

**BRIDGE HYDRAULIC STUDY
FOR THE CONSTRUCTION OF I-26 CD LANE BRIDGE
OVER THE SALUDA RIVER
CAROLINA CROSSROADS PROJECT – PHASE 1**



Final Hydraulic Report

Lexington/Richland County, South Carolina

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Prepared For:



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INTRODUCTION AND BACKGROUND

The Carolina Crossroads Project is a Design-Build reconfiguration of the Interstate 20, Interstate 26 and Interstate 126 corridor in Richland and Lexington Counties, South Carolina and is split up into multiple phases. The first phase consists of reconstruction of the Colonial Life Boulevard interchange along Interstate 126 and widening of Interstates I-26 and I-126. The South Carolina Department of Transportation (SCDOT) proposes to construct a collector-distributor (CD) ramp from Interstate 26 on a new alignment over the Saluda River in South Carolina as part of the Carolina Crossroads Phase 1 Project. The Saluda River is the dividing line between Lexington and Richland Counties, South Carolina. The crossing is located approximately 7,400 feet northwest of US Route 378 (Sunset Boulevard) interchange with I-26. The project location is shown in **Figure 1**.

The proposed bridge crossing for the CD lane will be constructed downstream of the existing I-26 crossing of the Saluda River and will consist of three 12 foot travel lanes with one 12 foot shoulder and one 10 foot shoulder. The total out to out width will be 48'-3", and the length of the bridge crossing the Saluda River will be approximately 846 feet. The existing I-26 crossing of the Saluda River along with the existing I-26 Ramp bridge will remain in place throughout the duration of phase 1 construction and will be replaced in a later phase of the Carolina Crossroads Project.

This report presents the results of a hydraulic design study for the proposed bridge. This crossing is located within a designated FEMA special flood hazard area Zone AE with a floodway. The project is being reviewed for any impacts on the FEMA 100-year base flood profile. The SCDOT requirements also include providing 2.0 feet of freeboard from the bridge low chord to the design high water elevation. In addition, the low chord shall remain above the water surface elevation produced by a 67,000 cfs discharge at the bridge crossing without pressure flow according to the criteria written in the project request for proposal document. Because I-26 is a primary route, the design high water elevation is based on the 50-year flood. The focus of the hydraulic study is to ensure that the proposed design will have no significant adverse upstream or downstream impacts on the 100-year frequency flood elevations. The proposed design will raise the low chord significantly and extends the length of the bridge to reduce the backwaters depth upstream of the crossing for the proposed condition. This report will be submitted as part of the roadway drainage and stormwater management study.

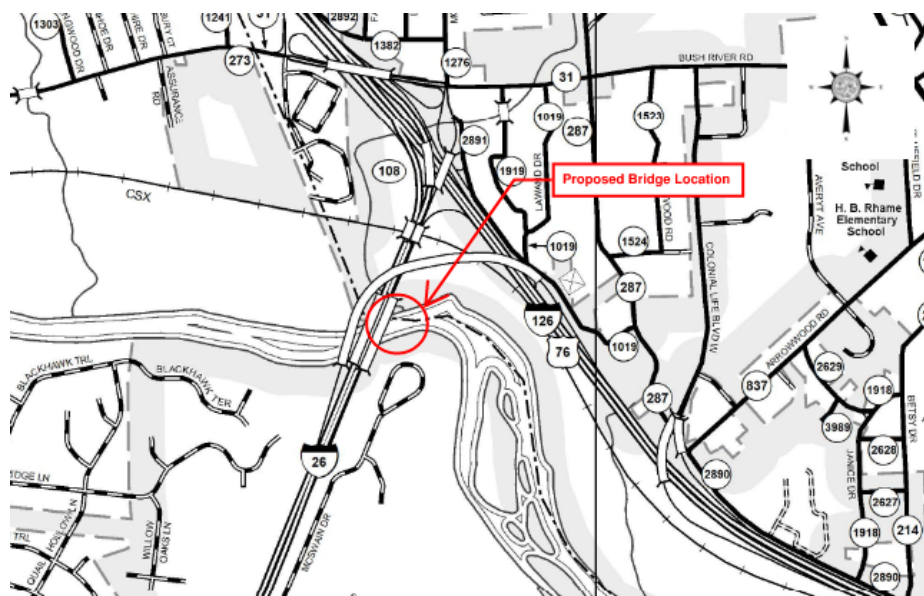


Figure 1. Project location map

PROJECT DESCRIPTION

A hydraulic model of The Saluda River and the Interstate 26 CD lane was prepared using HEC-RAS Version 6.1. The model was used to analyze and compare natural, existing, and proposed conditions, and to confirm that the design of the new bridge meets all design criteria. The model was developed according to criteria established by *The South Carolina Department of Transportation Requirements for Hydraulic Design Studies* (Rev. May 26th, 2009).

The Interstate 26 CD Lane crossing over The Saluda River crossing is located within a FEMA Special Flood Hazard Area Zone AE, with base flood elevations determined. The site is located on FEMA FIRM maps numbered 45063C0163J (map panel 163) and 45079C0238L (map panel 238), shown in **Figure 3**. The Saluda River is the boundary between much of Lexington and Richland County at the crossing and both communities will be involved with coordination efforts for the analysis. The downstream structure is located approximately 10,800 feet downstream from Interstate 26 and is a pedestrian bridge for Riverbanks Zoo and Gardens. Beyond that, the confluence of the Saluda River with the Broad River forms the Congaree River approximately 15,700 feet downstream. The upstream structure is the existing Interstate 26 Saluda River crossing and is located 5 feet upstream from the proposed bridge location. The next upstream structure is another CD flyover ramp from I-126 to I-26 and is approximately 350 ft upstream from the existing I-26 bridge. These structures are modeled in HEC-RAS.

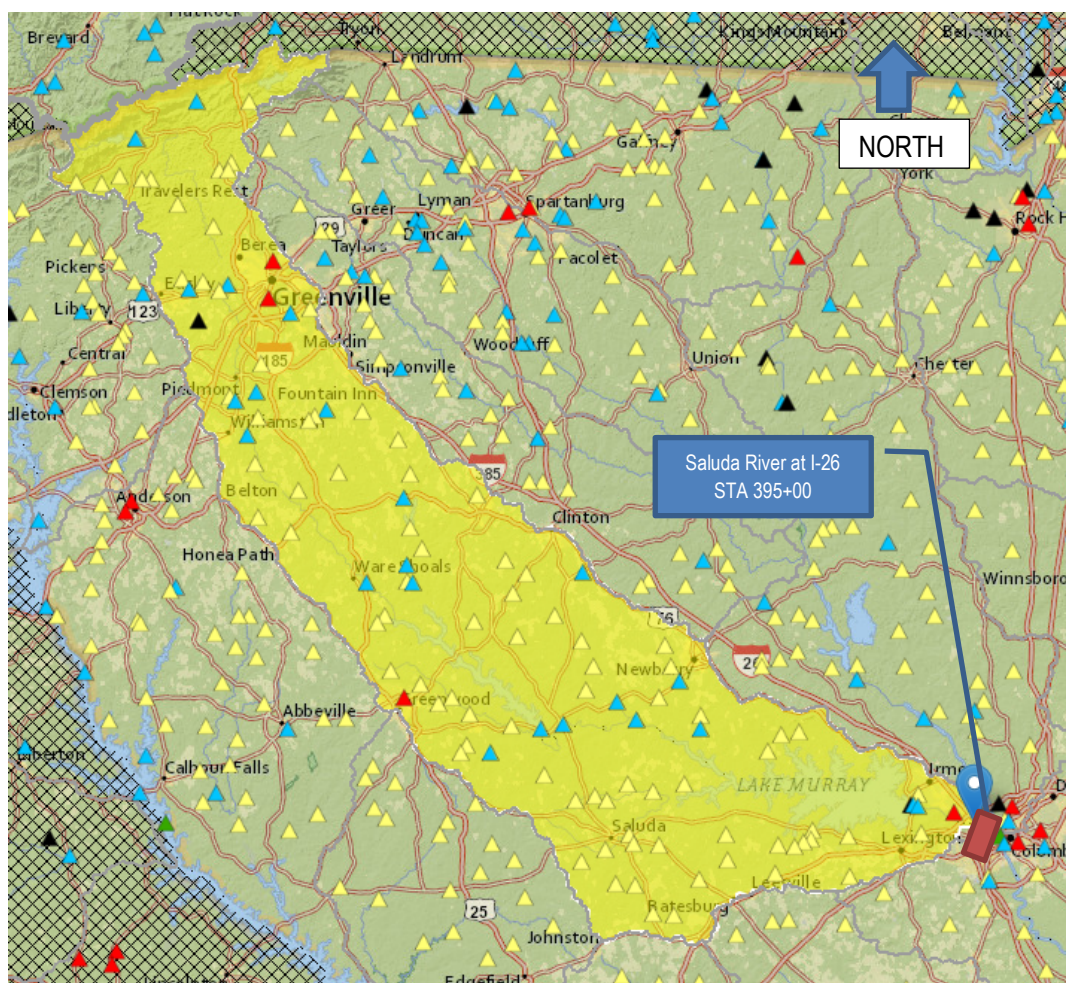


Figure 2. Drainage Area = 2,510 sq. miles

HYDRAULIC DESIGN CRITERIA

Per the project RFP and *The South Carolina Department of Transportation Requirements for Hydraulic Design Studies*, the following were established as the driving criteria for this project:

- **Design flood:** Bridge hydraulic analysis and design shall be for the 50-year flood event.
- **Freeboard:** A minimum of 2.0 feet of freeboard above the design flood event shall be provided for the structure. Minimum low chord elevation shall remain above the water surface elevation produced by a 67,000 cfs discharge at the bridge crossing without pressure flow. In addition the new bridge to be constructed in Phase 3 to replace the existing I-26 bridge should be modeled to ensure compliance with freeboard requirements. It is assumed the future bridge constructed in Phase 3 will have 6.5 foot diameter drilled shafts and they will be aligned with the proposed bents of the CD bridge constructed in Phase 1.
- **Backwater:** A maximum of 1 foot of backwater upstream of the bridge crossing.
- **FEMA:** Meet FEMA No Impact requirements.

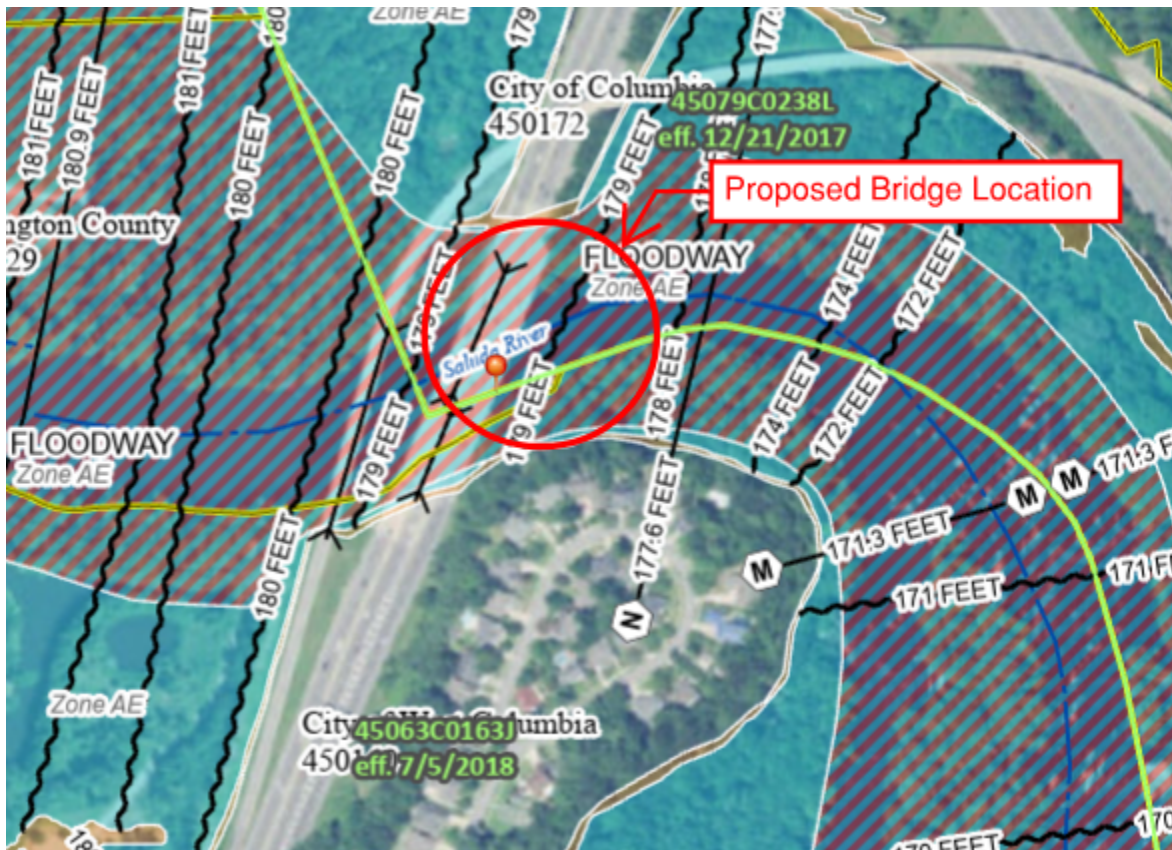


Figure 3. Richland County FEMA FIRM Panel 238 and Lexington County FEMA FIRM Panel 163

HYDROLOGIC ANALYSIS

The I-26 crossing over the Saluda River has a drainage area of 2,510 square miles (as seen in **Figure 2**) and drains through multiple large reservoirs including Lake Greenwood and Lake Murray. The drainage basin extends from the

Midlands of South Carolina upstream to the Appalachian Mountains foothills. The Lake Murray Dam operated by Dominion Energy is located a few miles upstream of the site, and it controls discharges from Lake Murray into the Saluda River. Due to the controlled discharges from multiple reservoirs, USGS regression equations are not applicable to this crossing. The discharges used by FEMA and this report will be based upon the FIS study performed by Richland and Lexington Counties that studied local gages along with discharge data from the Lake Murray Dam.

The flows used to model the Saluda River discharges within the Effective FEMA model (as seen in **Table 1**) were verified with the FIS flows for both Richland and Lexington County. The peak discharges provided in the FIS are based upon the USGS Gage Site No. 0216900: SALUDA RIVER NEAR COLUMBIA, SC. The gage is located downstream of the existing I-26 bridge. The FIS studied utilized this gage along with known discharges from the upstream Lake Murray dam to create peak discharges for the 10, 50, 100, and 500-year flood frequencies. During the 2015 flood event the discharges from the dam peaked at approximately 56,000 cfs at the dam and the peak discharge at USGS gage downstream of the I-26 bridge reached 60,800 cfs. These discharges were compared to the FIS discharges and align with approximately a 100-year flood event.

Design Storm	Richland County FIS Flow (cfs)
10-year	29,600
50-year	48,300
100-year	58,600
500-year	89,900

Table 1. FEMA FIS Peak Discharge Rates

CROSS SECTION GEOMETRY

HEC-RAS cross sections in proximity of the proposed bridge were updated using Richland and Lexington County LiDAR provided by SCDNR as well as survey data provided by SCDOT. The cross-section locations are shown in the Appendices.

MANNING'S ROUGHNESS COEFFICIENTS

Channel and overbank Manning's "n" values from the FEMA Effective model in the vicinity of the I-26 crossing were verified with field observations and aerial photography. Within the vicinity of the crossing, the FEMA model mostly consists of roughness values of 0.15 for the overbank areas and 0.045-0.05 for the channel. There was an error in the model provided by Richland County for XS 17000 which coded the channel Manning's "n" as 0.45 versus an actual typical Manning's "n" coefficient of 0.045 for the channel. This was updated in the CEM and REV models. A visual inspection of the overbank areas confirmed that they consist of hardwood forests with underbrush which is appropriate for a Manning's "n" of 0.15 to be used on all overbank areas. A Manning's "n" value range of 0.04-0.05 was used for the main channel, representative of the degree of channel irregularity and sinuosity, bank vegetation, and obstructions.

BRIDGE HYDRAULIC ANALYSIS

HEC-RAS Version 6.1 was used for bridge hydraulic analyses. Six models were prepared to evaluate the bridges:

NO IMPACT ANALYSIS / FEMA MODELS

- Effective Output: SCDOT provided files containing the Effective Outputs/Models on July 06, 2020.
 - Richland County - The effective HEC-RAS model for Richland County was provided by SCDOT. The model's upstream boundary is located just upstream of the existing ramp from I-126 westbound to I-26 eastbound and the downstream boundary is located at the confluence of the Saluda and Congaree River. The upstream location of the model along the Saluda River is near the boundary of Lexington and Richland County line crossing of the Saluda River. The HEC-RAS results were compared to the FEMA FIS report for the published cross sections and appear to match very closely with Richland County Floodway Data. The output results from HEC-RAS for the Richland County model also match the Lexington County FIS floodway data for cross section "O" through "A". The remaining cross section upstream of "O" fall within the entirety of Lexington County and are not modeled in the HEC-RAS model provided by Richland County.
 - Lexington County – The effective data provided by FEMA to SCDOT was the input data for the effective HEC-2 model for Lexington County. Additional information was requested from FEMA and the output runs were provided. The results from the HEC-2 output were compared to that of the Lexington County FIS and appear to match closely once the datum from the HEC-2 output was converted to NAVD88.
- Duplicate Effective Model: The engineering firm HDR was selected to prepare the design build prep package for the Carolina Crossroads project for all phases of the project. The HDR team utilized the data received from Lexington and Richland County to produce a Duplicate Effective Model to be utilized in analyzing the existing conditions along the Saluda River. The models were received from SCDOT on July 06, 2020 as part of the Project Information Package.
 - The HEC-RAS model provided by Richland County was used as the starting point for duplicating and combining the effective models/outputs. The Richland County model's upstream boundary is FEMA Cross Section "N" along the Saluda River and extends downstream to the confluence point of the Saluda River and the Congaree River.
 - The model was then extended upstream into Lexington County based upon the HEC-2 data provided by Lexington County. Datum adjustment from NGVD29 to NAVD88 was done to ensure the two models were on the NAVD88 datum.
 - Flows upstream of cross section "N" were updated from the SCDOT's model to reflect the Lexington County FIS report. The Lexington County FIS indicates a flow change at XS "N" that was utilized in the Richland County effective model and applied downstream to the confluence of the Saluda with the Congaree River.
 - The results of the DEM model were compared to that of the published FIS reports and appear to match the BFE very closely for the cross sections near the studied bridge as well as the cross sections downstream of I-26. These cross sections and portion of the model are from the Richland County provided HEC-RAS model.
 - The cross sections upstream of the I-26 bridge do not match the FIS values for the BFE. These cross sections were obtained from older HEC-2 model runs and were input into the DEM HEC-RAS model. The BFE's in this area are based upon this HEC-2 model and the differences in this area can be

associated with the differences in HEC-2 vs the HEC-RAS program and changes in the modeling of bridge hydraulics.

- Corrected Effective Model: The Corrected Effective model was created by duplicating and modifying the DEM. The changes from the DEM to the CEM are highlighted below. The comparison of the DEM to the CEM resulted in low water surfaces through the bridges adjacent to I-26 and a slight rise in water surface elevations upstream of the I-26 bridges.
 - XS 17365 added as the location of the downstream bounding cross section for the proposed bridge to be modeled within the Revised Model
 - Pier widths were updated to 4.0' based upon as-built drawings
 - Revised Manning's "n" value of XS 17000 to 0.045 for the channel. This appears to be a typo that was done in the effective model and has been corrected. The update significantly reduced the water surface through the bridge due to the more appropriate "n" value assigned for the channel.
 - Updated existing I-26 bridge distance from face of bridge to upstream XS to 30'
 - Updated length of I-26 bridge to 536' in length and 160' in width. The existing bridge is skewed compared the centerline of the Saluda River resulting in a shorter effective opening width as well as longer width across the skewed bridge section.
 - XS 17840, 17750, 17665, 17385, and 17365 were all skewed 40 degrees while XS 17000 was skewed 20 degrees in the model to reflect the XS skew with the Saluda River floodplain. The skew resulted in increased water surface elevations upstream of the bridge compared to that of the DEM.
 - Updated length of I-26 Westbound Ramp to I-26 Eastbound to 998' in length based upon the 40 degree skew to the floodplain.

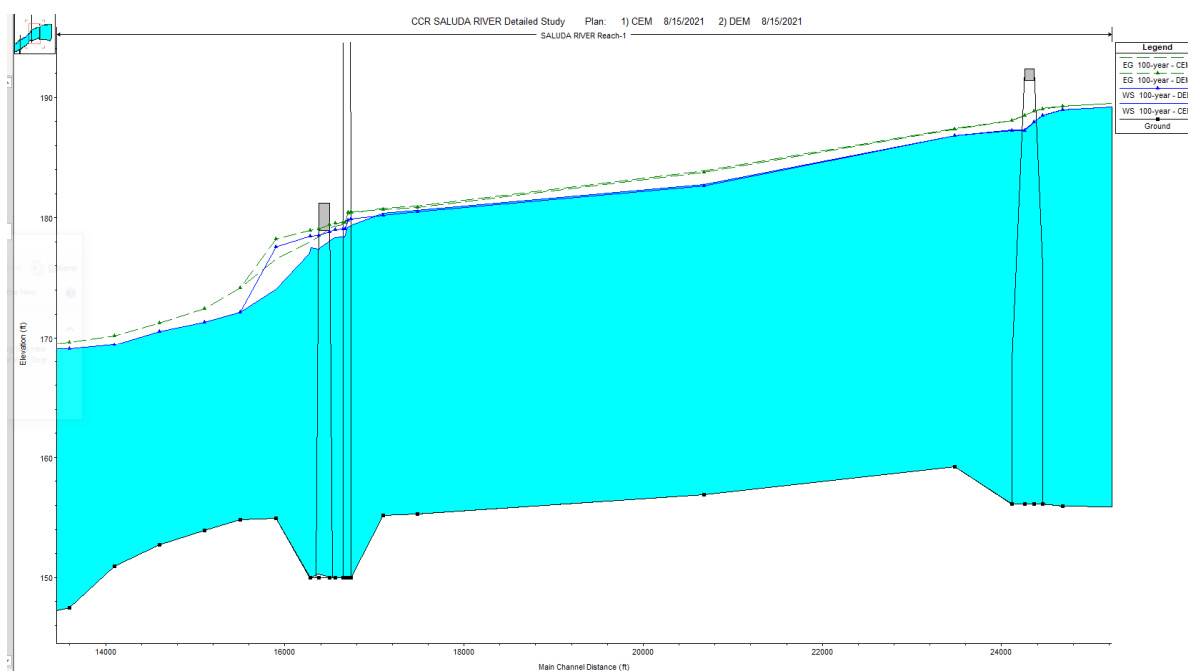


Figure 4. Comparison of DEM to CEM 100-yr BFE Profile

- Revised Model: CEM model was duplicated, and the existing bridge was removed and replaced with the proposed CD bridge (Bridge 35) as well as the replacement bridge to be constructed in Phase 3. The two

bridges are within a few feet of each other and will be modeled as one bridge to better reflect the hydraulics through the proposed opening.

- Proposed Bridge at XS 17540 was updated to reflect the profile of the proposed bridges for Phase 1 and 3. Width was entered in as 273 feet which combines the lengths of both the Proposed I-26 Bridge as well as the CD lane bridge to be constructed in Phase 1.
- Ineffective flow areas for the downstream cross-section were updated to reflect the proposed bridge. Minimal changes were made to the effective flow width due to the existing terrain near the river crossing.
- Piers were added to proposed bridge at a width of 6.5 feet for the proposed drilled shafts. Drag coefficient (C_d) added to reflect circular columns.
- XS 17385 was removed to allow the full width of the proposed bridge to be modeled.
- XS 16600 and XS 16200 were modified to show the realigned access road to be constructed. The realigned access road is located within the Saluda River floodplain. Ground elevations were updated within the HEC-RAS model based upon the roadway profiles and cross sections for proposed access road.

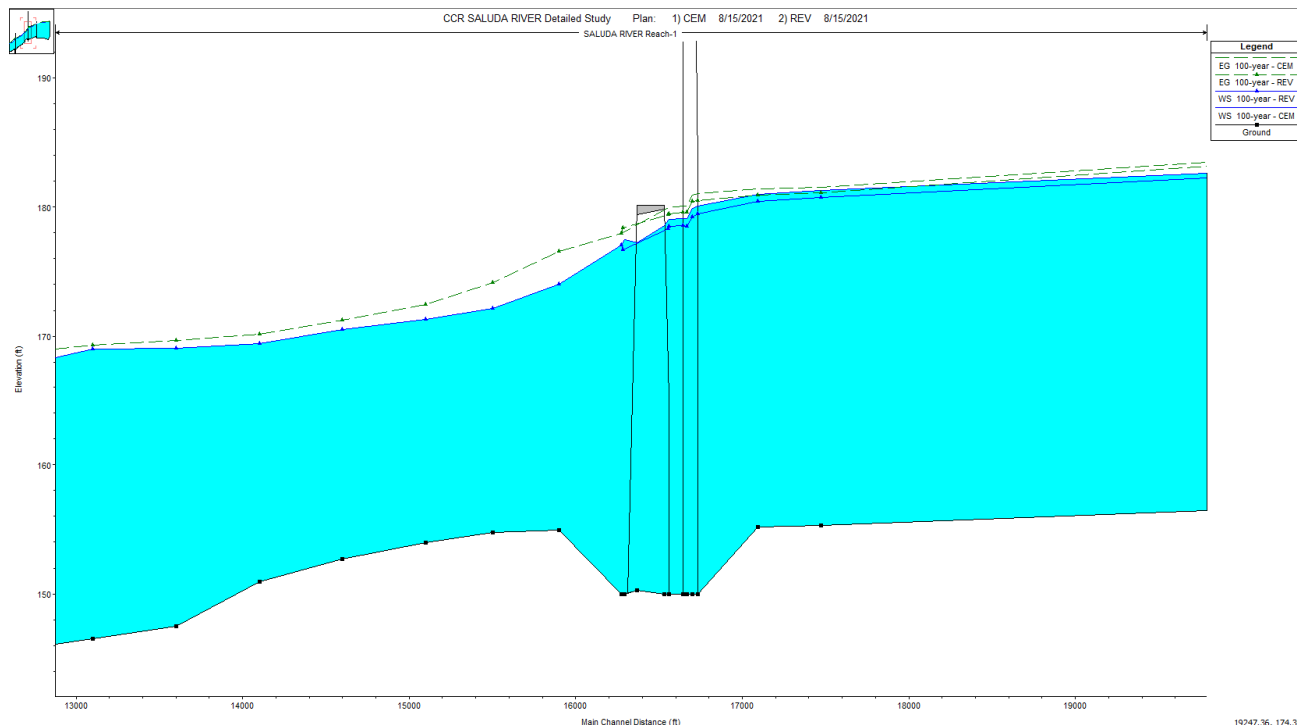


Figure 5. Comparison of CEM to REV 100-yr BFE Profile

- Floodway Models: The CEM and REV models were run using the 100-year flow along with encroachments to analyze the existing and proposed floodways. Encroachment widths were verified and set to equal those established by the Flood Insurance Study for all cross sections. Method 1 was used for the determination of floodway encroachments for both the CEM and REV floodway models.

Table 2. Comparison of Water Surface Elevations Between Effective, Duplicate Effective, and Corrected Effective Models

River Station	FEMA XS	100-Year Water Surface Elevations (feet-NAVD 1988)			Difference in CEM and Effective 100-year WSEs (feet)
		Effective (Published)	DEM	CEM	
24,800	Q	186.7	186.8	186.9	0.2
22,000	P	183.3	182.7	182.9	-0.4
18,800	O	180.9	180.5	180.9	0.0
17,000	N	177.6	177.6	174.0	-3.6
16,200	M	171.3	171.3	171.3	0.0
15,200	L	169.4	169.4	169.4	0.0
14,200	K	169.0	169.0	169.0	0.0

Table 3. Comparison of Water Surface Elevations Between Corrected Effective and Revised Models

River Station	FEMA XS	100-Year Water Surface Elevations (feet-NAVD 1988)		Difference in Revised & CEM 100-year WSEs (feet)
		CEM	Revised	
24,800	Q	186.9	186.9	0.0
22,000	P	182.9	182.9	0.0
18,800	O	180.9	180.8	-0.1
17,000	N	174.0	174.0	0.0
16,200	M	171.3	171.3	0.0
15,200	L	169.4	169.4	0.0
14,200	K	169.0	169.0	0.0

Table 4. Comparison of Floodway Widths and Elevations Between Corrected Effective Model and Revised Model

River Station	FEMA XS	100-Year Floodway Elevations (feet-NAVD 1988)		100-Year Floodway Widths (feet)	
		CEM	Revised	CEM	Revised
24,800	Q	187.4	187.3	1030	1030
22,000	P	183.3	183.2	939	939
18,800	O	181.6	181.4	1428	1428
17,000	N	174.1	174.1	600	600
16,200	M	171.8	171.8	710	710
15,200	L	169.9	169.9	920	920
14,200	K	169.4	169.4	740	740

SCDOT HYDRAULIC DESIGN MODELS

- Natural Model: The natural model was developed utilizing the corrected effective model and removing the existing I-26 bridge. The ineffective flows created by this bridge's causeway along the left overbank was removed from the model. The ineffective flows for the right overbank were retained and adjusted to account for the natural topography near the I-26 bridge crossing that results in an abrupt change in the floodplain. Directly downstream of the crossing a landmass extends into the floodplain creating a natural ineffective flow area upstream along the right overbank.
- Sensitivity Analysis: See section below

DOWNSTREAM BOUNDARY CONDITION / SENSITIVITY ANALYSIS

The preliminary model received from FEMA from Richland County was verified and the same boundary condition was used for the Corrected Effective Model as well as the Revised Model. A normal depth slope of 0.105% was used at downstream boundary which is essentially the confluence of the Saluda River and the Congaree River. The 100-year flood run resulted in a water surface elevation of 144.88 at the last cross section of the model. The sensitivity analysis was developed by creating multiple profiles with various starting water surface elevations at the downstream boundary condition. The analysis revealed no changes in the water surface elevation at the proposed bridge crossing for the multiple profile runs. The three profiles for the sensitivity analysis range from +3 feet above the normal depth water surface elevation to -3 feet below.

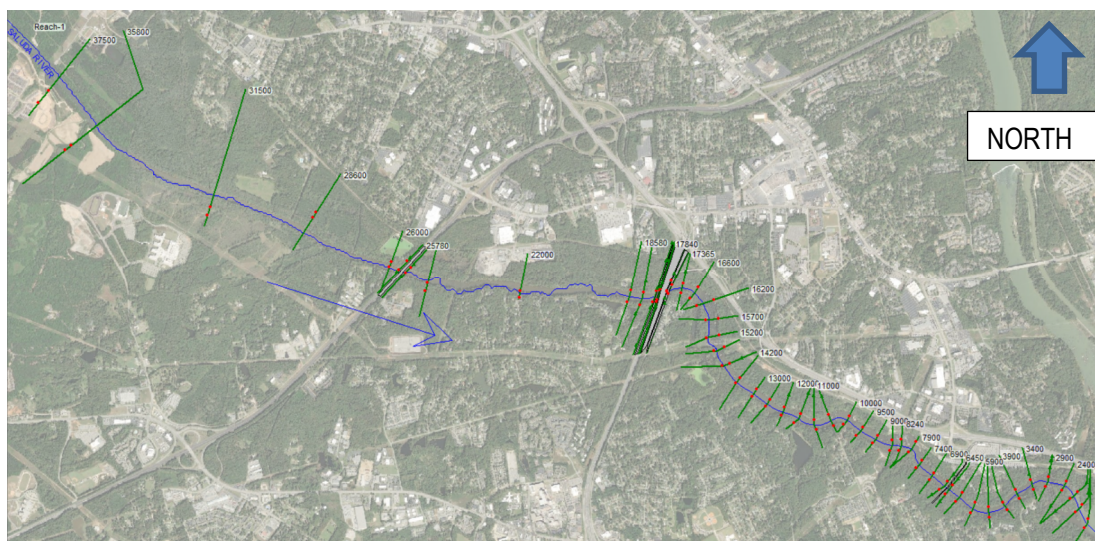


Figure 6. Cross section map for FEMA models in HEC-RAS

RESULTS

The results from the hydraulic analysis can be found in the Appendices for all of the various runs performed for the proposed bridge crossing. The results from the analysis shows that a “No-Impact” is anticipated for the proposed bridge construction of the CD bridge along with the replacement of the I-26 bridge in Phase 3. This comparison is done by comparing the REV output results with that of the CEM output results. The CEM floodway and REV floodway runs also are in compliance with a “No-Impact” analysis. The differences between the CEM and DEM are due to the corrections made with the manning’s “n” values for the channel downstream of the bridge as well as the skewing of the XS directly upstream of the I-26 bridge.

The proposed bridge minimum low chord was determined by analyzing the 50-year flood frequency. The resulting design high water upstream of the proposed I-26 bridge was 176.83. As a result, the proposed minimum low chord based upon the design flood was established as 178.83. The proposed bridge will have an actual designed low chord of 181.31 that will provide sufficient freeboard compared to that of the design flood.

The proposed bridge was also analyzed for an additional storm to ensure that pressure flow did not occur during the event. This storm discharge was based upon a historical storm where a discharge of 67,000 cfs was estimated along the Saluda River. The 67,000 cfs flow run resulted in a water surface elevation of 179.82 which does not impact the low chord of the proposed bridge, thus not resulting in pressure flow through the proposed bridge. **Figure 7** below shows the proposed bridge with the 50-yr, 100-yr, and the 67,000 cfs flood runs.

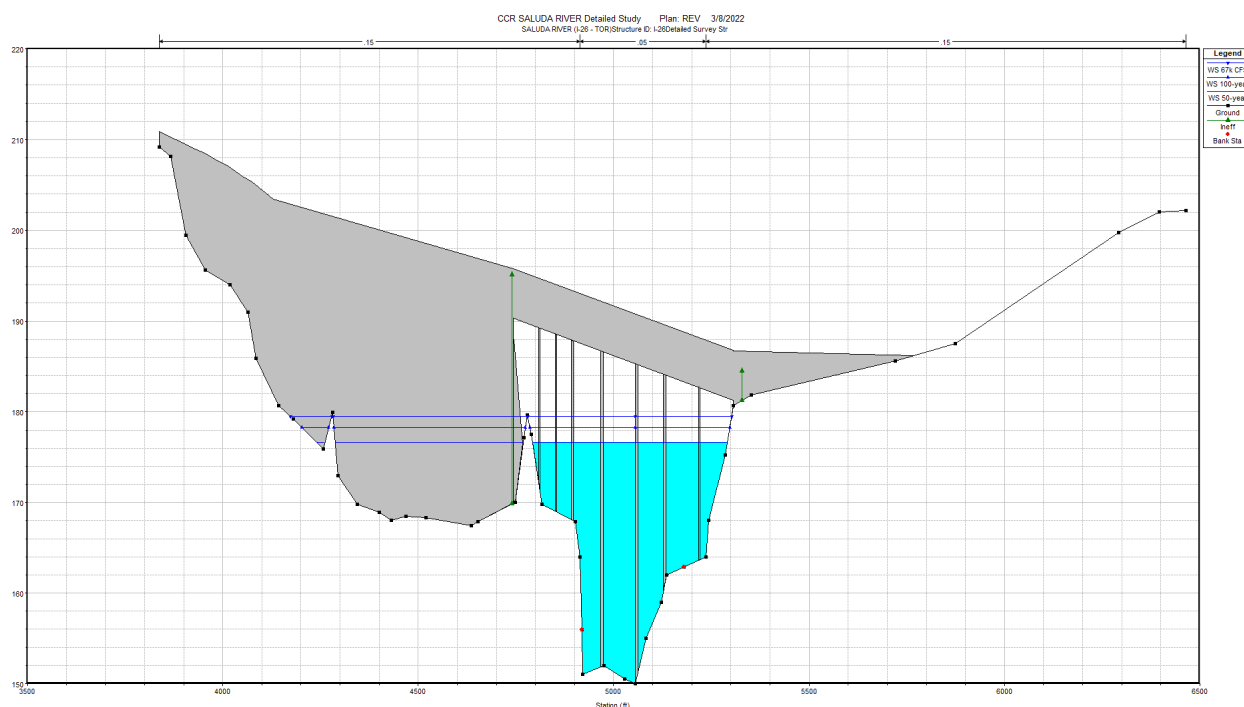


Figure 7. Proposed Bridge Cross Section

INTERMEDIATE MODEL

Due to the complex hydraulics related to the existing bridge's proximity to the proposed CD bridge, a two-dimensional analysis was performed to better simulate the intermediate condition. The intermediate condition will consist of the existing I-26 bridge remaining in place between the construction of Phases 1 and 3 of the Carolina Crossroad project. The intermediate 2D model was created using the latest version of HEC-RAS (6.1) to analyze and determine the impacts the downstream CD bridge may have on water surface elevations upstream of the I-26 crossing over the Saluda River. The RFP gave strict guidance on the placement of bents for the proposed CD bridge to be constructed in Phase 1 to avoid conflicts with existing bents on the I-26 bridges once the CD bridge is replaced. As a result, the columns do not line up between the two bridges which need to be analyzed to determine any measurable impacts to upstream structures in this temporary condition.

The existing terrain was created by obtaining LiDAR from Richland and Lexington County in the form of a DEM (geotiff). Multiple tiles were downloaded due to the size of the study area and the tiles were combined to create a single Terrain.

The LiDAR obtained does not contain elevations for the Saluda River channel and a typical section along with a slope was input into the terrain to better model the Saluda River. The geometry, slope, and layout were obtained by reviewing survey data, old plans, and aerial imagery. This typical section was used to modify the LiDAR terrain along with other features. These other features include the existing bents for the I-26 bridge. These were also input into the terrain using the Terrain modification tool to represent a square column with a 5' diameter. The old bridge plans were reviewed to determine spacing and location of these bents and were input into the terrain. These modifications created the base terrain for our existing conditions model. The proposed/intermediate conditions model utilized this terrain and modify it further to include the proposed 6.5 foot diameter drilled shafts to be constructed with CD ramp. Also included in the modifications for the proposed terrain was the end abutment to be constructed on the left overbank of floodplain. The end bridge abutment is approximately 150' past the existing end bridge and will be behind the existing causeway.

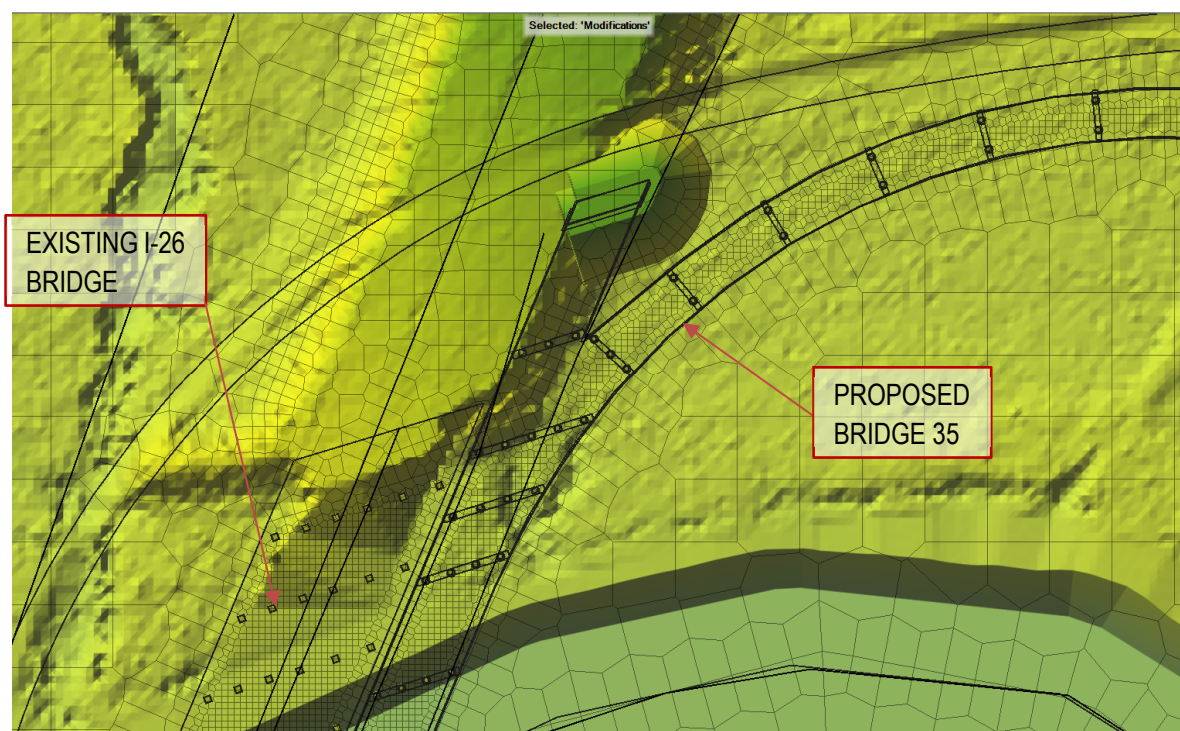


Figure 8. Proposed 2D Terrain Model – End Bridge Abutment and Columns

Manning's "n" values were assigned to each cell based upon aerial imagery. Most of the study area is heavily wooded and was assigned an "n" value of 0.15. The Saluda River channel and immediate banks were assigned a value of 0.045, grass areas were assigned a value of 0.08, and residential areas were assigned a value of 0.12. The only variance between the proposed and existing conditions model is that the proposed CD bridge "n" value was lowered to reflect a grass condition since it would not allow for thick vegetation to grow underneath the bridge compared to that of the existing floodplain.

The two-dimensional mesh contains approximately 17,000 cells with an average spacing of approximately 40 feet. Cells near the existing and proposed bridges were reduced to lengths of five feet to better model the affect the existing and proposed columns have on the water surface. The water surface elevations for the 100-year flow do not reach the low chord of the existing bridge and thus only the piers were input into the model since the existing bridge will not have an impact on the hydraulics. The proposed CD bridge will be significantly higher than the existing bridge and the proposed columns will be the only elements impacting the water surface in this area. Breaklines were also added

around features such as spur dikes, causeway, channel centerlines, etc to better align cells and also decrease cell spacing to better model these features. A flow hydrograph for the FEMA 100-year discharge of 58,600 cfs was input at the upstream end of the model and a normal slope of 0.105% was used as the downstream boundary condition. The flow hydrograph climbs from 1,000 cfs at hour 0 to the 100-year flow at hour 4 and maintains a steady flow for the rest of the model simulation.

The results between the two models do not show a measurable increase in water surface elevations upstream of the proposed CD ramp construction during the intermediate phase. The water surface profile plot comparison for the existing and intermediate condition does not show an increase along the centerline of the Saluda River. Plots were also included for the cross section under the existing bridge as well as the proposed bridge. These two cross sectional plots also do not show an increase in water surface elevations. Velocity vector plots have been included as well to show the existing and proposed flows in the intermediate condition. **Table 5** shows various cross sections upstream of the bridge crossings and the difference in the average water surface elevation across each section. The difference is less than 0.01' across all sections and will not have a measurable impact on upstream properties or structures during the intermediate phase of construction.

Upstream Station	Existing WSE (ft)	Intermediate Condition WSE (ft)	Difference (ft)
Existing Bridge	175.417	175.417	0.001
500	176.374	176.382	0.008
1000	176.924	176.931	0.007
1500	177.526	177.532	0.006

Table 5. Intermediate Water Surface Elevation Results

SCOUR ANALYSIS OF THE SALUDA RIVER CROSSING

The proposed new bridge was analyzed for scour potential for 100- and 500-year flood events using *The South Carolina Bridge-Scour Envelope Curves* (USGS; Scientific Investigations Report 2016-5121; Benedict, Feaster, and Caldwell). HEC-RAS model output for the proposed new bridge was used in computing contraction and pier scour. The bridge was analyzed for the ultimate build out of the Carolina Crossroads project which includes the construction of new CD ramp bridge as well as the replacement of the I-26 bridges. The bridge opening was based upon the Modified Selected Alignment for the ultimate build out to determine contraction scour through the bridge. HEC-18 equations were also used as a check to verify the calculated depths. The HEC-18 analysis resulted in scour depths less than Envelope Curves and as a result the values obtained from the Envelope curves were used for the ultimate scour depths.

Flood Event	Left Overbank* (Contraction + Pier Combined)	Right Overbank* (Contraction + Pier Combined)	Channel Live-Bed (Contraction + Pier Combined)
	Depth (ft.)*	Depth (ft.)**	Depth (ft.)*
100-year	15.9	15.9	22.7
500-year	19.0	19.0	27.3

Table 6 USGS Envelope Curves - Scour Results

The length of the bridge opening was measured to be 563' based up the skew of the bridge to the Saluda River floodplain. The length of bridge compared to the width of the floodplain at the approach cross section (XS 18,800) resulted in geometric contraction ratio of 0.65. Pier scour depths were determined by analyzing a pier width of 6.5 feet

which is the diameter of the drilled shafts that will be utilized for the construction of the columns. Abutment scour was not incorporated into the calculated scour depths due to existing spur dike along the left overbank. When the existing I-26 bridges were constructed in 1959, a spur dike was constructed along the left overbank to act as a scour countermeasure for the crossing. Spur dikes are highly effective in limiting scour from occurring near the abutments. The scour analysis performed in this report is for CD ramp bridge to be constructed in Phase 1. The bridge will be located downstream of the proposed I-26 bridge replacement to be completed in Phase 3. The location of this bridge along with the scour countermeasures utilized for the Saluda River resulted in no anticipated abutment along the left abutment for the CD ramp bridge. The existing bridge plans can be found in **Appendix O**. The right overbank near the bridge has shallow rock near the surface as indicated in the boring logs. The hard rock in this area limits scour depths for the proposed bents in the overbank as well as the abutment. The erodibility of the rock in this area was evaluated to determine if the rock would scour and it was determined that it would not. The results of the erodibility analysis as well as the scour analysis be found in **Appendix L**. The scour profile was updated to reflect the hard rock in this area and scour depths were limited to the elevation of the rock.

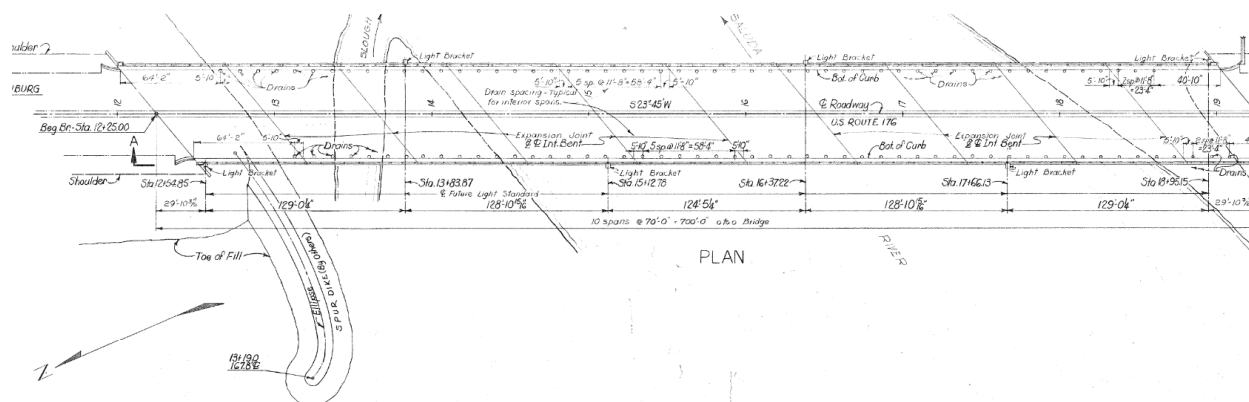


Figure 9. Existing Spur Dike Left Overbank

SCOUR ANALYSIS BENTS 14-33

Scour was analyzed for the portion of bridge 35 that runs parallel to the Saluda River using FHWA HEC-18 fifth edition for local pier scour. Bents 14 through 33 are located along the portion of bridge 35 that connects with the Colonial Life interchange. The alignment of the ramp follows along the outskirts of the Saluda River floodplain and runs parallel to the main channel. The bents in this area are far enough downstream of the proposed Saluda River Bridge crossing to not be impacted by contraction scour occurring through the bridge. This segment of the bridge will only experience local pier scour at each column due to this phenomenon. The velocities and flow depths at each bent vary significantly due to the steep longitudinal slope of the Saluda River. The water surface elevations for the 100 and 500-year storm drop quickly through this section prior to the convergence of the Saluda River with the Broad River near downtown Columbia. **Figure 10** shows the alignment as well as the velocities along the bridge alignment. Flow distributions were set within the 1-dimensional HEC-RAS model to provide a more detailed analysis of the varied velocity rates across the width of the overbank. Depths, water surface elevations, and velocities were determined at each bent and a scour depth was calculated based upon these variables for each of the bents. The scour analysis resulted in minimal scour depths through this area due to the shallow water depths along with minimal velocities. The results from the analysis can be found in **Appendix L**.

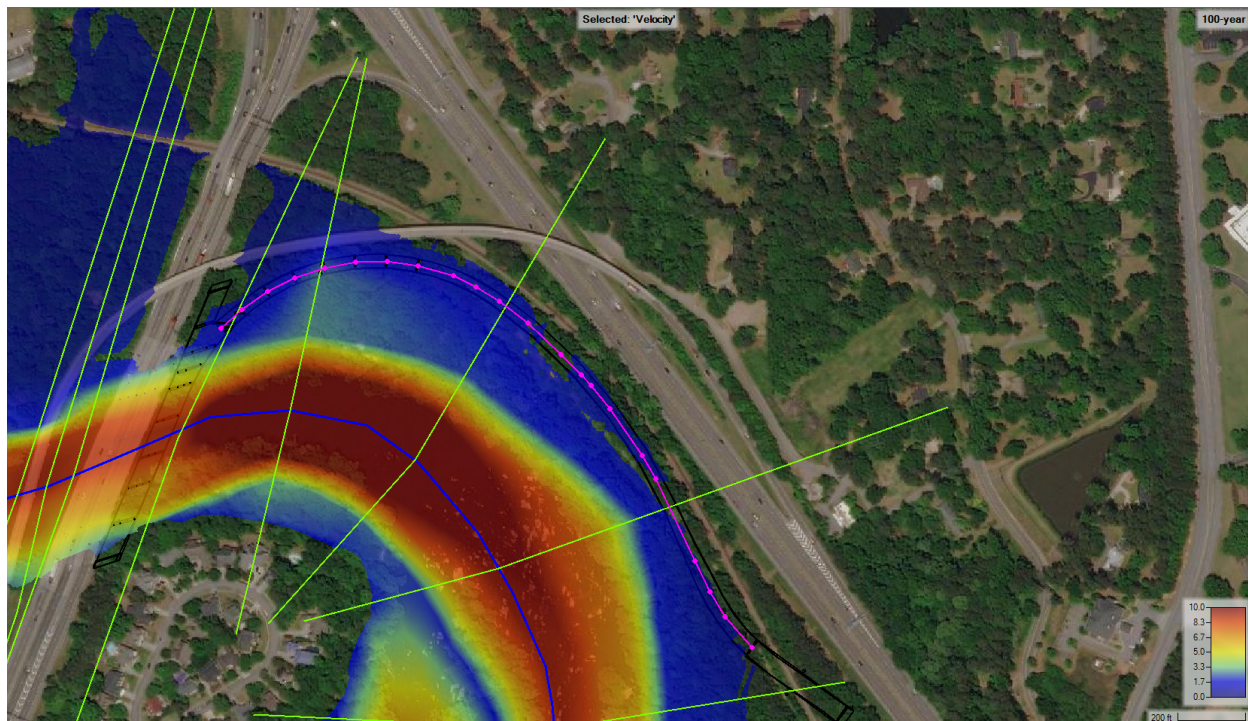


Figure 10. Bridge 35 Ramp 100-Year Velocities

CONCLUSION

The proposed CD lane bridge at Interstate 26 over The Saluda River is in conformance with freeboard criteria established by *The South Carolina Department of Transportation Requirements for Hydraulic Design Studies* and additional criteria presented in the Request for Proposals document. More than 2.0 feet of freeboard will be provided CD lane bridge for the 50-year design flood frequency for the Revised Model that includes the construction of both bridge in Phase 1 and 3 of the Carolina Crossroads Project. The intermediate condition has been analyzed and the results show no measurable increase in water surface elevation upstream during the first phase of construction for the Carolina Crossroad Project. The existing backwater of 1.92 feet was reduced to 1.89 feet in the proposed condition. To reduce backwater to less than 1 foot as recommended in SCDOT HDR for the ultimate buildout, much of the existing interstate's causeway into the Saluda River floodplain would need to be removed. It was determined that the length of the proposed bridge required across the Saluda River would be approximately 1,050 feet in length to reduce the backwater depth upstream to below 1.0' for the natural comparison. A bridge of this length would require removing more than 300 feet of the existing causeway located within the left overbank between the Saluda River and the existing CSX track. This scenario does not seem feasible based upon the ultimate build out of the Carolina Crossroads project as well as the constructability of removing this portion of the causeway. The skew of the I-26 crossing over the Saluda River is approximately 40 degrees which has a significant impact on the effective opening length of the bridge. A contract change request has been submitted and will propose to reduce the water surface elevations in the revised condition compared to that of the existing conditions and construct a bridge similar to that of the Modified Selected Alignment provided by the SCDOT for the ultimate build out condition.

APPENDIX A

FEMA DATA

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 (NAVD 88). 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 Lambert Conformal Conic State Plane South Carolina FIPS 3900. The **horizontal datum** was NAD83 HARN, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane 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. 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, NNGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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 Lexington County, South Carolina.

This map reflects more detailed and up-to-date **stream channel configurations** 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.

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.

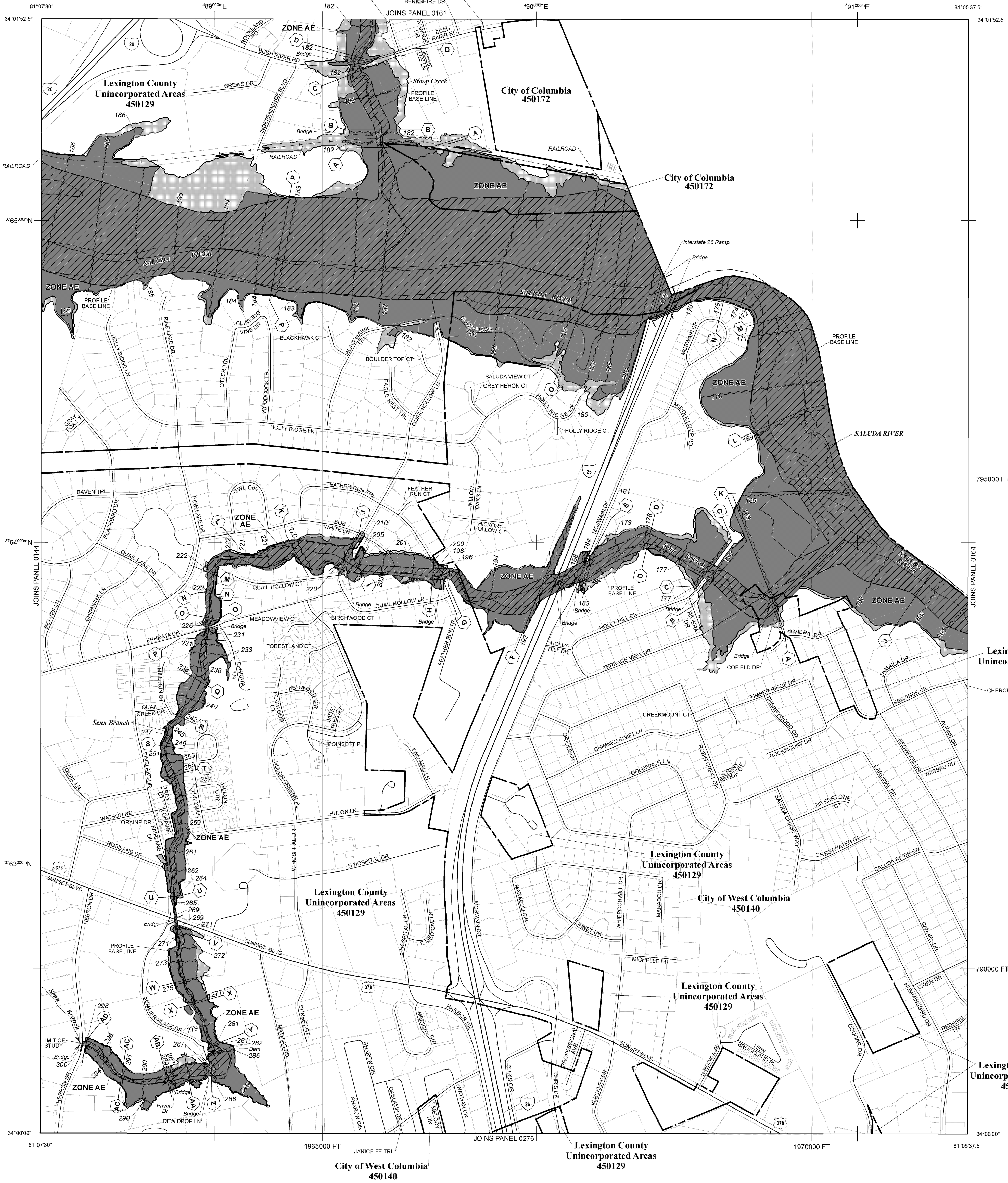
For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange** at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at <http://www.msc.fema.gov/>. Available products may include previously issued Letters of Map Change, a Flood Insurance Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

The "profile base lines" depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the "profile base line", in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.



This digital Flood Insurance Rate Map (FIRM) was produced through a unique cooperative partnership between the State of South Carolina and the Federal Emergency Management Agency (FEMA). The State of South Carolina has implemented a long term approach of floodplain management to decrease the costs associated with flooding. This is demonstrated by the State's commitment to map floodplain areas at the local level. As a part of this effort, the State of South Carolina has joined in a Cooperating Technical State agreement with FEMA to produce and maintain this digital FIRM.

<http://www.dnr.state.sc.us/>



LEGEND

SPECIAL FLOOD HAZARD AREAS 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 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** Areas to be protected from 1% annual chance flood event 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)

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- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
- Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*
- * Referenced to the North American Vertical Datum of 1988
- Cross section line
- Transsect line
- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) HARN, Western Hemisphere
- 1000-meter Universal Transverse Mercator grid ticks, zone 17
- 5000-foot grid values: South Carolina State Plane coordinate system (FIPSZONE = 3900), Lambert projection
- Bench mark (see explanation in Notes to Users section of this FIRM panel)
- River Mile

MAP REPOSITORIES
Refer to Map Repositories List on Map Index
EFFECTIVE DATE OF COUNTY-WIDE FLOOD INSURANCE RATE MAP
July 17, 1995

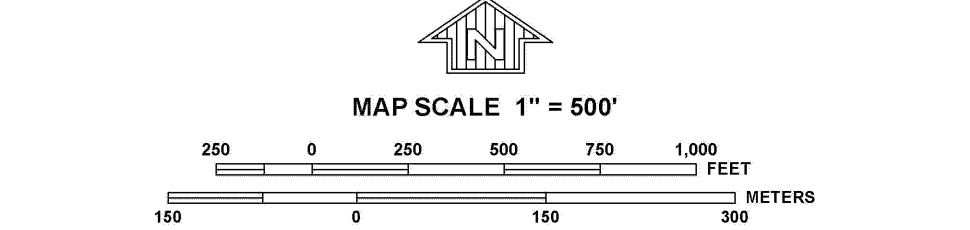
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

February 9, 2000 - to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to change zone designations, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to reflect updated topographic information.

July 5, 2018 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to change Special Flood Hazard Areas, to change zone designations, to update roads and road names, to incorporate previously issued Letters of Map Revision, to reflect updated topographic information, to change floodway, and to add reference suffix.

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.

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NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0163J
FIRM
FLOOD INSURANCE RATE MAP
LEXINGTON COUNTY,
SOUTH CAROLINA
AND INCORPORATED AREAS

PANEL 163 OF 555

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLUMBIA, CITY OF	450172	0163	J
LEXINGTON COUNTY	450129	0163	J
WEST COLUMBIA, CITY OF	450140	0163	J

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

45063C0163J

MAP REVISED

JULY 5, 2018



Federal Emergency Management Agency

NOTES TO USERS

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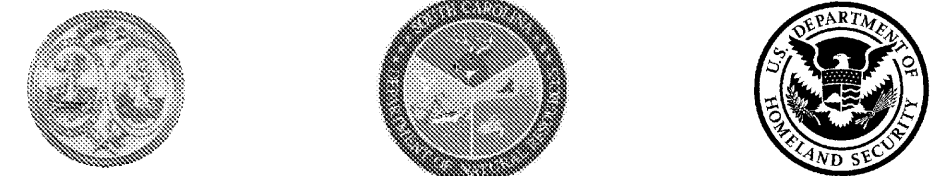
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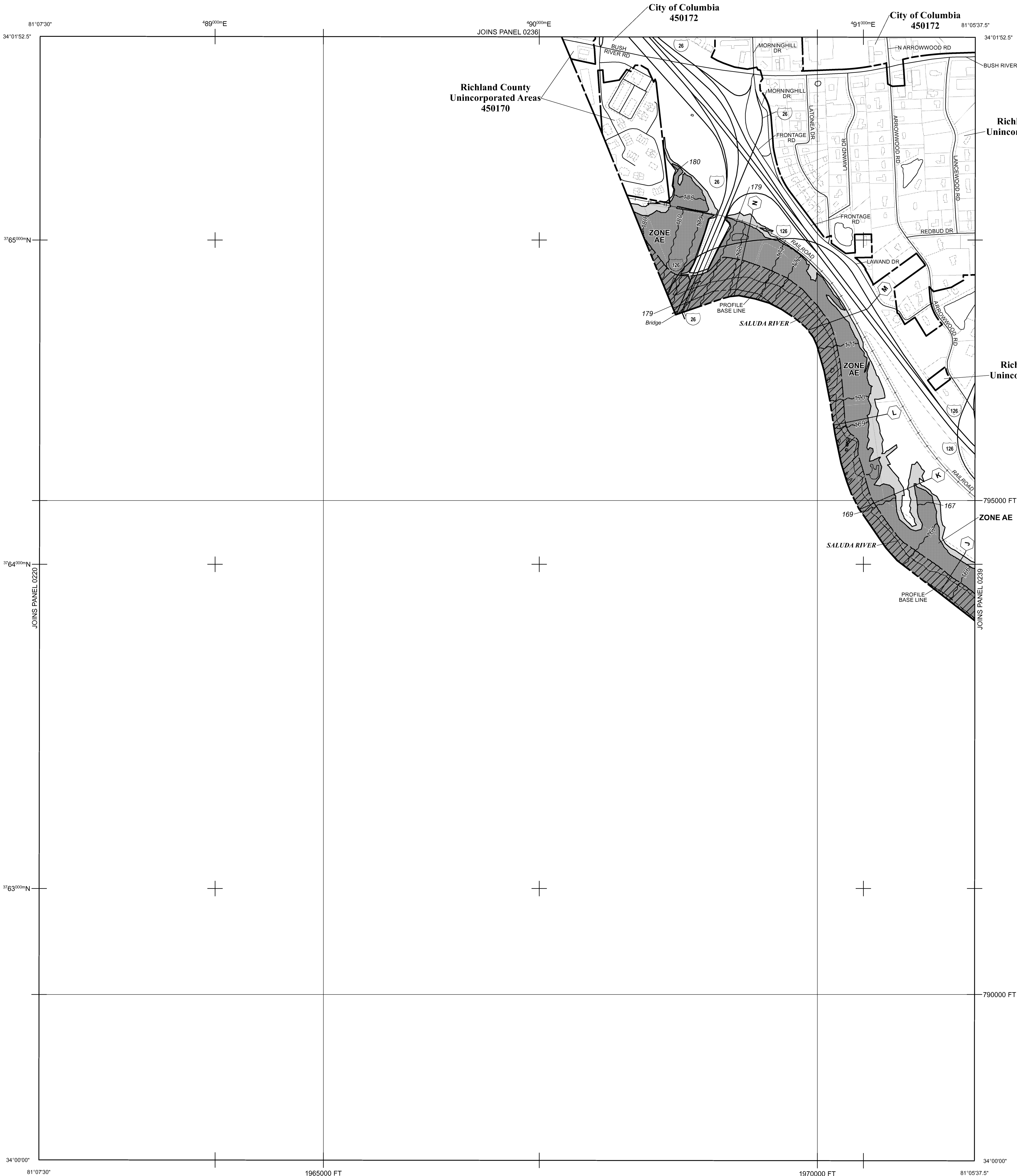
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LEGEND

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- Base Flood Elevation line and value; elevation in feet* (EL 987)
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* Referenced to the North American Vertical Datum of 1988

- Cross section line
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- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 1000-meter Universal Transverse Mercator grid ticks, zone 17
- 5000-foot grid values: South Carolina State Plane coordinate system (FIPSZONE = 3900), Lambert projection
- Bench mark (see explanation in Notes to Users section of this FIRM panel)

MAP REPOSITORIES
Refer to Map Repositories List on Map Index

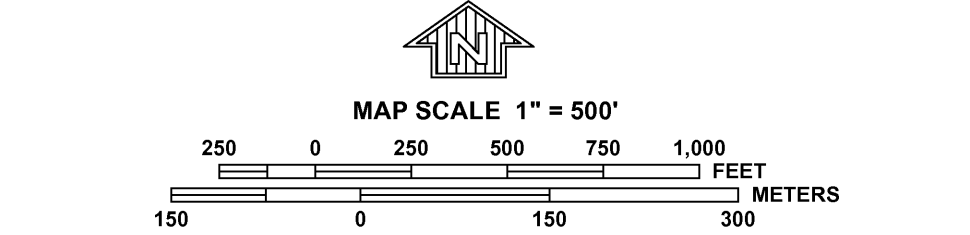
EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
January 19, 1994

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
February 20, 2002
September 29, 2010

December 21, 2017 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to update map format, to add roads and road names, to reflect updated topographic information, and to incorporate previously issued Letters of Map Revision.

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NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0238L

FIRM
FLOOD INSURANCE RATE MAP
RICHLAND COUNTY,
SOUTH CAROLINA
AND INCORPORATED AREAS

PANEL 238 OF 650

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLUMBIA, CITY OF	450172	0238	L
RICHLAND COUNTY	450170	0238	L

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
45079C0238L

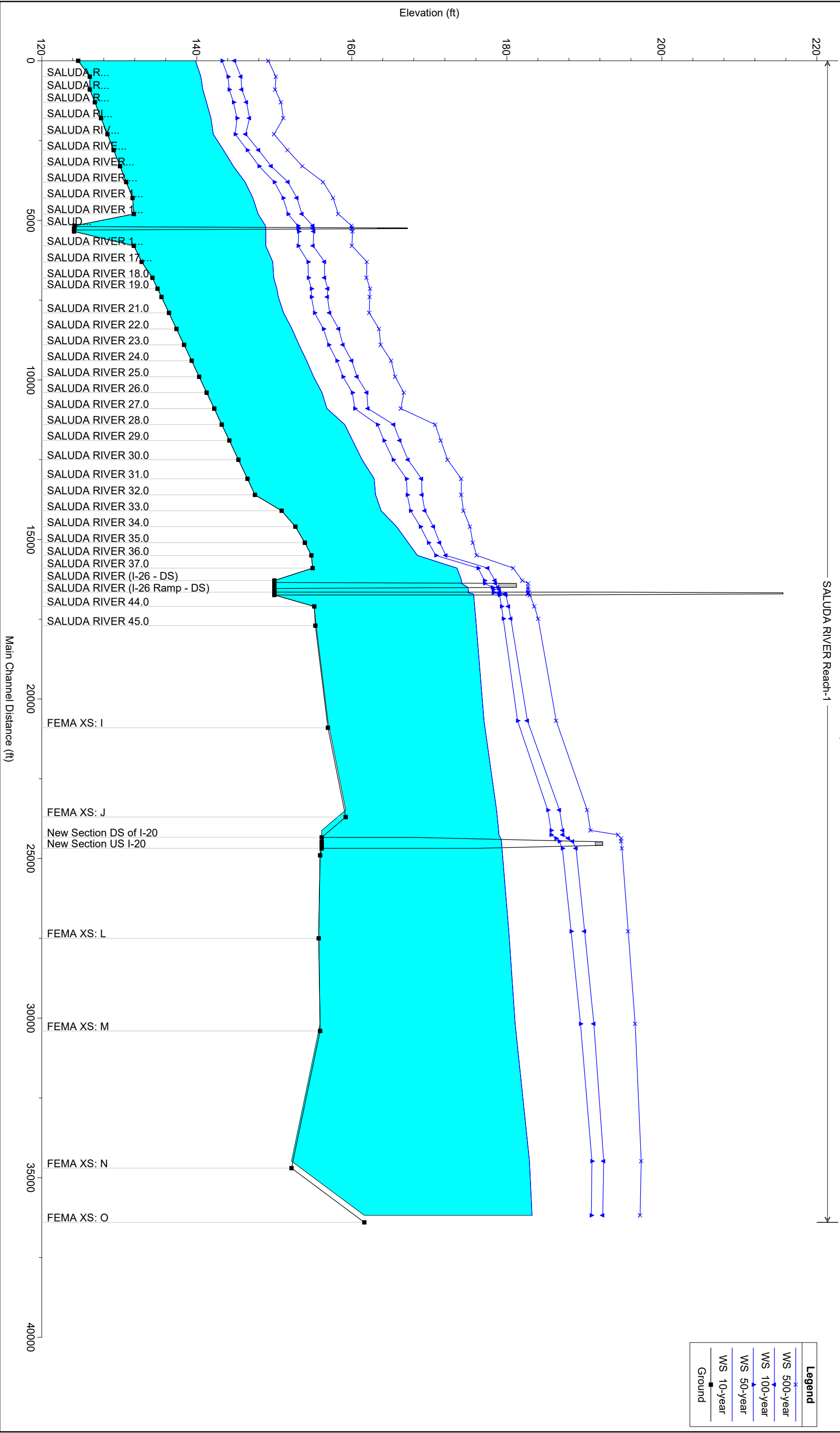
MAP REVISED
DECEMBER 21, 2017

Federal Emergency Management Agency

APPENDIX B

HEC-RAS OUTPUT – DUPLICATE EFFECTIVE MODEL

SALUDA RIVER Reach-1



Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	37500	10-year	32000.0	161.62	183.2		183.6	0.000485	4.60	7106.39	422.5	0.19
Reach-1	37500	50-year	90000.0	161.62	190.9		191.7	0.000913	7.92	16393.66	1806.2	0.27
Reach-1	37500	100-year	105000.0	161.62	192.4		193.2	0.000933	8.30	19165.54	1959.8	0.28
Reach-1	37500	500-year	145000.0	161.62	197.2		197.9	0.000714	8.08	29452.47	2201.9	0.25
Reach-1	35800	10-year	32000.0	152.22	182.9		183.0	0.000190	3.10	19521.47	2843.0	0.12
Reach-1	35800	50-year	90000.0	152.22	191.0		191.0	0.000129	3.17	59608.12	5466.6	0.10
Reach-1	35800	100-year	105000.0	152.22	192.5		192.6	0.000122	3.18	67954.17	5524.3	0.10
Reach-1	35800	500-year	145000.0	152.22	197.3		197.4	0.000088	2.98	95297.11	5820.0	0.09
Reach-1	31500	10-year	32000.0	155.92	181.1		181.5	0.000792	5.50	7848.17	1309.4	0.23
Reach-1	31500	50-year	90000.0	155.92	189.5		189.9	0.000683	6.67	27830.56	3848.8	0.23
Reach-1	31500	100-year	105000.0	155.92	191.2		191.6	0.000552	6.26	34522.79	3907.7	0.21
Reach-1	31500	500-year	145000.0	155.92	196.6		196.8	0.000289	5.10	55836.38	4089.5	0.16
Reach-1	28600	10-year	32000.0	155.72	180.2		180.4	0.000207	3.38	15431.65	1493.4	0.13
Reach-1	28600	50-year	90000.0	155.72	188.3		188.5	0.000336	5.28	29294.21	1952.1	0.17
Reach-1	28600	100-year	105000.0	155.72	190.0		190.3	0.000343	5.54	32804.61	2052.0	0.17
Reach-1	28600	500-year	145000.0	155.72	195.7		195.9	0.000288	5.65	45221.95	2372.0	0.16
Reach-1	26000	10-year	32000.0	155.92	179.4		179.6	0.000453	4.30	11589.52	1522.7	0.18
Reach-1	26000	50-year	90000.0	155.92	187.2		187.5	0.000506	5.76	25679.82	2084.6	0.20
Reach-1	26000	100-year	105000.0	155.92	188.9		189.2	0.000483	5.88	29496.22	2209.2	0.20
Reach-1	26000	500-year	145000.0	155.92	194.9		195.1	0.000331	5.53	42917.45	2320.6	0.17
Reach-1	25780	10-year	32000.0	156.12	179.3	165.4	179.5	0.000319	3.34	10456.79	1475.6	0.15
Reach-1	25780	50-year	90000.0	156.12	186.8	172.3	187.3	0.000598	5.91	17087.95	1770.2	0.22
Reach-1	25780	100-year	105000.0	156.12	188.5	173.5	189.0	0.000629	6.35	18587.94	1997.2	0.22
Reach-1	25780	500-year	145000.0	156.12	194.8	176.4	195.0	0.000282	4.93	42797.89	2502.3	0.16
Reach-1	25550		Bridge									
Reach-1	25436	10-year	32000.0	156.12	178.9	165.1	179.2	0.000411	4.13	9147.32	1508.4	0.17
Reach-1	25436	50-year	90000.0	156.12	185.7	172.9	186.4	0.000863	7.40	15147.36	1783.6	0.26
Reach-1	25436	100-year	105000.0	156.12	187.2	174.7	188.0	0.000918	7.94	16504.65	1877.3	0.27
Reach-1	25436	500-year	145000.0	156.12	190.8	177.9	191.9	0.001041	9.20	19669.91	1993.2	0.30
Reach-1	24800	10-year	32000.0	159.22	178.7		178.9					

HEC-RAS Plan: DEM River: SALUDA RIVER Reach: Reach-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
Reach-1	17385	10-year	29600.0	150.00	174.2	159.8	174.3	0.000313	3.63	9962.83	1019.4	0.15
Reach-1	17385	50-year	48300.0	150.00	177.1	163.0	177.5	0.000489	5.01	12157.78	1258.6	0.19
Reach-1	17385	100-year	58600.0	150.00	178.5	164.1	178.9	0.000579	5.68	13173.75	1349.0	0.21
Reach-1	17385	500-year	89900.0	150.00	182.0	167.1	182.8	0.000816	7.41	15854.66	1588.9	0.25
Reach-1	17000	10-year	29600.0	154.95	173.6	168.3	173.9	0.025526	2.76	7080.53	955.2	0.14
Reach-1	17000	50-year	48300.0	154.95	176.3	169.7	176.9	0.025040	3.14	9371.26	986.2	0.14
Reach-1	17000	100-year	58600.0	154.95	177.5	170.4	178.2	0.025335	3.33	10424.70	1033.6	0.15
Reach-1	17000	500-year	89900.0	154.95	180.8	172.6	181.8	0.026071	3.83	13209.64	1120.2	0.15
Reach-1	16600	10-year	29600.0	154.78	168.5		169.8	0.005306	9.38	3737.81	775.2	0.60
Reach-1	16600	50-year	48300.0	154.78	170.8		172.7	0.005322	11.25	5705.77	871.2	0.62
Reach-1	16600	100-year	58600.0	154.78	172.1		174.2	0.005063	11.89	6869.38	909.1	0.62
Reach-1	16600	500-year	89900.0	154.78	176.1		178.4	0.003977	12.85	10523.91	953.8	0.58
Reach-1	16200	10-year	29600.0	153.94	167.3		168.0	0.003133	7.06	5078.95	838.3	0.46
Reach-1	16200	50-year	48300.0	153.94	169.9		170.9	0.002944	8.35	7337.59	882.7	0.46
Reach-1	16200	100-year	58600.0	153.94	171.3		172.4	0.002717	8.78	8627.41	899.8	0.46
Reach-1	16200	500-year	89900.0	153.94	175.6		176.9	0.002127	9.59	12683.46	966.0	0.43
Reach-1	15700	10-year	29600.0	152.72	165.8		166.5	0.003258	7.44	5013.19	995.7	0.47
Reach-1	15700	50-year	48300.0	152.72	168.9		169.6	0.002308	7.81	8465.57	1188.3	0.42
Reach-1	15700	100-year	58600.0	152.72	170.5		171.2	0.001936	7.86	10470.12	1206.5	0.39
Reach-1	15700	500-year	89900.0	152.72	175.2		176.0	0.001338	8.08	16552.23	1337.0	0.34
Reach-1	15200	10-year	29600.0	150.94	163.8		164.6	0.003001	7.80	4415.48	864.4	0.50
Reach-1	15200	50-year	48300.0	150.94	167.6		168.3	0.001772	7.86	8290.50	1087.3	0.41
Reach-1	15200	100-year	58600.0	150.94	169.4		170.2	0.001490	7.97	10379.56	1160.0	0.39
Reach-1	15200	500-year	89900.0	150.94	174.4		175.2	0.001076	8.39	16400.34	1269.5	0.35
Reach-1	14700	10-year	29600.0	147.50	163.1		163.7	0.001395	6.77	5892.40	963.0	0.36
Reach-1	14700	50-year	48300.0	147.50	167.1		167.7	0.001000	7.09	10087.65	1118.0	0.32
Reach-1	14700	100-year	58600.0	147.50	169.1		169.7	0.000898	7.29	12263.92	1141.4	0.31
Reach-1	14700	500-year	89900.0	147.50	174.1		174.8	0.000744	7.91	18212.70	1263.0	0.30
Reach-1	14200	10-year	29600.0	146.53	162.9		163.2	0.000559	5.15	7513.96	1190.2	0.24
Reach-1	14200	50-year	48300.0	146.53	167.0		167.3	0.000449	5.46	13206.96	1463.8	0.22
Reach-1	14200	100-year	58600.0	146.53	169.0		169.3	0.000416	5.63	16114.27	1532.9	0.22
Reach-1	14200	500-year	89900.0	146.53	174.1		174.5	0.000362	6.08	24163.18	1744.6	0.21
Reach-1	13600	10-year	29600.0	145.36	161.3		162.4	0.001588	8.72	5810.49	993.5	0.40
Reach-1	13600	50-year	48300.0	145.36	165.3		166.6	0.001511	10.00	10218.26	1249.7	0.41
Reach-1	13600	100-year	58600.0	145.36	167.3		168.6	0.001452	10.46	12692.64	1328.4	0.41
Reach-1	13600	500-year	89900.0	145.36	172.4		173.8	0.001297	11.47	20121.14	1544.1	0.40
Reach-1	13000	10-year	29600.0	144.19	160.1		161.3	0.002089	9.00	3989.72	629.7	0.45
Reach-1	13000	50-year	48300.0	144.19	164.2		165.6	0.001839	10.20	7512.67	985.9	0.44
Reach-1	13000	100-year	58600.0	144.19	166.2		167.7	0.001664	10.49	9610.31	1054.5	0.43
Reach-1	13000	500-year	89900.0	144.19	171.5		173.0	0.001369	11.24	15395.69	1123.4	0.41
Reach-1	12500	10-year	29600.0	143.22	159.1		160.3	0.002112	9.01	4328.60	634.8	0.45
Reach-1	12500	50-year	48300.0	143.22	163.3		164.7	0.001787	10.10	7460.11	907.0	0.44
Reach-1	12500	100-year	58600.0	143.22	165.4		166.8	0.001638	10.47	9471.80	1003.2	0.43
Reach-1	12500	500-year	89900.0	143.22	170.8		172.3	0.001382	11.39	15450.97	1210.7	0.41
Reach-1	12000	10-year	29600.0	142.25	156.8		158.7	0.004036	11.20	2663.38	269.5	0.61
Reach-1	12000	50-year	48300.0	142.25	160.4		163.2	0.004003	13.56	3687.53	302.3	0.64
Reach-1	12000	100-year	58600.0	142.25	162.1		165.4	0.004005	14.64	4213.90	331.9	0.65
Reach-1	12000	500-year	89900.0	142.25	166.3		170.9	0.004085	17.34	6530.15	787.4	0.68
Reach-1	11500	10-year	29600.0	141.27	156.2		157.2	0.001814	8.06	3876.05	392.7	0.42
Reach-1	11500	50-year	48300.0	141.27	160.1		161.5	0.001791	9.73	5536.55	452.1	0.44
Reach-1	11500	100-year	58600.0	141.27	161.9		163.6	0.001783	10.48	6437.99	546.2	0.44
Reach-1	11500	500-year	89900.0	141.27	166.7		168.9	0.001732	12.15	10740.23	1153.9	0.46
Reach-1	11000	10-year	29600.0	140.30	155.1		156.2	0.002054	8.50	3526.92	334.8	0.44
Reach-1	11000	50-year	48300.0	140.30	158.9		160.5	0.002085	10.37	4875.16	373.6	0.47
Reach-1	11000	100-year	58600.0	140.30	160.7		162.6	0.002102	11.22	5766.42	643.6	0.48
Reach-1	11000	500-year	89900.0	140.30	165.6		167.9	0.001915	12.68	11047.59	1449.7	0.48
Reach-1	10500	10-year	29600.0	139.33	154.2		155.1	0.001922	7.99	3824.50	380.3	0.43
Reach-1	10500	50-year	48300.0	139.33	158.1		159.5	0.001886	9.46	5491.22	526.7	0.44
Reach-1	10500	100-year	58600.0	139.33	160.0		161.5	0.001803	10.05	6704.48	732.9	0.44
Reach-1	10500	500-year	89900.0	139.33	165.1		166.9	0.001566	11.25	11387.24	1137.0	0.43
Reach-1	10000	10-year	29600.0	138.36	153.2		154.2	0.001839	8.19	3994.44	426.5	0.42

HEC-RAS Plan: DEM River: SALUDA RIVER Reach: Reach-1 (Continued)

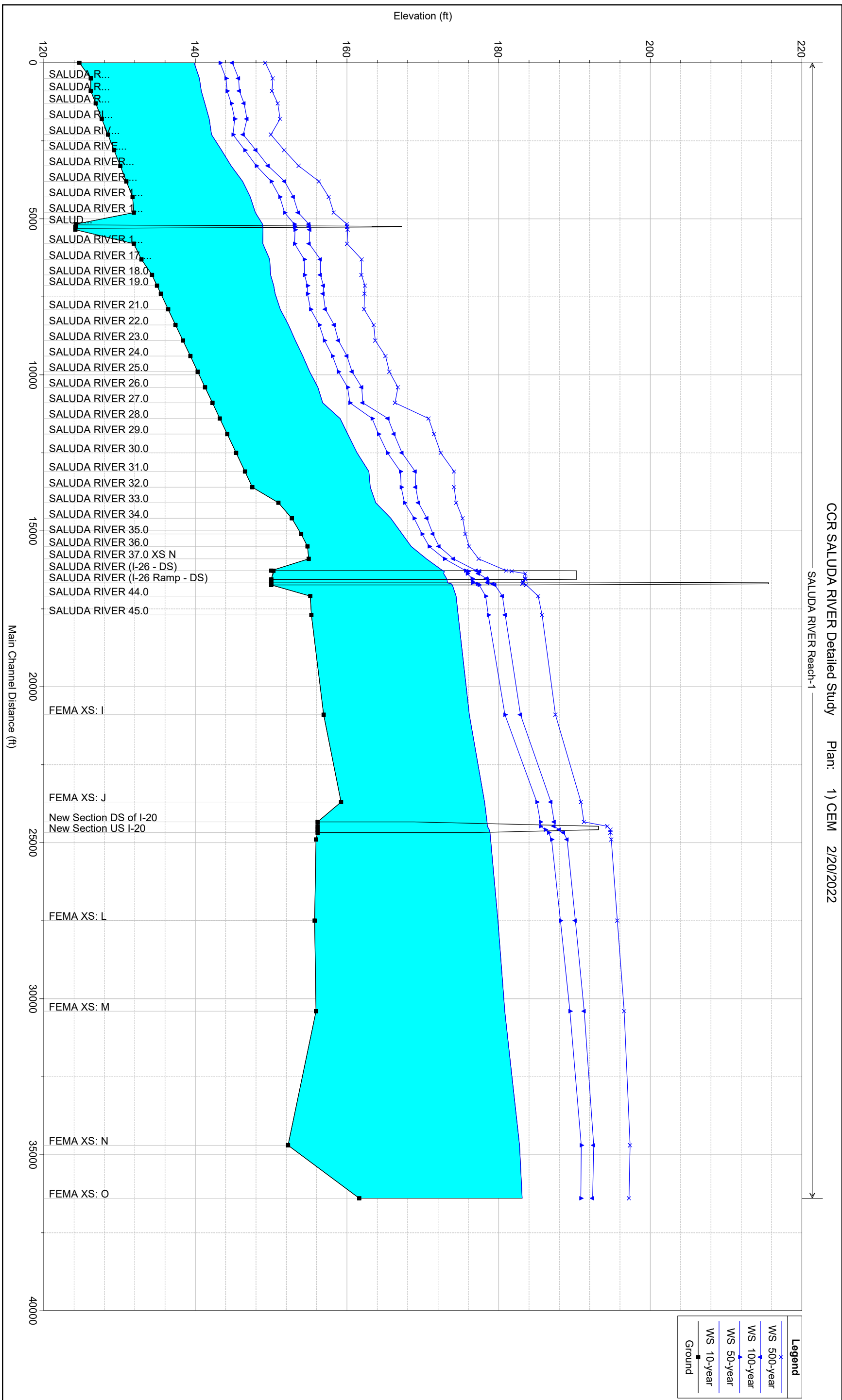
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	10000	50-year	48300.0	138.36	157.0		158.5	0.001845	9.91	5705.30	467.4	0.44
Reach-1	10000	100-year	58600.0	138.36	158.9		160.6	0.001856	10.71	6618.73	524.2	0.45
Reach-1	10000	500-year	89900.0	138.36	163.7		166.0	0.001830	12.54	9865.36	742.8	0.47
Reach-1	9500	10-year	29600.0	137.38	152.3		153.3	0.001867	8.02	3903.23	445.5	0.42
Reach-1	9500	50-year	48300.0	137.38	156.3		157.6	0.001611	9.15	5873.03	547.1	0.41
Reach-1	9500	100-year	58600.0	137.38	158.3		159.6	0.001510	9.60	7058.45	654.0	0.41
Reach-1	9500	500-year	89900.0	137.38	163.5		165.0	0.001297	10.61	11198.52	860.7	0.39
Reach-1	9000	10-year	29600.0	136.41	151.2		152.3	0.001935	8.57	3790.72	392.5	0.44
Reach-1	9000	50-year	48300.0	136.41	155.2		156.7	0.001825	10.08	5568.11	495.2	0.44
Reach-1	9000	100-year	58600.0	136.41	157.1		158.8	0.001770	10.71	6575.83	594.2	0.44
Reach-1	9000	500-year	89900.0	136.41	162.2		164.3	0.001634	12.16	10218.60	766.6	0.45
Reach-1	8500	10-year	29600.0	135.44	150.5		151.4	0.001541	7.51	4354.88	505.0	0.39
Reach-1	8500	50-year	48300.0	135.44	154.8		155.8	0.001302	8.48	6769.89	672.2	0.37
Reach-1	8500	100-year	58600.0	135.44	156.8		157.9	0.001183	8.77	8345.74	841.6	0.36
Reach-1	8500	500-year	89900.0	135.44	162.3		163.4	0.000928	9.26	13315.49	955.0	0.34
Reach-1	8240	10-year	29600.0	134.93	150.3		150.9	0.001191	6.55	6125.05	923.3	0.34
Reach-1	8240	50-year	48300.0	134.93	154.8		155.4	0.000853	6.89	10287.45	952.1	0.30
Reach-1	8240	100-year	58600.0	134.93	156.9		157.5	0.000769	7.10	12328.67	981.0	0.29
Reach-1	8240	500-year	89900.0	134.93	162.4		163.1	0.000651	7.78	17959.89	1050.5	0.28
Reach-1	7900	10-year	29600.0	134.27	149.9		150.5	0.001247	6.43	6131.70	872.0	0.34
Reach-1	7900	50-year	48300.0	134.27	154.4		155.1	0.000949	7.05	10105.09	903.0	0.32
Reach-1	7900	100-year	58600.0	134.27	156.5		157.2	0.000878	7.39	12019.61	916.7	0.31
Reach-1	7900	500-year	89900.0	134.27	161.9		162.8	0.000787	8.37	17062.93	967.4	0.31
Reach-1	7400	10-year	29600.0	132.87	149.8		150.1	0.000462	4.62	8023.77	767.3	0.22
Reach-1	7400	50-year	48300.0	132.87	154.3		154.7	0.000422	5.32	11625.07	814.6	0.22
Reach-1	7400	100-year	58600.0	132.87	156.5		156.8	0.000412	5.66	13376.63	831.2	0.22
Reach-1	7400	500-year	89900.0	132.87	161.9		162.4	0.000406	6.57	18051.44	880.0	0.23
Reach-1	6900	10-year	29600.0	131.87	148.9		149.7	0.001077	7.35	5747.59	526.6	0.34
Reach-1	6900	50-year	48300.0	131.87	153.1		154.3	0.001197	9.14	8049.09	594.3	0.37
Reach-1	6900	100-year	58600.0	131.87	155.0		156.4	0.001258	10.00	9247.99	645.9	0.38
Reach-1	6900	500-year	89900.0	131.87	160.0		161.9	0.001355	11.96	12625.15	693.8	0.41
Reach-1	6450	10-year	29600.0	124.16	148.9	134.0	149.2	0.000258	4.37	6945.50	410.9	0.17
Reach-1	6450	50-year	48300.0	124.16	153.1	136.8	153.7	0.000361	5.86	9216.30	613.5	0.21
Reach-1	6450	100-year	58600.0	124.16	155.1	138.0	155.7	0.000407	6.55	10440.25	650.0	0.22
Reach-1	6450	500-year	89900.0	124.16	160.1	141.5	161.1	0.000516	8.28	13879.67	719.9	0.26
Reach-1	6350		Bridge									
Reach-1	6270	10-year	29600.0	124.22	148.9	134.1	149.2	0.000263	4.40	6915.77	406.3	0.17
Reach-1	6270	50-year	48300.0	124.22	153.0	136.8	153.6	0.000368	5.90	9108.42	621.4	0.21
Reach-1	6270	100-year	58600.0	124.22	155.0	138.1	155.6	0.000414	6.58	10341.16	650.5	0.23
Reach-1	6270	500-year	89900.0	124.22	160.0	141.5	161.0	0.000521	8.29	13683.29	688.0	0.26
Reach-1	5900	10-year	29600.0	131.87	147.9		148.8	0.001473	7.57	3997.01	406.6	0.38
Reach-1	5900	50-year	48300.0	131.87	151.8		153.1	0.001545	9.29	5925.88	548.8	0.41
Reach-1	5900	100-year	58600.0	131.87	153.6		155.1	0.001579	10.07	6945.22	602.1	0.42
Reach-1	5900	500-year	89900.0	131.87	158.2		160.4	0.001633	11.94	9979.81	676.6	0.44
Reach-1	5400	10-year	29600.0	131.71	147.2		148.0	0.001415	7.23	4261.19	466.1	0.37
Reach-1	5400	50-year	48300.0	131.71	151.1		152.3	0.001434	8.78	6164.05	515.7	0.39
Reach-1	5400	100-year	58600.0	131.71	152.9		154.3	0.001456	9.51	7119.70	547.0	0.40
Reach-1	5400	500-year	89900.0	131.71	157.6		159.5	0.001507	11.32	10078.53	734.6	0.42
Reach-1	4900	10-year	29600.0	130.90	146.2		147.2	0.001774	8.08	3789.14	433.5	0.41
Reach-1	4900	50-year	48300.0	130.90	150.0		151.5	0.001814	9.82	5783.96	554.8	0.44
Reach-1	4900	100-year	58600.0	130.90	151.8		153.5	0.001834	10.59	6768.36	567.9	0.45
Reach-1	4900	500-year	89900.0	130.90	156.3		158.6	0.001904	12.59	9531.40	749.2	0.47
Reach-1	4400	10-year	29600.0	130.09	144.7		146.2	0.002496	9.61	3189.67	366.5	0.49
Reach-1	4400	50-year	48300.0	130.09	148.0		150.3	0.002873	12.12	4704.01	537.8	0.55
Reach-1	4400	100-year	58600.0	130.09	149.6		152.2	0.002990	13.19	5563.29	564.3	0.57
Reach-1	4400	500-year	89900.0	130.09	153.6		157.3	0.003238	15.83	8020.80	653.0	0.61
Reach-1	3900	10-year	29600.0	129.27	143.4		144.9	0.002645	9.59	3247.94	374.6	0.50
Reach-1	3900	50-year	48300.0	129.27	146.5		148.8	0.003108	12.15	4618.13	487.9	0.56
Reach-1	3900	100-year	58600.0	129.27	148.0		150.6	0.003278	13.29	5364.19	539.3	0.59
Reach-1	3900	500-year	89900.0	129.27	151.7	147.4	155.5	0.003638	16.12	7825.70	821.6	0.64

HEC-RAS Plan: DEM River: SALUDA RIVER Reach: Reach-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
Reach-1	3400	10-year	29600.0	128.46	142.1	138.3	143.5	0.002763	9.46	3427.84	413.3	0.51
Reach-1	3400	50-year	48300.0	128.46	145.0	141.0	147.2	0.003287	12.07	4670.48	486.3	0.58
Reach-1	3400	100-year	58600.0	128.46	146.3	142.4	148.9	0.003476	13.22	5307.66	582.6	0.60
Reach-1	3400	500-year	89900.0	128.46	150.0	146.0	153.7	0.003728	15.85	7724.65	647.8	0.65
Reach-1	2900	10-year	29600.0	127.65	141.8	138.1	142.4	0.001256	6.58	5485.25	747.2	0.35
Reach-1	2900	50-year	48300.0	127.65	145.2	139.9	145.8	0.001096	7.32	8057.78	799.6	0.34
Reach-1	2900	100-year	58600.0	127.65	146.8	140.7	147.5	0.001044	7.66	9339.36	839.4	0.34
Reach-1	2900	500-year	89900.0	127.65	151.2	142.8	152.0	0.000935	8.50	13297.96	955.2	0.33
Reach-1	2400	10-year	29600.0	126.84	141.3	136.7	141.7	0.001121	6.31	7640.49	1372.4	0.33
Reach-1	2400	50-year	48300.0	126.84	144.7	138.8	145.2	0.000952	6.93	12125.68	1705.8	0.32
Reach-1	2400	100-year	58600.0	126.84	146.4	139.6	146.9	0.000890	7.19	14365.48	1739.0	0.31
Reach-1	2400	500-year	89900.0	126.84	150.9	141.6	151.5	0.000782	7.90	20369.18	1795.7	0.30
Reach-1	2000	10-year	29600.0	126.19	140.8	136.0	141.3	0.001216	6.63	7160.53	1360.6	0.34
Reach-1	2000	50-year	48300.0	126.19	144.2	137.8	144.9	0.001184	7.76	10557.90	1601.6	0.35
Reach-1	2000	100-year	58600.0	126.19	145.8	139.0	146.6	0.001182	8.30	12221.15	1680.0	0.36
Reach-1	2000	500-year	89900.0	126.19	150.1	141.3	151.1	0.001184	9.68	17141.38	2008.0	0.37
Reach-1	1600	10-year	29600.0	126.19	140.5	135.5	140.8	0.000781	5.24	7778.17	1352.9	0.27
Reach-1	1600	50-year	48300.0	126.19	144.0	137.1	144.4	0.000701	5.94	11828.36	1431.0	0.27
Reach-1	1600	100-year	58600.0	126.19	145.7	137.8	146.1	0.000679	6.27	13810.17	1461.1	0.27
Reach-1	1600	500-year	89900.0	126.19	150.2	139.8	150.6	0.000526	6.48	23876.97	2041.4	0.25
Reach-1	1100	10-year	29600.0	124.69	139.8	134.8	140.3	0.001050	6.36	6240.04	1030.8	0.32
Reach-1	1100	50-year	48300.0	124.69	143.3	136.8	143.9	0.001050	7.50	9124.03	1110.3	0.33
Reach-1	1100	100-year	58600.0	124.69	144.9	137.7	145.6	0.001052	8.02	10526.49	1131.6	0.34
Reach-1	1100	500-year	89900.0	124.69	149.2	140.2	150.2	0.001051	9.31	15352.61	1823.7	0.35

APPENDIX C

HEC-RAS OUTPUT – CORRECTED EFFECTIVE MODEL



Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	37500	10-year	32000.0	161.62	183.11		183.4	0.000497	4.64	7049.22	421.4	0.19
Reach-1	37500	50-year	90000.0	161.62	190.83		191.7	0.000925	7.96	16275.32	1799.4	0.27
Reach-1	37500	100-year	105000.0	161.62	192.40		193.3	0.000926	8.28	19241.58	1963.8	0.28
Reach-1	37500	500-year	145000.0	161.62	197.19		197.9	0.000714	8.08	29454.12	2201.9	0.25
Reach-1	35800	10-year	32000.0	152.22	182.76		182.9	0.000200	3.17	19080.99	2821.8	0.12
Reach-1	35800	50-year	90000.0	152.22	190.91		191.0	0.000132	3.19	59242.51	5464.0	0.10
Reach-1	35800	100-year	105000.0	152.22	192.53		192.6	0.000121	3.17	68168.05	5525.8	0.10
Reach-1	35800	500-year	145000.0	152.22	197.33		197.4	0.000088	2.98	95301.29	5820.1	0.09
Reach-1	31500	10-year	32000.0	155.92	180.81		181.3	0.000852	5.65	7502.57	1254.1	0.24
Reach-1	31500	50-year	90000.0	155.92	189.40		189.8	0.000707	6.76	27417.66	3845.1	0.24
Reach-1	31500	100-year	105000.0	155.92	191.29		191.6	0.000544	6.22	34735.95	3909.5	0.21
Reach-1	31500	500-year	145000.0	155.92	196.57		196.8	0.000289	5.10	55839.75	4089.5	0.16
Reach-1	28600	10-year	32000.0	155.72	179.90		180.0	0.000224	3.48	14925.14	1474.0	0.13
Reach-1	28600	50-year	90000.0	155.72	188.15		188.4	0.000344	5.33	29026.41	1944.2	0.17
Reach-1	28600	100-year	105000.0	155.72	190.11		190.4	0.000339	5.52	32945.18	2055.9	0.17
Reach-1	28600	500-year	145000.0	155.72	195.66		195.9	0.000288	5.65	45224.11	2372.0	0.16
Reach-1	26000	10-year	32000.0	155.92	178.93		179.2	0.000520	4.53	10919.58	1487.7	0.19
Reach-1	26000	50-year	90000.0	155.92	186.99		187.3	0.000525	5.84	25318.70	2072.5	0.20
Reach-1	26000	100-year	105000.0	155.92	189.02		189.3	0.000475	5.84	29682.54	2215.1	0.20
Reach-1	26000	500-year	145000.0	155.92	194.85		195.1	0.000331	5.53	42919.89	2320.7	0.17
Reach-1	25780	10-year	32000.0	156.12	178.86	165.4	179.0	0.000355	3.46	10058.56	1468.9	0.16
Reach-1	25780	50-year	90000.0	156.12	186.60	172.3	187.1	0.000616	5.97	16929.55	1752.3	0.22
Reach-1	25780	100-year	105000.0	156.12	188.56	173.5	189.1	0.000621	6.32	18665.28	2003.5	0.22
Reach-1	25780	500-year	145000.0	156.12	194.76	176.4	195.0	0.000282	4.93	42800.60	2502.3	0.16
Reach-1	25550		Bridge									
Reach-1	25436	10-year	32000.0	156.12	178.46	165.1	178.7	0.000458	4.29	8730.02	1473.1	0.18
Reach-1	25436	50-year	90000.0	156.12	185.50	172.9	186.2	0.000894	7.49	14961.56	1772.8	0.27
Reach-1	25436	100-year	105000.0	156.12	187.33	174.7	188.1	0.000904	7.90	16590.75	1880.6	0.27
Reach-1	25436	500-year	145000.0	156.12	191.25	177.9	192.3	0.000979	9.01	20071.77	2013.1	0.29
Reach-1	24800	10-year	32000.0	159.2								

HEC-RAS Plan: CEM River: SALUDA RIVER Reach: Reach-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
Reach-1	17385	10-year	29600.0	150.00	172.84	159.8	173.1	0.000427	4.03	7945.81	958.4	0.17
Reach-1	17385	50-year	48300.0	150.00	176.01	163.0	176.5	0.000636	5.51	9676.78	1129.2	0.22
Reach-1	17385	100-year	58600.0	150.00	177.50	164.1	178.1	0.000734	6.21	10510.80	1283.9	0.23
Reach-1	17385	500-year	89900.0	150.00	181.73	167.1	182.4	0.000753	7.07	20917.62	1576.7	0.24
Reach-1	17365	10-year	29600.0	150.00	172.63	161.9	173.0	0.000736	5.17	6781.15	726.7	0.22
Reach-1	17365	50-year	48300.0	150.00	175.65	164.6	176.4	0.001089	7.01	8473.99	840.4	0.28
Reach-1	17365	100-year	58600.0	150.00	177.06	165.9	178.0	0.001255	7.87	9278.66	961.1	0.30
Reach-1	17365	500-year	89900.0	150.00	180.99	169.5	182.2	0.001457	9.48	15142.25	1179.6	0.33
Reach-1	17000	10-year	29600.0	154.95	170.46	168.9	172.1	0.005763	10.76	4256.49	797.9	0.63
Reach-1	17000	50-year	48300.0	154.95	172.86	171.1	175.1	0.006191	13.07	6112.38	882.1	0.68
Reach-1	17000	100-year	58600.0	154.95	174.03	172.1	176.6	0.006298	14.07	7021.52	902.4	0.70
Reach-1	17000	500-year	89900.0	154.95	177.36	174.8	180.6	0.006148	16.27	9644.15	967.5	0.72
Reach-1	16600	10-year	29600.0	154.78	168.45		169.8	0.005306	9.38	3737.81	775.2	0.60
Reach-1	16600	50-year	48300.0	154.78	170.85		172.7	0.005322	11.25	5705.77	871.2	0.62
Reach-1	16600	100-year	58600.0	154.78	172.14		174.2	0.005063	11.89	6869.38	909.1	0.62
Reach-1	16600	500-year	89900.0	154.78	176.10		178.4	0.003977	12.85	10523.91	953.8	0.58
Reach-1	16200	10-year	29600.0	153.94	167.28		168.0	0.003133	7.06	5078.95	838.3	0.46
Reach-1	16200	50-year	48300.0	153.94	169.89		170.9	0.002944	8.35	7337.59	882.7	0.46
Reach-1	16200	100-year	58600.0	153.94	171.33		172.4	0.002717	8.78	8627.41	899.8	0.46
Reach-1	16200	500-year	89900.0	153.94	175.63		176.9	0.002127	9.59	12683.46	966.0	0.43
Reach-1	15700	10-year	29600.0	152.72	165.77		166.5	0.003258	7.44	5013.19	995.7	0.47
Reach-1	15700	50-year	48300.0	152.72	168.86		169.6	0.002308	7.81	8465.57	1188.3	0.42
Reach-1	15700	100-year	58600.0	152.72	170.53		171.2	0.001936	7.86	10470.12	1206.5	0.39
Reach-1	15700	500-year	89900.0	152.72	175.25		176.0	0.001338	8.08	16552.23	1337.0	0.34
Reach-1	15200	10-year	29600.0	150.94	163.79		164.6	0.003001	7.80	4415.48	864.4	0.50
Reach-1	15200	50-year	48300.0	150.94	167.58		168.3	0.001772	7.86	8290.50	1087.3	0.41
Reach-1	15200	100-year	58600.0	150.94	169.44		170.2	0.001490	7.97	10379.56	1160.0	0.39
Reach-1	15200	500-year	89900.0	150.94	174.41		175.2	0.001076	8.39	16400.34	1269.5	0.35
Reach-1	14700	10-year	29600.0	147.50	163.07		163.7	0.001395	6.77	5892.40	963.0	0.36
Reach-1	14700	50-year	48300.0	147.50	167.14		167.7	0.001000	7.09	10087.65	1118.0	0.32
Reach-1	14700	100-year	58600.0	147.50	169.06		169.7	0.000898	7.29	12263.92	1141.4	0.31
Reach-1	14700	500-year	89900.0	147.50	174.13		174.8	0.000744	7.91	18212.70	1263.0	0.30
Reach-1	14200	10-year	29600.0	146.53	162.88	157.1	163.2	0.000559	5.15	7513.96	1190.2	0.24
Reach-1	14200	50-year	48300.0	146.53	167.05	158.9	167.3	0.000449	5.46	13206.96	1463.8	0.22
Reach-1	14200	100-year	58600.0	146.53	169.00	159.7	169.3	0.000416	5.63	16114.27	1532.9	0.22
Reach-1	14200	500-year	89900.0	146.53	174.13	161.8	174.5	0.000362	6.08	24163.18	1744.6	0.21
Reach-1	13600	10-year	29600.0	145.36	161.33		162.4	0.001588	8.72	5810.49	993.5	0.40
Reach-1	13600	50-year	48300.0	145.36	165.34		166.6	0.001511	10.00	10218.26	1249.7	0.41
Reach-1	13600	100-year	58600.0	145.36	167.26		168.6	0.001452	10.46	12692.64	1328.4	0.41
Reach-1	13600	500-year	89900.0	145.36	172.36		173.8	0.001297	11.47	20121.14	1544.1	0.40
Reach-1	13000	10-year	29600.0	144.19	160.10		161.3	0.002089	9.00	3989.72	629.7	0.45
Reach-1	13000	50-year	48300.0	144.19	164.17		165.6	0.001839	10.20	7512.67	985.9	0.44
Reach-1	13000	100-year	58600.0	144.19	166.20		167.7	0.001664	10.49	9610.31	1054.5	0.43
Reach-1	13000	500-year	89900.0	144.19	171.49		173.0	0.001369	11.24	15395.69	1123.4	0.41
Reach-1	12500	10-year	29600.0	143.22	159.08		160.3	0.002112	9.01	4328.60	634.8	0.45
Reach-1	12500	50-year	48300.0	143.22	163.32		164.7	0.001787	10.10	7460.11	907.0	0.44
Reach-1	12500	100-year	58600.0	143.22	165.41		166.8	0.001638	10.47	9471.80	1003.2	0.43
Reach-1	12500	500-year	89900.0	143.22	170.77		172.3	0.001382	11.39	15450.97	1210.7	0.41
Reach-1	12000	10-year	29600.0	142.25	156.80	153.8	158.7	0.004036	11.20	2663.38	269.5	0.61
Reach-1	12000	50-year	48300.0	142.25	160.38	156.8	163.2	0.004003	13.56	3687.53	302.3	0.64
Reach-1	12000	100-year	58600.0	142.25	162.08	158.3	165.4	0.004005	14.64	4213.90	331.9	0.65
Reach-1	12000	500-year	89900.0	142.25	166.32	162.2	170.9	0.004085	17.34	6530.15	787.4	0.68
Reach-1	11500	10-year	29600.0	141.27	156.16	151.1	157.2	0.001814	8.06	3876.05	392.7	0.42
Reach-1	11500	50-year	48300.0	141.27	160.07	153.6	161.5	0.001791	9.73	5536.55	452.1	0.44
Reach-1	11500	100-year	58600.0	141.27	161.95	154.9	163.6	0.001783	10.48	6437.99	546.2	0.44
Reach-1	11500	500-year	89900.0	141.27	166.73	158.3	168.9	0.001732	12.15	10740.23	1153.9	0.46
Reach-1	11000	10-year	29600.0	140.30	155.06	150.2	156.2	0.002054	8.50	3526.92	334.8	0.44
Reach-1	11000	50-year	48300.0	140.30	158.87	152.8	160.5	0.002085	10.37	4875.16	373.6	0.47
Reach-1	11000	100-year	58600.0	140.30	160.67	154.1	162.6	0.002102	11.22	5766.42	643.6	0.48
Reach-1	11000	500-year	89900.0	140.30	165.59	157.6	167.9	0.001915	12.68	11047.59	1449.7	0.48
Reach-1	10500	10-year	29600.0	139.33	154.16	149.1	155.1	0.001922	7.99	3824.50	380.3	0.43

HEC-RAS Plan: CEM River: SALUDA RIVER Reach: Reach-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
Reach-1	10500	50-year	48300.0	139.33	158.08	151.7	159.5	0.001886	9.46	5491.22	526.7	0.44
Reach-1	10500	100-year	58600.0	139.33	159.98	153.0	161.5	0.001803	10.05	6704.48	732.9	0.44
Reach-1	10500	500-year	89900.0	139.33	165.09	156.4	166.9	0.001566	11.25	11387.24	1137.0	0.43
Reach-1	10000	10-year	29600.0	138.36	153.18		154.2	0.001839	8.19	3994.44	426.5	0.42
Reach-1	10000	50-year	48300.0	138.36	157.02		158.5	0.001845	9.91	5705.30	467.4	0.44
Reach-1	10000	100-year	58600.0	138.36	158.86		160.6	0.001856	10.71	6618.73	524.2	0.45
Reach-1	10000	500-year	89900.0	138.36	163.73		166.0	0.001830	12.54	9865.36	742.8	0.47
Reach-1	9500	10-year	29600.0	137.38	152.29		153.3	0.001867	8.02	3903.23	445.5	0.42
Reach-1	9500	50-year	48300.0	137.38	156.34		157.6	0.001611	9.15	5873.03	547.1	0.41
Reach-1	9500	100-year	58600.0	137.38	158.31		159.6	0.001510	9.60	7058.45	654.0	0.41
Reach-1	9500	500-year	89900.0	137.38	163.52		165.0	0.001297	10.61	11198.52	860.7	0.39
Reach-1	9000	10-year	29600.0	136.41	151.19		152.3	0.001935	8.57	3790.72	392.5	0.44
Reach-1	9000	50-year	48300.0	136.41	155.20		156.7	0.001825	10.08	5568.11	495.2	0.44
Reach-1	9000	100-year	58600.0	136.41	157.14		158.8	0.001770	10.71	6575.83	594.2	0.44
Reach-1	9000	500-year	89900.0	136.41	162.25		164.3	0.001634	12.16	10218.60	766.6	0.45
Reach-1	8500	10-year	29600.0	135.44	150.53		151.4	0.001541	7.51	4354.88	505.0	0.39
Reach-1	8500	50-year	48300.0	135.44	154.77		155.8	0.001302	8.48	6769.89	672.2	0.37
Reach-1	8500	100-year	58600.0	135.44	156.85		157.9	0.001183	8.77	8345.74	841.6	0.36
Reach-1	8500	500-year	89900.0	135.44	162.31		163.4	0.000928	9.26	13315.49	955.0	0.34
Reach-1	8240	10-year	29600.0	134.93	150.34		150.9	0.001191	6.55	6125.05	923.3	0.34
Reach-1	8240	50-year	48300.0	134.93	154.79		155.4	0.000853	6.89	10287.45	952.1	0.30
Reach-1	8240	100-year	58600.0	134.93	156.90		157.5	0.000769	7.10	12328.67	981.0	0.29
Reach-1	8240	500-year	89900.0	134.93	162.37		163.1	0.000651	7.78	17959.89	1050.5	0.28
Reach-1	7900	10-year	29600.0	134.27	149.92		150.5	0.001247	6.43	6131.70	872.0	0.34
Reach-1	7900	50-year	48300.0	134.27	154.39		155.1	0.000949	7.05	10105.09	903.0	0.32
Reach-1	7900	100-year	58600.0	134.27	156.49		157.2	0.000878	7.39	12019.61	916.7	0.31
Reach-1	7900	500-year	89900.0	134.27	161.89		162.8	0.000787	8.37	17062.93	967.4	0.31
Reach-1	7400	10-year	29600.0	132.87	149.81		150.1	0.000462	4.62	8023.77	767.3	0.22
Reach-1	7400	50-year	48300.0	132.87	154.35		154.7	0.000422	5.32	11625.07	814.6	0.22
Reach-1	7400	100-year	58600.0	132.87	156.47		156.8	0.000412	5.66	13376.63	831.2	0.22
Reach-1	7400	500-year	89900.0	132.87	161.94		162.4	0.000406	6.57	18051.44	880.0	0.23
Reach-1	6900	10-year	29600.0	131.87	148.90		149.7	0.001077	7.35	5747.59	526.6	0.34
Reach-1	6900	50-year	48300.0	131.87	153.09		154.3	0.001197	9.14	8049.09	594.3	0.37
Reach-1	6900	100-year	58600.0	131.87	155.02		156.4	0.001258	10.00	9247.99	645.9	0.38
Reach-1	6900	500-year	89900.0	131.87	160.01		161.9	0.001355	11.96	12625.15	693.8	0.41
Reach-1	6450	10-year	29600.0	124.16	148.93	134.0	149.2	0.000258	4.37	6945.50	410.9	0.17
Reach-1	6450	50-year	48300.0	124.16	153.13	136.8	153.7	0.000361	5.86	9216.30	613.5	0.21
Reach-1	6450	100-year	58600.0	124.16	155.08	138.0	155.7	0.000407	6.55	10440.25	650.0	0.22
Reach-1	6450	500-year	89900.0	124.16	160.10	141.5	161.1	0.000516	8.28	13879.67	719.9	0.26
Reach-1	6350		Bridge									
Reach-1	6270	10-year	29600.0	124.22	148.86	134.1	149.2	0.000263	4.40	6915.77	406.3	0.17
Reach-1	6270	50-year	48300.0	124.22	153.04	136.8	153.6	0.000368	5.90	9108.42	621.4	0.21
Reach-1	6270	100-year	58600.0	124.22	154.98	138.1	155.6	0.000414	6.58	10341.16	650.5	0.23
Reach-1	6270	500-year	89900.0	124.22	159.97	141.5	161.0	0.000521	8.29	13683.29	688.0	0.26
Reach-1	5900	10-year	29600.0	131.87	147.90		148.8	0.001473	7.57	3997.01	406.6	0.38
Reach-1	5900	50-year	48300.0	131.87	151.77		153.1	0.001545	9.29	5925.88	548.8	0.41
Reach-1	5900	100-year	58600.0	131.87	153.57		155.1	0.001579	10.07	6945.22	602.1	0.42
Reach-1	5900	500-year	89900.0	131.87	158.25		160.4	0.001633	11.94	9979.81	676.6	0.44
Reach-1	5400	10-year	29600.0	131.71	147.24		148.0	0.001415	7.23	4261.19	466.1	0.37
Reach-1	5400	50-year	48300.0	131.71	151.13		152.3	0.001434	8.78	6164.05	515.7	0.39
Reach-1	5400	100-year	58600.0	131.71	152.92		154.3	0.001456	9.51	7119.70	547.0	0.40
Reach-1	5400	500-year	89900.0	131.71	157.60		159.5	0.001507	11.32	10078.53	734.6	0.42
Reach-1	4900	10-year	29600.0	130.90	146.22		147.2	0.001774	8.08	3789.14	433.5	0.41
Reach-1	4900	50-year	48300.0	130.90	150.01		151.5	0.001814	9.82	5783.96	554.8	0.44
Reach-1	4900	100-year	58600.0	130.90	151.76		153.5	0.001834	10.59	6768.36	567.9	0.45
Reach-1	4900	500-year	89900.0	130.90	156.30		158.6	0.001904	12.59	9531.40	749.2	0.47
Reach-1	4400	10-year	29600.0	130.09	144.72		146.2	0.002496	9.61	3189.67	366.5	0.49
Reach-1	4400	50-year	48300.0	130.09	148.03		150.3	0.002873	12.12	4704.01	537.8	0.55
Reach-1	4400	100-year	58600.0	130.09	149.58		152.2	0.002990	13.19	5563.29	564.3	0.57
Reach-1	4400	500-year	89900.0	130.09	153.62		157.3	0.003238	15.83	8020.80	653.0	0.61

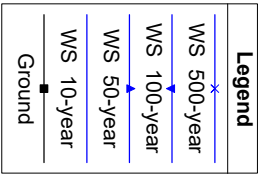
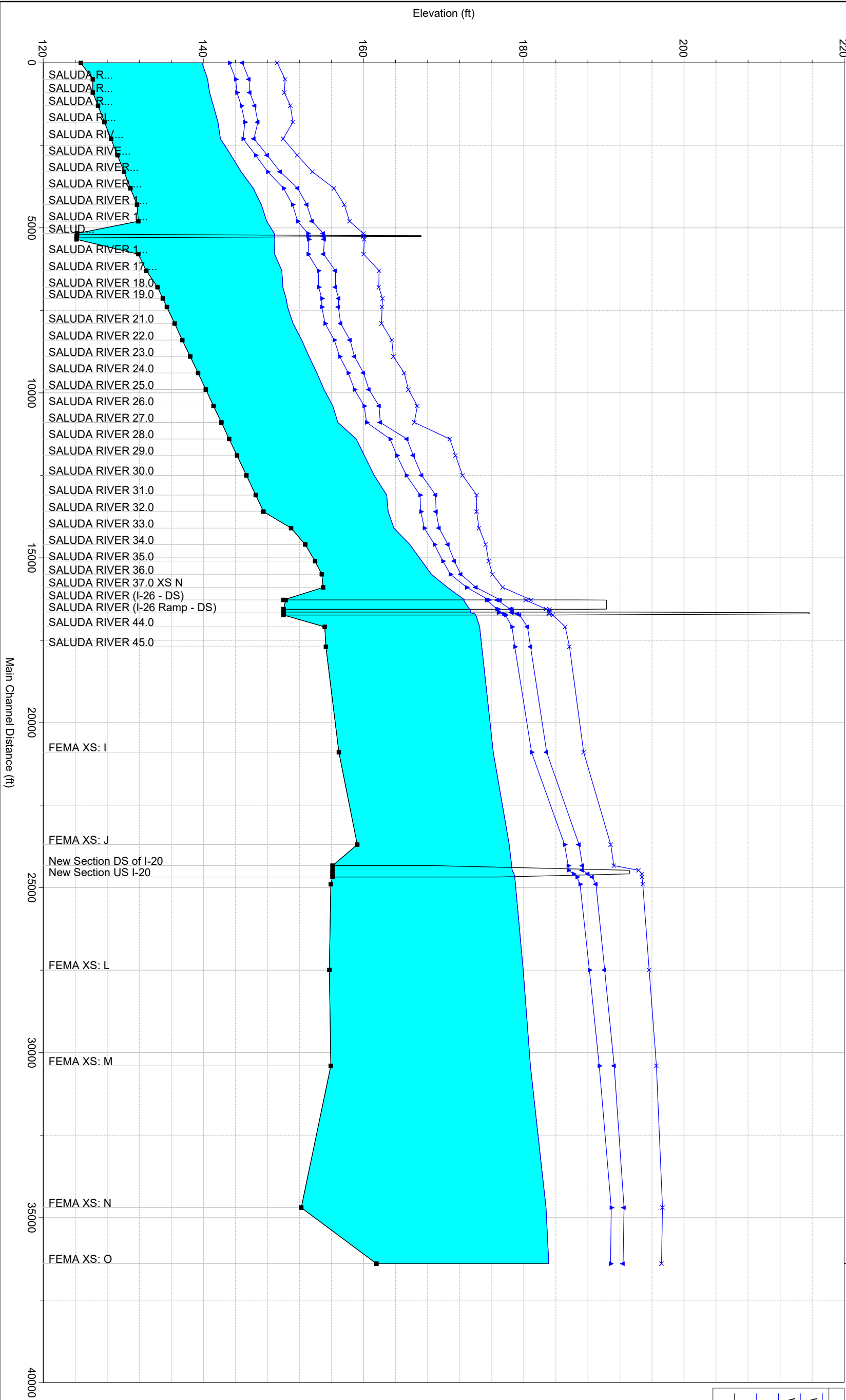
HEC-RAS Plan: CEM River: SALUDA RIVER Reach: Reach-1 (Continued)

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
Reach-1	3900	10-year	29600.0	129.27	143.44		144.9	0.002645	9.59	3247.94	374.6	0.50
Reach-1	3900	50-year	48300.0	129.27	146.52		148.8	0.003108	12.15	4618.13	487.9	0.56
Reach-1	3900	100-year	58600.0	129.27	147.97		150.6	0.003278	13.29	5364.19	539.3	0.59
Reach-1	3900	500-year	89900.0	129.27	151.71	147.4	155.5	0.003638	16.12	7825.70	821.6	0.64
Reach-1	3400	10-year	29600.0	128.46	142.12	138.3	143.5	0.002763	9.46	3427.84	413.3	0.51
Reach-1	3400	50-year	48300.0	128.46	144.95	141.0	147.2	0.003287	12.07	4670.48	486.3	0.58
Reach-1	3400	100-year	58600.0	128.46	146.30	142.4	148.9	0.003476	13.22	5307.66	582.6	0.60
Reach-1	3400	500-year	89900.0	128.46	149.97	146.0	153.7	0.003728	15.85	7724.65	647.8	0.65
Reach-1	2900	10-year	29600.0	127.65	141.82	138.1	142.4	0.001256	6.58	5485.25	747.2	0.35
Reach-1	2900	50-year	48300.0	127.65	145.18	139.9	145.8	0.001096	7.32	8057.78	799.6	0.34
Reach-1	2900	100-year	58600.0	127.65	146.80	140.7	147.5	0.001044	7.66	9339.36	839.4	0.34
Reach-1	2900	500-year	89900.0	127.65	151.16	142.8	152.0	0.000935	8.50	13297.96	955.2	0.33
Reach-1	2400	10-year	29600.0	126.84	141.25	136.7	141.7	0.001121	6.31	7640.49	1372.4	0.33
Reach-1	2400	50-year	48300.0	126.84	144.74	138.8	145.2	0.000952	6.93	12125.68	1705.8	0.32
Reach-1	2400	100-year	58600.0	126.84	146.41	139.6	146.9	0.000890	7.19	14365.48	1739.0	0.31
Reach-1	2400	500-year	89900.0	126.84	150.86	141.6	151.5	0.000782	7.90	20369.18	1795.7	0.30
Reach-1	2000	10-year	29600.0	126.19	140.77	136.0	141.3	0.001216	6.63	7160.53	1360.6	0.34
Reach-1	2000	50-year	48300.0	126.19	144.18	137.8	144.9	0.001184	7.76	10557.90	1601.6	0.35
Reach-1	2000	100-year	58600.0	126.19	145.80	139.0	146.6	0.001182	8.30	12221.15	1680.0	0.36
Reach-1	2000	500-year	89900.0	126.19	150.10	141.3	151.1	0.001184	9.68	17141.38	2008.0	0.37
Reach-1	1600	10-year	29600.0	126.19	140.53	135.5	140.8	0.000781	5.24	7778.17	1352.9	0.27
Reach-1	1600	50-year	48300.0	126.19	144.03	137.1	144.4	0.000701	5.94	11828.36	1431.0	0.27
Reach-1	1600	100-year	58600.0	126.19	145.69	137.8	146.1	0.000679	6.27	13810.17	1461.1	0.27
Reach-1	1600	500-year	89900.0	126.19	150.22	139.8	150.6	0.000526	6.48	23876.97	2041.4	0.25
Reach-1	1100	10-year	29600.0	124.69	139.84	134.8	140.3	0.001050	6.36	6240.04	1030.8	0.32
Reach-1	1100	50-year	48300.0	124.69	143.26	136.8	143.9	0.001050	7.50	9124.03	1110.3	0.33
Reach-1	1100	100-year	58600.0	124.69	144.88	137.7	145.6	0.001052	8.02	10526.49	1131.6	0.34
Reach-1	1100	500-year	89900.0	124.69	149.22	140.2	150.2	0.001051	9.31	15352.61	1823.7	0.35

APPENDIX D

HEC-RAS OUTPUT – REVISED MODEL

SALUDA RIVER Reach-1



HEC-RAS Plan: REV River: SALUDA RIVER Reach: Reach-1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	37500	10-year	32000.0	161.62	183.12		183.4	0.000497	4.64	7052.79	421.5	0.19
Reach-1	37500	50-year	90000.0	161.62	190.84		191.7	0.000922	7.95	16303.81	1801.0	0.27
Reach-1	37500	100-year	105000.0	161.62	192.40		193.3	0.000926	8.28	19236.27	1963.5	0.28
Reach-1	37500	500-year	145000.0	161.62	197.19		197.9	0.000714	8.08	29449.28	2201.9	0.25
Reach-1	35800	10-year	32000.0	152.22	182.77		182.9	0.000199	3.16	19108.59	2823.2	0.12
Reach-1	35800	50-year	90000.0	152.22	190.92		191.0	0.000131	3.19	59330.73	5464.7	0.10
Reach-1	35800	100-year	105000.0	152.22	192.53		192.6	0.000121	3.17	68153.21	5525.7	0.10
Reach-1	35800	500-year	145000.0	152.22	197.33		197.4	0.000088	2.98	95288.77	5819.9	0.09
Reach-1	31500	10-year	32000.0	155.92	180.83		181.3	0.000848	5.64	7524.21	1257.6	0.24
Reach-1	31500	50-year	90000.0	155.92	189.43		189.9	0.000701	6.74	27517.94	3846.0	0.24
Reach-1	31500	100-year	105000.0	155.92	191.29		191.6	0.000544	6.22	34721.15	3909.4	0.21
Reach-1	31500	500-year	145000.0	155.92	196.56		196.7	0.000289	5.10	55829.58	4089.4	0.16
Reach-1	28600	10-year	32000.0	155.72	179.93		180.1	0.000223	3.47	14957.68	1475.2	0.13
Reach-1	28600	50-year	90000.0	155.72	188.19		188.4	0.000342	5.31	29091.55	1946.2	0.17
Reach-1	28600	100-year	105000.0	155.72	190.11		190.4	0.000340	5.52	32935.39	2055.7	0.17
Reach-1	28600	500-year	145000.0	155.72	195.66		195.9	0.000288	5.65	45217.38	2371.9	0.16
Reach-1	26000	10-year	32000.0	155.92	178.96		179.2	0.000515	4.51	10963.18	1490.0	0.19
Reach-1	26000	50-year	90000.0	155.92	187.03		187.3	0.000520	5.82	25406.80	2075.4	0.20
Reach-1	26000	100-year	105000.0	155.92	189.02		189.3	0.000476	5.84	29669.64	2214.7	0.20
Reach-1	26000	500-year	145000.0	155.92	194.85		195.1	0.000331	5.54	42912.45	2320.6	0.17
Reach-1	25780	10-year	32000.0	156.12	178.89	165.4	179.1	0.000353	3.45	10084.78	1469.3	0.15
Reach-1	25780	50-year	90000.0	156.12	186.64	172.3	187.1	0.000612	5.96	16968.28	1756.7	0.22
Reach-1	25780	100-year	105000.0	156.12	188.55	173.5	189.1	0.000621	6.33	18659.94	2003.1	0.22
Reach-1	25780	500-year	145000.0	156.12	194.75	176.4	195.0	0.000282	4.94	42792.40	2502.3	0.16
Reach-1	25550		Bridge									
Reach-1	25436	10-year	32000.0	156.12	178.50	165.1	178.8	0.000454	4.28	8757.24	1475.4	0.18
Reach-1	25436	50-year	90000.0	156.12	185.55	172.9	186.3	0.000887	7.47	15007.11	1775.4	0.26
Reach-1	25436	100-year	105000.0	156.12	187.32	174.7	188.1	0.000905	7.90	16584.83	1880.4	0.27
Reach-1	25436	500-year	145000.0	156.12	191.24	177.9	192.3	0.000980	9.02	20064.02	2012.7	0.29
Reach-1	24800	10-year	32000.0	159.22	178.18		178.4	0.000586	4.54	10127.00	1151.5	0.20
Reach-1	24800	50-year	90000.0	159.22	185.10		185.6	0.000867	6.98	18267.49	1199.1	0.26
Reach-1	24800	100-year	105000.0	159.22	186.89		187.4	0.000858	7.29	20444.04	1233.6	0.26
Reach-1	24800	500-year	145000.0	159.22	190.85		191.5	0.000849	8.00	25945.89	1634.1	0.26
Reach-1	22000	10-year	32000.0	156.92	176.20		176.6	0.000734	5.28	8471.01	1037.0	0.23
Reach-1	22000	50-year	90000.0	156.92	180.97		182.0	0.001802	9.78	13685.31	1200.4	0.37
Reach-1	22000	100-year	105000.0	156.92	182.86		184.0	0.001721	10.10	16131.95	1395.8	0.37
Reach-1	22000	500-year	145000.0	156.92	187.47		188.5	0.001325	9.99	23210.39	1586.5	0.33
Reach-1	18800	10-year	29600.0	155.30	174.77		175.0	0.000324	4.26	11483.47	1391.6	0.19
Reach-1	18800	50-year	48300.0	155.30	178.87		179.2	0.000325	4.96	17434.82	1509.1	0.19
Reach-1	18800	100-year	58600.0	155.30	180.84		181.2	0.000328	5.30	20569.06	1760.4	0.20
Reach-1	18800	500-year	89900.0	155.30	185.71		186.1	0.000325	6.02	30244.96	2049.5	0.20
Reach-1	18200	10-year	29600.0	155.16	174.50	165.2	174.8	0.000402	4.52	10130.29	1791.6	0.21
Reach-1	18200	50-year	48300.0	155.16	178.53	167.6	178.9	0.000435	5.51	14156.78	1958.8	0.22
Reach-1	18200	100-year	58600.0	155.16	180.46	168.9	180.9	0.000446	5.95	16093.23	2013.6	0.23
Reach-1	18200	500-year	89900.0	155.16	185.18	171.7	185.8	0.000496	7.18	20810.29	2200.9	0.25
Reach-1	17840	10-year	29600.0	150.00	174.01	163.4	174.5	0.000550	5.88	5769.07	1674.1	0.25
Reach-1	17840	50-year	48300.0	150.00	177.71	166.1	178.6	0.000731	7.69	7466.51	1804.1	0.29
Reach-1	17840	100-year	58600.0	150.00	179.47	167.5	180.5	0.000804	8.51	8277.14	1852.1	0.31
Reach-1	17840	500-year	89900.0	150.00	183.61	171.5	185.3	0.001035	10.77	10182.02	1913.0	0.36
Reach-1	17790		Bridge									
Reach-1	17750	10-year	29600.0	150.00	173.35	163.5	173.8	0.000567	5.82	5684.13	1011.1	0.25
Reach-1	17750	50-year	48300.0	150.00	176.86	166.1	177.7	0.000766	7.67	7109.70	1128.4	0.30
Reach-1	17750	100-year	58600.0	150.00	178.56	167.4	179.6	0.000847	8.50	7796.98	1165.0	0.32
Reach-1	17750	500-year	89900.0	150.00	183.22	171.1	184.8	0.001008	10.52	9688.91	1425.1	0.36
Reach-1	17665	10-year	29600.0	150.00	173.32	161.3	173.8	0.000710	5.52	6166.92	933.1	0.23
Reach-1	17665	50-year	48300.0	150.00	176.83	165.1	177.6	0.000998	7.34	7953.00	1006.6	0.27
Reach-1	17665	100-year	58600.0	150.00	178.53	166.5	179.5	0.001117	8.16	8864.50	1079.4	0.29
Reach-1	17665	500-year	89900.0	150.00	183.21	170.2	184.6	0.001346	10.09	11554.13	1366.9	0.33
Reach-1	17540		Bridge									

HEC-RAS Plan: REV River: SALUDA RIVER Reach: Reach-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
Reach-1	17365	10-year	29600.0	150.00	172.63	161.9	173.0	0.000736	5.17	6781.15	726.7	0.22
Reach-1	17365	50-year	48300.0	150.00	175.65	164.6	176.4	0.001089	7.01	8473.94	840.4	0.28
Reach-1	17365	100-year	58600.0	150.00	177.06	165.9	178.0	0.001255	7.87	9279.28	961.1	0.30
Reach-1	17365	500-year	89900.0	150.00	180.94	169.5	182.2	0.001508	9.64	14224.72	1177.2	0.34
Reach-1	17000	10-year	29600.0	154.95	170.46	168.9	172.1	0.005763	10.76	4256.49	797.9	0.63
Reach-1	17000	50-year	48300.0	154.95	172.86	171.1	175.1	0.006192	13.07	6112.16	882.1	0.68
Reach-1	17000	100-year	58600.0	154.95	174.04	172.1	176.6	0.006289	14.07	7025.26	902.5	0.70
Reach-1	17000	500-year	89900.0	154.95	177.36	174.8	180.6	0.006142	16.27	9647.53	967.6	0.72
Reach-1	16600	10-year	29600.0	154.78	168.45		169.8	0.005306	9.38	3737.81	775.2	0.60
Reach-1	16600	50-year	48300.0	154.78	170.85		172.7	0.005321	11.25	5700.29	866.4	0.62
Reach-1	16600	100-year	58600.0	154.78	172.14		174.2	0.005078	11.90	6848.81	909.1	0.62
Reach-1	16600	500-year	89900.0	154.78	176.10		178.4	0.003986	12.87	10503.12	953.7	0.58
Reach-1	16200	10-year	29600.0	153.94	167.28		168.0	0.003133	7.06	5078.95	838.3	0.46
Reach-1	16200	50-year	48300.0	153.94	169.89		170.9	0.002944	8.35	7337.59	882.7	0.46
Reach-1	16200	100-year	58600.0	153.94	171.33		172.4	0.002717	8.78	8627.41	899.8	0.46
Reach-1	16200	500-year	89900.0	153.94	175.63		176.9	0.002128	9.59	12680.35	966.0	0.43
Reach-1	15700	10-year	29600.0	152.72	165.77		166.5	0.003258	7.44	5013.19	995.7	0.47
Reach-1	15700	50-year	48300.0	152.72	168.86		169.6	0.002308	7.81	8465.57	1188.3	0.42
Reach-1	15700	100-year	58600.0	152.72	170.53		171.2	0.001936	7.86	10470.12	1206.5	0.39
Reach-1	15700	500-year	89900.0	152.72	175.25		176.0	0.001338	8.08	16552.23	1337.0	0.34
Reach-1	15200	10-year	29600.0	150.94	163.79		164.6	0.003001	7.80	4415.48	864.4	0.50
Reach-1	15200	50-year	48300.0	150.94	167.58		168.3	0.001772	7.86	8290.50	1087.3	0.41
Reach-1	15200	100-year	58600.0	150.94	169.44		170.2	0.001490	7.97	10379.56	1160.0	0.39
Reach-1	15200	500-year	89900.0	150.94	174.41		175.2	0.001076	8.39	16400.34	1269.5	0.35
Reach-1	14700	10-year	29600.0	147.50	163.07		163.7	0.001395	6.77	5892.40	963.0	0.36
Reach-1	14700	50-year	48300.0	147.50	167.14		167.7	0.001000	7.09	10087.65	1118.0	0.32
Reach-1	14700	100-year	58600.0	147.50	169.06		169.7	0.000898	7.29	12263.92	1141.4	0.31
Reach-1	14700	500-year	89900.0	147.50	174.13		174.8	0.000744	7.91	18212.70	1263.0	0.30
Reach-1	14200	10-year	29600.0	146.53	162.88	157.1	163.2	0.000559	5.15	7513.96	1190.2	0.24
Reach-1	14200	50-year	48300.0	146.53	167.05	158.9	167.3	0.000449	5.46	13206.96	1463.8	0.22
Reach-1	14200	100-year	58600.0	146.53	169.00	159.7	169.3	0.000416	5.63	16114.27	1532.9	0.22
Reach-1	14200	500-year	89900.0	146.53	174.13	161.8	174.5	0.000362	6.08	24163.18	1744.6	0.21
Reach-1	13600	10-year	29600.0	145.36	161.33		162.4	0.001588	8.72	5810.49	993.5	0.40
Reach-1	13600	50-year	48300.0	145.36	165.34		166.6	0.001511	10.00	10218.26	1249.7	0.41
Reach-1	13600	100-year	58600.0	145.36	167.26		168.6	0.001452	10.46	12692.64	1328.4	0.41
Reach-1	13600	500-year	89900.0	145.36	172.36		173.8	0.001297	11.47	20121.14	1544.1	0.40
Reach-1	13000	10-year	29600.0	144.19	160.10		161.3	0.002089	9.00	3989.72	629.7	0.45
Reach-1	13000	50-year	48300.0	144.19	164.17		165.6	0.001839	10.20	7512.67	985.9	0.44
Reach-1	13000	100-year	58600.0	144.19	166.20		167.7	0.001664	10.49	9610.31	1054.5	0.43
Reach-1	13000	500-year	89900.0	144.19	171.49		173.0	0.001369	11.24	15395.69	1123.4	0.41
Reach-1	12500	10-year	29600.0	143.22	159.08		160.3	0.002112	9.01	4328.60	634.8	0.45
Reach-1	12500	50-year	48300.0	143.22	163.32		164.7	0.001787	10.10	7460.11	907.0	0.44
Reach-1	12500	100-year	58600.0	143.22	165.41		166.8	0.001638	10.47	9471.80	1003.2	0.43
Reach-1	12500	500-year	89900.0	143.22	170.77		172.3	0.001382	11.39	15450.97	1210.7	0.41
Reach-1	12000	10-year	29600.0	142.25	156.80	153.8	158.7	0.004036	11.20	2663.38	269.5	0.61
Reach-1	12000	50-year	48300.0	142.25	160.38	156.8	163.2	0.004003	13.56	3687.53	302.3	0.64
Reach-1	12000	100-year	58600.0	142.25	162.08	158.3	165.4	0.004005	14.64	4213.90	331.9	0.65
Reach-1	12000	500-year	89900.0	142.25	166.32	162.2	170.9	0.004085	17.34	6530.15	787.4	0.68
Reach-1	11500	10-year	29600.0	141.27	156.16	151.1	157.2	0.001814	8.06	3876.05	392.7	0.42
Reach-1	11500	50-year	48300.0	141.27	160.07	153.6	161.5	0.001791	9.73	5536.55	452.1	0.44
Reach-1	11500	100-year	58600.0	141.27	161.95	154.9	163.6	0.001783	10.48	6437.99	546.2	0.44
Reach-1	11500	500-year	89900.0	141.27	166.73	158.3	168.9	0.001732	12.15	10740.23	1153.9	0.46
Reach-1	11000	10-year	29600.0	140.30	155.06	150.2	156.2	0.002054	8.50	3526.92	334.8	0.44
Reach-1	11000	50-year	48300.0	140.30	158.87	152.8	160.5	0.002085	10.37	4875.16	373.6	0.47
Reach-1	11000	100-year	58600.0	140.30	160.67	154.1	162.6	0.002102	11.22	5766.42	643.6	0.48
Reach-1	11000	500-year	89900.0	140.30	165.59	157.6	167.9	0.001915	12.68	11047.59	1449.7	0.48
Reach-1	10500	10-year	29600.0	139.33	154.16	149.1	155.1	0.001922	7.99	3824.50	380.3	0.43
Reach-1	10500	50-year	48300.0	139.33	158.08	151.7	159.5	0.001886	9.46	5491.22	526.7	0.44
Reach-1	10500	100-year	58600.0	139.33	159.98	153.0	161.5	0.001803	10.05	6704.48	732.9	0.44
Reach-1	10500	500-year	89900.0	139.33	165.09	156.4	166.9	0.001566	11.25	11387.24	1137.0	0.43
Reach-1	10000	10-year	29600.0	138.36	153.18		154.2	0.001839	8.19	3994.44	426.5	0.42

HEC-RAS Plan: REV River: SALUDA RIVER Reach: Reach-1 (Continued)

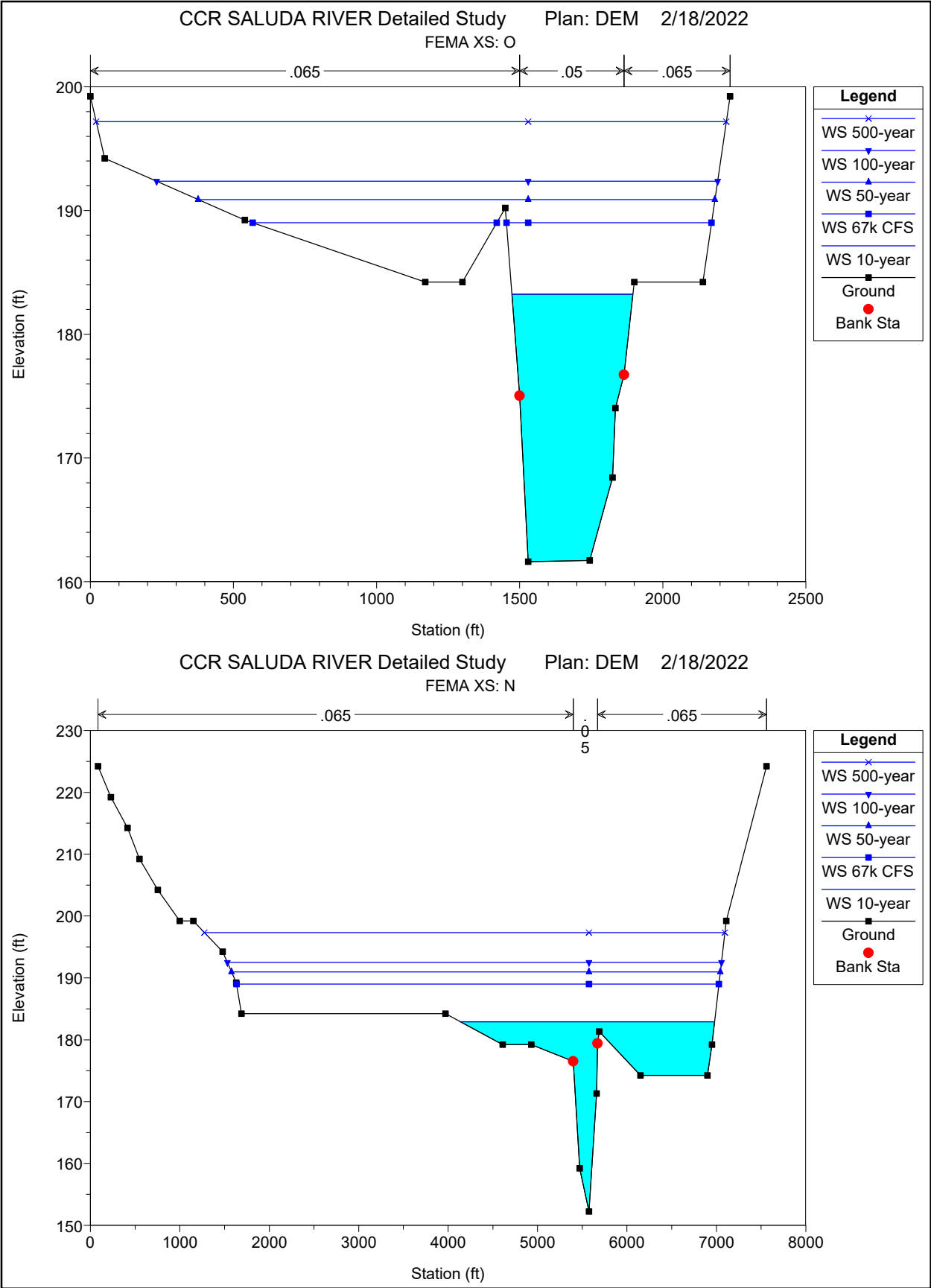
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	10000	50-year	48300.0	138.36	157.02		158.5	0.001845	9.91	5705.30	467.4	0.44
Reach-1	10000	100-year	58600.0	138.36	158.86		160.6	0.001856	10.71	6618.73	524.2	0.45
Reach-1	10000	500-year	89900.0	138.36	163.73		166.0	0.001830	12.54	9865.36	742.8	0.47
Reach-1	9500	10-year	29600.0	137.38	152.29		153.3	0.001867	8.02	3903.23	445.5	0.42
Reach-1	9500	50-year	48300.0	137.38	156.34		157.6	0.001611	9.15	5873.03	547.1	0.41
Reach-1	9500	100-year	58600.0	137.38	158.31		159.6	0.001510	9.60	7058.45	654.0	0.41
Reach-1	9500	500-year	89900.0	137.38	163.52		165.0	0.001297	10.61	11198.52	860.7	0.39
Reach-1	9000	10-year	29600.0	136.41	151.19		152.3	0.001935	8.57	3790.72	392.5	0.44
Reach-1	9000	50-year	48300.0	136.41	155.20		156.7	0.001825	10.08	5568.11	495.2	0.44
Reach-1	9000	100-year	58600.0	136.41	157.14		158.8	0.001770	10.71	6575.83	594.2	0.44
Reach-1	9000	500-year	89900.0	136.41	162.25		164.3	0.001634	12.16	10218.60	766.6	0.45
Reach-1	8500	10-year	29600.0	135.44	150.53		151.4	0.001541	7.51	4354.88	505.0	0.39
Reach-1	8500	50-year	48300.0	135.44	154.77		155.8	0.001302	8.48	6769.89	672.2	0.37
Reach-1	8500	100-year	58600.0	135.44	156.85		157.9	0.001183	8.77	8345.74	841.6	0.36
Reach-1	8500	500-year	89900.0	135.44	162.31		163.4	0.000928	9.26	13315.49	955.0	0.34
Reach-1	8240	10-year	29600.0	134.93	150.34		150.9	0.001191	6.55	6125.05	923.3	0.34
Reach-1	8240	50-year	48300.0	134.93	154.79		155.4	0.000853	6.89	10287.45	952.1	0.30
Reach-1	8240	100-year	58600.0	134.93	156.90		157.5	0.000769	7.10	12328.67	981.0	0.29
Reach-1	8240	500-year	89900.0	134.93	162.37		163.1	0.000651	7.78	17959.89	1050.5	0.28
Reach-1	7900	10-year	29600.0	134.27	149.92		150.5	0.001247	6.43	6131.70	872.0	0.34
Reach-1	7900	50-year	48300.0	134.27	154.39		155.1	0.000949	7.05	10105.09	903.0	0.32
Reach-1	7900	100-year	58600.0	134.27	156.49		157.2	0.000878	7.39	12019.61	916.7	0.31
Reach-1	7900	500-year	89900.0	134.27	161.89		162.8	0.000787	8.37	17062.93	967.4	0.31
Reach-1	7400	10-year	29600.0	132.87	149.81		150.1	0.000462	4.62	8023.77	767.3	0.22
Reach-1	7400	50-year	48300.0	132.87	154.35		154.7	0.000422	5.32	11625.07	814.6	0.22
Reach-1	7400	100-year	58600.0	132.87	156.47		156.8	0.000412	5.66	13376.63	831.2	0.22
Reach-1	7400	500-year	89900.0	132.87	161.94		162.4	0.000406	6.57	18051.44	880.0	0.23
Reach-1	6900	10-year	29600.0	131.87	148.90		149.7	0.001077	7.35	5747.59	526.6	0.34
Reach-1	6900	50-year	48300.0	131.87	153.09		154.3	0.001197	9.14	8049.09	594.3	0.37
Reach-1	6900	100-year	58600.0	131.87	155.02		156.4	0.001258	10.00	9247.99	645.9	0.38
Reach-1	6900	500-year	89900.0	131.87	160.01		161.9	0.001355	11.96	12625.15	693.8	0.41
Reach-1	6450	10-year	29600.0	124.16	148.93	134.0	149.2	0.000258	4.37	6945.50	410.9	0.17
Reach-1	6450	50-year	48300.0	124.16	153.13	136.8	153.7	0.000361	5.86	9216.30	613.5	0.21
Reach-1	6450	100-year	58600.0	124.16	155.08	138.0	155.7	0.000407	6.55	10440.25	650.0	0.22
Reach-1	6450	500-year	89900.0	124.16	160.10	141.5	161.1	0.000516	8.28	13879.67	719.9	0.26
Reach-1	6350		Bridge									
Reach-1	6270	10-year	29600.0	124.22	148.86	134.1	149.2	0.000263	4.40	6915.77	406.3	0.17
Reach-1	6270	50-year	48300.0	124.22	153.04	136.8	153.6	0.000368	5.90	9108.42	621.4	0.21
Reach-1	6270	100-year	58600.0	124.22	154.98	138.1	155.6	0.000414	6.58	10341.16	650.5	0.23
Reach-1	6270	500-year	89900.0	124.22	159.97	141.5	161.0	0.000521	8.29	13683.29	688.0	0.26
Reach-1	5900	10-year	29600.0	131.87	147.90		148.8	0.001473	7.57	3997.01	406.6	0.38
Reach-1	5900	50-year	48300.0	131.87	151.77		153.1	0.001545	9.29	5925.88	548.8	0.41
Reach-1	5900	100-year	58600.0	131.87	153.57		155.1	0.001579	10.07	6945.22	602.1	0.42
Reach-1	5900	500-year	89900.0	131.87	158.25		160.4	0.001633	11.94	9979.81	676.6	0.44
Reach-1	5400	10-year	29600.0	131.71	147.24		148.0	0.001415	7.23	4261.19	466.1	0.37
Reach-1	5400	50-year	48300.0	131.71	151.13		152.3	0.001434	8.78	6164.05	515.7	0.39
Reach-1	5400	100-year	58600.0	131.71	152.92		154.3	0.001456	9.51	7119.70	547.0	0.40
Reach-1	5400	500-year	89900.0	131.71	157.60		159.5	0.001507	11.32	10078.53	734.6	0.42
Reach-1	4900	10-year	29600.0	130.90	146.22		147.2	0.001774	8.08	3789.14	433.5	0.41
Reach-1	4900	50-year	48300.0	130.90	150.01		151.5	0.001814	9.82	5783.96	554.8	0.44
Reach-1	4900	100-year	58600.0	130.90	151.76		153.5	0.001834	10.59	6768.36	567.9	0.45
Reach-1	4900	500-year	89900.0	130.90	156.30		158.6	0.001904	12.59	9531.40	749.2	0.47
Reach-1	4400	10-year	29600.0	130.09	144.72		146.2	0.002496	9.61	3189.67	366.5	0.49
Reach-1	4400	50-year	48300.0	130.09	148.03		150.3	0.002873	12.12	4704.01	537.8	0.55
Reach-1	4400	100-year	58600.0	130.09	149.58		152.2	0.002990	13.19	5563.29	564.3	0.57
Reach-1	4400	500-year	89900.0	130.09	153.62		157.3	0.003238	15.83	8020.80	653.0	0.61
Reach-1	3900	10-year	29600.0	129.27	143.44		144.9	0.002645	9.59	3247.94	374.6	0.50
Reach-1	3900	50-year	48300.0	129.27	146.52		148.8	0.003108	12.15	4618.13	487.9	0.56
Reach-1	3900	100-year	58600.0	129.27	147.97		150.6	0.003278	13.29	5364.19	539.3	0.59
Reach-1	3900	500-year	89900.0	129.27	151.71	147.4	155.5	0.003638	16.12	7825.70	821.6	0.64

HEC-RAS Plan: REV River: SALUDA RIVER Reach: Reach-1 (Continued)

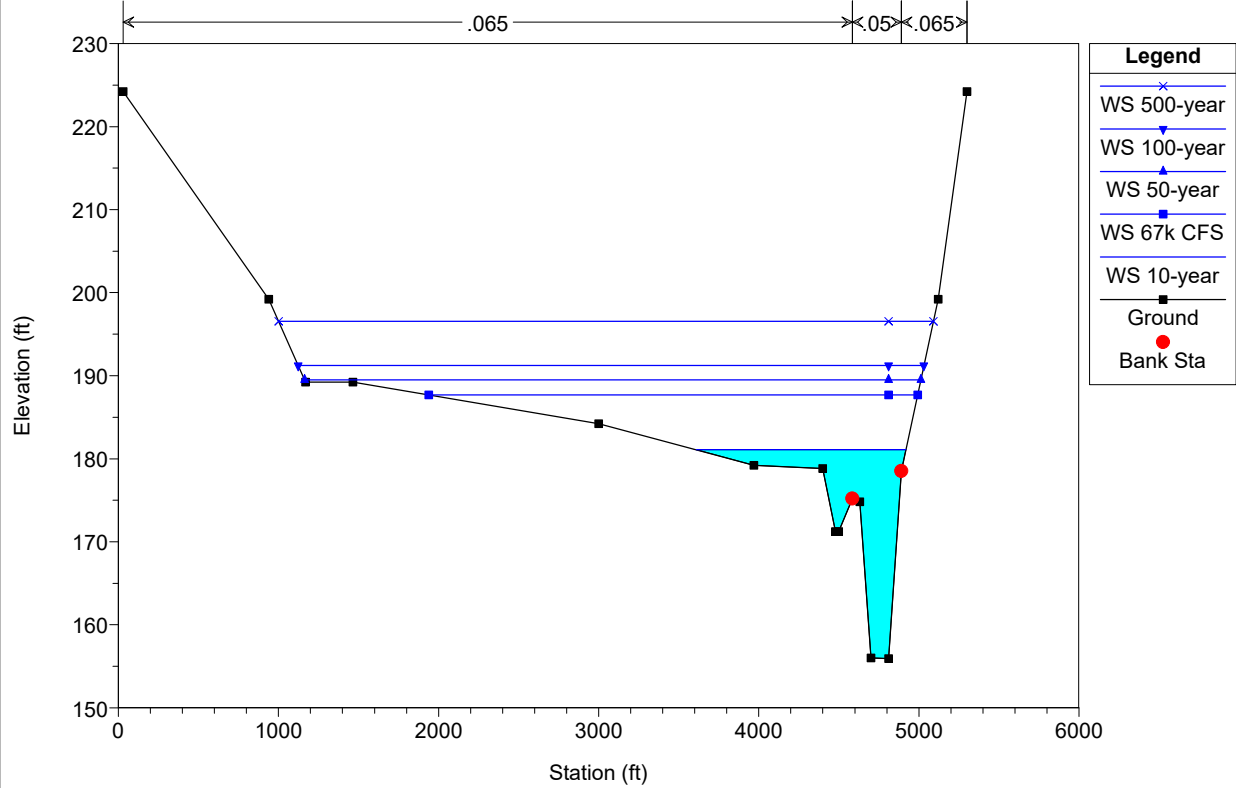
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	3400	10-year	29600.0	128.46	142.12	138.3	143.5	0.002763	9.46	3427.84	413.3	0.51
Reach-1	3400	50-year	48300.0	128.46	144.95	141.0	147.2	0.003287	12.07	4670.48	486.3	0.58
Reach-1	3400	100-year	58600.0	128.46	146.30	142.4	148.9	0.003476	13.22	5307.66	582.6	0.60
Reach-1	3400	500-year	89900.0	128.46	149.97	146.0	153.7	0.003728	15.85	7724.65	647.8	0.65
Reach-1	2900	10-year	29600.0	127.65	141.82	138.1	142.4	0.001256	6.58	5485.25	747.2	0.35
Reach-1	2900	50-year	48300.0	127.65	145.18	139.9	145.8	0.001096	7.32	8057.78	799.6	0.34
Reach-1	2900	100-year	58600.0	127.65	146.80	140.7	147.5	0.001044	7.66	9339.36	839.4	0.34
Reach-1	2900	500-year	89900.0	127.65	151.16	142.8	152.0	0.000935	8.50	13297.96	955.2	0.33
Reach-1	2400	10-year	29600.0	126.84	141.25	136.7	141.7	0.001121	6.31	7640.49	1372.4	0.33
Reach-1	2400	50-year	48300.0	126.84	144.74	138.8	145.2	0.000952	6.93	12125.68	1705.8	0.32
Reach-1	2400	100-year	58600.0	126.84	146.41	139.6	146.9	0.000890	7.19	14365.48	1739.0	0.31
Reach-1	2400	500-year	89900.0	126.84	150.86	141.6	151.5	0.000782	7.90	20369.18	1795.7	0.30
Reach-1	2000	10-year	29600.0	126.19	140.77	136.0	141.3	0.001216	6.63	7160.53	1360.6	0.34
Reach-1	2000	50-year	48300.0	126.19	144.18	137.8	144.9	0.001184	7.76	10557.90	1601.6	0.35
Reach-1	2000	100-year	58600.0	126.19	145.80	139.0	146.6	0.001182	8.30	12221.15	1680.0	0.36
Reach-1	2000	500-year	89900.0	126.19	150.10	141.3	151.1	0.001184	9.68	17141.38	2008.0	0.37
Reach-1	1600	10-year	29600.0	126.19	140.53	135.5	140.8	0.000781	5.24	7778.17	1352.9	0.27
Reach-1	1600	50-year	48300.0	126.19	144.03	137.1	144.4	0.000701	5.94	11828.36	1431.0	0.27
Reach-1	1600	100-year	58600.0	126.19	145.69	137.8	146.1	0.000679	6.27	13810.17	1461.1	0.27
Reach-1	1600	500-year	89900.0	126.19	150.22	139.8	150.6	0.000526	6.48	23876.97	2041.4	0.25
Reach-1	1100	10-year	29600.0	124.69	139.84	134.8	140.3	0.001050	6.36	6240.04	1030.8	0.32
Reach-1	1100	50-year	48300.0	124.69	143.26	136.8	143.9	0.001050	7.50	9124.03	1110.3	0.33
Reach-1	1100	100-year	58600.0	124.69	144.88	137.7	145.6	0.001052	8.02	10526.49	1131.6	0.34
Reach-1	1100	500-year	89900.0	124.69	149.22	140.2	150.2	0.001051	9.31	15352.61	1823.7	0.35

APPENDIX E

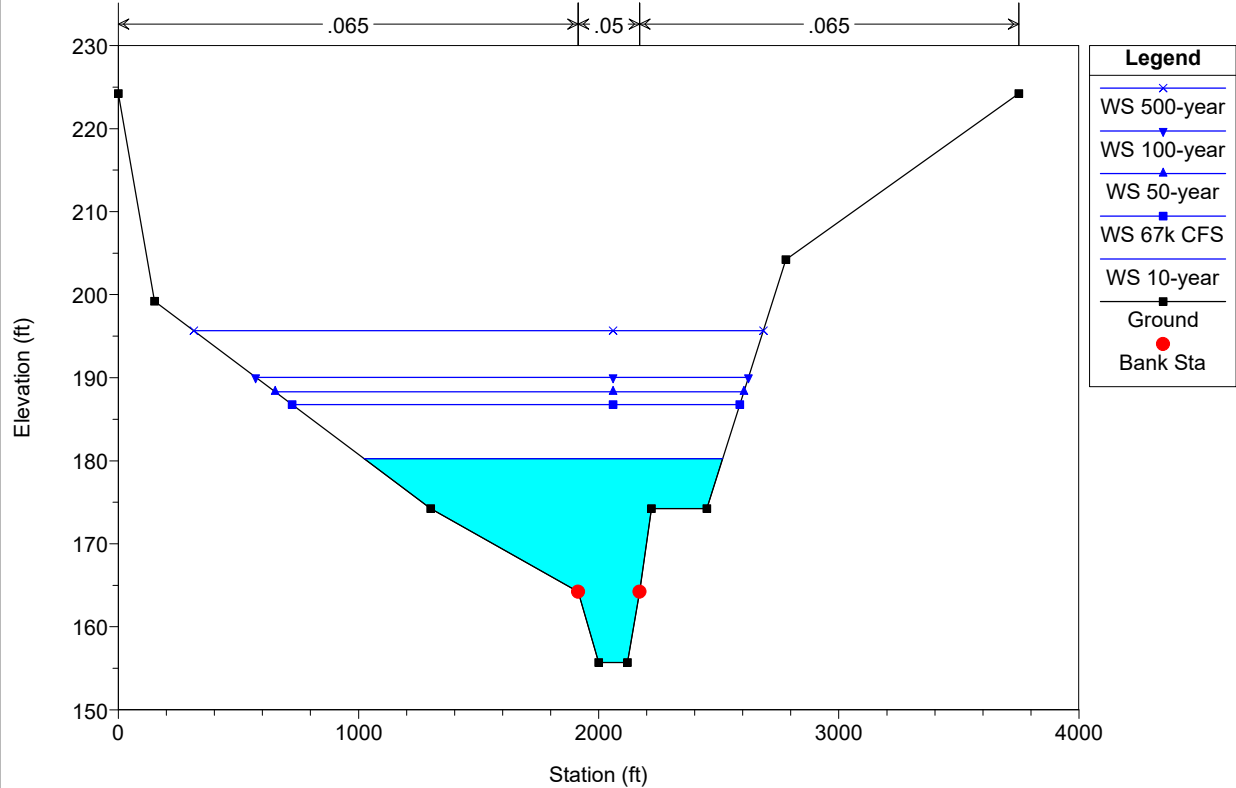
HEC-RAS OUTPUT – CROSS SECTIONS

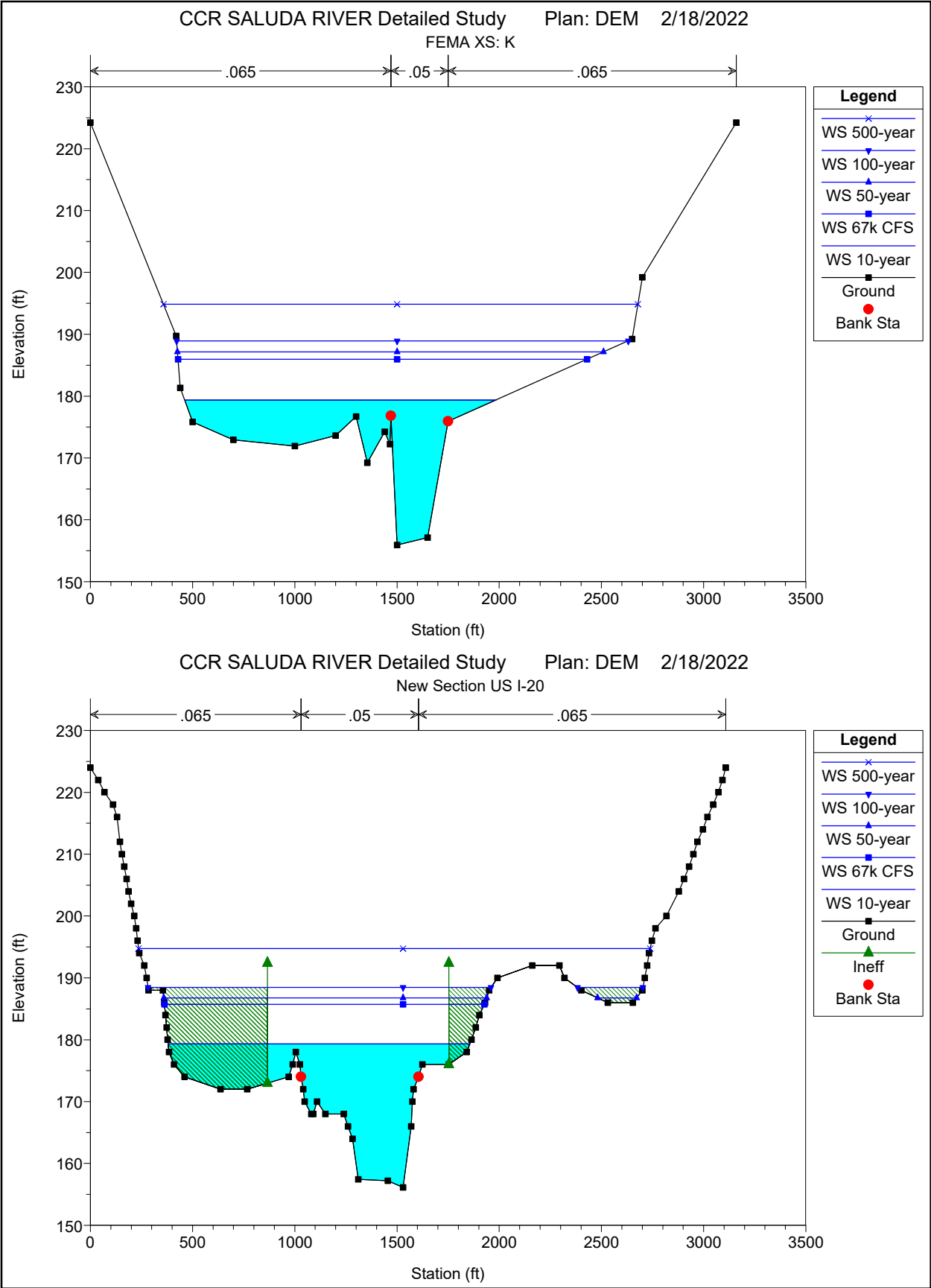


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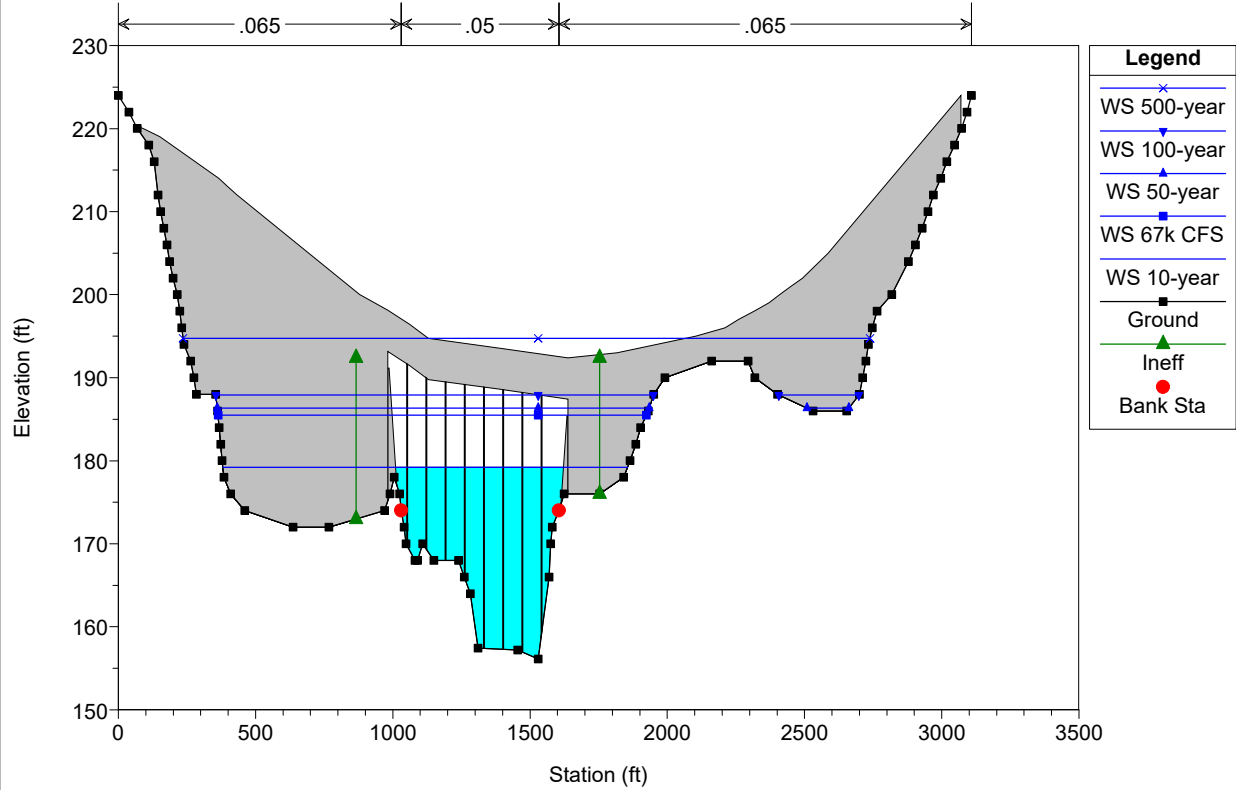


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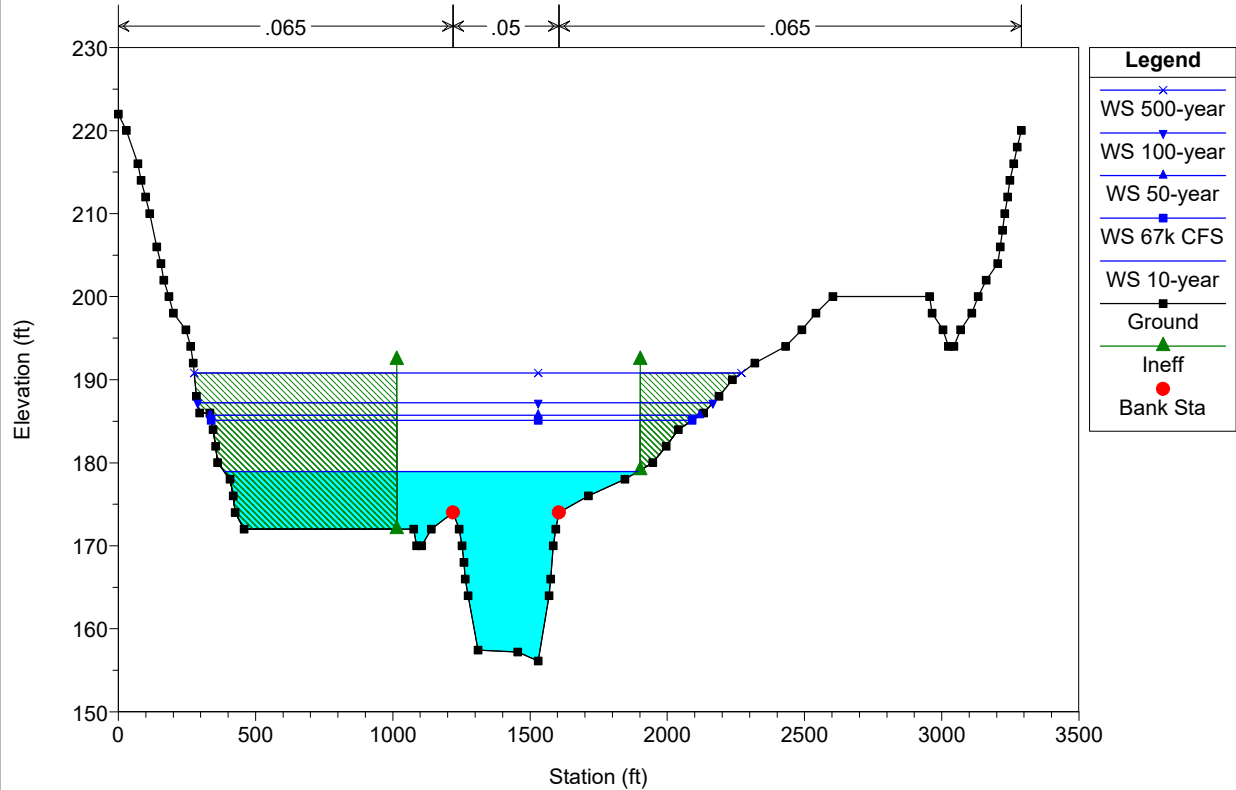


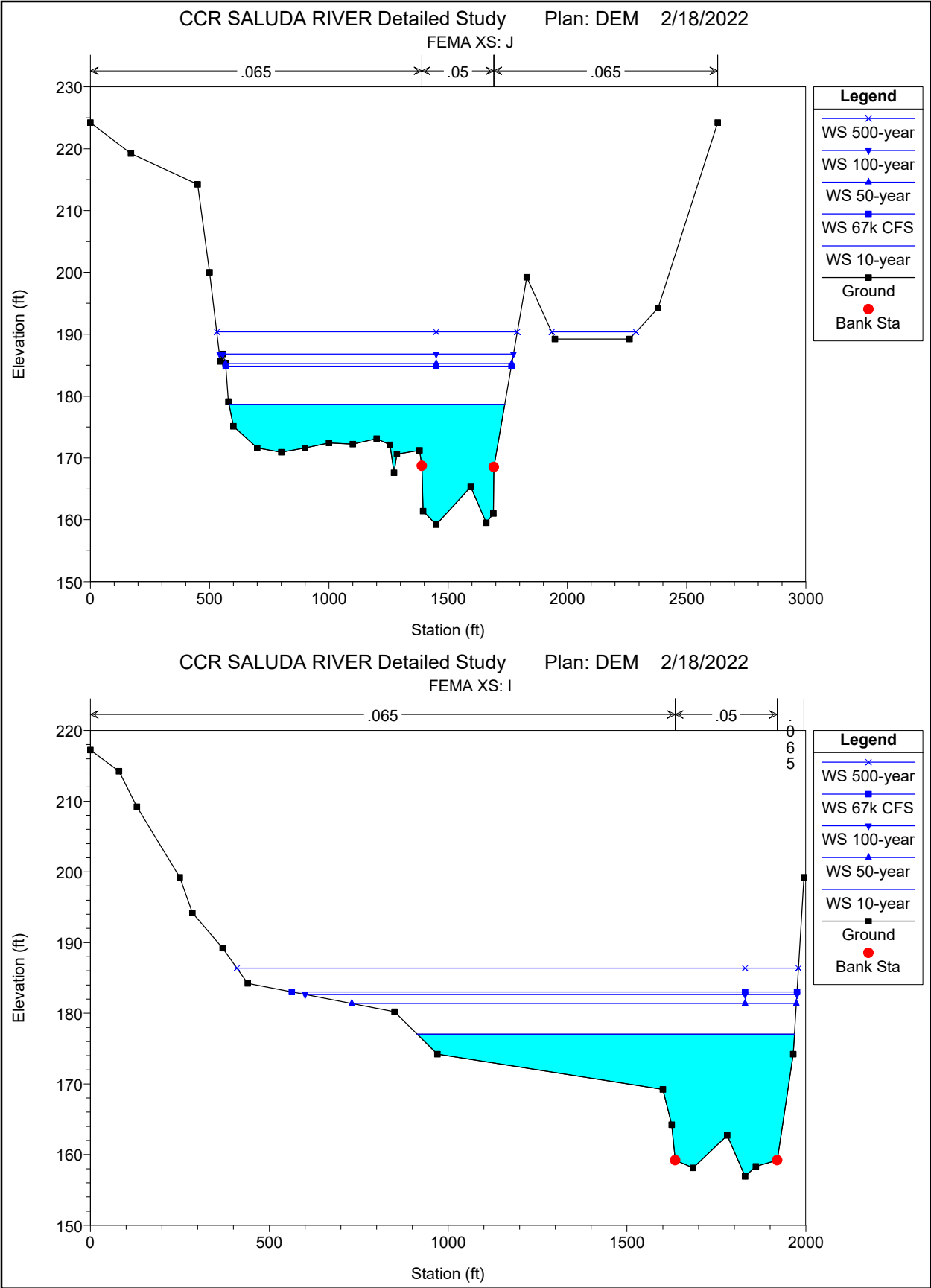


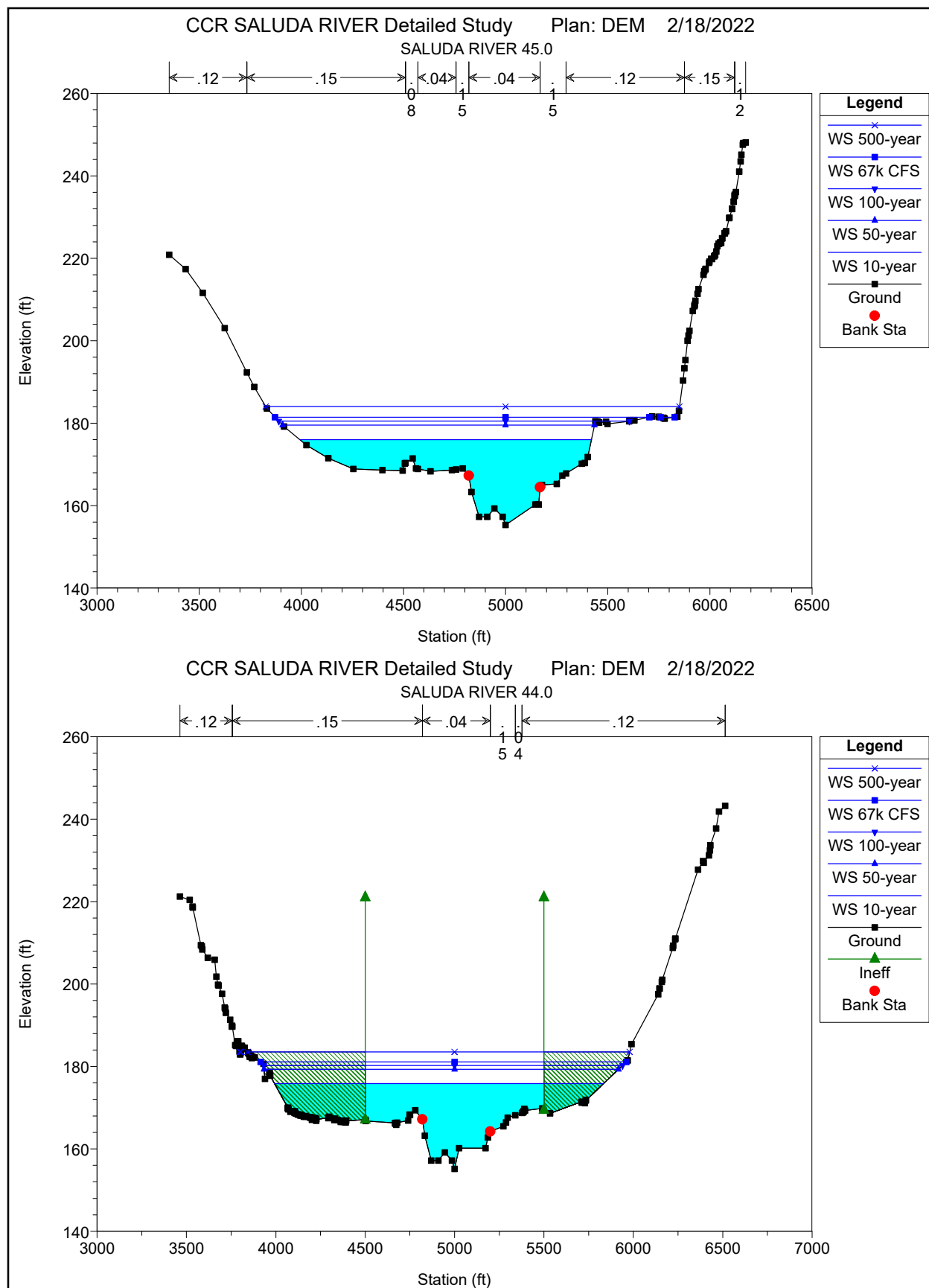
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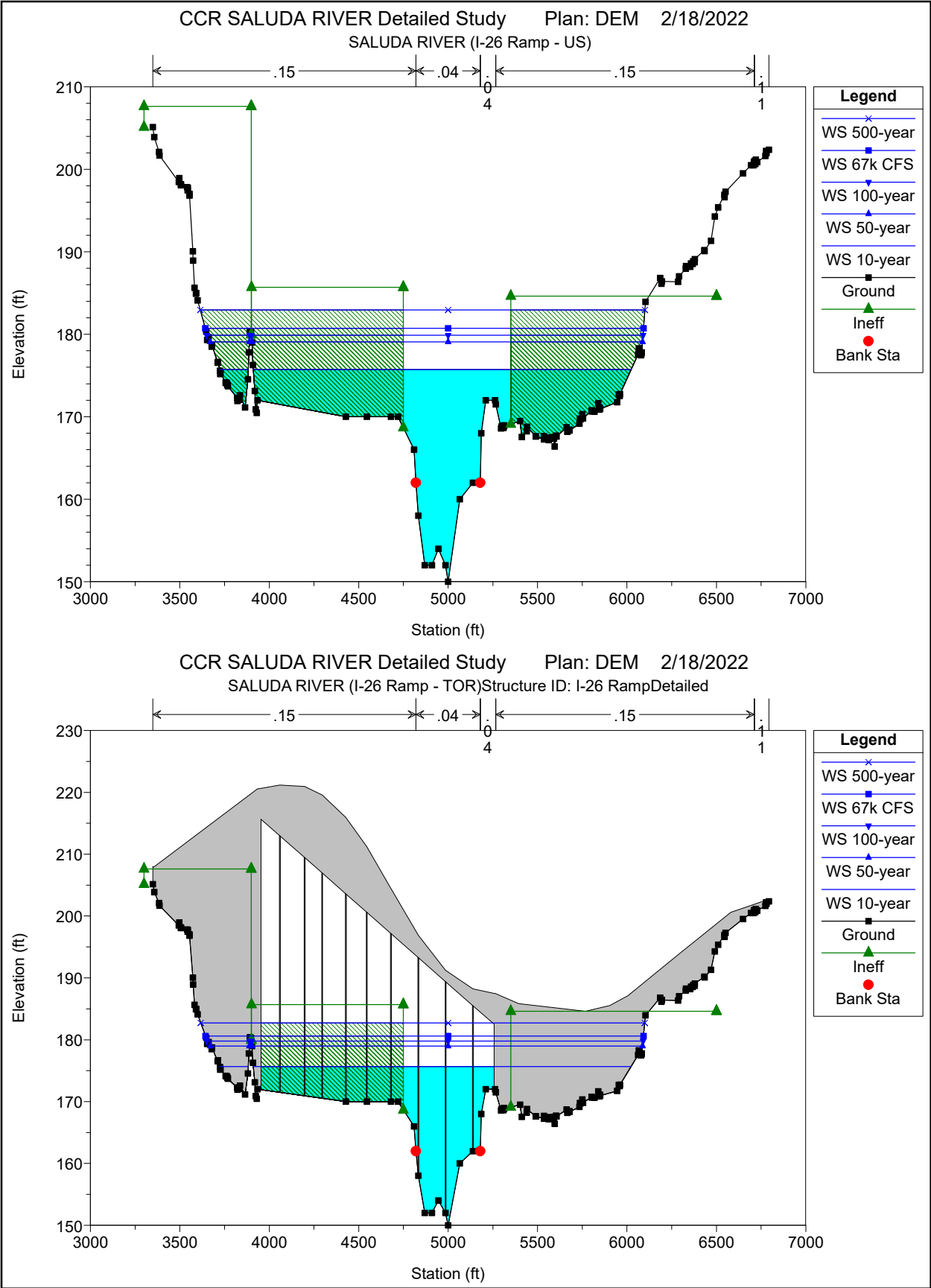


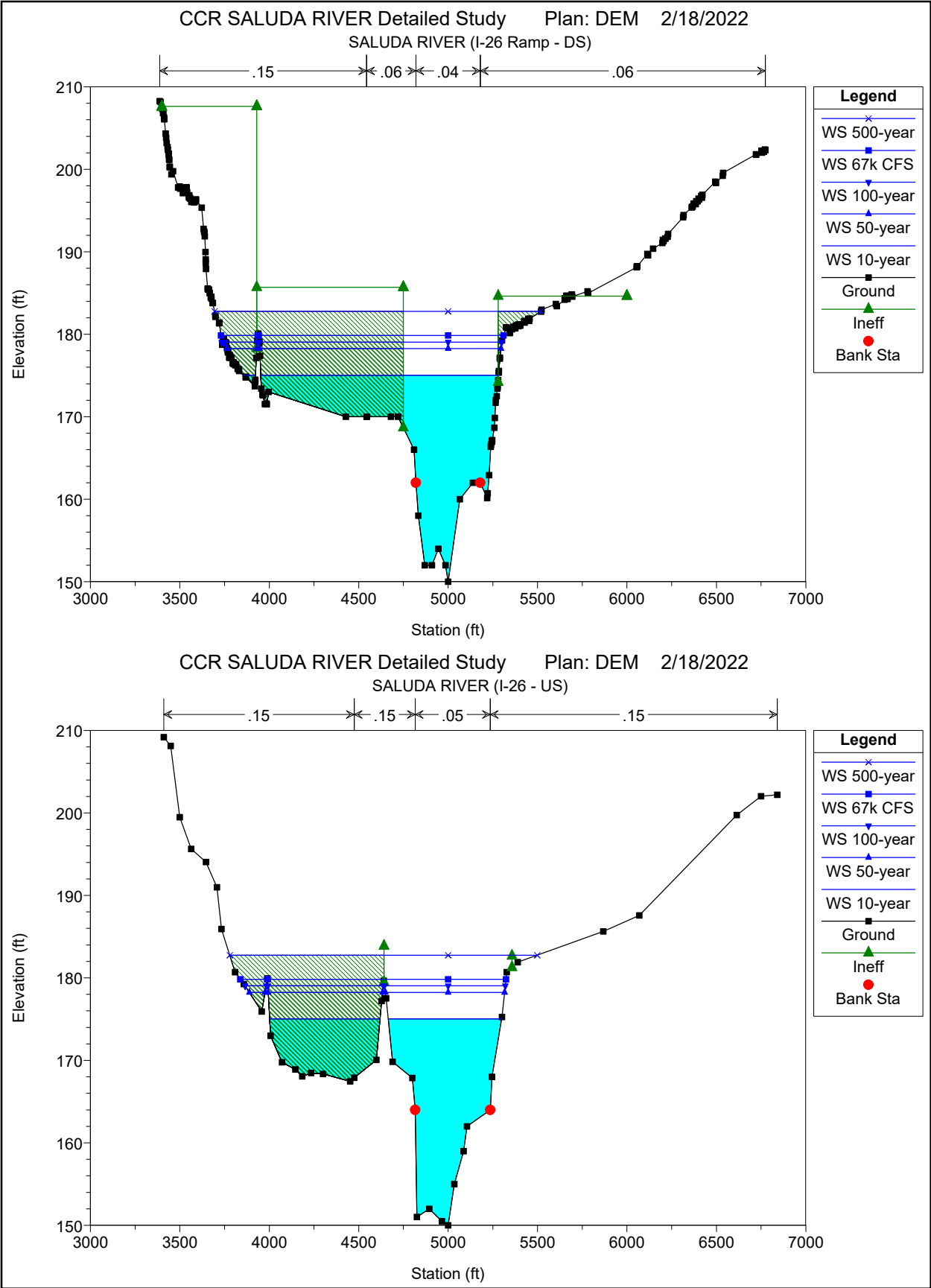
CCR SALUDA RIVER Detailed Study Plan: DEM 2/18/2022
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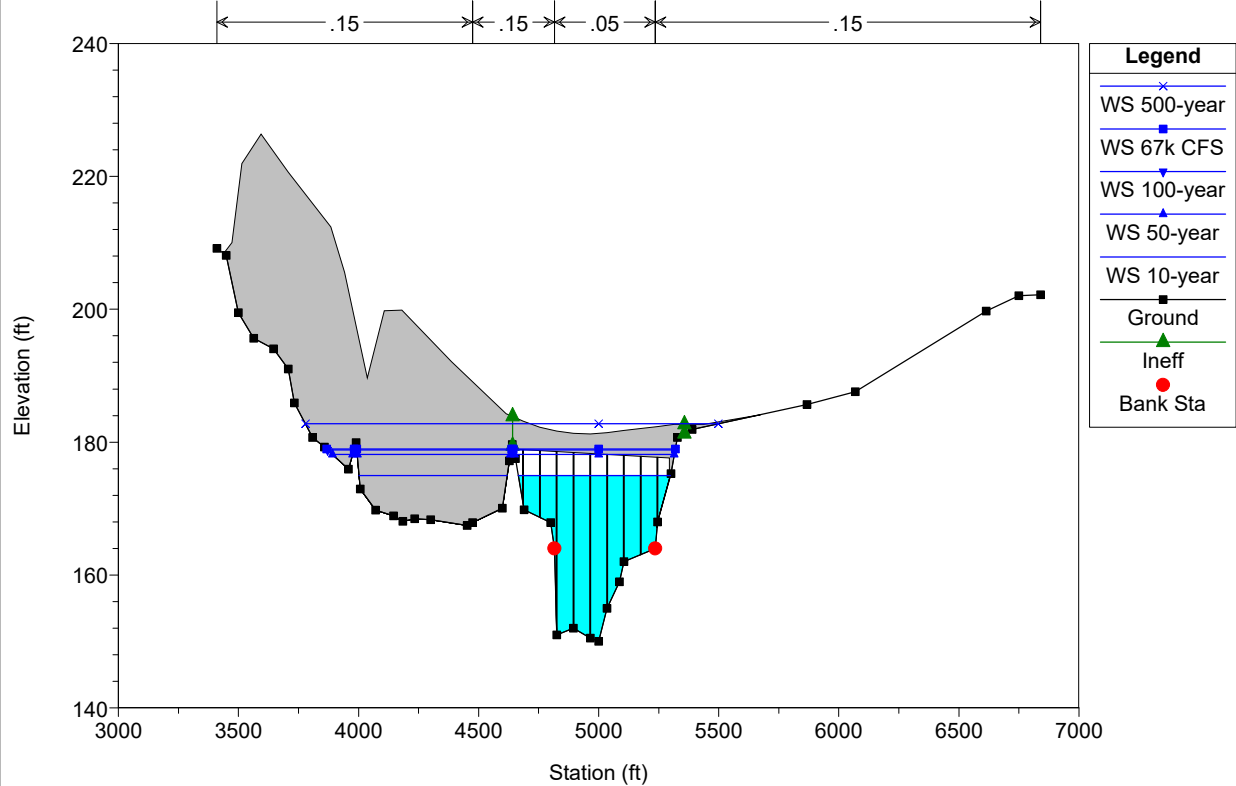




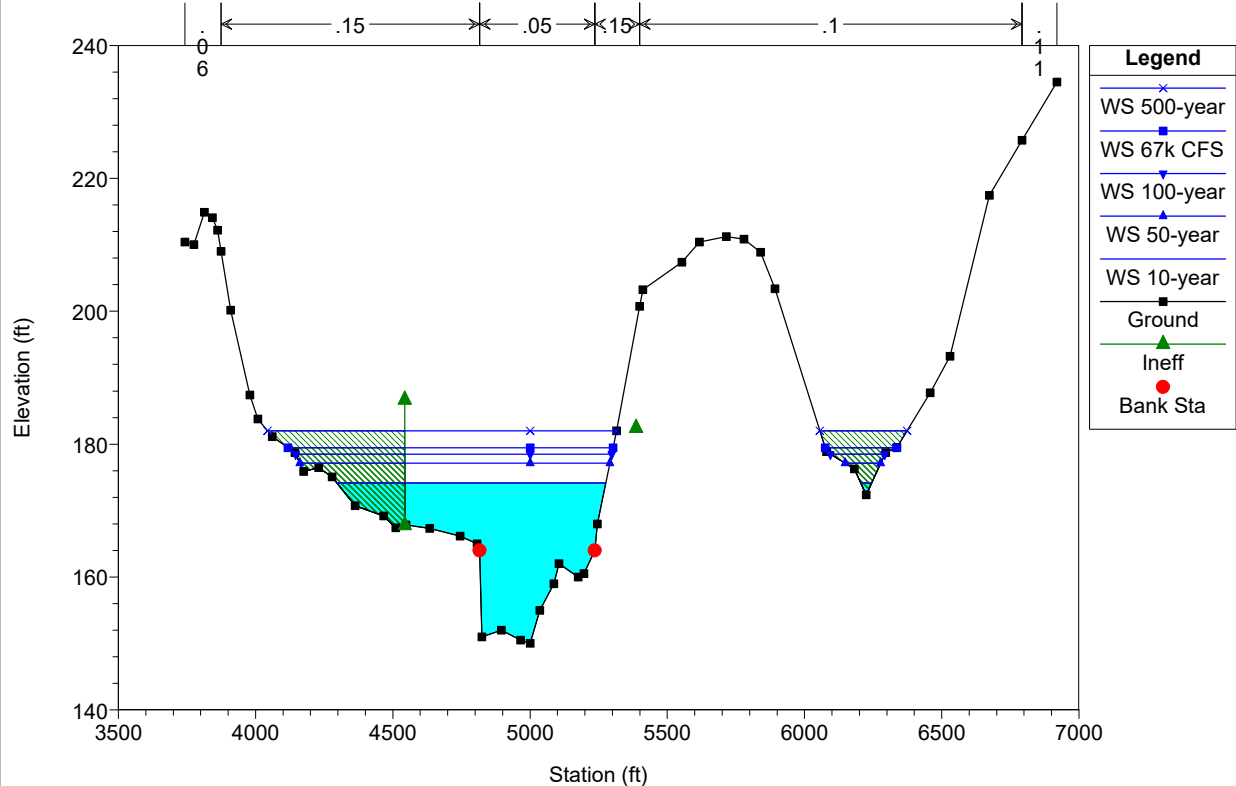


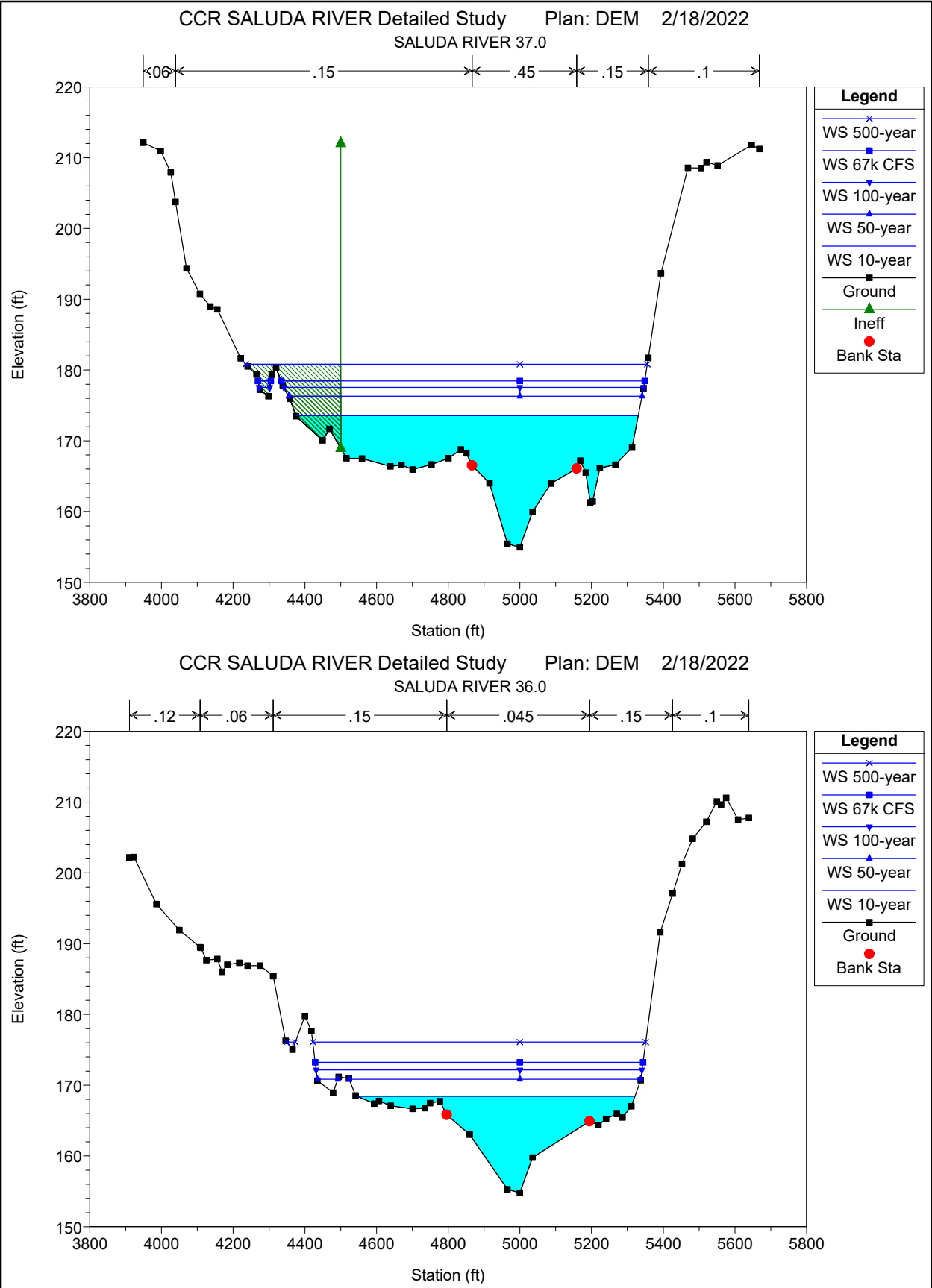


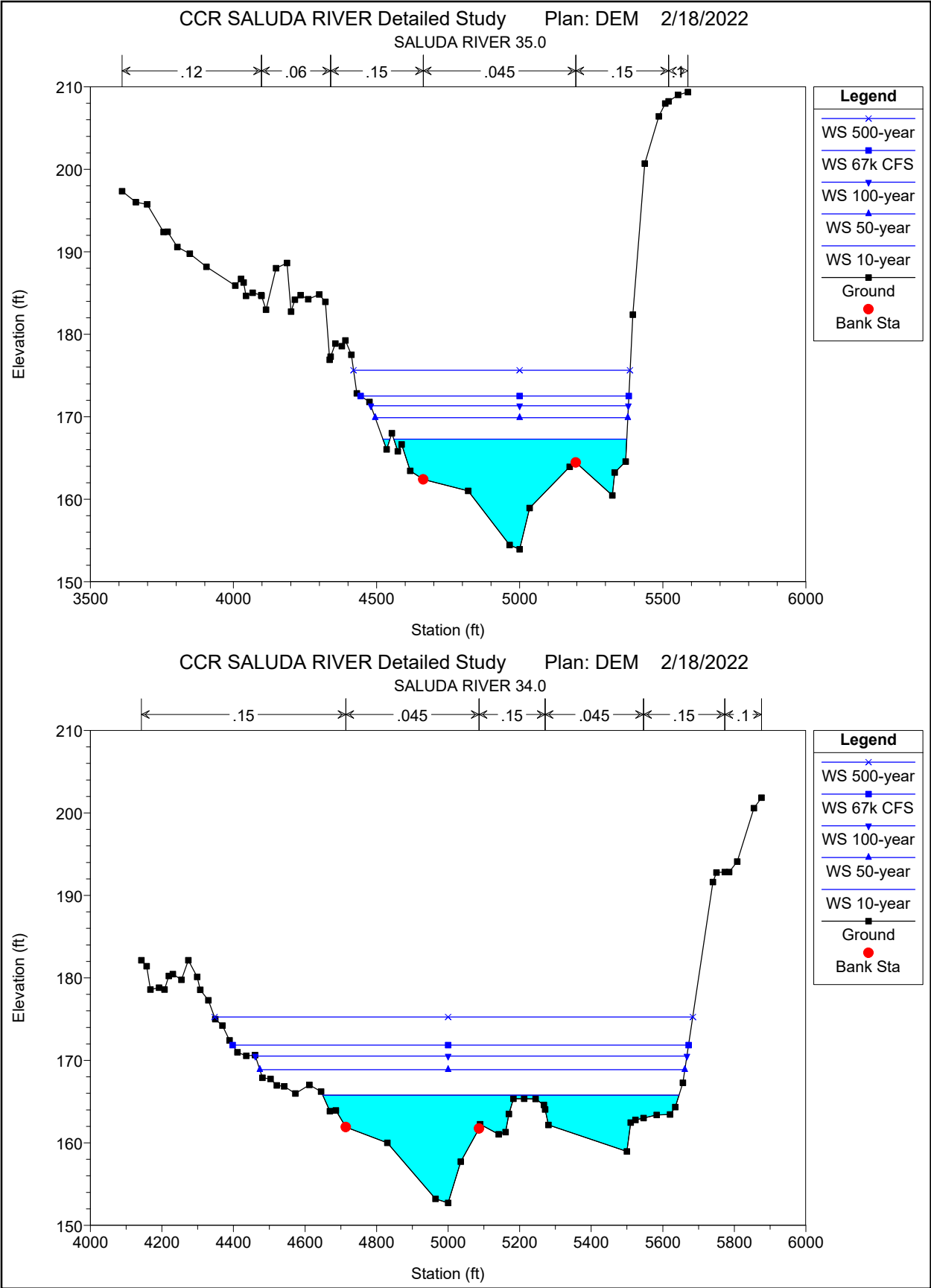
CCR SALUDA RIVER Detailed Study Plan: DEM 2/18/2022
SALUDA RIVER (I-26 - TOR) Structure ID: I-26Detailed Survey Str



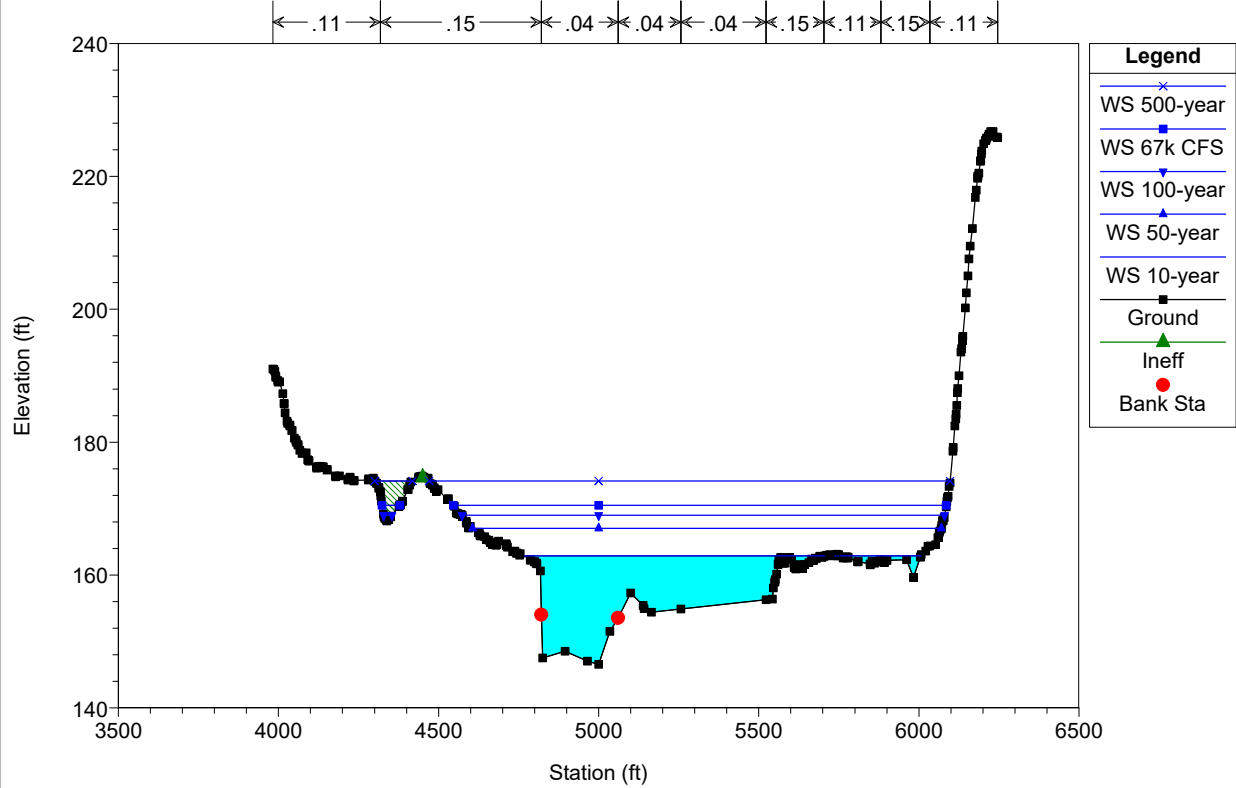
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SALUDA RIVER (I-26 - DS)



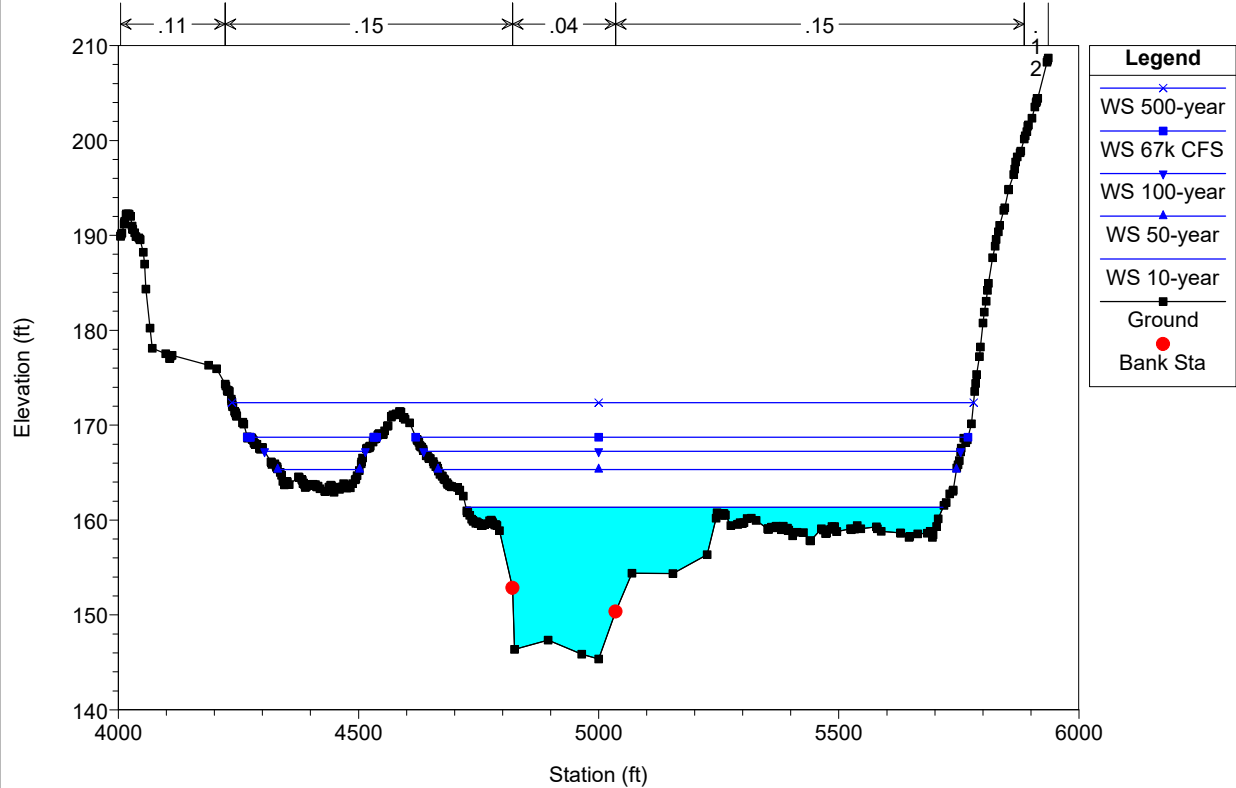




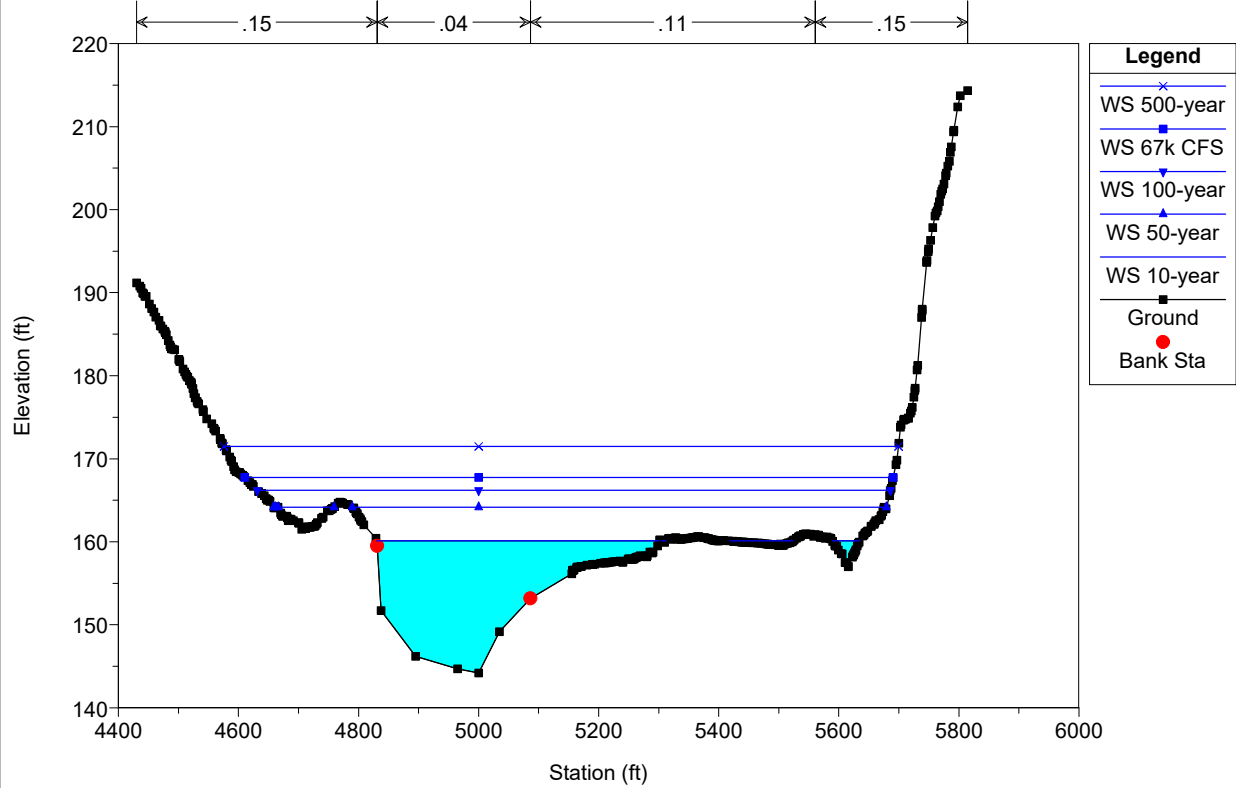
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SALUDA RIVER 31.0



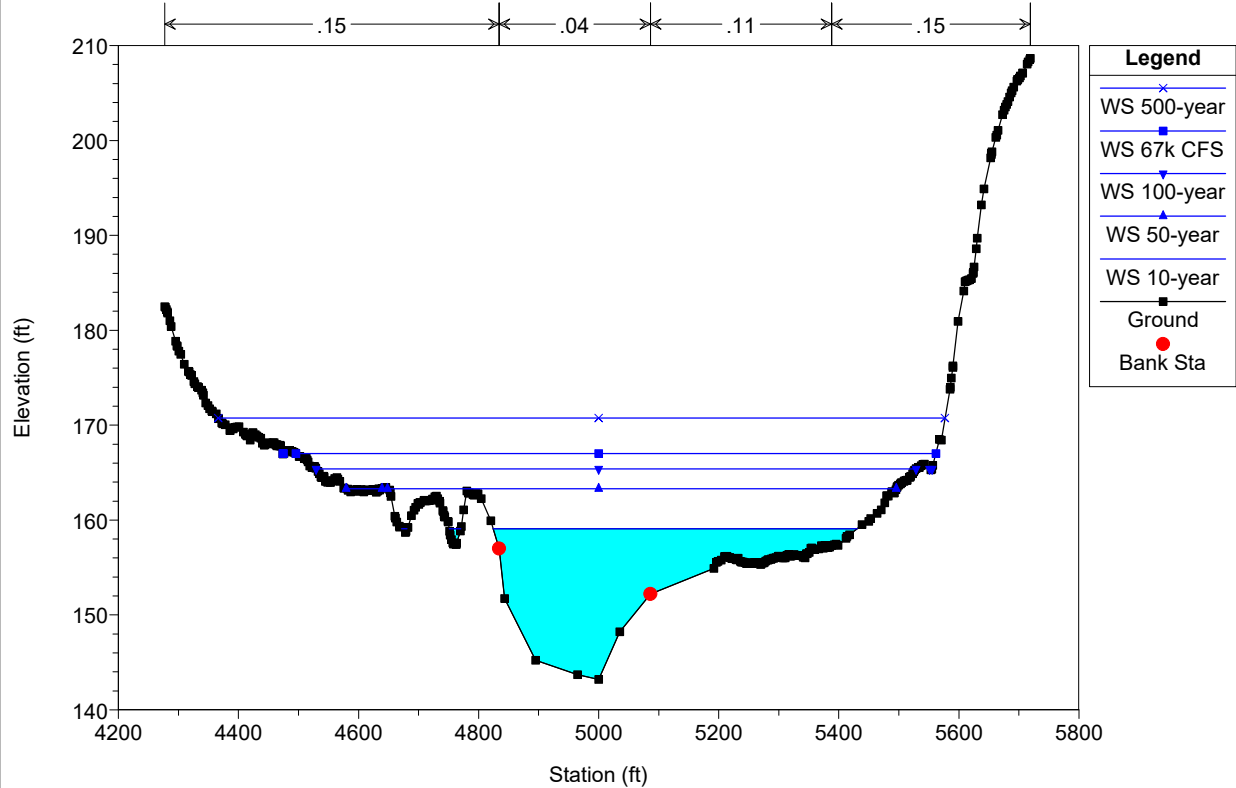
CCR SALUDA RIVER Detailed Study Plan: DEM 2/18/2022
SALUDA RIVER 30.0



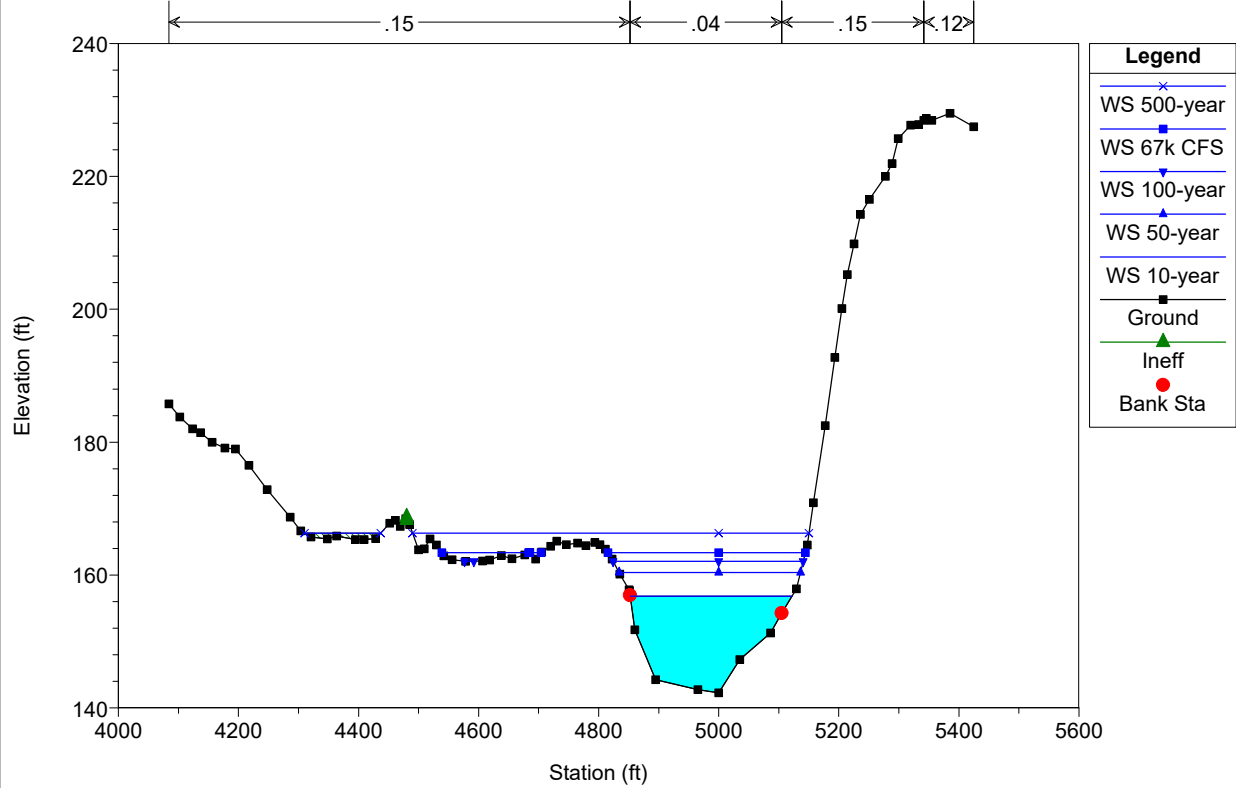
CCR SALUDA RIVER Detailed Study Plan: DEM 2/18/2022
SALUDA RIVER 29.0



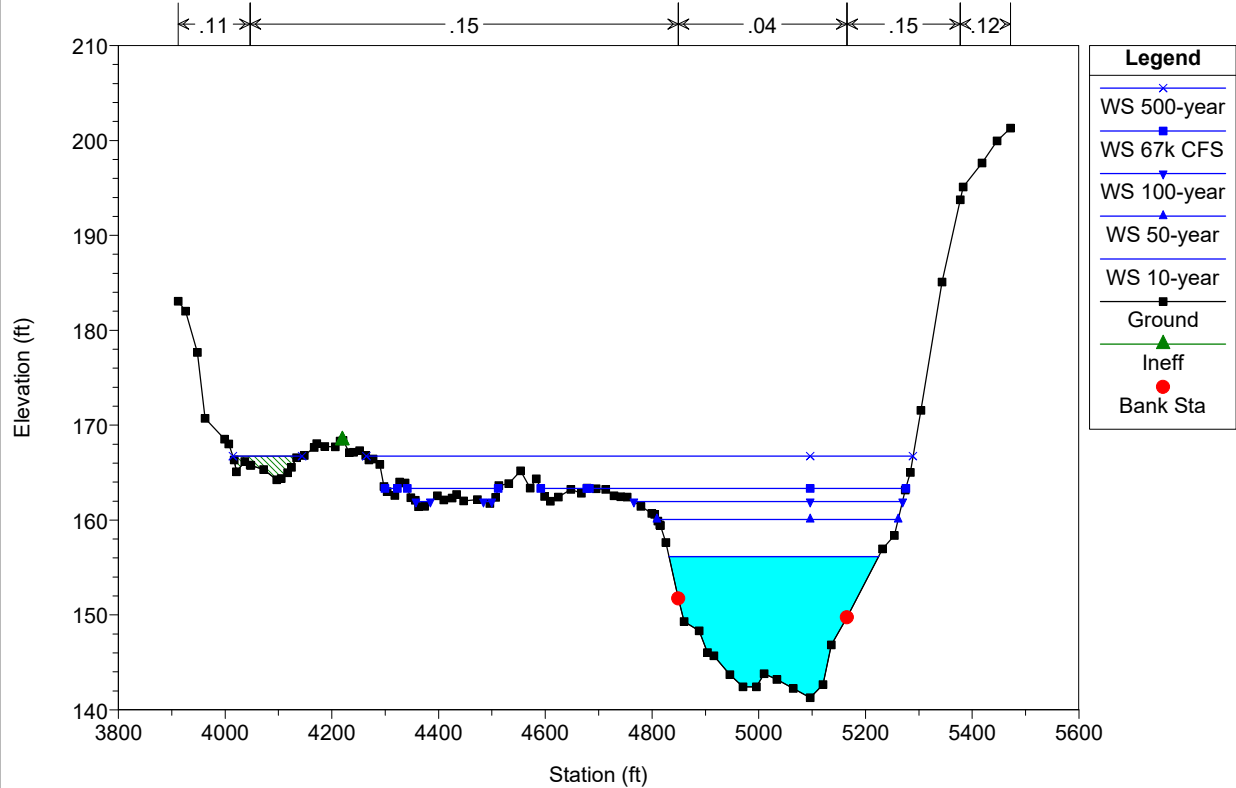
CCR SALUDA RIVER Detailed Study Plan: DEM 2/18/2022
SALUDA RIVER 28.0



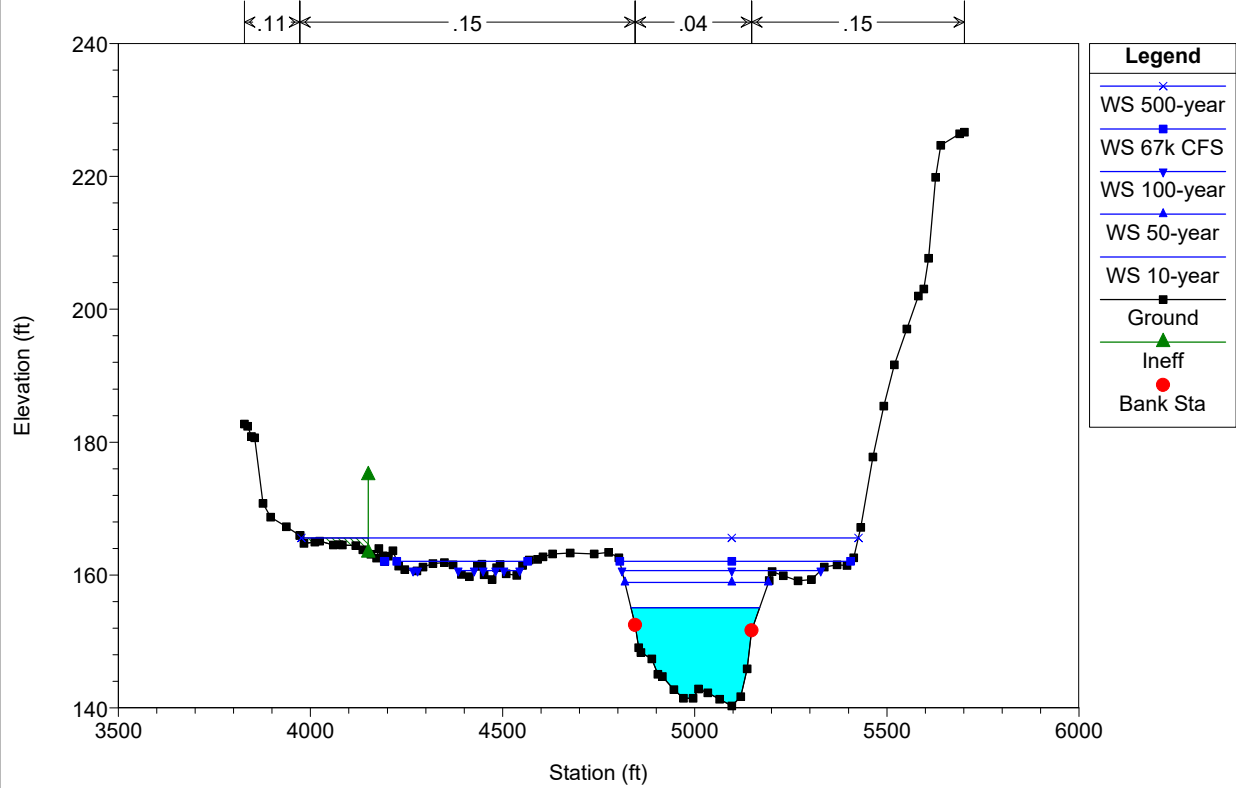
CCR SALUDA RIVER Detailed Study Plan: DEM 2/18/2022
SALUDA RIVER 27.0



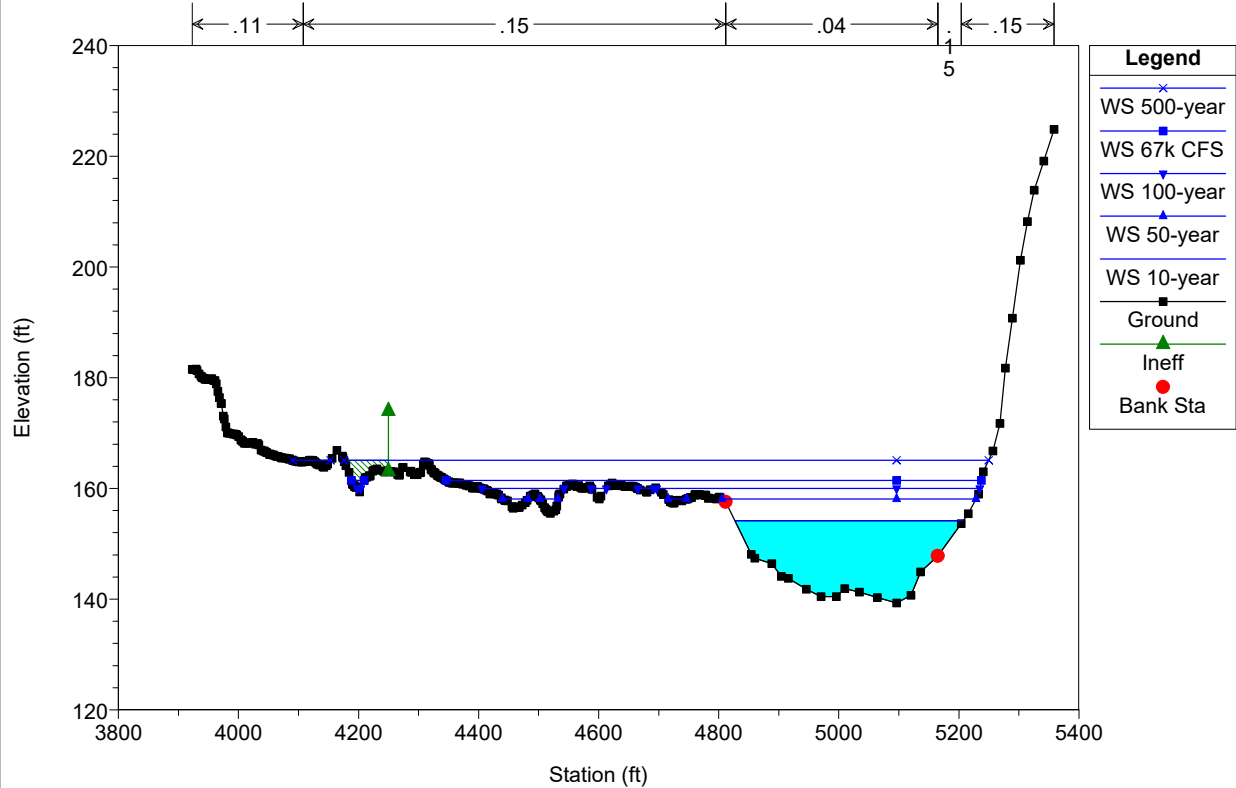
CCR SALUDA RIVER Detailed Study Plan: DEM 2/18/2022
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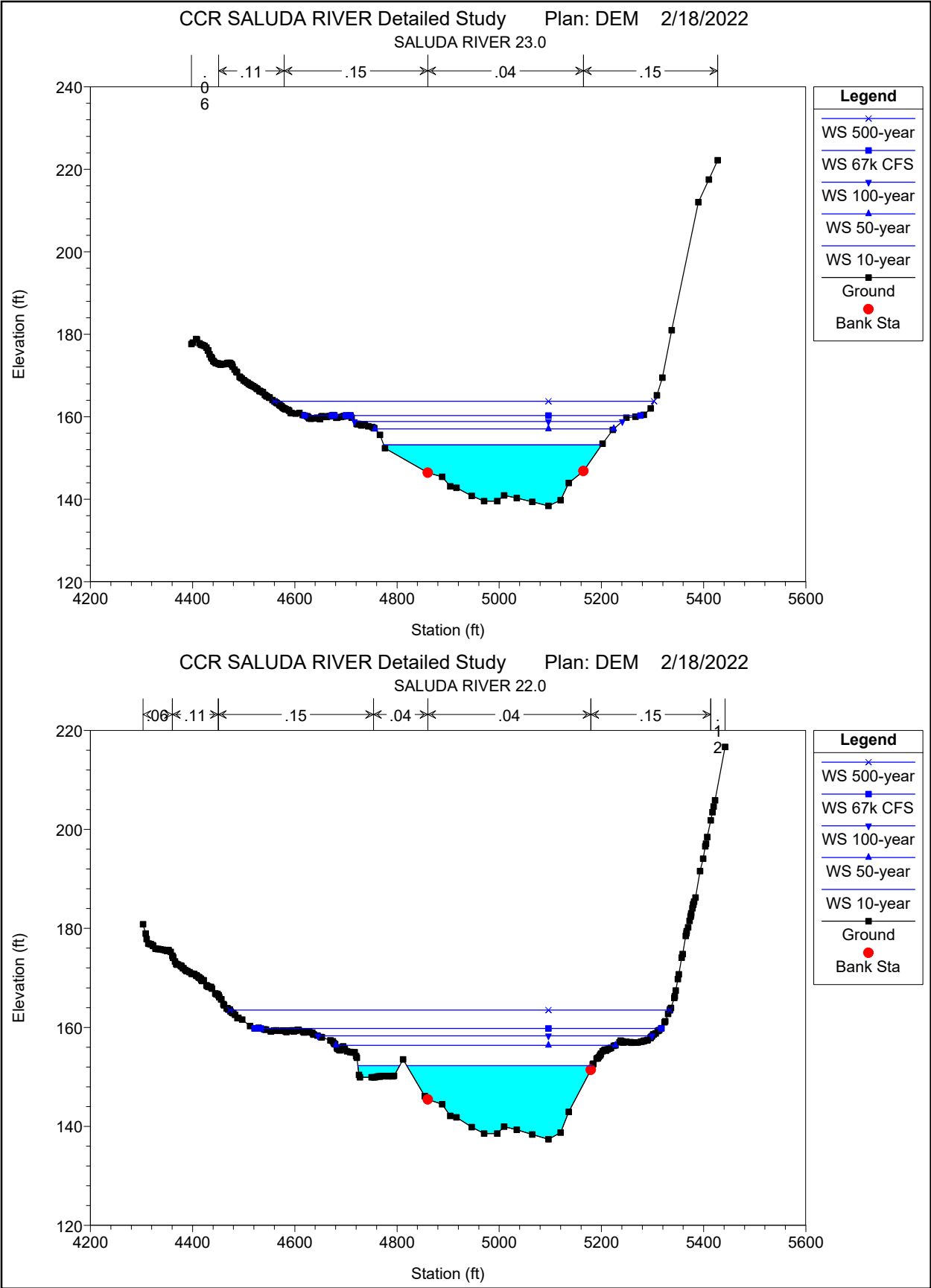


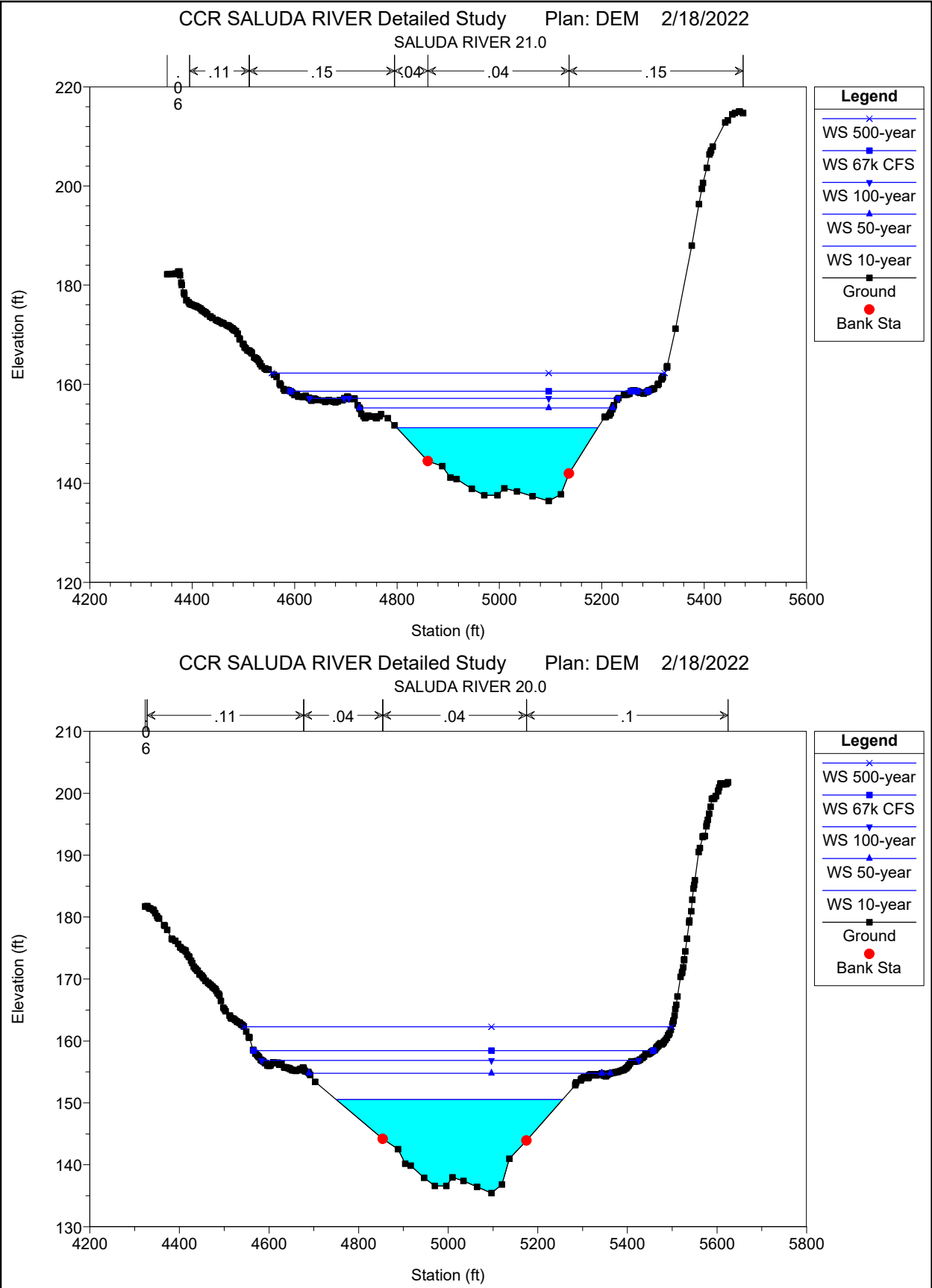
CCR SALUDA RIVER Detailed Study Plan: DEM 2/18/2022
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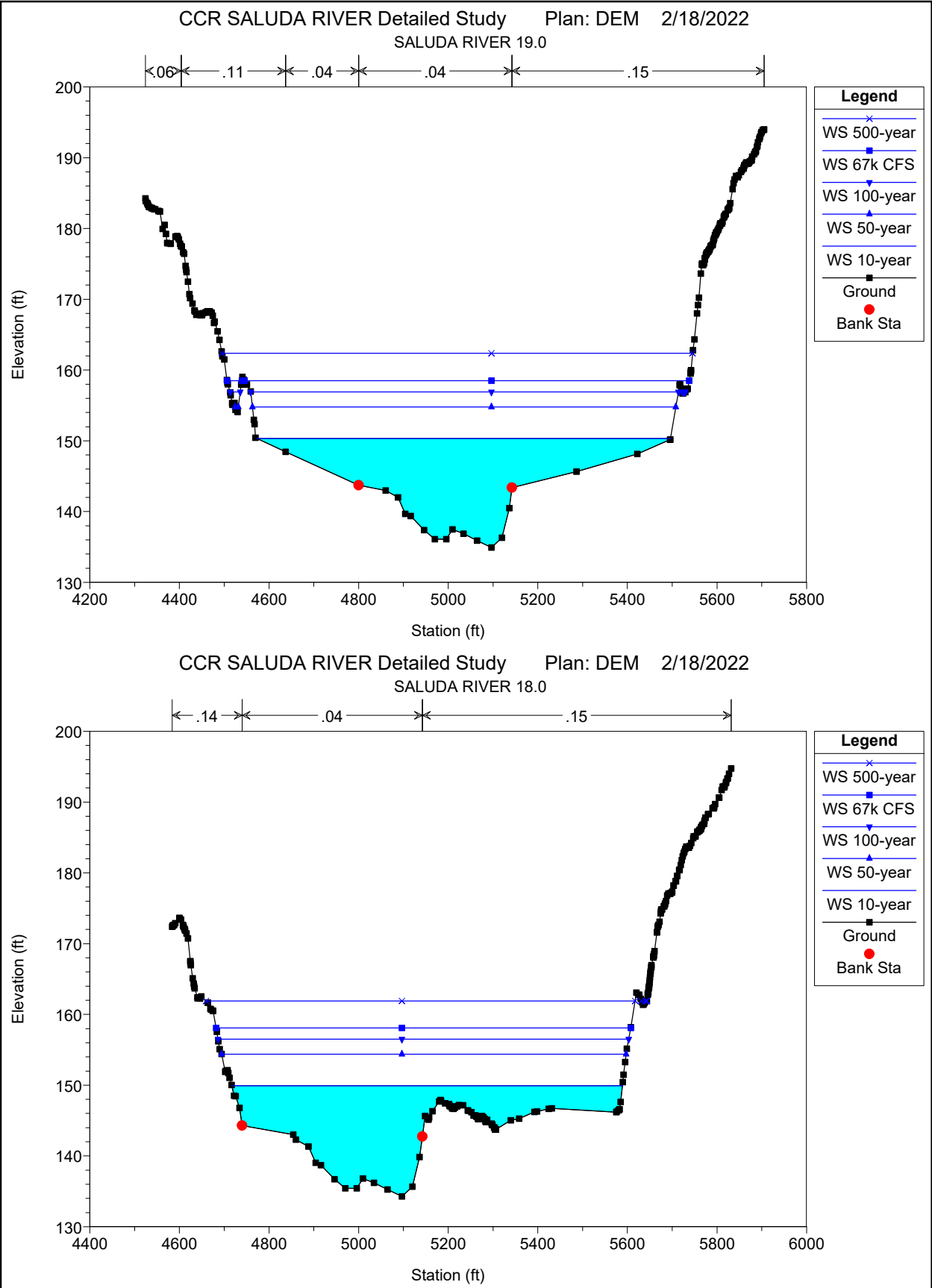


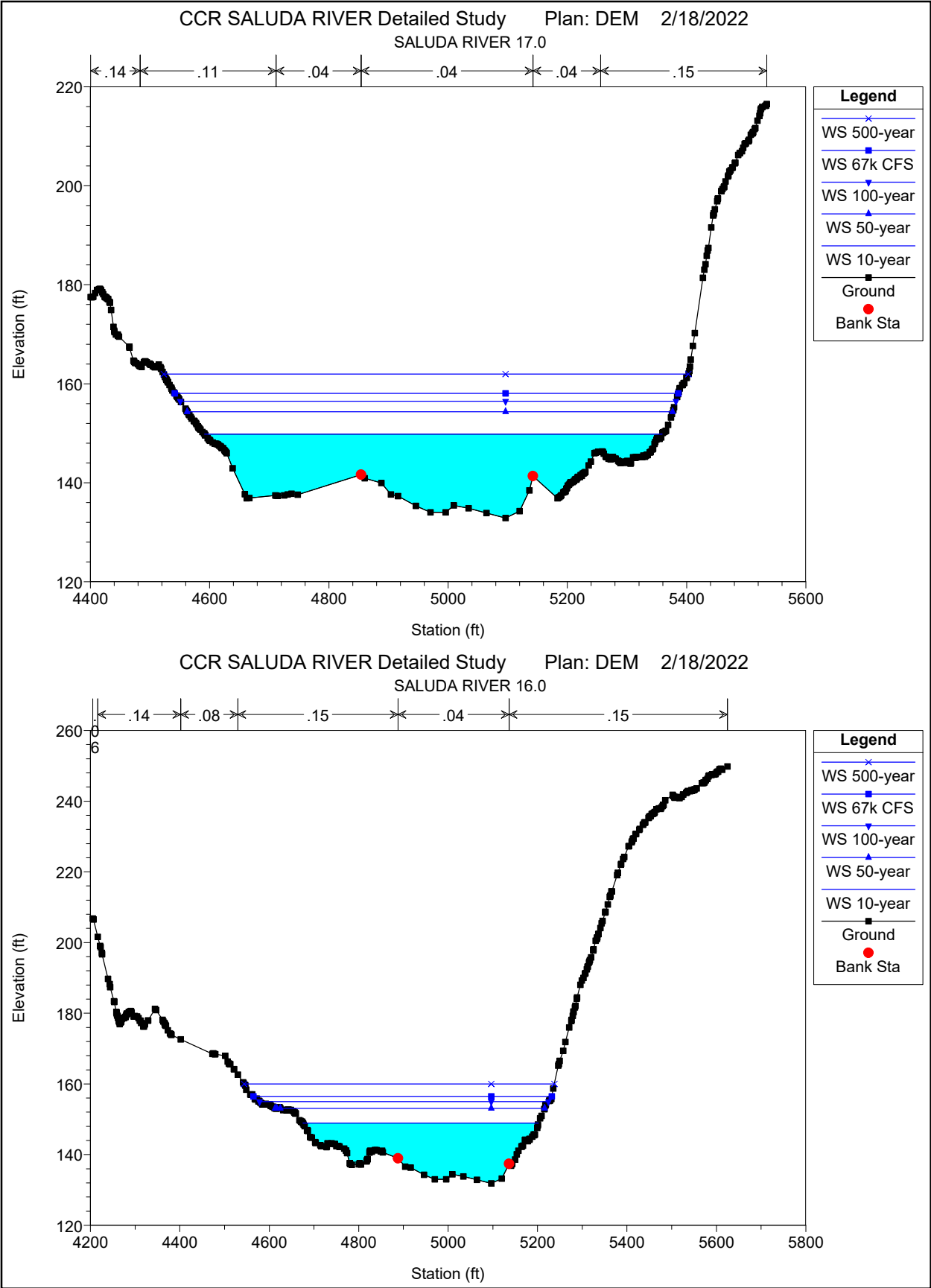
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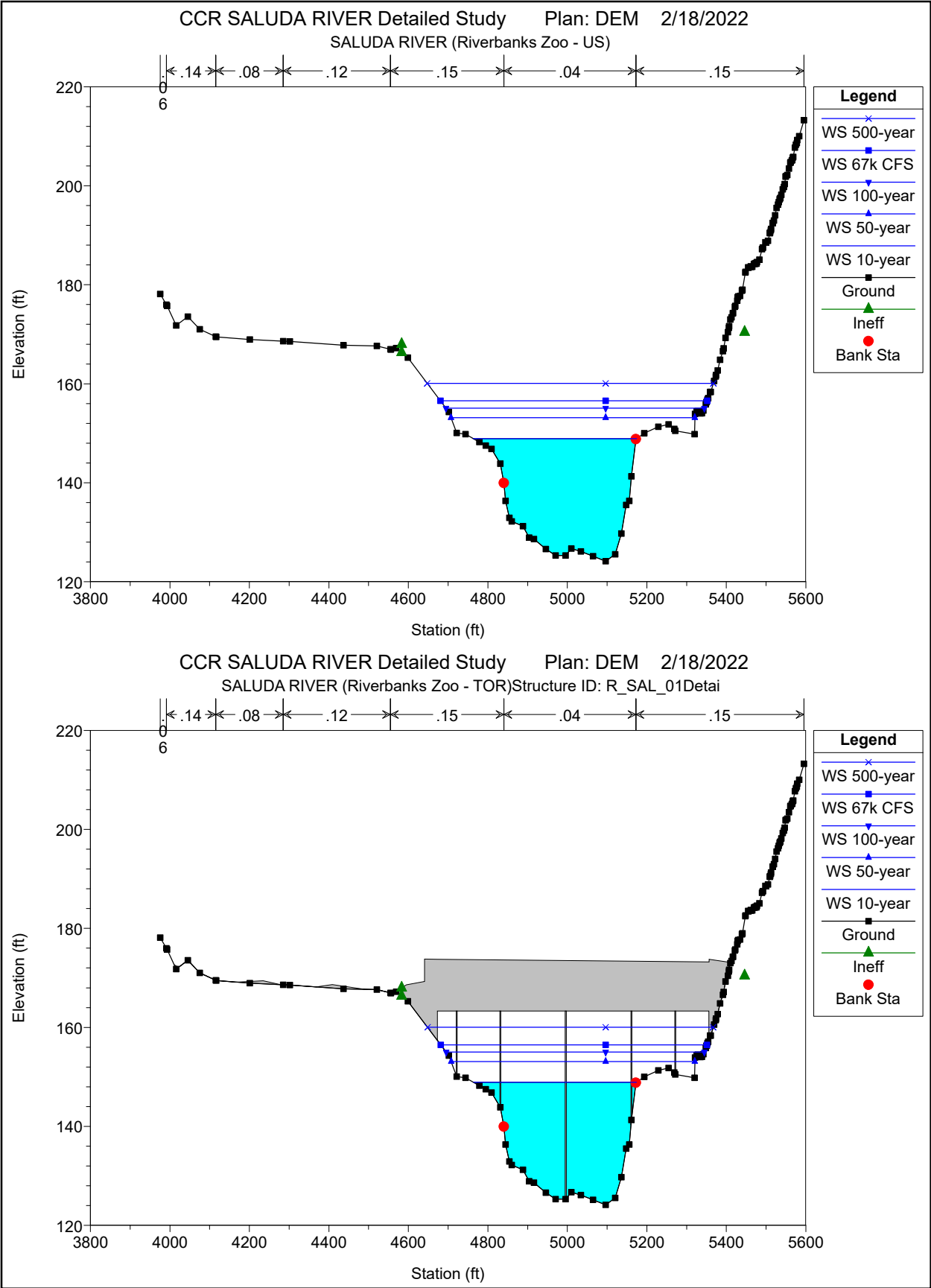


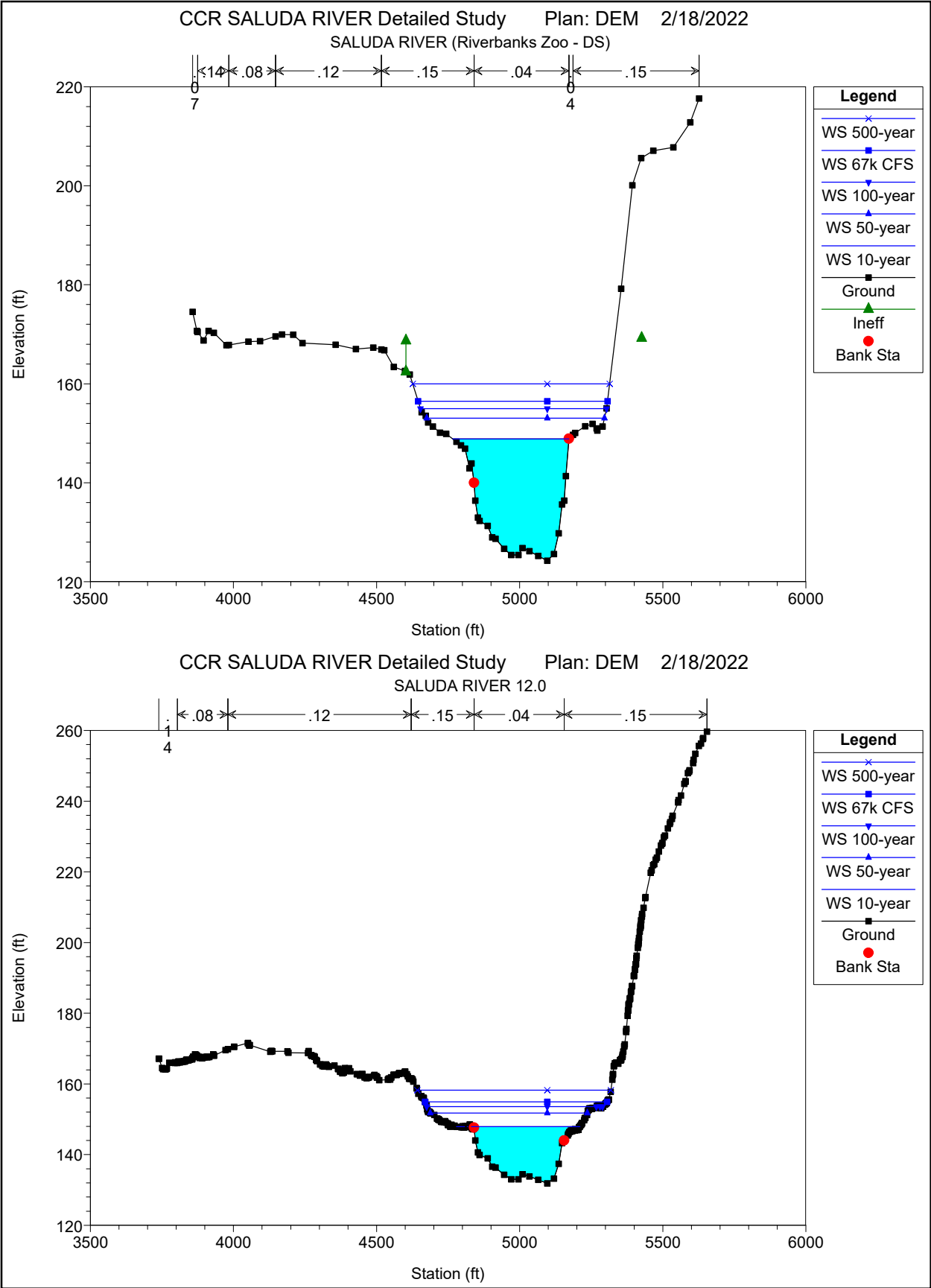


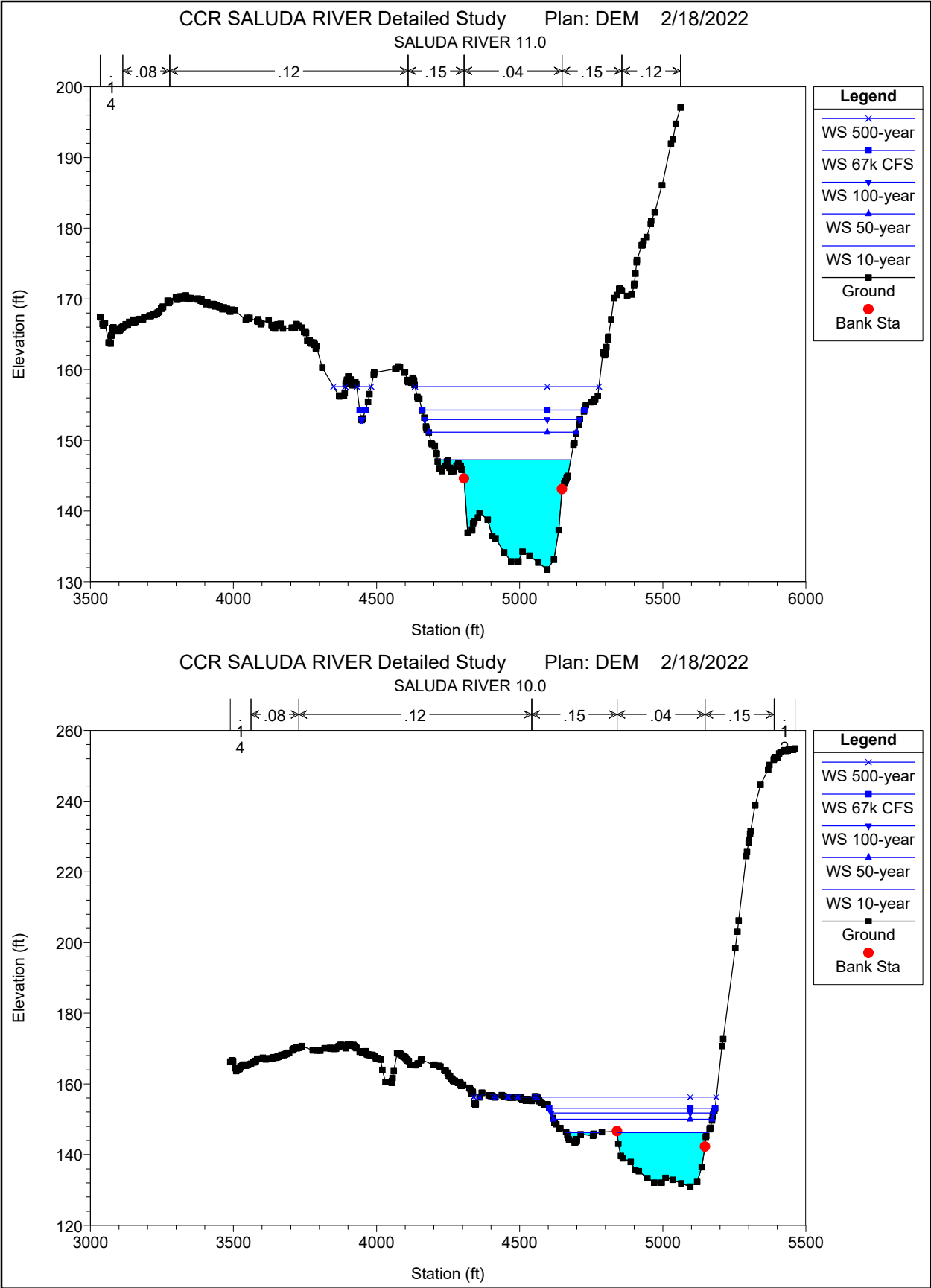


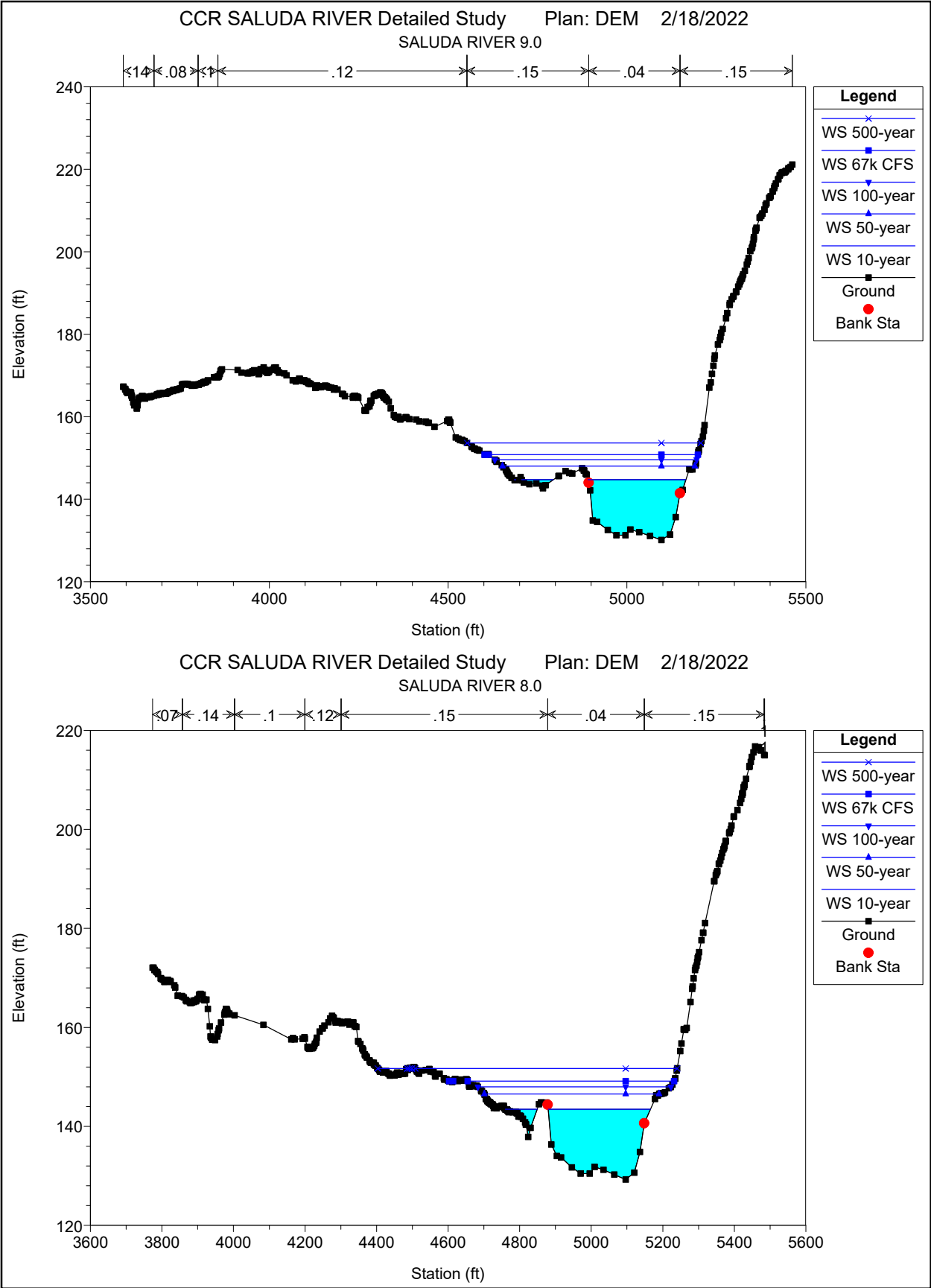


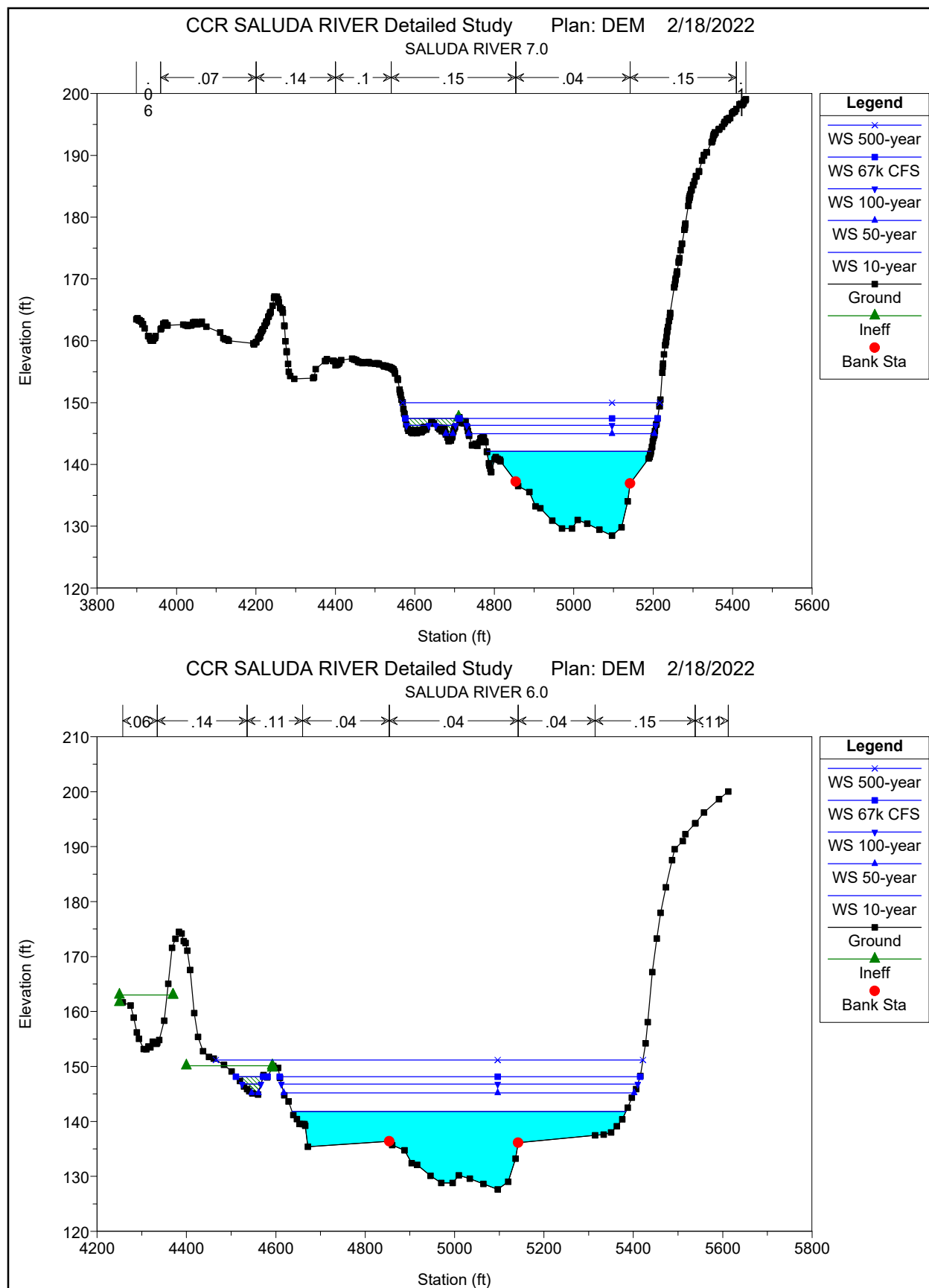


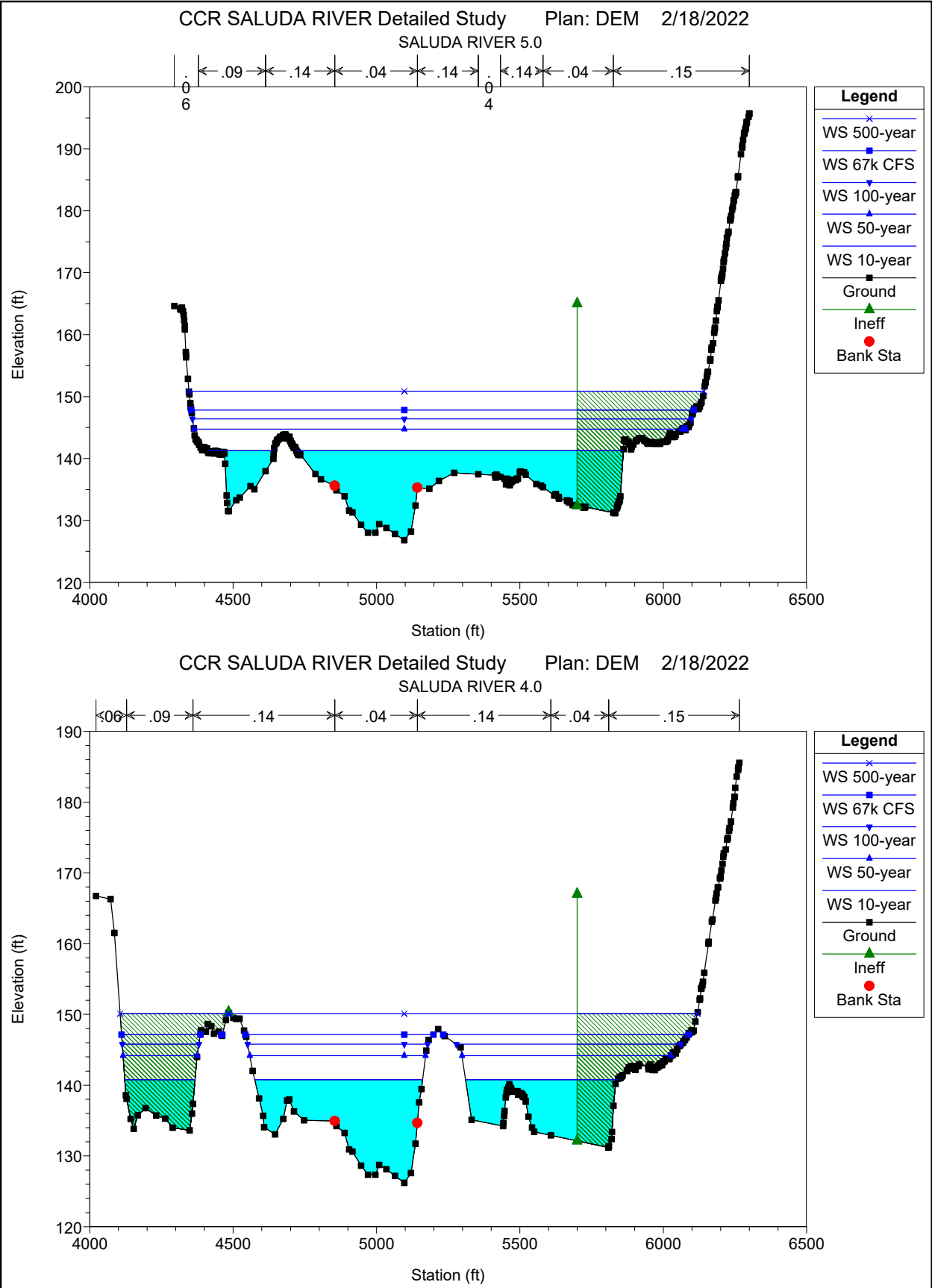


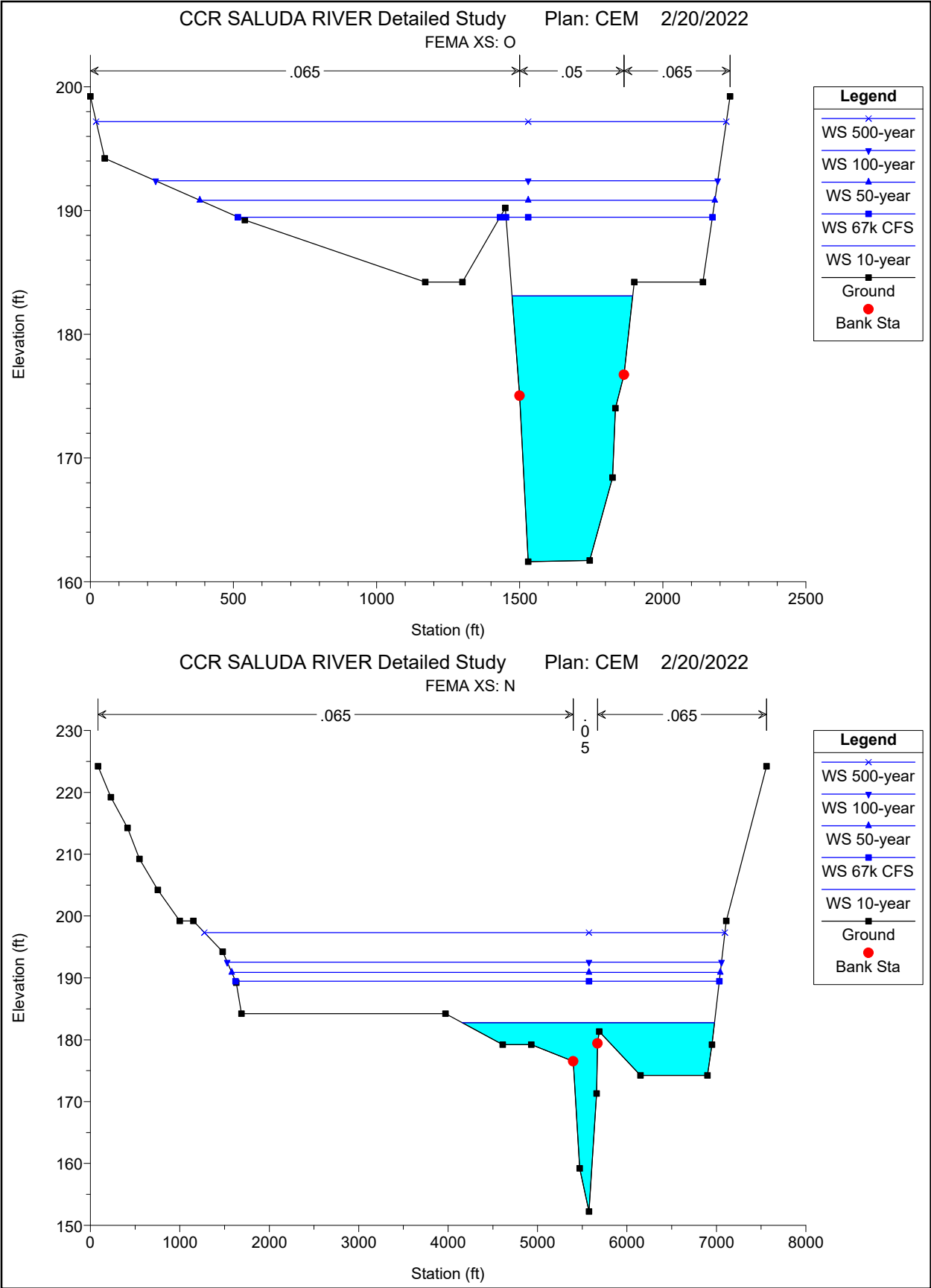


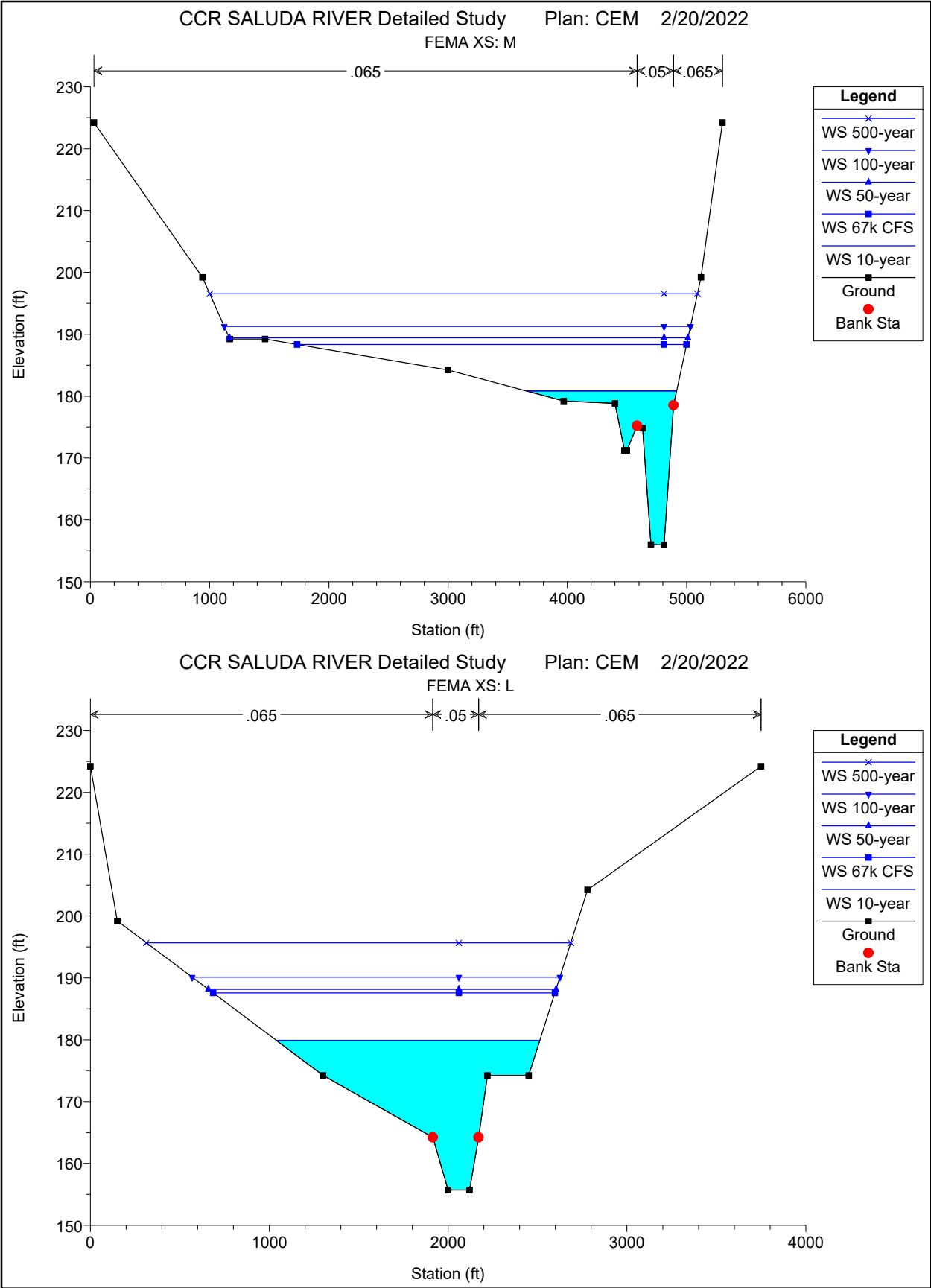


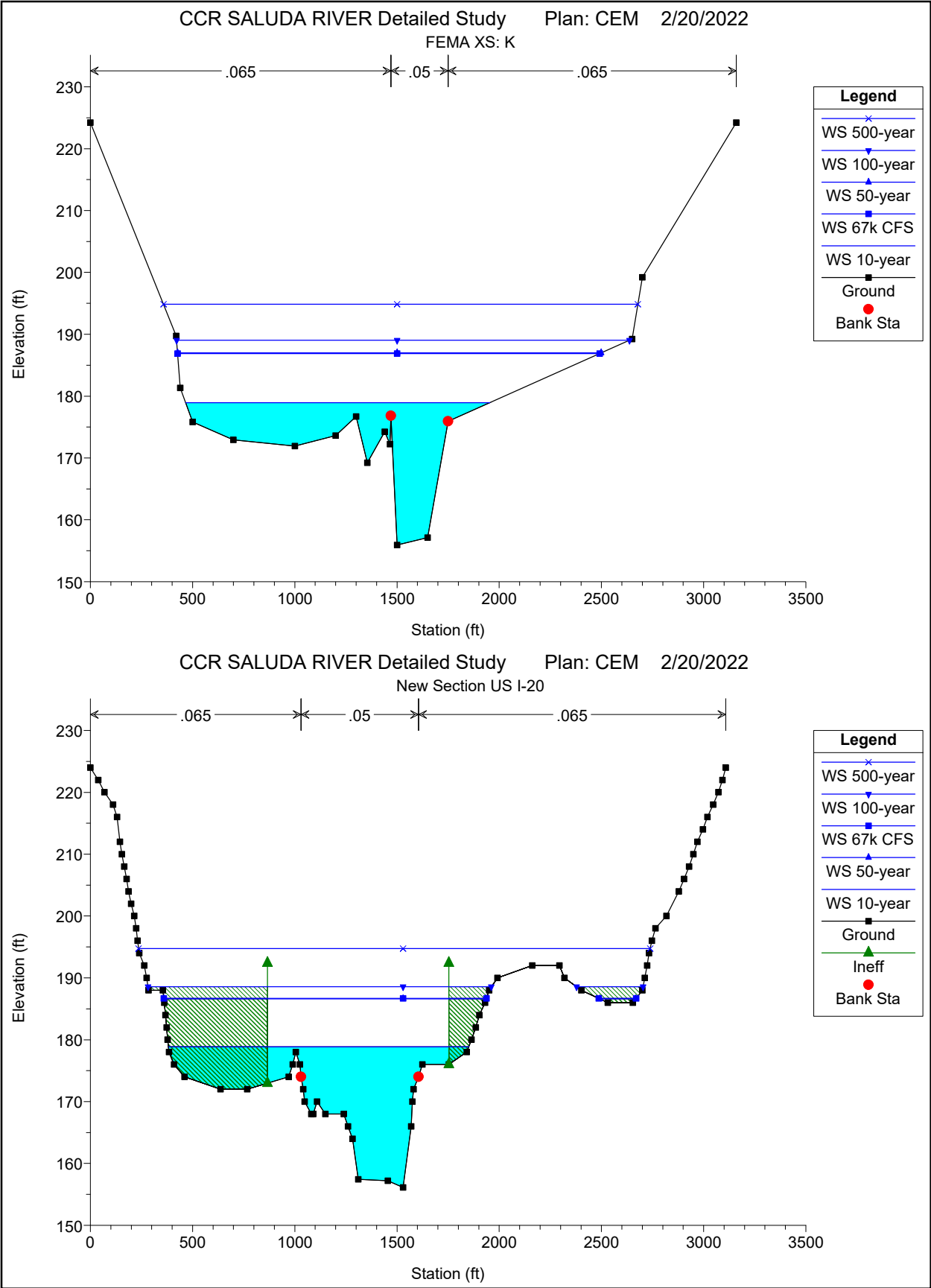




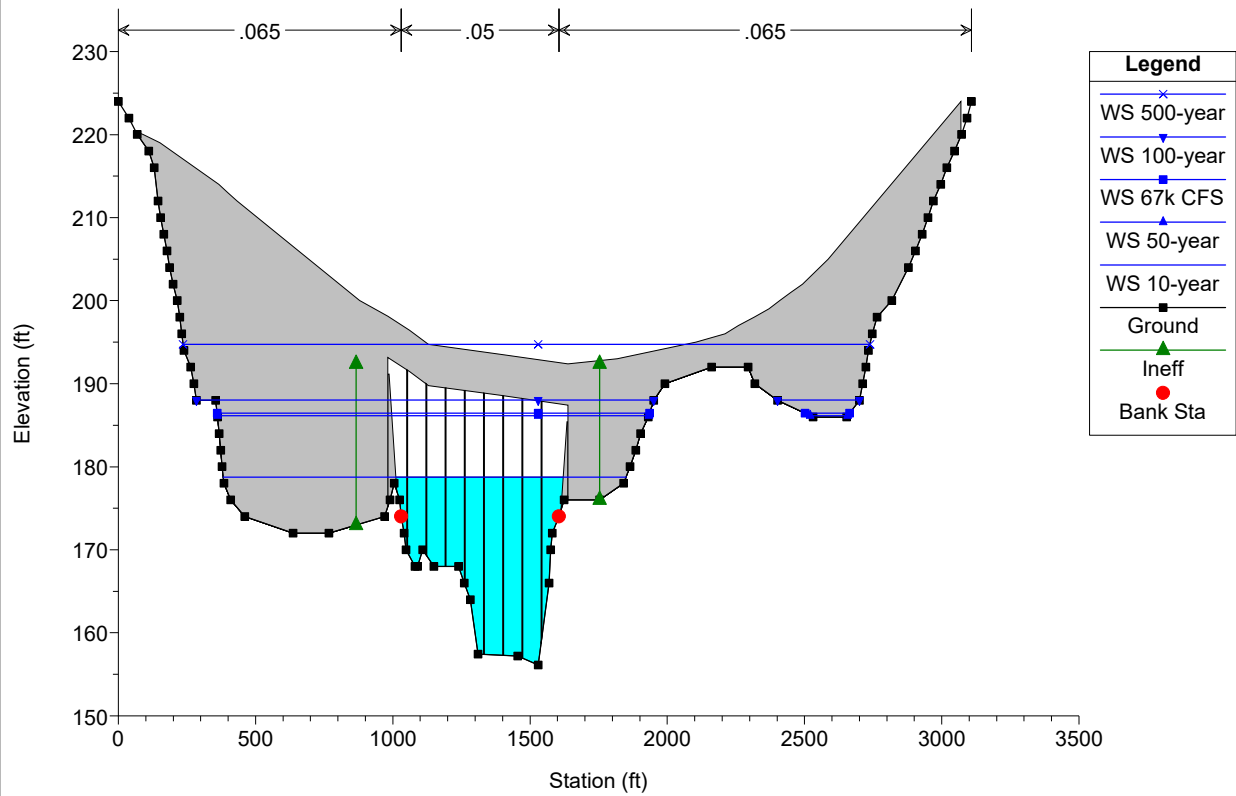






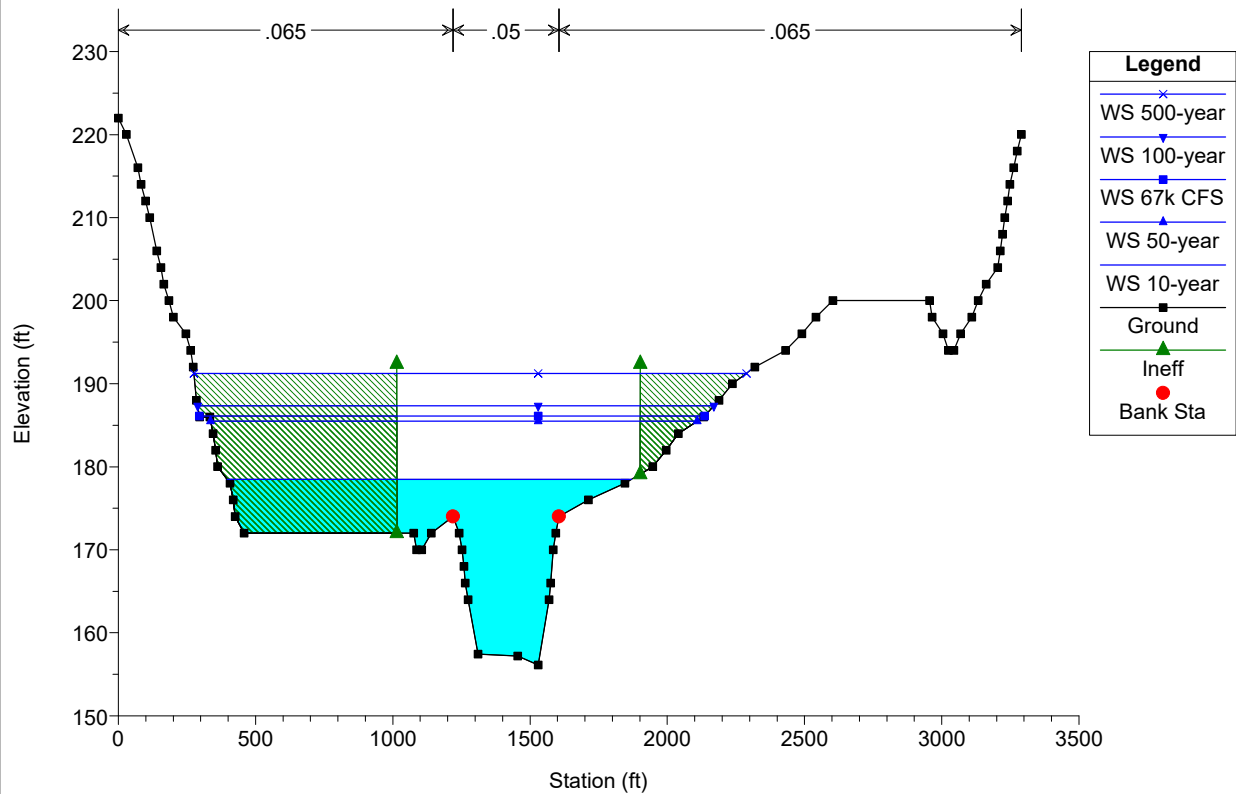


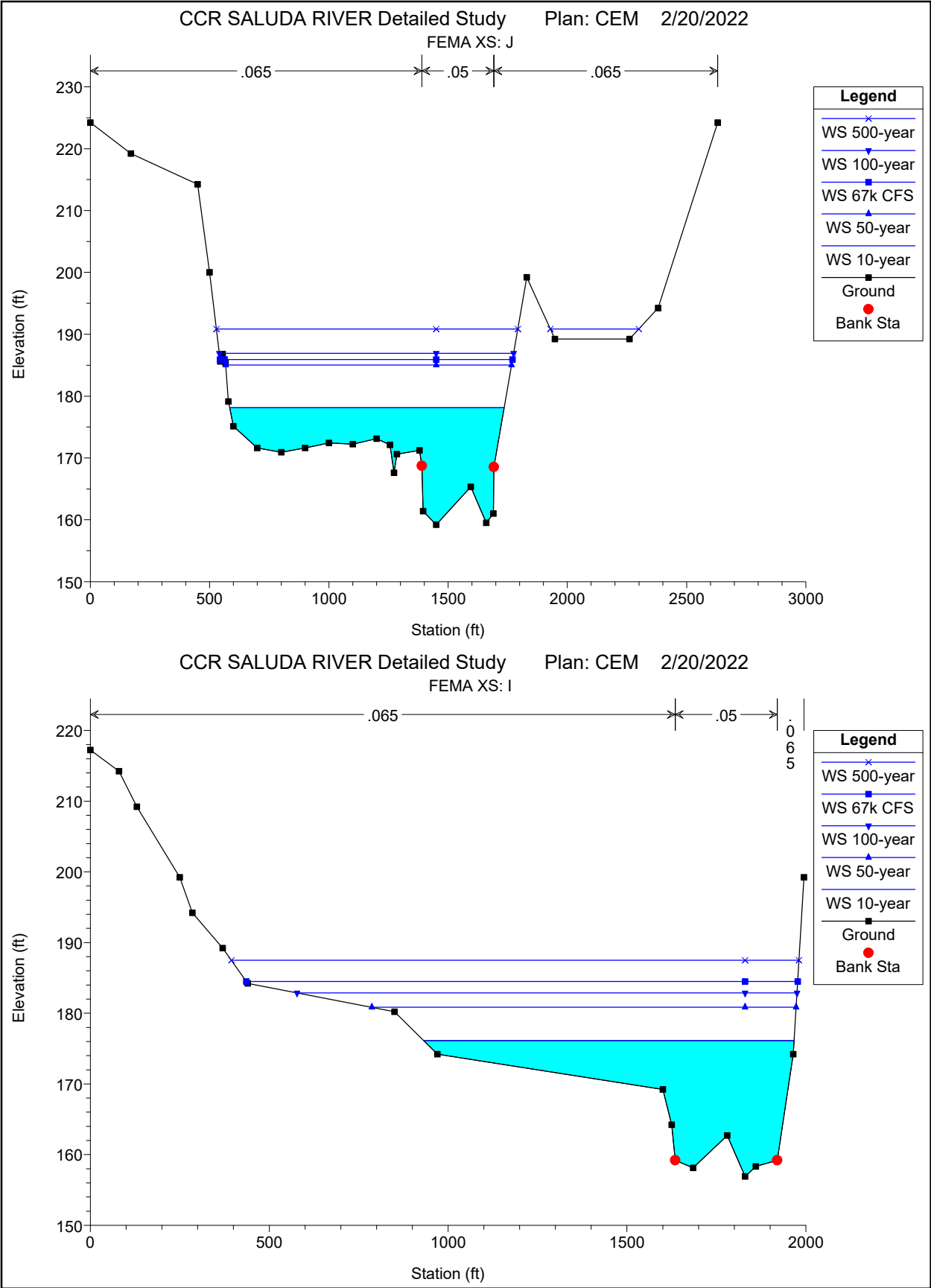
CCR SALUDA RIVER Detailed Study Plan: CEM 2/20/2022

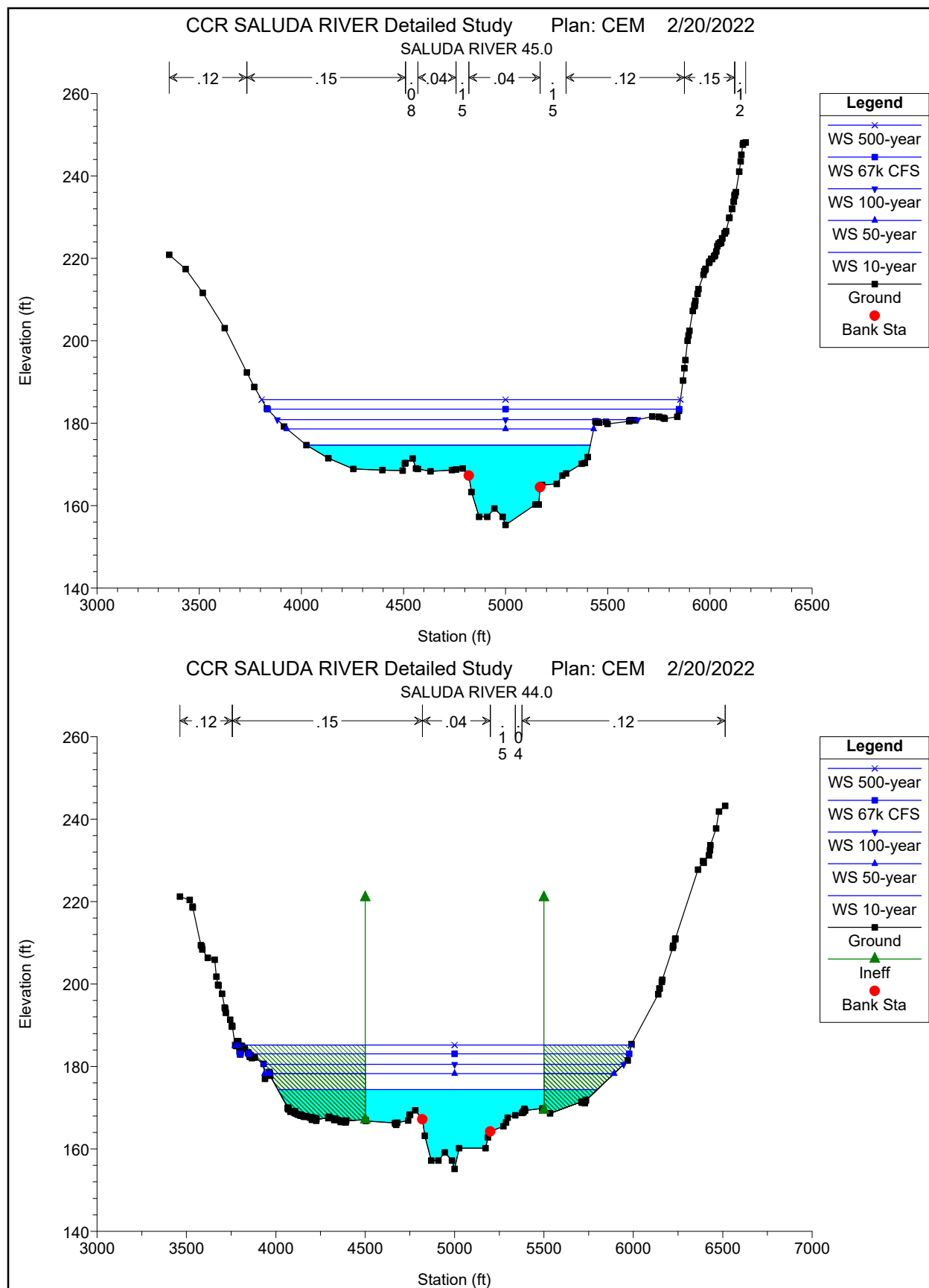


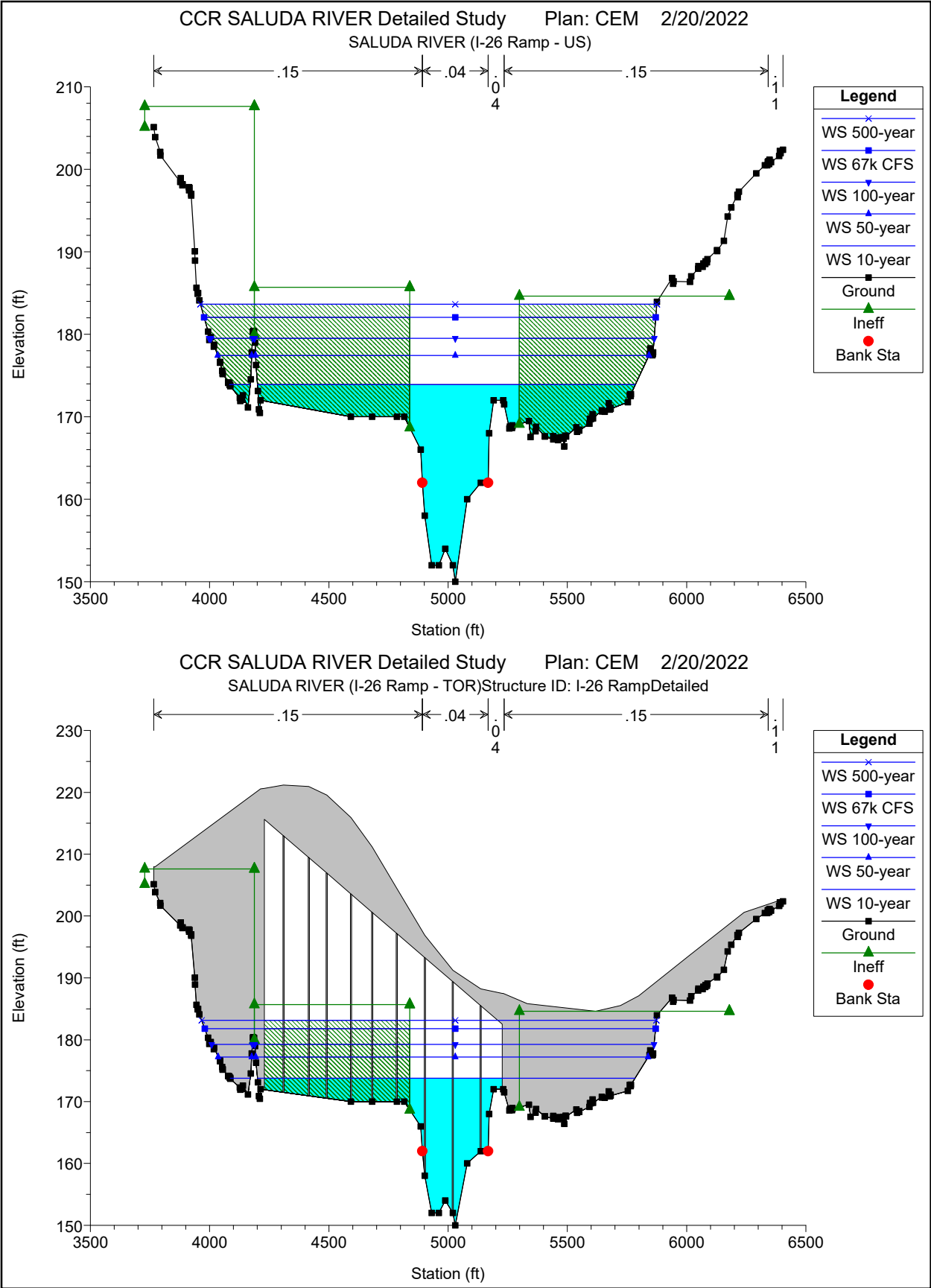
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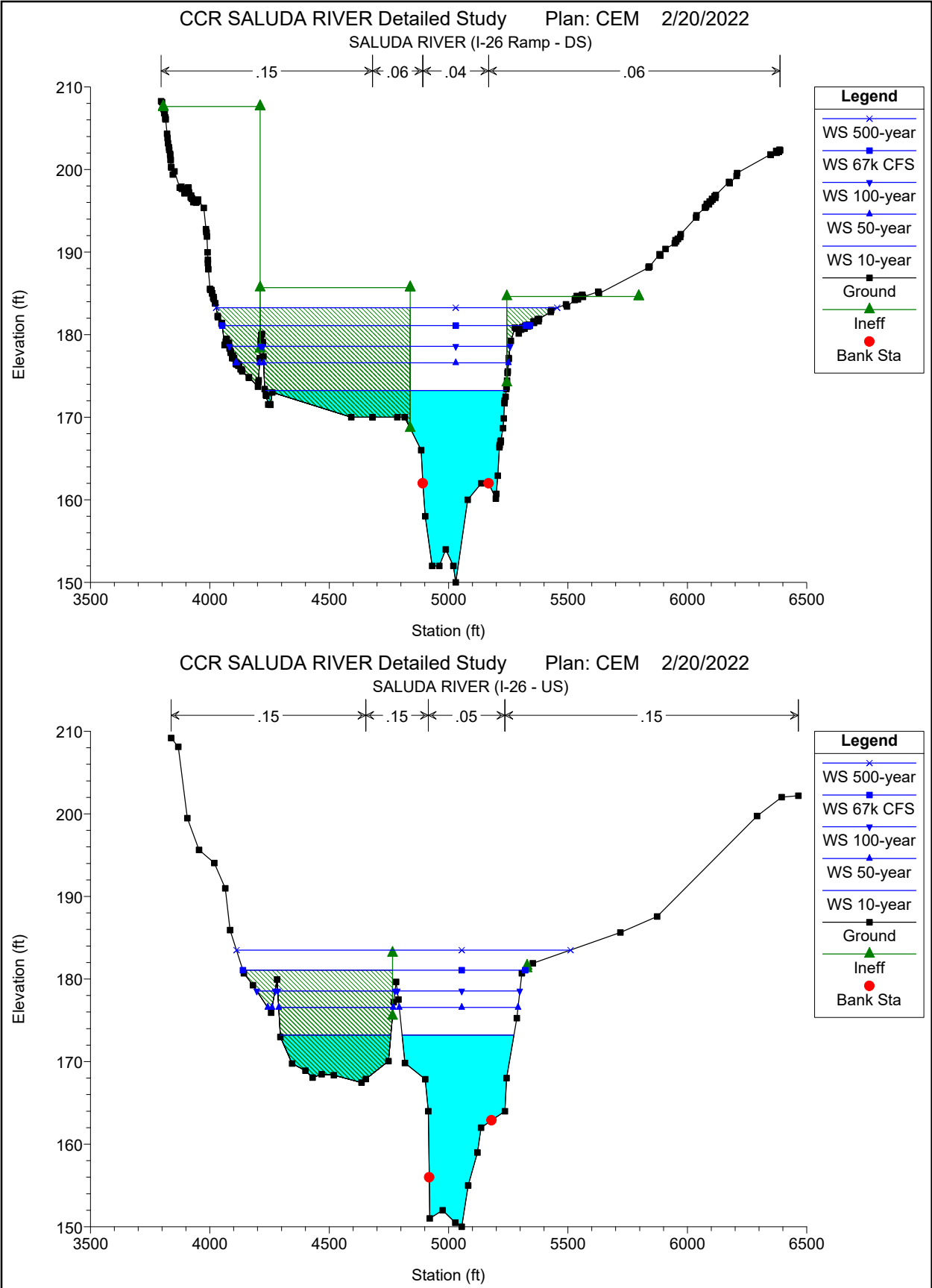
New Section DS of I-20



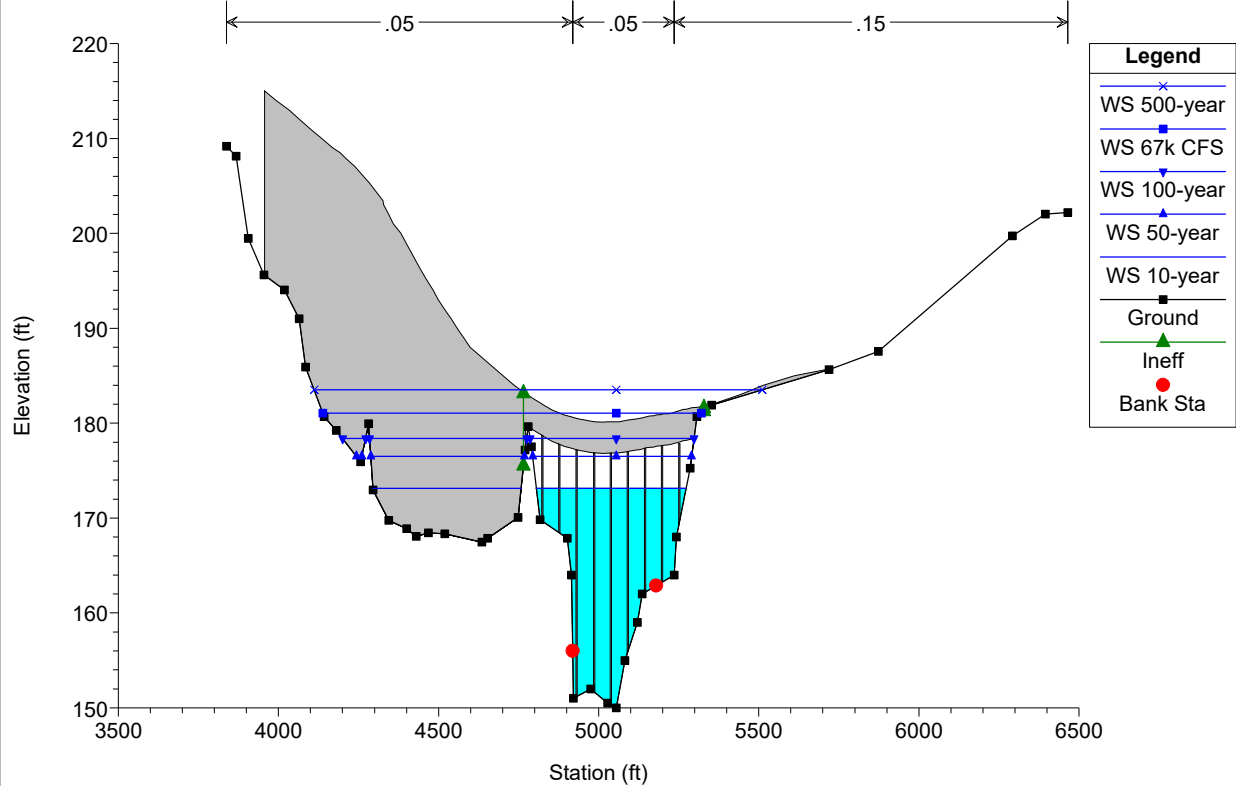




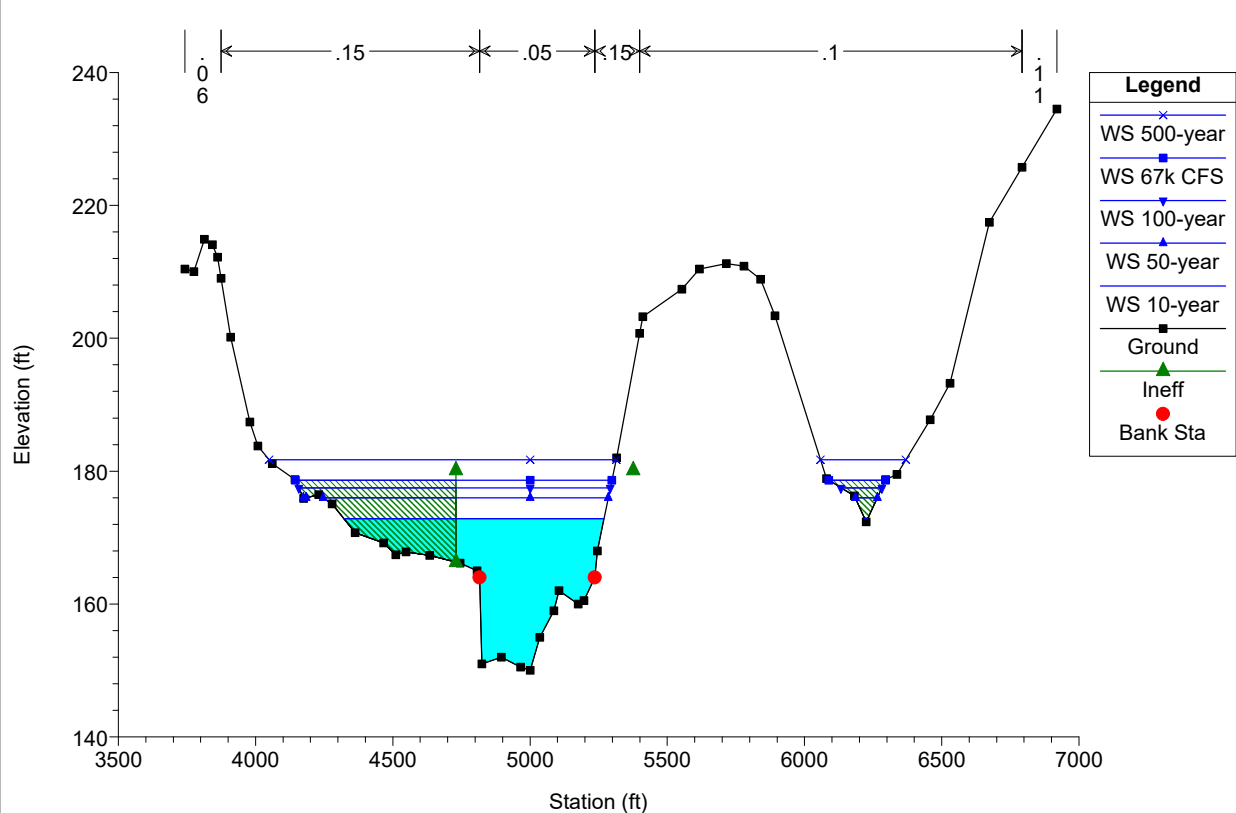


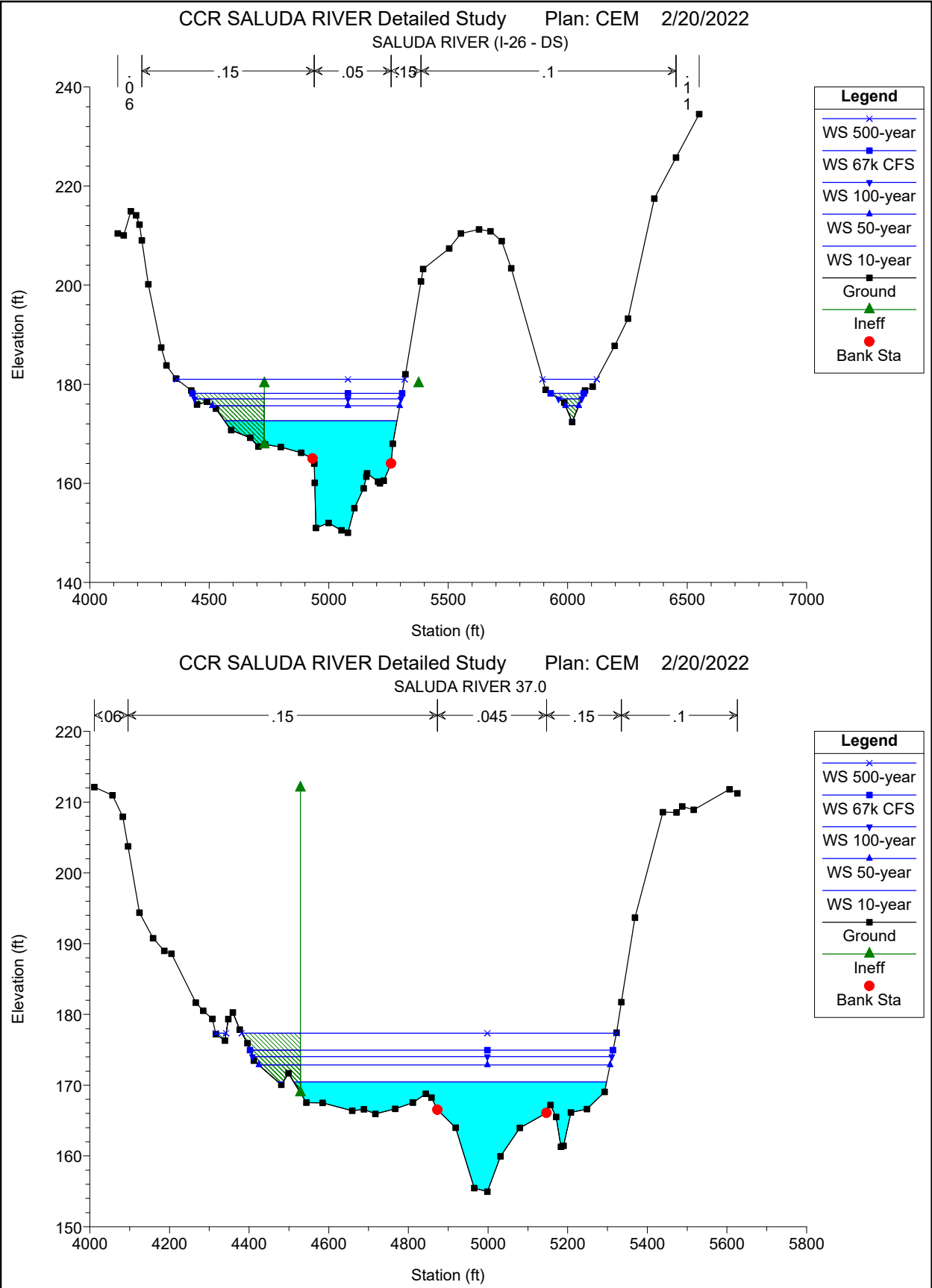


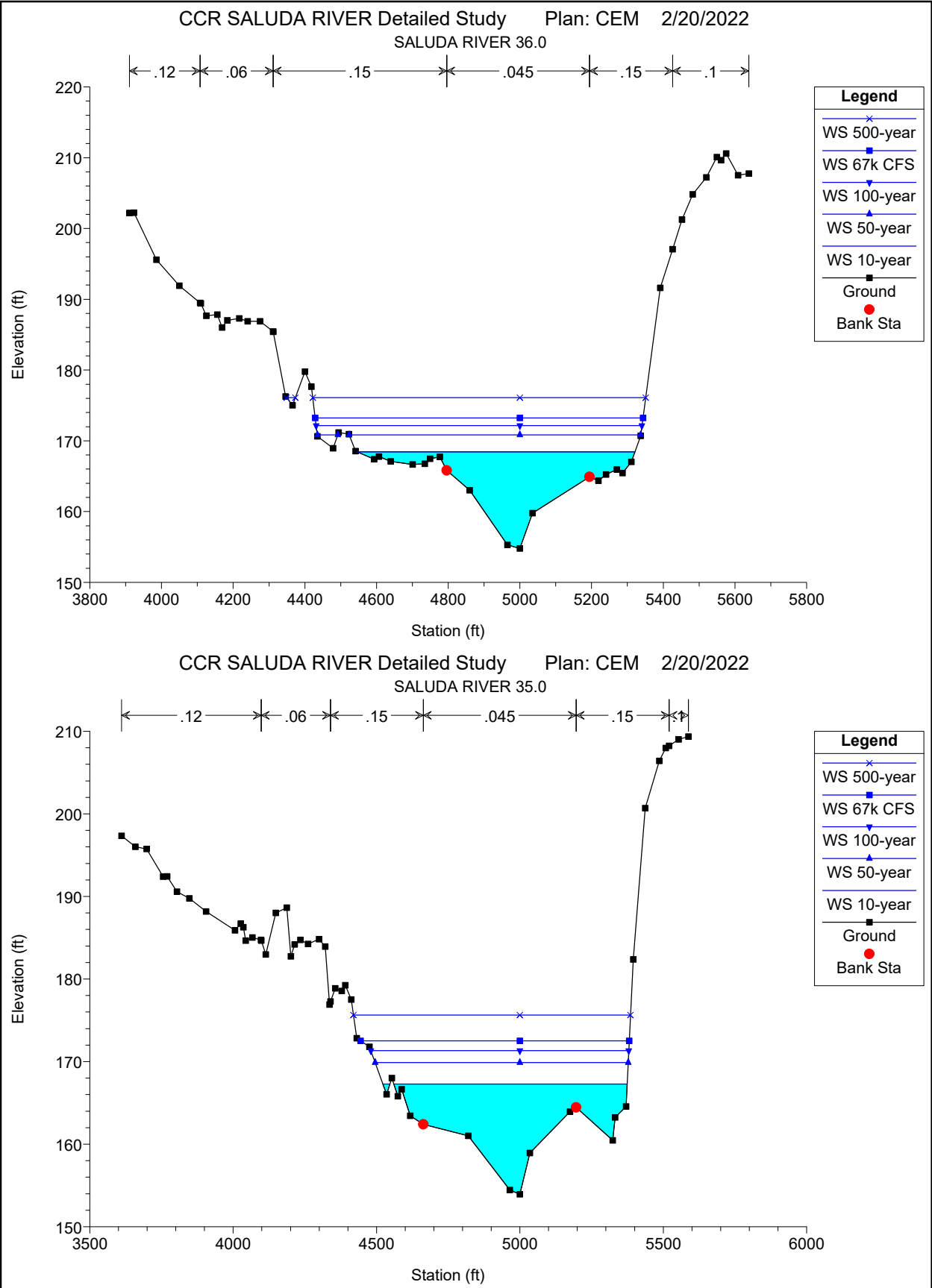
CCR SALUDA RIVER Detailed Study Plan: CEM 2/20/2022
SALUDA RIVER (I-26 - TOR) Structure ID: I-26Detailed Survey Str

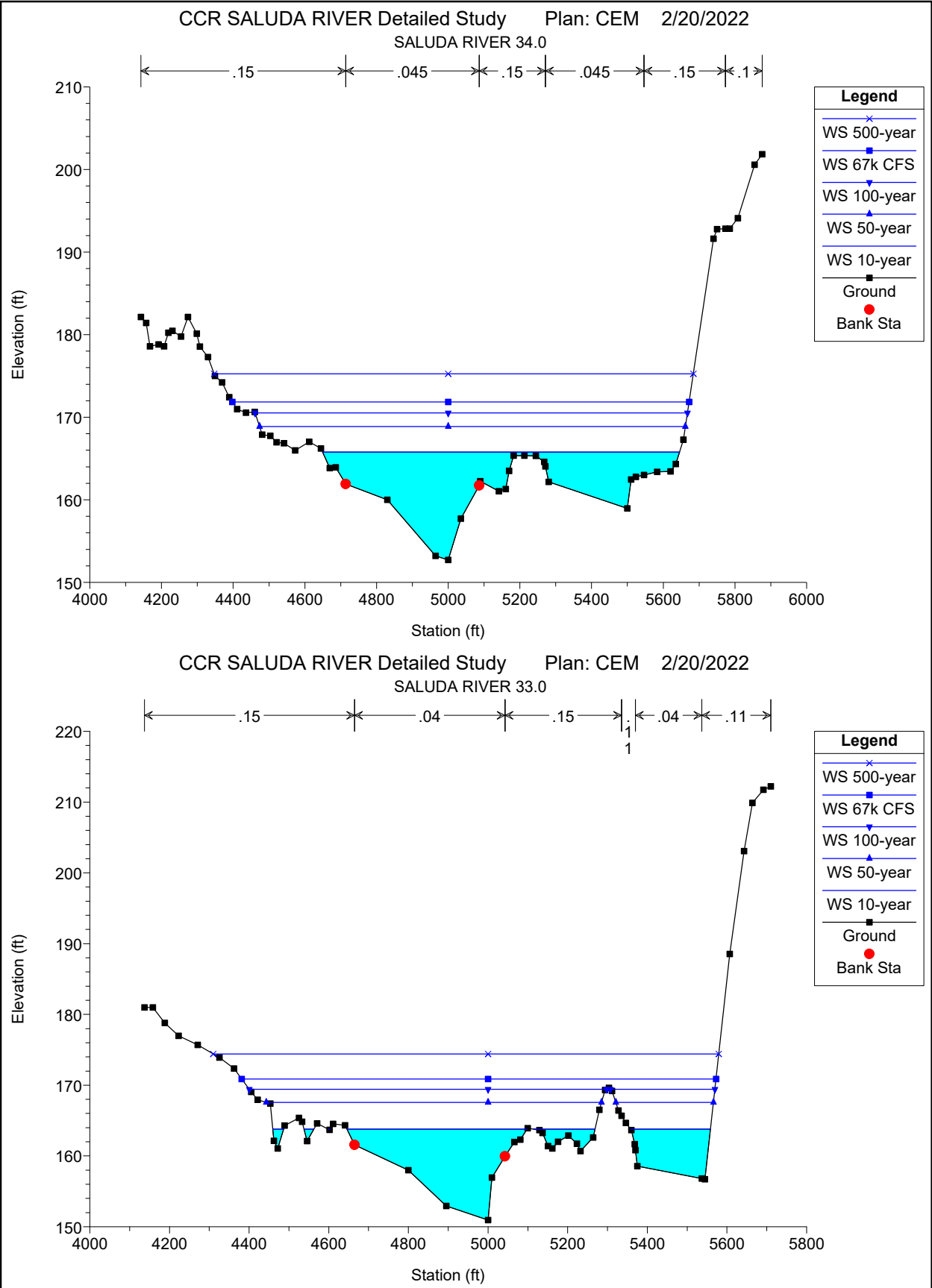


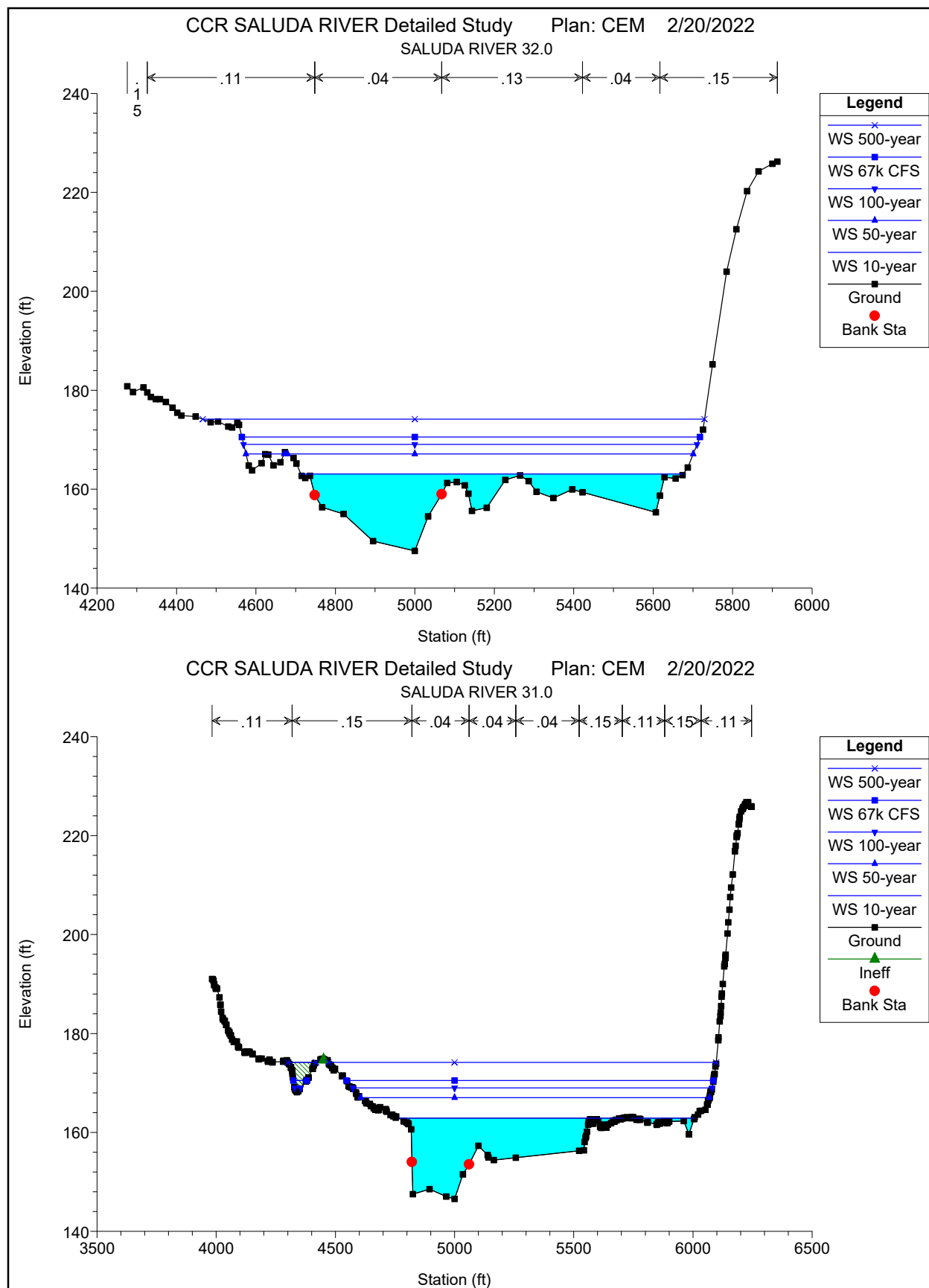
CCR SALUDA RIVER Detailed Study Plan: CEM 2/20/2022

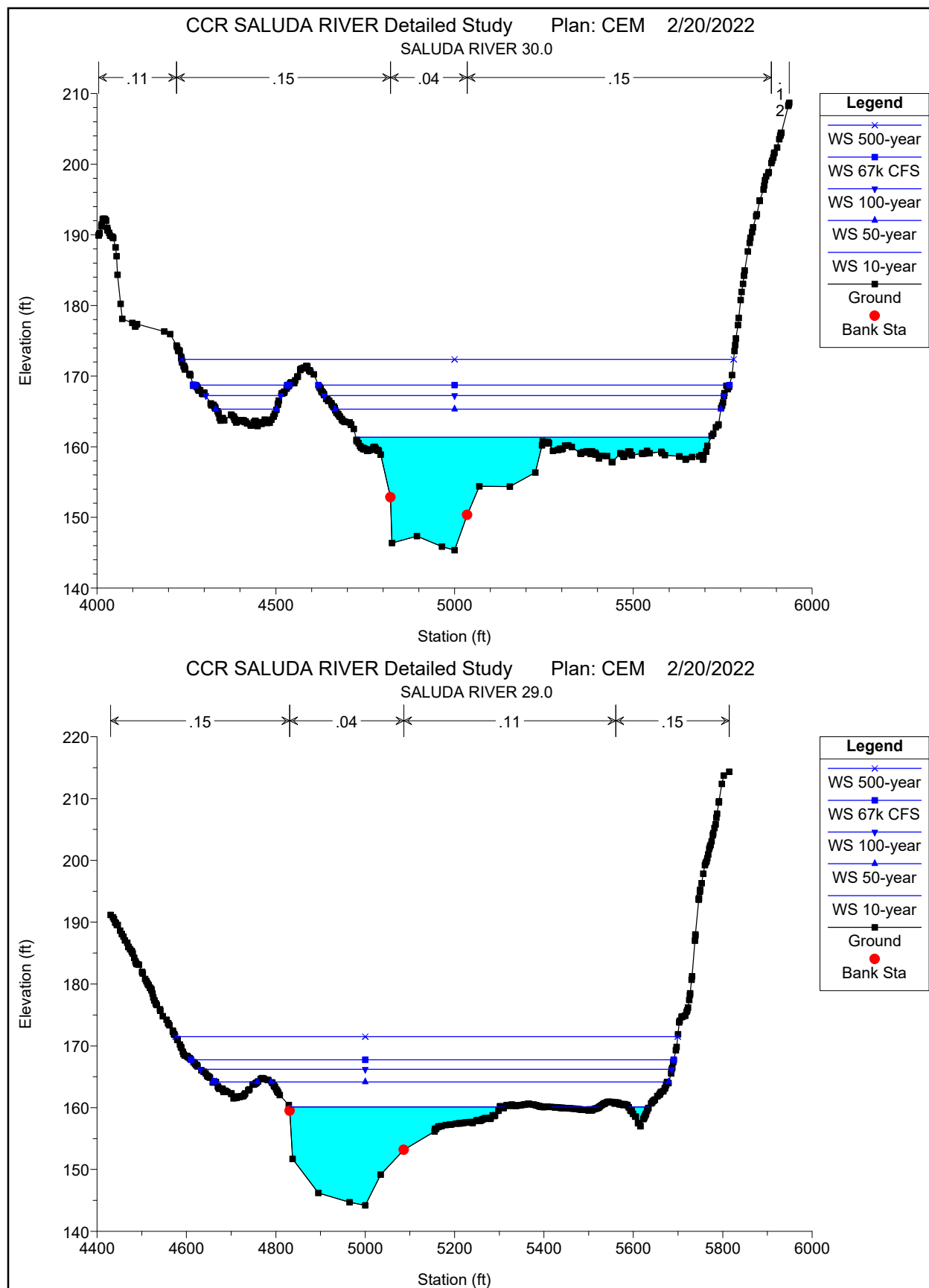


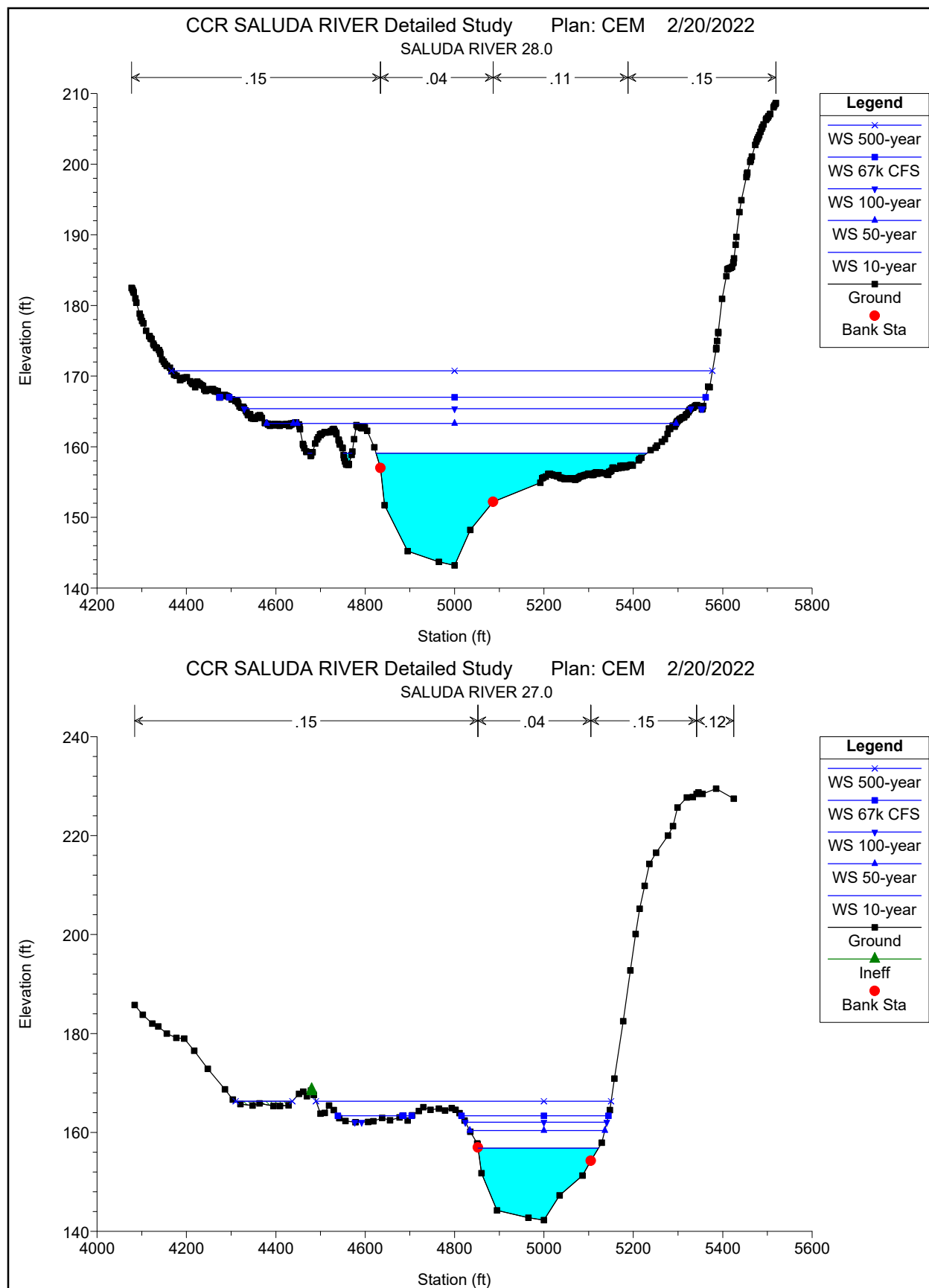


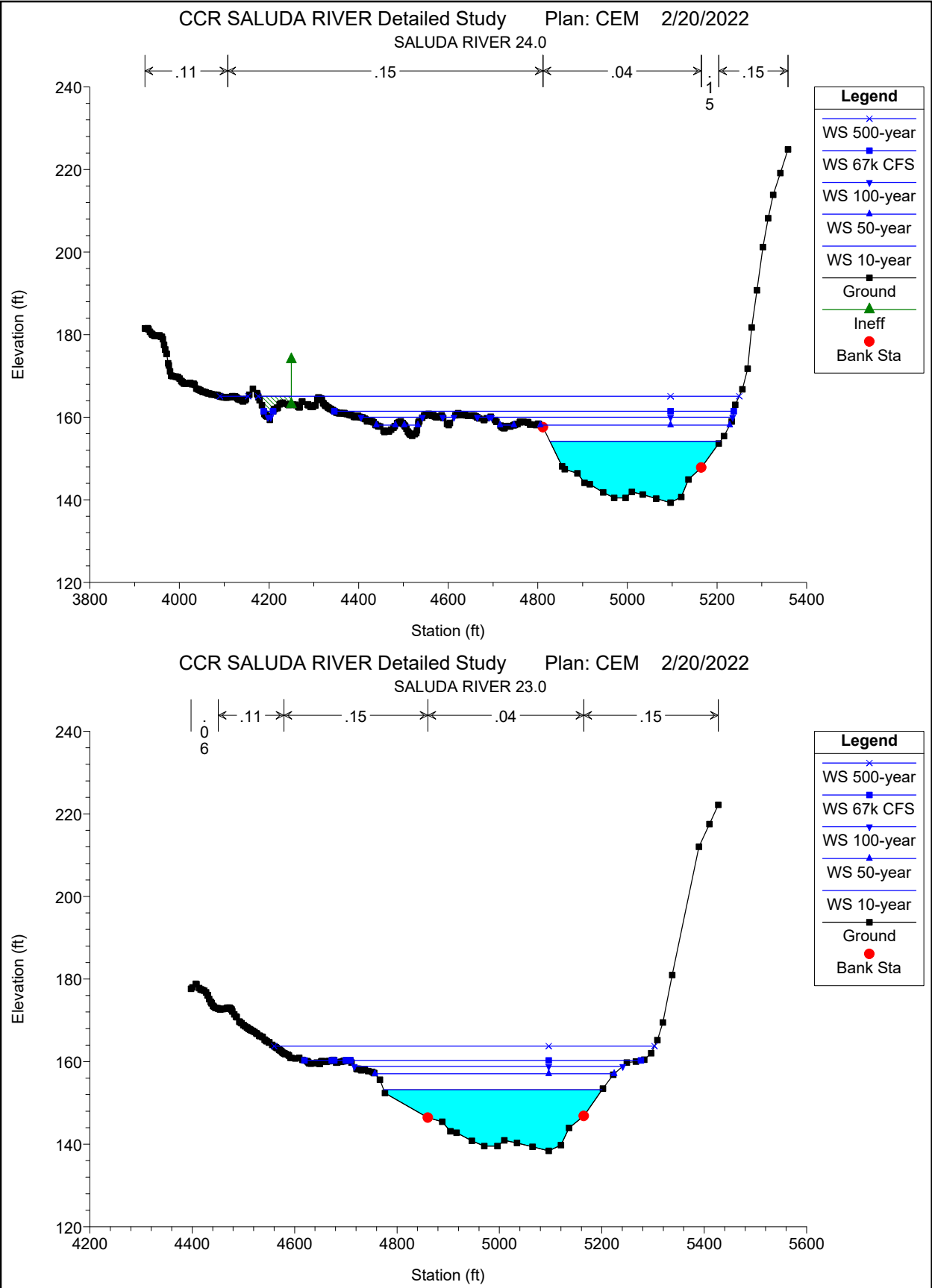


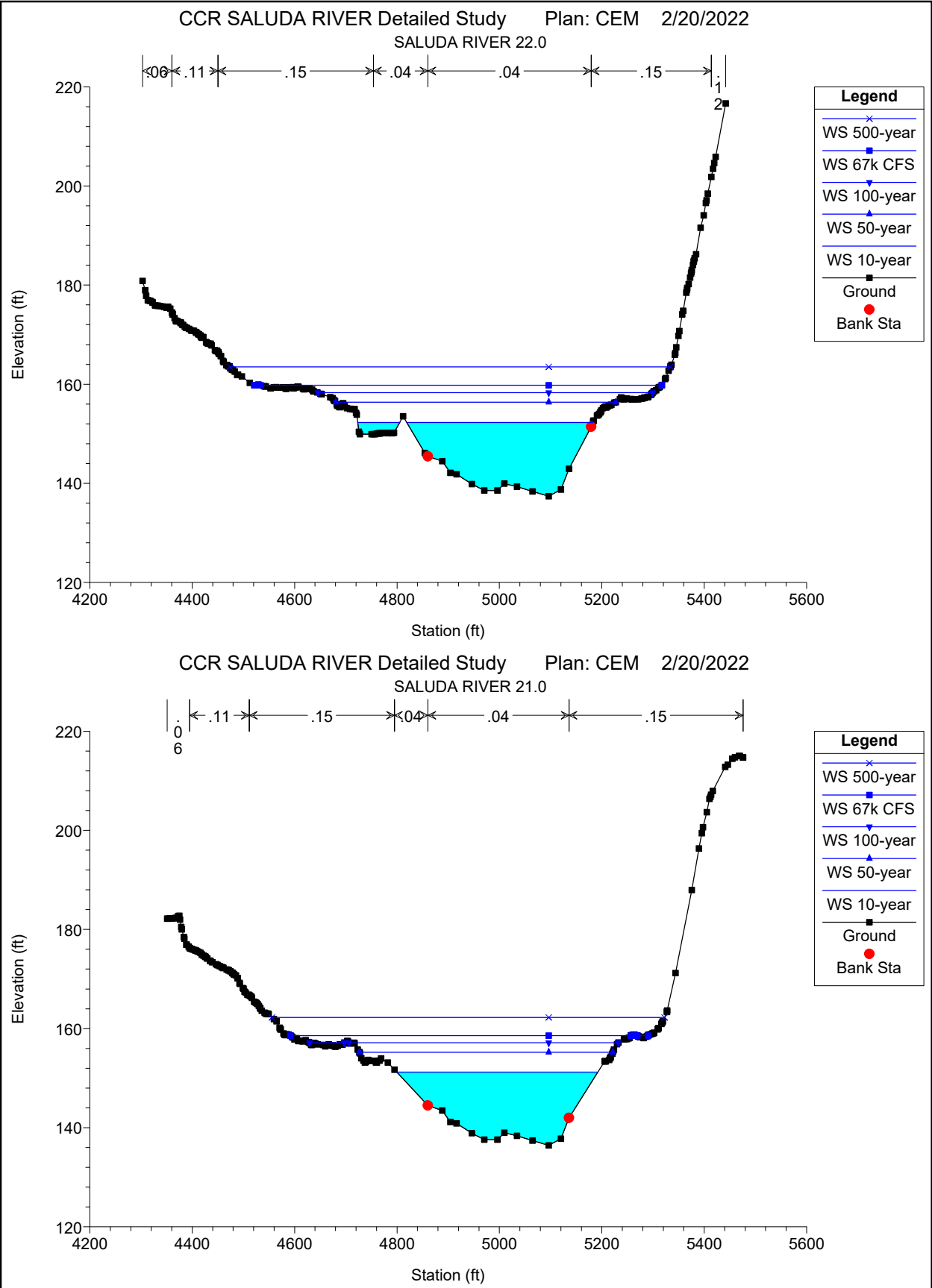


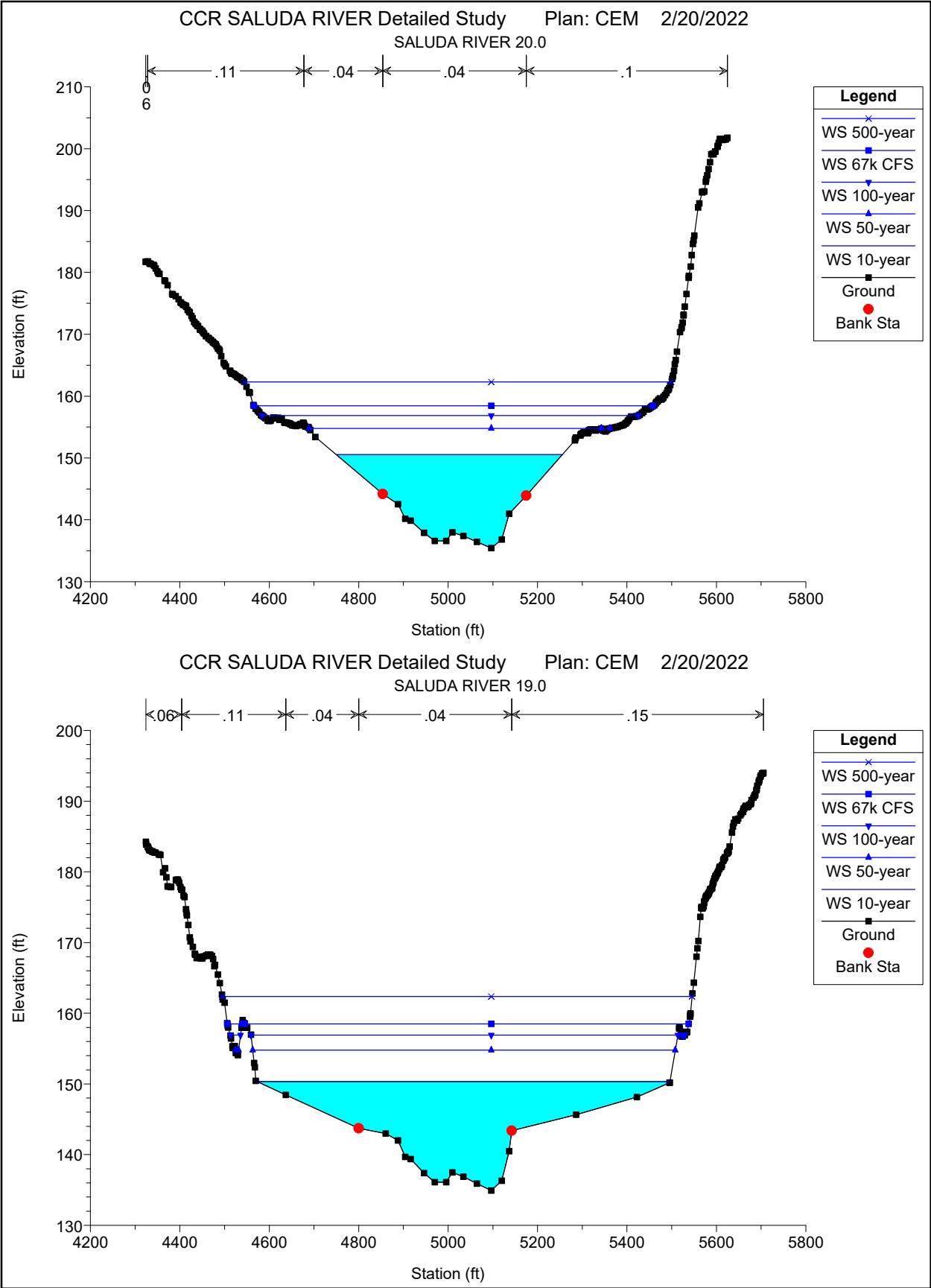


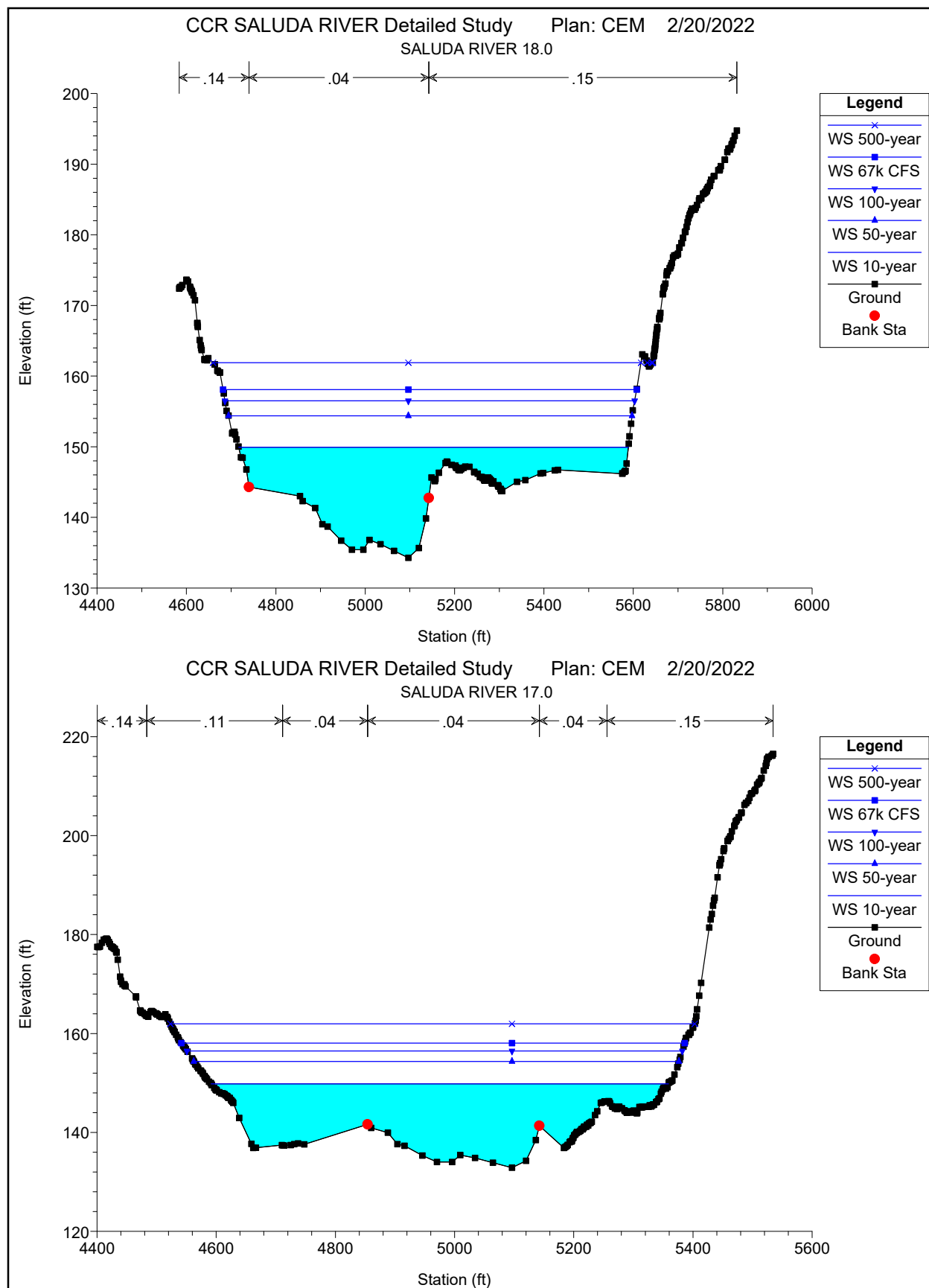


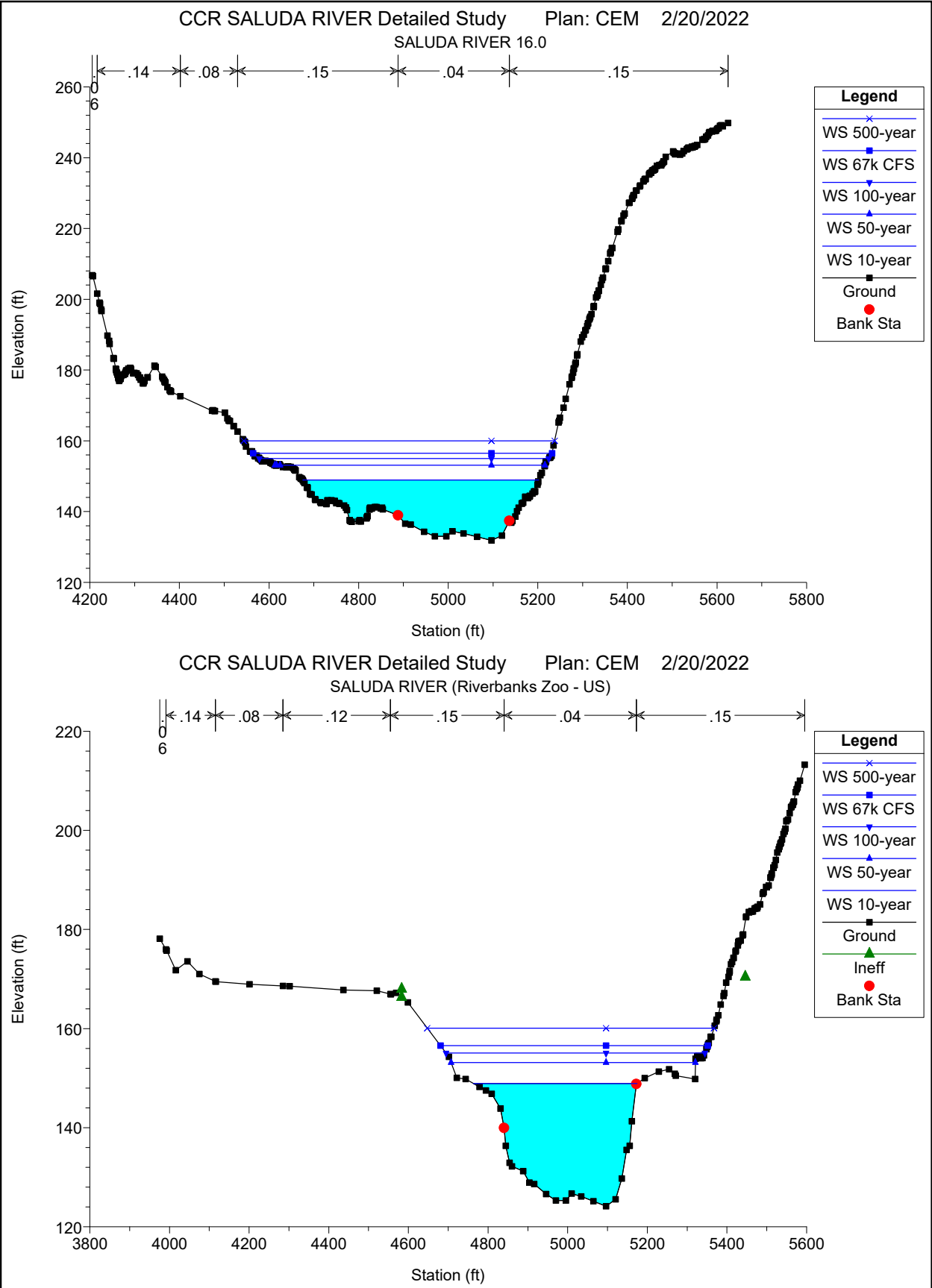






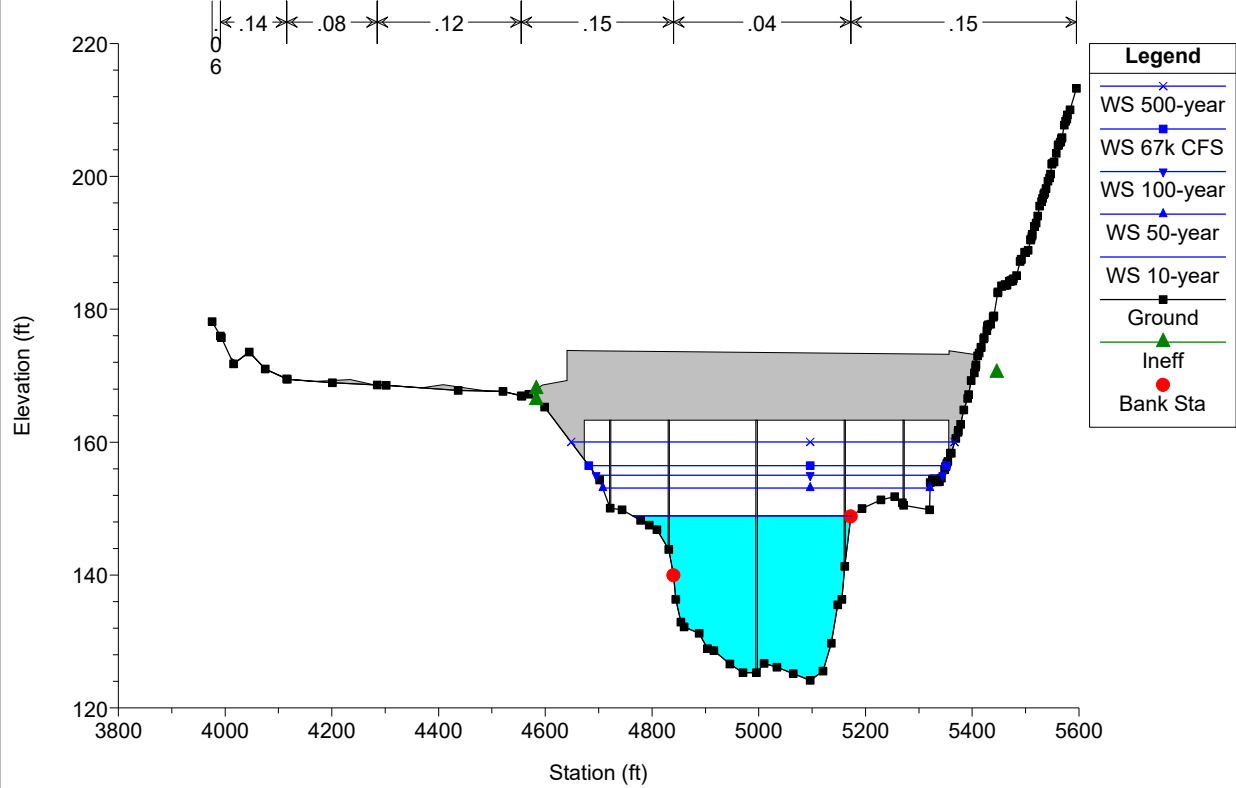






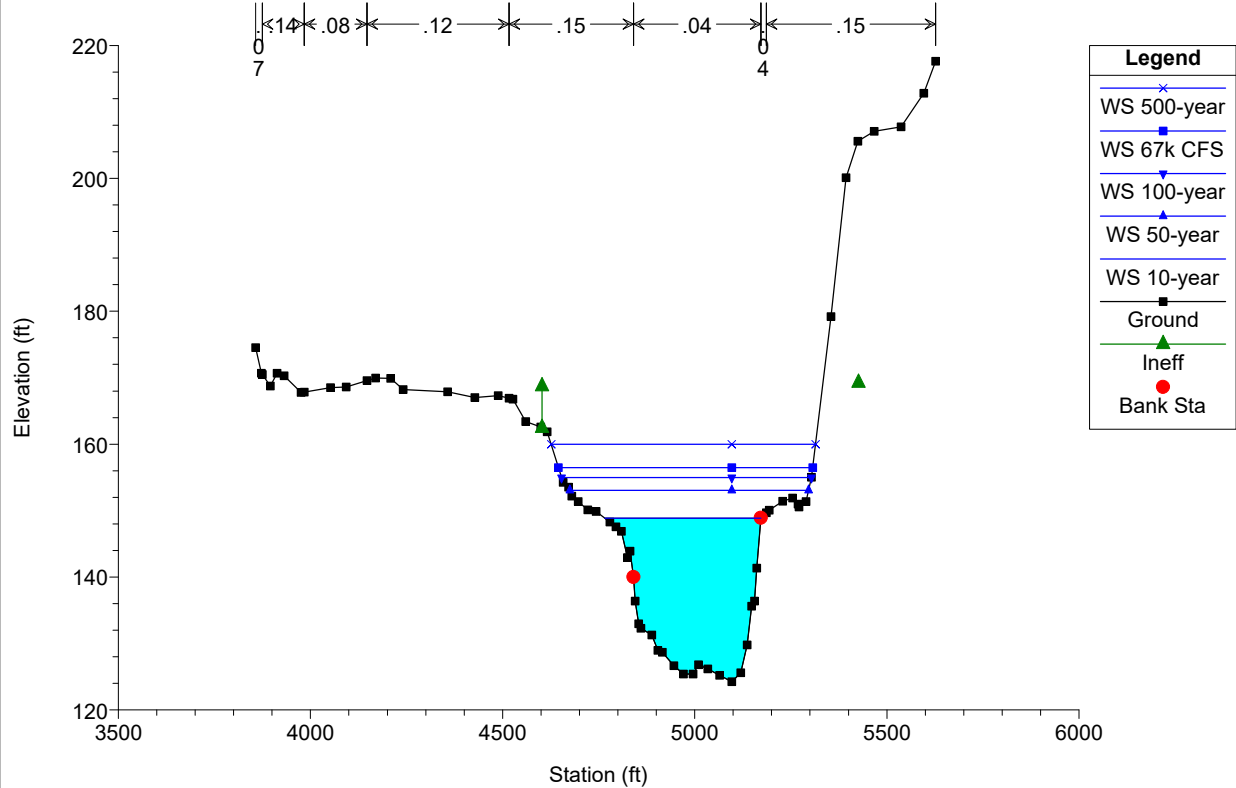
CCR SALUDA RIVER Detailed Study Plan: CEM 2/20/2022

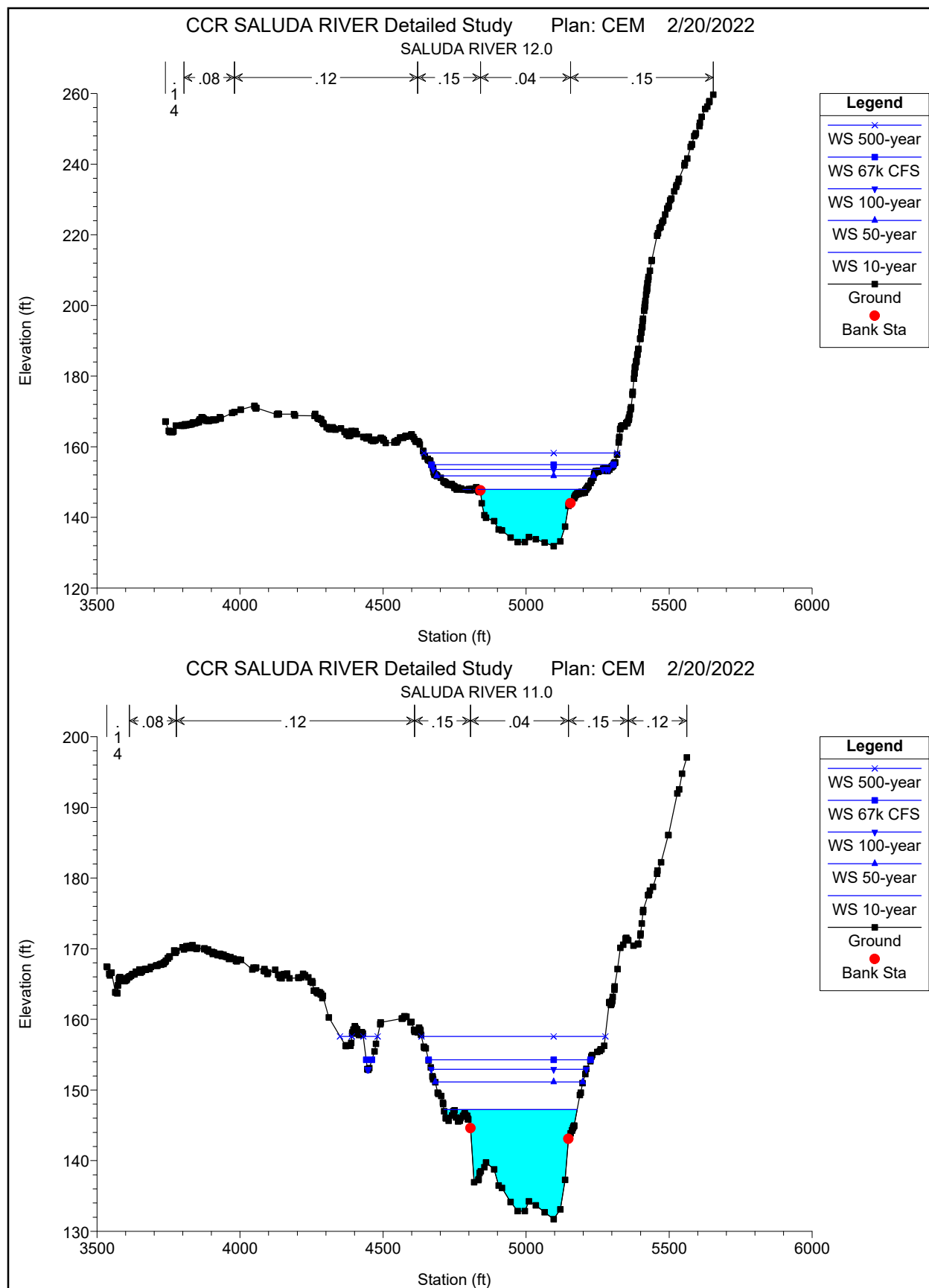
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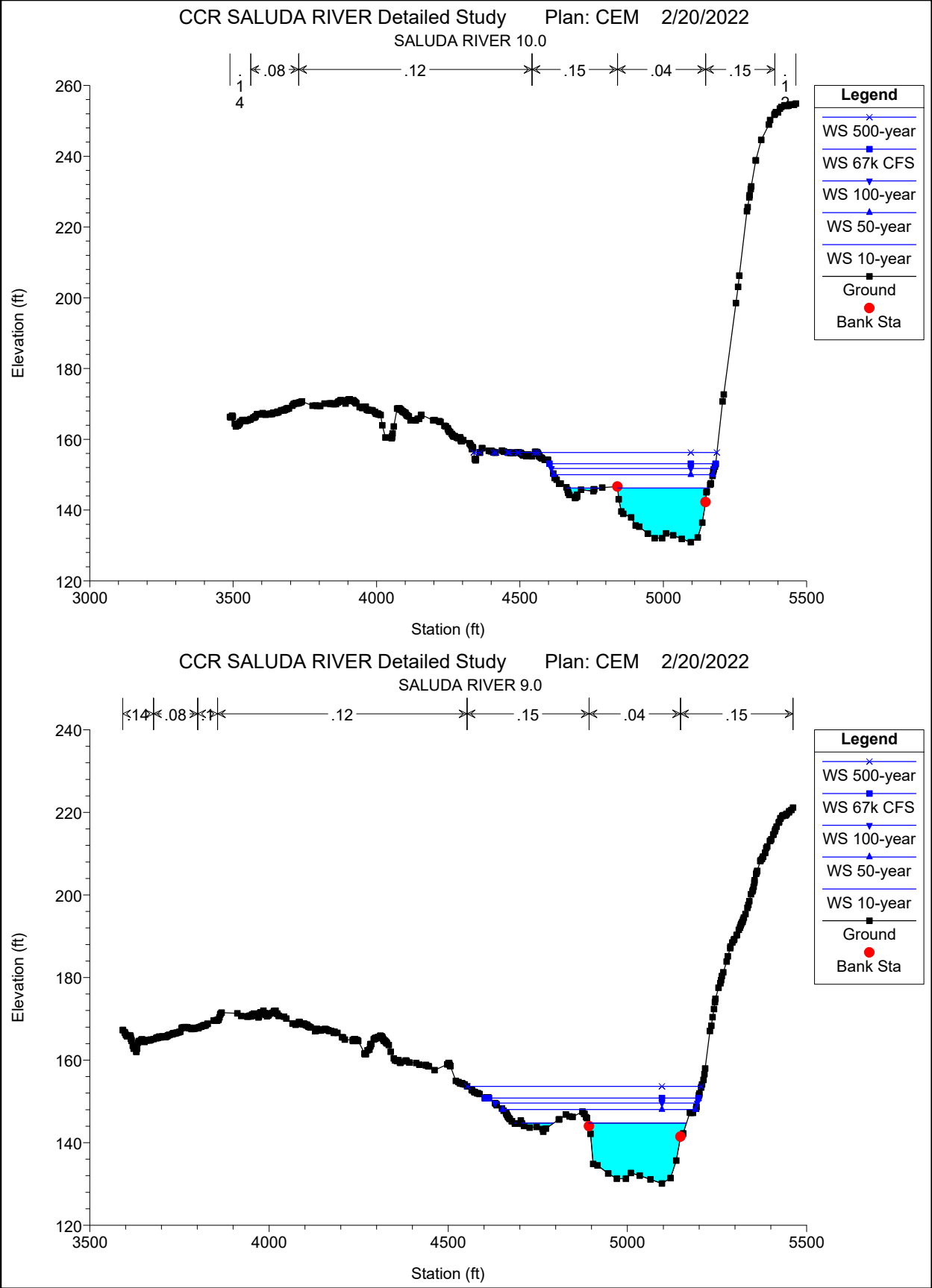


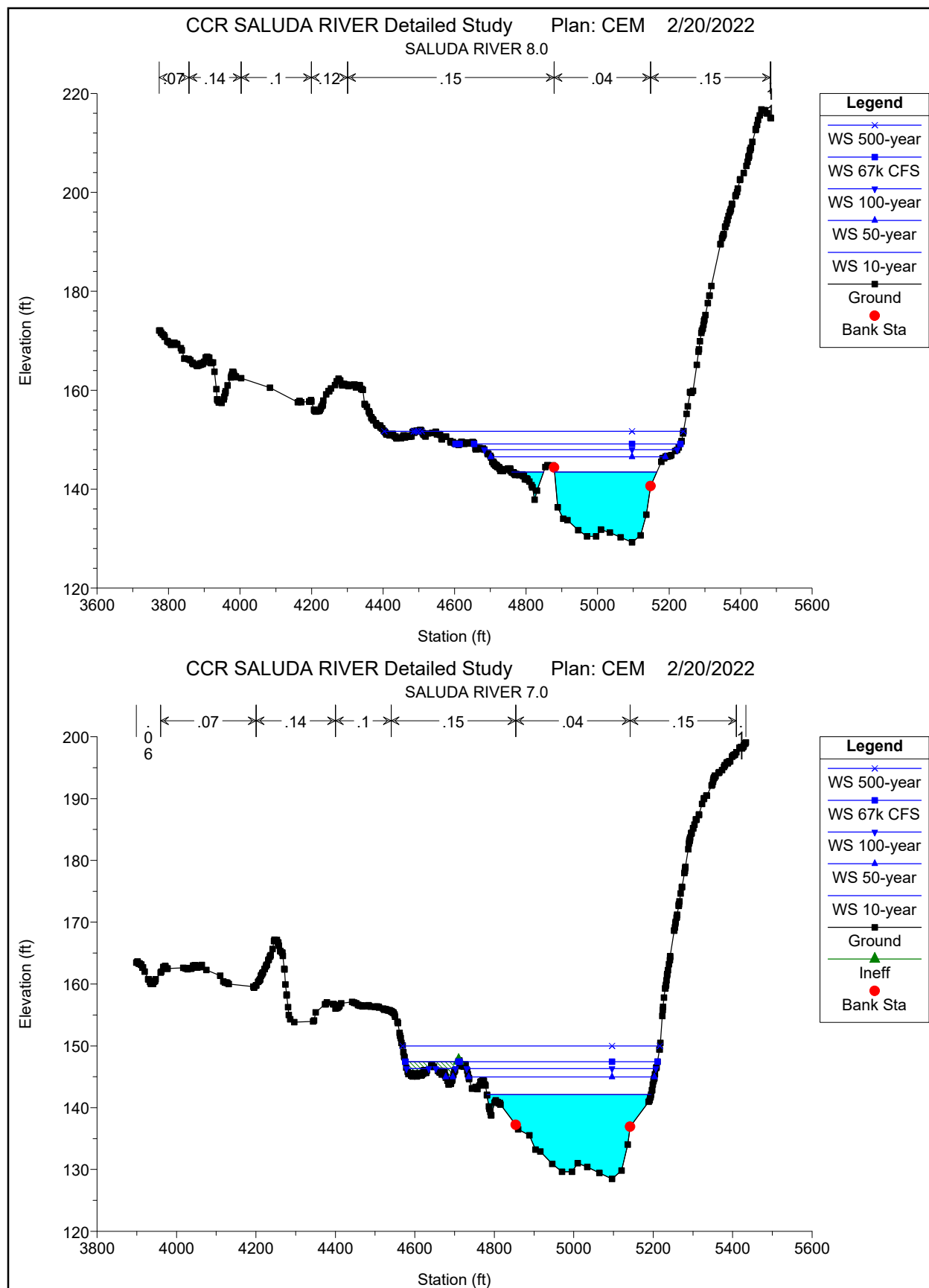
CCR SALUDA RIVER Detailed Study Plan: CEM 2/20/2022

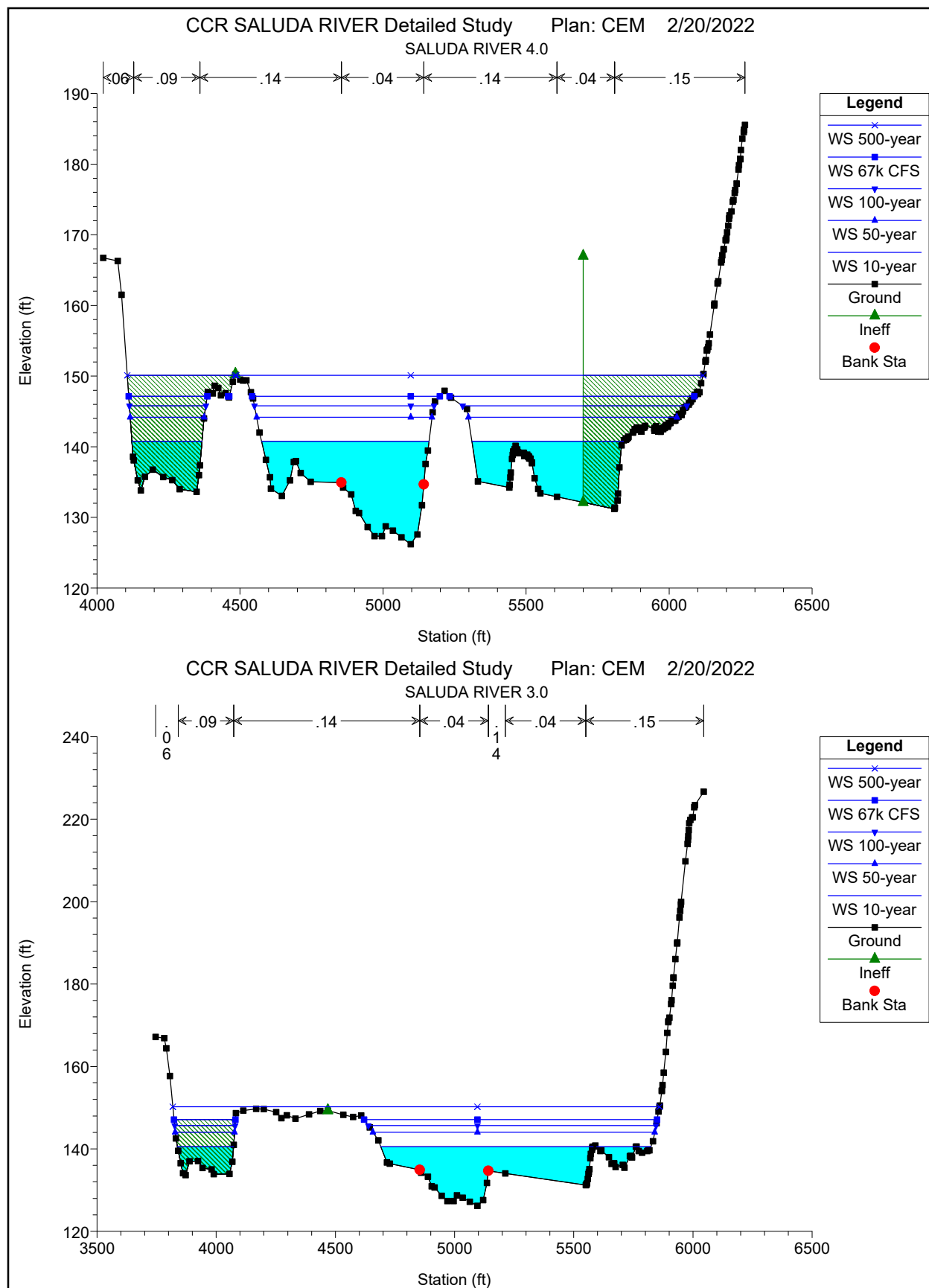
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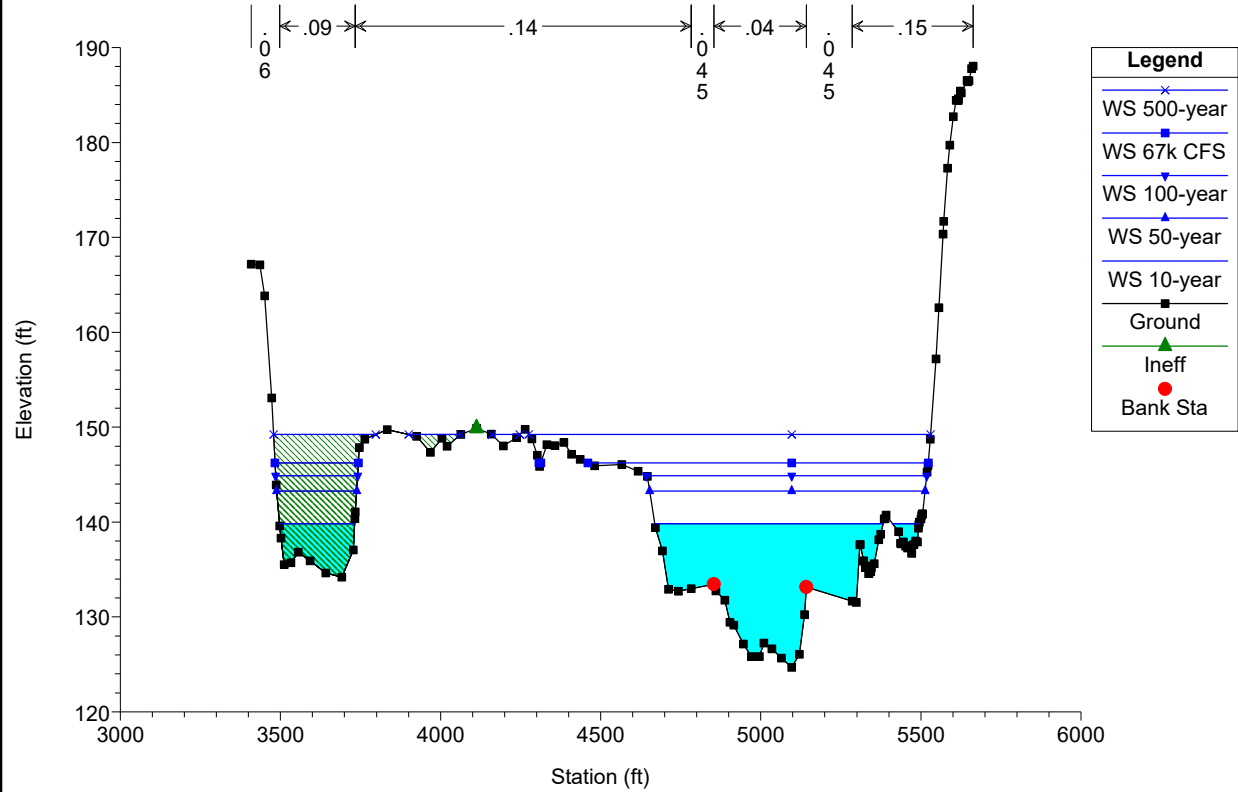


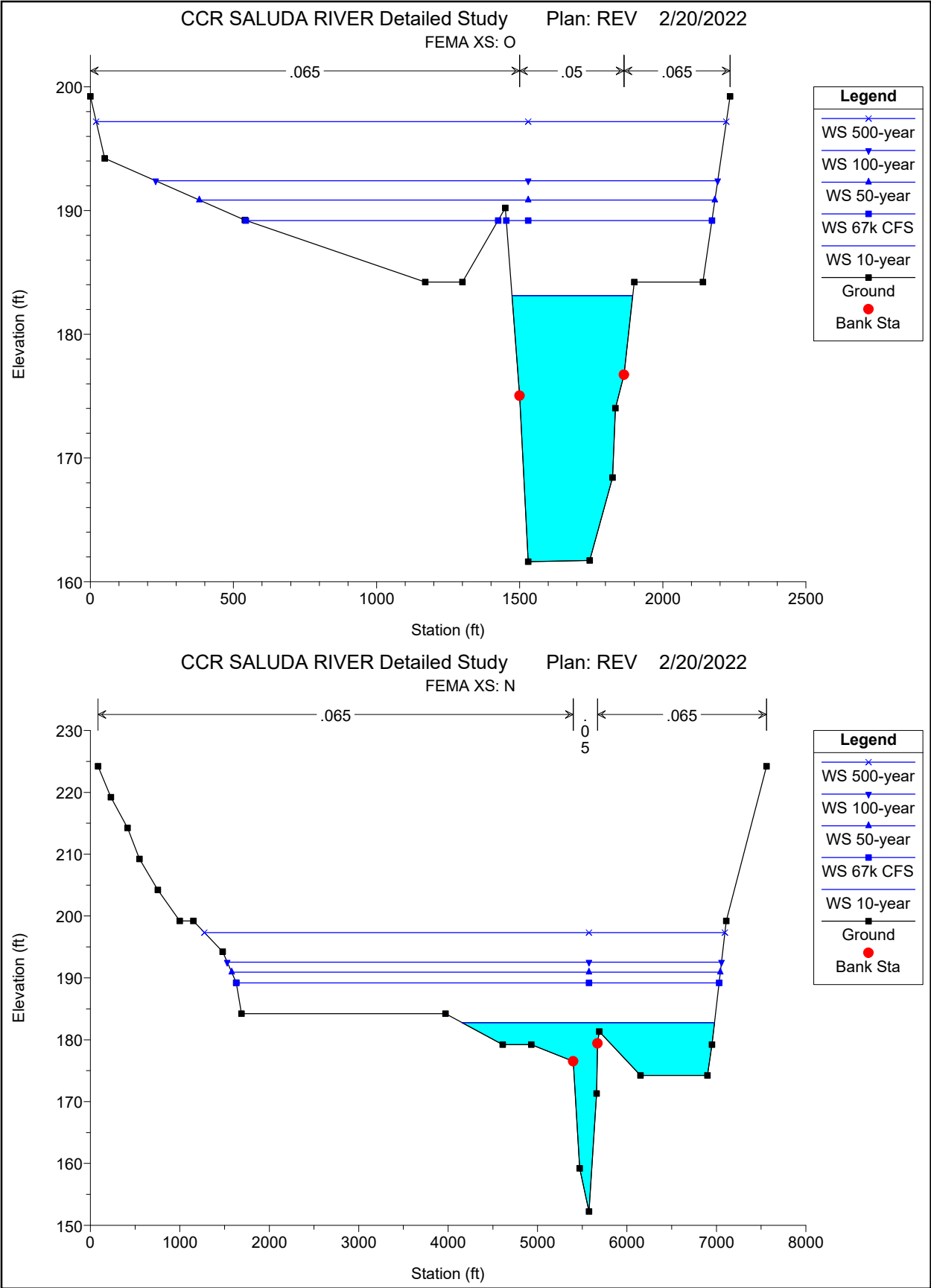




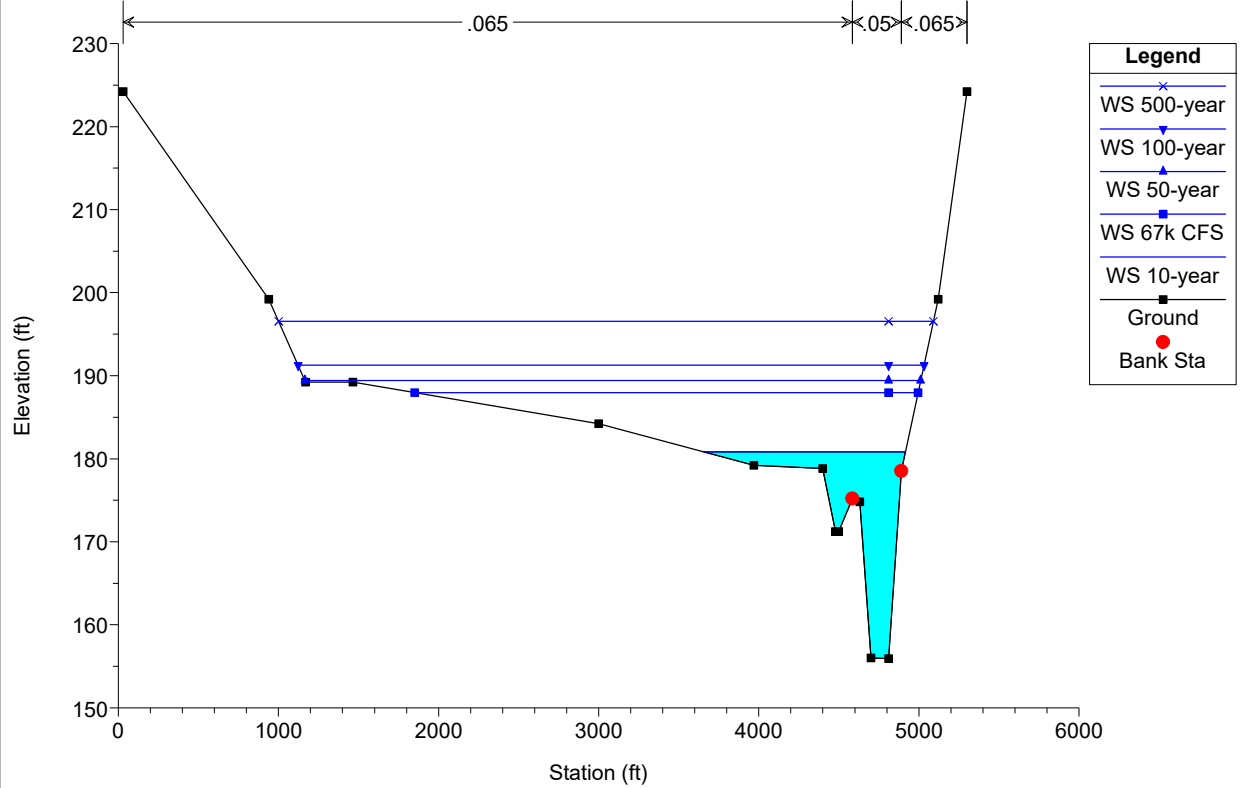


CCR SALUDA RIVER Detailed Study Plan: CEM 2/20/2022
SALUDA RIVER 2.0

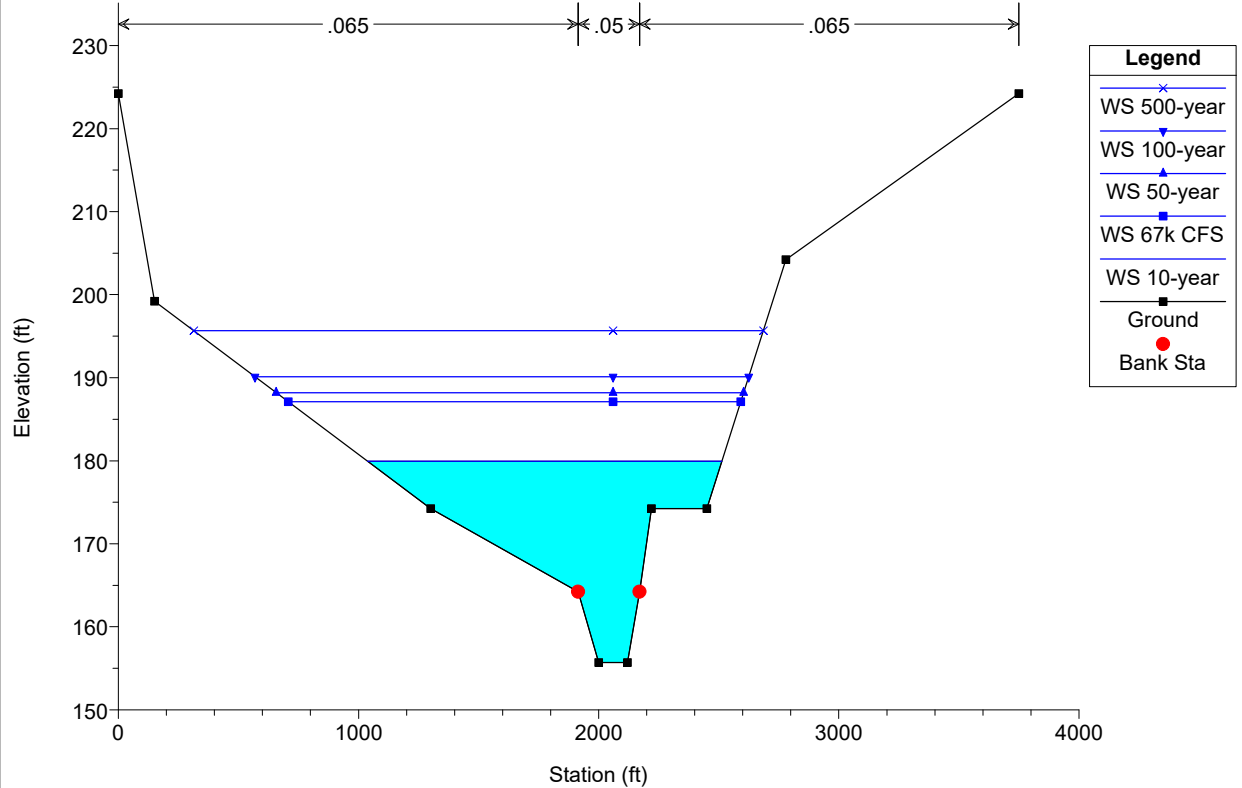




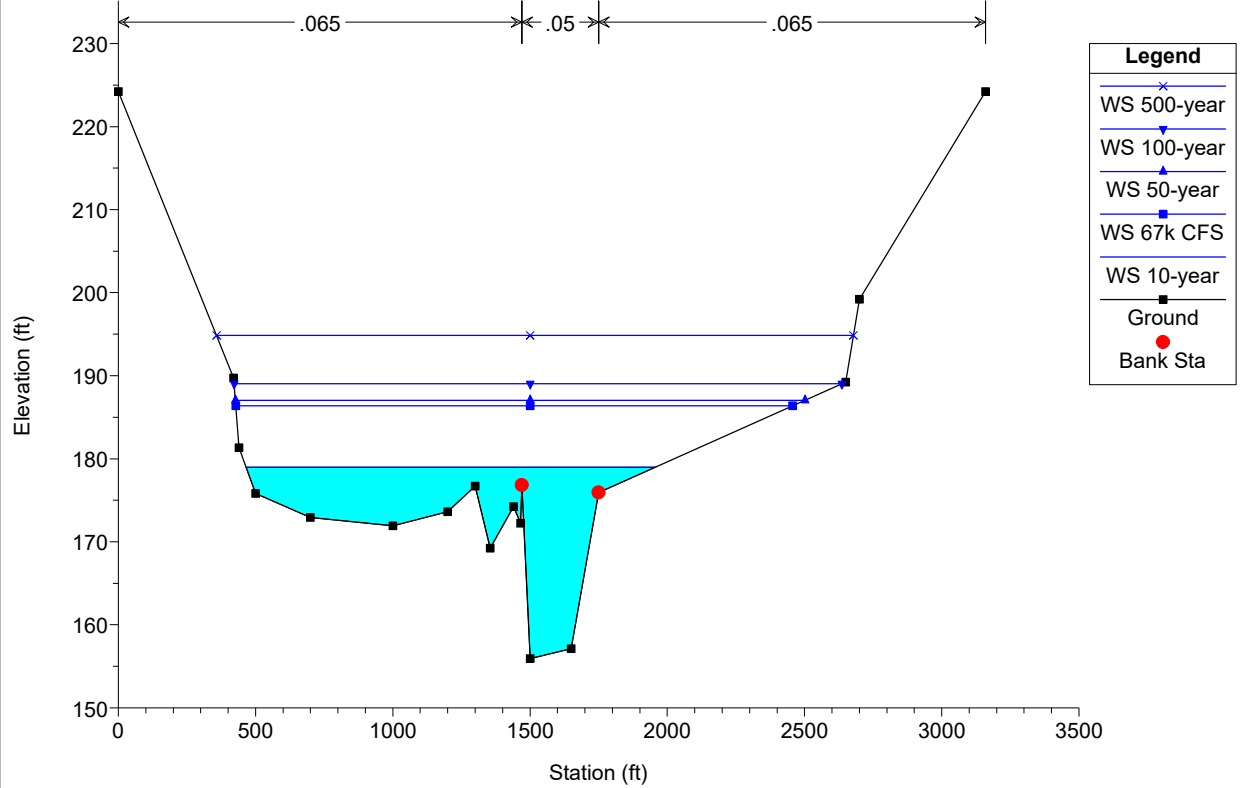
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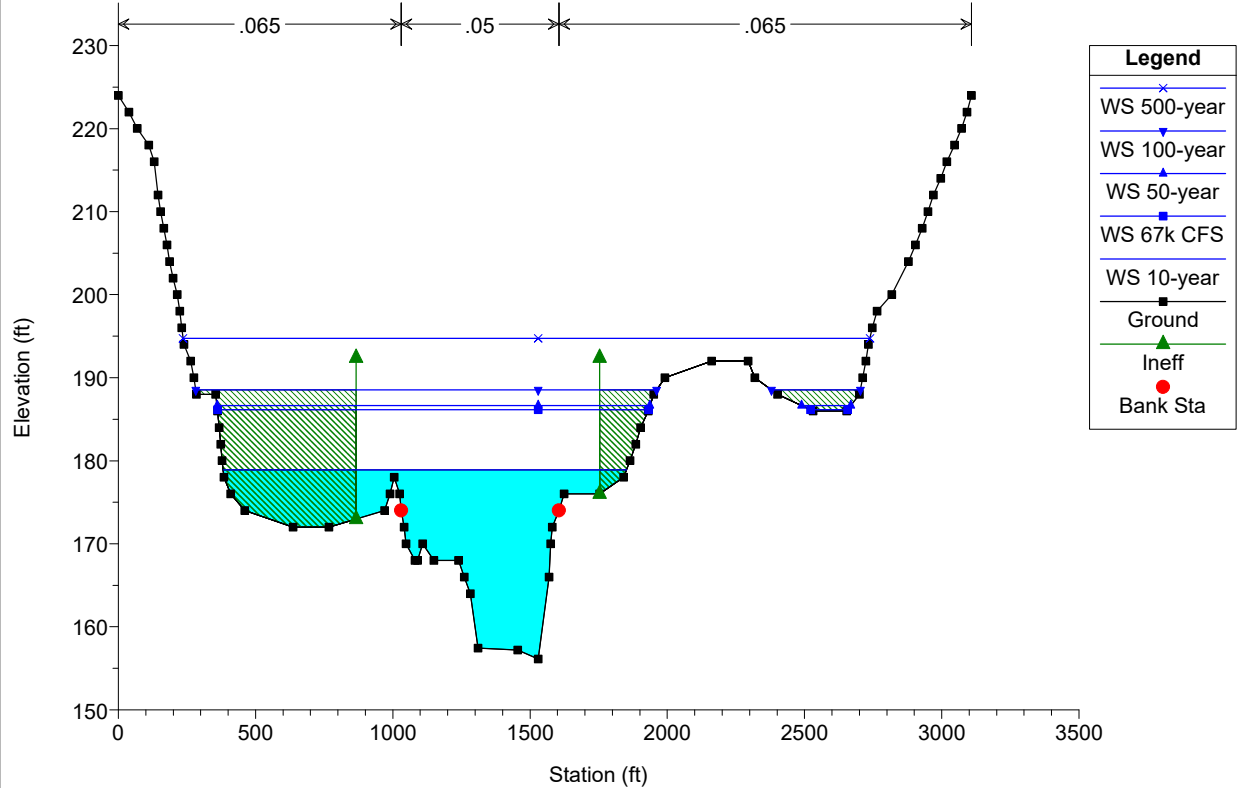
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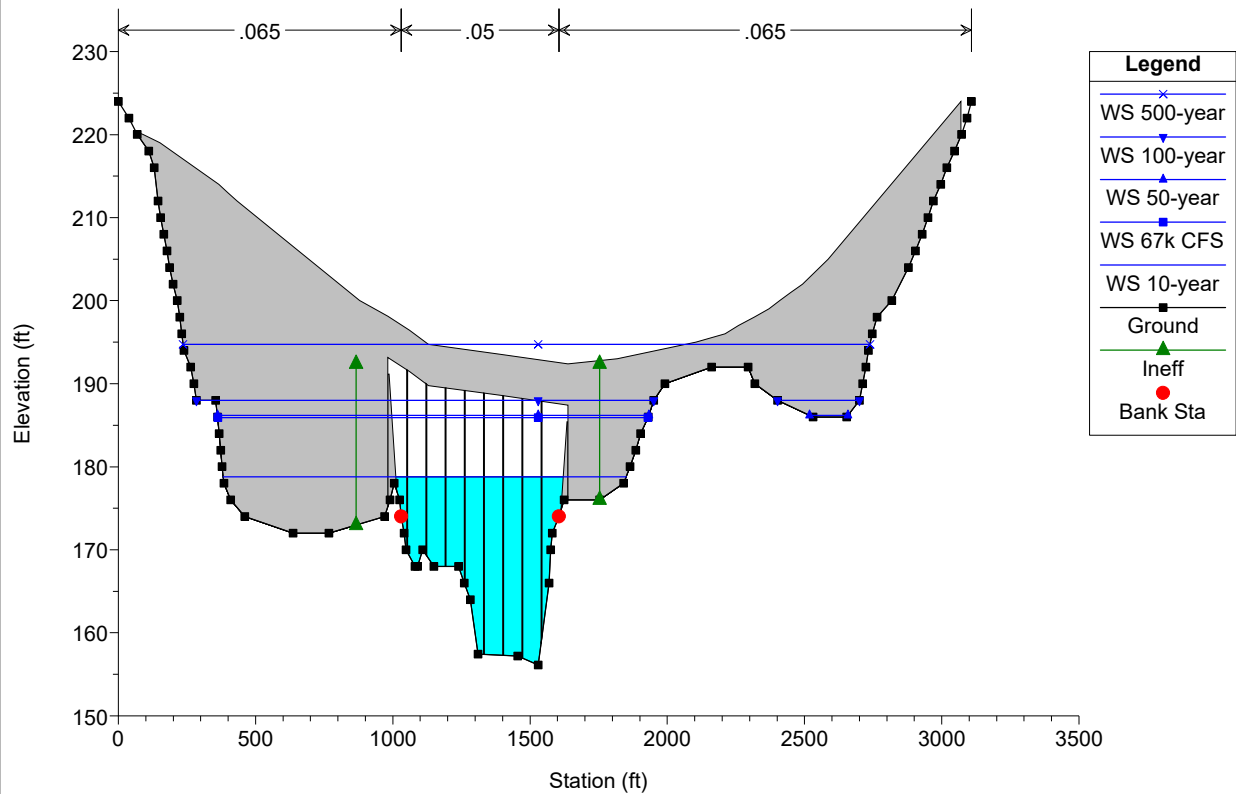
CCR SALUDA RIVER Detailed Study Plan: REV 2/20/2022
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CCR SALUDA RIVER Detailed Study Plan: REV 2/20/2022
New Section US I-20

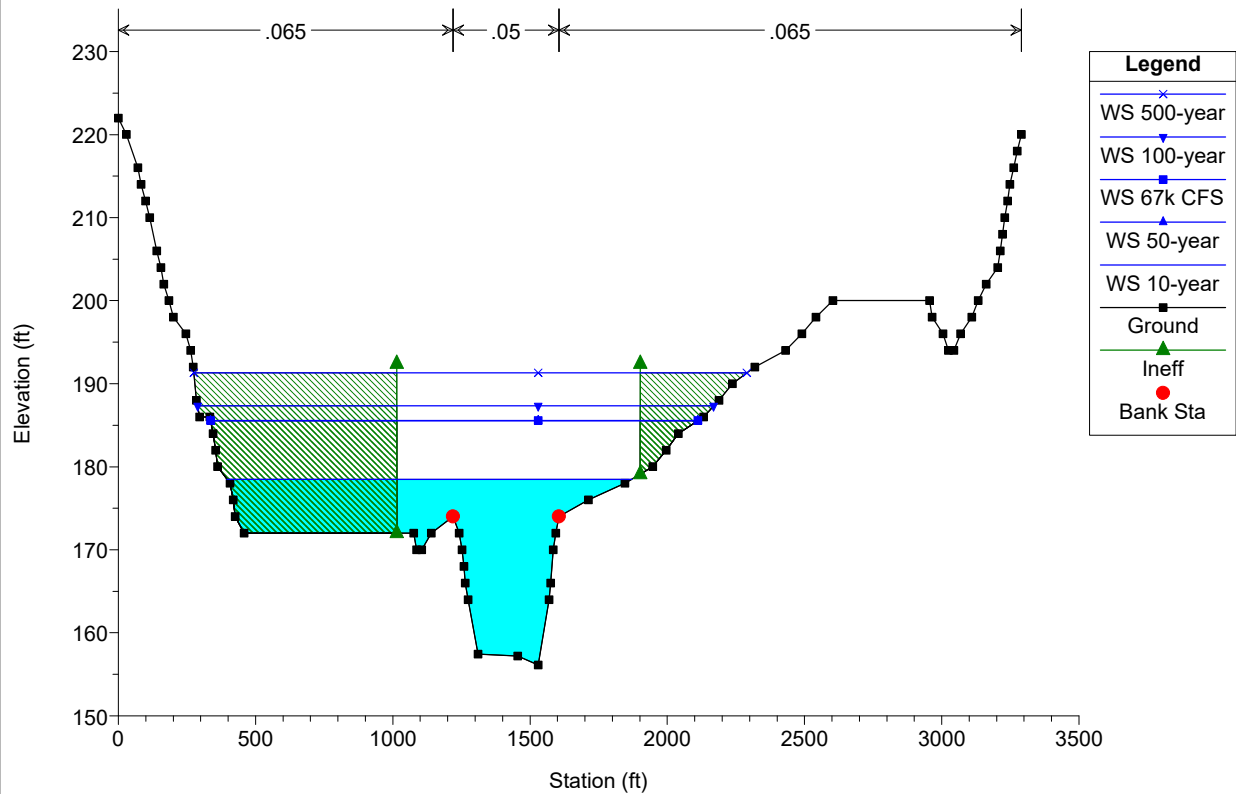


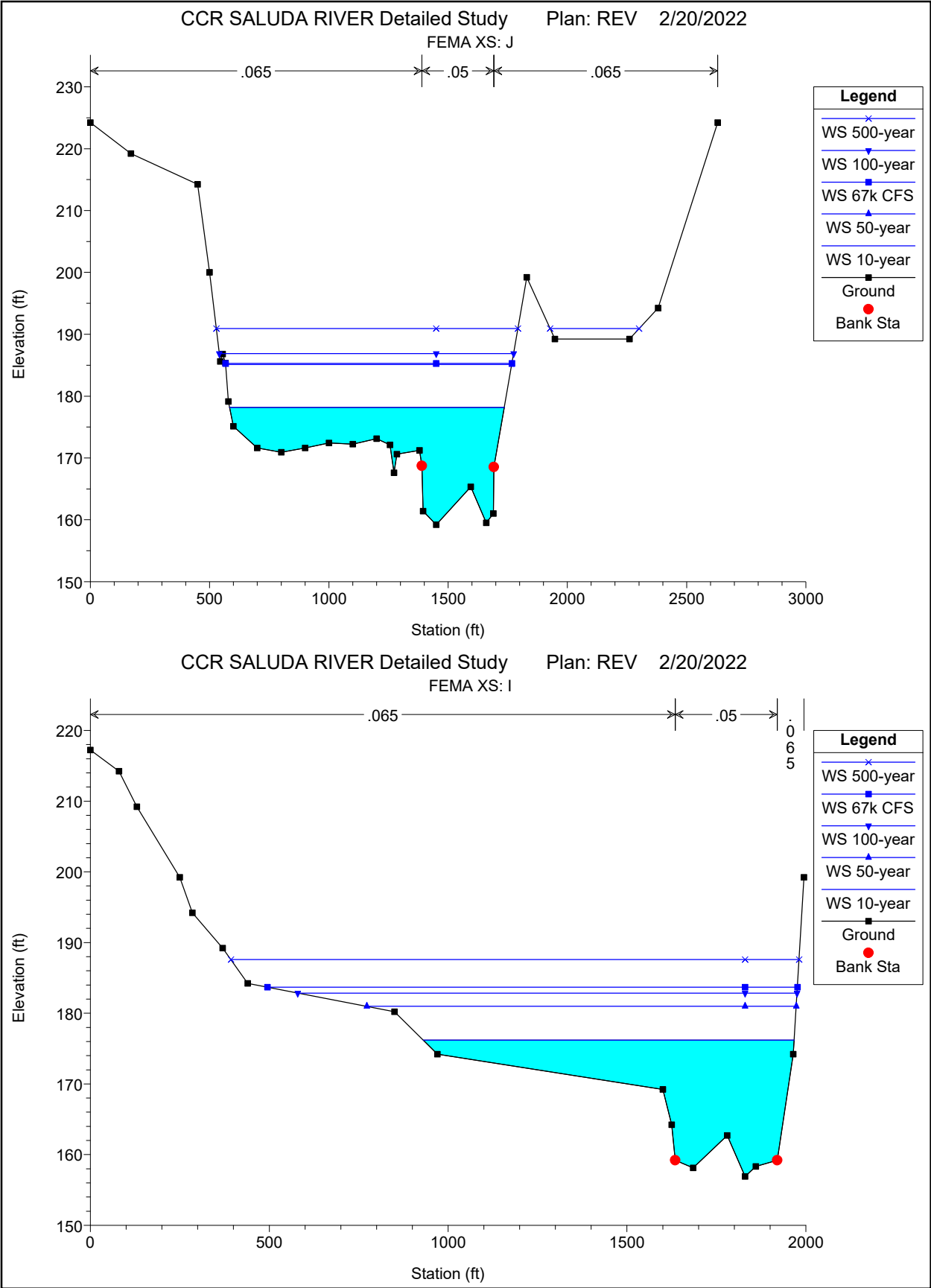
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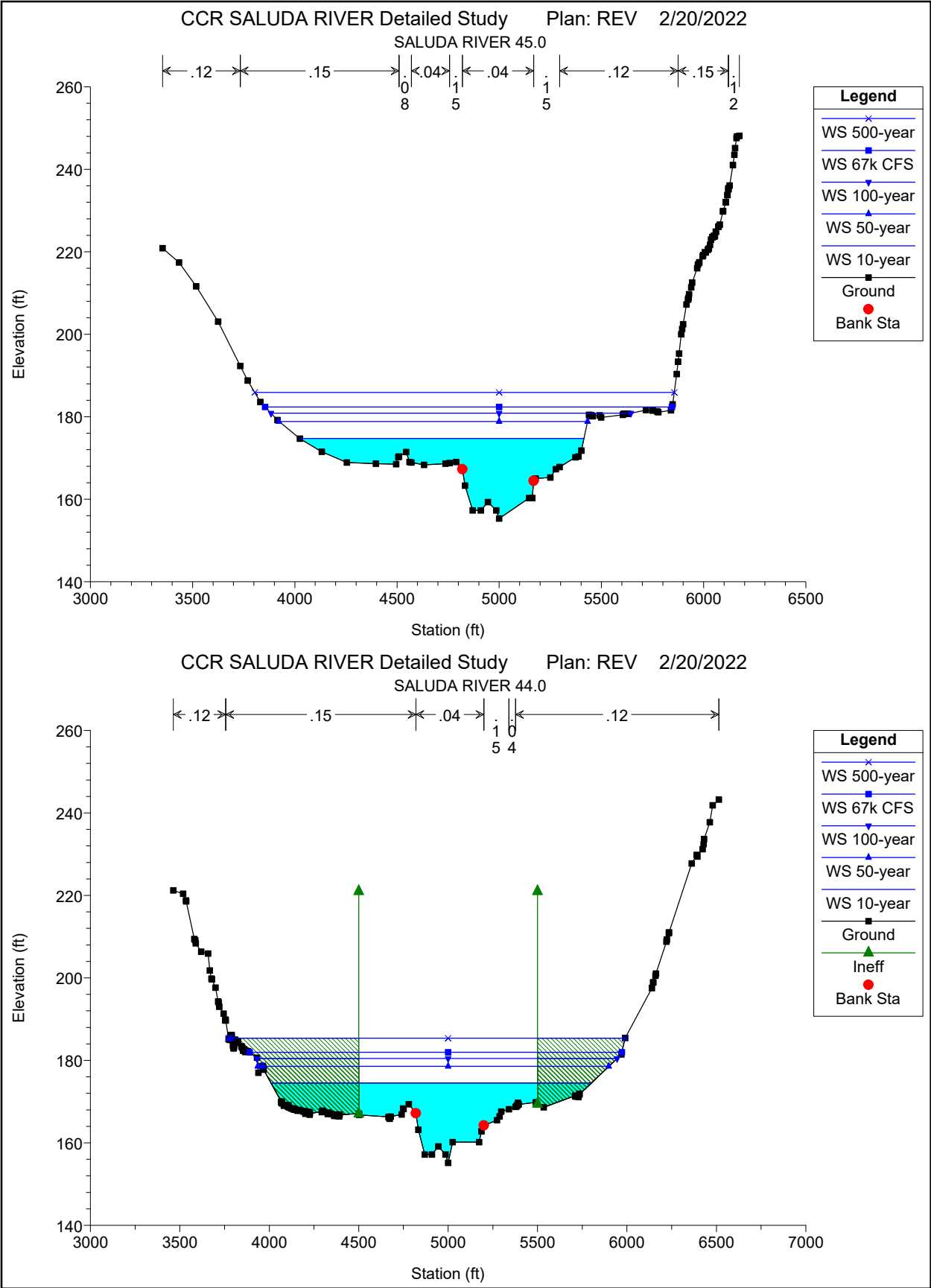


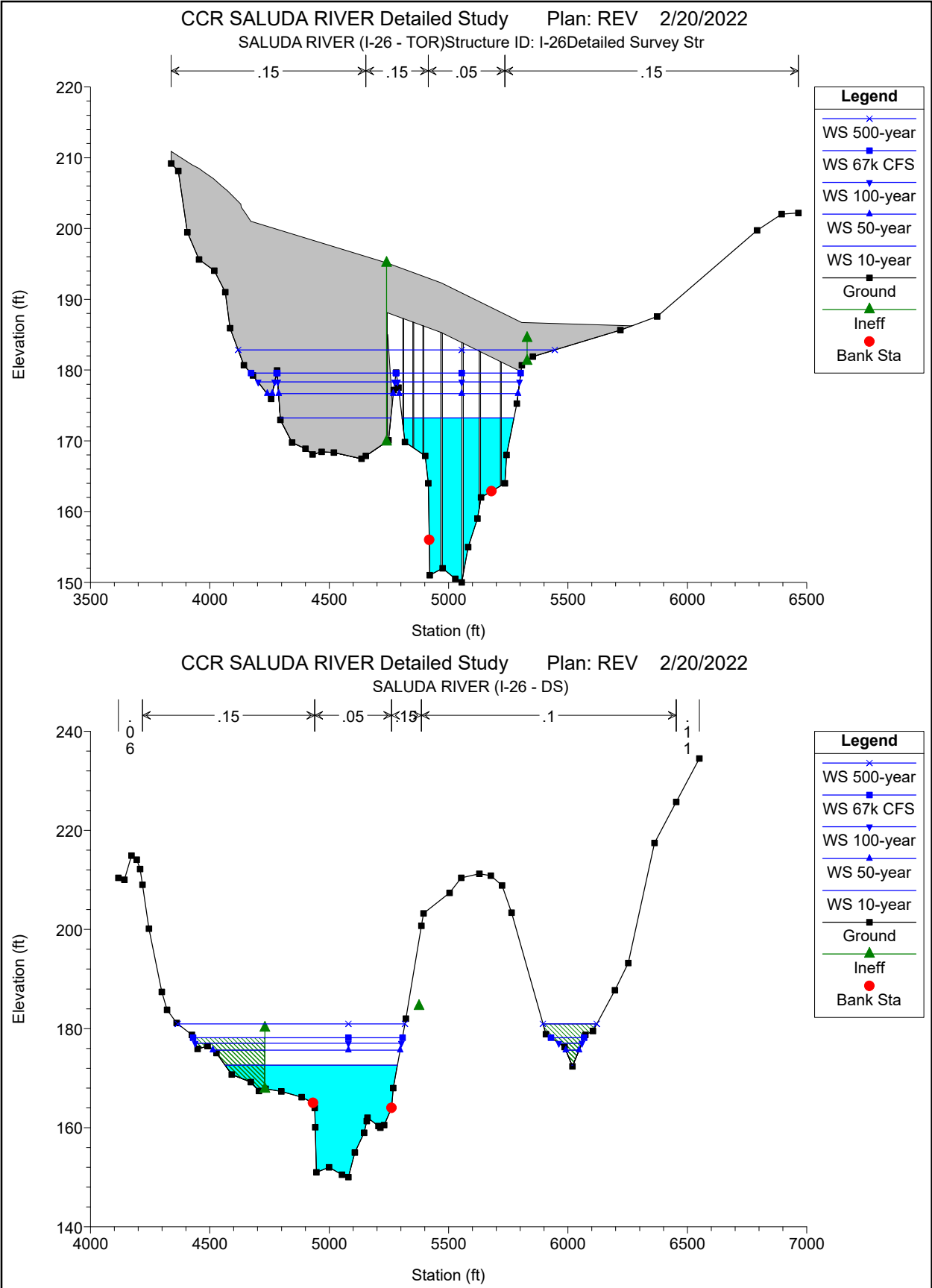
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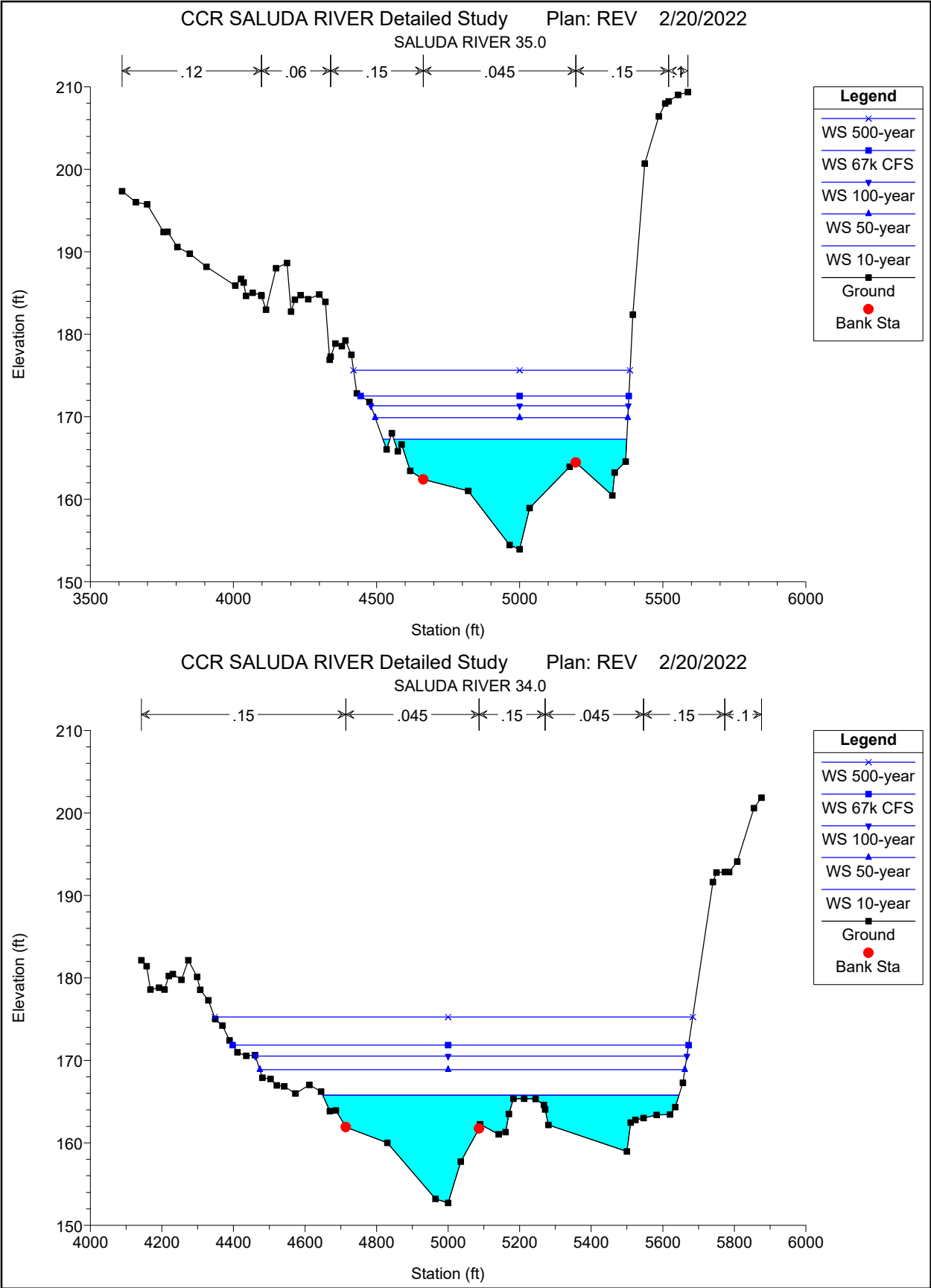
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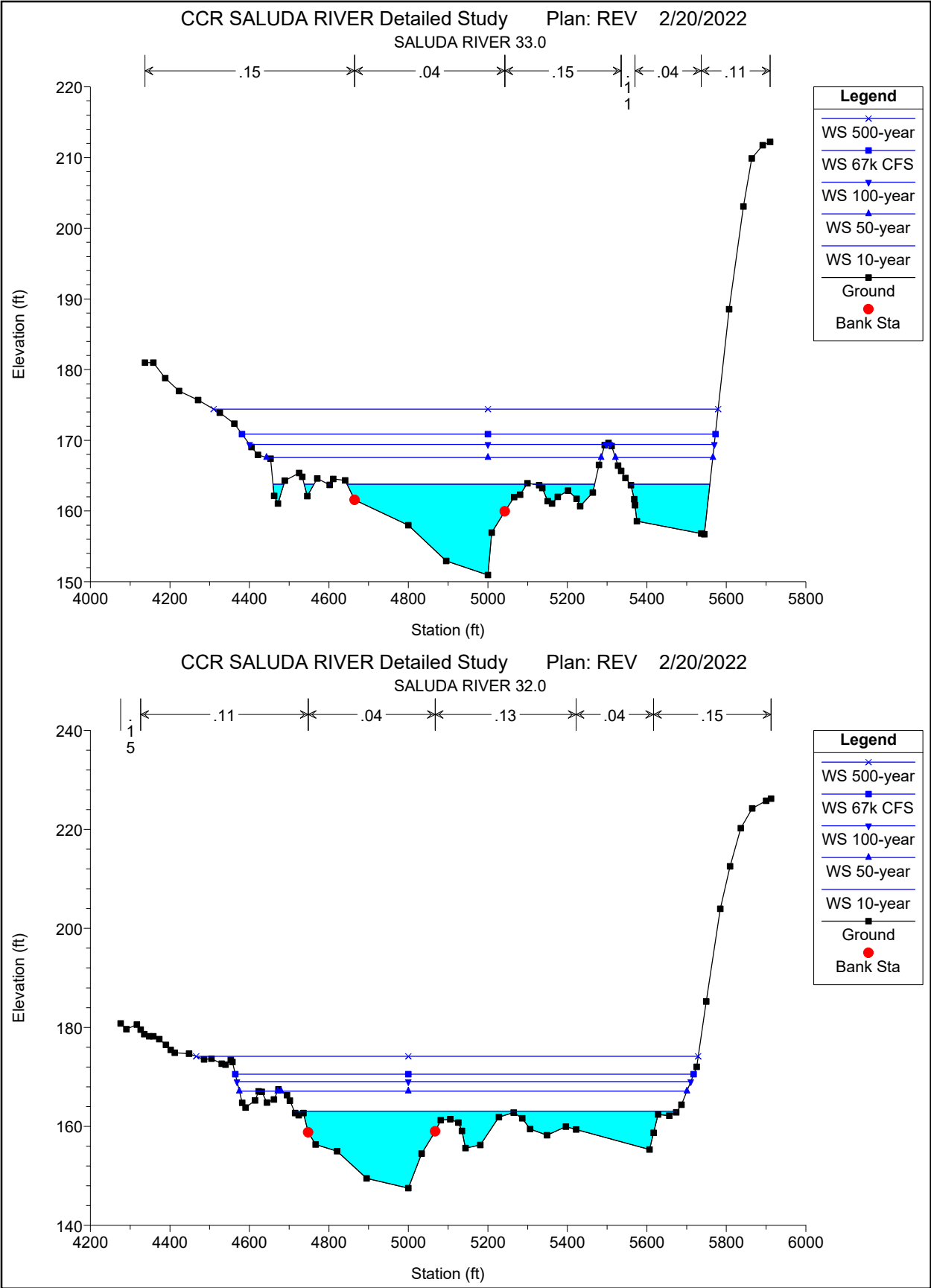




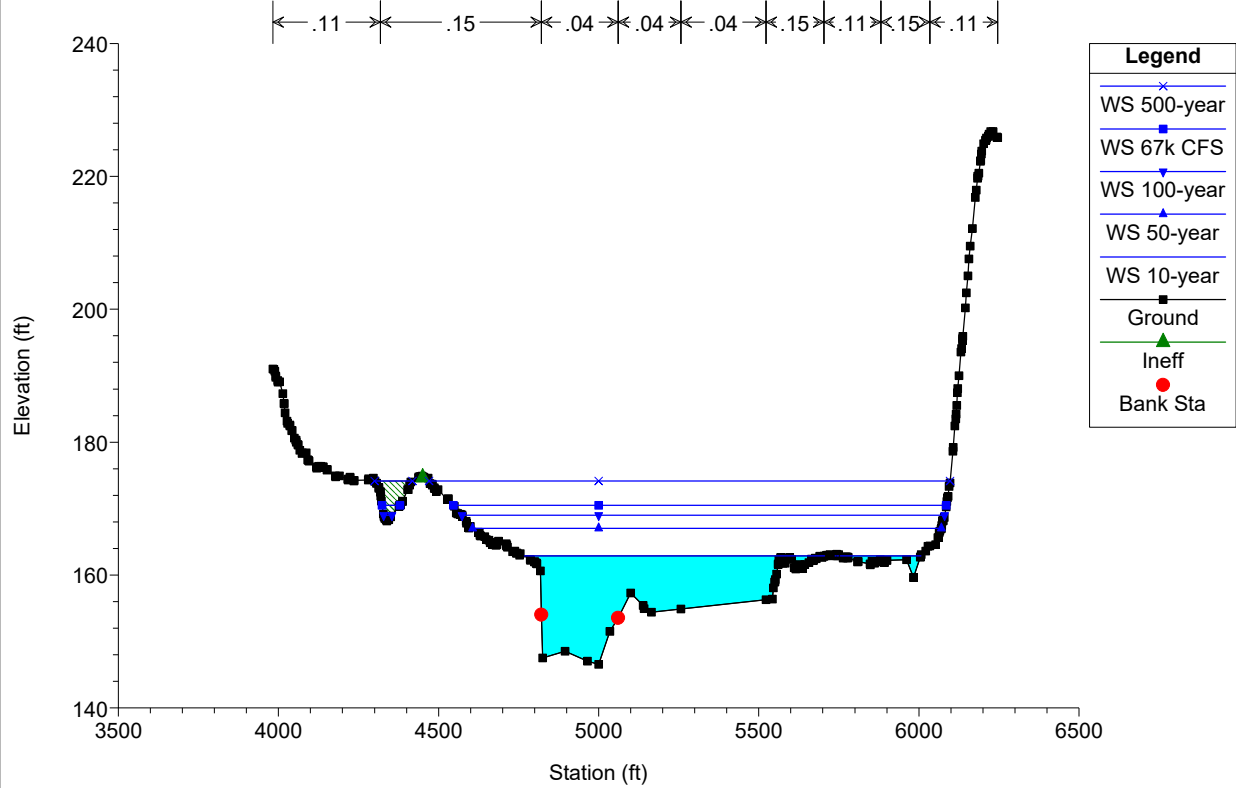




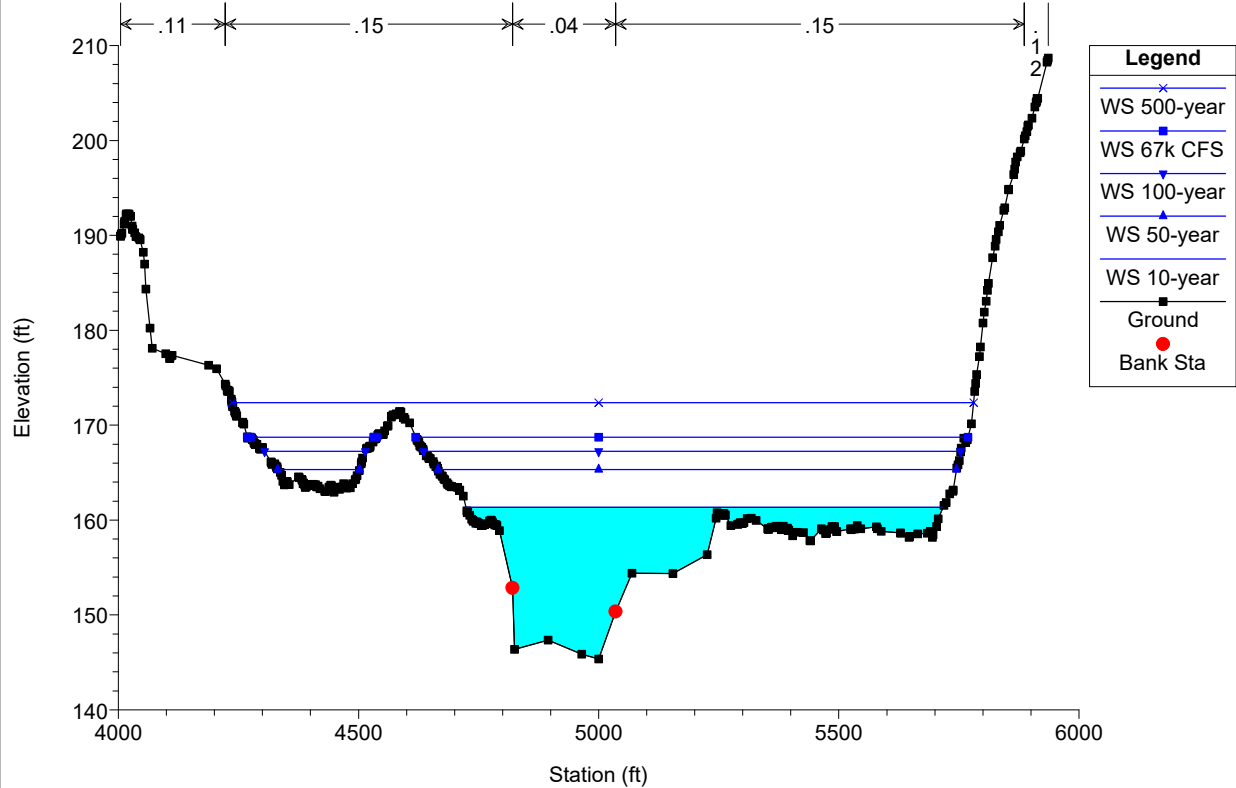




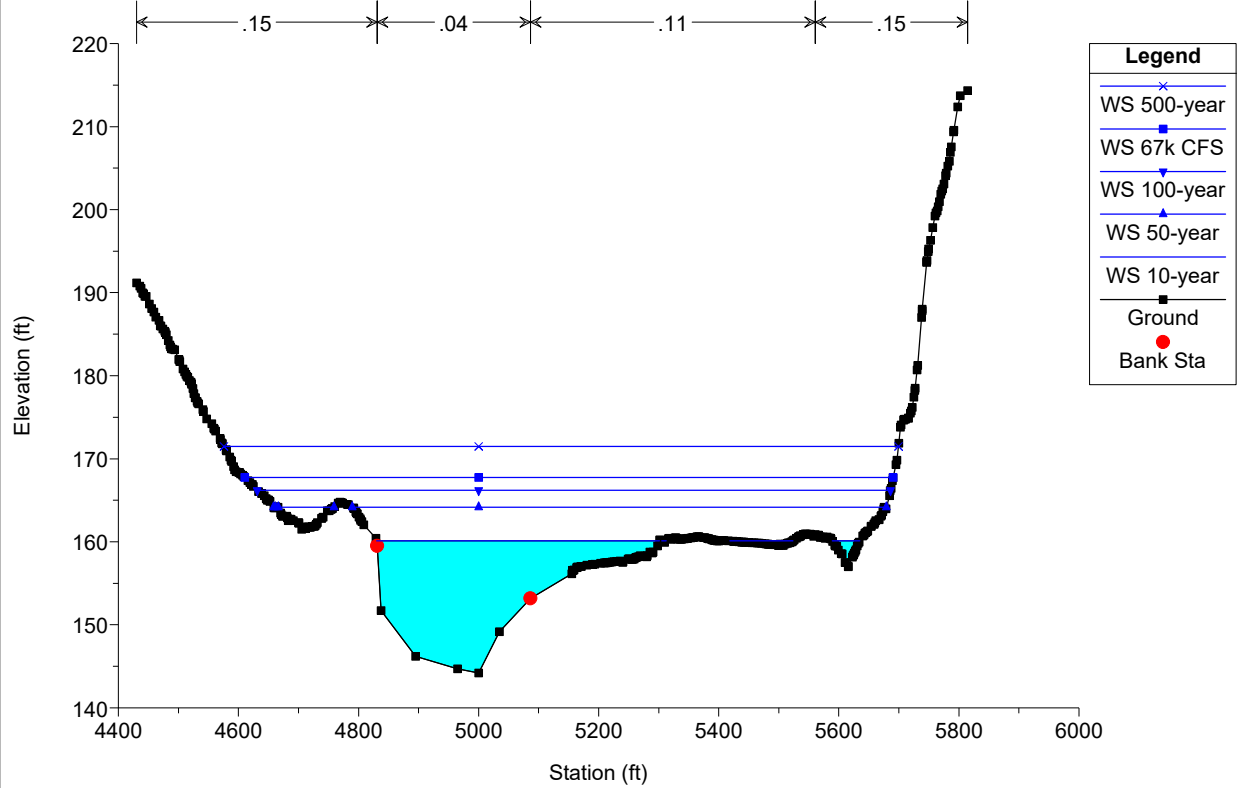
CCR SALUDA RIVER Detailed Study Plan: REV 2/20/2022
SALUDA RIVER 31.0



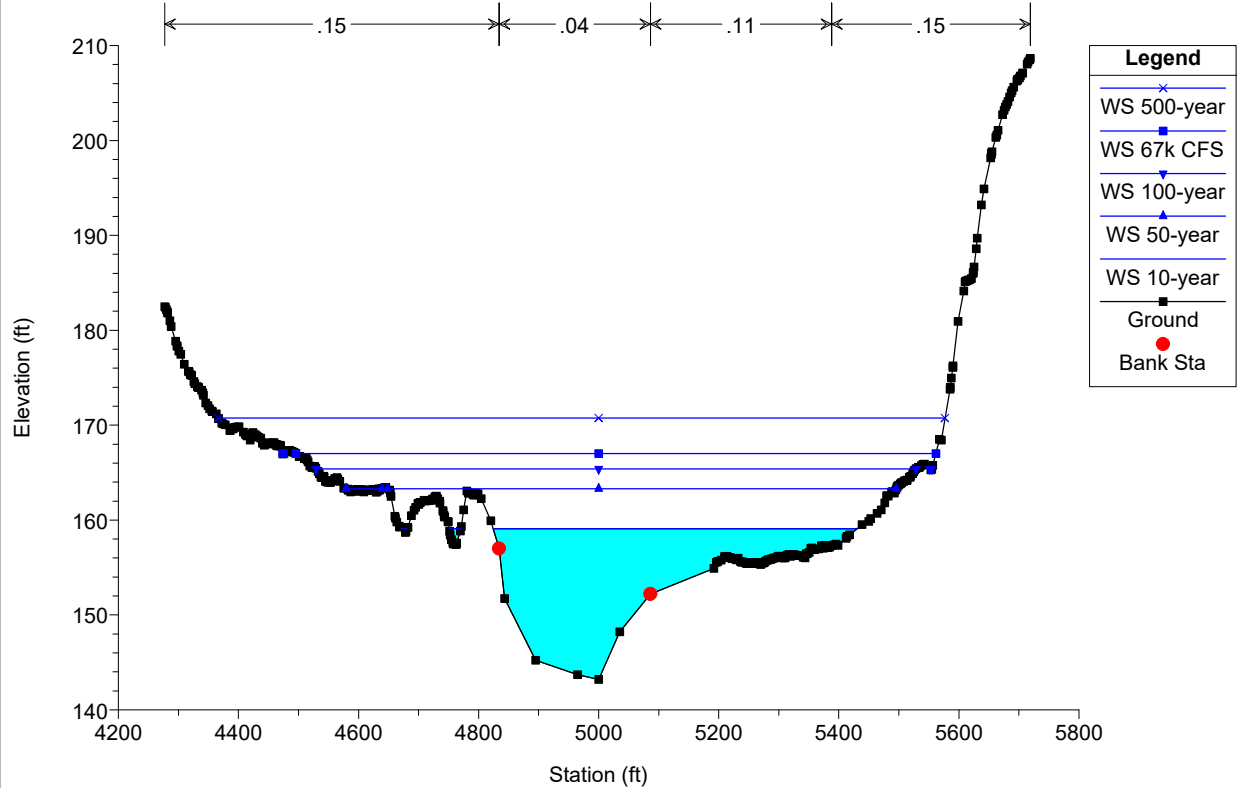
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SALUDA RIVER 30.0

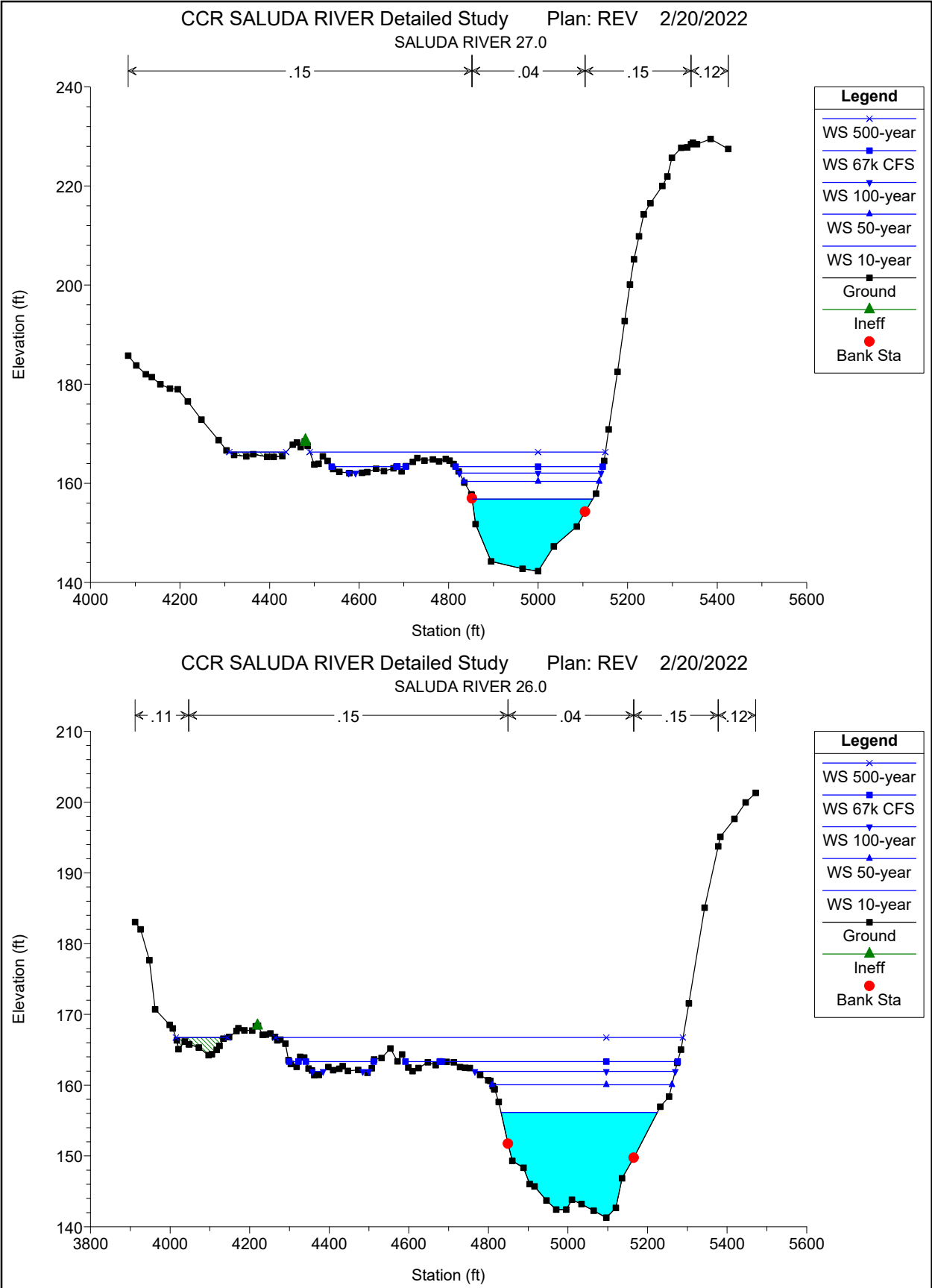


CCR SALUDA RIVER Detailed Study Plan: REV 2/20/2022
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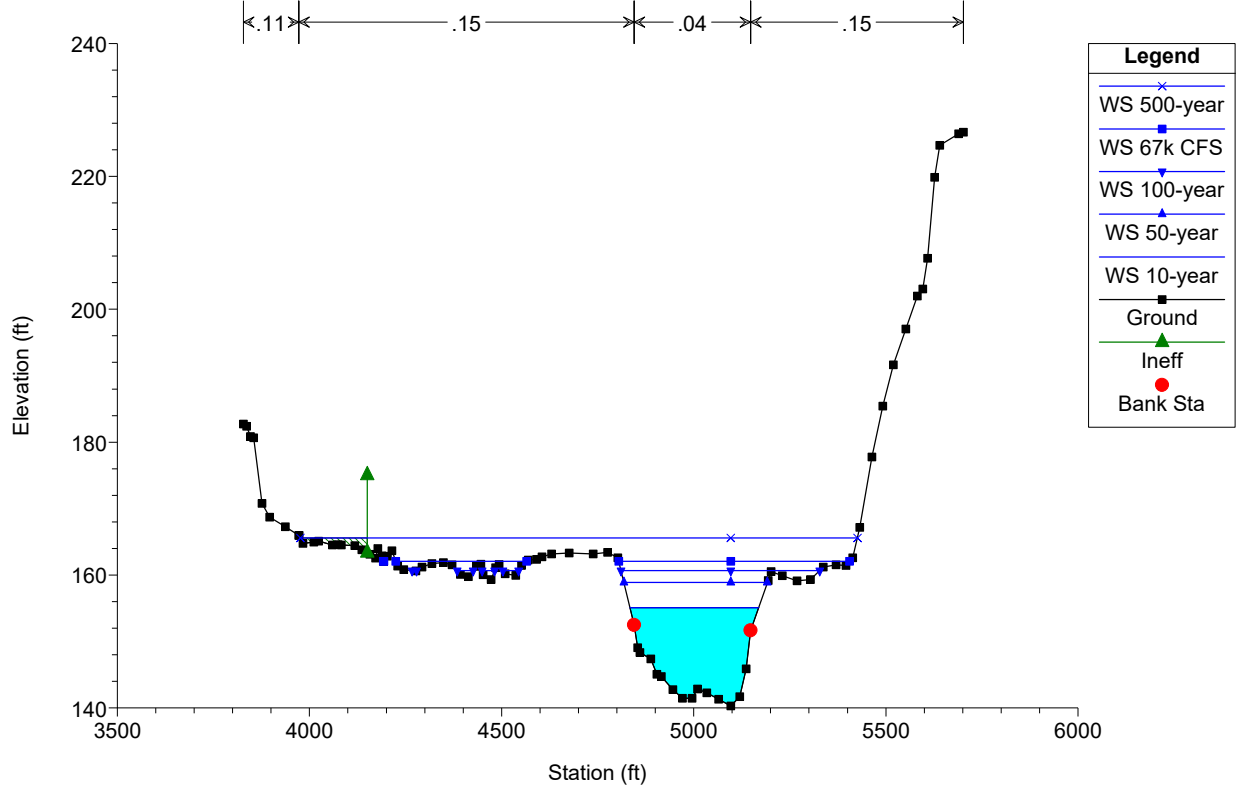


CCR SALUDA RIVER Detailed Study Plan: REV 2/20/2022
SALUDA RIVER 28.0

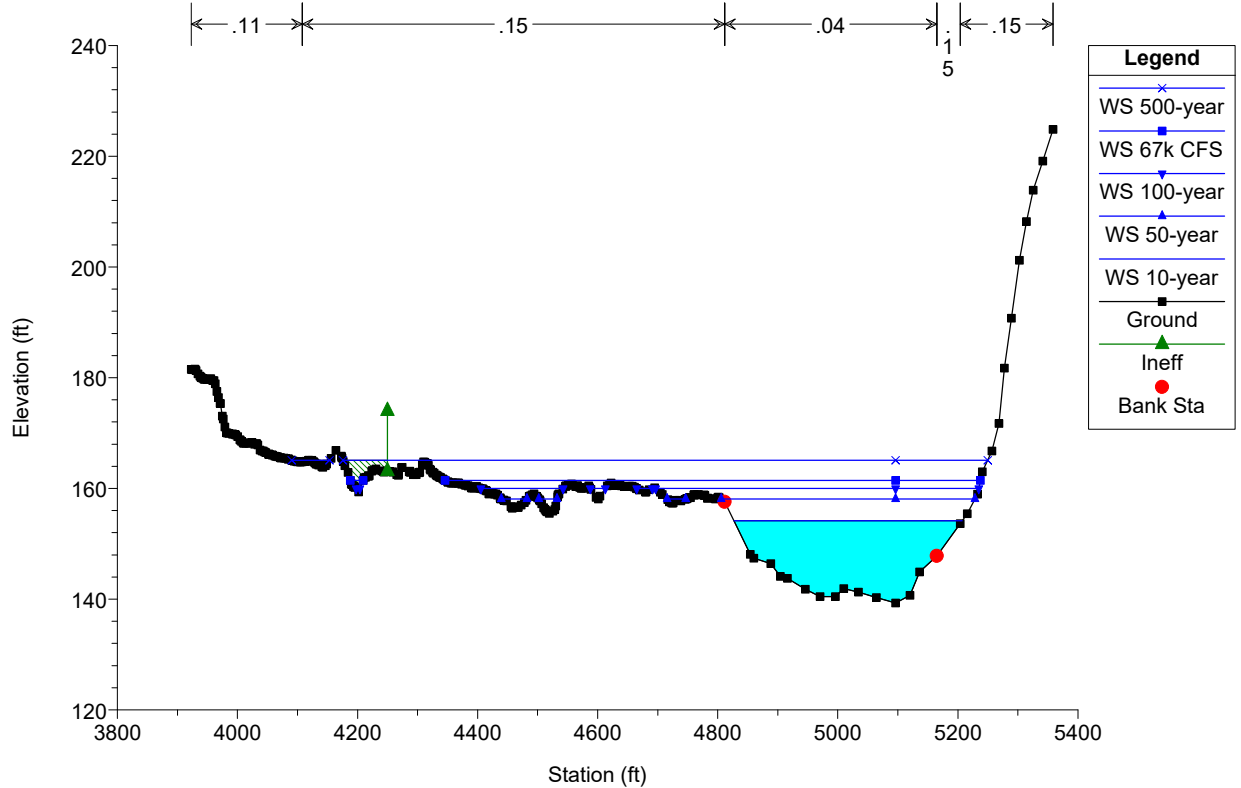




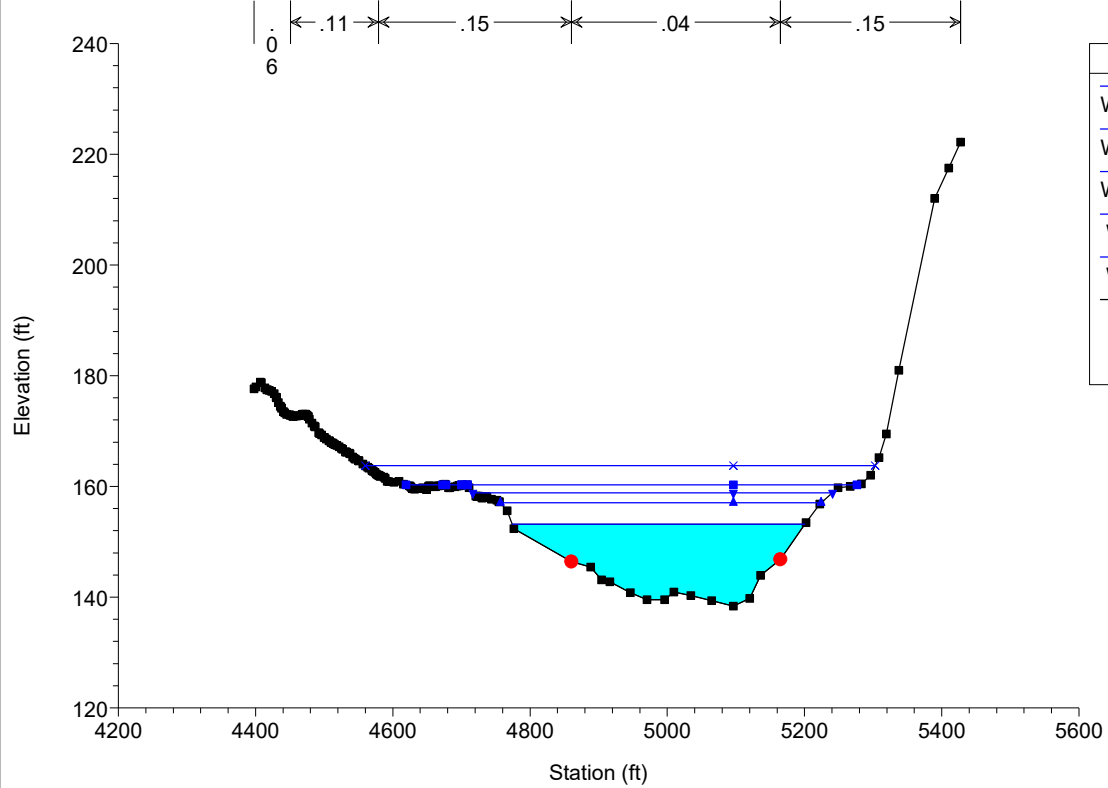
CCR SALUDA RIVER Detailed Study Plan: REV 2/20/2022
SALUDA RIVER 25.0



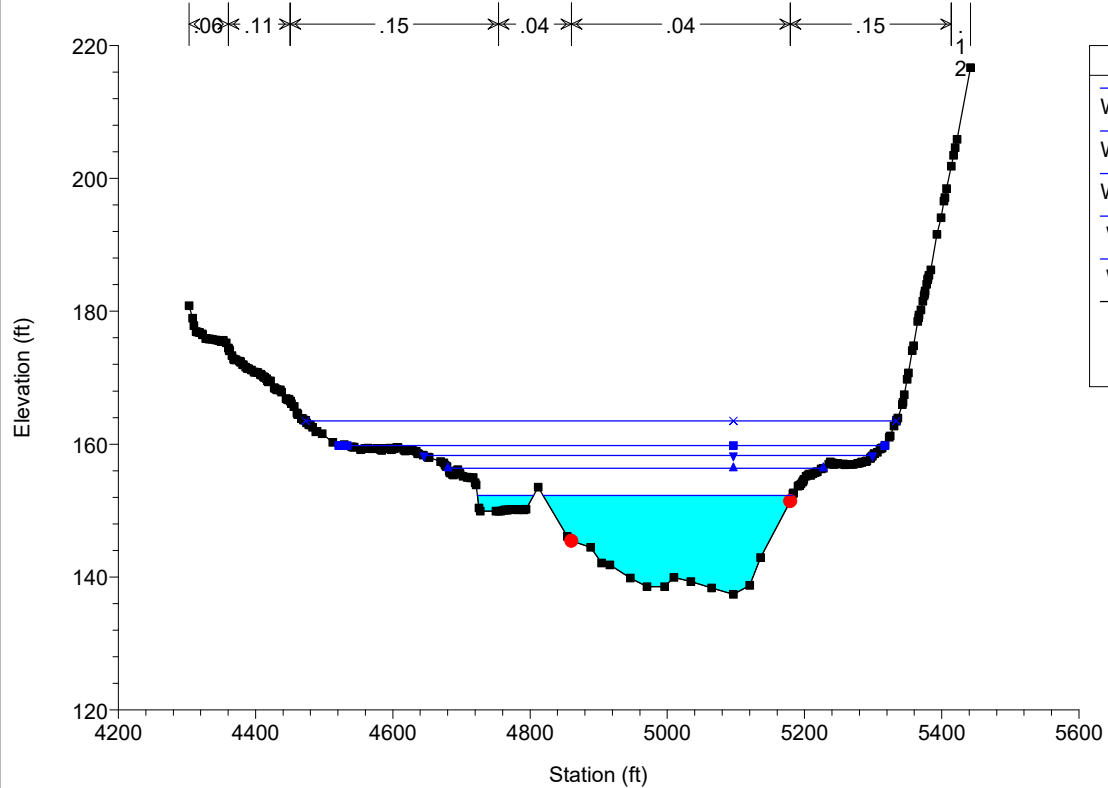
CCR SALUDA RIVER Detailed Study Plan: REV 2/20/2022
SALUDA RIVER 24.0

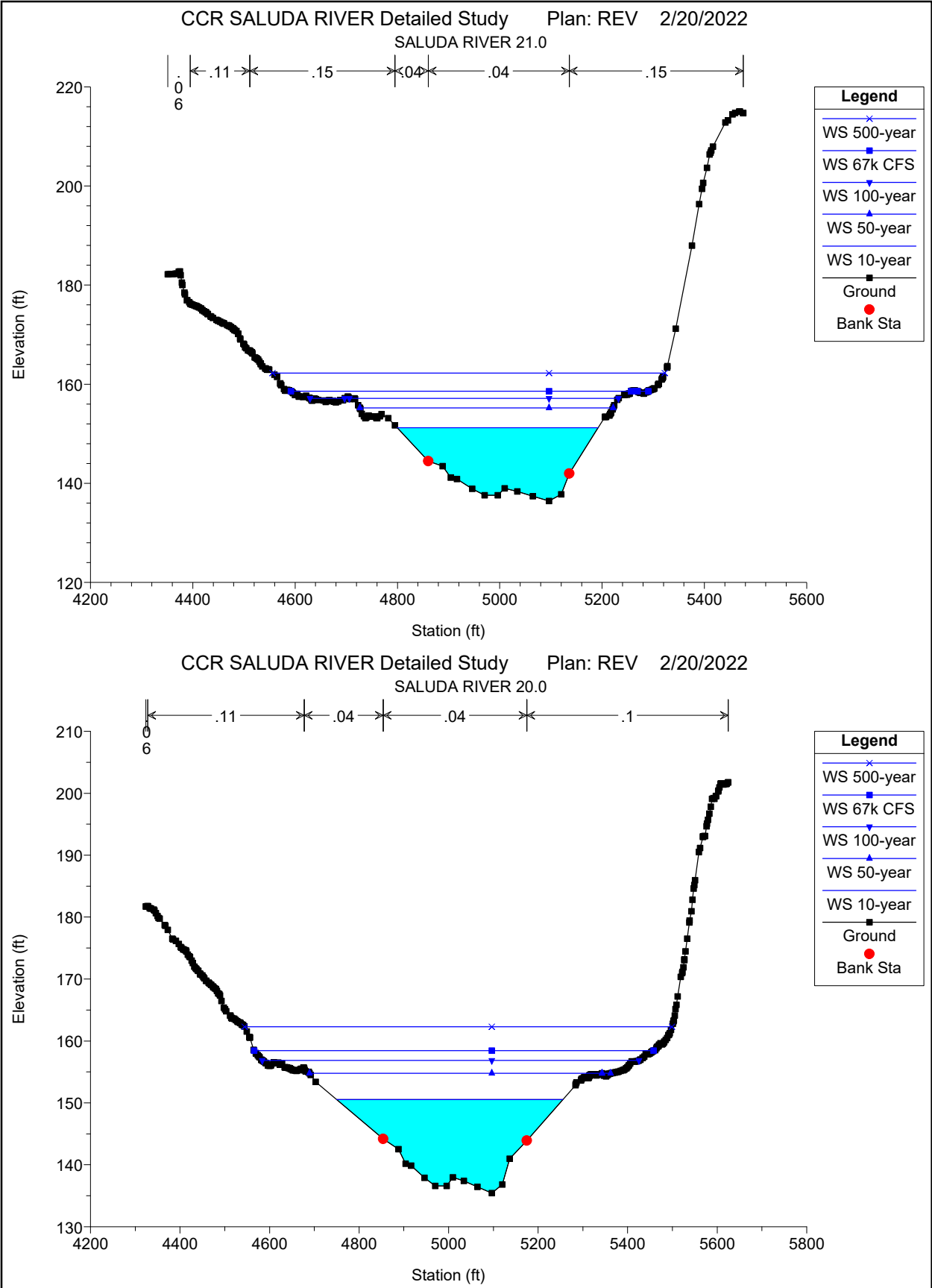


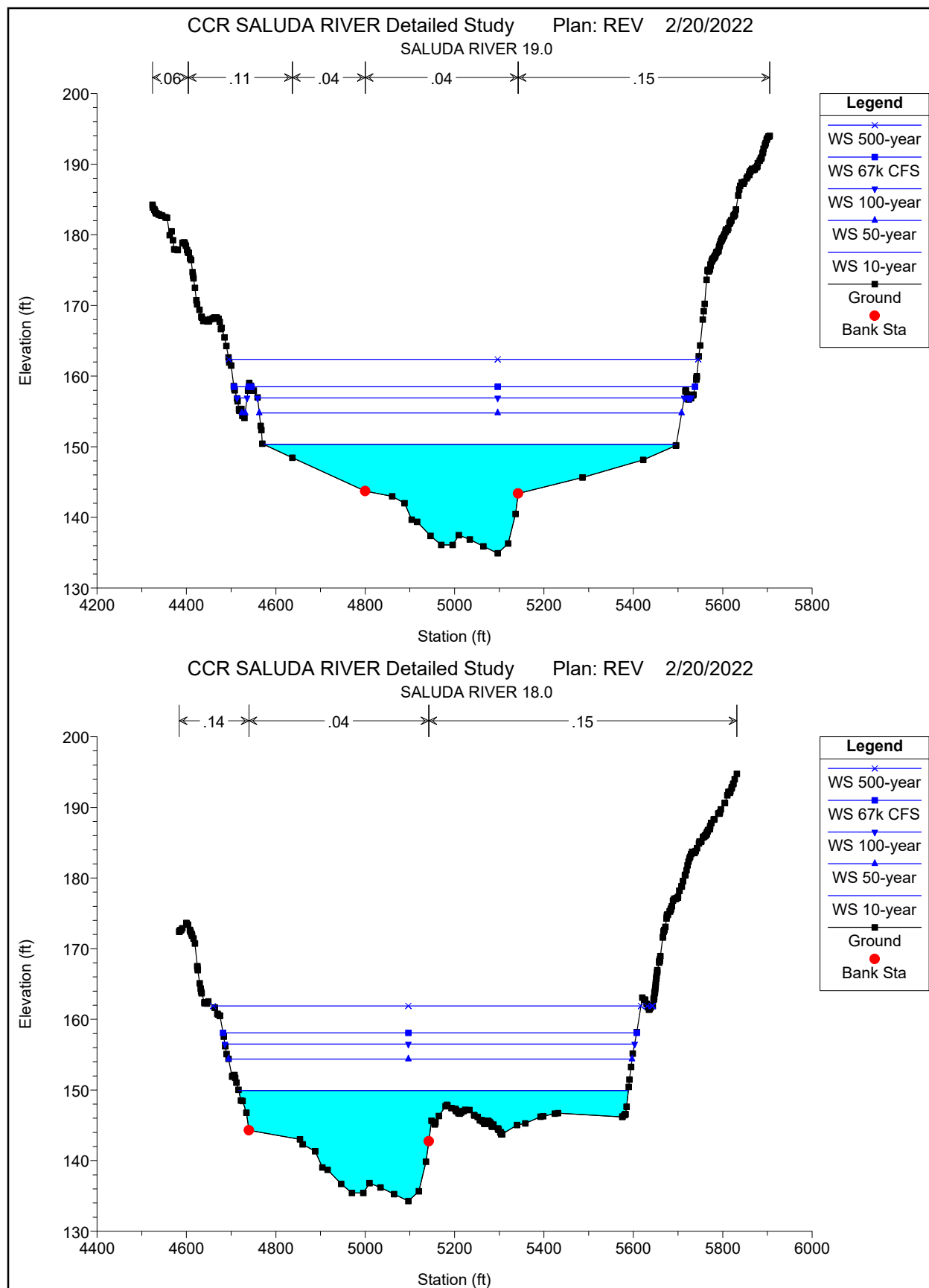
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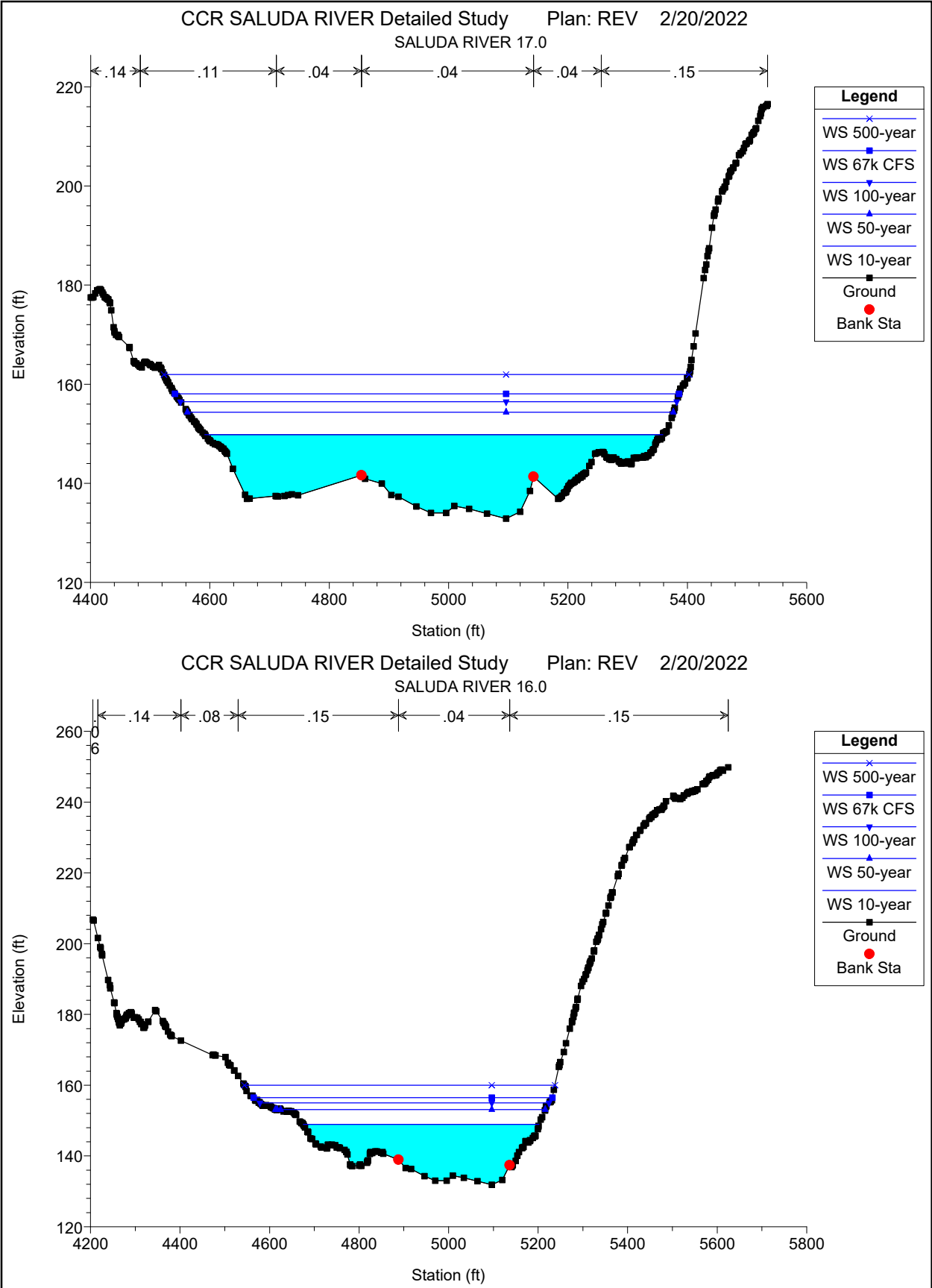


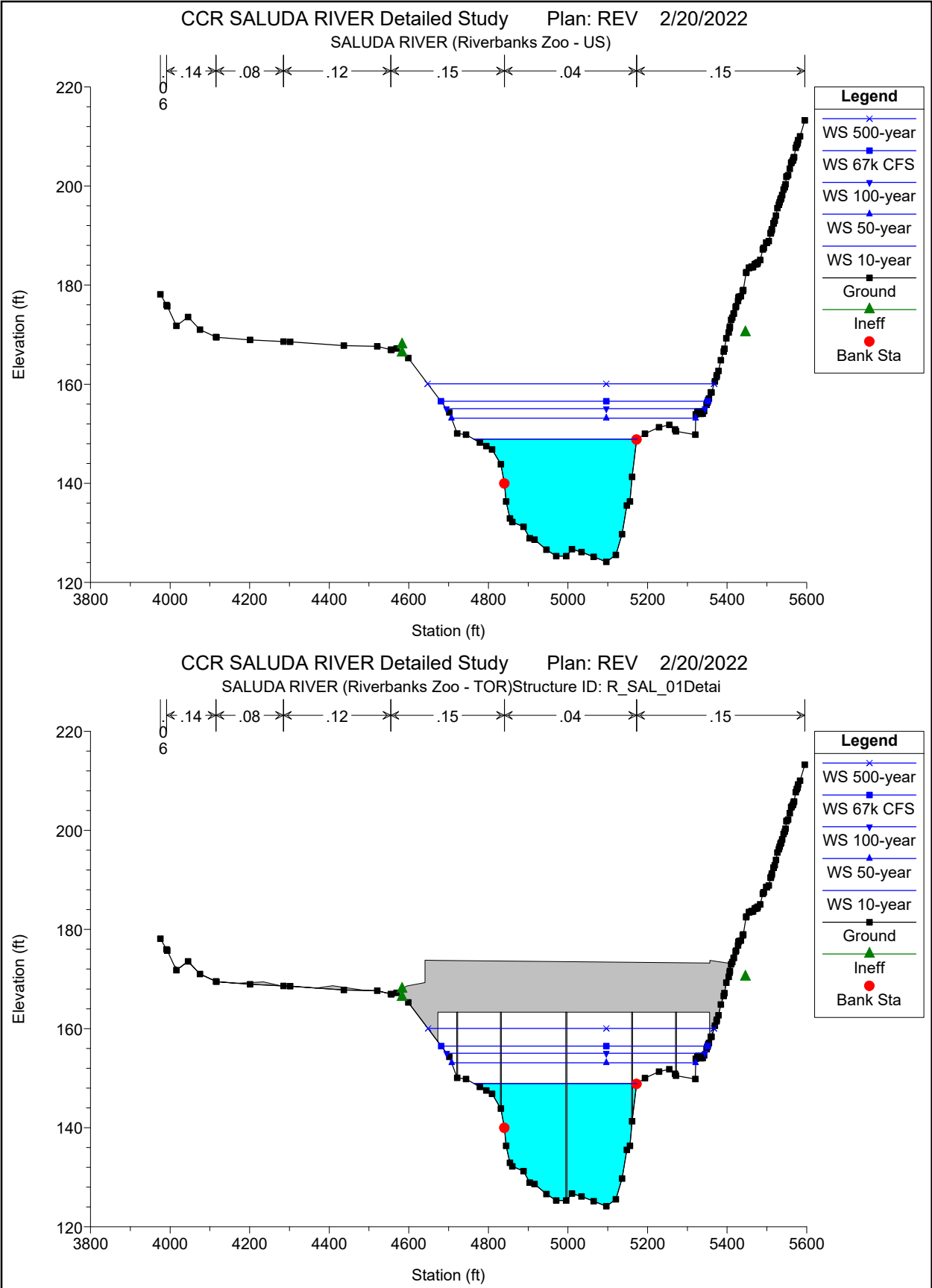
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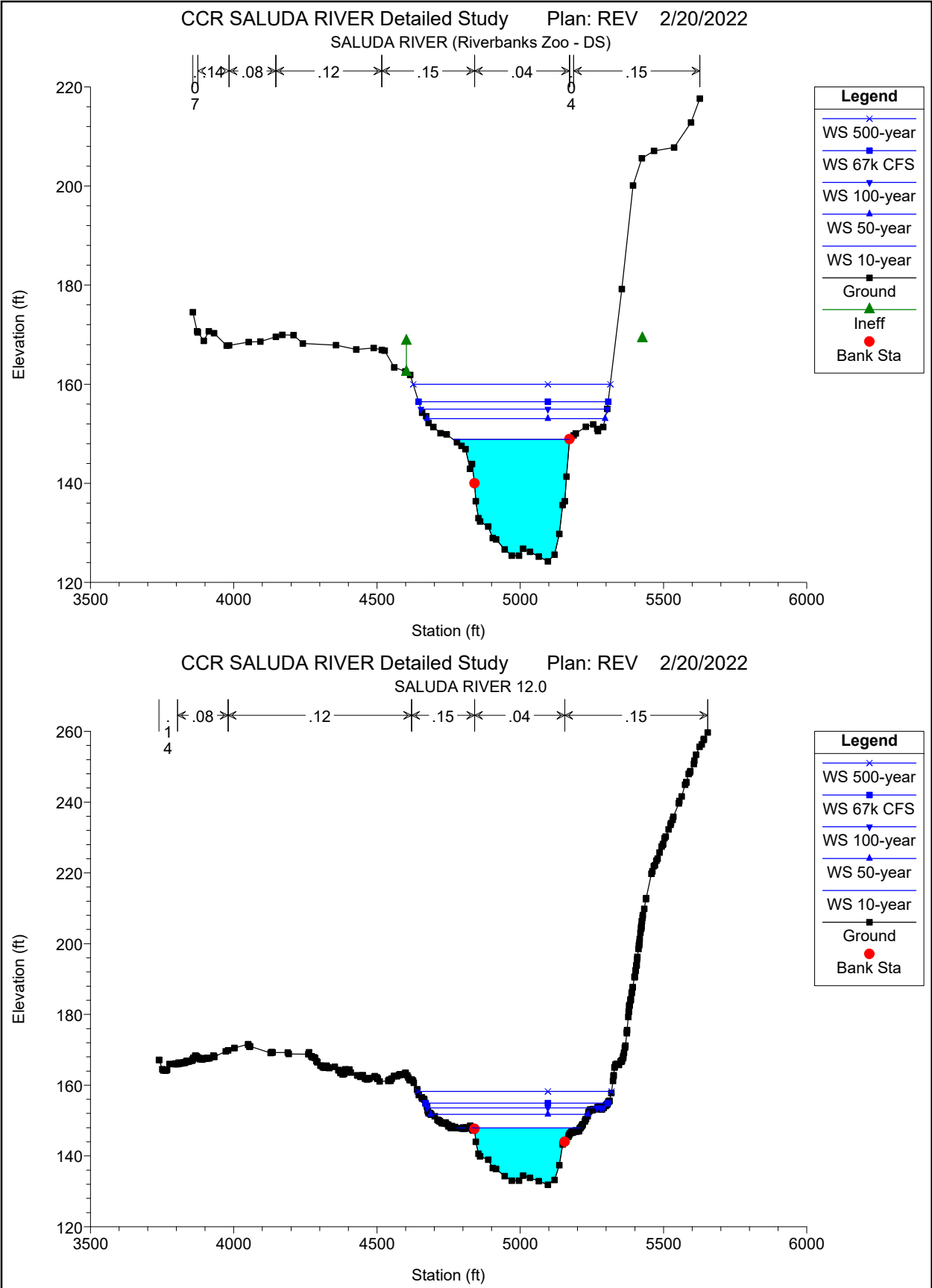


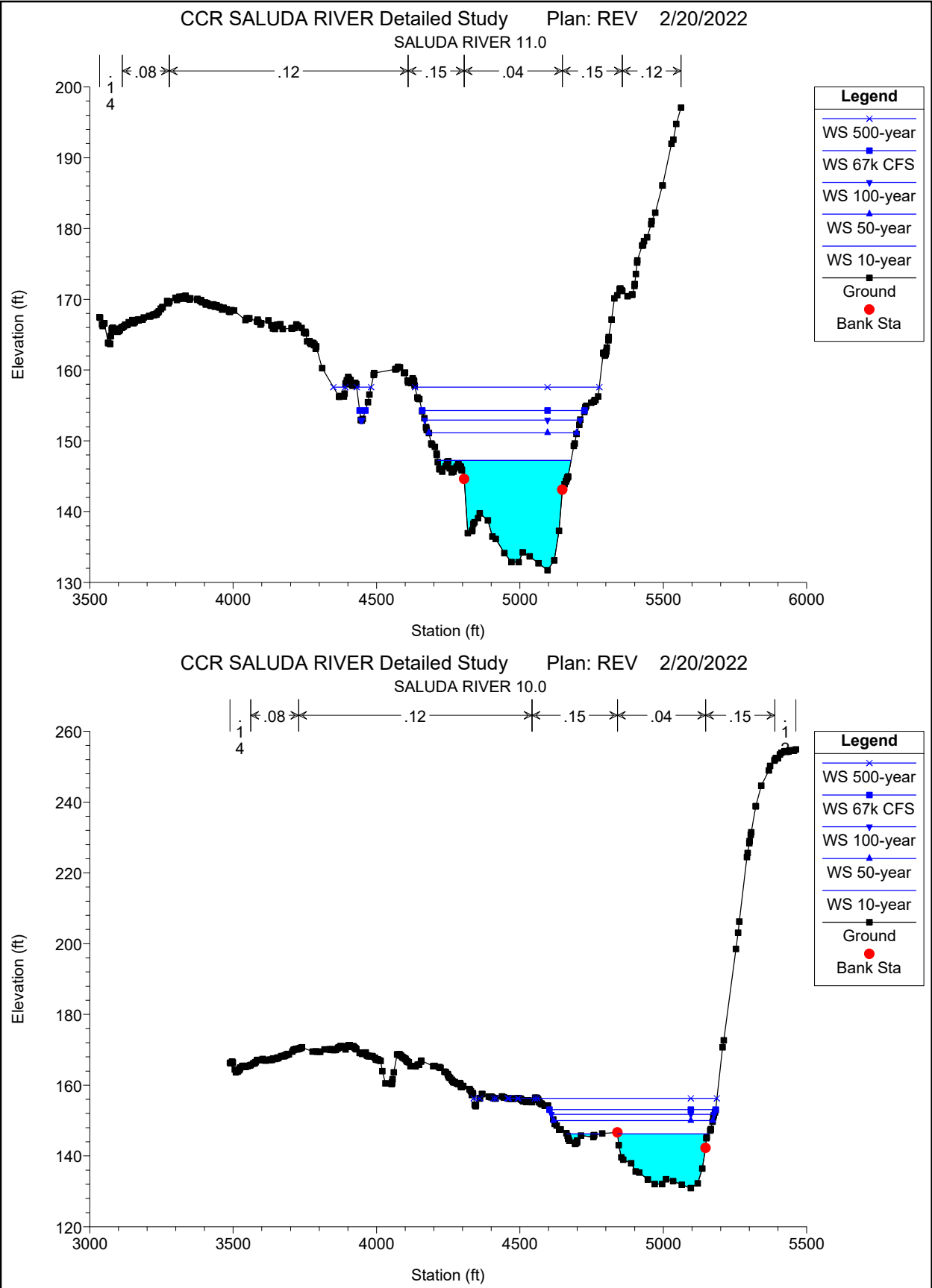


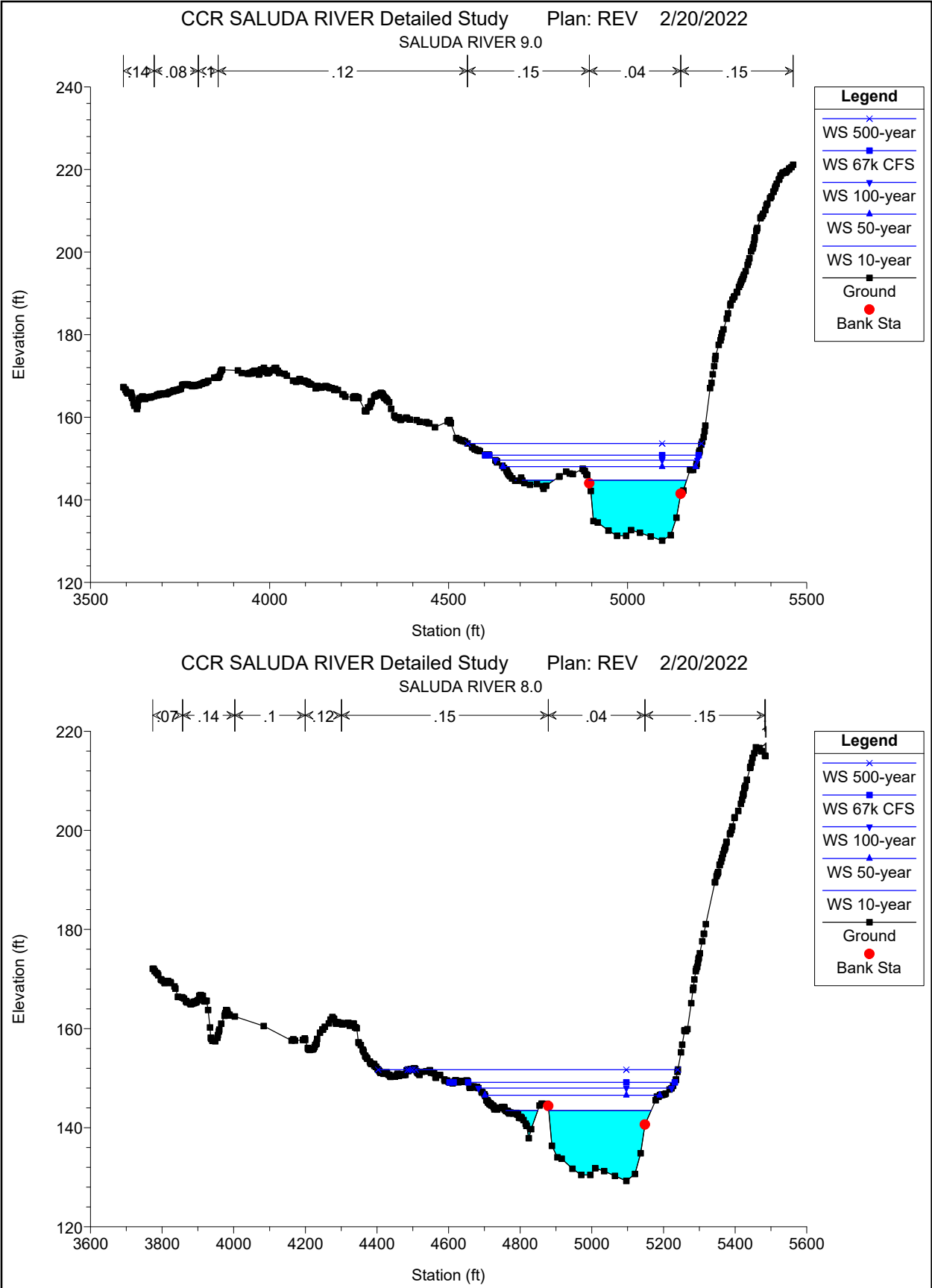


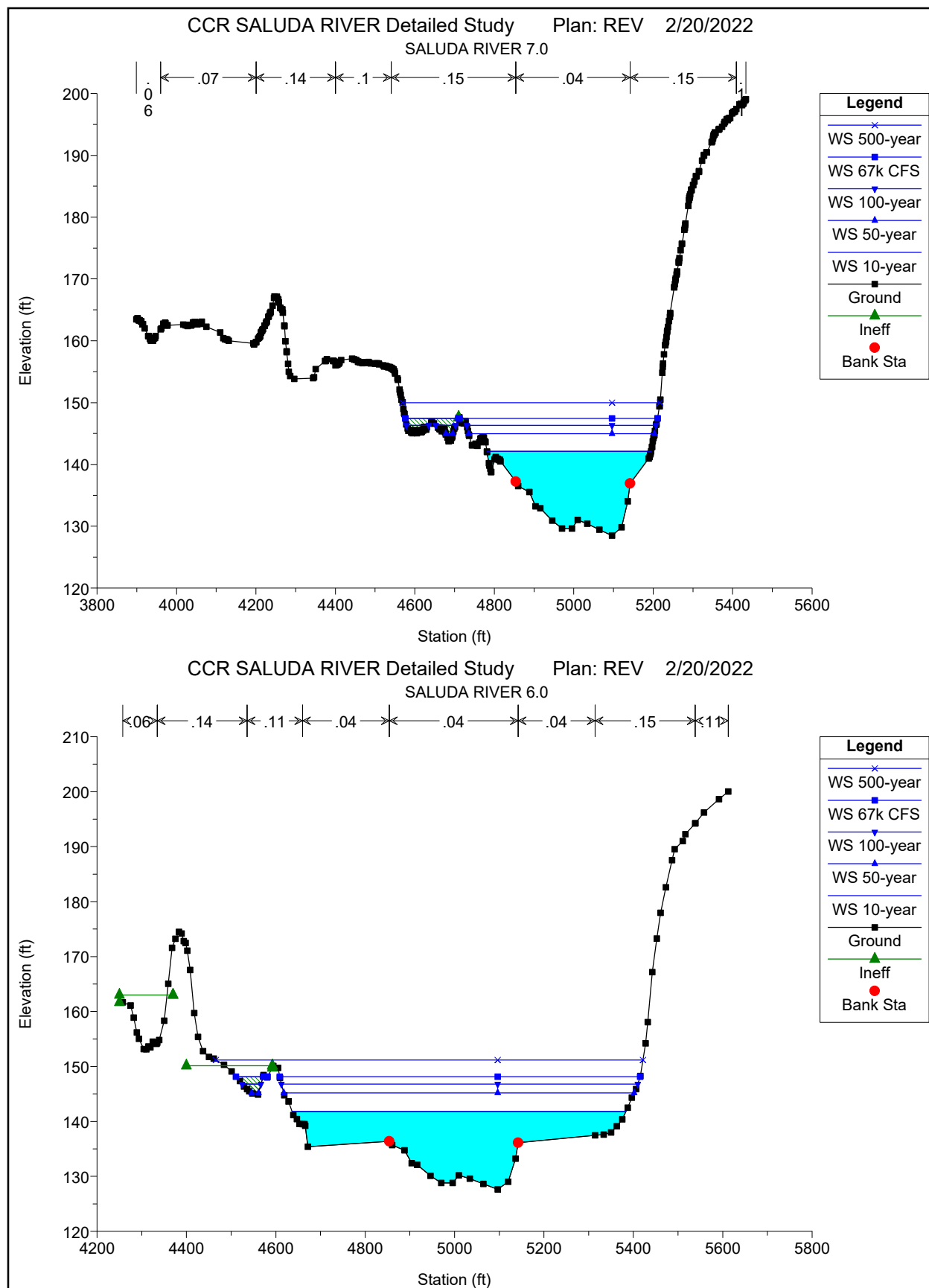


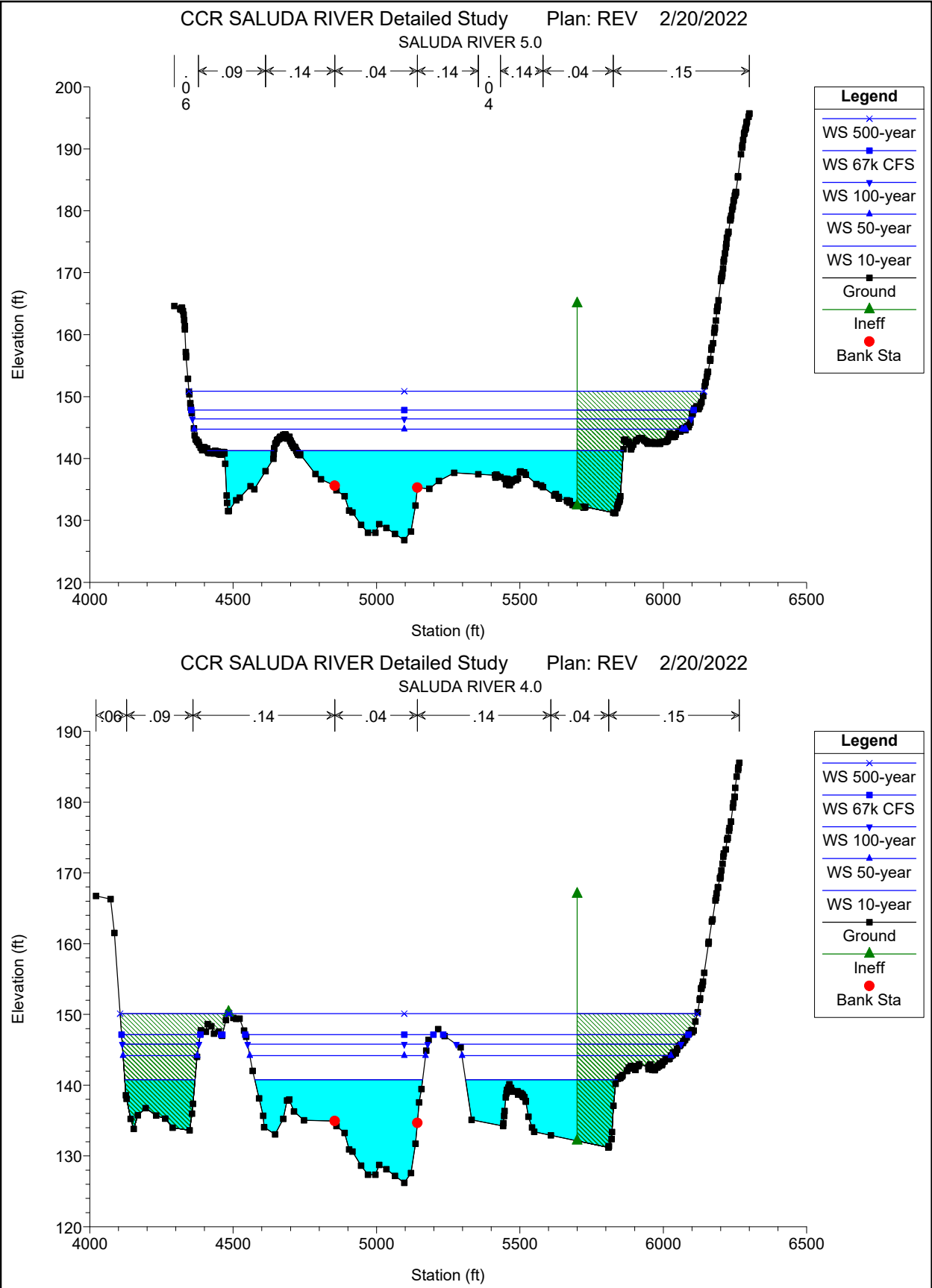






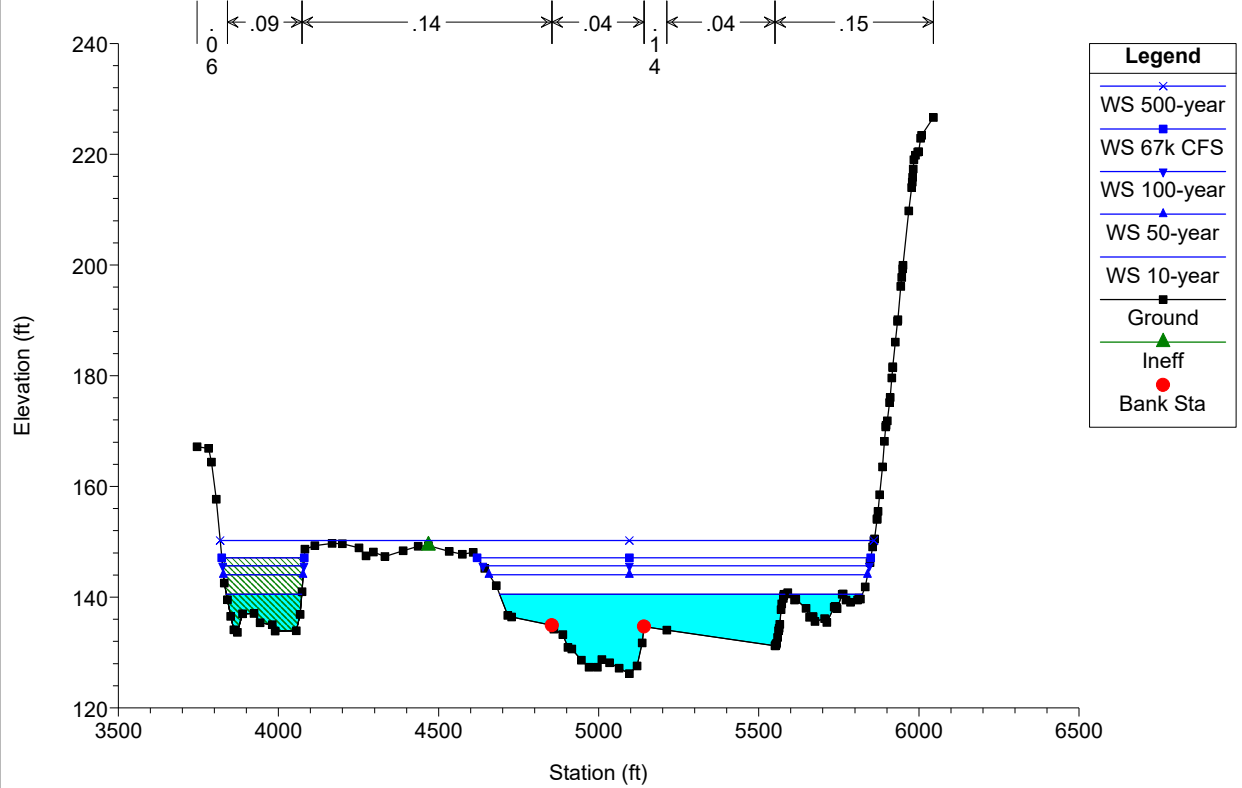






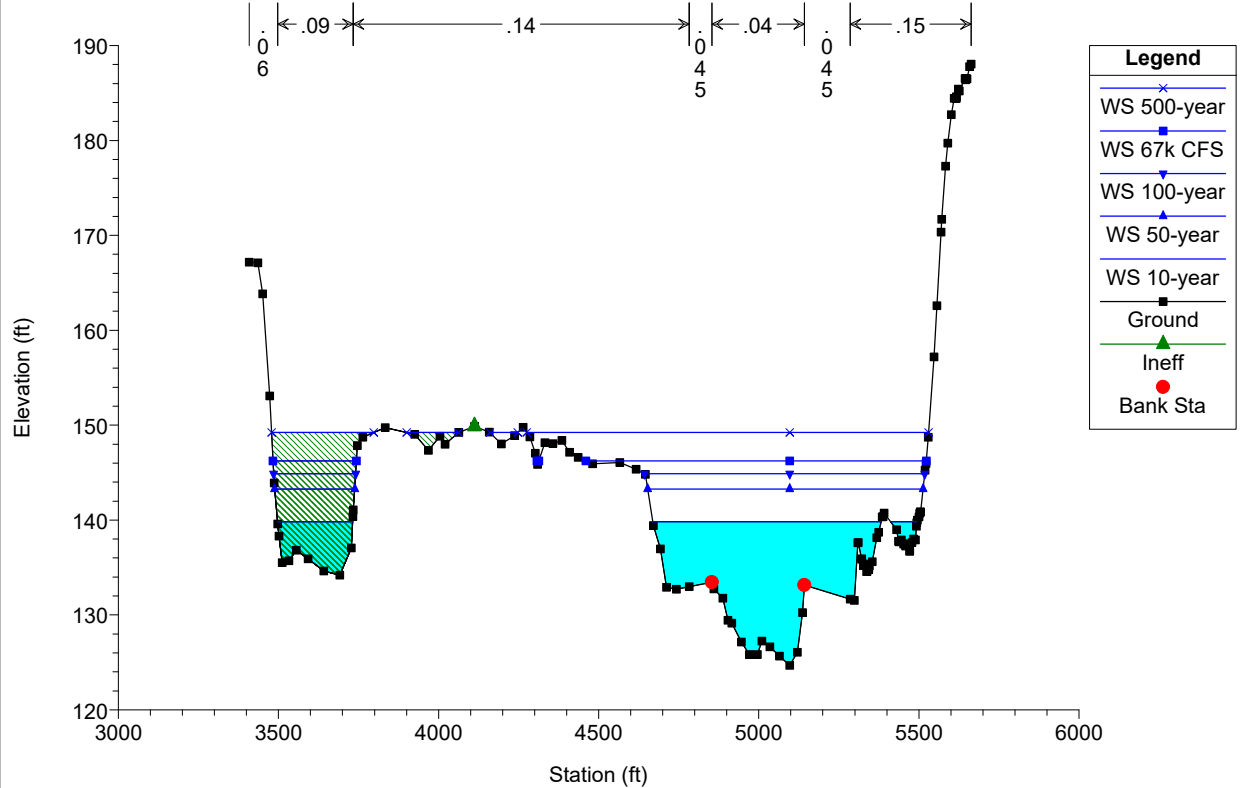
CCR SALUDA RIVER Detailed Study Plan: REV 2/20/2022

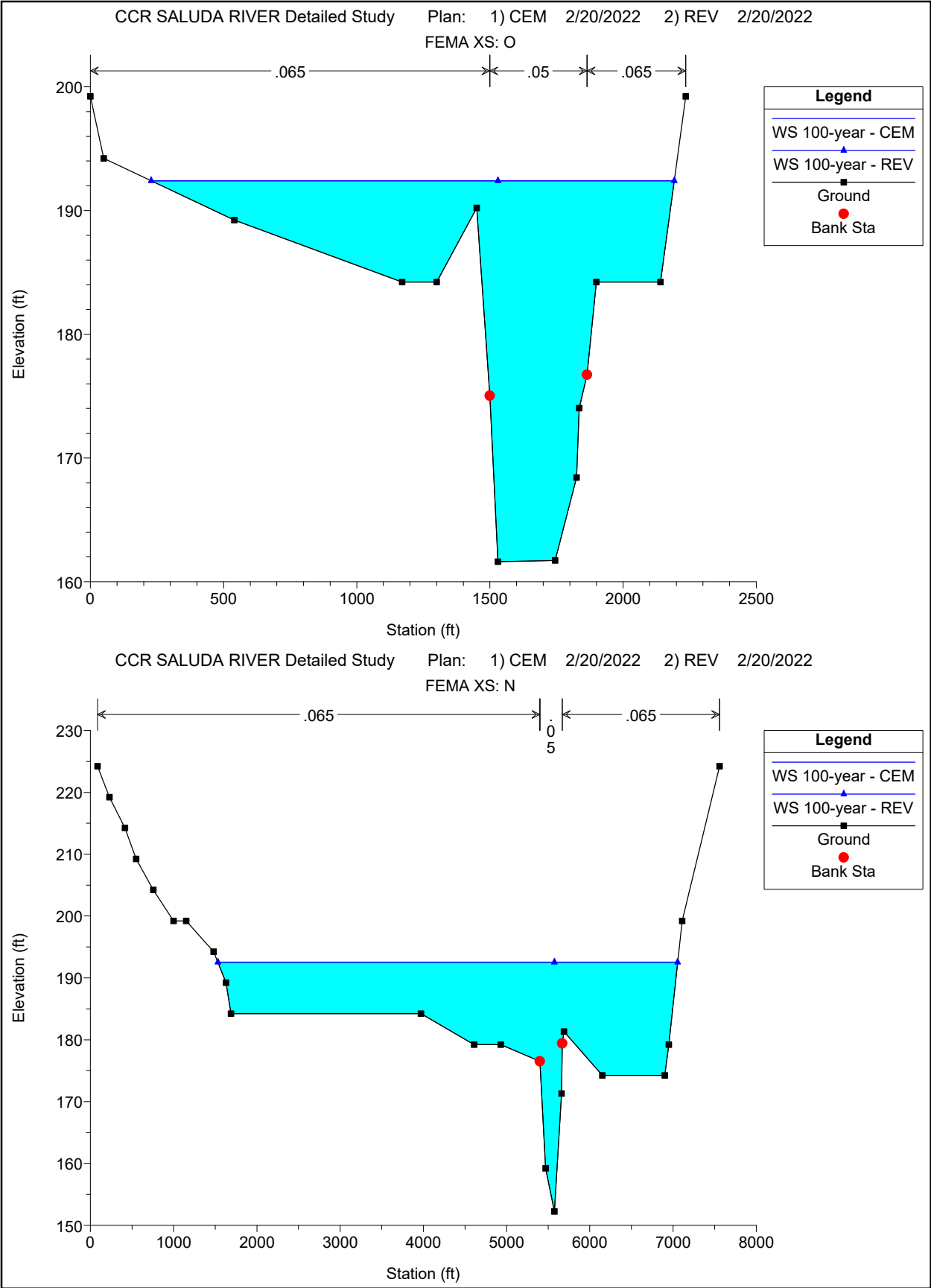
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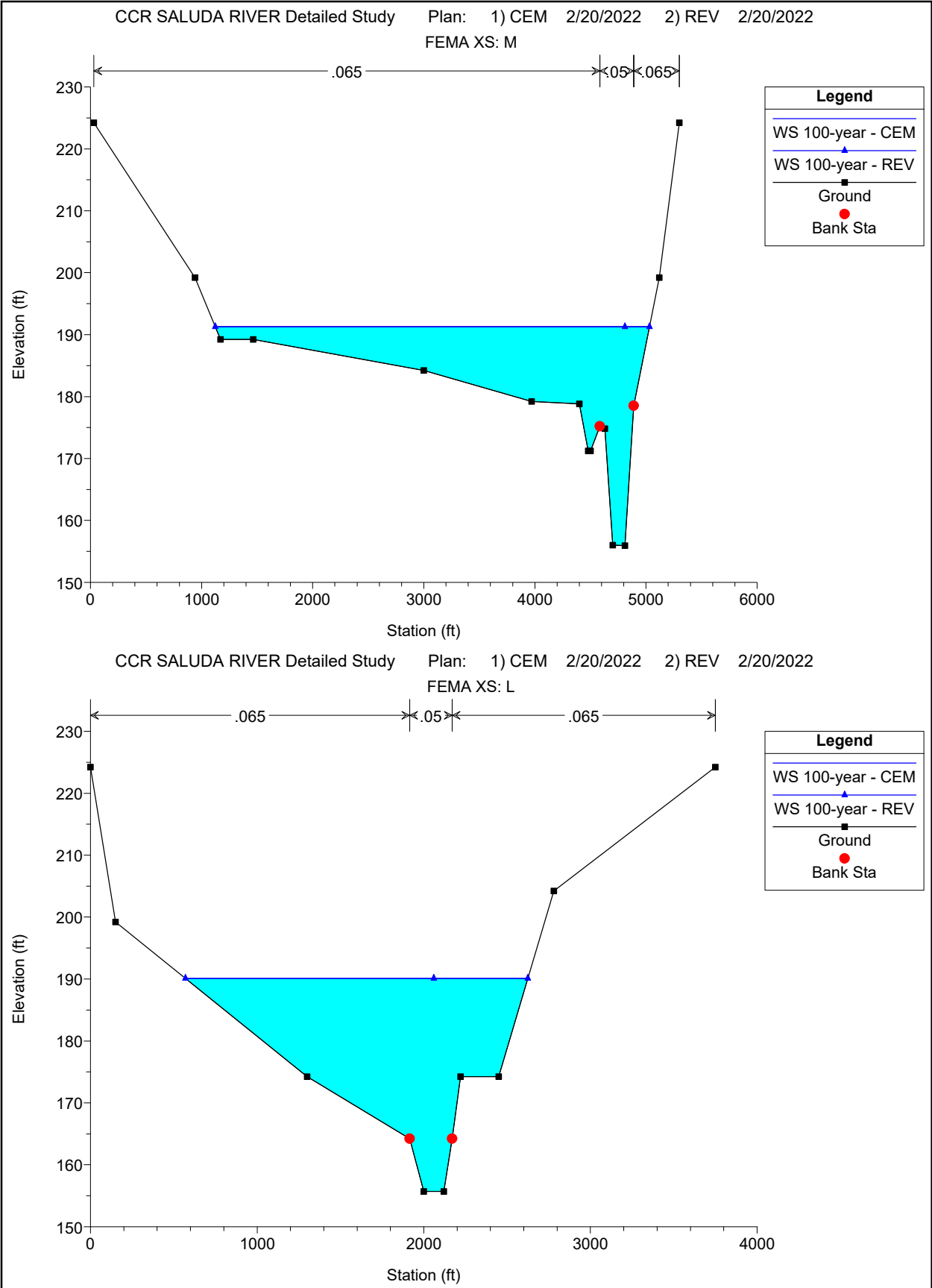


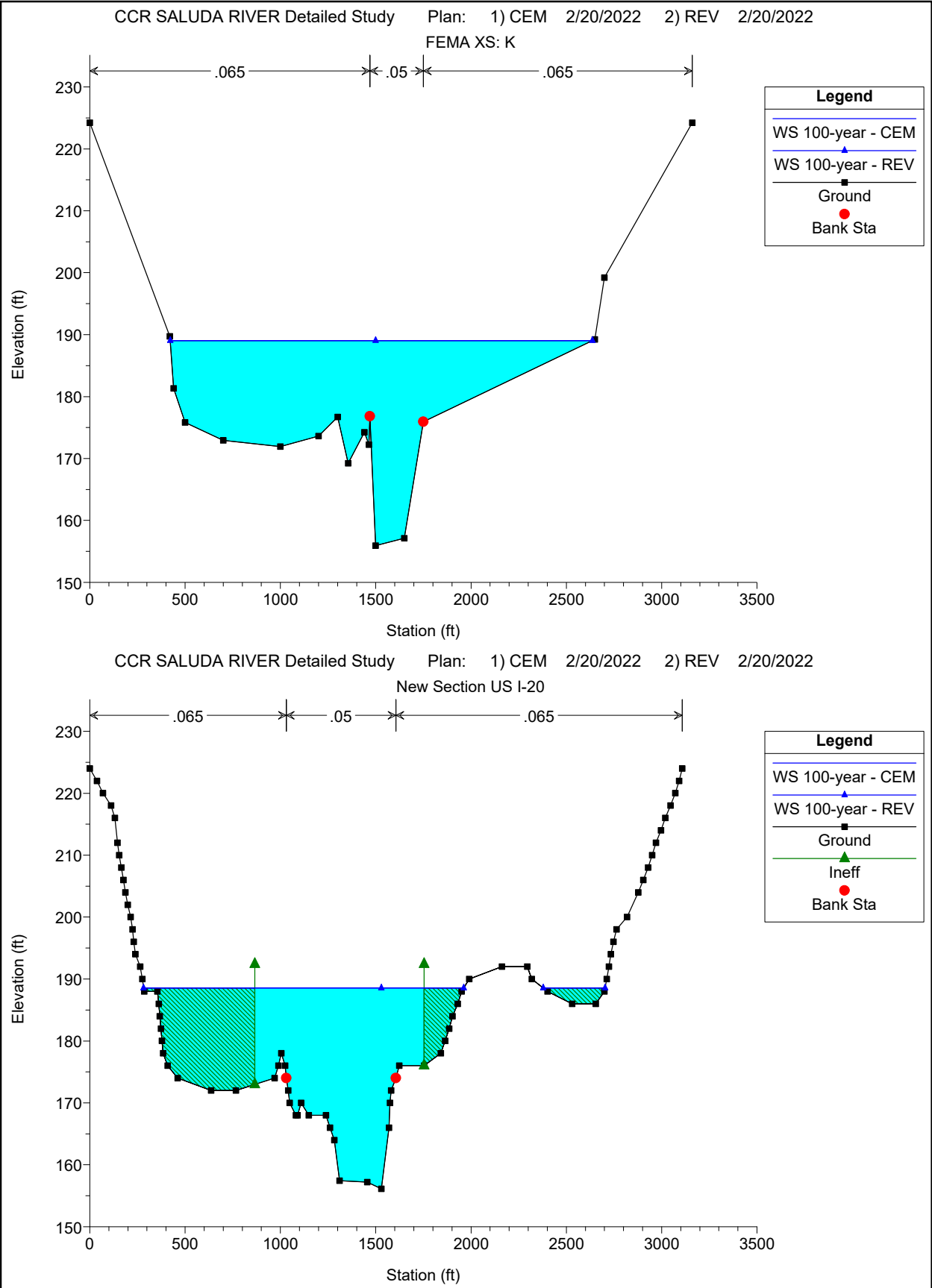
CCR SALUDA RIVER Detailed Study Plan: REV 2/20/2022

SALUDA RIVER 2.0

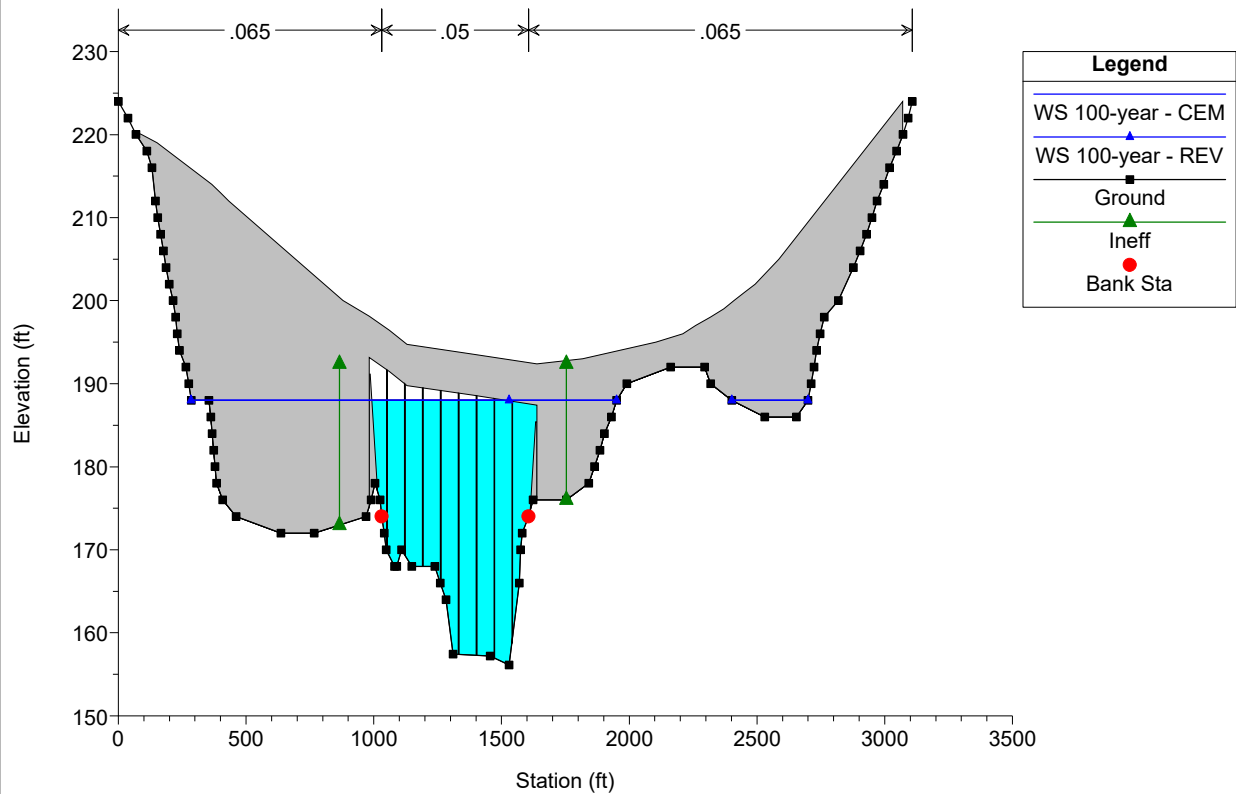






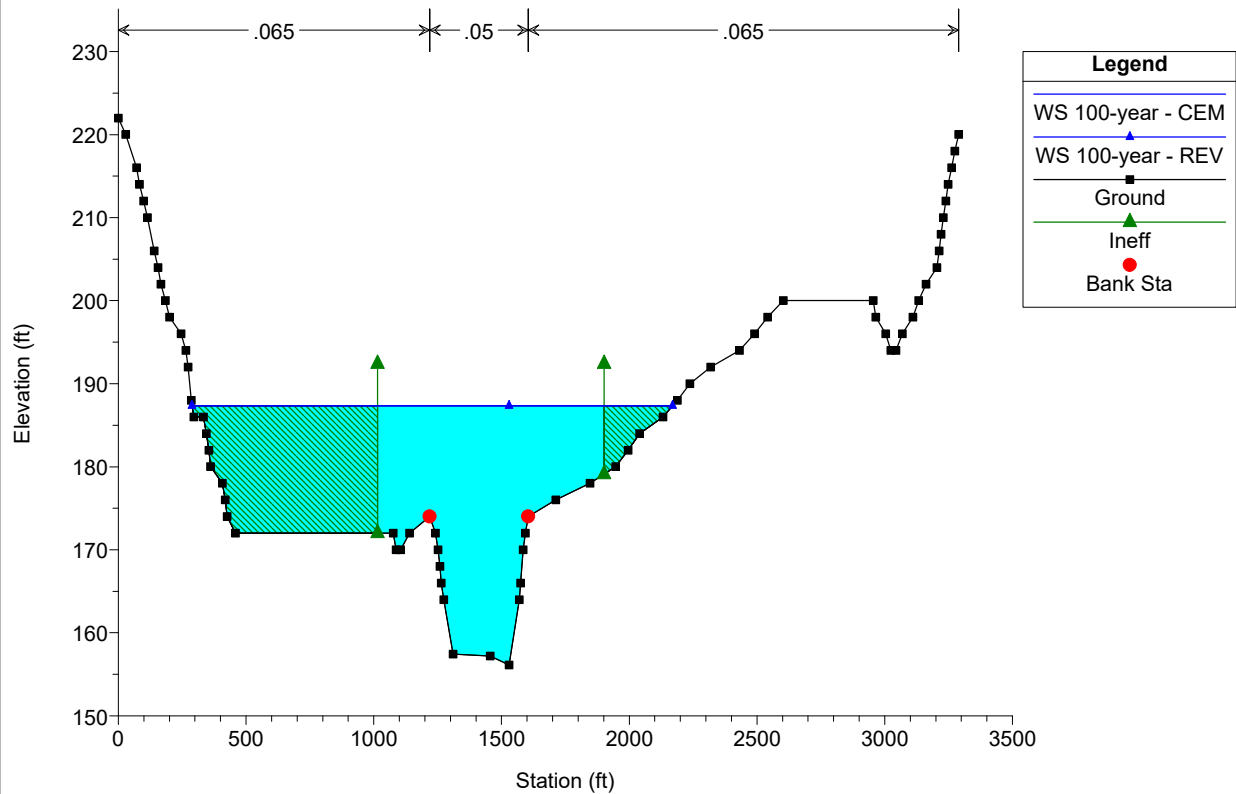


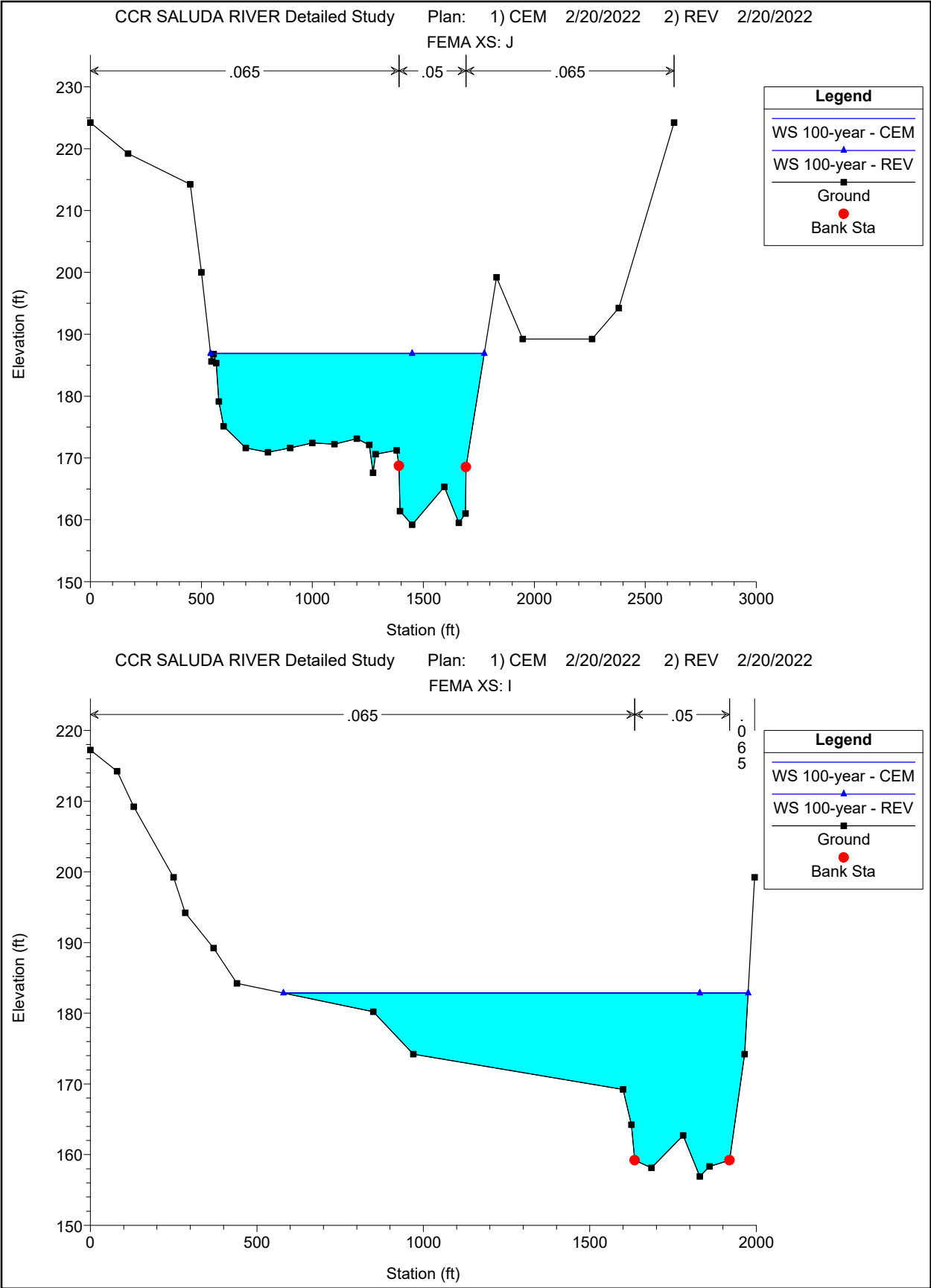
CCR SALUDA RIVER Detailed Study Plan: 1) CEM 2/20/2022 2) REV 2/20/2022



CCR SALUDA RIVER Detailed Study Plan: 1) CEM 2/20/2022 2) REV 2/20/2022

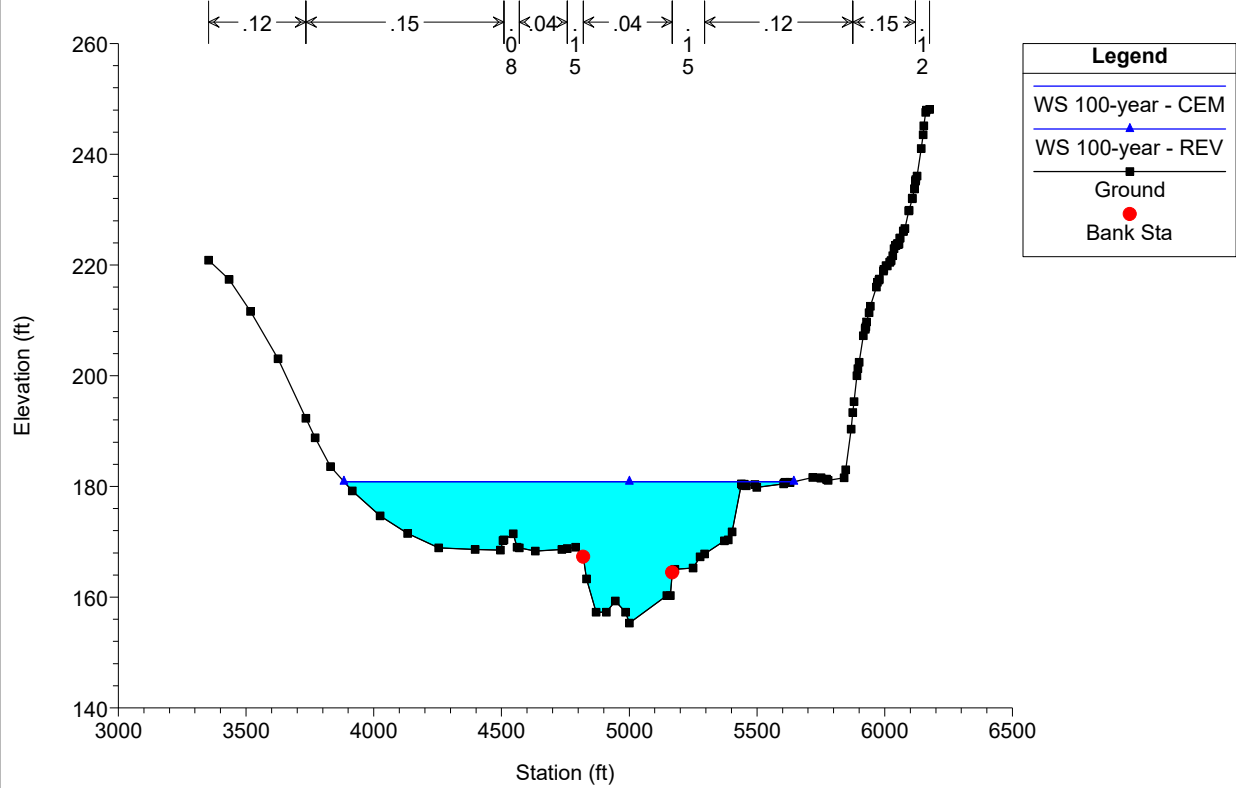
New Section DS of I-20





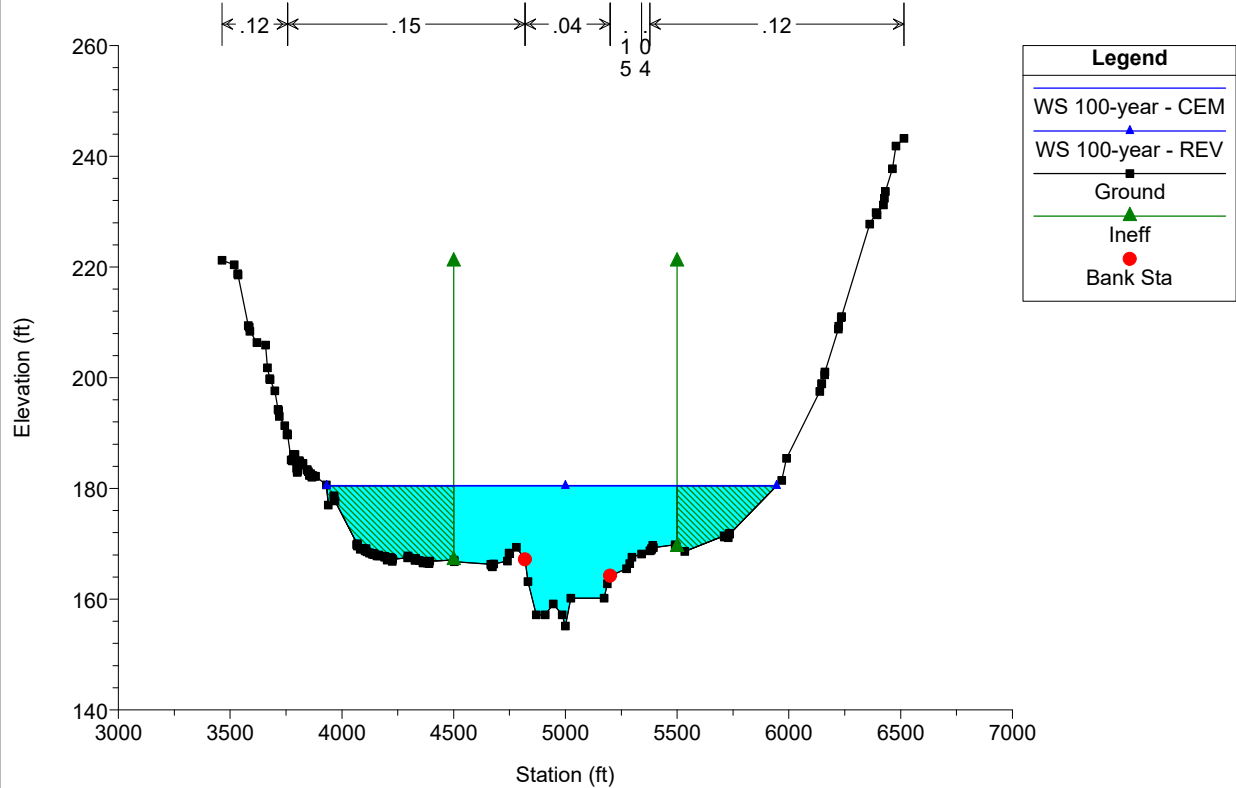
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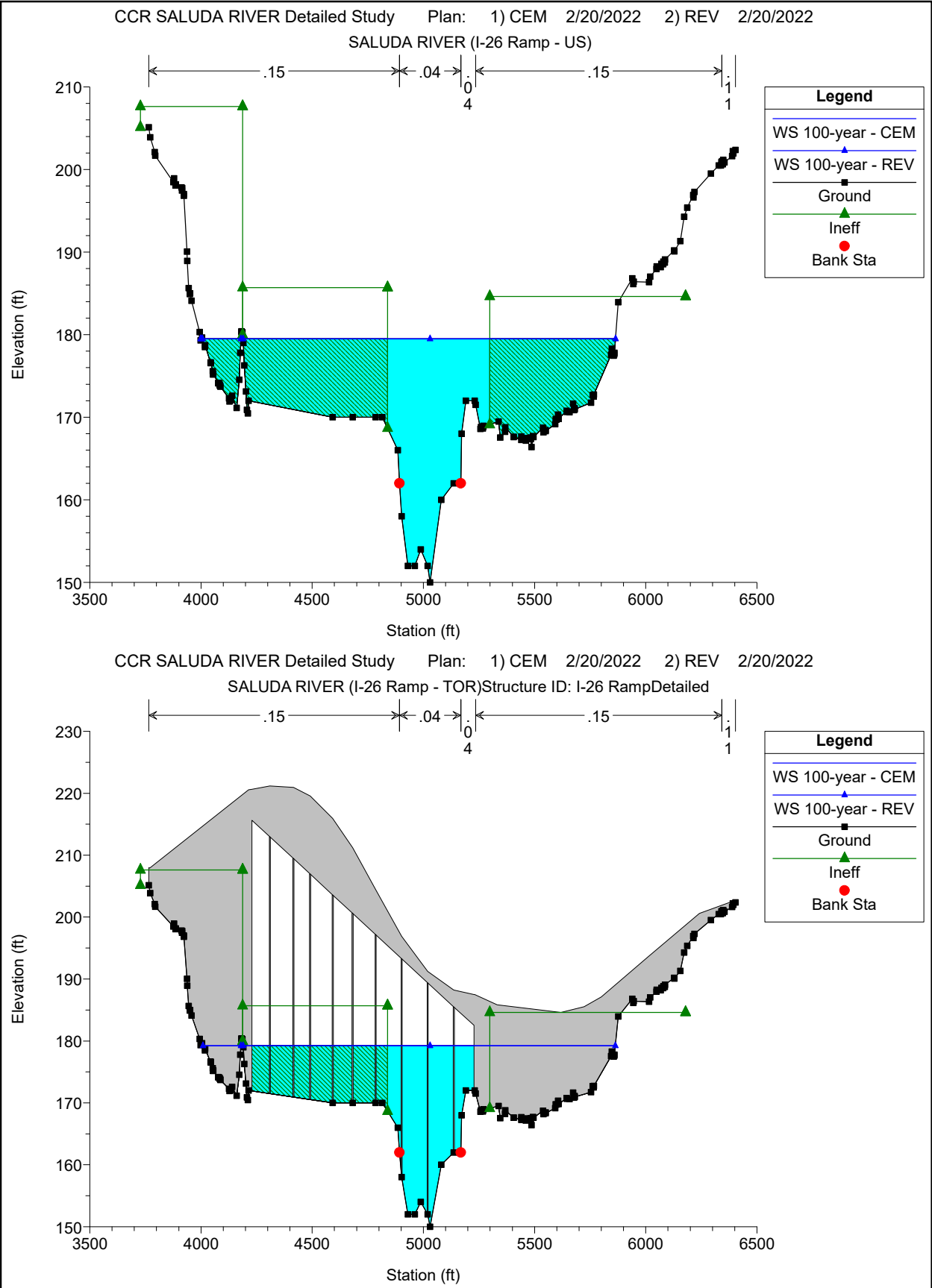
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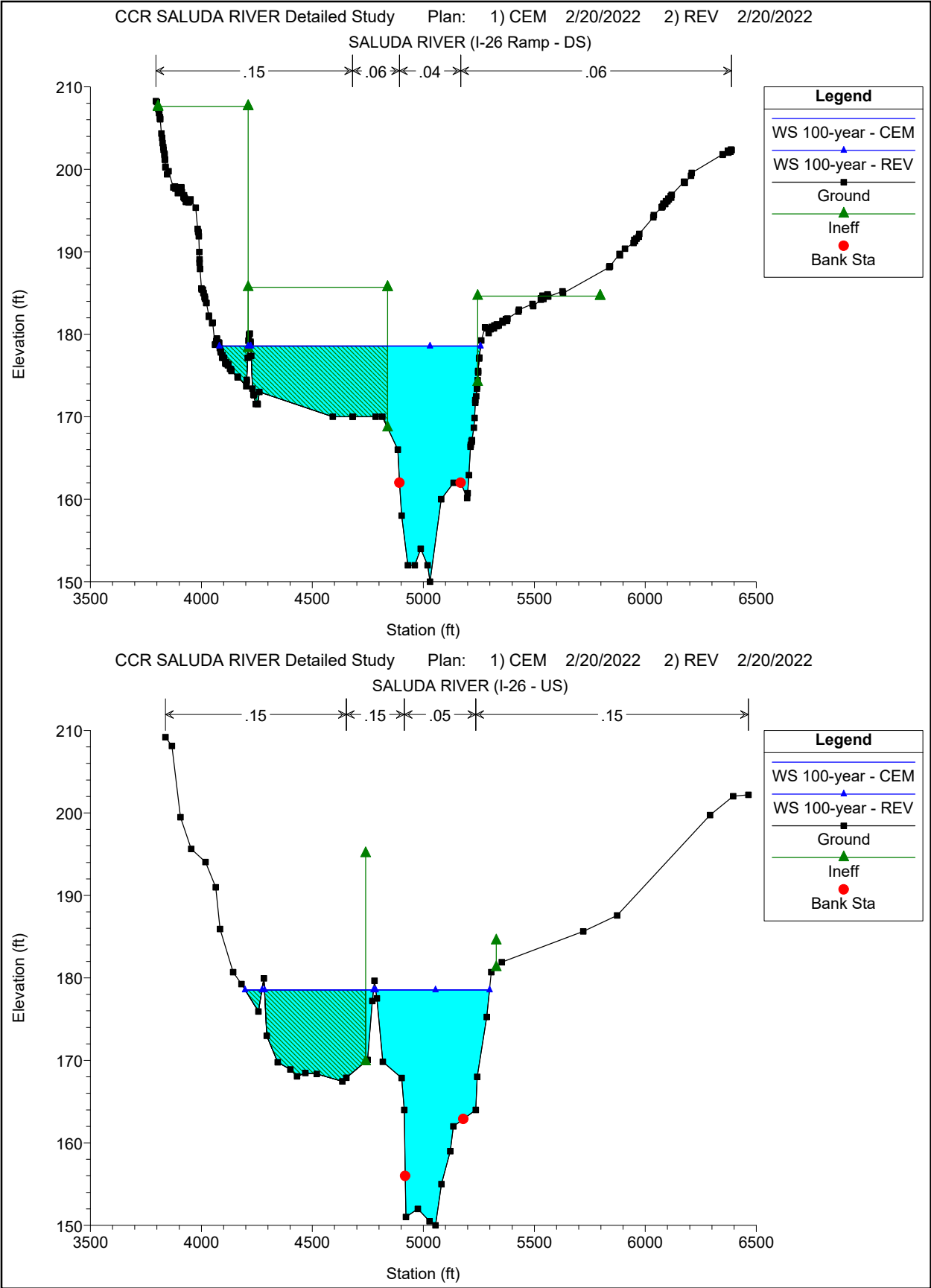


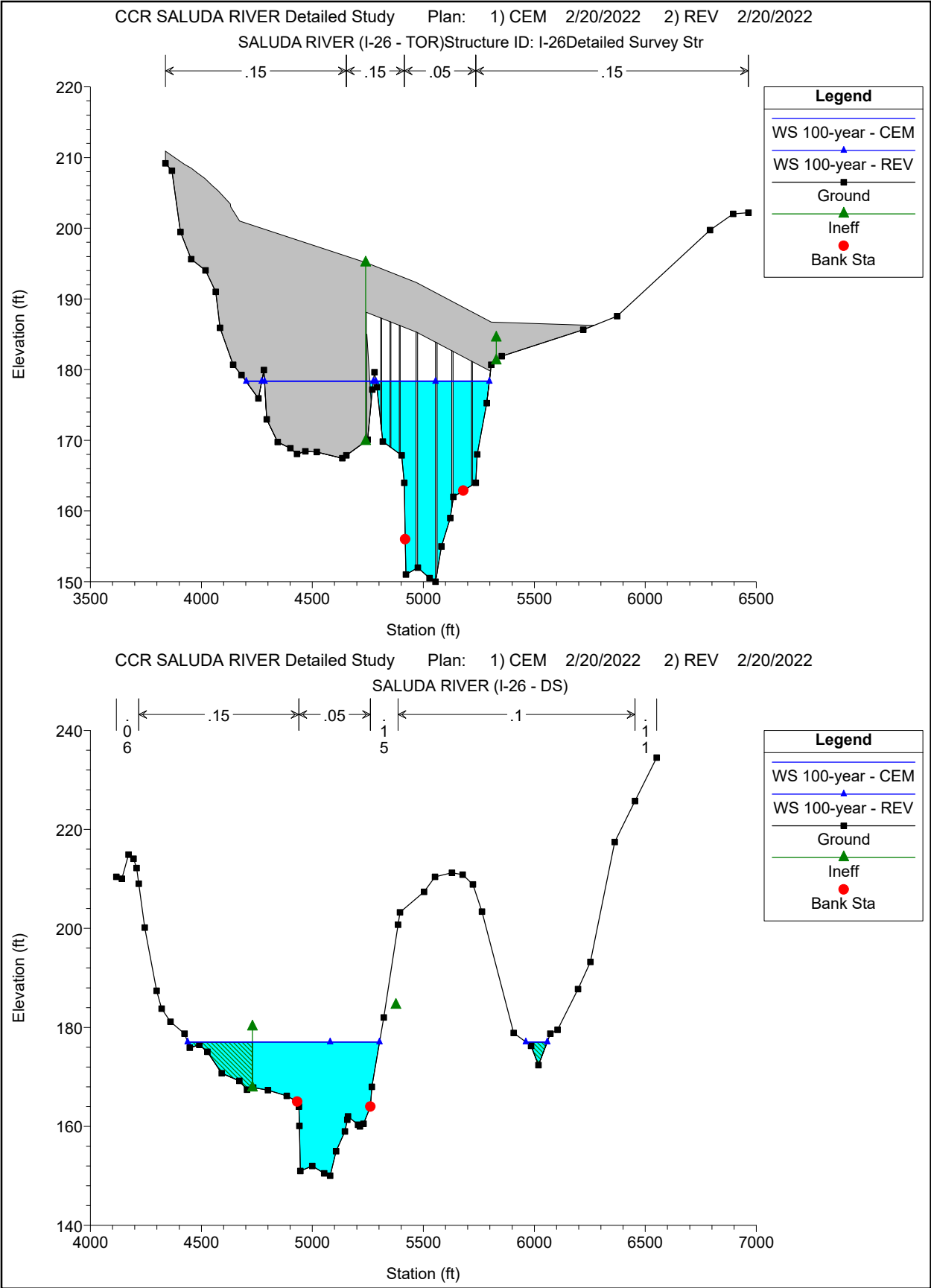
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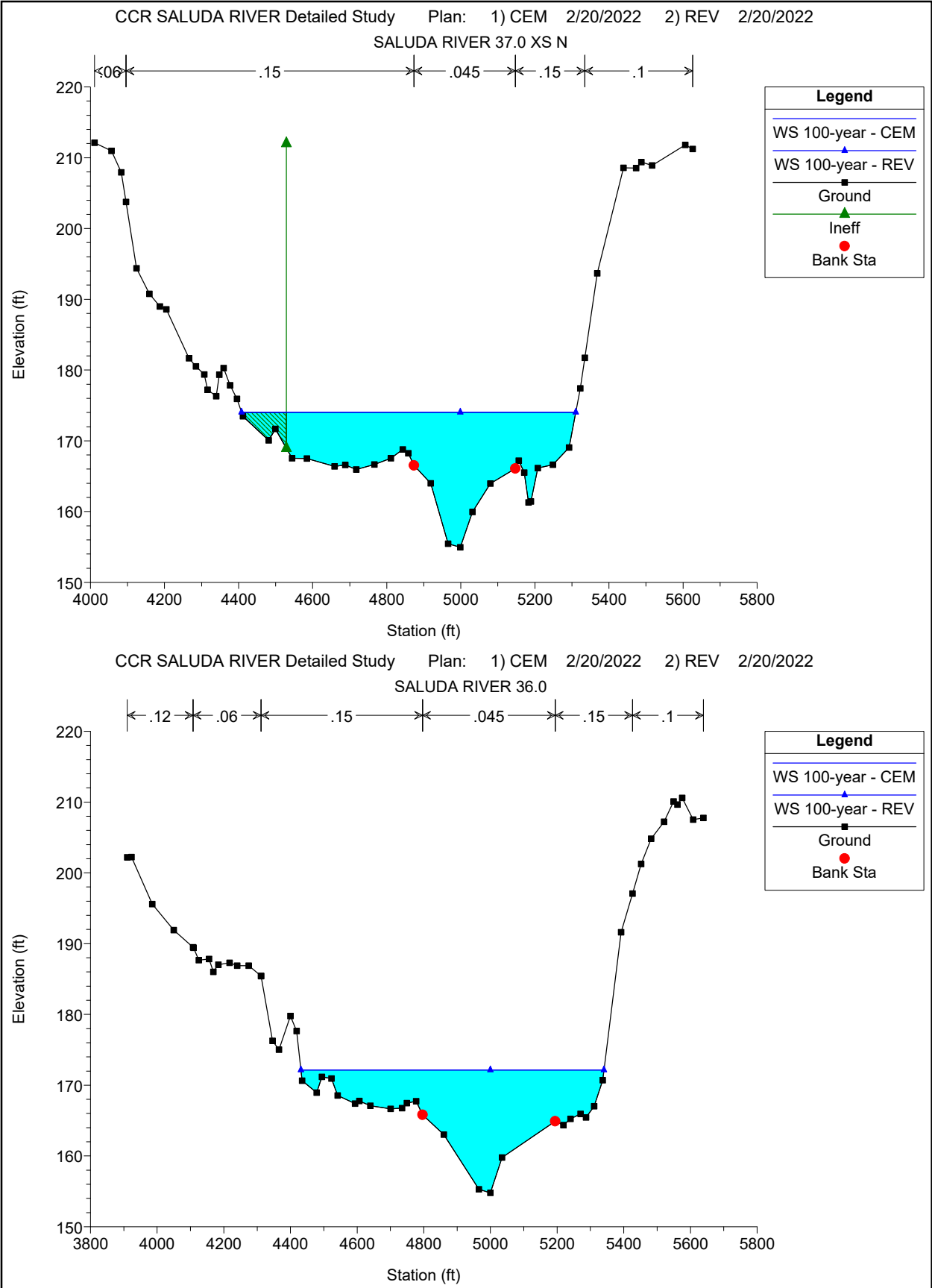
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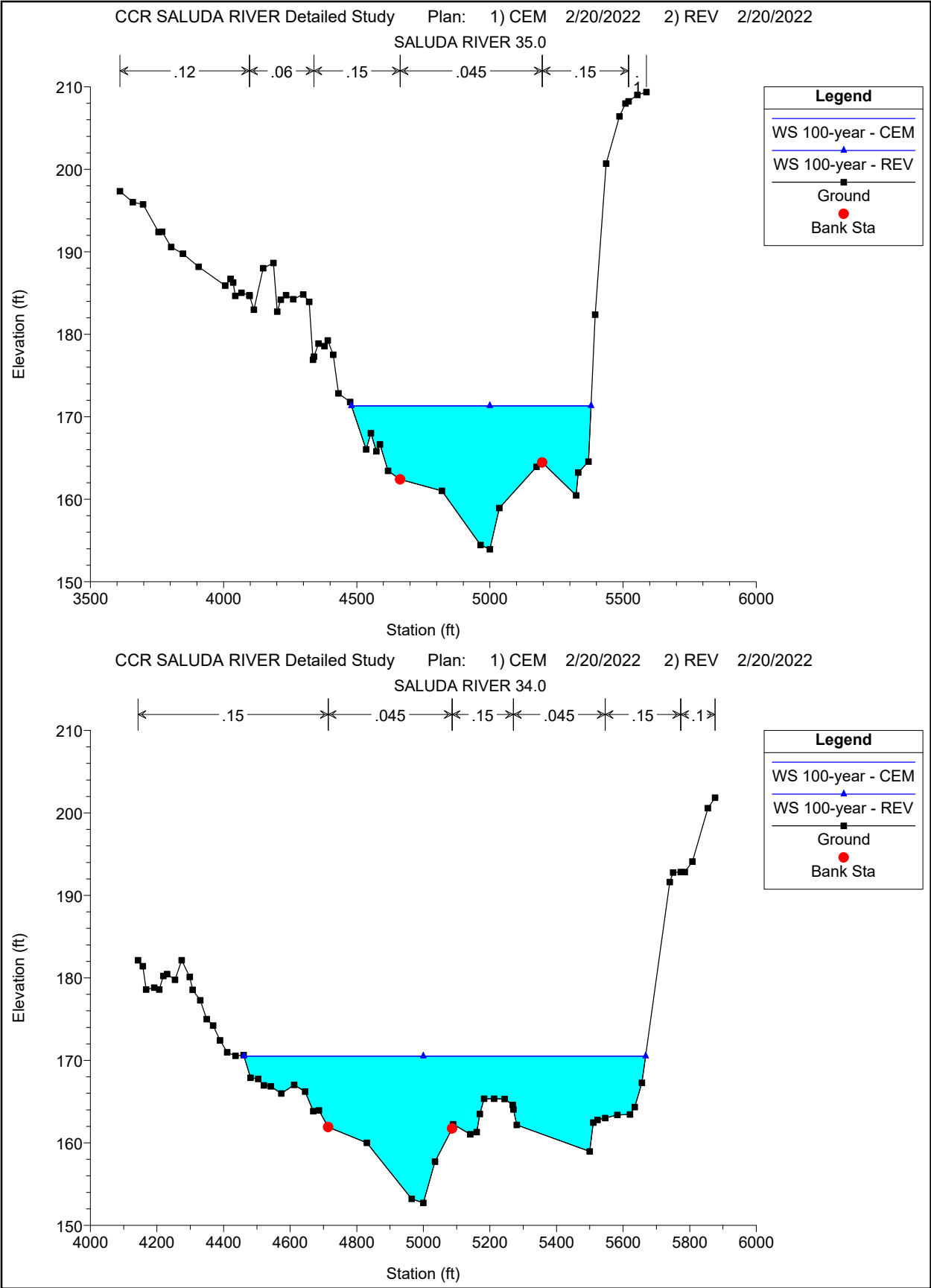




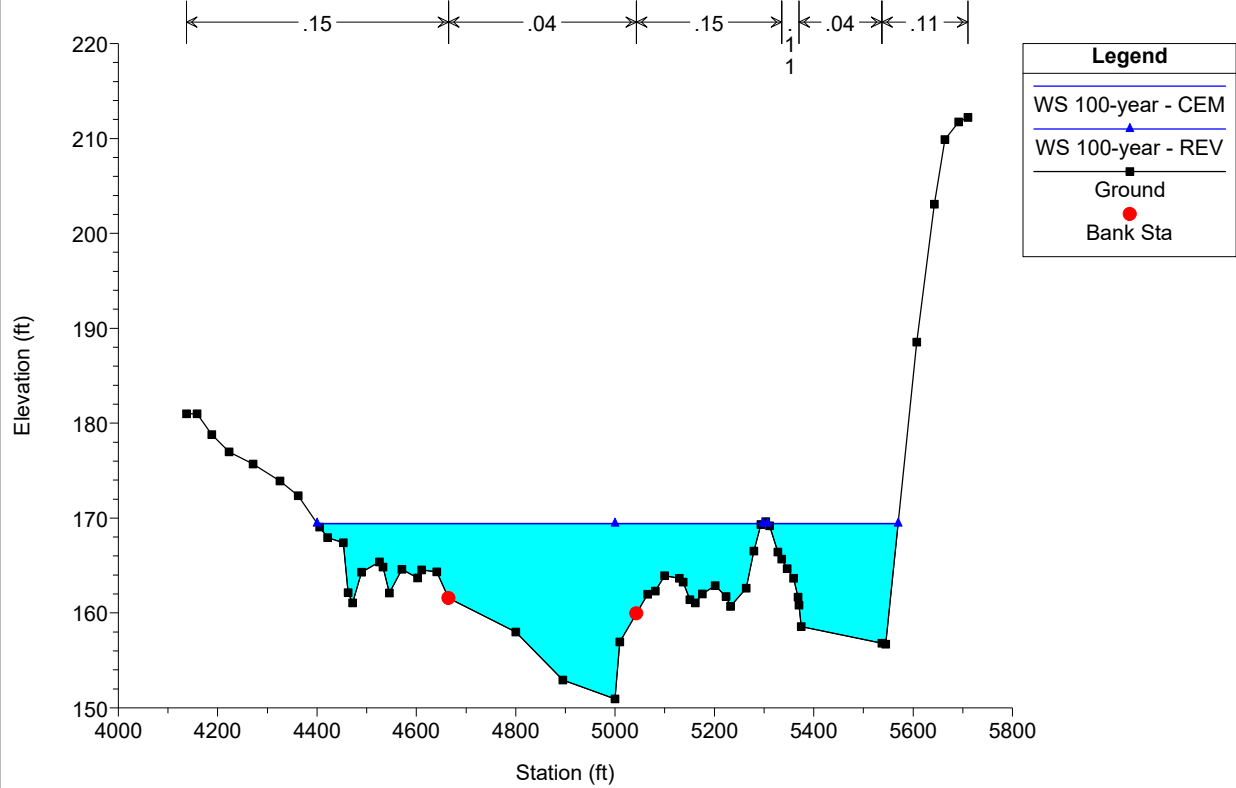




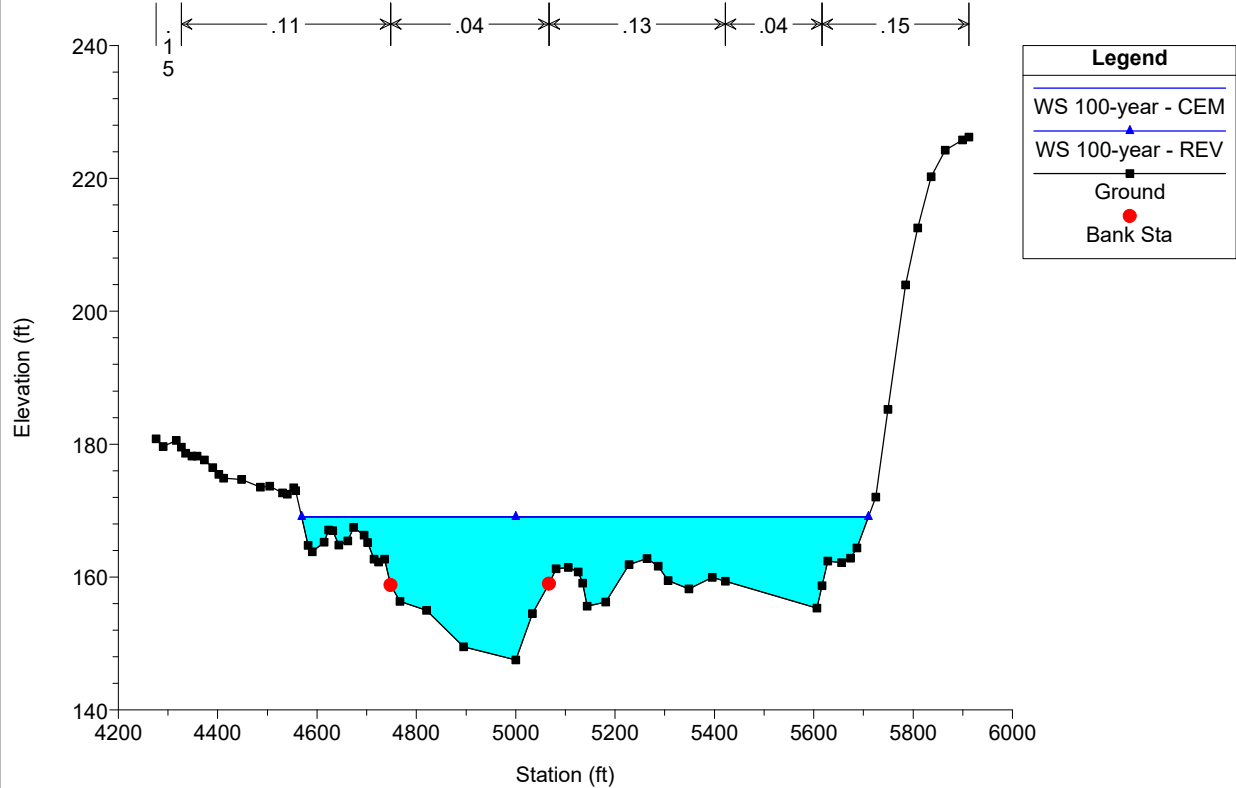




CCR SALUDA RIVER Detailed Study Plan: 1) CEM 2/20/2022 2) REV 2/20/2022
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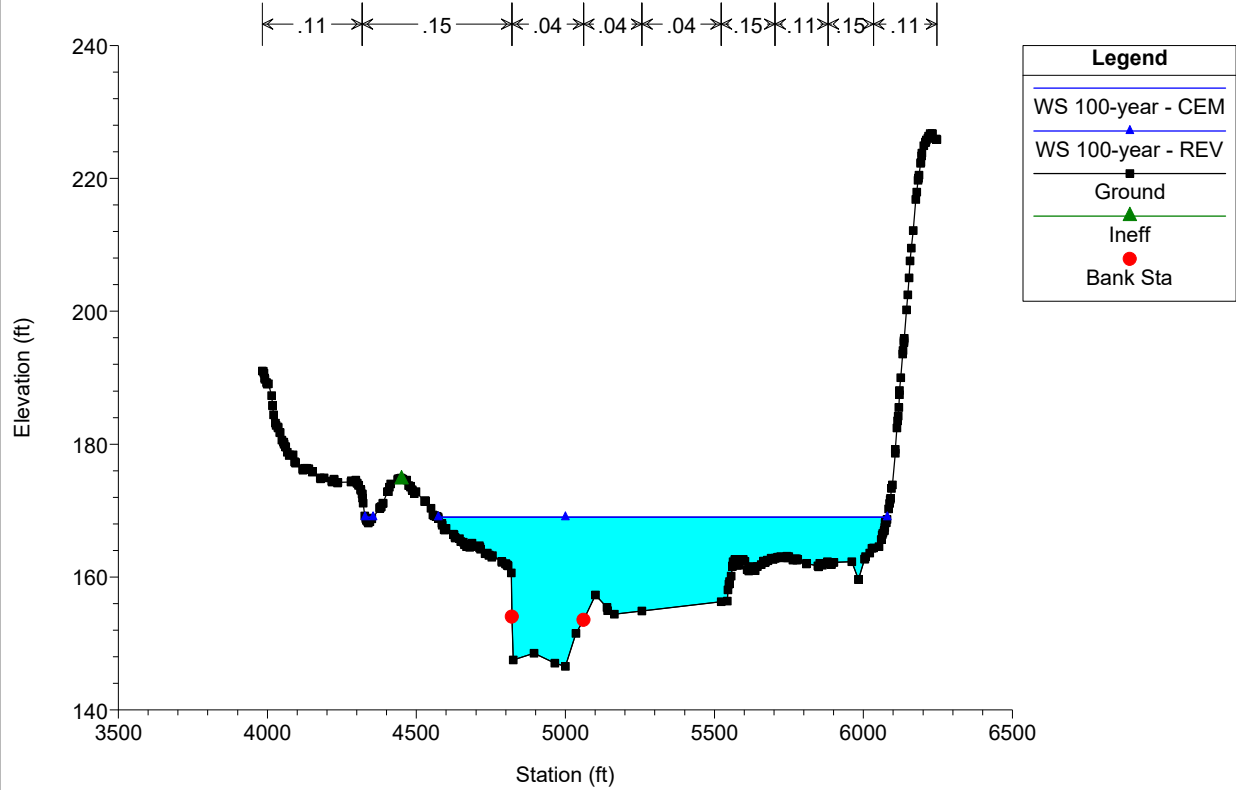


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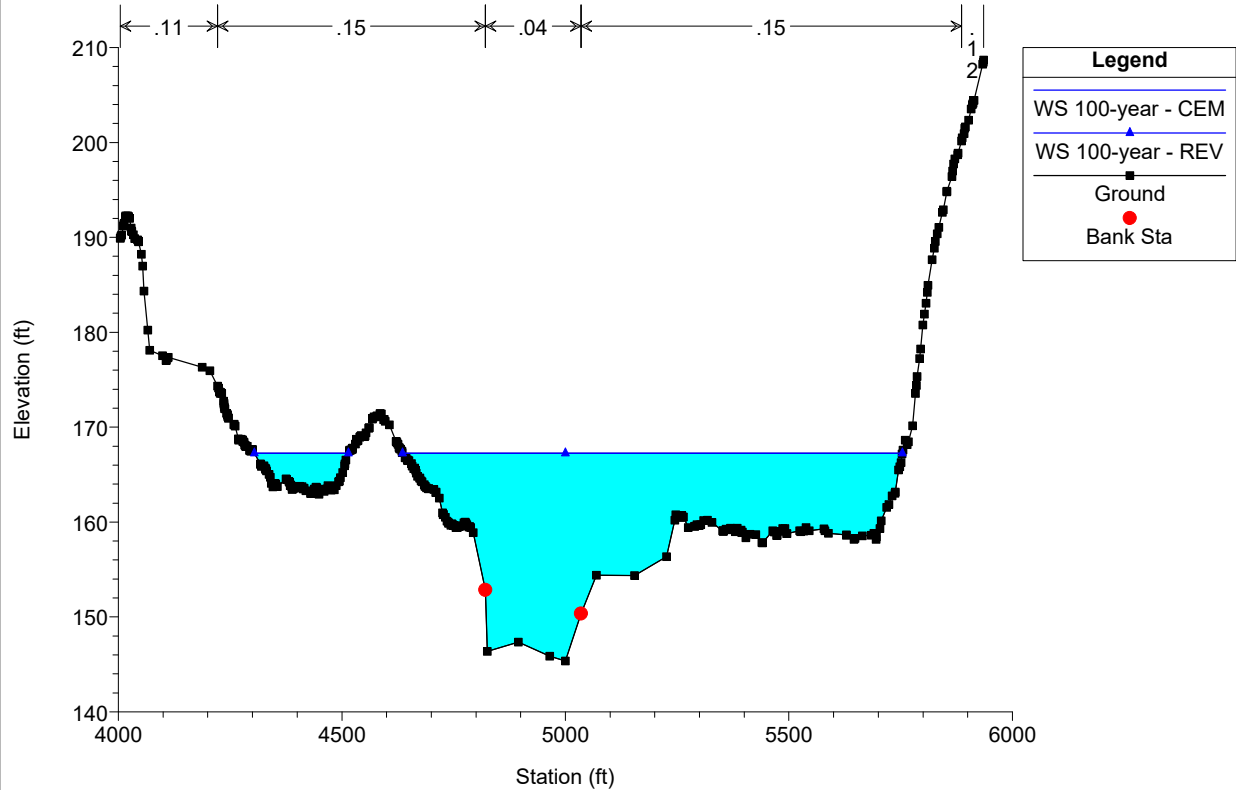
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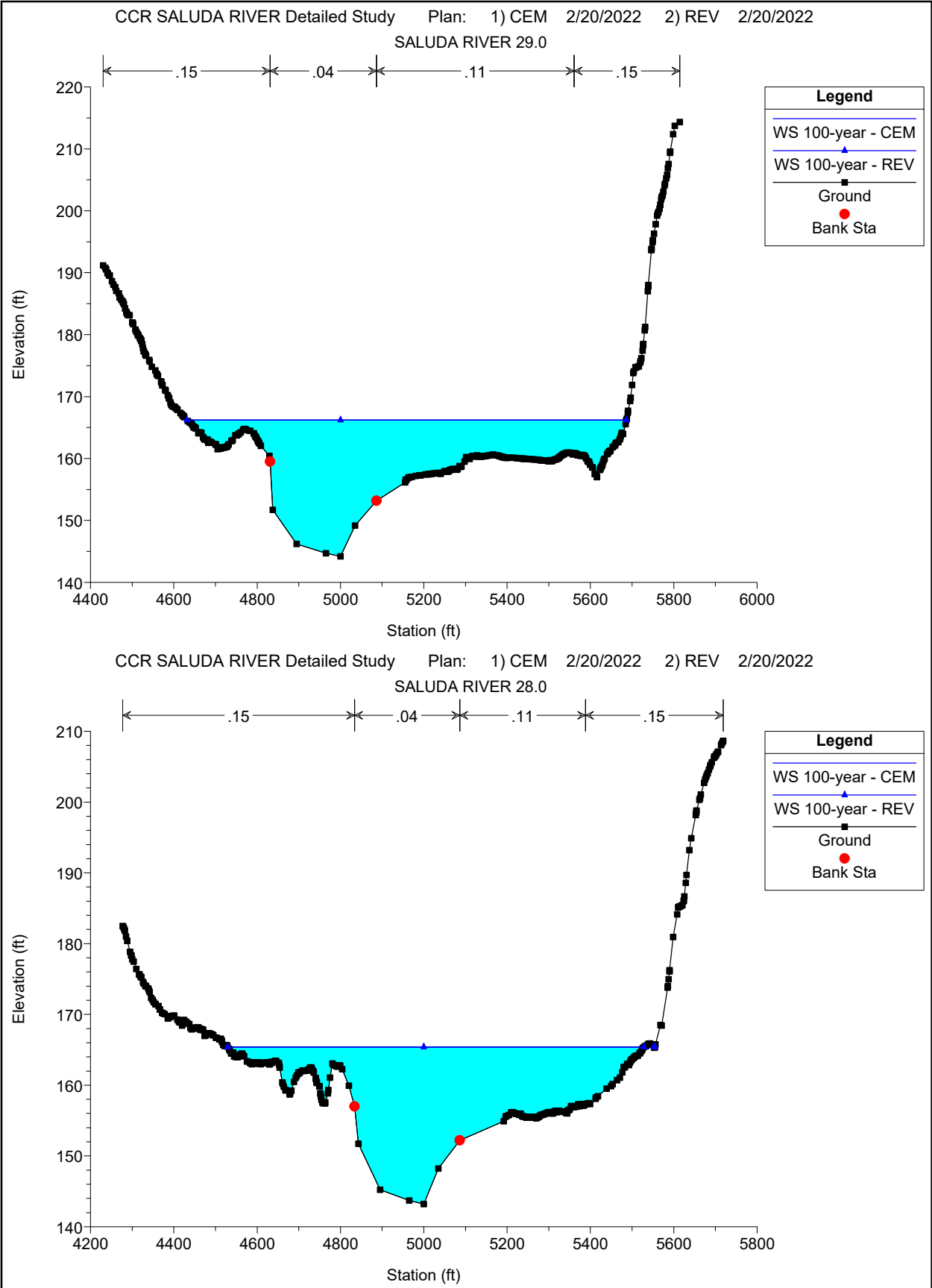
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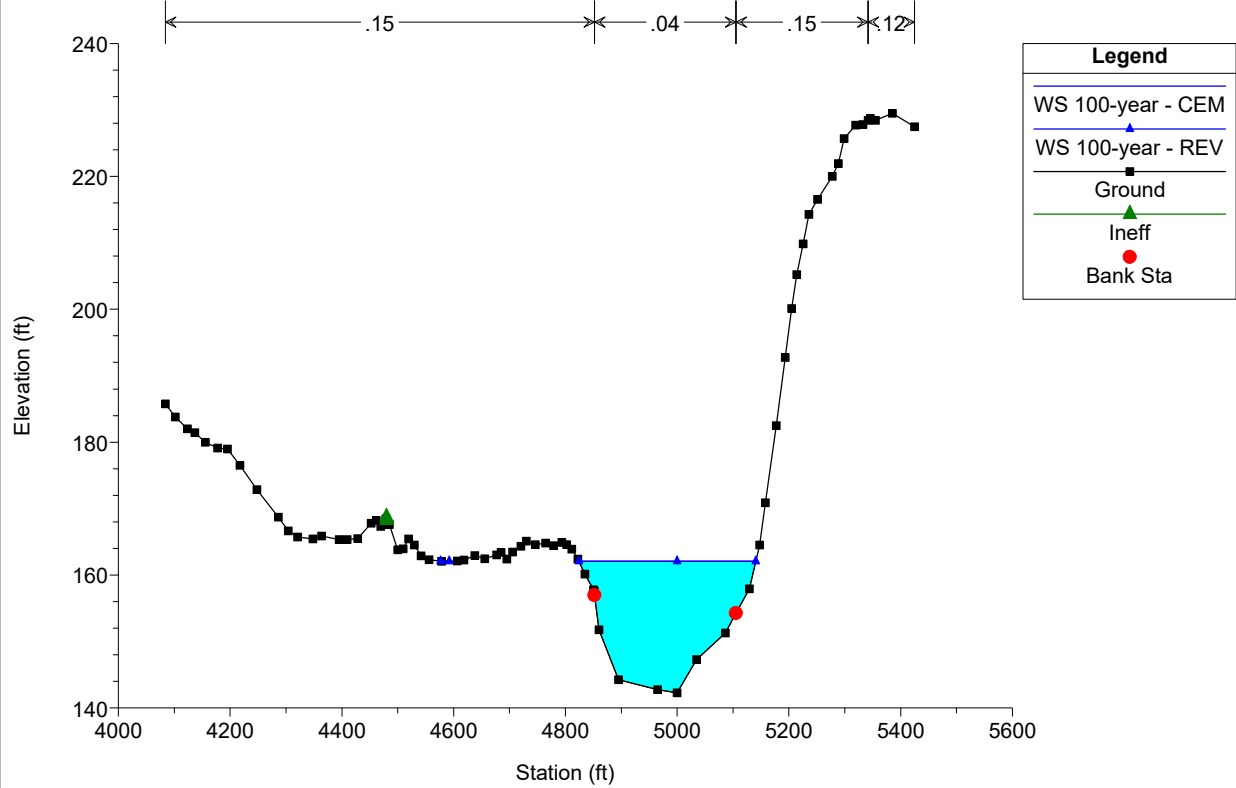
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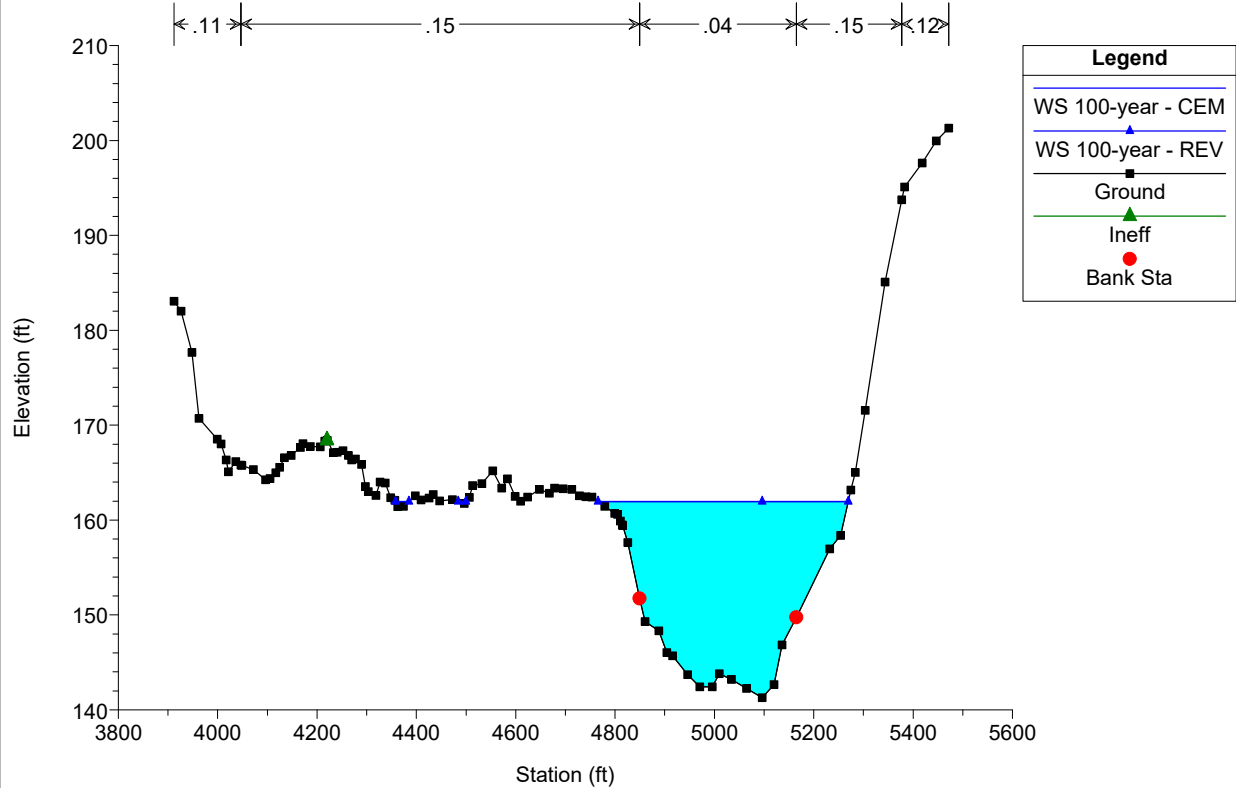


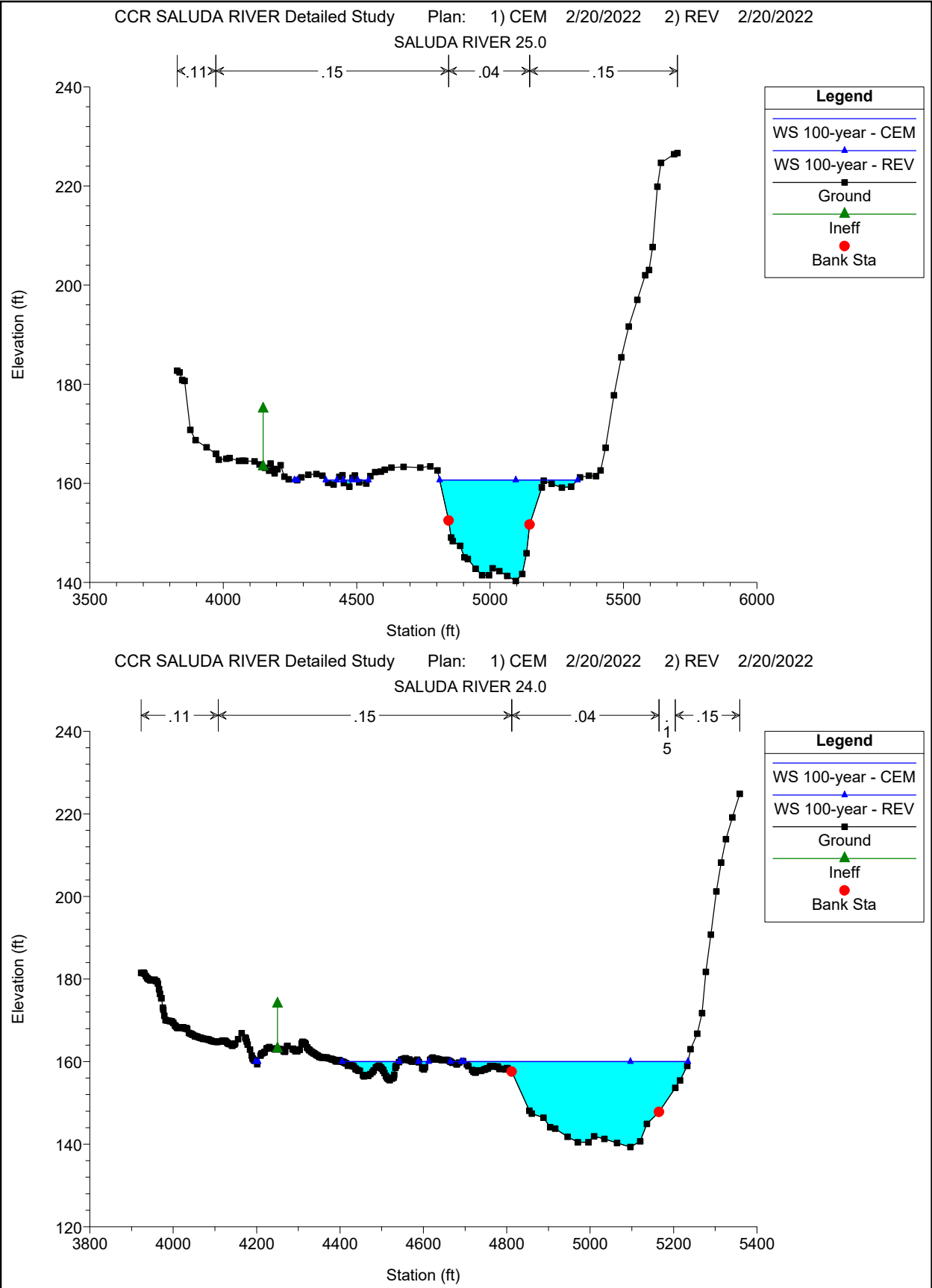


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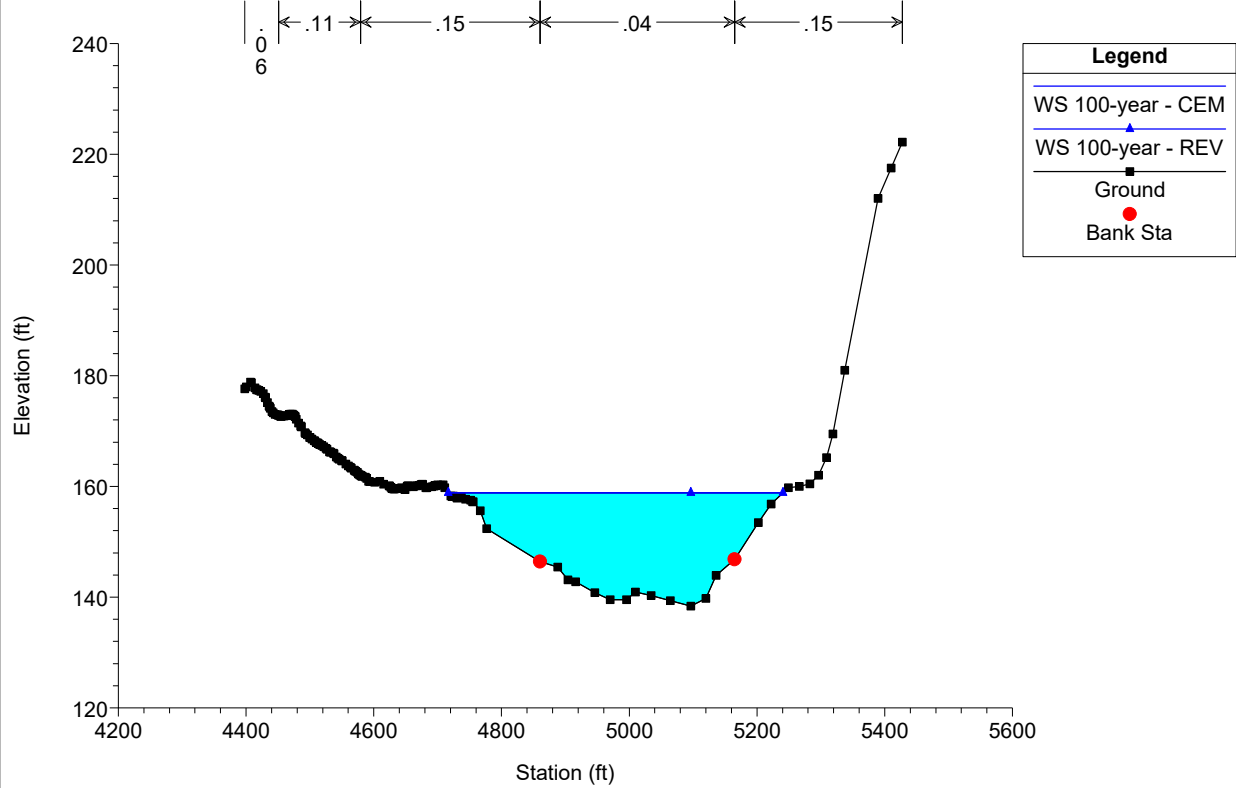
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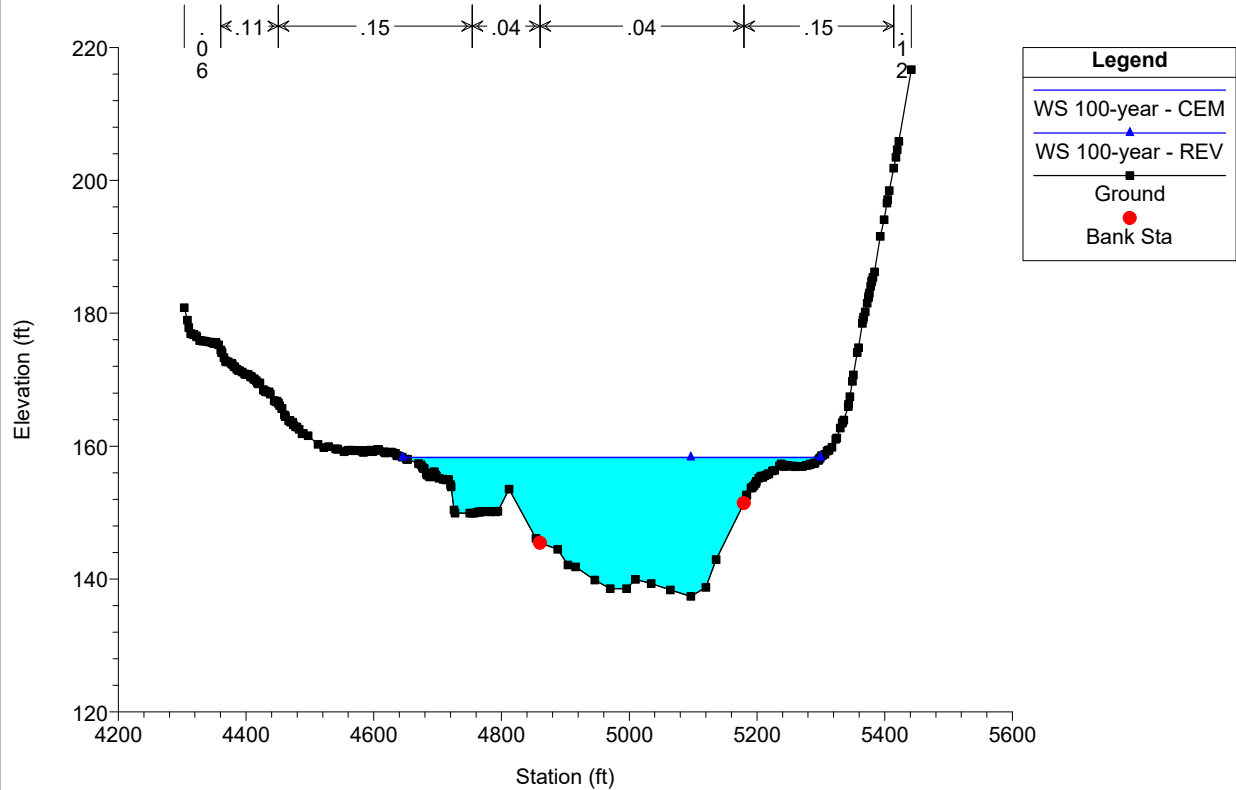
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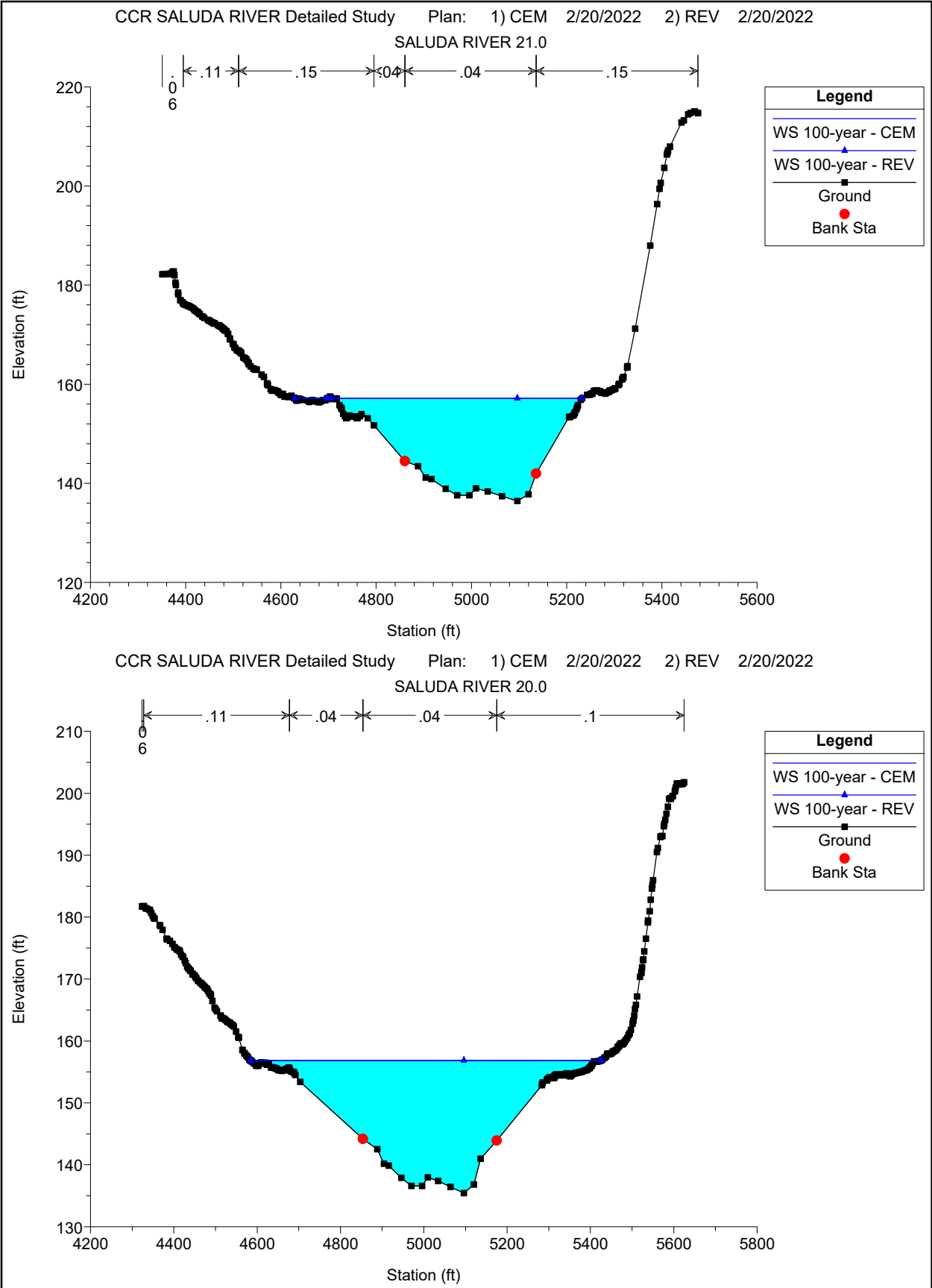
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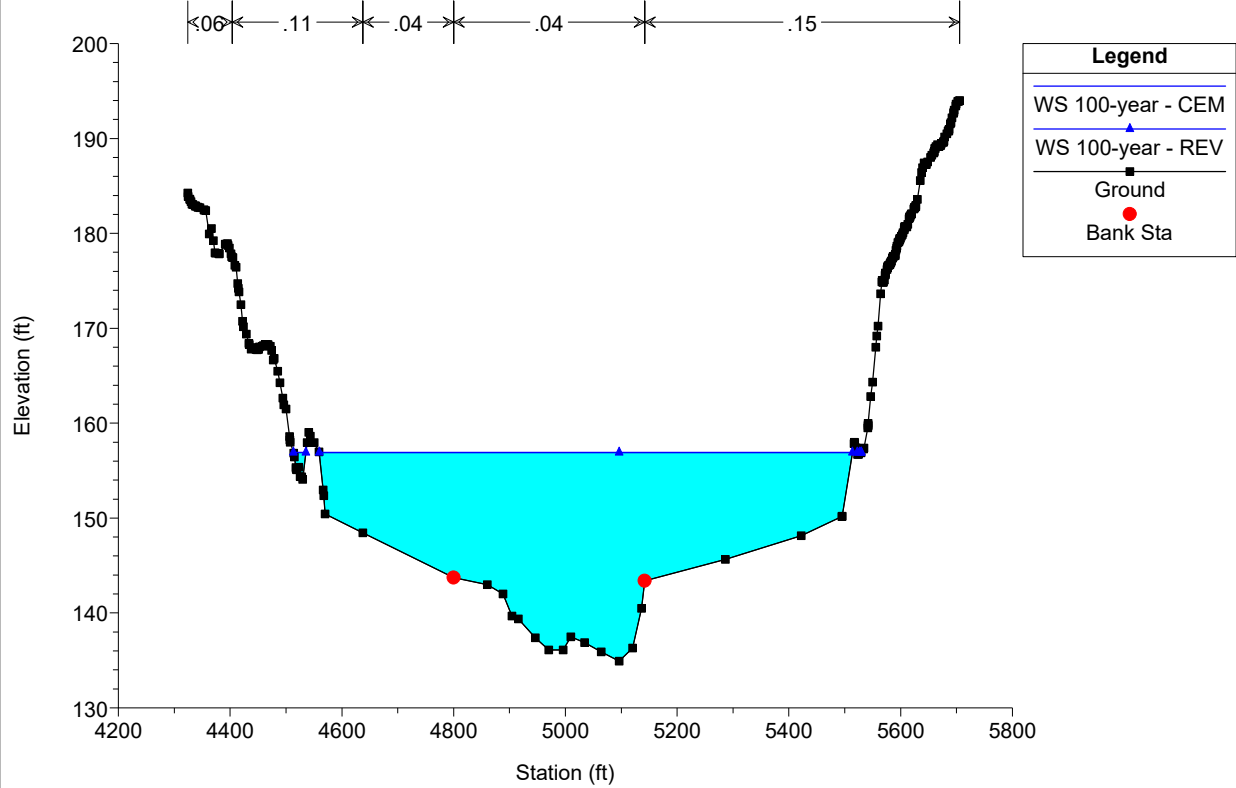
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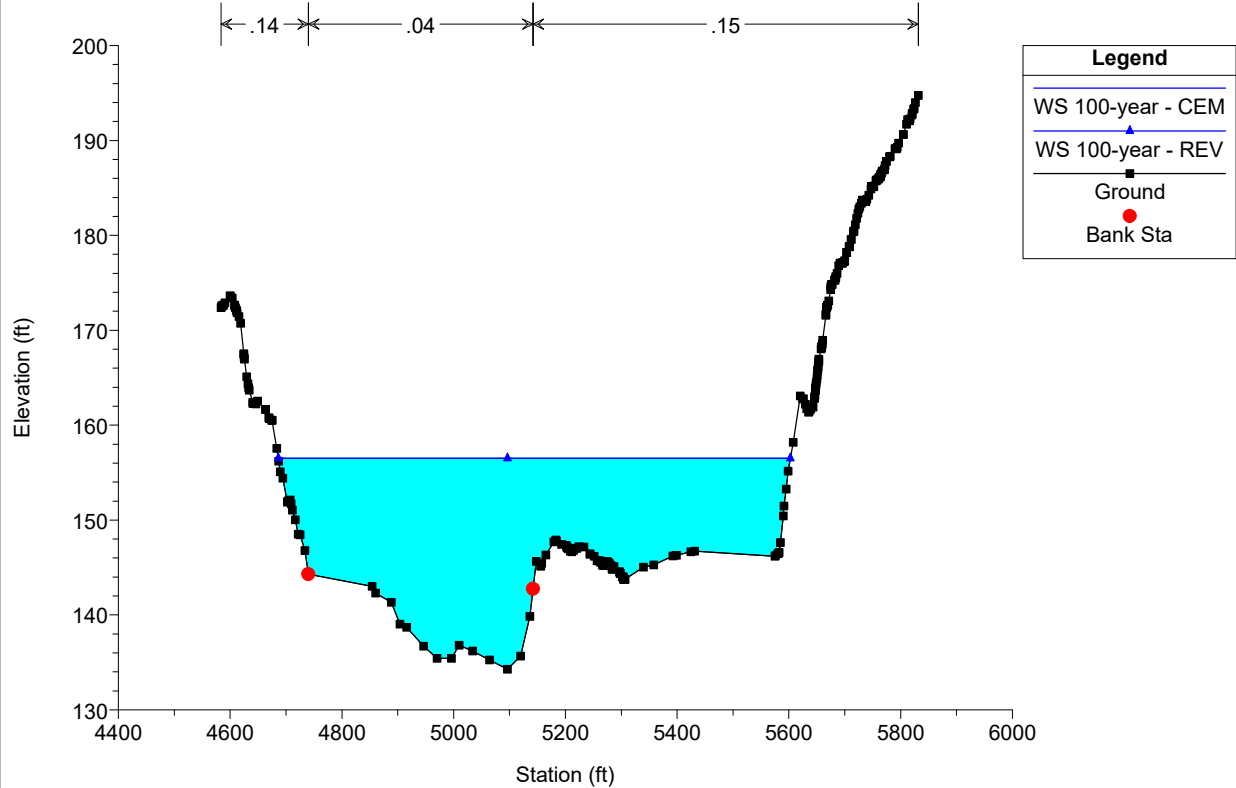
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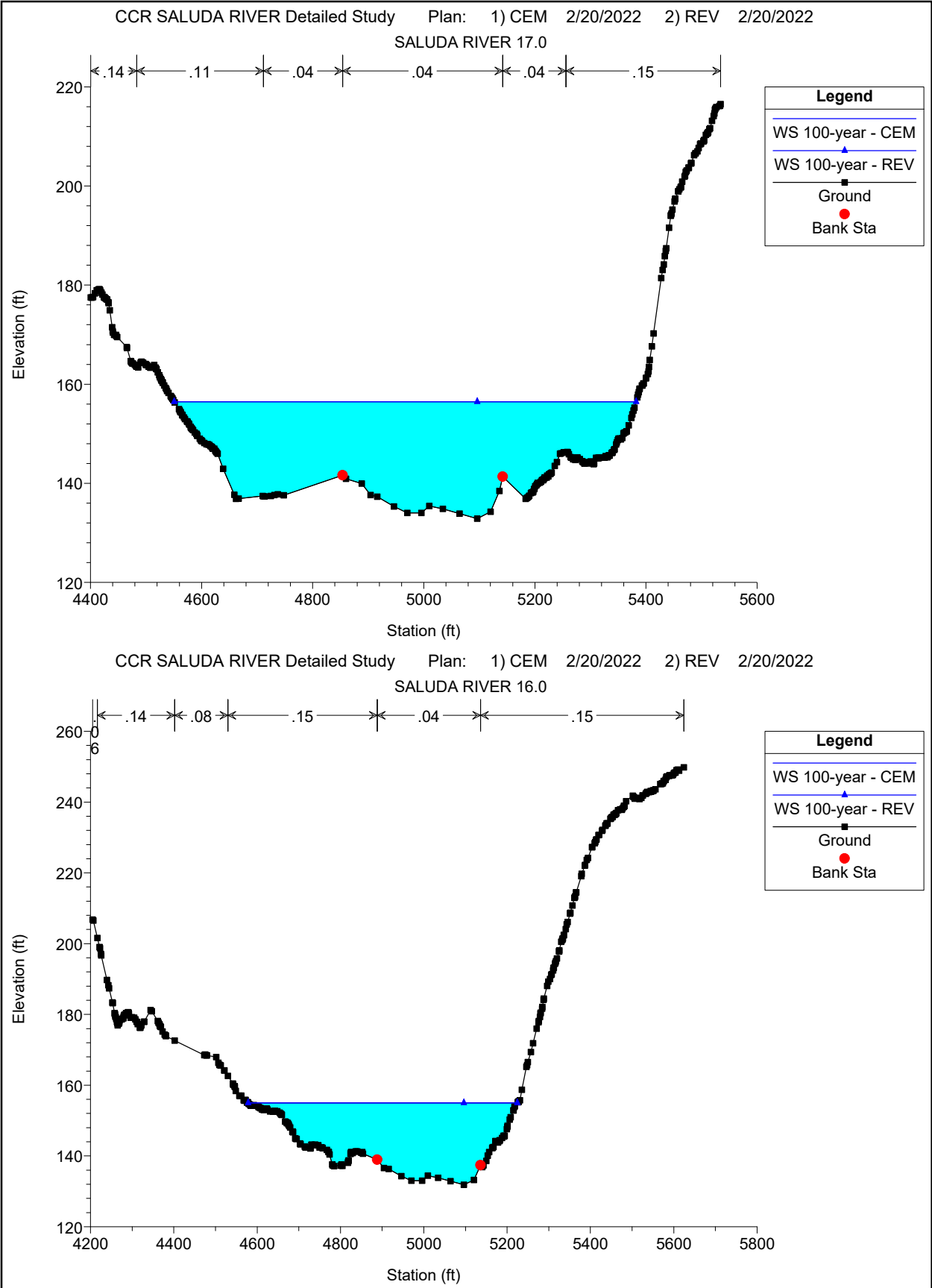
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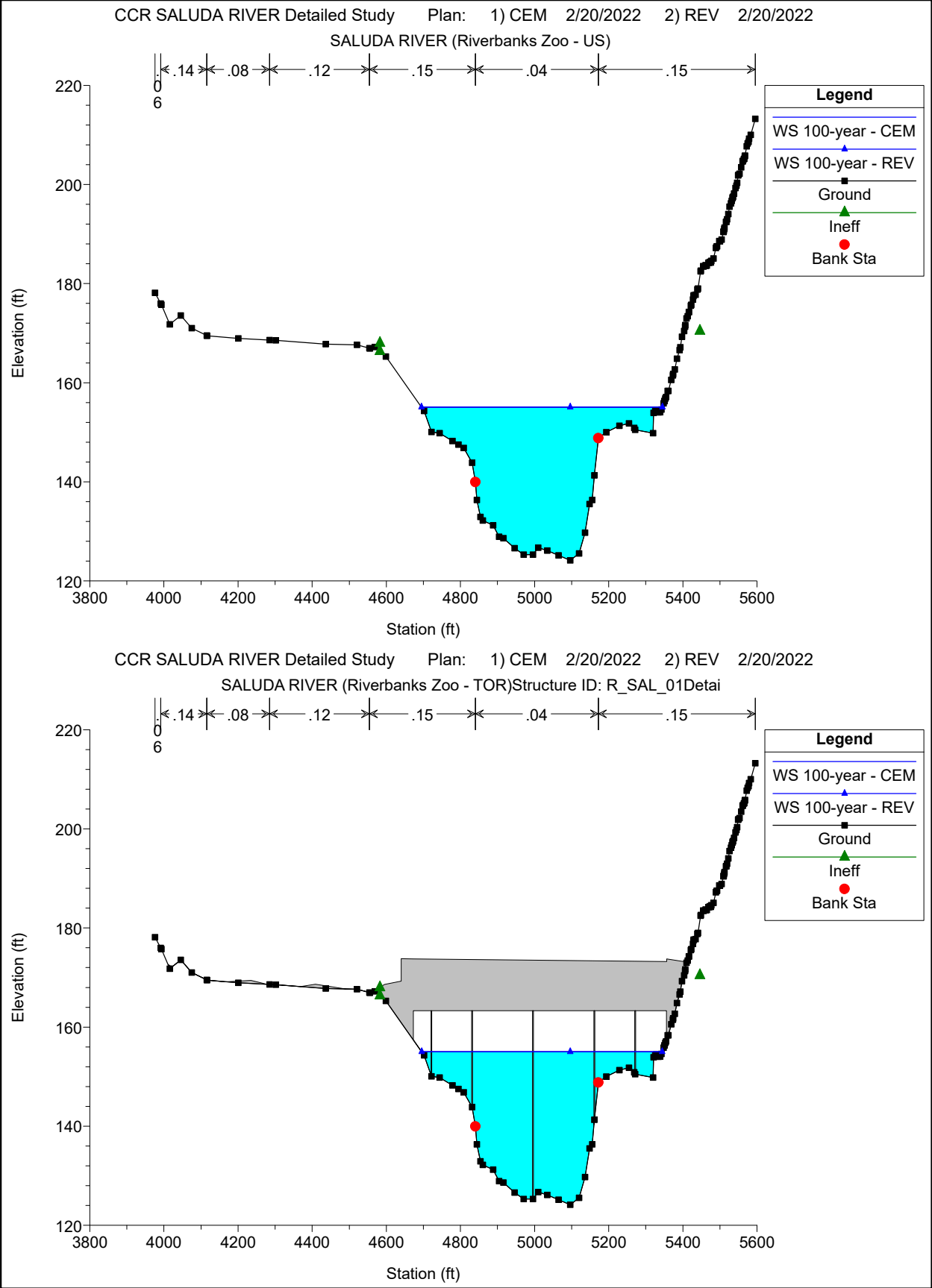


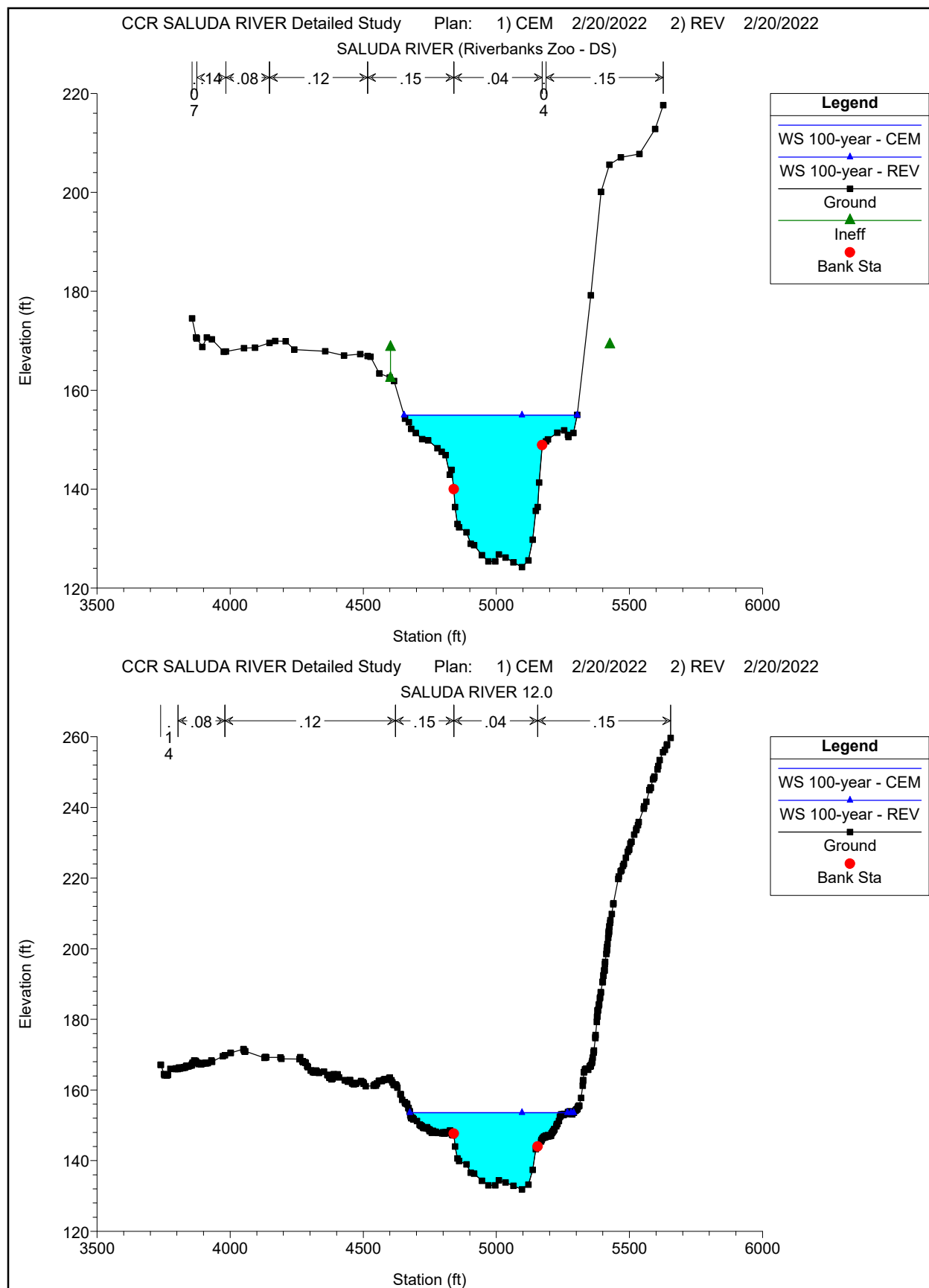
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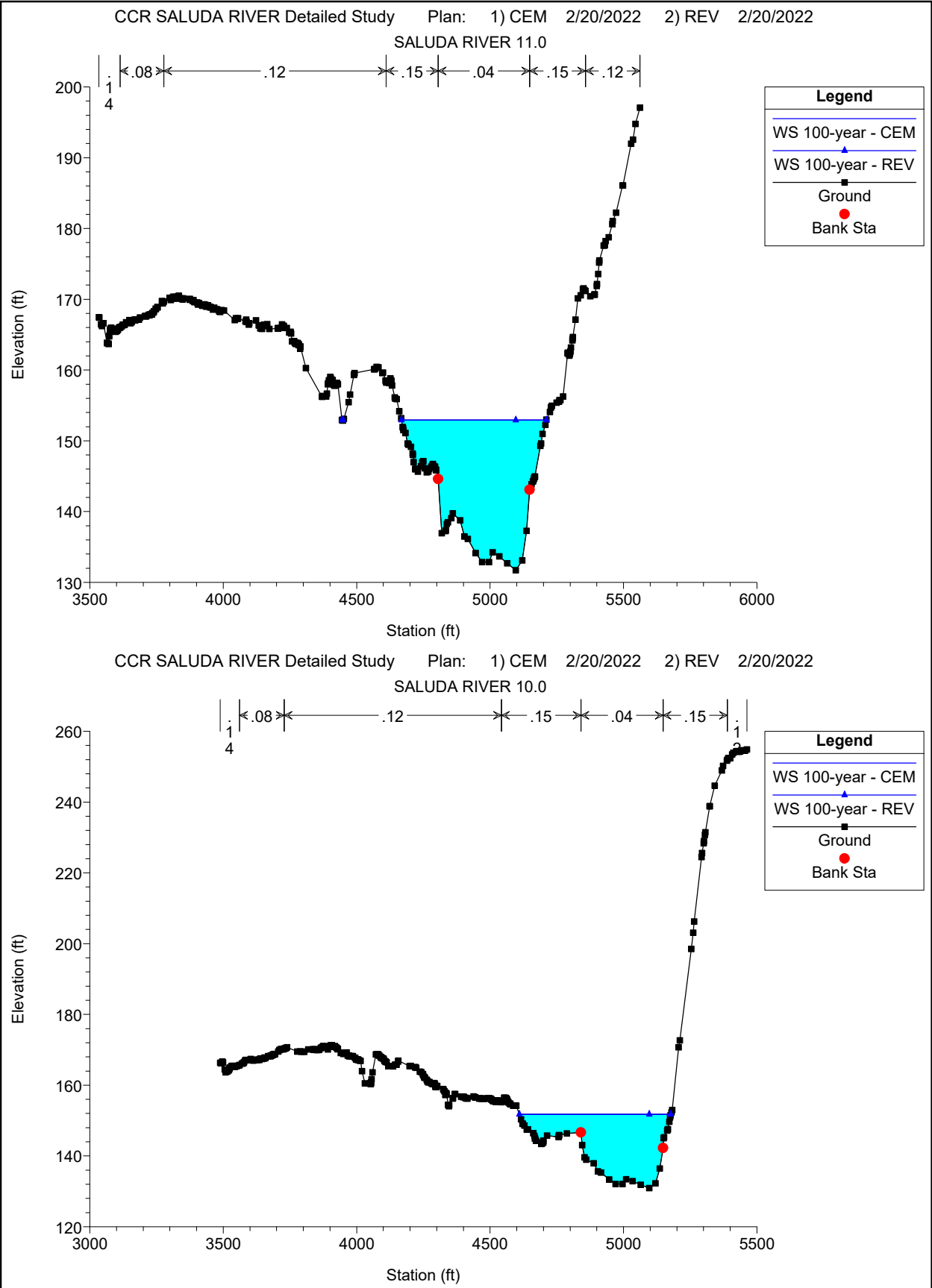
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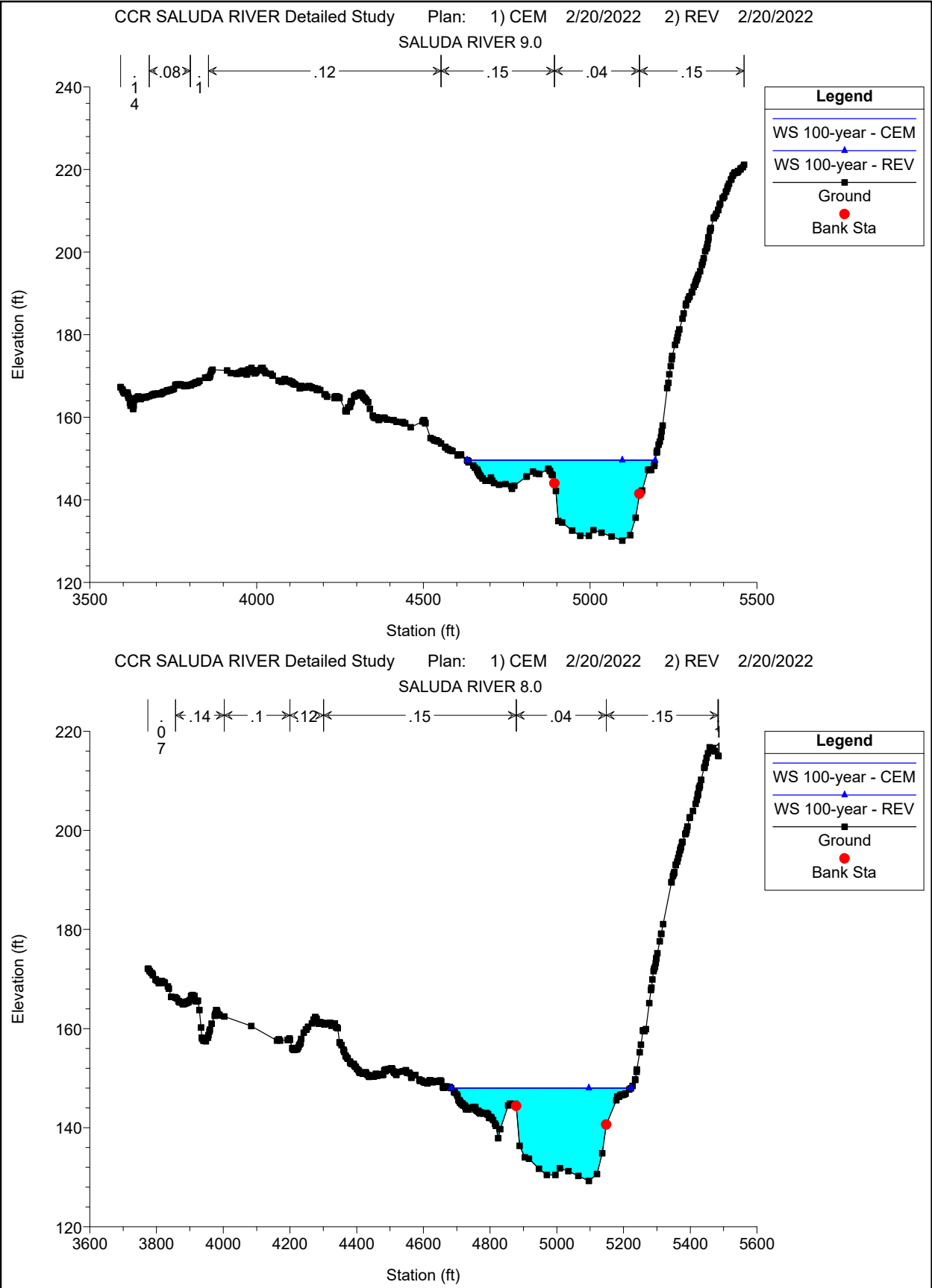


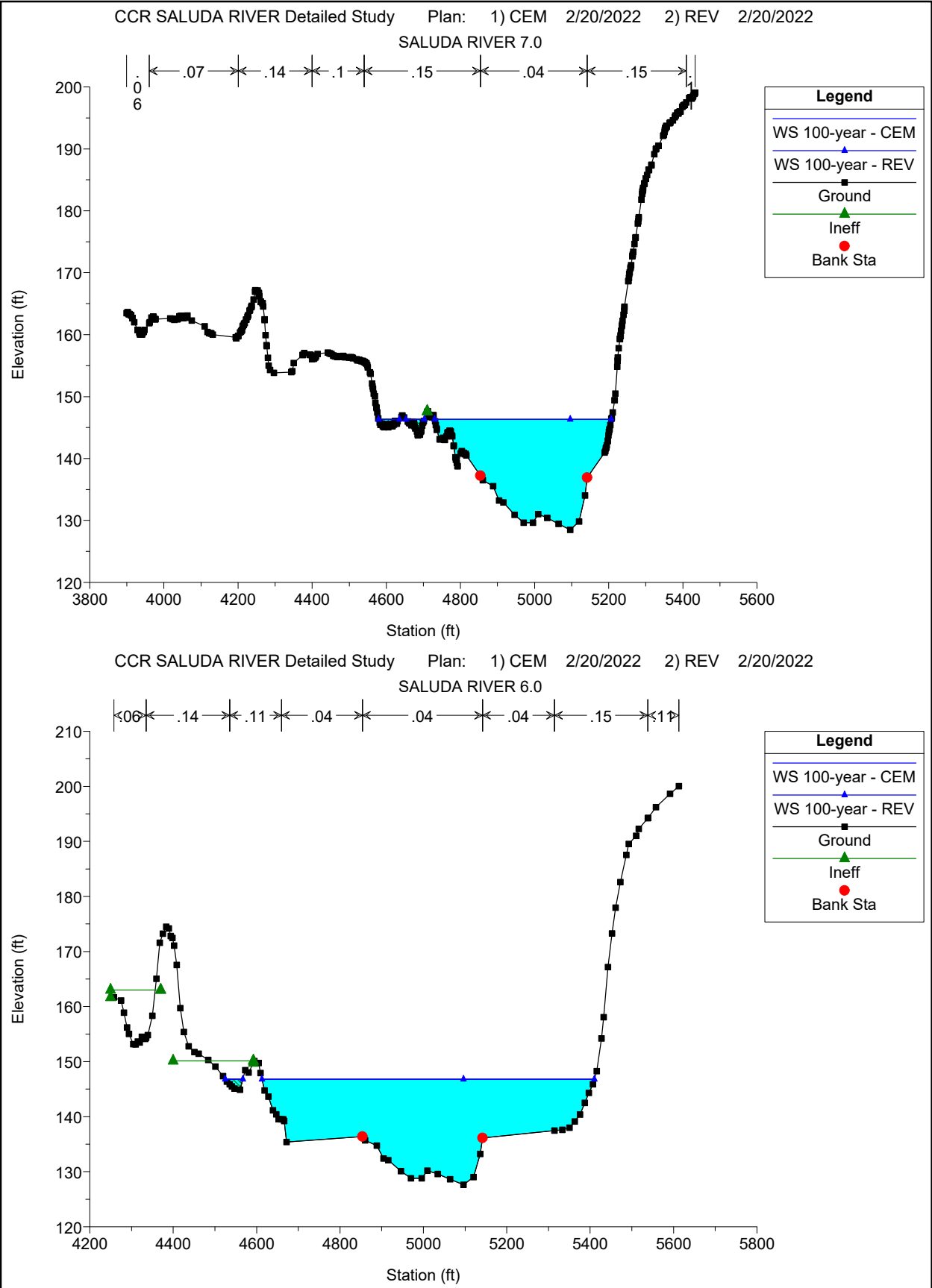






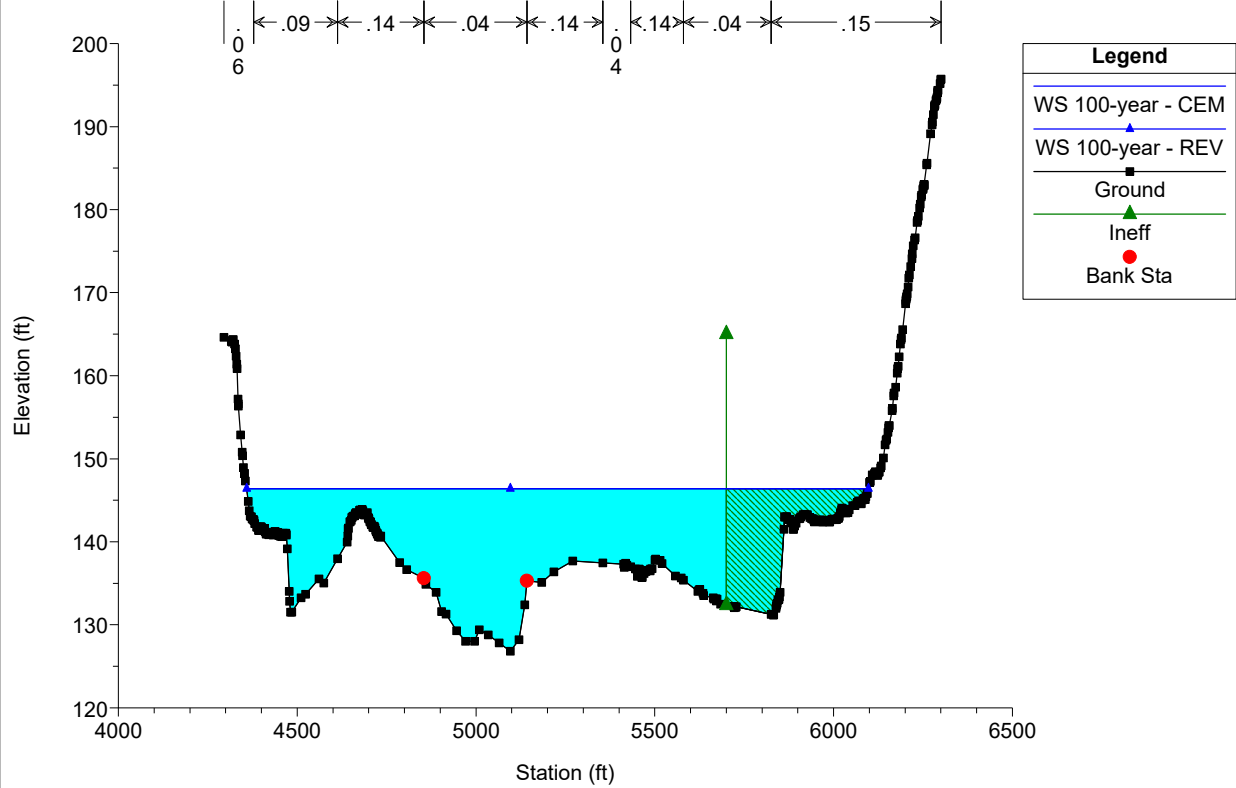






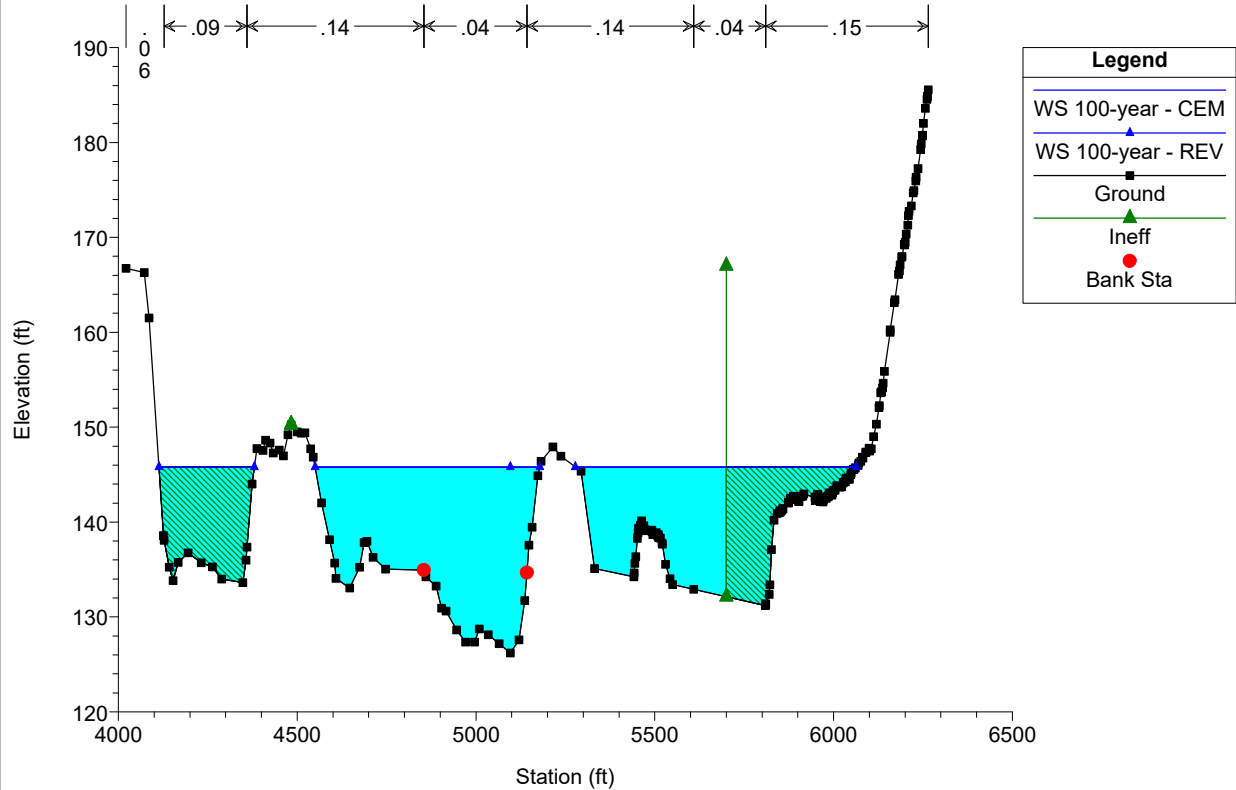
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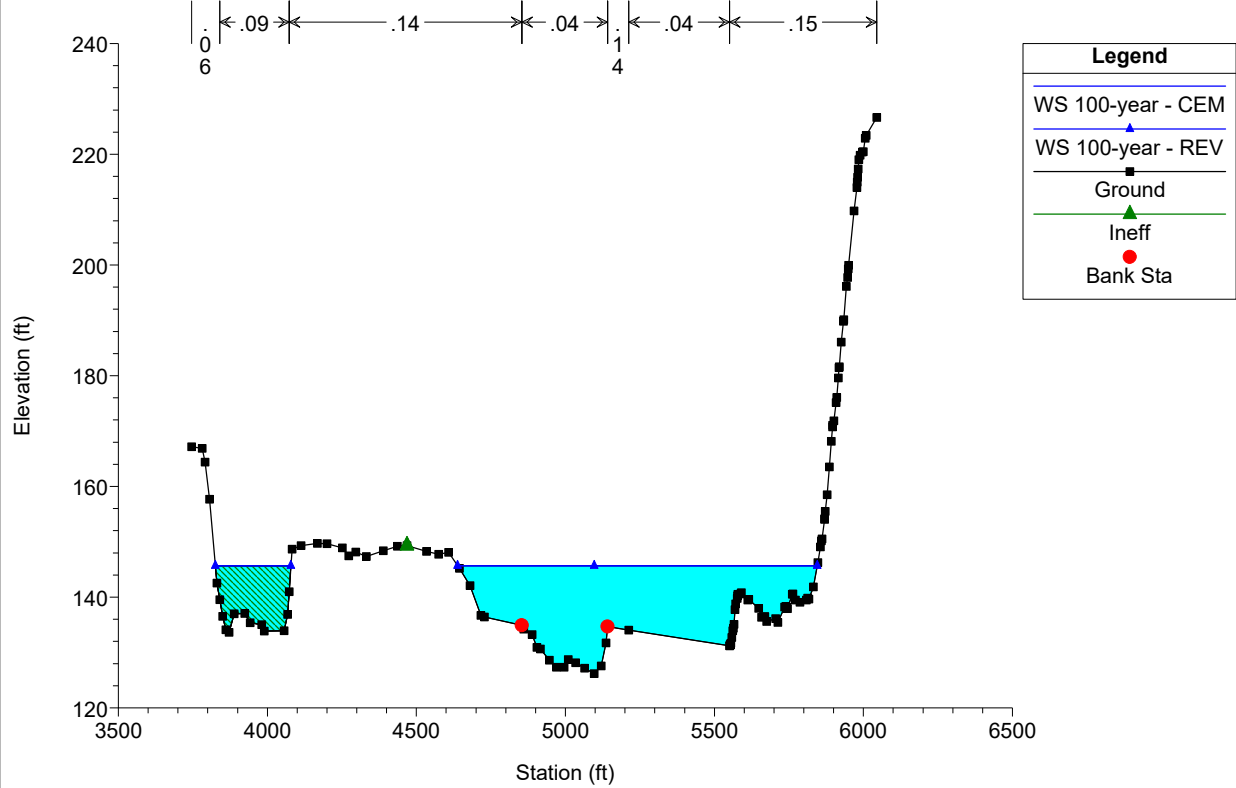
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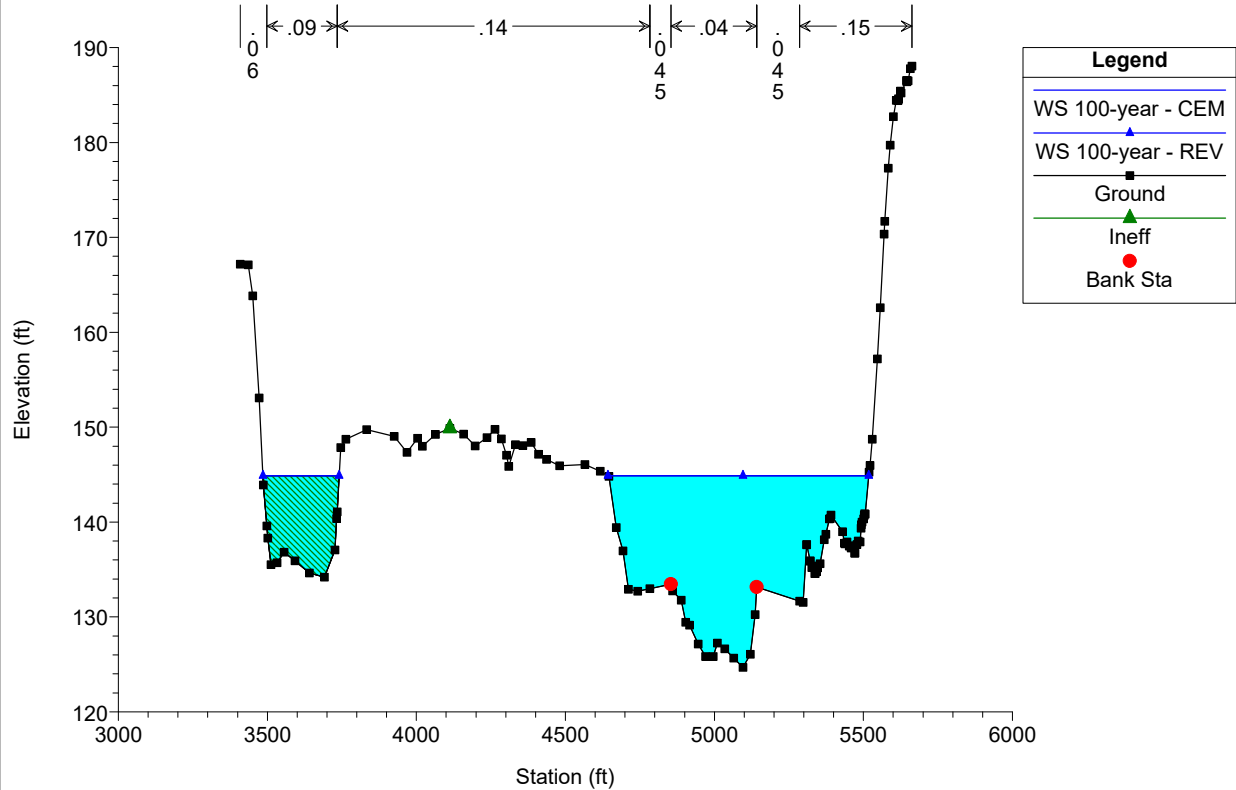
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SALUDA RIVER 3.0



CCR SALUDA RIVER Detailed Study Plan: 1) CEM 2/20/2022 2) REV 2/20/2022

SALUDA RIVER 2.0



APPENDIX F

HEC-RAS OUTPUT – FLOODWAY MODEL

HEC-RAS Plan: FW_CEM River: SALUDA RIVER Reach: Reach-1

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
Reach-1	37500	100-year	105000.0	161.62	192.40		193.3	0.000926	8.28	19241.58	1963.8	0.28
Reach-1	37500	100-FW	105000.0	161.62	193.18		194.2	0.000970	8.63	15474.38	960.0	0.28
Reach-1	35800	100-year	105000.0	152.22	192.53		192.6	0.000121	3.17	68168.05	5525.8	0.10
Reach-1	35800	100-FW	105000.0	152.22	193.26		193.4	0.000166	3.77	49173.76	3000.0	0.12
Reach-1	31500	100-year	105000.0	155.92	191.29		191.6	0.000544	6.22	34735.95	3909.5	0.21
Reach-1	31500	100-FW	105000.0	155.92	191.83		192.2	0.000524	6.19	28118.01	2010.0	0.21
Reach-1	28600	100-year	105000.0	155.72	190.11		190.4	0.000339	5.52	32945.18	2055.9	0.17
Reach-1	28600	100-FW	105000.0	155.72	190.73		191.0	0.000317	5.40	31630.38	1700.0	0.17
Reach-1	26000	100-year	105000.0	155.92	189.02		189.3	0.000475	5.84	29682.54	2215.1	0.20
Reach-1	26000	100-FW	105000.0	155.92	189.55		189.9	0.000531	6.25	24739.60	1335.0	0.21
Reach-1	25780	100-year	105000.0	156.12	188.56	173.5	189.1	0.000621	6.32	18665.28	2003.5	0.22
Reach-1	25780	100-FW	105000.0	156.12	189.22	173.5	189.7	0.000563	6.13	19255.57	1335.0	0.21
Reach-1	25550		Bridge									
Reach-1	25436	100-year	105000.0	156.12	187.33	174.7	188.1	0.000904	7.90	16590.75	1880.6	0.27
Reach-1	25436	100-FW	105000.0	156.12	187.77	174.7	188.7	0.000975	8.29	14784.08	1030.0	0.28
Reach-1	24800	100-year	105000.0	159.22	186.90		187.4	0.000856	7.29	20453.02	1233.6	0.26
Reach-1	24800	100-FW	105000.0	159.22	187.35		187.9	0.000916	7.34	19076.47	1030.0	0.26
Reach-1	22000	100-year	105000.0	156.92	182.88		184.0	0.001715	10.09	16156.10	1397.6	0.37
Reach-1	22000	100-FW	105000.0	156.92	183.32		184.4	0.001617	9.92	14667.99	939.1	0.36
Reach-1	18800	100-year	58600.0	155.30	180.87		181.2	0.000326	5.29	20617.32	1763.6	0.20
Reach-1	18800	100-FW	58600.0	155.30	181.61		181.9	0.000279	5.01	21142.41	1428.0	0.18
Reach-1	18200	100-year	58600.0	155.16	180.49	168.9	180.9	0.000443	5.94	16122.14	2014.4	0.23
Reach-1	18200	100-FW	58600.0	155.16	181.23	168.9	181.7	0.000408	5.83	15994.32	925.0	0.22
Reach-1	17840	100-year	58600.0	150.00	179.50	167.5	180.5	0.000800	8.49	8292.19	1853.4	0.31
Reach-1	17840	100-FW	58600.0	150.00	180.28	167.5	181.3	0.000734	8.31	7985.24	400.0	0.30
Reach-1	17790		Bridge									
Reach-1	17750	100-year	58600.0	150.00	178.59	167.4	179.6	0.000843	8.49	7810.18	1165.4	0.32
Reach-1	17750	100-FW	58600.0	150.00	179.38	167.4	180.3	0.000757	8.23	8092.61	400.0	0.30
Reach-1	17665	100-year	58600.0	150.00	178.55	166.5	179.5	0.001119	8.17	8712.36	1080.7	0.29
Reach-1	17665	100-FW	58600.0	150.00	179.36	166.5	180.2	0.000989	7.85	9124.05	627.6	0.28
Reach-1	17540		Bridge									
Reach-1	17385	100-year	58600.0	150.00	177.50	164.1	178.1	0.000734	6.21	10510.80	1283.9	0.23
Reach-1	17385	100-FW	58600.0	150.00	178.18	164.1	178.7	0.000661	6.01	10892.44	565.9	0.22
Reach-1	17365	100-year	58600.0	150.00	177.06	165.9	178.0	0.001255	7.87	9278.66	961.1	0.30
Reach-1	17365	100-FW	58600.0	150.00	177.78	165.9	178.6	0.001114	7.58	9688.00	600.0	0.29
Reach-1	17000	100-year	58600.0	154.95	174.03	172.1	176.6	0.006298	14.07	7021.52	902.4	0.70
Reach-1	17000	100-FW	58600.0	154.95	174.10	172.3	177.1	0.006965	14.86	5859.19	600.0	0.74
Reach-1	16600	100-year	58600.0	154.78	172.14		174.2	0.005063	11.89	6869.38	909.1	0.62
Reach-1	16600	100-FW	58600.0	154.78	172.42		174.5	0.004961	11.96	5925.33	600.0	0.62
Reach-1	16200	100-year	58600.0	153.94	171.33		172.4	0.002717	8.78	8627.41	899.8	0.46
Reach-1	16200	100-FW	58600.0	153.94	171.77		172.9	0.002525	8.67	8001.01	710.0	0.44
Reach-1	15700	100-year	58600.0	152.72	170.53		171.2	0.001936	7.86	10470.12	1206.5	0.39
Reach-1	15700	100-FW	58600.0	152.72	170.84		171.7	0.002108	8.34	8607.88	800.0	0.41
Reach-1	15200	100-year	58600.0	150.94	169.44		170.2	0.001490	7.97	10379.56	1160.0	0.39
Reach-1	15200	100-FW	58600.0	150.94	169.89		170.6	0.001379	7.84	9677.05	920.0	0.37
Reach-1	14700	100-year	58600.0	147.50	169.06		169.7	0.000898	7.29	12263.92	1141.4	0.31
Reach-1	14700	100-FW	58600.0	147.50	169.48		170.1	0.000913	7.46	11219.67	863.0	0.32
Reach-1	14200	100-year	58600.0	146.53	169.00	159.7	169.3	0.000416	5.63	16114.27	1532.9	0.22
Reach-1	14200	100-FW	58600.0	146.53	169.37	159.7	169.8	0.000437	5.83	11873.25	740.0	0.22
Reach-1	13600	100-year	58600.0	145.36	167.26		168.6	0.001452	10.46	12692.64	1328.4	0.41

HEC-RAS Plan: FW_CEM River: SALUDA RIVER Reach: Reach-1 (Continued)

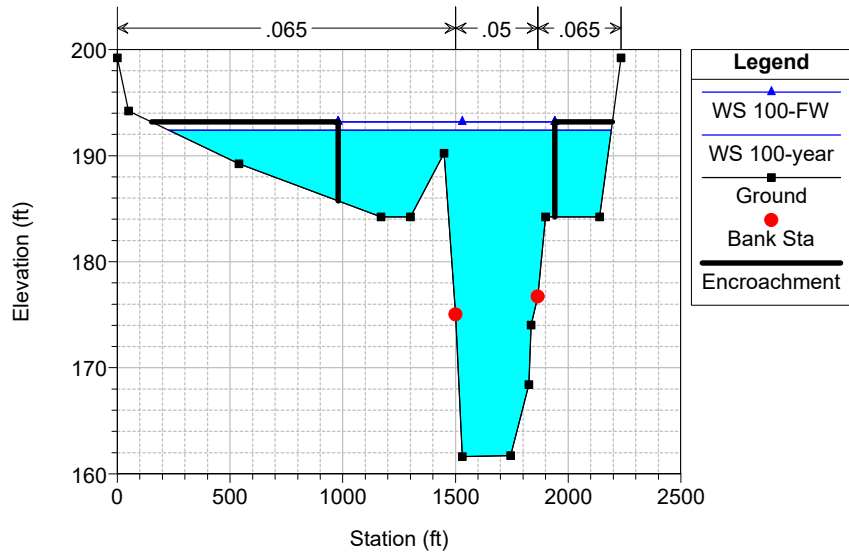
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	13600	100-FW	58600.0	145.36	167.36		169.0	0.001655	11.21	9376.05	700.0	0.44
Reach-1	13000	100-year	58600.0	144.19	166.20		167.7	0.001664	10.49	9610.31	1054.5	0.43
Reach-1	13000	100-FW	58600.0	144.19	166.17		167.9	0.001907	11.21	7028.43	519.0	0.46
Reach-1	12500	100-year	58600.0	143.22	165.41		166.8	0.001638	10.47	9471.80	1003.2	0.43
Reach-1	12500	100-FW	58600.0	143.22	165.40		167.0	0.001746	10.81	7795.46	561.0	0.44
Reach-1	12000	100-year	58600.0	142.25	162.08	158.3	165.4	0.004005	14.64	4213.90	331.9	0.65
Reach-1	12000	100-FW	58600.0	142.25	162.27	158.2	165.5	0.003862	14.50	4170.97	278.0	0.64
Reach-1	11500	100-year	58600.0	141.27	161.95	154.9	163.6	0.001783	10.48	6437.99	546.2	0.44
Reach-1	11500	100-FW	58600.0	141.27	162.15	154.9	163.8	0.001734	10.41	6116.97	376.0	0.44
Reach-1	11000	100-year	58600.0	140.30	160.67	154.1	162.6	0.002102	11.22	5766.42	643.6	0.48
Reach-1	11000	100-FW	58600.0	140.30	160.97	154.1	162.8	0.001991	11.04	5555.70	345.0	0.47
Reach-1	10500	100-year	58600.0	139.33	159.98	153.0	161.5	0.001803	10.05	6704.48	732.9	0.44
Reach-1	10500	100-FW	58600.0	139.33	160.29	153.0	161.8	0.001728	9.97	6158.62	394.0	0.43
Reach-1	10000	100-year	58600.0	138.36	158.86		160.6	0.001856	10.71	6618.73	524.2	0.45
Reach-1	10000	100-FW	58600.0	138.36	159.23		160.9	0.001758	10.57	6220.89	385.0	0.44
Reach-1	9500	100-year	58600.0	137.38	158.31		159.6	0.001510	9.60	7058.45	654.0	0.41
Reach-1	9500	100-FW	58600.0	137.38	158.53		160.0	0.001605	9.98	6201.33	410.0	0.42
Reach-1	9000	100-year	58600.0	136.41	157.14		158.8	0.001770	10.71	6575.83	594.2	0.44
Reach-1	9000	100-FW	58600.0	136.41	157.48		159.2	0.001732	10.73	6177.69	383.0	0.44
Reach-1	8500	100-year	58600.0	135.44	156.85		157.9	0.001183	8.77	8345.74	841.6	0.36
Reach-1	8500	100-FW	58600.0	135.44	157.30		158.3	0.001079	8.51	8076.02	557.0	0.35
Reach-1	8240	100-year	58600.0	134.93	156.90		157.5	0.000769	7.10	12328.67	981.0	0.29
Reach-1	8240	100-FW	58600.0	134.93	157.32		158.0	0.000738	7.06	11798.73	825.0	0.29
Reach-1	7900	100-year	58600.0	134.27	156.49		157.2	0.000878	7.39	12019.61	916.7	0.31
Reach-1	7900	100-FW	58600.0	134.27	156.98		157.7	0.000809	7.22	12026.40	845.0	0.30
Reach-1	7400	100-year	58600.0	132.87	156.47		156.8	0.000412	5.66	13376.63	831.2	0.22
Reach-1	7400	100-FW	58600.0	132.87	156.79		157.3	0.000505	6.33	10057.41	525.0	0.24
Reach-1	6900	100-year	58600.0	131.87	155.02		156.4	0.001258	10.00	9247.99	645.9	0.38
Reach-1	6900	100-FW	58600.0	131.87	155.40		156.9	0.001259	10.12	7796.50	405.0	0.39
Reach-1	6450	100-year	58600.0	124.16	155.08	138.0	155.7	0.000407	6.55	10440.25	650.0	0.22
Reach-1	6450	100-FW	58600.0	124.16	155.52	138.0	156.2	0.000388	6.47	9967.18	463.0	0.22
Reach-1	6350		Bridge									
Reach-1	6270	100-year	58600.0	124.22	154.98	138.1	155.6	0.000414	6.58	10341.16	650.5	0.23
Reach-1	6270	100-FW	58600.0	124.22	155.42	138.1	156.1	0.000393	6.48	10029.67	485.0	0.22
Reach-1	5900	100-year	58600.0	131.87	153.57		155.1	0.001579	10.07	6945.22	602.1	0.42
Reach-1	5900	100-FW	58600.0	131.87	153.96		155.5	0.001529	10.05	5971.14	335.0	0.41
Reach-1	5400	100-year	58600.0	131.71	152.92		154.3	0.001456	9.51	7119.70	547.0	0.40
Reach-1	5400	100-FW	58600.0	131.71	153.36		154.7	0.001398	9.47	6281.90	355.0	0.39
Reach-1	4900	100-year	58600.0	130.90	151.76		153.5	0.001834	10.59	6768.36	567.9	0.45
Reach-1	4900	100-FW	58600.0	130.90	152.14		153.9	0.001816	10.69	5548.98	320.0	0.45
Reach-1	4400	100-year	58600.0	130.09	149.58		152.2	0.002990	13.19	5563.29	564.3	0.57
Reach-1	4400	100-FW	58600.0	130.09	149.94		152.7	0.002955	13.29	4473.81	270.0	0.56
Reach-1	3900	100-year	58600.0	129.27	147.97		150.6	0.003278	13.29	5364.19	539.3	0.59
Reach-1	3900	100-FW	58600.0	129.27	148.43		151.2	0.003135	13.25	4498.35	290.0	0.58
Reach-1	3400	100-year	58600.0	128.46	146.30	142.4	148.9	0.003476	13.22	5307.66	582.6	0.60
Reach-1	3400	100-FW	58600.0	128.46	146.90	142.3	149.5	0.003216	13.05	4637.88	306.0	0.58
Reach-1	2900	100-year	58600.0	127.65	146.80	140.7	147.5	0.001044	7.66	9339.36	839.4	0.34
Reach-1	2900	100-FW	58600.0	127.65	147.21	140.8	148.1	0.001185	8.30	7928.14	575.0	0.36
Reach-1	2400	100-year	58600.0	126.84	146.41	139.6	146.9	0.000890	7.19	14365.48	1739.0	0.31
Reach-1	2400	100-FW	58600.0	126.84	146.80	140.1	147.5	0.001008	7.78	12912.52	1125.0	0.33

HEC-RAS Plan: FW_CEM River: SALUDA RIVER Reach: Reach-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
Reach-1	2000	100-year	58600.0	126.19	145.80	139.0	146.6	0.001182	8.30	12221.15	1680.0	0.36
Reach-1	2000	100-FW	58600.0	126.19	146.18	139.0	147.1	0.001248	8.66	10712.20	866.1	0.37
Reach-1	1600	100-year	58600.0	126.19	145.69	137.8	146.1	0.000679	6.27	13810.17	1461.1	0.27
Reach-1	1600	100-FW	58600.0	126.19	146.10	137.8	146.6	0.000668	6.32	11786.78	850.0	0.27
Reach-1	1100	100-year	58600.0	124.69	144.88	137.7	145.6	0.001052	8.02	10526.49	1131.6	0.34
Reach-1	1100	100-FW	58600.0	124.69	145.28	137.6	146.1	0.001050	8.13	8887.34	600.0	0.34

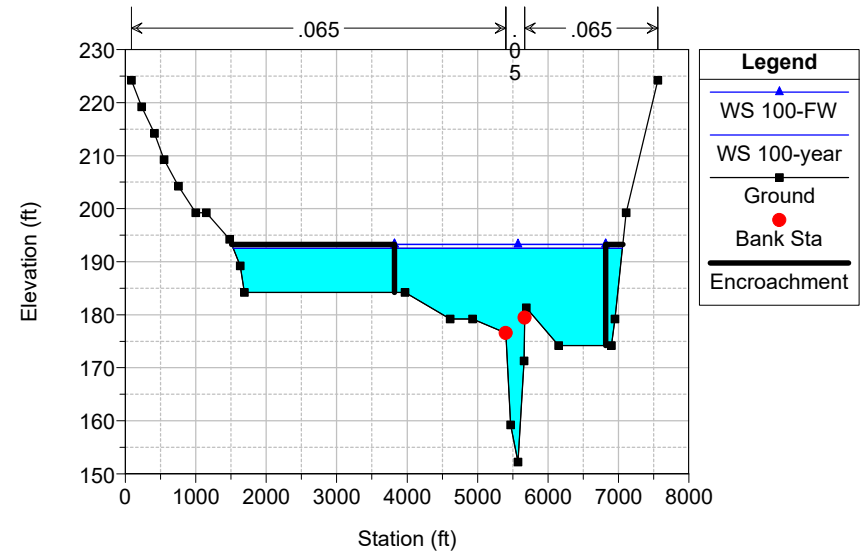
CCR SALUDA RIVER Detailed Study Plan: 1) FW_CEM 3/7/2022

FEMA XS: O



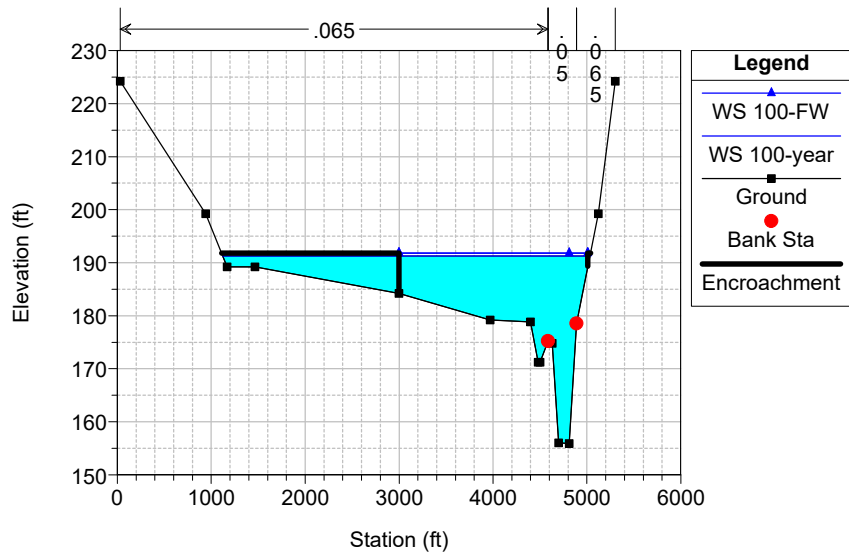
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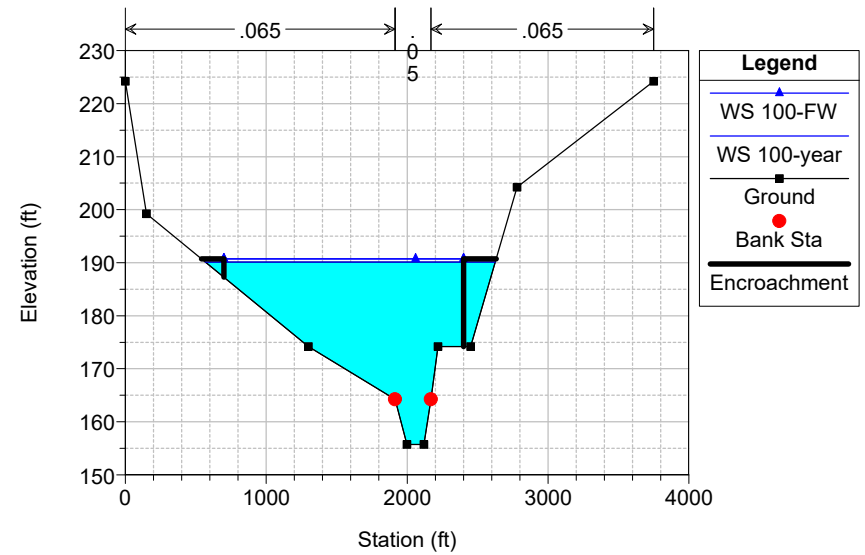
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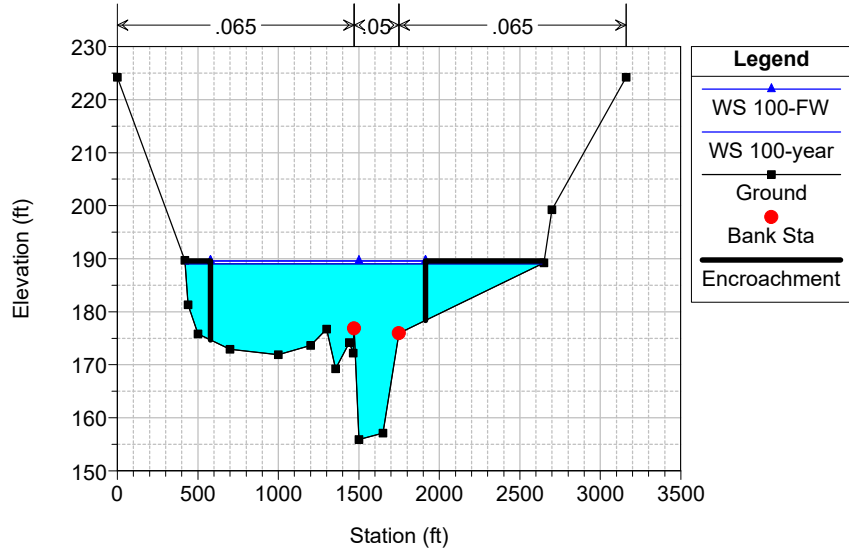
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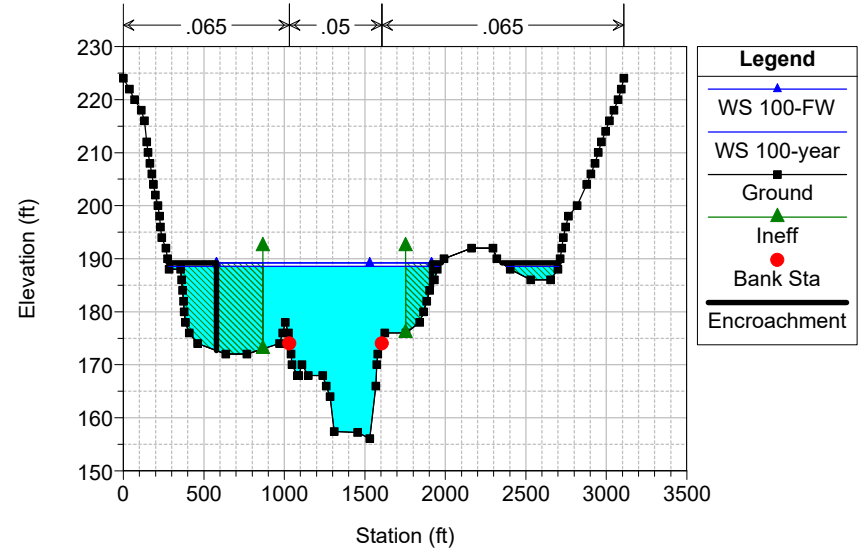
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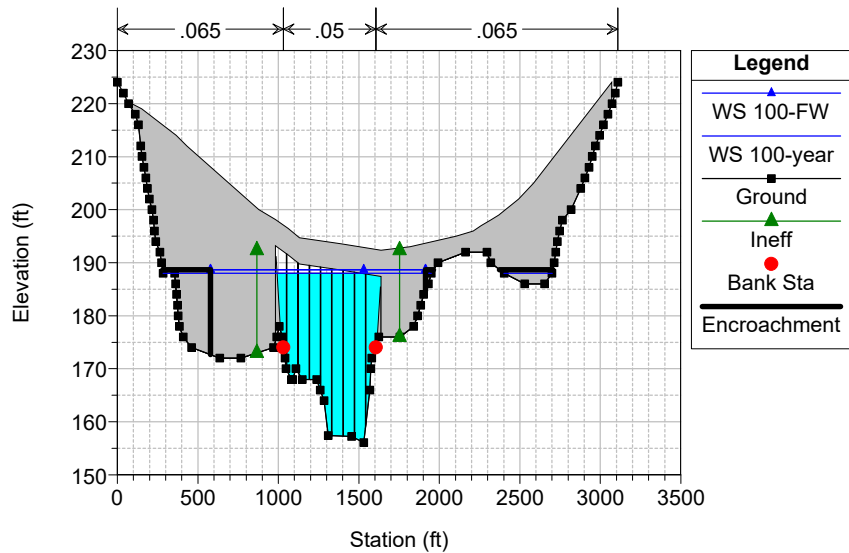


CCR SALUDA RIVER Detailed Study Plan: 1) FW_CEM 3/7/2022

New Section US I-20

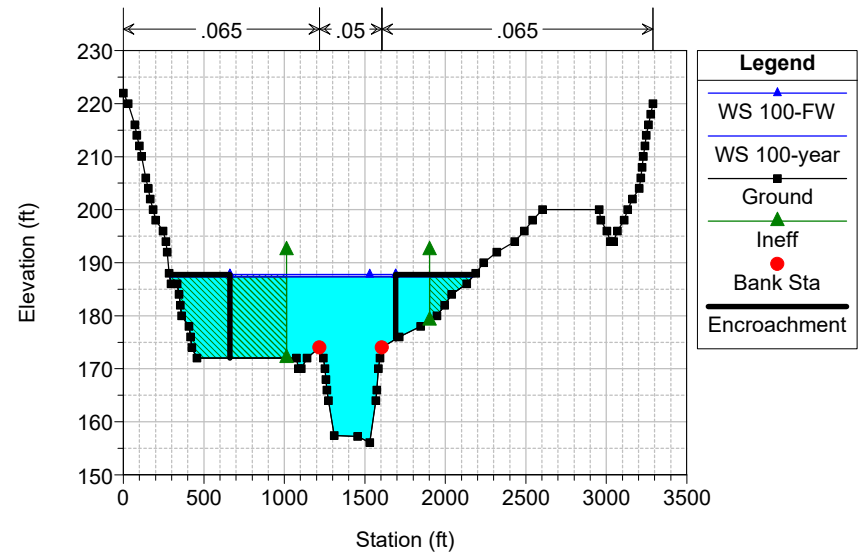


CCR SALUDA RIVER Detailed Study Plan: 1) FW_CEM 3/7/2022

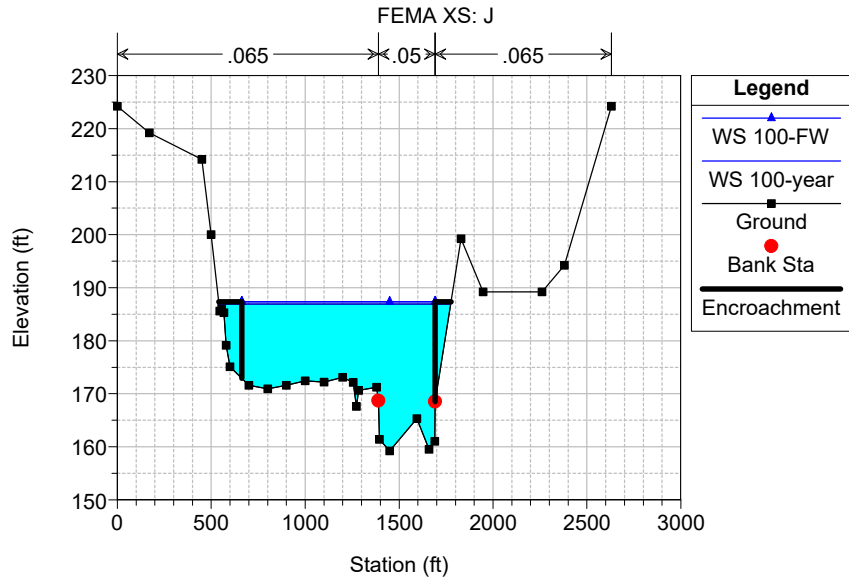


CCR SALUDA RIVER Detailed Study Plan: 1) FW_CEM 3/7/2022

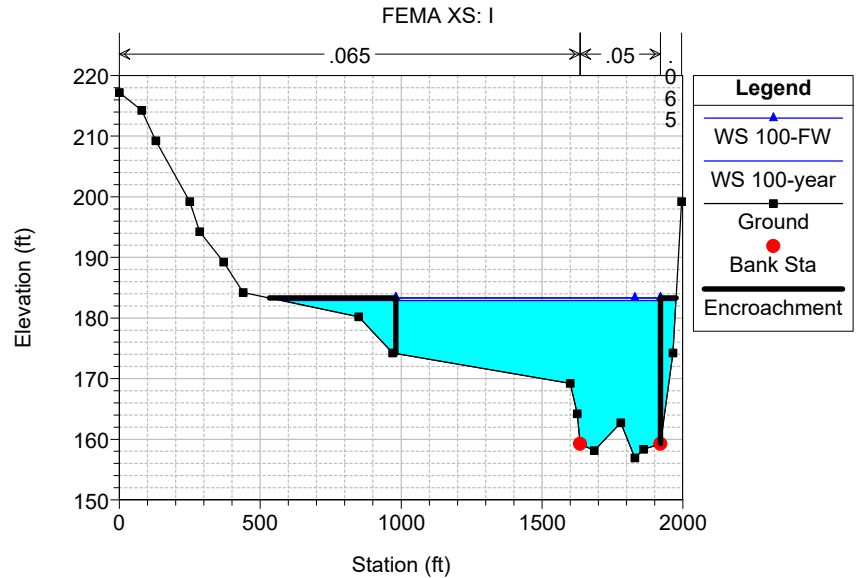
New Section DS of I-20



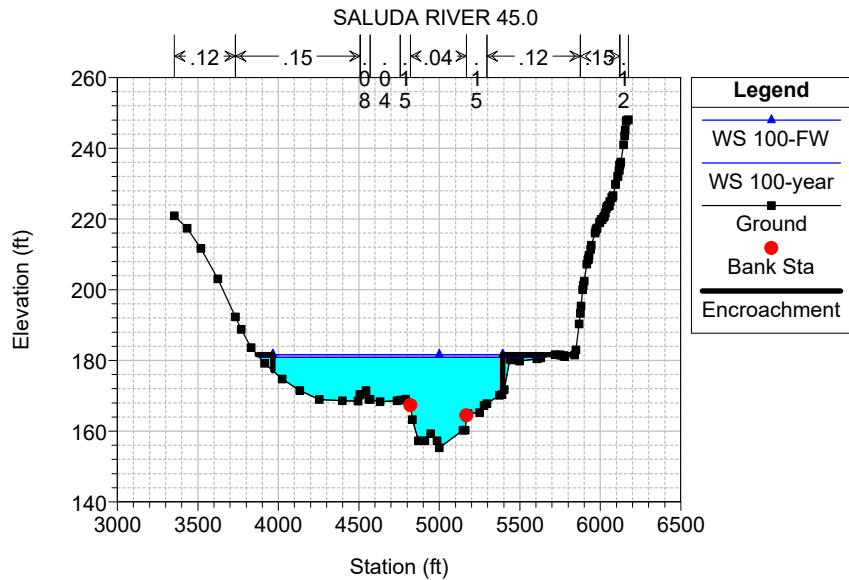
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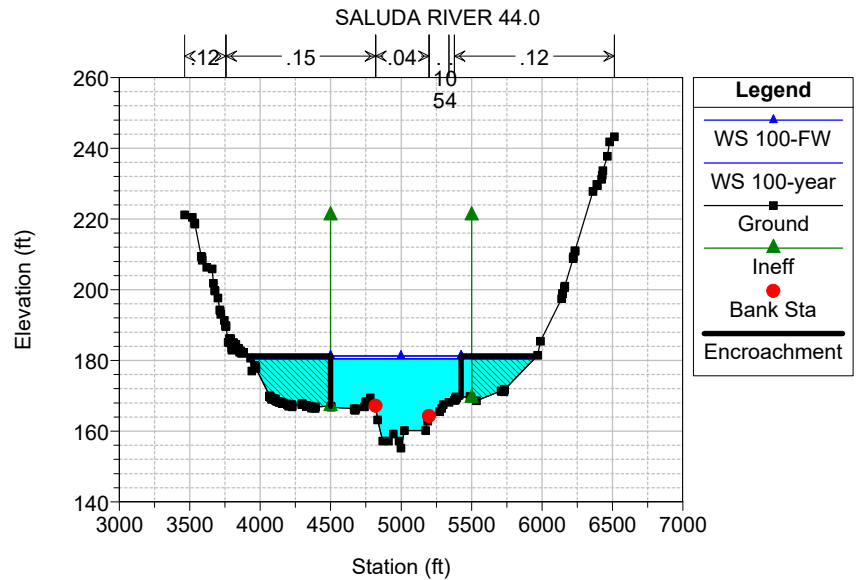
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CCR SALUDA RIVER Detailed Study Plan: 1) FW_CEM 3/7/2022

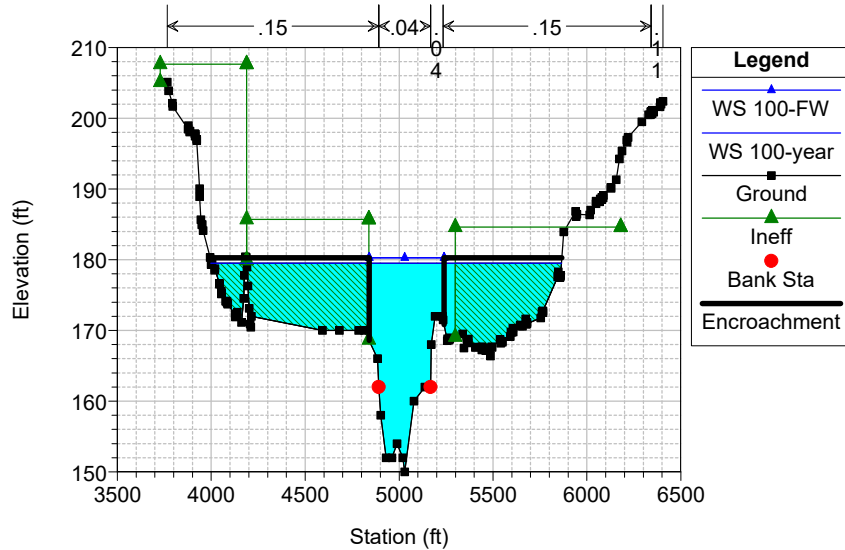


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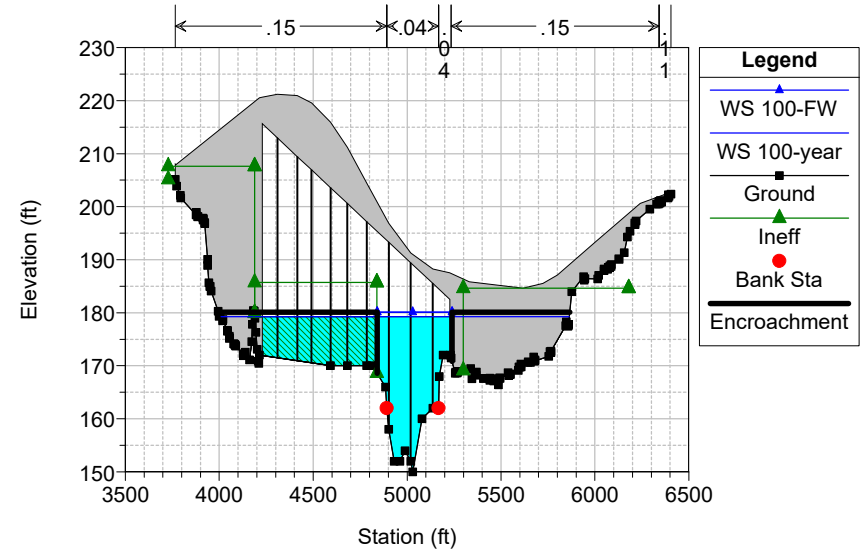
CCR SALUDA RIVER Detailed Study Plan: 1) FW_CEM 3/7/2022

SALUDA RIVER (I-26 Ramp - US)



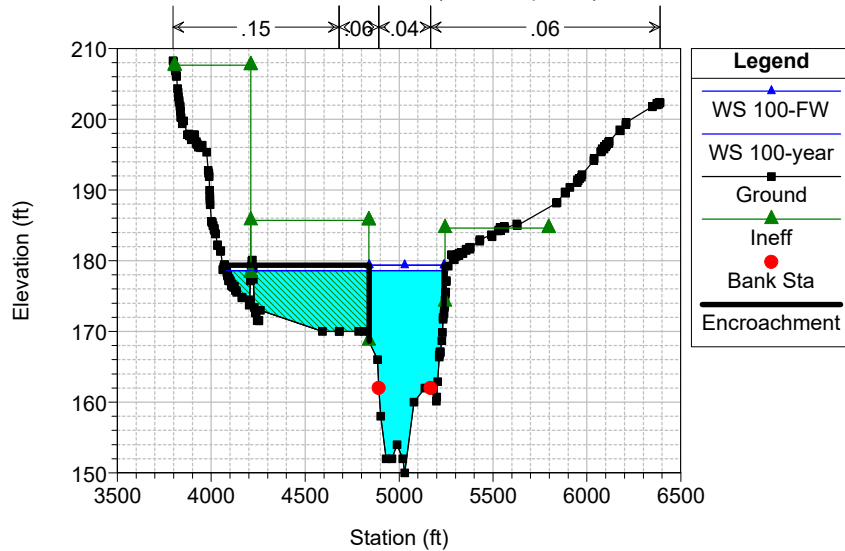
CCR SALUDA RIVER Detailed Study Plan: 1) FW_CEM 3/7/2022

SALUDA RIVER (I-26 Ramp - TOR) Structure ID: I-26 RampDetailed



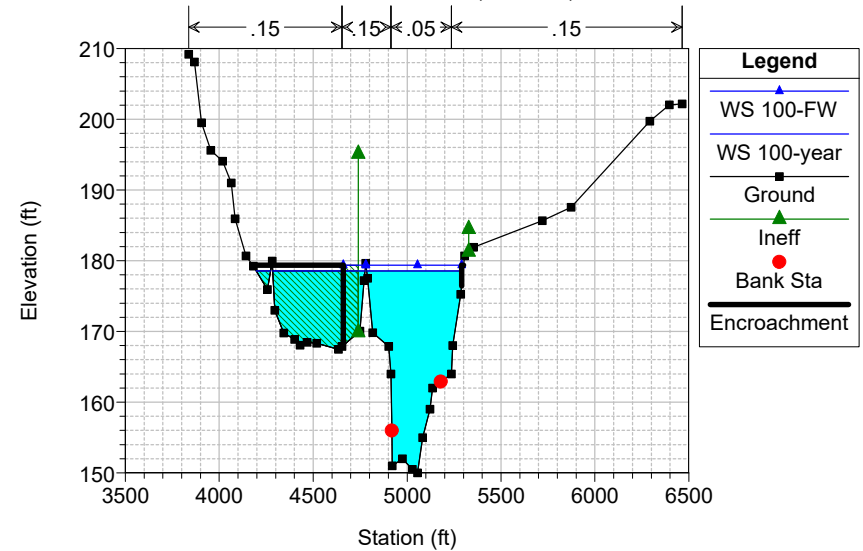
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SALUDA RIVER (I-26 Ramp - DS)



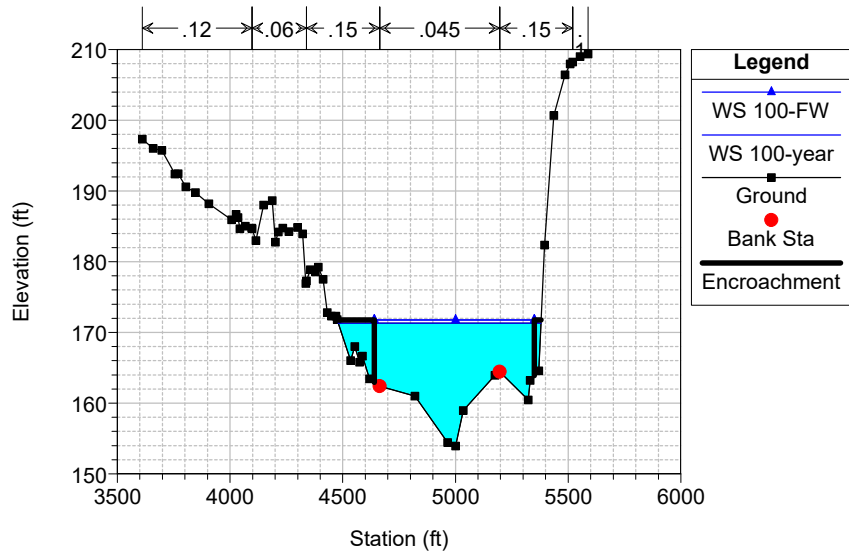
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SALUDA RIVER (I-26 - US)



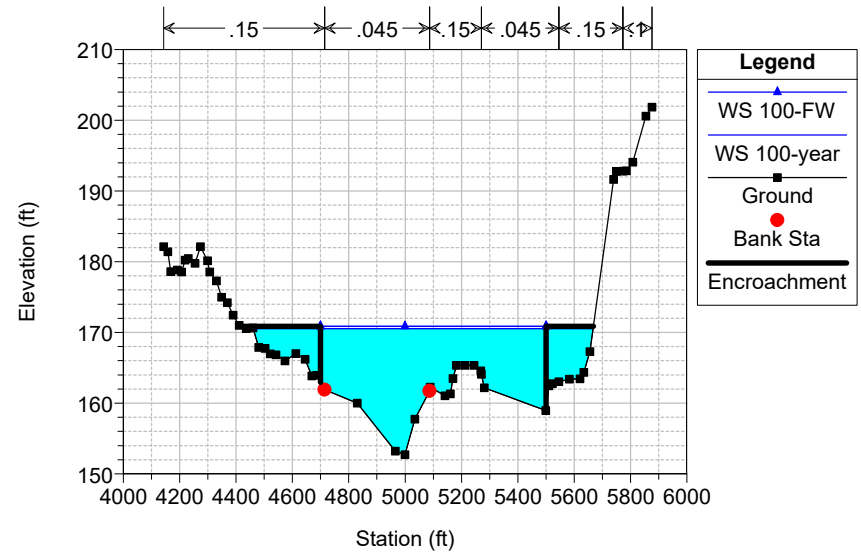
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SALUDA RIVER 35.0



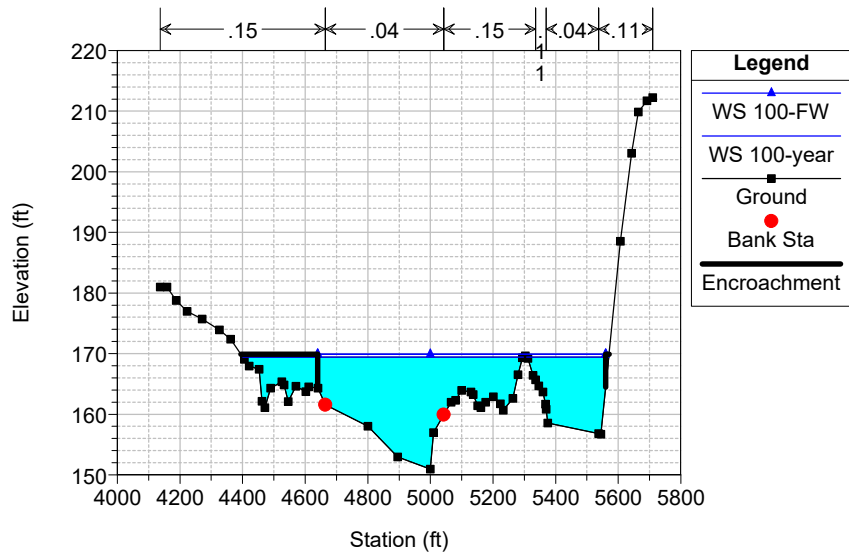
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SALUDA RIVER 34.0



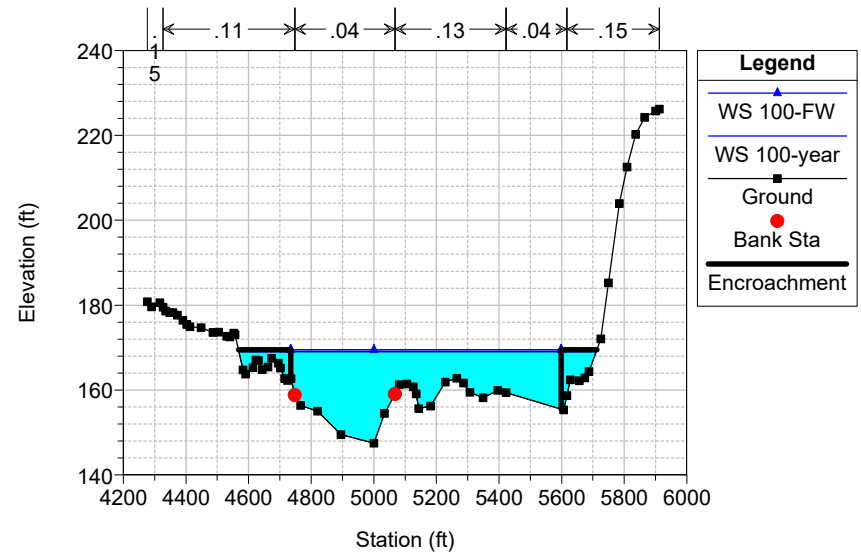
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SALUDA RIVER 33.0



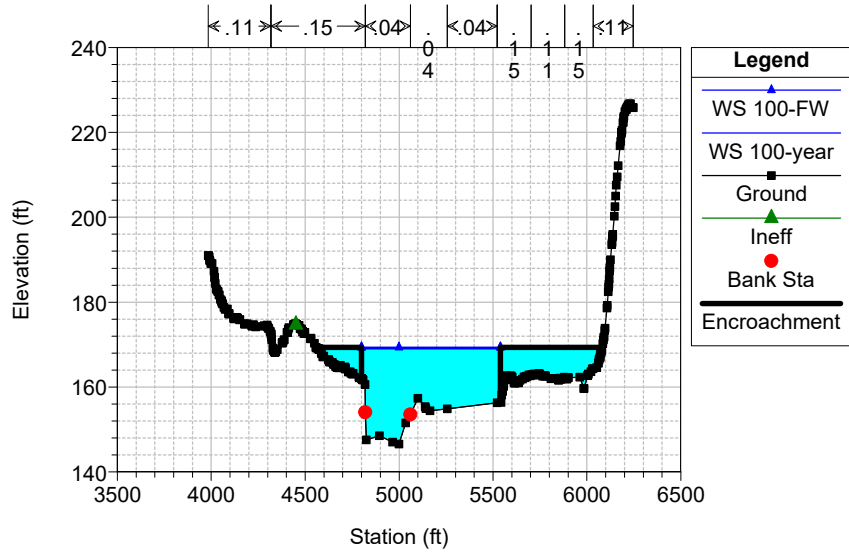
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SALUDA RIVER 32.0



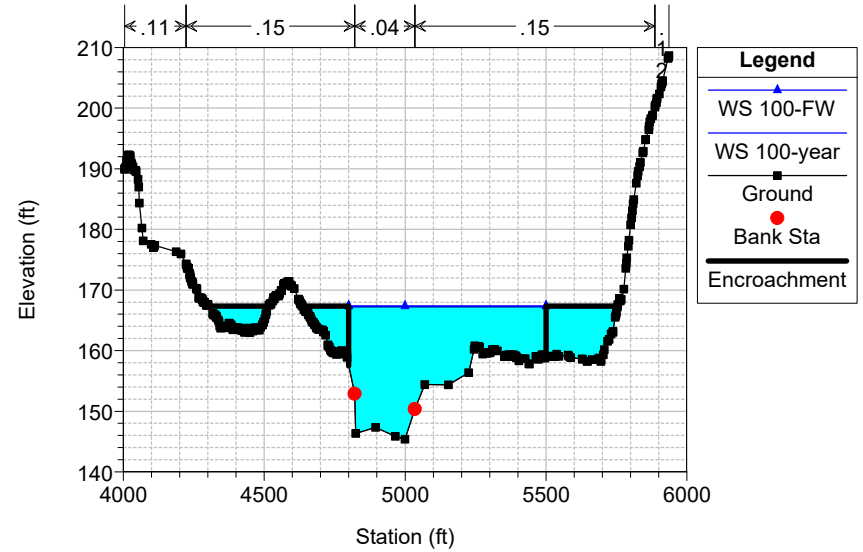
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SALUDA RIVER 31.0



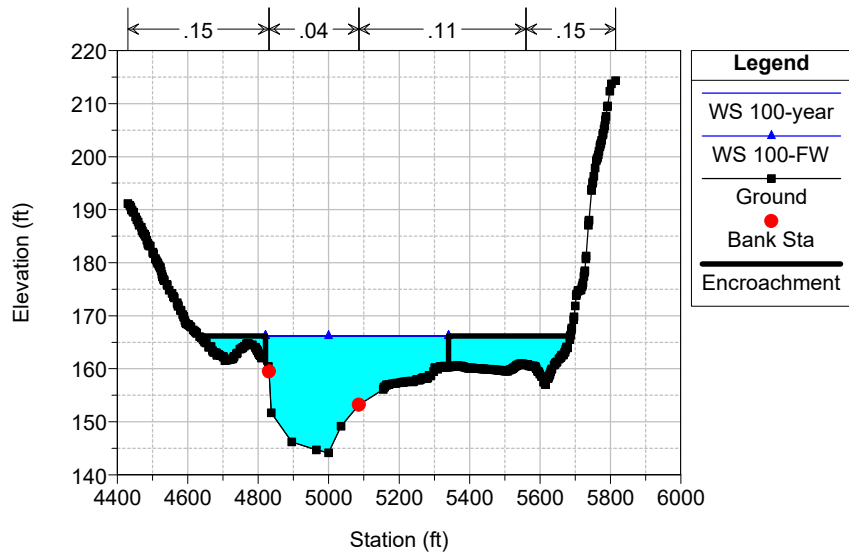
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SALUDA RIVER 30.0



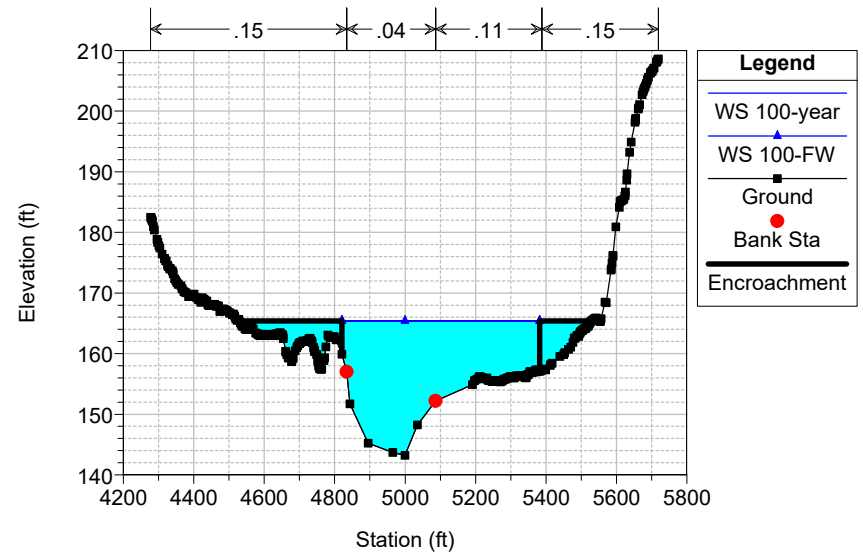
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SALUDA RIVER 29.0



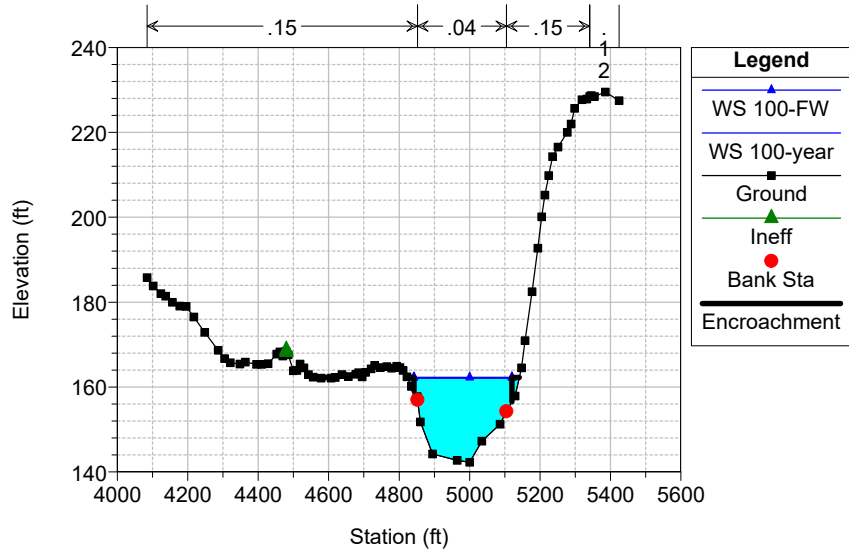
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SALUDA RIVER 28.0



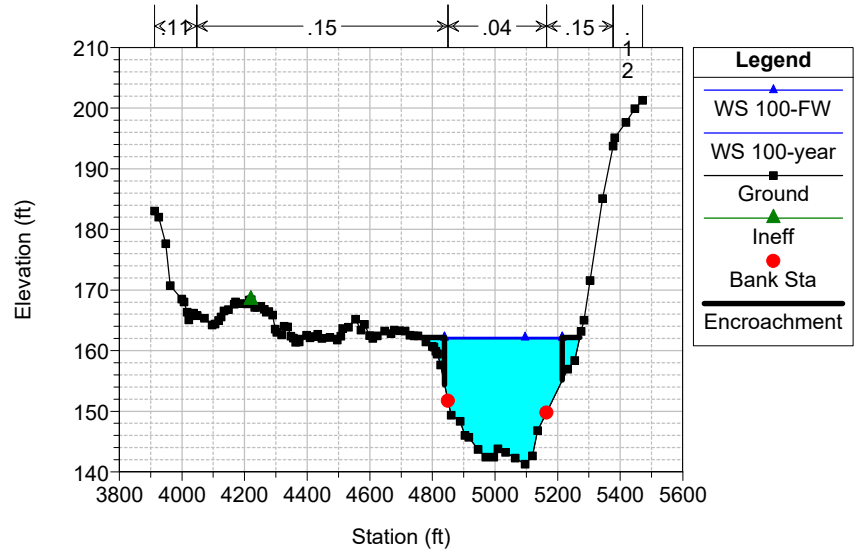
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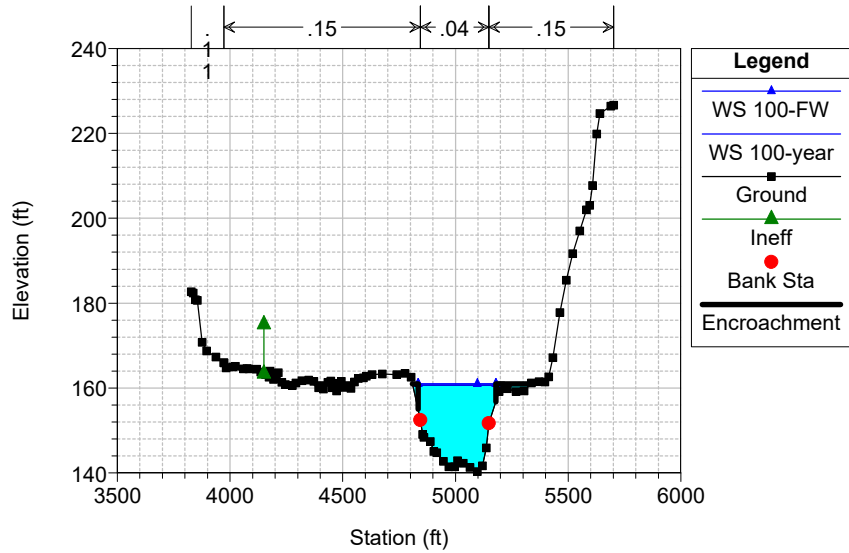
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SALUDA RIVER 26.0



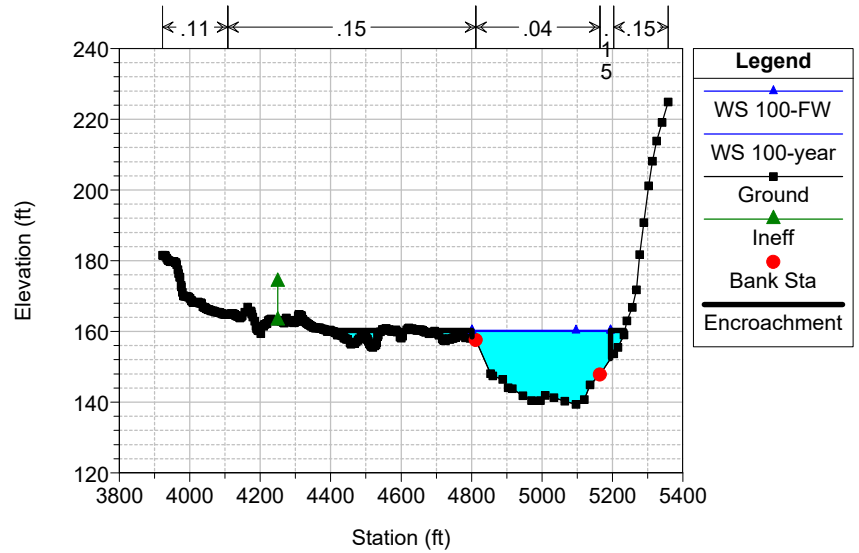
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SALUDA RIVER 25.0



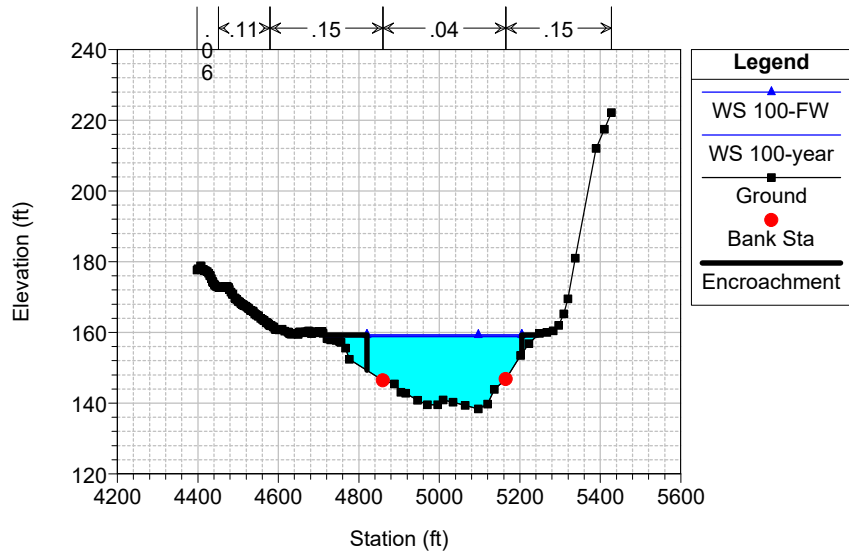
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SALUDA RIVER 24.0



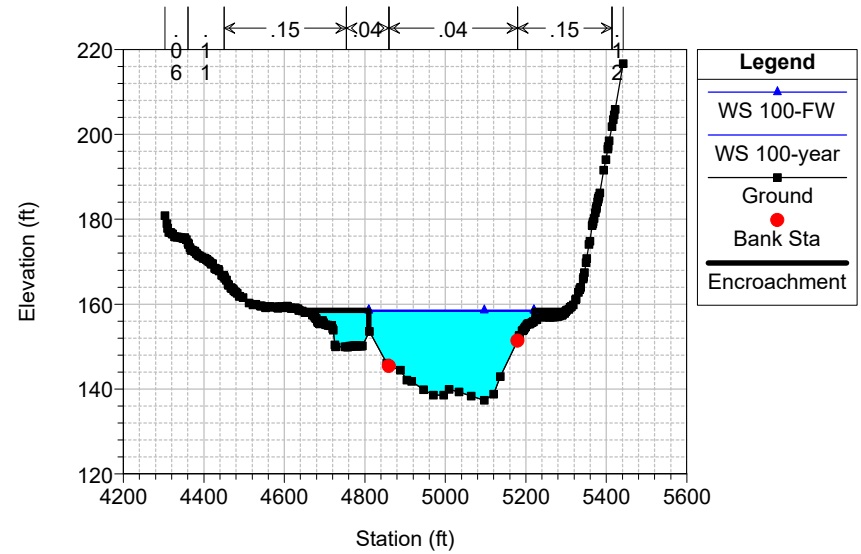
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SALUDA RIVER 23.0



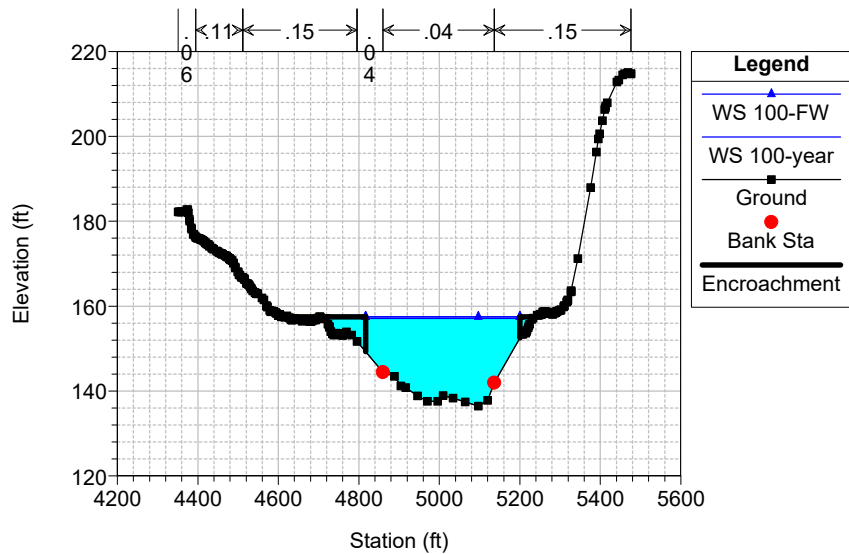
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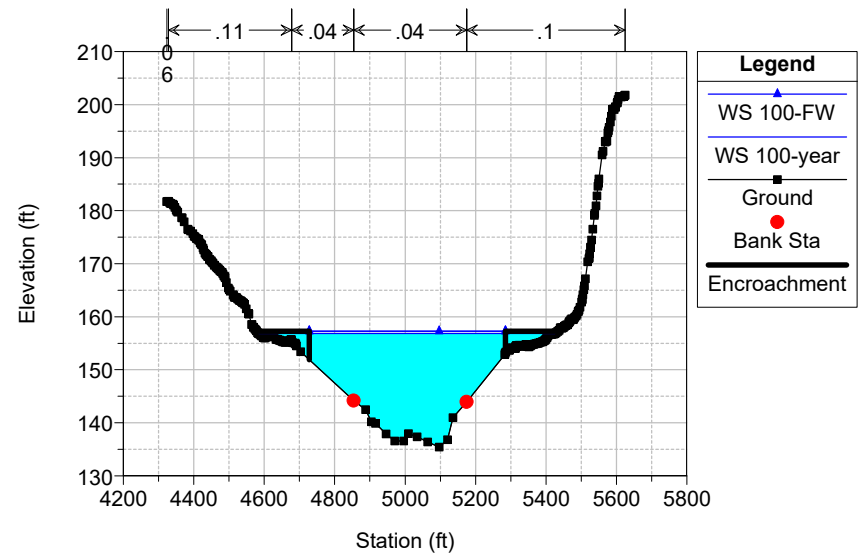
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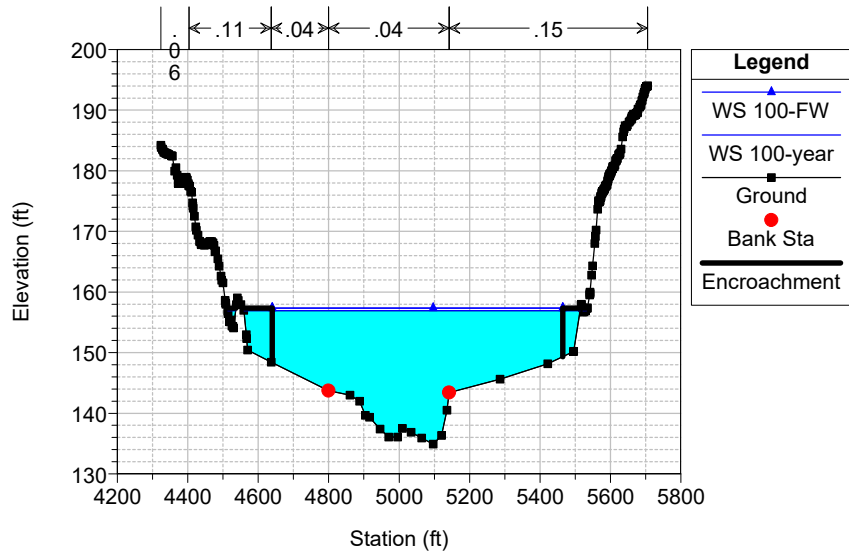
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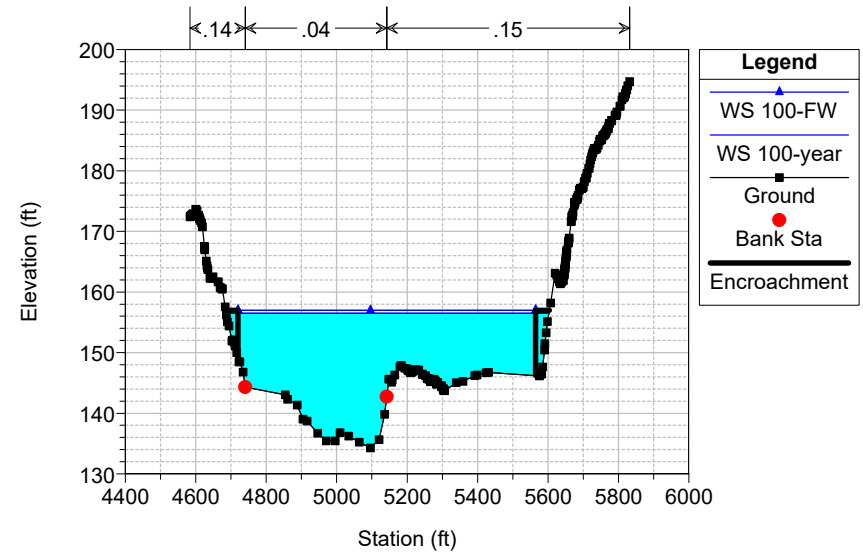
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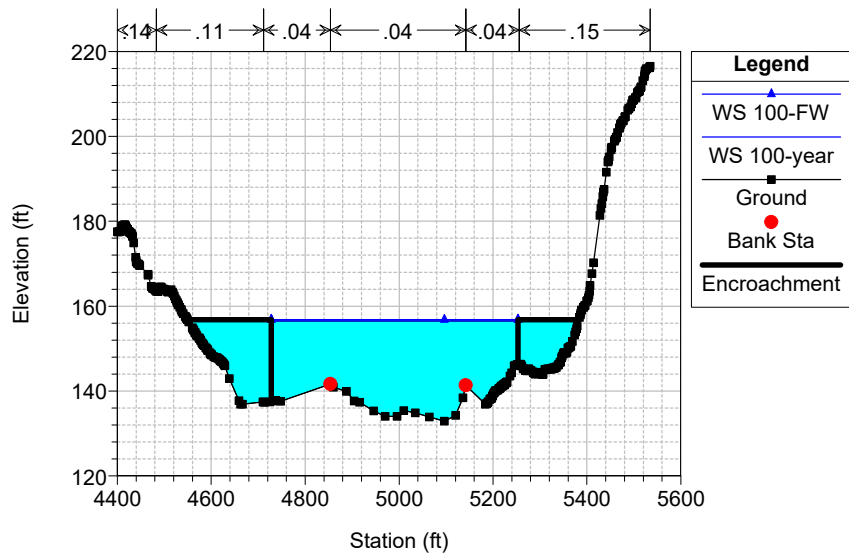
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SALUDA RIVER 18.0



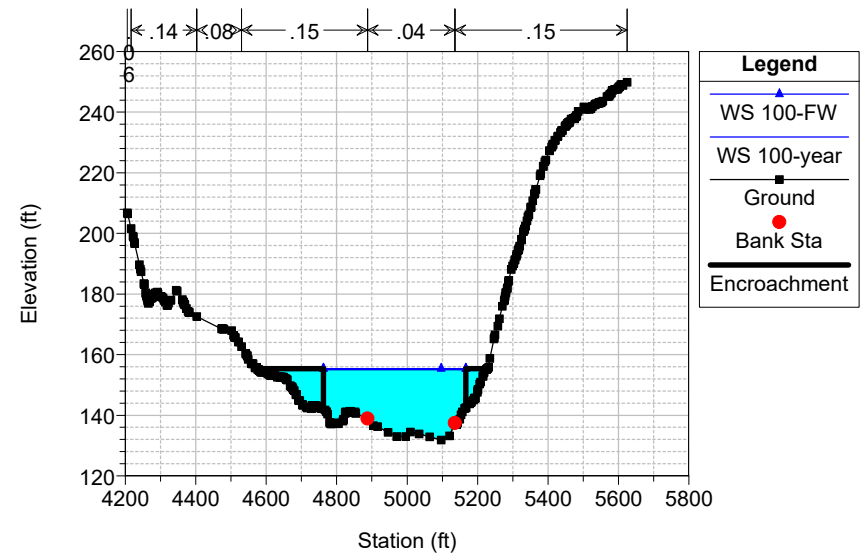
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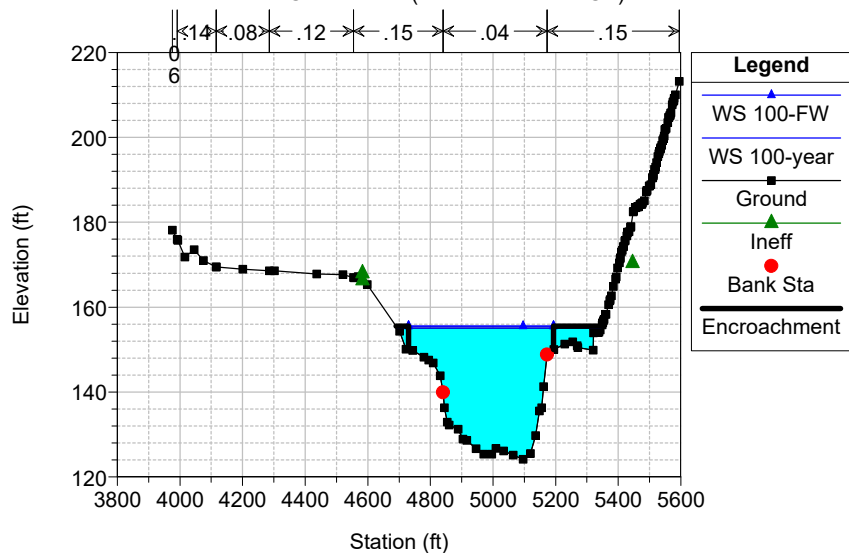
CCR SALUDA RIVER Detailed Study Plan: 1) FW_CEM 3/7/2022

SALUDA RIVER 16.0



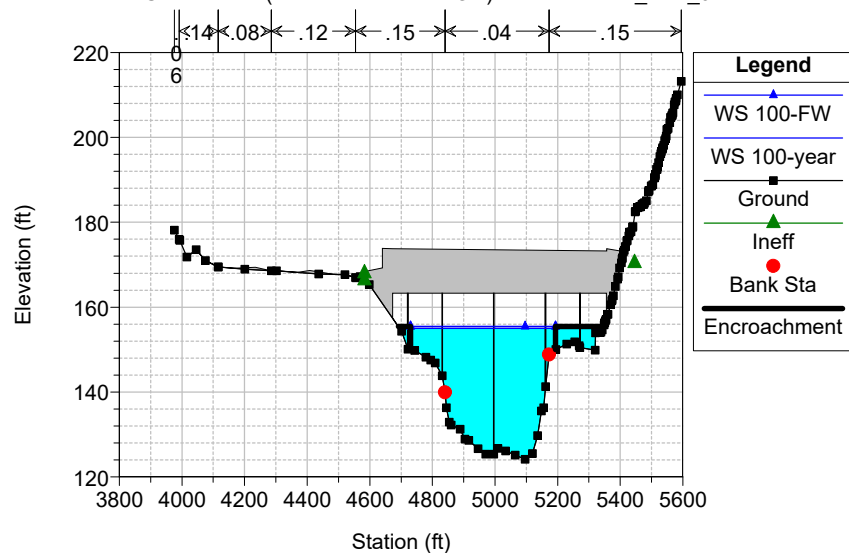
CCR SALUDA RIVER Detailed Study Plan: 1) FW_CEM 3/7/2022

SALUDA RIVER (Riverbanks Zoo - US)



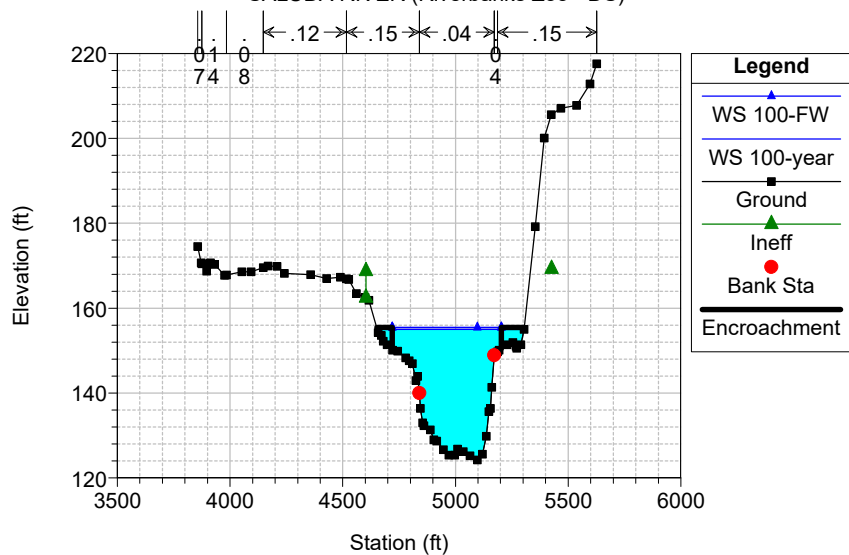
CCR SALUDA RIVER Detailed Study Plan: 1) FW_CEM 3/7/2022

SALUDA RIVER (Riverbanks Zoo - TOR) Structure ID: R_SAL_01Detail



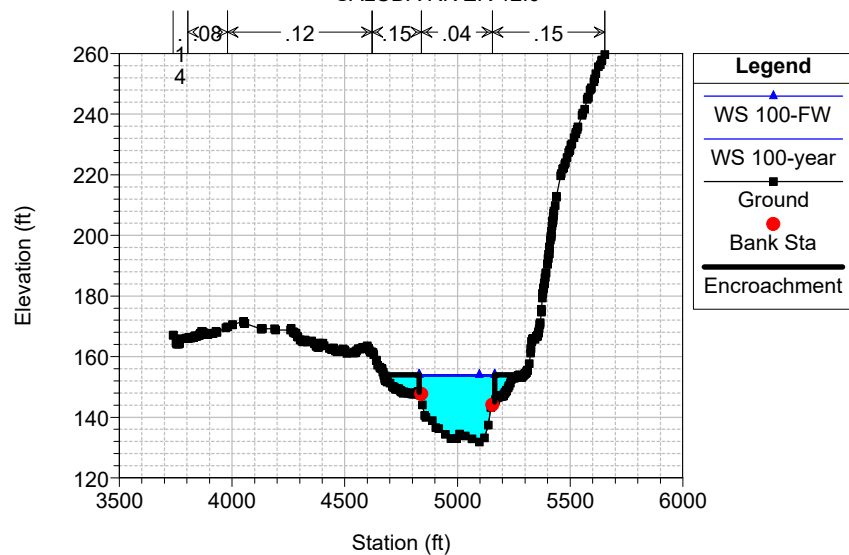
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SALUDA RIVER (Riverbanks Zoo - DS)



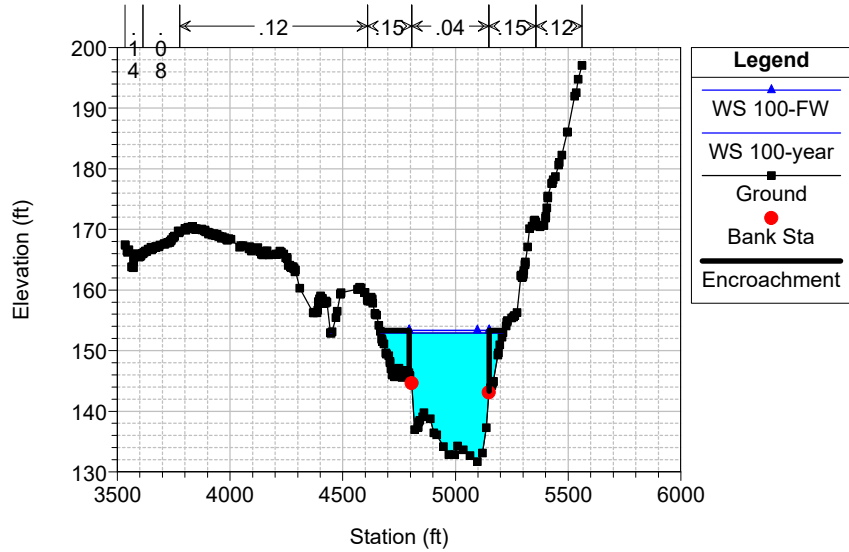
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SALUDA RIVER 12.0



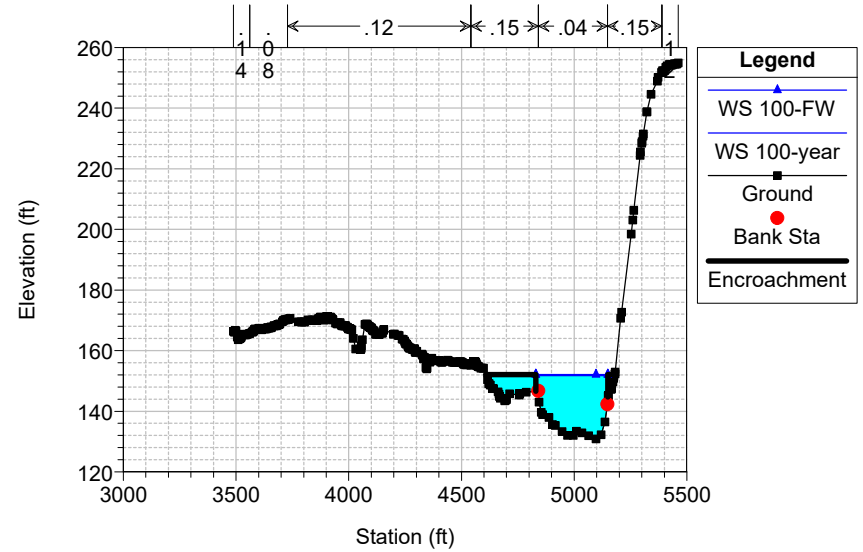
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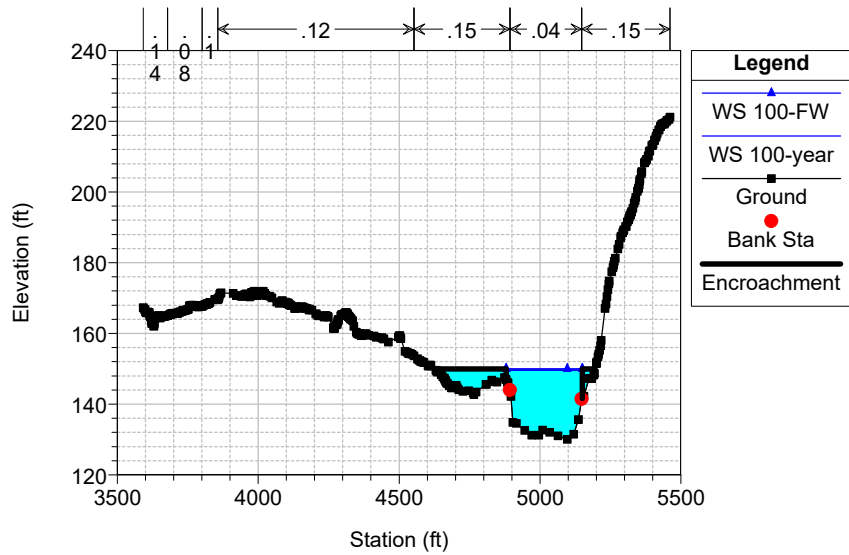
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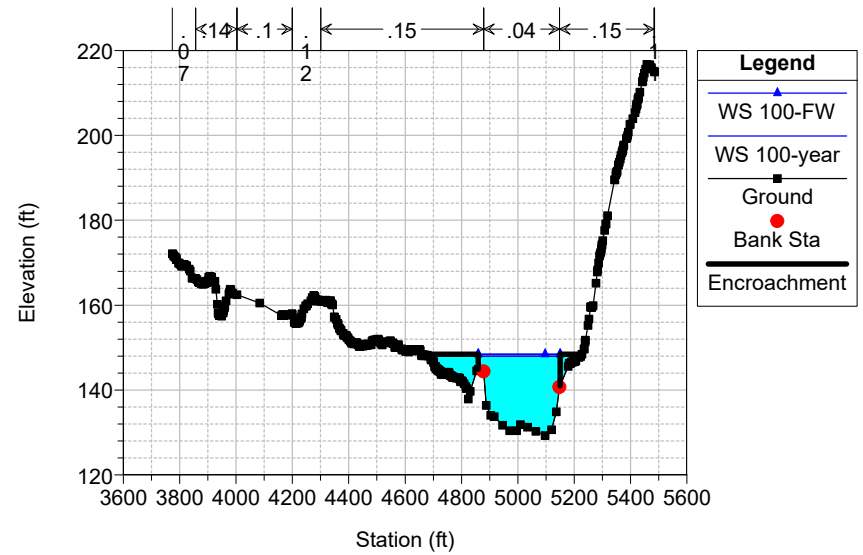
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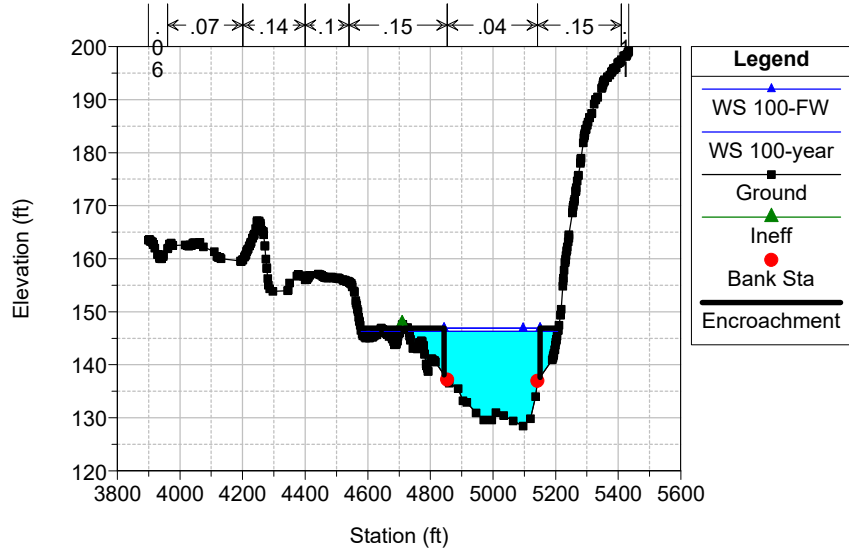
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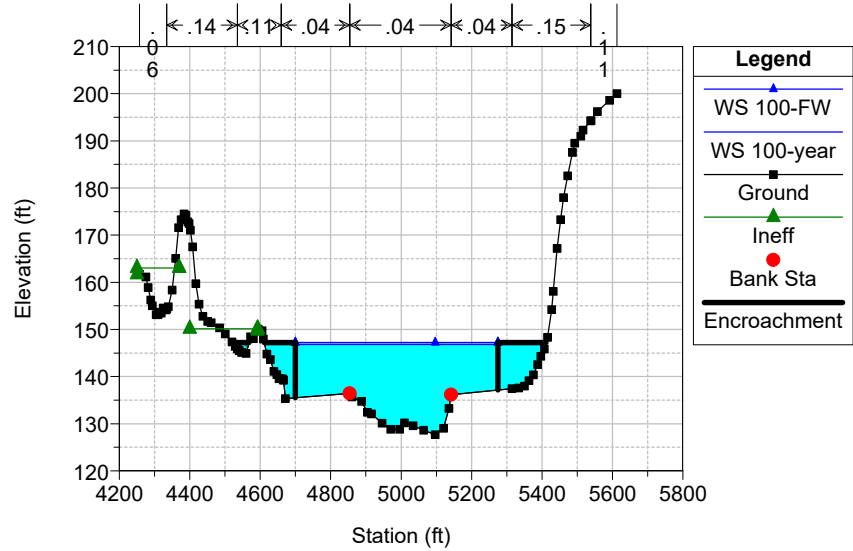
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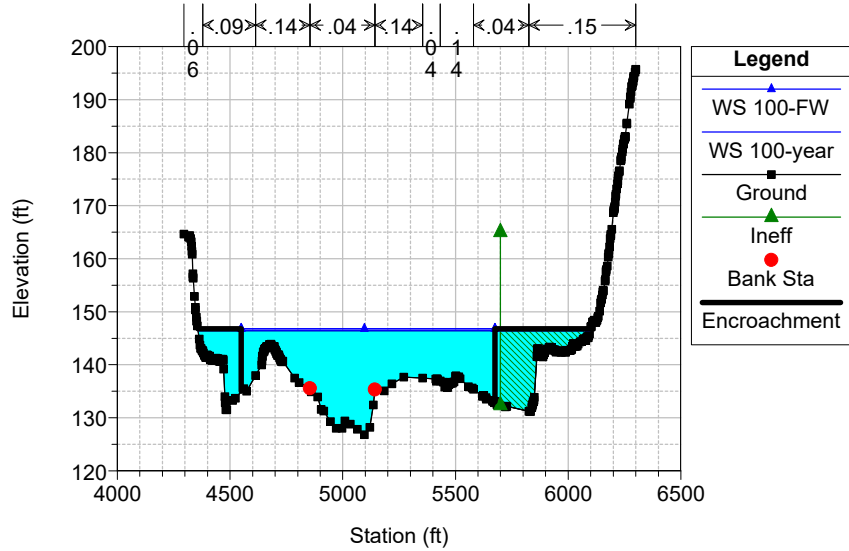
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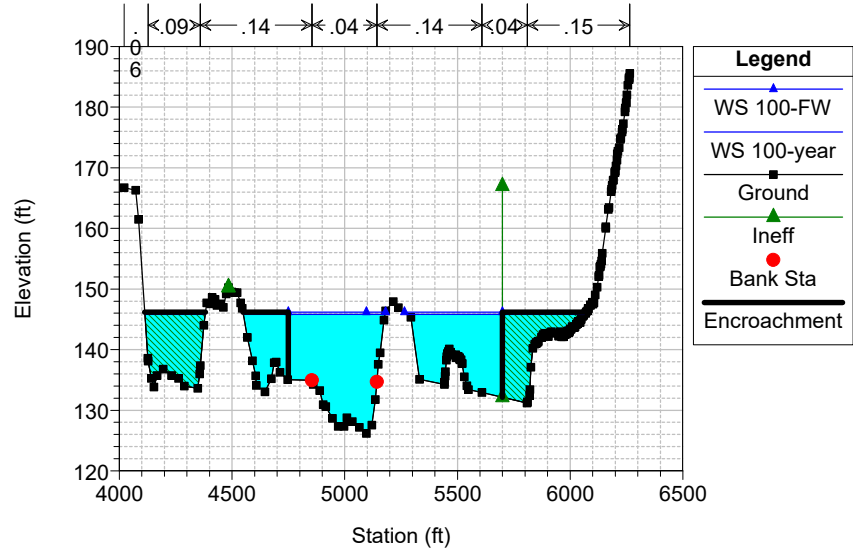
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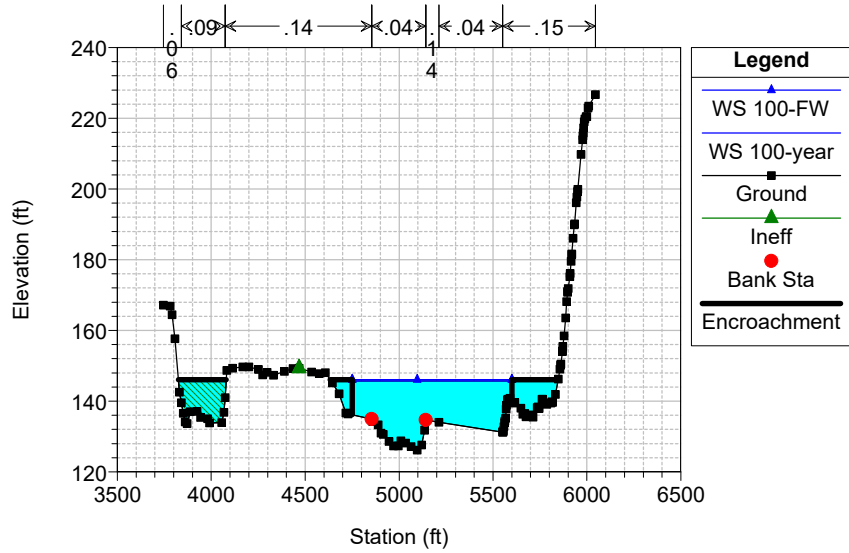
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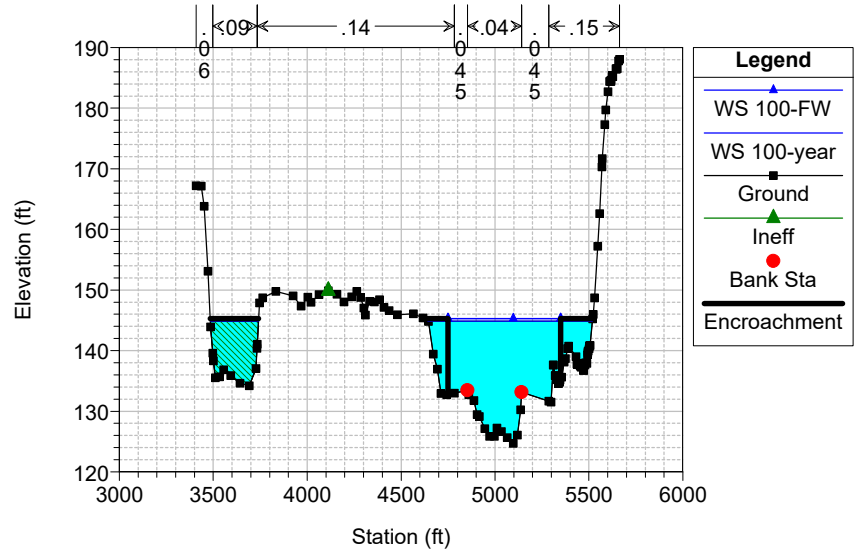
CCR SALUDA RIVER Detailed Study Plan: 1) FW_CEM 3/7/2022

SALUDA RIVER 3.0



CCR SALUDA RIVER Detailed Study Plan: 1) FW_CEM 3/7/2022

SALUDA RIVER 2.0



HEC-RAS Plan: FW_REV River: SALUDA RIVER Reach: Reach-1

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
Reach-1	37500	100-year	105000.0	161.62	192.40		193.3	0.000926	8.28	19236.18	1963.5	0.28
Reach-1	37500	100-FW	105000.0	161.62	193.16		194.2	0.000974	8.64	15448.93	960.0	0.28
Reach-1	35800	100-year	105000.0	152.22	192.53		192.6	0.000121	3.17	68152.96	5525.7	0.10
Reach-1	35800	100-FW	105000.0	152.22	193.23		193.3	0.000167	3.78	49092.14	3000.0	0.12
Reach-1	31500	100-year	105000.0	155.92	191.29		191.6	0.000544	6.22	34720.85	3909.4	0.21
Reach-1	31500	100-FW	105000.0	155.92	191.79		192.1	0.000528	6.21	28045.66	2010.0	0.21
Reach-1	28600	100-year	105000.0	155.72	190.11		190.4	0.000340	5.52	32935.23	2055.6	0.17
Reach-1	28600	100-FW	105000.0	155.72	190.69		190.9	0.000319	5.42	31555.90	1700.0	0.17
Reach-1	26000	100-year	105000.0	155.92	189.02		189.3	0.000476	5.84	29669.37	2214.6	0.20
Reach-1	26000	100-FW	105000.0	155.92	189.50		189.9	0.000535	6.27	24668.67	1335.0	0.21
Reach-1	25780	100-year	105000.0	156.12	188.55	173.5	189.1	0.000621	6.33	18659.82	2003.1	0.22
Reach-1	25780	100-FW	105000.0	156.12	189.17	173.5	189.7	0.000568	6.15	19207.08	1335.0	0.21
Reach-1	25550		Bridge									
Reach-1	25436	100-year	105000.0	156.12	187.32	174.7	188.1	0.000905	7.90	16584.66	1880.3	0.27
Reach-1	25436	100-FW	105000.0	156.12	187.71	174.7	188.6	0.000983	8.31	14742.74	1030.0	0.28
Reach-1	24800	100-year	105000.0	159.22	186.89		187.4	0.000858	7.30	20443.78	1233.6	0.26
Reach-1	24800	100-FW	105000.0	159.22	187.28		187.9	0.000926	7.37	19007.92	1030.0	0.26
Reach-1	22000	100-year	105000.0	156.92	182.86		184.0	0.001721	10.10	16131.29	1395.8	0.37
Reach-1	22000	100-FW	105000.0	156.92	183.16		184.3	0.001665	10.02	14519.49	939.1	0.36
Reach-1	18800	100-year	58600.0	155.30	180.84		181.2	0.000328	5.30	20567.75	1760.4	0.20
Reach-1	18800	100-FW	58600.0	155.30	181.38		181.7	0.000291	5.08	20808.83	1428.0	0.19
Reach-1	18200	100-year	58600.0	155.16	180.46	168.9	180.9	0.000446	5.95	16092.44	2013.6	0.23
Reach-1	18200	100-FW	58600.0	155.16	180.99	168.9	181.4	0.000425	5.91	15767.01	925.0	0.22
Reach-1	17840	100-year	58600.0	150.00	179.47	167.5	180.5	0.000804	8.51	8276.73	1852.0	0.31
Reach-1	17840	100-FW	58600.0	150.00	180.01	167.5	181.1	0.000765	8.42	7875.51	400.0	0.31
Reach-1	17790		Bridge									
Reach-1	17750	100-year	58600.0	150.00	178.56	167.4	179.6	0.000847	8.50	7796.64	1165.0	0.32
Reach-1	17750	100-FW	58600.0	150.00	179.11	167.4	180.1	0.000790	8.34	7983.83	400.0	0.31
Reach-1	17665	100-year	58600.0	150.00	178.53	166.5	179.5	0.001118	8.16	8864.03	1079.4	0.29
Reach-1	17665	100-FW	58600.0	150.00	179.10	166.5	180.0	0.001024	7.93	9164.72	625.2	0.28
Reach-1	17540		Bridge									
Reach-1	17365	100-year	58600.0	150.00	177.06	165.9	178.0	0.001255	7.87	9278.66	961.1	0.30
Reach-1	17365	100-FW	58600.0	150.00	177.78	165.9	178.6	0.001114	7.58	9688.00	600.0	0.29
Reach-1	17000	100-year	58600.0	154.95	174.03	172.1	176.6	0.006298	14.07	7021.52	902.4	0.70
Reach-1	17000	100-FW	58600.0	154.95	174.10	172.3	177.1	0.006965	14.86	5859.19	600.0	0.74
Reach-1	16600	100-year	58600.0	154.78	172.14		174.2	0.005063	11.89	6869.38	909.1	0.62
Reach-1	16600	100-FW	58600.0	154.78	172.42		174.5	0.004961	11.96	5925.33	600.0	0.62
Reach-1	16200	100-year	58600.0	153.94	171.33		172.4	0.002717	8.78	8627.41	899.8	0.46
Reach-1	16200	100-FW	58600.0	153.94	171.77		172.9	0.002525	8.67	8001.01	710.0	0.44
Reach-1	15700	100-year	58600.0	152.72	170.53		171.2	0.001936	7.86	10470.12	1206.5	0.39
Reach-1	15700	100-FW	58600.0	152.72	170.84		171.7	0.002108	8.34	8607.88	800.0	0.41
Reach-1	15200	100-year	58600.0	150.94	169.44		170.2	0.001490	7.97	10379.56	1160.0	0.39
Reach-1	15200	100-FW	58600.0	150.94	169.89		170.6	0.001379	7.84	9677.05	920.0	0.37
Reach-1	14700	100-year	58600.0	147.50	169.06		169.7	0.000898	7.29	12263.92	1141.4	0.31
Reach-1	14700	100-FW	58600.0	147.50	169.48		170.1	0.000913	7.46	11219.67	863.0	0.32
Reach-1	14200	100-year	58600.0	146.53	169.00	159.7	169.3	0.000416	5.63	16114.27	1532.9	0.22
Reach-1	14200	100-FW	58600.0	146.53	169.37	159.7	169.8	0.000437	5.83	11873.25	740.0	0.22
Reach-1	13600	100-year	58600.0	145.36	167.26		168.6	0.001452	10.46	12692.64	1328.4	0.41
Reach-1	13600	100-FW	58600.0	145.36	167.36		169.0	0.001655	11.21	9376.05	700.0	0.44
Reach-1	13000	100-year	58600.0	144.19	166.20		167.7	0.001664	10.49	9610.31	1054.5	0.43

HEC-RAS Plan: FW_REV River: SALUDA RIVER Reach: Reach-1 (Continued)

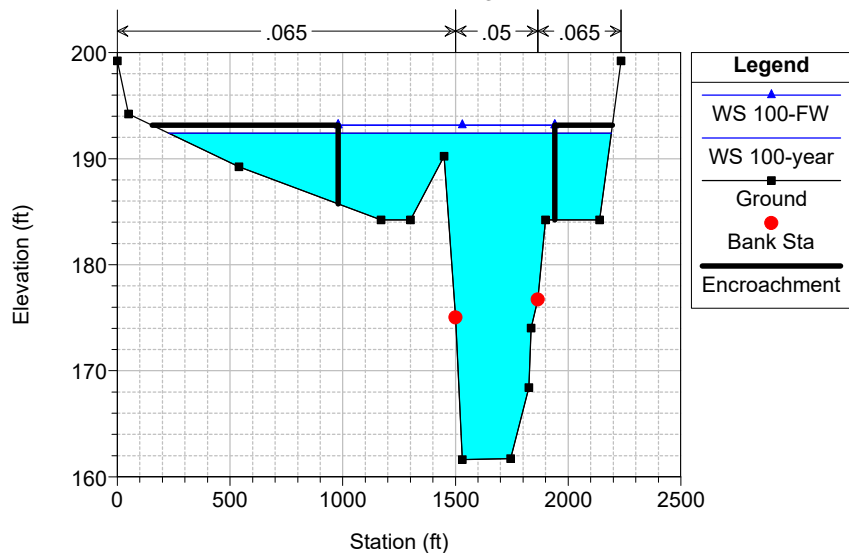
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	13000	100-FW	58600.0	144.19	166.17		167.9	0.001907	11.21	7028.43	519.0	0.46
Reach-1	12500	100-year	58600.0	143.22	165.41		166.8	0.001638	10.47	9471.80	1003.2	0.43
Reach-1	12500	100-FW	58600.0	143.22	165.40		167.0	0.001746	10.81	7795.46	561.0	0.44
Reach-1	12000	100-year	58600.0	142.25	162.08	158.3	165.4	0.004005	14.64	4213.90	331.9	0.65
Reach-1	12000	100-FW	58600.0	142.25	162.27	158.2	165.5	0.003862	14.50	4170.97	278.0	0.64
Reach-1	11500	100-year	58600.0	141.27	161.95	154.9	163.6	0.001783	10.48	6437.99	546.2	0.44
Reach-1	11500	100-FW	58600.0	141.27	162.15	154.9	163.8	0.001734	10.41	6116.97	376.0	0.44
Reach-1	11000	100-year	58600.0	140.30	160.67	154.1	162.6	0.002102	11.22	5766.42	643.6	0.48
Reach-1	11000	100-FW	58600.0	140.30	160.97	154.1	162.8	0.001991	11.04	5555.70	345.0	0.47
Reach-1	10500	100-year	58600.0	139.33	159.98	153.0	161.5	0.001803	10.05	6704.48	732.9	0.44
Reach-1	10500	100-FW	58600.0	139.33	160.29	153.0	161.8	0.001728	9.97	6158.62	394.0	0.43
Reach-1	10000	100-year	58600.0	138.36	158.86		160.6	0.001856	10.71	6618.73	524.2	0.45
Reach-1	10000	100-FW	58600.0	138.36	159.23		160.9	0.001758	10.57	6220.89	385.0	0.44
Reach-1	9500	100-year	58600.0	137.38	158.31		159.6	0.001510	9.60	7058.45	654.0	0.41
Reach-1	9500	100-FW	58600.0	137.38	158.53		160.0	0.001605	9.98	6201.33	410.0	0.42
Reach-1	9000	100-year	58600.0	136.41	157.14		158.8	0.001770	10.71	6575.83	594.2	0.44
Reach-1	9000	100-FW	58600.0	136.41	157.48		159.2	0.001732	10.73	6177.69	383.0	0.44
Reach-1	8500	100-year	58600.0	135.44	156.85		157.9	0.001183	8.77	8345.74	841.6	0.36
Reach-1	8500	100-FW	58600.0	135.44	157.30		158.3	0.001079	8.51	8076.02	557.0	0.35
Reach-1	8240	100-year	58600.0	134.93	156.90		157.5	0.000769	7.10	12328.67	981.0	0.29
Reach-1	8240	100-FW	58600.0	134.93	157.32		158.0	0.000738	7.06	11798.73	825.0	0.29
Reach-1	7900	100-year	58600.0	134.27	156.49		157.2	0.000878	7.39	12019.61	916.7	0.31
Reach-1	7900	100-FW	58600.0	134.27	156.98		157.7	0.000809	7.22	12026.40	845.0	0.30
Reach-1	7400	100-year	58600.0	132.87	156.47		156.8	0.000412	5.66	13376.63	831.2	0.22
Reach-1	7400	100-FW	58600.0	132.87	156.79		157.3	0.000505	6.33	10057.41	525.0	0.24
Reach-1	6900	100-year	58600.0	131.87	155.02		156.4	0.001258	10.00	9247.99	645.9	0.38
Reach-1	6900	100-FW	58600.0	131.87	155.40		156.9	0.001259	10.12	7796.50	405.0	0.39
Reach-1	6450	100-year	58600.0	124.16	155.08	138.0	155.7	0.000407	6.55	10440.25	650.0	0.22
Reach-1	6450	100-FW	58600.0	124.16	155.52	138.0	156.2	0.000388	6.47	9967.18	463.0	0.22
Reach-1	6350		Bridge									
Reach-1	6270	100-year	58600.0	124.22	154.98	138.1	155.6	0.000414	6.58	10341.16	650.5	0.23
Reach-1	6270	100-FW	58600.0	124.22	155.42	138.1	156.1	0.000393	6.48	10029.67	485.0	0.22
Reach-1	5900	100-year	58600.0	131.87	153.57		155.1	0.001579	10.07	6945.22	602.1	0.42
Reach-1	5900	100-FW	58600.0	131.87	153.96		155.5	0.001529	10.05	5971.14	335.0	0.41
Reach-1	5400	100-year	58600.0	131.71	152.92		154.3	0.001456	9.51	7119.70	547.0	0.40
Reach-1	5400	100-FW	58600.0	131.71	153.36		154.7	0.001398	9.47	6281.90	355.0	0.39
Reach-1	4900	100-year	58600.0	130.90	151.76		153.5	0.001834	10.59	6768.36	567.9	0.45
Reach-1	4900	100-FW	58600.0	130.90	152.14		153.9	0.001816	10.69	5548.98	320.0	0.45
Reach-1	4400	100-year	58600.0	130.09	149.58		152.2	0.002990	13.19	5563.29	564.3	0.57
Reach-1	4400	100-FW	58600.0	130.09	149.94		152.7	0.002955	13.29	4473.81	270.0	0.56
Reach-1	3900	100-year	58600.0	129.27	147.97		150.6	0.003278	13.29	5364.19	539.3	0.59
Reach-1	3900	100-FW	58600.0	129.27	148.43		151.2	0.003135	13.25	4498.35	290.0	0.58
Reach-1	3400	100-year	58600.0	128.46	146.30	142.4	148.9	0.003476	13.22	5307.66	582.6	0.60
Reach-1	3400	100-FW	58600.0	128.46	146.90	142.3	149.5	0.003216	13.05	4637.88	306.0	0.58
Reach-1	2900	100-year	58600.0	127.65	146.80	140.7	147.5	0.001044	7.66	9339.36	839.4	0.34
Reach-1	2900	100-FW	58600.0	127.65	147.21	140.8	148.1	0.001185	8.30	7928.14	575.0	0.36
Reach-1	2400	100-year	58600.0	126.84	146.41	139.6	146.9	0.000890	7.19	14365.48	1739.0	0.31
Reach-1	2400	100-FW	58600.0	126.84	146.80	140.1	147.5	0.001008	7.78	12912.52	1125.0	0.33
Reach-1	2000	100-year	58600.0	126.19	145.80	139.0	146.6	0.001182	8.30	12221.15	1680.0	0.36
Reach-1	2000	100-FW	58600.0	126.19	146.18	139.0	147.1	0.001248	8.66	10712.20	866.1	0.37

HEC-RAS Plan: FW_REV River: SALUDA RIVER Reach: Reach-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
Reach-1	1600	100-year	58600.0	126.19	145.69	137.8	146.1	0.000679	6.27	13810.17	1461.1	0.27
Reach-1	1600	100-FW	58600.0	126.19	146.10	137.8	146.6	0.000668	6.32	11786.78	850.0	0.27
Reach-1	1100	100-year	58600.0	124.69	144.88	137.7	145.6	0.001052	8.02	10526.49	1131.6	0.34
Reach-1	1100	100-FW	58600.0	124.69	145.28	137.6	146.1	0.001050	8.13	8887.34	600.0	0.34

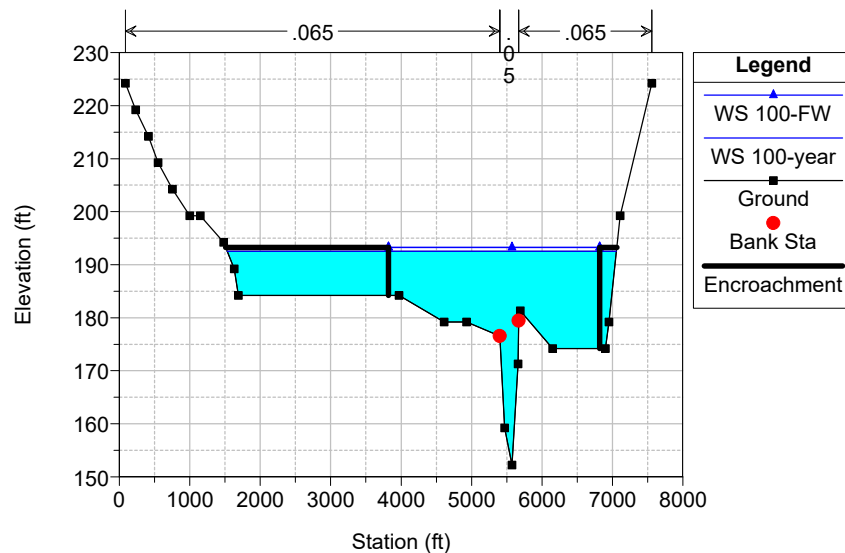
CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

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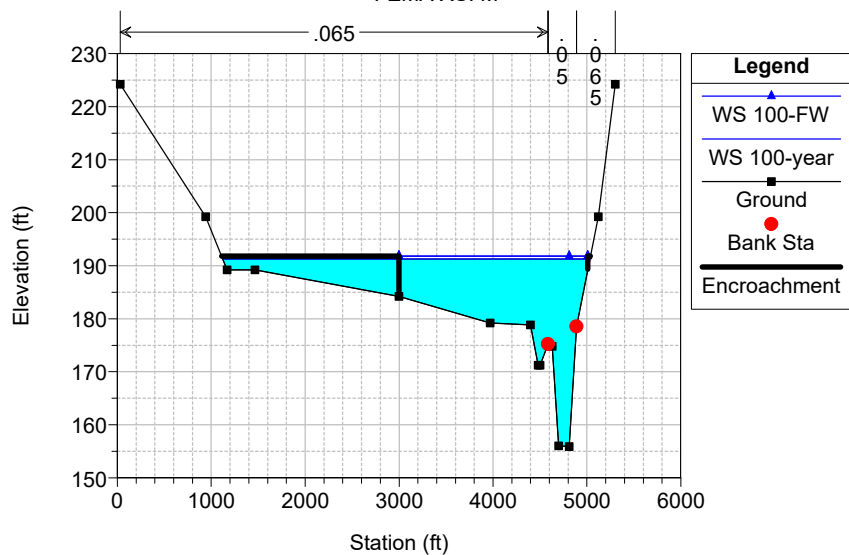
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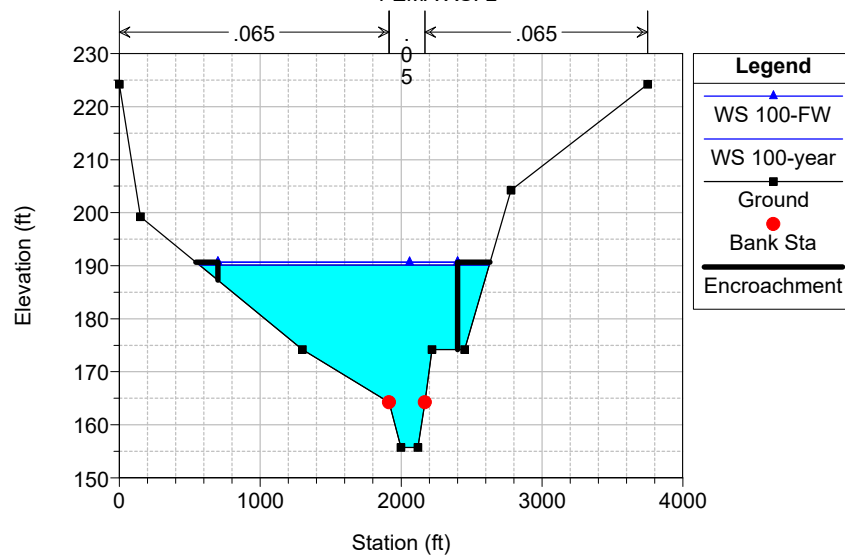
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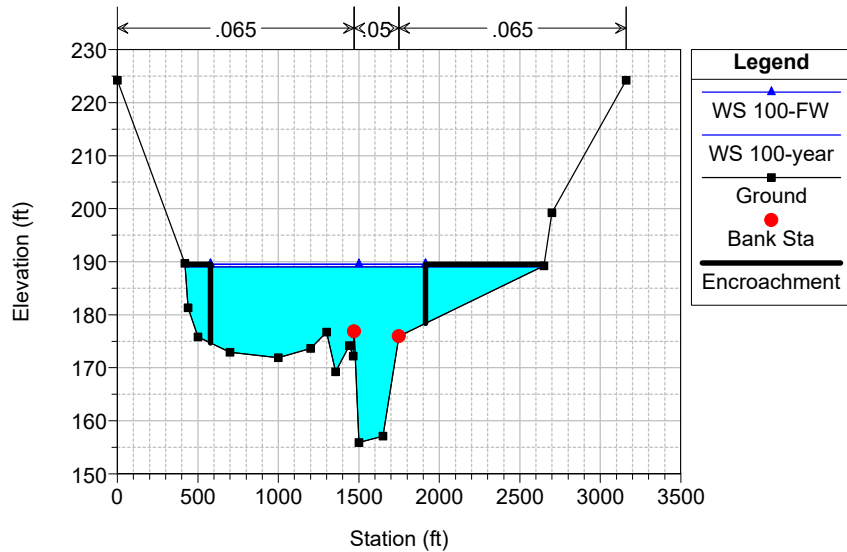
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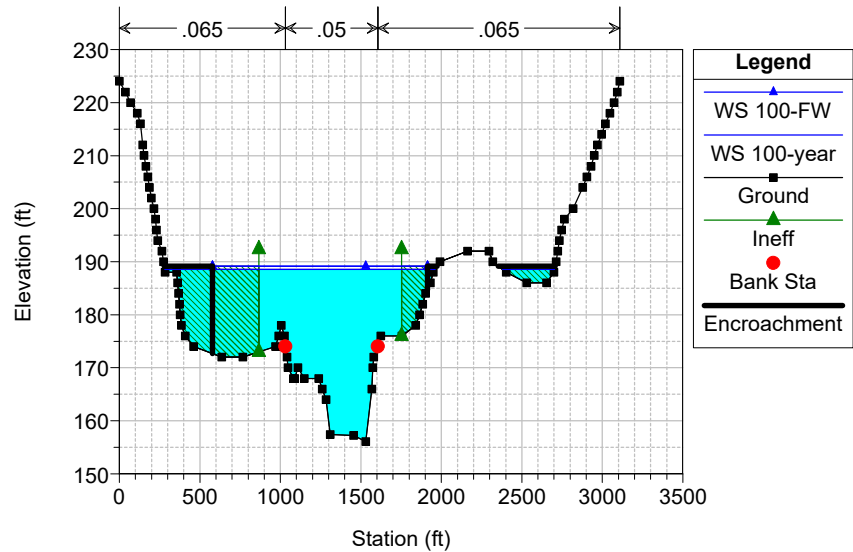
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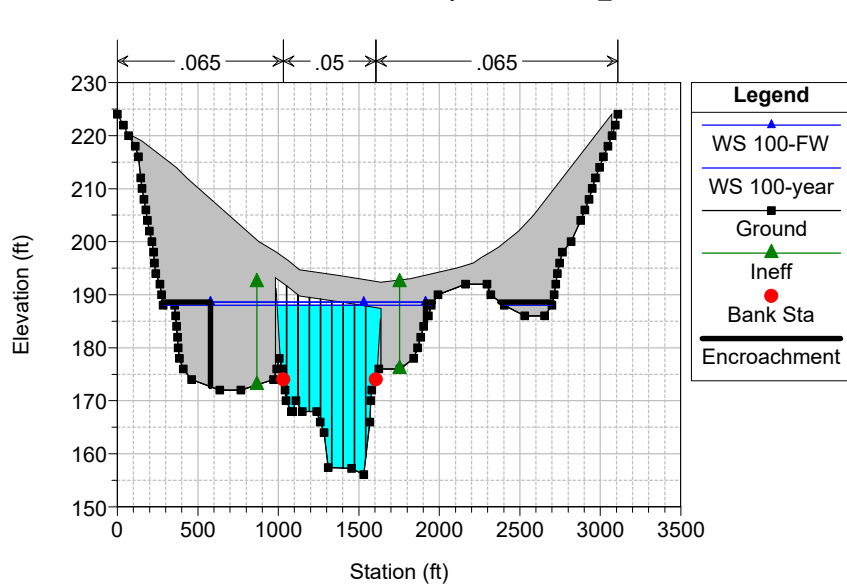


CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

New Section US I-20

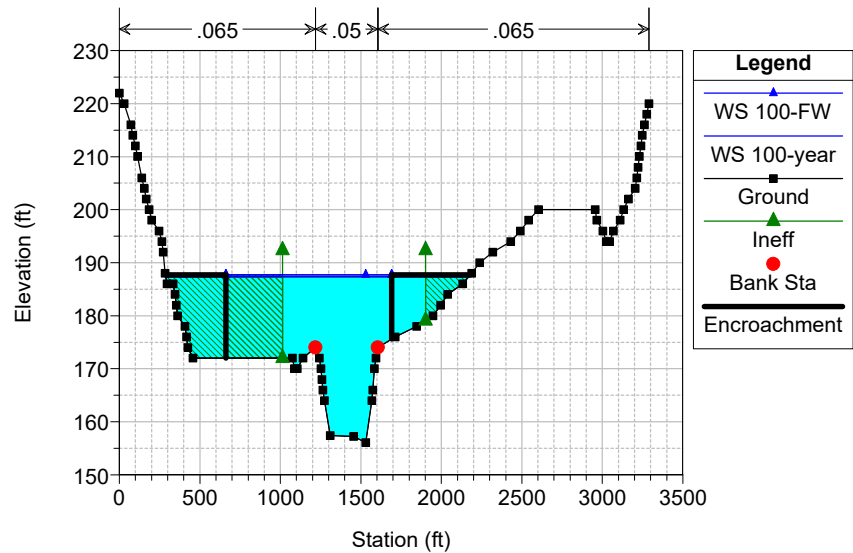


CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

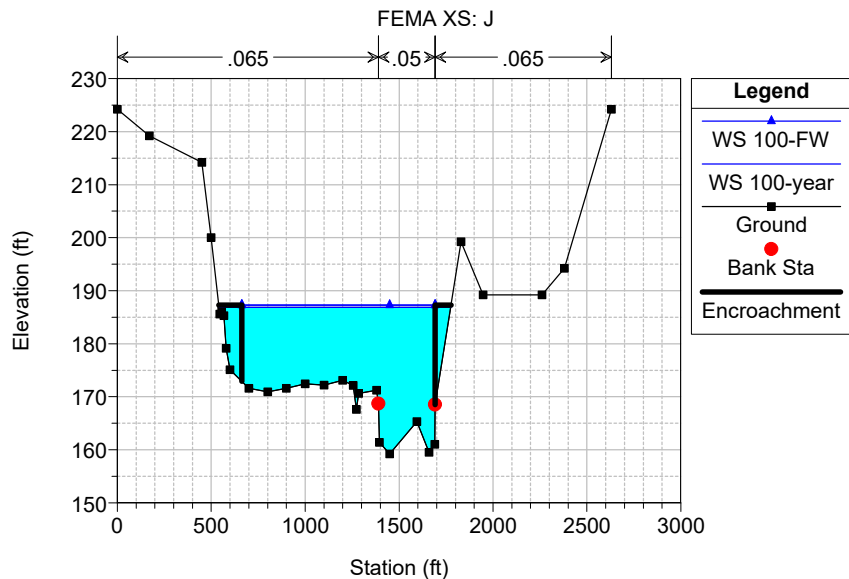


CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

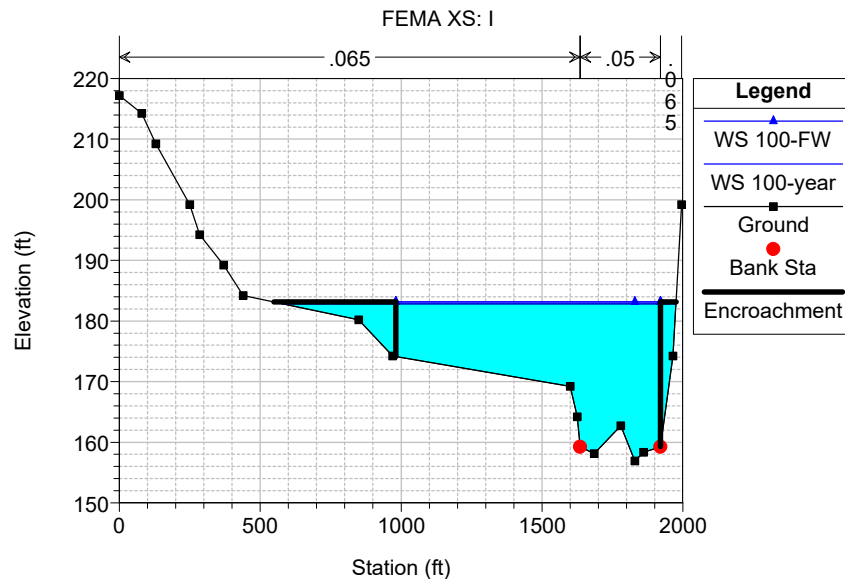
New Section DS of I-20



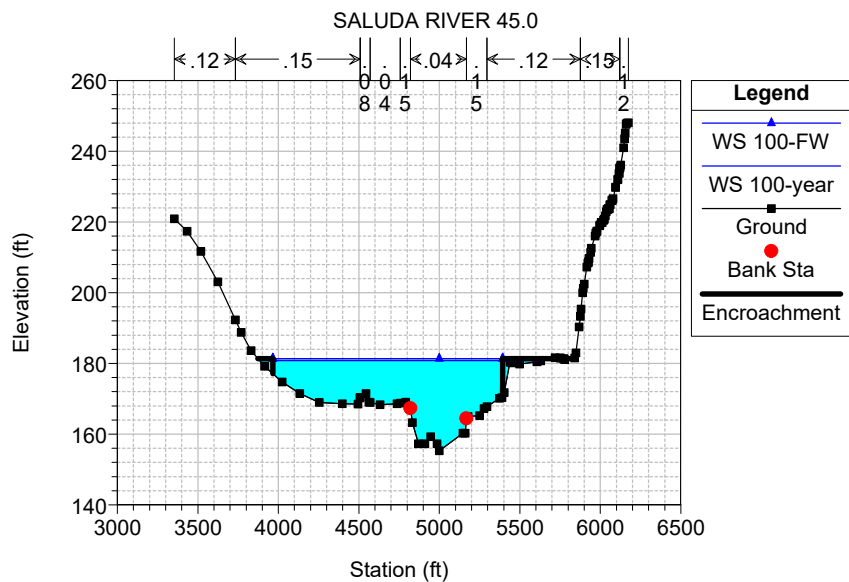
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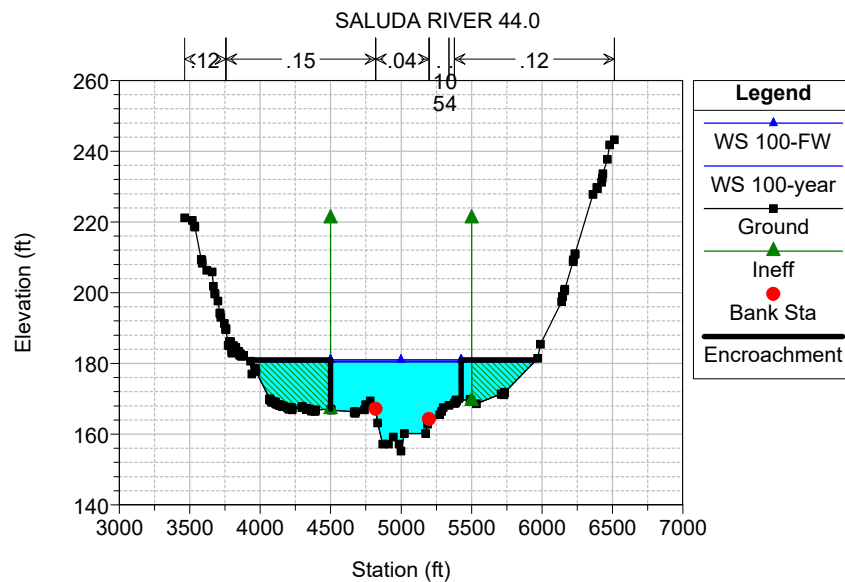
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CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

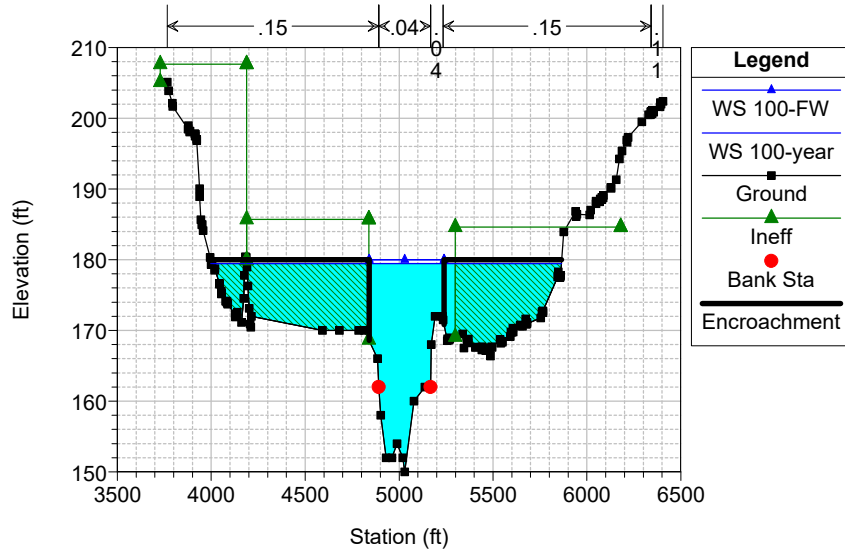


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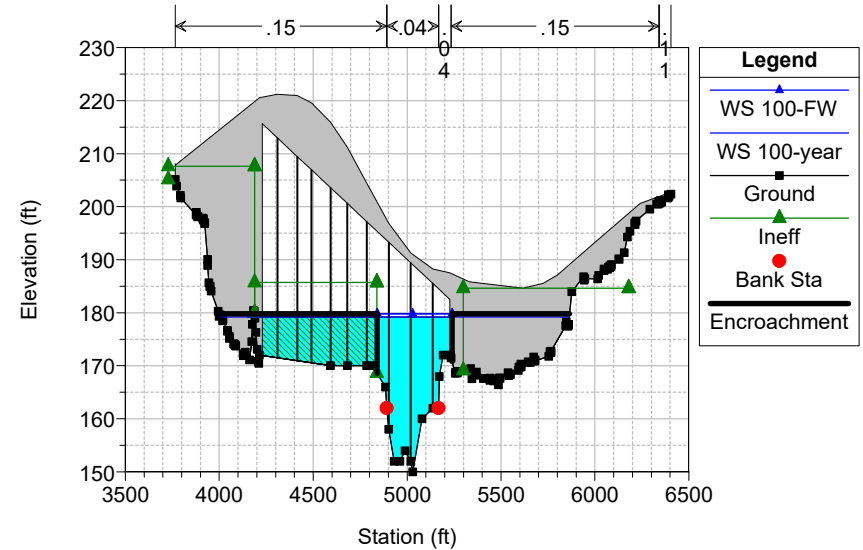
CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

SALUDA RIVER (I-26 Ramp - US)



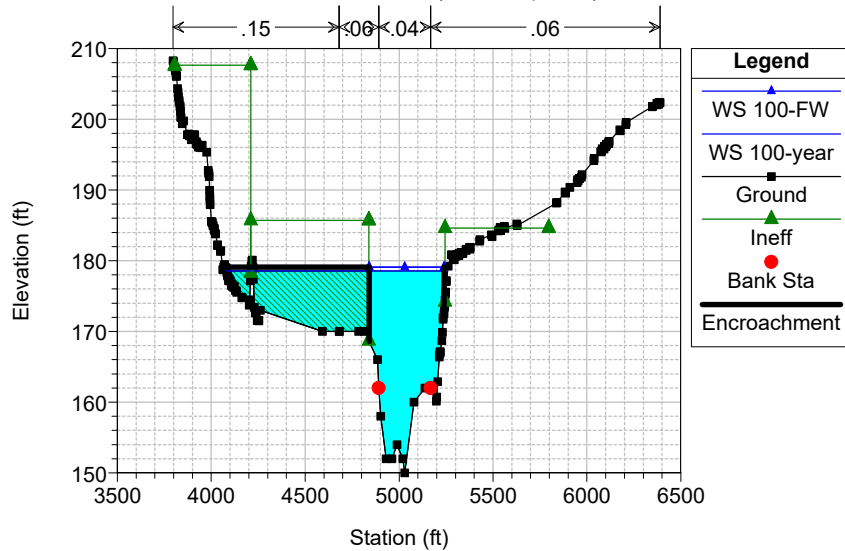
CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

SALUDA RIVER (I-26 Ramp - TOR) Structure ID: I-26 RampDetailed



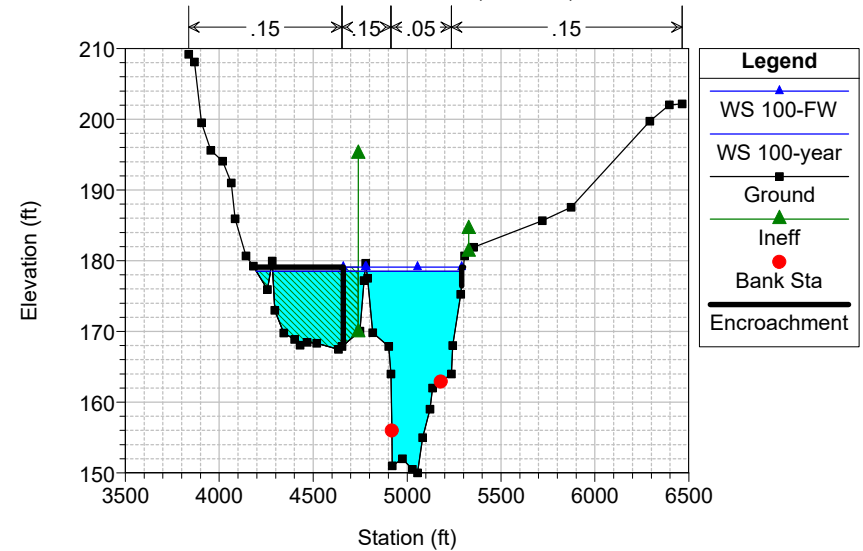
CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

SALUDA RIVER (I-26 Ramp - DS)



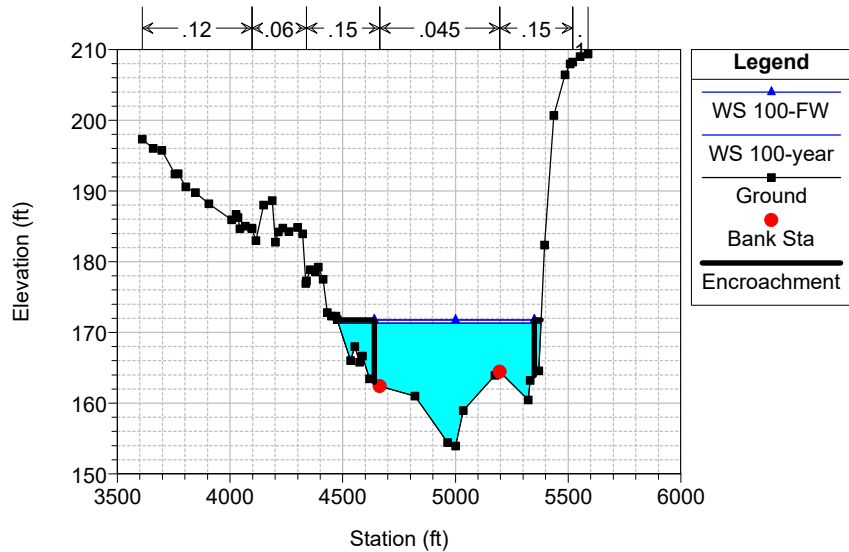
CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

SALUDA RIVER (I-26 - US)



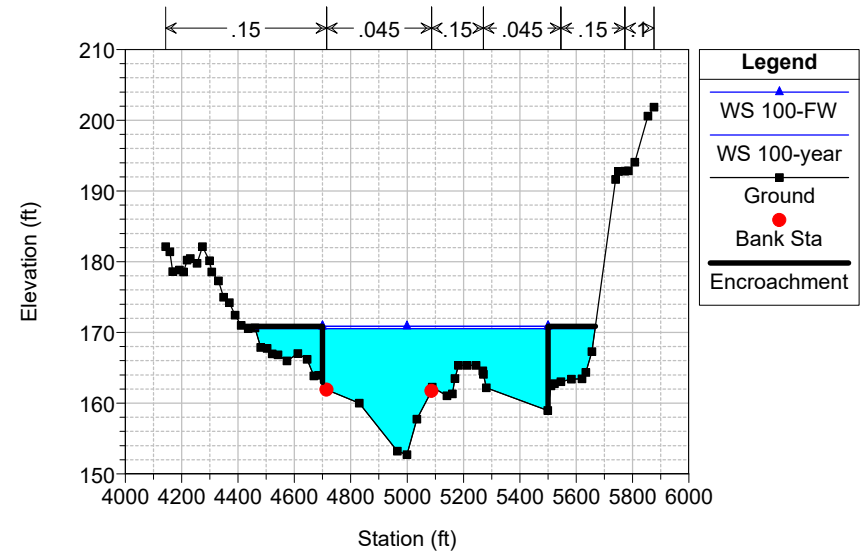
CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

SALUDA RIVER 35.0



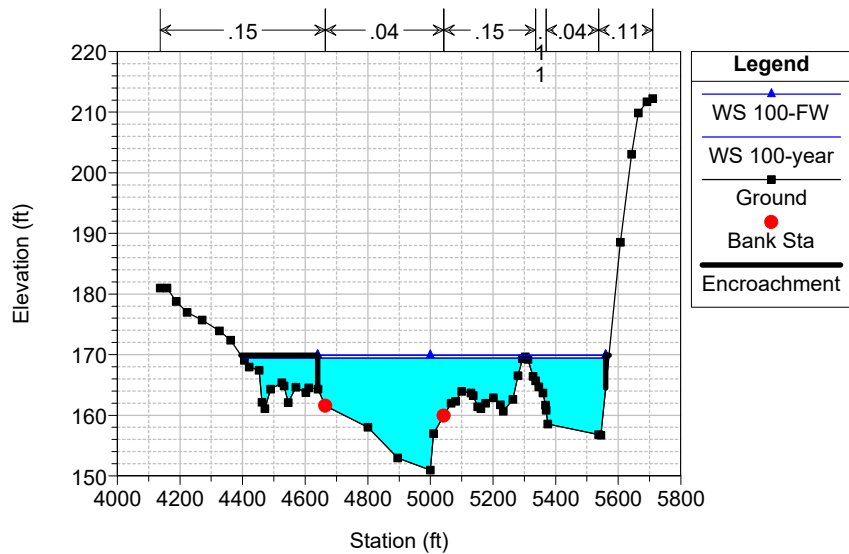
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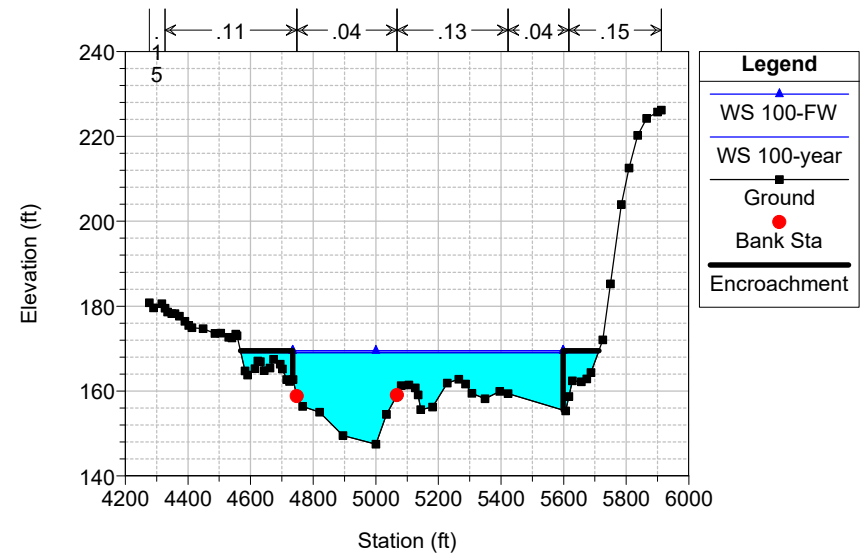
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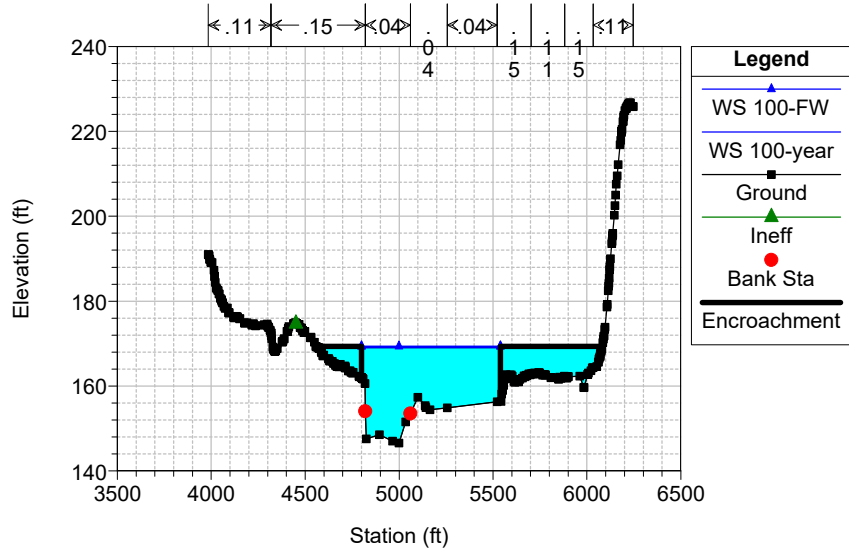
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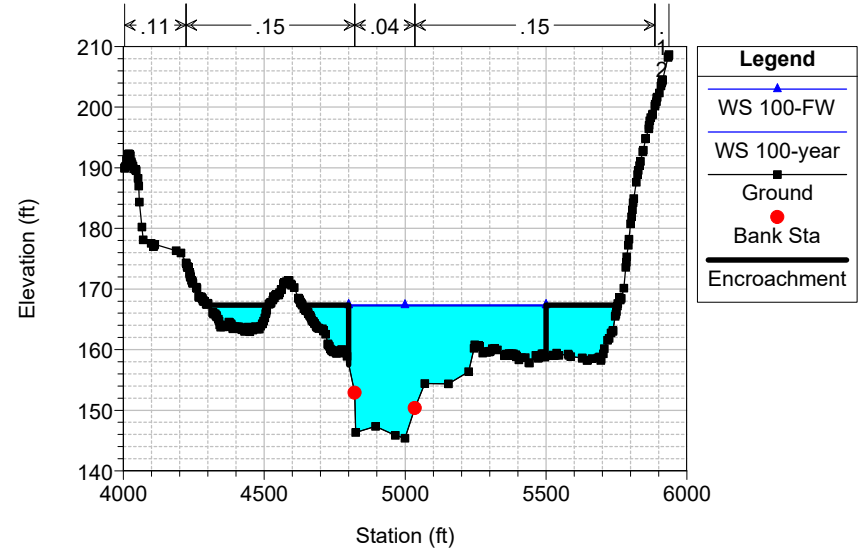
CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

SALUDA RIVER 31.0



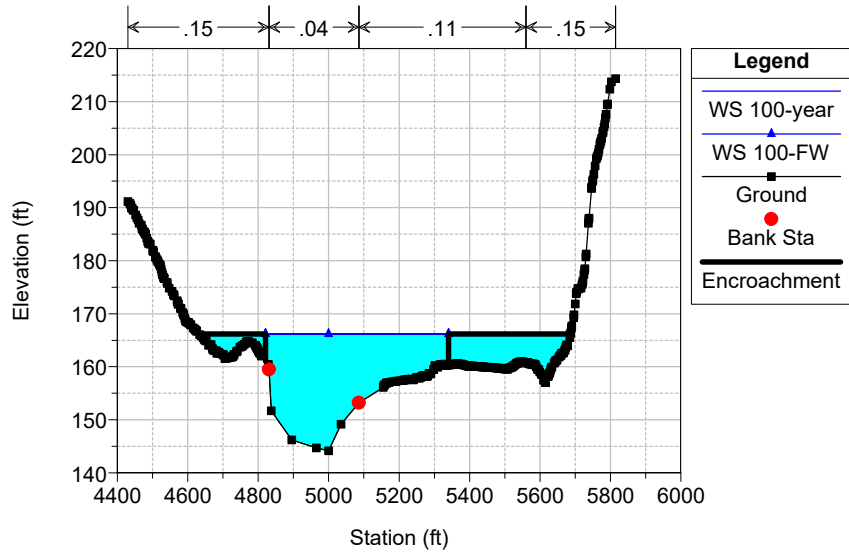
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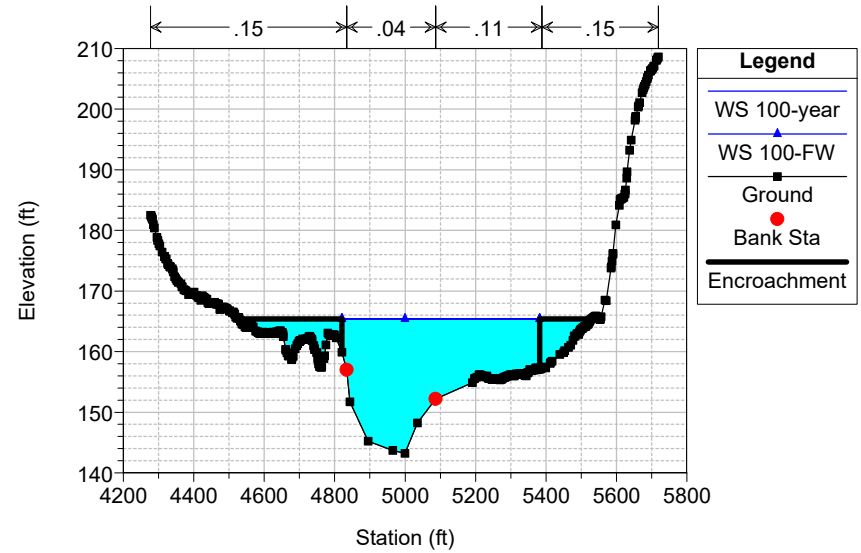
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SALUDA RIVER 29.0



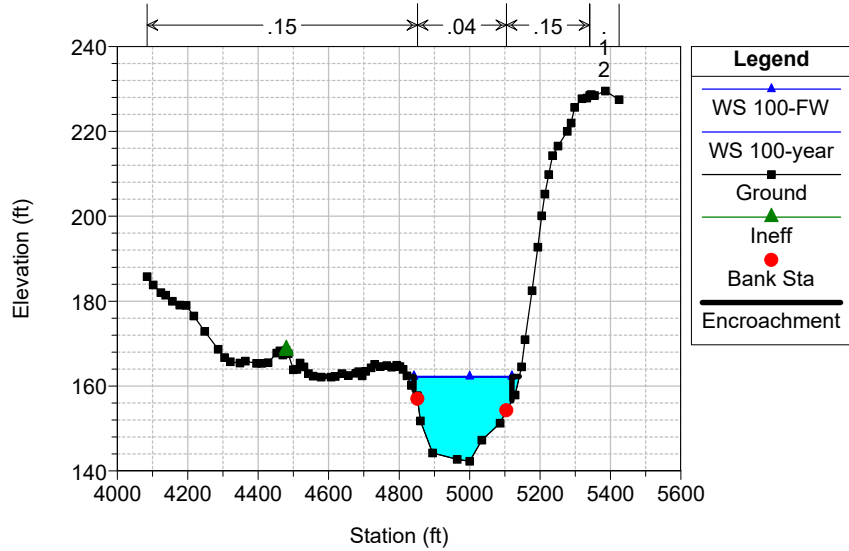
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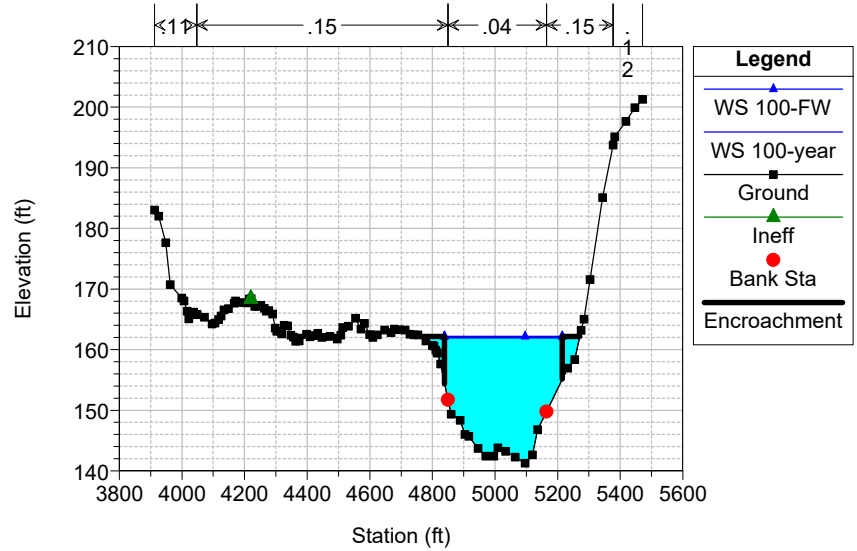
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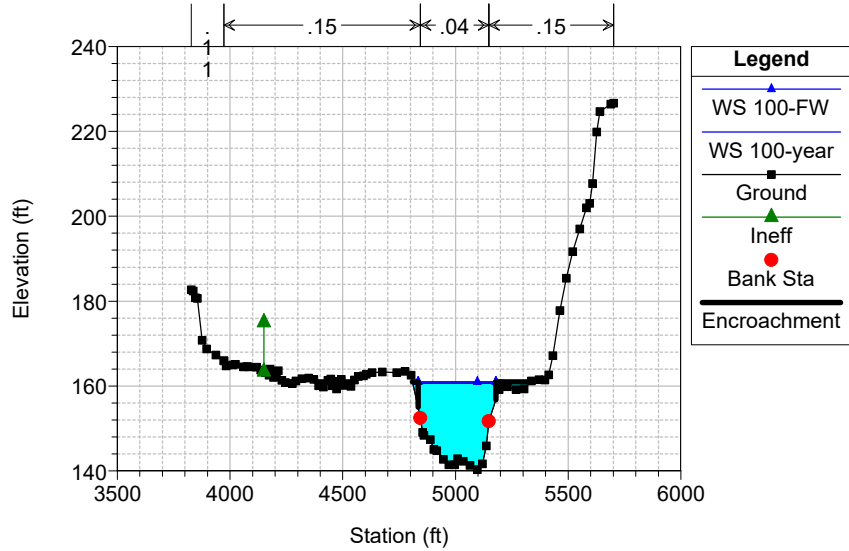
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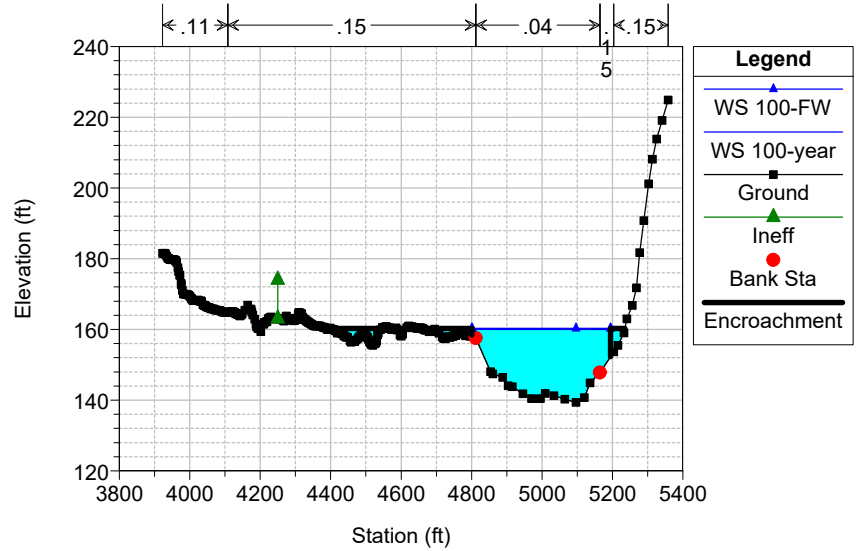
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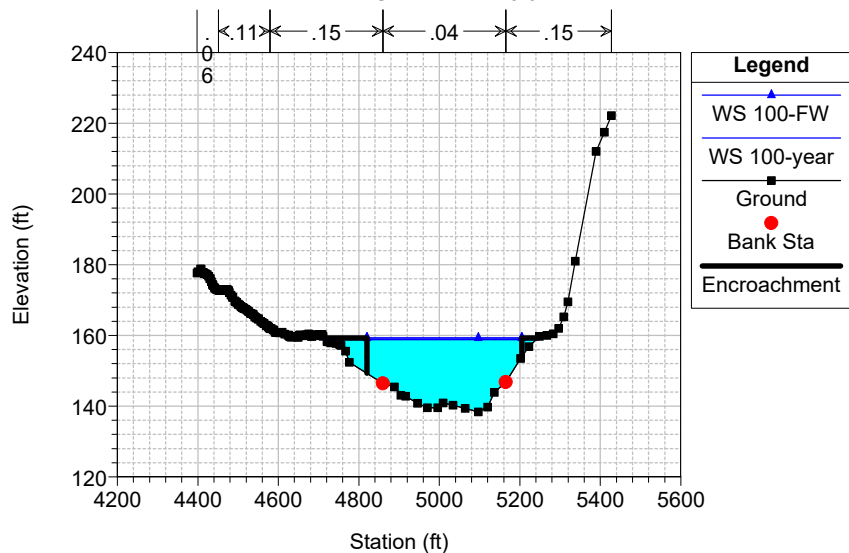
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SALUDA RIVER 24.0



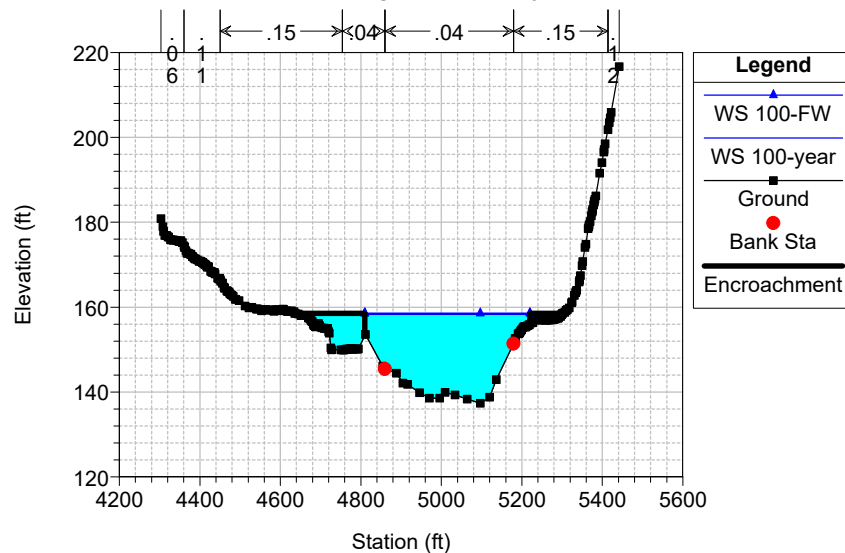
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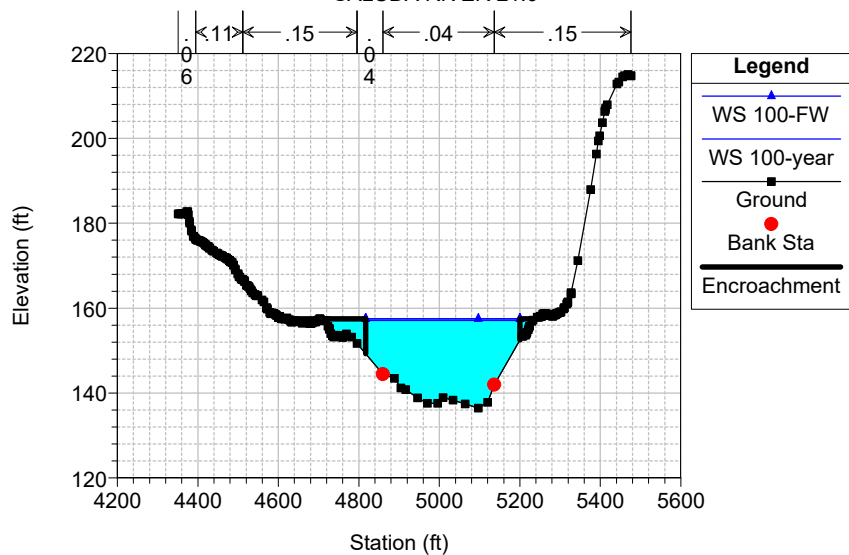
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SALUDA RIVER 22.0



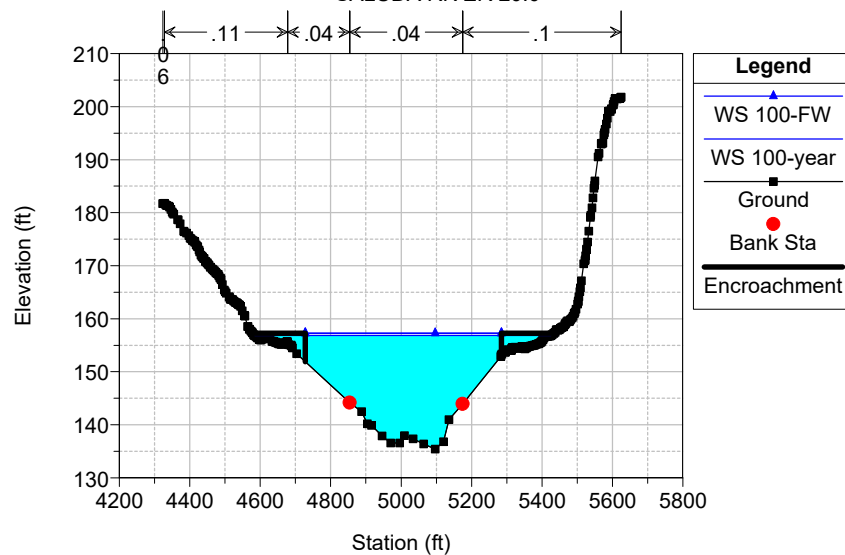
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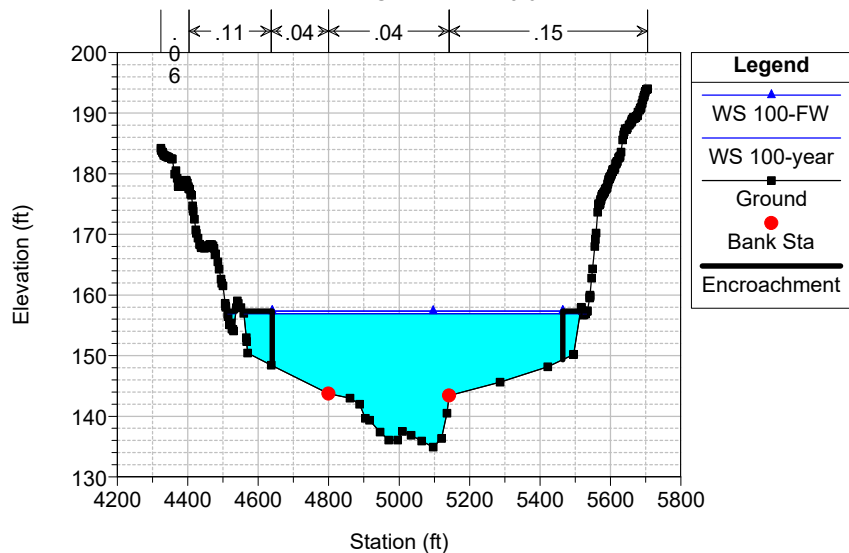
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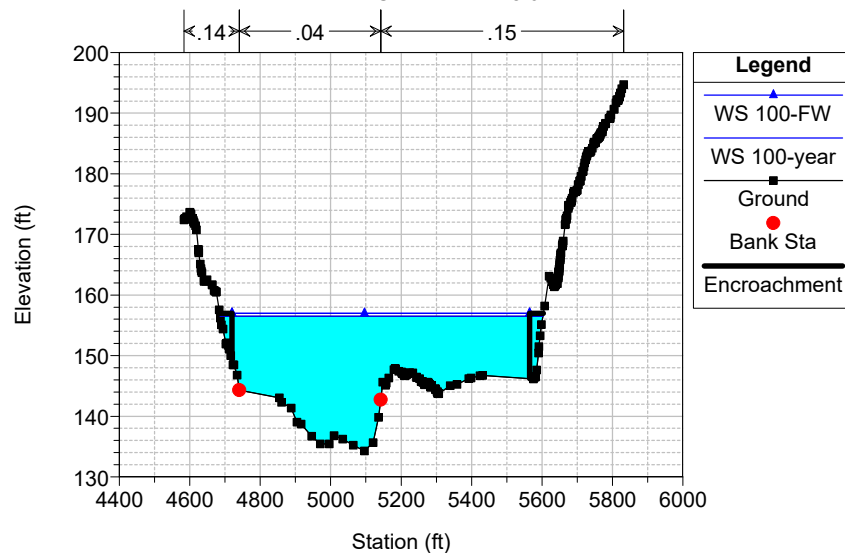
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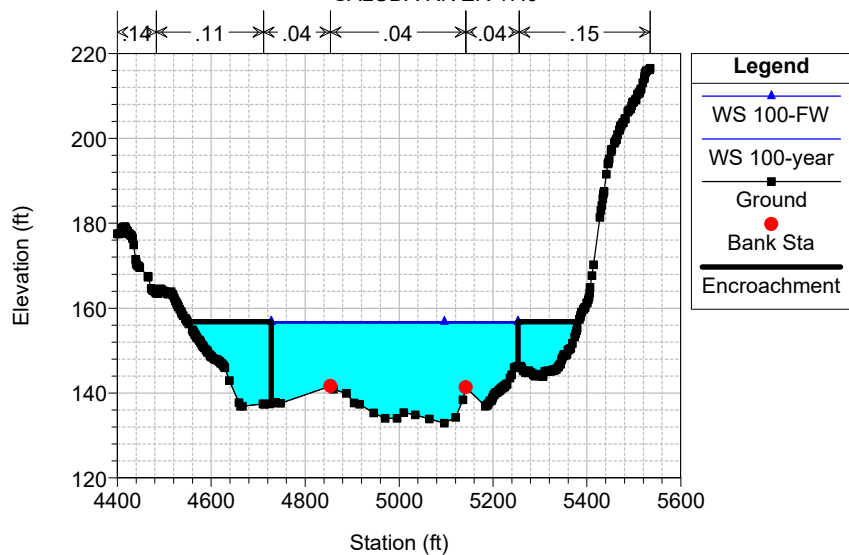
CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

SALUDA RIVER 18.0



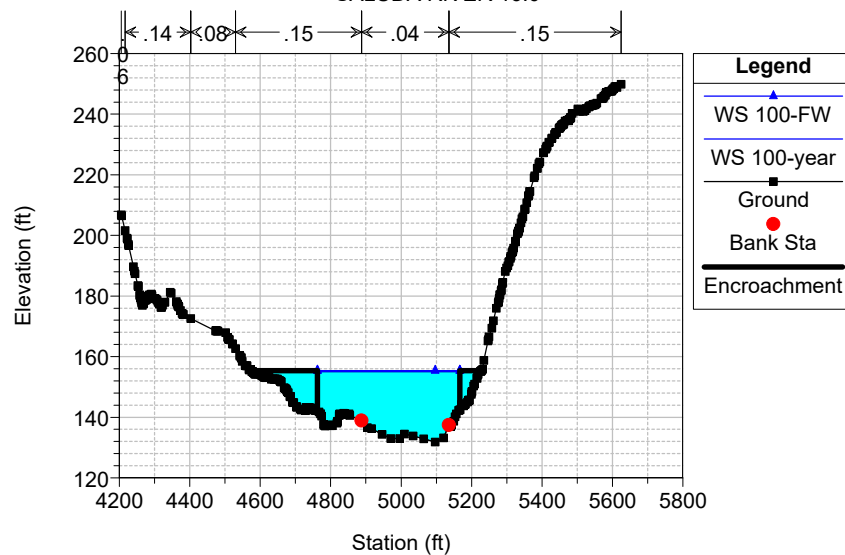
CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

SALUDA RIVER 17.0



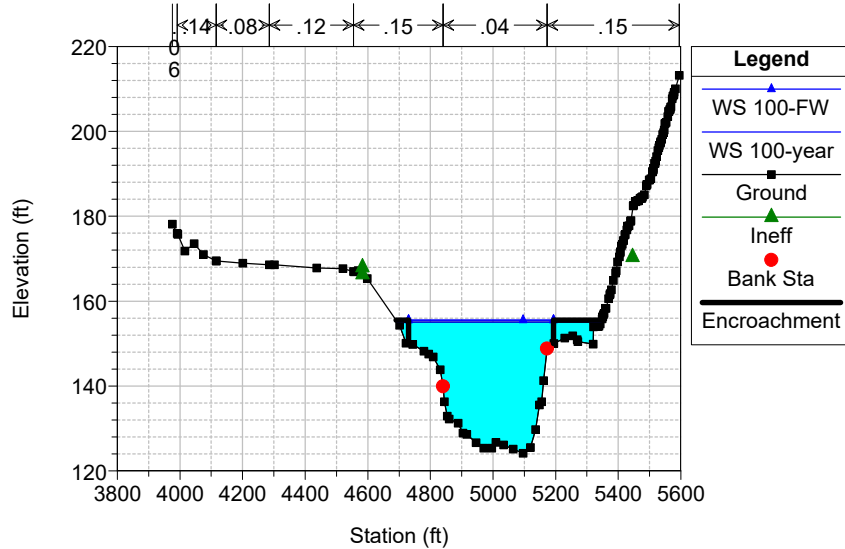
CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

SALUDA RIVER 16.0



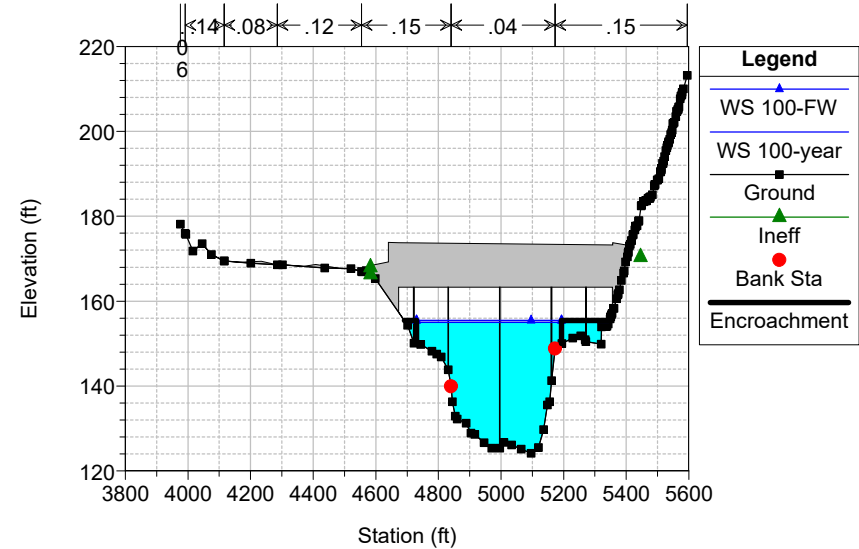
CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

SALUDA RIVER (Riverbanks Zoo - US)



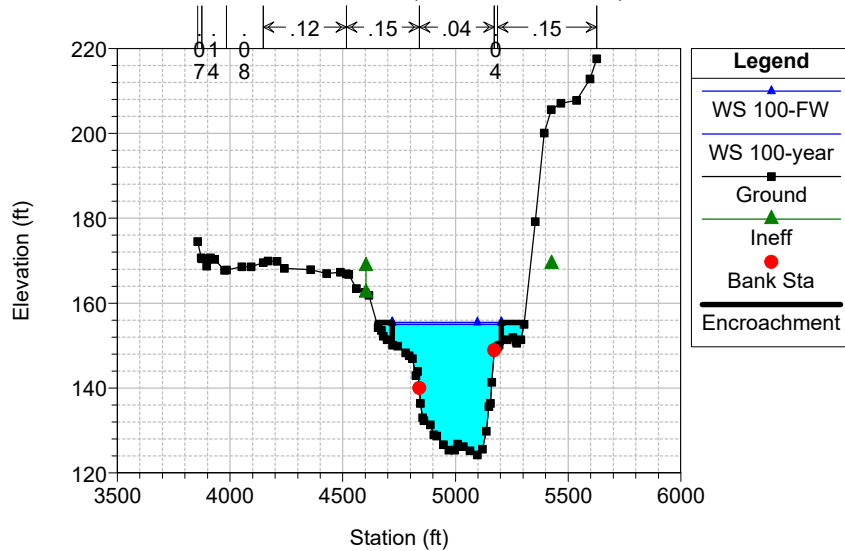
CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

SALUDA RIVER (Riverbanks Zoo - TOR) Structure ID: R_SAL_01Detail



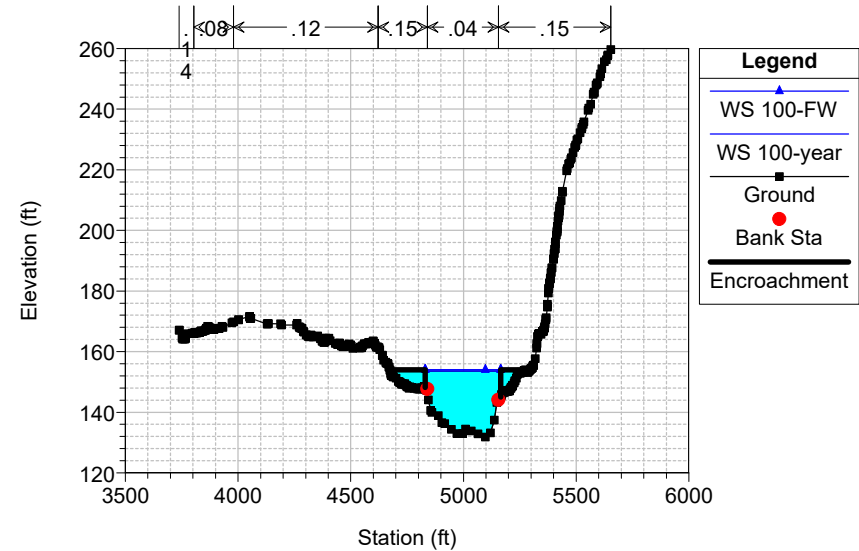
CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

SALUDA RIVER (Riverbanks Zoo - DS)



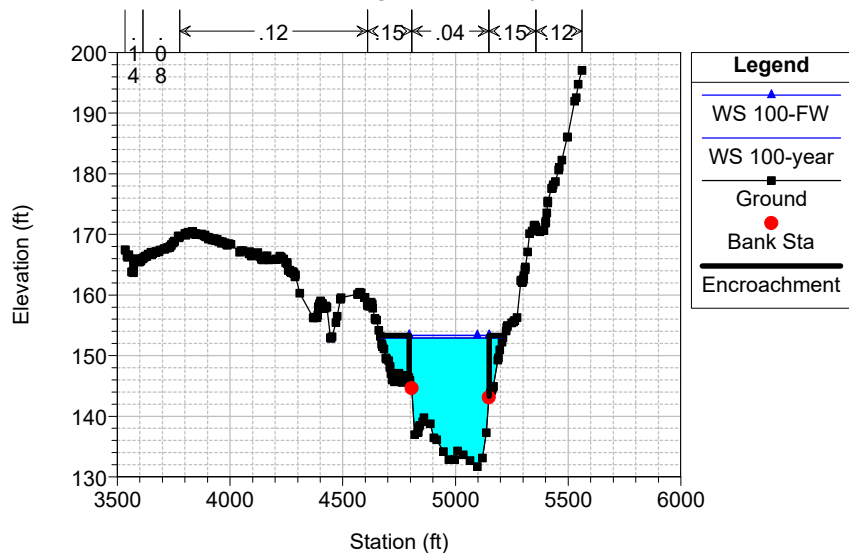
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SALUDA RIVER 12.0



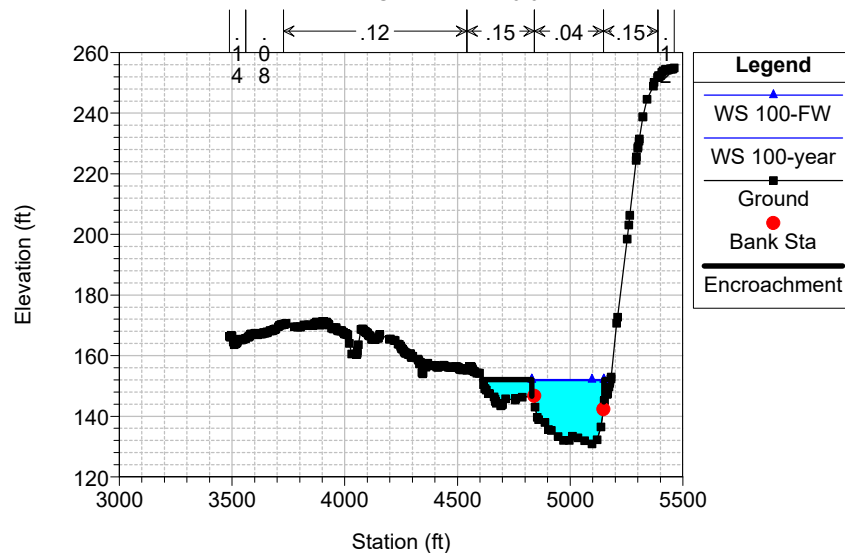
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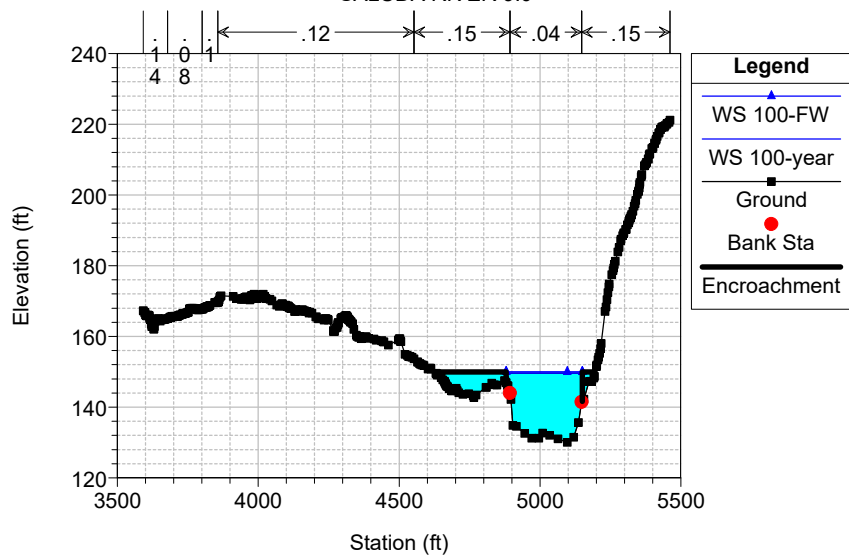
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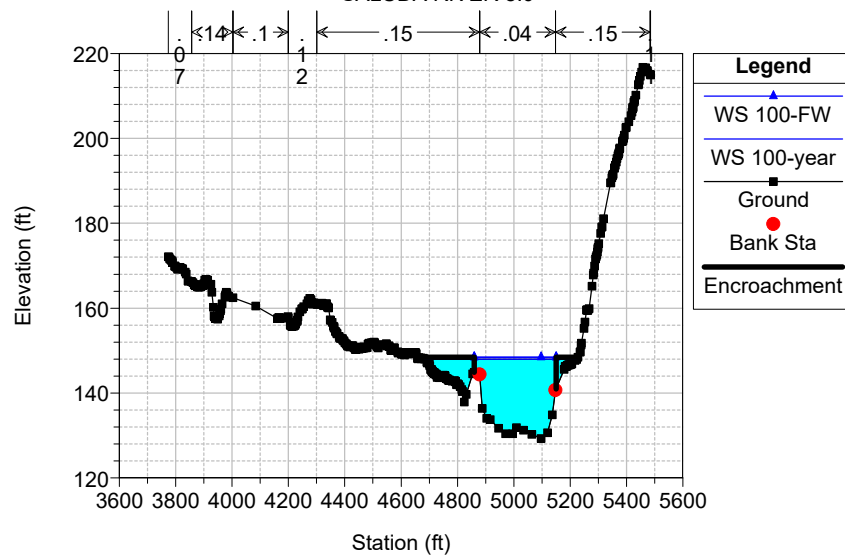
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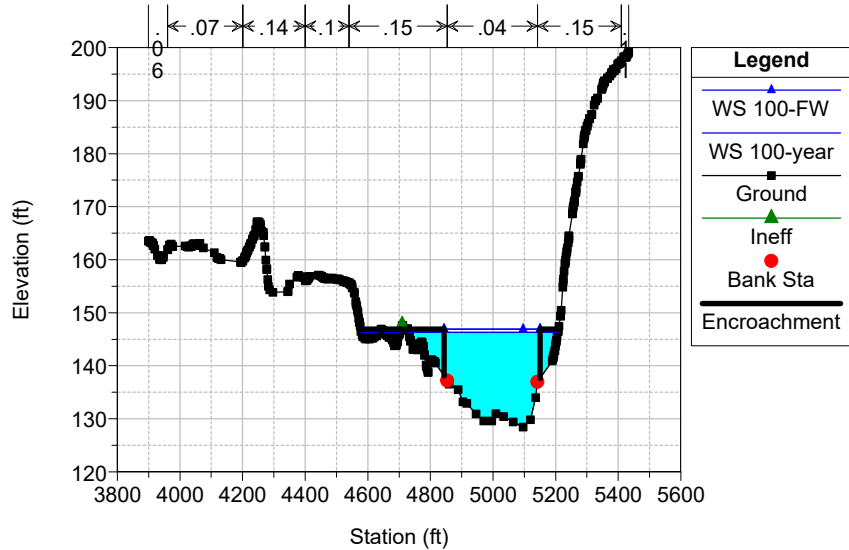
CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

SALUDA RIVER 8.0



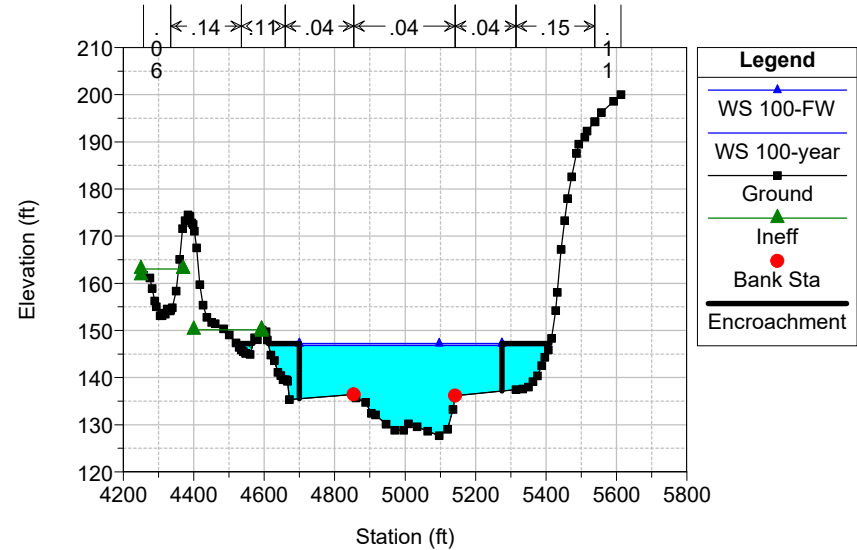
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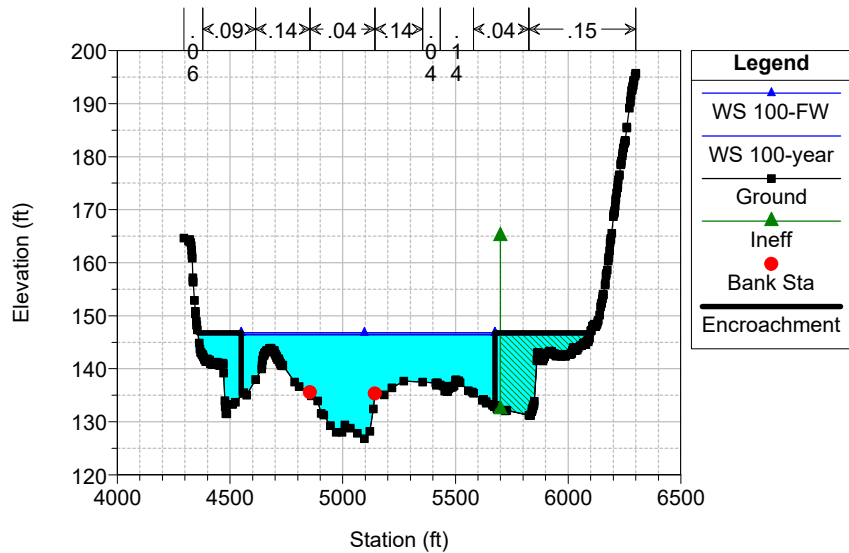
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SALUDA RIVER 6.0



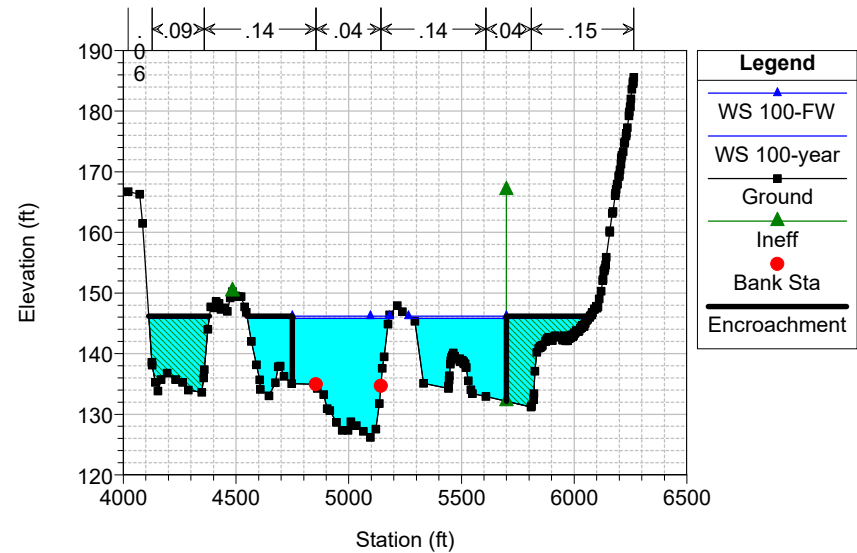
CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

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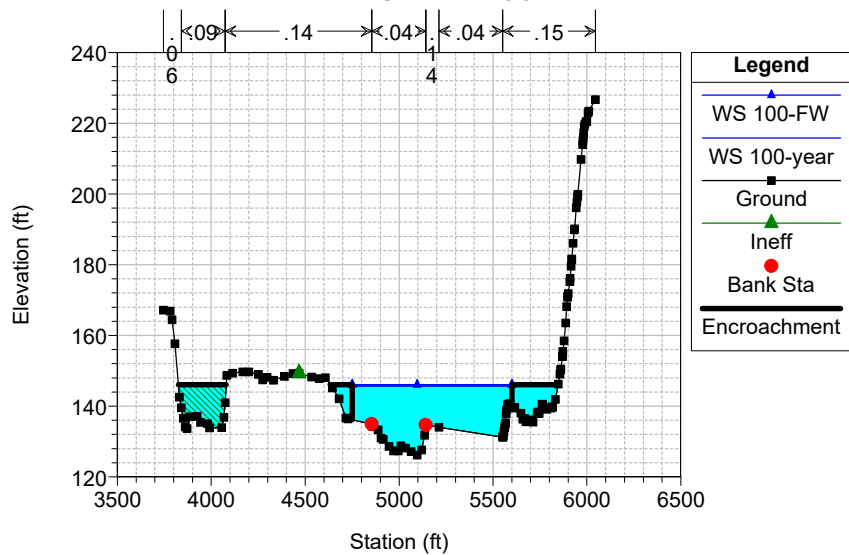
CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

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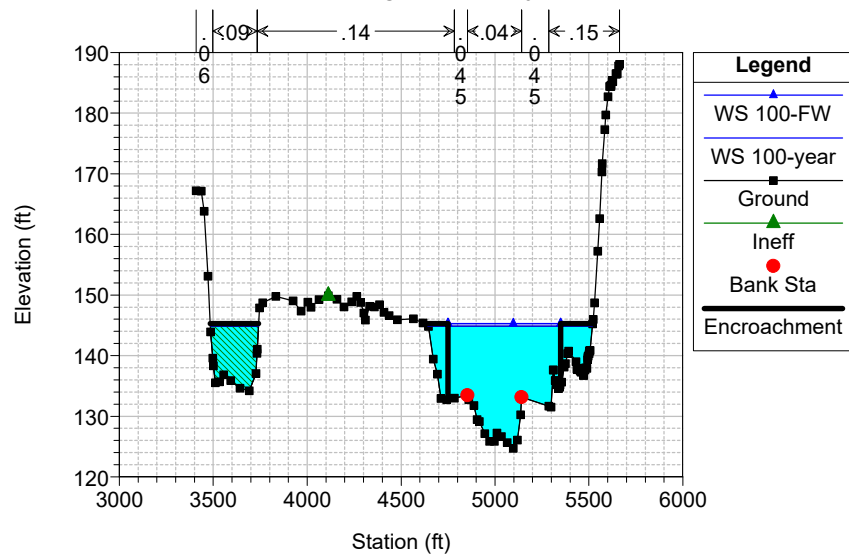
CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

SALUDA RIVER 3.0



CCR SALUDA RIVER Detailed Study Plan: FW_REV 3/7/2022

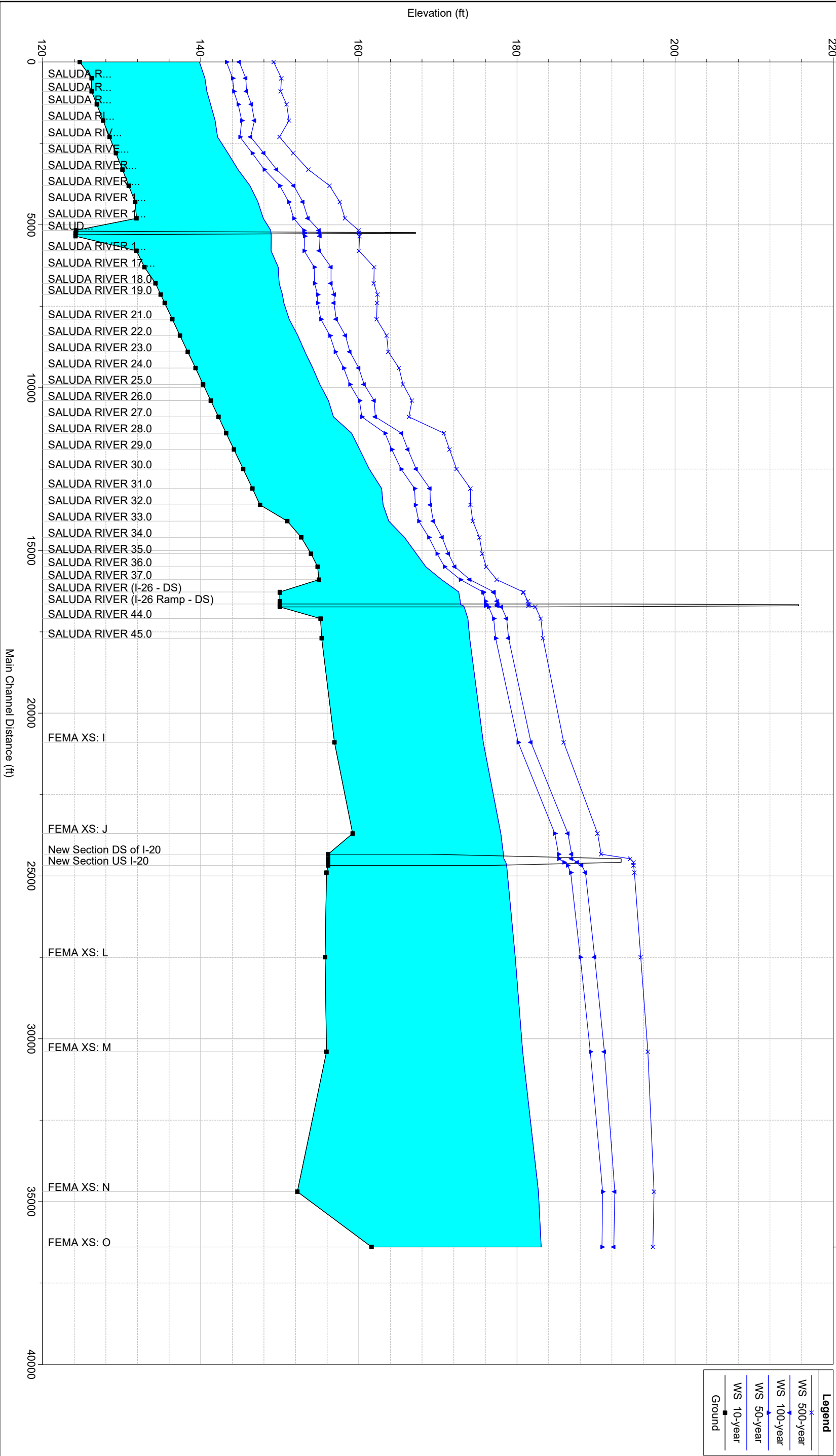
SALUDA RIVER 2.0



APPENDIX G

HEC-RAS OUTPUT – SCDOT NATURAL CONDITIONS MODEL

SALUDA RIVER Reach-1



HEC-RAS Plan: NATURAL River: SALUDA RIVER Reach: Reach-1

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
Reach-1	37500	10-year	32000.0	161.62	183.06		183.4	0.000502	4.65	7029.79	421.0	0.19
Reach-1	37500	50-year	90000.0	161.62	190.76		191.6	0.000938	8.00	16148.19	1792.0	0.27
Reach-1	37500	100-year	105000.0	161.62	192.25		193.1	0.000954	8.37	18932.11	1947.3	0.28
Reach-1	37500	500-year	145000.0	161.62	197.19		197.9	0.000714	8.08	29451.74	2201.9	0.25
Reach-1	35800	10-year	32000.0	152.22	182.71		182.8	0.000203	3.19	18930.87	2814.6	0.12
Reach-1	35800	50-year	90000.0	152.22	190.83		190.9	0.000134	3.22	58847.84	5461.3	0.10
Reach-1	35800	100-year	105000.0	152.22	192.37		192.4	0.000125	3.22	67294.41	5519.8	0.10
Reach-1	35800	500-year	145000.0	152.22	197.33		197.4	0.000088	2.98	95295.07	5820.0	0.09
Reach-1	31500	10-year	32000.0	155.92	180.72		181.2	0.000875	5.70	7385.04	1234.7	0.25
Reach-1	31500	50-year	90000.0	155.92	189.29		189.7	0.000734	6.87	26963.60	3841.1	0.24
Reach-1	31500	100-year	105000.0	155.92	191.07		191.4	0.000580	6.39	33857.73	3901.9	0.22
Reach-1	31500	500-year	145000.0	155.92	196.57		196.8	0.000289	5.10	55834.70	4089.5	0.16
Reach-1	28600	10-year	32000.0	155.72	179.78		179.9	0.000231	3.51	14746.29	1467.0	0.13
Reach-1	28600	50-year	90000.0	155.72	188.00		188.3	0.000353	5.38	28730.67	1935.6	0.17
Reach-1	28600	100-year	105000.0	155.72	189.83		190.1	0.000355	5.61	32364.41	2039.8	0.18
Reach-1	28600	500-year	145000.0	155.72	195.66		195.9	0.000288	5.65	45220.79	2372.0	0.16
Reach-1	26000	10-year	32000.0	155.92	178.77		179.0	0.000547	4.61	10678.43	1475.0	0.19
Reach-1	26000	50-year	90000.0	155.92	186.79		187.1	0.000547	5.93	24916.67	2058.8	0.21
Reach-1	26000	100-year	105000.0	155.92	188.67		189.0	0.000509	5.99	28908.84	2190.5	0.20
Reach-1	26000	500-year	145000.0	155.92	194.85		195.1	0.000331	5.53	42916.18	2320.6	0.17
Reach-1	25780	10-year	32000.0	156.12	178.70	165.4	178.9	0.000370	3.50	9912.84	1466.4	0.16
Reach-1	25780	50-year	90000.0	156.12	186.40	172.3	186.9	0.000636	6.03	16752.03	1732.2	0.22
Reach-1	25780	100-year	105000.0	156.12	188.19	173.5	188.8	0.000655	6.43	18342.56	1977.0	0.23
Reach-1	25780	500-year	145000.0	156.12	194.76	176.4	195.0	0.000282	4.94	42796.48	2502.3	0.16
Reach-1	25550		Bridge									
Reach-1	25436	10-year	32000.0	156.12	178.29	165.1	178.6	0.000477	4.35	8579.42	1460.1	0.18
Reach-1	25436	50-year	90000.0	156.12	185.26	172.9	186.0	0.000931	7.59	14753.20	1760.5	0.27
Reach-1	25436	100-year	105000.0	156.12	186.92	174.7	187.8	0.000964	8.07	16226.33	1866.8	0.28
Reach-1	25436	500-year	145000.0	156.12	190.65	177.9	191.7	0.001063	9.26	19534.25	1986.4	0.30
Reach-1	24800	10-year	32000.0	159.22	177.95		178.2	0.000629	4.65	9861.35	1149.2	0.20
Reach-1	24800	50-year	90000.0	159.22	184.78		185.3	0.000923	7.14	17888.11	1197.1	0.26
Reach-1	24800	100-year	105000.0	159.22	186.45		187.0	0.000918	7.46	19906.88	1224.3	0.26
Reach-1	24800	500-year	145000.0	159.22	190.20		190.9	0.000940	8.30	24895.99	1606.0	0.27
Reach-1	22000	10-year	32000.0	156.92	175.74		176.1	0.000839	5.54	7996.32	1027.2	0.24
Reach-1	22000	50-year	90000.0	156.92	180.16		181.4	0.002106	10.30	12740.33	1120.9	0.40
Reach-1	22000	100-year	105000.0	156.92	181.77		183.1	0.002112	10.84	14672.42	1282.8	0.40
Reach-1	22000	500-year	145000.0	156.92	185.92		187.2	0.001788	11.17	20757.02	1562.8	0.38
Reach-1	18800	10-year	29600.0	155.30	174.02		174.3	0.000398	4.58	10448.41	1363.8	0.21
Reach-1	18800	50-year	48300.0	155.30	177.30		177.7	0.000459	5.59	15097.52	1464.1	0.23
Reach-1	18800	100-year	58600.0	155.30	178.95		179.4	0.000470	5.99	17551.26	1511.4	0.23
Reach-1	18800	500-year	89900.0	155.30	183.29		183.8	0.000491	6.96	25328.14	2012.0	0.25
Reach-1	18200	10-year	29600.0	155.16	173.79		174.0	0.000410	4.42	13181.19	1765.5	0.21
Reach-1	18200	50-year	48300.0	155.16	177.05		177.4	0.000462	5.38	19123.51	1886.4	0.23
Reach-1	18200	100-year	58600.0	155.16	178.69		179.1	0.000472	5.77	22293.05	1966.9	0.23
Reach-1	18200	500-year	89900.0	155.16	183.03		183.5	0.000482	6.68	31146.93	2128.5	0.24
Reach-1	17840	10-year	29600.0	150.00	173.33	163.4	173.8	0.000556	5.76	9187.20	1644.9	0.25
Reach-1	17840	50-year	48300.0	150.00	176.42	166.1	177.1	0.000689	7.17	14477.61	1761.2	0.28
Reach-1	17840	100-year	58600.0	150.00	178.04	167.5	178.8	0.000709	7.65	17361.63	1815.0	0.29
Reach-1	17840	500-year	89900.0	150.00	182.32	173.0	183.2	0.000732	8.77	25347.21	1897.0	0.30
Reach-1	17790		Bridge									
Reach-1	17750	10-year	29600.0	150.00	172.85		173.3	0.000598	5.86	6672.55	988.6	0.25
Reach-1	17750	50-year	48300.0	150.00	176.05		176.8	0.000754	7.40	10025.46	1103.4	0.29
Reach-1	17750	100-year	58600.0	150.00	177.56		178.4	0.000809	8.05	11722.02	1148.5	0.31
Reach-1	17750	500-year	89900.0	150.00	181.46		182.6	0.000960	9.82	16419.51	1306.4	0.35
Reach-1	17665	10-year	29600.0	150.00	172.83		173.2	0.000719	5.46	7737.40	924.3	0.23
Reach-1	17665	50-year	48300.0	150.00	176.01		176.7	0.000978	7.09	10755.90	972.7	0.27
Reach-1	17665	100-year	58600.0	150.00	177.51		178.3	0.001086	7.81	12253.37	1034.8	0.29
Reach-1	17665	500-year	89900.0	150.00	181.38		182.5	0.001356	9.69	16577.00	1197.5	0.33
Reach-1	17385	10-year	29600.0	150.00	172.65		173.0	0.000722	5.17	7308.88	727.5	0.22
Reach-1	17385	50-year	48300.0	150.00	175.71		176.4	0.001036	6.92	9704.97	843.5	0.27

HEC-RAS Plan: NATURAL River: SALUDA RIVER Reach: Reach-1 (Continued)

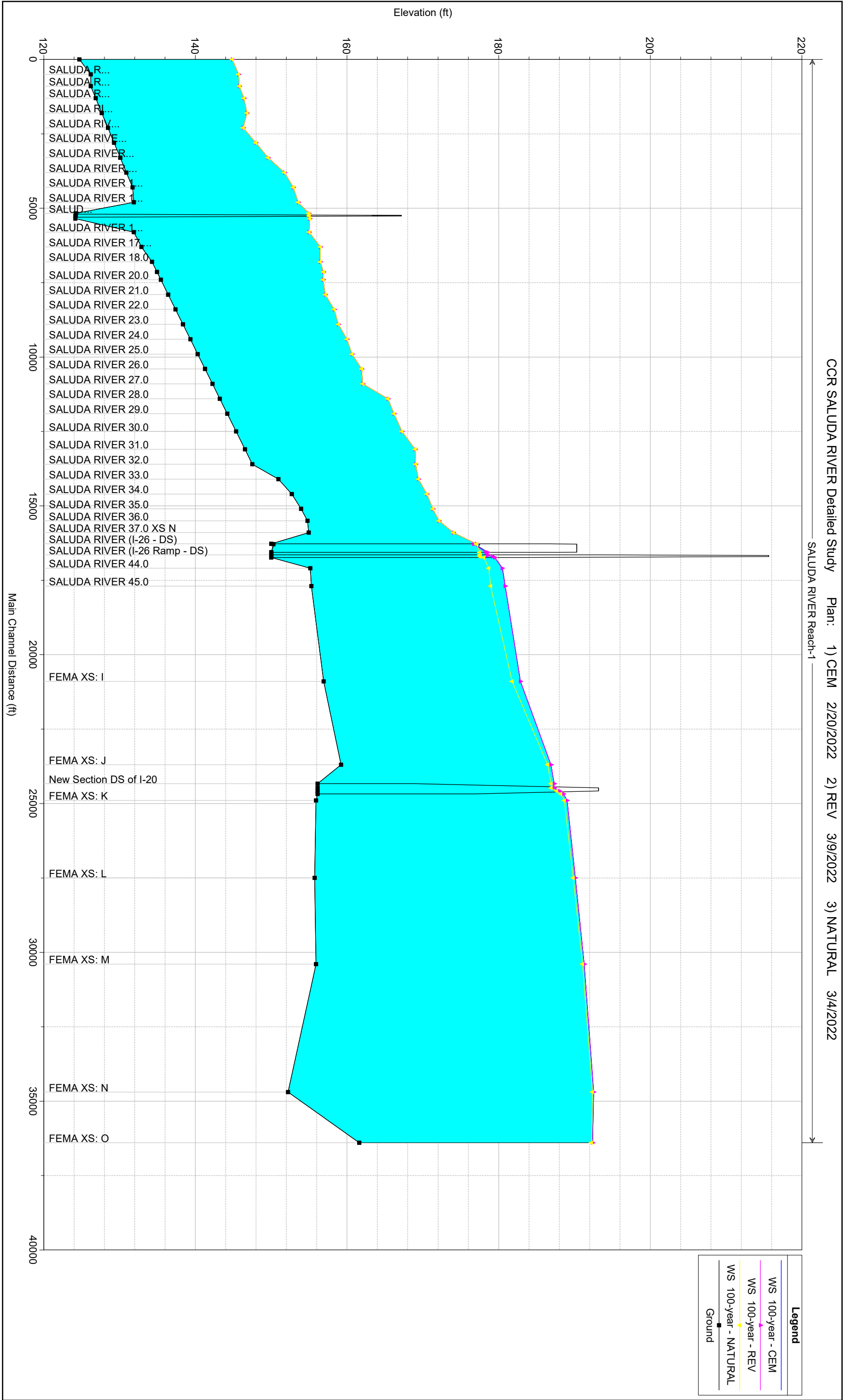
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	17385	100-year	58600.0	150.00	177.11		178.0	0.001191	7.76	10976.96	963.6	0.30
Reach-1	17385	500-year	89900.0	150.00	180.83		182.1	0.001495	9.68	14955.89	1172.1	0.34
Reach-1	17365	10-year	29600.0	150.00	172.64		173.0	0.000723	5.13	7300.29	727.1	0.22
Reach-1	17365	50-year	48300.0	150.00	175.70		176.4	0.001038	6.86	9691.75	842.7	0.27
Reach-1	17365	100-year	58600.0	150.00	177.09		177.9	0.001194	7.69	10960.25	962.7	0.29
Reach-1	17365	500-year	89900.0	150.00	180.81		182.1	0.001498	9.57	14933.93	1171.2	0.34
Reach-1	17000	10-year	29600.0	154.95	170.46		172.1	0.005776	10.78	4270.60	797.9	0.64
Reach-1	17000	50-year	48300.0	154.95	172.86		175.1	0.006233	13.11	6298.51	882.0	0.69
Reach-1	17000	100-year	58600.0	154.95	174.04		176.6	0.006266	14.04	7352.49	902.5	0.70
Reach-1	17000	500-year	89900.0	154.95	177.45		180.5	0.005863	15.95	10507.98	969.2	0.70
Reach-1	16600	10-year	29600.0	154.78	168.45		169.8	0.005306	9.38	3737.81	775.2	0.60
Reach-1	16600	50-year	48300.0	154.78	170.85		172.7	0.005322	11.25	5705.77	871.2	0.62
Reach-1	16600	100-year	58600.0	154.78	172.14		174.2	0.005063	11.89	6869.38	909.1	0.62
Reach-1	16600	500-year	89900.0	154.78	176.10		178.4	0.003977	12.85	10523.91	953.8	0.58
Reach-1	16200	10-year	29600.0	153.94	167.28		168.0	0.003133	7.06	5078.95	838.3	0.46
Reach-1	16200	50-year	48300.0	153.94	169.89		170.9	0.002944	8.35	7337.59	882.7	0.46
Reach-1	16200	100-year	58600.0	153.94	171.33		172.4	0.002717	8.78	8627.41	899.8	0.46
Reach-1	16200	500-year	89900.0	153.94	175.63		176.9	0.002127	9.59	12683.46	966.0	0.43
Reach-1	15700	10-year	29600.0	152.72	165.77		166.5	0.003258	7.44	5013.19	995.7	0.47
Reach-1	15700	50-year	48300.0	152.72	168.86		169.6	0.002308	7.81	8465.57	1188.3	0.42
Reach-1	15700	100-year	58600.0	152.72	170.53		171.2	0.001936	7.86	10470.12	1206.5	0.39
Reach-1	15700	500-year	89900.0	152.72	175.25		176.0	0.001338	8.08	16552.23	1337.0	0.34
Reach-1	15200	10-year	29600.0	150.94	163.79		164.6	0.003001	7.80	4415.48	864.4	0.50
Reach-1	15200	50-year	48300.0	150.94	167.58		168.3	0.001772	7.86	8290.50	1087.3	0.41
Reach-1	15200	100-year	58600.0	150.94	169.44		170.2	0.001490	7.97	10379.56	1160.0	0.39
Reach-1	15200	500-year	89900.0	150.94	174.41		175.2	0.001076	8.39	16400.34	1269.5	0.35
Reach-1	14700	10-year	29600.0	147.50	163.07		163.7	0.001395	6.77	5892.40	963.0	0.36
Reach-1	14700	50-year	48300.0	147.50	167.14		167.7	0.001000	7.09	10087.65	1118.0	0.32
Reach-1	14700	100-year	58600.0	147.50	169.06		169.7	0.000898	7.29	12263.92	1141.4	0.31
Reach-1	14700	500-year	89900.0	147.50	174.13		174.8	0.000744	7.91	18212.70	1263.0	0.30
Reach-1	14200	10-year	29600.0	146.53	162.88	157.1	163.2	0.000559	5.15	7513.96	1190.2	0.24
Reach-1	14200	50-year	48300.0	146.53	167.05	158.9	167.3	0.000449	5.46	13206.96	1463.8	0.22
Reach-1	14200	100-year	58600.0	146.53	169.00	159.7	169.3	0.000416	5.63	16114.27	1532.9	0.22
Reach-1	14200	500-year	89900.0	146.53	174.13	161.8	174.5	0.000362	6.08	24163.18	1744.6	0.21
Reach-1	13600	10-year	29600.0	145.36	161.33		162.4	0.001588	8.72	5810.49	993.5	0.40
Reach-1	13600	50-year	48300.0	145.36	165.34		166.6	0.001511	10.00	10218.26	1249.7	0.41
Reach-1	13600	100-year	58600.0	145.36	167.26		168.6	0.001452	10.46	12692.64	1328.4	0.41
Reach-1	13600	500-year	89900.0	145.36	172.36		173.8	0.001297	11.47	20121.14	1544.1	0.40
Reach-1	13000	10-year	29600.0	144.19	160.10		161.3	0.002089	9.00	3989.72	629.7	0.45
Reach-1	13000	50-year	48300.0	144.19	164.17		165.6	0.001839	10.20	7512.67	985.9	0.44
Reach-1	13000	100-year	58600.0	144.19	166.20		167.7	0.001664	10.49	9610.31	1054.5	0.43
Reach-1	13000	500-year	89900.0	144.19	171.49		173.0	0.001369	11.24	15395.69	1123.4	0.41
Reach-1	12500	10-year	29600.0	143.22	159.08		160.3	0.002112	9.01	4328.60	634.8	0.45
Reach-1	12500	50-year	48300.0	143.22	163.32		164.7	0.001787	10.10	7460.11	907.0	0.44
Reach-1	12500	100-year	58600.0	143.22	165.41		166.8	0.001638	10.47	9471.80	1003.2	0.43
Reach-1	12500	500-year	89900.0	143.22	170.77		172.3	0.001382	11.39	15450.97	1210.7	0.41
Reach-1	12000	10-year	29600.0	142.25	156.80	153.8	158.7	0.004036	11.20	2663.38	269.5	0.61
Reach-1	12000	50-year	48300.0	142.25	160.38	156.8	163.2	0.004003	13.56	3687.53	302.3	0.64
Reach-1	12000	100-year	58600.0	142.25	162.08	158.3	165.4	0.004005	14.64	4213.90	331.9	0.65
Reach-1	12000	500-year	89900.0	142.25	166.32	162.2	170.9	0.004085	17.34	6530.15	787.4	0.68
Reach-1	11500	10-year	29600.0	141.27	156.16	151.1	157.2	0.001814	8.06	3876.05	392.7	0.42
Reach-1	11500	50-year	48300.0	141.27	160.07	153.6	161.5	0.001791	9.73	5536.55	452.1	0.44
Reach-1	11500	100-year	58600.0	141.27	161.95	154.9	163.6	0.001783	10.48	6437.99	546.2	0.44
Reach-1	11500	500-year	89900.0	141.27	166.73	158.3	168.9	0.001732	12.15	10740.23	1153.9	0.46
Reach-1	11000	10-year	29600.0	140.30	155.06	150.2	156.2	0.002054	8.50	3526.92	334.8	0.44
Reach-1	11000	50-year	48300.0	140.30	158.87	152.8	160.5	0.002085	10.37	4875.16	373.6	0.47
Reach-1	11000	100-year	58600.0	140.30	160.67	154.1	162.6	0.002102	11.22	5766.42	643.6	0.48
Reach-1	11000	500-year	89900.0	140.30	165.59	157.6	167.9	0.001915	12.68	11047.59	1449.7	0.48
Reach-1	10500	10-year	29600.0	139.33	154.16	149.1	155.1	0.001922	7.99	3824.50	380.3	0.43
Reach-1	10500	50-year	48300.0	139.33	158.08	151.7	159.5	0.001886	9.46	5491.22	526.7	0.44
Reach-1	10500	100-year	58600.0	139.33	159.98	153.0	161.5	0.001803	10.05	6704.48	732.9	0.44

HEC-RAS Plan: NATURAL River: SALUDA RIVER Reach: Reach-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
Reach-1	10500	500-year	89900.0	139.33	165.09	156.4	166.9	0.001566	11.25	11387.24	1137.0	0.43
Reach-1	10000	10-year	29600.0	138.36	153.18		154.2	0.001839	8.19	3994.44	426.5	0.42
Reach-1	10000	50-year	48300.0	138.36	157.02		158.5	0.001845	9.91	5705.30	467.4	0.44
Reach-1	10000	100-year	58600.0	138.36	158.86		160.6	0.001856	10.71	6618.73	524.2	0.45
Reach-1	10000	500-year	89900.0	138.36	163.73		166.0	0.001830	12.54	9865.36	742.8	0.47
Reach-1	9500	10-year	29600.0	137.38	152.29		153.3	0.001867	8.02	3903.23	445.5	0.42
Reach-1	9500	50-year	48300.0	137.38	156.34		157.6	0.001611	9.15	5873.03	547.1	0.41
Reach-1	9500	100-year	58600.0	137.38	158.31		159.6	0.001510	9.60	7058.45	654.0	0.41
Reach-1	9500	500-year	89900.0	137.38	163.52		165.0	0.001297	10.61	11198.52	860.7	0.39
Reach-1	9000	10-year	29600.0	136.41	151.19		152.3	0.001935	8.57	3790.72	392.5	0.44
Reach-1	9000	50-year	48300.0	136.41	155.20		156.7	0.001825	10.08	5568.11	495.2	0.44
Reach-1	9000	100-year	58600.0	136.41	157.14		158.8	0.001770	10.71	6575.83	594.2	0.44
Reach-1	9000	500-year	89900.0	136.41	162.25		164.3	0.001634	12.16	10218.60	766.6	0.45
Reach-1	8500	10-year	29600.0	135.44	150.53		151.4	0.001541	7.51	4354.88	505.0	0.39
Reach-1	8500	50-year	48300.0	135.44	154.77		155.8	0.001302	8.48	6769.89	672.2	0.37
Reach-1	8500	100-year	58600.0	135.44	156.85		157.9	0.001183	8.77	8345.74	841.6	0.36
Reach-1	8500	500-year	89900.0	135.44	162.31		163.4	0.000928	9.26	13315.49	955.0	0.34
Reach-1	8240	10-year	29600.0	134.93	150.34		150.9	0.001191	6.55	6125.05	923.3	0.34
Reach-1	8240	50-year	48300.0	134.93	154.79		155.4	0.000853	6.89	10287.45	952.1	0.30
Reach-1	8240	100-year	58600.0	134.93	156.90		157.5	0.000769	7.10	12328.67	981.0	0.29
Reach-1	8240	500-year	89900.0	134.93	162.37		163.1	0.000651	7.78	17959.89	1050.5	0.28
Reach-1	7900	10-year	29600.0	134.27	149.92		150.5	0.001247	6.43	6131.70	872.0	0.34
Reach-1	7900	50-year	48300.0	134.27	154.39		155.1	0.000949	7.05	10105.09	903.0	0.32
Reach-1	7900	100-year	58600.0	134.27	156.49		157.2	0.000878	7.39	12019.61	916.7	0.31
Reach-1	7900	500-year	89900.0	134.27	161.89		162.8	0.000787	8.37	17062.93	967.4	0.31
Reach-1	7400	10-year	29600.0	132.87	149.81		150.1	0.000462	4.62	8023.77	767.3	0.22
Reach-1	7400	50-year	48300.0	132.87	154.35		154.7	0.000422	5.32	11625.07	814.6	0.22
Reach-1	7400	100-year	58600.0	132.87	156.47		156.8	0.000412	5.66	13376.63	831.2	0.22
Reach-1	7400	500-year	89900.0	132.87	161.94		162.4	0.000406	6.57	18051.44	880.0	0.23
Reach-1	6900	10-year	29600.0	131.87	148.90		149.7	0.001077	7.35	5747.59	526.6	0.34
Reach-1	6900	50-year	48300.0	131.87	153.09		154.3	0.001197	9.14	8049.09	594.3	0.37
Reach-1	6900	100-year	58600.0	131.87	155.02		156.4	0.001258	10.00	9247.99	645.9	0.38
Reach-1	6900	500-year	89900.0	131.87	160.01		161.9	0.001355	11.96	12625.15	693.8	0.41
Reach-1	6450	10-year	29600.0	124.16	148.93	134.0	149.2	0.000258	4.37	6945.50	410.9	0.17
Reach-1	6450	50-year	48300.0	124.16	153.13	136.8	153.7	0.000361	5.86	9216.30	613.5	0.21
Reach-1	6450	100-year	58600.0	124.16	155.08	138.0	155.7	0.000407	6.55	10440.25	650.0	0.22
Reach-1	6450	500-year	89900.0	124.16	160.10	141.5	161.1	0.000516	8.28	13879.67	719.9	0.26
Reach-1	6350		Bridge									
Reach-1	6270	10-year	29600.0	124.22	148.86	134.1	149.2	0.000263	4.40	6915.77	406.3	0.17
Reach-1	6270	50-year	48300.0	124.22	153.04	136.8	153.6	0.000368	5.90	9108.42	621.4	0.21
Reach-1	6270	100-year	58600.0	124.22	154.98	138.1	155.6	0.000414	6.58	10341.16	650.5	0.23
Reach-1	6270	500-year	89900.0	124.22	159.97	141.5	161.0	0.000521	8.29	13683.29	688.0	0.26
Reach-1	5900	10-year	29600.0	131.87	147.90		148.8	0.001473	7.57	3997.01	406.6	0.38
Reach-1	5900	50-year	48300.0	131.87	151.77		153.1	0.001545	9.29	5925.88	548.8	0.41
Reach-1	5900	100-year	58600.0	131.87	153.57		155.1	0.001579	10.07	6945.22	602.1	0.42
Reach-1	5900	500-year	89900.0	131.87	158.25		160.4	0.001633	11.94	9979.81	676.6	0.44
Reach-1	5400	10-year	29600.0	131.71	147.24		148.0	0.001415	7.23	4261.19	466.1	0.37
Reach-1	5400	50-year	48300.0	131.71	151.13		152.3	0.001434	8.78	6164.05	515.7	0.39
Reach-1	5400	100-year	58600.0	131.71	152.92		154.3	0.001456	9.51	7119.70	547.0	0.40
Reach-1	5400	500-year	89900.0	131.71	157.60		159.5	0.001507	11.32	10078.53	734.6	0.42
Reach-1	4900	10-year	29600.0	130.90	146.22		147.2	0.001774	8.08	3789.14	433.5	0.41
Reach-1	4900	50-year	48300.0	130.90	150.01		151.5	0.001814	9.82	5783.96	554.8	0.44
Reach-1	4900	100-year	58600.0	130.90	151.76		153.5	0.001834	10.59	6768.36	567.9	0.45
Reach-1	4900	500-year	89900.0	130.90	156.30		158.6	0.001904	12.59	9531.40	749.2	0.47
Reach-1	4400	10-year	29600.0	130.09	144.72		146.2	0.002496	9.61	3189.67	366.5	0.49
Reach-1	4400	50-year	48300.0	130.09	148.03		150.3	0.002873	12.12	4704.01	537.8	0.55
Reach-1	4400	100-year	58600.0	130.09	149.58		152.2	0.002990	13.19	5563.29	564.3	0.57
Reach-1	4400	500-year	89900.0	130.09	153.62		157.3	0.003238	15.83	8020.80	653.0	0.61
Reach-1	3900	10-year	29600.0	129.27	143.44		144.9	0.002645	9.59	3247.94	374.6	0.50
Reach-1	3900	50-year	48300.0	129.27	146.52		148.8	0.003108	12.15	4618.13	487.9	0.56

HEC-RAS Plan: NATURAL River: SALUDA RIVER Reach: Reach-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
Reach-1	3900	100-year	58600.0	129.27	147.97		150.6	0.003278	13.29	5364.19	539.3	0.59
Reach-1	3900	500-year	89900.0	129.27	151.71	147.5	155.5	0.003638	16.12	7825.70	821.6	0.64
Reach-1	3400	10-year	29600.0	128.46	142.12	138.3	143.5	0.002763	9.46	3427.84	413.3	0.51
Reach-1	3400	50-year	48300.0	128.46	144.95	141.0	147.2	0.003287	12.07	4670.48	486.3	0.58
Reach-1	3400	100-year	58600.0	128.46	146.30	142.4	148.9	0.003476	13.22	5307.66	582.6	0.60
Reach-1	3400	500-year	89900.0	128.46	149.97	146.0	153.7	0.003728	15.85	7724.65	647.8	0.65
Reach-1	2900	10-year	29600.0	127.65	141.82	138.1	142.4	0.001256	6.58	5485.25	747.2	0.35
Reach-1	2900	50-year	48300.0	127.65	145.18	139.9	145.8	0.001096	7.32	8057.78	799.6	0.34
Reach-1	2900	100-year	58600.0	127.65	146.80	140.7	147.5	0.001044	7.66	9339.36	839.4	0.34
Reach-1	2900	500-year	89900.0	127.65	151.16	142.8	152.0	0.000935	8.50	13297.96	955.2	0.33
Reach-1	2400	10-year	29600.0	126.84	141.25	136.7	141.7	0.001121	6.31	7640.49	1372.4	0.33
Reach-1	2400	50-year	48300.0	126.84	144.74	138.8	145.2	0.000952	6.93	12125.68	1705.8	0.32
Reach-1	2400	100-year	58600.0	126.84	146.41	139.6	146.9	0.000890	7.19	14365.48	1739.0	0.31
Reach-1	2400	500-year	89900.0	126.84	150.86	141.6	151.5	0.000782	7.90	20369.18	1795.7	0.30
Reach-1	2000	10-year	29600.0	126.19	140.77	136.0	141.3	0.001216	6.63	7160.53	1360.6	0.34
Reach-1	2000	50-year	48300.0	126.19	144.18	137.8	144.9	0.001184	7.76	10557.90	1601.6	0.35
Reach-1	2000	100-year	58600.0	126.19	145.80	139.0	146.6	0.001182	8.30	12221.15	1680.0	0.36
Reach-1	2000	500-year	89900.0	126.19	150.10	141.3	151.1	0.001184	9.68	17141.38	2008.0	0.37
Reach-1	1600	10-year	29600.0	126.19	140.53	135.5	140.8	0.000781	5.24	7778.17	1352.9	0.27
Reach-1	1600	50-year	48300.0	126.19	144.03	137.1	144.4	0.000701	5.94	11828.36	1431.0	0.27
Reach-1	1600	100-year	58600.0	126.19	145.69	137.8	146.1	0.000679	6.27	13810.17	1461.1	0.27
Reach-1	1600	500-year	89900.0	126.19	150.22	139.8	150.6	0.000526	6.48	23876.97	2041.4	0.25
Reach-1	1100	10-year	29600.0	124.69	139.84	134.8	140.3	0.001050	6.36	6240.04	1030.8	0.32
Reach-1	1100	50-year	48300.0	124.69	143.26	136.8	143.9	0.001050	7.50	9124.03	1110.3	0.33
Reach-1	1100	100-year	58600.0	124.69	144.88	137.7	145.6	0.001052	8.02	10526.49	1131.6	0.34
Reach-1	1100	500-year	89900.0	124.69	149.22	140.2	150.2	0.001051	9.31	15352.61	1823.7	0.35



HEC-RAS River: SALUDA RIVER Reach: Reach-1

Reach	River Sta	Profile	Plan	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
Reach-1	37500	50-year	CEM	90000.0	161.62	190.83		191.7	0.000925	7.96	16275.32	1799.4	0.27
Reach-1	37500	50-year	REV	90000.0	161.62	190.84		191.7	0.000922	7.95	16303.81	1801.0	0.27
Reach-1	37500	50-year	NATURAL	90000.0	161.62	190.76		191.6	0.000938	8.00	16148.19	1792.0	0.27
Reach-1	37500	100-year	CEM	105000.0	161.62	192.40		193.3	0.000926	8.28	19241.58	1963.8	0.28
Reach-1	37500	100-year	REV	105000.0	161.62	192.40		193.3	0.000926	8.28	19236.27	1963.5	0.28
Reach-1	37500	100-year	NATURAL	105000.0	161.62	192.25		193.1	0.000954	8.37	18932.11	1947.3	0.28
Reach-1	35800	50-year	CEM	90000.0	152.22	190.91		191.0	0.000132	3.19	59242.51	5464.0	0.10
Reach-1	35800	50-year	REV	90000.0	152.22	190.92		191.0	0.000131	3.19	59330.73	5464.7	0.10
Reach-1	35800	50-year	NATURAL	90000.0	152.22	190.83		190.9	0.000134	3.22	58847.84	5461.3	0.10
Reach-1	35800	100-year	CEM	105000.0	152.22	192.53		192.6	0.000121	3.17	68168.05	5525.8	0.10
Reach-1	35800	100-year	REV	105000.0	152.22	192.53		192.6	0.000121	3.17	68153.21	5525.7	0.10
Reach-1	35800	100-year	NATURAL	105000.0	152.22	192.37		192.4	0.000125	3.22	67294.41	5519.8	0.10
Reach-1	31500	50-year	CEM	90000.0	155.92	189.40		189.8	0.000707	6.76	27417.66	3845.1	0.24
Reach-1	31500	50-year	REV	90000.0	155.92	189.43		189.9	0.000701	6.74	27517.94	3846.0	0.24
Reach-1	31500	50-year	NATURAL	90000.0	155.92	189.29		189.7	0.000734	6.87	26963.60	3841.1	0.24
Reach-1	31500	100-year	CEM	105000.0	155.92	191.29		191.6	0.000544	6.22	34735.95	3909.5	0.21
Reach-1	31500	100-year	REV	105000.0	155.92	191.29		191.6	0.000544	6.22	34721.15	3909.4	0.21
Reach-1	31500	100-year	NATURAL	105000.0	155.92	191.07		191.4	0.000580	6.39	33857.73	3901.9	0.22
Reach-1	28600	50-year	CEM	90000.0	155.72	188.15		188.4	0.000344	5.33	29026.41	1944.2	0.17
Reach-1	28600	50-year	REV	90000.0	155.72	188.19		188.4	0.000342	5.31	29091.55	1946.2	0.17
Reach-1	28600	50-year	NATURAL	90000.0	155.72	188.00		188.3	0.000353	5.38	28730.67	1935.6	0.17
Reach-1	28600	100-year	CEM	105000.0	155.72	190.11		190.4	0.000339	5.52	32945.18	2055.9	0.17
Reach-1	28600	100-year	REV	105000.0	155.72	190.11		190.4	0.000340	5.52	32935.39	2055.7	0.17
Reach-1	28600	100-year	NATURAL	105000.0	155.72	189.83		190.1	0.000355	5.61	32364.41	2039.8	0.18
Reach-1	26000	50-year	CEM	90000.0	155.92	186.99		187.3	0.000525	5.84	25318.70	2072.5	0.20
Reach-1	26000	50-year	REV	90000.0	155.92	187.03		187.3	0.000520	5.82	25406.80	2075.4	0.20
Reach-1	26000	50-year	NATURAL	90000.0	155.92	186.79		187.1	0.000547	5.93	24916.67	2058.8	0.21
Reach-1	26000	100-year	CEM	105000.0	155.92	189.02		189.3	0.000475	5.84	29682.54	2215.1	0.20
Reach-1	26000	100-year	REV	105000.0	155.92	189.02		189.3	0.000476	5.84	29669.64	2214.7	0.20
Reach-1	26000	100-year	NATURAL	105000.0	155.92	188.67		189.0	0.000509	5.99	28908.84	2190.5	0.20
Reach-1	25780	50-year	CEM	90000.0	156.12	186.60	172.3	187.1	0.000616	5.97	16929.55	1752.3	0.22
Reach-1	25780	50-year	REV	90000.0	156.12	186.64	172.3	187.1	0.000612	5.96	16968.28	1756.7	0.22
Reach-1	25780	50-year	NATURAL	90000.0	156.12	186.40	172.3	186.9	0.000636	6.03	16752.03	1732.2	0.22
Reach-1	25780	100-year	CEM	105000.0	156.12	188.56	173.5	189.1	0.000621	6.32	18665.28	2003.5	0.22
Reach-1	25780	100-year	REV	105000.0	156.12	188.55	173.5	189.1	0.000621	6.33	18659.94	2003.1	0.22
Reach-1	25780	100-year	NATURAL	105000.0	156.12	188.19	173.5	188.8	0.000655	6.43	18342.56	1977.0	0.23
Reach-1	25550			Bridge									
Reach-1	25436	50-year	CEM	90000.0	156.12	185.50	172.9	186.2	0.000894	7.49	14961.56	1772.8	0.27
Reach-1	25436	50-year	REV	90000.0	156.12	185.55	172.9	186.3	0.000887	7.47	15007.11	1775.4	0.26
Reach-1	25436	50-year	NATURAL	90000.0	156.12	185.26	172.9	186.0	0.000931	7.59	14753.20	1760.5	0.27
Reach-1	25436	100-year	CEM	105000.0	156.12	187.33	174.7	188.1	0.000904	7.90	16590.75	1880.6	0.27
Reach-1	25436	100-year	REV	105000.0	156.12	187.32	174.7	188.1	0.000905	7.90	16584.83	1880.4	0.27
Reach-1	25436	100-year	NATURAL	105000.0	156.12	186.92	174.7	187.8	0.000964	8.07	16226.33	1866.8	0.28
Reach-1	24800	50-year	CEM	90000.0	159.22	185.04		185.6	0.000877	7.01	18199.60	1198.7	0.26
Reach-1	24800	50-year	REV	90000.0	159.22	185.10		185.6	0.000867	6.98	18267.49	1199.1	0.26
Reach-1	24800	50-year	NATURAL	90000.0	159.22	184.78		185.3	0.000923	7.14	17888.11	1197.1	0.26
Reach-1	24800	100-year	CEM	105000.0	159.22	186.90		187.4	0.000856	7.29	20453.02	1233.6	0.26
Reach-1	24800	100-year	REV	105000.0	159.22	186.89		187.4	0.000858	7.29	20444.04	1233.6	0.26
Reach-1	24800	100-year	NATURAL	105000.0	159.22	186.45		187.0	0.000918	7.46	19906.88	1224.3	0.26
Reach-1	22000	50-year	CEM	90000.0	156.92	180.84		181.9	0.001849	9.86	13521.63	1186.1	0.38
Reach-1	22000	50-year	REV	90000.0	156.92	180.97		182.0	0.001802	9.78	13685.31	1200.4	0.37
Reach-1	22000	50-year	NATURAL	90000.0	156.92	180.16		181.4	0.002106	10.30	12740.33	1120.9	0.40
Reach-1	22000	100-year	CEM	105000.0	156.92	182.88		184.0	0.001715	10.09	16156.10	1397.6	0.37
Reach-1	22000	100-year	REV	105000.0	156.92	182.86		184.0	0.001721	10.10	16131.95	1395.8	0.37
Reach-1	22000	100-year	NATURAL	105000.0	156.92	181.77		183.1	0.002112	10.84	14672.42	1282.8	0.40
Reach-1	18800	50-year	CEM	48300.0	155.30	178.63		178.9	0.000342	5.05	17077.71	1502.4	0.20
Reach-1	18800	50-year	REV	48300.0	155.30	178.87		179.2	0.000325	4.96	17434.82	1509.1	0.19
Reach-1	18800	50-year	NATURAL	48300.0	155.30	177.30		177.7	0.000459	5.59	15097.52	1464.1	0.23
Reach-1	18800	100-year	CEM	58600.0	155.30	180.87		181.2	0.000326	5.29	20617.32	1763.6	0.20
Reach-1	18800	100-year	REV	58600.0	155.30	180.84		181.2	0.000328	5.30	20569.06	1760.4	0.20
Reach-1	18800	100-year	NATURAL	58600.0	155.30	178.95		179.4	0.000470	5.99	17551.26	1511.4	0.23
Reach-1	18200	50-year	CEM	48300.0	155.16	178.28	167.6	178.7	0.000457	5.60	13905.38	1946.2	0.23
Reach-1	18200	50-year	REV	48300.0	155.16	178.53	167.6	178.9	0.000435	5.51	14156.78	1958.8	0.22
Reach-1	18200	50-year	NATURAL	48300.0	155.16	177.05		177.4	0.000462	5.38	19123.51	1886.4	0.23
Reach-1	18200	100-year	CEM	58600.0	155.16	180.49	168.9	180.9	0.000443	5.94	16122.14	2014.4	0.23
Reach-1	18200	100-year	REV	58600.0	155.16	180.46	168.9	180.9	0.000446	5.95	16093.23	2013.6	0.23
Reach-1	18200	100-year	NATURAL	58600.0	155.16	178.69		179.1	0.000472	5.77	22293.05	1966.9	0.23
Reach-1	17840	50-year	CEM	48300.0	150.00	177.43		178.3	0.000768	7.81	7337.16	1792.0	0.30
Reach-1	17840	50-year	REV	48300.0	150.00	177.71		178.6	0.000731	7.69	7466.51	1804.1	0.29
Reach-1	17840	50-year	NATURAL	48300.0	150.00	176.42		177.1	0.000689	7.17	14477.61	1761.2	0.28
Reach-1	17840	100-year	CEM	58600.0	150.00	179.50		180.5	0.000800	8.49	8292.19	1853.4	0.31
Reach-1	17840	100-year	REV	58600.0	150.00	179.47		180.5	0.000804	8.51	8277.14	1852.1	0.31

HEC-RAS River: SALUDA RIVER Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Plan	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
Reach-1	17840	100-year	NATURAL	58600.0	150.00	178.04	167.5	178.8	0.000709	7.65	17361.63	1815.0	0.29
Reach-1	17790			Bridge									
Reach-1	17750	50-year	CEM	48300.0	150.00	176.59	166.1	177.5	0.000805	7.79	6997.13	1123.2	0.30
Reach-1	17750	50-year	REV	48300.0	150.00	176.86	166.1	177.7	0.000766	7.67	7109.70	1128.4	0.30
Reach-1	17750	50-year	NATURAL	48300.0	150.00	176.05		176.8	0.000754	7.40	10025.46	1103.4	0.29
Reach-1	17750	100-year	CEM	58600.0	150.00	178.59	167.4	179.6	0.000843	8.49	7810.18	1165.4	0.32
Reach-1	17750	100-year	REV	58600.0	150.00	178.56	167.4	179.6	0.000847	8.50	7796.98	1165.0	0.32
Reach-1	17750	100-year	NATURAL	58600.0	150.00	177.56		178.4	0.000809	8.05	11722.02	1148.5	0.31
Reach-1	17665	50-year	CEM	48300.0	150.00	176.55	165.1	177.3	0.001050	7.47	7686.80	994.9	0.28
Reach-1	17665	50-year	REV	48300.0	150.00	176.83	165.1	177.6	0.000998	7.34	7953.00	1006.6	0.27
Reach-1	17665	50-year	NATURAL	48300.0	150.00	176.01		176.7	0.000978	7.09	10755.90	972.7	0.27
Reach-1	17665	100-year	CEM	58600.0	150.00	178.55	166.5	179.5	0.001119	8.17	8712.36	1080.7	0.29
Reach-1	17665	100-year	REV	58600.0	150.00	178.53	166.5	179.5	0.001117	8.16	8864.50	1079.4	0.29
Reach-1	17665	100-year	NATURAL	58600.0	150.00	177.51		178.3	0.001086	7.81	12253.37	1034.8	0.29
Reach-1	17540			Bridge									
Reach-1	17385	50-year	CEM	48300.0	150.00	176.01	163.0	176.5	0.000636	5.51	9676.78	1129.2	0.22
Reach-1	17385	50-year	NATURAL	48300.0	150.00	175.71		176.4	0.001036	6.92	9704.97	843.5	0.27
Reach-1	17385	100-year	CEM	58600.0	150.00	177.50	164.1	178.1	0.000734	6.21	10510.80	1283.9	0.23
Reach-1	17385	100-year	NATURAL	58600.0	150.00	177.11		178.0	0.001191	7.76	10976.96	963.6	0.30
Reach-1	17365	50-year	CEM	48300.0	150.00	175.65	164.6	176.4	0.001089	7.01	8473.99	840.4	0.28
Reach-1	17365	50-year	REV	48300.0	150.00	175.65	164.6	176.4	0.001089	7.01	8473.94	840.4	0.28
Reach-1	17365	50-year	NATURAL	48300.0	150.00	175.70		176.4	0.001038	6.86	9691.75	842.7	0.27
Reach-1	17365	100-year	CEM	58600.0	150.00	177.06	165.9	178.0	0.001255	7.87	9278.66	961.1	0.30
Reach-1	17365	100-year	REV	58600.0	150.00	177.06	165.9	178.0	0.001255	7.87	9279.28	961.1	0.30
Reach-1	17365	100-year	NATURAL	58600.0	150.00	177.09		177.9	0.001194	7.69	10960.25	962.7	0.29
Reach-1	17000	50-year	CEM	48300.0	154.95	172.86	171.1	175.1	0.006191	13.07	6112.38	882.1	0.68
Reach-1	17000	50-year	REV	48300.0	154.95	172.86	171.1	175.1	0.006192	13.07	6112.16	882.1	0.68
Reach-1	17000	50-year	NATURAL	48300.0	154.95	172.86		175.1	0.006233	13.11	6298.51	882.0	0.69
Reach-1	17000	100-year	CEM	58600.0	154.95	174.03	172.1	176.6	0.006298	14.07	7021.52	902.4	0.70
Reach-1	17000	100-year	REV	58600.0	154.95	174.04	172.1	176.6	0.006289	14.07	7025.26	902.5	0.70
Reach-1	17000	100-year	NATURAL	58600.0	154.95	174.04		176.6	0.006266	14.04	7352.49	902.5	0.70
Reach-1	16600	50-year	CEM	48300.0	154.78	170.85		172.7	0.005322	11.25	5705.77	871.2	0.62
Reach-1	16600	50-year	REV	48300.0	154.78	170.85		172.7	0.005321	11.25	5700.29	866.4	0.62
Reach-1	16600	50-year	NATURAL	48300.0	154.78	170.85		172.7	0.005322	11.25	5705.77	871.2	0.62
Reach-1	16600	100-year	CEM	58600.0	154.78	172.14		174.2	0.005063	11.89	6869.38	909.1	0.62
Reach-1	16600	100-year	REV	58600.0	154.78	172.14		174.2	0.005078	11.90	6848.81	909.1	0.62
Reach-1	16600	100-year	NATURAL	58600.0	154.78	172.14		174.2	0.005063	11.89	6869.38	909.1	0.62
Reach-1	16200	50-year	CEM	48300.0	153.94	169.89		170.9	0.002944	8.35	7337.59	882.7	0.46
Reach-1	16200	50-year	REV	48300.0	153.94	169.89		170.9	0.002944	8.35	7337.59	882.7	0.46
Reach-1	16200	50-year	NATURAL	48300.0	153.94	169.89		170.9	0.002944	8.35	7337.59	882.7	0.46
Reach-1	16200	100-year	CEM	58600.0	153.94	171.33		172.4	0.002717	8.78	8627.41	899.8	0.46
Reach-1	16200	100-year	REV	58600.0	153.94	171.33		172.4	0.002717	8.78	8627.41	899.8	0.46
Reach-1	16200	100-year	NATURAL	58600.0	153.94	171.33		172.4	0.002717	8.78	8627.41	899.8	0.46
Reach-1	15700	50-year	CEM	48300.0	152.72	168.86		169.6	0.002308	7.81	8465.57	1188.3	0.42
Reach-1	15700	50-year	REV	48300.0	152.72	168.86		169.6	0.002308	7.81	8465.57	1188.3	0.42
Reach-1	15700	50-year	NATURAL	48300.0	152.72	168.86		169.6	0.002308	7.81	8465.57	1188.3	0.42
Reach-1	15700	100-year	CEM	58600.0	152.72	170.53		171.2	0.001936	7.86	10470.12	1206.5	0.39
Reach-1	15700	100-year	REV	58600.0	152.72	170.53		171.2	0.001936	7.86	10470.12	1206.5	0.39
Reach-1	15700	100-year	NATURAL	58600.0	152.72	170.53		171.2	0.001936	7.86	10470.12	1206.5	0.39
Reach-1	15200	50-year	CEM	48300.0	150.94	167.58		168.3	0.001772	7.86	8290.50	1087.3	0.41
Reach-1	15200	50-year	REV	48300.0	150.94	167.58		168.3	0.001772	7.86	8290.50	1087.3	0.41
Reach-1	15200	50-year	NATURAL	48300.0	150.94	167.58		168.3	0.001772	7.86	8290.50	1087.3	0.41
Reach-1	15200	100-year	CEM	58600.0	150.94	169.44		170.2	0.001490	7.97	10379.56	1160.0	0.39
Reach-1	15200	100-year	REV	58600.0	150.94	169.44		170.2	0.001490	7.97	10379.56	1160.0	0.39
Reach-1	15200	100-year	NATURAL	58600.0	150.94	169.44		170.2	0.001490	7.97	10379.56	1160.0	0.39
Reach-1	14700	50-year	CEM	48300.0	147.50	167.14		167.7	0.001000	7.09	10087.65	1118.0	0.32
Reach-1	14700	50-year	REV	48300.0	147.50	167.14		167.7	0.001000	7.09	10087.65	1118.0	0.32
Reach-1	14700	50-year	NATURAL	48300.0	147.50	167.14		167.7	0.001000	7.09	10087.65	1118.0	0.32
Reach-1	14700	100-year	CEM	58600.0	147.50	169.06		169.7	0.000898	7.29	12263.92	1141.4	0.31
Reach-1	14700	100-year	REV	58600.0	147.50	169.06		169.7	0.000898	7.29	12263.92	1141.4	0.31
Reach-1	14700	100-year	NATURAL	58600.0	147.50	169.06		169.7	0.000898	7.29	12263.92	1141.4	0.31
Reach-1	14200	50-year	CEM	48300.0	146.53	167.05	158.9	167.3	0.000449	5.46	13206.96	1463.8	0.22
Reach-1	14200	50-year	REV	48300.0	146.53	167.05	158.9	167.3	0.000449	5.46	13206.96	1463.8	0.22
Reach-1	14200	50-year	NATURAL	48300.0	146.53	167.05	158.9	167.3	0.000449	5.46	13206.96	1463.8	0.22
Reach-1	14200	100-year	CEM	58600.0	146.53	169.00	159.7	169.3	0.000416	5.63	16114.27	1532.9	0.22
Reach-1	14200	100-year	REV	58600.0	146.53	169.00	159.7	169.3	0.000416	5.63	16114.27	1532.9	0.22
Reach-1	14200	100-year	NATURAL	58600.0	146.53	169.00	159.7	169.3	0.000416	5.63	16114.27	1532.9	0.22
Reach-1	13600	50-year	CEM	48300.0	145.36	165.34		166.6	0.001511	10.00	10218.26	1249.7	0.41
Reach-1	13600	50-year	REV	48300.0	145.36	165.34		166.6	0.001511	10.00	10218.26	1249.7	0.41
Reach-1	13600	50-year	NATURAL	48300.0	145.36	165.34		166.6	0.001511	10.00	10218.26	1249.7	0.41

HEC-RAS River: SALUDA RIVER Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Plan	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
Reach-1	13600	100-year	CEM	58600.0	145.36	167.26		168.6	0.001452	10.46	12692.64	1328.4	0.41
Reach-1	13600	100-year	REV	58600.0	145.36	167.26		168.6	0.001452	10.46	12692.64	1328.4	0.41
Reach-1	13600	100-year	NATURAL	58600.0	145.36	167.26		168.6	0.001452	10.46	12692.64	1328.4	0.41
Reach-1	13000	50-year	CEM	48300.0	144.19	164.17		165.6	0.001839	10.20	7512.67	985.9	0.44
Reach-1	13000	50-year	REV	48300.0	144.19	164.17		165.6	0.001839	10.20	7512.67	985.9	0.44
Reach-1	13000	50-year	NATURAL	48300.0	144.19	164.17		165.6	0.001839	10.20	7512.67	985.9	0.44
Reach-1	13000	100-year	CEM	58600.0	144.19	166.20		167.7	0.001664	10.49	9610.31	1054.5	0.43
Reach-1	13000	100-year	REV	58600.0	144.19	166.20		167.7	0.001664	10.49	9610.31	1054.5	0.43
Reach-1	13000	100-year	NATURAL	58600.0	144.19	166.20		167.7	0.001664	10.49	9610.31	1054.5	0.43
Reach-1	12500	50-year	CEM	48300.0	143.22	163.32		164.7	0.001787	10.10	7460.11	907.0	0.44
Reach-1	12500	50-year	REV	48300.0	143.22	163.32		164.7	0.001787	10.10	7460.11	907.0	0.44
Reach-1	12500	50-year	NATURAL	48300.0	143.22	163.32		164.7	0.001787	10.10	7460.11	907.0	0.44
Reach-1	12500	100-year	CEM	58600.0	143.22	165.41		166.8	0.001638	10.47	9471.80	1003.2	0.43
Reach-1	12500	100-year	REV	58600.0	143.22	165.41		166.8	0.001638	10.47	9471.80	1003.2	0.43
Reach-1	12500	100-year	NATURAL	58600.0	143.22	165.41		166.8	0.001638	10.47	9471.80	1003.2	0.43
Reach-1	12000	50-year	CEM	48300.0	142.25	160.38	156.8	163.2	0.004003	13.56	3687.53	302.3	0.64
Reach-1	12000	50-year	REV	48300.0	142.25	160.38	156.8	163.2	0.004003	13.56	3687.53	302.3	0.64
Reach-1	12000	50-year	NATURAL	48300.0	142.25	160.38	156.8	163.2	0.004003	13.56	3687.53	302.3	0.64
Reach-1	12000	100-year	CEM	58600.0	142.25	162.08	158.3	165.4	0.004005	14.64	4213.90	331.9	0.65
Reach-1	12000	100-year	REV	58600.0	142.25	162.08	158.3	165.4	0.004005	14.64	4213.90	331.9	0.65
Reach-1	12000	100-year	NATURAL	58600.0	142.25	162.08	158.3	165.4	0.004005	14.64	4213.90	331.9	0.65
Reach-1	11500	50-year	CEM	48300.0	141.27	160.07	153.6	161.5	0.001791	9.73	5536.55	452.1	0.44
Reach-1	11500	50-year	REV	48300.0	141.27	160.07	153.6	161.5	0.001791	9.73	5536.55	452.1	0.44
Reach-1	11500	50-year	NATURAL	48300.0	141.27	160.07	153.6	161.5	0.001791	9.73	5536.55	452.1	0.44
Reach-1	11500	100-year	CEM	58600.0	141.27	161.95	154.9	163.6	0.001783	10.48	6437.99	546.2	0.44
Reach-1	11500	100-year	REV	58600.0	141.27	161.95	154.9	163.6	0.001783	10.48	6437.99	546.2	0.44
Reach-1	11500	100-year	NATURAL	58600.0	141.27	161.95	154.9	163.6	0.001783	10.48	6437.99	546.2	0.44
Reach-1	11000	50-year	CEM	48300.0	140.30	158.87	152.8	160.5	0.002085	10.37	4875.16	373.6	0.47
Reach-1	11000	50-year	REV	48300.0	140.30	158.87	152.8	160.5	0.002085	10.37	4875.16	373.6	0.47
Reach-1	11000	50-year	NATURAL	48300.0	140.30	158.87	152.8	160.5	0.002085	10.37	4875.16	373.6	0.47
Reach-1	11000	100-year	CEM	58600.0	140.30	160.67	154.1	162.6	0.002102	11.22	5766.42	643.6	0.48
Reach-1	11000	100-year	REV	58600.0	140.30	160.67	154.1	162.6	0.002102	11.22	5766.42	643.6	0.48
Reach-1	11000	100-year	NATURAL	58600.0	140.30	160.67	154.1	162.6	0.002102	11.22	5766.42	643.6	0.48
Reach-1	10500	50-year	CEM	48300.0	139.33	158.08	151.7	159.5	0.001886	9.46	5491.22	526.7	0.44
Reach-1	10500	50-year	REV	48300.0	139.33	158.08	151.7	159.5	0.001886	9.46	5491.22	526.7	0.44
Reach-1	10500	50-year	NATURAL	48300.0	139.33	158.08	151.7	159.5	0.001886	9.46	5491.22	526.7	0.44
Reach-1	10500	100-year	CEM	58600.0	139.33	159.98	153.0	161.5	0.001803	10.05	6704.48	732.9	0.44
Reach-1	10500	100-year	REV	58600.0	139.33	159.98	153.0	161.5	0.001803	10.05	6704.48	732.9	0.44
Reach-1	10500	100-year	NATURAL	58600.0	139.33	159.98	153.0	161.5	0.001803	10.05	6704.48	732.9	0.44
Reach-1	10000	50-year	CEM	48300.0	138.36	157.02		158.5	0.001845	9.91	5705.30	467.4	0.44
Reach-1	10000	50-year	REV	48300.0	138.36	157.02		158.5	0.001845	9.91	5705.30	467.4	0.44
Reach-1	10000	50-year	NATURAL	48300.0	138.36	157.02		158.5	0.001845	9.91	5705.30	467.4	0.44
Reach-1	10000	100-year	CEM	58600.0	138.36	158.86		160.6	0.001856	10.71	6618.73	524.2	0.45
Reach-1	10000	100-year	REV	58600.0	138.36	158.86		160.6	0.001856	10.71	6618.73	524.2	0.45
Reach-1	10000	100-year	NATURAL	58600.0	138.36	158.86		160.6	0.001856	10.71	6618.73	524.2	0.45
Reach-1	9500	50-year	CEM	48300.0	137.38	156.34		157.6	0.001611	9.15	5873.03	547.1	0.41
Reach-1	9500	50-year	REV	48300.0	137.38	156.34		157.6	0.001611	9.15	5873.03	547.1	0.41
Reach-1	9500	50-year	NATURAL	48300.0	137.38	156.34		157.6	0.001611	9.15	5873.03	547.1	0.41
Reach-1	9500	100-year	CEM	58600.0	137.38	158.31		159.6	0.001510	9.60	7058.45	654.0	0.41
Reach-1	9500	100-year	REV	58600.0	137.38	158.31		159.6	0.001510	9.60	7058.45	654.0	0.41
Reach-1	9500	100-year	NATURAL	58600.0	137.38	158.31		159.6	0.001510	9.60	7058.45	654.0	0.41
Reach-1	9000	50-year	CEM	48300.0	136.41	155.20		156.7	0.001825	10.08	5568.11	495.2	0.44
Reach-1	9000	50-year	REV	48300.0	136.41	155.20		156.7	0.001825	10.08	5568.11	495.2	0.44
Reach-1	9000	50-year	NATURAL	48300.0	136.41	155.20		156.7	0.001825	10.08	5568.11	495.2	0.44
Reach-1	9000	100-year	CEM	58600.0	136.41	157.14		158.8	0.001770	10.71	6575.83	594.2	0.44
Reach-1	9000	100-year	REV	58600.0	136.41	157.14		158.8	0.001770	10.71	6575.83	594.2	0.44
Reach-1	9000	100-year	NATURAL	58600.0	136.41	157.14		158.8	0.001770	10.71	6575.83	594.2	0.44
Reach-1	8500	50-year	CEM	48300.0	135.44	154.77		155.8	0.001302	8.48	6769.89	672.2	0.37
Reach-1	8500	50-year	REV	48300.0	135.44	154.77		155.8	0.001302	8.48	6769.89	672.2	0.37
Reach-1	8500	50-year	NATURAL	48300.0	135.44	154.77		155.8	0.001302	8.48	6769.89	672.2	0.37
Reach-1	8500	100-year	CEM	58600.0	135.44	156.85		157.9	0.001183	8.77	8345.74	841.6	0.36
Reach-1	8500	100-year	REV	58600.0	135.44	156.85		157.9	0.001183	8.77	8345.74	841.6	0.36
Reach-1	8500	100-year	NATURAL	58600.0	135.44	156.85		157.9	0.001183	8.77	8345.74	841.6	0.36
Reach-1	8240	50-year	CEM	48300.0	134.93	154.79		155.4	0.000853	6.89	10287.45	952.1	0.30
Reach-1	8240	50-year	REV	48300.0	134.93	154.79		155.4	0.000853	6.89	10287.45	952.1	0.30
Reach-1	8240	50-year	NATURAL	48300.0	134.93	154.79		155.4	0.000853	6.89	10287.45	952.1	0.30
Reach-1	8240	100-year	CEM	58600.0	134.93	156.90		157.5	0.000769	7.10	12328.67	981.0	0.29
Reach-1	8240	100-year	REV	58600.0	134.93	156.90		157.5	0.000769	7.10	12328.67	981.0	0.29
Reach-1	8240	100-year	NATURAL	58600.0	134.93	156.90		157.5	0.000769	7.10	12328.67	981.0	0.29
Reach-1	7900	50-year	CEM	48300.0	134.27	154.39		155.1	0.000949	7.05	10105.09	903.0	0.32
Reach-1	7900	50-year	REV	48300.0	134.27	154.39		155.1	0.000949	7.05	10105.09	903.0	0.32
Reach-1	7900	50-year	NATURAL	48300.0	134.27	154.39		155.1	0.000949	7.05	10105.09	903.0	0.32

HEC-RAS River: SALUDA RIVER Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Plan	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
Reach-1	7900	100-year	CEM	58600.0	134.27	156.49		157.2	0.000878	7.39	12019.61	916.7	0.31
Reach-1	7900	100-year	REV	58600.0	134.27	156.49		157.2	0.000878	7.39	12019.61	916.7	0.31
Reach-1	7900	100-year	NATURAL	58600.0	134.27	156.49		157.2	0.000878	7.39	12019.61	916.7	0.31
Reach-1	7400	50-year	CEM	48300.0	132.87	154.35		154.7	0.000422	5.32	11625.07	814.6	0.22
Reach-1	7400	50-year	REV	48300.0	132.87	154.35		154.7	0.000422	5.32	11625.07	814.6	0.22
Reach-1	7400	50-year	NATURAL	48300.0	132.87	154.35		154.7	0.000422	5.32	11625.07	814.6	0.22
Reach-1	7400	100-year	CEM	58600.0	132.87	156.47		156.8	0.000412	5.66	13376.63	831.2	0.22
Reach-1	7400	100-year	REV	58600.0	132.87	156.47		156.8	0.000412	5.66	13376.63	831.2	0.22
Reach-1	7400	100-year	NATURAL	58600.0	132.87	156.47		156.8	0.000412	5.66	13376.63	831.2	0.22
Reach-1	6900	50-year	CEM	48300.0	131.87	153.09		154.3	0.001197	9.14	8049.09	594.3	0.37
Reach-1	6900	50-year	REV	48300.0	131.87	153.09		154.3	0.001197	9.14	8049.09	594.3	0.37
Reach-1	6900	50-year	NATURAL	48300.0	131.87	153.09		154.3	0.001197	9.14	8049.09	594.3	0.37
Reach-1	6900	100-year	CEM	58600.0	131.87	155.02		156.4	0.001258	10.00	9247.99	645.9	0.38
Reach-1	6900	100-year	REV	58600.0	131.87	155.02		156.4	0.001258	10.00	9247.99	645.9	0.38
Reach-1	6900	100-year	NATURAL	58600.0	131.87	155.02		156.4	0.001258	10.00	9247.99	645.9	0.38
Reach-1	6450	50-year	CEM	48300.0	124.16	153.13	136.8	153.7	0.000361	5.86	9216.30	613.5	0.21
Reach-1	6450	50-year	REV	48300.0	124.16	153.13	136.8	153.7	0.000361	5.86	9216.30	613.5	0.21
Reach-1	6450	50-year	NATURAL	48300.0	124.16	153.13	136.8	153.7	0.000361	5.86	9216.30	613.5	0.21
Reach-1	6450	100-year	CEM	58600.0	124.16	155.08	138.0	155.7	0.000407	6.55	10440.25	650.0	0.22
Reach-1	6450	100-year	REV	58600.0	124.16	155.08	138.0	155.7	0.000407	6.55	10440.25	650.0	0.22
Reach-1	6450	100-year	NATURAL	58600.0	124.16	155.08	138.0	155.7	0.000407	6.55	10440.25	650.0	0.22
Reach-1	6350			Bridge									
Reach-1	6270	50-year	CEM	48300.0	124.22	153.04	136.8	153.6	0.000368	5.90	9108.42	621.4	0.21
Reach-1	6270	50-year	REV	48300.0	124.22	153.04	136.8	153.6	0.000368	5.90	9108.42	621.4	0.21
Reach-1	6270	50-year	NATURAL	48300.0	124.22	153.04	136.8	153.6	0.000368	5.90	9108.42	621.4	0.21
Reach-1	6270	100-year	CEM	58600.0	124.22	154.98	138.1	155.6	0.000414	6.58	10341.16	650.5	0.23
Reach-1	6270	100-year	REV	58600.0	124.22	154.98	138.1	155.6	0.000414	6.58	10341.16	650.5	0.23
Reach-1	6270	100-year	NATURAL	58600.0	124.22	154.98	138.1	155.6	0.000414	6.58	10341.16	650.5	0.23
Reach-1	5900	50-year	CEM	48300.0	131.87	151.77		153.1	0.001545	9.29	5925.88	548.8	0.41
Reach-1	5900	50-year	REV	48300.0	131.87	151.77		153.1	0.001545	9.29	5925.88	548.8	0.41
Reach-1	5900	50-year	NATURAL	48300.0	131.87	151.77		153.1	0.001545	9.29	5925.88	548.8	0.41
Reach-1	5900	100-year	CEM	58600.0	131.87	153.57		155.1	0.001579	10.07	6945.22	602.1	0.42
Reach-1	5900	100-year	REV	58600.0	131.87	153.57		155.1	0.001579	10.07	6945.22	602.1	0.42
Reach-1	5900	100-year	NATURAL	58600.0	131.87	153.57		155.1	0.001579	10.07	6945.22	602.1	0.42
Reach-1	5400	50-year	CEM	48300.0	131.71	151.13		152.3	0.001434	8.78	6164.05	515.7	0.39
Reach-1	5400	50-year	REV	48300.0	131.71	151.13		152.3	0.001434	8.78	6164.05	515.7	0.39
Reach-1	5400	50-year	NATURAL	48300.0	131.71	151.13		152.3	0.001434	8.78	6164.05	515.7	0.39
Reach-1	5400	100-year	CEM	58600.0	131.71	152.92		154.3	0.001456	9.51	7119.70	547.0	0.40
Reach-1	5400	100-year	REV	58600.0	131.71	152.92		154.3	0.001456	9.51	7119.70	547.0	0.40
Reach-1	5400	100-year	NATURAL	58600.0	131.71	152.92		154.3	0.001456	9.51	7119.70	547.0	0.40
Reach-1	4900	50-year	CEM	48300.0	130.90	150.01		151.5	0.001814	9.82	5783.96	554.8	0.44
Reach-1	4900	50-year	REV	48300.0	130.90	150.01		151.5	0.001814	9.82	5783.96	554.8	0.44
Reach-1	4900	50-year	NATURAL	48300.0	130.90	150.01		151.5	0.001814	9.82	5783.96	554.8	0.44
Reach-1	4900	100-year	CEM	58600.0	130.90	151.76		153.5	0.001834	10.59	6768.36	567.9	0.45
Reach-1	4900	100-year	REV	58600.0	130.90	151.76		153.5	0.001834	10.59	6768.36	567.9	0.45
Reach-1	4900	100-year	NATURAL	58600.0	130.90	151.76		153.5	0.001834	10.59	6768.36	567.9	0.45
Reach-1	4400	50-year	CEM	48300.0	130.09	148.03		150.3	0.002873	12.12	4704.01	537.8	0.55
Reach-1	4400	50-year	REV	48300.0	130.09	148.03		150.3	0.002873	12.12	4704.01	537.8	0.55
Reach-1	4400	50-year	NATURAL	48300.0	130.09	148.03		150.3	0.002873	12.12	4704.01	537.8	0.55
Reach-1	4400	100-year	CEM	58600.0	130.09	149.58		152.2	0.002990	13.19	5563.29	564.3	0.57
Reach-1	4400	100-year	REV	58600.0	130.09	149.58		152.2	0.002990	13.19	5563.29	564.3	0.57
Reach-1	4400	100-year	NATURAL	58600.0	130.09	149.58		152.2	0.002990	13.19	5563.29	564.3	0.57
Reach-1	3900	50-year	CEM	48300.0	129.27	146.52		148.8	0.003108	12.15	4618.13	487.9	0.56
Reach-1	3900	50-year	REV	48300.0	129.27	146.52		148.8	0.003108	12.15	4618.13	487.9	0.56
Reach-1	3900	50-year	NATURAL	48300.0	129.27	146.52		148.8	0.003108	12.15	4618.13	487.9	0.56
Reach-1	3900	100-year	CEM	58600.0	129.27	147.97		150.6	0.003278	13.29	5364.19	539.3	0.59
Reach-1	3900	100-year	REV	58600.0	129.27	147.97		150.6	0.003278	13.29	5364.19	539.3	0.59
Reach-1	3900	100-year	NATURAL	58600.0	129.27	147.97		150.6	0.003278	13.29	5364.19	539.3	0.59
Reach-1	3400	50-year	CEM	48300.0	128.46	144.95	141.0	147.2	0.003287	12.07	4670.48	486.3	0.58
Reach-1	3400	50-year	REV	48300.0	128.46	144.95	141.0	147.2	0.003287	12.07	4670.48	486.3	0.58
Reach-1	3400	50-year	NATURAL	48300.0	128.46	144.95	141.0	147.2	0.003287	12.07	4670.48	486.3	0.58
Reach-1	3400	100-year	CEM	58600.0	128.46	146.30	142.4	148.9	0.003476	13.22	5307.66	582.6	0.60
Reach-1	3400	100-year	REV	58600.0	128.46	146.30	142.4	148.9	0.003476	13.22	5307.66	582.6	0.60
Reach-1	3400	100-year	NATURAL	58600.0	128.46	146.30	142.4	148.9	0.003476	13.22	5307.66	582.6	0.60
Reach-1	2900	50-year	CEM	48300.0	127.65	145.18	139.9	145.8	0.001096	7.32	8057.78	799.6	0.34
Reach-1	2900	50-year	REV	48300.0	127.65	145.18	139.9	145.8	0.001096	7.32	8057.78	799.6	0.34
Reach-1	2900	50-year	NATURAL	48300.0	127.65	145.18	139.9	145.8	0.001096	7.32	8057.78	799.6	0.34
Reach-1	2900	100-year	CEM	58600.0	127.65	146.80	140.7	147.5	0.001044	7.66	9339.36	839.4	0.34
Reach-1	2900	100-year	REV	58600.0	127.65	146.80	140.7	147.5	0.001044	7.66	9339.36	839.4	0.34
Reach-1	2900	100-year	NATURAL	58600.0	127.65	146.80	140.7	147.5	0.001044	7.66	9339.36	839.4	0.34
Reach-1	2400	50-year	CEM	48300.0	126.84	144.74	138.8	145.2	0.000952	6.93	12125.68	1705.8	0.32

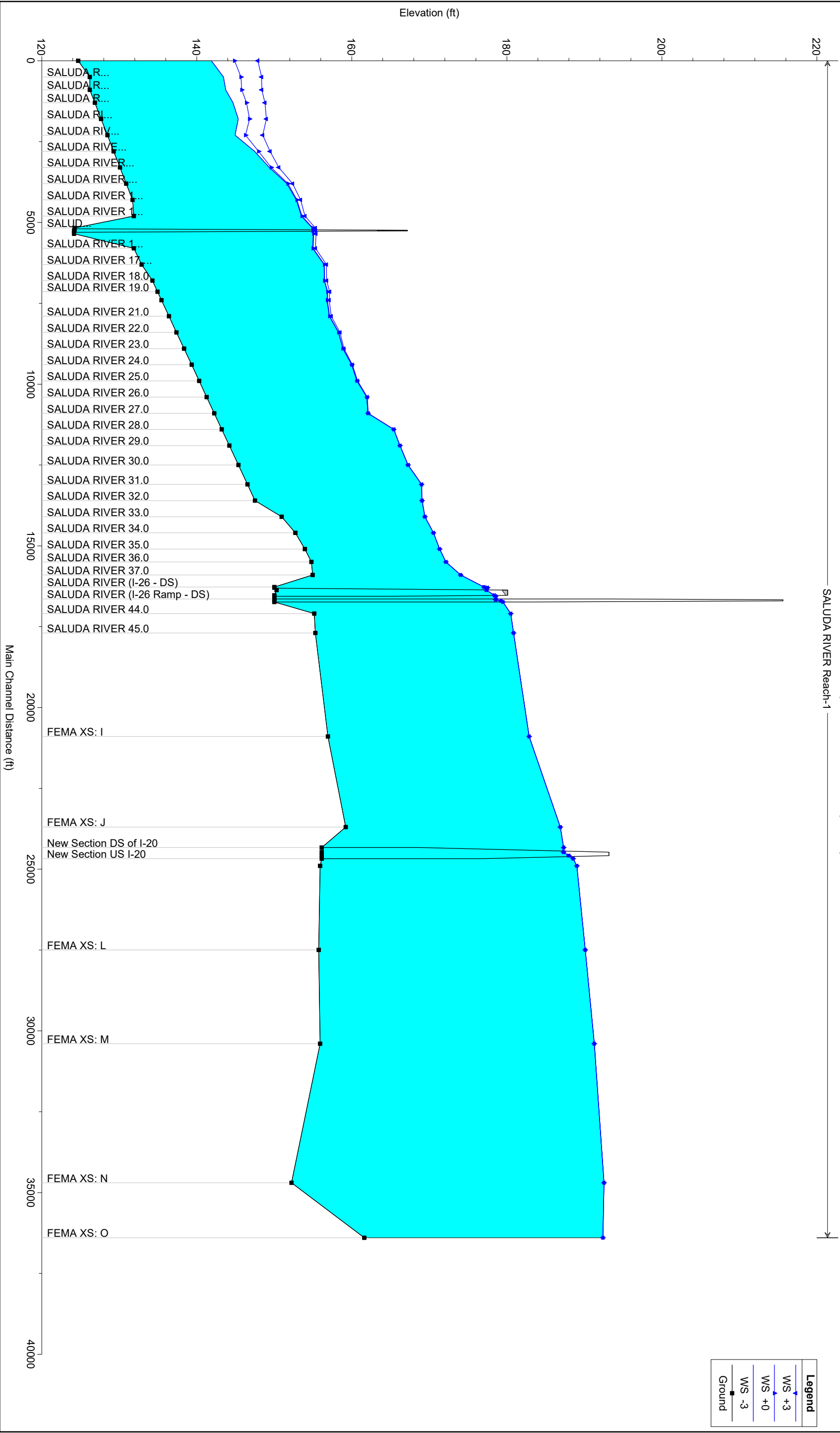
HEC-RAS River: SALUDA RIVER Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Plan	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
Reach-1	2400	50-year	REV	48300.0	126.84	144.74	138.8	145.2	0.000952	6.93	12125.68	1705.8	0.32
Reach-1	2400	50-year	NATURAL	48300.0	126.84	144.74	138.8	145.2	0.000952	6.93	12125.68	1705.8	0.32
Reach-1	2400	100-year	CEM	58600.0	126.84	146.41	139.6	146.9	0.000890	7.19	14365.48	1739.0	0.31
Reach-1	2400	100-year	REV	58600.0	126.84	146.41	139.6	146.9	0.000890	7.19	14365.48	1739.0	0.31
Reach-1	2400	100-year	NATURAL	58600.0	126.84	146.41	139.6	146.9	0.000890	7.19	14365.48	1739.0	0.31
Reach-1	2000	50-year	CEM	48300.0	126.19	144.18	137.8	144.9	0.001184	7.76	10557.90	1601.6	0.35
Reach-1	2000	50-year	REV	48300.0	126.19	144.18	137.8	144.9	0.001184	7.76	10557.90	1601.6	0.35
Reach-1	2000	50-year	NATURAL	48300.0	126.19	144.18	137.8	144.9	0.001184	7.76	10557.90	1601.6	0.35
Reach-1	2000	100-year	CEM	58600.0	126.19	145.80	139.0	146.6	0.001182	8.30	12221.15	1680.0	0.36
Reach-1	2000	100-year	REV	58600.0	126.19	145.80	139.0	146.6	0.001182	8.30	12221.15	1680.0	0.36
Reach-1	2000	100-year	NATURAL	58600.0	126.19	145.80	139.0	146.6	0.001182	8.30	12221.15	1680.0	0.36
Reach-1	1600	50-year	CEM	48300.0	126.19	144.03	137.1	144.4	0.000701	5.94	11828.36	1431.0	0.27
Reach-1	1600	50-year	REV	48300.0	126.19	144.03	137.1	144.4	0.000701	5.94	11828.36	1431.0	0.27
Reach-1	1600	50-year	NATURAL	48300.0	126.19	144.03	137.1	144.4	0.000701	5.94	11828.36	1431.0	0.27
Reach-1	1600	100-year	CEM	58600.0	126.19	145.69	137.8	146.1	0.000679	6.27	13810.17	1461.1	0.27
Reach-1	1600	100-year	REV	58600.0	126.19	145.69	137.8	146.1	0.000679	6.27	13810.17	1461.1	0.27
Reach-1	1600	100-year	NATURAL	58600.0	126.19	145.69	137.8	146.1	0.000679	6.27	13810.17	1461.1	0.27
Reach-1	1100	50-year	CEM	48300.0	124.69	143.26	136.8	143.9	0.001050	7.50	9124.03	1110.3	0.33
Reach-1	1100	50-year	REV	48300.0	124.69	143.26	136.8	143.9	0.001050	7.50	9124.03	1110.3	0.33
Reach-1	1100	50-year	NATURAL	48300.0	124.69	143.26	136.8	143.9	0.001050	7.50	9124.03	1110.3	0.33
Reach-1	1100	100-year	CEM	58600.0	124.69	144.88	137.7	145.6	0.001052	8.02	10526.49	1131.6	0.34
Reach-1	1100	100-year	REV	58600.0	124.69	144.88	137.7	145.6	0.001052	8.02	10526.49	1131.6	0.34
Reach-1	1100	100-year	NATURAL	58600.0	124.69	144.88	137.7	145.6	0.001052	8.02	10526.49	1131.6	0.34

APPENDIX H

HEC-RAS OUTPUT – SENSITIVITY ANALYSIS

SALUDA RIVER Reach-1



HEC-RAS Plan: Sensitivity_Analysis River: SALUDA RIVER Reach: Reach-1

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
Reach-1	37500	-3	105000.0	161.62	192.4		193.3	0.000926	8.28	19241.58	1963.8	0.28
Reach-1	37500	+0	105000.0	161.62	192.4		193.3	0.000926	8.28	19241.58	1963.8	0.28
Reach-1	37500	+3	105000.0	161.62	192.4		193.3	0.000926	8.28	19241.61	1963.8	0.28
Reach-1	35800	-3	105000.0	152.22	192.5		192.6	0.000121	3.17	68168.05	5525.8	0.10
Reach-1	35800	+0	105000.0	152.22	192.5		192.6	0.000121	3.17	68168.05	5525.8	0.10
Reach-1	35800	+3	105000.0	152.22	192.5		192.6	0.000121	3.17	68168.13	5525.8	0.10
Reach-1	31500	-3	105000.0	155.92	191.3		191.6	0.000544	6.22	34735.95	3909.5	0.21
Reach-1	31500	+0	105000.0	155.92	191.3		191.6	0.000544	6.22	34735.95	3909.5	0.21
Reach-1	31500	+3	105000.0	155.92	191.3		191.6	0.000544	6.22	34736.07	3909.5	0.21
Reach-1	28600	-3	105000.0	155.72	190.1		190.4	0.000339	5.52	32945.18	2055.9	0.17
Reach-1	28600	+0	105000.0	155.72	190.1		190.4	0.000339	5.52	32945.18	2055.9	0.17
Reach-1	28600	+3	105000.0	155.72	190.1		190.4	0.000339	5.52	32945.27	2055.9	0.17
Reach-1	26000	-3	105000.0	155.92	189.0		189.3	0.000475	5.84	29682.54	2215.1	0.20
Reach-1	26000	+0	105000.0	155.92	189.0		189.3	0.000475	5.84	29682.54	2215.1	0.20
Reach-1	26000	+3	105000.0	155.92	189.0		189.3	0.000475	5.84	29682.68	2215.1	0.20
Reach-1	25780	-3	105000.0	156.12	188.6	173.5	189.1	0.000621	6.32	18665.28	2003.5	0.22
Reach-1	25780	+0	105000.0	156.12	188.6	173.5	189.1	0.000621	6.32	18665.28	2003.5	0.22
Reach-1	25780	+3	105000.0	156.12	188.6	173.5	189.1	0.000621	6.32	18665.35	2003.6	0.22
Reach-1	25550		Bridge									
Reach-1	25436	-3	105000.0	156.12	187.3	174.7	188.1	0.000904	7.90	16590.75	1880.6	0.27
Reach-1	25436	+0	105000.0	156.12	187.3	174.7	188.1	0.000904	7.90	16590.75	1880.6	0.27
Reach-1	25436	+3	105000.0	156.12	187.3	174.7	188.1	0.000904	7.90	16590.81	1880.6	0.27
Reach-1	24800	-3	105000.0	159.22	186.9		187.4	0.000856	7.29	20453.02	1233.6	0.26
Reach-1	24800	+0	105000.0	159.22	186.9		187.4	0.000856	7.29	20453.02	1233.6	0.26
Reach-1	24800	+3	105000.0	159.22	186.9		187.4	0.000856	7.29	20453.11	1233.6	0.26
Reach-1	22000	-3	105000.0	156.92	182.9		184.0	0.001715	10.09	16156.10	1397.6	0.37
Reach-1	22000	+0	105000.0	156.92	182.9		184.0	0.001715	10.09	16156.10	1397.6	0.37
Reach-1	22000	+3	105000.0	156.92	182.9		184.0	0.001715	10.09	16156.33	1397.6	0.37
Reach-1	18800	-3	58600.0	155.30	180.9		181.2	0.000326	5.29	20617.30	1763.6	0.20
Reach-1	18800	+0	58600.0	155.30	180.9		181.2	0.000326	5.29	20617.32	1763.6	0.20
Reach-1	18800	+3	58600.0	155.30	180.9		181.2	0.000326	5.29	20617.75	1763.6	0.20
Reach-1	18200	-3	58600.0	155.16	180.5	168.9	180.9	0.000443	5.94	16122.10	2014.4	0.23
Reach-1	18200	+0	58600.0	155.16	180.5	168.9	180.9	0.000443	5.94	16122.14	2014.4	0.23
Reach-1	18200	+3	58600.0	155.16	180.5	168.9	180.9	0.000443	5.94	16122.38	2014.4	0.23
Reach-1	17840	-3	58600.0	150.00	179.5	167.5	180.5	0.000800	8.49	8292.16	1853.4	0.31
Reach-1	17840	+0	58600.0	150.00	179.5	167.5	180.5	0.000800	8.49	8292.19	1853.4	0.31
Reach-1	17840	+3	58600.0	150.00	179.5	167.5	180.5	0.000800	8.49	8292.30	1853.5	0.31
Reach-1	17790		Bridge									
Reach-1	17750	-3	58600.0	150.00	178.6	167.4	179.6	0.000843	8.49	7810.15	1165.4	0.32
Reach-1	17750	+0	58600.0	150.00	178.6	167.4	179.6	0.000843	8.49	7810.18	1165.4	0.32
Reach-1	17750	+3	58600.0	150.00	178.6	167.4	179.6	0.000843	8.49	7810.28	1165.4	0.32
Reach-1	17665	-3	58600.0	150.00	178.6	166.5	179.5	0.001119	8.17	8712.34	1080.7	0.29
Reach-1	17665	+0	58600.0	150.00	178.6	166.5	179.5	0.001119	8.17	8712.36	1080.7	0.29
Reach-1	17665	+3	58600.0	150.00	178.6	166.5	179.5	0.001119	8.17	8712.49	1080.7	0.29
Reach-1	17540		Bridge									
Reach-1	17385	-3	58600.0	150.00	177.5	164.1	178.1	0.000734	6.21	10510.77	1283.9	0.23
Reach-1	17385	+0	58600.0	150.00	177.5	164.1	178.1	0.000734	6.21	10510.80	1283.9	0.23
Reach-1	17385	+3	58600.0	150.00	177.5	164.1	178.1	0.000734	6.21	10510.92	1283.9	0.23
Reach-1	17365	-3	58600.0	150.00	177.1	165.9	178.0	0.001255	7.87	9278.63	961.1	0.30
Reach-1	17365	+0	58600.0	150.00	177.1	165.9	178.0	0.001255	7.87	9278.66	961.1	0.30
Reach-1	17365	+3	58600.0	150.00	177.1	165.9	178.0	0.001255	7.87	9278.78	961.1	0.30
Reach-1	17000	-3	58600.0	154.95	174.0	172.1	176.6	0.006298	14.07	7021.38	902.4	0.70
Reach-1	17000	+0	58600.0	154.95	174.0	172.1	176.6	0.006298	14.07	7021.52	902.4	0.70
Reach-1	17000	+3	58600.0	154.95	174.0	172.1	176.6	0.006296	14.07	7022.24	902.4	0.70
Reach-1	16600	-3	58600.0	154.78	172.1		174.2	0.005064	11.89	6868.89	909.1	0.62
Reach-1	16600	+0	58600.0	154.78	172.1		174.2	0.005063	11.89	6869.38	909.1	0.62

HEC-RAS Plan: Sensitivity_Analysis River: SALUDA RIVER Reach: Reach-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
Reach-1	16600	+3	58600.0	154.78	172.1		174.2	0.005059	11.88	6872.01	909.1	0.62
Reach-1	16200	-3	58600.0	153.94	171.3		172.4	0.002718	8.78	8626.68	899.8	0.46
Reach-1	16200	+0	58600.0	153.94	171.3		172.4	0.002717	8.78	8627.41	899.8	0.46
Reach-1	16200	+3	58600.0	153.94	171.3		172.4	0.002714	8.77	8631.21	899.9	0.46
Reach-1	15700	-3	58600.0	152.72	170.5		171.2	0.001937	7.86	10468.74	1206.5	0.39
Reach-1	15700	+0	58600.0	152.72	170.5		171.2	0.001936	7.86	10470.12	1206.5	0.39
Reach-1	15700	+3	58600.0	152.72	170.5		171.2	0.001932	7.86	10477.32	1206.7	0.39
Reach-1	15200	-3	58600.0	150.94	169.4		170.2	0.001491	7.97	10377.65	1159.9	0.39
Reach-1	15200	+0	58600.0	150.94	169.4		170.2	0.001490	7.97	10379.56	1160.0	0.39
Reach-1	15200	+3	58600.0	150.94	169.4		170.2	0.001486	7.97	10389.35	1160.5	0.39
Reach-1	14700	-3	58600.0	147.50	169.1		169.7	0.000898	7.29	12261.81	1141.4	0.31
Reach-1	14700	+0	58600.0	147.50	169.1		169.7	0.000898	7.29	12263.92	1141.4	0.31
Reach-1	14700	+3	58600.0	147.50	169.1		169.7	0.000896	7.28	12274.66	1141.4	0.31
Reach-1	14200	-3	58600.0	146.53	169.0	159.7	169.3	0.000417	5.63	16111.42	1532.8	0.22
Reach-1	14200	+0	58600.0	146.53	169.0	159.7	169.3	0.000416	5.63	16114.27	1532.9	0.22
Reach-1	14200	+3	58600.0	146.53	169.0	159.7	169.3	0.000416	5.62	16128.88	1533.2	0.22
Reach-1	13600	-3	58600.0	145.36	167.3		168.6	0.001453	10.47	12688.97	1328.3	0.41
Reach-1	13600	+0	58600.0	145.36	167.3		168.6	0.001452	10.46	12692.64	1328.4	0.41
Reach-1	13600	+3	58600.0	145.36	167.3		168.6	0.001447	10.45	12711.37	1328.9	0.41
Reach-1	13000	-3	58600.0	144.19	166.2		167.7	0.001666	10.49	9606.27	1054.4	0.43
Reach-1	13000	+0	58600.0	144.19	166.2		167.7	0.001664	10.49	9610.31	1054.5	0.43
Reach-1	13000	+3	58600.0	144.19	166.2		167.7	0.001657	10.47	9630.79	1054.8	0.43
Reach-1	12500	-3	58600.0	143.22	165.4		166.8	0.001639	10.47	9467.10	1003.0	0.43
Reach-1	12500	+0	58600.0	143.22	165.4		166.8	0.001638	10.47	9471.80	1003.2	0.43
Reach-1	12500	+3	58600.0	143.22	165.4		166.9	0.001629	10.45	9495.50	1004.6	0.43
Reach-1	12000	-3	58600.0	142.25	162.1	158.3	165.4	0.004014	14.65	4210.53	323.5	0.65
Reach-1	12000	+0	58600.0	142.25	162.1	158.3	165.4	0.004005	14.64	4213.90	331.9	0.65
Reach-1	12000	+3	58600.0	142.25	162.1	158.3	165.4	0.003961	14.59	4231.79	354.3	0.65
Reach-1	11500	-3	58600.0	141.27	161.9	154.9	163.6	0.001787	10.49	6431.54	544.6	0.44
Reach-1	11500	+0	58600.0	141.27	161.9	154.9	163.6	0.001783	10.48	6437.99	546.2	0.44
Reach-1	11500	+3	58600.0	141.27	162.0	154.9	163.7	0.001762	10.44	6470.50	555.0	0.44
Reach-1	11000	-3	58600.0	140.30	160.7	154.1	162.6	0.002109	11.23	5755.86	639.6	0.48
Reach-1	11000	+0	58600.0	140.30	160.7	154.1	162.6	0.002102	11.22	5766.42	643.6	0.48
Reach-1	11000	+3	58600.0	140.30	160.8	154.1	162.7	0.002067	11.16	5819.88	663.5	0.48
Reach-1	10500	-3	58600.0	139.33	160.0	153.0	161.5	0.001811	10.07	6689.69	730.3	0.44
Reach-1	10500	+0	58600.0	139.33	160.0	153.0	161.5	0.001803	10.05	6704.46	732.9	0.44
Reach-1	10500	+3	58600.0	139.33	160.1	153.0	161.6	0.001764	9.99	6778.72	754.6	0.44
Reach-1	10000	-3	58600.0	138.36	158.8		160.6	0.001866	10.73	6604.85	523.8	0.45
Reach-1	10000	+0	58600.0	138.36	158.9		160.6	0.001856	10.71	6618.70	524.2	0.45
Reach-1	10000	+3	58600.0	138.36	159.0		160.7	0.001809	10.63	6687.11	526.2	0.45
Reach-1	9500	-3	58600.0	137.38	158.3		159.6	0.001521	9.62	7037.51	653.1	0.41
Reach-1	9500	+0	58600.0	137.38	158.3		159.6	0.001510	9.60	7058.41	654.0	0.41
Reach-1	9500	+3	58600.0	137.38	158.5		159.8	0.001460	9.50	7161.23	660.0	0.40
Reach-1	9000	-3	58600.0	136.41	157.1		158.8	0.001783	10.74	6552.33	590.3	0.45
Reach-1	9000	+0	58600.0	136.41	157.1		158.8	0.001770	10.71	6575.79	594.2	0.44
Reach-1	9000	+3	58600.0	136.41	157.3		158.9	0.001699	10.57	6697.13	604.6	0.44
Reach-1	8500	-3	58600.0	135.44	156.8		157.9	0.001195	8.80	8306.76	839.4	0.37
Reach-1	8500	+0	58600.0	135.44	156.8		157.9	0.001183	8.77	8345.65	841.6	0.36
Reach-1	8500	+3	58600.0	135.44	157.1		158.1	0.001122	8.61	8542.49	849.6	0.36
Reach-1	8240	-3	58600.0	134.93	156.9		157.5	0.000777	7.12	12283.37	979.6	0.29
Reach-1	8240	+0	58600.0	134.93	156.9		157.5	0.000769	7.10	12328.58	981.0	0.29
Reach-1	8240	+3	58600.0	134.93	157.1		157.7	0.000732	6.98	12557.05	991.3	0.29
Reach-1	7900	-3	58600.0	134.27	156.4		157.2	0.000887	7.41	11973.98	916.4	0.31
Reach-1	7900	+0	58600.0	134.27	156.5		157.2	0.000878	7.39	12019.51	916.7	0.31
Reach-1	7900	+3	58600.0	134.27	156.7		157.5	0.000835	7.27	12247.64	918.1	0.30
Reach-1	7400	-3	58600.0	132.87	156.4		156.8	0.000416	5.68	13334.61	830.8	0.22
Reach-1	7400	+0	58600.0	132.87	156.5		156.8	0.000412	5.66	13376.54	831.2	0.22

HEC-RAS Plan: Sensitivity_Analysis River: SALUDA RIVER Reach: Reach-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
Reach-1	7400	+3	58600.0	132.87	156.7		157.1	0.000394	5.58	13586.51	833.1	0.21
Reach-1	6900	-3	58600.0	131.87	155.0		156.3	0.001272	10.03	9207.59	645.1	0.39
Reach-1	6900	+0	58600.0	131.87	155.0		156.4	0.001258	10.00	9247.90	645.9	0.38
Reach-1	6900	+3	58600.0	131.87	155.3		156.7	0.001195	9.84	9447.00	652.9	0.38
Reach-1	6450	-3	58600.0	124.16	155.0	138.0	155.7	0.000410	6.57	10399.96	649.1	0.23
Reach-1	6450	+0	58600.0	124.16	155.1	138.0	155.7	0.000407	6.55	10440.16	650.0	0.22
Reach-1	6450	+3	58600.0	124.16	155.4	138.0	156.0	0.000391	6.47	10639.07	654.3	0.22
Reach-1	6350		Bridge									
Reach-1	6270	-3	58600.0	124.22	154.9	138.1	155.6	0.000417	6.60	10300.21	649.9	0.23
Reach-1	6270	+0	58600.0	124.22	155.0	138.1	155.6	0.000414	6.58	10341.08	650.5	0.23
Reach-1	6270	+3	58600.0	124.22	155.3	138.1	155.9	0.000397	6.49	10542.84	652.9	0.22
Reach-1	5900	-3	58600.0	131.87	153.5		155.0	0.001605	10.12	6895.69	599.5	0.42
Reach-1	5900	+0	58600.0	131.87	153.6		155.1	0.001579	10.07	6945.12	602.0	0.42
Reach-1	5900	+3	58600.0	131.87	154.0		155.4	0.001462	9.83	7187.62	621.0	0.40
Reach-1	5400	-3	58600.0	131.71	152.8		154.2	0.001484	9.56	7067.46	541.7	0.40
Reach-1	5400	+0	58600.0	131.71	152.9		154.3	0.001456	9.51	7119.59	546.9	0.40
Reach-1	5400	+3	58600.0	131.71	153.4		154.7	0.001333	9.25	7373.34	560.9	0.38
Reach-1	4900	-3	58600.0	130.90	151.6		153.4	0.001884	10.68	6694.69	566.7	0.45
Reach-1	4900	+0	58600.0	130.90	151.8		153.5	0.001834	10.59	6768.21	567.9	0.45
Reach-1	4900	+3	58600.0	130.90	152.4		153.9	0.001629	10.21	7106.79	573.5	0.42
Reach-1	4400	-3	58600.0	130.09	149.3		152.1	0.003152	13.41	5425.39	560.1	0.58
Reach-1	4400	+0	58600.0	130.09	149.6		152.2	0.002991	13.19	5562.99	564.3	0.57
Reach-1	4400	+3	58600.0	130.09	150.6		152.9	0.002431	12.36	6134.31	581.0	0.51
Reach-1	3900	-3	58600.0	129.27	147.5		150.3	0.003668	13.77	5099.03	524.8	0.62
Reach-1	3900	+0	58600.0	129.27	148.0		150.6	0.003279	13.30	5363.64	539.3	0.59
Reach-1	3900	+3	58600.0	129.27	149.5		151.6	0.002383	12.03	6223.58	632.5	0.51
Reach-1	3400	-3	58600.0	128.46	144.9	142.4	148.2	0.004846	14.65	4667.85	486.2	0.70
Reach-1	3400	+0	58600.0	128.46	146.3	142.4	148.9	0.003477	13.22	5306.83	582.5	0.60
Reach-1	3400	+3	58600.0	128.46	148.5	142.4	150.4	0.002134	11.36	6781.69	641.3	0.48
Reach-1	2900	-3	58600.0	127.65	145.3	140.7	146.3	0.001540	8.74	8187.79	804.6	0.40
Reach-1	2900	+0	58600.0	127.65	146.8	140.7	147.5	0.001045	7.67	9337.94	839.3	0.34
Reach-1	2900	+3	58600.0	127.65	149.0	140.7	149.5	0.000625	6.45	11096.73	895.6	0.27
Reach-1	2400	-3	58600.0	126.84	144.7	139.6	145.4	0.001427	8.47	12041.14	1703.4	0.39
Reach-1	2400	+0	58600.0	126.84	146.4	139.6	146.9	0.000890	7.20	14362.77	1739.0	0.31
Reach-1	2400	+3	58600.0	126.84	148.8	139.6	149.1	0.000508	5.94	17564.21	1779.6	0.24
Reach-1	2000	-3	58600.0	126.19	143.7	139.0	144.8	0.001958	9.79	10105.32	1580.4	0.45
Reach-1	2000	+0	58600.0	126.19	145.8	139.0	146.6	0.001182	8.31	12218.78	1679.8	0.36
Reach-1	2000	+3	58600.0	126.19	148.4	139.0	148.9	0.000694	7.01	15107.47	1926.7	0.28
Reach-1	1600	-3	58600.0	126.19	143.4	137.8	144.1	0.001211	7.60	11139.91	1420.5	0.35
Reach-1	1600	+0	58600.0	126.19	145.7	137.8	146.1	0.000679	6.27	13807.29	1461.0	0.27
Reach-1	1600	+3	58600.0	126.19	148.4	137.8	148.6	0.000383	5.20	17113.95	1713.3	0.21
Reach-1	1100	-3	58600.0	124.69	141.9	137.7	143.1	0.002231	10.28	7940.31	1093.2	0.48
Reach-1	1100	+0	58600.0	124.69	144.9	137.7	145.6	0.001053	8.02	10524.07	1131.4	0.34
Reach-1	1100	+3	58600.0	124.69	147.9	137.7	148.4	0.000575	6.59	13645.79	1461.9	0.26

APPENDIX I

HEC-RAS OUTPUT – HYDRAULIC DESIGN SUMMARY TABLES

HEC-RAS River: SALUDA RIVER Reach: Reach-1

Reach	River Sta	Profile	Plan	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
Reach-1	37500	50-year	REV	90000.0	161.62	190.84		191.7	0.000922	7.95	16303.81	1801.0	0.27
Reach-1	37500	50-year	NATURAL	90000.0	161.62	190.76		191.6	0.000938	8.00	16148.19	1792.0	0.27
Reach-1	37500	100-year	REV	105000.0	161.62	192.40		193.3	0.000926	8.28	19236.27	1963.5	0.28
Reach-1	37500	100-year	NATURAL	105000.0	161.62	192.25		193.1	0.000954	8.37	18932.11	1947.3	0.28
Reach-1	37500	500-year	REV	145000.0	161.62	197.19		197.9	0.000714	8.08	29449.28	2201.9	0.25
Reach-1	37500	500-year	NATURAL	145000.0	161.62	197.19		197.9	0.000714	8.08	29451.74	2201.9	0.25
Reach-1	37500	67k CFS	REV	67000.0	161.62	189.20		189.8	0.000703	6.65	13499.34	1600.1	0.24
Reach-1	37500	67k CFS	NATURAL	67000.0	161.62	188.78		189.4	0.000763	6.85	12838.79	1532.3	0.24
Reach-1	35800	50-year	REV	90000.0	152.22	190.92		191.0	0.000131	3.19	59330.73	5464.7	0.10
Reach-1	35800	50-year	NATURAL	90000.0	152.22	190.83		190.9	0.000134	3.22	58847.84	5461.3	0.10
Reach-1	35800	100-year	REV	105000.0	152.22	192.53		192.6	0.000121	3.17	68153.21	5525.7	0.10
Reach-1	35800	100-year	NATURAL	105000.0	152.22	192.37		192.4	0.000125	3.22	67294.41	5519.8	0.10
Reach-1	35800	500-year	REV	145000.0	152.22	197.33		197.4	0.000088	2.98	95288.77	5819.9	0.09
Reach-1	35800	500-year	NATURAL	145000.0	152.22	197.33		197.4	0.000088	2.98	95295.07	5820.0	0.09
Reach-1	35800	67k CFS	REV	67000.0	152.22	189.20		189.3	0.000116	2.88	49971.07	5399.6	0.10
Reach-1	35800	67k CFS	NATURAL	67000.0	152.22	188.75		188.8	0.000132	3.04	47574.23	5390.7	0.10
Reach-1	31500	50-year	REV	90000.0	155.92	189.43		189.9	0.000701	6.74	27517.94	3846.0	0.24
Reach-1	31500	50-year	NATURAL	90000.0	155.92	189.29		189.7	0.000734	6.87	26963.60	3841.1	0.24
Reach-1	31500	100-year	REV	105000.0	155.92	191.29		191.6	0.000544	6.22	34721.15	3909.4	0.21
Reach-1	31500	100-year	NATURAL	105000.0	155.92	191.07		191.4	0.000580	6.39	33857.73	3901.9	0.22
Reach-1	31500	500-year	REV	145000.0	155.92	196.56		196.7	0.000289	5.10	55829.58	4089.4	0.16
Reach-1	31500	500-year	NATURAL	145000.0	155.92	196.57		196.8	0.000289	5.10	55834.70	4089.5	0.16
Reach-1	31500	67k CFS	REV	67000.0	155.92	187.96		188.3	0.000550	5.74	22507.67	3143.8	0.21
Reach-1	31500	67k CFS	NATURAL	67000.0	155.92	187.32		187.7	0.000653	6.14	20540.29	2938.0	0.22
Reach-1	28600	50-year	REV	90000.0	155.72	188.19		188.4	0.000342	5.31	29091.55	1946.2	0.17
Reach-1	28600	50-year	NATURAL	90000.0	155.72	188.00		188.3	0.000353	5.38	28730.67	1935.6	0.17
Reach-1	28600	100-year	REV	105000.0	155.72	190.11		190.4	0.000340	5.52	32935.39	2055.7	0.17
Reach-1	28600	100-year	NATURAL	105000.0	155.72	189.83		190.1	0.000355	5.61	32364.41	2039.8	0.18
Reach-1	28600	500-year	REV	145000.0	155.72	195.66		195.9	0.000288	5.65	45217.38	2371.9	0.16
Reach-1	28600	500-year	NATURAL	145000.0	155.72	195.66		195.9	0.000288	5.65	45220.79	2372.0	0.16
Reach-1	28600	67k CFS	REV	67000.0	155.72	187.11		187.3	0.000228	4.24	27024.62	1884.6	0.14
Reach-1	28600	67k CFS	NATURAL	67000.0	155.72	186.33		186.5	0.000262	4.46	25577.50	1840.4	0.15
Reach-1	26000	50-year	REV	90000.0	155.92	187.03		187.3	0.000520	5.82	25406.80	2075.4	0.20
Reach-1	26000	50-year	NATURAL	90000.0	155.92	186.79		187.1	0.000547	5.93	24916.67	2058.8	0.21
Reach-1	26000	100-year	REV	105000.0	155.92	189.02		189.3	0.000476	5.84	29669.64	2214.7	0.20
Reach-1	26000	100-year	NATURAL	105000.0	155.92	188.67		189.0	0.000509	5.99	28908.84	2190.5	0.20
Reach-1	26000	500-year	REV	145000.0	155.92	194.85		195.1	0.000331	5.54	42912.45	2320.6	0.17
Reach-1	26000	500-year	NATURAL	145000.0	155.92	194.85		195.1	0.000331	5.53	42916.18	2320.6	0.17
Reach-1	26000	67k CFS	REV	67000.0	155.92	186.36		186.6	0.000332	4.57	24030.43	2028.5	0.16
Reach-1	26000	67k CFS	NATURAL	67000.0	155.92	185.44		185.7	0.000407	4.93	22184.97	1963.7	0.18
Reach-1	25780	50-year	REV	90000.0	156.12	186.64	172.3	187.1	0.000612	5.96	16968.28	1756.7	0.22
Reach-1	25780	50-year	NATURAL	90000.0	156.12	186.40	172.3	186.9	0.000636	6.03	16752.03	1732.2	0.22
Reach-1	25780	100-year	REV	105000.0	156.12	188.55	173.5	189.1	0.000621	6.33	18659.94	2003.1	0.22
Reach-1	25780	100-year	NATURAL	105000.0	156.12	188.19	173.5	188.8	0.000655	6.43	18342.56	1977.0	0.23
Reach-1	25780	500-year	REV	145000.0	156.12	194.75	176.4	195.0	0.000282	4.94	42792.40	2502.3	0.16
Reach-1	25780	500-year	NATURAL	145000.0	156.12	194.76	176.4	195.0	0.000282	4.94	42796.48	2502.3	0.16
Reach-1	25780	67k CFS	REV	67000.0	156.12	186.14	170.5	186.4	0.000367	4.55	16525.15	1706.5	0.17
Reach-1	25780	67k CFS	NATURAL	67000.0	156.12	185.21	170.5	185.5	0.000430	4.79	15693.61	1555.9	0.18
Reach-1	25550			Bridge									
Reach-1	25436	50-year	REV	90000.0	156.12	185.55	172.9	186.3	0.000887	7.47	15007.11	1775.4	0.26
Reach-1	25436	50-year	NATURAL	90000.0	156.12	185.26	172.9	186.0	0.000931	7.59	14753.20	1760.5	0.27
Reach-1	25436	100-year	REV	105000.0	156.12	187.32	174.7	188.1	0.000905	7.90	16584.83	1880.4	0.27
Reach-1	25436	100-year	NATURAL	105000.0	156.12	186.92	174.7	187.8	0.000964	8.07	16226.33	1866.8	0.28
Reach-1	25436	500-year	REV	145000.0	156.12	191.24	177.9	192.3	0.000980	9.02	20064.02	2012.7	0.29
Reach-1	25436	500-year	NATURAL	145000.0	156.12	190.65	177.9	191.7	0.001063	9.26	19534.25	1986.4	0.30
Reach-1	25436	67k CFS	REV	67000.0	156.12	185.55	169.7	186.0	0.000491	5.56	15010.66	1775.6	0.20
Reach-1	25436	67k CFS	NATURAL	67000.0	156.12	184.53	169.7	185.0	0.000586	5.90	14100.83	1722.3	0.21
Reach-1	24800	50-year	REV	90000.0	159.22	185.10		185.6	0.000867	6.98	18267.49	1199.1	0.26
Reach-1	24800	50-year	NATURAL	90000.0	159.22	184.78		185.3	0.000923	7.14	17888.11	1197.1	0.26
Reach-1	24800	100-year	REV	105000.0	159.22	186.89		187.4	0.000858	7.29	20444.04	1233.6	0.26
Reach-1	24800	100-year	NATURAL	105000.0	159.22	186.45		187.0	0.000918	7.46	19906.88	1224.3	0.26
Reach-1	24800	500-year	REV	145000.0	159.22	190.85		191.5	0.000849	8.00	25945.89	1634.1	0.26
Reach-1	24800	500-year	NATURAL	145000.0	159.22	190.20		190.9	0.000940	8.30	24895.99	1606.0	0.27
Reach-1	24800	67k CFS	REV	67000.0	159.22	185.31		185.6	0.000461	5.12	18524.74	1200.5	0.19
Reach-1	24800	67k CFS	NATURAL	67000.0	159.22	184.23		184.5	0.000572	5.53	17224.38	1193.5	0.21
Reach-1	22000	50-year	REV	90000.0	156.92	180.97		182.0	0.001802	9.78	13685.31	1200.4	0.37
Reach-1	22000	50-year	NATURAL	90000.0	156.92	180.16		181.4	0.002106	10.30	12740.33	1120.9	0.40
Reach-1	22000	100-year	REV	105000.0	156.92	182.86		184.0	0.001721	10.10	16131.95	1395.8	0.37
Reach-1	22000	100-year	NATURAL	105000.0	156.92	181.77		183.1	0.002112	10.84	14672.42	1282.8	0.40
Reach-1	22000	500-year	REV	145000.0	156.92	187.47		188.5	0.001325	9.99	23210.39	1586.5	0.33
Reach-1	22000	500-year	NATURAL	145000.0	156.92	185.92		187.2	0.001788	11.17	20757.02	1562.8	0.38
Reach-1	22000	67k CFS	REV	67000.0	156.92	183.68		184.1	0.000601	6.11	17315.44	1481.1	0.22
Reach-1	22000	67k CFS	NATURAL	67000.0	156.92	182.10		182.6	0.000809	6.77	15096.99	1316.7	0.25
Reach-1	18800	50-year	REV	48300.0	155.30	178.87		179.2	0.000325	4.96	17434.82	1509.1	0.19

HEC-RAS River: SALUDA RIVER Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Plan	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
Reach-1	18800	50-year	NATURAL	48300.0	155.30	177.30		177.7	0.000459	5.59	15097.52	1464.1	0.23
Reach-1	18800	100-year	REV	58600.0	155.30	180.84		181.2	0.000328	5.30	20569.06	1760.4	0.20
Reach-1	18800	100-year	NATURAL	58600.0	155.30	178.95		179.4	0.000470	5.99	17551.26	1511.4	0.23
Reach-1	18800	500-year	REV	89900.0	155.30	185.71		186.1	0.000325	6.02	30244.96	2049.5	0.20
Reach-1	18800	500-year	NATURAL	89900.0	155.30	183.29		183.8	0.000491	6.96	25328.14	2012.0	0.25
Reach-1	18800	67k CFS	REV	67000.0	155.30	182.35		182.7	0.000324	5.51	23450.12	1990.0	0.20
Reach-1	18800	67k CFS	NATURAL	67000.0	155.30	180.18		180.6	0.000478	6.28	19447.47	1615.7	0.24
Reach-1	18200	50-year	REV	48300.0	155.16	178.53	167.6	178.9	0.000435	5.51	14156.78	1958.8	0.22
Reach-1	18200	50-year	NATURAL	48300.0	155.16	177.05		177.4	0.000462	5.38	19123.51	1886.4	0.23
Reach-1	18200	100-year	REV	58600.0	155.16	180.46	168.9	180.9	0.000446	5.95	16093.23	2013.6	0.23
Reach-1	18200	100-year	NATURAL	58600.0	155.16	178.69		179.1	0.000472	5.77	22293.05	1966.9	0.23
Reach-1	18200	500-year	REV	89900.0	155.16	185.18	171.7	185.8	0.000496	7.18	20810.29	2200.9	0.25
Reach-1	18200	500-year	NATURAL	89900.0	155.16	183.03		183.5	0.000482	6.68	31146.93	2128.5	0.24
Reach-1	18200	67k CFS	REV	67000.0	155.16	181.94	169.8	182.4	0.000452	6.27	17571.73	2080.5	0.23
Reach-1	18200	67k CFS	NATURAL	67000.0	155.16	179.93		180.3	0.000475	6.03	24739.40	1999.4	0.24
Reach-1	17840	50-year	REV	48300.0	150.00	177.71	166.1	178.6	0.000731	7.69	7466.51	1804.1	0.29
Reach-1	17840	50-year	NATURAL	48300.0	150.00	176.42	166.1	177.1	0.000689	7.17	14477.61	1761.2	0.28
Reach-1	17840	100-year	REV	58600.0	150.00	179.47	167.5	180.5	0.000804	8.51	8277.14	1852.1	0.31
Reach-1	17840	100-year	NATURAL	58600.0	150.00	178.04	167.5	178.8	0.000709	7.65	17361.63	1815.0	0.29
Reach-1	17840	500-year	REV	89900.0	150.00	183.61	171.5	185.3	0.001035	10.77	10182.02	1913.0	0.36
Reach-1	17840	500-year	NATURAL	89900.0	150.00	182.32	173.0	183.2	0.000732	8.77	25347.21	1897.0	0.30
Reach-1	17840	67k CFS	REV	67000.0	150.00	180.81	168.6	182.0	0.000855	9.10	8893.99	1878.3	0.32
Reach-1	17840	67k CFS	NATURAL	67000.0	150.00	179.25	168.9	180.0	0.000722	8.01	19575.46	1844.4	0.29
Reach-1	17790			Bridge									
Reach-1	17750	50-year	REV	48300.0	150.00	176.86	166.1	177.7	0.000766	7.67	7109.70	1128.4	0.30
Reach-1	17750	50-year	NATURAL	48300.0	150.00	176.05		176.8	0.000754	7.40	10025.46	1103.4	0.29
Reach-1	17750	100-year	REV	58600.0	150.00	178.56	167.4	179.6	0.000847	8.50	7796.98	1165.0	0.32
Reach-1	17750	100-year	NATURAL	58600.0	150.00	177.56		178.4	0.000809	8.05	11722.02	1148.5	0.31
Reach-1	17750	500-year	REV	89900.0	150.00	183.22	171.1	184.8	0.001008	10.52	9688.91	1425.1	0.36
Reach-1	17750	500-year	NATURAL	89900.0	150.00	181.46		182.6	0.000960	9.82	16419.51	1306.4	0.35
Reach-1	17750	67k CFS	REV	67000.0	150.00	179.85	168.5	181.0	0.000904	9.12	8322.17	1205.8	0.33
Reach-1	17750	67k CFS	NATURAL	67000.0	150.00	178.68		179.6	0.000848	8.53	13021.80	1166.5	0.32
Reach-1	17665	50-year	REV	48300.0	150.00	176.83	165.1	177.6	0.000998	7.34	7953.00	1006.6	0.27
Reach-1	17665	50-year	NATURAL	48300.0	150.00	176.01		176.7	0.000978	7.09	10755.90	972.7	0.27
Reach-1	17665	100-year	REV	58600.0	150.00	178.53	166.5	179.5	0.001117	8.16	8864.50	1079.4	0.29
Reach-1	17665	100-year	NATURAL	58600.0	150.00	177.51		178.3	0.001086	7.81	12253.37	1034.8	0.29
Reach-1	17665	500-year	REV	89900.0	150.00	183.21	170.2	184.6	0.001346	10.09	11554.13	1366.9	0.33
Reach-1	17665	500-year	NATURAL	89900.0	150.00	181.38		182.5	0.001356	9.69	16577.00	1197.5	0.33
Reach-1	17665	67k CFS	REV	67000.0	150.00	179.82	167.5	180.9	0.001202	8.76	9585.66	1136.5	0.31
Reach-1	17665	67k CFS	NATURAL	67000.0	150.00	178.62		179.5	0.001165	8.35	13429.72	1083.4	0.30
Reach-1	17540			Bridge									
Reach-1	17385	50-year	NATURAL	48300.0	150.00	175.71		176.4	0.001036	6.92	9704.97	843.5	0.27
Reach-1	17385	100-year	NATURAL	58600.0	150.00	177.11		178.0	0.001191	7.76	10976.96	963.6	0.30
Reach-1	17385	500-year	NATURAL	89900.0	150.00	180.83		182.1	0.001495	9.68	14955.89	1172.1	0.34
Reach-1	17385	67k CFS	NATURAL	67000.0	150.00	178.17		179.1	0.001289	8.34	12025.04	1017.7	0.31
Reach-1	17365	50-year	REV	48300.0	150.00	175.65	164.6	176.4	0.001089	7.01	8473.94	840.4	0.28
Reach-1	17365	50-year	NATURAL	48300.0	150.00	175.70		176.4	0.001038	6.86	9691.75	842.7	0.27
Reach-1	17365	100-year	REV	58600.0	150.00	177.06	165.9	178.0	0.001255	7.87	9279.28	961.1	0.30
Reach-1	17365	100-year	NATURAL	58600.0	150.00	177.09		177.9	0.001194	7.69	10960.25	962.7	0.29
Reach-1	17365	500-year	REV	89900.0	150.00	180.94	169.5	182.2	0.001508	9.64	14224.72	1177.2	0.34
Reach-1	17365	500-year	NATURAL	89900.0	150.00	180.81		182.1	0.001498	9.57	14933.93	1171.2	0.34
Reach-1	17365	67k CFS	REV	67000.0	150.00	178.13	166.9	179.2	0.001378	8.52	9892.23	1015.7	0.32
Reach-1	17365	67k CFS	NATURAL	67000.0	150.00	178.15		179.1	0.001292	8.26	12007.07	1016.8	0.31
Reach-1	17000	50-year	REV	48300.0	154.95	172.86	171.1	175.1	0.006192	13.07	6112.16	882.1	0.68
Reach-1	17000	50-year	NATURAL	48300.0	154.95	172.86		175.1	0.006233	13.11	6298.51	882.0	0.69
Reach-1	17000	100-year	REV	58600.0	154.95	174.04	172.1	176.6	0.006289	14.07	7025.26	902.5	0.70
Reach-1	17000	100-year	NATURAL	58600.0	154.95	174.04		176.6	0.006266	14.04	7352.49	902.5	0.70
Reach-1	17000	500-year	REV	89900.0	154.95	177.36	174.8	180.6	0.006142	16.27	9647.53	967.6	0.72
Reach-1	17000	500-year	NATURAL	89900.0	154.95	177.45		180.5	0.005863	15.95	10507.98	969.2	0.70
Reach-1	17000	67k CFS	REV	67000.0	154.95	174.94	172.9	177.7	0.006320	14.78	7737.06	911.7	0.71
Reach-1	17000	67k CFS	NATURAL	67000.0	154.95	174.96		177.7	0.006217	14.67	8192.93	911.9	0.71
Reach-1	16600	50-year	REV	48300.0	154.78	170.85		172.7	0.005321	11.25	5700.29	866.4	0.62
Reach-1	16600	50-year	NATURAL	48300.0	154.78	170.85		172.7	0.005322	11.25	5705.77	871.2	0.62
Reach-1	16600	100-year	REV	58600.0	154.78	172.14		174.2	0.005078	11.90	6848.81	909.1	0.62
Reach-1	16600	100-year	NATURAL	58600.0	154.78	172.14		174.2	0.005063	11.89	6869.38	909.1	0.62
Reach-1	16600	500-year	REV	89900.0	154.78	176.10		178.4	0.003986	12.87	10503.12	953.7	0.58
Reach-1	16600	500-year	NATURAL	89900.0	154.78	176.10		178.4	0.003977	12.85	10523.91	953.8	0.58
Reach-1	16600	67k CFS	REV	67000.0	154.78	173.22		175.3	0.004750	12.23	7835.04	914.5	0.61
Reach-1	16600	67k CFS	NATURAL	67000.0	154.78	173.22		175.3	0.004738	12.22	7855.02	914.5	0.61
Reach-1	16200	50-year	REV	48300.0	153.94	169.89		170.9	0.002944	8.35	7337.59	882.7	0.46
Reach-1	16200	50-year	NATURAL	48300.0	153.94	169.89		170.9	0.002944	8.35	7337.59	882.7	0.46
Reach-1	16200	100-year	REV	58600.0	153.94	171.33		172.4	0.002717	8.78	8627.41	899.8	0.46
Reach-1	16200	100-year	NATURAL	58600.0	153.94	171.33		172.4	0.002717	8.78	8627.41	899.8	0.46

HEC-RAS River: SALUDA RIVER Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Plan	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
Reach-1	16200	500-year	REV	89900.0	153.94	175.63		176.9	0.002128	9.59	12680.35	966.0	0.43
Reach-1	16200	500-year	NATURAL	89900.0	153.94	175.63		176.9	0.002127	9.59	12683.46	966.0	0.43
Reach-1	16200	67k CFS	REV	67000.0	153.94	172.52		173.7	0.002542	9.06	9703.04	939.4	0.45
Reach-1	16200	67k CFS	NATURAL	67000.0	153.94	172.52		173.7	0.002540	9.06	9706.75	937.2	0.45
Reach-1	15700	50-year	REV	48300.0	152.72	168.86		169.6	0.002308	7.81	8465.57	1188.3	0.42
Reach-1	15700	50-year	NATURAL	48300.0	152.72	168.86		169.6	0.002308	7.81	8465.57	1188.3	0.42
Reach-1	15700	100-year	REV	58600.0	152.72	170.53		171.2	0.001936	7.86	10470.12	1206.5	0.39
Reach-1	15700	100-year	NATURAL	58600.0	152.72	170.53		171.2	0.001936	7.86	10470.12	1206.5	0.39
Reach-1	15700	500-year	REV	89900.0	152.72	175.25		176.0	0.001338	8.08	16552.23	1337.0	0.34
Reach-1	15700	500-year	NATURAL	89900.0	152.72	175.25		176.0	0.001338	8.08	16552.23	1337.0	0.34
Reach-1	15700	67k CFS	REV	67000.0	152.72	171.86		172.6	0.001718	7.92	12140.21	1274.4	0.37
Reach-1	15700	67k CFS	NATURAL	67000.0	152.72	171.86		172.6	0.001718	7.92	12140.21	1274.4	0.37
Reach-1	15200	50-year	REV	48300.0	150.94	167.58		168.3	0.001772	7.86	8290.50	1087.3	0.41
Reach-1	15200	50-year	NATURAL	48300.0	150.94	167.58		168.3	0.001772	7.86	8290.50	1087.3	0.41
Reach-1	15200	100-year	REV	58600.0	150.94	169.44		170.2	0.001490	7.97	10379.56	1160.0	0.39
Reach-1	15200	100-year	NATURAL	58600.0	150.94	169.44		170.2	0.001490	7.97	10379.56	1160.0	0.39
Reach-1	15200	500-year	REV	89900.0	150.94	174.41		175.2	0.001076	8.39	16400.34	1269.5	0.35
Reach-1	15200	500-year	NATURAL	89900.0	150.94	174.41		175.2	0.001076	8.39	16400.34	1269.5	0.35
Reach-1	15200	67k CFS	REV	67000.0	150.94	170.87		171.6	0.001331	8.07	12068.07	1191.0	0.37
Reach-1	15200	67k CFS	NATURAL	67000.0	150.94	170.87		171.6	0.001331	8.07	12068.07	1191.0	0.37
Reach-1	14700	50-year	REV	48300.0	147.50	167.14		167.7	0.001000	7.09	10087.65	1118.0	0.32
Reach-1	14700	50-year	NATURAL	48300.0	147.50	167.14		167.7	0.001000	7.09	10087.65	1118.0	0.32
Reach-1	14700	100-year	REV	58600.0	147.50	169.06		169.7	0.000898	7.29	12263.92	1141.4	0.31
Reach-1	14700	100-year	NATURAL	58600.0	147.50	169.06		169.7	0.000898	7.29	12263.92	1141.4	0.31
Reach-1	14700	500-year	REV	89900.0	147.50	174.13		174.8	0.000744	7.91	18212.70	1263.0	0.30
Reach-1	14700	500-year	NATURAL	89900.0	147.50	174.13		174.8	0.000744	7.91	18212.70	1263.0	0.30
Reach-1	14700	67k CFS	REV	67000.0	147.50	170.53		171.1	0.000837	7.44	13951.07	1153.1	0.31
Reach-1	14700	67k CFS	NATURAL	67000.0	147.50	170.53		171.1	0.000837	7.44	13951.07	1153.1	0.31
Reach-1	14200	50-year	REV	48300.0	146.53	167.05	158.9	167.3	0.000449	5.46	13206.96	1463.8	0.22
Reach-1	14200	50-year	NATURAL	48300.0	146.53	167.05	158.9	167.3	0.000449	5.46	13206.96	1463.8	0.22
Reach-1	14200	100-year	REV	58600.0	146.53	169.00	159.7	169.3	0.000416	5.63	16114.27	1532.9	0.22
Reach-1	14200	100-year	NATURAL	58600.0	146.53	169.00	159.7	169.3	0.000416	5.63	16114.27	1532.9	0.22
Reach-1	14200	500-year	REV	89900.0	146.53	174.13	161.8	174.5	0.000362	6.08	24163.18	1744.6	0.21
Reach-1	14200	500-year	NATURAL	89900.0	146.53	174.13	161.8	174.5	0.000362	6.08	24163.18	1744.6	0.21
Reach-1	14200	67k CFS	REV	67000.0	146.53	170.49	160.3	170.8	0.000396	5.75	18393.29	1595.4	0.22
Reach-1	14200	67k CFS	NATURAL	67000.0	146.53	170.49	160.3	170.8	0.000396	5.75	18393.29	1595.4	0.22
Reach-1	13600	50-year	REV	48300.0	145.36	165.34		166.6	0.001511	10.00	10218.26	1249.7	0.41
Reach-1	13600	50-year	NATURAL	48300.0	145.36	165.34		166.6	0.001511	10.00	10218.26	1249.7	0.41
Reach-1	13600	100-year	REV	58600.0	145.36	167.26		168.6	0.001452	10.46	12692.64	1328.4	0.41
Reach-1	13600	100-year	NATURAL	58600.0	145.36	167.26		168.6	0.001452	10.46	12692.64	1328.4	0.41
Reach-1	13600	500-year	REV	89900.0	145.36	172.36		173.8	0.001297	11.47	20121.14	1544.1	0.40
Reach-1	13600	500-year	NATURAL	89900.0	145.36	172.36		173.8	0.001297	11.47	20121.14	1544.1	0.40
Reach-1	13600	67k CFS	REV	67000.0	145.36	168.73		170.1	0.001407	10.79	14709.09	1418.4	0.41
Reach-1	13600	67k CFS	NATURAL	67000.0	145.36	168.73		170.1	0.001407	10.79	14709.09	1418.4	0.41
Reach-1	13000	50-year	REV	48300.0	144.19	164.17		165.6	0.001839	10.20	7512.67	985.9	0.44
Reach-1	13000	50-year	NATURAL	48300.0	144.19	164.17		165.6	0.001839	10.20	7512.67	985.9	0.44
Reach-1	13000	100-year	REV	58600.0	144.19	166.20		167.7	0.001664	10.49	9610.31	1054.5	0.43
Reach-1	13000	100-year	NATURAL	58600.0	144.19	166.20		167.7	0.001664	10.49	9610.31	1054.5	0.43
Reach-1	13000	500-year	REV	89900.0	144.19	171.49		173.0	0.001369	11.24	15395.69	1123.4	0.41
Reach-1	13000	500-year	NATURAL	89900.0	144.19	171.49		173.0	0.001369	11.24	15395.69	1123.4	0.41
Reach-1	13000	67k CFS	REV	67000.0	144.19	167.76		169.2	0.001551	10.68	11270.13	1080.2	0.42
Reach-1	13000	67k CFS	NATURAL	67000.0	144.19	167.76		169.2	0.001551	10.68	11270.13	1080.2	0.42
Reach-1	12500	50-year	REV	48300.0	143.22	163.32		164.7	0.001787	10.10	7460.11	907.0	0.44
Reach-1	12500	50-year	NATURAL	48300.0	143.22	163.32		164.7	0.001787	10.10	7460.11	907.0	0.44
Reach-1	12500	100-year	REV	58600.0	143.22	165.41		166.8	0.001638	10.47	9471.80	1003.2	0.43
Reach-1	12500	100-year	NATURAL	58600.0	143.22	165.41		166.8	0.001638	10.47	9471.80	1003.2	0.43
Reach-1	12500	500-year	REV	89900.0	143.22	170.77		172.3	0.001382	11.39	15450.97	1210.7	0.41
Reach-1	12500	500-year	NATURAL	89900.0	143.22	170.77		172.3	0.001382	11.39	15450.97	1210.7	0.41
Reach-1	12500	67k CFS	REV	67000.0	143.22	167.00		168.5	0.001539	10.72	11126.52	1066.6	0.42
Reach-1	12500	67k CFS	NATURAL	67000.0	143.22	167.00		168.5	0.001539	10.72	11126.52	1066.6	0.42
Reach-1	12000	50-year	REV	48300.0	142.25	160.38	156.8	163.2	0.004003	13.56	3687.53	302.3	0.64
Reach-1	12000	50-year	NATURAL	48300.0	142.25	160.38	156.8	163.2	0.004003	13.56	3687.53	302.3	0.64
Reach-1	12000	100-year	REV	58600.0	142.25	162.08	158.3	165.4	0.004005	14.64	4213.90	331.9	0.65
Reach-1	12000	100-year	NATURAL	58600.0	142.25	162.08	158.3	165.4	0.004005	14.64	4213.90	331.9	0.65
Reach-1	12000	500-year	REV	89900.0	142.25	166.32	162.2	170.9	0.004085	17.34	6530.15	787.4	0.68
Reach-1	12000	500-year	NATURAL	89900.0	142.25	166.32	162.2	170.9	0.004085	17.34	6530.15	787.4	0.68
Reach-1	12000	67k CFS	REV	67000.0	142.25	163.34	159.4	167.0	0.004021	15.45	4757.81	492.5	0.66
Reach-1	12000	67k CFS	NATURAL	67000.0	142.25	163.34	159.4	167.0	0.004021	15.45	4757.81	492.5	0.66
Reach-1	11500	50-year	REV	48300.0	141.27	160.07	153.6	161.5	0.001791	9.73	5536.55	452.1	0.44
Reach-1	11500	50-year	NATURAL	48300.0	141.27	160.07	153.6	161.5	0.001791	9.73	5536.55	452.1	0.44
Reach-1	11500	100-year	REV	58600.0	141.27	161.95	154.9	163.6	0.001783	10.48	6437.99	546.2	0.44
Reach-1	11500	100-year	NATURAL	58600.0	141.27	161.95	154.9	163.6	0.001783	10.48	6437.99	546.2	0.44
Reach-1	11500	500-year	REV	89900.0	141.27	166.73	158.3	168.9	0.001732	12.15	10740.23	1153.9	0.46
Reach-1	11500	500-year	NATURAL	89900.0	141.27	166.73	158.3	168.9	0.001732	12.15	10740.23	1153.9	0.46
Reach-1	11500	67k CFS	REV	67000.0	141.27	163.35	155.8	165.2	0.001778	11.02	7454.75	872.9	0.45

HEC-RAS River: SALUDA RIVER Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Plan	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
Reach-1	11500	67k CFS	NATURAL	67000.0	141.27	163.35	155.8	165.2	0.001778	11.02	7454.75	872.9	0.45
Reach-1	11000	50-year	REV	48300.0	140.30	158.87	152.8	160.5	0.002085	10.37	4875.16	373.6	0.47
Reach-1	11000	50-year	NATURAL	48300.0	140.30	158.87	152.8	160.5	0.002085	10.37	4875.16	373.6	0.47
Reach-1	11000	100-year	REV	58600.0	140.30	160.67	154.1	162.6	0.002102	11.22	5766.42	643.6	0.48
Reach-1	11000	100-year	NATURAL	58600.0	140.30	160.67	154.1	162.6	0.002102	11.22	5766.42	643.6	0.48
Reach-1	11000	500-year	REV	89900.0	140.30	165.59	157.6	167.9	0.001915	12.68	11047.59	1449.7	0.48
Reach-1	11000	500-year	NATURAL	89900.0	140.30	165.59	157.6	167.9	0.001915	12.68	11047.59	1449.7	0.48
Reach-1	11000	67k CFS	REV	67000.0	140.30	162.06	155.1	164.2	0.002085	11.77	6873.09	942.2	0.48
Reach-1	11000	67k CFS	NATURAL	67000.0	140.30	162.06	155.1	164.2	0.002085	11.77	6873.09	942.2	0.48
Reach-1	10500	50-year	REV	48300.0	139.33	158.08	151.7	159.5	0.001886	9.46	5491.22	526.7	0.44
Reach-1	10500	50-year	NATURAL	48300.0	139.33	158.08	151.7	159.5	0.001886	9.46	5491.22	526.7	0.44
Reach-1	10500	100-year	REV	58600.0	139.33	159.98	153.0	161.5	0.001803	10.05	6704.48	732.9	0.44
Reach-1	10500	100-year	NATURAL	58600.0	139.33	159.98	153.0	161.5	0.001803	10.05	6704.48	732.9	0.44
Reach-1	10500	500-year	REV	89900.0	139.33	165.09	156.4	166.9	0.001566	11.25	11387.24	1137.0	0.43
Reach-1	10500	500-year	NATURAL	89900.0	139.33	165.09	156.4	166.9	0.001566	11.25	11387.24	1137.0	0.43
Reach-1	10500	67k CFS	REV	67000.0	139.33	161.45	154.0	163.1	0.001735	10.45	7923.84	912.9	0.44
Reach-1	10500	67k CFS	NATURAL	67000.0	139.33	161.45	154.0	163.1	0.001735	10.45	7923.84	912.9	0.44
Reach-1	10000	50-year	REV	48300.0	138.36	157.02		158.5	0.001845	9.91	5705.30	467.4	0.44
Reach-1	10000	50-year	NATURAL	48300.0	138.36	157.02		158.5	0.001845	9.91	5705.30	467.4	0.44
Reach-1	10000	100-year	REV	58600.0	138.36	158.86		160.6	0.001856	10.71	6618.73	524.2	0.45
Reach-1	10000	100-year	NATURAL	58600.0	138.36	158.86		160.6	0.001856	10.71	6618.73	524.2	0.45
Reach-1	10000	500-year	REV	89900.0	138.36	163.73		166.0	0.001830	12.54	9865.36	742.8	0.47
Reach-1	10000	500-year	NATURAL	89900.0	138.36	163.73		166.0	0.001830	12.54	9865.36	742.8	0.47
Reach-1	10000	67k CFS	REV	67000.0	138.36	160.27		162.2	0.001855	11.28	7404.64	650.4	0.46
Reach-1	10000	67k CFS	NATURAL	67000.0	138.36	160.27		162.2	0.001855	11.28	7404.64	650.4	0.46
Reach-1	9500	50-year	REV	48300.0	137.38	156.34		157.6	0.001611	9.15	5873.03	547.1	0.41
Reach-1	9500	50-year	NATURAL	48300.0	137.38	156.34		157.6	0.001611	9.15	5873.03	547.1	0.41
Reach-1	9500	100-year	REV	58600.0	137.38	158.31		159.6	0.001510	9.60	7058.45	654.0	0.41
Reach-1	9500	100-year	NATURAL	58600.0	137.38	158.31		159.6	0.001510	9.60	7058.45	654.0	0.41
Reach-1	9500	500-year	REV	89900.0	137.38	163.52		165.0	0.001297	10.61	11198.52	860.7	0.39
Reach-1	9500	500-year	NATURAL	89900.0	137.38	163.52		165.0	0.001297	10.61	11198.52	860.7	0.39
Reach-1	9500	67k CFS	REV	67000.0	137.38	159.81		161.2	0.001447	9.94	8116.66	783.8	0.40
Reach-1	9500	67k CFS	NATURAL	67000.0	137.38	159.81		161.2	0.001447	9.94	8116.66	783.8	0.40
Reach-1	9000	50-year	REV	48300.0	136.41	155.20		156.7	0.001825	10.08	5568.11	495.2	0.44
Reach-1	9000	50-year	NATURAL	48300.0	136.41	155.20		156.7	0.001825	10.08	5568.11	495.2	0.44
Reach-1	9000	100-year	REV	58600.0	136.41	157.14		158.8	0.001770	10.71	6575.83	594.2	0.44
Reach-1	9000	100-year	NATURAL	58600.0	136.41	157.14		158.8	0.001770	10.71	6575.83	594.2	0.44
Reach-1	9000	500-year	REV	89900.0	136.41	162.25		164.3	0.001634	12.16	10218.60	766.6	0.45
Reach-1	9000	500-year	NATURAL	89900.0	136.41	162.25		164.3	0.001634	12.16	10218.60	766.6	0.45
Reach-1	9000	67k CFS	REV	67000.0	136.41	158.60		160.4	0.001737	11.18	7517.62	688.3	0.45
Reach-1	9000	67k CFS	NATURAL	67000.0	136.41	158.60		160.4	0.001737	11.18	7517.62	688.3	0.45
Reach-1	8500	50-year	REV	48300.0	135.44	154.77		155.8	0.001302	8.48	6769.89	672.2	0.37
Reach-1	8500	50-year	NATURAL	48300.0	135.44	154.77		155.8	0.001302	8.48	6769.89	672.2	0.37
Reach-1	8500	100-year	REV	58600.0	135.44	156.85		157.9	0.001183	8.77	8345.74	841.6	0.36
Reach-1	8500	100-year	NATURAL	58600.0	135.44	156.85		157.9	0.001183	8.77	8345.74	841.6	0.36
Reach-1	8500	500-year	REV	89900.0	135.44	162.31		163.4	0.000928	9.26	13315.49	955.0	0.34
Reach-1	8500	500-year	NATURAL	89900.0	135.44	162.31		163.4	0.000928	9.26	13315.49	955.0	0.34
Reach-1	8500	67k CFS	REV	67000.0	135.44	158.43		159.5	0.001093	8.91	9719.11	892.1	0.35
Reach-1	8500	67k CFS	NATURAL	67000.0	135.44	158.43		159.5	0.001093	8.91	9719.11	892.1	0.35
Reach-1	8240	50-year	REV	48300.0	134.93	154.79		155.4	0.000853	6.89	10287.45	952.1	0.30
Reach-1	8240	50-year	NATURAL	48300.0	134.93	154.79		155.4	0.000853	6.89	10287.45	952.1	0.30
Reach-1	8240	100-year	REV	58600.0	134.93	156.90		157.5	0.000769	7.10	12328.67	981.0	0.29
Reach-1	8240	100-year	NATURAL	58600.0	134.93	156.90		157.5	0.000769	7.10	12328.67	981.0	0.29
Reach-1	8240	500-year	REV	89900.0	134.93	162.37		163.1	0.000651	7.78	17959.89	1050.5	0.28
Reach-1	8240	500-year	NATURAL	89900.0	134.93	162.37		163.1	0.000651	7.78	17959.89	1050.5	0.28
Reach-1	8240	67k CFS	REV	67000.0	134.93	158.49		159.2	0.000728	7.30	13927.84	1025.5	0.29
Reach-1	8240	67k CFS	NATURAL	67000.0	134.93	158.49		159.2	0.000728	7.30	13927.84	1025.5	0.29
Reach-1	7900	50-year	REV	48300.0	134.27	154.39		155.1	0.000949	7.05	10105.09	903.0	0.32
Reach-1	7900	50-year	NATURAL	48300.0	134.27	154.39		155.1	0.000949	7.05	10105.09	903.0	0.32
Reach-1	7900	100-year	REV	58600.0	134.27	156.49		157.2	0.000878	7.39	12019.61	916.7	0.31
Reach-1	7900	100-year	NATURAL	58600.0	134.27	156.49		157.2	0.000878	7.39	12019.61	916.7	0.31
Reach-1	7900	500-year	REV	89900.0	134.27	161.89		162.8	0.000787	8.37	17062.93	967.4	0.31
Reach-1	7900	500-year	NATURAL	89900.0	134.27	161.89		162.8	0.000787	8.37	17062.93	967.4	0.31
Reach-1	7900	67k CFS	REV	67000.0	134.27	158.07		158.9	0.000841	7.66	13474.94	925.7	0.31
Reach-1	7900	67k CFS	NATURAL	67000.0	134.27	158.07		158.9	0.000841	7.66	13474.94	925.7	0.31
Reach-1	7400	50-year	REV	48300.0	132.87	154.35		154.7	0.000422	5.32	11625.07	814.6	0.22
Reach-1	7400	50-year	NATURAL	48300.0	132.87	154.35		154.7	0.000422	5.32	11625.07	814.6	0.22
Reach-1	7400	100-year	REV	58600.0	132.87	156.47		156.8	0.000412	5.66	13376.63	831.2	0.22
Reach-1	7400	100-year	NATURAL	58600.0	132.87	156.47		156.8	0.000412	5.66	13376.63	831.2	0.22
Reach-1	7400	500-year	REV	89900.0	132.87	161.94		162.4	0.000406	6.57	18051.44	880.0	0.23
Reach-1	7400	500-year	NATURAL	89900.0	132.87	161.94		162.4	0.000406	6.57	18051.44	880.0	0.23
Reach-1	7400	67k CFS	REV	67000.0	132.87	158.07		158.5	0.000408	5.92	14715.70	844.7	0.22
Reach-1	7400	67k CFS	NATURAL	67000.0	132.87	158.07		158.5	0.000408	5.92	14715.70	844.7	0.22
Reach-1	6900	50-year	REV	48300.0	131.87	153.09		154.3	0.001197	9.14	8049.09	594.3	0.37

HEC-RAS River: SALUDA RIVER Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Plan	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
Reach-1	6900	50-year	NATURAL	48300.0	131.87	153.09		154.3	0.001197	9.14	8049.09	594.3	0.37
Reach-1	6900	100-year	REV	58600.0	131.87	155.02		156.4	0.001258	10.00	9247.99	645.9	0.38
Reach-1	6900	100-year	NATURAL	58600.0	131.87	155.02		156.4	0.001258	10.00	9247.99	645.9	0.38
Reach-1	6900	500-year	REV	89900.0	131.87	160.01		161.9	0.001355	11.96	12625.15	693.8	0.41
Reach-1	6900	500-year	NATURAL	89900.0	131.87	160.01		161.9	0.001355	11.96	12625.15	693.8	0.41
Reach-1	6900	67k CFS	REV	67000.0	131.87	156.48		158.0	0.001288	10.58	10213.06	667.5	0.39
Reach-1	6900	67k CFS	NATURAL	67000.0	131.87	156.48		158.0	0.001288	10.58	10213.06	667.5	0.39
Reach-1	6450	50-year	REV	48300.0	124.16	153.13	136.8	153.7	0.000361	5.86	9216.30	613.5	0.21
Reach-1	6450	50-year	NATURAL	48300.0	124.16	153.13	136.8	153.7	0.000361	5.86	9216.30	613.5	0.21
Reach-1	6450	100-year	REV	58600.0	124.16	155.08	138.0	155.7	0.000407	6.55	10440.25	650.0	0.22
Reach-1	6450	100-year	NATURAL	58600.0	124.16	155.08	138.0	155.7	0.000407	6.55	10440.25	650.0	0.22
Reach-1	6450	500-year	REV	89900.0	124.16	160.10	141.5	161.1	0.000516	8.28	13879.67	719.9	0.26
Reach-1	6450	500-year	NATURAL	89900.0	124.16	160.10	141.5	161.1	0.000516	8.28	13879.67	719.9	0.26
Reach-1	6450	67k CFS	REV	67000.0	124.16	156.55	139.0	157.3	0.000439	7.05	11412.38	670.8	0.24
Reach-1	6450	67k CFS	NATURAL	67000.0	124.16	156.55	139.0	157.3	0.000439	7.05	11412.38	670.8	0.24
Reach-1	6350			Bridge									
Reach-1	6270	50-year	REV	48300.0	124.22	153.04	136.8	153.6	0.000368	5.90	9108.42	621.4	0.21
Reach-1	6270	50-year	NATURAL	48300.0	124.22	153.04	136.8	153.6	0.000368	5.90	9108.42	621.4	0.21
Reach-1	6270	100-year	REV	58600.0	124.22	154.98	138.1	155.6	0.000414	6.58	10341.16	650.5	0.23
Reach-1	6270	100-year	NATURAL	58600.0	124.22	154.98	138.1	155.6	0.000414	6.58	10341.16	650.5	0.23
Reach-1	6270	500-year	REV	89900.0	124.22	159.97	141.5	161.0	0.000521	8.29	13683.29	688.0	0.26
Reach-1	6270	500-year	NATURAL	89900.0	124.22	159.97	141.5	161.0	0.000521	8.29	13683.29	688.0	0.26
Reach-1	6270	67k CFS	REV	67000.0	124.22	156.44	139.1	157.2	0.000446	7.08	11301.68	661.5	0.24
Reach-1	6270	67k CFS	NATURAL	67000.0	124.22	156.44	139.1	157.2	0.000446	7.08	11301.68	661.5	0.24
Reach-1	5900	50-year	REV	48300.0	131.87	151.77		153.1	0.001545	9.29	5925.88	548.8	0.41
Reach-1	5900	50-year	NATURAL	48300.0	131.87	151.77		153.1	0.001545	9.29	5925.88	548.8	0.41
Reach-1	5900	100-year	REV	58600.0	131.87	153.57		155.1	0.001579	10.07	6945.22	602.1	0.42
Reach-1	5900	100-year	NATURAL	58600.0	131.87	153.57		155.1	0.001579	10.07	6945.22	602.1	0.42
Reach-1	5900	500-year	REV	89900.0	131.87	158.25		160.4	0.001633	11.94	9979.81	676.6	0.44
Reach-1	5900	500-year	NATURAL	89900.0	131.87	158.25		160.4	0.001633	11.94	9979.81	676.6	0.44
Reach-1	5900	67k CFS	REV	67000.0	131.87	154.93		156.6	0.001596	10.63	7796.37	636.3	0.43
Reach-1	5900	67k CFS	NATURAL	67000.0	131.87	154.93		156.6	0.001596	10.63	7796.37	636.3	0.43
Reach-1	5400	50-year	REV	48300.0	131.71	151.13		152.3	0.001434	8.78	6164.05	515.7	0.39
Reach-1	5400	50-year	NATURAL	48300.0	131.71	151.13		152.3	0.001434	8.78	6164.05	515.7	0.39
Reach-1	5400	100-year	REV	58600.0	131.71	152.92		154.3	0.001456	9.51	7119.70	547.0	0.40
Reach-1	5400	100-year	NATURAL	58600.0	131.71	152.92		154.3	0.001456	9.51	7119.70	547.0	0.40
Reach-1	5400	500-year	REV	89900.0	131.71	157.60		159.5	0.001507	11.32	10078.53	734.6	0.42
Reach-1	5400	500-year	NATURAL	89900.0	131.71	157.60		159.5	0.001507	11.32	10078.53	734.6	0.42
Reach-1	5400	67k CFS	REV	67000.0	131.71	154.29		155.8	0.001469	10.04	7895.59	586.8	0.41
Reach-1	5400	67k CFS	NATURAL	67000.0	131.71	154.29		155.8	0.001469	10.04	7895.59	586.8	0.41
Reach-1	4900	50-year	REV	48300.0	130.90	150.01		151.5	0.001814	9.82	5783.96	554.8	0.44
Reach-1	4900	50-year	NATURAL	48300.0	130.90	150.01		151.5	0.001814	9.82	5783.96	554.8	0.44
Reach-1	4900	100-year	REV	58600.0	130.90	151.76		153.5	0.001834	10.59	6768.36	567.9	0.45
Reach-1	4900	100-year	NATURAL	58600.0	130.90	151.76		153.5	0.001834	10.59	6768.36	567.9	0.45
Reach-1	4900	500-year	REV	89900.0	130.90	156.30		158.6	0.001904	12.59	9531.40	749.2	0.47
Reach-1	4900	500-year	NATURAL	89900.0	130.90	156.30		158.6	0.001904	12.59	9531.40	749.2	0.47
Reach-1	4900	67k CFS	REV	67000.0	130.90	153.10		155.0	0.001844	11.16	7537.43	579.5	0.45
Reach-1	4900	67k CFS	NATURAL	67000.0	130.90	153.10		155.0	0.001844	11.16	7537.43	579.5	0.45
Reach-1	4400	50-year	REV	48300.0	130.09	148.03		150.3	0.002873	12.12	4704.01	537.8	0.55
Reach-1	4400	50-year	NATURAL	48300.0	130.09	148.03		150.3	0.002873	12.12	4704.01	537.8	0.55
Reach-1	4400	100-year	REV	58600.0	130.09	149.58		152.2	0.002990	13.19	5563.29	564.3	0.57
Reach-1	4400	100-year	NATURAL	58600.0	130.09	149.58		152.2	0.002990	13.19	5563.29	564.3	0.57
Reach-1	4400	500-year	REV	89900.0	130.09	153.62		157.3	0.003238	15.83	8020.80	653.0	0.61
Reach-1	4400	500-year	NATURAL	89900.0	130.09	153.62		157.3	0.003238	15.83	8020.80	653.0	0.61
Reach-1	4400	67k CFS	REV	67000.0	130.09	150.80		153.7	0.003044	13.94	6259.39	585.8	0.58
Reach-1	4400	67k CFS	NATURAL	67000.0	130.09	150.80		153.7	0.003044	13.94	6259.39	585.8	0.58
Reach-1	3900	50-year	REV	48300.0	129.27	146.52		148.8	0.003108	12.15	4618.13	487.9	0.56
Reach-1	3900	50-year	NATURAL	48300.0	129.27	146.52		148.8	0.003108	12.15	4618.13	487.9	0.56
Reach-1	3900	100-year	REV	58600.0	129.27	147.97		150.6	0.003278	13.29	5364.19	539.3	0.59
Reach-1	3900	100-year	NATURAL	58600.0	129.27	147.97		150.6	0.003278	13.29	5364.19	539.3	0.59
Reach-1	3900	500-year	REV	89900.0	129.27	151.71	147.4	155.5	0.003638	16.12	7825.70	821.6	0.64
Reach-1	3900	500-year	NATURAL	89900.0	129.27	151.71	147.5	155.5	0.003638	16.12	7825.70	821.6	0.64
Reach-1	3900	67k CFS	REV	67000.0	129.27	149.13		152.1	0.003338	14.06	6023.48	588.1	0.60
Reach-1	3900	67k CFS	NATURAL	67000.0	129.27	149.13		152.1	0.003338	14.06	6023.48	588.1	0.60
Reach-1	3400	50-year	REV	48300.0	128.46	144.95	141.0	147.2	0.003287	12.07	4670.48	486.3	0.58
Reach-1	3400	50-year	NATURAL	48300.0	128.46	144.95	141.0	147.2	0.003287	12.07	4670.48	486.3	0.58
Reach-1	3400	100-year	REV	58600.0	128.46	146.30	142.4	148.9	0.003476	13.22	5307.66	582.6	0.60
Reach-1	3400	100-year	NATURAL	58600.0	128.46	146.30	142.4	148.9	0.003476	13.22	5307.66	582.6	0.60
Reach-1	3400	500-year	REV	89900.0	128.46	149.97	146.0	153.7	0.003728	15.85	7724.65	647.8	0.65
Reach-1	3400	500-year	NATURAL	89900.0	128.46	149.97	146.0	153.7	0.003728	15.85	7724.65	647.8	0.65
Reach-1	3400	67k CFS	REV	67000.0	128.46	147.44	143.4	150.4	0.003526	13.98	5860.38	631.5	0.62
Reach-1	3400	67k CFS	NATURAL	67000.0	128.46	147.44	143.4	150.4	0.003526	13.98	5860.38	631.5	0.62
Reach-1	2900	50-year	REV	48300.0	127.65	145.18	139.9	145.8	0.001096	7.32	8057.78	799.6	0.34
Reach-1	2900	50-year	NATURAL	48300.0	127.65	145.18	139.9	145.8	0.001096	7.32	8057.78	799.6	0.34

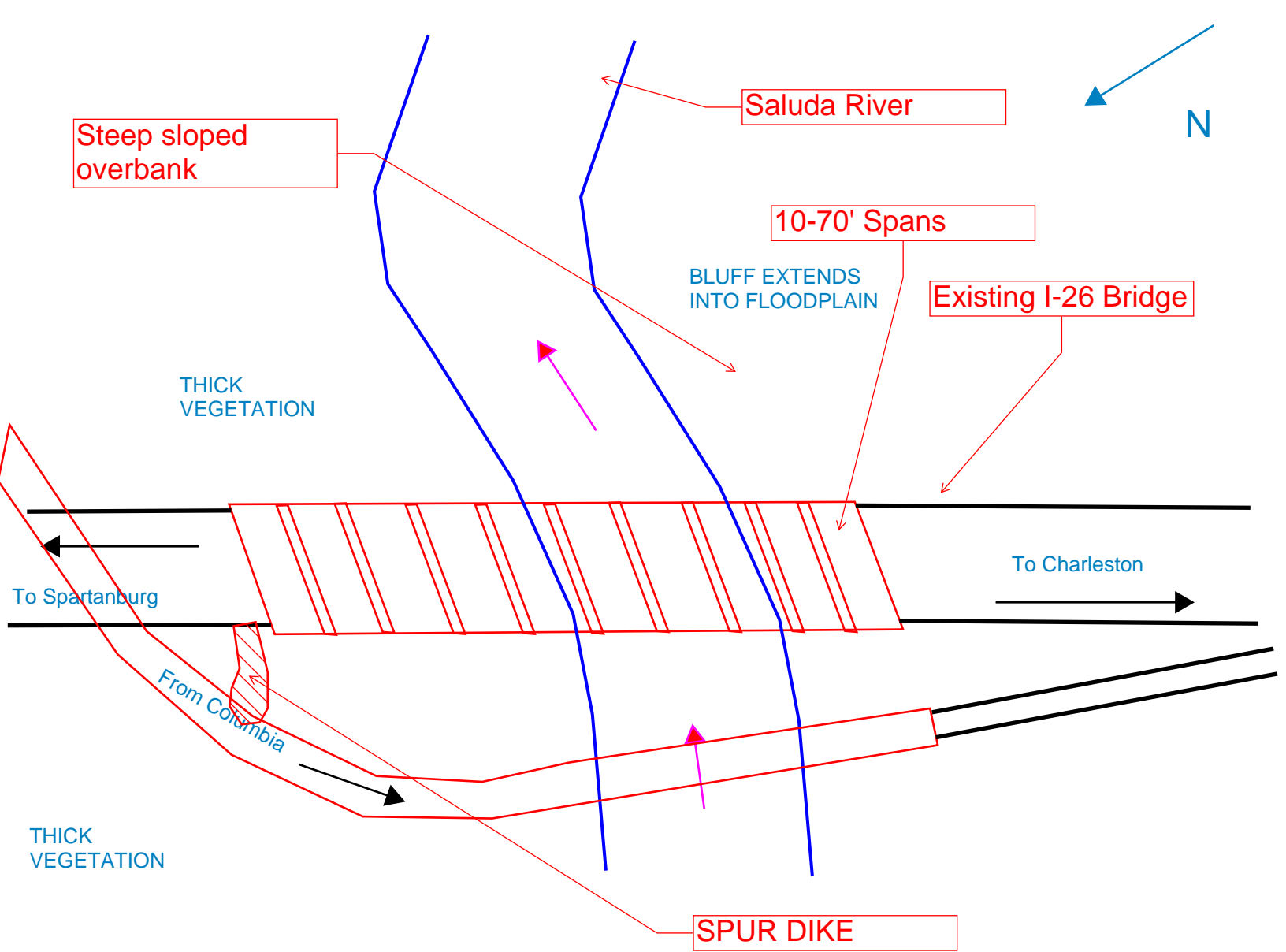
HEC-RAS River: SALUDA RIVER Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Plan	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
Reach-1	2900	100-year	REV	58600.0	127.65	146.80	140.7	147.5	0.001044	7.66	9339.36	839.4	0.34
Reach-1	2900	100-year	NATURAL	58600.0	127.65	146.80	140.7	147.5	0.001044	7.66	9339.36	839.4	0.34
Reach-1	2900	500-year	REV	89900.0	127.65	151.16	142.8	152.0	0.000935	8.50	13297.96	955.2	0.33
Reach-1	2900	500-year	NATURAL	89900.0	127.65	151.16	142.8	152.0	0.000935	8.50	13297.96	955.2	0.33
Reach-1	2900	67k CFS	REV	67000.0	127.65	148.15	141.3	148.9	0.000986	7.85	10420.54	870.5	0.33
Reach-1	2900	67k CFS	NATURAL	67000.0	127.65	148.15	141.3	148.9	0.000986	7.85	10420.54	870.5	0.33
Reach-1	2400	50-year	REV	48300.0	126.84	144.74	138.8	145.2	0.000952	6.93	12125.68	1705.8	0.32
Reach-1	2400	50-year	NATURAL	48300.0	126.84	144.74	138.8	145.2	0.000952	6.93	12125.68	1705.8	0.32
Reach-1	2400	100-year	REV	58600.0	126.84	146.41	139.6	146.9	0.000890	7.19	14365.48	1739.0	0.31
Reach-1	2400	100-year	NATURAL	58600.0	126.84	146.41	139.6	146.9	0.000890	7.19	14365.48	1739.0	0.31
Reach-1	2400	500-year	REV	89900.0	126.84	150.86	141.6	151.5	0.000782	7.90	20369.18	1795.7	0.30
Reach-1	2400	500-year	NATURAL	89900.0	126.84	150.86	141.6	151.5	0.000782	7.90	20369.18	1795.7	0.30
Reach-1	2400	67k CFS	REV	67000.0	126.84	147.81	140.2	148.3	0.000828	7.33	16241.63	1752.8	0.30
Reach-1	2400	67k CFS	NATURAL	67000.0	126.84	147.81	140.2	148.3	0.000828	7.33	16241.63	1752.8	0.30
Reach-1	2000	50-year	REV	48300.0	126.19	144.18	137.8	144.9	0.001184	7.76	10557.90	1601.6	0.35
Reach-1	2000	50-year	NATURAL	48300.0	126.19	144.18	137.8	144.9	0.001184	7.76	10557.90	1601.6	0.35
Reach-1	2000	100-year	REV	58600.0	126.19	145.80	139.0	146.6	0.001182	8.30	12221.15	1680.0	0.36
Reach-1	2000	100-year	NATURAL	58600.0	126.19	145.80	139.0	146.6	0.001182	8.30	12221.15	1680.0	0.36
Reach-1	2000	500-year	REV	89900.0	126.19	150.10	141.3	151.1	0.001184	9.68	17141.38	2008.0	0.37
Reach-1	2000	500-year	NATURAL	89900.0	126.19	150.10	141.3	151.1	0.001184	9.68	17141.38	2008.0	0.37
Reach-1	2000	67k CFS	REV	67000.0	126.19	147.16	139.7	148.0	0.001158	8.66	13695.71	1789.6	0.36
Reach-1	2000	67k CFS	NATURAL	67000.0	126.19	147.16	139.7	148.0	0.001158	8.66	13695.71	1789.6	0.36
Reach-1	1600	50-year	REV	48300.0	126.19	144.03	137.1	144.4	0.000701	5.94	11828.36	1431.0	0.27
Reach-1	1600	50-year	NATURAL	48300.0	126.19	144.03	137.1	144.4	0.000701	5.94	11828.36	1431.0	0.27
Reach-1	1600	100-year	REV	58600.0	126.19	145.69	137.8	146.1	0.000679	6.27	13810.17	1461.1	0.27
Reach-1	1600	100-year	NATURAL	58600.0	126.19	145.69	137.8	146.1	0.000679	6.27	13810.17	1461.1	0.27
Reach-1	1600	500-year	REV	89900.0	126.19	150.22	139.8	150.6	0.000526	6.48	23876.97	2041.4	0.25
Reach-1	1600	500-year	NATURAL	89900.0	126.19	150.22	139.8	150.6	0.000526	6.48	23876.97	2041.4	0.25
Reach-1	1600	67k CFS	REV	67000.0	126.19	147.09	138.4	147.5	0.000646	6.45	15513.66	1487.1	0.27
Reach-1	1600	67k CFS	NATURAL	67000.0	126.19	147.09	138.4	147.5	0.000646	6.45	15513.66	1487.1	0.27
Reach-1	1100	50-year	REV	48300.0	124.69	143.26	136.8	143.9	0.001050	7.50	9124.03	1110.3	0.33
Reach-1	1100	50-year	NATURAL	48300.0	124.69	143.26	136.8	143.9	0.001050	7.50	9124.03	1110.3	0.33
Reach-1	1100	100-year	REV	58600.0	124.69	144.88	137.7	145.6	0.001052	8.02	10526.49	1131.6	0.34
Reach-1	1100	100-year	NATURAL	58600.0	124.69	144.88	137.7	145.6	0.001052	8.02	10526.49	1131.6	0.34
Reach-1	1100	500-year	REV	89900.0	124.69	149.22	140.2	150.2	0.001051	9.31	15352.61	1823.7	0.35
Reach-1	1100	500-year	NATURAL	89900.0	124.69	149.22	140.2	150.2	0.001051	9.31	15352.61	1823.7	0.35
Reach-1	1100	67k CFS	REV	67000.0	124.69	146.24	138.4	147.0	0.001051	8.43	11794.98	1330.2	0.34
Reach-1	1100	67k CFS	NATURAL	67000.0	124.69	146.24	138.4	147.0	0.001051	8.43	11794.98	1330.2	0.34

APPENDIX J

BRIDGE HYDRO DATA SHEET

SITE INSPECTION FORM					
<u>PROJECT DESCRIPTION</u>					
County:	<u>Richland/Lexington</u>	Rt. / Rd. No.:	<u>I-26</u>		
Stream:	<u>Saluda River</u>	File No:			
Project No:	<u>Saluda River</u>	PIN:	<u>39718</u>		
By:	<u>Stuart Timmons</u>	Date:	<u>02 / 23 / 2022</u>		
Note: All references to left and right are looking in the direction of flow.					
<u>EXISTING BRIDGE</u>					
Length:	<u>700</u> ft.	Width:	<u>122.8</u> ft.	Max. Span Length:	<u>70</u> ft.
Alignment:	Tangent <input checked="" type="checkbox"/>	Curved	<input type="checkbox"/>		
Bridge skewed?	Yes <input checked="" type="checkbox"/>	No	<input type="checkbox"/>	Angle:	<u>40 degrees</u>
End Abutment Type:	<u>Spill Through</u>				
Riprap on Fills?	Yes <input checked="" type="checkbox"/>	No	<input type="checkbox"/>	Condition:	
Superstructure Type:	<u>xxx</u>				
Substructure Type:	<u>xxx</u>				
Utilities Present?	Yes <input type="checkbox"/>	No	<input type="checkbox"/>	Describe:	
Debris Accumulations on Bridge:					
		Percent Blocked (Horizontal):	<u>0</u>	%	
		Percent Blocked (Vertical):	<u>0</u>	%	
Hydraulic Problems?	Yes <input type="checkbox"/>	No	<input checked="" type="checkbox"/>	Describe:	
Draw Sketch of Bridge and Stream Below: (Show north arrow and direction of flow)					



1.6.3.1 Site Characteristics Form

SITE CHARACTERISTICS FORM			
General Topography	<u>Floodplain medium slopes, defined large channel</u>		
Stream Type (circle one)			
<u>Straight</u>	Braided	Anabranching	Meandering
Are channel banks stable?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
If No, describe: _____			

Soil Type	<u>Sandy loam</u>		
Exposed Rock?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
If Yes, give description and location: <u>Rock can be seen along the right edge of bank in places.</u>			

Describe potential for debris: <u>Existing bridge shows very little signs of debris build up. Upstream of this bridge is the Lake Murray Dam which limits the amount of debris flowing down the Saluda River.</u>			

Give description and location of any structures or other property that could be damaged by backwater: <u>Residential neighborhood located upstream on the right overbank.</u>			

Describe any other features that might affect or be affected by the hydraulic performance of the proposed bridge: <u>Discharge rates from the Lake Murray Dam.</u>			

1.6.4 Risk Assessment

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION FLOODPLAIN AND RISK ASSESSMENT

Regulation 23 CFR 650 shall apply to all encroachment and to all actions which affect base floodplains, except for repairs made with emergency funds. (See HEC-17) Note: These studies shall be summarized in the environmental review document prepared pursuant to 23 CFR 771.

Project Description: The Carolina Crossroads project proposed to replace the existing I-26 bridge over the Saluda River as well as construct a new CD ramp bridge that will carry traffic from I-26 Westbound to the new Colonial Life Interchange along I-126. The I-26 bridges will be replaced during Phase 3 of the project and the CD ramp bridge will be constructed in Phase 1.

A. Narrative Describing Purpose and Need for Project:

a. Relevant Project History: The Carolina Crossroads project purpose is to alleviate traffic, plan for growth, and improve safety along the corridor. The existing I-26 bridge has reached the end of its service life and the proposed project calls to construct a wider bridge to alleviate traffic now and in the future.

b. Project Location (attach Location and Project Map):
The project location is at the I-26 crossing of the Saluda River. This portion of the Saluda River separates Lexington and Richland County. Construction will take place in each county for the proposed work with the Carolina Crossroads Project.

c. Major Issues and Concerns: Existing bridge low chord does not provide adequate freeboard for the design storm. Propose to raise the proposed bridge to ensure adequate freeboard is met and lengthen to improve water surface elevations upstream of the crossing.

B. Are there any floodplain(s) regulated by FEMA located in the project area?

Yes ☒

No ☐

C. Will fill be placed within a 100-year floodplain?

Yes ☒

No ☐

D. Will the existing profile grade be raised within the floodplain?

Yes ☐

No ☒

E. If applicable, please discuss the practicability of alternatives to any longitudinal encroachments.

N/A

F. Please include a discussion of the following: commensurate with the significance of the risk or environmental impact for all alternatives containing encroachments and those actions which would support base floodplain development:

i. What are the flood-related risks associated with implementation of the action?

Flooding upstream will be reduce with the longer proposed bridge as well as taller bridge.

There is a low risk to flooding of any downstream structures from the Saluda River. The river profile drops significantly through the bridge thus keeping water surfaces relatively low.

ii. What are the impacts on the natural and beneficial floodplain values?

Minimal Impacts are anticipated to the floodplain due to the proposed design and method of bridge construction.

iii. Will the bridge entice people to build in floodplains?

The areas around the bridge have an established floodplain as well as floodway making it difficult for any further development along the Saluda River.

iv. What measures were used to minimize floodplain impacts associated with the action?

Drilled shafts will be utilized through the entire corridor to minimize land disturbance. The CD bridge (Bridge 35) will be elevated throughout the floodplain to not have any impacts on the water surface.

v. Were any measures used to restore and preserve the natural and beneficial floodplain values impacted by the action?

The proposed bridge will be lengthened as well as raised to help lower velocities through the bridge crossing. The CD bridge (Bridge 35) was designed to prevent and fill being placed in the floodway.

Page 2 of 5

G. Please discuss the practicability of alternatives to any significant encroachments or to support of incompatible floodplain development.

Flooding upstream will be reduce with the longer proposed bridge as well as taller bridge.

There is a low risk to flooding of any downstream structures from the Saluda River. The river profile drops significantly through the bridge thus keeping water surfaces relatively low.

H. List local, state, and federal water resources and floodplain management agencies consulted to determine if the proposed highway action is consistent with existing watershed and floodplain management programs. Describe any information obtained on development and proposed actions in the affected area. Please include agency documentation.

Coordination with FEMA, SCDNR, DHEC, City of Columbia, Richland County, City of West Columbia, and Lexington County is being performed on the proposed work. No-Impact Analysis will be submitted to the jurisdictions for the proposed bridge. An 404/401 permit has already been obtained for the project.

I. BACKWATER DAMAGE FORM

Major flood damage applies to shopping centers, hospitals, industrial facilities, residential areas, schools, farming operations, etc.

1. Does the maximum flood cause major damage to upstream property?

Yes - (Go to 2.)

No - (Go to 3.)

2. Would this damage occur if the road were not there?

Yes - (Go to 3.)

No - (Perform a limited Least Total Expected Cost (LTEC) (HEC-17) analysis to see if the bridge opening should be increased and/or grades raised to minimize the damage potential. Go to II.)

3. Was this a bridge replacement? If so, was the bridge opening increased enough to increase the discharge passed through the bridge?

Yes - (Go to 4.)

No - (Go to II.)

Page 3 of 5

4. Does the increased flow cause major damage downstream?

Yes - (Perform a limited LTEC analysis to determine if the bridge opening should be reduced, the floodway redefined, and flood easements purchased upstream or if flood easements should be purchased downstream. Go to II.)

No - (Go to II)

II. TRAFFIC RELATED LOSSES

1. Is the overtopping flood greater than the 100-year flood?

Yes - (Go to III)

No - (Go to 2.)

2. Does the ADT exceed 50 vehicles per day?

Yes - (Go to 3.)

No - (Go to III.)

3. Does the duration of road closure in days, multiplied by the difference in length, in miles between the normal route and the detour, exceed 20?

Yes - (Go to 4.)

No - (Go to III.)

4. Does the annual risk cost for traffic related costs exceed 10% of the estimated annual capital costs?

Yes - (Perform a limited LTEC analysis to compare the cost to raise the grades and if necessary increase the bridge length with the traffic related costs. Go to III.)

No - (Go to III.)

III. ROADWAY AND/OR STRUCTURE REPAIR COST

1. Is the overtopping flood less than the 100-year flood?

Yes - (Go to 2)

No - (Go to 3)

2. Is the overtopping flood less than 0.5 foot over the low point on the roadway and duration no more than 1.0 hour?

Yes - (Go to 3)

No - (perform a limited LTEC analysis to determine if the grades should be raised and/or the bridge opening increased or that the repair cost for embankment erosion are less significant. Traffic cost should be included in this evaluation.)

3. Is the proposed bridge or culvert structure subject to potential damage due to debris?

Yes - (Go to 4)

No - (Go to 5)

4. Perform a limited LTEC analysis to determine if the structure should be modified. (Go to 5.)

5. The risk assessment has determined the most economical design for the crossing within the design constraints.

Revised 3/16/09

Page 5 of 5

1.6.3.2 Manning's "n" Values – for Channels

MANNING’S “n” VALUES – FOR CHANNELS							
n = [(n _b +n ₁ + n ₂ +n ₃ +n ₄) m]							
Channel		n_b -- Base n for soil		Channel		n₁ -- Degree of Irregularity	
Earth		.020		Smooth		.000	
Rock Cut		.025		Minor		.001-.005	
Fine Gravel		.024		Moderate		.006-.010	
Course Gravel		.028		Severe		.011-.020	
		n₂ -- Variations of Channel Cross Sections				n₃ -- Relative Effect of Obstructions	
Gradual		.000		Negligible		.000-.004	
Alternating Occasionally		.001-.005		Minor		.010-.015	
Frequently		.010-.015		Appreciable		.020-.030	
				Severe		.040-.060	
		n₄ -- Vegetation				m -- Degree of Meandering	
Low		.002-.010		Minor		1.00	
Medium		.010-.025		Appreciable		1.15	
High		.025-.050		Severe		1.30	
Very High		.050-.100					
SITE OBSERVATIONS FOR CHANNELS							
Channel Depth	n _b	n ₁	n ₂	n ₃	n ₄	m	Computed n
Channel	0.024	0.003	0.00	0.003	0.015	1.00	0.045

1.5.4 Hydrology Data Sheet for Bridges

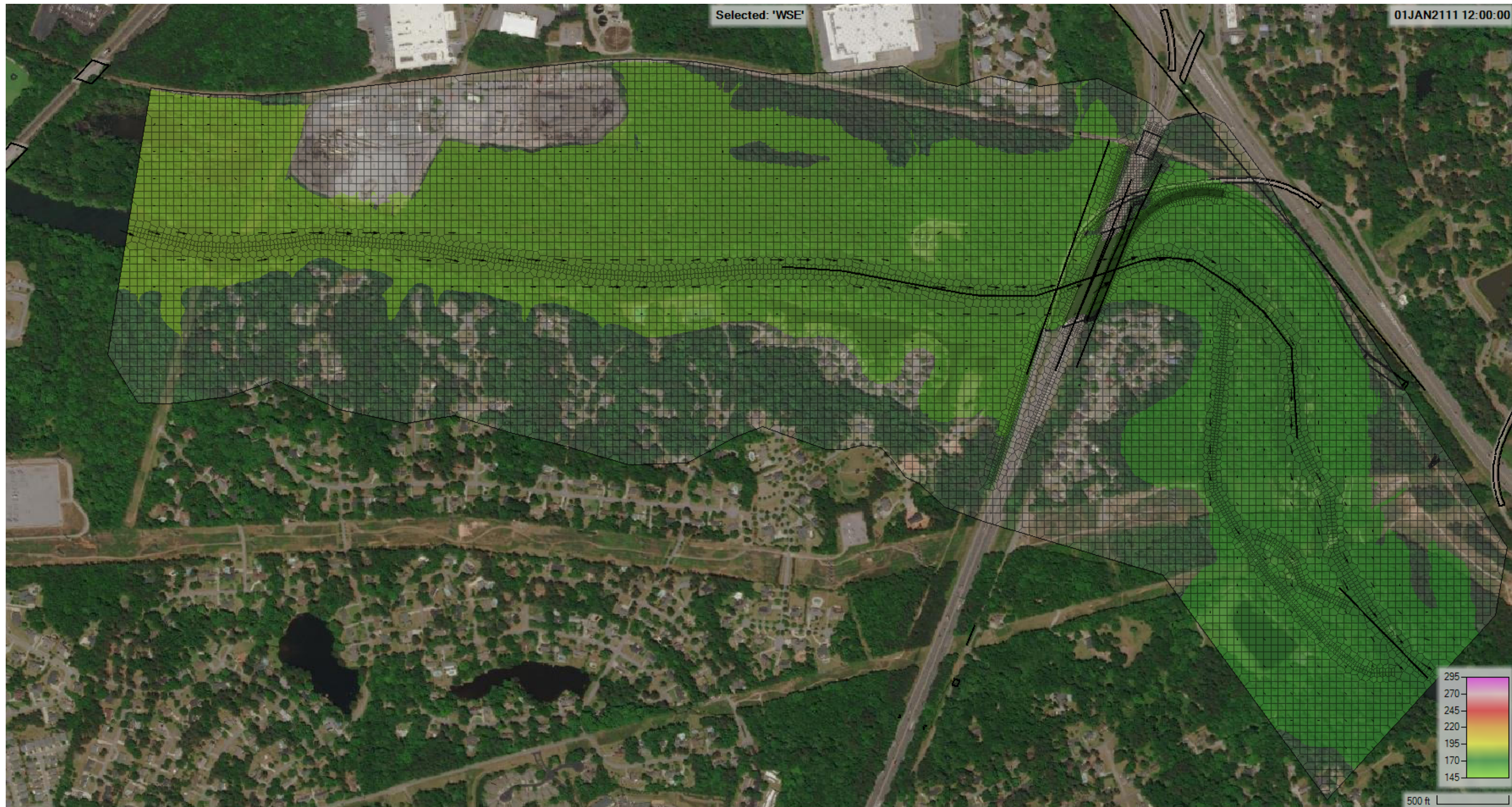
MEMORANDUM TO:		Submittal Date: _____
		Supersedes Submittal Date: _____
RPG ROAD DESIGN TEAM LEADER: _____		
RPG STRUCTURAL ENGINEER: _____		
From: Hydraulic Design Squad / Engineer _____		
Subject: Hydrology Data for Bridge over _____		
County: _____		Rd/Rte: _____
Structure No: _____		Const. Pin: _____
Bridge Data:		
Bridge Length: _____ ft.		Bridge Width: _____ ft.
Beg. Station: _____		Ending Station: _____
Pier/Pile Type: _____		Pier/Pipe Width: _____ ft.
Skew Angle: _____ °		
Bridge Span Configuration: _____		
Bridge Span Type: _____		
Min. F.G. Elev.: _____ ft.		Min. Low Steel Elev. _____ ft.
Min. Bottom Interior Bent Cap Elev. (For Tidal Bridges Only) _____ ft.		
Br. End Fill Slope: _____ Riprap Req'd: Yes <input type="checkbox"/> No <input type="checkbox"/> To Elevation: _____ ft.		
Comments: _____ _____ _____ _____ _____		
Historic High Water Information:		
Elevation of High Water: _____ ft.		Discharge: (if available) _____ ft.
Date of occurrence: _____		Source of Data: _____

Design High Water and Backwater Information: (Show high water elevations including backwater on plans)	
If 'Secondary Road' provide 25-yr high water elevation including backwater:	_____ ft.
If 'Primary Road' provide 50-yr high water elevation including backwater:	_____ ft.
For all roads provide 100-yr high water elevation including backwater:	_____ ft.
Hydrology Data for Tidal Bridges: (Only complete this section if tidal flow is the dominant flow) (show on plans)	
Mean Higher high tide elevation	= _____ ft.
Mean Lower low tide elevation	= _____ ft.
10-year tidal surge height	= _____ ft. (includes wave height)
100-year stillwater height	= _____ ft.
500-year stillwater height	= _____ ft.
Maximum vel. within bridge	= 100-yr. tidal surge velocity: _____ fps 500-yr. tidal surge velocity: _____ fps
Hydrology Data for Riverine Bridges: (Only complete this section if riverine flow is the dominant flow) (show on plans)	
D.A. = _____	sq. mi. (or acres)
Q _{Design} = _____	cfs
Vel. _{Design} = _____	ft./sec.
Design Headwater Elevation = _____	ft.
Including _____	ft. backwater
Q ₁₀₀ = _____	cfs
Vel ₁₀₀ = _____	ft/sec
100 Year Headwater Elev. = _____	ft.
Including _____	ft. backwater
Overtopping Flood:	
Q = _____ cfs	Probability: _____ %
cc: Environmental Engineer _____	
<small>Note: Probability may be determined by plotting the 2-, 10-, 25-, 50-, 100-, and 500-year discharges on Gumble paper and reading the probability corresponding to the overtopping discharge. For discharges greater than 500-year, the probability should be stated as less than (<) 0.002. Profiles of the computed scour for the 100-year and 500-year floods should be shown on the bridge plan and profile sheet. The shape of these profiles should be based on the methods described in the HEC-18. A plot of the 100- and 500-year scour lines on a bridge plan and profile sheet must be provided.</small>	

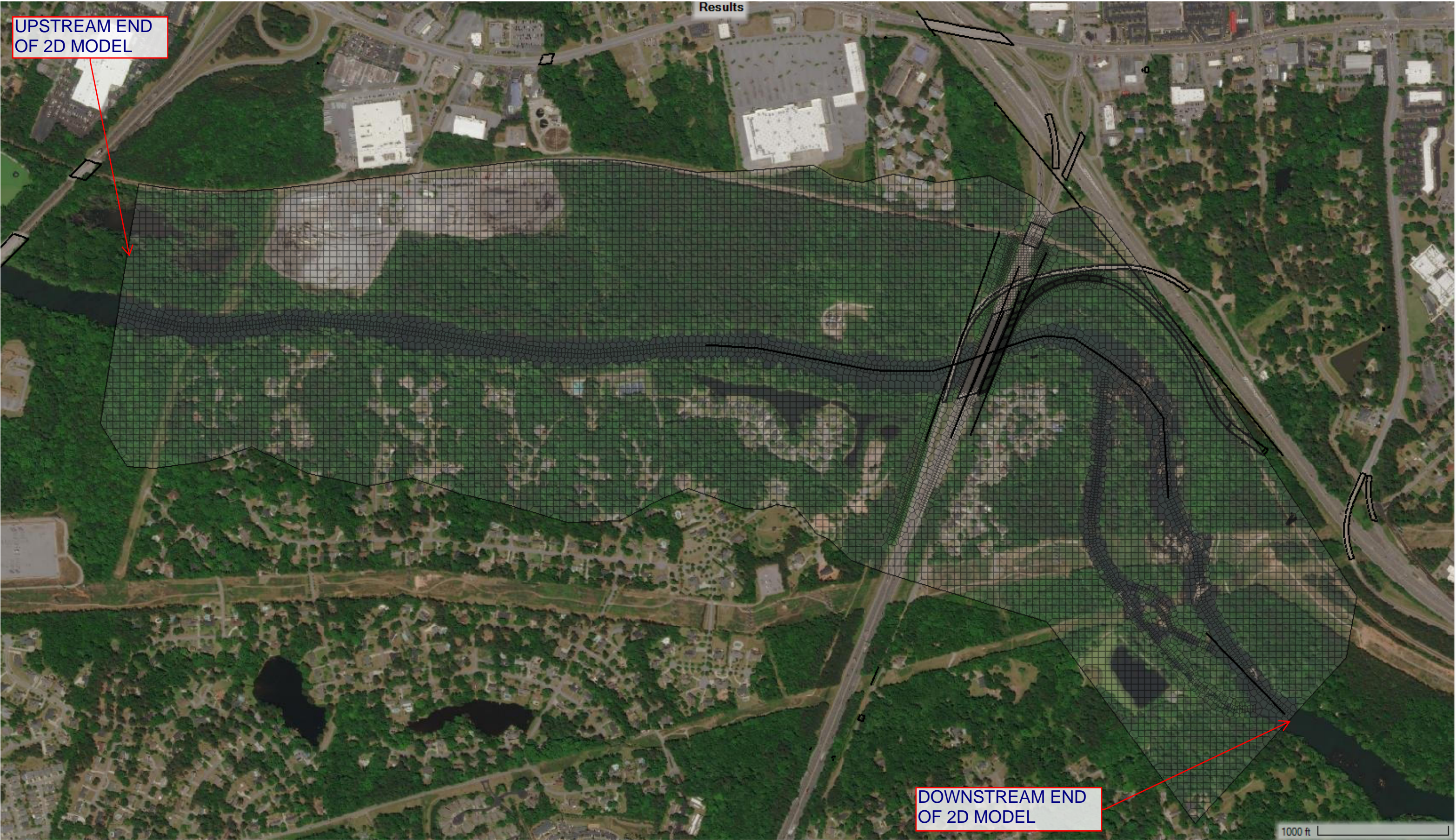
APPENDIX K

INTERMEDIATE 2D MODEL OUTPUT

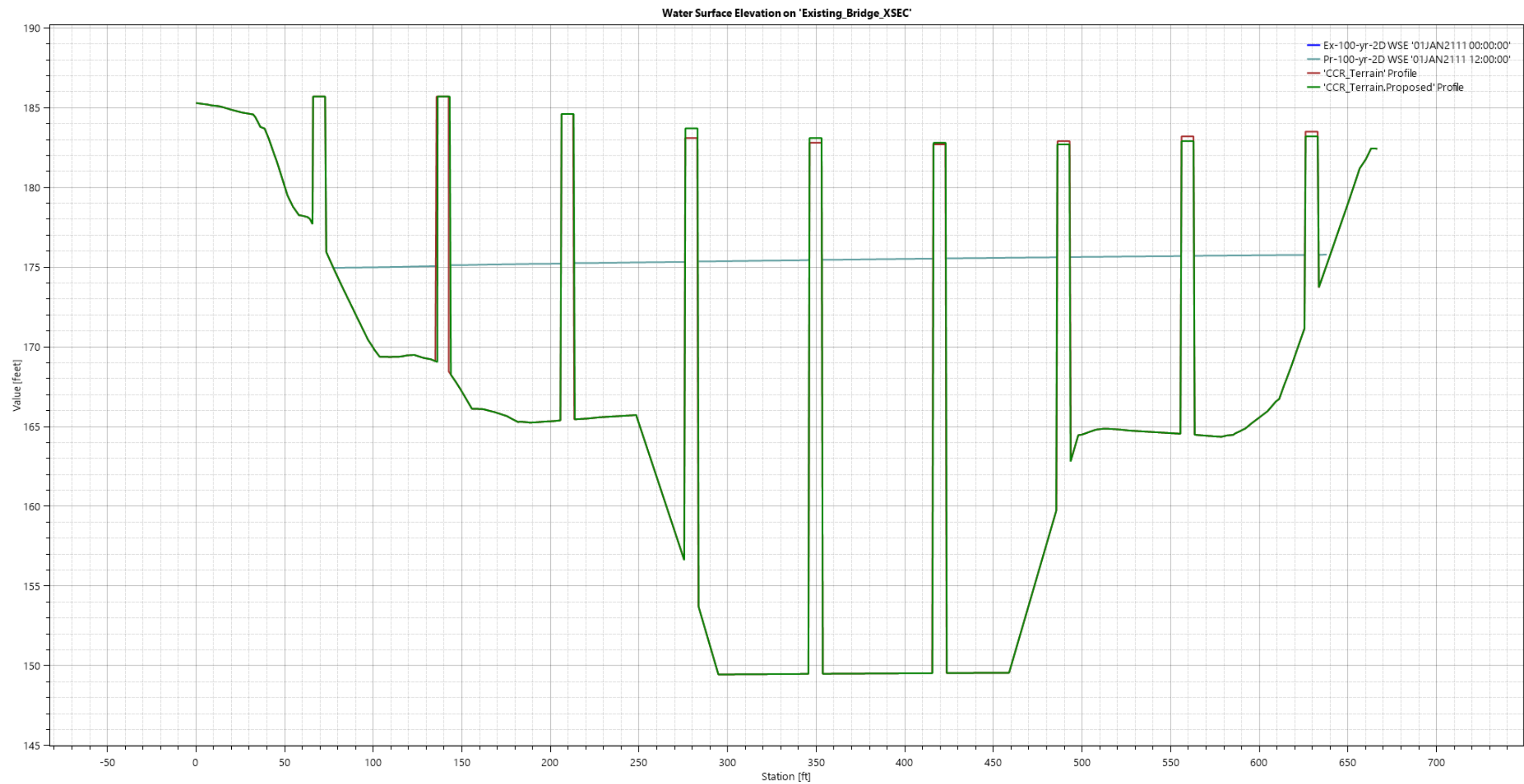
100-YEAR 2D FLOODPLAIN



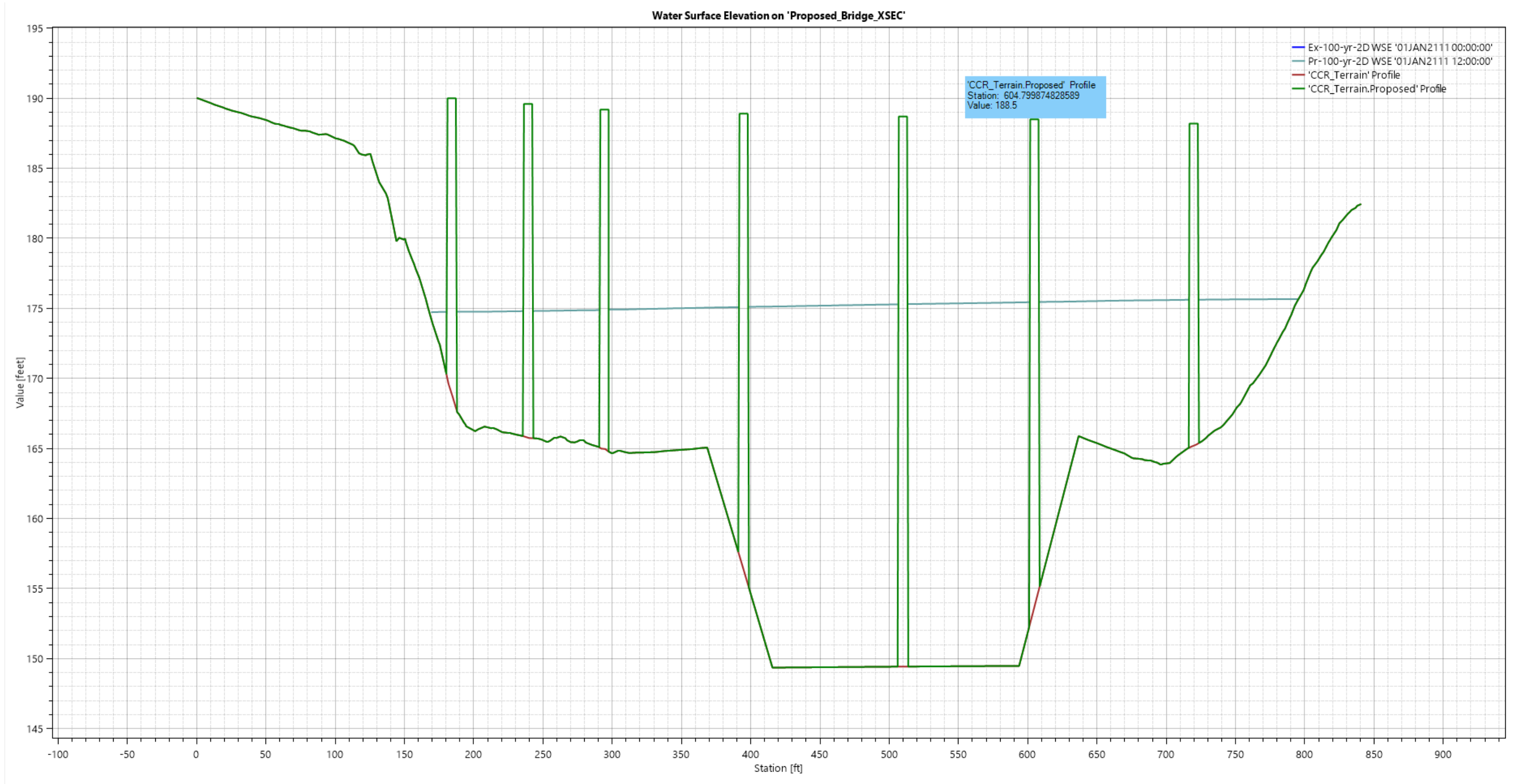
OVERALL LAYOUT OF 2D MODEL



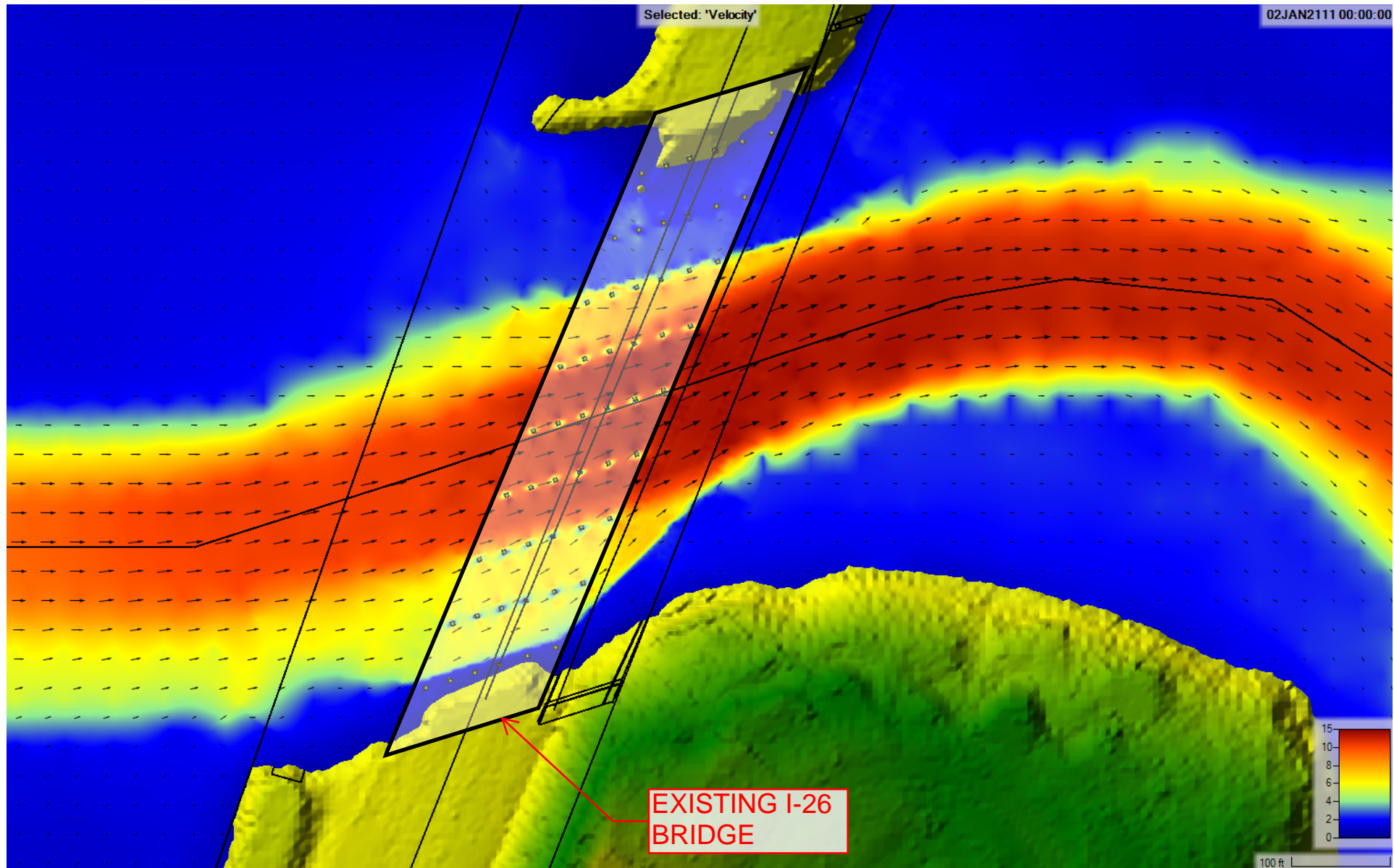
INTERMEDIATE VS EXISTING WATER SURFACE COMPARISON



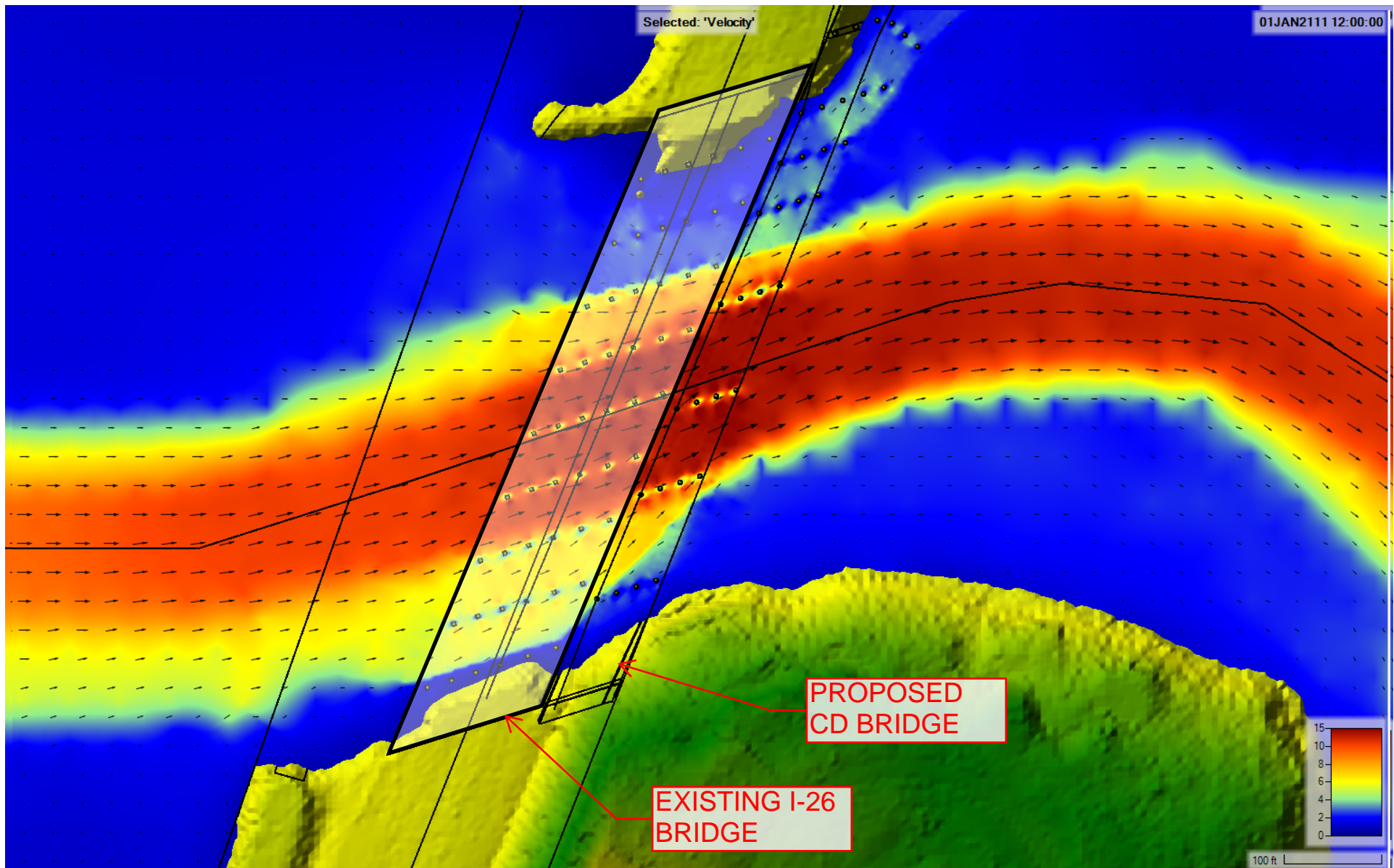
INTERMEDIATE VS EXISTING WATER SURFACE COMPARISON



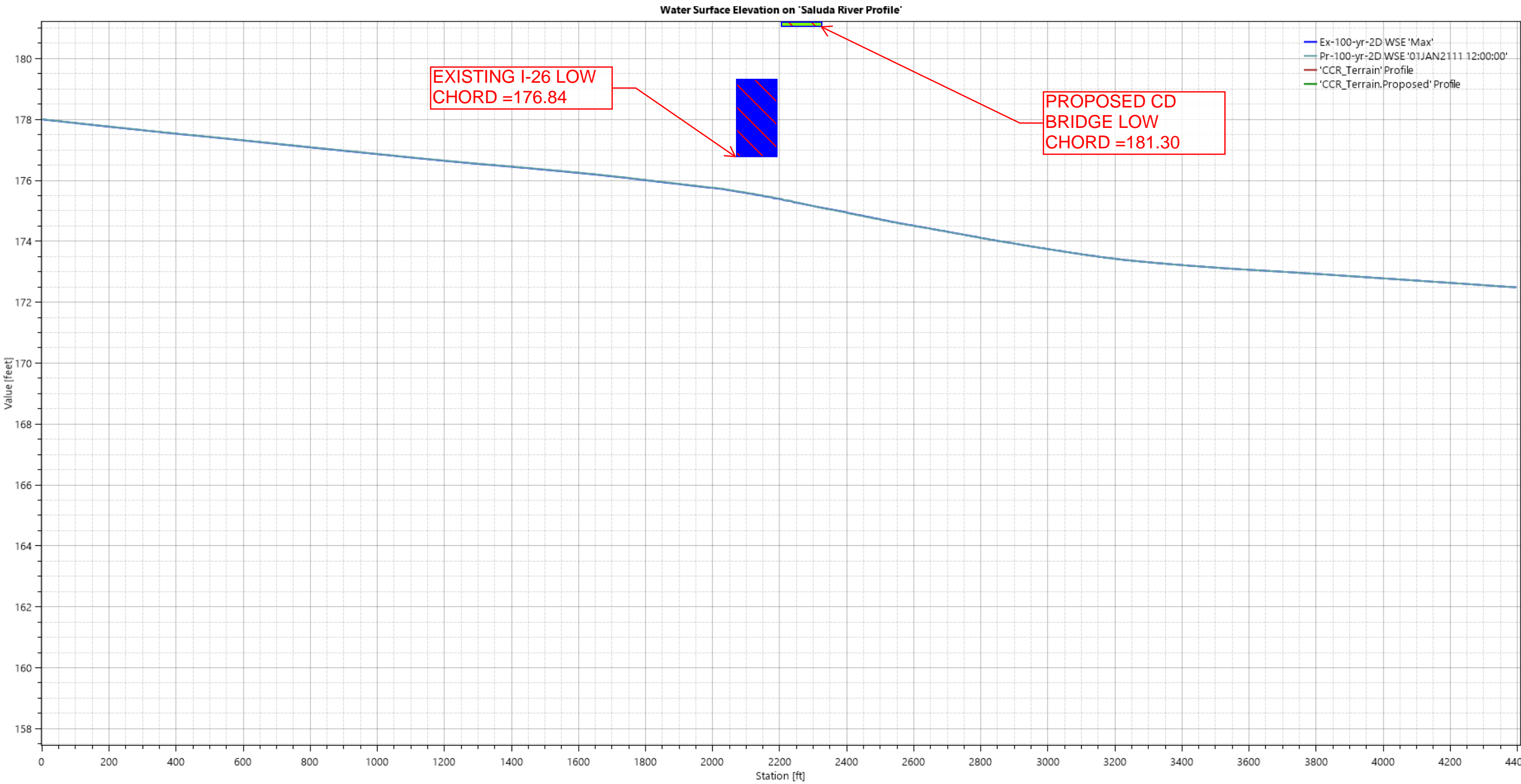
EXISTING CONDITION VELOCITY VECTORS



INTERMEDIATE CONDITION VELOCITY VECTORS



EXISTING VS INTERMEDIATE WATER SURFACE SALUDA RIVER PROFILE



APPENDIX L

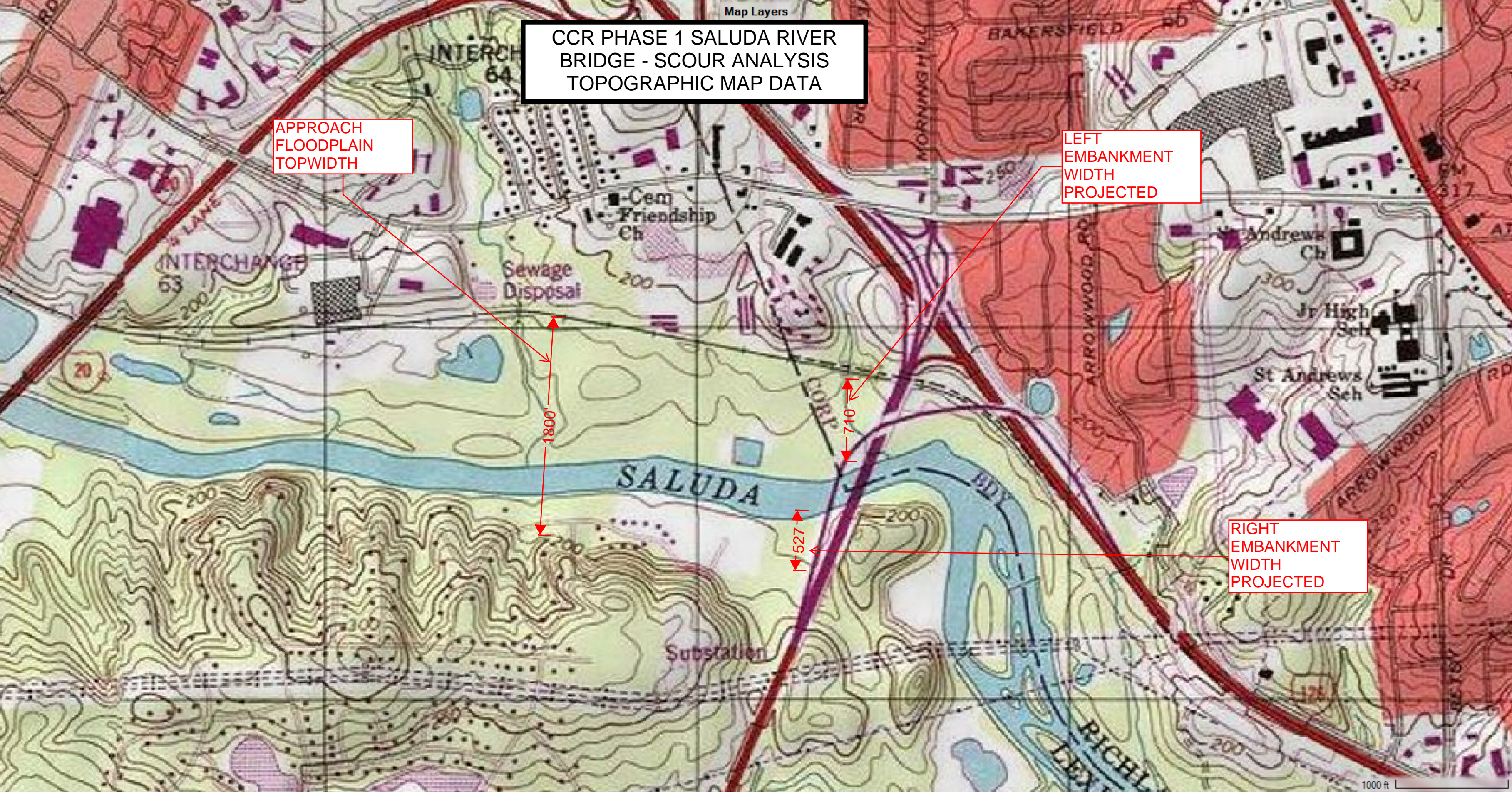
SCOUR ANALYSIS

CCR PHASE 1 SALUDA RIVER
BRIDGE - SCOUR ANALYSIS
TOPOGRAPHIC MAP DATA

APPROACH
FLOODPLAIN
TOPWIDTH

LEFT
EMBANKMENT
WIDTH
PROJECTED

RIGHT
EMBANKMENT
WIDTH
PROJECTED



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 (NAVD 88). 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 Lambert Conformal Conic State Plane South Carolina FIPS 3900. The **horizontal datum** was NAD83 HARN, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane 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. 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, NNGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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 Lexington County, South Carolina.

This map reflects more detailed and up-to-date **stream channel configurations** 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.

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.

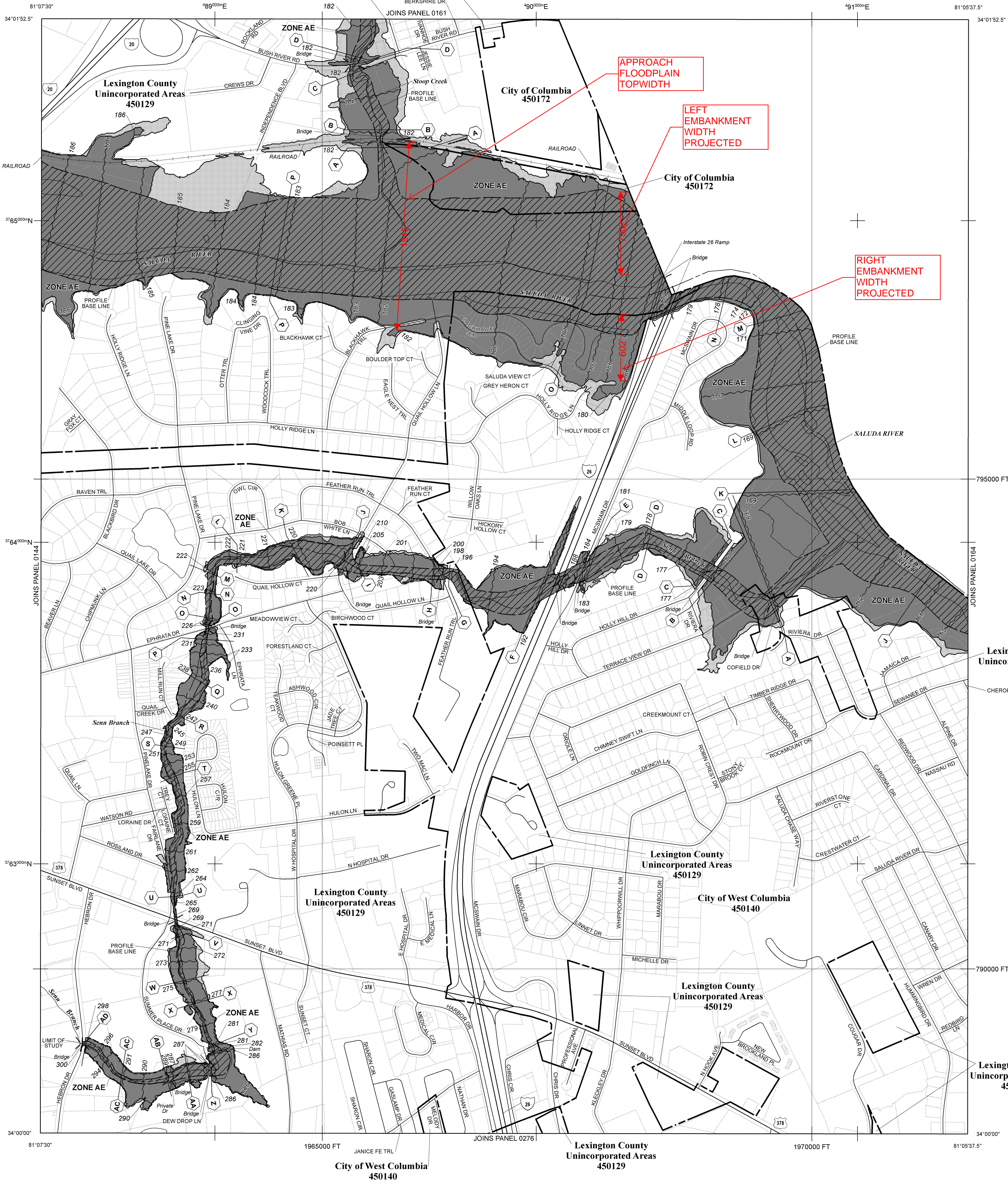
For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange** at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at <http://www.msc.fema.gov/>. Available products may include previously issued Letters of Map Change, a Flood Insurance Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

The "profile base lines" depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the "profile base line", in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.



This digital Flood Insurance Rate Map (FIRM) was produced through a unique cooperative partnership between the State of South Carolina and the Federal Emergency Management Agency (FEMA). The State of South Carolina has implemented a long term approach of floodplain management to decrease the costs associated with flooding. This is demonstrated by the State's commitment to map floodplain areas at the local level. As a part of this effort, the State of South Carolina has joined in a Cooperating Technical State agreement with FEMA to produce and maintain this digital FIRM.

<http://www.dnr.state.sc.us/>



LEGEND

SPECIAL FLOOD HAZARD AREAS 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 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** Areas to be protected from 1% annual chance flood event 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 Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
- Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*
- * Referenced to the North American Vertical Datum of 1988
- Cross section line
- Transect line
- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) HARN, Western Hemisphere
- 1000-meter Universal Transverse Mercator grid ticks, zone 17
- 5000-foot grid values: South Carolina State Plane coordinate system (FIPSZONE = 3900), Lambert projection
- Bench mark (see explanation in Notes to Users section of this FIRM panel)
- River Mile

MAP REPOSITORIES
Refer to Map Repositories List on Map Index
EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
July 17, 1995

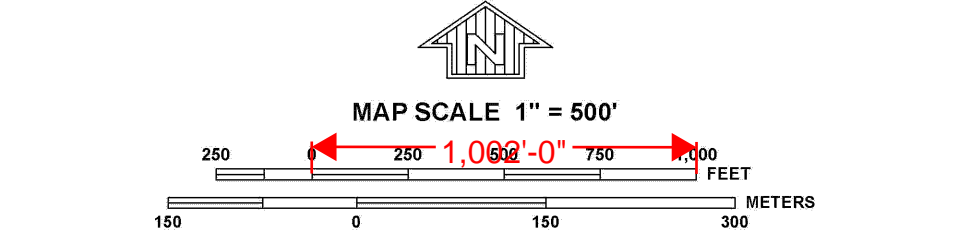
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

February 9, 2000 - to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to change zone designations, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to reflect updated topographic information

July 5, 2018 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to change Special Flood Hazard Areas, to change zone designations, to update roads and road names, to incorporate previously issued Letters of Map Revision, to reflect updated topographic information, to change floodway, and to advance suffix.

For community map revision history prior to countywide mapping, refer to the Community Map Inventory 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.



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0163J

FIRM

FLOOD INSURANCE RATE MAP

LEXINGTON COUNTY, SOUTH CAROLINA

AND INCORPORATED AREAS

PANEL 163 OF 555

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLUMBIA, CITY OF	450172	0163	J
LEXINGTON COUNTY	450129	0163	J
WEST COLUMBIA, CITY OF	450140	0163	J

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
45063C0163J

MAP REVISED
JULY 5, 2018

Federal Emergency Management Agency

Site Information

1

Use a blank template when starting new assessments
(Fill in gray shaded cells; leave blank if data not available.)

Bridge Number:	3210002600400	Stream:	Saluda River	Date of Analysis:	2/18/2022
County:	Richland/Lexington	Road:	I-26		
Physiographic Region (for scour):	Coastal Plain	Multiple Bridge?	No	Bridge Length:	563 ft
Latitude:	34° 1' 25.3" DMS	Relief Bridge?	No	Drainage Area:	2510 sq mi
Longitude:	81° 6' 12.7" DMS	Swampy, Poorly Defined Channel?	No		

Hydraulic Model Data (Stations for bridge cross section are based on unconstricted approach section station with bridge projected on to approach)

Data Available?	Yes
Quality of Model Data:	Good

LEW station at unconstricted approach cross section; OR left stagnation point for multiple bridge (if no data, leave cell empty):	3883	ft
REW station at unconstricted approach cross section; OR right stagnation point for multiple bridge (if no data, leave cell empty):	5438	ft
Unconstricted cross-section topwidth from model data (approach before cross-section):	1555	ft

CHECK (Single bridge data):

Do embankment lengths and toe-to-toe distance equal unconstricted cross-section topwidth? (approach before cross-section)	Yes
---	-----

LEW station at bridge (based on approach):	4758	ft
REW station at bridge (based on approach):	5297	ft
Left abutment toe station (based on approach):	4817	ft
Right abutment toe station (based on approach):	5236	ft
LTB station at bridge (if relief bridge or swampy, poorly defined channel, leave cell empty):	4902	ft
RTB station at bridge (if relief bridge or swampy, poorly defined channel, leave cell empty):	5136	ft

Channel topwidth (model):	234	ft
Distance from toe to toe (model):	419	ft

Left embankment length (model):	934	ft
Right embankment length (model):	202	ft
m (model):	0.65	

SCDOT Plan Data (Be sure to check for tie equalities)

Data Available?	Yes
Quality of Plan Data:	Good

SCDOT Road Plan number:	
Use HWM or average flood-plain flow depth for WSEL?*	High Water
WSEL on SCDOT datum:	181
LEW station at unconstricted cross section from plans (if no data, leave cell empty):	0
REW station at unconstricted cross section from plans (if no data, leave cell empty):	1636.5
Unconstricted cross-section topwidth from plans:	1637

CHECK (Single bridge data):

Do embankment lengths and toe-to-toe distance equal unconstricted cross-section topwidth?	Yes
---	-----

LEW station at bridge:	808.5	ft
REW station at bridge:	1349	ft
Left abutment toe station:	850	ft
Right abutment toe station:	1268	ft
LTB station at bridge (if relief bridge or swampy, poorly defined channel, leave cell empty):	978.2	ft
RTB station at bridge (if relief bridge or swampy, poorly defined channel, leave cell empty):	1167	ft

Channel topwidth (plans):	189	ft
Distance from toe to toe (plans):	418	ft

Left embankment length (plans):	850	ft
Right embankment length (plans):	369	ft
m (plans):	0.67	

**NOTE: Average flood-plain flow depth in Coastal Plain and Piedmont is approximately 7 ft.

Topographic Map Data

Data Available?	Yes
Quality of Map Data:	Fair

Does topo indicate wide, flat floodplain?	No
Does topo indicate severe meander just upstream?	No
Bridge length as provided by SCDOT (verify with topo map if possible):	563

ft Site Info

CHECK (Single bridge data):

Does sum of embankment and bridge lengths

Yes

Bridge-Scour Envelope Curve Template

Approach flood-plain topwidth (topo map):**
Left embankment length (topo map):
Right embankment length (topo map):
m (topo map):

1800	ft
710	ft
527	ft
0.69	

equal approach flood-plain topwidth? Yes

****NOTE:** The approach cross section should represent the unconstricted natural cross section located approximately one bridge-width upstream of the bridge of interest.
****NOTE:** The HWM from the SCDOT plans, HWM from flood documentation, or the average flood-plain flow depth should be used to approximate the flood-plain topwidth.

FEMA/Other Map Data

Data Available?	Yes
Quality of Map Data:	Fair

If "Other Map," describe:

Bridge length as provided by SCDOT (verify with FEMA/Other map if possible):
Approach flood-plain topwidth (FEMA/Other map):**
Left embankment length (FEMA/Other map):
Right embankment length (FEMA/Other map):
m (FEMA/Other map):

563	ft
1915	ft
750	ft
602	ft
0.71	

CHECK (Single bridge data):

Does sum of embankment and bridge lengths
equal approach flood-plain topwidth? Yes

****NOTE:** The approach cross section should represent the unconstricted natural cross section located approximately one bridge-length upstream of the bridge of interest.
****NOTE:** The inundated areas on the FEMA/Other map should be used to approximate the flood-plain topwidth.

Comparison of Geometric-Contraction Ratios [m]

Select Source for m:

Source Used: Hydraulic Model

m from model:
 m from road plans:
 m from topographic map:
 m from FEMA/Other map:
 USE m:

m Value	Quality of Source Data
0.65	Good
0.67	Good
0.69	Fair
0.71	Fair
0.65	

****NOTE: The "USE m" value is automatically selected, but can be overridden by typing in another value. If the originally selected value of m is overridden, justification should be provided in the comments below.**

****NOTE:** In most cases, the model data should provide a reasonable estimate of m and should be given strong consideration in the selection of the final m. The other sources of data (road plans and maps) should be used to confirm the m estimate based on the model data. The road plans are based on an actual survey, likely providing a better data source for confirming the m determined from the model data. The details associated with the topographic and FEMA/Other maps will often be limited, causing discrepancies in the estimate of m. When significant discrepancies in the estimate of m exist between the four data sources, the user should determine the reason for the discrepancy and then select a reasonable, but conservative estimate of m. As a general rule, the selected m and embankment lengths should come from the same data source.

Comparison of Embankment Lengths

Select Source for Embankment Length:

Source Used: Hydraulic Model

Embankment length from model:
 Embankment length from road plans:
 Embankment length from topographic map:
 Embankment length from FEMA/Other map:

Left	
Embankment Length (ft)	Quality of Source Data
934	Good
850	Good
710	Fair
750	Fair

USE embankment length:

934 ft

Right	
Embankment Length (ft)	Quality of Source Data
202	Good
369	Good
527	Fair
602	Fair

202 ft

CHECK:

Is this a relief or swampy bridge with a poorly defined channel
 and a bridge length less than or equal to 240 ft?

If so, use the maximum embankment length from the selected

"Source Used" for left and right embankment length.

No

****NOTE: The "USE embankment length" value is automatically selected, but can be overridden by typing in another value. If the originally selected value of embankment length is overridden, justification should be provided in the comments below.**

****NOTE:** In most cases, the model data should provide a reasonable estimate of embankment lengths and should be given strong consideration in the selection of the final embankment lengths. The other sources of data (road plans and maps) should be used to confirm the embankment length estimates based on the model data. The road plans are based on an actual survey, likely providing a better data source for confirming the embankment lengths determined from the model data. The details associated with the topographic and FEMA/Other maps will often be limited, causing discrepancies in the estimate of embankment length. When significant discrepancies in the estimate of embankment lengths exist between the four data sources, the user should determine the reason for the discrepancy and then select a reasonable, but conservative estimate of embankment length. As a general rule, the selected m and embankment lengths should come from the same data source.

Comparison of Overbank Widths underneath Bridge

Select Source for Overbank Width:

Source Used: SCDOT Plans

Overbank width (Old SCDOT plans if available):
 Overbank width (Hydraulic Model):

Left Overbank Width
 (Left abutment toe to left top of bank)**

128.2 ft
 85 ft

USE overbank width:

128.2 ft

CHECK:

Is overbank width greater than or equal to 10 feet?*

Yes

Right Overbank Width
 (Right top of bank to right abutment toe)**

101 ft
 100 ft

101 ft

Yes

****NOTE:** The overbank width information is compared with the topwidth of the abutment-scour hole to determine how much of the overbank width will be covered by the abutment-scour hole and how much will remain for overbank scour.

****NOTE:** If the site is a relief bridge or has a swampy, poorly defined channel, then the overbank width will be determined by splitting the toe-to-toe width between the left and right overbanks.

****NOTE:** The SCDOT Requirements Manual recommends for new and replacement bridges that there be a minimum 10 foot setback distance from the top of bank to the abutment toe (written commun., S.T. Benedict, South Carolina Department of Transportation, September 12, 2016).

Comments:

1	These and other limitations should be kept in mind when using the envelope curves to assess scour potential. The envelope curves are empirical methods that are based on limited field samples; it is possible that scour could exceed the envelope curves; therefore, application of a safety factor may be prudent. Application of the envelope curves is constrained to the range of data and site characteristics used to develop the envelope curves. The uncertainty associated with the envelope curves increases near the limits of the data range. The live-bed scour data have the largest uncertainty.
2	The envelope curves do not account for unusual site conditions such as: debris; channel bank failures; pressure flow; unusual flow patterns created by unique site conditions; unusual pier geometries; and washout of approach road embankments.
3	The field data generally represent scour associated with flows approaching the 100-year flow magnitude but should not be considered a definitive estimate of the scour depth associated with the 100-year flow. Similarly, the 500-year flow adjustment coefficients can be used to provide perspective on the relative increase in theoretical scour associated with the 100- to 500-year flow condition, but should not be considered a definitive estimate of the scour depth associated with the 500-year flow.
4	Subsurface soils can impede or promote scour. Therefore, assessing the potential effect of subsurface soils on scour is important.
5	
6	

Clear-Water Abutment-Scour Estimate

1

(occurs in the abutment region)

(Option to fill in/modify gray shaded cells. Other cells are selected/calculated automatically.)

Bridge Number:	3210002600400	Stream:	Saluda River	Date of Analysis:	2/18/2022
County:	Richland/Lexington	Road:	I-26		
Physiographic Region:	Coastal Plain	Multiple Bridge?	No	Bridge Length:	563 ft
Latitude:	34° 1' 25.3" DMS	Relief Bridge?	No	Drainage Area:	2510 sq mi
Longitude:	81° 6' 12.7" DMS	Swampy, Poorly Defined Channel?	No		

Drainage Area Check -- Original Curve (Benedict and others, 2016; Benedict, 2003): Caution: DA in range but exceeds 80 percent of data
 Drainage Area Check -- Modified Curve (Benedict and others, 2016; Benedict and Caldwell, 2012): DA OUTSIDE RANGE (Above)

Comparison of Geometric-Contraction Ratios [m]

m from model:
 m from road plans:
 m from topographic map:
 m from FEMA/Other map:
 USE m: (from "Site Info" Sheet)

m Value	Quality of Source
0.65	Good
0.67	Good
0.69	Fair
0.71	Fair
0.65	

m range check -- Original Curve (Benedict and others, 2016; Benedict, 2003):
 m range check -- Modified Curve (Benedict and others, 2016; Benedict and Caldwell, 2012):

OK
OK

****NOTE: The "USE m" value is automatically pulled from the Site Info Sheet.**

Guidance:

Original Clear-Water Abutment-Scour Curves (Benedict and others, 2016; Benedict, 2003)

- Limits:
- 1) For Piedmont sites the maximum $m = 0.82$, but 0.86 could be justified with caution.
 - 2) For Coastal Plain sites the maximum $m = 0.98$, but use caution when greater than 0.9 .
 - 3) Drainage area should fall within range of measured data and caution should be used as drainage area approaches limits of data.

Modified Clear-Water Abutment-Scour Curve (Benedict and others, 2016; Benedict and Caldwell, 2012)

- Limits:
- 1) For Piedmont sites the maximum $m = 0.85$.
 - 2) For Coastal Plain sites the maximum $m = 0.9$.
 - 3) Drainage area should fall within the range of measured data and caution should be used as drainage area approaches limits of data.

Comparison of Embankment Lengths

Embankment length from model:
 Embankment length from road plans:
 Embankment length from topographic map:
 Embankment length from FEMA/Other map:
 USE embankment length (from Site Info Sheet):

Embankment length range check -- Original Curve (Benedict and others, 2016; Benedict, 2003): (from "EQUATIONS" Sheet)

Embankment length range check -- Modified Curve (Benedict and others, 2016; Benedict and Caldwell, 2012): (from "EQUATIONS" Sheet)

Left		Right	
Embankment Length (ft)	Quality of Source Data	Embankment Length (ft)	Quality of Source Data
934	Good	202	Good
850	Good	369	Good
710	Fair	527	Fair
750	Fair	602	Fair
934		202	

OK
OUTSIDE RANGE

OK
OK

****NOTE:** The "USE embankment length" value is automatically pulled from the Site Info Sheet.

CHECK:

Is this a relief or swampy bridge with a length less than or equal to 240 ft?	No
If so, use the maximum embankment length from the selected "Source Used" (see "Site Info" Sheet) for left and right embankment lengths.	

Guidance:

Original Clear-Water Abutment-Scour Curves (Benedict and others, 2016; Benedict, 2003)

- Limits:
- 1) If the bridge is a relief or swampy bridge with a length of 240 ft or less, the longest embankment length for the left or right embankments should be used at both abutments.
 - 2) For Piedmont sites the maximum embankment length = 950 ft.
 - 3) For Coastal Plain sites the maximum embankment length = 7,440 ft, but most of the data is for lengths of about 2,000 ft or less. Caution must be used when values exceed 2,000 ft.
 - 4) Drainage area should fall within the range of measured data and caution should be used as drainage area approaches limits of data.

Modified Clear-Water Abutment-Scour Curve (Benedict and others, 2016; Benedict and Caldwell, 2012)

- Limits:
- 1) If the bridge is a relief or swampy bridge with a length of 240 ft or less, the longest embankment length for the left or right embankments should be used at both abutments.
 - 2) For Piedmont and Coastal Plain sites, the maximum embankment length = 500 ft.
 - 3) Drainage area should fall within the range of measured data and caution should be used as drainage area approaches limits of data.

Clear-Water Abutment-Scour Depth from Envelope Curves

Original Clear-Water Abutment-Scour Curves (Benedict and others, 2016; Benedict, 2003):

Abutment-scour depth by embankment length:
 Abutment-scour depth by geometric-contraction ratio m:
 Original abutment-scour curve selection:
 Selected original abutment-scour depth:

Left Abutment		Right Abutment	
15.1	ft	6.8	ft
7.5	ft	7.5	ft
Automatic Calculation		Automatic Calculation	
15.1	ft	6.8	ft

Modified Clear-Water Abutment-Scour Curve (Benedict and others, 2016; Benedict and Caldwell, 2012):

Abutment-scour depth by embankment-length category:
 Abutment-scour depth by interpolation:
 Modified abutment-scour curve selection:
 Selected modified abutment-scour depth:

N/A	ft	7.4	ft
N/A	ft	4.7	ft
Automatic Calculation		Automatic Calculation	
N/A	ft	7.4	ft

Final Selected Clear-Water Abutment-Scour Depth:

Final abutment-scour curve selection:
 Final selected clear water abutment-scour depth:

Automatic Selection		Automatic Selection	
15.1	ft	6.8	ft

Relative Increase in Theoretical Clear-Water Abutment-Scour from the 100- to 500-Year Flows (Benedict and others, 2016):

500-yr flow coefficient:
 Abutment-scour by 500-year flow coefficient:

1.21		1.21	
18.2	ft	8.3	ft

Guidance:

Original Clear-Water Abutment-Scour Curves

(Benedict and others, 2016; Benedict, 2003)

- 1) If the bridge is a relief or swampy bridge with a length of 240 ft or less, the scour depth determined by embankment length for the left and right abutments should be based on the longest embankment length. NOTE: The "Use embankment length" from above should reflect the maximum embankment length from the left or right embankment if the bridge meets the criteria in item 1. Check to verify.
- 2) For single bridge, the spreadsheet will use the embankment-length envelope curves. However, there are cases when it may be appropriate to use the geometric-contraction ratio envelope curve if a more conservative estimate is deemed appropriate. Refer to Benedict and others (2016) for additional discussion.
- 3) For multiple bridge in Piedmont, use m envelope curve.
- 4) For multiple bridge in Coastal Plain, for embankment length < 426 ft use m envelope curve.
- 5) For multiple bridge in Coastal Plain: for embankment length ≥ 426 ft, the spreadsheet will use the embankment-length envelope curves. However, there are cases when it may be appropriate to use the geometric-contraction ratio envelope curve if a more conservative estimate is deemed appropriate. Refer to Benedict and others (2016) for additional discussion.
- 6) If the m and (or) embankment lengths are near the limits or beyond the range of the envelope data a caution or warning message, respectively, will appear in the "m range check" and (or) "Embankment length range check" cells above. For these cases judgment, must be used to assess the best estimate of clear-water abutment scour.

Modified Clear-Water Abutment-Scour Curve

(Benedict and others, 2016; Benedict and Caldwell, 2012)

- 1) If the bridge is a relief or swampy bridge with a length of 240 ft or less, the scour depth determined by embankment length for the left and right abutments should be based on the longest embankment length. NOTE: The "Use embankment length" from above should reflect the maximum embankment length from the left or right embankment if the bridge meets the criteria in item 1. Check to verify.
- 2) Use for single bridges only. Use original curve (Benedict and others, 2016; Benedict, 2003) for multiple bridges.
- 3) If the estimate of scour using the original envelope curves is less than that using the modified curve, then use the scour depth associated with the original curve.
- 4) If the m and (or) embankment lengths are near the limits or beyond the range of the envelope data a caution or warning message, respectively, will appear in the "m range check" and (or) "Embankment length range check" cells above. For these cases judgment must be used to assess the best estimate of clear-water abutment scour.

Relative Increase in Theoretical Clear-Water Abutment-Scour from the 100- to 500-Year Flows

(Benedict and others, 2016)

- 1) The 500-year flow adjustment coefficient (K_{500}) is used to calculate the relative abutment scour increase from 100- to 500-year flows.
- 2) The K_{500} is a helpful tool for gaining perspective on the relative increase of theoretical scour associated with the 100- to 500-year abutment-scour depth. However, the adjusted envelope curve values should not be considered a definitive estimate of the abutment scour associated with the 500-year flow.

Scour-Hole Topwidths

(Benedict and others, 2016; Benedict, 2003)

Use Abutment Scour-Hole Topwidth Curve (select from 1 or 2 below):

- (1) Any length bridge with a well defined channel or any bridge longer than 240 feet
- (2) Flood-plain relief or swampy bridge with length of 240 ft or less

Abutment scour-hole topwidth:

Is scour depth outside range of graph?

Left Abutment		Right Abutment	
1		1	
70.0	ft	66.0	ft
No		No	

NOTE: The "Abutment scour-hole topwidth" is automatically calculated. The scour-hole topwidth equations coded in the spreadsheet limit the abutment-scour depth to 25 feet, which is beyond the range of the original graphs. The cell below the scour-hole topwidth will indicate if the abutment-scour depth exceeds the graph range and judgment must be used with regard to utilizing the estimated value.

Comments:

- | | |
|---|---|
| 1 | These and other limitations should be kept in mind when using the envelope curves to assess scour potential. The envelope curves are empirical methods that are based on limited field samples; it is possible that scour could exceed the envelope curves; therefore, application of a safety factor may be prudent. Application of the envelope curves is constrained to the range of data and site characteristics used to develop the envelope curves. The uncertainty associated with the envelope curves increases near the limits of the data range. The live-bed scour data have the largest uncertainty. |
| 2 | The envelope curves do not account for unusual site conditions such as: debris; channel bank failures; pressure flow; unusual flow patterns created by unique site conditions; unusual pier geometries; and washout of approach road embankments. |
| 3 | The field data generally represent scour associated with flows approaching the 100-year flow magnitude but should not be considered a definitive estimate of the scour depth associated with the 100-year flow. Similarly, the 500-year flow adjustment coefficients can be used to provide perspective on the relative increase in theoretical scour associated with the 100- to 500-year flow condition, but should not be considered a definitive estimate of the scour depth associated with the 500-year flow. |
| 4 | Subsurface soils can impede or promote scour. Therefore, assessing the potential effect of subsurface soils on scour is important. |
| 5 | |

Clear-Water Contraction-Scour Estimate

1

(occurs in the overbank region)

(Option to fill in/modify gray shaded cells. Other cells are selected/calculated automatically.)

Bridge Number:	3210002600400	Stream:	Saluda River	Date of Analysis:	2/18/2022
County:	Richland/Lexington	Road:	I-26	Bridge Length:	563 ft
Physiographic Region:	Coastal Plain	Multiple Bridge?	No	Drainage Area:	2510 sq mi
Latitude:	34° 1' 25.3"	Relief Bridge?	No	Drainage Area Check:	Caution: DA in range but exceeds 80 percent of data
Longitude:	81° 6' 12.7"	Swampy, Poorly Defined Channel?	No		

Comparison of Geometric-Contraction Ratios [m]

m from model:
m from road plans:
m from topographic map:
m from FEMA/Other map:
USE m: (from "Site Info" Sheet)
m range check: (from "EQUATIONS" Sheet)

m Value	Quality of Source Data
0.65	Good
0.67	Good
0.69	Fair
0.71	Fair
0.65	
OK	

****NOTES:** If the geometric-contraction ratio is greater than 0.95 message is **OUTSIDE RANGE**.
If the geometric-contraction ratio is between 0 and 0.85 message is **OK**.
If the geometric-contraction ratio is between 0.85 and 0.95 message is **CAUTION**.

****NOTE:** The "USE m" value is automatically pulled from the Site Info Sheet.

Guidance:

(Benedict and others, 2016; Benedict and Caldwell, 2006)

- 1) For the Piedmont data the maximum m for clear-water overbank contraction scour was 0.85.
- 2) For the Coastal Plain data the maximum m for clear-water overbank contraction scour was 0.95 with data sparse for m greater than 0.9.
- 3) Caution must be used when m nears or exceeds the upper limits of the data and the "m range check" cell above should be used to help evaluate the final selection of m.

Clear-Water Contraction-Scour Depth from Envelope Curves

	Left Overbank	Right Overbank
Clear-Water Contraction-Scour Curve (Benedict and others, 2016; Benedict and Caldwell, 2006)		
Clear-water contraction-scour depth by geometric-contraction ratio m:	4.6 ft	4.6 ft
Final Selected Clear-Water Contraction-Scour Depth:	4.6 ft	4.6 ft
Relative Increase in Theoretical Clear-Water Contraction Scour from the 100- to 500-Year Flows (Benedict and others, 2016):		
500-yr flow coefficient:	1.46	1.46
Clear-water contraction-scour by 500-year flow coefficient:	6.7 ft	6.7 ft

****NOTE:** The "Selected clear-water overbank-contraction-scour depth" value is automatically selected, but can be overridden by typing in another value. If the originally selected value of overbank-contraction-scour depth is overridden, justification should be provided in the comments below.

Guidance:

Clear-Water Contraction-Scour Curve

(Benedict and others, 2016; Benedict and Caldwell, 2006)

- 1) If the m is near the limits or beyond the range of the envelope data a caution or warning message, respectively, will appear in the "m range check" cell above. For these cases judgment must be used to assess the best estimate of clear-water overbank-contraction scour.

Relative Increase in Theoretical Clear-Water Contraction-Scour from the 100- to 500-Year Flows
(Benedict and others, 2016)

- 1) The 500-year flow adjustment coefficient (K_{500}) is used to calculate the relative clear-water contraction scour increase from 100- to 500-year flows.
- 2) The K_{500} is a helpful tool for gaining perspective on the relative increase of theoretical scour associated with the 100- to 500-year clear-water contraction-scour depth. However, the adjusted envelope curve values should not be considered a definitive estimate of the scour associated with the 500-year flow.

Bridge-Scour Envelope Curve Template

2

Comments:

- 1 These and other limitations should be kept in mind when using the envelope curves to assess scour potential. The envelope curves are empirical methods that are based on limited field samples; it is possible that scour could exceed the envelope curves; therefore, application of a safety factor may be prudent. Application of the envelope curves is constrained to the range of data and site characteristics used to develop the envelope curves. The uncertainty associated with the envelope curves increases near the limits of the data range. The live-bed scour data have the largest uncertainty.
- 2 The envelope curves do not account for unusual site conditions such as: debris; channel bank failures; pressure flow; unusual flow patterns created by unique site conditions; unusual pier geometries; and washout of approach road embankments.
- 3 The field data generally represent scour associated with flows approaching the 100-year flow magnitude but should not be considered a definitive estimate of the scour depth associated with the 100-year flow. Similarly, the 500-year flow adjustment coefficients can be used to provide perspective on the relative increase in theoretical scour associated with the 100- to 500-year flow condition, but should not be considered a definitive estimate of the scour depth associated with the 500-year flow.
- 4 Subsurface soils can impede or promote scour. Therefore, assessing the potential effect of subsurface soils on scour is important.

Live-Bed Contraction-Scour Estimate

1

(occurs in the channel region)

(Option to fill in/modify gray shaded cells. Other cells are selected/calculated automatically.)

Bridge Number:	3210002600400	Stream:	Saluda River	Date of Analysis:	2/18/2022
County:	Richland/Lexington	Road:	I-26	Bridge Length:	563 ft
Physiographic Region:	Coastal Plain	Multiple Bridge?	No	Drainage Area:	2510 sq mi
		Relief Bridge?	No		
Latitude:	34° 1' 25.3" DMS	Swampy, Poorly			
Longitude:	81° 6' 12.7" DMS	Defined Channel?	No		

Drainage Area Check -- Original Curve (Benedict and others, 2016; Benedict and Caldwell, 2009):

Caution: DA in range but exceeds 80 percent of data

Drainage Area Check -- Modified Curve (Benedict and others, 2016; Benedict and Caldwell, 2012):

DA OUTSIDE RANGE (Above)

Comparison of Geometric-Contraction Ratios [m]

m from model:
m from road plans:
m from topographic map:
m from FEMA/Other map:
USE m: (from "Site Info" Sheet)

m Value	Quality of Source Data
0.65	Good
0.67	Good
0.69	Fair
0.71	Fair
0.65	

m range check -- Original Curve (Benedict and Caldwell, 2009) (m <=0.82):

OK

m range check -- Modified Curve (Benedict and Caldwell, 2012) (m <=0.90):

OK

****NOTE:** The "USE m" value is automatically pulled from the Site Info Sheet.

Guidance:

Original Live-Bed Contraction-Scour Curve:
(Benedict and others, 2016; Benedict and Caldwell, 2009)

NOTE: Only the field envelope curve for live-bed contraction scour is used in the spreadsheet template. The user may refer to Benedict and others (2016) for application of the dimensionless envelope curve, if deemed appropriate.
Limits:

- 1) For Piedmont and Coastal Plain sites the maximum m =0.82.
- 2) Limited clear-water scour data suggests that it may be appropriate to extend the live-bed curve beyond a value of 0.82; however caution and judgment must be used.
- 3) Drainage area should fall within range of the measured data and caution should be used as drainage area approaches limits of data.
- 4) Because of uncertainty associated with the live-bed contraction-scour data, caution and judgment must be used in the final estimate of live-bed contraction scour.

Modified Live-Bed Contraction-Scour Curve:
(Benedict and others, 2016; Benedict and Caldwell, 2012)

- Limits:
- 1) For Piedmont and Coastal Plain sites the maximum m =0.9.
 - 2) Drainage area should be 200 square miles or less.
 - 3) Because of uncertainty associated with the live-bed contraction-scour data, caution and judgment must be used in the final estimate of live-bed contraction scour.

Live-Bed Contraction-Scour Depth from Envelope Curves (NOTE: Only the Field Envelope Curves are Used)

Original Field Envelope Curve for Live-Bed Contraction-Scour Curve (Benedict and others, 2016; Benedict and Caldwell, 2009):

Live-bed contraction-scour depth:

Scour Depth

11.4 ft

Modified Field Envelope Curve for Live-Bed Contraction-Scour Curve (Benedict and others, 2016; Benedict and Caldwell, 2012):

Live-bed contraction-scour depth:

N/A ft

Final Selected Live-Bed Contraction-Scour Depth:

Final live-bed contraction-scour curve selection:

Final selected live-bed contraction-scour depth:

Automatic Selection
11.4 ft

Relative Increase in Theoretical Live-Bed Contraction Scour from the 100- to 500-Year Flows (Benedict and others, 2016):

500-yr flow coefficient:

Live-bed contraction-scour by 500-year flow coefficient:

1.32
15 ft

Guidance:

Original and Modified Live-Bed Contraction-Scour Curve

(Benedict and others, 2016; Benedict and Caldwell, 2012; Benedict and Caldwell, 2009)

NOTE: Only the field envelope curve for live-bed contraction scour is used in the spreadsheet template. The user may refer to Benedict and others (2016) for application of the dimensionless envelope curve, if deemed appropriate.

1) If drainage area is 200 square miles or less, then use the live-bed contraction-scour estimate based on the modified envelope curve (Benedict and Caldwell, 2012). Otherwise, use the estimate based on the original envelope curve (Benedict and others, 2016; Benedict and Caldwell, 2009).

2) If site is a relief bridge or is swampy with a poorly defined channel, it will be assumed that live-bed contraction scour will not occur and the scour depths in the above cells will be set to "N/A."

Relative Increase in Theoretical Live-Bed Contraction-Scour from the 100- to 500-Year Flows

(Benedict and others, 2016)

1) The 500-year flow adjustment coefficient (K_{500}) is used to calculate the relative abutment scour increase from 100- to 500-year flows.

2) The K_{500} is a helpful tool for gaining perspective on the relative increase of theoretical scour associated with the 100- to 500-year live-bed contraction-scour depth. However, the adjusted envelope curve values should not be considered a definitive estimate of the scour associated with the 500-year flow.

Comments:

- 1 These and other limitations should be kept in mind when using the envelope curves to assess scour potential. The envelope curves are empirical methods that are based on limited field samples; it is possible that scour could exceed the envelope curves; therefore, application of a safety factor may be prudent. Application of the envelope curves is constrained to the range of data and site characteristics used to develop the envelope curves. The uncertainty associated with the envelope curves increases near the limits of the data range. The live-bed scour data have the largest uncertainty.
- 2 The envelope curves do not account for unusual site conditions such as: debris; channel bank failures; pressure flow; unusual flow patterns created by unique site conditions; unusual pier geometries; and washout of approach road embankments.
- 3 The field data generally represent scour associated with flows approaching the 100-year flow magnitude but should not be considered a definitive estimate of the scour depth associated with the 100-year flow. Similarly, the 500-year flow adjustment coefficients can be used to provide perspective on the relative increase in theoretical scour associated with the 100- to 500-year flow condition, but should not be considered a definitive estimate of the scour depth associated with the 500-year flow.
- 4 Subsurface soils can impede or promote scour. Therefore, assessing the potential effect of subsurface soils on scour is important.

Bridge-Scour Envelope Curve Template

Pier Scour Estimate

1

(Fill in gray shaded cells. Other cells are selected/calculated automatically.)

Bridge Number:	3210002600400	Stream:	Saluda River	Date of Analysis:	2/18/2022
County:	Richland/Lexington	Road:	I-26		
Physiographic Region:	Coastal Plain	Multiple Bridge?	No	Bridge Length:	563 ft
Latitude:	34° 1' 25.3"	Relief Bridge?	No	Drainage Area:	2510 sq mi
Longitude:	81° 6' 12.7"	Swampy, Poorly Defined Channel?	No		

Guidance:

Use of Pier Scour Table below

- See cell comments for guidance on using the Pier Scour Table below.

Pier Scour Computations

- If a pier or bent falls anywhere on the overbank, pier scour will be computed for both the abutment and overbank regions.
- If there are piers or bents of varying geometries on the same overbank, use the worst case pier geometry in both the abutment and overbank areas.
- When a pier is on the floodplain, but near the channel bank, the user must decide if the pier should be considered to be a channel pier or not; in addition to the proximity of the pier to the bank, the user should consider other factors such as bends that may increase potential for scour.

Pier Scour Table

(Benedict and others, 2016; Benedict and Caldwell, 2009; Benedict and Caldwell, 2006)

	Left Abutment	Left Overbank	Channel	Right Overbank	Right Abutment
Location of pier	LABUT	LOB	CH	ROB	RABUT
Type of pier or bent (choose from list)	Tower Bent	Single Pier	Multiple Column Pier	Multiple Column Pier	Multiple Column Pier
Envelope curve used (choose from list)	Automatic Calculation	Automatic Calculation	Automatic Calculation	Automatic Calculation	Automatic Calculation
Pier width (feet)	6.5	6.5	6.5	6.5	6.5
Pier length (feet) (should not be less than pier width)	6.5	6.5	6.5	6.5	6.5
Angle of attack (degrees) (should not exceed 90)	0	0	0	0	0
Multiple column pier or bent? (choose from list)	Yes	Yes	Yes	Yes	Yes
Estimate of minimum spacing between columns (feet)	21	21	21	21	21
Column spacing to width ratio (should be between 2 and 10)	3.23	3.2	3.2	3.2	3.2
Skew coefficient [Based on guidance in Benedict and others (2016) and HEC-18]	1.00	1.00	1.00	1.00	1.00
Skew coefficient (selected value; should not exceed a value of 5)	1.00	1.00	1.00	1.00	1.00
Envelope curve used in pier scour estimate	PSDb-2014	PSDb-2014	PSDb-2014	PSDb-2014	PSDb-2014
Pier scour from envelope (feet) (no adjustment)	11.3	11.3	11.3	11.3	11.3
Pier scour adjusted for skew (feet)	11.3	11.3	11.32	11.3	11.3
Final selected pier scour depth (feet)	11.3	11.3	11.3	11.3	11.3
500-year flow coefficient:	1.09	1.09	1.09	1.09	1.09
Relative Increase in Theoretical Pier-Scour from the 100- to 500-Year Flows (Benedict and others, 2016):	12.3	12.3	12.3	12.3	12.3

****NOTE:** The K_{500} is a helpful tool for gaining perspective on the relative increase of theoretical scour associated with the 100- to 500-year clear-water contraction-scour depth. However, the adjusted envelope curve values should not be considered a definitive estimate of the scour associated with the 500-year flow.

Bridge-Scour Envelope Curve Template

		2
Comments:		
1	These and other limitations should be kept in mind when using the envelope curves to assess scour potential. The envelope curves are empirical methods that are based on limited field samples; it is possible that scour could exceed the envelope curves; therefore, application of a safety factor may be prudent. Application of the envelope curves is constrained to the range of data and site characteristics used to develop the envelope curves. The uncertainty associated with the envelope curves increases near the limits of the data range. The live-bed scour data have the largest uncertainty.	
2	The envelope curves do not account for unusual site conditions such as: debris; channel bank failures; pressure flow; unusual flow patterns created by unique site conditions; unusual pier geometries; and washout of approach road embankments.	
3	The field data generally represent scour associated with flows approaching the 100-year flow magnitude but should not be considered a definitive estimate of the scour depth associated with the 100-year flow. Similarly, the 500-year flow adjustment coefficients can be used to provide perspective on the relative increase in theoretical scour associated with the 100- to 500-year flow condition, but should not be considered a definitive estimate of the scour depth associated with the 500-year flow.	
4	Subsurface soils can impede or promote scour. Therefore, assessing the potential effect of subsurface soils on scour is important.	

Pile Penetration Table for Scour Estimates Using Flows Approaching the 100-year Flow

1

Scour analysis using USGS Bridge-Scour Envelope Curves

(Fill in gray shaded cells. Other cells are selected/calculated automatically.)

Bridge Number:	3210002600400	Stream:	Saluda River	Date of Analysis:	2/18/2022
County:	Richland/Lexington	Road:	I-26		
Physiographic Region:	Coastal Plain	Multiple Bridge?	No	Bridge Length:	563 ft
Latitude:	34° 1' 25.3"	Relief Bridge?	No	Drainage Area:	2510 sq mi
Longitude:	81° 6' 12.7"	Swampy, Poorly Defined Channel?	No		

NOTE: Bents are listed from left to right looking downstream

GUIDANCE FOR LEFT AND RIGHT ABUTMENT SCOUR:

Refer to Benedict and others (2016) and Benedict (2003) for additional guidance.

- 1) Do not include clear-water overbank scour depth in abutment-scour area.
- 2) If site is in the Piedmont region and the abutment-scour depth is less than or equal to 5 feet then add pier-scour depth for determining total scour.
- 3) If the pier in the abutment area is a multiple column bent/pier with minimal skew or a solid, long pier with no skew, and the pier width is less than or equal to 2.3 ft, then do not add pier scour to total scour. (NOTE: The exception to this guidance is for sites in the Piedmont with abutment-scour depths less than or equal to 5 ft as noted in item 2 above.)
- 4) The spreadsheet assumes that abutment scour will always occur at the left and right abutments. The spreadsheet will automatically make an initial determination regarding the inclusion of pier scour in the total scour estimate. The user should review this initial determination and if appropriate override the automated value by typing "Yes" or "No" (case sensitive) in the "Use pier scour?" column. If the pier is skewed, the user should apply judgment to determine if pier scour should be included in the total scour estimate, especially for long solid piers where a pier skew can cause large scour depths.
- 5) If the site is a relief or swampy bridge that is 240 ft or less, the abutment-scour depth will be applicable from toe-to-toe; if the relief or swampy bridge is greater than 240 ft, the abutment scour-hole depths will be limited to the abutment scour-hole topwidths and the clear-water overbank contraction scour will be applied to the remaining overbank area. The spreadsheet will automatically determine if there is any overbank area on which overbank contraction scour will occur.
- 6) If clear-water overbank contraction scour depth (with no adjustment for pier scour) is greater than the abutment scour depth (with no adjustment for pier scour), then the clear-water overbank contraction scour depth will be used as the best representation of the abutment scour depth. The spreadsheet will automatically determine if the clear-water overbank contraction scour depth is to be used in place of the abutment scour depth.

GUIDANCE FOR LEFT AND RIGHT OVERBANK CONTRACTION SCOUR:

Refer to Benedict and others (2016) and Benedict and Caldwell (2006) for additional guidance.

- 1) If the abutment-scour hole topwidth is greater than the overbank width then it will be assumed that the abutment-scour depth will cover the entire overbank area and there will be no clear-water overbank scour applied to the bridge overbank. However, if the abutment-scour hole topwidth is less than the overbank width then it will be assumed that clear-water overbank scour occurs in the overbank area not affected by the abutment scour hole.
- 2) The spreadsheet will automatically determine if clear-water overbank scour should be applied or not.
- 3) If clear-water overbank scour is determined to be applicable to the overbank area, then the spreadsheet will automatically apply the calculated pier scour to the overbank as well.

GUIDANCE FOR LIVE-BED CHANNEL SCOUR:

Refer to Benedict and others (2016) and Benedict and Caldwell (2009) for additional guidance.

- 1) If the main channel is well defined and considered to be live-bed in nature, it will be assumed that the live-bed contraction scour and channel pier scour will be included in the estimate for total scour in the main channel. The spreadsheet will automatically determine if these scour components are to be included in the estimate of total scour in the main channel.
- 2) Live-bed contraction scour will not be applied to a relief bridge or to a bridge with a swampy, poorly defined channel; at such bridges, it will be assumed that clear-water scour conditions prevail and the procedures for applying clear-water abutment and contraction scour, as noted previously, will be used. The spreadsheet will automatically determine if live-bed scour should or should not be applied to the channel.

GENERAL GUIDANCE:

- 1) Drainage area should fall within the range of measured data and caution should be used as drainage area approaches limits of the data or exceeds the data range.
- 2) If the m and (or) embankment lengths are near the limits or beyond the range of the envelope data caution should be used.
- 3) User should review automatically determined values to assure that selected values are reasonable.

Scour region	Pier location	Use clear-water abutment scour?	Clear-water abutment scour from USGS curves (feet)	Use clear-water overbank contraction scour?	Clear-water overbank contraction scour from USGS curves (feet)	Use live-bed channel contraction scour?	Live-bed channel contraction scour from USGS curves (feet)	Use pier scour?	Pier scour (feet)	Total scour at bent (feet)	Computed embedment of pile from consultant (feet)	Remaining pile penetration (feet)	Embedment below thalweg from consultant (feet)	Remaining pile penetration (at thalweg) (feet)
Left Abutment	LABUT	NO	0.00	No	0.00	No	0.00	No	0.00	N/A		N/A		N/A
Left Overbank	LOB	No	0.00	Yes	4.57	No	0.00	Yes	11.32	15.89		-15.89		-15.89
Channel	CH	No	0.00	No	0.00	Yes	11.39	Yes	11.32	22.71		-22.71		-22.71
Right Overbank	ROB	No	0.00	Yes	4.57	No	0.00	Yes	11.32	15.89		-15.89		-15.89
Right Abutment	RABUT	NO	0.00	No	0.00	No	0.00	No	0.00	N/A		N/A		N/A

Pile Penetration Table for Scour Estimates Using Flows Approaching the 100-year Flow and Adjusted by the 500-year Flow Adjustment Coefficient

1

Scour analysis using USGS Bridge-Scour Envelope Curves

(Fill in gray shaded cells. Other cells are selected/calculated automatically.)

Bridge Number:	3210002600400	Stream:	Saluda River	Date of Analysis:	2/18/2022
County:	Richland/Lexington	Road:	I-26		
Physiographic Region:	Coastal Plain	Multiple Bridge?	No	Bridge Length:	563 ft
Latitude:	34° 1' 25.3" DMS	Relief Bridge?	No	Drainage Area:	2510 sq mi
Longitude:	81° 6' 12.7" DMS	Swampy, Poorly Defined Channel?	No		

NOTE: Bents are listed from left to right looking downstream

GUIDANCE FOR LEFT AND RIGHT ABUTMENT SCOUR:

Refer to Benedict and others (2016) and Benedict (2003) for additional guidance.

- 1) Do not include clear-water overbank scour depth in abutment-scour area.
- 2) If site is in the Piedmont region and the abutment-scour depth is less than or equal to 5 feet then add pier-scour depth for determining total scour.
- 3) If the pier in the abutment area is a multiple column bent/pier with minimal skew or a solid, long pier with no skew, and the pier width is less than or equal to 2.3 ft, then do not add pier scour to total scour. (NOTE: The exception to this guidance is for sites in the Piedmont with abutment-scour depths less than or equal to 5 ft as noted in item 2 above.)
- 4) The spreadsheet assumes that abutment scour will always occur at the left and right abutments. The spreadsheet will automatically make an initial determination regarding the inclusion of pier scour in the total scour estimate. The user should review this initial determination and if appropriate override the automated value by typing "Yes" or "No" (case sensitive) in the "Use pier scour?" column. If the pier is skewed, the user should apply judgment to determine if pier scour should be included in the total scour estimate, especially for long solid piers where a pier skew can cause large scour depths.
- 5) If the site is a relief or swampy bridge that is 240 ft or less, the abutment-scour depth will be applicable from toe-to-toe; if the relief or swampy bridge is greater than 240 ft, the abutment scour-hole depths will be limited to the abutment scour-hole topwidths and the clear-water overbank contraction scour will be applied to the remaining overbank area. The spreadsheet will automatically determine if there is any overbank area on which overbank contraction scour will occur.
- 6) If clear-water overbank contraction scour depth (with no adjustment for pier scour) is greater than the abutment scour depth (with no adjustment for pier scour), then the clear-water overbank contraction scour depth will be used as the best representation of the abutment scour depth. The spreadsheet will automatically determine if the clear-water overbank contraction scour depth is to be used in place of the abutment scour depth.

GUIDANCE FOR LEFT AND RIGHT OVERBANK CONTRACTION SCOUR:

Refer to Benedict and others (2016) and Benedict and Caldwell (2006) for additional guidance.

- 1) If the abutment-scour hole topwidth is greater than the overbank width then it will be assumed that the abutment-scour depth will cover the entire overbank area and there will be no clear-water overbank scour applied to the bridge overbank. However, if the abutment-scour hole topwidth is less than the overbank width then it will be assumed that clear-water overbank scour occurs in the overbank area not affected by the abutment scour hole.
- 2) The spreadsheet will automatically determine if clear-water overbank scour should be applied or not.
- 3) If clear-water overbank scour is determined to be applicable to the overbank area, then the spreadsheet will automatically apply the calculated pier scour to the overbank as well.

GUIDANCE FOR LIVE-BED CHANNEL SCOUR:

Refer to Benedict and others (2016) and Benedict and Caldwell (2009) for additional guidance.

- 1) If the main channel is well defined and considered to be live-bed in nature, it will be assumed that the live-bed contraction scour and channel pier scour will be included in the estimate for total scour in the main channel. The spreadsheet will automatically determine if these scour components are to be included in the estimate of total scour in the main channel.
- 2) Live-bed contraction scour will not be applied to a relief bridge or to a bridge with a swampy, poorly defined channel; at such bridges, it will be assumed that clear-water scour conditions prevail and the procedures for applying clear-water abutment and contraction scour, as noted previously, will be used. The spreadsheet will automatically determine if live-bed scour should or should not be applied to the channel.

GENERAL GUIDANCE:

- 1) Drainage area should fall within the range of measured data and caution should be used as drainage area approaches limits of the data or exceeds the data range.
- 2) If the m and (or) embankment lengths are near the limits or beyond the range of the envelope data caution should be used.
- 3) User should review automatically determined values to assure that selected values are reasonable.

Scour region	Pier location	Use clear-water abutment scour?	Clear-water abutment scour from USGS curves (feet)	Use clear-water overbank contraction scour?	Clear-water overbank contraction scour from USGS curves (feet)	Use live-bed channel contraction scour?	Live-bed channel contraction scour from USGS curves (feet)	Use pier scour?	Pier scour (feet)	Total scour at bent (feet)	Computed embedment of pile from consultant (feet)	Remaining pile penetration (feet)	Embedment below thalweg from consultant (feet)	Remaining pile penetration (at thalweg) (feet)
Left Abutment	LABUT	NO	0.00	No	0.00	No	0.00	No	0.00	N/A		N/A		N/A
Left Overbank	LOB	No	0.00	Yes	6.70	No	0.00	Yes	12.30	19.00		-19.00		-19.00
Channel	CH	No	0.00	No	0.00	Yes	15.00	Yes	12.30	27.30		-27.30		-27.30
Right Overbank	ROB	No	0.00	Yes	6.70	No	0.00	Yes	12.30	19.00		-19.00		-19.00

Bridge-Scour Envelope Curve Template

Right Abutment	RABUT	NO	0.00	No	0.00	No	0.00	No	0.00	N/A		N/A		N/A
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Bridge-Scour Envelope Curve Template

	Comments:	2
1	These and other limitations should be kept in mind when using the envelope curves to assess scour potential. The envelope curves are empirical methods that are based on limited field samples; it is possible that scour could exceed the envelope curves; therefore, application of a safety factor may be prudent. Application of the envelope curves is constrained to the range of data and site characteristics used to develop the envelope curves. The uncertainty associated with the envelope curves increases near the limits of the data range. The live-bed scour data have the largest uncertainty.	
2	The envelope curves do not account for unusual site conditions such as: debris; channel bank failures; pressure flow; unusual flow patterns created by unique site conditions; unusual pier geometries; and washout of approach road embankments.	
3	The field data generally represent scour associated with flows approaching the 100-year flow magnitude but should not be considered a definitive estimate of the scour depth associated with the 100-year flow. Similarly, the 500-year flow adjustment coefficients can be used to provide perspective on the relative increase in theoretical scour associated with the 100- to 500-year flow condition, but should not be considered a definitive estimate of the scour depth associated with the 500-year flow.	
4	Subsurface soils can impede or promote scour. Therefore, assessing the potential effect of subsurface soils on scour is important.	
5		

Application of Selected Envelope-Curve Equations

Do not modify this worksheet. This worksheet uses data entered in other worksheets of this workbook and uses the various South Carolina Bridge-Scour Envelope Curves to calculate the upper bound of selected scour parameters.

Estimate of Upper Bound of Clear-Water Abutment-Scour Depth from Envelope Curves

I. Estimate from abutment-length envelope curves -- Original Curves (Benedict and others, 2016; Benedict, 2003)

	Left Abutment	Right Abutment
Coastal Plain	Scour Depth: 15.1 ft	6.8 ft
	Embankment Length: 934 ft	202 ft
	Embankment Length Check: OK	OK
NOTES: If embankment length is greater than 7,440 ft it is OUTSIDE RANGE . If embankment length is greater than 2,000 ft but less than 7,440 ft use CAUTION . If embankment length is between 0 and 2,000 ft it is OK .		
Piedmont	Scour Depth: 17.9 ft	5.2 ft
	Embankment Length: 934.0 ft	202.0 ft
	Embankment Length Check: OK	OK
NOTES: If embankment length is greater than 950 ft it is OUTSIDE RANGE . If embankment length is between 0 and 950 ft it is OK .		

II. Estimate from the geometric contraction ratio m -- Original Curves (Benedict and others, 2016; Benedict, 2003)

	Left Abutment	Right Abutment
Coastal Plain	Scour Depth: 7.5 ft	7.5 ft
	Contraction Ratio: 0.65	0.65
	Contraction Ratio Check: OK	OK
NOTES: If contraction ratio is greater than 0.98 it is OUTSIDE RANGE . If contraction ratio is greater than 0.9 but less than 0.98 use CAUTION . If contraction ratio is between 0 and 0.9 it is OK .		
Piedmont	Scour Depth: 12.5 ft	12.5 ft
	Contraction Ratio: 0.65	0.65
	Contraction Ratio Check: OK	OK
NOTES: If contraction ratio is greater than 0.86 it is OUTSIDE RANGE . If contraction ratio is greater than 0.82 but less than 0.86 use CAUTION . If contraction ratio is between 0 and 0.82 it is OK .		

III. Estimate by embankment-length category -- Modified Curves (Benedict and others, 2016; Benedict and Caldwell, 2012)

	Left Abutment	Right Abutment
Coastal Plain		
Initial Estimate of Scour Depth (by Category):	N/A ft	7.43 ft
Final Selection of Scour Depth (by Category):	N/A ft	7.4 ft
Initial Estimate of Scour Depth (by Interpolation):	N/A ft	4.7 ft
Final Selection of Scour Depth (by Interpolation):	N/A ft	4.7 ft
Embankment Length:	934 ft	202 ft
Embankment Length Check:	OUTSIDE RANGE	OK
Contraction Ratio:	0.65	0.65
Contraction Ratio Check:	OK	OK

Embankment Length Category (ft)	Lower m Limit	m used in equation	Abutment-Scour Depth (ft)
0	0.00	0.00	0.0
100	0.25	0.65	2.1
200	0.50	0.65	4.6
300	0.65	0.65	7.4
400	0.76	0.76	11.2
500	0.84	0.84	14.9

NOTES:
 If embankment length is greater than 500 ft it is **OUTSIDE RANGE**.
 If embankment length is between 0 and 500 ft it is **OK**.
 If contraction ratio is greater than 0.9 it is **OUTSIDE RANGE**.
 If contraction ratio is between 0 and 0.9 it is **OK**.

Piedmont		
Initial Estimate of Scour Depth (by Category):	N/A ft	5.7 ft
Final Selection of Scour Depth (by Category):	N/A ft	5.7 ft
Initial Estimate of Scour Depth (by Interpolation):	N/A ft	4.0 ft
Final Selection of Scour Depth (by Interpolation):	N/A ft	4.0 ft
Embankment Length:	934 ft	202 ft
Embankment Length Check:	OUTSIDE RANGE	OK
Contraction Ratio:	0.65	0.65
Contraction Ratio Check:	OK	OK

Embankment Length Category (ft)	Lower m Limit	m used in equation	Abutment-Scour Depth (ft)
0	0.00	0.00	0.0
100	0.14	0.65	2.0
200	0.25	0.65	4.0
300	0.34	0.65	5.7
400	0.42	0.65	7.4
500	0.50	0.65	9.1

NOTES:
 If embankment length is greater than 500 ft it is **OUTSIDE RANGE**.
 If embankment length is between 0 and 500 ft it is **OK**.
 If contraction ratio is greater than 0.85 it is **OUTSIDE RANGE**.
 If contraction ratio is between 0 and 0.85 it is **OK**.

Estimate of Clear-Water Abutment-Scour Hole Topwidth from Envelope Curve (Benedict and others, 2016; Benedict, 2003)

Using "final selected abutment-scour depth"

	Left Abutment	Right Abutment
Any length bridge with well defined channel	70.0 ft	66.0 ft
Is scour depth greater than 18 feet and therefore outside range of graph?	No	No
Relief or swampy bridge with length of 240 ft or less	104.1 ft	75.2 ft
Is scour depth greater than 23.6 feet and therefore outside range of graph?	No	No

NOTES:

If scour depth is outside the range of the graph then cell is highlighted in **red**.

If scour depth is within the range of the graph then cell is highlighted in **green**.

Estimate of Clear-Water Overbank Contraction-Scour Depth from Envelope Curves (Benedict and others, 2016; Benedict and Caldwell, 2006)

	Left Overbank	Right Overbank
Scour Depth:	4.6 ft	4.6 ft
Contraction Ratio:	0.65	0.65
Contraction Ratio Check:	OK	OK

NOTES:

If contraction ratio is greater than 0.95 it is **OUTSIDE RANGE**.

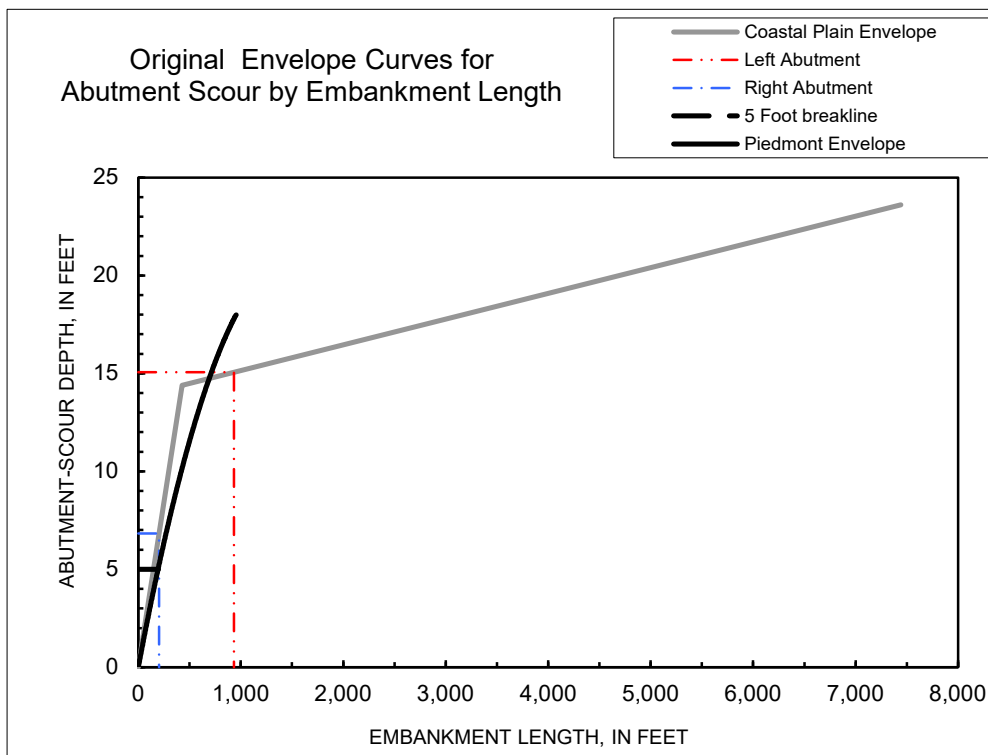
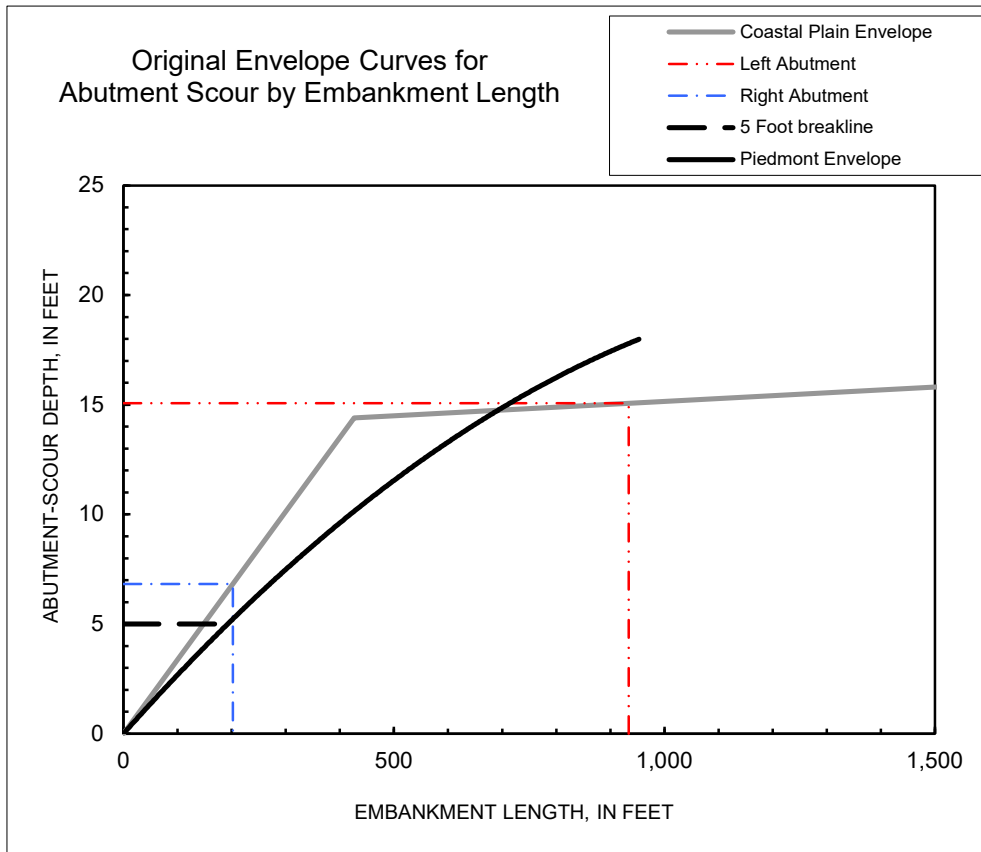
If contraction ratio is greater than 0.85 but less than 0.95 use **CAUTION**.

If contraction ratio is between 0 and 0.85 it is **OK**.

Bridge Number: 3210002600400
County: Richland/Lexington
Stream: Saluda River
Road: I-26
Region: Coastal Plain

1

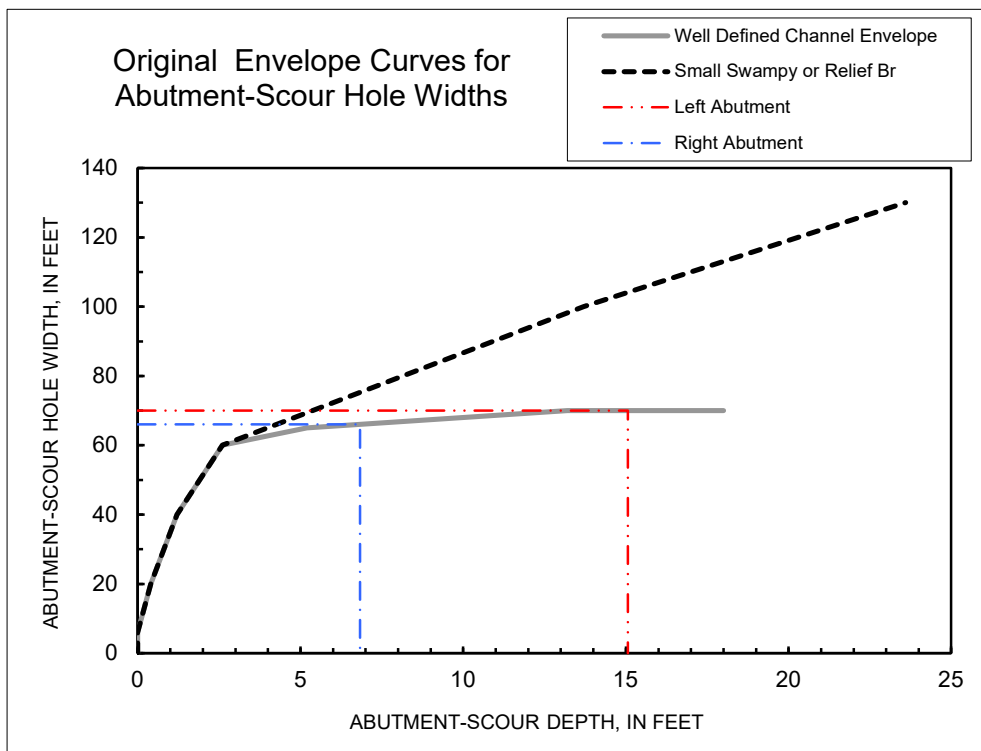
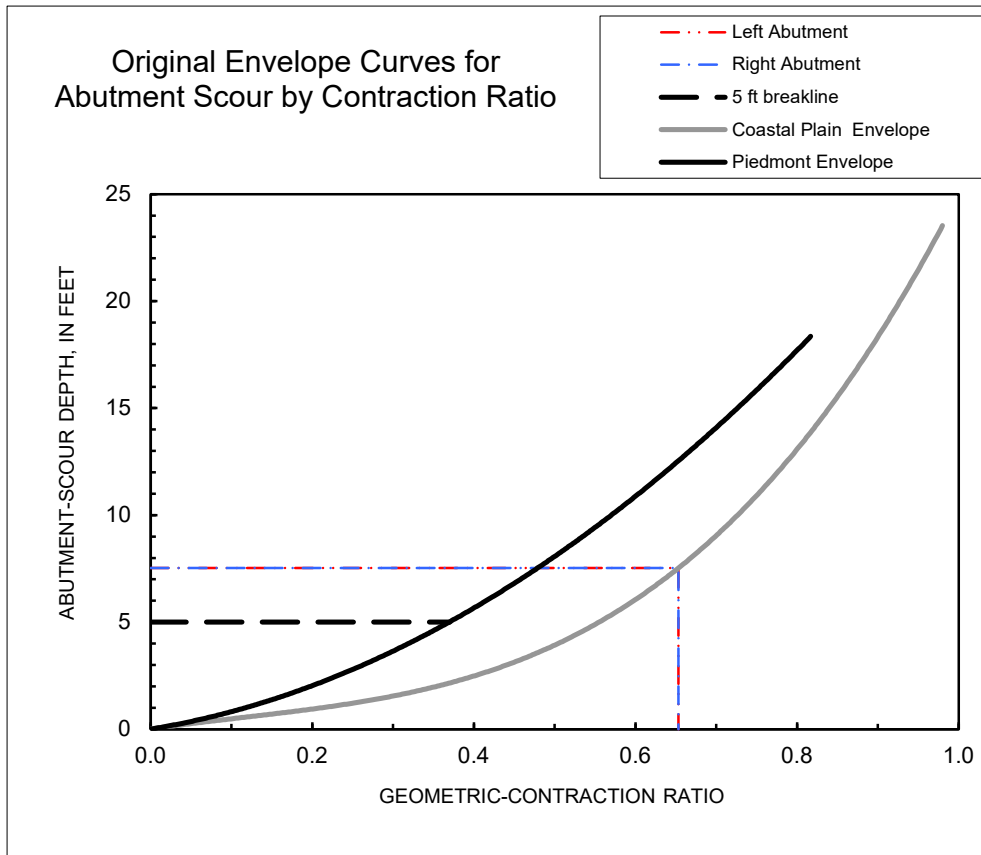
**Original Clear-Water Abutment-Scour Envelope Curves
(Benedict and others, 2016; Benedict, 2003)**



Bridge Number: 3210002600400
County: Richland/Lexington
Stream: Saluda River
Road: I-26
Region: Coastal Plain

2

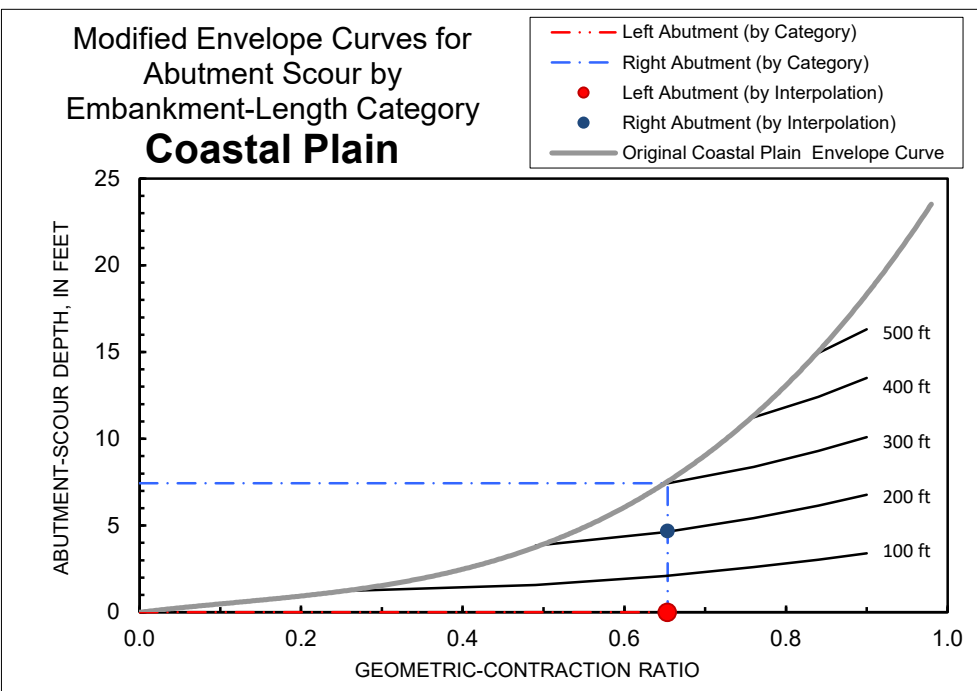
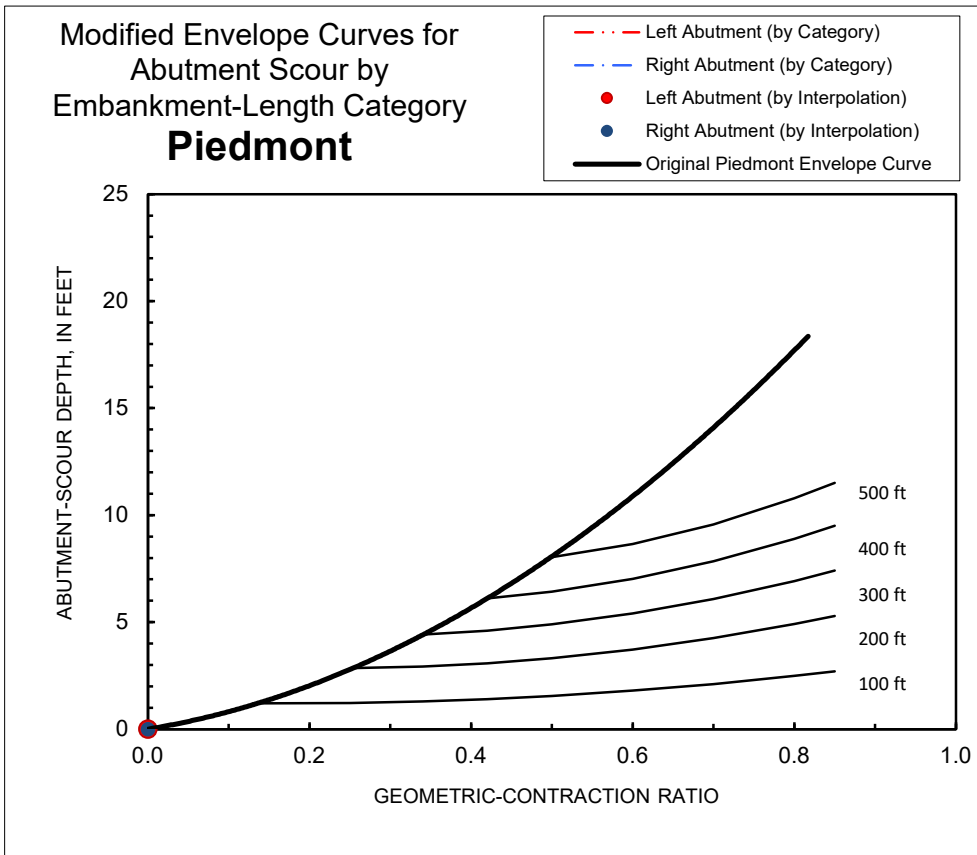
**Original Clear-Water Abutment-Scour Envelope Curves
(Benedict and others, 2016; Benedict, 2003)**



Bridge Number: 3210002600400
County: Richland/Lexington
Stream: Saluda River
Road: I-26
Region: Coastal Plain

3

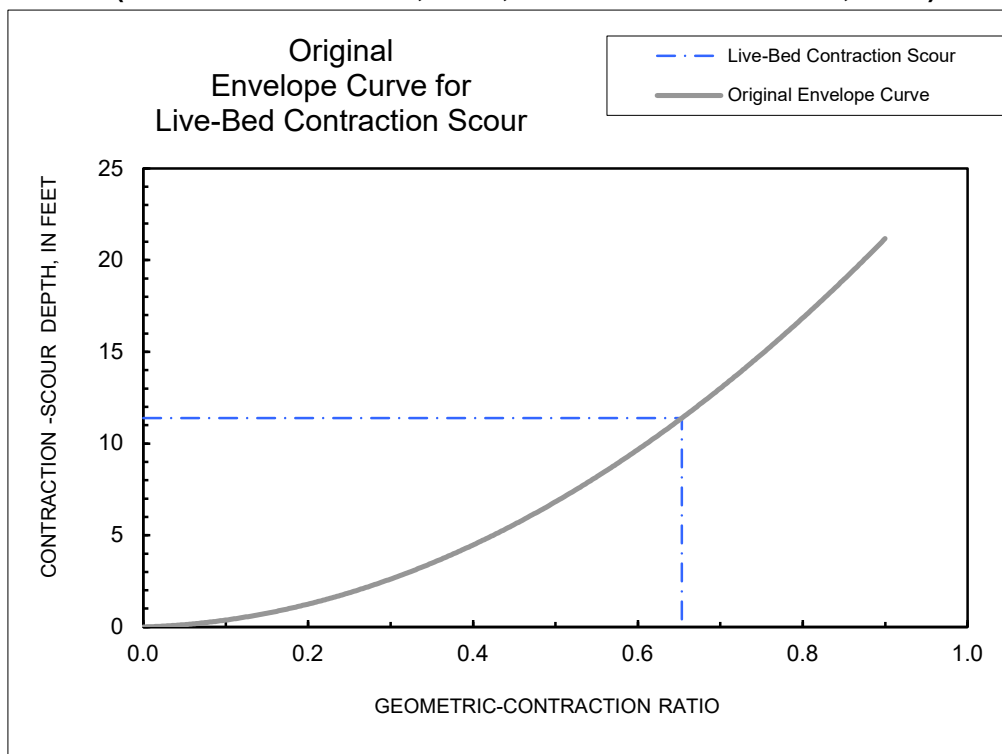
Modified Clear-Water Abutment-Scour Envelope Curves
(Benedict and others, 2016; Benedict and Caldwell, 2012)



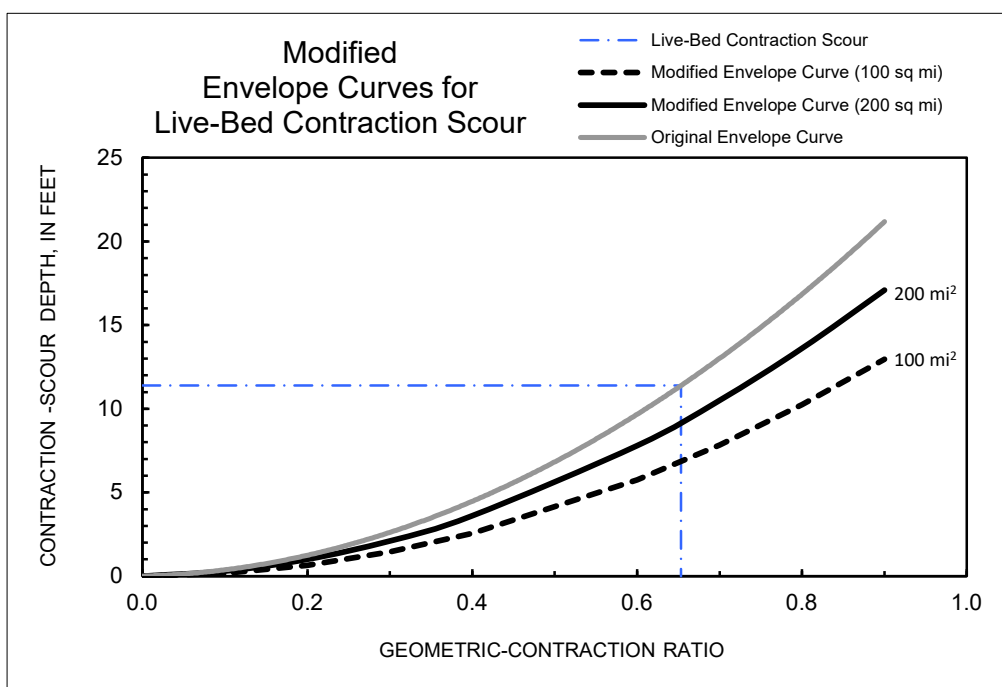
Bridge Number: 3210002600400
County: Richland/Lexington
Stream: Saluda River
Road: I-26
Region: Coastal Plain

4

Original Live-Bed Channel Contraction-Scour Envelope Curve (Benedict and others, 2016; Benedict and Caldwell, 2009)



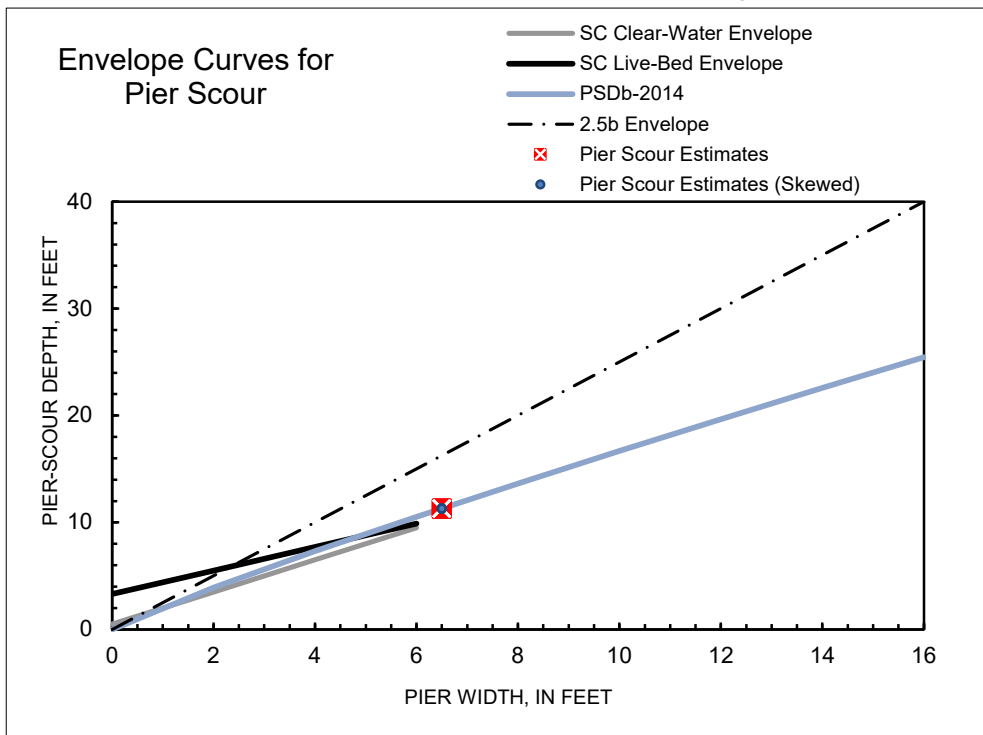
Modified Live-Bed Channel Contraction-Scour Envelope Curves (Benedict and others, 2016; Benedict and Caldwell, 2012)



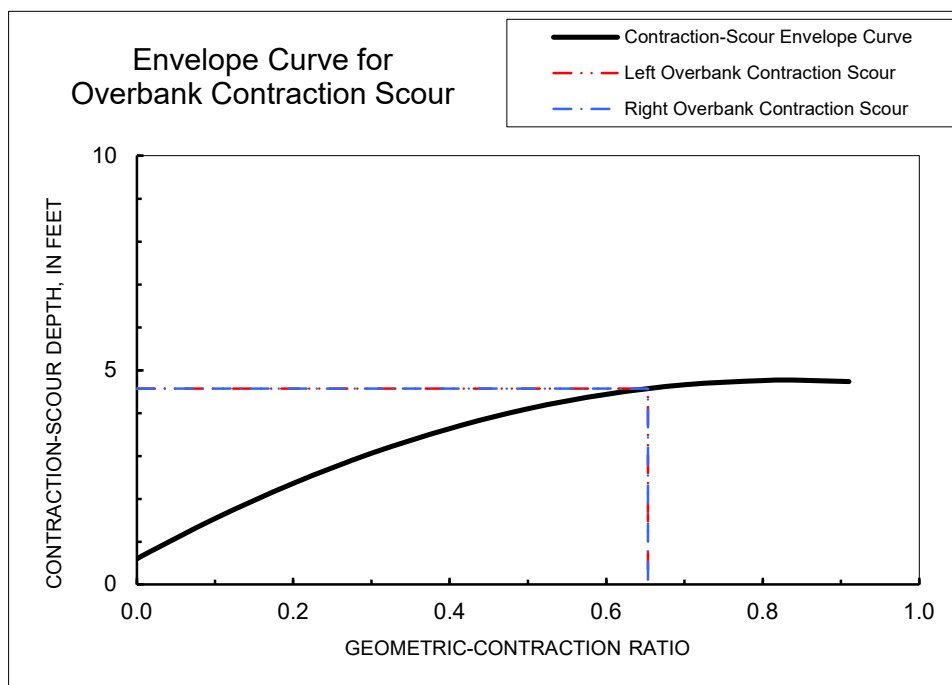
Bridge Number: 3210002600400
County: Richland/Lexington
Stream: Saluda River
Road: I-26
Region: Coastal Plain

5

Pier-Scour Envelope Curves (Benedict and others, 2016; Benedict and Caldwell, 2006; 2009)



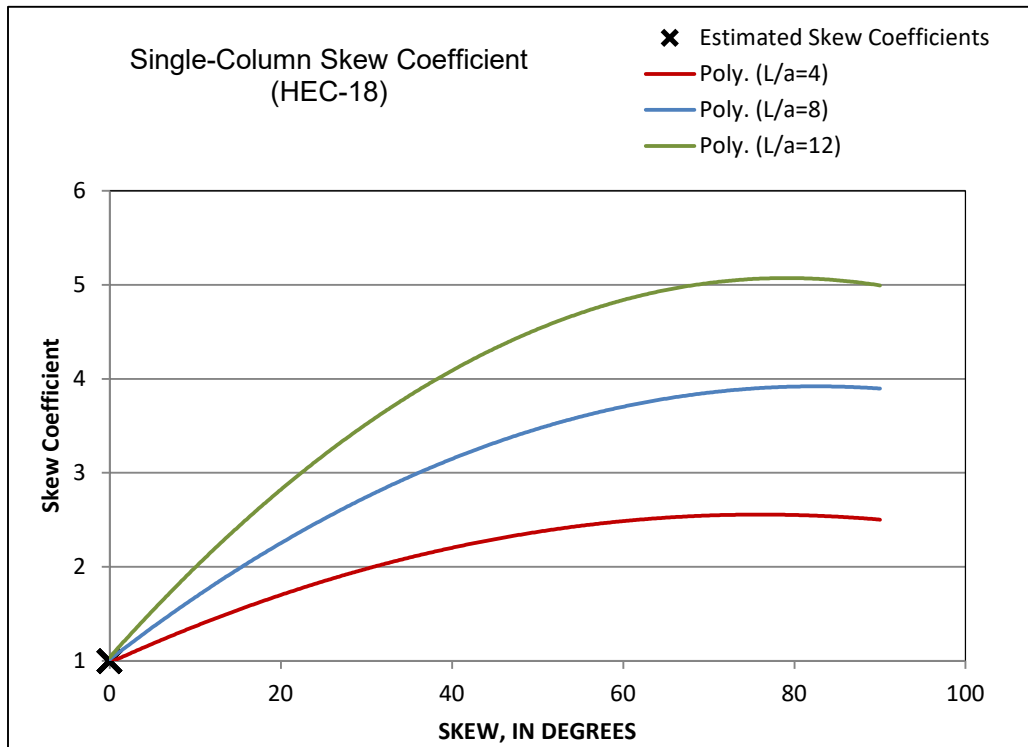
Clear-Water Overbank Contraction-Scour Envelope Curve (Benedict and others, 2016; Benedict and Caldwell, 2006)



Bridge Number: 3210002600400
County: Richland/Lexington
Stream: Saluda River
Road: I-26
Region: Coastal Plain

6

Pier-Scour Skew Coefficients



Bridge-Scour Envelope Curve Template

Data for Graphs

Estimate of Abutment-Scour -- Original Abutment-Scour Envelope Curves (Benedict and others, 2016; Benedict, 2003)

Use the following envelope curve:

Coastal Plain

Left Abutment

Embankment Length (ft)	Scour Depth (ft)
0	15.1
934	15.1
934	0

Abutment Scour by Embankment Length

Coastal Plain

Right Abutment

Embankment Length (ft)	Scour Depth (ft)
0	6.8
202	6.8
202	0

5 ft break line

Embankment Length (ft)	Scour Depth (ft)
0	5
194	5

Left Abutment

m	Scour Depth (ft)
0	7.5
0.65	7.5
0.65	0

Abutment Scour by m

Right Abutment

m	Scour Depth (ft)
0	7.5
0.65	7.5
0.65	0

5 ft break line

m	Scour Depth (ft)
0	5
0.37	5

Estimate of Abutment-Scour -- Modified Abutment-Scour Envelope Curves (Benedict and others, 2016; Benedict and Caldwell, 2012)

Piedmont				Coastal Plain																															
By Category		By Category		By Category		By Category																													
Left Abutment	Right Abutment	Left Abutment	Right Abutment	Left Abutment	Right Abutment	Left Abutment	Right Abutment																												
<table><tr><th>m</th><th>Scour Depth (ft)</th></tr><tr><td>0</td><td>0.0</td></tr><tr><td>0.00</td><td>0.0</td></tr><tr><td>0.00</td><td>0</td></tr></table>	m	Scour Depth (ft)	0	0.0	0.00	0.0	0.00	0	<table><tr><th>m</th><th>Scour Depth (ft)</th></tr><tr><td>0</td><td>0.0</td></tr><tr><td>0.00</td><td>0.0</td></tr><tr><td>0.00</td><td>0</td></tr></table>	m	Scour Depth (ft)	0	0.0	0.00	0.0	0.00	0	<table><tr><th>m</th><th>Scour Depth (ft)</th></tr><tr><td>0</td><td>N/A</td></tr><tr><td>0.65</td><td>N/A</td></tr><tr><td>0.65</td><td>0</td></tr></table>	m	Scour Depth (ft)	0	N/A	0.65	N/A	0.65	0	<table><tr><th>m</th><th>Scour Depth (ft)</th></tr><tr><td>0</td><td>7.4</td></tr><tr><td>0.65</td><td>7.4</td></tr><tr><td>0.65</td><td>0</td></tr></table>	m	Scour Depth (ft)	0	7.4	0.65	7.4	0.65	0
m	Scour Depth (ft)																																		
0	0.0																																		
0.00	0.0																																		
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By Interpolation		By Interpolation		By Interpolation		By Interpolation																													
<table><tr><th>m</th><th>Scour Depth (ft)</th></tr><tr><td>0</td><td>0.0</td></tr><tr><td>0.00</td><td>0.0</td></tr><tr><td>0.00</td><td>0</td></tr></table>	m	Scour Depth (ft)	0	0.0	0.00	0.0	0.00	0	<table><tr><th>m</th><th>Scour Depth (ft)</th></tr><tr><td>0</td><td>0.0</td></tr><tr><td>0.00</td><td>0.0</td></tr><tr><td>0.00</td><td>0</td></tr></table>	m	Scour Depth (ft)	0	0.0	0.00	0.0	0.00	0	<table><tr><th>m</th><th>Scour Depth (ft)</th></tr><tr><td>0</td><td>N/A</td></tr><tr><td>0.65</td><td>N/A</td></tr><tr><td>0.65</td><td>0</td></tr></table>	m	Scour Depth (ft)	0	N/A	0.65	N/A	0.65	0	<table><tr><th>m</th><th>Scour Depth (ft)</th></tr><tr><td>0</td><td>4.7</td></tr><tr><td>0.65</td><td>4.7</td></tr><tr><td>0.65</td><td>0</td></tr></table>	m	Scour Depth (ft)	0	4.7	0.65	4.7	0.65	0
m	Scour Depth (ft)																																		
0	0.0																																		
0.00	0.0																																		
0.00	0																																		
m	Scour Depth (ft)																																		
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m	Scour Depth (ft)																																		
0	4.7																																		
0.65	4.7																																		
0.65	0																																		

Coastal Plain and Piedmont Clear-Water Overbank Contraction-Scour Envelope Curve by m (Benedict and others, 2016; Benedict and Caldwell, 2006)

Left Overbank

m	Scour Depth (ft)
0	4.6
0.65	4.6
0.65	0

Right Overbank

m	Scour Depth (ft)
0	4.6
0.65	4.6
0.65	0

Coastal Plain and Piedmont Live-Bed Channel Contraction-Scour Envelope Curve by m

Original Live-Bed Channel Contraction Scour (Benedict and Caldwell, 2009)

m	Scour Depth (ft)
0	11.4
0.65	11.4
0.65	0.0

Modified Live-Bed Channel Contraction Scour (Benedict and Caldwell, 2012)

m	Scour Depth (ft)
0	11.4
0.65	11.4
0.65	0.0

Abutment-Scour Hole Topwidths (Benedict and others, 2016; Benedict, 2003)

Use the following envelope curve:

Long Bridge

Left Abutment

Scour Depth (ft)	Scour Topwidth (ft)
0	70.0
15.1	70.0
15.1	0

Long Bridge

Right Abutment

Scour Depth (ft)	Scour Topwidth (ft)
0	66.0
6.8	66.0
6.8	0

Envelope Curve Data

Abutment-Scour Depth by Embankment Length
Original Curve (Benedict, 2003)

Abut Length (ft)	Scour Depth (ft)
0	0
426.5	14.4
7440.6	23.6

Abut Length (ft)	Scour Depth (ft)
0	0
18.4	0.6
112.3	3.1
181.4	4.6
408.5	9.7
571.8	12.9
606.4	13.7
675	14.2
952.9	18

Envelope Curve Data

Pier Scour Envelopes
(Benedict and Caldwell, 2006; 2009)

	SC Clear-Water	SC Live-Bed	National	2.5b	PSDb-2014
Pier Width (ft)	Scour Depth (ft)	Scour Depth (ft)	Scour Depth (ft)	Scour Depth (ft)	Scour Depth (ft)
0	0.5	3.3	4.1	0.0	0.0
2	3.5	5.5	7.1	5.0	3.9
4	6.5	7.7	10.1	10.0	7.3
6	9.5	9.9	13.1	15.0	10.5
8			16.1	20.0	13.6
10			19.1	25.0	16.7
12			22.1	30.0	19.7
14			25.1	35	22.6
16				40.0	25.5

Bridge-Scour Envelope Curve Template

Envelope Curve Data

Abutment-Scour Depth by Contraction Ratio
Original Curve (Benedict, 2003)

Coastal Plain

m	Scour Depth (ft)
0	0
0.32	1.69
0.67	8.18
0.77	11.75
0.81	13.55
0.82	14.03
0.98	23.53

Piedmont Sands

m	Scour Depth (ft)
0	0
0.022	0.6
0.372	4.6
0.668	13.7
0.817	18

Envelope Curve Data

Abutment-Scour Hole Topwidth
Original Curve (Benedict, 2003)

Long Bridges

Scour Depth (ft)	Scour Topwidth (ft)
0	0
0	6
0.4	20
1.2	40
2.6	60
5.2	65
13.2	70
18	70

Small Swampy Bridges

Scour Depth (ft)	Scour Topwidth (ft)
0	0
0	6
0.4	20
1.2	40
2.6	60
13.7	100
23.6	130

Skew Coefficients from HEC-18

Correction Factor, K_s, for Angle of Attack, θ, of the Flow.

Angle	L/a=4	L/a=8	L/a=12
0	1.00	1.00	1.00
15	1.50	2.00	2.50
30	2.00	2.75	3.50
45	2.30	3.30	4.30
90	2.50	3.90	5.00

Angle = skew angle of flow, in degrees; L = length of pier, in feet; a = pier width, in feet

Envelope Curve Data

Modified Abutment-Scour Envelope Curves (Benedict and others, 2016; Benedict and Caldwell, 2012)

Piedmont

m	Embankment Length Category (ft)				
	100	200	300	400	500
	Scour Depth (ft)	Scour Depth (ft)	Scour Depth (ft)	Scour Depth (ft)	Scour Depth (ft)
0.130	1.20				
0.25	1.21	2.84			
0.34	1.29	2.92	4.42		
0.42	1.40	3.08	4.60	6.12	
0.5	1.55	3.31	4.89	6.43	8.04
0.6	1.80	3.72	5.40	7.02	8.65
0.7	2.11	4.25	6.08	7.84	9.57
0.8	2.49	4.91	6.92	8.89	10.79
0.85	2.70	5.28	7.41	9.50	11.52

Coastal Plain

m	Embankment Length Category (ft)				
	100	200	300	400	500
	Scour Depth (ft)	Scour Depth (ft)	Scour Depth (ft)	Scour Depth (ft)	Scour Depth (ft)
0.25	1.22				
0.49	1.57	3.84			
0.65	2.10	4.62	7.40		
0.76	2.60	5.42	8.39	11.24	
0.84	3.03	6.14	9.30	12.42	14.94
0.90	3.40	6.76	10.10	13.50	16.30

Envelope Curve Data

Coastal Plain and Piedmont
Clear-Water Overbank Contraction Scour
(Benedict and Caldwell, 2006)

m	Scour Depth (ft)
0	0.60
0.02	0.80
0.1	1.54
0.2	2.36
0.3	3.06
0.4	3.64
0.5	4.10
0.6	4.44
0.7	4.66
0.8	4.76
0.85	4.77
0.91	4.73

Envelope Curve Data

Coastal Plain and Piedmont
Original Live-Bed Channel Contraction Scour
(Benedict and Caldwell, 2009)

m	Scour Depth (ft)
0	0.0
0.02	0.04
0.1	0.38
0.2	1.25
0.3	2.61
0.4	4.47
0.5	6.83
0.6	9.67
0.7	13.01
0.8	16.85
0.85	18.95
0.9	21.18

Envelope Curve Data

Coastal Plain and Piedmont
Modified Live-Bed Channel Contraction Scour

(Benedict and Caldwell, 2012)

m	Drainage Area (sq mi)	
	100	200
	Scour Depth (ft)	Scour Depth (ft)
0.000	0.00	0.00
0.1	0.16	0.30
0.2	0.64	1.00
0.3	1.44	2.10
0.4	2.56	3.60
0.6	5.76	7.80
0.7	7.84	10.50
0.8	10.24	13.60
0.9	12.96	17.10

Bridge-Scour Envelope Curve Template

ABUTMENT-SCOUR DATA

SCDOT Bridge Number	County	Road	Stream	Latitude (DMS)	Longitude (DMS)	Analysis date	Physiographic Province	Multiple bridge?	Relief bridge?	Swampy, Poorly Defined Channel?	Bridge length (feet)	Drainage area (sq mi)	Drainage area check (original envelope)	Drainage area check (modified envelope)	Quality of SCDOT Plan Data
3210002600400	Richland/Lexington	I-26	Saluda River	34° 1' 25.3"	81° 6' 12.7"	2/18/2022	Coastal Plain	No	No	No	563	2510	Caution: DA in range but exceeds 80 percent of data	DA OUTSIDE RANGE (Above)	Good

CLEAR-WATER CONTRACTION-SCOUR DATA

SCDOT Bridge Number	County	Road	Stream	Latitude (DMS)	Longitude (DMS)	Analysis date	Physiographic Province	Multiple bridge?	Relief bridge?	Swampy, Poorly Defined Channel?	Bridge length (feet)	Drainage area (sq mi)	Drainage area check	Plan m	Topo m
3210002600400	Richland/Lexington	I-26	Saluda River	34° 1' 25.3"	81° 6' 12.7"	2/18/2022	Coastal Plain	No	No	No	563	2510	Caution: DA in range but exceeds 80 percent of data	0.67	0.69

LIVE-BED CONTRACTION-SCOUR DATA

SCDOT Bridge Number	County	Road	Stream	Latitude (DMS)	Longitude (DMS)	Analysis date	Physiographic Province	Multiple bridge?	Relief bridge?	Swampy, Poorly Defined Channel?	Bridge length (feet)	Drainage area (sq mi)	Drainage area check (original curve)	Drainage area check (modified curve)	Plan m
3210002600400	Richland/Lexington	I-26	Saluda River	34° 1' 25.3"	81° 6' 12.7"	2/18/2022	Coastal Plain	No	No	No	563	2510	Caution: DA in range but exceeds 80 percent of data	DA OUTSIDE RANGE (Above)	0.67

PIER-SCOUR DATA

SCDOT Bridge Number	County	Road	Stream	Latitude (DMS)	Longitude (DMS)	Analysis date	Physiographic Province	Multiple bridge?	Relief bridge?	Swampy, Poorly Defined Channel?	Bridge length (feet)	Drainage area (sq mi)	Location of pier	Pier or bent type	Envelope curve used
3210002600400	Richland/Lexington	I-26	Saluda River	34° 1' 25.3"	81° 6' 12.7"	2/18/2022	Coastal Plain	No	No	No	563	2510	LABUT	Tower Bent	Automatic Calculation
3210002600400	Richland/Lexington	I-26	Saluda River	34° 1' 25.3"	81° 6' 12.7"	2/18/2022	Coastal Plain	No	No	No	563	2510	LOB	Single Pier	Automatic Calculation
3210002600400	Richland/Lexington	I-26	Saluda River	34° 1' 25.3"	81° 6' 12.7"	2/18/2022	Coastal Plain	No	No	No	563	2510	CH	Multiple Column Pier	Automatic Calculation
3210002600400	Richland/Lexington	I-26	Saluda River	34° 1' 25.3"	81° 6' 12.7"	2/18/2022	Coastal Plain	No	No	No	563	2510	ROB	Multiple Column Pier	Automatic Calculation
3210002600400	Richland/Lexington	I-26	Saluda River	34° 1' 25.3"	81° 6' 12.7"	2/18/2022	Coastal Plain	No	No	No	563	2510	RABUT	Multiple Column Pier	Automatic Calculation

Bridge-Scour Envelope Curve Template

Quality of Topo Map Data	Quality of FEMA/Other Map Data	Plan m	Topo m	FEMA/Other m	Used m	m check (original envelope)	m check (modified envelope)	Plan (left abutment length) (feet)	Topo (left abutment length) (feet)	FEMA/Other (left abutment length) (feet)	Used (left abutment length) (feet)	Left abutment length check (original envelope)	Left abutment length check (modified envelope)	Plan (right abutment length) (feet)	Topo (right abutment length) (feet)
Fair	Fair	0.67	0.69	0.71	0.65	OK	OK	850	710	750	934	OK	OUTSIDE RANGE	368.5	527

FEMA/Other m	Used m	m check	Left overbank scour depth (feet)	Right overbank scour depth (feet)	Selected left overbank scour depth (feet)	Selected right overbank scour depth (feet)
0.71	0.65	OK	4.6	4.6	4.6	4.6

Topo m	FEMA/Other m	Used m	m check (original curve)	m check (modified curve)	Original channel scour depth (feet)	Modified channel scour depth (feet)	Selected channel scour depth (feet)
0.69	0.71	0.65	OK	OK	11.4	N/A	11.4

PENETRATION TABLE

Pier width (feet)	Pier length (feet)	Angle of attack (degrees)	Multiple column bent?	Minimum spacing between columns (feet)	Column spacing to width ratio	Skew coefficient (single pier - HEC 18)		Skew coefficient used	Envelope curve used in pier scour estimate	Pier scour from envelope (feet) (no adjustment)	Pier scour adjusted for skew (feet)	Use abutment scour at pier?	Clear-water abutment scour from USGS curves (feet)	Use overbank contraction scour at pier?	Clear-water overbank contraction scour from USGS curves (feet)
6.5	6.5	0	Yes	21	3.23	1.00		1.00	PSDb-2014	11.3	11.3	NO	0.0	No	0.0
6.5	6.5	0	Yes	21	3.23	1.00		1.00	PSDb-2014	11.3	11.3	No	0.0	Yes	4.6
6.5	6.5	0	Yes	21	3.23	1.00		1.00	PSDb-2014	11.3	11.3	No	0.0	No	0.0
6.5	6.5	0	Yes	21	3.23	1.00		1.00	PSDb-2014	11.3	11.3	No	0.0	Yes	4.6
6.5	6.5	0	Yes	21	3.23	1.00		1.00	PSDb-2014	11.3	11.3	NO	0.0	No	0.0

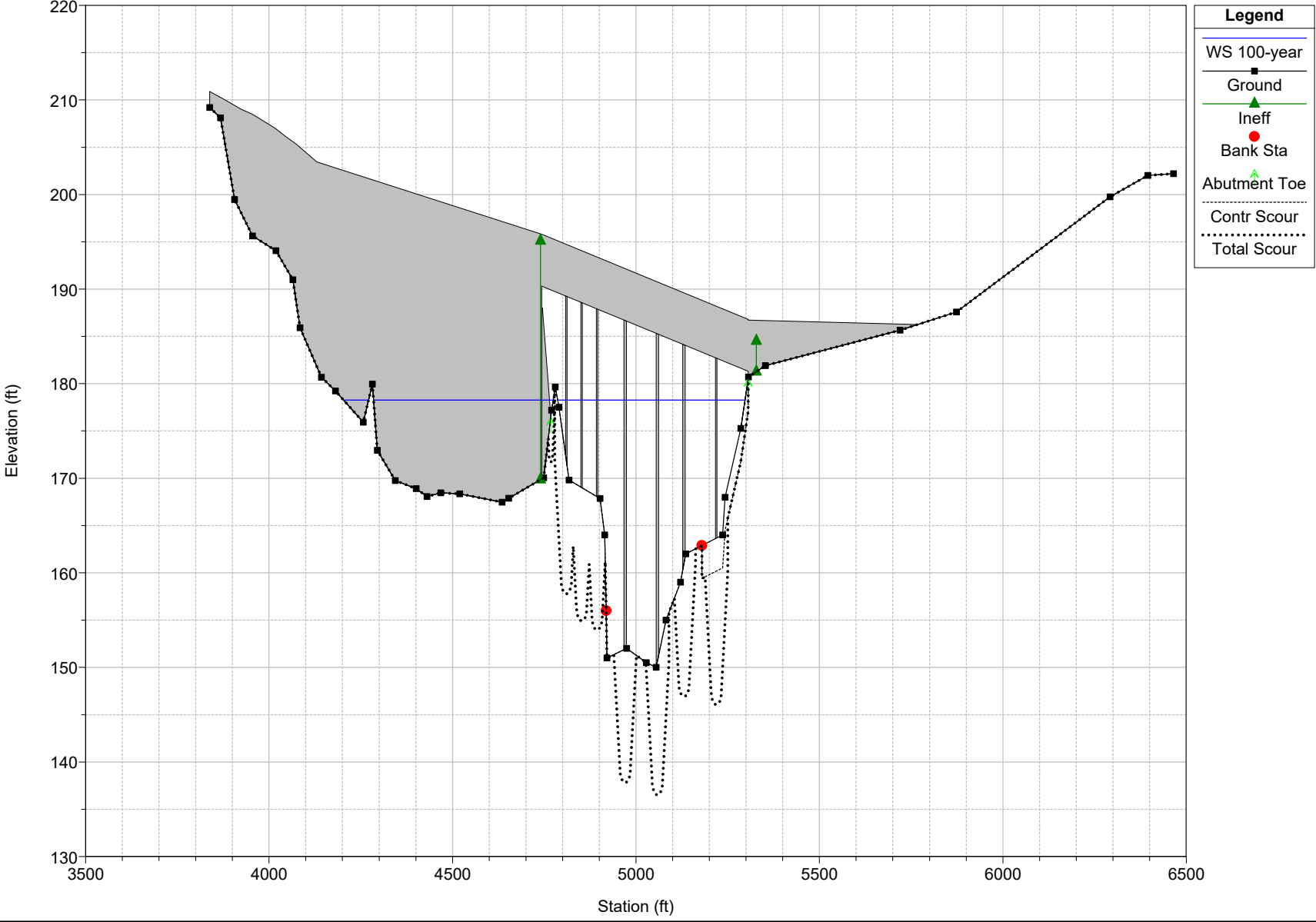
Bridge-Scour Envelope Curve Template

FEMA/Other (right abutment length) (feet)	Used (right abutment length) (feet)	Right abutment length check (original envelope)	Right abutment length check (modified envelope)	Original left abutment depth by m (feet)	Original right abutment depth by m (feet)	Original left abutment depth by length (feet)	Original right abutment depth by length (feet)	Modified left abutment depth by Category (feet)	Modified right abutment depth by Category (feet)	Modified left abutment depth by Interpolation (feet)	Modified right abutment depth by Interpolation (feet)	Left abutment depth selected (feet)	Right abutment depth selected (feet)	Left abutment hole width (feet)	Right abutment hole width (feet)
602	202	OK	OK	7.53	7.53	15.07	6.83	N/A	7.43	N/A	4.69	15.07	6.83	70.00	66.02

Use live-bed channel contraction scour at pier?	Live-bed contraction scour from USGS curves (feet)	Use pier scour?	Pier scour (feet)	Total scour at bent (feet)	Computed embedment of pile from consultant (feet)	Remaining pile penetration (feet)	Embedment below thalweg from consultant (feet)	Remaining pile penetration (at thalweg) (feet)
No	0.0	No	0.0	N/A	0.00	N/A	0.00	N/A
No	0.0	Yes	11.3	15.89	0.00	-15.89	0.00	-15.89
Yes	11.4	Yes	11.3	22.71	0.00	-22.71	0.00	-22.71
No	0.0	Yes	11.3	15.89	0.00	-15.89	0.00	-15.89
No	0.0	No	0.0	N/A	0.00	N/A	0.00	N/A

HEC-18 SCOUR ANALYSIS FOR SALUDA RIVER CROSSING

Bridge Scour RS = 17540



Contraction Scour

	Left	Channel	Right
Ys (ft):	0.00	0.08	3.64
Vc (ft/s):	0.78	0.87	0.80
Equation:	Live	Live	Live

Pier Scour

All Piers:	Ys (ft):	14.10
	Froude #:	0.30
	Equation:	CSU equation

Abutment Scour

	Left	Right
Abutment Ys (ft):	4.76	
Froude #:	0.18	
Equation:	HIRE	Default

Combined Scour Depths

Pier Scour + Contraction Scour (ft):

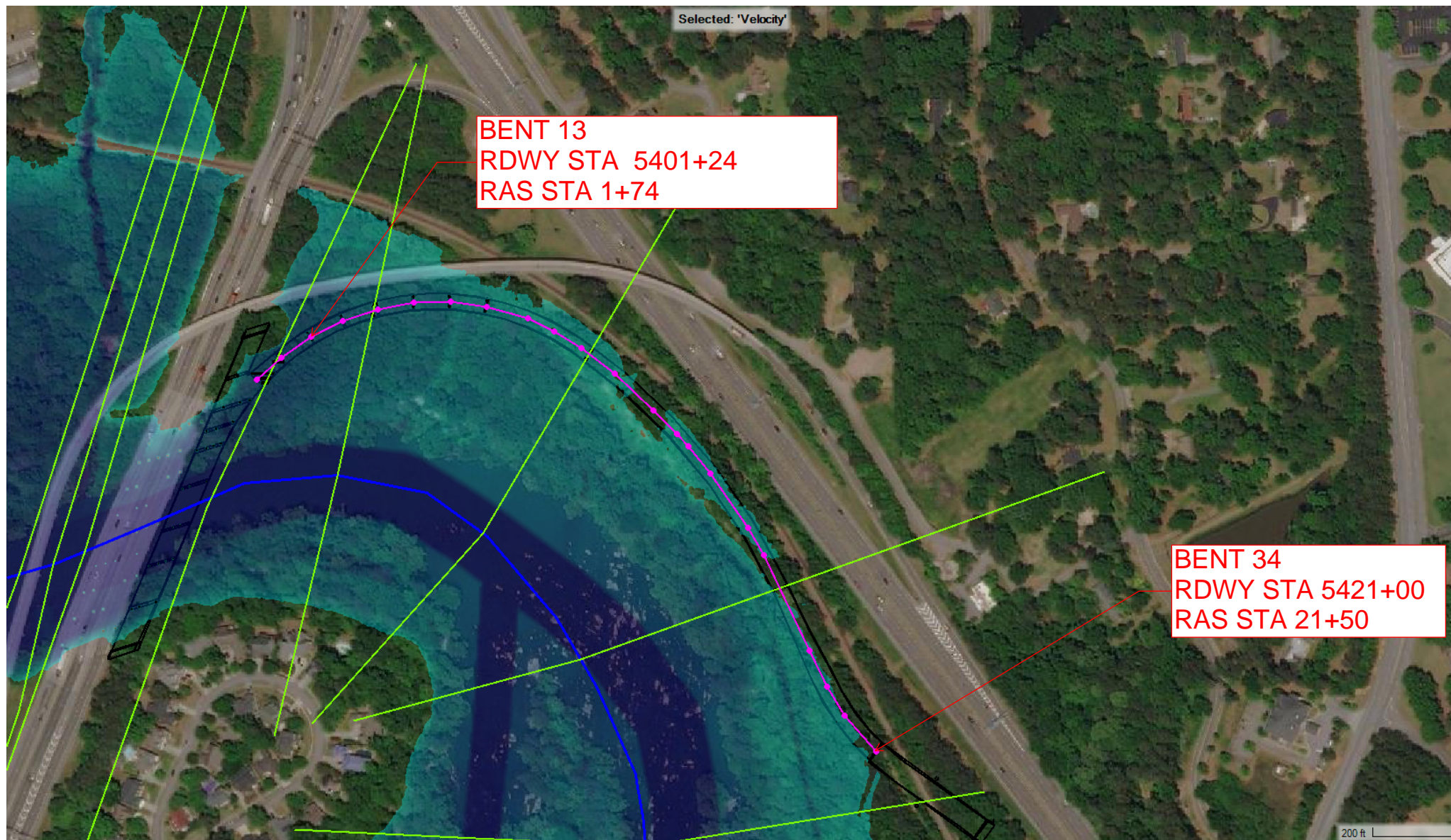
Left Bank:	14.10
Channel:	14.18
Right Bank:	17.74

Left abut + contr (ft):	4.76
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HEC-18 SCOUR ANALYSIS FOR CD RAMP BRIDGE

(BENTS 13-34)

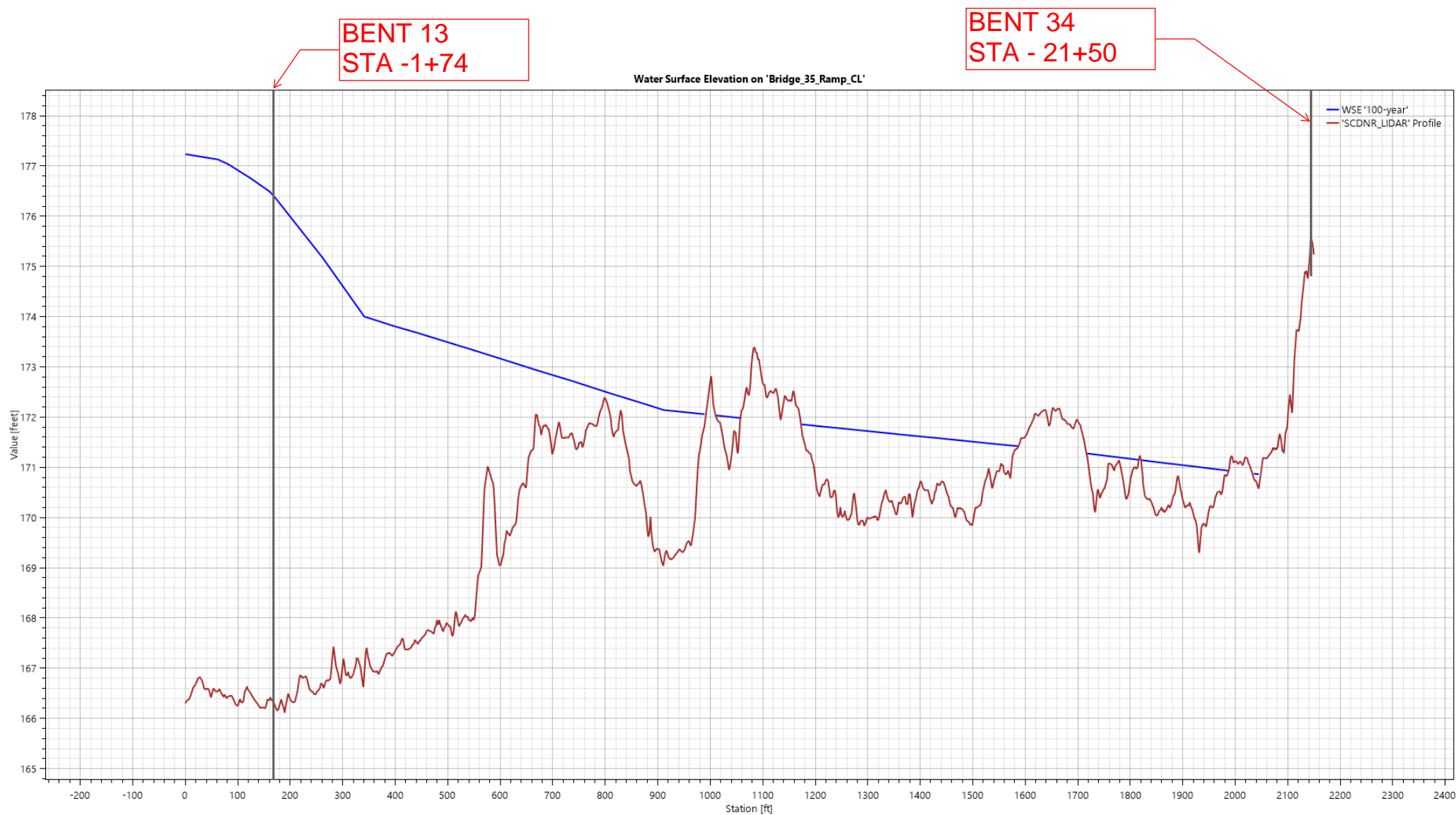
Bridge 35 Ramp Profiles Alignment



100-Year Hydraulic Results - Bents 14-33

	Water Surface Elevation (ft)	Velocity (ft/s)	Ground Elevation (ft)	Depth (ft)
Bent 14	175.012	1.821	166.627	8.385
Bent 15	173.97	2.753	167.019	6.951
Bent 16	173.691	2.461	167.523	6.168
Bent 17	173.384	2.024	168.032	5.352
Bent 18	173.085	0.984	169.815	3.27
Bent 19	172.79	0.918	171.829	0.961
Bent 20	172.489	1.311	172.273	0.216
Bent 21	172.183	1.321	169.342	2.841
Bent 22	172.126	1.046	171.643	0.483
Bent 23	172.437	0	172.598	0
Bent 24	171.85	0.496	171.622	0.228
Bent 25	171.739	0.412	169.93	1.809
Bent 26	171.623	0.503	170.023	1.6
Bent 27	171.524	0.404	170.115	1.409
Bent 28	171.425	0.209	171.351	0.074
Bent 29	171.86	0	171.906	0
Bent 30	171.182	0.202	170.485	0.697
Bent 31	171.034	0.368	170.212	0.822
Bent 32	171.173	0.45	170.912	0.261
Bent 33	171.394	0	171.302	0

100-Year Water Surface along Bridge 35 Ramp



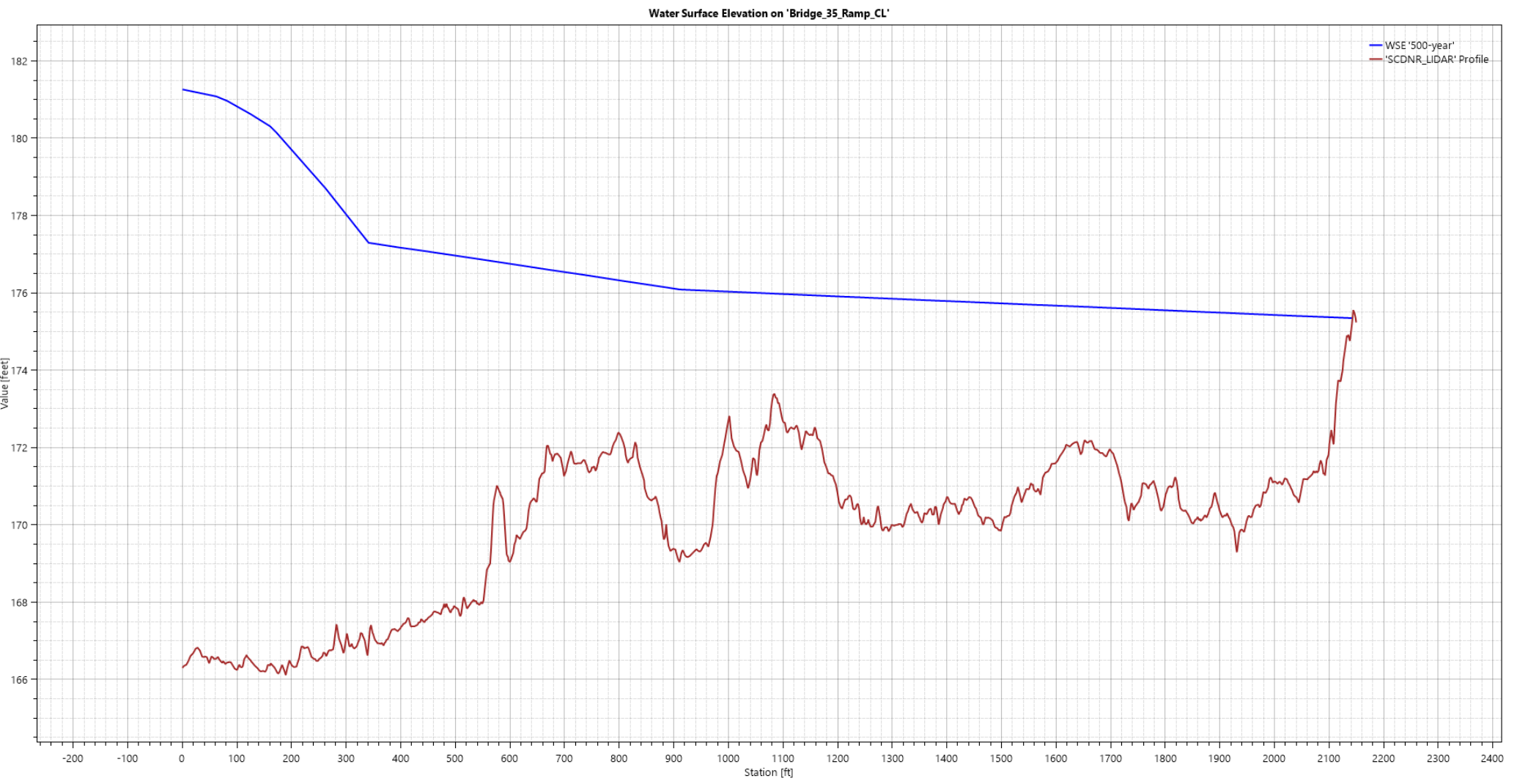
100-Year Velocity along Bridge 35 Ramp



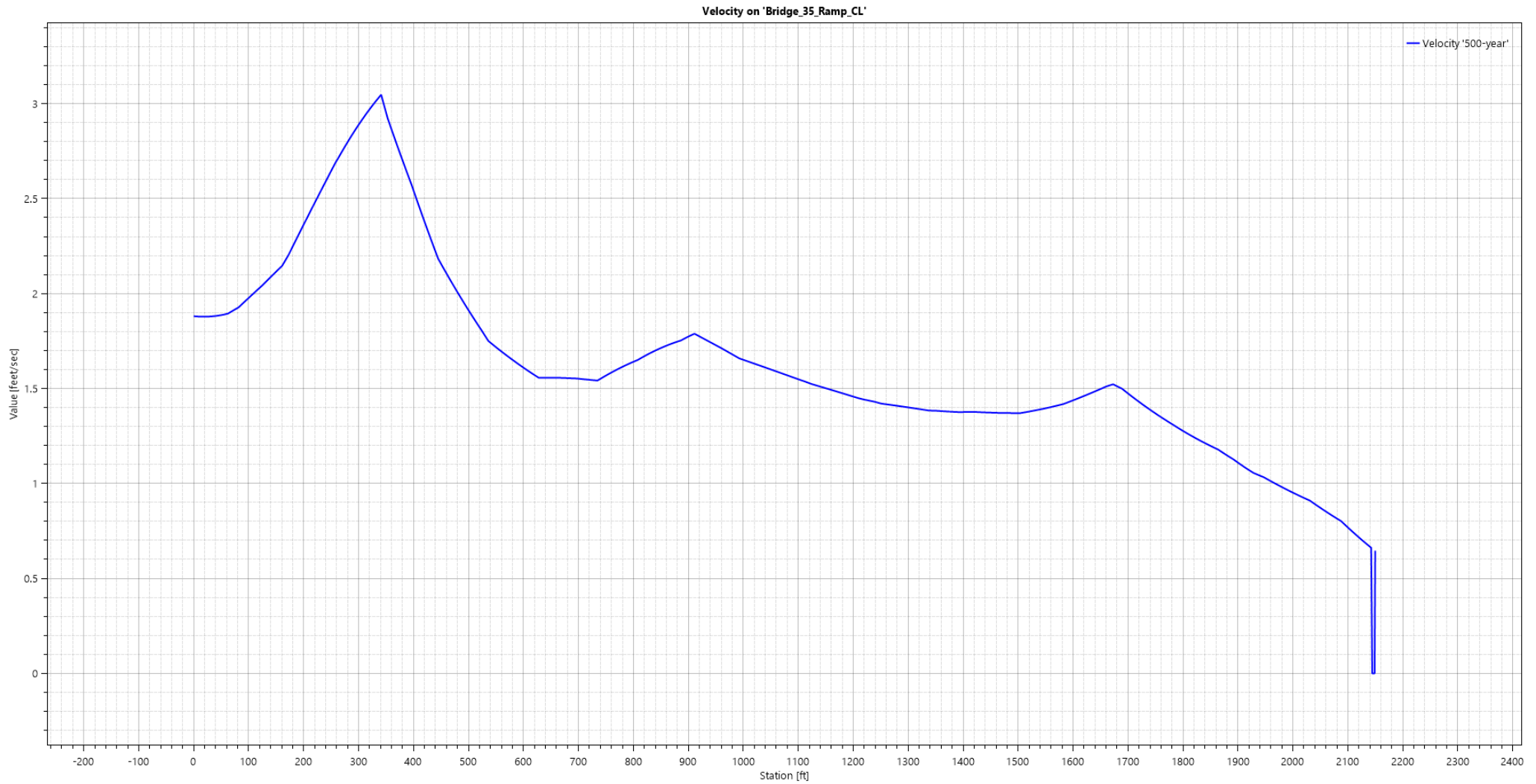
500-Year Hydraulic Results - Bents 14-33

	Water Surface Elevation (ft)	Velocity (ft/s)	Ground Elevation (ft)	Depth (ft)
Bent 14	178.655	3.004	166.627	12.028
Bent 15	177.333	3.58	167.019	10.314
Bent 16	177.138	3.305	167.523	9.615
Bent 17	176.941	2.882	168.032	8.909
Bent 18	176.741	1.563	169.815	6.926
Bent 19	176.54	1.553	171.829	4.711
Bent 20	176.34	2.221	172.273	4.067
Bent 21	176.14	2.197	169.342	6.798
Bent 22	176.056	1.876	171.643	4.413
Bent 23	176.002	1.324	172.598	3.404
Bent 24	175.933	1.18	171.622	4.311
Bent 25	175.868	0.939	169.93	5.938
Bent 26	175.801	0.816	170.023	5.778
Bent 27	175.741	0.588	170.115	5.626
Bent 28	175.682	0.894	171.351	4.331
Bent 29	175.623	1.04	171.906	3.717
Bent 30	175.555	0.761	170.485	5.07
Bent 31	175.487	0.504	170.212	5.275
Bent 32	175.437	0.654	170.912	4.525
Bent 33	175.39	0.731	171.302	4.088

500-Year Water Surface along Bridge 35 Ramp



500-Year Velocity along Bridge 35 Ramp



Bridge 35 - Bents 14-33 HEC-18 Pier Scour Analysis

Local Scour Calculation for the 100 -Year Storm

*K1 AND K2 VALUES SET TO 1 FOR GROUP OF PILES

*K2 VALUES FOR CHANNEL DRILLED SHAFTS BASED UPON SPACING OF COLUMNS AND ANGLE OF ATTACK

Bents in overbanks have an adjusted pier width based upon angle of attack

Bent	Pier Width (a)	Bent Configuration	V1	Fr1	K1	K2	K3	Angle of Attack	Depth Y1	Pier Scour YS p	Pier Scour
14	6.5	2 Drilled Shafts	1.82	0.11	1.00	1.00	1.10	0.0	8.50	6.08	6.1
15	6.5	2 Drilled Shafts	2.75	0.18	1.00	1.00	1.10	0.0	6.97	7.07	7.1
16	6.5	2 Drilled Shafts	2.46	0.17	1.00	1.00	1.10	0.0	6.18	6.63	6.7
17	6.5	2 Drilled Shafts	2.02	0.15	1.00	1.00	1.10	0.0	5.37	5.98	6.0
18	6.5	2 Drilled Shafts	0.98	0.10	1.00	1.00	1.10	0.0	3.29	4.11	4.2
19	6.5	2 Drilled Shafts	0.92	0.16	1.00	1.00	1.10	0.0	0.97	3.38	3.4
20	6.5	2 Drilled Shafts	1.31	0.49	1.00	1.00	1.10	0.0	0.23	3.24	3.3
21	6.5	2 Drilled Shafts	1.32	0.14	1.00	1.00	1.10	0.0	2.86	4.57	4.6
22	6.5	2 Drilled Shafts	1.05	0.28	1.00	1.00	1.10	0.0	0.42	3.19	3.2
23	6.5	2 Drilled Shafts	0.00	0.00	1.00	1.00	1.10	0.0	0.00	0.00	0.0
24	6.5	2 Drilled Shafts	0.50	0.18	1.00	1.00	1.10	0.0	0.23	2.14	0.0
25	6.5	2 Drilled Shafts	0.41	0.05	1.00	1.00	1.10	0.0	1.81	2.61	2.7
26	6.5	2 Drilled Shafts	0.50	0.07	1.00	1.00	1.10	0.0	1.61	2.79	2.8
27	6.5	2 Drilled Shafts	0.40	0.06	1.00	1.00	1.10	0.0	1.41	2.50	2.5
28	6.5	2 Drilled Shafts	0.21	0.13	1.00	1.00	1.10	0.0	0.08	1.27	0.0
29	6.5	2 Drilled Shafts	0.00	0.00	1.00	1.00	1.10	0.0	0.00	0.00	0.0
30	6.5	3 Drilled Shafts	0.20	0.04	1.00	1.00	1.10	0.0	0.70	1.69	1.7
31	6.5	3 Drilled Shafts	0.37	0.07	1.00	1.00	1.10	0.0	0.83	2.23	2.3
32	6.5	3 Drilled Shafts	0.45	0.52	1.00	1.00	1.10	0.0	0.02	1.50	0.0
33	6.5	3 Drilled Shafts	0.00	0.00	1.00	1.00	1.10	0.0	0.00	0.00	0.0

Local Scour Calculation for the 500 -Year Storm

*K1 AND K2 VALUES SET TO 1 FOR GROUP OF PILES

*K2 VALUES FOR CHANNEL DRILLED SHAFTS BASED UPON SPACING OF COLUMNS AND ANGLE OF ATTACK

Bents in overbanks have an adjusted pier width based upon angle of attack

Bent	Pier Width (a)	Bent Configuration	V1	Fr1	K1	K2	K3	Angle of Attack	Depth Y1	Pier Scour YS p	Pier Scour
14	6.5	2 Drilled Shafts	3.00	0.15	1.00	1.00	1.10	0.0	12.03	7.90	8.0
15	6.5	2 Drilled Shafts	3.58	0.20	1.00	1.00	1.10	0.0	10.31	8.35	8.4
16	6.5	2 Drilled Shafts	3.31	0.19	1.00	1.00	1.10	0.0	9.62	7.99	8.0
17	6.5	2 Drilled Shafts	2.88	0.17	1.00	1.00	1.10	0.0	8.91	7.46	7.5
18	6.5	2 Drilled Shafts	1.56	0.10	1.00	1.00	1.10	0.0	6.93	5.54	5.6
19	6.5	2 Drilled Shafts	1.55	0.13	1.00	1.00	1.10	0.0	4.71	5.24	5.3
20	6.5	2 Drilled Shafts	2.22	0.19	1.00	1.00	1.10	0.0	4.07	6.00	6.0
21	6.5	2 Drilled Shafts	2.20	0.15	1.00	1.00	1.10	0.0	6.80	6.40	6.4
22	6.5	2 Drilled Shafts	1.88	0.16	1.00	1.00	1.10	0.0	4.41	5.64	5.7
23	6.5	2 Drilled Shafts	1.32	0.13	1.00	1.00	1.10	0.0	3.40	4.69	4.7
24	6.5	2 Drilled Shafts	1.18	0.10	1.00	1.00	1.10	0.0	4.31	4.60	4.7
25	6.5	2 Drilled Shafts	0.94	0.07	1.00	1.00	1.10	0.0	5.94	4.36	4.4
26	6.5	2 Drilled Shafts	0.82	0.06	1.00	1.00	1.10	0.0	5.78	4.09	4.1
27	6.5	2 Drilled Shafts	0.59	0.04	1.00	1.00	1.10	0.0	5.63	3.54	3.6
28	6.5	2 Drilled Shafts	0.89	0.08	1.00	1.00	1.10	0.0	4.33	4.09	4.1
29	6.5	2 Drilled Shafts	1.04	0.10	1.00	1.00	1.10	0.0	3.72	4.27	4.3
30	6.5	3 Drilled Shafts	0.76	0.06	1.00	1.00	1.10	0.0	5.07	3.90	3.9
31	6.5	3 Drilled Shafts	0.50	0.04	1.00	1.00	1.10	0.0	5.28	3.28	3.3
32	6.5	3 Drilled Shafts	0.65	0.05	1.00	1.00	1.10	0.0	4.53	3.60	3.6
33	6.5	3 Drilled Shafts	0.73	0.06	1.00	1.00	1.10	0.0	4.09	3.72	3.8

SCOUR ERODIBILITY ANALYSIS

RIGHT OVERBANK

Project: CCR Phase 1
Location: Bridge 35 - Bent 8
Computed: NDM **Date:** 2/11/22
Checked: ST **Date:** 2/21/22

PIER SCOUR DEPTH BY ERODIBILITY INDEX METHOD CHANNEL

Reference HEC 18, 5th Edition, Ch.7, Section 7.13

Channel Bents Boring IB 8-4	Elev (m)	Ys (m)	Rock Erosive Characteristics						100 YEAR FLOOD					500 YEAR FLOOD				
			Ms	Kb	Kd	Js	K	Pc (KW/m^2)	Ys/b (m)	P/Pa	Pa (KW/m^2)	P (KW/m^2)	Scour (y/n)	Ys/b (m)	P/Pa	Pa (KW/m^2)	P (KW/m^2)	Scour (y/n)
Riverbed Level	47.9	0.0																
Top Of ROCK	46.2	1.7	8.39	10.44	1.50	1.00	131.39	38.81	0.86	4.57	1.00	4.56	no	0.86	4.57	1.34	6.10	no
Scour to Elev 100yr	40.8	7.1	8.39	10.44	1.50	1.00	131.39	38.81	3.59	0.66	1.00	0.65	no	3.59	0.66	1.34	0.88	no
Scour to Elev 500yr	39.4	8.5	8.39	10.44	1.50	1.00	131.39	38.81	4.29	0.40	1.00	0.40	no	4.29	0.40	1.34	0.53	no

Gamma = 9800 N/m³

Rho = 1000 kg/m³

Water Surface Elevation 100 YR= 54.35 m

Water Surface Elevation 500 YR= 55.73 m

Slope of EGL (Sf) = 0.004000 (m/m)

Pier W (b) = 1.98 m

Approach Depth 100 YR (y)= 6.45 m

Approach Depth 500 YR (y)= 7.83 m

$$K = (M_s)(K_b)(K_d)(J_s)$$

where:

- K = Erodibility Index
- M_s = Intact rock mass strength parameter
- K_b = Block size parameter
- K_d = Shear strength parameter
- J_s = Relative orientation parameter

$$P_o = K^{0.76}$$

where:

- K = Erodibility Index
- P_c = Critical stream power necessary to initiate scour, KW/m²

$$\frac{P}{P_a} = 8.42 e^{-0.712 \left(\frac{Y_s}{b} \right)}$$

where:

- P = Stream power at the bottom of the scour hole, W/m²
- P_a = Stream power of the approach flow near the stream bed, W/m²
- y_s = Depth of scour hole, m
- b = Pier width perpendicular to the flow direction, m

$$\tau = K_b \gamma R S_f$$

where:

- τ = Design shear stress, lb/ft² (N/m²)
- K_b = Bend coefficient (dimensionless)
- γ = Unit weight of water, lb/ft³
- R = Hydraulic radius (area divided by wetted perimeter), ft (m)
- S_f = Slope of the energy grade line, ft/ft (m/m)

* Use the local approach depth upstream of the pier instead of the hydraulic radius and assume Kb=1 if the stream is relatively straight in the bridge reach

$$P_a = 7.853 \rho \left(\frac{\tau}{\rho} \right)^{3/2}$$

where:

- P_a = Stream power of approach flow, W/m²
- ρ = Mass density of water, 1000 kg/m³
- τ = Bed shear stress of approach flow, N/m² or Pa

Project: CCR Phase 1
Location: Bridge 35 - Bent 9
Computed: NDM **Date:** 2/11/22
Checked: ST **Date:** 2/21/22

PIER SCOUR DEPTH BY ERODIBILITY INDEX METHOD CHANNEL

Reference HEC 18, 5th Edition, Ch.7, Section 7.13

Channel Bents Boring IB 9-4	Elev (m)	Ys (m)	Rock Erosive Characteristics						100 YEAR FLOOD					500 YEAR FLOOD				
			Ms	Kb	Kd	Js	K	Pc (KW/m^2)	Ys/b (m)	P/Pa	Pa (KW/m^2)	P (KW/m^2)	Scour (y/n)	Ys/b (m)	P/Pa	Pa (KW/m^2)	P (KW/m^2)	Scour (y/n)
Riverbed Level	50.6	0.0																
Top Of ROCK	47.9	2.7	8.39	14.84	1.50	1.00	186.76	50.52	1.36	3.19	0.44	1.41	no	1.36	3.19	0.71	2.26	no
Scour to Elev 100yr	45.8	4.8	8.39	14.84	1.50	1.00	186.76	50.52	2.42	1.50	0.44	0.66	no	2.42	1.50	0.71	1.06	no
Scour to Elev 500yr	44.9	5.7	8.39	14.84	1.50	1.00	186.76	50.52	2.88	1.08	0.44	0.48	no	2.88	1.08	0.71	0.77	no

Gamma = 9800 N/m³

Rho = 1000 kg/m³

Water Surface Elevation 100 YR= 54.35 m

Water Surface Elevation 500 YR= 55.73 m

Slope of EGL (Sf) = 0.004000 (m/m)

Pier W (b) = 1.98 m

Approach Depth 100 YR (y)= 3.75 m

Approach Depth 500 YR (y)= 5.13 m

$$K = (M_s)(K_b)(K_d)(J_s)$$

where:

- K = Erodibility Index
- M_s = Intact rock mass strength parameter
- K_b = Block size parameter
- K_d = Shear strength parameter
- J_s = Relative orientation parameter

$$P_o = K^{0.76}$$

where:

- K = Erodibility Index
- P_c = Critical stream power necessary to initiate scour, KW/m²

$$\frac{P}{P_a} = 8.42 e^{-0.712 \left(\frac{Y_s}{b} \right)}$$

where:

- P = Stream power at the bottom of the scour hole, W/m²
- P_a = Stream power of the approach flow near the stream bed, W/m²
- y_s = Depth of scour hole, m
- b = Pier width perpendicular to the flow direction, m

$$\tau = K_b \gamma R S_f$$

where:

- τ = Design shear stress, lb/ft² (N/m²)
- K_b = Bend coefficient (dimensionless)
- γ = Unit weight of water, lb/ft³
- R = Hydraulic radius (area divided by wetted perimeter), ft (m)
- S_f = Slope of the energy grade line, ft/ft (m/m)

* Use the local approach depth upstream of the pier instead of the hydraulic radius and assume Kb=1 if the stream is relatively straight in the bridge reach

$$P_a = 7.853 \rho \left(\frac{\tau}{\rho} \right)^{3/2}$$

where:

- P_a = Stream power of approach flow, W/m²
- ρ = Mass density of water, 1000 kg/m³
- τ = Bed shear stress of approach flow, N/m² or Pa

APPENDIX M

NO-IMPACT CERTIFICATION LETTER

ENGINEERING “NO-IMPACT” CERTIFICATION

This is to certify that I am a duly qualified engineer licensed to practice in the State of South Carolina. It is to further certify that the attached technical data supports the fact that the proposed Bridge Replacement over the Saluda River in Lexington and Richland County, South Carolina meets the South Carolina Department of Transportation requirements for a project to be considered “No Impact”. Based on these guidelines, the project will not negatively impact the 100-year base flood or floodway elevations along the Saluda River shown on Flood Insurance Rate Map Panel 45063C0163J, dated July 5, 2018.

3/06/2022

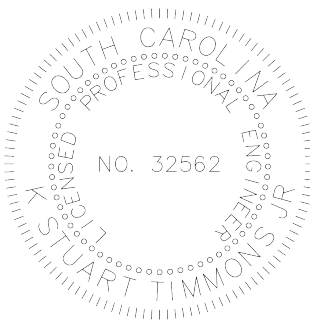
Date

Seal:

K Stuart Timmons Jr.

(Signature)

K. Stuart Timmons Jr., P.E.
Water Resources Project Manager
Infrastructure Consulting & Engineering, PLLC
481 Garlington Road Suite L
Greenville, SC 29615



APPENDIX N

SITE PHOTOS



Upstream of the existing I-26 bridge



Upstream looking at ROB



Existing square column



Downstream looking upstream

APPENDIX O

EXISTING BRIDGE PLANS

INDEX OF SHEETS

1. Title Sheet
2. Traffic Control Devices
3. Flared Curb & Gutter
4. Concrete Block Slope Drains
5. Standard Welding Sheet
6. Road Plan & Profile Sheet
7. Bridge Plan & Profile Sheet
8. General Plan
9. Standard Notes
10. Standard Details
11. End Bent 1
12. Interior Bents 2 thru 10
13. Details for Interior Bents 2 thru 10
14. End Bent 11
15. Pretensioned Concrete Beams
16. 70 Ft. Span
17. Details of 70 Ft. Span
18. Details of End Posts, Aluminum Rail, & Light Brackets

SOUTH CAROLINA STATE HIGHWAY DEPARTMENT COLUMBIA

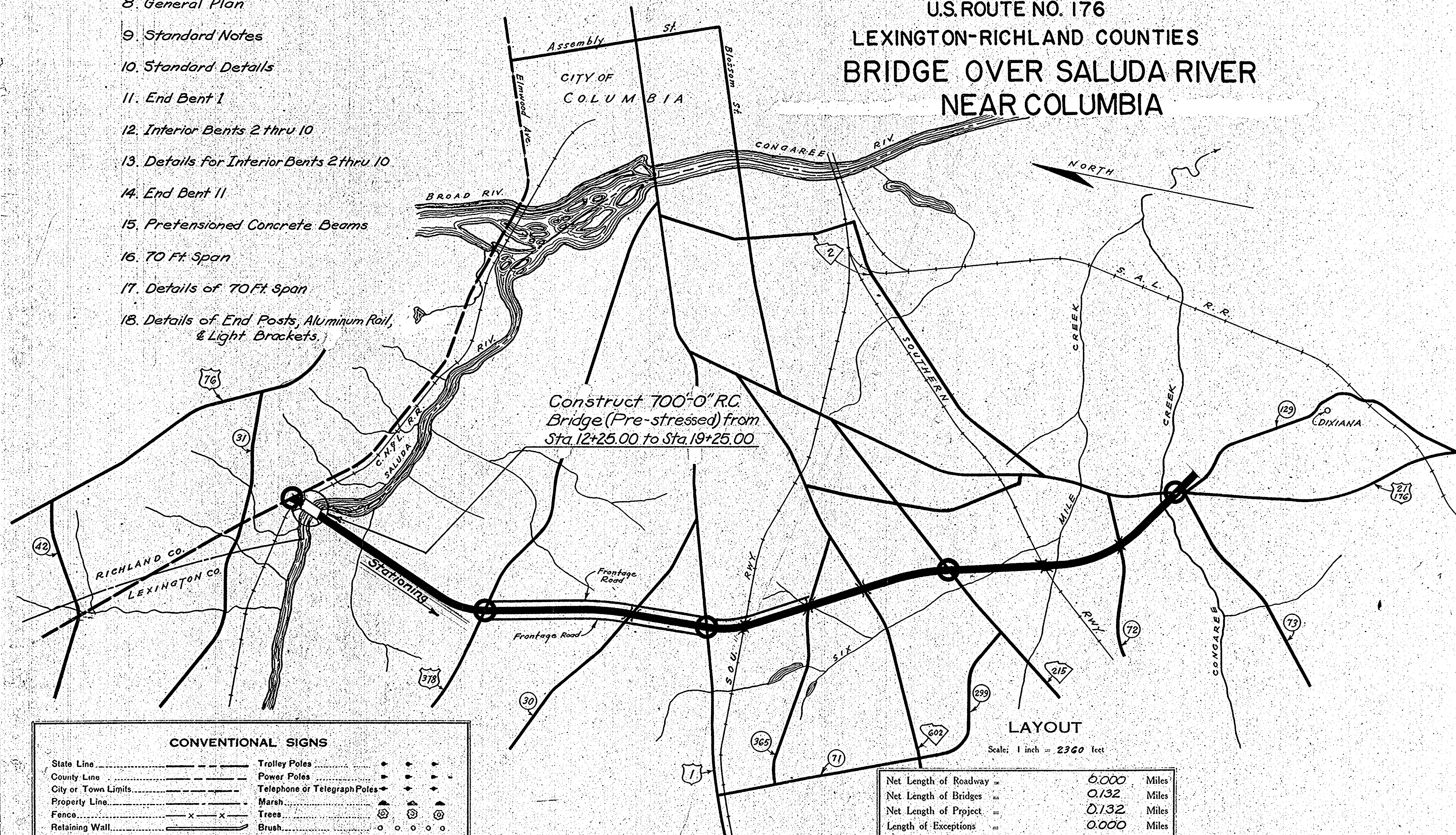
PLAN AND PROFILE OF PROPOSED STATE HIGHWAY

FED. AID PROJECT NO. I-304-2(5)
DOCKET NO. 3240.253
U.S. ROUTE NO. 176

LEXINGTON-RICHLAND COUNTIES BRIDGE OVER SALUDA RIVER NEAR COLUMBIA

SUMMARY OF ESTIMATED QUANTITIES

	SUB- STRUCTURE	SUPER STRUCTURE	TOTALS
Dry Excavation	405 C.Y.	—	405 C.Y.
Wet Excavation	1310 C.Y.	—	1310 C.Y.
Rock Excavation	450 C.Y.	—	450 C.Y.
Concrete-Class "A"	1888.5 C.Y.	1313.4 C.Y.	3201.9 C.Y.
Reinforcing Steel	139,128 Lbs.	275,104 Lbs.	414,232 Lbs.
Steel Bearing Piling (10 in. 42 lbs.)	700 L.F.	—	700 L.F.
Concrete Block Slope Drains	—	45 L.F.	45 L.F.
Fabricated Metal Handrailing (Aluminum)	—	1400 L.F.	1400 L.F.
70 Ft. Prestressed Concrete Beams	—	100 Ea.	100 Ea.
Cofferdams (Int. Bents 2 thru 10)	9 Ea.	—	9 Ea.

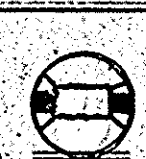


CONVENTIONAL SIGNS

State Line	Trolley Poles
County Line	Power Poles
City or Town Limits	Telephone or Telegraph Poles
Property Line	Marsh
Fence	Trees
Retaining Wall	Brush
Existing Road	Stumps
Q and R.O.W. Lines of	Buildings
Proposed Road	Bridge
Railroad	Concrete Box Culvert
Levee or Embankment	Pipe Culvert
Guard Rail	Drop Inlet and Culvert
Point of Intersection (P. I.)	Hub on Center Line

LEGEND

PROPOSED PROJECT
OTHER ROADS



LAYOUT

Scale: 1 inch = 2360 feet

Net Length of Roadway	0.000	Miles
Net Length of Bridges	0.132	Miles
Net Length of Project	0.132	Miles
Length of Exceptions	0.000	Miles
Gross Length of Project	0.132	Miles

Equalities in Stationing

Note: All workmanship and material on this project to conform with South Carolina State Highway Department Standard Specifications for Highway Construction dated Nov. 1, 1955

APPROVED:

S. M. Pearson 8-7-57
STATE HIGHWAY ENGINEER DATE

DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS

APPROVED

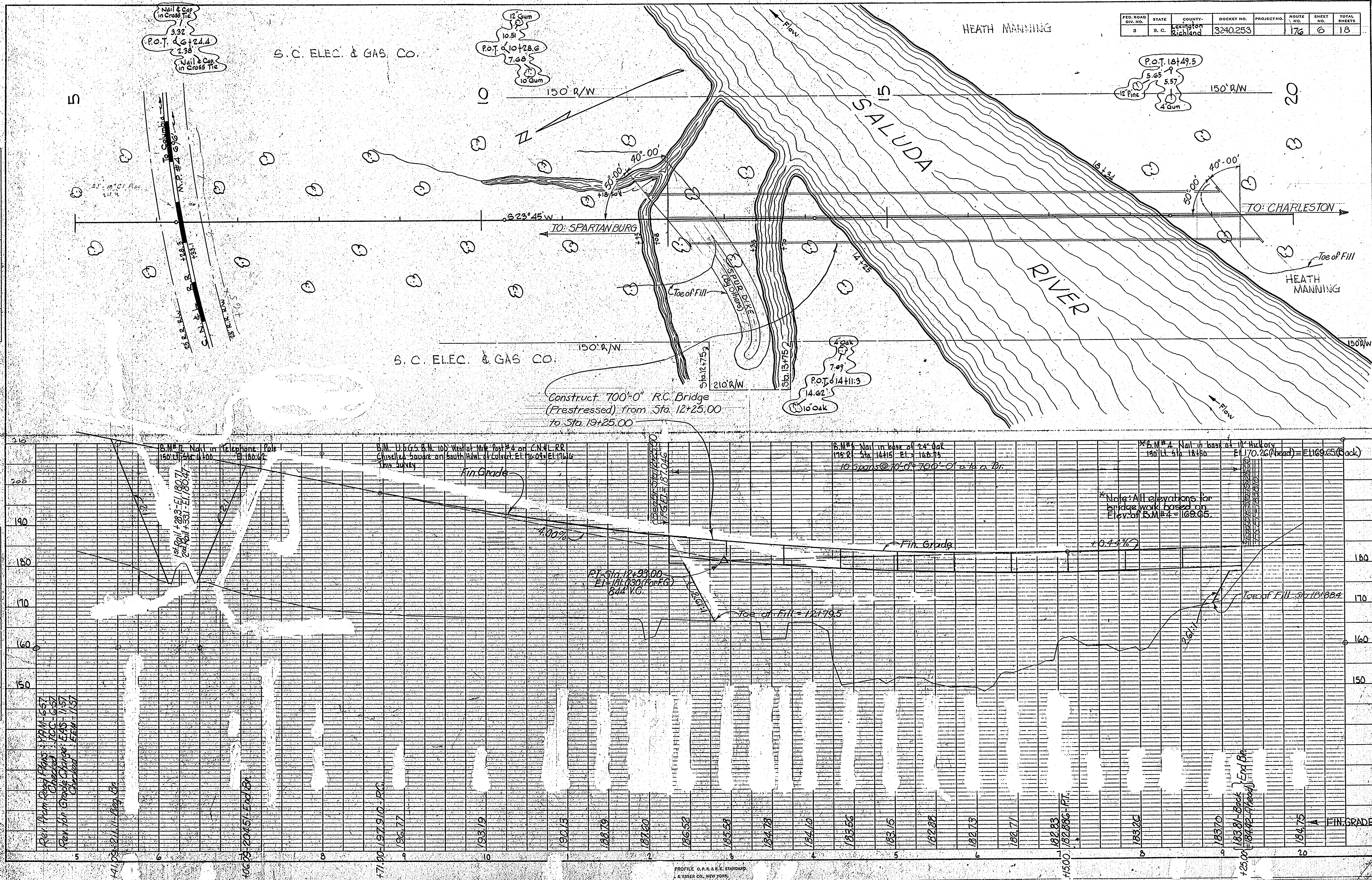
DISTRICT ENGINEER

DATE

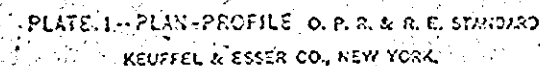
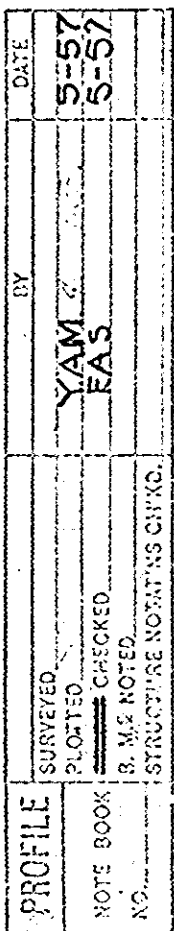
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DESIGNED			
PLOTTED			
CHECKED			
NO.			

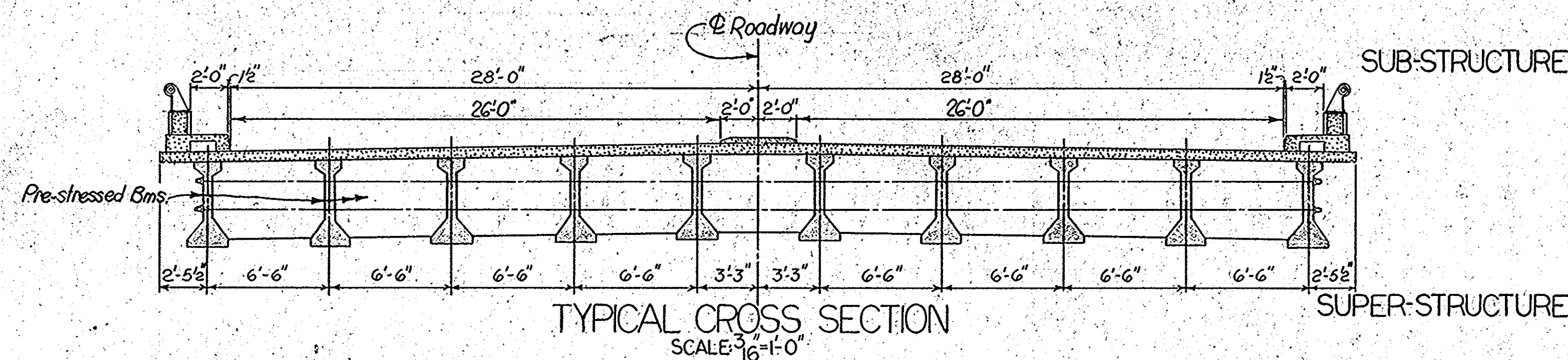
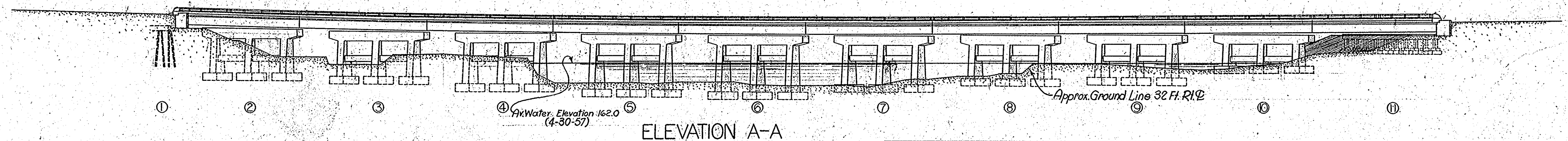
PROFILE	DATE	BY	CHKD.
DESIGNED			
PLOTTED			
CHECKED			
NO.			

FED. ROAD DIV. NO.	STATE	COUNTY	DOCKET NO.	PROJECT NO.	ROUTE NO.	SHEET NO.	TOTAL SHEETS
3	S. C.	Richland	3240.253		176	6	18



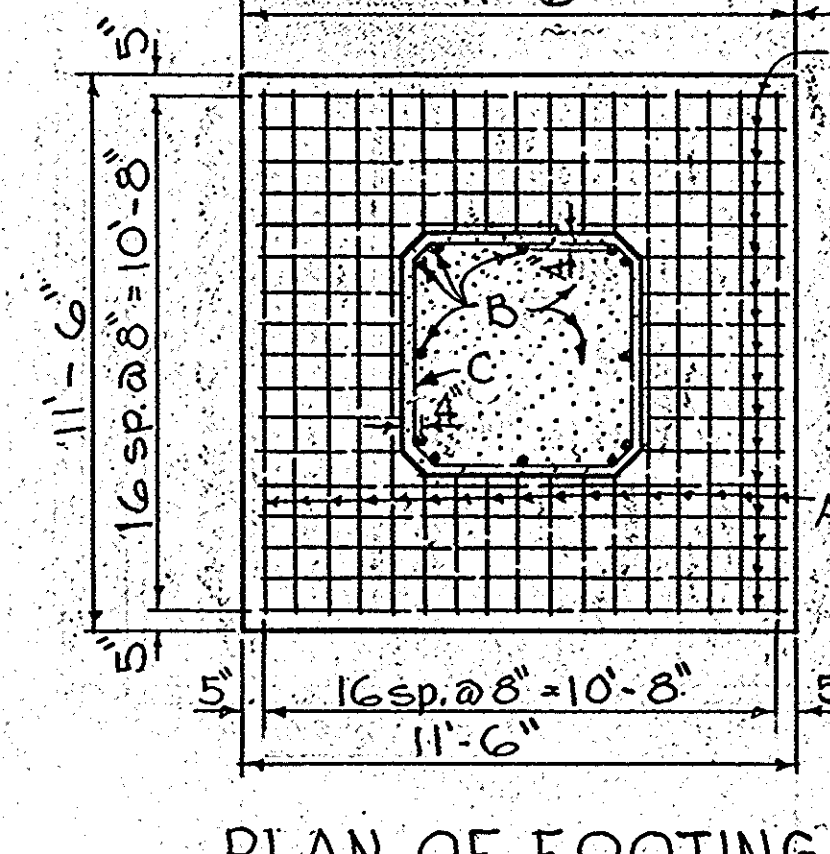
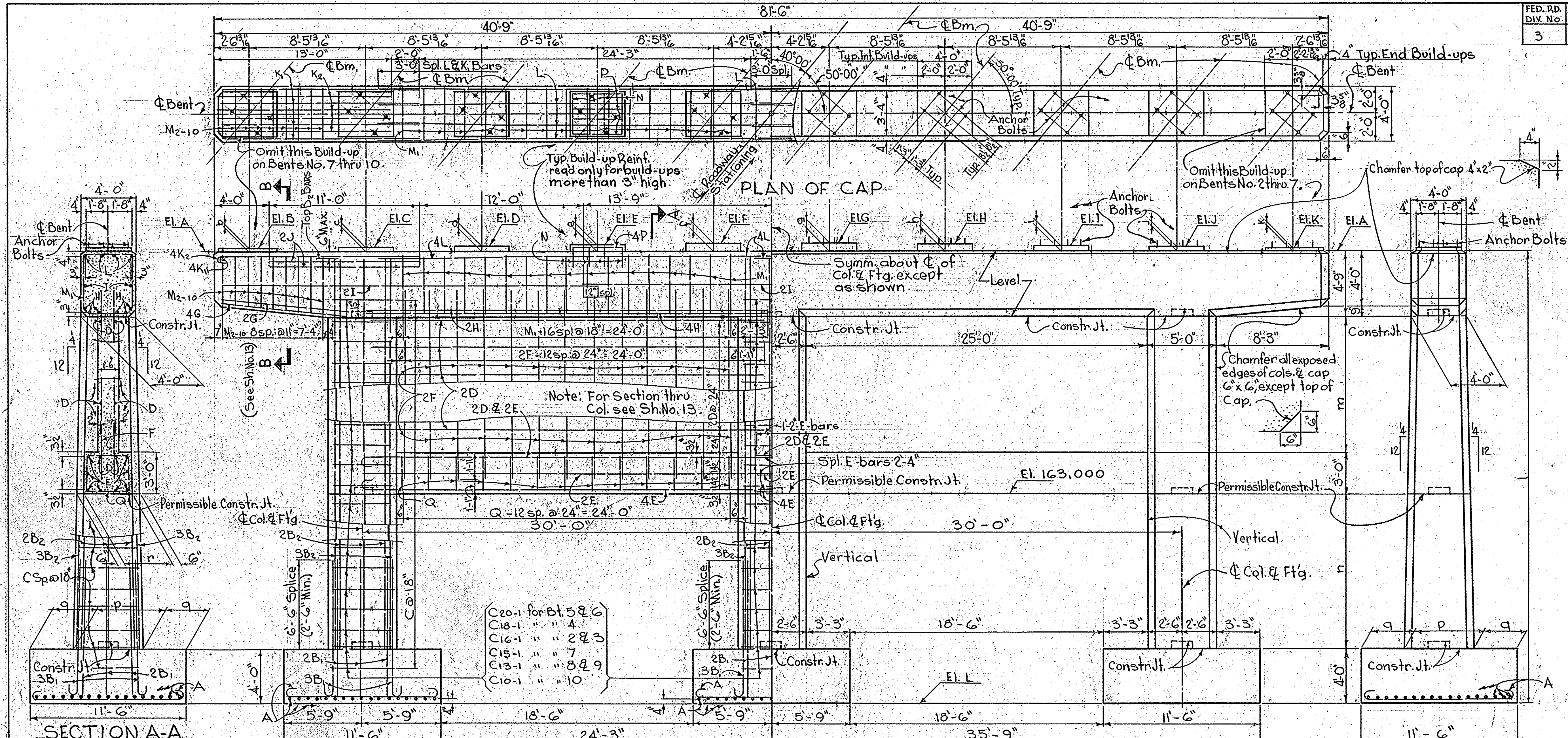
PLAN	SURVIVED	BY	DATE
NOTE BOOK	PLOTTED	YAM	5-57
NO.	CHECKED	EAS	5-57
	RY OF WAY CHECKED		





- ① Includes 04 G.Y. for 2 Light Brackets.
- ② Includes 08 G.Y. for 4 Light Brackets.
- ③ Includes 204 Lbs. for 2 Light Brackets.
- ④ Includes 388 Lbs. for 4 Light Brackets.

DOCKET NO. 3240.253 U.S. RT. NO. 176
COUNTY: LEXINGTON-RICHLAND MAY 1957
SCALE: 1" = 30'-0", OR AS NOTED.



MAXIMUM FOOTING REACTION		EXT. FTG.	INT. FTG.
Dead Load, Bent		288 K	347 K
Dead Load, Superstructure		359 K	255 K
Live Load, Superstructure		111 K	127 K
Backfill (5 Ft. Net Wt.)		31 K	31 K
Buoyancy (Water: El. = 160.0)		52 K	52 K
Total of Above		737 K	708 K
Average Bearing		2.8%	2.7%
Maximum Bearing at Edge of Footing Due to Wind:			
Wind on Superstructure		0.6%	0.6%
Wind on Sub-structure		0.6%	0.9%
Maximum Condition:			
Wind		2.4%	2.2%
Total (125% of Normal Stress)		3.6%	3.7%
Normal Stress		2.9%	3.0%

TABLE OF ELEVATIONS												
ELEV. →	A	B	C	D	E	F	G	H	I	J	K	L
Bent 2	179.426	180.293	180.294	180.292	180.297	180.298	180.201	180.008	179.811	179.620	---	150.426
3	178.408	179.095	179.117	179.135	179.159	179.181	179.104	178.931	178.754	178.583	---	148.909
4	177.650	178.155	178.197	178.235	178.280	178.321	178.265	178.112	177.954	177.804	---	145.650
5	177.149	177.473	177.535	177.593	177.658	177.720	177.683	177.550	177.413	177.283	---	142.649
6	176.905	177.049	177.131	177.209	177.294	177.376	177.360	177.246	177.129	177.019	---	141.905
7	176.883	---	176.984	177.083	177.188	177.289	177.292	177.199	177.101	177.011	---	148.883
8	176.969	---	177.091	177.209	177.334	177.455	177.478	177.403	177.323	177.248	177.168	152.969
9	177.260	---	177.388	177.511	177.639	177.762	177.786	177.711	177.631	177.556	177.476	153.260
10	177.568	---	177.696	177.819	177.947	178.070	178.094	178.019	177.939	177.864	177.784	157.068

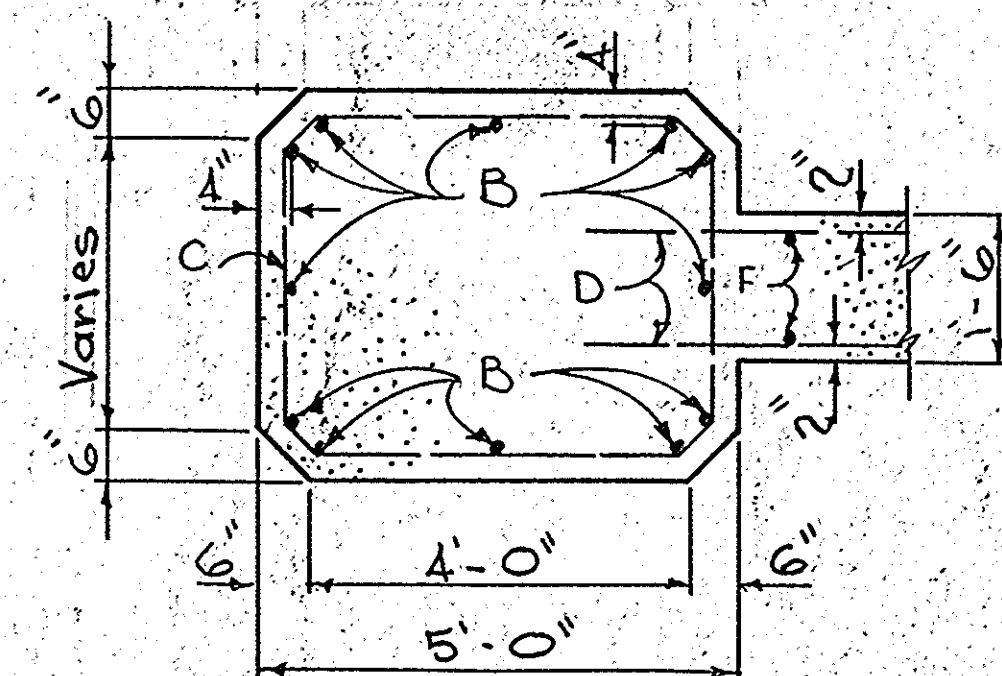
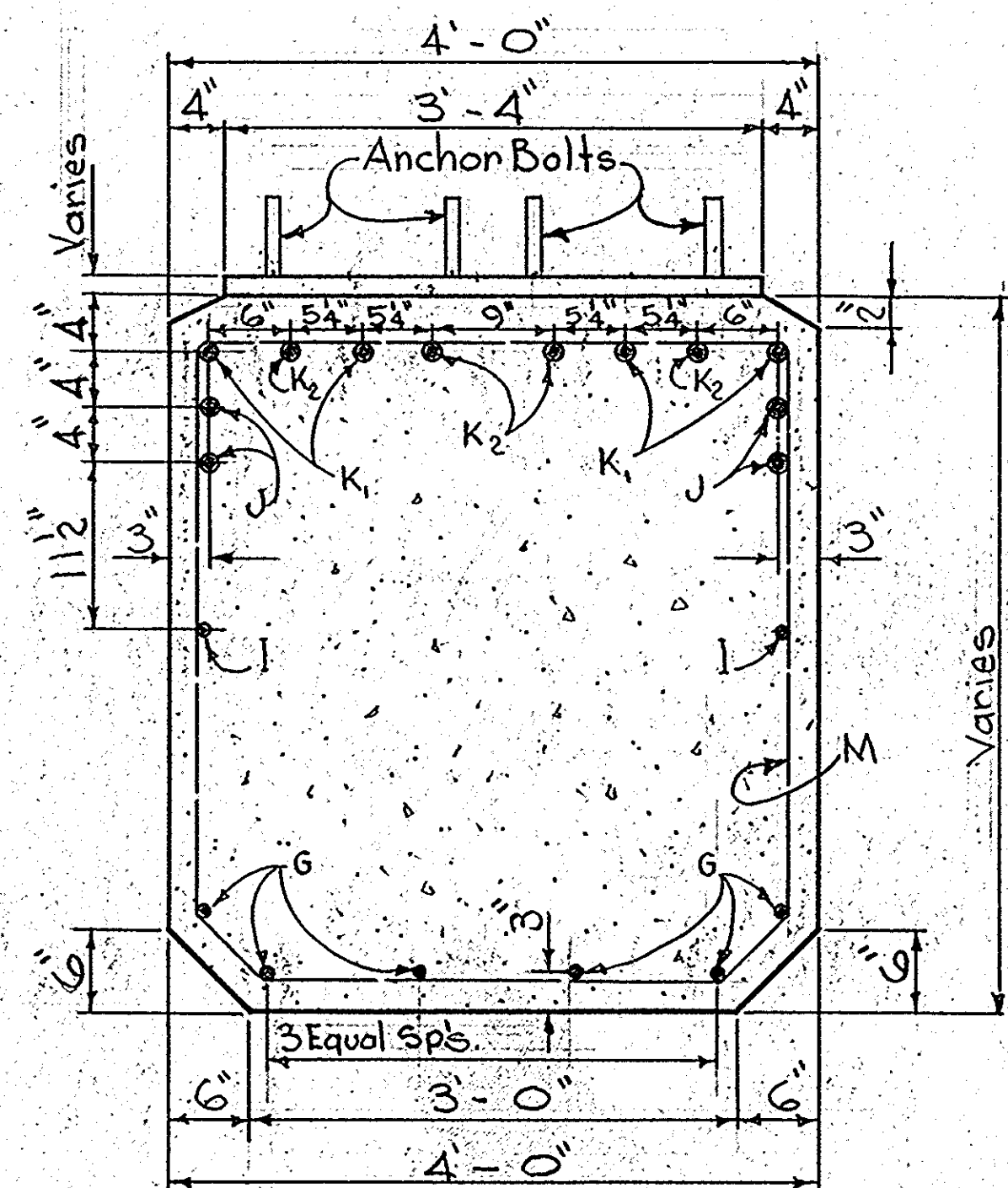
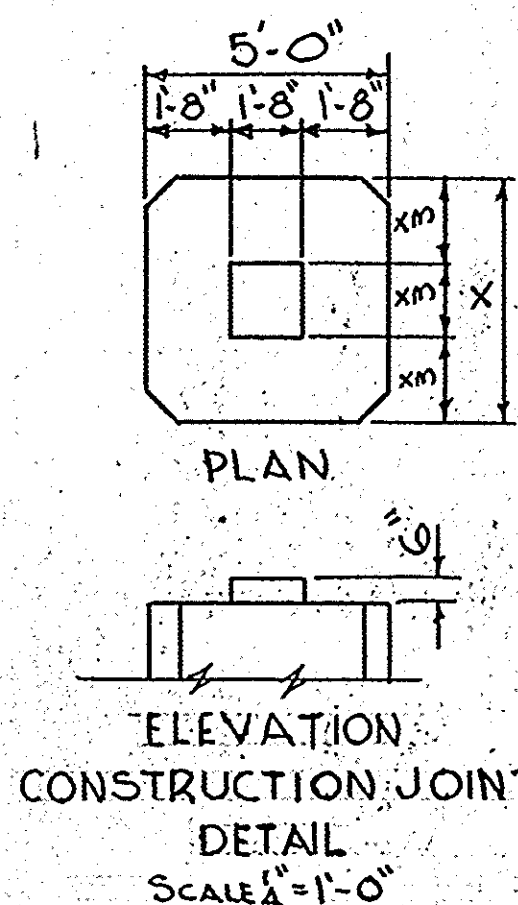
TABLE OF DIMENSIONS																
DIM. →	b	c	d	e	f	g	h	i	j	k	l	m	n	p	q	r
Bent 2	10'-8"	10'-6"	10'-3"	10'-0"	9'-6"	9'-0"	8'-6"	8'-0"	7'-6"	7'-0"	6'-6"	6'-0"	5'-6"	5'-0"	4'-6"	4'-0"
3	8'-6"	8'-0"	7'-6"	7'-0"	6'-6"	6'-0"	5'-6"	5'-0"	4'-6"	4'-0"	3'-6"	3'-0"	2'-6"	2'-0"	1'-6"	1'-0"
4	6'-0"	6'-0"	5'-6"	5'-0"	4'-6"	4'-0"	3'-6"	3'-0"	2'-6"	2'-0"	1'-6"	1'-0"	0'-6"	0'-0"	0'-0"	0'-0"
5	3'-6"	4'-0"	4'-6"	5'-0"	5'-6"	6'-0"	6'-6"	7'-0"	7'-6"	8'-0"	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"
6	1'-6"	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	5'-0"	5'-6"	6'-0"	6'-6"	7'-0"	7'-6"	8'-0"	8'-6"	9'-0"
7	---	1'-6"	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	5'-0"	5'-6"	6'-0"	6'-6"	7'-0"	7'-6"	8'-0"	8'-6"
8	---	---	1'-6"	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	5'-0"	5'-6"	6'-0"	6'-6"	7'-0"	7'-6"	8'-0"
9	---	---	---	1'-6"	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	5'-0"	5'-6"	6'-0"	6'-6"	7'-0"	7'-6"
10	---	---	---	---	1'-6"	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	5'-0"	5'-6"	6'-0"	6'-6"	7'-0"

For Standard Notes see Sheet No. 9.
 Anchor bolts to be paid for as reinforcing steel and are included in Bent Quantities.
 Build-ups to be cast monolithic with cap.
 Footings may be lowered a maximum of 4'-0" with out providing additional vertical column reinforcing by decreasing the length of splice at top of footings.
 For Standard Details including Hook Details, Detail of Anchor Bolt and Anchor Bolt Schedule, See Sh. No. 10.

This sheet to accompany Sh. No. 13

REV. E.E.M. 11-57
 QUANT. J.C. 5-57
 TR. W.C.F. 5-57
 DR. E.A.S. 5-57
 DES. E.A.S. 5-57
 BY C.K.D. DATE

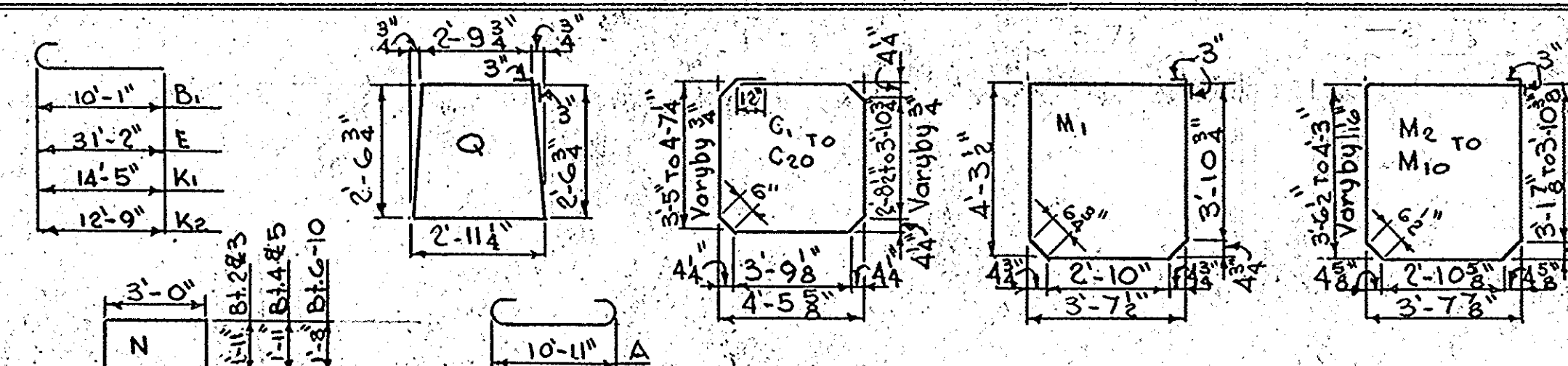
S. C. STATE HIGHWAY DEPARTMENT
 COLUMBIA
INTERIOR BENTS 2-10
 FOR BRIDGE OVER
SALUDA RIVER
 NEAR COLUMBIA
 DOCKET NO. 3240.253 ROUTE NO. 176
 COUNTY: LEXINGTON-RICHLAND DATE: MAY 1957
 SCALE: 1" = 1'-0" OR AS NOTED



REINFORCING STEEL SCHEDULE

MARK	Size	BENT No. 2	BENT No. 3	BENT No. 4	BENT No. 5	BENT No. 6	BENT No. 7	BENT No. 8	BENT No. 9	BENT No. 10	
		HT = 29'-0"	HT = 29'-0"	HT = 32'-0"	HT = 34'-0"	HT = 35'-0"	HT = 28'-0"	HT = 24'-0"	HT = 24'-0"	HT = 20'-0"	D
A	5	102 12'-3"	102 12'-3"	102 12'-3"	102 12'-3"	102 12'-3"	102 12'-3"	102 12'-3"	102 12'-3"	102 12'-3"	B
B ₁	10	36 11'-1"	36 11'-1"	36 11'-1"	36 11'-1"	36 11'-1"	36 11'-1"	36 11'-1"	36 11'-1"	36 11'-1"	B
B ₂	10	36 24'-9"	36 25'-3"	36 27'-9"	36 30'-3"	36 30'-9"	36 23'-9"	36 19'-9"	36 19'-9"	36 16'-3"	S
C ₁ TO C ₁₀	3	3ea 15-11 1017-1 Vary by 12	3ea 15-11 1017-1 Vary by 12	3ea 15-11 1017-1 Vary by 12	3ea 15-11 1017-1 Vary by 12	3ea 15-11 1017-1 Vary by 12	3ea 15-11 1017-1 Vary by 12	3ea 15-11 1017-1 Vary by 12	3ea 15-11 1017-1 Vary by 12	3ea 15-11 1017-1 Vary by 12	B
C ₁₁ TO C ₁₃	3	3ea 17-2 1017-5 Vary by 12	3ea 17-2 1017-5 Vary by 12	3ea 17-2 1017-5 Vary by 12	3ea 17-2 1017-5 Vary by 12	3ea 17-2 1017-5 Vary by 12	3ea 17-2 1017-5 Vary by 12	3ea 17-2 1017-5 Vary by 12	3ea 17-2 1017-5 Vary by 12	3ea 17-2 1017-5 Vary by 12	B
C ₁₄	3	3 17'-7"	3 17'-7"	3 17'-7"	3 17'-7"	3 17'-7"	3 17'-7"	3 17'-7"	3 17'-7"	3 17'-7"	B
C ₁₅	3	3 17'-8"	3 17'-8"	3 17'-8"	3 17'-8"	3 17'-8"	3 17'-8"	3 17'-8"	3 17'-8"	3 17'-8"	B
C ₁₆	3	3 17'-10"	3 17'-10"	3 17'-10"	3 17'-10"	3 17'-10"	3 17'-10"	3 17'-10"	3 17'-10"	3 17'-10"	B
C ₁₇	3	3 17'-11"	3 17'-11"	3 17'-11"	3 17'-11"	3 17'-11"	3 17'-11"	3 17'-11"	3 17'-11"	3 17'-11"	B
C ₁₈	3	3 18'-1"	3 18'-1"	3 18'-1"	3 18'-1"	3 18'-1"	3 18'-1"	3 18'-1"	3 18'-1"	3 18'-1"	B
C ₁₉	3	3 18'-2"	3 18'-2"	3 18'-2"	3 18'-2"	3 18'-2"	3 18'-2"	3 18'-2"	3 18'-2"	3 18'-2"	B
C ₂₀	3	3 18'-4"	3 18'-4"	3 18'-4"	3 18'-4"	3 18'-4"	3 18'-4"	3 18'-4"	3 18'-4"	3 18'-4"	B
D	5	20 28'-10"	16 28'-10"	16 28'-10"	16 28'-10"	16 28'-10"	16 28'-10"	16 28'-10"	16 28'-10"	16 28'-10"	S
E	9	16 32'-2"	16 32'-2"	16 32'-2"	16 32'-2"	16 32'-2"	16 32'-2"	16 32'-2"	16 32'-2"	16 32'-2"	B
F	5	52 12'-6"	52 11'-6"	52 10'-8"	52 10'-8"	52 10'-8"	52 10'-8"	52 10'-8"	52 10'-8"	52 10'-8"	S
G	6	12 9'-7"	12 9'-7"	12 9'-7"	12 9'-7"	12 9'-7"	12 9'-7"	12 9'-7"	12 9'-7"	12 9'-7"	S
H	8	12 29'-6"	12 29'-6"	12 29'-6"	12 29'-6"	12 29'-6"	12 29'-6"	12 29'-6"	12 29'-6"	12 29'-6"	S
I	4	6 27'-6"	6 27'-6"	6 27'-6"	6 27'-6"	6 27'-6"	6 27'-6"	6 27'-6"	6 27'-6"	6 27'-6"	S
J	11	8 11'-0"	8 11'-0"	8 11'-0"	8 11'-0"	8 11'-0"	8 11'-0"	8 11'-0"	8 11'-0"	8 11'-0"	S
K ₁	11	8 15'-5"	8 15'-5"	8 15'-5"	8 15'-5"	8 15'-5"	8 15'-5"	8 15'-5"	8 15'-5"	8 15'-5"	B
K ₂	11	8 13'-9"	8 13'-9"	8 13'-9"	8 13'-9"	8 13'-9"	8 13'-9"	8 13'-9"	8 13'-9"	8 13'-9"	B
L	8	8 30'-3"	8 30'-3"	8 30'-3"	8 30'-3"	8 30'-3"	8 30'-3"	8 30'-3"	8 30'-3"	8 30'-3"	S
M ₁	4	34 15'-11"	34 15'-11"	34 15'-11"	34 15'-11"	34 15'-11"	34 15'-11"	34 15'-11"	34 15'-11"	34 15'-11"	B
M ₂ TO M ₁₀	4	2ea 14-5 1015-10 Vary by 28	2ea 14-5 1015-10 Vary by 28	2ea 14-5 1015-10 Vary by 28	2ea 14-5 1015-10 Vary by 28	2ea 14-5 1015-10 Vary by 28	2ea 14-5 1015-10 Vary by 28	2ea 14-5 1015-10 Vary by 28	2ea 14-5 1015-10 Vary by 28	2ea 14-5 1015-10 Vary by 28	B
N	4	32 6'-10"	32 6'-10"	32 6'-10"	32 6'-10"	32 6'-10"	32 6'-10"	32 6'-10"	32 6'-10"	32 6'-10"	B
P	4	32 3'-8"	32 3'-8"	32 3'-8"	32 3'-8"	32 3'-8"	32 3'-8"	32 3'-8"	32 3'-8"	32 3'-8"	S
Q	4	26 11'-5"	26 11'-5"	26 11'-5"	26 11'-5"	26 11'-5"	26 11'-5"	26 11'-5"	26 11'-5"	26 11'-5"	B

BENDING DETAILS



QUANTITIES

ITEM	BENT No. 2	BENT No. 3	BENT No. 4	BENT No. 5	BENT No. 6	BENT No. 7	BENT No. 8	BENT No. 9	BENT No. 10
Dry Excavation C.Y.	95		110	175	145	60	165	90	150
Wet Excavation C.Y.	220	275		45	45	45	45	45	70
Rock Excavation C.Y.	45	45	45	45	45	45	45	45	45
Concrete, Class A C.Y.	209.2	207.0	211.0	215.8	216.1	196.9	187.3	188.2	180.5
Reinforcing Steel Lb	*14,943	*14,847	*15,229	*15,658	*15,645	*14,431	*13,825	*13,825	*13,225

*Includes 40 Anchor Bolt Assemblies (Wt. = 208 Lbs).

NOTES:

For Standard Notes see Sh. No. 9.
For Standard Details including Hook Details, Detail of Anchor Bolt and Anchor Bolt Schedule, see Sh. No. 10.
Anchor Bolts to be paid for as Reinforcing Steel and are included in Bent Quantities.

This sheet to accompany sheet No. 12.

S. C. STATE HIGHWAY DEPARTMENT
COLUMBIA

DETAILS FOR
INTERIOR BENTS 2-10
FOR BRIDGE OVER
SALUDA RIVER
NEAR COLUMBIA

DOCKET NO. 3240/253 ROUTE NO. 176
COUNTY: LEXINGTON-RICHLAND DATE: MAY 1957
SCALE AS NOTED

REV.	NO.	DATE	BY	CHKD	DATE
1	1	7-57	S.B.		
2	2	7-57	S.B.		
3	3	7-57	S.B.		
4	4	7-57	S.B.		
5	5	7-57	S.B.		
6	6	7-57	S.B.		
7	7	7-57	S.B.		
8	8	7-57	S.B.		
9	9	7-57	S.B.		
10	10	7-57	S.B.		

FED. RD. DIV. NO.	STATE	COUNTY	DOCKET NO.	ROUTE NO.	SHEET NO.	TOTAL SHEETS
3	S.C.	LEXINGTON RICHLAND	3240.253	US.176	14	18

REINFORCING STEEL SCHEDULE					
MARK	SIZE	NO.	REQD.	LENGTH	D
A	4	70		6'-5"	B
B	4	110		4'-5"	B
C	8	40		10'-4"	B
D	3	40		7'-0"	B
E	8	8		42'-3"	B
F	4	4		40'-3"	S
G	8	8		40'-9"	S
H	4	54		9'-0"	B
I	4	21		5'-2"	B
J	4	21		2'-8"	S

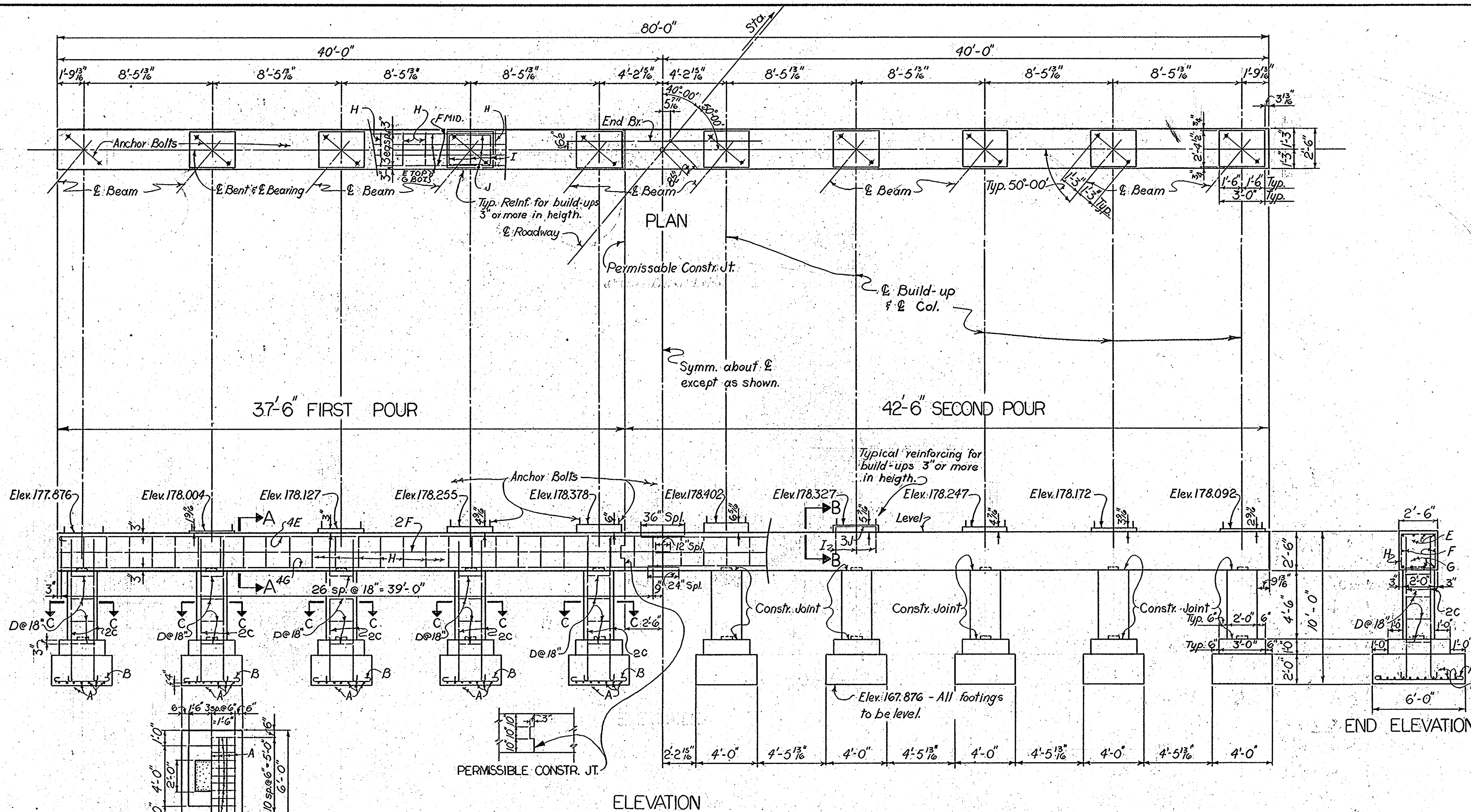
BENDING DETAILS			

Notes:
 For Standard Notes See Sh. No. 9.
 For Standard Details including Hook Details, Detail of Anchor Bolts, and Anchor Bolt Schedule, See Sh. No. 10.

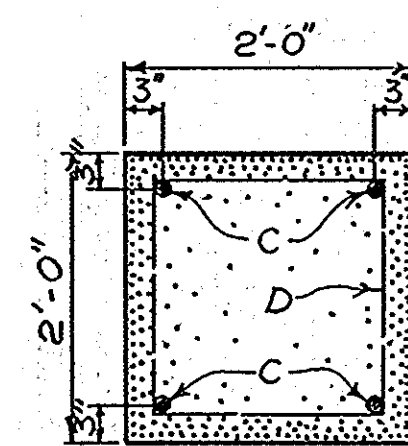
QUANTITIES		
DRY EXCAVATION,		160 C.Y.
ROCK EXCAVATION,		45 C.Y.
CONCRETE CLASS "A",		48.2 C.Y.
REINFORCING STEEL,		4252 LBS.

* Includes 104 Lbs. for Anchor Bolt Assemblies.

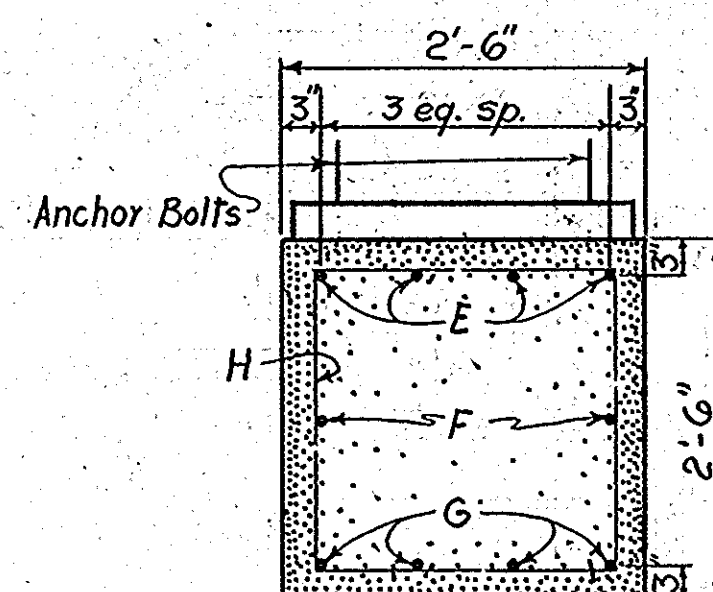
S.C. STATE HIGHWAY DEPARTMENT
 COLUMBIA
 END BENT NO. 11
 FOR BRIDGE OVER
 SALUDA RIVER
 NEAR COLUMBIA
 DOCKET NO. 3240.253 U.S. RT. NO. 176
 COUNTY: LEXINGTON-RICHLAND MAY 1957
 SCALE: 1/4"=1'-0", EXCEPT AS NOTED



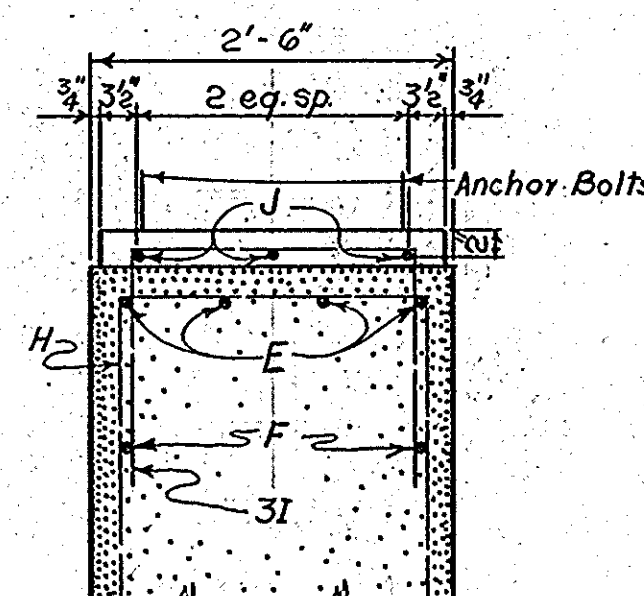
PLAN OF FOOTING



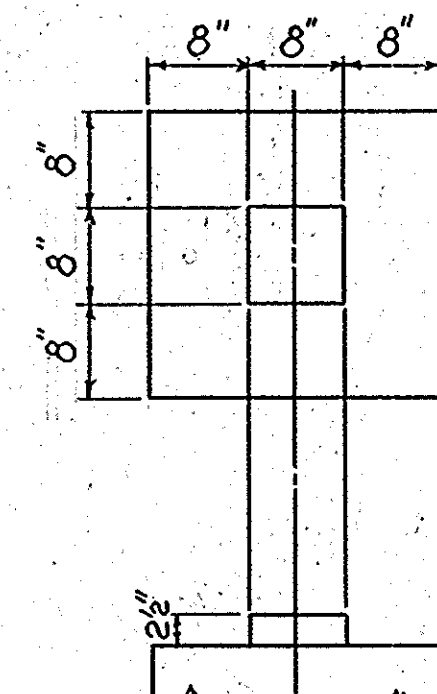
SECTION C-C
SCALE: 3/4"=1'-0"



SECTION A-A
SCALE: 3/4"=1'-0"



SECTION B-B
SCALE: 3/4"=1'-0"



CONSTR. JOINT
DETAIL
SCALE: 3/4"=1'-0"

REV.	BY	CHKD	DATE
QUANT.	JCC	WCF	5-57
TR.	JCC	WCF	5-57
DES.	JCC	WCF	5-57
BY	CHKD	DATE	

APPENDIX P

PROPOSED BRIDGE PLANS



South Carolina Department of Transportation



PROPOSED PLANS
FOR
LEXINGTON/RICHLAND COUNTY
PROJECT ID P039718
I-26 TO I-20 FUTURE RAMPS AND
RAMP I-26 WB TO I-126 EB
BRIDGE OVER SALUDA RIVER AND CSX R.R.

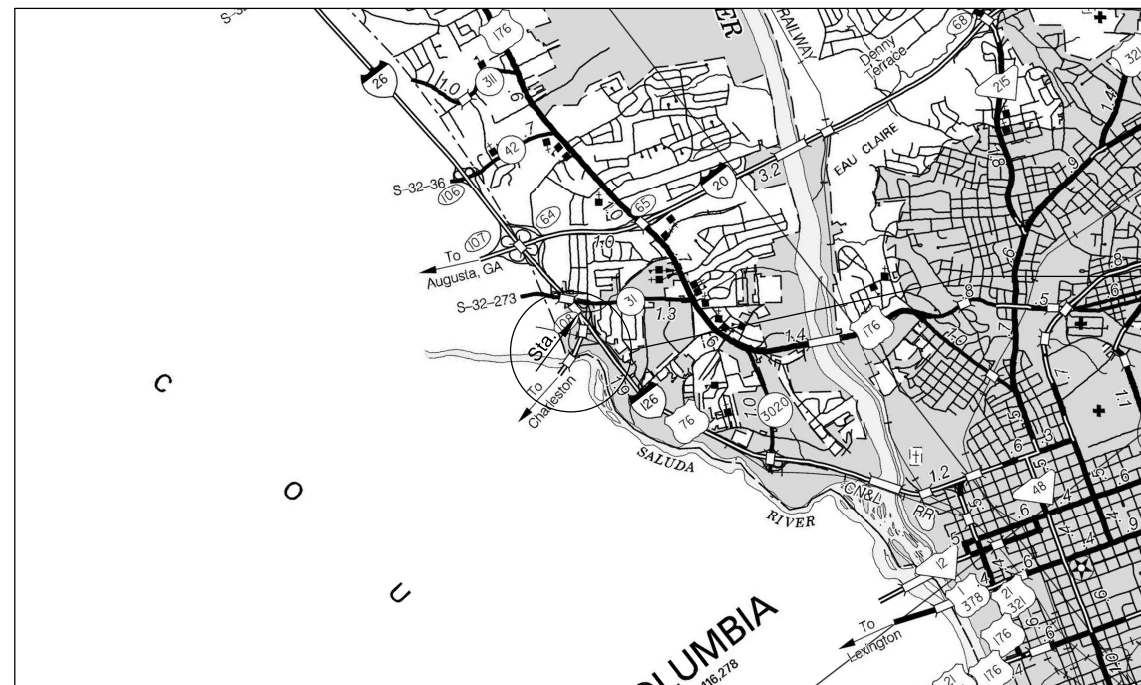
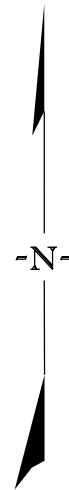
Submit Shop Plans to:

Infrastructure Consulting & Engineering
110 Midlands Court
West Columbia, SC 29169

Telephone: (803) 822-0333

Approximate Location of Bridge is

Latitude 34°01'26" N
Longitude 81°06'11" W



— SITE LOCATION

LAYOUT

NET LENGTH OF ROADWAY	0.000	MILES
NET LENGTH OF BRIDGES	0.628	MILES
NET LENGTH OF PROJECT	0.628	MILES
LENGTH OF EXCEPTIONS	0.000	MILES
GROSS LENGTH OF PROJECT	0.628	MILES

NOTE: EXCEPT AS MAY OTHERWISE BE SPECIFIED ON THE PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIALS AND WORKMANSHIP ON THIS PROJECT SHALL CONFORM TO THE SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (2007 EDITION) AND THE STANDARD DRAWINGS FOR ROAD CONSTRUCTION IN EFFECT AT THE TIME OF THE RELEASE OF THE FINAL RFP.

PLANS PREPARED BY:



110 MIDLANDS COURT
WEST COLUMBIA, SC 29169
Telephone: (803) 822-0333

ENGINEER OF RECORD

FOR CONSTRUCTION : _____ DATE _____

3 DAYS BEFORE DIGGING IN
SOUTH CAROLINA
CALL 811
SOUTH CAROLINA 811 (SC811)
WWW.SC811.COM
ALL UTILITIES MAY NOT BE A MEMBER OF SC811

ASSET IDS 10658 (SALUDA RIVER)
10667 (CSX RAILROAD)

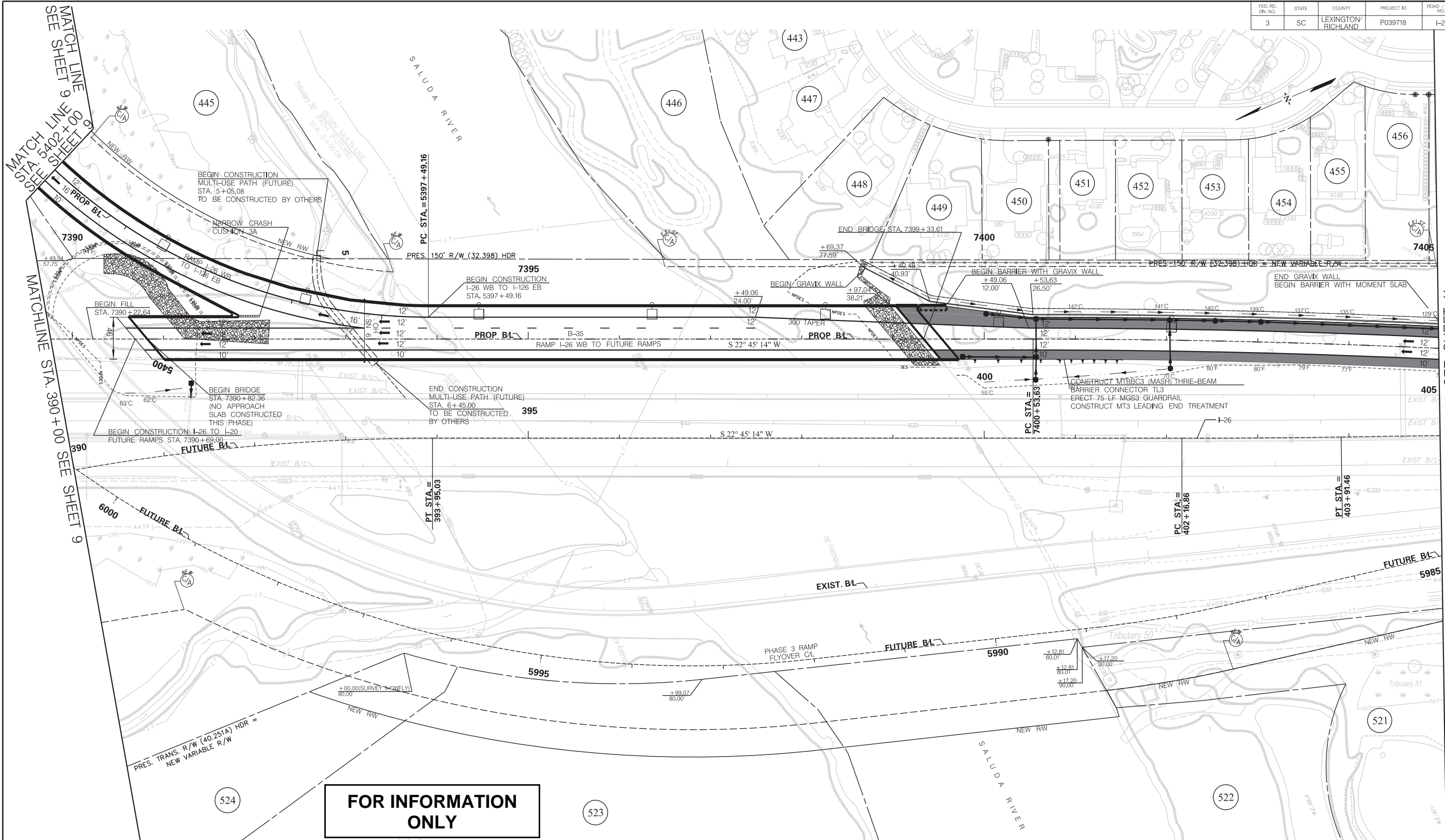
TRAFFIC DATA

<u>2020</u>	ADT	<u>5,400</u>	V.P.D.
<u>2040</u>	ADT	<u>10,600</u>	V.P.D.
TRUCKS		<u>9</u>	%



REVIEWED	J. FELKEL		
DR.	BFS	DKY	10-21
	BY	CHK	DATE

Z:\Projects\20-61CCR Ph 1\Structures\01_New Bridges\Bridge 35\04_Final Plans\01_BRIDGE 35_TITLE SHEET.dgn
3/9/2022



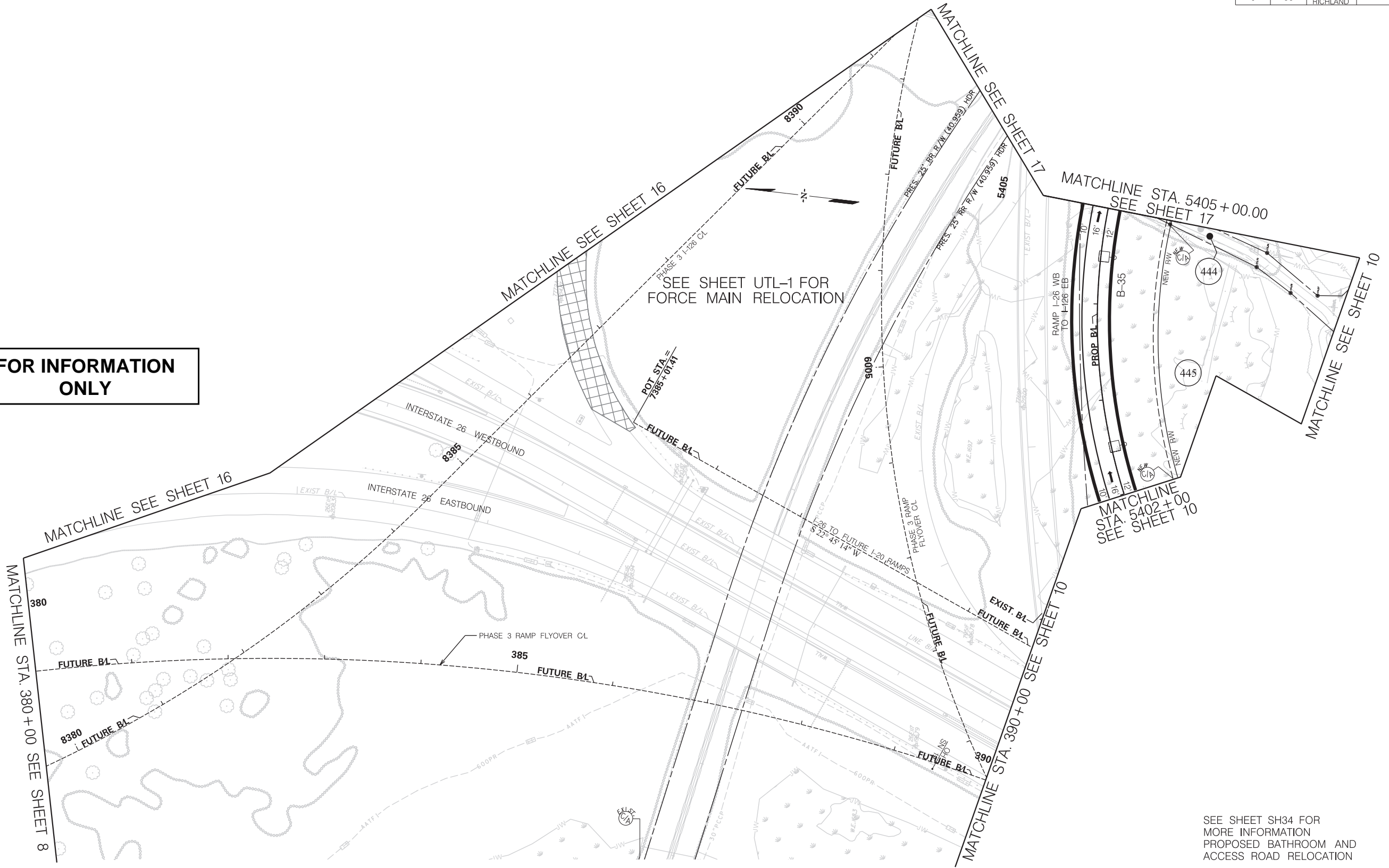
FOR INFORMATION ONLY

<div>LEGEND</div> <div></div> <div>PAVEMENT REMOVAL</div>	<div>ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE DATA SHEET.</div> <div>RIGHT-OF-WAY SECURED UNDER PROJECT ID P027662.</div> <div></div> <div>SCALE : 1" = 50'</div>		<div>FINAL PLANS</div> <div>NOT FOR CONSTRUCTION</div> <div>SCALE: 1" = 50'</div>	<div>6</div> <div>5</div> <div>4</div> <div>3</div> <div>2</div> <div>1</div> <div>0</div>	<div>REV. NO.</div> <div>BY</div> <div>DATE</div> <div>DESCRIPTION OF REVISION</div>	<div>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION</div> <div>CAROLINA CROSSROADS PHASE 1</div> <div>PLAN SHEET</div>

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2/15/2022

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	LEXINGTON/RICHLAND	P039718	I-26	9

FOR INFORMATION ONLY



SEE SHEET SH34 FOR
MORE INFORMATION
PROPOSED BATHROOM AND
ACCESS ROAD RELOCATION

LEGEND

PAVEMENT REMOVAL

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE DATA SHEET.

RIGHT-OF-WAY SECURED UNDER PROJECT ID P027662.

SCALE : 1" = 50'

JOINT VENTURE

UNITED

FINAL PLANS

NOT FOR CONSTRUCTION

SCALE: 1" = 50'

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5				
4				
3				
2				
1				
0				
REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

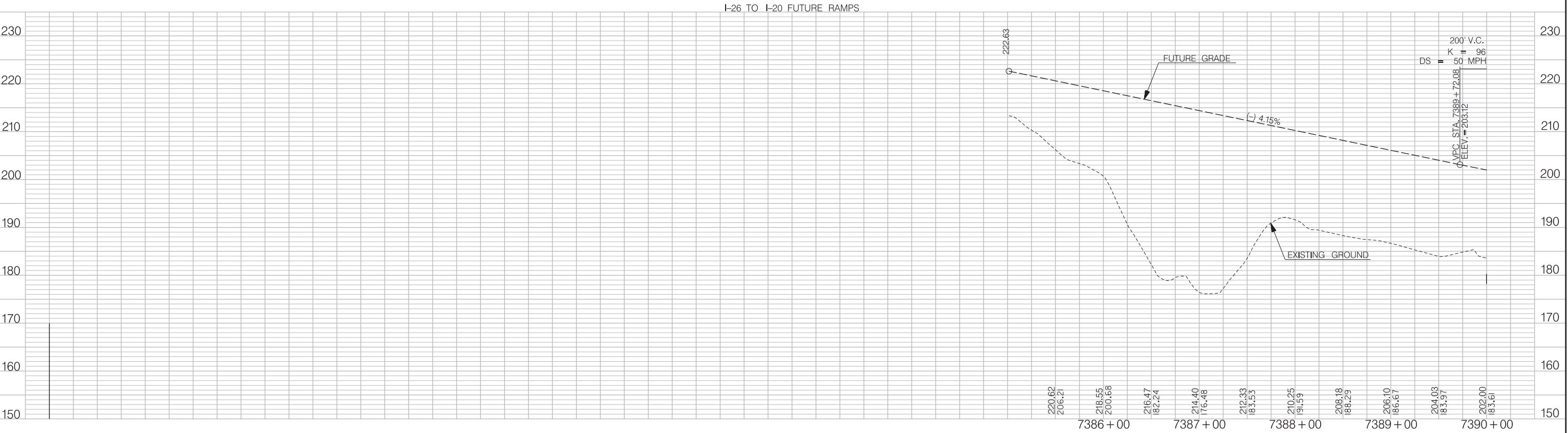
SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION

CAROLINA CROSSROADS PHASE 1

PLAN SHEET

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2/5/2022

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	LEXINGTON RICHLAND	P039718	I-26	13



FOR INFORMATION
ONLY



FINAL PLANS
NOT FOR CONSTRUCTION

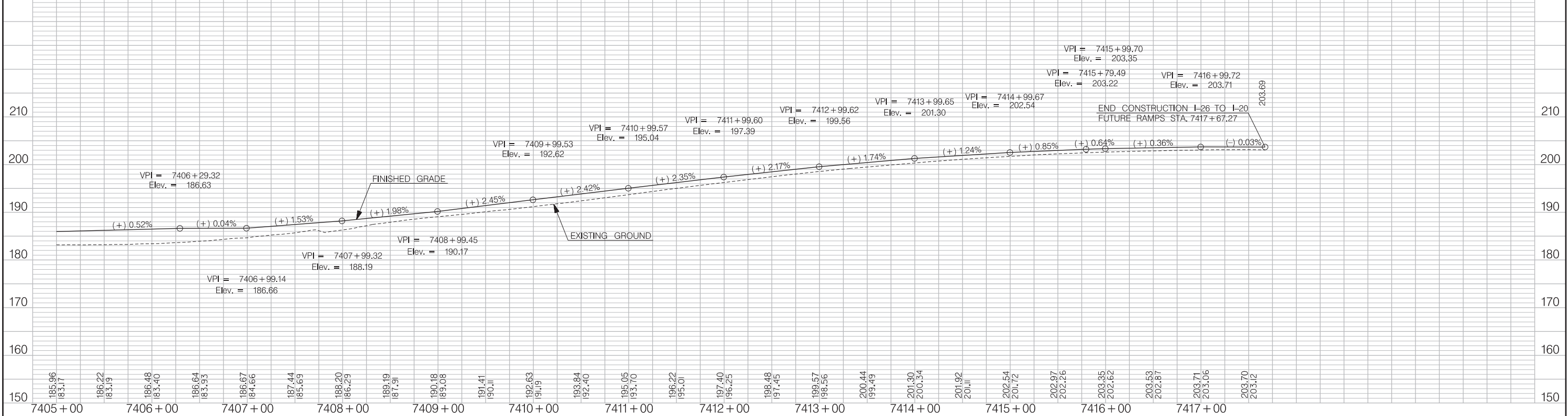
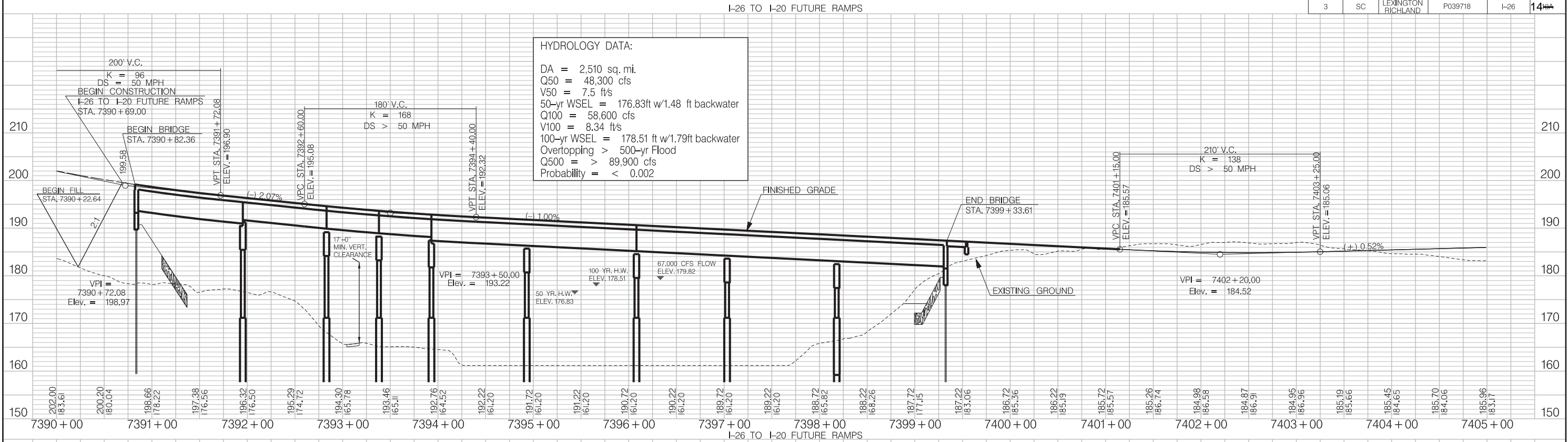
SCALE: 1" = 50' HORIZONTAL 1" = 10' VERTICAL

6			
5			
4			
3			
2			
1			
0			
REV. NO.	BY	DATE	DESCRIPTION OF REVISION

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
CAROLINA CROSSROADS PHASE 1
PROFILE SHEET

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2/5/2022

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	LEXINGTON RICHLAND	P039718	I-26	14



FOR INFORMATION
ONLY



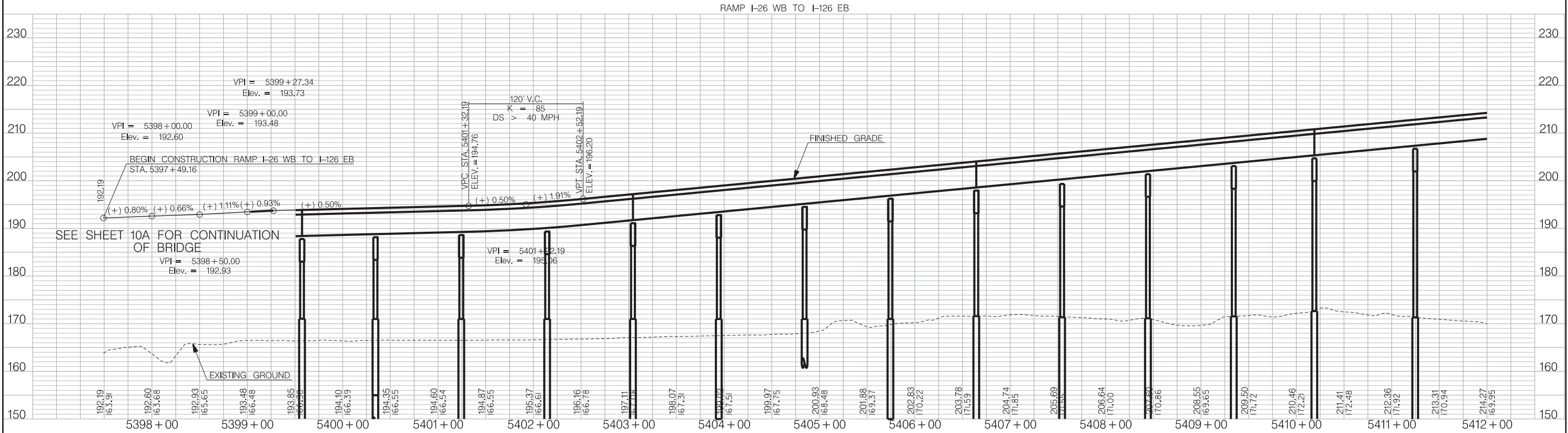
FINAL PLANS
NOT FOR CONSTRUCTION

SCALE: 1" = 50' HORIZONTAL 1" = 10' VERTICAL

6			
5			
4			
3			
2			
1			
0			
REV. NO.	BY	DATE	DESCRIPTION OF REVISION

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
CAROLINA CROSSROADS PHASE 1
PROFILE SHEET

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	LEXINGTON RICHLAND	P039718	I-26	15



FOR INFORMATION
ONLY



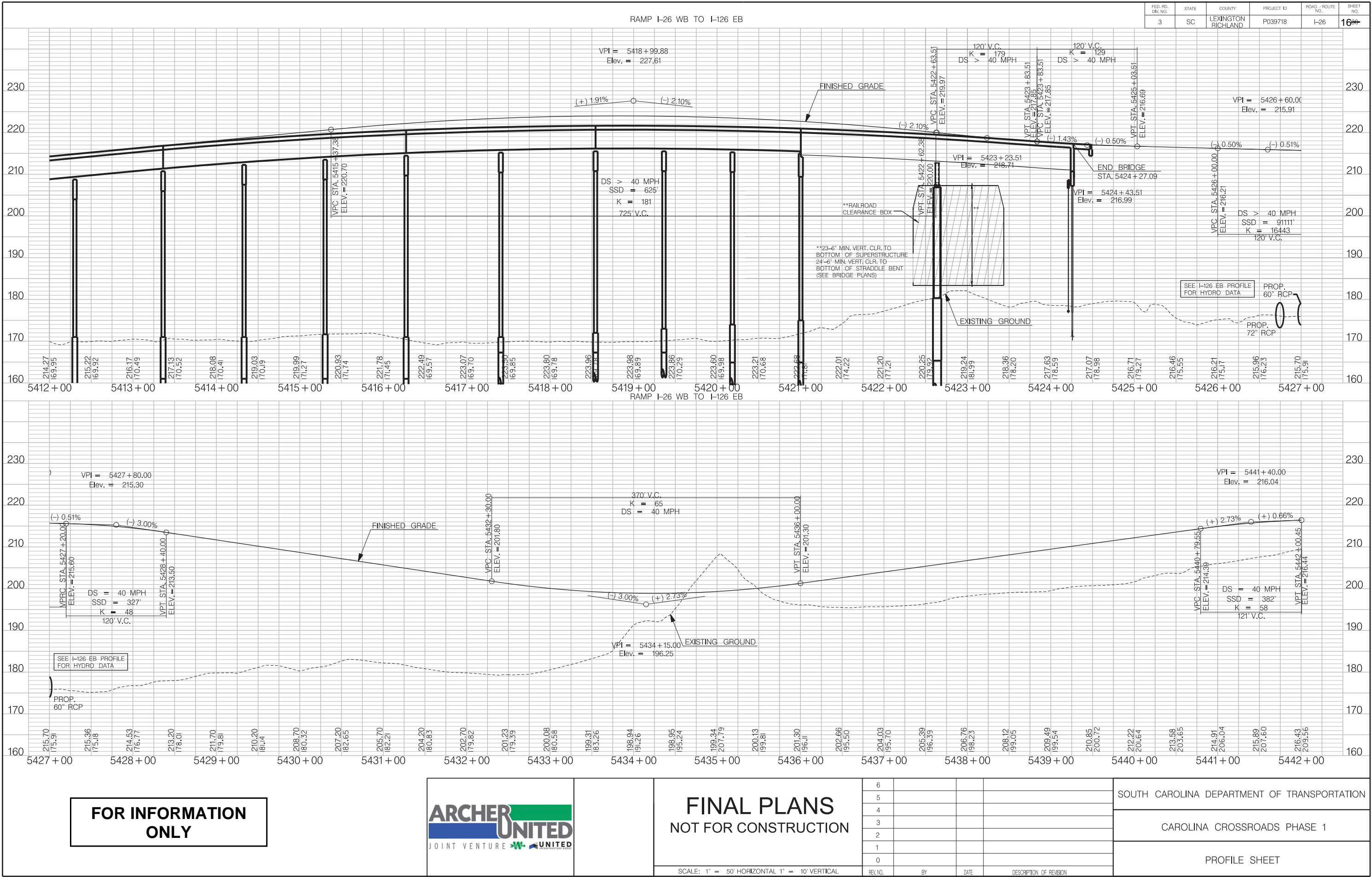
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NOT FOR CONSTRUCTION

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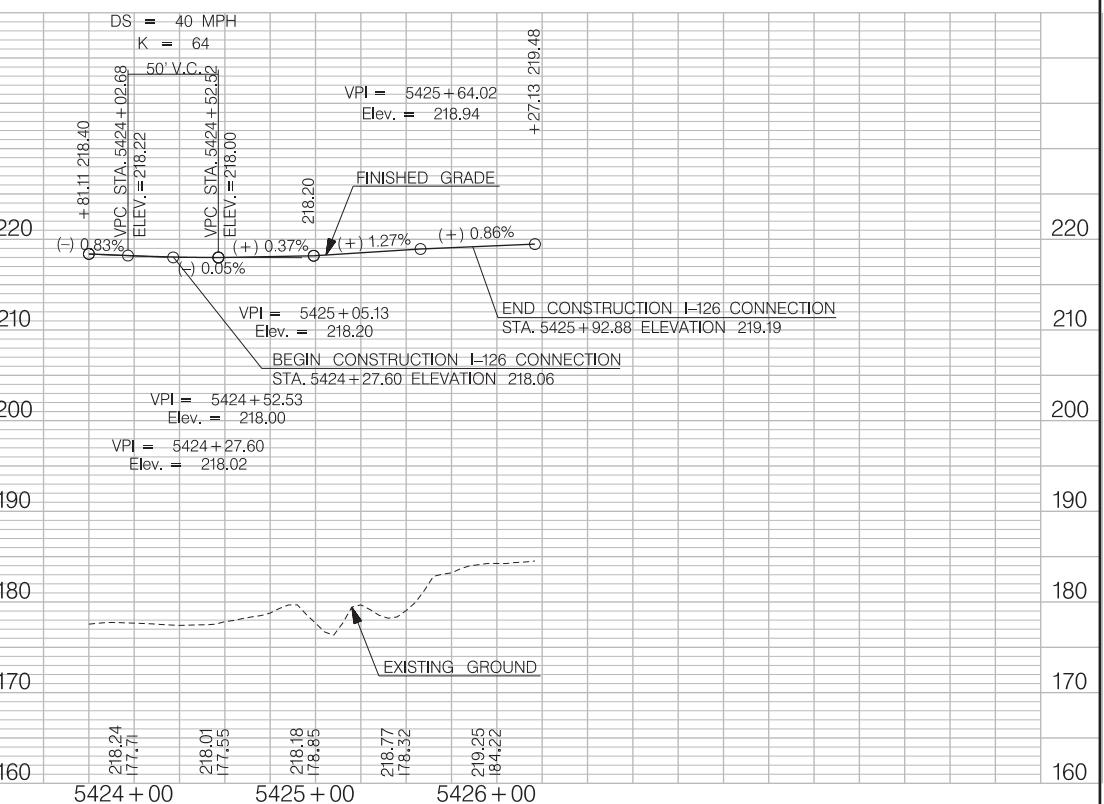
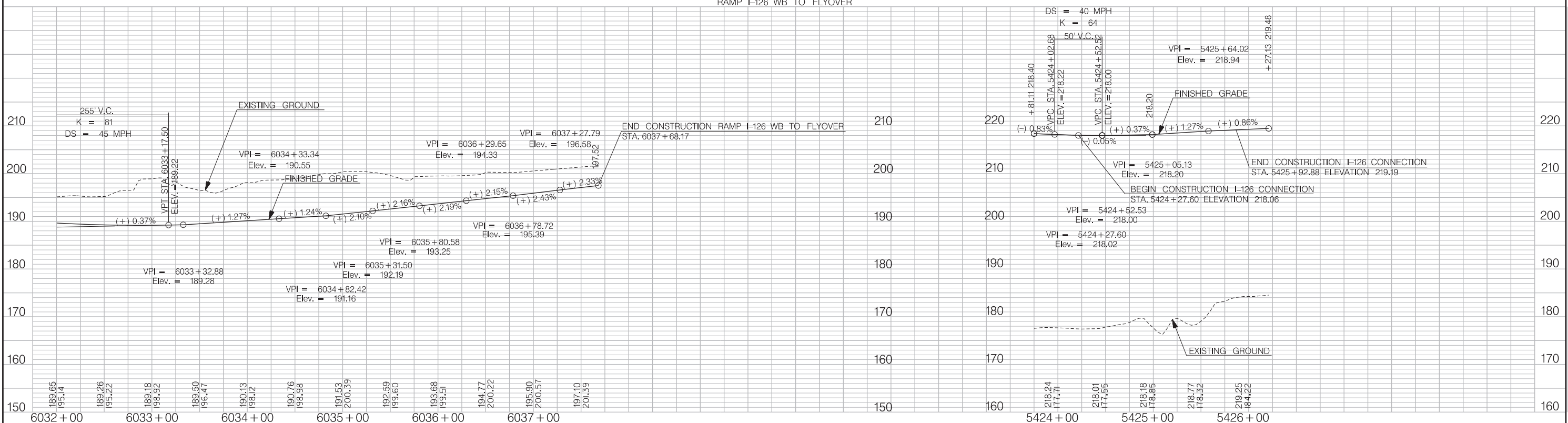
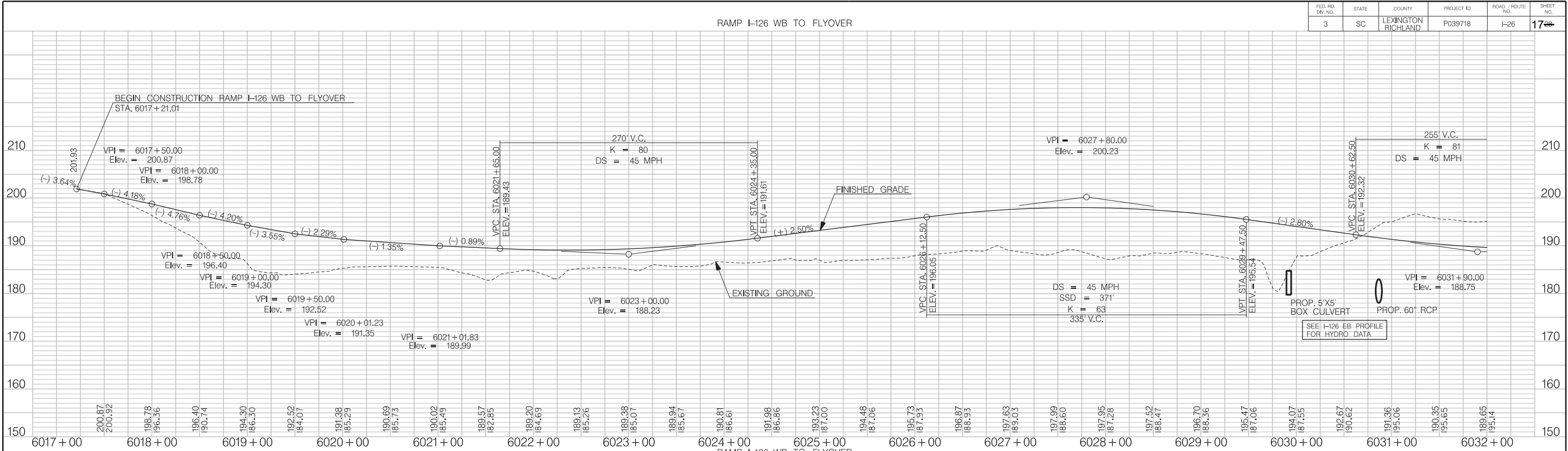
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SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
CAROLINA CROSSROADS PHASE 1
PROFILE SHEET

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FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	LEXINGTON RICHLAND	P039718	I-26	17



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FINAL PLANS
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SCALE: 1" = 50' HORIZONTAL 1" = 10' VERTICAL

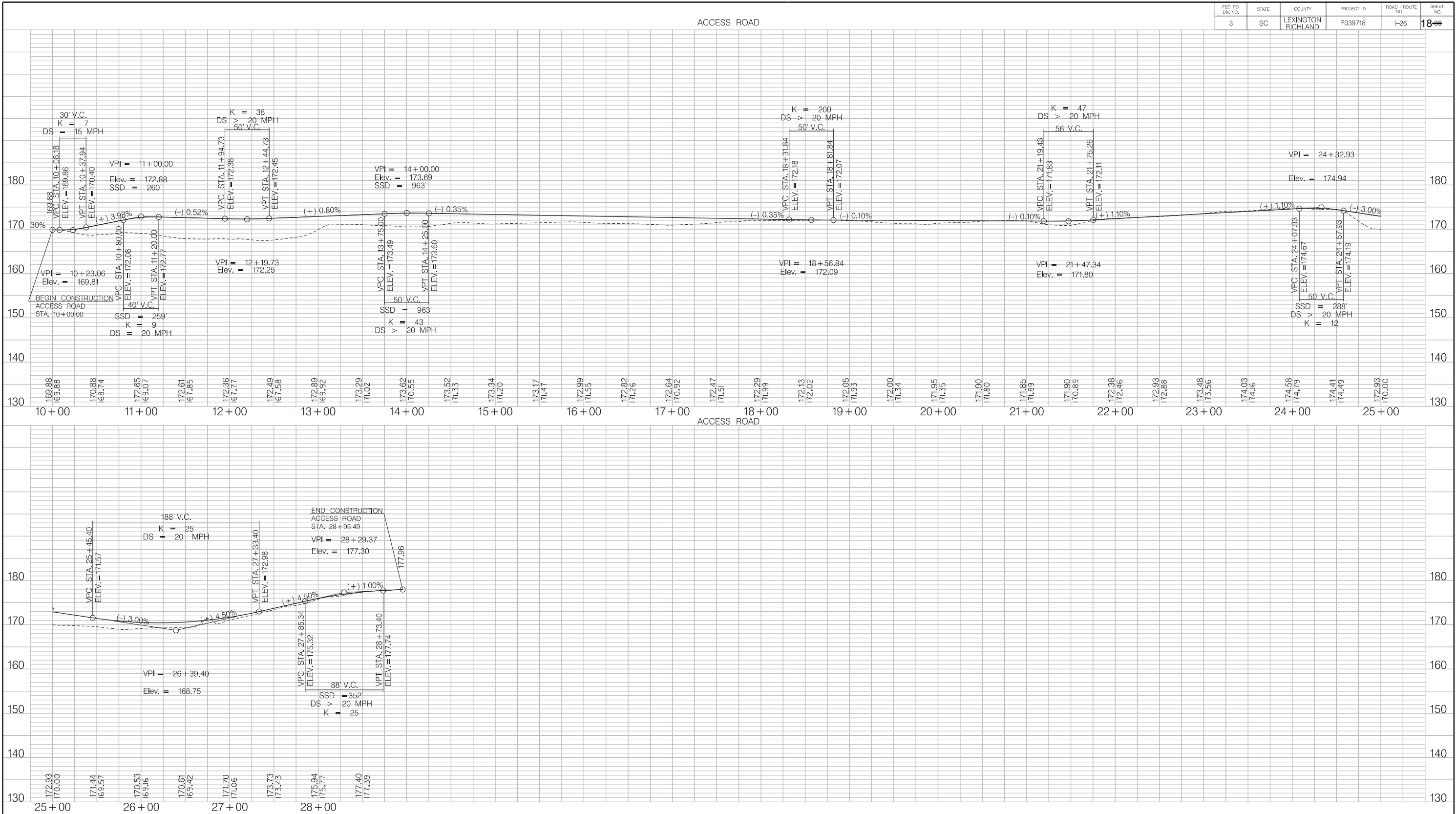
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SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION

CAROLINA CROSSROADS PHASE 1

PROFILE SHEET

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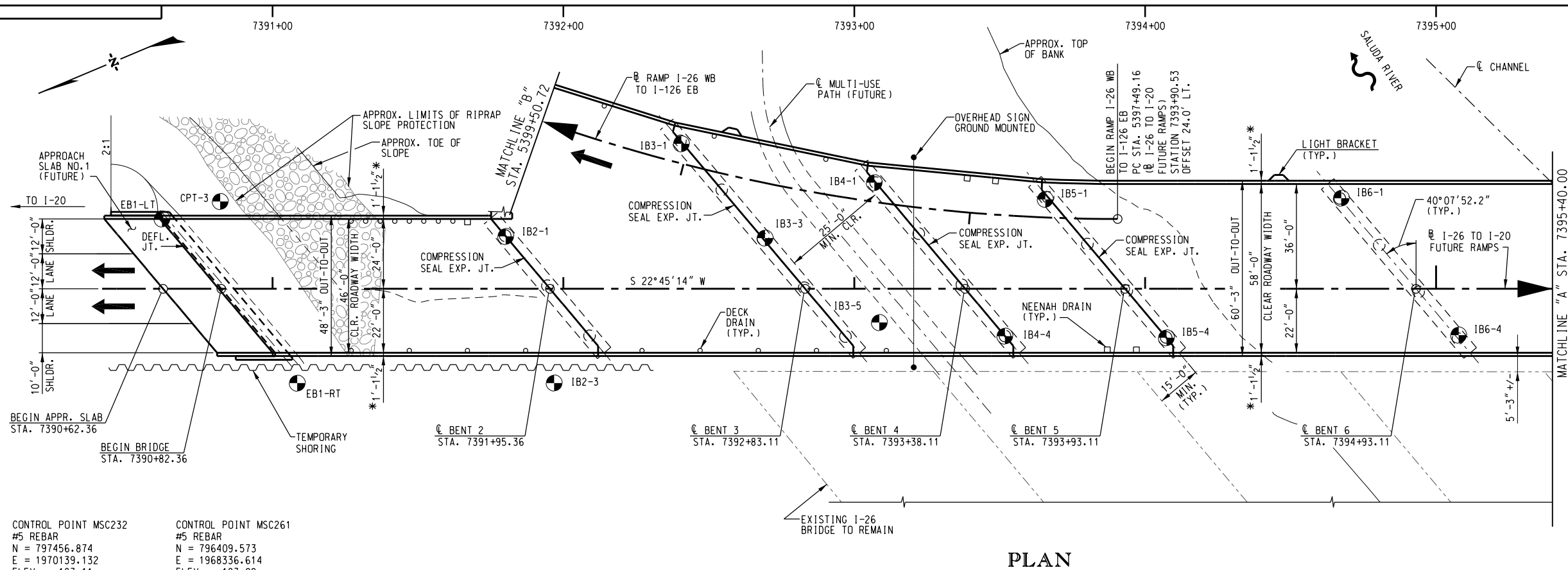


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SCALE: 1" = 50' HORIZONTAL 1" = 10' VERTICAL

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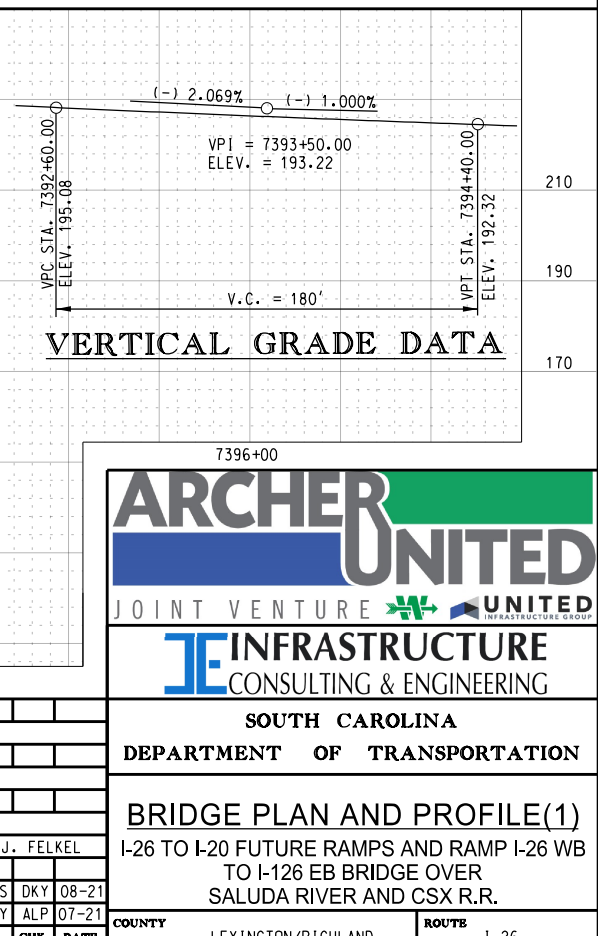
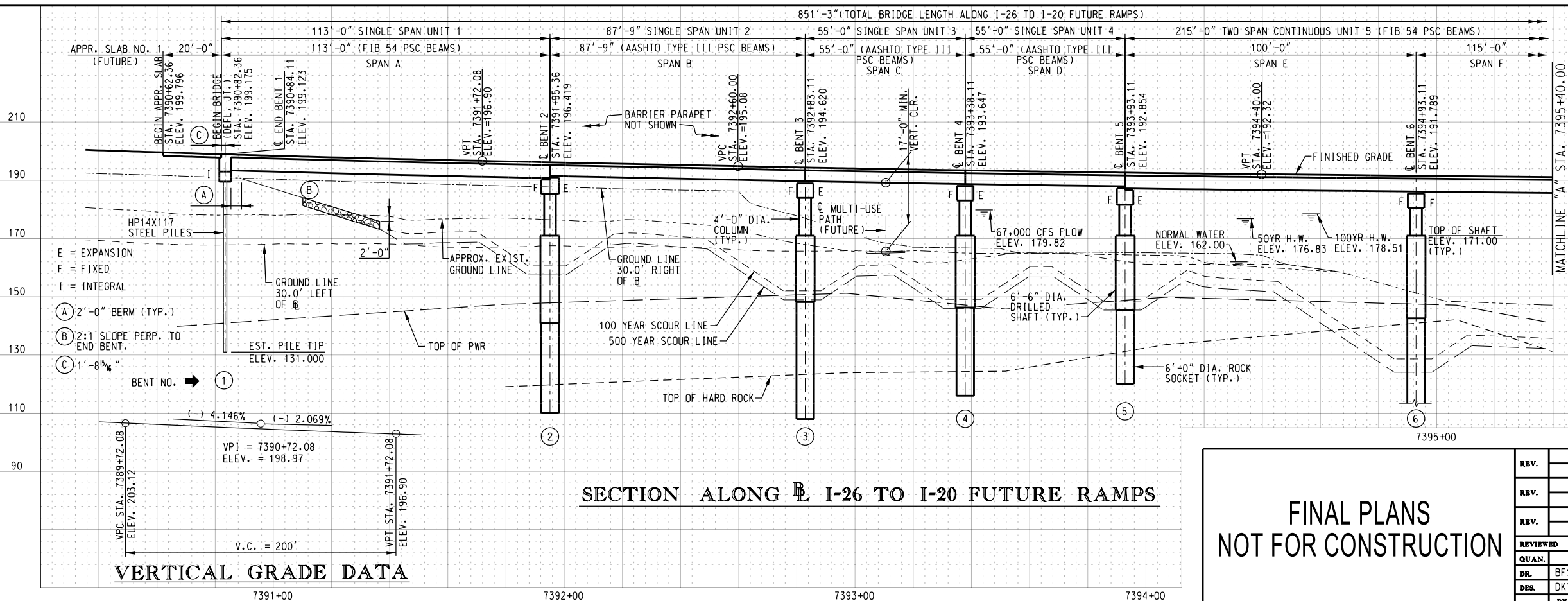
SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
CAROLINA CROSSROADS PHASE 1
PROFILE SHEET



TEST BORING LOCATIONS		
BORING	STATION	OFFSET
EB1-EMBK	7389+62.03	0.3' LT
SPT-1	7390+12.42	30.1' LT
EB1-LT	7390+61.75	23.7' LT
CPT-3	7390+82.00	30.0' LT
EB1-RT	7391+08.19	32.8' RT
IB2-1	7391+80.15	18.0' LT
IB2-3	7391+96.96	32.4' RT
IB3-1	7392+40.53	49.8' LT
IB3-3	7392+69.30	17.4' LT
IB3-5	7393+08.60	11.6' RT
IB4-1	7393+06.87	36.5' LT
IB4-4	7393+51.77	16.3' RT
IB5-1	7393+65.66	30.7' LT
IB5-4	7394+07.31	16.8' RT
IB6-1	7394+67.42	31.1' LT
IB6-4	7395+07.76	15.9' RT


SOME TEST BORING LOCATIONS FALL
OUTSIDE OF BRIDGE PLAN VIEW.

STATIONS AND OFFSETS ARE REFERENCED
TO PROPOSED R 1-26 TO I-20
FUTURE RAMP ALIGNMENT.



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REVIEWED J. FELKEL			
QUAN.			
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JOINT VENTURE  	
 INFRASTRUCTURE CONSULTING & ENGINEERING	
SOUTH CAROLINA	
DEPARTMENT OF TRANSPORTATION	
<u>BRIDGE PLAN AND PROFILE(1)</u>	
I-26 TO I-20 FUTURE RAMPS AND RAMP I-26 WB TO I-126 EB BRIDGE OVER SALUDA RIVER AND CSX R.R.	
COUNTY	ROUTE
LEXINGTON/DICHLAND	126

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BRIDGE PLANS ID	SHEET NO.
P039718-B35	22

NOTES:

* 1'-0" MASH BARRIER WITH 1 1/2" SLAB EXTENSION

(M) DENOTES MTBBC3 GUARDRAIL ATTACHMENT

TOP OF HARD ROCK AND PWR PROFILES ARE AN AVERAGE REPRESENTATION AT EACH BENT TO ACCOUNT FOR VARIATION IN THE TRANSVERSE DIRECTION.

TEST BORING LOCATIONS

BORING	STATION	OFFSET
IB7-1	7395+80.88	32.1' LT
IB7-4	7396+22.92	16.4' RT
IB8-1	7396+76.73	31.1' LT
IB8-4	7397+17.46	16.9' RT
IB9-1	7397+91.83	23.0' LT
IB9-4	7398+48.32	23.8' RT
CPT-44	7398+82.74	5.0' RT
EB10-EMBK	7400+52.04	0.2' RT
EB10-LT	7399+38.96	2.1' RT
EB10-LT.B	7399+38.87	36.9' LT
EB10-RT	7399+54.23	15.2' RT
B-44	7398+37.14	10.1' RT
B-45	7401+12.38	32.3' RT

SOME TEST BORING LOCATIONS FALL OUTSIDE OF BRIDGE PLAN VIEW.

STATIONS AND OFFSETS ARE REFERENCED TO PROPOSED I-26 TO I-20 FUTURE RAMPS ALIGNMENT.

HYDROLOGY DATA

DA = 2,510 SQ MI
Q50 = 48,300 CFS
V50 = 7.45 FPS
50 YR WSE = 176.83 W/ 1.47' BACKWATER
Q100 = 58,600 CFS
V100 = 8.28 FPS
100 YR WSE = 178.53 W/ 1.78' BACKWATER
OVERTOPPING: > 500 YR FLOOD
Q500 = > 89,900 CFS
PROBABILITY = < 0.002

PLAN

E = EXPANSION
F = FIXED
I = INTEGRAL

(A) 2'-0" BERM (TYP.)

(B) 2:1 SLOPE PERP. TO END BENT.

(C) 1'-8 5/8"

SECTION ALONG I-26 TO I-20 FUTURE RAMPS

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QUAN.			
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DES.	DKY	ALP	07-21
BY	CHK.	DATE	

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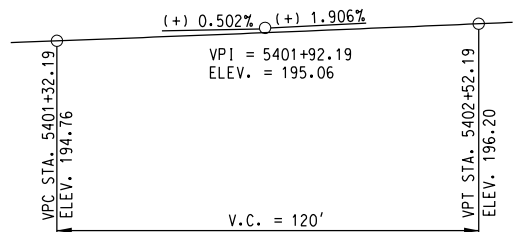
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BRIDGE PLAN AND PROFILE(2)
I-26 TO I-20 FUTURE RAMPS AND RAMP I-26 WB
TO I-126 EB BRIDGE OVER
SALUDA RIVER AND CSX R.R.

COUNTY LEXINGTON/RICHLAND ROUTE I-26



TEST BORING LOCATIONS		
BORING	STATION	OFFSET
IB11-1	5399+57.09	28.4' LT
IB11-3	5399+57.08	5.6' RT
IB12-1	5400+34.19	19.5' LT
IB12-2	5400+34.10	3.9' RT
CPT-4	5400+58.71	25.4' LT
CPT-1	5400+89.58	104.4' LT
CPT-2	5401+13.91	62.7' LT
IB13-1	5401+24.28	20.4' LT
IB13-2	5401+23.56	3.8' RT
IB14-1	5402+14.36	19.9' LT
IB14-2	5402+14.12	3.8' RT
IB15-1	5403+04.39	20.4' LT
IB15-2B	5403+08.22	5.3' RT
CPT-5	5403+00.00	0.0'
IB16-1	5403+93.83	20.4' LT
IB16-2	5403+94.44	3.7' RT
IB17-1	5404+83.88	20.2' LT
IB17-2	5404+84.11	3.8' RT




VERTICAL GRADE DATA



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SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BRIDGE PLAN AND PROFILE(3)
I-26 TO I-20 FUTURE RAMPS AND RAMP I-26 WB
TO I-126 EB BRIDGE OVER
SALUDA RIVER AND CSX R.R.

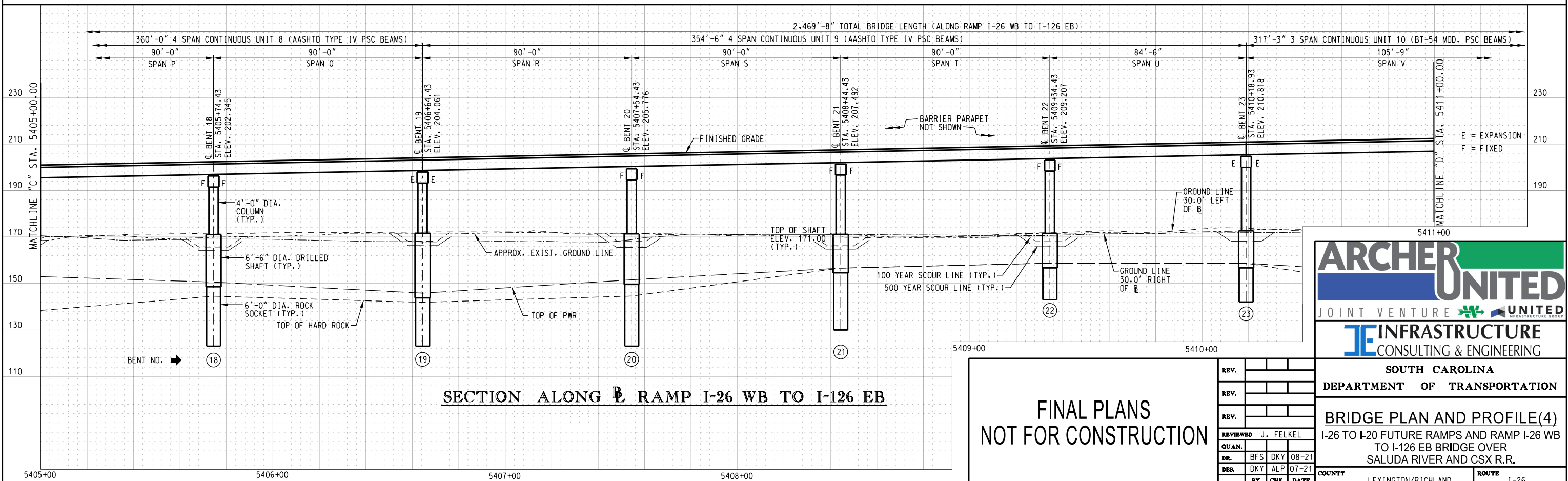
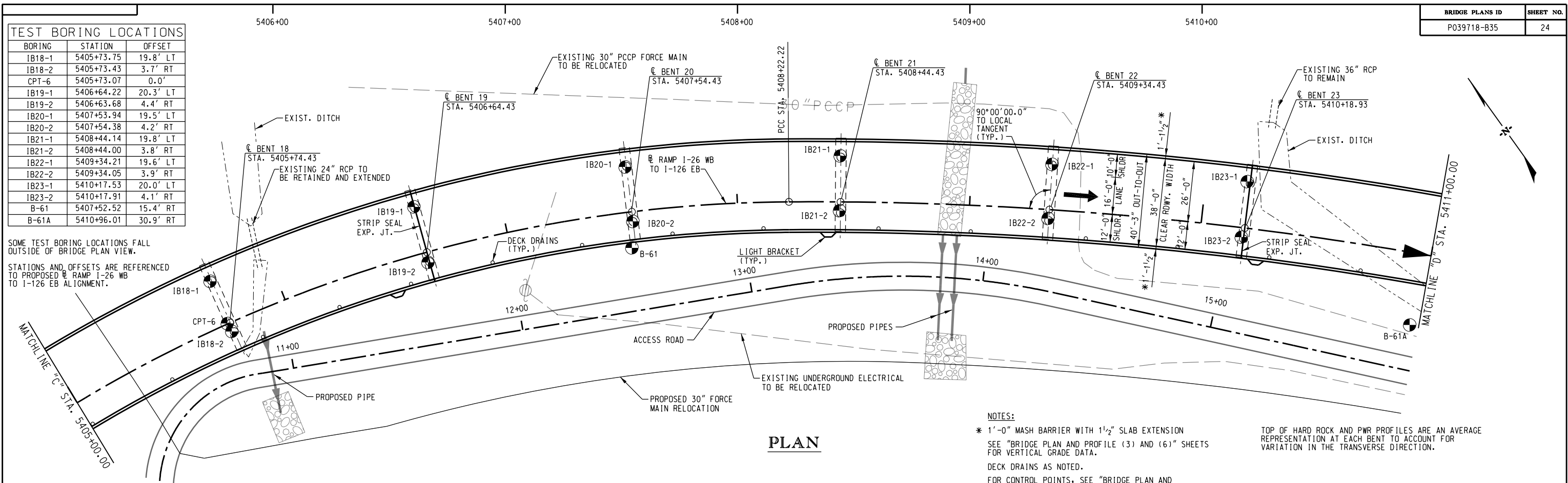
COUNTY	LEXINGTON/RICHLAND	ROUTE	1-26
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BRIDGE PLANS ID	SHEET NO.
P039718-B35	24

TEST BORING LOCATIONS		
BORING	STATION	OFFSET
IB18-1	5405+73.75	19.8' LT
IB18-2	5405+73.43	3.7' RT
CPT-6	5405+73.07	0.0'
IB19-1	5406+64.22	20.3' LT
IB19-2	5406+63.68	4.4' RT
IB20-1	5407+53.94	19.5' LT
IB20-2	5407+54.38	4.2' RT
IB21-1	5408+44.14	19.8' LT
IB21-2	5408+44.00	3.8' RT
IB22-1	5409+34.21	19.6' LT
IB22-2	5409+34.05	3.9' RT
IB23-1	5410+17.53	20.0' LT
IB23-2	5410+17.91	4.1' RT
B-61	5407+52.52	15.4' RT
B-61A	5410+96.01	30.9' RT

SOME TEST BORING LOCATIONS FALL
OUTSIDE OF BRIDGE PLAN VIEW.

STATIONS AND OFFSETS ARE REFERENCED
TO PROPOSED RAMP 1-26 WB
TO I-126 EB ALIGNMENT.



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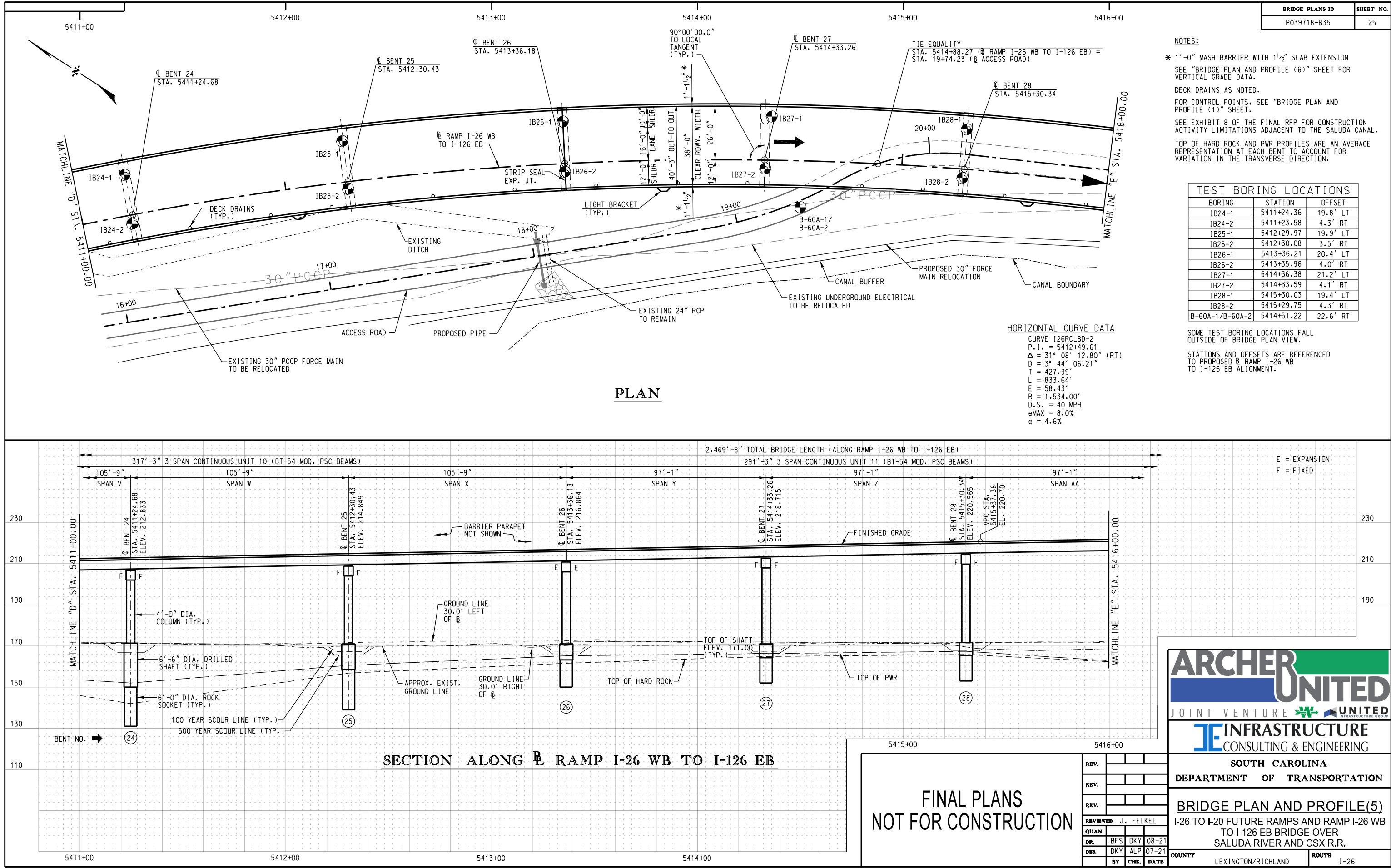
The image displays two corporate logos. The top logo is for Archer United, featuring the word "ARCHER" in a large, bold, grey sans-serif font, with a green rectangle to its right. Below "ARCHER" is a blue rectangle. To the right of the blue rectangle, the word "UNITED" is written in a large, bold, grey sans-serif font. Below this, the text "JOINT VENTURE" is in a smaller, grey sans-serif font, followed by a green stylized logo of two arrows pointing towards each other, and then the "UNITED INFRASTRUCTURE GROUP" logo, which includes a blue stylized building icon and the text "UNITED INFRASTRUCTURE GROUP". The bottom logo is for IE Infrastructure Consulting & Engineering, featuring a large, stylized blue "IE" monogram. To the right of the monogram, the word "INFRASTRUCTURE" is in a large, bold, black sans-serif font, and below it, "CONSULTING & ENGINEERING" is in a smaller, black sans-serif font.

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DEPARTMENT OF TRANSPORTATION**

BRIDGE PLAN AND PROFILE(4)
I-26 TO I-20 FUTURE RAMPS AND RAMP I-26 WB
TO I-126 EB BRIDGE OVER
SALUDA RIVER AND CSX R.R.

COUNTY	LEXINGTON/RICHLAND	ROUTE	1-26
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TOP OF HARD ROCK AND PWR PROFILES ARE AN AVERAGE REPRESENTATION AT EACH BENT TO ACCOUNT FOR VARIATION IN THE TRANSVERSE DIRECTION.

SOME TEST BORING LOCATIONS FALL
OUTSIDE OF BRIDGE PLAN VIEW.

STATIONS AND OFFSETS ARE REFERENCED
TO PROPOSED ~~B~~ RAMP 1-26 WB
TO 1-126 EB ALIGNMENT.

CURVE 126RC_BD-3
P. I. = 5420+25.98
 $\Delta = 31^\circ 20' 51.48''$ (LT)
D = $9^\circ 21' 43.40''$
T = 171.72
L = 334.84'
E = 23.64'
R = 612.00'
D.S. = 40 MPH
eMAX = 8.0%
e = 7.6%

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COUNTY	LEXINGTON/RICHLAND	ROUTE	I-26
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