FEBRUARY 26, 2026

Sara Smith, PE
Wallace State Office Building
502. E 9th St.
Des Moines, IA 50319
Sara.Smith@IowaAgriculture.gov

RE: FLOODPLAIN SUMMARY: SAC883604B

SCOPE OF WORK

The proposed project is located in the NW ¼ of Section 4, Township 88 North, Range 36 West, Sac County Iowa. The proposed project involves the construction of a Floodplain Nutrient Reduction Wetland funded by the Iowa Department of Agriculture and Land Stewardship (IDALS).

The proposed site is fed by the surrounding crop ground as well as the main tile of Drainage District No. 4. The proposed wetland includes a containment berm to maintain 3.0 acre-feet of storage, submerged berms to slow flow, and a primary outlet pipe with water control structure and area inlet for a controlled outlet into Drainage District No. 4's Main Open Ditch. The wetland has an average pool depth of 1.00-ft and a wetland area of 1.67 acres with a normal water level of 1277.5-ft. The containment berm's top elevation is 1179.0-ft with varying side-slopes and has a max height of 3.5-ft which falls into the Class IV Dike (NRCS Practice Standard 356) category. A site plan of the proposed wetland is attached to this document in Appendix A for reference. A solar panel pad is also planned to be constructed to ensure the lift station rim and solar panels are above the base flood elevation.

FLOODPLAIN ANALYSIS

STEADY STREAM ANALYSIS

Due to the cross-sectional area disturbed within the existing floodplain being greater than 15% (IAC 567-71.12(1), a No-Rise analysis may be required by the IDNR to show that the proposed construction will not result in an increase of more than 1ft in the existing base flood water elevation at any given cross-section. Due to the project location and minimal change in floodplain elevation, a floodway analysis was not completed for this site.

GEOMETRY DATA

A topographic survey was done by our team to obtain channel and surface data upstream, within, and downstream of the proposed project location. Topography data was surveyed on IaRCS Zone 4 and NAVD88 for elevation but was converted to NAD 1983 UTM Zone 15N for floodplain modeling in HEC-RAS 6.5.

FLOW DATA

USGS StreamStats was used to obtain peak flow characteristics of the river system at the location of the proposed wetland. The peak flow of the 100-year, 24-hour storm was used for analysis as required by the FEMA Floodway Analysis and Mapping, Guidance Document No. 79. A peak flow of 587cfs was used for cross-sections (609-418) prior to the double culverts receiving flow from north of 220th Street. Accounting for the additional flow from the double culverts, the remaining cross-sections were modeled for a peak flow of 632cfs.

HEC-RAS RESULTS

Multiple cross-sections were generated upstream, within wetland area, and downstream of the project location to analyze the effects of the berm and wetland excavation. Before analyzing the proposed site, the existing site was modeled and compared to the FEMA Floodplain maps to ensure the models accuracy. Once the existing model was completed the proposed surface was added to the geometry and modeled for comparison and to ensure there was no more than 1ft of rise in flood elevation (IAC 567-72.4(1). Manning's n values were selected based off the river channel characteristics as well as the surrounding ground characteristics. Cross-section locations and a comparison of the floodplain water levels is attached to this report in Appendix B.

The steady stream analysis results of the model are shown in the following table, and the cross-sectional representation of the data is attached to this report in Appendix C.

IDALS SAC883604B: 100YR-24HR EVENT EXISTING VS PROPOSED CONDITIONS (STANDARD TABLE 1)

Cross-Section	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
609	Existing	587	1280.72	1282.59	0	1282.86	0.006668	4.54	140.37	138.86	0.8
	Proposed	587	1280.16	1282.57	0	1282.88	0.007578	5.12	133.75	136.39	0.85
576	Existing	587	1279.97	1282.62	0	1282.69	0.001727	3.45	300.49	274.25	0.45
	Proposed	587	1280	1282.62	0	1282.69	0.001655	3.29	305.09	273.63	0.44
513	Existing	587	1279.96	1282.23	1282.23	1282.52	0.007423	6.11	165.97	296.17	0.88
	Proposed	587	1279.95	1282.24	1282.24	1282.53	0.007968	5.68	163.26	294.31	0.9
453	Existing	587	1276.84	1281.5	1281.5	1281.9	0.006307	7.42	150.32	204.01	0.77
	Proposed	587	1276.78	1281.44	1281.44	1281.92	0.008379	8.01	131.32	188.27	0.91
418	Existing	587	1276.2	1280.85	0	1280.88	0.000881	2.55	503.72	609.56	0.29
	Proposed	587	1276.14	1281.55	0	1281.55	0.000125	0.99	950.35	656.33	0.11
396	Existing	632	1275.85	1280.67	0	1280.74	0.000897	2.91	311.07	178.71	0.31
	Proposed	632	1275.88	1280.58	1280.58	1281.35	0.010079	9.49	115.24	107.35	1
376	Existing	632	1275.75	1280.64	0	1280.72	0.00089	3.25	296.84	161.77	0.32
	Proposed	632	1275.88	1280.63	1279.28	1280.7	0.000835	3.1	301.77	160.9	0.32
359	Existing	632	1275.81	1280.63	0	1280.7	0.000722	2.95	308.9	156.53	0.28
	Proposed	632	1275.81	1280.62	1278.8	1280.69	0.000603	2.66	325.79	156.34	0.27
339	Existing	632	1275.56	1280.62	0	1280.69	0.000652	2.71	324.4	169.21	0.26
	Proposed	632	1275.69	1280.61	1278.67	1280.67	0.000556	2.4	341.12	169.48	0.24
320	Existing	632	1275.5	1280.6	0	1280.67	0.000714	2.84	327.9	189.45	0.27
	Proposed	632	1275.68	1280.6	1278.55	1280.66	0.00053	2.49	356.86	188.16	0.24
298	Existing	632	1275.28	1280.59	0	1280.66	0.000728	2.95	342.2	204.47	0.28
	Proposed	632	1275.26	1280.6	1278.45	1280.65	0.000445	2.24	396.88	204.69	0.23
279	Existing	632	1275.16	1280.61	0	1280.64	0.000377	2.22	443.22	222.11	0.2
	Proposed	632	1275.78	1280.61	1278.44	1280.64	0.000318	2.13	470.15	226.2	0.21
258	Existing	632	1274.95	1280.61	0	1280.63	0.000281	1.99	502.75	231.25	0.18
	Proposed	632	1275.08	1280.61	1278.39	1280.63	0.000252	1.94	517.31	230.51	0.18
233	Existing	632	1274.69	1280.59	0	1280.62	0.000396	2.23	431.9	198.5	0.2
	Proposed	632	1274.69	1280.59	1278.5	1280.62	0.000312	2.01	462.57	197.57	0.19
211	Existing	632	1274.69	1280.56	0	1280.61	0.000619	2.76	368.92	187.43	0.25
	Proposed	632	1274.72	1280.55	0	1280.61	0.000655	3.03	358.53	186.64	0.28
191	Existing	632	1274.7	1280.51	0	1280.59	0.000888	3.49	326.03	191.53	0.32
	Proposed	632	1274.59	1280.5	0	1280.59	0.000859	3.68	325.75	191.22	0.33
162	Existing	632	1274.13	1280.23	1279.92	1280.46	0.00174	5.12	263.86	265.47	0.48
	Proposed	632	1274.38	1280.24	1279.91	1280.46	0.001836	5.14	263.72	265.44	0.5
128	Existing	632	1274.22	1279.9	1279.9	1280.35	0.003371	6.87	191.81	217.83	0.65
	Proposed	632	1274.34	1279.91	1279.91	1280.35	0.00327	6.83	194.97	220.51	0.65
83	Existing	632	1273.86	1279.67	1279.67	1280.14	0.003391	6.85	182.91	196.43	0.66
	Proposed	632	1273.89	1279.63	1279.63	1280.13	0.003596	7.06	176.49	192.29	0.69
42	Existing	632	1273.7	1279.36	1279.36	1279.91	0.003308	7.13	169.83	186.39	0.65
	Proposed	632	1273.72	1279.46	1279.46	1279.94	0.003142	6.89	183.07	202.72	0.64
10	Existing	632	1273.51	1279.29	1279.13	1279.55	0.002001	5.57	250.07	291.18	0.51
	Proposed	632	1273.62	1279.27	1279.12	1279.54	0.002002	5.63	249.71	289.67	0.52

As shown in the table above, the proposed wetland does not result in a rise of more than 1-ft in water surface elevation (W.S. ELEV) at any cross-section. The maximum observed rise is 0.70' at section 418. This is an expected result as with the addition of the containment berm and solar panel pad, we are also excavating out the wetland to create more storage for treatment. The

change in velocity is also minimal with a decrease in velocity once the flow hits the wetland area. The Froude Number is less than one indicating subcritical flow reinforcing the model.

Overall, the proposed construction is expected to have a minimal impact on the existing 100-yr floodplain elevation (change in elevation is less than 1-ft).

Sincerely,

Spencer D Pech

Spencer Pech, PE
Civil Engineer

spencer.pech@ISGInc.com

enc: Site Plan, Comparisons, Sections

Appendix A: Proposed Site Concept



Site Characteristics:

Consultant	ISG, INC.	
Project ID	SAC883604B	
Landowner(s)	YOUBERG	
Preliminary or Final Design	FINAL	
DD4 Tile Watershed	1,600	Acres
Local Wetland Watershed	9.9	Acres
Pump Equivalent Watershed	96	Acres
Claimed Treated Watershed	105.9	Acres
Wetland Pool Area	1.67	Acres
Deep Water Area (>3 ft deep)	0	Acres
Normal Pool Elevation / Primary Spillway Elevation	1277.50	Feet
Average Pool Depth	1.0	Feet
Maximum Pool Depth	2.0	Feet
Pool Storage	1.0	Acre-Feet
Berm Elevation	1278.40	Feet
Berm Storage	1.46	Acre-Feet
Length of Berm	263	Feet
Auxiliary Spillway Elevation	1278.00	Feet
Auxiliary Spillway Width	25	Feet
Weir Width	N/A	Feet
Drop Height (Primary Spillway Elevation – Stilling Basin Lowest Elevation)	N/A	Feet
Height of Dam (Berm Elevation – Stilling Basin Lowest Elevation)	4.5	Feet
Dike Classification	IV	
Stilling Basin Length	N/A	Feet
Time of Concentration	1.12	Hours
Weighted Runoff Curve Number	78	-----
25-year Storm Design Flow	17.18	CFS
100-year Storm Design Flow	27.35	CFS
100-year Flood Surf. Elevation (River)	1280.6	Feet
Estimated Sediment Storage	29	Years
Total Easement Area	7.05	Acres

ISG

IOWA DEPARTMENT OF **AGRICULTURE & LAND STEWARDSHIP**

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PROJECT

IDALS SAC883604B

NUTRIENT REDUCTION WETLAND

SAC COUNTY IOWA

REVISION SCHEDULE

DATE	DESCRIPTION	BY

PROJECT NO.	24-31714
FILE NAME	31714-C3-SITE
DRAWN BY	JAT
DESIGNED BY	HPT
REVIEWED BY	SDP
ORIGINAL ISSUE DATE	12/30/2025
CLIENT PROJECT NO.	-

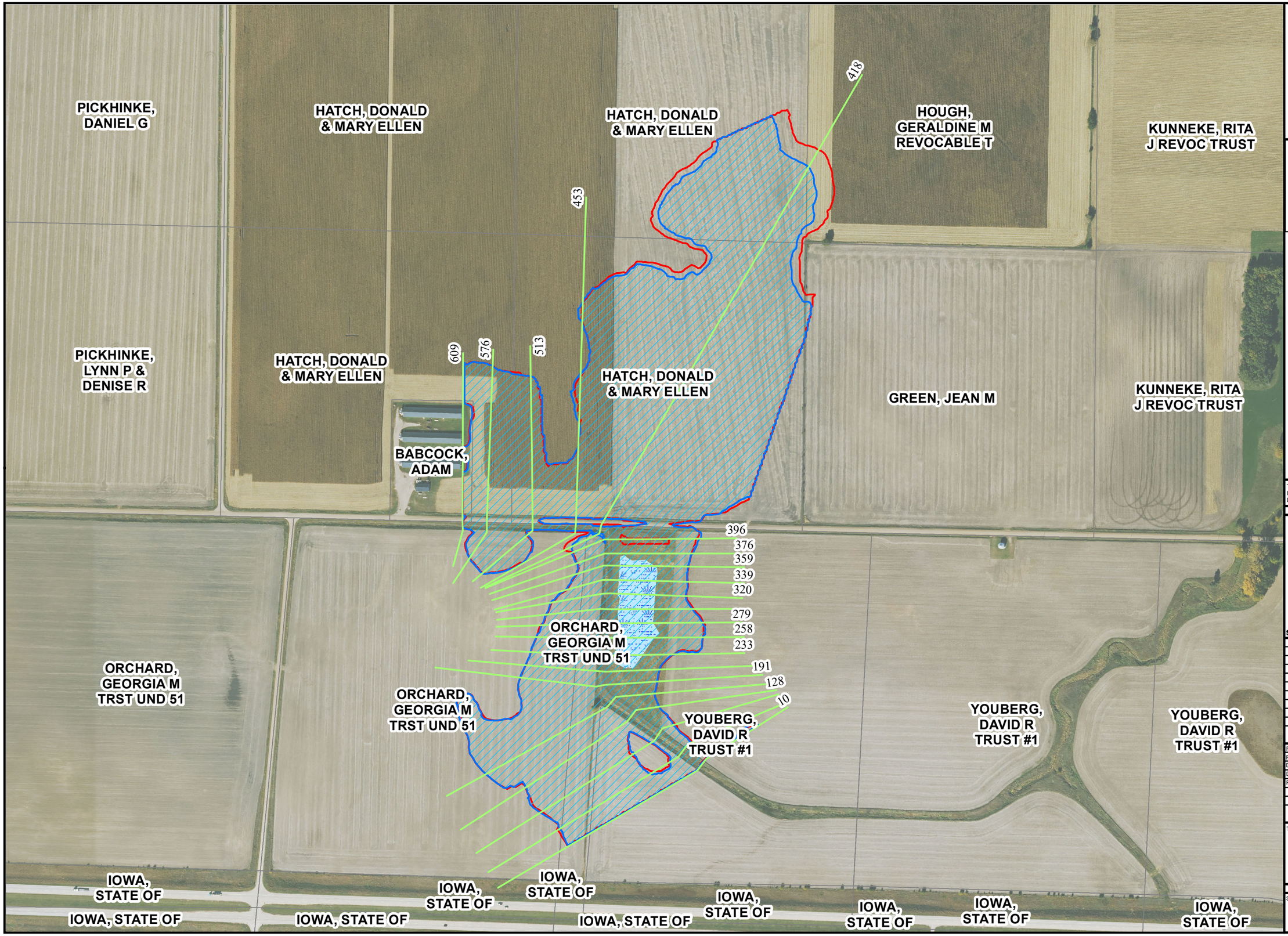
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SITE PLAN

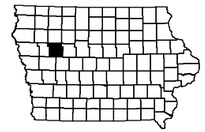
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Appendix B: Floodplain Comparison



ISG



Legend

- HEC-RAS Cross Sections
- Existing Floodplain
- Proposed Floodplain
- Proposed Wetland
- Sac County Parcels

N

0 200 400 Feet

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31714 SAC883604B

SAC COUNTY WETLAND

SIOUX COUNTY **IOWA**

Revision Schedule

Mark	Date	

PROJECT NO.	xx-xxxxx
FILE NAME	x
DRAWN BY	x
DESIGNED BY	x
REVIEWED BY	x

TITLE

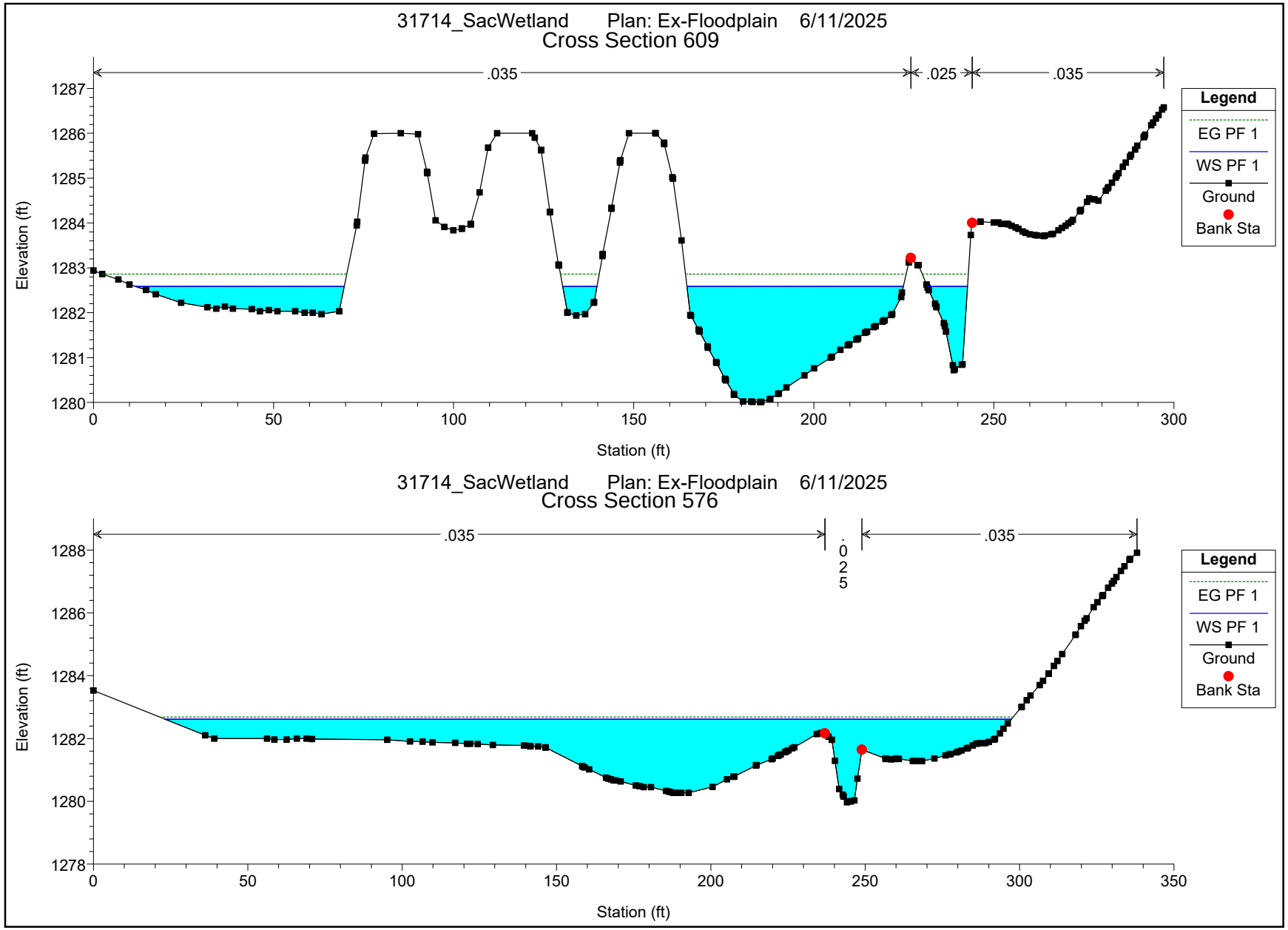
EX VS PRO FLOODPLAINS

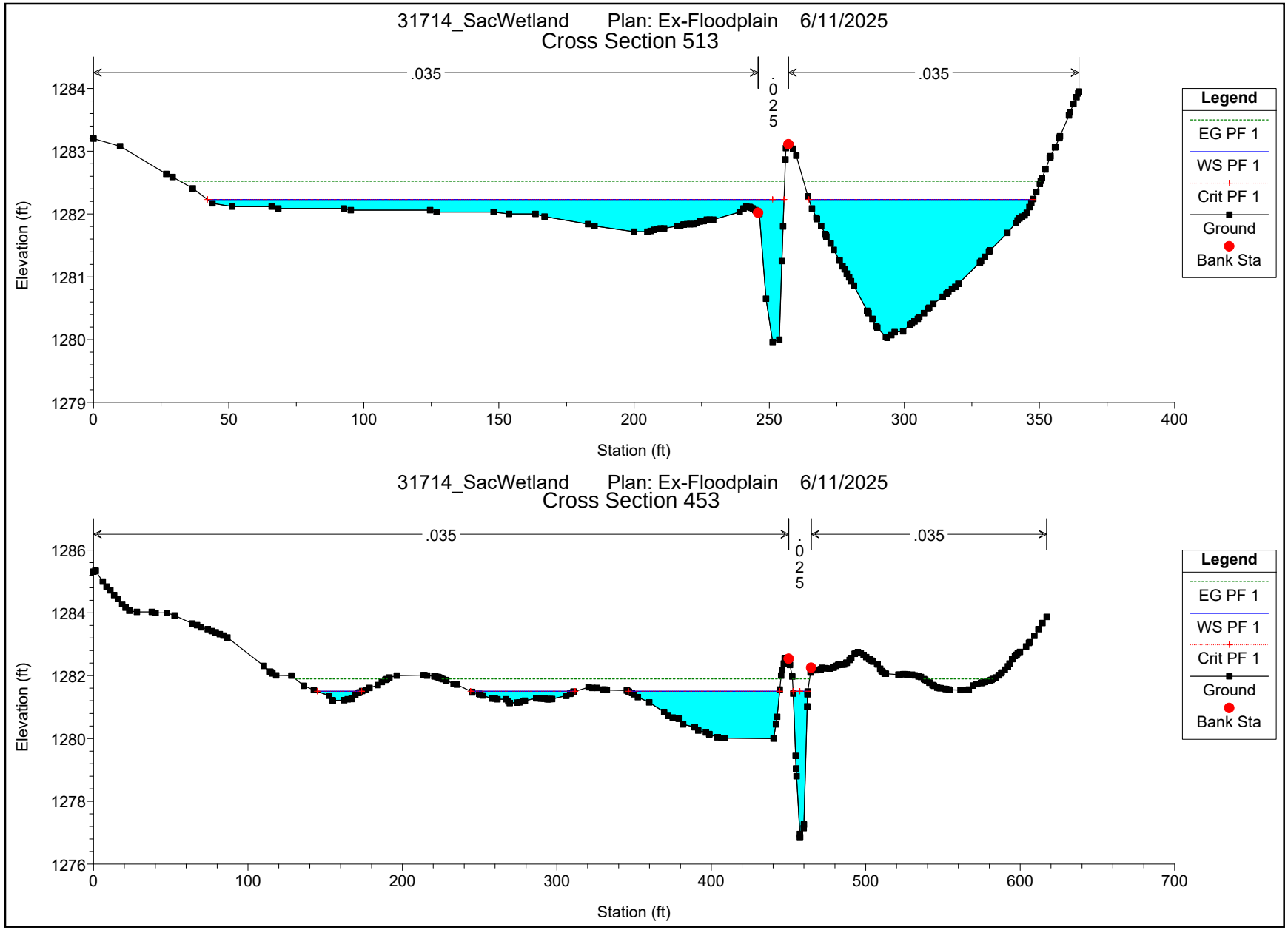
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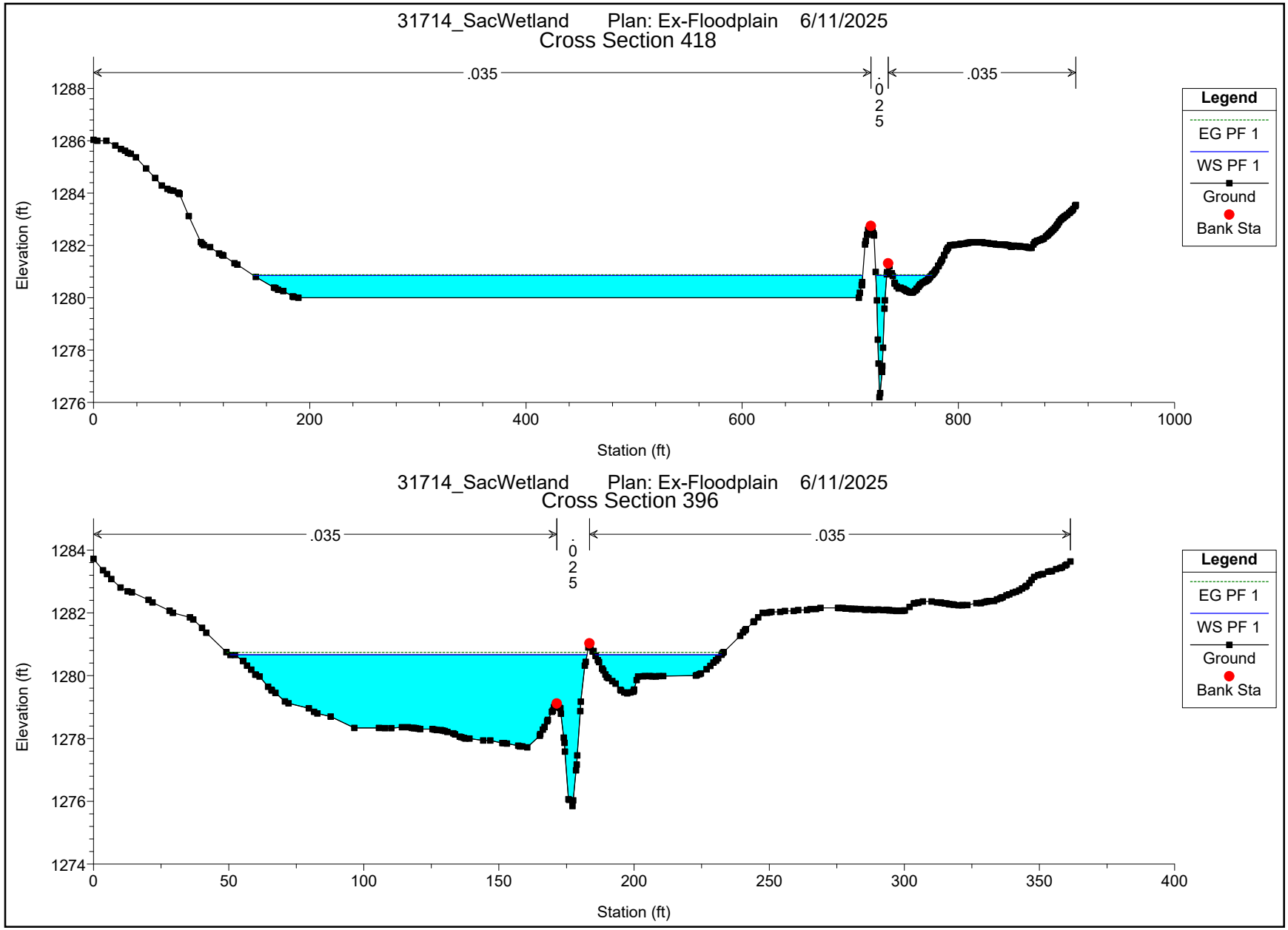
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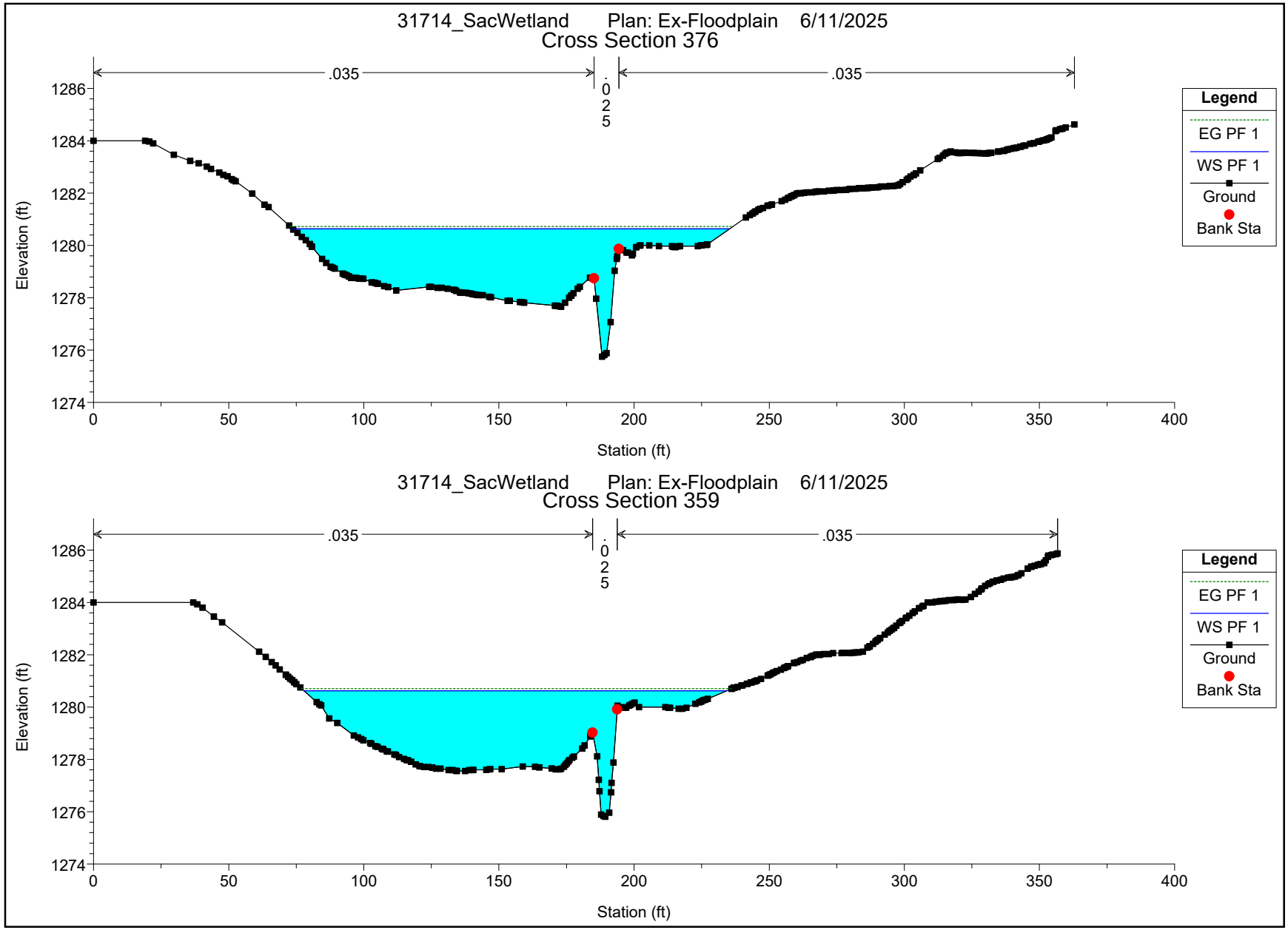
Appendix C: HEC-RAS 100-yr Floodplain Model Cross-Sections

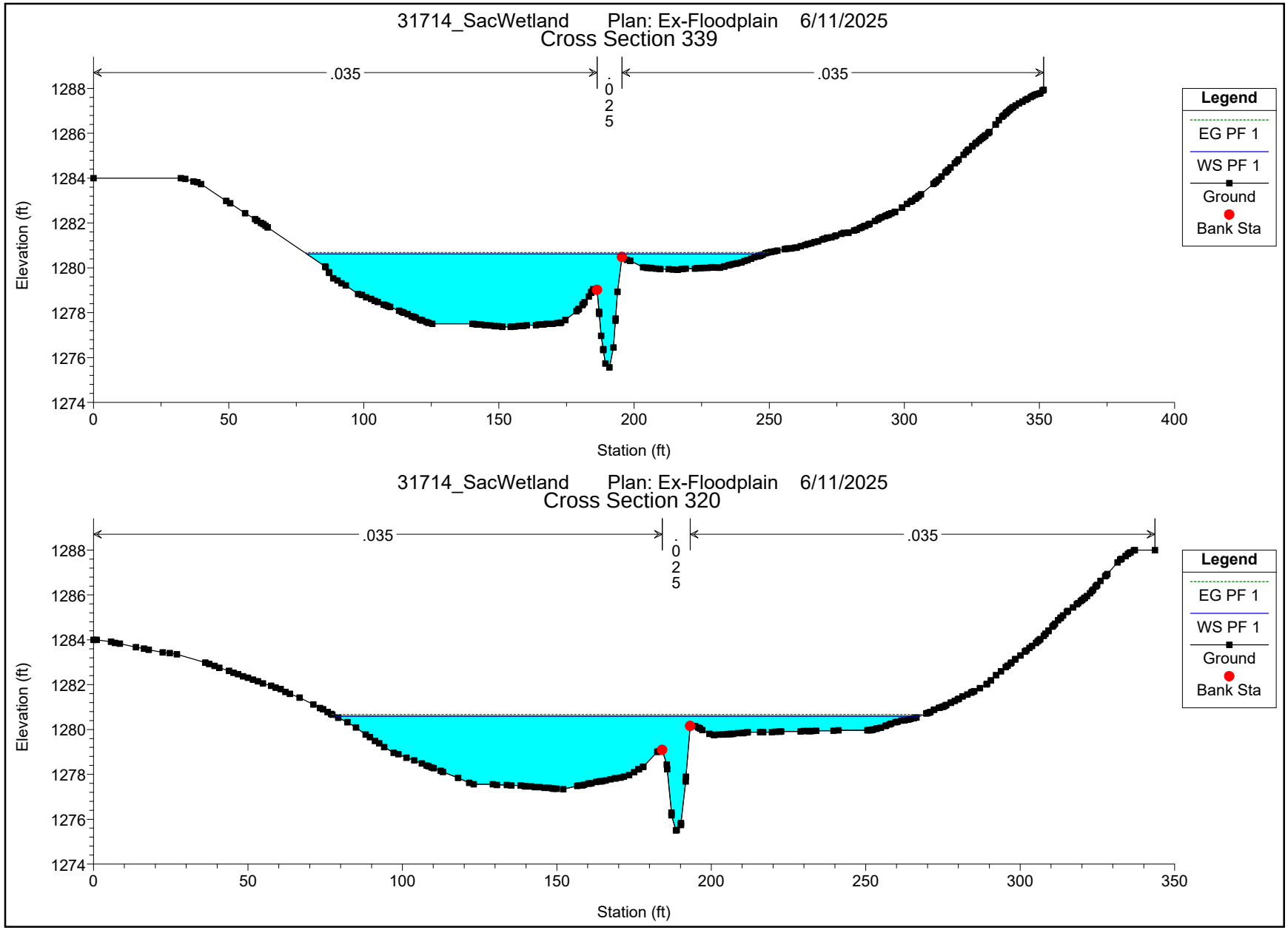
EXISTING FLOODPLAIN

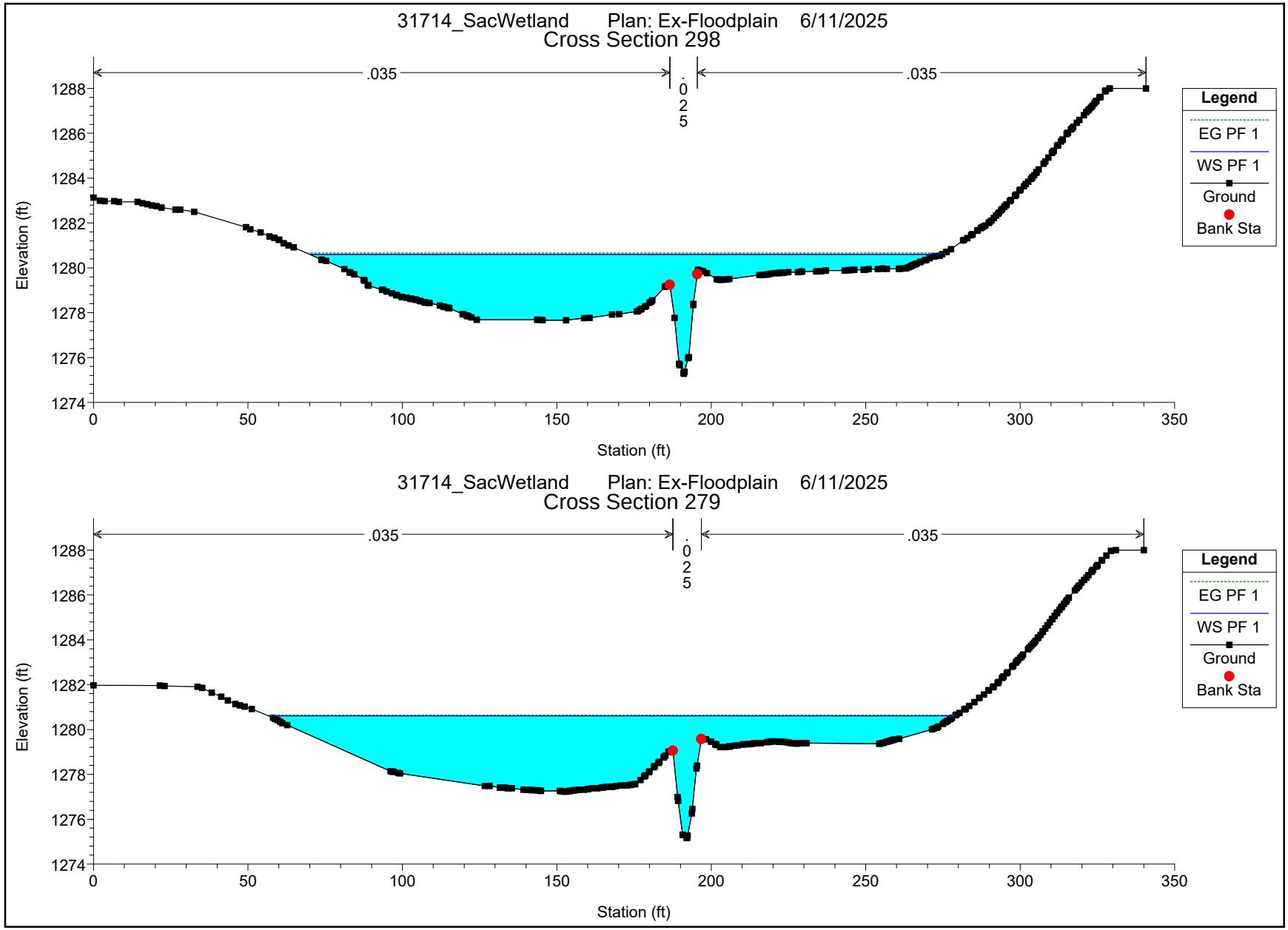


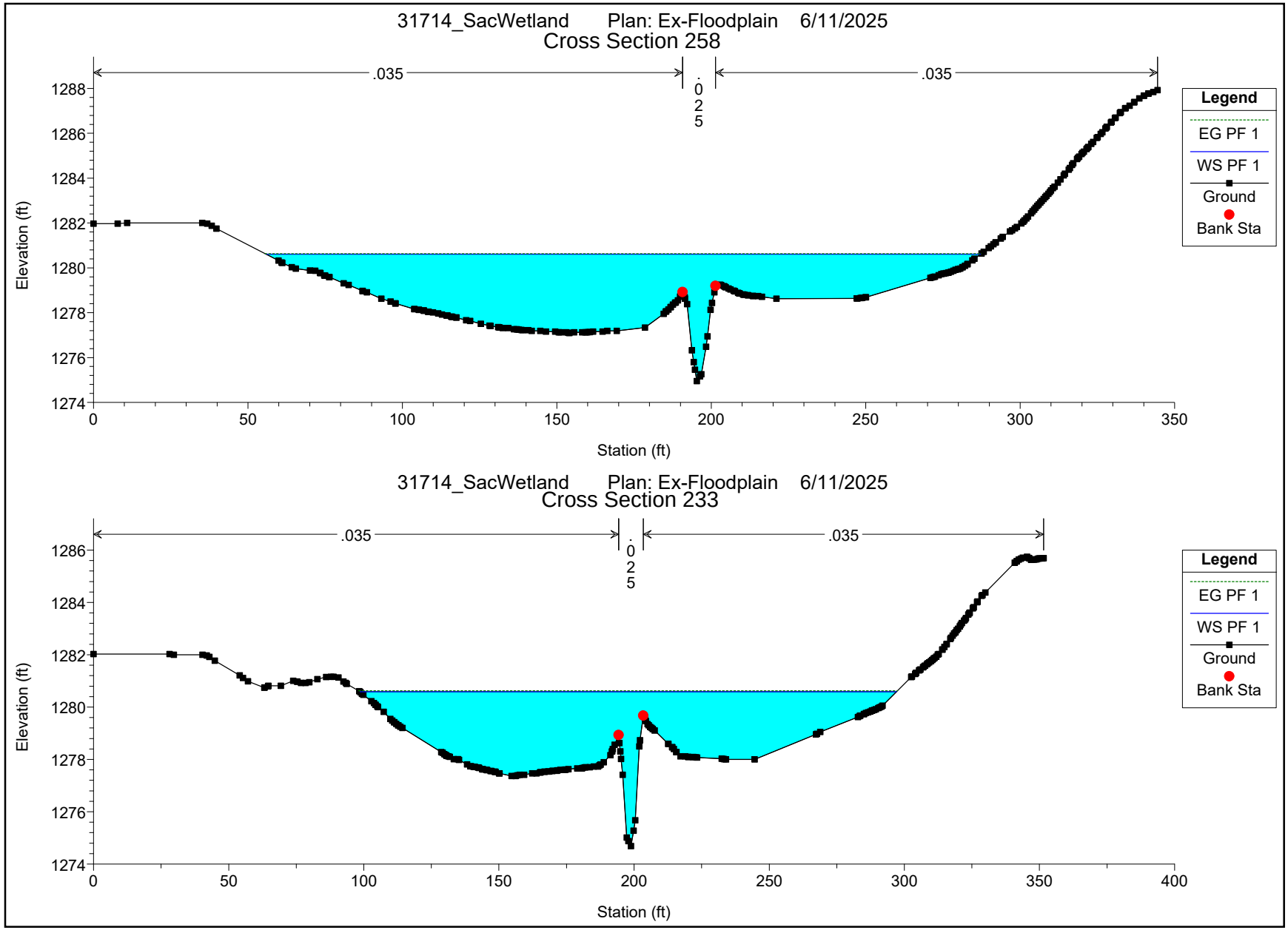

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1282
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1280
1279
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50
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150
200
250
300
350
400
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
31714_SacWetland Plan: Ex-Floodplain 6/11/2025
Cross Section 453
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.025
.035
Elevation (ft)
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1284
1282
1280
1278
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Station (ft)
Legend
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WS PF 1
Crit PF 1
Ground
Bank Sta

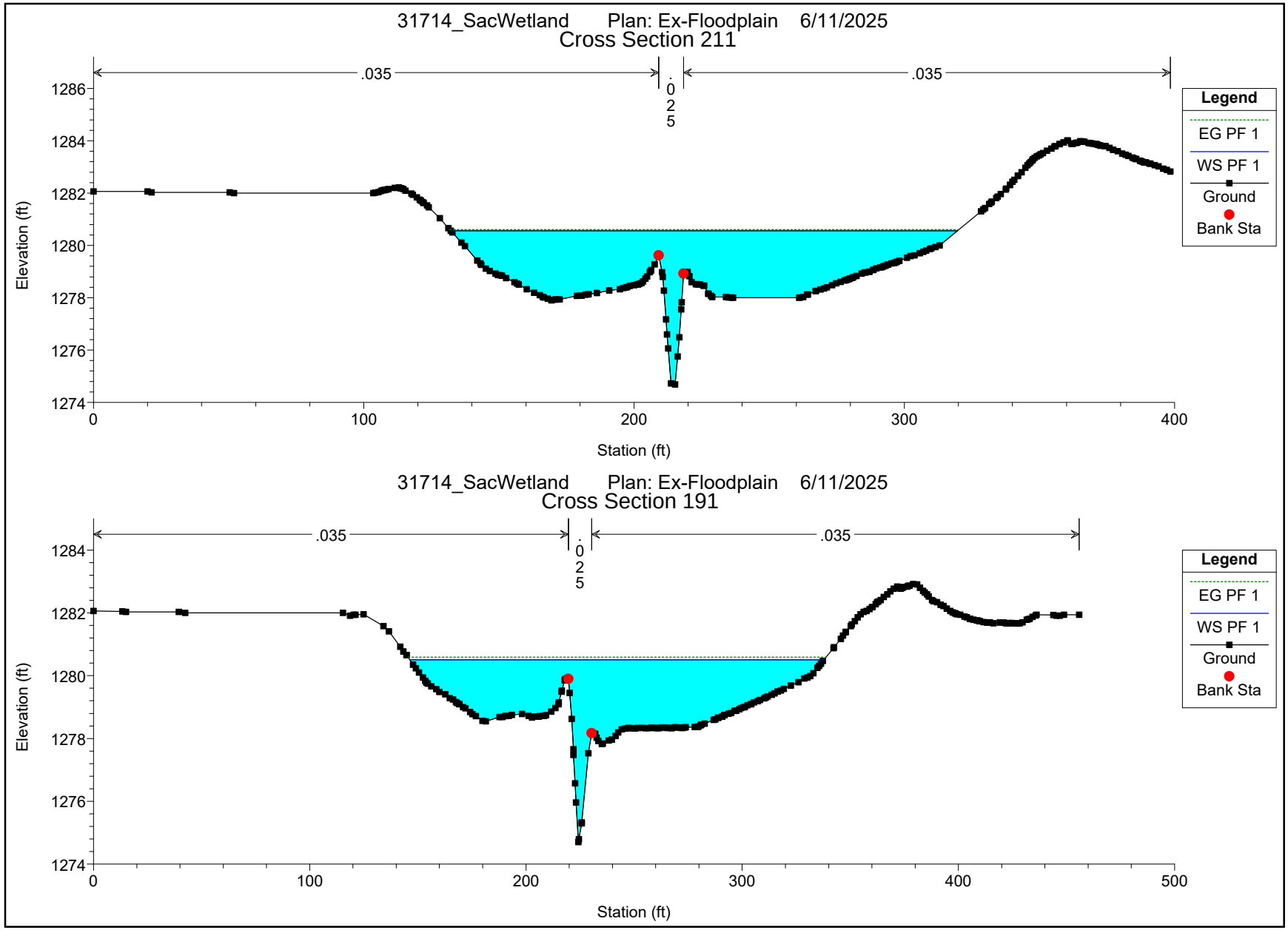

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Bank Sta
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Station (ft)
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Bank Sta
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Station (ft)

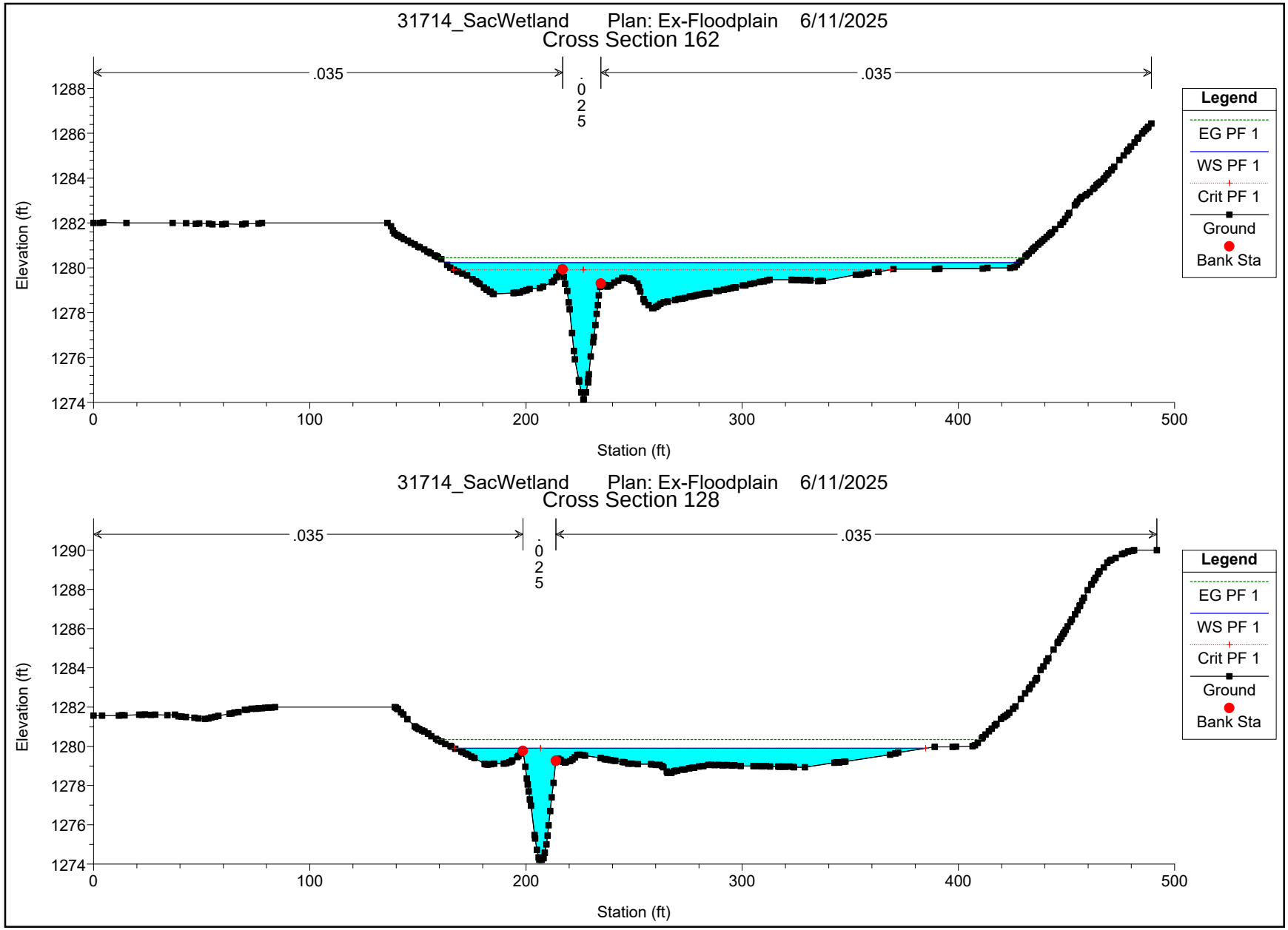

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300
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Station (ft)
Legend
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WS PF 1
Ground
Bank Sta
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Elevation (ft)
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1284
1282
1280
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1276
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Station (ft)
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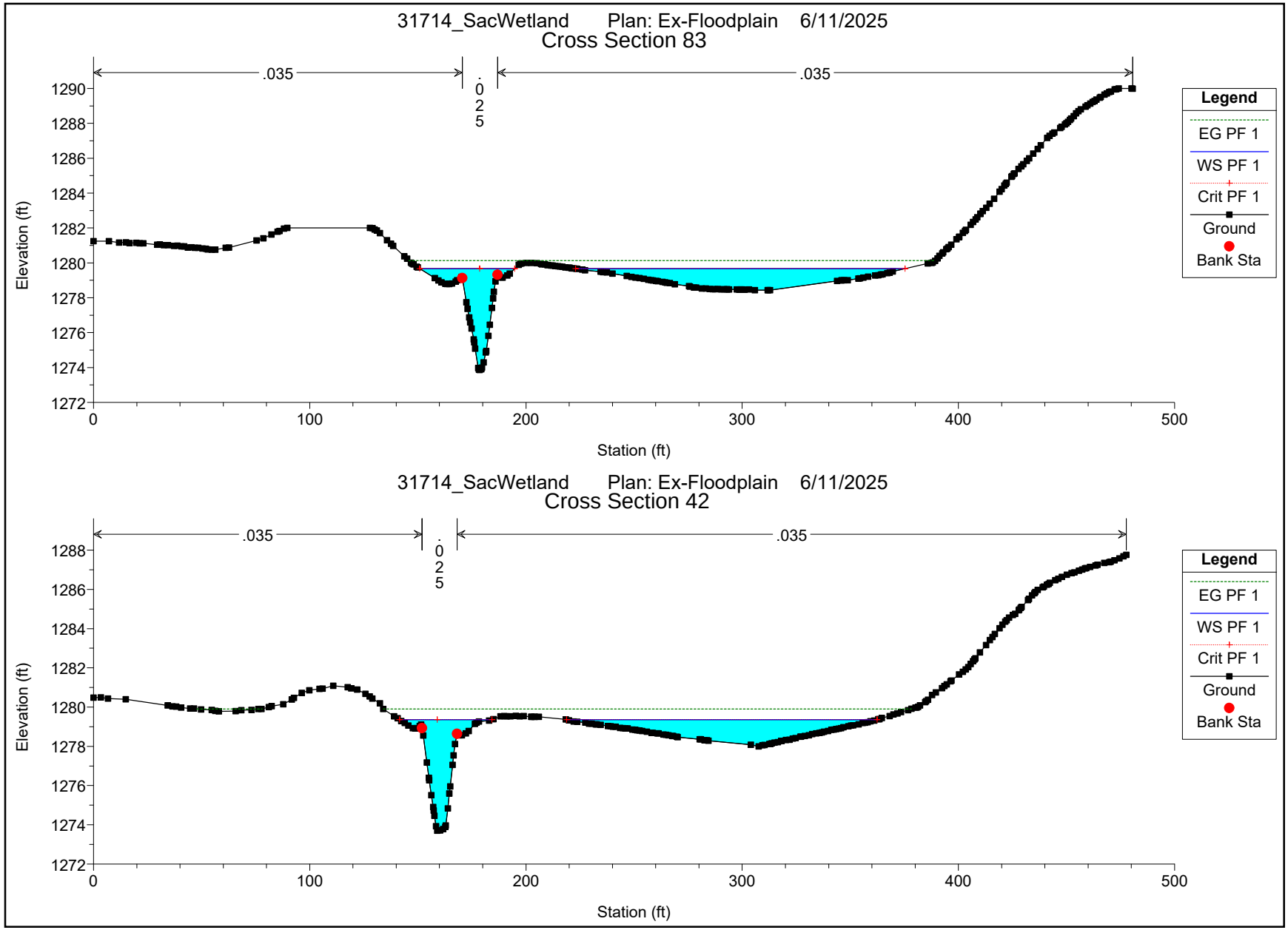

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1282
1280
1278
1276
1274
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100
150
200
250
300
350
400
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
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Elevation (ft)
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1286
1284
1282
1280
1278
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Station (ft)
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WS PF 1
Ground
Bank Sta

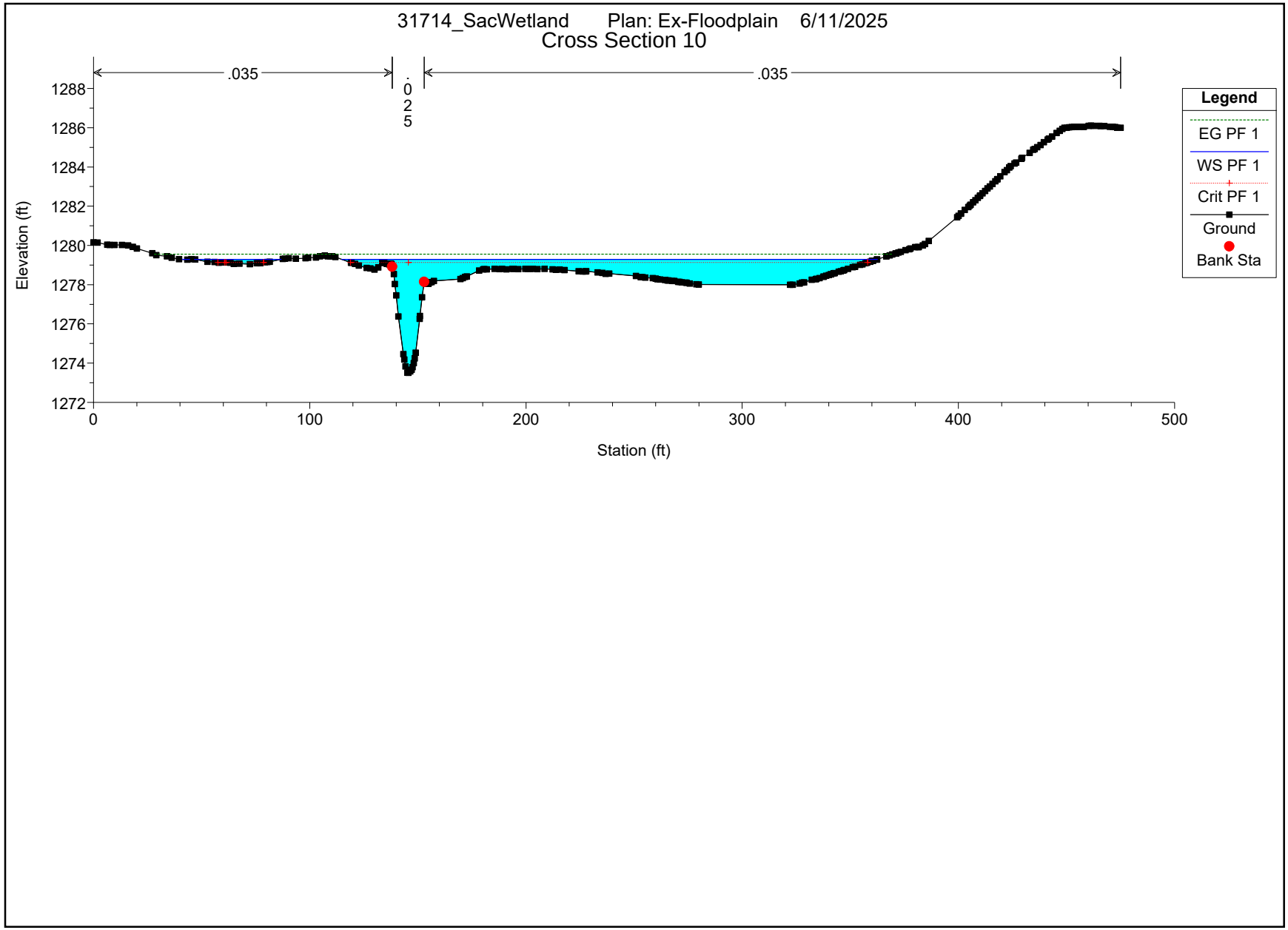

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.035
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WS PF 1
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Bank Sta
Elevation (ft)
Station (ft)
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.035
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Legend
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WS PF 1
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Bank Sta
Elevation (ft)
Station (ft)


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WS PF 1
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Bank Sta
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Station (ft)
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.035
.025
.035
Legend
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WS PF 1
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Bank Sta
Elevation (ft)
Station (ft)


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.035
Elevation (ft)
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1284
1282
1280
1278
1276
1274
0
100
200
300
400
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
31714_SacWetland Plan: Ex-Floodplain 6/11/2025
Cross Section 191
.035
.025
.035
Elevation (ft)
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1282
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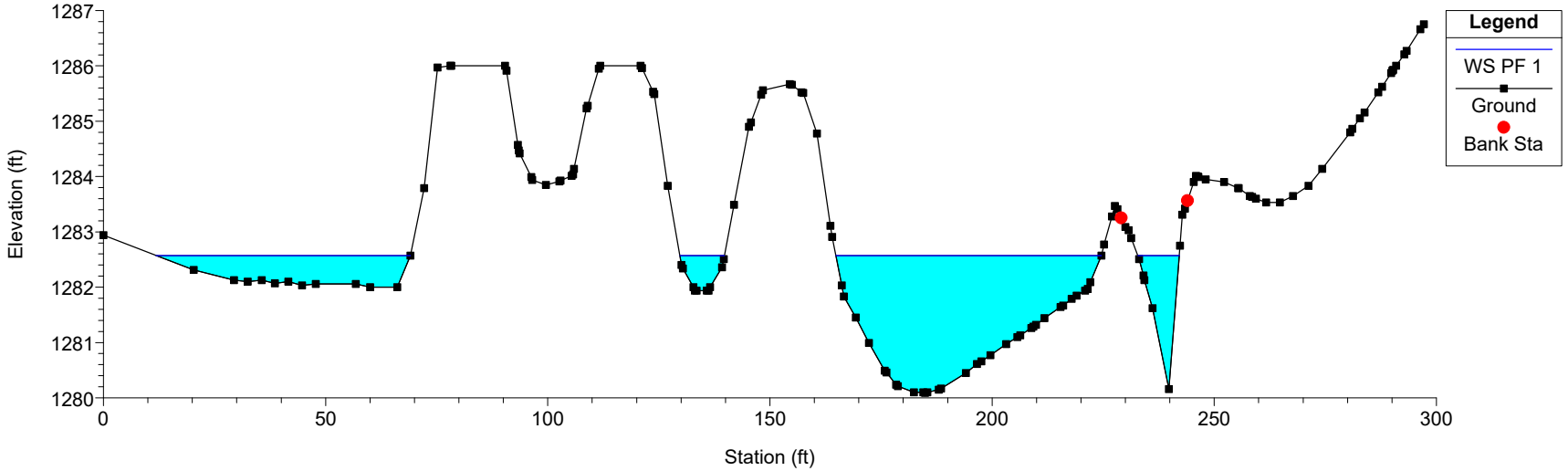

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1278
1276
1274
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200
300
400
500
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
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Cross Section 128
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.025
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1286
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1282
1280
1278
1276
1274
0
100
200
300
400
500
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta


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.025
.035
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1286
1284
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1280
1278
1276
1274
1272
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100
200
300
400
500
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
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.025
.035
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1286
1284
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1280
1278
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1274
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500
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

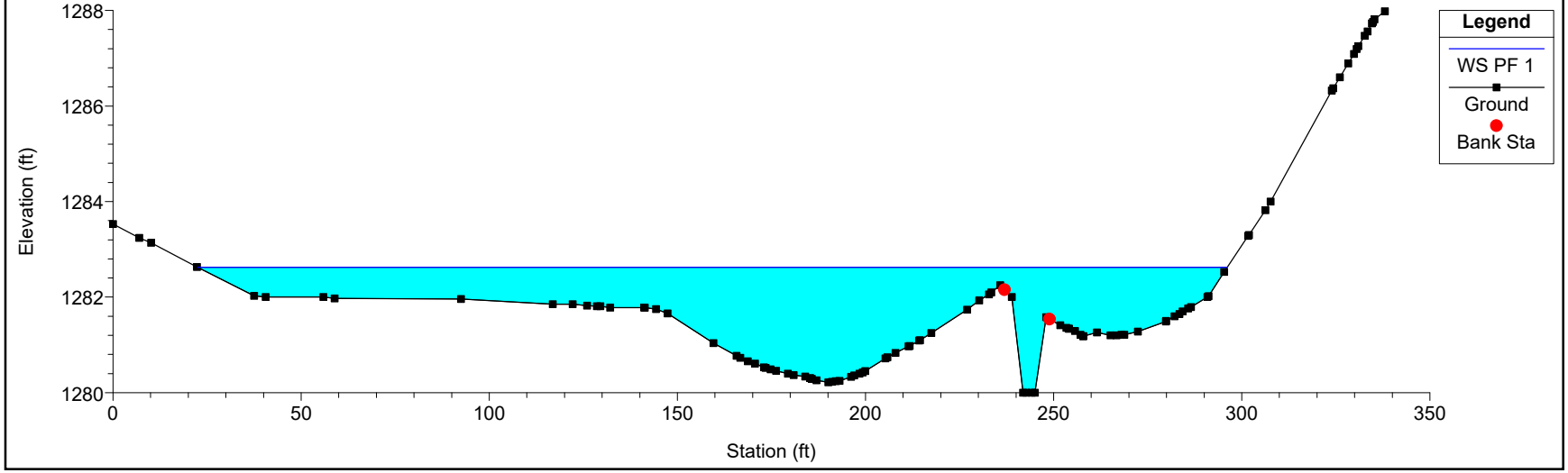

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1284
1282
1280
1278
1276
1274
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0
100
200
300
400
500
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

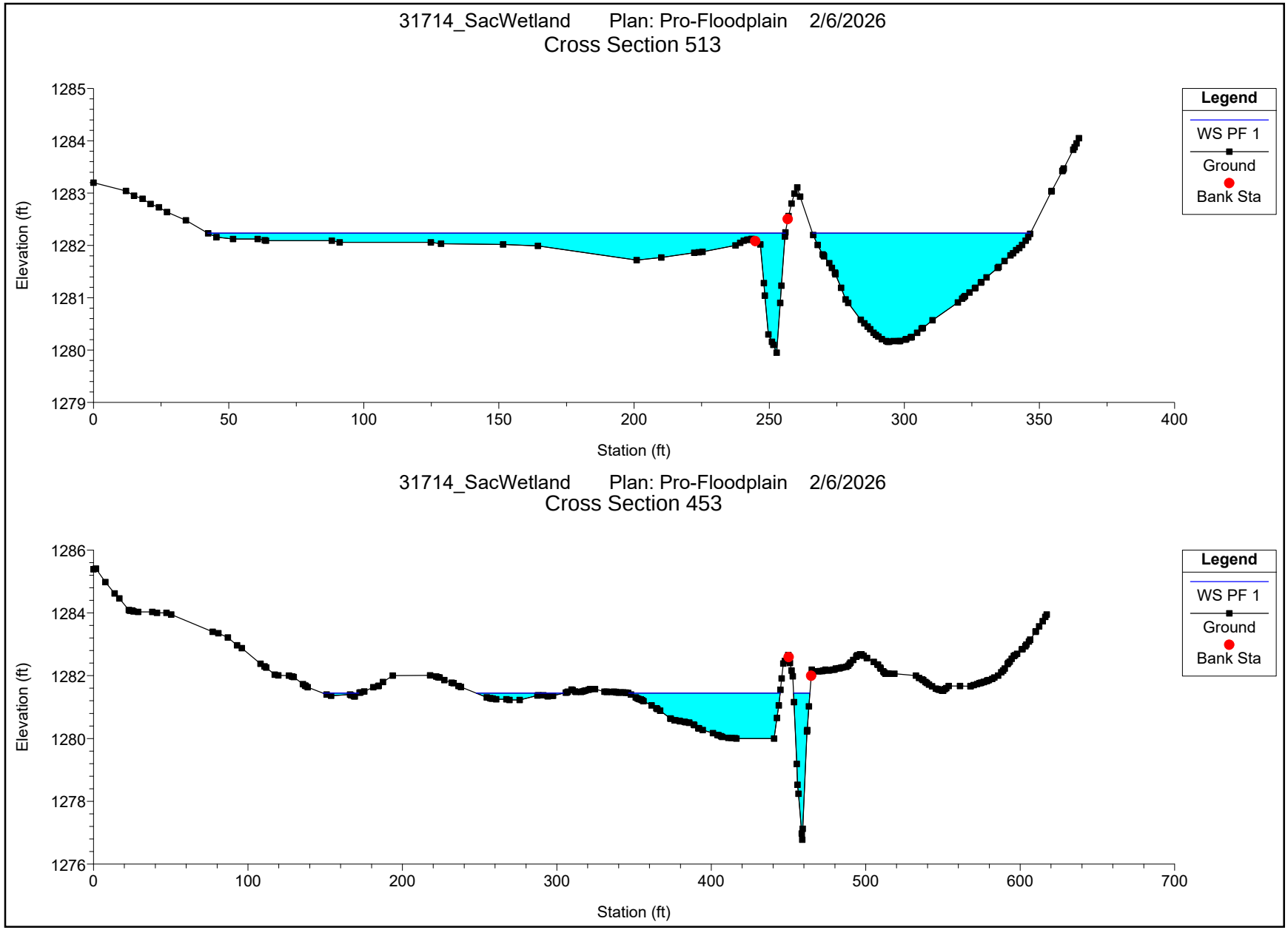
PROPOSED FLOODPLAIN

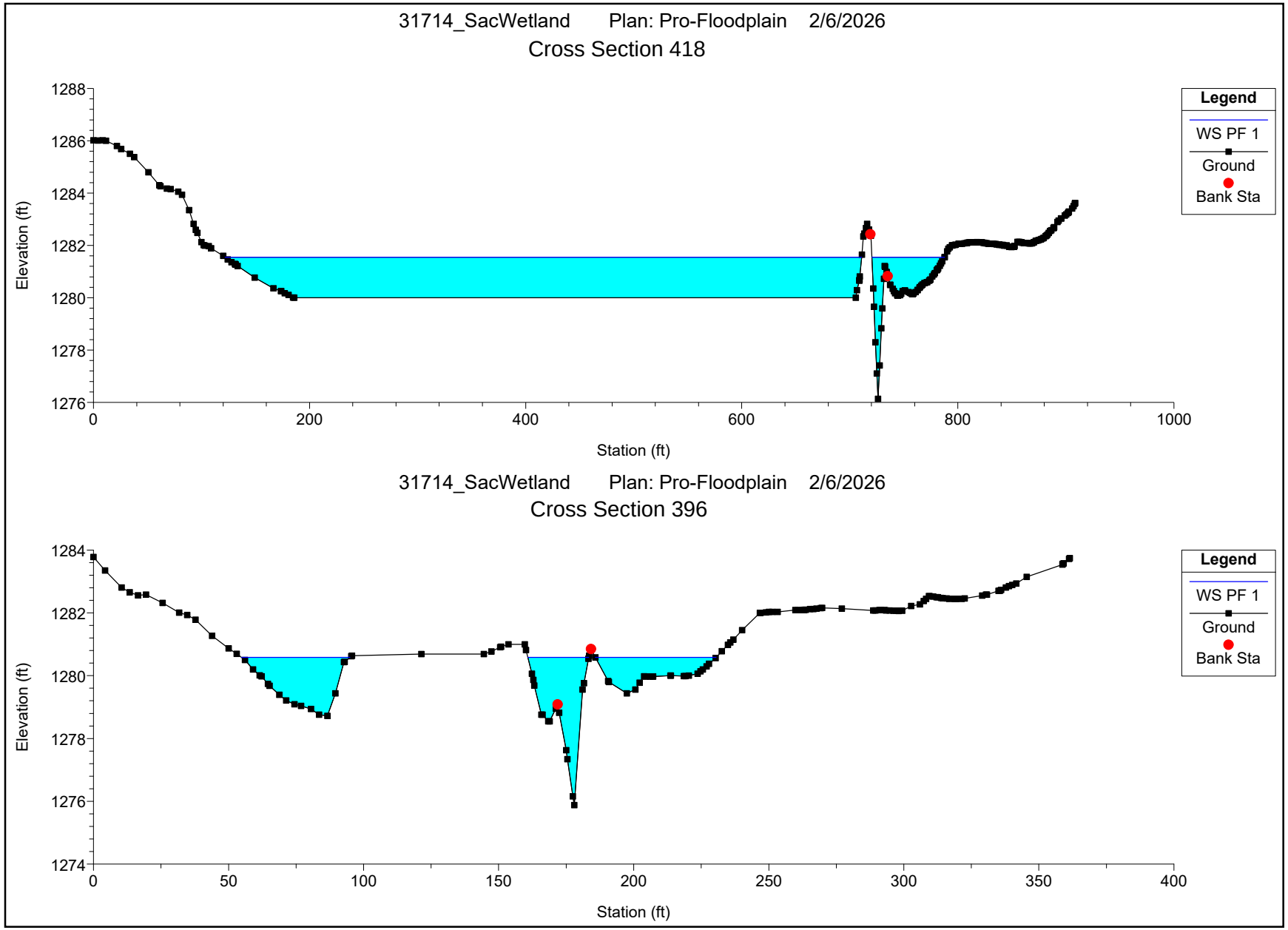
31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 609

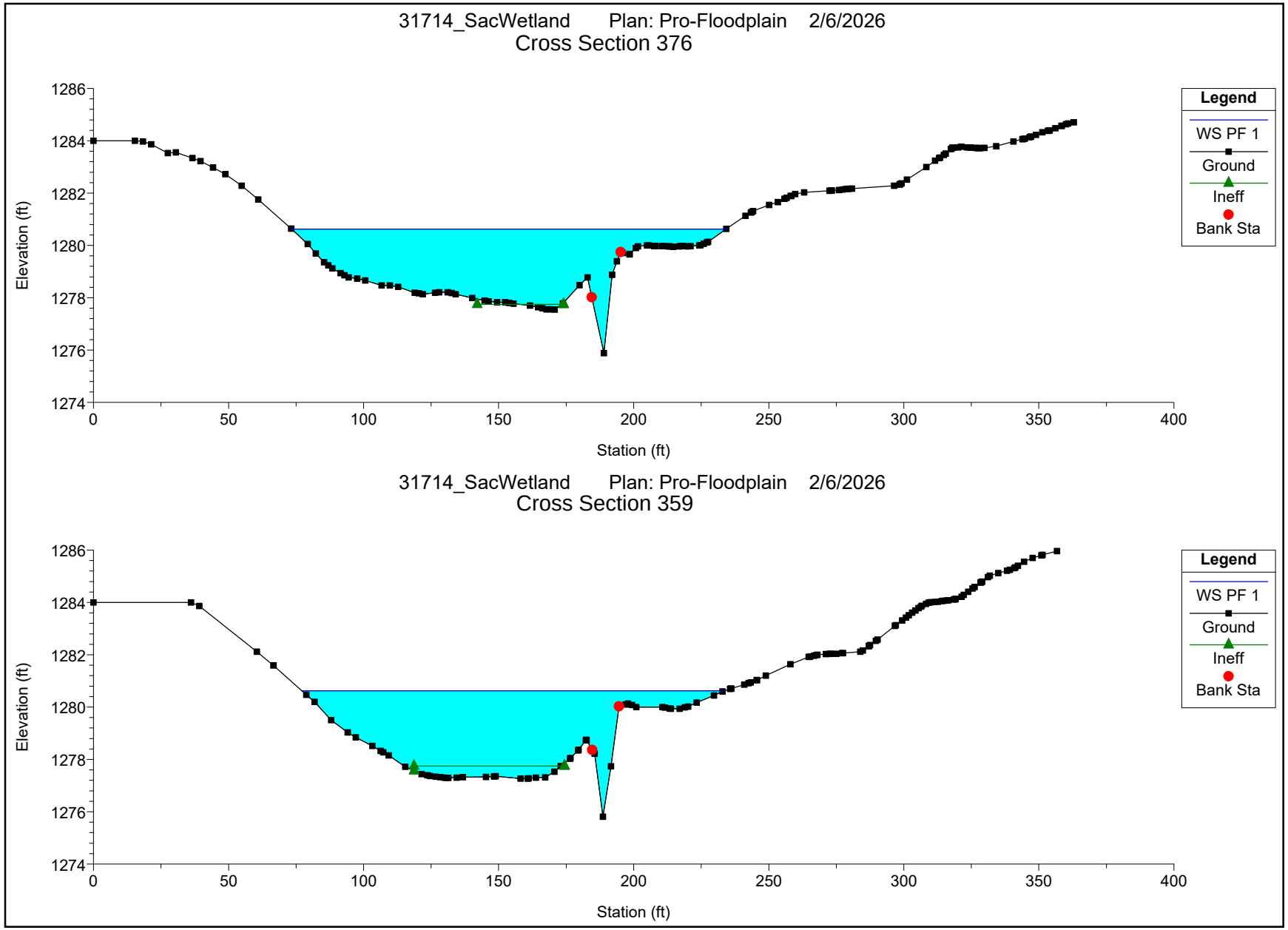


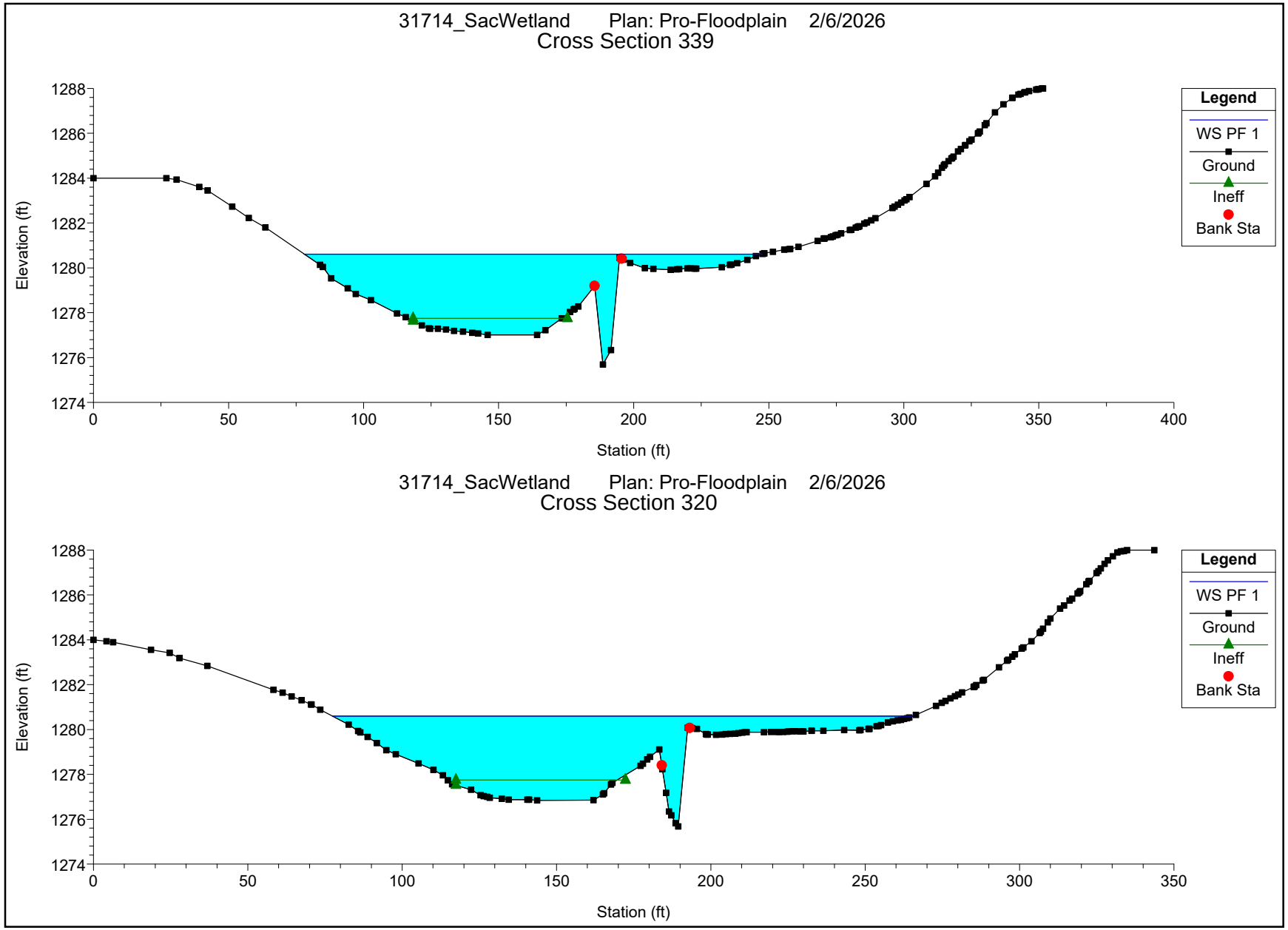
31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 576

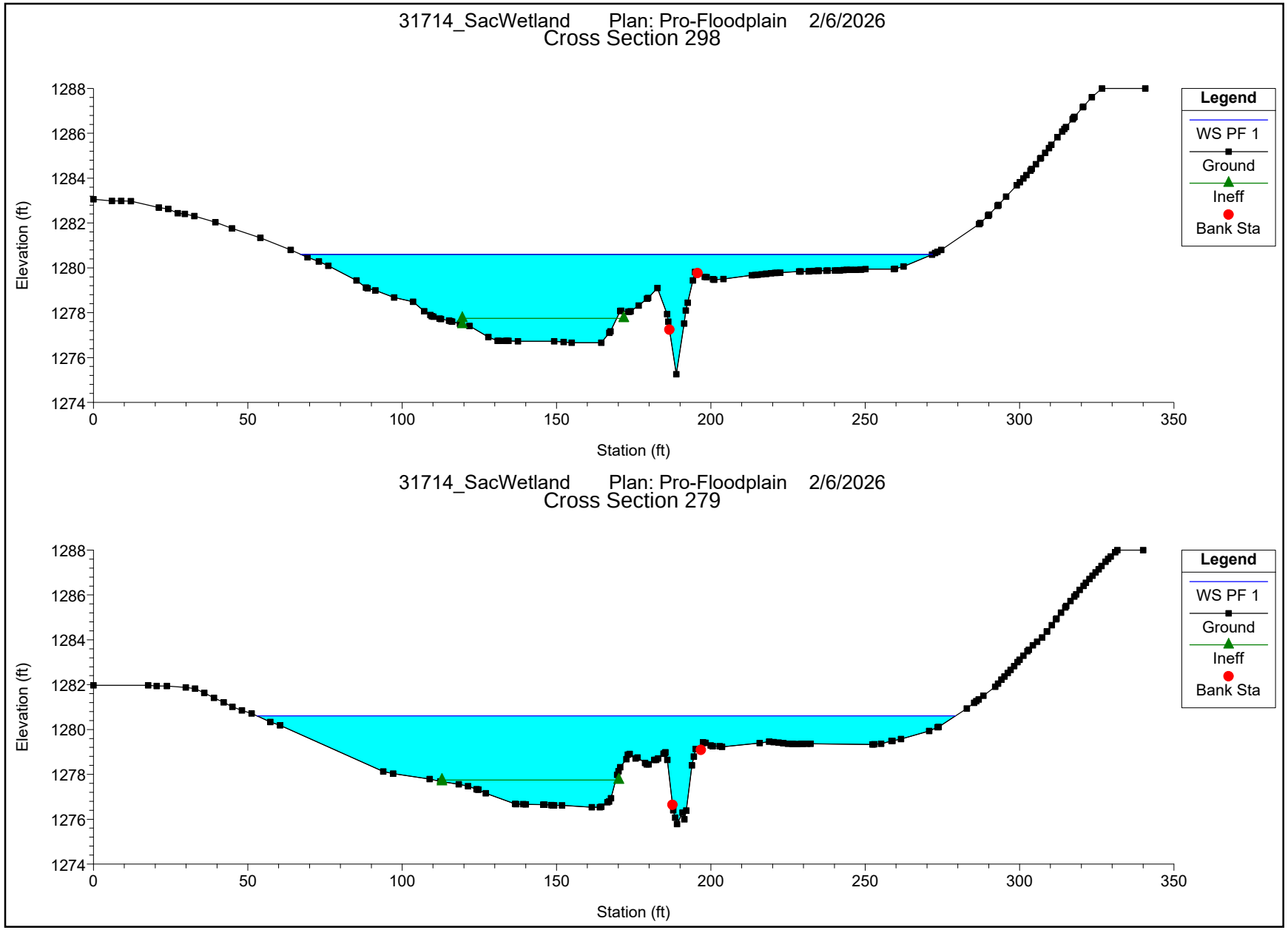


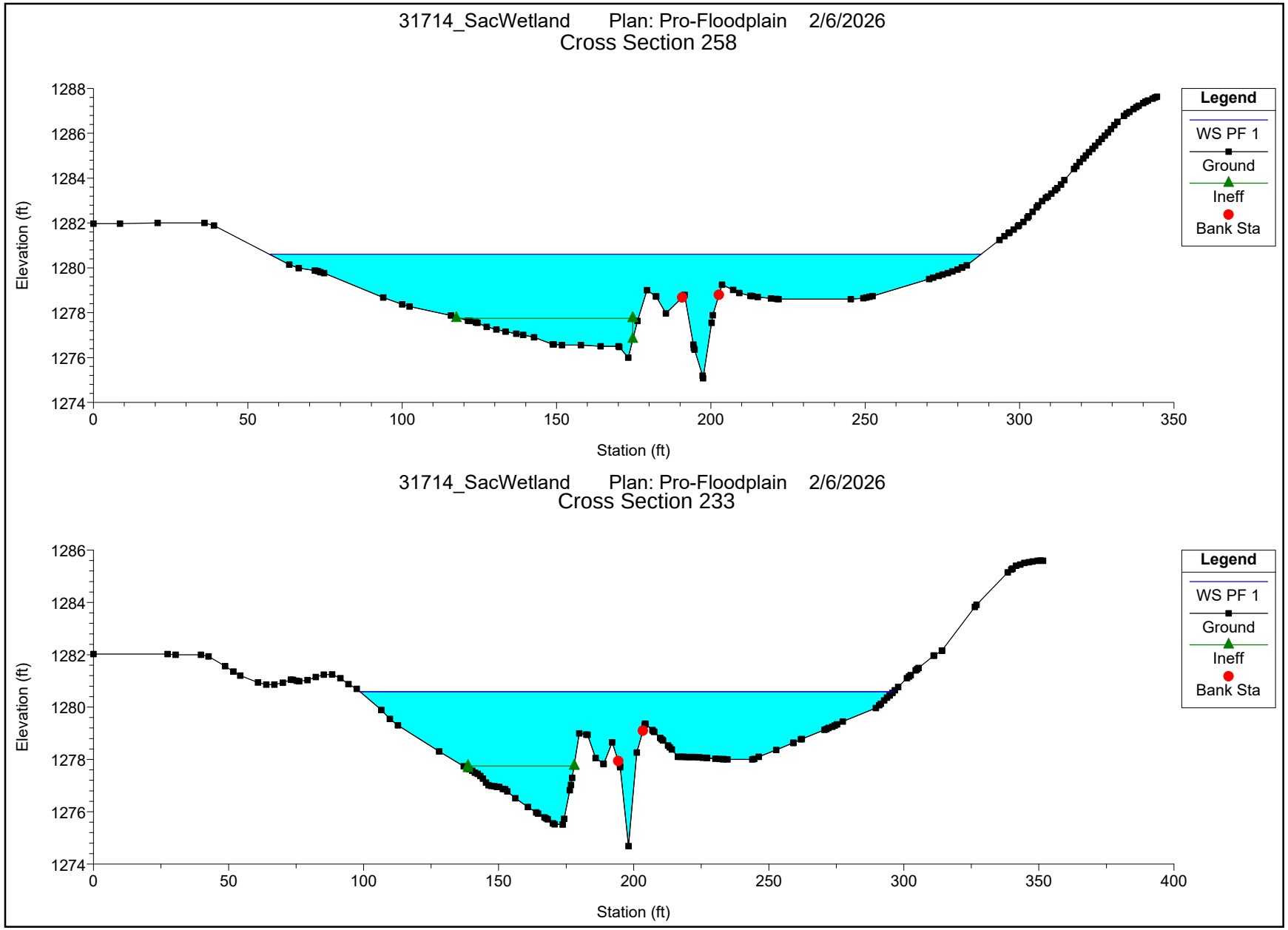

31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 513
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 453
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta

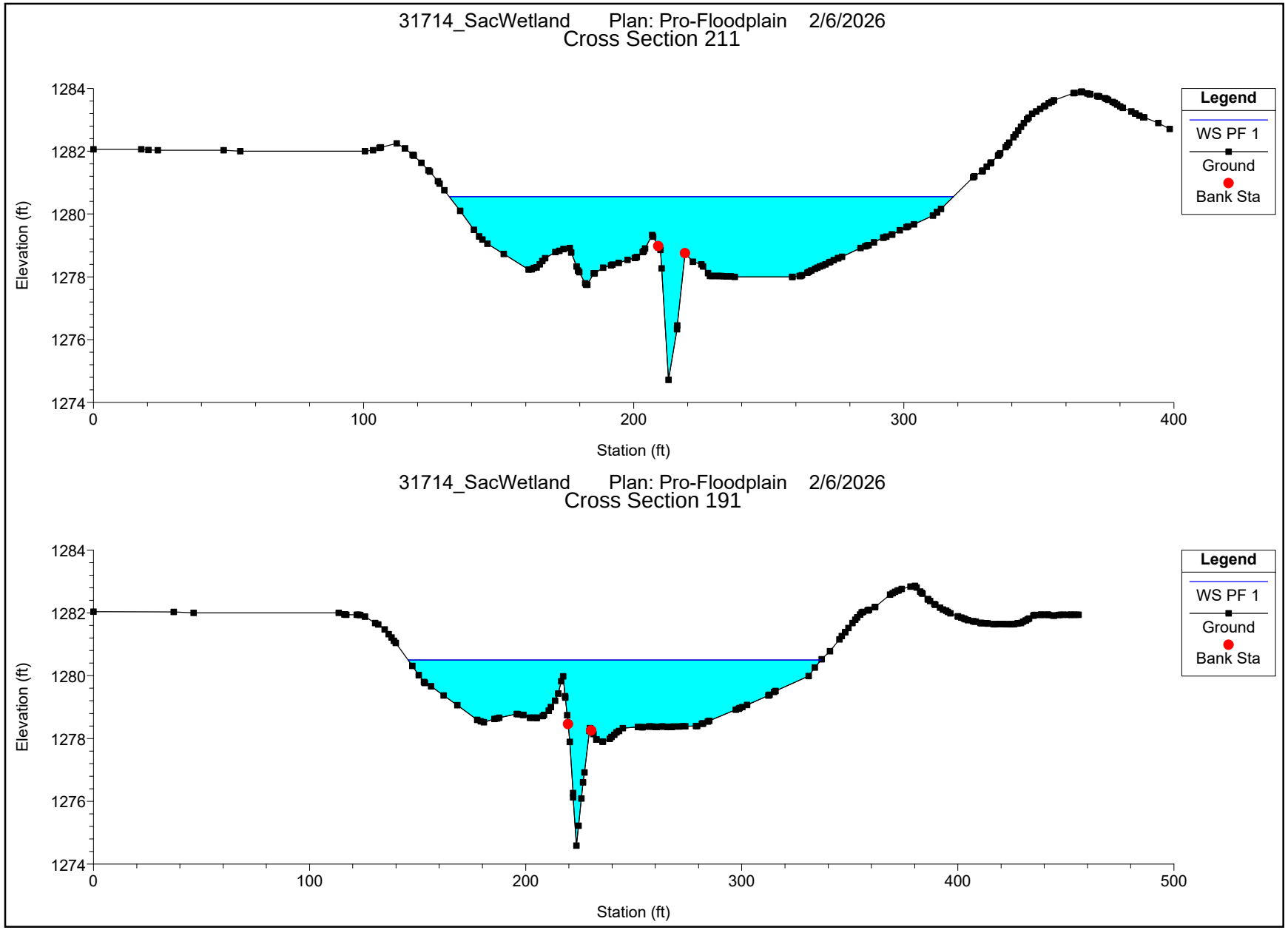

31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 418
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 396
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta

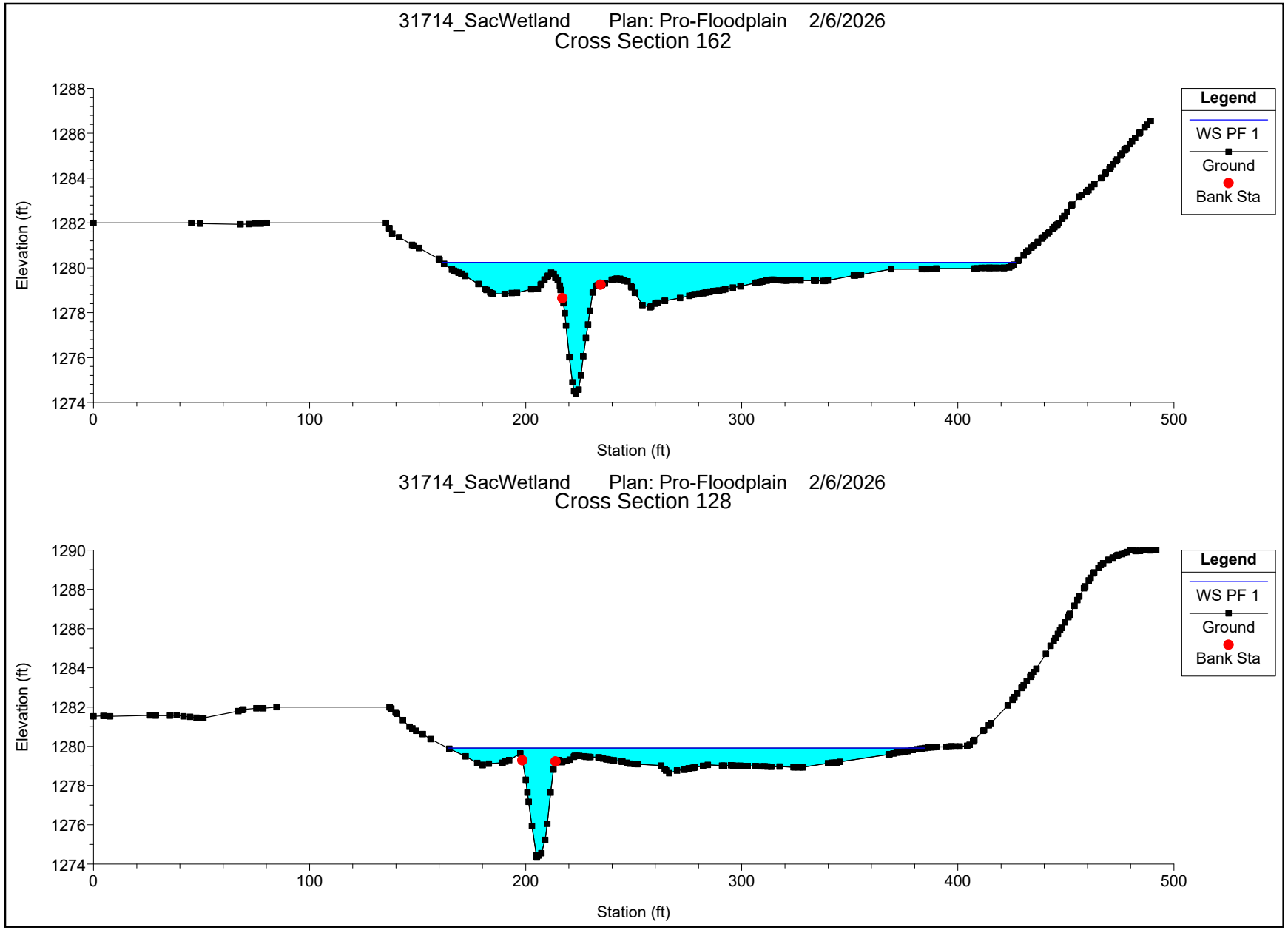

31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 376
Elevation (ft)
1286
1284
1282
1280
1278
1276
1274
0
50
100
150
200
250
300
350
400
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 359
Elevation (ft)
1286
1284
1282
1280
1278
1276
1274
0
50
100
150
200
250
300
350
400
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta

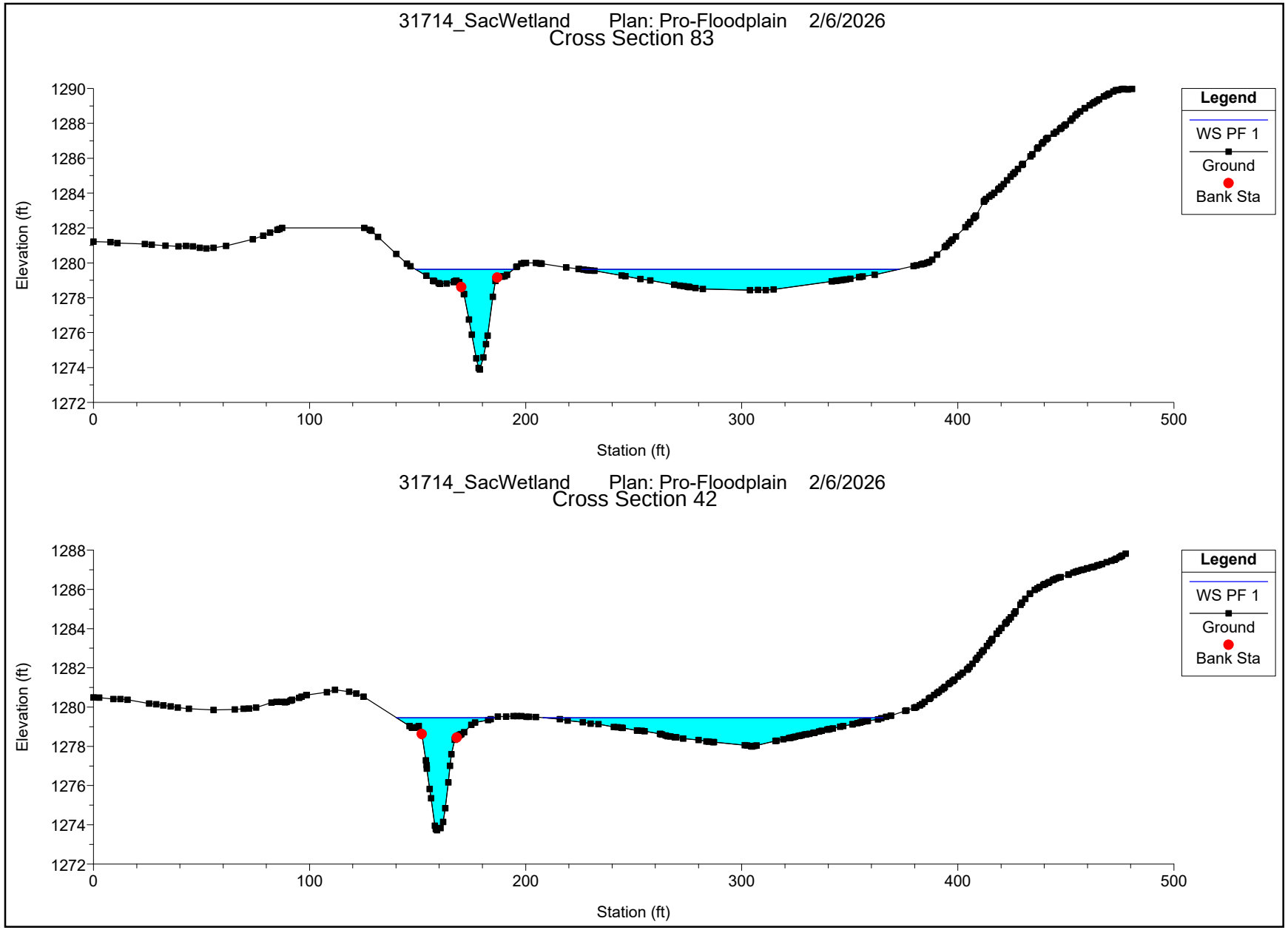

31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 339
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 320
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta

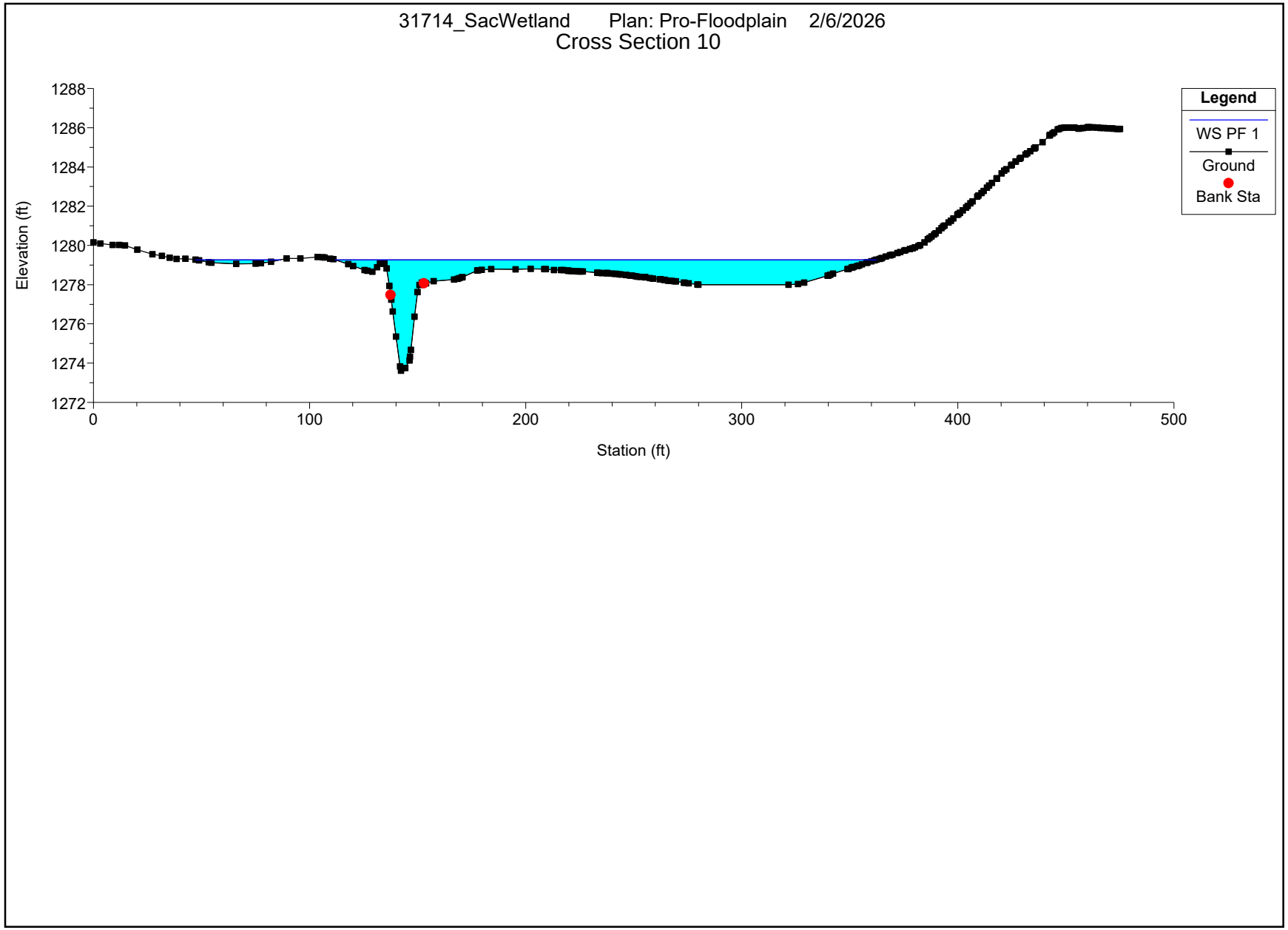

31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 298
Elevation (ft)
1288
1286
1284
1282
1280
1278
1276
1274
0
50
100
150
200
250
300
350
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 279
Elevation (ft)
1288
1286
1284
1282
1280
1278
1276
1274
0
50
100
150
200
250
300
350
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta


31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 258
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta
31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 233
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta


31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 211
Elevation (ft)
1284
1282
1280
1278
1276
1274
0
100
200
300
400
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 191
Elevation (ft)
1284
1282
1280
1278
1276
1274
0
100
200
300
400
500
Station (ft)
Legend
WS PF 1
Ground
Bank Sta


31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 162
Elevation (ft)
1288
1286
1284
1282
1280
1278
1276
1274
0
100
200
300
400
500
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 128
Elevation (ft)
1290
1288
1286
1284
1282
1280
1278
1276
1274
0
100
200
300
400
500
Station (ft)
Legend
WS PF 1
Ground
Bank Sta


31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 83
Elevation (ft)
1290
1288
1286
1284
1282
1280
1278
1276
1274
1272
0
100
200
300
400
500
Station (ft)
Legend
WS PF 1
Ground
Bank Sta
31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 42
Elevation (ft)
1288
1286
1284
1282
1280
1278
1276
1274
1272
0
100
200
300
400
500
Station (ft)
Legend
WS PF 1
Ground
Bank Sta


31714_SacWetland Plan: Pro-Floodplain 2/6/2026
Cross Section 10
Elevation (ft)
1288
1286
1284
1282
1280
1278
1276
1274
1272
0
100
200
300
400
500
Station (ft)
Legend
WS PF 1
Ground
Bank Sta