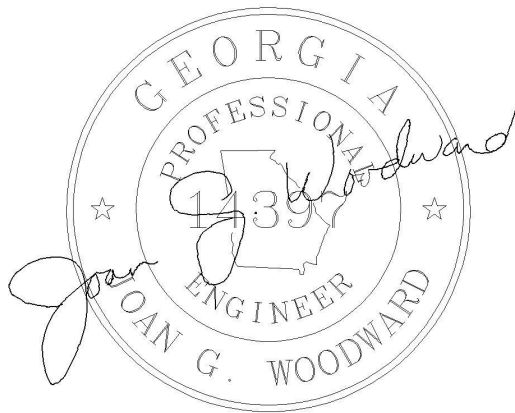


HYDRAULICS ANALYSIS
FOR
ELLIOTT GREENE

CITY OF POWDER SPRINGS, GEORGIA

March 9, 2025



PREPARED BY:
JOAN G. WOODWARD, P.E.
GA P.E. # 14397
WOODWARD CONSULTING, INC
P.O. BOX 1816
ROSWELL, GA 30077
[REDACTED]

HYDRAULIC ANALYSIS FOR Elliott Greene Powder Springs, Georgia

OBJECTIVE: To determine the effect of development upon the baseflood and future elevations (BFE's) for the subject area located adjacent to Powder Springs Creek.

Vicinity Map



METHODOLOGY: The creek was modeled for the County and was obtained from Dewberry. This model has established BFE's and represents the latest information available to the County. The 100 year flows used through the project were determined by the County contractor and they are listed in the Summary tables. There was no encroachment into the 100 year floodplain from developing Elliott Greene. Recent topography was utilized to locate the actual floodline. Since the topography was slightly different from the 2006 study, the cross sections in the vicinity of the Elliott Greene developments were extracted from the model and edited for

the new topography. Additionally, the future conditions floodplain was run. Starting water surface elevations were extracted from the 2006 model.

All development was outside of existing floodplain so floodway was not affected.

Six cross sections were entered in the areas of grading to accurately verify a no rise in flood elevations. The added cross sections were at stations 31781, 31467, 31273, 30591, 30343 and 29987.

The GeoHecRas software 5.0.0.1317 7/31/2024 was used to generate the water surface elevations.

RESULTS:

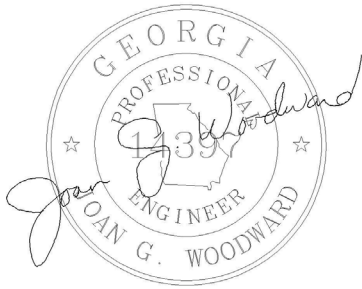
The results are attached. The proposed developments result in a no-rise to baseflood and future floodplain elevations.

Plots of all cross sections in the model affected by the area of development are attached at the end of this report and they are located on the map.

ENGINEERING 'NO-RISE' CERTIFICATION

This is to certify that I am a duly qualified engineer licensed to practice in the state of Georgia. Is it to further certify that the attached technical data supports the fact that the proposed Elliott Green developments will not impact the existing and future Base Flood Elevations (100-year flood) off the property for Powder Springs Creek.

Certifying seal or stamp:



March 9, 2025

0 250 500 1000 ft



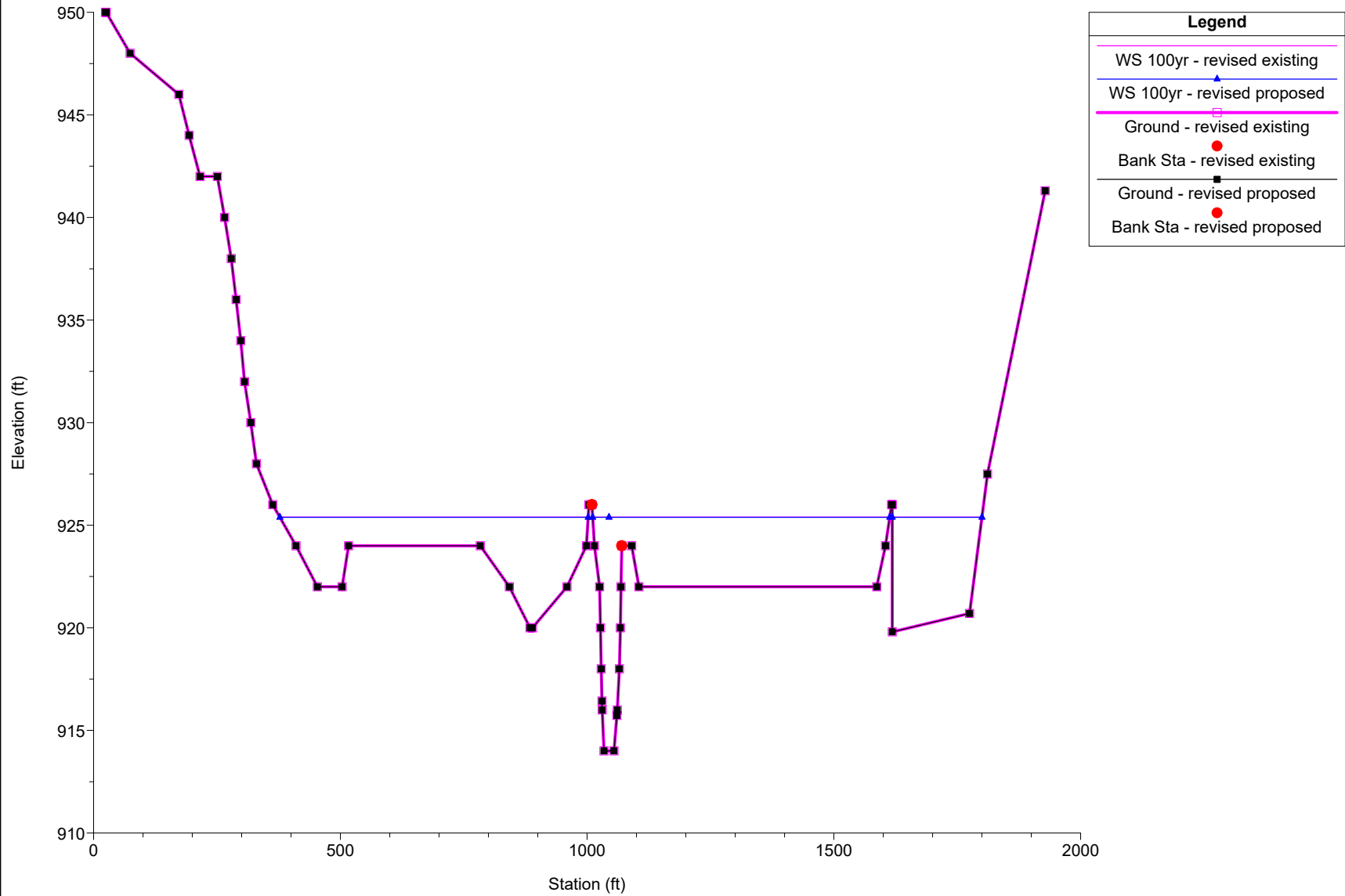
HEC-RAS River: RIVER-1 Reach: Reach-1 Profile: 100yr

Reach	River Sta	Profile	Plan	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	32168.69	100yr	revised proposed	5111.00	914.00	925.39		925.45	0.001118	3.27	4516.70	1408.33	0.21
Reach-1	32168.69	100yr	revised existing	5111.00	914.00	925.40		925.45	0.001111	3.26	4527.97	1408.65	0.21
Reach-1	31781	100yr	revised proposed	5111.00	914.00	925.20		925.22	0.000321	2.05	6383.73	1222.65	0.12
Reach-1	31781	100yr	revised existing	5111.00	914.00	925.21		925.23	0.000319	2.05	6394.63	1222.75	0.12
Reach-1	31467	100yr	revised proposed	5111.00	914.00	925.03		925.08	0.000626	2.98	4043.28	657.55	0.17
Reach-1	31467	100yr	revised existing	5111.00	914.00	925.04		925.09	0.000646	3.03	4060.50	683.69	0.17
Reach-1	31273	100yr	revised proposed	5111.00	912.00	924.74		924.89	0.001596	4.43	2831.81	655.83	0.26
Reach-1	31273	100yr	revised existing	5111.00	912.00	924.74		924.89	0.001615	4.46	2837.29	669.54	0.26
Reach-1	30960.21	100yr	revised proposed	5111.00	912.00	924.49		924.55	0.000689	3.08	4469.69	922.01	0.18
Reach-1	30960.21	100yr	revised existing	5111.00	912.00	924.50		924.55	0.000670	3.04	4459.71	887.84	0.17
Reach-1	30904.46	100yr	revised proposed	5111.00	912.00	924.43	920.74	924.50	0.000710	3.35	4176.96	857.26	0.18
Reach-1	30904.46	100yr	revised existing	5111.00	912.00	924.44	920.74	924.51	0.000713	3.35	4249.51	904.90	0.18
Reach-1	30886.46			Bridge									
Reach-1	30803.00	100yr	revised proposed	5111.00	912.00	923.99	920.34	924.21	0.001718	4.15	2192.57	719.92	0.27
Reach-1	30803.00	100yr	revised existing	5111.00	912.00	924.00	920.34	924.22	0.001706	4.14	2210.33	731.72	0.27
Reach-1	30713.78	100yr	revised proposed	5111.00	912.00	923.91		924.03	0.001228	3.97	3272.44	829.81	0.23
Reach-1	30713.78	100yr	revised existing	5111.00	912.00	923.91		924.04	0.001328	4.12	3083.35	770.48	0.24
Reach-1	30591	100yr	revised proposed	5111.00	912.00	923.82		923.89	0.000908	3.38	3843.18	828.06	0.20
Reach-1	30591	100yr	revised existing	5111.00	912.00	923.82		923.89	0.000907	3.38	3844.24	828.07	0.20
Reach-1	30343	100yr	revised proposed	5111.00	914.00	923.49		923.60	0.001521	4.30	3357.75	847.07	0.26
Reach-1	30343	100yr	revised existing	5111.00	914.00	923.49		923.60	0.001529	4.31	3363.99	855.37	0.26
Reach-1	29987	100yr	revised proposed	5111.00	912.00	923.27		923.30	0.000476	2.38	5585.92	1124.52	0.14
Reach-1	29987	100yr	revised existing	5111.00	912.00	923.27		923.30	0.000476	2.38	5585.92	1124.52	0.14
Reach-1	29349.80	100yr	revised proposed	5149.00	912.00	923.04	919.00	923.06	0.000298	1.84	6833.53	1361.50	0.11
Reach-1	29349.80	100yr	revised existing	5149.00	912.00	923.04	919.00	923.06	0.000298	1.84	6833.53	1361.50	0.11

HEC-RAS River: RIVER-1 Reach: Reach-1 Profile: 100 future

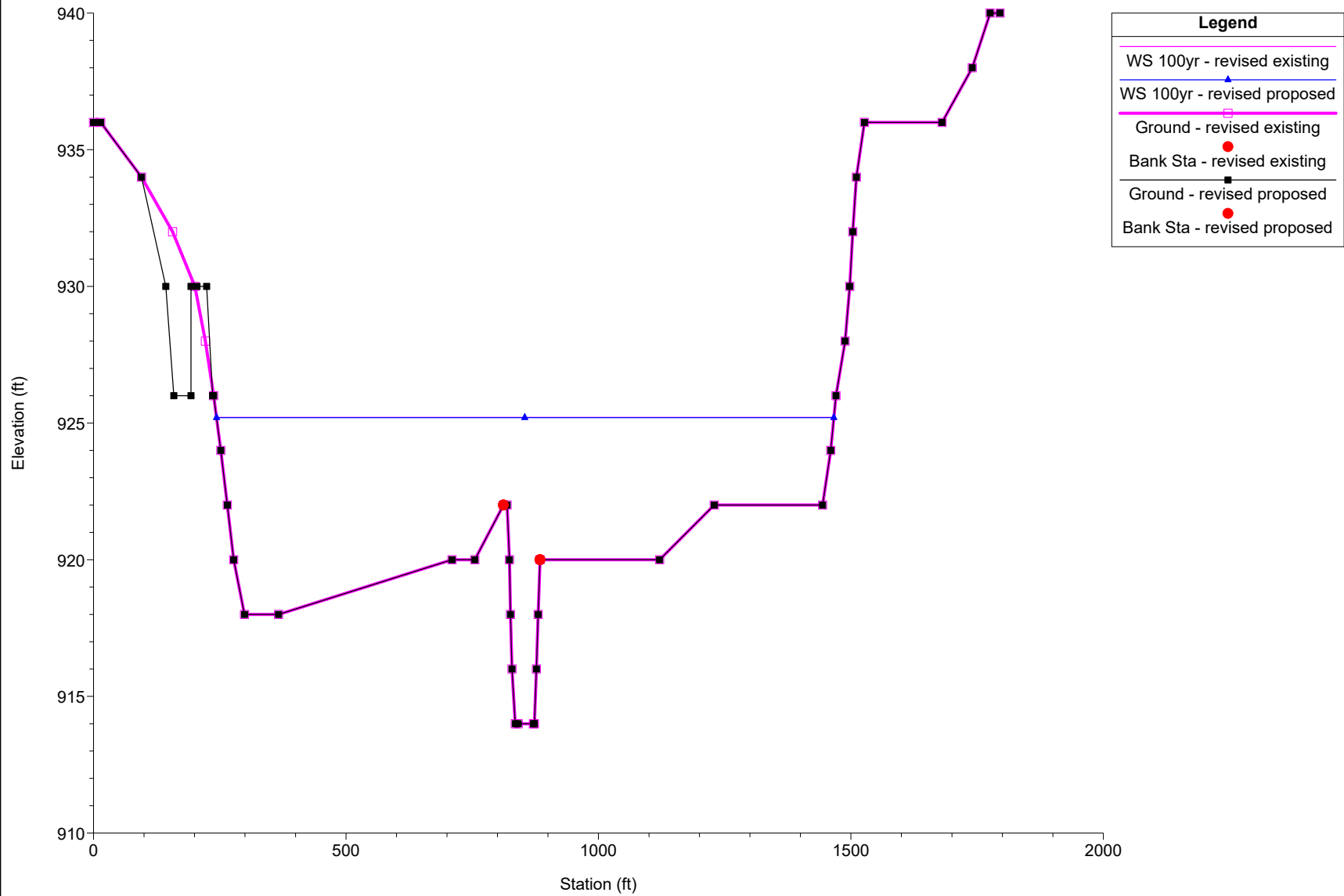
Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	32168.69	100 future	revised proposed	6051.00	914.00	926.13		926.17	0.000891	3.06	5572.06	1443.21	0.19
Reach-1	32168.69	100 future	revised existing	6051.00	914.00	926.14		926.19	0.000883	3.05	5589.94	1443.48	0.19
Reach-1	31781	100 future	revised proposed	6051.00	914.00	925.96		925.98	0.000299	2.09	7313.53	1231.85	0.12
Reach-1	31781	100 future	revised existing	6051.00	914.00	925.97		925.99	0.000297	2.08	7330.52	1232.01	0.12
Reach-1	31467	100 future	revised proposed	6051.00	914.00	925.79		925.85	0.000622	3.12	4546.38	667.22	0.17
Reach-1	31467	100 future	revised existing	6051.00	914.00	925.80		925.86	0.000651	3.19	4593.27	712.60	0.17
Reach-1	31273	100 future	revised proposed	6051.00	912.00	925.52		925.66	0.001432	4.44	3353.11	679.00	0.25
Reach-1	31273	100 future	revised existing	6051.00	912.00	925.52		925.67	0.001456	4.48	3376.26	707.21	0.25
Reach-1	30960.21	100 future	revised proposed	6051.00	912.00	925.31		925.36	0.000611	3.07	5221.22	929.03	0.17
Reach-1	30960.21	100 future	revised existing	6051.00	912.00	925.31		925.36	0.000600	3.04	5181.46	892.52	0.17
Reach-1	30904.46	100 future	revised proposed	6051.00	912.00	925.25	921.03	925.32	0.000639	3.34	4881.35	865.36	0.18
Reach-1	30904.46	100 future	revised existing	6051.00	912.00	925.25	921.03	925.32	0.000646	3.36	5003.04	939.95	0.18
Reach-1	30886.46			Bridge									
Reach-1	30803.00	100 future	revised proposed	6051.00	912.00	924.89	920.80	925.08	0.001371	4.01	2857.91	759.76	0.25
Reach-1	30803.00	100 future	revised existing	6051.00	912.00	924.90	920.80	925.09	0.001354	3.99	2882.72	762.75	0.25
Reach-1	30713.78	100 future	revised proposed	6051.00	912.00	924.83		924.93	0.000986	3.80	4043.26	847.63	0.21
Reach-1	30713.78	100 future	revised existing	6051.00	912.00	924.83		924.94	0.001080	3.97	3803.59	794.99	0.22
Reach-1	30591	100 future	revised proposed	6051.00	912.00	924.75		924.82	0.000757	3.30	4626.55	851.52	0.18
Reach-1	30591	100 future	revised existing	6051.00	912.00	924.75		924.82	0.000756	3.30	4628.27	851.58	0.18
Reach-1	30343	100 future	revised proposed	6051.00	914.00	924.51		924.59	0.001120	3.97	4237.60	890.61	0.23
Reach-1	30343	100 future	revised existing	6051.00	914.00	924.51		924.59	0.001131	3.99	4256.19	908.00	0.23
Reach-1	29987	100 future	revised proposed	6051.00	912.00	924.34		924.36	0.000368	2.27	6793.59	1144.32	0.13
Reach-1	29987	100 future	revised existing	6051.00	912.00	924.34		924.36	0.000369	2.27	6793.75	1144.87	0.13
Reach-1	29349.80	100 future	revised proposed	6093.00	912.00	924.16	919.15	924.18	0.000226	1.74	8372.42	1385.91	0.10
Reach-1	29349.80	100 future	revised existing	6093.00	912.00	924.16	919.15	924.18	0.000226	1.74	8372.42	1385.91	0.10

Powder Springs Flood Study Plan: 1) revised proposed 2) revised existing
River = RIVER-1 Reach = Reach-1 RS = 32168.69 6.02 S - FIS-S VALLEY SECTION



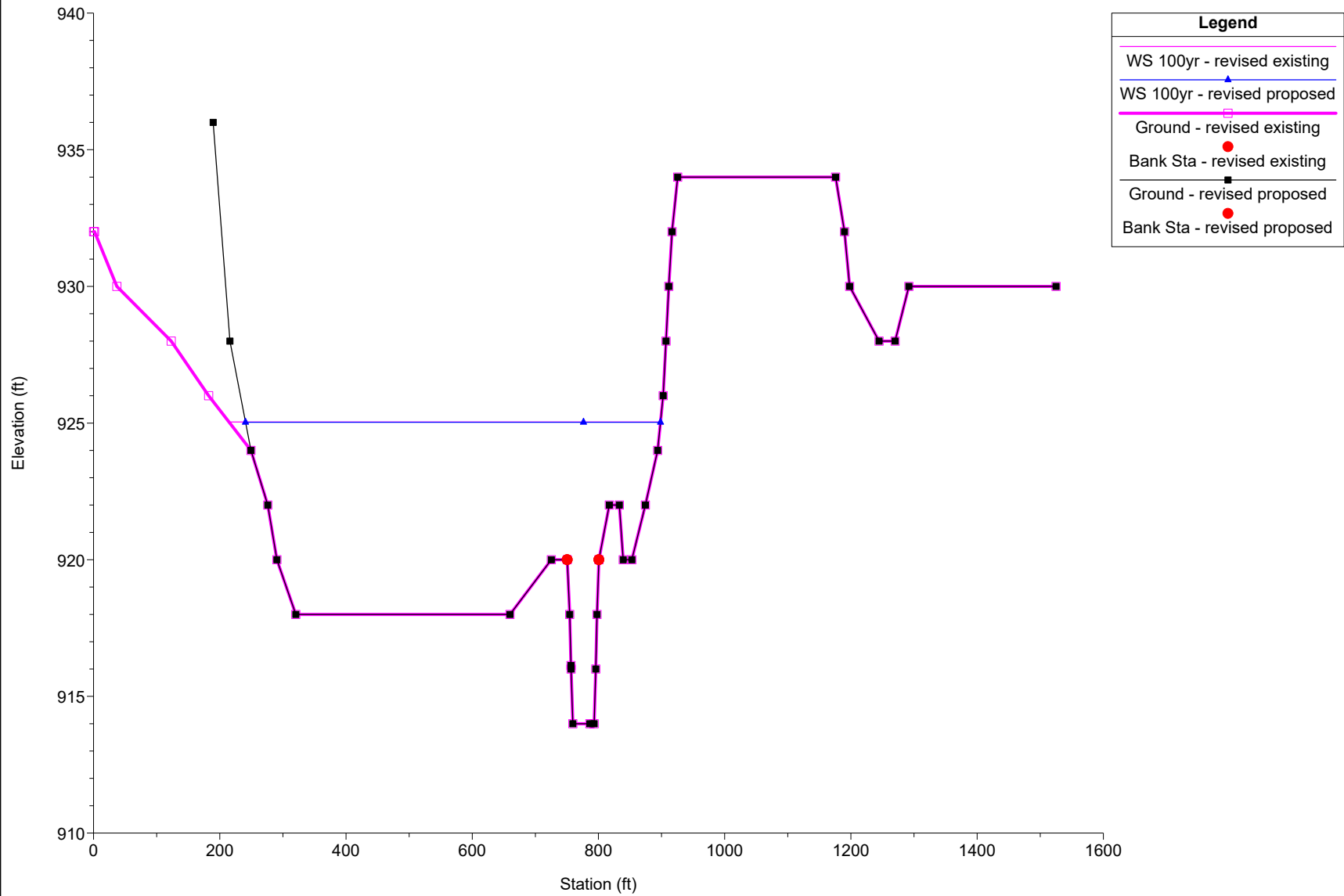
Powder Springs Flood Study Plan: 1) revised proposed 2) revised existing

River = RIVER-1 Reach = Reach-1 RS = 31781



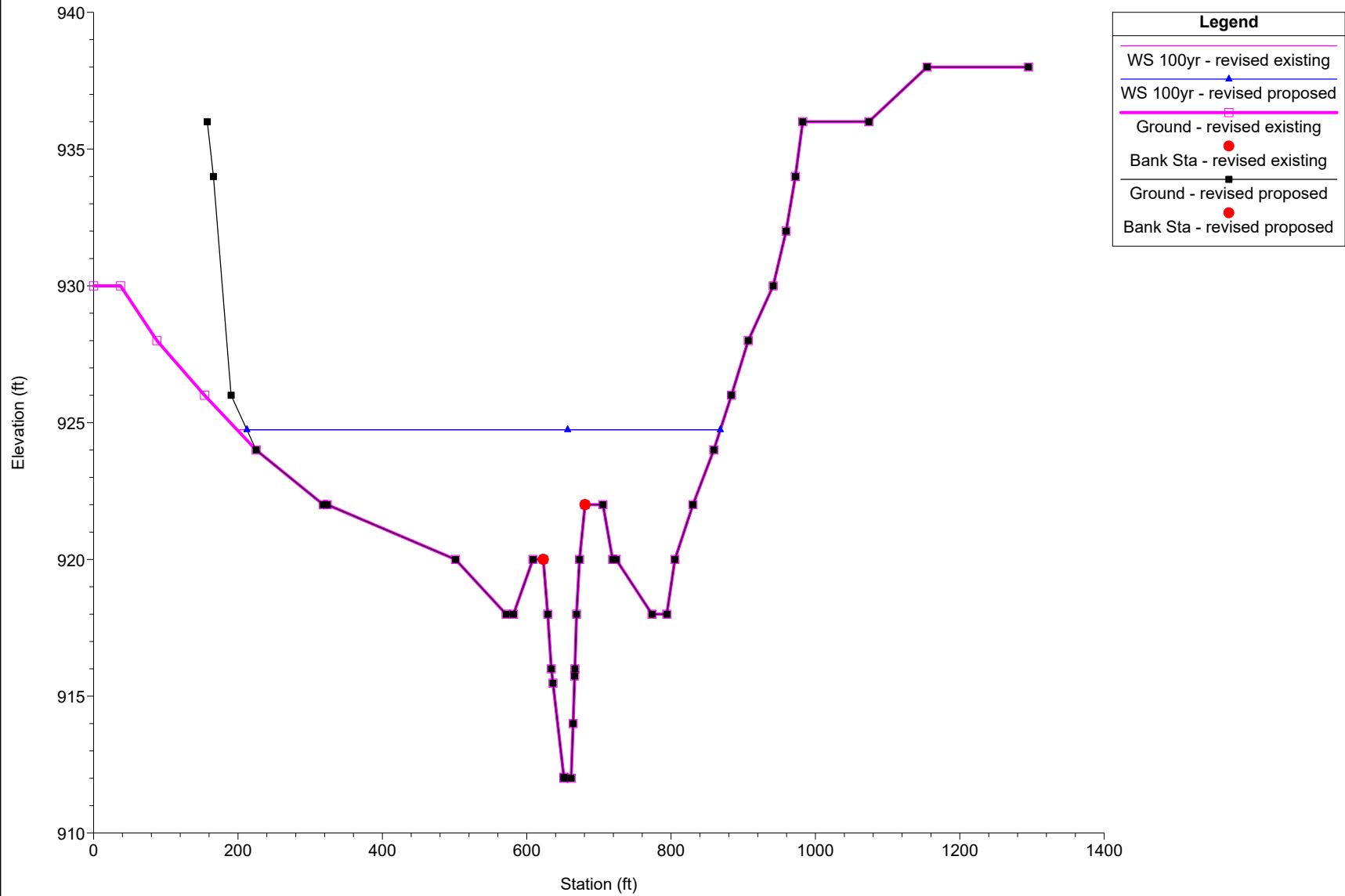
Powder Springs Flood Study Plan: 1) revised proposed 2) revised existing

River = RIVER-1 Reach = Reach-1 RS = 31467

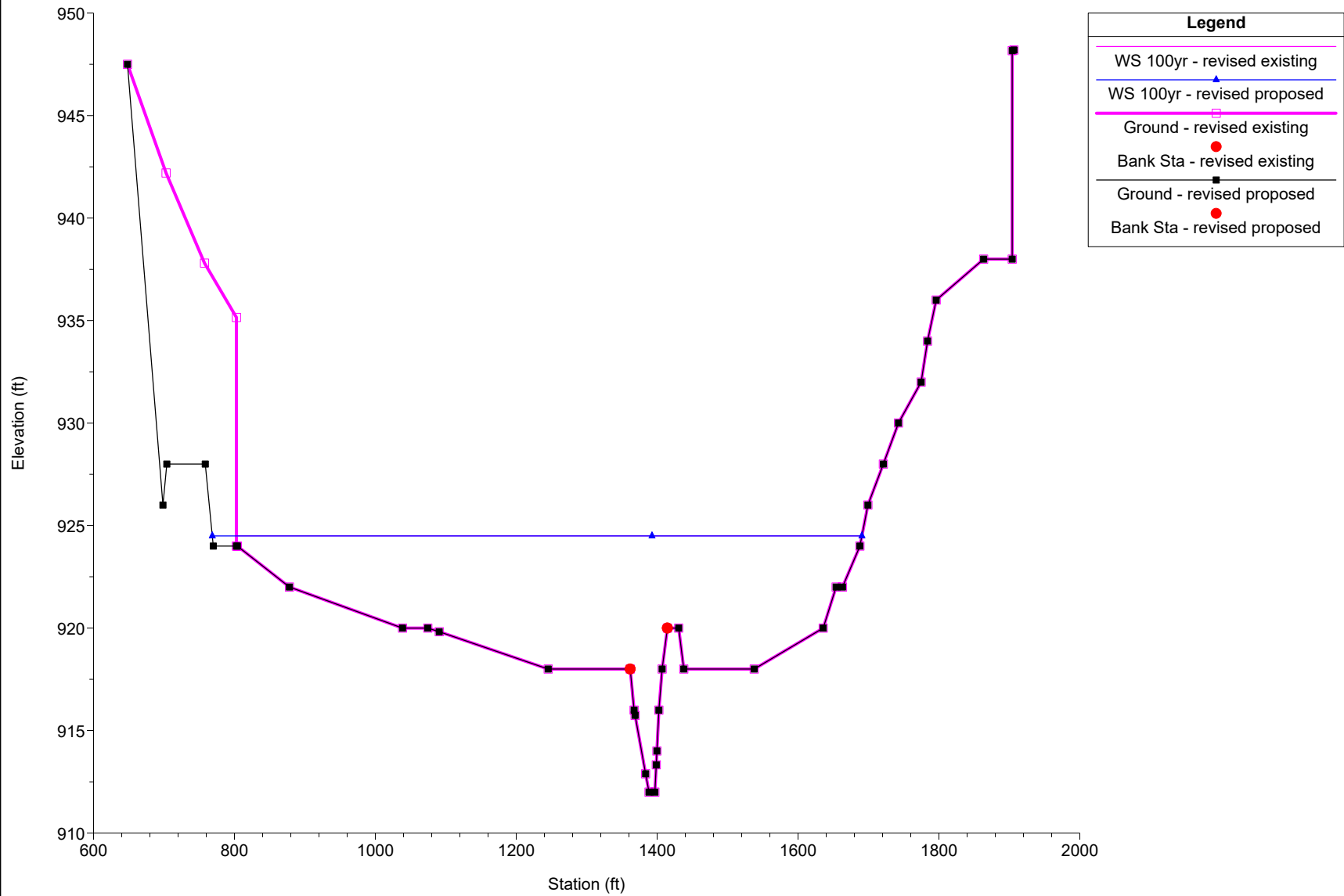


Powder Springs Flood Study Plan: 1) revised proposed 2) revised existing

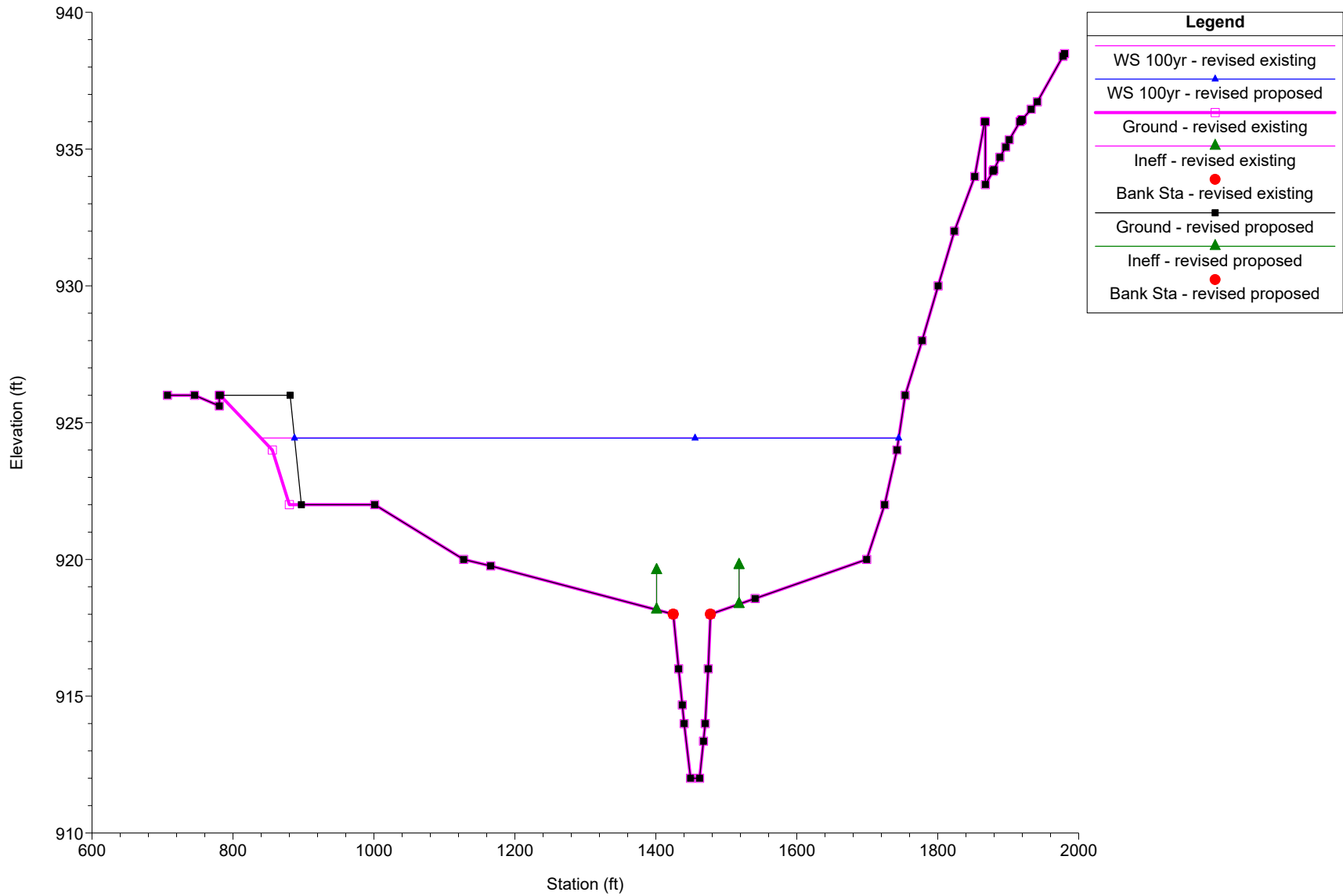
River = RIVER-1 Reach = Reach-1 RS = 31273



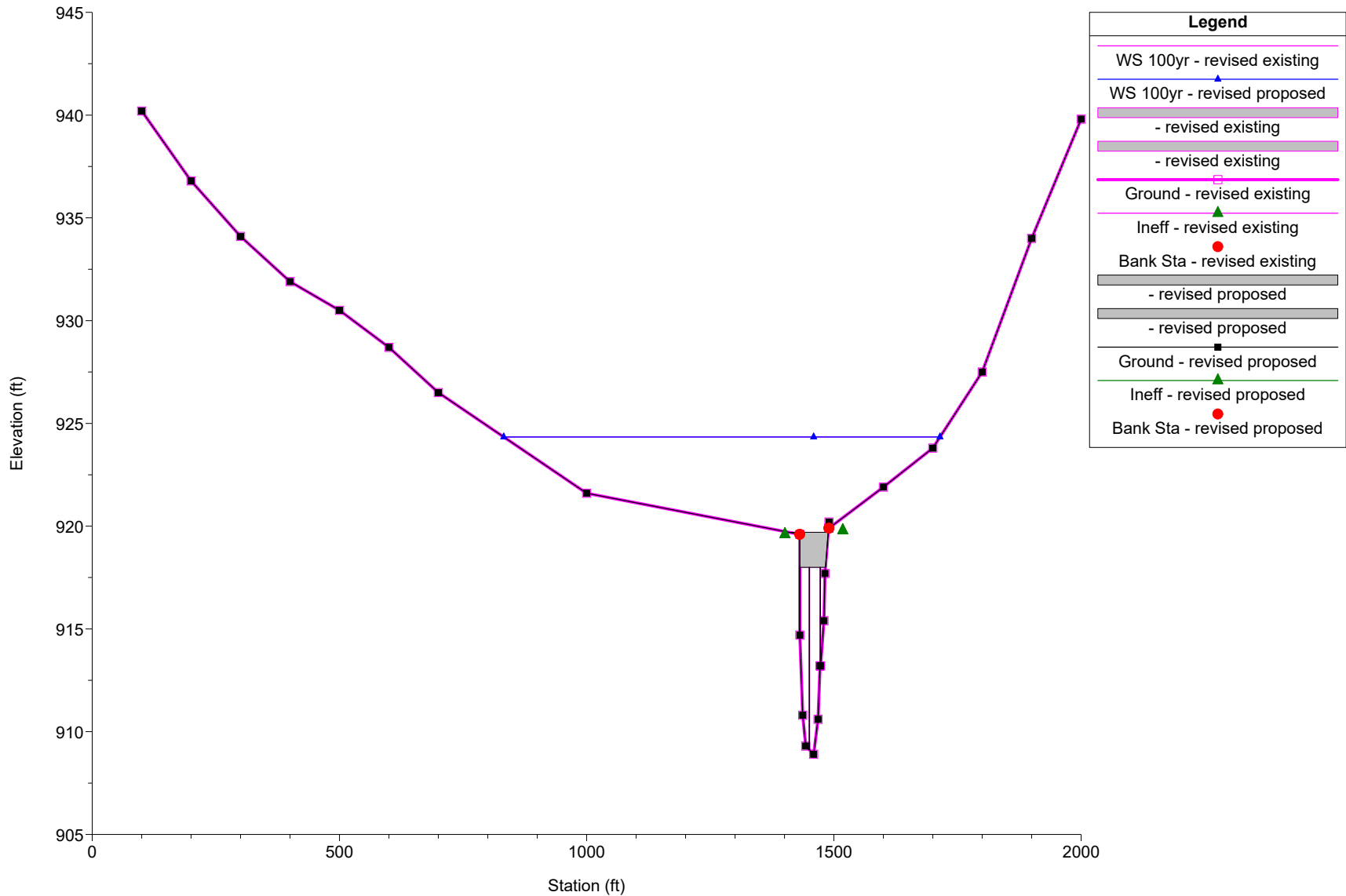
Powder Springs Flood Study Plan: 1) revised proposed 2) revised existing
River = RIVER-1 Reach = Reach-1 RS = 30960.21 5.77 C 006



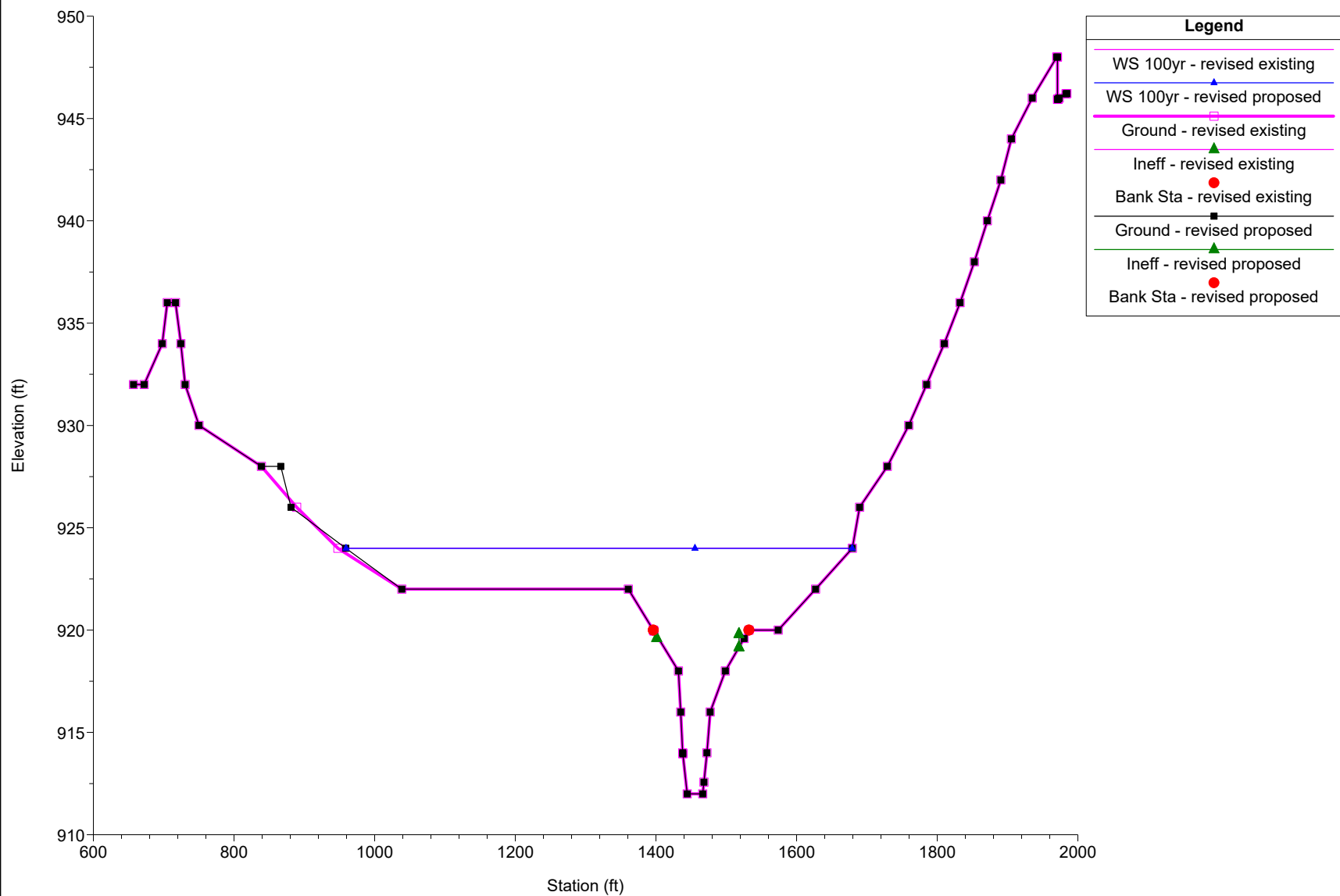
Powder Springs Flood Study Plan: 1) revised proposed 2) revised existing
River = RIVER-1 Reach = Reach-1 RS = 30904.46 5.761 This is a REPEATED section.ELLIOT ROAD U.S.



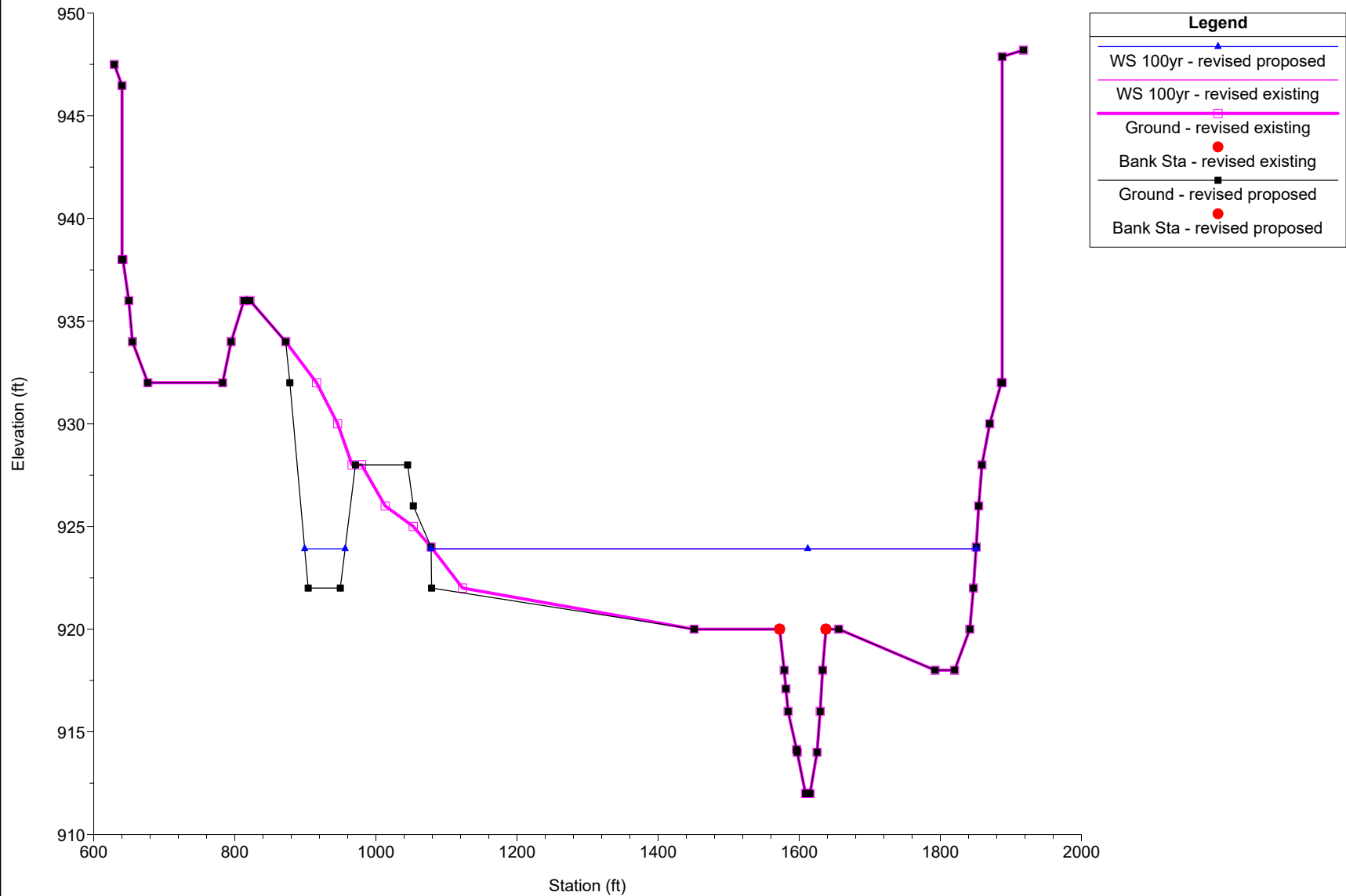
Powder Springs Flood Study Plan: 1) revised proposed 2) revised existing
 River = RIVER-1 Reach = Reach-1 RS = 30886.46 BR 5.7605 ELLIOT ROAD D.S Bridge #11



Powder Springs Flood Study Plan: 1) revised proposed 2) revised existing
River = RIVER-1 Reach = Reach-1 RS = 30803.00 5.76 ELLIOT ROAD D.S.

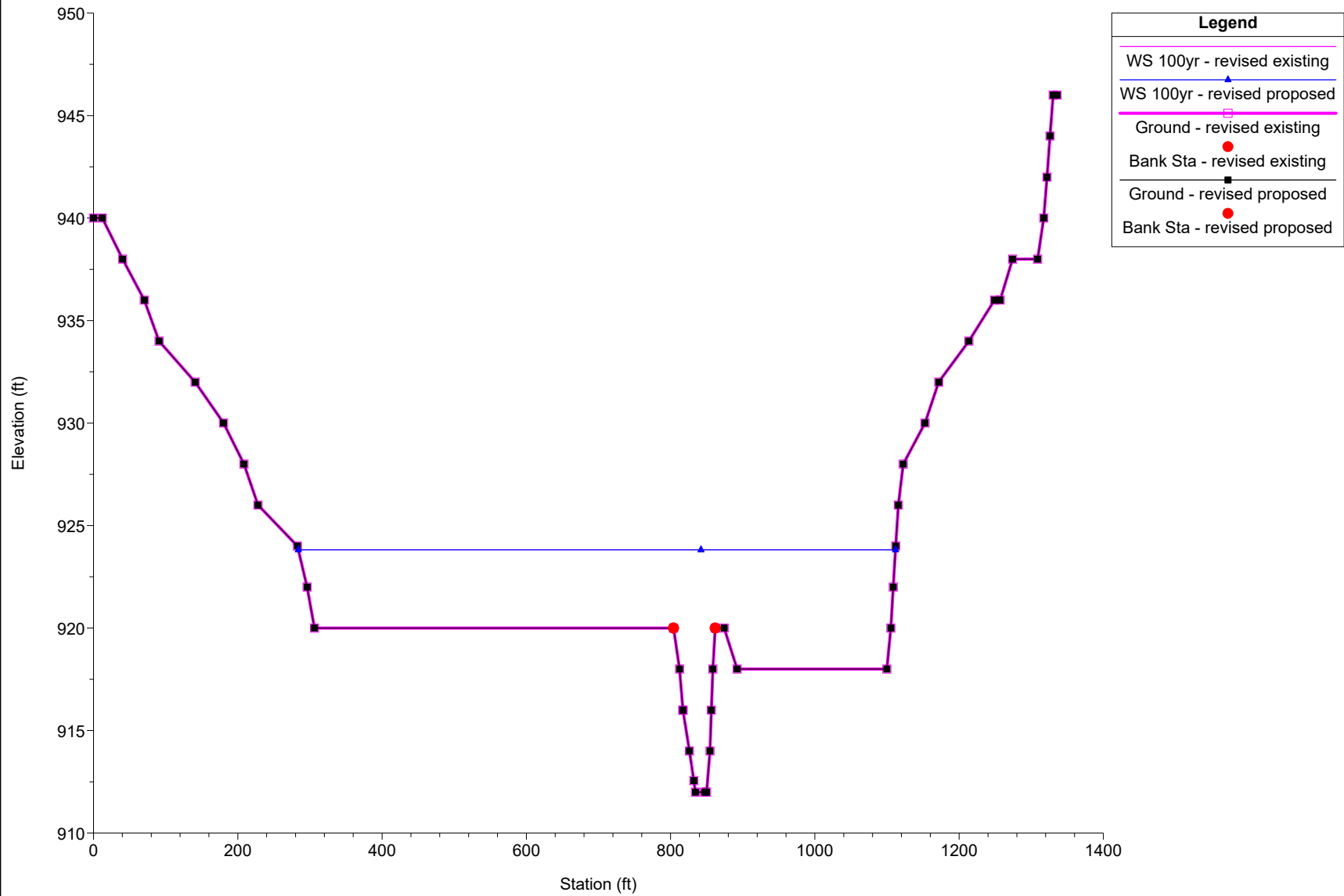


Powder Springs Flood Study Plan: 1) revised proposed 2) revised existing
River = RIVER-1 Reach = Reach-1 RS = 30713.78 5.75 R - *** FIS-R VALLEY SECTION ***MODIFIED***



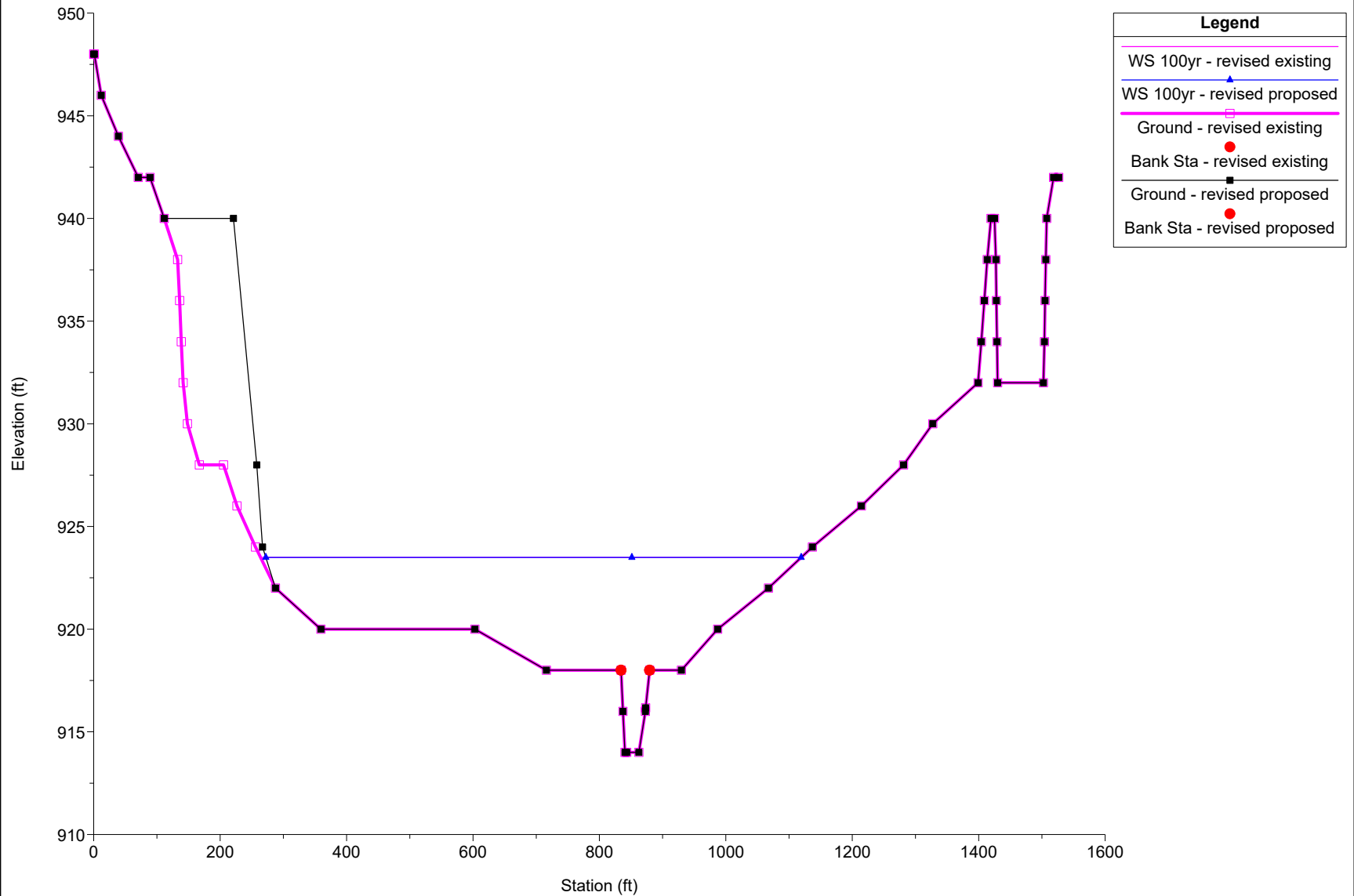
Powder Springs Flood Study Plan: 1) revised proposed 2) revised existing

River = RIVER-1 Reach = Reach-1 RS = 30591



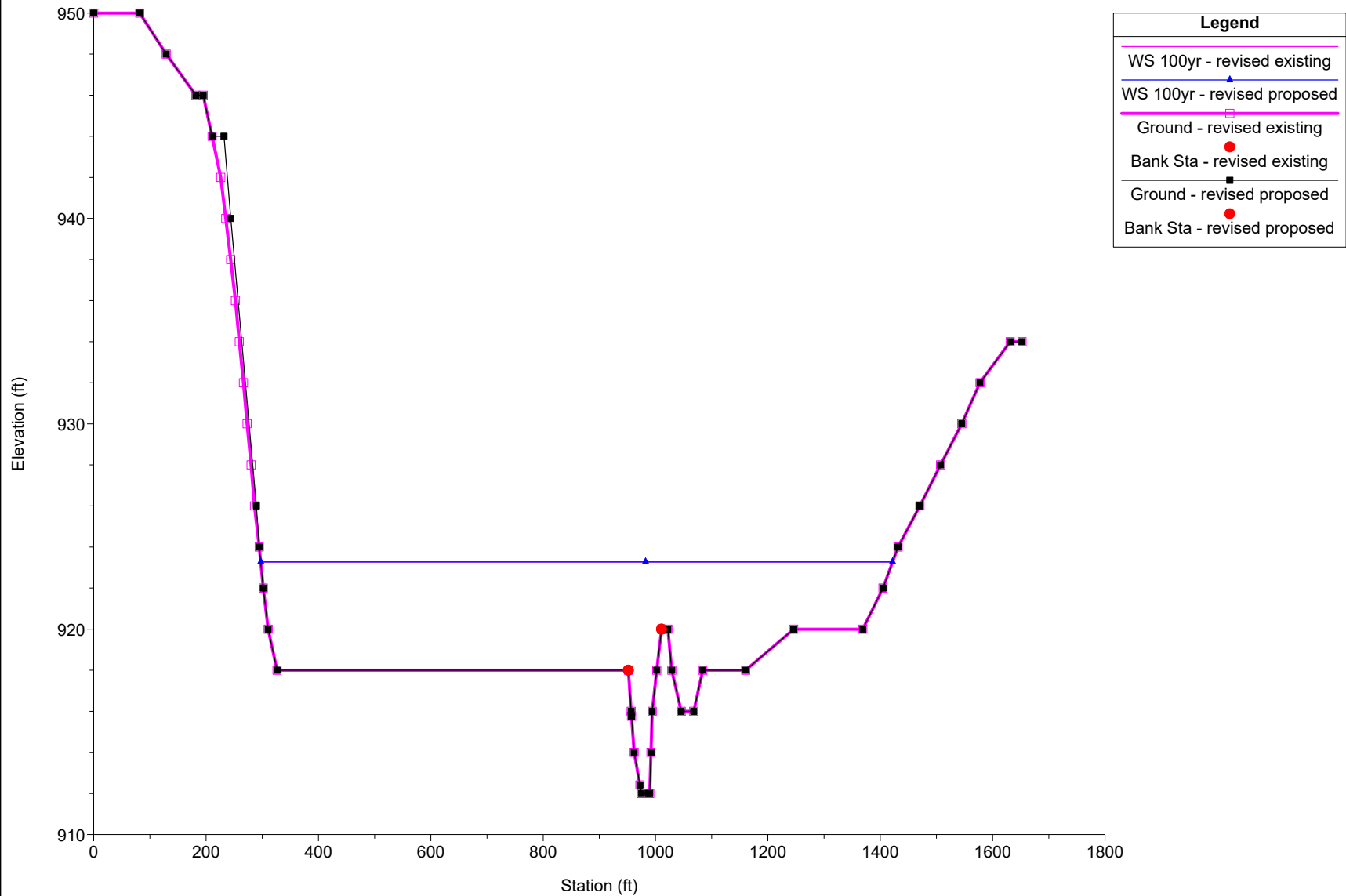
Powder Springs Flood Study Plan: 1) revised proposed 2) revised existing

River = RIVER-1 Reach = Reach-1 RS = 30343

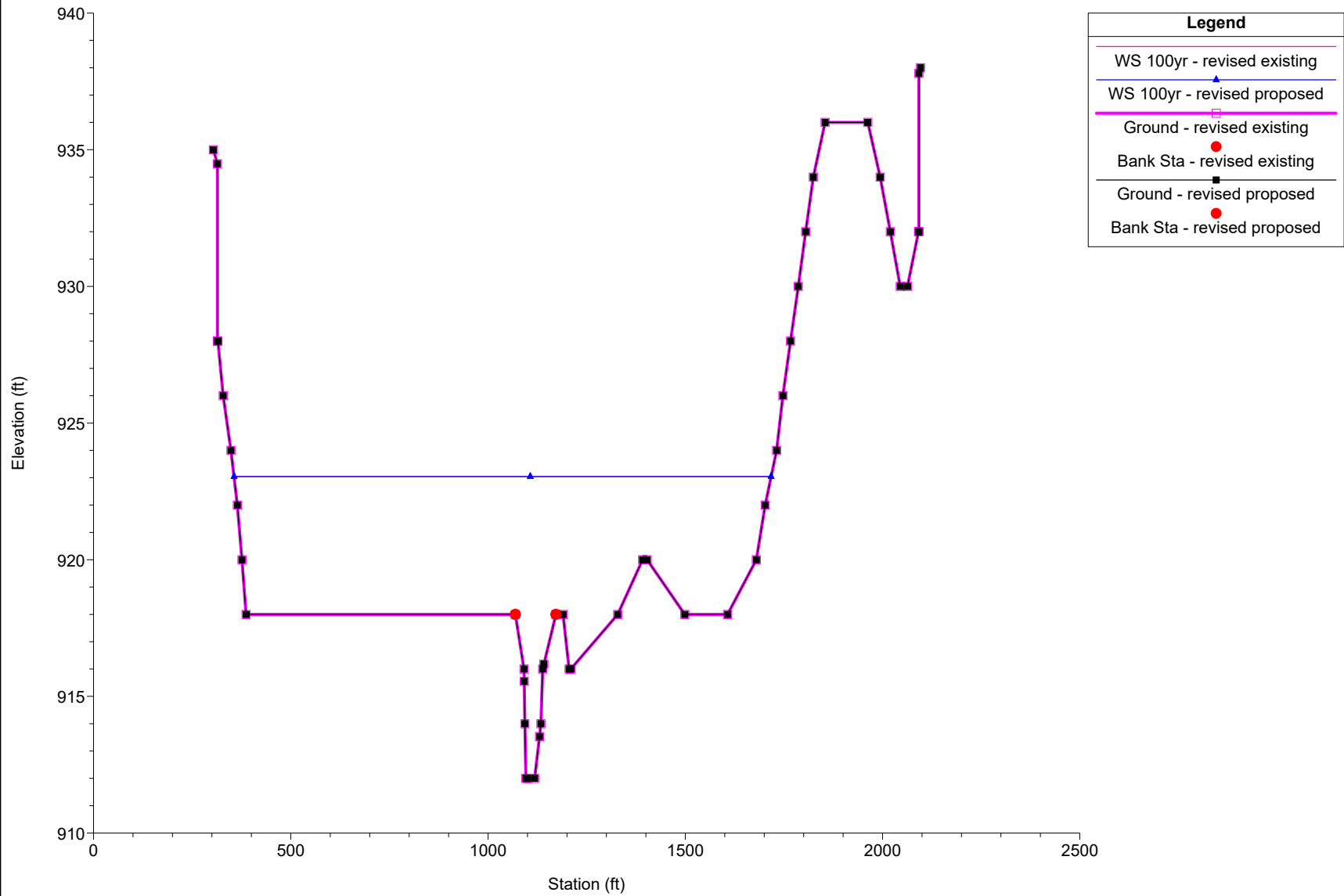


Powder Springs Flood Study Plan: 1) revised proposed 2) revised existing

River = RIVER-1 Reach = Reach-1 RS = 29987



Powder Springs Flood Study Plan: 1) revised proposed 2) revised existing
River = RIVER-1 Reach = Reach-1 RS = 29349.80 5.49 *** VALLEY SECTION ***NEW*****



HEC-RAS HEC-RAS 6.4.1 June 2023
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```

X      X  XXXXXX      XXXX      XXXX      XX      XXXX
X      X  X          X      X      X      X      X
X      X  X          X          X      X      X      X
XXXXXXXX XXXX      X      XXX XXXX      XXXXXX      XXXX
X      X  X          X          X      X      X      X
X      X  X          X      X      X      X      X
X      X  XXXXXX      XXXX      X      X      X      X

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PROJECT DATA

Project Title: Powder Springs Flood Study
Project File : Powder2006revtopo.prj
Run Date and Time: 3/9/2025 3:36:06 PM

Project in English units

Project Description:

Cobb County Stormwater Division Contract SW653
ORIGINAL HEC 2 DATA FROM
FEMA FLOOD STUDY

*

001

*

001

BASIN WIDE STORMWATER CAPITAL IMPROVEMENT STUDIES

* 001

PRIORITY AREA 1

* 001

COBB COUNTY, GEORGIA

* 001

POWDER SPRINGS

CREEK EXISTING CONDITIONS

*

001

*

001

(DISCHARGES FROM HEC-1 ANALYSIS)

* 001

COBB COUNTY STORMWATER STUDY

T1 039

2 YR B/W - DUPLICATE

EFFECTIVE

T2

040

041

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PLAN DATA

Plan Title: revised proposed

Plan File : C:\Users\joanw\OneDrive\ridge\elliott road\comment
response\Powder2006revtopo.p07

Geometry Title: revised

Geometry File : C:\Users\joanw\OneDrive\ridge\elliott road\comment
response\Powder2006revtopo.g02

Flow Title : revised existing

Flow File : C:\Users\joanw\OneDrive\ridge\elliott road\comment
response\Powder2006revtopo.f05

Plan Summary Information:

Number of: Cross Sections	=	12	Multiple Openings	=	0
Culverts	=	0	Inline Structures	=	0
Bridges	=	1	Lateral Structures	=	0

Computational Information

Water surface calculation tolerance	=	0.01
Critical depth calculation tolerance	=	0.01
Maximum number of iterations	=	20
Maximum difference tolerance	=	0.3
Flow tolerance factor	=	0.001

Computation Options

Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: revised existing

Flow File : C:\Users\joanw\OneDrive\ridge\elliott road\comment
response\Powder2006revtopo.f05

Flow Data (cfs)

River	Reach	RS	100yr	100 future
RIVER-1	Reach-1	32168.69	5111	6051
RIVER-1	Reach-1	29349.80	5149	6093

Boundary Conditions

River Downstream	Reach	Profile	Upstream
RIVER-1	Reach-1	100yr	
Known WS = 923.04			
RIVER-1	Reach-1	100 future	
Known WS = 924.16			

GEOMETRY DATA

Geometry Title: revised

Geometry File : C:\Users\joanw\OneDrive\ridge\elliott road\comment
response\Powder2006revtopo.g02

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 32168.69

INPUT

Description: 6.02 S - FIS-S VALLEY SECTION
C 006

Station Elevation Data			num=	51					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
24.04	950	25.35	950	73.92	948	172.82	946	193.57	944
215.73	942	250.54	942	265.39	940	278.79	938	288.77	936
298.07	934	305.88	932	318.46	930	329.79	928	362.89	926
410.14	924	453.3	922	503.71	922	516.68	924	783.41	924
842.46	922	884.29	920	889.19	920	959.34	922	998.64	924
1003.57	926	1009.75	926	1014.74	924	1025.26	922	1026.96	920
1028.64	918	1030.21	916.43	1030.64	916	1034.22	914	1054.38	914
1060.21	915.73	1061.12	916	1065.32	918	1067.33	920	1068.67	922
1070.34	924	1090.23	924	1104.94	922	1586.81	922	1604.51	924

1616.99	926	1618.29	926	1618.29	919.8	1775.09	920.7	1811.28	927.5
1928.01	941.3								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
24.04	.12	1009.75	.055	1070.34	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1009.75	1070.34		387.99	387.99		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 31781

INPUT

Description:

Station	Elevation	Data	num=	44					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	936	14.13	936	95	934	143	930	159	926
193	926	193	930	205	930	224	930	236	926
237.95	926	252.06	924	264.84	922	277.64	920	298.8	918
366.3	918	710.03	920	755.16	920	811.95	922	819.14	922
823.66	920	825.66	918	828.75	916	835.19	914	841.19	914
871.19	914	873.1	914	877.05	916	880.59	918	884.32	920
1121.08	920	1229.28	922	1443.85	922	1460.12	924	1470.3	926
1488.51	928	1497.77	930	1503.61	932	1510.88	934	1526.75	936
1680.62	936	1740.41	938	1775.84	940	1795.44	940		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	811.95	.055	884.32	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	811.95	884.32		313.95	313.95		.1	.3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 31467

INPUT

Description:

Station	Elevation	Data	num=	36				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta
189.5	936	216	928	249.38	924	275.96	922	290.5
320.5	918	659.79	918	725.37	920	750.47	920	754.36

756.49	916.13	756.64	916	759.46	914	786.49	914	793.15	914
795.68	916	797.65	918	800.67	920	817.26	922	833.09	922
839.14	920	852.8	920	874.28	922	893.79	924	902.57	926
907.08	928	911.43	930	916.53	932	925.57	934	1175.71	934
1189.82	932	1197.88	930	1244.51	928	1270.01	928	1291.88	930
1525.04	930								

Manning's n Values	num=	3
Sta n Val Sta n Val Sta n Val		
189.5 .12 750.47 .055 800.67 .12		

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
750.47	800.67	193.6	193.6	193.6		.1	.3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 31273

INPUT

Description:

Station Elevation Data	num=	40
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev		
157.5 936 166 934 190.5 926 225.21 924 318.31 922		
323.73 922 501.24 920 571.43 918 581.73 918 608.6 920		
622.94 920 629.02 918 634.13 916 636.41 915.48 651.41 912.04		
651.6 912 661.62 912 664.37 914 666.41 915.74 666.71 916		
668.96 918 673.09 920 680.75 922 705.57 922 718.96 920		
723.84 920 773.59 918 794.04 918 805.39 920 830.35 922		
859.05 924 883.67 926 906.91 928 941.37 930 959.25 932		
972.22 934 982.46 936 1073.95 936 1154.74 938 1295.2 938		

Manning's n Values	num=	3
Sta n Val Sta n Val Sta n Val		
157.5 .12 622.94 .055 680.75 .12		

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
622.94	680.75	312.95	312.95	312.95		.1	.3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 30960.21

INPUT

Description: 5.77 C

Station Elevation Data	num=	006
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev		
40		

648.16	947.5	698.5	926	704	928	758.5	928	770	924
802.79	924	804.13	924	877.96	922	1038.5	920	1074.43	920
1090.62	919.82	1245.31	918	1361.86	918	1367.37	916	1368.73	915.74
1383.73	912.89	1388.39	912	1396.86	912	1398.73	913.33	1399.67	914
1402.47	916	1407.12	918	1414.53	920	1430.64	920	1437.86	918
1537.72	918	1635.77	920	1653.96	922	1663.04	922	1687.74	924
1699.28	926	1721.1	928	1742.5	930	1774.67	932	1783.84	934
1796.1	936	1863.38	938	1903.96	938	1903.96	948.17	1906.4	948.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
648.16	.12	1361.86	.055	1414.53	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1361.86	1414.53		55.74	55.74		.3	.5

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 30904.46

INPUT

Description: 5.761 This is a REPEATED section.

ELLIOT ROAD U.S.

Station Elevation Data						C 006			
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
707	926	745.36	926	780.56	925.61	780.56	926	781.87	926
881	926	897	922	1001.15	922	1127.23	920	1165.77	919.76
1424.78	918	1432.43	916	1437.52	914.68	1440.15	914	1449.31	912
1462.03	912	1467.52	913.36	1470.13	914	1474.34	916	1477.53	918
1540.72	918.57	1699.15	920	1724.66	922	1741.98	924	1753.79	926
1777.85	928	1800.48	930	1823.57	932	1852.36	934	1866.45	936
1867.5	936	1867.5	933.7	1878.39	934.19	1879.66	934.24	1888.09	934.7
1896.28	935.07	1901.58	935.34	1916.64	936	1918.73	936.05	1919.56	936.08
1932.69	936.46	1941.35	936.73	1977.6	938.39	1979.85	938.49		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
707	.12	1424.78	.055	1477.53	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1424.78	1477.53		101.46	101.46		.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
707	1401	919.6	F
1518	1979.85	919.79	F

Sediment Elevation = 0

BRIDGE

RIVER: RIVER-1

REACH: Reach-1 RS: 30886.46

INPUT

Description: 5.7605 ELLIOT ROAD D.S Bridge #11

Distance from Upstream XS = 30

Deck/Roadway Width = 30

Weir Coefficient = 2.6

Upstream Deck/Roadway Coordinates

num= 2

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
100	919.7		918		2000	919.7		918	

Upstream Bridge Cross Section Data

Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
100.001	940.2	200	936.8	300	934.1	400	931.9	500	930.5
600	928.7	700	926.5	1000	921.6	1431	919.6	1431	914.7
1437	910.8	1443	909.3	1459	908.9	1468	910.6	1472	913.2
1473	913.2	1480	915.4	1482	917.7	1490	920.2	1490	919.9
1600	921.9	1700	923.8	1800	927.5	1900	934	2000	939.8

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
100.001	.15	1431	.05	1490	.15

Bank Sta: Left Right Coeff Contr. Expan.

1431 1490 .3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
100.001	1401	919.6	F
1518	2000	919.79	F

Sediment Elevation = 0

Downstream Deck/Roadway Coordinates

num= 2

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
100	919.7		918		2000	919.7		918	

Downstream Bridge Cross Section Data

Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
100.001	940.2	200	936.8	300	934.1	400	931.9	500	930.5
600	928.7	700	926.5	1000	921.6	1431	919.6	1431	914.7
1437	910.8	1443	909.3	1450	909.3	1451	909.3	1459	908.9
1468	910.6	1480	915.4	1482	917.7	1490	920.2	1490	919.9

1600 921.9 1700 923.8 1800 927.5 1900 934 2000 939.8

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 100.001 .15 1431 .05 1490 .15

Bank Sta: Left Right Coeff Contr. Expan.
 1431 1490 .3 .5

Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 100.001 1401 919.6 F
 1518 2000 919.79 F

Sediment Elevation = 0

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins = 919.7
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data

Pier Station Upstream= 1450.5 Downstream= 1450.5
 Upstream num= 2
 Width Elev Width Elev
 1 0 1 1100
 Downstream num= 2
 Width Elev Width Elev
 1 0 1 1100

Pier Data

Pier Station Upstream= 1472.5 Downstream= 1472.5
 Upstream num= 2
 Width Elev Width Elev
 1 0 1 1100
 Downstream num= 2
 Width Elev Width Elev
 1 0 1 1100

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy
 Momentum Cd = 2
 Yarnell KVal = 1.25
 Selected Low Flow Methods = Highest Energy Answer

High Flow Method

Pressure and Weir flow

Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters

Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 30803.00

INPUT

Description: 5.76 ELLIOT ROAD D.S.

C 006

Station Elevation Data				num=	50				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
657	932	672.26	932	698.03	934	705.08	936	716.79	936
724.37	934	730.45	932	750.2	930	838.93	928	866.5	928
881	926	959	924	1038.66	922	1360.67	922	1396.35	920
1397.3	919.95	1432.03	918	1435.15	916	1438.09	914	1438.25	913.95
1444.47	912	1466.56	912	1468.25	912.57	1472.54	914	1477.21	916
1498.71	918	1525.38	919.59	1532.27	920	1573.8	920	1627.07	922
1679.31	924	1689.63	926	1729.08	928	1759.52	930	1784.94	932
1809.96	934	1832.61	936	1852.86	938	1871.27	940	1890.45	942
1905.45	944	1935.19	946	1970	948	1971.07	948	1971.07	945.93
1971.61	945.95	1971.85	945.95	1973.59	946	1983.12	946.21	1984.36	946.22

Manning's n Values				num=	3
Sta	n Val	Sta	n Val	Sta	n Val
657	.12	1396.35	.055	1532.27	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1396.35	1532.27		89.22	89.22		.3	.5

Ineffective Flow				num=	2
Sta L	Sta R	Elev	Permanent		
657	1401	919.6	F		
1518	1984.36	919.79	F		

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 30713.78

INPUT

Description: 5.75 R - *** FIS-R VALLEY SECTION ***MODIFIED***

C 006

*** REACH LENGTH SHORTENED TO

ACOUNT FOR NEW X-SEC 5.490

C

006

*

001

001

*

001

Q DATA FROM

HEC-1 ANALYSIS

* 001

*

001

REACH LENGTH IN FOLLOWING X1

CARD MODIFIED

Station Elevation Data num= 47

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
629.18	947.5	640.1	946.47	640.1	938	641.45	938	649.84	936
654.89	934	676.84	932	782.81	932	794.84	934	812.99	936
821.46	936	872.22	934	878	932	904	922	949.5	922
971	928	1045	928	1053	926	1078.14	924	1079	922
1451.02	920	1572.19	920	1578.73	918	1581.19	917.09	1584.12	916
1596.19	914.14	1597.1	914	1608.92	912	1611.19	912	1615.36	912
1625.2	914	1629.71	916	1633.1	918	1637.87	920	1656.06	920
1792.47	918	1820.23	918	1841.82	920	1846.94	922	1850.83	924
1854.32	926	1858.96	928	1870.09	930	1886.44	932	1887.57	932
1887.57	947.88	1917.92	948.2						

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
629.18	.12	1572.19	.055	1637.87	.12

Bank Sta: Left Right

1572.19 1637.87

Lengths: Left Channel Right

122.98 122.98 122.98

Coeff Contr.

.1

Expan.

.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 30591

INPUT

Description:

Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	940	12.1	940	40.23	938	70.28	936	90.86	934
140.73	932	180.3	930	208.61	928	227.95	926	282.6	924
296	922	306.27	920	804.01	920	812.42	918	817.15	916
817.2	915.99	826.15	914	832.2	912.56	834.53	912	847.2	912
849.87	912	854.55	914	856.58	916	858.64	918	861.95	920
874.31	920	892.37	918	1099.73	918	1105.42	920	1108.7	922
1112.2	924	1115.81	926	1122.62	928	1152.8	930	1171.64	932
1213.52	934	1249.17	936	1256.88	936	1274.09	938	1308.92	938
1317.38	940	1321.88	942	1326.02	944	1330.43	946	1335.69	946

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	804.01	.055	861.95	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	804.01	861.95		247.51	247.51		.1	.3

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 30343

INPUT

Description:

Station Elevation Data	num=	46							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	948	1.02	948	11.89	946	39.18	944	70.45	942
89.02	942	111.45	940	221	940	258	928	267	924
287.53	922	359.45	920	603.14	920	716.11	918	834.22	918
837.26	916	840.29	914	843.2	914	862.4	914	872.63	916
873.2	916.17	879.49	918	929.68	918	987.04	920	1067.35	922
1136.89	924	1214.39	926	1281.1	928	1327.29	930	1398.96	932
1404.15	934	1408.83	936	1413.49	938	1419.49	940	1424.96	940
1427.2	938	1427.99	936	1428.87	934	1429.9	932	1502.33	932
1503.91	934	1505	936	1506.09	938	1507.43	940	1518.39	942
1526.52	942								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	834.22	.055	879.49	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	834.22	879.49		356.21	356.21		.1	.3

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 29987

INPUT

Description:

Station Elevation Data		num=		41					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	950	81.99	950	129.11	948	181.98	946	194.83	946
210.84	944	232	944	244	940	289.5	926	294.69	924
301.85	922	310.44	920	326.45	918	951.7	918	956.58	916
957.22	915.76	961.88	914	972.22	912.41	974.87	912	987.22	912
989.65	912	991.9	914	994.19	916	1002.19	918	1010.89	920
1022.04	920	1028.88	918	1045.67	916	1067.9	916	1084.02	918
1160.48	918	1245.95	920	1368.92	920	1404.78	922	1431.6	924
1470.58	926	1507.25	928	1545.14	930	1577.37	932	1631.3	934
1652.24	934								

Manning's n Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.12	951.7	.055	1010.89	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	951.7	1010.89		637.28	637.28		.1	.3

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 29349.80

INPUT

Description: 5.49 *** VALLEY SECTION ***NEW*****

C 006

*** MEASURED FROM USGS TOPO, CHANNEL

SECTION FROM HEC-2

C

006

*** X-SEC

5.430

DELETED

C

006

***U/S X-SECTION (FULL VALLEY)

*

001

***MEASURED FROM USGS

TOPO, CHANNEL X-SEC FROM HEC-2

*

001

Station Elevation Data		num=		47					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
303.72	935	314.12	934.49	314.12	928	315.13	928	328.46	926
348.26	924	364.47	922	376.12	920	386.71	918	1069.35	918
1091.14	916	1091.62	915.55	1093.23	914	1095.86	912	1100.35	912
1118.21	912	1130.35	913.53	1134.11	914	1138.57	916	1141.62	916.18
1171.95	918	1190.1	918	1205.33	916	1209.9	916	1328.71	918
1391.88	920	1403.29	920	1498.65	918	1607.04	918	1680.03	920

1702.64	922	1731.3	924	1747.36	926	1766.73	928	1786.26	930
1804.93	932	1824.36	934	1854.21	936	1962.48	936	1993.85	934
2019.57	932	2044.83	930	2063.13	930	2091	932	2092	932
2092	937.79	2096.28	938						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
303.72	.12	1069.35	.055	1171.95	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1069.35	1171.95		29137.1	29349.829345.98		.3	.5

Sediment Elevation = 0

SUMMARY OF MANNING'S N VALUES

River:RIVER-1

Reach	River Sta.	n1	n2	n3
Reach-1	32168.69	.12	.055	.12
Reach-1	31781	.12	.055	.12
Reach-1	31467	.12	.055	.12
Reach-1	31273	.12	.055	.12
Reach-1	30960.21	.12	.055	.12
Reach-1	30904.46	.12	.055	.12
Reach-1	30886.46	Bridge		
Reach-1	30803.00	.12	.055	.12
Reach-1	30713.78	.12	.055	.12
Reach-1	30591	.12	.055	.12
Reach-1	30343	.12	.055	.12
Reach-1	29987	.12	.055	.12
Reach-1	29349.80	.12	.055	.12

SUMMARY OF REACH LENGTHS

River: RIVER-1

Reach	River Sta.	Left	Channel	Right
Reach-1	32168.69	387.99	387.99	387.99
Reach-1	31781	313.95	313.95	313.95
Reach-1	31467	193.6	193.6	193.6
Reach-1	31273	312.95	312.95	312.95
Reach-1	30960.21	55.74	55.74	55.74
Reach-1	30904.46	101.46	101.46	101.46

Reach-1	30886.46	Bridge		
Reach-1	30803.00	89.22	89.22	89.22
Reach-1	30713.78	122.98	122.98	122.98
Reach-1	30591	247.51	247.51	247.51
Reach-1	30343	356.21	356.21	356.21
Reach-1	29987	637.28	637.28	637.28
Reach-1	29349.80	29137.1	29349.8	29345.98

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: RIVER-1

Reach	River Sta.	Contr.	Expan.
Reach-1	32168.69	.1	.3
Reach-1	31781	.1	.3
Reach-1	31467	.1	.3
Reach-1	31273	.1	.3
Reach-1	30960.21	.3	.5
Reach-1	30904.46	.3	.5
Reach-1	30886.46	Bridge	
Reach-1	30803.00	.3	.5
Reach-1	30713.78	.1	.3
Reach-1	30591	.1	.3
Reach-1	30343	.1	.3
Reach-1	29987	.1	.3
Reach-1	29349.80	.3	.5