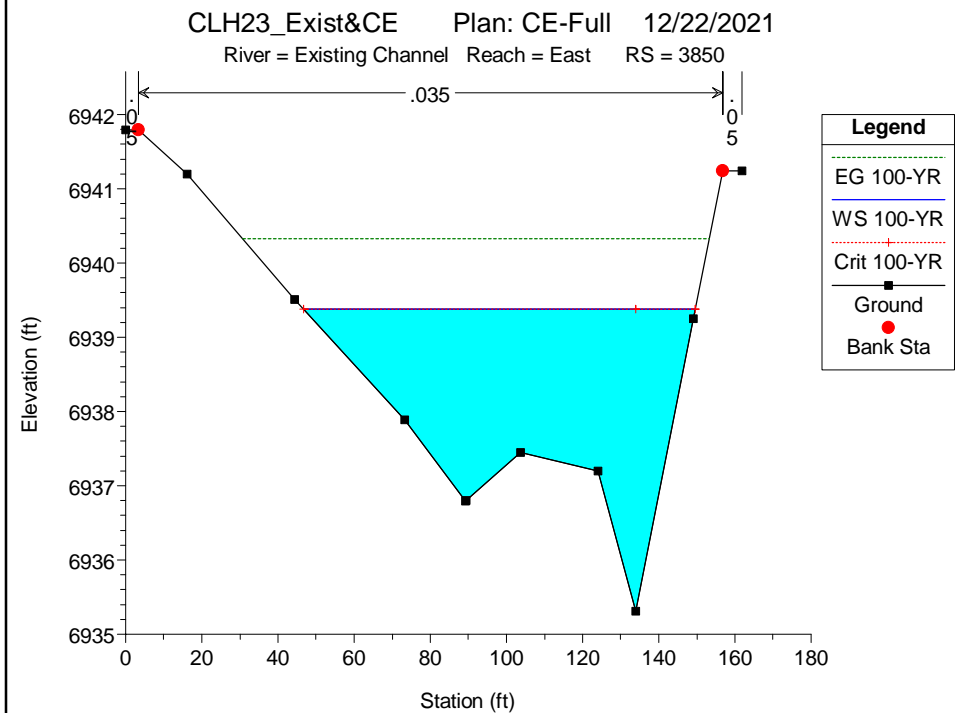
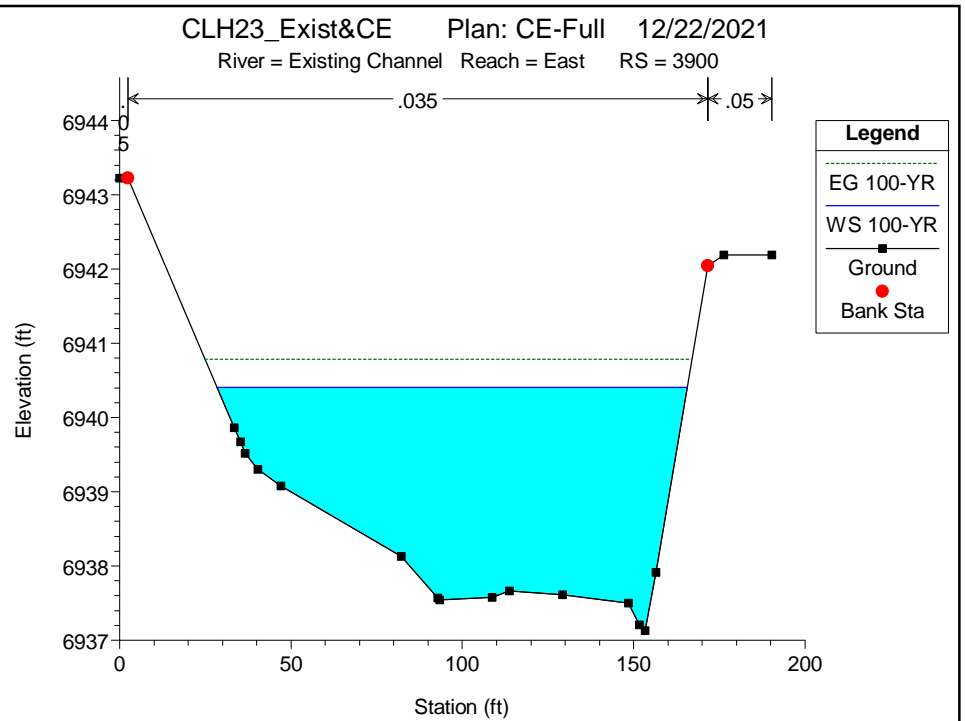
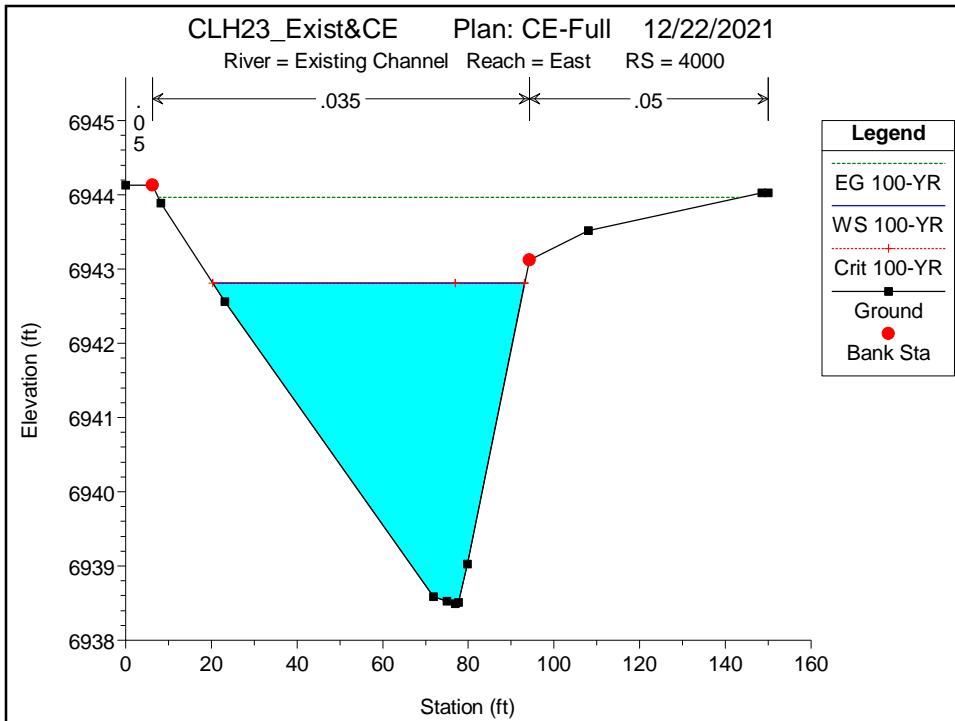


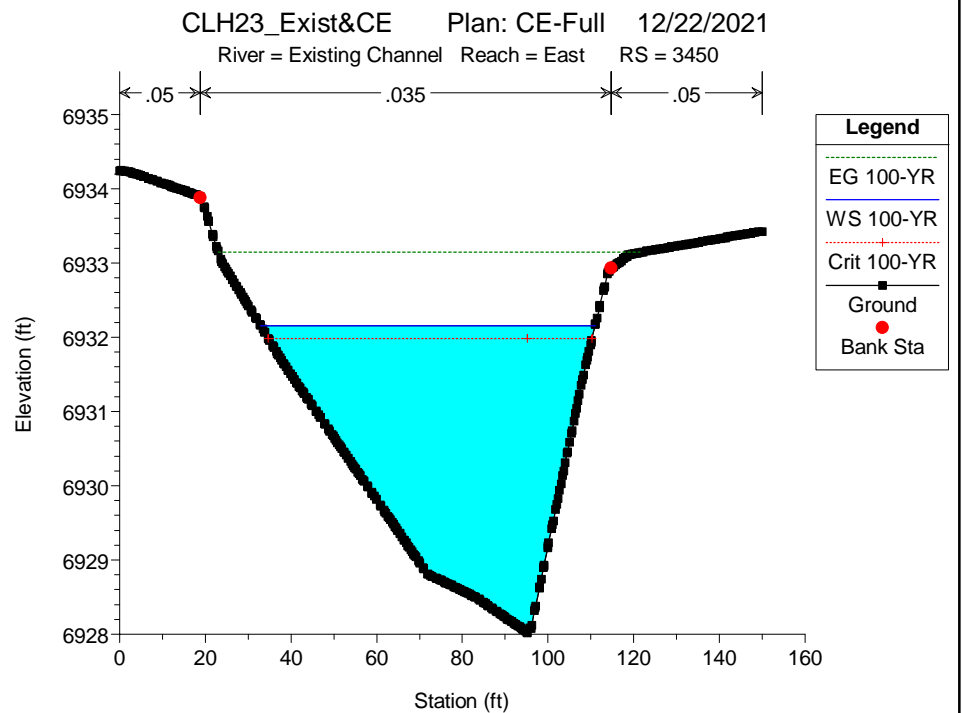
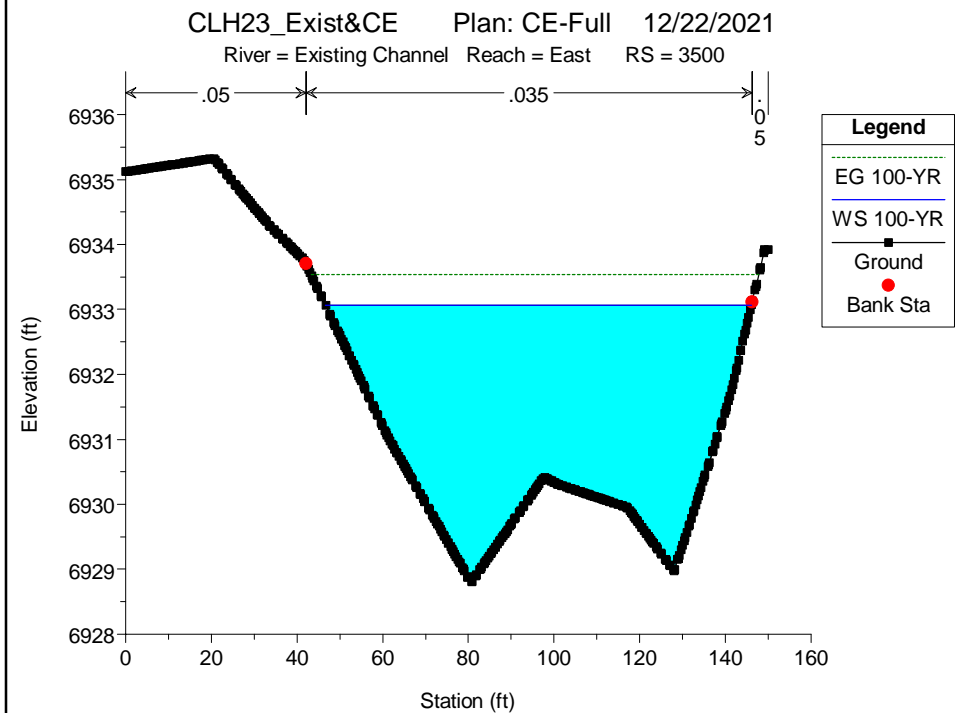
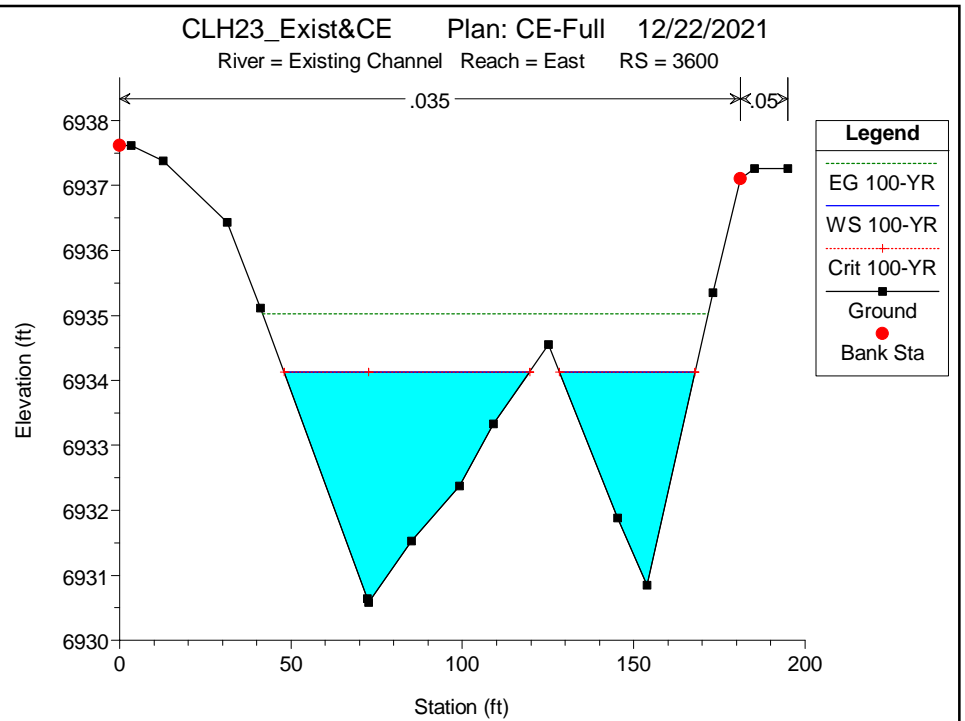
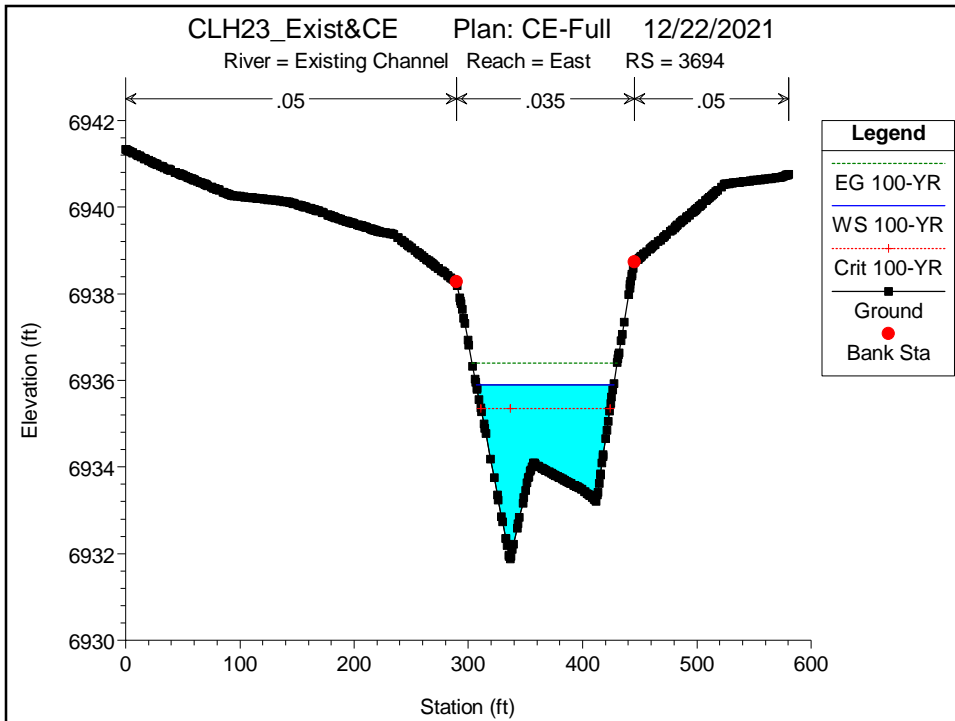


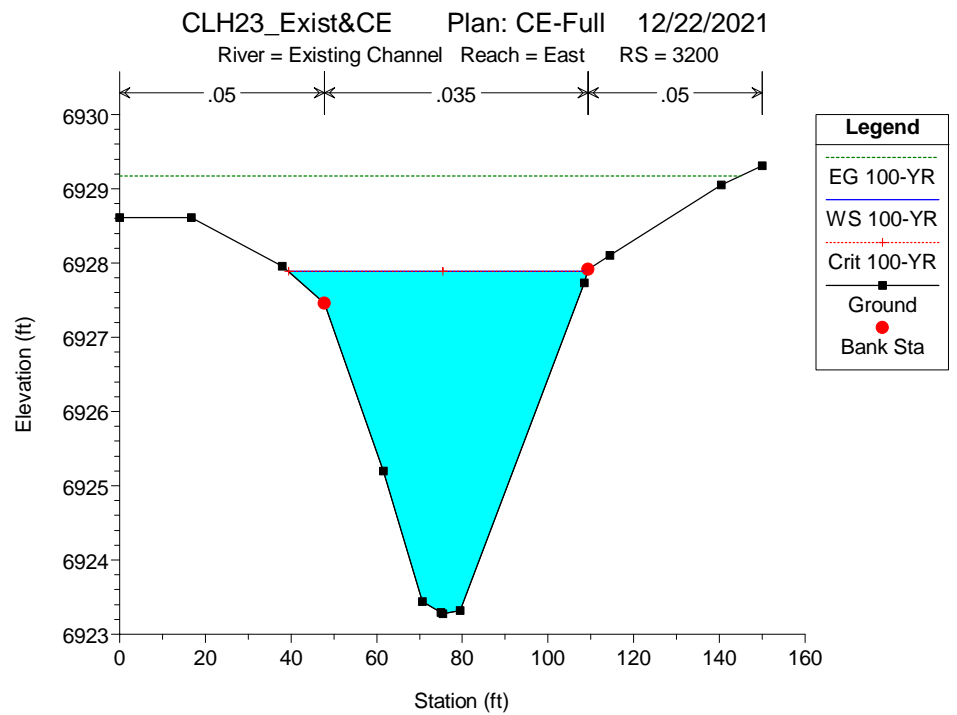
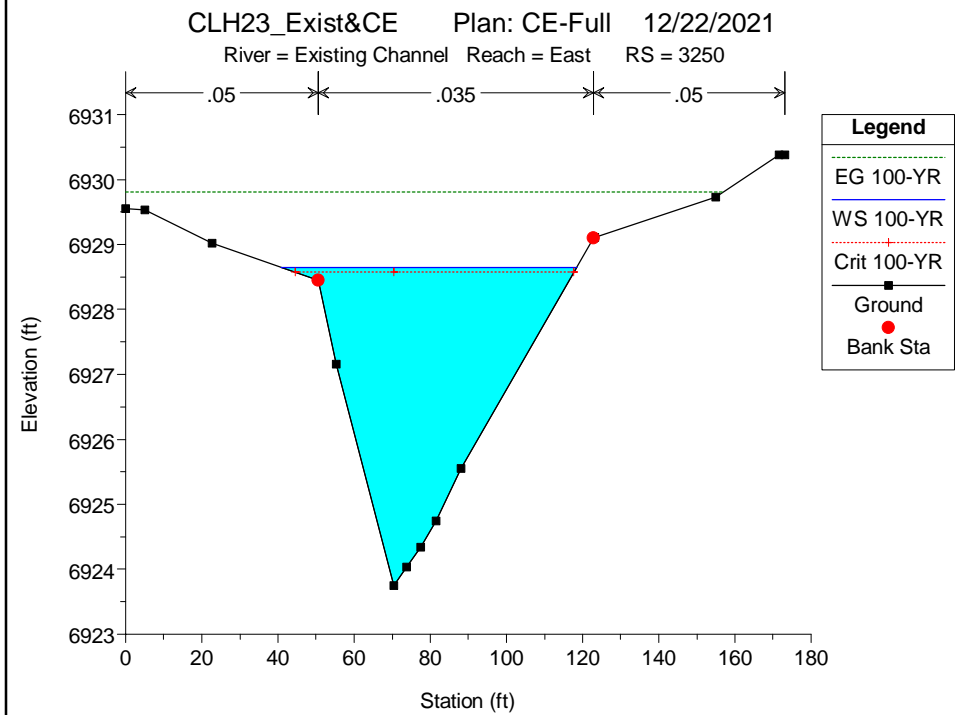
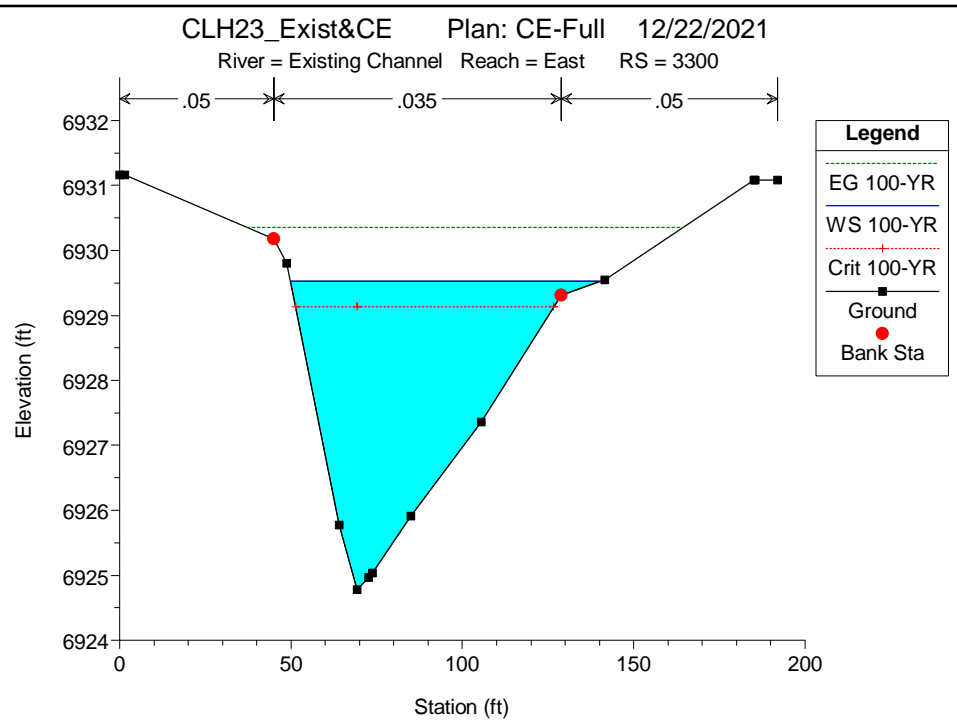
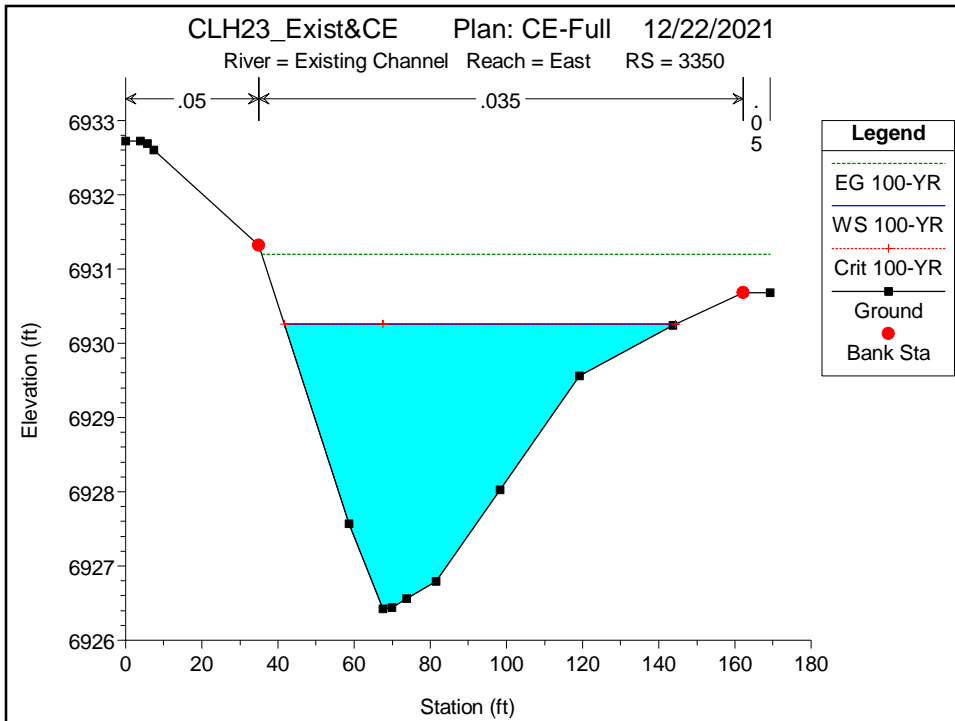


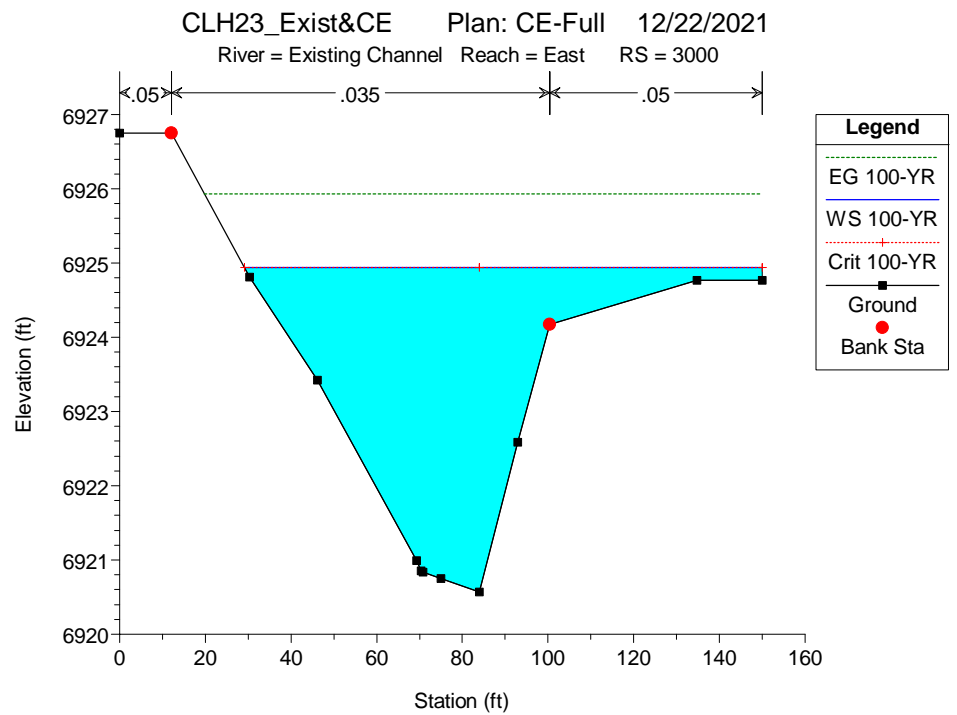
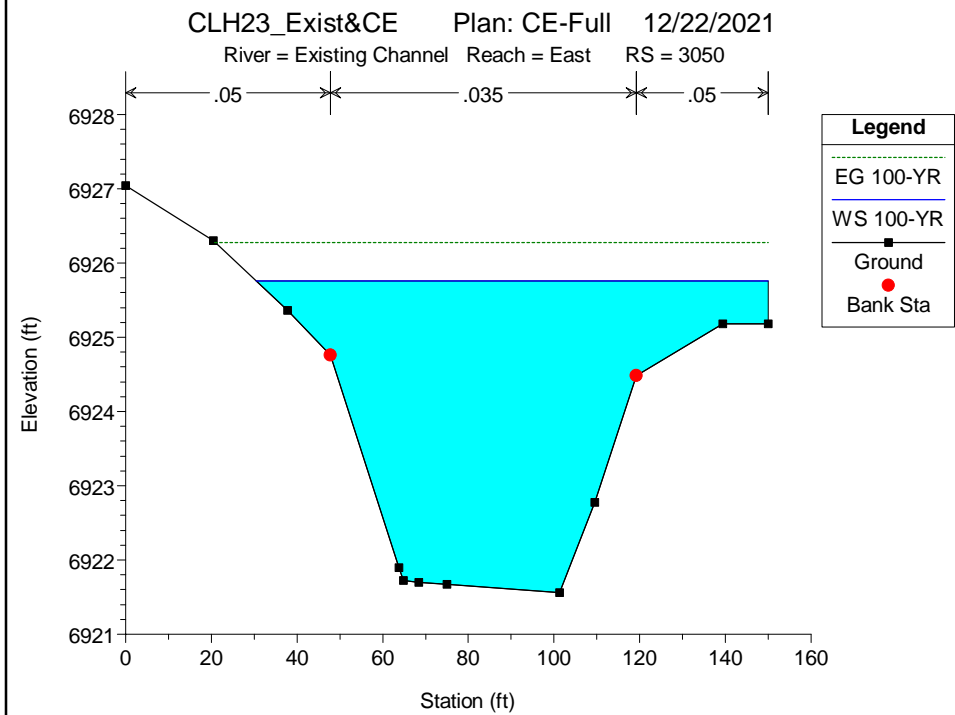
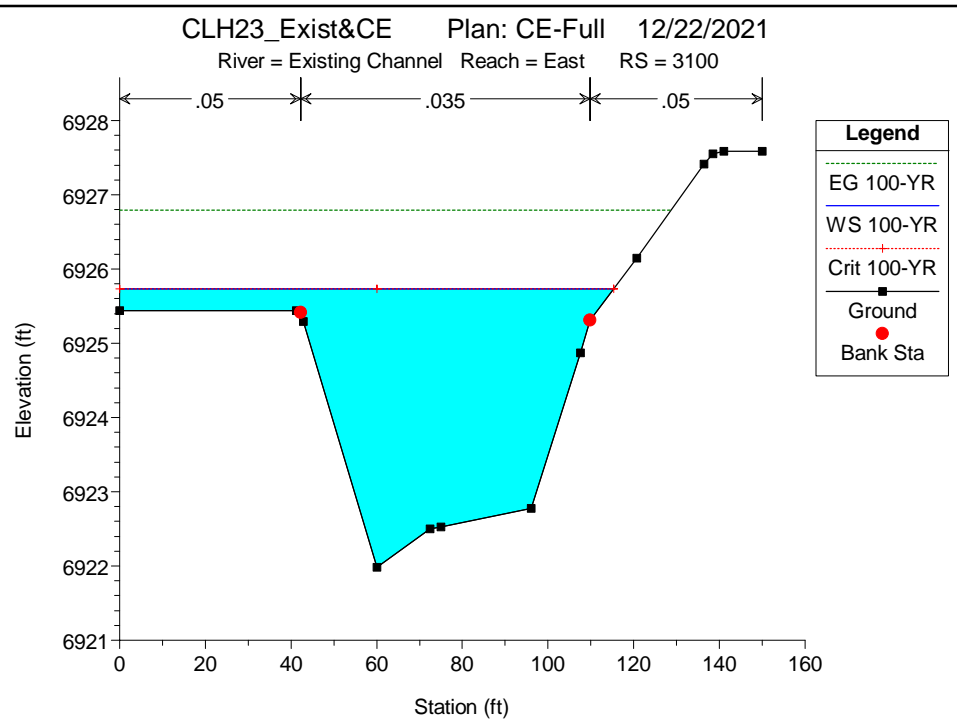
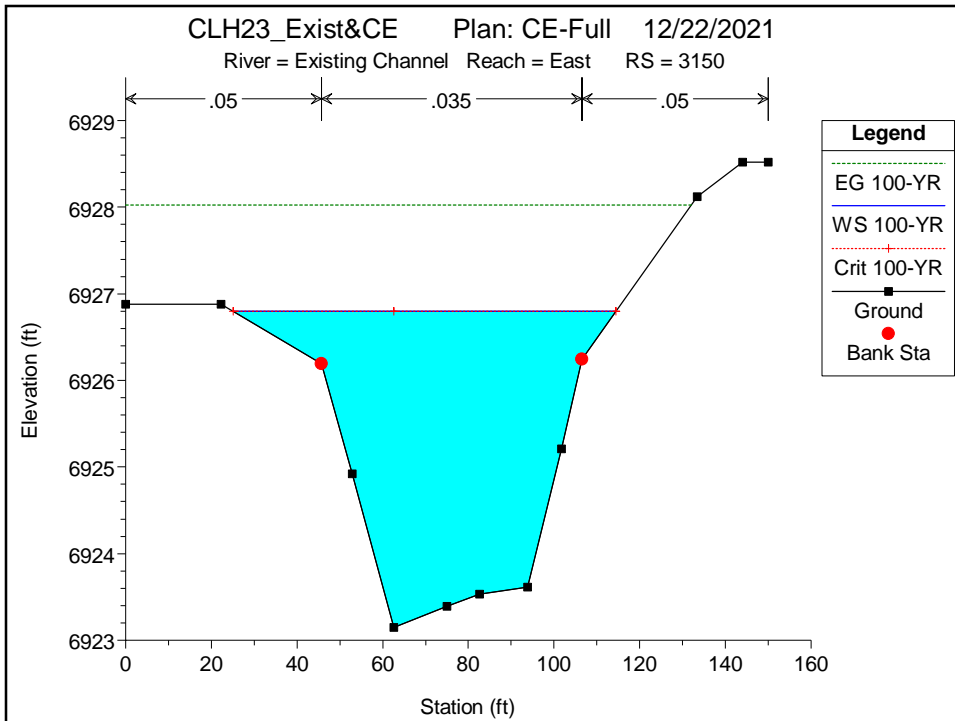


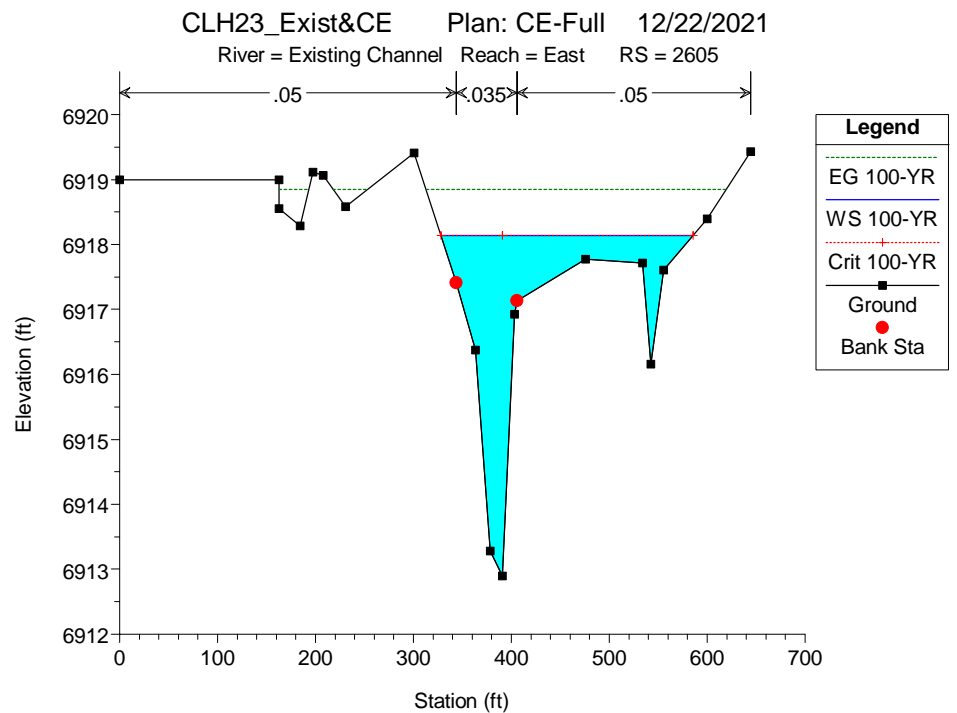
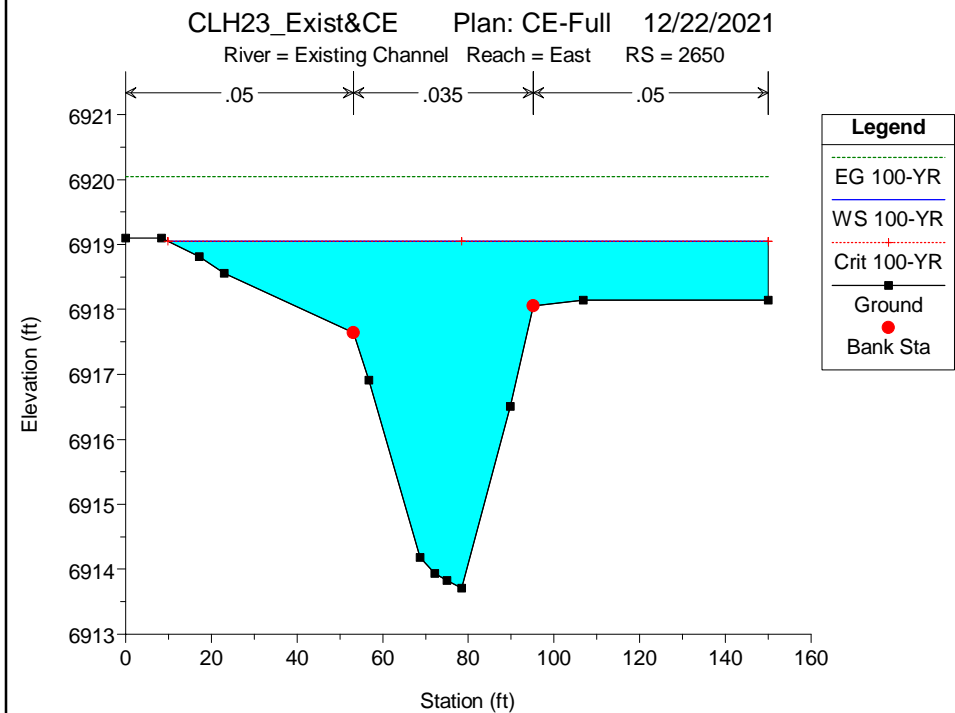
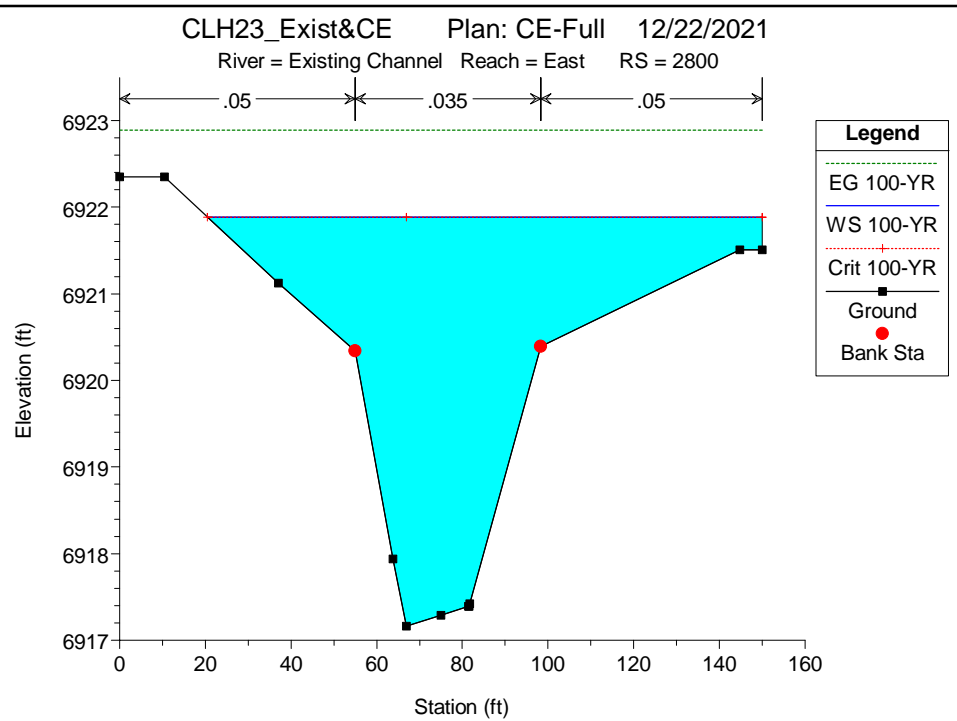
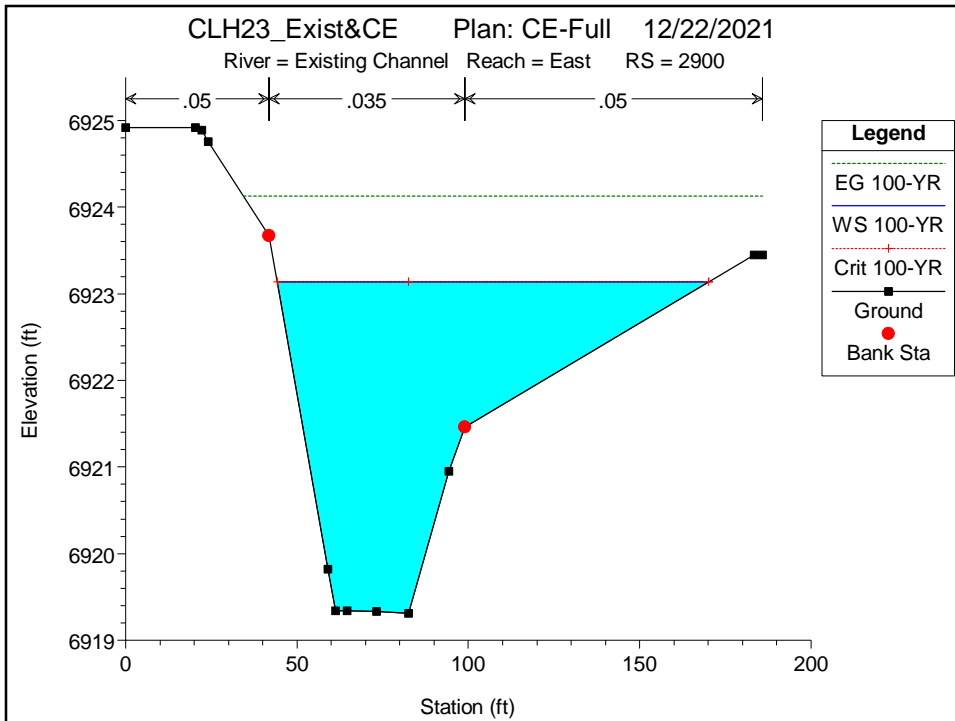


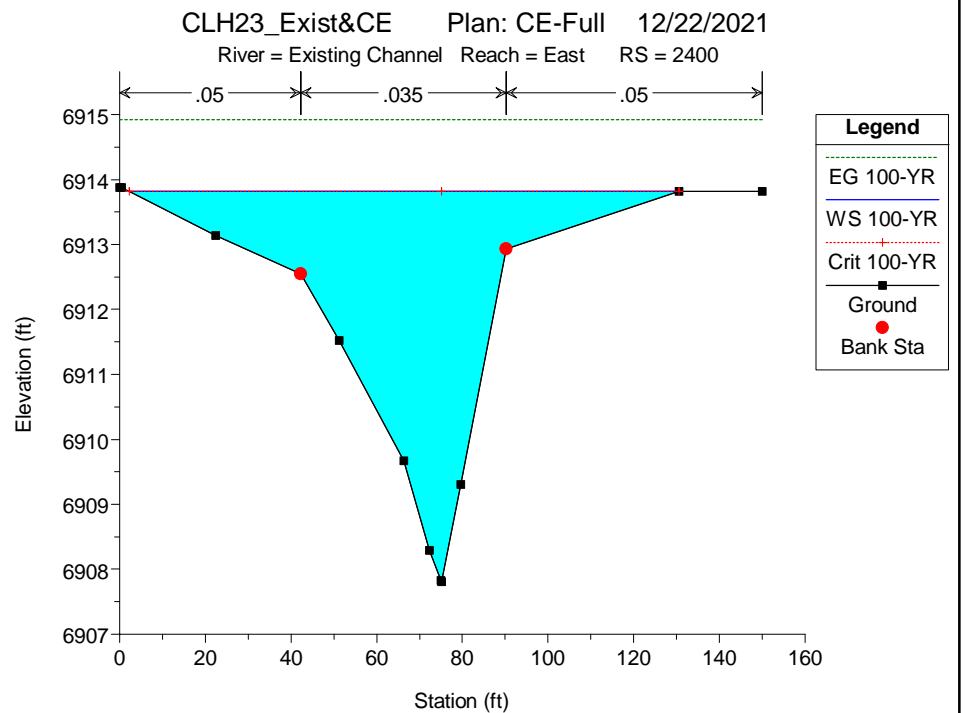
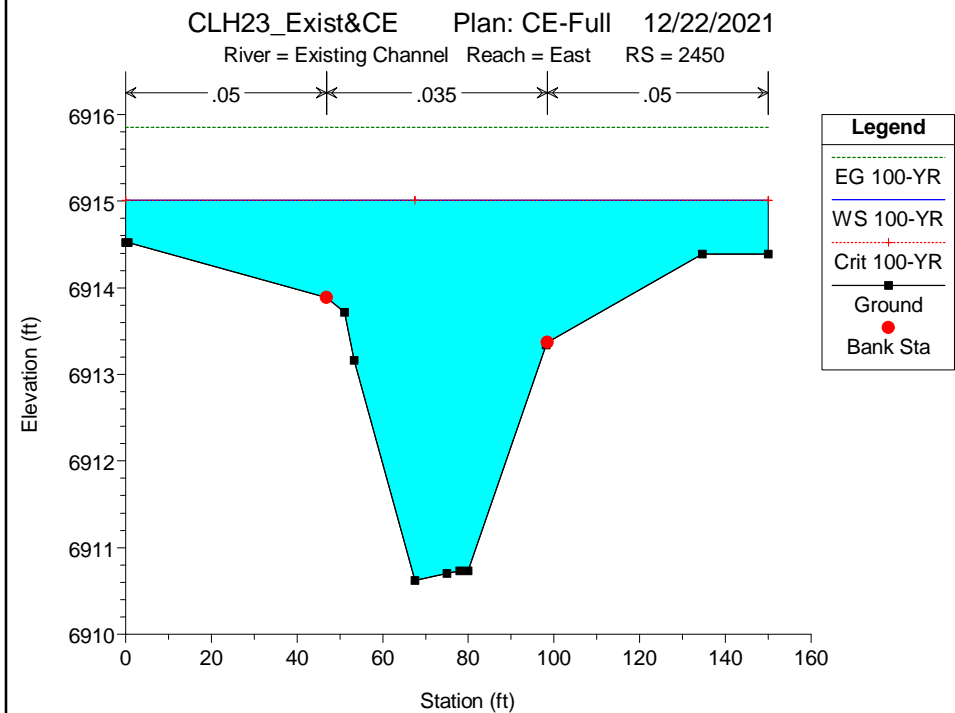
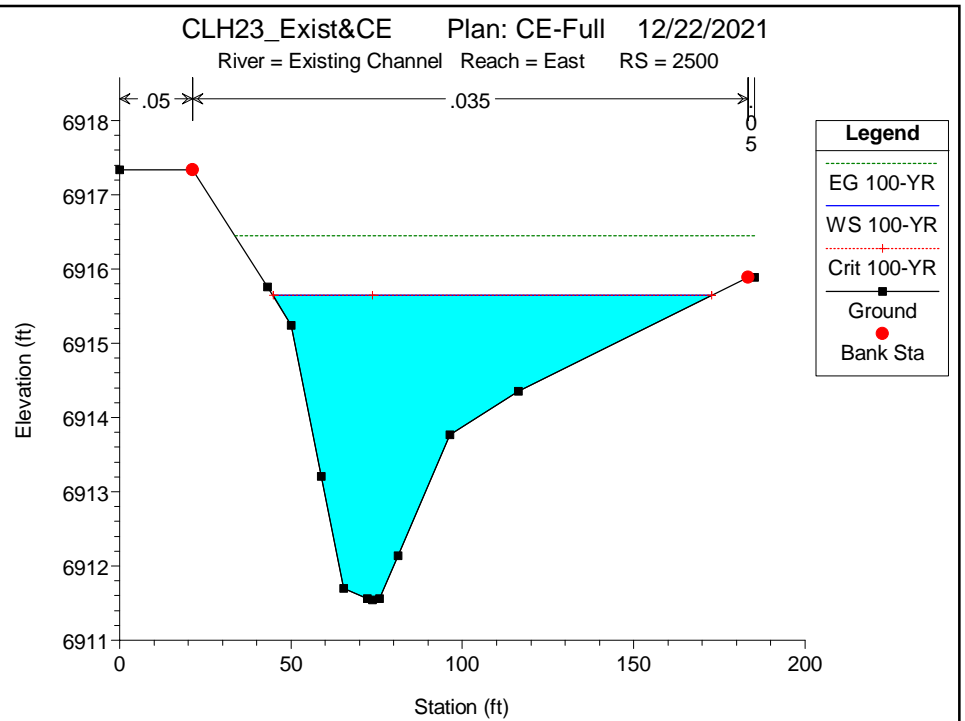
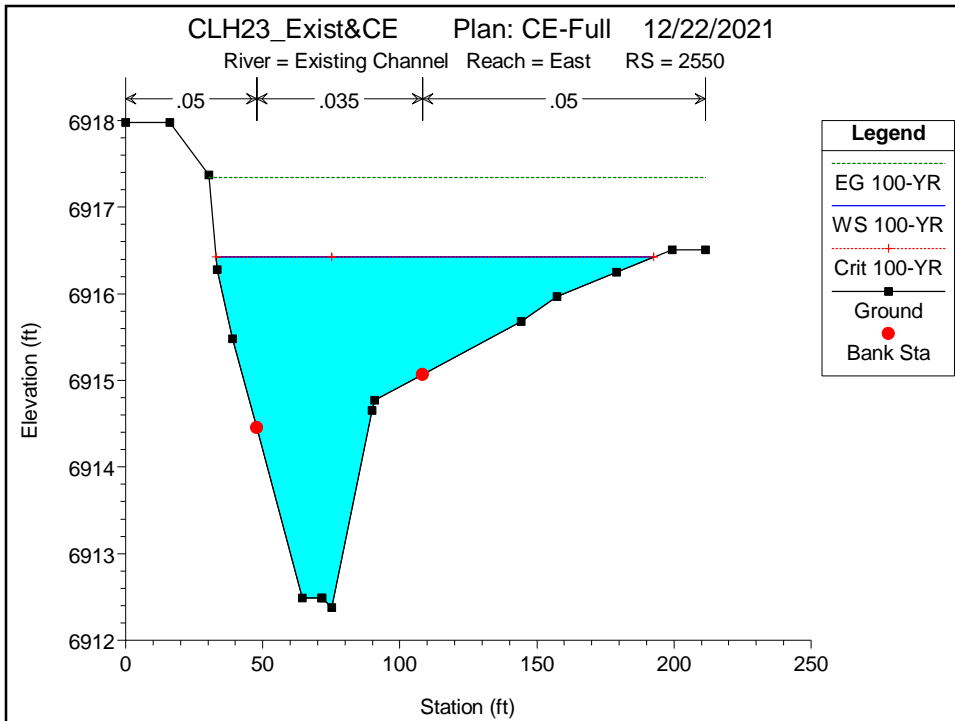


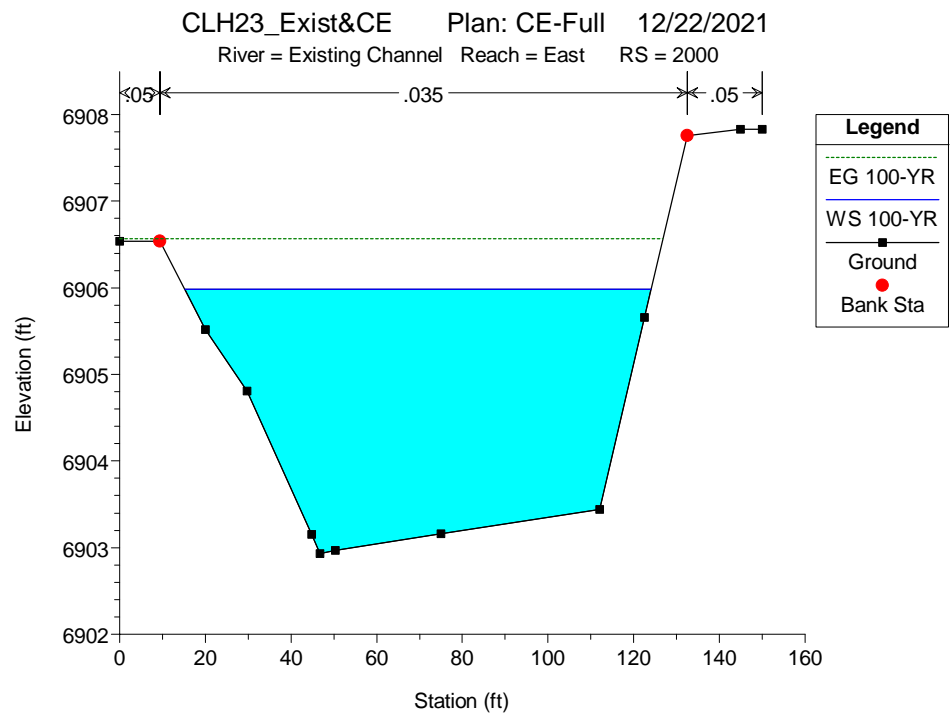
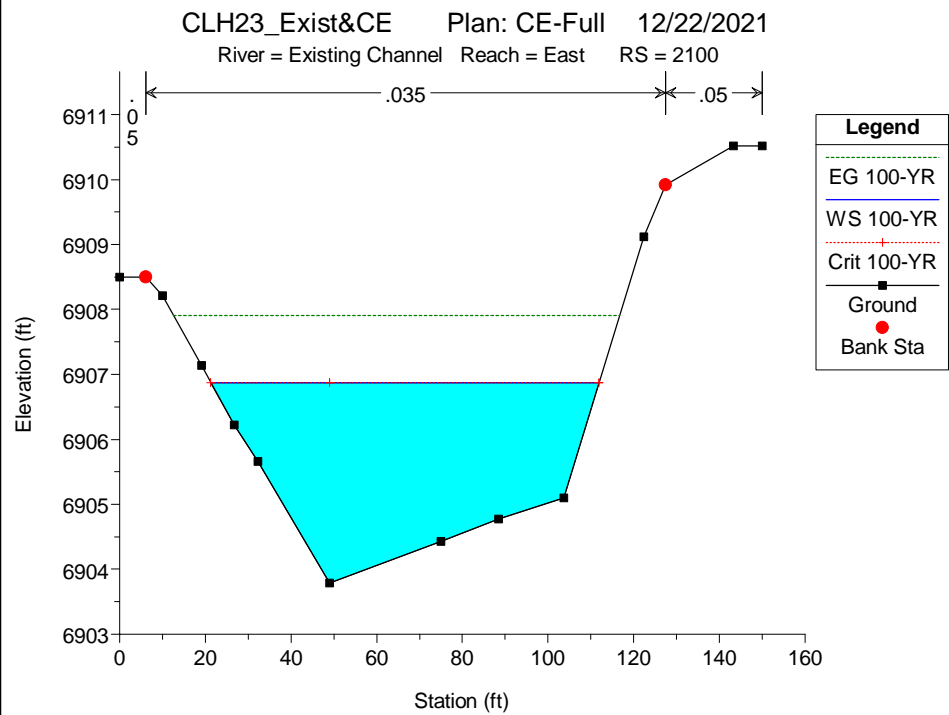
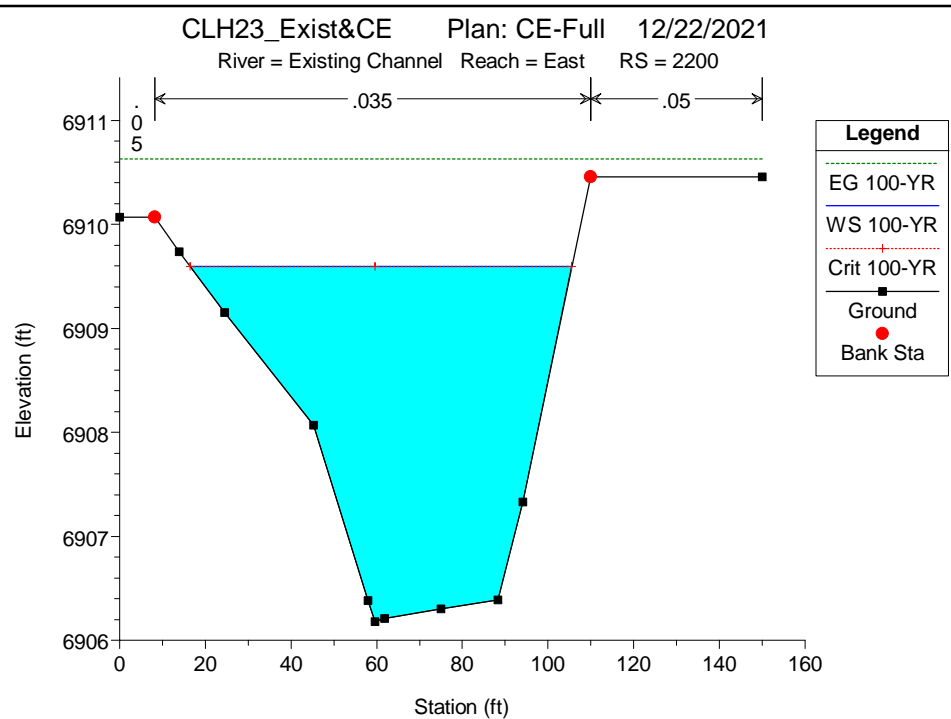
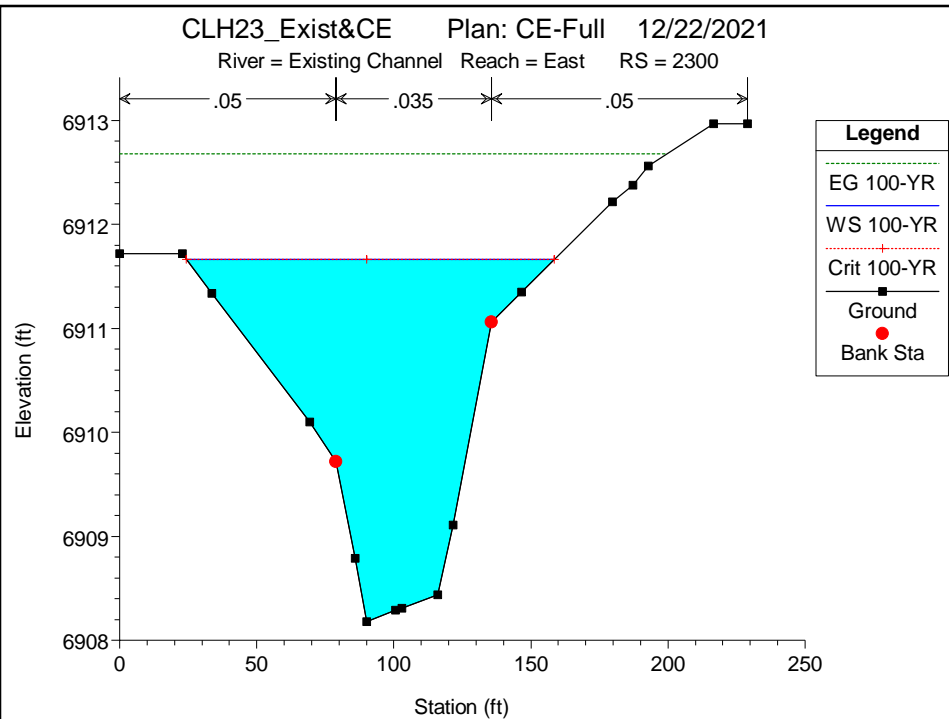


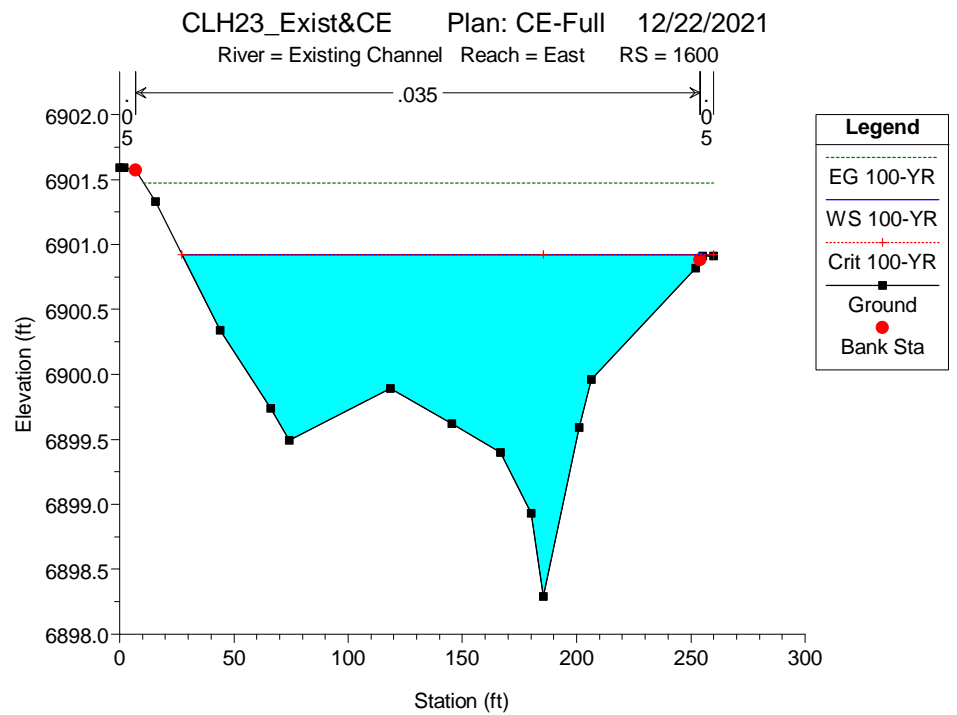
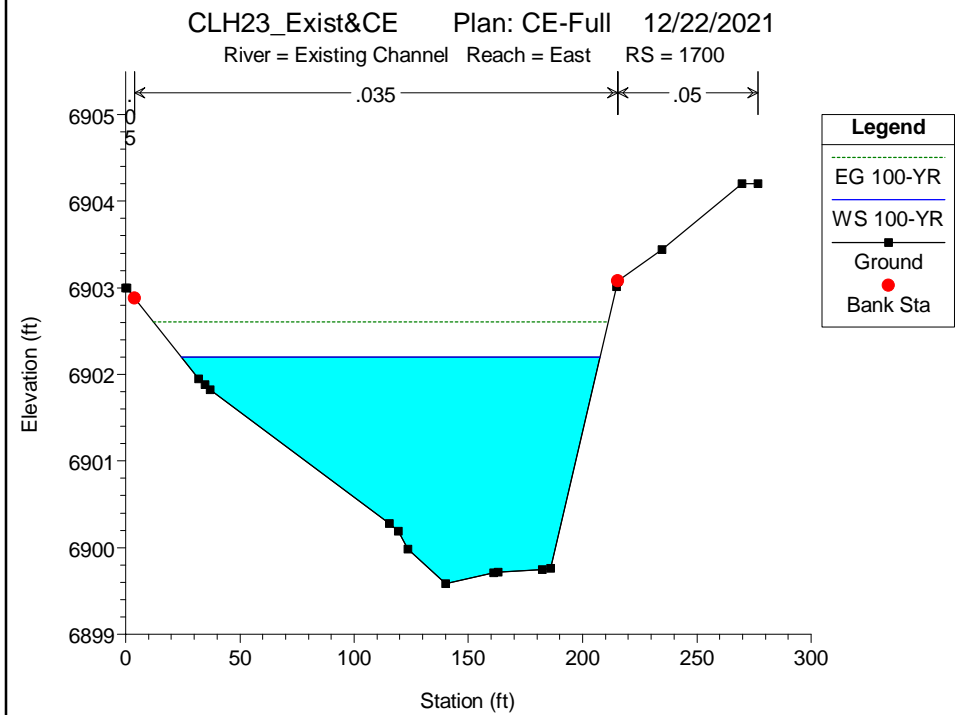
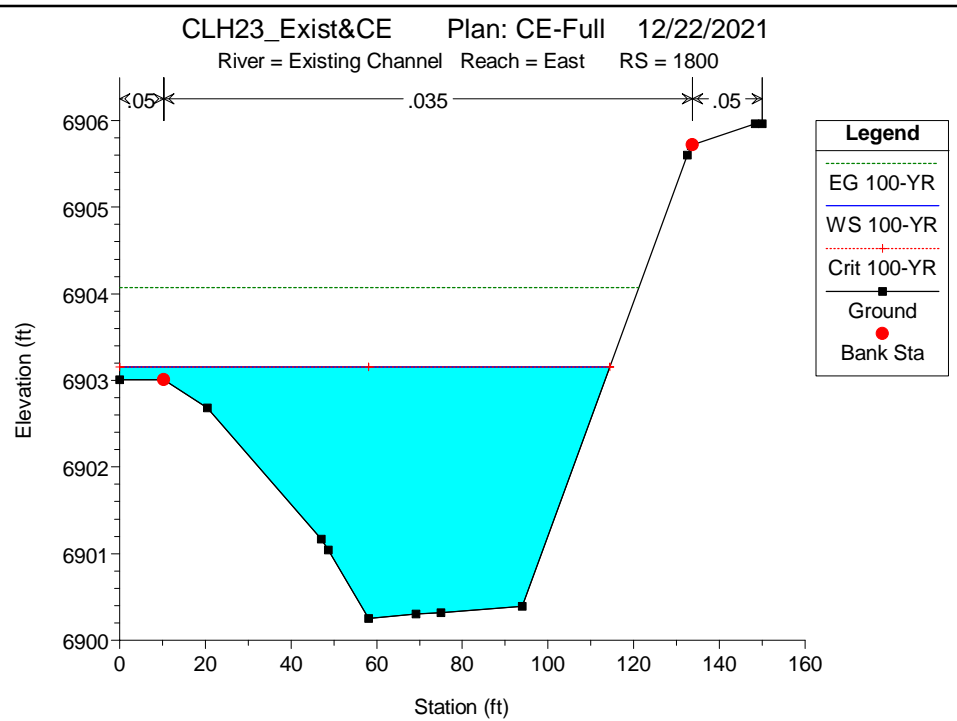
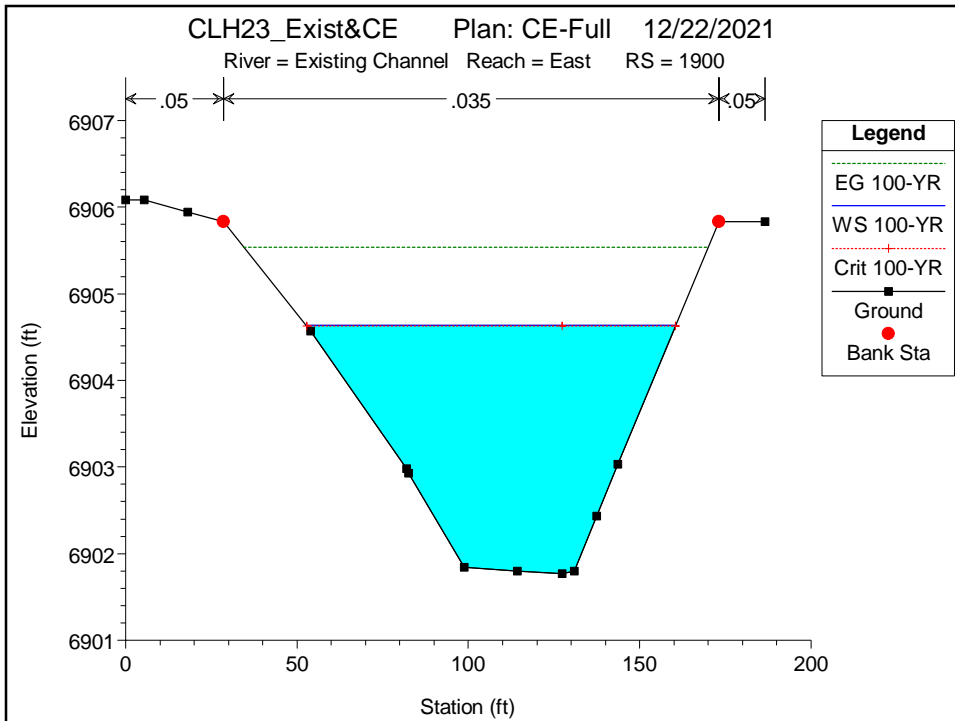


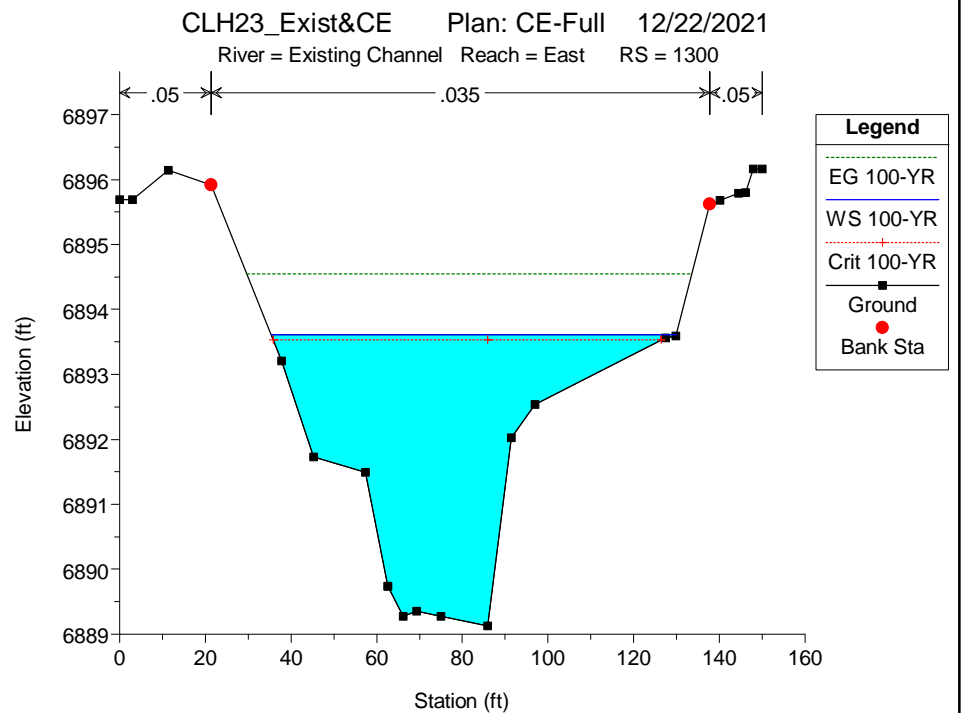
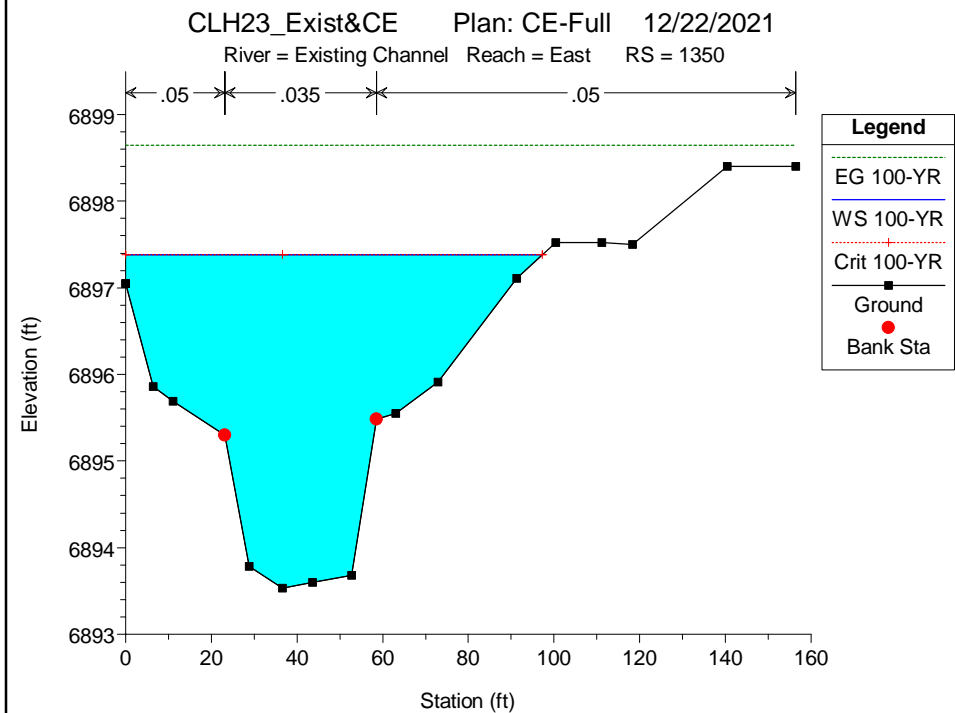
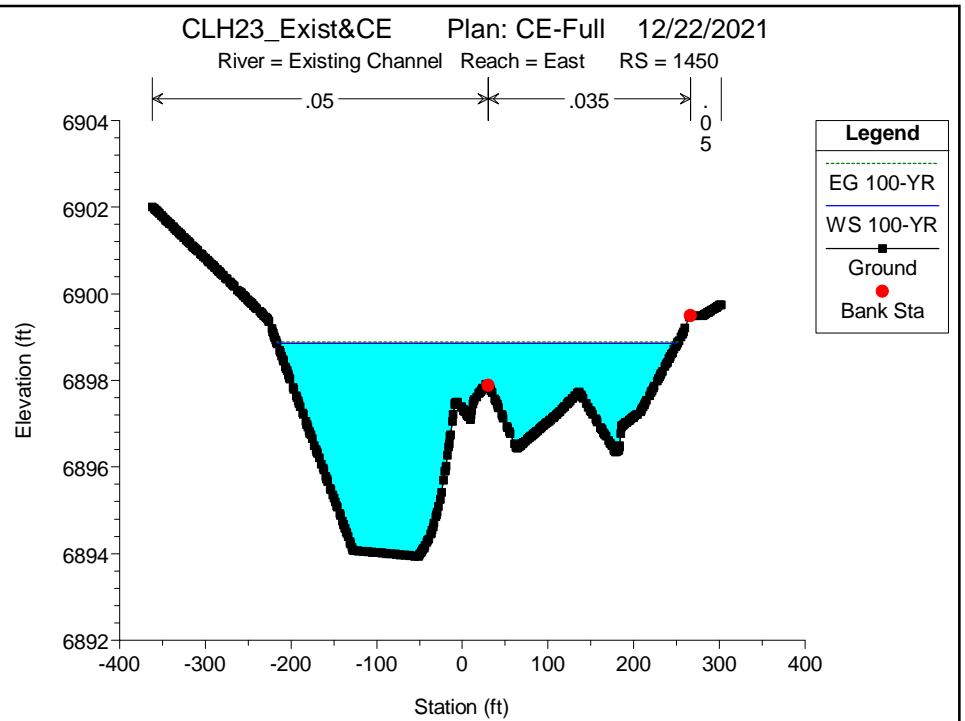
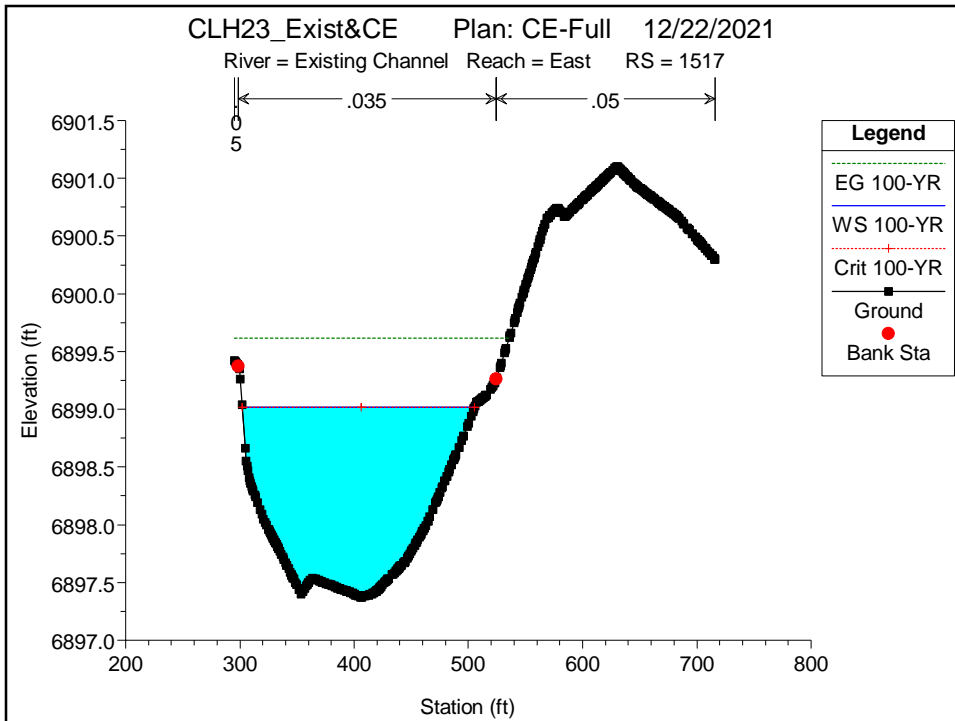


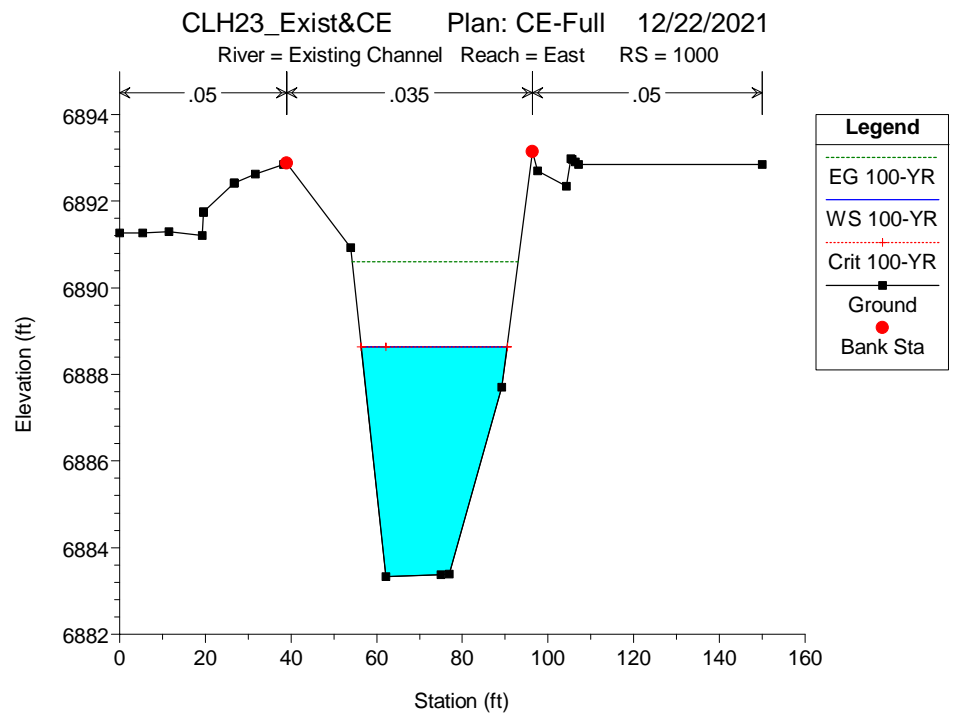
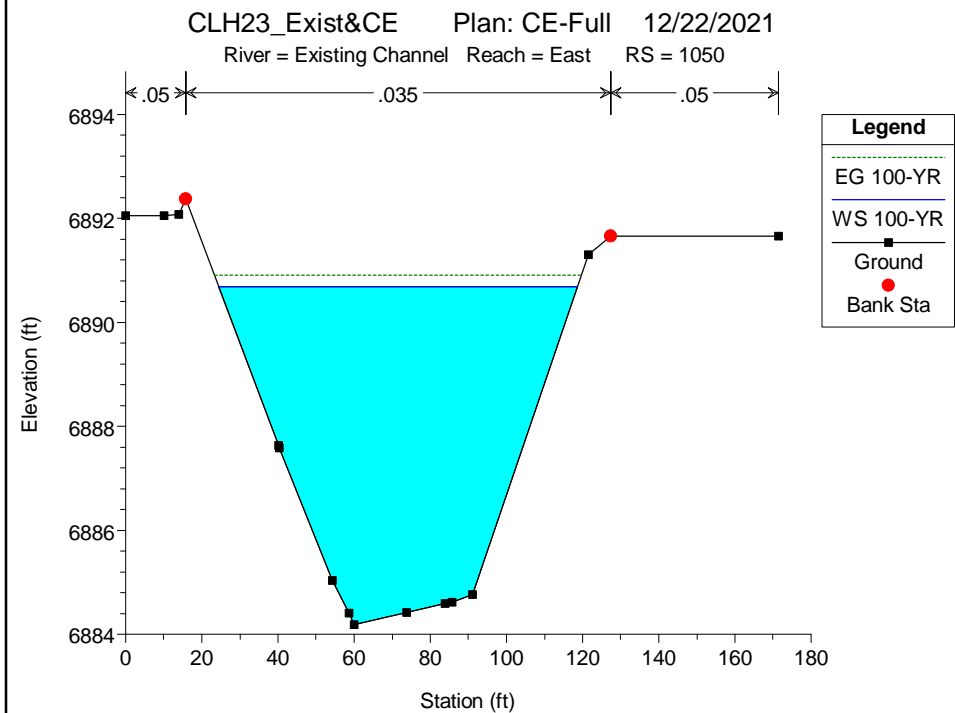
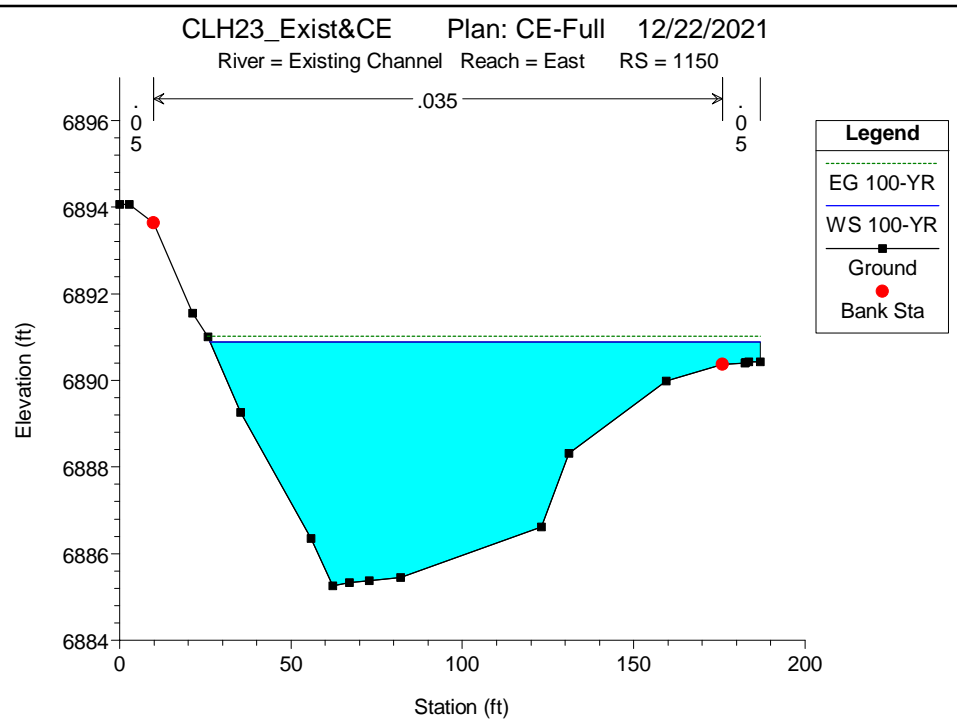
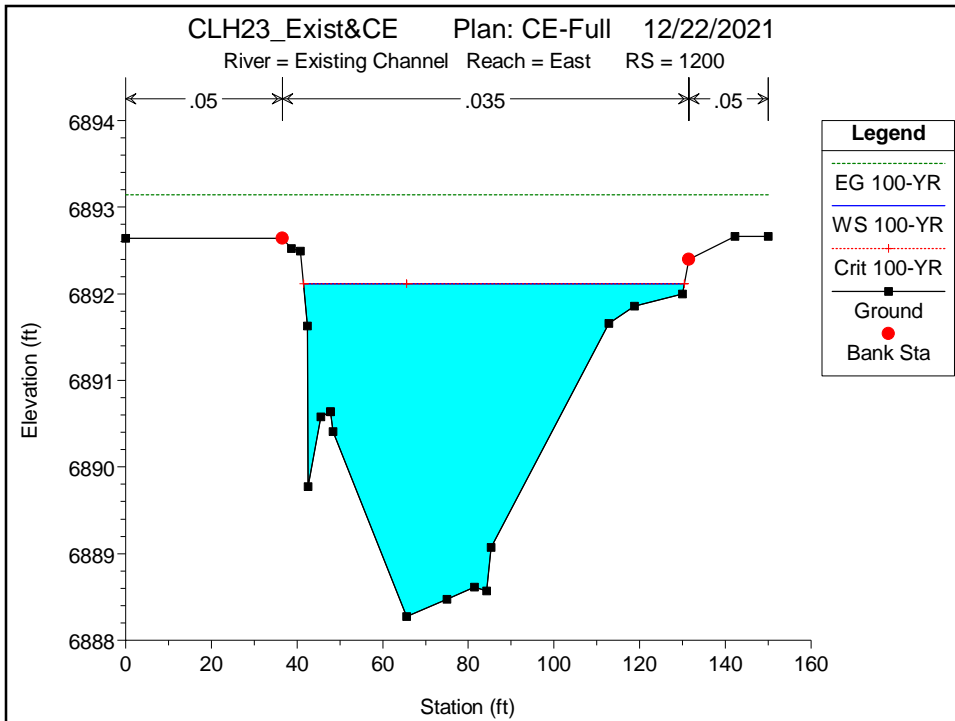












ATTACHMENT I
Pre-Project Model Results Table



| 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 | 6973.71 | 6973.71 | 6975.04 | 0.018072 | 9.23 | 108.34 | 41.88 | 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 | 6963.99 | | 6964.60 | 0.007245 | 6.25 | 160.07 | 56.67 | 0.66 |
| NCONFL-BGM | 5056 | 100-YR | 1000.00 | 6960.08 | 6963.96 | | 6964.56 | 0.007179 | 6.22 | 160.90 | 57.04 | 0.65 |
| NCONFL-BGM | 5006 | 100-YR | 1000.00 | 6959.90 | 6963.82 | | 6964.18 | 0.004901 | 5.16 | 231.85 | 127.94 | 0.54 |
| 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 | 0.004374 | 6.54 | 245.40 | 120.11 | 0.61 |
| NCONFL-BGM | 4500 | 100-YR | 1450.00 | 6947.90 | 6952.81 | 6952.81 | 6954.22 | 0.012705 | 9.54 | 153.27 | 63.21 | 0.99 |
| NCONFL-BGM | 4400 | 100-YR | 1450.00 | 6945.00 | 6949.07 | 6948.95 | 6950.39 | 0.010952 | 9.27 | 158.71 | 56.31 | 0.93 |
| NCONFL-BGM | 4300 | 100-YR | 1450.00 | 6944.70 | 6948.29 | 6947.85 | 6949.23 | 0.007955 | 7.77 | 188.35 | 66.97 | 0.79 |
| NCONFL-BGM | 4275 | 100-YR | 1450.00 | 6944.60 | 6947.78 | 6947.78 | 6949.05 | 0.013541 | 9.02 | 160.84 | 64.50 | 1.01 |
| NCONFL-BGM | 4250 | 100-YR | 1450.00 | 6939.95 | 6943.08 | 6943.08 | 6944.38 | 0.012773 | 9.17 | 159.77 | 63.35 | 0.99 |
| NCONFL-BGM | 4212.47 | 100-YR | 1450.00 | 6937.01 | 6943.68 | | 6943.86 | 0.000746 | 3.37 | 443.93 | 98.81 | 0.26 |
| 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 | 0.001392 | 9.86 | 149.37 | 42.54 | 0.93 |
| NCONFL-BGM | 4001.57 | 100-YR | 1450.00 | 6936.38 | 6940.29 | | 6941.07 | 0.005472 | 7.08 | 206.05 | 68.38 | 0.67 |
| NCONFL-BGM | 4000 | 100-YR | 1450.00 | 6936.28 | 6939.58 | 6939.45 | 6940.73 | 0.011463 | 8.57 | 169.20 | 79.57 | 0.93 |
| NCONFL-BGM | 3900 | 100-YR | 1450.00 | 6936.02 | 6939.36 | | 6939.87 | 0.005665 | 5.74 | 257.80 | 122.58 | 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 | 6925.56 | | 6926.21 | 0.005185 | 6.46 | 233.74 | 92.25 | 0.65 |
| NCONFL-BGM | 3000 | 100-YR | 1482.00 | 6920.36 | 6924.58 | 6924.58 | 6925.60 | 0.011958 | 8.63 | 197.85 | 132.67 | 0.95 |
| 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 |

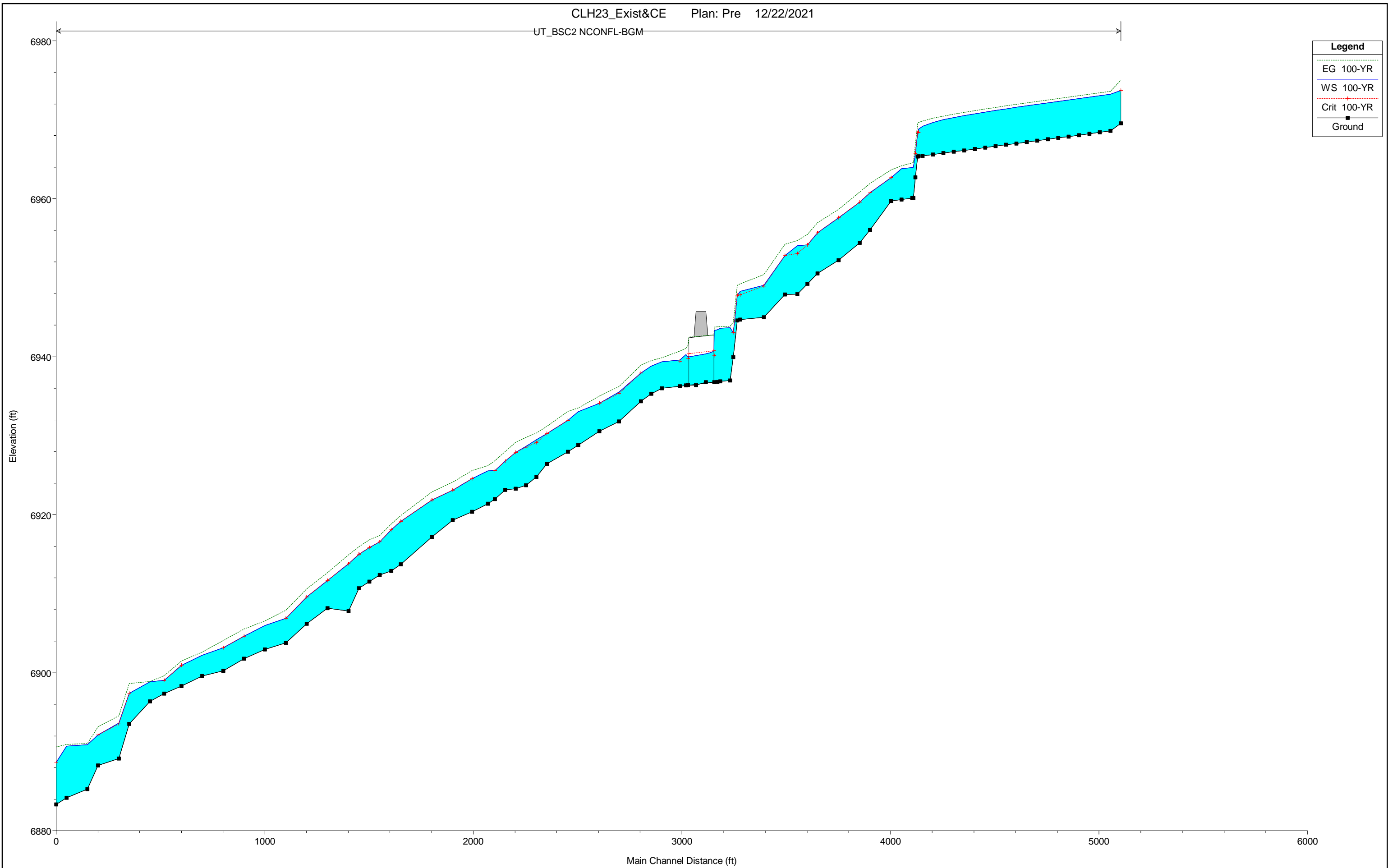
HEC-RAS Plan: Pre River: UT_BSC2 Reach: NCONFL-BGM Profile: 100-YR (Continued)

| 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 | 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 | 6902.21 | | 6902.61 | 0.007716 | 5.08 | 291.85 | 183.50 | 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 | 6899.02 | 6899.02 | 6899.62 | 0.017218 | 6.20 | 238.99 | 203.41 | 1.01 |
| NCONFL-BGM | 1450 | 100-YR | 1482.00 | 6896.35 | 6898.86 | | 6898.89 | 0.000429 | 1.20 | 1144.29 | 467.39 | 0.17 |
| NCONFL-BGM | 1350 | 100-YR | 1482.00 | 6893.53 | 6897.38 | 6897.38 | 6898.64 | 0.010449 | 9.83 | 200.13 | 97.33 | 0.93 |
| NCONFL-BGM | 1300 | 100-YR | 1482.00 | 6889.13 | 6893.61 | 6893.53 | 6894.55 | 0.013285 | 7.75 | 191.12 | 94.55 | 0.96 |
| NCONFL-BGM | 1200 | 100-YR | 1482.00 | 6888.27 | 6892.12 | 6892.12 | 6893.15 | 0.014620 | 8.13 | 182.20 | 88.91 | 1.00 |
| NCONFL-BGM | 1150 | 100-YR | 1482.00 | 6885.25 | 6890.89 | | 6891.02 | 0.000976 | 2.96 | 505.40 | 160.45 | 0.29 |
| NCONFL-BGM | 1050 | 100-YR | 1482.00 | 6884.18 | 6890.69 | | 6890.91 | 0.001169 | 3.75 | 395.65 | 94.20 | 0.32 |
| 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

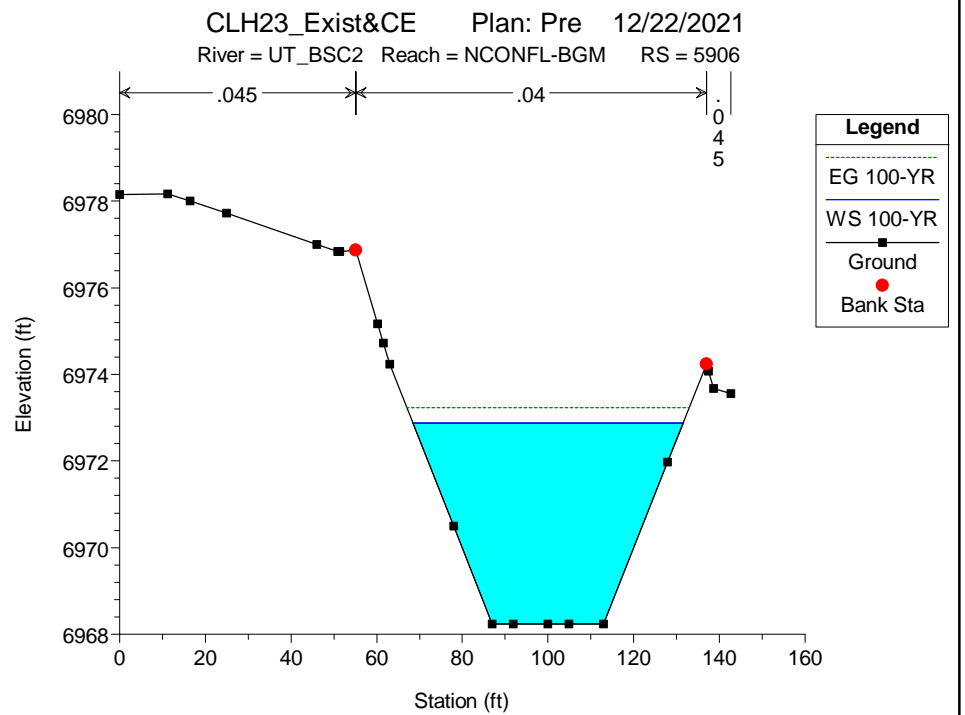
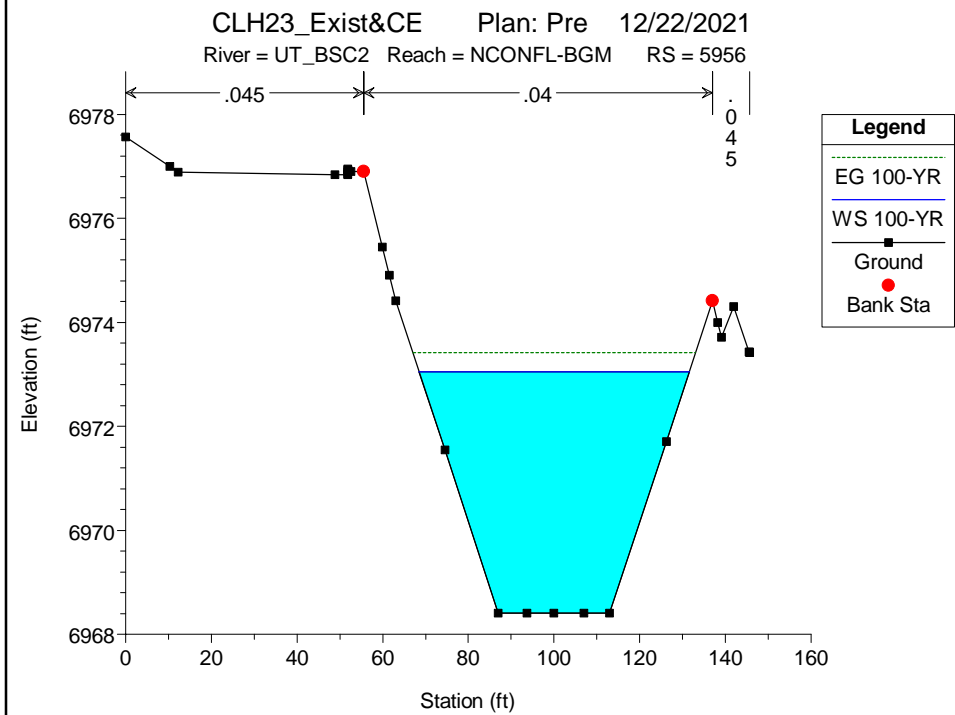
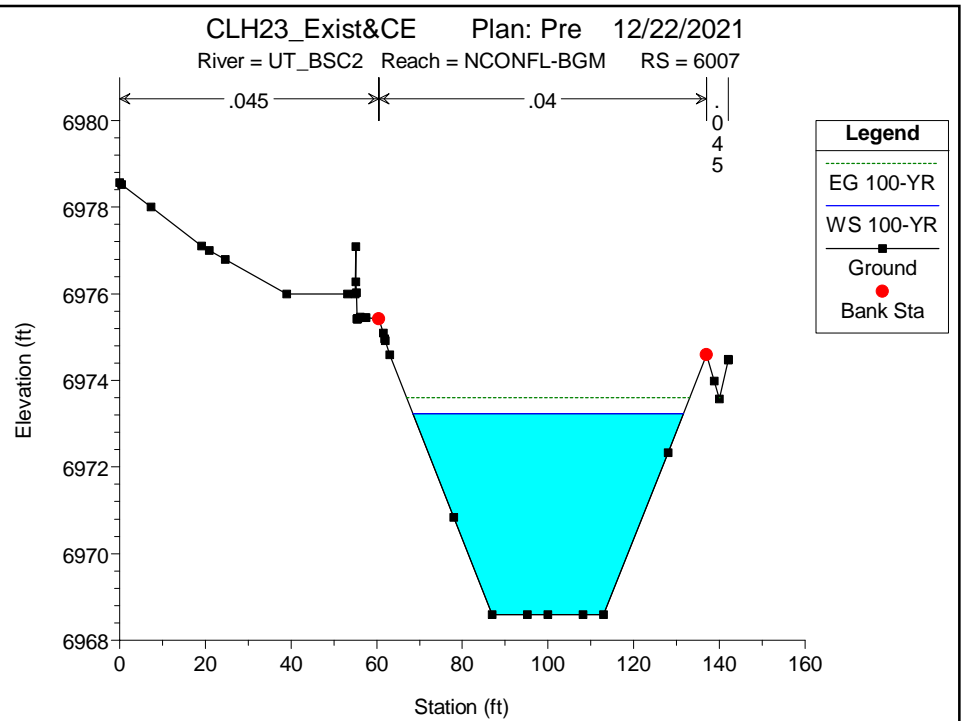
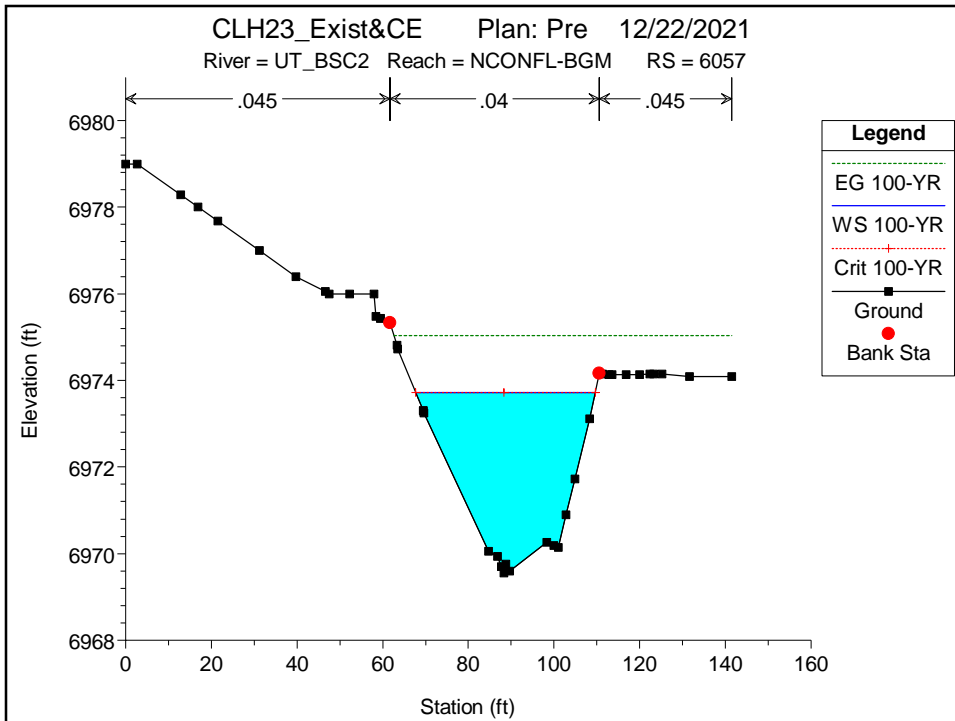


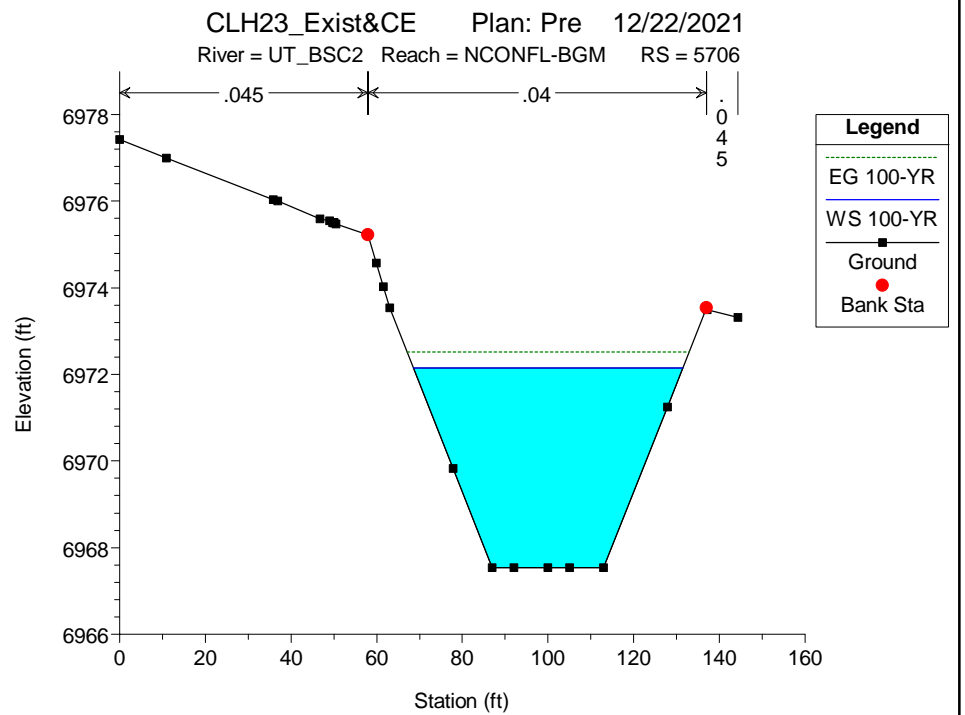
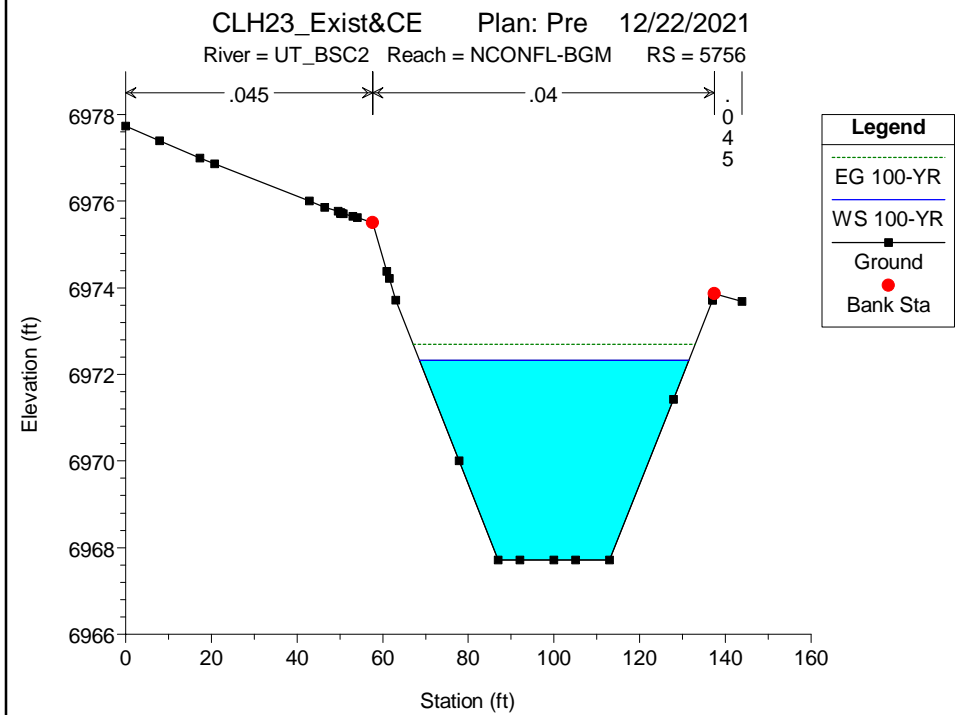
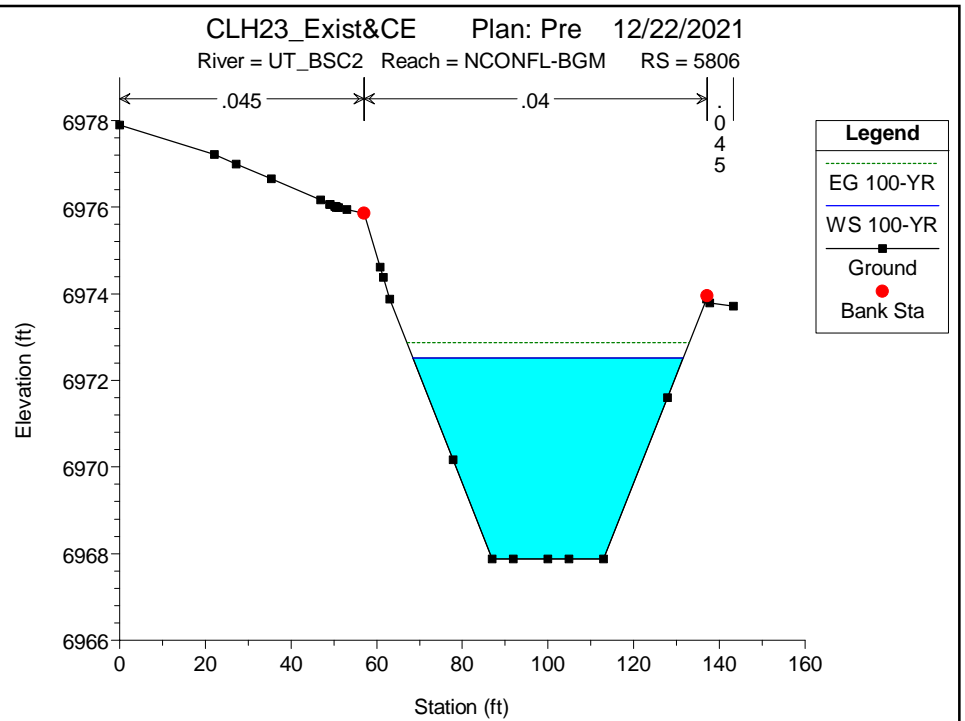
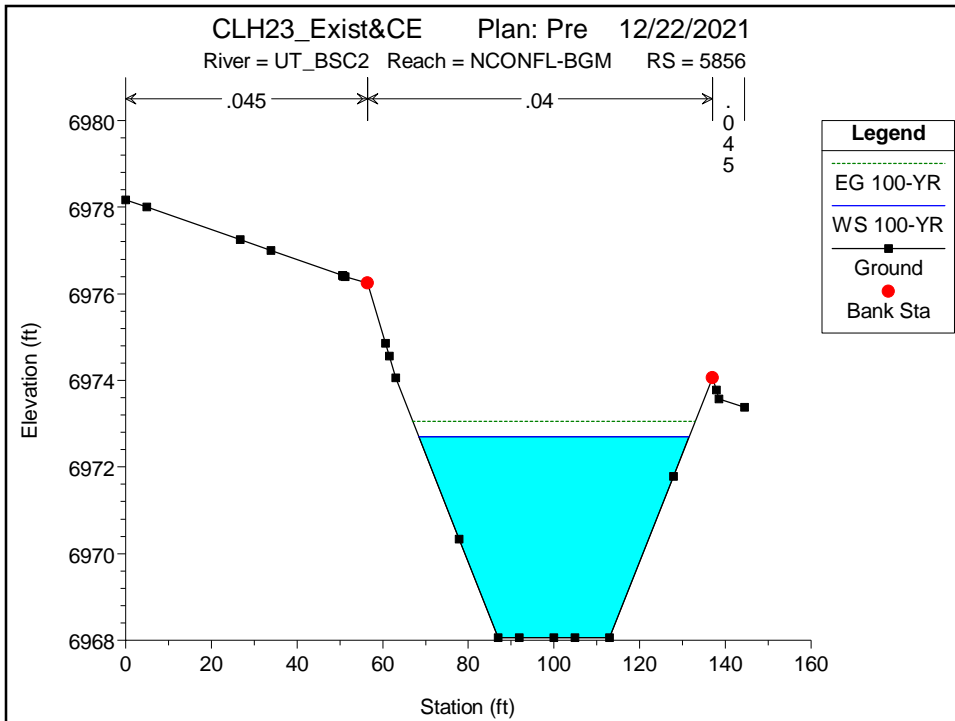
| Legend | |
|-------------|--|
| EG 100-YR | |
| WS 100-YR | |
| Crit 100-YR | |
| Ground | |

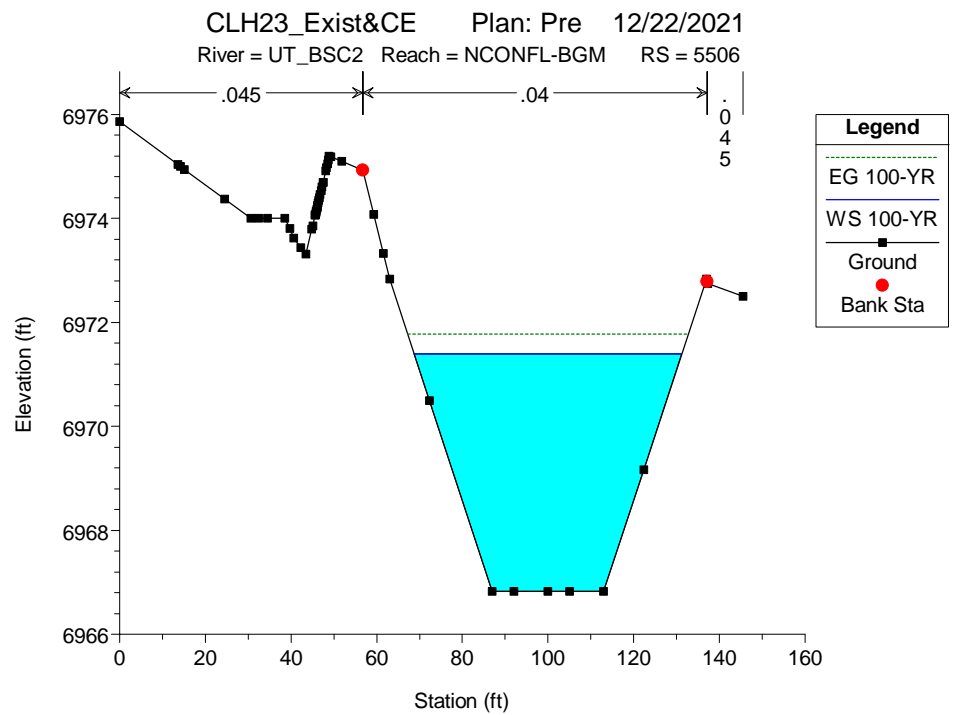
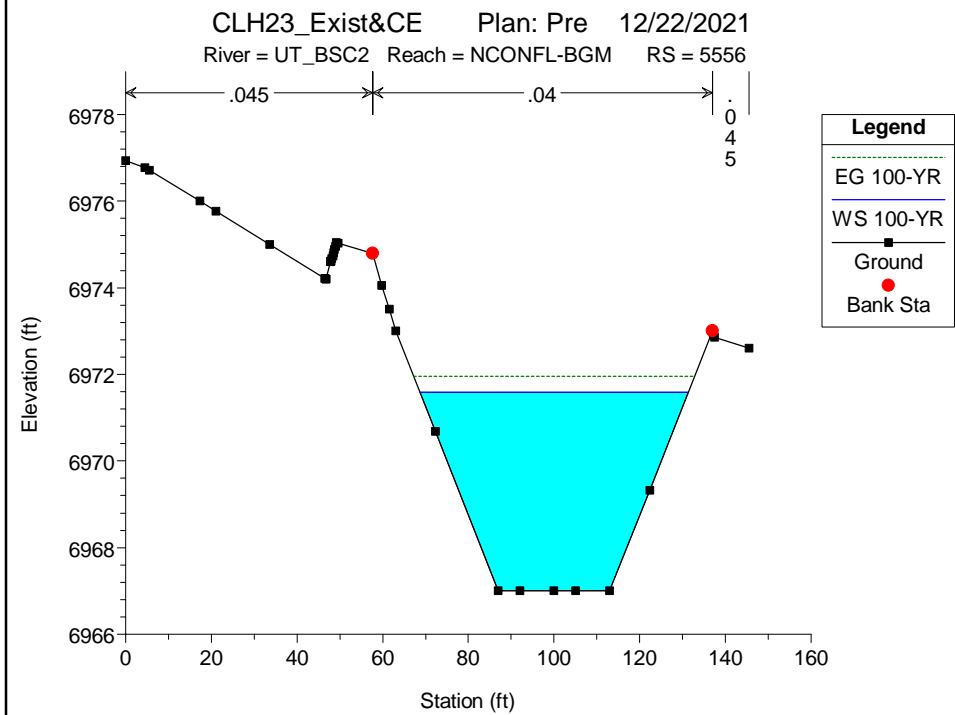
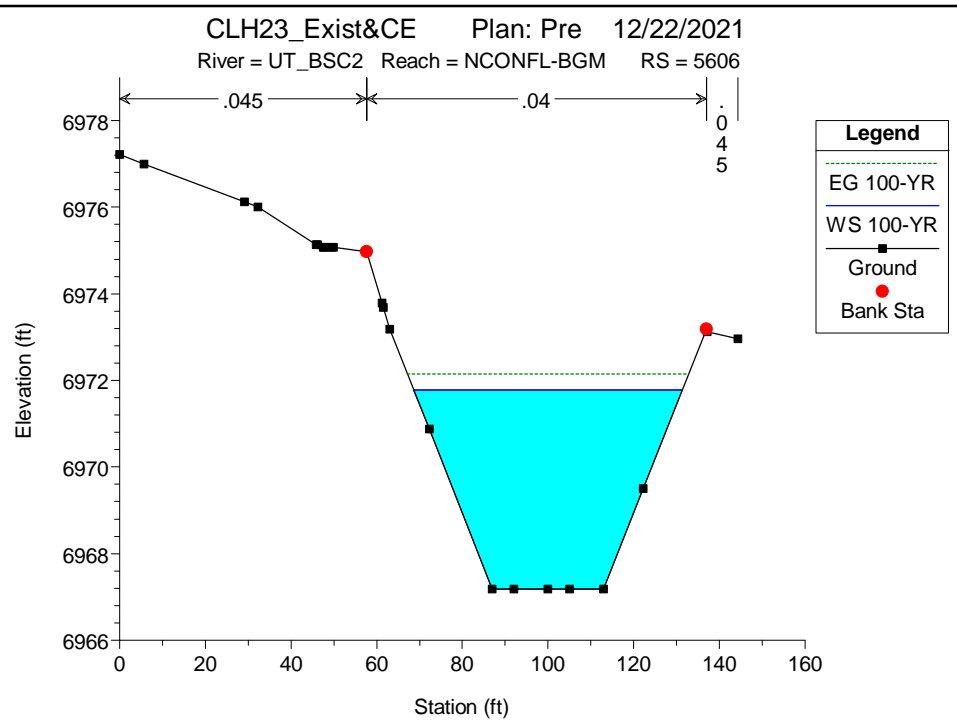
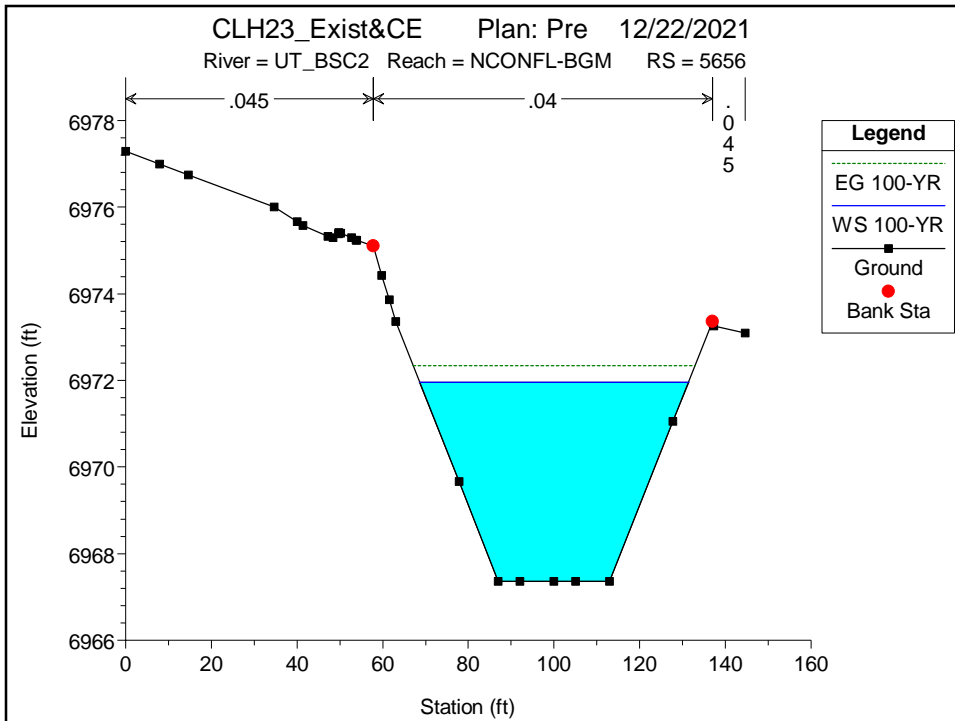


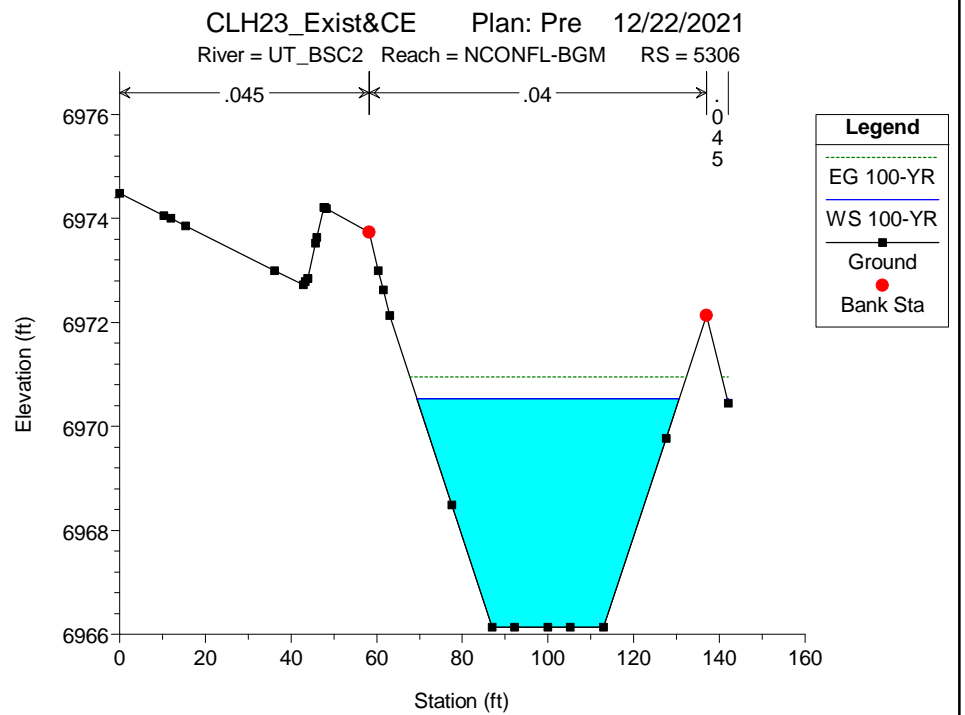
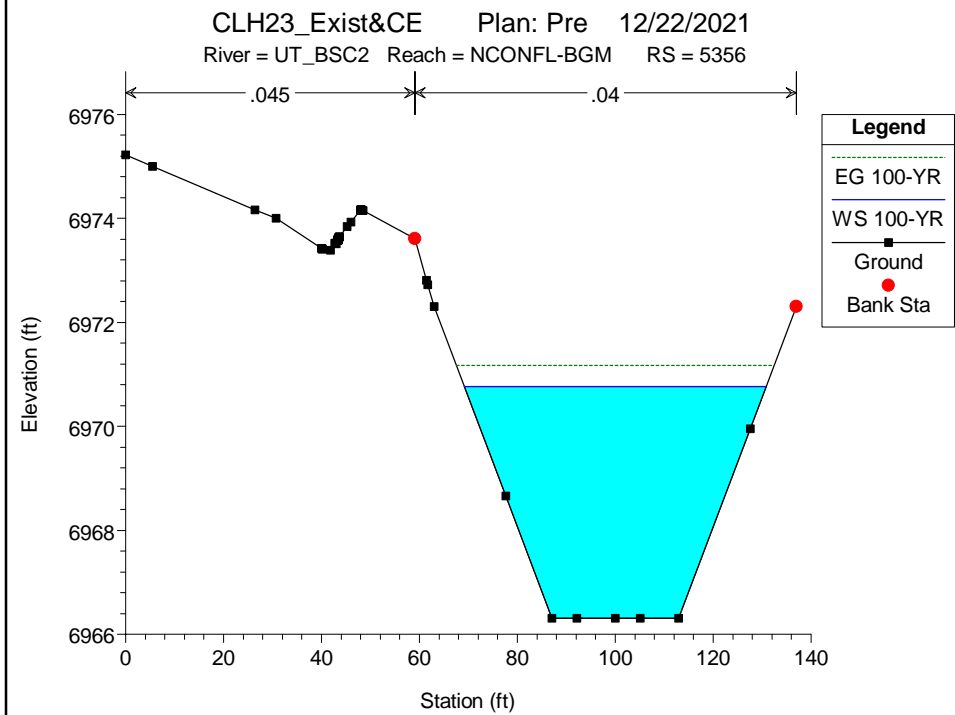
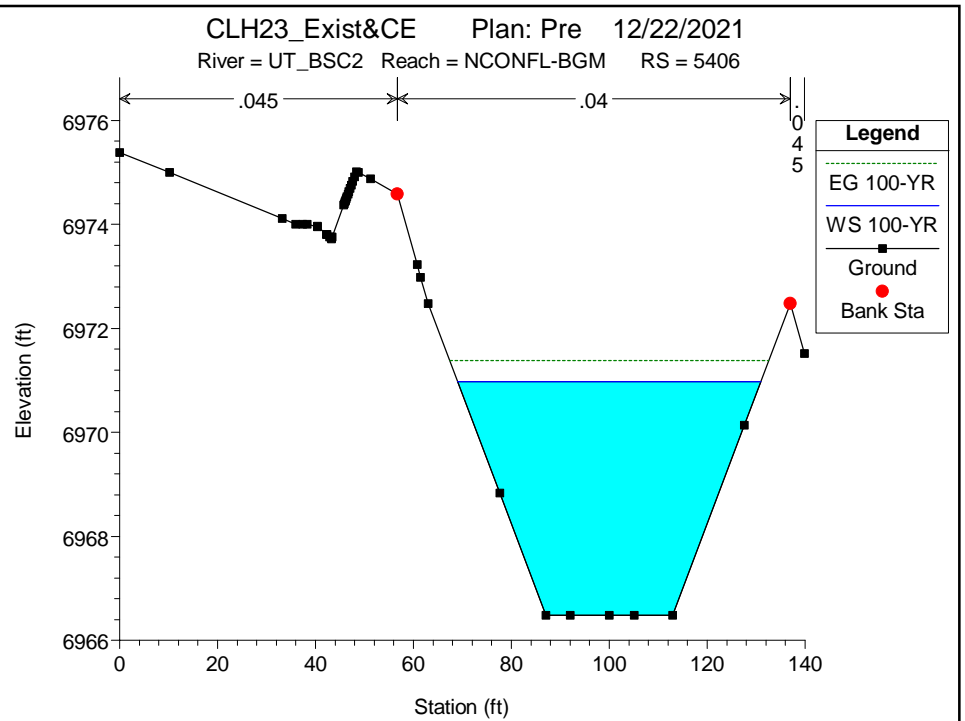
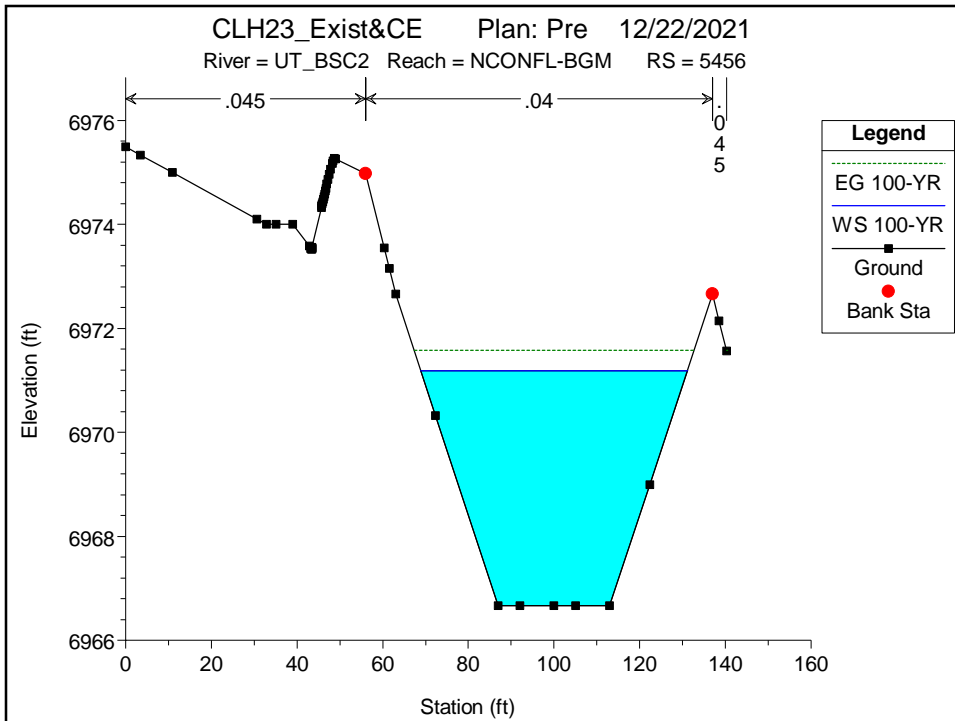
ATTACHMENT K
Pre-Project Cross Sections

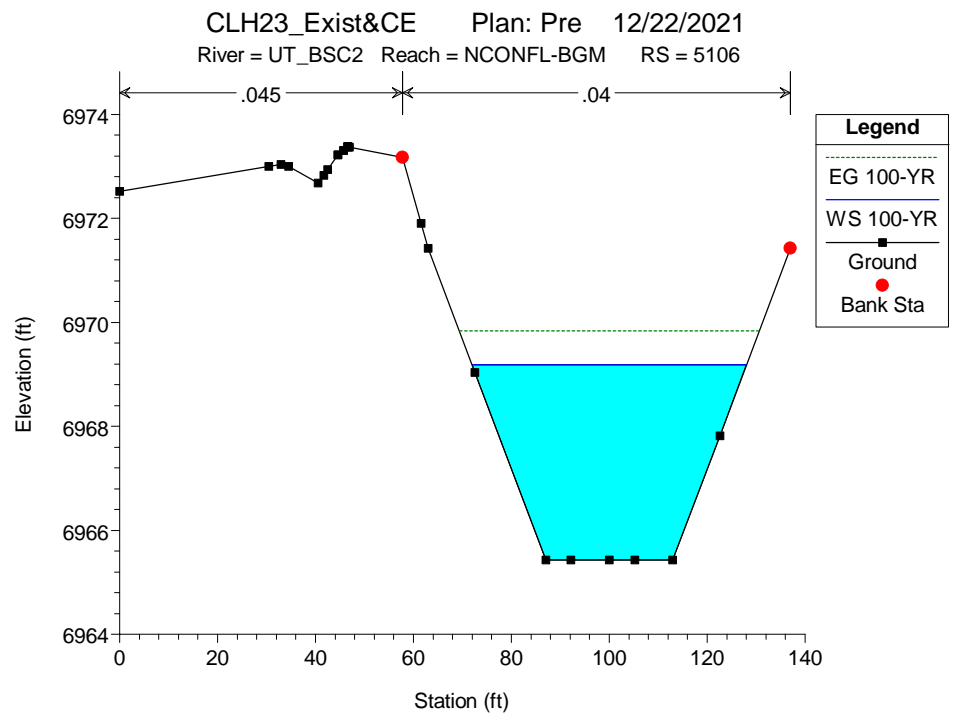
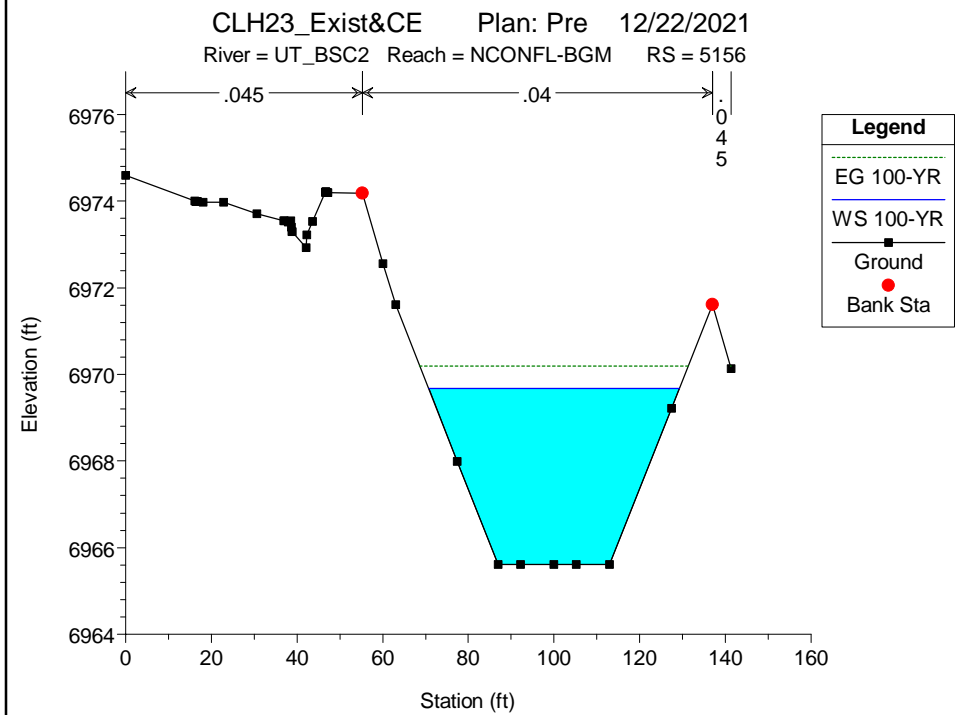
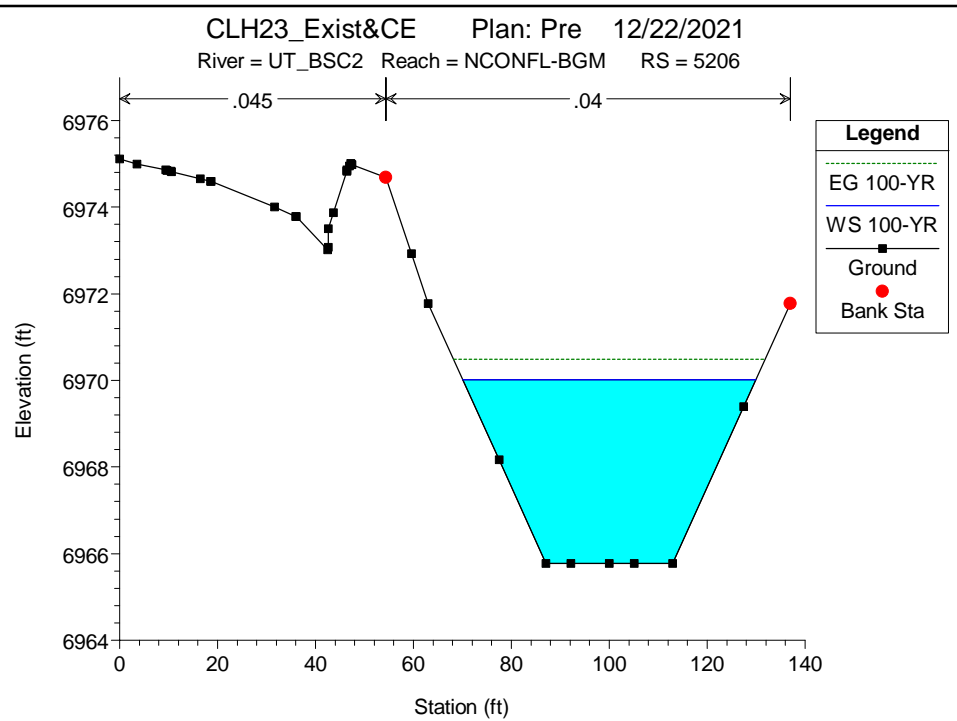
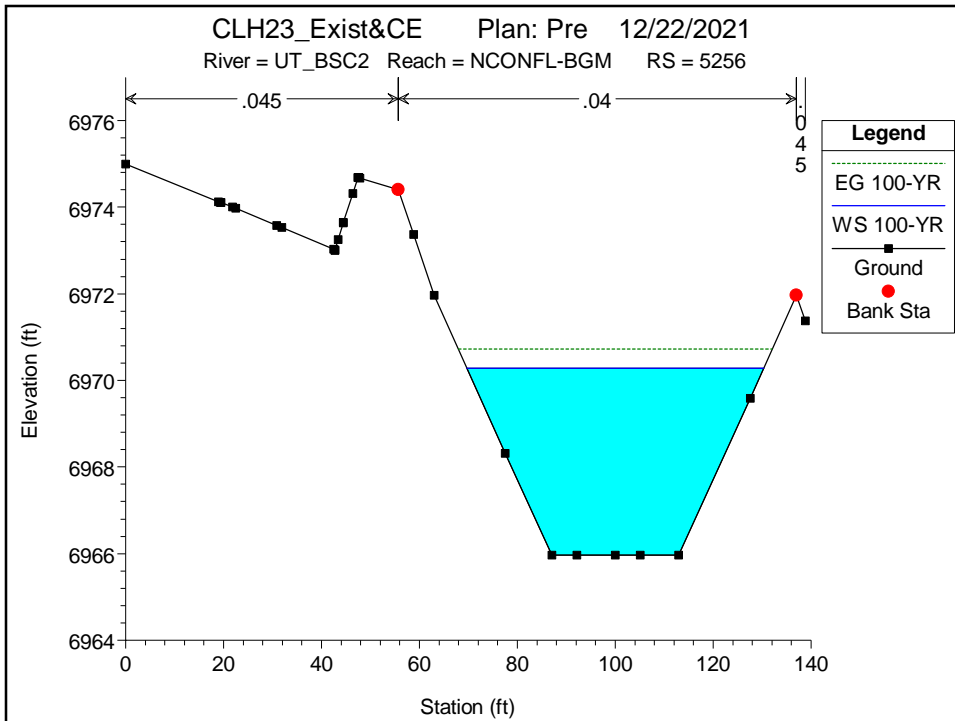


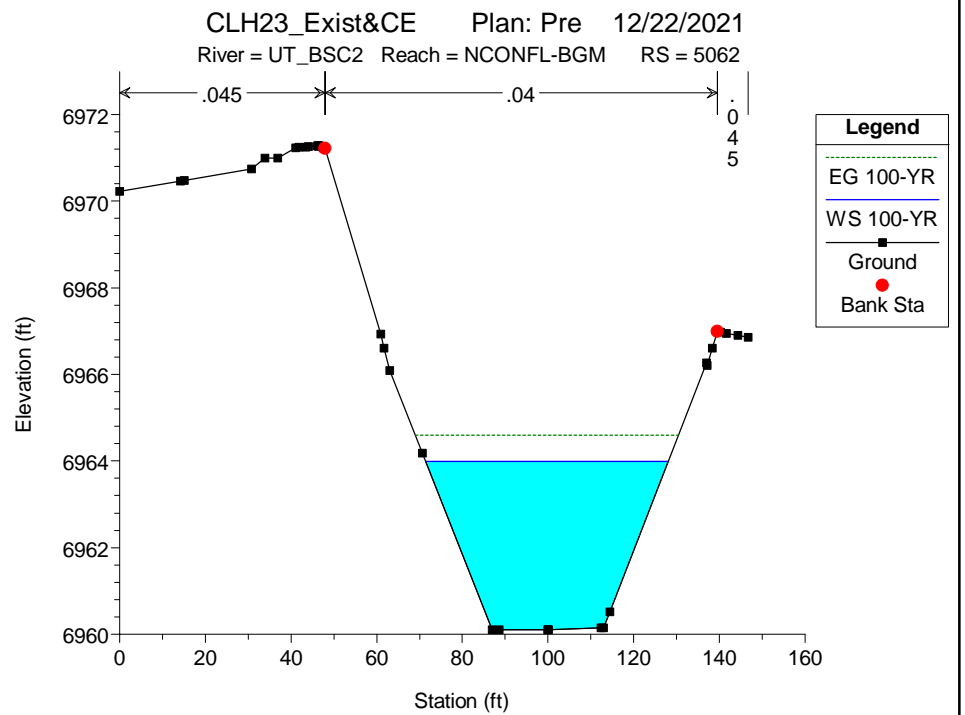
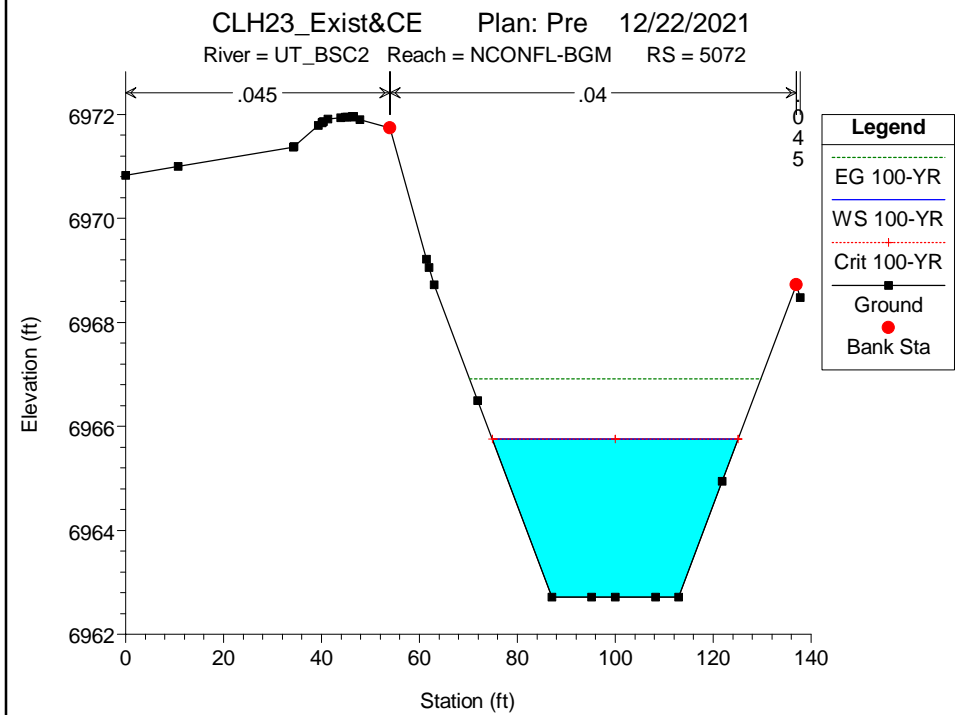
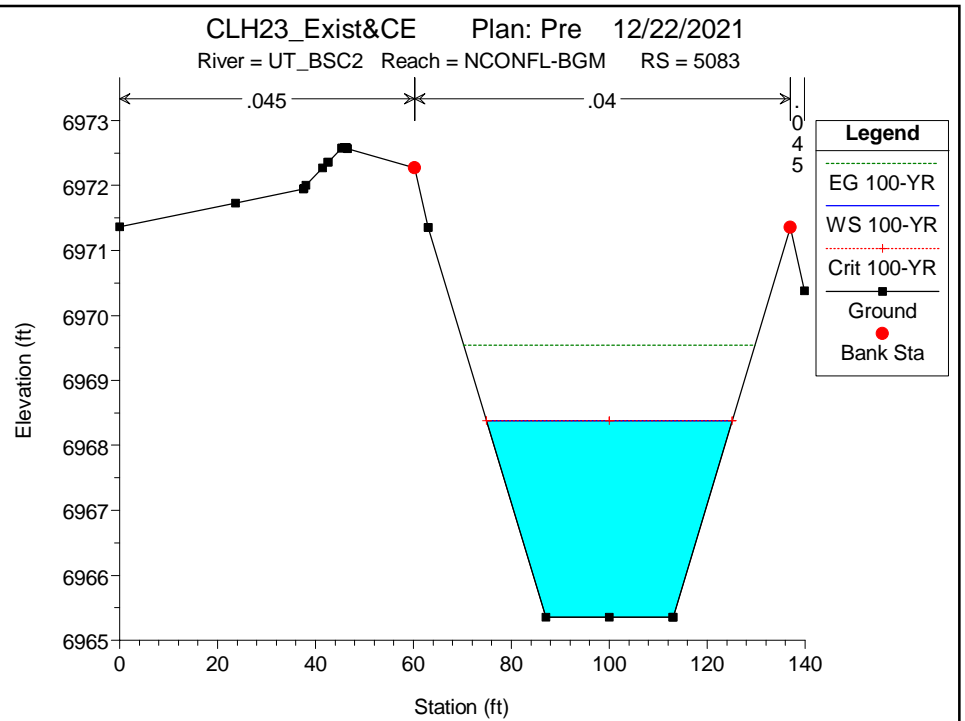
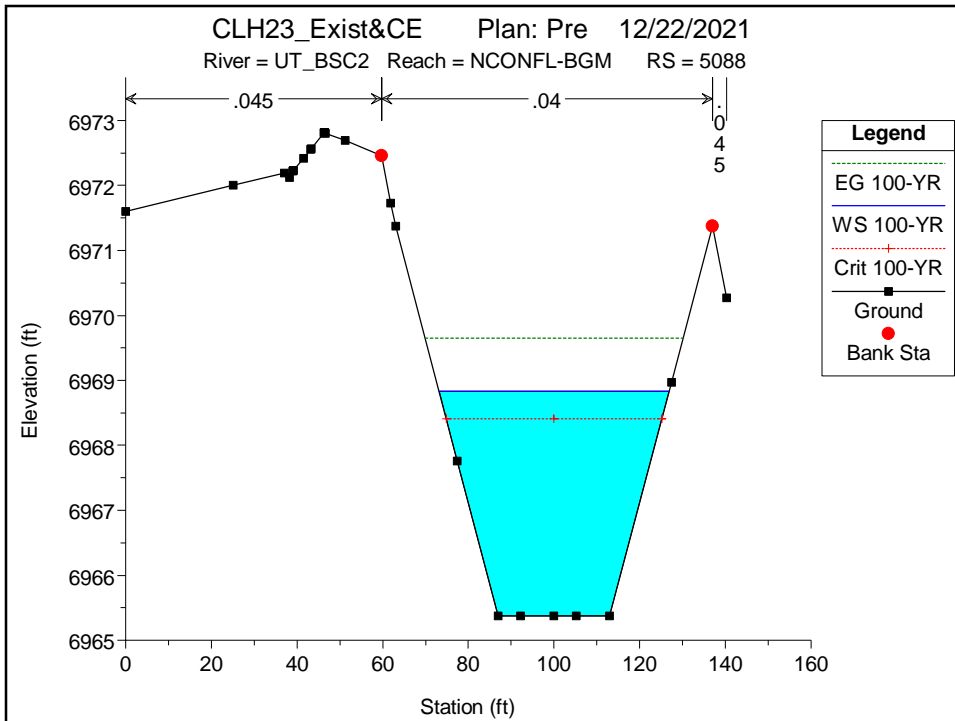


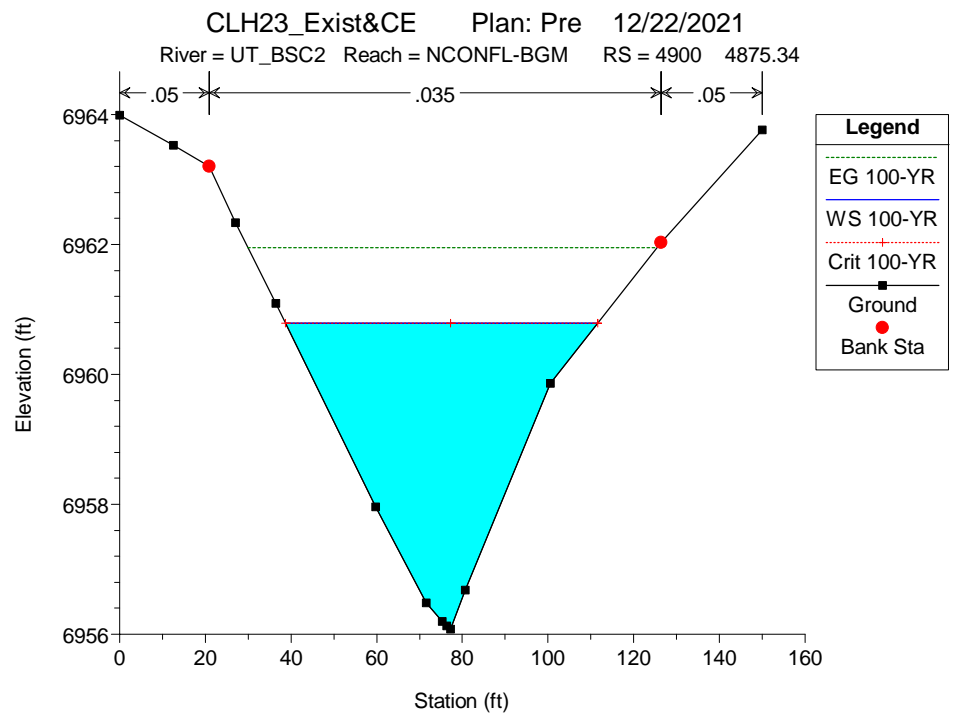
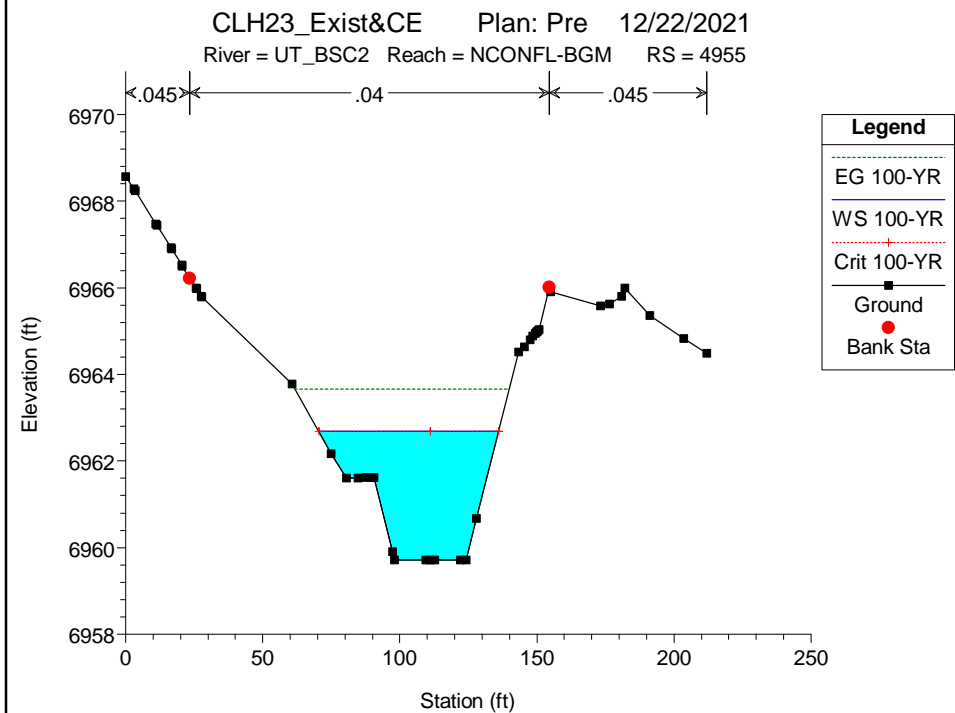
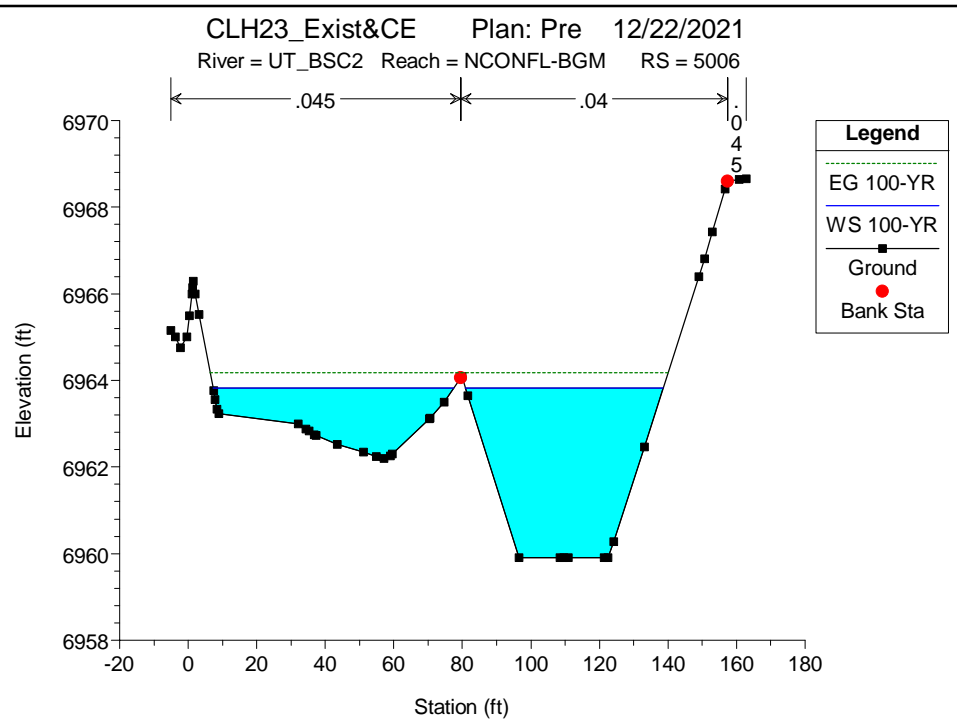
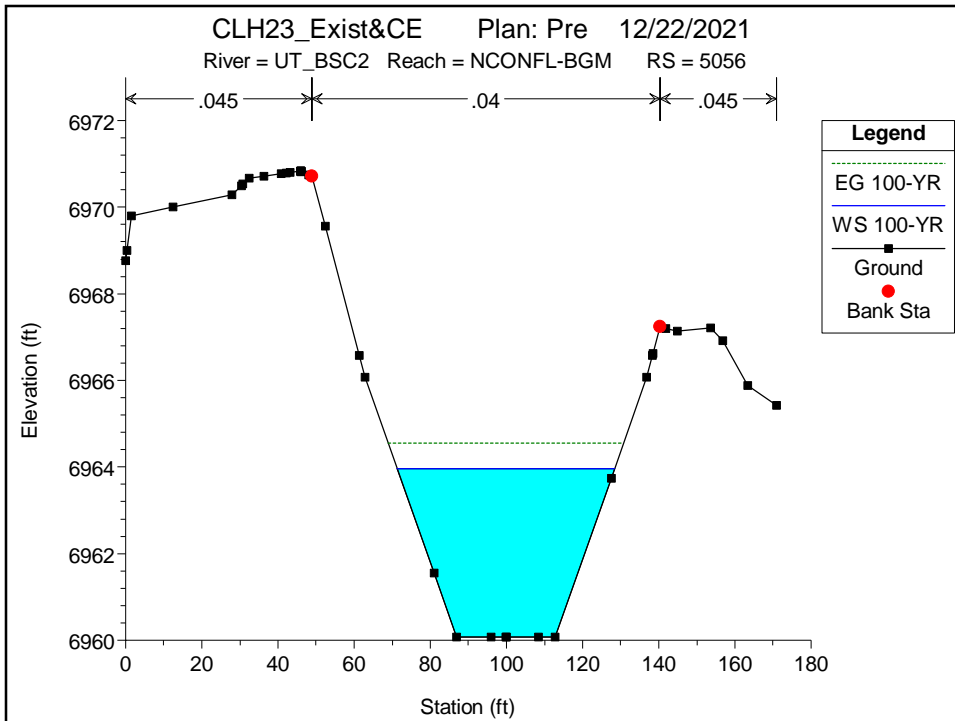


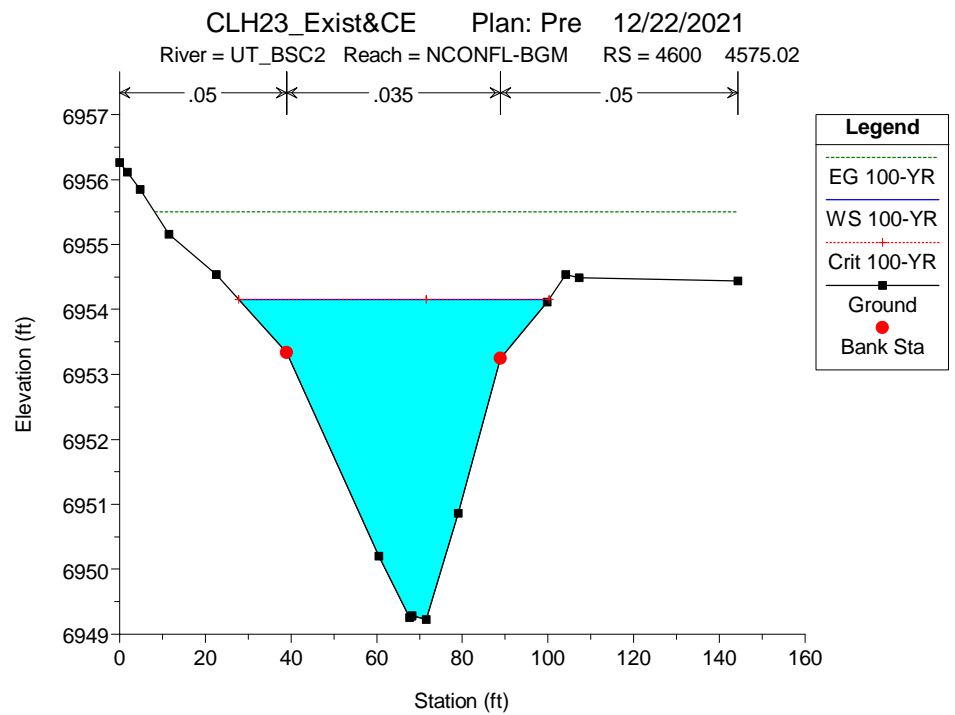
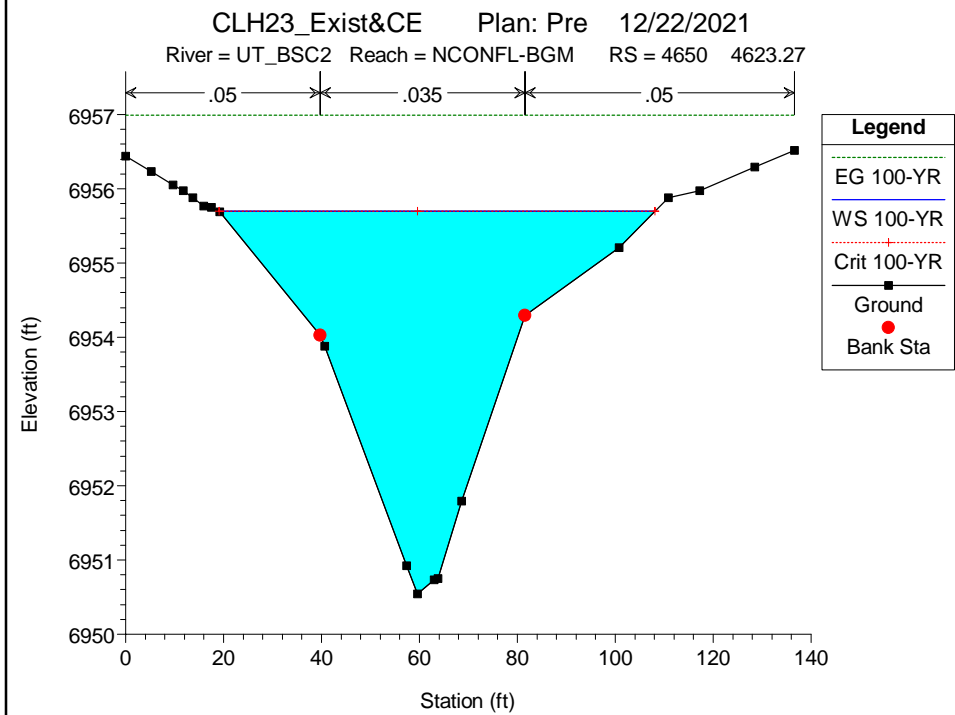
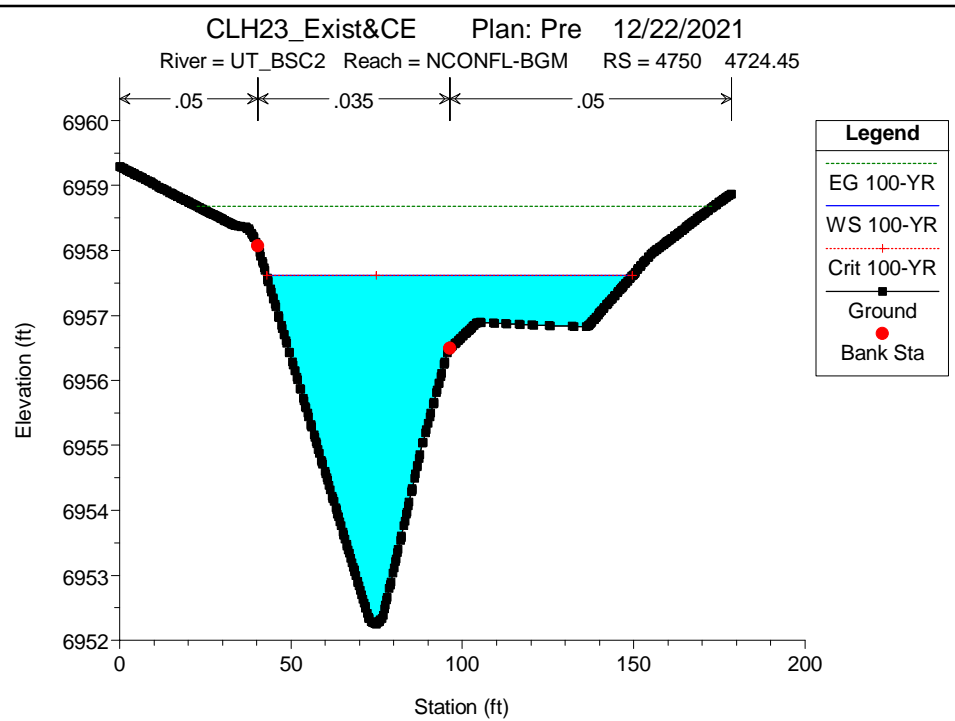
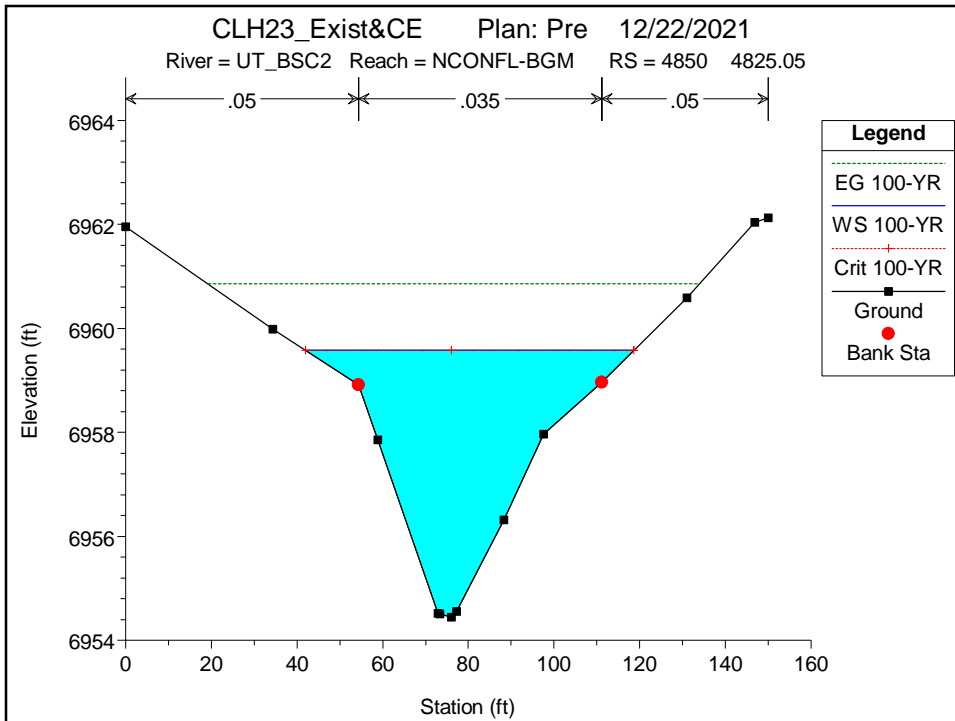


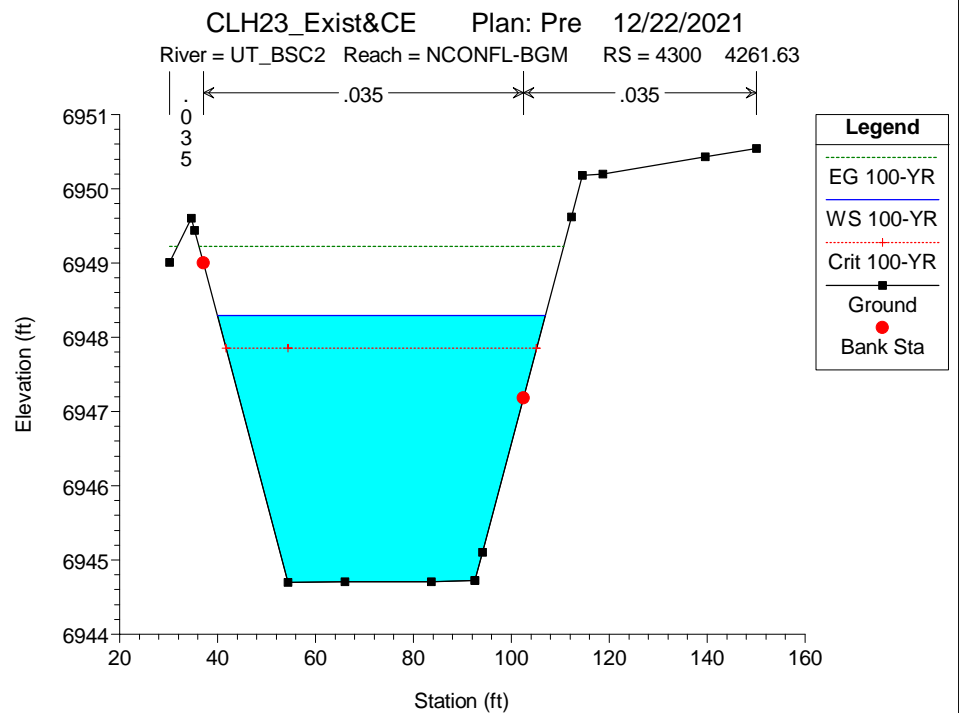
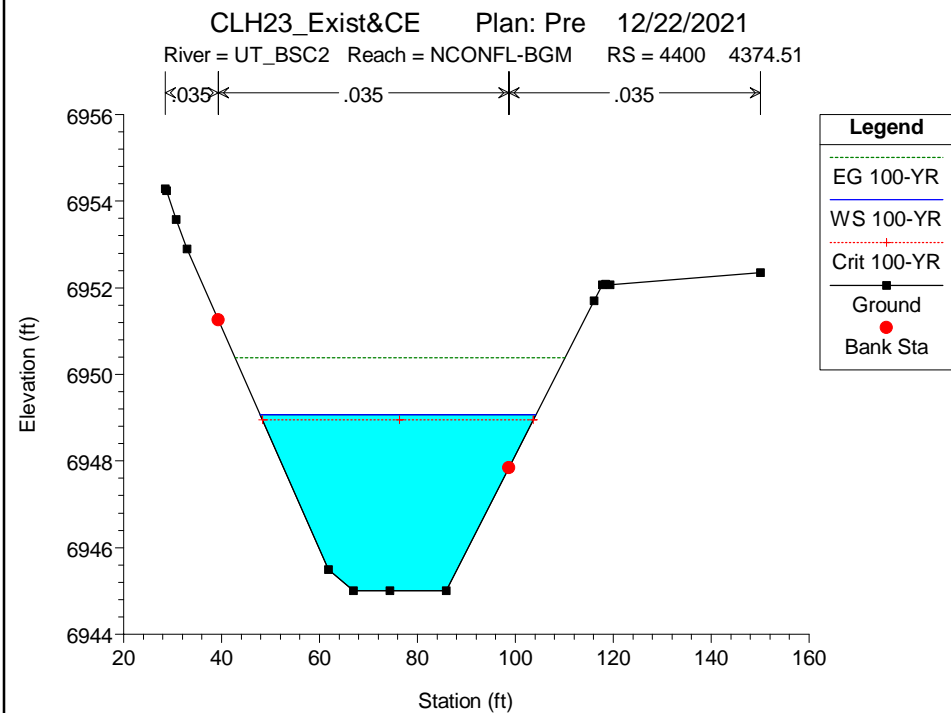
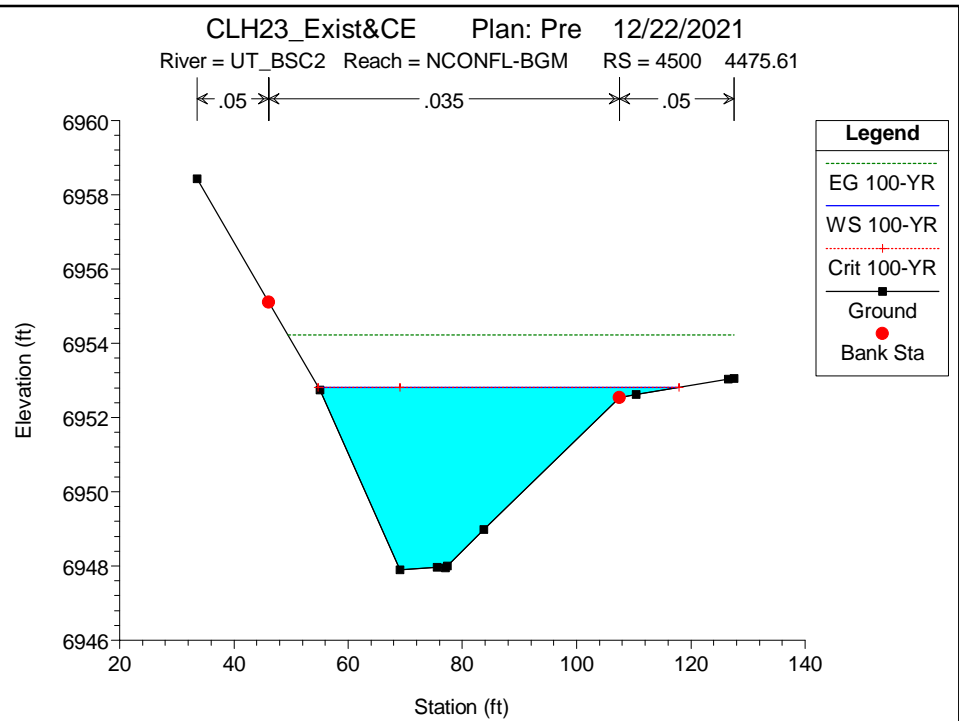
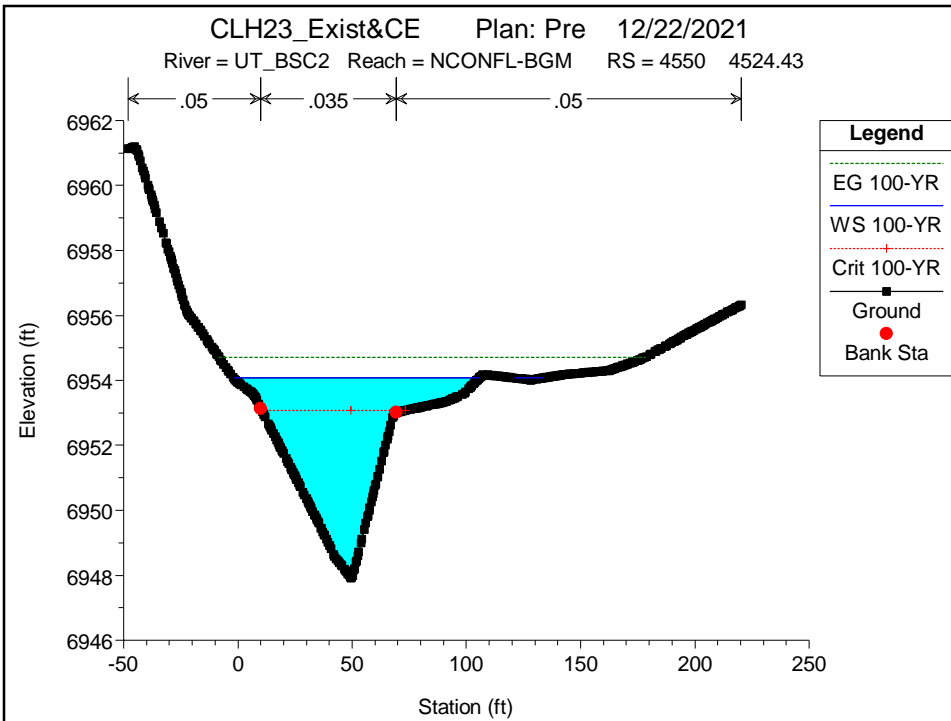


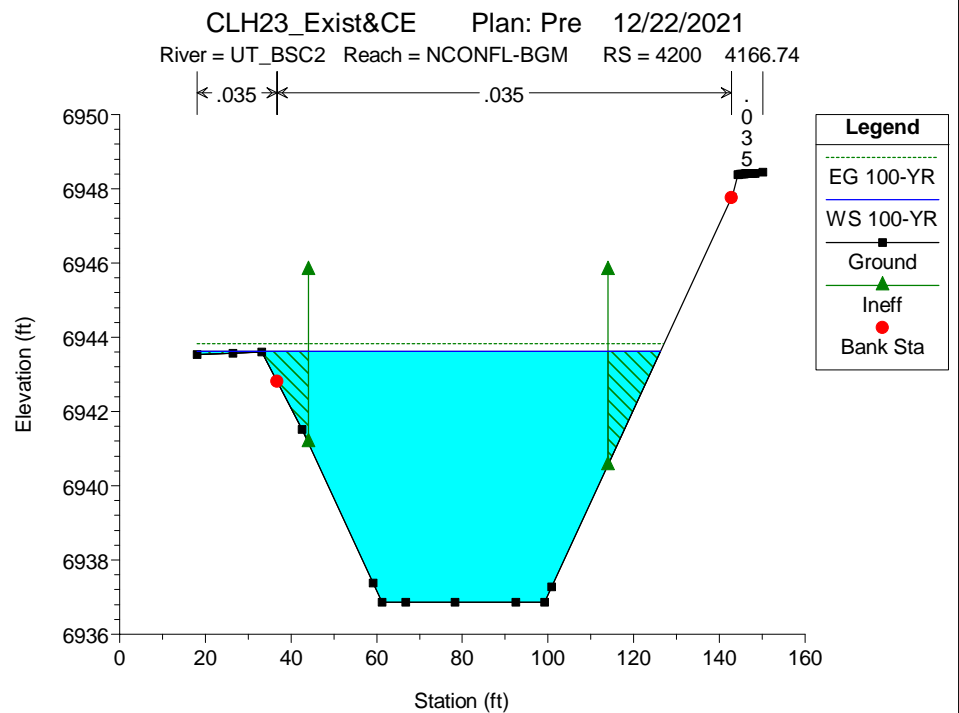
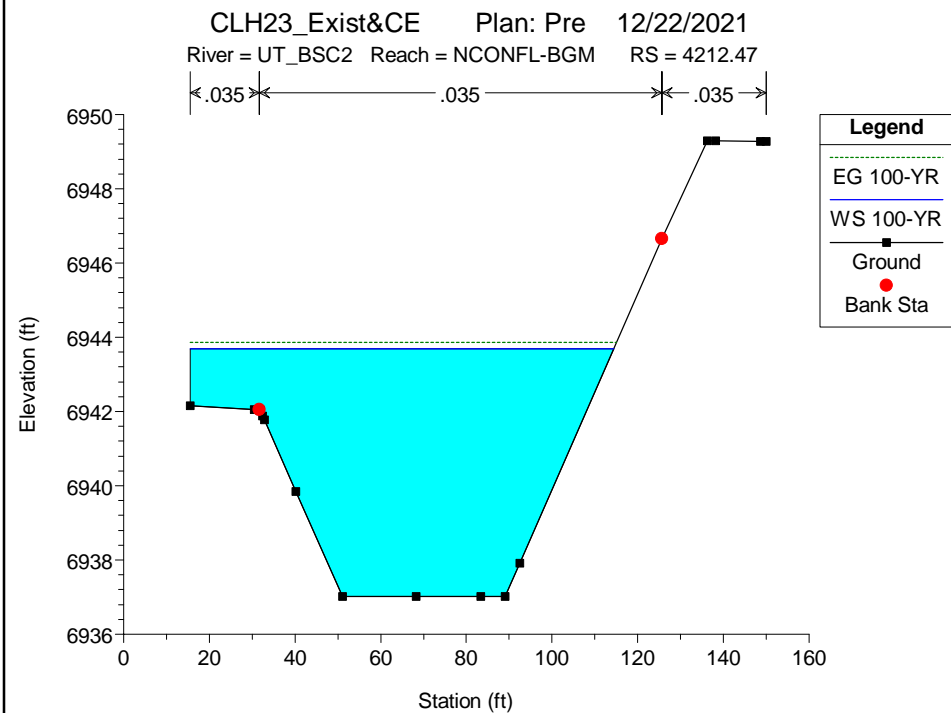
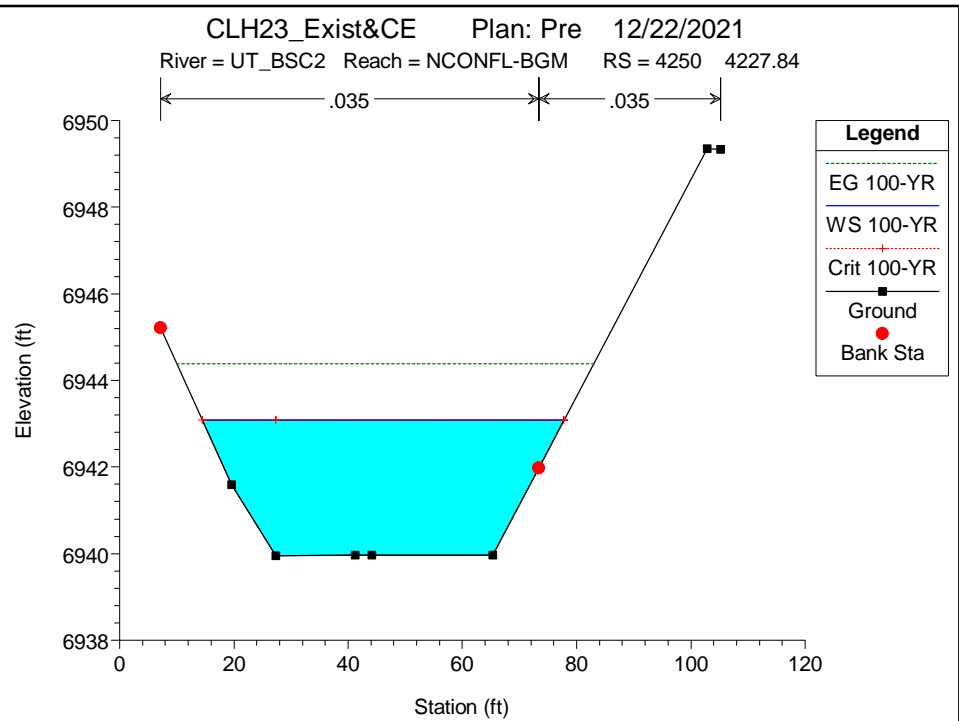
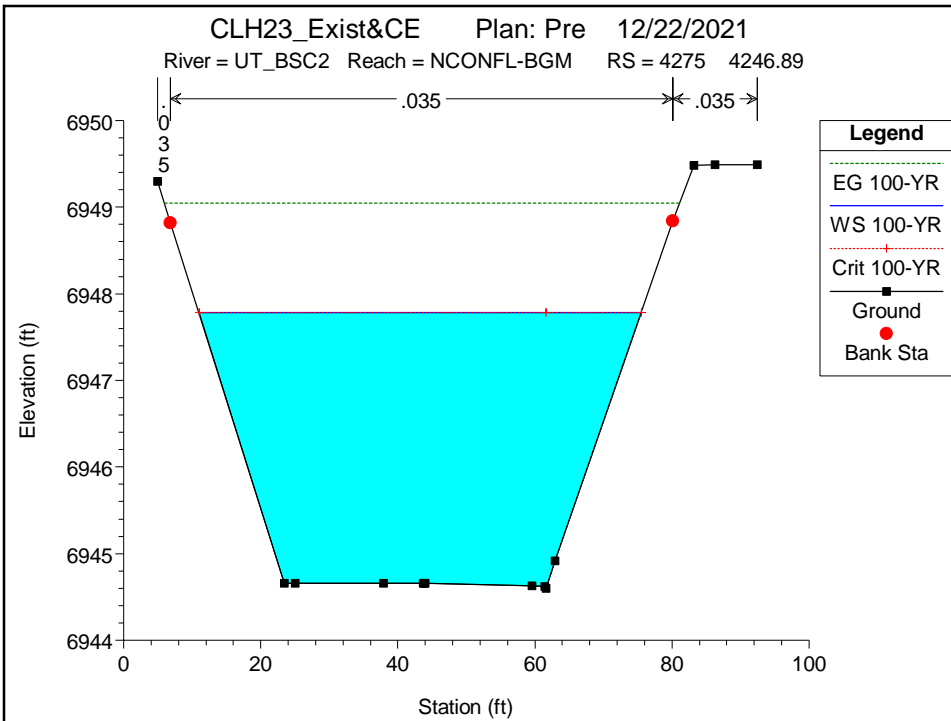


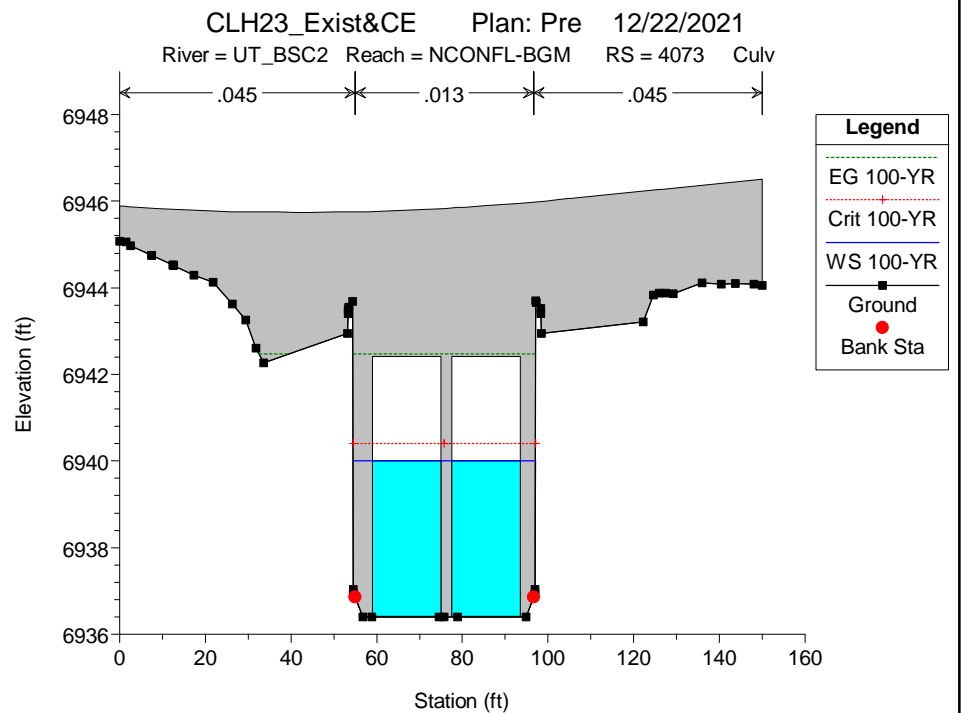
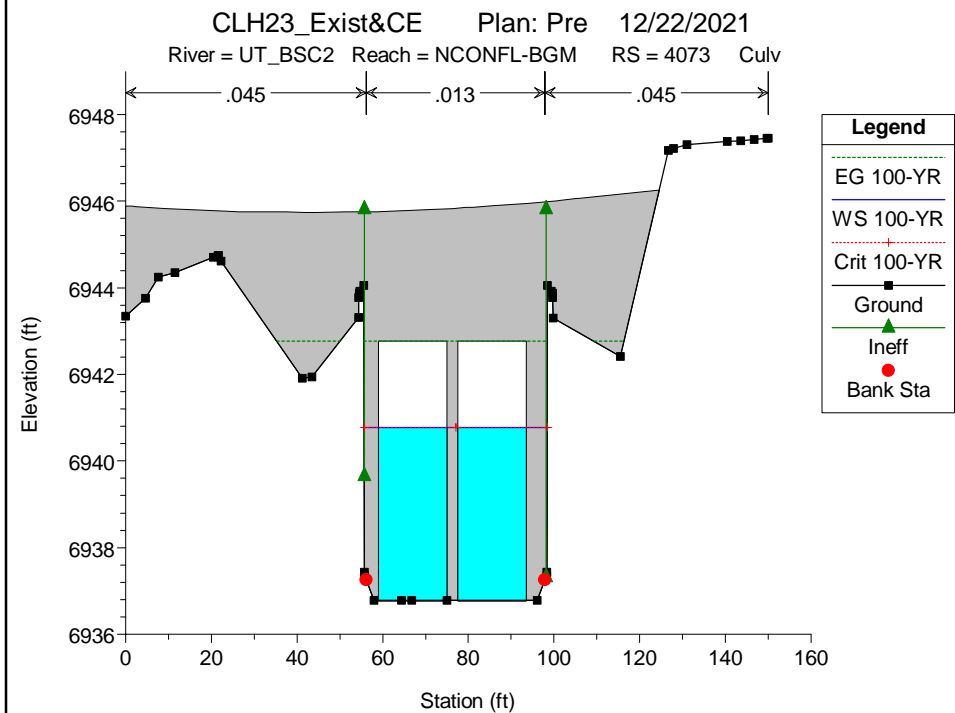
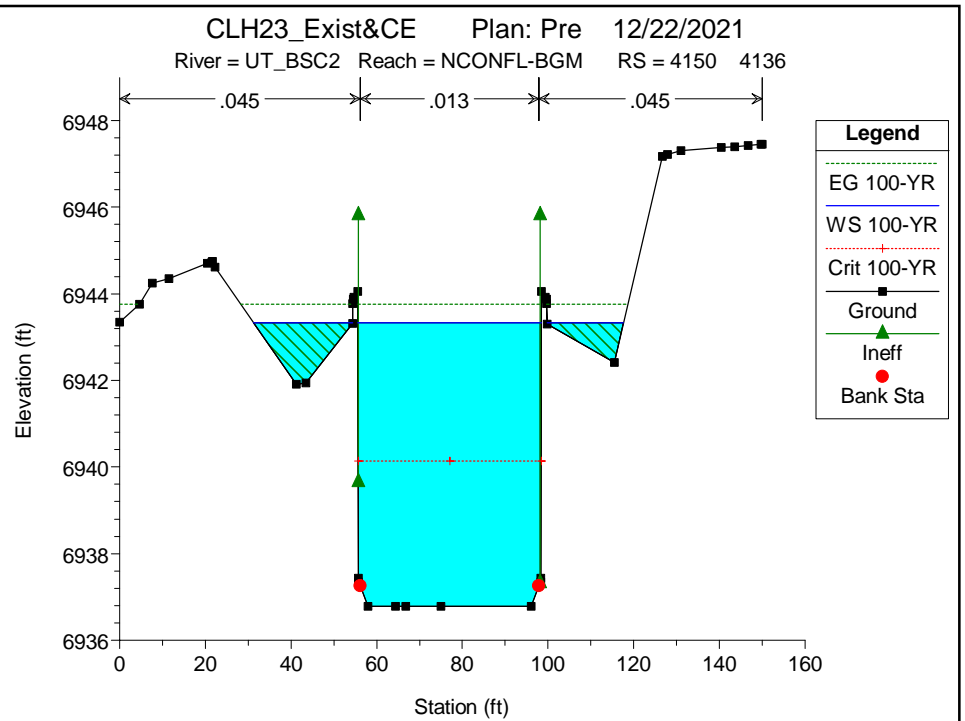
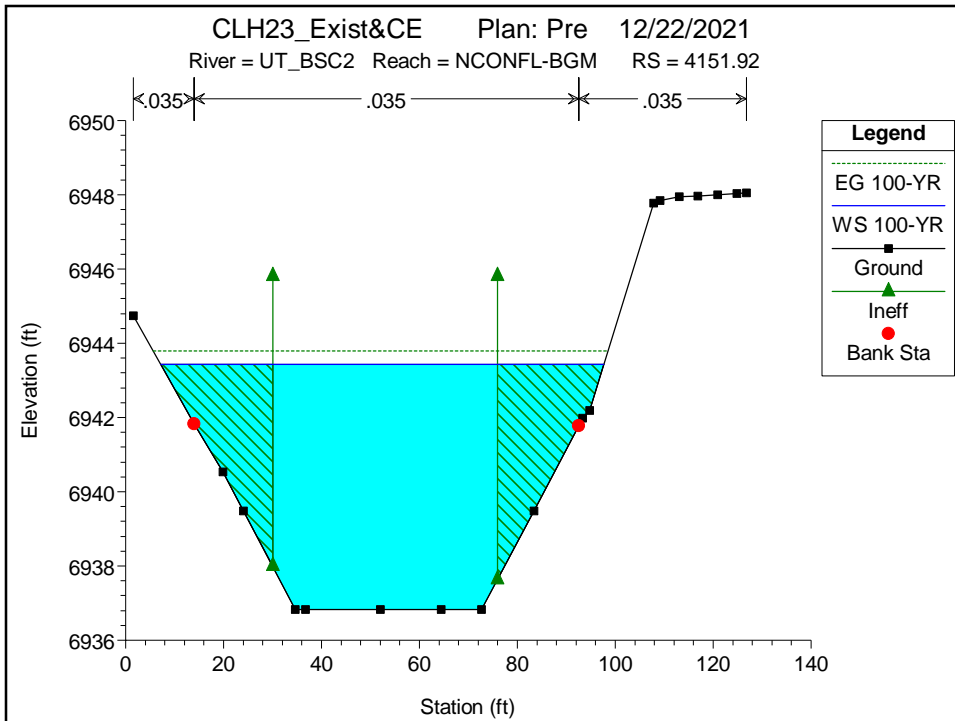


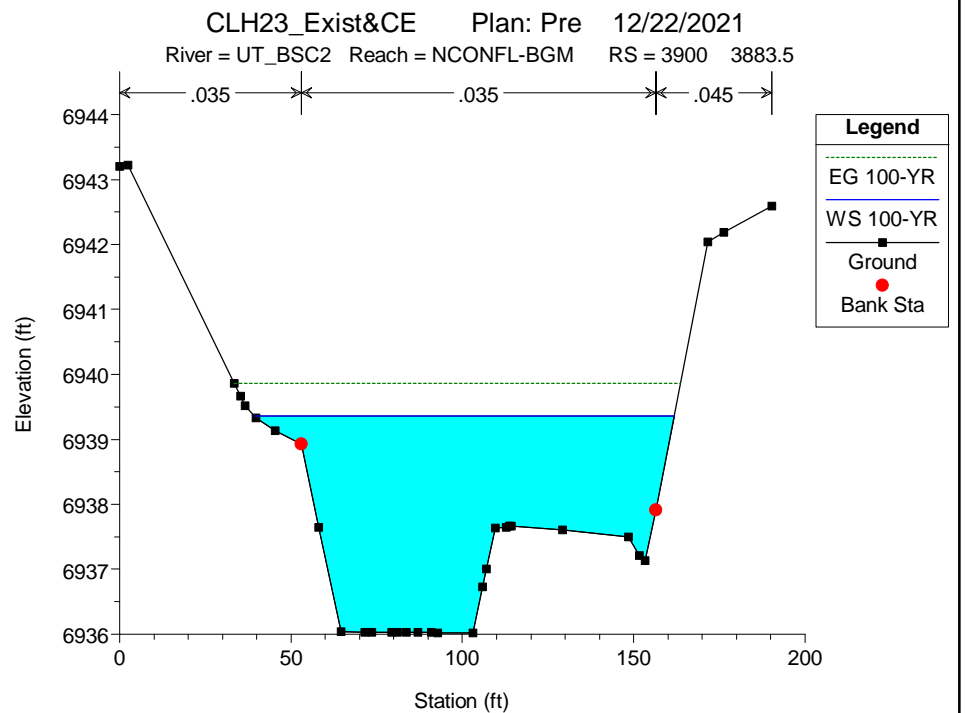
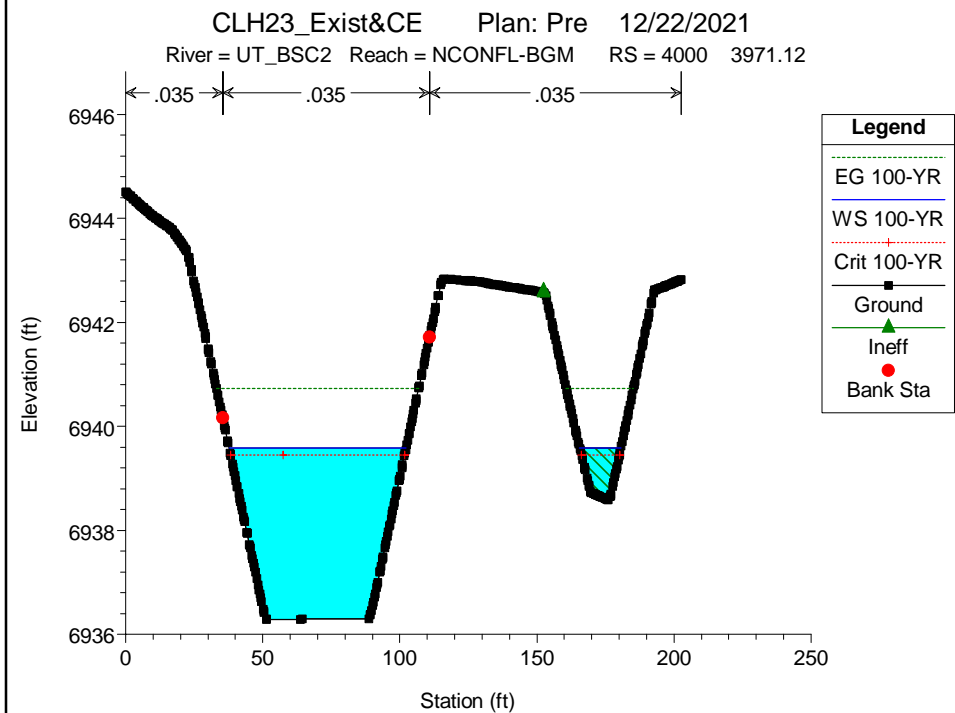
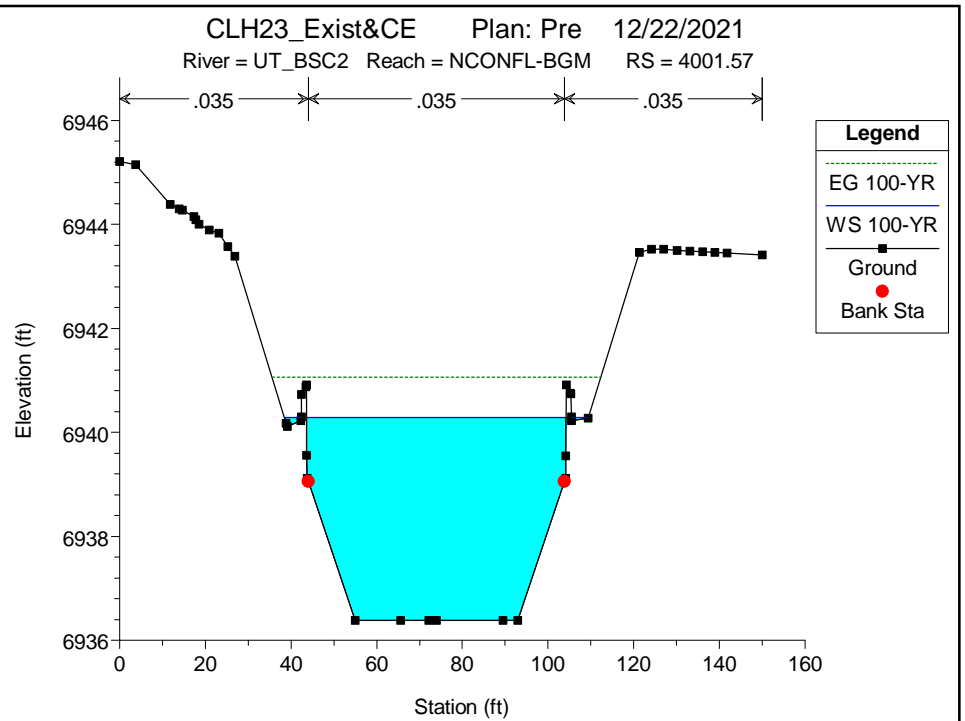
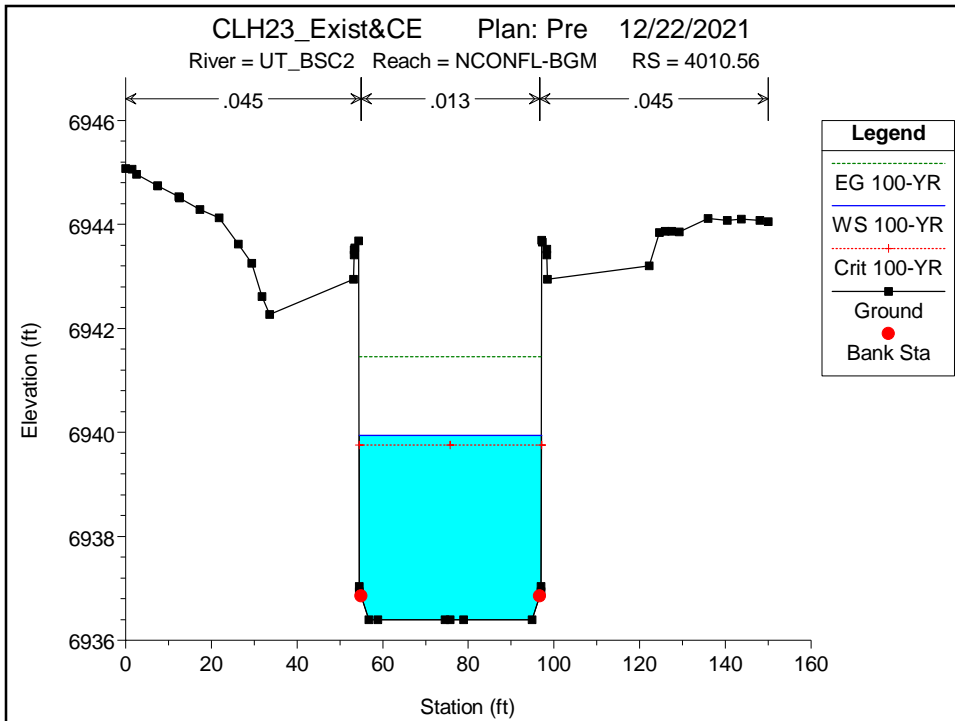


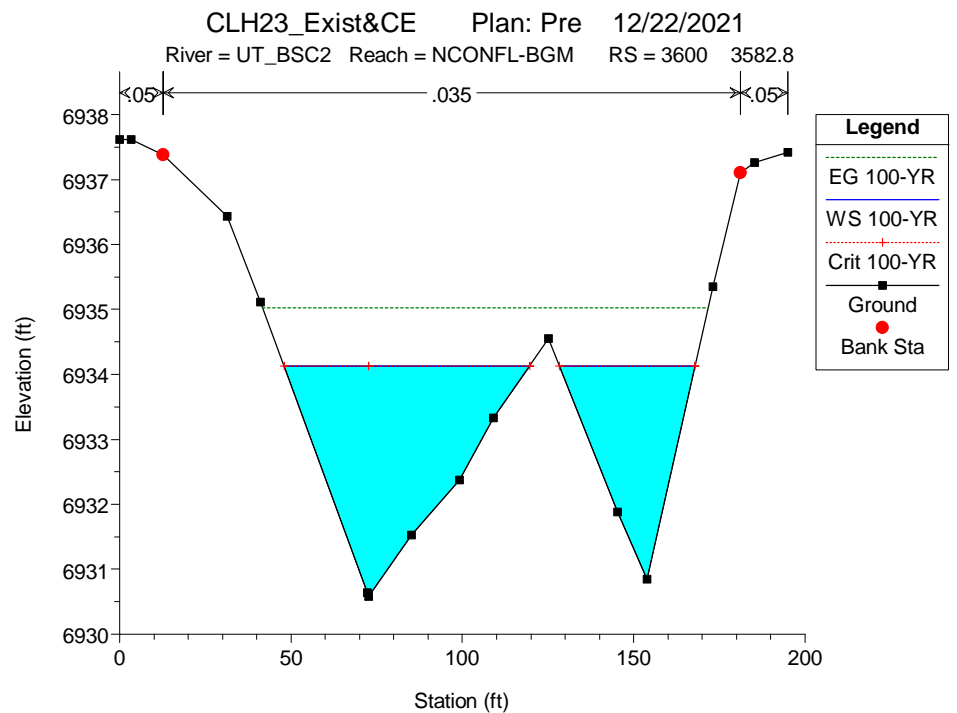
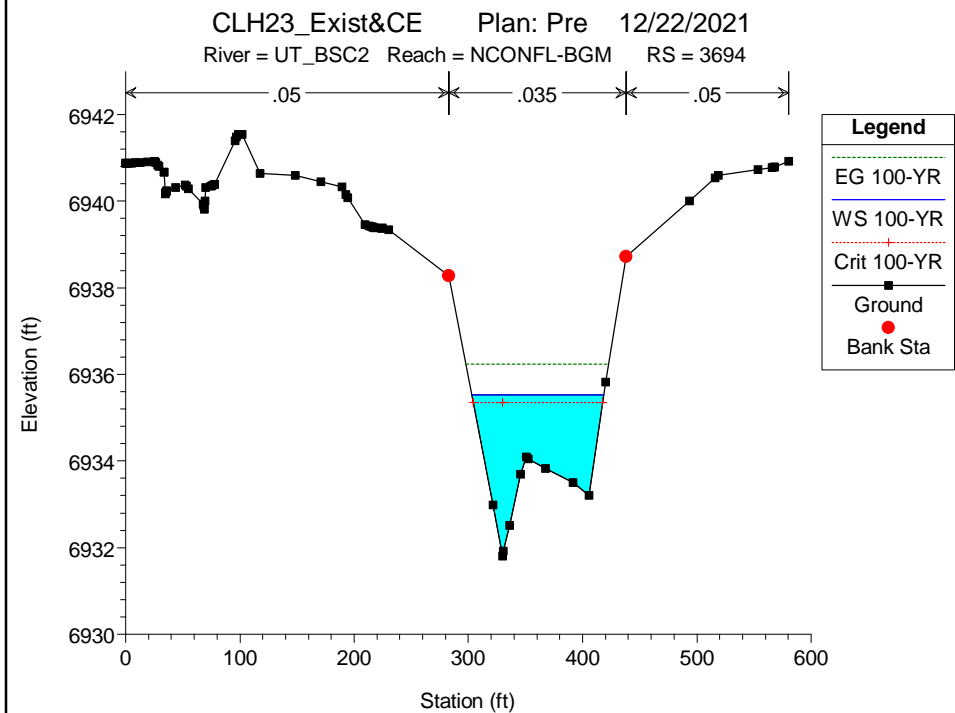
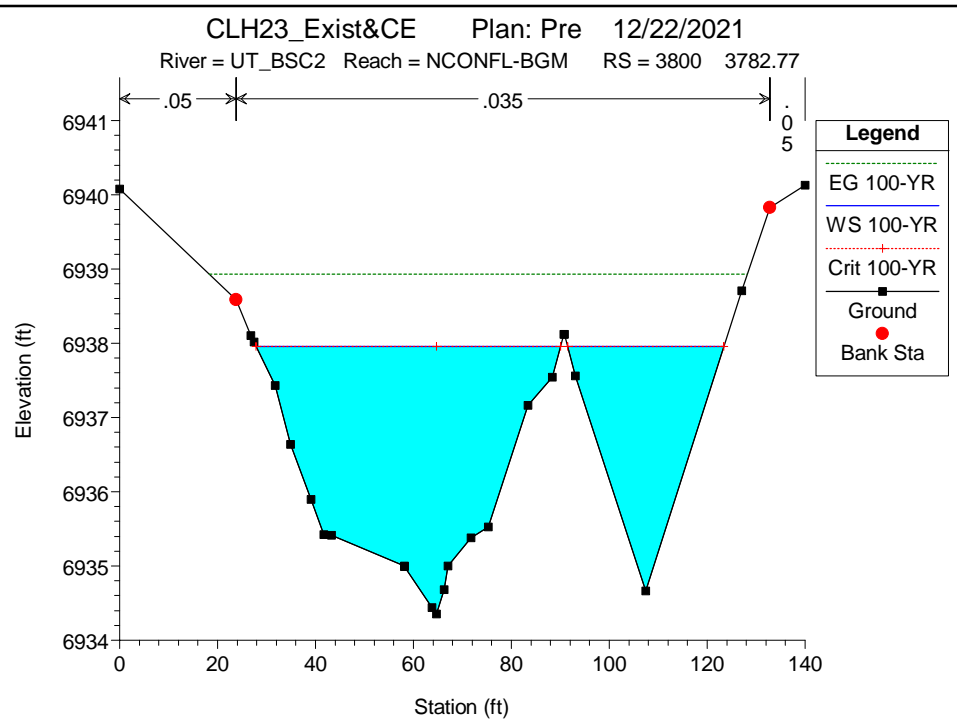
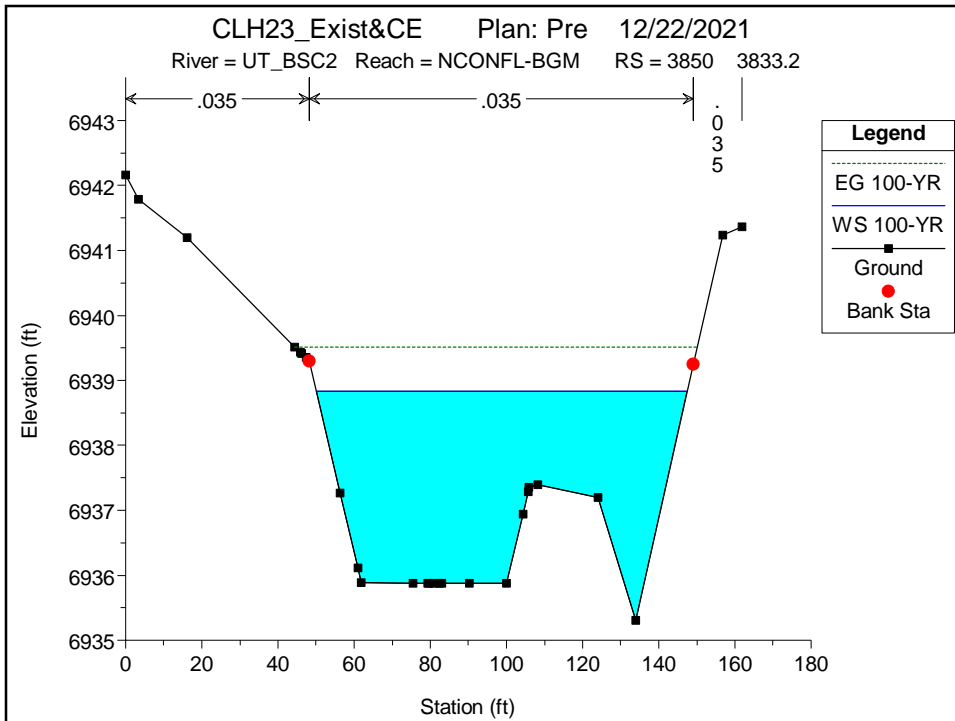


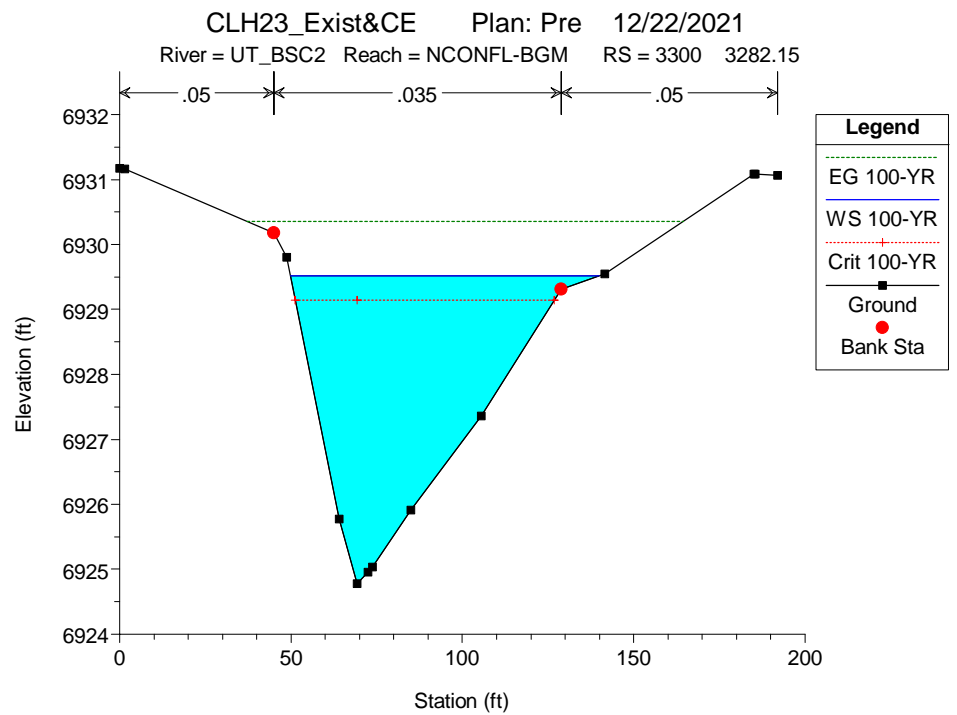
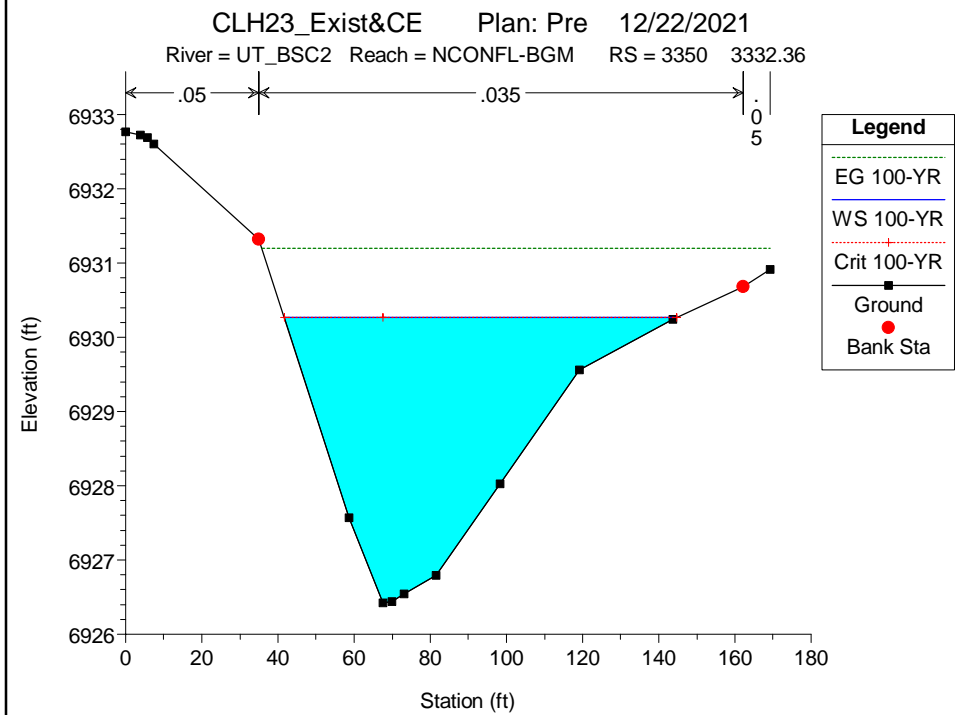
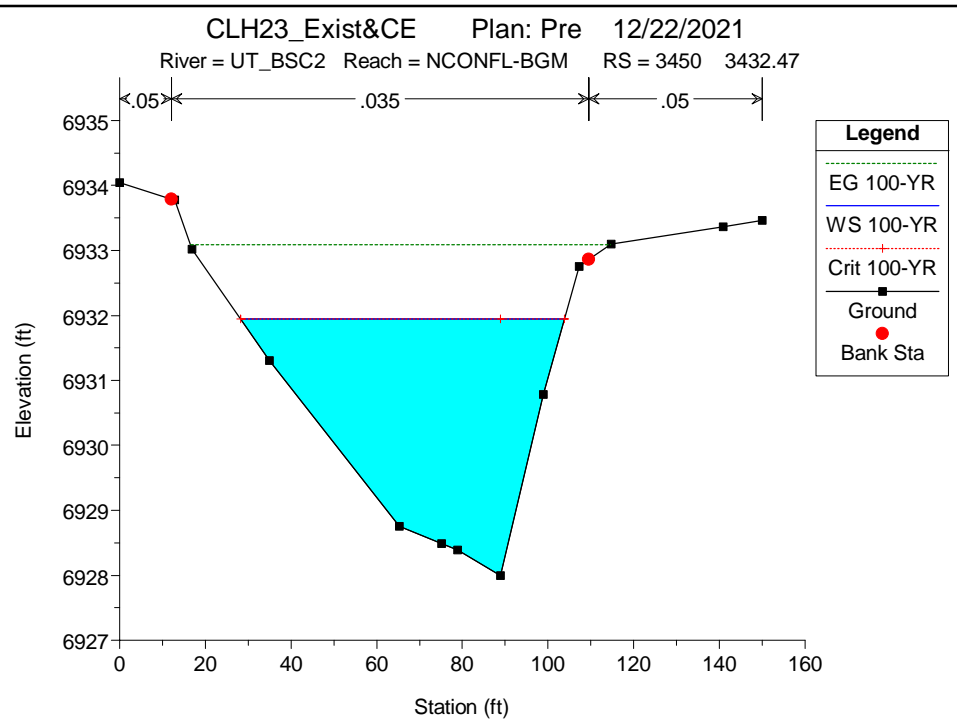
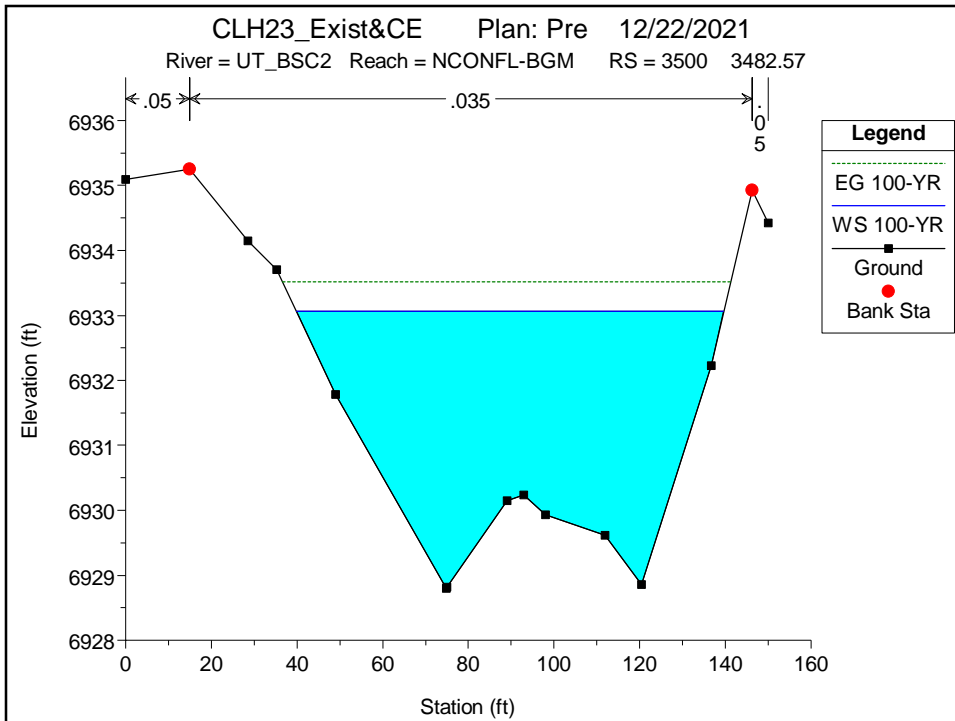


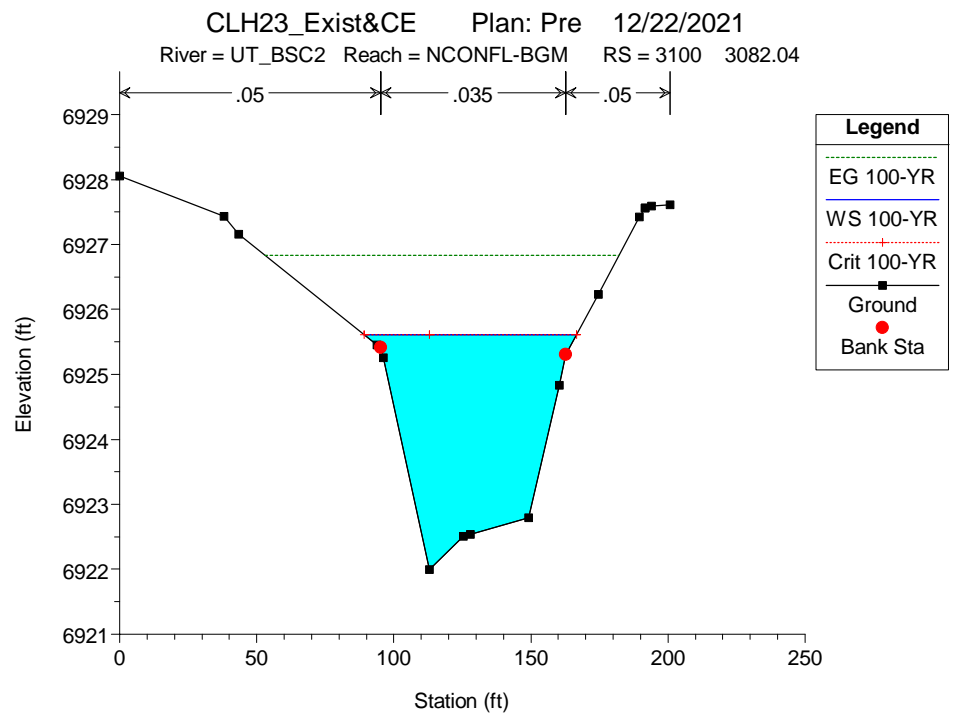
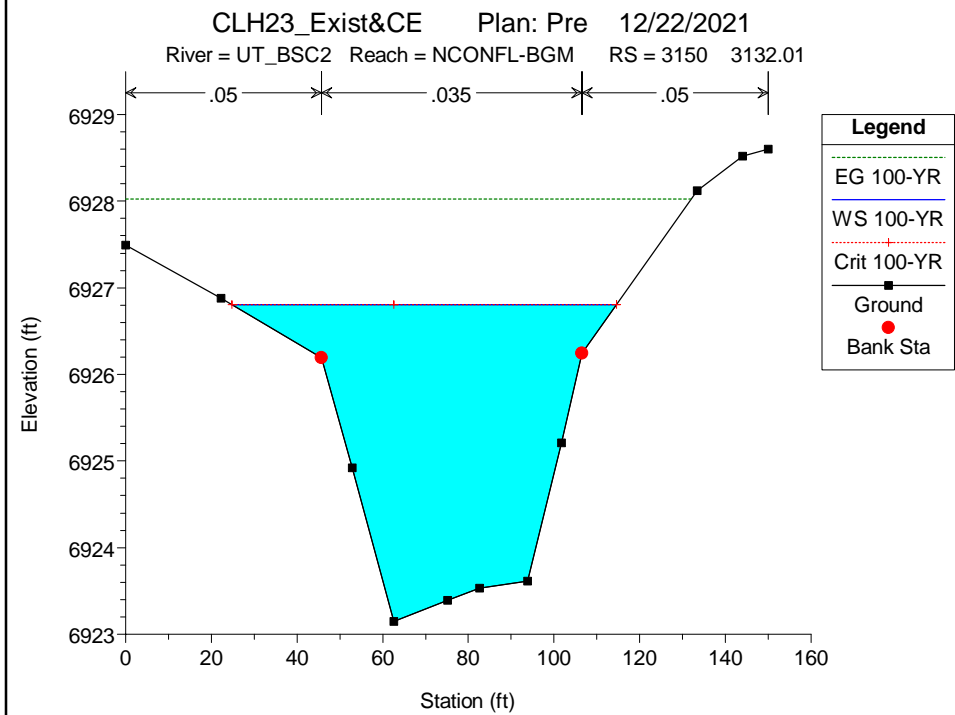
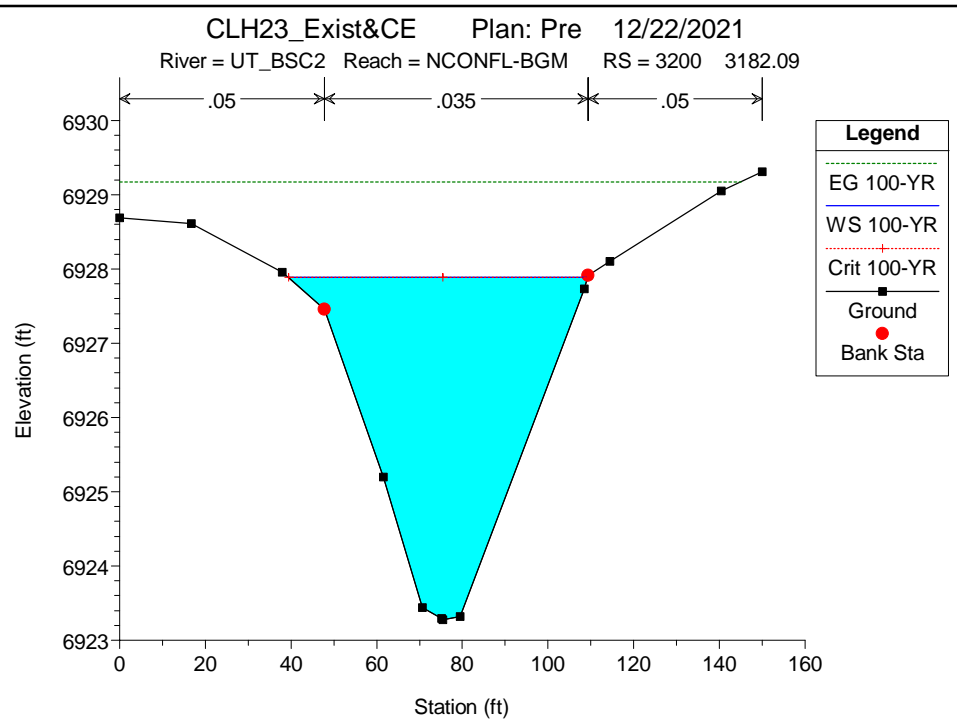
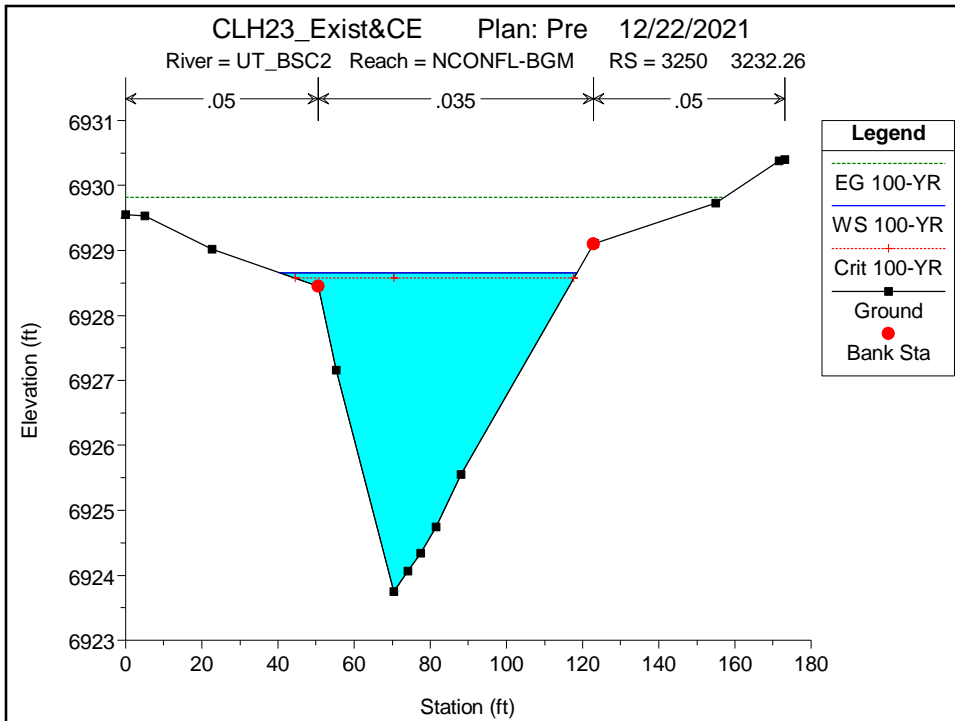


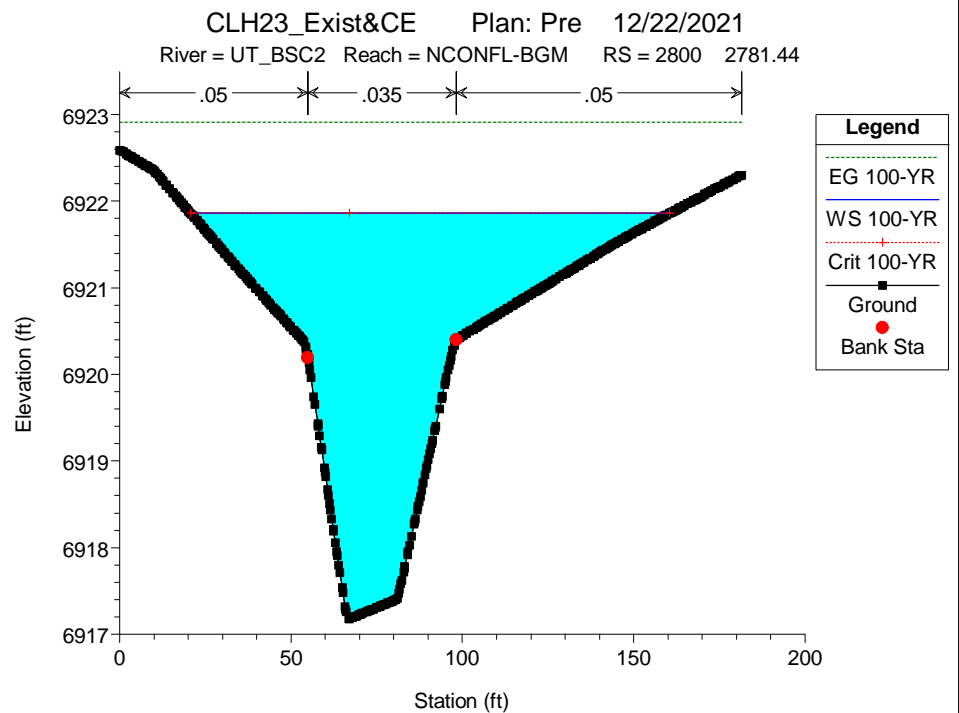
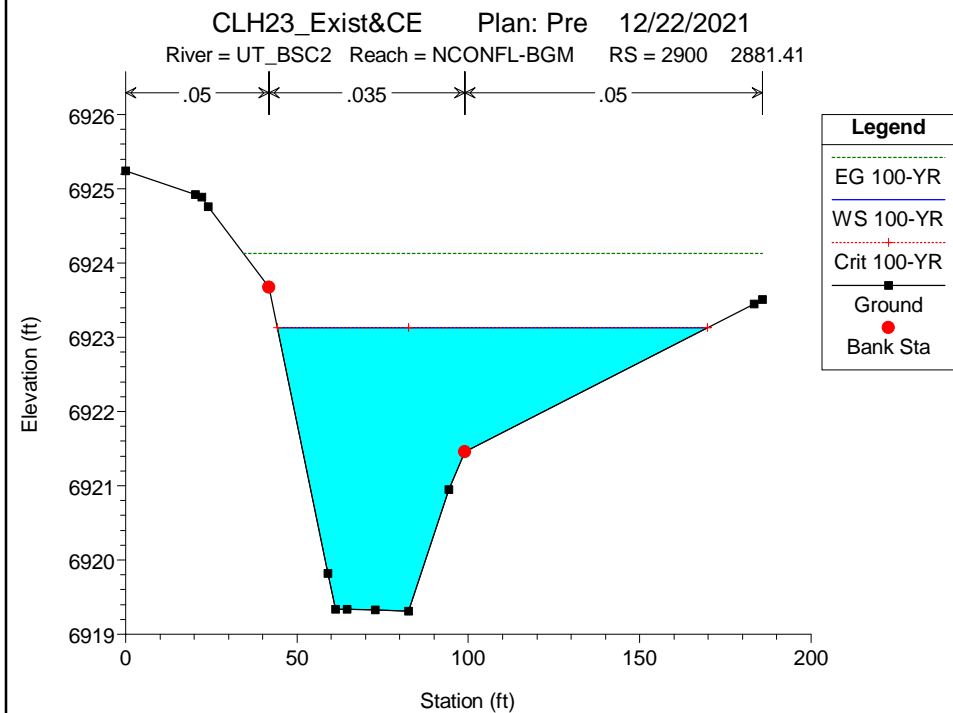
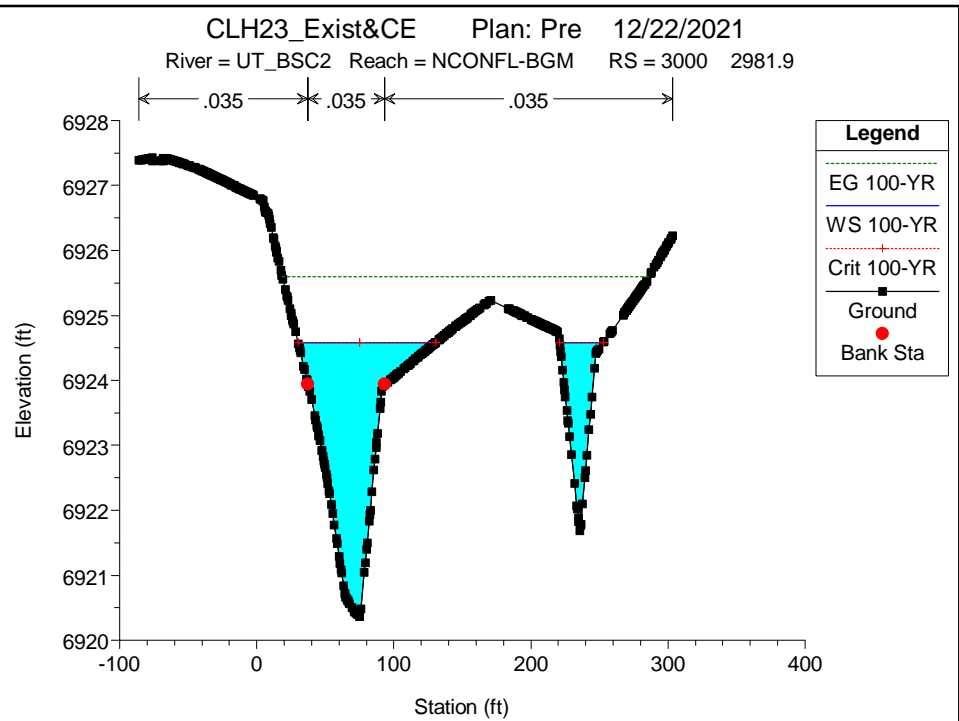
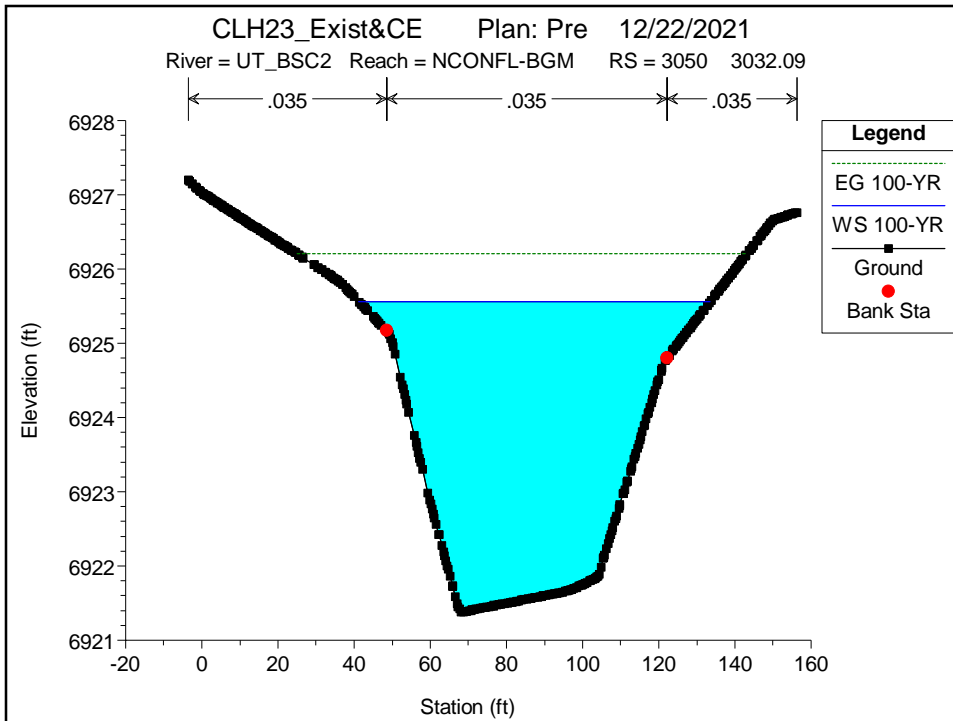


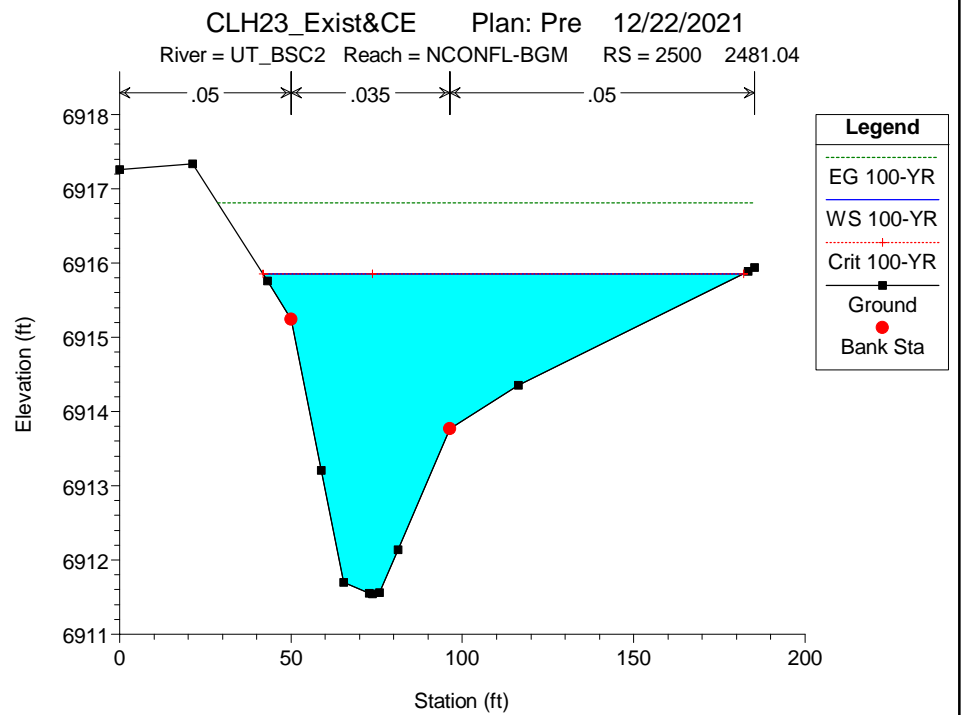
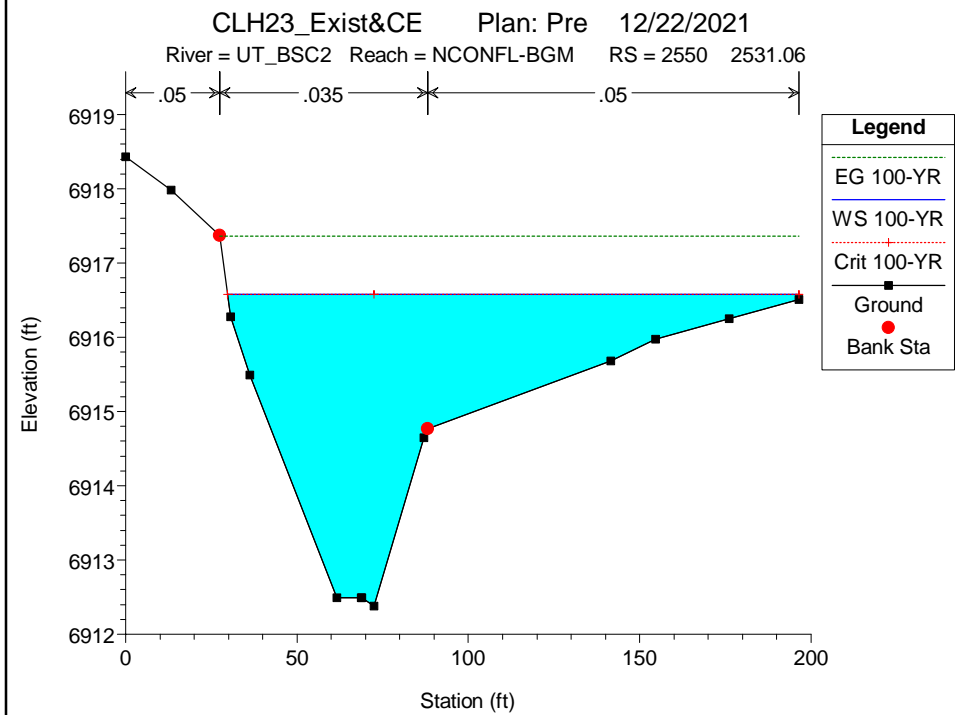
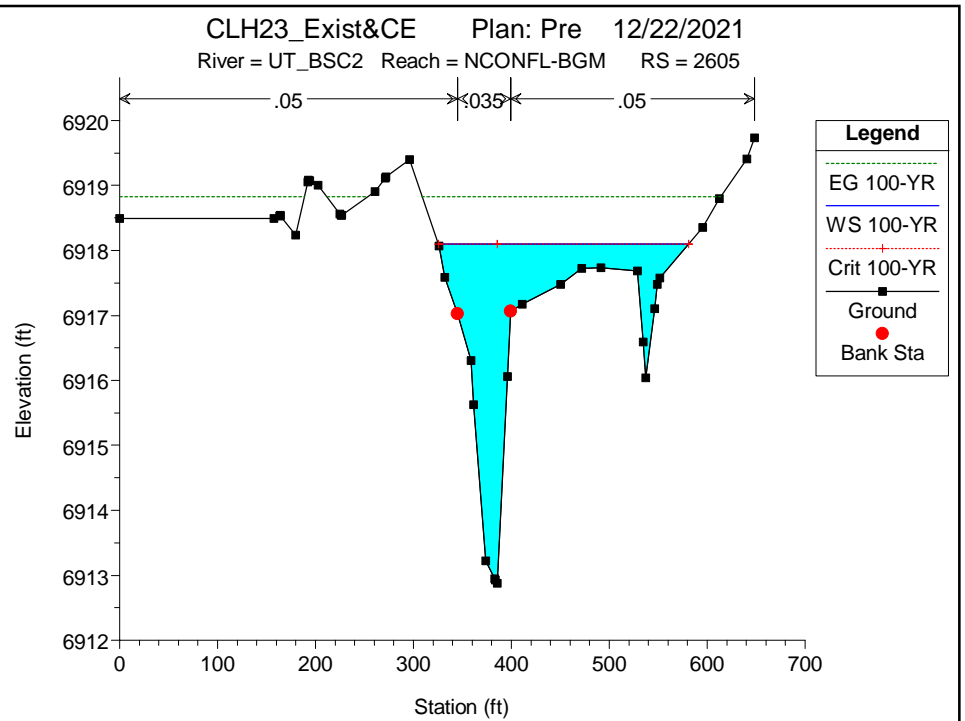
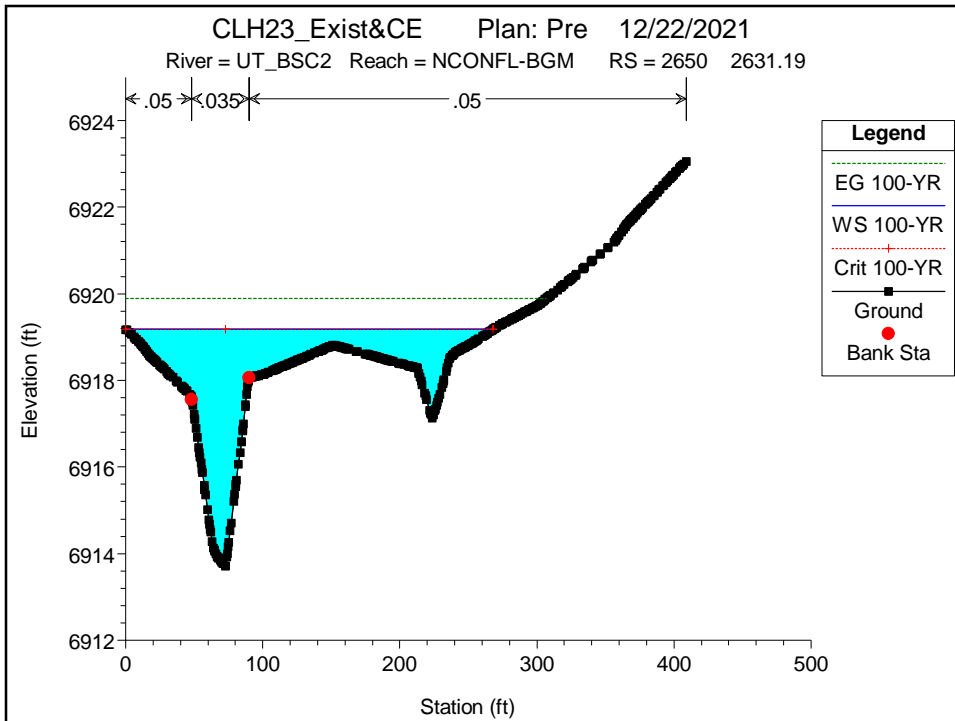


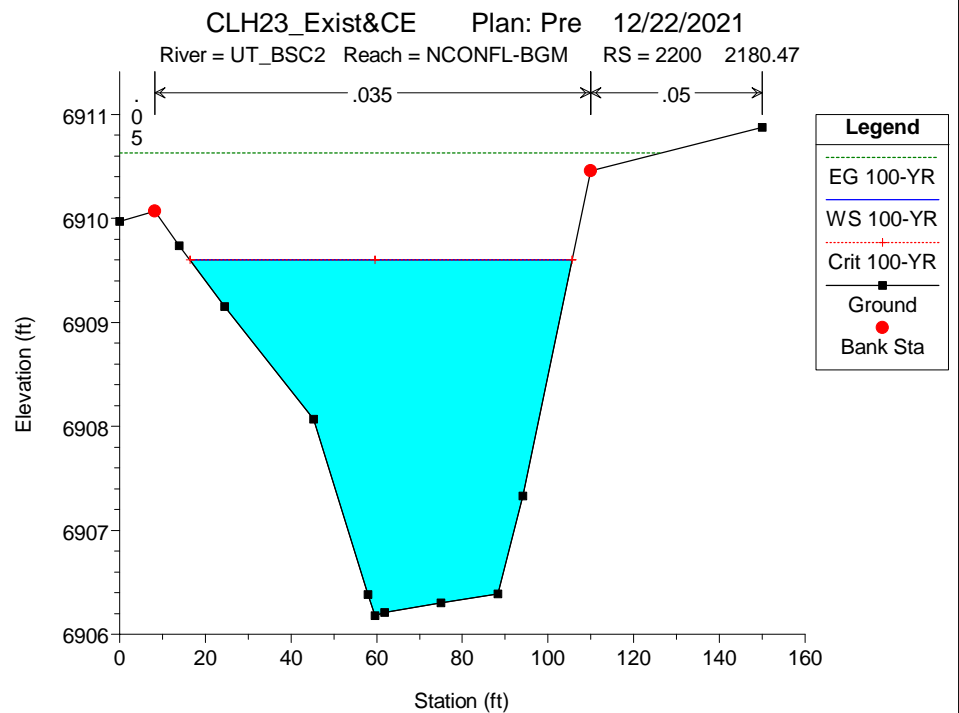
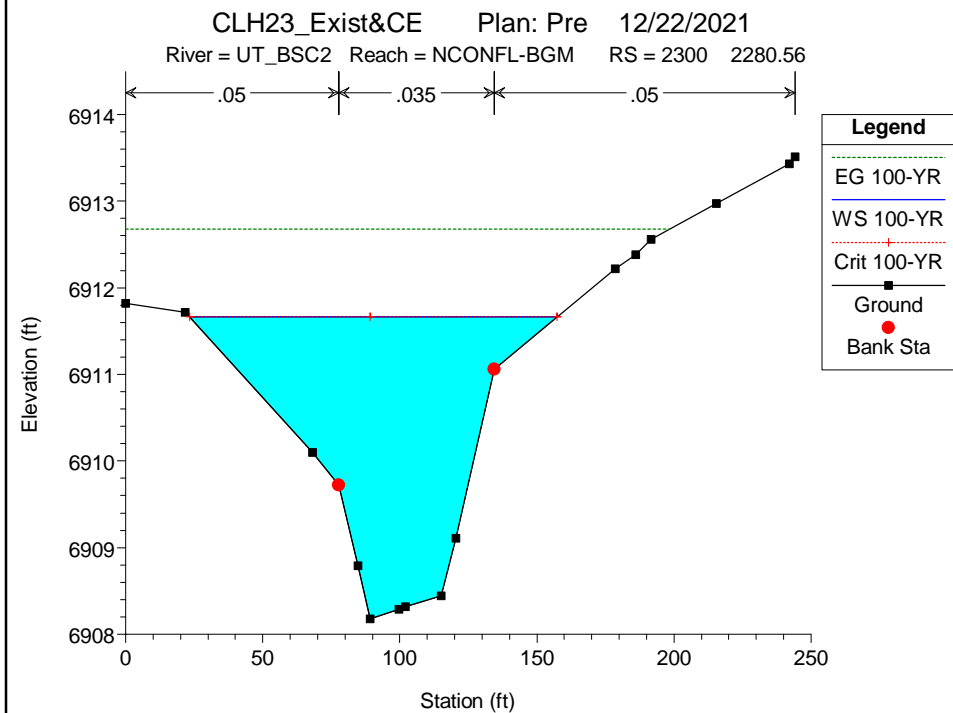
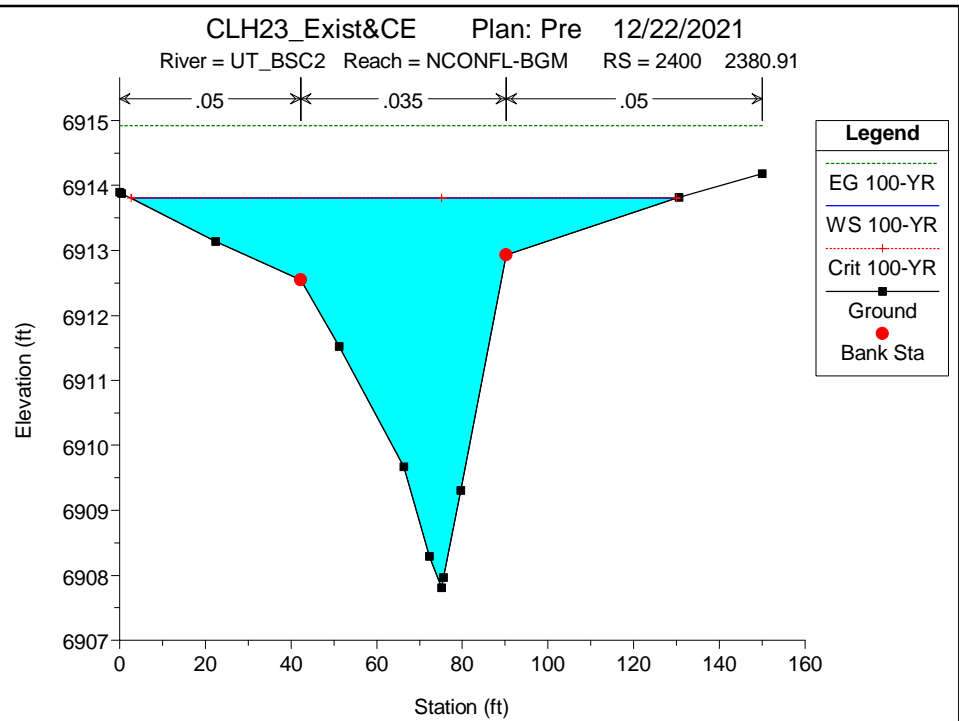
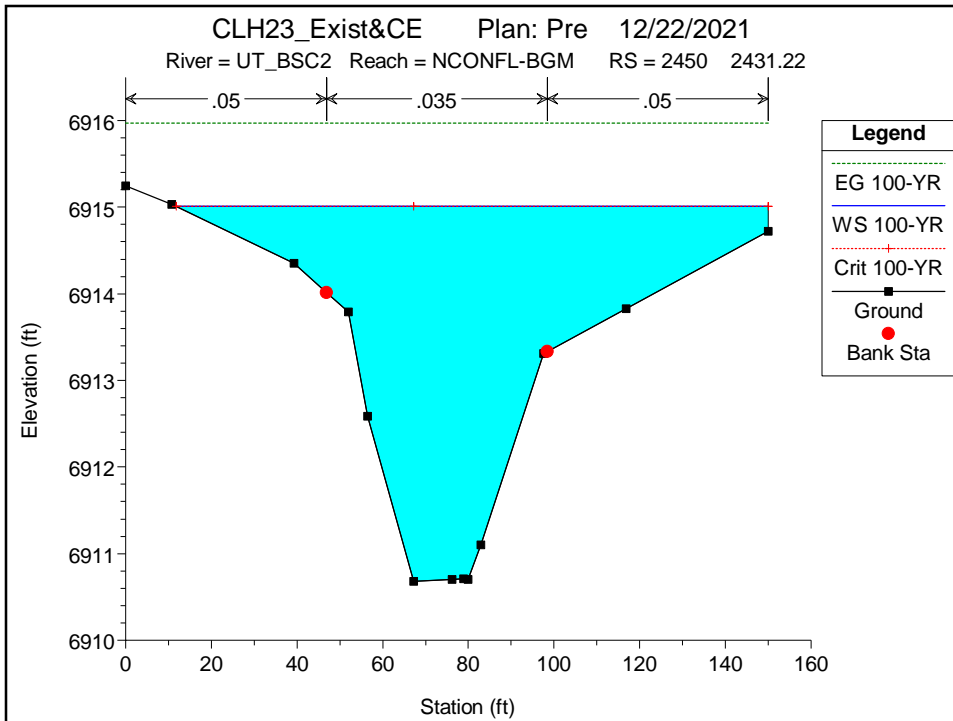


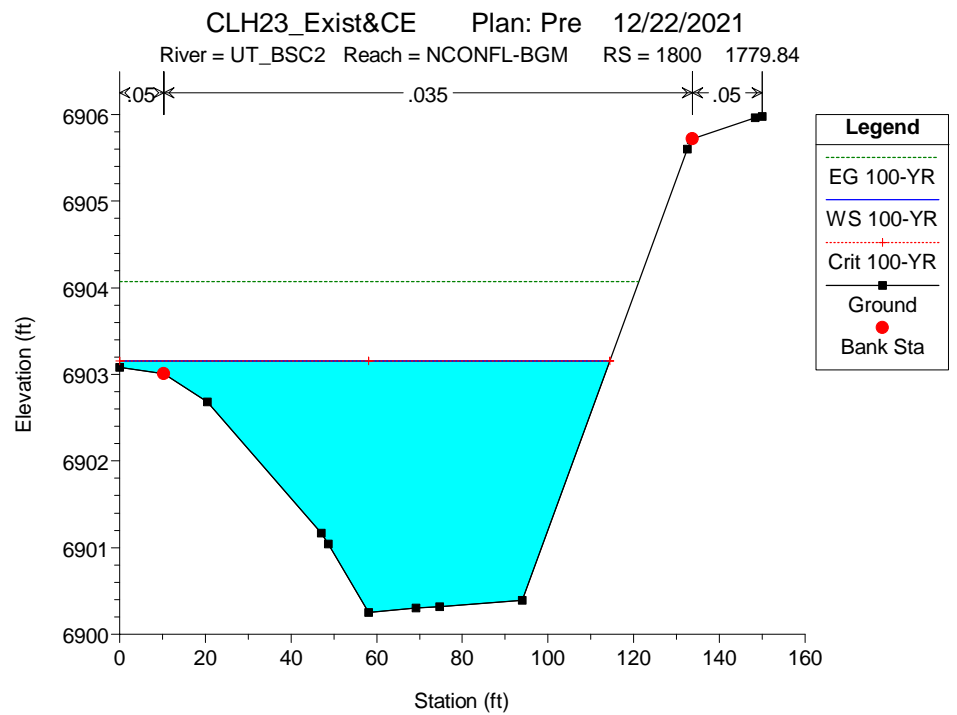
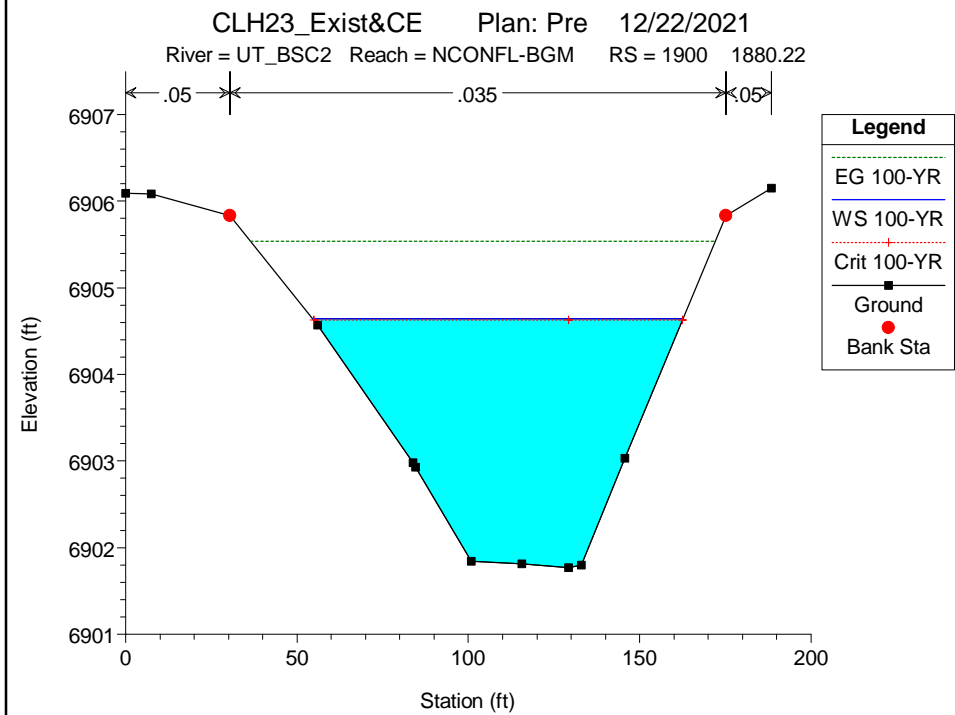
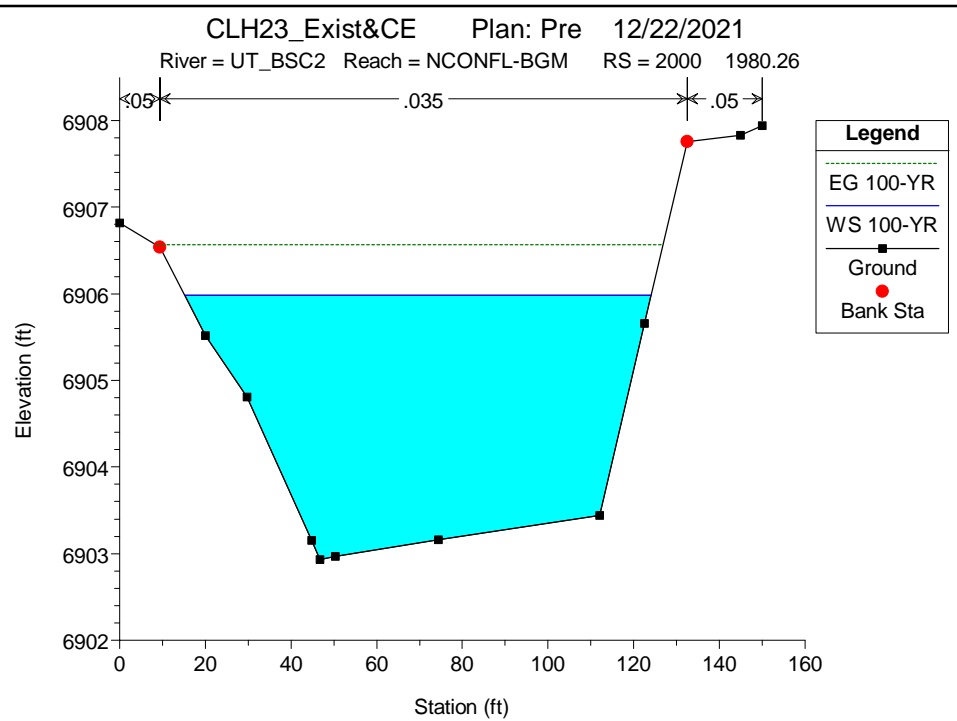
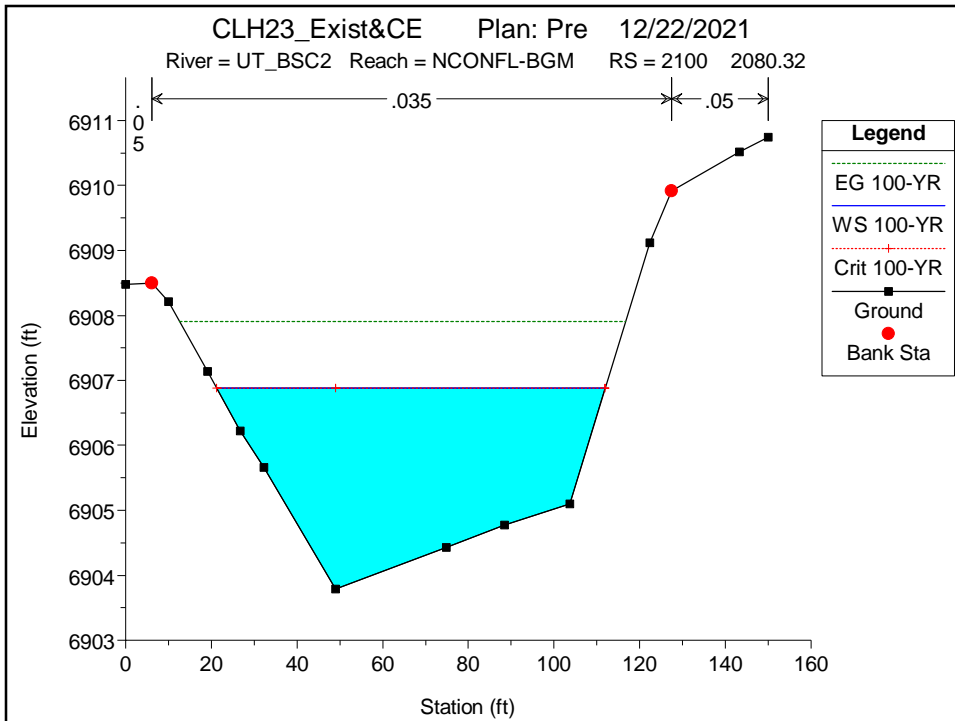


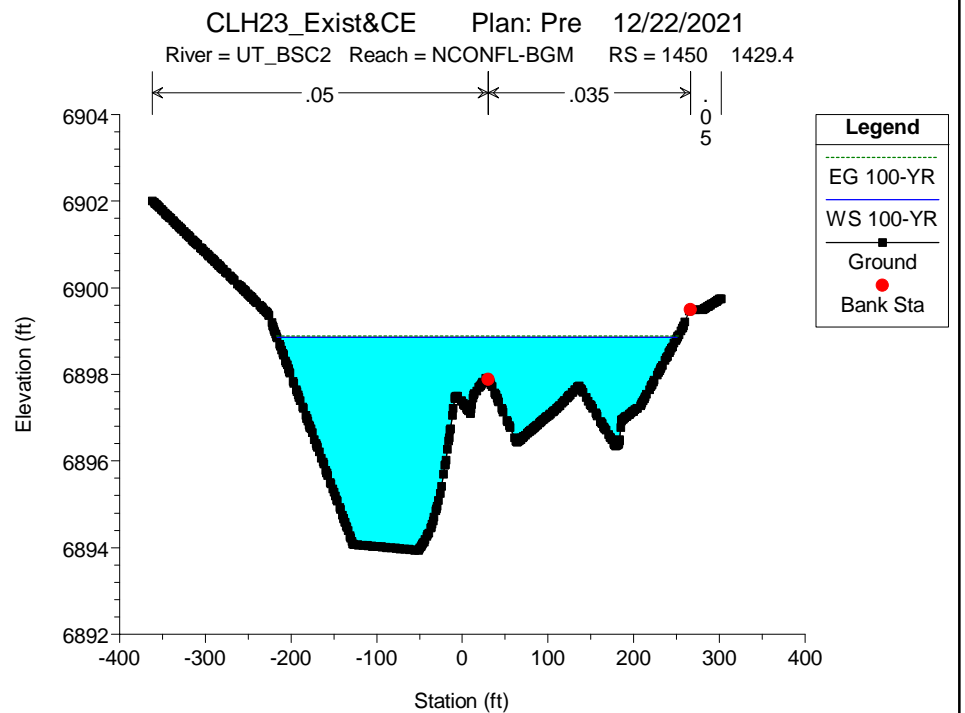
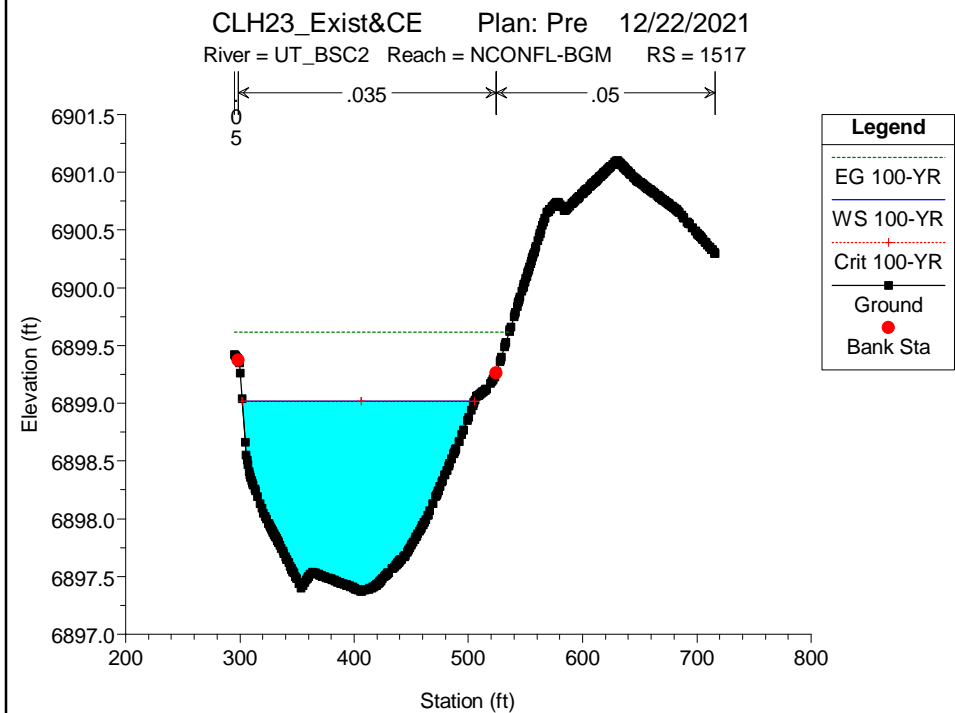
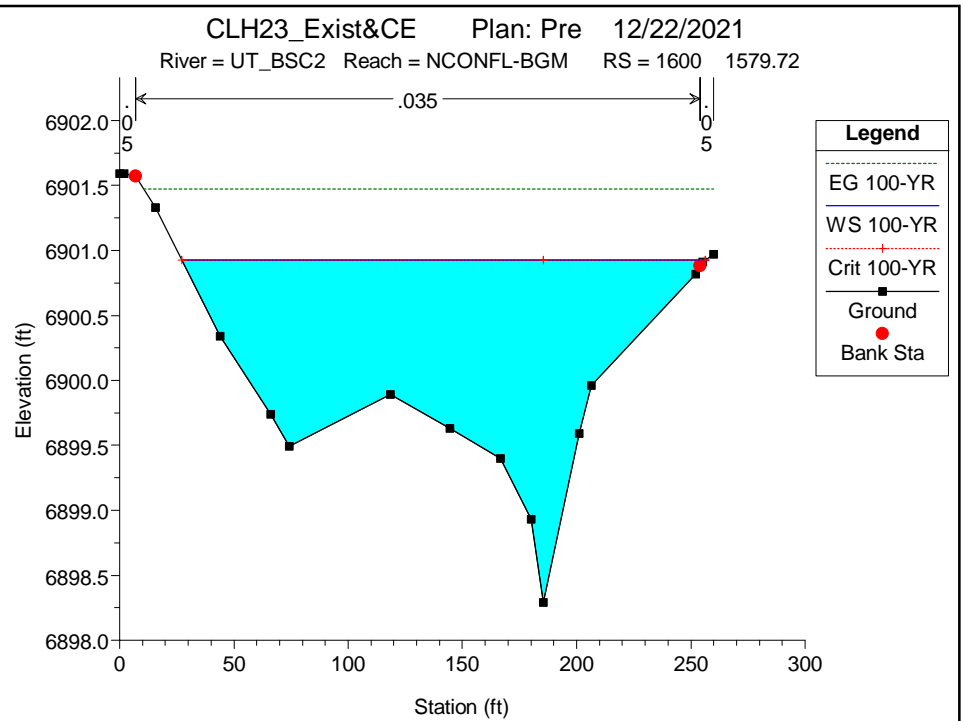
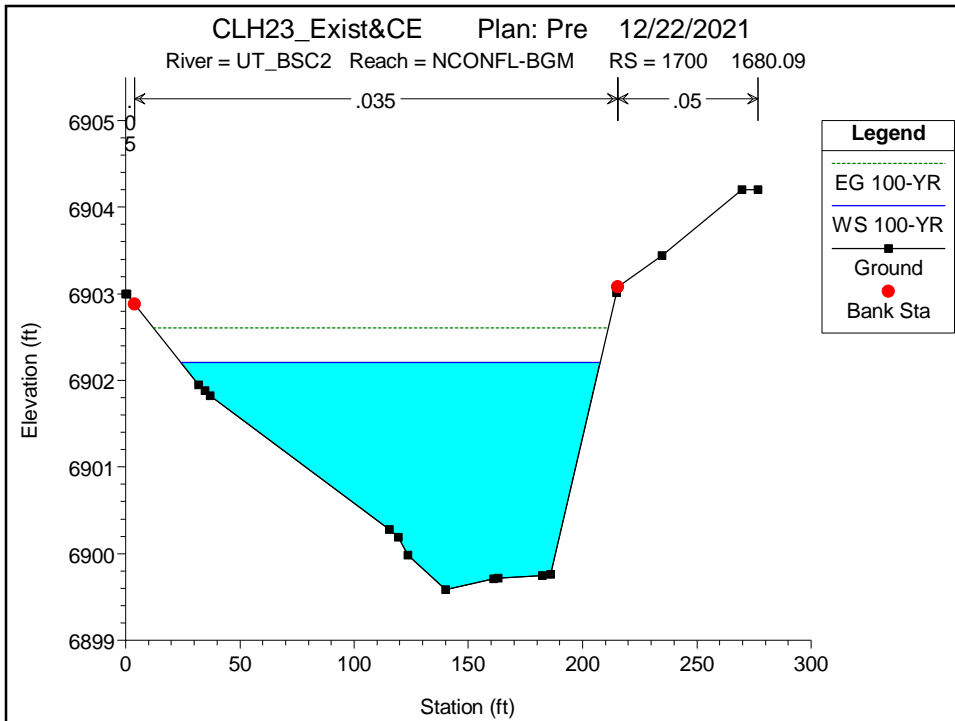


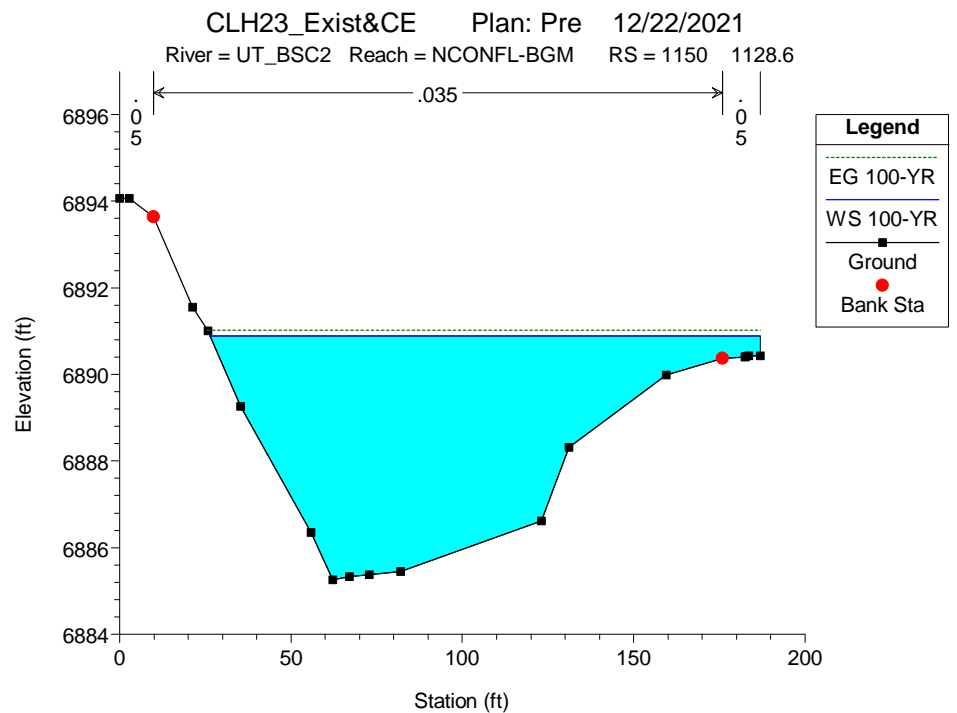
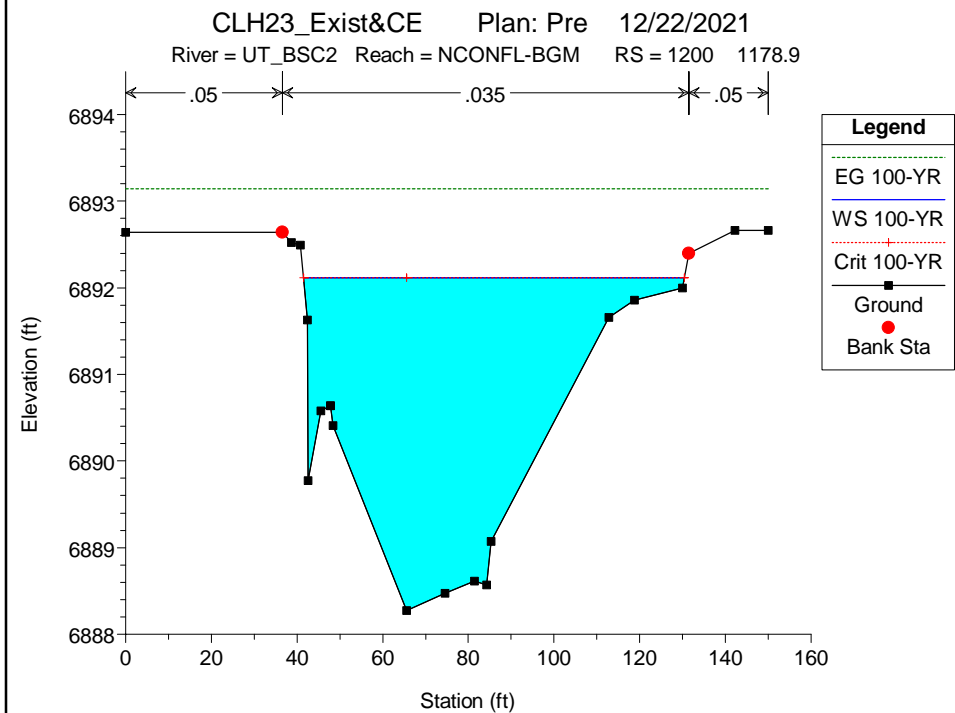
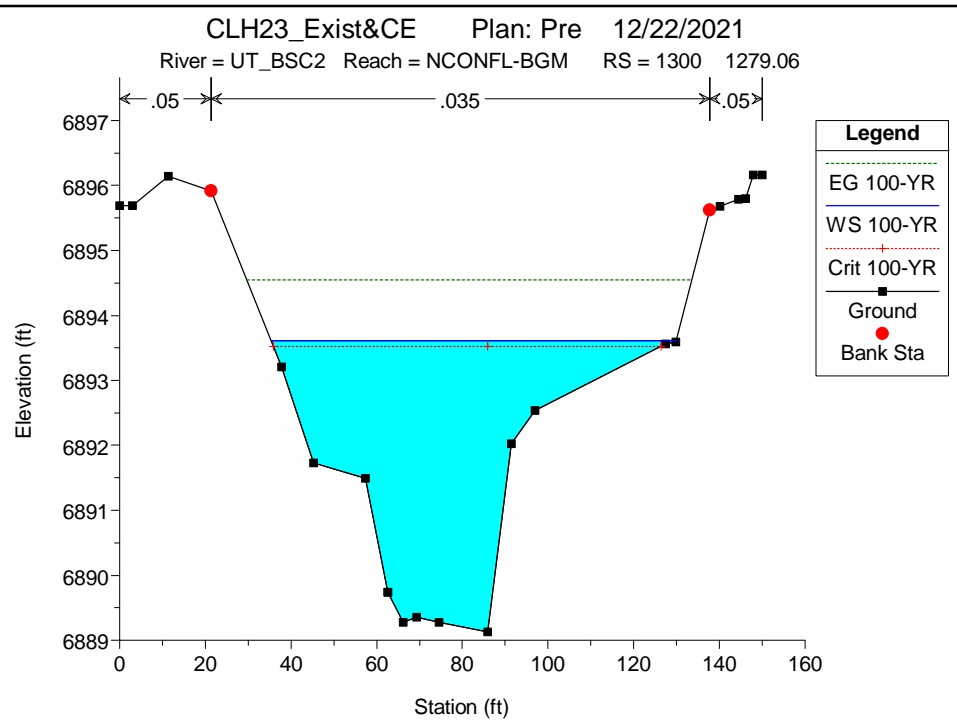
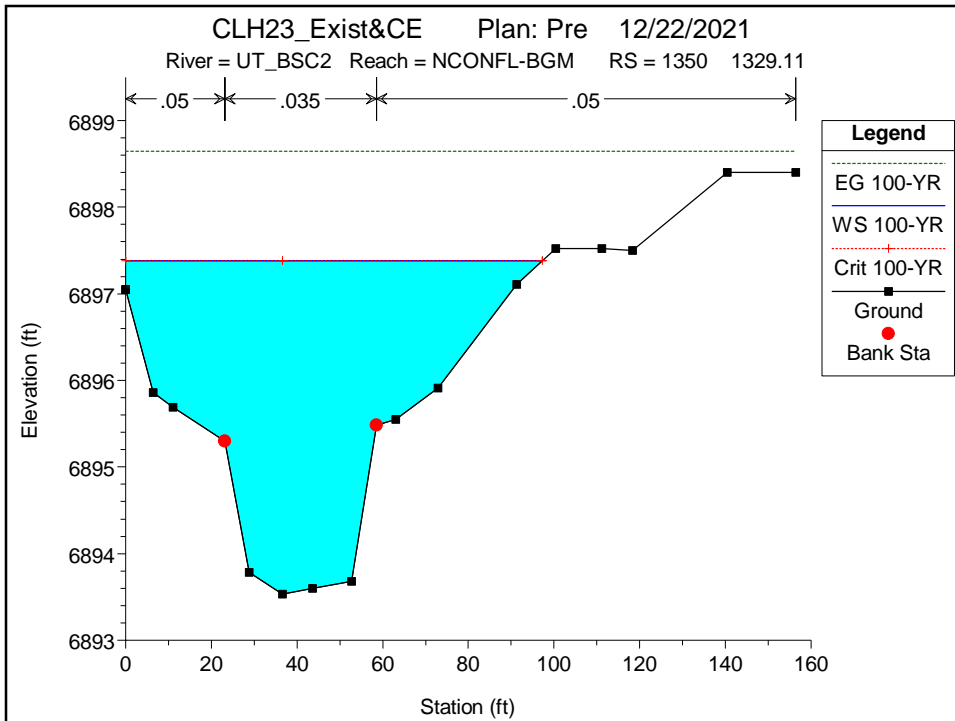


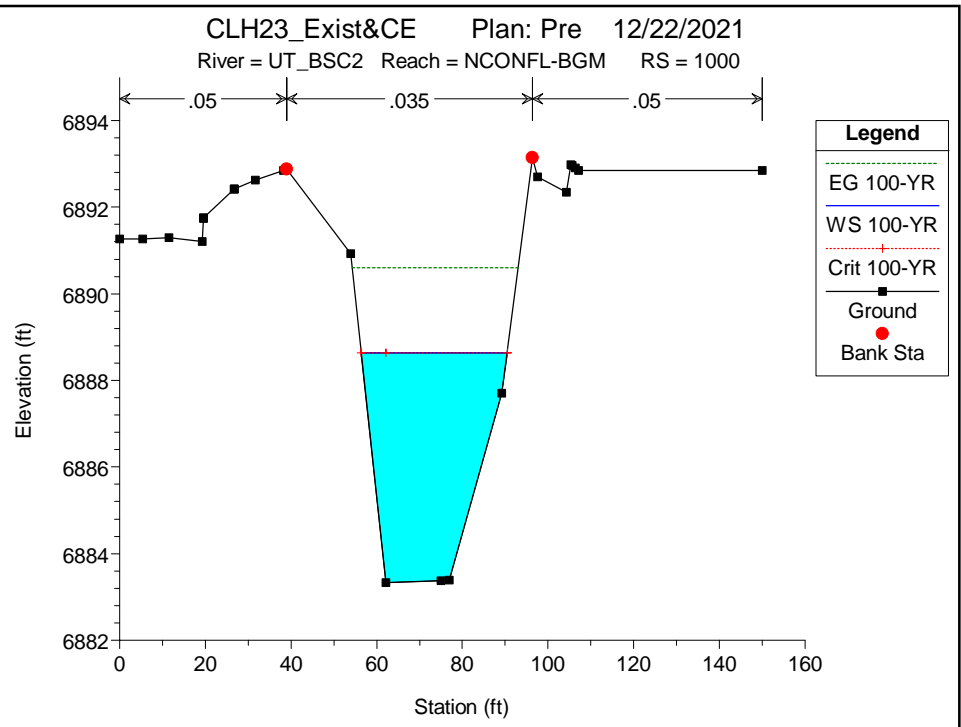
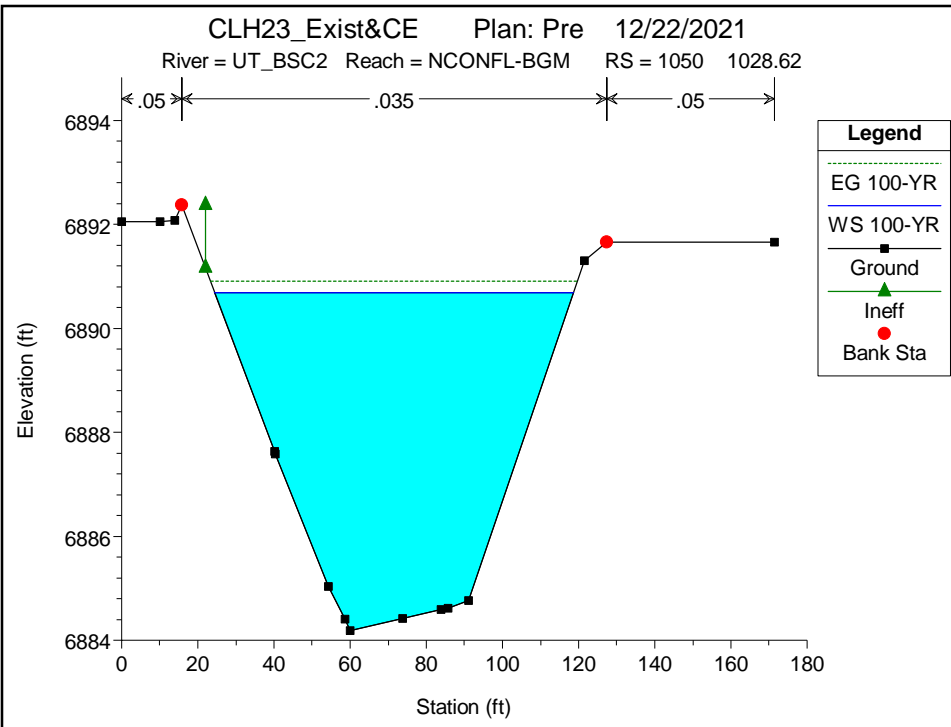












ATTACHMENT L
Post Project Model Results Table



| 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 |
|------------------|-----------|---------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Channel-Rev Stat | 6057 | PF 1 | 1000.00 | 6969.55 | 6973.71 | 6973.71 | 6975.04 | 0.018072 | 9.23 | 108.34 | 41.88 | 1.01 |
| Channel-Rev Stat | 6007 | PF 1 | 1000.00 | 6968.59 | 6973.23 | | 6973.59 | 0.003560 | 4.83 | 206.96 | 63.16 | 0.47 |
| Channel-Rev Stat | 5956 | PF 1 | 1000.00 | 6968.41 | 6973.05 | | 6973.42 | 0.003569 | 4.84 | 206.71 | 63.08 | 0.47 |
| Channel-Rev Stat | 5906 | PF 1 | 1000.00 | 6968.23 | 6972.88 | | 6973.24 | 0.003560 | 4.83 | 206.93 | 63.14 | 0.47 |
| Channel-Rev Stat | 5856 | PF 1 | 1000.00 | 6968.06 | 6972.69 | | 6973.06 | 0.003587 | 4.85 | 206.37 | 63.07 | 0.47 |
| Channel-Rev Stat | 5806 | PF 1 | 1000.00 | 6967.88 | 6972.51 | | 6972.88 | 0.003593 | 4.85 | 206.26 | 63.05 | 0.47 |
| Channel-Rev Stat | 5756 | PF 1 | 1000.00 | 6967.71 | 6972.33 | | 6972.70 | 0.003627 | 4.86 | 205.57 | 62.97 | 0.47 |
| Channel-Rev Stat | 5706 | PF 1 | 1000.00 | 6967.53 | 6972.15 | | 6972.52 | 0.003639 | 4.87 | 205.30 | 62.93 | 0.48 |
| Channel-Rev Stat | 5656 | PF 1 | 1000.00 | 6967.36 | 6971.96 | | 6972.33 | 0.003679 | 4.89 | 204.50 | 62.84 | 0.48 |
| Channel-Rev Stat | 5606 | PF 1 | 1000.00 | 6967.18 | 6971.78 | | 6972.15 | 0.003714 | 4.91 | 203.80 | 62.74 | 0.48 |
| Channel-Rev Stat | 5556 | PF 1 | 1000.00 | 6967.01 | 6971.58 | | 6971.96 | 0.003780 | 4.94 | 202.53 | 62.58 | 0.48 |
| Channel-Rev Stat | 5506 | PF 1 | 1000.00 | 6966.83 | 6971.39 | | 6971.77 | 0.003827 | 4.96 | 201.62 | 62.46 | 0.49 |
| Channel-Rev Stat | 5456 | PF 1 | 1000.00 | 6966.66 | 6971.19 | | 6971.58 | 0.003926 | 5.01 | 199.78 | 62.23 | 0.49 |
| Channel-Rev Stat | 5406 | PF 1 | 1000.00 | 6966.48 | 6970.98 | | 6971.38 | 0.004028 | 5.05 | 197.92 | 61.98 | 0.50 |
| Channel-Rev Stat | 5356 | PF 1 | 1000.00 | 6966.31 | 6970.76 | | 6971.17 | 0.004186 | 5.12 | 195.23 | 61.65 | 0.51 |
| Channel-Rev Stat | 5306 | PF 1 | 1000.00 | 6966.13 | 6970.54 | | 6970.96 | 0.004370 | 5.20 | 192.23 | 61.51 | 0.52 |
| Channel-Rev Stat | 5256 | PF 1 | 1000.00 | 6965.96 | 6970.29 | | 6970.73 | 0.004680 | 5.33 | 187.54 | 60.64 | 0.53 |
| Channel-Rev Stat | 5206 | PF 1 | 1000.00 | 6965.78 | 6970.01 | | 6970.48 | 0.005121 | 5.51 | 181.57 | 59.85 | 0.56 |
| Channel-Rev Stat | 5156 | PF 1 | 1000.00 | 6965.61 | 6969.67 | | 6970.20 | 0.006003 | 5.83 | 171.53 | 58.50 | 0.60 |
| Channel-Rev Stat | 5106 | PF 1 | 1000.00 | 6965.43 | 6969.18 | | 6968.84 | 0.008144 | 6.50 | 153.79 | 56.00 | 0.69 |
| Channel-Rev Stat | 5088 | PF 1 | 1000.00 | 6965.37 | 6968.83 | 6968.41 | 6969.65 | 0.011024 | 7.24 | 138.10 | 53.74 | 0.80 |
| Channel-Rev Stat | 5083 | PF 1 | 1000.00 | 6965.35 | 6968.38 | 6968.38 | 6969.54 | 0.018242 | 8.66 | 115.53 | 50.24 | 1.01 |
| Channel-Rev Stat | 5072 | PF 1 | 1000.00 | 6962.72 | 6965.76 | 6965.76 | 6966.92 | 0.018147 | 8.64 | 115.75 | 50.28 | 1.00 |
| Channel-Rev Stat | 5062 | PF 1 | 1000.00 | 6960.10 | 6963.96 | | 6964.58 | 0.007495 | 6.32 | 158.14 | 56.40 | 0.67 |
| Channel-Rev Stat | 5056 | PF 1 | 1000.00 | 6960.08 | 6963.92 | | 6964.54 | 0.007446 | 6.30 | 158.82 | 56.74 | 0.66 |
| Channel-Rev Stat | 5006 | PF 1 | 1000.00 | 6959.90 | 6963.76 | | 6964.15 | 0.005332 | 5.34 | 223.83 | 126.73 | 0.56 |
| Channel-Rev Stat | 4955 | PF 1 | 1000.00 | 6959.72 | 6963.18 | | 6963.76 | 0.009315 | 6.13 | 163.19 | 72.23 | 0.72 |
| Channel-Rev Stat | 4895 | PF 1 | 1000.00 | 6959.49 | 6962.78 | | 6963.33 | 0.005561 | 5.96 | 167.73 | 64.10 | 0.65 |
| Channel-Rev Stat | 4880 | PF 1 | 1000.00 | 6959.40 | 6962.69 | | 6963.24 | 0.005546 | 5.95 | 168.07 | 64.29 | 0.65 |
| Channel-Rev Stat | 4855 | PF 1 | 1000.00 | 6959.37 | 6962.33 | | 6963.05 | 0.010545 | 6.77 | 147.65 | 61.68 | 0.77 |
| Channel-Rev Stat | 4852 | PF 1 | 1000.00 | 6959.36 | 6962.20 | | 6963.01 | 0.014550 | 5.55 | 140.32 | 60.74 | 0.82 |
| Channel-Rev Stat | 4850 | PF 1 | 1000.00 | 6959.36 | 6962.19 | 6961.88 | 6962.99 | 0.012399 | 7.16 | 139.69 | 60.66 | 0.83 |
| Channel-Rev Stat | 4847.66 | PF 1 | 1000.00 | 6959.34 | 6961.87 | 6961.87 | 6962.92 | 0.018572 | 8.22 | 121.70 | 58.23 | 1.00 |
| Channel-Rev Stat | 4845 | PF 1 | 1000.00 | 6958.99 | 6961.53 | 6961.53 | 6962.58 | 0.018511 | 8.23 | 121.55 | 57.89 | 1.00 |
| Channel-Rev Stat | 4830 | PF 1 | 1000.00 | 6955.00 | 6959.00 | | 6959.41 | 0.004009 | 5.13 | 194.87 | 58.99 | 0.50 |
| Channel-Rev Stat | 4827.6 | PF 1 | 1000.00 | 6954.33 | 6959.13 | | 6959.34 | 0.001777 | 3.64 | 274.88 | 76.43 | 0.34 |
| Channel-Rev Stat | 4818 | PF 1 | 1000.00 | 6954.30 | 6959.05 | | 6959.32 | 0.002198 | 4.16 | 240.13 | 63.20 | 0.38 |
| Channel-Rev Stat | 4802 | PF 1 | 1450.00 | 6954.25 | 6958.65 | | 6959.24 | 0.005453 | 6.15 | 235.75 | 69.00 | 0.59 |
| Channel-Rev Stat | 4798 | PF 1 | 1450.00 | 6954.24 | 6958.66 | | 6959.20 | 0.005100 | 5.89 | 246.24 | 73.38 | 0.57 |
| Channel-Rev Stat | 4794 | PF 1 | 1450.00 | 6954.23 | 6958.64 | | 6959.18 | 0.003937 | 5.91 | 245.53 | 73.30 | 0.57 |
| Channel-Rev Stat | 4752 | PF 1 | 1450.00 | 6954.10 | 6958.45 | | 6959.01 | 0.004156 | 6.02 | 240.87 | 72.77 | 0.58 |
| Channel-Rev Stat | 4735 | PF 1 | 1450.00 | 6954.04 | 6958.35 | | 6958.93 | 0.005657 | 6.11 | 237.38 | 72.38 | 0.59 |
| Channel-Rev Stat | 4717 | PF 1 | 1450.00 | 6954.00 | 6958.21 | | 6958.82 | 0.006125 | 6.28 | 230.87 | 71.68 | 0.62 |
| Channel-Rev Stat | 4711 | PF 1 | 1450.00 | 6953.98 | 6957.67 | | 6958.53 | 0.010009 | 7.46 | 194.42 | 67.48 | 0.77 |
| Channel-Rev Stat | 4708 | PF 1 | 1450.00 | 6953.97 | 6957.59 | | 6958.50 | 0.010685 | 7.63 | 190.05 | 66.97 | 0.80 |
| Channel-Rev Stat | 4706 | PF 1 | 1450.00 | 6953.97 | 6957.55 | 6957.13 | 6958.48 | 0.011106 | 7.73 | 187.54 | 66.69 | 0.81 |
| Channel-Rev Stat | 4703.2 | PF 1 | 1450.00 | 6953.96 | 6957.12 | 6957.12 | 6958.40 | 0.017580 | 9.07 | 159.94 | 63.27 | 1.01 |
| Channel-Rev Stat | 4691.54 | PF 1 | 1450.00 | 6951.04 | 6955.53 | | 6956.05 | 0.004812 | 5.77 | 251.35 | 73.93 | 0.55 |
| Channel-Rev Stat | 4678 | PF 1 | 1450.00 | 6951.00 | 6955.40 | | 6955.98 | 0.005436 | 6.12 | 237.12 | 69.88 | 0.59 |
| Channel-Rev Stat | 4666 | PF 1 | 1450.00 | 6950.96 | 6955.18 | | 6955.81 | 0.006214 | 6.37 | 227.80 | 69.99 | 0.62 |
| Channel-Rev Stat | 4658 | PF 1 | 1450.00 | 6950.94 | 6955.14 | | 6955.76 | 0.004805 | 6.33 | 229.02 | 71.55 | 0.62 |
| Channel-Rev Stat | 4652 | PF 1 | 1450.00 | 6950.92 | 6955.11 | | 6955.73 | 0.004772 | 6.32 | 229.44 | 71.50 | 0.62 |
| Channel-Rev Stat | 4620 | PF 1 | 1450.00 | 6950.83 | 6954.89 | | 6955.56 | 0.005387 | 6.59 | 219.91 | 70.45 | 0.66 |
| Channel-Rev Stat | 4602 | PF 1 | 1450.00 | 6950.77 | 6954.75 | | 6955.46 | 0.005771 | 6.76 | 214.65 | 69.83 | 0.68 |
| Channel-Rev Stat | 4600 | PF 1 | 1450.00 | 6950.77 | 6954.73 | | 6955.45 | 0.007694 | 6.80 | 213.14 | 69.67 | 0.69 |
| Channel-Rev Stat | 4577 | PF 1 | 1450.00 | 6950.70 | 6954.37 | | 6955.24 | 0.010098 | 7.47 | 195.70 | 72.62 | 0.78 |
| Channel-Rev Stat | 4575 | PF 1 | 1450.00 | 6950.69 | 6954.31 | | 6955.21 | 0.010728 | 7.64 | 189.79 | 66.94 | 0.80 |
| Channel-Rev Stat | 4572 | PF 1 | 1450.00 | 6950.68 | 6954.27 | 6953.85 | 6955.19 | 0.010951 | 7.69 | 190.21 | 71.71 | 0.81 |
| Channel-Rev Stat | 4570.48 | PF 1 | 1450.00 | 6950.68 | 6953.84 | 6953.84 | 6955.12 | 0.017609 | 9.07 | 159.85 | 63.26 | 1.01 |
| Channel-Rev Stat | 4567 | PF 1 | 1450.00 | 6950.00 | 6953.21 | 6953.21 | 6954.50 | 0.017591 | 9.14 | 158.75 | 62.45 | 1.01 |
| Channel-Rev Stat | 4551 | PF 1 | 1450.00 | 6946.00 | 6949.92 | | 6950.84 | 0.009200 | 7.68 | 188.70 | 58.11 | 0.75 |
| Channel-Rev Stat | 4539 | PF 1 | 1450.00 | 6945.58 | 6950.03 | | 6950.67 | 0.005603 | 6.41 | 226.06 | 62.95 | 0.60 |
| Channel-Rev Stat | 4520 | PF 1 | 1450.00 | 6945.53 | 6950.01 | | 6950.53 | 0.004843 | 5.78 | 250.77 | 73.87 | 0.55 |
| Channel-Rev Stat | 4516 | PF 1 | 1450.00 | 6945.51 | 6950.00 | | 6950.52 | 0.003697 | 5.78 | 251.03 | 73.89 | 0.55 |
| Channel-Rev Stat | 4502 | PF 1 | 1450.00 | 6945.47 | 6949.94 | | 6950.47 | 0.003749 | 5.80 | 249.82 | 73.87 | 0.56 |
| Channel-Rev Stat | 4452 | PF 1 | 1450.00 | 6945.32 | 6949.89 | | 6950.38 | 0.003469 | 5.65 | 256.72 | 74.50 | 0.54 |
| Channel-Rev Stat | 4402 | PF 1 | 1450.00 | 6945.18 | 6949.69 | | 6950.20 | 0.003622 | 5.73 | 252.91 | 74.13 | 0.55 |
| Channel-Rev Stat | 4352 | PF 1 | 1450.00 | 6945.18 | 6949.41 | | 6949.99 | 0.004478 | 6.15 | 235.78 | 73.02 | 0.60 |
| Channel-Rev Stat | 4302 | PF 1 | 1450.00 | 6944.88 | 6949.20 | | 6949.77 | 0.004243 | 6.06 | 239.22 | 72.66 | 0.59 |
| Channel-Rev Stat | 4252 | PF 1 | 1450.00 | 6944.73 | 6948.92 | | 6949.54 | 0.004772 | 6.32 | 229.45 | 71.52 | 0.62 |
| Channel-Rev Stat | 4245 | PF 1 | 1450.00 | 6944.70 | 6948.12 | 6947.86 | 6949.16 | 0.010092 | 8.19 | 176.99 | 65.65 | 0.88 |
| Channel-Rev Stat | 4230 | PF 1 | 1450.00 | 6944.60 | 6947.78 | 6947.78 | 6949.05 | 0.022511 | 9.03 | 160.53 | 64.46 | 1.01 |
| Channel-Rev Stat | 4214 | PF 1 | 1450.00 | 6939.95 | 6943.09 | 6943.09 | 6944.37 | 0.020893 | 9.13 | 160.17 | 63.40 | 0.98 |
| Channel-Rev Stat | 4200 | PF 1 | 1450.00 | 6937.01 | 6943.65 | | 6943.82 | 0.001244 | 3.38 | 440.41 | 98.68 | 0.27 |
| Channel-Rev Stat | 4152 | PF 1 | 1450.00 | 6936.87 | 6943.61 | | 6943.81 | 0.000094 | 3.56 | 407.60 | 107.97 | 0.26 |
| Channel-Rev Stat | 4118 | PF 1 | 1450.00 | 6936.82 | 6943.42 | | 6943.79 | 0.000148 | 4.84 | 299.66 | 90.40 | 0.33 |
| Channel-Rev Stat | 4102 | PF 1 | 1450.00 | 6936.78 | 6943.33 | 6940.13 | 6943.76 | 0.000177 | 5.31 | 276.90 | 83.75 | 0.37 |
| Channel-Rev Stat | 4073 | | Culvert | | | | | | | | | |
| Channel-Rev Stat | 4002 | PF 1 | 1450.00 | 6936.40 | 6939.98 | 6939.98 | 6941.75 | 0.015100 | 10.67 | 135.86 | 42.55 | 1.00 |

Please indicate stations with drop structures and culverts



why is this one so high?

HEC-RAS Plan: Post River: BG-Full Reach: Channel-Rev Stat Profile: PF 1 (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 |
|------------------|-----------|---------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Channel-Rev Stat | 3980 | PF 1 | 1450.00 | 6936.38 | 6939.97 | 6939.60 | 6941.26 | 0.014153 | 9.11 | 159.25 | 75.70 | 0.85 |
| Channel-Rev Stat | 3950 | PF 1 | 1482.00 | 6936.29 | 6939.49 | 6939.49 | 6940.78 | 0.017590 | 9.12 | 162.48 | 63.73 | 1.01 |
| Channel-Rev Stat | 3934 | PF 1 | 1482.00 | 6932.27 | 6936.97 | | 6937.45 | 0.004242 | 5.55 | 266.86 | 75.59 | 0.52 |
| Channel-Rev Stat | 3900 | PF 1 | 1482.00 | 6932.17 | 6936.83 | | 6937.32 | 0.003354 | 5.62 | 263.84 | 75.27 | 0.53 |
| Channel-Rev Stat | 3860 | PF 1 | 1482.00 | 6932.02 | 6936.73 | | 6937.20 | 0.003223 | 5.54 | 267.65 | 75.70 | 0.52 |
| Channel-Rev Stat | 3821 | PF 1 | 1482.00 | 6931.90 | 6936.32 | | 6936.88 | 0.004095 | 6.03 | 245.91 | 73.34 | 0.58 |
| Channel-Rev Stat | 3782 | PF 1 | 1482.00 | 6931.78 | 6936.13 | | 6936.72 | 0.004347 | 6.15 | 240.79 | 72.78 | 0.60 |
| Channel-Rev Stat | 3750 | PF 1 | 1482.00 | 6931.72 | 6935.86 | | 6936.53 | 0.005229 | 6.57 | 225.65 | 71.08 | 0.65 |
| Channel-Rev Stat | 3732 | PF 1 | 1482.00 | 6931.61 | 6935.75 | | 6936.42 | 0.006797 | 6.56 | 226.03 | 71.14 | 0.65 |
| Channel-Rev Stat | 3705 | PF 1 | 1482.00 | 6931.59 | 6935.24 | 6934.79 | 6936.17 | 0.010874 | 7.73 | 191.79 | 67.18 | 0.81 |
| Channel-Rev Stat | 3700 | PF 1 | 1482.00 | 6931.57 | 6934.77 | 6934.77 | 6936.06 | 0.017457 | 9.11 | 162.76 | 63.63 | 1.00 |
| Channel-Rev Stat | 3684 | PF 1 | 1482.00 | 6927.53 | 6931.72 | | 6932.37 | 0.004963 | 6.45 | 229.90 | 71.62 | 0.63 |
| Channel-Rev Stat | 3650 | PF 1 | 1482.00 | 6927.36 | 6931.56 | | 6932.21 | 0.004924 | 6.43 | 230.45 | 71.63 | 0.63 |
| Channel-Rev Stat | 3580 | PF 1 | 1482.00 | 6926.94 | 6931.31 | | 6931.89 | 0.004254 | 6.11 | 242.61 | 72.97 | 0.59 |
| Channel-Rev Stat | 3475 | PF 1 | 1482.00 | 6926.30 | 6930.46 | | 6931.26 | 0.007627 | 7.18 | 206.43 | 61.27 | 0.69 |
| Channel-Rev Stat | 3432 | PF 1 | 1482.00 | 6926.30 | 6929.50 | 6929.50 | 6930.79 | 0.017533 | 9.12 | 162.51 | 63.59 | 1.01 |
| Channel-Rev Stat | 3405 | PF 1 | 1482.00 | 6925.88 | 6929.50 | 6929.08 | 6930.44 | 0.011212 | 7.81 | 189.76 | 66.93 | 0.82 |
| Channel-Rev Stat | 3400 | PF 1 | 1482.00 | 6925.85 | 6929.05 | 6929.05 | 6930.34 | 0.017516 | 9.12 | 162.57 | 63.60 | 1.01 |
| Channel-Rev Stat | 3384 | PF 1 | 1482.00 | 6921.85 | 6926.49 | | 6926.99 | 0.004449 | 5.65 | 262.41 | 75.12 | 0.53 |
| Channel-Rev Stat | 3359 | PF 1 | 1482.00 | 6921.77 | 6926.41 | | 6926.91 | 0.004453 | 5.65 | 262.34 | 75.11 | 0.53 |
| Channel-Rev Stat | 3350 | PF 1 | 1482.00 | 6921.72 | 6926.35 | | 6926.85 | 0.003431 | 5.66 | 261.75 | 75.05 | 0.53 |
| Channel-Rev Stat | 3294 | PF 1 | 1482.00 | 6921.54 | 6926.18 | | 6926.68 | 0.003400 | 5.64 | 262.60 | 75.14 | 0.53 |
| Channel-Rev Stat | 3235 | PF 1 | 1482.00 | 6921.32 | 6925.96 | | 6926.45 | 0.003414 | 5.65 | 262.19 | 80.07 | 0.53 |
| Channel-Rev Stat | 3193 | PF 1 | 1482.00 | 6921.15 | 6925.74 | | 6926.25 | 0.003553 | 5.73 | 258.53 | 74.70 | 0.54 |
| Channel-Rev Stat | 3138 | PF 1 | 1482.00 | 6920.96 | 6925.58 | | 6926.08 | 0.003419 | 5.66 | 261.96 | 75.00 | 0.53 |
| Channel-Rev Stat | 3133 | PF 1 | 1482.00 | 6920.93 | 6925.34 | | 6925.90 | 0.004135 | 6.05 | 245.06 | 73.25 | 0.58 |
| Channel-Rev Stat | 3128 | PF 1 | 1482.00 | 6920.91 | 6925.31 | | 6925.88 | 0.004142 | 6.05 | 244.92 | 73.23 | 0.58 |
| Channel-Rev Stat | 3113 | PF 1 | 1482.00 | 6920.85 | 6924.98 | | 6925.83 | 0.006142 | 7.38 | 200.77 | 59.20 | 0.71 |
| Channel-Rev Stat | 3100 | PF 1 | 1482.00 | 6920.76 | 6924.93 | | 6925.71 | 0.005725 | 7.10 | 208.79 | 62.16 | 0.68 |
| Channel-Rev Stat | 3050 | PF 1 | 1482.00 | 6920.60 | 6925.05 | | 6925.60 | 0.004046 | 5.97 | 248.34 | 90.01 | 0.58 |
| Channel-Rev Stat | 3025 | PF 1 | 1482.00 | 6920.53 | 6924.65 | | 6925.33 | 0.005292 | 6.60 | 224.71 | 70.99 | 0.65 |
| Channel-Rev Stat | 3007 | PF 1 | 1482.00 | 6920.47 | 6924.48 | | 6925.21 | 0.007646 | 6.83 | 216.89 | 70.10 | 0.68 |
| Channel-Rev Stat | 3000 | PF 1 | 1482.00 | 6920.43 | 6924.46 | | 6925.18 | 0.007549 | 6.80 | 217.86 | 163.78 | 0.68 |
| Channel-Rev Stat | 2980 | PF 1 | 1482.00 | 6920.37 | 6924.02 | 6923.57 | 6924.95 | 0.010858 | 7.72 | 191.89 | 67.19 | 0.81 |
| Channel-Rev Stat | 2975 | PF 1 | 1482.00 | 6920.35 | 6923.55 | 6923.55 | 6924.84 | 0.017516 | 9.12 | 162.57 | 63.60 | 1.01 |
| Channel-Rev Stat | 2959 | PF 1 | 1482.00 | 6916.35 | 6920.80 | | 6921.39 | 0.005118 | 6.36 | 248.07 | 73.57 | 0.58 |
| Channel-Rev Stat | 2925 | PF 1 | 1482.00 | 6916.25 | 6920.65 | | 6921.22 | 0.004142 | 6.05 | 244.92 | 73.23 | 0.58 |
| Channel-Rev Stat | 2900 | PF 1 | 1482.00 | 6916.21 | 6920.59 | | 6921.17 | 0.004228 | 6.09 | 243.17 | 91.09 | 0.59 |
| Channel-Rev Stat | 2825 | PF 1 | 1482.00 | 6915.95 | 6920.07 | | 6920.75 | 0.005315 | 6.61 | 224.36 | 70.95 | 0.65 |
| Channel-Rev Stat | 2807 | PF 1 | 1482.00 | 6915.89 | 6919.94 | | 6920.65 | 0.005665 | 6.75 | 219.39 | 70.39 | 0.67 |
| Channel-Rev Stat | 2800 | PF 1 | 1482.00 | 6915.88 | 6919.91 | | 6920.63 | 0.007526 | 6.80 | 218.09 | 92.53 | 0.68 |
| Channel-Rev Stat | 2780 | PF 1 | 1482.00 | 6915.81 | 6919.49 | 6919.01 | 6920.40 | 0.010560 | 7.65 | 193.76 | 67.41 | 0.80 |
| Channel-Rev Stat | 2775 | PF 1 | 1482.00 | 6915.80 | 6919.00 | 6919.00 | 6920.29 | 0.017448 | 9.10 | 162.79 | 63.63 | 1.00 |
| Channel-Rev Stat | 2759 | PF 1 | 1482.00 | 6911.80 | 6916.67 | | 6917.11 | 0.003705 | 5.29 | 279.97 | 76.96 | 0.49 |
| Channel-Rev Stat | 2725 | PF 1 | 1482.00 | 6911.70 | 6916.56 | | 6917.00 | 0.002866 | 5.31 | 278.96 | 76.86 | 0.49 |
| Channel-Rev Stat | 2650 | PF 1 | 1482.00 | 6911.49 | 6916.37 | | 6916.80 | 0.002820 | 5.28 | 280.50 | 100.95 | 0.49 |
| Channel-Rev Stat | 2605 | PF 1 | 1482.00 | 6911.34 | 6915.69 | | 6916.28 | 0.004323 | 6.14 | 241.26 | 93.25 | 0.60 |
| Channel-Rev Stat | 2550 | PF 1 | 1482.00 | 6911.18 | 6915.42 | | 6916.05 | 0.004752 | 6.35 | 233.36 | 94.86 | 0.62 |
| Channel-Rev Stat | 2470 | PF 1 | 1482.00 | 6910.93 | 6915.16 | | 6915.79 | 0.004818 | 6.38 | 232.23 | 136.29 | 0.63 |
| Channel-Rev Stat | 2450 | PF 1 | 1482.00 | 6910.87 | 6915.03 | | 6915.69 | 0.005112 | 6.52 | 227.45 | 71.30 | 0.64 |
| Channel-Rev Stat | 2432 | PF 1 | 1482.00 | 6910.82 | 6914.87 | | 6915.58 | 0.007386 | 6.75 | 219.53 | 70.40 | 0.67 |
| Channel-Rev Stat | 2405 | PF 1 | 1482.00 | 6910.74 | 6914.39 | 6913.94 | 6915.32 | 0.010853 | 7.72 | 191.92 | 67.19 | 0.81 |
| Channel-Rev Stat | 2400 | PF 1 | 1482.00 | 6910.72 | 6913.92 | 6913.92 | 6915.21 | 0.017525 | 9.12 | 162.54 | 63.60 | 1.01 |
| Channel-Rev Stat | 2384 | PF 1 | 1482.00 | 6906.72 | 6911.29 | | 6911.81 | 0.004715 | 5.76 | 257.08 | 74.55 | 0.55 |
| Channel-Rev Stat | 2355 | PF 1 | 1482.00 | 6906.63 | 6911.09 | | 6911.68 | 0.005413 | 6.16 | 240.76 | 71.72 | 0.59 |
| Channel-Rev Stat | 2353 | PF 1 | 1482.00 | 6906.63 | 6911.05 | 6909.89 | 6911.64 | 0.005477 | 6.14 | 241.33 | 75.69 | 0.59 |
| Channel-Rev Stat | 2350 | PF 1 | 1482.00 | 6906.62 | 6911.06 | | 6911.62 | 0.004027 | 5.99 | 247.35 | 73.50 | 0.58 |
| Channel-Rev Stat | 2300 | PF 1 | 1482.00 | 6906.47 | 6910.81 | | 6911.41 | 0.004426 | 6.21 | 238.52 | 92.93 | 0.60 |
| Channel-Rev Stat | 2250 | PF 1 | 1482.00 | 6906.32 | 6910.52 | | 6911.16 | 0.004965 | 6.45 | 229.79 | 71.56 | 0.63 |
| Channel-Rev Stat | 2232 | PF 1 | 1482.00 | 6906.26 | 6910.38 | | 6911.06 | 0.006906 | 6.59 | 224.98 | 71.17 | 0.65 |
| Channel-Rev Stat | 2225 | PF 1 | 1482.00 | 6906.25 | 6910.31 | | 6911.01 | 0.007356 | 6.74 | 219.81 | 71.85 | 0.67 |
| Channel-Rev Stat | 2205 | PF 1 | 1482.00 | 6906.18 | 6910.02 | 6909.38 | 6910.83 | 0.009014 | 7.24 | 204.76 | 68.70 | 0.74 |
| Channel-Rev Stat | 2200 | PF 1 | 1482.00 | 6906.17 | 6909.41 | 6909.41 | 6910.73 | 0.016317 | 9.44 | 165.25 | 63.94 | 0.99 |
| Channel-Rev Stat | 2184 | PF 1 | 1482.00 | 6902.17 | 6906.51 | | 6907.10 | 0.005695 | 6.16 | 240.54 | 72.75 | 0.60 |
| Channel-Rev Stat | 2160 | PF 1 | 1482.00 | 6902.10 | 6906.22 | | 6906.94 | 0.007180 | 6.82 | 217.44 | 67.10 | 0.67 |
| Channel-Rev Stat | 2150 | PF 1 | 1482.00 | 6902.07 | 6906.18 | | 6906.86 | 0.005350 | 6.62 | 223.84 | 70.89 | 0.66 |
| Channel-Rev Stat | 2100 | PF 1 | 1482.00 | 6901.92 | 6905.70 | | 6906.55 | 0.007327 | 7.39 | 200.51 | 71.27 | 0.76 |
| Channel-Rev Stat | 2050 | PF 1 | 1482.00 | 6901.77 | 6905.25 | | 6906.14 | 0.008219 | 7.57 | 195.89 | 70.23 | 0.80 |
| Channel-Rev Stat | 2029 | PF 1 | 1482.00 | 6901.70 | 6905.01 | | 6905.96 | 0.009176 | 7.80 | 189.93 | 70.64 | 0.84 |
| Channel-Rev Stat | 2019 | PF 1 | 1482.00 | 6901.67 | 6905.09 | | 6905.81 | 0.006544 | 6.80 | 217.93 | 77.38 | 0.71 |
| Channel-Rev Stat | 2005 | PF 1 | 1482.00 | 6901.63 | 6904.86 | 6904.40 | 6905.69 | 0.010504 | 7.29 | 203.19 | 75.84 | 0.79 |
| Channel-Rev Stat | 2000 | PF 1 | 1482.00 | 6901.62 | 6904.39 | 6904.39 | 6905.58 | 0.018007 | 8.75 | 169.40 | 72.18 | 1.01 |
| Channel-Rev Stat | 1987.1 | PF 1 | 1482.00 | 6898.39 | 6902.51 | | 6902.96 | 0.004404 | 5.42 | 273.50 | 82.92 | 0.53 |
| Channel-Rev Stat | 1955 | PF 1 | 1482.00 | 6898.36 | 6902.32 | | 6902.83 | 0.003861 | 5.68 | 261.04 | 81.71 | 0.56 |
| Channel-Rev Stat | 1950 | PF 1 | 1482.00 | 6898.36 | 6902.29 | | 6902.80 | 0.003987 | 5.75 | 257.94 | 81.23 | 0.57 |
| Channel-Rev Stat | 1800 | PF 1 | 1482.00 | 6898.28 | 6901.23 | 6901.06 | 6902.26 | 0.011139 | 8.14 | 182.00 | 73.57 | 0.91 |
| Channel-Rev Stat | 1700 | PF 1 | 1482.00 | 6898.19 | 6900.58 | | 6901.23 | 0.008215 | 6.44 | 230.15 | 105.73 | 0.77 |
| Channel-Rev Stat | 1600 | PF 1 | 1482.00 | 6898.09 | 6899.88 | | 6900.32 | 0.007817 | 5.35 | 276.83 | 162.09 | 0.72 |
| Channel-Rev Stat | 1517 | PF 1 | 1482.00 | 6897.38 | 6899.32 | | 6899.69 | 0.005750 | 4.84 | 306.13 | 165.52 | 0.63 |

HEC-RAS Plan: Post River: BG-Full Reach: Channel-Rev Stat Profile: PF 1 (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 |
|------------------|-----------|---------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Channel-Rev Stat | 1450 | PF 1 | 1482.00 | 6897.15 | 6898.79 | | 6899.31 | 0.010217 | 5.79 | 256.06 | 163.09 | 0.81 |
| Channel-Rev Stat | 1350 | PF 1 | 1482.00 | 6894.60 | 6897.29 | 6897.29 | 6898.05 | 0.015142 | 6.99 | 213.05 | 158.50 | 0.99 |
| Channel-Rev Stat | 1300 | PF 1 | 1482.00 | 6889.13 | 6893.61 | 6893.53 | 6894.55 | 0.013276 | 7.75 | 191.17 | 94.56 | 0.96 |
| Channel-Rev Stat | 1200 | PF 1 | 1482.00 | 6888.27 | 6892.12 | 6892.12 | 6893.15 | 0.014656 | 8.14 | 182.05 | 88.89 | 1.00 |
| Channel-Rev Stat | 1150 | PF 1 | 1482.00 | 6885.25 | 6890.89 | | 6891.02 | 0.000976 | 2.96 | 505.40 | 160.45 | 0.29 |
| Channel-Rev Stat | 1050 | PF 1 | 1482.00 | 6884.18 | 6890.69 | | 6890.91 | 0.001169 | 3.75 | 395.65 | 94.20 | 0.32 |
| Channel-Rev Stat | 1000 | PF 1 | 1482.00 | 6883.33 | 6888.64 | 6888.64 | 6890.60 | 0.012887 | 11.22 | 132.13 | 34.10 | 1.00 |

ATTACHMENT M
Post Project Water Surface Profiles



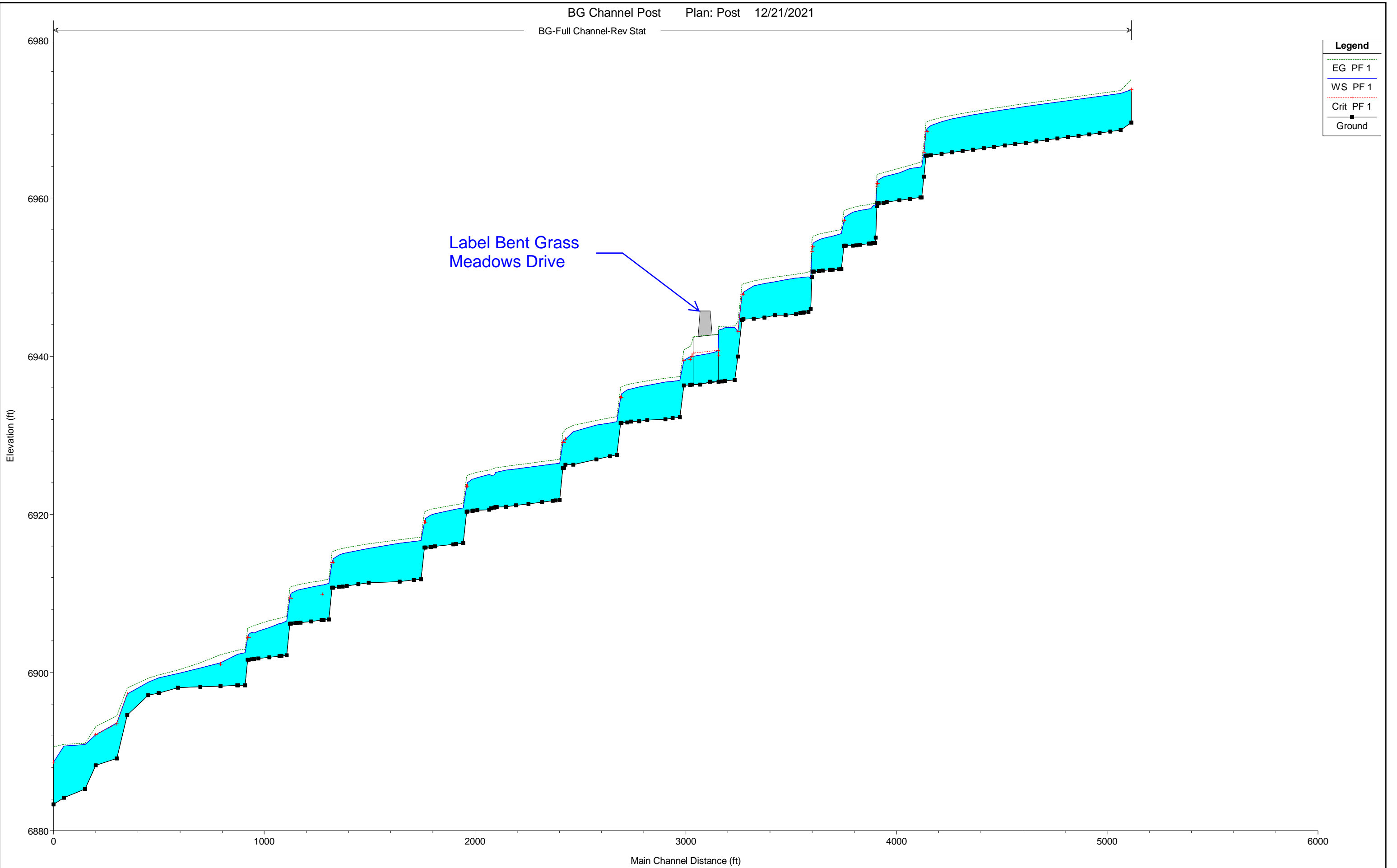
Legend

EG PF 1

WS PF 1

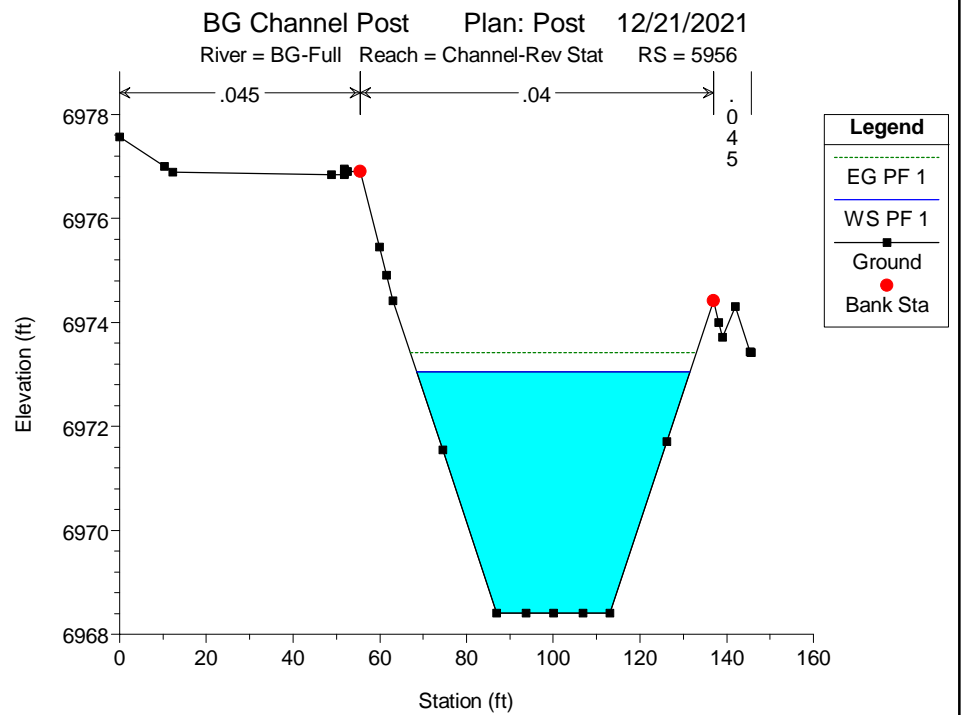
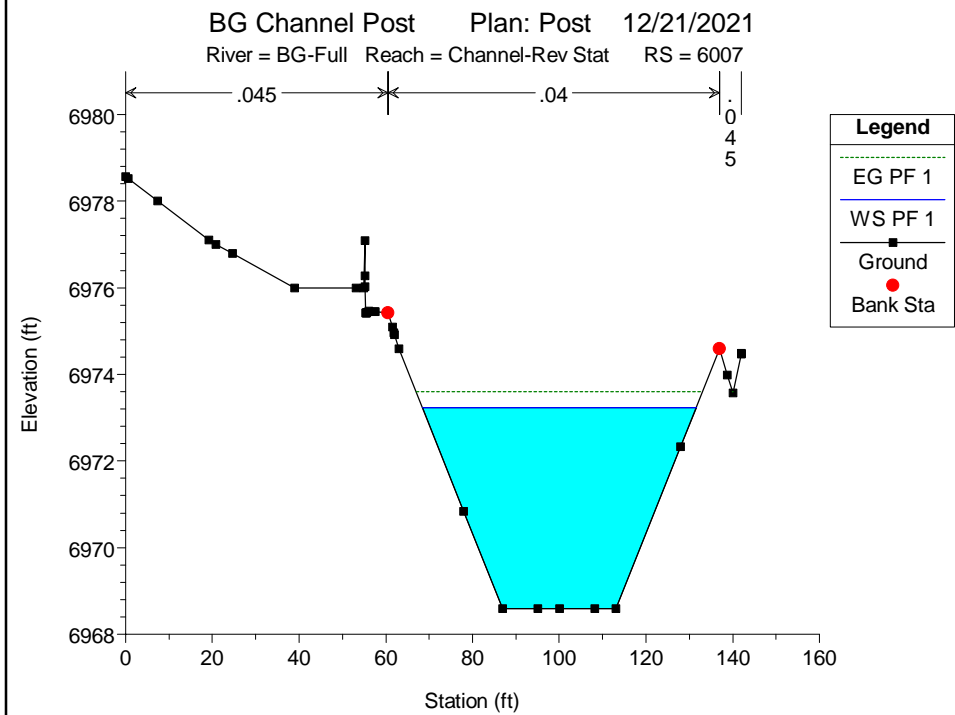
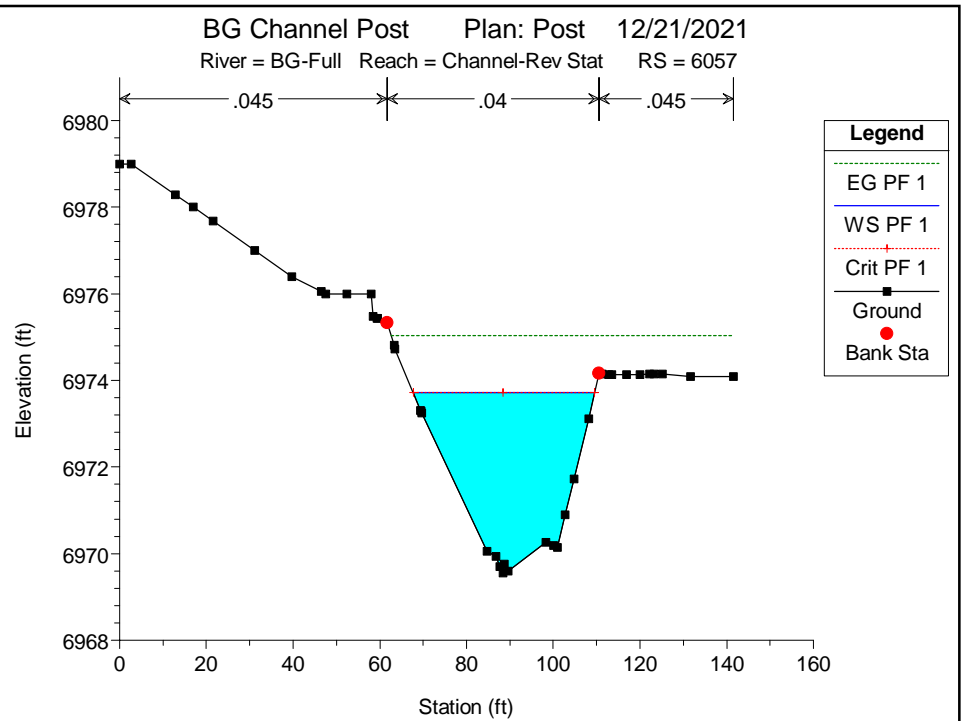
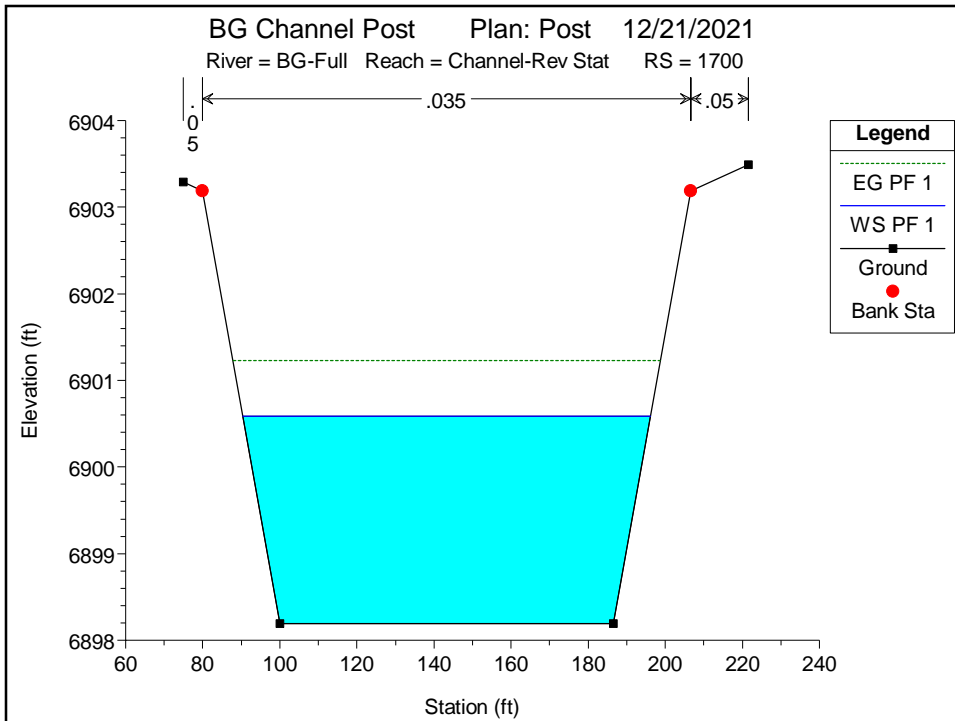
Crit PF 1

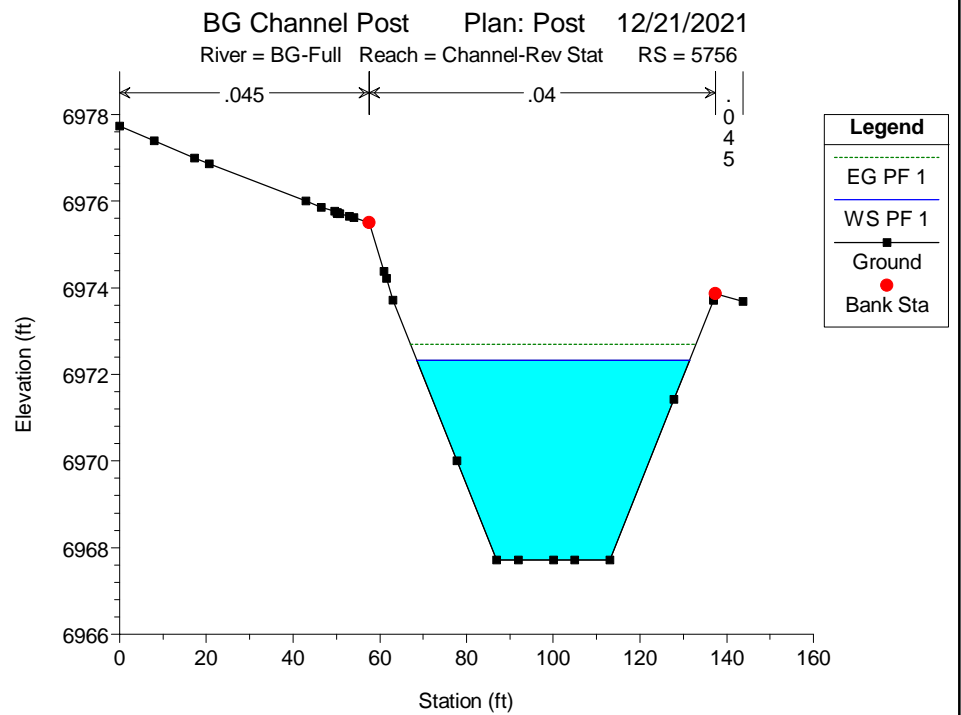
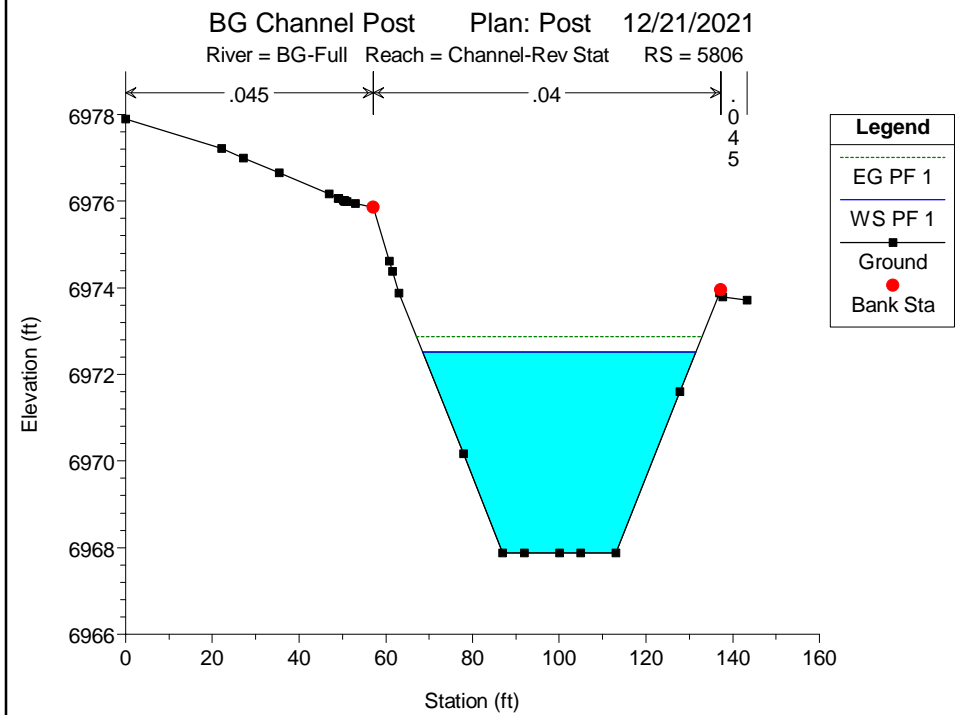
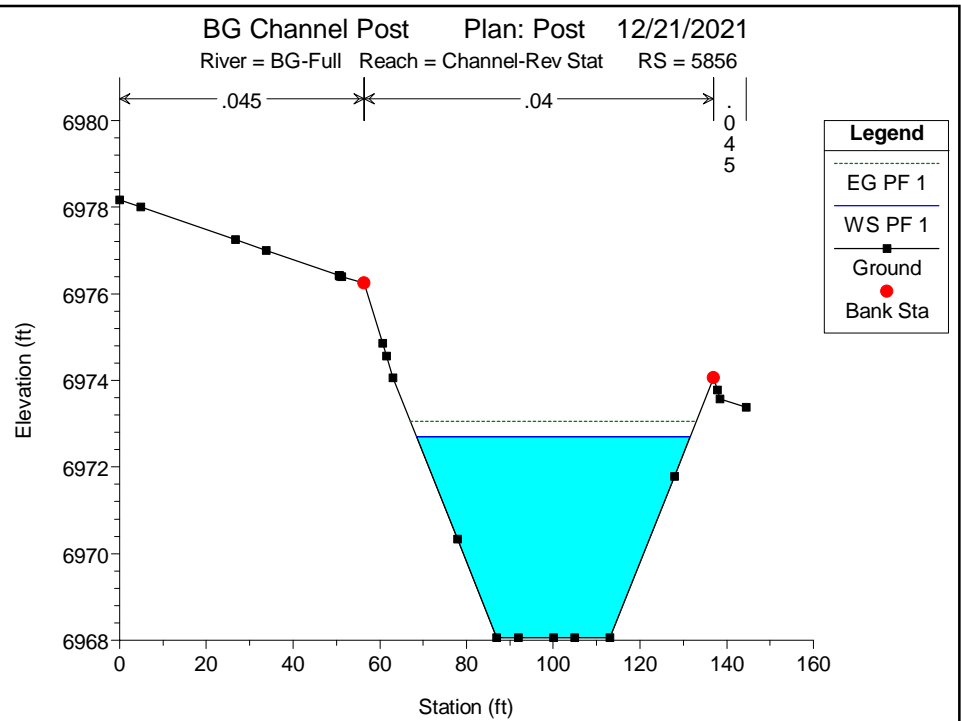
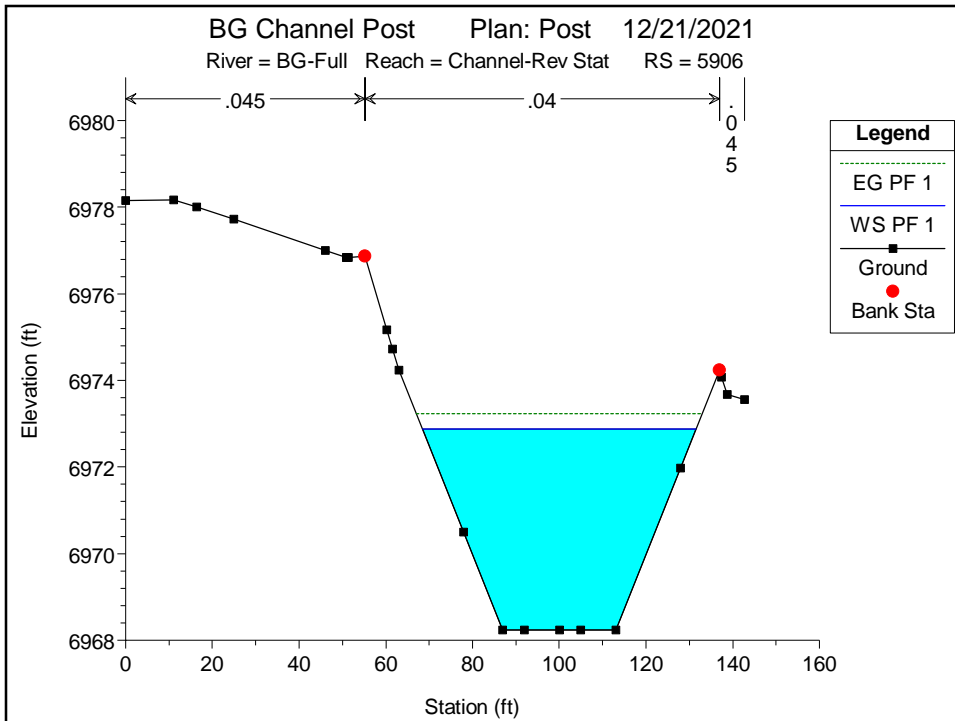
Ground

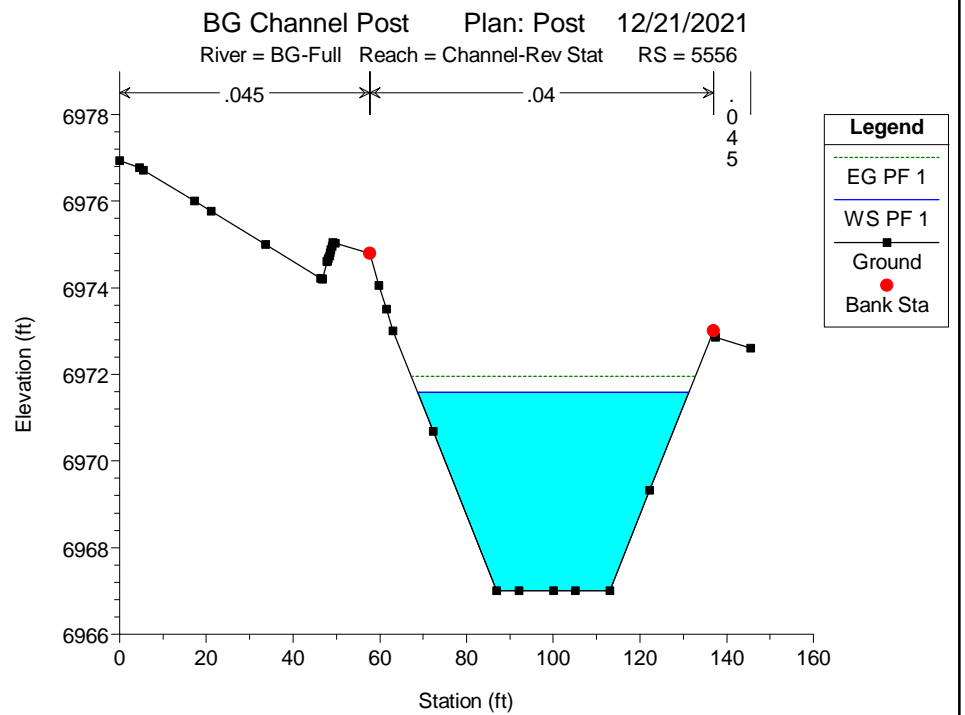
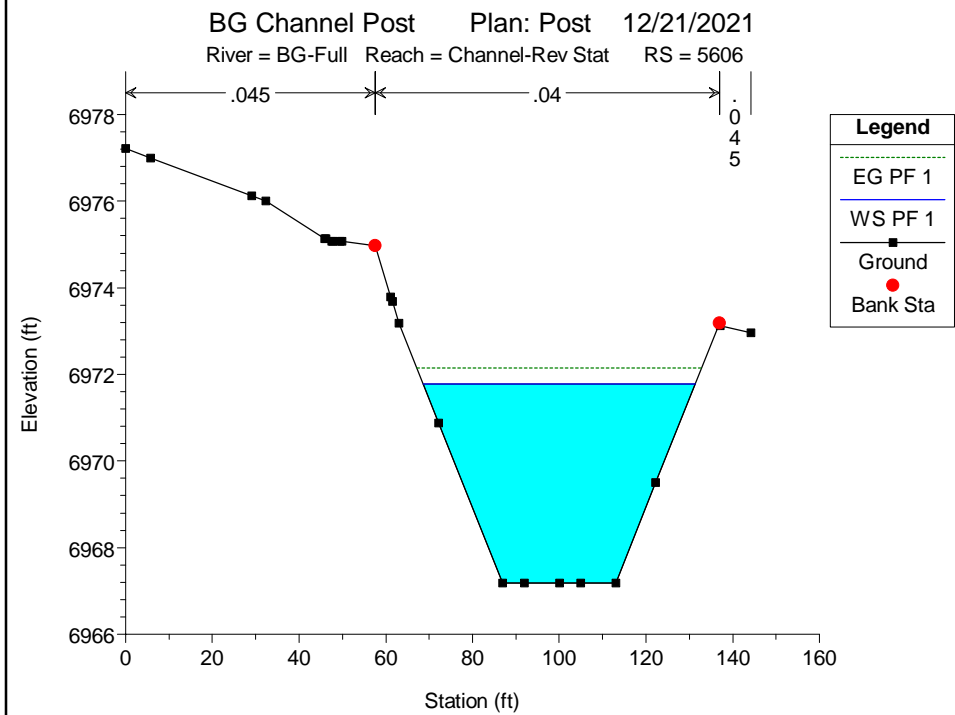
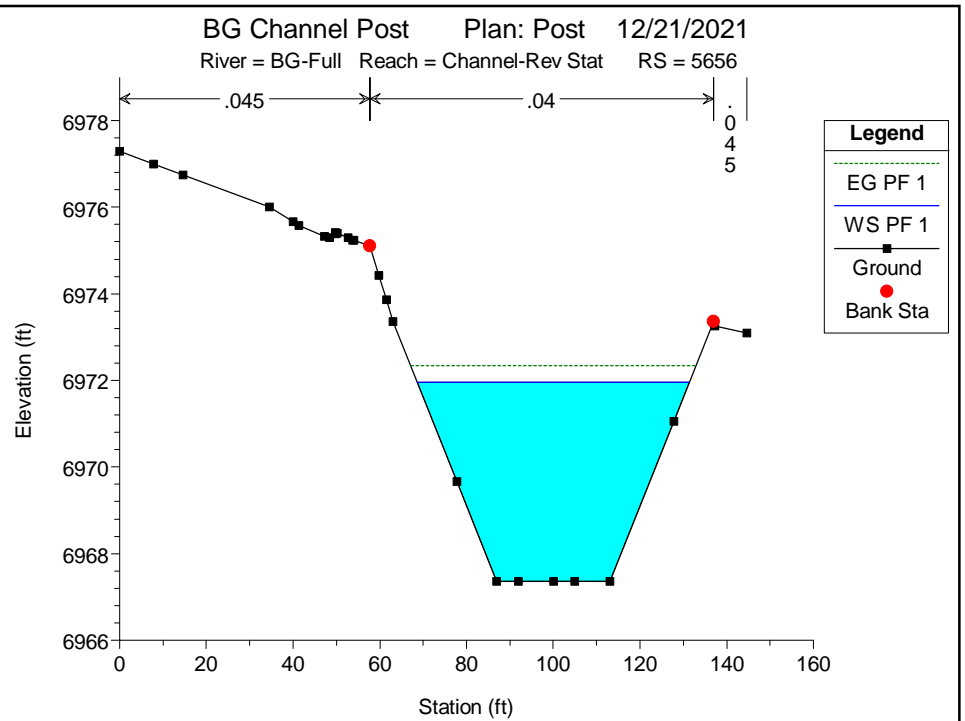
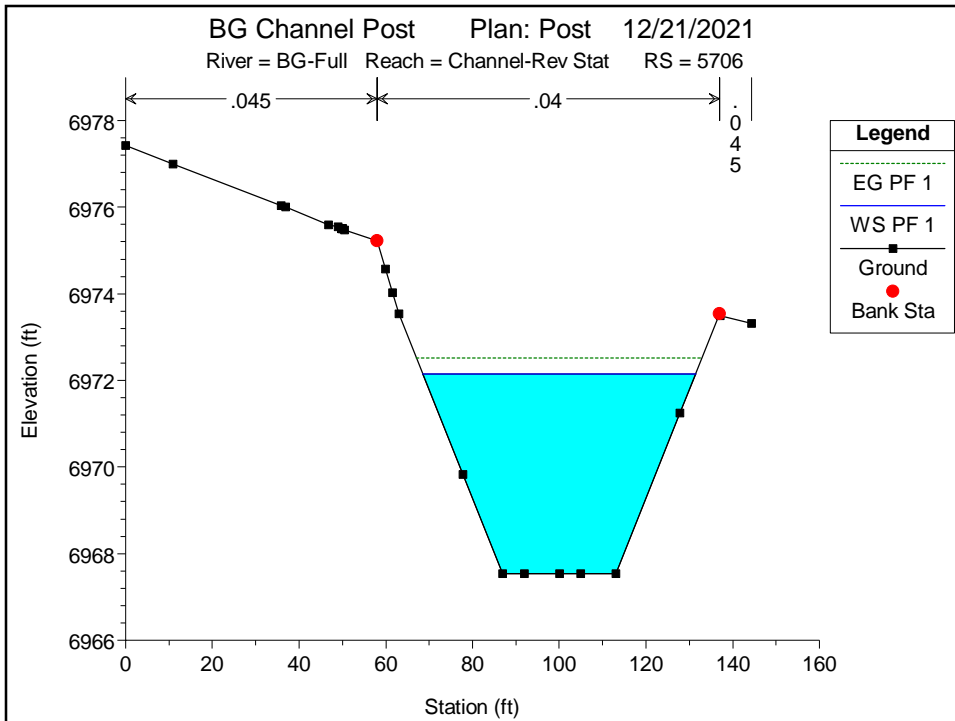


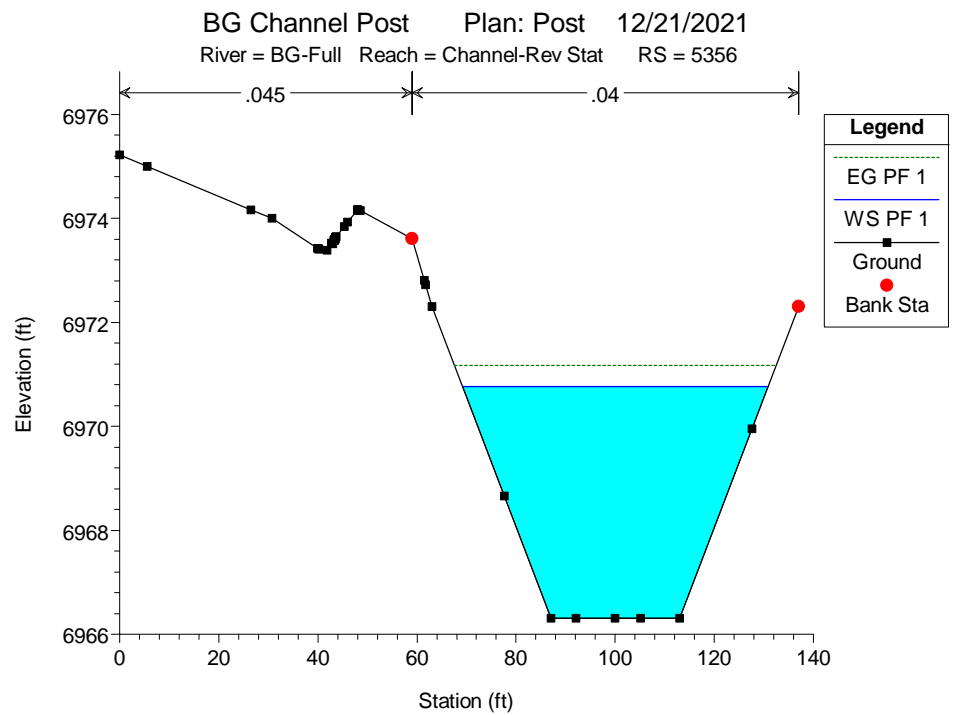
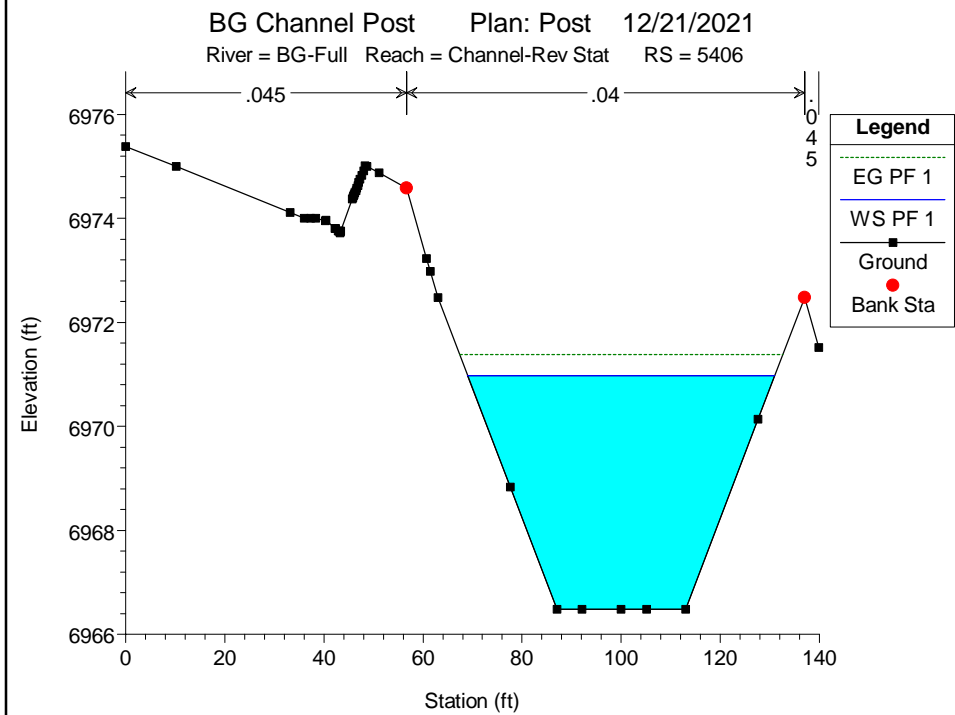
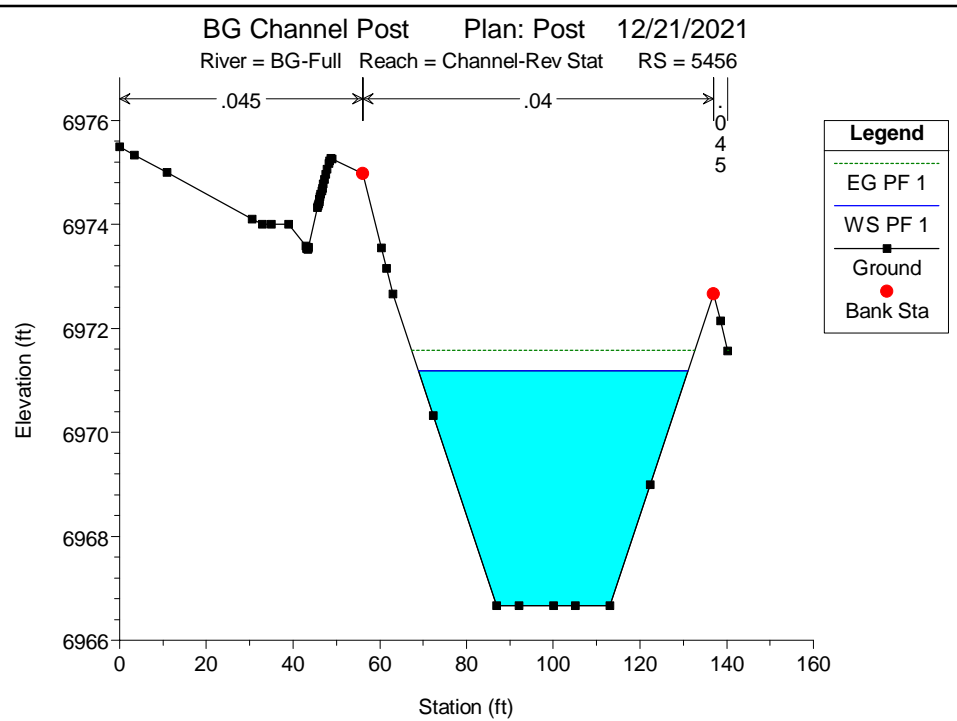
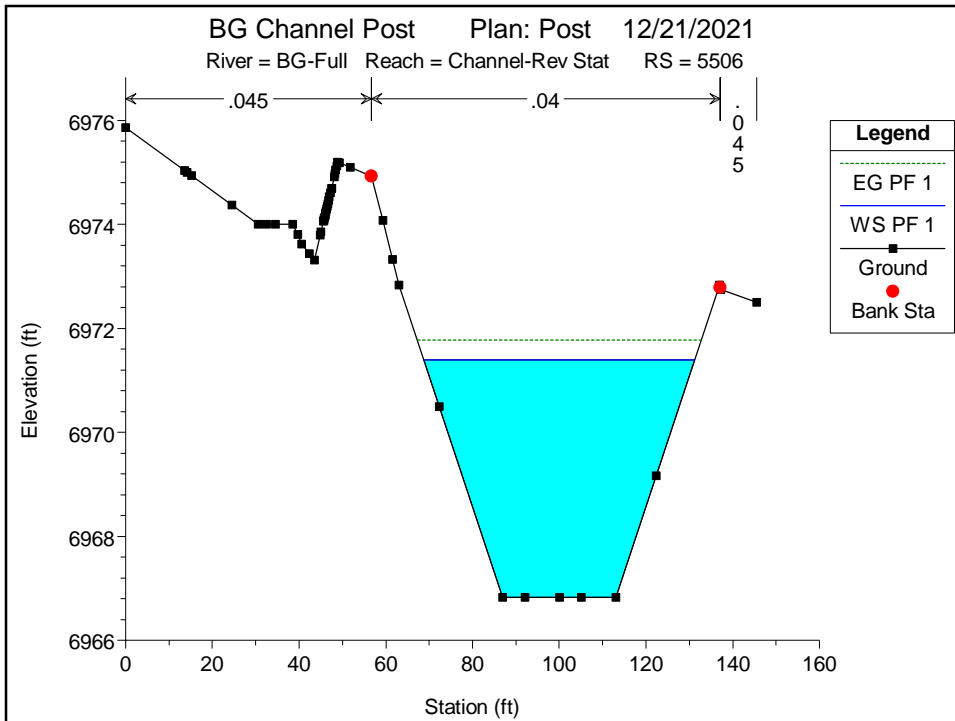
ATTACHMENT N
Post Project Cross Sections

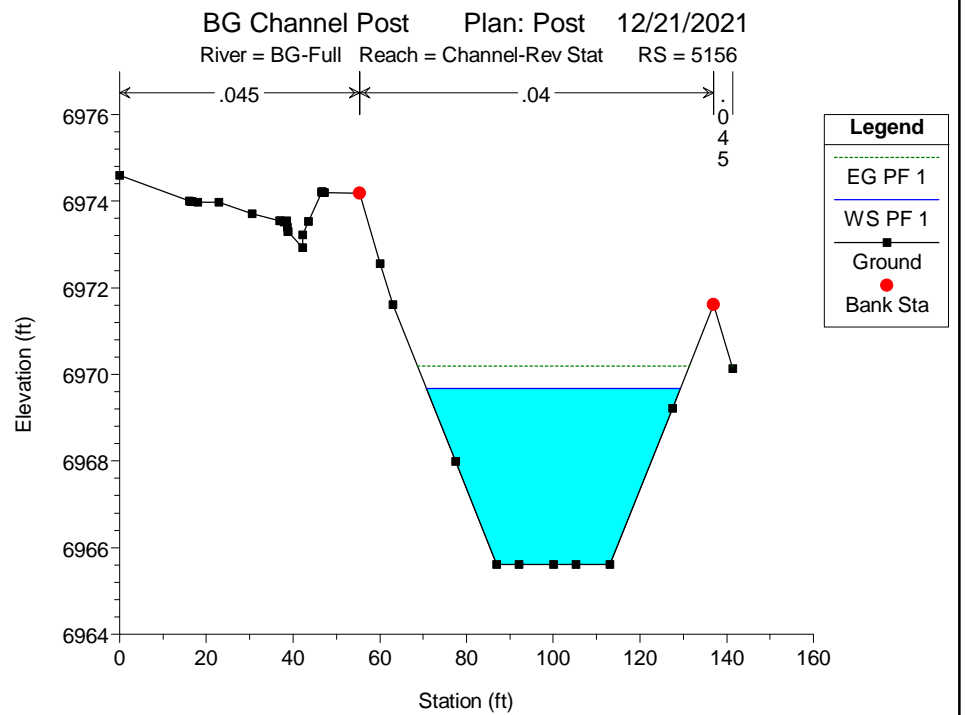
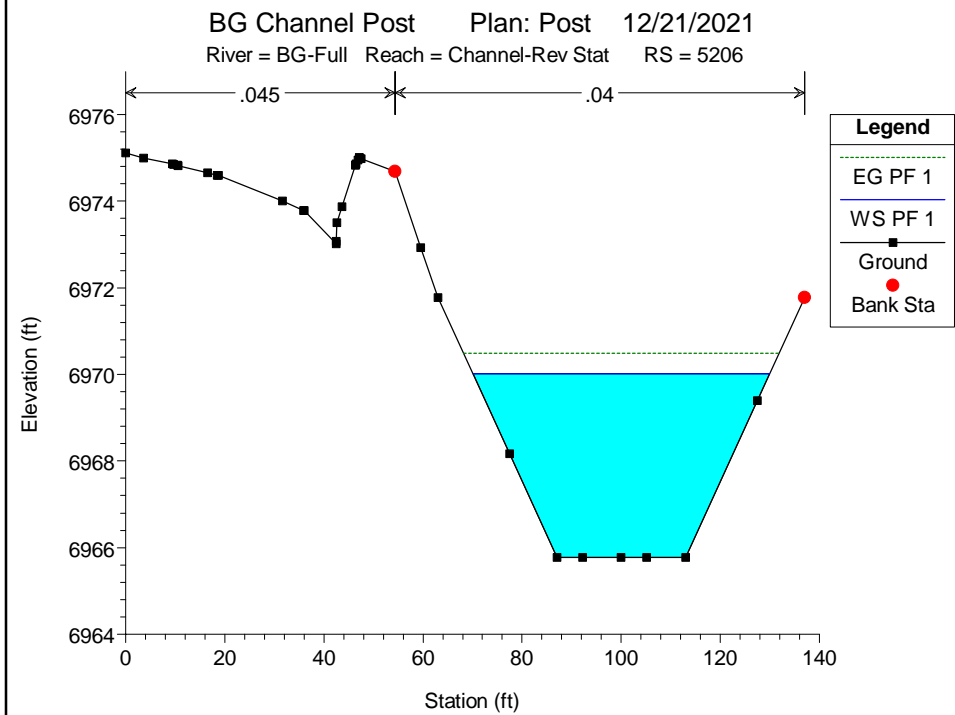
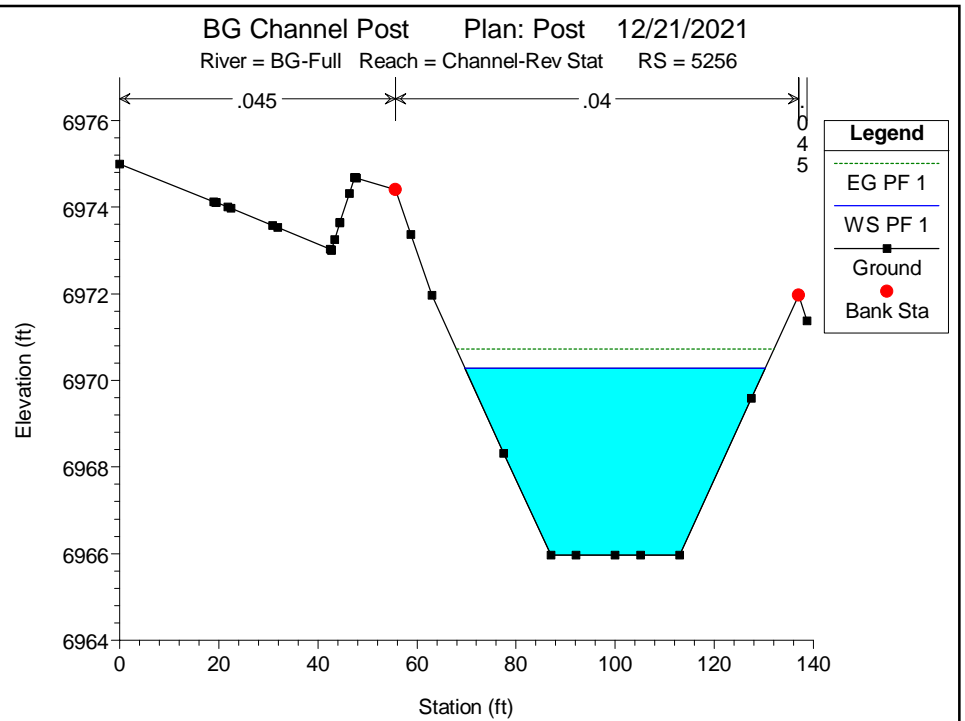
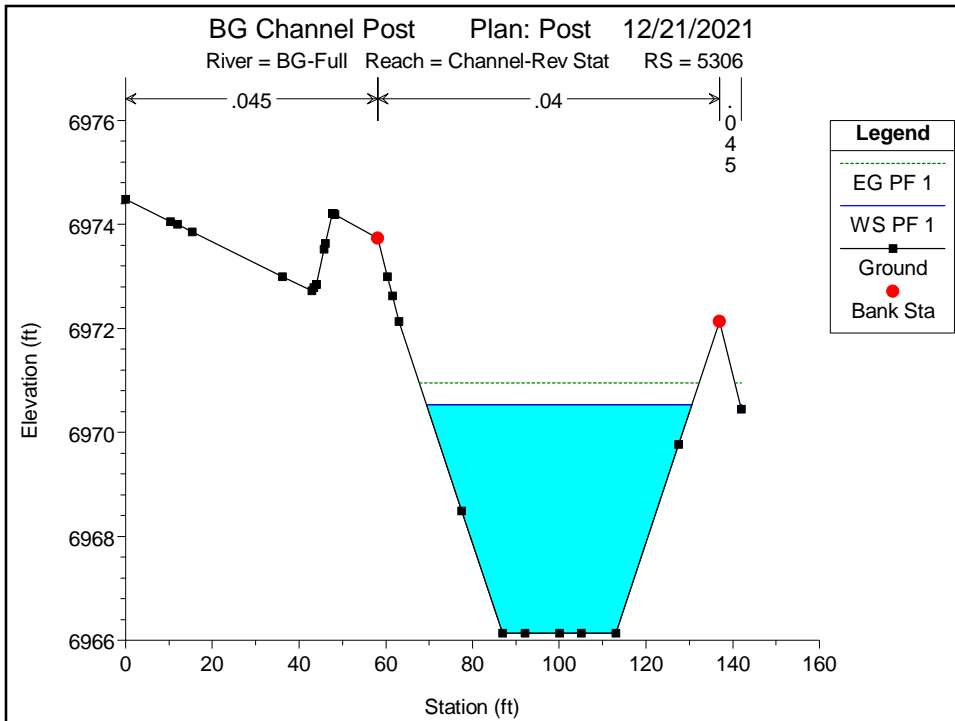


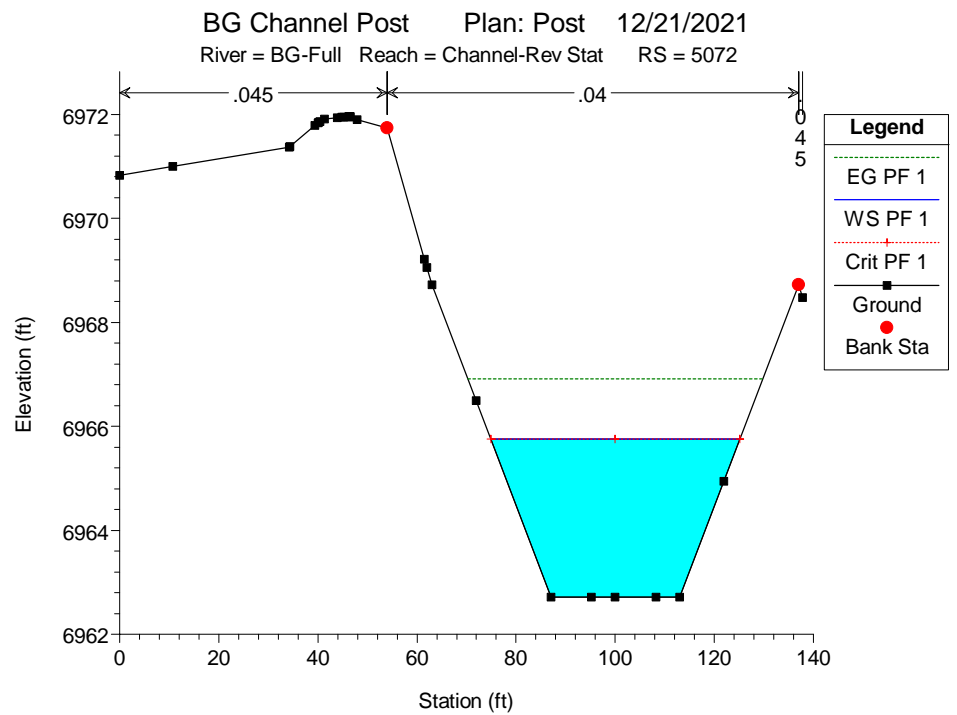
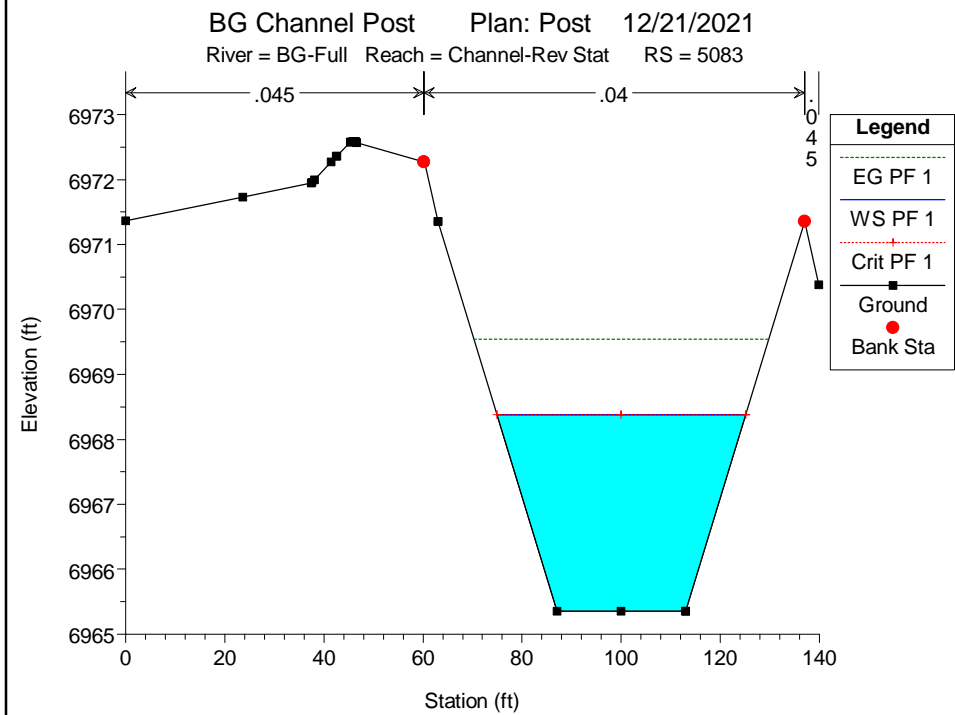
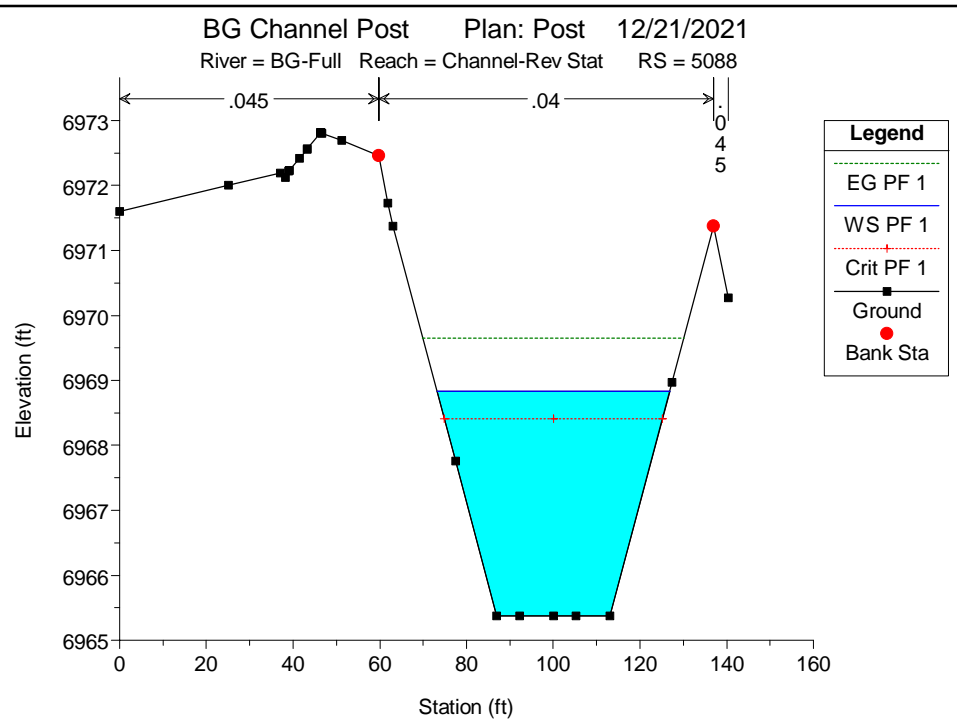
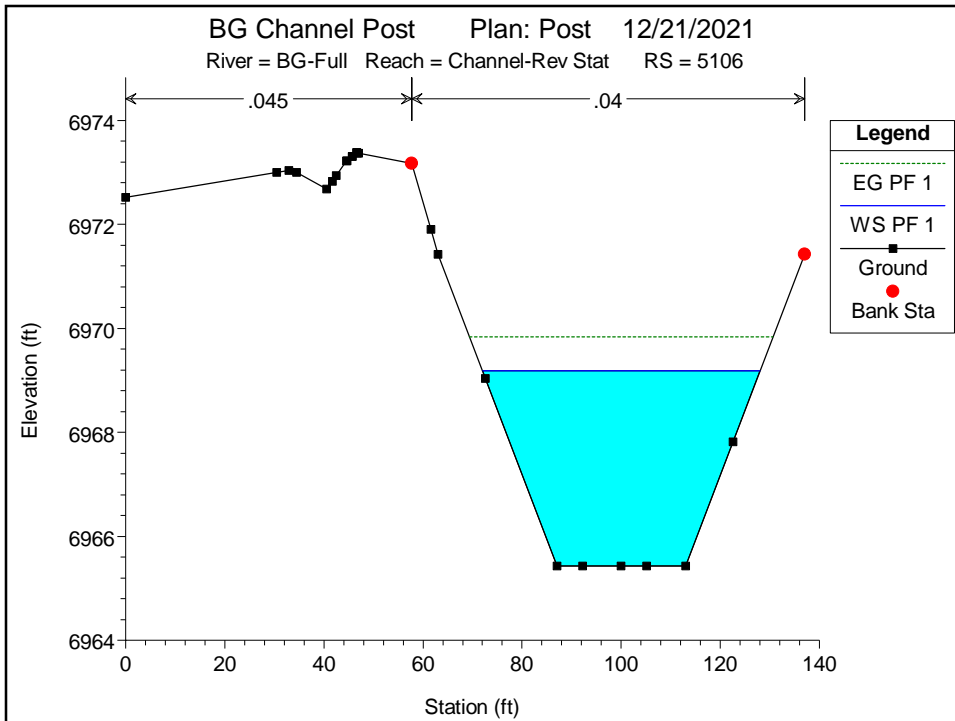


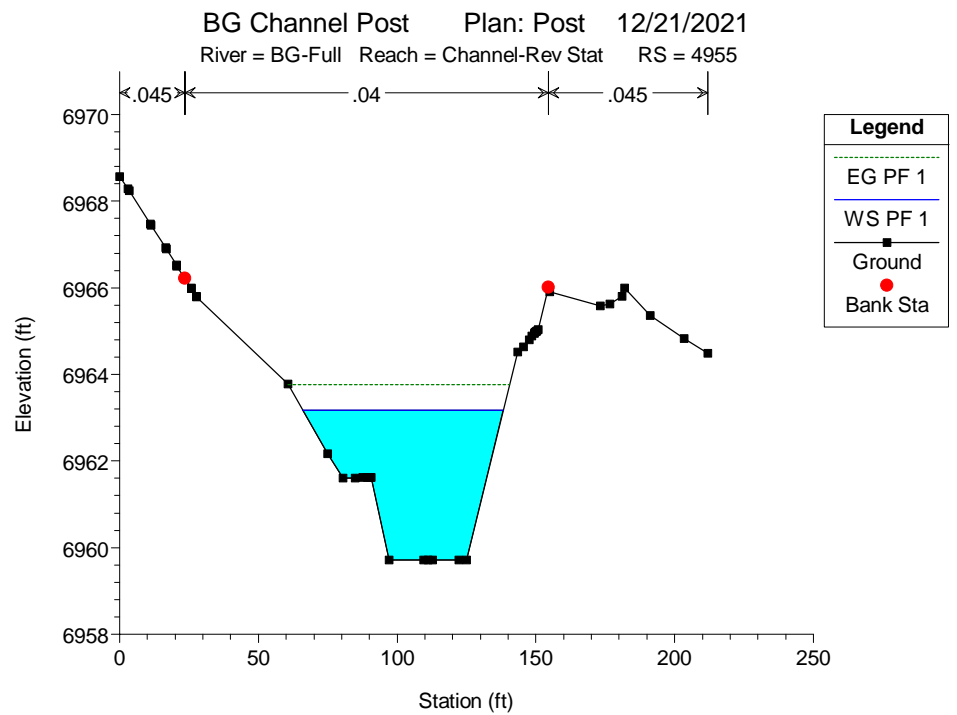
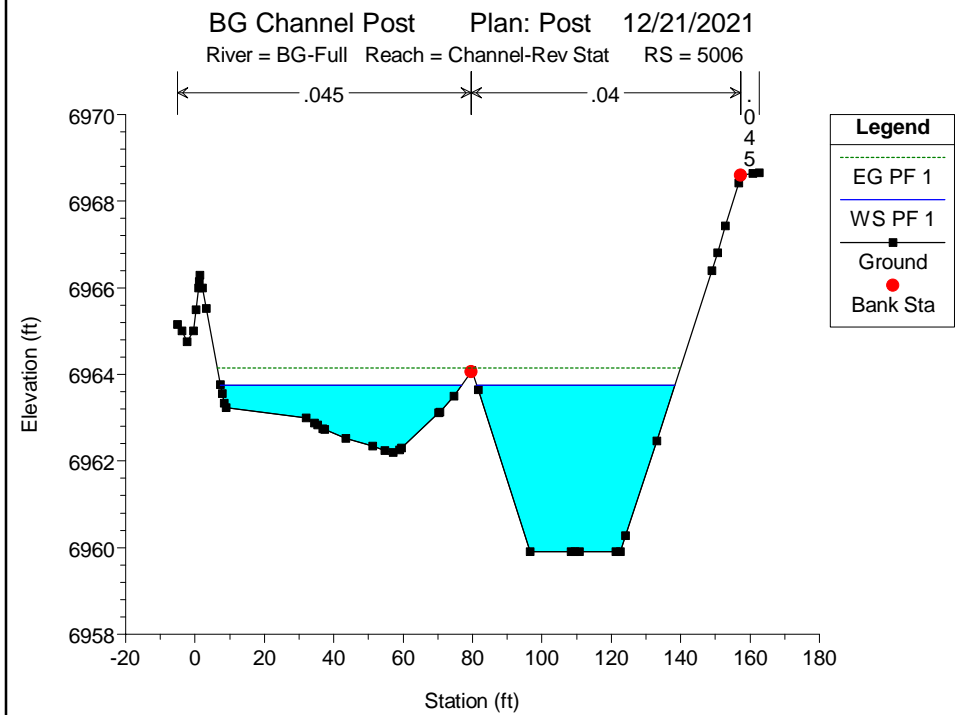
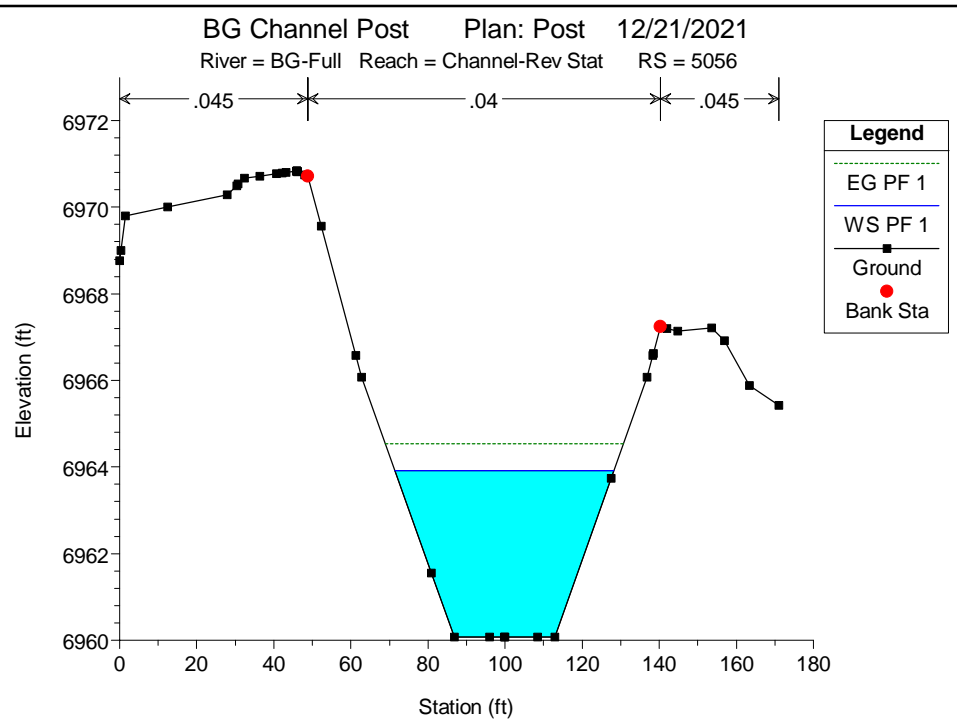
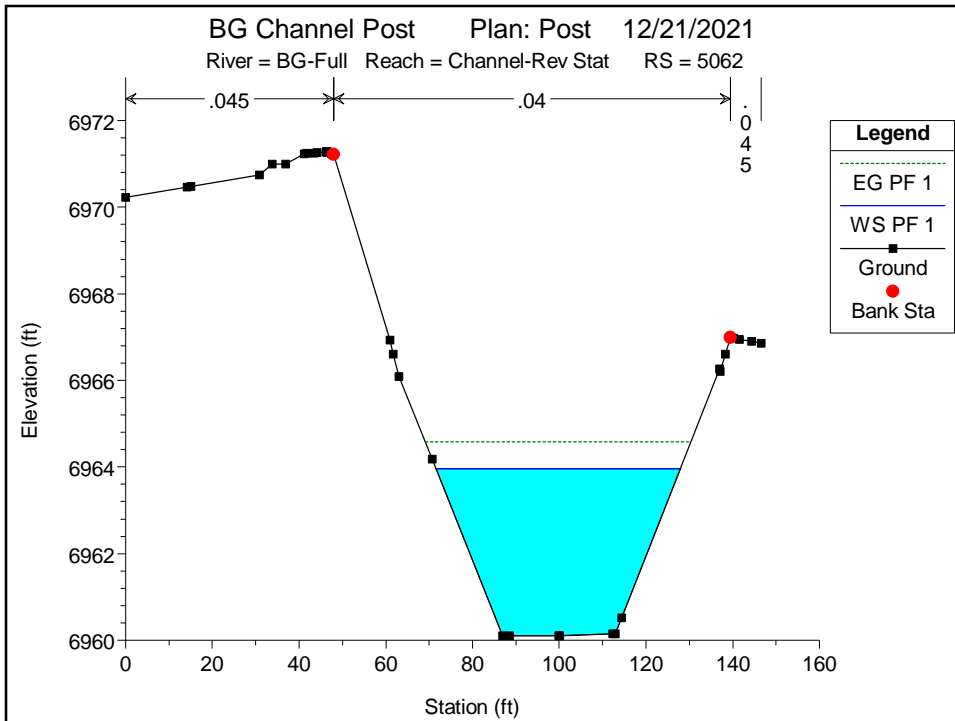


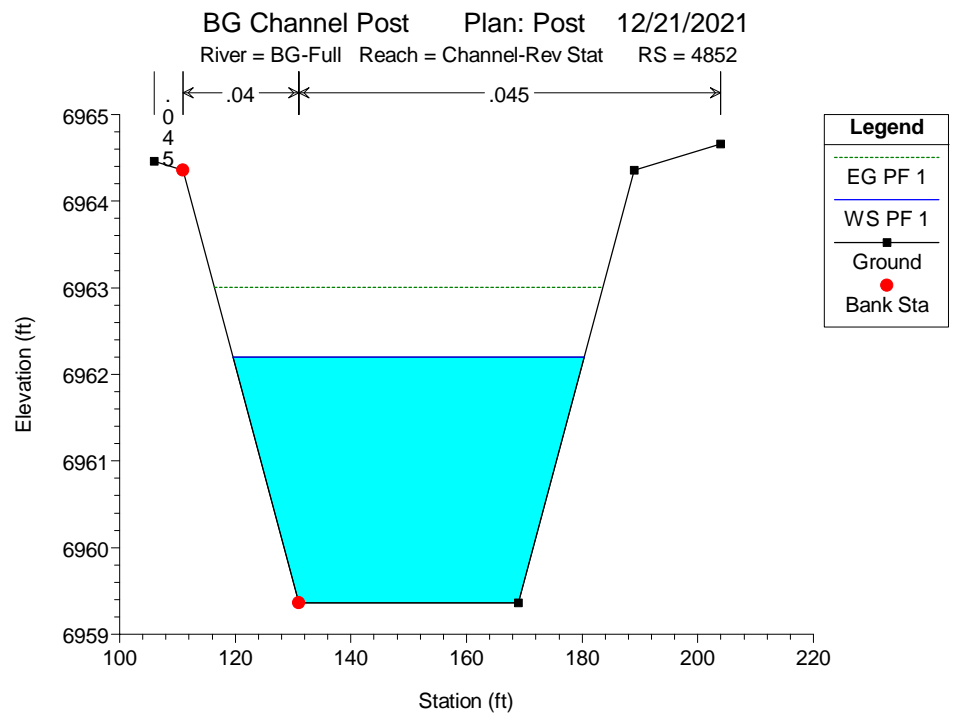
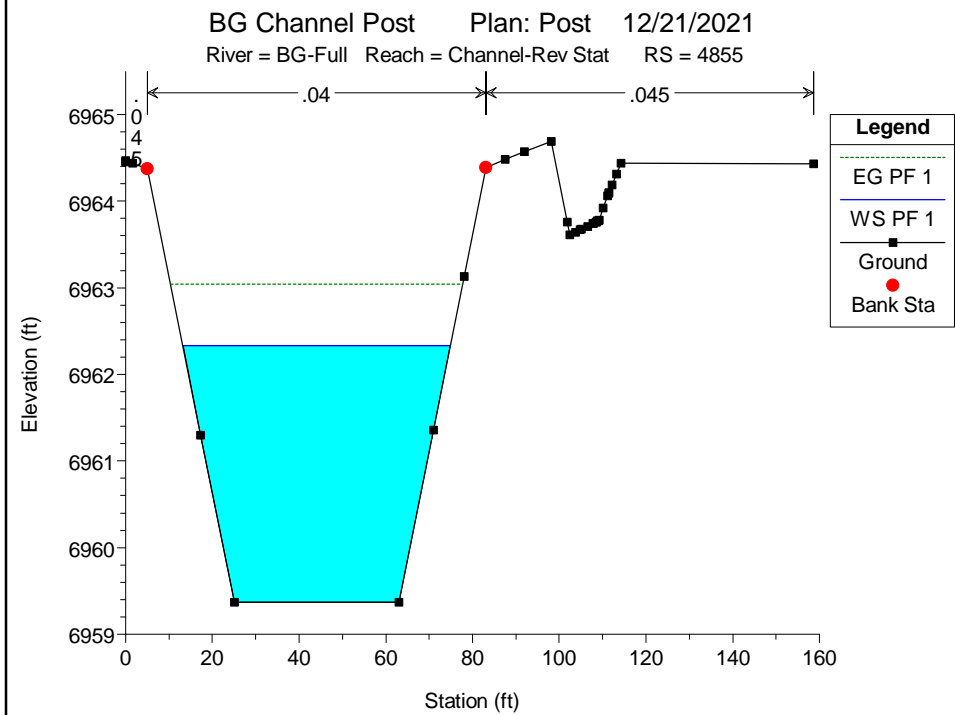
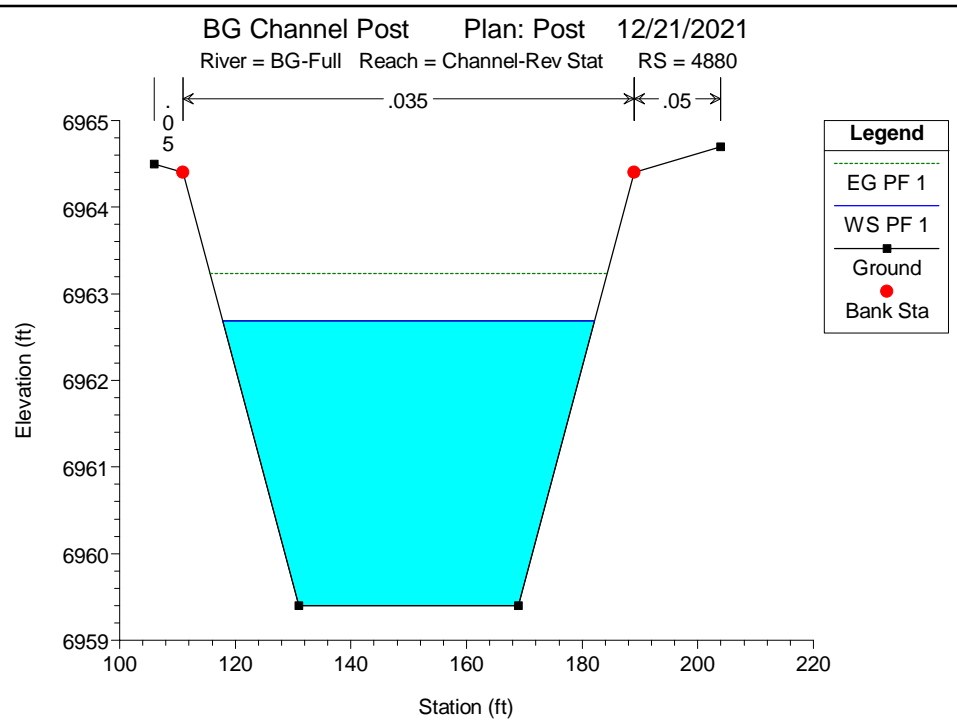
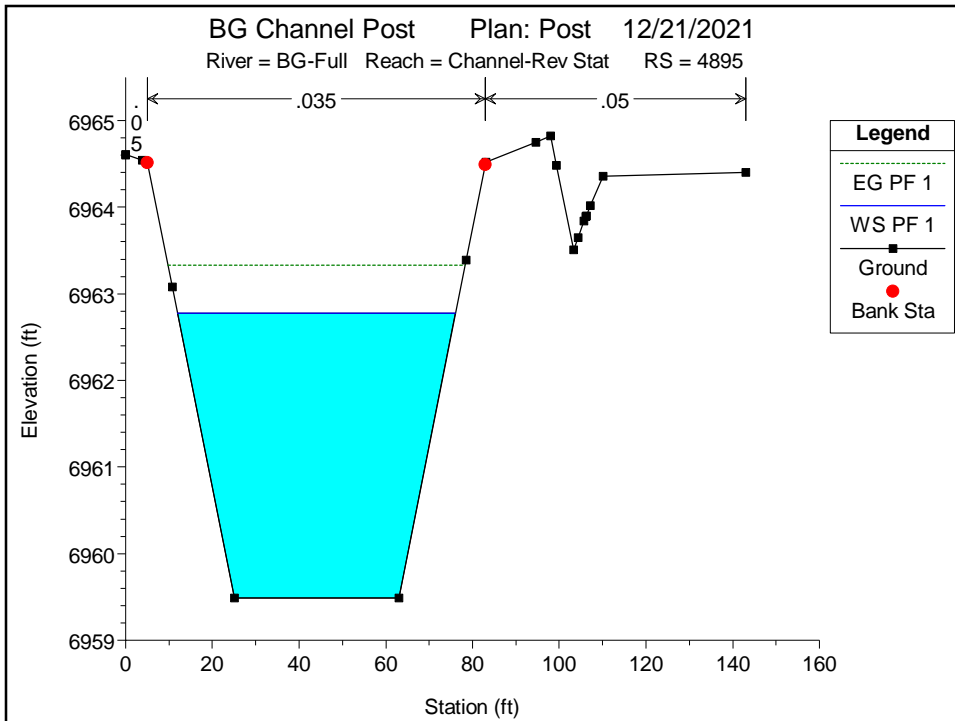


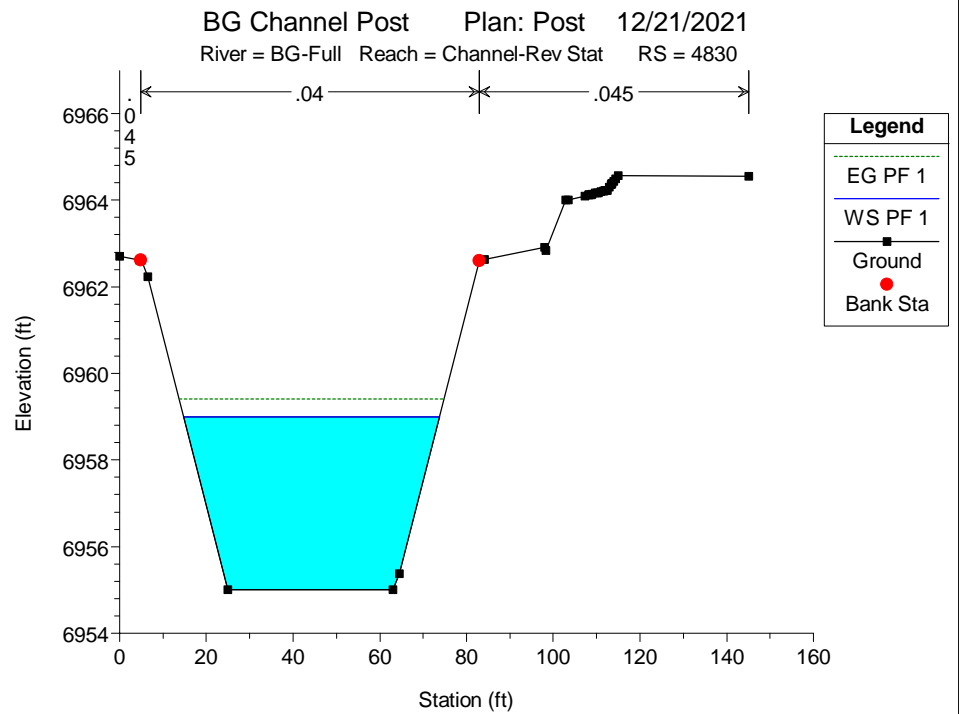
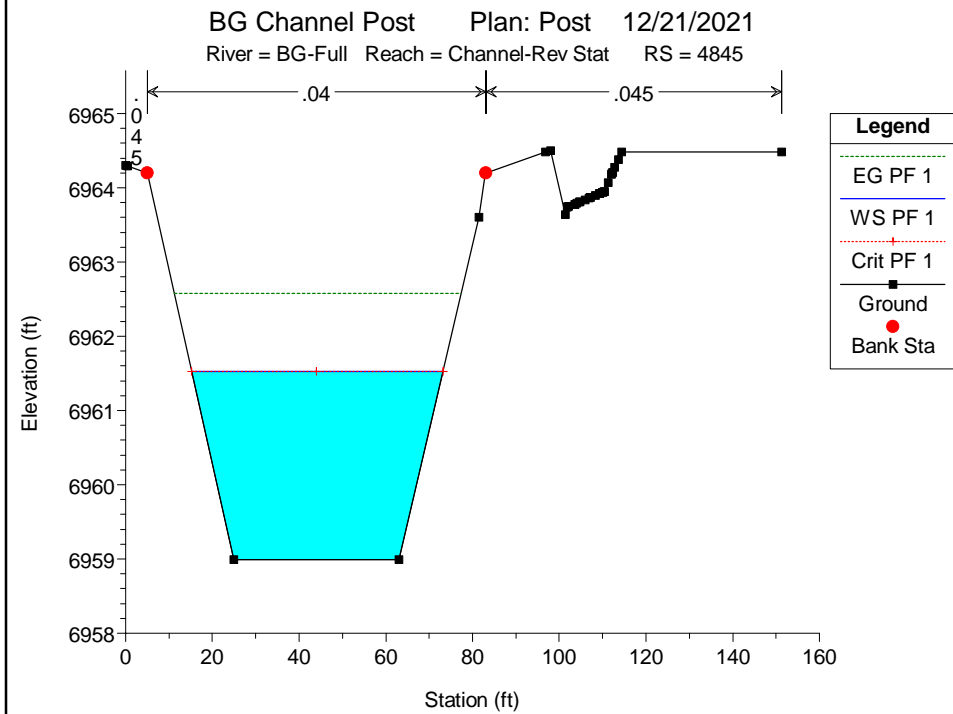
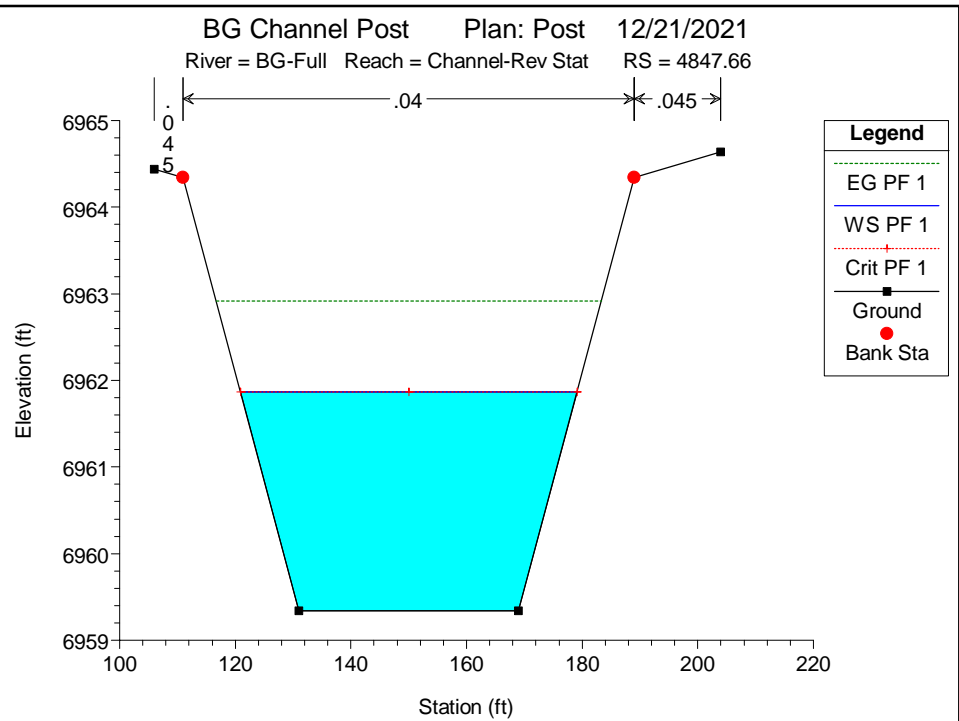
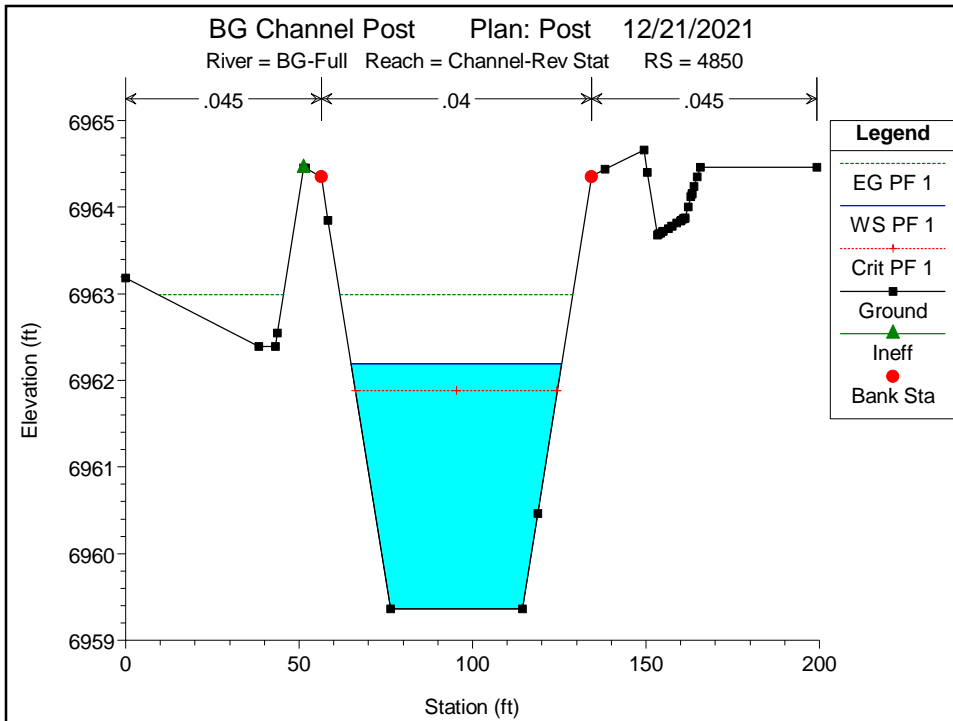


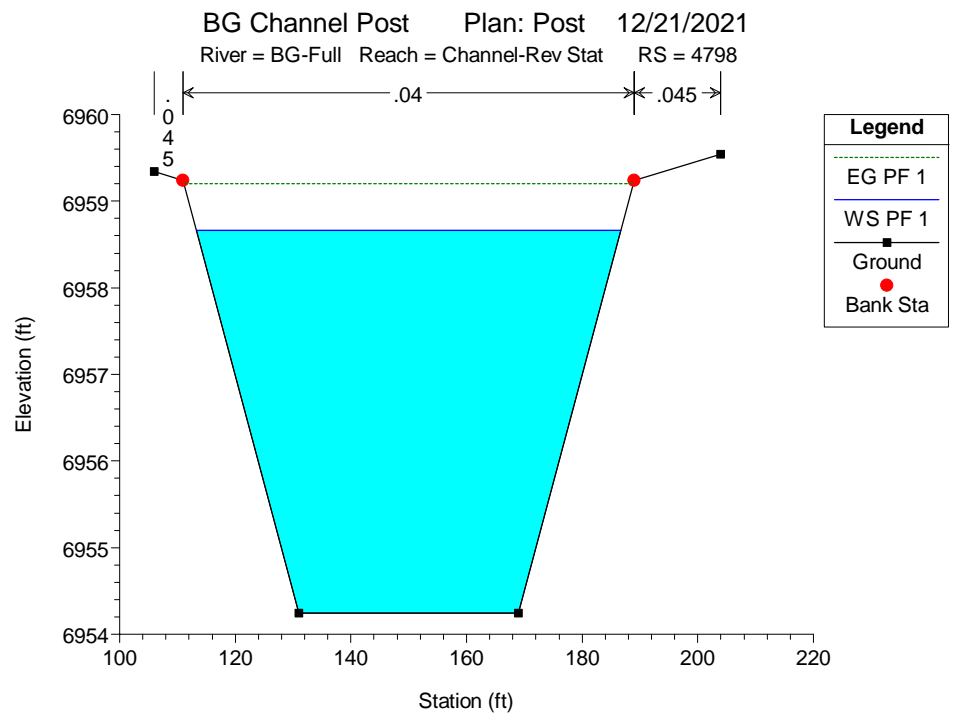
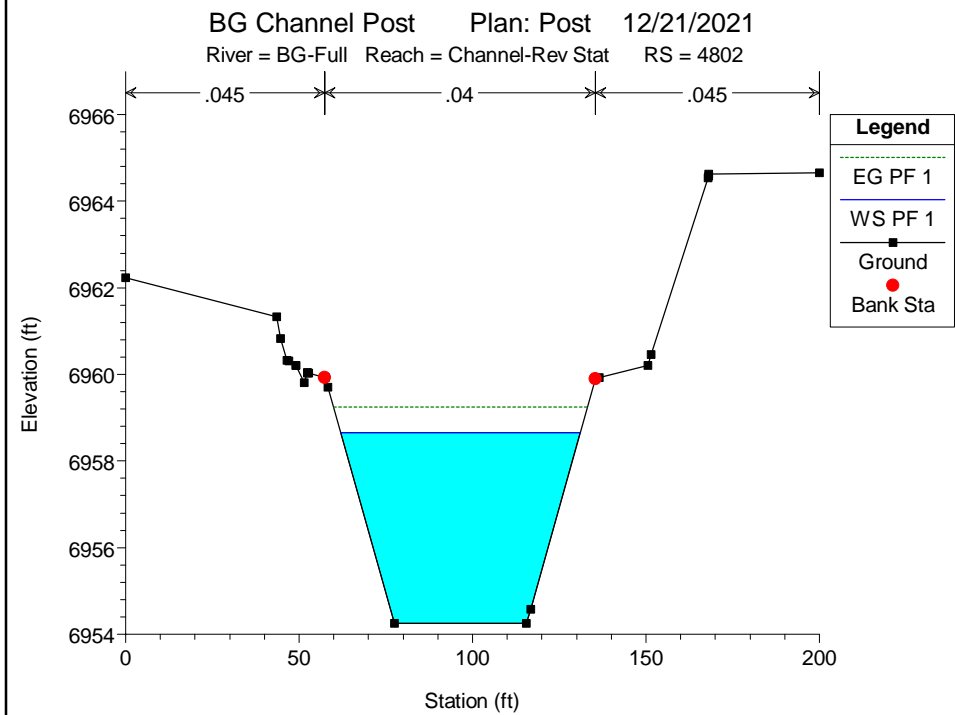
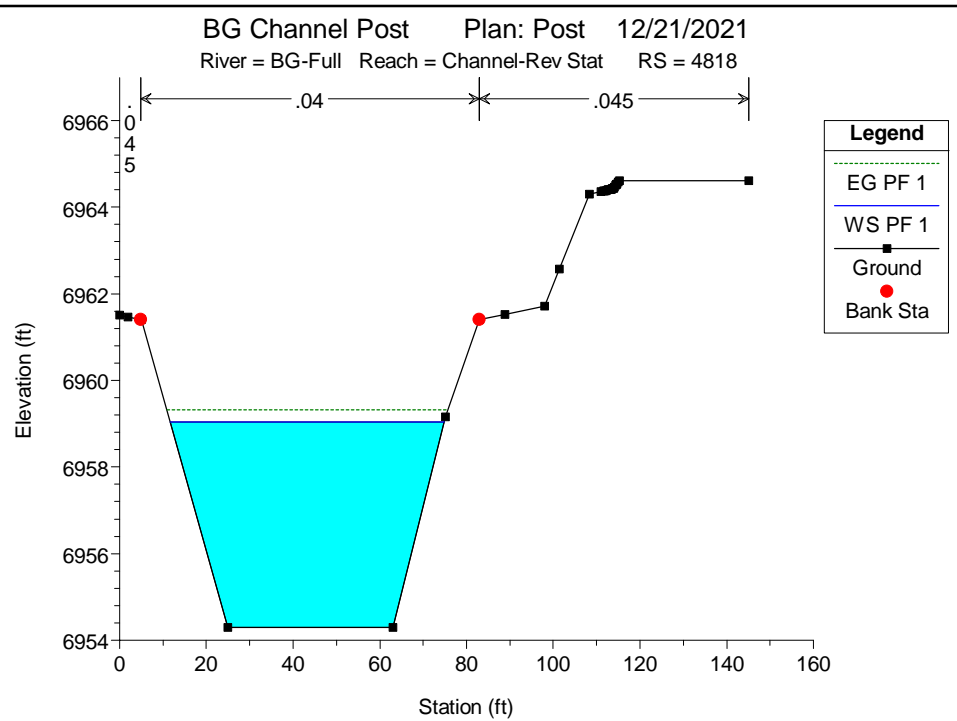
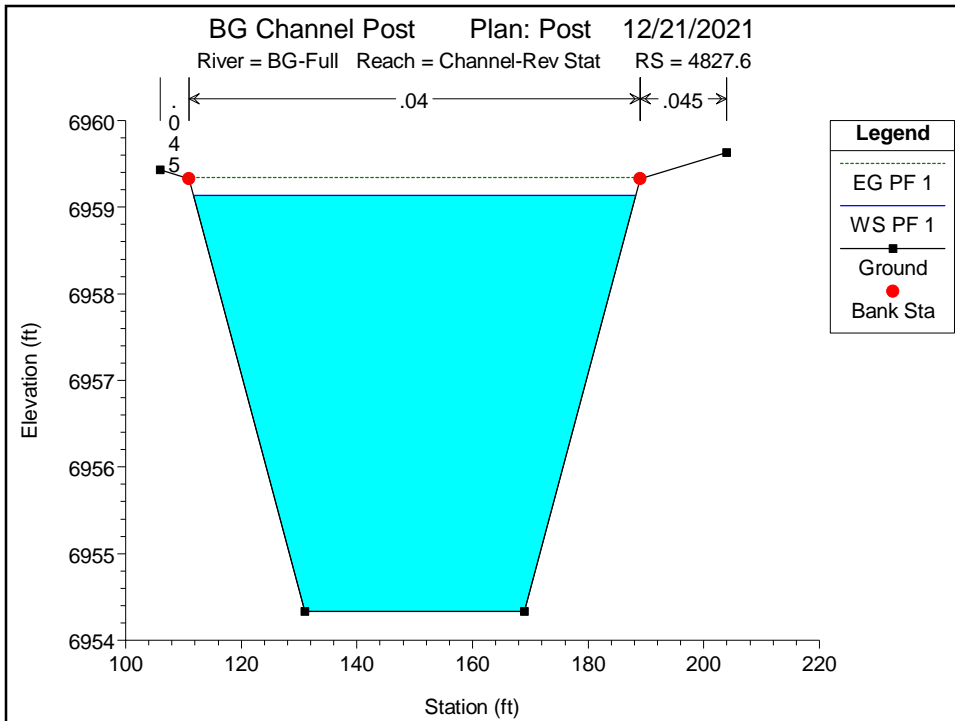


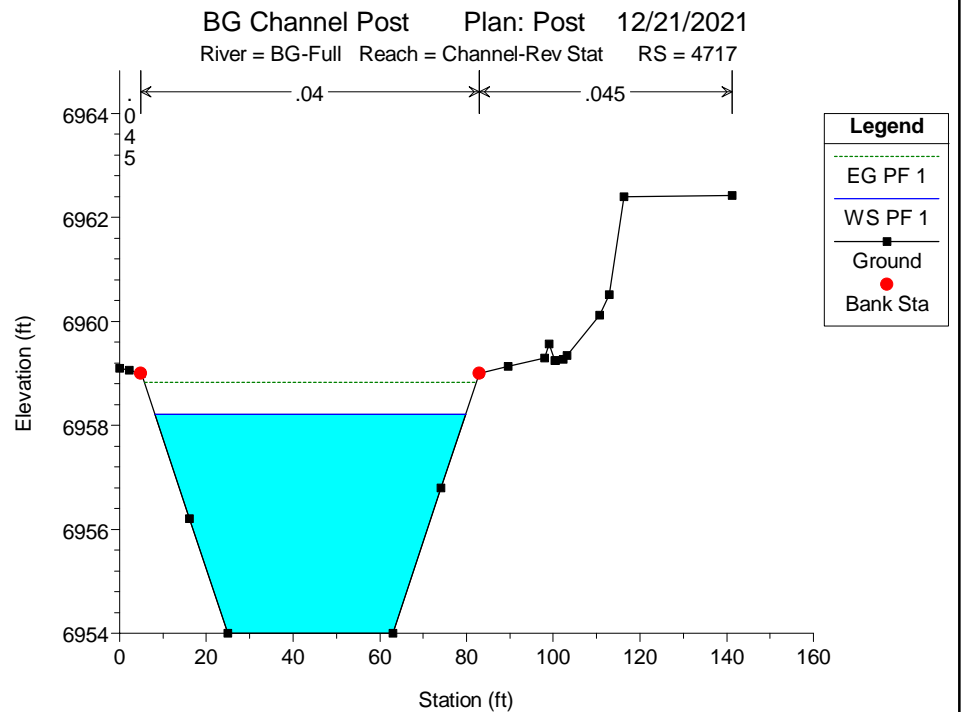
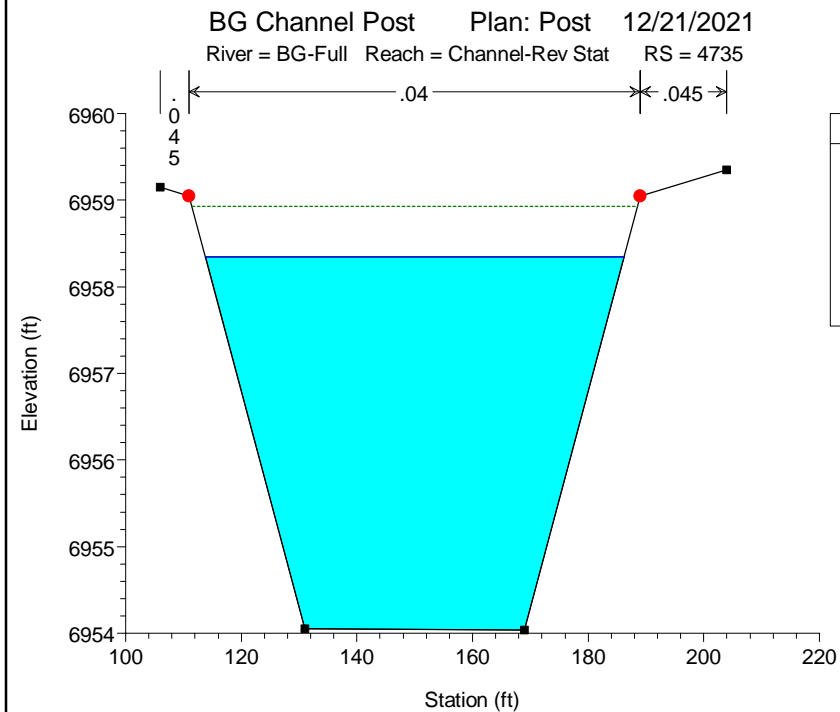
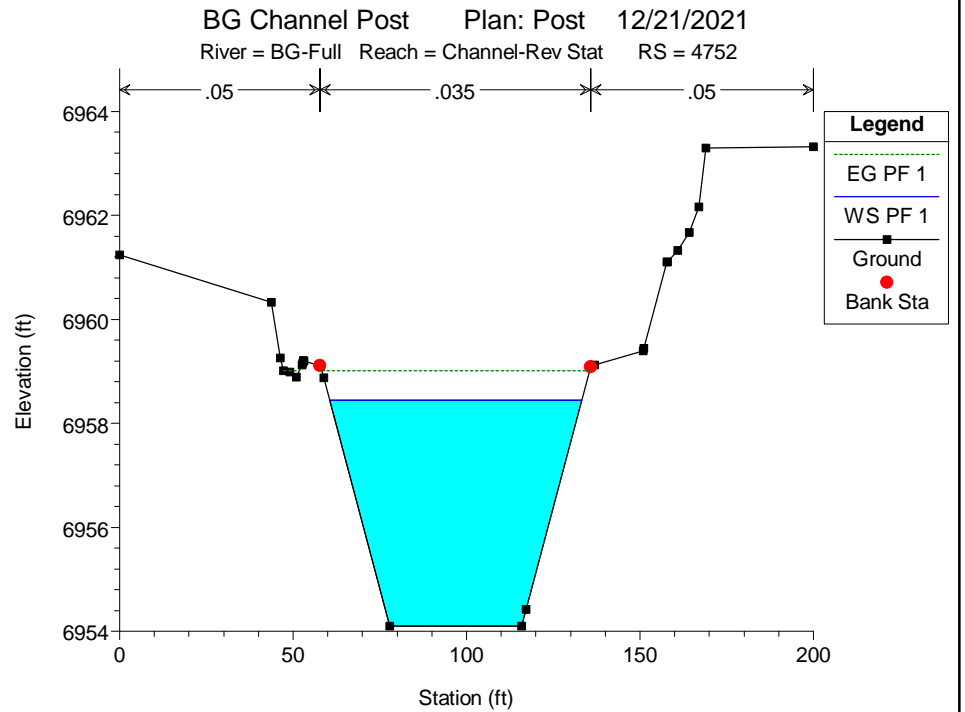
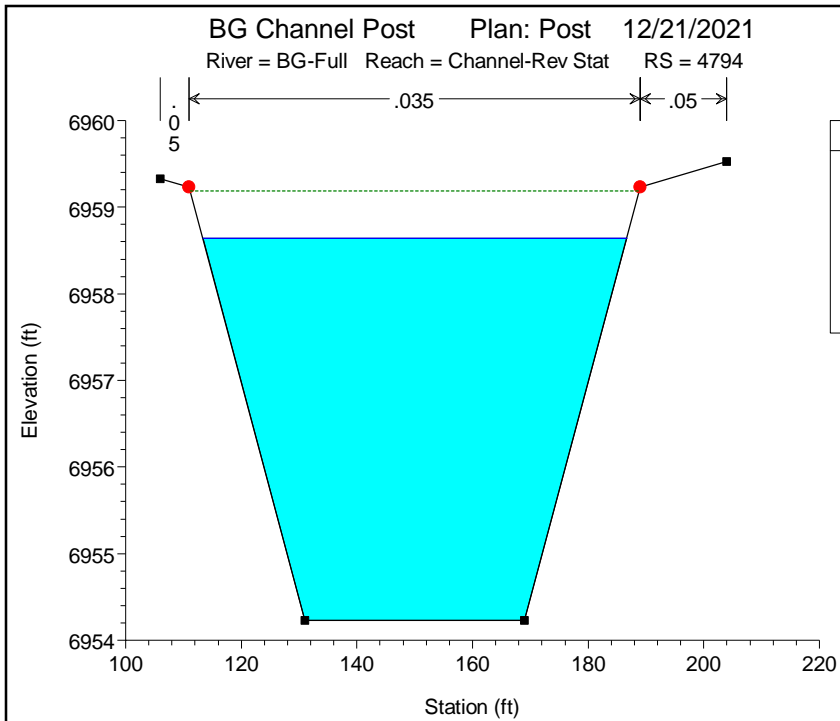


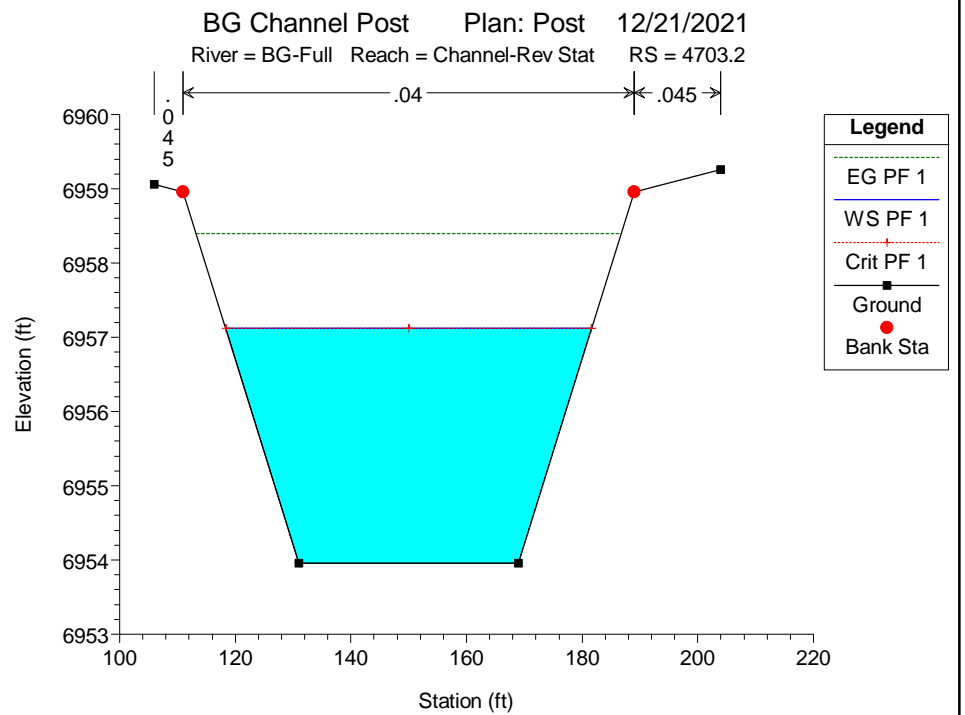
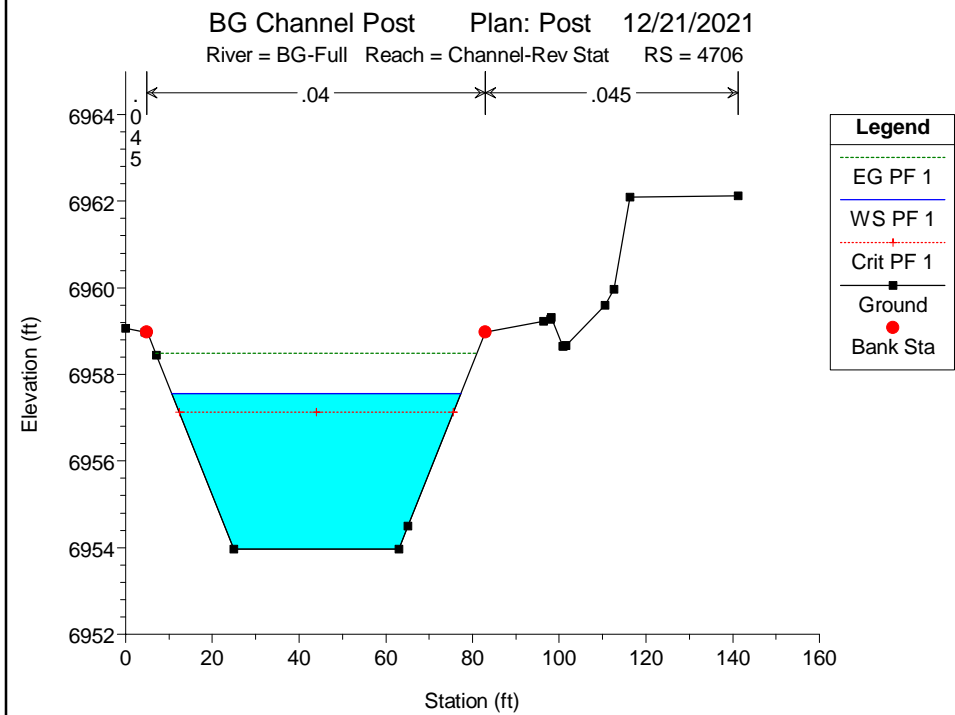
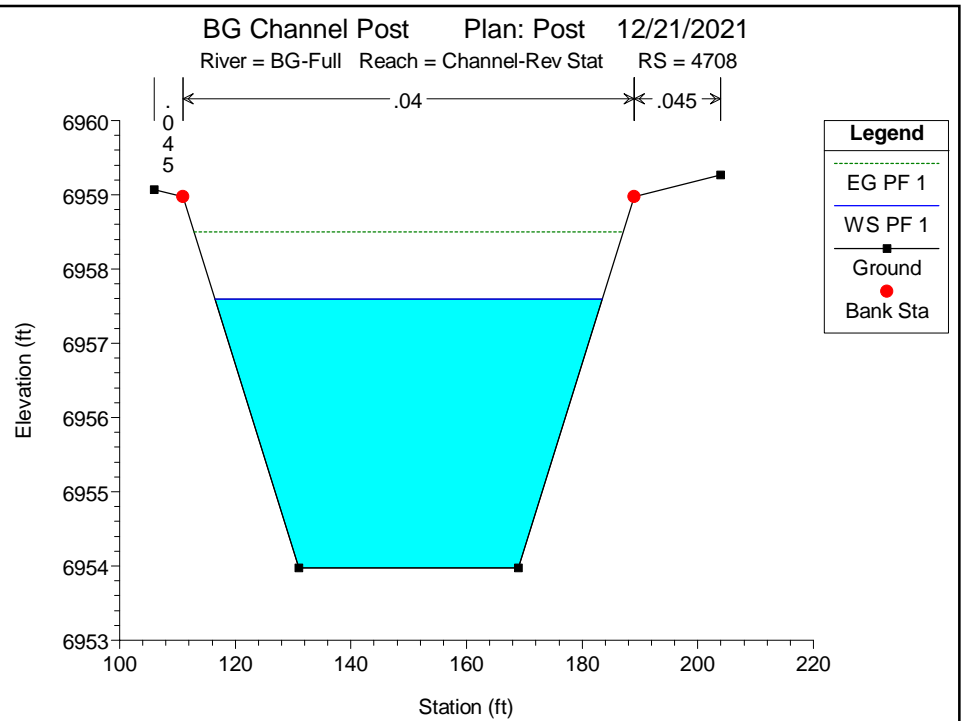
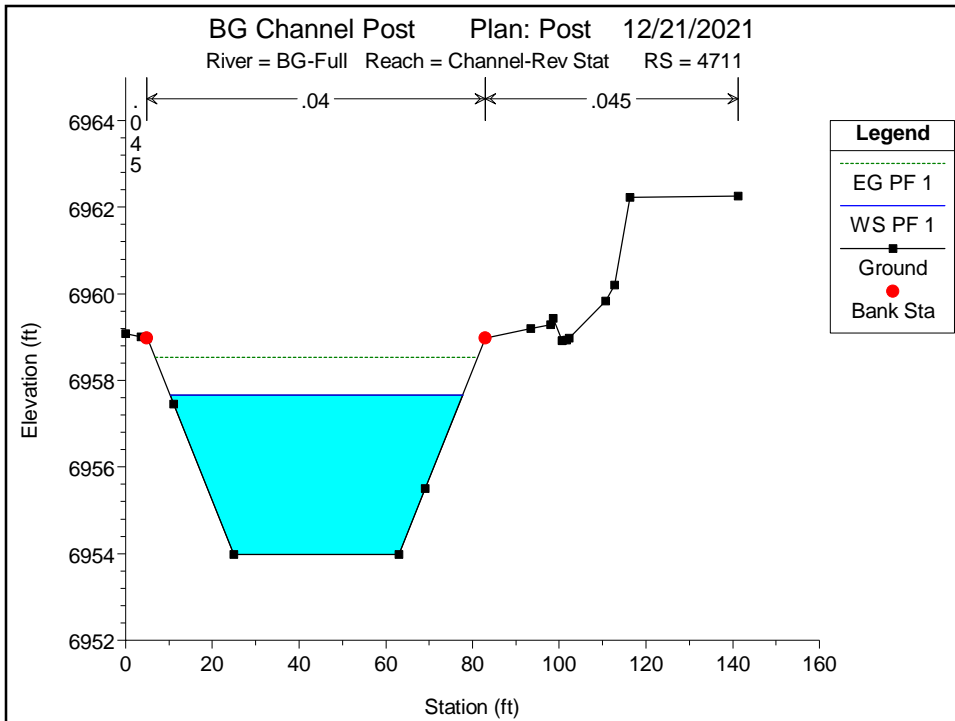


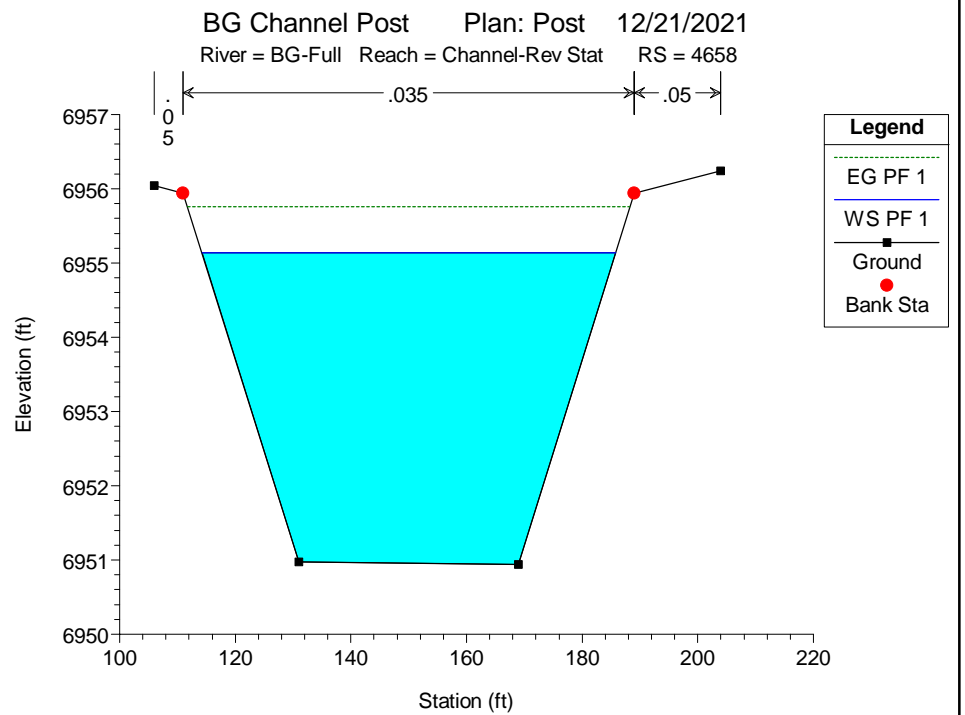
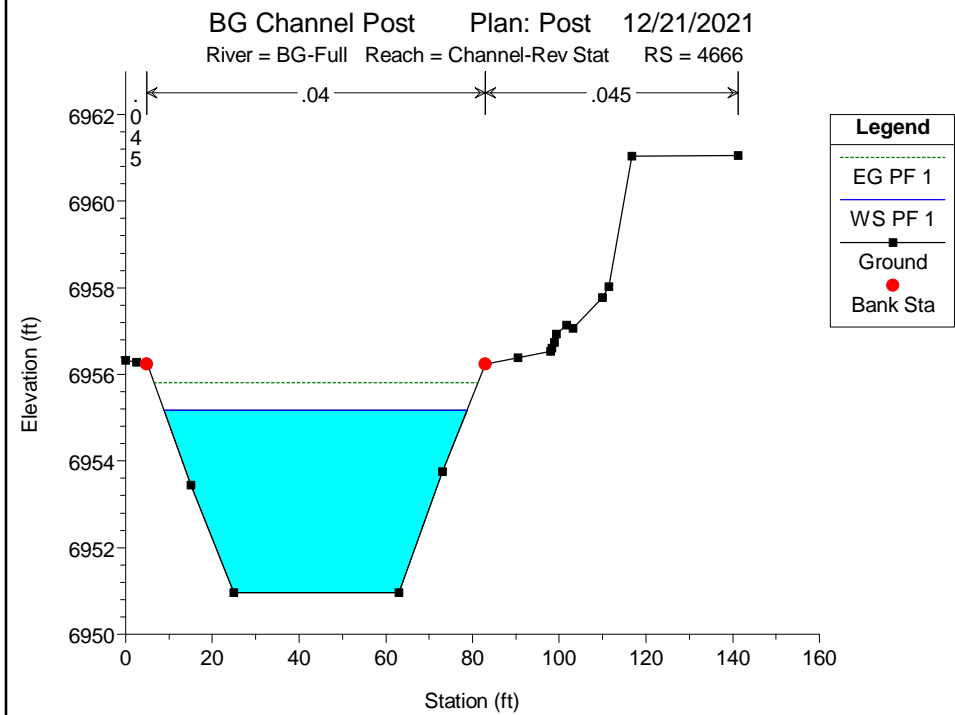
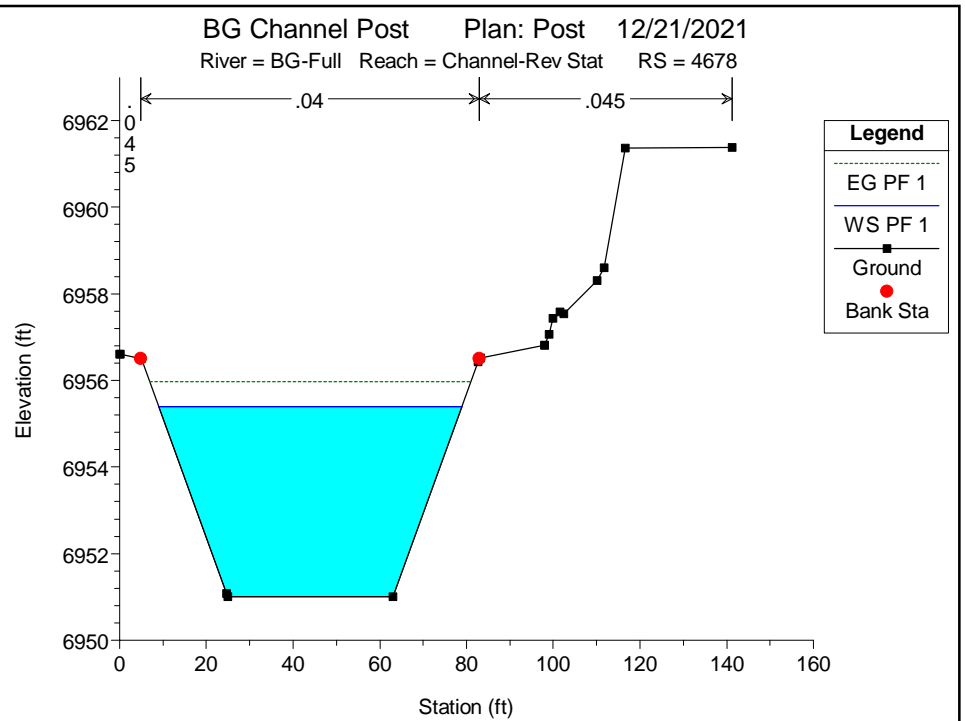
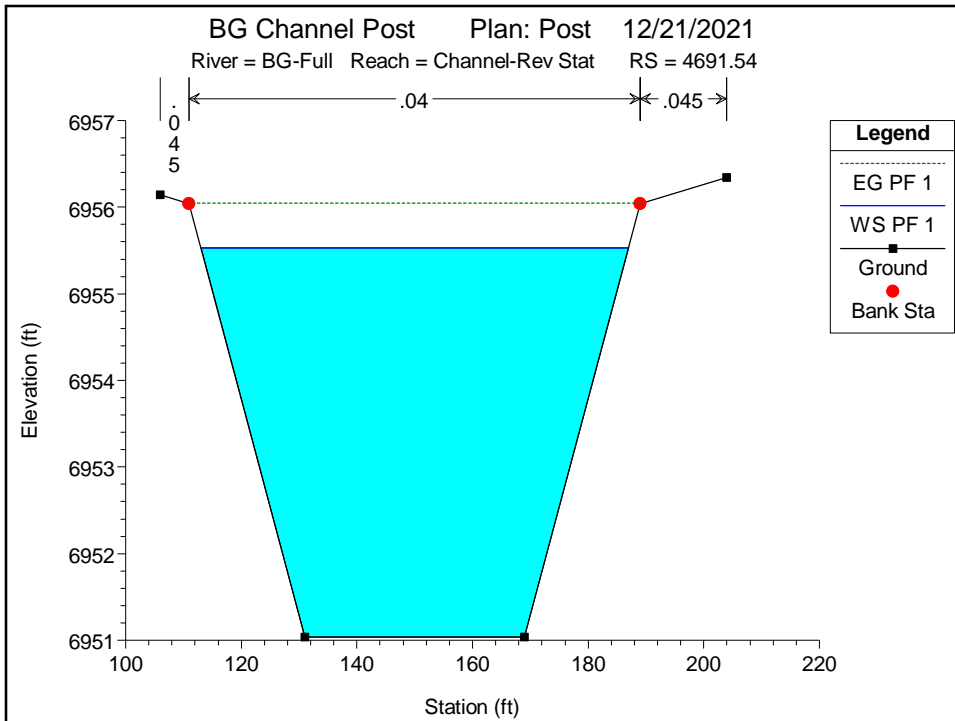


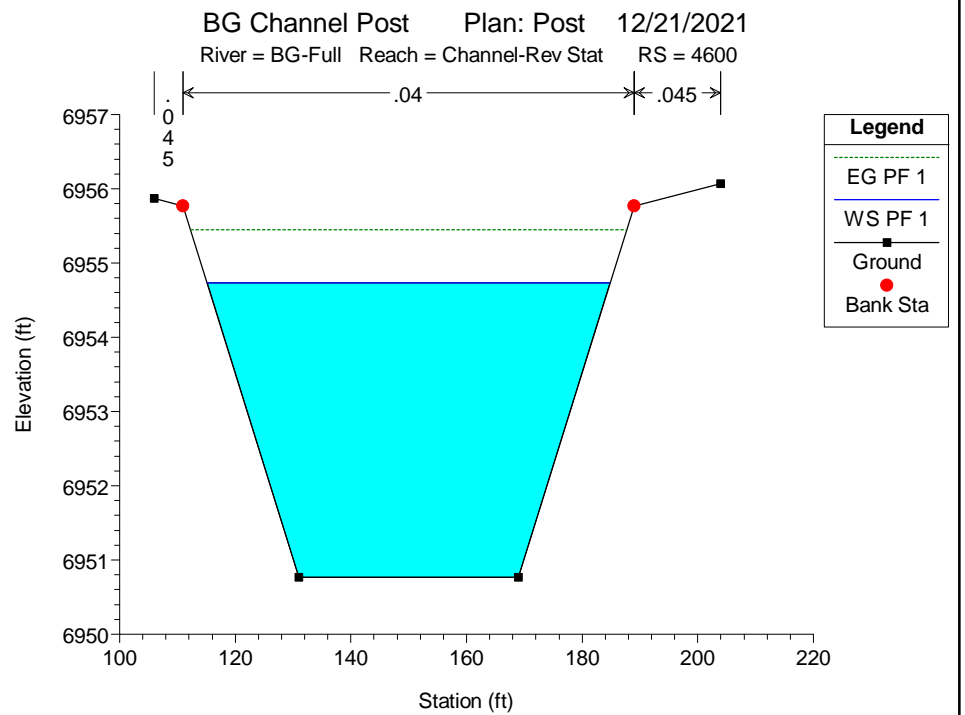
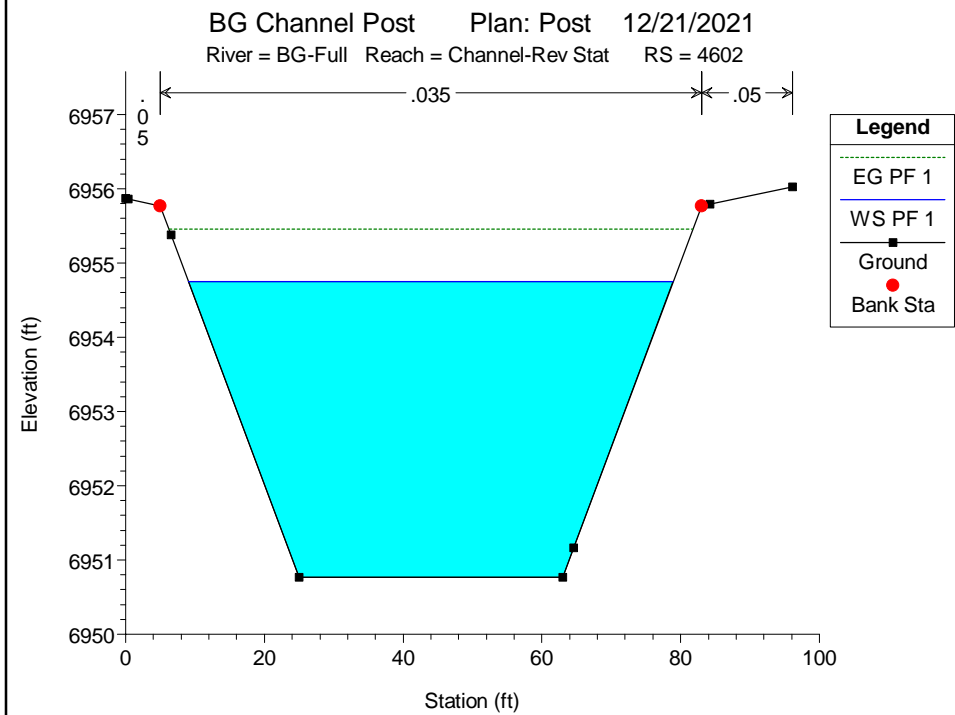
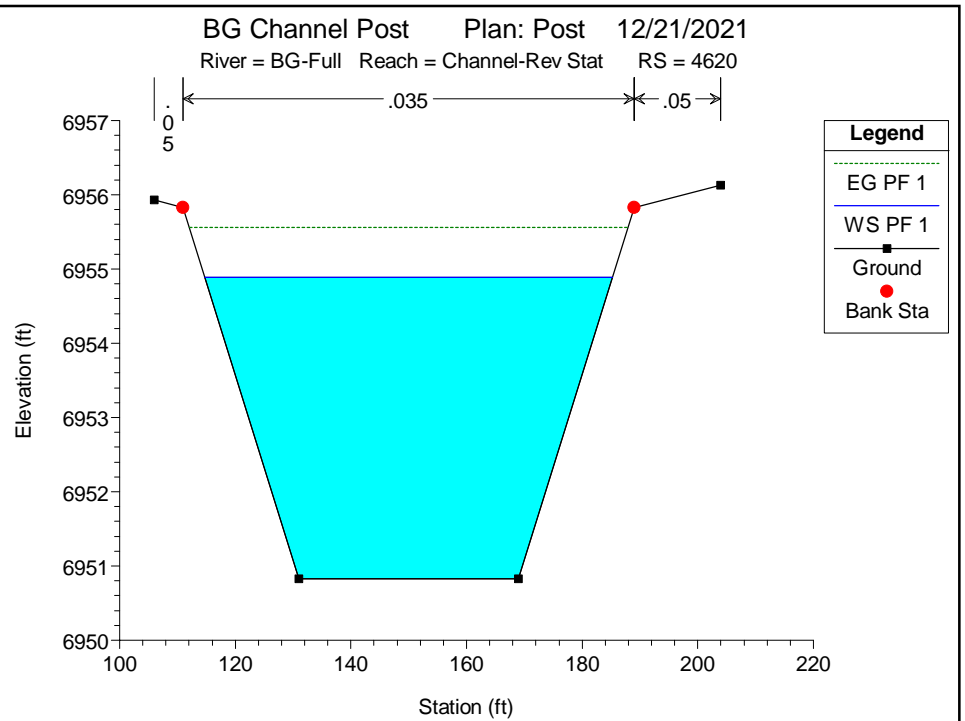
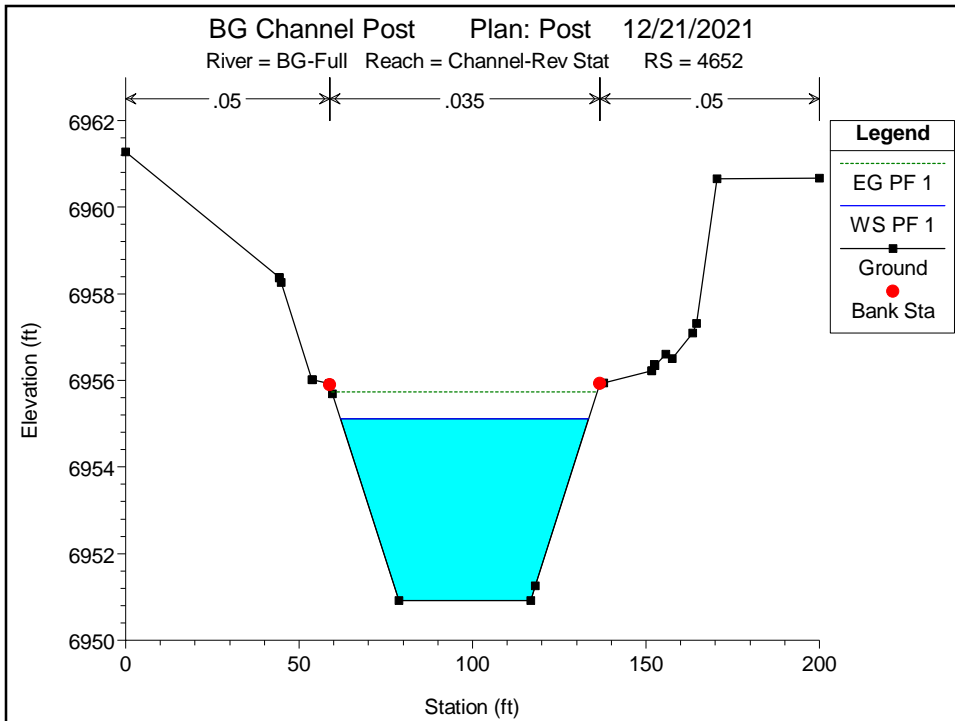


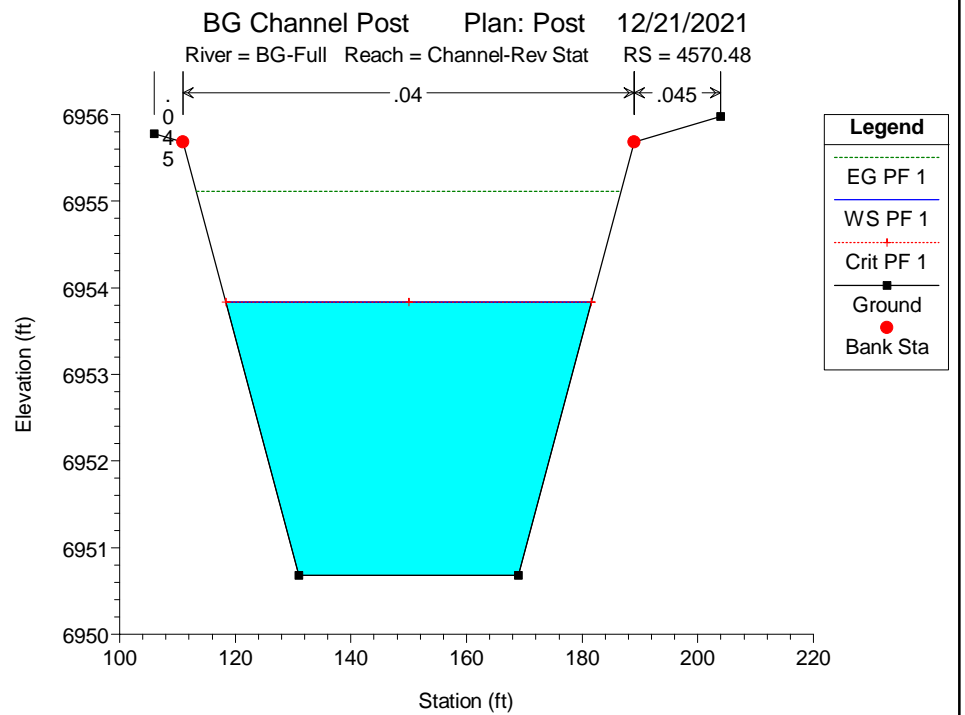
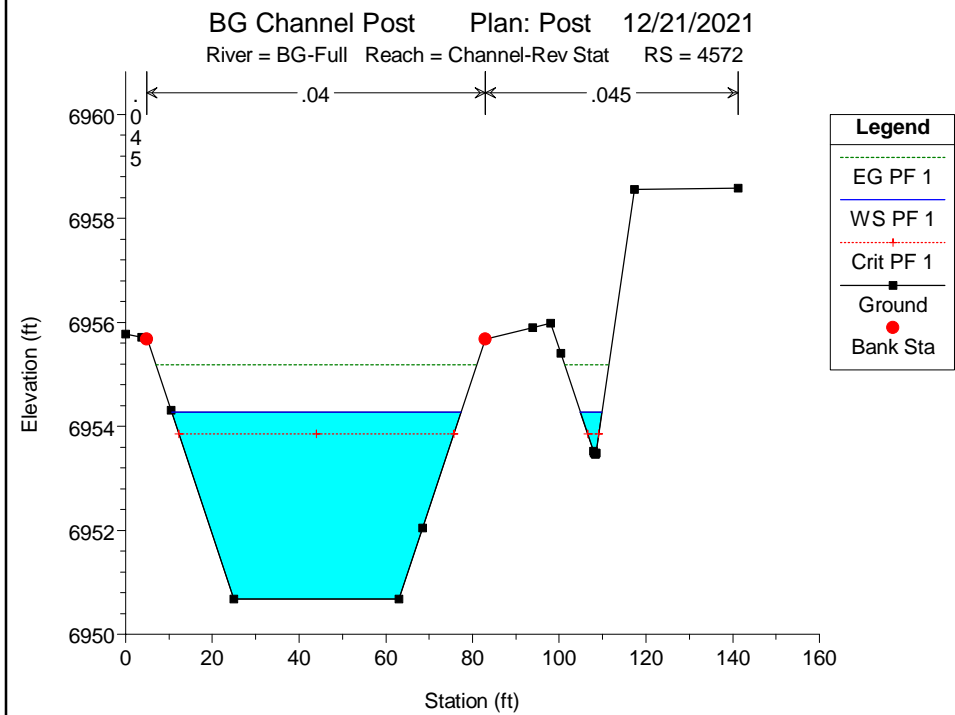
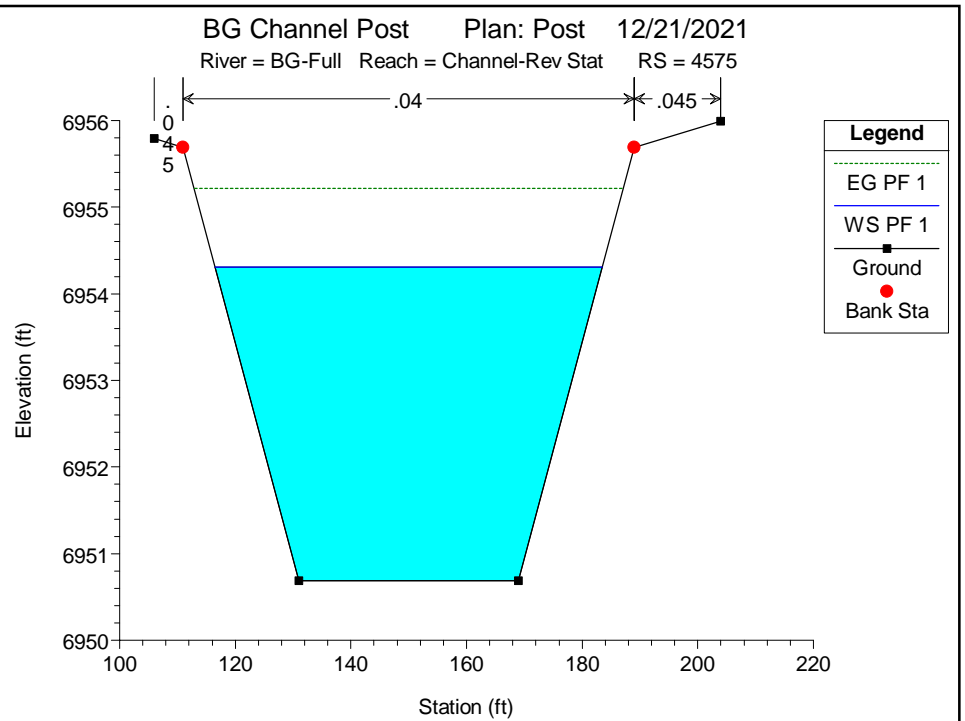
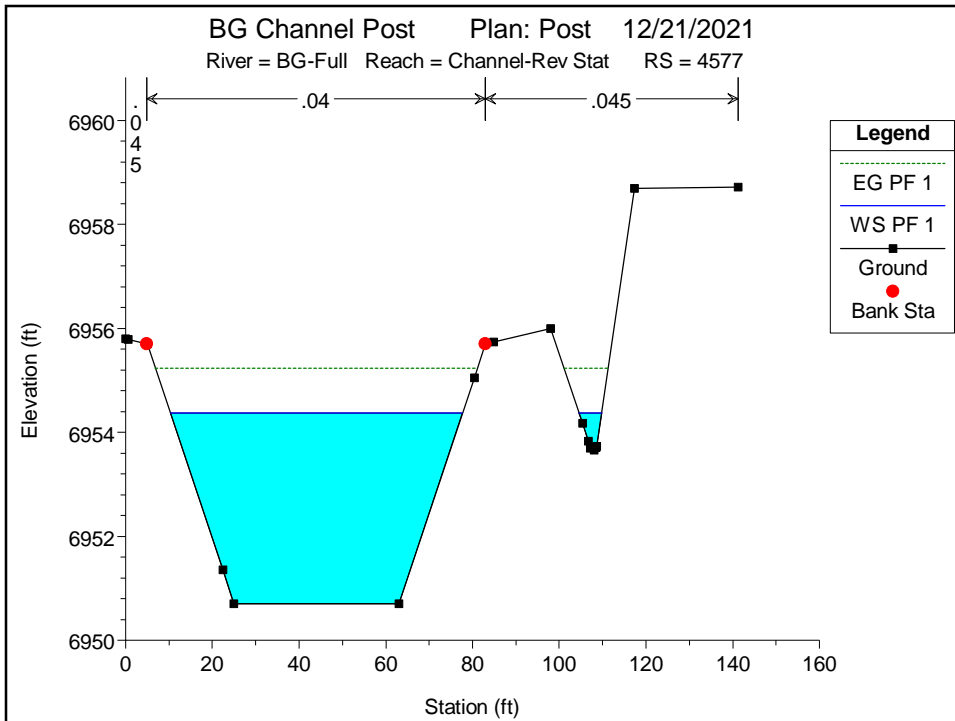


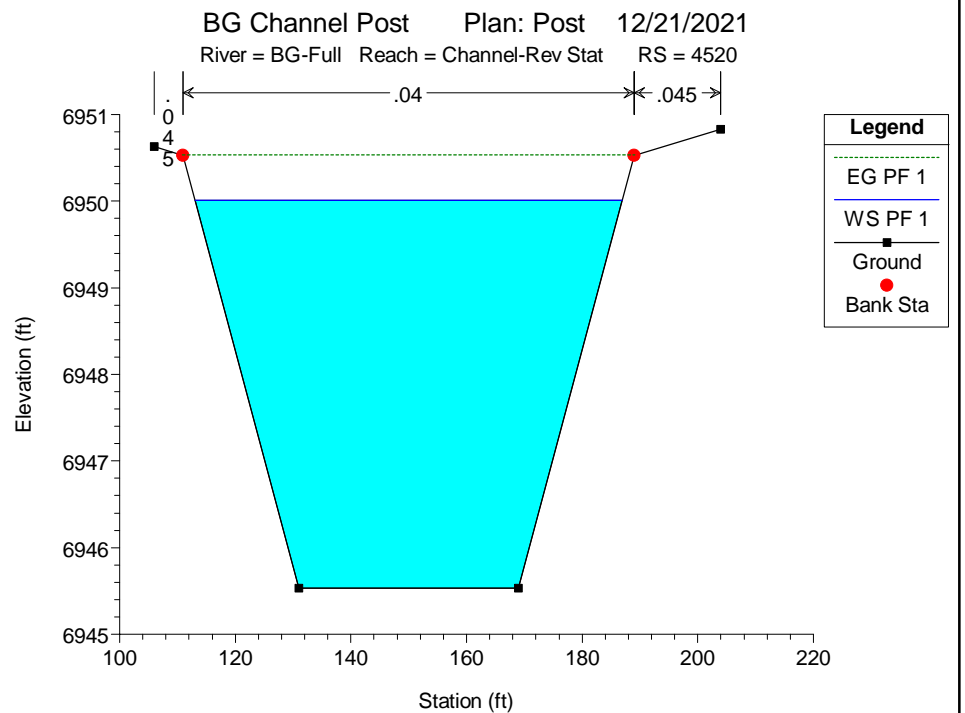
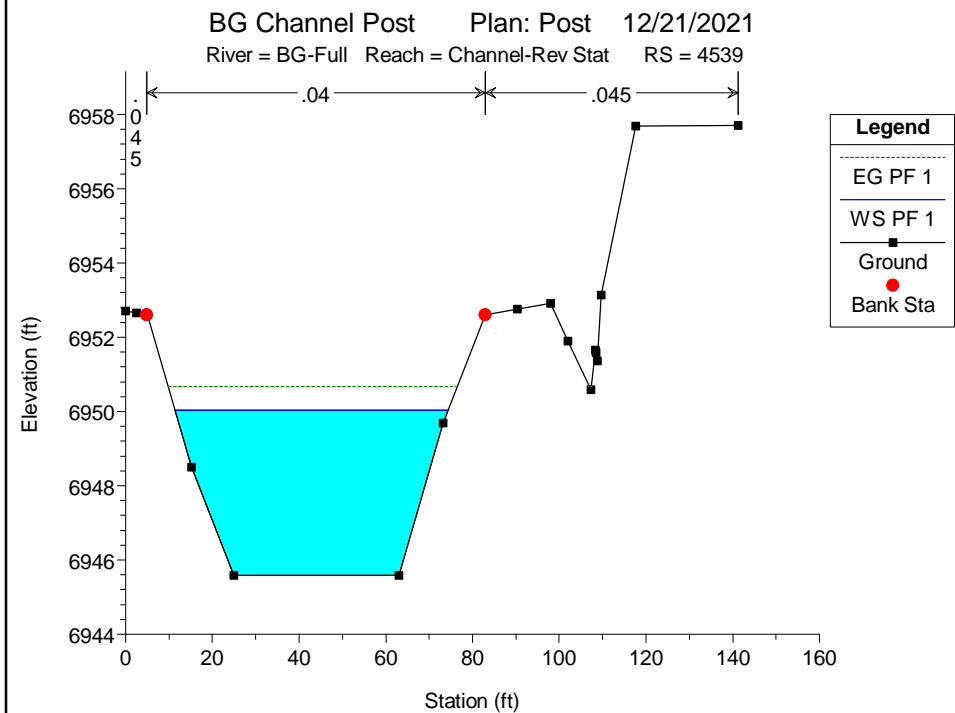
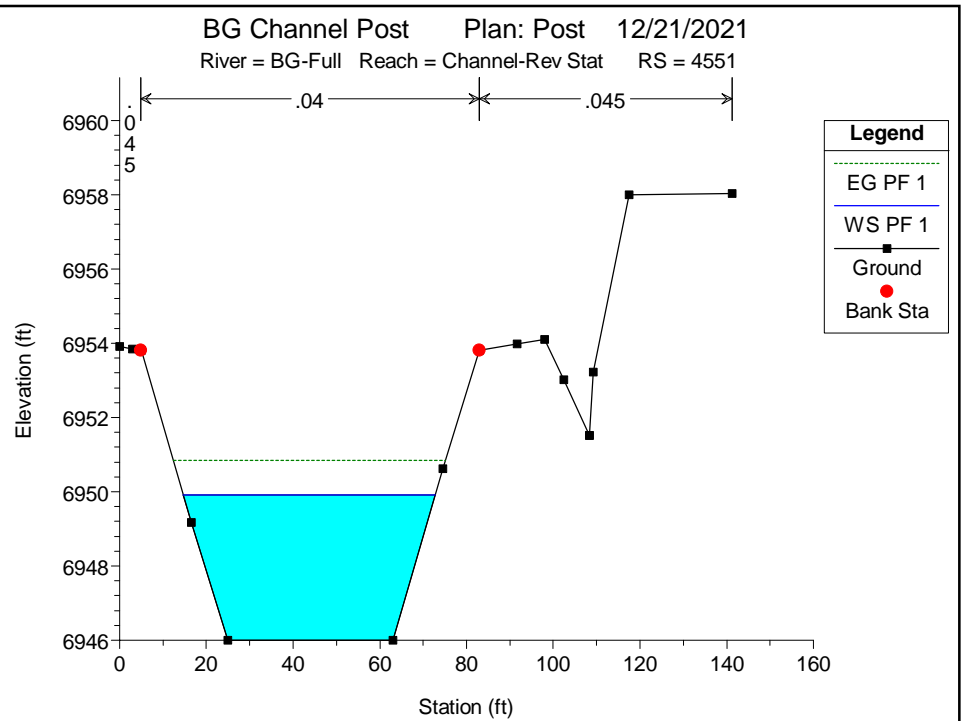
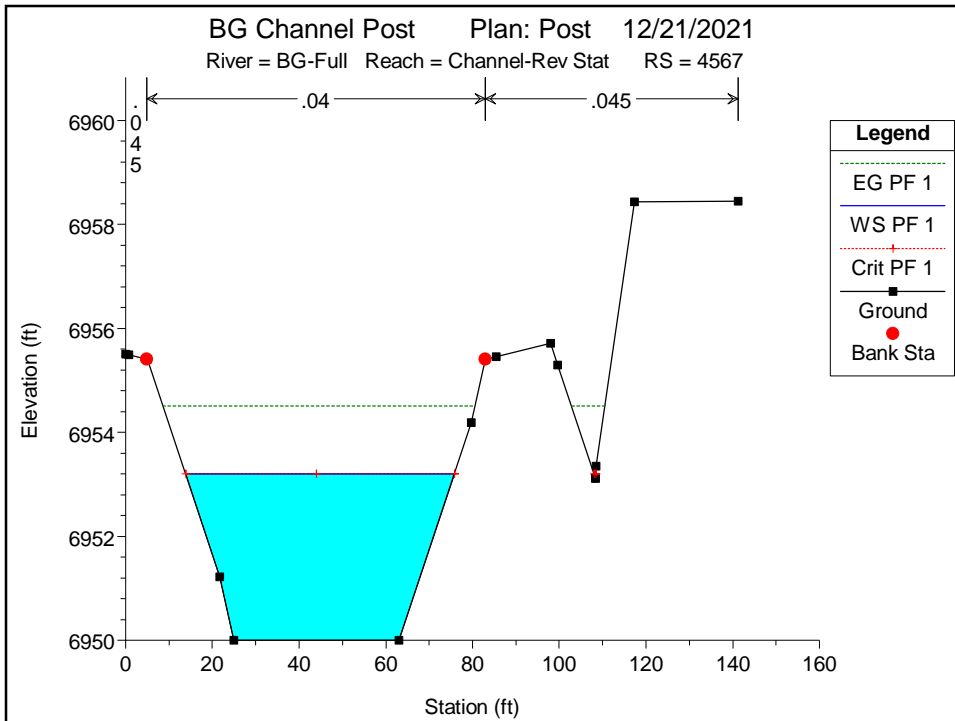


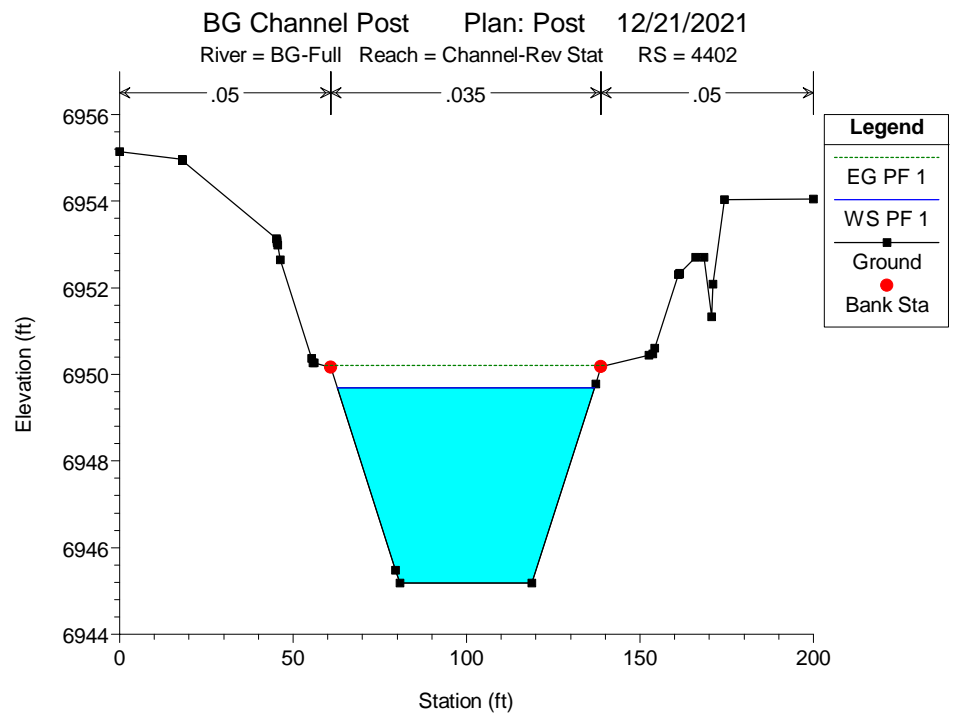
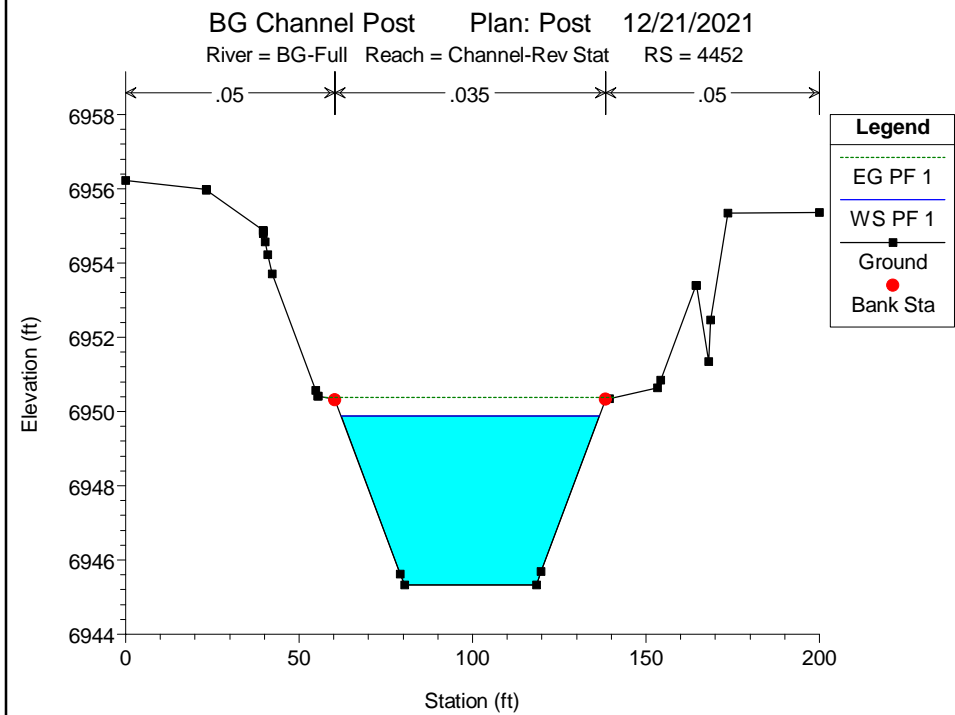
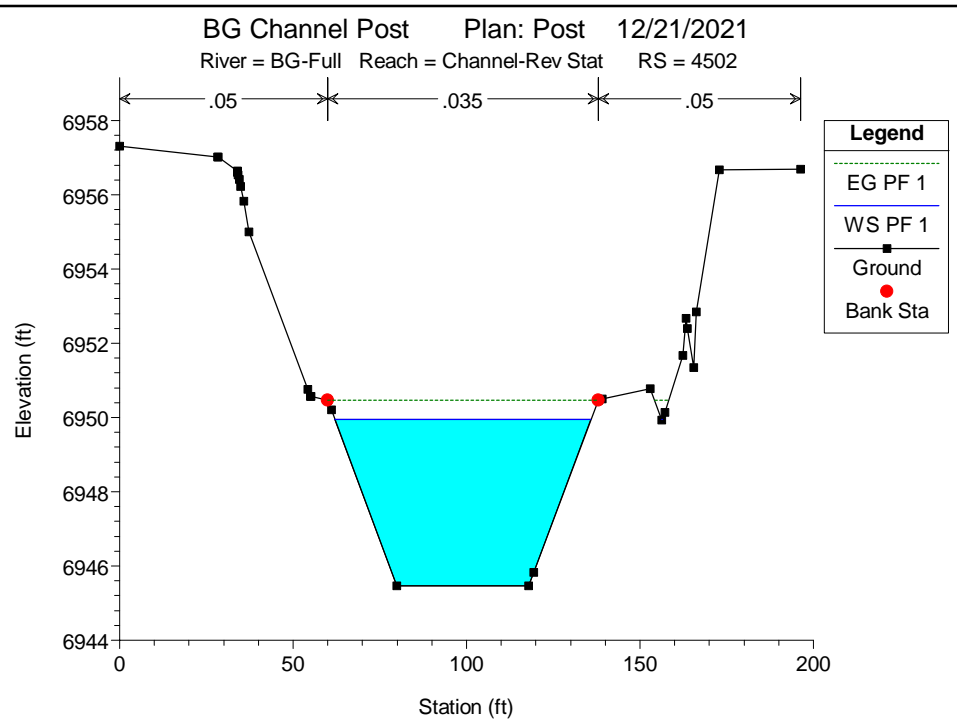
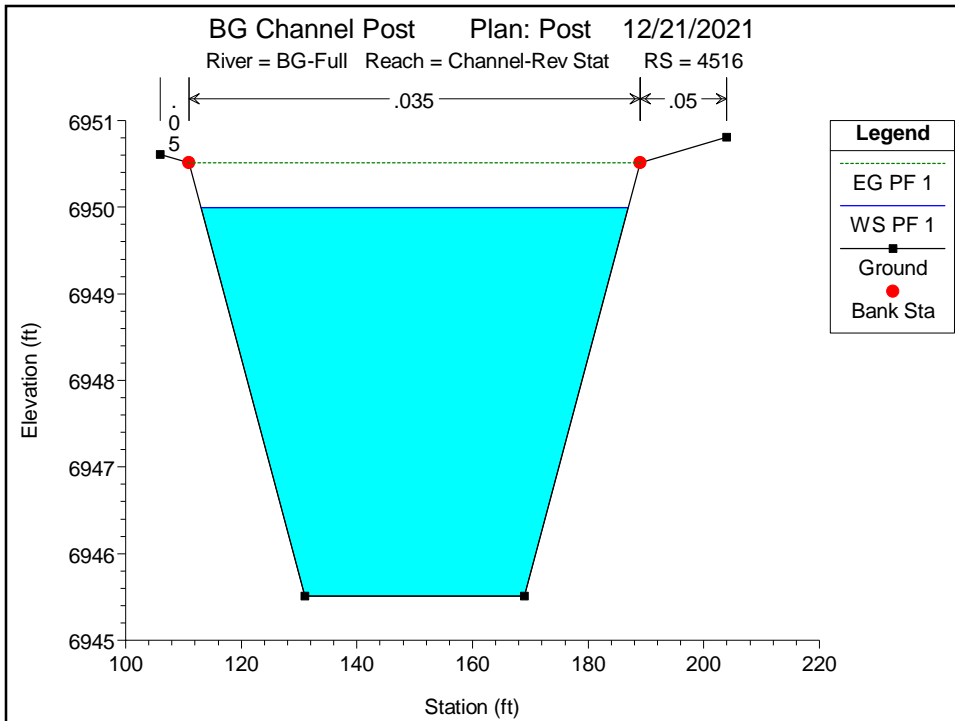


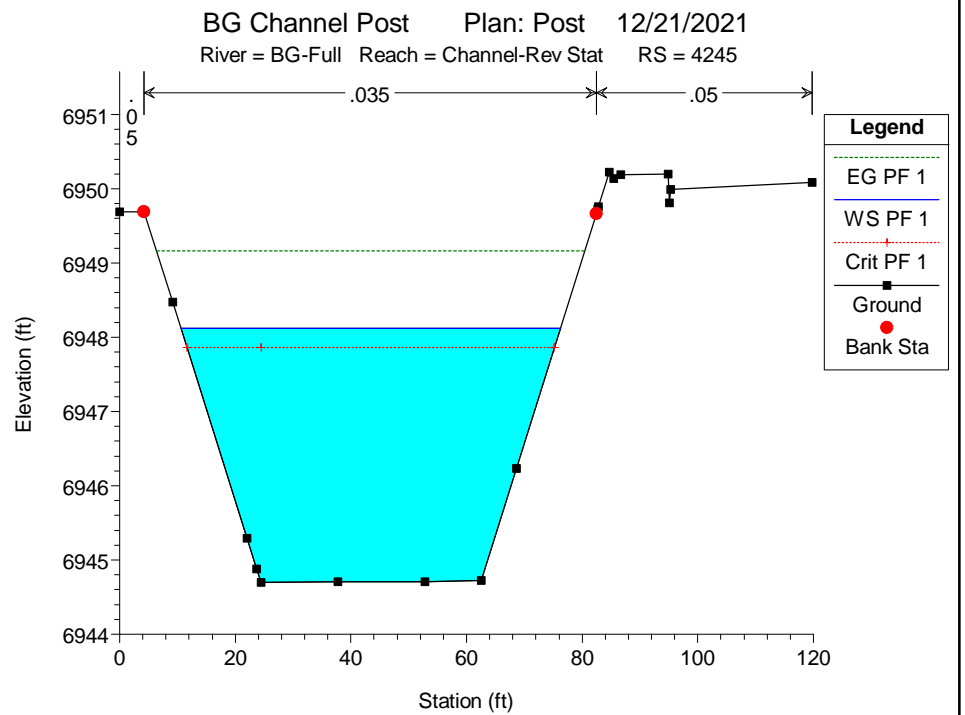
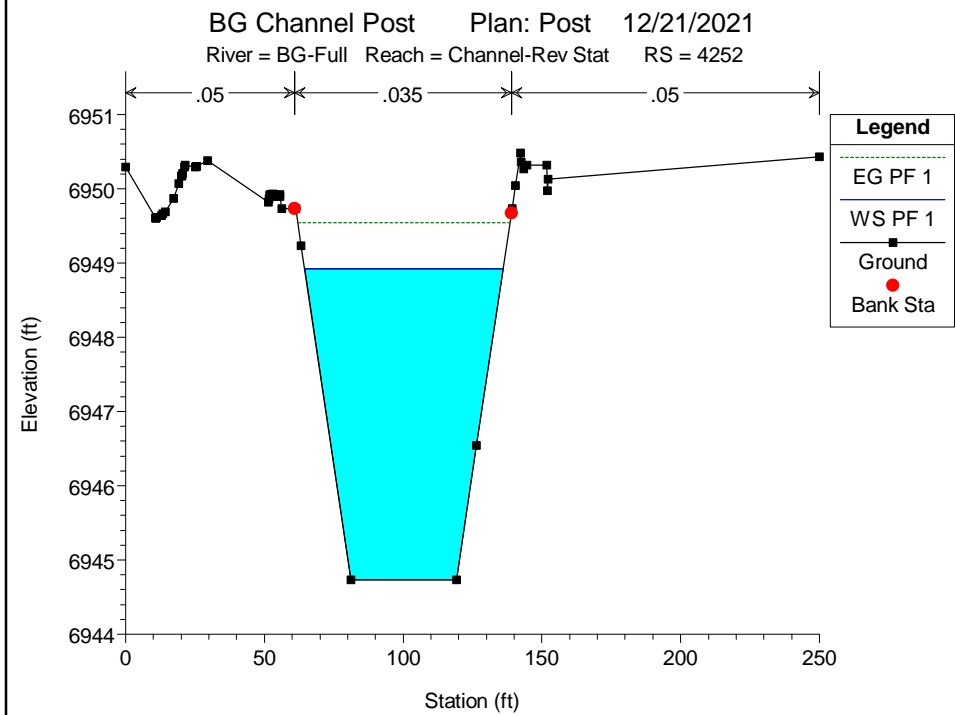
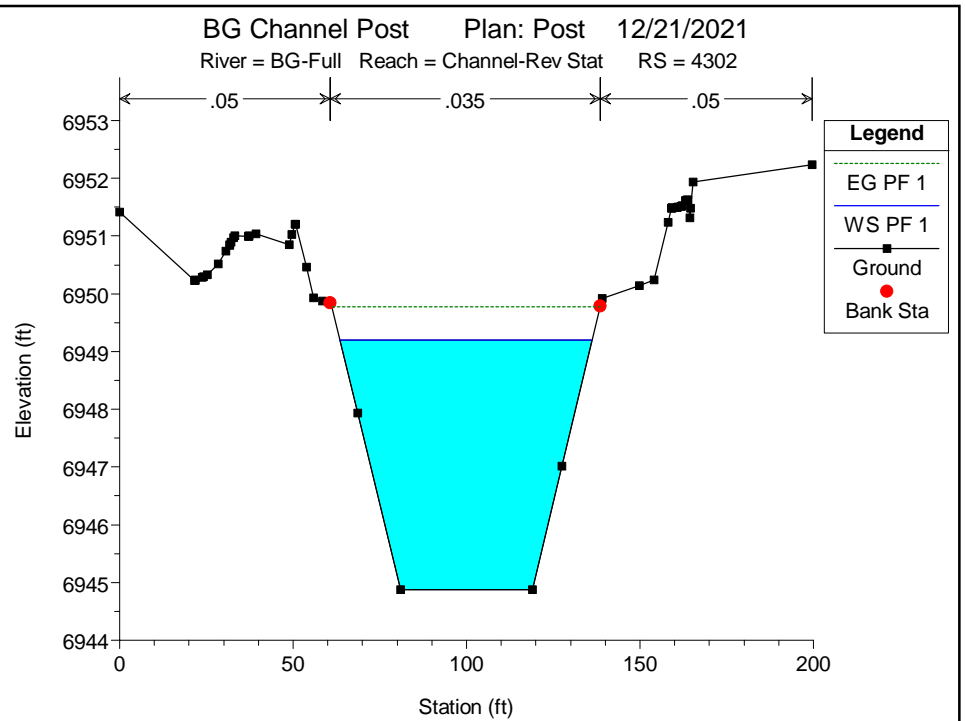
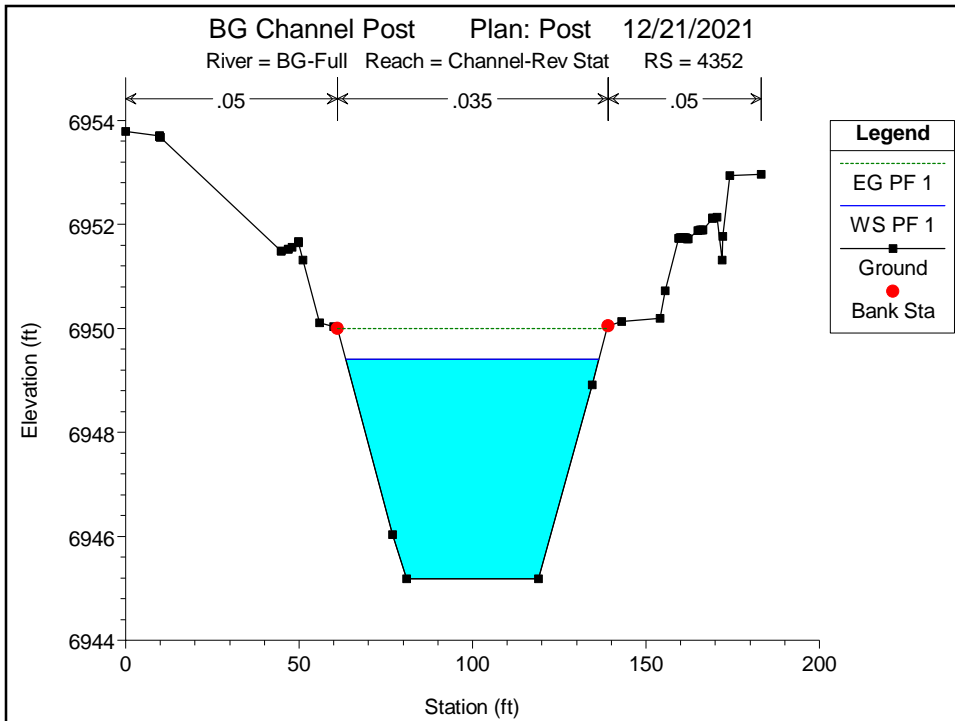


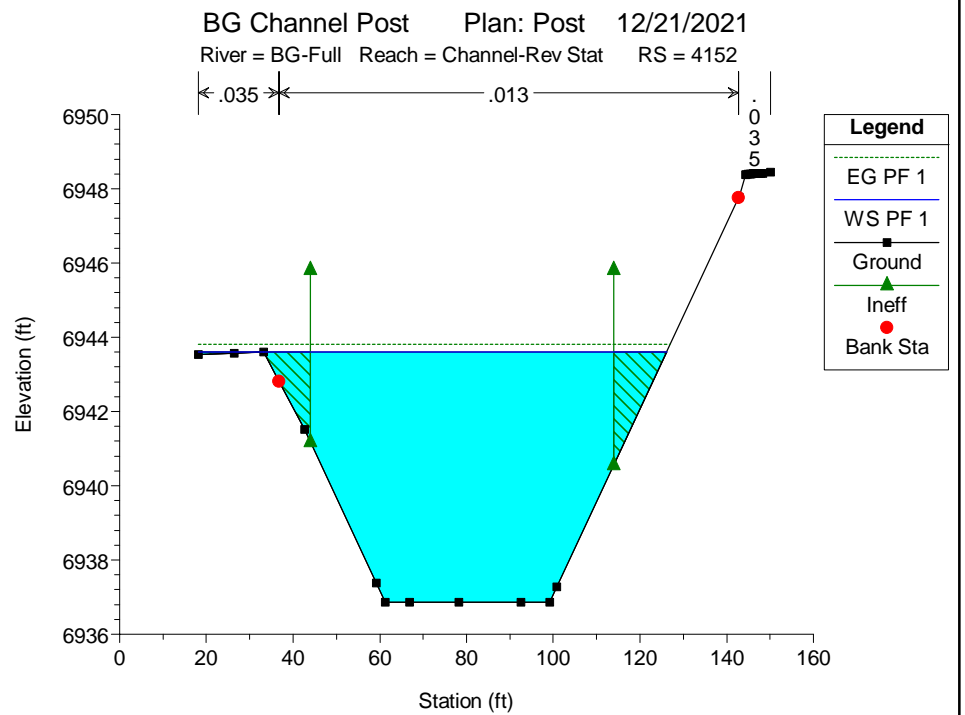
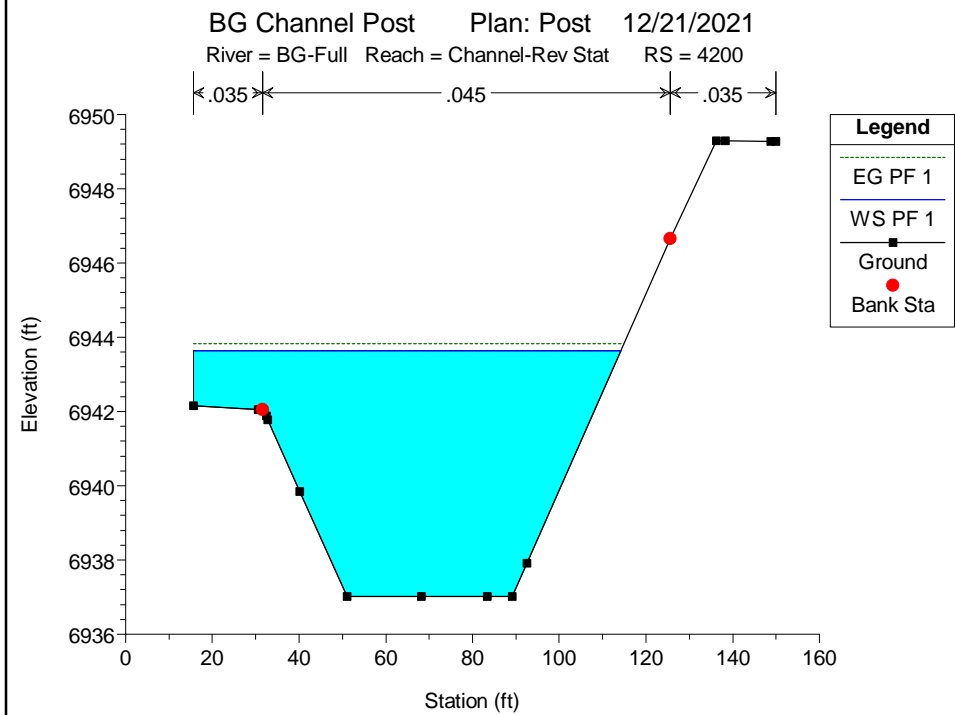
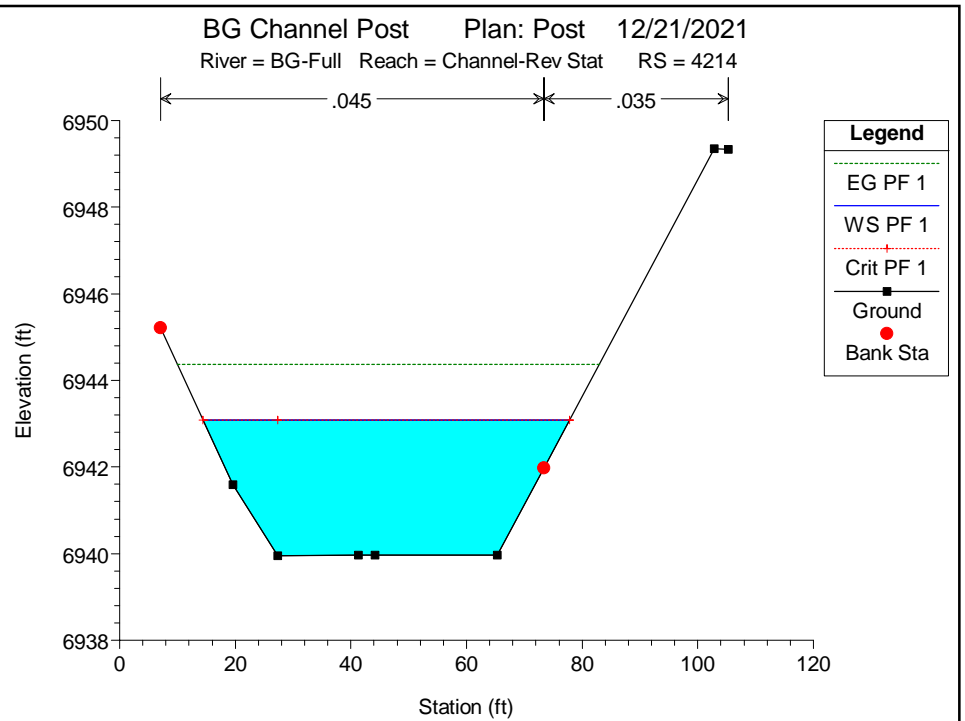
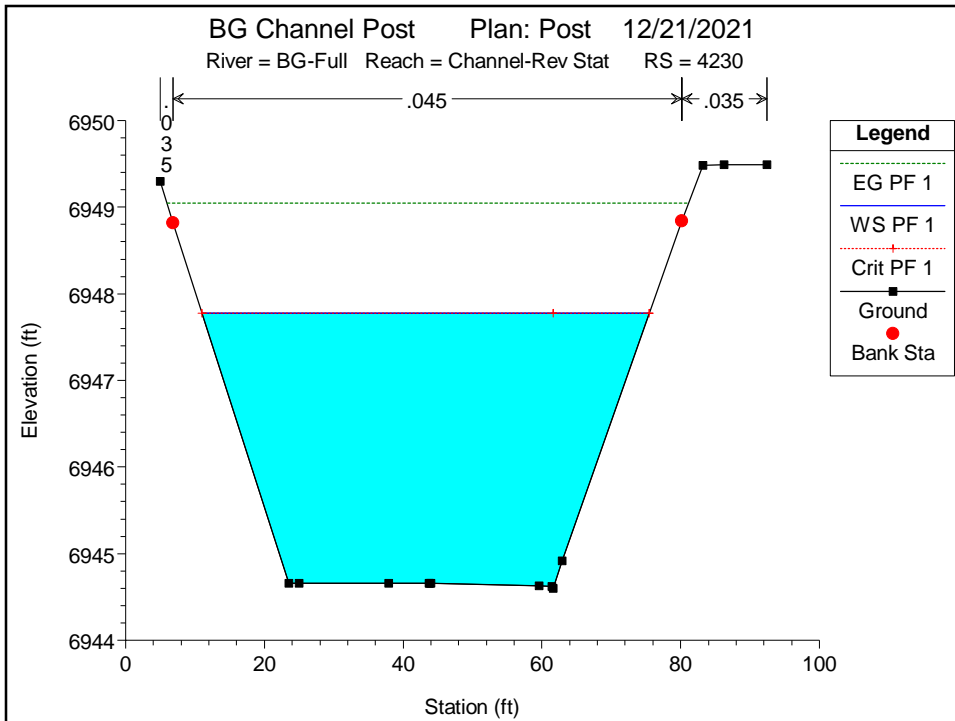


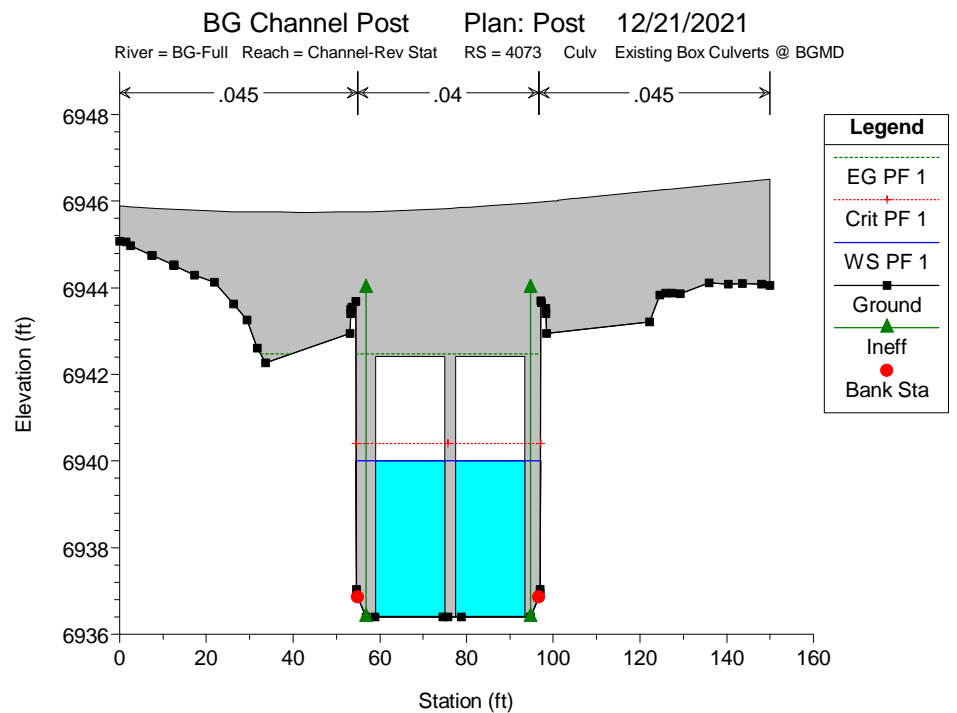
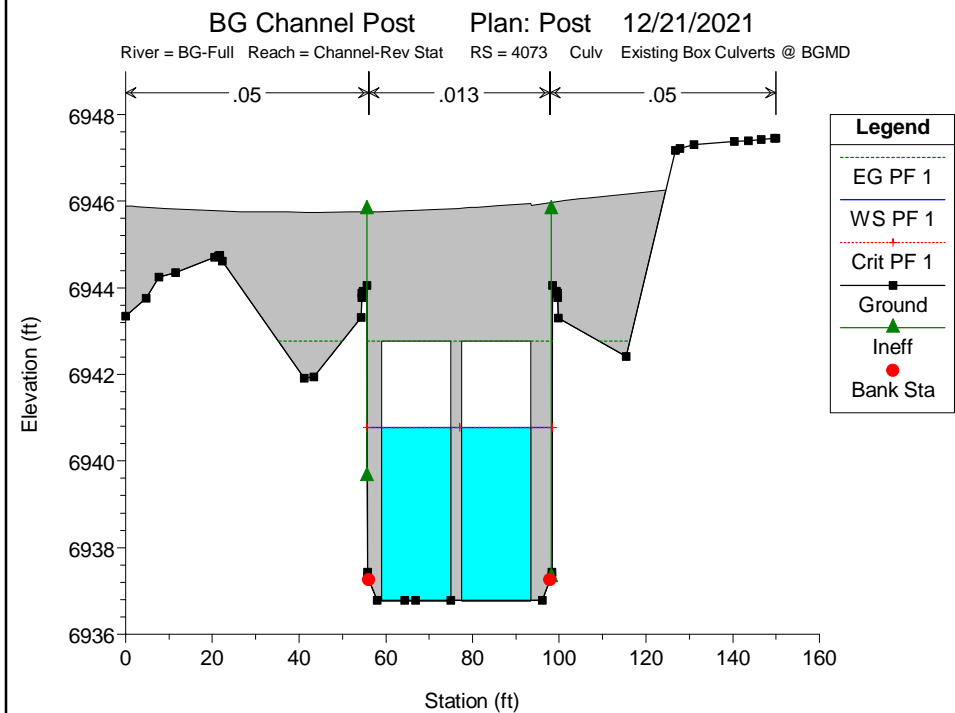
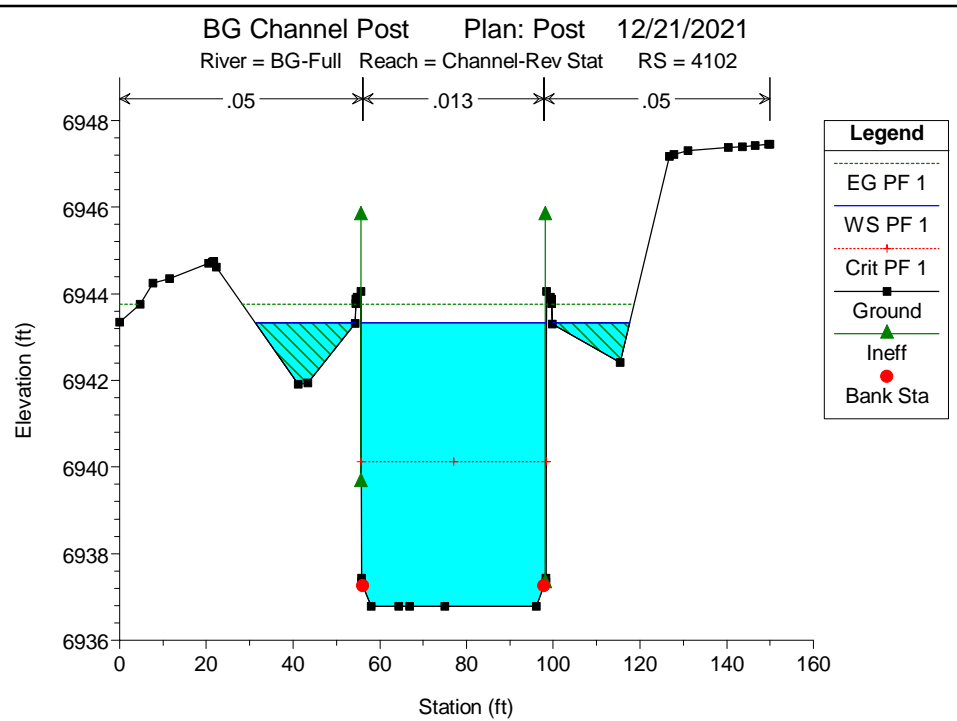
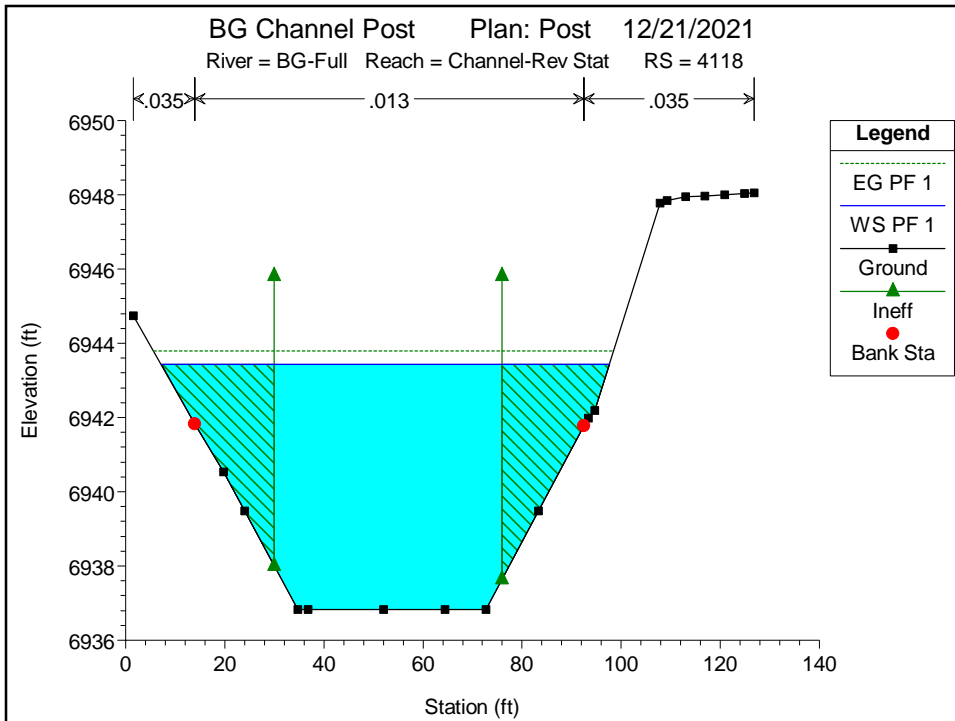


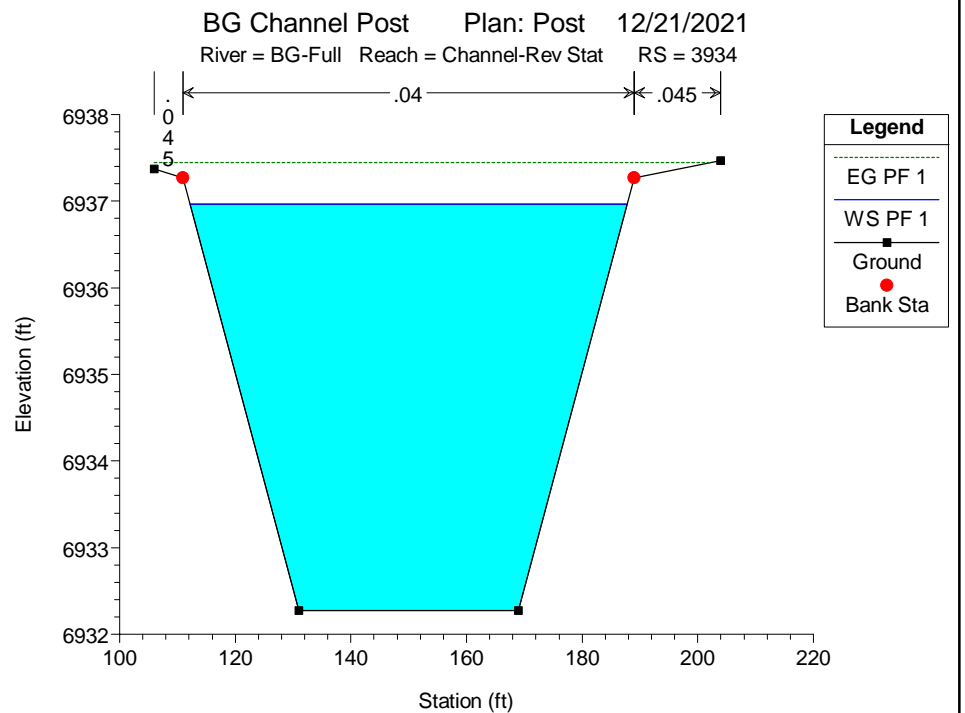
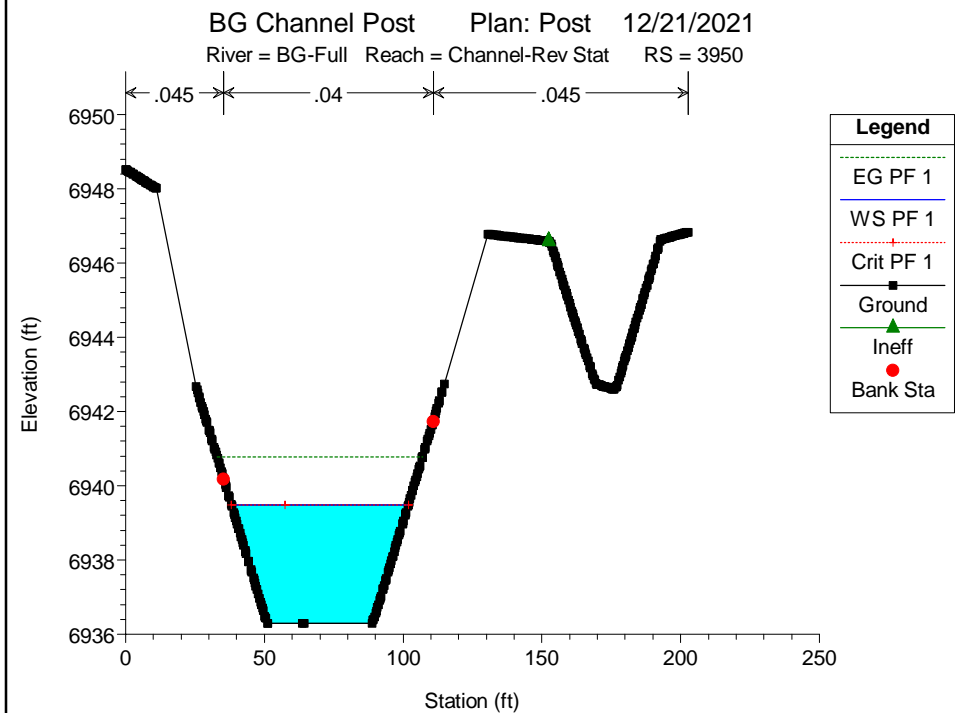
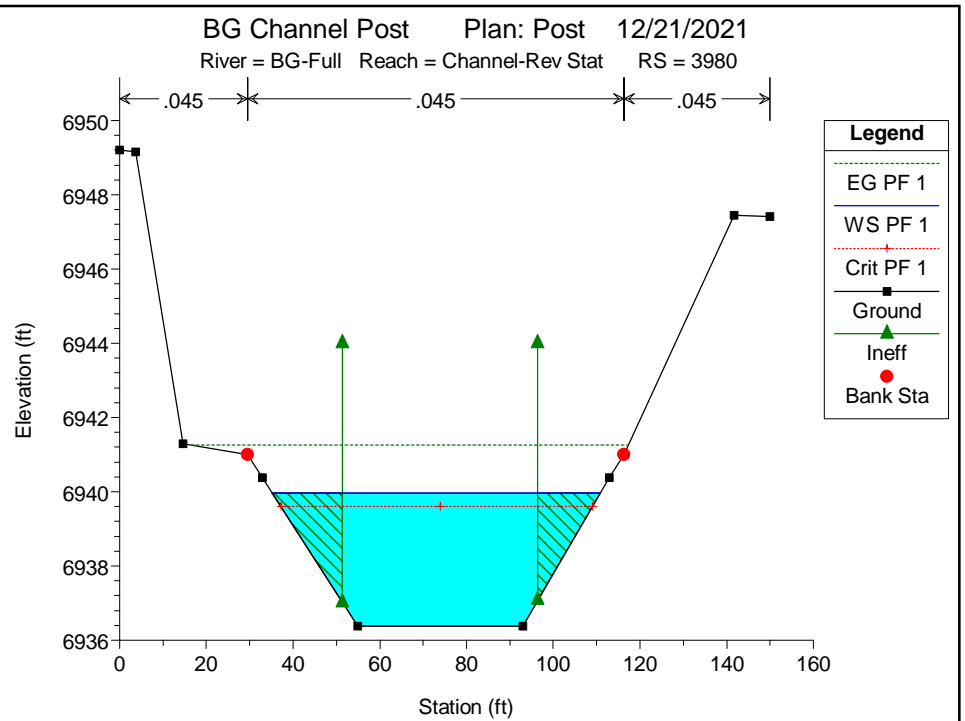
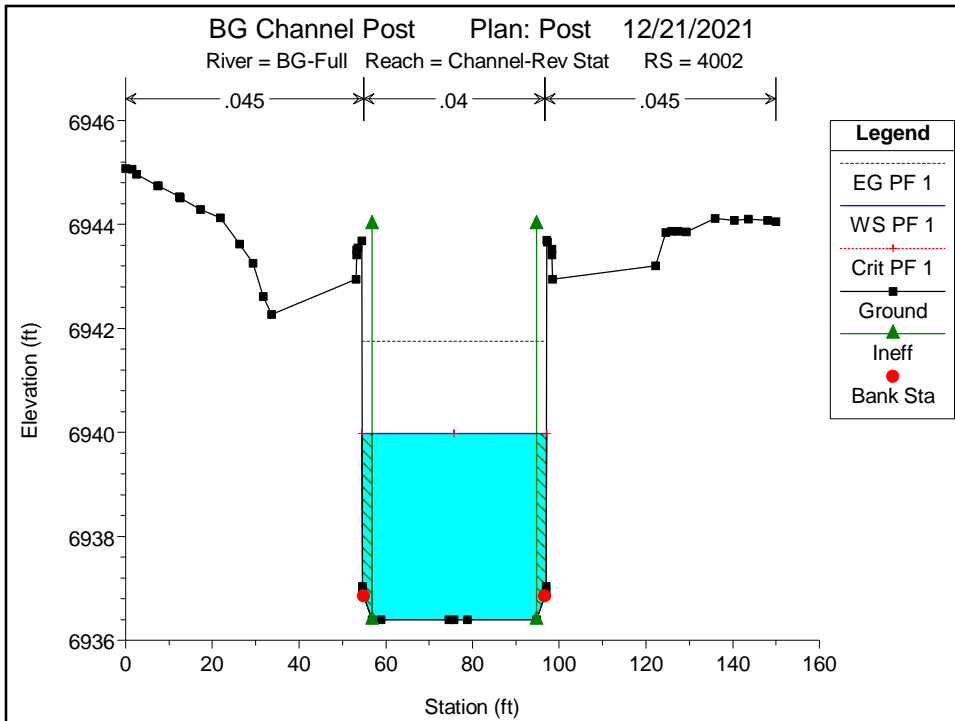


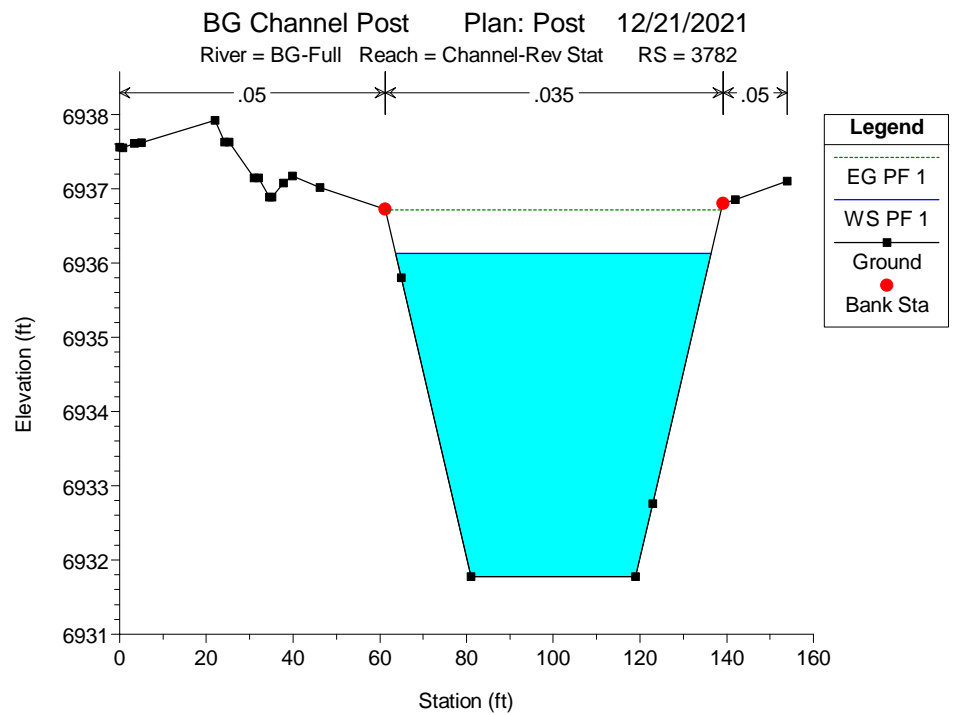
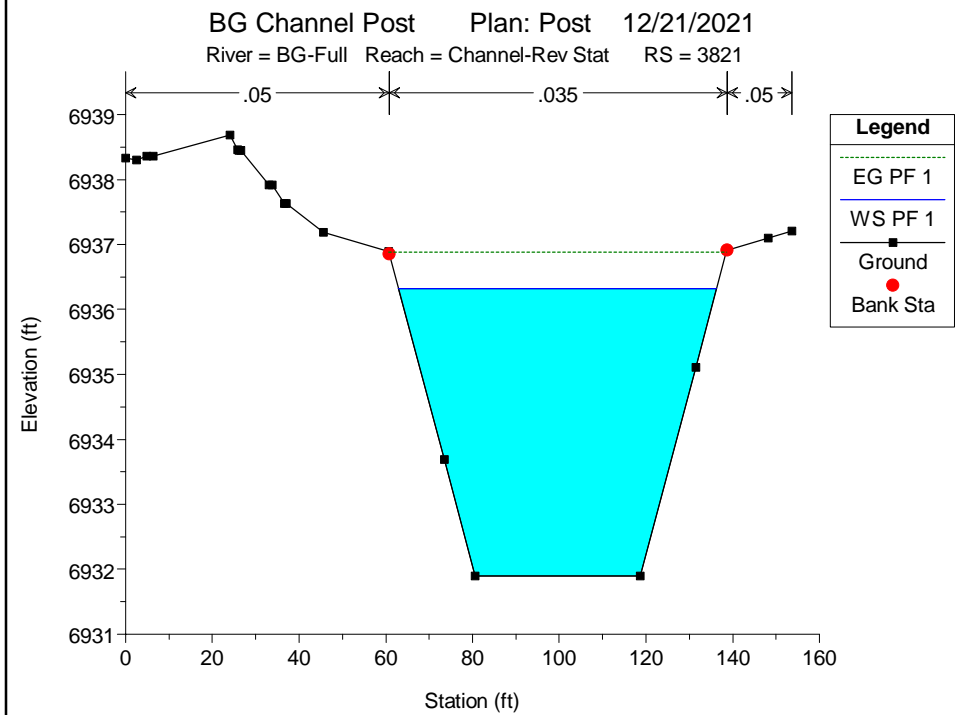
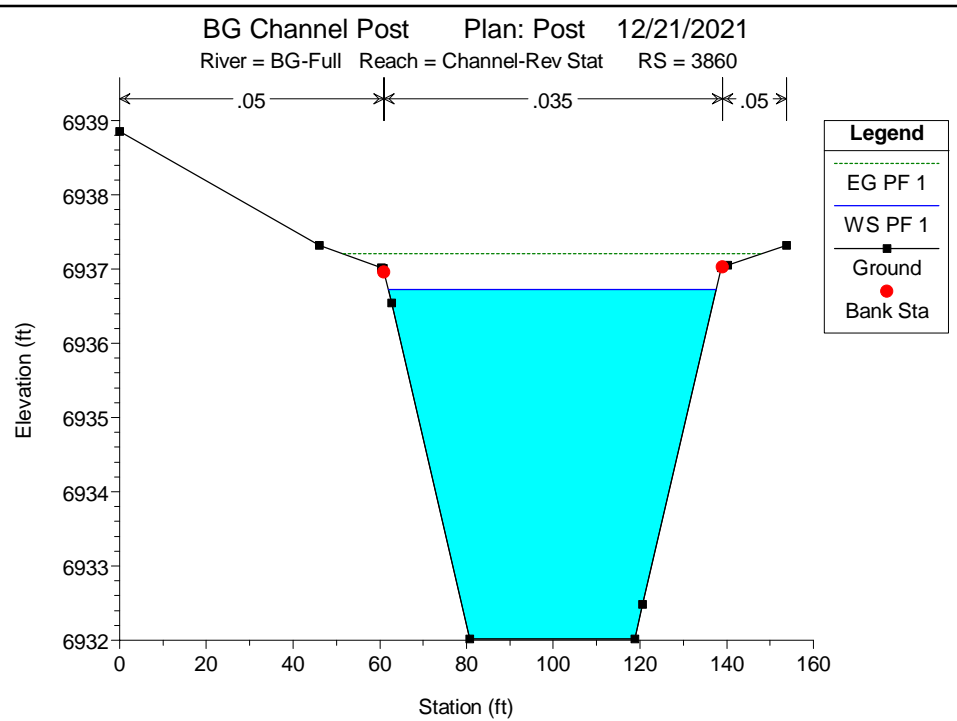
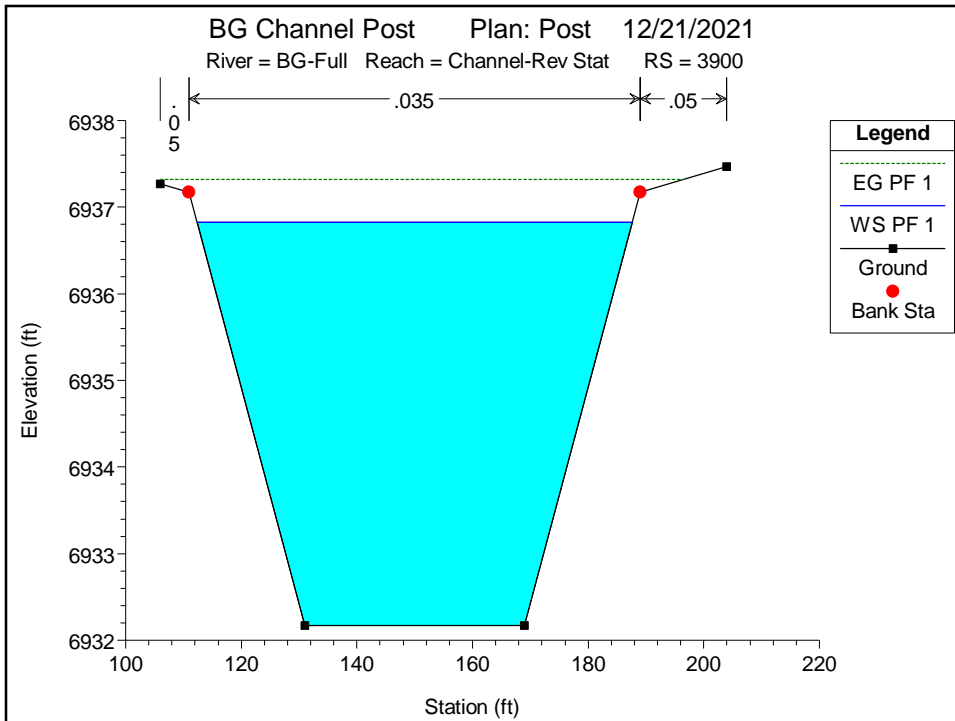


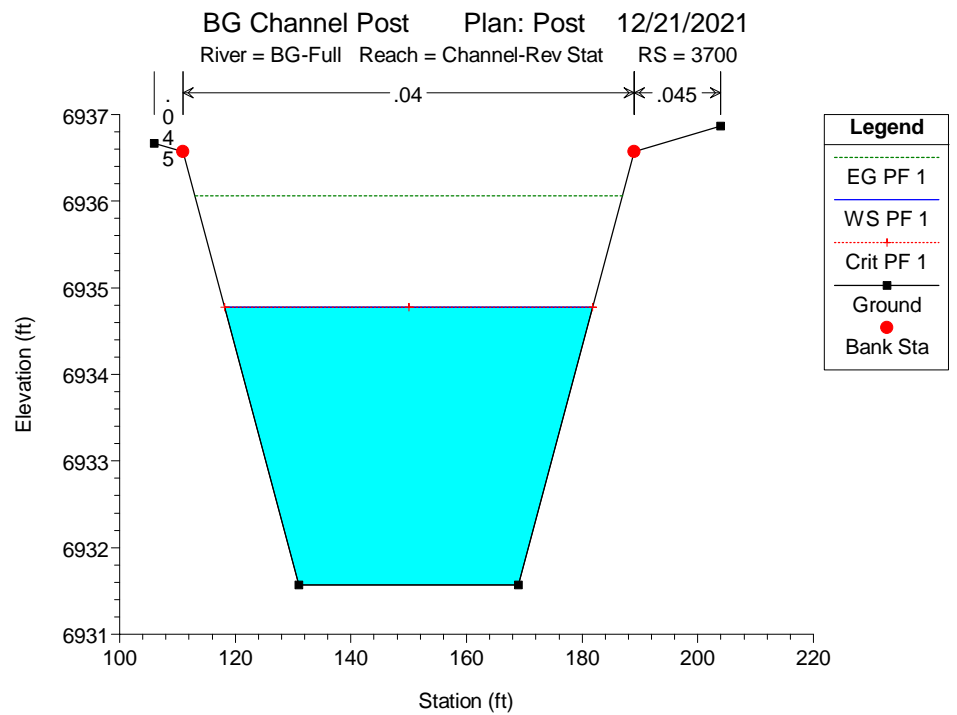
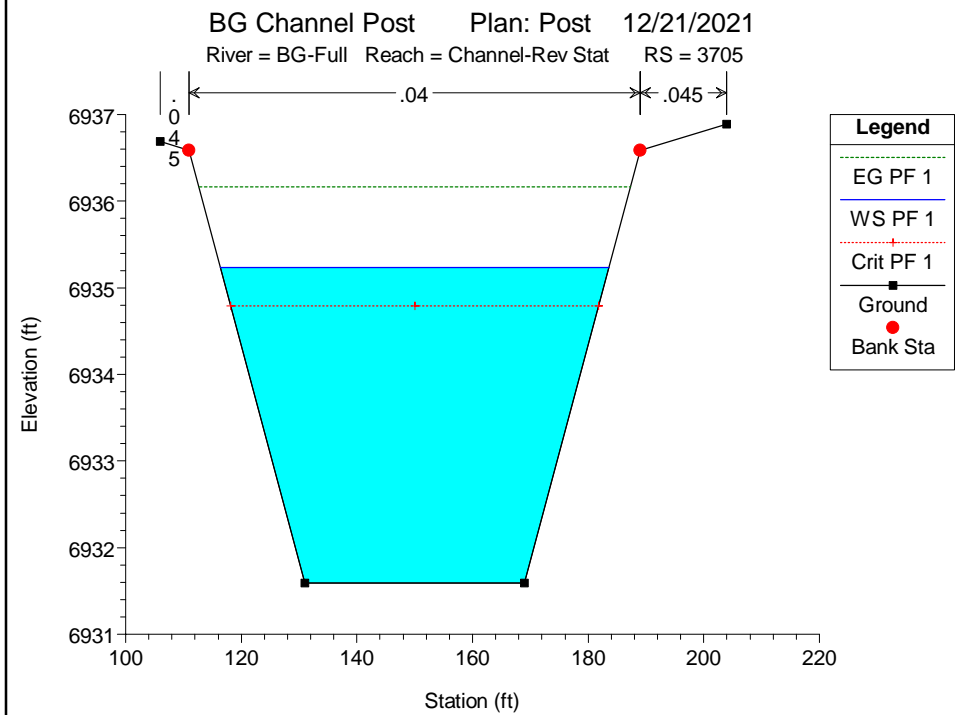
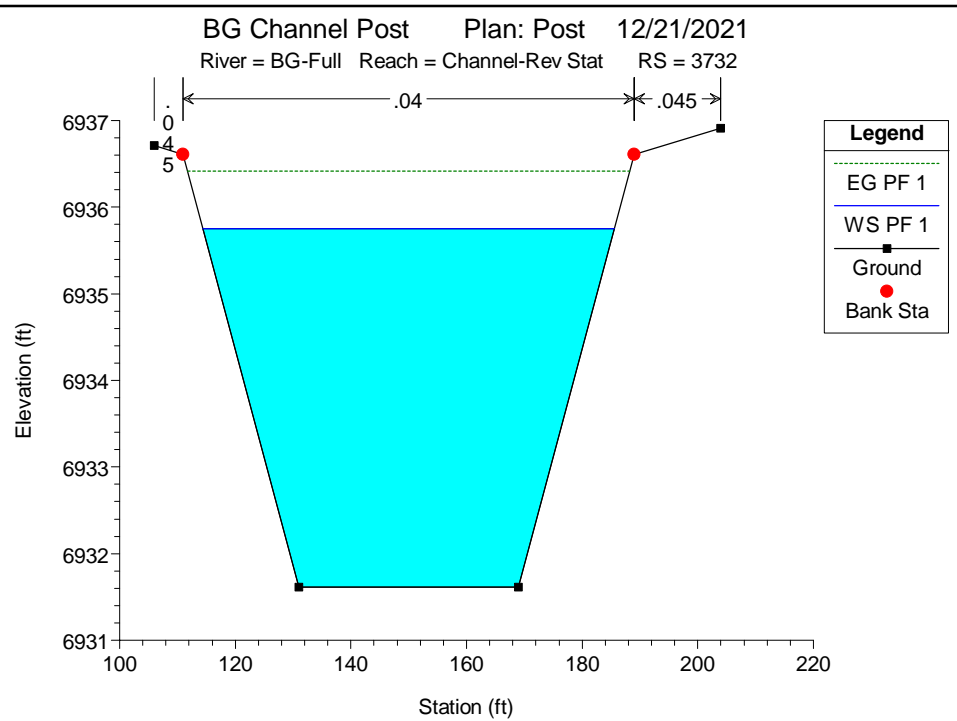
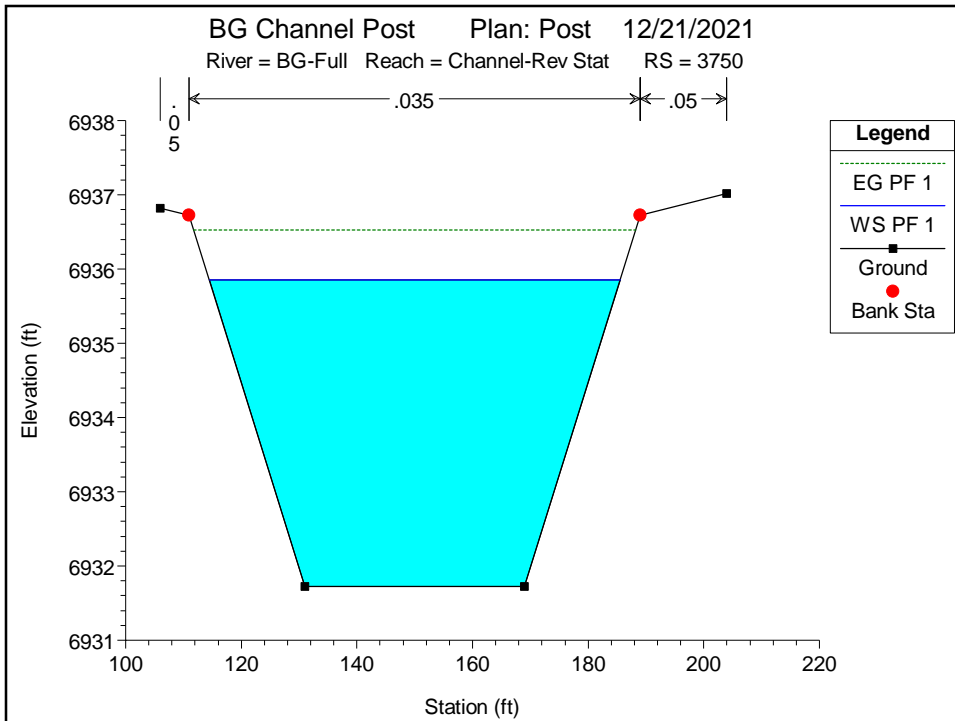


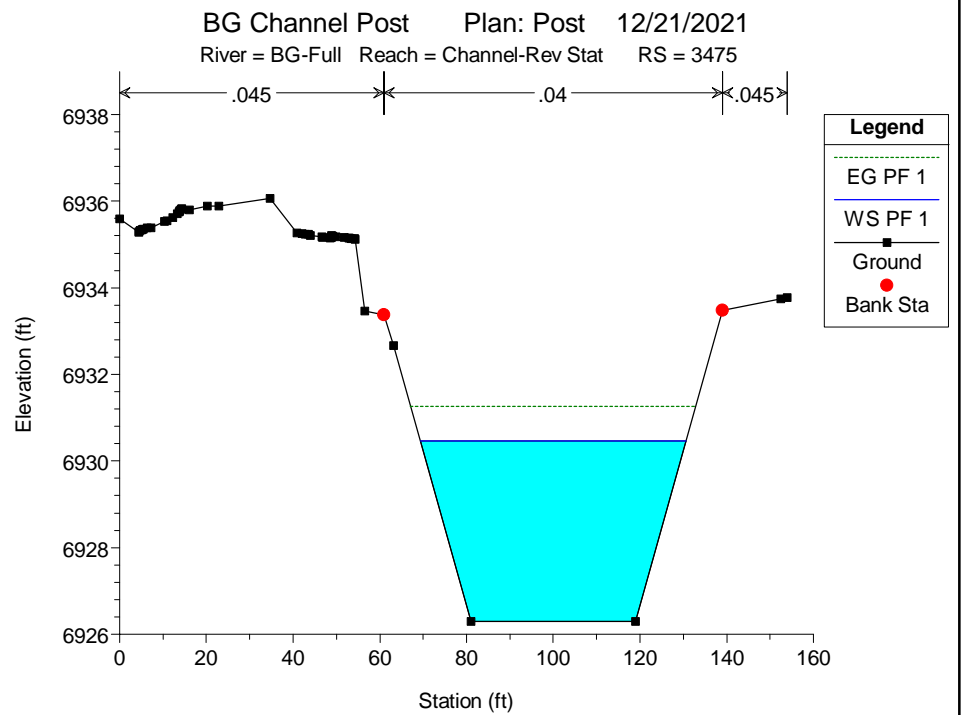
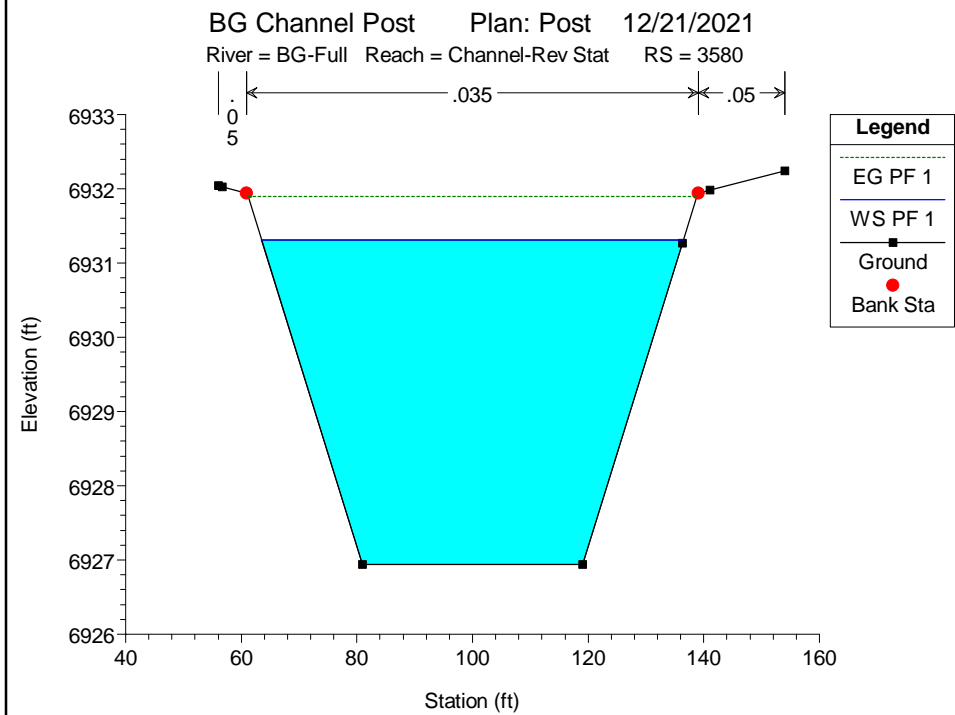
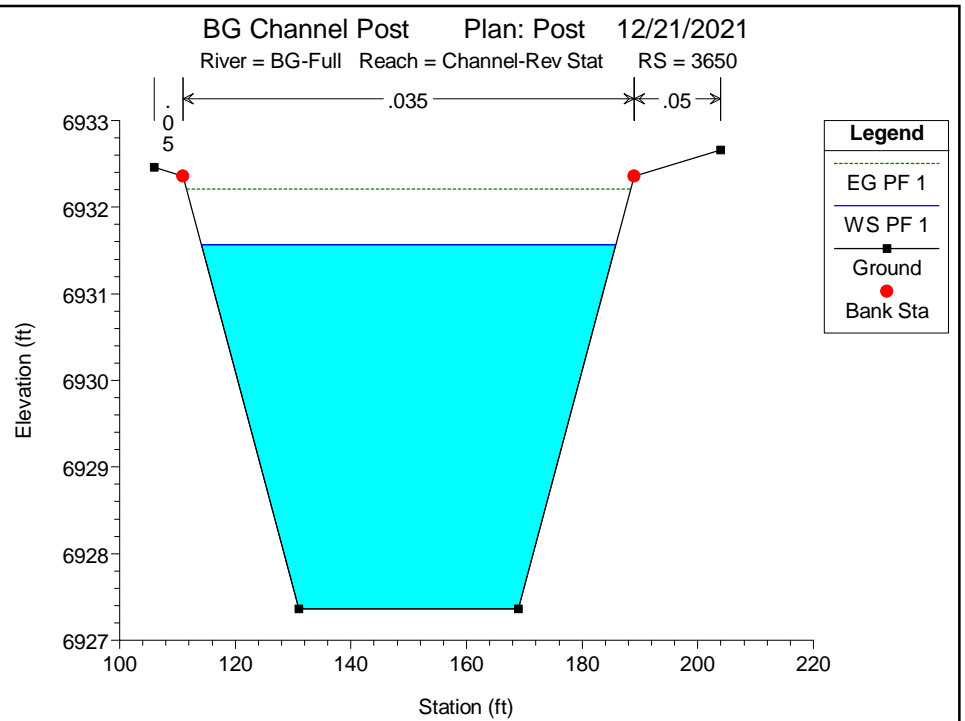
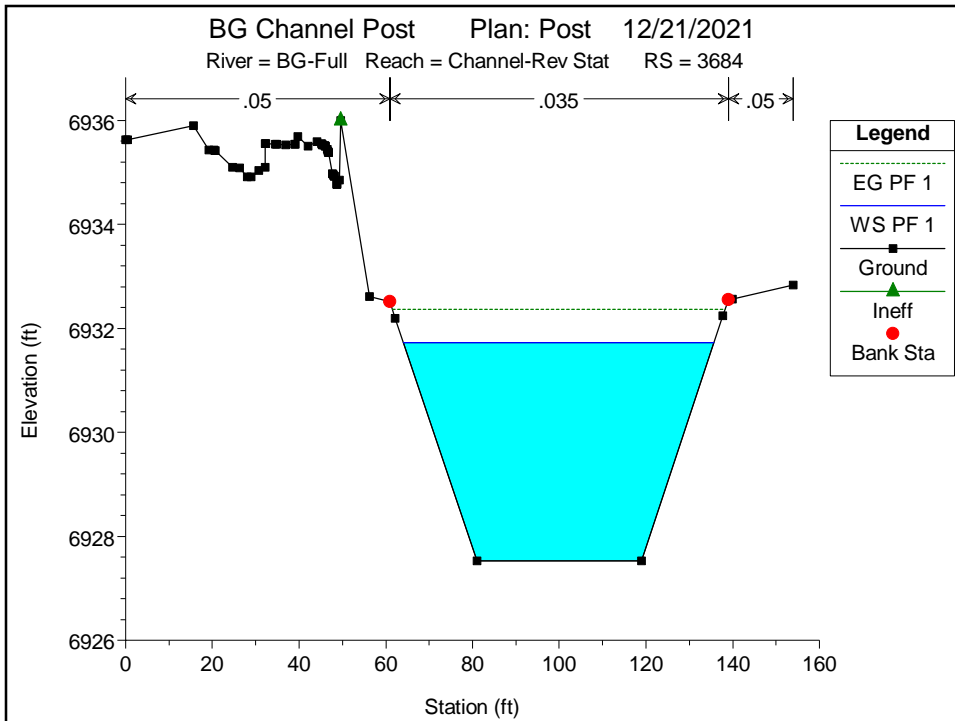


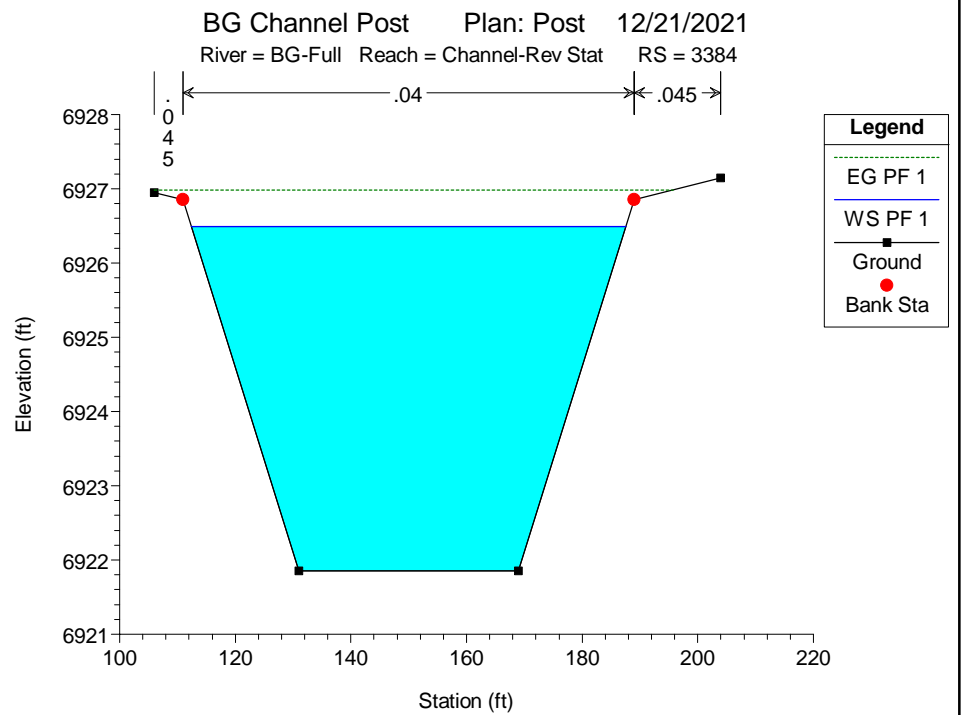
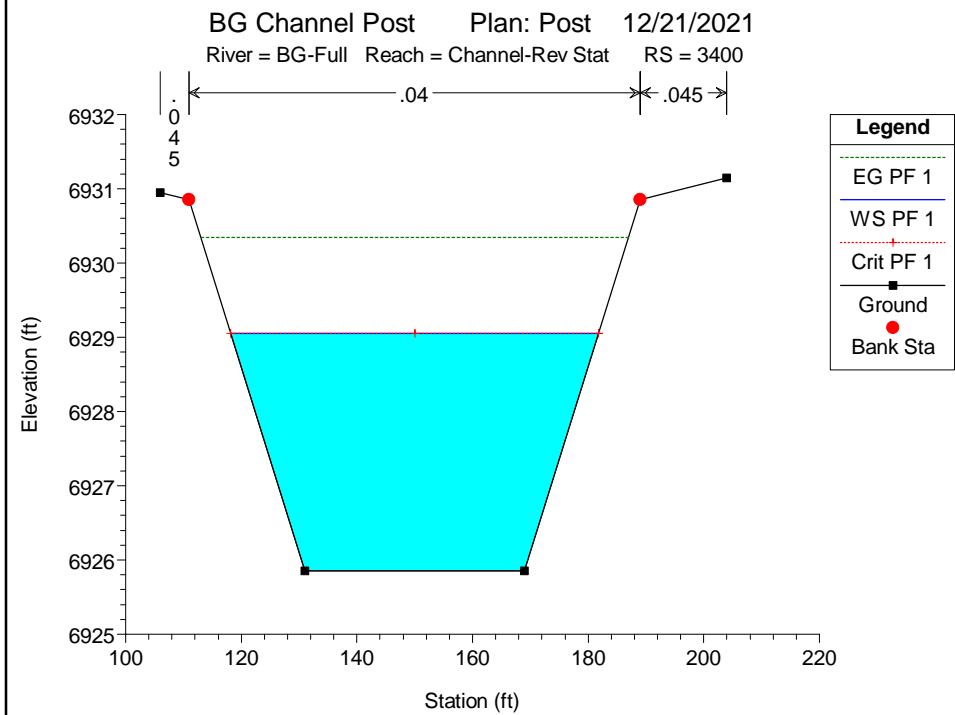
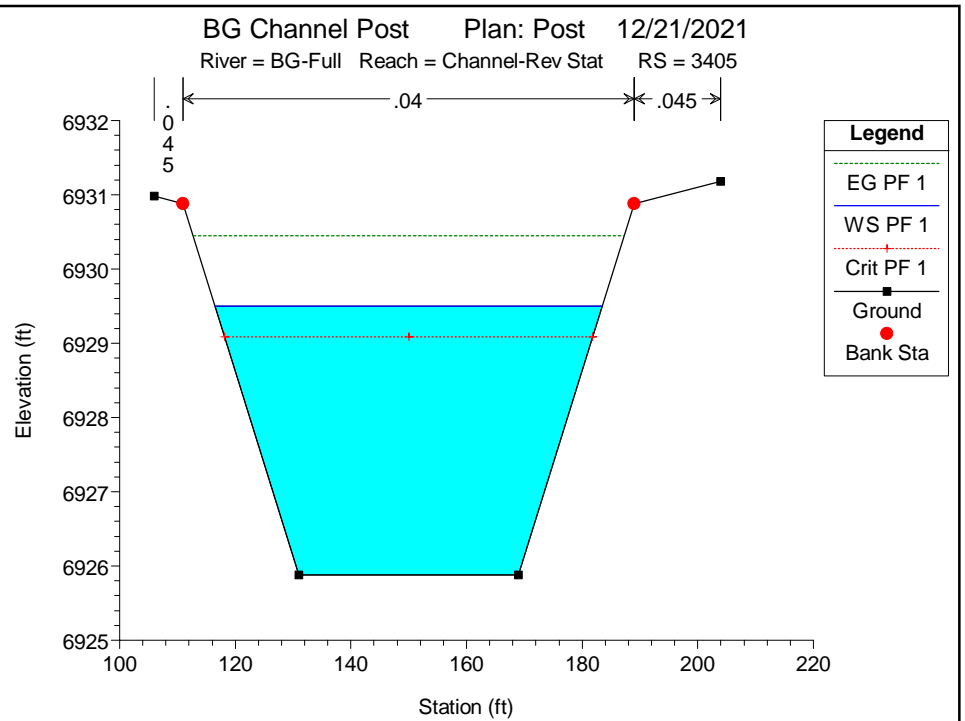
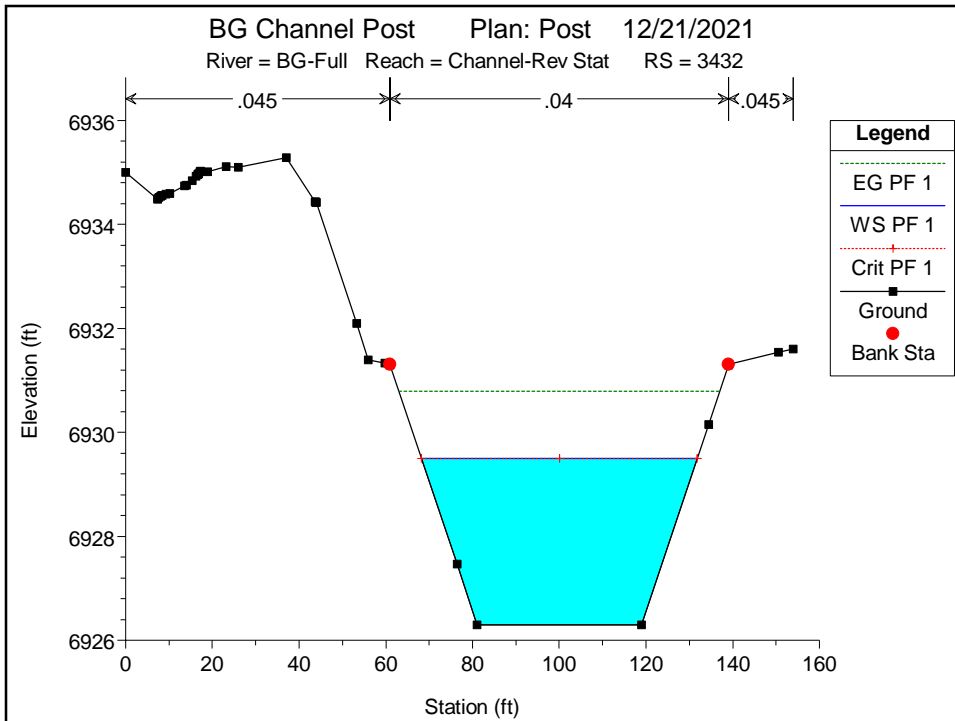


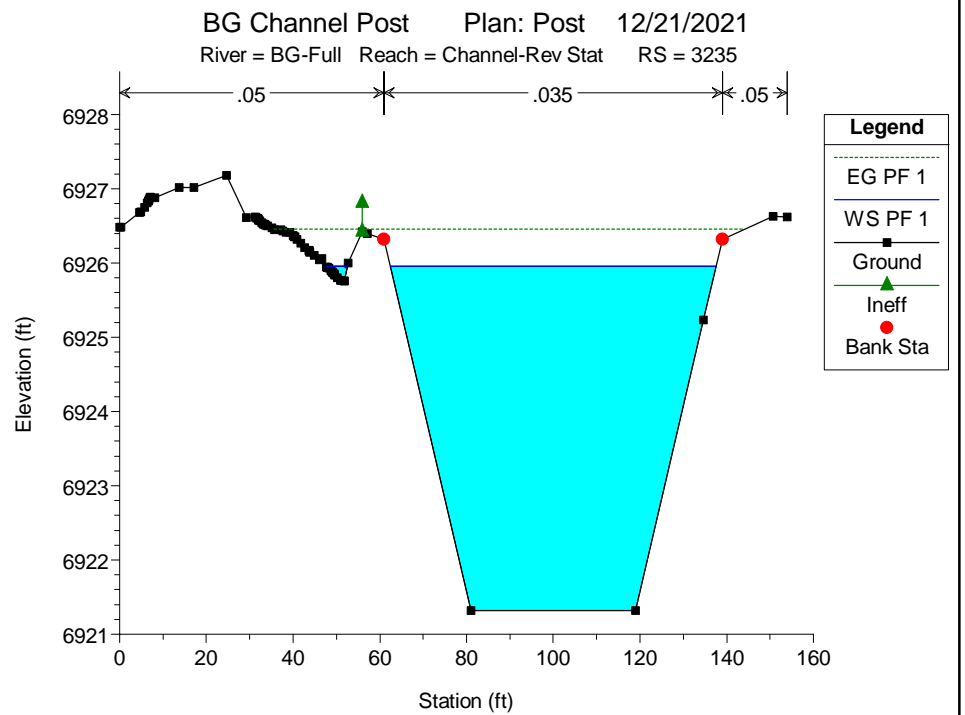
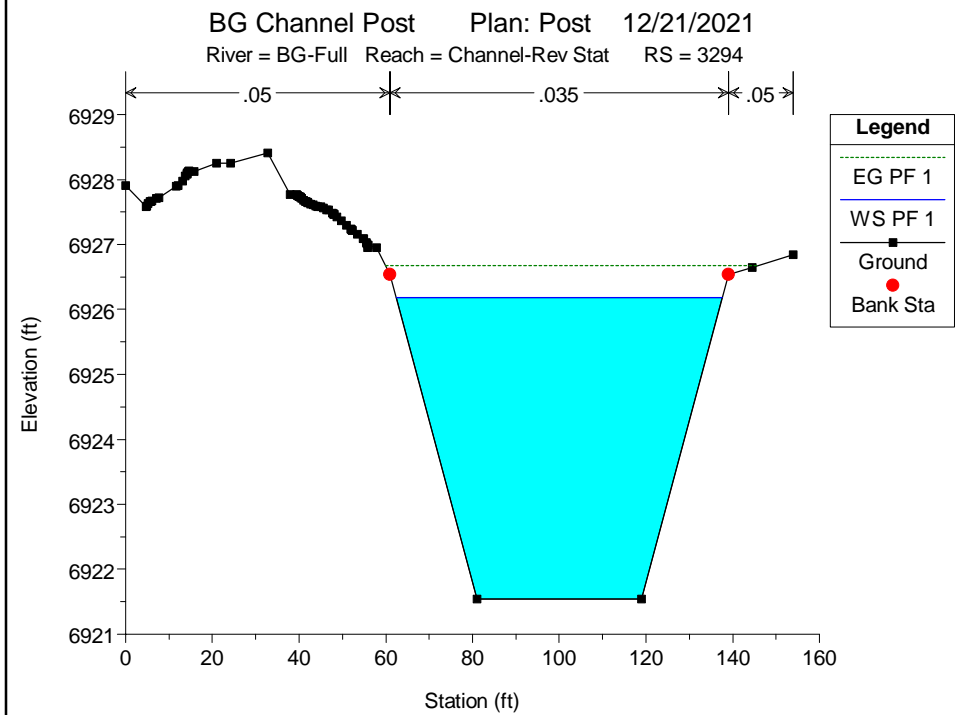
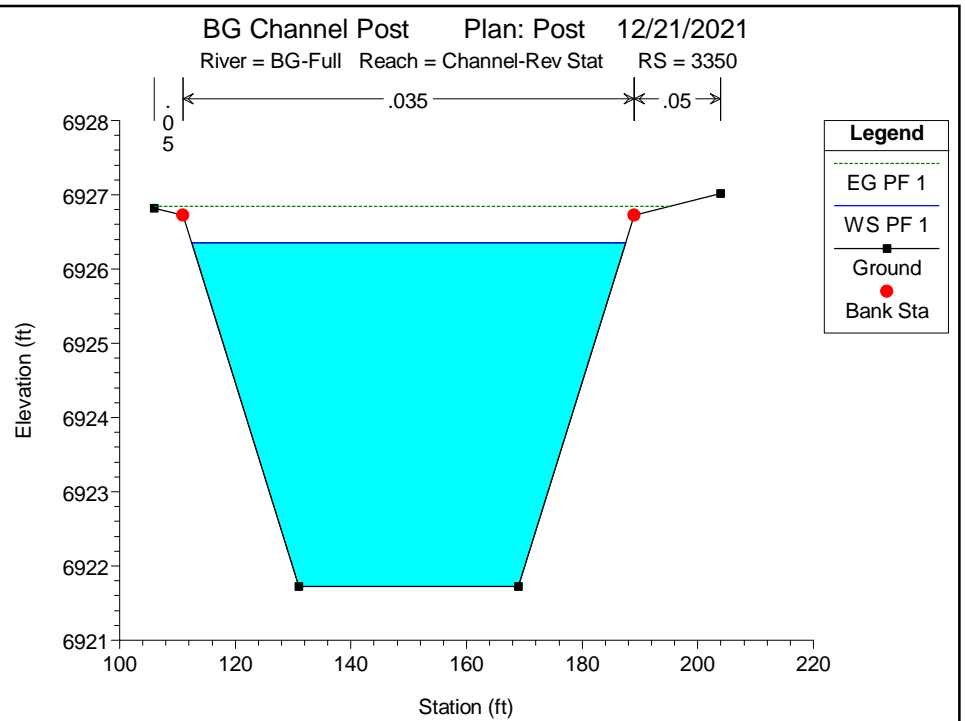
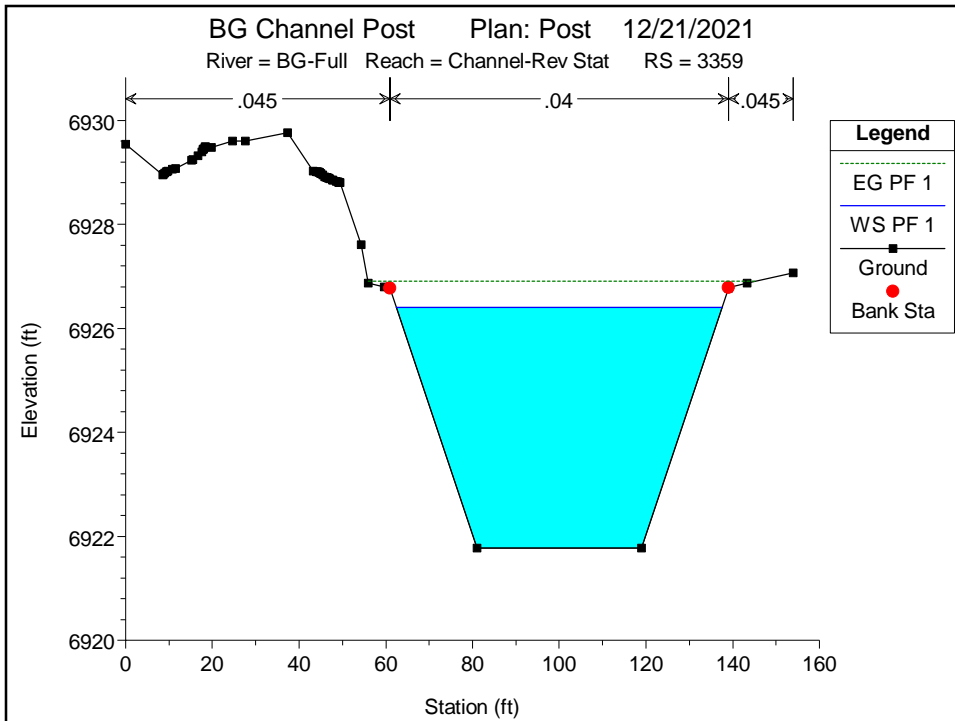


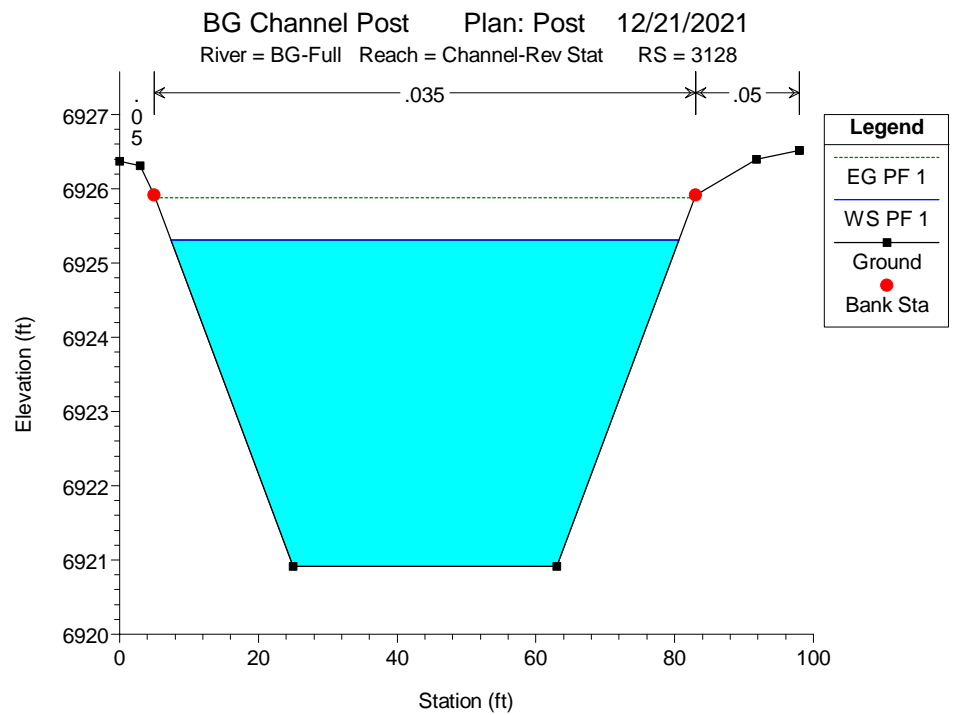
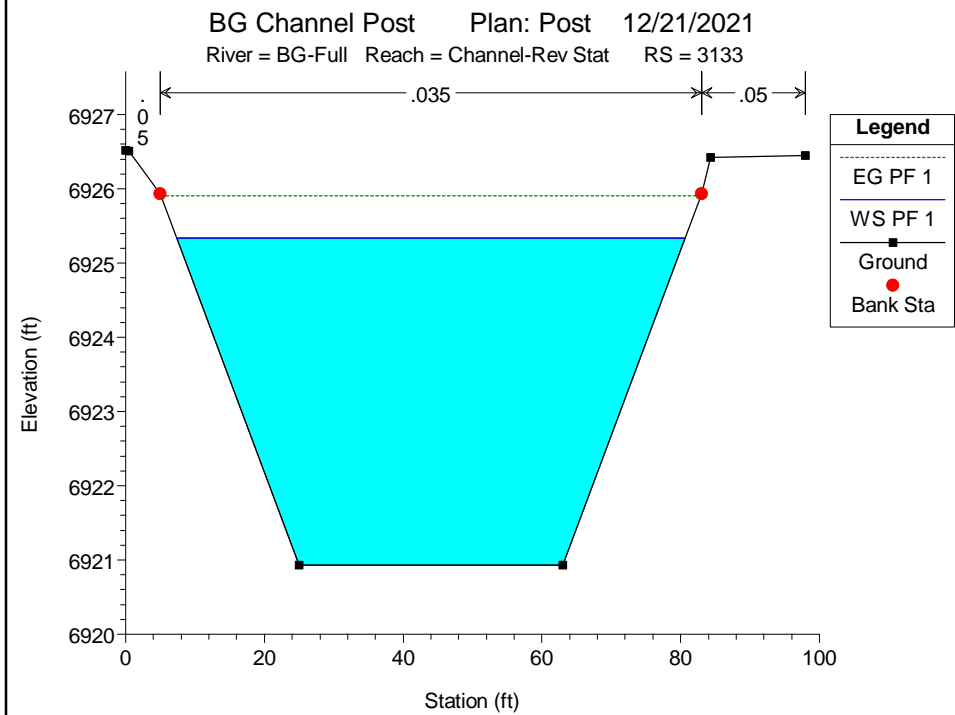
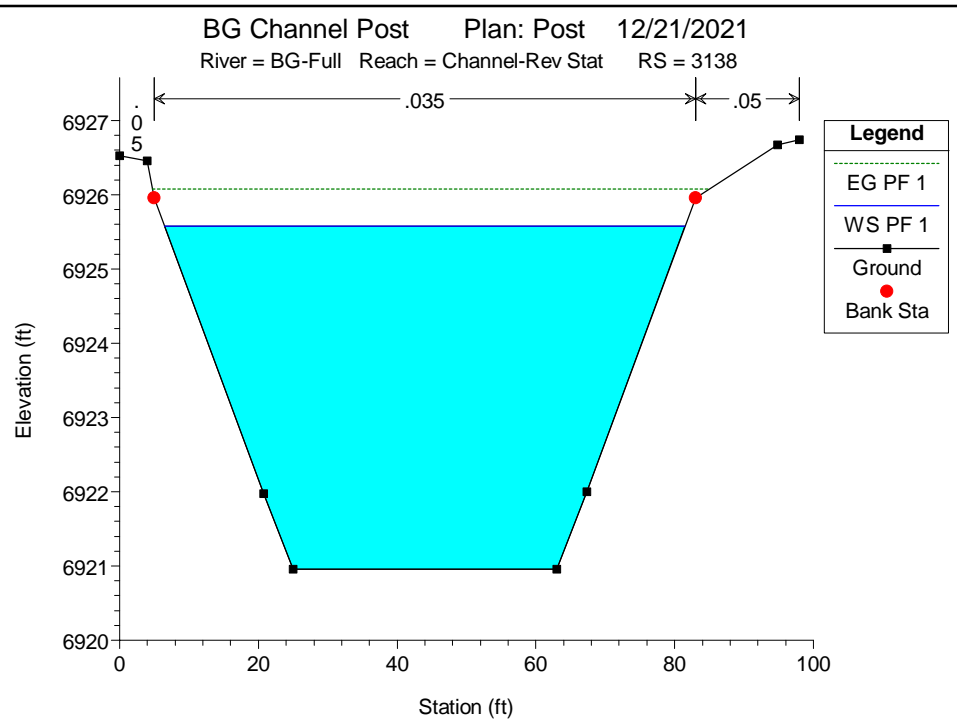
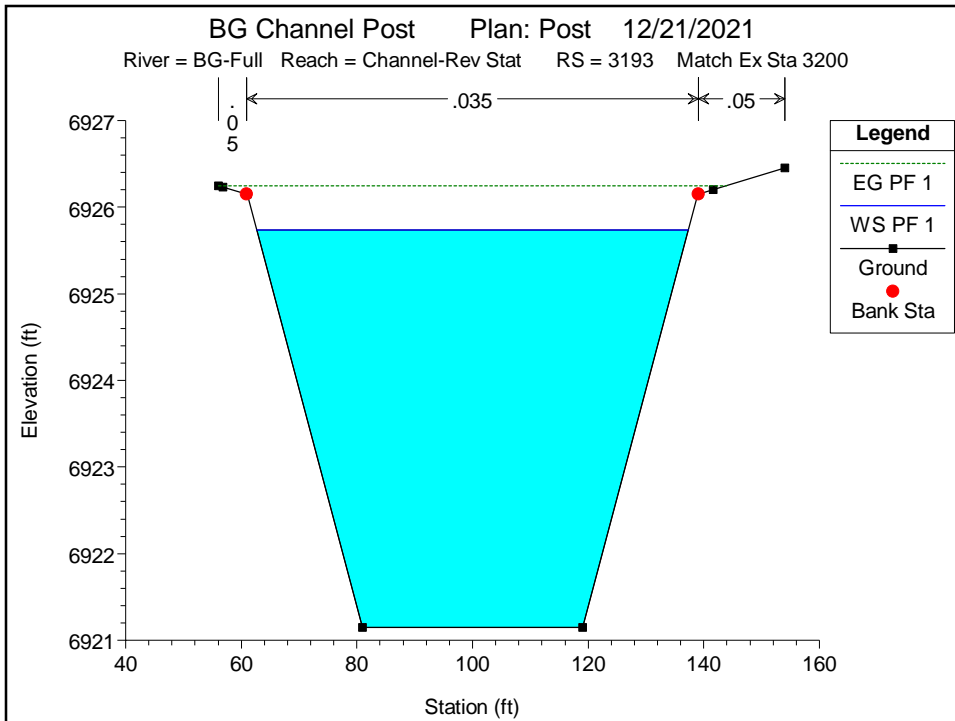


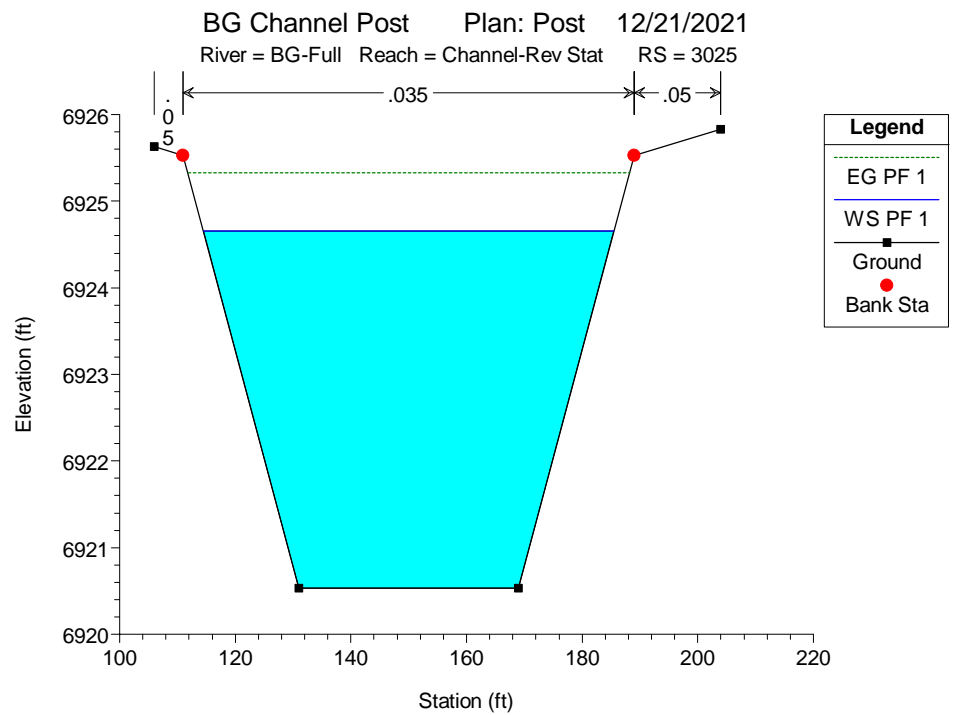
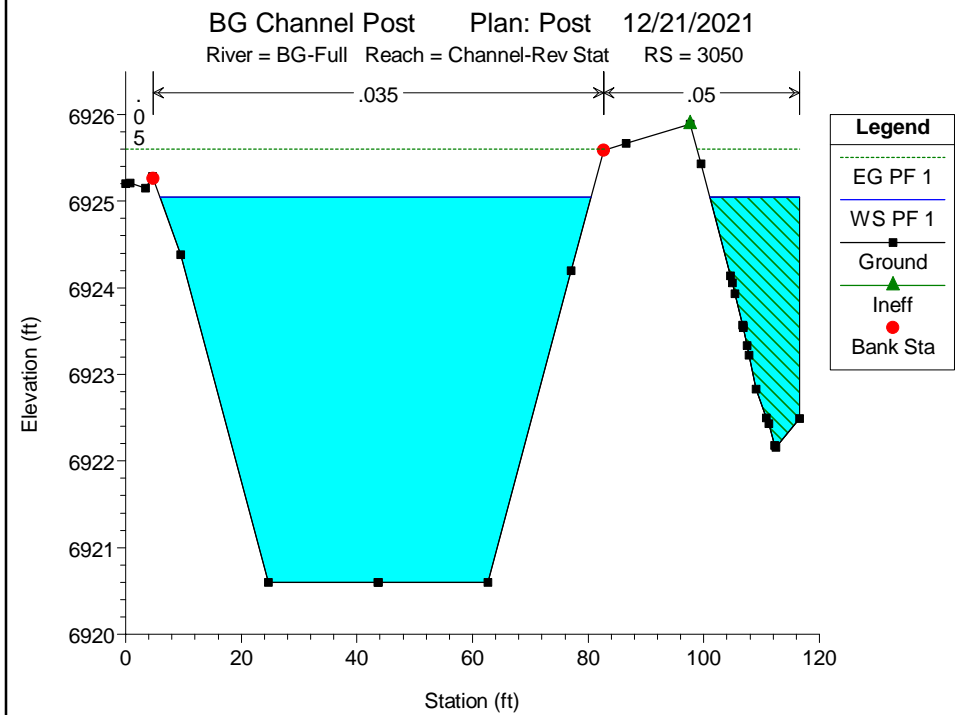
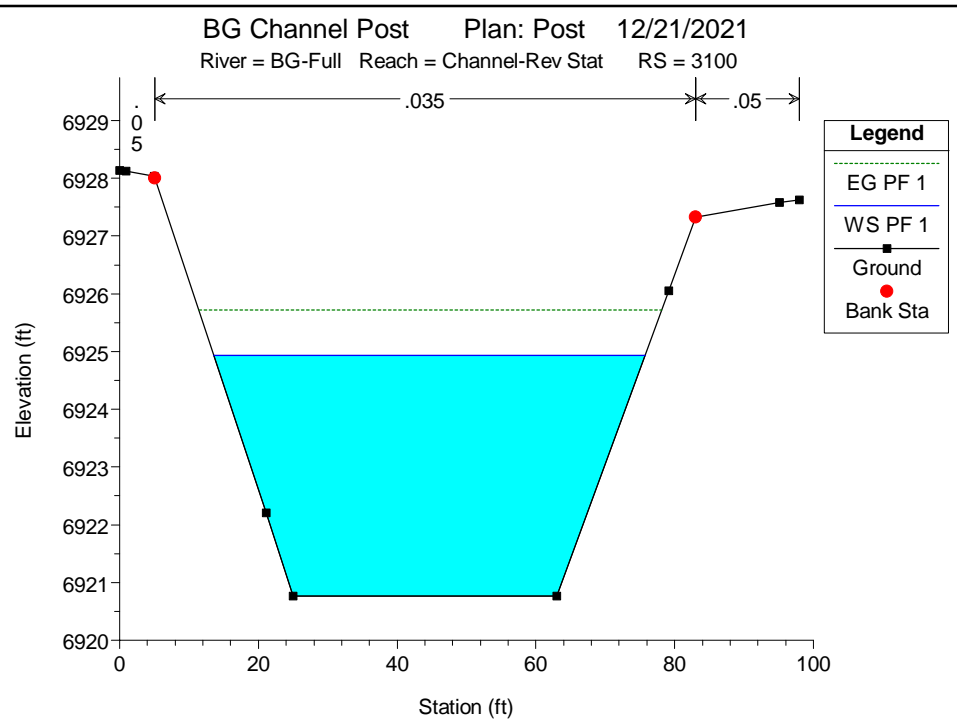
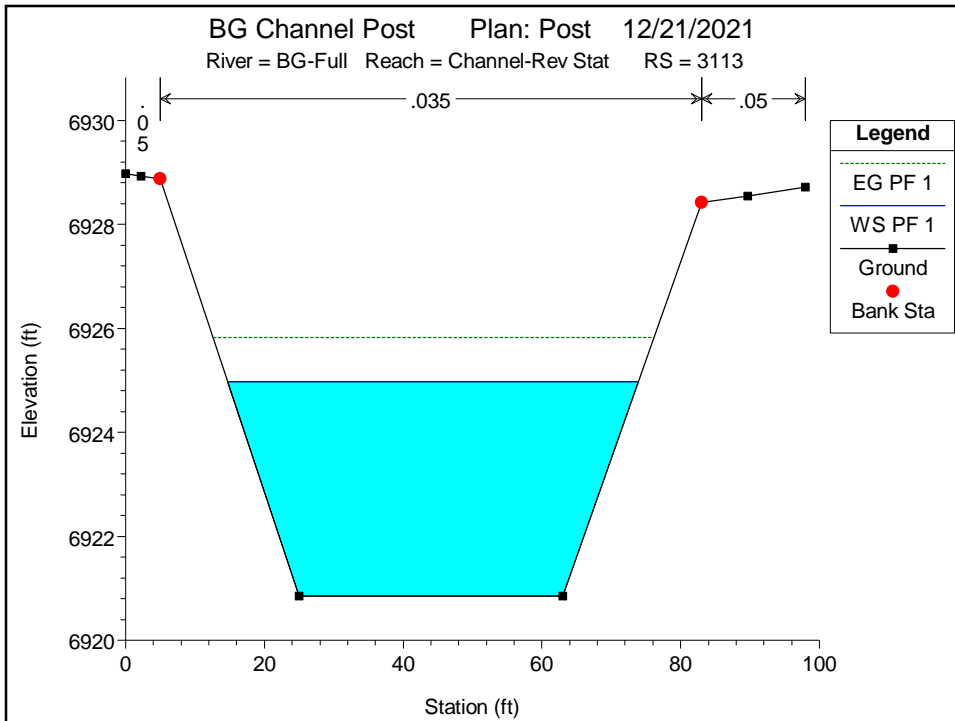


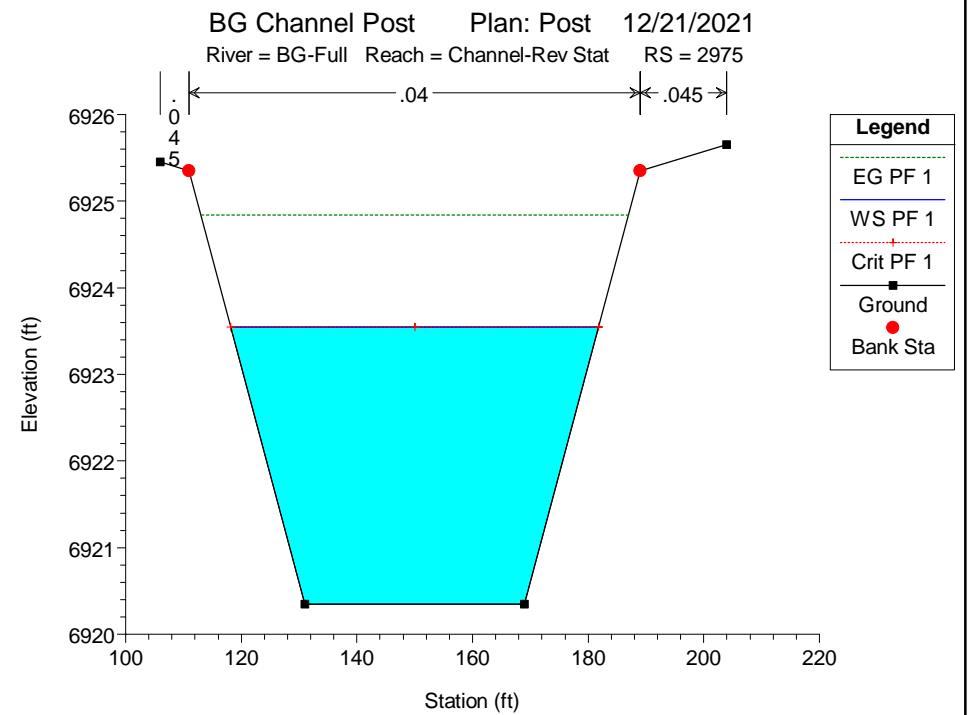
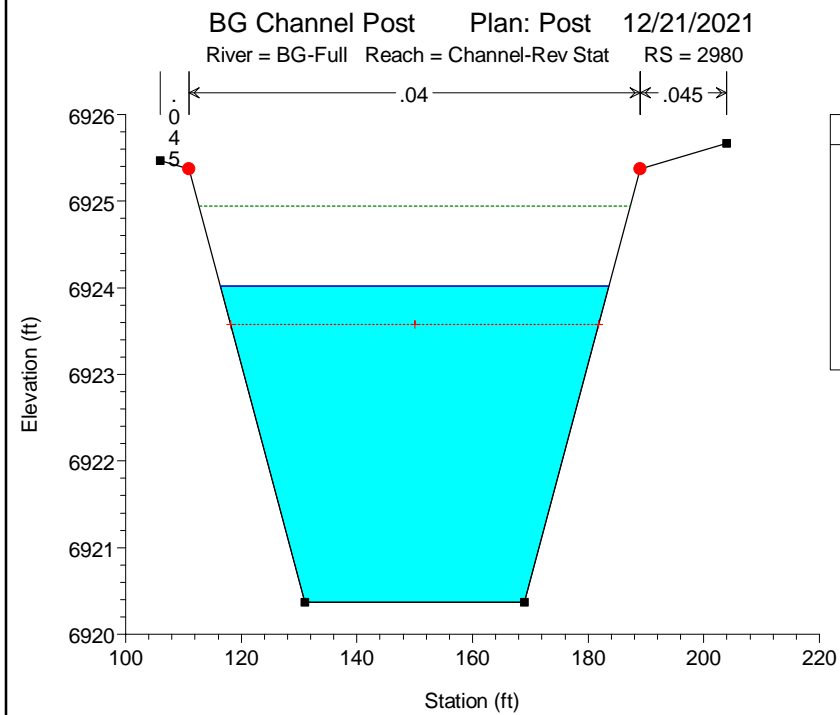
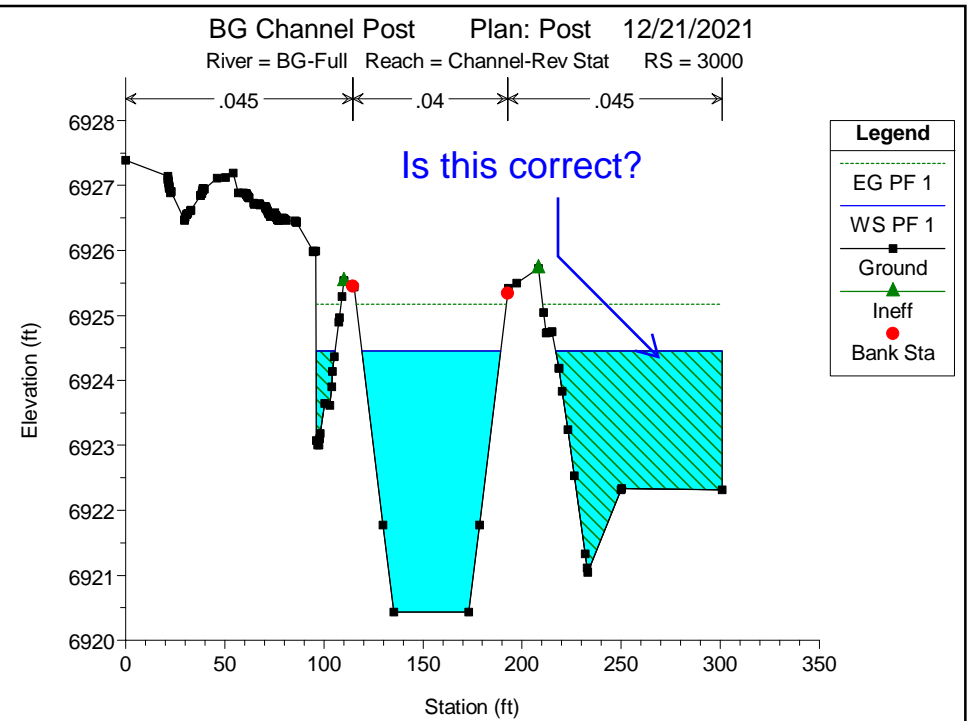
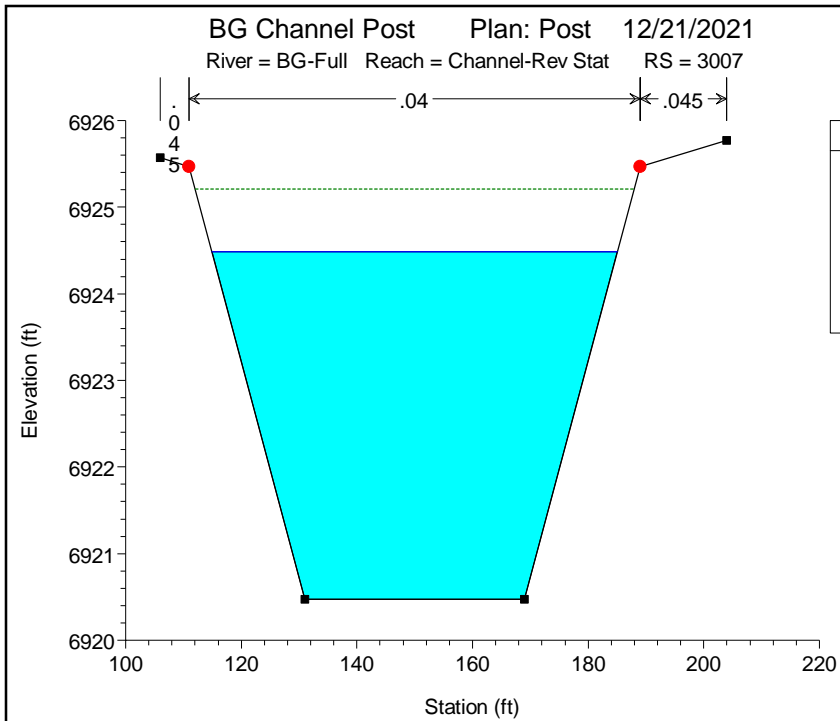


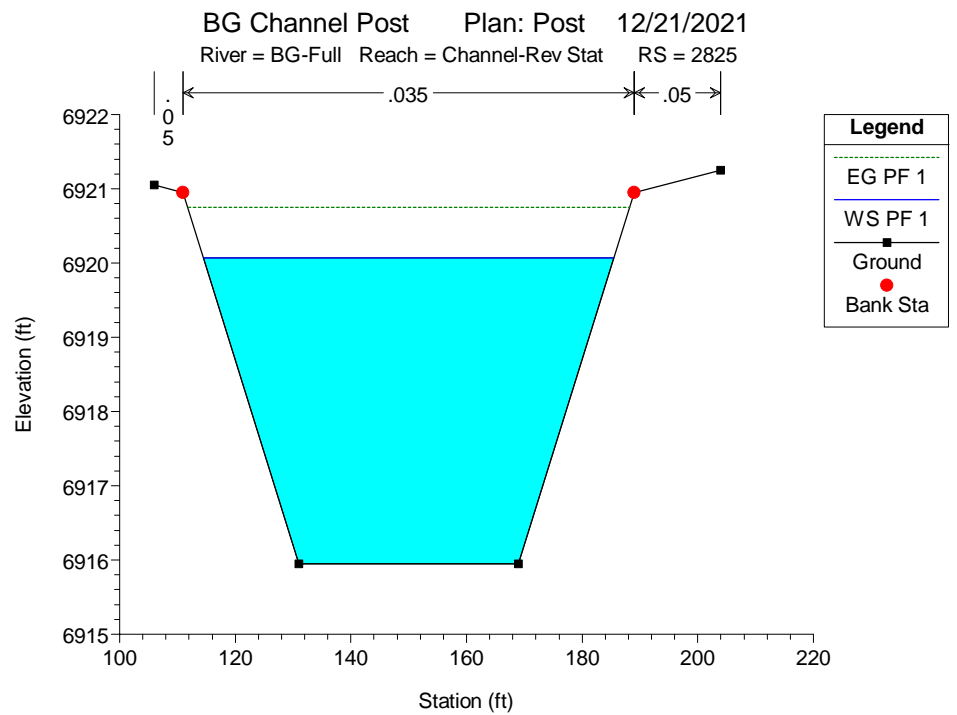
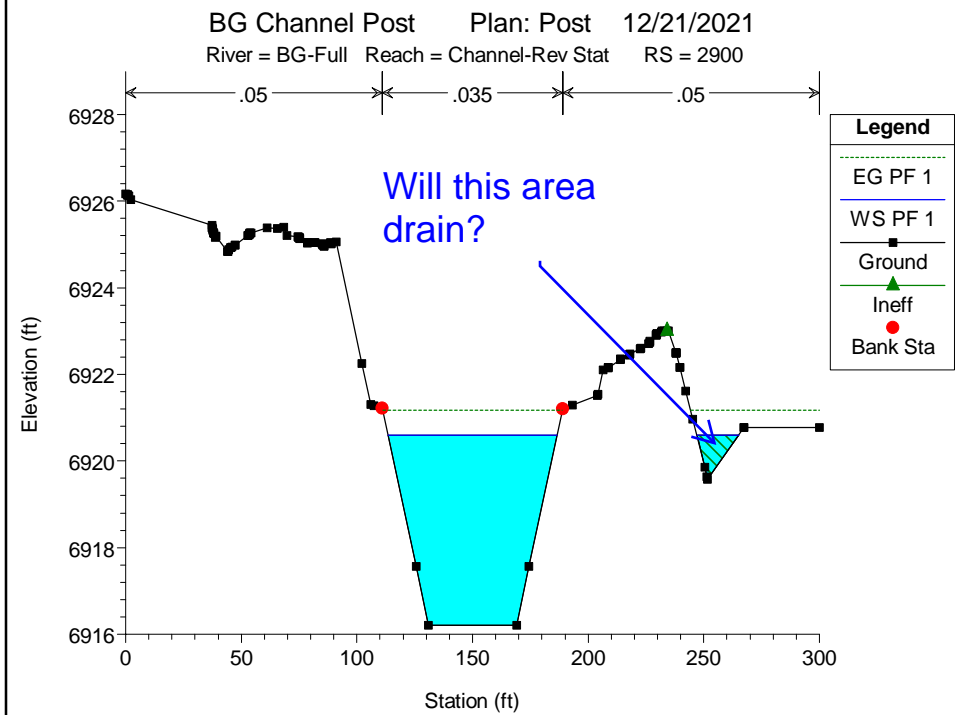
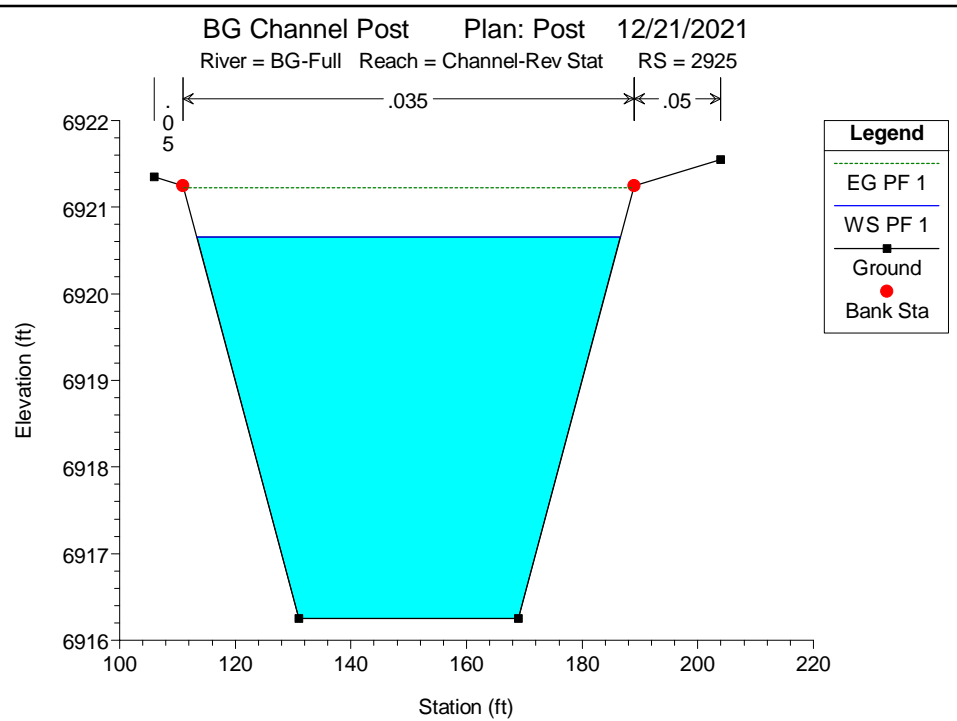
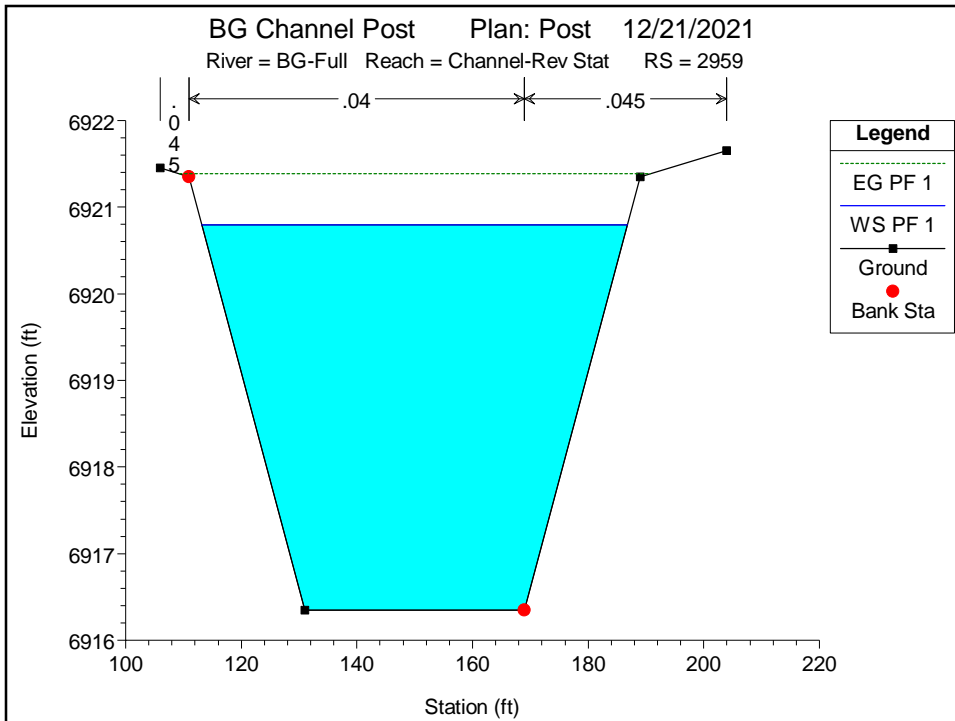


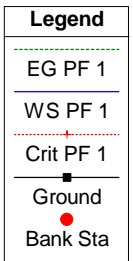
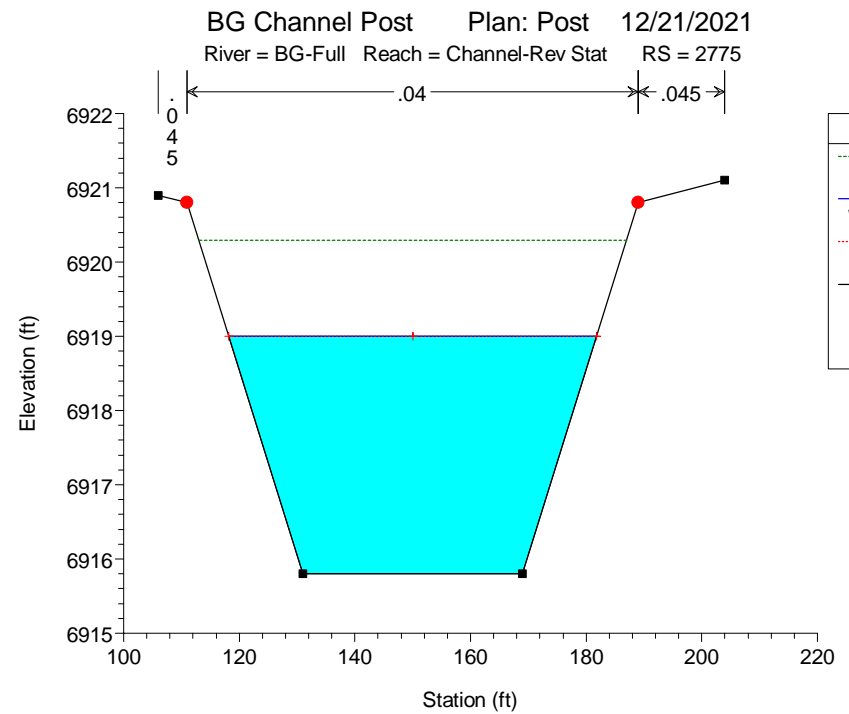
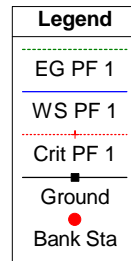
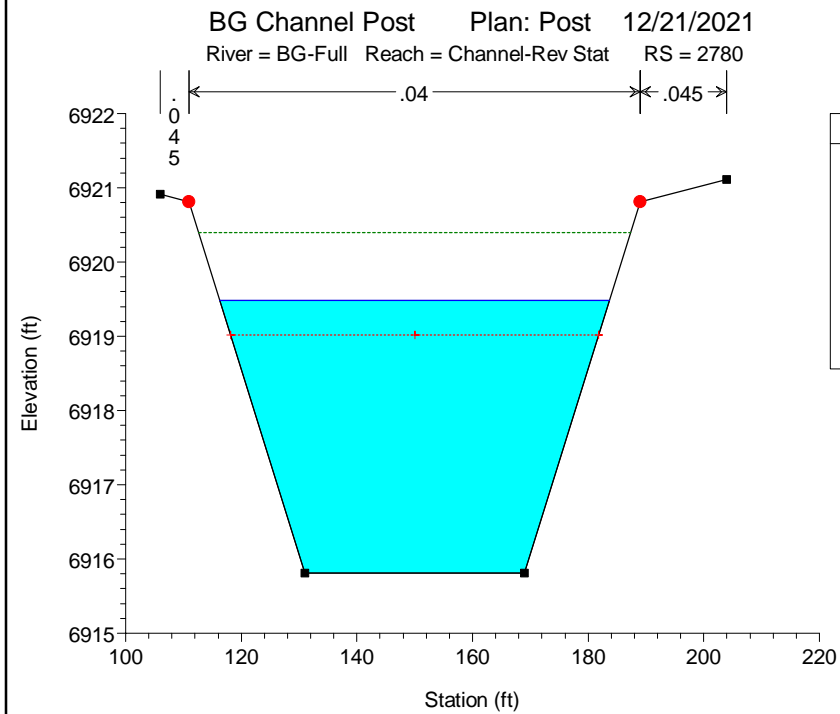
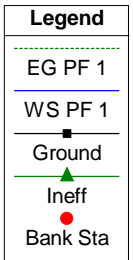
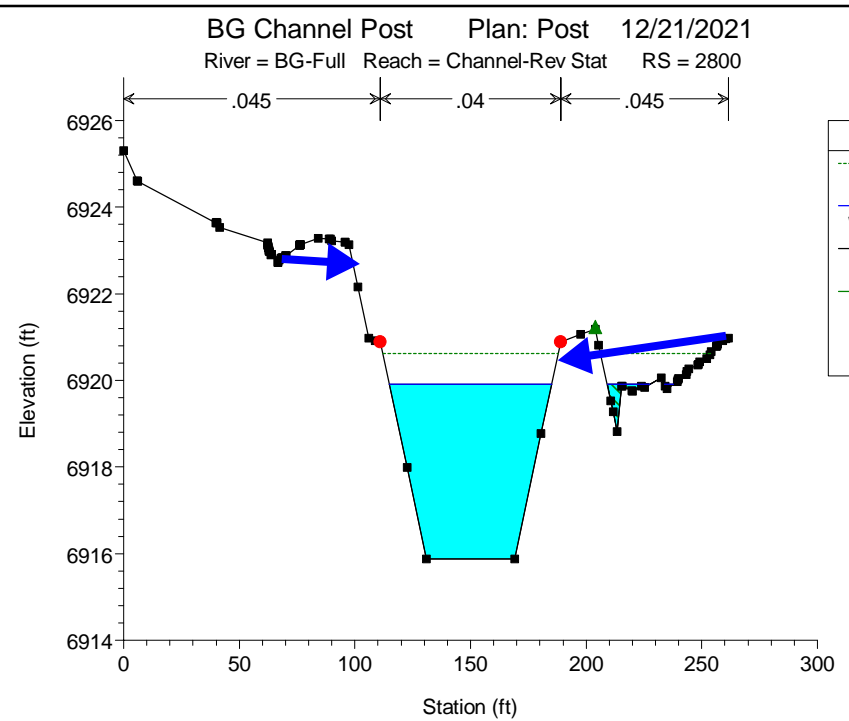
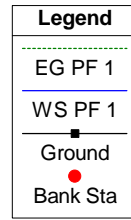
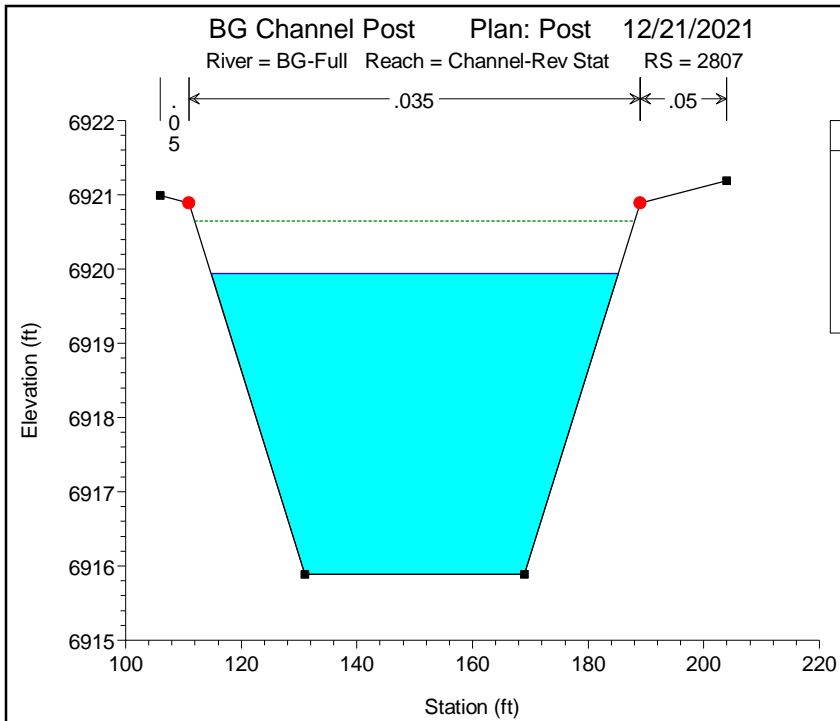


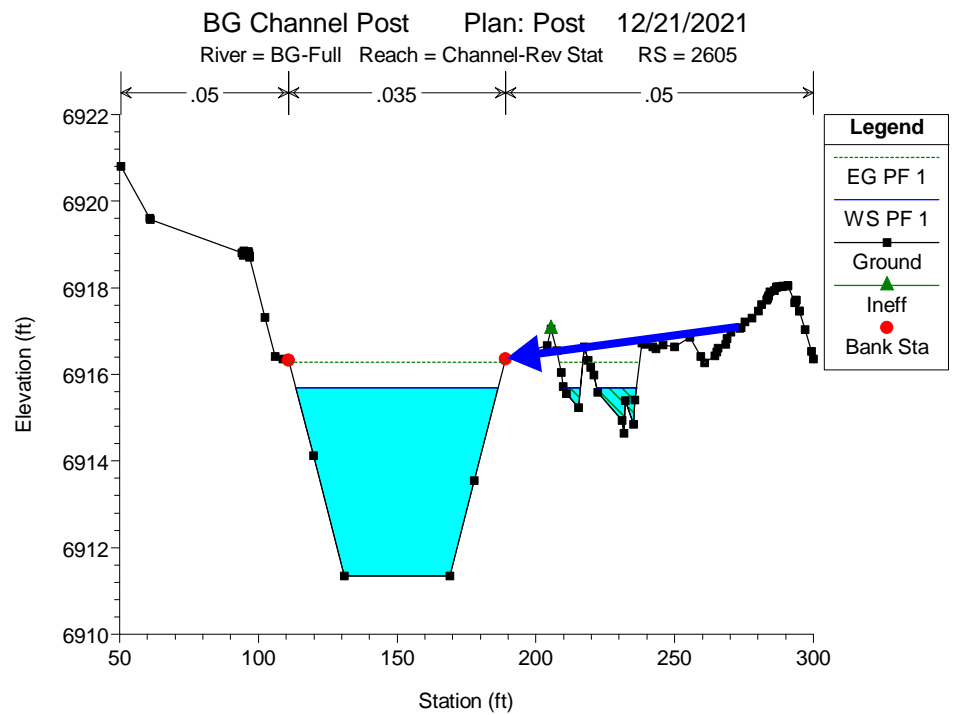
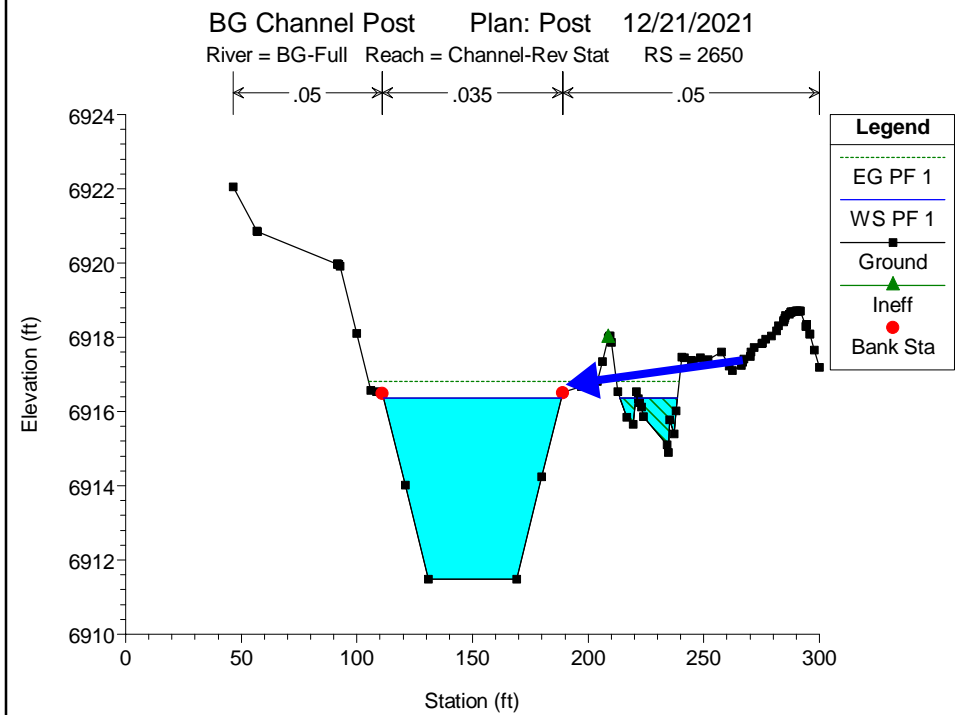
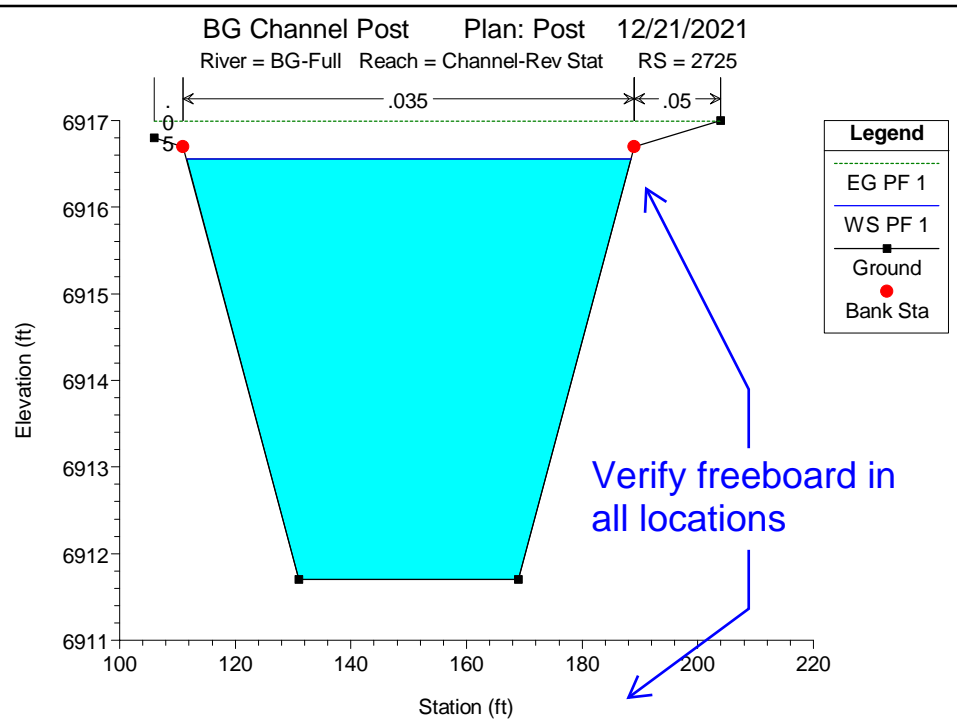
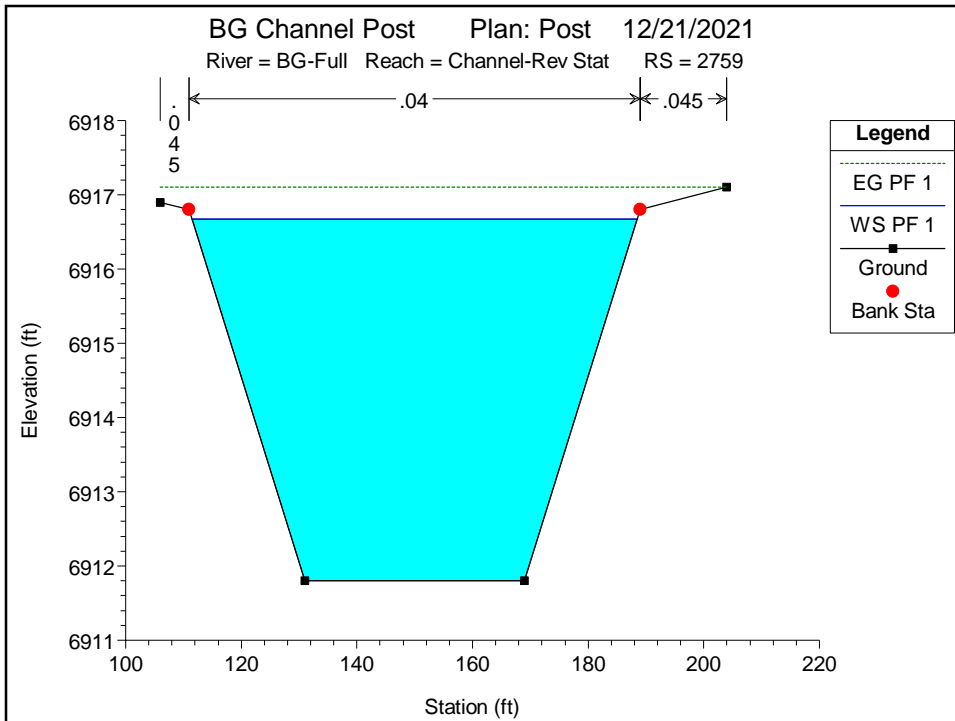


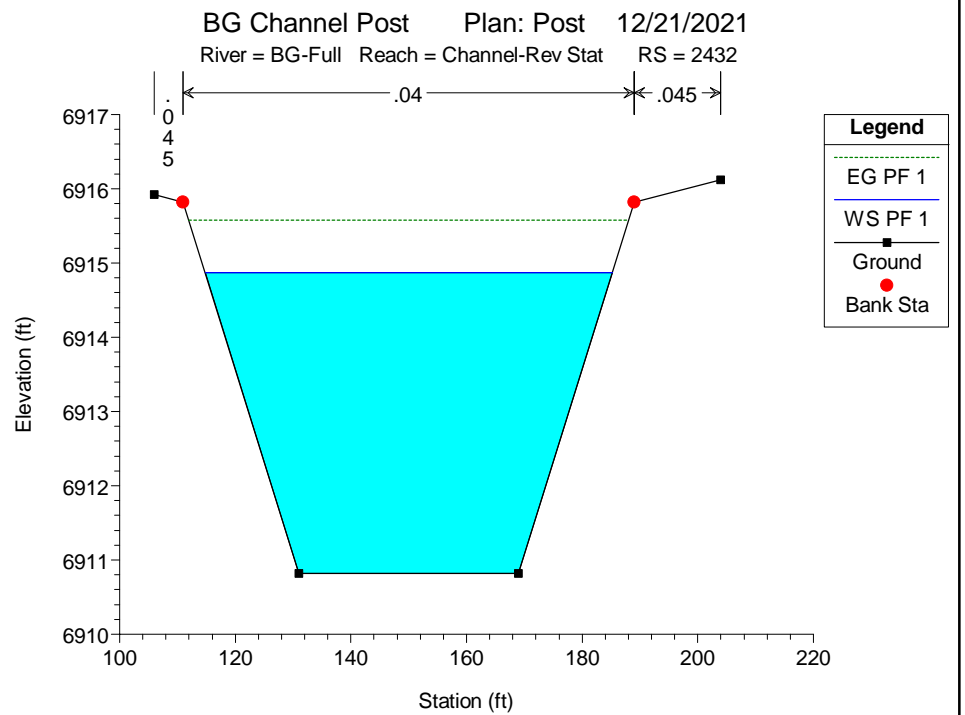
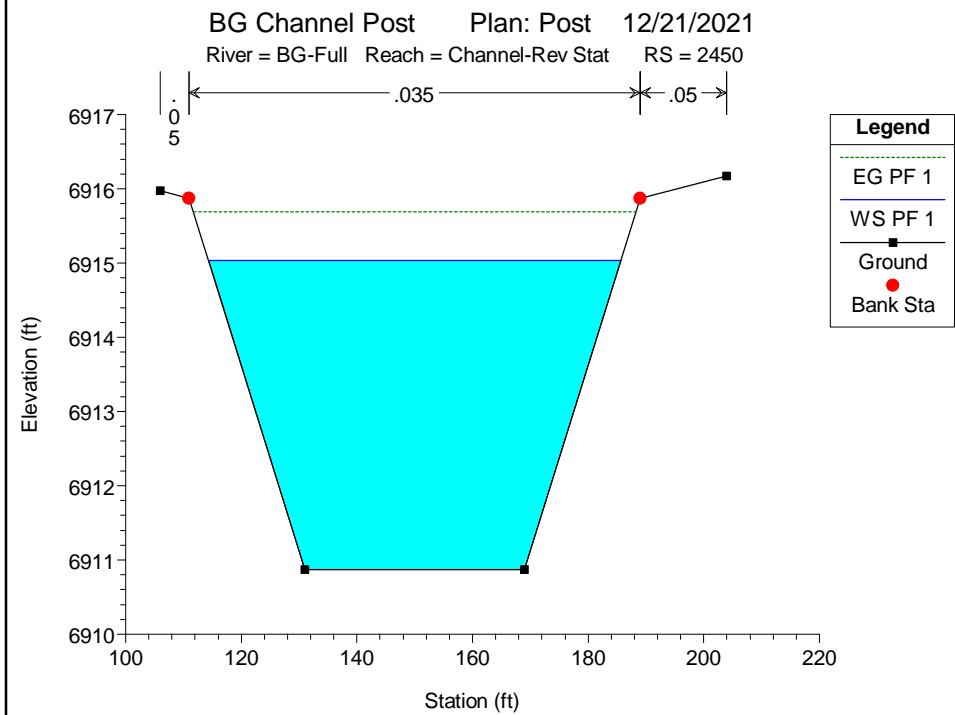
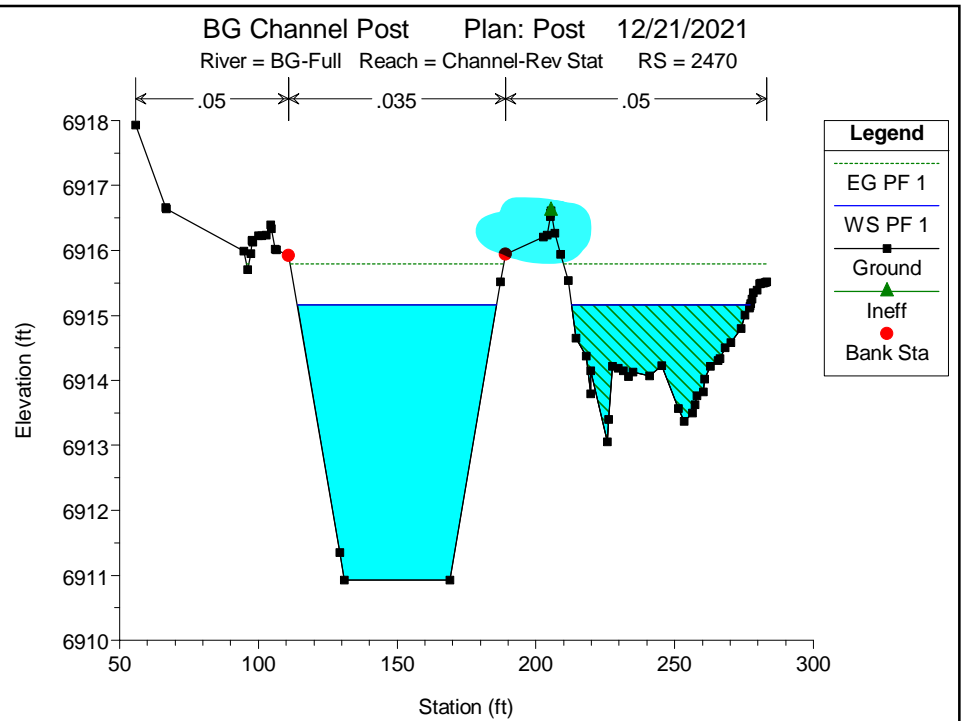
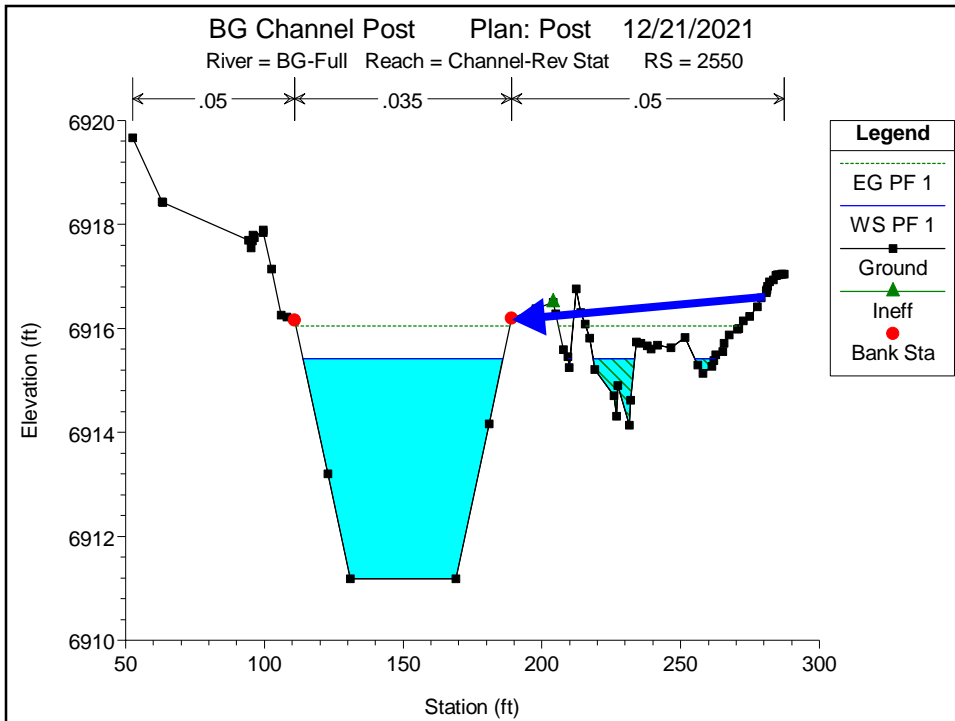


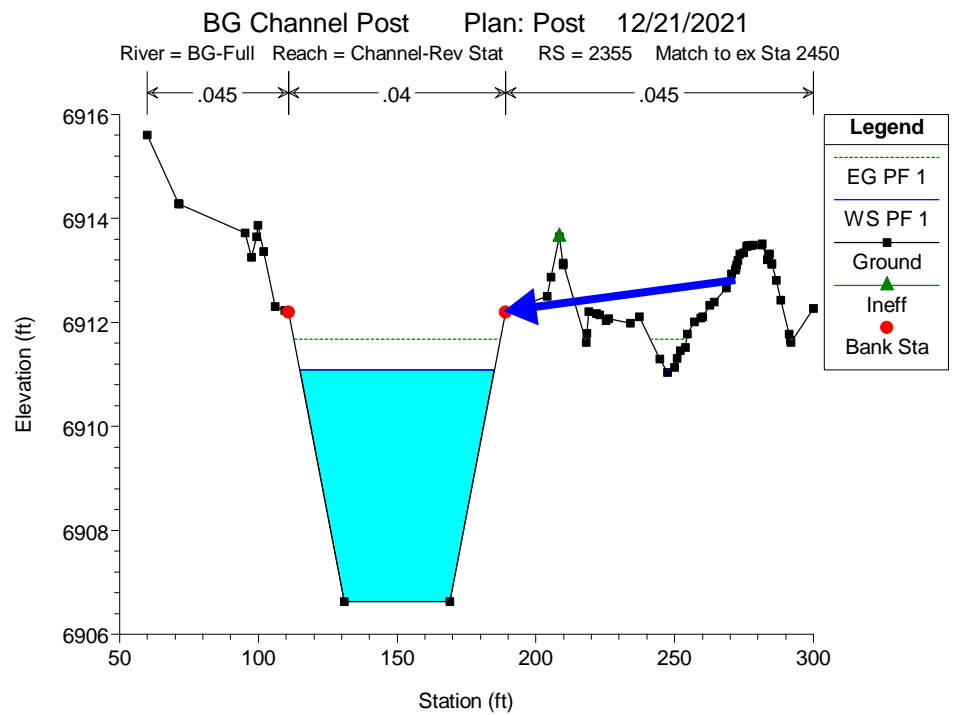
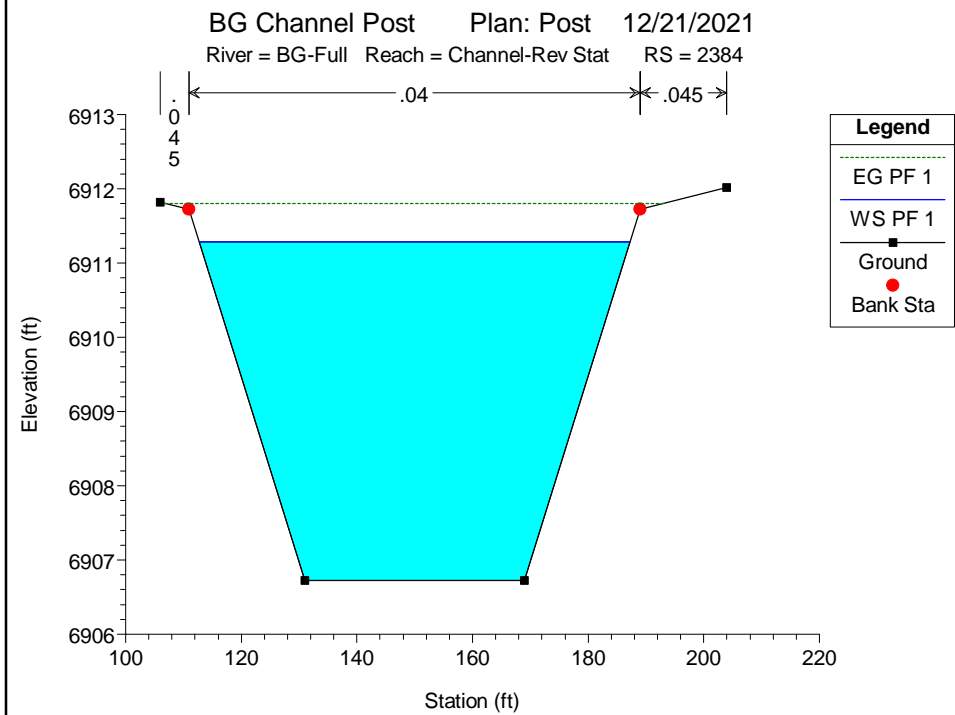
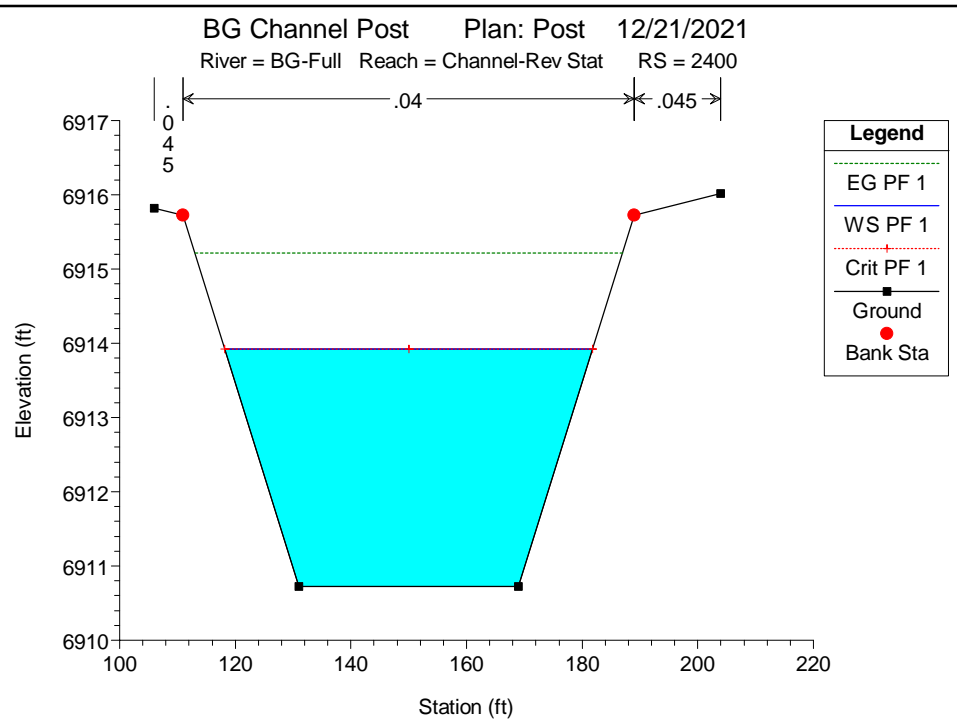
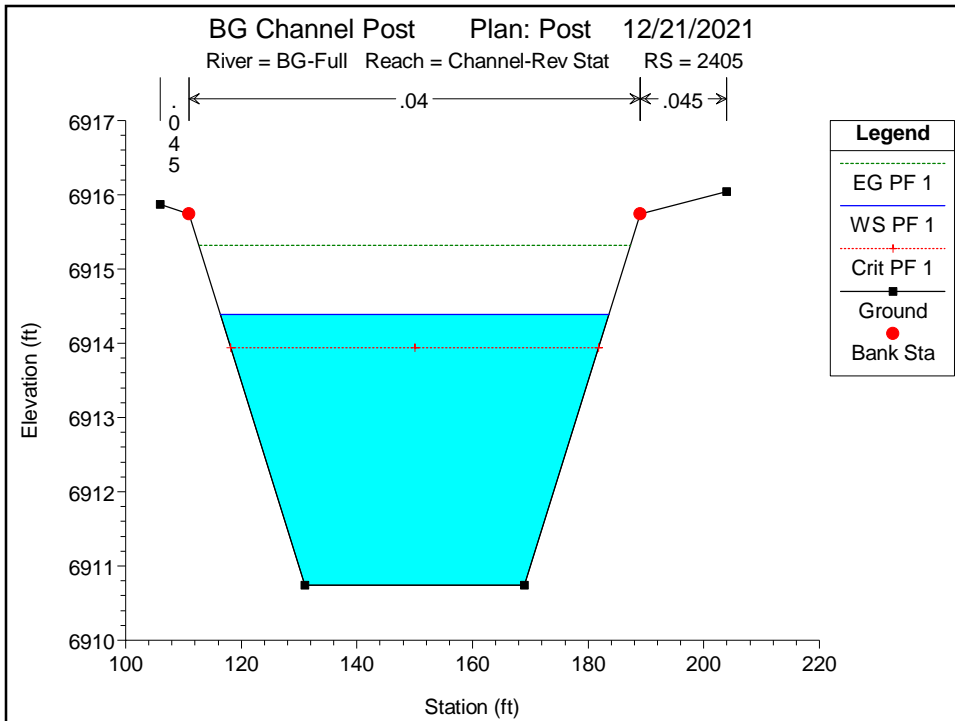


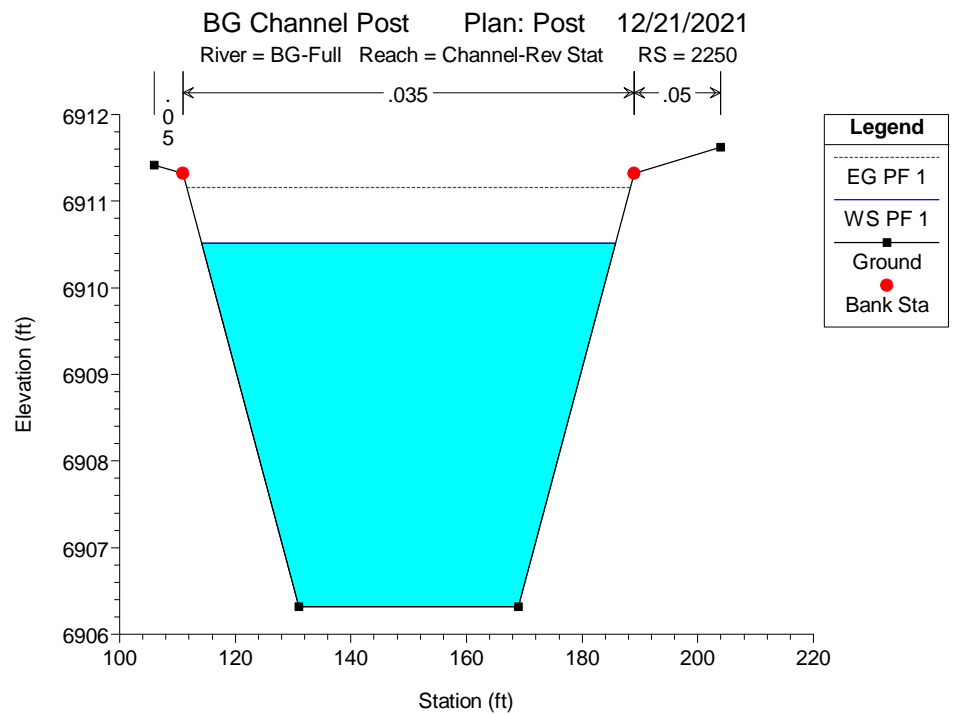
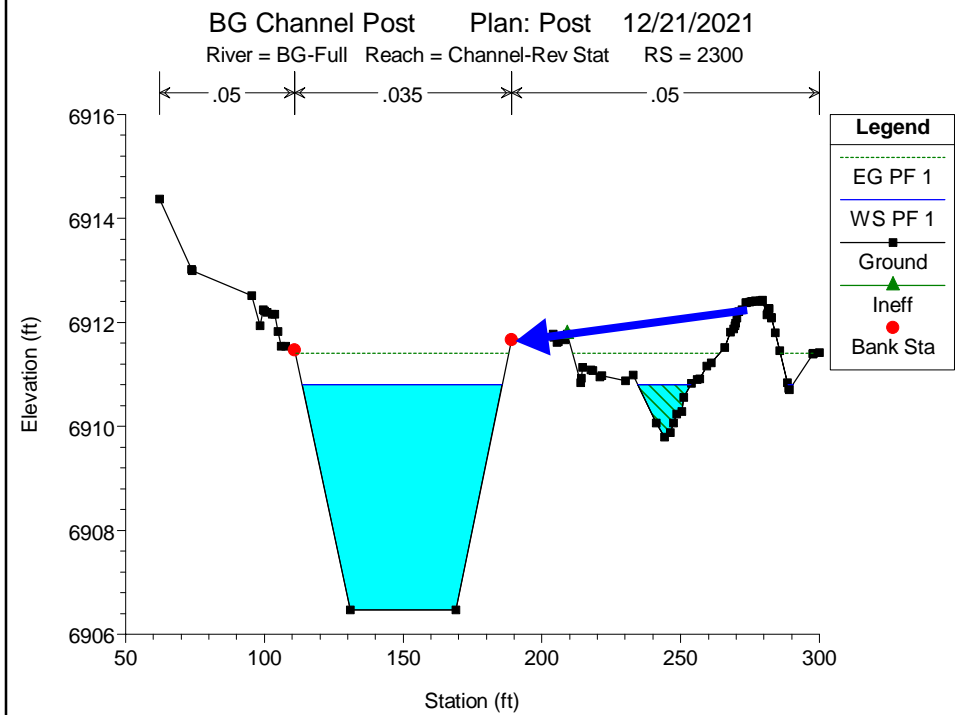
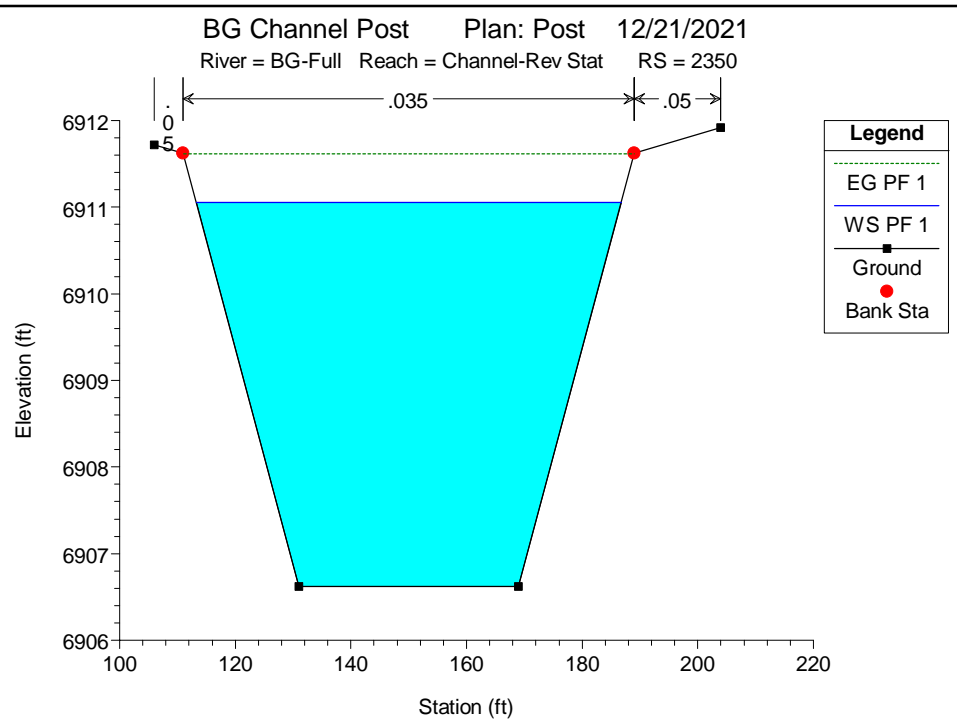
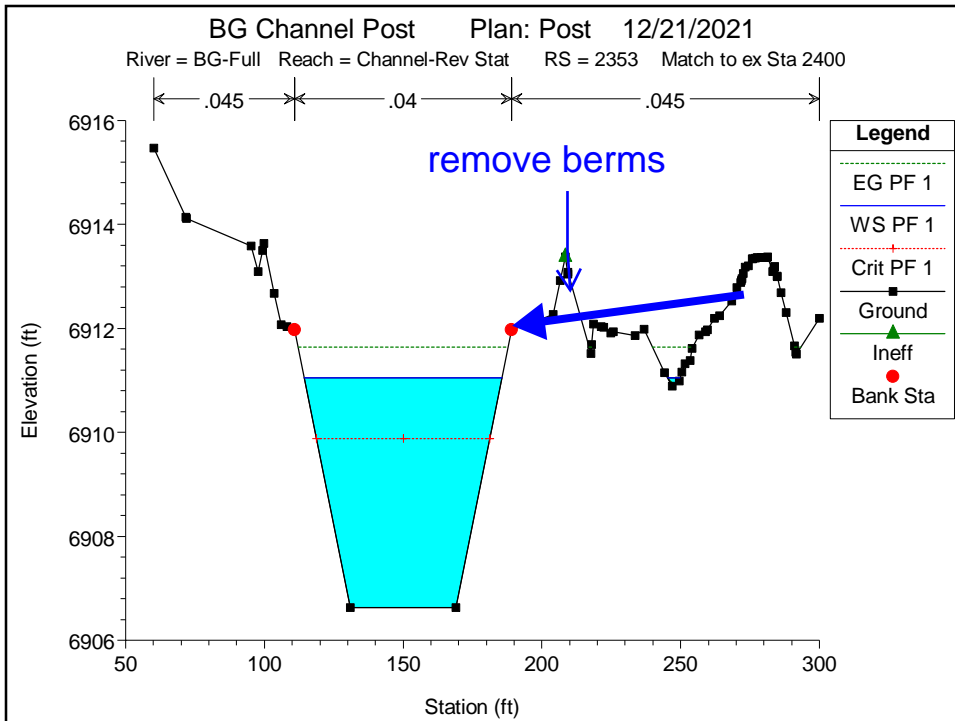


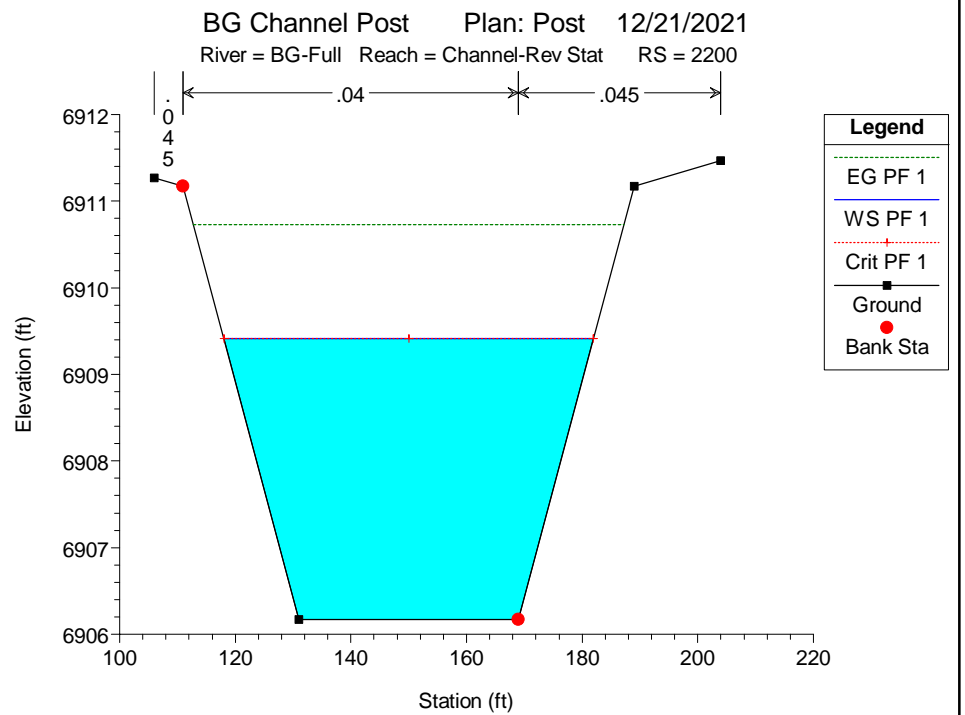
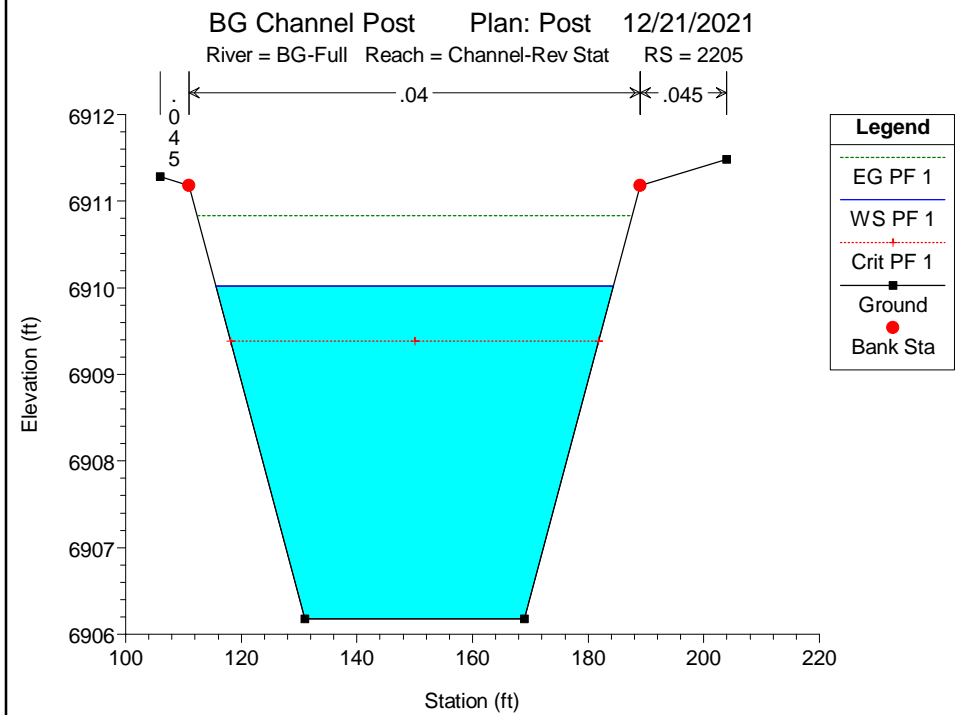
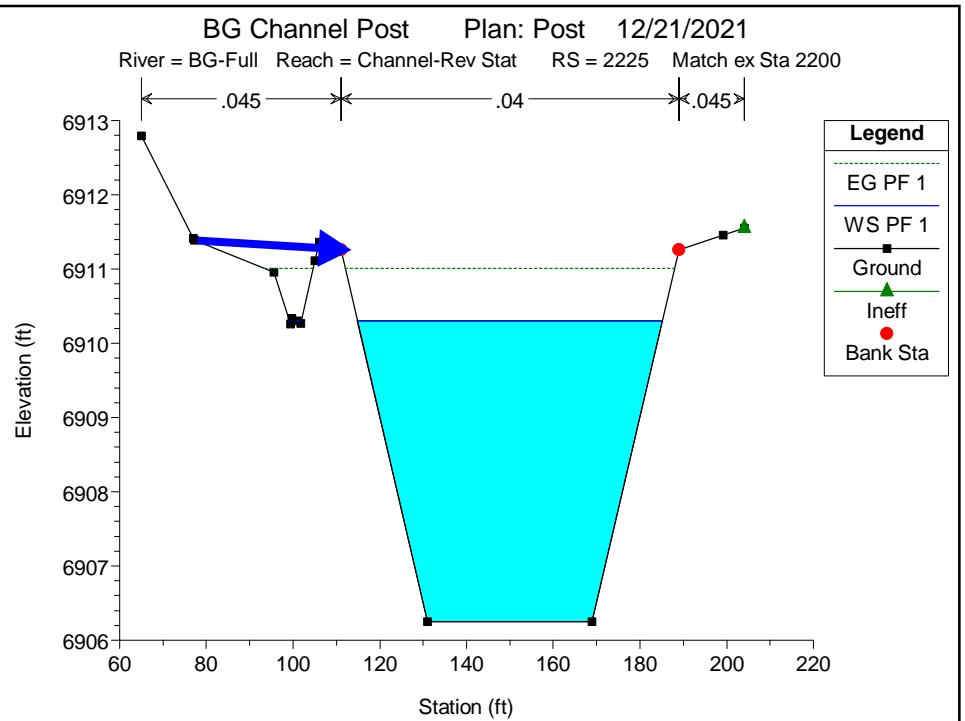
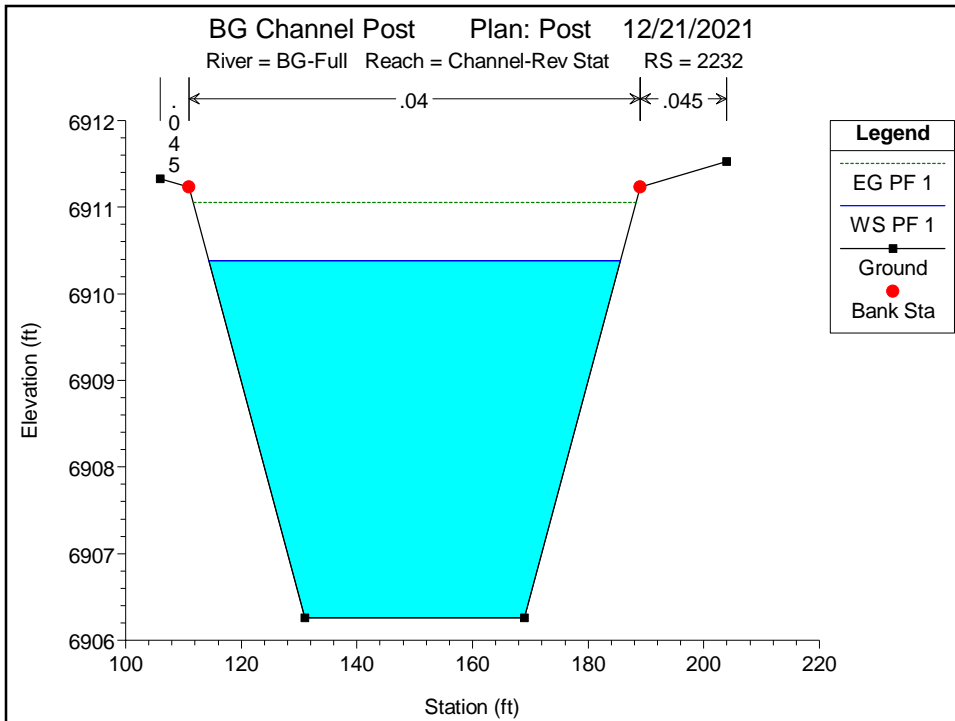


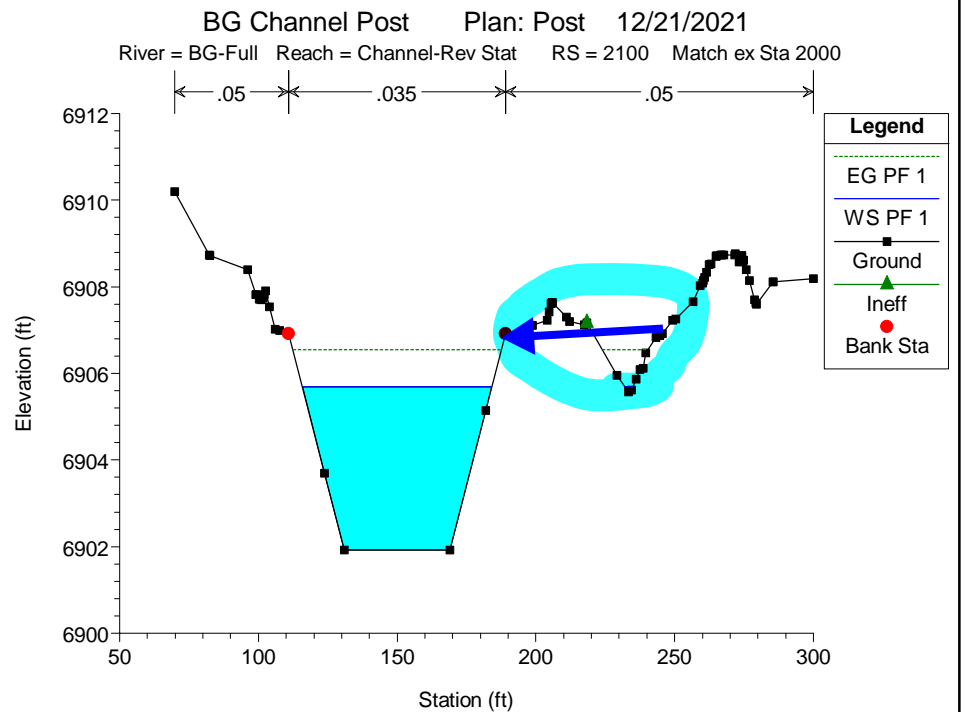
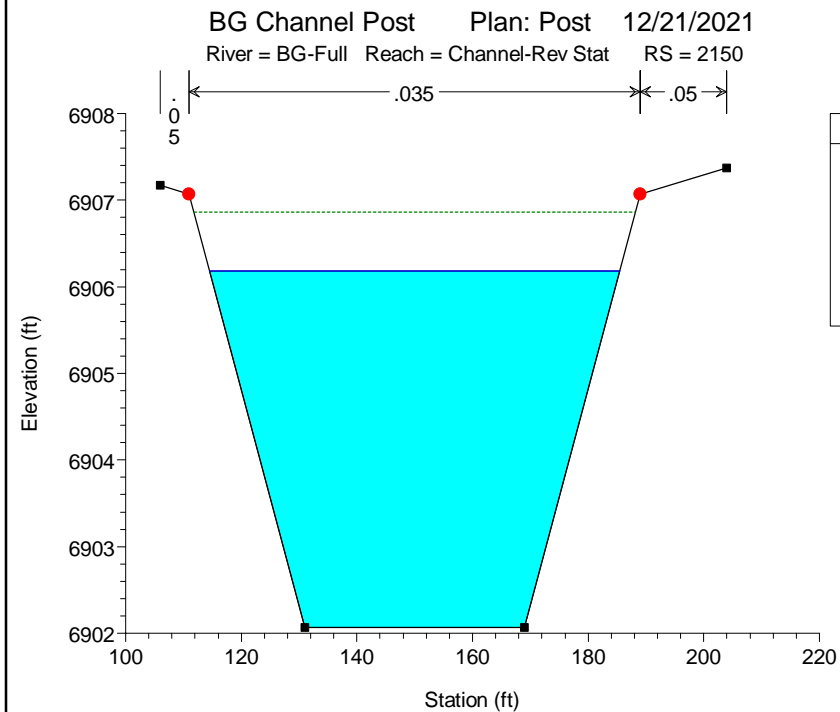
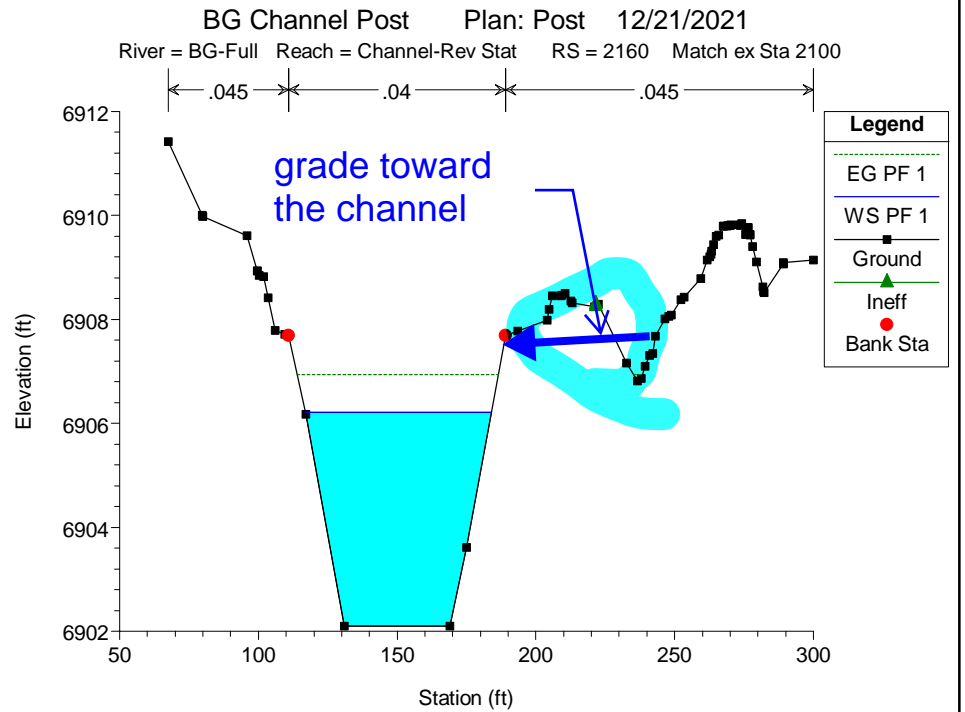
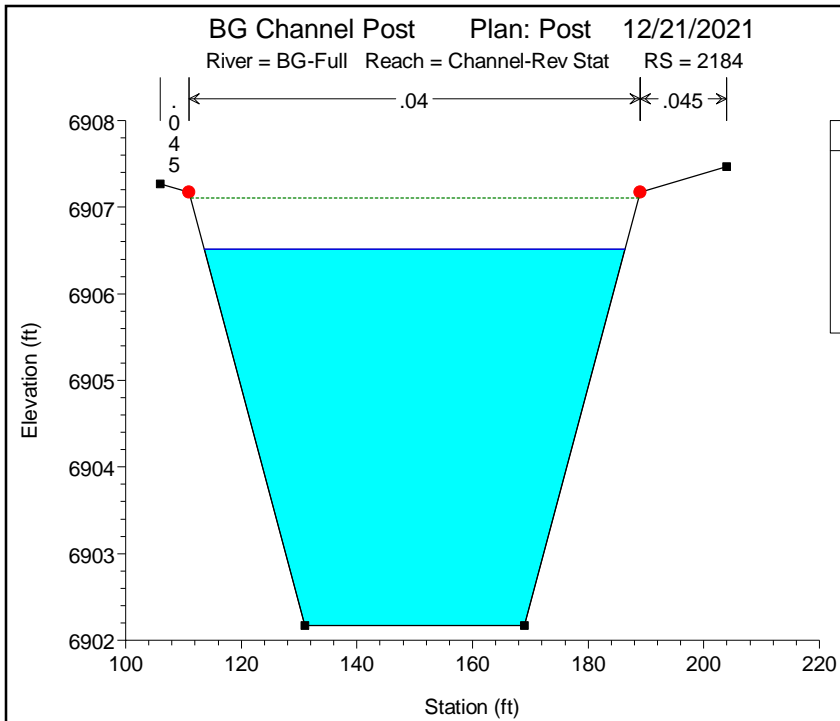


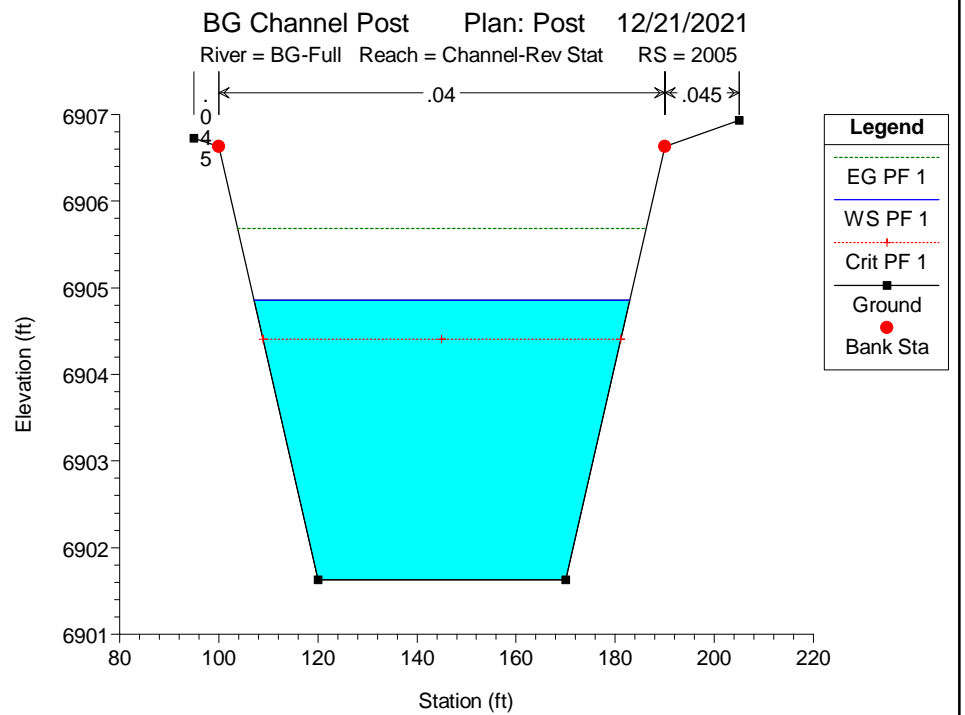
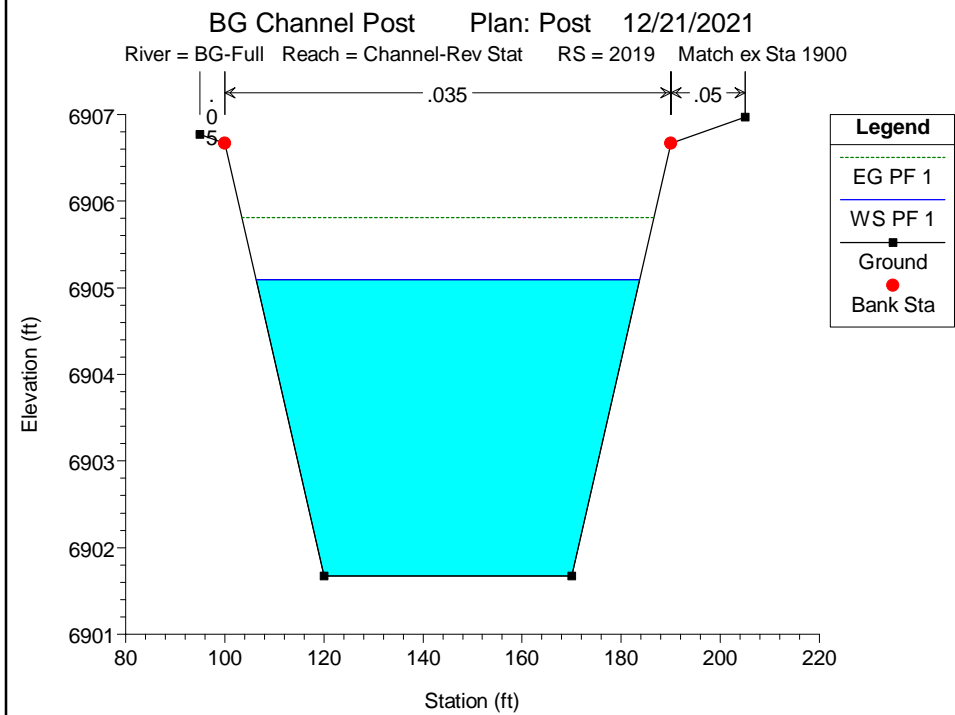
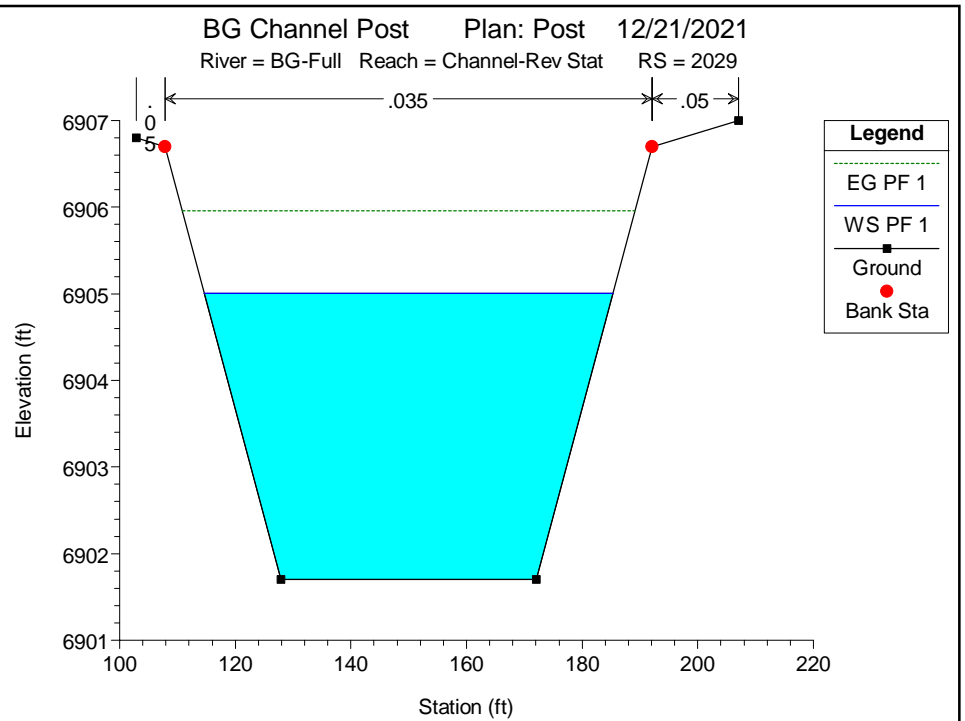
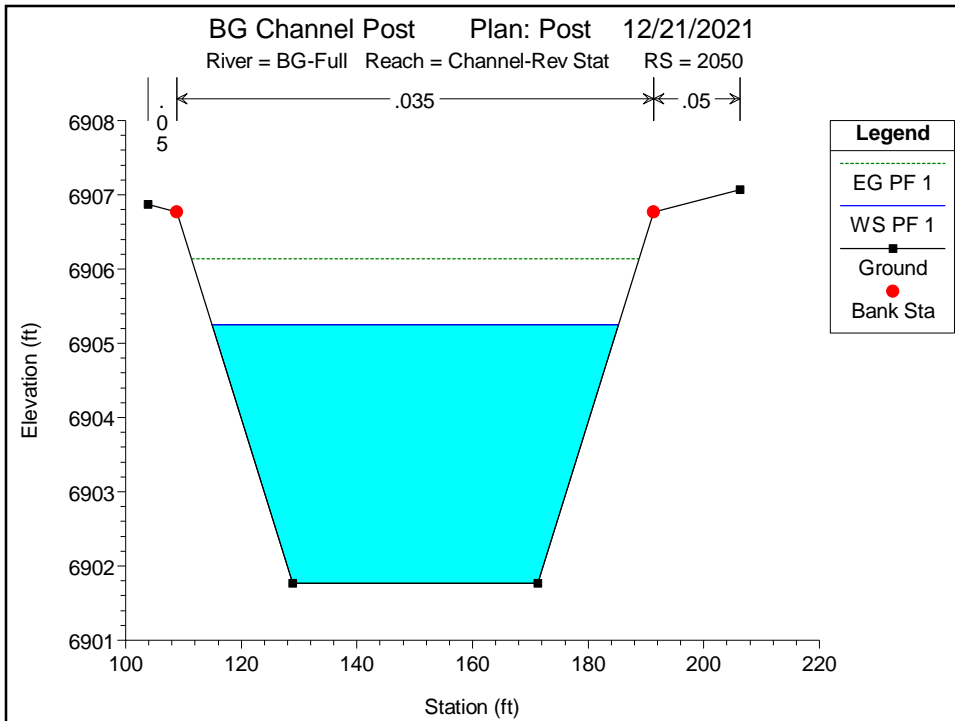


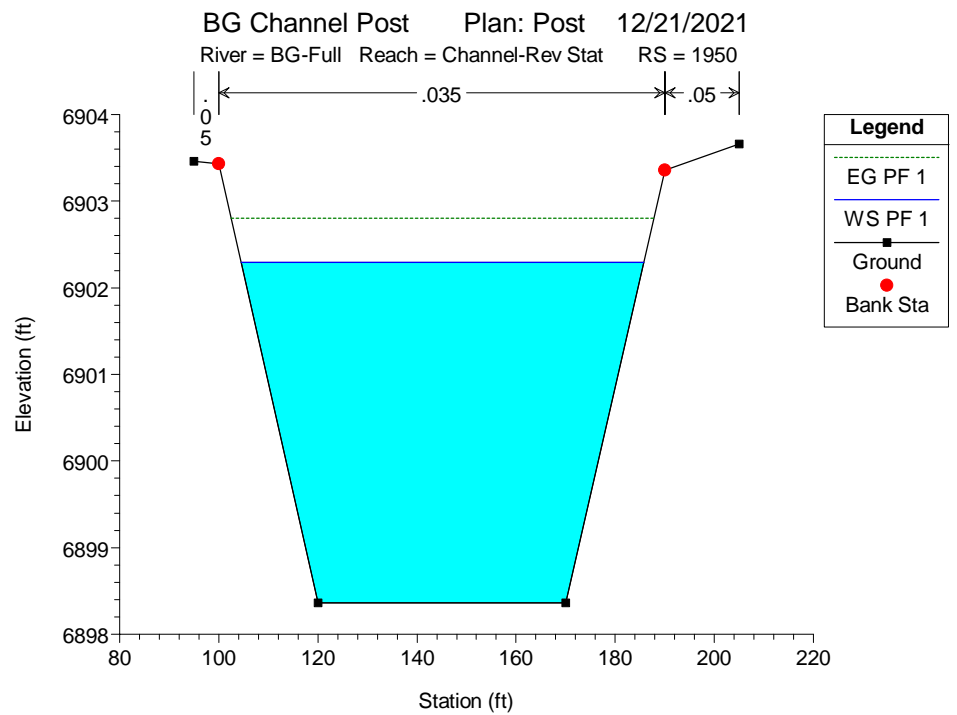
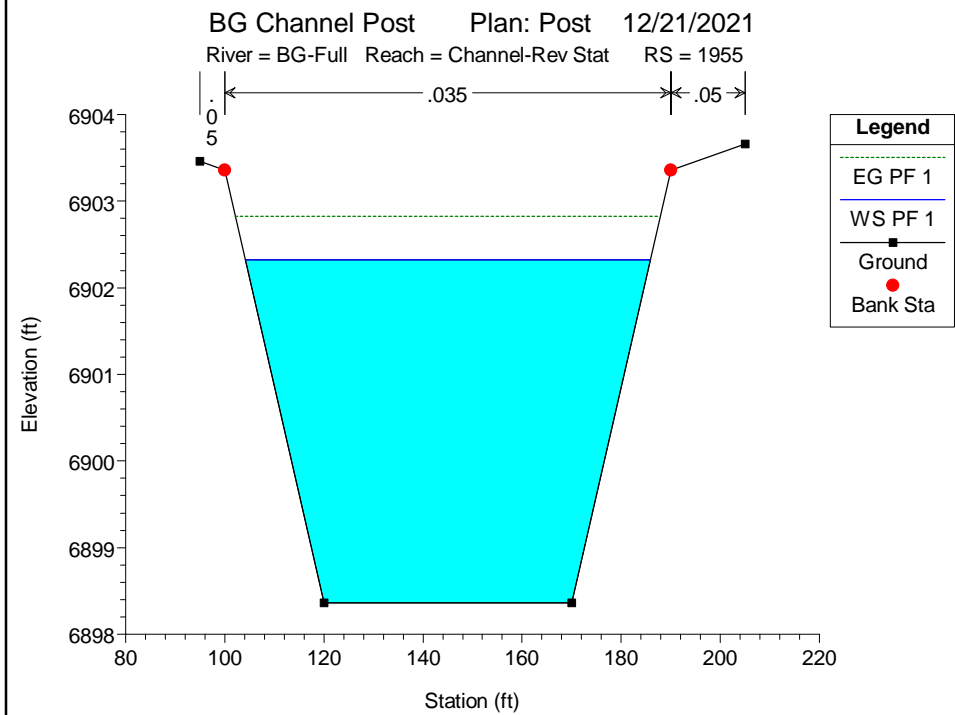
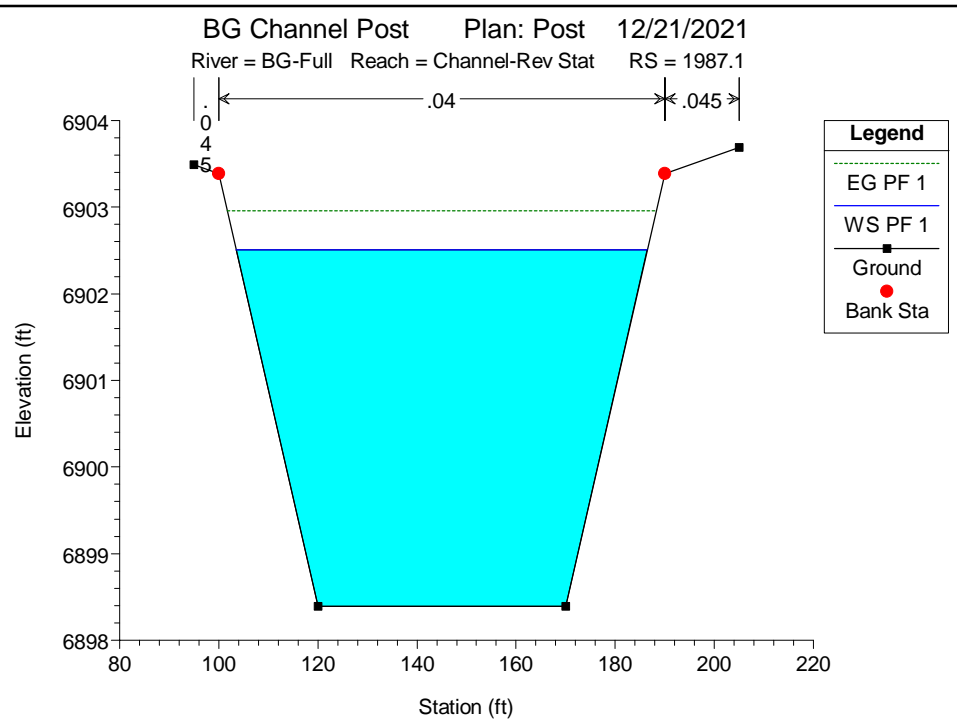
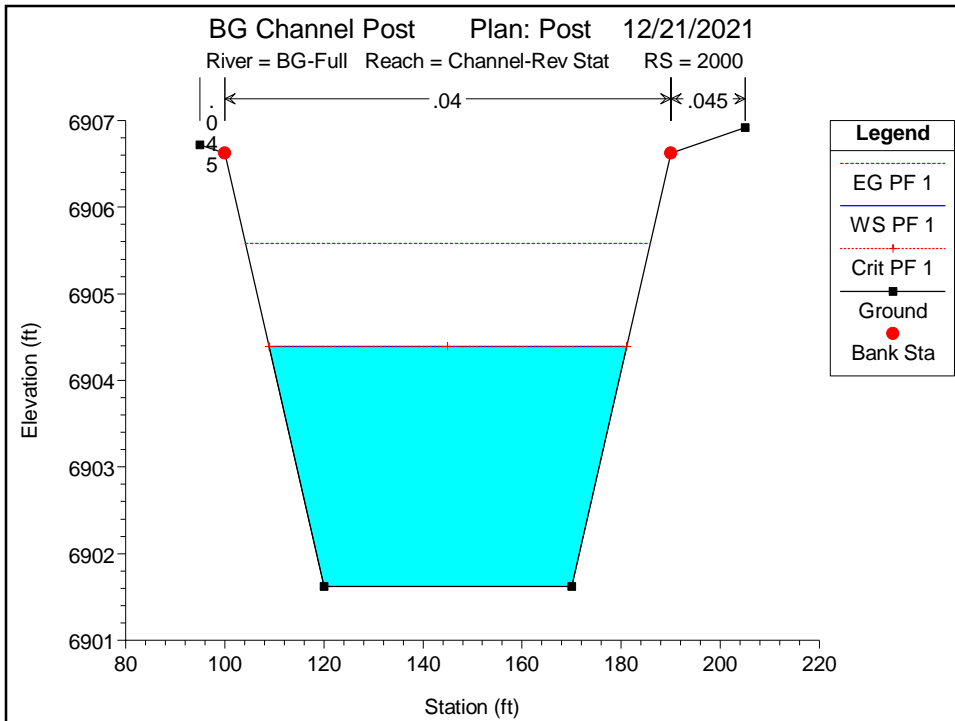


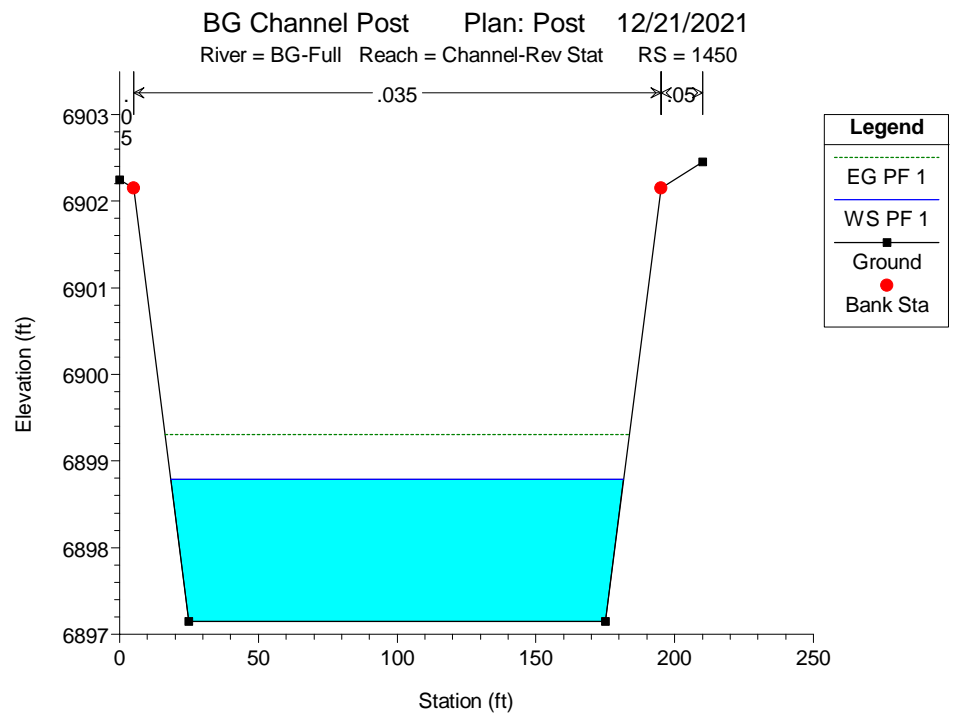
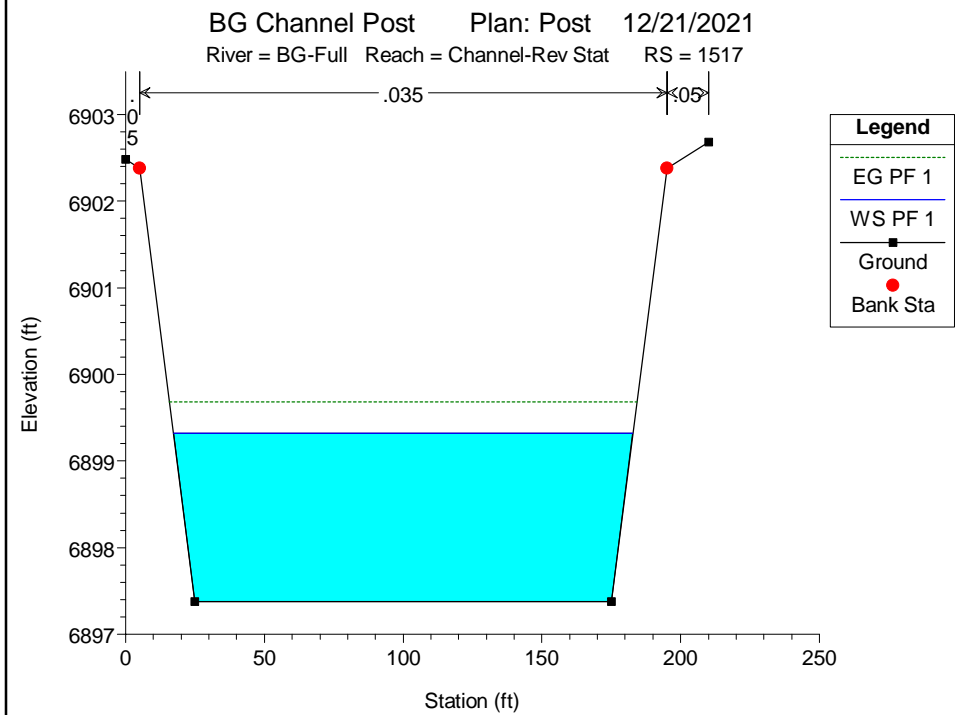
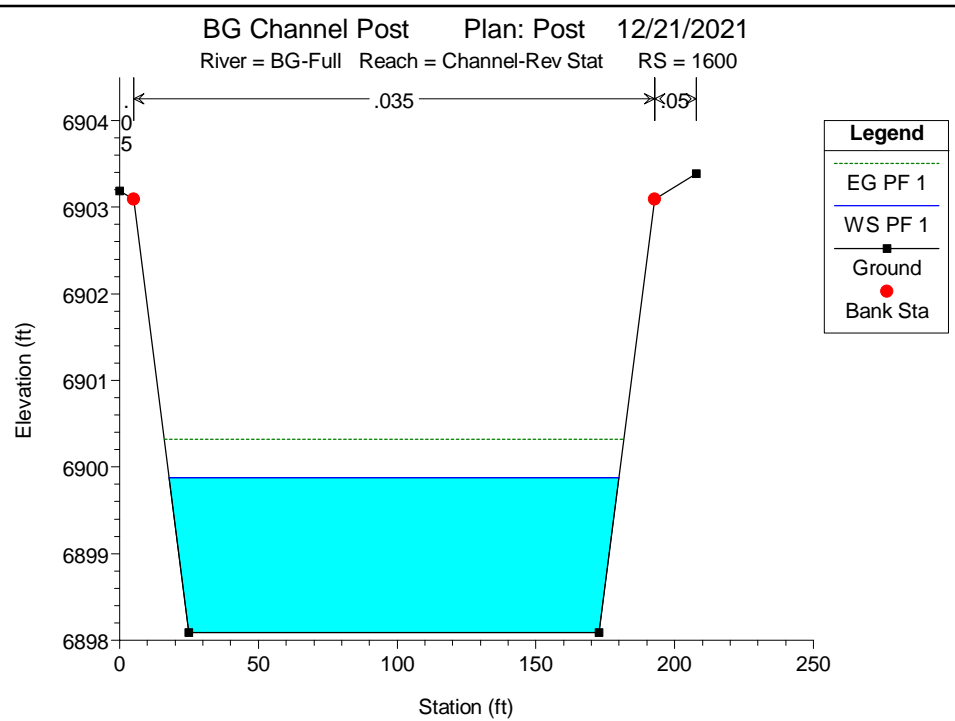
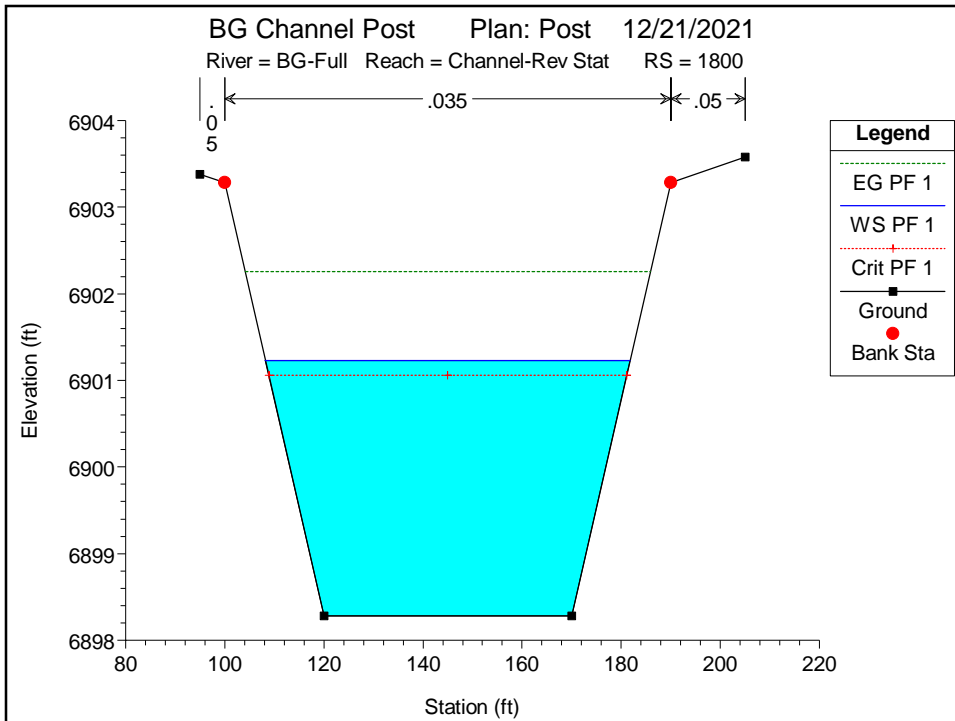


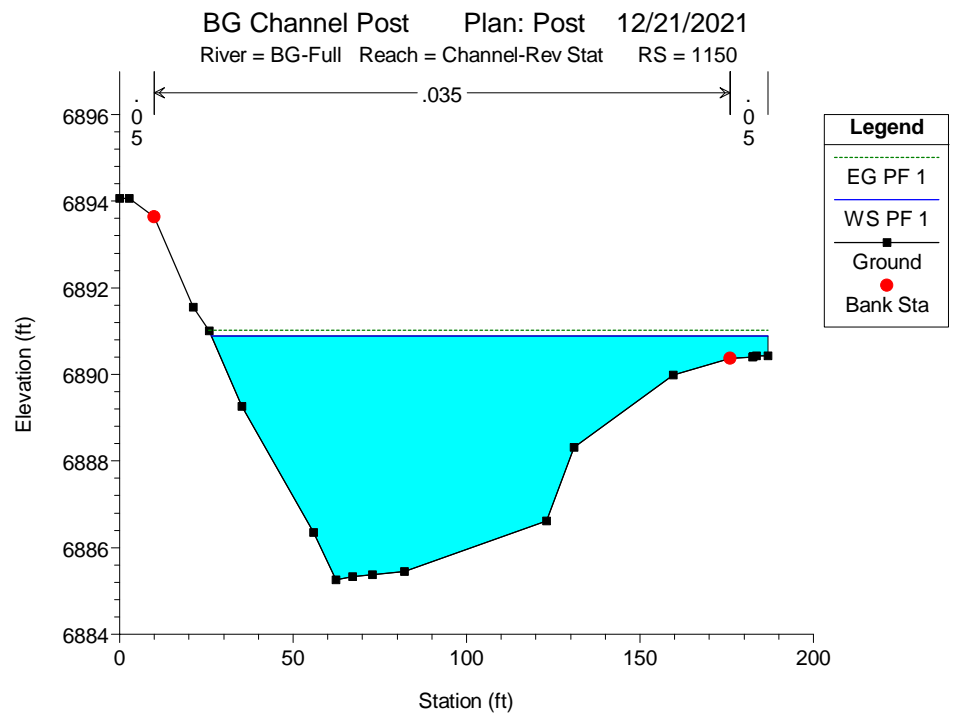
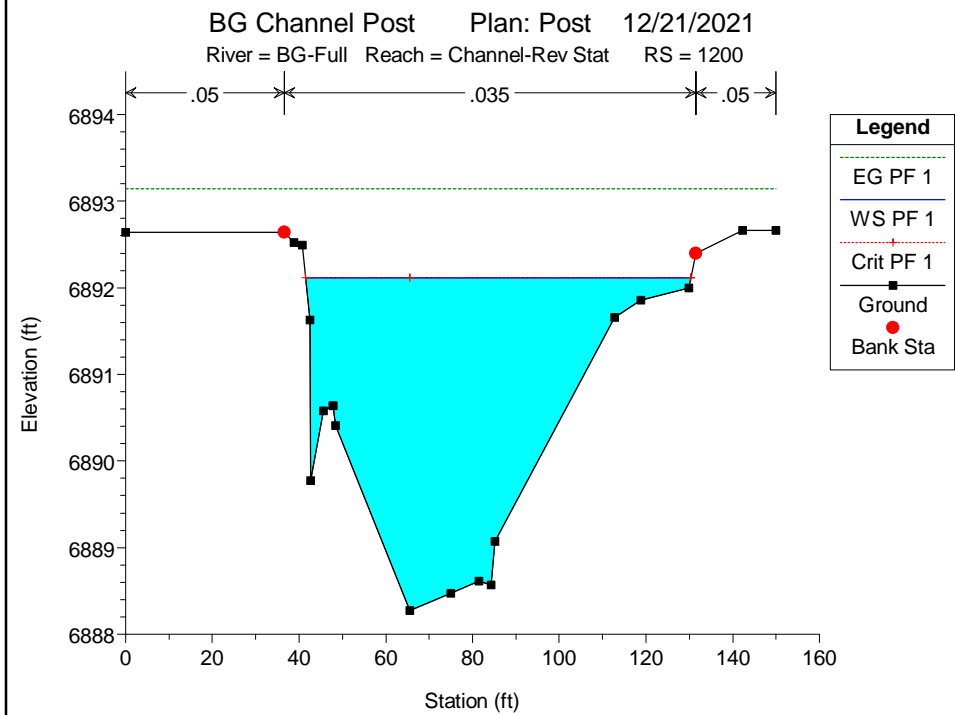
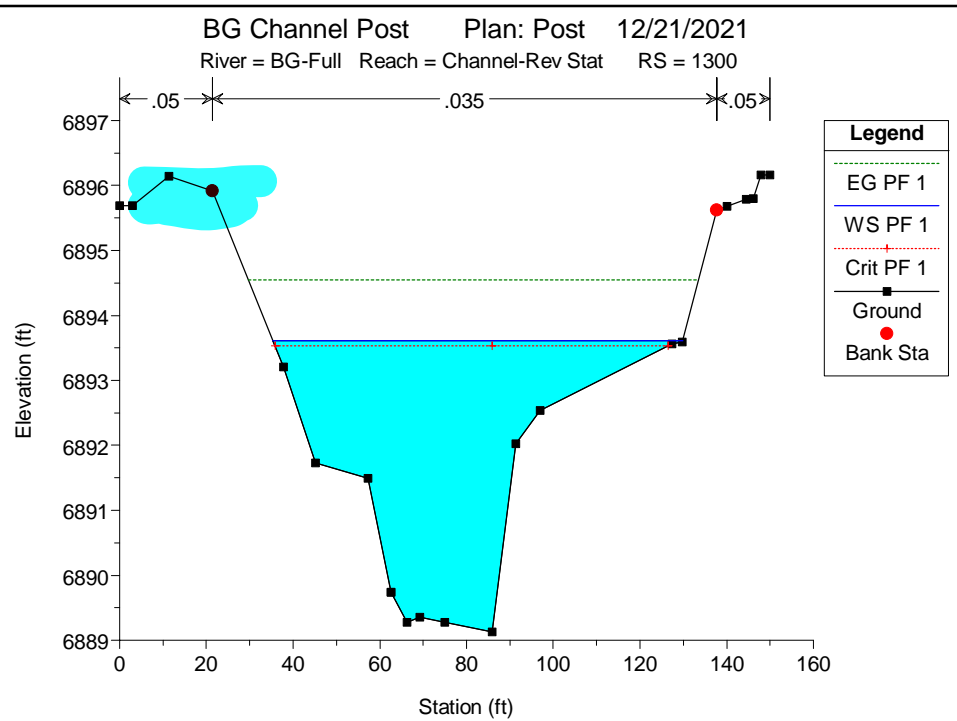
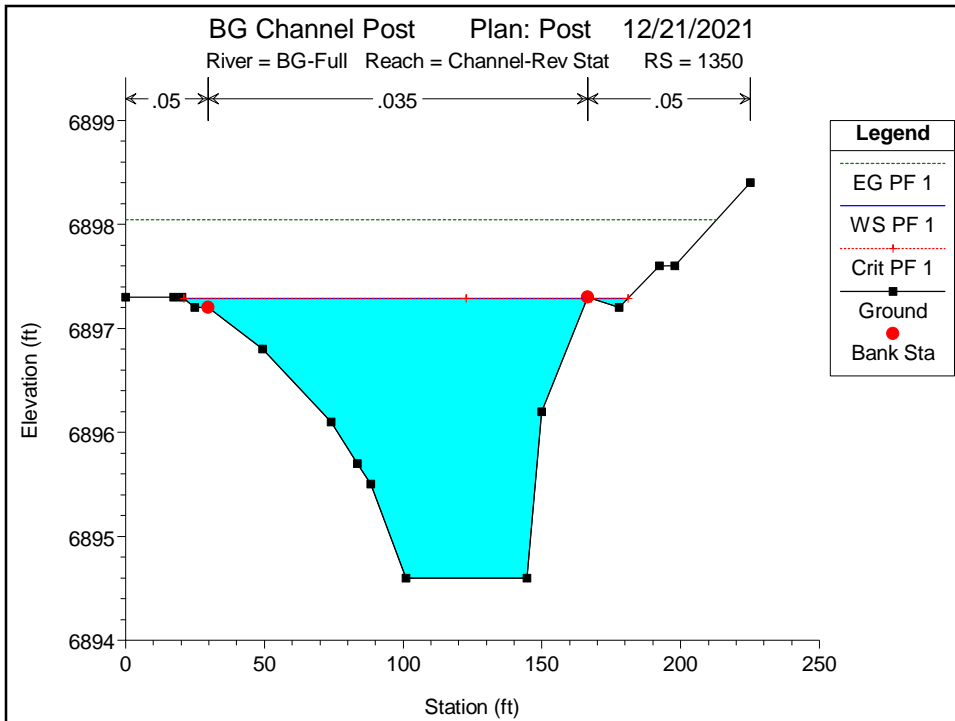


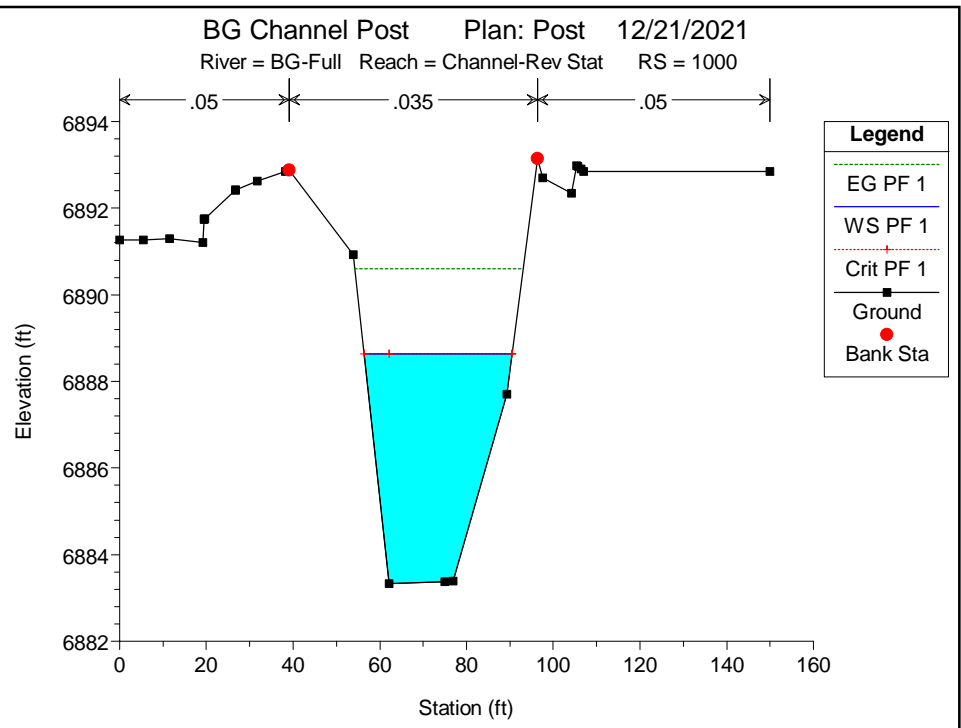
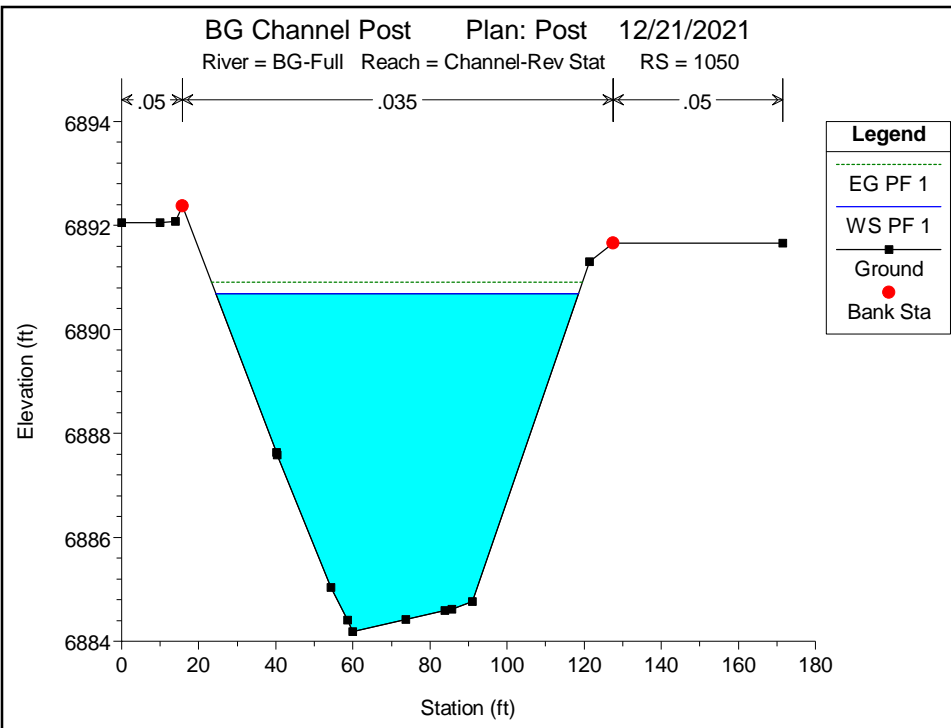












ATTACHMENT O
Cover Page of LOMR No.: 03-08-0385P





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



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

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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 | | |

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| | | | | | | | | | | |
|----|------|--------|------|------|------|------|------|------|------|------|
| 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 | | | | |

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| SECNO | DEPTH | CWSEL | CRISWS | WSELK | EG | HV | HL | OLOSS | BANK ELEV |
|-------|-------|-------|--------|-------|------|-------|-------|--------|------------|
| Q | QLOB | QCH | QROB | ALOB | ACH | AROB | VOL | TWA | LEFT/RIGHT |
| TIME | VLOB | VCH | VROB | XLN | 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 | ITRIAL | 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 |

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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 |

1

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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 |

1

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