

CEQA-LEVEL DRAINAGE STUDY
FOR THE
COTTONWOOD SAND MINING PROJECT
(PDS2018-MUP-18-023)

November 29, 2021



A handwritten signature in black ink, appearing to read "Wayne W. Chang".

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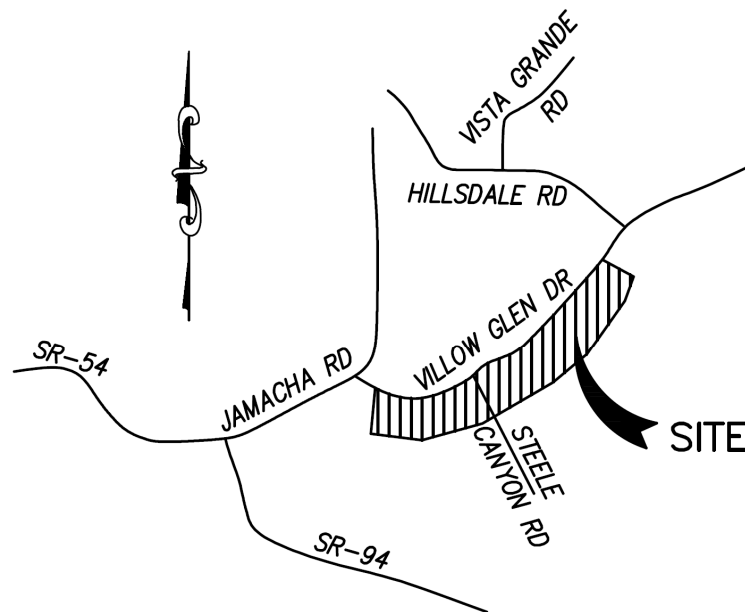
- A. Effective, Existing Condition (Corrected Effective), and Proposed Condition HEC-RAS Analyses

MAP POCKET

Proposed Condition HEC-RAS Work Map
CD containing Rick Engineering Company LOMR files, Plot Plan and Reclamation Plan for the Cottonwood Sand Mining Project, HEC-RAS analyses, and FIRMs.

INTRODUCTION

The Cottonwood Sand Mining Project is located at 3121 Willow Glen Road within the unincorporated southwestern portion of San Diego County (see the Vicinity Map). The Assessor's Parcel Numbers are 506-021-19-00, 506-020-52-00, 518-012-13-00, 518-012-14-00, 518-030-05-00, 518-030-06-00, 518-030-07-00, 518-030-08-00, 518-030-10-00, 518-030-12-00, 518-030-13-00, 518-030-15-00, 518-030-21-00, 518-030-22-00, 519-010-15-00, 519-010-17-00, 519-010-20-00, 519-010-21-00, 519-010-33-00, 519-010-34-00, 519-010-37-00, and 519-011-03-00. The site is on the east and west sides of Steele Canyon Road and historically supported two 18-hole golf courses referred to as the Lakes course and the Ivanhoe course. The Lakes course is along the westerly portion of the site and is no longer operational. The majority of the site is within the Sweetwater River 100-year floodplain and regulatory floodway. The Sweetwater River flows in a southwesterly direction through the site and is included on FEMA's May 16, 2012, *Flood Insurance Rate Map* No.'s 06073C1668G, 06073C1669G, 06073C1931G, and 06073C1932G (included on CD). FEMA's floodplain and regulatory floodway mapping has been updated by a Rick Engineering Company Letter of Map Revision, which is discussed in the next section.



THOMAS BROS. PAGE 1252
GRID B5, B6, C4, C5, D4, D5

Vicinity Map

The project proposes mining and restoration activities within approximately 251 acres along and within the Sweetwater River floodplain. Extractive operations are expected to continue for 10 years in three mining phases with a total production of 3.8 million cubic yards (5.7 million tons). The maximum excavation depth is approximately 40 feet. Reclamation involving grading, habitat improvement, and revegetation is anticipated to be concluded 2 years after mining completion. Post-mining land use of the entire property will include approximately 230 acres of

sloped land and floodplain along the Sweetwater River and approximately 50 acres of relatively flat areas along the property edges.

The project is primarily excavating within the FEMA floodplain and regulatory floodway, which will increase the flow conveyance area. This will be offset somewhat by the increased vegetation density resulting from replacing the existing golf course with revegetation and habitat restoration. A hydraulic goal is that the excavation will dominate over revegetation/restoration resulting in no increased 100-year water elevations on off-site areas, i.e., no-rise on off-site properties along the Sweetwater River.

The Sweetwater Authority (Authority) owns and manages Sweetwater Reservoir and Loveland Reservoir. Sweetwater Reservoir is a terminal drinking water reservoir located less than three miles downstream of the proposed project location. Loveland Reservoir is located near Alpine and approximately 10 miles upstream of the Project. Runoff from the upper Sweetwater River watershed is captured at Loveland Reservoir, primarily during winter and spring months. Runoff stored at Loveland Reservoir can be stored or transferred to Sweetwater Reservoir via the Sweetwater River channel to augment water production for the Authority's service area. The Loveland bunger valve can release up to 358 cubic feet per second (cfs). Water transfers generally take place during the winter months of December, January, and/or February, which minimizes water loss and aims to avoid negative impacts to the arroyo toad, a federally endangered species and state Species of Special Concern. However, water transfers could occur in the late winter or early spring (i.e., March and/or April) subject to environmental compliance, arroyo toad avoidance, and wildlife agency concurrence. Both Loveland Reservoir and Sweetwater Reservoir are a vital part of the San Diego region's drinking water supply.

The Authority has senior water rights along the Sweetwater River. These water rights were acquired by the Authority through its predecessors and allow the Authority to transfer water from Loveland Reservoir to Sweetwater Reservoir along the Sweetwater River channel. Under pre-project conditions, the transferred water flows in a naturally-lined (earth, grass, and weeds) trapezoidal channel constructed within the golf course. The channel transitions to a broader riparian channel near the downstream portion of the site. A sizeable portion of the Sweetwater River floodplain will be altered within the project boundaries. However, the bottom of the trapezoidal channel will be undisturbed in order to allow water transfer to continue along its current path. The maximum transfer flow rate of 358 cfs can be conveyed within the trapezoidal channel footprint at a depth of approximately 2 to 4 feet. The project is being designed to avoid capture of transferred water in extraction areas. To ensure no significant mining impacts on water transfers during extraction activities, short berms can be constructed to separate the operations areas from the channel, as needed. The berm locations can be adjusted as mining progresses and should be setback from the mining so that they are not impacted by ongoing operations. Berms can also be incorporated upon final reclamation, where needed, to prevent significant impacts on water transfers. The project design and berming are intended to preserve the Authority's ability to transfer water from Loveland Reservoir to Sweetwater Reservoir.

A conveyor system will be utilized during project operations to transport mined material. Portions of the conveyor system will be within the 100-year floodplain. These portions will either be anchored, as needed, to prevent displacement by flowing water or removed at least 24

hours prior to forecast of significant rain (over 0.5 inches). The conveyors shall also be anchored, as needed, during scheduled water transfers. The conveyors are primarily aligned in the direction of flow and have a profile that causes minimal flow blockage, so will have minimal impact on water surface elevations.

Two adjacent SDG&E transmission towers exist on-site just upstream of Steele Canyon Road. The towers and ground supporting the towers will remain and not be disturbed by mining activities. A ramp will be provided from the extraction area to the towers for access. The ramp and slopes surrounding the towers shall be lined, as needed, for access and to prevent erosion. The project is designed so that retention of the towers meets the no-rise criteria.

This CEQA-level report contains pre- (existing condition) and post-project (proposed condition) hydraulic analyses demonstrating that no-rise in the 100-year water surface elevations will occur off-site. The extraction will occur in phases (see Figure 1). Since the project primarily involves extraction in the floodplain, the individual phases (Phase 1 to 3) will meet the off-site no-rise criteria. The final reclamation (Phase 4) will also meet the criteria. Since the project is for mining and restoration, minimal impervious surfaces will be added. The largest proposed impervious area is associated with the requirement to improve half of Willow Glen Drive along the site. The on-site project footprint will not increase the off-site flow rates since there are minimal impervious areas proposed on-site. In fact, the extraction areas will provide detention and retention benefits during mining that will reduce off-site flow rates.

Rational method hydrologic analyses are not applicable to the project since the majority of the site is within the Sweetwater River 100-year floodplain (see the HEC-RAS Work Map in the map pocket). According to the USGS Streamstats software contained after this report text, the Sweetwater River watershed tributary to the site covers over 155 square miles. The project runoff and floodplain are associated with the river flow generated by the watershed. The river flow cannot be determined using the rational method. The river flow is based on FEMA data. The river flow exits the westerly (downstream) end of the site and is considered to be the same under existing and proposed conditions (see Table 1).

Condition	Watershed Area, sq. mi.	100-Year Flow, cfs
Existing	155.6	29,500
Proposed	155.6	29,500

Note: Tc, I, and C are not applicable for river flow.

Table 1. Hydrology Summary

HYDRAULIC ANALYSES

The pre-project hydraulic conditions are established by a Letter of Map Revision (LOMR) for the Cottonwood Golf Course by Rick Engineering Company (Rick). The LOMR has been approved by the County of San Diego and FEMA (LOMR Case No. 20-09-2025P dated December 1, 2020, effective April 14, 2021). Rick’s latest LOMR files are included on the CD.

The LOMR includes an As-Built Conditions HEC-RAS model that reflects the pre-project 100-year floodplain and regulatory floodway. The As-Built model represents the effective conditions along the site. The As-Built results are included in Appendix A and the plan has been added to the HEC-RAS model prepared for the project. It was noted that when the As-Built plan was executed in the latest version of HEC-RAS (v 6.1.0), some of the base flood elevations changed by a few hundredths. Review of the As-Built HEC-RAS model revealed that the effective flow area associated with Steele Canyon Road did not reflect an existing culvert under the southerly portion of the road crossing, so a corrected effective model was created that widens the effective flow area based on the culvert. The corrected effective model is included with Rick's HEC-RAS model on the CD as well as on the HEC-RAS model prepared for the project, and its summary output and cross-section plots are included in Appendix A.

The post-project HEC-RAS cross-sections, base topography, and proposed grading are shown on the Proposed Condition HEC-RAS Work Map in the map pocket. The mapping is on NGVD 29. The cross-sections are at the same locations as the LOMR analysis. The cross-sections were created from various sources. Downstream cross-section 5 and upstream cross-sections 394.1 to 398 were reproduced from the LOMR As-built geometry. Cross-sections 120 and 130 bounding the Steele Canyon Road crossing were also reproduced from the As-built geometry. The remaining cross-sections are along the proposed mining and reclamation footprint, so were created based on the phased mining and reclamation grading as well as the project's topographic mapping for the surrounding area.

The remaining post-project HEC-RAS input parameters are as follows. The FEMA 100-year flow rate of 29,500 cubic feet per second (cfs) was used throughout the study reach. The roughness coefficients in the areas outside the project footprint are based on the roughness coefficients in the As-built model. These range from 0.025 to 0.080. The roughness coefficient within the excavation area was assigned a value of 0.11 to reflect dense, mature vegetation resulting from restoration. The *San Diego County Hydraulic Design Manual* Section 5.6.2 states the roughness can be justified using information such as existing adjacent vegetative conditions. As a result, the vegetated restoration roughness has been modeled similar to the existing vegetated areas upstream and downstream of the site. The ineffective flow areas are based on the LOMR ineffective flow areas except as noted near Steele Canyon Road. Material stockpiles will be present during the mining phases. Blocked obstructions were used to represent the stockpile locations during mining. The obstructions are removed for the post-mining phase.

The existing/effective (As-built), corrected effective, and phased proposed condition 100-year HEC-RAS results are included in Appendix A and on the CD. Separate proposed condition results have been determined for mining during Phase 1 to 3 as well as the final reclaimed Phase 4 landform. The 100-year water surface elevations are summarized in Table 2. Table 2 shows that the project is generally lowering water surface elevations compared to the effective results (the effective results were run on the latest version of HEC-RAS, v 6.1.0) due to the excavation. There is a small rise in the 100-year water surface elevation at cross-sections 20 and 60, but the rise occurs on-site. There is also a small rise at cross-section 140, but this can be adjusted by revising the roughness. Berming could also be performed along the southerly property boundary to keep the flow on-site. Table 3 contains a comparison of the Phase 1 through 4 water surface

elevations with the corrected effective results. This table shows that the small rise only occurs at cross-sections 20 and 60, so are contained on-site.

Velocities over 6 feet per second are typically considered to be erosive. The proposed velocities within the site at the completion of mining are less than 6 fps except at cross-sections 120 and 130. Grouted light class riprap will be installed here to prevent erosion associated with upstream headcutting. Similar grouted riprap will be placed at the upstream end of the quarry to prevent upstream headcutting. The operator shall routinely inspect the areas during ongoing mining and provide erosion protection measures and maintenance, as needed, and documented in the Industrial SWPPP.

Ultimately, a Conditional Letter of Map Revision and Letter of Map Revision will be performed to define the proposed condition floodplain and regulatory floodway.

CONCLUSION AND CERTIFICATION

CEQA-level hydraulic analyses have been performed for the proposed Cottonwood Sand Mining Project along the Sweetwater River in the county of San Diego, California. This report includes existing and proposed condition 100-year HEC-RAS hydraulic analyses. The existing condition analyses are from a corrected Rick Engineering Company As-built model included in the Cottonwood Golf Course LOMR approved by FEMA. The proposed condition analyses show that the 100-year flow velocities within the project are generally low and considered non-erosive. Grouted riprap will be installed on some of the pit slopes to protect against upstream headcutting. The riprap will not prevent nor impede water transfer along the low flow channel. An Industrial SWPPP will address BMPs required for operations.

Since the project proposes mining and restoration in the floodplain, the floodplain is being altered somewhat. In most areas, the 100-year water surface elevations are lowered due to the instream excavation. The river course and on-site drainage patterns are generally being maintained as evidenced by comparison of the effective and proposed condition floodplains on the HEC-RAS Work Map. The flow velocities are generally being reduced since the mining increases conveyance, so the project will not cause substantial erosion. The mining pits will have the ability to capture sediment and reduce downstream sedimentation. The project is creating minimal impervious surfaces, so the river's 100-year flow rate is not altered.

The following summarizes the CEQA-level requirements:

- The project will not substantially alter the existing drainage pattern of the site or area. The site and area runoff will continue to be conveyed to the Sweetwater River that flows through the site. The Sweetwater River will continue to flow in the same direction through the site. Riprap will be installed at the upstream end of the mining pit to prevent headcutting erosion. The mining pit will reduce downstream siltation.

- The project proposes minor impervious surfaces, so will essentially maintain existing storm runoff flow rates. The project meets no-rise criteria, so will not cause on- or off-site flood inundation impacts.
- The project is primarily within the Sweetwater River floodplain. There are no existing or planned storm water drainage systems in the floodplain that will be impacted by the project since the flow rate is not being altered and the no-rise criteria is met.
- The project does not propose housing.

This is to certify that I am a duly qualified registered professional engineer licensed to practice in the State of California.

Name of Report: *CEQA-Level Drainage Study for the Cottonwood Sand Mining Project*
Date of Report: November 10, 2021

Will sign and stamp upon approval

Date: November 29, 2021
Name: Wayne W. Chang

Mining Phase	Acres	Subphase Area (acres)	Mining Duration (years)	Mining Initiation Date (est.)	Mining Completion Date (est.)	Reclamation Completion Date (est.)
Phase 1	78.98		3	2022	2025	2027
Subphase 1A	-	22.10	1	-	-	-
Subphase 1B	-	26.46	1	-	-	-
Subphase 1C	-	30.42	1	-	-	-
Phase 2	48.18		3	2025	2028	2030
Subphase 2A	-	15.26	1	-	-	-
Subphase 2B	-	19.08	1	-	-	-
Subphase 2C	-	13.74	1	-	-	-
Phase 3	78.57		4	2028	2032	2034
Subphase 3A	-	29.42	1	-	-	-
Subphase 3B	-	16.15	1	-	-	-
Subphase 3C	-	14.13	1	-	-	-
Subphase 3D	-	18.87	1	-	-	-
Phase 4	8.65	-	1	2032	2032	2034
Total	214.4	-	10*	-	-	-

Figure 1. Project Phasing

Station	Effective ¹ , ft	Prop. Cond. Phase 1, ft	Phase 1 – Corr. Eff., ft	Prop. Cond. Phase 2, ft	Phase 2 – Corr. Eff., ft	Prop. Cond. Phase 3, ft	Phase 3 – Corr. Eff., ft	Prop. Cond. Phase 4, ft	Phase 4 – Corr. Eff., ft
398	383.17	383.17	0.00	383.17	0.00	383.17	0.00	383.17	0.00
396	378.38	378.38	0.00	378.38	0.00	377.94	-0.44	377.93	-0.45
394.1	377.81	377.81	0.00	377.81	0.00	376.97	-0.84	376.94	-0.87
320	376.30	376.30	0.00	376.30	0.00	375.09	-1.21	375.12	-1.18
310	376.28	376.28	0.00	376.28	0.00	374.86	-1.42	374.88	-1.40
300	375.73	375.73	0.00	375.73	0.00	374.07	-1.66	374.07	-1.66
290	375.52	375.52	0.00	375.52	0.00	373.18	-2.34	373.18	-2.34
280	372.00	372.00	0.00	372.00	0.00	362.75	-9.25	363.63	-8.37
270	370.66	370.66	0.00	370.66	0.00	361.11	-9.55	362.54	-8.12
260	367.90	367.90	0.00	367.90	0.00	359.20	-8.70	361.46	-6.44
250	365.55	365.55	0.00	365.45	-0.10	357.17	-8.38	360.26	-5.29
240	365.31	365.31	0.00	365.17	-0.14	357.14	-8.17	360.24	-5.07
230	364.67	364.67	0.00	364.37	-0.30	356.19	-8.48	359.39	-5.28
220	363.65	363.65	0.00	363.65	0.00	356.15	-7.50	359.35	-4.30
210	362.54	362.54	0.00	356.97	-5.57	354.94	-7.60	357.79	-4.75
200	361.42	361.42	0.00	356.90	-4.52	354.90	-6.52	357.72	-3.70
190	359.56	359.56	0.00	355.37	-4.19	353.92	-5.64	355.74	-3.82
180	356.18	356.18	0.00	354.12	-2.06	353.11	-3.07	354.46	-1.72
170	354.53	354.53	0.00	351.69	-2.84	351.66	-2.87	352.37	-2.16
160	353.77	353.77	0.00	351.56	-2.21	351.58	-2.19	352.24	-1.53
150	351.69	351.69	0.00	349.73	-1.96	349.73	-1.96	349.71	-1.98
140	349.31	349.51	0.20	349.44	0.13	349.44	0.13	349.44	0.13
130	348.47	348.46	-0.01	348.46	-0.01	348.46	-0.01	348.47	0.00
120	346.46	346.46	0.00	346.46	0.00	346.46	0.00	346.46	0.00
110	343.57	342.69	-0.88	342.69	-0.88	342.69	-0.88	342.62	-0.95
100	343.29	341.94	-1.35	341.94	-1.35	341.94	-1.35	341.9	-1.39
90	342.31	340.53	-1.78	340.53	-1.78	340.53	-1.78	340.53	-1.78
80	341.24	340.45	-0.79	340.45	-0.79	340.45	-0.79	340.45	-0.79
70	339.40	339.28	-0.12	339.28	-0.12	339.28	-0.12	339.28	-0.12
60	339.14	339.21	0.07	339.21	0.07	339.21	0.07	339.21	0.07
50	337.58	337.28	-0.30	337.28	-0.30	337.28	-0.30	337.28	-0.30
40	336.13	335.63	-0.50	335.63	-0.50	335.63	-0.50	335.63	-0.50
30	335.13	334.80	-0.33	334.80	-0.33	334.80	-0.33	334.8	-0.33
20	333.90	333.91	0.01	333.91	0.01	333.91	0.01	333.91	0.01
10	333.85	333.75	-0.10	333.75	-0.10	333.75	-0.10	333.75	-0.10
5	330.28	330.28	0.00	330.28	0.00	330.28	0.00	330.28	0.00

¹The effective analysis was run on HEC-RAS v 6.1.0

**Table 2. Comparison of 100-Year Water Surface Elevations for Proposed vs. Effective Conditions
(a negative number indicates that the project is lowering the 100-year water surface elevation)**

Station	Corrected Effective, ft	Prop. Cond. Phase 1, ft	Phase 1 – Corr. Eff., ft	Prop. Cond. Phase 2, ft	Phase 2 – Corr. Eff., ft	Prop. Cond. Phase 3, ft	Phase 3 – Corr. Eff., ft	Prop. Cond. Phase 4, ft	Phase 4 – Corr. Eff., ft
398	383.17	383.17	0.00	383.17	0.00	383.17	0.00	383.17	0.00
396	378.38	378.38	0.00	378.38	0.00	377.94	-0.44	377.93	-0.45
394.1	377.81	377.81	0.00	377.81	0.00	376.97	-0.84	376.94	-0.87
320	376.30	376.30	0.00	376.30	0.00	375.09	-1.21	375.12	-1.18
310	376.28	376.28	0.00	376.28	0.00	374.86	-1.42	374.88	-1.40
300	375.73	375.73	0.00	375.73	0.00	374.07	-1.66	374.07	-1.66
290	375.52	375.52	0.00	375.52	0.00	373.18	-2.34	373.18	-2.34
280	372.00	372.00	0.00	372.00	0.00	362.75	-9.25	363.63	-8.37
270	370.66	370.66	0.00	370.66	0.00	361.11	-9.55	362.54	-8.12
260	367.90	367.90	0.00	367.90	0.00	359.20	-8.70	361.46	-6.44
250	365.55	365.55	0.00	365.45	-0.10	357.17	-8.38	360.26	-5.29
240	365.31	365.31	0.00	365.17	-0.14	357.14	-8.17	360.24	-5.07
230	364.67	364.67	0.00	364.37	-0.30	356.19	-8.48	359.39	-5.28
220	363.65	363.65	0.00	363.65	0.00	356.15	-7.50	359.35	-4.30
210	362.54	362.54	0.00	356.97	-5.57	354.94	-7.60	357.79	-4.75
200	361.42	361.42	0.00	356.90	-4.52	354.90	-6.52	357.72	-3.70
190	359.56	359.56	0.00	355.37	-4.19	353.92	-5.64	355.74	-3.82
180	356.18	356.18	0.00	354.12	-2.06	353.11	-3.07	354.46	-1.72
170	354.53	354.53	0.00	351.69	-2.84	351.66	-2.87	352.37	-2.16
160	353.77	353.77	0.00	351.56	-2.21	351.58	-2.19	352.24	-1.53
150	351.69	351.69	0.00	349.73	-1.96	349.73	-1.96	349.71	-1.98
140	349.55	349.51	-0.04	349.44	-0.11	349.44	-0.11	349.44	-0.11
130	348.47	348.46	-0.01	348.46	-0.01	348.46	-0.01	348.47	0.00
120	346.46	346.46	0.00	346.46	0.00	346.46	0.00	346.46	0.00
110	343.81	342.69	-1.12	342.69	-1.12	342.69	-1.12	342.62	-1.19
100	343.29	341.94	-1.35	341.94	-1.35	341.94	-1.35	341.9	-1.39
90	342.31	340.53	-1.78	340.53	-1.78	340.53	-1.78	340.53	-1.78
80	341.24	340.45	-0.79	340.45	-0.79	340.45	-0.79	340.45	-0.79
70	339.40	339.28	-0.12	339.28	-0.12	339.28	-0.12	339.28	-0.12
60	339.14	339.21	0.07	339.21	0.07	339.21	0.07	339.21	0.07
50	337.58	337.28	-0.30	337.28	-0.30	337.28	-0.30	337.28	-0.30
40	336.13	335.63	-0.50	335.63	-0.50	335.63	-0.50	335.63	-0.50
30	335.13	334.80	-0.33	334.80	-0.33	334.80	-0.33	334.8	-0.33
20	333.90	333.91	0.01	333.91	0.01	333.91	0.01	333.91	0.01
10	333.85	333.75	-0.10	333.75	-0.10	333.75	-0.10	333.75	-0.10
5	330.28	330.28	0.00	330.28	0.00	330.28	0.00	330.28	0.00

¹The corrected effective analysis was run on HEC-RAS v 6.1.0

Table 3. Comparison of 100-Year Water Surface Elevations for Proposed vs. Corrected Effective Conditions (a negative number indicates that the project is lowering the 100-year water surface elevation)

StreamStats Report

Region ID: CA

Workspace ID: CA20201105164552757000

Clicked Point (Latitude, Longitude): 32.74180, -116.92806

Time: 2020-11-05 08:46:11 -0800



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLDEM30M	Mean basin slope computed from 30 m DEM	23.1	percent

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	155.6	square miles
ELEV	Mean Basin Elevation	2659	feet
ELEVMAX	Maximum basin elevation	6465	feet
LFPLENGTH	Length of longest flow path	44	miles
MINBELEV	Minimum basin elevation	330	feet
OUTLETELEV	Elevation of the stream outlet in feet above NAVD88	330	feet
PRECIP	Mean Annual Precipitation	22.3	inches
RELIEF	Maximum - minimum elevation	6135	feet

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Application Version: 4.4.0

APPENDIX A

**EFFECTIVE,
EXISTING CONDITION
(CORRECTED EFFECTIVE),
AND
PROPOSED CONDITION
HEC-RAS ANALYSES**

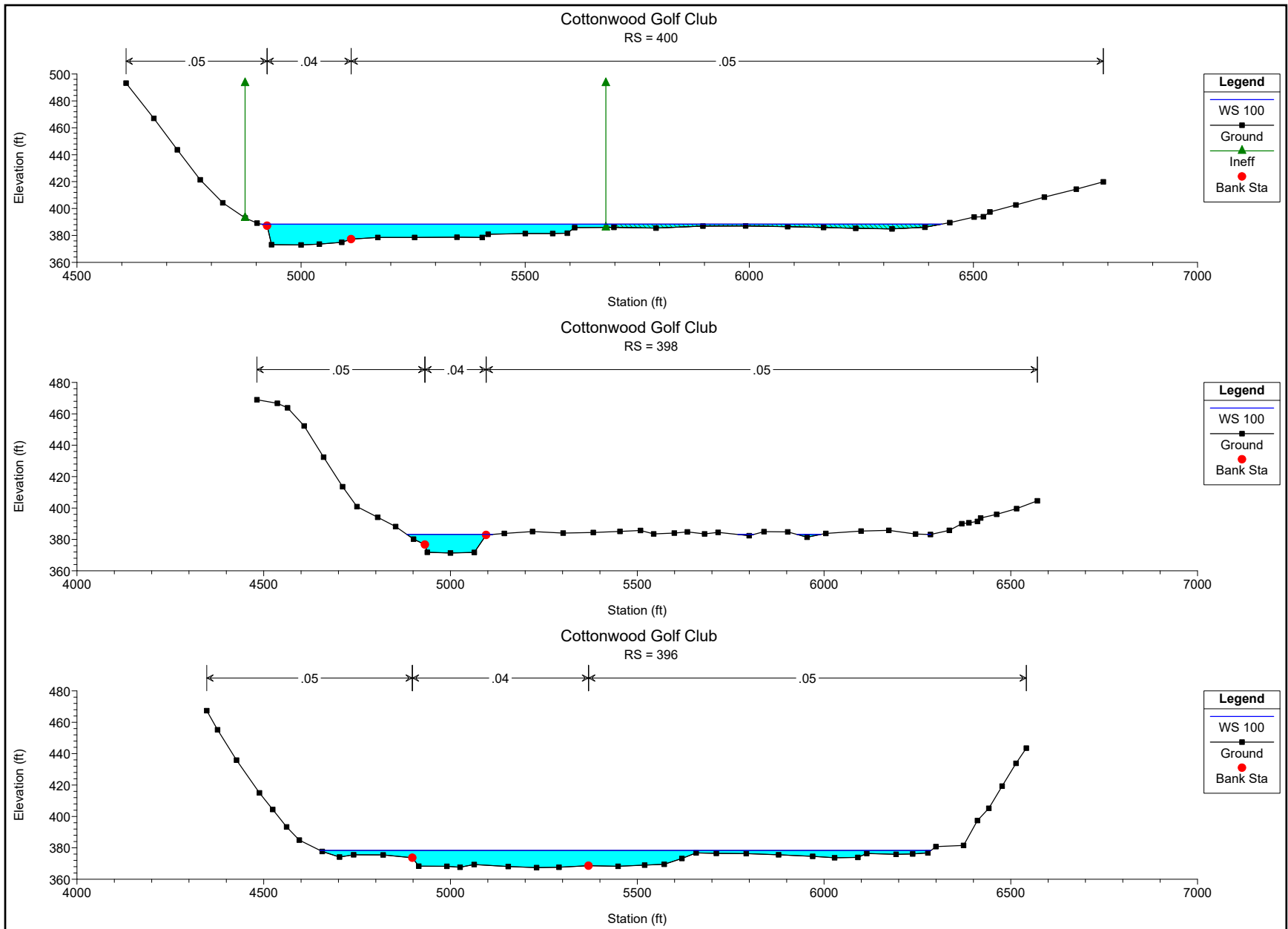
Rick Engineering As-Built Condition (Effective)

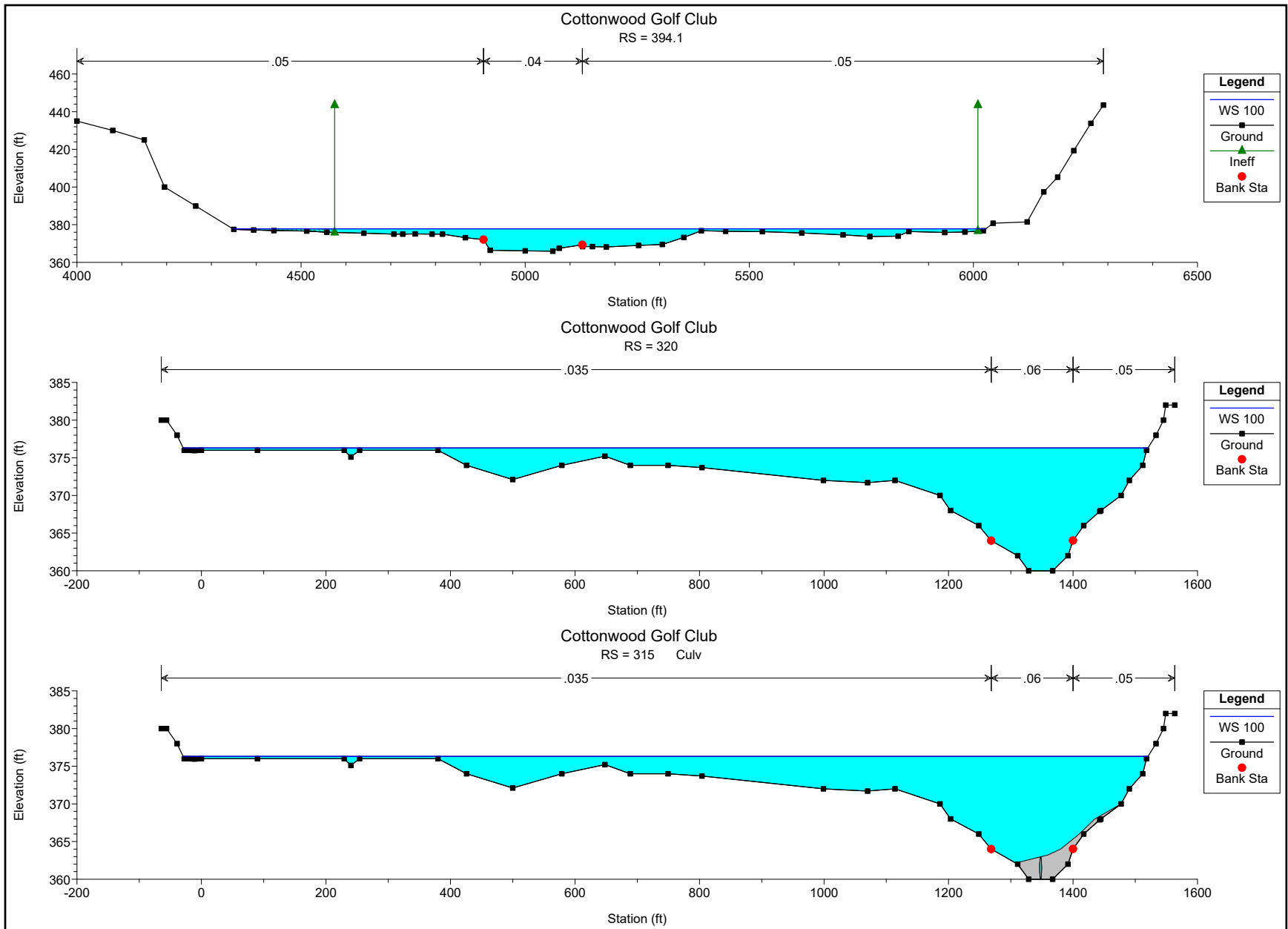
HEC-RAS Plan: Effective River: RIVER-1 Reach: Reach-1 Profile: 100

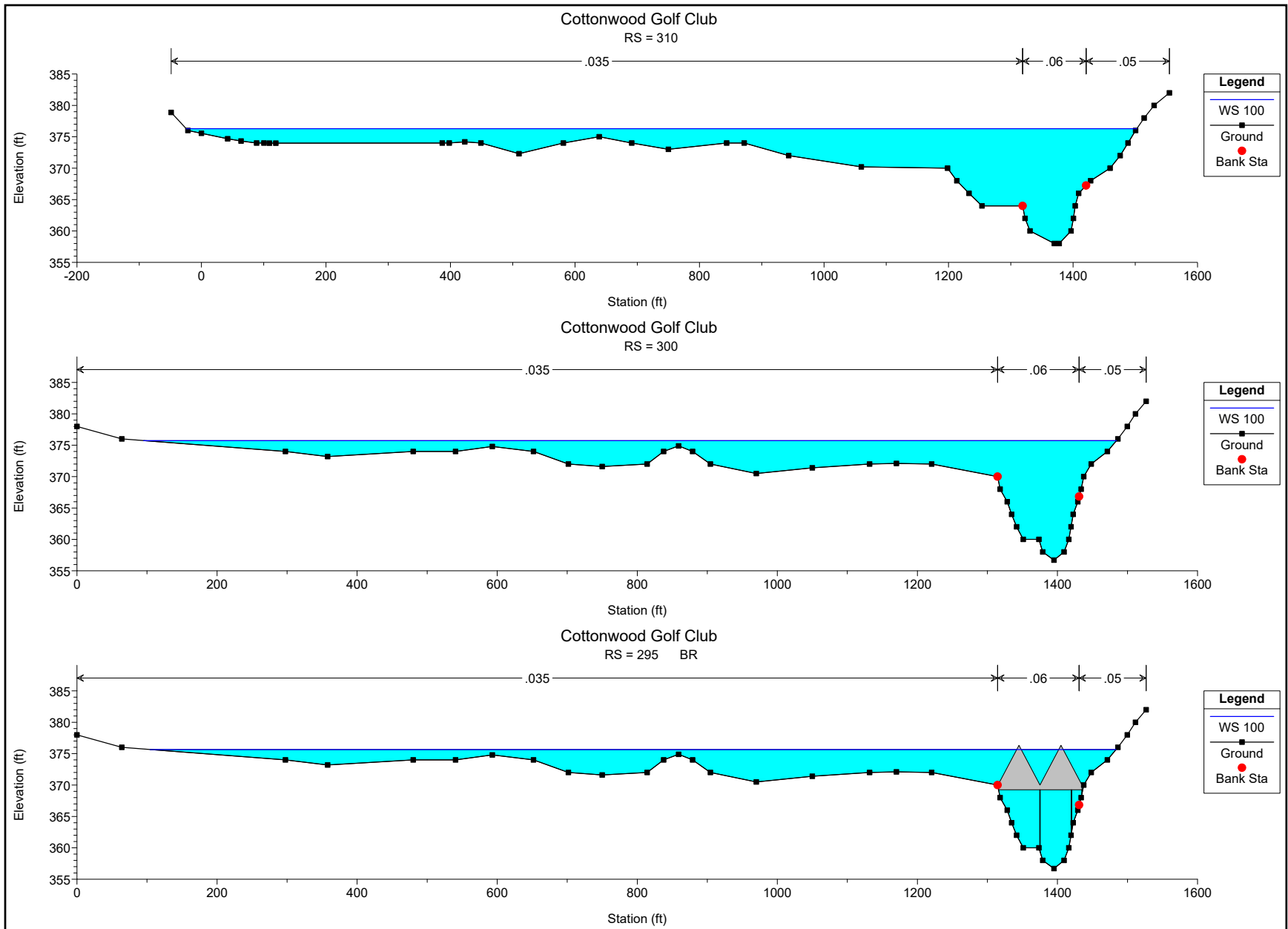
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	400	100	29500.00	373.00	388.40		388.73	0.000710	5.67	7217.89	1518.65	0.26
Reach-1	398	100	29500.00	371.30	383.17	383.17	387.25	0.008936	16.52	1955.33	346.72	0.90
Reach-1	396	100	29500.00	367.40	378.38		378.59	0.000584	4.20	9721.64	1635.84	0.23
Reach-1	394.1	100	29500.00	365.90	377.81		378.32	0.001542	7.14	6838.40	1679.65	0.38
Reach-1	320	100	29500.00	360.00	376.30	371.89	376.73	0.001952	6.59	6279.85	1549.75	0.30
Reach-1	315		Culvert									
Reach-1	310	100	29500.00	358.00	376.28		376.58	0.001332	5.57	7122.92	1526.89	0.25
Reach-1	300	100	29500.00	356.70	375.73	374.22	376.36	0.003004	7.94	5237.34	1389.14	0.37
Reach-1	295		Bridge									
Reach-1	290	100	29500.00	357.00	375.52		376.15	0.003116	8.26	5088.74	1311.24	0.37
Reach-1	280	100	29500.00	354.60	372.00	372.00	374.39	0.006896	15.00	2918.15	813.73	0.79
Reach-1	270	100	29500.00	351.30	370.66	370.66	372.55	0.002422	13.13	3851.40	1241.65	0.64
Reach-1	260	100	29500.00	349.90	367.90	367.90	369.70	0.002600	12.88	3797.93	1077.01	0.66
Reach-1	250	100	29500.00	347.70	365.55	364.94	366.98	0.001893	10.89	4095.02	981.89	0.56
Reach-1	245		Bridge									
Reach-1	240	100	29500.00	347.70	365.31	364.86	366.87	0.002054	11.27	3932.89	950.11	0.58
Reach-1	230	100	29500.00	346.00	364.67	363.81	366.22	0.001776	11.32	3984.29	1061.74	0.55
Reach-1	225		Bridge									
Reach-1	220	100	29500.00	346.00	363.65	363.65	365.86	0.002594	13.12	3294.18	896.67	0.66
Reach-1	210	100	29500.00	345.30	362.54	361.40	363.56	0.001345	9.77	5066.40	1143.45	0.48
Reach-1	205		Bridge									
Reach-1	200	100	29500.00	345.30	361.42	361.42	363.30	0.002438	12.49	3775.20	1032.94	0.64
Reach-1	190	100	29500.00	343.70	359.56	359.56	361.51	0.002915	12.91	3651.46	1022.27	0.69
Reach-1	180	100	29500.00	342.80	356.18	356.18	357.72	0.003876	12.86	3862.30	1116.68	0.77
Reach-1	170	100	29500.00	342.10	354.53	354.06	355.68	0.003014	11.51	4697.07	1191.20	0.68
Reach-1	165		Bridge									
Reach-1	160	100	29500.00	342.10	353.77	353.77	355.38	0.004551	13.38	3963.11	1107.15	0.83
Reach-1	150	100	29500.00	340.70	351.69	351.69	353.25	0.004000	12.70	4463.50	1266.04	0.78
Reach-1	140	100	29500.00	340.00	349.31		349.71	0.000298	2.82	6252.03	999.31	0.20
Reach-1	130	100	29500.00	337.30	348.47	345.10	349.33	0.001370	7.64	4041.50	1122.41	0.46
Reach-1	125		Mult Open									
Reach-1	120	100	29500.00	338.10	346.46	346.46	348.93	0.007769	12.80	2359.45	982.82	1.01
Reach-1	110	100	29500.00	334.20	343.57		344.47	0.001252	6.06	4083.34	1011.17	0.42
Reach-1	100	100	29500.00	332.00	343.29		343.81	0.001243	7.38	5524.65	969.52	0.44
Reach-1	90	100	29500.00	329.50	342.31	340.97	343.05	0.001776	8.93	5077.04	1105.35	0.53
Reach-1	85		Bridge									
Reach-1	80	100	29500.00	329.40	341.24	341.24	342.84	0.003678	12.74	3817.31	1103.62	0.75
Reach-1	70	100	29500.00	327.60	339.40	339.27	340.78	0.003511	12.12	4076.96	1150.47	0.73

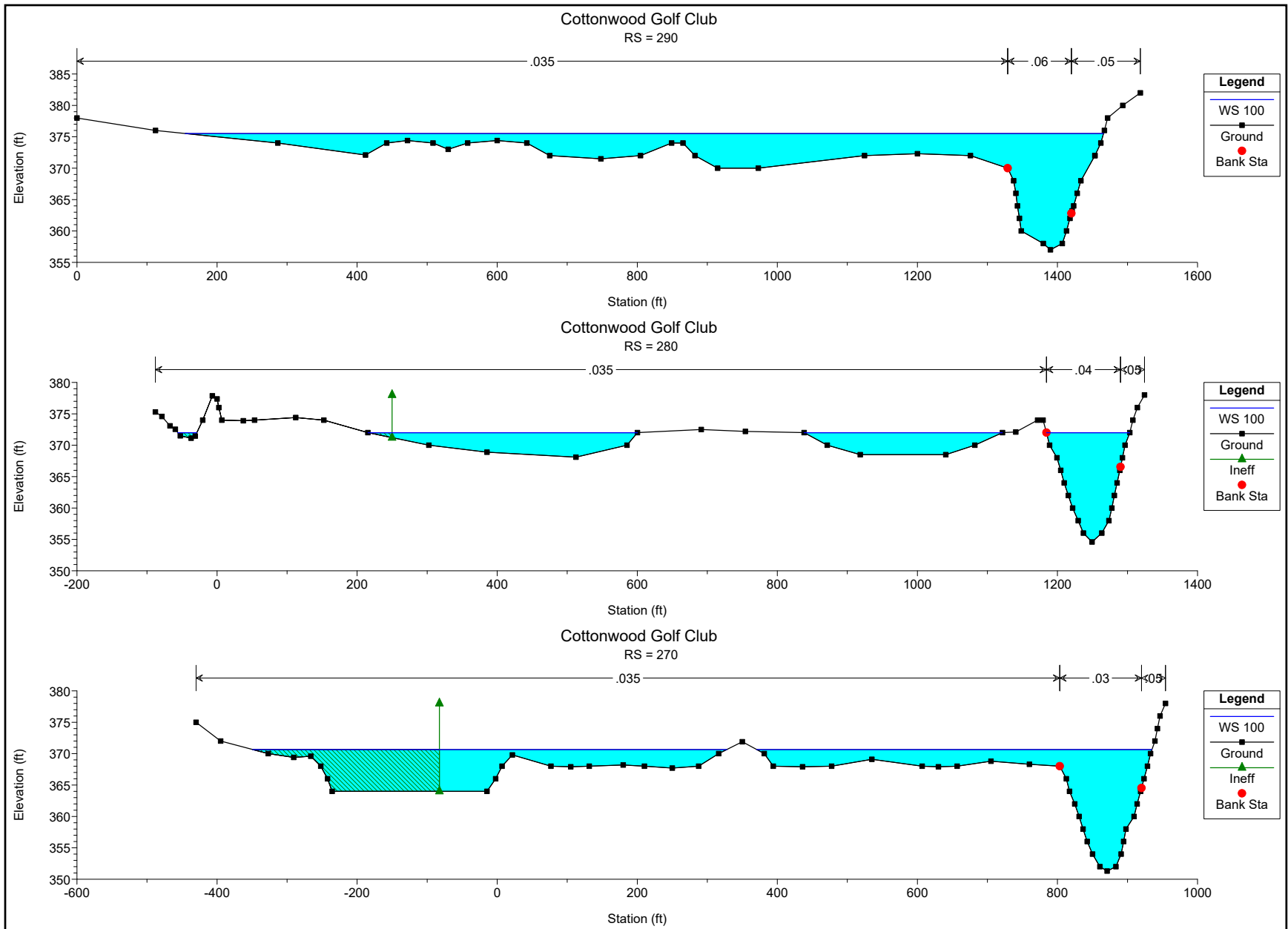
HEC-RAS Plan: Effective River: RIVER-1 Reach: Reach-1 Profile: 100 (Continued)

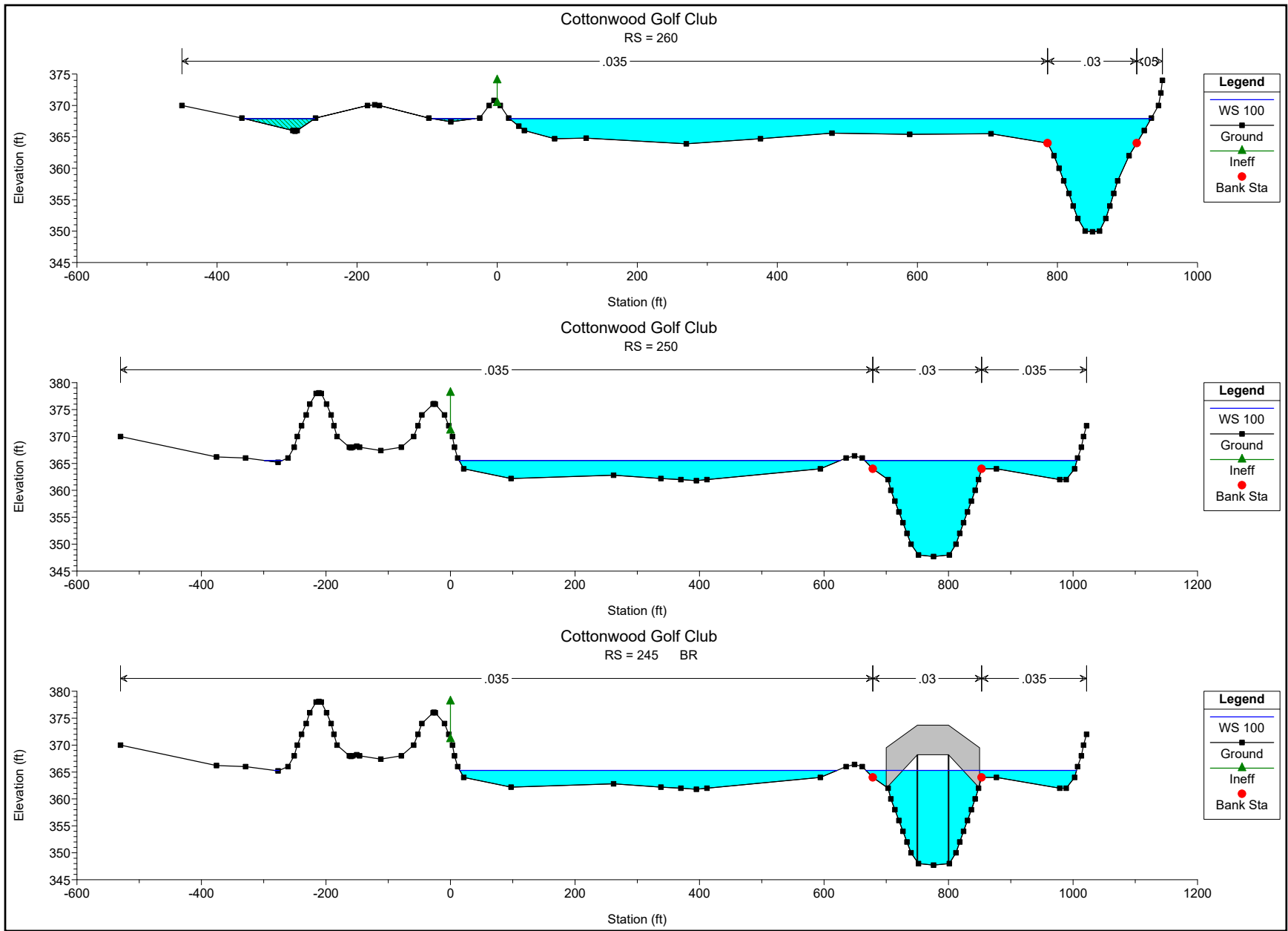
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	65		Bridge									
Reach-1	60	100	29500.00	327.10	339.14	339.14	340.64	0.003940	12.57	3873.52	1131.38	0.77
Reach-1	50	100	29500.00	325.40	337.58		337.98	0.002917	4.98	5819.82	1115.15	0.26
Reach-1	40	100	29500.00	324.50	336.13		336.59	0.002341	4.28	5713.12	1014.69	0.23
Reach-1	30	100	29500.00	323.60	335.13		335.48	0.001631	3.54	6621.18	1161.91	0.19
Reach-1	20	100	29500.00	323.00	333.90	331.66	334.44	0.002912	4.37	5163.59	1336.52	0.25
Reach-1	15		Bridge									
Reach-1	10	100	29500.00	322.00	333.85	331.57	334.35	0.002739	4.22	5402.62	1248.54	0.25
Reach-1	5	100	29500.00	321.10	330.28	328.76	330.93	0.004294	10.82	5598.21	1123.72	0.68

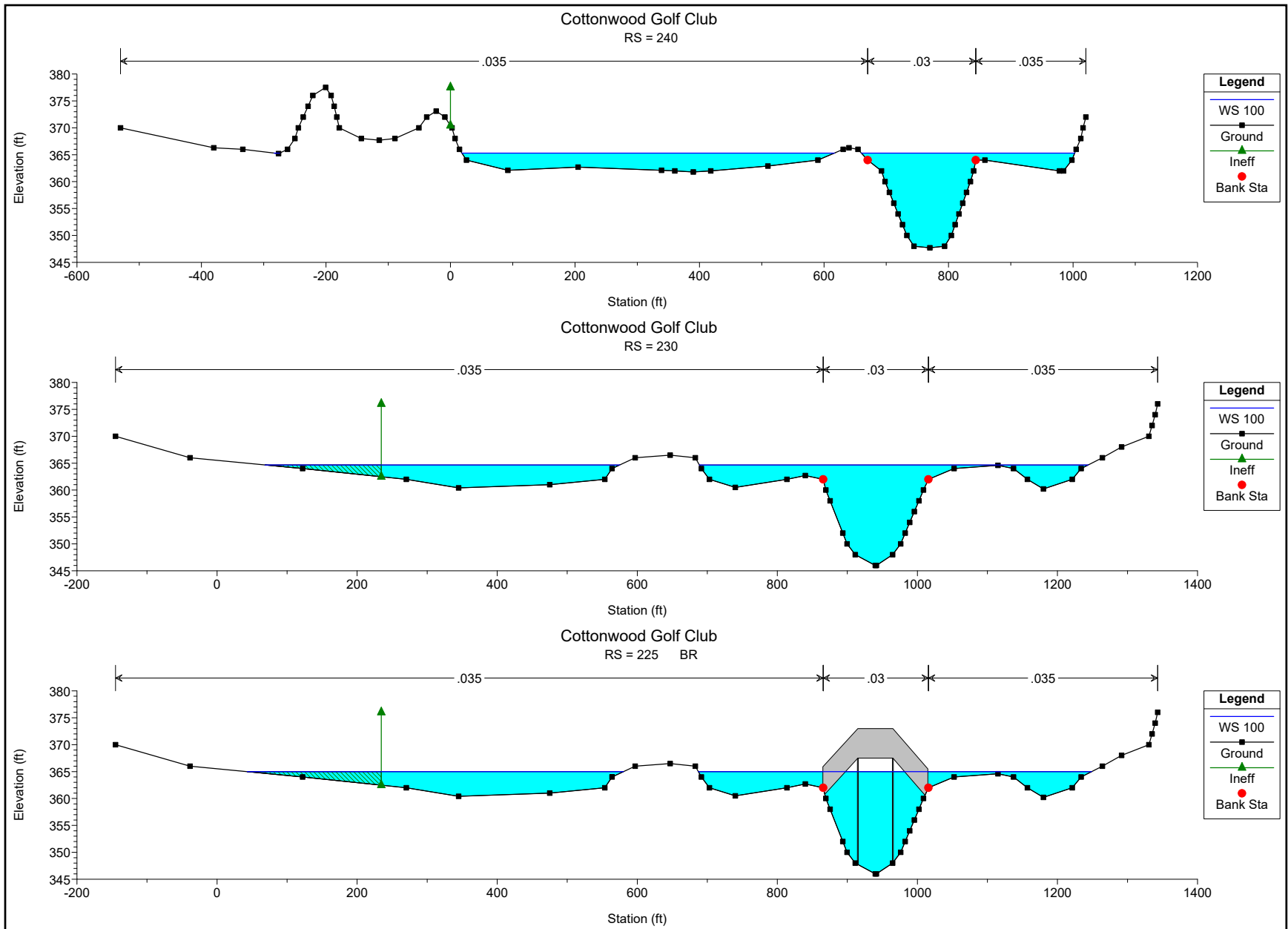


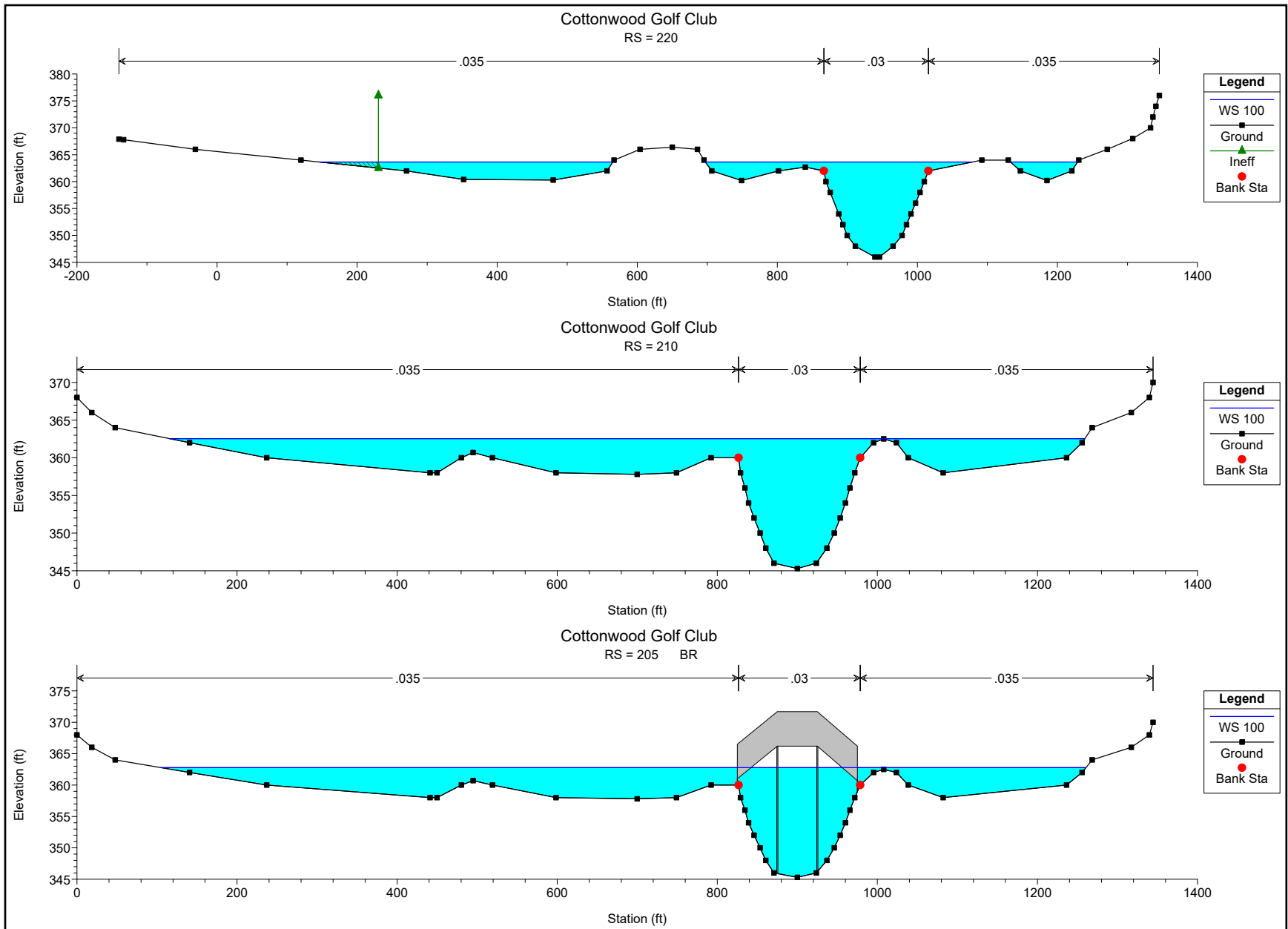


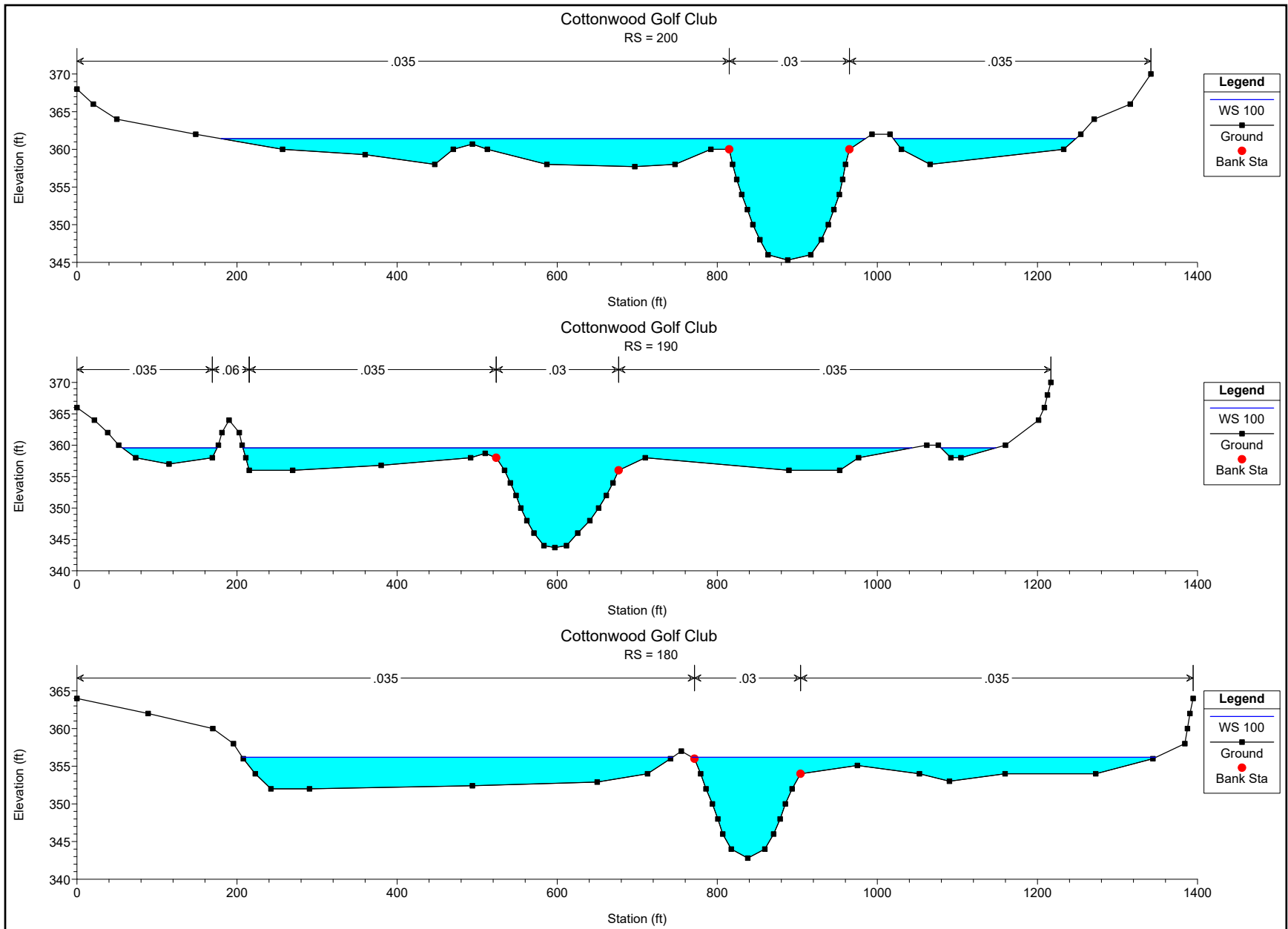


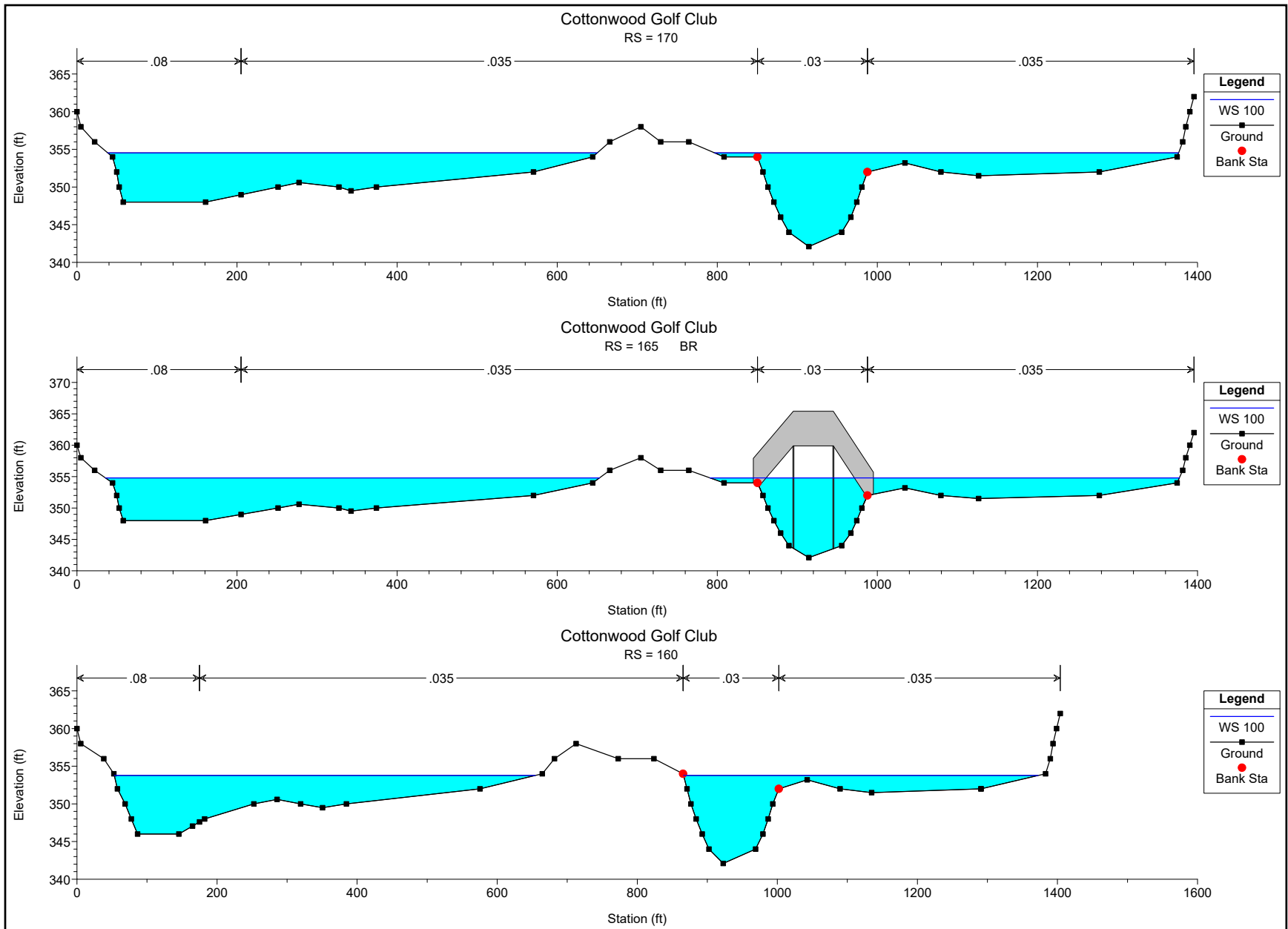


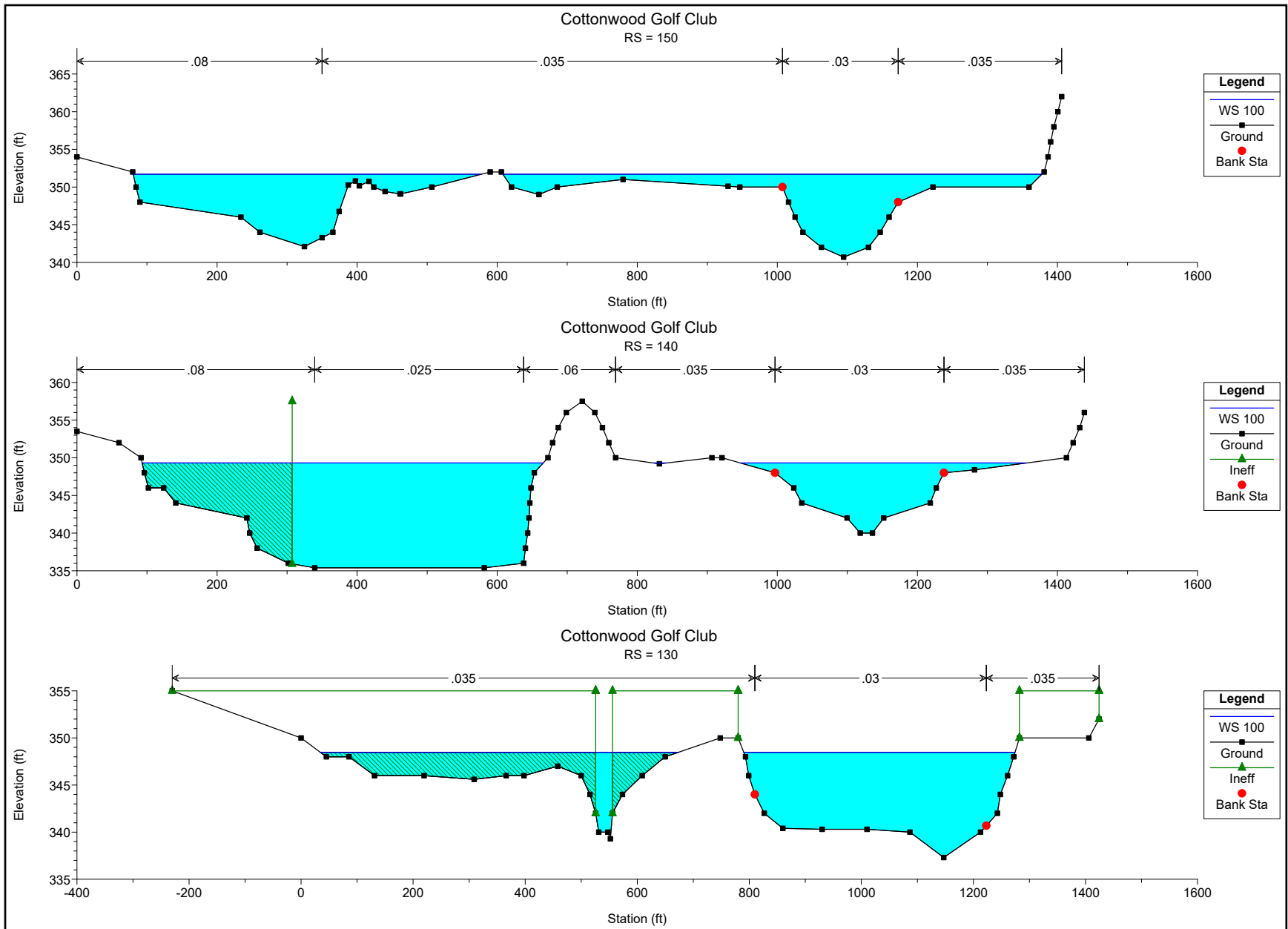


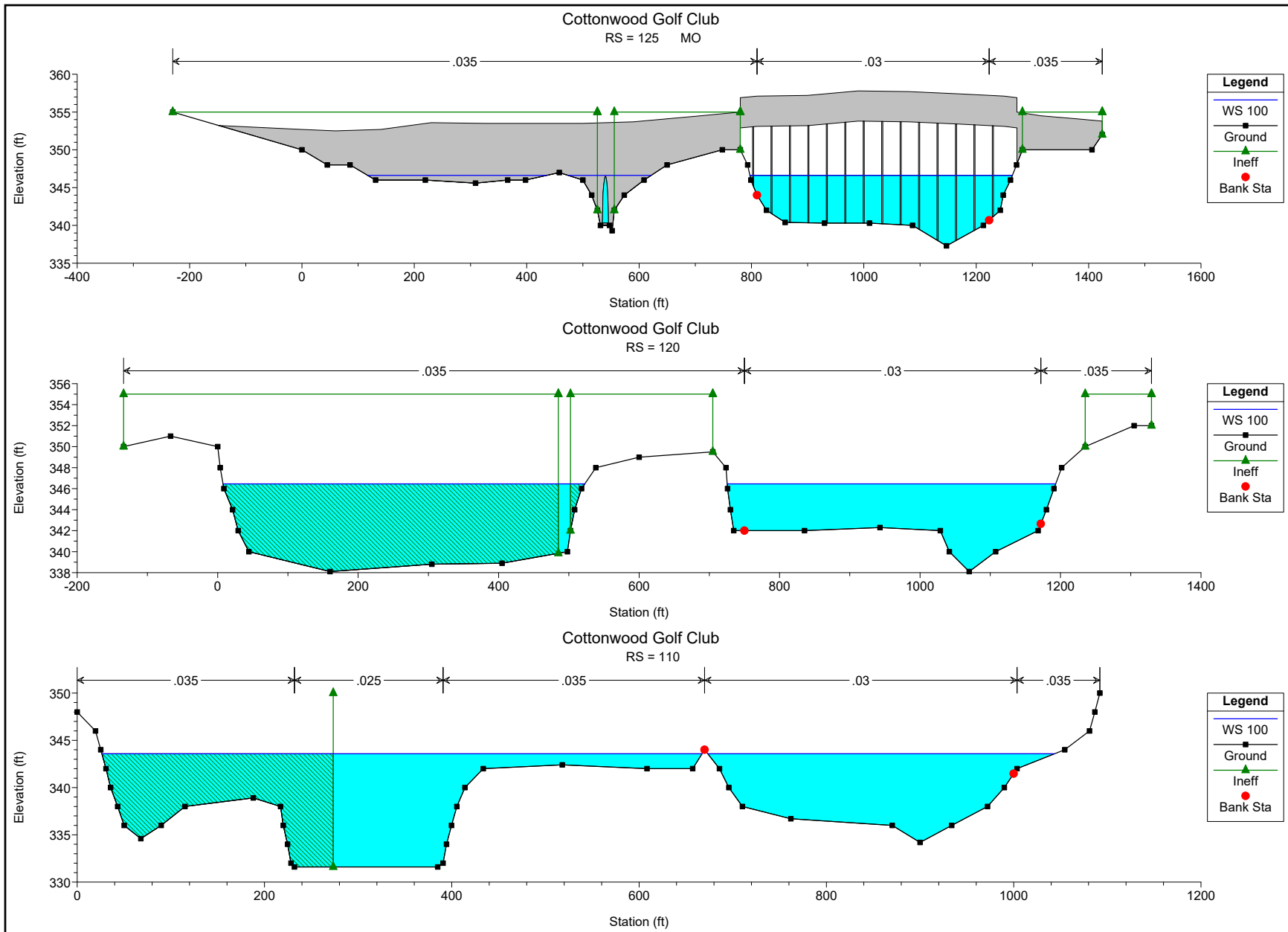


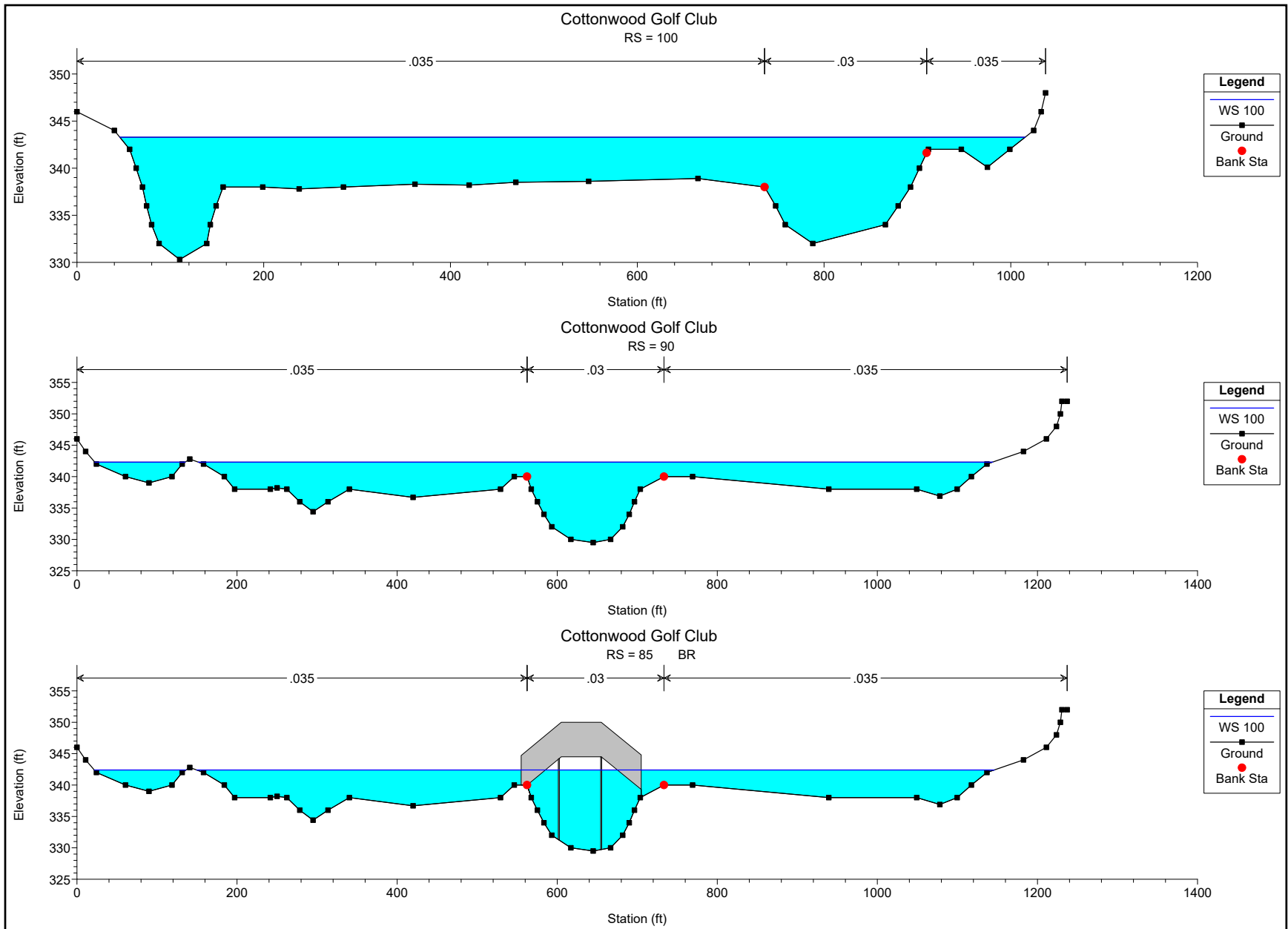


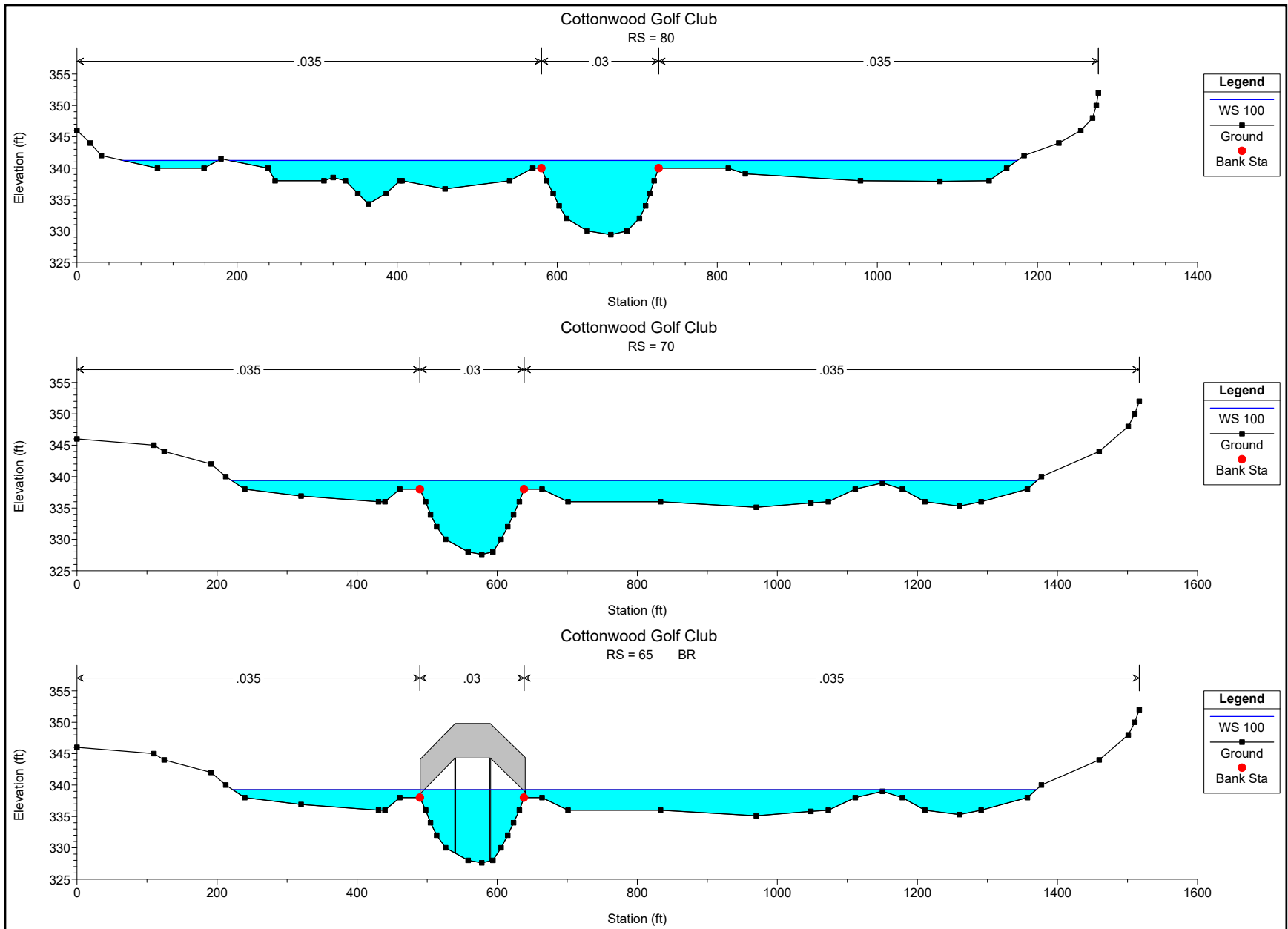


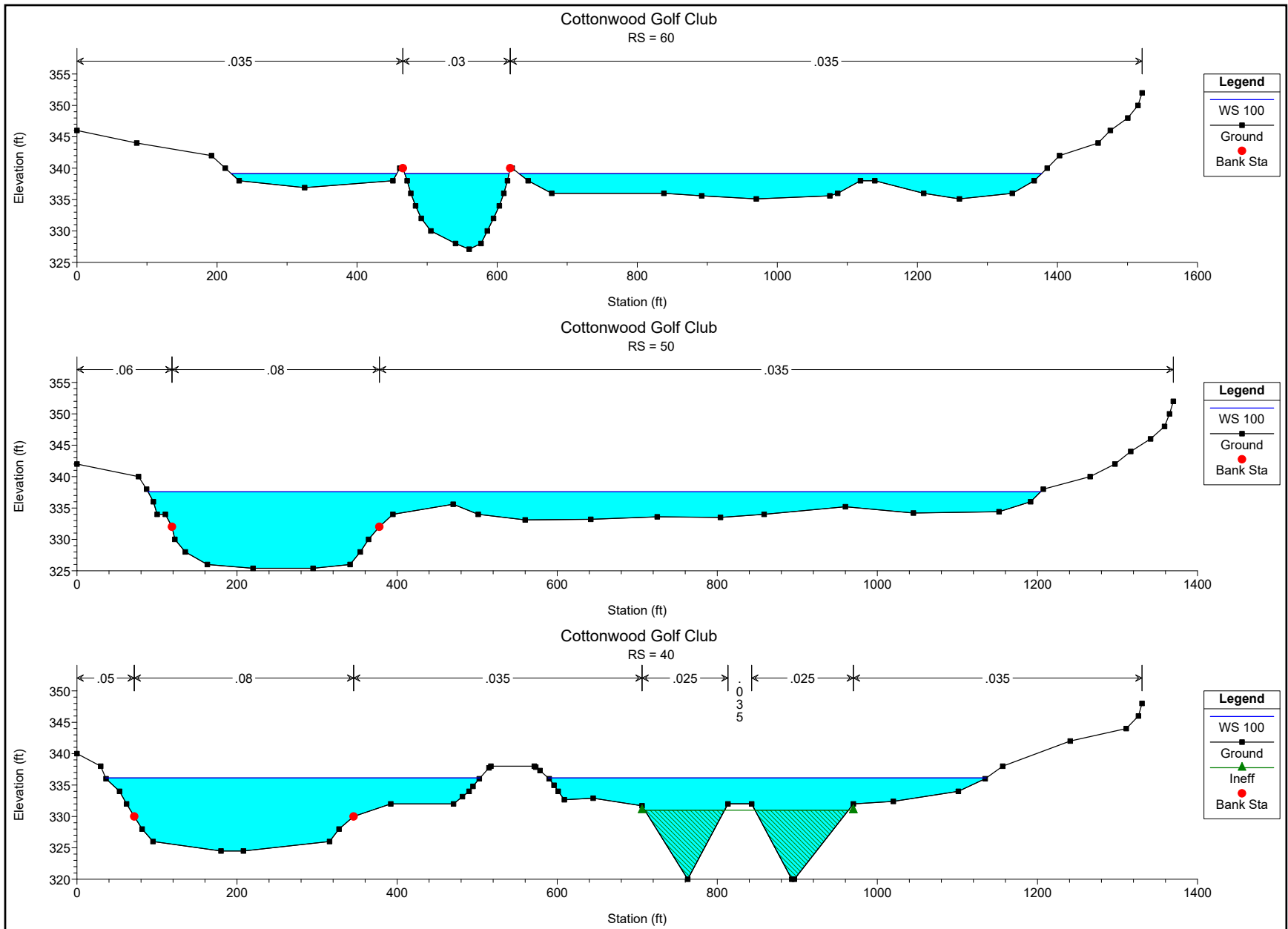


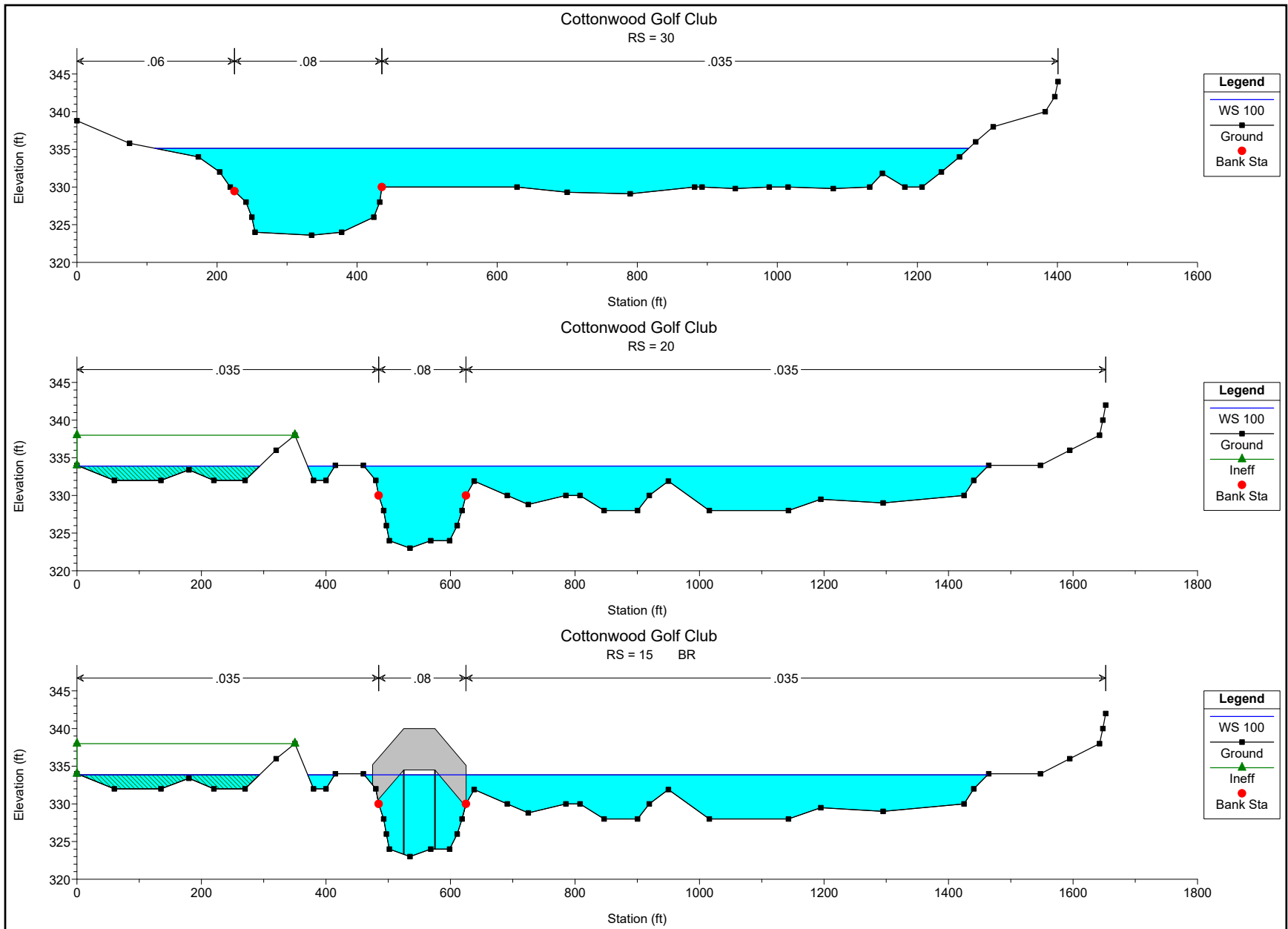


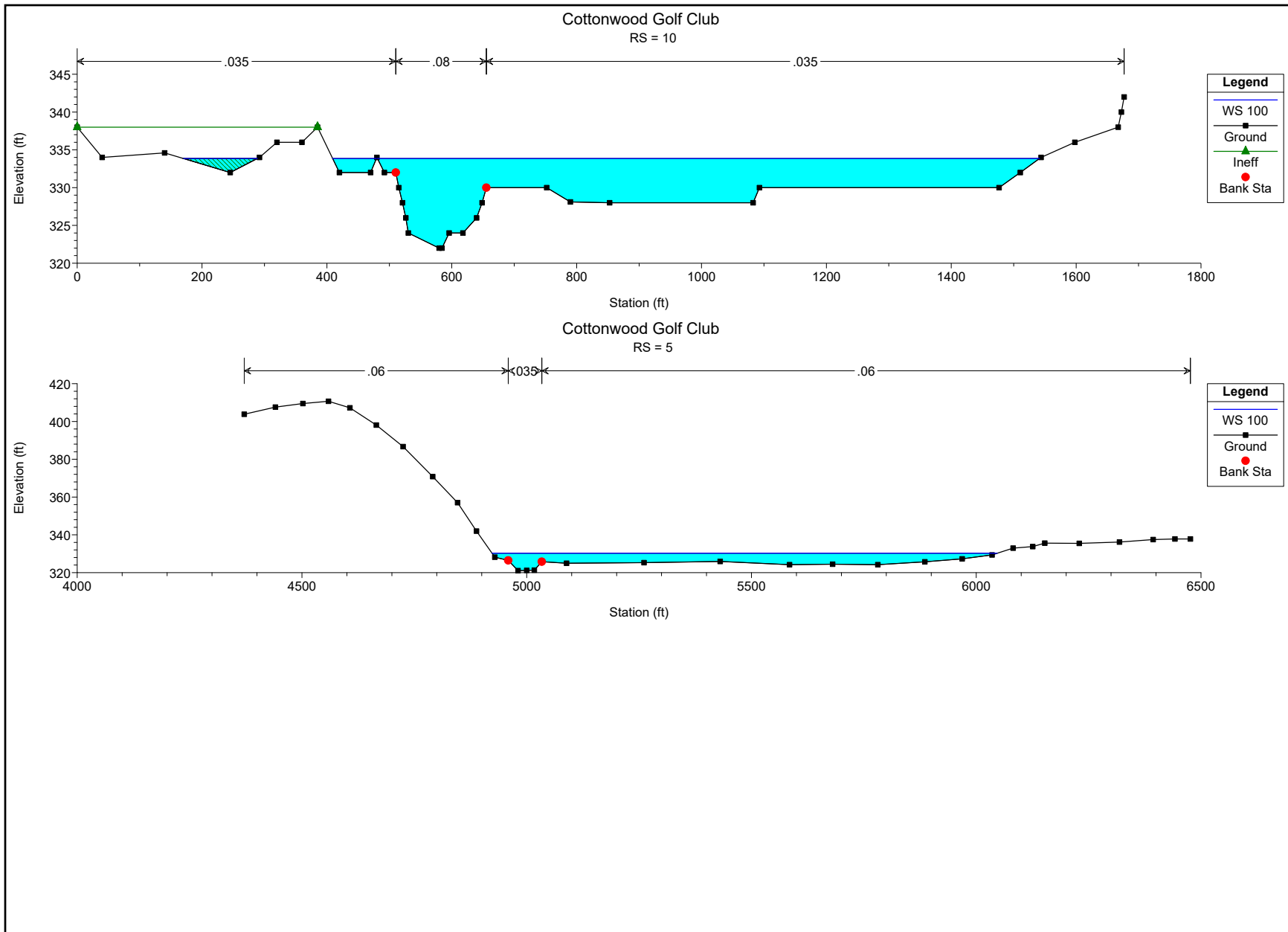












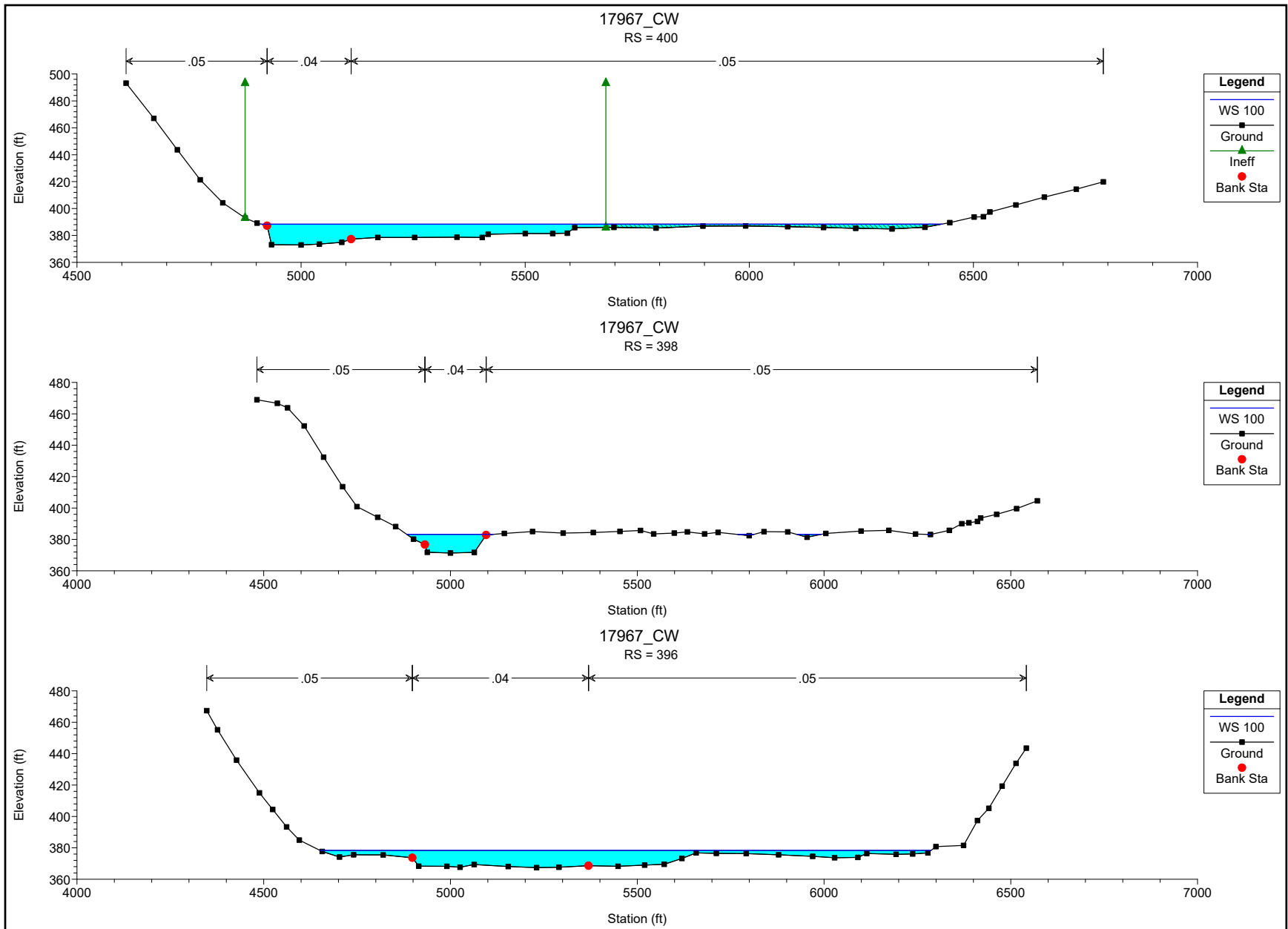
Existing Condition (Corrected Effective)

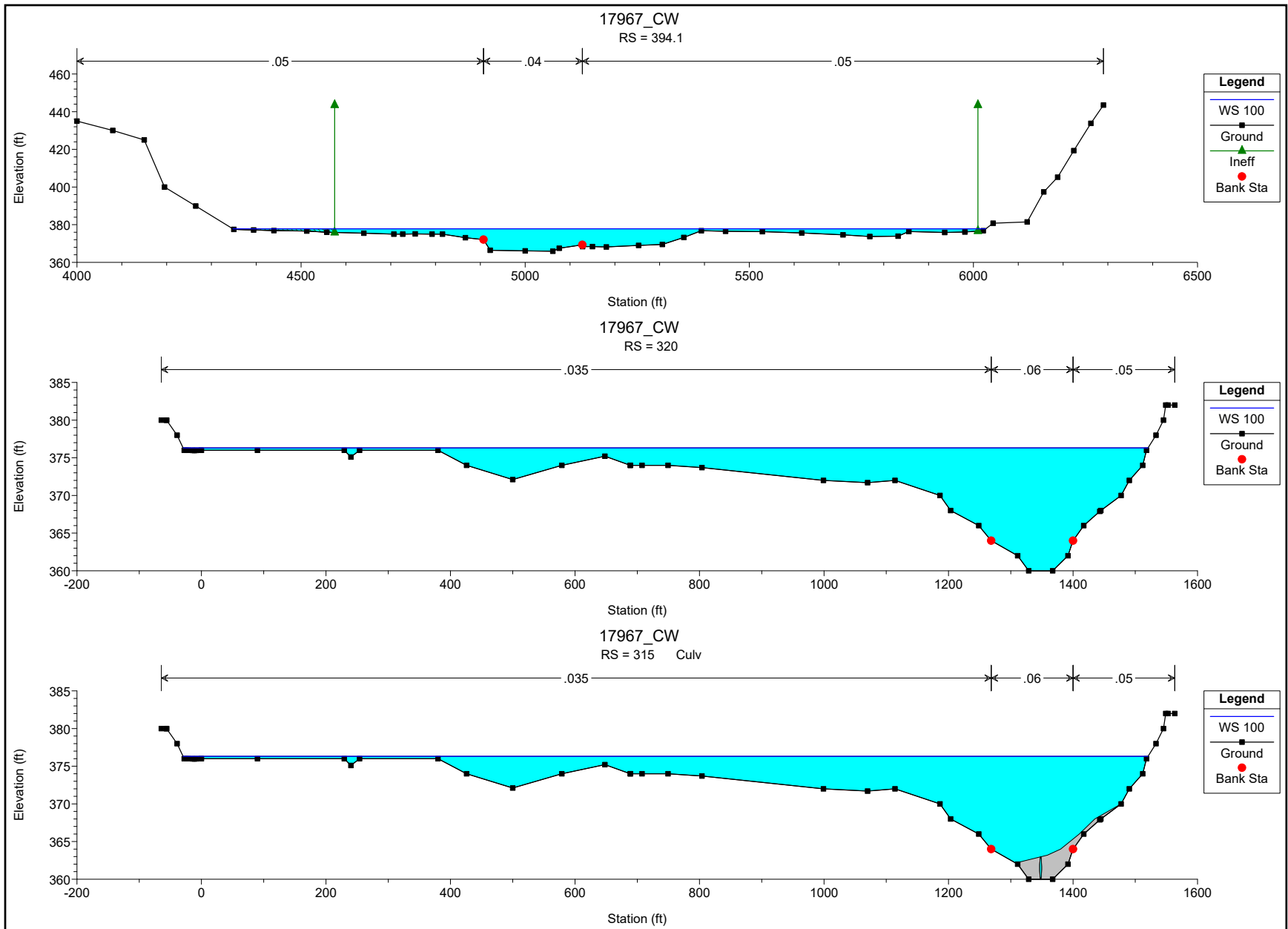
HEC-RAS Plan: As-Built Corr Eff River: RIVER-1 Reach: Reach-1 Profile: 100

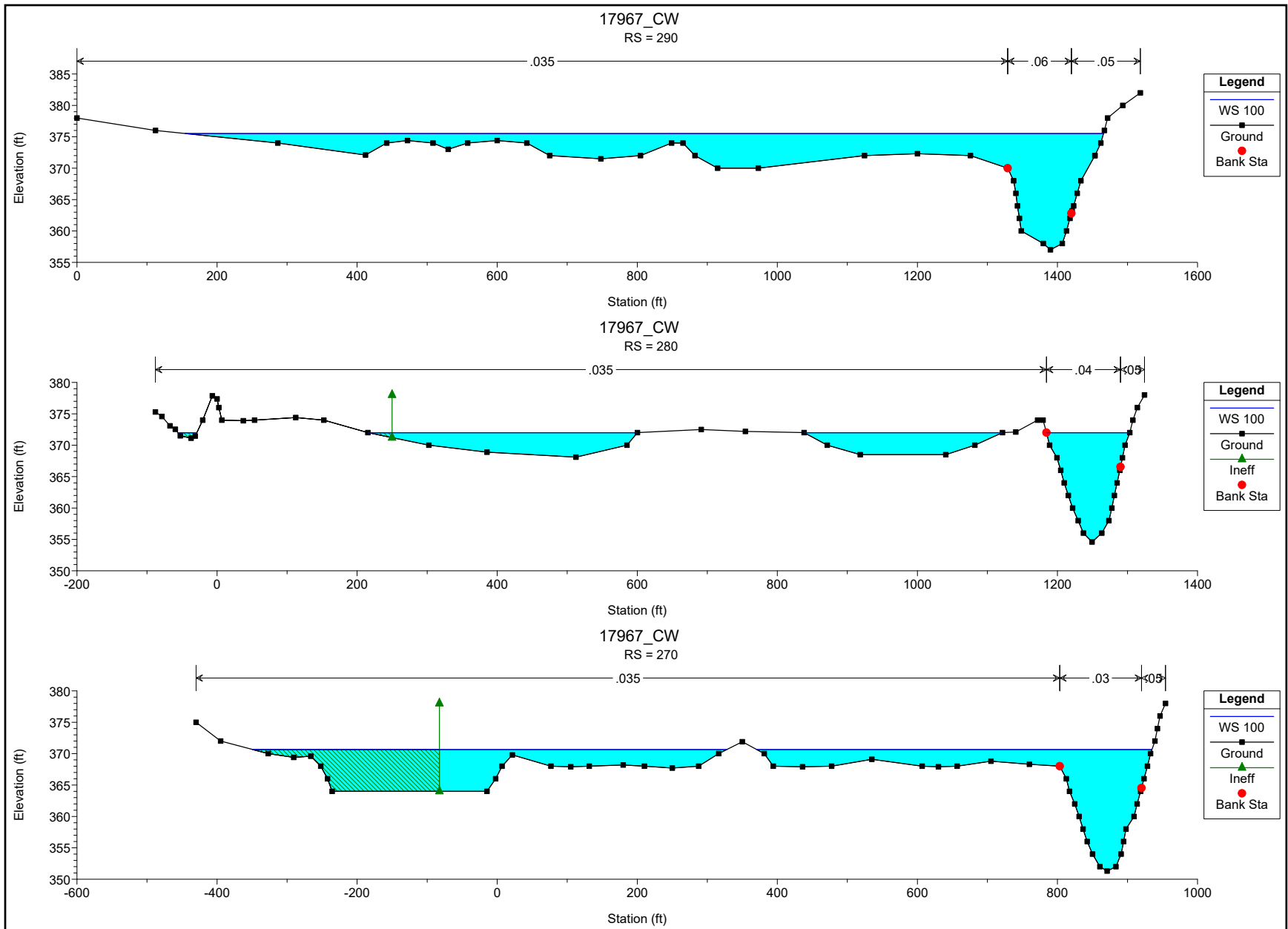
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	400	100	29500.00	373.00	388.40		388.73	0.000710	5.67	7217.89	1518.65	0.26
Reach-1	398	100	29500.00	371.30	383.17	383.17	387.25	0.008936	16.52	1955.33	346.72	0.90
Reach-1	396	100	29500.00	367.40	378.38		378.59	0.000584	4.20	9721.67	1635.85	0.23
Reach-1	394.1	100	29500.00	365.90	377.81		378.32	0.001542	7.14	6838.40	1679.65	0.38
Reach-1	320	100	29500.00	360.00	376.30	371.89	376.73	0.001952	6.59	6279.88	1549.75	0.30
Reach-1	315		Culvert									
Reach-1	310	100	29500.00	358.00	376.28		376.58	0.001332	5.57	7123.00	1526.89	0.25
Reach-1	300	100	29500.00	356.70	375.73	374.22	376.36	0.003003	7.94	5237.41	1389.15	0.37
Reach-1	295		Bridge									
Reach-1	290	100	29500.00	357.00	375.52		376.15	0.003116	8.26	5088.77	1311.24	0.37
Reach-1	280	100	29500.00	354.60	372.00	372.00	374.39	0.006896	15.00	2918.15	813.73	0.79
Reach-1	270	100	29500.00	351.30	370.66	370.66	372.55	0.002422	13.13	3851.40	1241.65	0.64
Reach-1	260	100	29500.00	349.90	367.90	367.90	369.70	0.002600	12.88	3797.93	1077.01	0.66
Reach-1	250	100	29500.00	347.70	365.55	364.94	366.98	0.001893	10.89	4095.02	981.89	0.56
Reach-1	245		Bridge									
Reach-1	240	100	29500.00	347.70	365.31	364.86	366.87	0.002054	11.27	3932.89	950.11	0.58
Reach-1	230	100	29500.00	346.00	364.67	363.81	366.22	0.001776	11.32	3984.29	1061.74	0.55
Reach-1	225		Bridge									
Reach-1	220	100	29500.00	346.00	363.65	363.65	365.86	0.002594	13.12	3294.18	896.67	0.66
Reach-1	210	100	29500.00	345.30	362.54	361.40	363.56	0.001345	9.77	5066.40	1143.45	0.48
Reach-1	205		Bridge									
Reach-1	200	100	29500.00	345.30	361.42	361.42	363.30	0.002438	12.49	3775.20	1032.94	0.64
Reach-1	190	100	29500.00	343.70	359.56	359.56	361.51	0.002915	12.91	3651.46	1022.27	0.69
Reach-1	180	100	29500.00	342.80	356.18	356.18	357.72	0.003876	12.86	3862.30	1116.68	0.77
Reach-1	170	100	29500.00	342.10	354.53	354.06	355.68	0.003014	11.51	4697.07	1191.20	0.68
Reach-1	165		Bridge									
Reach-1	160	100	29500.00	342.10	353.77	353.77	355.38	0.004551	13.38	3963.11	1107.15	0.83
Reach-1	150	100	29500.00	340.70	351.69	351.69	353.25	0.004000	12.70	4463.50	1266.04	0.78
Reach-1	140	100	29500.00	340.00	349.55		349.76	0.000298	2.90	8066.88	1072.12	0.20
Reach-1	130	100	29500.00	337.30	348.47	345.10	349.33	0.001370	7.64	4041.50	1122.41	0.46
Reach-1	125		Mult Open									
Reach-1	120	100	29500.00	338.10	346.46	346.46	348.93	0.007768	12.80	2359.51	982.82	1.01
Reach-1	110	100	29500.00	334.20	343.81		344.19	0.000582	4.22	6070.13	1021.10	0.29
Reach-1	100	100	29500.00	332.00	343.29		343.81	0.001243	7.38	5524.66	969.52	0.44
Reach-1	90	100	29500.00	329.50	342.31	340.97	343.05	0.001776	8.93	5077.04	1105.35	0.53
Reach-1	85		Bridge									
Reach-1	80	100	29500.00	329.40	341.24	341.24	342.84	0.003678	12.74	3817.31	1103.62	0.75
Reach-1	70	100	29500.00	327.60	339.40	339.27	340.78	0.003511	12.12	4076.96	1150.47	0.73

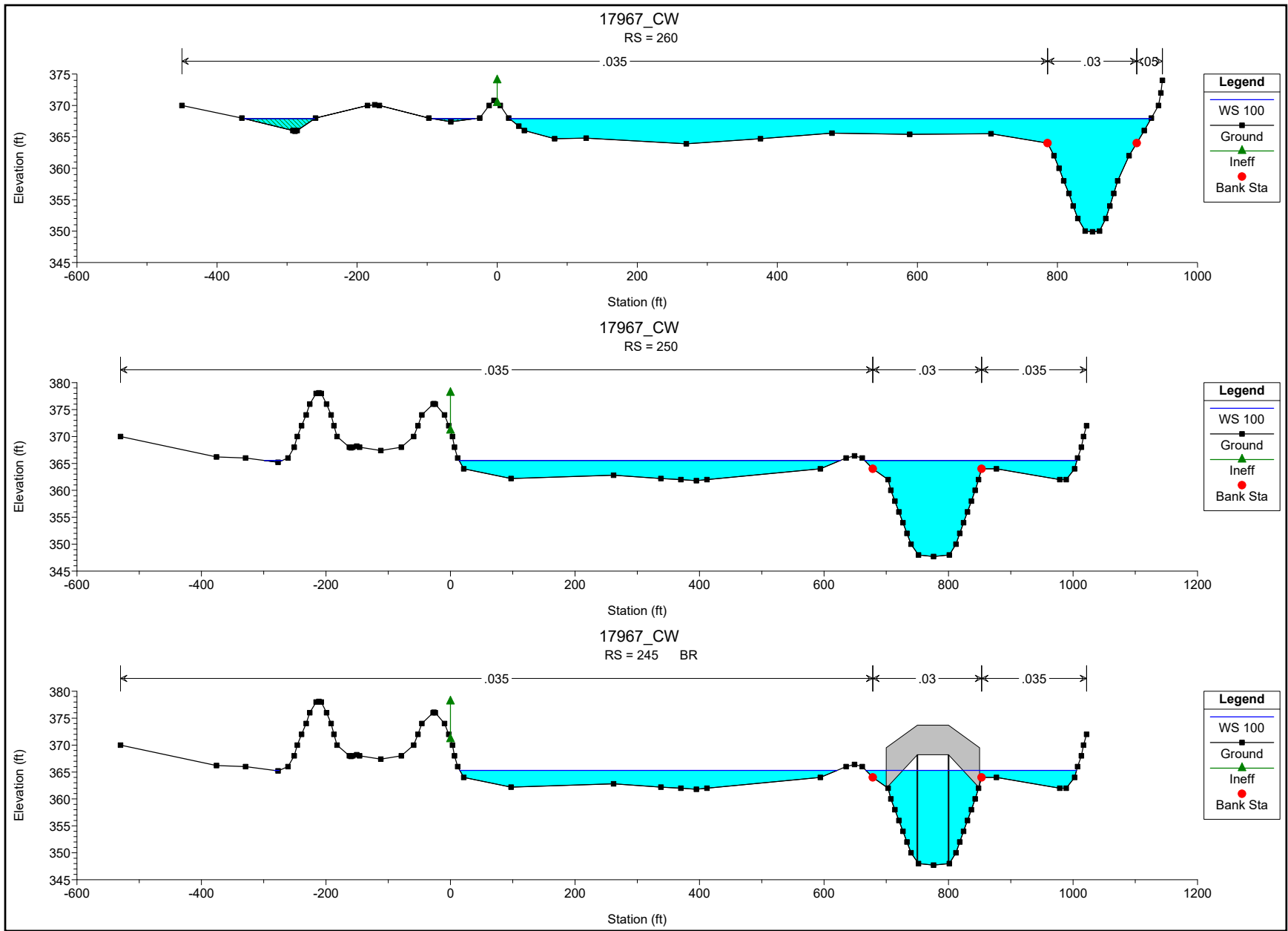
HEC-RAS Plan: As-Built Corr Eff River: RIVER-1 Reach: Reach-1 Profile: 100 (Continued)

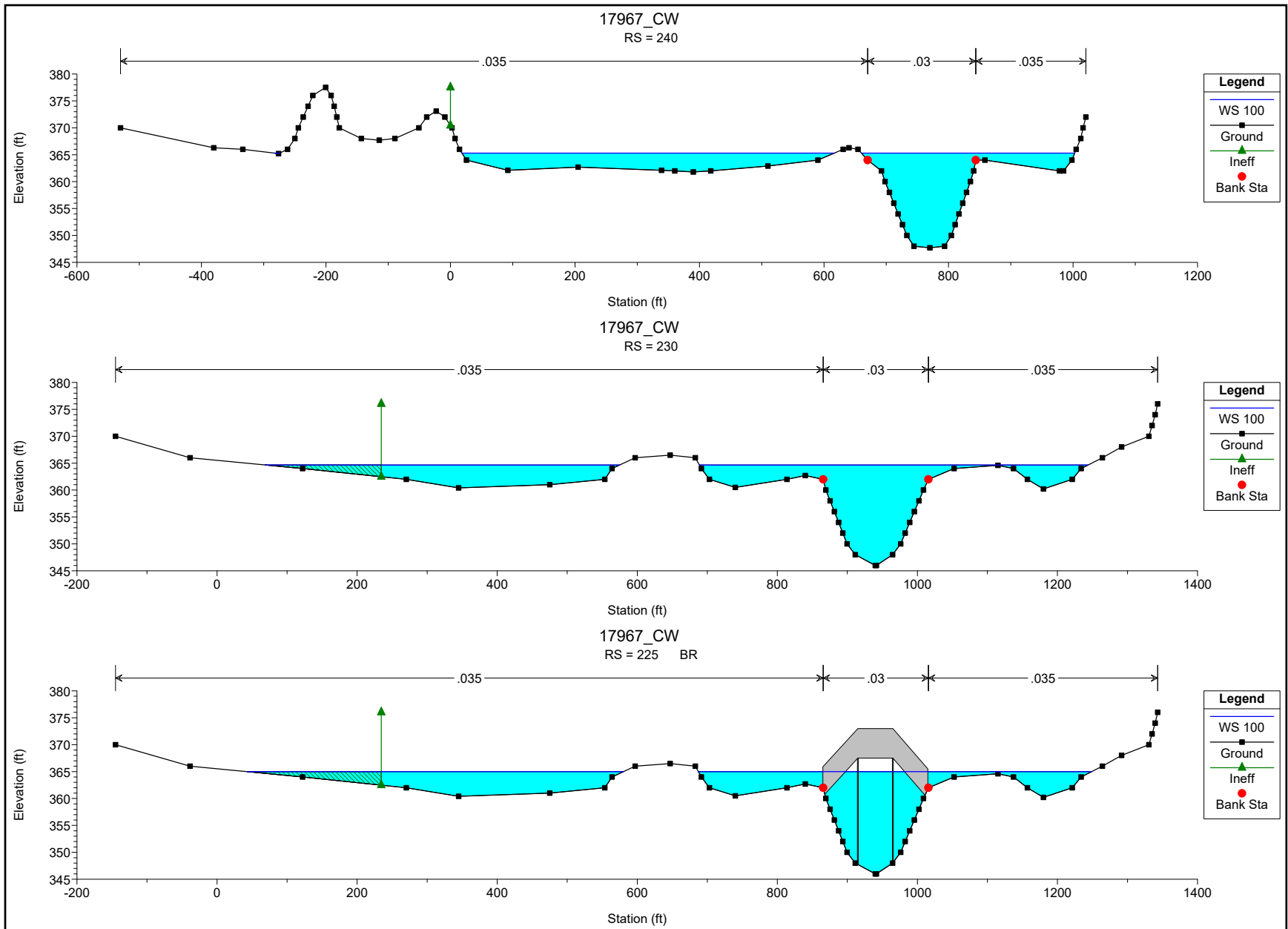
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	65		Bridge									
Reach-1	60	100	29500.00	327.10	339.14	339.14	340.64	0.003940	12.57	3873.52	1131.38	0.77
Reach-1	50	100	29500.00	325.40	337.58		337.98	0.002917	4.98	5819.82	1115.15	0.26
Reach-1	40	100	29500.00	324.50	336.13		336.59	0.002341	4.28	5713.12	1014.69	0.23
Reach-1	30	100	29500.00	323.60	335.13		335.48	0.001631	3.54	6621.18	1161.92	0.19
Reach-1	20	100	29500.00	323.00	333.90	331.66	334.44	0.002912	4.37	5163.59	1336.52	0.25
Reach-1	15		Bridge									
Reach-1	10	100	29500.00	322.00	333.85	331.57	334.35	0.002739	4.22	5402.62	1248.54	0.25
Reach-1	5	100	29500.00	321.10	330.28	328.76	330.93	0.004294	10.82	5598.21	1123.72	0.68

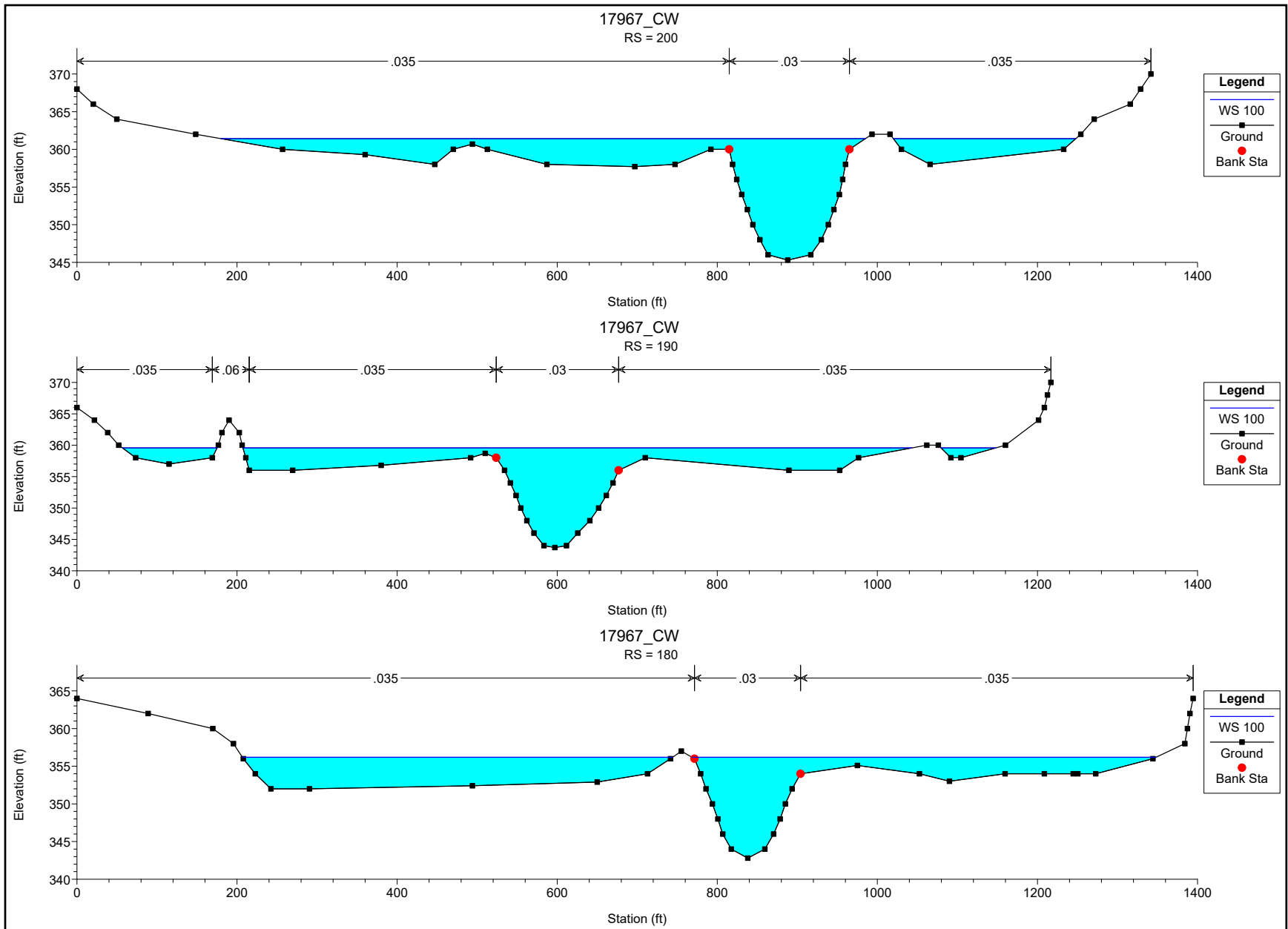


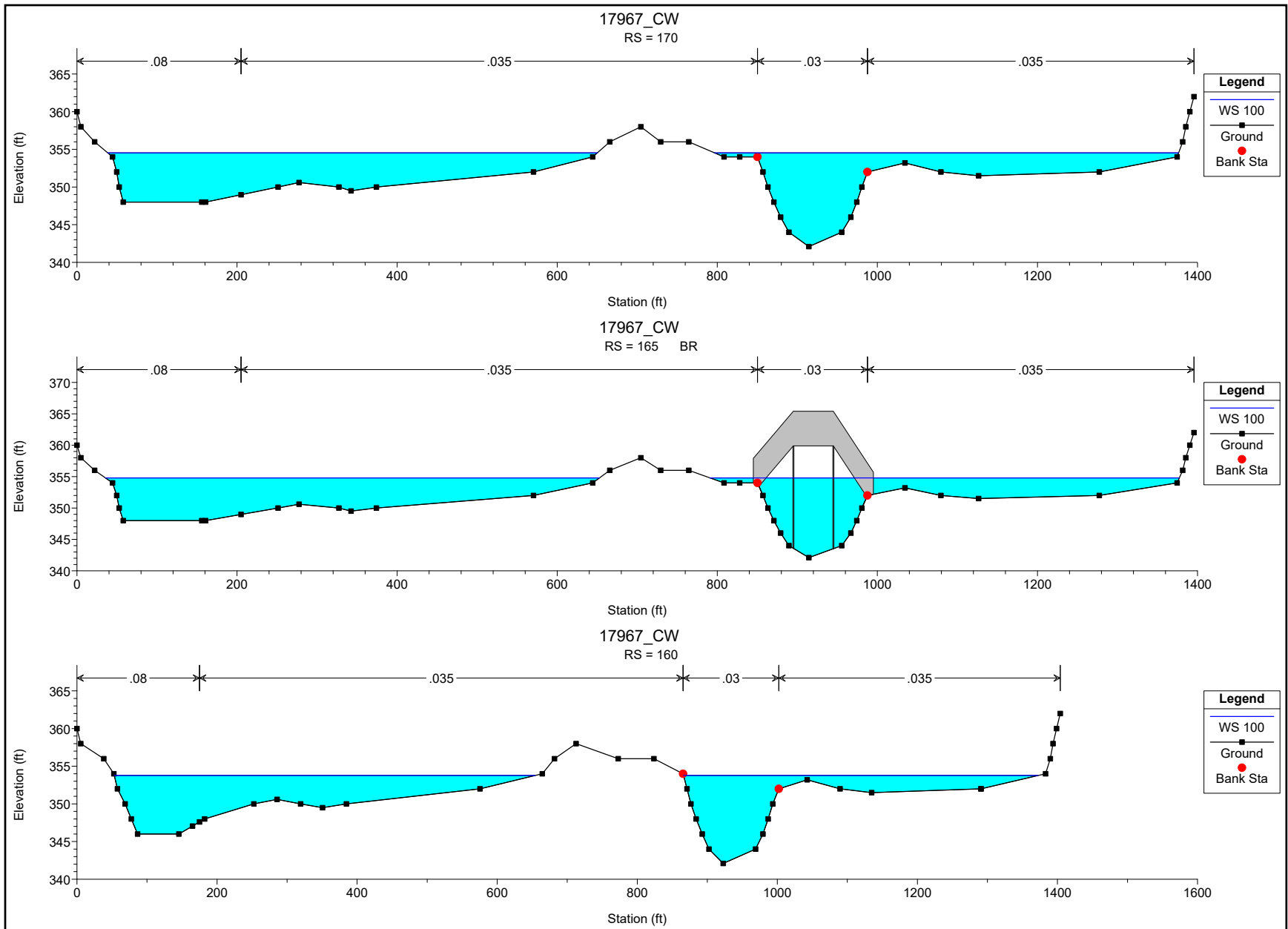


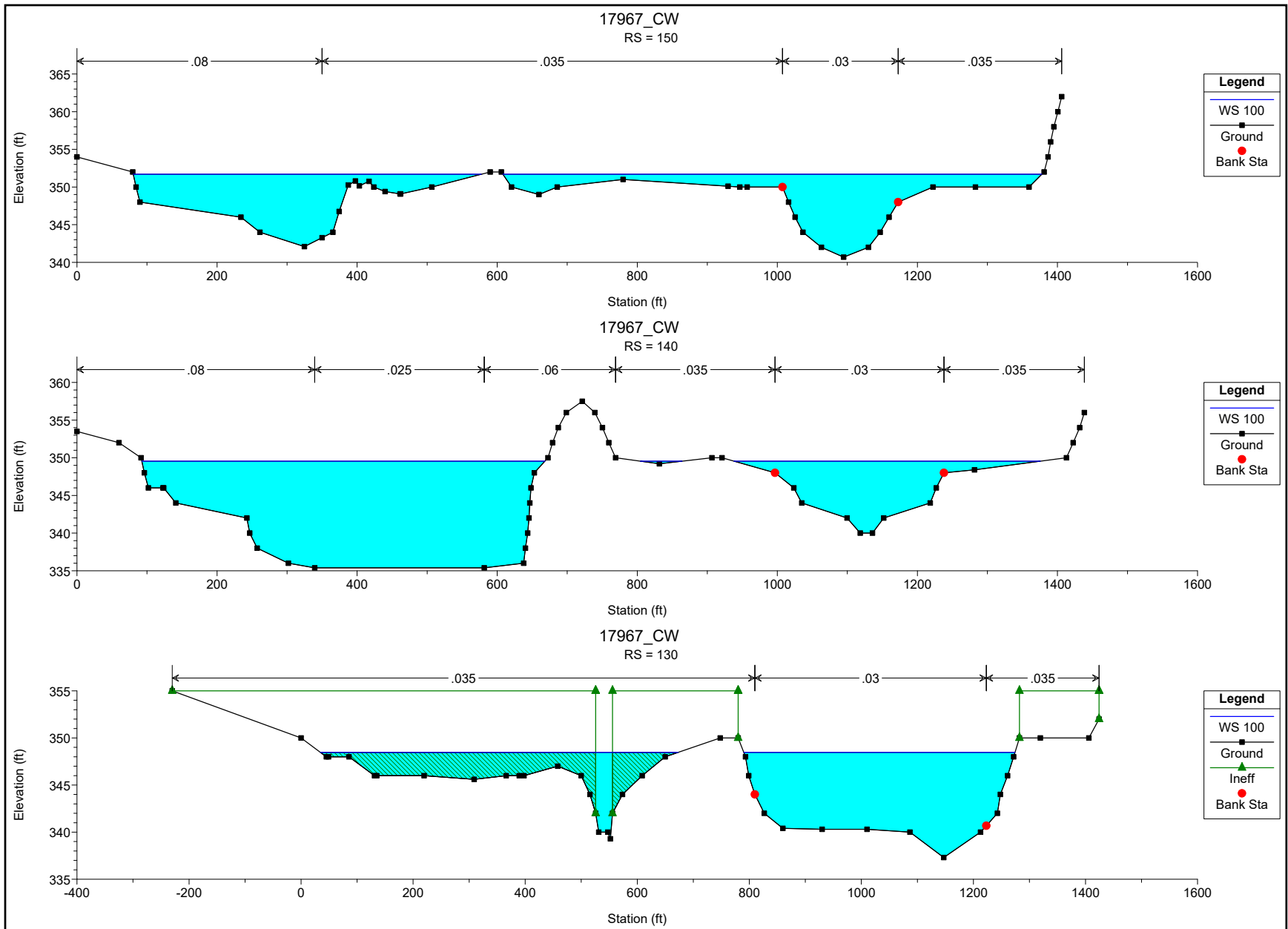


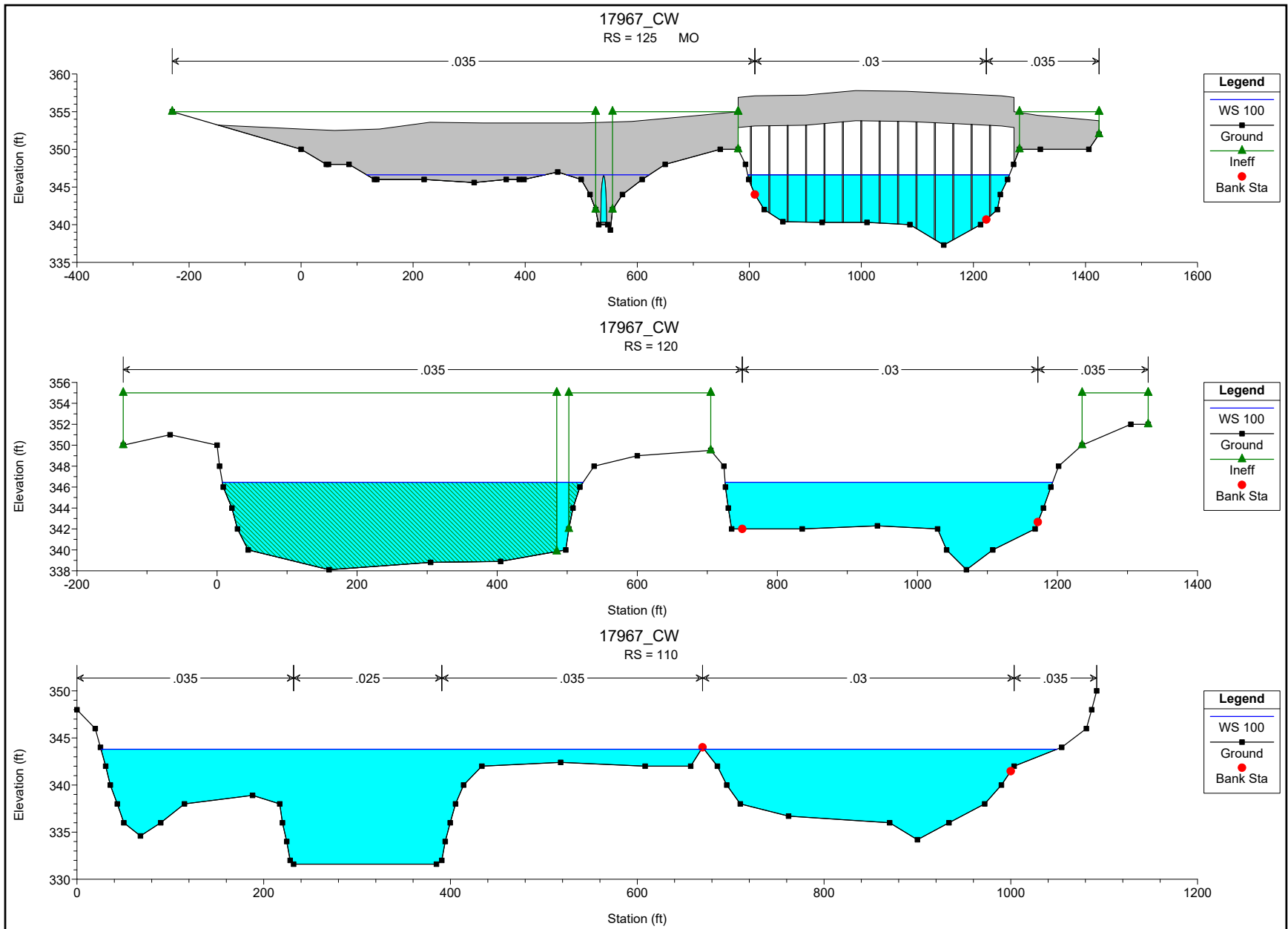


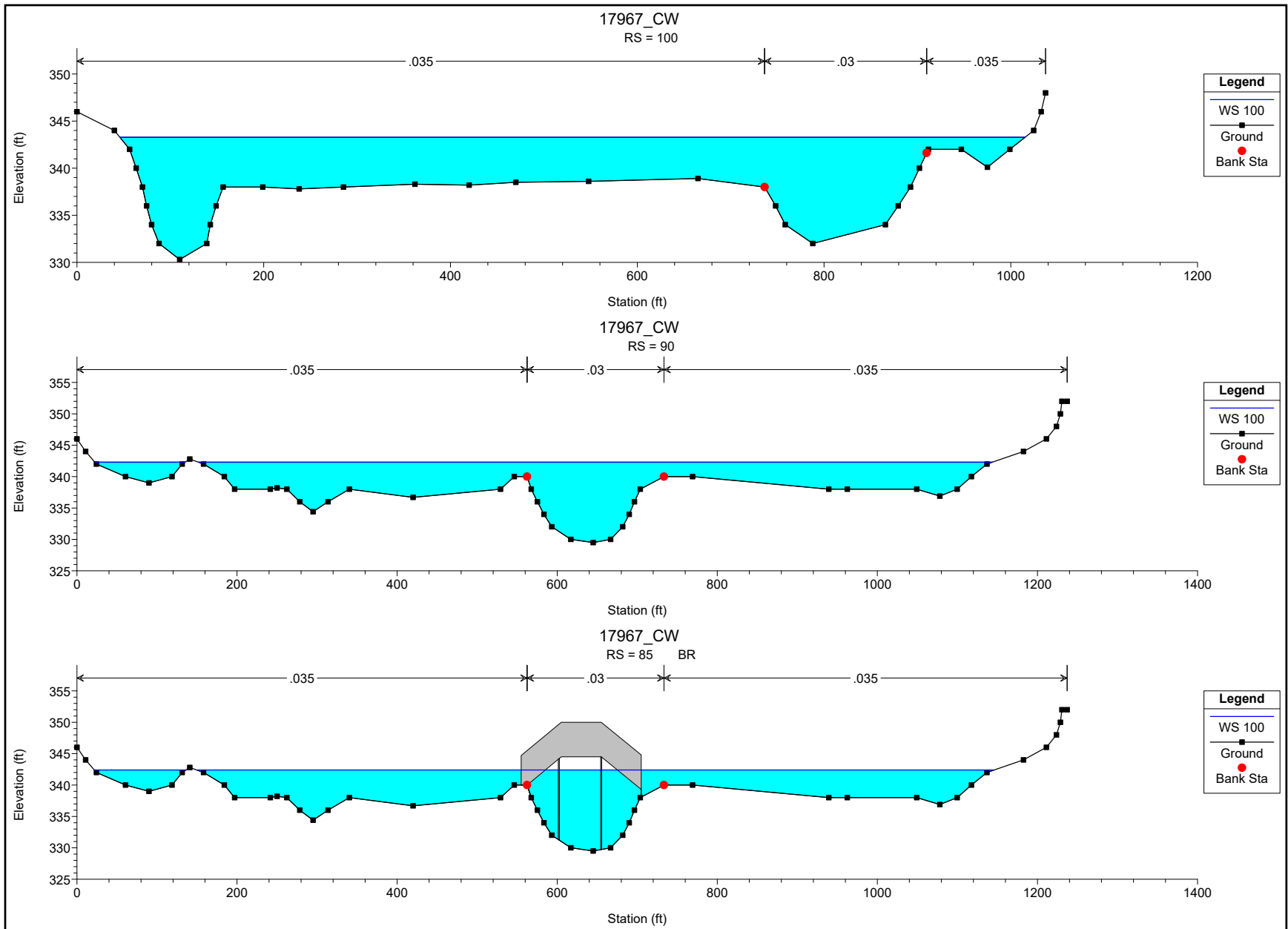


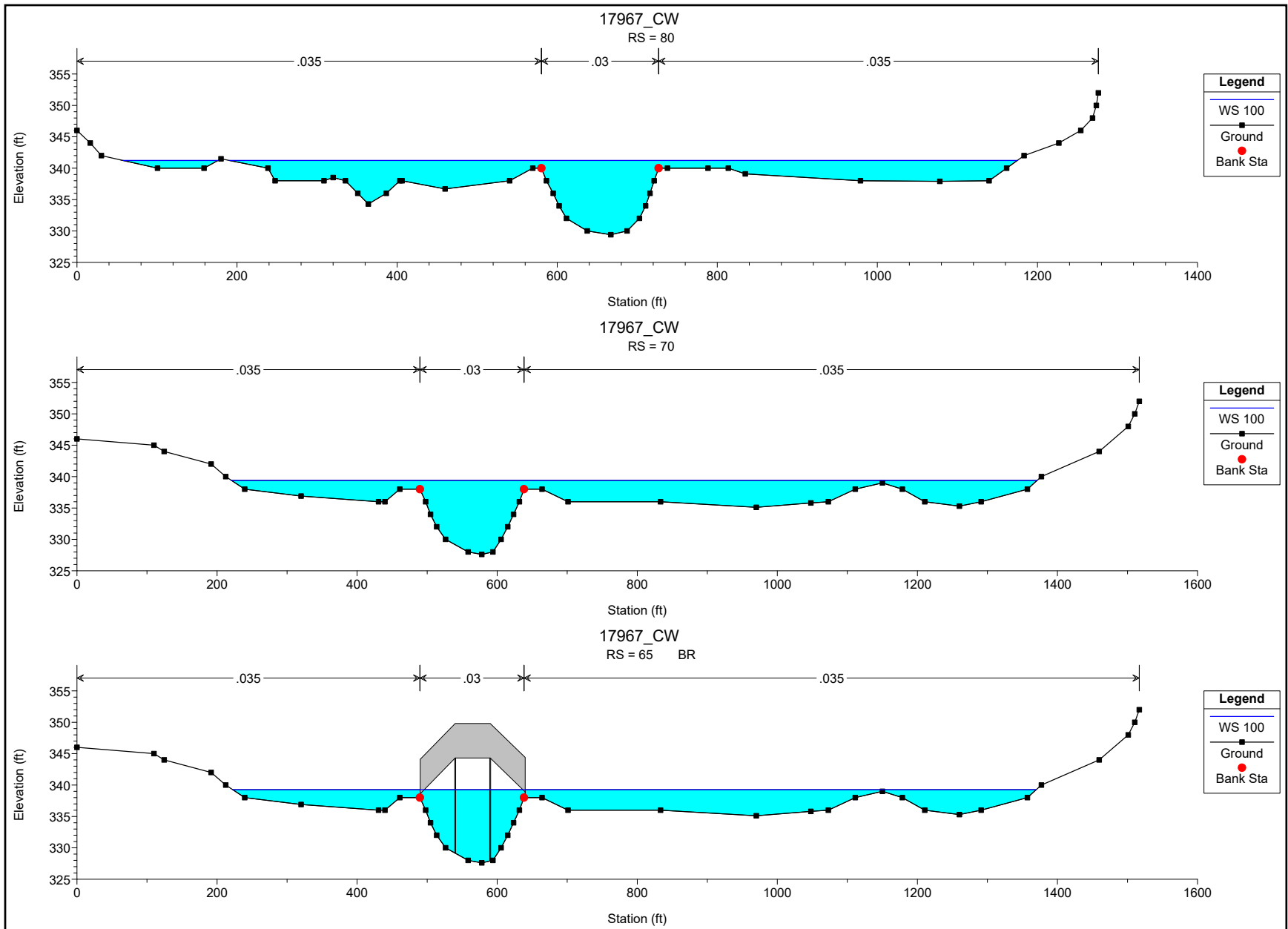


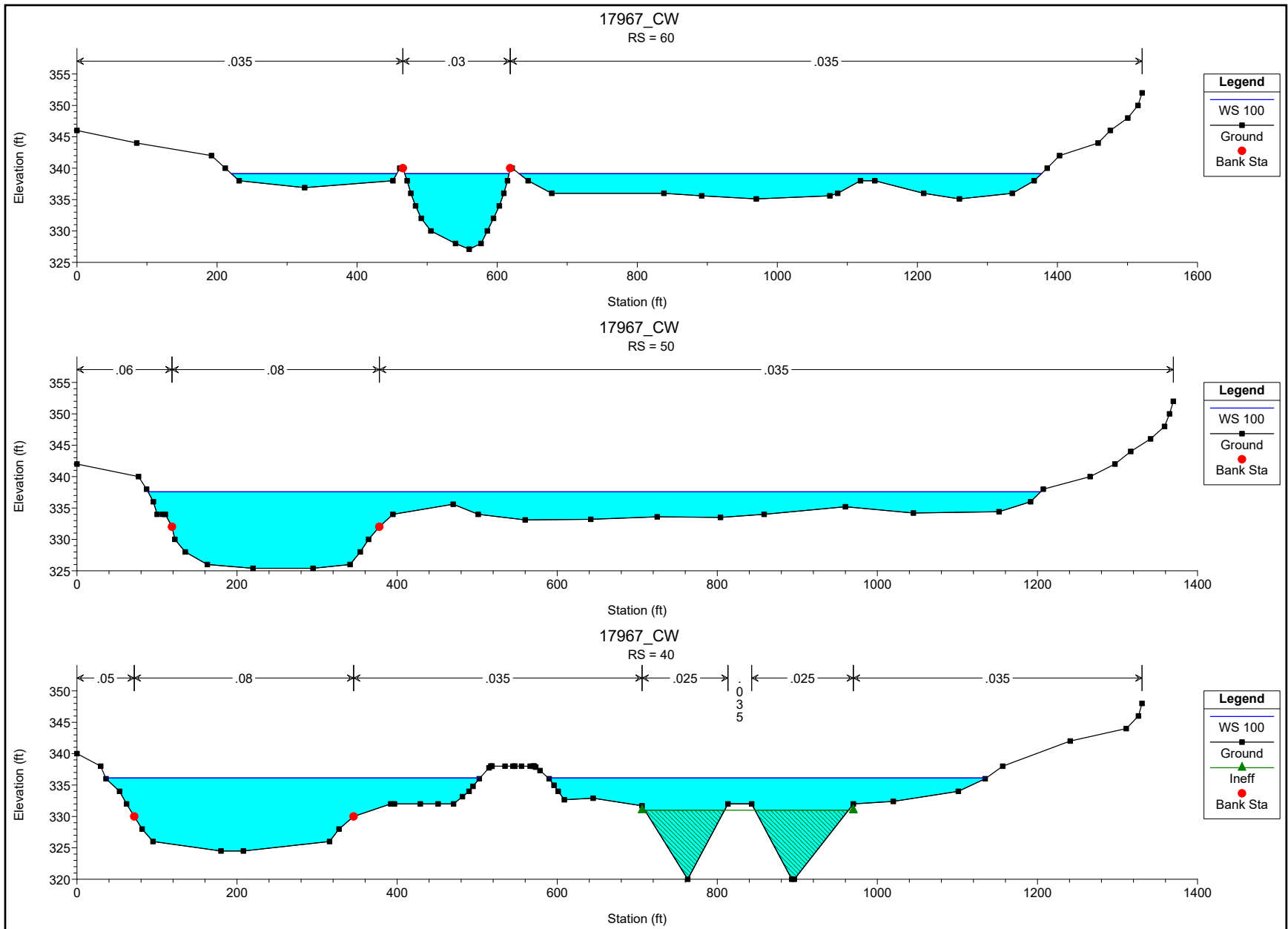


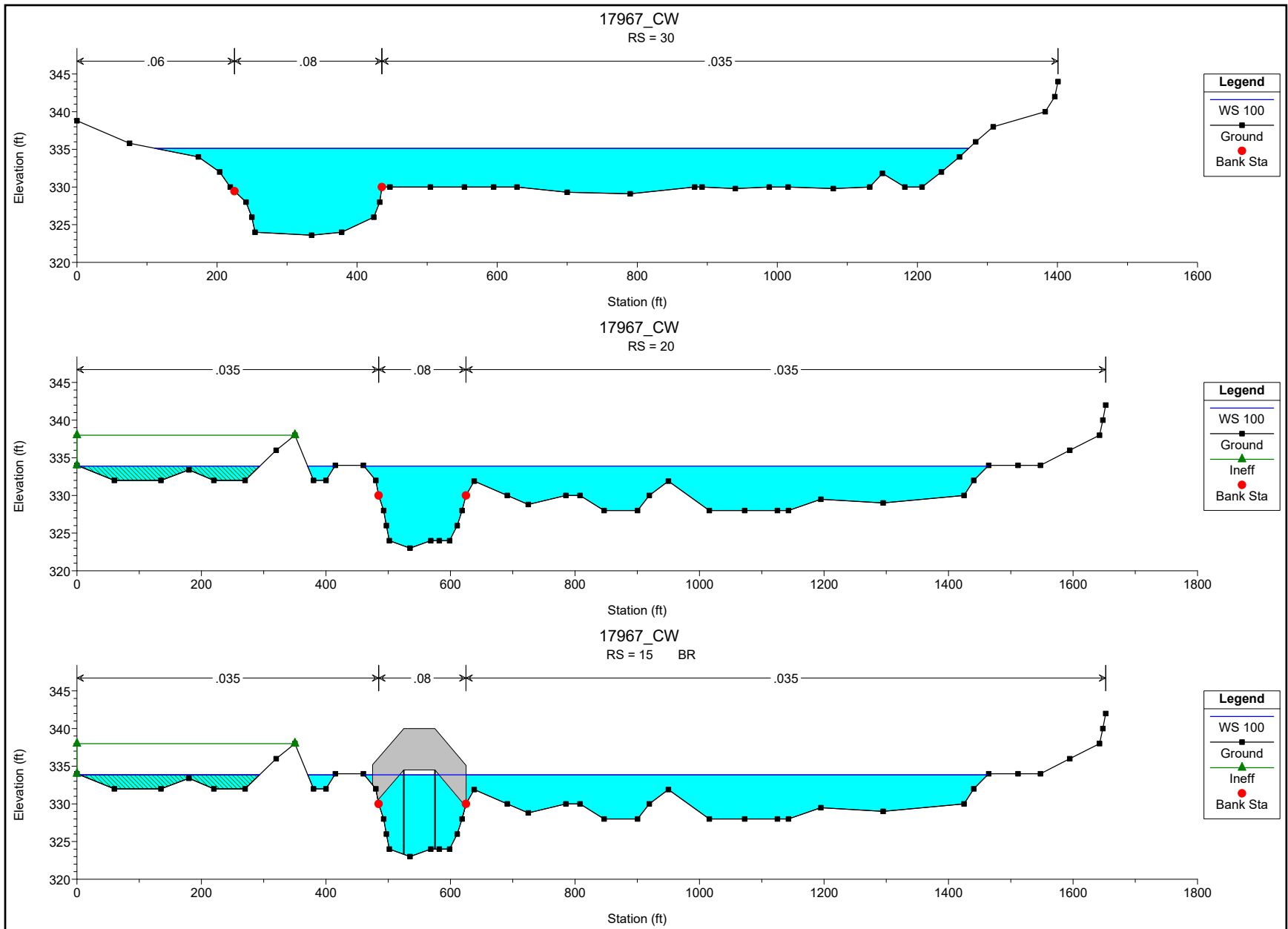


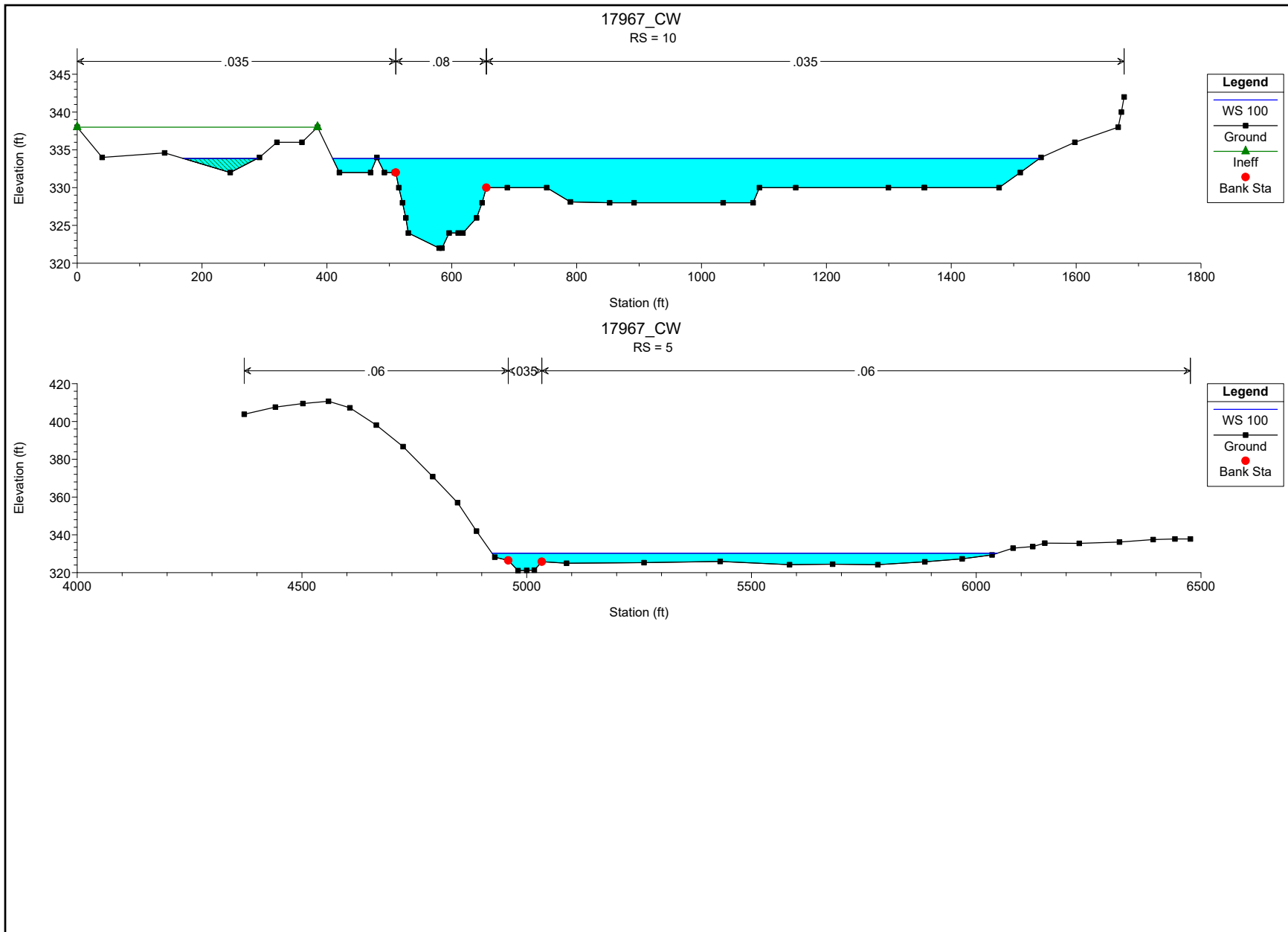












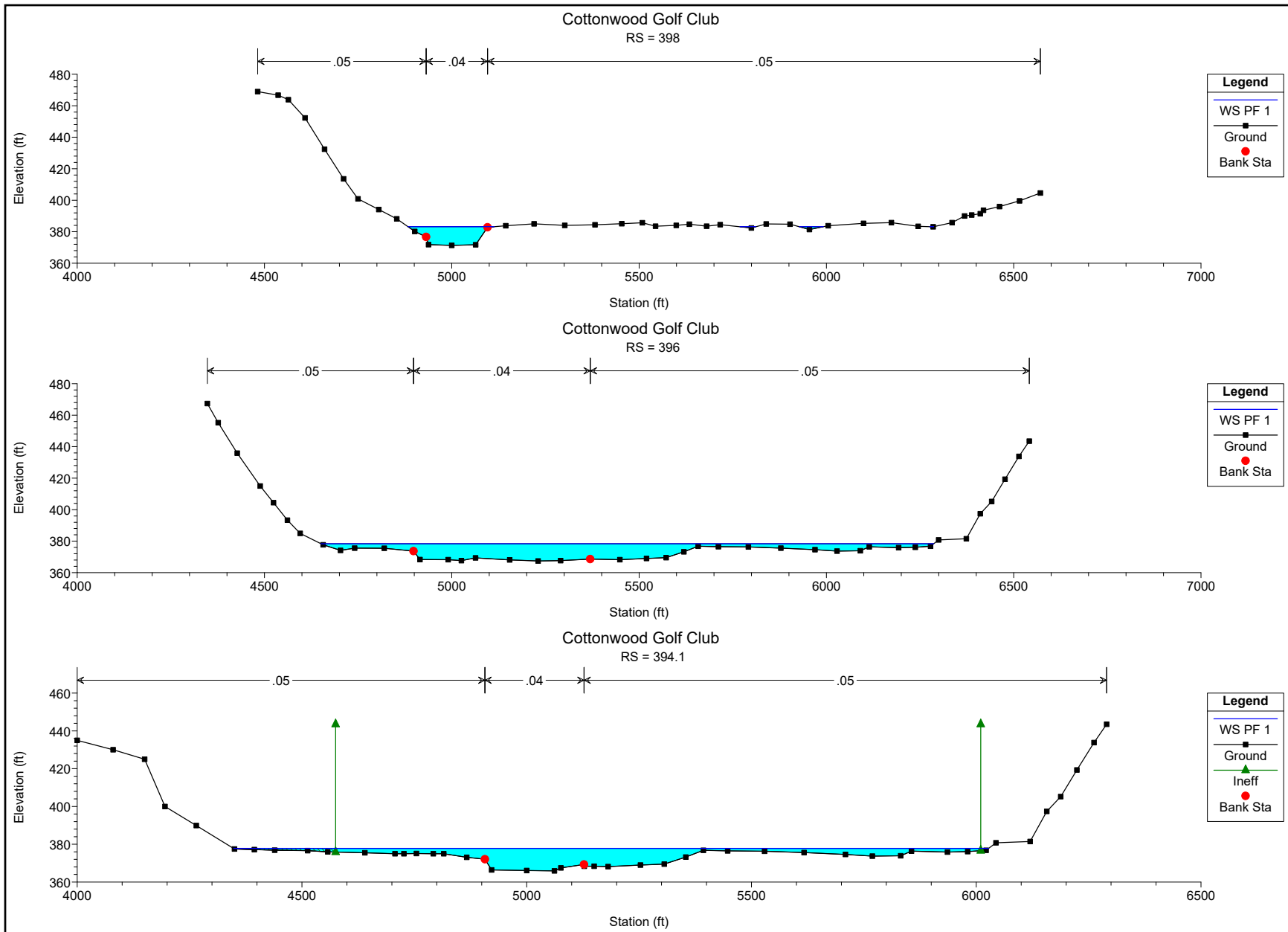
Mining Phase 1

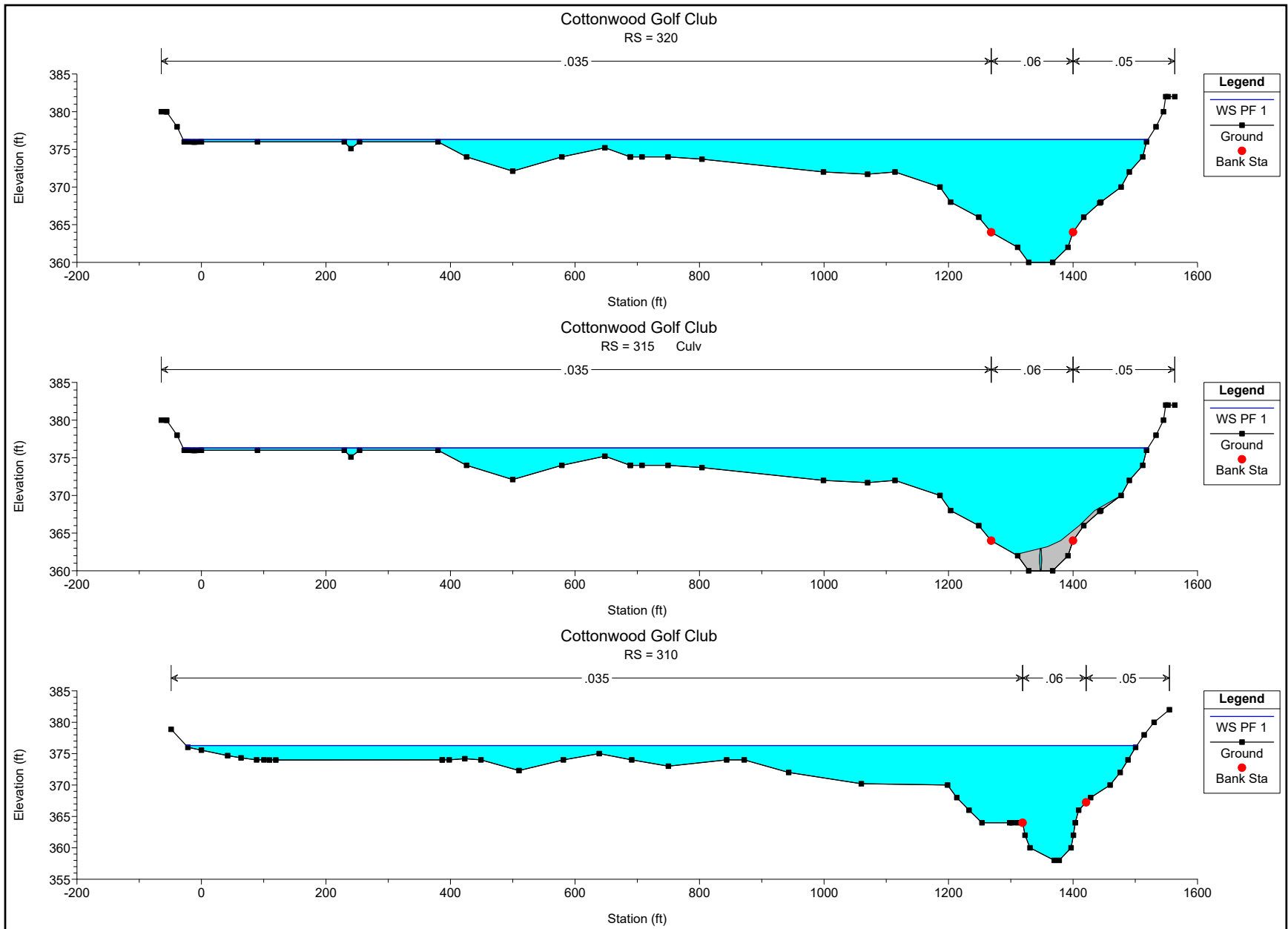
HEC-RAS Plan: PC Phase 1 River: RIVER-1 Reach: Reach-1 Profile: PF 1

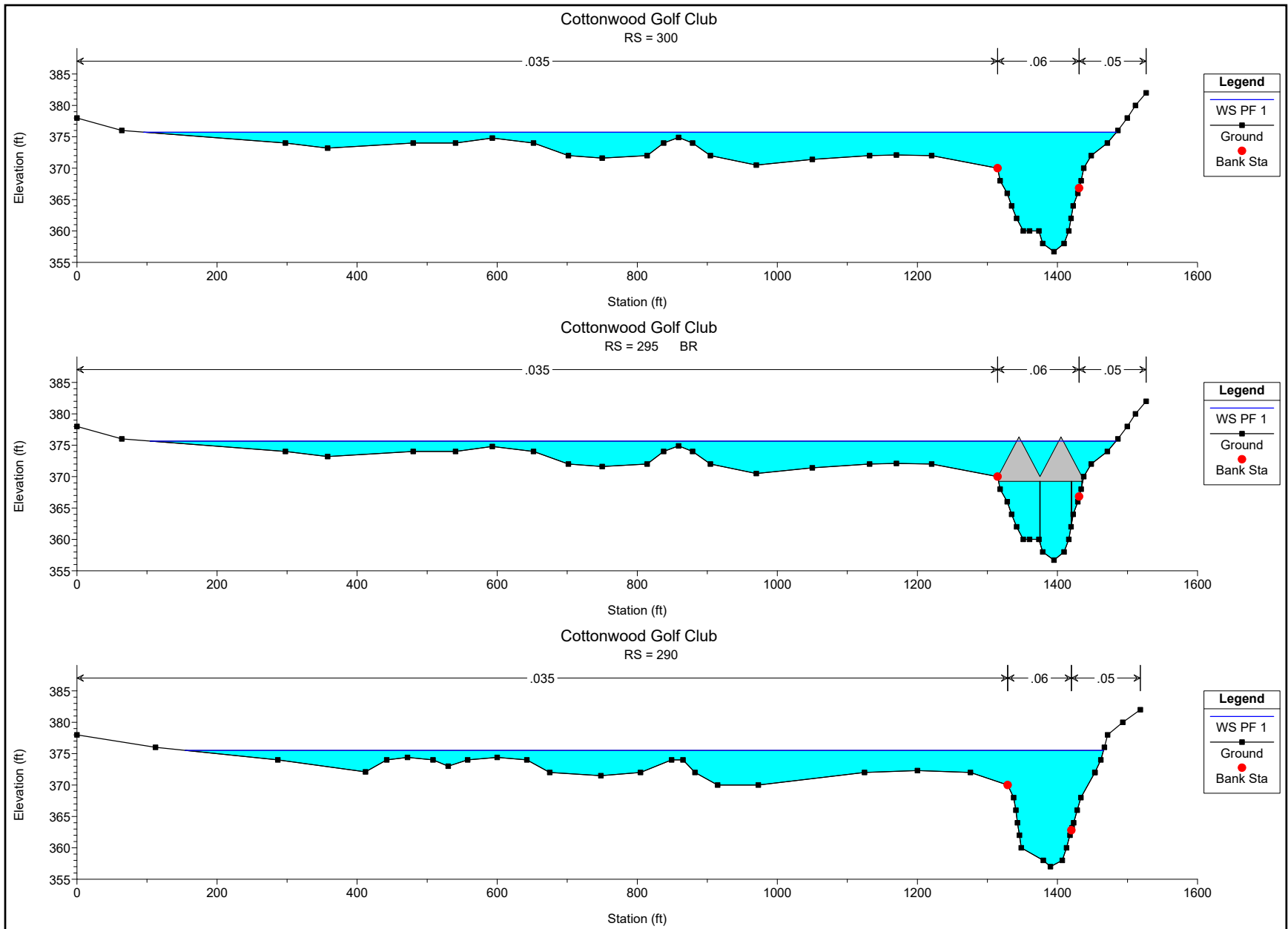
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	398	PF 1	29500.00	371.30	383.17	383.17	387.25	0.008936	16.52	1955.33	346.72	0.90
Reach-1	396	PF 1	29500.00	367.40	378.38		378.59	0.000584	4.20	9721.67	1635.85	0.23
Reach-1	394.1	PF 1	29500.00	365.90	377.81		378.32	0.001542	7.14	6838.40	1679.65	0.38
Reach-1	320	PF 1	29500.00	360.00	376.30	371.89	376.73	0.001952	6.59	6279.88	1549.75	0.30
Reach-1	315		Culvert									
Reach-1	310	PF 1	29500.00	358.00	376.28		376.58	0.001332	5.57	7123.00	1526.89	0.25
Reach-1	300	PF 1	29500.00	356.70	375.73	374.22	376.36	0.003003	7.94	5237.41	1389.15	0.37
Reach-1	295		Bridge									
Reach-1	290	PF 1	29500.00	357.00	375.52		376.15	0.003116	8.26	5088.77	1311.24	0.37
Reach-1	280	PF 1	29500.00	354.60	372.00	372.00	374.39	0.006896	15.00	2918.15	813.73	0.79
Reach-1	270	PF 1	29500.00	351.30	370.66	370.66	372.55	0.002422	13.13	3851.40	1241.65	0.64
Reach-1	260	PF 1	29500.00	349.90	367.90	367.90	369.70	0.002600	12.88	3797.93	1077.01	0.66
Reach-1	250	PF 1	29500.00	347.70	365.55	364.94	366.98	0.001893	10.89	4095.02	981.89	0.56
Reach-1	245		Bridge									
Reach-1	240	PF 1	29500.00	347.70	365.31	364.86	366.87	0.002054	11.27	3932.89	950.11	0.58
Reach-1	230	PF 1	29500.00	346.00	364.67	363.81	366.22	0.001776	11.32	3984.29	1061.74	0.55
Reach-1	225		Bridge									
Reach-1	220	PF 1	29500.00	346.00	363.65	363.65	365.86	0.002594	13.12	3294.18	896.67	0.66
Reach-1	210	PF 1	29500.00	345.30	362.54	361.40	363.56	0.001345	9.77	5066.40	1143.45	0.48
Reach-1	205		Bridge									
Reach-1	200	PF 1	29500.00	345.30	361.42	361.42	363.30	0.002438	12.49	3775.20	1032.94	0.64
Reach-1	190	PF 1	29500.00	343.70	359.56	359.56	361.51	0.002915	12.91	3651.46	1022.27	0.69
Reach-1	180	PF 1	29500.00	342.80	356.18	356.18	357.72	0.003876	12.86	3862.30	1116.68	0.77
Reach-1	170	PF 1	29500.00	342.10	354.53	354.06	355.68	0.003014	11.51	4697.07	1191.20	0.68
Reach-1	165		Bridge									
Reach-1	160	PF 1	29500.00	342.10	353.77	353.77	355.38	0.004551	13.38	3963.11	1107.15	0.83
Reach-1	150	PF 1	29500.00	340.70	351.69	351.69	353.25	0.004000	12.70	4463.50	1266.04	0.78
Reach-1	140	PF 1	29500.00	340.00	349.51		349.73	0.000249	2.64	8024.10	1059.92	0.19
Reach-1	130	PF 1	29500.00	337.30	348.46	345.10	349.33	0.001372	7.64	4039.56	1122.09	0.46
Reach-1	125		Mult Open									
Reach-1	120	PF 1	29500.00	338.10	346.46	346.46	348.93	0.007768	12.80	2359.51	982.82	1.01
Reach-1	110	PF 1	29500.00	334.00	342.69		342.93	0.001323	3.97	7431.45	1017.85	0.26
Reach-1	100	PF 1	29500.00	332.20	341.94		342.22	0.002151	3.79	7249.99	866.61	0.22
Reach-1	90	PF 1	29500.00	331.00	340.53		340.79	0.002873	4.11	7209.08	1000.04	0.24
Reach-1	80	PF 1	29500.00	331.00	340.45		340.72	0.002908	4.12	7205.16	1036.12	0.24
Reach-1	70	PF 1	29500.00	329.80	339.28		339.50	0.002975	3.76	7799.26	1156.97	0.22
Reach-1	60	PF 1	29500.00	329.80	339.21		339.43	0.003037	3.63	7955.90	1166.75	0.21
Reach-1	50	PF 1	29500.00	326.00	337.28		337.62	0.004460	5.39	6378.49	1064.31	0.31

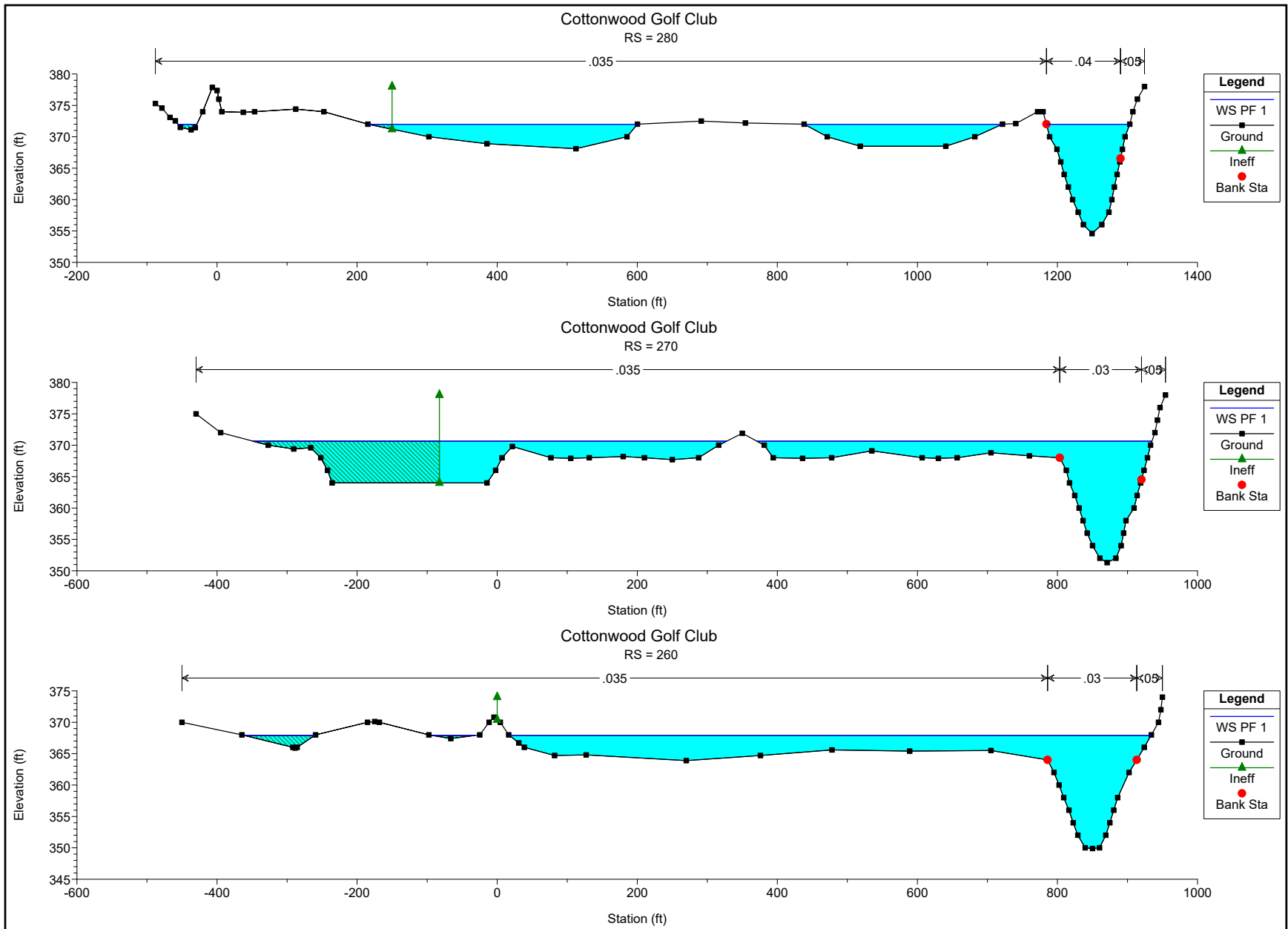
HEC-RAS Plan: PC Phase 1 River: RIVER-1 Reach: Reach-1 Profile: PF 1 (Continued)

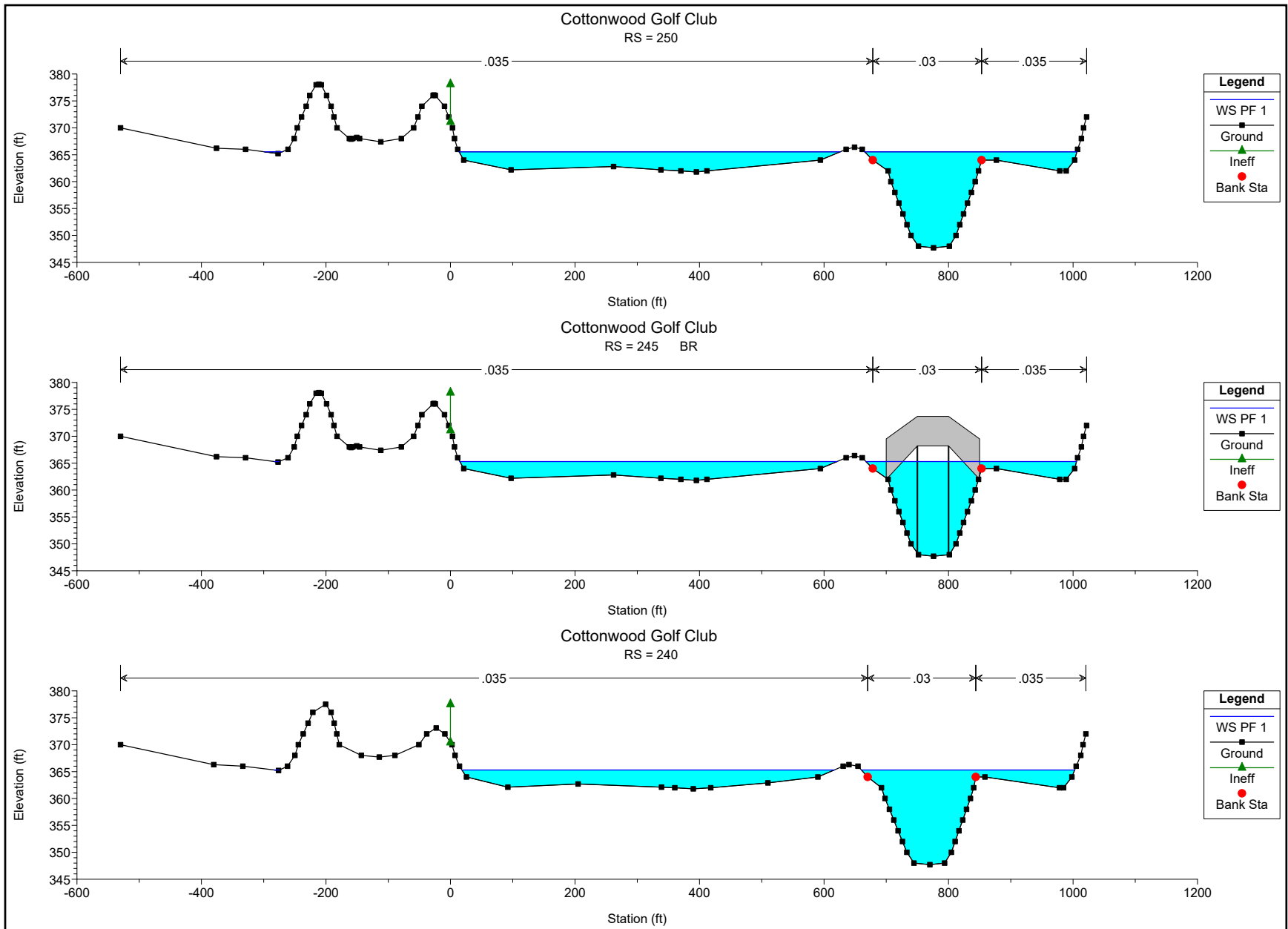
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	40	PF 1	29500.00	324.00	335.63		335.91	0.002460	4.55	7081.80	1096.53	0.27
Reach-1	30	PF 1	29500.00	324.00	334.80		335.01	0.001108	2.70	8251.28	1142.26	0.16
Reach-1	20	PF 1	29500.00	324.00	333.91		334.32	0.001881	4.77	5746.74	1011.29	0.34
Reach-1	10	PF 1	29500.00	324.00	333.75		334.26	0.002611	5.83	5166.49	1069.62	0.40
Reach-1	5	PF 1	29500.00	321.10	330.28	328.76	330.93	0.004294	10.82	5598.21	1123.72	0.68

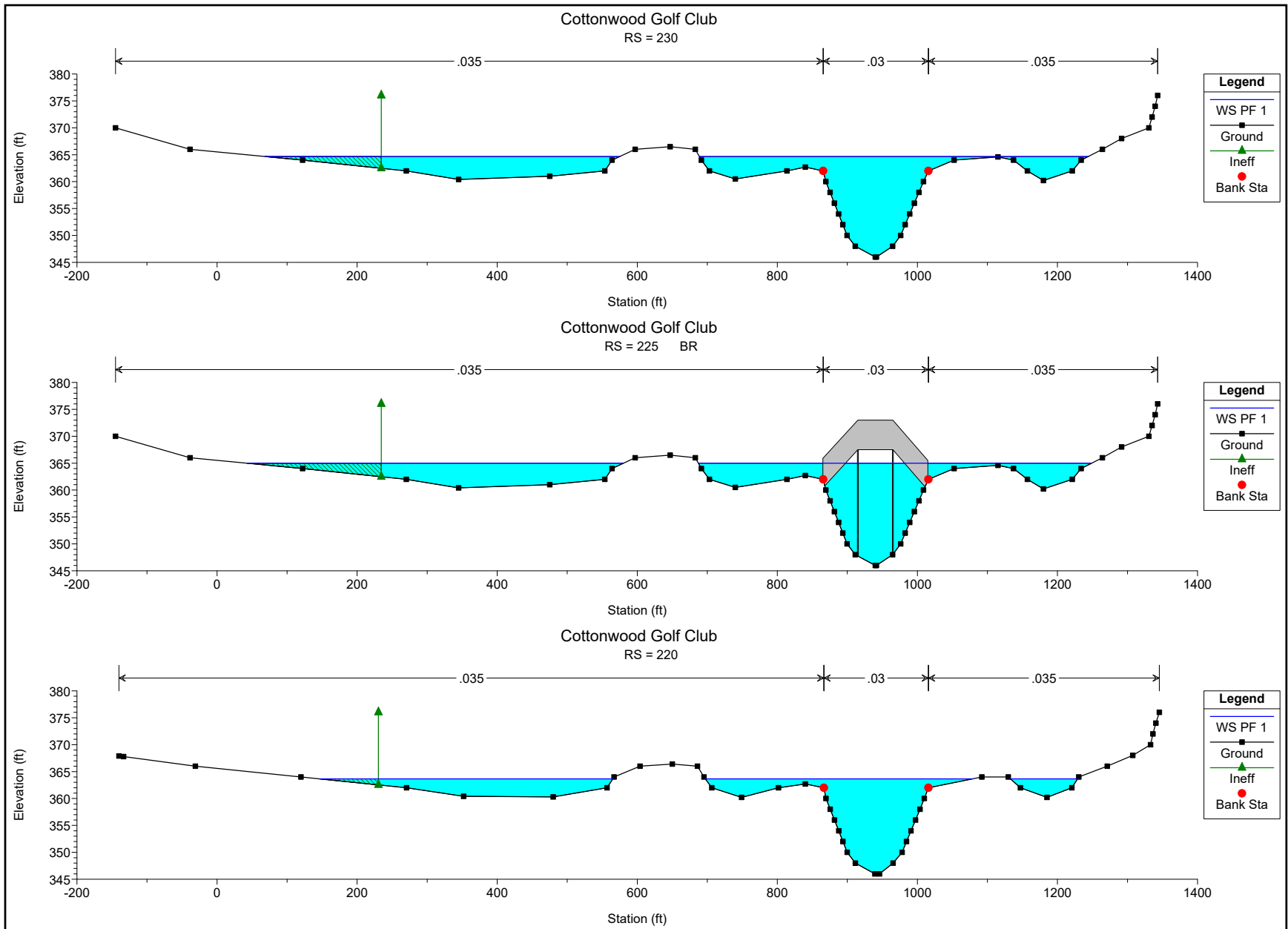












Cottonwood Golf Club
RS = 230

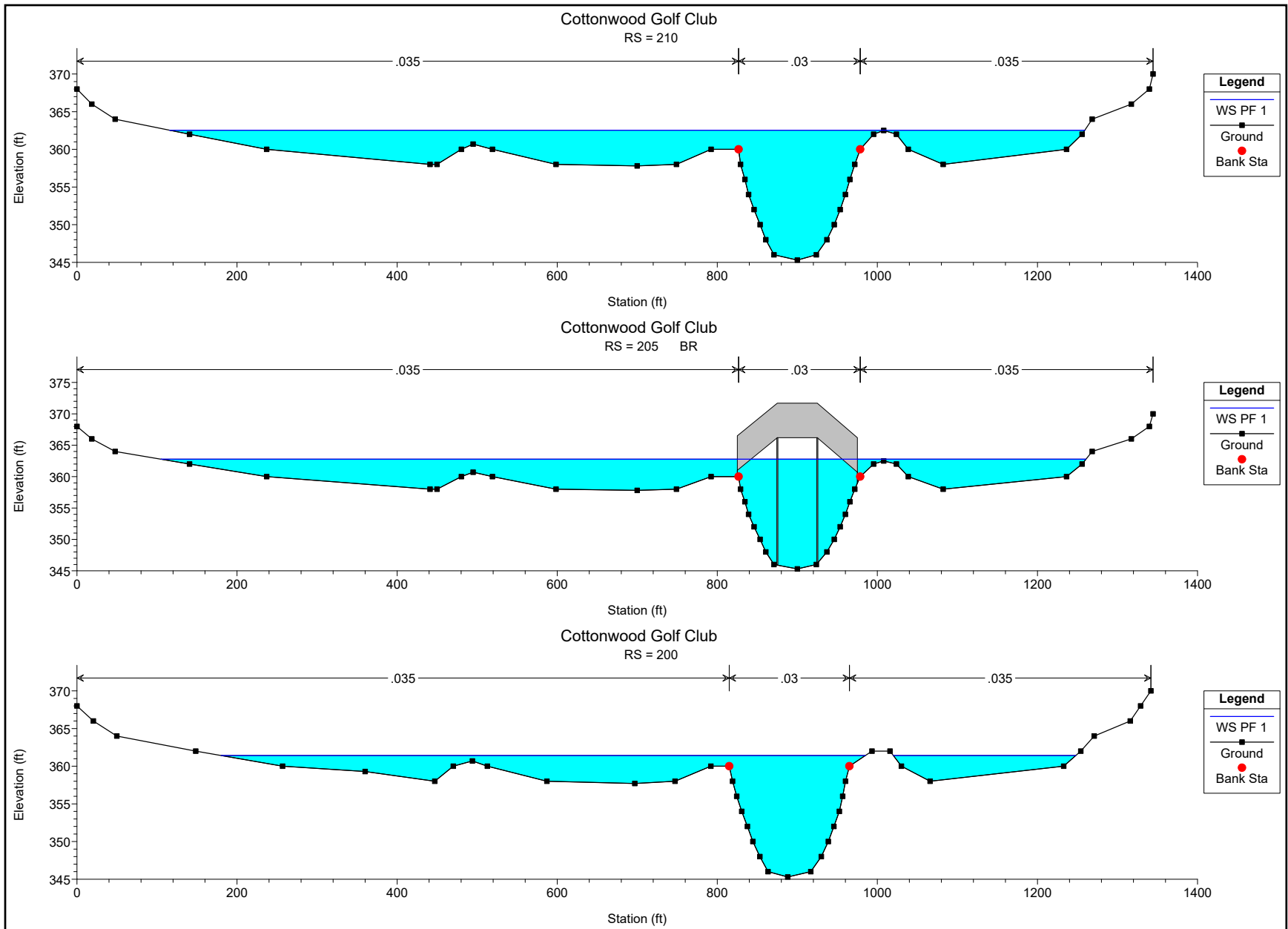
- Legend**
- WS PF 1
 - Ground
 - Ineff
 - Bank Sta

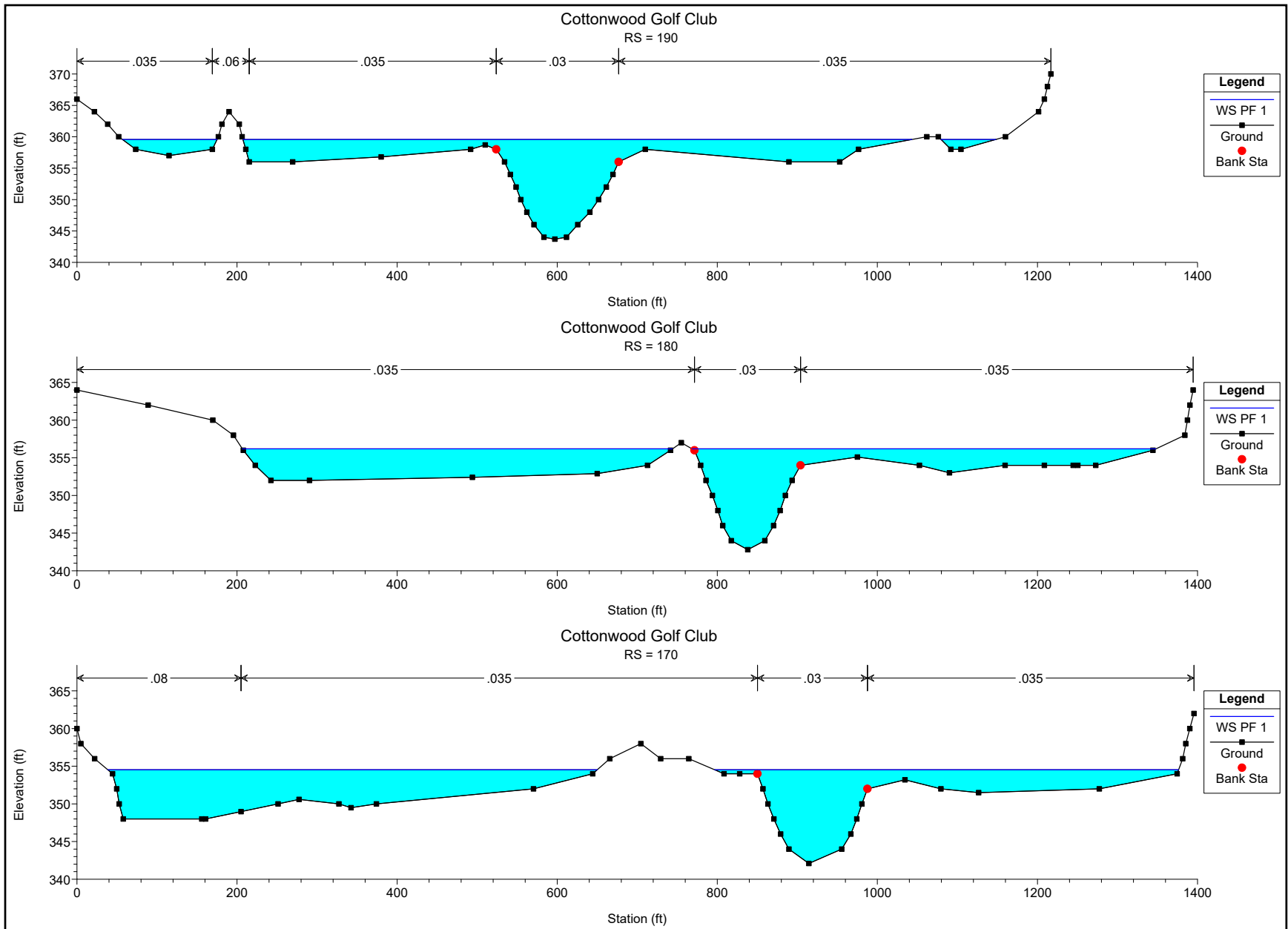
Cottonwood Golf Club
RS = 225 BR

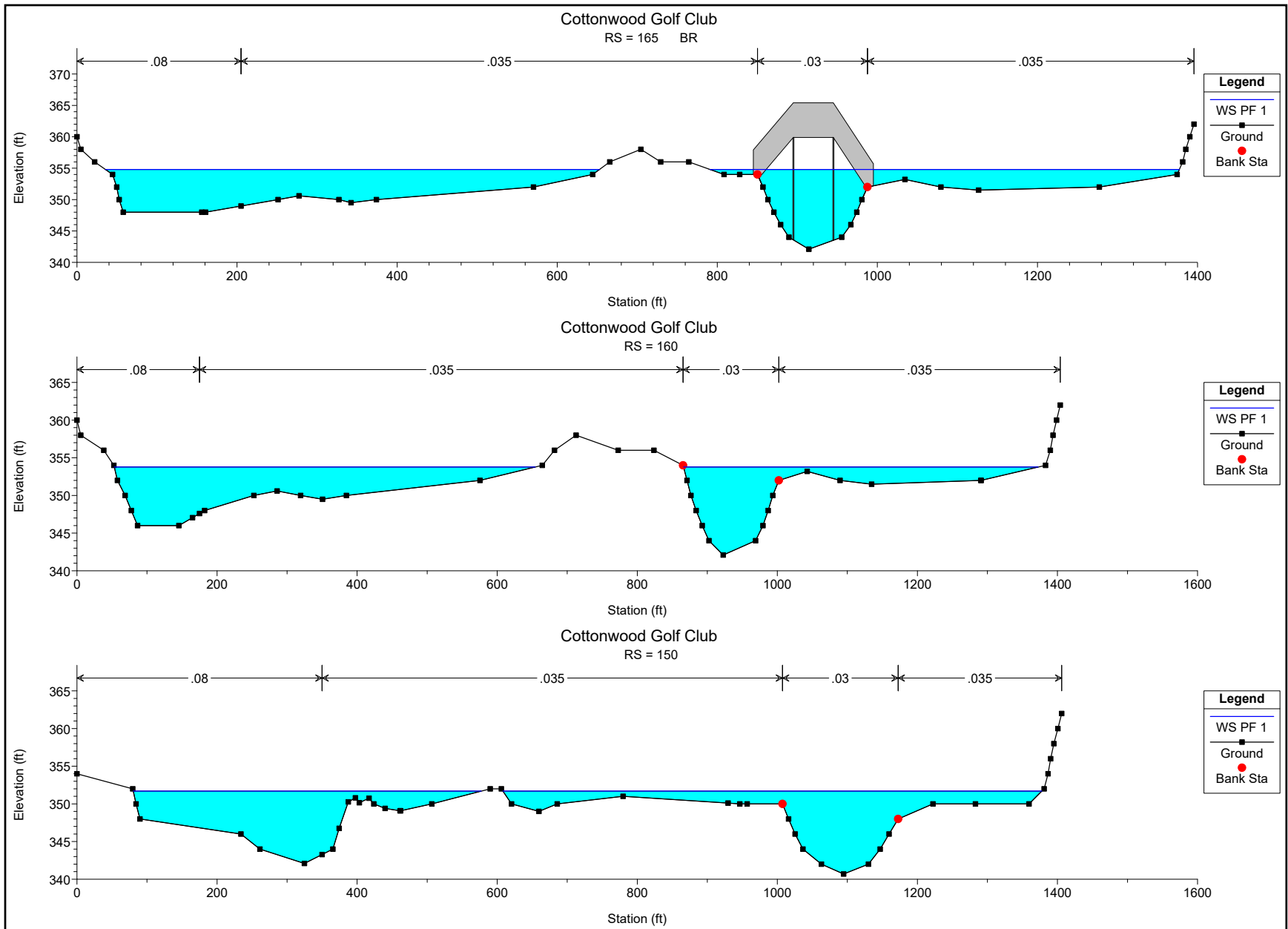
- Legend**
- WS PF 1
 - Ground
 - Ineff
 - Bank Sta

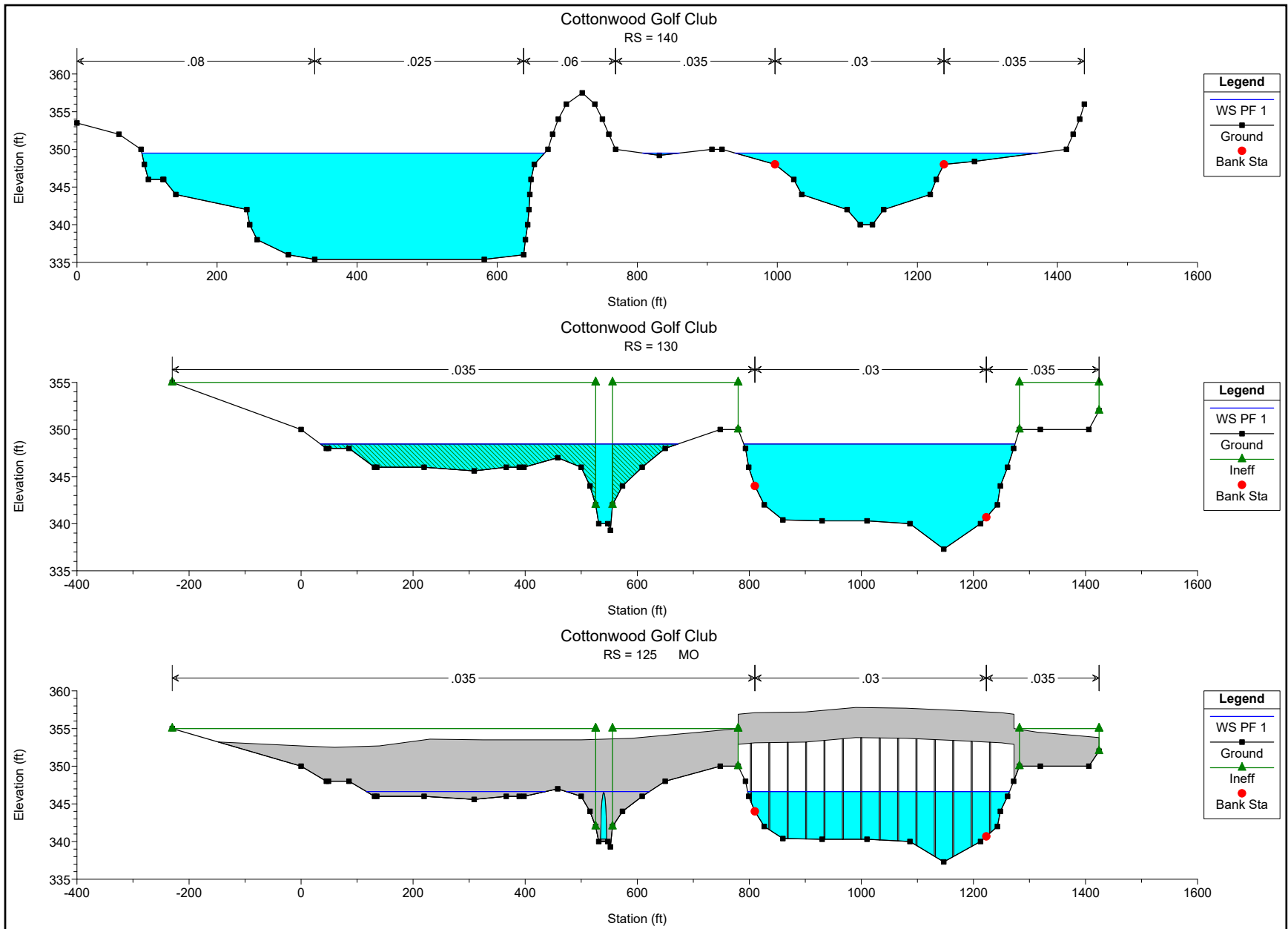
Cottonwood Golf Club
RS = 220

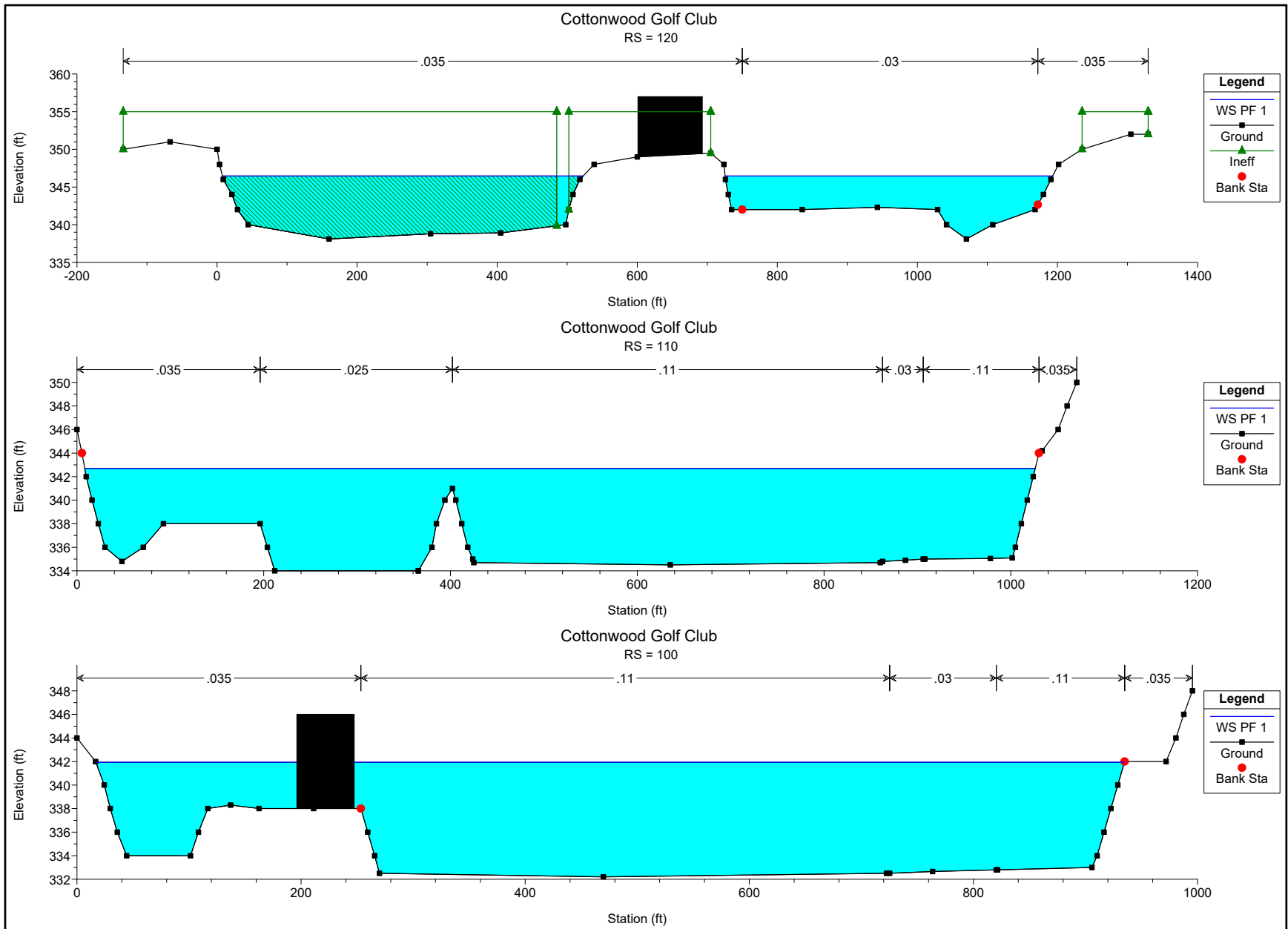
- Legend**
- WS PF 1
 - Ground
 - Ineff
 - Bank Sta

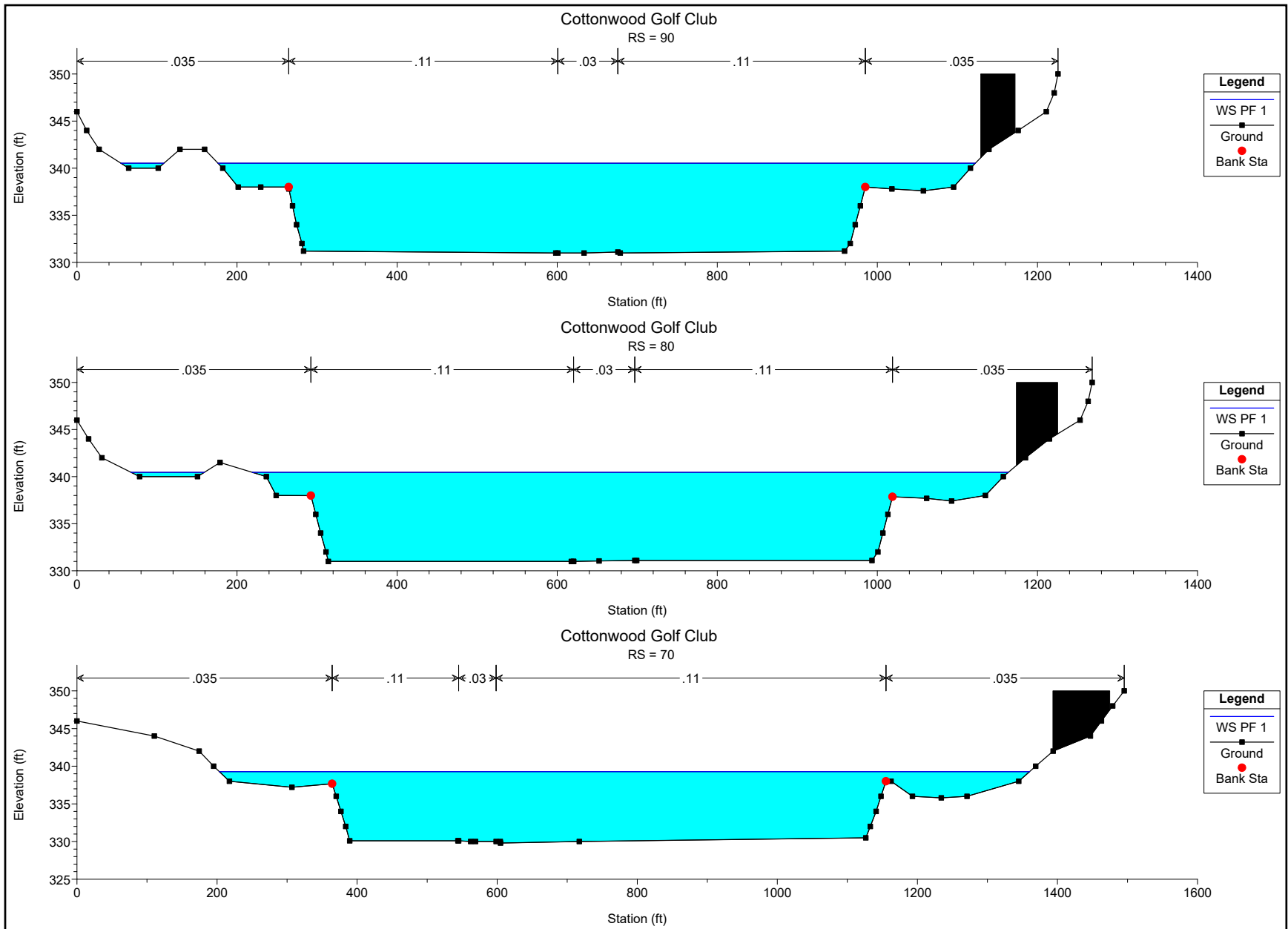


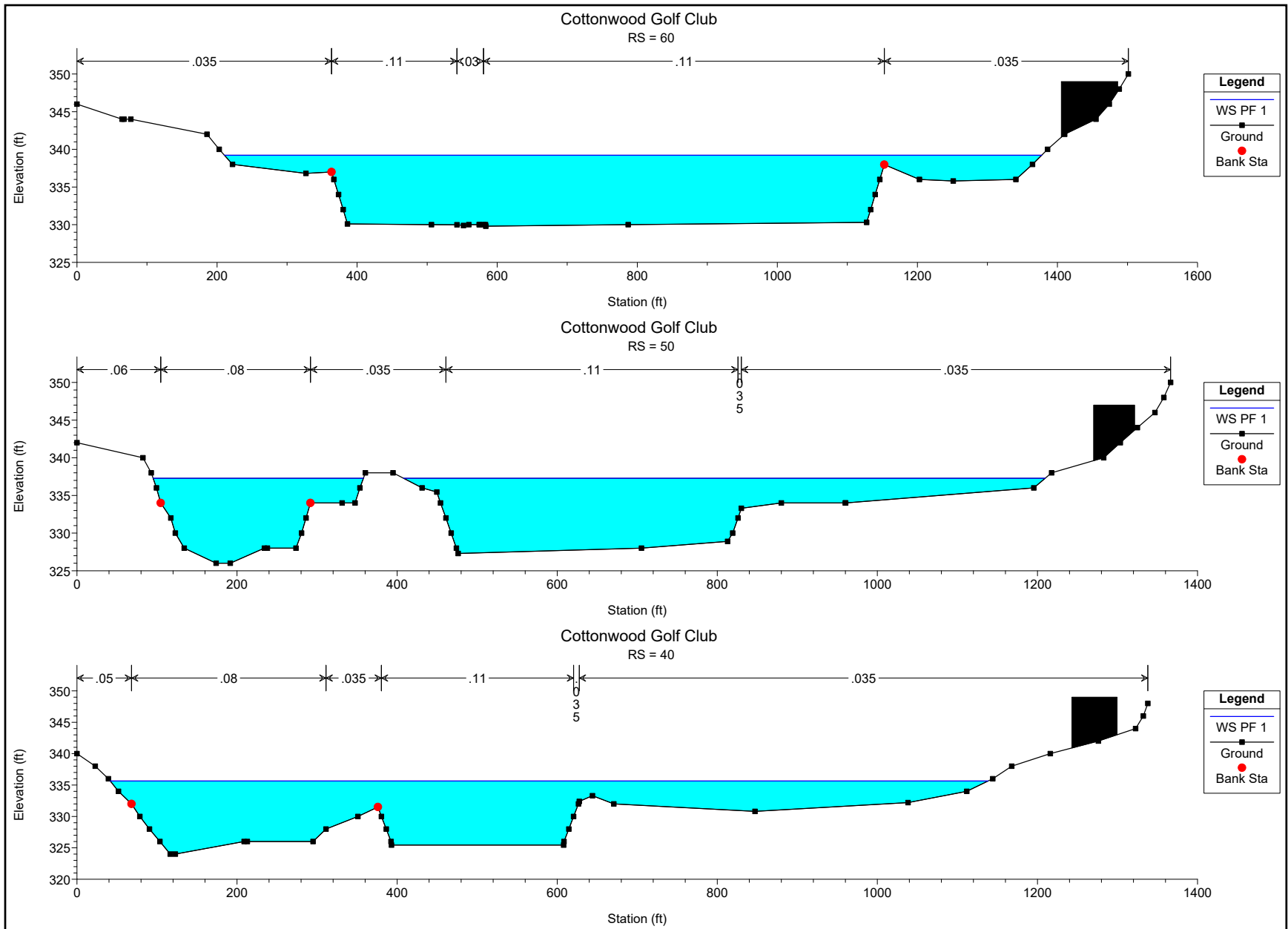


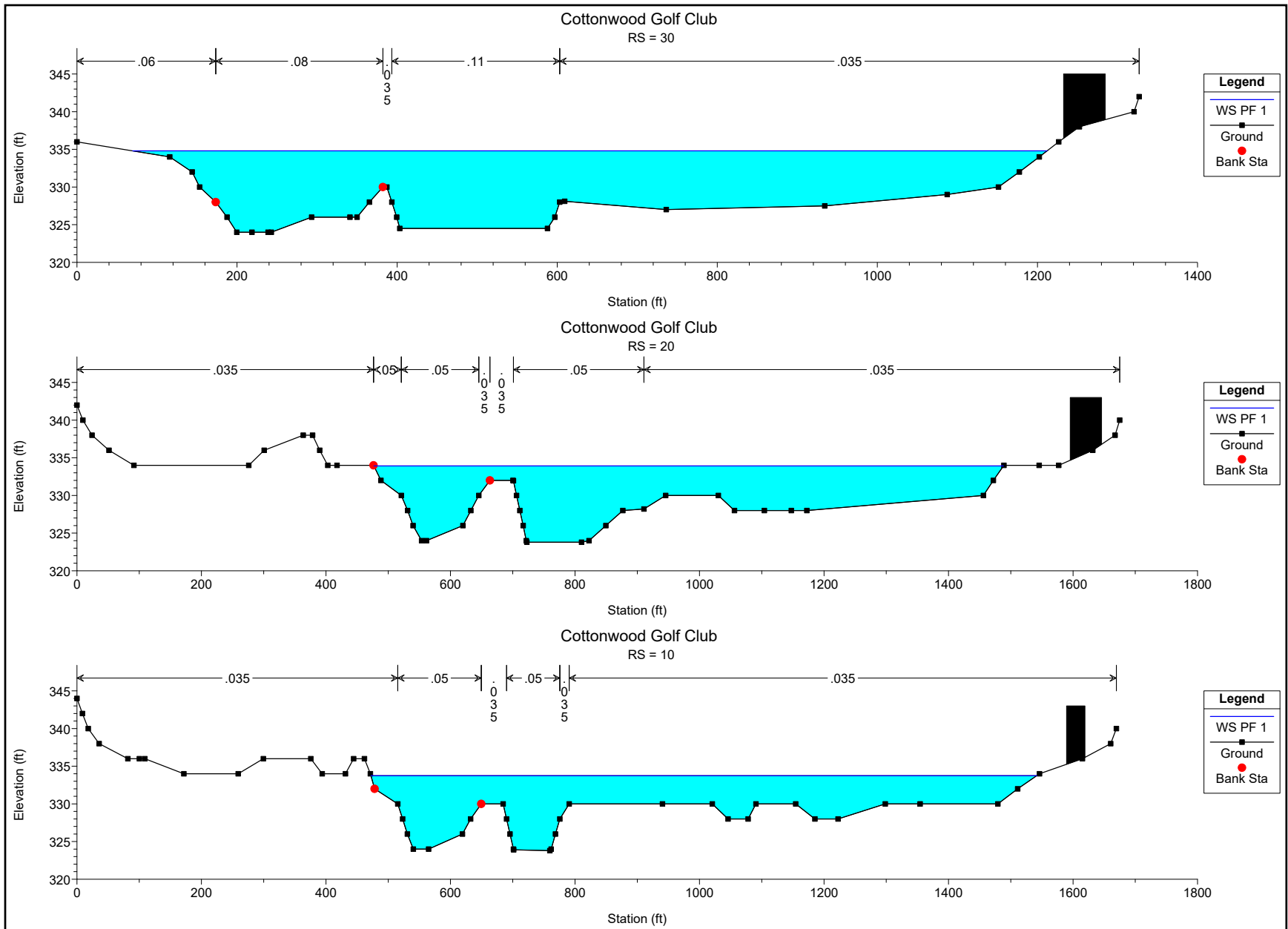




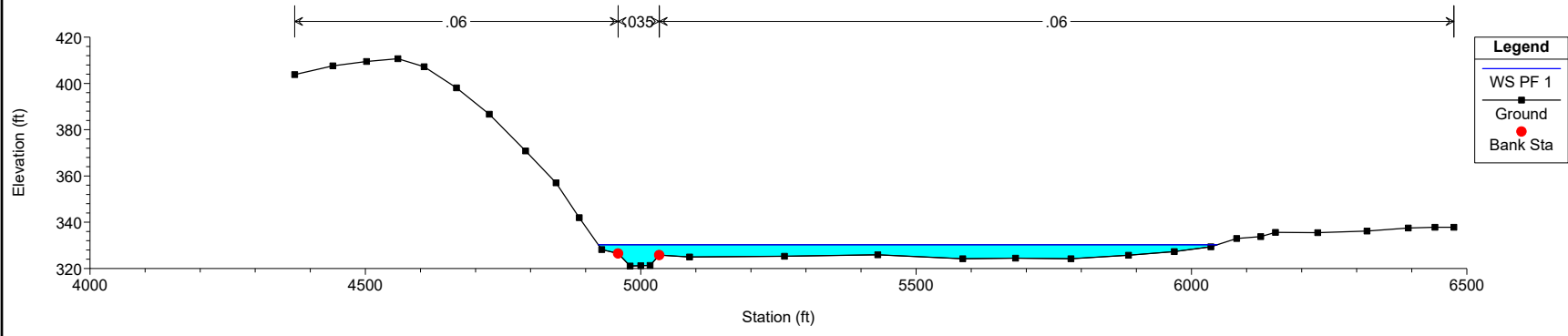








Cottonwood Golf Club
RS = 5



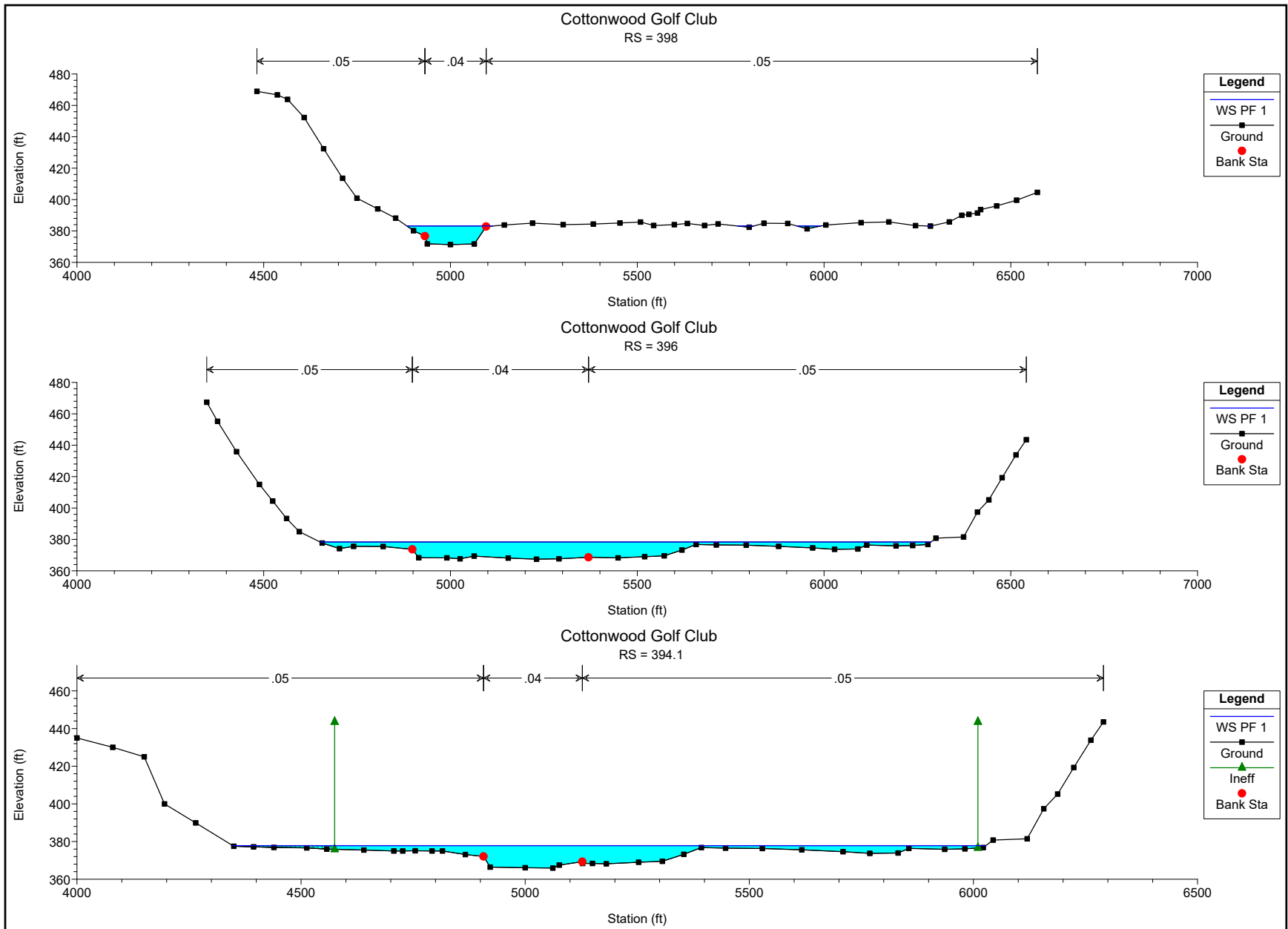
Mining Phase 2

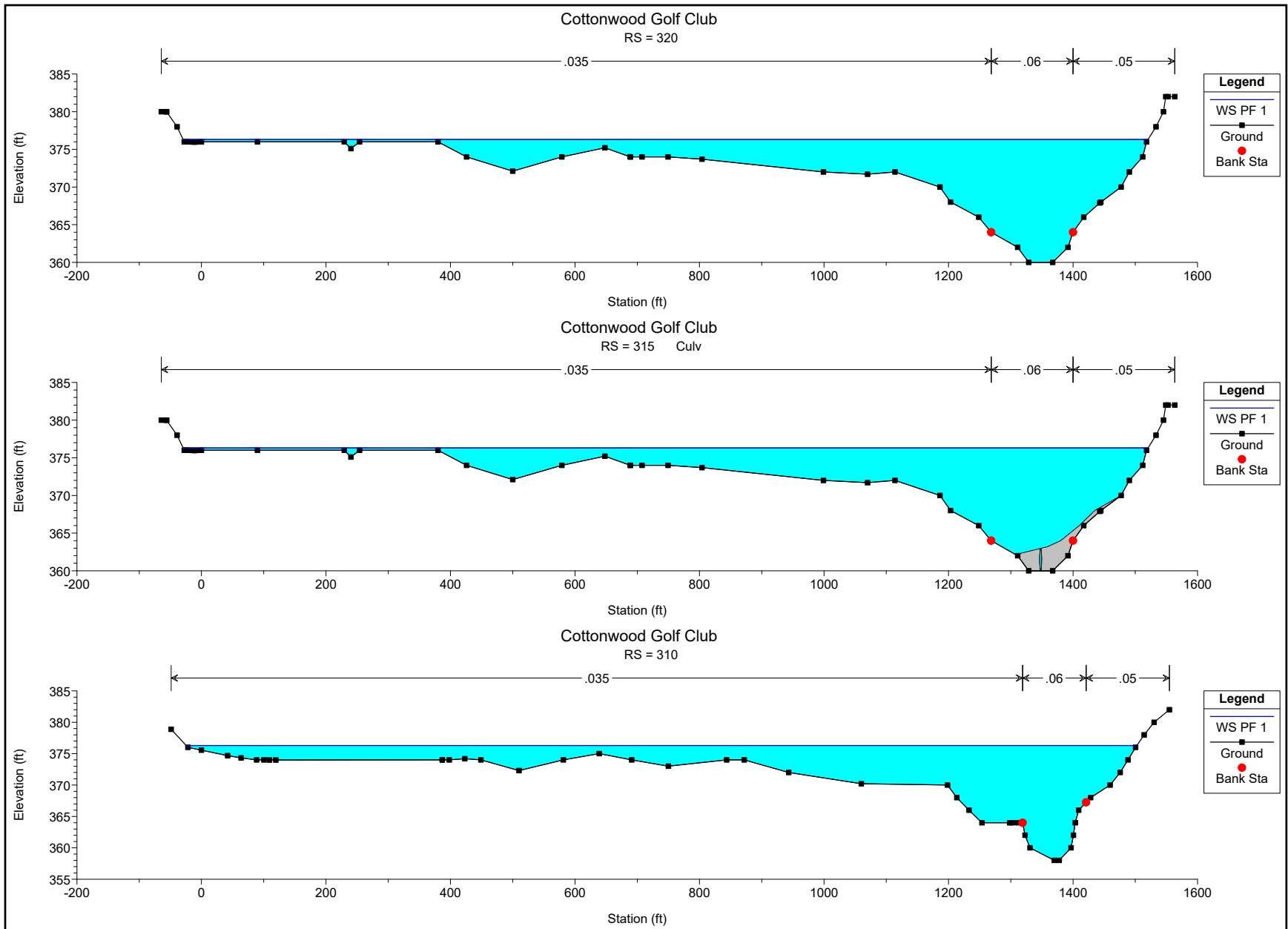
HEC-RAS Plan: PC Phase 2 River: RIVER-1 Reach: Reach-1 Profile: PF 1

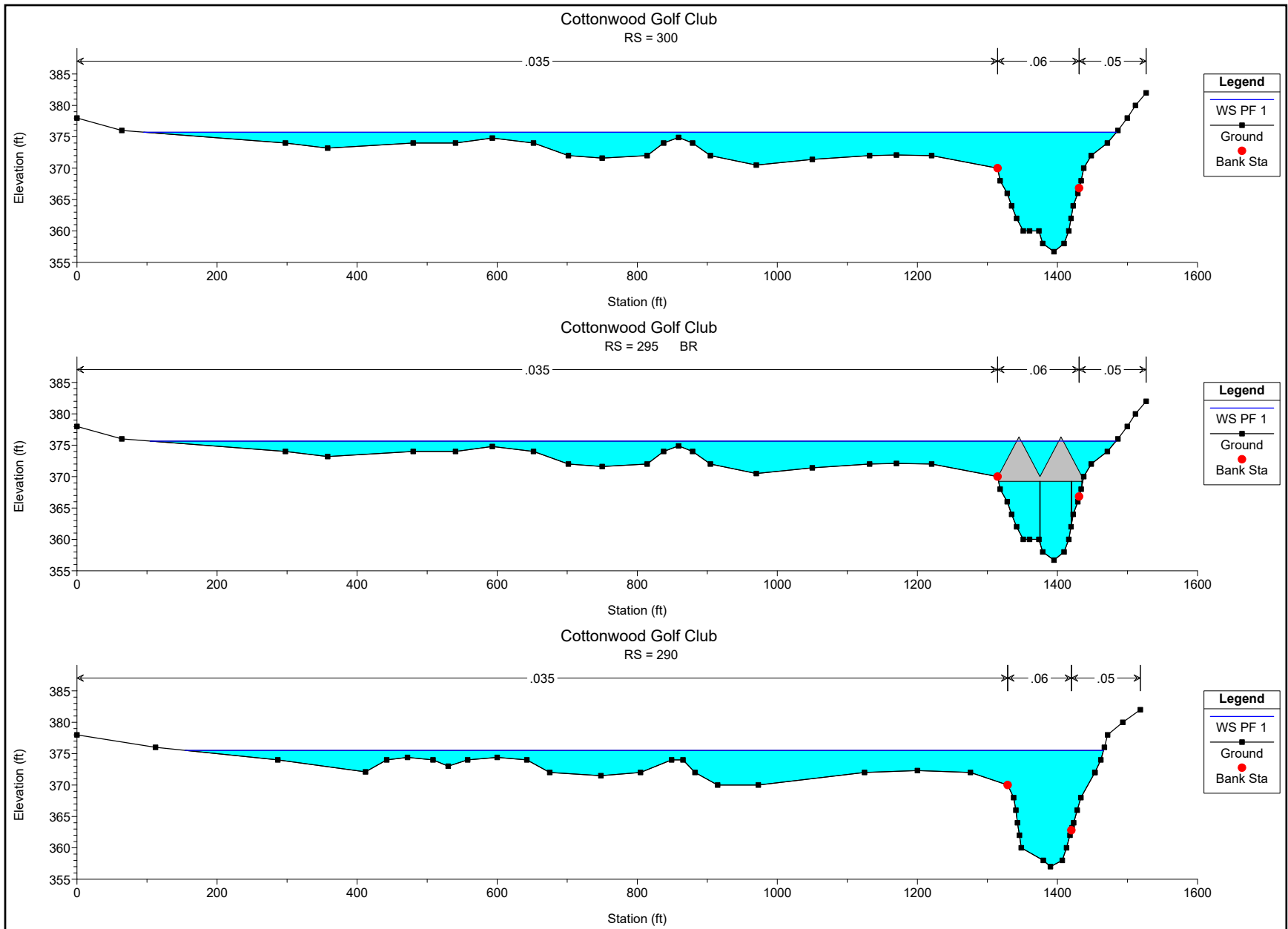
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	398	PF 1	29500.00	371.30	383.17	383.17	387.25	0.008936	16.52	1955.33	346.72	0.90
Reach-1	396	PF 1	29500.00	367.40	378.38		378.59	0.000584	4.20	9721.67	1635.85	0.23
Reach-1	394.1	PF 1	29500.00	365.90	377.81		378.32	0.001542	7.14	6838.40	1679.65	0.38
Reach-1	320	PF 1	29500.00	360.00	376.30	371.89	376.73	0.001952	6.59	6279.88	1549.75	0.30
Reach-1	315		Culvert									
Reach-1	310	PF 1	29500.00	358.00	376.28		376.58	0.001332	5.57	7123.00	1526.89	0.25
Reach-1	300	PF 1	29500.00	356.70	375.73	374.22	376.36	0.003003	7.94	5237.41	1389.15	0.37
Reach-1	295		Bridge									
Reach-1	290	PF 1	29500.00	357.00	375.52		376.15	0.003116	8.26	5088.77	1311.24	0.37
Reach-1	280	PF 1	29500.00	354.60	372.00	372.00	374.39	0.006896	15.00	2918.15	813.73	0.79
Reach-1	270	PF 1	29500.00	351.30	370.66	370.66	372.55	0.002422	13.13	3851.40	1241.65	0.64
Reach-1	260	PF 1	29500.00	349.90	367.90	367.90	369.70	0.002600	12.88	3797.93	1077.01	0.66
Reach-1	250	PF 1	29500.00	347.70	365.45	364.94	366.95	0.001994	11.11	3999.68	969.47	0.58
Reach-1	245		Bridge									
Reach-1	240	PF 1	29500.00	347.70	365.17	364.86	366.84	0.002206	11.59	3803.53	935.87	0.60
Reach-1	230	PF 1	29500.00	346.00	364.37	363.81	366.11	0.002020	11.89	3721.92	994.34	0.59
Reach-1	225		Bridge									
Reach-1	220	PF 1	29500.00	346.00	363.65	363.65	365.71	0.002465	12.78	3291.45	896.21	0.64
Reach-1	210	PF 1	29500.00	345.00	356.97		357.29	0.002732	4.55	6483.13	588.28	0.24
Reach-1	200	PF 1	29500.00	345.00	356.90		357.23	0.002830	4.61	6397.23	578.25	0.24
Reach-1	190	PF 1	29500.00	344.00	355.37		355.81	0.003686	5.27	5619.94	589.24	0.29
Reach-1	180	PF 1	29500.00	343.20	354.12		354.41	0.003137	4.33	6933.46	926.23	0.24
Reach-1	170	PF 1	29500.00	342.10	351.69		352.44	0.007351	7.00	4305.24	580.28	0.43
Reach-1	160	PF 1	29500.00	342.00	351.56	347.86	352.32	0.007737	7.08	4274.74	592.05	0.44
Reach-1	150	PF 1	29500.00	340.40	349.73		349.95	0.003184	3.84	8062.17	1158.98	0.23
Reach-1	140	PF 1	29500.00	338.00	349.44		349.66	0.000343	1.20	11684.50	1320.25	0.07
Reach-1	130	PF 1	29500.00	337.30	348.46	345.10	349.33	0.001372	7.64	4039.56	1122.09	0.46
Reach-1	125		Mult Open									
Reach-1	120	PF 1	29500.00	338.10	346.46	346.46	348.93	0.007768	12.80	2359.51	982.82	1.01
Reach-1	110	PF 1	29500.00	334.00	342.69		342.93	0.001323	3.97	7431.45	1017.85	0.26
Reach-1	100	PF 1	29500.00	332.20	341.94		342.22	0.002151	3.79	7249.99	866.61	0.22
Reach-1	90	PF 1	29500.00	331.00	340.53		340.79	0.002873	4.11	7209.08	1000.04	0.24
Reach-1	80	PF 1	29500.00	331.00	340.45		340.72	0.002908	4.12	7205.16	1036.12	0.24
Reach-1	70	PF 1	29500.00	329.80	339.28		339.50	0.002975	3.76	7799.26	1156.97	0.22
Reach-1	60	PF 1	29500.00	329.80	339.21		339.43	0.003037	3.63	7955.90	1166.75	0.21
Reach-1	50	PF 1	29500.00	326.00	337.28		337.62	0.004460	5.39	6378.49	1064.31	0.31
Reach-1	40	PF 1	29500.00	324.00	335.63		335.91	0.002460	4.55	7081.80	1096.53	0.27
Reach-1	30	PF 1	29500.00	324.00	334.80		335.01	0.001108	2.70	8251.28	1142.26	0.16

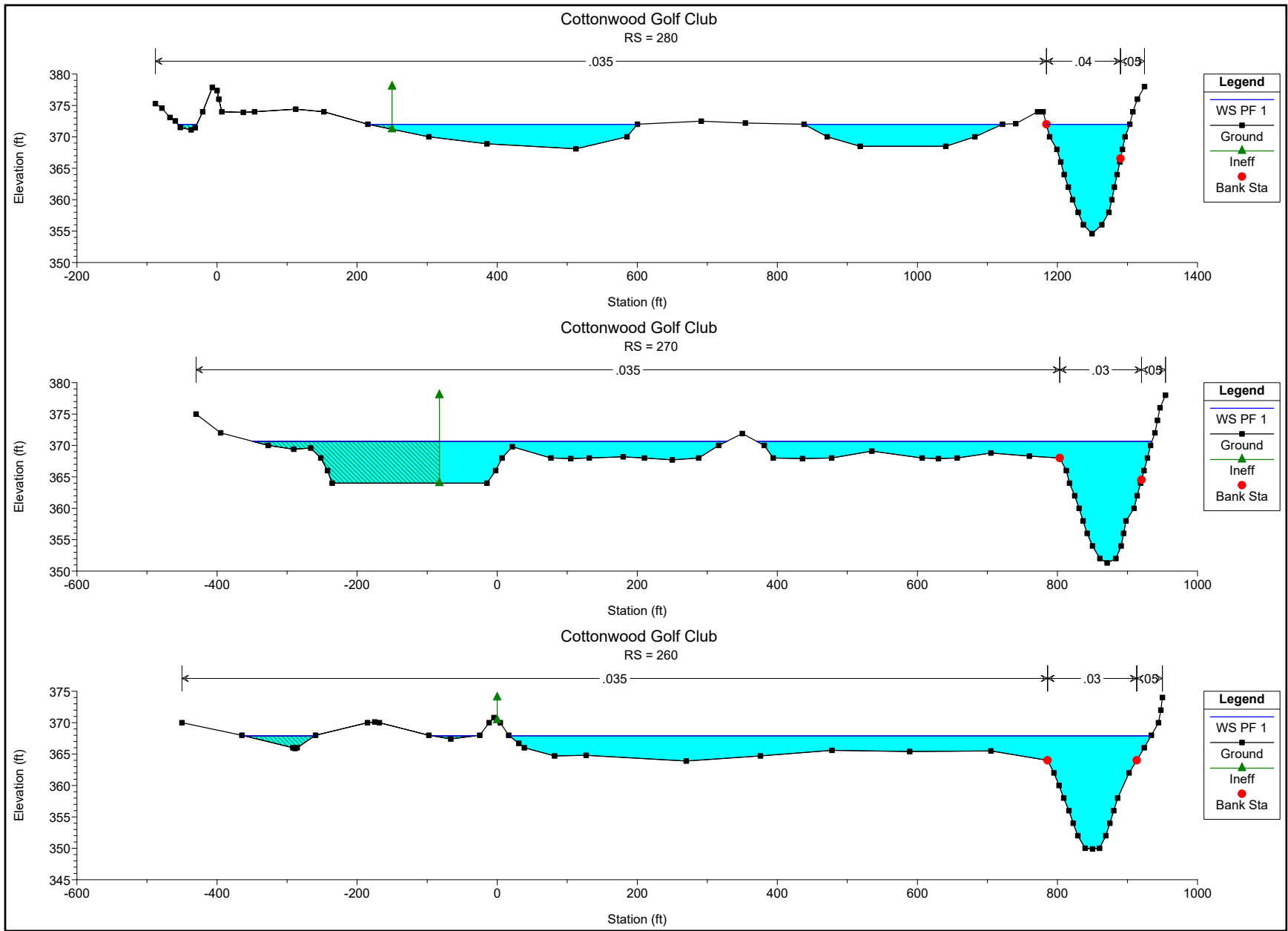
HEC-RAS Plan: PC Phase 2 River: RIVER-1 Reach: Reach-1 Profile: PF 1 (Continued)

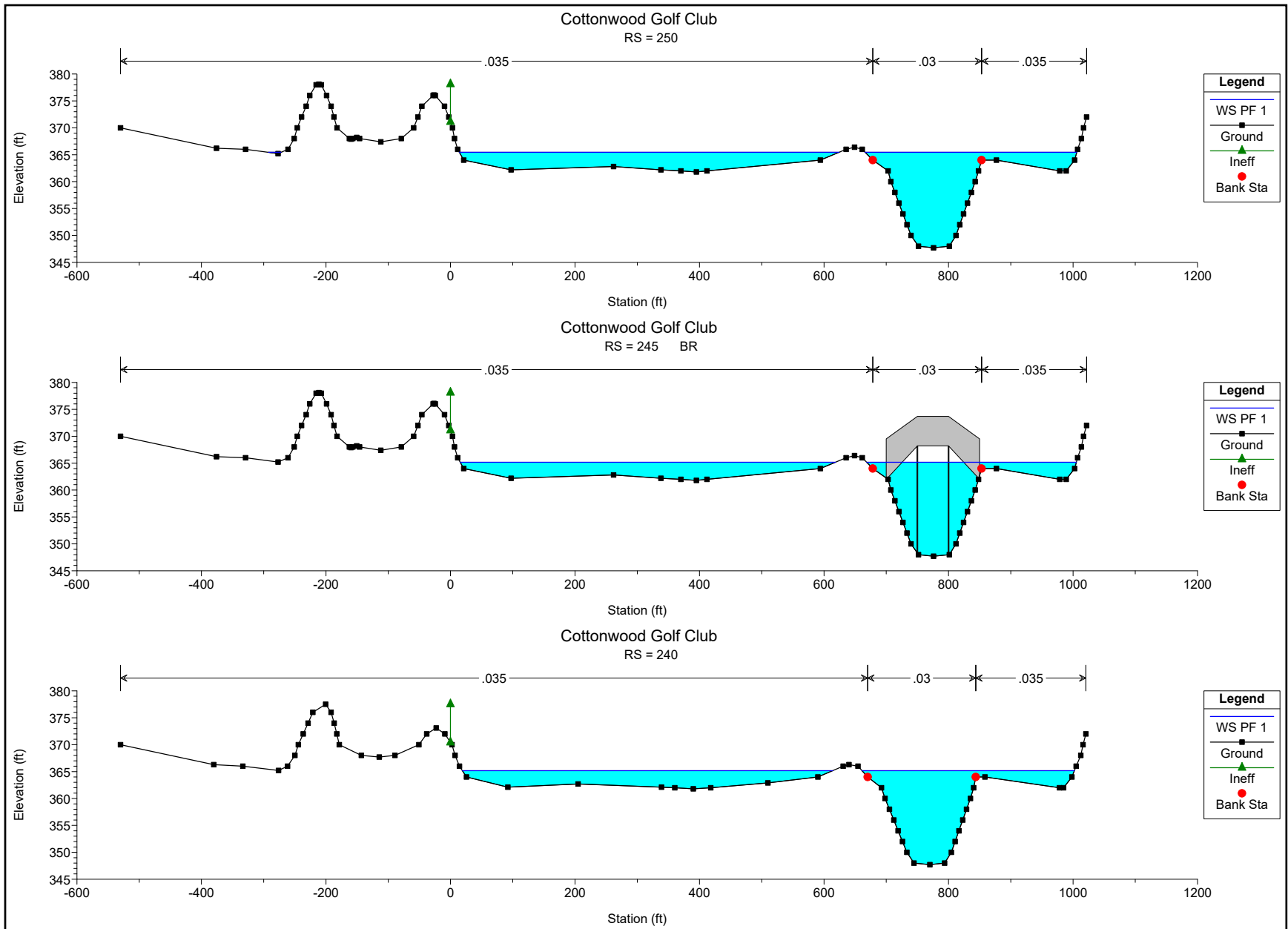
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	20	PF 1	29500.00	324.00	333.91		334.32	0.001881	4.77	5746.74	1011.29	0.34
Reach-1	10	PF 1	29500.00	324.00	333.75		334.26	0.002611	5.83	5166.49	1069.62	0.40
Reach-1	5	PF 1	29500.00	321.10	330.28	328.76	330.93	0.004294	10.82	5598.21	1123.72	0.68

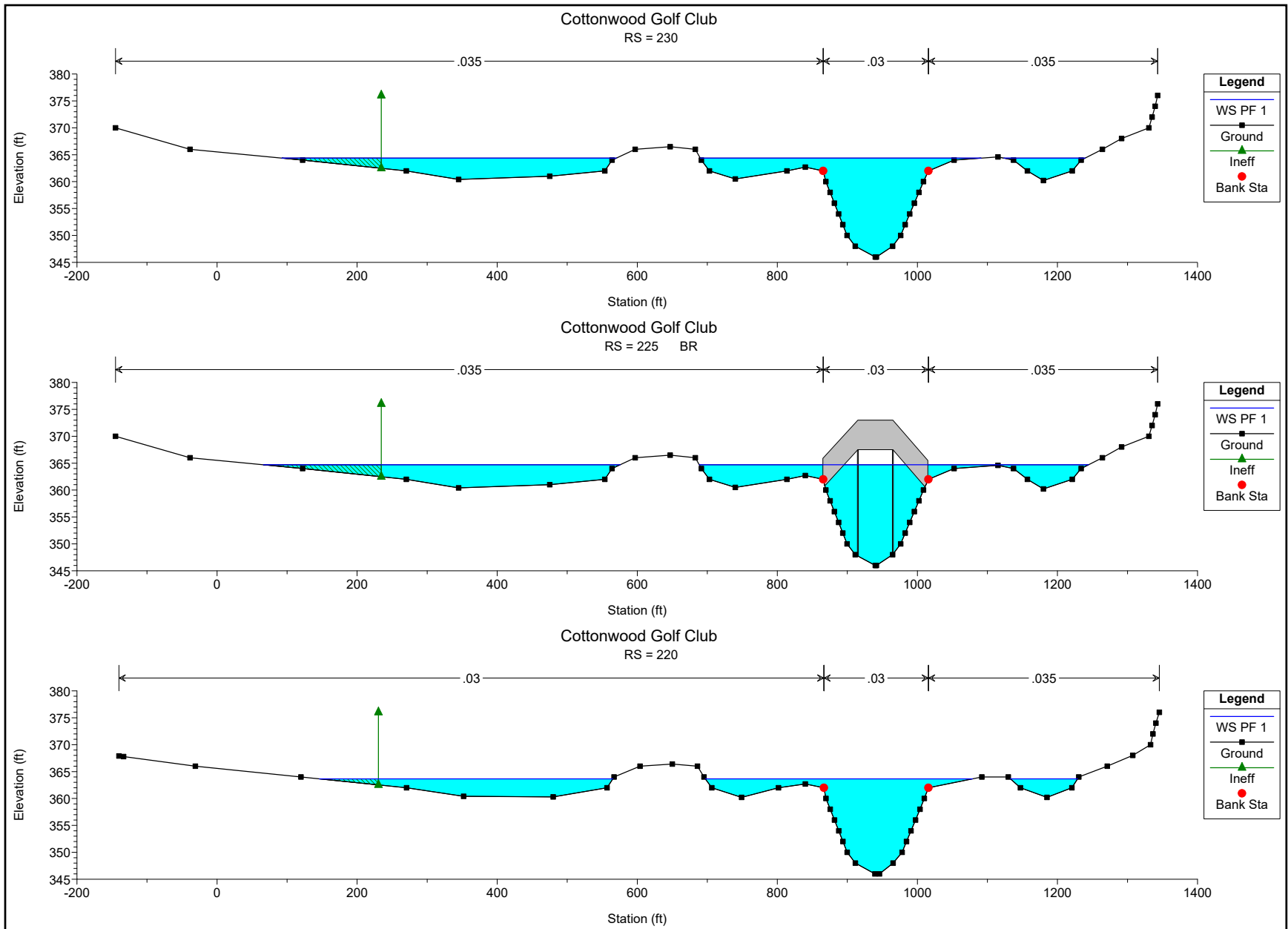


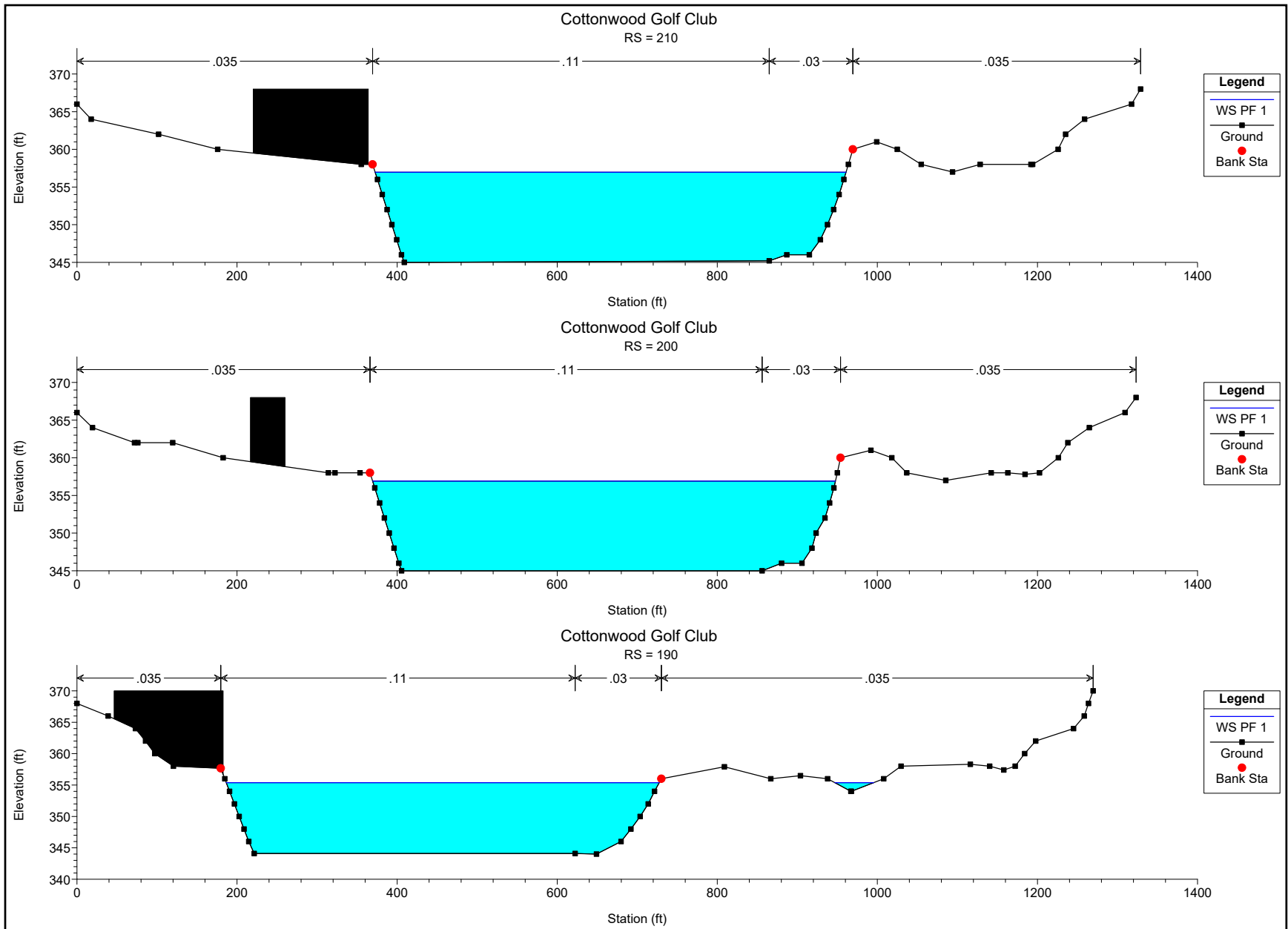


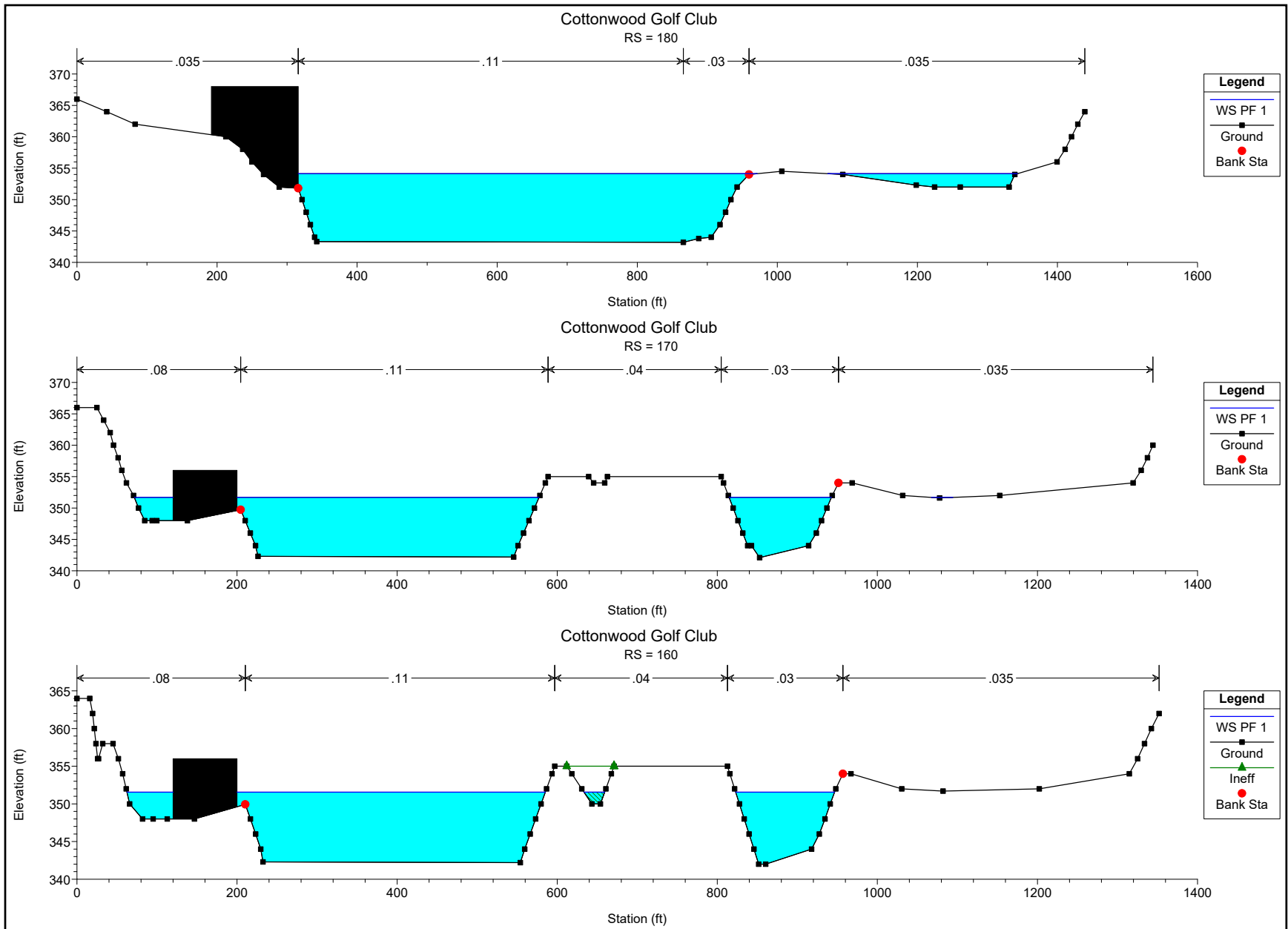


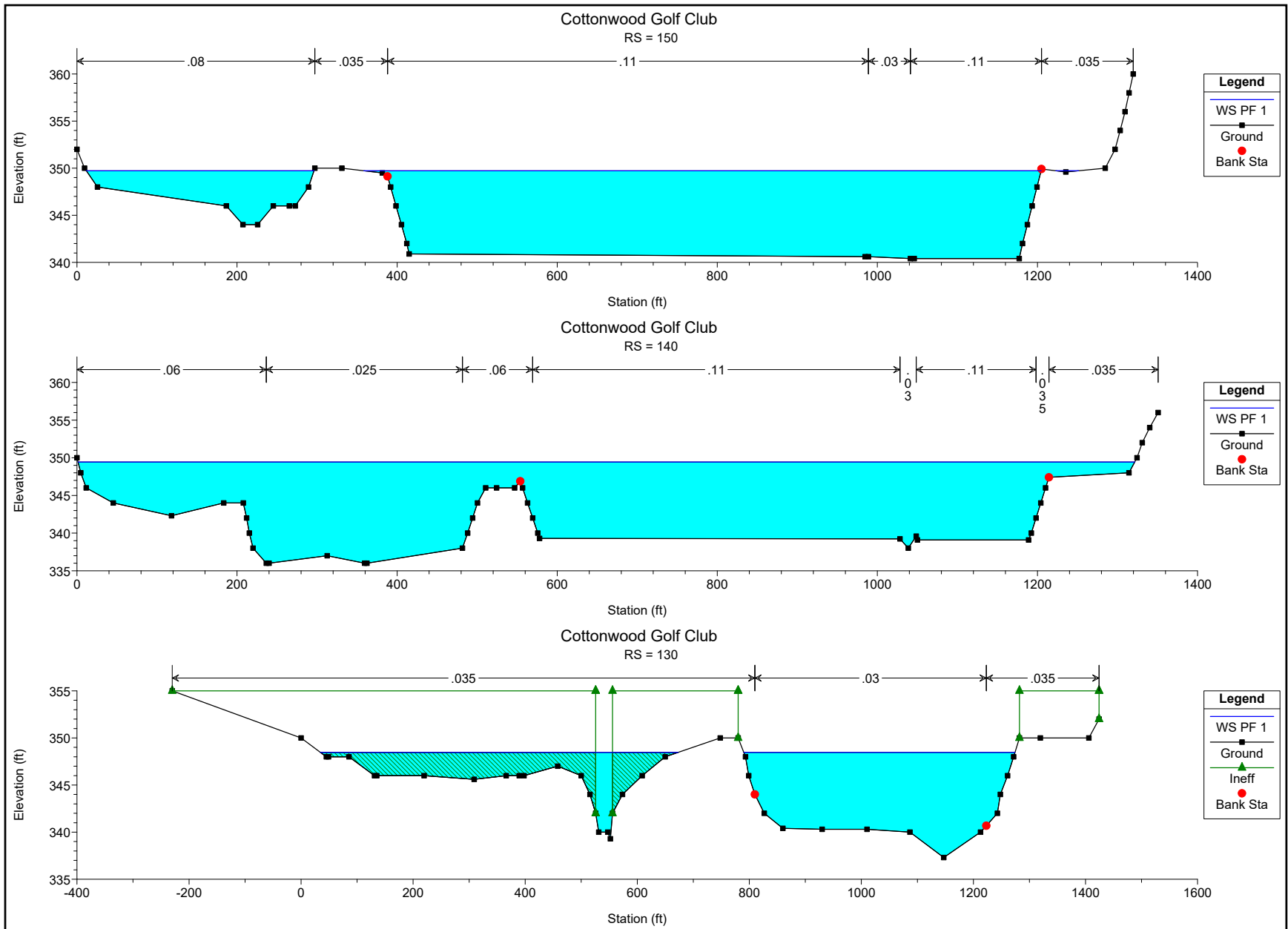


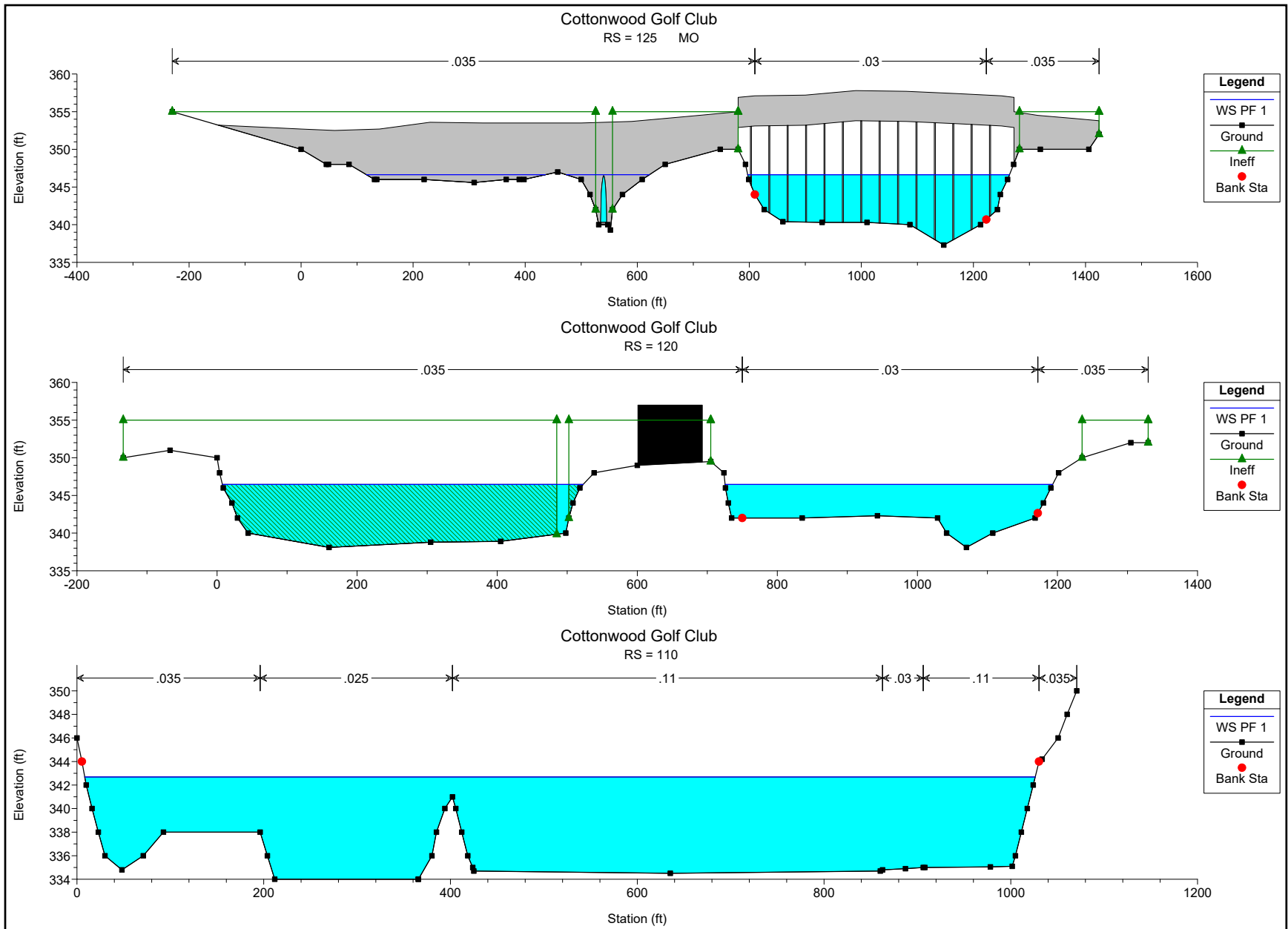


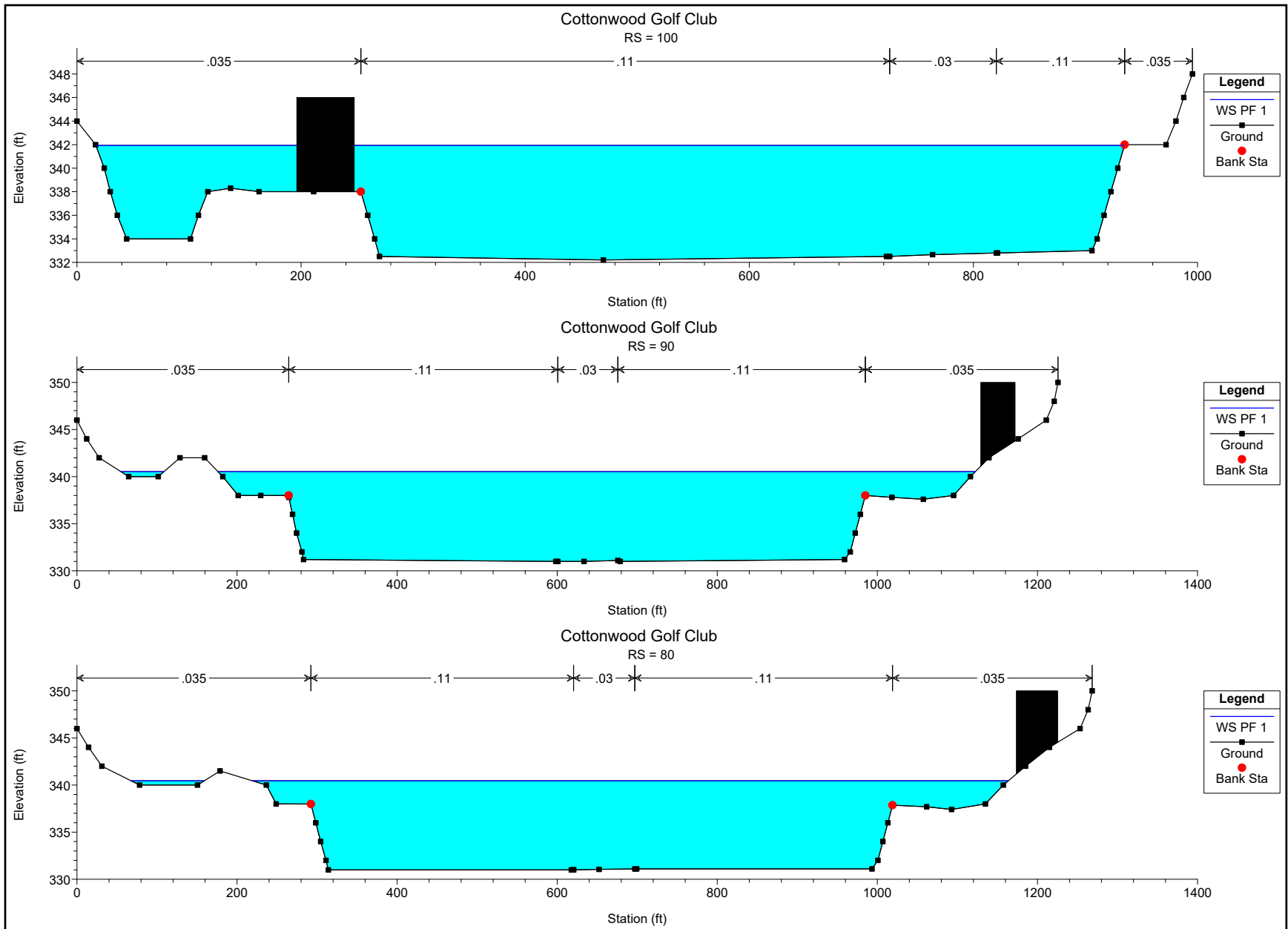


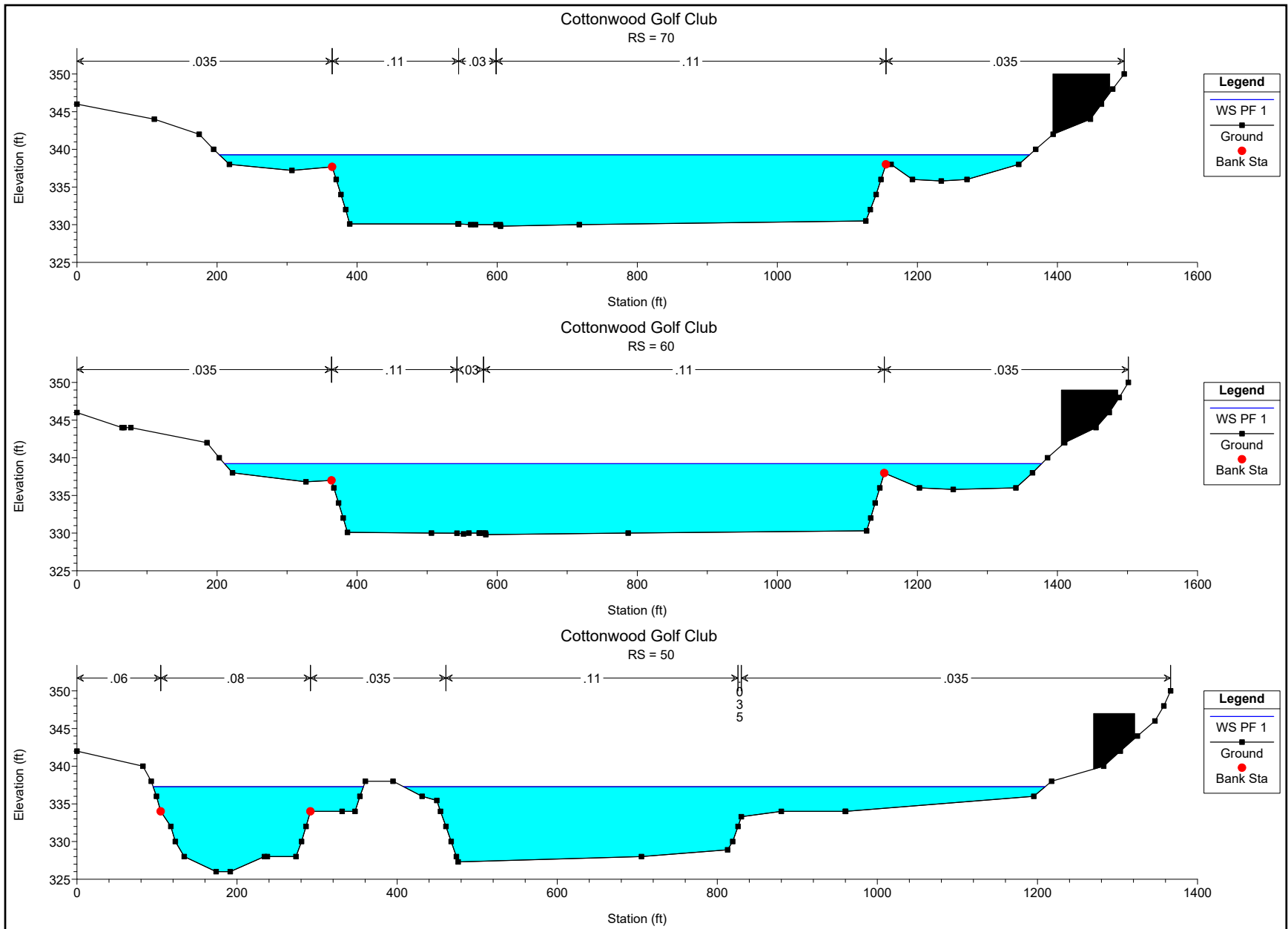


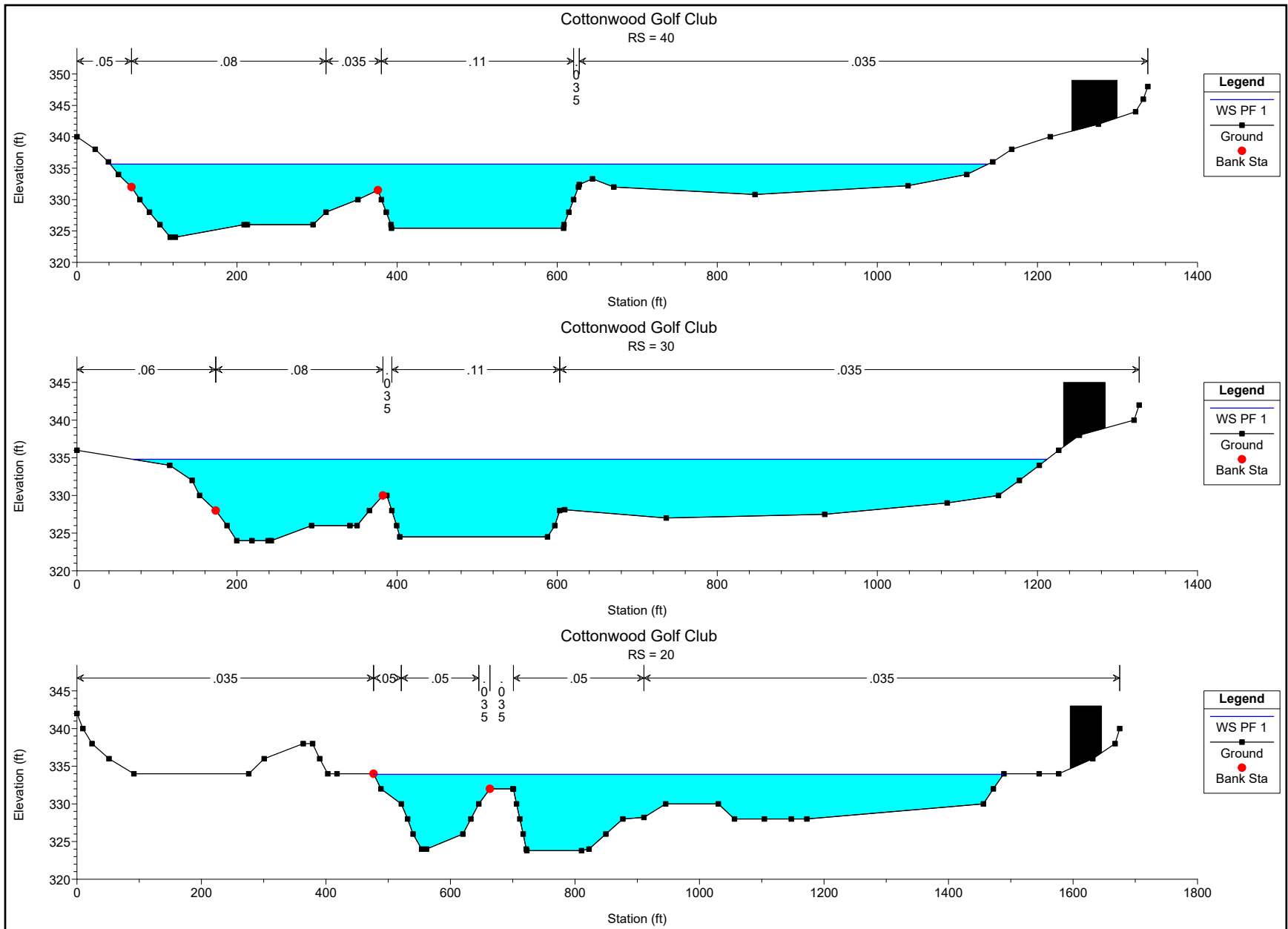


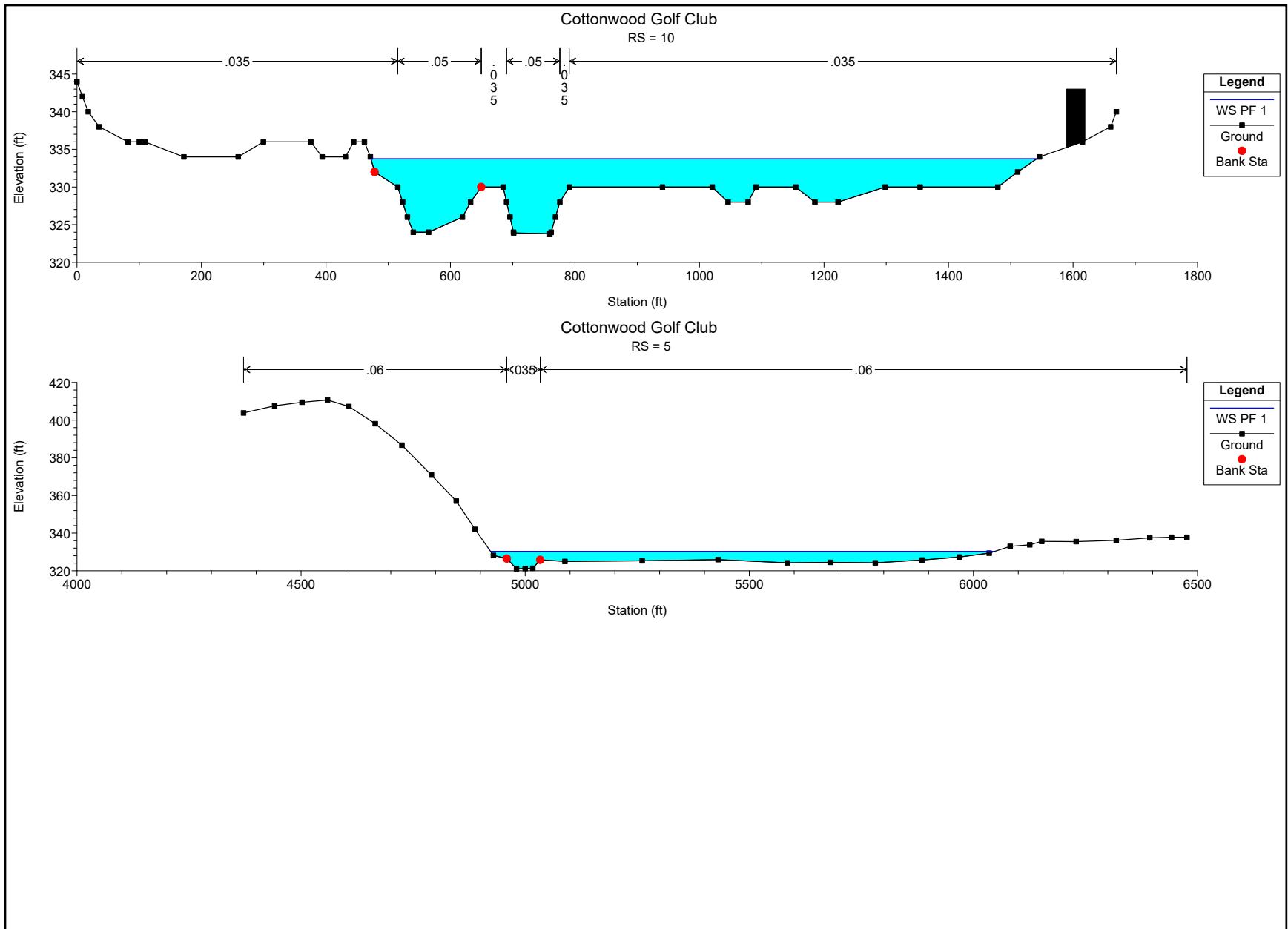












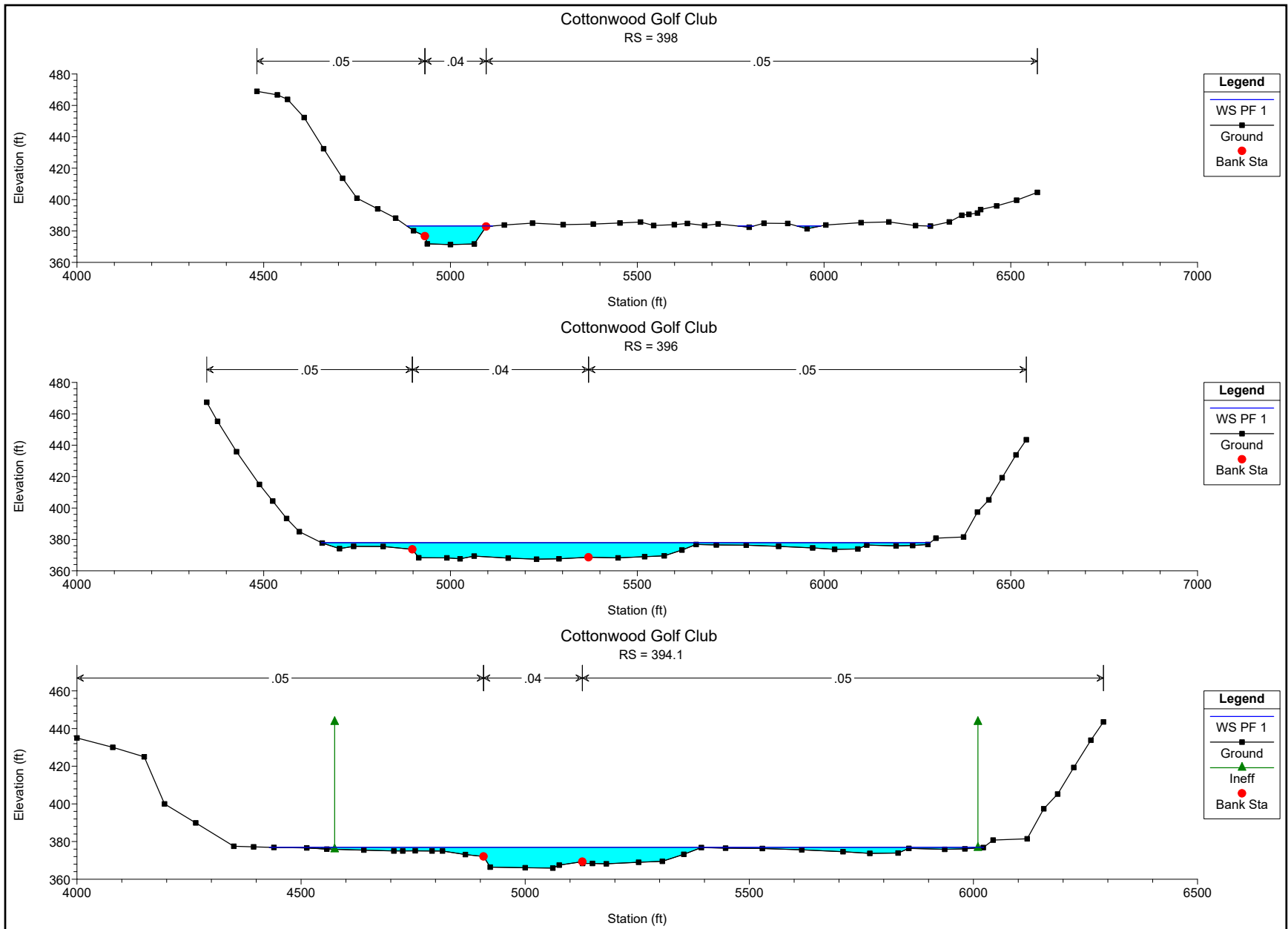
Mining Phase 3

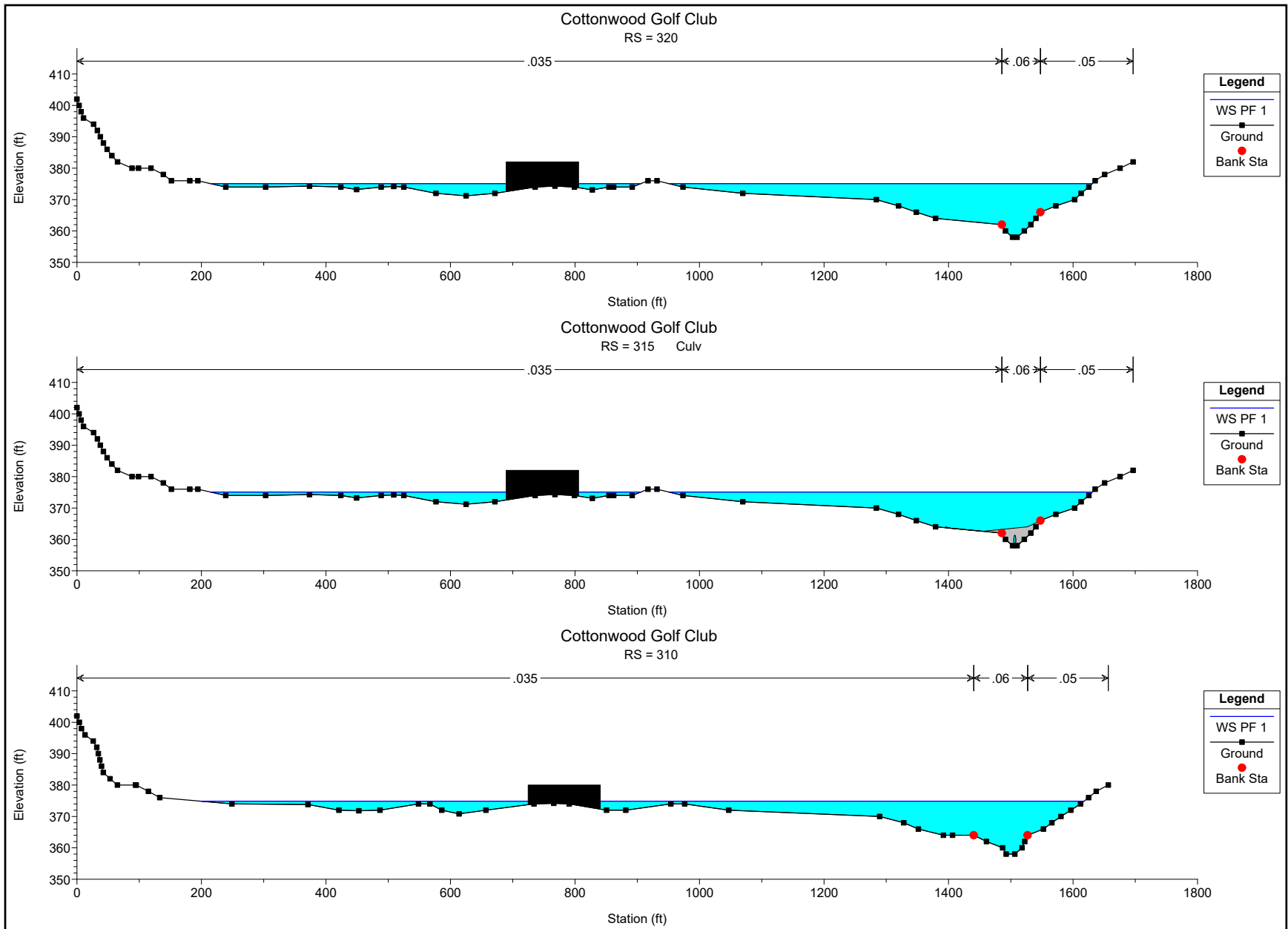
HEC-RAS Plan: PC Phase 3 River: RIVER-1 Reach: Reach-1 Profile: PF 1

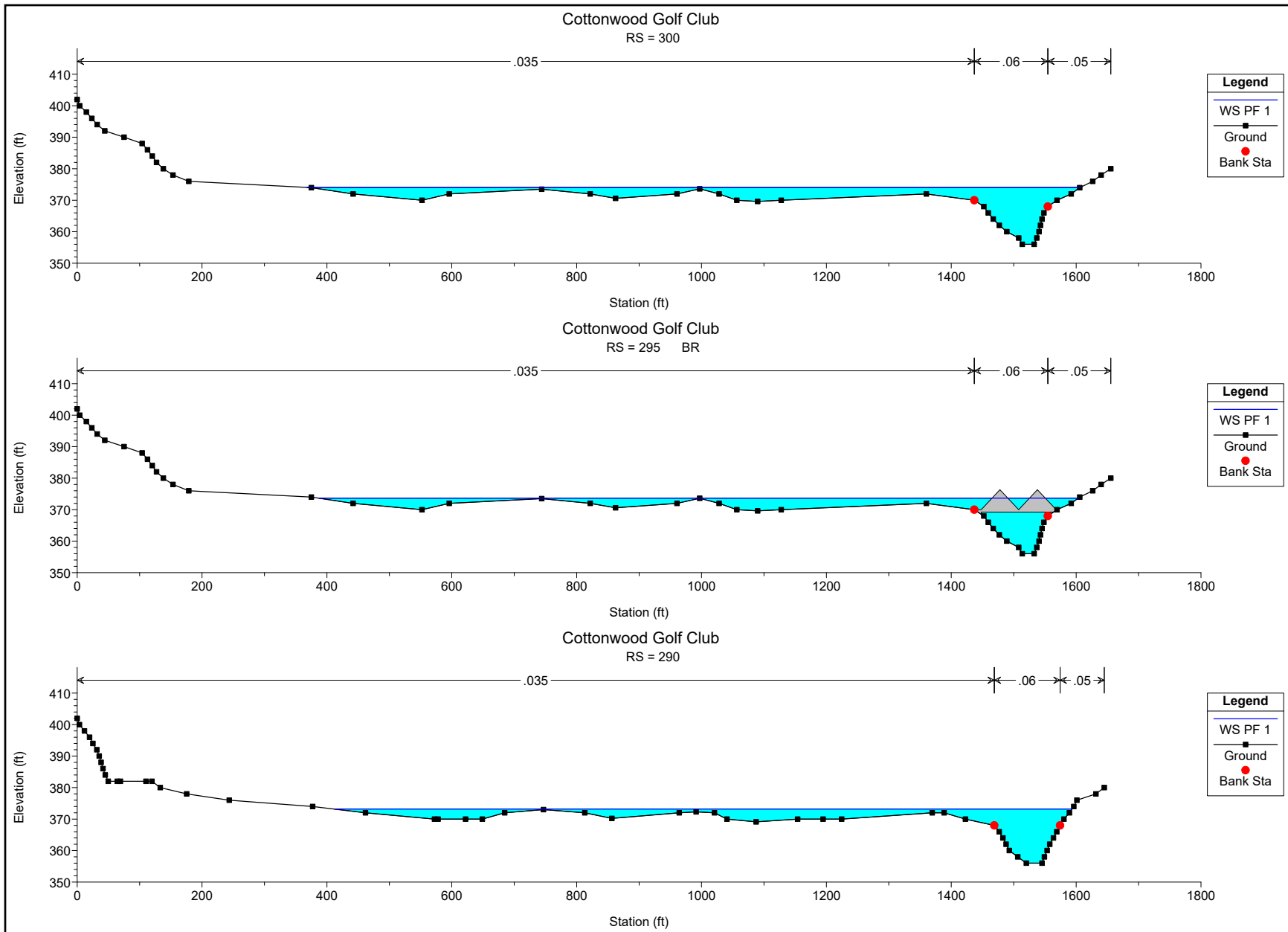
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	398	PF 1	29500.00	371.30	383.17	383.17	387.25	0.008936	16.52	1955.33	346.72	0.90
Reach-1	396	PF 1	29500.00	367.40	377.94		378.18	0.000724	4.54	8995.08	1629.67	0.26
Reach-1	394.1	PF 1	29500.00	365.90	376.97		377.78	0.002528	8.67	5635.37	1593.94	0.48
Reach-1	320	PF 1	29500.00	358.00	375.09	372.02	375.56	0.001994	6.47	5433.80	1255.25	0.30
Reach-1	315		Culvert									
Reach-1	310	PF 1	29500.00	358.00	374.86		375.36	0.002439	7.08	5417.09	1302.76	0.33
Reach-1	300	PF 1	29500.00	356.00	374.07	373.56	374.98	0.005361	9.41	4263.89	1238.66	0.47
Reach-1	295		Bridge									
Reach-1	290	PF 1	29500.00	356.00	373.18	373.18	374.44	0.006936	11.12	3758.37	1181.64	0.54
Reach-1	280	PF 1	29500.00	352.90	362.75		363.02	0.004761	4.19	7039.47	744.78	0.24
Reach-1	270	PF 1	29500.00	350.00	361.11		361.36	0.004000	3.99	7424.62	832.86	0.22
Reach-1	260	PF 1	29500.00	348.00	359.20		359.45	0.003794	4.01	7348.81	717.24	0.22
Reach-1	250	PF 1	29500.00	347.00	357.17		357.44	0.003283	4.18	7060.01	727.77	0.24
Reach-1	240	PF 1	29500.00	346.00	357.14		357.39	0.002917	4.02	7346.61	727.35	0.22
Reach-1	230	PF 1	29500.00	346.00	356.19		356.41	0.002637	3.74	7890.29	822.17	0.21
Reach-1	220	PF 1	29500.00	346.00	356.15		356.37	0.002616	3.71	7948.61	827.26	0.21
Reach-1	210	PF 1	29500.00	345.00	354.94		355.10	0.002289	3.27	9029.17	945.77	0.19
Reach-1	200	PF 1	29500.00	344.90	354.90		355.06	0.002211	3.23	9119.39	947.31	0.18
Reach-1	190	PF 1	29500.00	344.00	353.92		354.08	0.002214	3.22	9166.21	962.53	0.18
Reach-1	180	PF 1	29500.00	343.00	353.11		353.25	0.001947	2.95	9990.12	1030.26	0.17
Reach-1	170	PF 1	29500.00	341.90	351.66		351.93	0.005605	4.26	6984.19	836.42	0.25
Reach-1	160	PF 1	29500.00	341.10	351.58	345.90	351.85	0.005264	4.19	7114.03	870.56	0.25
Reach-1	150	PF 1	29500.00	340.40	349.73		349.95	0.003184	3.84	8062.17	1158.98	0.23
Reach-1	140	PF 1	29500.00	338.00	349.44		349.66	0.000343	1.20	11684.50	1320.25	0.07
Reach-1	130	PF 1	29500.00	337.30	348.46	345.10	349.33	0.001372	7.64	4039.56	1122.09	0.46
Reach-1	125		Mult Open									
Reach-1	120	PF 1	29500.00	338.10	346.46	346.46	348.93	0.007768	12.80	2359.51	982.82	1.01
Reach-1	110	PF 1	29500.00	334.00	342.69		342.93	0.001323	3.97	7431.45	1017.85	0.26
Reach-1	100	PF 1	29500.00	332.20	341.94		342.22	0.002151	3.79	7249.99	866.61	0.22
Reach-1	90	PF 1	29500.00	331.00	340.53		340.79	0.002873	4.11	7209.08	1000.04	0.24
Reach-1	80	PF 1	29500.00	331.00	340.45		340.72	0.002908	4.12	7205.16	1036.12	0.24
Reach-1	70	PF 1	29500.00	329.80	339.28		339.50	0.002975	3.76	7799.26	1156.97	0.22
Reach-1	60	PF 1	29500.00	329.80	339.21		339.43	0.003037	3.63	7955.90	1166.75	0.21
Reach-1	50	PF 1	29500.00	326.00	337.28		337.62	0.004460	5.39	6378.49	1064.31	0.31
Reach-1	40	PF 1	29500.00	324.00	335.63		335.91	0.002460	4.55	7081.80	1096.53	0.27
Reach-1	30	PF 1	29500.00	324.00	334.80		335.01	0.001108	2.70	8251.28	1142.26	0.16
Reach-1	20	PF 1	29500.00	324.00	333.91		334.32	0.001881	4.77	5746.74	1011.29	0.34
Reach-1	10	PF 1	29500.00	324.00	333.75		334.26	0.002611	5.83	5166.49	1069.62	0.40

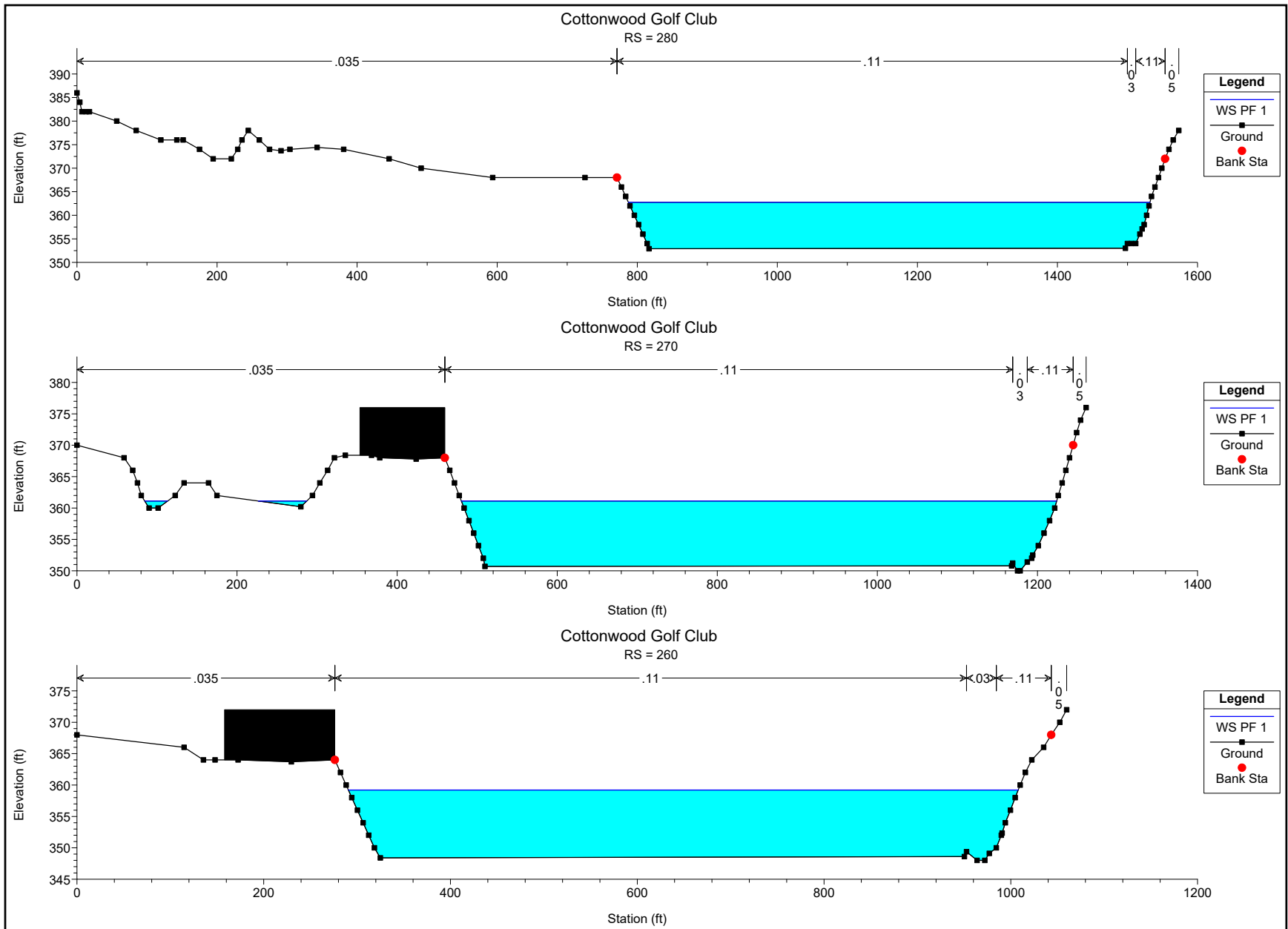
HEC-RAS Plan: PC Phase 3 River: RIVER-1 Reach: Reach-1 Profile: PF 1 (Continued)

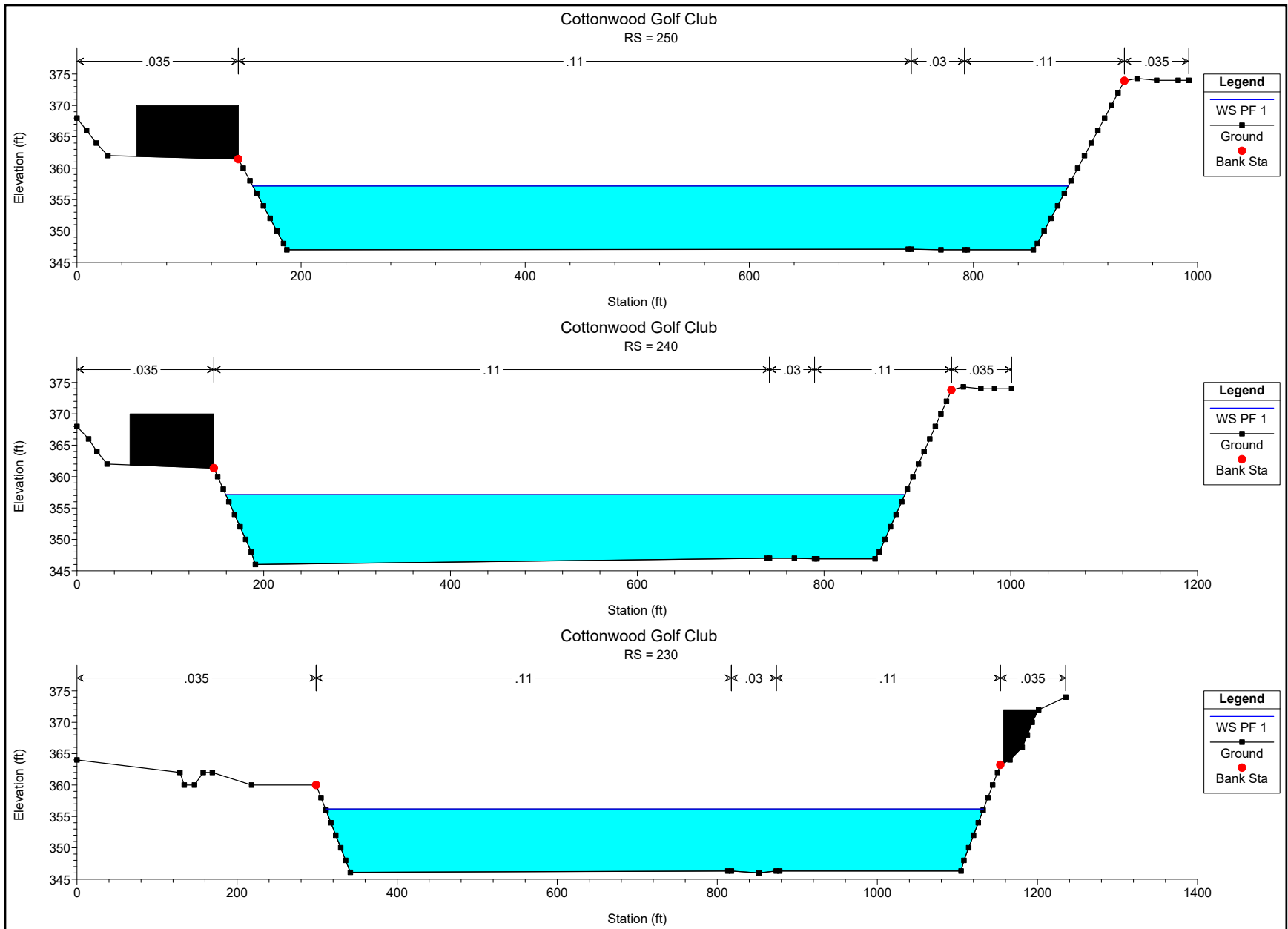
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	5	PF 1	29500.00	321.10	330.28	328.76	330.93	0.004294	10.82	5598.21	1123.72	0.68

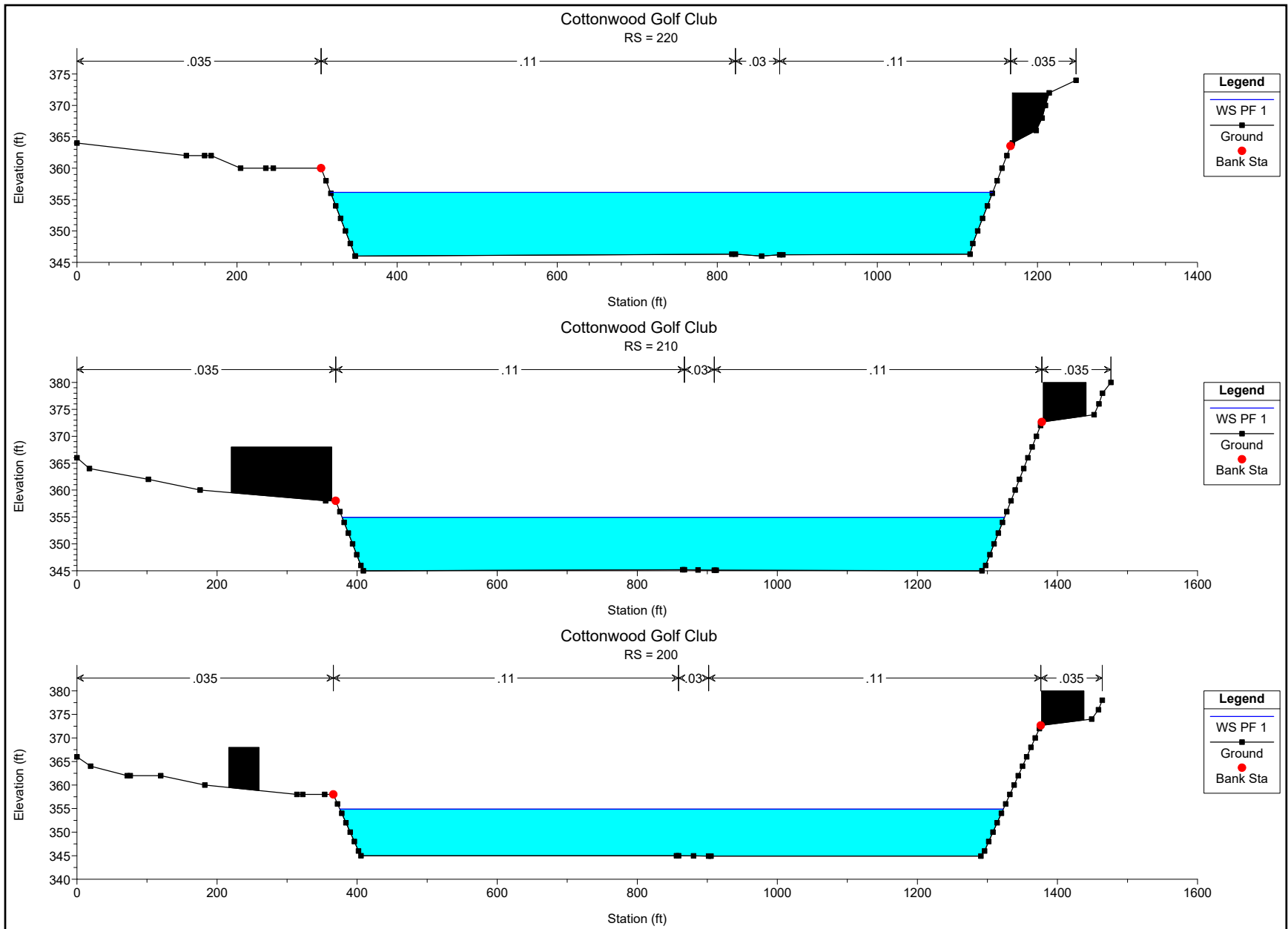


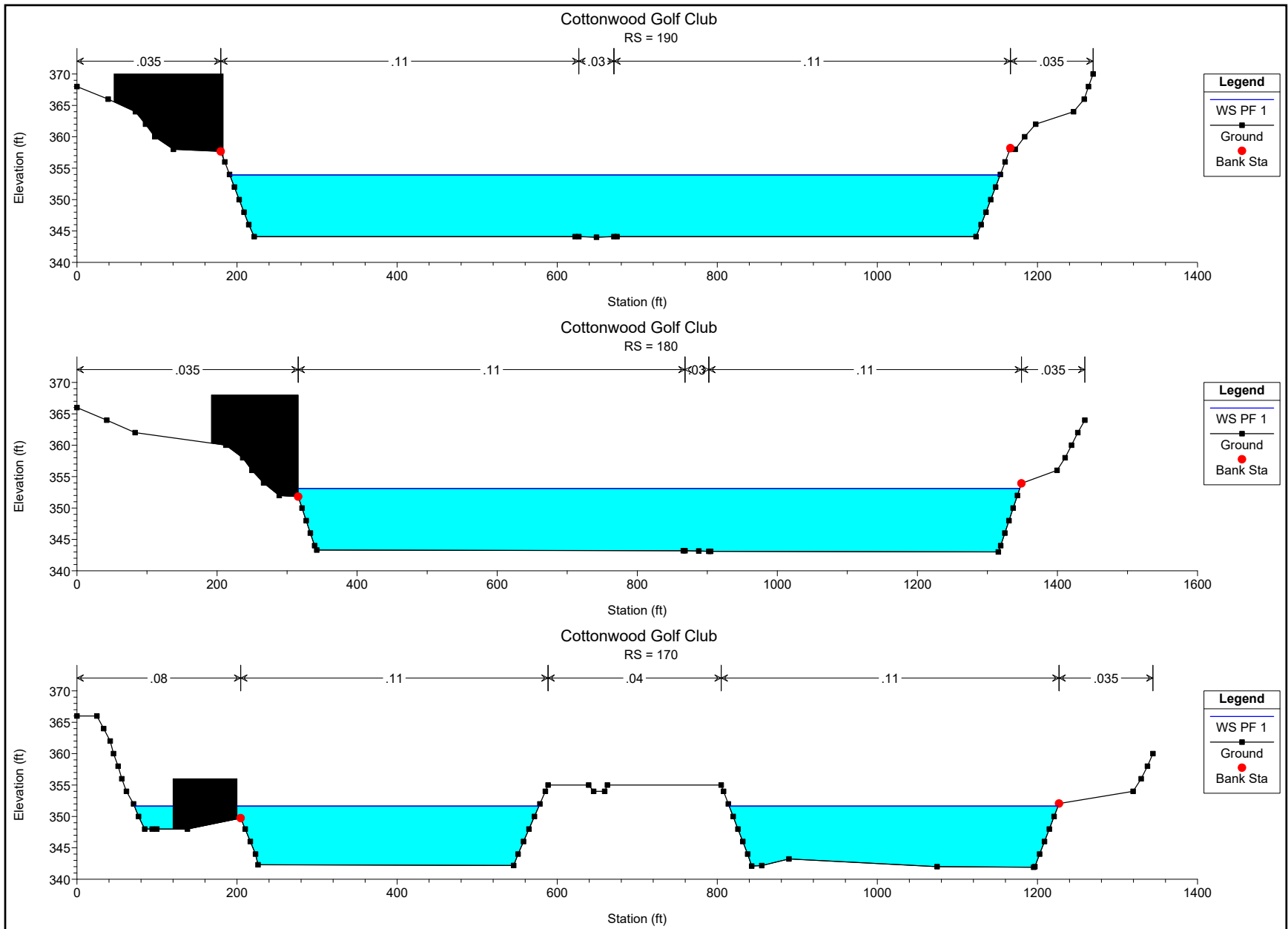


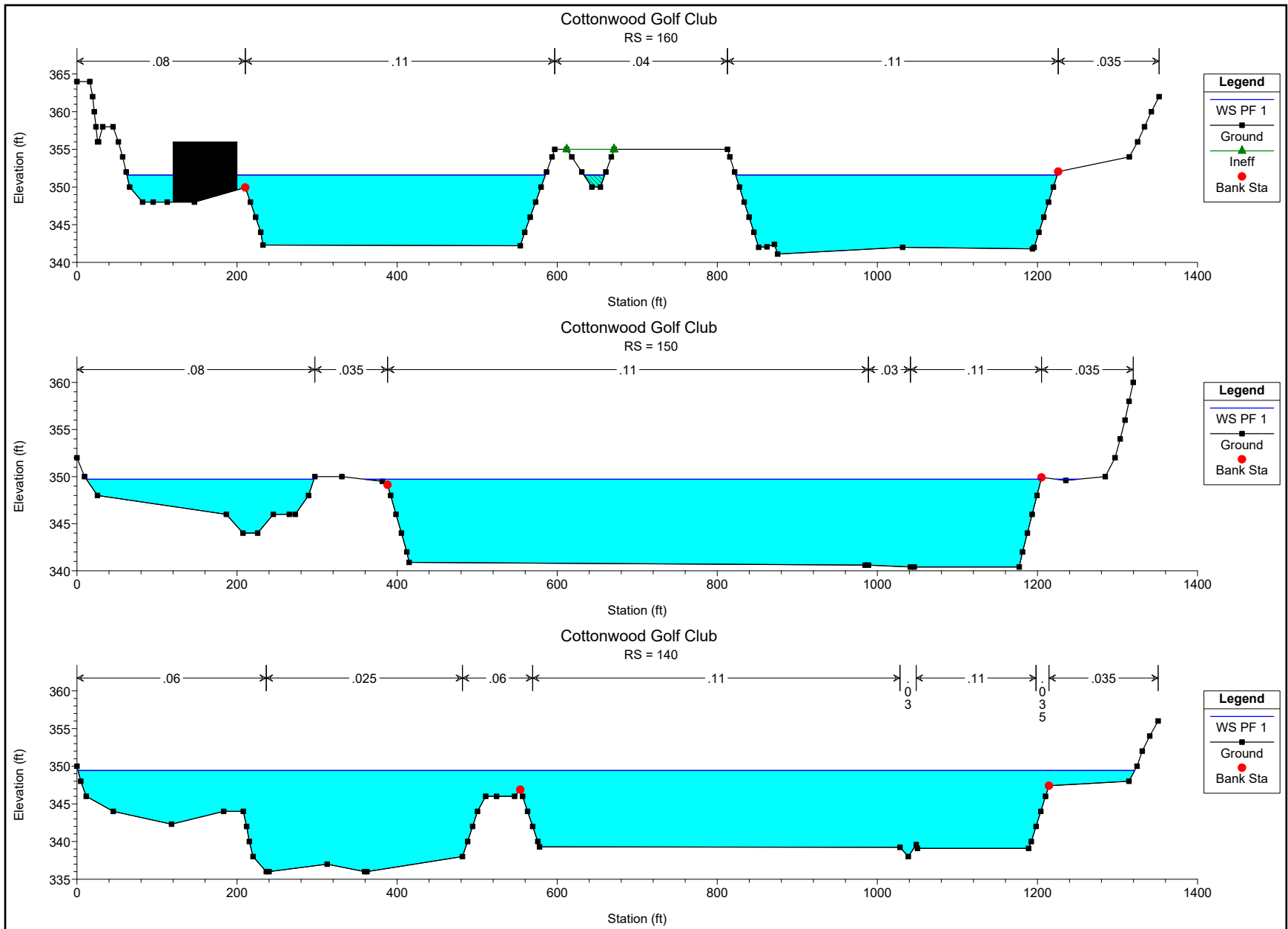


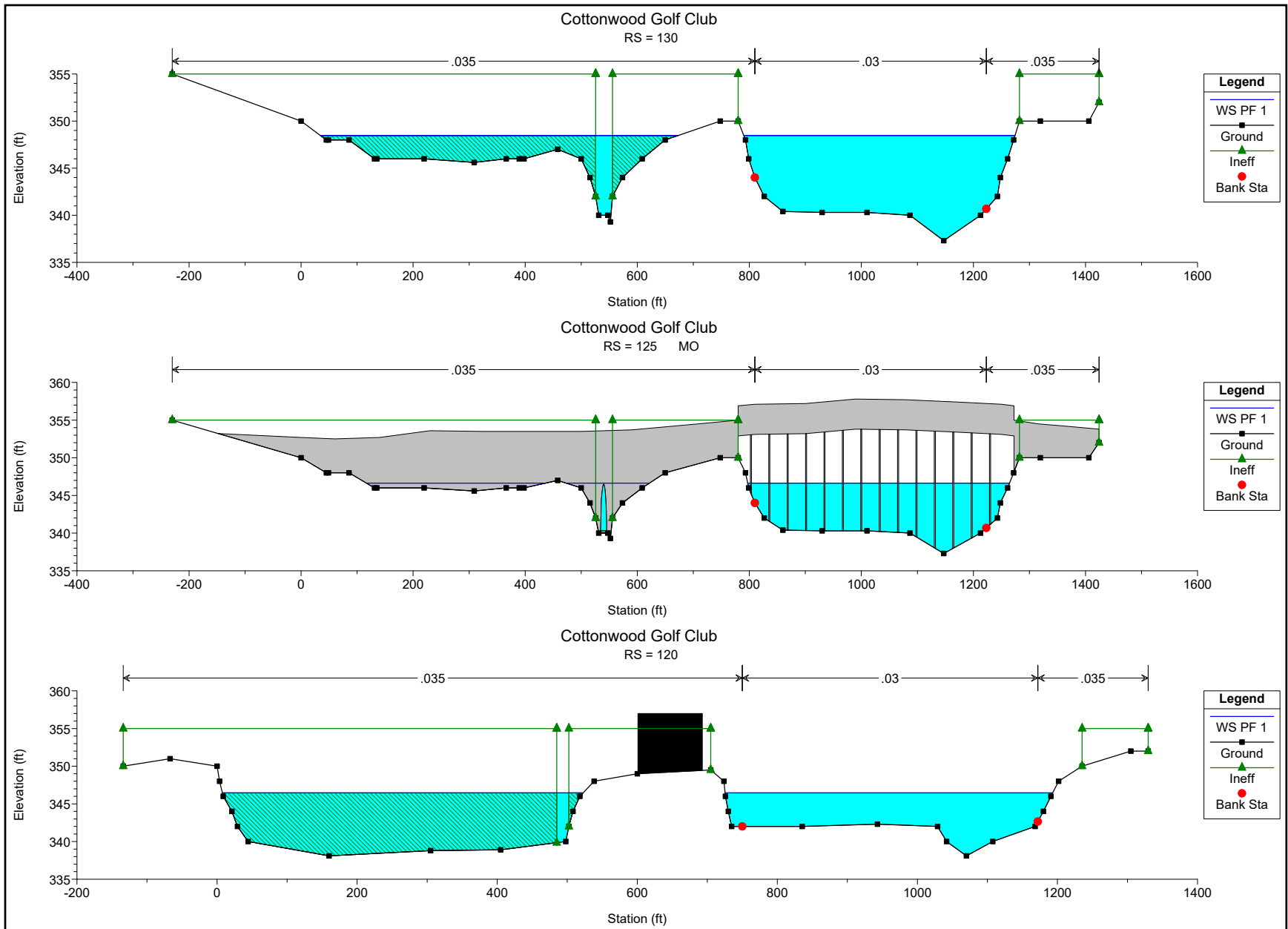


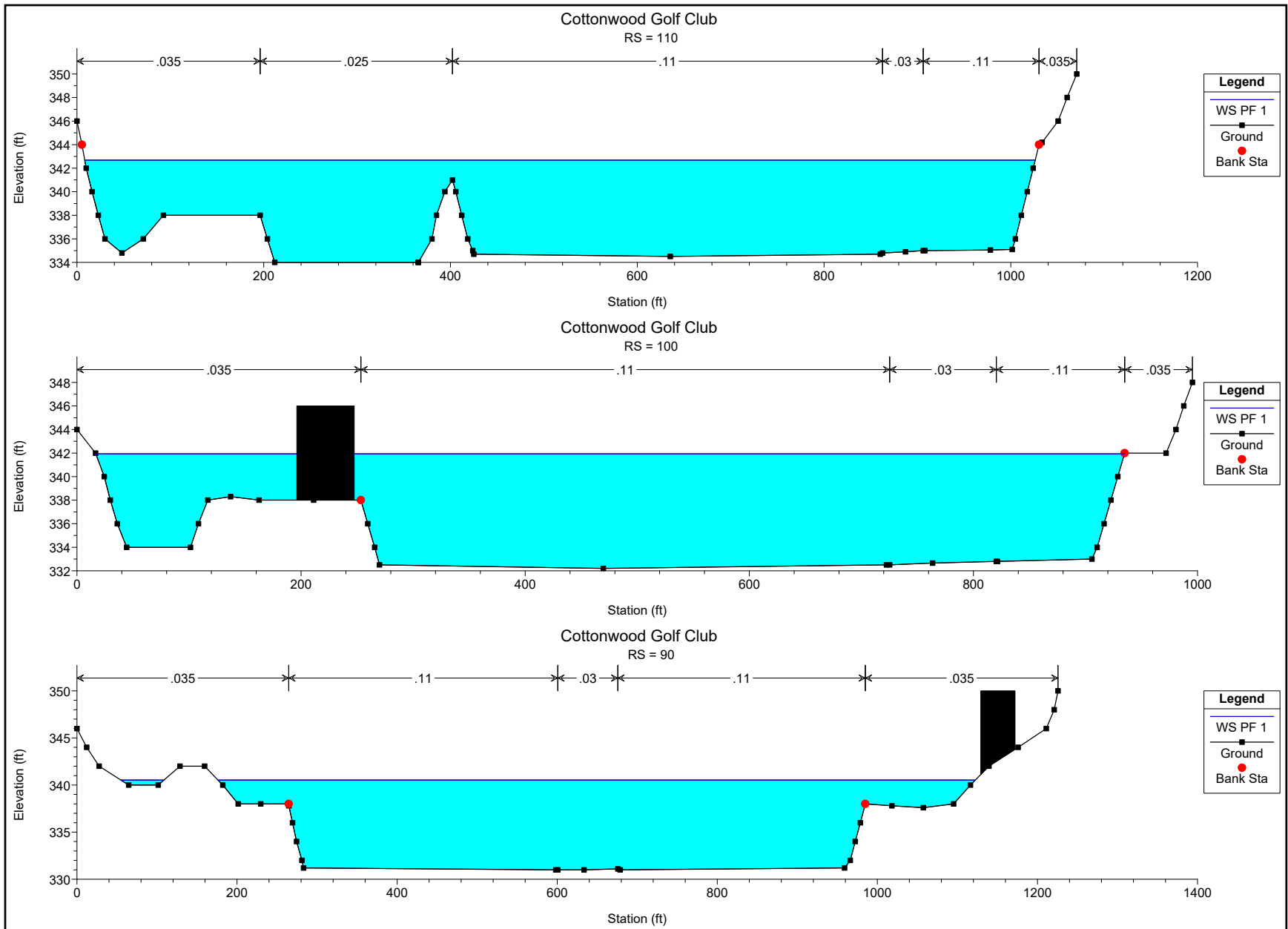


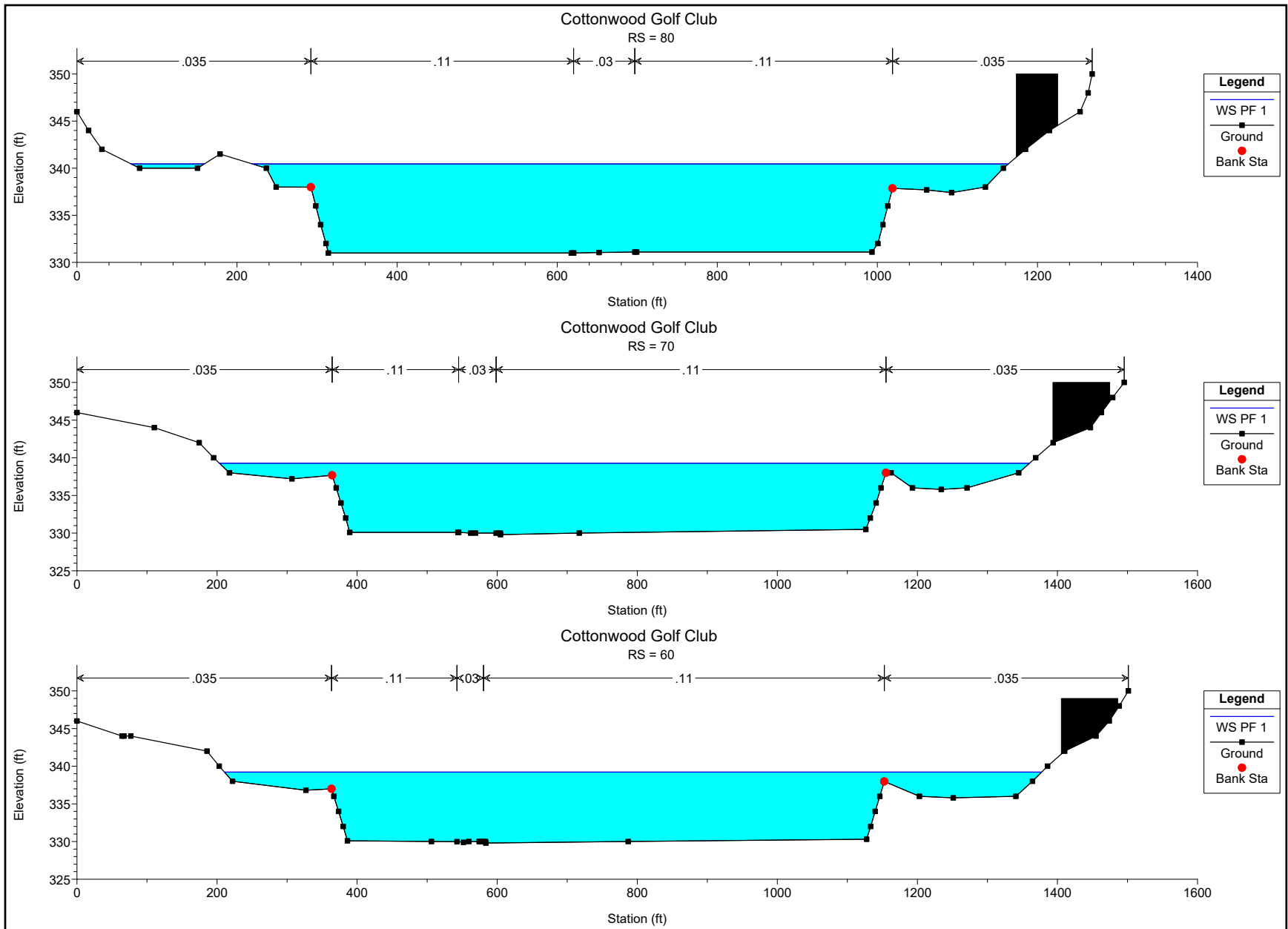


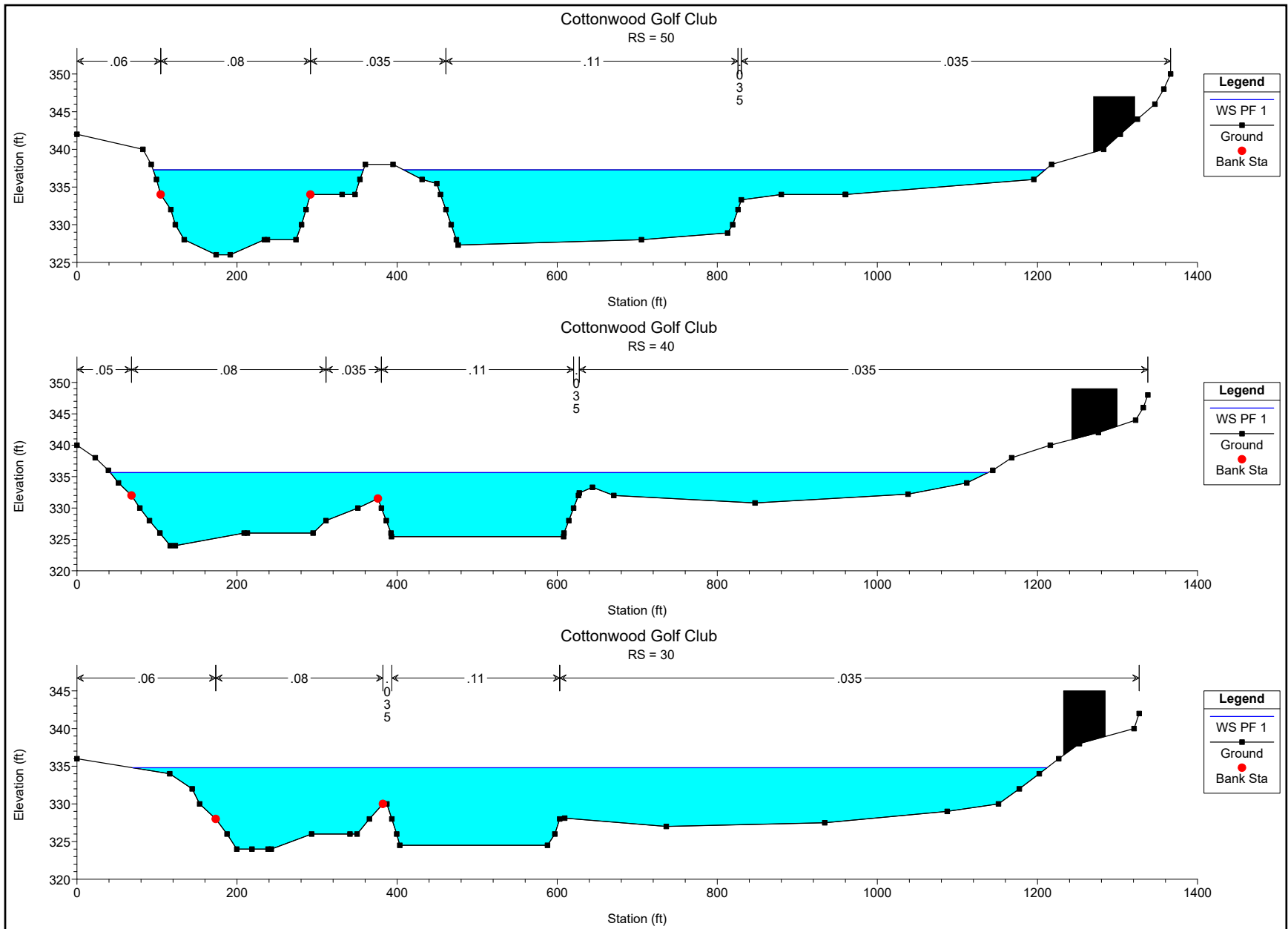


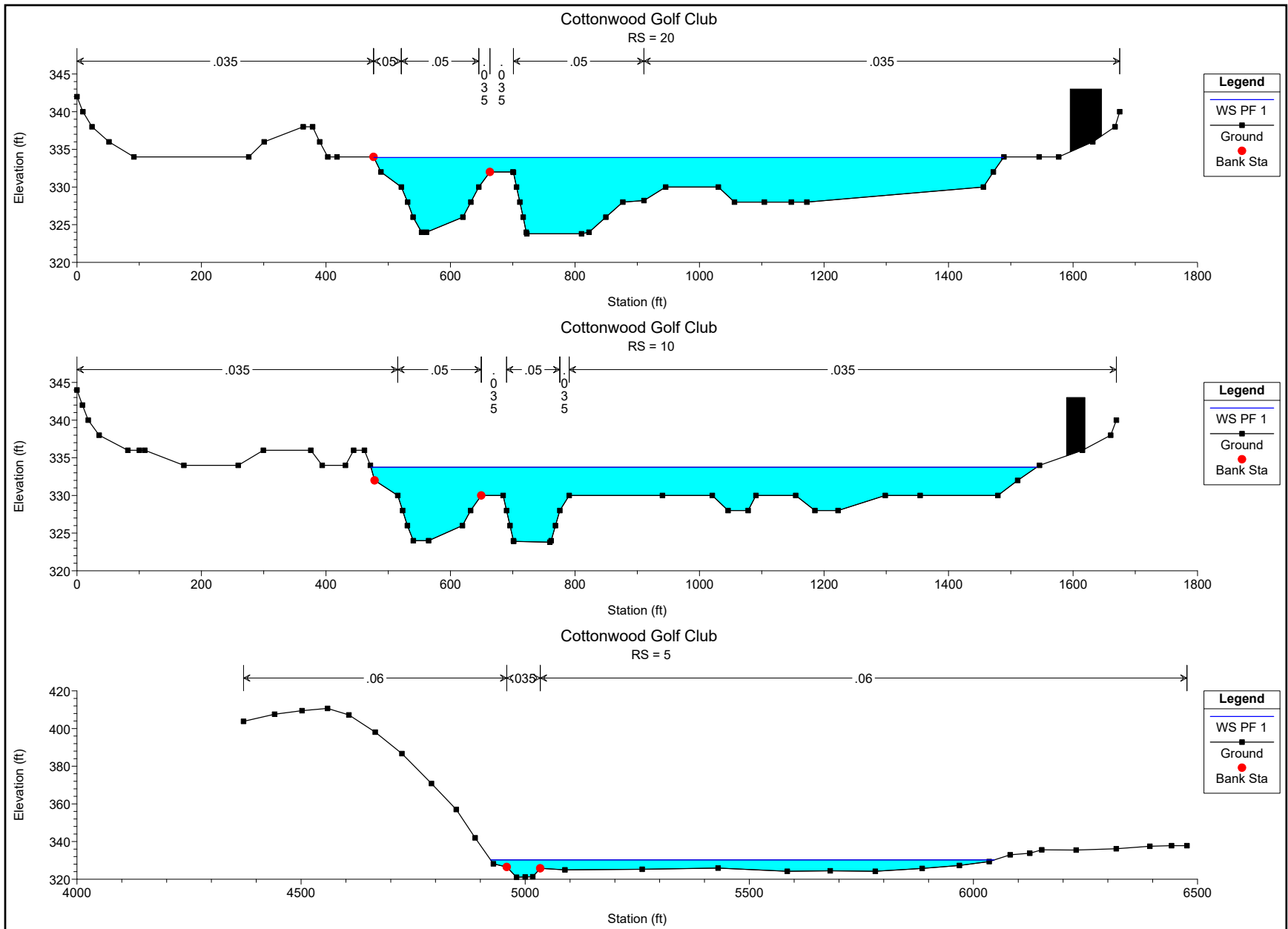












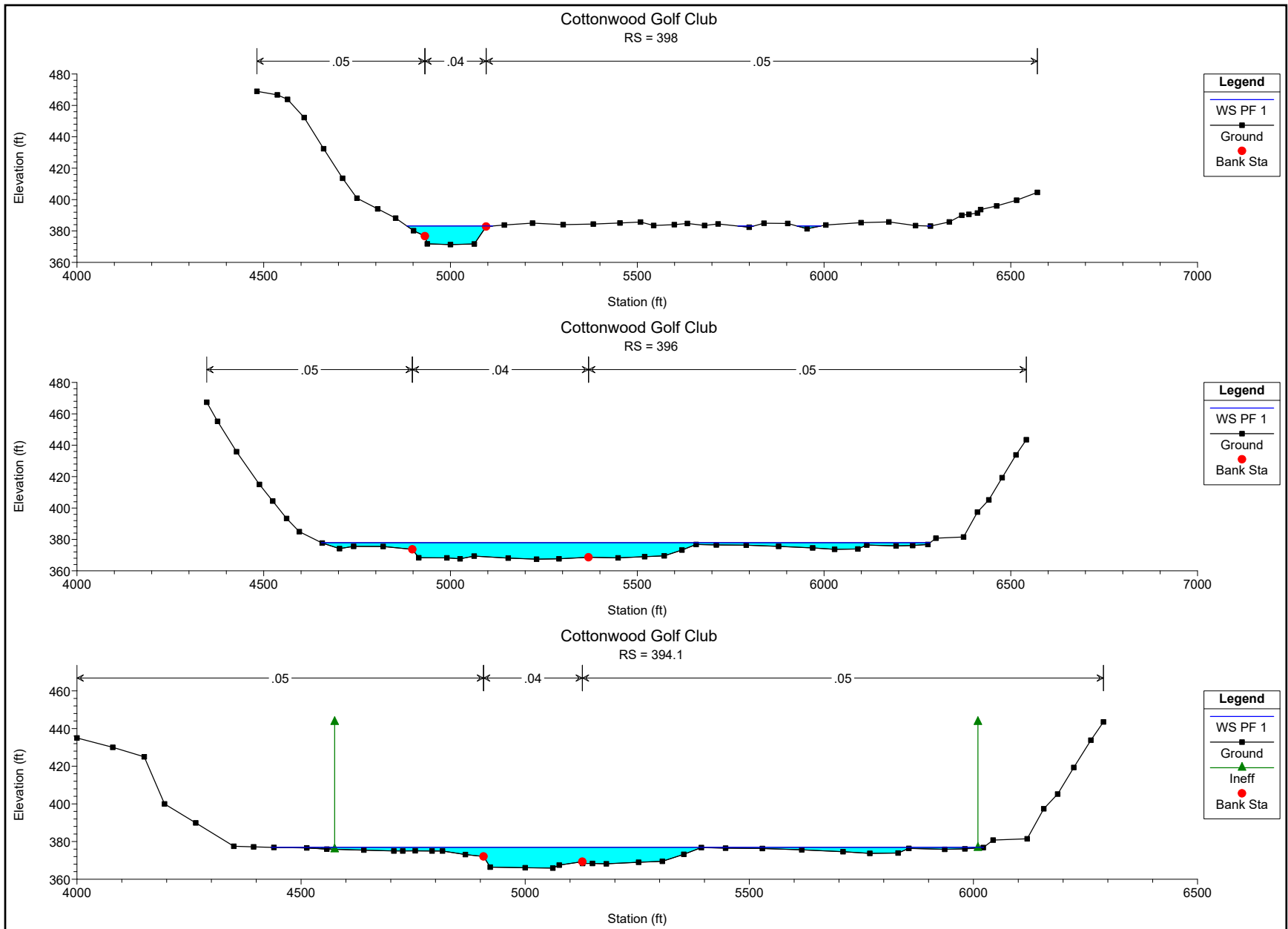
Reclamation Phase 4

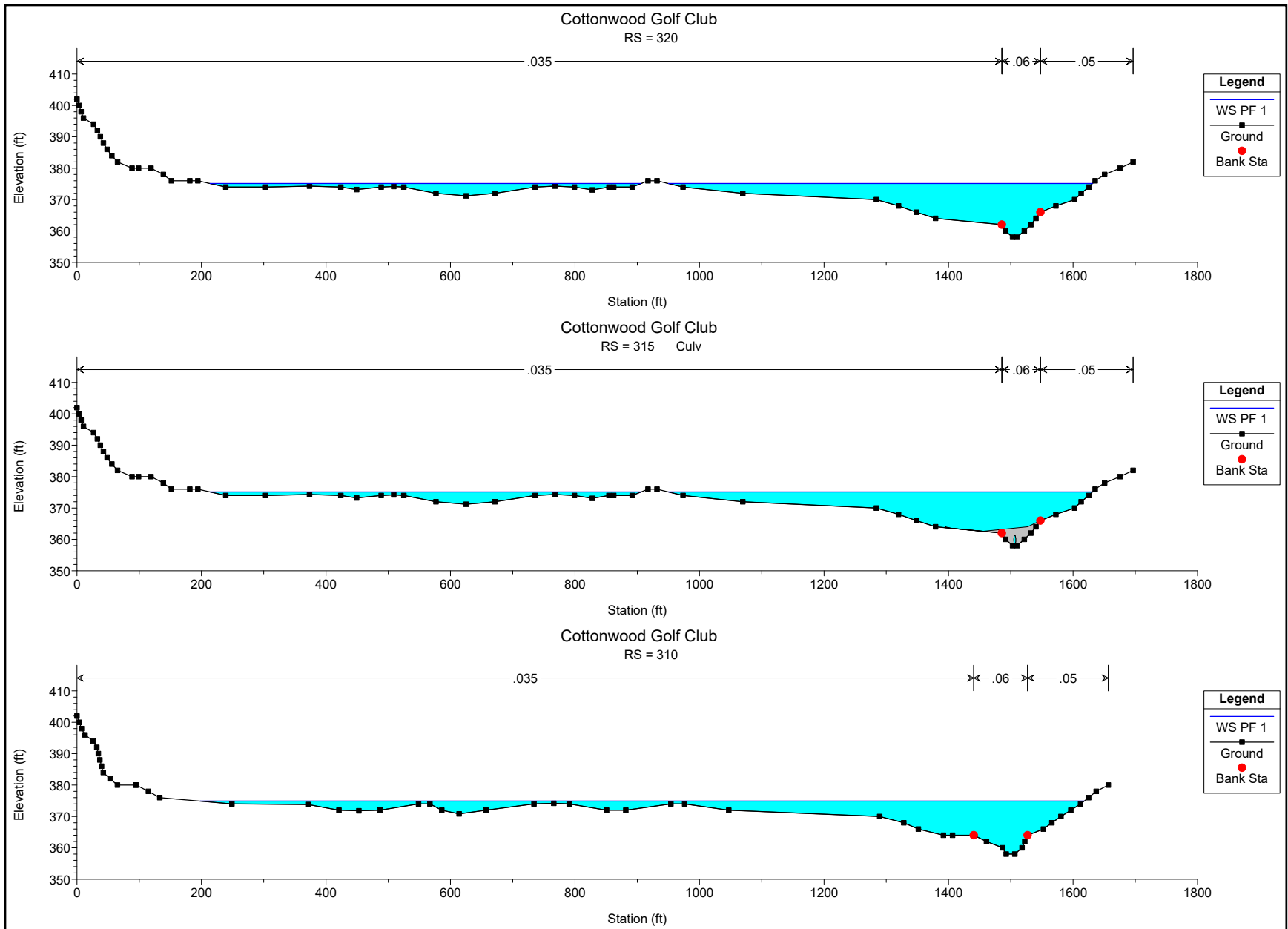
HEC-RAS Plan: PC Phase 4 River: RIVER-1 Reach: Reach-1 Profile: PF 1

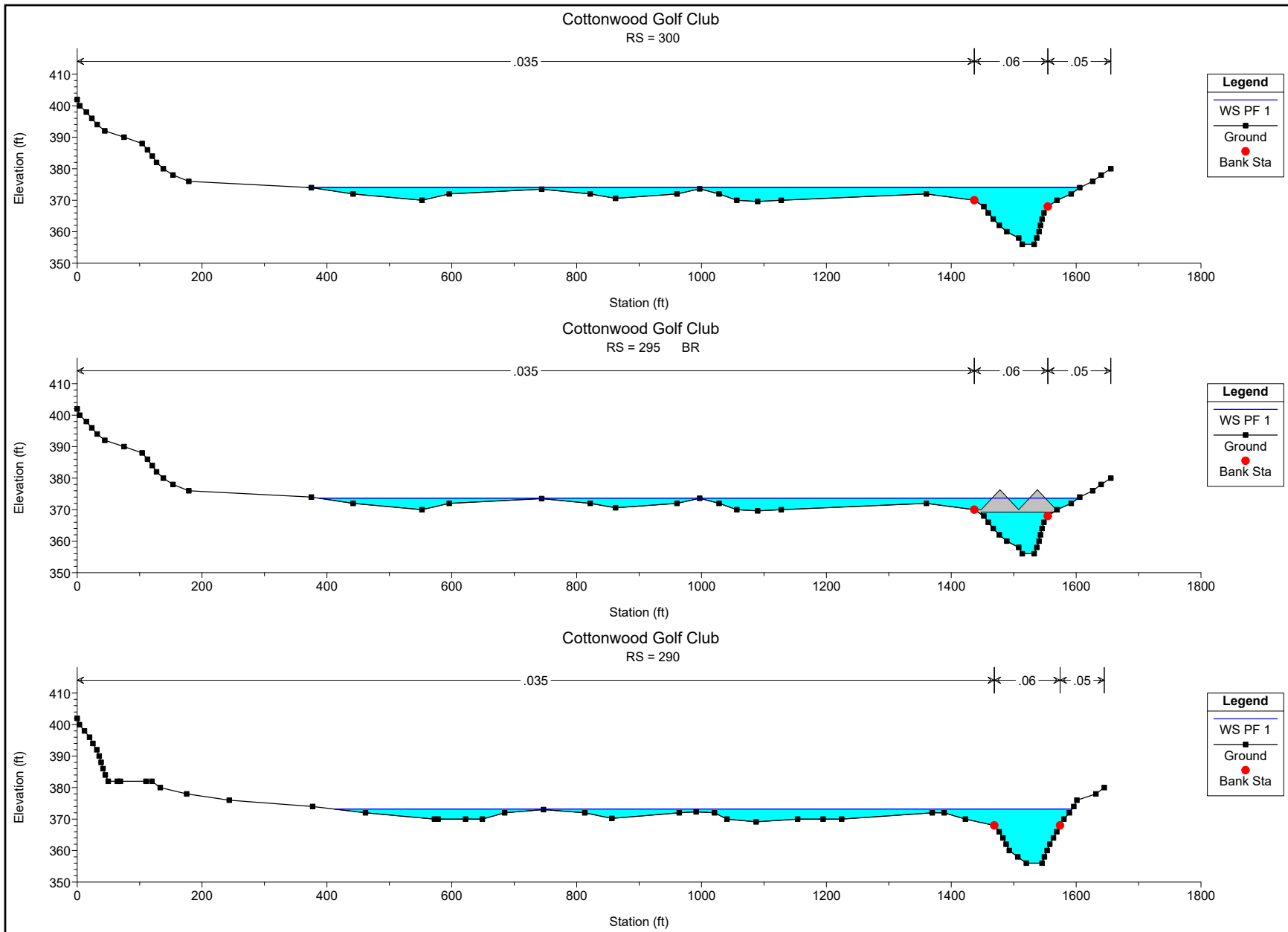
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	398	PF 1	29500.00	371.30	383.17	383.17	387.25	0.008936	16.52	1955.33	346.72	0.90
Reach-1	396	PF 1	29500.00	367.40	377.93		378.17	0.000727	4.55	8978.87	1629.54	0.26
Reach-1	394.1	PF 1	29500.00	365.90	376.94		377.77	0.002571	8.73	5596.40	1589.67	0.49
Reach-1	320	PF 1	29500.00	358.00	375.12	372.02	375.57	0.001912	6.34	5630.40	1373.51	0.29
Reach-1	315		Culvert									
Reach-1	310	PF 1	29500.00	358.00	374.88		375.38	0.002675	7.42	5581.72	1420.00	0.35
Reach-1	300	PF 1	29500.00	356.00	374.07	373.56	374.98	0.005361	9.41	4263.89	1238.66	0.47
Reach-1	295		Bridge									
Reach-1	290	PF 1	29500.00	356.00	373.18	373.18	374.44	0.006936	11.12	3758.37	1181.64	0.54
Reach-1	280	PF 1	29500.00	352.90	363.63		363.86	0.003566	3.83	7696.40	749.07	0.21
Reach-1	270	PF 1	29500.00	350.00	362.54		362.72	0.002483	3.41	8694.27	922.67	0.18
Reach-1	260	PF 1	29500.00	348.00	361.46		361.63	0.001992	3.28	8986.93	730.28	0.16
Reach-1	250	PF 1	29500.00	347.00	360.26		360.45	0.002155	3.48	8486.68	683.61	0.17
Reach-1	240	PF 1	29500.00	346.00	360.24		360.41	0.001961	3.39	8702.74	677.93	0.17
Reach-1	230	PF 1	29500.00	346.00	359.39		359.62	0.002619	3.87	7613.56	617.78	0.19
Reach-1	220	PF 1	29500.00	346.00	359.35		359.58	0.002633	3.88	7596.85	615.84	0.19
Reach-1	210	PF 1	29500.00	345.00	357.79		358.07	0.003344	4.21	7006.03	592.63	0.22
Reach-1	200	PF 1	29500.00	344.90	357.72		358.00	0.003368	4.23	6967.36	588.05	0.22
Reach-1	190	PF 1	29500.00	344.00	355.74		356.14	0.005365	5.07	5813.55	534.51	0.27
Reach-1	180	PF 1	29500.00	343.00	354.46		354.68	0.002494	3.76	7862.60	771.20	0.20
Reach-1	170	PF 1	29500.00	342.10	352.37		352.83	0.009103	5.54	5444.81	687.26	0.33
Reach-1	160	PF 1	29500.00	341.10	352.24	347.24	352.69	0.008780	5.48	5520.05	728.68	0.32
Reach-1	150	PF 1	29500.00	340.40	349.71		349.98	0.003976	4.35	7168.46	1040.53	0.26
Reach-1	140	PF 1	29500.00	338.00	349.44		349.66	0.000342	1.20	11688.17	1320.27	0.07
Reach-1	130	PF 1	29500.00	337.30	348.47	345.10	349.33	0.001370	7.64	4041.50	1122.41	0.46
Reach-1	125		Mult Open									
Reach-1	120	PF 1	29500.00	338.10	346.46	346.46	348.93	0.007768	12.80	2359.51	982.82	1.01
Reach-1	110	PF 1	29500.00	334.00	342.62		342.87	0.001362	4.00	7368.00	1017.51	0.26
Reach-1	100	PF 1	29500.00	332.20	341.90		342.17	0.002037	3.68	7417.15	917.67	0.21
Reach-1	90	PF 1	29500.00	331.00	340.53		340.79	0.002873	4.11	7209.08	1000.04	0.24
Reach-1	80	PF 1	29500.00	331.00	340.45		340.72	0.002908	4.12	7205.16	1036.12	0.24
Reach-1	70	PF 1	29500.00	329.80	339.28		339.50	0.002975	3.76	7799.26	1156.97	0.22
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Reach-1	10	PF 1	29500.00	324.00	333.75		334.26	0.002611	5.83	5166.49	1069.62	0.40

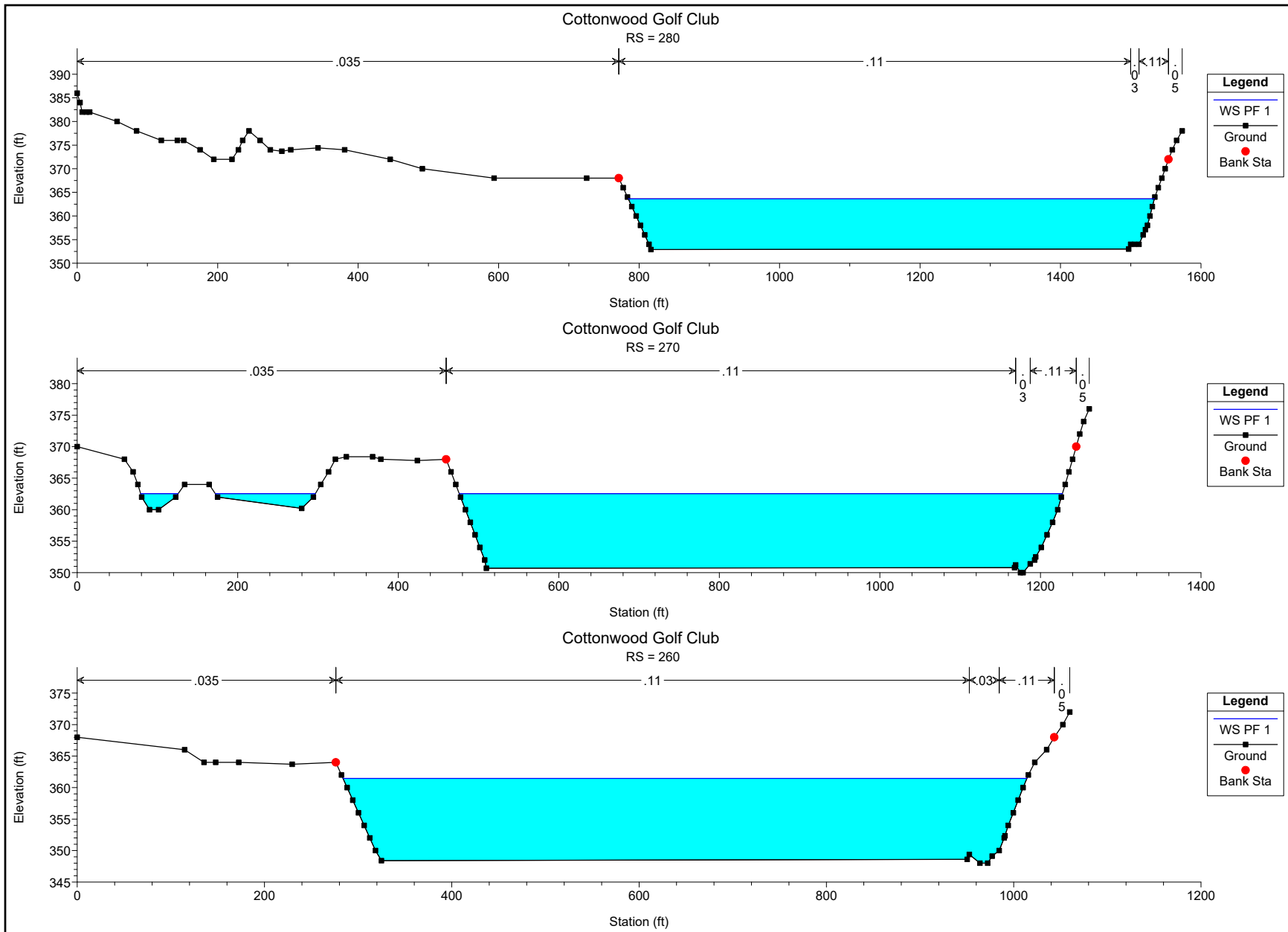
HEC-RAS Plan: PC Phase 4 River: RIVER-1 Reach: Reach-1 Profile: PF 1 (Continued)

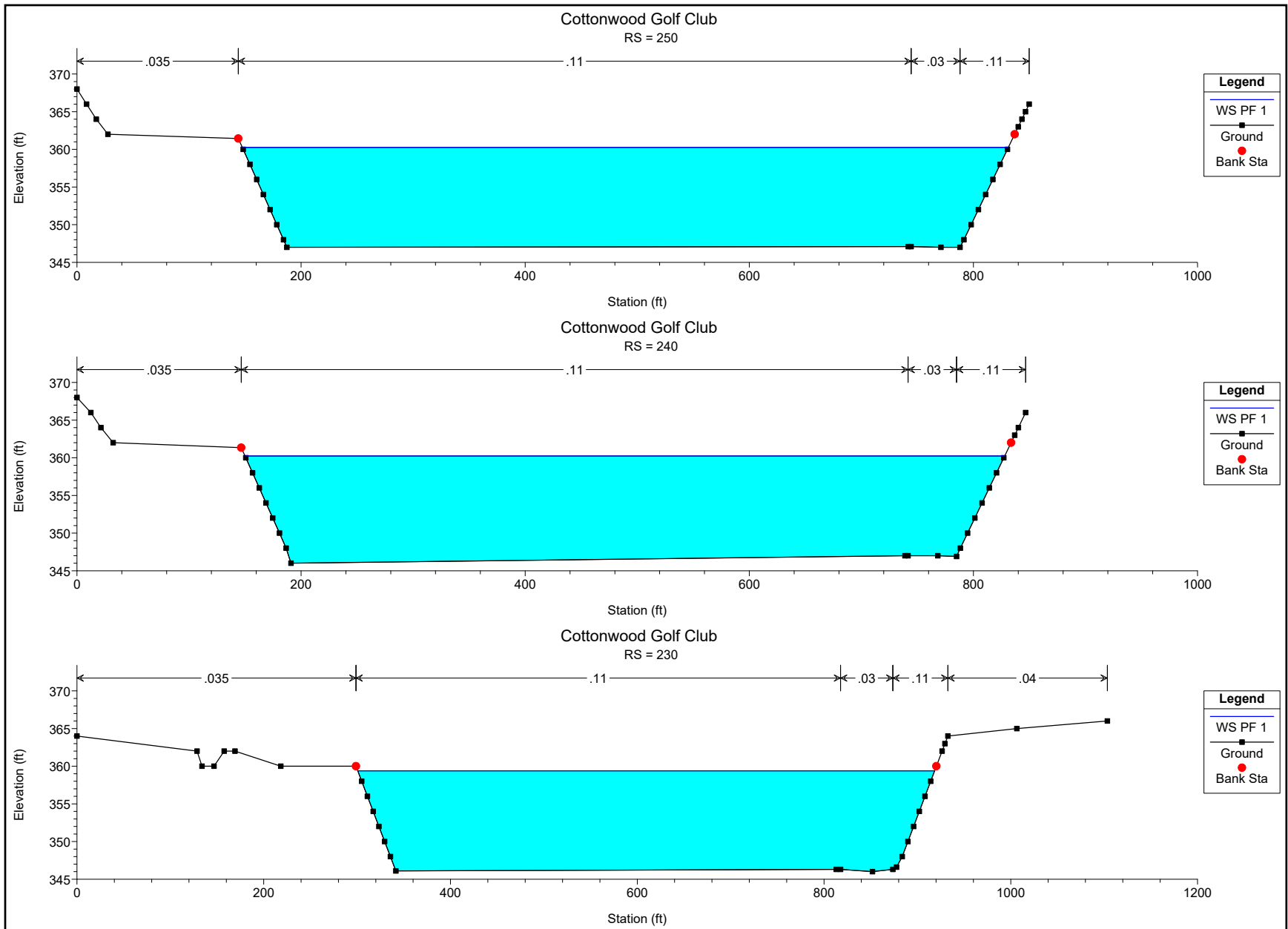
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	5	PF 1	29500.00	321.10	330.28	328.76	330.93	0.004294	10.82	5598.21	1123.72	0.68

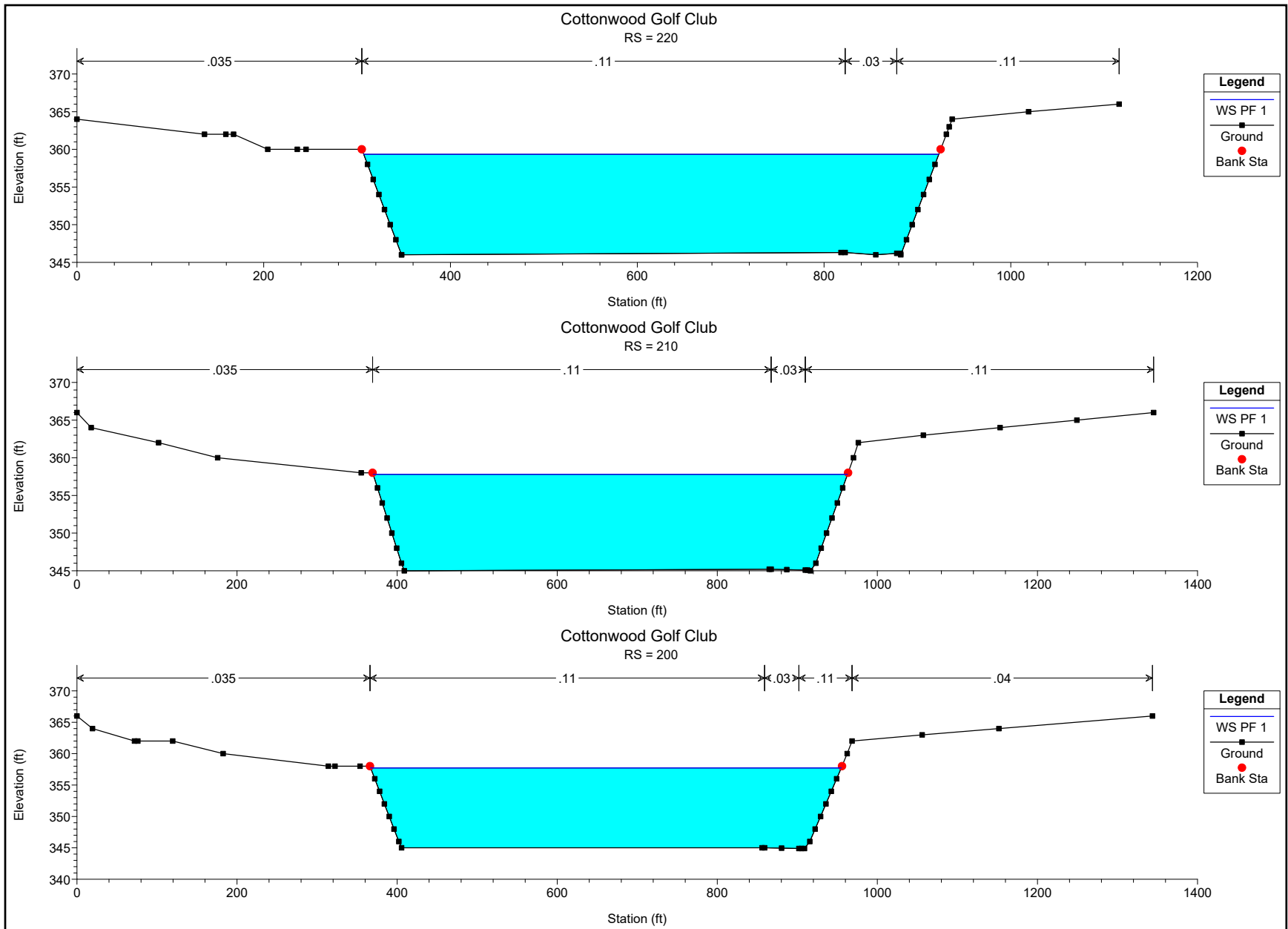


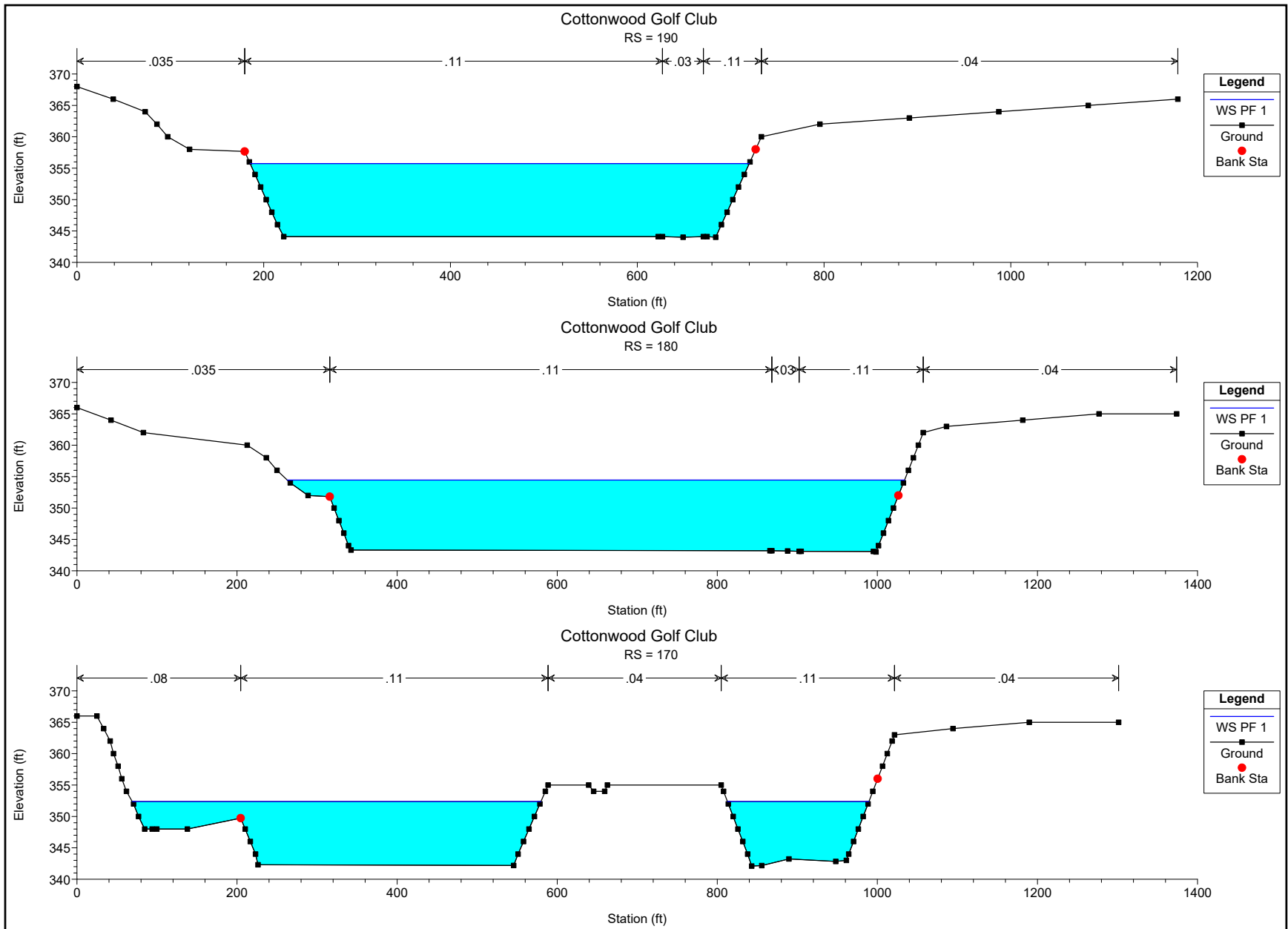


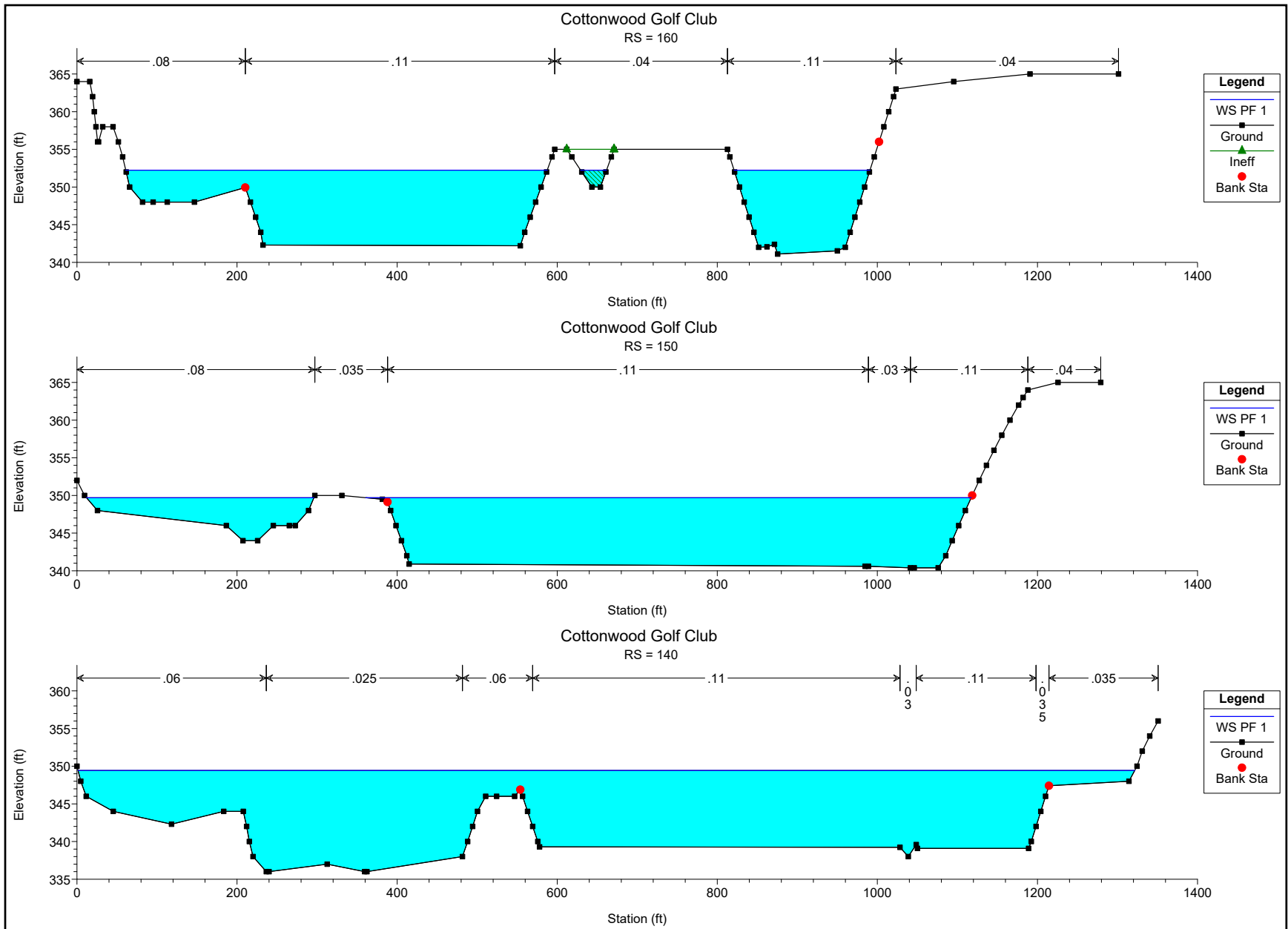


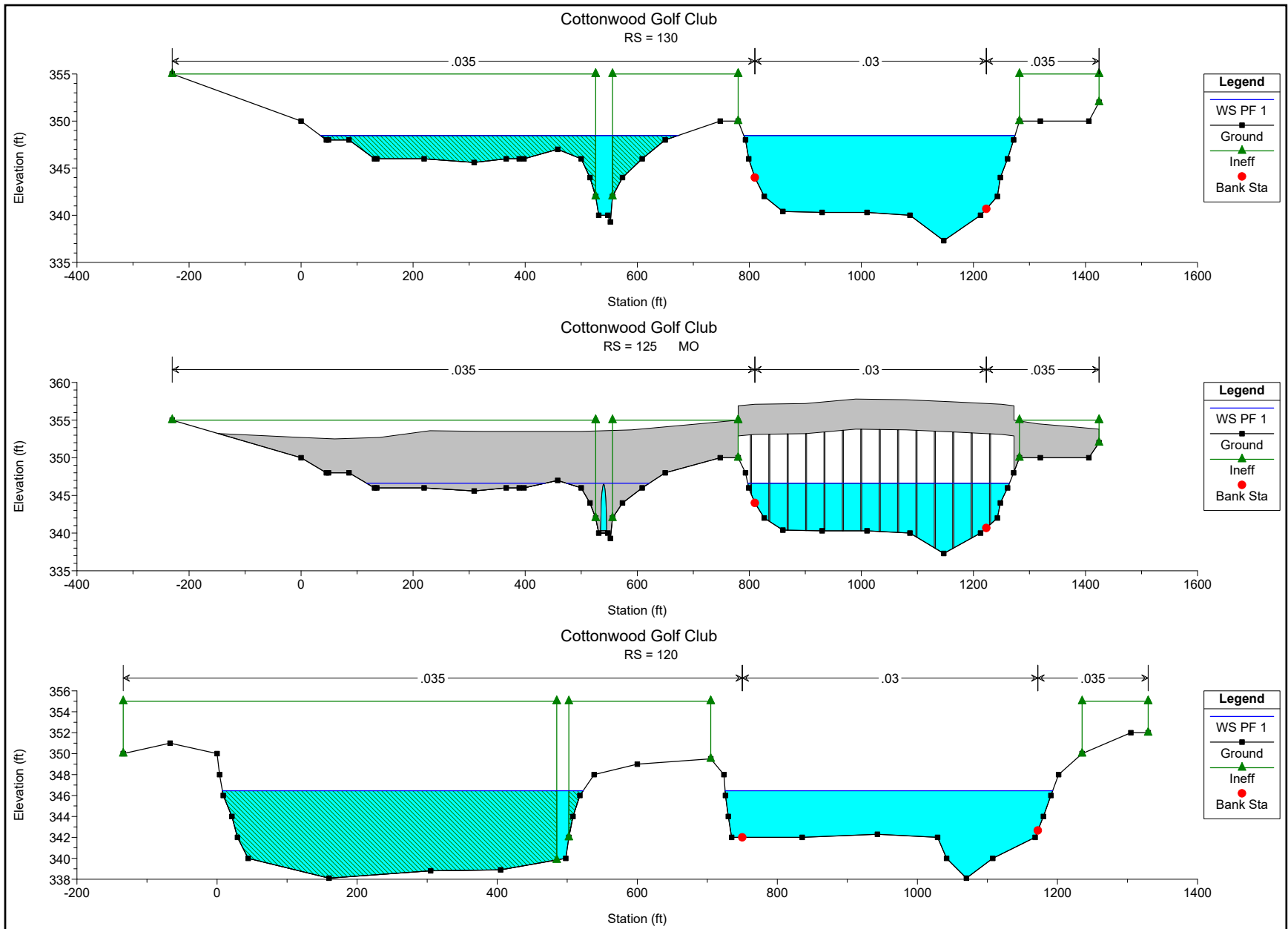


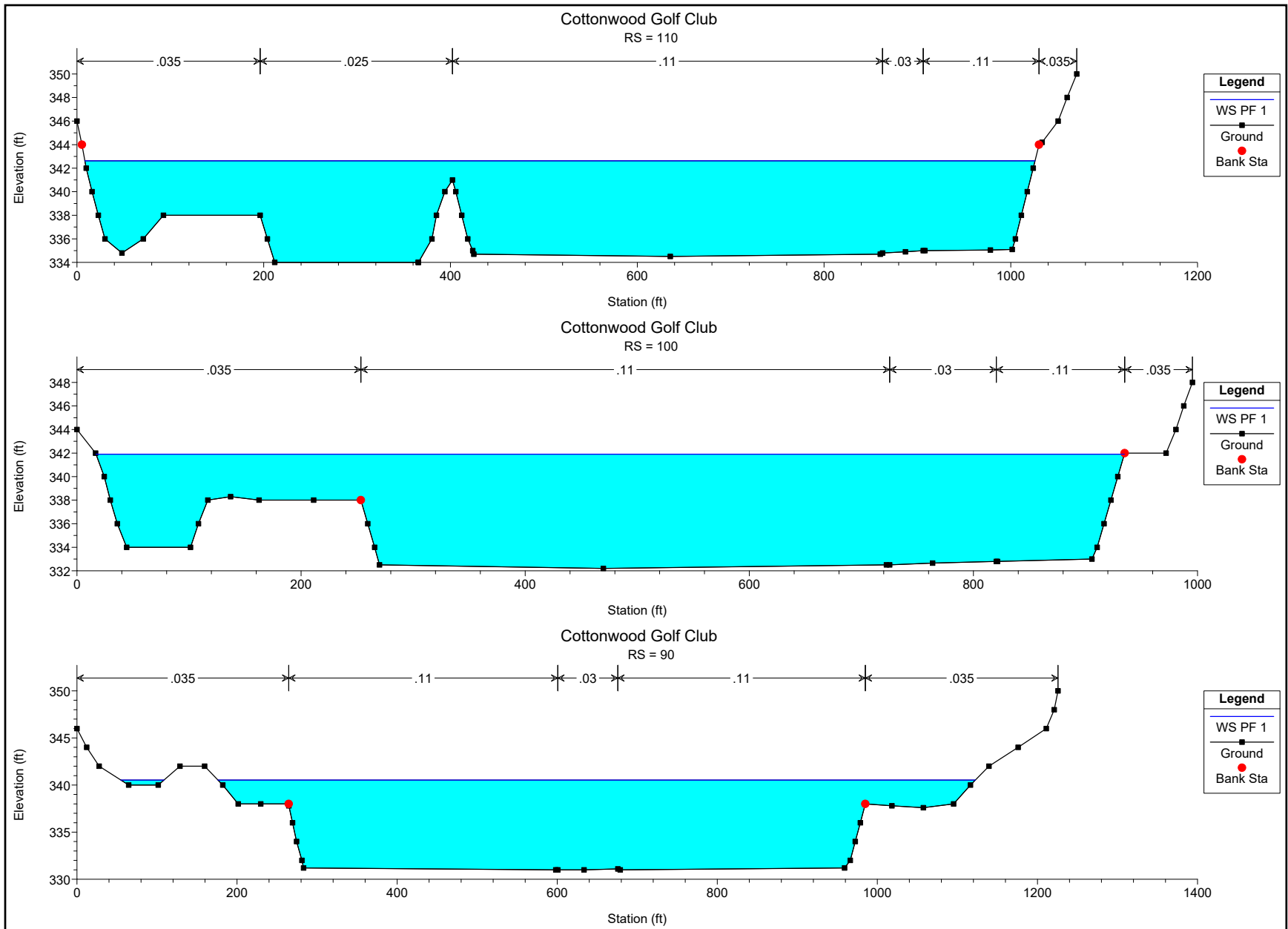


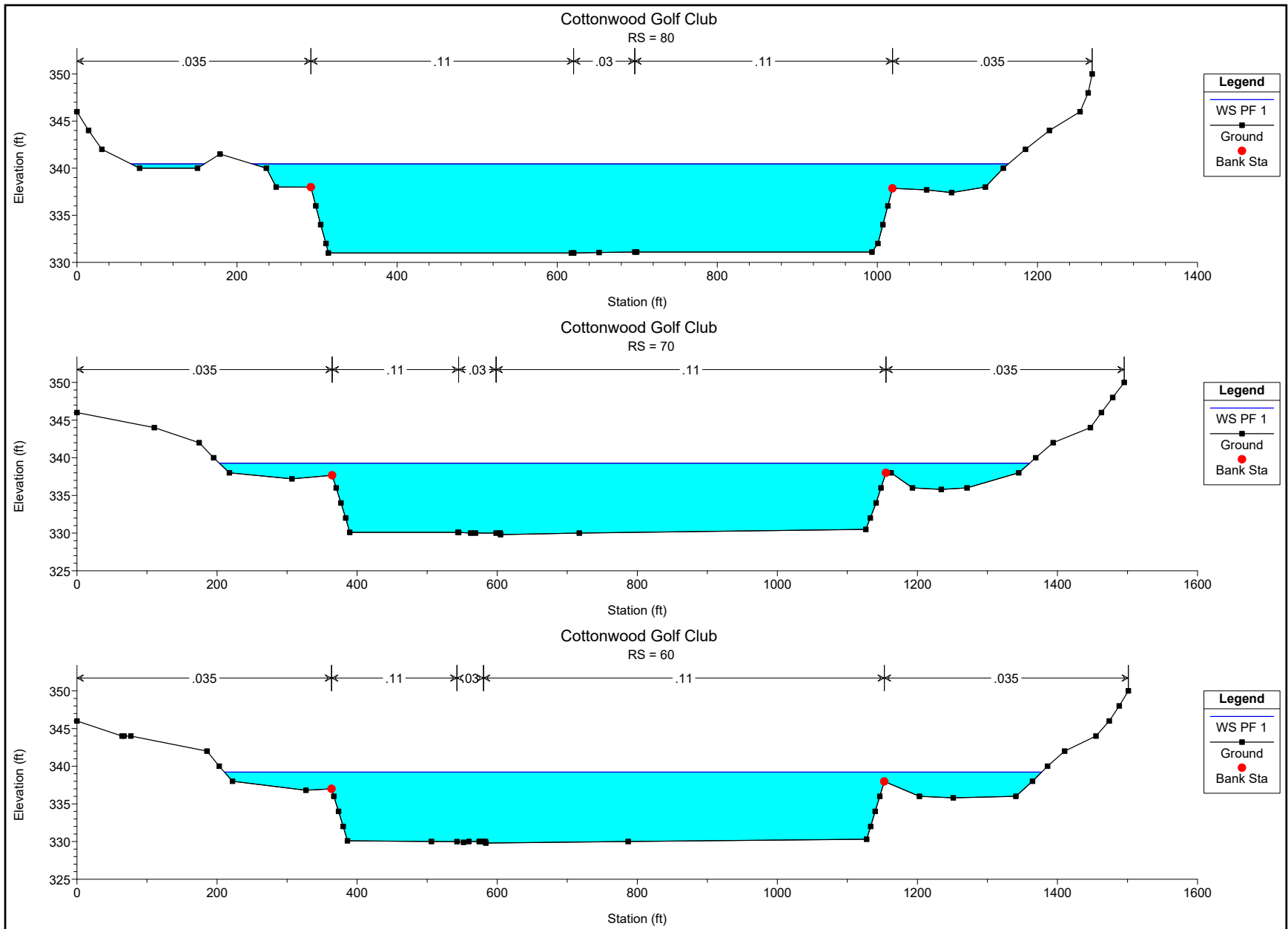


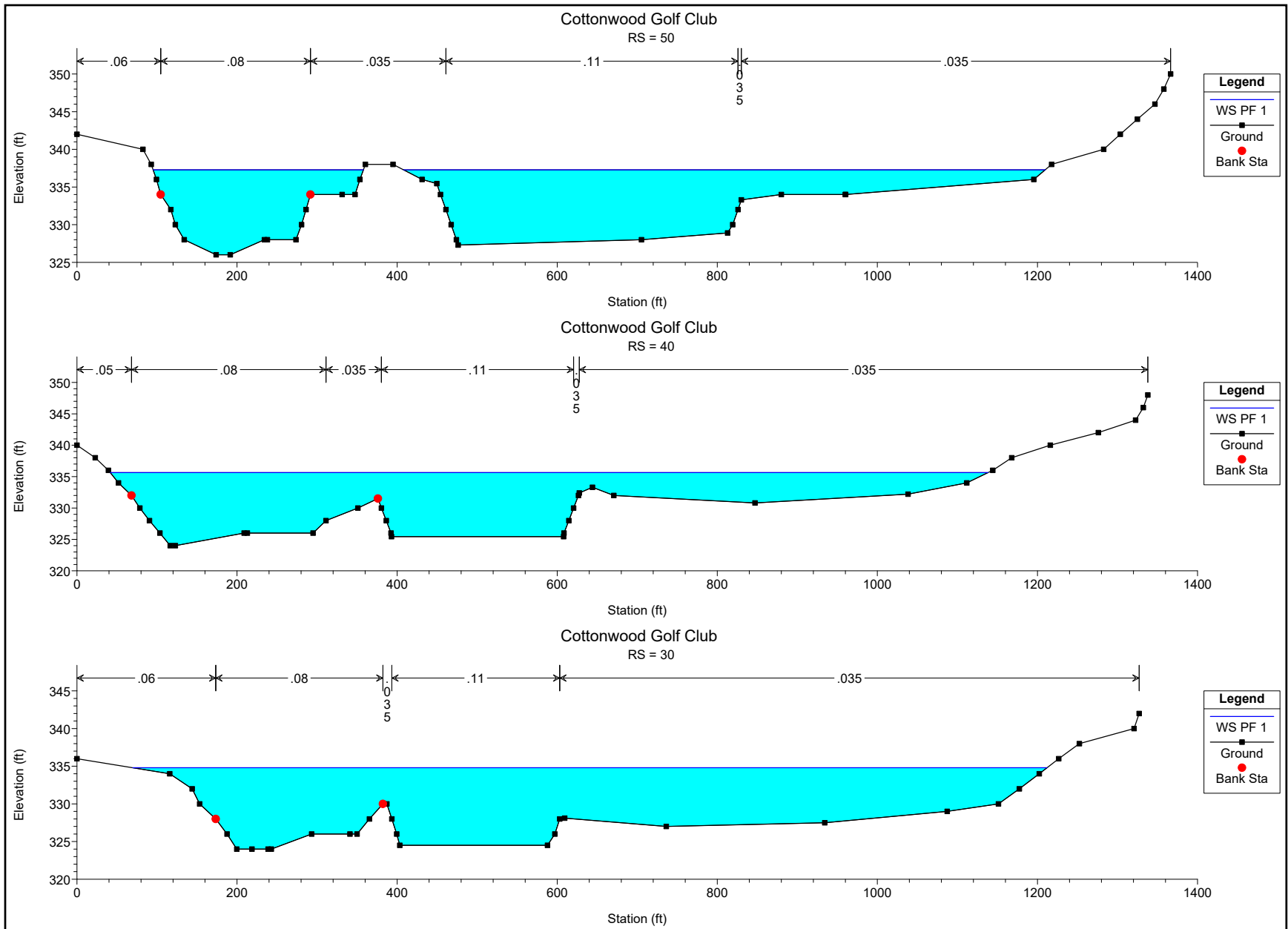


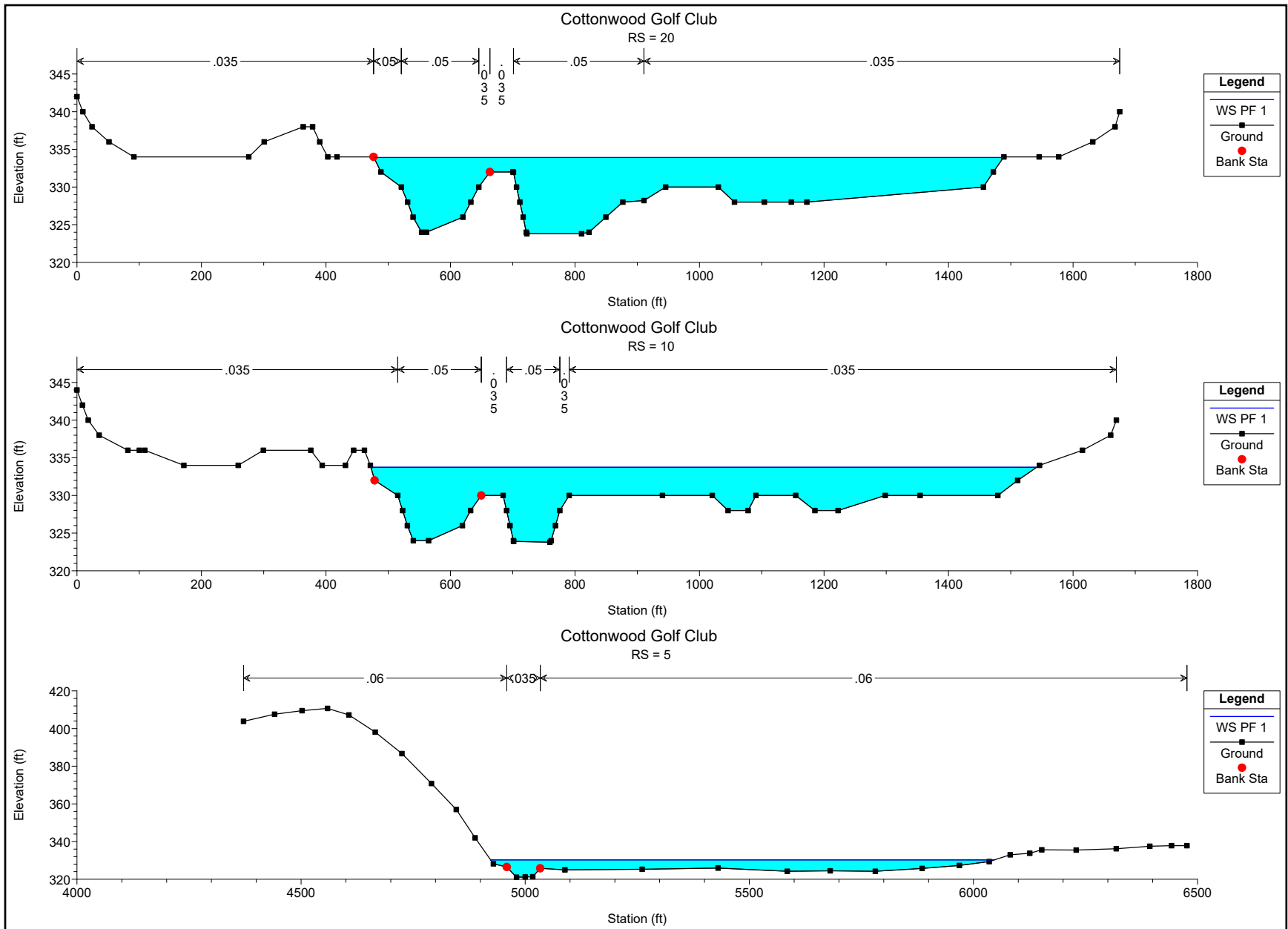










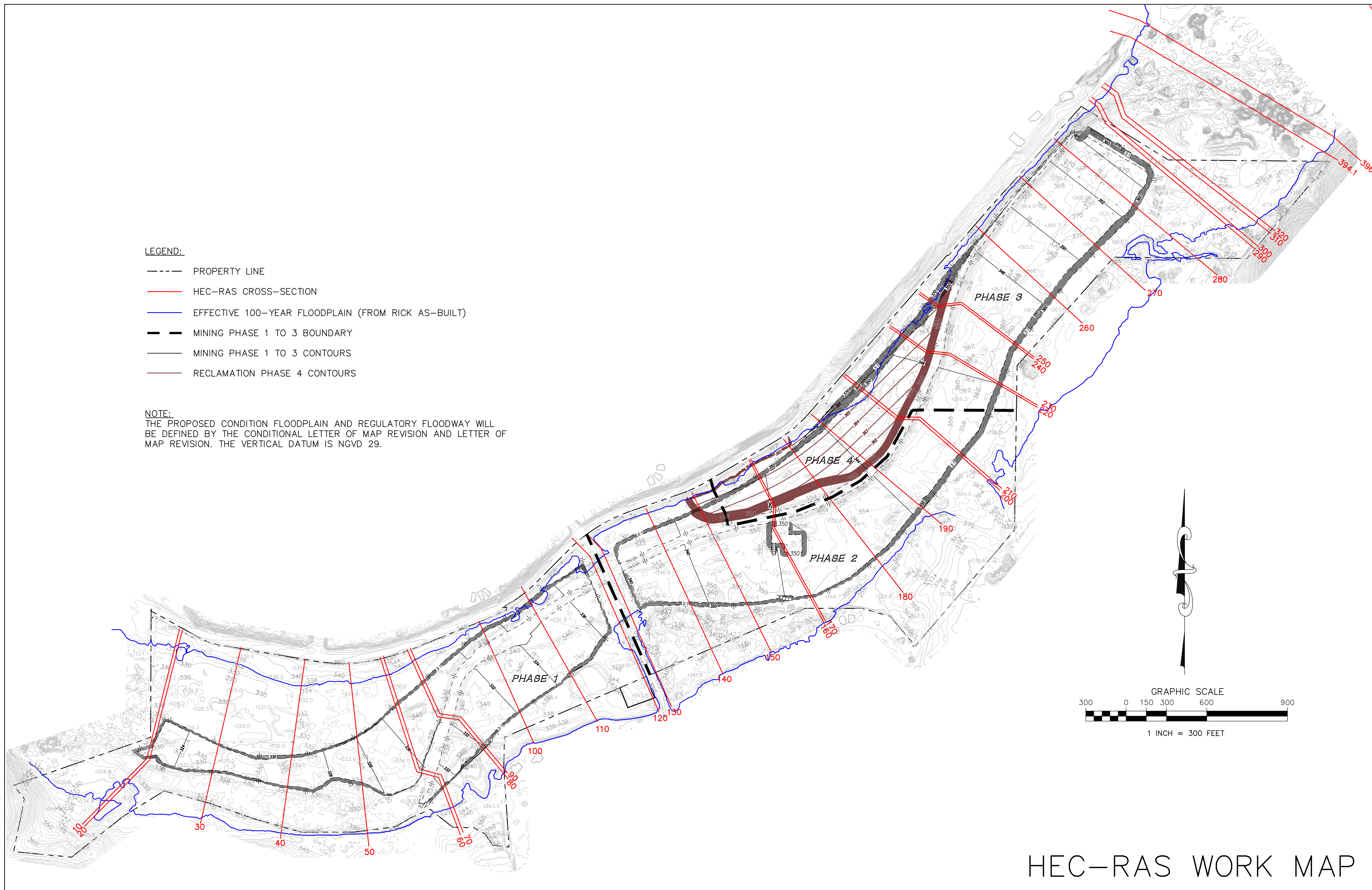


LEGEND:

- PROPERTY LINE
- HEC-RAS CROSS-SECTION
- EFFECTIVE 100-YEAR FLOODPLAIN (FROM RICK AS-BUILT)
- MINING PHASE 1 TO 3 BOUNDARY
- MINING PHASE 1 TO 3 CONTOURS
- RECLAMATION PHASE 4 CONTOURS

NOTE:

THE PROPOSED CONDITION FLOODPLAIN AND REGULATORY FLOODWAY WILL BE DEFINED BY THE CONDITIONAL LETTER OF MAP REVISION AND LETTER OF MAP REVISION. THE VERTICAL DATUM IS NGVD 29.



HEC-RAS WORK MAP