2009P062

Chandler Heights Road Bridge Over the East Maricopa Floodway Scour Analysis

Greenfield and Chandler Heights Improvements

TOG Project No. ST076

November 2009

GILBERT
ARIZONA

Prepared for
Town of Gilbert

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EXPIRES: 3-31-12

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Post-Project HEC-RAS Analysis (NAVD 88)

Scour Calculations

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1 EAST MARICOPA HYDRAULICS

1.1 Background

The East Maricopa Floodway (EMF) is one of the major regional outfalls for the eastern Maricopa County cities. In 1999, HNTB Corporation, under contract with the Flood Control District of Maricopa County, assessed the conveyance capacity of the entire EMF for three 100-year discharge rates: the original design discharges; the future discharges under the future land use in the watershed; and the existing discharges under the 1999 land use. One of the objectives of HNTB's study was to develop the HEC-RAS models to determine the existing channel performance for the three 100-year discharge rates.

The total EMF project is divided into six reaches from the downstream end at Gila River (Reach 1) to the upstream end at Princess Park (Reach 6). The portion of the EMF that contains the Chandler Heights Road Bridge is Reach 3. Within this portion of Reach 3, the EMF is a trapezoidal earthen channel with an approximate top width of 315 feet. The EMF channel crosses Chandler Heights Road at an 18 ½ -degree skew and flows in a southwesterly direction.

The EMF benchmark used for this project is #531 (See EMF Capacity Assessment Plan and Profile Sheets, Sheet 19 of 50). The EMF elevation of the benchmark is 1309.587 feet (NGVD29), and the project survey elevation for the benchmark is 1311.372 feet. Therefore a datum adjustment of + 1.785 feet is used to translate elevations from the EMF project elevations to the Chandler Heights Road Project.

Based on direction from FCDMC during the Chandler Heights Road Widening Kick-Off Meeting held on March 19, 2009, the 100-year design flow of 6,900 cfs is used to analyze the freeboard under the new bridge improvements and a 500-year (superflood) flow of 11,730 cfs (1.7 x 6,900) is used for estimating scour.

1.2 Hydraulic Modeling

As mentioned in the previous section, the Flood Control District of Maricopa County provided AZTEC with the effective HEC-RAS analysis to modify for the proposed bridge improvements. The hydraulic modeling was performed using the U.S. Army Corps of Engineers' HEC-RAS program, Version 3.1.3. Due to changes in the new versions of the program the effective model that was obtained did not run properly because there was not a distance from the upstream cross-section to the bridge deck. The effective model was then used as a basis for the duplicate effective model, which was adjusted by changing the distance to 1.0 feet and offsetting that value in the bridge deck width. Once these changes were completed the model ran properly and the water surface

elevations of the duplicate effective model were checked against the effective model water surface elevations. No significant differences were found between the two models.

A pre-project conditions model was created from the duplicate effective model to add in the man-made low-flow channel that has been placed within the EMF after the effective study was completed. The low-flow channel is uniform throughout the study reach with an average depth of 1.5 feet, a bottom width of 10 feet, and 5:1 side slopes.

Due to the bridge improvements included in this project, a post-project conditions HEC-RAS model was performed to verify that the pier extensions to the north and south sides of the bridge will not adversely impact the water surface elevations or freeboard under the bridge.

Improvements to the bridge will include widening of both the north and south side of the bridge and placing additional piers on the outside for the wider deck width. The post-project conditions model includes the new width of the bridge. The cross-sections immediately upstream and downstream of the bridge needed to be moved out and renumbered to accommodate the widening of the bridge deck.

Chandler Heights Road is a normal crown section. Due to the widening of the roadway section, the low chord of the bridge will be lowered by 0.15 feet on the north (upstream) end of the bridge and 0.21 feet on the south (downstream) end. These changes were also added to the HEC-RAS analysis to determine the provided freeboard.

The freeboard was determined based on the post-project conditions with the EMF under the Chandler Heights Road Bridge. The freeboard required, as stated by FCDMC, is the greater of 2.0 feet or 0.2*He for subcritical flows, where He is the specific energy head. The freeboard provided at the upstream section of the bridge is 5.11 feet and the freeboard provided at the downstream section of the bridge is 4.82 feet, exceeding the freeboard requirements.

1.3 Scour Analysis

The Drainage Design Manual for Maricopa County (DDMMC), Hydraulics, outlines the District's scour estimating methodology. The Chapter 11 (draft), Sedimentation, is dedicated to outlining the District's erosion and sedimentation procedures. Six forms of scour were considered or analyzed for this reach of the EMF in the vicinity of the Chandler Heights Road Bridge; long term degradation, general scour, local scour, bend scour, bed-form scour and scour due to low flow incisement. The following sections provide discussion of the results of investigating each form of scour.

1.3.1 LONG TERM DEGRADATION

Long term degradation was evaluated by comparing the bed slope at the time of the HNTB Study (1999) with the surveyed bed slope at the time of this project. The results of the evaluation indicate that the bed slope of the channel at the time of the HNTB study was 0.00046 ft/ft and the bed slope at the time of this project is 0.00112 ft/ft. This change in slope is minor over a period of 10 years. Since the channel is man-made and has grade control structures at regular intervals, the long term scour is not considered to be a factor in the total scour estimate for the bridge. A plan sheet from the channel reconstruction project in 1985 and a plan sheet from the HNTB HEC-RAS model are included in Appendix A.

1.3.2 GENERAL SCOUR

General scour is the lowering of all or part of the streambed or artificial channel due to stormwater runoff in a typical reach of channel. The three General Scour equations considered for this bridge crossing are the Neill, Blench and Lacey equations. The Neill equation is most applicable where there is a constriction in the channel due to a bridge or some other feature. In this location the bridge does not create a constriction, as described in the local scour discussion below, and the Neill equation was not applied.

The Blench equation is most applicable where there is a clear water condition imposed on the stream by a reservoir or a sand and gravel pit upstream of the project location. This situation does not exist in the project area either, so the Blench equation was not applied. Initially, both equations were tested and the calculations resulted in much deeper scour depths than would reasonably be expected for a man-made flood control channel with mild slopes and relatively low design velocities. One reason for this, at least in regards the Blench equation, is that the multiplying factor 'Z' is the same for a straight reach of channel as a severe bend, in either case Z=0.6. But for a right angle bend Z=1.25. Whereas for the Lacey equation, Z= 0.25 for a straight reach, 0.50 for a moderate bend, and so on up to 1.25 for a vertical rock bank or wall.

The Lacey equation, according to the DDMMC, is more applicable to a natural river system. The equation was, however, developed for use in irrigation canals with uniform section and slope and are relatively straight. This is the most applicable of the three equations to the East Maricopa Floodway in the Chandler Heights Road bridge reach. The calculations for General Scour using the Lacey equation are included in the Appendix.

1.3.3 LOCAL SCOUR

Local scour at a bridge can be caused by three main factors, bridge piers, abutments and contraction of the channel. With the Chandler Heights Road Bridge, the abutments

are not within the channel and the channel cross-section does not contract due to the bridge. The channel reach upstream and downstream of the Chandler Heights Road Bridge is straight, i.e. there are no contractions or bends in the channel section. There is a contraction and an expansion of the EMF approximately 300 feet upstream of the Chandler Heights Road Bridge. The contraction is not associated with the bridge and far enough from the bridge to have negligible local scour effects, and therefore the only form of local scour that was examined was pier scour.

The methods used to analyze the pier scour at the proposed Chandler Heights Road Bridge are presented in the Federal Highway Administration's Hydraulic Engineering Circular (HEC) No. 18 publication *Evaluating Scour at Bridges.* Pier scour is a function of bed material characteristics and configuration, velocity and depth of the flow upstream and the geometry of the piers as well as well as debris accumulation on the piers. In the case of the Chandler Heights Road Bridge the following conditions apply: the pier nose shape is rounded therefore the correction factor is 1.0, the angle of attack of the flow is 0-degrees so the correction factor is 1.0, clear water scour was used since it was the most conservative and its correction factor is 1.1, armoring of the bed is an additional consideration and a correction factor of 1.0 was used as it was the most conservative. The pier width was adjusted for a debris accumulation from the actual width of 1 ½ -feet to 5 ½ -feet thus accounting for four feet of debris. The Froude number of the flow at the upstream cross-section of 0.20 is an additional factor. Once all of the terms of the equation were determined the resulting scour depth due to the piers is 8.6-feet for the superflood flow.

1.3.4 BEND SCOUR

Bend scour was considered and investigated but was not analyzed in detail because there are no bends in the channel at the Chandler Heights Road crossing location. There is a channel bend located about 300 feet downstream of the bridge. This is not close enough to the bridge to induce scour effects to the channel lining at the bridge or the bridge structure itself.

1.3.5 BED-FORM SCOUR

Anti-dune scour and dune scour are two types of bed-form scour. Anti-dunes typically form during transitional flow, between subcritical and supercritical, or during supercritical flow regimes. Dunes form during lower regime flow, or subcritical flow. Subcritical flow conditions occur throughout Reach 3 of the EMF, therefore the Dune Height within the EMF is estimated using the Simons and Senturk (1992) equation:

$$d_h = 0.066y^{1.21}$$

Where:

d_h is the dune height, in feet, and

y is hydraulic depth of flow, in feet.

Anti-dune scour is not anticipated within the vicinity of the Chandler Heights Road crossing. The bed-form scour is estimated as one-half the Dune Height:

$Z_{bedform} = 0.5d_h$.

Bed-forms typically develop in response to hydraulic conditions in flowing water in alluvial systems. The EMF is not an alluvial channel; it is an engineered channel with uniform dimensions, low sediment load, low debris loads and mild slopes. However, it is not a concrete lined channel and it receives some sediment flow from the drainage area, therefore bed-form scour is anticipated.

1.3.6 LOW FLOW INCISEMENT

In a natural or man-made channel, a low-flow channel, or thalweg, is usually formed over time by storm flows. If the channel does not exist it is often estimated at a depth of 1-foot to 2-feet or greater, depending on conditions. In the existing EMF channel a low-flow channel has already been constructed. The depth of the low-flow channel through the project reach is 2.0 feet. All scour depths resulting from our calculations use the elevation of the low-flow channel invert as the baseline for computing scour elevations.

1.3.7 TOTAL SCOUR

Total scour is the sum total of all applicable forms of scour at a given location. The total scour is calculated at two locations; outside of the pier scour zone of influence, and inside of the pier zone of influence (at the piers). The total scour for the superflood outside of the pier zone of influence is 6.9 feet, elevation 1286.4. The total scour for the superflood at the piers is 14.3 feet, elevation 1279.0.

2 REFERENCES

Flood Control District of Maricopa County, *Maricopa County Drainage Policies and Standards*, January 2007.

Flood Control District of Maricopa County, *Drainage Design Manual Volume Two – Hydraulics*, September 2003.

HNTB Corporation, *East Maricopa Floodway Capacity Assessment Final Study Report*, FCD 97-06, January 1999, Revised February 1999.

U.S. Army Corps of Engineers, *HEC-RAS River Analysis System*, Version 3.1.3, May 2005.

U.S. Army Corps of Engineers, *HEC-18 Evaluating Scour at Bridges*, Fourth Edition, May 2001.

Bureau of Reclamation: Engineering and Research Center, *Computing Degradation and Local Scour*, January 1984.

EMF Capacity Assessment Plan and Profile Sheets

(FCD 97-06)

1298 [redacted] ELEV.
1300.13 W.S. ELEV.
1301.98 W.S. ELEV.

ERM 1531
EL. 1309.587

RIGGS RD.

M10.0

EAST MARICOPA FLOODWAY

MATCH LINE SEE SHEET 20 OF 50

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T2S R6E SEC 34

T2S R6E SEC 27

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W.S. PROFILE FOR FUTURE CONDITIONS

℄ RIGGS ROAD
M10.207

W.S. PROFILE FOR DESIGN CONDITIONS

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1300

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1300.13 W.S. ELEV.
1301.98 W.S. ELEV.

ERM 1531
EL. 1309.587

RIGGS RD

M10.0

EAST MARICOPA FLOODWAY

MATCH LINE SEE SHEET 20 OF 50

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T2S R6E SEC 34

T2S R6E SEC 27

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QE=14650 CFS, EE=1302.69 W.S. ELEV.

W.S. PROFILE FOR EXISTING CONDITIONS

W.S. PROFILE FOR FUTURE CONDITIONS

℄ RIGGS ROAD
M10.207

W.S. PROFILE FOR DESIGN CONDITIONS

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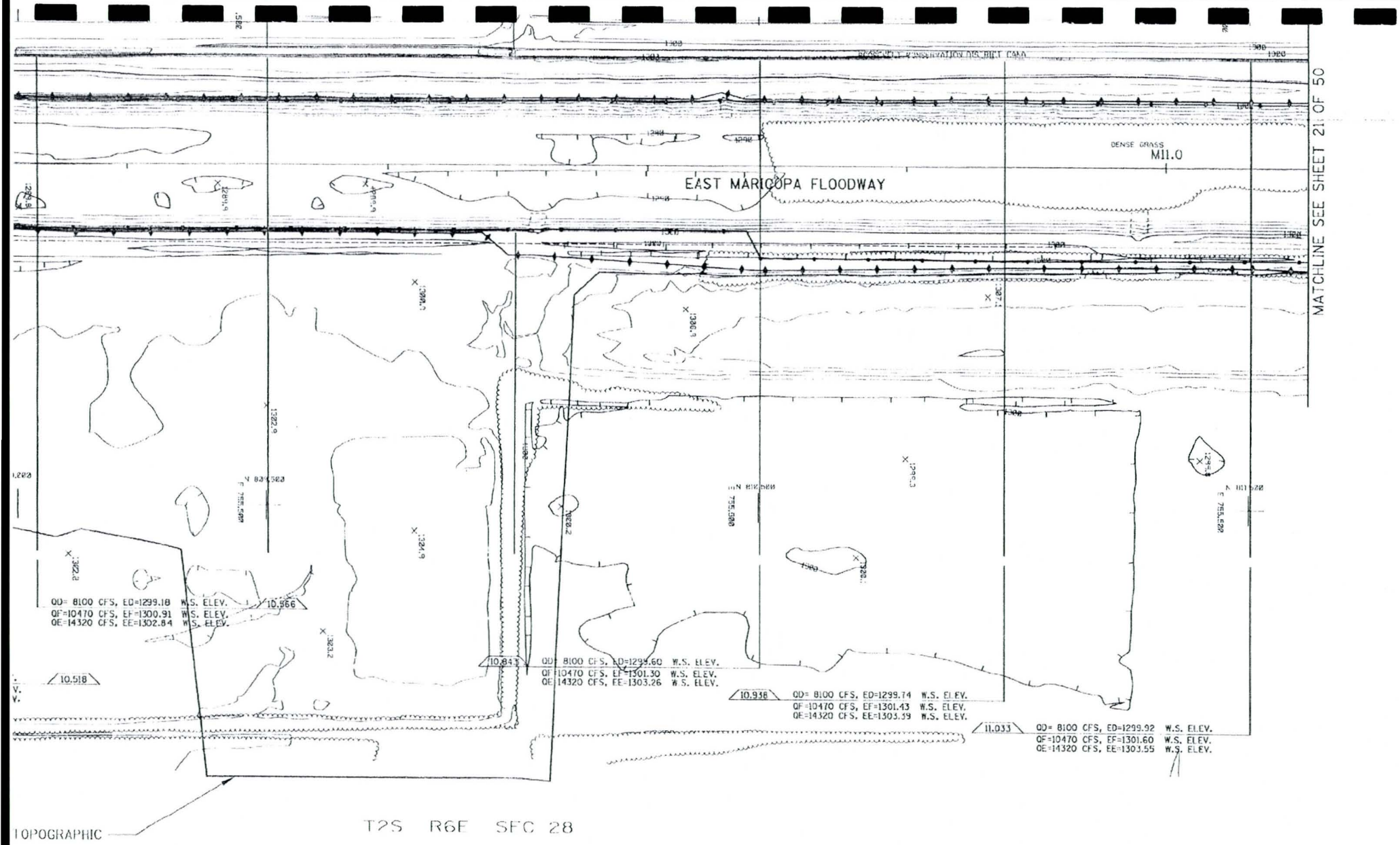
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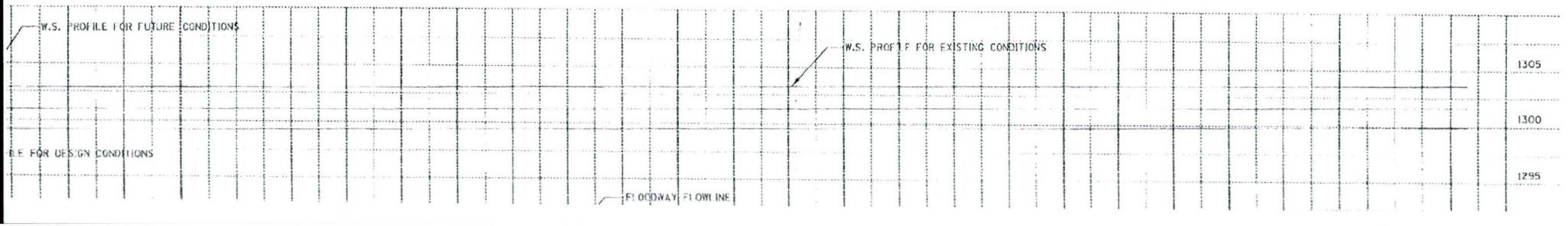
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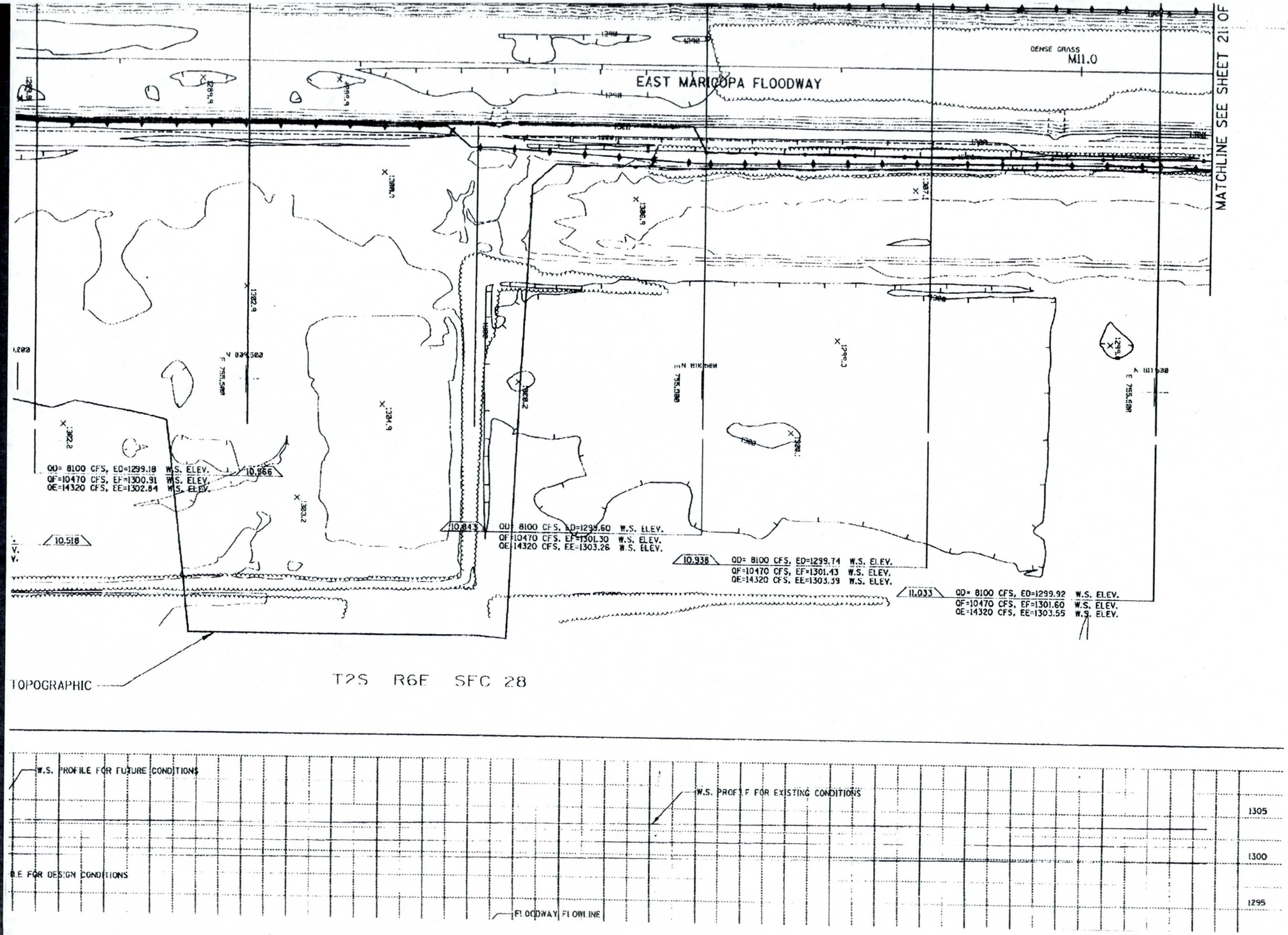
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TOPOGRAPHIC
T2S R6E SEC 28
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B.E. FOR DESIGN CONDITIONS
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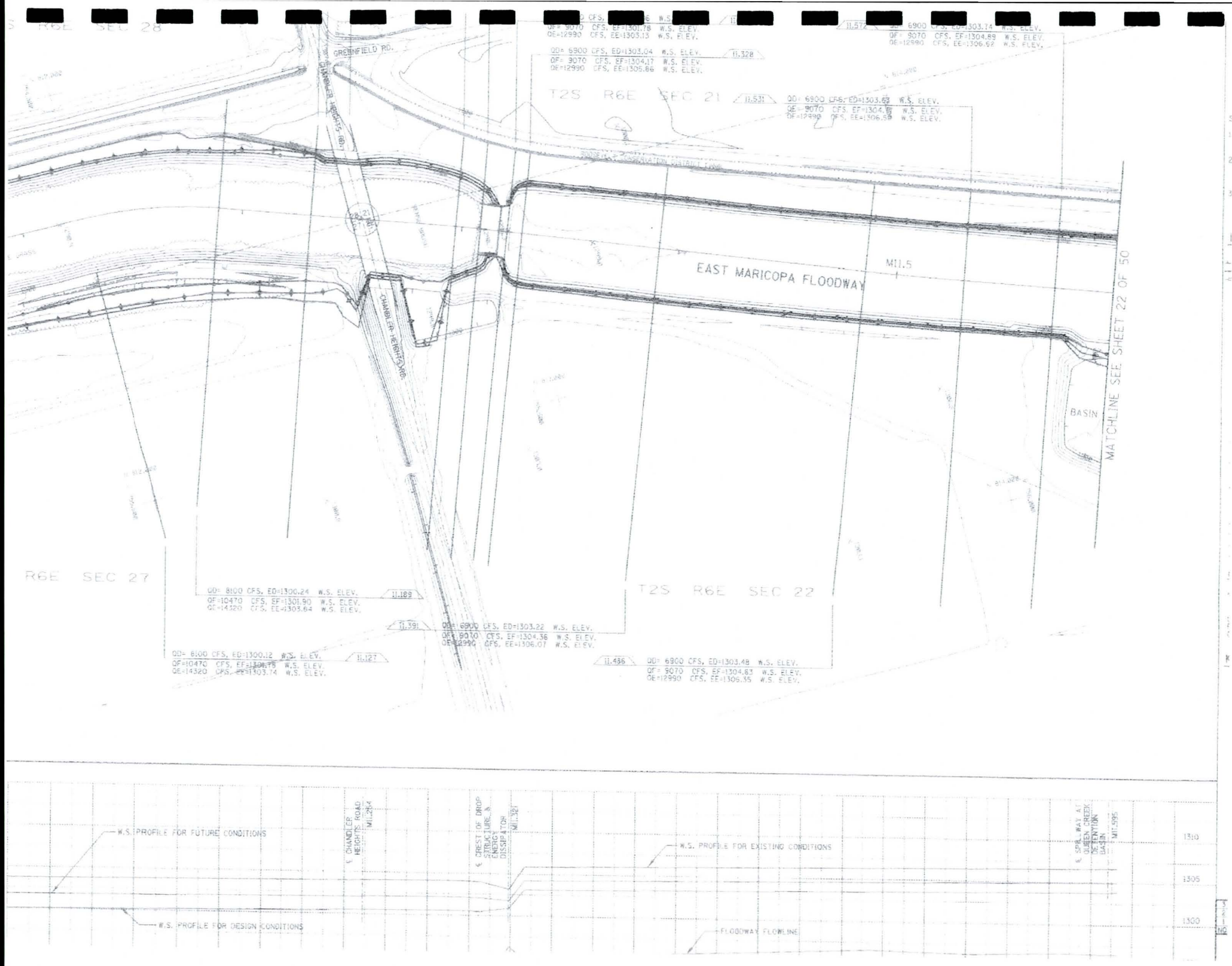
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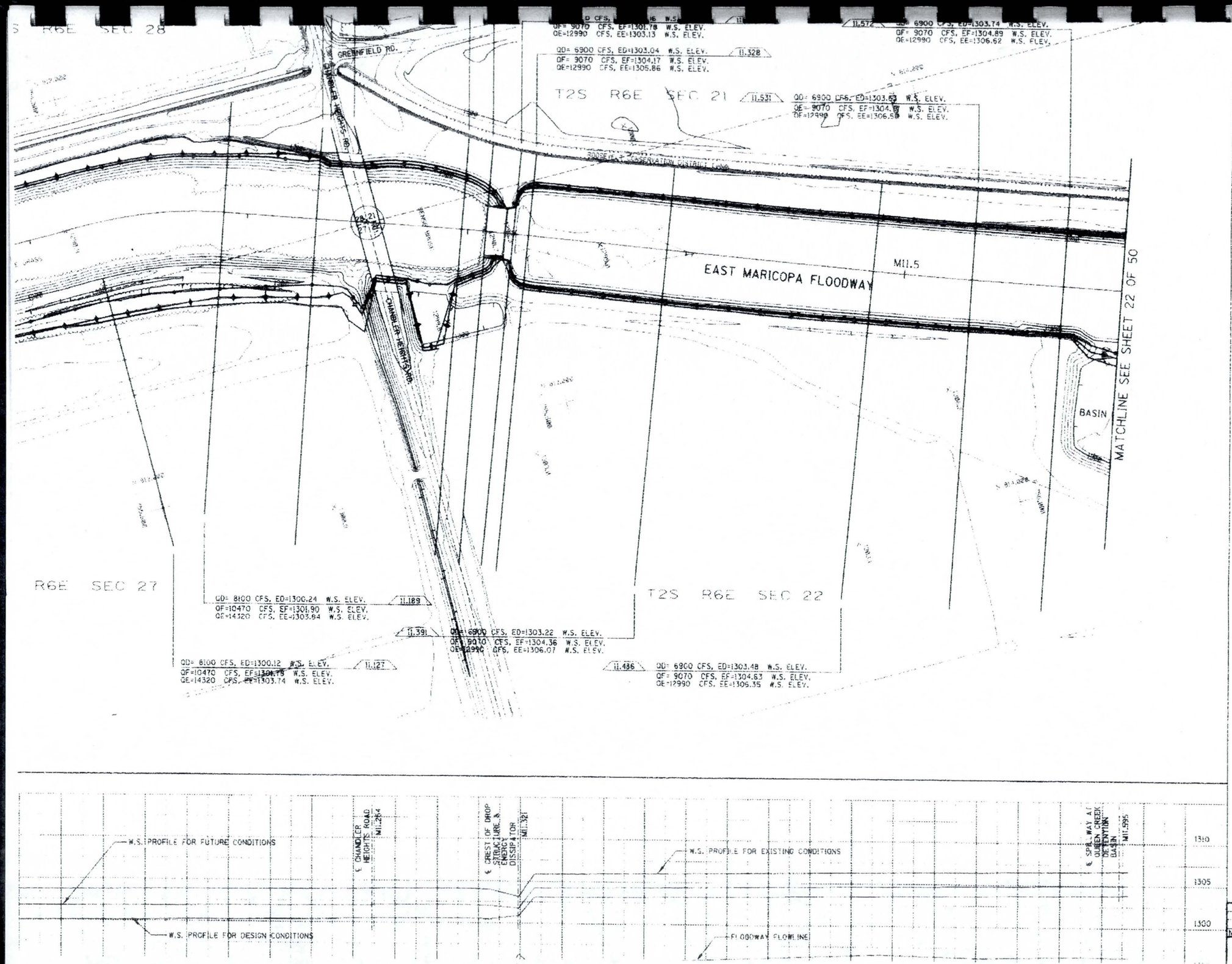
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28-21
EAST MARICOPA FLOODWAY
M11.5
BASIN
MATCHLINE SEE SHEET 22 OF 50
R6E SEC 27
T2S R6E SEC 22
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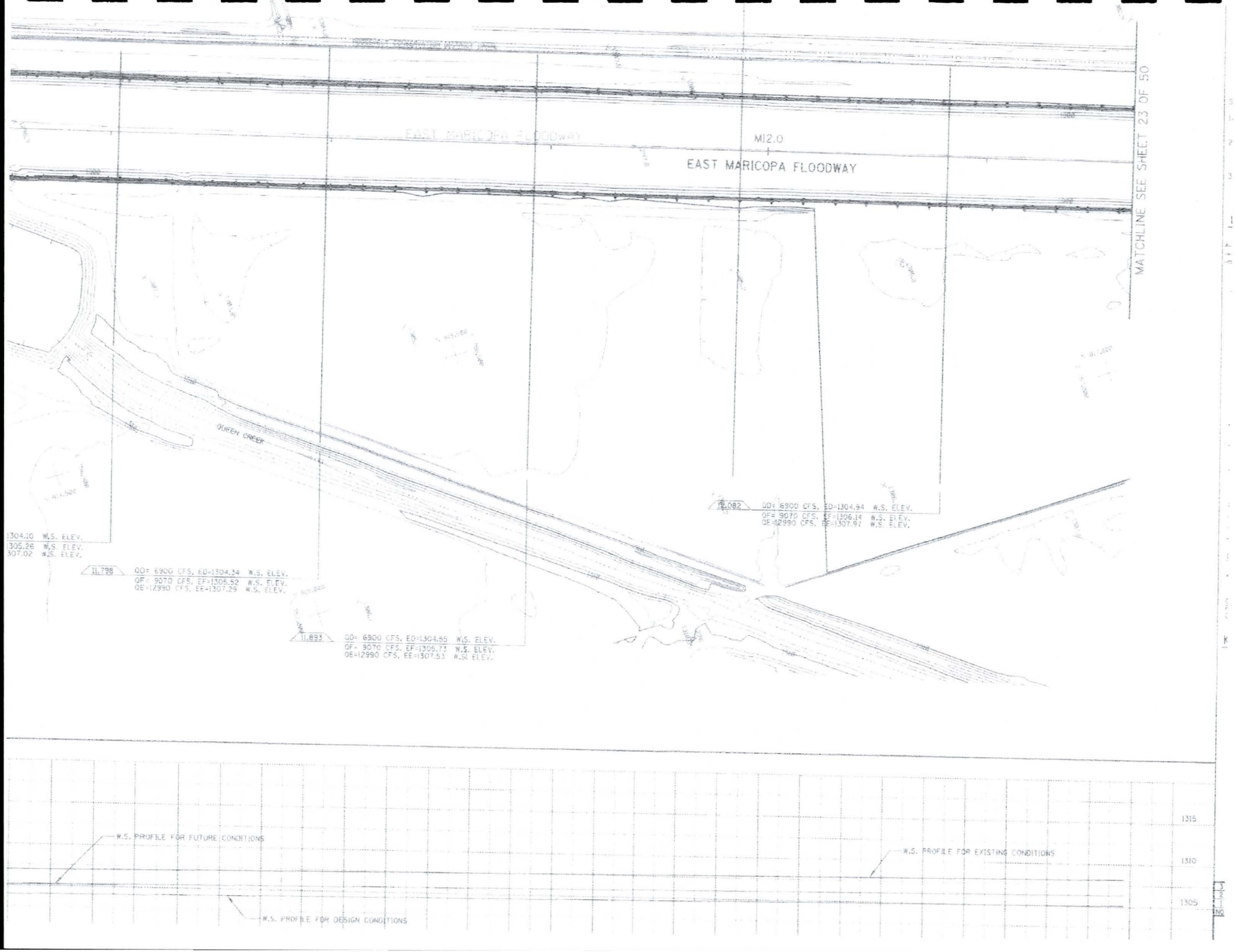
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M12.0
EAST MARICOPA FLOODWAY
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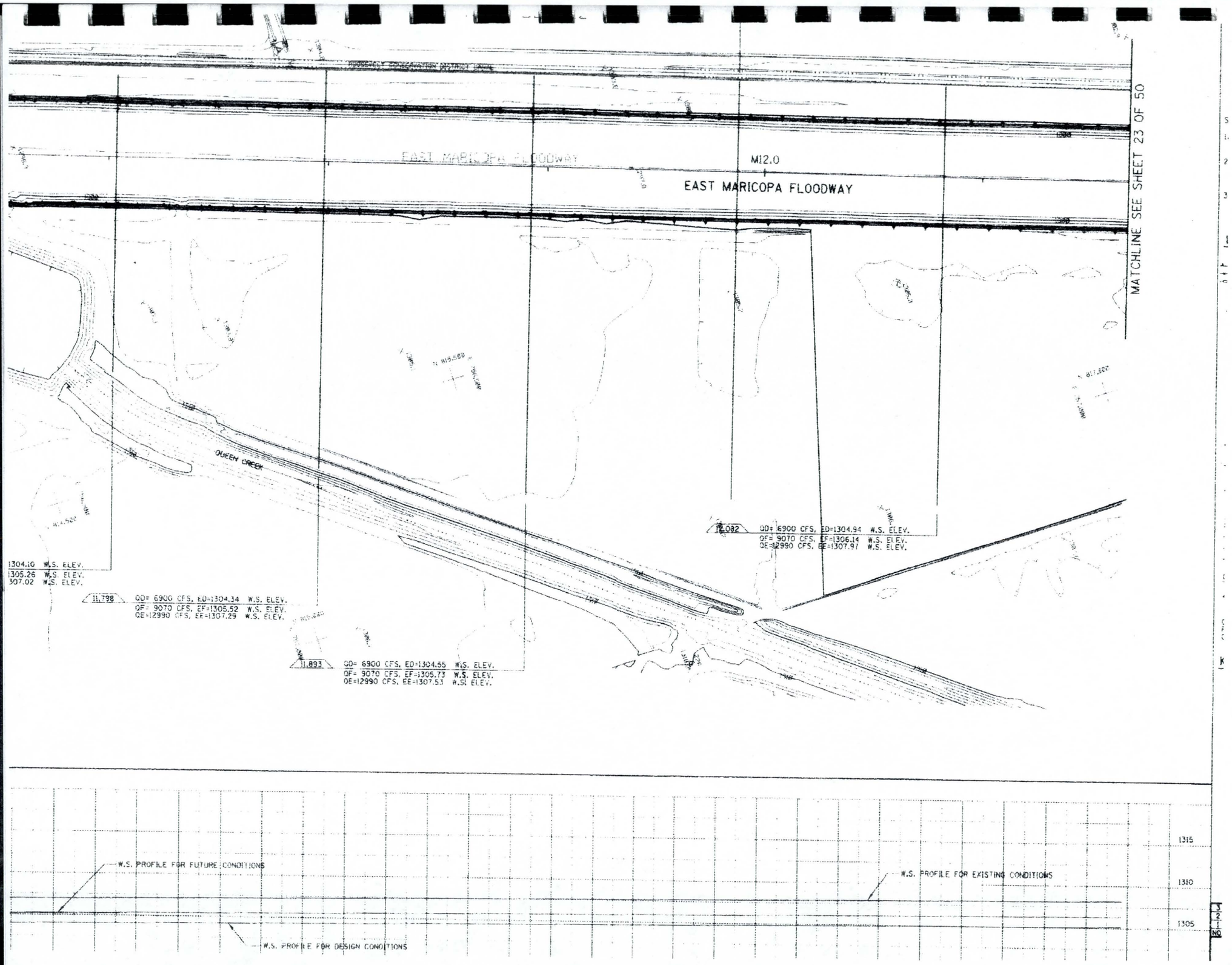
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M12.0
EAST MARICOPA FLOODWAY
MATCHLINE SEE SHEET 23 OF 50
QUEEN CREEK
1304.10 W.S. ELEV.
1305.26 W.S. ELEV.
1307.02 W.S. ELEV.
11.798
QD= 6900 CFS, ED=1304.34 W.S. ELEV.
QF= 9070 CFS, EF=1305.52 W.S. ELEV.
QE=12990 CFS, EE=1307.29 W.S. ELEV.
11.893
QD= 6900 CFS, ED=1304.55 W.S. ELEV.
QF= 9070 CFS, EF=1305.73 W.S. ELEV.
QE=12990 CFS, EE=1307.53 W.S. ELEV.
QD= 6900 CFS, ED=1304.94 W.S. ELEV.
QF= 9070 CFS, EF=1306.14 W.S. ELEV.
QE=12990 CFS, EE=1307.97 W.S. ELEV.
W.S. PROFILE FOR FUTURE CONDITIONS
W.S. PROFILE FOR EXISTING CONDITIONS
W.S. PROFILE FOR DESIGN CONDITIONS
1315
1310
1305

T2S R6E SEC 15

MATCHLINE SEE SHEET 24 OF 50

EAST MARICOPA FLOODWAY

M12.5

12.552 QD= 6900 CFS, ED=1305.95 W.S. ELEV.
QF= 9070 CFS, EF=1307.20 W.S. ELEV.
QE=12990 CFS, EE=1309.09 W.S. ELEV.

ERM #541
EL. 1309.343

12.694 QD= 6900 CFS, ED=1306.23 W.S. ELEV.
QF= 9070 CFS, EF=1307.49 W.S. ELEV.
QE=12990 CFS, EE=1309.40 W.S. ELEV.

12.441 QD= 6900 CFS, ED=1305.71 W.S. ELEV.
QF= 9070 CFS, EF=1306.95 W.S. ELEV.
QE=12990 CFS, EE=1308.83 W.S. ELEV.

12.686 QD= 6900 CFS, ED=1305.82 W.S. ELEV.
QF= 9070 CFS, EF=1307.06 W.S. ELEV.
QE=12990 CFS, EE=1308.95 W.S. ELEV.

5.28 W.S. ELEV. 12.245
6.50 W.S. ELEV.
3.35 W.S. ELEV.

5.15 W.S. ELEV. 12.177
6.37 W.S. ELEV.
1.21 W.S. ELEV.

W.S. PROFILE FOR FUTURE CONDITIONS

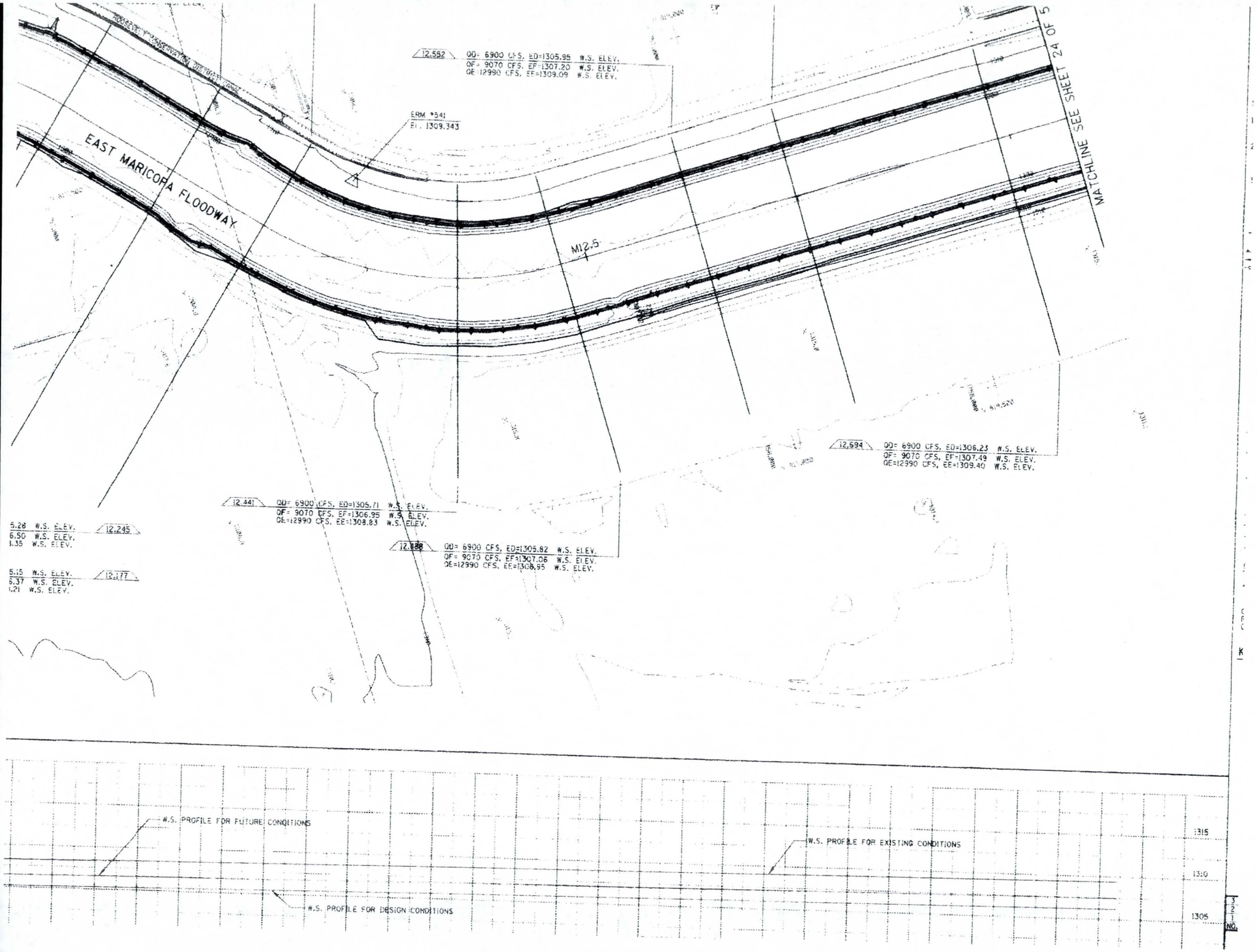
W.S. PROFILE FOR EXISTING CONDITIONS

W.S. PROFILE FOR DESIGN CONDITIONS

1315

1310

1305


EAST MARICOPA FLOODWAY
12.552
QD= 6900 CFS, ED=1305.95 W.S. ELEV.
QF= 9070 CFS, EF=1307.20 W.S. ELEV.
QE=12990 CFS, EE=1309.09 W.S. ELEV.
ERM #541
El. 1309.343
M12.5
MATCHLINE SEE SHEET 24 OF 5
12.694
QD= 6900 CFS, ED=1306.23 W.S. ELEV.
QF= 9070 CFS, EF=1307.49 W.S. ELEV.
QE=12990 CFS, EE=1309.40 W.S. ELEV.
12.441
QD= 6900 CFS, ED=1305.71 W.S. ELEV.
QF= 9070 CFS, EF=1306.95 W.S. ELEV.
QE=12990 CFS, EE=1308.83 W.S. ELEV.
12.245
5.28 W.S. ELEV.
6.50 W.S. ELEV.
1.35 W.S. ELEV.
12.177
5.15 W.S. ELEV.
6.37 W.S. ELEV.
1.21 W.S. ELEV.
QD= 6900 CFS, ED=1305.82 W.S. ELEV.
QF= 9070 CFS, EF=1307.06 W.S. ELEV.
QE=12990 CFS, EE=1308.95 W.S. ELEV.
W.S. PROFILE FOR FUTURE CONDITIONS
W.S. PROFILE FOR EXISTING CONDITIONS
W.S. PROFILE FOR DESIGN CONDITIONS
1315
1310
1305

Pre-Project HEC-RAS Analysis

(NGVD 29)

HEC-RAS Plan: EMF R 3 River: EMF Reach: Reach 3

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 3	9.001	Design	8700.00	1285.34	1296.69	1290.88	1296.94	0.000272	4.02	2164.84	257.60	0.24
Reach 3	9.001	Future	11920.00	1285.34	1298.43	1291.78	1298.75	0.000287	4.54	2624.42	270.48	0.26
Reach 3	9.001	Existing	15770.00	1285.34	1300.09	1292.74	1300.50	0.000306	5.12	3081.16	746.86	0.27
Reach 3	9.018	Design	8700.00	1285.62	1296.72	1291.11	1296.97	0.000273	4.00	2174.04	260.97	0.24
Reach 3	9.018	Future	11920.00	1285.62	1298.46	1291.96	1298.78	0.000285	4.52	2638.71	272.43	0.26
Reach 3	9.018	Existing	15770.00	1285.62	1300.12	1292.91	1300.53	0.000300	5.09	3098.71	404.42	0.27
Reach 3	9.036	Design	8100.00	1286.20	1296.76	1291.25	1296.99	0.000269	3.89	2079.89	257.85	0.24
Reach 3	9.036	Future	10790.00	1286.20	1298.53	1292.01	1298.81	0.000259	4.24	2546.99	310.82	0.24
Reach 3	9.036	Existing	14630.00	1286.20	1300.19	1292.99	1300.56	0.000282	4.88	3000.57	437.51	0.26
Reach 3	9.053	Design	8100.00	1286.50	1296.78	1291.38	1297.02	0.000281	3.96	2045.45	255.48	0.25
Reach 3	9.053	Future	10800.00	1286.50	1298.55	1292.14	1298.83	0.000270	4.31	2507.82	282.50	0.25
Reach 3	9.053	Existing	14660.00	1286.50	1300.20	1293.13	1300.59	0.000290	4.96	2952.69	389.11	0.26
Reach 3	9.145	Design	8100.00	1286.79	1296.91	1291.95	1297.18	0.000329	4.16	1946.94	253.91	0.26
Reach 3	9.145	Future	10800.00	1286.79	1298.67	1292.69	1298.98	0.000308	4.49	2404.32	289.88	0.26
Reach 3	9.145	Existing	14660.00	1286.79	1300.34	1293.68	1300.75	0.000341	5.10	2871.89	387.35	0.28
Reach 3	9.24	Design	8100.00	1287.00	1297.08	1292.00	1297.34	0.000315	4.10	1976.15	254.97	0.26
Reach 3	9.24	Future	10800.00	1287.00	1298.83	1292.75	1299.13	0.000298	4.44	2432.93	292.10	0.26
Reach 3	9.24	Existing	14660.00	1287.00	1300.51	1293.72	1300.91	0.000315	5.08	2885.49	389.65	0.27
Reach 3	9.334	Design	8100.00	1286.50	1297.24	1291.92	1297.49	0.000289	3.98	2035.44	257.33	0.25
Reach 3	9.334	Future	10800.00	1286.50	1298.99	1292.69	1299.28	0.000277	4.33	2494.60	403.38	0.25
Reach 3	9.334	Existing	14660.00	1286.50	1300.68	1293.65	1301.06	0.000293	4.97	2952.66	785.17	0.27
Reach 3	9.424	Design	8100.00	1287.07	1297.38	1291.95	1297.62	0.000286	3.98	2033.82	254.91	0.25
Reach 3	9.424	Future	10800.00	1287.07	1299.12	1292.71	1299.41	0.000277	4.34	2488.00	269.52	0.25
Reach 3	9.424	Existing	14660.00	1287.07	1300.82	1293.73	1301.20	0.000294	4.97	2970.10	732.16	0.27
Reach 3	9.518	Design	8100.00	1286.59	1297.53	1291.84	1297.76	0.000263	3.88	2089.05	256.27	0.24
Reach 3	9.518	Future	10800.00	1286.59	1299.26	1292.64	1299.54	0.000260	4.24	2545.16	269.55	0.24
Reach 3	9.518	Existing	14660.00	1286.59	1300.98	1293.64	1301.34	0.000276	4.87	3009.40	825.50	0.26
Reach 3	9.613	Design	8100.00	1286.70	1297.67	1291.87	1297.89	0.000245	3.76	2152.09	264.44	0.23
Reach 3	9.613	Future	10800.00	1286.70	1299.41	1292.66	1299.67	0.000236	4.12	2668.13	315.75	0.23
Reach 3	9.613	Existing	14660.00	1286.70	1301.14	1293.63	1301.48	0.000250	4.70	3219.24	854.79	0.25
Reach 3	9.708	Design	8100.00	1286.85	1297.79	1292.05	1298.02	0.000256	3.85	2102.70	255.14	0.24
Reach 3	9.708	Future	10800.00	1286.85	1299.52	1292.82	1299.80	0.000254	4.23	2554.72	267.73	0.24
Reach 3	9.708	Existing	14660.00	1286.85	1301.25	1293.84	1301.62	0.000272	4.85	3023.72	857.80	0.26
Reach 3	9.802	Design	8100.00	1287.21	1297.91	1292.63	1298.16	0.000301	4.04	2006.30	256.24	0.25
Reach 3	9.802	Future	10800.00	1287.21	1299.64	1293.41	1299.94	0.000290	4.39	2460.20	418.87	0.26
Reach 3	9.802	Existing	14660.00	1287.21	1301.38	1294.40	1301.77	0.000302	5.00	2932.74	862.05	0.27
Reach 3	9.844	Design	8100.00	1287.16	1297.99	1292.46	1298.23	0.000267	3.88	2086.56	258.49	0.24
Reach 3	9.844	Future	10800.00	1287.16	1299.72	1293.22	1300.00	0.000263	4.24	2544.37	289.26	0.24
Reach 3	9.844	Existing	14660.00	1287.16	1301.47	1294.20	1301.83	0.000276	4.85	3022.36	860.53	0.26
Reach 3	9.849	Design	8100.00	1287.05	1297.96	1292.63	1298.28	0.000357	4.54	1783.94	208.75	0.27
Reach 3	9.849	Future	10800.00	1287.05	1299.67	1293.49	1300.06	0.000360	5.03	2146.85	215.28	0.28
Reach 3	9.849	Existing	14660.00	1287.05	1301.40	1294.56	1301.92	0.000398	5.81	2521.55	270.04	0.30
Reach 3	9.854	Design	8100.00	1287.02	1298.08	1292.45	1298.31	0.000258	3.85	2105.51	257.54	0.24
Reach 3	9.854	Future	10800.00	1287.02	1299.83	1293.22	1300.11	0.000253	4.21	2566.39	269.88	0.24
Reach 3	9.854	Existing	14660.00	1287.02	1301.62	1294.16	1301.98	0.000266	4.80	3053.67	867.85	0.25
Reach 3	9.897	Design	8100.00	1287.03	1298.15	1292.40	1298.37	0.000254	3.82	2119.13	258.08	0.24
Reach 3	9.897	Future	10800.00	1287.03	1299.89	1293.19	1300.17	0.000249	4.18	2582.63	280.81	0.24
Reach 3	9.897	Existing	14660.00	1287.03	1301.69	1294.17	1302.04	0.000258	4.77	3092.39	808.19	0.25
Reach 3	9.944	Design	8100.00	1287.05	1298.21	1292.59	1298.44	0.000264	3.88	2085.41	255.17	0.24
Reach 3	9.944	Future	10800.00	1287.05	1299.95	1293.35	1300.23	0.000258	4.25	2541.68	275.27	0.24
Reach 3	9.944	Existing	14660.00	1287.05	1301.74	1294.34	1302.11	0.000268	4.84	3048.29	842.79	0.25
Reach 3	10.039	Design	8100.00	1287.88	1298.34	1292.84	1298.58	0.000274	3.91	2069.24	257.76	0.24
Reach 3	10.039	Future	10800.00	1287.88	1300.08	1293.61	1300.36	0.000267	4.27	2529.59	270.72	0.25
Reach 3	10.039	Existing	14660.00	1287.88	1301.93	1294.59	1302.24	0.000243	4.58	3733.72	841.93	0.24
Reach 3	10.134	Design	8100.00	1288.17	1298.48	1293.25	1298.72	0.000289	3.95	2048.50	261.47	0.25
Reach 3	10.134	Future	10800.00	1288.17	1300.21	1293.99	1300.50	0.000276	4.30	2513.10	273.19	0.25
Reach 3	10.134	Existing	14660.00	1288.17	1302.04	1294.95	1302.37	0.000263	4.69	3436.09	855.62	0.25

HEC-RAS Plan: EMF R 3 River: EMF Reach: Reach 3 (Continued)

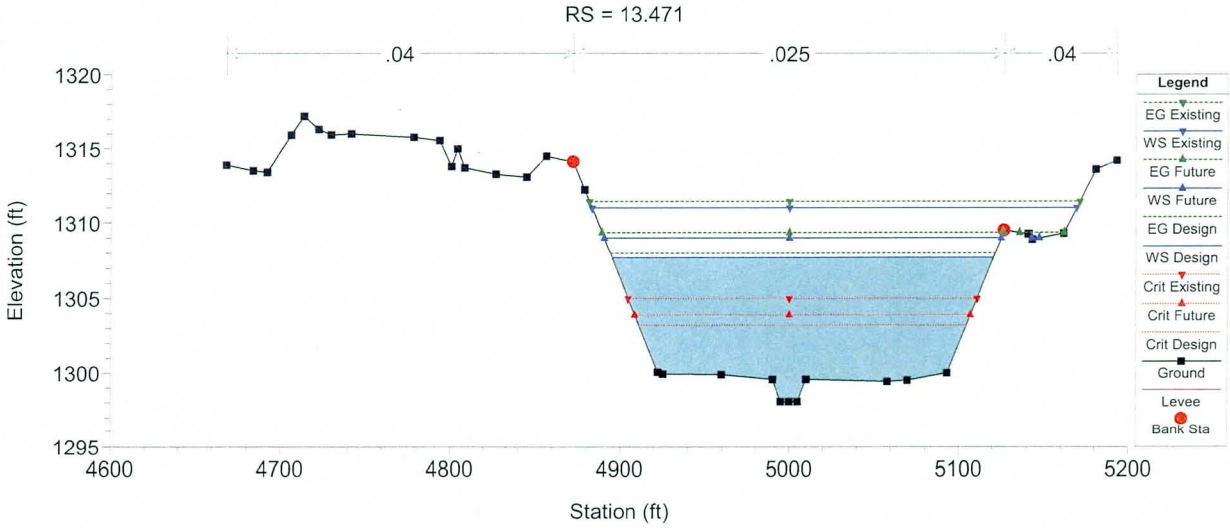
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 3	10.171	Design	8100.00	1287.50	1298.54	1292.82	1298.77	0.000257	3.86	2099.61	254.61	0.24
Reach 3	10.171	Future	10800.00	1287.50	1300.28	1293.60	1300.55	0.000252	4.22	2612.11	688.55	0.24
Reach 3	10.171	Existing	14660.00	1287.50	1302.09	1294.59	1302.43	0.000261	4.75	3234.85	880.40	0.25
Reach 3	10.195	Design	8100.00	1287.41	1298.59	1292.87	1298.81	0.000363	3.83	2113.81	255.21	0.23
Reach 3	10.195	Future	10790.00	1287.41	1300.32	1293.62	1300.59	0.000359	4.21	2565.87	266.71	0.24
Reach 3	10.195	Existing	14650.00	1287.41	1302.12	1294.62	1302.48	0.000392	4.79	3058.03	278.91	0.25
Reach 3	10.207		Bridge									
Reach 3	10.218	Design	8100.00	1287.34	1298.69	1292.50	1298.89	0.000303	3.61	2243.67	258.73	0.22
Reach 3	10.218	Future	10790.00	1287.34	1300.43	1293.26	1300.67	0.000306	3.99	2702.81	269.61	0.22
Reach 3	10.218	Existing	14650.00	1287.34	1302.35	1294.25	1302.67	0.000331	4.53	3235.29	282.75	0.24
Reach 3	10.252	Design	8100.00	1288.04	1298.72	1292.89	1298.95	0.000246	3.81	2127.05	254.26	0.23
Reach 3	10.252	Future	10790.00	1288.04	1300.46	1293.66	1300.73	0.000244	4.18	2579.12	266.16	0.24
Reach 3	10.252	Existing	14650.00	1288.04	1302.40	1294.64	1302.73	0.000241	4.64	3387.36	478.86	0.24
Reach 3	10.346	Design	8100.00	1287.67	1298.87	1292.68	1299.06	0.000206	3.56	2276.81	264.26	0.21
Reach 3	10.346	Future	10790.00	1287.67	1300.61	1293.42	1300.85	0.000209	3.93	2747.83	394.31	0.22
Reach 3	10.346	Existing	14650.00	1287.67	1302.53	1294.40	1302.84	0.000215	4.46	3286.16	477.53	0.23
Reach 3	10.441	Design	8100.00	1287.78	1298.96	1292.97	1299.18	0.000228	3.70	2191.14	259.32	0.22
Reach 3	10.441	Future	10790.00	1287.78	1300.71	1293.74	1300.96	0.000226	4.07	2657.22	402.38	0.23
Reach 3	10.441	Existing	14650.00	1287.78	1302.63	1294.72	1302.96	0.000230	4.61	3203.87	579.15	0.24
Reach 3	10.518	Design	8100.00	1288.65	1299.05	1293.60	1299.29	0.000276	3.93	2058.60	255.96	0.24
Reach 3	10.518	Future	10470.00	1288.65	1300.79	1294.29	1301.06	0.000251	4.16	2516.05	267.68	0.24
Reach 3	10.518	Existing	14320.00	1288.65	1302.72	1295.26	1303.06	0.000257	4.71	3038.84	679.40	0.25
Reach 3	10.566	Design	8100.00	1288.55	1299.12	1293.61	1299.36	0.000272	3.93	2060.13	253.70	0.24
Reach 3	10.566	Future	10470.00	1288.55	1300.86	1294.28	1301.13	0.000250	4.17	2511.79	265.33	0.24
Reach 3	10.566	Existing	14320.00	1288.55	1302.78	1295.28	1303.13	0.000258	4.72	3032.00	963.89	0.25
Reach 3	10.654	Design	8100.00	1288.59	1299.24	1293.87	1299.49	0.000282	3.97	2041.25	254.68	0.25
Reach 3	10.654	Future	10470.00	1288.59	1300.97	1294.55	1301.25	0.000257	4.20	2491.44	265.84	0.24
Reach 3	10.654	Existing	14320.00	1288.59	1302.90	1295.53	1303.25	0.000264	4.75	3013.69	818.72	0.25
Reach 3	10.749	Design	8100.00	1288.54	1299.39	1293.79	1299.62	0.000255	3.84	2110.00	256.76	0.24
Reach 3	10.749	Future	10470.00	1288.54	1301.11	1294.45	1301.37	0.000237	4.09	2568.33	292.52	0.23
Reach 3	10.749	Existing	14320.00	1288.54	1303.05	1295.43	1303.38	0.000241	4.60	3239.06	955.91	0.24
Reach 3	10.843	Design	8100.00	1288.79	1299.53	1293.70	1299.75	0.000236	3.75	2165.63	276.90	0.23
Reach 3	10.843	Future	10470.00	1288.79	1301.24	1294.38	1301.49	0.000220	3.99	2683.62	324.71	0.23
Reach 3	10.843	Existing	14320.00	1288.79	1303.19	1295.36	1303.50	0.000222	4.48	3413.67	396.89	0.23
Reach 3	10.938	Design	8100.00	1289.19	1299.67	1294.11	1299.90	0.000373	3.84	2116.25	281.02	0.24
Reach 3	10.938	Future	10470.00	1289.19	1301.37	1294.77	1301.62	0.000342	4.06	2641.70	335.76	0.23
Reach 3	10.938	Existing	14320.00	1289.19	1303.32	1295.74	1303.63	0.000334	4.52	3368.97	392.62	0.24
Reach 3	11.033	Design	8100.00	1289.10	1299.85	1294.34	1300.09	0.000383	3.89	2083.58	257.83	0.24
Reach 3	11.033	Future	10470.00	1289.10	1301.54	1295.02	1301.80	0.000355	4.13	2578.49	316.93	0.24
Reach 3	11.033	Existing	14320.00	1289.10	1303.49	1295.99	1303.81	0.000352	4.60	3282.27	387.53	0.24
Reach 3	11.127	Design	8100.00	1289.57	1300.05	1294.49	1300.28	0.000370	3.83	2122.10	278.45	0.24
Reach 3	11.127	Future	10470.00	1289.57	1301.72	1295.16	1301.98	0.000342	4.06	2644.73	339.47	0.23
Reach 3	11.127	Existing	14320.00	1289.57	1303.67	1296.12	1303.98	0.000334	4.52	3370.12	393.13	0.24
Reach 3	11.189	Design	8100.00	1289.50	1300.17	1294.58	1300.40	0.000370	3.82	2122.31	275.40	0.24
Reach 3	11.189	Future	10470.00	1289.50	1301.83	1295.26	1302.09	0.000344	4.07	2639.84	335.56	0.23
Reach 3	11.189	Existing	14320.00	1289.50	1303.78	1296.22	1304.09	0.000337	4.52	3369.23	392.74	0.24
Reach 3	11.231	Design	8100.00	1289.43	1300.26	1294.43	1300.48	0.000341	3.72	2178.99	269.57	0.23
Reach 3	11.231	Future	10470.00	1289.43	1301.92	1295.10	1302.16	0.000321	3.98	2678.91	319.33	0.23
Reach 3	11.231	Existing	14320.00	1289.43	1303.86	1296.09	1304.17	0.000323	4.46	3334.08	352.75	0.23
Reach 3	11.249	Design	6900.00	1289.19	1300.36	1294.37	1300.52	0.000264	3.24	2127.78	260.43	0.20
Reach 3	11.249	Future	10060.00	1289.19	1301.96	1295.29	1302.20	0.000330	3.94	2553.70	275.64	0.23
Reach 3	11.249	Existing	13910.00	1289.19	1303.89	1296.27	1304.20	0.000359	4.47	3109.30	295.12	0.24
Reach 3	11.254		Bridge									
Reach 3	11.26	Design	6900.00	1288.90	1300.40	1294.15	1300.55	0.000237	3.12	2208.89	263.94	0.19
Reach 3	11.26	Future	10060.00	1288.90	1302.01	1295.07	1302.24	0.000297	3.80	2644.08	277.54	0.22
Reach 3	11.26	Existing	13910.00	1288.90	1303.96	1296.05	1304.25	0.000327	4.35	3200.92	295.64	0.23

HEC-RAS Plan: EMF R 3 River: EMF Reach: Reach 3 (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 3	11.297	Design	6900.00	1289.28	1300.43	1294.72	1300.63	0.000329	3.58	1928.32	239.42	0.22
Reach 3	11.297	Future	9070.00	1289.28	1302.07	1295.40	1302.30	0.000324	3.89	2329.78	252.16	0.23
Reach 3	11.297	Existing	12990.00	1289.28	1304.01	1296.51	1304.34	0.000375	4.58	2834.04	267.55	0.25
Reach 3	11.308	Design	6900.00	1290.71	1300.36	1295.60	1300.73	0.000129	4.94	1397.56	186.01	0.32
Reach 3	11.308	Future	9070.00	1290.71	1301.98	1296.49	1302.42	0.000125	5.30	1710.09	198.95	0.32
Reach 3	11.308	Existing	12990.00	1290.71	1303.89	1297.84	1304.48	0.000142	6.17	2105.04	214.54	0.35
Reach 3	11.321	Design	6900.00	1296.29	1300.86	1300.86	1302.84	0.001623	11.31	610.15	152.45	1.00
Reach 3	11.321	Future	9070.00	1296.29	1301.78	1301.78	1304.01	0.001561	11.98	757.02	168.53	1.00
Reach 3	11.321	Existing	12990.00	1296.29	1303.14	1303.14	1305.76	0.001470	12.99	1000.03	189.14	1.00
Reach 3	11.328	Design	6900.00	1294.88	1303.04	1299.36	1303.37	0.000521	4.62	1493.65	235.96	0.32
Reach 3	11.328	Future	9070.00	1294.88	1304.17	1300.02	1304.58	0.000539	5.13	1767.06	244.37	0.34
Reach 3	11.328	Existing	12990.00	1294.88	1305.86	1301.11	1306.41	0.000579	5.93	2190.70	256.86	0.36
Reach 3	11.391	Design	6900.00	1294.70	1303.22	1299.67	1303.54	0.000526	4.58	1508.11	242.77	0.32
Reach 3	11.391	Future	9070.00	1294.70	1304.37	1300.29	1304.76	0.000534	5.06	1791.05	250.22	0.33
Reach 3	11.391	Existing	12990.00	1294.70	1306.08	1301.36	1306.60	0.000561	5.83	2228.34	261.31	0.35
Reach 3	11.486	Design	6900.00	1295.34	1303.48	1300.05	1303.82	0.000553	4.64	1485.87	242.89	0.33
Reach 3	11.486	Future	9070.00	1295.34	1304.63	1300.69	1305.04	0.000556	5.13	1769.69	250.35	0.34
Reach 3	11.486	Existing	12990.00	1295.34	1306.35	1301.70	1306.89	0.000577	5.88	2210.32	261.27	0.36
Reach 3	11.531	Design	6900.00	1294.79	1303.63	1299.95	1303.94	0.000495	4.51	1531.07	241.03	0.32
Reach 3	11.531	Future	9070.00	1294.79	1304.78	1300.58	1305.17	0.000508	5.00	1813.14	248.43	0.33
Reach 3	11.531	Existing	12990.00	1294.79	1306.51	1301.63	1307.02	0.000537	5.77	2252.21	259.53	0.35
Reach 3	11.572	Design	6900.00	1295.17	1303.73	1300.03	1304.05	0.000497	4.53	1523.23	238.42	0.32
Reach 3	11.572	Future	9070.00	1295.17	1304.89	1300.69	1305.28	0.000510	5.03	1802.56	245.47	0.33
Reach 3	11.572	Existing	12990.00	1295.17	1306.62	1301.72	1307.14	0.000540	5.81	2237.25	256.07	0.35
Reach 3	11.609	Design	6900.00	1295.12	1303.85	1300.00	1304.14	0.000451	4.36	1582.58	244.31	0.30
Reach 3	11.609	Future	9070.00	1295.12	1305.01	1300.66	1305.38	0.000465	4.85	1870.56	251.36	0.31
Reach 3	11.609	Existing	12990.00	1295.12	1306.76	1301.68	1307.25	0.000493	5.60	2319.48	261.92	0.33
Reach 3	11.703	Design	6900.00	1295.18	1304.07	1300.12	1304.37	0.000447	4.37	1578.35	240.83	0.30
Reach 3	11.703	Future	9070.00	1295.18	1305.24	1300.77	1305.61	0.000464	4.86	1864.75	249.08	0.31
Reach 3	11.703	Existing	12990.00	1295.18	1307.01	1301.85	1307.49	0.000495	5.61	2315.12	261.53	0.33
Reach 3	11.798	Design	6900.00	1295.17	1304.31	1300.10	1304.58	0.000395	4.21	1640.11	241.62	0.28
Reach 3	11.798	Future	9070.00	1295.17	1305.49	1300.74	1305.83	0.000415	4.70	1930.21	249.55	0.30
Reach 3	11.798	Existing	12990.00	1295.17	1307.27	1301.80	1307.73	0.000448	5.44	2386.21	261.53	0.32
Reach 3	11.893	Design	6900.00	1295.21	1304.51	1300.25	1304.78	0.000388	4.18	1650.72	242.24	0.28
Reach 3	11.893	Future	9070.00	1295.21	1305.70	1300.91	1306.04	0.000407	4.66	1944.54	250.53	0.30
Reach 3	11.893	Existing	12990.00	1295.21	1307.50	1301.95	1307.95	0.000438	5.40	2407.74	263.07	0.31
Reach 3	11.988	Design	6900.00	1295.43	1304.71	1300.29	1304.97	0.000364	4.10	1683.58	242.66	0.27
Reach 3	11.988	Future	9070.00	1295.43	1305.91	1300.94	1306.24	0.000384	4.58	1980.80	251.03	0.29
Reach 3	11.988	Existing	12990.00	1295.43	1307.73	1302.03	1308.17	0.000412	5.30	2451.31	275.54	0.31
Reach 3	12.082	Design	6900.00	1295.82	1304.88	1300.70	1305.17	0.000409	4.26	1620.71	240.83	0.29
Reach 3	12.082	Future	9070.00	1295.82	1306.10	1301.37	1306.44	0.000424	4.73	1917.87	249.62	0.30
Reach 3	12.082	Existing	12990.00	1295.82	1307.93	1302.45	1308.39	0.000445	5.44	2393.36	920.60	0.32
Reach 3	12.177	Design	6900.00	1296.00	1305.09	1300.76	1305.36	0.000378	4.16	1658.97	240.45	0.28
Reach 3	12.177	Future	9070.00	1296.00	1306.32	1301.42	1306.65	0.000394	4.63	1957.32	248.46	0.29
Reach 3	12.177	Existing	12990.00	1296.00	1308.16	1302.50	1308.61	0.000421	5.35	2427.23	817.92	0.31
Reach 3	12.245	Design	6900.00	1296.00	1305.22	1300.97	1305.51	0.000409	4.29	1607.54	235.82	0.29
Reach 3	12.245	Future	9070.00	1296.00	1306.45	1301.64	1306.80	0.000425	4.77	1902.05	245.11	0.30
Reach 3	12.245	Existing	12990.00	1296.00	1308.30	1302.74	1308.77	0.000452	5.48	2369.65	259.18	0.32
Reach 3	12.302	Design	6900.00	1296.42	1305.35	1301.19	1305.63	0.000413	4.29	1607.65	237.69	0.29
Reach 3	12.302	Future	9070.00	1296.42	1306.58	1301.82	1306.93	0.000425	4.76	1905.25	246.12	0.30
Reach 3	12.302	Existing	12990.00	1296.42	1308.44	1302.92	1308.91	0.000448	5.47	2375.72	258.88	0.32
Reach 3	12.349	Design	6900.00	1296.16	1305.46	1301.13	1305.73	0.000389	4.21	1640.05	238.71	0.28
Reach 3	12.349	Future	9070.00	1296.16	1306.69	1301.80	1307.03	0.000403	4.67	1940.34	247.44	0.29
Reach 3	12.349	Existing	12990.00	1296.16	1308.57	1302.89	1309.02	0.000427	5.38	2415.94	260.66	0.31
Reach 3	12.441	Design	6900.00	1296.21	1305.65	1301.38	1305.92	0.000384	4.16	1658.32	243.39	0.28
Reach 3	12.441	Future	9070.00	1296.21	1306.90	1302.03	1307.23	0.000395	4.61	1966.67	252.14	0.29
Reach 3	12.441	Existing	12990.00	1296.21	1308.79	1303.10	1309.22	0.000413	5.29	2454.94	302.25	0.31

HEC-RAS Plan: EMF R 3 River: EMF Reach: Reach 3 (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 3	12.488	Design	6900.00	1296.30	1305.76	1301.42	1306.02	0.000369	4.10	1684.11	245.41	0.28
Reach 3	12.488	Future	9070.00	1296.30	1307.00	1302.08	1307.32	0.000380	4.54	1995.82	253.92	0.29
Reach 3	12.488	Existing	12990.00	1296.30	1308.90	1303.12	1309.32	0.000397	5.22	2488.79	298.02	0.30
Reach 3	12.552	Design	6900.00	1296.15	1305.89	1301.37	1306.14	0.000350	4.04	1709.69	244.84	0.27
Reach 3	12.552	Future	9070.00	1296.15	1307.14	1302.04	1307.45	0.000364	4.49	2022.23	254.01	0.28
Reach 3	12.552	Existing	12990.00	1296.15	1309.04	1303.10	1309.45	0.000382	5.16	2517.96	296.71	0.30
Reach 3	12.6	Design	6900.00	1296.53	1305.97	1301.63	1306.23	0.000378	4.13	1669.87	244.53	0.28
Reach 3	12.6	Future	9070.00	1296.53	1307.22	1302.31	1307.55	0.000388	4.57	1982.71	253.72	0.29
Reach 3	12.6	Existing	12990.00	1296.53	1309.13	1303.37	1309.56	0.000403	5.24	2479.20	299.02	0.30
Reach 3	12.694	Design	6900.00	1296.54	1306.16	1301.67	1306.42	0.000348	4.03	1714.17	245.39	0.27
Reach 3	12.694	Future	9070.00	1296.54	1307.43	1302.33	1307.74	0.000360	4.47	2029.49	254.20	0.28
Reach 3	12.694	Existing	12990.00	1296.54	1309.34	1303.38	1309.75	0.000374	5.14	2527.40	301.95	0.29
Reach 3	12.789	Design	6900.00	1296.60	1306.34	1301.78	1306.59	0.000341	4.00	1723.93	244.87	0.27
Reach 3	12.789	Future	9070.00	1296.60	1307.61	1302.43	1307.92	0.000353	4.44	2040.52	254.11	0.28
Reach 3	12.789	Existing	12990.00	1296.60	1309.53	1303.49	1309.94	0.000368	5.11	2540.94	302.14	0.29
Reach 3	12.884	Design	6900.00	1297.09	1306.51	1301.93	1306.76	0.000341	3.99	1727.35	246.01	0.27
Reach 3	12.884	Future	9070.00	1297.09	1307.79	1302.61	1308.09	0.000351	4.43	2047.06	255.20	0.28
Reach 3	12.884	Existing	12990.00	1297.09	1309.72	1303.66	1310.12	0.000370	5.08	2558.07	315.99	0.29
Reach 3	12.905	Design	6900.00	1297.17	1306.55	1302.00	1306.80	0.000346	4.03	1712.11	243.34	0.27
Reach 3	12.905	Future	9070.00	1297.17	1307.82	1302.66	1308.13	0.000357	4.47	2028.63	252.67	0.28
Reach 3	12.905	Existing	12990.00	1297.17	1309.76	1303.74	1310.17	0.000368	5.14	2529.13	309.77	0.29
Reach 3	12.981	Design	6900.00	1297.30	1306.69	1302.20	1306.94	0.000347	4.03	1713.33	244.39	0.27
Reach 3	12.981	Future	9070.00	1297.30	1307.97	1302.87	1308.28	0.000356	4.46	2031.81	252.85	0.28
Reach 3	12.981	Existing	12990.00	1297.30	1309.91	1303.92	1310.32	0.000370	5.13	2534.16	301.82	0.29
Reach 3	13.037	Design	6900.00	1297.30	1306.79	1302.21	1307.04	0.000334	3.96	1740.95	247.21	0.26
Reach 3	13.037	Future	9070.00	1297.30	1308.08	1302.87	1308.38	0.000343	4.39	2064.62	256.36	0.27
Reach 3	13.037	Existing	12990.00	1297.30	1310.03	1303.93	1310.42	0.000358	5.04	2576.94	312.42	0.29
Reach 3	13.084	Design	6900.00	1297.40	1306.87	1302.39	1307.13	0.000351	4.04	1708.94	245.26	0.27
Reach 3	13.084	Future	9070.00	1297.40	1308.16	1303.06	1308.47	0.000359	4.47	2030.44	254.30	0.28
Reach 3	13.084	Existing	12990.00	1297.40	1310.11	1304.10	1310.52	0.000373	5.11	2539.64	307.91	0.29
Reach 3	13.179	Design	6900.00	1297.89	1307.05	1302.81	1307.32	0.000391	4.19	1648.05	242.83	0.28
Reach 3	13.179	Future	9070.00	1297.89	1308.33	1303.45	1308.67	0.000394	4.61	1966.93	251.97	0.29
Reach 3	13.179	Existing	12990.00	1297.89	1310.29	1304.52	1310.72	0.000403	5.25	2472.95	303.77	0.30
Reach 3	13.232	Design	6900.00	1297.59	1307.16	1302.88	1307.43	0.000386	4.17	1656.51	243.61	0.28
Reach 3	13.232	Future	9070.00	1297.59	1308.45	1303.51	1308.78	0.000390	4.59	1976.82	252.84	0.29
Reach 3	13.232	Existing	12990.00	1297.59	1310.41	1304.61	1310.83	0.000398	5.23	2485.59	327.64	0.30
Reach 3	13.28	Design	6900.00	1297.90	1307.27	1302.77	1307.52	0.000352	4.04	1707.43	244.96	0.27
Reach 3	13.28	Future	9070.00	1297.90	1308.56	1303.45	1308.87	0.000359	4.47	2030.02	254.01	0.28
Reach 3	13.28	Existing	12990.00	1297.90	1310.52	1304.52	1310.93	0.000372	5.11	2542.06	326.93	0.29
Reach 3	13.374	Design	6900.00	1298.27	1307.45	1303.09	1307.70	0.000352	4.01	1719.75	249.59	0.27
Reach 3	13.374	Future	9070.00	1298.27	1308.75	1303.71	1309.05	0.000355	4.43	2048.71	257.41	0.28
Reach 3	13.374	Existing	12990.00	1298.27	1310.72	1304.76	1311.11	0.000361	5.05	2602.22	330.35	0.29
Reach 3	13.426	Design	6900.00	1298.61	1307.56	1303.11	1307.81	0.000491	3.99	1728.15	246.09	0.27
Reach 3	13.426	Future	8970.00	1298.61	1308.87	1303.73	1309.17	0.000489	4.36	2055.32	255.11	0.27
Reach 3	13.426	Existing	12910.00	1298.61	1310.84	1304.77	1311.23	0.000516	5.02	2571.59	268.89	0.29
Reach 3	13.431		Bridge									
Reach 3	13.439	Design	6900.00	1297.84	1307.67	1302.81	1307.88	0.000412	3.76	1834.56	250.84	0.25
Reach 3	13.439	Future	8970.00	1297.84	1308.98	1303.42	1309.25	0.000416	4.13	2169.83	258.92	0.25
Reach 3	13.439	Existing	12910.00	1297.84	1310.97	1304.47	1311.33	0.000447	4.78	2698.46	272.83	0.27
Reach 3	13.471	Design	6900.00	1298.07	1307.70	1303.19	1307.99	0.000389	4.31	1602.47	225.11	0.28
Reach 3	13.471	Future	8970.00	1298.07	1309.01	1303.87	1309.35	0.000391	4.71	1903.65	238.70	0.29
Reach 3	13.471	Existing	12910.00	1298.07	1311.00	1304.98	1311.45	0.000401	5.40	2447.86	285.67	0.30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Station (ft)
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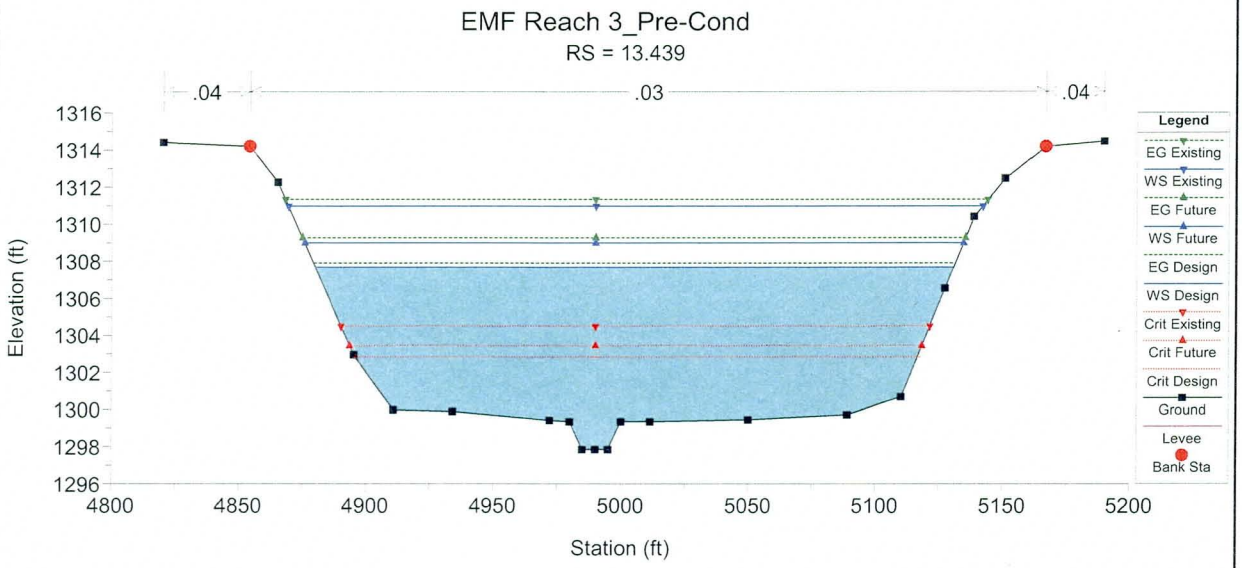
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta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Station (ft)
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WS Existing
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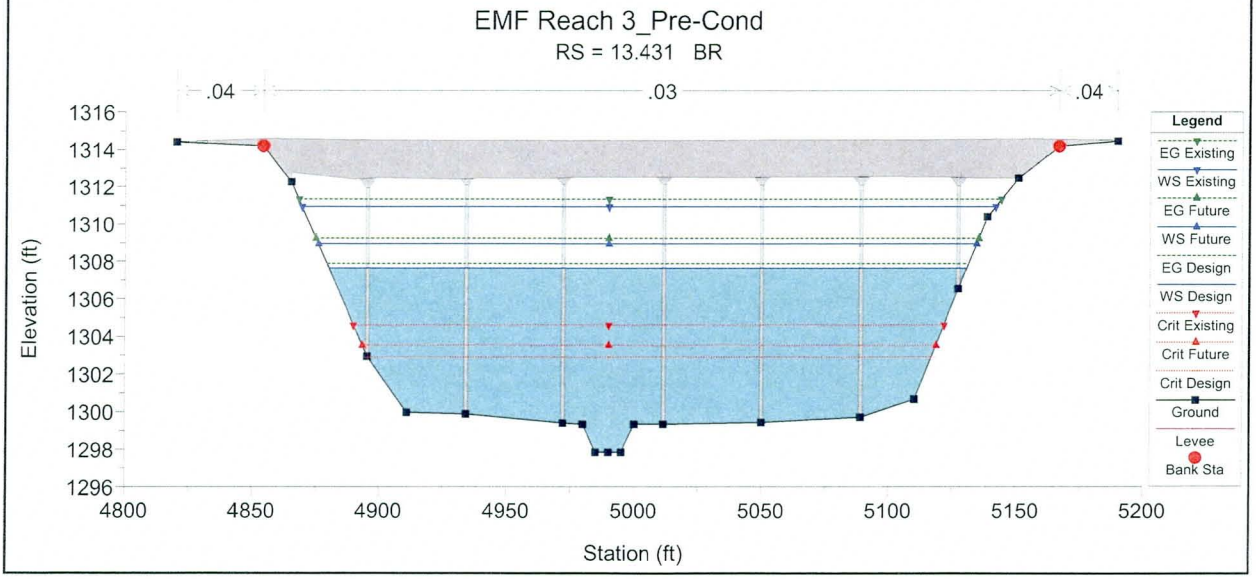
Crit Future
Crit Design
Ground
Levee
Bank Sta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.03
.04
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Station (ft)
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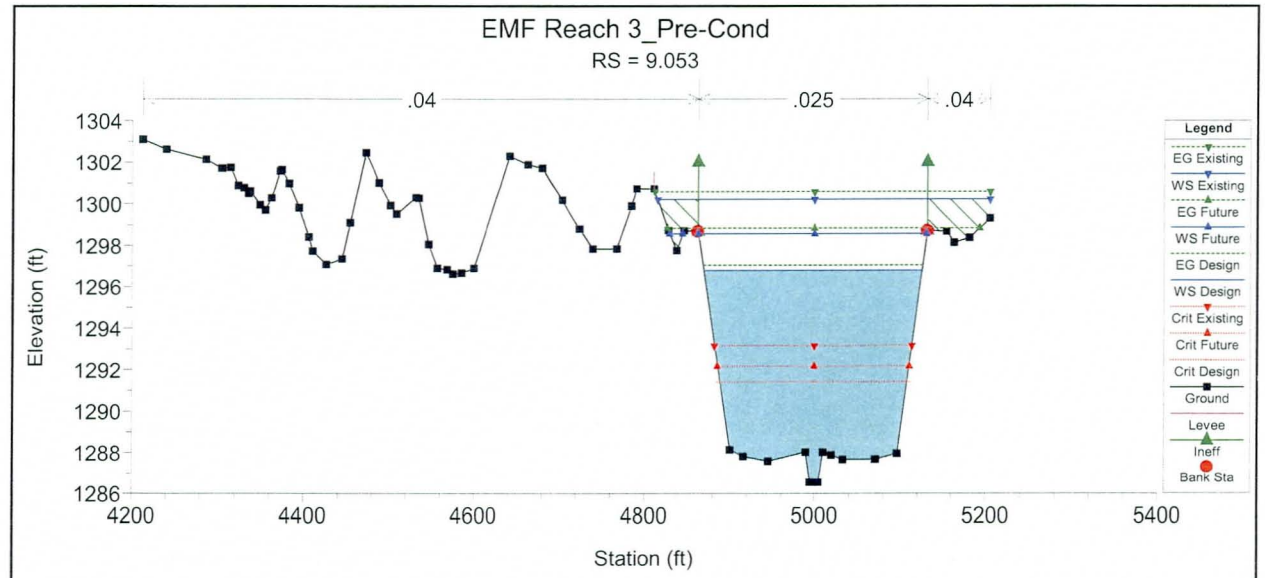
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta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.025
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Station (ft)
Legend
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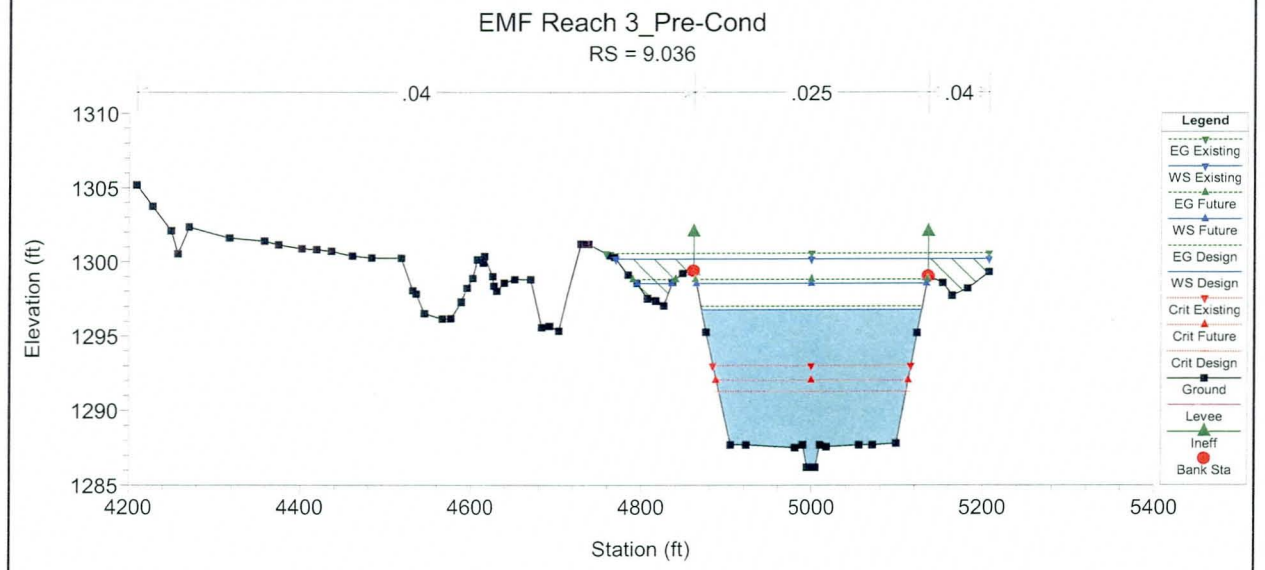
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Station (ft)
Legend
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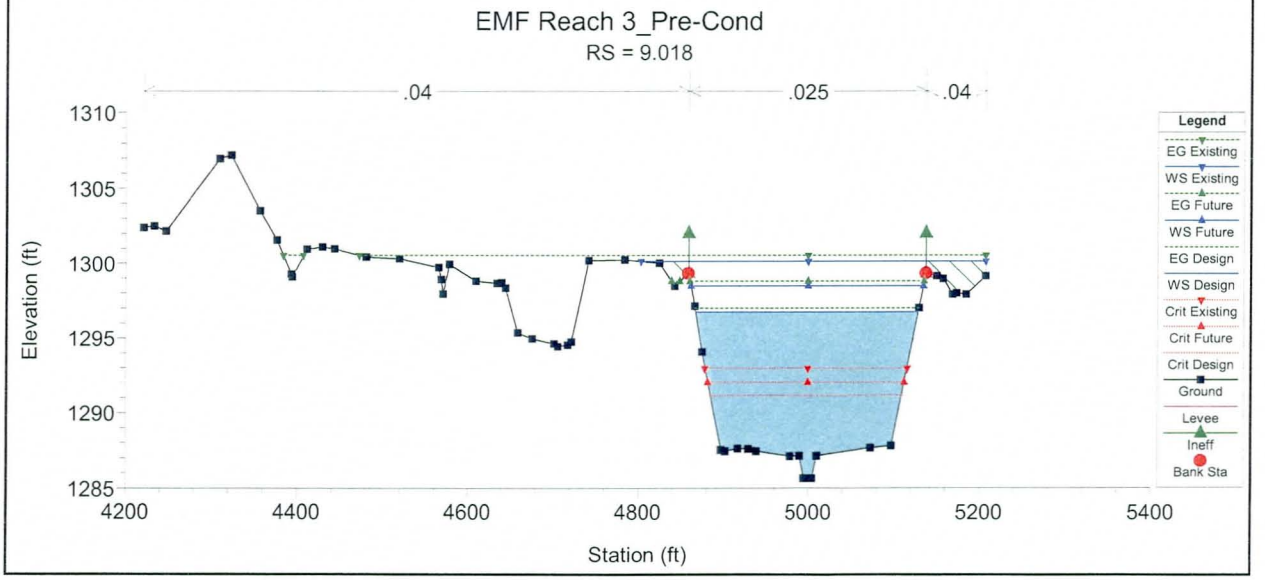
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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.025
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Station (ft)
Legend
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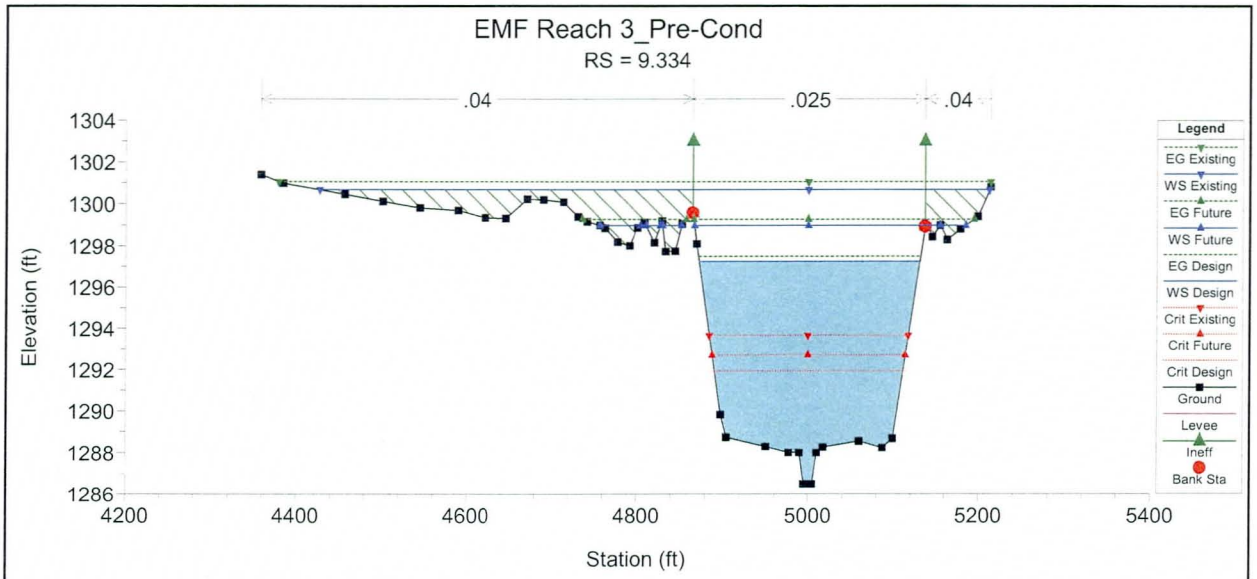
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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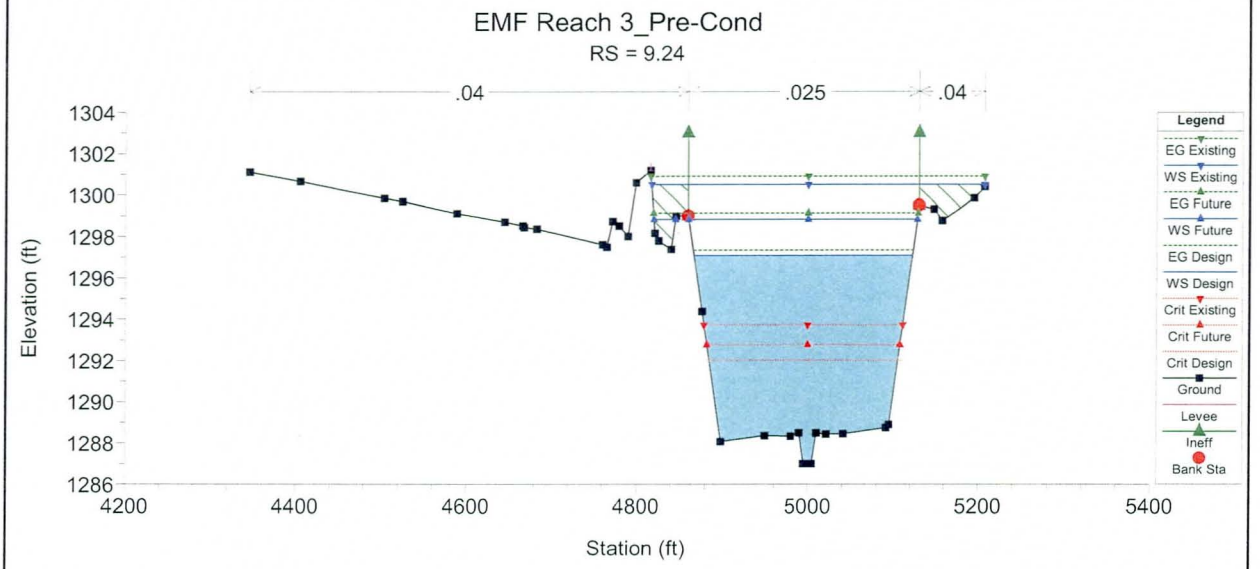
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 9.24
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.025
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Elevation (ft)
Station (ft)
Legend
EG Existing
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EG Future
WS Future
EG Design
WS Design
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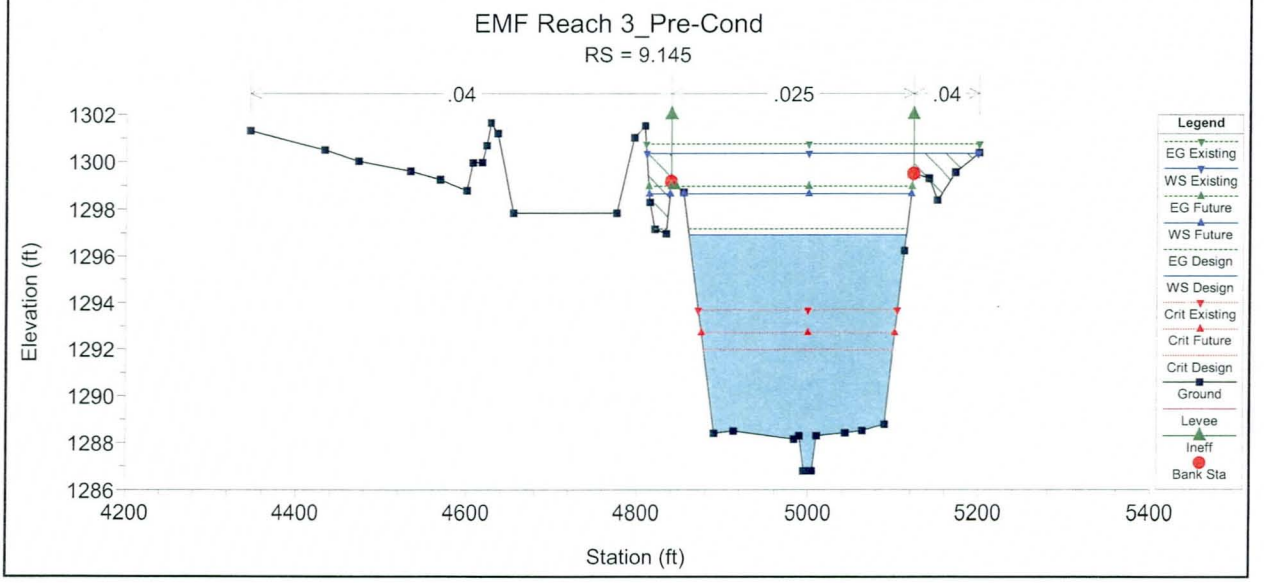
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 9.145
.04
.025
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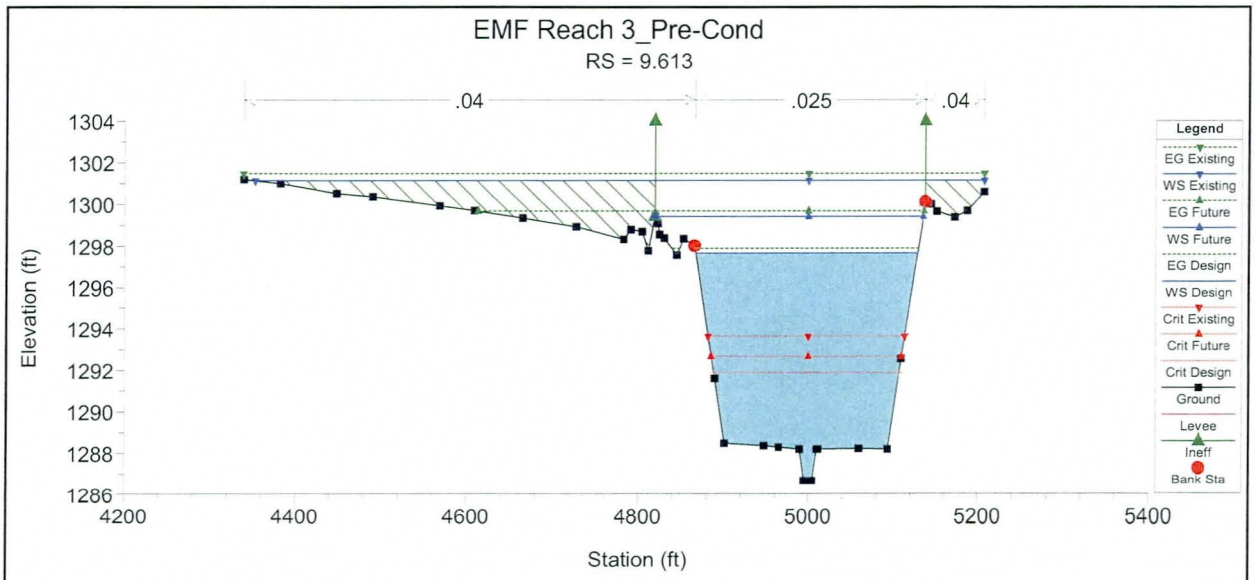
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 9.613
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.025
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Elevation (ft)
Station (ft)
Legend
EG Existing
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EG Future
WS Future
EG Design
WS Design
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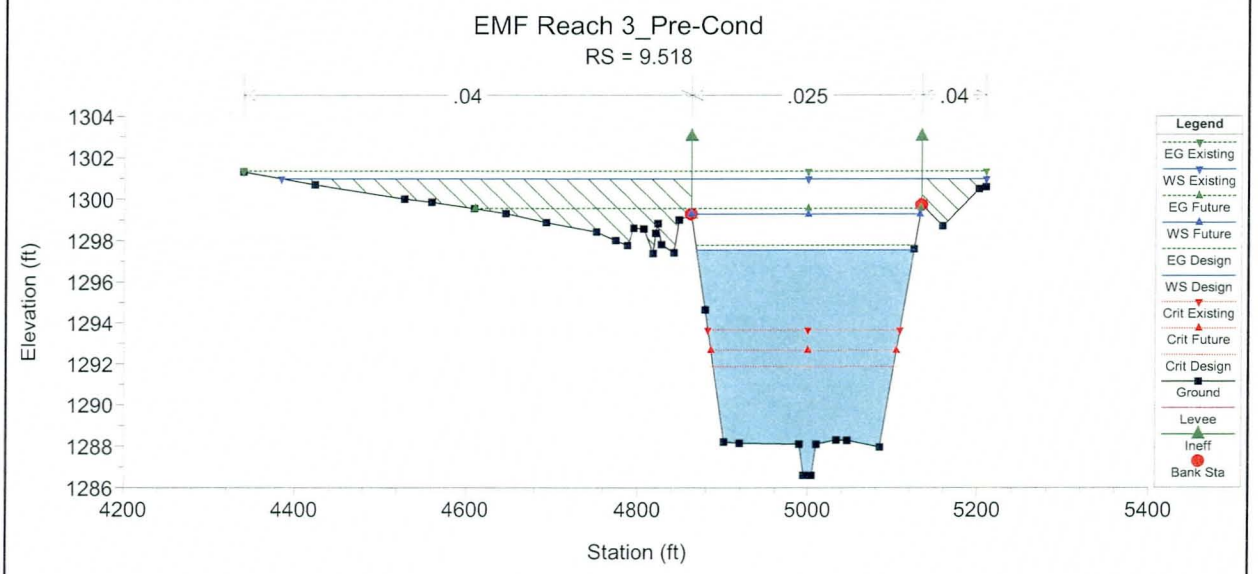
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 9.518
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.025
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Elevation (ft)
Station (ft)
Legend
EG Existing
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EG Future
WS Future
EG Design
WS Design
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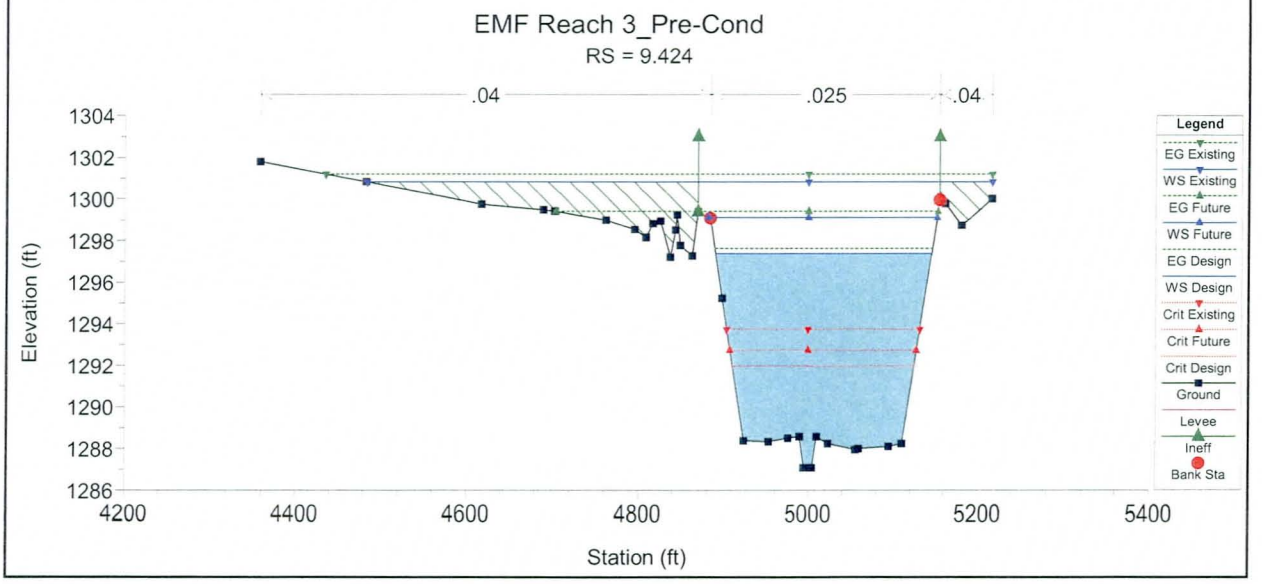
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 9.424
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.025
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Elevation (ft)
Station (ft)
Legend
EG Existing
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EG Future
WS Future
EG Design
WS Design
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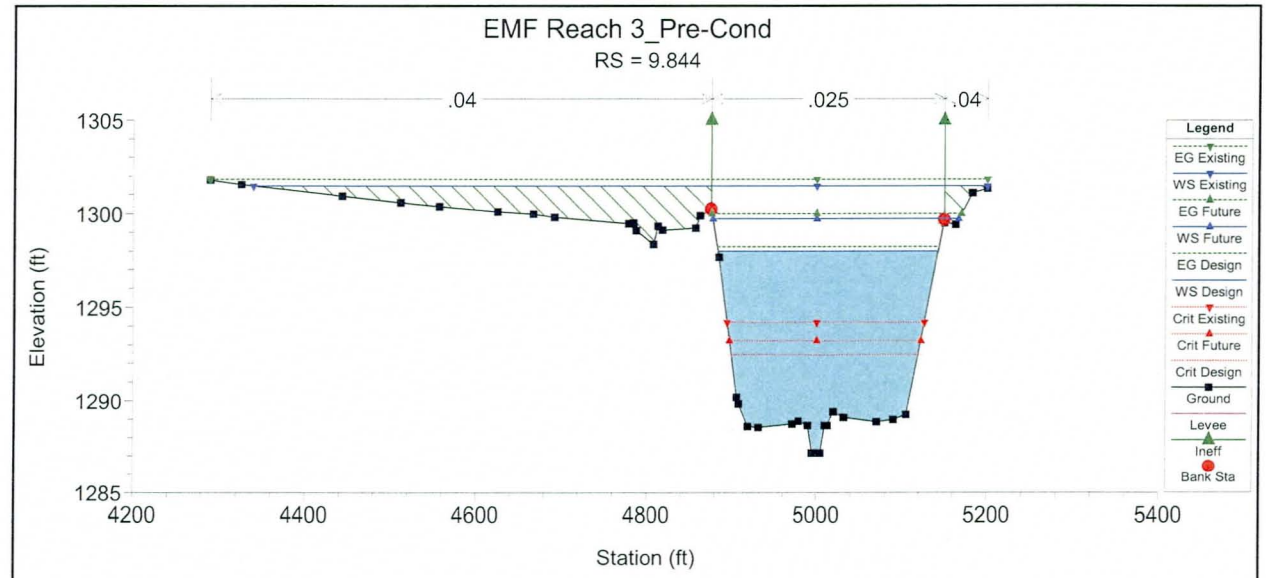
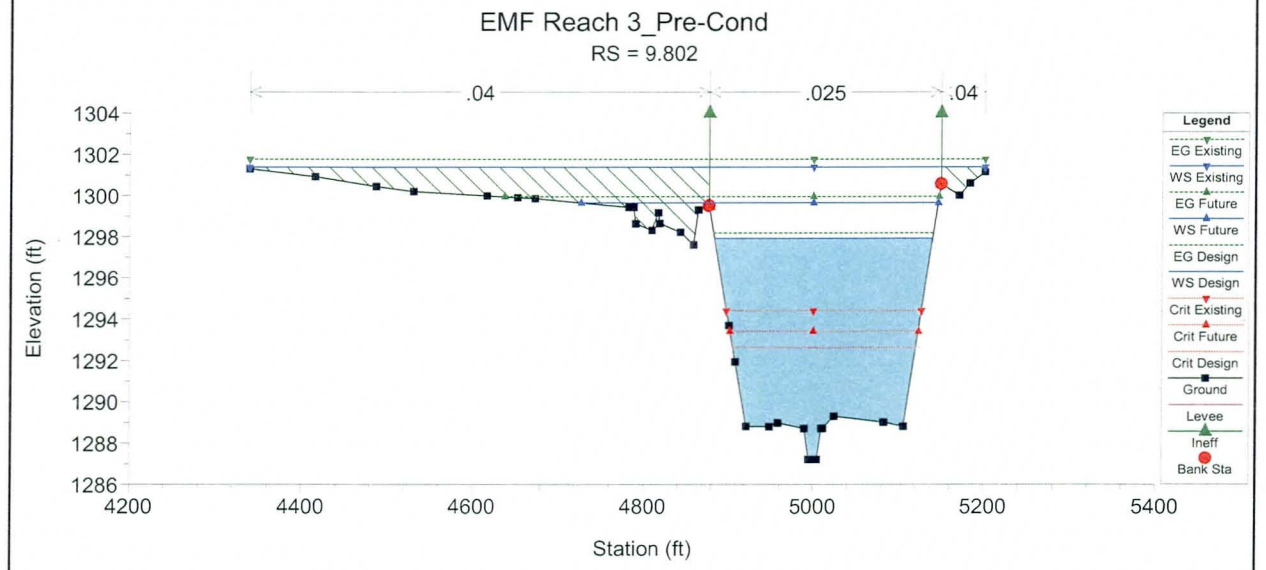
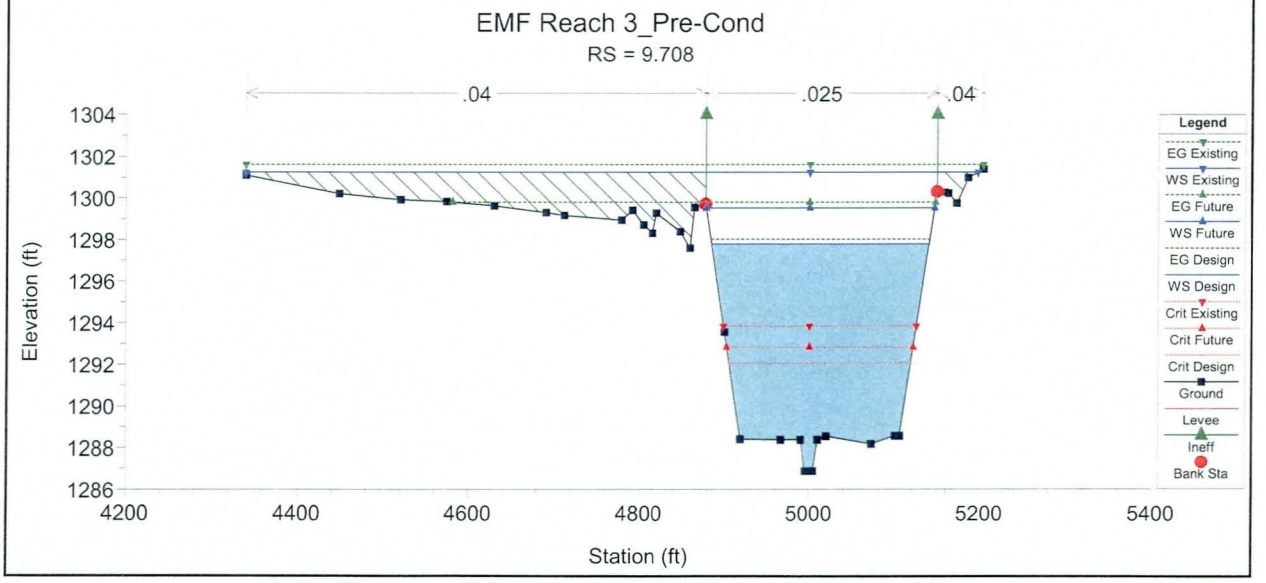
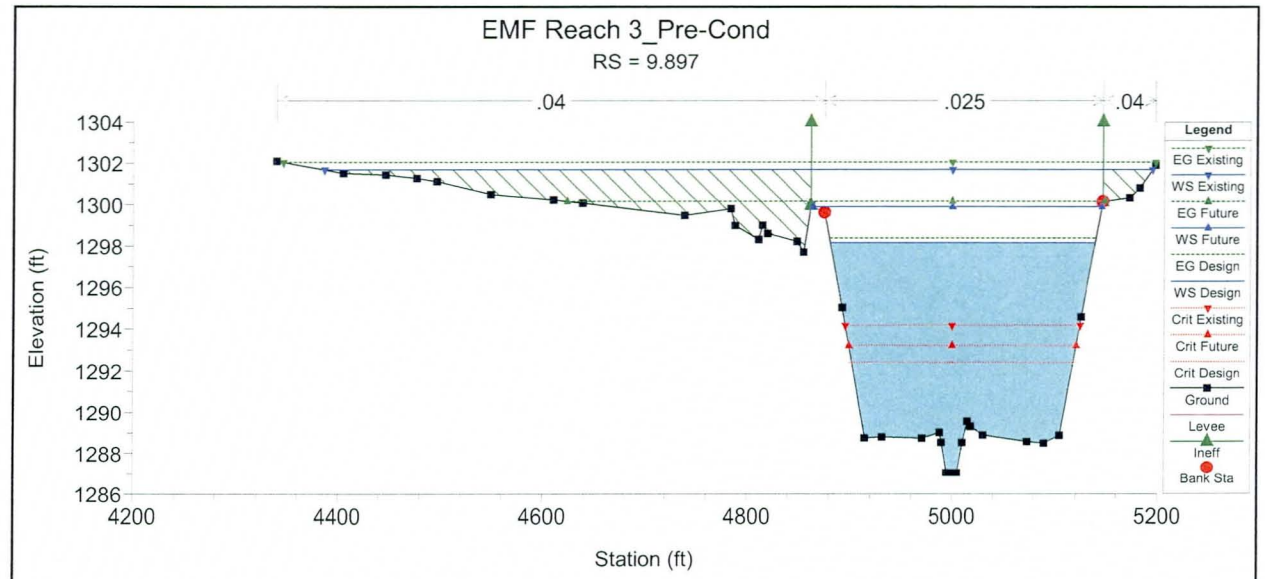
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 9.844
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 9.802
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 9.708
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 9.897
.04
.025
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Elevation (ft)
Station (ft)
Legend
EG Existing
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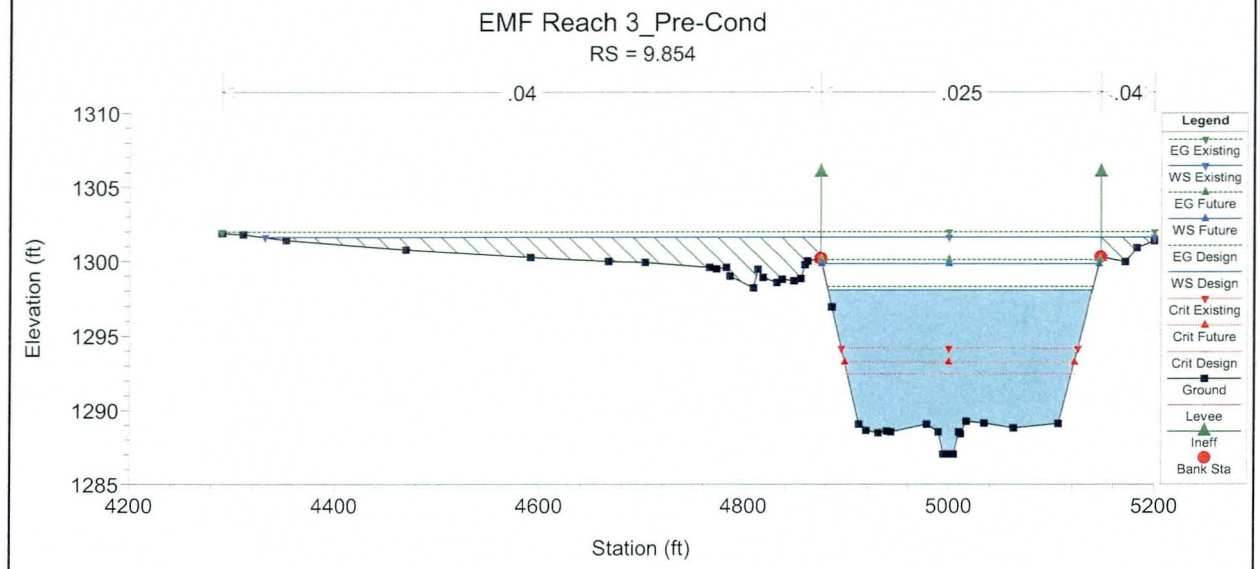
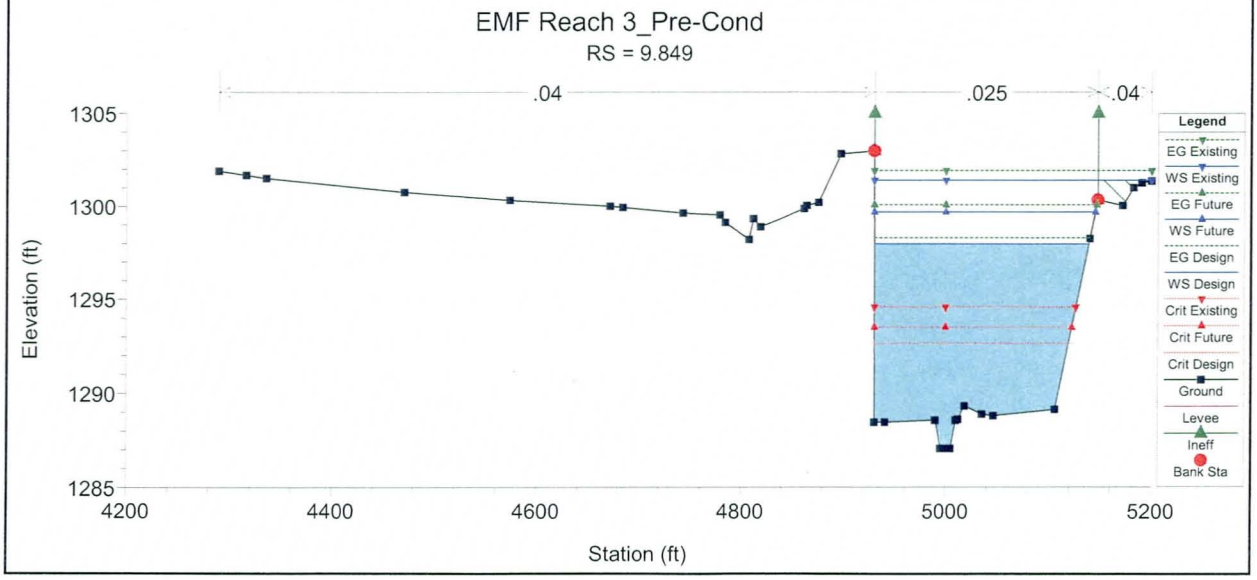
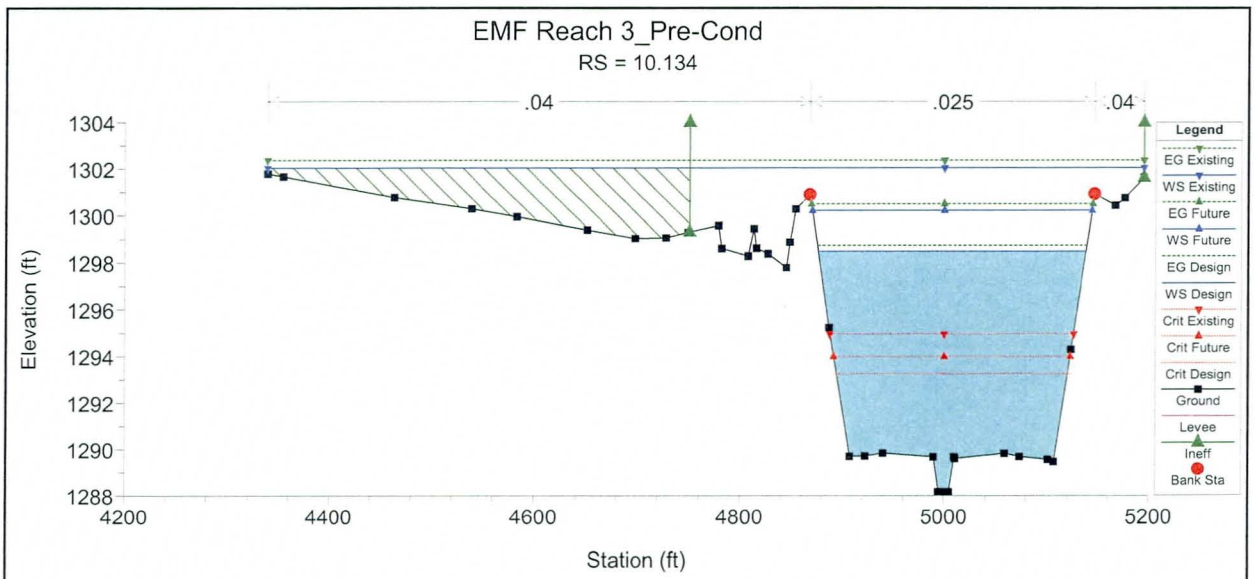
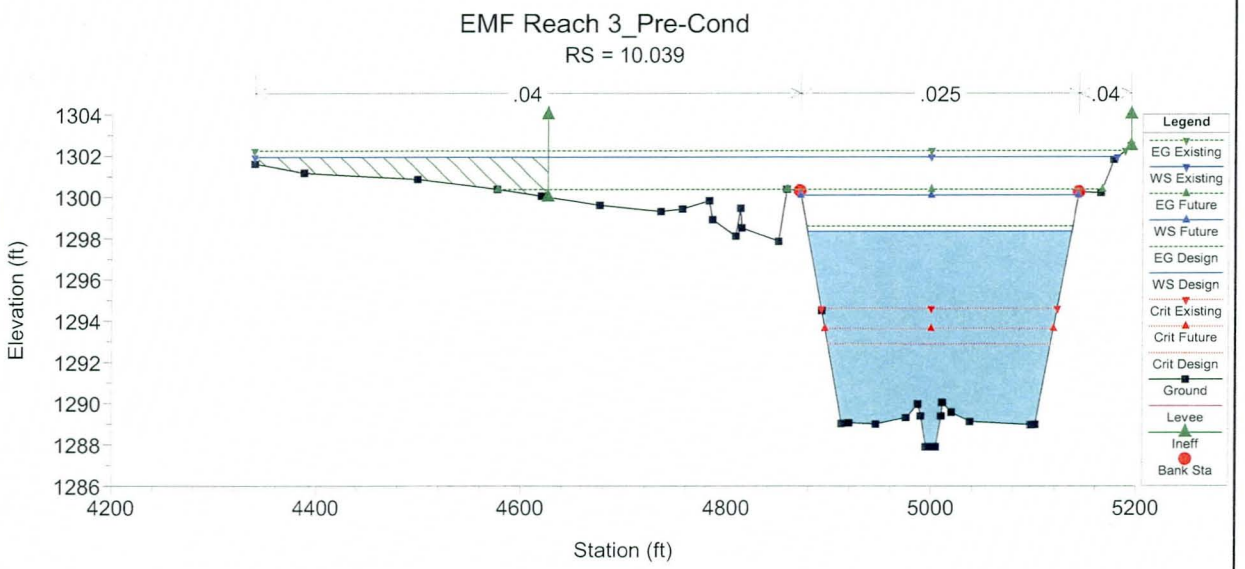
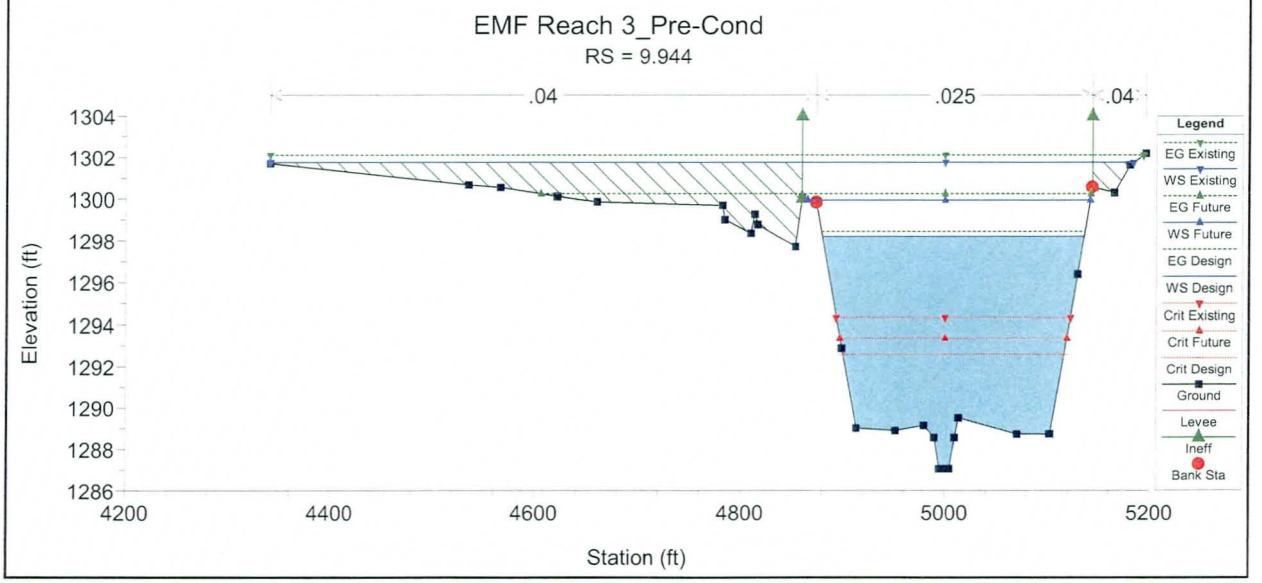
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

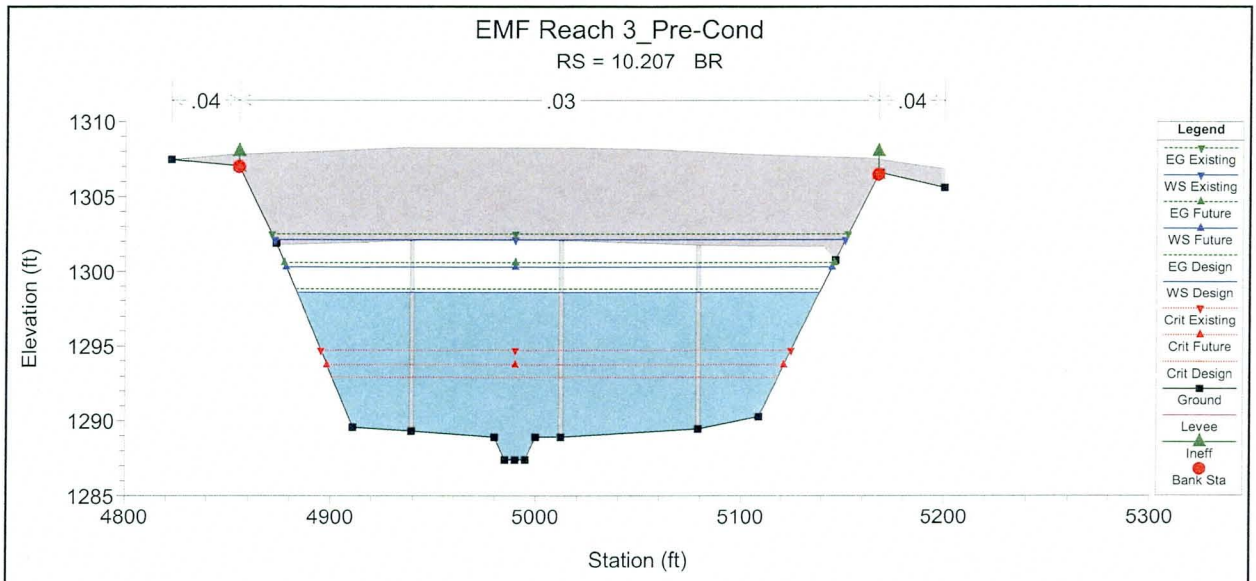

EMF Reach 3_Pre-Cond
RS = 9.854
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

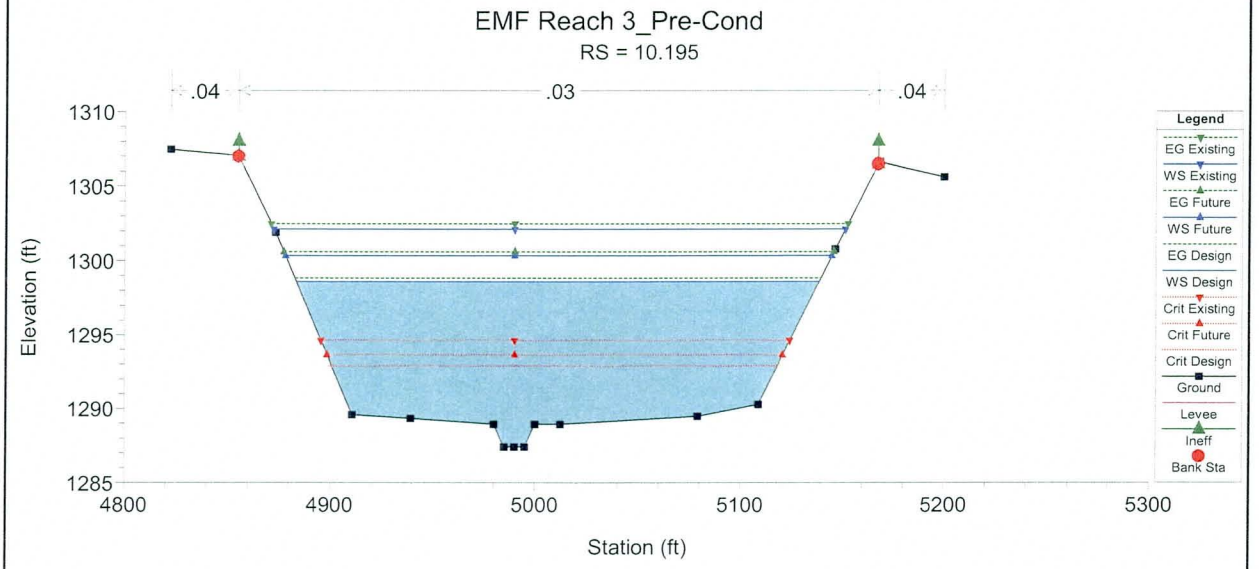

EMF Reach 3_Pre-Cond
RS = 9.849
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

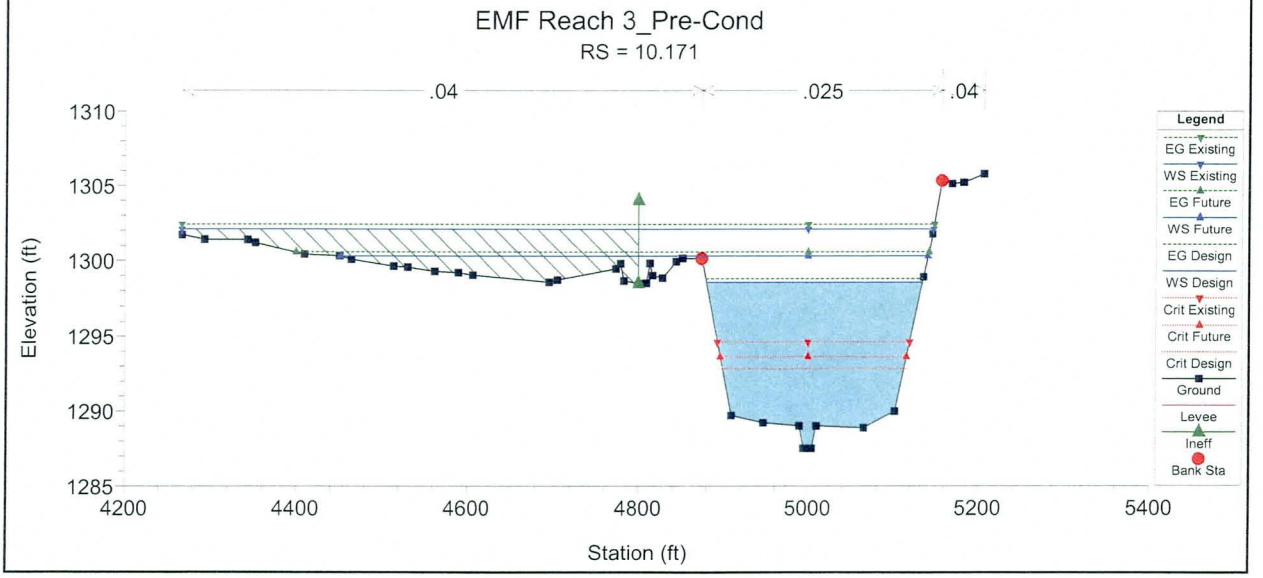

EMF Reach 3_Pre-Cond
RS = 10.134
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

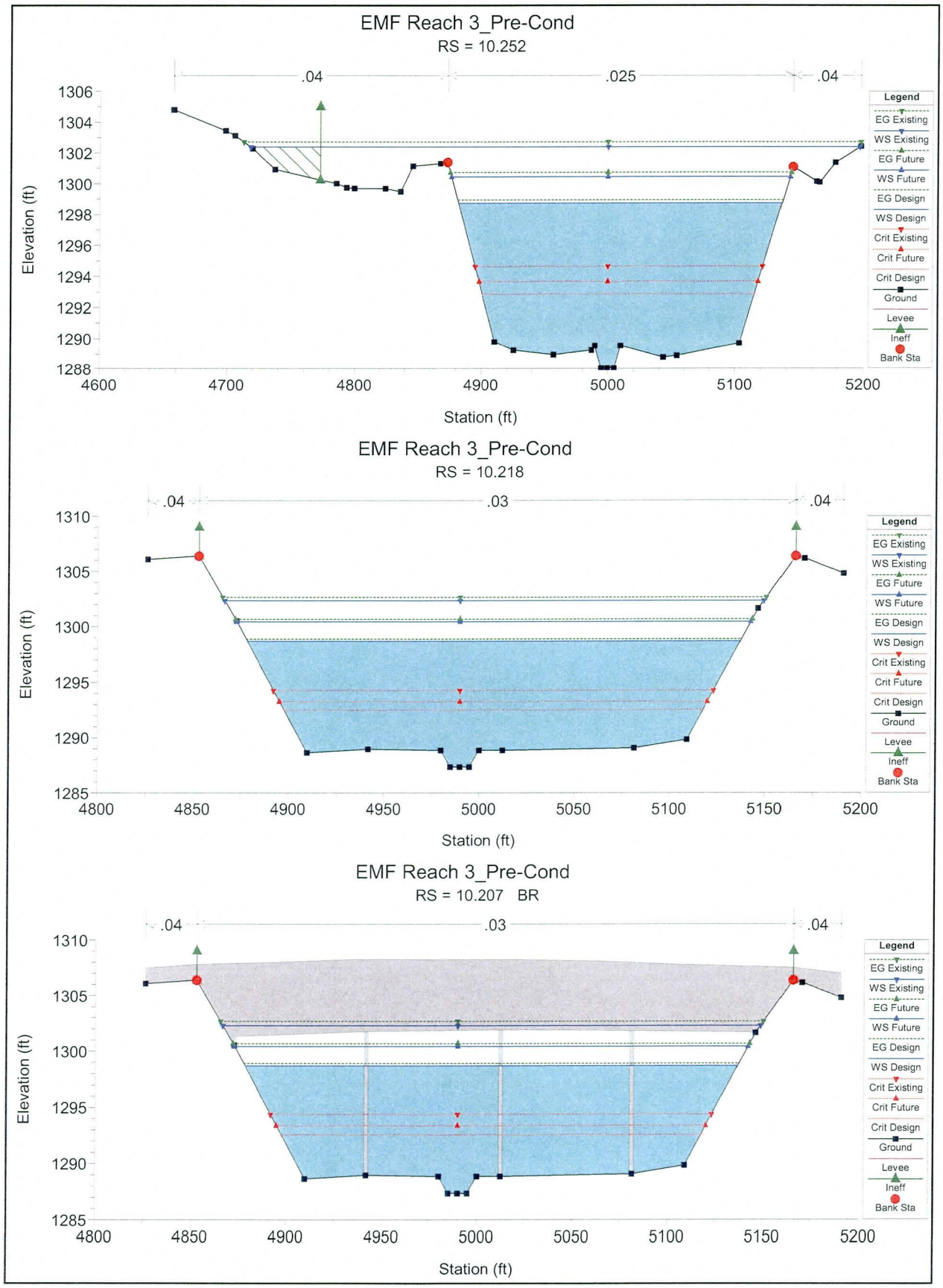

EMF Reach 3_Pre-Cond
RS = 10.039
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

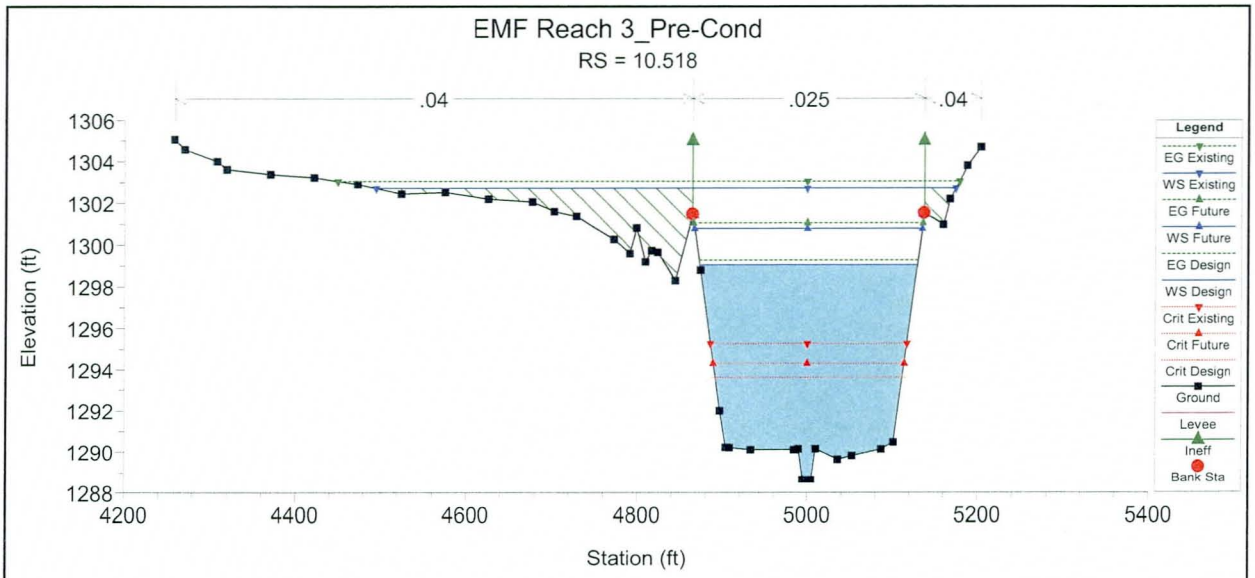

EMF Reach 3_Pre-Cond
RS = 9.944
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

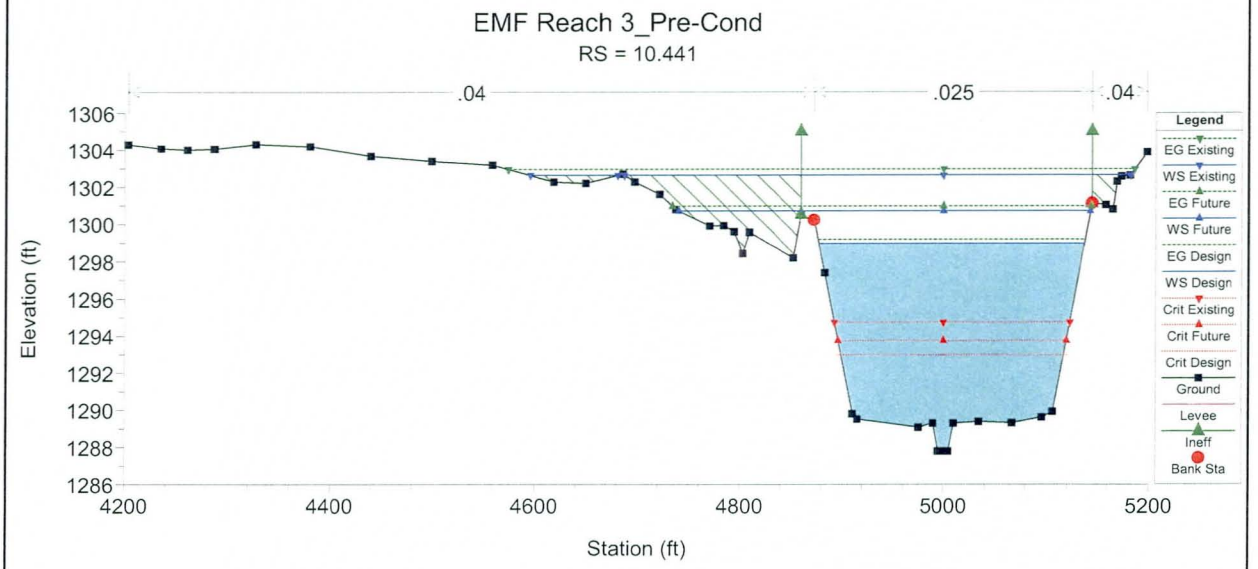

EMF Reach 3_Pre-Cond
RS = 10.207 BR
.04
.03
.04
1310
1305
1300
1295
1290
1285
Elevation (ft)
4800
4900
5000
5100
5200
5300
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

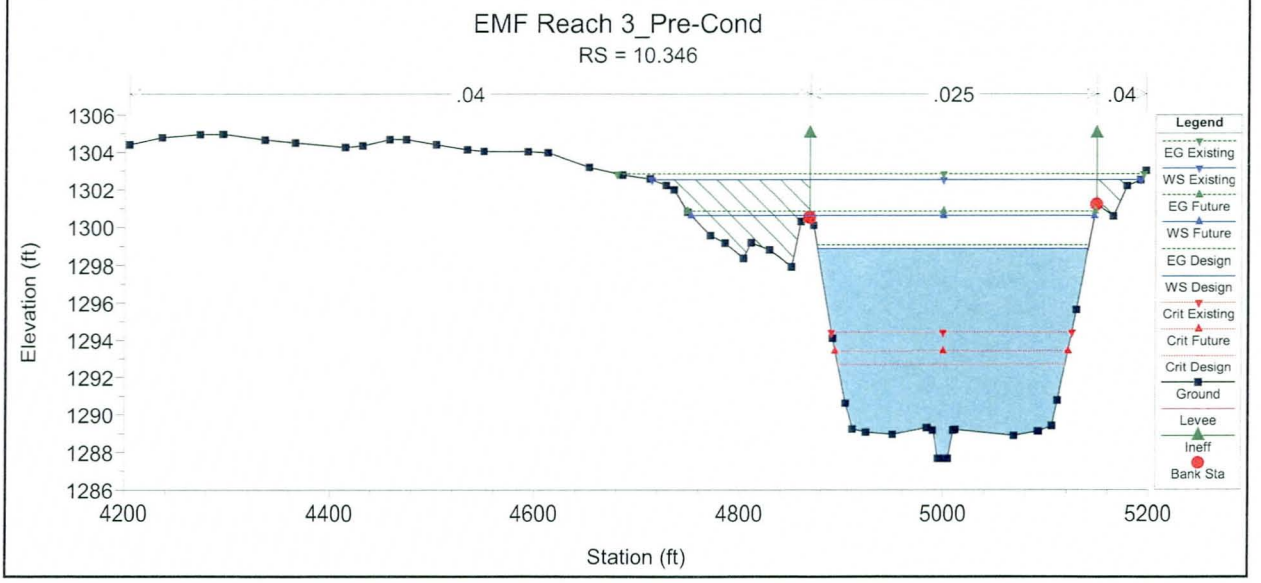

EMF Reach 3_Pre-Cond
RS = 10.195
.04
.03
.04
1310
1305
1300
1295
1290
1285
Elevation (ft)
4800
4900
5000
5100
5200
5300
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 10.171
.04
.025
.04
1310
1305
1300
1295
1290
1285
Elevation (ft)
4200
4400
4600
4800
5000
5200
5400
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 10.252
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta
EMF Reach 3_Pre-Cond
RS = 10.218
.04
.03
.04
Elevation (ft)
Station (ft)
EMF Reach 3_Pre-Cond
RS = 10.207 BR
.04
.03
.04
Elevation (ft)
Station (ft)


EMF Reach 3_Pre-Cond
RS = 10.518
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 10.441
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 10.346
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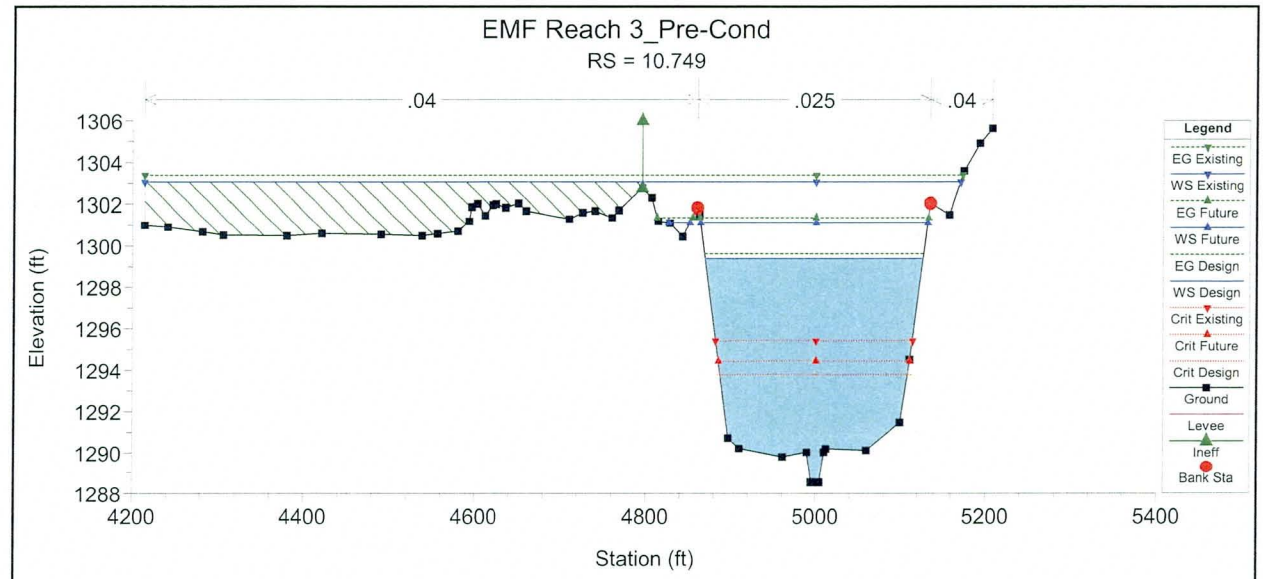
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 10.749
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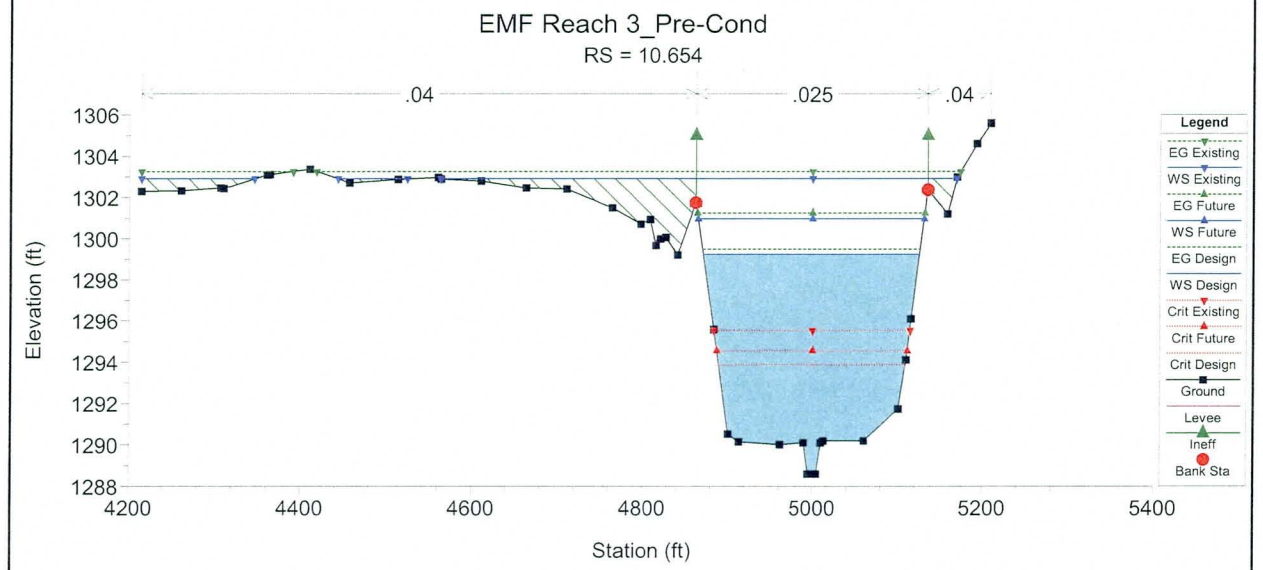
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 10.654
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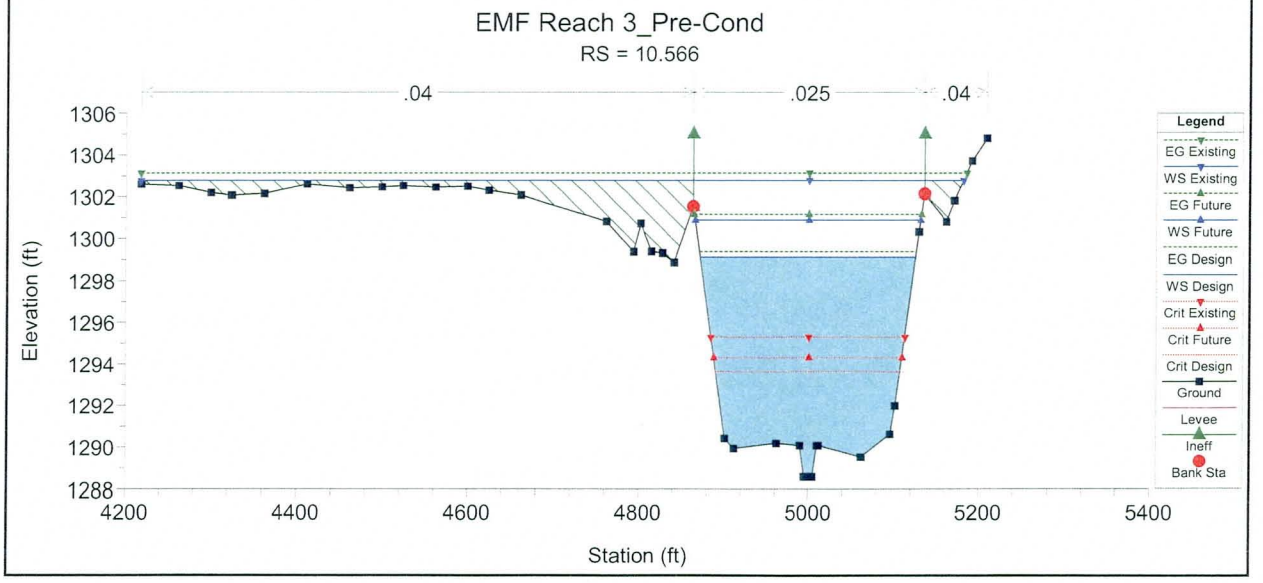
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 10.566
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Elevation (ft)
Station (ft)
Legend
EG Existing
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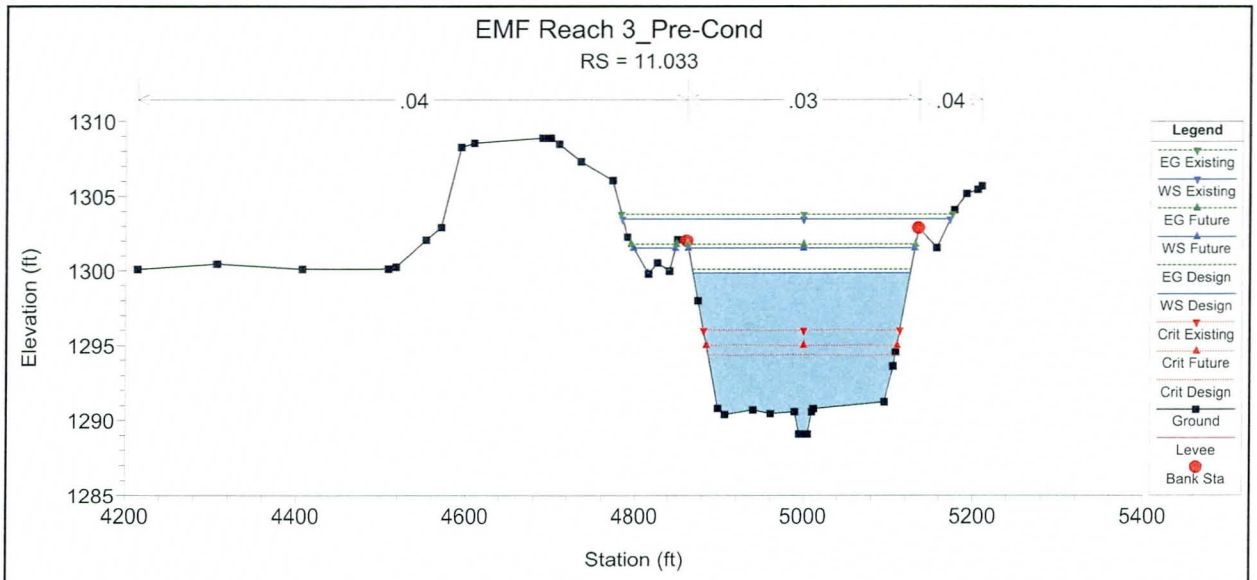
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 11.033
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.03
.04
Elevation (ft)
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1285
4200
4400
4600
4800
5000
5200
5400
Station (ft)
Legend
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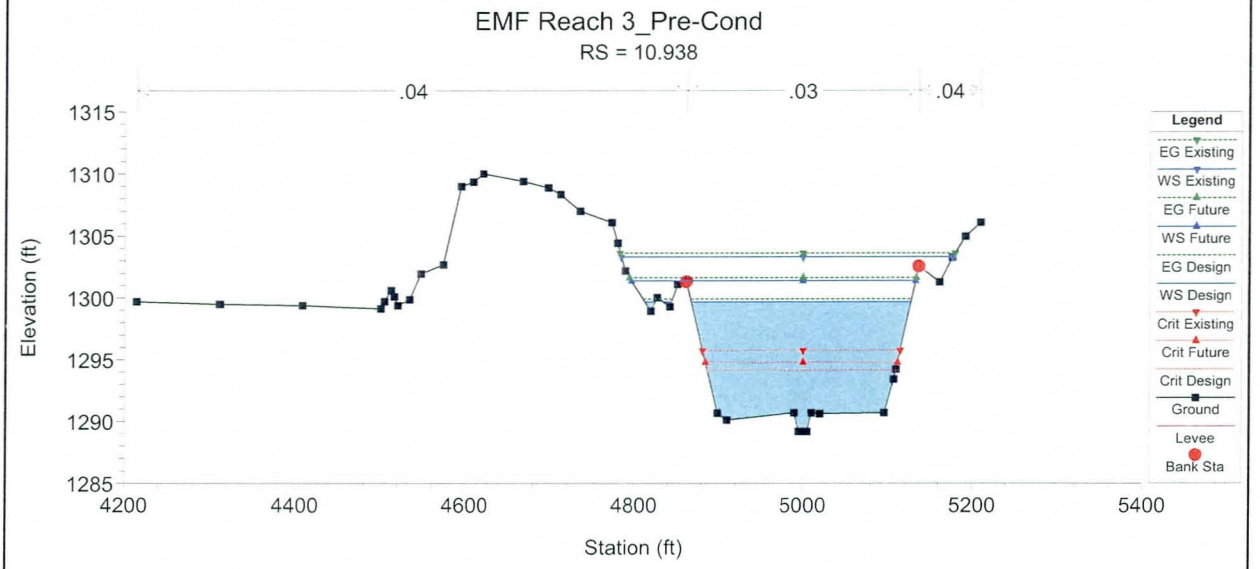
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Pre-Cond
RS = 10.938
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.03
.04
Elevation (ft)
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4800
5000
5200
5400
Station (ft)
Legend
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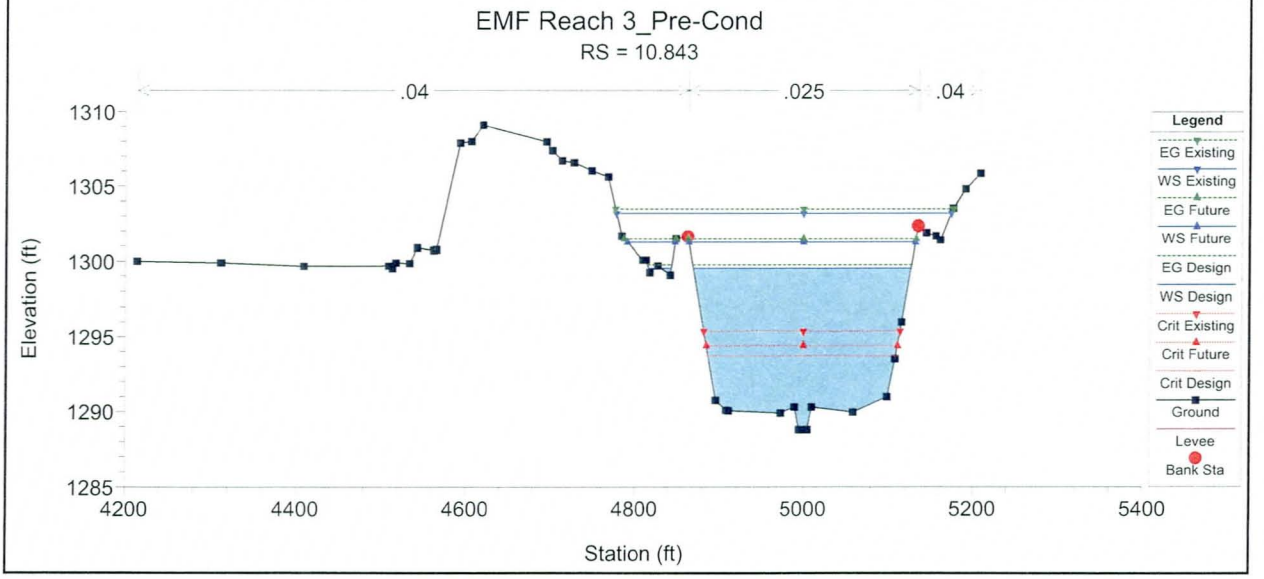
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Pre-Cond
RS = 10.843
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.04
Elevation (ft)
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5400
Station (ft)
Legend
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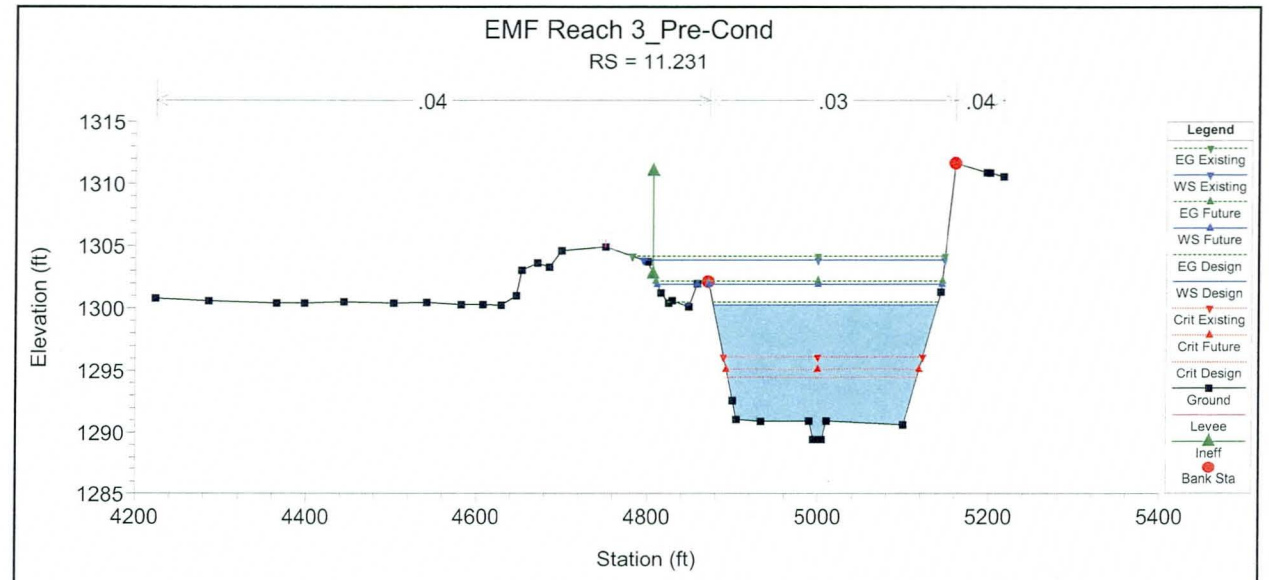
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Pre-Cond
RS = 11.231
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.04
Elevation (ft)
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5200
5400
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
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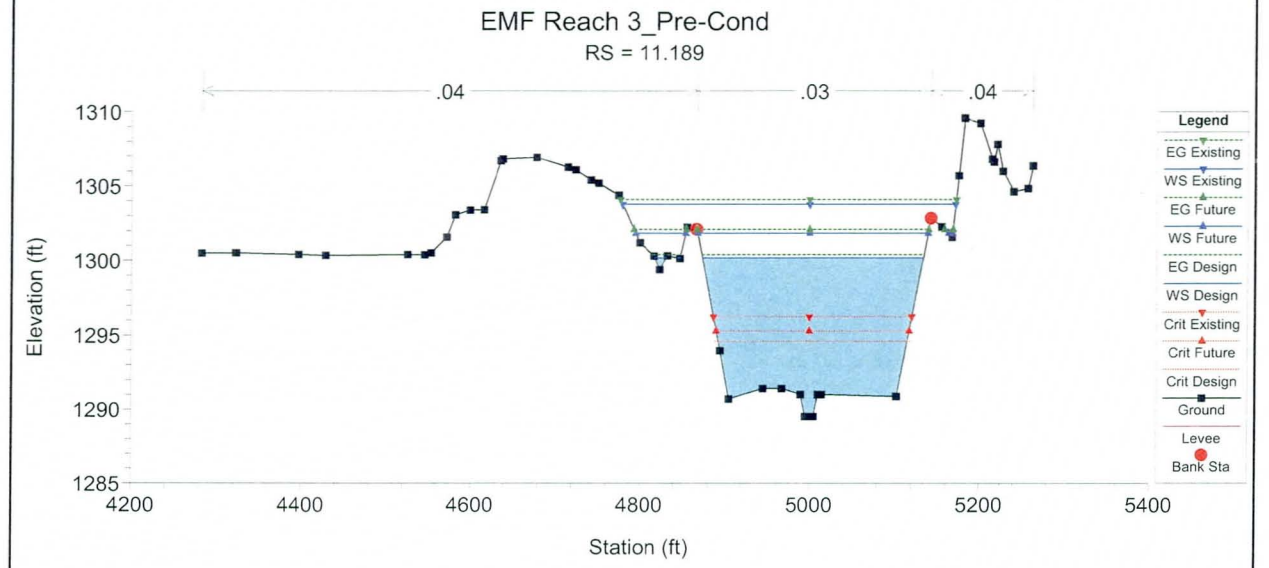
Bank Sta


EMF Reach 3_Pre-Cond
RS = 11.189
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.04
Elevation (ft)
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5400
Station (ft)
Legend
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WS Existing
EG Future
WS Future
EG Design
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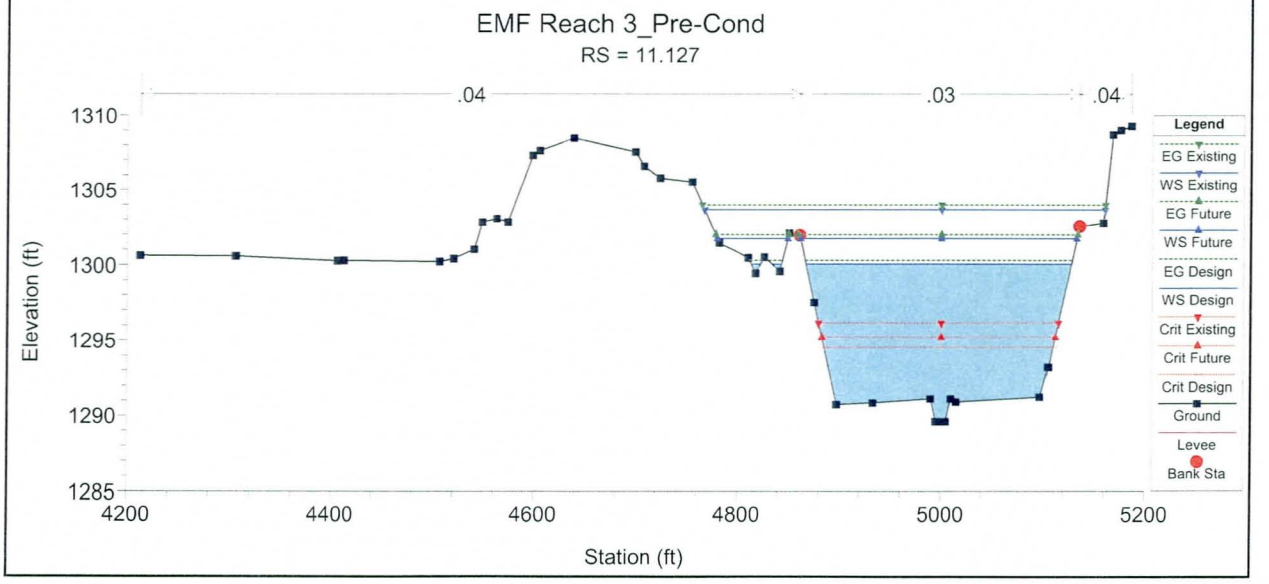
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Pre-Cond
RS = 11.127
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.04
Elevation (ft)
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4600
4800
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5200
Station (ft)
Legend
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WS Existing
EG Future
WS Future
EG Design
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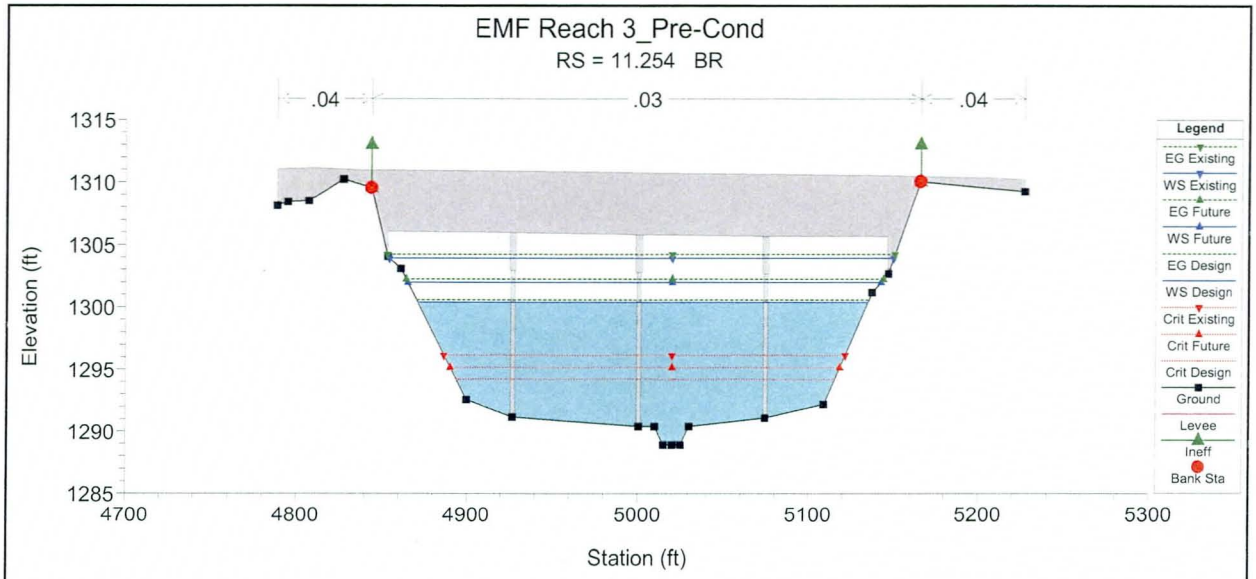
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Pre-Cond
RS = 11.254 BR
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.03
.04
Elevation (ft)
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5100
5200
5300
Station (ft)
Legend
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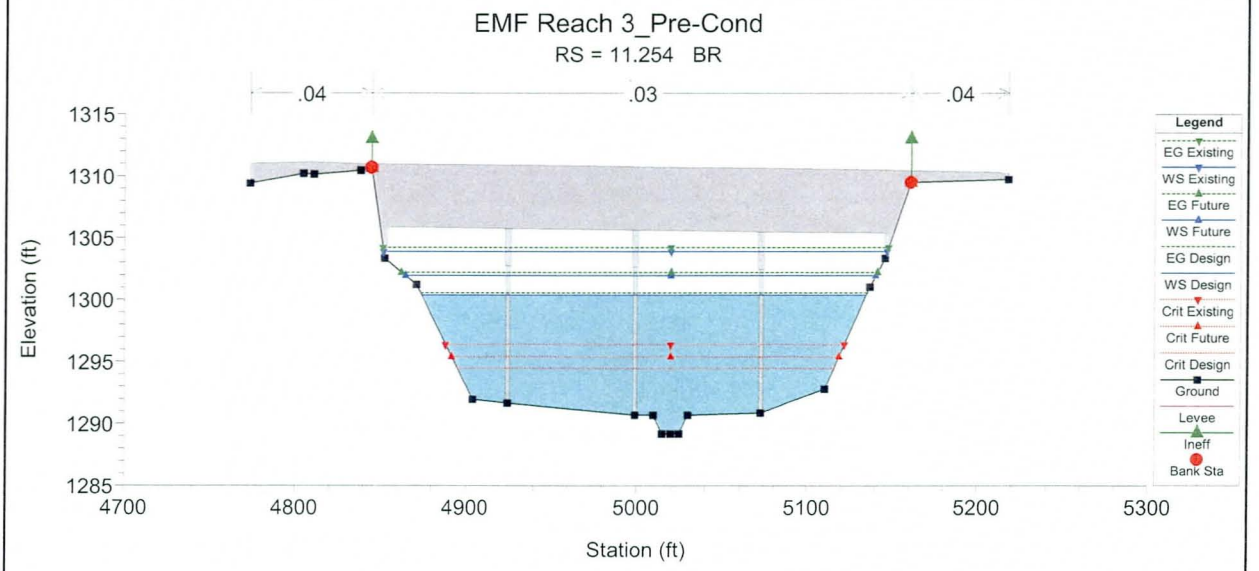
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 11.254 BR
.04
.03
.04
Elevation (ft)
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1285
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5200
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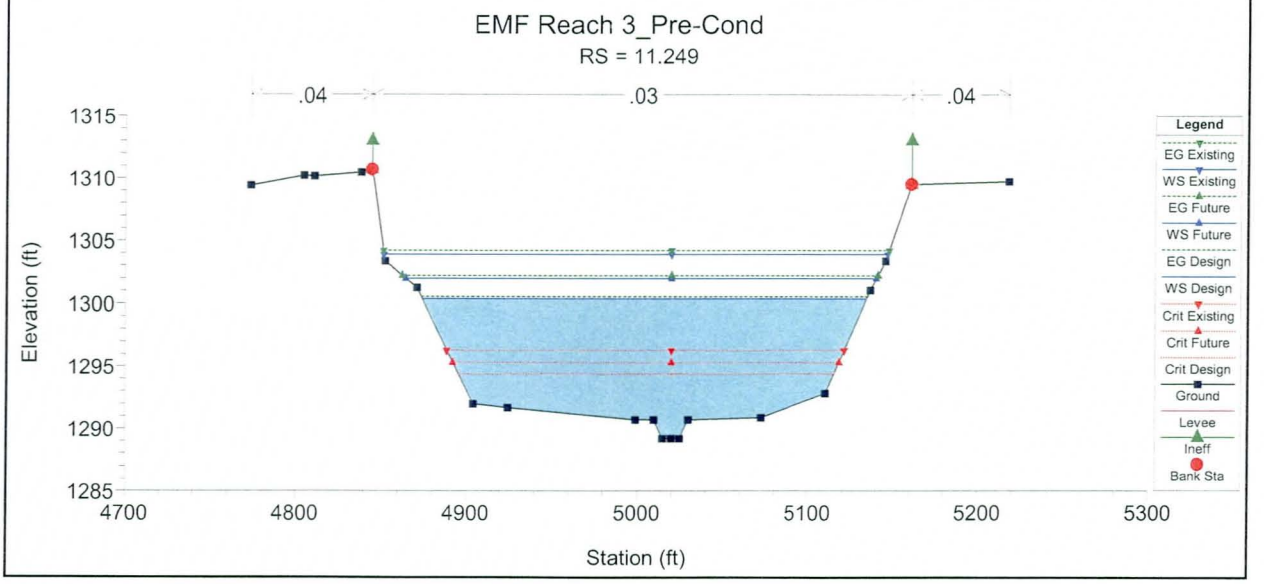
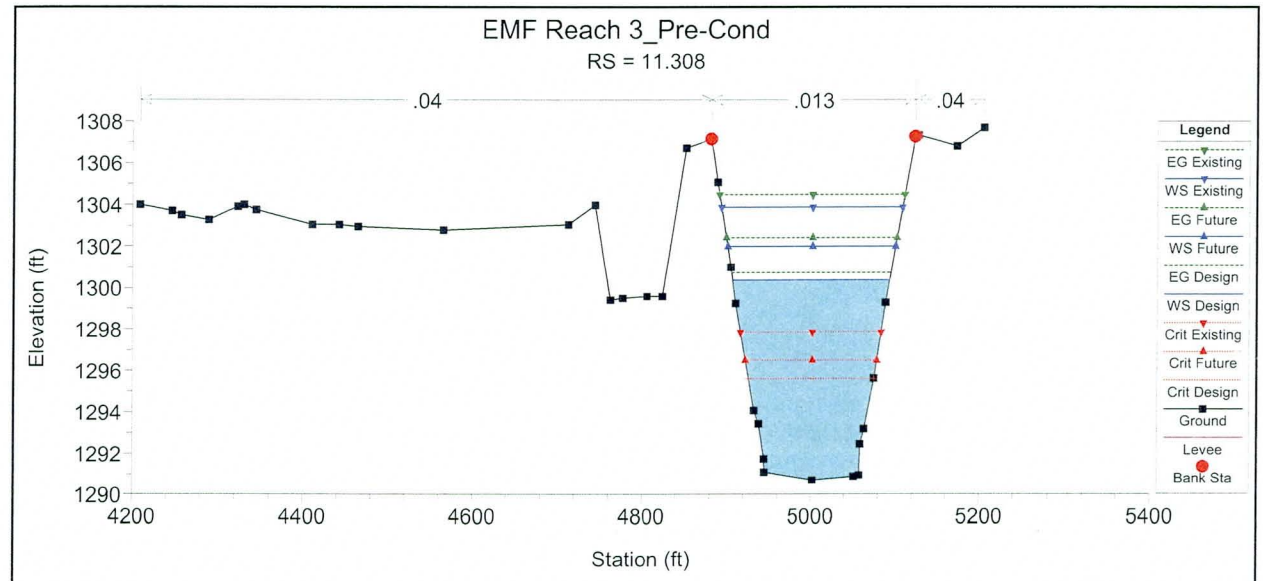
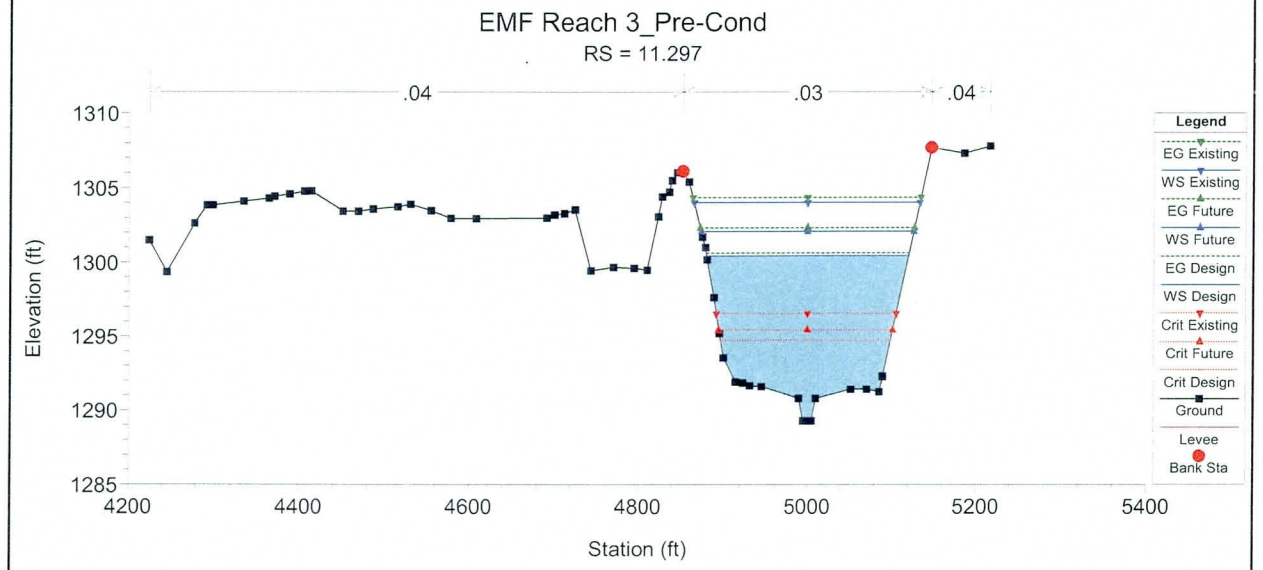
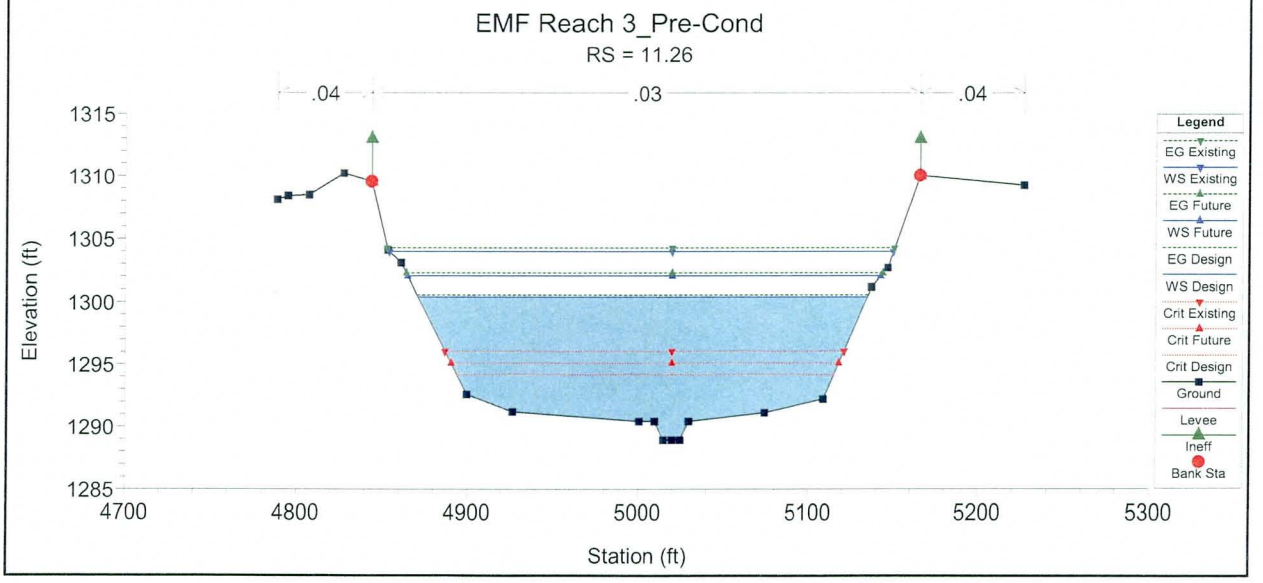
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 11.249
.04
.03
.04
Elevation (ft)
1315
1310
1305
1300
1295
1290
1285
4700
4800
4900
5000
5100
5200
5300
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 11.308
.04
.013
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Pre-Cond
RS = 11.297
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Pre-Cond
RS = 11.26
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
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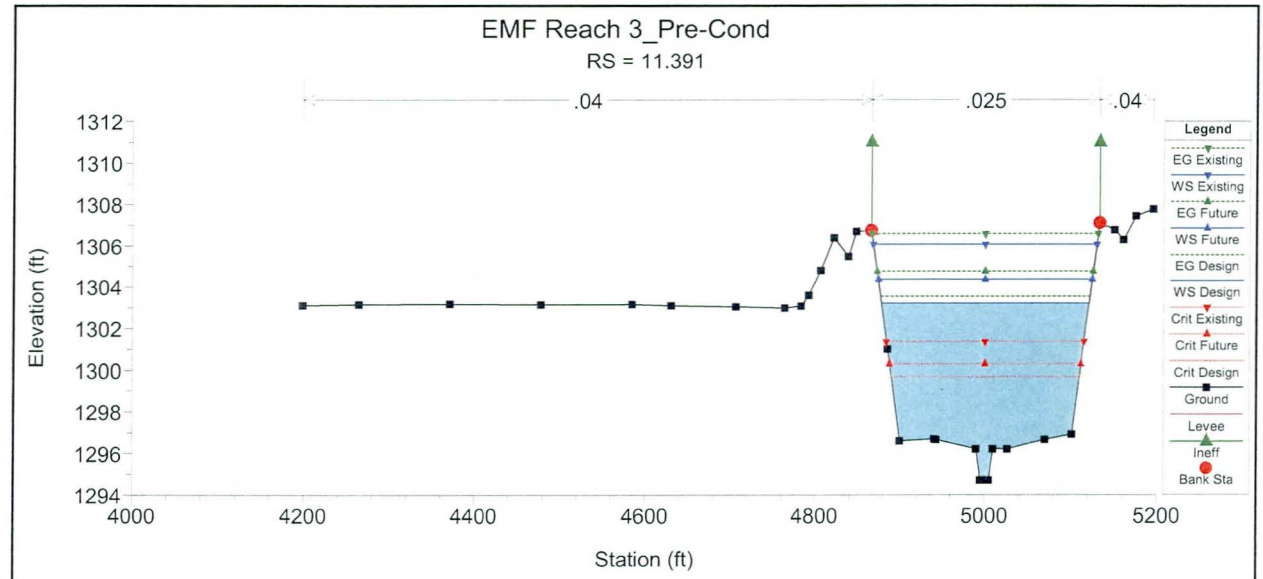
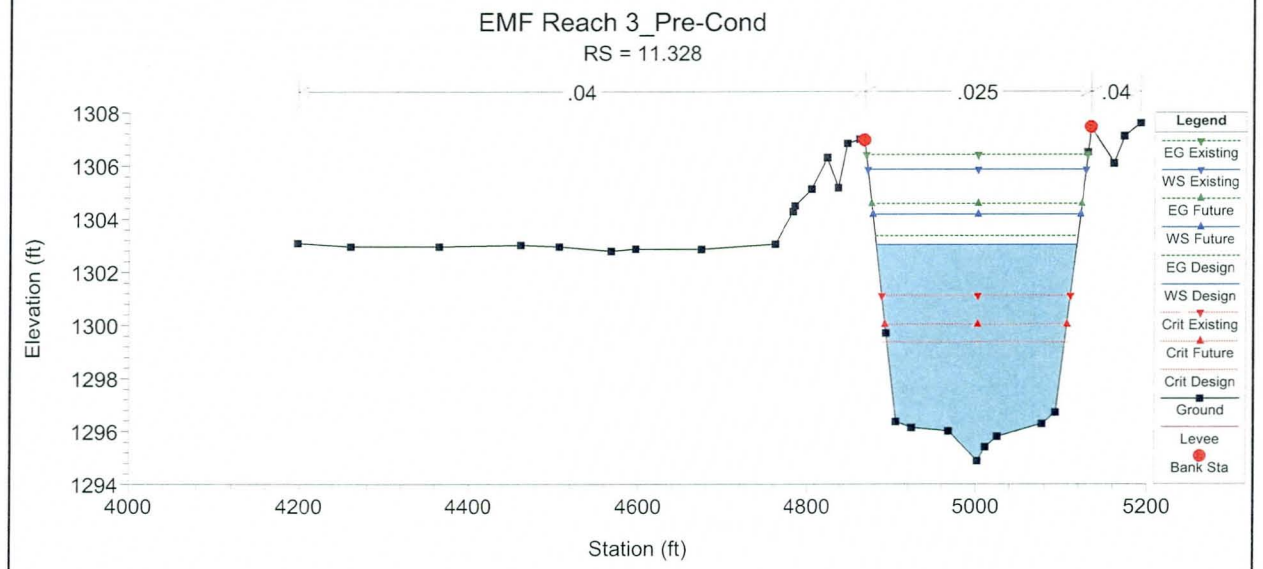
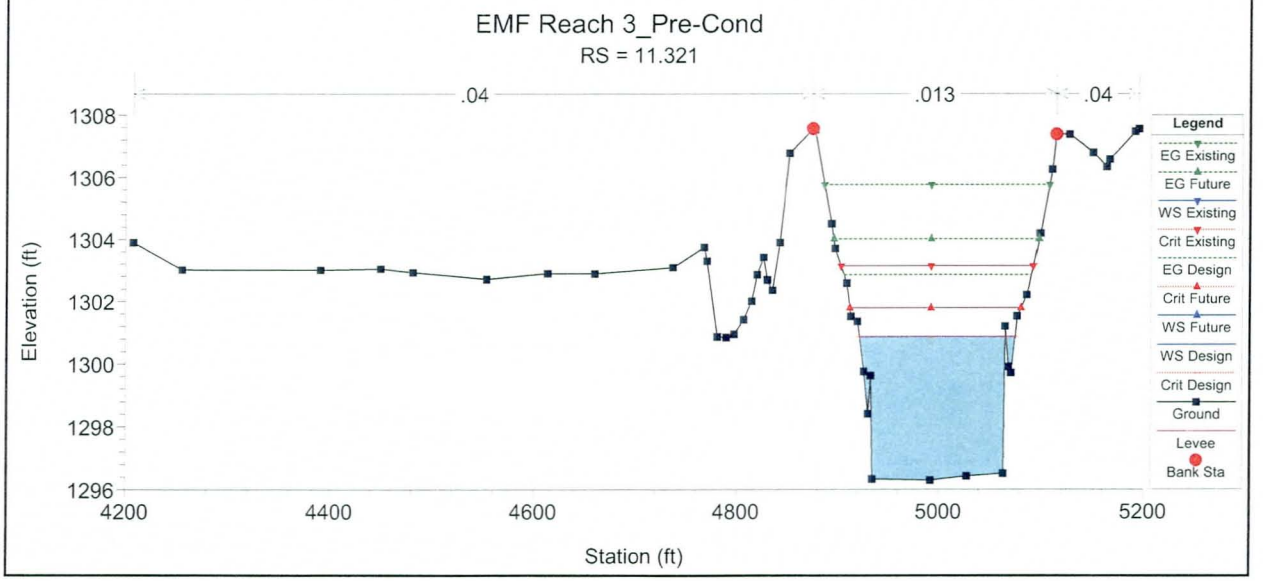
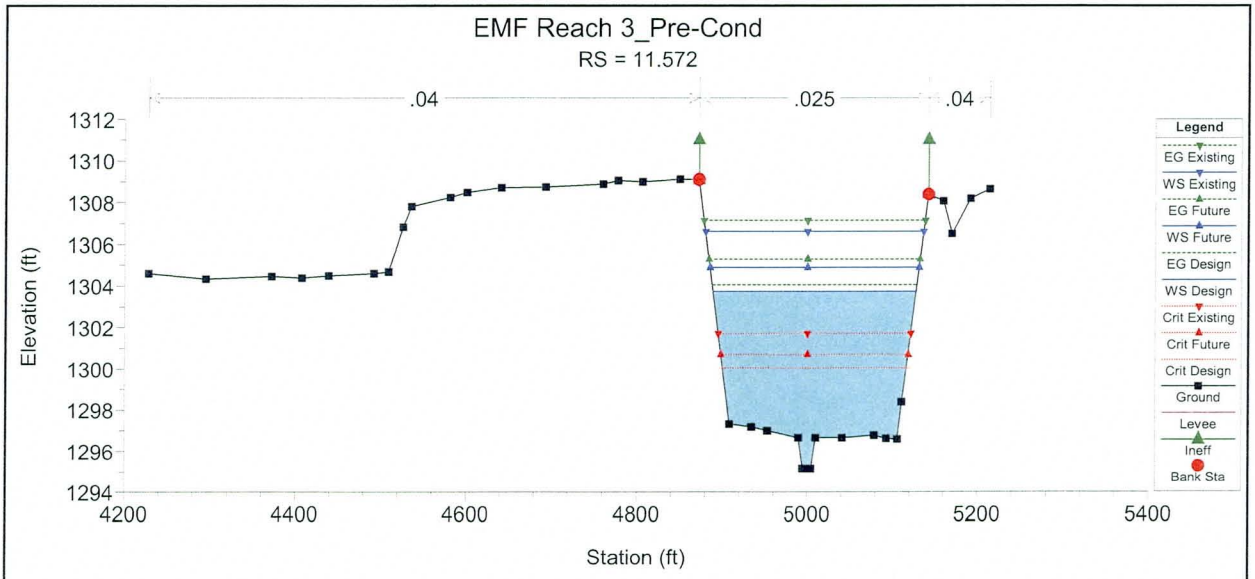
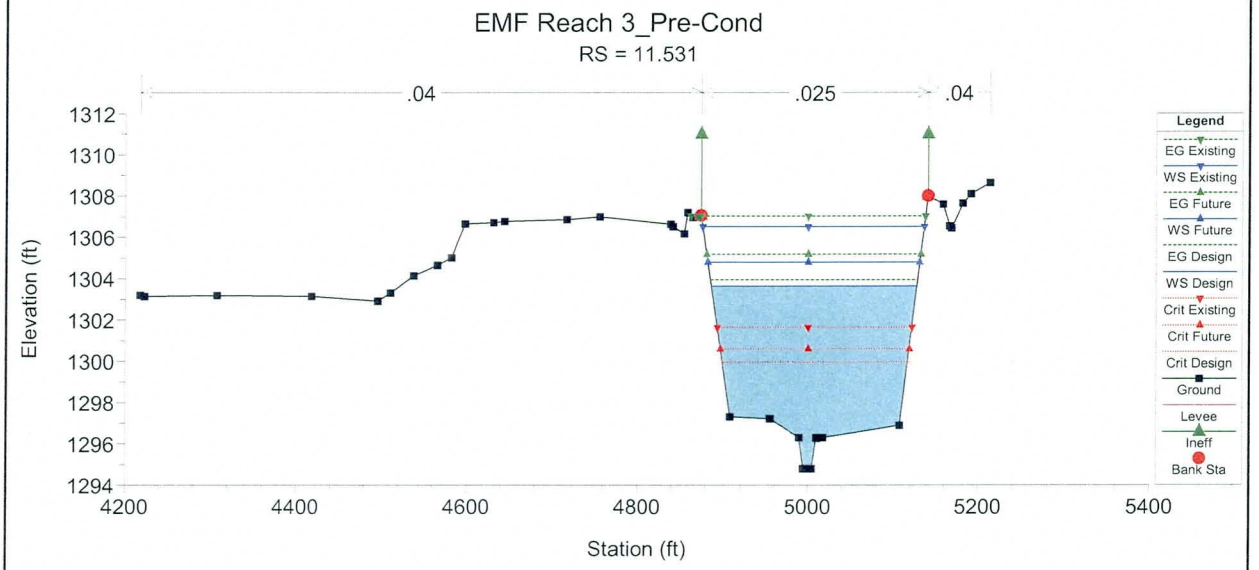
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

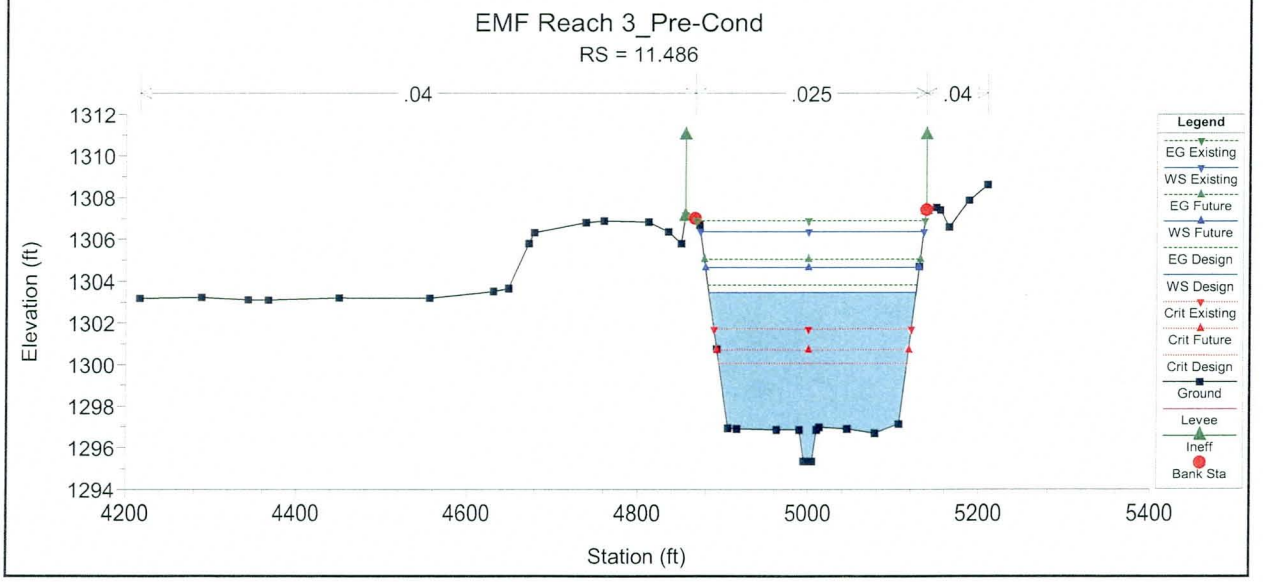

EMF Reach 3_Pre-Cond
RS = 11.391
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

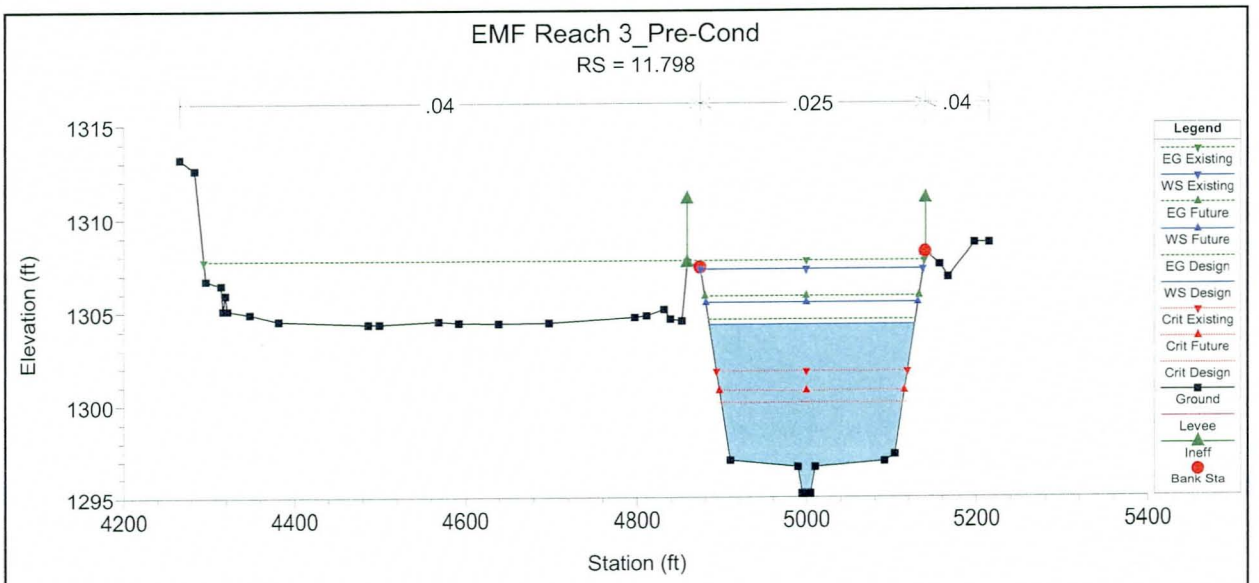

EMF Reach 3_Pre-Cond
RS = 11.328
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta

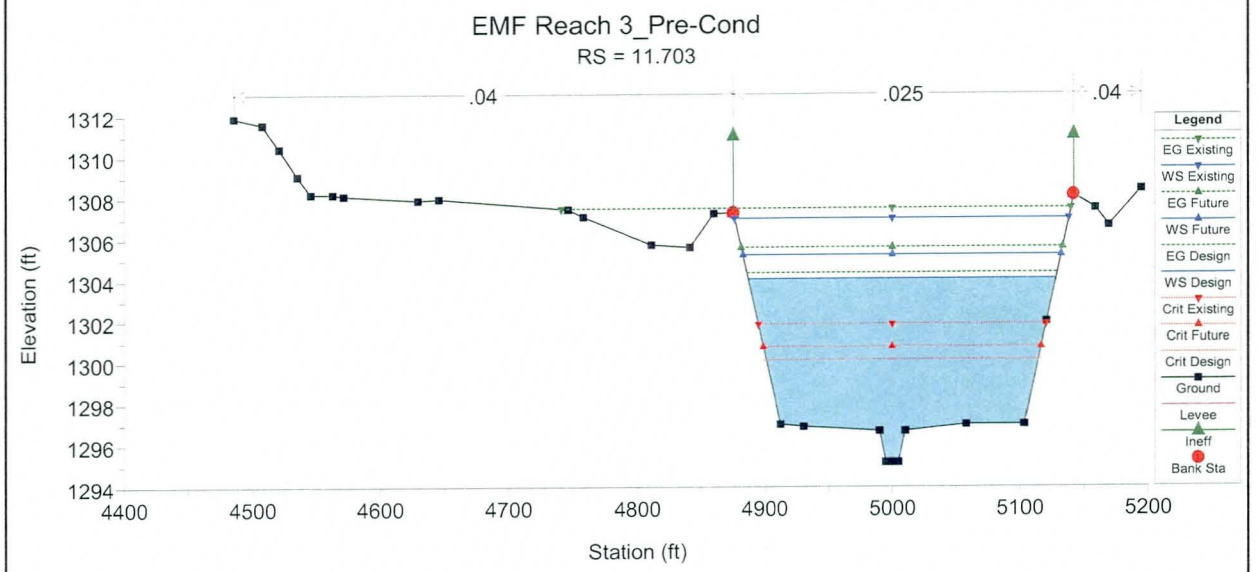

EMF Reach 3_Pre-Cond
RS = 11.321
.04
.013
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
EG Future
WS Existing
Crit Existing
EG Design
Crit Future
WS Future
WS Design
Crit Design
Ground
Levee
Bank Sta

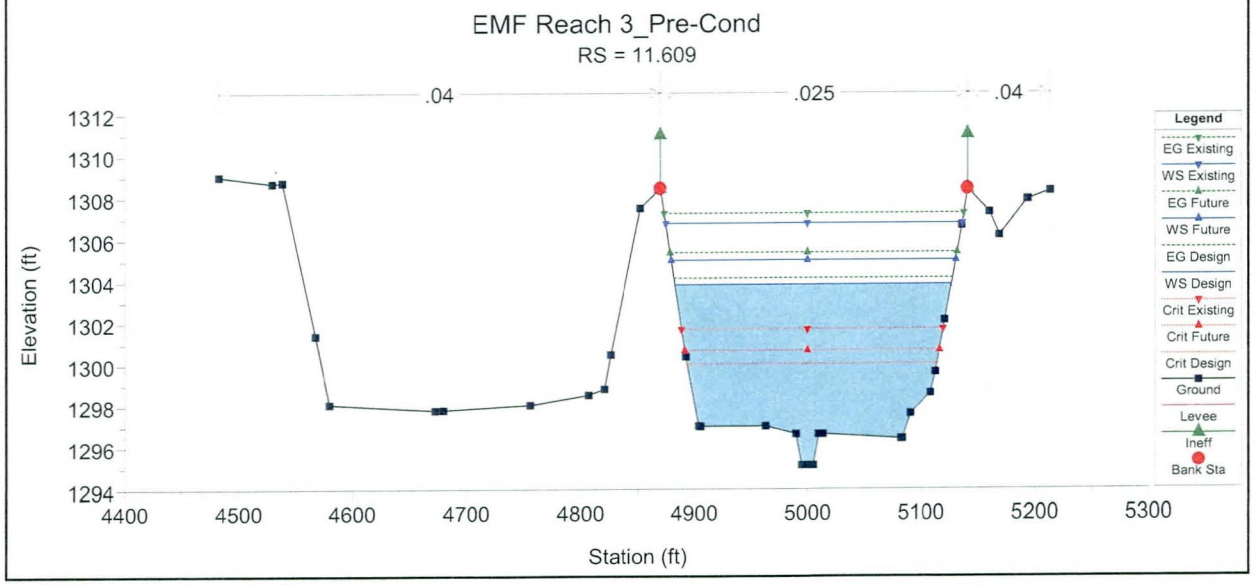

EMF Reach 3_Pre-Cond
RS = 11.572
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

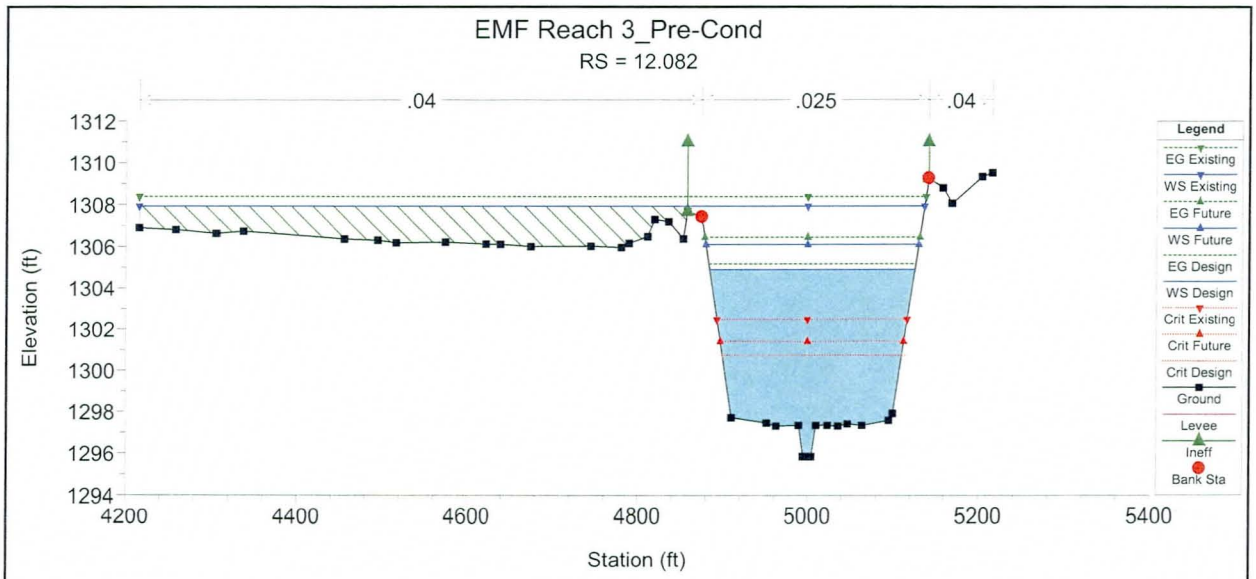

EMF Reach 3_Pre-Cond
RS = 11.531
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

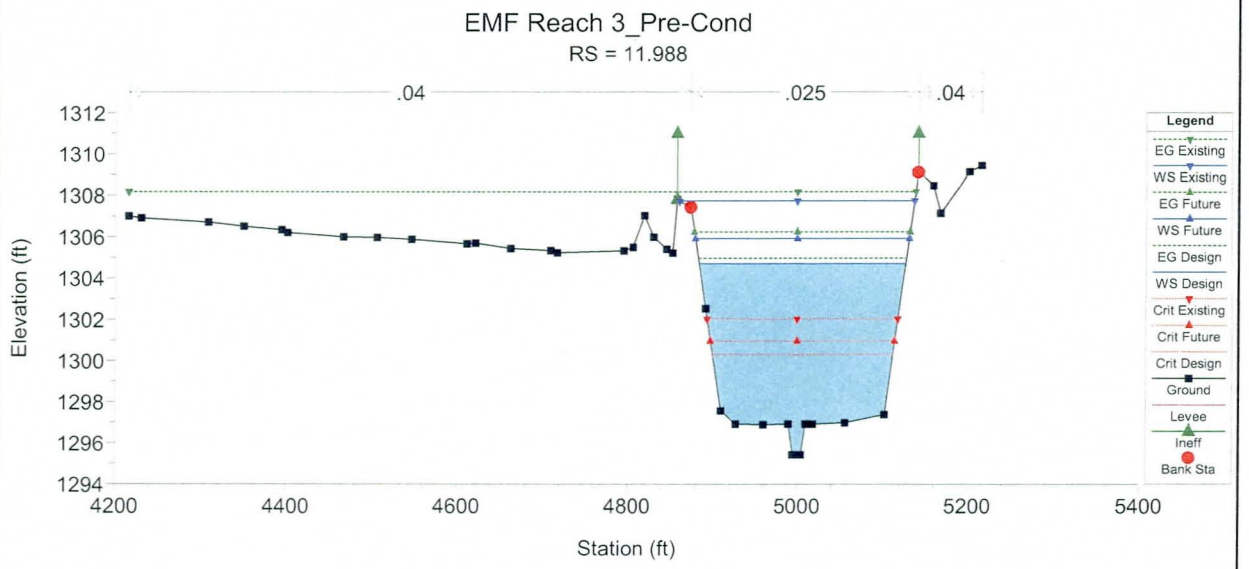

EMF Reach 3_Pre-Cond
RS = 11.486
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

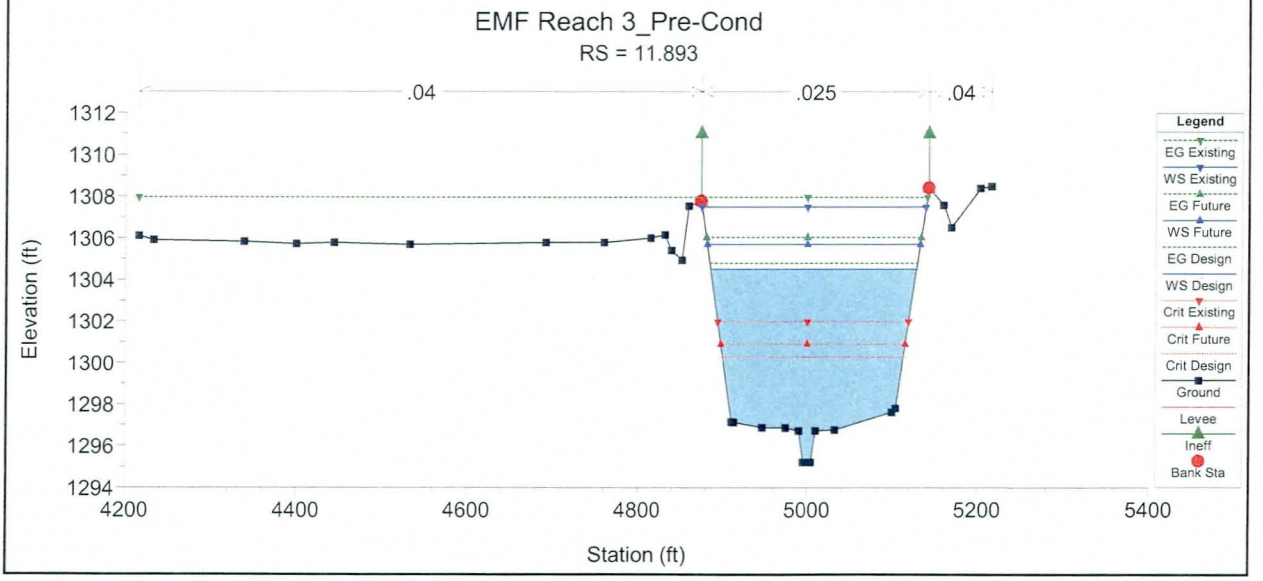

EMF Reach 3_Pre-Cond
RS = 11.798
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

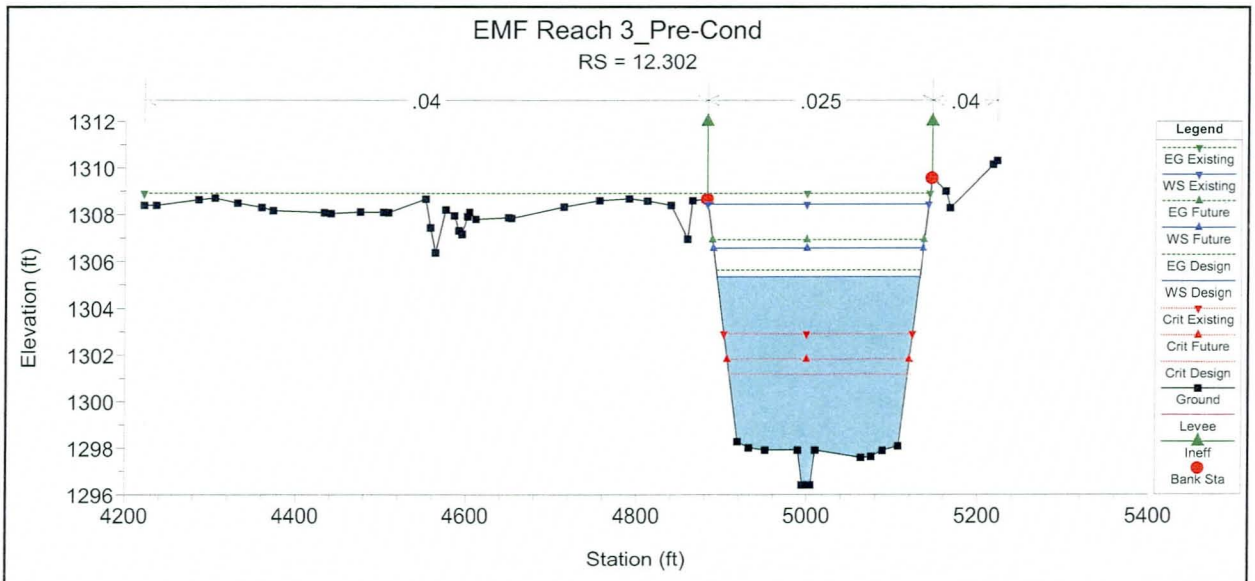

EMF Reach 3_Pre-Cond
RS = 11.703
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

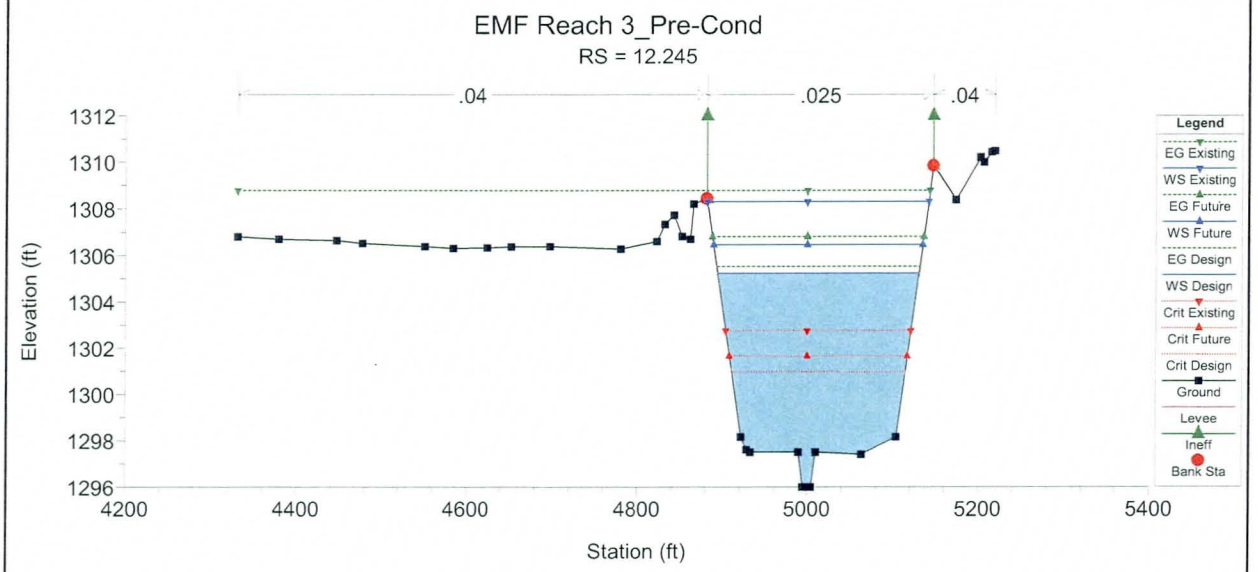

EMF Reach 3_Pre-Cond
RS = 11.609
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

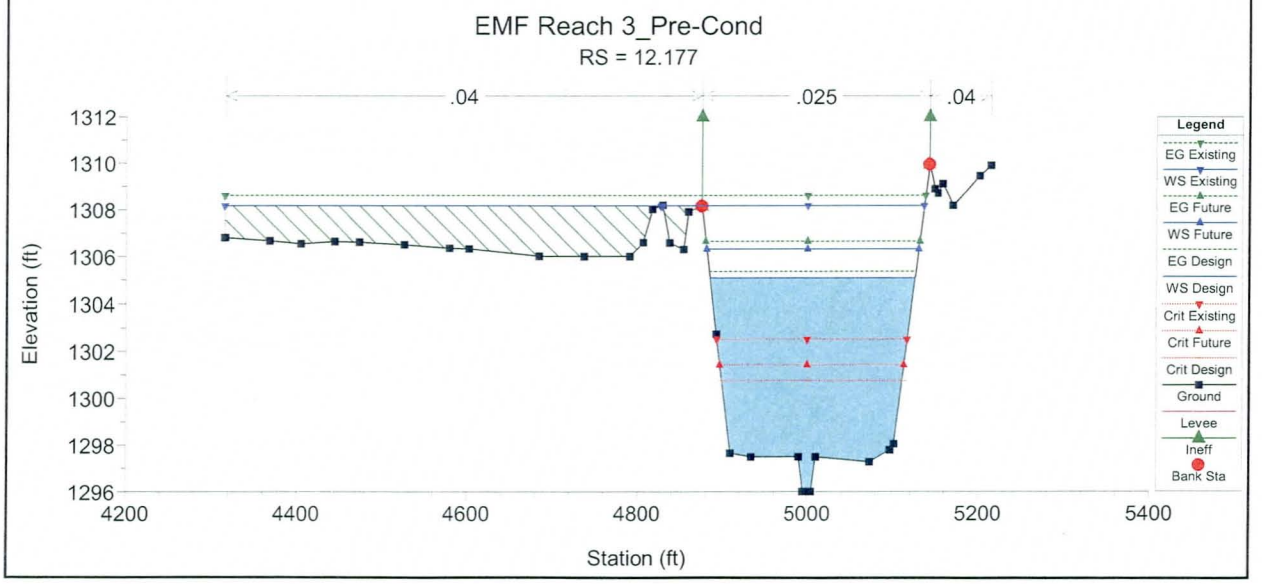

EMF Reach 3_Pre-Cond
RS = 12.082
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

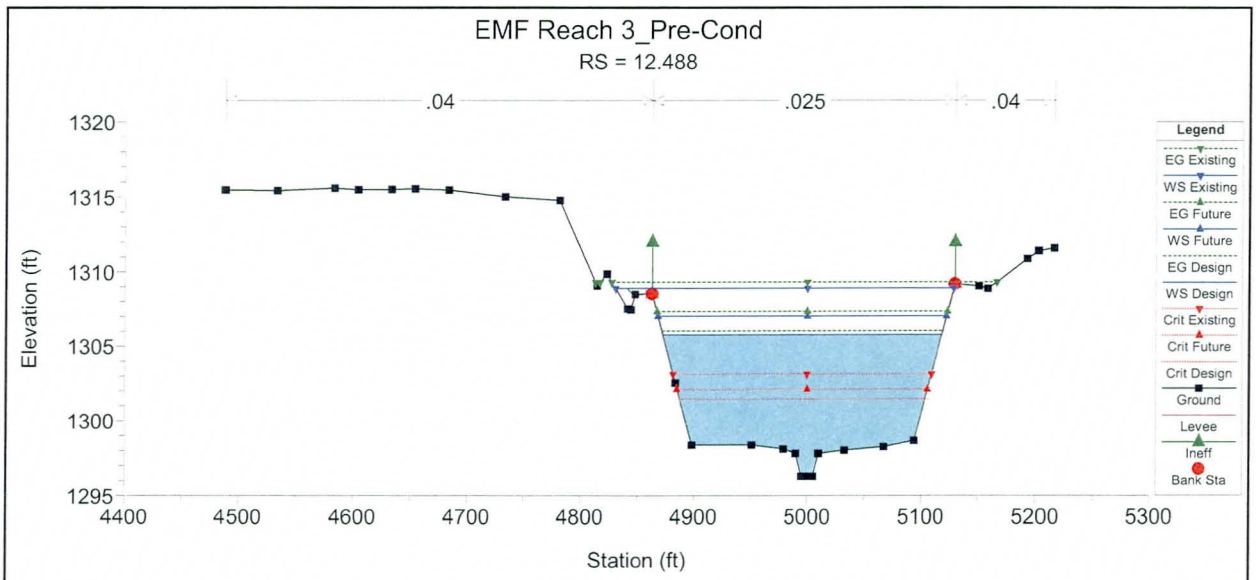

EMF Reach 3_Pre-Cond
RS = 11.988
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

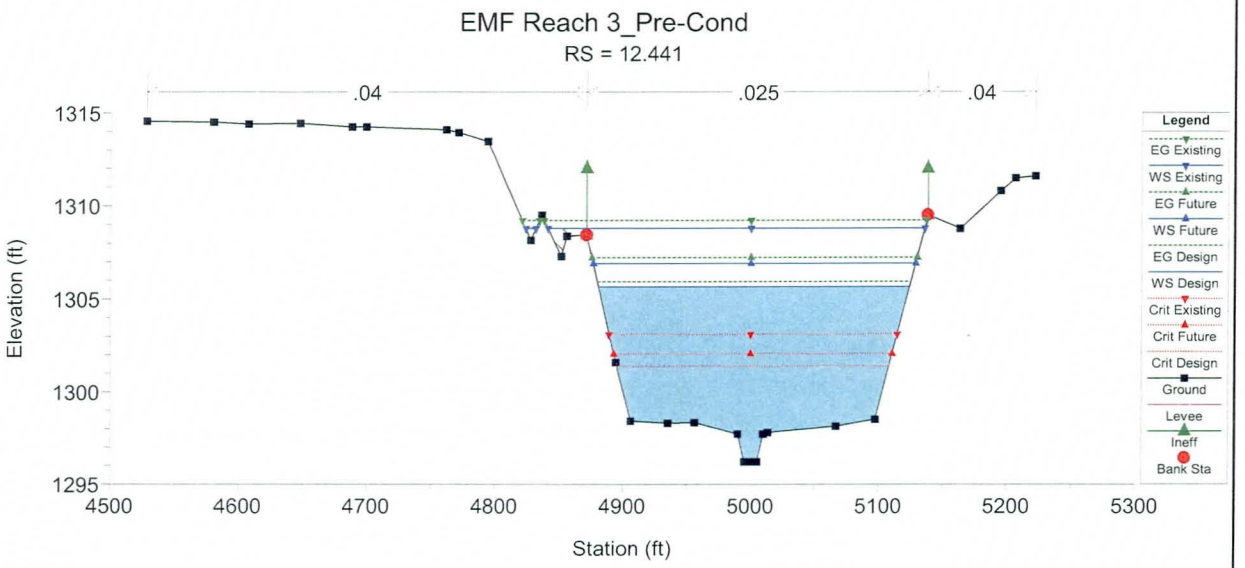

EMF Reach 3_Pre-Cond
RS = 11.893
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

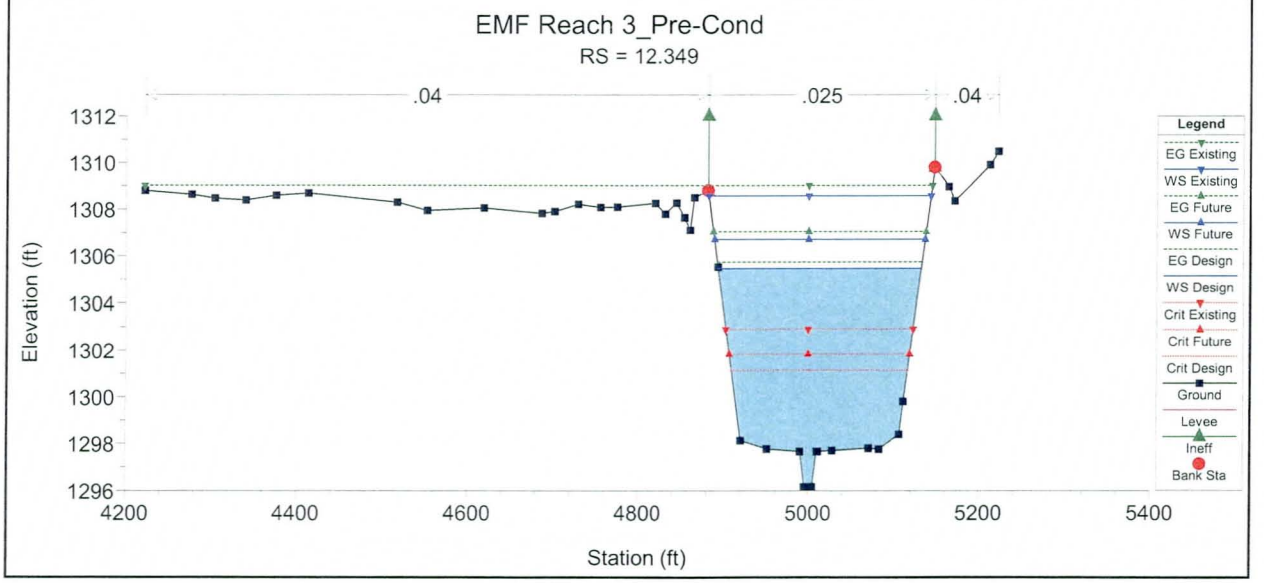

EMF Reach 3_Pre-Cond
RS = 12.302
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

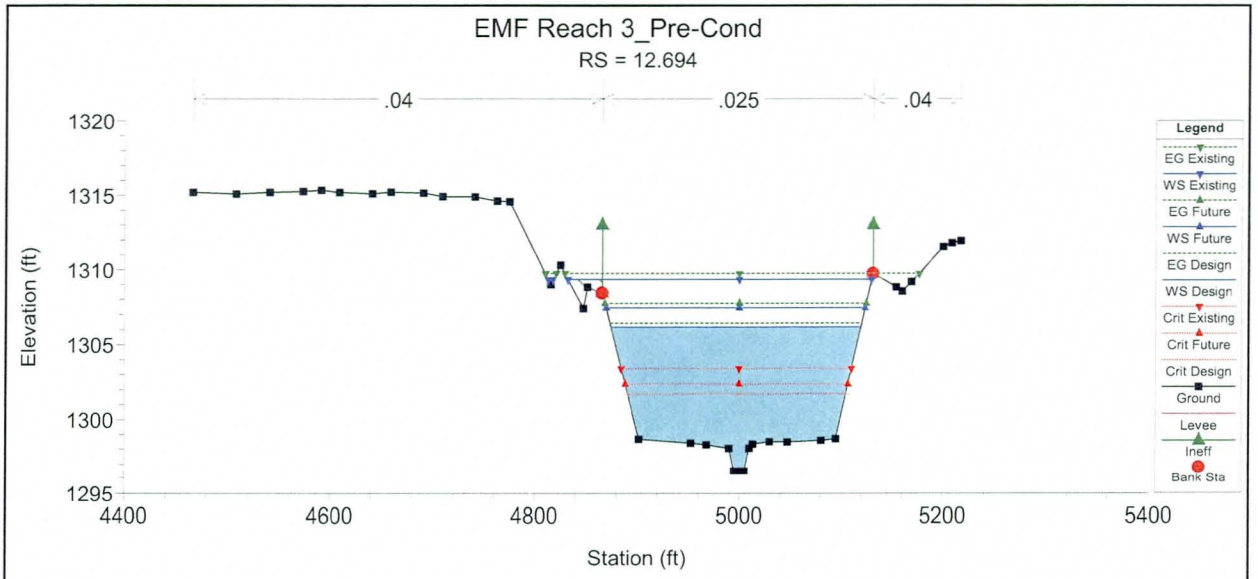

EMF Reach 3_Pre-Cond
RS = 12.245
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

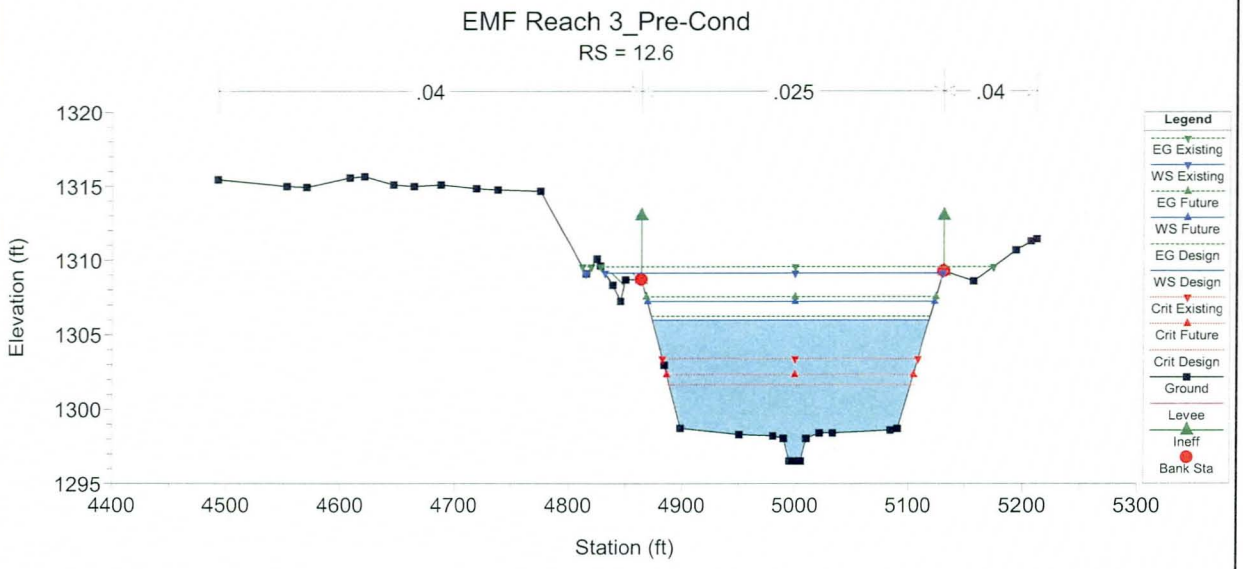

EMF Reach 3_Pre-Cond
RS = 12.177
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

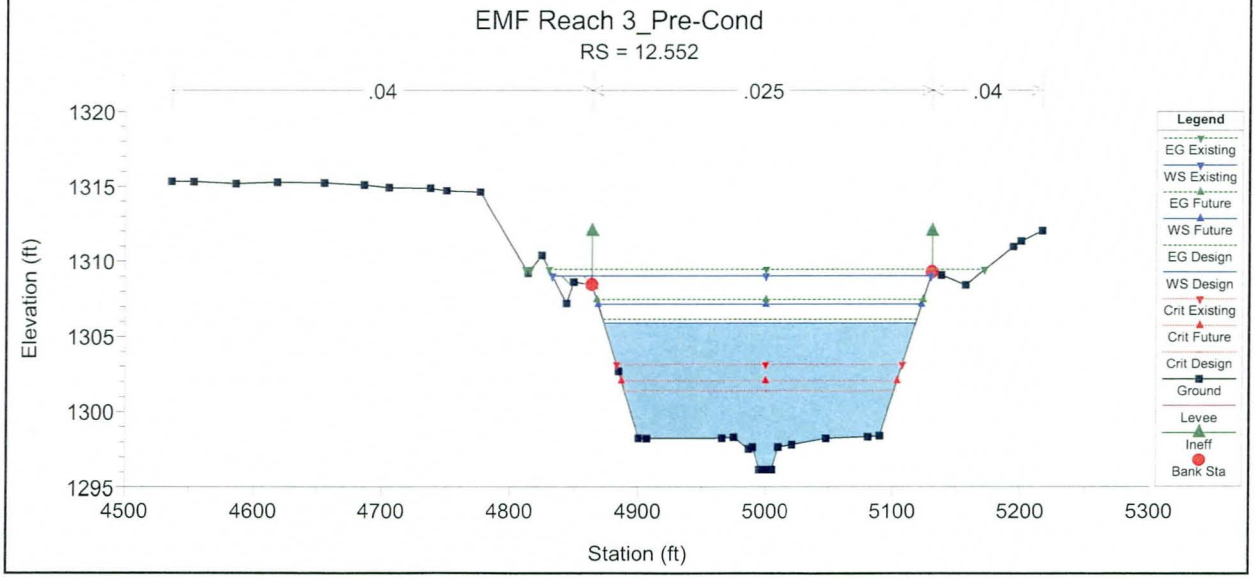

EMF Reach 3_Pre-Cond
RS = 12.488
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

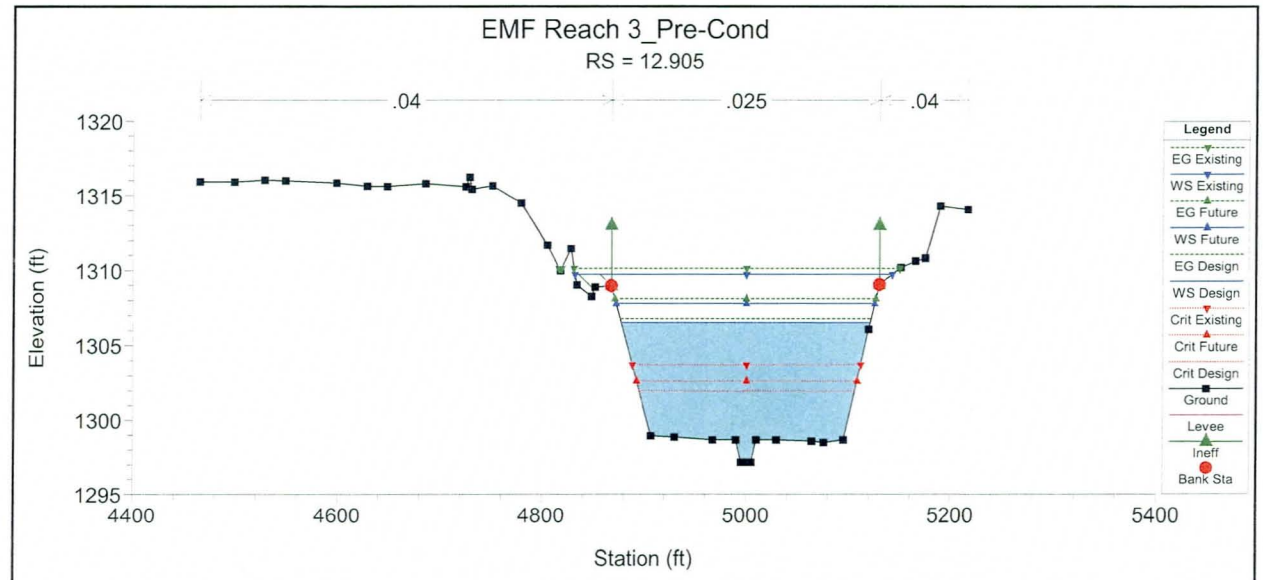

EMF Reach 3_Pre-Cond
RS = 12.441
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

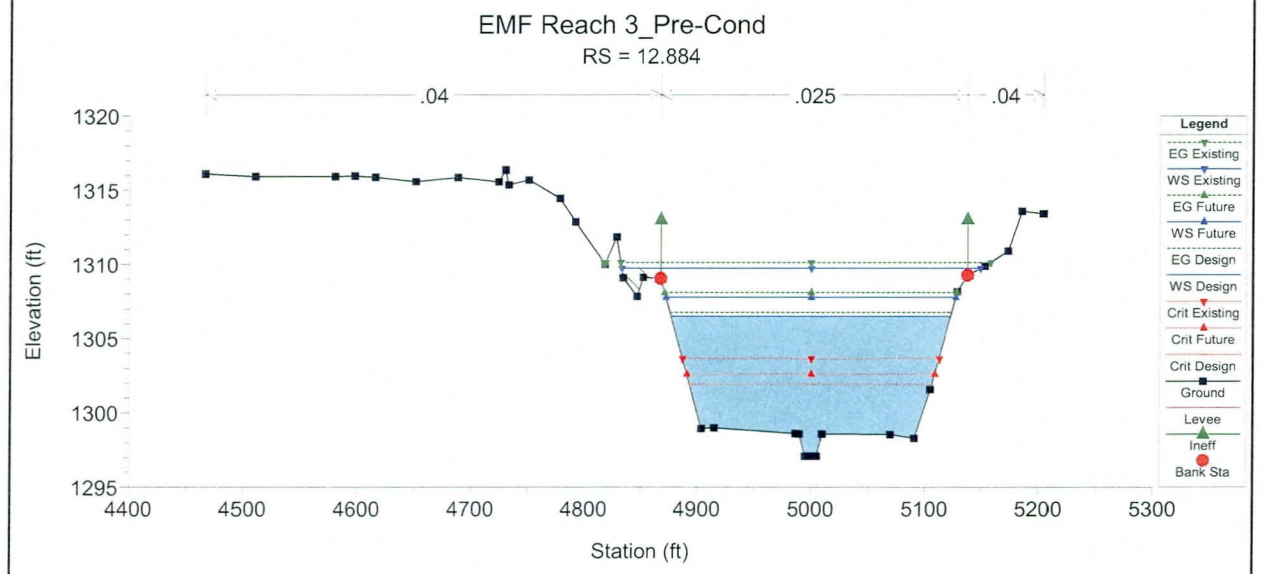

EMF Reach 3_Pre-Cond
RS = 12.349
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

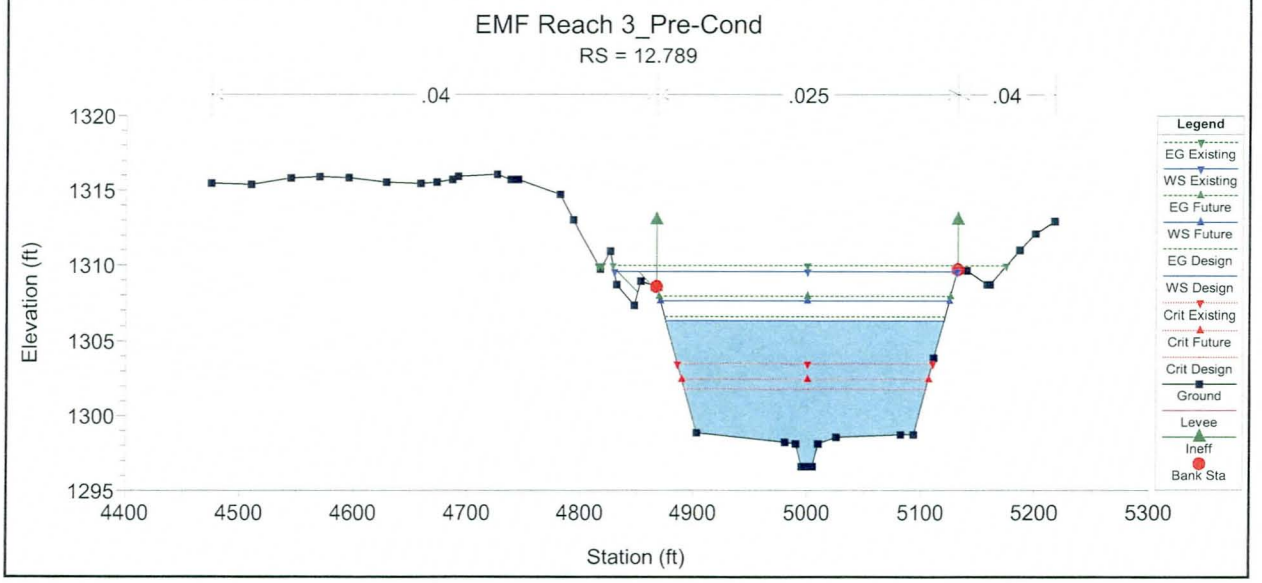

EMF Reach 3_Pre-Cond
RS = 12.694
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

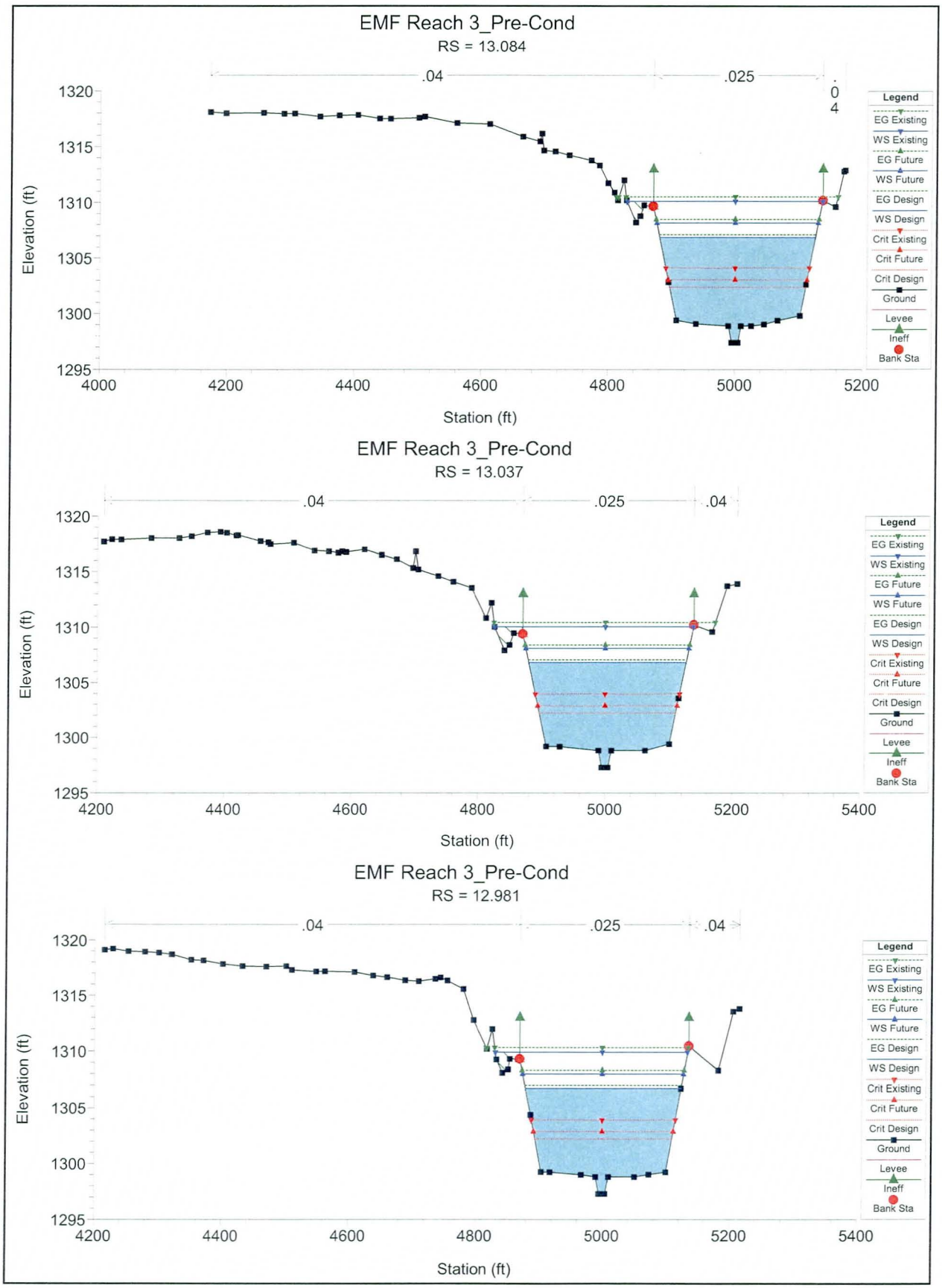

EMF Reach 3_Pre-Cond
RS = 12.6
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

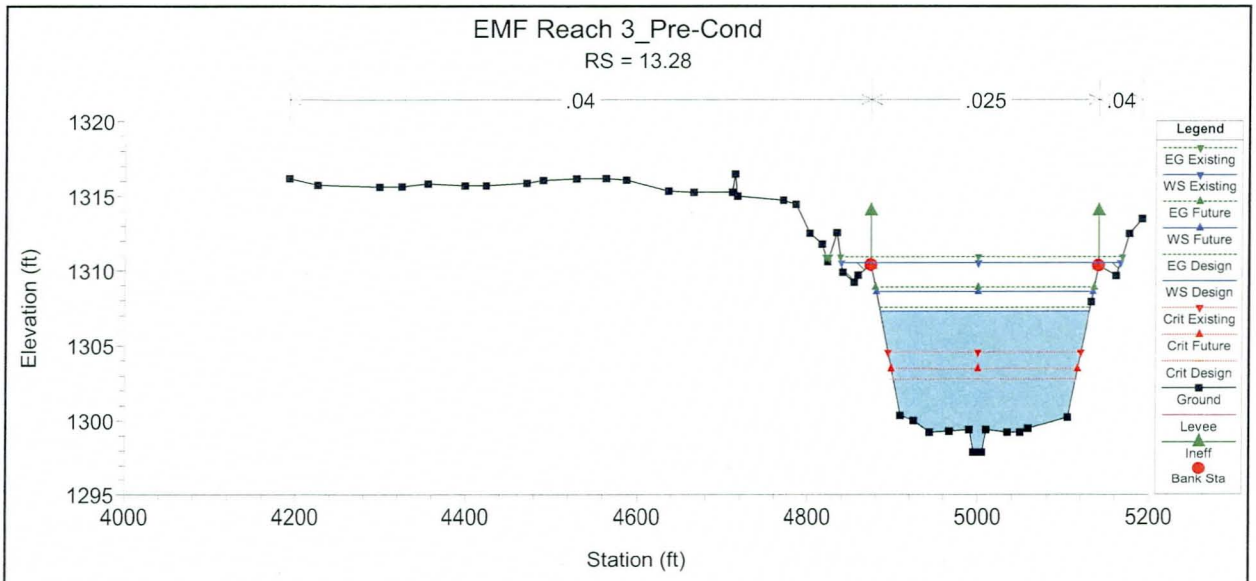

EMF Reach 3_Pre-Cond
RS = 12.552
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

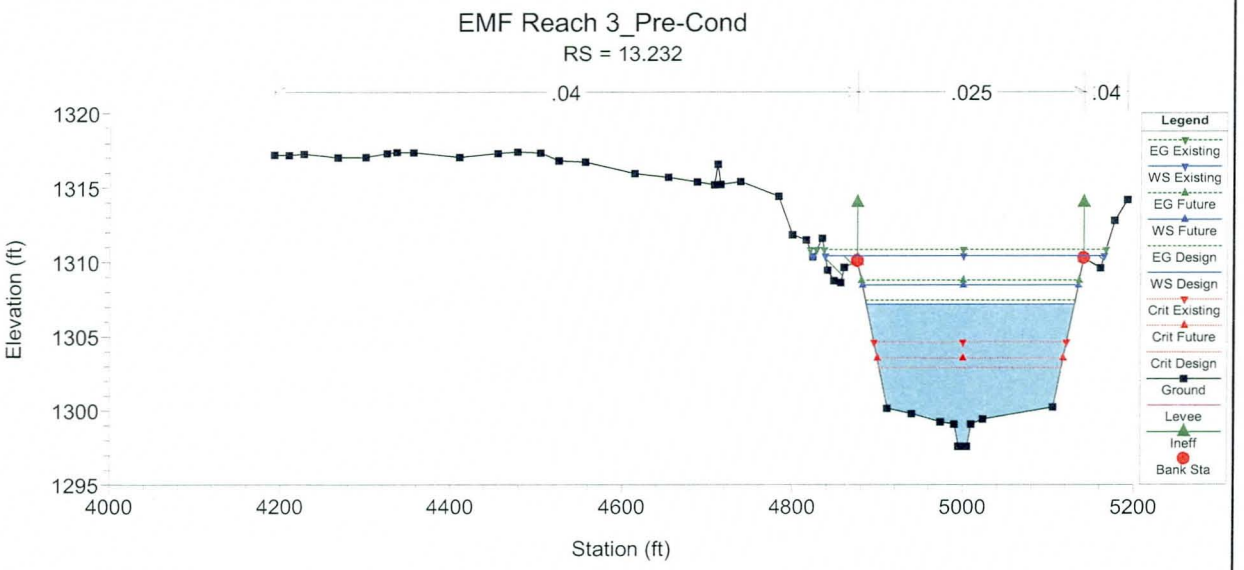

EMF Reach 3_Pre-Cond
RS = 12.905
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

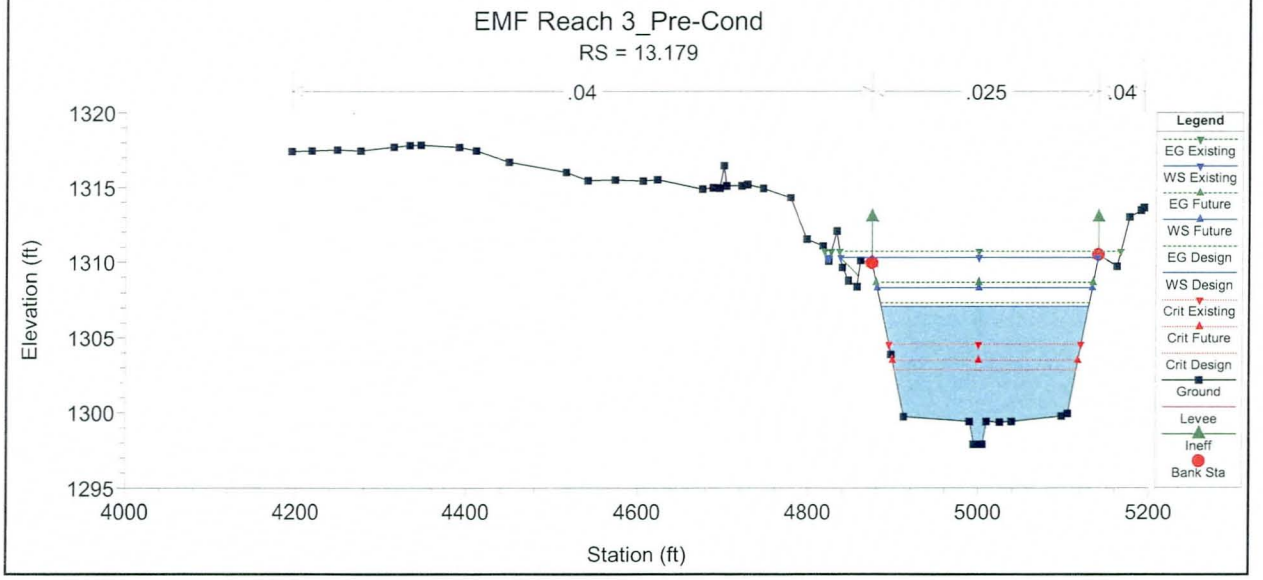

EMF Reach 3_Pre-Cond
RS = 12.884
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

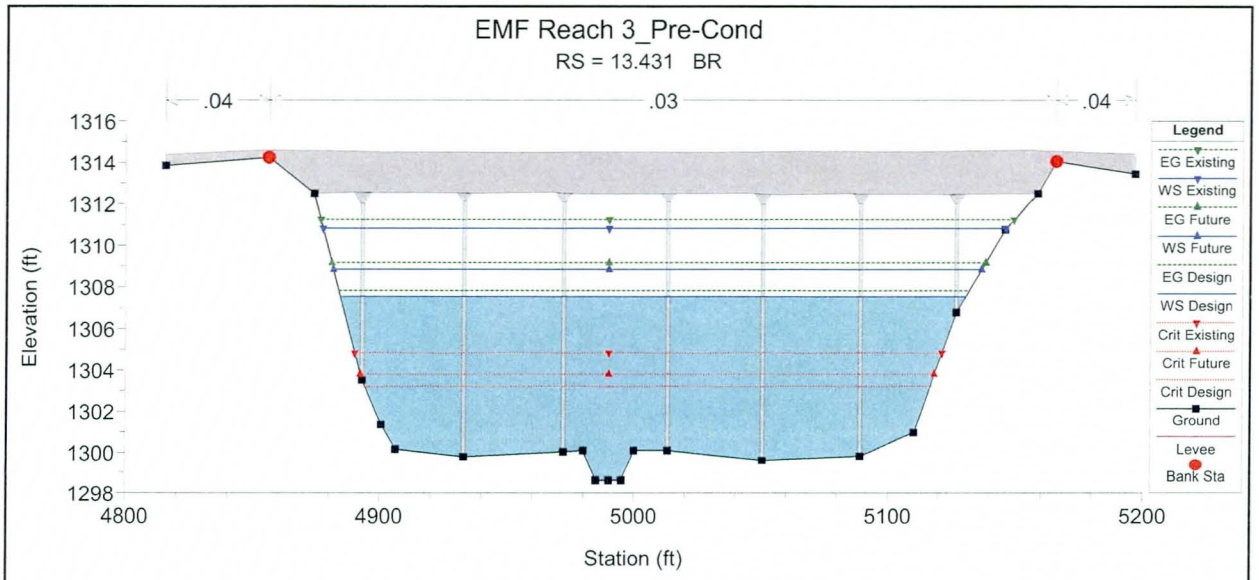

EMF Reach 3_Pre-Cond
RS = 12.789
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 13.084
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta
EMF Reach 3_Pre-Cond
RS = 13.037
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta
EMF Reach 3_Pre-Cond
RS = 12.981
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 13.28
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 13.232
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 13.179
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Pre-Cond
RS = 13.431 BR
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
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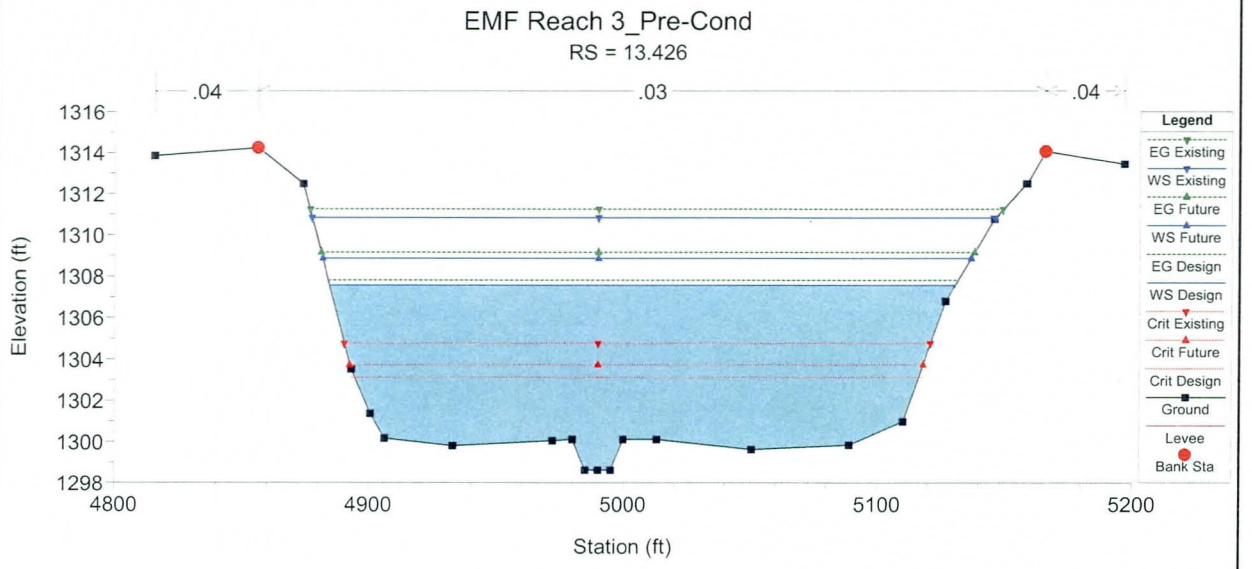
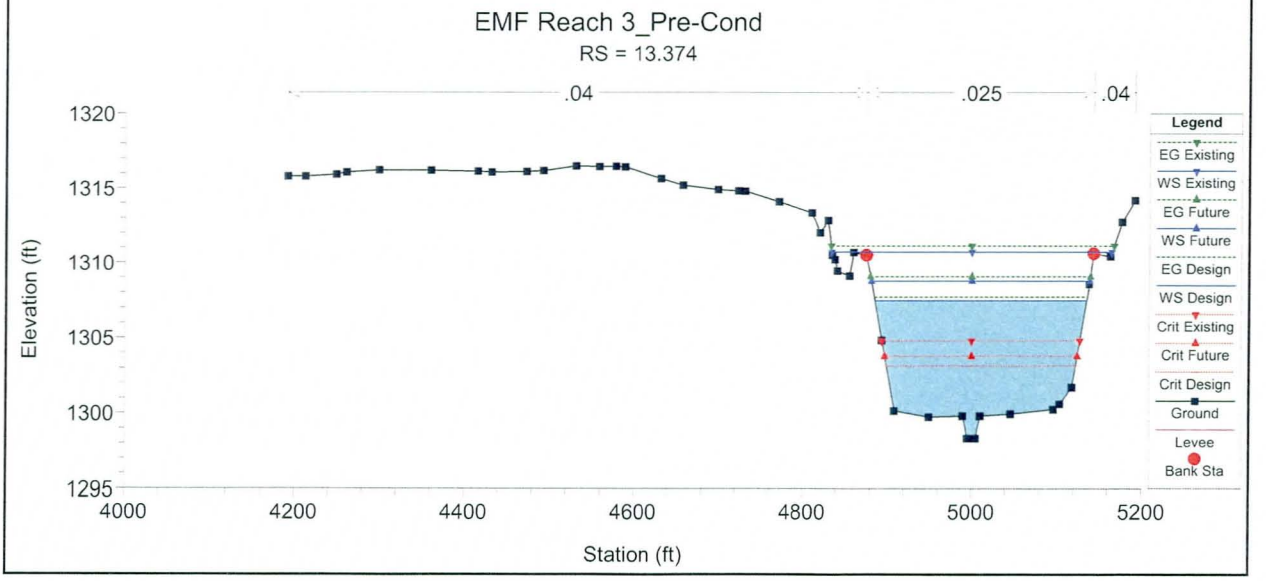
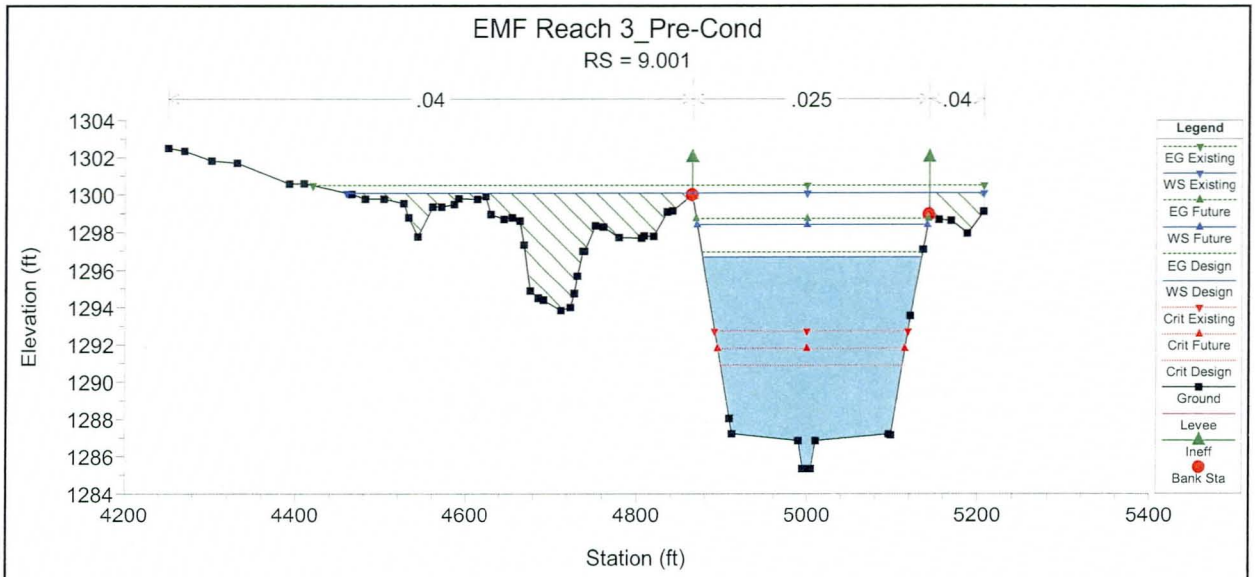
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Pre-Cond
RS = 13.426
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Pre-Cond
RS = 13.374
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Pre-Cond
RS = 9.001
.04
.025
.04
1304
1302
1300
1298
1296
1294
1292
1290
1288
1286
1284
Elevation (ft)
4200
4400
4600
4800
5000
5200
5400
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

Post-Project HEC-RAS Analysis

(NGVD 29)

East Maricopa Floodway at Chandler Heights Road Bridge Water Surface Elevation Comparison									
Duplicate Effective		Pre-Project		Difference Pre-Project - Duplicate Eff.		Post-Project		Difference Post-Project - Pre-Project	
River Sta	W.S. Elev (ft)	River Sta	W.S. Elev (ft)	River Sta	W.S. Elev (ft)	River Sta	W.S. Elev (ft)	River Sta	W.S. Elev (ft)
9.001	1296.69	9.001	1296.69	9.001	0.00	9.001	1296.69	9.001	0.00
9.018	1296.72	9.018	1296.72	9.018	0.00	9.018	1296.72	9.018	0.00
9.036	1296.76	9.036	1296.76	9.036	0.00	9.036	1296.76	9.036	0.00
9.053	1296.78	9.053	1296.78	9.053	0.00	9.053	1296.78	9.053	0.00
9.145	1296.91	9.145	1296.91	9.145	0.00	9.145	1296.91	9.145	0.00
9.240	1297.09	9.24	1297.08	9.240	-0.01	9.240	1297.08	9.240	0.00
9.334	1297.26	9.334	1297.24	9.334	-0.02	9.334	1297.24	9.334	0.00
9.424	1297.40	9.424	1297.38	9.424	-0.02	9.424	1297.38	9.424	0.00
9.518	1297.55	9.518	1297.53	9.518	-0.02	9.518	1297.53	9.518	0.00
9.613	1297.70	9.613	1297.67	9.613	-0.03	9.613	1297.67	9.613	0.00
9.708	1297.82	9.708	1297.79	9.708	-0.03	9.708	1297.79	9.708	0.00
9.802	1297.94	9.802	1297.91	9.802	-0.03	9.802	1297.91	9.802	0.00
9.844	1298.04	9.844	1297.99	9.844	-0.05	9.844	1297.99	9.844	0.00
9.849	1298.00	9.849	1297.96	9.849	-0.04	9.849	1297.96	9.849	0.00
9.854	1298.13	9.854	1298.08	9.854	-0.05	9.854	1298.08	9.854	0.00
9.897	1298.20	9.897	1298.15	9.897	-0.05	9.897	1298.15	9.897	0.00
9.944	1298.26	9.944	1298.21	9.944	-0.05	9.944	1298.21	9.944	0.00
10.039	1298.40	10.039	1298.34	10.039	-0.06	10.039	1298.34	10.039	0.00
10.134	1298.54	10.134	1298.48	10.134	-0.06	10.134	1298.48	10.134	0.00
10.171	1298.60	10.171	1298.54	10.171	-0.06	10.171	1298.54	10.171	0.00
10.195	1298.65	10.195	1298.59	10.195	-0.06	10.195	1298.59	10.195	0.00
10.207		10.207		10.207		10.207		10.207	
10.218	1298.75	10.218	1298.69	10.218	-0.06	10.218	1298.69	10.218	0.00
10.252	1298.79	10.252	1298.72	10.252	-0.07	10.252	1298.72	10.252	0.00
10.346	1298.93	10.346	1298.87	10.346	-0.06	10.346	1298.87	10.346	0.00
10.441	1299.03	10.441	1298.96	10.441	-0.07	10.441	1298.96	10.441	0.00
10.518	1299.11	10.518	1299.05	10.518	-0.06	10.518	1299.05	10.518	0.00
10.566	1299.18	10.566	1299.12	10.566	-0.06	10.566	1299.12	10.566	0.00

East Maricopa Floodway at Chandler Heights Road Bridge Water Surface Elevation Comparison									
Duplicate Effective		Pre-Project		Difference Pre-Project - Duplicate Eff.		Post-Project		Difference Post-Project - Pre-Project	
River Sta	W.S. Elev (ft)	River Sta	W.S. Elev (ft)	River Sta	W.S. Elev (ft)	River Sta	W.S. Elev (ft)	River Sta	W.S. Elev (ft)
10.654	1299.31	10.654	1299.24	10.654	-0.07	10.654	1299.24	10.654	0.00
10.749	1299.46	10.749	1299.39	10.749	-0.07	10.749	1299.39	10.749	0.00
10.843	1299.60	10.843	1299.53	10.843	-0.07	10.843	1299.53	10.843	0.00
10.938	1299.74	10.938	1299.67	10.938	-0.07	10.938	1299.67	10.938	0.00
11.033	1299.92	11.033	1299.85	11.033	-0.07	11.033	1299.85	11.033	0.00
11.127	1300.12	11.127	1300.05	11.127	-0.07	11.127	1300.05	11.127	0.00
11.189	1300.24	11.189	1300.17	11.189	-0.07	11.189	1300.17	11.189	0.00
11.231	1300.34	11.231	1300.26	11.231	-0.08	11.231	1300.26	11.231	0.00
11.249	1300.43	11.249	1300.36	11.249	-0.07	11.246	1300.35	11.249	-0.01
11.254		11.254		11.254		11.254		11.254	
11.260	1300.48	11.26	1300.4	11.260	-0.08	11.262	1300.41	11.260	0.01
11.297	1300.51	11.297	1300.43	11.297	-0.08	11.297	1300.44	11.297	0.01
11.308	1300.43	11.308	1300.36	11.308	-0.07	11.308	1300.36	11.308	0.00
11.321	1300.86	11.321	1300.86	11.321	0.00	11.321	1300.86	11.321	0.00
11.328	1303.04	11.328	1303.04	11.328	0.00	11.328	1303.04	11.328	0.00
11.391	1303.22	11.391	1303.22	11.391	0.00	11.391	1303.22	11.391	0.00
11.486	1303.48	11.486	1303.48	11.486	0.00	11.486	1303.48	11.486	0.00
11.531	1303.63	11.531	1303.63	11.531	0.00	11.531	1303.63	11.531	0.00
11.572	1303.74	11.572	1303.73	11.572	-0.01	11.572	1303.73	11.572	0.00
11.609	1303.86	11.609	1303.85	11.609	-0.01	11.609	1303.85	11.609	0.00
11.703	1304.10	11.703	1304.07	11.703	-0.03	11.703	1304.07	11.703	0.00
11.798	1304.34	11.798	1304.31	11.798	-0.03	11.798	1304.31	11.798	0.00
11.893	1304.55	11.893	1304.51	11.893	-0.04	11.893	1304.51	11.893	0.00
11.988	1304.75	11.988	1304.71	11.988	-0.04	11.988	1304.71	11.988	0.00
12.082	1304.94	12.082	1304.88	12.082	-0.06	12.082	1304.88	12.082	0.00
12.177	1305.15	12.177	1305.09	12.177	-0.06	12.177	1305.09	12.177	0.00
12.245	1305.28	12.245	1305.22	12.245	-0.06	12.245	1305.22	12.245	0.00
12.302	1305.41	12.302	1305.35	12.302	-0.06	12.302	1305.35	12.302	0.00

East Maricopa Floodway at Chandler Heights Road Bridge Water Surface Elevation Comparison									
Duplicate Effective		Pre-Project		Difference Pre-Project - Duplicate Eff.		Post-Project		Difference Post-Project - Pre-Project	
River Sta	W.S. Elev (ft)	River Sta	W.S. Elev (ft)	River Sta	W.S. Elev (ft)	River Sta	W.S. Elev (ft)	River Sta	W.S. Elev (ft)
12.349	1305.52	12.349	1305.46	12.349	-0.06	12.349	1305.46	12.349	0.00
12.441	1305.71	12.441	1305.65	12.441	-0.06	12.441	1305.65	12.441	0.00
12.488	1305.82	12.488	1305.76	12.488	-0.06	12.488	1305.76	12.488	0.00
12.552	1305.95	12.552	1305.89	12.552	-0.06	12.552	1305.89	12.552	0.00
12.600	1306.04	12.6	1305.97	12.600	-0.07	12.600	1305.97	12.600	0.00
12.694	1306.23	12.694	1306.16	12.694	-0.07	12.694	1306.16	12.694	0.00
12.789	1306.41	12.789	1306.34	12.789	-0.07	12.789	1306.34	12.789	0.00
12.884	1306.59	12.884	1306.51	12.884	-0.08	12.884	1306.51	12.884	0.00
12.905	1306.63	12.905	1306.55	12.905	-0.08	12.905	1306.55	12.905	0.00
12.981	1306.76	12.981	1306.69	12.981	-0.07	12.981	1306.69	12.981	0.00
13.037	1306.87	13.037	1306.79	13.037	-0.08	13.037	1306.79	13.037	0.00
13.084	1306.95	13.084	1306.87	13.084	-0.08	13.084	1306.87	13.084	0.00
13.179	1307.12	13.179	1307.05	13.179	-0.07	13.179	1307.05	13.179	0.00
13.232	1307.23	13.232	1307.16	13.232	-0.07	13.232	1307.16	13.232	0.00
13.280	1307.34	13.28	1307.27	13.280	-0.07	13.280	1307.27	13.280	0.00
13.374	1307.52	13.374	1307.45	13.374	-0.07	13.374	1307.45	13.374	0.00
13.426	1307.63	13.426	1307.56	13.426	-0.07	13.426	1307.56	13.426	0.00
13.431		13.431		13.431		13.431		13.431	
13.439	1307.74	13.439	1307.67	13.439	-0.07	13.439	1307.67	13.439	0.00
13.471	1307.77	13.471	1307.7	13.471	-0.07	13.471	1307.70	13.471	0.00

HEC-RAS Plan: EMF R 3 River: EMF Reach: Reach 3

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 3	9.001	Design	8700.00	1285.34	1296.69	1290.88	1296.94	0.000272	4.02	2164.84	257.60	0.24
Reach 3	9.001	Future	11920.00	1285.34	1298.43	1291.78	1298.75	0.000287	4.54	2624.42	270.48	0.26
Reach 3	9.001	Existing	15770.00	1285.34	1300.09	1292.74	1300.50	0.000306	5.12	3081.16	746.86	0.27
Reach 3	9.018	Design	8700.00	1285.62	1296.72	1291.11	1296.97	0.000273	4.00	2174.04	260.97	0.24
Reach 3	9.018	Future	11920.00	1285.62	1298.46	1291.96	1298.78	0.000285	4.52	2638.71	272.43	0.26
Reach 3	9.018	Existing	15770.00	1285.62	1300.12	1292.91	1300.53	0.000300	5.09	3098.71	404.42	0.27
Reach 3	9.036	Design	8100.00	1286.20	1296.76	1291.25	1296.99	0.000269	3.89	2079.89	257.85	0.24
Reach 3	9.036	Future	10790.00	1286.20	1298.53	1292.01	1298.81	0.000259	4.24	2546.99	310.82	0.24
Reach 3	9.036	Existing	14630.00	1286.20	1300.19	1292.99	1300.56	0.000282	4.88	3000.57	437.51	0.26
Reach 3	9.053	Design	8100.00	1286.50	1296.78	1291.38	1297.02	0.000281	3.96	2045.45	255.48	0.25
Reach 3	9.053	Future	10800.00	1286.50	1298.55	1292.14	1298.83	0.000270	4.31	2507.82	282.50	0.25
Reach 3	9.053	Existing	14660.00	1286.50	1300.20	1293.13	1300.59	0.000290	4.96	2952.69	389.11	0.26
Reach 3	9.145	Design	8100.00	1286.79	1296.91	1291.95	1297.18	0.000329	4.16	1946.94	253.91	0.26
Reach 3	9.145	Future	10800.00	1286.79	1298.67	1292.69	1298.98	0.000308	4.49	2404.32	289.88	0.26
Reach 3	9.145	Existing	14660.00	1286.79	1300.34	1293.68	1300.75	0.000341	5.10	2871.89	387.35	0.28
Reach 3	9.24	Design	8100.00	1287.00	1297.08	1292.00	1297.34	0.000315	4.10	1976.15	254.97	0.26
Reach 3	9.24	Future	10800.00	1287.00	1298.83	1292.75	1299.13	0.000298	4.44	2432.93	292.10	0.26
Reach 3	9.24	Existing	14660.00	1287.00	1300.51	1293.72	1300.91	0.000315	5.08	2885.49	389.65	0.27
Reach 3	9.334	Design	8100.00	1286.50	1297.24	1291.92	1297.49	0.000289	3.98	2035.44	257.33	0.25
Reach 3	9.334	Future	10800.00	1286.50	1298.99	1292.69	1299.28	0.000277	4.33	2494.60	403.38	0.25
Reach 3	9.334	Existing	14660.00	1286.50	1300.68	1293.65	1301.06	0.000293	4.97	2952.66	785.17	0.27
Reach 3	9.424	Design	8100.00	1287.07	1297.38	1291.95	1297.62	0.000286	3.98	2033.82	254.91	0.25
Reach 3	9.424	Future	10800.00	1287.07	1299.12	1292.71	1299.41	0.000277	4.34	2488.00	269.52	0.25
Reach 3	9.424	Existing	14660.00	1287.07	1300.82	1293.73	1301.20	0.000294	4.97	2970.10	732.16	0.27
Reach 3	9.518	Design	8100.00	1286.59	1297.53	1291.84	1297.76	0.000263	3.88	2089.05	256.27	0.24
Reach 3	9.518	Future	10800.00	1286.59	1299.26	1292.64	1299.54	0.000260	4.24	2545.16	269.55	0.24
Reach 3	9.518	Existing	14660.00	1286.59	1300.98	1293.64	1301.34	0.000276	4.87	3009.40	825.50	0.26
Reach 3	9.613	Design	8100.00	1286.70	1297.67	1291.87	1297.89	0.000245	3.76	2152.09	264.44	0.23
Reach 3	9.613	Future	10800.00	1286.70	1299.41	1292.66	1299.67	0.000236	4.12	2668.13	315.75	0.23
Reach 3	9.613	Existing	14660.00	1286.70	1301.14	1293.63	1301.48	0.000250	4.70	3219.24	854.79	0.25
Reach 3	9.708	Design	8100.00	1286.85	1297.79	1292.05	1298.02	0.000256	3.85	2102.70	255.14	0.24
Reach 3	9.708	Future	10800.00	1286.85	1299.52	1292.82	1299.80	0.000254	4.23	2554.72	267.73	0.24
Reach 3	9.708	Existing	14660.00	1286.85	1301.25	1293.84	1301.62	0.000272	4.85	3023.72	857.80	0.26
Reach 3	9.802	Design	8100.00	1287.21	1297.91	1292.63	1298.16	0.000301	4.04	2006.30	256.24	0.25
Reach 3	9.802	Future	10800.00	1287.21	1299.64	1293.41	1299.94	0.000290	4.39	2460.20	418.87	0.26
Reach 3	9.802	Existing	14660.00	1287.21	1301.38	1294.40	1301.77	0.000302	5.00	2932.74	862.05	0.27
Reach 3	9.844	Design	8100.00	1287.16	1297.99	1292.46	1298.23	0.000267	3.88	2086.56	258.49	0.24
Reach 3	9.844	Future	10800.00	1287.16	1299.72	1293.22	1300.00	0.000263	4.24	2544.37	289.26	0.24
Reach 3	9.844	Existing	14660.00	1287.16	1301.47	1294.20	1301.83	0.000276	4.85	3022.36	860.53	0.26
Reach 3	9.849	Design	8100.00	1287.05	1297.96	1292.63	1298.28	0.000357	4.54	1783.94	208.75	0.27
Reach 3	9.849	Future	10800.00	1287.05	1299.67	1293.49	1300.06	0.000360	5.03	2146.85	215.28	0.28
Reach 3	9.849	Existing	14660.00	1287.05	1301.40	1294.56	1301.92	0.000398	5.81	2521.55	270.04	0.30
Reach 3	9.854	Design	8100.00	1287.02	1298.08	1292.45	1298.31	0.000258	3.85	2105.51	257.54	0.24
Reach 3	9.854	Future	10800.00	1287.02	1299.83	1293.22	1300.11	0.000253	4.21	2566.39	269.88	0.24
Reach 3	9.854	Existing	14660.00	1287.02	1301.62	1294.16	1301.98	0.000266	4.80	3053.67	867.85	0.25
Reach 3	9.897	Design	8100.00	1287.03	1298.15	1292.40	1298.37	0.000254	3.82	2119.13	258.08	0.24
Reach 3	9.897	Future	10800.00	1287.03	1299.89	1293.19	1300.17	0.000249	4.18	2582.63	280.81	0.24
Reach 3	9.897	Existing	14660.00	1287.03	1301.69	1294.17	1302.04	0.000258	4.77	3092.39	808.19	0.25
Reach 3	9.944	Design	8100.00	1287.05	1298.21	1292.59	1298.44	0.000264	3.88	2085.41	255.17	0.24
Reach 3	9.944	Future	10800.00	1287.05	1299.95	1293.35	1300.23	0.000258	4.25	2541.68	275.27	0.24
Reach 3	9.944	Existing	14660.00	1287.05	1301.74	1294.34	1302.11	0.000268	4.84	3048.29	842.79	0.25
Reach 3	10.039	Design	8100.00	1287.88	1298.34	1292.84	1298.58	0.000274	3.91	2069.24	257.76	0.24
Reach 3	10.039	Future	10800.00	1287.88	1300.08	1293.61	1300.36	0.000267	4.27	2529.59	270.72	0.25
Reach 3	10.039	Existing	14660.00	1287.88	1301.93	1294.59	1302.24	0.000243	4.58	3733.72	841.93	0.24
Reach 3	10.134	Design	8100.00	1288.17	1298.48	1293.25	1298.72	0.000289	3.95	2048.50	261.47	0.25
Reach 3	10.134	Future	10800.00	1288.17	1300.21	1293.99	1300.50	0.000276	4.30	2513.10	273.19	0.25
Reach 3	10.134	Existing	14660.00	1288.17	1302.04	1294.95	1302.37	0.000263	4.69	3436.09	855.62	0.25

HEC-RAS Plan: EMF R 3 River: EMF Reach: Reach 3 (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 3	10.171	Design	8100.00	1287.50	1298.54	1292.82	1298.77	0.000257	3.86	2099.61	254.61	0.24
Reach 3	10.171	Future	10800.00	1287.50	1300.28	1293.60	1300.55	0.000252	4.22	2612.11	688.55	0.24
Reach 3	10.171	Existing	14660.00	1287.50	1302.09	1294.59	1302.43	0.000261	4.75	3234.85	880.40	0.25
Reach 3	10.195	Design	8100.00	1287.41	1298.59	1292.87	1298.81	0.000363	3.83	2113.81	255.21	0.23
Reach 3	10.195	Future	10790.00	1287.41	1300.32	1293.62	1300.59	0.000359	4.21	2565.87	266.71	0.24
Reach 3	10.195	Existing	14650.00	1287.41	1302.12	1294.62	1302.48	0.000392	4.79	3058.03	278.91	0.25
Reach 3	10.207		Bridge									
Reach 3	10.218	Design	8100.00	1287.34	1298.69	1292.50	1298.89	0.000303	3.61	2243.67	258.73	0.22
Reach 3	10.218	Future	10790.00	1287.34	1300.43	1293.26	1300.67	0.000306	3.99	2702.81	269.61	0.22
Reach 3	10.218	Existing	14650.00	1287.34	1302.35	1294.25	1302.67	0.000331	4.53	3235.29	282.75	0.24
Reach 3	10.252	Design	8100.00	1288.04	1298.72	1292.89	1298.95	0.000246	3.81	2127.05	254.26	0.23
Reach 3	10.252	Future	10790.00	1288.04	1300.46	1293.66	1300.73	0.000244	4.18	2579.12	266.16	0.24
Reach 3	10.252	Existing	14650.00	1288.04	1302.40	1294.64	1302.73	0.000241	4.64	3387.36	478.86	0.24
Reach 3	10.346	Design	8100.00	1287.67	1298.87	1292.68	1299.06	0.000206	3.56	2276.81	264.26	0.21
Reach 3	10.346	Future	10790.00	1287.67	1300.61	1293.42	1300.85	0.000209	3.93	2747.83	394.31	0.22
Reach 3	10.346	Existing	14650.00	1287.67	1302.53	1294.40	1302.84	0.000215	4.46	3286.16	477.53	0.23
Reach 3	10.441	Design	8100.00	1287.78	1298.96	1292.97	1299.18	0.000228	3.70	2191.14	259.32	0.22
Reach 3	10.441	Future	10790.00	1287.78	1300.71	1293.74	1300.96	0.000226	4.07	2657.22	402.38	0.23
Reach 3	10.441	Existing	14650.00	1287.78	1302.63	1294.72	1302.96	0.000230	4.61	3203.87	579.15	0.24
Reach 3	10.518	Design	8100.00	1288.65	1299.05	1293.60	1299.29	0.000276	3.93	2058.60	255.96	0.24
Reach 3	10.518	Future	10470.00	1288.65	1300.79	1294.29	1301.06	0.000251	4.16	2516.05	267.68	0.24
Reach 3	10.518	Existing	14320.00	1288.65	1302.72	1295.26	1303.06	0.000257	4.71	3038.84	679.40	0.25
Reach 3	10.566	Design	8100.00	1288.55	1299.12	1293.61	1299.36	0.000272	3.93	2060.13	253.70	0.24
Reach 3	10.566	Future	10470.00	1288.55	1300.86	1294.28	1301.13	0.000250	4.17	2511.79	265.33	0.24
Reach 3	10.566	Existing	14320.00	1288.55	1302.78	1295.28	1303.13	0.000258	4.72	3032.00	963.89	0.25
Reach 3	10.654	Design	8100.00	1288.59	1299.24	1293.87	1299.49	0.000282	3.97	2041.25	254.68	0.25
Reach 3	10.654	Future	10470.00	1288.59	1300.97	1294.55	1301.25	0.000257	4.20	2491.44	265.84	0.24
Reach 3	10.654	Existing	14320.00	1288.59	1302.90	1295.53	1303.25	0.000264	4.75	3013.69	818.72	0.25
Reach 3	10.749	Design	8100.00	1288.54	1299.39	1293.79	1299.62	0.000255	3.84	2110.00	256.76	0.24
Reach 3	10.749	Future	10470.00	1288.54	1301.11	1294.45	1301.37	0.000237	4.09	2568.33	292.52	0.23
Reach 3	10.749	Existing	14320.00	1288.54	1303.05	1295.43	1303.38	0.000241	4.60	3239.06	955.91	0.24
Reach 3	10.843	Design	8100.00	1288.79	1299.53	1293.70	1299.75	0.000236	3.75	2165.63	276.90	0.23
Reach 3	10.843	Future	10470.00	1288.79	1301.24	1294.38	1301.49	0.000220	3.99	2683.62	324.71	0.23
Reach 3	10.843	Existing	14320.00	1288.79	1303.19	1295.36	1303.50	0.000222	4.48	3413.67	396.89	0.23
Reach 3	10.938	Design	8100.00	1289.19	1299.67	1294.11	1299.90	0.000373	3.84	2116.25	281.02	0.24
Reach 3	10.938	Future	10470.00	1289.19	1301.37	1294.77	1301.62	0.000342	4.06	2641.70	335.76	0.23
Reach 3	10.938	Existing	14320.00	1289.19	1303.32	1295.74	1303.63	0.000334	4.52	3368.97	392.62	0.24
Reach 3	11.033	Design	8100.00	1289.10	1299.85	1294.34	1300.09	0.000383	3.89	2083.58	257.83	0.24
Reach 3	11.033	Future	10470.00	1289.10	1301.54	1295.02	1301.80	0.000355	4.13	2578.49	316.93	0.24
Reach 3	11.033	Existing	14320.00	1289.10	1303.49	1295.99	1303.81	0.000352	4.60	3282.27	387.53	0.24
Reach 3	11.127	Design	8100.00	1289.57	1300.05	1294.49	1300.28	0.000370	3.83	2122.10	278.45	0.24
Reach 3	11.127	Future	10470.00	1289.57	1301.72	1295.16	1301.98	0.000342	4.06	2644.73	339.47	0.23
Reach 3	11.127	Existing	14320.00	1289.57	1303.67	1296.12	1303.98	0.000334	4.52	3370.12	393.13	0.24
Reach 3	11.189	Design	8100.00	1289.50	1300.17	1294.58	1300.40	0.000370	3.82	2122.31	275.40	0.24
Reach 3	11.189	Future	10470.00	1289.50	1301.83	1295.26	1302.09	0.000344	4.07	2639.84	335.56	0.23
Reach 3	11.189	Existing	14320.00	1289.50	1303.78	1296.22	1304.09	0.000337	4.52	3369.23	392.74	0.24
Reach 3	11.231	Design	8100.00	1289.43	1300.26	1294.43	1300.48	0.000341	3.72	2178.99	269.57	0.23
Reach 3	11.231	Future	10470.00	1289.43	1301.92	1295.10	1302.16	0.000321	3.98	2678.91	319.33	0.23
Reach 3	11.231	Existing	14320.00	1289.43	1303.86	1296.09	1304.17	0.000323	4.46	3334.08	352.75	0.23
Reach 3	11.246	Design	6900.00	1289.19	1300.35	1294.37	1300.52	0.000265	3.24	2126.51	260.40	0.20
Reach 3	11.246	Future	10060.00	1289.19	1301.95	1295.29	1302.19	0.000331	3.94	2552.22	275.58	0.23
Reach 3	11.246	Existing	13910.00	1289.19	1303.88	1296.27	1304.20	0.000360	4.48	3107.71	295.10	0.24
Reach 3	11.254		Bridge									
Reach 3	11.262	Design	6900.00	1288.90	1300.41	1294.15	1300.56	0.000237	3.12	2210.28	263.97	0.19
Reach 3	11.262	Future	10060.00	1288.90	1302.02	1295.07	1302.25	0.000296	3.80	2646.15	277.62	0.22
Reach 3	11.262	Existing	13910.00	1288.90	1303.97	1296.05	1304.26	0.000326	4.34	3203.60	295.73	0.23

HEC-RAS Plan: EMF R 3 River: EMF Reach: Reach 3 (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 3	11.297	Design	6900.00	1289.28	1300.44	1294.72	1300.63	0.000328	3.58	1928.84	239.44	0.22
Reach 3	11.297	Future	9070.00	1289.28	1302.07	1295.40	1302.31	0.000324	3.89	2330.79	252.19	0.23
Reach 3	11.297	Existing	12990.00	1289.28	1304.01	1296.51	1304.34	0.000375	4.58	2835.45	267.59	0.25
Reach 3	11.308	Design	6900.00	1290.71	1300.36	1295.60	1300.74	0.000129	4.94	1397.97	186.03	0.32
Reach 3	11.308	Future	9070.00	1290.71	1301.98	1296.49	1302.42	0.000125	5.30	1710.91	198.98	0.32
Reach 3	11.308	Existing	12990.00	1290.71	1303.90	1297.84	1304.49	0.000142	6.17	2106.19	214.58	0.35
Reach 3	11.321	Design	6900.00	1296.29	1300.86	1300.86	1302.84	0.001623	11.31	610.15	152.45	1.00
Reach 3	11.321	Future	9070.00	1296.29	1301.78	1301.78	1304.01	0.001561	11.98	757.02	168.53	1.00
Reach 3	11.321	Existing	12990.00	1296.29	1303.14	1303.14	1305.76	0.001470	12.99	1000.03	189.14	1.00
Reach 3	11.328	Design	6900.00	1294.88	1303.04	1299.36	1303.37	0.000521	4.62	1493.65	235.96	0.32
Reach 3	11.328	Future	9070.00	1294.88	1304.17	1300.02	1304.58	0.000539	5.13	1767.06	244.37	0.34
Reach 3	11.328	Existing	12990.00	1294.88	1305.86	1301.11	1306.41	0.000579	5.93	2190.70	256.86	0.36
Reach 3	11.391	Design	6900.00	1294.70	1303.22	1299.67	1303.54	0.000526	4.58	1508.11	242.77	0.32
Reach 3	11.391	Future	9070.00	1294.70	1304.37	1300.29	1304.76	0.000534	5.06	1791.05	250.22	0.33
Reach 3	11.391	Existing	12990.00	1294.70	1306.08	1301.36	1306.60	0.000561	5.83	2228.34	261.31	0.35
Reach 3	11.486	Design	6900.00	1295.34	1303.48	1300.05	1303.82	0.000553	4.64	1485.87	242.89	0.33
Reach 3	11.486	Future	9070.00	1295.34	1304.63	1300.69	1305.04	0.000556	5.13	1769.69	250.35	0.34
Reach 3	11.486	Existing	12990.00	1295.34	1306.35	1301.70	1306.89	0.000577	5.88	2210.32	261.27	0.36
Reach 3	11.531	Design	6900.00	1294.79	1303.63	1299.95	1303.94	0.000495	4.51	1531.07	241.03	0.32
Reach 3	11.531	Future	9070.00	1294.79	1304.78	1300.58	1305.17	0.000508	5.00	1813.14	248.43	0.33
Reach 3	11.531	Existing	12990.00	1294.79	1306.51	1301.63	1307.02	0.000537	5.77	2252.21	259.53	0.35
Reach 3	11.572	Design	6900.00	1295.17	1303.73	1300.03	1304.05	0.000497	4.53	1523.23	238.42	0.32
Reach 3	11.572	Future	9070.00	1295.17	1304.89	1300.69	1305.28	0.000510	5.03	1802.56	245.47	0.33
Reach 3	11.572	Existing	12990.00	1295.17	1306.62	1301.72	1307.14	0.000540	5.81	2237.25	256.07	0.35
Reach 3	11.609	Design	6900.00	1295.12	1303.85	1300.00	1304.14	0.000451	4.36	1582.58	244.31	0.30
Reach 3	11.609	Future	9070.00	1295.12	1305.01	1300.66	1305.38	0.000465	4.85	1870.56	251.36	0.31
Reach 3	11.609	Existing	12990.00	1295.12	1306.76	1301.68	1307.25	0.000493	5.60	2319.48	261.92	0.33
Reach 3	11.703	Design	6900.00	1295.18	1304.07	1300.12	1304.37	0.000447	4.37	1578.35	240.83	0.30
Reach 3	11.703	Future	9070.00	1295.18	1305.24	1300.77	1305.61	0.000464	4.86	1864.75	249.08	0.31
Reach 3	11.703	Existing	12990.00	1295.18	1307.01	1301.85	1307.49	0.000495	5.61	2315.12	261.53	0.33
Reach 3	11.798	Design	6900.00	1295.17	1304.31	1300.10	1304.58	0.000395	4.21	1640.11	241.62	0.28
Reach 3	11.798	Future	9070.00	1295.17	1305.49	1300.74	1305.83	0.000415	4.70	1930.21	249.55	0.30
Reach 3	11.798	Existing	12990.00	1295.17	1307.27	1301.80	1307.73	0.000448	5.44	2386.21	261.53	0.32
Reach 3	11.893	Design	6900.00	1295.21	1304.51	1300.25	1304.78	0.000388	4.18	1650.72	242.24	0.28
Reach 3	11.893	Future	9070.00	1295.21	1305.70	1300.91	1306.04	0.000407	4.66	1944.54	250.53	0.30
Reach 3	11.893	Existing	12990.00	1295.21	1307.50	1301.95	1307.95	0.000438	5.40	2407.74	263.07	0.31
Reach 3	11.988	Design	6900.00	1295.43	1304.71	1300.29	1304.97	0.000364	4.10	1683.58	242.66	0.27
Reach 3	11.988	Future	9070.00	1295.43	1305.91	1300.94	1306.24	0.000384	4.58	1980.80	251.03	0.29
Reach 3	11.988	Existing	12990.00	1295.43	1307.73	1302.03	1308.17	0.000412	5.30	2451.31	275.54	0.31
Reach 3	12.082	Design	6900.00	1295.82	1304.88	1300.70	1305.17	0.000409	4.26	1620.71	240.83	0.29
Reach 3	12.082	Future	9070.00	1295.82	1306.10	1301.37	1306.44	0.000424	4.73	1917.87	249.62	0.30
Reach 3	12.082	Existing	12990.00	1295.82	1307.93	1302.45	1308.39	0.000445	5.44	2393.36	920.60	0.32
Reach 3	12.177	Design	6900.00	1296.00	1305.09	1300.76	1305.36	0.000378	4.16	1658.97	240.45	0.28
Reach 3	12.177	Future	9070.00	1296.00	1306.32	1301.42	1306.65	0.000394	4.63	1957.32	248.46	0.29
Reach 3	12.177	Existing	12990.00	1296.00	1308.16	1302.50	1308.61	0.000421	5.35	2427.23	817.92	0.31
Reach 3	12.245	Design	6900.00	1296.00	1305.22	1300.97	1305.51	0.000409	4.29	1607.54	235.82	0.29
Reach 3	12.245	Future	9070.00	1296.00	1306.45	1301.64	1306.80	0.000425	4.77	1902.05	245.11	0.30
Reach 3	12.245	Existing	12990.00	1296.00	1308.30	1302.74	1308.77	0.000452	5.48	2369.65	259.18	0.32
Reach 3	12.302	Design	6900.00	1296.42	1305.35	1301.19	1305.63	0.000413	4.29	1607.65	237.69	0.29
Reach 3	12.302	Future	9070.00	1296.42	1306.58	1301.82	1306.93	0.000425	4.76	1905.25	246.12	0.30
Reach 3	12.302	Existing	12990.00	1296.42	1308.44	1302.92	1308.91	0.000448	5.47	2375.72	258.88	0.32
Reach 3	12.349	Design	6900.00	1296.16	1305.46	1301.13	1305.73	0.000389	4.21	1640.05	238.71	0.28
Reach 3	12.349	Future	9070.00	1296.16	1306.69	1301.80	1307.03	0.000403	4.67	1940.34	247.44	0.29
Reach 3	12.349	Existing	12990.00	1296.16	1308.57	1302.89	1309.02	0.000427	5.38	2415.94	260.66	0.31
Reach 3	12.441	Design	6900.00	1296.21	1305.65	1301.38	1305.92	0.000384	4.16	1658.32	243.39	0.28
Reach 3	12.441	Future	9070.00	1296.21	1306.90	1302.03	1307.23	0.000395	4.61	1966.67	252.14	0.29
Reach 3	12.441	Existing	12990.00	1296.21	1308.79	1303.10	1309.22	0.000413	5.29	2454.94	302.25	0.31

HEC-RAS Plan: EMF R 3 River: EMF Reach: Reach 3 (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 3	12.488	Design	6900.00	1296.30	1305.76	1301.42	1306.02	0.000369	4.10	1684.11	245.41	0.28
Reach 3	12.488	Future	9070.00	1296.30	1307.00	1302.08	1307.32	0.000380	4.54	1995.82	253.92	0.29
Reach 3	12.488	Existing	12990.00	1296.30	1308.90	1303.12	1309.32	0.000397	5.22	2488.79	298.02	0.30
Reach 3	12.552	Design	6900.00	1296.15	1305.89	1301.37	1306.14	0.000350	4.04	1709.69	244.84	0.27
Reach 3	12.552	Future	9070.00	1296.15	1307.14	1302.04	1307.45	0.000364	4.49	2022.23	254.01	0.28
Reach 3	12.552	Existing	12990.00	1296.15	1309.04	1303.10	1309.45	0.000382	5.16	2517.96	296.71	0.30
Reach 3	12.6	Design	6900.00	1296.53	1305.97	1301.63	1306.23	0.000378	4.13	1669.87	244.53	0.28
Reach 3	12.6	Future	9070.00	1296.53	1307.22	1302.31	1307.55	0.000388	4.57	1982.71	253.72	0.29
Reach 3	12.6	Existing	12990.00	1296.53	1309.13	1303.37	1309.56	0.000403	5.24	2479.20	299.02	0.30
Reach 3	12.694	Design	6900.00	1296.54	1306.16	1301.67	1306.42	0.000348	4.03	1714.17	245.39	0.27
Reach 3	12.694	Future	9070.00	1296.54	1307.43	1302.33	1307.74	0.000360	4.47	2029.49	254.20	0.28
Reach 3	12.694	Existing	12990.00	1296.54	1309.34	1303.38	1309.75	0.000374	5.14	2527.40	301.95	0.29
Reach 3	12.789	Design	6900.00	1296.60	1306.34	1301.78	1306.59	0.000341	4.00	1723.93	244.87	0.27
Reach 3	12.789	Future	9070.00	1296.60	1307.61	1302.43	1307.92	0.000353	4.44	2040.52	254.11	0.28
Reach 3	12.789	Existing	12990.00	1296.60	1309.53	1303.49	1309.94	0.000368	5.11	2540.94	302.14	0.29
Reach 3	12.884	Design	6900.00	1297.09	1306.51	1301.93	1306.76	0.000341	3.99	1727.35	246.01	0.27
Reach 3	12.884	Future	9070.00	1297.09	1307.79	1302.61	1308.09	0.000351	4.43	2047.06	255.20	0.28
Reach 3	12.884	Existing	12990.00	1297.09	1309.72	1303.66	1310.12	0.000370	5.08	2558.07	315.99	0.29
Reach 3	12.905	Design	6900.00	1297.17	1306.55	1302.00	1306.80	0.000346	4.03	1712.11	243.34	0.27
Reach 3	12.905	Future	9070.00	1297.17	1307.82	1302.66	1308.13	0.000357	4.47	2028.63	252.67	0.28
Reach 3	12.905	Existing	12990.00	1297.17	1309.76	1303.74	1310.17	0.000368	5.14	2529.13	309.77	0.29
Reach 3	12.981	Design	6900.00	1297.30	1306.69	1302.20	1306.94	0.000347	4.03	1713.33	244.39	0.27
Reach 3	12.981	Future	9070.00	1297.30	1307.97	1302.87	1308.28	0.000356	4.46	2031.81	252.85	0.28
Reach 3	12.981	Existing	12990.00	1297.30	1309.91	1303.92	1310.32	0.000370	5.13	2534.16	301.82	0.29
Reach 3	13.037	Design	6900.00	1297.30	1306.79	1302.21	1307.04	0.000334	3.96	1740.95	247.21	0.26
Reach 3	13.037	Future	9070.00	1297.30	1308.08	1302.87	1308.38	0.000343	4.39	2064.62	256.36	0.27
Reach 3	13.037	Existing	12990.00	1297.30	1310.03	1303.93	1310.42	0.000358	5.04	2576.94	312.42	0.29
Reach 3	13.084	Design	6900.00	1297.40	1306.87	1302.39	1307.13	0.000351	4.04	1708.94	245.26	0.27
Reach 3	13.084	Future	9070.00	1297.40	1308.16	1303.06	1308.47	0.000359	4.47	2030.44	254.30	0.28
Reach 3	13.084	Existing	12990.00	1297.40	1310.11	1304.10	1310.52	0.000373	5.11	2539.64	307.91	0.29
Reach 3	13.179	Design	6900.00	1297.89	1307.05	1302.81	1307.32	0.000391	4.19	1648.05	242.83	0.28
Reach 3	13.179	Future	9070.00	1297.89	1308.33	1303.45	1308.67	0.000394	4.61	1966.93	251.97	0.29
Reach 3	13.179	Existing	12990.00	1297.89	1310.29	1304.52	1310.72	0.000403	5.25	2472.95	303.77	0.30
Reach 3	13.232	Design	6900.00	1297.59	1307.16	1302.88	1307.43	0.000386	4.17	1656.51	243.61	0.28
Reach 3	13.232	Future	9070.00	1297.59	1308.45	1303.51	1308.78	0.000390	4.59	1976.82	252.84	0.29
Reach 3	13.232	Existing	12990.00	1297.59	1310.41	1304.61	1310.83	0.000398	5.23	2485.59	327.64	0.30
Reach 3	13.28	Design	6900.00	1297.90	1307.27	1302.77	1307.52	0.000352	4.04	1707.43	244.96	0.27
Reach 3	13.28	Future	9070.00	1297.90	1308.56	1303.45	1308.87	0.000359	4.47	2030.02	254.01	0.28
Reach 3	13.28	Existing	12990.00	1297.90	1310.52	1304.52	1310.93	0.000372	5.11	2542.06	326.93	0.29
Reach 3	13.374	Design	6900.00	1298.27	1307.45	1303.09	1307.70	0.000352	4.01	1719.75	249.59	0.27
Reach 3	13.374	Future	9070.00	1298.27	1308.75	1303.71	1309.05	0.000355	4.43	2048.71	257.41	0.28
Reach 3	13.374	Existing	12990.00	1298.27	1310.72	1304.76	1311.11	0.000361	5.05	2602.22	330.35	0.29
Reach 3	13.426	Design	6900.00	1298.61	1307.56	1303.11	1307.81	0.000491	3.99	1728.15	246.09	0.27
Reach 3	13.426	Future	8970.00	1298.61	1308.87	1303.73	1309.17	0.000489	4.36	2055.32	255.11	0.27
Reach 3	13.426	Existing	12910.00	1298.61	1310.84	1304.77	1311.23	0.000516	5.02	2571.59	268.89	0.29
Reach 3	13.431		Bridge									
Reach 3	13.439	Design	6900.00	1297.84	1307.67	1302.81	1307.88	0.000412	3.76	1834.56	250.84	0.25
Reach 3	13.439	Future	8970.00	1297.84	1308.98	1303.42	1309.25	0.000416	4.13	2169.83	258.92	0.25
Reach 3	13.439	Existing	12910.00	1297.84	1310.97	1304.47	1311.33	0.000447	4.78	2698.46	272.83	0.27
Reach 3	13.471	Design	6900.00	1298.07	1307.70	1303.19	1307.99	0.000389	4.31	1602.47	225.11	0.28
Reach 3	13.471	Future	8970.00	1298.07	1309.01	1303.87	1309.35	0.000391	4.71	1903.65	238.70	0.29
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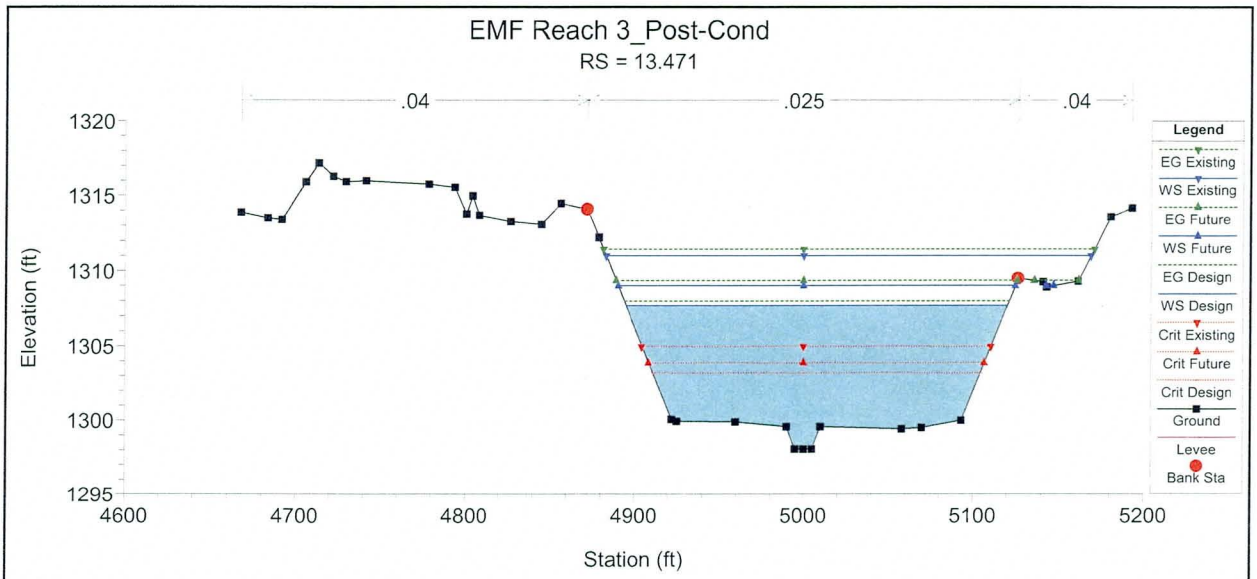
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.025
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Elevation (ft)
Station (ft)
Legend
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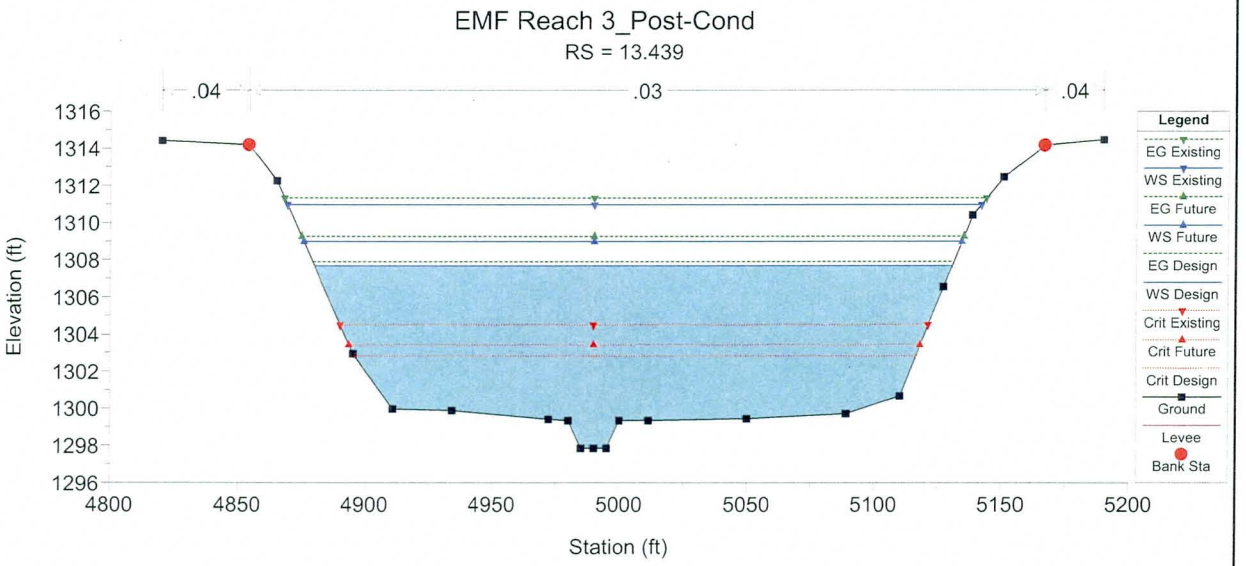
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta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Elevation (ft)
Station (ft)
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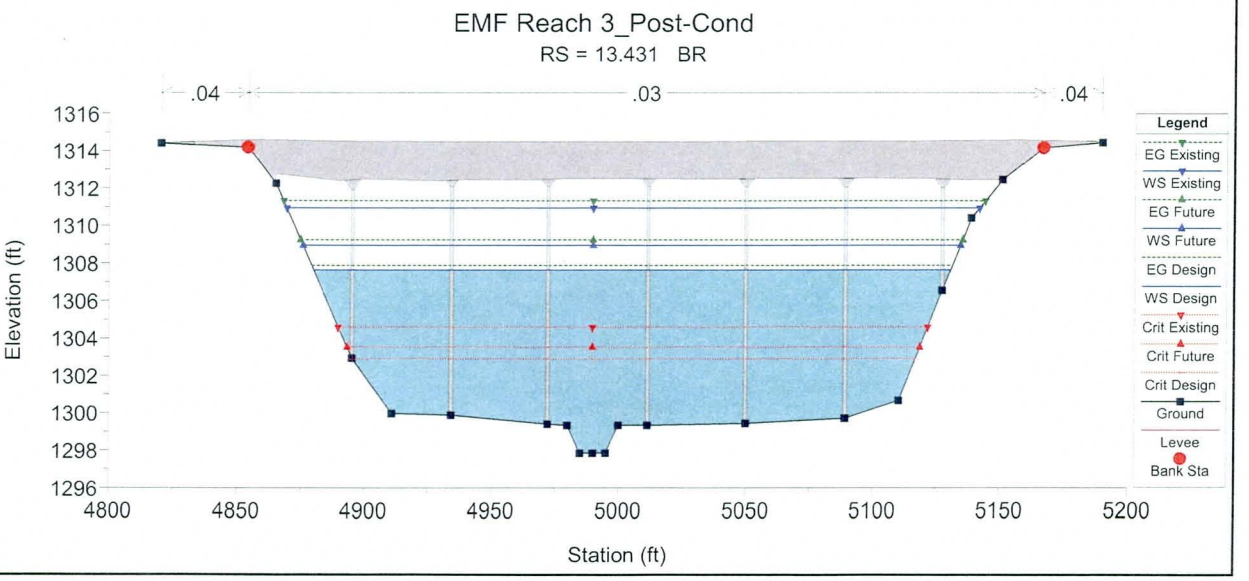
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta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Station (ft)
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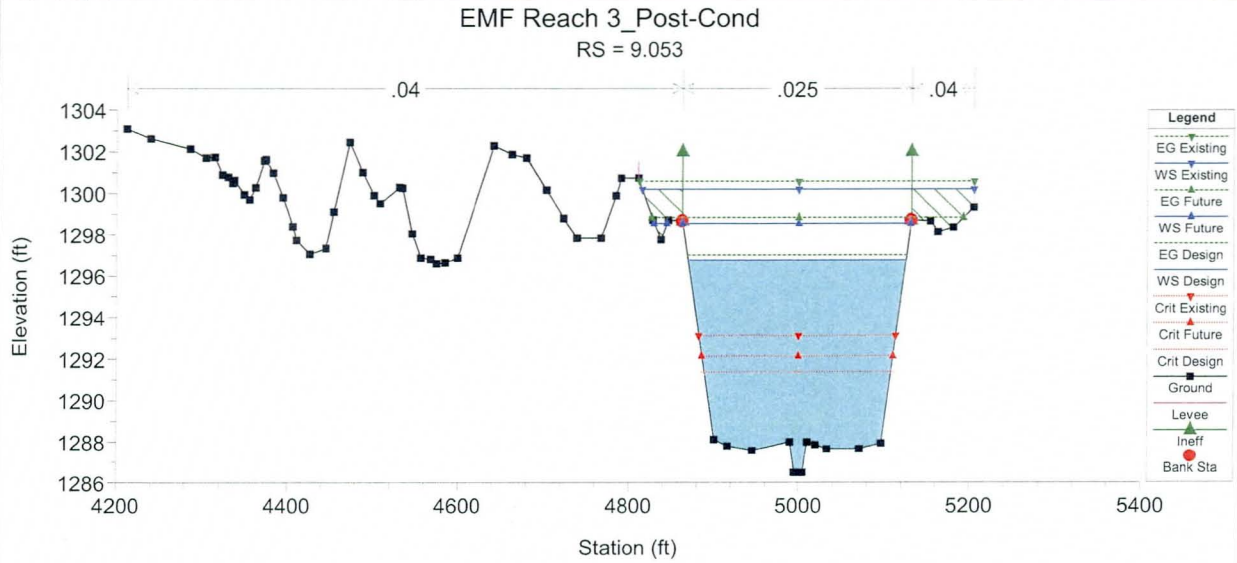
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta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.025
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Elevation (ft)
Station (ft)
Legend
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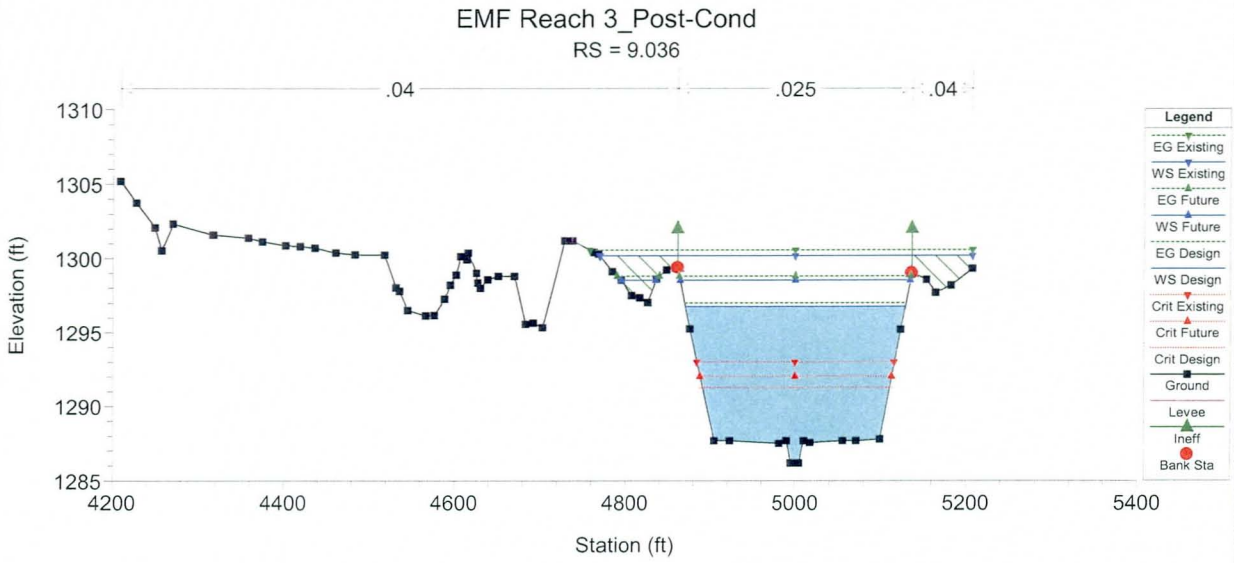
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Elevation (ft)
Station (ft)
Legend
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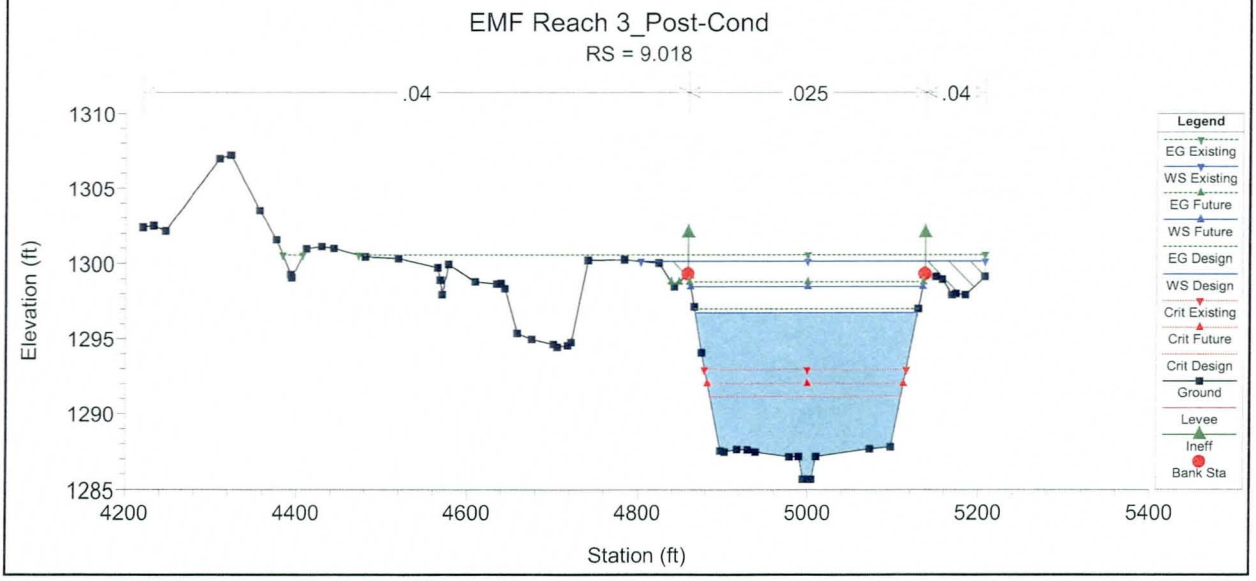
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Elevation (ft)
Station (ft)
Legend
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WS Future
EG Design
WS Design
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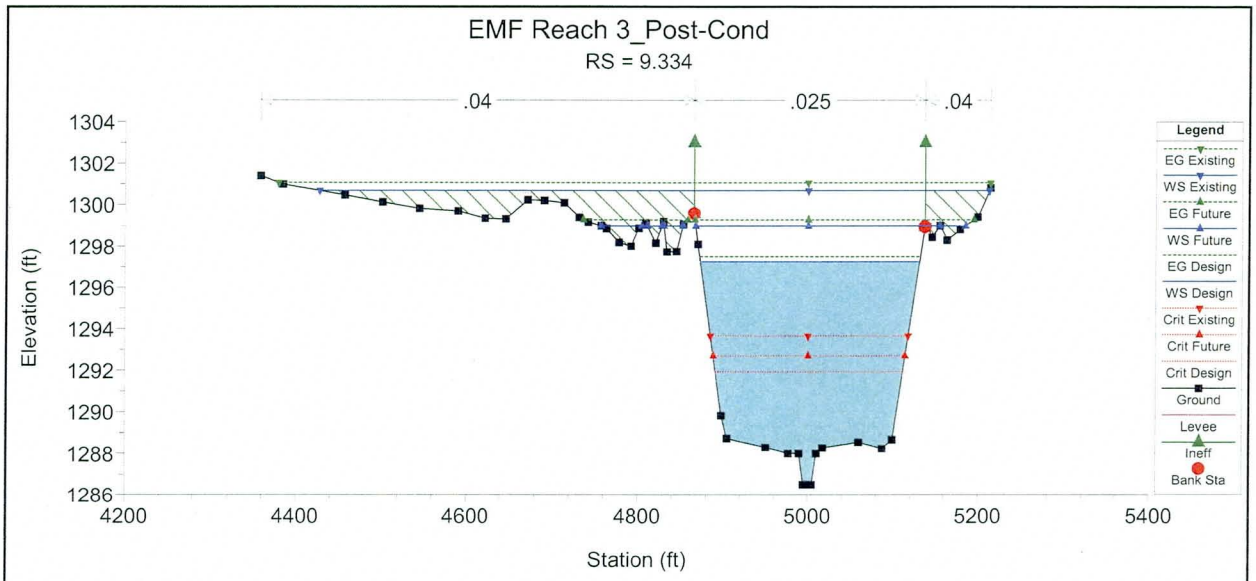
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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.025
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Elevation (ft)
Station (ft)
Legend
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EG Future
WS Future
EG Design
WS Design
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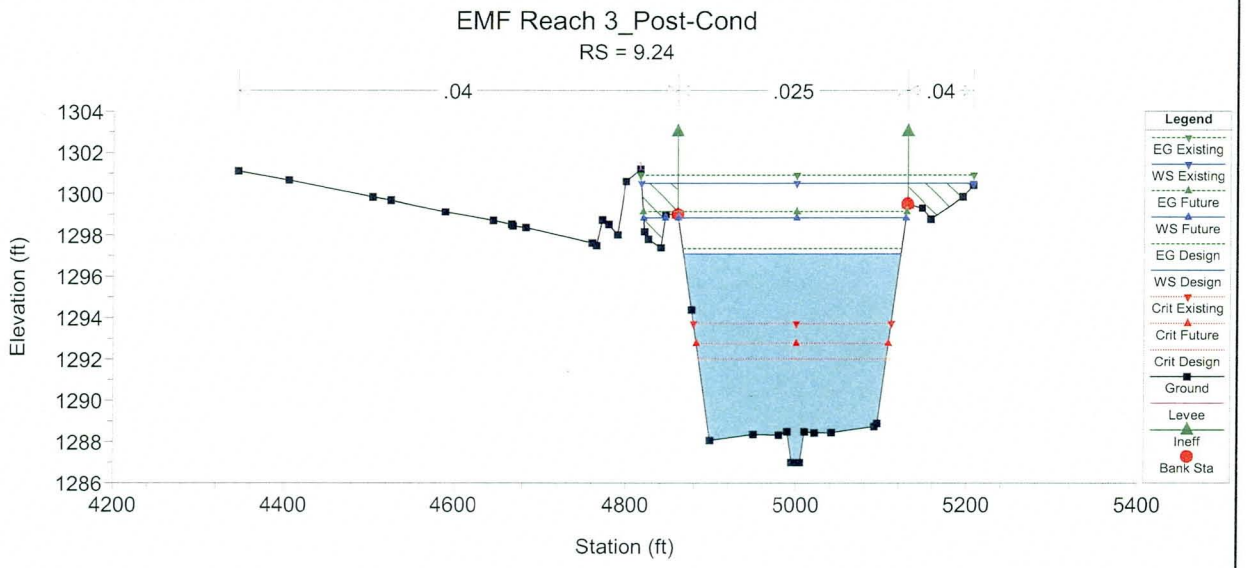
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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.025
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Elevation (ft)
Station (ft)
Legend
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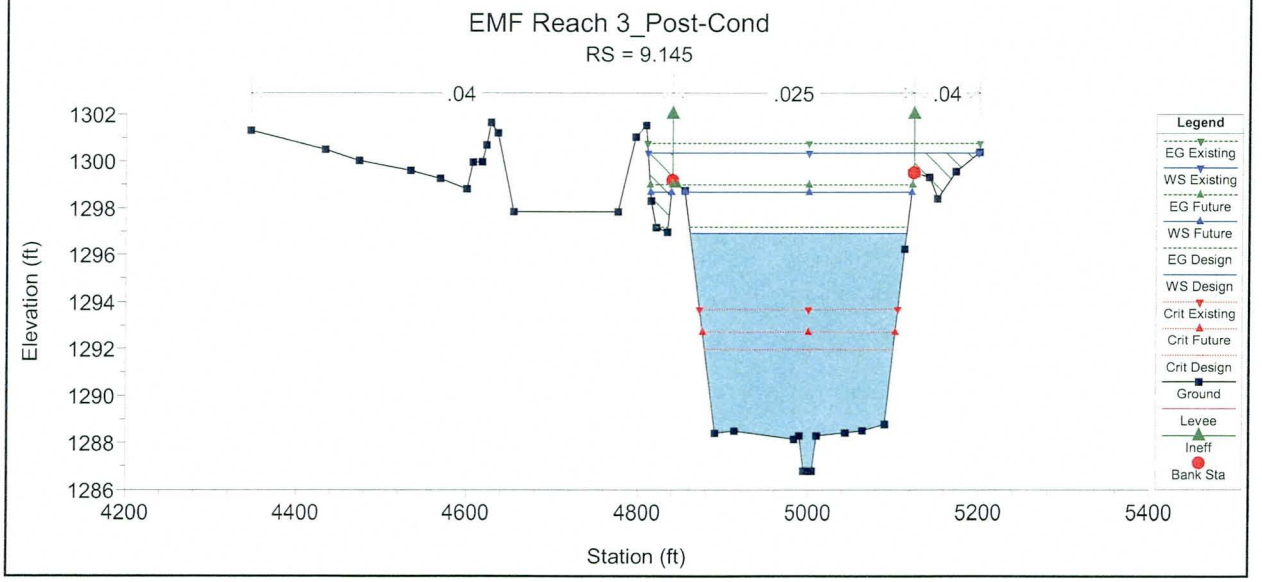
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Station (ft)
Legend
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EG Future
WS Future
EG Design
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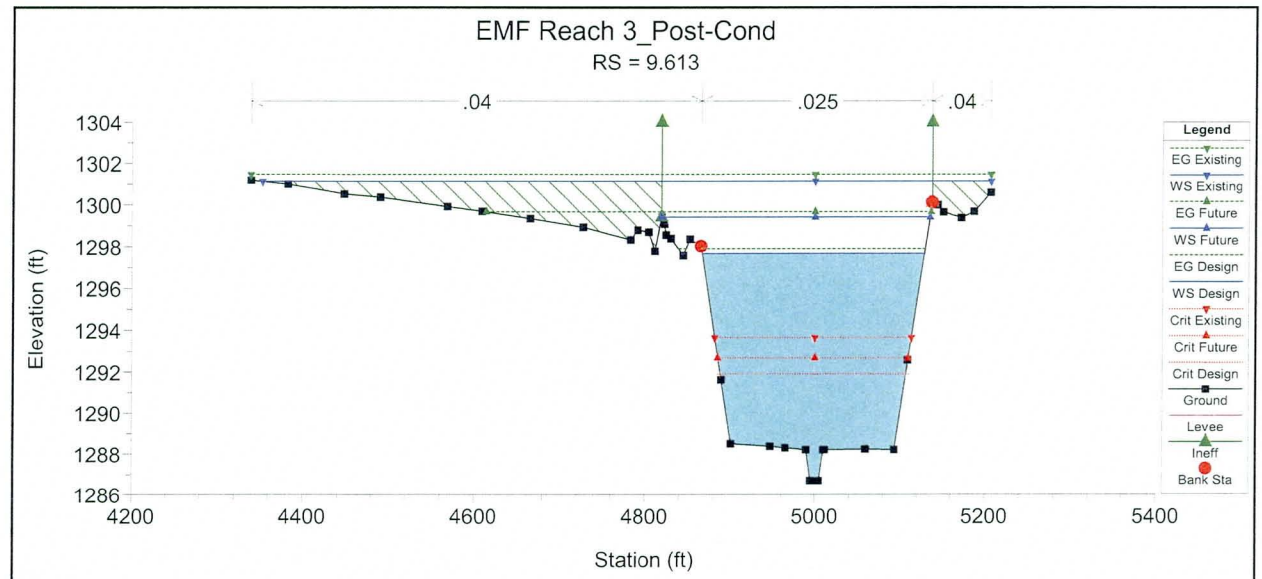
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Elevation (ft)
Station (ft)
Legend
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EG Future
WS Future
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Crit Design
Ground
Levee
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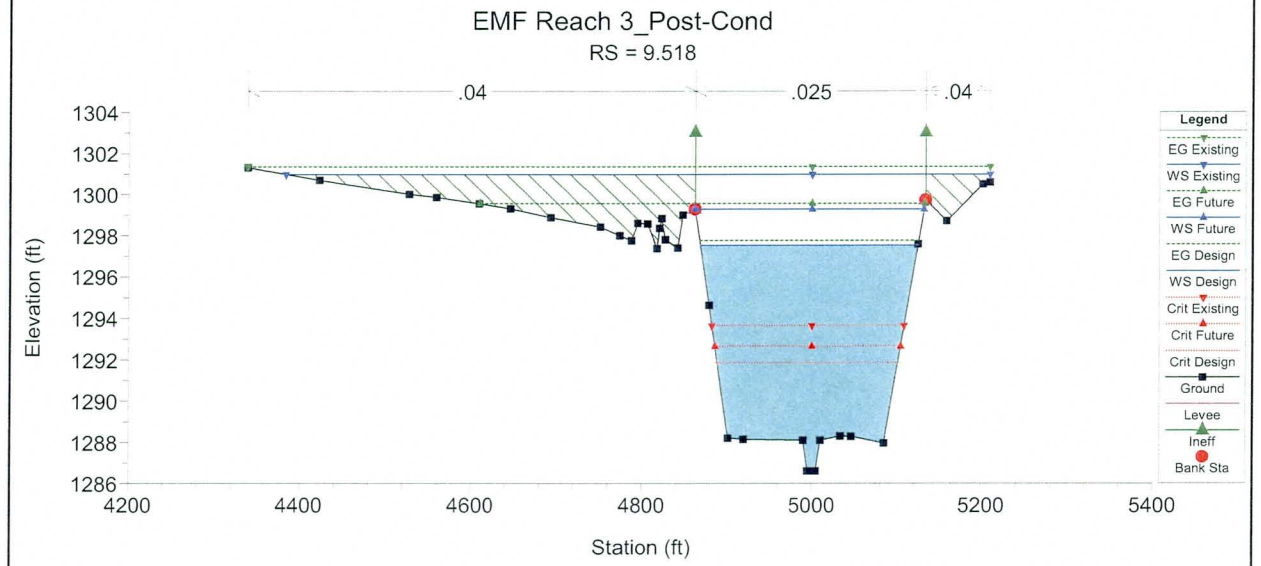
Bank Sta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Station (ft)
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EG Future
WS Future
EG Design
WS Design
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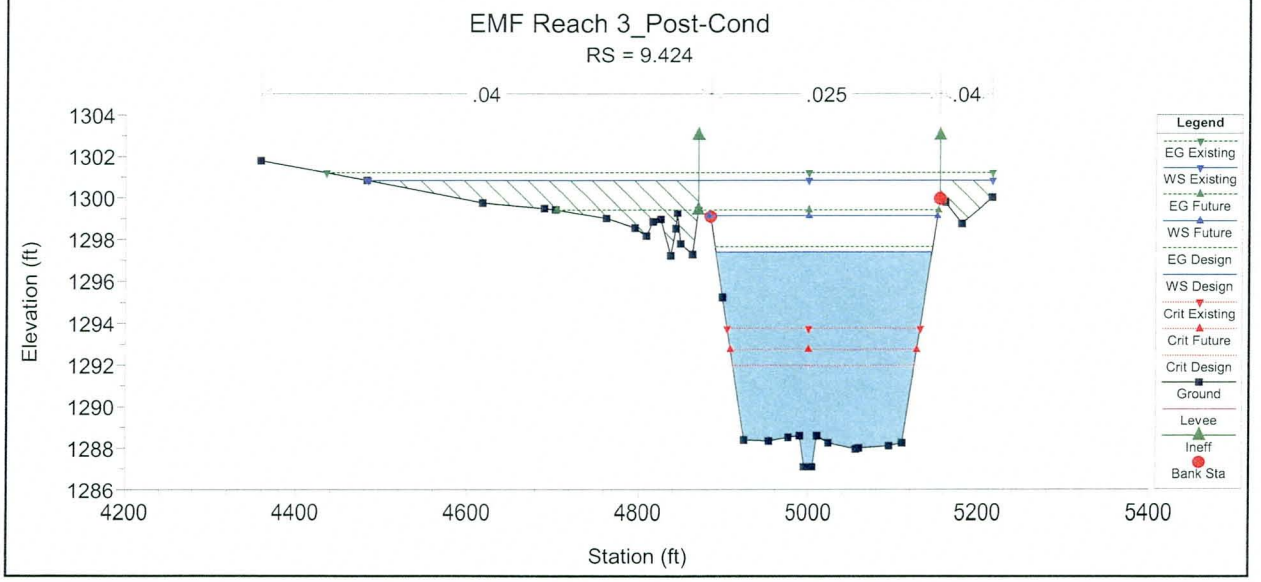
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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RS = 9.424
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Elevation (ft)
Station (ft)
Legend
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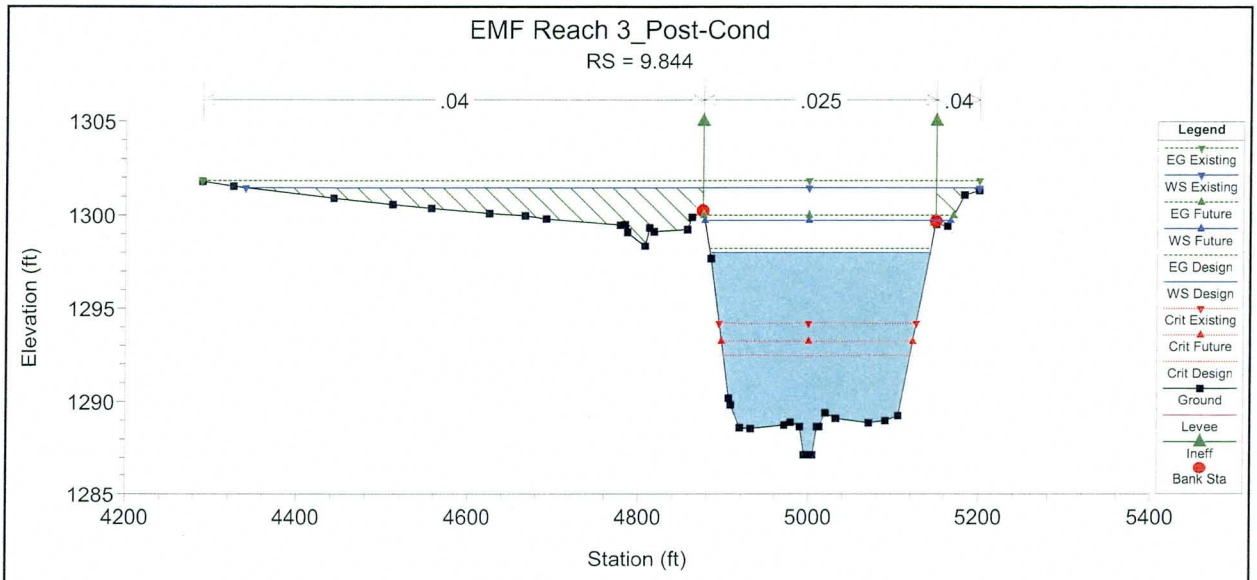
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Elevation (ft)
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1300
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1290
1285
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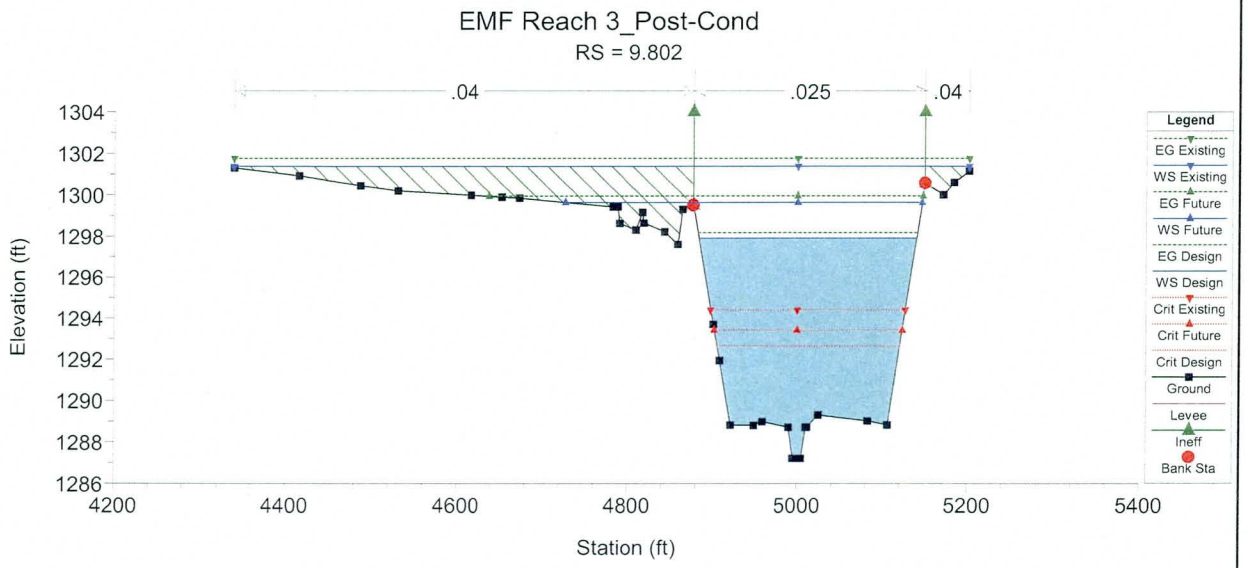
5200
5400
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond
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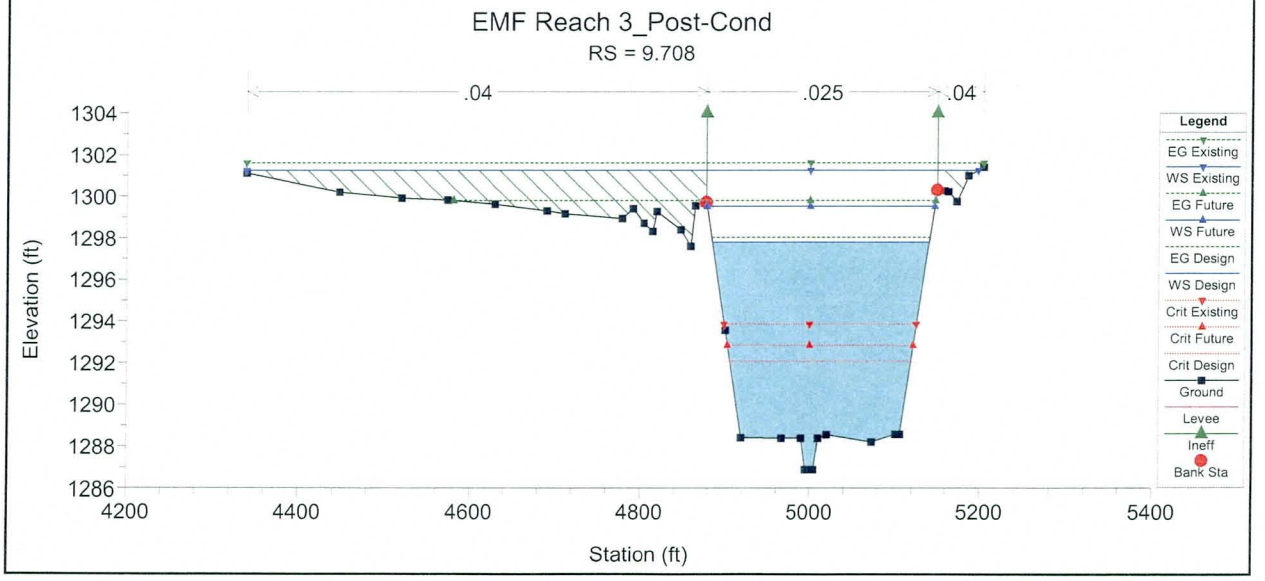
.04
.025
.04
Elevation (ft)
1304
1302
1300
1298
1296
1294
1292
1290
1288
1286
4200
4400
4600
4800
5000
5200
5400
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond
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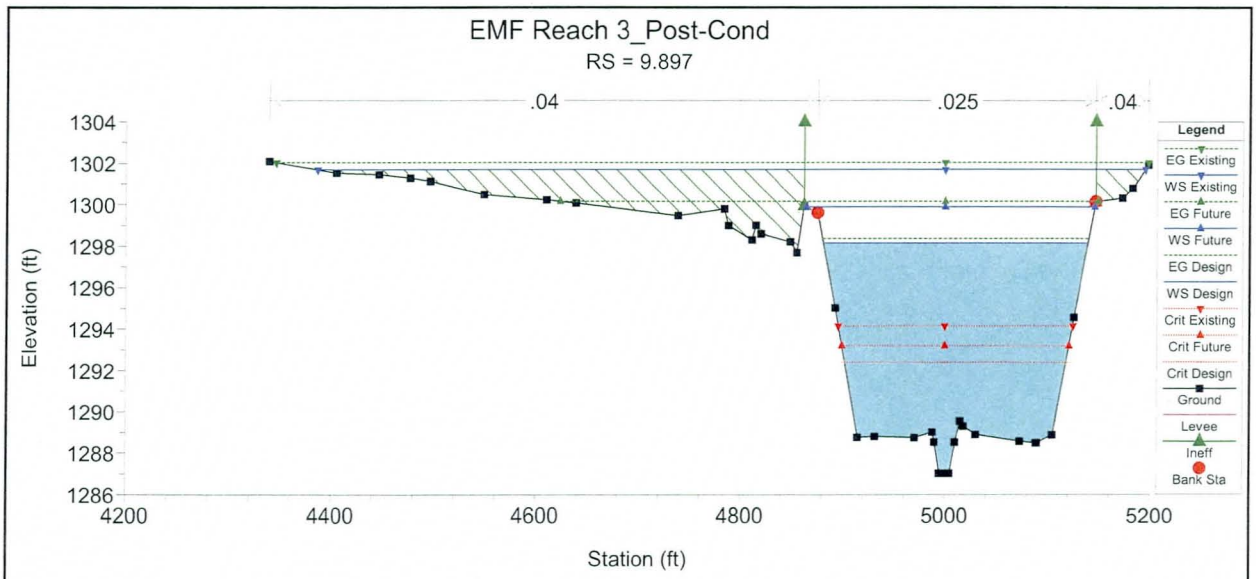
Elevation (ft)
1304
1302
1300
1298
1296
1294
1292
1290
1288
1286
4200
4400
4600
4800
5000
5200
5400
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Elevation (ft)
Station (ft)
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EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
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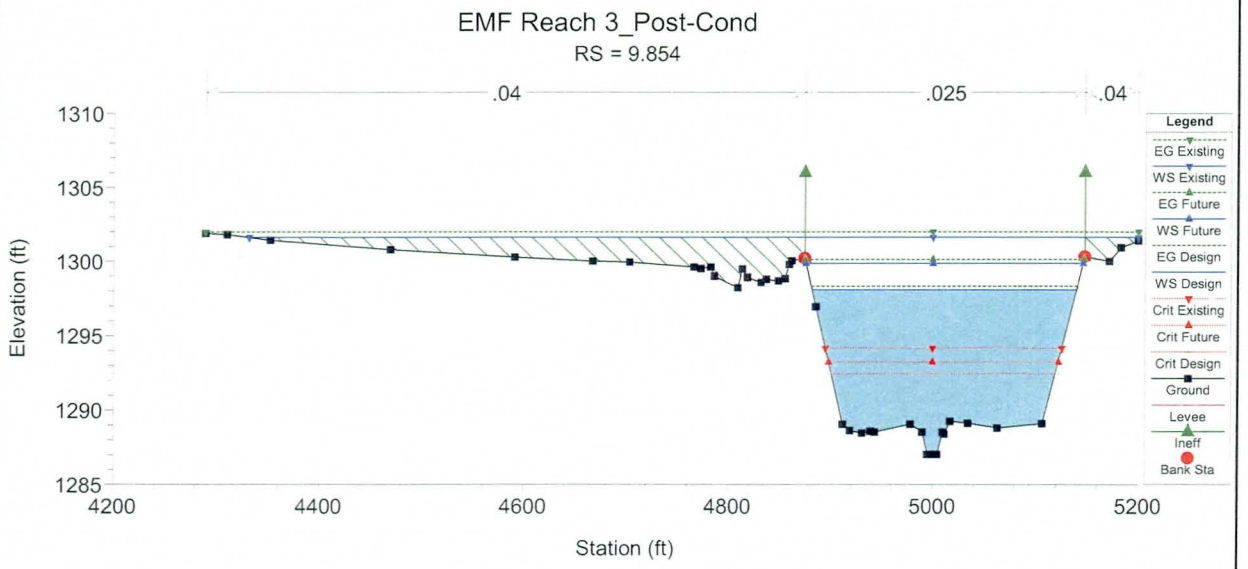
Bank Sta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Station (ft)
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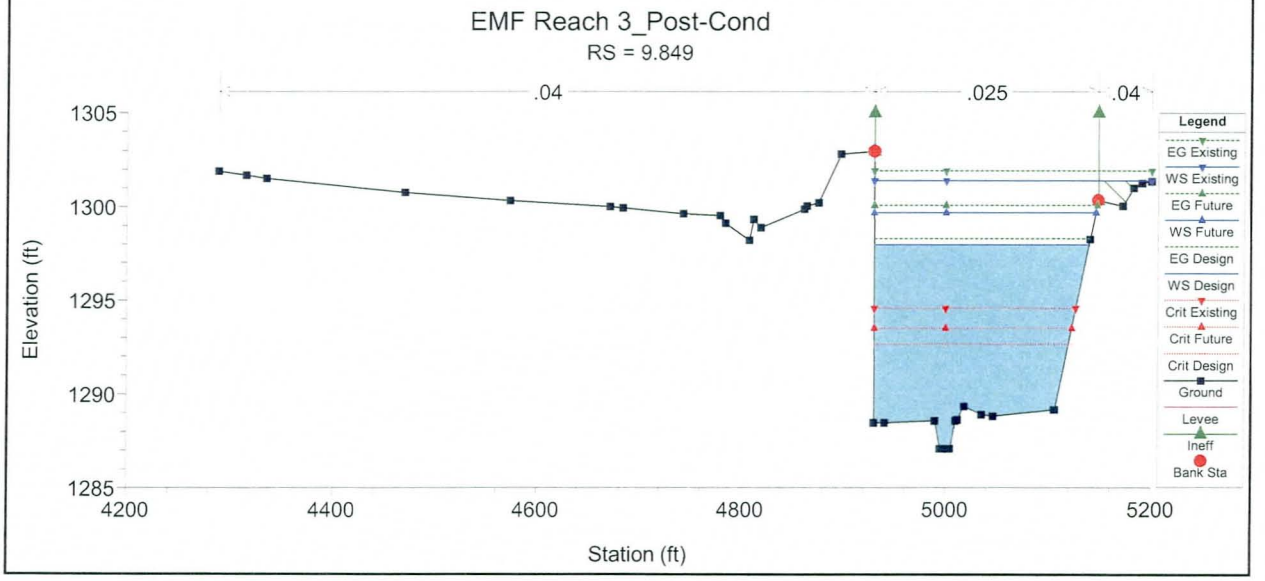
Crit Design
Ground
Levee
Ineff
Bank Sta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Elevation (ft)
Station (ft)
Legend
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EG Future
WS Future
EG Design
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Crit Existing
Crit Future
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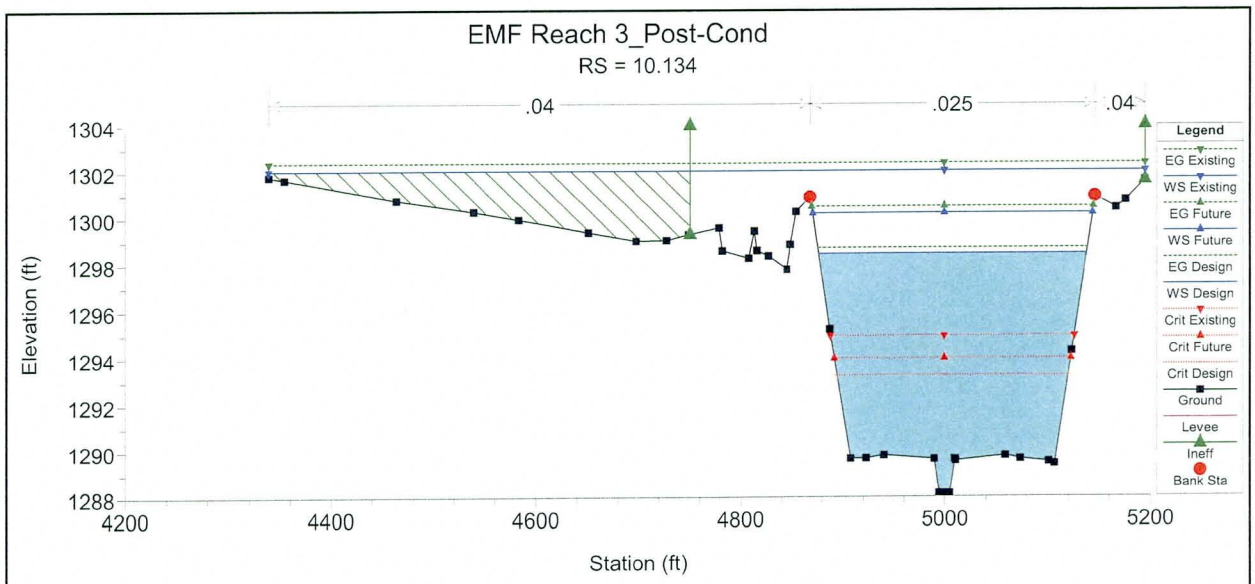
Ground
Levee
Ineff
Bank Sta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Elevation (ft)
Station (ft)
Legend
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EG Future
WS Future
EG Design
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Crit Existing
Crit Future
Crit Design
Ground
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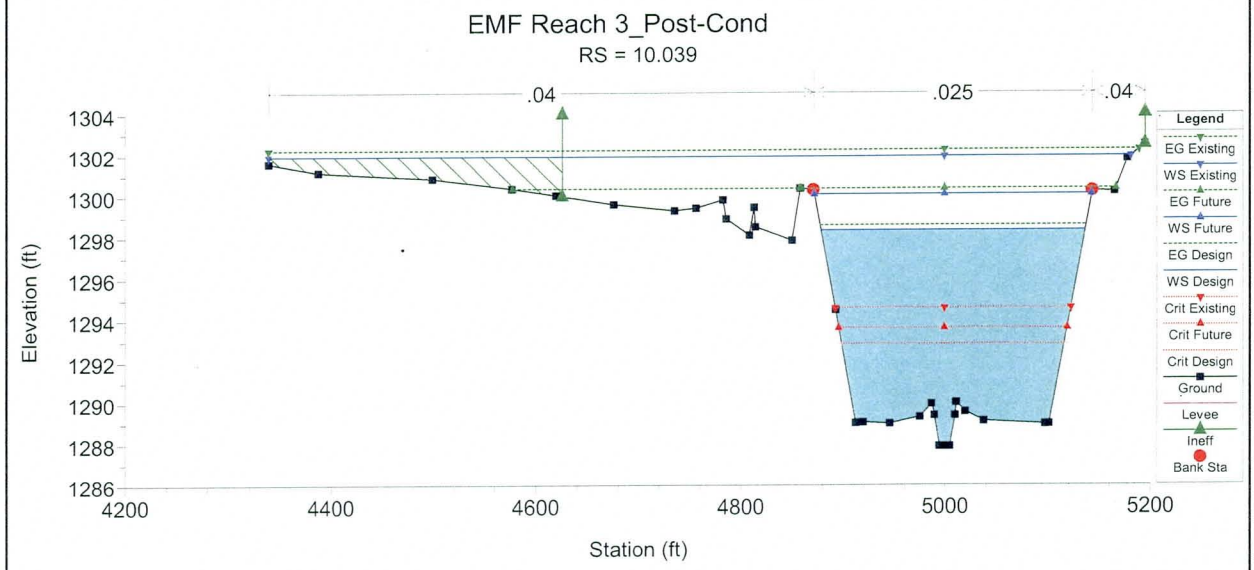
Bank Sta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Elevation (ft)
Station (ft)
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EG Future
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EG Design
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Crit Design
Ground
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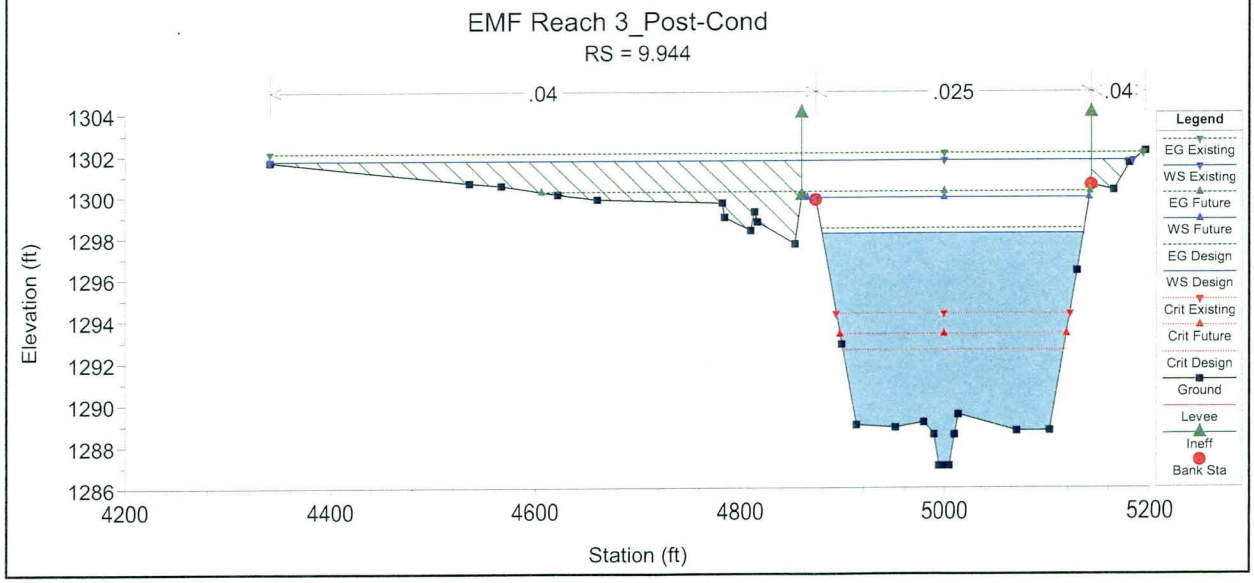
Bank Sta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Station (ft)
Legend
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EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
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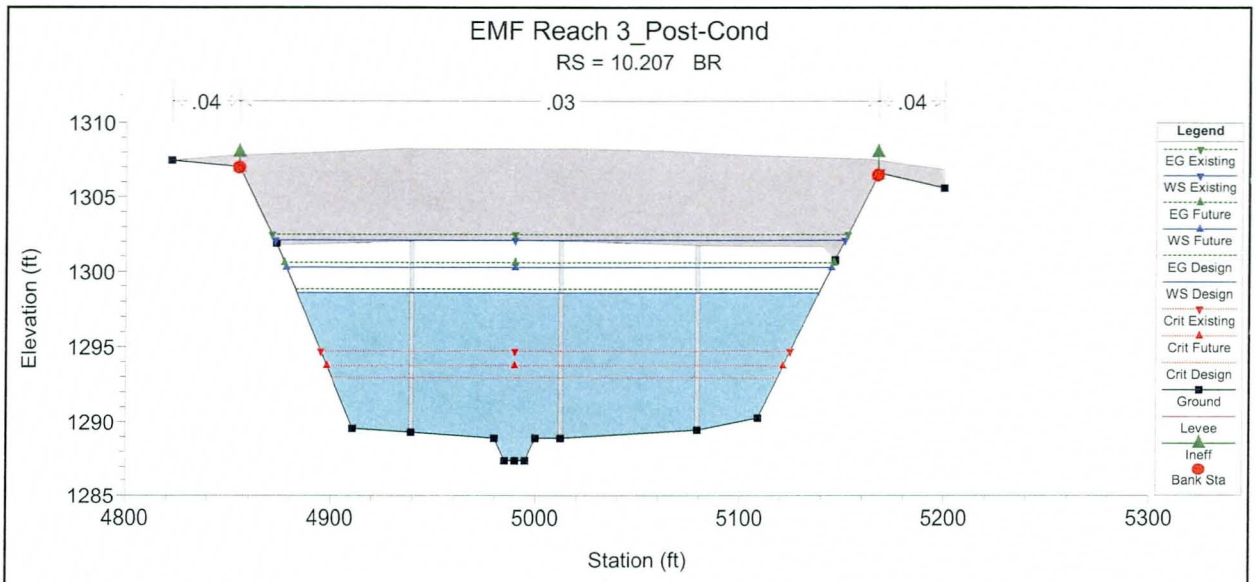
Ineff
Bank Sta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5200
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Station (ft)
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EG Design
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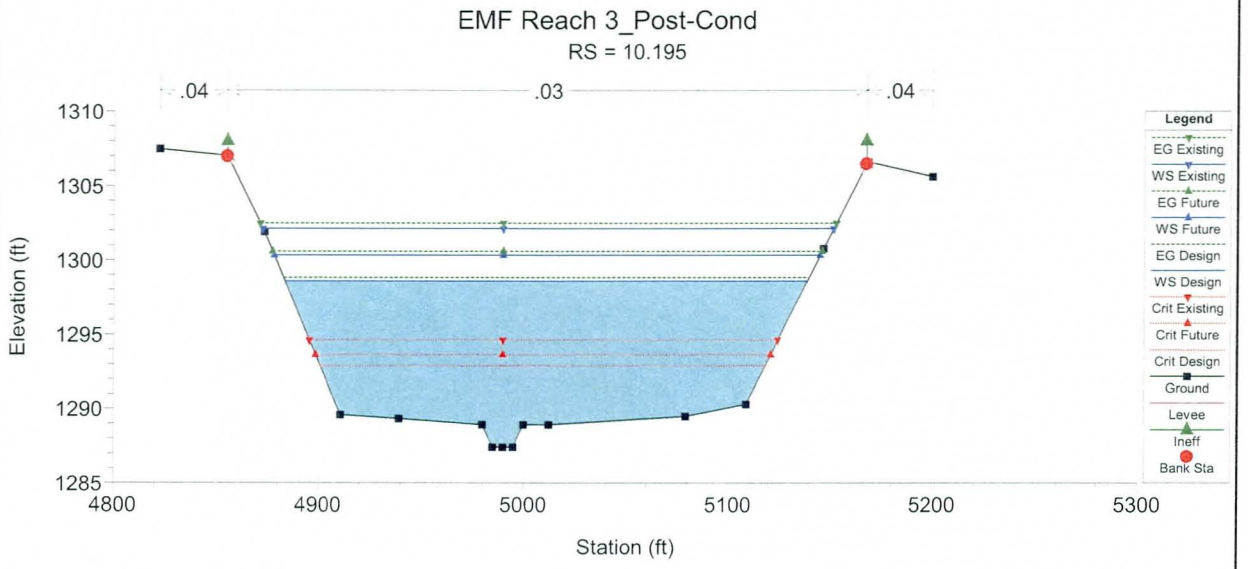
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Elevation (ft)
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5200
5300
Station (ft)
Legend
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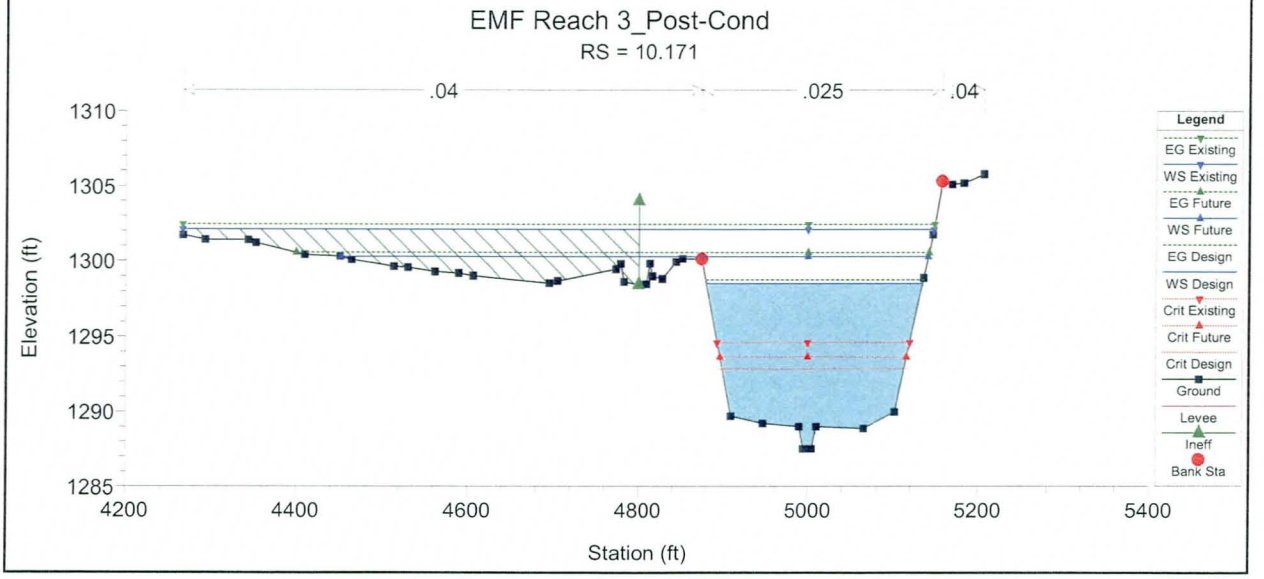
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Elevation (ft)
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1300
1295
1290
1285
4200
4400
4600
4800
5000
5200
5400
Station (ft)
Legend
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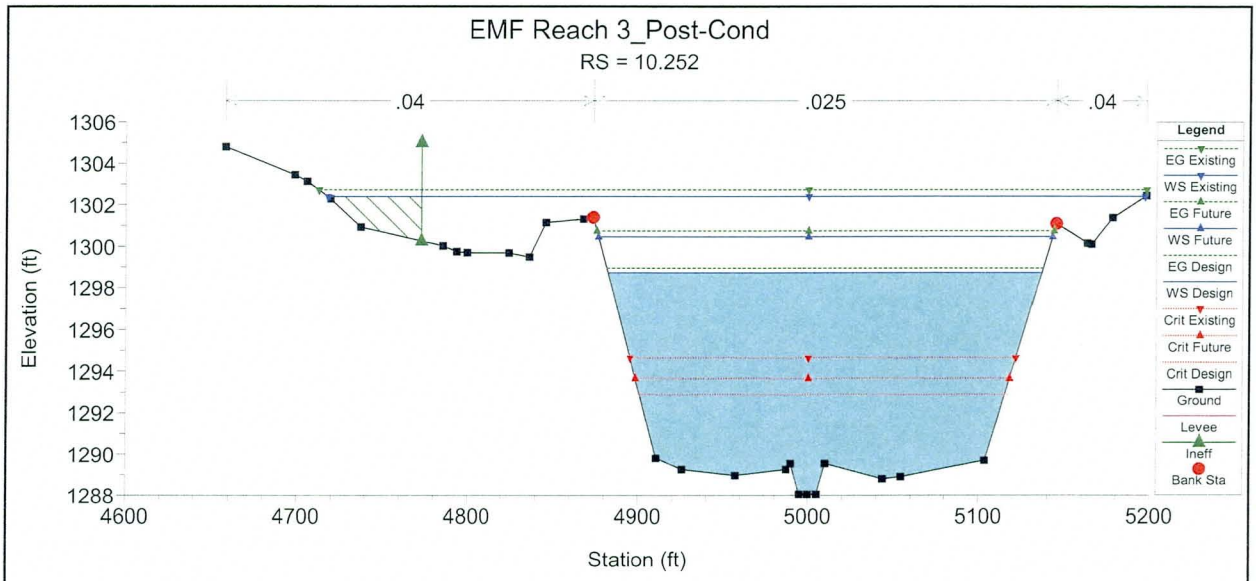
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Station (ft)
Legend
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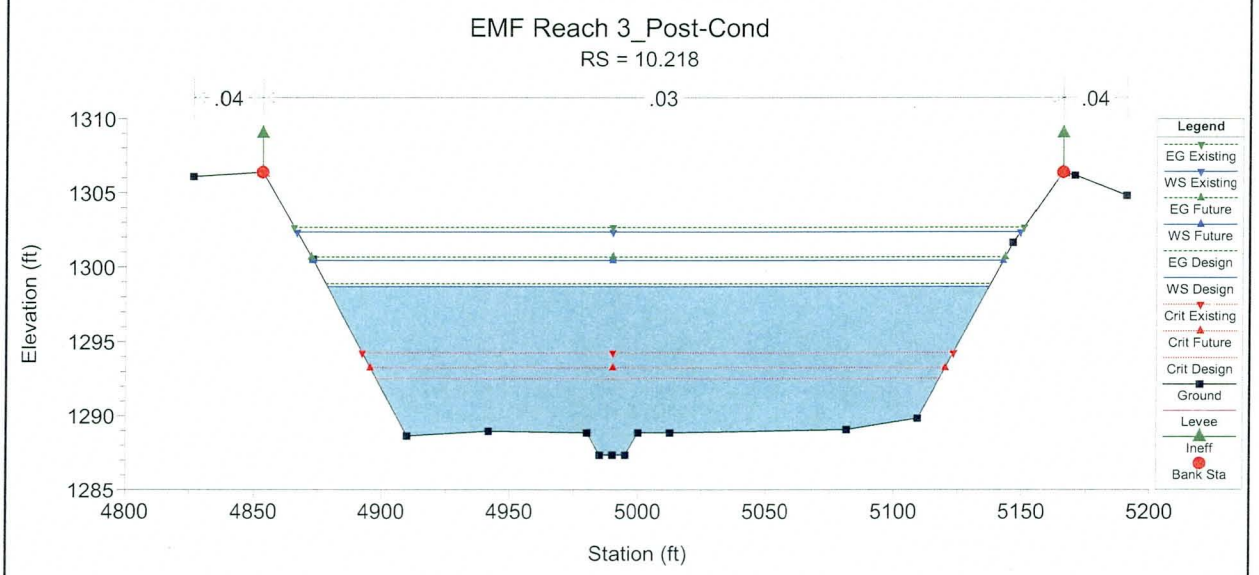
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Station (ft)
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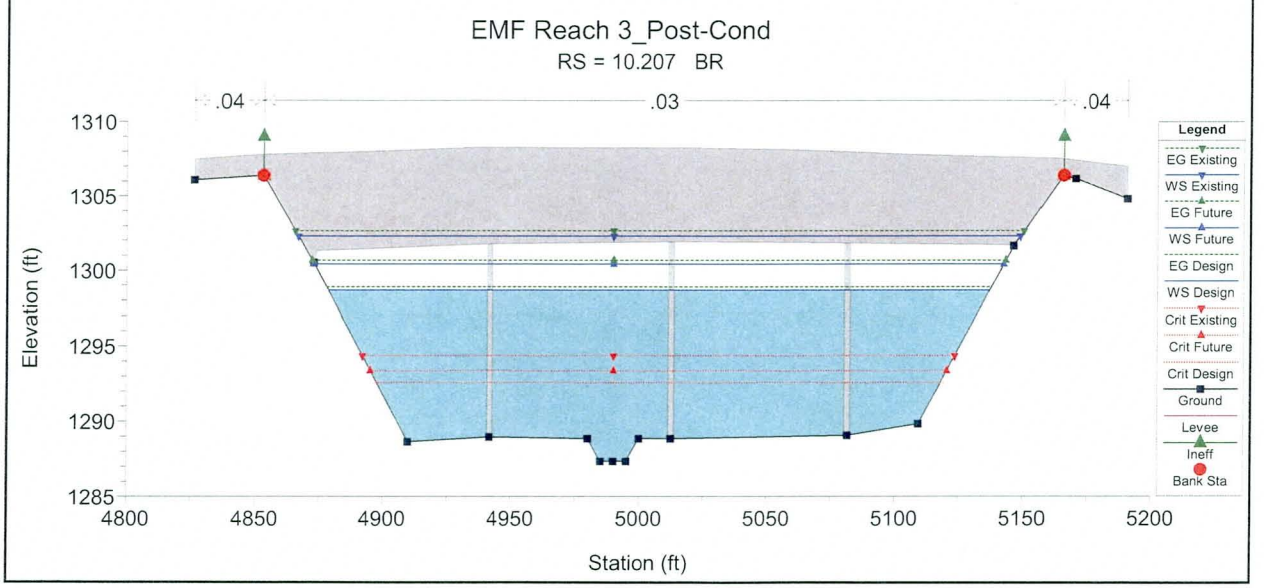
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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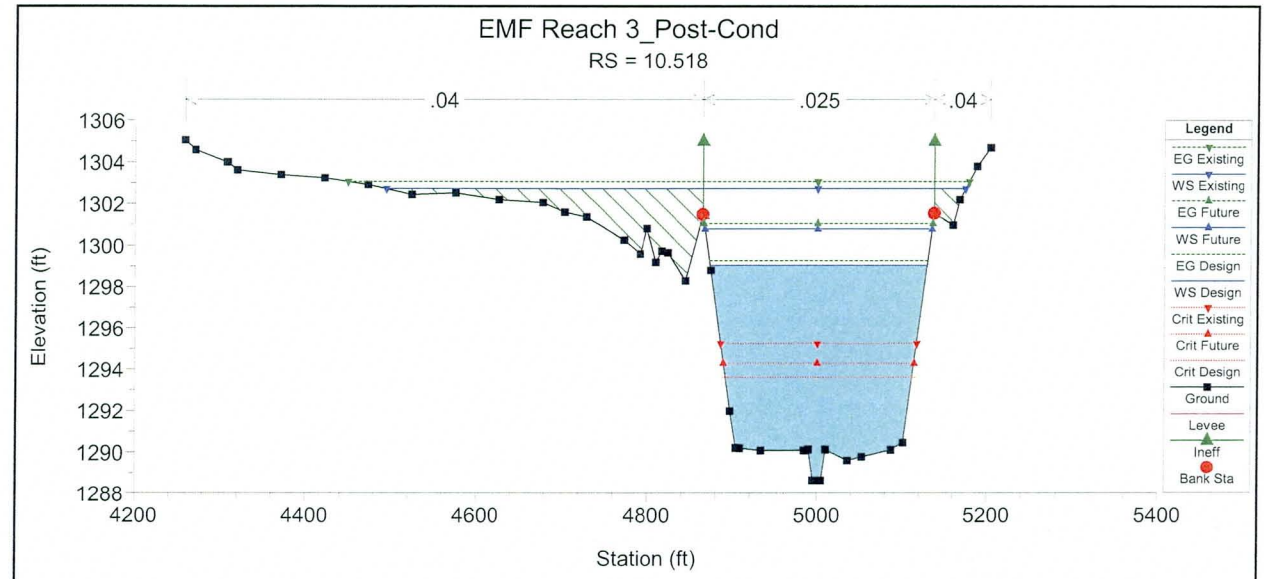
RS = 10.207 BR
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Elevation (ft)
Station (ft)
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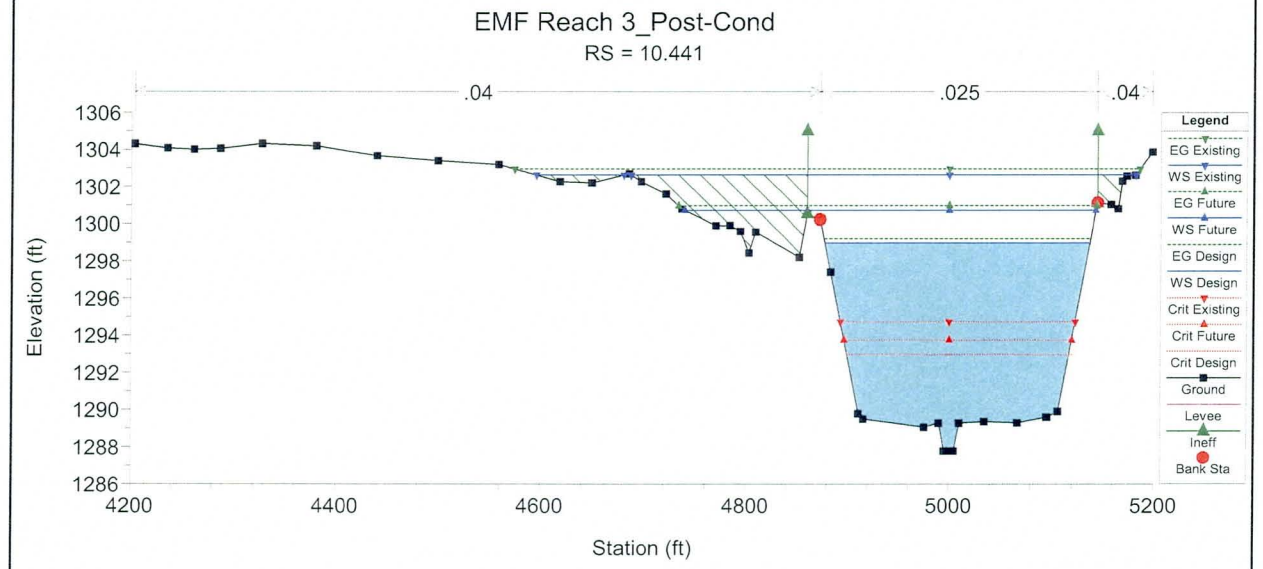
Bank Sta


EMF Reach 3_Post-Cond
RS = 10.441
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Station (ft)
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Levee
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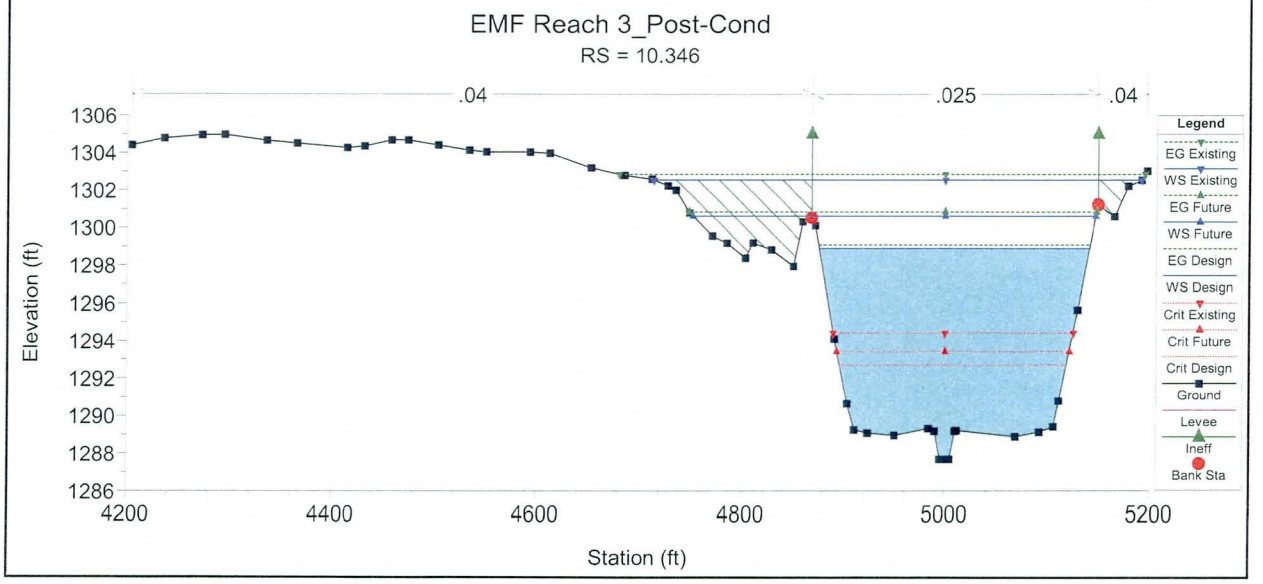
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Crit Design
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Levee
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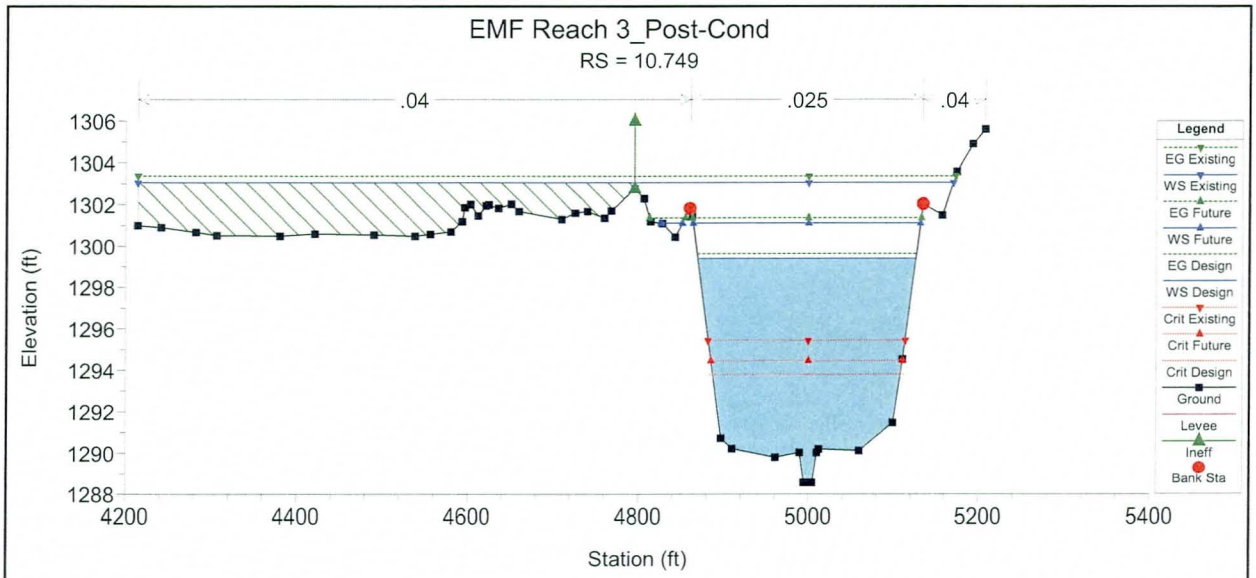
Bank Sta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Station (ft)
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Crit Design
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Levee
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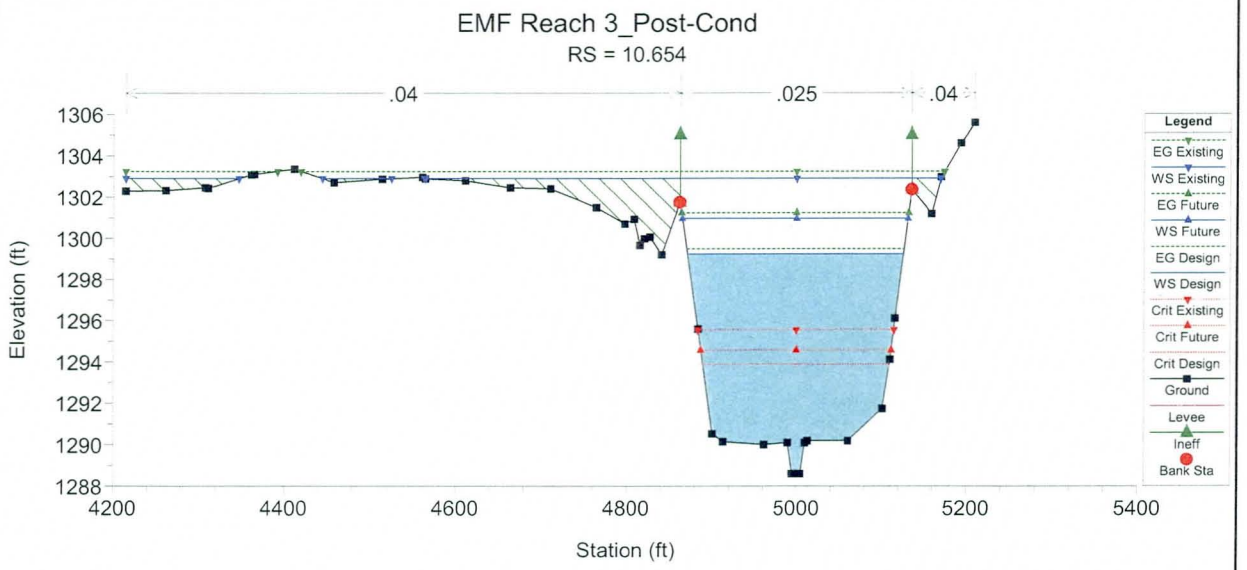
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Station (ft)
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EG Future
WS Future
EG Design
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Crit Design
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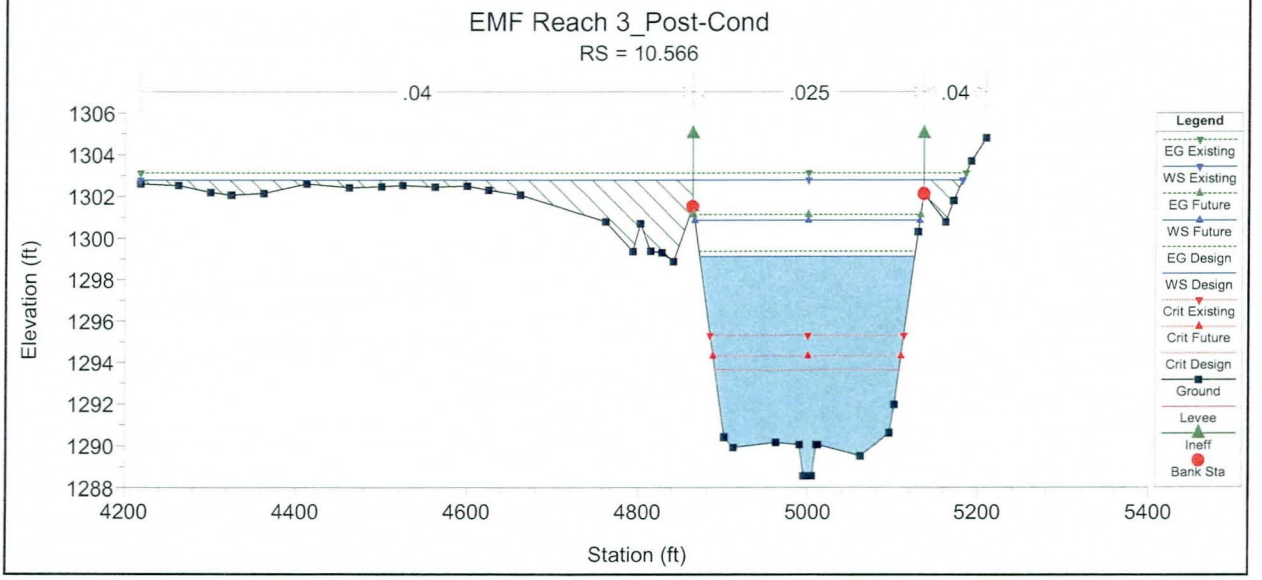
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Station (ft)
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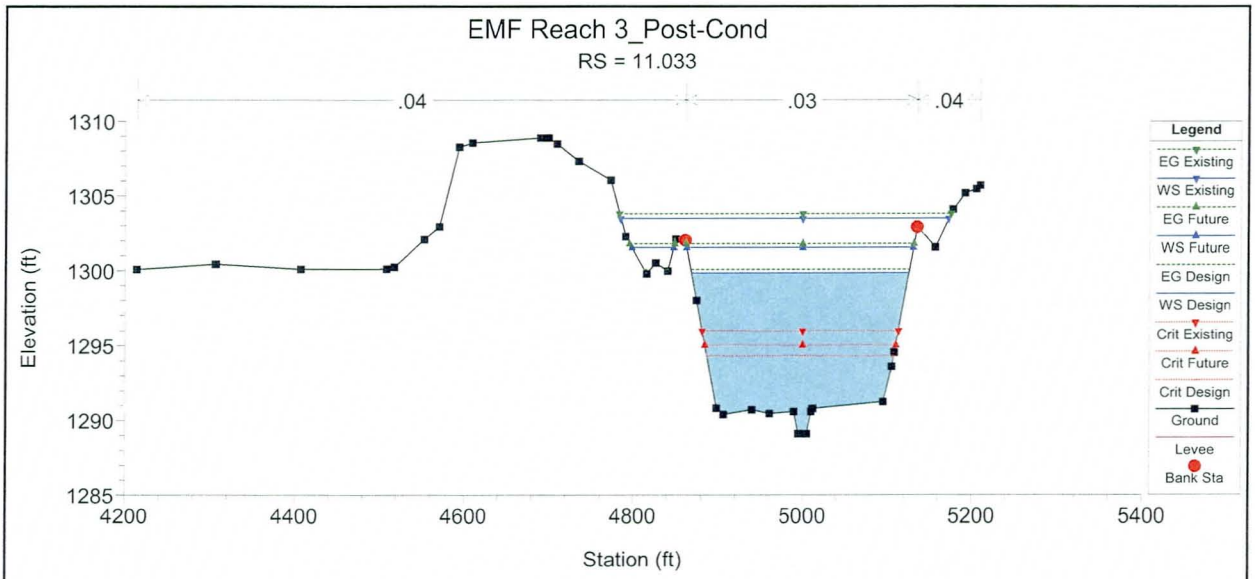
Bank Sta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WS Future
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Levee
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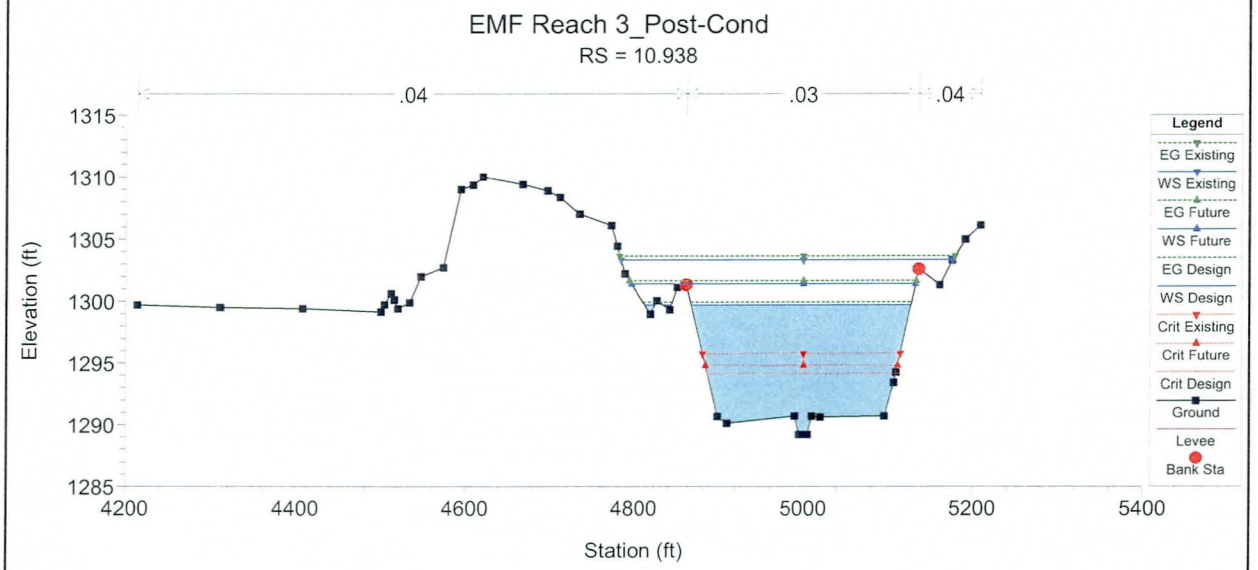
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.03
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Levee
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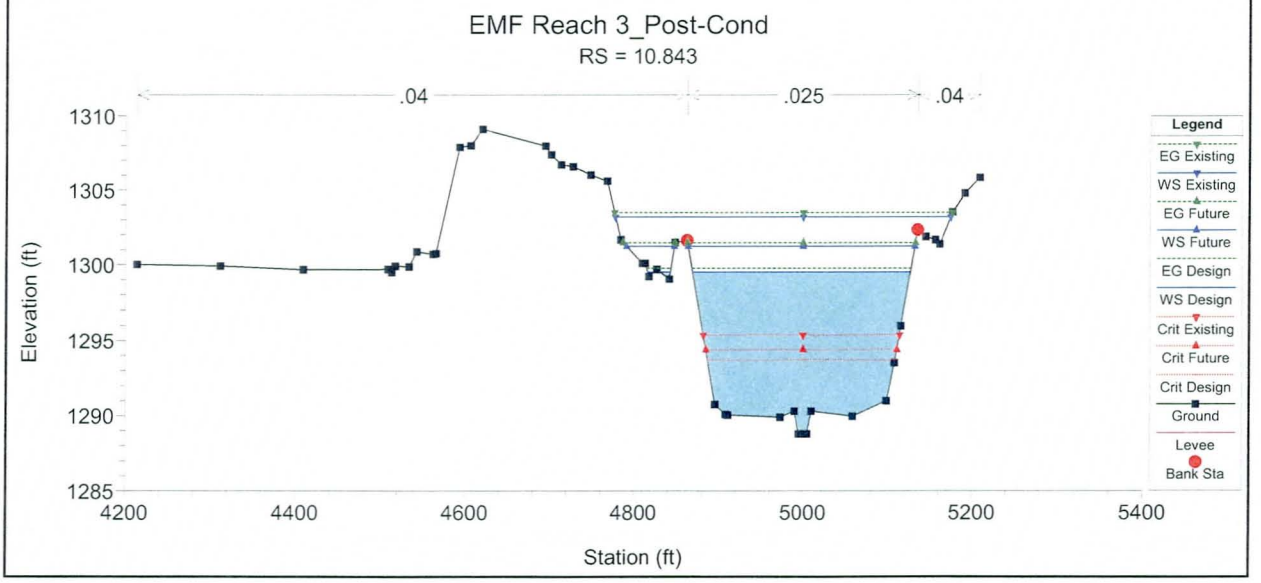
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Levee
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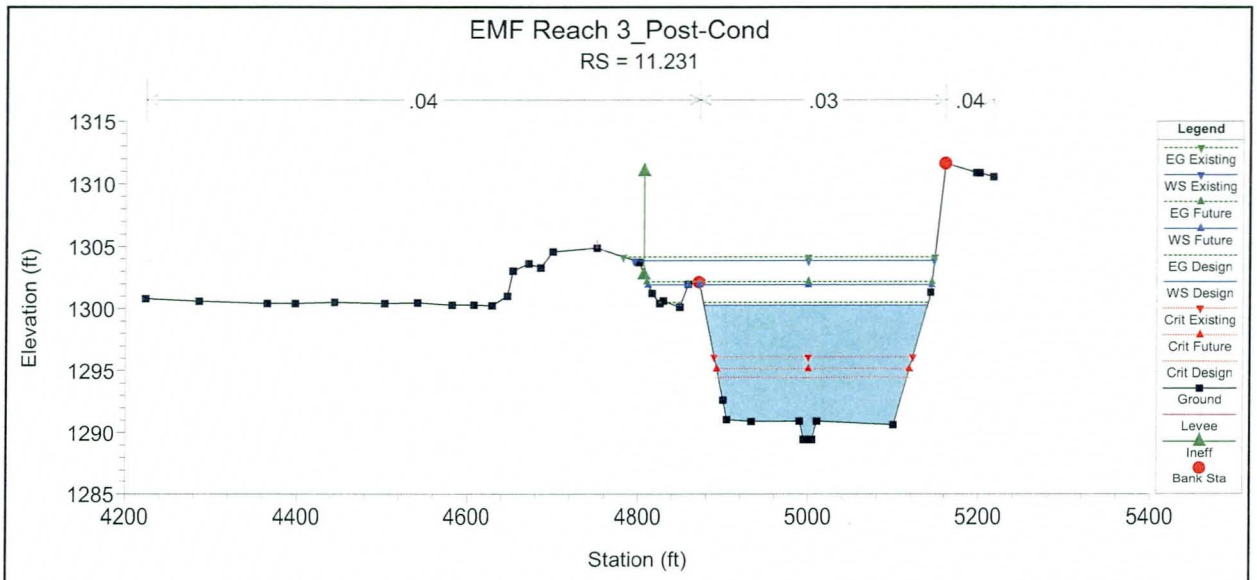
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Station (ft)
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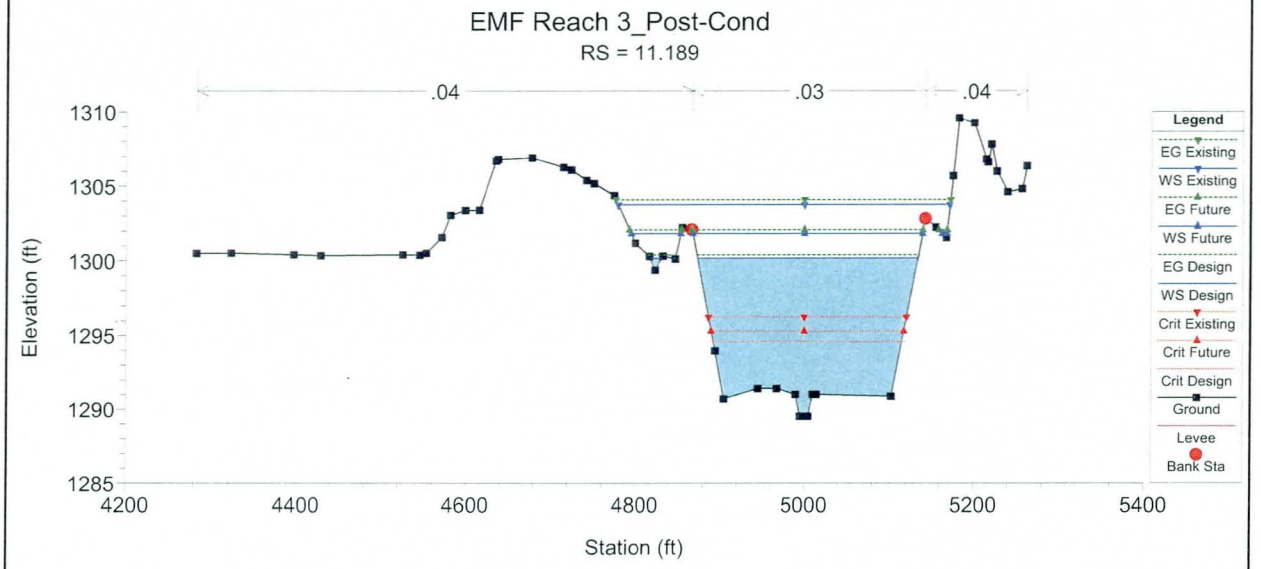
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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WS Future
EG Design
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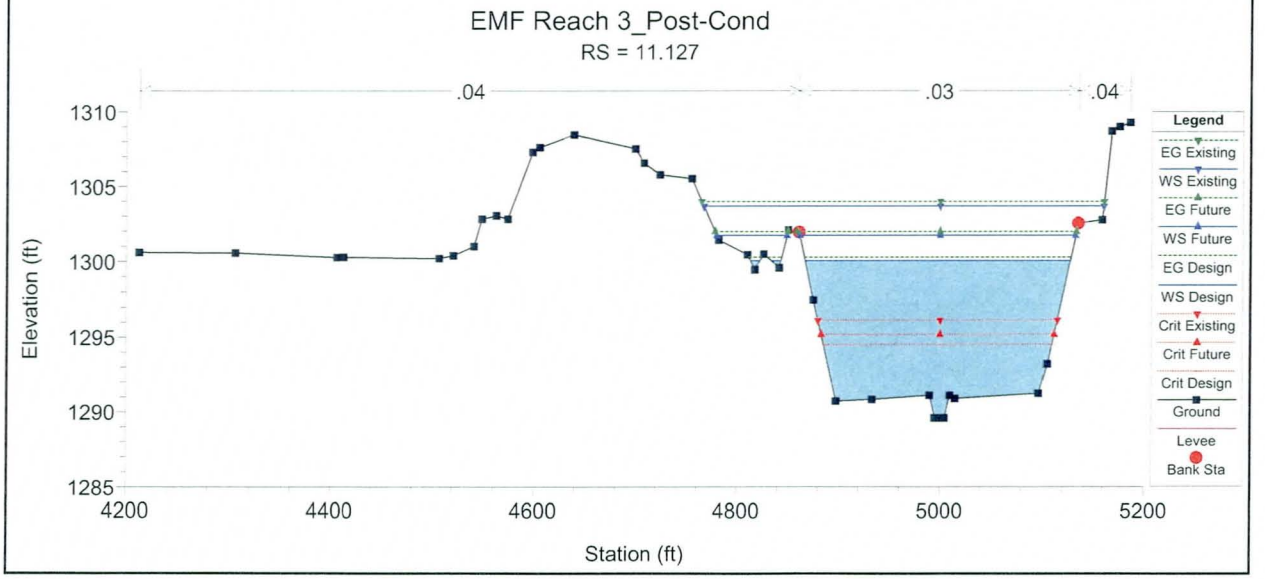
Crit Future
Crit Design
Ground
Levee
Bank Sta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RS = 11.127
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Elevation (ft)
Station (ft)
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WS Future
EG Design
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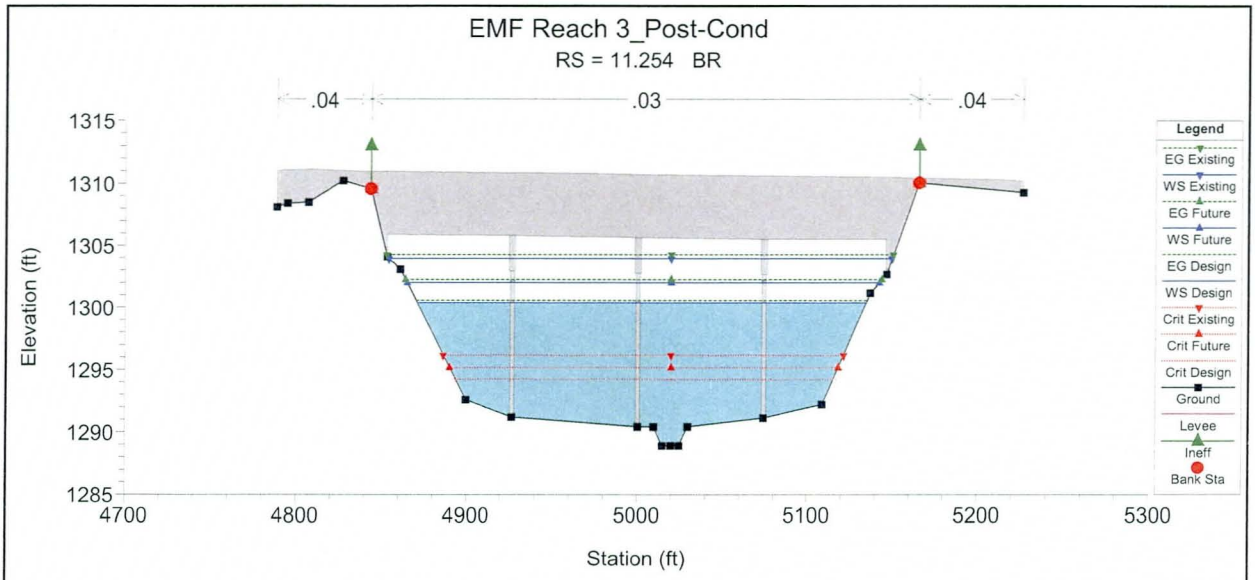
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta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1305
1300
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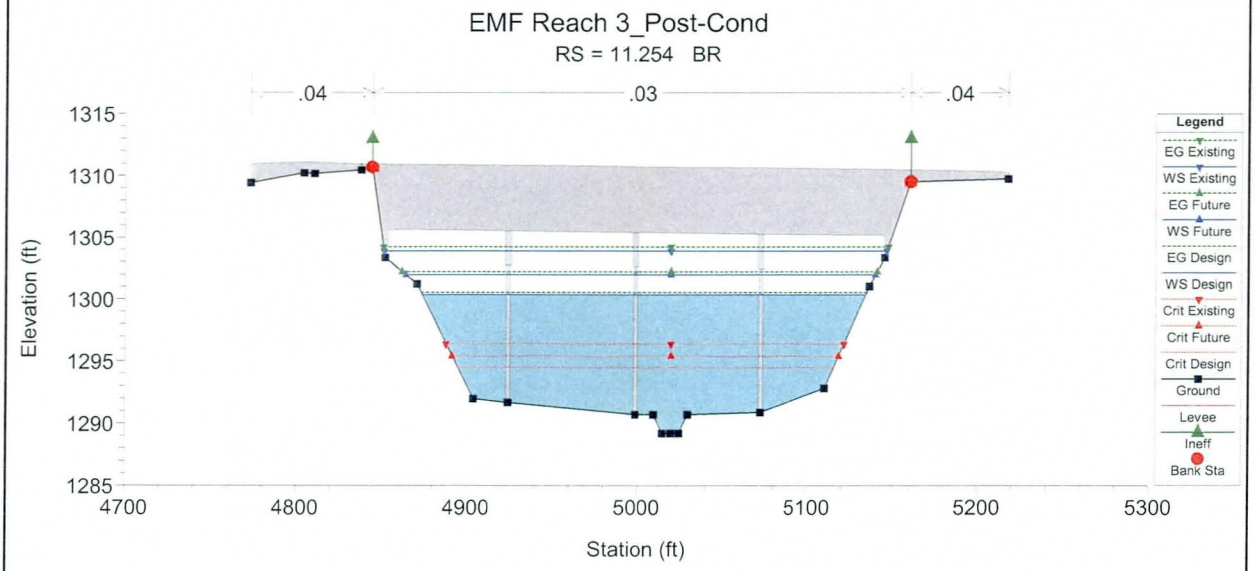
1285
4700
4800
4900
5000
5100
5200
5300
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond
RS = 11.254 BR
.04
.03
.04
Elevation (ft)
1315
1310
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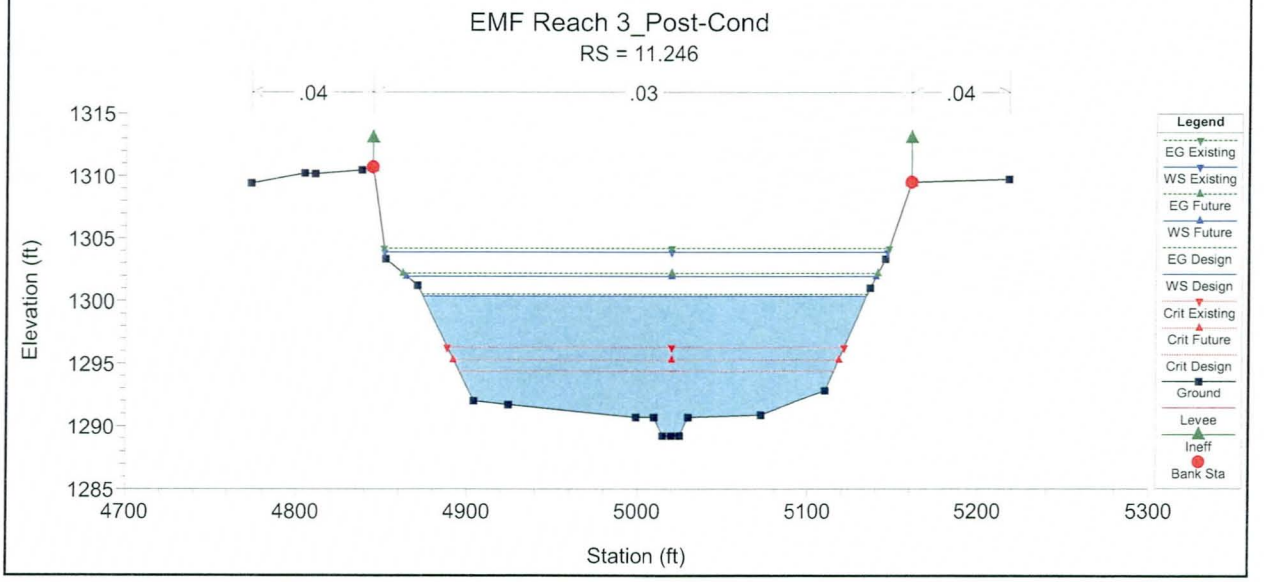
1300
1295
1290
1285
4700
4800
4900
5000
5100
5200
5300
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Elevation (ft)
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5200
5300
Station (ft)
Legend
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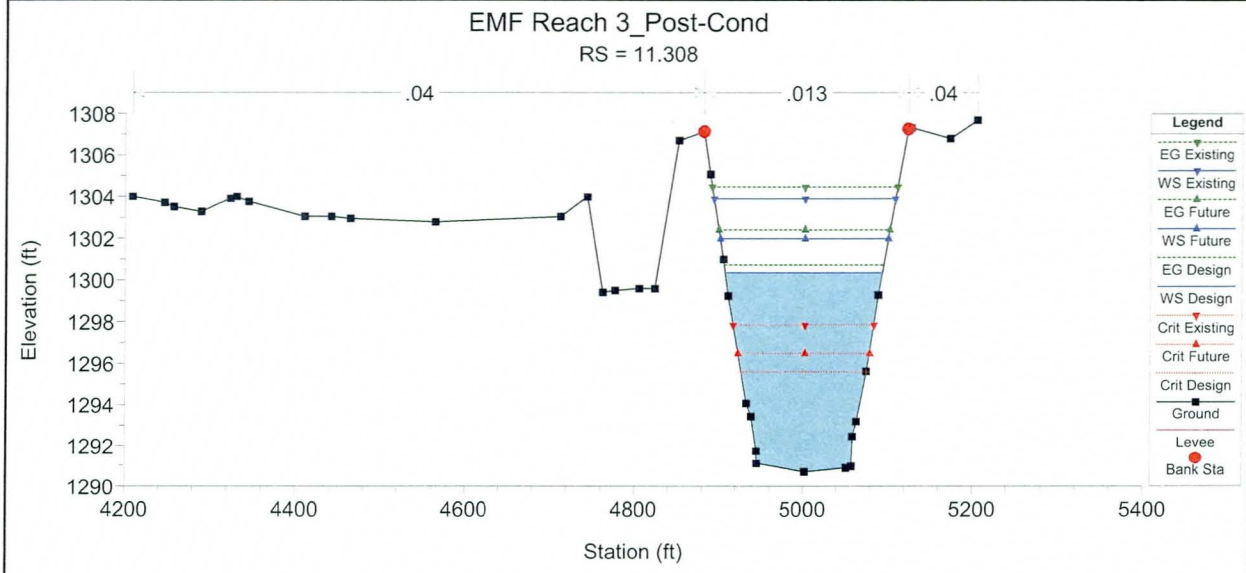
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Elevation (ft)
Station (ft)
Legend
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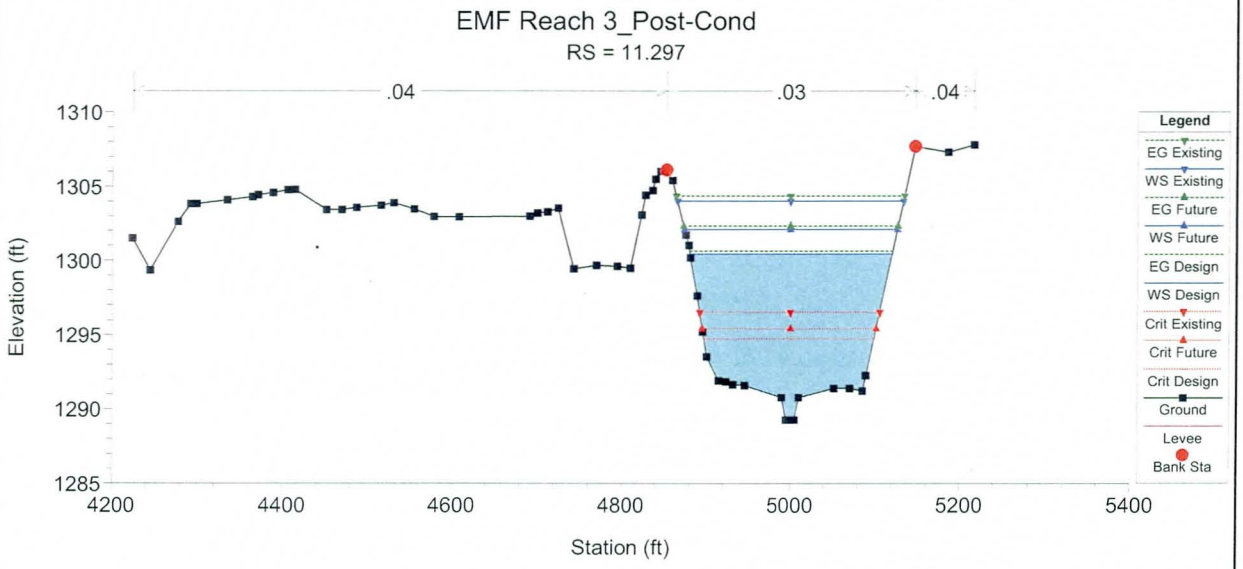
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Post-Cond
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Station (ft)
Legend
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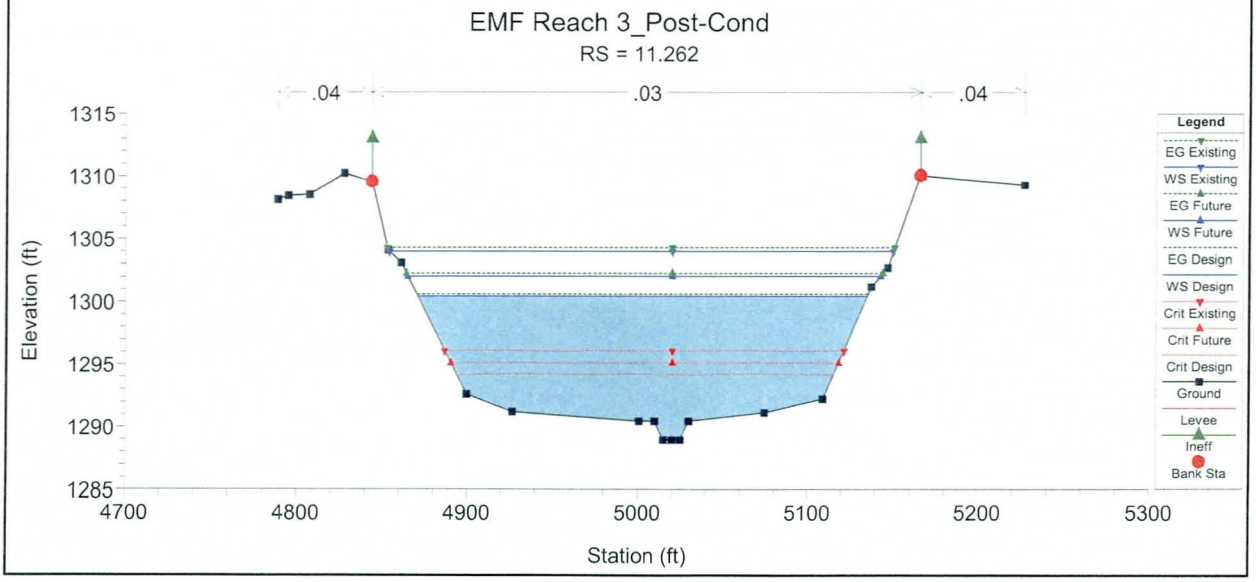
Crit Design
Ground
Levee
Bank Sta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Elevation (ft)
Station (ft)
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EG Future
WS Future
EG Design
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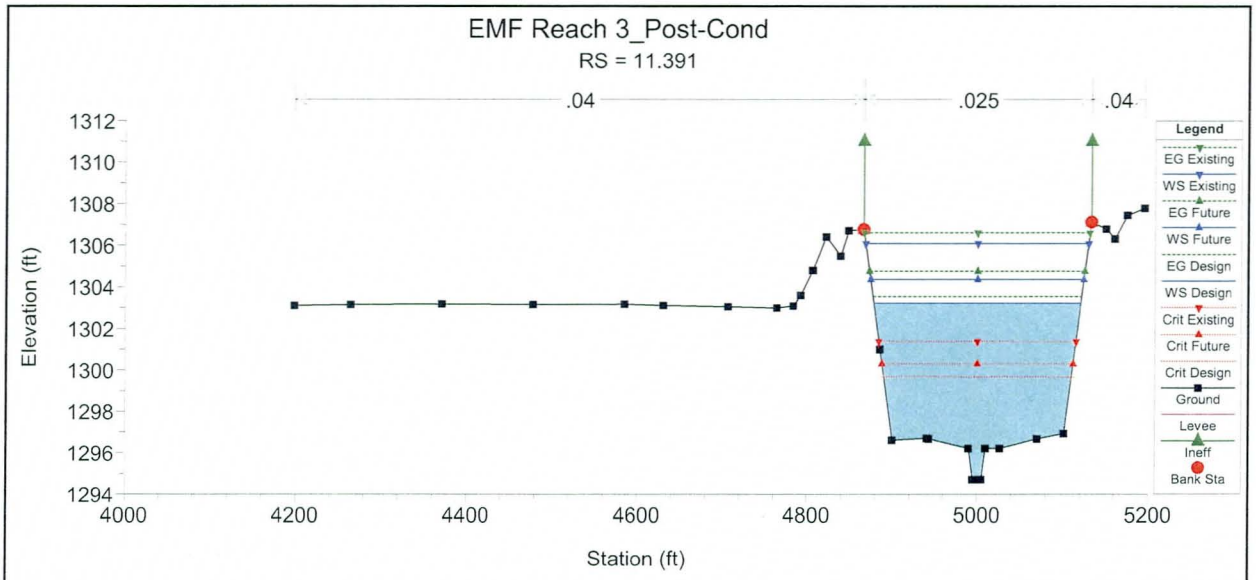
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond
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Elevation (ft)
Station (ft)
Legend
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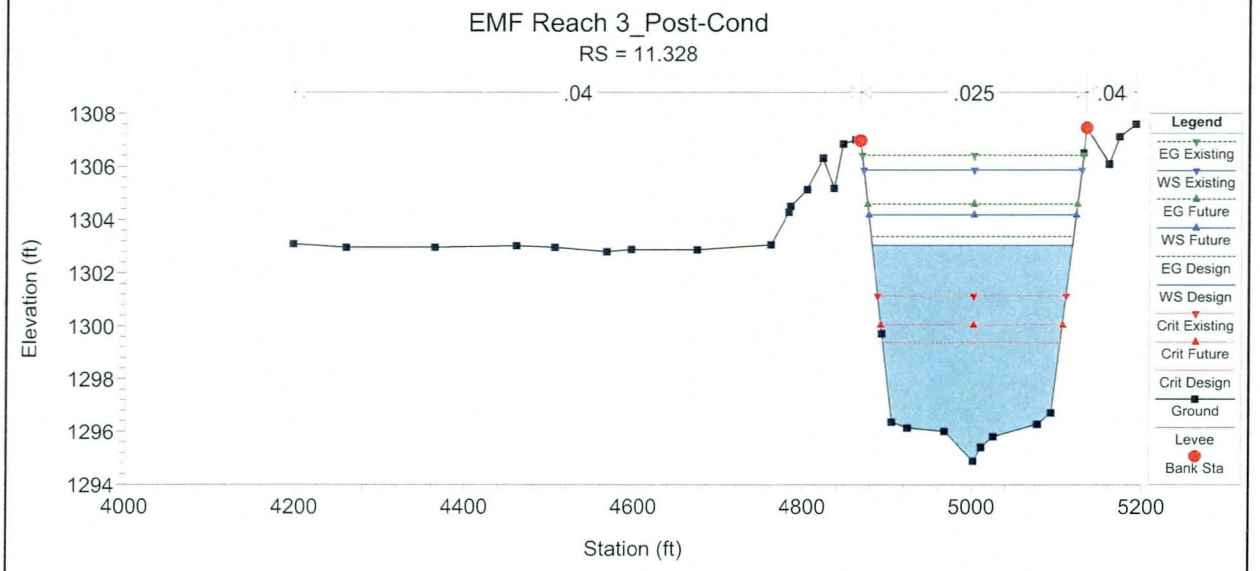
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond
RS = 11.328
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.025
.04
Elevation (ft)
Station (ft)
Legend
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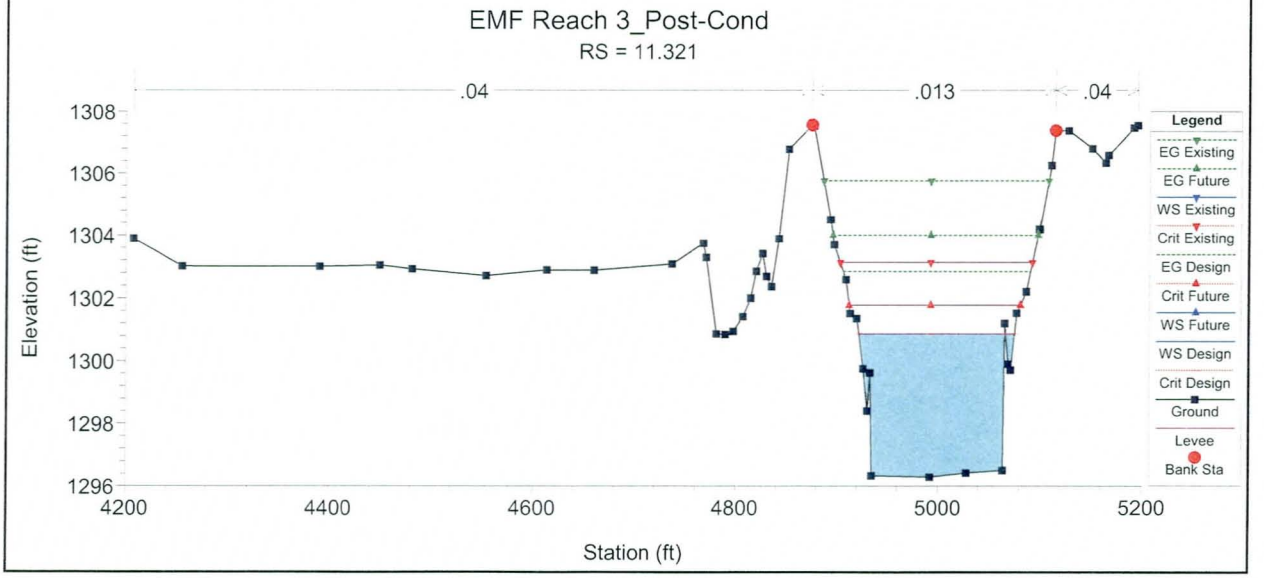
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta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RS = 11.321
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Elevation (ft)
Station (ft)
Legend
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EG Future
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Crit Existing
EG Design
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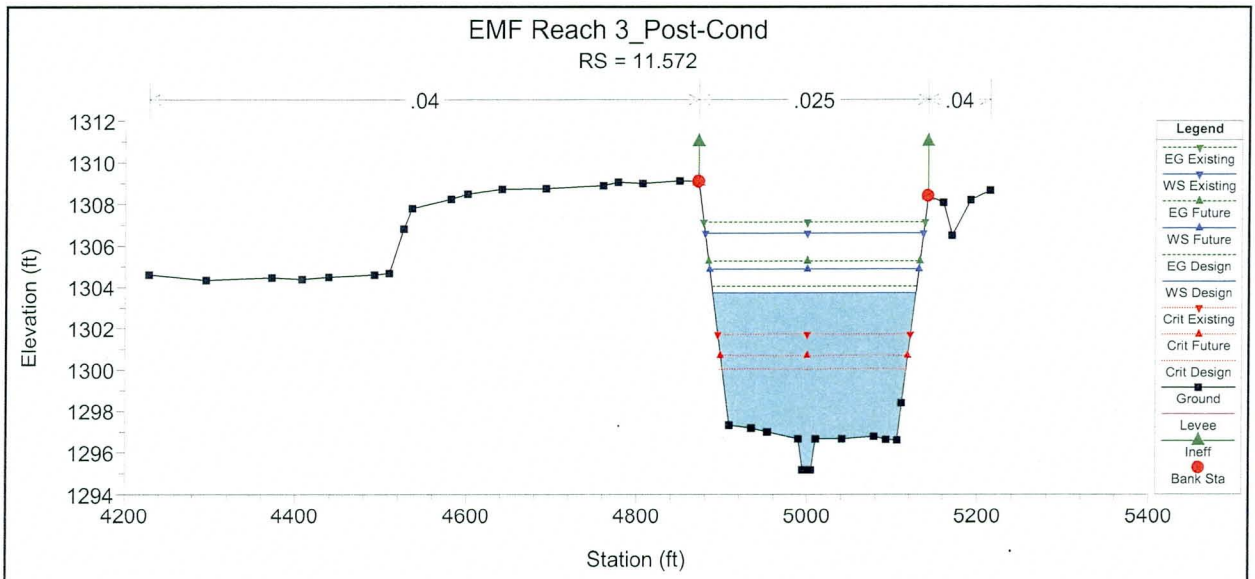
WS Future
WS Design
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Post-Cond
RS = 11.572
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Elevation (ft)
Station (ft)
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Crit Design
Ground
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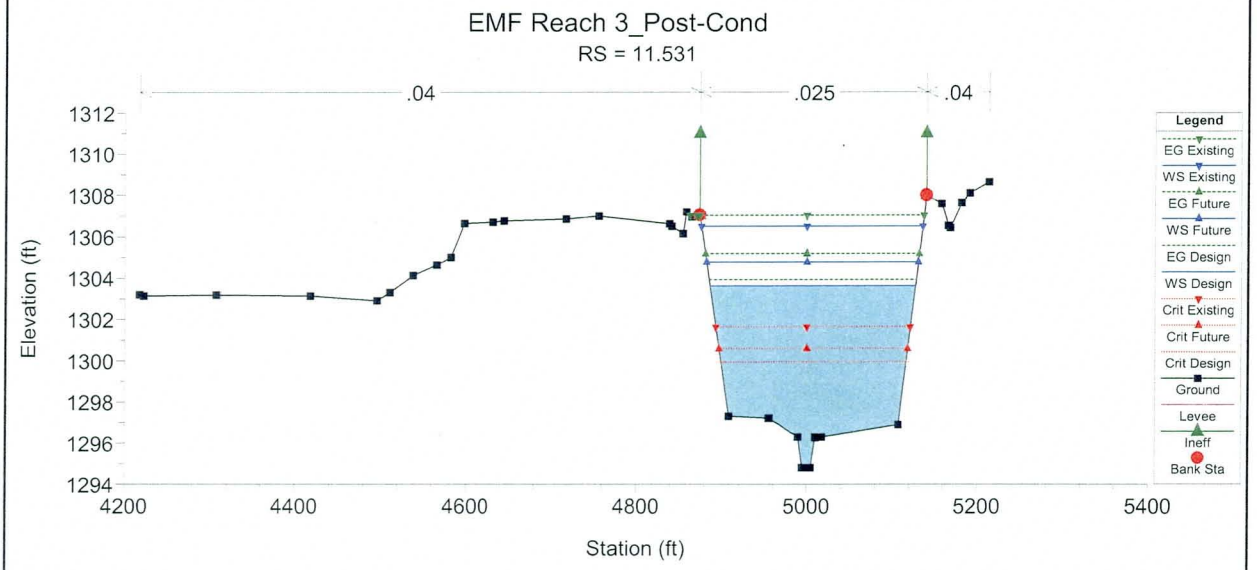
Bank Sta


EMF Reach 3_Post-Cond
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Elevation (ft)
Station (ft)
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EG Future
WS Future
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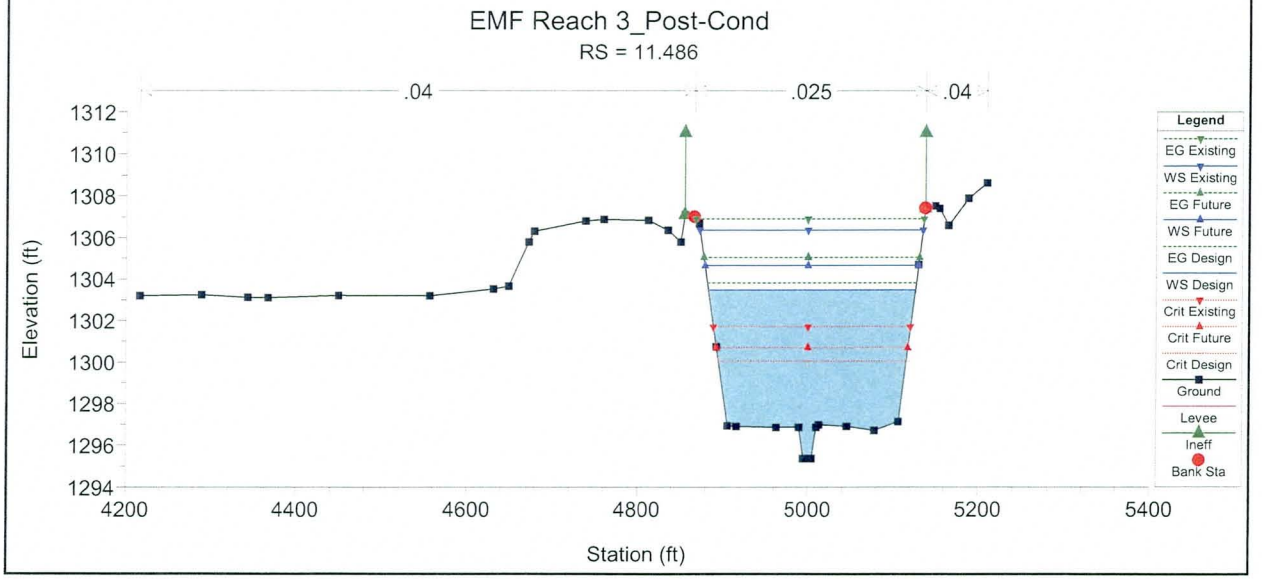
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Elevation (ft)
Station (ft)
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EG Design
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Crit Design
Ground
Levee
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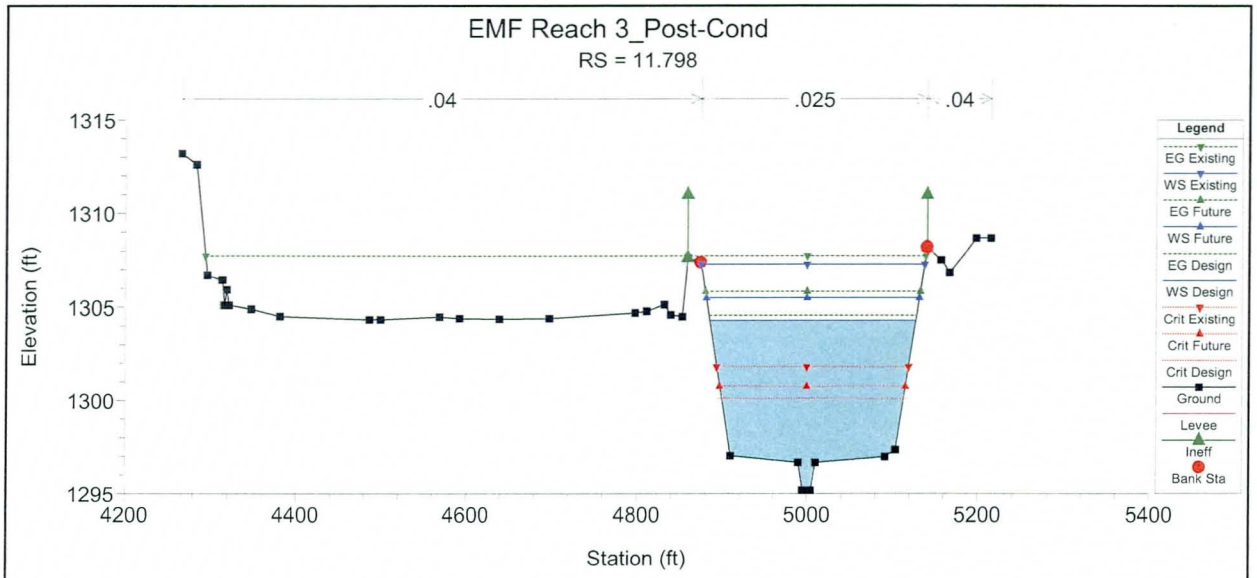
Bank Sta


EMF Reach 3_Post-Cond
RS = 11.798
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Elevation (ft)
Station (ft)
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WS Future
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Crit Existing
Crit Future
Crit Design
Ground
Levee
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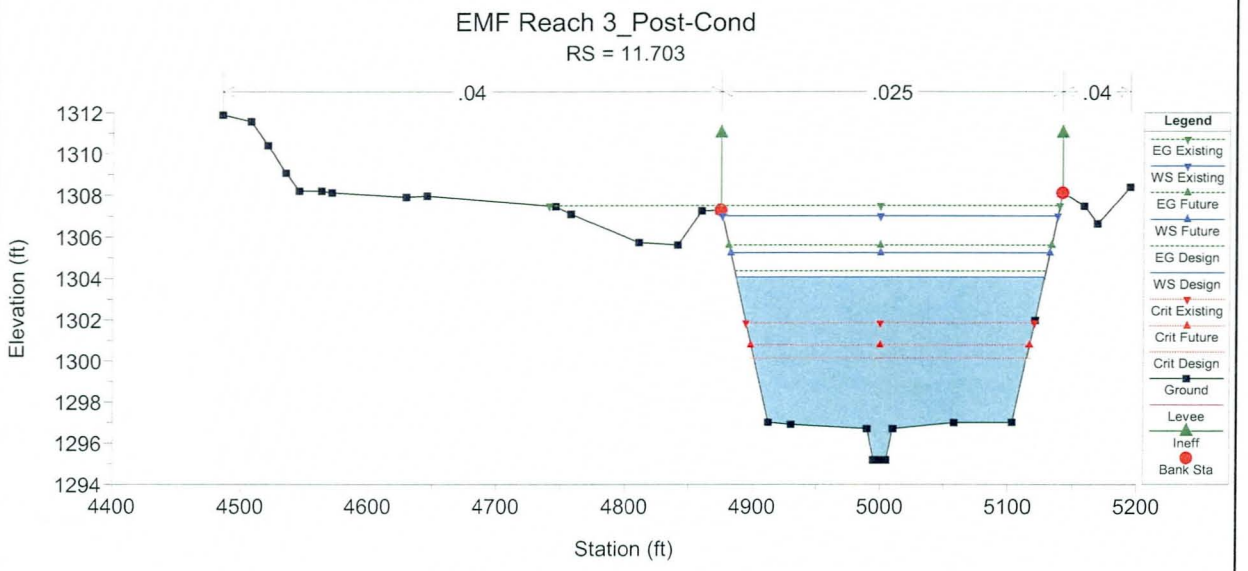
Bank Sta


EMF Reach 3_Post-Cond
RS = 11.703
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Elevation (ft)
Station (ft)
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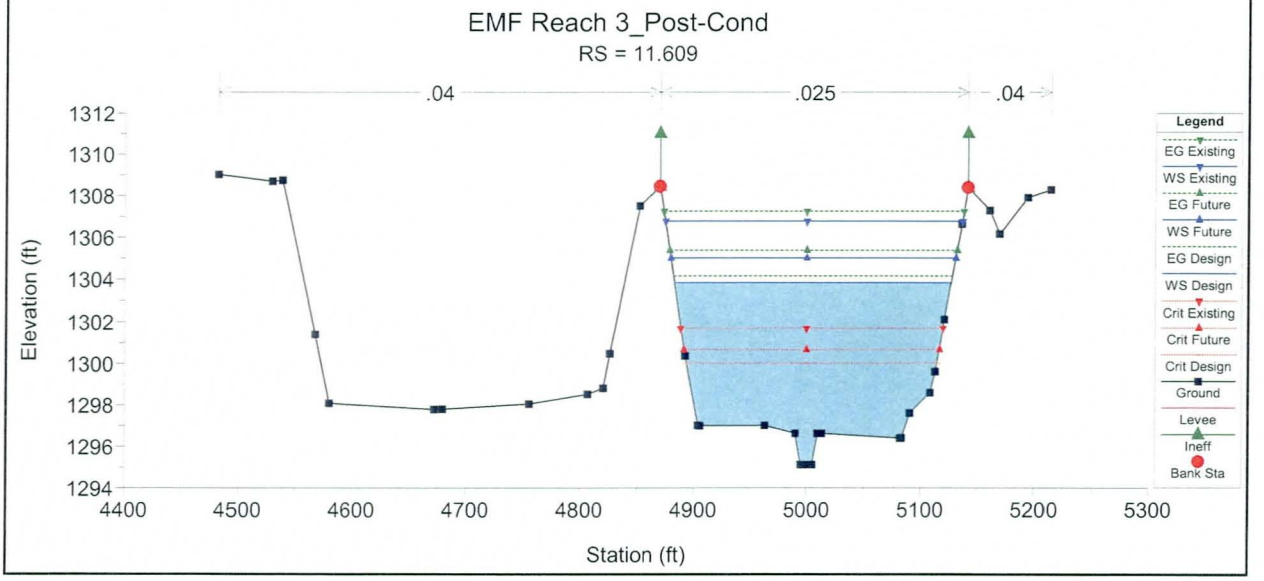
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond
RS = 11.609
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Station (ft)
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WS Future
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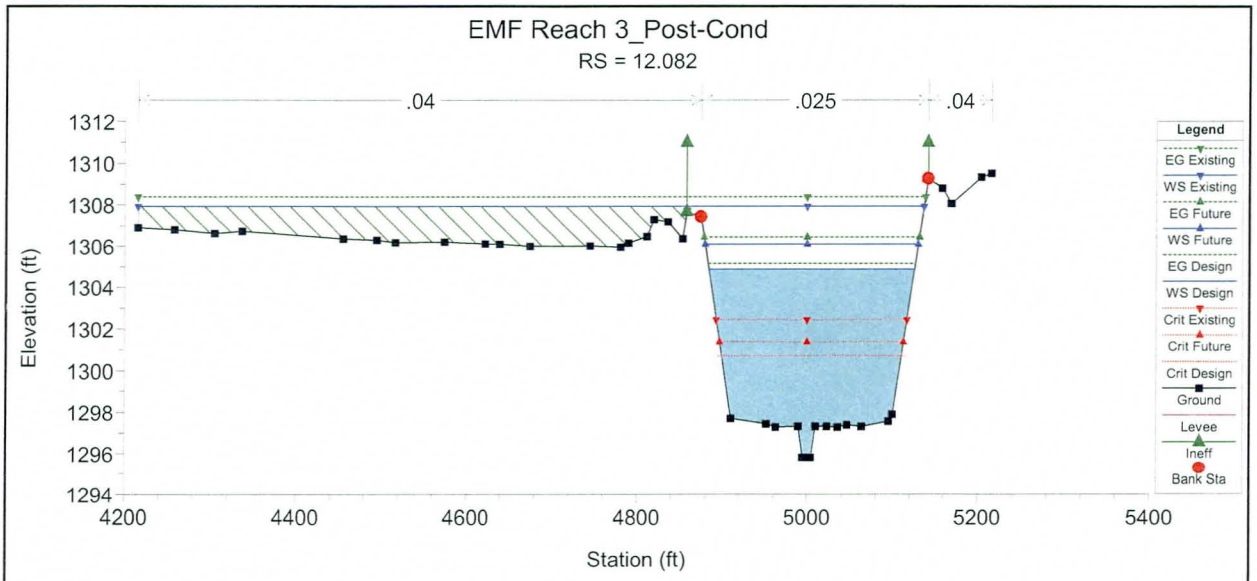
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond
RS = 12.082
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Elevation (ft)
Station (ft)
Legend
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WS Future
EG Design
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Crit Design
Ground
Levee
Ineff
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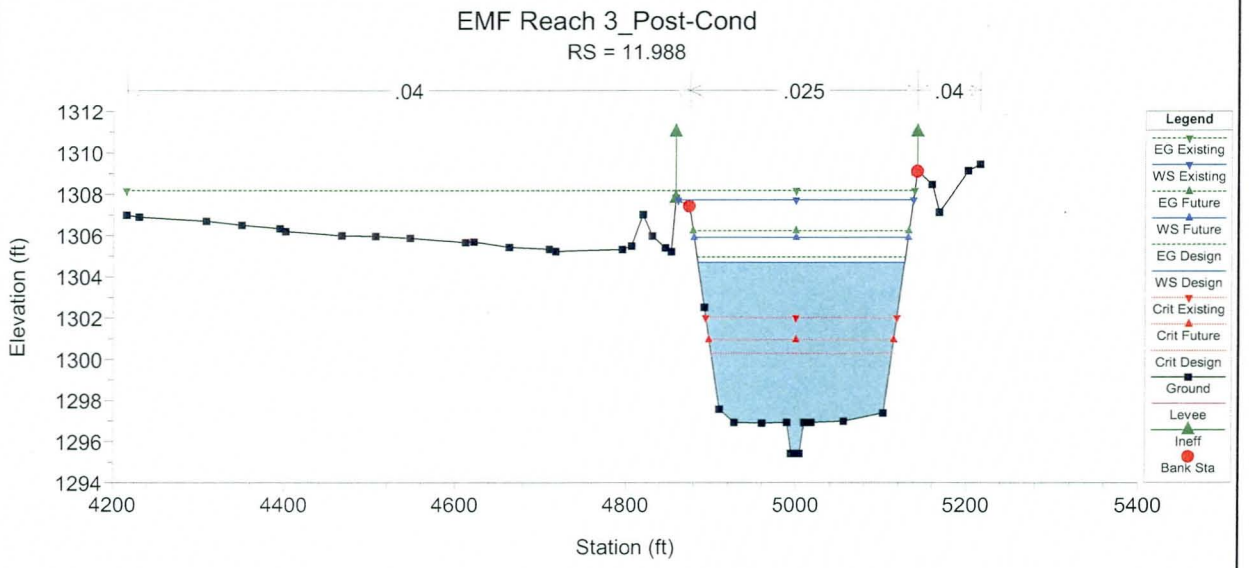
EMF Reach 3_Post-Cond
RS = 11.988
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Station (ft)
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WS Future
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Ground
Levee
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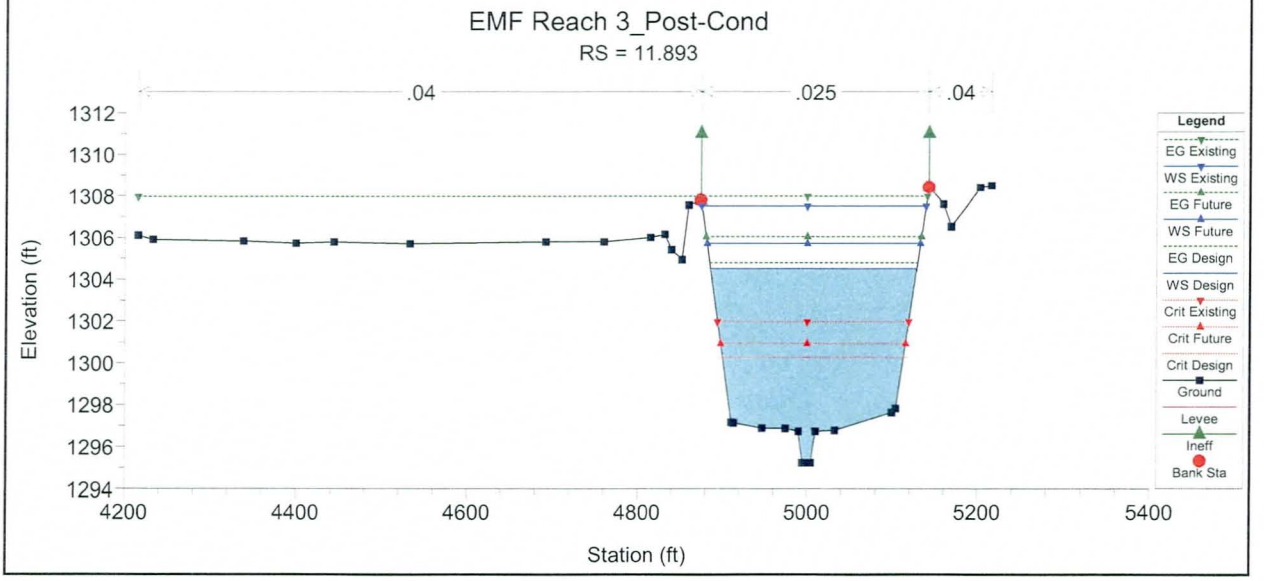
Bank Sta


EMF Reach 3_Post-Cond
RS = 11.893
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Station (ft)
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WS Future
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Ground
Levee
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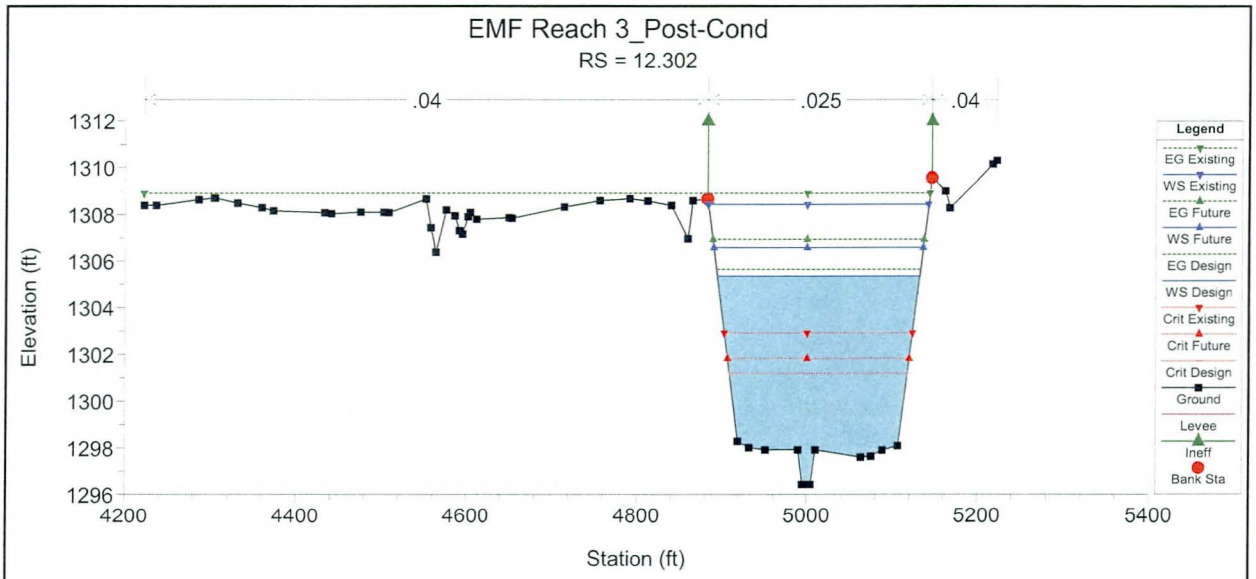
Bank Sta


EMF Reach 3_Post-Cond
RS = 12.302
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Elevation (ft)
Station (ft)
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EG Future
WS Future
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Ground
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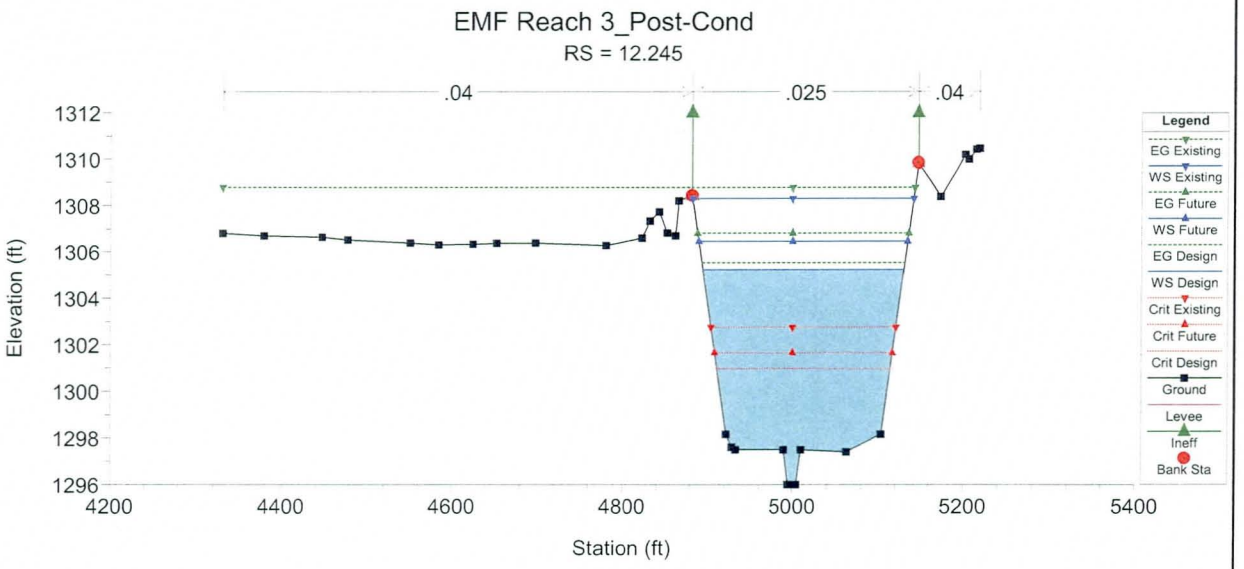
Bank Sta


EMF Reach 3_Post-Cond
RS = 12.245
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Station (ft)
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EG Future
WS Future
EG Design
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Ground
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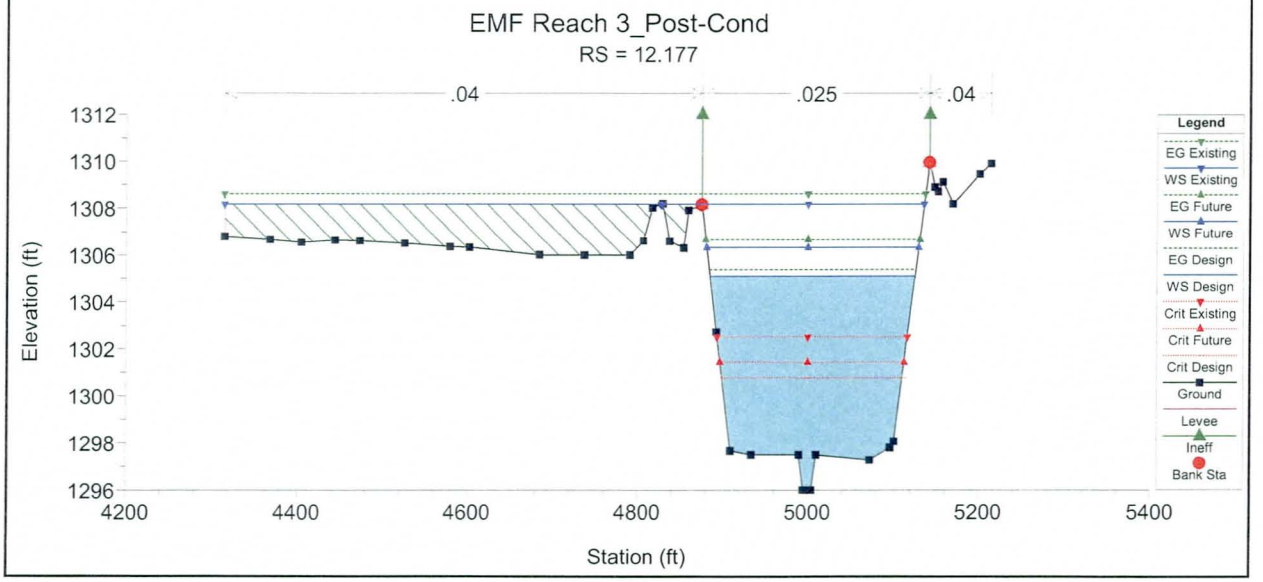
Bank Sta


EMF Reach 3_Post-Cond
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Station (ft)
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WS Future
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Crit Existing
Crit Future
Crit Design
Ground
Levee
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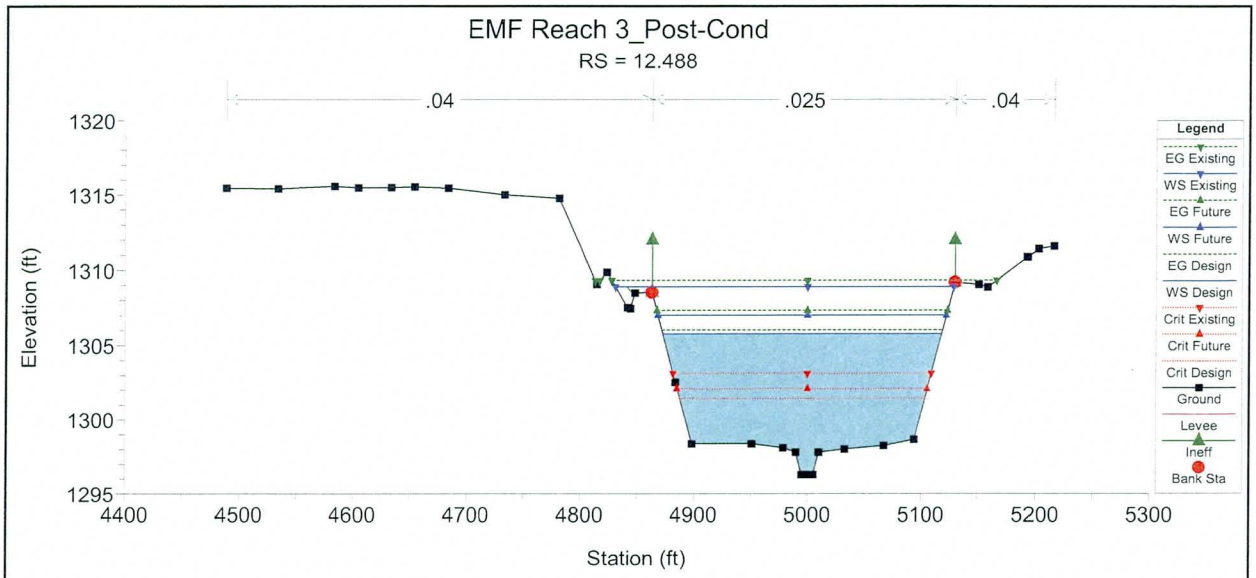
Bank Sta


EMF Reach 3_Post-Cond
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Station (ft)
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Crit Future
Crit Design
Ground
Levee
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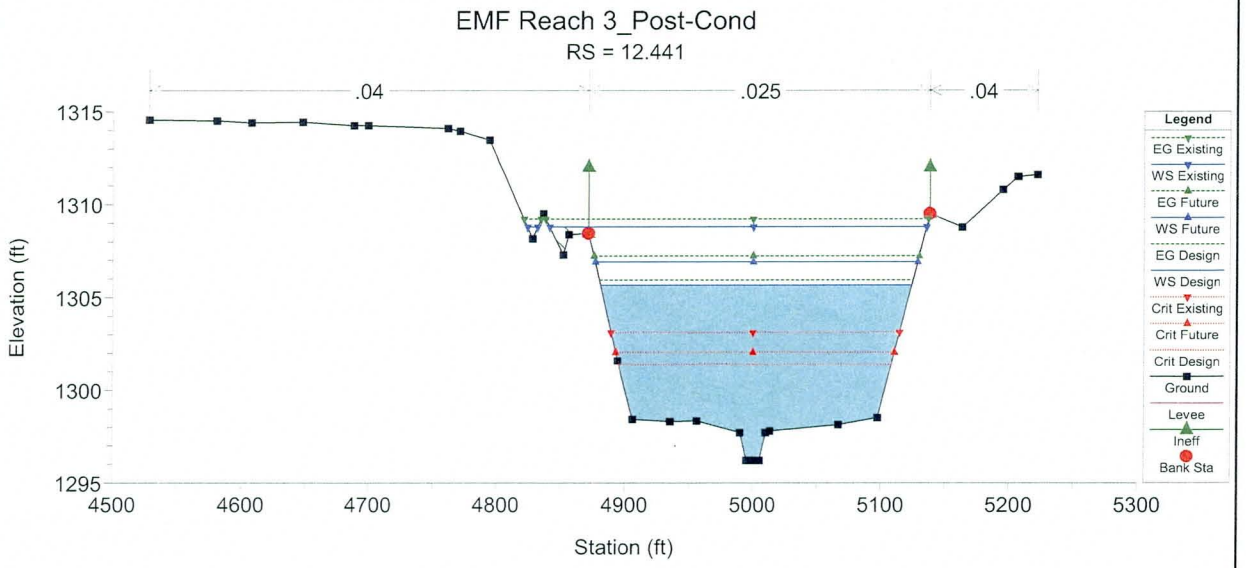
Bank Sta


EMF Reach 3_Post-Cond
RS = 12.441
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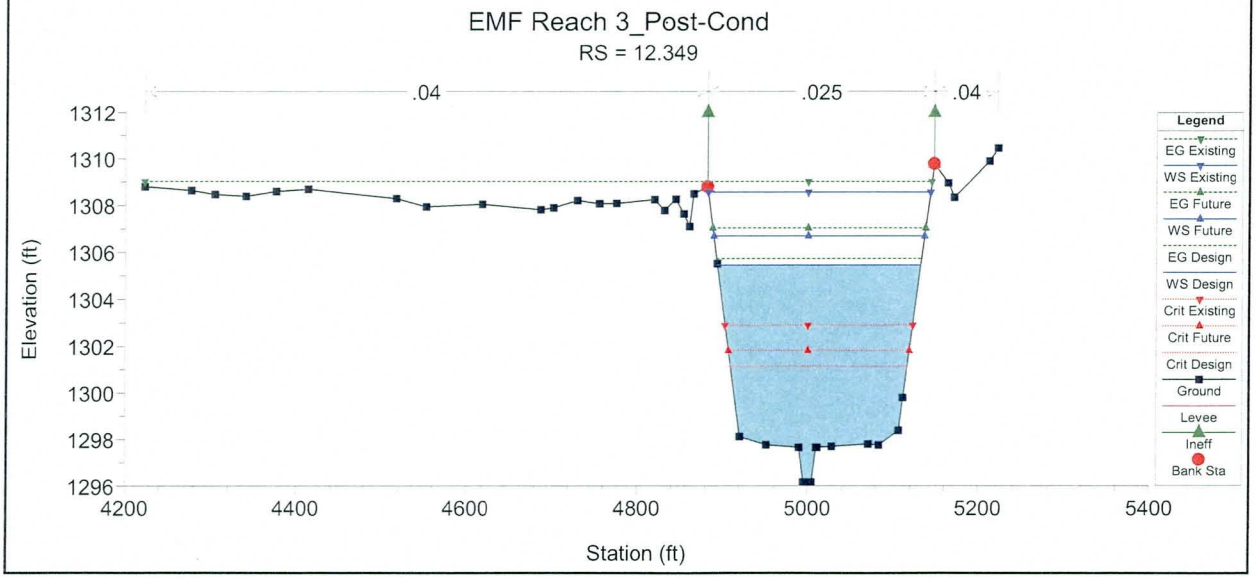
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond
RS = 12.349
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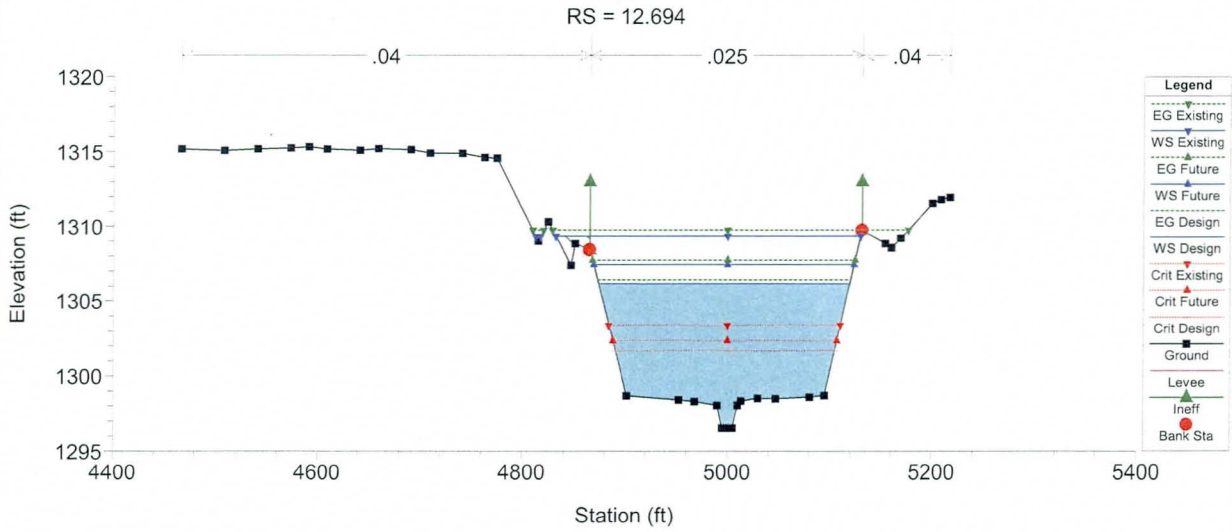
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond
RS = 12.694
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.025
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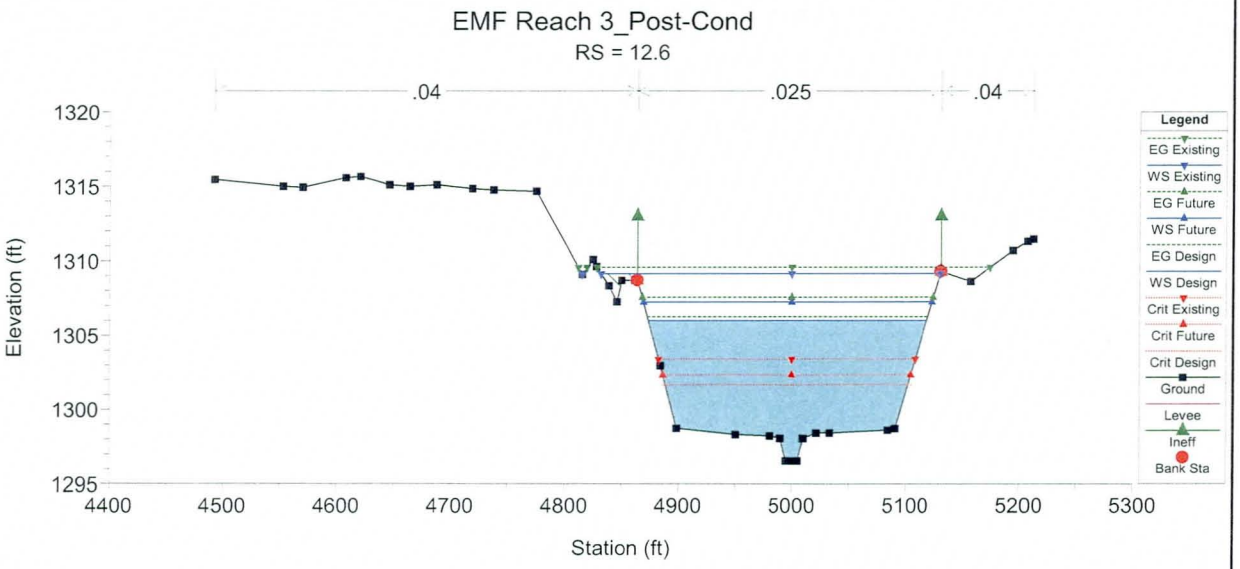
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond
RS = 12.6
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.025
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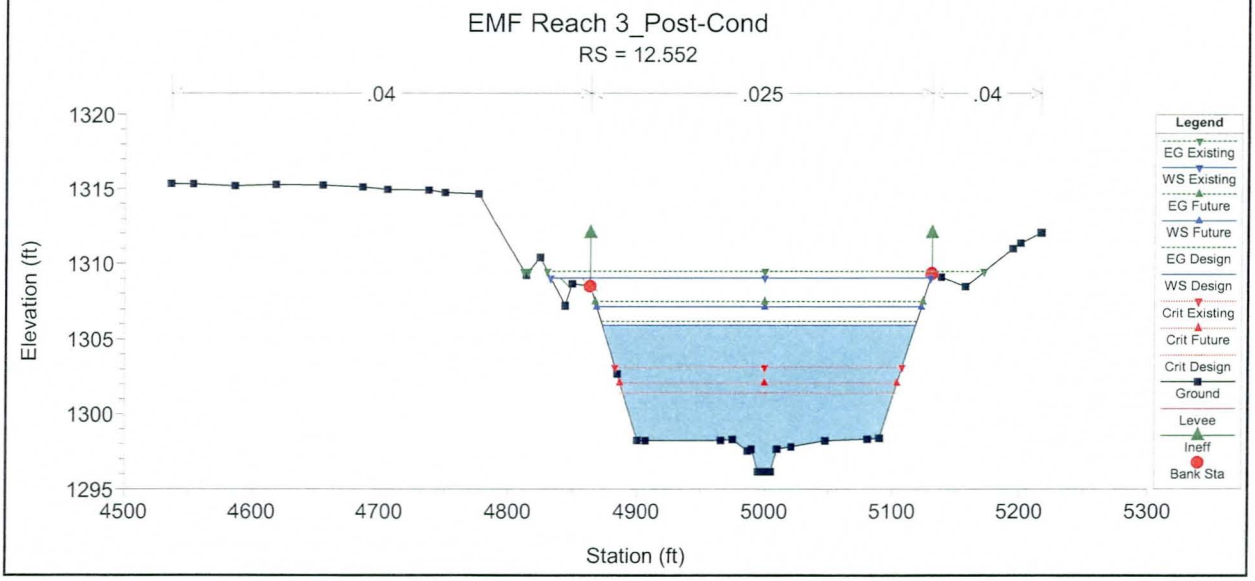
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond
RS = 12.552
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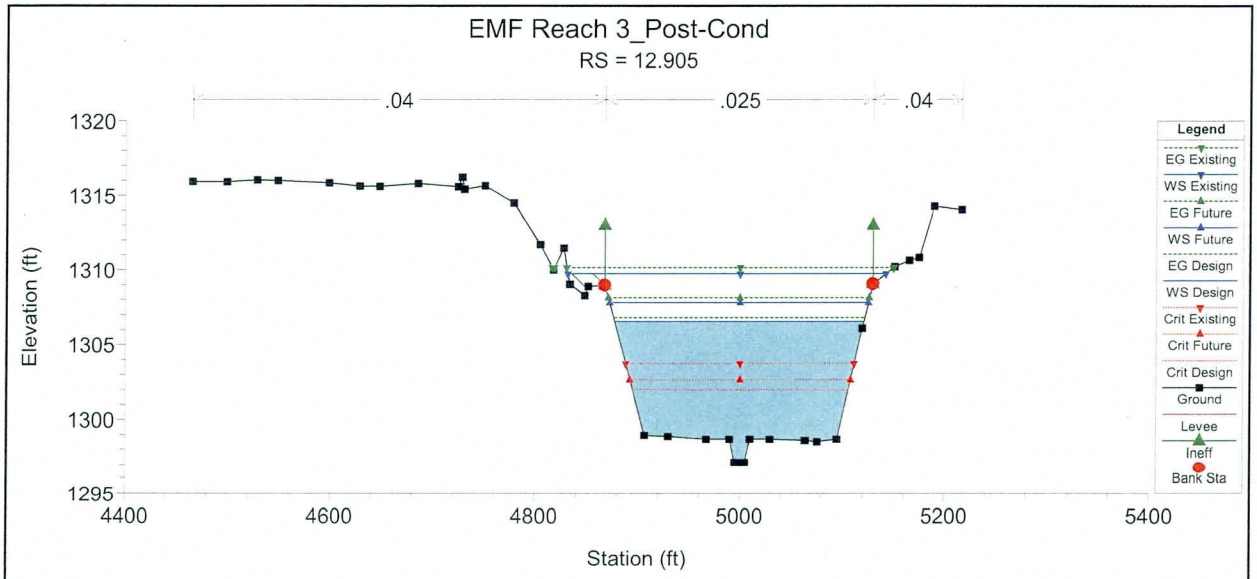
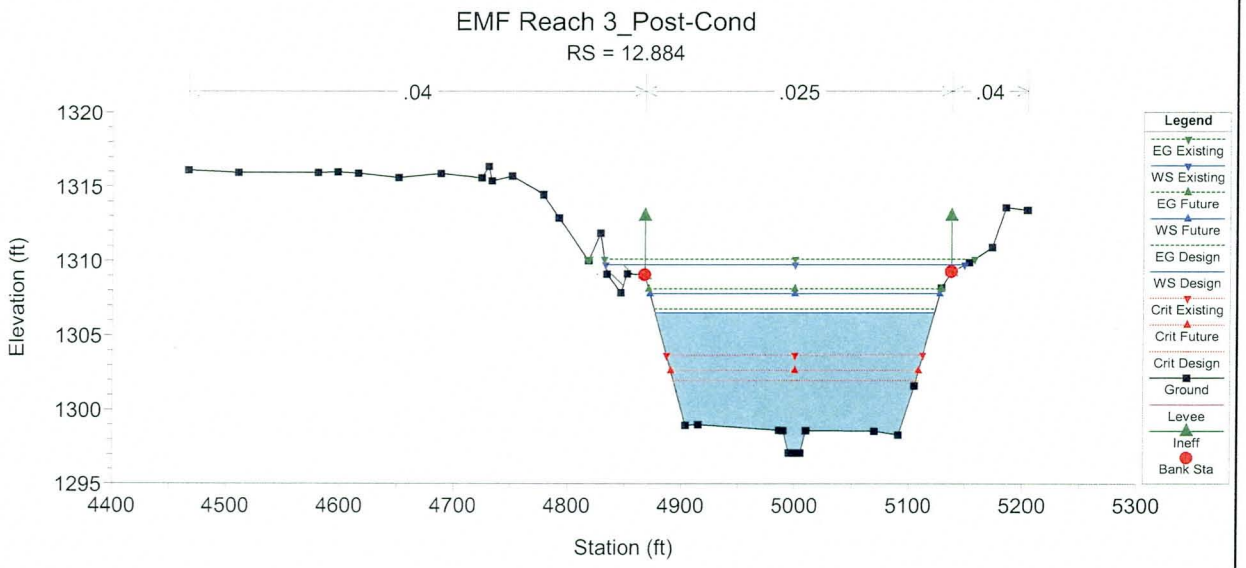
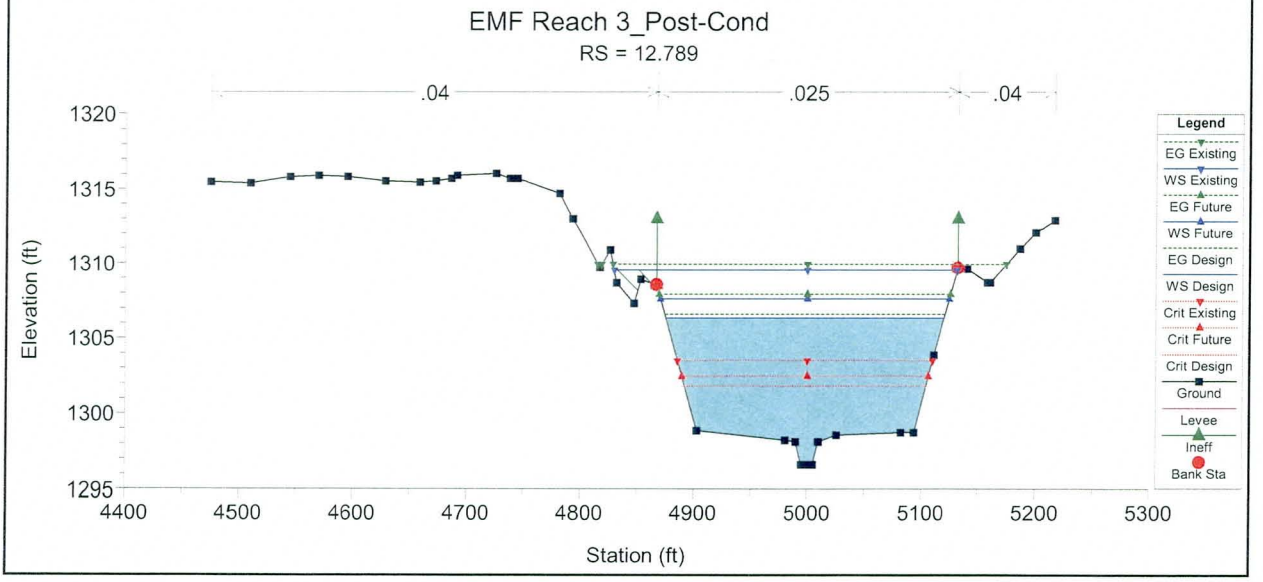
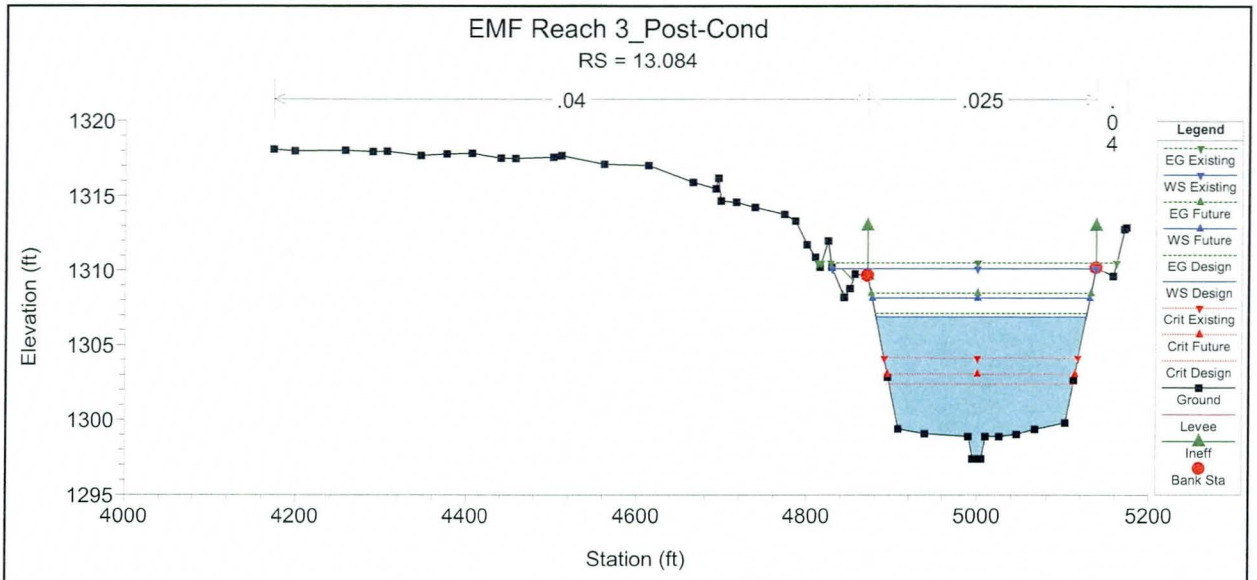
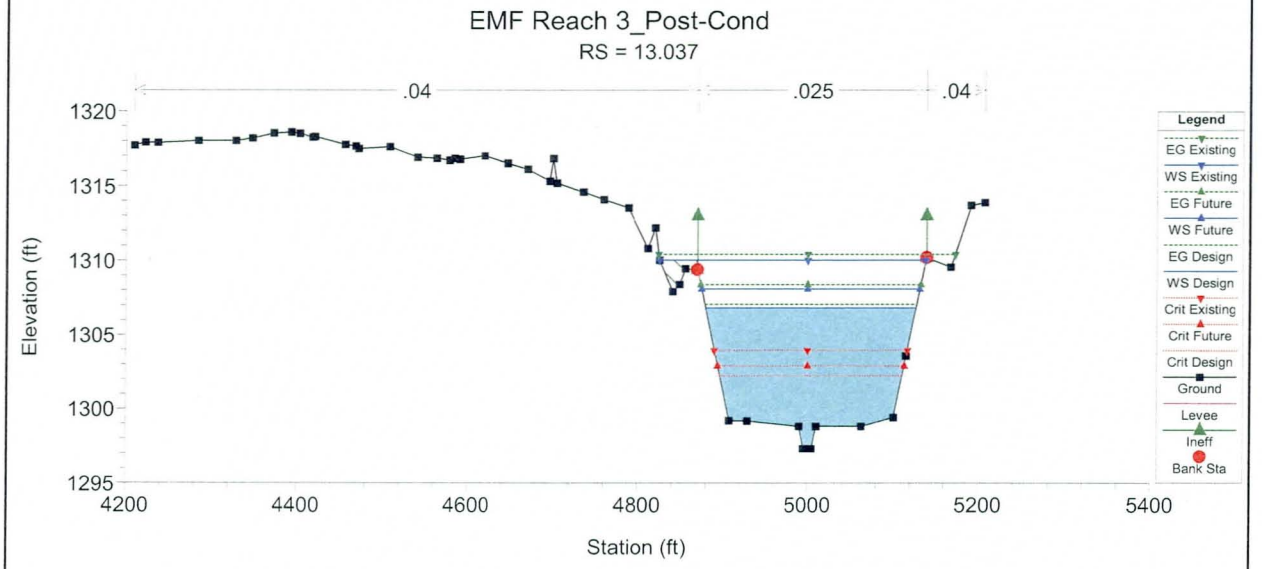
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond
RS = 12.905
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond
RS = 12.884
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond
RS = 12.789
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond
RS = 13.084
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond
RS = 13.037
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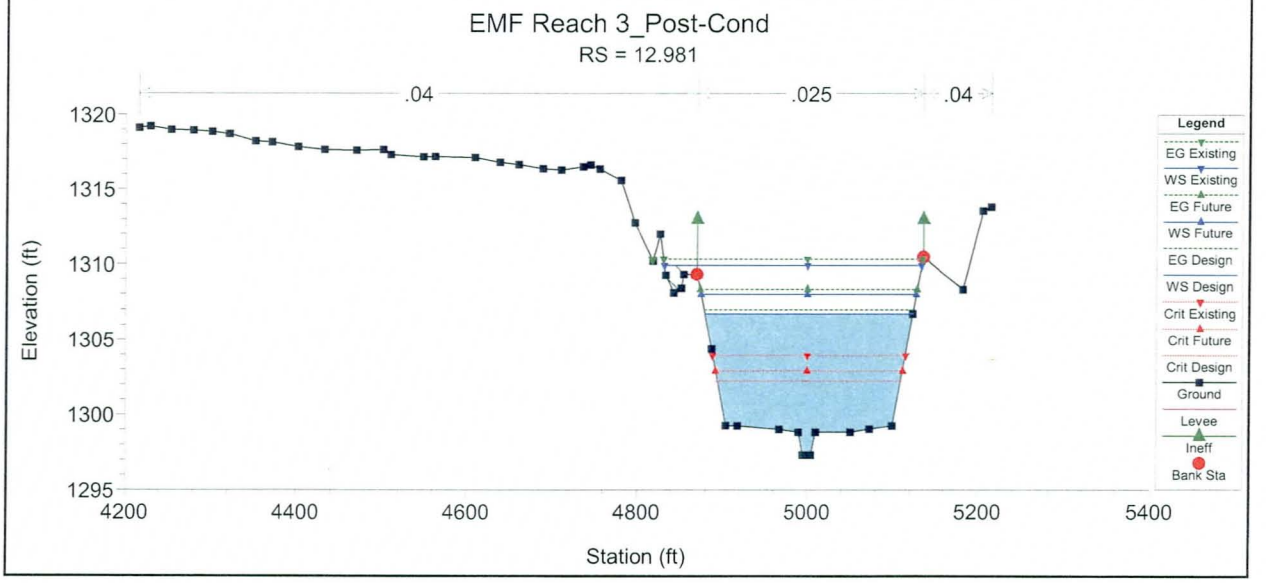
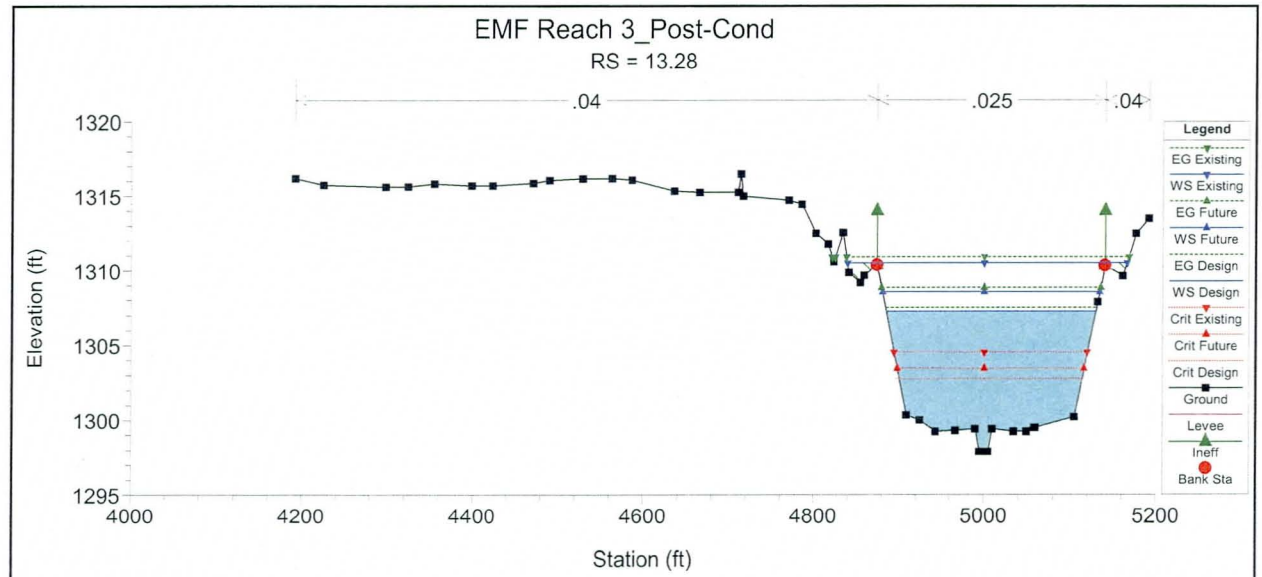
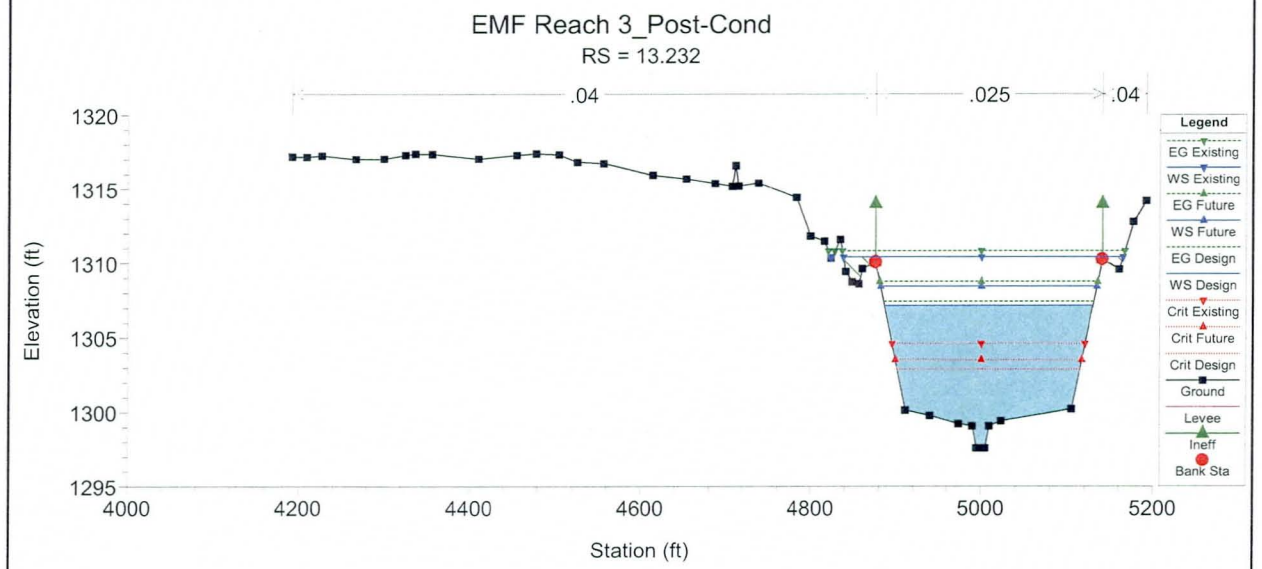
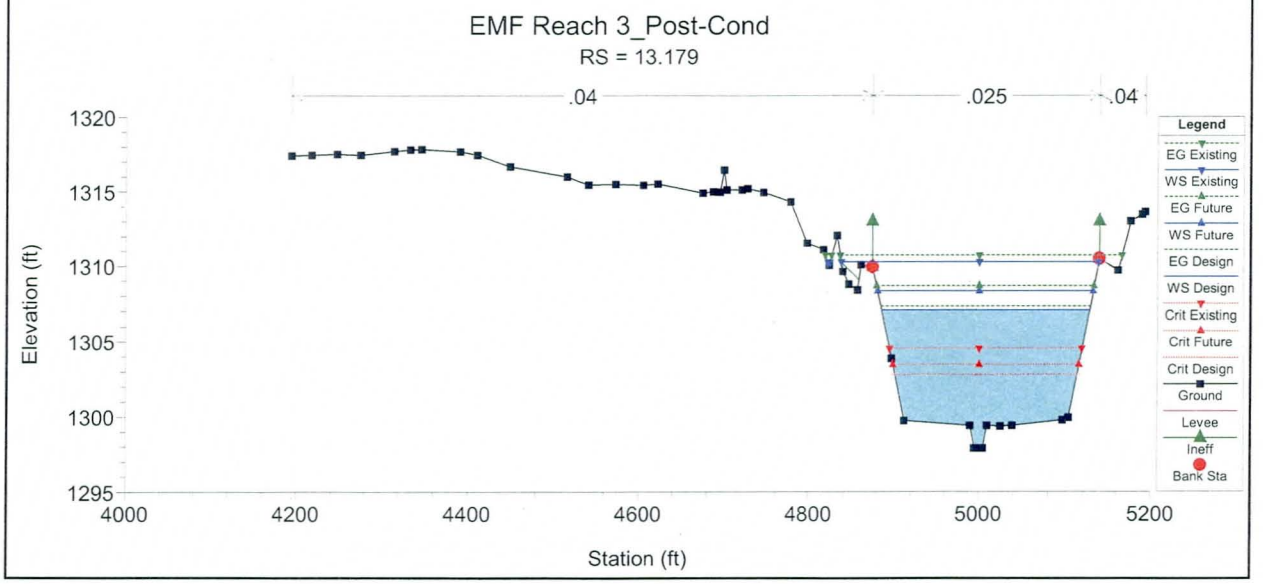
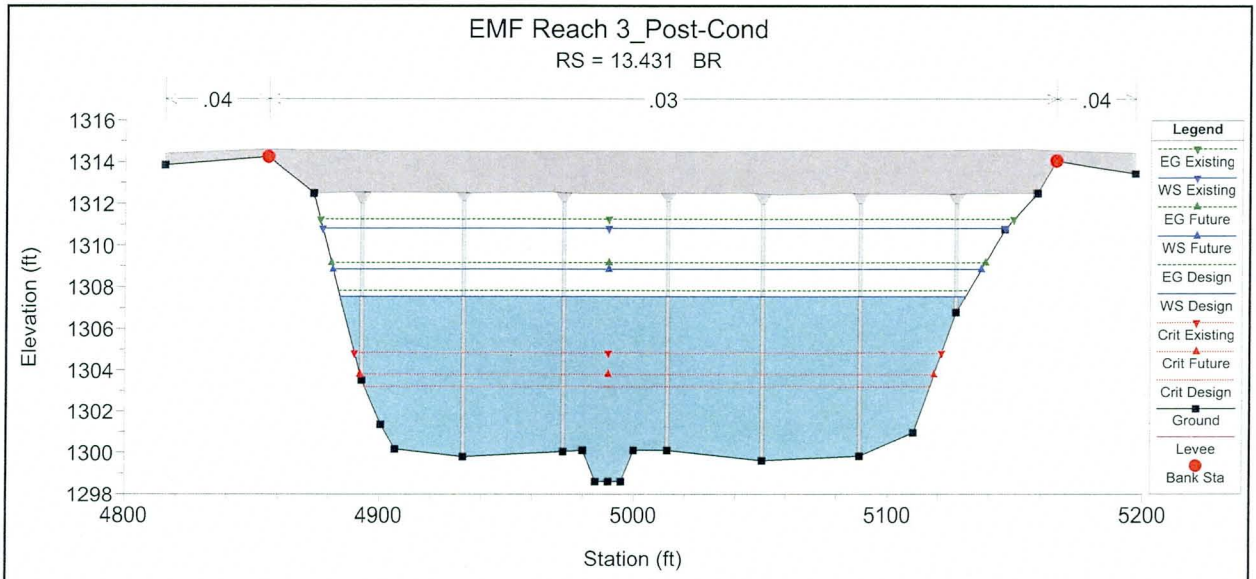
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

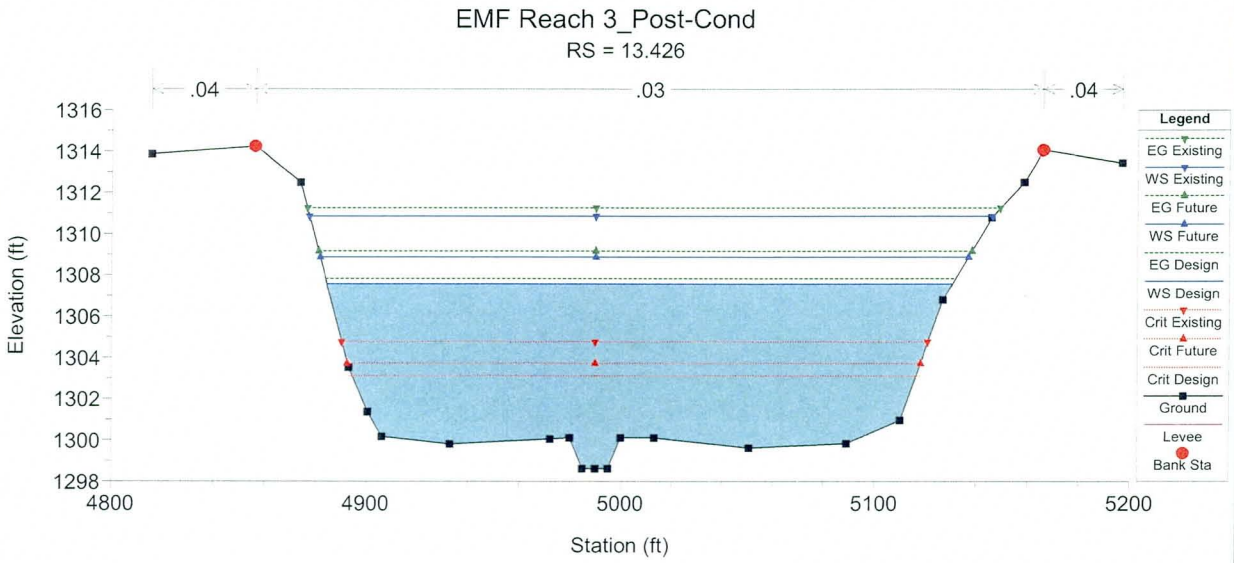

EMF Reach 3_Post-Cond
RS = 12.981
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

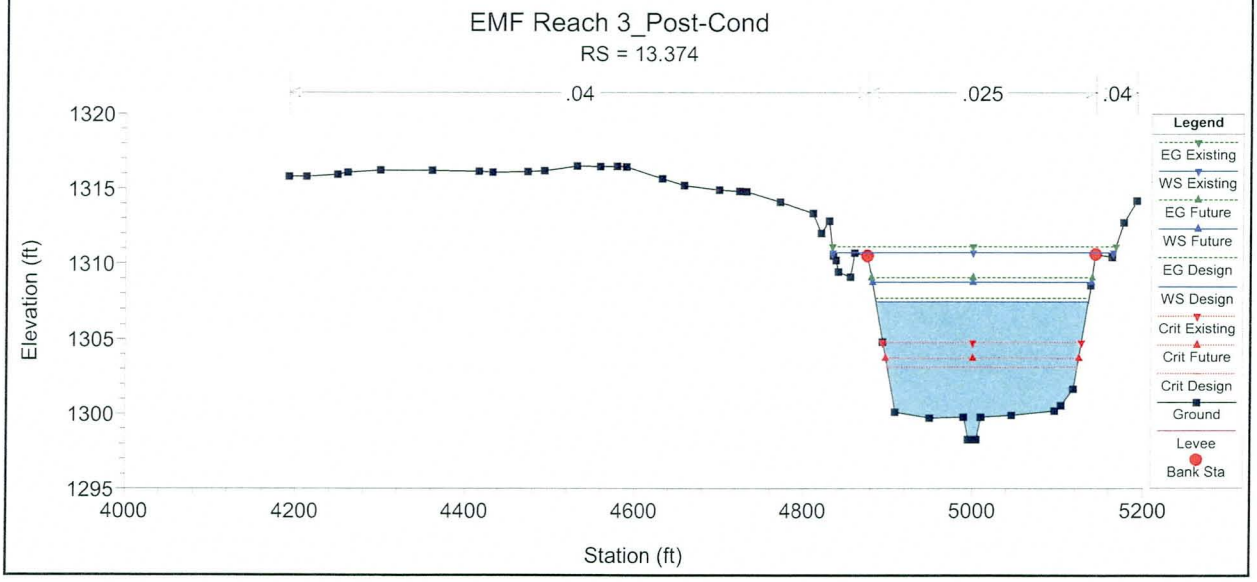

EMF Reach 3_Post-Cond
RS = 13.28
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

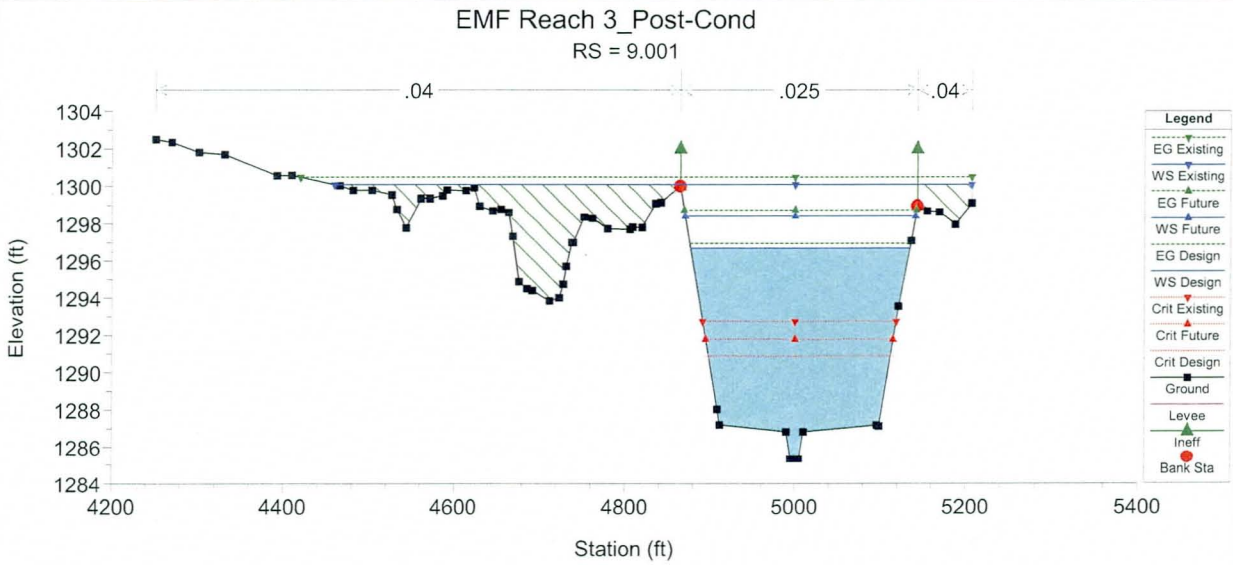

EMF Reach 3_Post-Cond
RS = 13.232
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond
RS = 13.179
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond
RS = 13.431 BR
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Post-Cond
RS = 13.426
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Post-Cond
RS = 13.374
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Post-Cond
RS = 9.001
.04
.025
.04
1304
1302
1300
1298
1296
1294
1292
1290
1288
1286
1284
Elevation (ft)
4200
4400
4600
4800
5000
5200
5400
Station (ft)
Legend
EG Existing
WS Existing
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

Post-Project HEC-RAS Analysis

(NAVD 88)

HEC-RAS Plan: EMF R 3 River: EMF Reach: Reach 3

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 3	9.001	Design	8700.00	1287.13	1298.48	1292.67	1298.73	0.000272	4.02	2164.84	257.60	0.24
Reach 3	9.001	Future	11920.00	1287.13	1300.22	1293.56	1300.54	0.000287	4.54	2624.39	270.48	0.26
Reach 3	9.001	Existing	15770.00	1287.13	1301.88	1294.53	1302.29	0.000306	5.12	3081.16	746.87	0.27
Reach 3	9.001	500-YR	14790.00	1287.13	1301.88	1294.29	1302.24	0.000269	4.80	3081.16	746.87	0.25
Reach 3	9.018	Design	8700.00	1287.41	1298.51	1292.89	1298.76	0.000273	4.00	2174.05	260.97	0.24
Reach 3	9.018	Future	11920.00	1287.41	1300.25	1293.76	1300.57	0.000285	4.52	2638.69	272.43	0.26
Reach 3	9.018	Existing	15770.00	1287.41	1301.91	1294.69	1302.32	0.000300	5.09	3098.72	404.42	0.27
Reach 3	9.018	500-YR	14790.00	1287.41	1301.91	1294.48	1302.26	0.000264	4.77	3097.56	403.67	0.25
Reach 3	9.036	Design	8100.00	1287.99	1298.55	1293.04	1298.78	0.000269	3.89	2079.90	257.85	0.24
Reach 3	9.036	Future	10790.00	1287.99	1300.32	1293.80	1300.60	0.000259	4.24	2546.96	310.82	0.24
Reach 3	9.036	Existing	14630.00	1287.99	1301.98	1294.78	1302.35	0.000282	4.88	3000.57	437.51	0.26
Reach 3	9.036	500-YR	13770.00	1287.99	1301.96	1294.57	1302.29	0.000251	4.60	2996.45	437.31	0.25
Reach 3	9.053	Design	8100.00	1288.29	1298.57	1293.18	1298.81	0.000281	3.96	2045.46	255.48	0.25
Reach 3	9.053	Future	10800.00	1288.29	1300.34	1293.94	1300.62	0.000270	4.31	2507.80	282.50	0.25
Reach 3	9.053	Existing	14660.00	1288.29	1301.99	1294.91	1302.38	0.000290	4.96	2952.70	389.11	0.26
Reach 3	9.053	500-YR	13770.00	1288.29	1301.98	1294.70	1302.32	0.000257	4.67	2948.44	388.98	0.25
Reach 3	9.145	Design	8100.00	1288.58	1298.70	1293.74	1298.97	0.000329	4.16	1946.95	253.91	0.26
Reach 3	9.145	Future	10800.00	1288.58	1300.46	1294.49	1300.77	0.000308	4.49	2404.30	289.88	0.26
Reach 3	9.145	Existing	14660.00	1288.58	1302.13	1295.46	1302.54	0.000341	5.10	2871.90	387.35	0.28
Reach 3	9.145	500-YR	13770.00	1288.58	1302.10	1295.25	1302.46	0.000304	4.81	2862.90	386.23	0.27
Reach 3	9.24	Design	8100.00	1288.79	1298.87	1293.78	1299.13	0.000315	4.10	1976.16	254.97	0.26
Reach 3	9.24	Future	10800.00	1288.79	1300.62	1294.54	1300.92	0.000298	4.44	2432.91	292.10	0.26
Reach 3	9.24	Existing	14660.00	1288.79	1302.30	1295.52	1302.70	0.000315	5.08	2885.50	389.65	0.27
Reach 3	9.24	500-YR	13770.00	1288.79	1302.25	1295.30	1302.60	0.000283	4.79	2871.77	389.56	0.26
Reach 3	9.334	Design	8100.00	1288.29	1299.03	1293.72	1299.28	0.000289	3.98	2035.44	257.33	0.25
Reach 3	9.334	Future	10800.00	1288.29	1300.78	1294.49	1301.07	0.000277	4.33	2494.57	403.36	0.25
Reach 3	9.334	Existing	14660.00	1288.29	1302.47	1295.44	1302.85	0.000293	4.97	2952.67	785.17	0.27
Reach 3	9.334	500-YR	13770.00	1288.29	1302.40	1295.24	1302.74	0.000265	4.69	2933.82	774.53	0.25
Reach 3	9.424	Design	8100.00	1288.86	1299.17	1293.74	1299.41	0.000286	3.98	2033.82	254.91	0.25
Reach 3	9.424	Future	10800.00	1288.86	1300.91	1294.50	1301.20	0.000277	4.34	2487.96	269.51	0.25
Reach 3	9.424	Existing	14660.00	1288.86	1302.61	1295.52	1302.99	0.000294	4.97	2970.10	732.16	0.27
Reach 3	9.424	500-YR	13770.00	1288.86	1302.52	1295.30	1302.87	0.000266	4.70	2946.23	721.73	0.25
Reach 3	9.518	Design	8100.00	1288.38	1299.32	1293.64	1299.55	0.000263	3.88	2089.06	256.27	0.24
Reach 3	9.518	Future	10800.00	1288.38	1301.05	1294.41	1301.33	0.000260	4.24	2545.14	269.55	0.24
Reach 3	9.518	Existing	14660.00	1288.38	1302.77	1295.39	1303.13	0.000276	4.87	3009.41	825.50	0.26
Reach 3	9.518	500-YR	13770.00	1288.38	1302.67	1295.20	1303.00	0.000251	4.62	2982.38	811.86	0.25
Reach 3	9.613	Design	8100.00	1288.49	1299.46	1293.68	1299.68	0.000245	3.76	2152.09	264.44	0.23
Reach 3	9.613	Future	10800.00	1288.49	1301.20	1294.45	1301.46	0.000236	4.12	2668.10	315.75	0.23
Reach 3	9.613	Existing	14660.00	1288.49	1302.93	1295.44	1303.27	0.000250	4.70	3219.25	854.79	0.25
Reach 3	9.613	500-YR	13770.00	1288.49	1302.81	1295.22	1303.12	0.000228	4.46	3182.38	829.97	0.23
Reach 3	9.708	Design	8100.00	1288.64	1299.58	1293.84	1299.81	0.000256	3.85	2102.71	255.14	0.24
Reach 3	9.708	Future	10800.00	1288.64	1301.31	1294.63	1301.59	0.000254	4.23	2554.70	267.73	0.24
Reach 3	9.708	Existing	14660.00	1288.64	1303.04	1295.59	1303.41	0.000272	4.85	3023.74	857.80	0.26
Reach 3	9.708	500-YR	13770.00	1288.64	1302.92	1295.37	1303.25	0.000249	4.61	2989.80	852.42	0.24
Reach 3	9.802	Design	8100.00	1289.00	1299.70	1294.41	1299.95	0.000301	4.04	2006.30	256.24	0.25
Reach 3	9.802	Future	10800.00	1289.00	1301.43	1295.20	1301.73	0.000290	4.39	2460.17	418.85	0.26
Reach 3	9.802	Existing	14660.00	1289.00	1303.17	1296.19	1303.56	0.000302	5.00	2932.75	862.05	0.27
Reach 3	9.802	500-YR	13770.00	1289.00	1303.03	1295.97	1303.38	0.000278	4.76	2895.70	850.09	0.26
Reach 3	9.844	Design	8100.00	1288.95	1299.78	1294.25	1300.02	0.000267	3.88	2086.57	258.49	0.24
Reach 3	9.844	Future	10800.00	1288.95	1301.51	1295.03	1301.79	0.000263	4.24	2544.35	289.26	0.24
Reach 3	9.844	Existing	14660.00	1288.95	1303.26	1296.00	1303.62	0.000276	4.85	3022.38	860.55	0.26
Reach 3	9.844	500-YR	13770.00	1288.95	1303.11	1295.77	1303.44	0.000254	4.62	2983.01	833.28	0.25
Reach 3	9.849	Design	8100.00	1288.84	1299.75	1294.45	1300.07	0.000357	4.54	1783.95	208.75	0.27
Reach 3	9.849	Future	10800.00	1288.84	1301.46	1295.28	1301.85	0.000360	5.03	2146.84	215.28	0.28
Reach 3	9.849	Existing	14660.00	1288.84	1303.19	1296.35	1303.71	0.000398	5.81	2521.56	270.04	0.30
Reach 3	9.849	500-YR	13770.00	1288.84	1303.05	1296.12	1303.52	0.000365	5.53	2491.88	260.85	0.29
Reach 3	9.854	Design	8100.00	1288.81	1299.88	1294.24	1300.10	0.000258	3.85	2105.52	257.54	0.24
Reach 3	9.854	Future	10800.00	1288.81	1301.62	1295.00	1301.90	0.000253	4.21	2566.37	269.88	0.24
Reach 3	9.854	Existing	14660.00	1288.81	1303.41	1295.96	1303.77	0.000266	4.80	3053.68	867.85	0.25
Reach 3	9.854	500-YR	13770.00	1288.81	1303.25	1295.76	1303.58	0.000246	4.57	3010.02	849.65	0.24
Reach 3	9.897	Design	8100.00	1288.82	1299.94	1294.20	1300.16	0.000254	3.82	2119.14	258.08	0.24

HEC-RAS Plan: EMF R 3 River: EMF Reach: Reach 3 (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 3	9.897	Future	10800.00	1288.82	1301.68	1294.97	1301.96	0.000249	4.18	2582.61	280.81	0.24
Reach 3	9.897	Existing	14660.00	1288.82	1303.48	1295.97	1303.83	0.000258	4.77	3092.41	808.19	0.25
Reach 3	9.897	500-YR	13770.00	1288.82	1303.31	1295.74	1303.63	0.000239	4.55	3045.35	787.15	0.24
Reach 3	9.944	Design	8100.00	1288.84	1300.00	1294.38	1300.23	0.000264	3.88	2085.42	255.17	0.24
Reach 3	9.944	Future	10800.00	1288.84	1301.74	1295.14	1302.02	0.000258	4.25	2541.66	275.26	0.24
Reach 3	9.944	Existing	14660.00	1288.84	1303.53	1296.12	1303.90	0.000268	4.84	3048.30	842.79	0.25
Reach 3	9.944	500-YR	13770.00	1288.84	1303.37	1295.91	1303.70	0.000249	4.62	3000.27	815.21	0.24
Reach 3	10.039	Design	8100.00	1289.67	1300.13	1294.62	1300.37	0.000274	3.91	2069.25	257.76	0.24
Reach 3	10.039	Future	10800.00	1289.67	1301.87	1295.40	1302.15	0.000267	4.27	2529.57	270.72	0.25
Reach 3	10.039	Existing	14660.00	1289.67	1303.72	1296.38	1304.03	0.000243	4.58	3733.75	841.94	0.24
Reach 3	10.039	500-YR	13770.00	1289.67	1303.53	1296.15	1303.82	0.000229	4.40	3629.52	838.17	0.23
Reach 3	10.134	Design	8100.00	1289.96	1300.27	1295.04	1300.51	0.000289	3.95	2048.51	261.47	0.25
Reach 3	10.134	Future	10800.00	1289.96	1302.00	1295.77	1302.29	0.000276	4.30	2513.08	273.19	0.25
Reach 3	10.134	Existing	14660.00	1289.96	1303.83	1296.71	1304.16	0.000263	4.69	3436.11	855.62	0.25
Reach 3	10.134	500-YR	13770.00	1289.96	1303.64	1296.53	1303.94	0.000248	4.50	3350.01	855.62	0.24
Reach 3	10.171	Design	8100.00	1289.29	1300.33	1294.61	1300.56	0.000257	3.86	2099.61	254.62	0.24
Reach 3	10.171	Future	10800.00	1289.29	1302.07	1295.39	1302.34	0.000252	4.22	2612.07	688.55	0.24
Reach 3	10.171	Existing	14660.00	1289.29	1303.88	1296.38	1304.22	0.000261	4.75	3234.86	880.40	0.25
Reach 3	10.171	500-YR	13770.00	1289.29	1303.68	1296.17	1304.00	0.000245	4.55	3166.87	879.81	0.24
Reach 3	10.195	Design	8100.00	1289.20	1300.38	1294.66	1300.60	0.000363	3.83	2113.83	255.21	0.23
Reach 3	10.195	Future	10790.00	1289.20	1302.11	1295.43	1302.38	0.000359	4.21	2565.86	266.71	0.24
Reach 3	10.195	Existing	14650.00	1289.20	1303.91	1296.42	1304.27	0.000392	4.79	3058.05	278.91	0.25
Reach 3	10.195	500-YR	13770.00	1289.20	1303.71	1296.19	1304.04	0.000365	4.59	3003.03	277.48	0.25
Reach 3	10.207		Bridge									
Reach 3	10.218	Design	8100.00	1289.13	1300.48	1294.31	1300.68	0.000303	3.61	2243.67	258.73	0.22
Reach 3	10.218	Future	10790.00	1289.13	1302.22	1295.07	1302.46	0.000306	3.99	2702.78	269.61	0.22
Reach 3	10.218	Existing	14650.00	1289.13	1304.14	1296.04	1304.46	0.000331	4.53	3235.30	282.75	0.24
Reach 3	10.218	500-YR	13770.00	1289.13	1303.89	1295.83	1304.19	0.000312	4.35	3163.88	280.87	0.23
Reach 3	10.252	Design	8100.00	1289.83	1300.51	1294.68	1300.74	0.000246	3.81	2127.07	254.26	0.23
Reach 3	10.252	Future	10790.00	1289.83	1302.25	1295.45	1302.52	0.000244	4.18	2579.10	266.16	0.24
Reach 3	10.252	Existing	14650.00	1289.83	1304.19	1296.45	1304.52	0.000241	4.64	3387.39	478.86	0.24
Reach 3	10.252	500-YR	13770.00	1289.83	1303.93	1296.22	1304.24	0.000231	4.47	3279.10	470.48	0.24
Reach 3	10.346	Design	8100.00	1289.46	1300.66	1294.47	1300.85	0.000206	3.56	2276.82	264.26	0.21
Reach 3	10.346	Future	10790.00	1289.46	1302.40	1295.20	1302.64	0.000209	3.93	2747.80	394.31	0.22
Reach 3	10.346	Existing	14650.00	1289.46	1304.32	1296.19	1304.63	0.000215	4.46	3286.17	477.53	0.23
Reach 3	10.346	500-YR	13770.00	1289.46	1304.06	1295.97	1304.35	0.000204	4.29	3213.21	455.98	0.22
Reach 3	10.441	Design	8100.00	1289.57	1300.75	1294.75	1300.97	0.000228	3.70	2191.16	259.32	0.22
Reach 3	10.441	Future	10790.00	1289.57	1302.50	1295.53	1302.75	0.000226	4.07	2657.20	402.38	0.23
Reach 3	10.441	Existing	14650.00	1289.57	1304.42	1296.51	1304.75	0.000230	4.61	3203.89	579.15	0.24
Reach 3	10.441	500-YR	13770.00	1289.57	1304.16	1296.30	1304.46	0.000219	4.43	3128.58	523.47	0.23
Reach 3	10.518	Design	8100.00	1290.44	1300.84	1295.40	1301.08	0.000276	3.93	2058.61	255.96	0.24
Reach 3	10.518	Future	10470.00	1290.44	1302.58	1296.08	1302.85	0.000251	4.16	2516.03	267.68	0.24
Reach 3	10.518	Existing	14320.00	1290.44	1304.51	1297.05	1304.85	0.000257	4.71	3038.85	679.41	0.25
Reach 3	10.518	500-YR	13770.00	1290.44	1304.23	1296.92	1304.57	0.000258	4.65	2963.20	581.71	0.25
Reach 3	10.566	Design	8100.00	1290.34	1300.91	1295.39	1301.15	0.000272	3.93	2060.15	253.70	0.24
Reach 3	10.566	Future	10470.00	1290.34	1302.65	1296.08	1302.92	0.000250	4.17	2511.78	265.33	0.24
Reach 3	10.566	Existing	14320.00	1290.34	1304.57	1297.06	1304.92	0.000258	4.72	3032.02	963.89	0.25
Reach 3	10.566	500-YR	13770.00	1290.34	1304.30	1296.92	1304.63	0.000260	4.66	2956.64	862.76	0.25
Reach 3	10.654	Design	8100.00	1290.38	1301.03	1295.65	1301.28	0.000282	3.97	2041.26	254.68	0.25
Reach 3	10.654	Future	10470.00	1290.38	1302.76	1296.33	1303.04	0.000257	4.20	2491.41	265.84	0.24
Reach 3	10.654	Existing	14320.00	1290.38	1304.69	1297.32	1305.04	0.000264	4.75	3013.69	818.73	0.25
Reach 3	10.654	500-YR	13770.00	1290.38	1304.41	1297.19	1304.76	0.000266	4.69	2938.30	639.77	0.25
Reach 3	10.749	Design	8100.00	1290.33	1301.18	1295.57	1301.41	0.000255	3.84	2110.01	256.76	0.24
Reach 3	10.749	Future	10470.00	1290.33	1302.90	1296.21	1303.16	0.000237	4.09	2568.30	292.50	0.23
Reach 3	10.749	Existing	14320.00	1290.33	1304.84	1297.22	1305.17	0.000241	4.60	3239.07	955.91	0.24
Reach 3	10.749	500-YR	13770.00	1290.33	1304.57	1297.09	1304.88	0.000243	4.54	3135.31	953.67	0.24
Reach 3	10.843	Design	8100.00	1290.58	1301.32	1295.50	1301.54	0.000236	3.75	2165.65	276.90	0.23
Reach 3	10.843	Future	10470.00	1290.58	1303.03	1296.18	1303.28	0.000220	3.99	2683.60	324.71	0.23
Reach 3	10.843	Existing	14320.00	1290.58	1304.98	1297.14	1305.29	0.000222	4.48	3413.69	396.89	0.23
Reach 3	10.843	500-YR	13770.00	1290.58	1304.70	1297.01	1305.00	0.000223	4.42	3303.90	393.82	0.23

HEC-RAS Plan: EMF R 3 River: EMF Reach: Reach 3 (Continued)

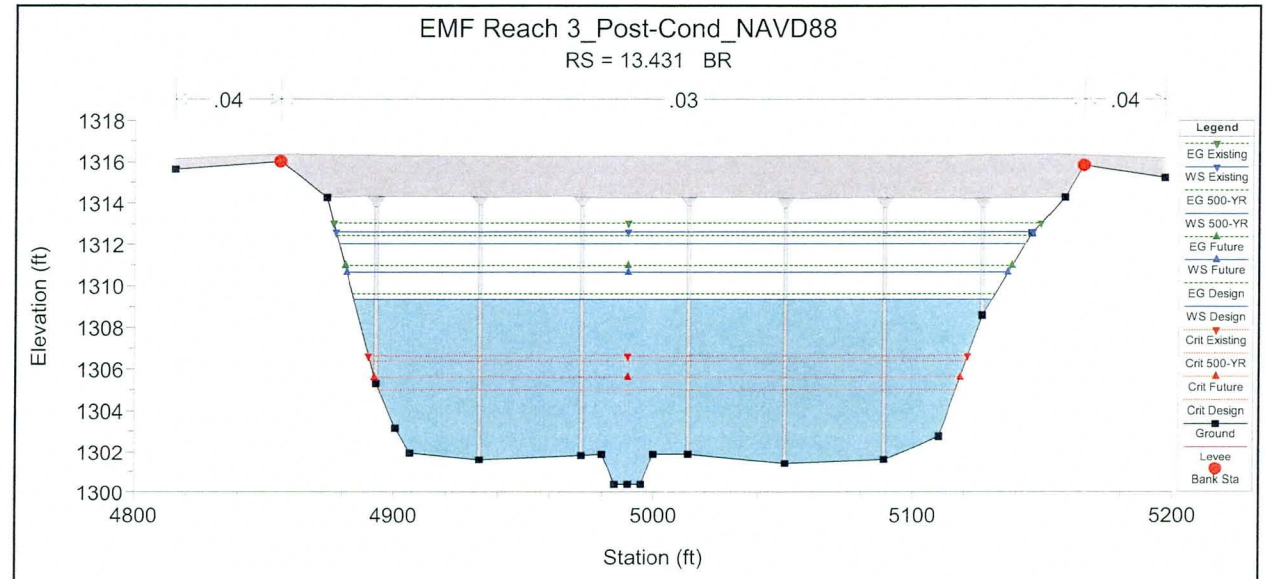
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 3	10.938	Design	8100.00	1290.98	1301.46	1295.89	1301.69	0.000373	3.84	2116.26	281.02	0.24
Reach 3	10.938	Future	10470.00	1290.98	1303.16	1296.56	1303.41	0.000342	4.06	2641.67	335.76	0.23
Reach 3	10.938	Existing	14320.00	1290.98	1305.11	1297.53	1305.42	0.000334	4.52	3368.98	392.62	0.24
Reach 3	10.938	500-YR	13770.00	1290.98	1304.84	1297.39	1305.14	0.000338	4.47	3260.78	389.38	0.24
Reach 3	11.033	Design	8100.00	1290.89	1301.64	1296.14	1301.88	0.000383	3.89	2083.59	257.83	0.24
Reach 3	11.033	Future	10470.00	1290.89	1303.33	1296.80	1303.59	0.000355	4.13	2578.47	316.93	0.24
Reach 3	11.033	Existing	14320.00	1290.89	1305.28	1297.78	1305.60	0.000352	4.60	3282.29	387.53	0.24
Reach 3	11.033	500-YR	13770.00	1290.89	1305.00	1297.65	1305.32	0.000356	4.55	3176.38	384.03	0.24
Reach 3	11.127	Design	8100.00	1291.36	1301.84	1296.28	1302.07	0.000370	3.83	2122.11	278.46	0.24
Reach 3	11.127	Future	10470.00	1291.36	1303.51	1296.93	1303.77	0.000342	4.06	2644.70	339.47	0.23
Reach 3	11.127	Existing	14320.00	1291.36	1305.46	1297.90	1305.77	0.000334	4.52	3370.14	393.13	0.24
Reach 3	11.127	500-YR	13770.00	1291.36	1305.19	1297.76	1305.49	0.000337	4.47	3263.08	390.94	0.24
Reach 3	11.189	Design	8100.00	1291.29	1301.96	1296.38	1302.19	0.000370	3.82	2122.31	275.41	0.24
Reach 3	11.189	Future	10470.00	1291.29	1303.62	1297.05	1303.88	0.000344	4.07	2639.81	335.56	0.23
Reach 3	11.189	Existing	14320.00	1291.29	1305.57	1298.02	1305.88	0.000337	4.52	3369.24	392.74	0.24
Reach 3	11.189	500-YR	13770.00	1291.29	1305.30	1297.87	1305.60	0.000340	4.47	3262.79	390.09	0.24
Reach 3	11.231	Design	8100.00	1291.22	1302.05	1296.22	1302.27	0.000341	3.72	2179.01	269.57	0.23
Reach 3	11.231	Future	10470.00	1291.22	1303.71	1296.89	1303.95	0.000321	3.98	2678.90	319.33	0.23
Reach 3	11.231	Existing	14320.00	1291.22	1305.65	1297.88	1305.96	0.000323	4.46	3334.11	352.75	0.23
Reach 3	11.231	500-YR	13770.00	1291.22	1305.38	1297.74	1305.68	0.000324	4.40	3242.03	345.96	0.23
Reach 3	11.246	Design	6900.00	1290.98	1302.14	1296.16	1302.31	0.000265	3.24	2126.51	260.40	0.20
Reach 3	11.246	Future	10060.00	1290.98	1303.74	1297.08	1303.98	0.000331	3.94	2552.20	275.58	0.23
Reach 3	11.246	Existing	13910.00	1290.98	1305.67	1298.07	1305.99	0.000360	4.48	3107.72	295.10	0.24
Reach 3	11.246	500-YR	11730.00	1290.98	1305.49	1297.53	1305.72	0.000270	3.84	3054.14	294.47	0.21
Reach 3	11.254		Bridge									
Reach 3	11.262	Design	6900.00	1290.69	1302.20	1295.93	1302.35	0.000237	3.12	2210.30	263.97	0.19
Reach 3	11.262	Future	10060.00	1290.69	1303.81	1296.85	1304.04	0.000296	3.80	2646.13	277.62	0.22
Reach 3	11.262	Existing	13910.00	1290.69	1305.76	1297.83	1306.05	0.000326	4.34	3203.62	295.73	0.23
Reach 3	11.262	500-YR	11730.00	1290.69	1305.55	1297.29	1305.77	0.000245	3.73	3143.54	293.63	0.20
Reach 3	11.297	Design	6900.00	1291.07	1302.23	1296.51	1302.42	0.000328	3.58	1928.86	239.44	0.22
Reach 3	11.297	Future	9070.00	1291.07	1303.86	1297.20	1304.10	0.000324	3.89	2330.78	252.19	0.23
Reach 3	11.297	Existing	12990.00	1291.07	1305.80	1298.29	1306.13	0.000375	4.58	2835.47	267.59	0.25
Reach 3	11.297	500-YR	11730.00	1291.07	1305.57	1297.95	1305.85	0.000326	4.23	2774.01	265.77	0.23
Reach 3	11.308	Design	6900.00	1292.50	1302.15	1297.39	1302.53	0.000129	4.94	1397.97	186.03	0.32
Reach 3	11.308	Future	9070.00	1292.50	1303.77	1298.28	1304.21	0.000125	5.30	1710.89	198.98	0.32
Reach 3	11.308	Existing	12990.00	1292.50	1305.69	1299.64	1306.28	0.000142	6.17	2106.20	214.58	0.35
Reach 3	11.308	500-YR	11730.00	1292.50	1305.47	1299.21	1305.98	0.000123	5.69	2060.78	212.85	0.32
Reach 3	11.321	Design	6900.00	1298.08	1302.65	1302.65	1304.63	0.001623	11.31	610.14	152.45	1.00
Reach 3	11.321	Future	9070.00	1298.08	1303.57	1303.57	1305.80	0.001562	11.98	756.85	168.51	1.00
Reach 3	11.321	Existing	12990.00	1298.08	1304.92	1304.92	1307.55	0.001477	13.01	998.36	189.00	1.00
Reach 3	11.321	500-YR	11730.00	1298.08	1304.51	1304.51	1307.02	0.001495	12.71	922.53	182.27	1.00
Reach 3	11.328	Design	6900.00	1296.67	1304.83	1301.14	1305.16	0.000521	4.62	1493.66	235.96	0.32
Reach 3	11.328	Future	9070.00	1296.67	1305.96	1301.81	1306.37	0.000539	5.13	1767.12	244.37	0.34
Reach 3	11.328	Existing	12990.00	1296.67	1307.66	1302.90	1308.20	0.000578	5.93	2191.49	256.88	0.36
Reach 3	11.328	500-YR	11730.00	1296.67	1307.15	1302.57	1307.65	0.000566	5.69	2062.34	253.14	0.35
Reach 3	11.391	Design	6900.00	1296.49	1305.01	1301.47	1305.33	0.000526	4.58	1508.12	242.77	0.32
Reach 3	11.391	Future	9070.00	1296.49	1306.16	1302.11	1306.55	0.000534	5.06	1791.12	250.22	0.33
Reach 3	11.391	Existing	12990.00	1296.49	1307.87	1303.12	1308.40	0.000561	5.83	2229.08	261.33	0.35
Reach 3	11.391	500-YR	11730.00	1296.49	1307.36	1302.81	1307.84	0.000552	5.60	2095.98	258.01	0.35
Reach 3	11.486	Design	6900.00	1297.13	1305.27	1301.83	1305.61	0.000553	4.64	1485.87	242.89	0.33
Reach 3	11.486	Future	9070.00	1297.13	1306.42	1302.46	1306.83	0.000556	5.13	1769.73	250.35	0.34
Reach 3	11.486	Existing	12990.00	1297.13	1308.15	1303.49	1308.68	0.000576	5.88	2210.96	261.29	0.36
Reach 3	11.486	500-YR	11730.00	1297.13	1307.63	1303.19	1308.12	0.000569	5.65	2076.73	258.01	0.35
Reach 3	11.531	Design	6900.00	1296.58	1305.42	1301.73	1305.73	0.000495	4.51	1531.09	241.03	0.32
Reach 3	11.531	Future	9070.00	1296.58	1306.57	1302.37	1306.96	0.000508	5.00	1813.19	248.43	0.33
Reach 3	11.531	Existing	12990.00	1296.58	1308.30	1303.42	1308.82	0.000537	5.77	2252.80	259.54	0.34
Reach 3	11.531	500-YR	11730.00	1296.58	1307.78	1303.09	1308.26	0.000527	5.54	2118.95	256.21	0.34
Reach 3	11.572	Design	6900.00	1296.96	1305.52	1301.82	1305.84	0.000497	4.53	1523.24	238.42	0.32
Reach 3	11.572	Future	9070.00	1296.96	1306.68	1302.45	1307.07	0.000510	5.03	1802.58	245.47	0.33
Reach 3	11.572	Existing	12990.00	1296.96	1308.41	1303.53	1308.93	0.000540	5.80	2237.80	256.08	0.35
Reach 3	11.572	500-YR	11730.00	1296.96	1307.89	1303.20	1308.37	0.000530	5.57	2105.33	252.90	0.34

HEC-RAS Plan: EMF R 3 River: EMF Reach: Reach 3 (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 3	11.609	Design	6900.00	1296.91	1305.64	1301.79	1305.93	0.000451	4.36	1582.59	244.31	0.30
Reach 3	11.609	Future	9070.00	1296.91	1306.80	1302.44	1307.17	0.000465	4.85	1870.56	251.36	0.31
Reach 3	11.609	Existing	12990.00	1296.91	1308.55	1303.48	1309.04	0.000493	5.60	2319.99	261.93	0.33
Reach 3	11.609	500-YR	11730.00	1296.91	1308.03	1303.17	1308.47	0.000484	5.37	2183.22	258.80	0.33
Reach 3	11.703	Design	6900.00	1296.97	1305.86	1301.90	1306.16	0.000447	4.37	1578.36	240.83	0.30
Reach 3	11.703	Future	9070.00	1296.97	1307.03	1302.58	1307.40	0.000464	4.86	1864.76	249.08	0.31
Reach 3	11.703	Existing	12990.00	1296.97	1308.80	1303.63	1309.29	0.000494	5.61	2315.61	261.54	0.33
Reach 3	11.703	500-YR	11730.00	1296.97	1308.27	1303.29	1308.72	0.000485	5.39	2177.94	257.80	0.33
Reach 3	11.798	Design	6900.00	1296.96	1306.10	1301.87	1306.37	0.000395	4.21	1640.13	241.62	0.28
Reach 3	11.798	Future	9070.00	1296.96	1307.28	1302.54	1307.62	0.000415	4.70	1930.23	249.55	0.30
Reach 3	11.798	Existing	12990.00	1296.96	1309.06	1303.60	1309.52	0.000447	5.44	2386.68	261.54	0.32
Reach 3	11.798	500-YR	11730.00	1296.96	1308.53	1303.26	1308.95	0.000437	5.22	2247.33	257.94	0.31
Reach 3	11.893	Design	6900.00	1297.00	1306.30	1302.04	1306.57	0.000388	4.18	1650.72	242.25	0.28
Reach 3	11.893	Future	9070.00	1297.00	1307.49	1302.70	1307.83	0.000407	4.66	1944.54	250.53	0.30
Reach 3	11.893	Existing	12990.00	1297.00	1309.29	1303.74	1309.75	0.000437	5.39	2408.17	263.08	0.31
Reach 3	11.893	500-YR	11730.00	1297.00	1308.75	1303.43	1309.17	0.000428	5.18	2266.47	259.31	0.31
Reach 3	11.988	Design	6900.00	1297.22	1306.50	1302.09	1306.76	0.000364	4.10	1683.60	242.66	0.27
Reach 3	11.988	Future	9070.00	1297.22	1307.70	1302.74	1308.03	0.000384	4.58	1980.82	251.03	0.29
Reach 3	11.988	Existing	12990.00	1297.22	1309.52	1303.78	1309.96	0.000412	5.30	2451.73	275.61	0.31
Reach 3	11.988	500-YR	11730.00	1297.22	1308.98	1303.47	1309.38	0.000405	5.09	2306.57	259.90	0.30
Reach 3	12.082	Design	6900.00	1297.61	1306.67	1302.51	1306.96	0.000409	4.26	1620.72	240.83	0.29
Reach 3	12.082	Future	9070.00	1297.61	1307.89	1303.17	1308.23	0.000424	4.73	1917.89	249.62	0.30
Reach 3	12.082	Existing	12990.00	1297.61	1309.72	1304.24	1310.18	0.000445	5.44	2393.74	920.61	0.32
Reach 3	12.082	500-YR	11730.00	1297.61	1309.17	1303.91	1309.59	0.000441	5.23	2244.49	258.94	0.31
Reach 3	12.177	Design	6900.00	1297.79	1306.89	1302.56	1307.15	0.000378	4.16	1658.98	240.45	0.28
Reach 3	12.177	Future	9070.00	1297.79	1308.11	1303.21	1308.44	0.000394	4.63	1957.33	248.46	0.29
Reach 3	12.177	Existing	12990.00	1297.79	1309.95	1304.28	1310.40	0.000421	5.35	2427.56	818.01	0.31
Reach 3	12.177	500-YR	11730.00	1297.79	1309.40	1303.96	1309.81	0.000412	5.13	2284.38	256.95	0.30
Reach 3	12.245	Design	6900.00	1297.79	1307.01	1302.75	1307.30	0.000409	4.29	1607.56	235.82	0.29
Reach 3	12.245	Future	9070.00	1297.79	1308.24	1303.42	1308.59	0.000425	4.77	1902.06	245.11	0.30
Reach 3	12.245	Existing	12990.00	1297.79	1310.09	1304.54	1310.56	0.000452	5.48	2369.99	259.19	0.32
Reach 3	12.245	500-YR	11730.00	1297.79	1309.54	1304.21	1309.97	0.000443	5.27	2227.04	254.97	0.31
Reach 3	12.302	Design	6900.00	1298.21	1307.14	1302.98	1307.42	0.000413	4.29	1607.67	237.69	0.29
Reach 3	12.302	Future	9070.00	1298.21	1308.37	1303.64	1308.72	0.000425	4.76	1905.27	246.12	0.30
Reach 3	12.302	Existing	12990.00	1298.21	1310.23	1304.71	1310.70	0.000448	5.47	2376.06	258.89	0.32
Reach 3	12.302	500-YR	11730.00	1298.21	1309.67	1304.39	1310.10	0.000441	5.25	2232.45	255.06	0.31
Reach 3	12.349	Design	6900.00	1297.95	1307.25	1302.92	1307.52	0.000389	4.21	1640.06	238.71	0.28
Reach 3	12.349	Future	9070.00	1297.95	1308.48	1303.59	1308.82	0.000403	4.67	1940.35	247.44	0.29
Reach 3	12.349	Existing	12990.00	1297.95	1310.36	1304.69	1310.81	0.000427	5.38	2416.24	260.67	0.31
Reach 3	12.349	500-YR	11730.00	1297.95	1309.80	1304.33	1310.21	0.000419	5.17	2270.95	256.71	0.31
Reach 3	12.441	Design	6900.00	1298.00	1307.44	1303.16	1307.71	0.000384	4.16	1658.33	243.39	0.28
Reach 3	12.441	Future	9070.00	1298.00	1308.69	1303.83	1309.02	0.000395	4.61	1966.68	252.14	0.29
Reach 3	12.441	Existing	12990.00	1298.00	1310.58	1304.88	1311.01	0.000412	5.29	2455.21	302.28	0.31
Reach 3	12.441	500-YR	11730.00	1298.00	1310.01	1304.56	1310.41	0.000408	5.09	2306.24	261.43	0.30
Reach 3	12.488	Design	6900.00	1298.09	1307.55	1303.21	1307.81	0.000369	4.10	1684.11	245.41	0.28
Reach 3	12.488	Future	9070.00	1298.09	1308.79	1303.86	1309.12	0.000380	4.54	1995.83	253.92	0.29
Reach 3	12.488	Existing	12990.00	1298.09	1310.69	1304.90	1311.11	0.000397	5.22	2489.06	298.03	0.30
Reach 3	12.488	500-YR	11730.00	1298.09	1310.12	1304.60	1310.51	0.000393	5.02	2338.84	262.96	0.30
Reach 3	12.552	Design	6900.00	1297.94	1307.68	1303.17	1307.93	0.000350	4.04	1709.70	244.84	0.27
Reach 3	12.552	Future	9070.00	1297.94	1308.93	1303.84	1309.24	0.000364	4.49	2022.24	254.01	0.28
Reach 3	12.552	Existing	12990.00	1297.94	1310.83	1304.90	1311.24	0.000382	5.16	2518.20	296.72	0.30
Reach 3	12.552	500-YR	11730.00	1297.94	1310.26	1304.58	1310.64	0.000379	4.95	2367.38	263.77	0.29
Reach 3	12.6	Design	6900.00	1298.32	1307.76	1303.42	1308.02	0.000378	4.13	1669.89	244.53	0.28
Reach 3	12.6	Future	9070.00	1298.32	1309.01	1304.11	1309.34	0.000388	4.57	1982.73	253.72	0.29
Reach 3	12.6	Existing	12990.00	1298.32	1310.92	1305.17	1311.35	0.000403	5.24	2479.44	299.04	0.30
Reach 3	12.6	500-YR	11730.00	1298.32	1310.35	1304.83	1310.74	0.000400	5.04	2328.30	263.50	0.30
Reach 3	12.694	Design	6900.00	1298.33	1307.95	1303.47	1308.21	0.000348	4.03	1714.18	245.39	0.27
Reach 3	12.694	Future	9070.00	1298.33	1309.22	1304.13	1309.53	0.000360	4.47	2029.50	254.20	0.28
Reach 3	12.694	Existing	12990.00	1298.33	1311.13	1305.17	1311.54	0.000374	5.14	2527.64	301.98	0.29
Reach 3	12.694	500-YR	11730.00	1298.33	1310.56	1304.86	1310.94	0.000371	4.93	2377.07	288.31	0.29

HEC-RAS Plan: EMF R 3 River: EMF Reach: Reach 3 (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 3	12.789	Design	6900.00	1298.39	1308.13	1303.57	1308.38	0.000341	4.00	1723.94	244.87	0.27
Reach 3	12.789	Future	9070.00	1298.39	1309.40	1304.21	1309.71	0.000353	4.44	2040.52	254.11	0.28
Reach 3	12.789	Existing	12990.00	1298.39	1311.32	1305.28	1311.73	0.000368	5.11	2541.17	302.14	0.29
Reach 3	12.789	500-YR	11730.00	1298.39	1310.75	1304.96	1311.12	0.000364	4.91	2389.85	298.61	0.29
Reach 3	12.884	Design	6900.00	1298.88	1308.30	1303.75	1308.55	0.000341	3.99	1727.36	246.01	0.27
Reach 3	12.884	Future	9070.00	1298.88	1309.58	1304.40	1309.88	0.000351	4.43	2047.07	255.20	0.28
Reach 3	12.884	Existing	12990.00	1298.88	1311.51	1305.46	1311.91	0.000369	5.08	2558.31	316.01	0.29
Reach 3	12.884	500-YR	11730.00	1298.88	1310.94	1305.15	1311.31	0.000370	4.88	2402.75	302.45	0.29
Reach 3	12.905	Design	6900.00	1298.96	1308.34	1303.78	1308.59	0.000346	4.03	1712.12	243.34	0.27
Reach 3	12.905	Future	9070.00	1298.96	1309.61	1304.46	1309.92	0.000357	4.47	2028.64	252.67	0.28
Reach 3	12.905	Existing	12990.00	1298.96	1311.55	1305.52	1311.96	0.000368	5.14	2529.37	309.79	0.29
Reach 3	12.905	500-YR	11730.00	1298.96	1310.97	1305.20	1311.35	0.000368	4.93	2378.88	297.81	0.29
Reach 3	12.981	Design	6900.00	1299.09	1308.48	1304.00	1308.73	0.000347	4.03	1713.34	244.39	0.27
Reach 3	12.981	Future	9070.00	1299.09	1309.76	1304.66	1310.07	0.000356	4.46	2031.82	252.85	0.28
Reach 3	12.981	Existing	12990.00	1299.09	1311.70	1305.70	1312.11	0.000370	5.13	2534.40	301.83	0.29
Reach 3	12.981	500-YR	11730.00	1299.09	1311.12	1305.32	1311.50	0.000367	4.92	2383.01	298.62	0.29
Reach 3	13.037	Design	6900.00	1299.09	1308.58	1304.00	1308.83	0.000334	3.96	1740.97	247.21	0.26
Reach 3	13.037	Future	9070.00	1299.09	1309.87	1304.66	1310.17	0.000343	4.39	2064.65	256.36	0.27
Reach 3	13.037	Existing	12990.00	1299.09	1311.82	1305.72	1312.21	0.000357	5.04	2577.20	312.43	0.29
Reach 3	13.037	500-YR	11730.00	1299.09	1311.24	1305.38	1311.60	0.000354	4.84	2422.77	303.84	0.28
Reach 3	13.084	Design	6900.00	1299.19	1308.66	1304.19	1308.92	0.000351	4.04	1708.96	245.26	0.27
Reach 3	13.084	Future	9070.00	1299.19	1309.95	1304.84	1310.26	0.000359	4.47	2030.45	254.30	0.28
Reach 3	13.084	Existing	12990.00	1299.19	1311.90	1305.91	1312.31	0.000373	5.11	2539.85	307.92	0.29
Reach 3	13.084	500-YR	11730.00	1299.19	1311.32	1305.58	1311.70	0.000369	4.92	2386.15	263.95	0.29
Reach 3	13.179	Design	6900.00	1299.68	1308.84	1304.60	1309.11	0.000391	4.19	1648.02	242.83	0.28
Reach 3	13.179	Future	9070.00	1299.68	1310.12	1305.23	1310.46	0.000394	4.61	1966.93	251.97	0.29
Reach 3	13.179	Existing	12990.00	1299.68	1312.08	1306.31	1312.51	0.000403	5.25	2473.15	303.78	0.30
Reach 3	13.179	500-YR	11730.00	1299.68	1311.50	1305.99	1311.90	0.000401	5.06	2320.35	261.73	0.30
Reach 3	13.232	Design	6900.00	1299.38	1308.95	1304.67	1309.22	0.000386	4.17	1656.50	243.61	0.28
Reach 3	13.232	Future	9070.00	1299.38	1310.24	1305.35	1310.57	0.000390	4.59	1976.84	252.84	0.29
Reach 3	13.232	Existing	12990.00	1299.38	1312.20	1306.41	1312.62	0.000398	5.23	2485.80	327.66	0.30
Reach 3	13.232	500-YR	11730.00	1299.38	1311.62	1306.05	1312.01	0.000396	5.03	2332.15	262.69	0.30
Reach 3	13.28	Design	6900.00	1299.69	1309.06	1304.57	1309.31	0.000352	4.04	1707.41	244.96	0.27
Reach 3	13.28	Future	9070.00	1299.69	1310.35	1305.24	1310.66	0.000359	4.47	2030.03	254.01	0.28
Reach 3	13.28	Existing	12990.00	1299.69	1312.32	1306.29	1312.72	0.000372	5.11	2542.27	326.93	0.29
Reach 3	13.28	500-YR	11730.00	1299.69	1311.73	1305.98	1312.11	0.000368	4.91	2387.63	263.64	0.29
Reach 3	13.374	Design	6900.00	1300.06	1309.24	1304.89	1309.49	0.000352	4.01	1719.73	249.59	0.27
Reach 3	13.374	Future	9070.00	1300.06	1310.54	1305.50	1310.84	0.000355	4.43	2048.72	257.41	0.28
Reach 3	13.374	Existing	12990.00	1300.06	1312.51	1306.56	1312.90	0.000361	5.05	2602.48	330.36	0.29
Reach 3	13.374	500-YR	11730.00	1300.06	1311.92	1306.24	1312.29	0.000359	4.86	2411.19	265.32	0.28
Reach 3	13.426	Design	6900.00	1300.40	1309.35	1304.91	1309.60	0.000491	3.99	1728.13	246.09	0.27
Reach 3	13.426	Future	8970.00	1300.40	1310.66	1305.49	1310.96	0.000489	4.36	2055.33	255.11	0.27
Reach 3	13.426	Existing	12910.00	1300.40	1312.63	1306.56	1313.02	0.000516	5.02	2571.80	268.90	0.29
Reach 3	13.426	500-YR	11730.00	1300.40	1312.04	1306.27	1312.41	0.000515	4.86	2414.10	264.66	0.28
Reach 3	13.431		Bridge									
Reach 3	13.439	Design	6900.00	1299.63	1309.46	1304.60	1309.67	0.000412	3.76	1834.54	250.84	0.25
Reach 3	13.439	Future	8970.00	1299.63	1310.77	1305.22	1311.04	0.000416	4.13	2169.84	258.92	0.25
Reach 3	13.439	Existing	12910.00	1299.63	1312.76	1306.26	1313.12	0.000447	4.78	2698.68	272.84	0.27
Reach 3	13.439	500-YR	11730.00	1299.63	1312.17	1305.96	1312.50	0.000441	4.62	2537.67	267.50	0.26
Reach 3	13.471	Design	6900.00	1299.86	1309.49	1304.98	1309.78	0.000389	4.31	1602.45	225.11	0.28
Reach 3	13.471	Future	8970.00	1299.86	1310.80	1305.67	1311.15	0.000391	4.71	1903.66	238.70	0.29
Reach 3	13.471	Existing	12910.00	1299.86	1312.79	1306.77	1313.24	0.000401	5.40	2448.08	285.68	0.30
Reach 3	13.471	500-YR	11730.00	1299.86	1312.19	1306.48	1312.62	0.000404	5.23	2279.51	280.88	0.30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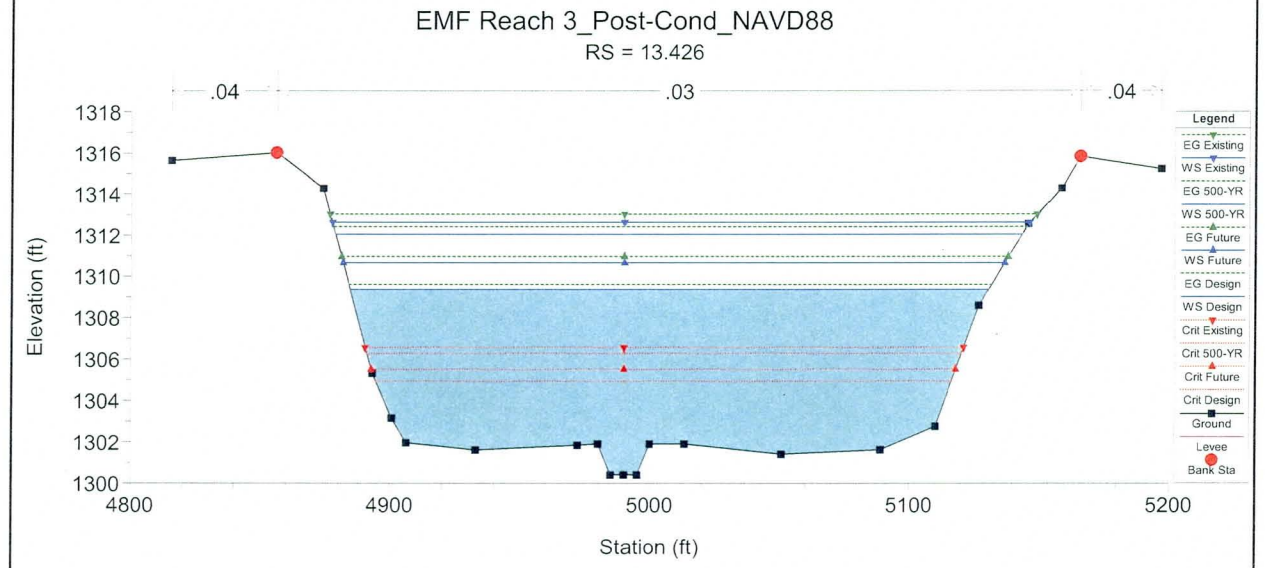
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Bank Sta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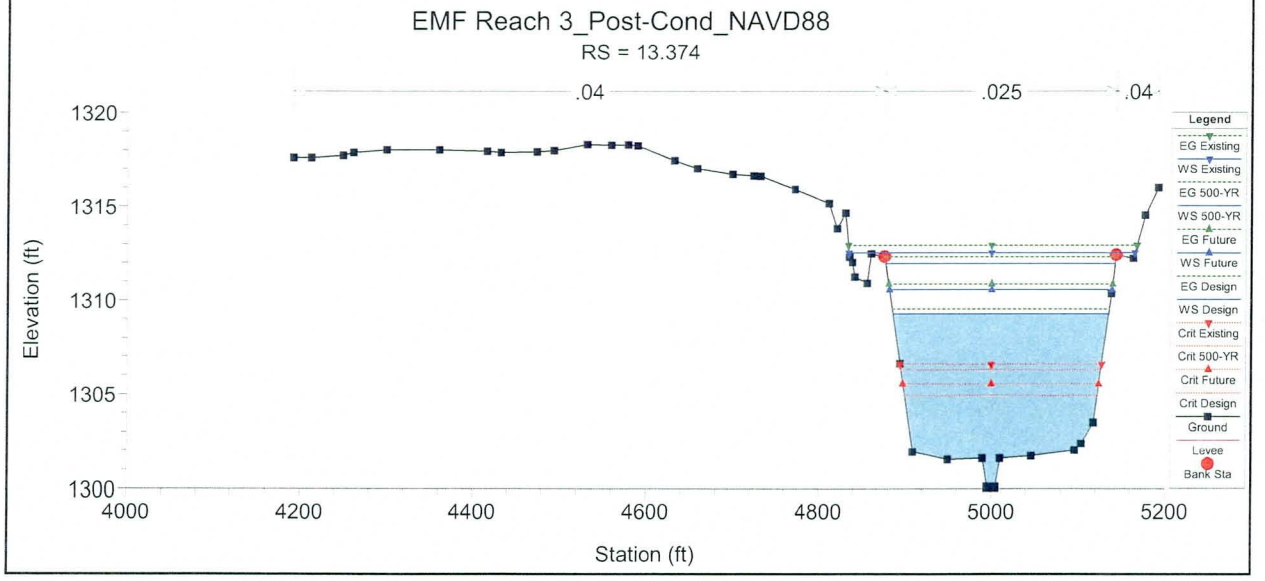
.03
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Bank Sta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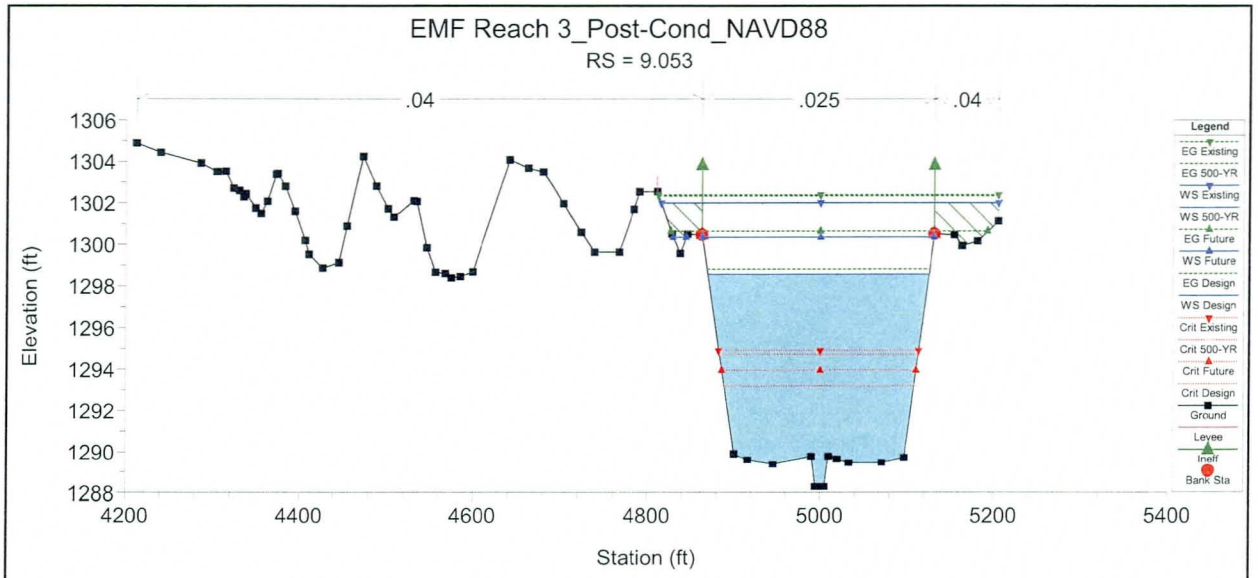
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Bank Sta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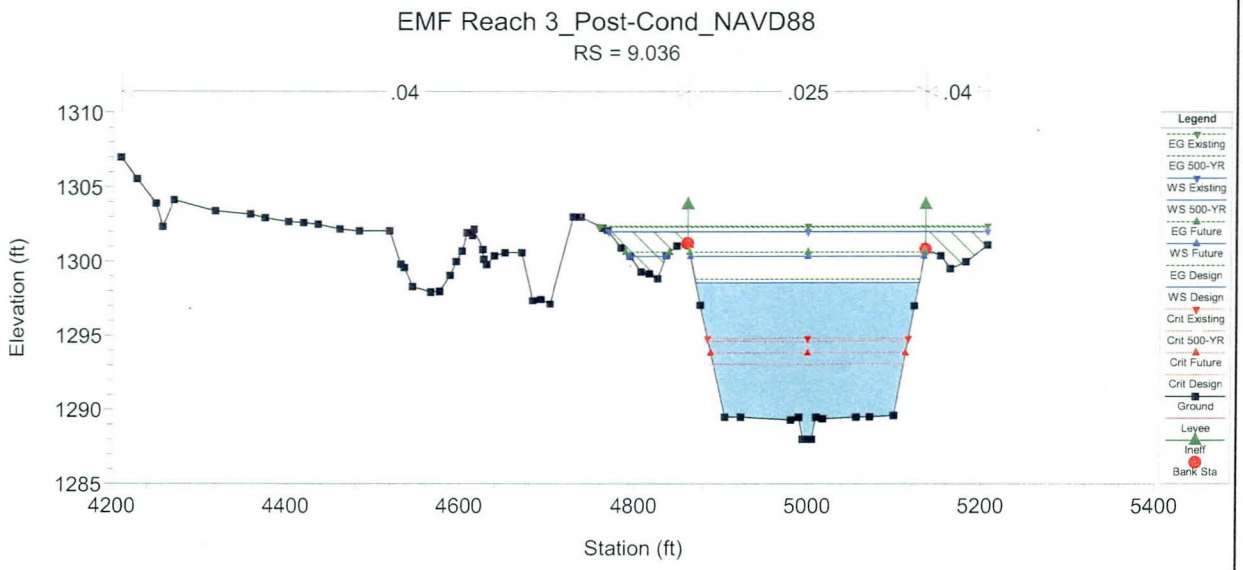
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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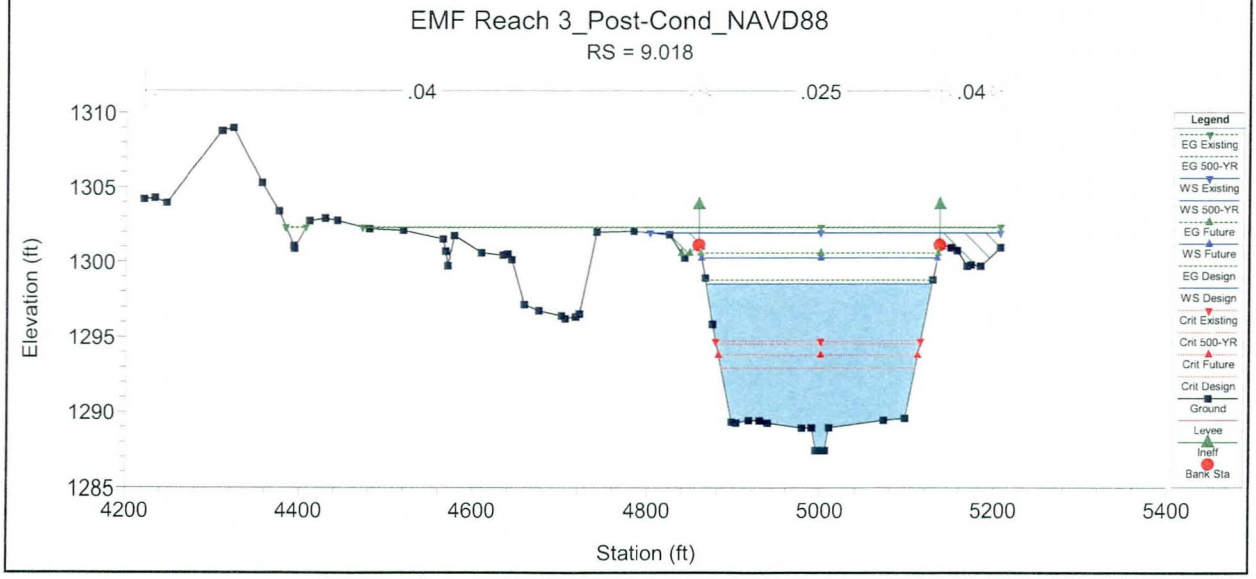
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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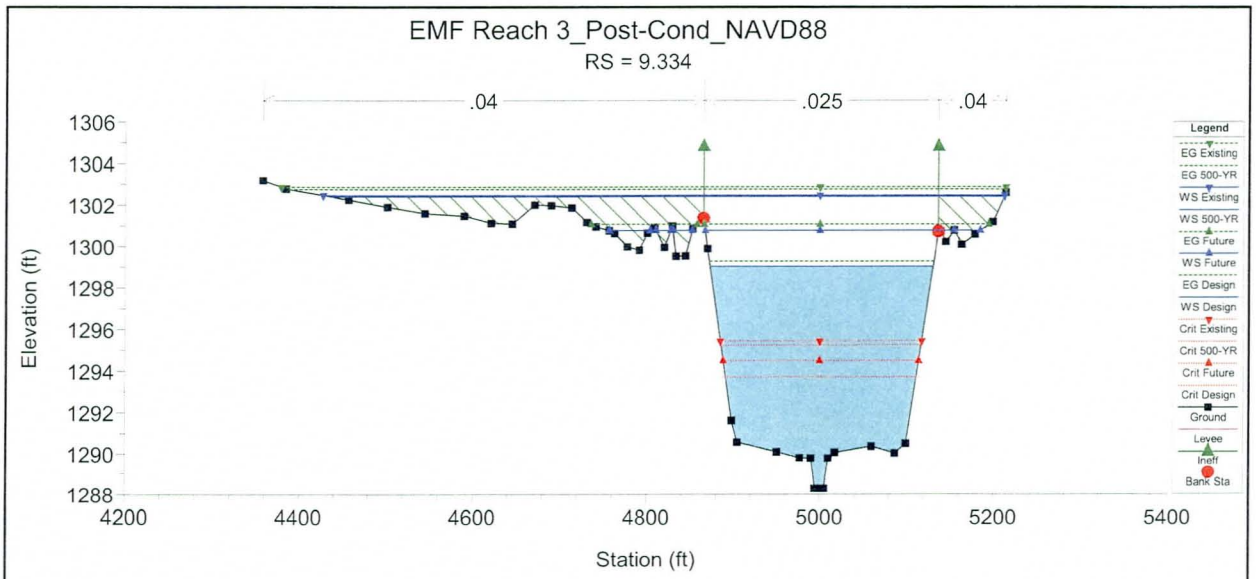
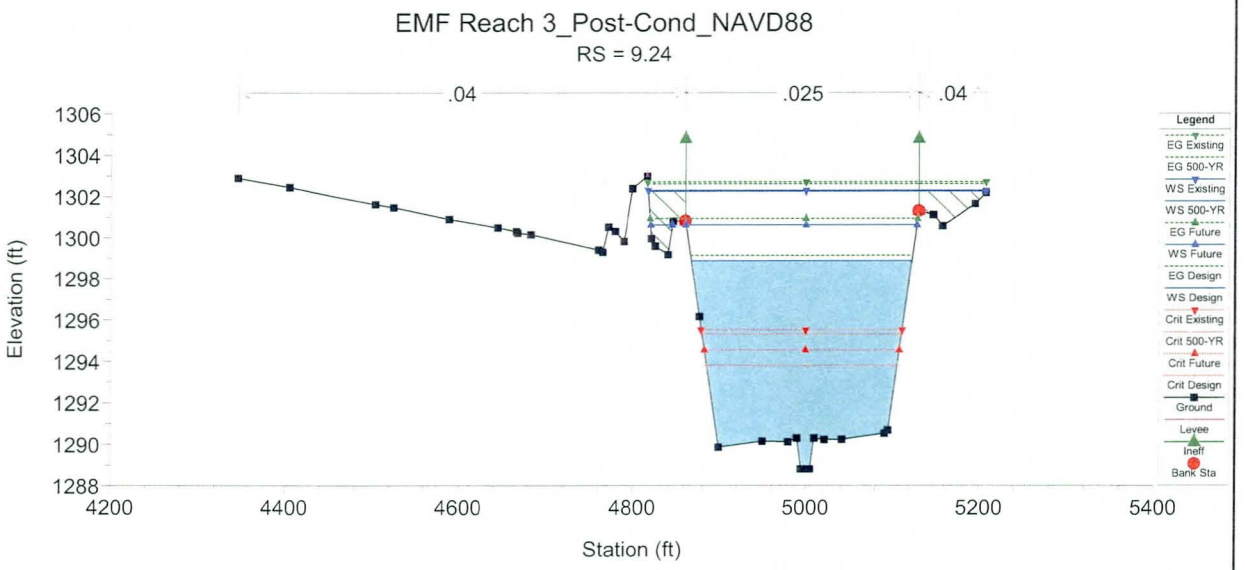
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 9.334
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
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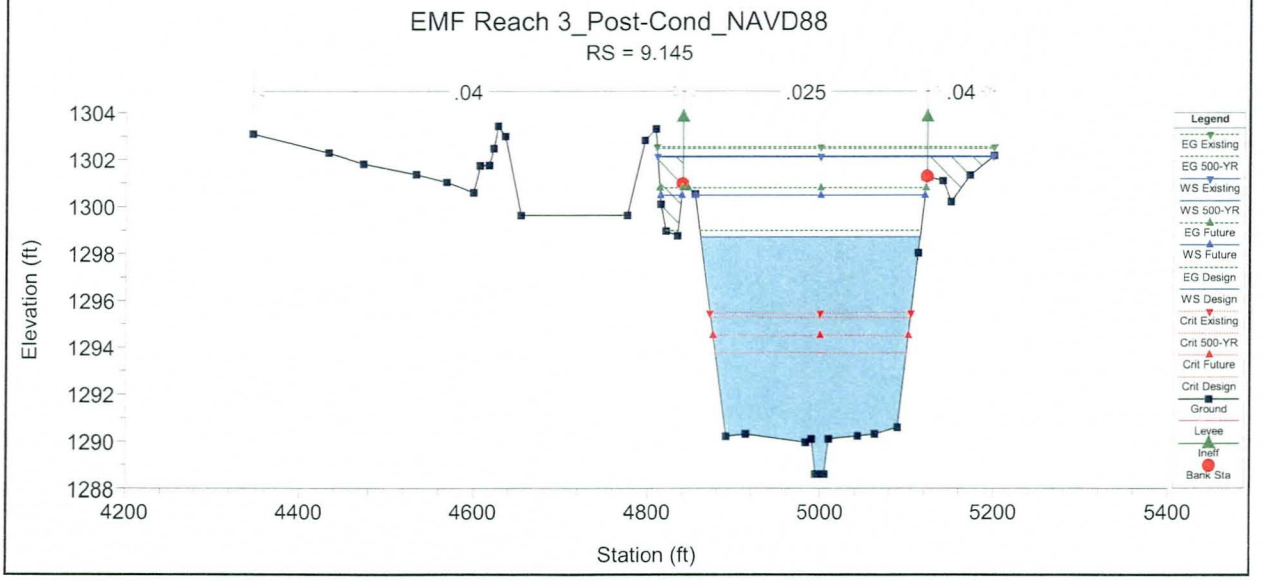
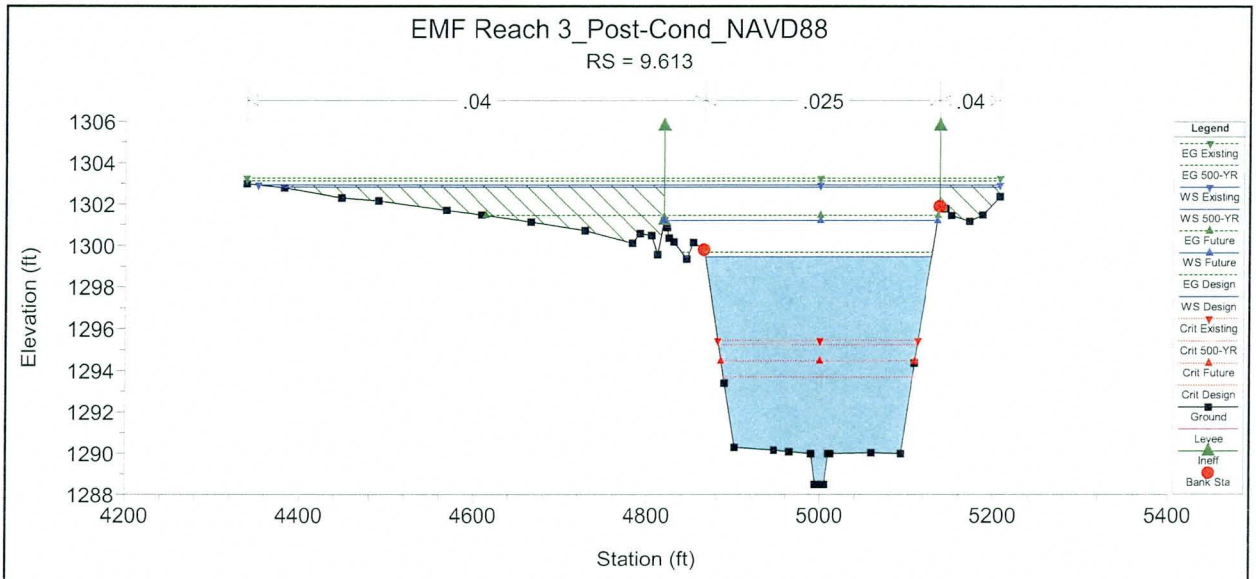
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 9.145
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
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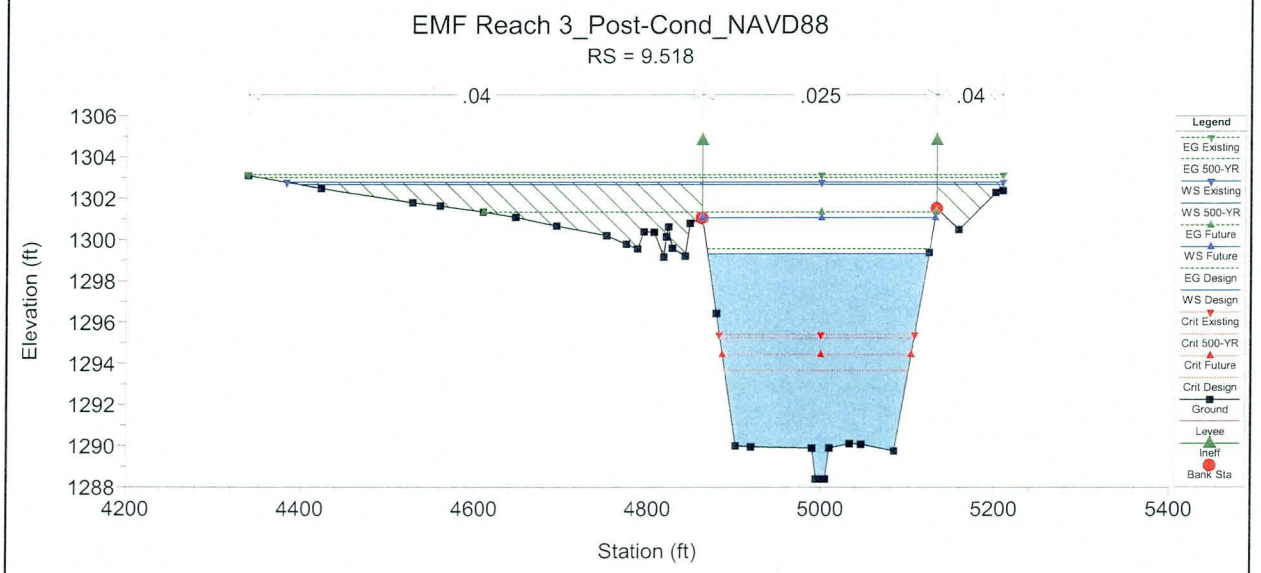
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Station (ft)
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EG 500-YR
WS Existing
WS 500-YR
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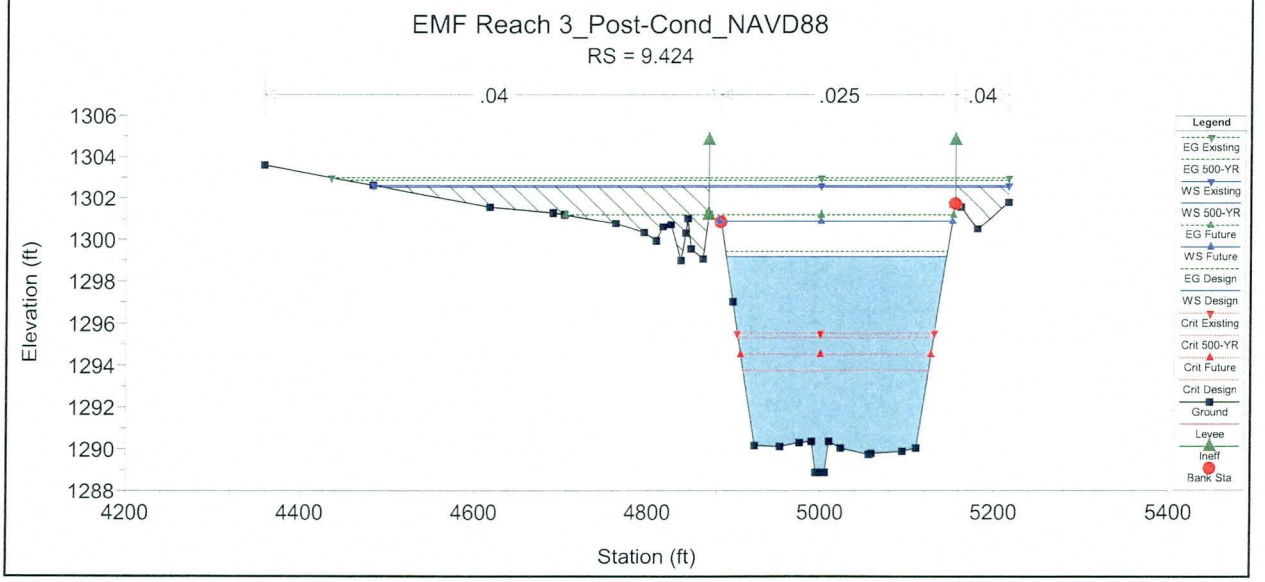
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Station (ft)
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EG 500-YR
WS Existing
WS 500-YR
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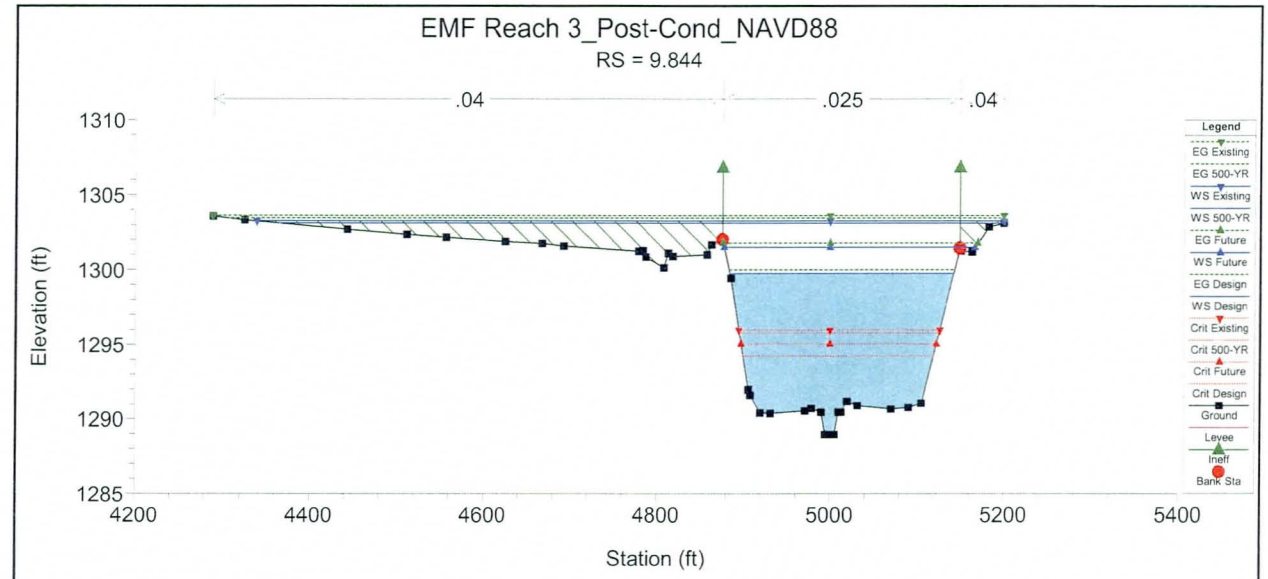
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Station (ft)
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EG 500-YR
WS Existing
WS 500-YR
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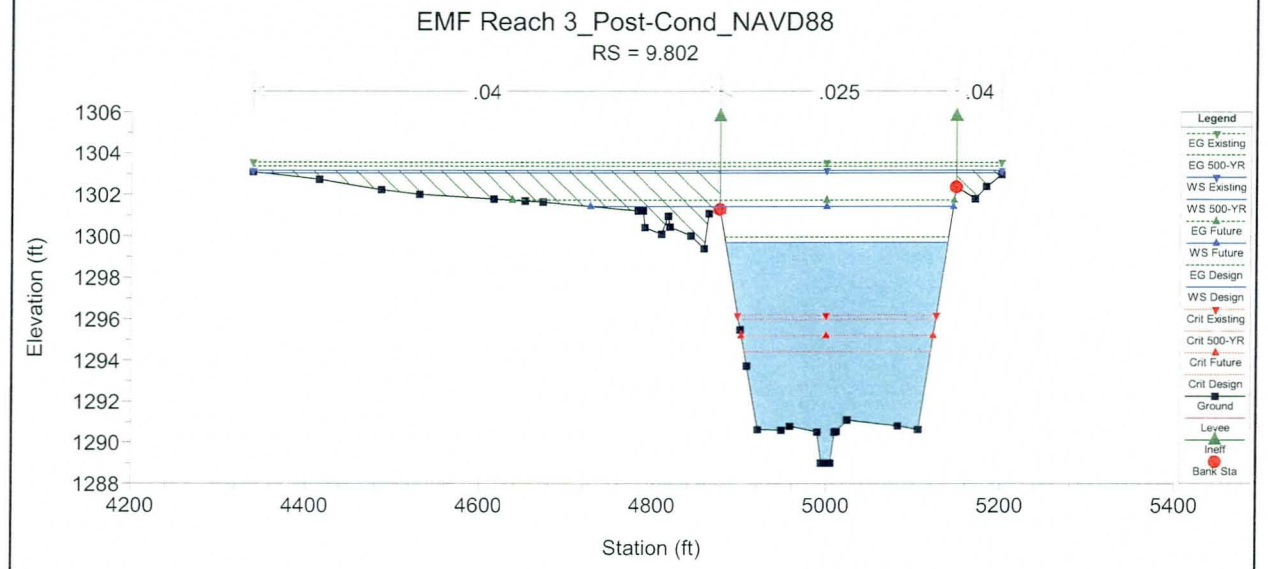
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Elevation (ft)
Station (ft)
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WS 500-YR
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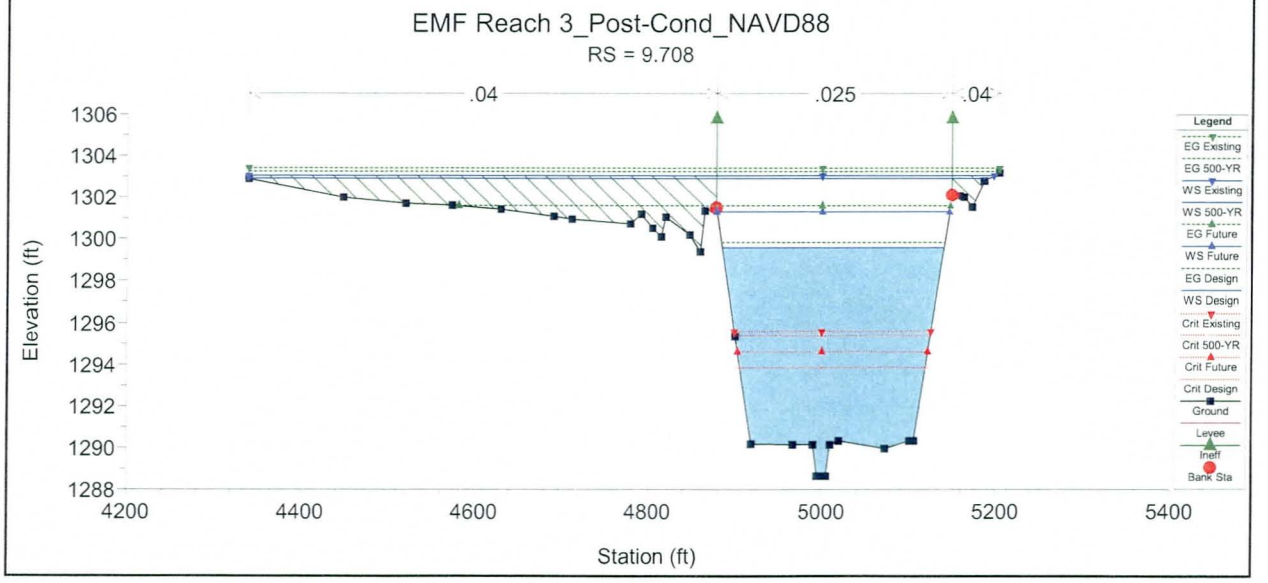
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Station (ft)
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WS 500-YR
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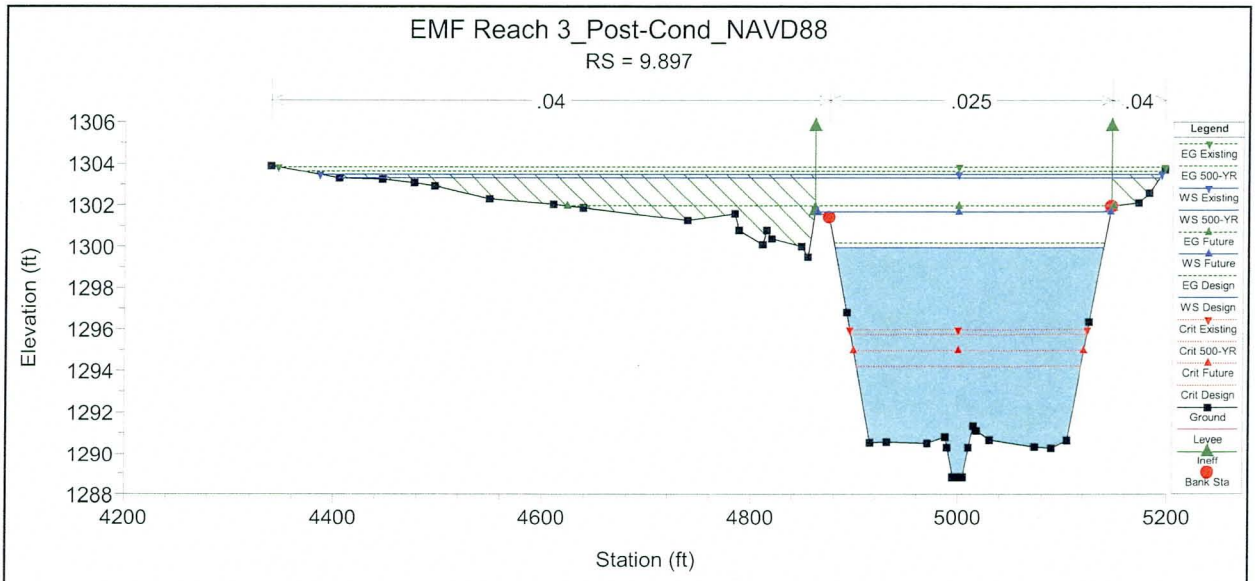
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Station (ft)
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EG 500-YR
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WS 500-YR
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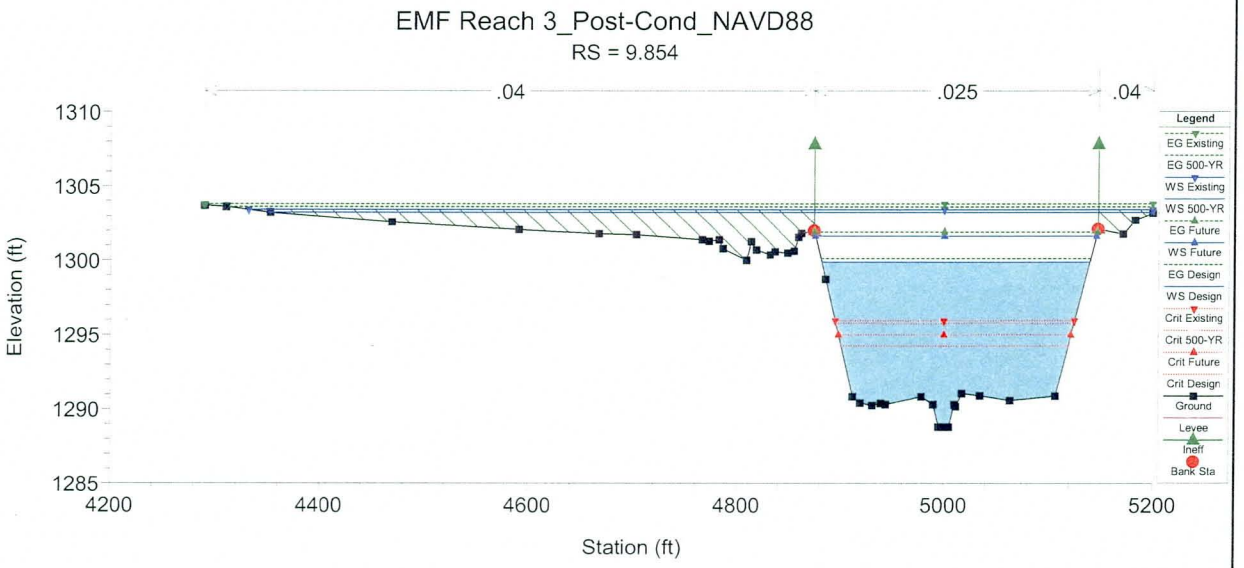
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Station (ft)
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WS 500-YR
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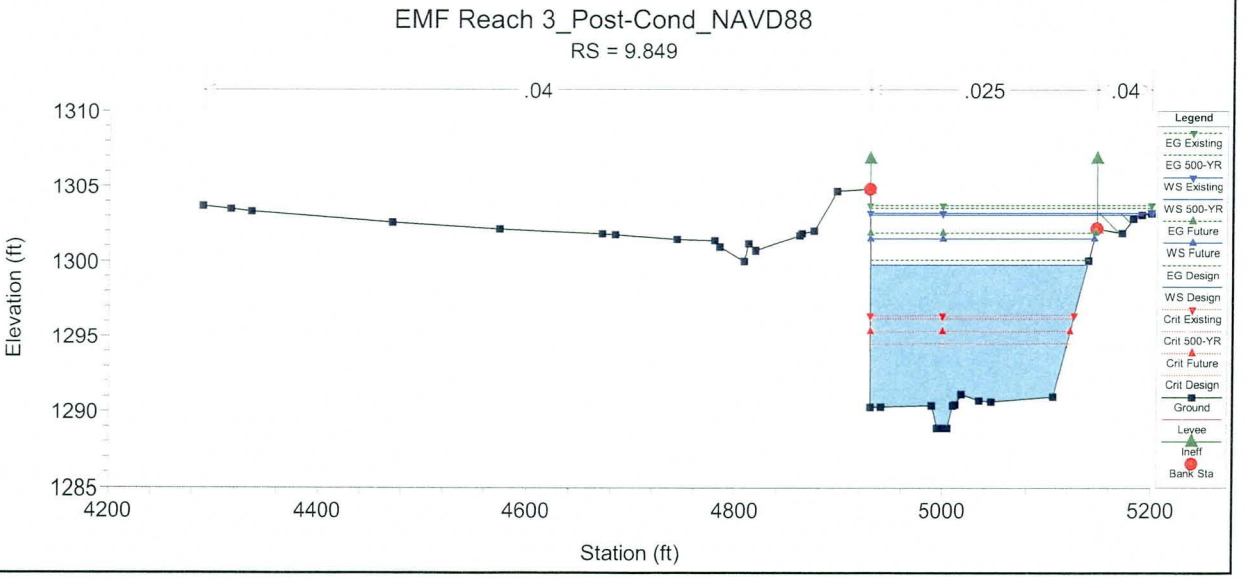
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 9.849
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Elevation (ft)
Station (ft)
Legend
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EG 500-YR
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WS 500-YR
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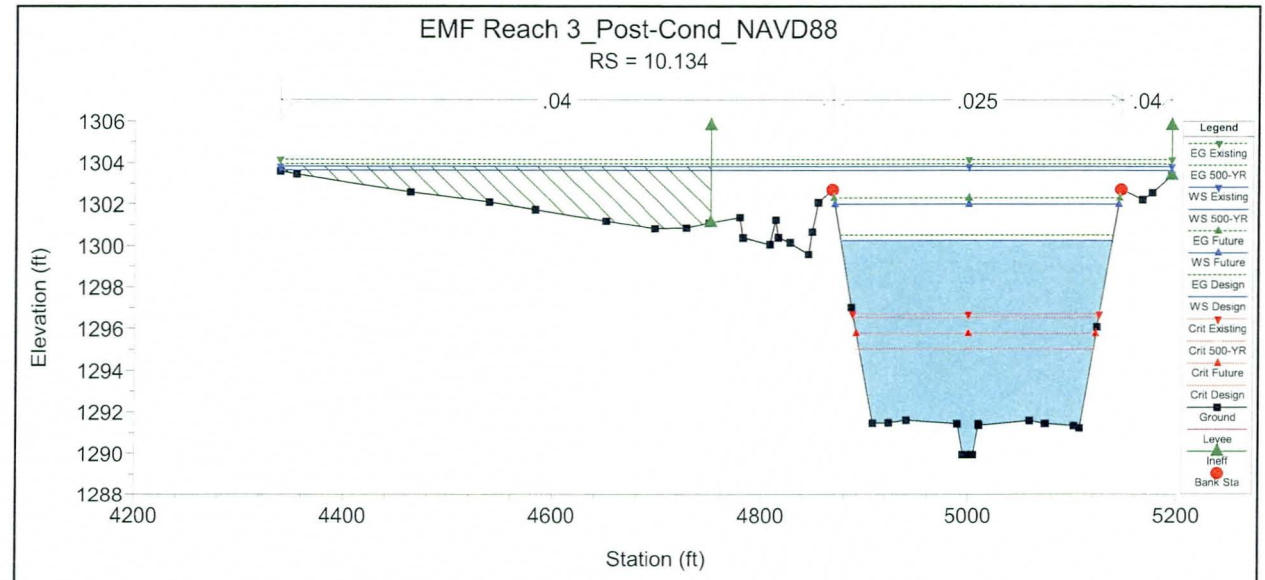
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Elevation (ft)
Station (ft)
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WS 500-YR
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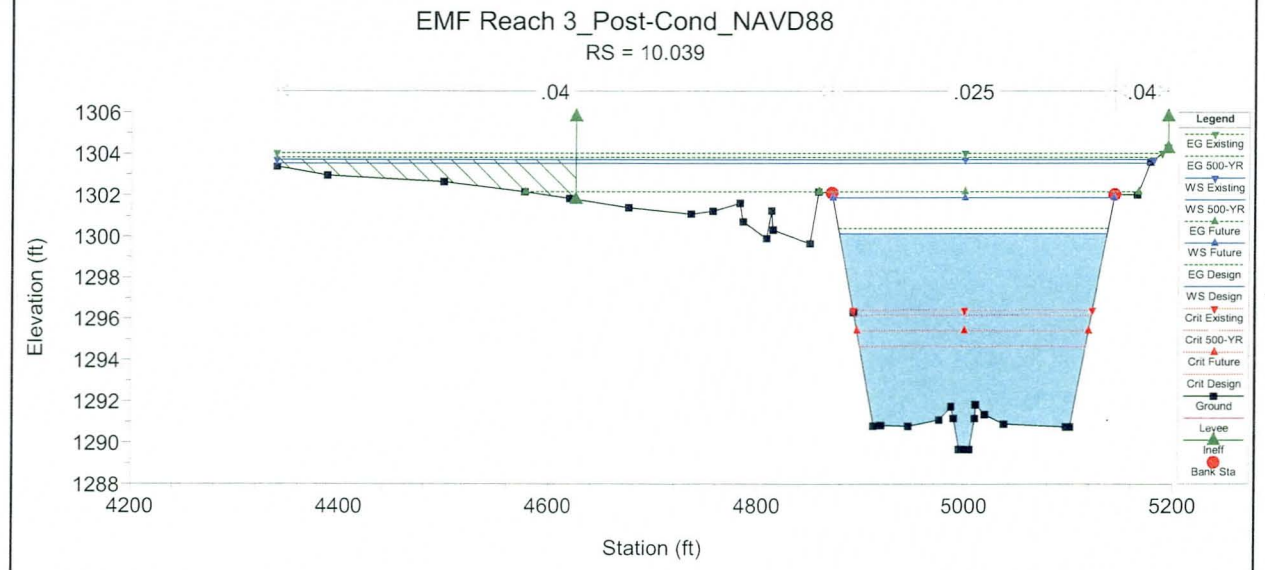
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Station (ft)
Legend
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WS 500-YR
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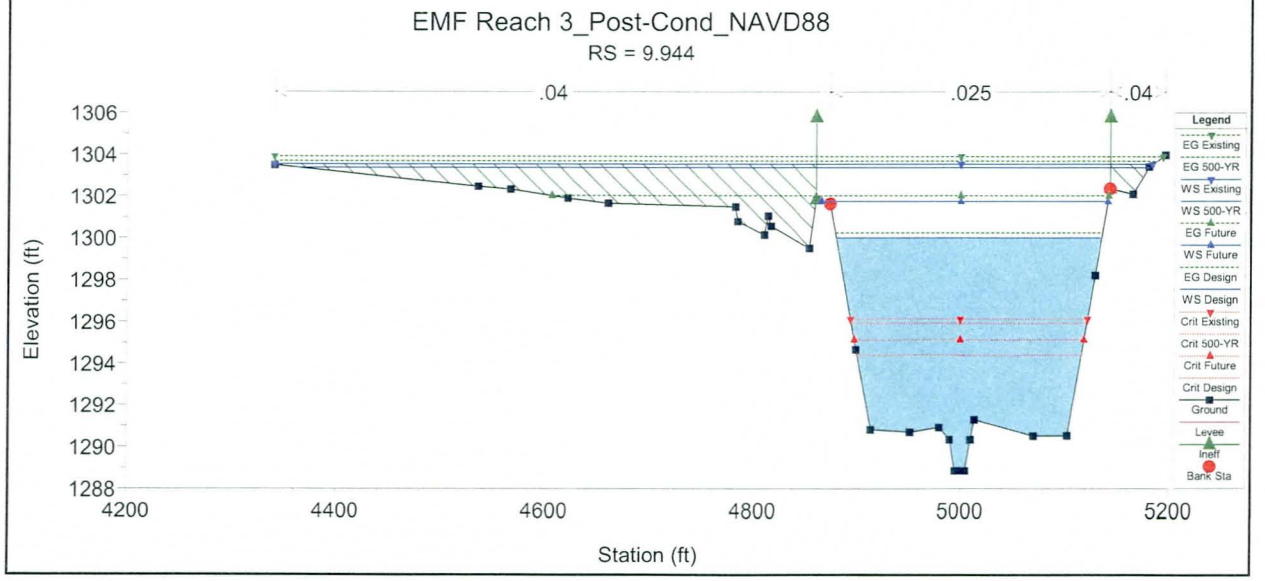
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Station (ft)
Legend
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EG 500-YR
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WS 500-YR
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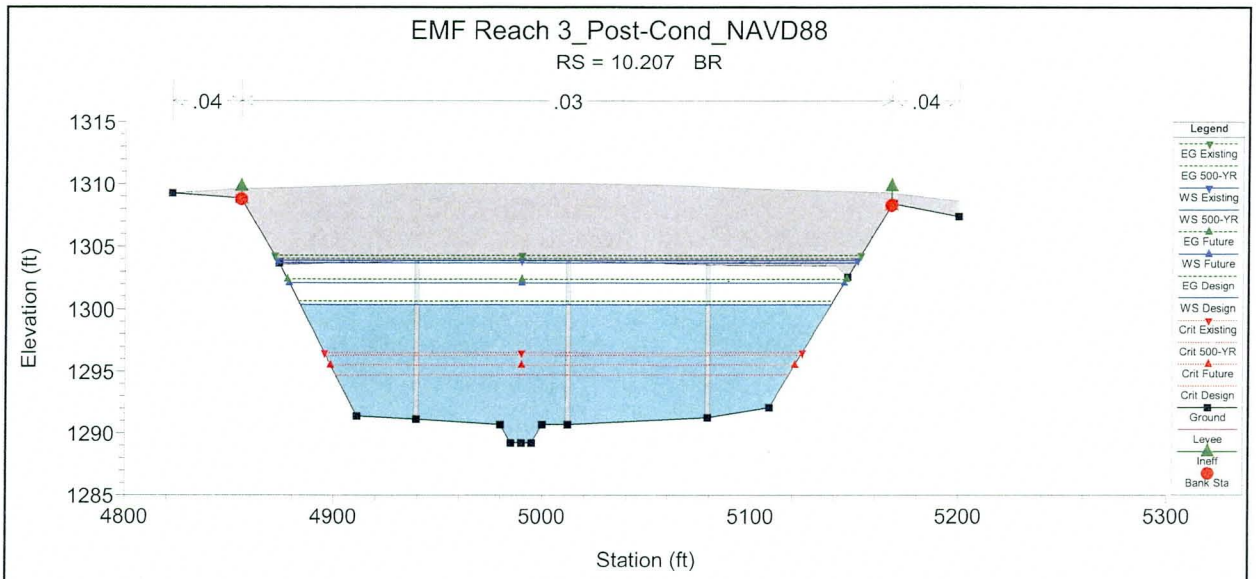
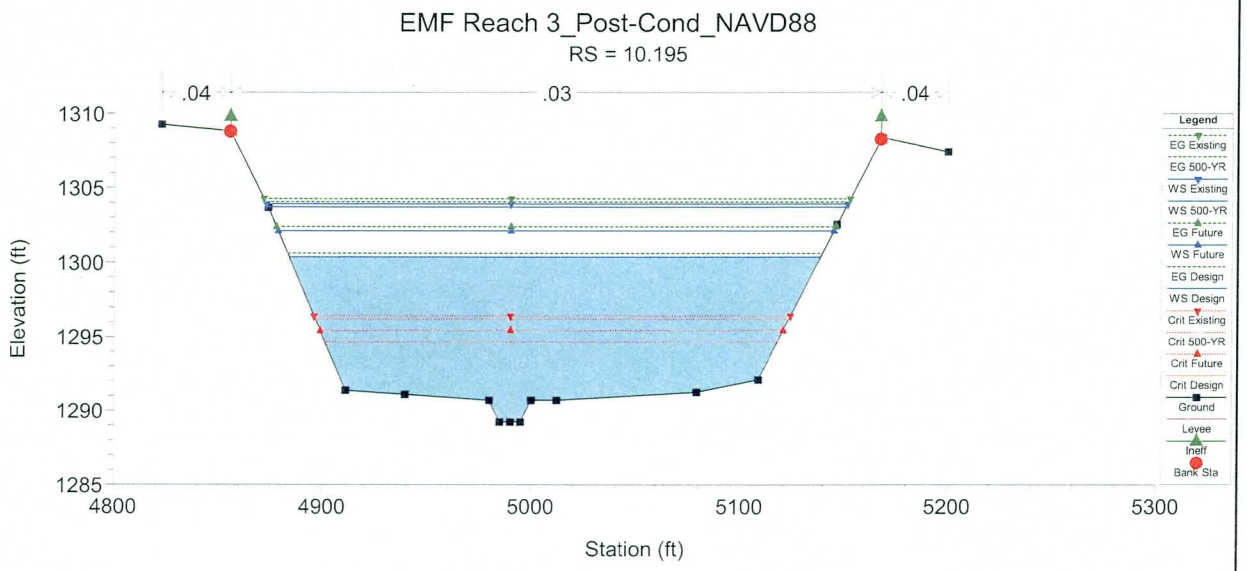
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 10.207 BR
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 10.195
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.03
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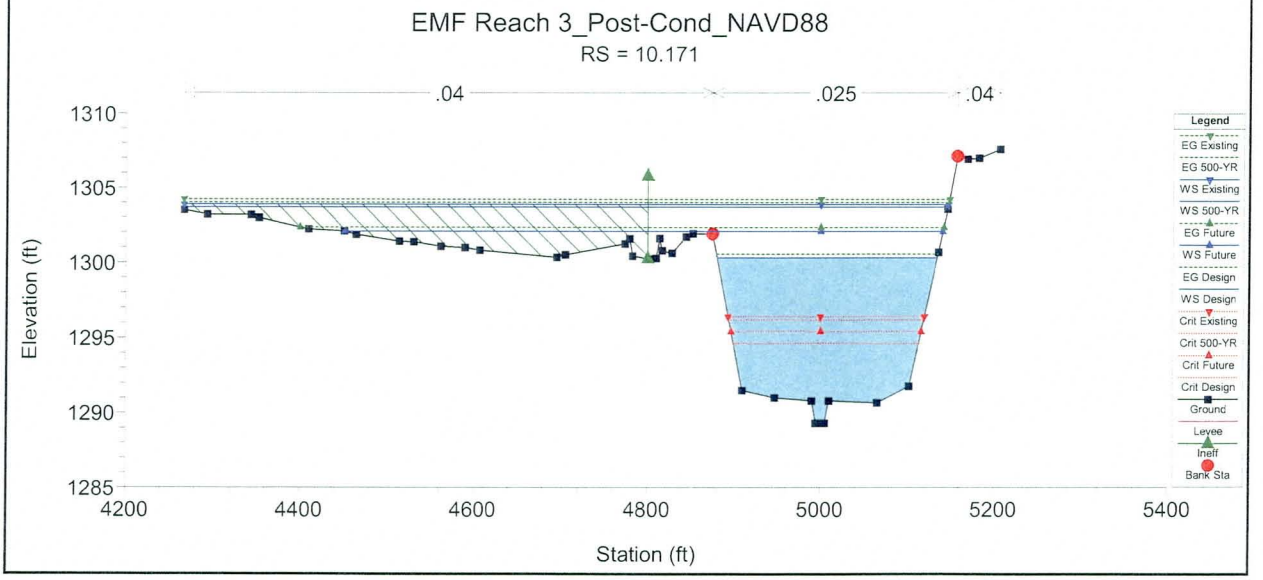
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
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.025
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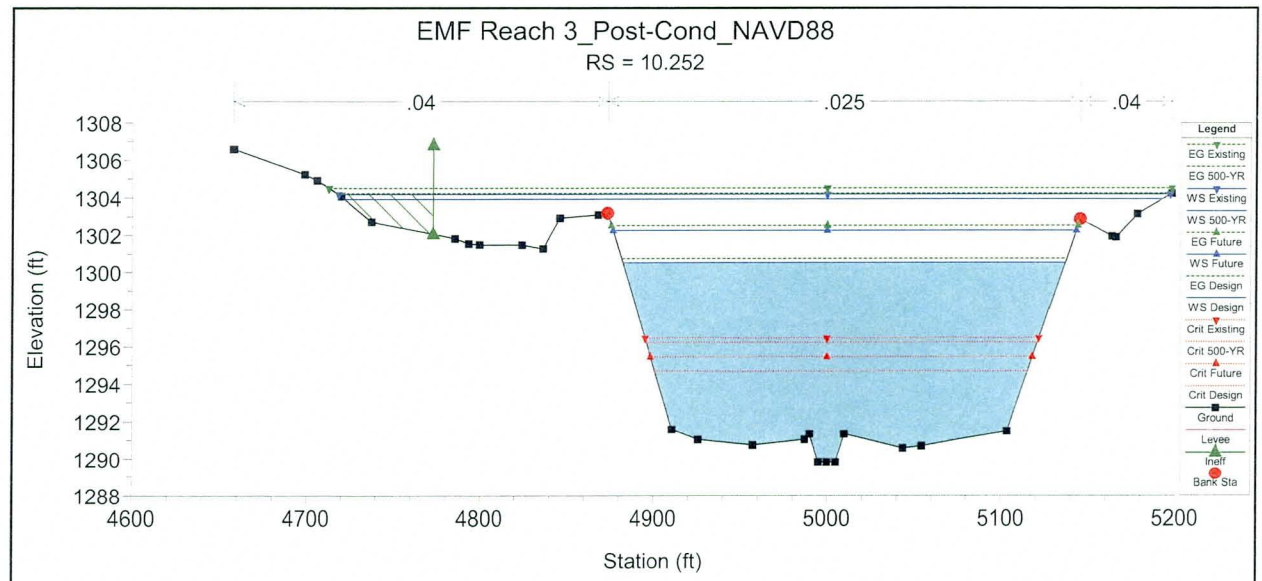
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 10.252
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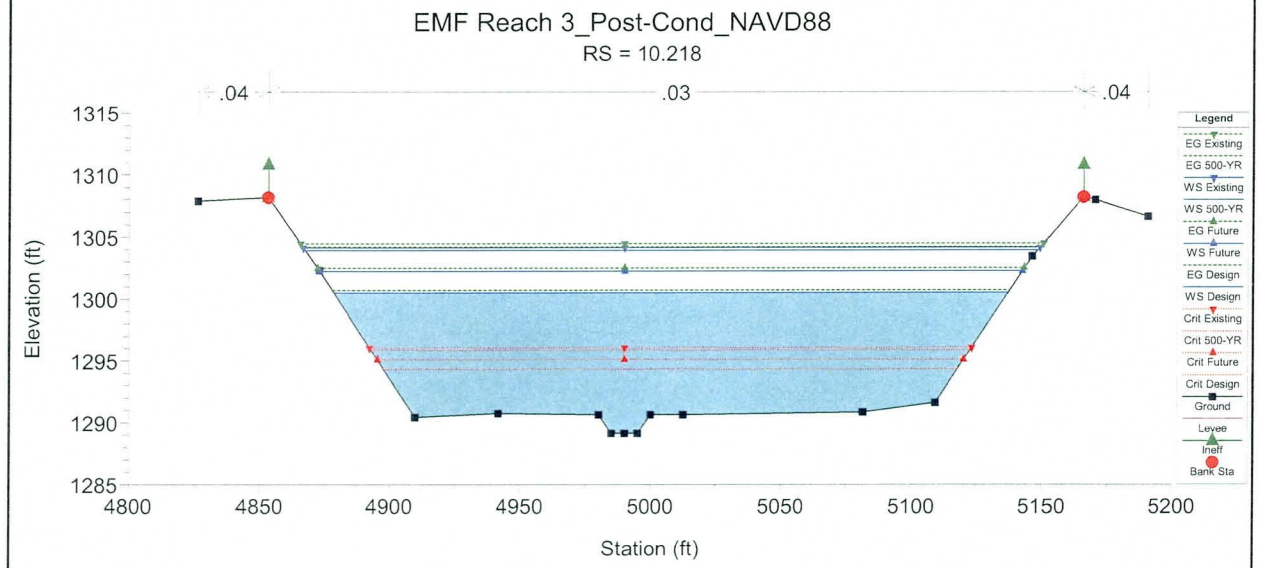
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 10.218
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.03
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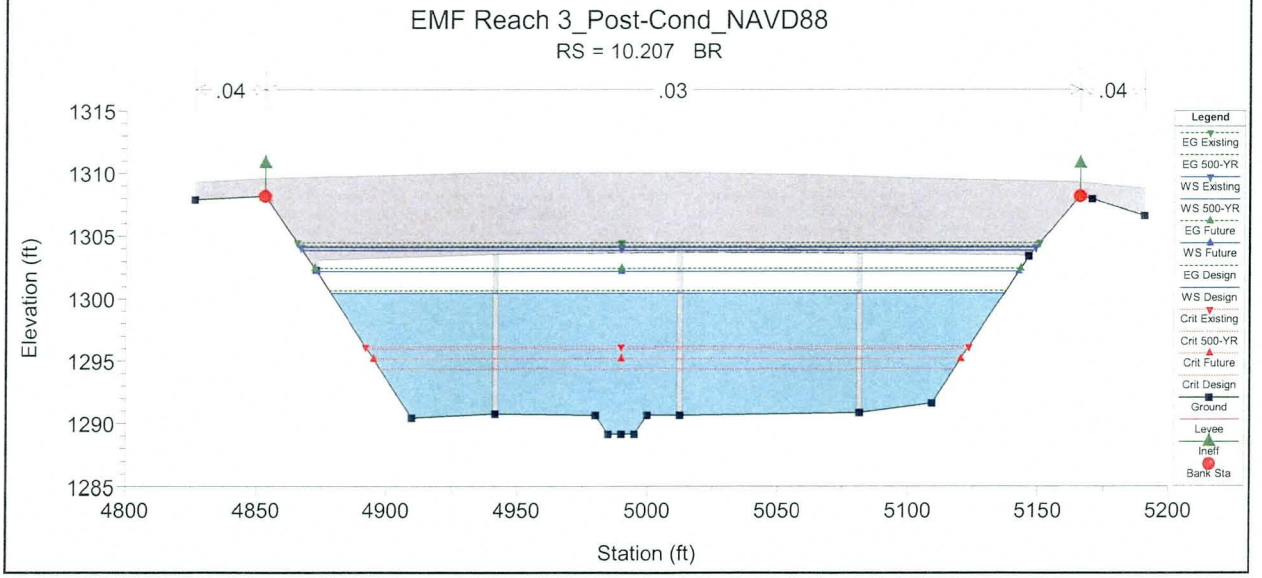
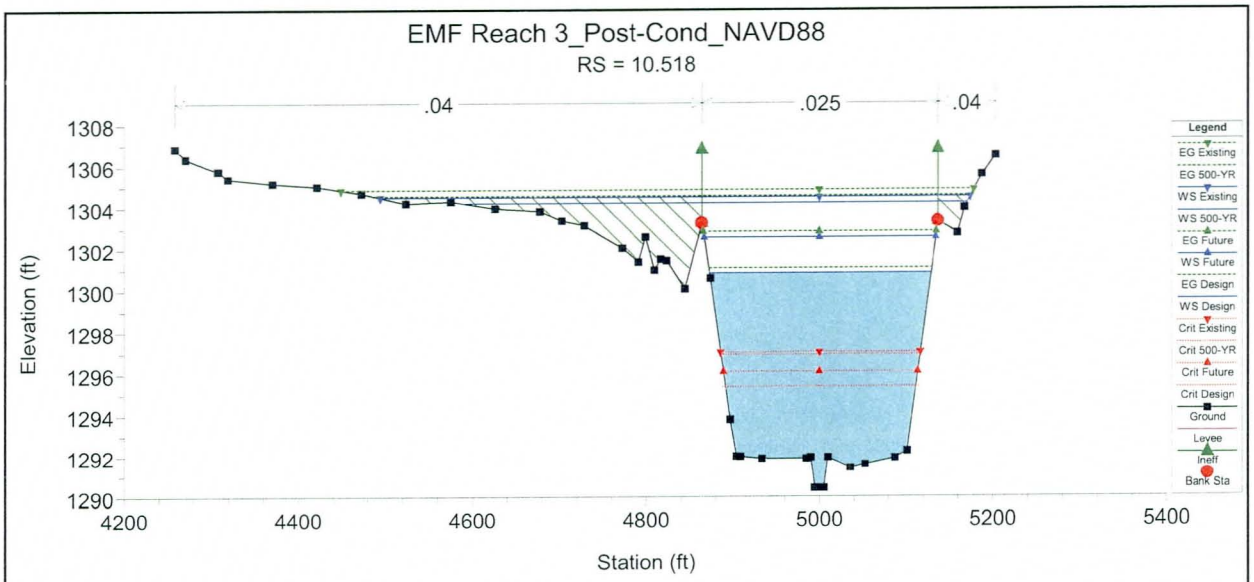
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 10.207 BR
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 10.518
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.025
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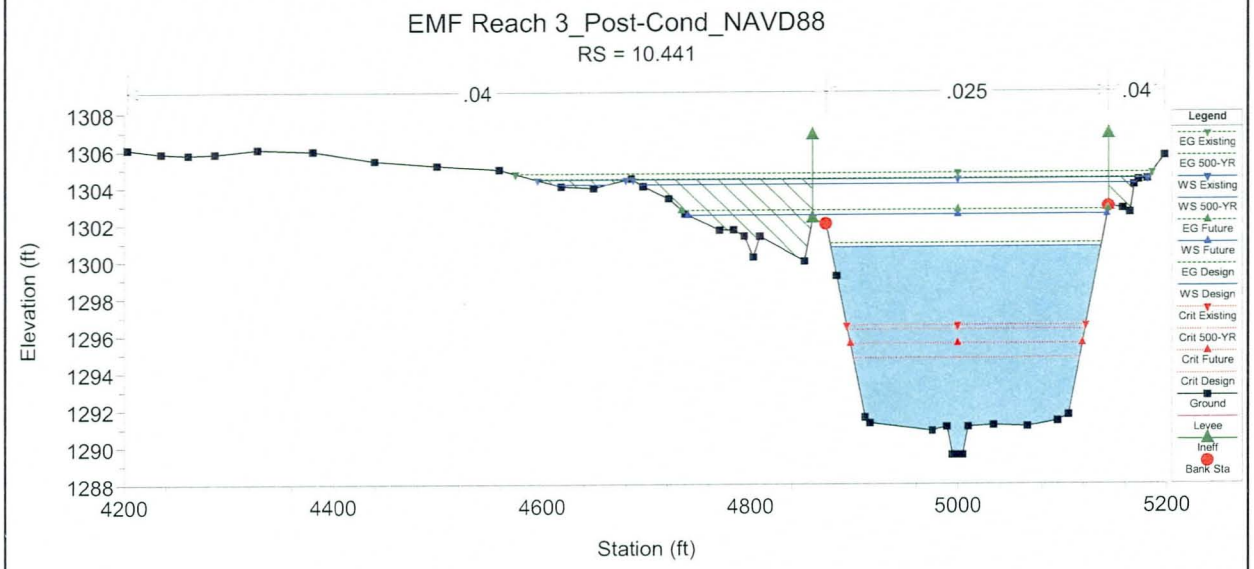
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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RS = 10.441
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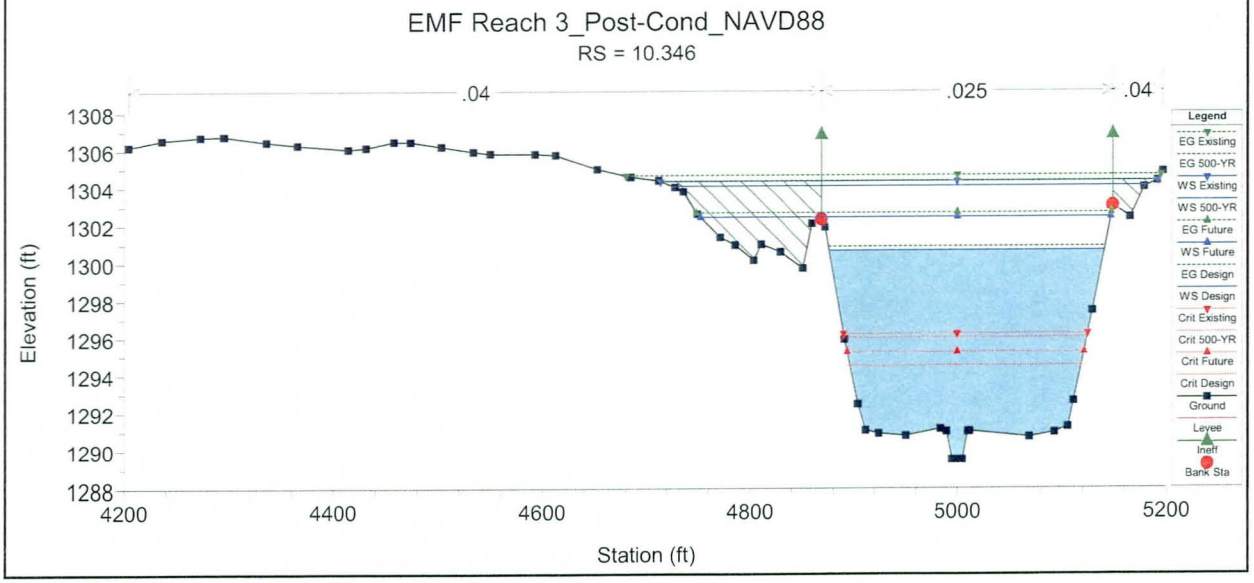
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
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WS 500-YR
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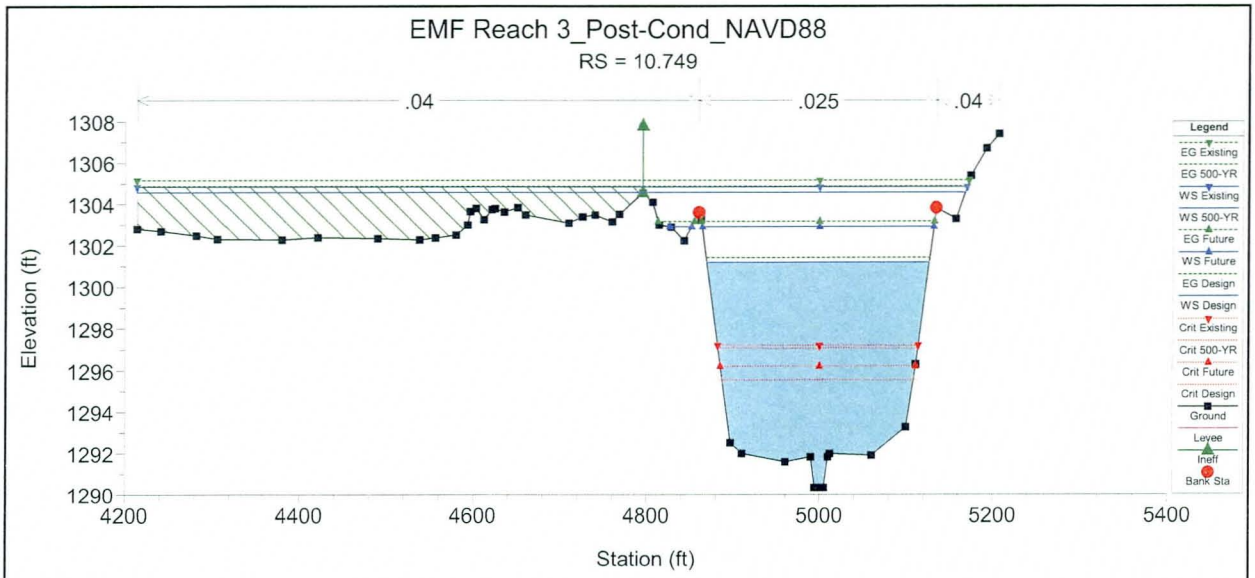
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta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RS = 10.749
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Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
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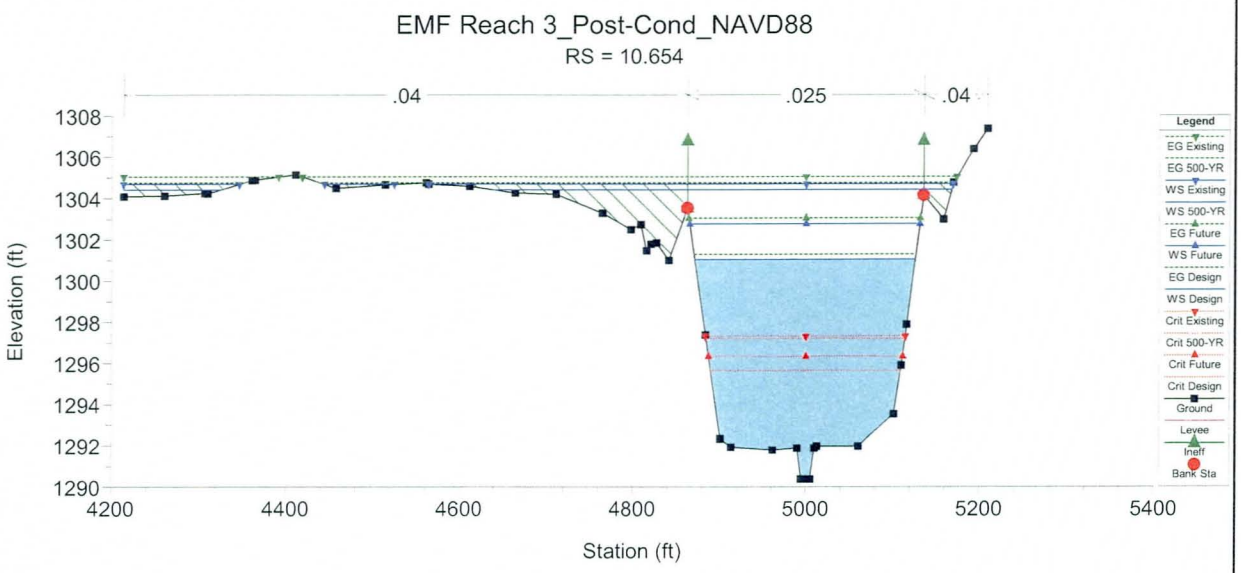
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 10.654
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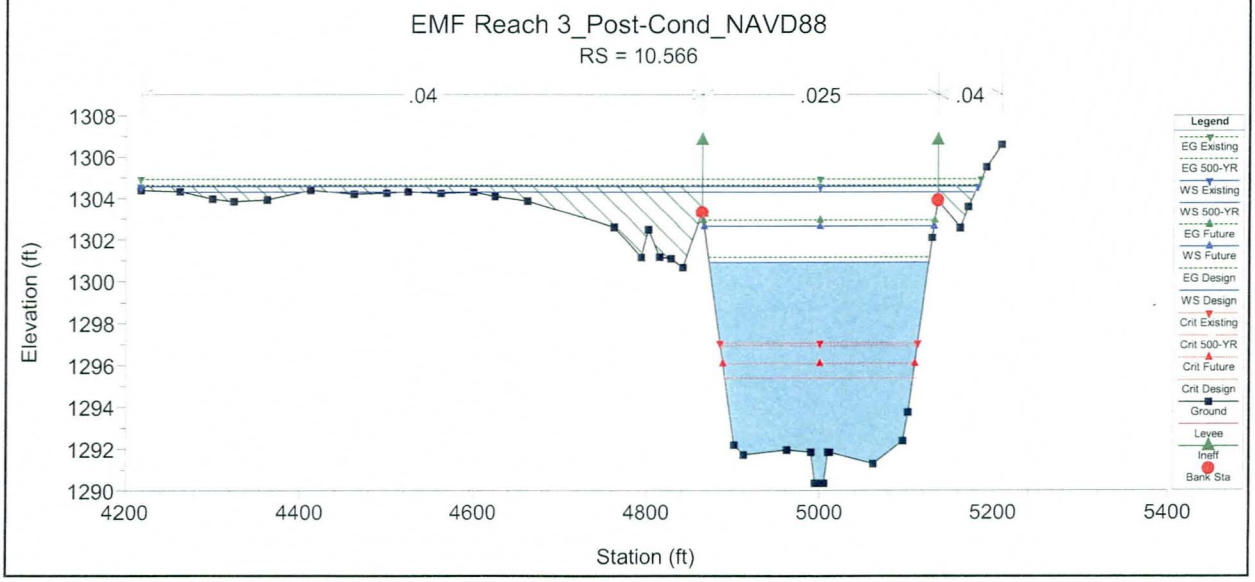
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 10.566
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Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
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WS 500-YR
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WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
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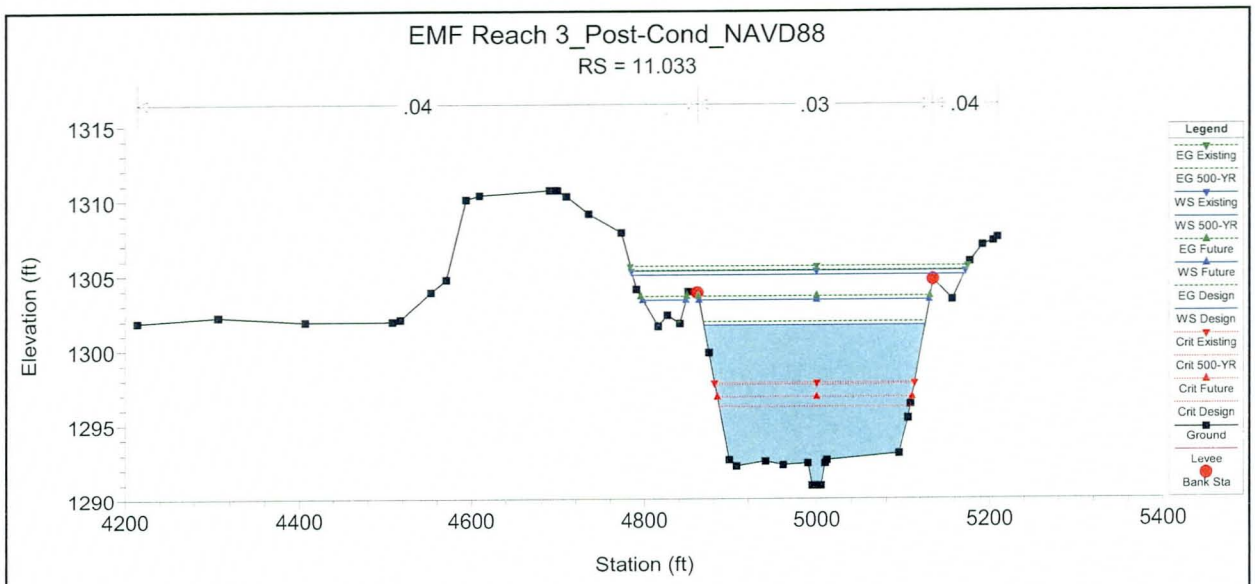
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
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Elevation (ft)
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1300
1295
1290
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4400
4600
4800
5000
5200
5400
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
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EG Future
WS Future
EG Design
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Crit Existing
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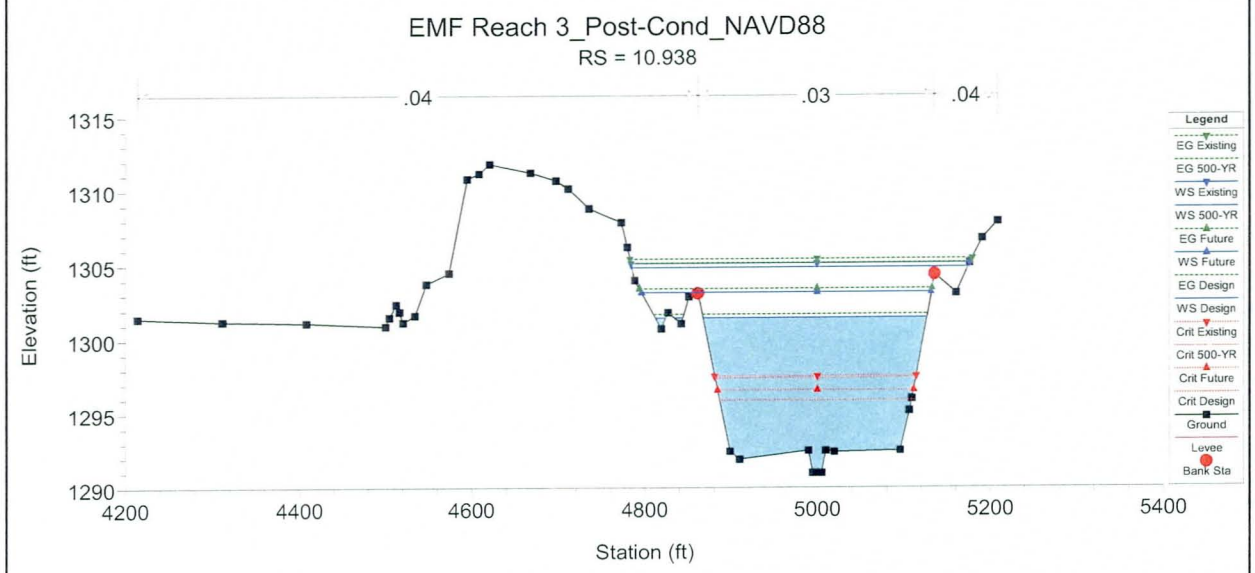
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
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.03
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Elevation (ft)
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1295
1290
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4800
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5200
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Station (ft)
Legend
EG Existing
EG 500-YR
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EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
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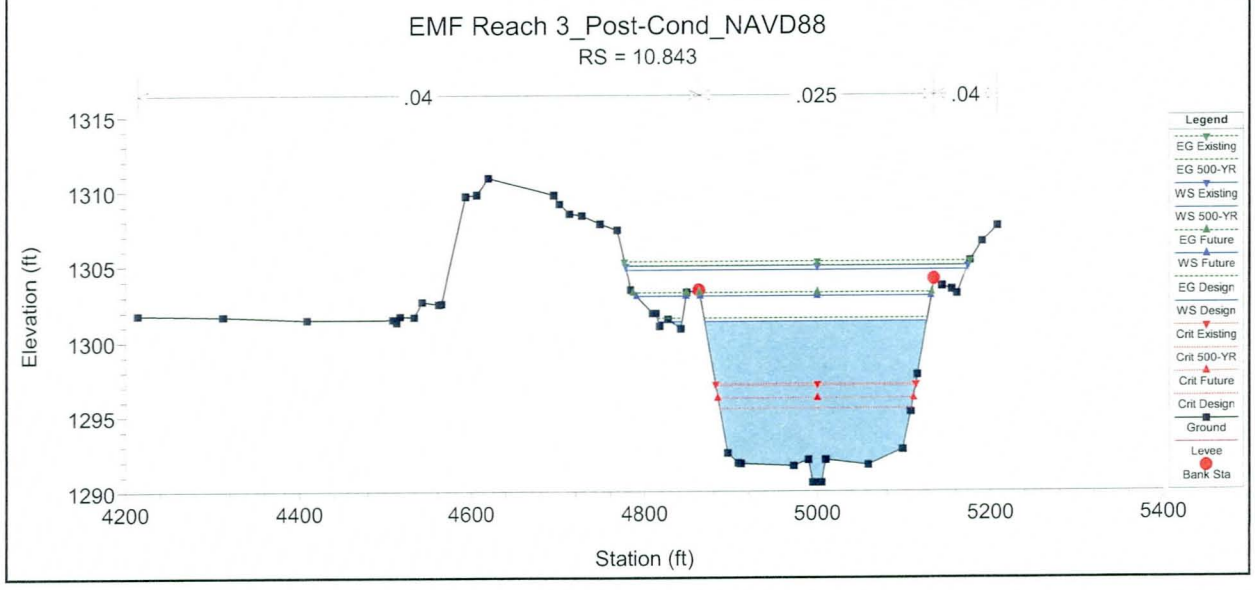
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
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Elevation (ft)
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1290
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4600
4800
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5200
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Station (ft)
Legend
EG Existing
EG 500-YR
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Crit 500-YR
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Crit Design
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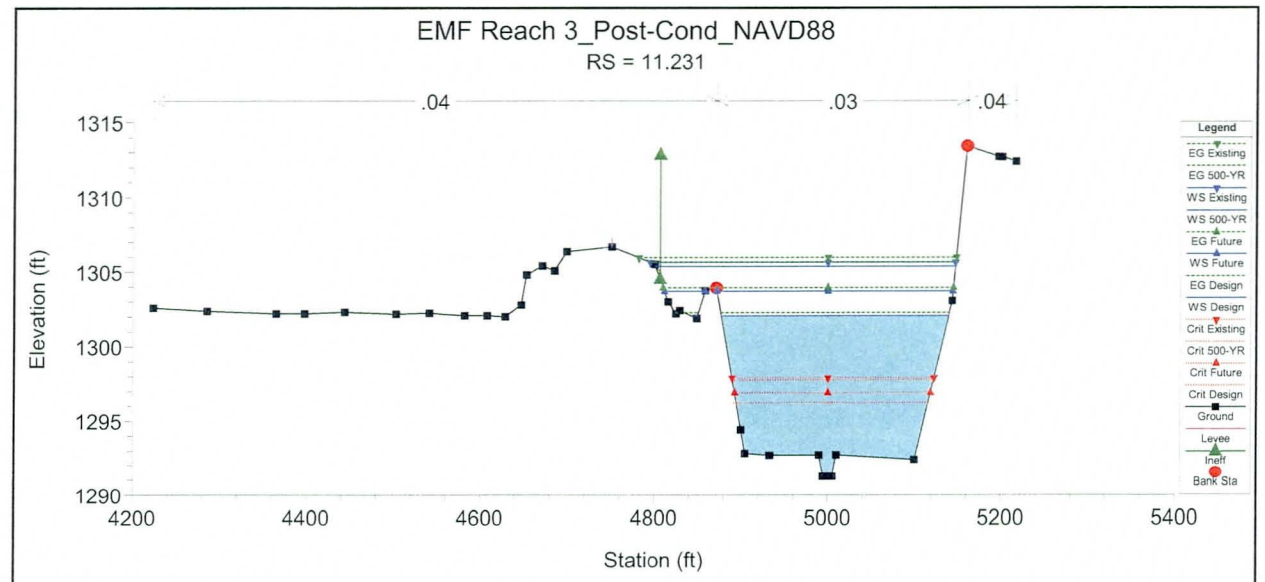
Levee
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
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.03
.04
Elevation (ft)
Station (ft)
Legend
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EG 500-YR
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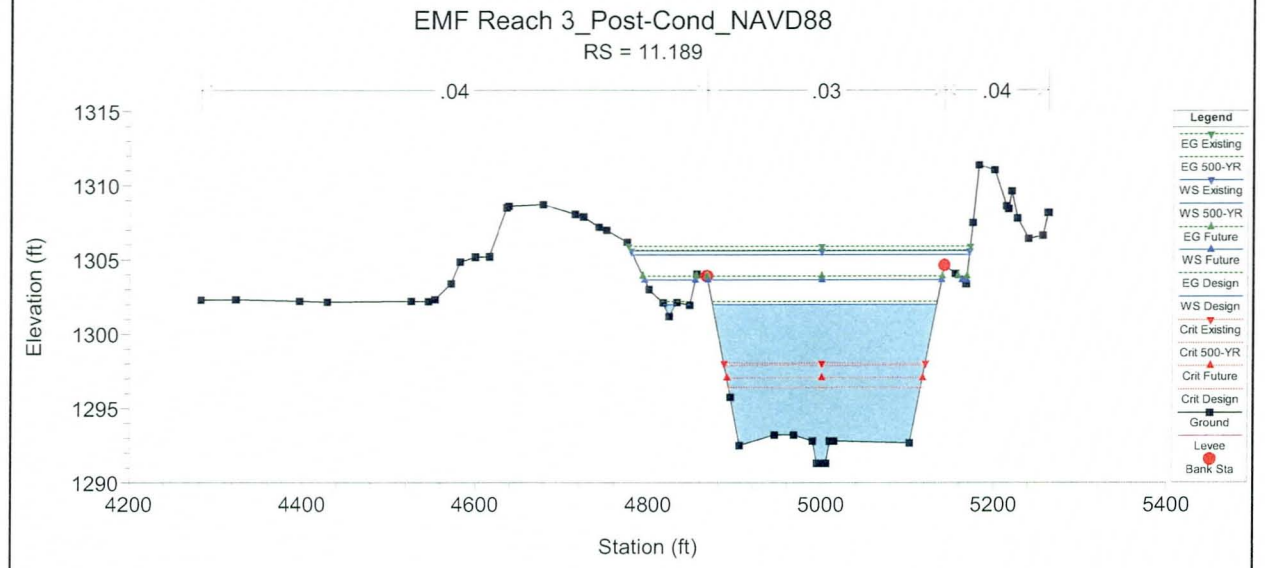
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
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Station (ft)
Legend
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Crit Existing
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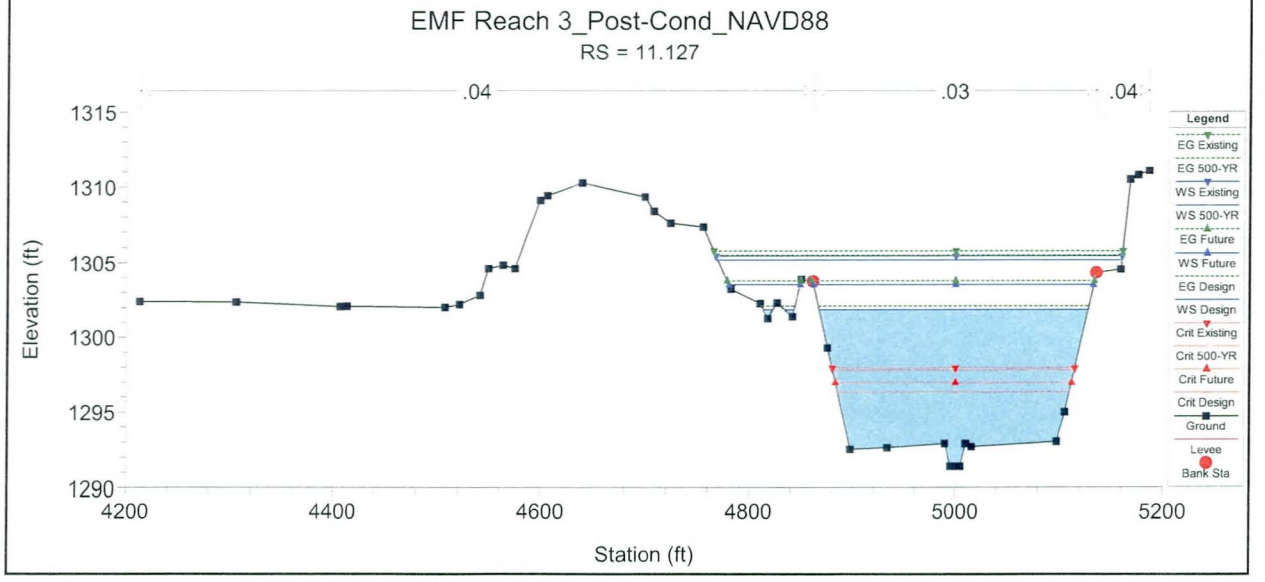
Crit Future
Crit Design
Ground
Levee
Bank Sta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Station (ft)
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Levee
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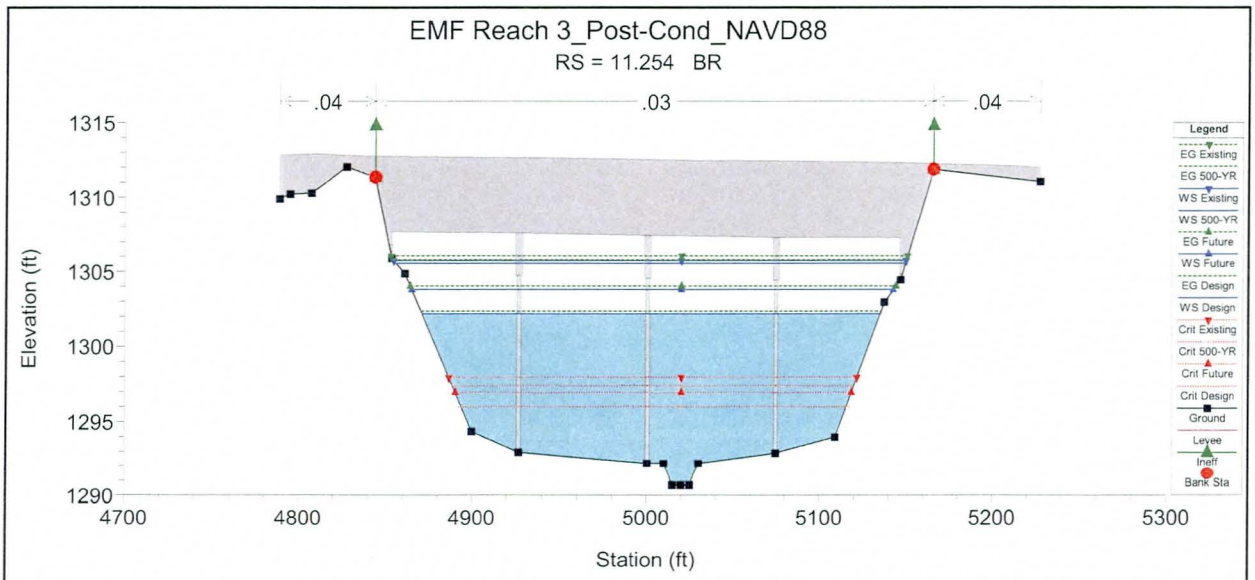
EMF Reach 3_Post-Cond_NAVD88
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Station (ft)
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WS Future
EG Design
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Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
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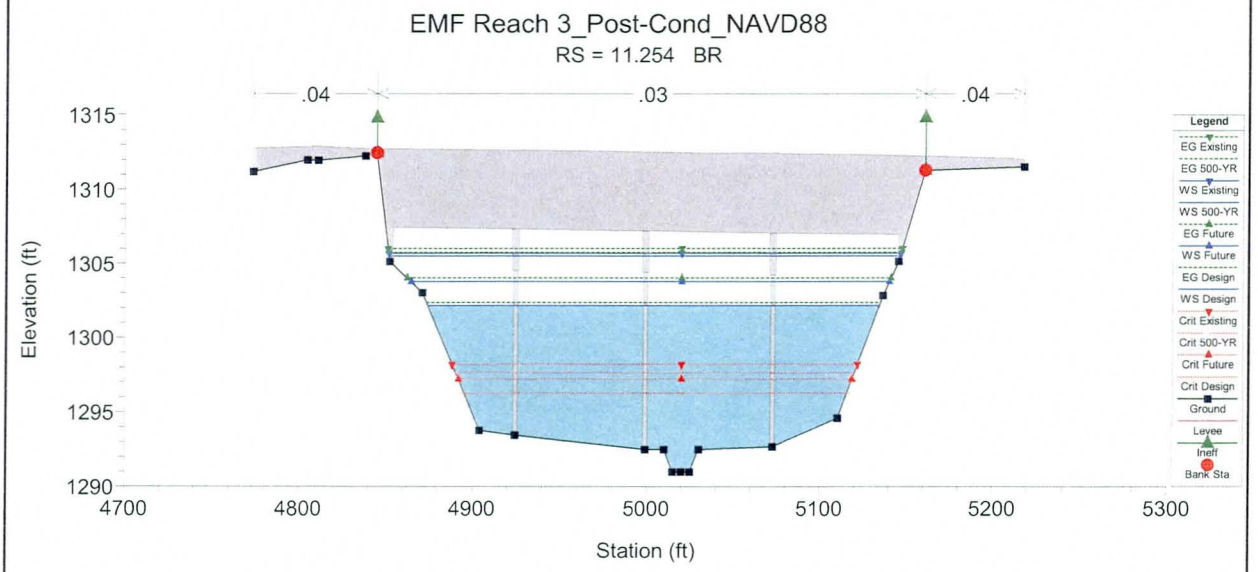
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 11.254 BR
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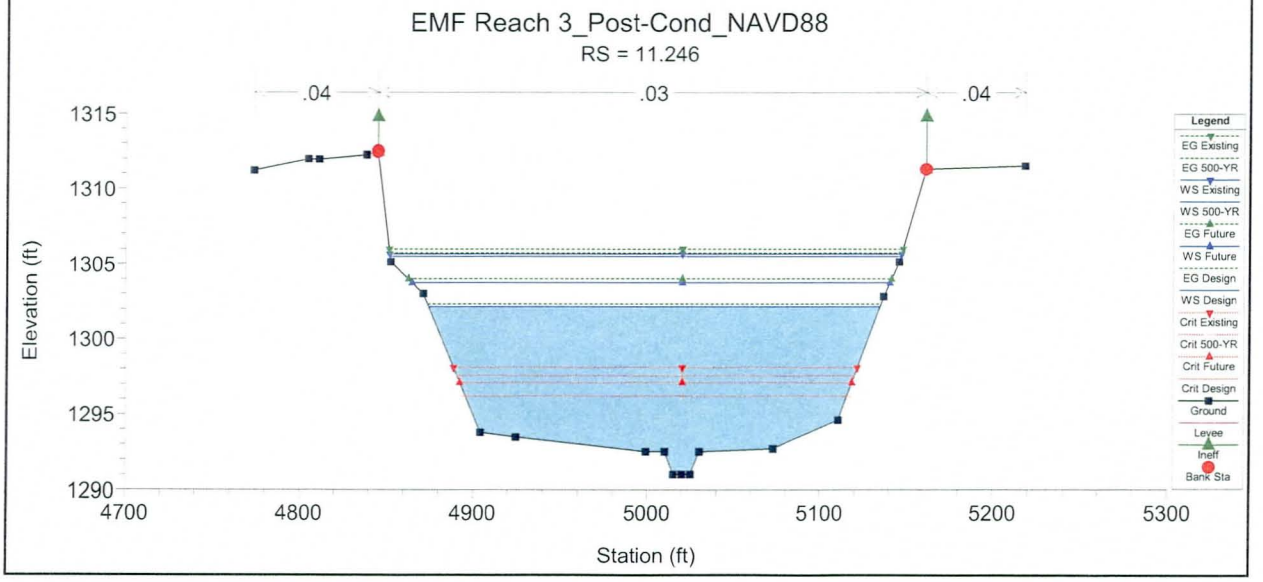
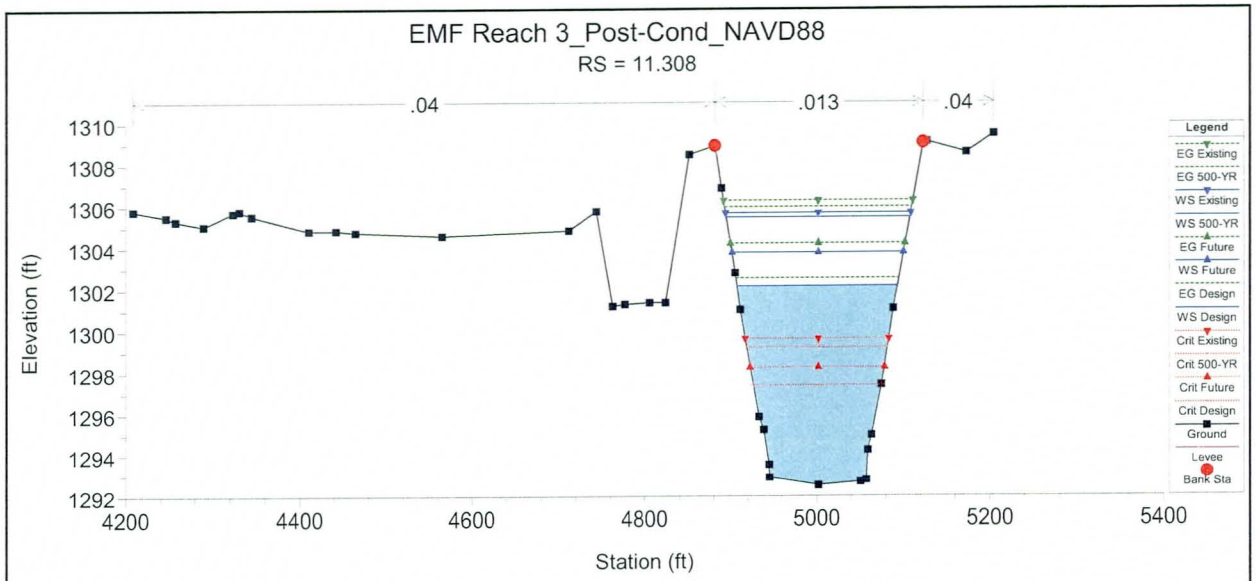
.03
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 11.246
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 11.308
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.013
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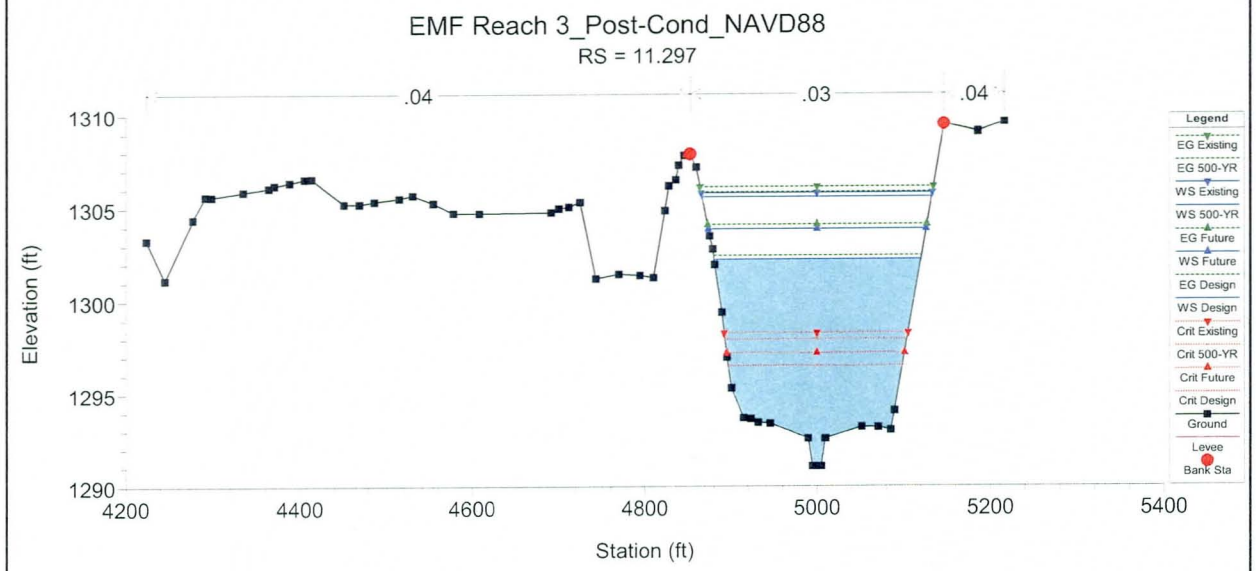
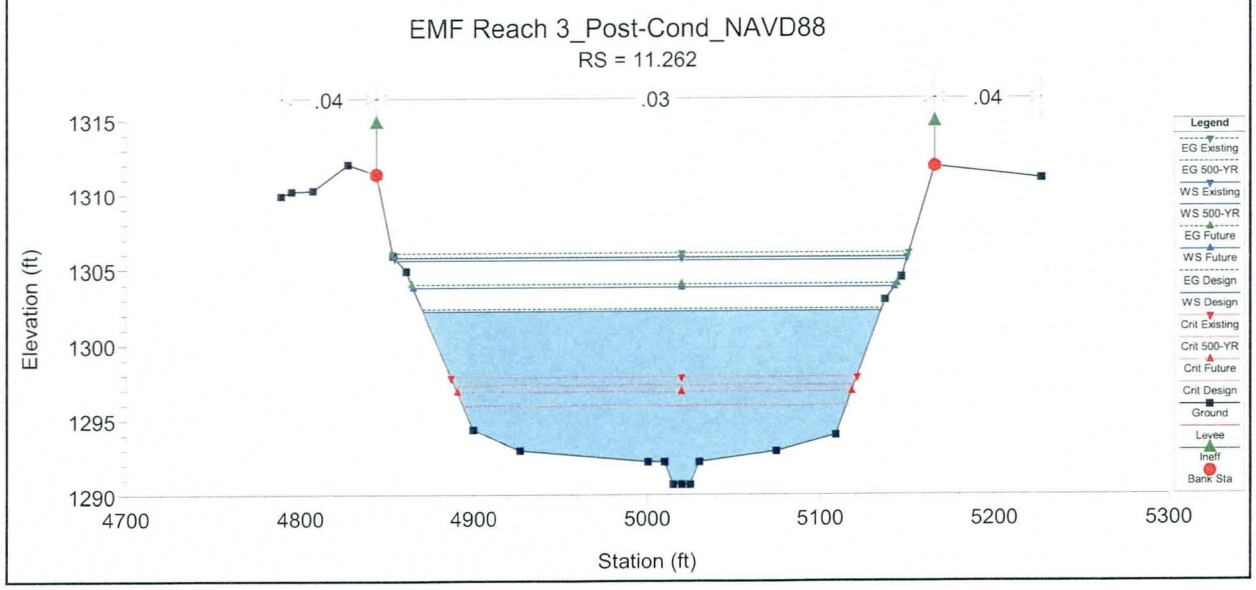
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 11.297
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 11.262
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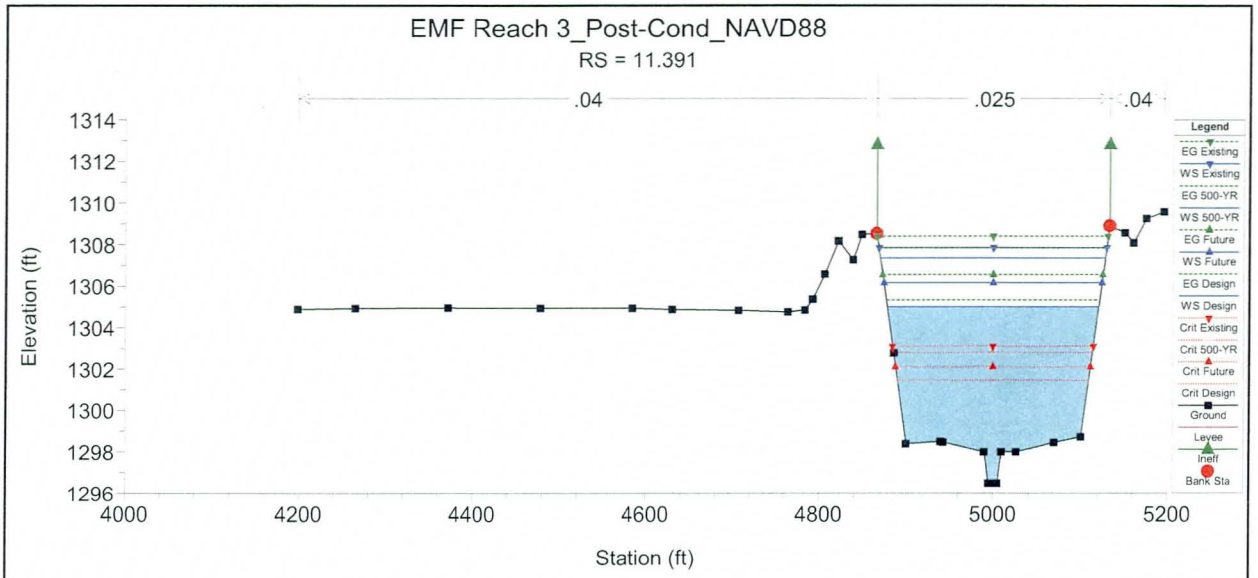
.03
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 11.391
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.025
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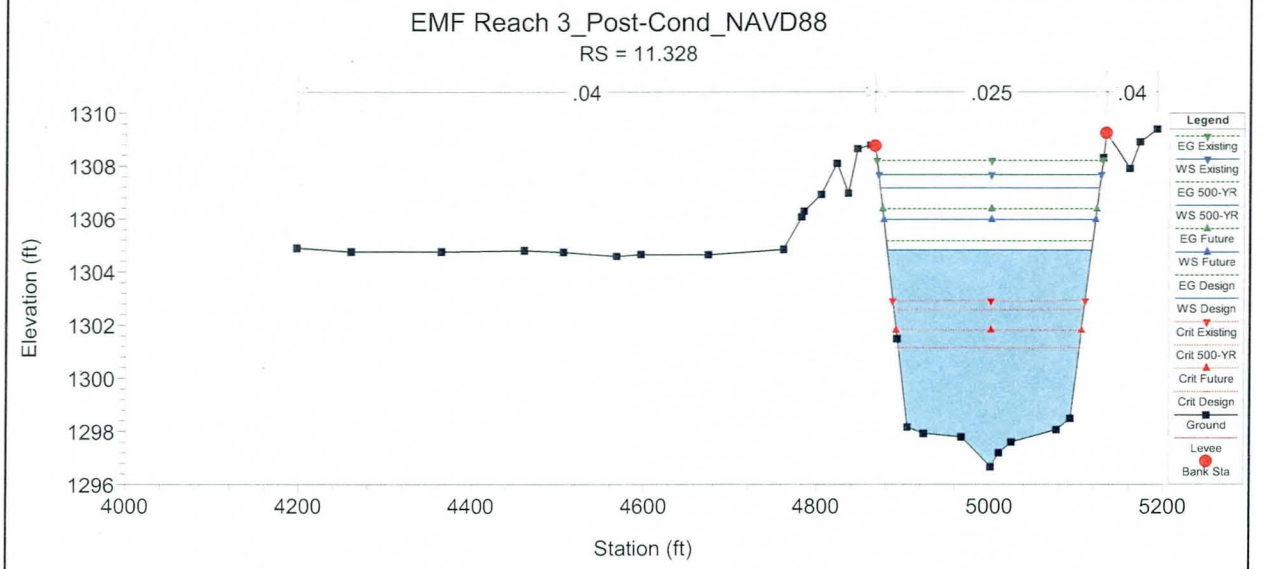
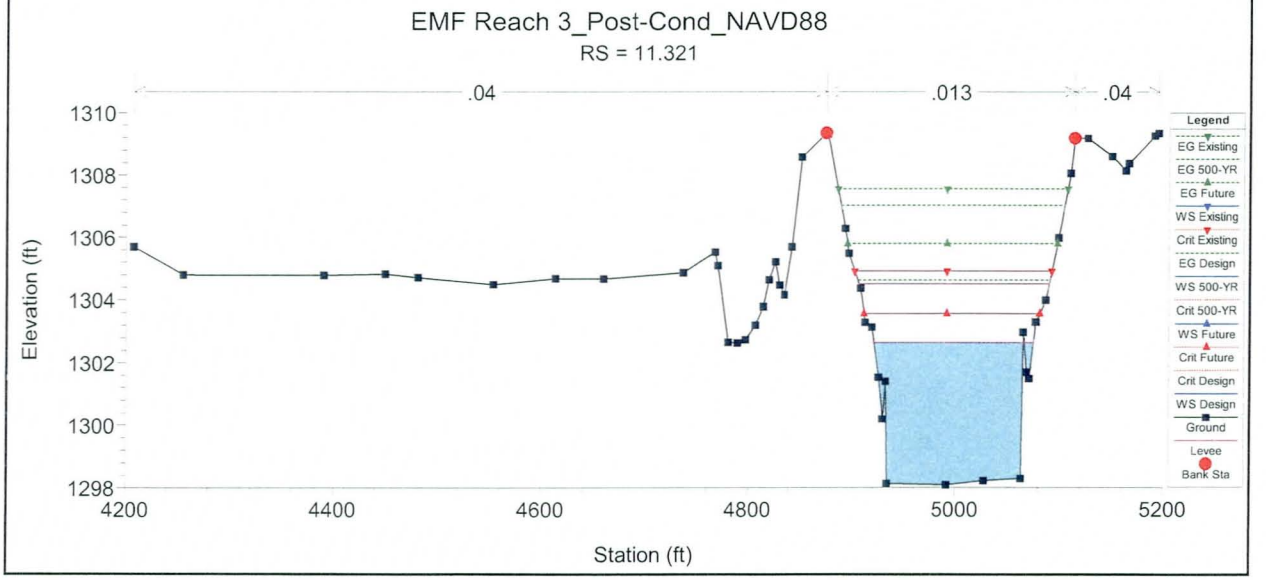
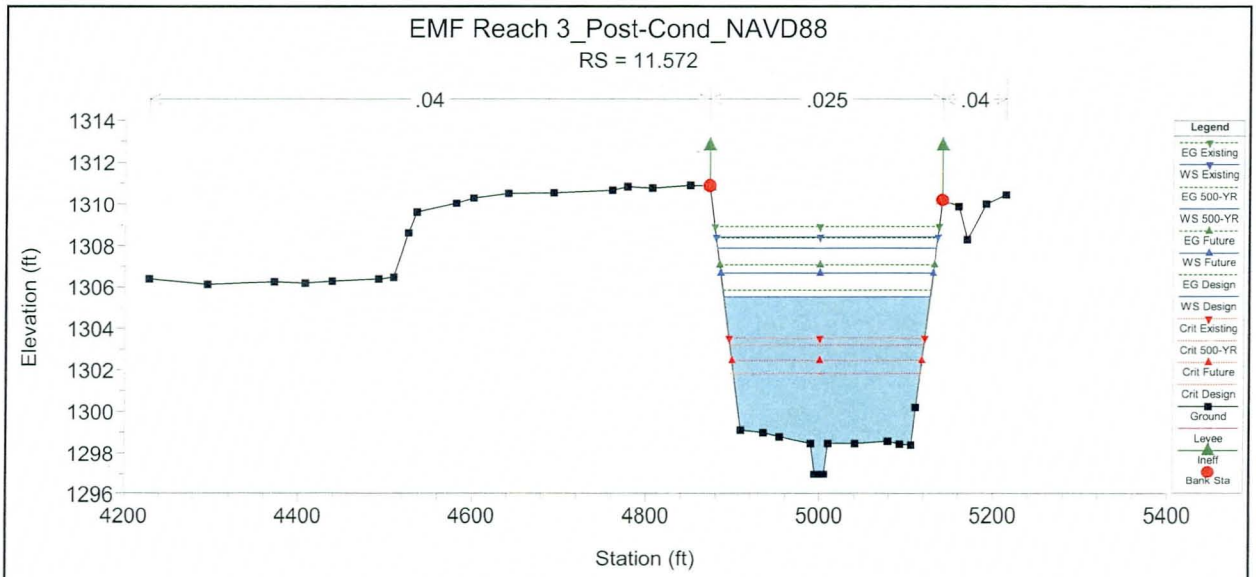
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 11.328
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 11.321
.04
.013
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
EG 500-YR
EG Future
WS Existing
Crit Existing
EG Design
WS 500-YR
Crit 500-YR
WS Future
Crit Future
Crit Design
WS Design
Ground
Levee
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 11.572
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.025
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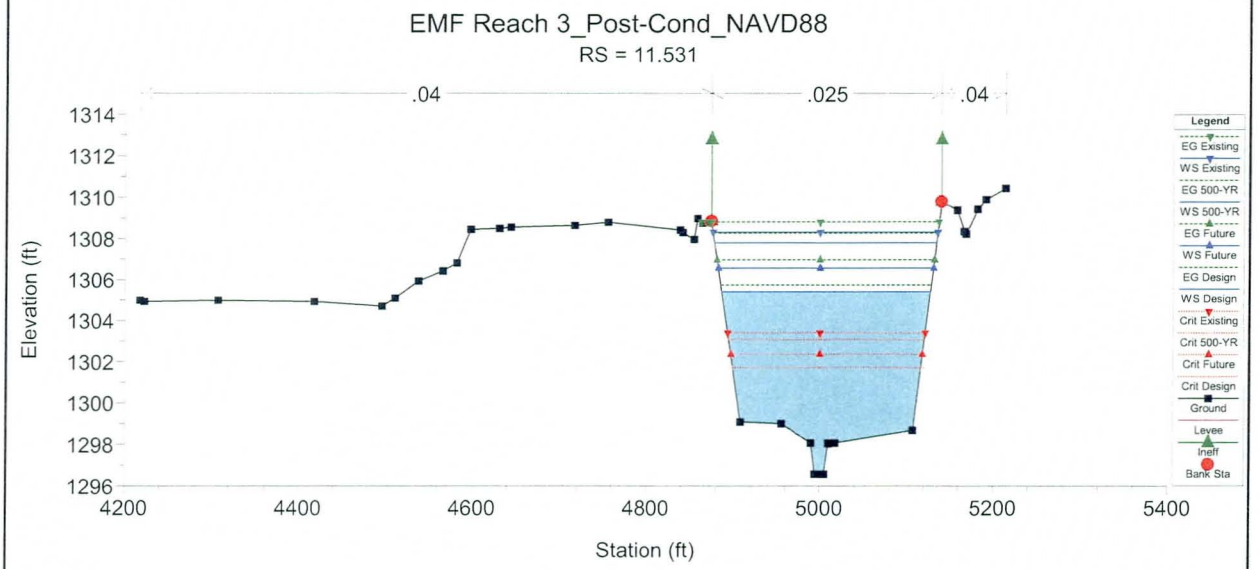
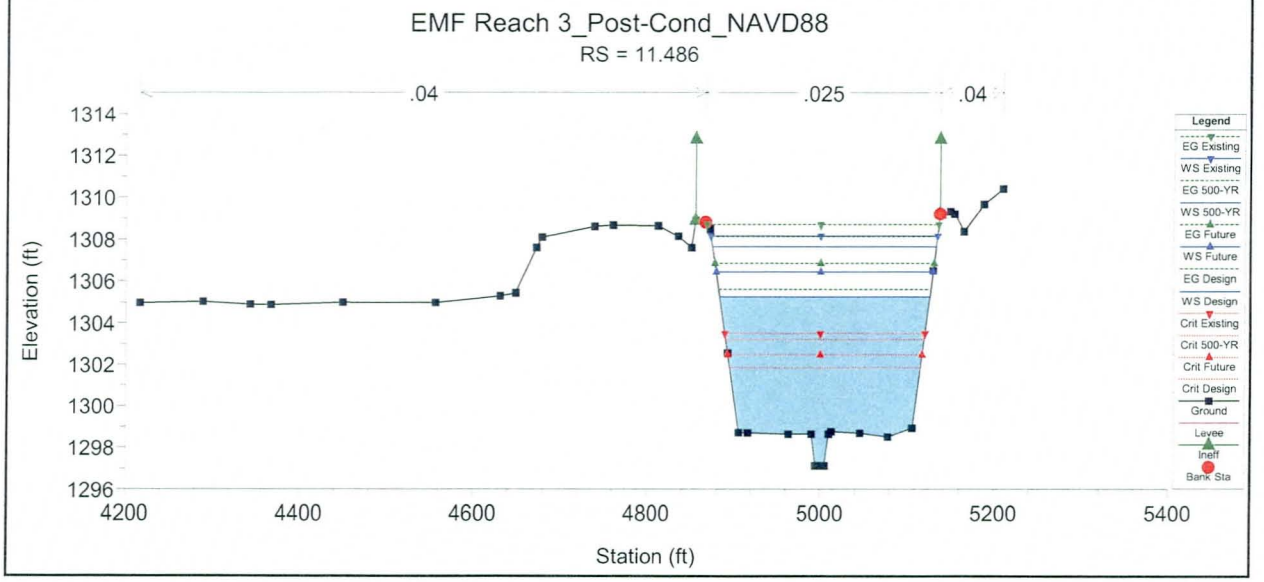
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 11.531
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 11.486
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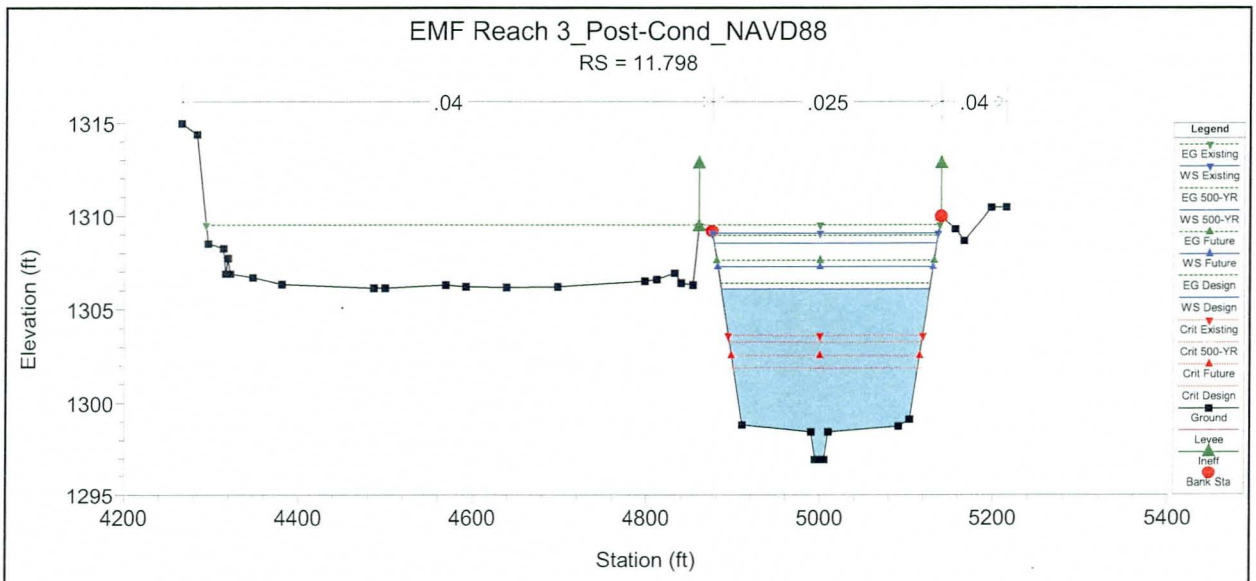
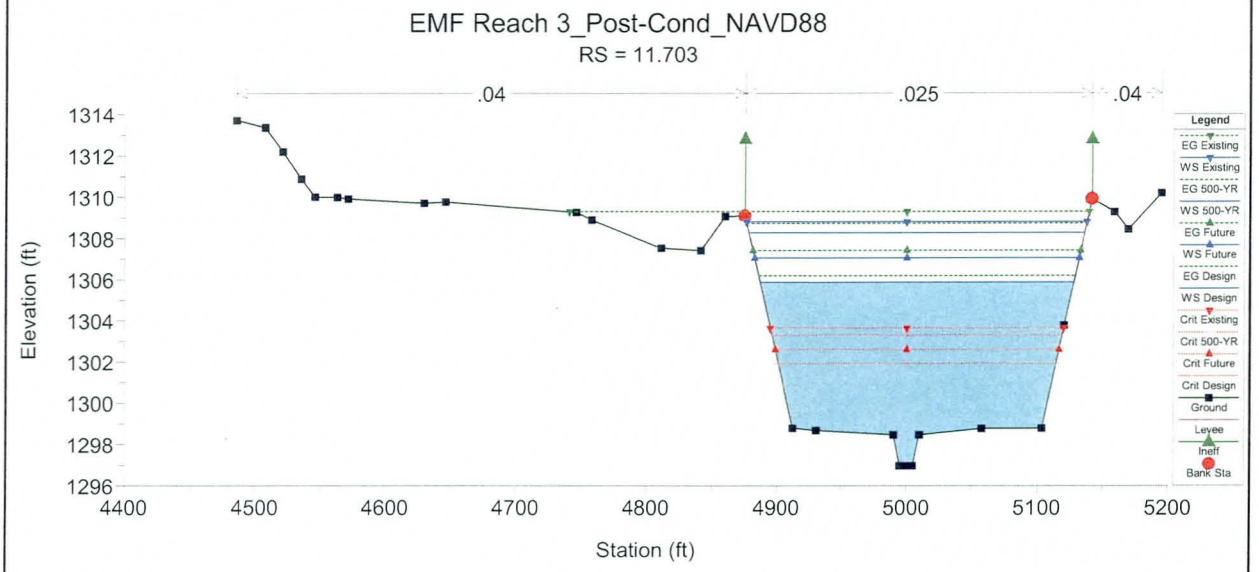
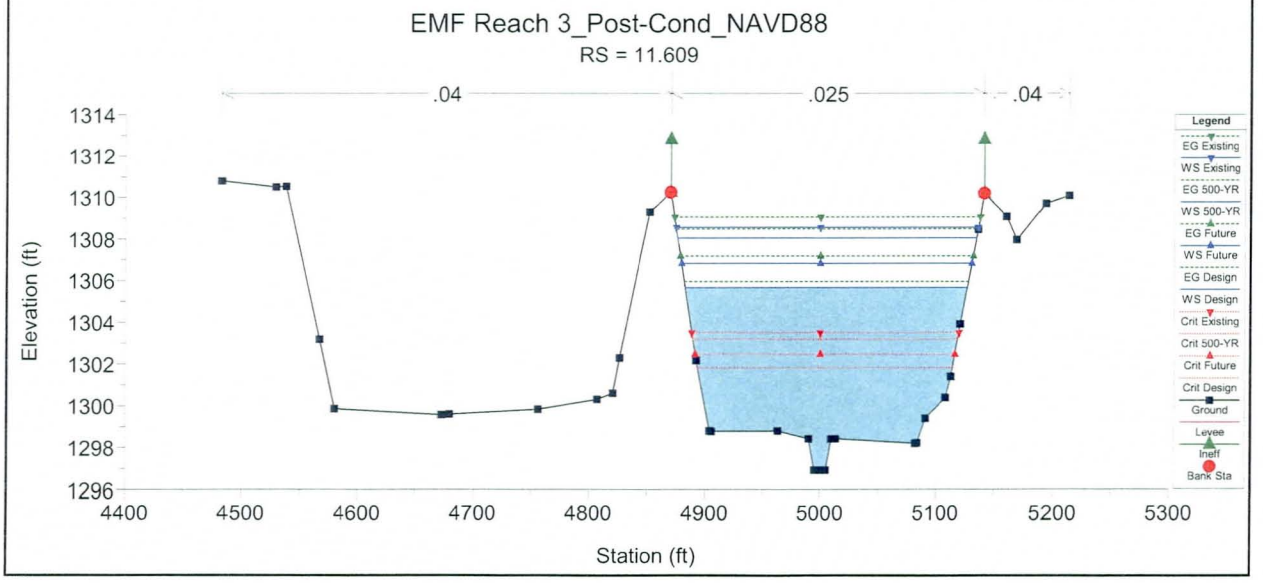
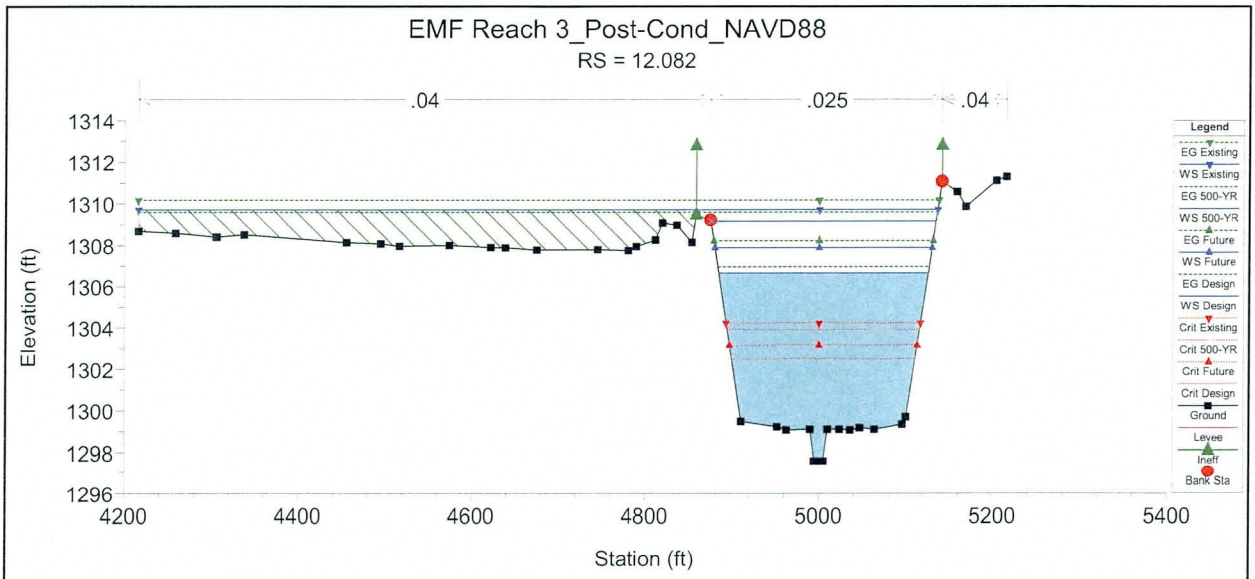
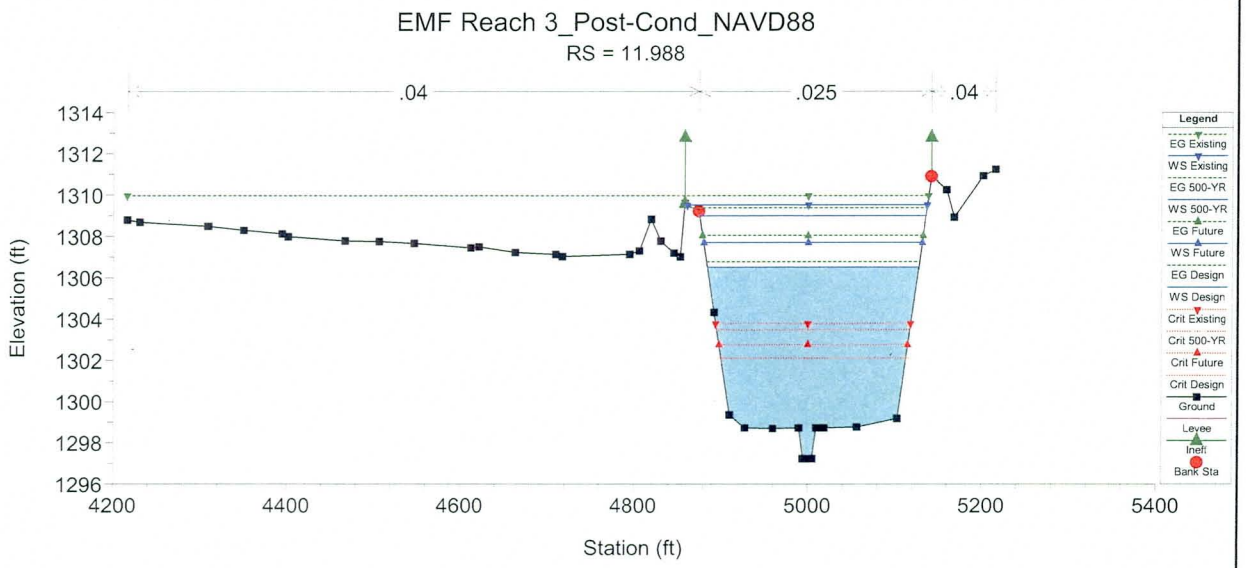
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

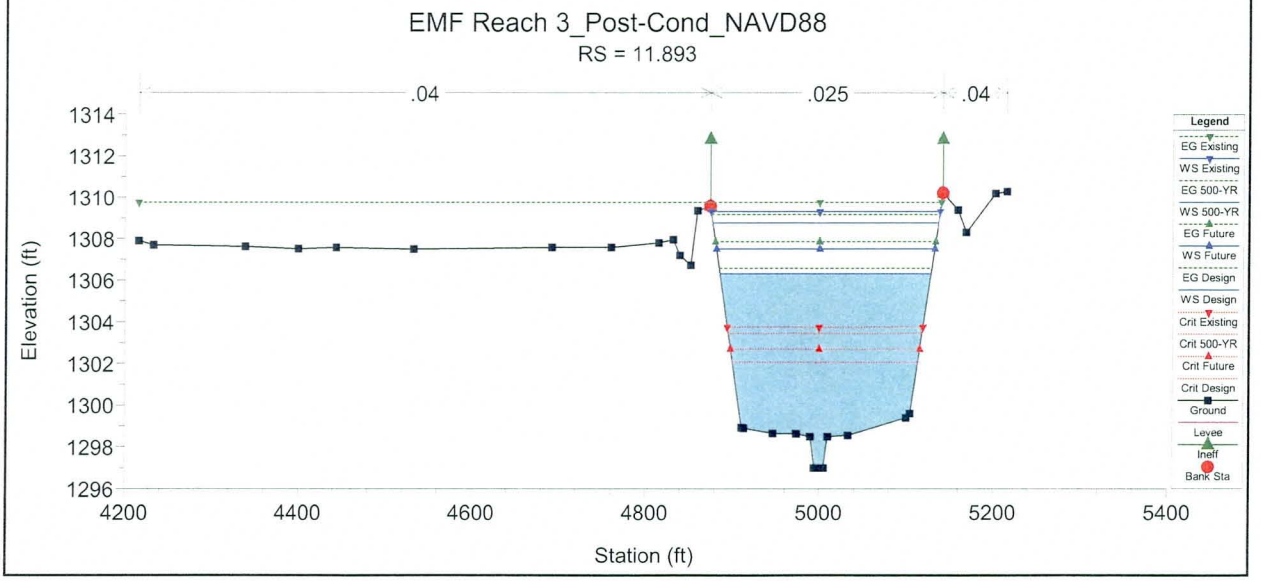

EMF Reach 3_Post-Cond_NAVD88
RS = 11.798
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

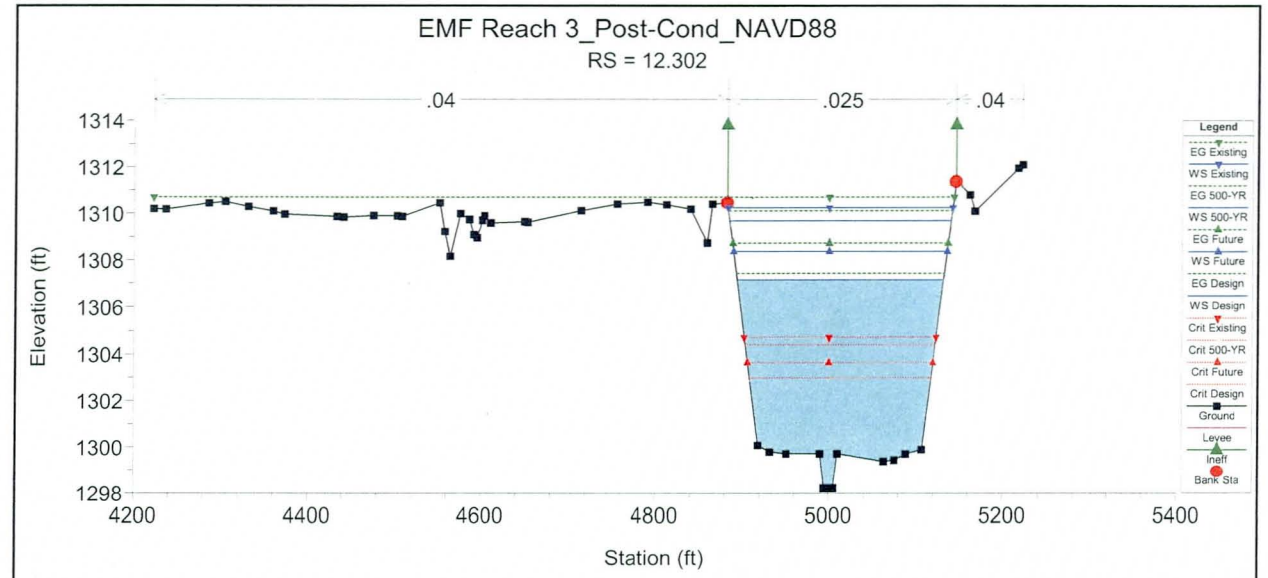

EMF Reach 3_Post-Cond_NAVD88
RS = 11.703
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

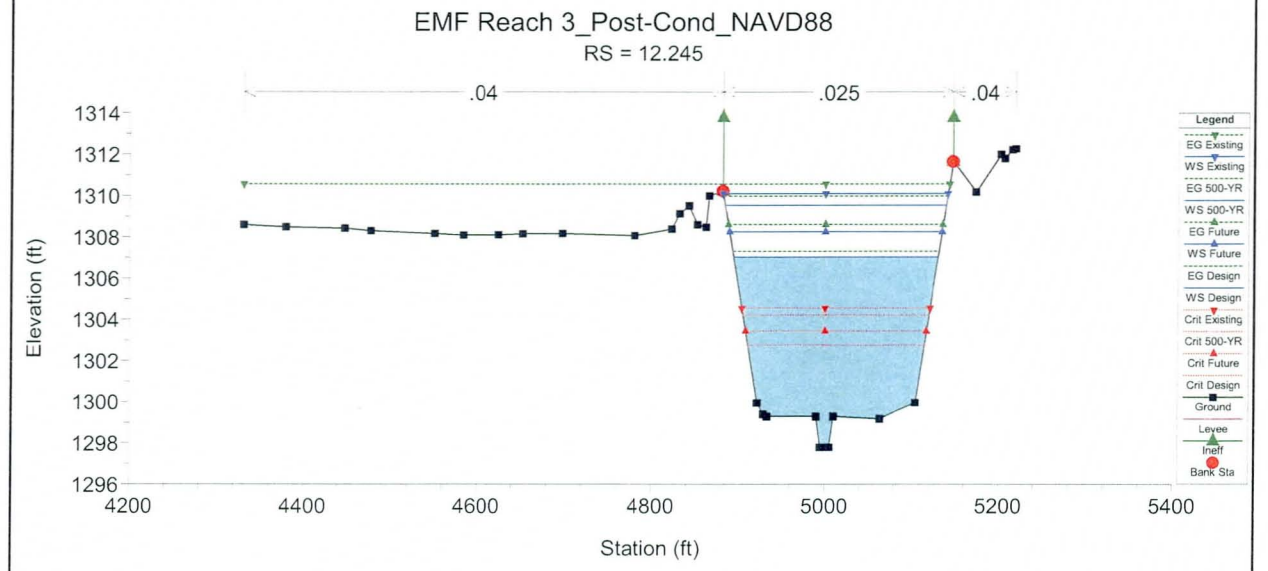

EMF Reach 3_Post-Cond_NAVD88
RS = 11.609
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

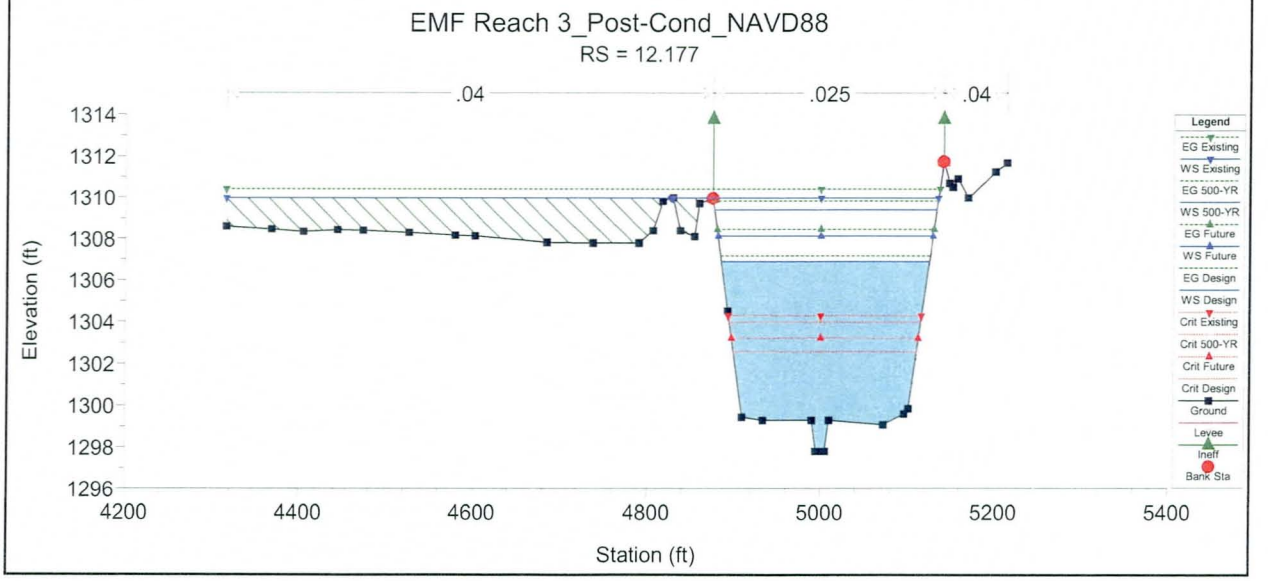

EMF Reach 3_Post-Cond_NAVD88
RS = 12.082
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

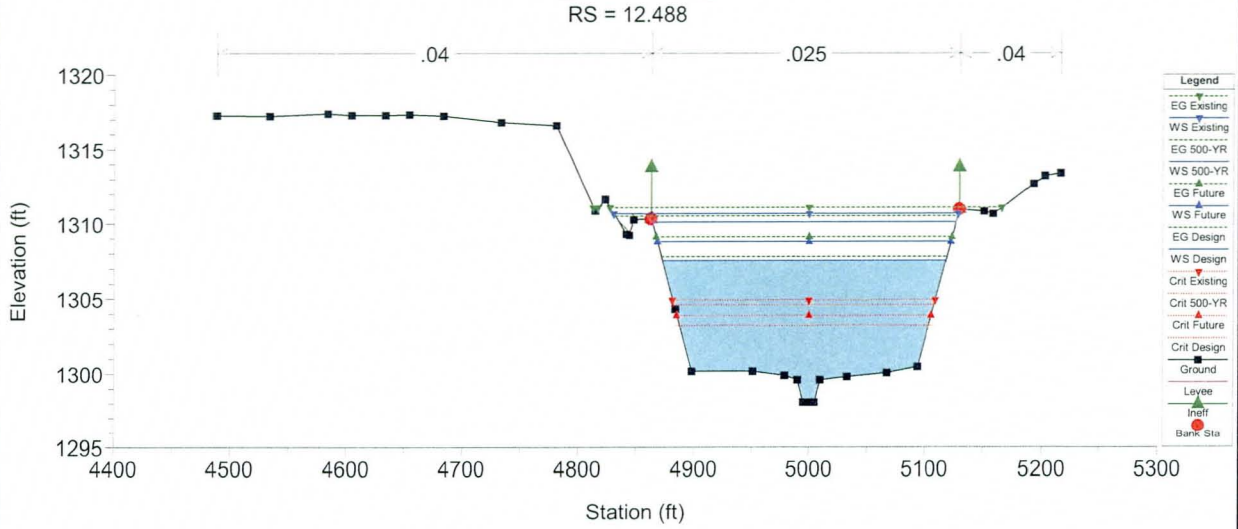

EMF Reach 3_Post-Cond_NAVD88
RS = 11.988
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

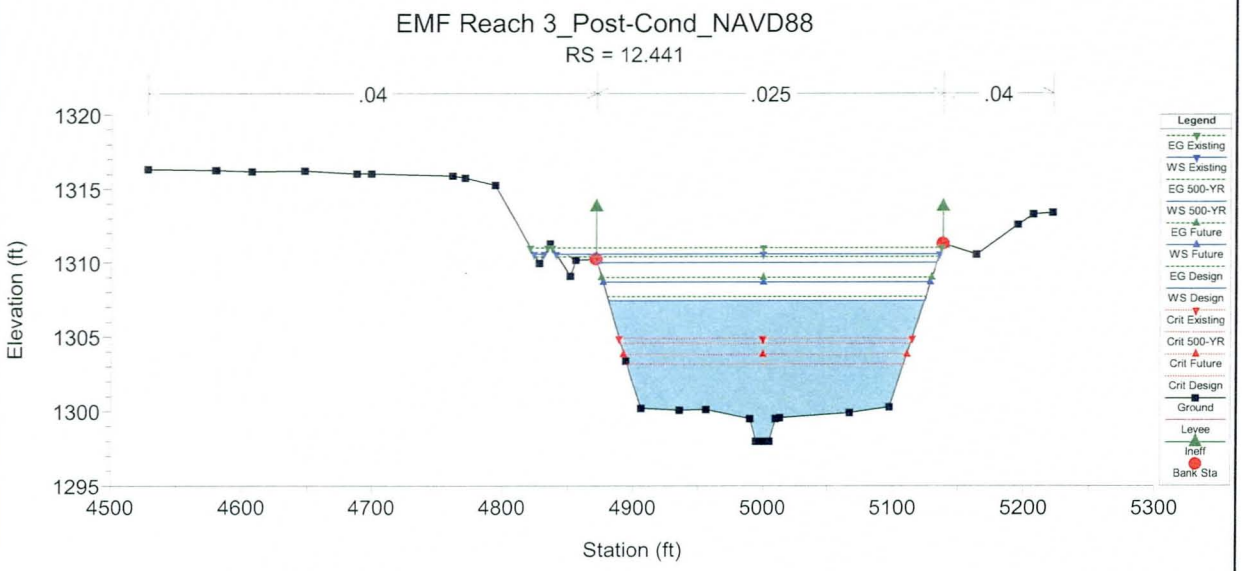

EMF Reach 3_Post-Cond_NAVD88
RS = 11.893
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

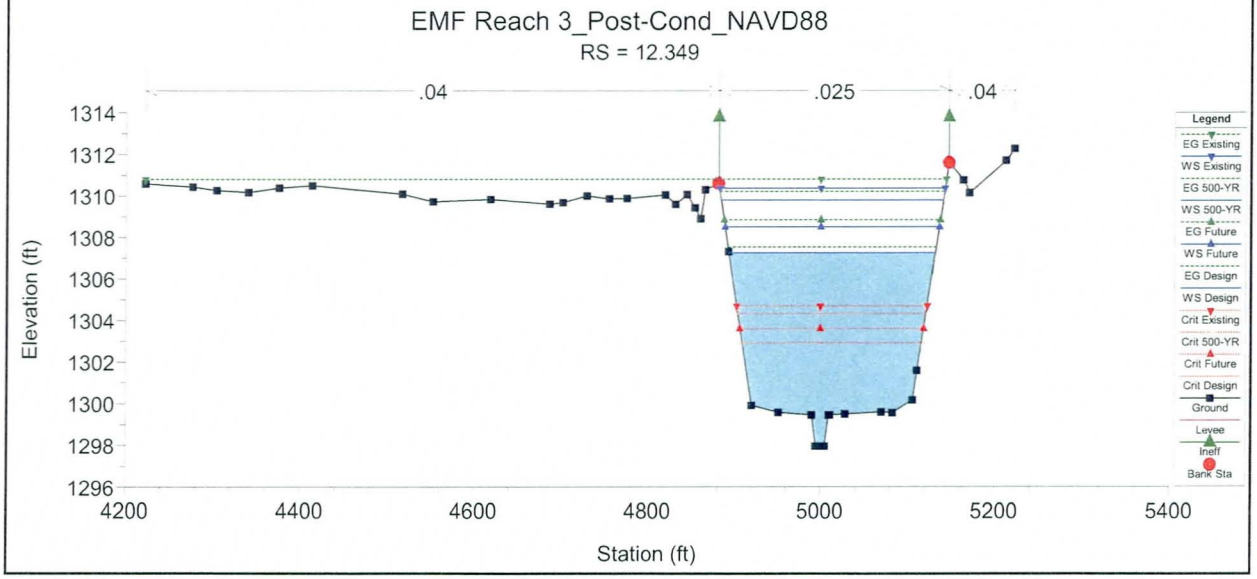

EMF Reach 3_Post-Cond_NAVD88
RS = 12.302
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

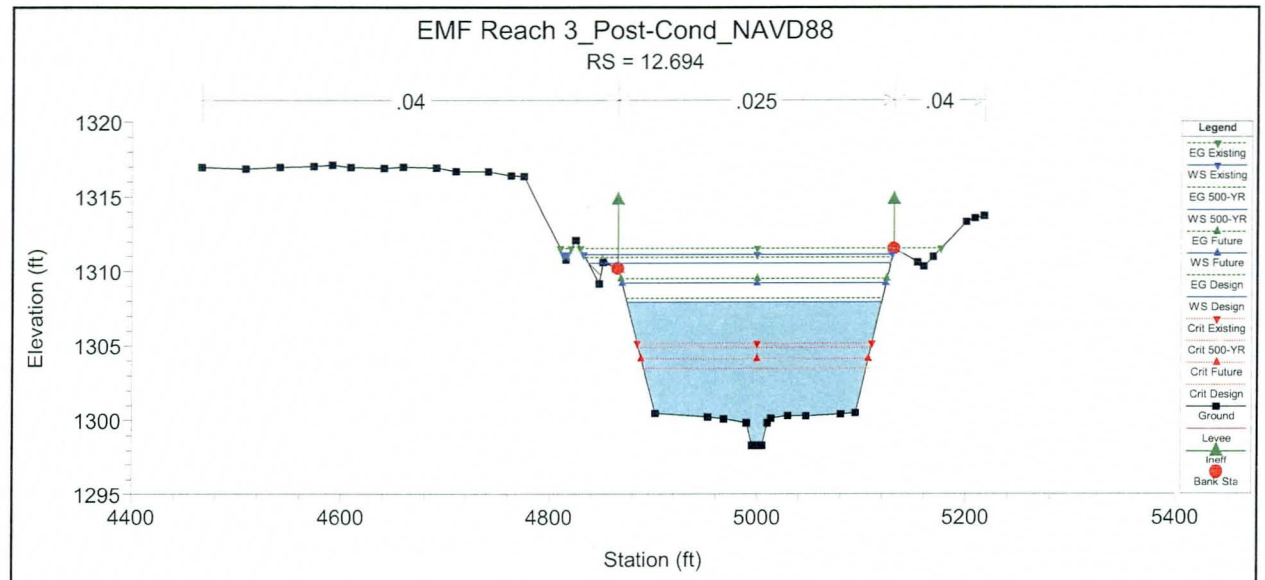

EMF Reach 3_Post-Cond_NAVD88
RS = 12.245
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

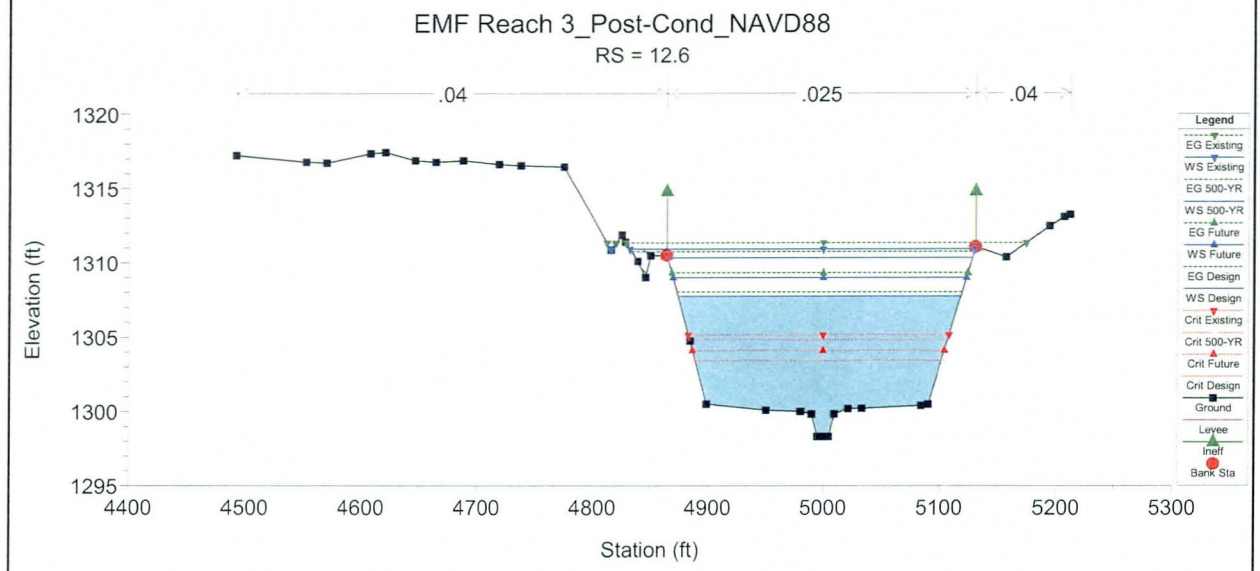

EMF Reach 3_Post-Cond_NAVD88
RS = 12.177
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

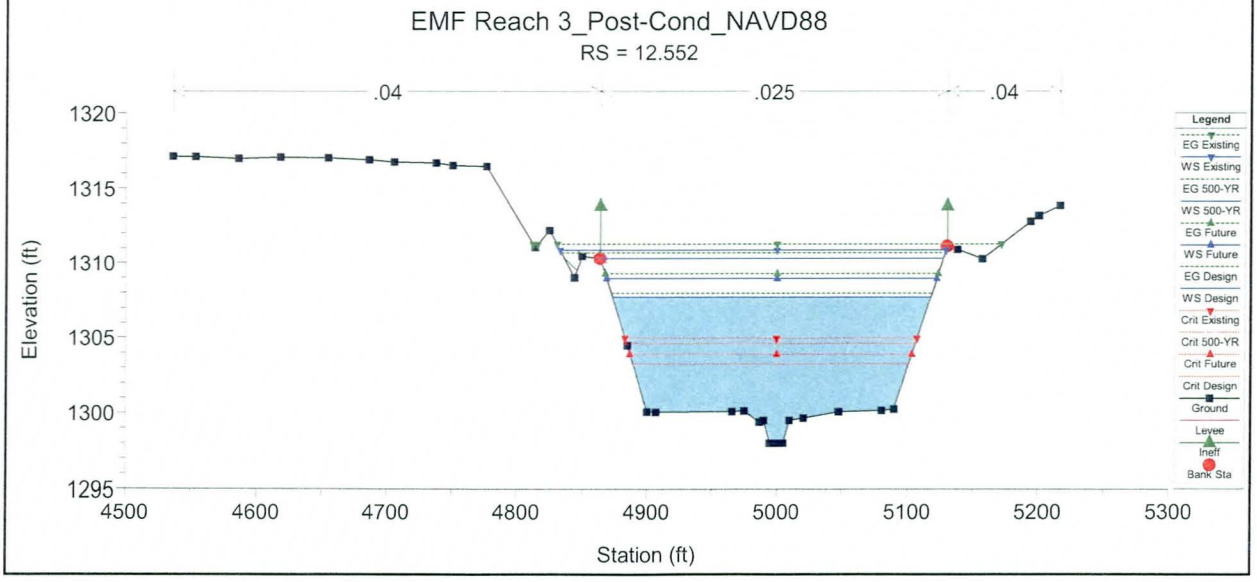

EMF Reach 3_Post-Cond_NAVD88
RS = 12.488
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

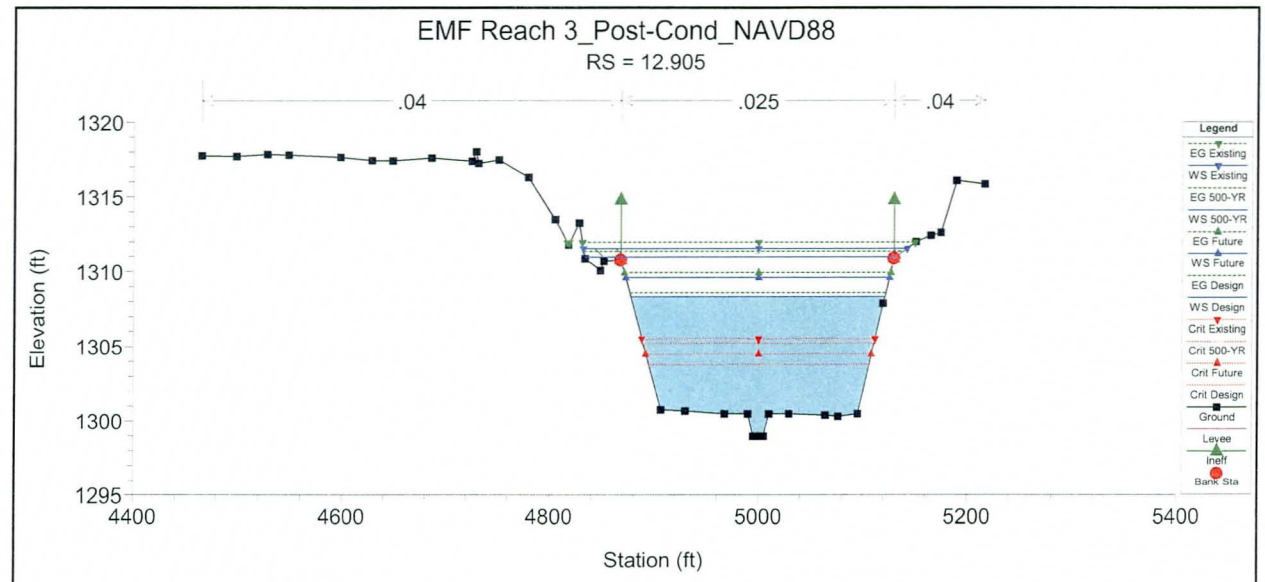

EMF Reach 3_Post-Cond_NAVD88
RS = 12.441
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

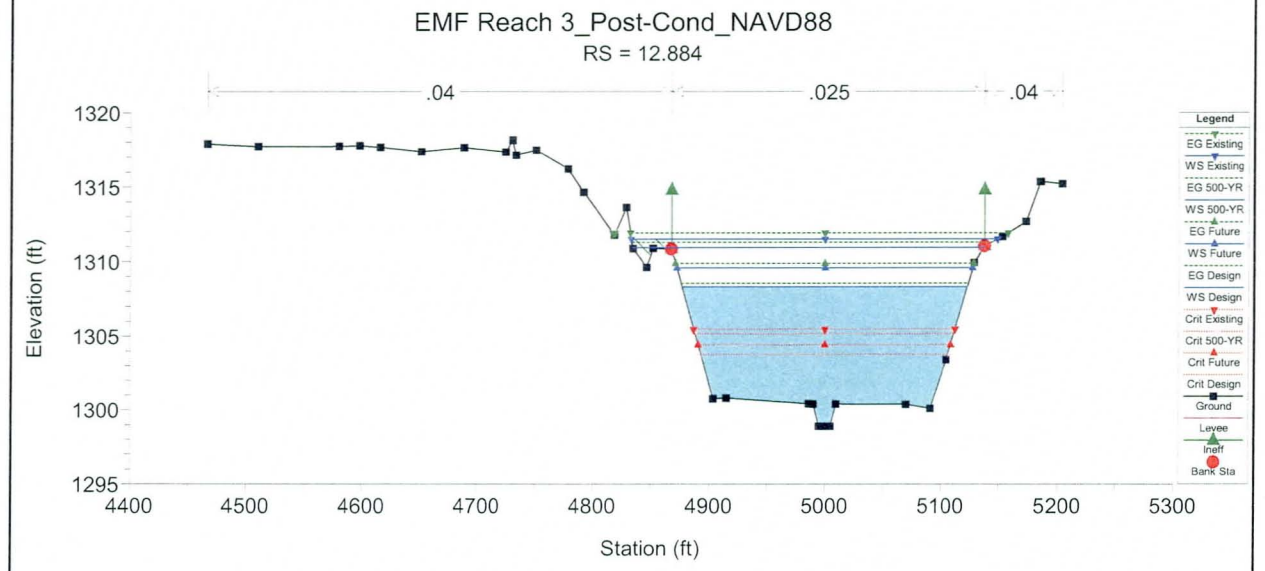

EMF Reach 3_Post-Cond_NAVD88
RS = 12.349
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

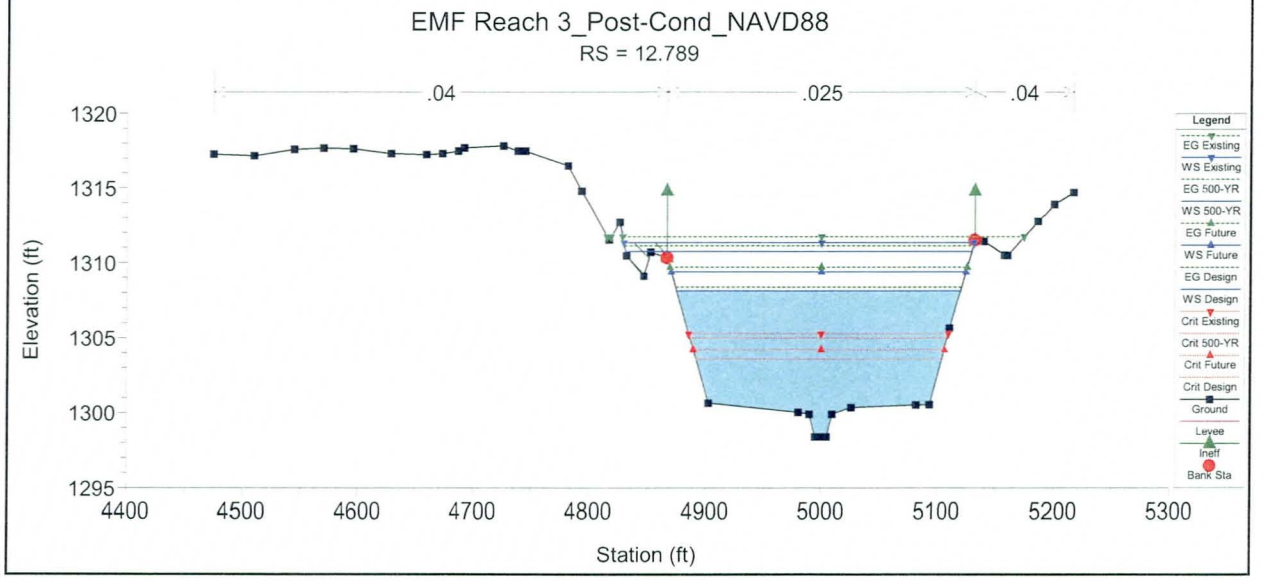

EMF Reach 3_Post-Cond_NAVD88
RS = 12.694
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

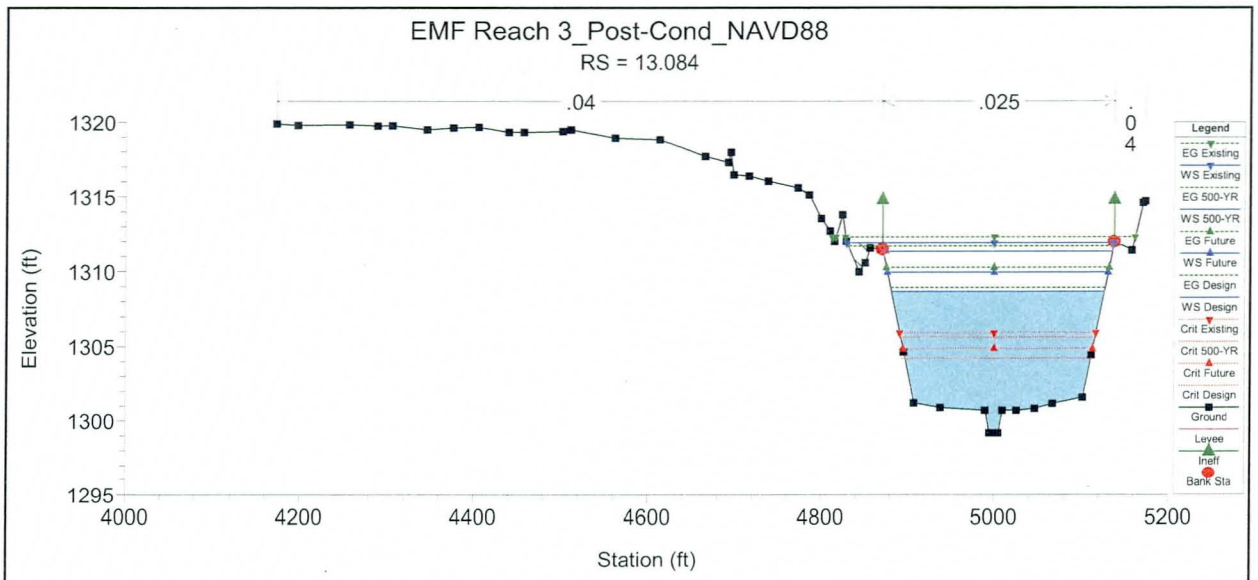

EMF Reach 3_Post-Cond_NAVD88
RS = 12.6
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

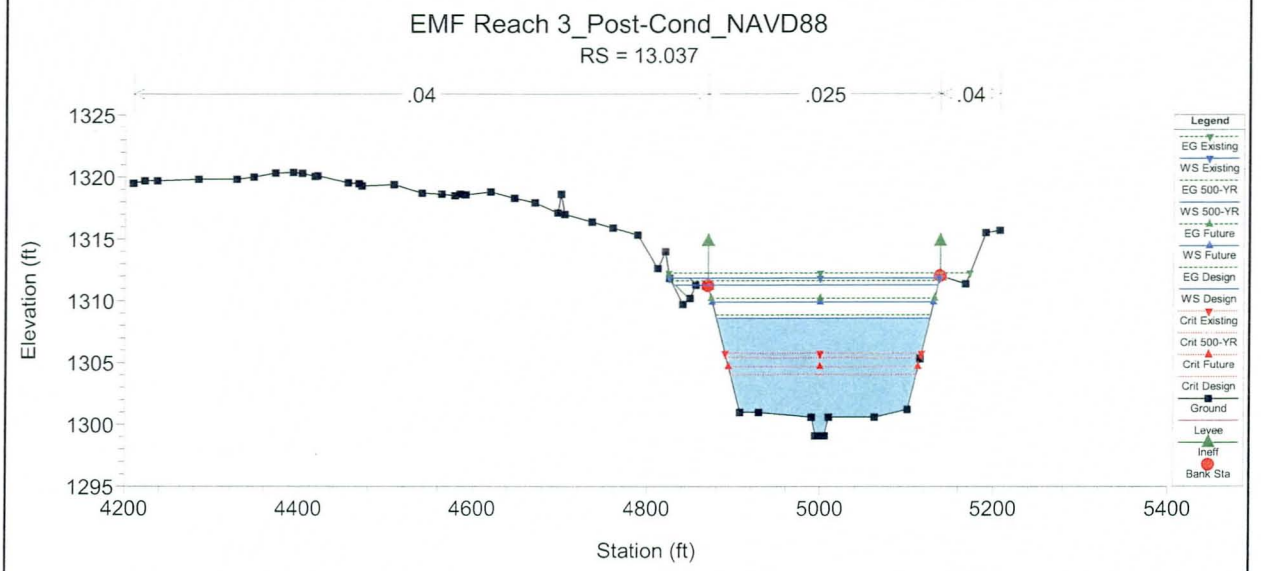

EMF Reach 3_Post-Cond_NAVD88
RS = 12.552
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

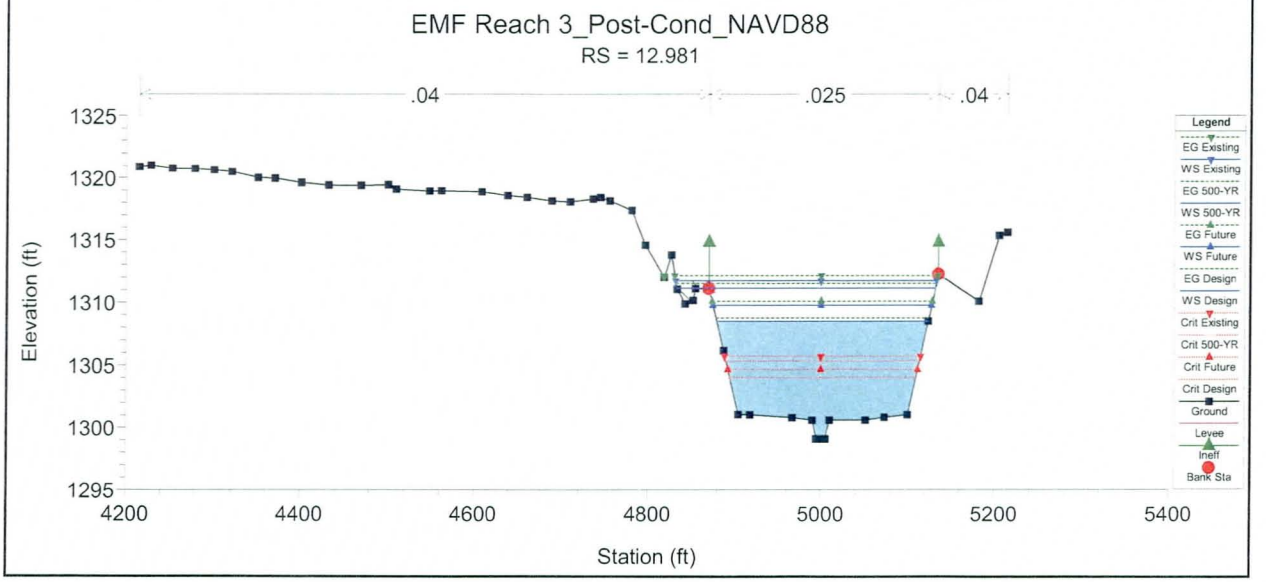

EMF Reach 3_Post-Cond_NAVD88
RS = 12.905
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

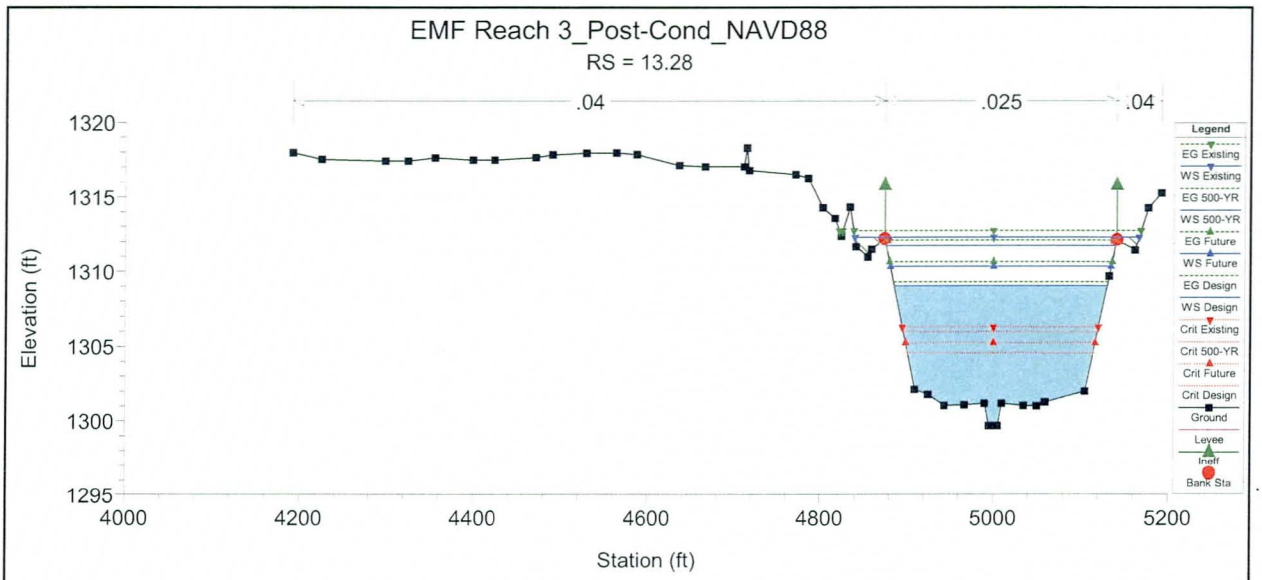

EMF Reach 3_Post-Cond_NAVD88
RS = 12.884
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

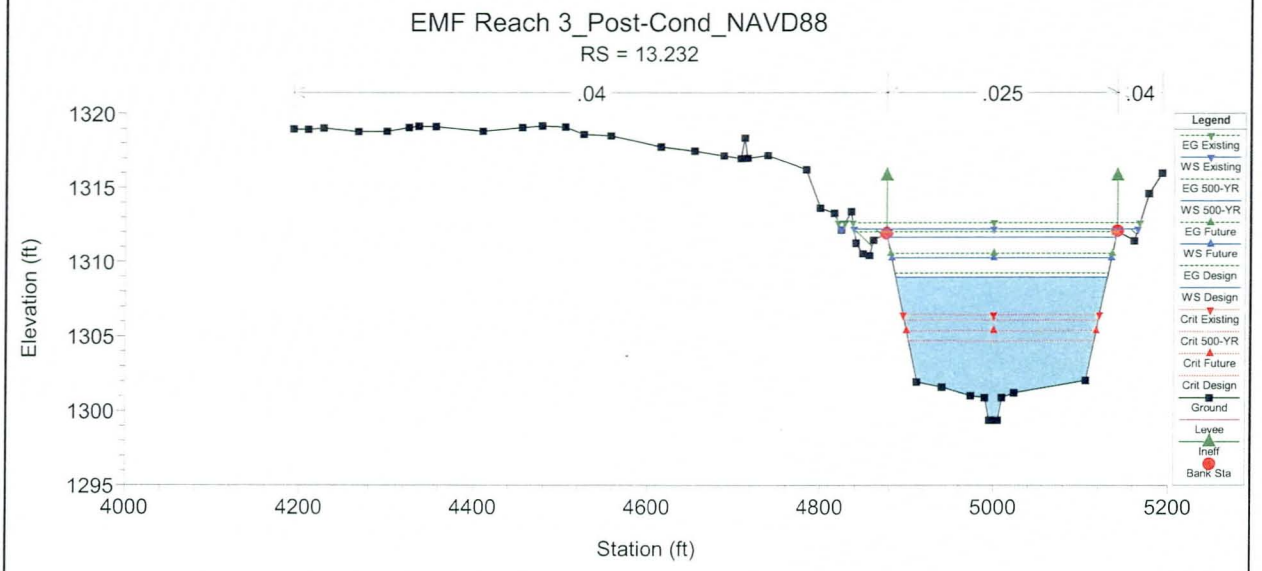

EMF Reach 3_Post-Cond_NAVD88
RS = 12.789
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

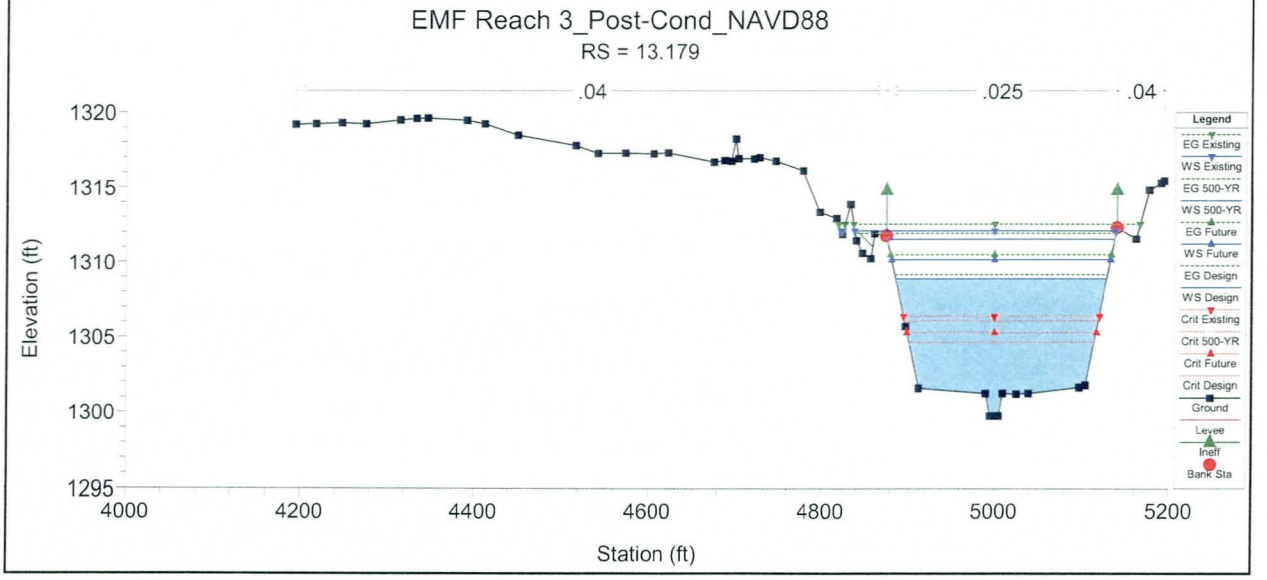

EMF Reach 3_Post-Cond_NAVD88
RS = 13.084
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

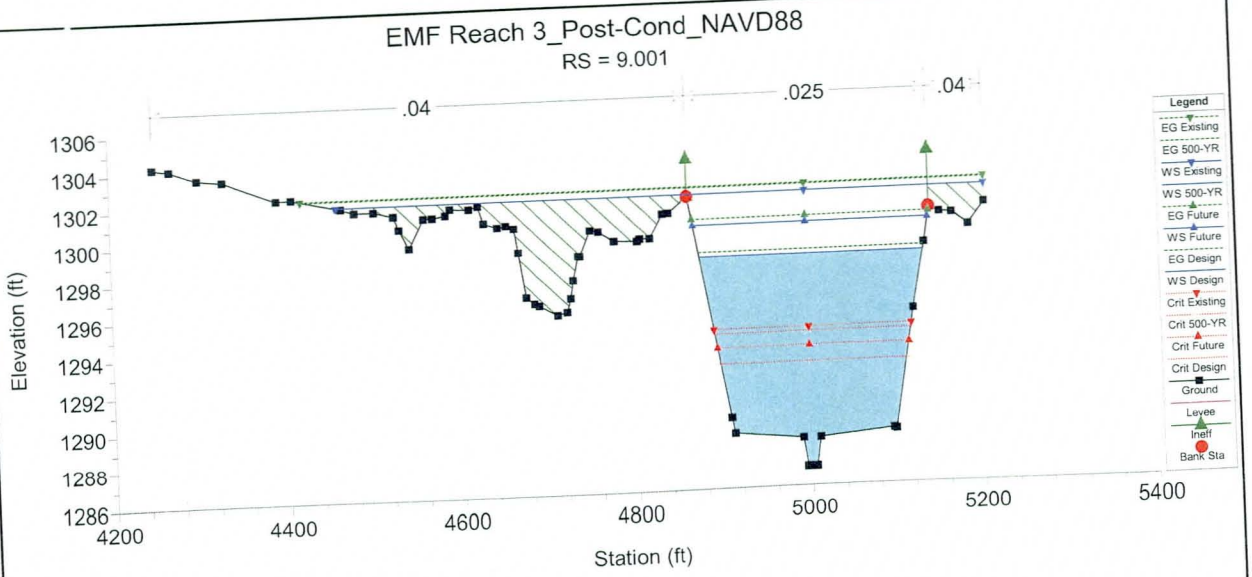

EMF Reach 3_Post-Cond_NAVD88
RS = 13.037
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 12.981
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 13.28
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 13.232
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 13.179
.04
.025
.04
Elevation (ft)
Station (ft)
Legend
EG Existing
WS Existing
EG 500-YR
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta


EMF Reach 3_Post-Cond_NAVD88
RS = 9.001
.04
.025
.04
Elevation (ft)
1306
1304
1302
1300
1298
1296
1294
1292
1290
1288
1286
4200
4400
4600
4800
5000
5200
5400
Station (ft)
Legend
EG Existing
EG 500-YR
WS Existing
WS 500-YR
EG Future
WS Future
EG Design
WS Design
Crit Existing
Crit 500-YR
Crit Future
Crit Design
Ground
Levee
Ineff
Bank Sta

Scour Calculations

Project:	Chandler Heights Rd. Bridge Scour	Project No.:	AZE0906
Computed By:	M.Martinez	Date:	11/13/2009
Checked By:	T. Bokich	Date:	11/14/2009
Sheet Name:	100-Year Total Scour	Sheet:	1 of 2

INDIVIDUAL SCOUR COMPONENTS

REFERENCE

$FS(Z_{long\text{-}term})$

FS =	1.3	
$Z_{long\text{-}term}$ =	0.0	
$FS(Z_{long\text{-}term})$ =	0.0	

*Note: The EMF is a man-made channel with grade control structures.

$FS(Z_{general})$

FS =	1.3		
$Z_{general}$ =	$z*0.47*(Q/f)^{1/3}$		Computing Degradation and Local Scour, BOR, Lacey Equation
z =	0.25	(For Straight Reaches)	
Q =	6,900	cfs	Geotech Report, GEC 6/9/2009
D_{50} =	0.16	mm	
D_m =	$1.25*D_{50}$		
D_m =	0.20	mm	
f =	$1.76*(D_m)^{1/2}$		
f =	0.79		
$Z_{general}$ =	2.4	ft	
$FS(Z_{general})$ =	3.1	ft	

$FS(Z_{low\text{-}flow})$

FS =	1.0		
$Z_{low\text{-}flow}$ =	2.0	ft	FCDMC Design
$FS(Z_{low\text{-}flow})$ =	2.0	ft	

*Note: The low-flow is a designed low-flow channel.

$FS(Z_{bend})$

FS =	1.3	
Z_{bend} =	0.0	No Bends near the bridge
$FS(Z_{bend})$ =	0.0	

$FS(Z_{bedform})$

FS =	1.3		
$Z_{bedform}$ =	$0.5*d_h$		
Froude Number =	0.19		HEC-RAS, Cross Sect. 11.262
Dune or Antidune Equation:	Dune		
Dune Height, d_h =	$0.066*y^{1.21}$		Simons and Senturk
Flow Depth, y =	11.51	ft	HEC-RAS, Cross Sect. 11.262
d_h =	1.3	ft	
$Z_{bedform}$ =	0.6	ft	
$FS(Z_{bedform})$ =	0.8	ft	

Project:	Chandler Heights Rd. Bridge Scour	Project No.:	AZE0825
Computed By:	M.Martinez	Date:	11/13/2009
Checked By:	T. Bokich	Date:	11/14/2009
Sheet Name:	100-Year Total Scour	Sheet:	2 of 2

$FS(Z_{local})$

			REFERENCE
FS =	1.0		
Z_{local} =	y_s/y_1		
y_s/y_1 =	$2.0*(K_1*K_2*K_3*K_4)*(a/y_1)^{0.65} * (Fr_1)^{0.43}$		HEC-18, Eq 21
Flow depth directly upstream of the pier, y_1 =	11.51	ft	HEC-RAS, Cross Sect. 11.262
y_1 =	3.51	m	
Correction factor for pier nose shape, K_1 =	1.0	(Round)	HEC-18, Fig. 7, Table 2
Correction factor for angle of attack of flow, K_2 =	1.0	(Θ = 0)	HEC-18, Table 3, Eq. 23
Correction factor for bed condition, K_3 =	1.1	(Clear Water Scour)	
Correction factor for armoring by bed material, K_4 =	1.0	(Most Conservative)	
a =	Pier Width + Debris		
Pier Width =	1.5	ft	
Debris =	4.0	ft	
a =	1.68	m	
Froude Number, Fr_1 =	0.19		HEC-RAS, Cross Sect. 11.262
Pier Conrtraction Scour Depth, y_s =	2.34	m	
y_s =	7.7	ft	
$FS(Z_{local})$ =	7.7	ft	

TOTAL SCOUR

Outside Pier scour zone of influence

$Z_{t_Outside} = FS(Z_{long\text{-}term} + Z_{general} + Z_{low\text{-}flow} + Z_{bend} + Z_{bedform})$

Drainage Design Manual, Hydraulics, FCDMC

$FS(Z_{long\text{-}term})$ =	0.0	ft
$FS(Z_{general})$ =	3.1	ft
$FS(Z_{bend})$ =	0.0	ft
$FS(Z_{bedform})$ =	0.8	ft
$FS(Z_{low\text{-}flow})$ =	2.0	ft
Zt Outside =	**6.0**	ft

Inside Pier zone of influence

$Z_{t_Inside} = FS(Z_{long\text{-}term} + Z_{general} + Z_{low\text{-}flow} + Z_{bend} + Z_{local})$

Drainage Design Manual, Hydraulics, FCDMC

$FS(Z_{long\text{-}term})$ =	0.0	ft
$FS(Z_{general})$ =	3.1	ft
$FS(Z_{bend})$ =	0.0	ft
$FS(Z_{low\text{-}flow})$ =	2.0	ft
$FS(Z_{local})$ =	7.7	ft
Zt Inside =	**12.8**	ft

Scour Elevations

Bed Elevation =	1293.3	ft	Project Topo
$FS(Z_{long\text{-}term})$ =	0.0	ft	
$FS(Z_{general})$ =	-3.1	ft	
$FS(Z_{bend})$ =	0.0	ft	
$FS(Z_{bedform})$ =	-0.8	ft	
$FS(Z_{low\text{-}flow})$ =	-2.0	ft	
Zt Outside Scour Elevation =	**1287.3**	ft	

Bed Elevation =	1293.3	ft	Project Topo
$FS(Z_{long\text{-}term})$ =	0.0	ft	
$FS(Z_{general})$ =	-3.1	ft	
$FS(Z_{bend})$ =	0.0	ft	
$FS(Z_{low\text{-}flow})$ =	-2.0	ft	
$FS(Z_{local})$ =	-7.7	ft	
Zt Inside Scour Elevation =	**1280.5**	ft	

Project:	Queen Creek Rd. Bridge Scour	Project No.:	AZE0825
Computed By:	M.Martinez	Date:	11/13/2009
Checked By:	T. Bokich	Date:	11/14/2009
Sheet Name:	500-Year Total Scour	Sheet:	1 of 2

INDIVIDUAL SCOUR COMPONENTS

REFERENCE

$FS(Z_{long\text{-}term})$

FS =	1.3	
$Z_{long\text{-}term}$ =	0.0	
$FS(Z_{long\text{-}term})$ =	0.0	

*Note: The EMF is a man-made channel with grade control structures.

$FS(Z_{general})$

FS =	1.3		
$Z_{general}$ =	$z*0.47*(Q/f)^{1/3}$		Computing Degradation and Local Scour, BOR, Lacey Equation
z =	0.25	(For Straight Reaches)	
Q =	11,730	cfs	
D_{50} =	0.16	mm	Geotech Report, GEC 6/9/2009
D_m =	$1.25*D_{50}$		
D_m =	0.20	mm	
f =	$1.76*(D_m)^{1/2}$		
f =	0.79		
$Z_{general}$ =	2.9	ft	
$FS(Z_{general})$ =	3.8	ft	

$FS(Z_{low\text{-}flow})$

FS =	1.0		
$Z_{low\text{-}flow}$ =	2.0	ft	FDCMC Design
$FS(Z_{low\text{-}flow})$ =	2.0	ft	

*Note: The low-flow is a designed low-flow channel.

$FS(Z_{bend})$

FS =	1.3	
Z_{bend} =	0.0	No Bends near the bridge
$FS(Z_{bend})$ =	0.0	

$FS(Z_{bedform})$

FS =	1.3		
$Z_{bedform}$ =	$0.5*d_h$		
Froude Number =	0.2		HEC-RAS, Cross Sect. 11.262
Dune or Antidune Equation:	Dune		
Dune Height, d_h =	$0.066*y^{1.21}$		Simons and Senturk
Flow Depth, y =	14.86	ft	HEC-RAS, Cross Sect. 11.262
d_h =	1.7	ft	
$Z_{bedform}$ =	0.9	ft	
$FS(Z_{bedform})$ =	1.1	ft	

			REFERENCE
$FS(Z_{local})$			
FS =	1.0		
Z_{local} =	y_s/y_1		
y_s/y_1 =	$2.0*(K_1*K_2*K_3*K_4)*(a/y_1)^{0.65} * (Fr_1)^{0.43}$		HEC-18, Eq 21
Flow depth directly upstream of the pier, y_1 =	14.86	ft	HEC-RAS, Cross Sect. 11.262
y_1 =	4.53	m	
Correction factor for pier nose shape, K_1 =	1.0	(Round)	HEC-18, Fig. 7, Table 2
Correction factor for angle of attack of flow, K_2 =	1.0	(Θ = 0)	HEC-18, Table 3, Eq. 23
Correction factor for bed condition, K_3 =	1.1	(Clear Water Scour)	
Correction factor for armoring by bed material, K_4 =	1.0	(Most Conservative)	
a =	Pier Width + Debris		
Pier Width =	1.5	ft	
Debris =	4.0	ft	
a =	1.68	m	
Froude Number, Fr_1 =	0.2		HEC-RAS, Cross Sect. 11.262
Pier Conrtraction Scour Depth, y_s =	2.61	m	
y_s =	8.6	ft	
$FS(Z_{local})$ =	8.6	ft	

TOTAL SCOUR

Outside Pier scour zone of influence

$Z_{t_Outside} = FS(Z_{long\text{-}term} + Z_{general} + Z_{low\text{-}flow} + Z_{bend} + Z_{bedform})$

Drainage Design Manual, Hydraulics, FCDMC

$FS(Z_{long\text{-}term})$ =	0.0	ft
$FS(Z_{general})$ =	3.8	ft
$FS(Z_{bend})$ =	0.0	ft
$FS(Z_{bedform})$ =	1.1	ft
$FS(Z_{low\text{-}flow})$ =	2.0	ft
Zt Outside =	**6.9**	ft

Inside Pier zone of influence

$Z_{t_Inside} = FS(Z_{long\text{-}term} + Z_{general} + Z_{low\text{-}flow} + Z_{bend} + Z_{local})$

Drainage Design Manual, Hydraulics, FCDMC

$FS(Z_{long\text{-}term})$ =	0.0	ft
$FS(Z_{general})$ =	3.8	ft
$FS(Z_{bend})$ =	0.0	ft
$FS(Z_{low\text{-}flow})$ =	2.0	ft
$FS(Z_{local})$ =	8.6	ft
Zt Inside =	**14.3**	ft

Scour Elevations

Project Topo

Bed Elevation =	1293.3	ft
$FS(Z_{long\text{-}term})$ =	0.0	ft
$FS(Z_{general})$ =	-3.8	ft
$FS(Z_{bend})$ =	0.0	ft
$FS(Z_{bedform})$ =	-1.1	ft
$FS(Z_{low\text{-}flow})$ =	-2.0	ft
Zt Outside Scour Elevation =	**1286.4**	ft

Project Topo

Bed Elevation =	1293.3	ft
$FS(Z_{long\text{-}term})$ =	0.0	ft
$FS(Z_{general})$ =	-3.8	ft
$FS(Z_{bend})$ =	0.0	ft
$FS(Z_{low\text{-}flow})$ =	-2.0	ft
$FS(Z_{local})$ =	-8.6	ft
Zt Inside Scour Elevation =	**1279.0**	ft