REPORT NARRATIVE

FRA-33-24.76 Hydraulic Report

U. S. Route 33 Over Blacklick Creek

Introduction

The purpose of this report is to present the drainage design for the widening of U.S. Route 33 in southeastern Franklin County, Ohio. The overall project will provide additional lanes in each direction of U. S. Route 33 on the median side. The work at the structures carrying U. S. Route 33 over Blacklick Creek will widen each structure on the median side to accommodate the additional travel lane in each direction.

Project Description

The project area is located in southeastern Franklin County and is entirely within the watershed of the Blacklick Creek. Two existing structures constructed in 1963 carry U.S. 33 over the waters of Blacklick Creek (Structure File Number 2502046 [Left] and 2502070 [Right]). Each bridge is a three span continuous steel beam structure with span lengths of 44 feet, 55 feet, and 44 feet. The existing deck width of each structure is 41 feet from parapet to parapet. The deck is a concrete deck with a 1.75" concrete wearing surface overlay.

This project will widen each structure by reconstructing the abutments of both bridges, adding piers and extending the pier cap, adding beams, widening the deck, and providing a new parapet wall. The widened structures will meet at the centerline and functionally become one single structure. All work will occur between the two existing structures. The existing upstream face of SFN 2502046 and the existing downstream face of SFN 2502070 will not be modified.

Drainage Criteria

The project area spans multiple jurisdictions, but the two structures are located entirely within Madison Township, Franklin County, Ohio. The drainage criteria of the current ODOT Location and Design Manual, Volume 2 will govern the drainage design for the project. The following storm events will be used for the design of this project:

- 2% AEP: Hydraulic Design Storm, Flood Hazard Evaluation
- 1% AEP: Design Check Storm, Floodplain Elevation Comparison, Scour Design Storm
- 0.2% AEP: Scour Check Storm

Blacklick Creek - Flood Plain and Flood Hazard Study

Blacklick Creek in the project area has been modeled by FEMA and is the subject of a published Flood Insurance Study, complete with cross-sections and flow data for various points along its length where tributary flows enter. This FIS is the basis of the flood plain analysis for this project. Four FEMA cross-sections lie within the project stream study limits. These offer a starting point for the analysis and also act to help calibrate the hydraulic model.

Modeling Parameters

The Army Corps of Engineers' HEC-RAS River Analysis system was used to model Blacklick Creek through the project area. In order to provide for adequate modeling of the contraction and expansion area, the model of the main stem of Blacklick Creek extends 1,900 feet downstream of the project structures and 2,600 feet upstream the project structures. This provides room to model the contraction of the flow upstream of the structure and model the expansion after the water passes through the structures. The model is based on a subcritical flow regime and uses FEMA flow data and water surface elevations in conjunction with Franklin County Auditor mapping to establish flood levels. Bathymetric survey data was collected at many of the cross-sections and is used to model the creek bed. This provides the best correlation to the FIS, as the FIS states that Franklin County mapping was used to develop contours and adjust cross-sections for the project. The existing project structures used survey data for dimensions and elevations. Proposed project structures were based on the proposed modifications to the structure. This generated two hydraulic models – an existing model calibrated to the FIS and a proposed model that adjusted the structures in the existing model to match the proposed structure work in this project.

HEC-RAS input consisted of cross-sections cut from Franklin County Auditor's contour mapping. Cross-sections were cut immediately up and downstream of the bridge and then at intervals of 200 to 400 feet as needed to model flow transitions. Station 20+00 was arbitrarily assigned to the intersection between the stream centerline and the centerline of U.S. 33. Cross-section stationing was then based off of distance along the stream center from this point. Franklin County mapping allowed the width of the cross-sections to pick up the high ground on both sides of the channel in order to allow the model to calculate the water surface elevations without running out of known topography.

Parameters for the individual HEC-RAS cross-sections were based on the HEC-RAS manual and field data. The existing stream is generally a winding channel with some minor obstructions, although the channel upstream of the bridges does have some significant bends near the extent of the modeled area. The overbanks on each side of the channel through the entire project area are wooded in the immediate vicinity of the creek with open fields in the upland areas. The Manning's "n" value for the stream channel is based on a clean winding stream with minor

obstructions. The values of 0.035 to 0.045 were used and area based on using the normal value given in Table 3-1, Line A.1.d for "Clean, winding, some weeds and stones" as the channel description, with the higher "n" values used for the segments of the stream channel where the bends are more severe. For the overbanks, the density of the woods is not known. The HEC-RAS manual recommends a Manning's "n" value of 0.045 to 0.11 for medium to dense brush. For these areas, values of 0.055 to 0.075 were used, basing it on an assumed moderate density of brush near the creek and less dense brush or open fields in the upland areas.

Several cross sections contained embankments, primarily associated with the Blacklick Trail crossing of U. S. Route 33. These embankments were incorporated into the model but were not modeled as levees since water can reach areas behind the trail embankment without overtopping the embankment. Ineffective flow areas were added near the bridge to model expansion and contraction areas where water was likely to stagnate and not flow.

The two existing bridges were modeled as a single opening in HEC-RAS, consistent with the guidance that "[i]f the parallel bridges are very close to each other, and the flow will not be able to expand between the bridges, the bridges can be modeled as a single bridge." The embankment between the two existing structures is a continuation of the sloped abutment of each structure and prevents any expansion of flow in the roughly 70 feet of space between the structures. The roadway information and bridge low chord data is based on the field survey of the existing 1963 bridges.

The proposed conditions model the structure as a single structure opening since the proposed work effectively creates a single continuous bridge from the upstream face of SFN 2502046 to the downstream face of SFN 2502070. Because the existing structure pair is modeled as a single structure, the proposed structure model is effectively identical to the existing model since no changes are proposed to the most upstream and downstream faces of the crossing. Therefore, obtaining a calibrated model of the existing conditions also furnishes a calibrated model of the proposed conditions.

Flow Data

The flow data for the 2% AEP, 1% AEP, and 0.2% AEP storm events is based on the FIS flow data given at the U. S. Route 33 crossing. This flow data given in the FIS is directly within the project area at the project structure(s), with a 4% AEP flow of 7,400 cfs and a 1% AEP flow of 8,600 cfs. The USGS Streamstats application was also used to generate flow data, but these generated numbers appeared to be smaller than the FEMA model (approximately 80% to 95% of the FEMA flows). The USGS urban regression equations were used to approximate flows since some portion of the Blacklick Creek watershed lies within urban areas. These flows were significantly higher for all storm events, suggesting that the urban regression method overestimates the anticipated flow rates and is not a proper modeling method for this watershed.

For the 4% and 1% AEP flows, the flows in the FIS govern and will be used. For the 2% AEP and 0.2% AEP flows, the best approximation is that these flow rates are about 20% higher than Streamstats for the 2% AEP and about 8% higher than Streamstats for the 0.2% AEP. The urban regression flowrates are presented but are ignored as they are all significantly higher than both FEMA and Streamstats. The table below summarizes the flow rates.

Table 1-1

Storm Event	FEMA FIS Flow (cfs)	Streamstats Flow (cfs)	Urban Regression Flow (cfs)	Flow Rate Used
4% AEP	7,400	5,590	11,171	FIS Flowrate (7,400 cfs)
2% AEP	--	6,650	14,581	~120% Streamstats (8,000 cfs)
1% AEP	8,600	7,700	18,107	FIS Flowrate (8,600 cfs)
0.2% AEP	--	10,600	--	~108% Streamstats (11,500 cfs)

FEMA Calibration

The existing model was calibrated to the FEMA model by using known water surface elevations at the lower end of the project. Cross-section 6+25 is the third cross-section from the most downstream extent of the model and is located at FEMA cross-section H. Initial water surface elevations for the most downstream cross-section 2+29 were interpolated from the graphical stream profile at a point 400 feet downstream of FEMA cross-section H for the 4% AEP and 1% AEP. Interpolation of the graphical stream profile provided initial elevations of 740 for the 4% AEP and 740.2 for the 1% AEP. The FEMA FIS profile for Blacklick Creek does not provide data for the 2% AEP and 0.2% AEP. Initial boundary conditions for these events assumed a normal depth with an energy slope of 0.001 ft/ft.

Examination of the cross-sections and field data then led to the setting of ineffective flow areas. This led to the generation of the existing condition profile. We then compared the overall appearance of the profile to the FEMA model and water surface elevations at FEMA cross-sections close to the HEC-RAS sections. See table 1-2 below for comparisons.

Table 1-2

HEC-RAS Station	FEMA Cross-Section	4% AEP		2% AEP		1% AEP	
		HEC-RAS	FEMA	HEC-RAS	FEMA	HEC-RAS	FEMA
6+25	H	740.28	740.1	739.97	N/A	740.52	740.6
20+98	I	744.06	744.8	744.47	N/A	744.90	745.2
29+06	J	744.54	745.0	744.93	N/A	745.34	745.4
46+00	K	745.51	746.0	745.80	N/A	746.12	746.2

The calibration indicates a close correlation to the elevations in the FEMA model, particularly for the 1% AEP event. The 4% AEP elevations in the model tend to run about 0.5 feet lower than the FEMA elevations upstream of the project structure. The 1% AEP elevations are within 0.1 feet of the FEMA elevation except at the cross-section immediately upstream of the bridge where is it 0.3 feet lower. This cross-section (20+98 / FEMA Cross-Section I) is within the hydraulic jump at the upstream face of the bridge and the difference is likely due to a slight variation in the modeling of the jump at the structure.

The overall profile of the flow is similar to the FEMA model in that it shows a free-flowing channel downstream of the structure for all profiles, a hydraulic jump at the U.S. 33 crossing, and a backwater effect upstream of U.S. 33. This is consistent with the stream profile of the FIS and the inundation limits shown on the FEMA map panel for the area. Inconsistencies between the HEC-RAS model and the FEMA model are likely attributable to the additional cross-sections in the HEC-RAS model that give a clearer picture of the topography of the project area than the four FEMA cross-sections.

Summary of Existing Conditions

The existing flow regimes for the storm events as they flow through the project structures generally show a free-flowing channel downstream of the structure and a backwater effect upstream of the structures. The 2% AEP and 1% AEP events behave similarly, with both sustaining a hydraulic jump through the channel under the structures and leveling out upstream of the structures. Water surface elevations for both events are slightly higher than the low chord elevation at the upstream face of the bridge, but the hydraulic jump carries the flow through the hydraulic opening below the low chord elevation.

The 0.2% AEP event does not overtop the structure. The flow is contained by the roadway embankment and channeled under the bridge. The sag in the U. S. Route 33 roadway 1,500 feet east of the bridge is lower than the bridge deck, and flooding from the 0.2% AEP event would overtop this sag before overtopping the bridge itself.

Proposed Conditions

The model for the proposed conditions is based off of the existing conditions model with modifications to the U.S. 33 structures. The structural modification is primarily a deck widening on the inside edge of both bridges that creates a single structure for the entire roadway crossing. Because the HEC-RAS modeling approach for adjacent parallel bridges treats the bridge pair as a single structure from the upstream face of the first bridge to the downstream face of the second bridge, the proposed bridge model is identical to the existing model. No other changes were made, as the project does not propose any stream modifications. Structure work will be limited to superstructure widening between the existing bridges and will not change the structure model.

Additional piers will be added to the two existing sets of piers, but all work will be done inside the limits of the current bridge limits in the model.

The results of the proposed model show no change between existing and proposed conditions for all storm events. This is to be expected, as the models are identical owing to modeling the existing parallel bridges as a single structure.

The following table summarizes the flow for existing and proposed conditions at the section upstream of the bridge. All output tables are attached in the appendices.

Table 1-3

Station	Event	Flow (cfs)	Condition	Elevation (ft)	Velocity (ft/s)
20+73	2% AEP	8,000	Existing	744.02	6.25
			Proposed	744.02	6.25
20+73	1% AEP	8,600	Existing	744.40	6.44
			Proposed	744.40	6.44
20+73	0.2% AEP	11,500	Existing	747.68	4.58
			Proposed	747.68	4.58

The HEC-RAS analysis, calibrated by the FEMA FIS, shows that the proposed work on the U.S. 33 structures causes no increase in the 100-year floodplain and has no significant impact on the behavior of the 100-year storm event.

Fill in the FEMA 100-Year Floodplain

The project places negligible fill in the FEMA 100-year floodplain. The only proposed work will be to add piers and pier caps between the two existing parallel structures. The existing embankment between the bridges will become a sloped abutment under the superstructure of the proposed structure and will not require additional fill. Should it be necessary to compensate for the volume of concrete from the piers and pier caps, one of the adjacent upstream roadside ditches could be dredged slightly to provide compensatory storage for the minimal storage lost from the new bridge substructure elements.

Flood Hazard Evaluation

Since the proposed work produces no change to the flood profile of the 2% AEP, there are no increased flood hazards. The extent of the 2% AEP flooding is unoccupied land adjacent to Blacklick Creek. Some of the land is actively farmed, but there are no residential uses or residential structures located within the extents of the 2% AEP floodplain.

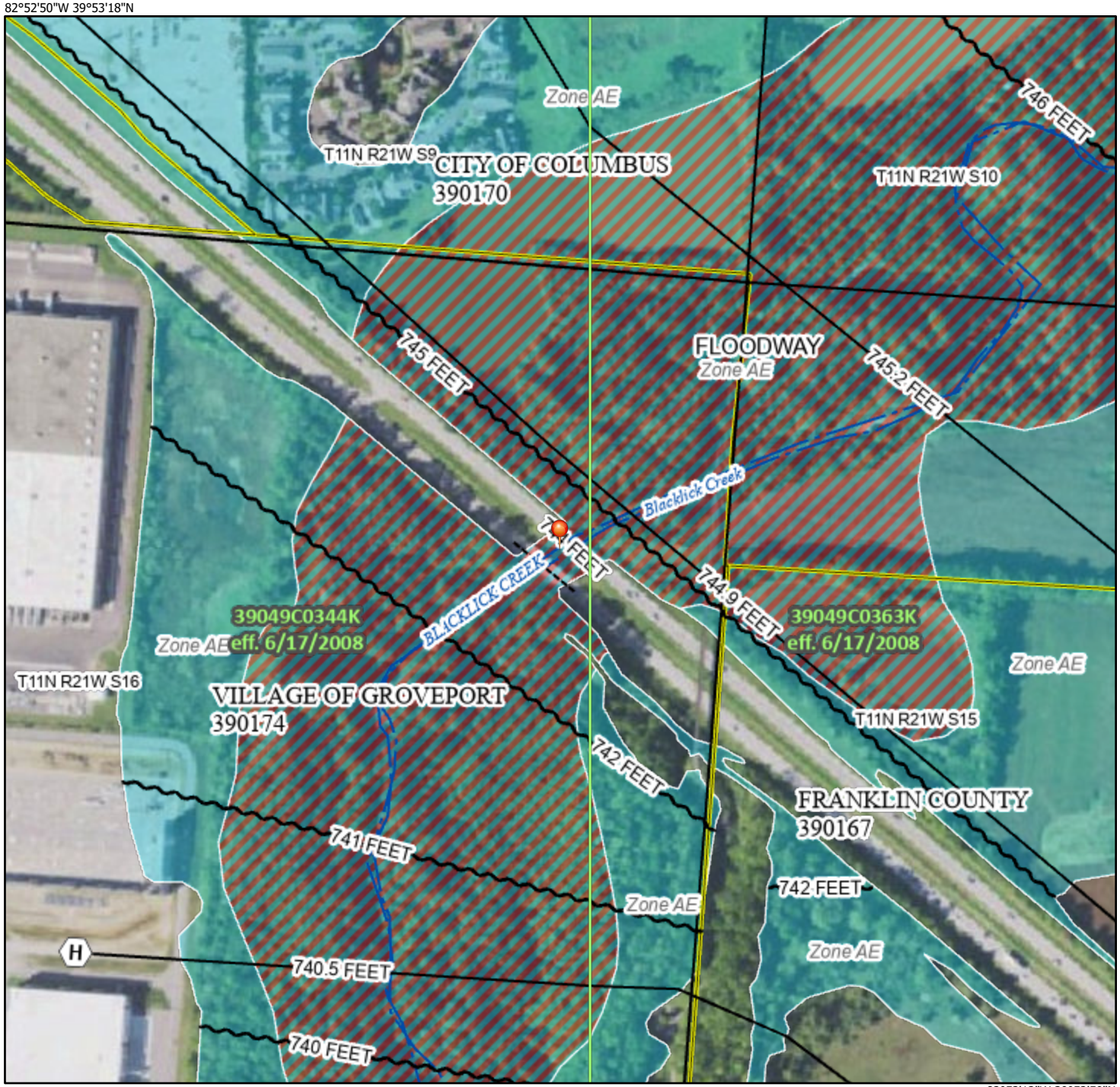
APPENDIX A

FEMA MAP AND FIS DATA

National Flood Hazard Layer FIRMette

FEMA

82°52'50"W 39°53'18"N



0 250 500 1,000 1,500 2,000 Feet

1:6,000

82°52'12"W 39°52'50"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/2/2025 at 3:58 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Table 8. Summary of Roughness Coefficients

Stream	Channel "n"	Overbank "n"
Alum Creek	0.036-0.050	0.042-0.140
Barbee Ditch	0.035-0.055	0.080-0.150
Barnes Ditch	0.035-0.050	0.060-0.200
Baumgardner Ditch	0.030-0.048	0.030-0.080
Beem Ditch	0.035-0.040	0.030-0.110
Big Darby Creek	0039-0.064	0.043-0.068
Big Run	0035-0.040	0.045-0.300
Big Walnut Creek	0.035-0.050	0.020-0.085
Billingsley Ditch	0.040-0.050	0.550-0.070
Bishop Run	0.030-0.035	0.040-0.080
Blacklick Creek	0.025-0.062	0.035-0.100
Blacklick Creek Lateral D	0.045-0.072	0.042-0.091
Blacklick Creek Lateral G-B	0.075	0.092
Blacklick Creek Lateral K	0.049-0.078	0.032-0.083
Blacklick Creek Tributary C	0.075	0.083-0.090
Blau Ditch	0.040-0.055	0.080-0.160
Brown Run	0.030-0.060	0.035-0.110
Clover Groff Ditch	0.028-0.036	0.045-0.070
Coble-Bowman Ditch	0.058-0.073	0.090-0.105
Cosgray Ditch	0.030-0.060	0.080-0.200
Cramer Ditch	0.035-0.055	0.060-0.120
Dry Run	0.040-0.060	0.080-0.160
Dysar Ditch	0.036-0.063	0.060-0.095
Early Run	0.045-0.050	0.050-0.075
French Run	0.048-0.061	0.065-0.085
French Run (Lateral G-A)	0.028-0.059	0.034-0.090
Georges Creek	030-0.050	0.030-0.100
Grant Run	0.012-0.048	0.060-0.078
Grove City Creek 1	0.040-0.075	0.030-0.075
Grove City Creek 2	0.020-0.045	0.040-0.080
Haines Ditch	0.050	0.085-0.090
Hamilton Ditch	0.035-0.045	0.050-0.075
Hayden Run	0.030-0.050	0.040-0.075
Faust County Ditch	0.030-0.050	0.040-0.150
Hellbranch Run	0.035-0.040	0.045-0.065
McCoy Ditch	0.035-0.040	0.045-0.065
Indian Run	0.025-0.050	0.055-0.100
North Fork Indian Run	0.025-0.050	0.055-0.100
Lisle Ditch	0.035-0.040	0.060-0.070
Little Darby Creek	0.045-0.060	0.053-0.079
Little Walnut Creek	0.030-0.050	0.030-0.080
Marsh Run	0.030-0.048	0.030-0.080
Martin Grove Ditch	0.042-0.083	0.041-0.076
Mason Run	0.035-0.054	0.043-0.090
Molcomb Ditch	0.035-0.050	0.045-0.150
Mulberry Run	0.040-0.075	0.030-0.075
West Water Run	0.020-0.045	0.004-0.080
Olentangy River	0.032-0.062	0.025-0.138

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	WIDTH REDUCED FROM PRIOR STUDY	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
Blacklick Creek									
G	13,230	1,630		7,206	1.2	736.7	736.7	737.2	0.5
H	15,365	942		3,964	2.2	740.5	740.5	741.0	0.5
I	16,815	1,681		10,078	0.9	744.9	744.9	745.4	0.5
J	17,675	1,141		6,678	1.3	745.2	745.2	745.7	0.5
K	19,325	1,190		5,789	1.5	746.3	746.3	746.8	0.5
L	21,950	698		4,953	1.7	750.0	750.0	750.5	0.5
M	23,150	1,252		5,148	1.7	750.9	750.9	751.4	0.5
N	24,050	1,263		4,971	1.8	752.2	752.2	752.7	0.5
O	25,225	1,579		6,486	1.3	753.3	753.3	753.8	0.5
P	26,175	1,823		6,341	1.4	755.2	755.2	755.7	0.5
Q	27,175	686		3,449	2.5	757.0	757.0	757.5	0.5
R	28,475	986		6,083	1.4	758.7	758.7	759.2	0.5
S	30,325	1,179		4,607	1.9	762.6	762.6	763.1	0.5
T	32,100	907		5,233	2.1	765.9	765.9	766.4	0.5
U	33,800	1,006		6,857	1.6	769.8	769.8	770.3	0.5
V	34,425	865		4,491	2.4	773.7	773.7	774.2	0.5
W	38,000	486		3,123	3.5	778.0	778.0	778.5	0.5
X	40,000	673		3,659	3.0	782.7	782.7	783.2	0.5
Y	40,815	961		5,590	1.9	786.5	786.5	787.0	0.5
Z	41,890	647		3,981	2.7	788.8	788.8	789.3	0.5
AA	42,925	552		3,242	3.3	790.9	790.9	791.4	0.5
AB	43,020	1,249		9,194	1.2	794.6	794.6	795.1	0.5
AC	44,650	559[2]		4,217	2.6	796.1	796.1	796.6	0.5
AD	46,640	557		4,214	2.6	800.2	800.2	800.7	0.5

[1]Feet above confluence with Big Walnut Creek [2]Floodway lies partially outside City of Columbus

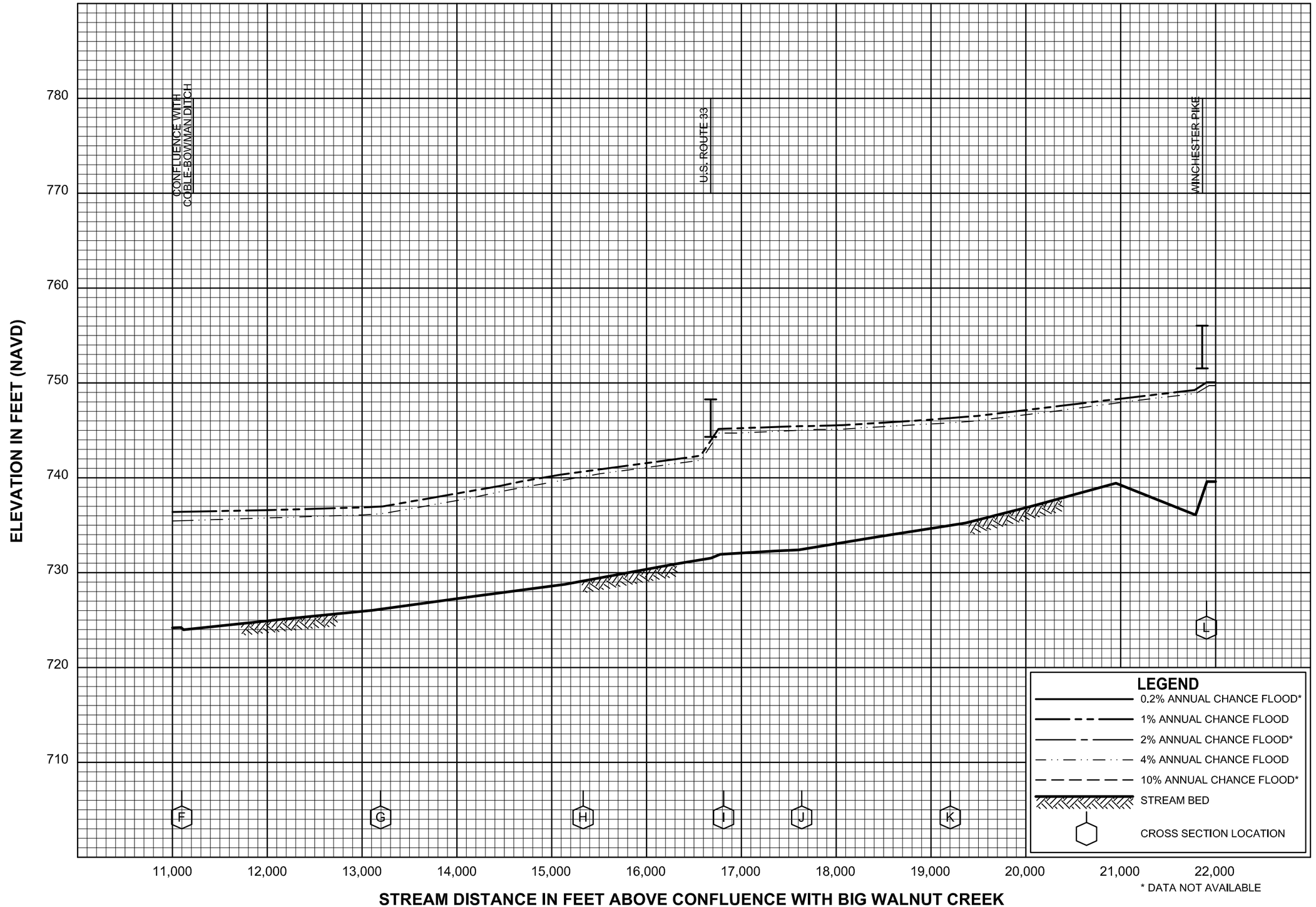
Table 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

FRANKLIN COUNTY, OHIO
AND INCORPORATED AREAS

FLOODWAY DATA

Blacklick Creek



FLOOD PROFILES

BLACKLICK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

FRANKLIN COUNTY, OH

AND INCORPORATED AREAS

APPENDIX B

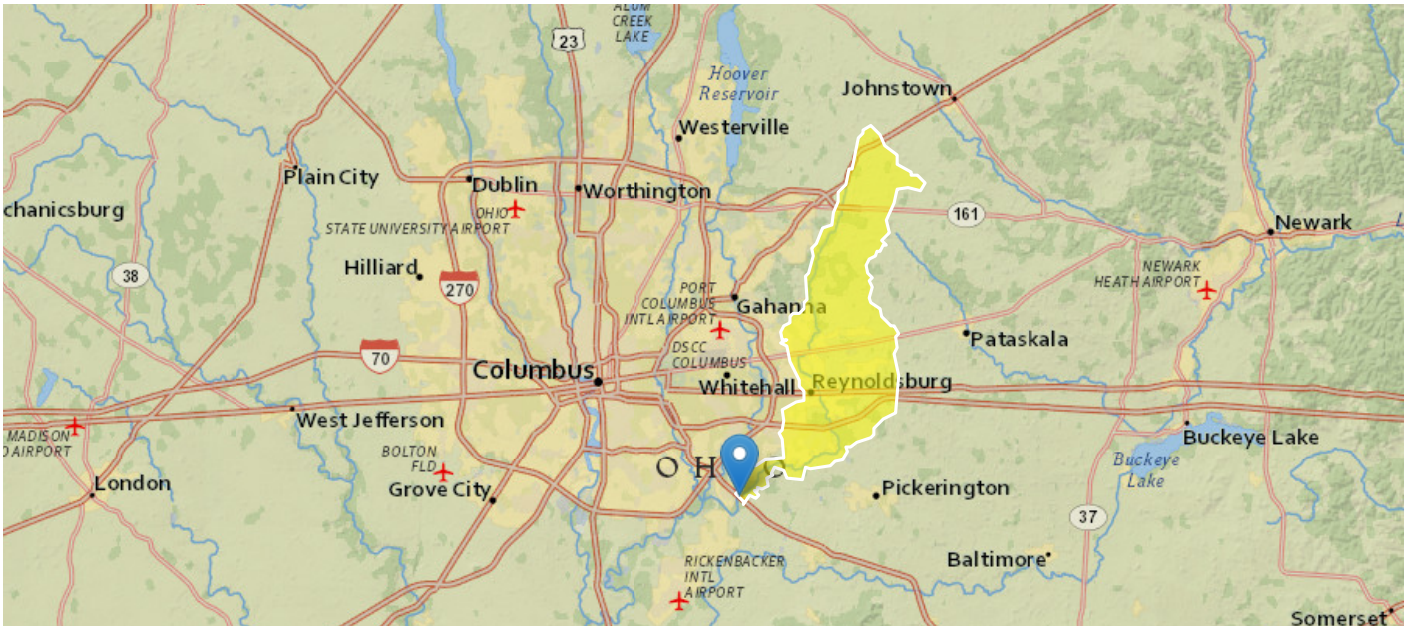
HYDROLOGIC DATA

Table 7. Summary of Discharges

Flooding Source and Location	Drainage Area (square miles)	Peak Discharges (cfs)			
		10-percent-annual-chance	2-percent-annual-chance	1-percent-annual-chance	0.2-percent-annual-chance
Billingsley Ditch					
At confluence with the Scioto River	1.8	490	750	870	1,120
Bishop Run					
At confluence with Little Walnut Creek	3.70	914	1,425	1,668	2,542
At Lithopolis Road	2.18	613	957	1,117	1,654
At county boundary	1.90	568	891	1,041	1,551
Blacklick Creek					
At confluence with Big Walnut	*	7,300[1]	*	8,800	*
DS of Hamilton Road	*	7,300[1]	*	8,800	*
DS of U.S. Route 33	*	7,400[1]	*	8,600	*
Just DS of confluence of Powell Ditch	*	7,250[1]	*	8,700	*
Just DS of Long Road	*	8,550[1]	*	10,800	*
Approximately 9,000 feet DS of Tussing Road	50.6	*	*	10,900	*
At cross-section Al	42.27	6,540	8,696	10,000	13,066
Just US of Livingston Avenue	*	7,900[1]	*	10,000	*
Just US of Blacklick Creek Lateral K	38.53	6,185	8,243	9,500	12,471
Just US of French Run	32.20	5,096	6,832	7,900	10,352
Just US of Dysar Ditch	26.96	4,548	6,101	7,000	9,212
Just DS of confluence of Utzinger Ditch	*	5,550[1]	*	7,000	*
Just US of State Route 6	*	5,200[1]	*	6,800	*
Just US of confluence with Blacklick Creek Tributary C	*	4,750[1]	*	6,000	*
Just US of Clark State Road	*	4,200[1]	*	5,300	*
Just US of Dublin-Granville Road	*	2,825[1]	*	3,500	*
Just DS of Central College Road	4.72	742	157	1,341	1,976
Just DS of Tributary A	3.73	619	966	1,120	1,654
Just US of Tributary Al	2.12	402	630	731	1,084
Blacklick Creek Lateral D					
At confluence with Blacklick Creek	0.80	313	425	495	652
Blacklick Creek Lateral G-B					
At confluence with French Run	0.35	194	256	297	385
Blacklick Creek Lateral K					
At cross-section H	1.17	240	315	361	465
Blacklick Creek Tributary C					
At confluence with Blacklick Creek	2.2	*	*	1,150	*
Blau Ditch					
At Wilson Road	0.97	485	698	804	1,200
Brown Run					
At Hoover Road	1.53	270	490	660	1,200
At CSX Transportation	1.00	150	310	410	780

Blacklick Creek

Region ID: OH
Workspace ID: OH20250211135631412000
Clicked Point (Latitude, Longitude): 39.88440, -82.87543
Time: 2025-02-11 08:57:37 -0500



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
CSL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	15.8	feet per mi
DRNAREA	Area that drains to a point on a stream	57.9	square miles
FOREST	Percentage of area covered by forest	24	percent
LAT_CENT	Latitude of Basin Centroid	39.9986	decimal degrees
LC92STOR	Percentage of water bodies and wetlands determined from the NLCD	1.26	percent
OH_SVI2024	Mapped Ohio Streamflow Variability Index as defined in SIR 2024-5075	0.66	Log base 10
OHREGA	Ohio Region A Indicator	1	dimensionless
OHREGC	Ohio Region C Indicator	0	dimensionless
PRECIPCENT	Mean Annual Precip at Basin Centroid	37.4	inches
STREAM_VARG	Streamflow variability index as defined in WRIR 02-4068, computed from regional grid	0.56	dimensionless

Peak-Flow Statistics

Peak-Flow Statistics Parameters [Peak Flow Full Model Reg A SIR2019 5018]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
CSL1085LFP	Stream Slope 10 and 85 Longest Flow Path	15.8	feet per mi	1.53	516
DRNAREA	Drainage Area	57.9	square miles	0.04	5989
LC92STOR	Percent Storage from NLCD1992	1.26	percent	0	25.35
OHREGA	Ohio Region A Indicator 1 if in A else 0	1	dimensionless	0	1
OHREGC	Ohio Region C Indicator 1 if in C else 0	0	dimensionless	0	1

Peak-Flow Statistics Flow Report [Peak Flow Full Model Reg A SIR2019 5018]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	PIL	PIU	ASEp
50-percent AEP flood	2090	ft^3/s	1110	3940	40.1
20-percent AEP flood	3330	ft^3/s	1850	6010	37.2
10-percent AEP flood	4270	ft^3/s	2350	7750	37.6
4-percent AEP flood	5590	ft^3/s	3060	10200	38.1
2-percent AEP flood	6650	ft^3/s	3600	12300	37.8
1-percent AEP flood	7770	ft^3/s	4170	14500	39.6
0.2-percent AEP flood	10600	ft^3/s	5640	19900	40.3

Peak-Flow Statistics Citations

Koltun, G.F.,2019, Flood-frequency estimates for Ohio streamgages based on data through water year 2015 and techniques for estimating flood-frequency characteristics of rural, unregulated Ohio streams: U.S. Geological Survey Scientific Investigations Report 2019–5018, 25 p. (https://dx.doi.org/10.3133/sir20195018)

Low-Flow Statistics

Low-Flow Statistics Parameters [Statewide annual one day ten year low flow with SVI less than or equal to 0.71 from SIR 2024-5075]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	57.9	square miles	0.21	540
OH_SVI2024	Mapped Ohio Streamflow Variability Index	0.66	Log base 10 cubic feet per second	0.41	1.23

Low-Flow Statistics Parameters [Statewide annual seven day ten year low flow with SVI less than or equal to 0.76 from SIR 2024-5075]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	57.9	square miles	0.21	540

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
OH_SVI2024	Mapped Ohio Streamflow Variability Index	0.66	Log base 10 cubic feet per second	0.41	1.23

Low-Flow Statistics Parameters [Statewide annual thirty day ten year low flow with SVI less than or equal to 0.87 from SIR 2024-5075]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	57.9	square miles	0.21	540
OH_SVI2024	Mapped Ohio Streamflow Variability Index	0.66	Log base 10 cubic feet per second	0.41	1.23

Low-Flow Statistics Parameters [Statewide annual ninety day ten year low flow with SVI less than or equal to 1.00 from SIR 2024-5075]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	57.9	square miles	0.21	540
OH_SVI2024	Mapped Ohio Streamflow Variability Index	0.66	Log base 10 cubic feet per second	0.41	1.23

Low-Flow Statistics Flow Report [Statewide annual one day ten year low flow with SVI less than or equal to 0.71 from SIR 2024-5075]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	RMSE	PseudoR^2
1 Day 10 Year Low Flow	0.166	ft^3/s	1	0.85

Low-Flow Statistics Flow Report [Statewide annual seven day ten year low flow with SVI less than or equal to 0.76 from SIR 2024-5075]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	RMSE	PseudoR^2
7 Day 10 Year Low Flow	0.27	ft^3/s	1	0.89

Low-Flow Statistics Flow Report [Statewide annual thirty day ten year low flow with SVI less than or equal to 0.87 from SIR 2024-5075]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	RMSE	PseudoR^2
30 Day 10 Year Low Flow	0.764	ft^3/s	1.1	0.88

Low-Flow Statistics Flow Report [Statewide annual ninety day ten year low flow with SVI less than or equal to 1.00 from SIR 2024-5075]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	RMSE	PseudoR^2
90 Day 10 Year Low Flow	2.16	ft^3/s	2.12	0.85

Low-Flow Statistics Flow Report [Area-Averaged]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	RMSE	PseudoR^2
1 Day 10 Year Low Flow	0.166	ft^3/s	1	0.85
7 Day 10 Year Low Flow	0.27	ft^3/s	1	0.89
30 Day 10 Year Low Flow	0.764	ft^3/s	1.1	0.88
90 Day 10 Year Low Flow	2.16	ft^3/s	2.12	0.85

Low-Flow Statistics Citations

Branden L. VonIns and G.F. Koltun 2024, Low-flow statistics computed for streamflow gages and methods for estimating selected low-flow statistics for ungaged stream locations in Ohio, water years 1975–2020: U.S. Geological Survey Scientific Investigations Report 2024–5075 (https://doi.org/10.3133/sir20245075)

Monthly Flow Statistics

Monthly Flow Statistics Parameters [Low Flow LatLE 41.2 wri02 4068]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	57.9	square miles	0.12	7422
FOREST	Percent Forest	24	percent	0	99.1
LAT_CENT	Latitude of Basin Centroid	39.9986	decimal degrees	38.68	41.2
LC92STOR	Percent Storage from NLCD1992	1.26	percent	0	19
PRECIPCENT	Mean Annual Precip at Basin Centroid	37.4	inches	34	43.2
STREAM_VARG	Streamflow Variability Index from Grid	0.56	dimensionless	0.25	1.13

Monthly Flow Statistics Flow Report [Low Flow LatLE 41.2 wri02 4068]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	SE	ASEp
January Mean Flow	85.4	ft^3/s	16.6	16.6
February Mean Flow	96	ft^3/s	11.9	11.9
March Mean Flow	115	ft^3/s	14	14
April Mean Flow	99.3	ft^3/s	11.2	11.2
May Mean Flow	71.6	ft^3/s	19.5	19.5
June Mean Flow	45.6	ft^3/s	27	27
July Mean Flow	26.9	ft^3/s	28.2	28.2
August Mean Flow	18	ft^3/s	36.8	36.8
September Mean Flow	12.4	ft^3/s	43.6	43.6
October Mean Flow	13.2	ft^3/s	50.8	50.8

Statistic	Value	Unit	SE	ASEp
November Mean Flow	30.8	ft^3/s	37.5	37.5
December Mean Flow	60.2	ft^3/s	21.8	21.8

Monthly Flow Statistics Citations

Koltun, G. F., and Whitehead, M. T.,2002, Techniques for Estimating Selected Streamflow Characteristics of Rural, Unregulated Streams in Ohio: U. S. Geological Survey Water-Resources Investigations Report 02-4068, 50 p (https://pubs.er.usgs.gov/publication/wri024068)

Maximum Probable Flood Statistics

Maximum Probable Flood Statistics Parameters [Crippen Bue Region 6]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	57.9	square miles	0.1	10000

Maximum Probable Flood Statistics Flow Report [Crippen Bue Region 6]

Statistic	Value	Unit
Maximum Flood Crippen Bue Regional	118000	ft^3/s

Maximum Probable Flood Statistics Citations

Crippen, J.R. and Bue, Conrad D.1977, Maximum Floodflows in the Conterminous United States, Geological Survey Water-Supply Paper 1887, 52p. (https://pubs.usgs.gov/wsp/1887/report.pdf)

Application Version: 4.26.0
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1

U. S. Route 33 Over Blacklick Creek - Basin Development Factors

	Channel Improvements	Channel Linings	Storm Sewer Drainage	Curb and Gutter Drainage	Subtotal
Upper Third	0	0	1	1	2
Middle Third	0	0	1	0	1
Lower Third	0	0	1	0	1
				BDF =	4

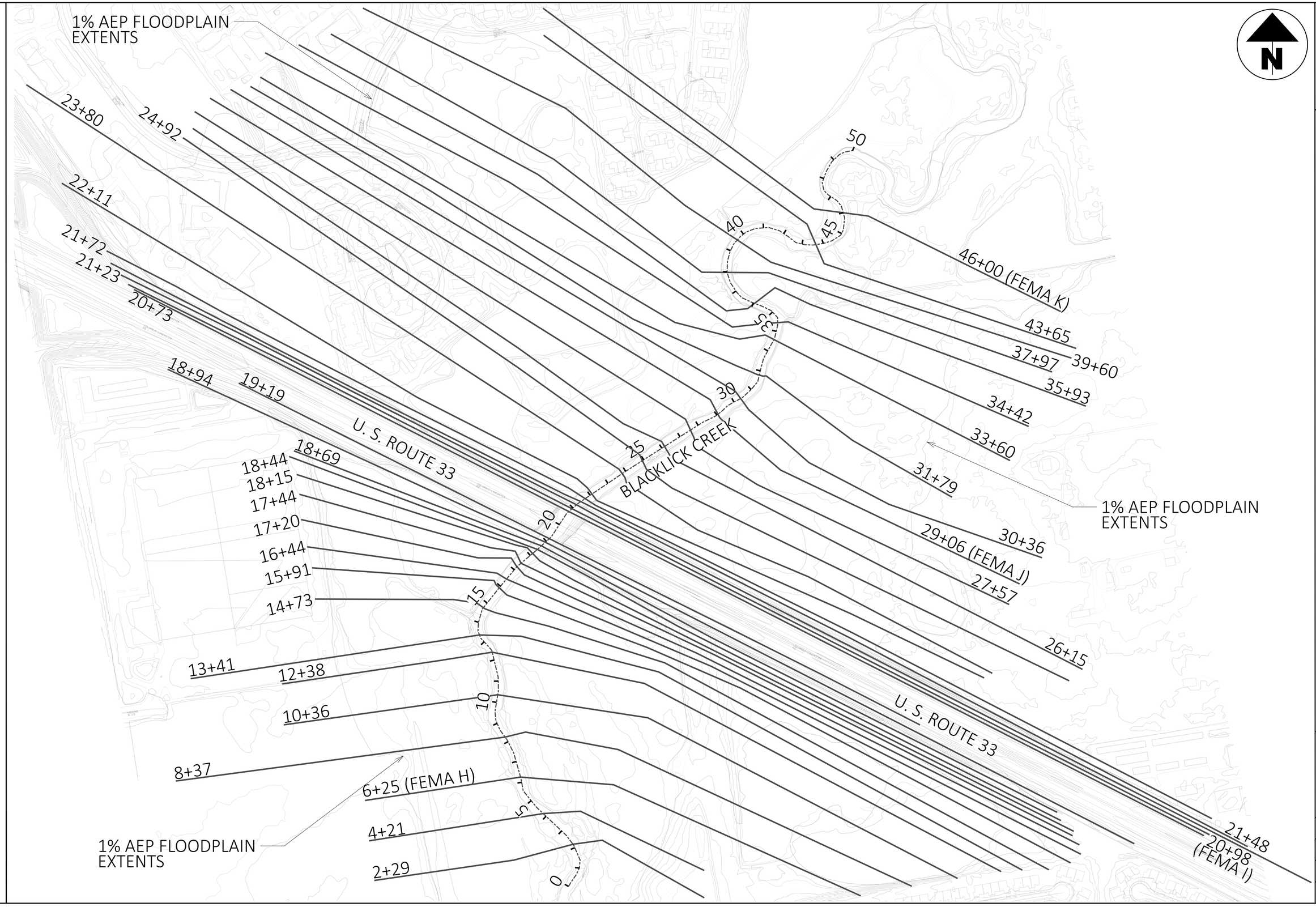
Basin Drainage Area:	57.9	sq. mi.
Annual Precipitation:	37.7	inches

USGS Open File Report 2432 Peak Flow

																					Peak Flow (cfs)	Streamstats Flow (cfs)	FEMA Flows
UQ_2	=	$155(A)^{0.68}$	*	$(P-30)^{0.50}$	*	$(13-BDF)^{-0.50}$	=	$155(57.9)^{0.68}$	*	$(37.7-30)^{0.50}$	*	$(13-4)^{-0.50}$	=	2265	2090	--
UQ_5	=	$200(A)^{0.71}$	*	$(P-30)^{0.63}$	*	$(13-BDF)^{-0.44}$	=	$200(57.9)^{0.71}$	*	$(37.7-30)^{0.63}$	*	$(13-4)^{-0.44}$	=	4911	3330	--
UQ_{10}	=	$228(A)^{0.74}$	*	$(P-30)^{0.68}$	*	$(13-BDF)^{-0.41}$	=	$228(57.9)^{0.74}$	*	$(37.7-30)^{0.68}$	*	$(13-4)^{-0.41}$	=	7480	4270	--
UQ_{25}	=	$265(A)^{0.76}$	*	$(P-30)^{0.72}$	*	$(13-BDF)^{-0.37}$	=	$265(57.9)^{0.76}$	*	$(37.7-30)^{0.72}$	*	$(13-4)^{-0.37}$	=	11171	5590	7400
UQ_{50}	=	$293(A)^{0.78}$	*	$(P-30)^{0.74}$	*	$(13-BDF)^{-0.35}$	=	$293(57.9)^{0.78}$	*	$(37.7-30)^{0.74}$	*	$(13-4)^{-0.35}$	=	14581	6650	--
UQ_{100}	=	$321(A)^{0.79}$	*	$(P-30)^{0.76}$	*	$(13-BDF)^{-0.33}$	=	$321(57.9)^{0.79}$	*	$(37.7-30)^{0.76}$	*	$(13-4)^{-0.33}$	=	18107	7770	8600

APPENDIX C

HEC-RAS – EXISTING



FRA-33-24.76

BLACKLICK CREEK - CROSS-SECTION MAP

DESIGN AGENCY

.

DESIGNER ECH

REVIEWER JWE 04-08-25

PROJECT ID 119387

SHEET XS-1 | TOTAL 1

HEC-RAS HEC-RAS 6.3.1 September 2022
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: FRA-33-24.76 2502046
Project File : FRA3324762502046.prj
Run Date and Time: 3/28/2025 10:33:55 AM

Project in English units

PLAN DATA

Plan Title: Existing
Plan File : C:\HEC-RAS\FRA-33-2476-2502046\FRA3324762502046.p01

Geometry Title: Existing
Geometry File : C:\HEC-RAS\FRA-33-2476-2502046\FRA3324762502046.g01

Flow Title : Existing
Flow File : C:\HEC-RAS\FRA-33-2476-2502046\FRA3324762502046.f01

Plan Summary Information:
Number of: Cross Sections = 37 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 1 Lateral Structures = 0

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

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

FLOW DATA

Flow Title: Existing
Flow File : C:\HEC-RAS\FRA-33-2476-2502046\FRA3324762502046.f01

Flow Data (cfs)

River	Reach	RS	4% AEP	2% AEP	1% AEP	0.2% AEP
Blacklick Creek	Main	4600	7400	8000	8600	11500

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Blacklick Creek	Main	4% AEP	Known WS = 740	
Blacklick Creek	Main	2% AEP	Normal S = 0.001	
Blacklick Creek	Main	1% AEP	Known WS = 740.2	
Blacklick Creek	Main	0.2% AEP	Normal S = 0.001	

GEOMETRY DATA

Geometry Title: Existing
Geometry File : C:\HEC-RAS\FRA-33-2476-2502046\FRA3324762502046.g01

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 4600

INPUT
Description: Cross Section 46+00 (FEMA K)
Station Elevation Data num= 42

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	750	47	748	88	746	150	744	356	742
534	742	564	744.3	681	743.7	824	744.5	912	743.5
984	744.5	1006	744	1019	743.5	1044	744.2	1056	744
1085	742	1094	736	1110	734	1120	732	1133	732
1145	734	1154	735	1157	738	1165	740	1212	742
1340	743	1424	742	1438	741.5	1495	742.5	1532	742
1554	741.7	1781	741.7	1790	742	1828	748	1854	748
1983	749	2006	747.6	2083	750.2	2331	747.8	2504	749
2654	747.8	2828	749						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	1085	.05	1212	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1085	1212	255	235	139	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	824	744.5	T
1983	2828	749	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 4365

INPUT
Description: Cross Section 43+65
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	750	217	748	527	746	649	744	815	742
841	739.7	874	742	953	742.5	1009	742	1022	739.7
1035	740	1086	742	1236	742.5	1282	742	1290	740
1296	738	1310	734	1325	733	1338	732	1350	732
1355	733	1360	734	1368	738	1375	742	1388	742.5
1421	741.9	1455	742.3	1498	742	1650	741.5	1719	742.2
1737	742	1769	741.7	1977	741.7	1981	742	2026	750
2213	750	2282	747.7	2370	748.5	2443	747.7	2516	748
2661	750.3								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	1282	.05	1375	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1282	1375	384	405	422	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
2026	2661	750	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 3960

INPUT
Description: Cross Section 39+60
Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	750	420	748	567	746	663	744	746	741.9
875	742.5	931	742	952	739.7	973	742	994	742.4
1013	742	1018	740	1027	739.7	1033	740	1079	742
1137	742.5	1199	742	1469	741	1610	741	1632	740
1633	739	1645	734	1655	732	1666	732	1675	735
1685	738	1692	742	1737	742.5	1771	742	1838	741.5
2080	741.5	2089	742	2115	744	2143	746	2248	748
2470	748	2521	744	2653	741.8	2759	746	2835	747.5
2940	746	3078	744.9	3295	746	3520	748.5		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	1610	.05	1692	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1610	1692	144	163	180	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
2248	3520	748	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 3797

INPUT
Description: Cross Section 37+97
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	750	393	748	515	746	650	744	727	742
772	741.7	830	742	945	744.1	959	744	986	742
992	740	1002	739.7	1010	740	1088	740.5	1176	737.9
1272	741	1402	740.5	1556	742.1	1567	740	1569	738
1571	736	1580	733	1590	732	1600	732	1610	734
1614	736	1621	742	1711	742.4	1779	742	1894	741
2132	741	2143	742	2263	748.1	2339	742	2384	741.5
2518	743.5	2651	741	2728	742	2752	744	2804	746
2834	746.5	3072	744.7	3267	746	3464	748	3500	748.5

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	1556	.05	1621	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1556	1621	182	196	227	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	945	744.1	T
2263	3500	748.1	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 3593

INPUT
Description: Cross Section 35+93

Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	750	451	748	713	746	892	744	958	742
1006	742.3	1057	742	1386	742	1398	740	1408	738
1414	737.5	1422	738	1469	740.2	1552	739.8	1601	740.4
1639	738	1650	736	1660	734	1665	731	1670	731
1681	733	1690	736	1698	742	1761	742.6	1806	742
1981	744	2000	744.3	2018	744	2188	741.3	2469	742.1
2646	741.3	2743	742	2809	744	3118	746.1	3277	743.9
3515	746	3724	745.9	3782	748.5				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	1601	.05	1698	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1601	1698	190	149	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
2000	3782	744.3	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 3442

INPUT
Description: Cross Section 34+42
Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	750	238	748	379	746	653	744	765	742
821	741.5	885	742	956	741.7	1023	742.2	1112	741.7
1222	742.2	1233	742.5	1254	733.4	1262	730.5	1265	730
1267	729.81	1278	730.7	1293	733.7	1310	734.16	1327	741.8
1482	742.6	1528	742	1934	741.3	2160	740	2175	739.7
2187	740	2600	742	2652	744	2794	741.7	2878	744
2972	744.5	3056	743.7	3120	744.2	3309	746	3375	746.7
3411	746	3428	745.8	3438	746	3456	748	3487	749

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	1233	.05	1327	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1233	1327	103	82	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
2652	3487	744	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 3360

INPUT
Description: Cross Section 33+60
Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	751.5	93	750	253	748	333	746	446	744
480	743.5	580	744.2	630	744	775	742	1206	742.57
1212	742.59	1226	733.85	1239	730.08	1251	732.24	1267	732.95
1283	741.65	1493	742	1520	742.3	1548	742	1949	740
1957	739.7	1988	739.7	2031	740.2	2068	739.7	2331	739.7
2356	740	2433	740.7	2654	742	2702	744	2746	746
2924	747	3124	748.6	3470	748.2				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	1206	.05	1283	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.

1206	1283	168	181	184	.1	.3	

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 3179

INPUT
Description: Cross Section 31+79
Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	748.5	28	748	55	746	111	745.5	214	746.3
246	746	365	744	395	743.5	425	744	576	744.5
765	744	863	742	1036	740.52	1043	740.3	1051	733.37
1064	733.02	1081	731.6	1099	733.6	1107	737.65	1111	737.95
1117	740	1290	740.5	1445	739.7	1629	740.3	1773	739.7
1794	739.7	1819	739.5	2165	739.5	2192	740	2426	742
2462	744	2495	746	2526	748	2564	749	2649	748
2763	747.5	2952	748.4	3243	747.4	3352	748.4		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	1036	.045	1117	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1036	1117	173	143	119	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	214	746.3	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 3036

INPUT
Description: Cross Section 30+36
Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	750.6	48	750	124	748	300	746.8	473	746
654	744	754	743.2	916	744	1112	746	1176	747.4
1242	746	1400	744	1541	742	1584	742.15	1592	741.67
1601	734.3	1612	730.83	1635	732.82	1641	734	1650	739.25
1656	741.3	1789	741.5	1893	739.9	1930	740.3	1966	739.9
2099	740.5	2238	739.7	2268	739.7	2288	740.1	2305	739.7
2703	739.7	2730	740	2861	742	2896	744	2945	746
2997	745.8	3046	748	3212	748	3432	748	3479	747.9
3611	748.3	3686	744.2	3783	744.2	3945	748		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.07	1584	.035	1656	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1584	1656	127	130	123	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1176	747.4	T
3046	3945	748	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 2906

INPUT
Description: Cross Section 29+06 (FEMA J)
Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	750.2	15	750	265	748	361	746	574	744

754	743	912	743.1	1136	743.2	1384	743.1	1598	742.13
1601	741.36	1608	734.1	1634	736.09	1654	733.79	1669	732.16
1678	733.45	1683	732.91	1687	733.65	1696	739.71	1702	740.46
1878	740	1890	739.7	1904	740	2032	740	2046	739.7
2082	739.7	2100	740	2215	740	2240	739.7	2686	739.7
2733	740	2754	742	2781	744	2849	746	2869	746.3
2964	745.7	3041	746.4	3109	748	3163	748	3352	745.2
3469	746.3	3726	744.2	3883	744.2	3961	748		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	1598	.035	1702	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1598	1702	158	149	143	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1136	743.2	T
3109	3961	748	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 2757

INPUT
Description: Cross Section 27+57
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	748.4	54	748	221	746	252	744	336	743.5
460	744	513	744.4	580	744	1011	742	1055	741.9
1091	742	1363	742.1	1399	742.2	1441	742.1	1559	742
1675	741.47	1692	741.37	1703	733.15	1713	732.1	1717	731.5
1727	731.8	1731	732.82	1742	732.27	1755	733.05	1770	738.7
1777	740	1939	741	2085	740	2098	739.7	2134	739.7
2153	740	2270	741	2378	740	2393	739.7	2751	739.7
2788	740	2831	742	2879	744	3049	746.2	3101	745.7
3128	746	3306	746.2	3577	746.2	3614	745.7	3674	748
3807	748	3847	744.2	3937	744.2	4067	747.9	4470	748.5

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	1675	.035	1777	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1675	1777	139	142	154	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1399	742.2	T
3049	4470	748	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 2615

INPUT
Description: Cross Section 26+15
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	749.5	107	748	251	747.5	451	748.2	502	748
577	746	617	744	652	743	880	743	966	744.3
1031	743.7	1112	744.3	1159	744	1316	742	1486	741.7
1604	741.7	1731	742	1840	742.2	1871	742.1	1961	742
2152	740.45	2183	741.75	2202	733.5	2216	732	2224	730.5
2254	730.6	2268	740.6	2440	740.4	2635	740	2660	739.8
2741	740	2912	742.5	2962	742	2982	739.7	3250	739.7
3283	746	3436	746	3477	745	3547	746	3607	746
3724	742.7	3856	746	4002	746	4110	745.5	4195	746
4279	746	4437	745.7	4538	748.1	4608	747.9	4676	748
4873	748.5								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	2183	.035	2268	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
2183	2268	133	123	110	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1840	742.2	T
3283	4873	746	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 2492

INPUT
Description: Cross Section 24+92
Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	749.5	99	748	542	746	570	744	619	742.7
810	742.7	888	744	916	744	989	743.5	1085	744.1
1151	744	1288	742	1361	741.7	1693	741.7	1833	742.5
1918	742	2199	740	2205	739.49	2222	739.09	2230	733.14
2245	730.75	2264	730.75	2275	732.48	2280	737.44	2287	740.5
2311	737.9	2334	740	2487	741.7	2656	740	2690	739.5
2737	740	2923	742.5	3057	739.7	3260	739.7	3297	746
3354	747.5	3421	746	3575	746.1	3766	746	3894	745.9
4032	747	4171	746	4371	744.9	4536	746	4570	748
4712	748.1								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	2199	.035	2334	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
2199	2334	114	112	117	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1085	744.1	T
3297	4712	748	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 2380

INPUT
Description: Cross Section 23+80
Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	748.1	27	748	232	746	521	744	605	743.5
716	744.1	938	742	1024	741.5	1319	741.5	1386	742
1527	742.4	1689	742	1925	740.15	1956	732.11	1971	729.09
1982	729.16	1990	729.73	1995	731.53	2006	737.29	2023	738
2058	740	2219	741.5	2371	740	2395	739.7	2915	739.7
2969	740	2988	742	3003	744	3022	746	3089	747.5
3155	746	3323	743.9	3481	746.1	3548	745.7	3628	747.3
3687	745.8	4425	746	5410	746.2	5500	746.5	5830	748

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	1925	.035	2058	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1925	2058	160	169	168	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1527	742.4	T
3022	5830	746	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 2211

INPUT
Description: Cross Section 22+11
Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	748.5	23	748	321	746	496	744	924	742
1176	741.5	1307	742	1549	742.1	1698	742	1761	740
1837	739.5	1959	740.75	1979	740	1986	732.72	2000	730.7
2018	732.31	2033	733.03	2051	736.32	2059	738.33	2090	740
2274	741	2393	739.7	2984	739.7	2991	740	3003	742
3059	744	3156	746	3315	746.3	3353	745.8	3625	745.5
3931	746	4006	746.2	4143	745.9	4231	746.1	4374	746.9
4393	746.5	4439	745.8	4579	746.4	4797	743.9	4807	744
4822	746	4839	748	4858	750	4873	752	4881	754
4893	756								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	1959	.035	2090	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1959	2090	25	39	54	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1549	742.1	T
3156	4893	746	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 2172

INPUT
Description: Cross Section 21+72
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	748	140	747	200	746.5	303	745.7	380	746
610	746.5	832	746	862	746.2	973	745.8	1082	746
1332	747	1510	746	1539	745.7	1603	746	1720	746.5
1854	746	1957	744	2522	742	2602	741.5	2690	742
2976	742.3	3125	742	3181	740	3301	739.5	3421	740.5
3434	740	3445	732.7	3458	730.7	3479	732.3	3494	733.03
3500	734.54	3516	736	3538	738	3843	739	4361	740
4450	742	4621	744	4689	746.1	4763	745.9	5184	746
5351	746	5457	745	5620	746	5803	746	5816	744
5920	744	5945	746	5964	748	5979	750	5991	752

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	3421	.035	3538	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
3421	3538	18	24	30	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1720	746.5	T
4689	5991	746.1	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 2148

INPUT
Description: Cross Section 21+48

Station Elevation Data num= 47

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	748	230	746	300	745.3	502	744	602	744
939	743.7	965	744	1079	746	1198	745.5	1508	744.5
1790	744.3	1964	744	2490	742	2613	741.5	3023	740
3321	739.5	3437	740.5	3450	740	3455	738	3460	736
3478	733	3490	732	3495	731	3505	732	3520	733
3532	736	3543	738	3714	740	3731	740.3	3750	739.5
3783	740.3	3837	739.7	3870	740.1	4068	739.8	4177	740
4310	739.8	4463	740	4610	742	4799	744	5211	746
5382	746	5708	743.8	5790	744	5857	746	5894	748
5916	750	5956	752						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	3437	.035	3543	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
3437	3543	27	25	19	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	2613	746.4	T
4799	5956	747	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 2123

INPUT
Description: Cross Section 21+23
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	748	390	746	500	745.5	894	744	1178	742
1301	741.8	1420	742	1455	744	1515	746	1951	746
2161	744	2771	746	2874	746	2900	744	2926	742
2945	741.5	2967	742	3305	744	3440	744	3556	742
3595	740	3693	738	3803	740.1	3804	740	3808	738
3812	736	3830	732	3841	731	3855	731	3865	732
3877	734	3885	736	3892	738	4679	738	4688	737.9
4692	738	4736	740	4760	742	4918	743.2	5077	741.7
5461	744	5970	744	6109	746	6162	748	6228	750

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	3803	.035	3892	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
3803	3892	22	25	24	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	2874	746	T
4760	6228	746	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 2098

INPUT
Description: Cross Section 20+98 (FEMA I)
Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	747.5	574	746	851	744	924	746	1019	748
1416	748	2005	746	2596	744	3030	744	3106	742
3210	740	3261	737.5	3279	738.5	3295	736	3310	734
3330	732	3343	731.5	3350	732	3375	734	3389	736
3454	738	4154	740	4193	742	4307	744	4456	744
4730	743.5	5109	744	5313	746	5565	748	5654	750

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	3279	.035	3389	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
3279	3389	25	25	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	3030	747.5	T
3454	5654	747.5	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 2073

INPUT
Description: Cross Section 20+73
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	749	557	748	864	748	1142	746	1282	745
1684	744	1992	744	2181	746	2717	746	3162	746
3233	744.2	3244	742	3250	740	3257	738	3277	737
3282	734.5	3299	731.8	3314	730.7	3330	729.7	3343	731.5
3352	732.2	3357	735	3365	736	3368	738	3371	740
3373	742	3375	744	3377	746	3590	746	4021	746.4
5346	748	5600	750						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	3233	.045	3375	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
3233	3375	159	154	159	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	3233	746	T
3375	5600	746	T

BRIDGE

RIVER: Blacklick Creek
REACH: Main RS: 2000

INPUT
Description: Bridge 2502046
Distance from Upstream XS = 9.24
Deck/Roadway Width = 134.4
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 21

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	750.6	0	351	750	0	1060	748	0
1737	746	0	2023	745.4	0	2237	746	0
2763	747.2	0	3096	748	0	3224	748.3	0
3242.9	748.56	0	3243	748.56	744.63	3384	748.9	745.01
3384.1	748.9	0	3421	748.9	0	3888	750	0
4004	750.2	0	4114	750	0	4525	748.9	0
5196	748.8	0	5485	750	0	5634	750.2	0

Upstream Bridge Cross Section Data
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	749	557	748	864	748	1142	746	1282	745
1684	744	1992	744	2181	746	2717	746	3162	746
3233	744.2	3244	742	3250	740	3257	738	3277	737
3282	734.5	3299	731.8	3314	730.7	3330	729.7	3343	731.5
3352	732.2	3357	735	3365	736	3368	738	3371	740
3373	742	3375	744	3377	746	3590	746	4021	746.4
5346	748	5600	750						

Manning's n Values num= 3

```
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08    3233    .045    3375     .08

Bank Sta: Left   Right    Coeff Contr.   Expan.
          3233    3375            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    3233     746       T
    3375    5600     746       T

Downstream  Deck/Roadway Coordinates
    num=      17
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0     747       0     325     746       0     611   745.4       0
     825     746       0    1351   747.2       0    1684     748       0
    1812   748.3       0  1830.9  748.56       0    1831  748.56  744.63
    1972   748.9  745.01  1972.1   748.9       0    2009   748.9       0
    2476     750       0    2592   750.2       0    2702     750       0
    3113   748.9       0    3552  748.85       0

Downstream Bridge Cross Section Data
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   746.2      38     746    1034     746    1857     746    1869     744
    1874     742    1879     740    1891     738    1897     736    1900  732.05
    1913  730.76    1940  732.15    1963  732.63    1967   735.6    1981  736.75
    1986     738    2000     740    2007     742    2018     744    2487     746
    2840   746.4    3119     746    3275     748    3552   746.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08    1879    .045    2000     .08

Bank Sta: Left   Right    Coeff Contr.   Expan.
          1879    2000            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    1857     746       T
    2487    3552     746       T

Upstream Embankment side slope              =       2 horiz. to 1.0 vertical
Downstream Embankment side slope            =       2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Abutments =  1

Abutment Data
Upstream     num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    3235     744    3266     738    3287     737 3287.01     727 3358.99     727
    3359     736    3377     744
Downstream     num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    1823     744    1858     738    1862     727 1966.99     727    1967   735.6
    2018     744

Number of Piers =  2

Pier Data
Pier Station     Upstream=    3287    Downstream=    1875
Upstream     num=       2
    Width   Elev    Width   Elev
       1     730       1     746
Downstream     num=       2
    Width   Elev    Width   Elev
       1     730       1     746

Pier Data
Pier Station     Upstream=    3341    Downstream=    1929
```

```
Upstream     num=       2
    Width   Elev    Width   Elev
       1     730       1     746
Downstream     num=       2
    Width   Elev    Width   Elev
       1     730       1     746

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

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

CROSS SECTION


RIVER: Blacklick Creek
REACH: Main               RS: 1919

INPUT
Description: Cross Section 19+19
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   746.2      38     746    1034     746    1857     746    1869     744
    1874     742    1879     740    1891     738    1897     736    1900  732.05
    1913  730.76    1940  732.15    1963  732.63    1967   735.6    1981  736.75
    1986     738    2000     740    2007     742    2018     744    2487     746
    2840   746.4    3119     746    3275     748    3552   746.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08    1879    .045    2000     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1879    2000               25      25      25             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    1857     746       T
    2487    3552     746       T

CROSS SECTION


RIVER: Blacklick Creek
REACH: Main               RS: 1894

INPUT
Description: Cross Section 18+94
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     745     687     744     702     746     738     748    1038     749
    1313     748    1888     746    2319     744    2353   743.5    2426     744
    2647     745    2788     744    2882     742    3012     740    3033     738
    3048     736    3060     733    3080   731.5    3100   731.5    3110     734
    3125     736    3131     738    4013     740    4166     738    4322     738
    4334   737.7    4345     738    4443   740.5    4494   739.7    4664     742
    4800     744

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08    3012    .045    3131     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
```

```
          3012    3131                25      25      25              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    2647     746       T
    3131    4800     746       T

CROSS SECTION


RIVER: Blacklick Creek
REACH: Main               RS: 1869

INPUT
Description: Cross Section 18+69
Station Elevation Data    num=      33
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     744     227   744.5     490     744     787     742     853   741.7
     994   742.3    1760     740    1780   739.7    1786     740    1812     742
    1879     742    2033   739.9    2191     742    2325     743    2388     742
    2403     740    2629     740    2661     738    2668     736    2700     734
    2710     733    2720     733    2735     734    2744     736    2749     738
    3113   739.5    3421     738    3653   736.9    3860     738    3869     740
    3885     742    3899     744    3940     745

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08    2661    .045    2749     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          2661    2749                31      25      24              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    2325     745       T
    3113    3940     745       T

CROSS SECTION


RIVER: Blacklick Creek
REACH: Main               RS: 1844

INPUT
Description: Cross Section 18+44
Station Elevation Data    num=      35
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     744     300     742     399   740.5     690   742.5    1071   741.9
    1777     740    1795   739.5    1809     740    1844     742    1910     744
    1991     742    2035     740    2044   739.5    2053     740    2066     742
    2246     743    2402   741.5    2431     742    2673     742    2698     740
    2703     738    2708     736    2720     735    2740     733    2770     733
    2783     736    2790     738    3078   739.5    3458   736.5    3858   736.5
    3861     738    3877     740    3894     742    3906     744    3983     746

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08    2698    .045    3078     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          2698    3078                40      29      10              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    1910     745       T
    3078    3983     745       T

CROSS SECTION


RIVER: Blacklick Creek
REACH: Main               RS: 1815

INPUT
Description: Cross Section 18+15
Station Elevation Data    num=      41
```

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	744	229	742	415	740	502	739.7	632	740
749	742	773	742.1	795	742	1508	740	1769	739.7
1864	739.7	1890	740.5	1941	744	1978	744.5	2026	744
2100	739.7	2110	740	2129	742	2169	744	2383	746
2452	744	2482	742	2552	740	2790	738.64	2797	738.13
2805	732.29	2812	729.7	2840	731.32	2864	732.11	2870	736.45
2874	737.2	2932	739	3330	738.5	3509	738	3525	737.7
3894	737.7	3897	738	3911	740	3926	742	3947	744
4001	746								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	2790	.045	2932	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
2790	2932	50	69	.3	.5

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	2383	746	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 1744

INPUT
Description: Cross Section 17+44
Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	744	202	742	366	740	406	739.7	581	739.7
650	740	778	742	1491	740	1731	739.5	1823	740
1913	742	1939	744	1973	744.6	2001	744	2058	742
2079	740	2086	739.5	2100	740	2130	742	2184	744
2296	744.6	2415	744	2461	742	2514	740	2805	738
2836	736	2850	734	2880	733	2885	733	2895	735
2901	736	2906	738	3164	739.3	3654	736.7	3849	738
3865	740	3887	742	3911	744	3963	746		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	2805	.045	2906	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
2805	2906	43	24	32	.3	.5

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	1973	744.6	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 1720

INPUT
Description: Cross Section 17+20
Station Elevation Data num= 36

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	744	235	742	377	740	446	739.7	654	739.7
713	740	1148	741	1551	740	1811	739.7	1860	740
1943	742	1974	744	2015	745.2	2049	744	2072	742
2095	740	2116	739.7	2134	740	2204	742	2325	744.1
2443	742	2500	740	2876	742.31	2889	737.79	2893	733.51
2902	730.94	2933	731.67	2960	731.72	2967	738.2	2976	739.05
3210	739.3	3665	736.5	3843	738	3881	742	3902	744
3975	746								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	2876	.045	2976	.08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2876 2976 60 76 90 .3 .5
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 2015 745.2 T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 1644

INPUT
Description: Cross Section 16+44
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	744	218	742	404	740	438	739.7	715	739.7
773	740	1202	740.5	1606	740	1693	739.5	1787	740.1
1826	739.7	1877	740	1952	742	1981	744	2056	745.6
2067	744	2088	742	2105	740	2199	740	2328	742.1
2924	738.3	2941	738	2946	736	2955	733	2969	731.5
2991	733	2995	736	2999	738	3196	739	3623	737
3796	738	3816	740	3836	742	3862	744	3915	746

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	2924	.045	2999	.08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2924 2999 84 53 34 .3 .5
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 2056 745.6 T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 1591

INPUT
Description: Cross Section 15+91
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	746	28	744	94	742	349	740	358	739.7
726	739.7	767	740	1282	740.8	1652	739.7	1822	740
1888	742	1931	744	1980	745.4	2037	744	2049	742
2059	740	2257	740.2	2326	740	2914	739.43	2922	738.02
2930	733.05	2955	732.33	2983	730.52	2991	732.33	2997	737.9
3004	739.18	3347	739.2	3391	738	3586	737.5	3764	738
3775	740	3789	742	3804	744	3855	746		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	2914	.045	3004	.08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2914 3004 98 119 131 .3 .5
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 1980 745.4 T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 1472

INPUT
Description: Cross Section 14+92
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	746	61	744	75	742	286	740	300	739.7

```
     738   739.7     798     740    1228   741.1    1620     740    1689   739.7
    1721     740    1793     742    1830     744    1879   745.3    1927     744
    1942     742    1955     740    2857     740    2865  740.14    2882  732.96
    2907  731.75    2927  731.19    2936  732.14    2954  739.91    2958     740
    3010   740.5    3069     740    3143   737.9    3287   738.7    3487   737.5
    3579     740    3626     742    3652     744    3711     746

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08    2865    .045    2958     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          2865    2958             112     131     166             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0    1879   745.3       T

CROSS SECTION


RIVER: Blacklick Creek
REACH: Main               RS: 1341

INPUT
Description: Cross Section 13+41
Station Elevation Data    num=      32
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     746      29     744      42     742     149     740     177   739.7
     635   739.7     678     740    1132   741.3    1451     740    1547   739.7
    1584     740    1656     742    1693     744    1751   745.1    1790     744
    1801     742    1813     740    2746     738    2752     736    2760     734
    2765   733.2    2794   733.2    2800     734    2806     736    2812     738
    2840   739.7    3069   737.9    3326   737.5    3387     738    3416     740
    3458     742    4147   742.6

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08    2746    .045    2812     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          2746    2812             100     103      93             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0    1751   745.1       T

CROSS SECTION


RIVER: Blacklick Creek
REACH: Main               RS: 1238

INPUT
Description: Cross Section 12+38
Station Elevation Data    num=      37
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     746      23     744      35     742     109     740     127   739.7
     611   739.7     645     740    1045   741.3    1379     740    1433   739.7
    1467     740    1539     741    1585     744    1611   744.8    1637     744
    1657     742    1669     740    1879   739.5    2255   739.1    2466     738
    2495   737.5    2555   738.2    2571     738    2573     736    2575     734
    2587   733.1    2616   733.1    2625     734    2647     736    2678     738
    2697   738.5    2923   735.8    3021     738    3083     740    3203     742
    3380     744    3593     745

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08    2495    .045    2697     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          2495    2697             206     202     201             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0    1611   744.8       T
```

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 1036

INPUT
Description: Cross Section 10+36
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	747	12	746	20	744	26	742	31	740
46	739.7	506	739.7	719	740	946	741	1178	739.8
1198	740	1325	742	1367	742.5	1504	737.5	1625	738.8
1787	737.8	1949	739.1	2106	737.8	2229	738.5	2290	738
2298	736	2312	734	2326	733	2342	733	2355	734
2364	736	2389	738.5	2442	738.6	2547	739	2672	737.5
2771	738	2907	740	3280	742	3340	742.4		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	2229	.045	2389	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
2229	2389	190	199	207	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	1367	742.5	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 837

INPUT
Description: Cross Section 8+37
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	750	12	748	22	746	32	744	36	742
43	740	45	739.7	554	739.7	600	740	747	741.5
897	739.5	919	740	1060	742.5	1113	742	1165	740
1298	738	1360	737.5	1509	738.8	1773	735.9	1948	739
1995	738	2009	736	2016	734	2037	733	2062	733
2076	734	2094	736	2227	738	2246	738.2	2262	738
2479	738	2528	740	2788	740.7	3595	741.5		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	2009	.045	2094	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
2009	2094	221	212	197	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	1060	742.5	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 625

INPUT
Description: Cross Section 6+25 (FEMA H)
Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	754.8	9	754	21	752	32	750	42	748
53	746	62	744	77	742	90	740	216	739.5
417	740	539	742.1	619	739.8	668	742	772	744
785	746	797	748	832	749	864	748	883	748
903	744	922	742	948	740	992	738	1093	737.5
1264	738.2	1389	735.9	1421	736.2	1463	735.9	1594	738.5

1630	738	1660	736	1676	734	1684	732.8	1687	732
1723	732.8	1749	734	1785	736	1924	737.5	2176	738
2229	740	2329	742	2430	742.4				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.07	1594	.035	1785	.07

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1594	1785	223	204	202	.1 .3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	832	749	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 421

INPUT
Description: Cross Section 4+21
Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	751	35	750	108	748	143	746	183	744
210	742	229	740	263	738	549	736	580	735.5
607	736	640	736.5	665	736	753	734	779	733
814	732	848	733	856	734	865	736	1063	738.3
1306	737.1	1382	738	1395	740	1414	742	1634	742.6

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.07	665	.035	865	.07

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
665	865	182	192	199	.1 .3

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 229

INPUT
Description: Cross Section 2+29
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	751.1	127	750	192	748	229	746	248	744
268	742	290	740	316	738	562	736	568	734
601	733.2	642	733.2	663	733	686	732.1	723	734
763	736	876	735.9	907	736	1167	737.5	1356	738
1372	740	1403	742	1625	742.5				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.07	562	.035	763	.07

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
562	763	0	0	0	.1 .3

SUMMARY OF MANNING'S N VALUES

River:Blacklick Creek

Reach	River Sta.	n1	n2	n3
Main	4600	.08	.05	.08
Main	4365	.08	.05	.08
Main	3960	.08	.05	.08
Main	3797	.08	.05	.08
Main	3593	.08	.05	.08

Main	3442	.08	.05	.08
Main	3360	.08	.05	.08
Main	3179	.08	.045	.08
Main	3036	.07	.035	.08
Main	2906	.06	.035	.065
Main	2757	.06	.035	.065
Main	2615	.06	.035	.065
Main	2492	.06	.035	.065
Main	2380	.06	.035	.065
Main	2211	.06	.035	.065
Main	2172	.06	.035	.065
Main	2148	.06	.035	.065
Main	2123	.06	.035	.065
Main	2098	.06	.035	.06
Main	2073	.08	.045	.08
Main	2000	Bridge		
Main	1919	.08	.045	.08
Main	1894	.08	.045	.08
Main	1869	.08	.045	.08
Main	1844	.08	.045	.08
Main	1815	.08	.045	.08
Main	1744	.08	.045	.08
Main	1720	.08	.045	.08
Main	1644	.08	.045	.08
Main	1591	.08	.045	.08
Main	1472	.08	.045	.08
Main	1341	.08	.045	.08
Main	1238	.08	.045	.08
Main	1036	.08	.045	.08
Main	837	.08	.045	.08
Main	625	.07	.035	.07
Main	421	.07	.035	.07
Main	229	.07	.035	.07

SUMMARY OF REACH LENGTHS

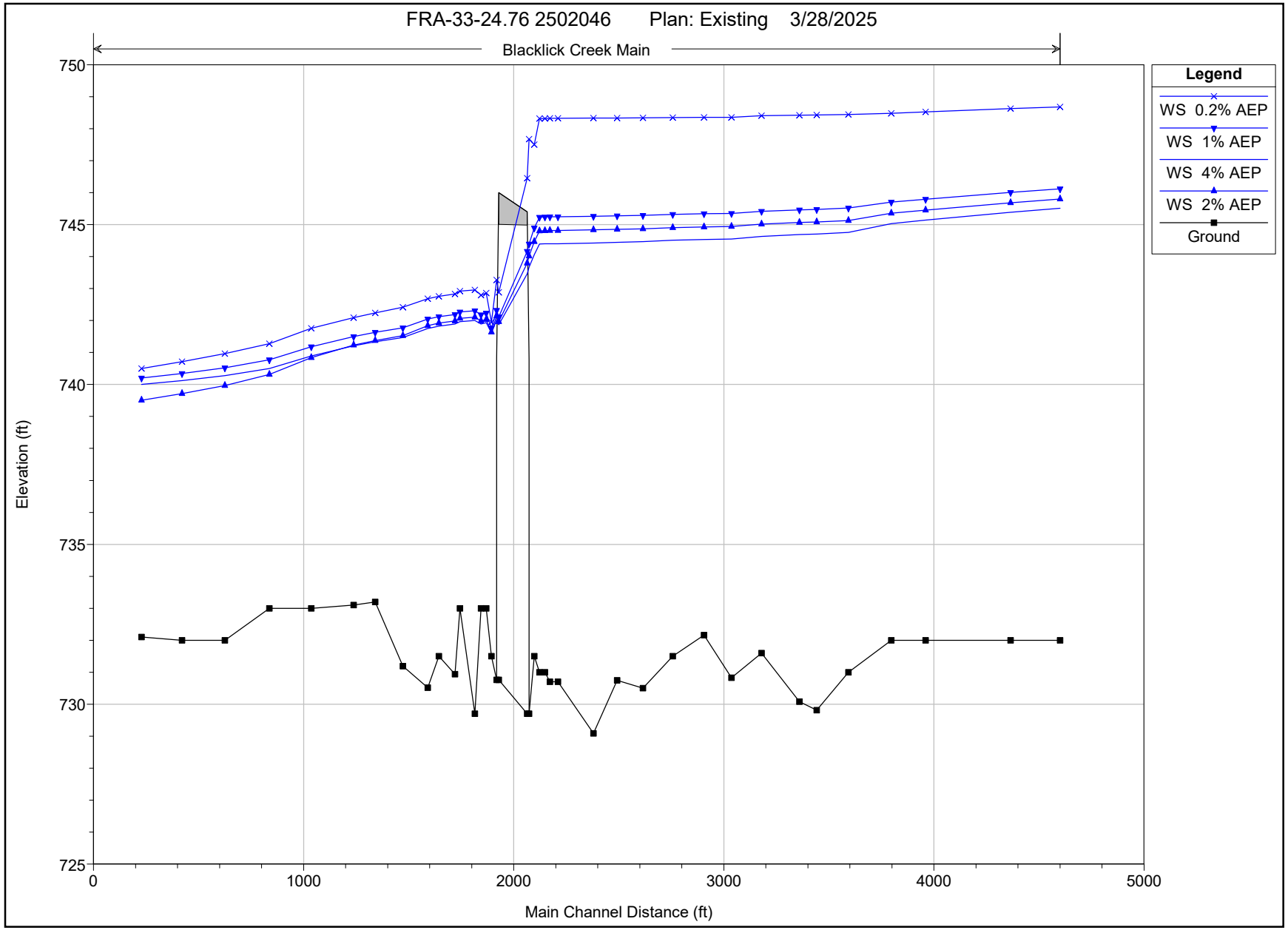
River: Blacklick Creek

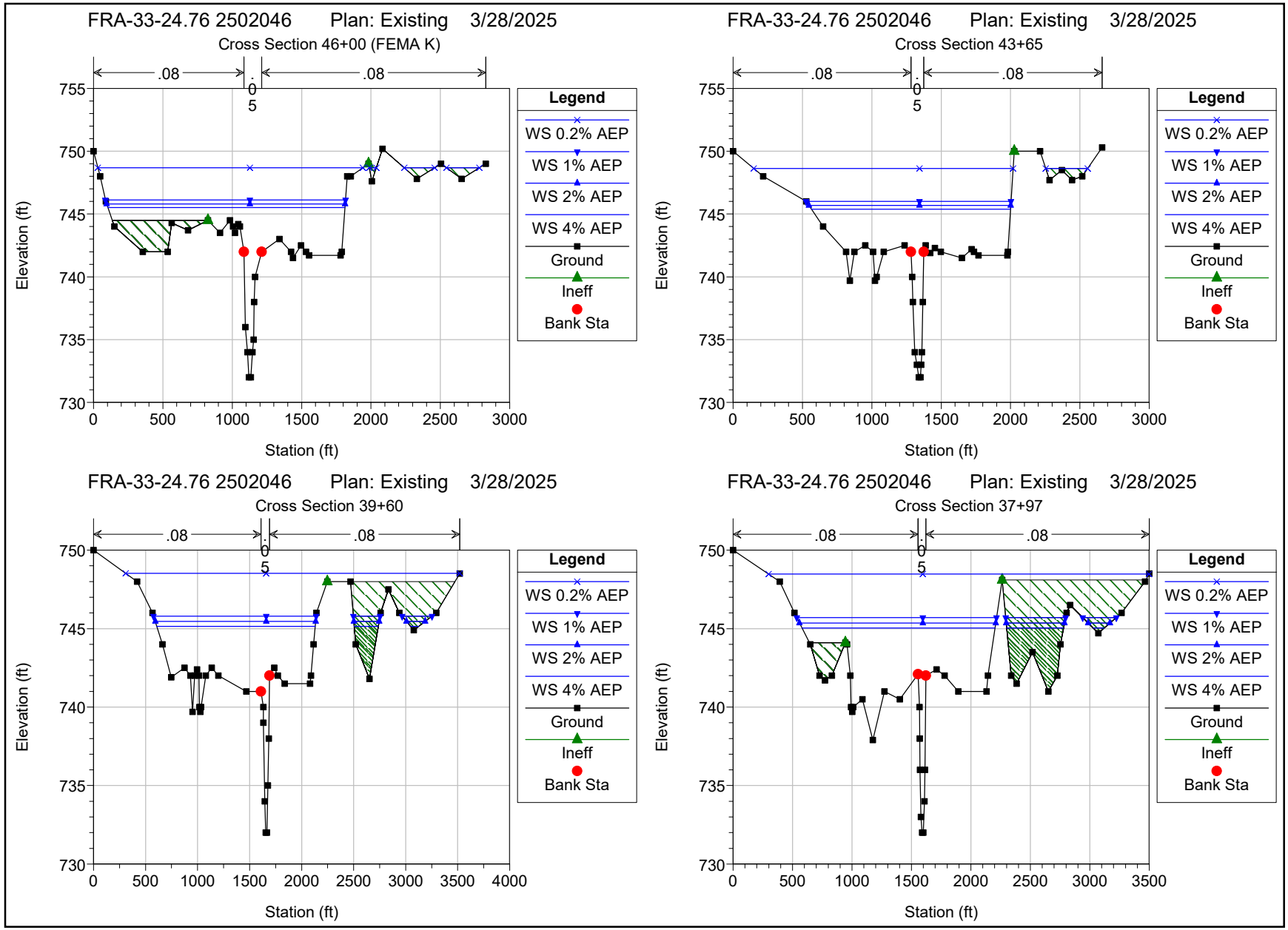
Reach	River Sta.	Left	Channel	Right
Main	4600	255	235	139
Main	4365	384	405	422
Main	3960	144	163	180
Main	3797	182	196	227
Main	3593	190	149	132
Main	3442	103	82	63
Main	3360	168	181	184
Main	3179	173	143	119
Main	3036	127	130	123
Main	2906	158	149	143
Main	2757	139	142	154
Main	2615	133	123	110
Main	2492	114	112	117
Main	2380	160	169	168
Main	2211	25	39	54
Main	2172	18	24	30
Main	2148	27	25	19
Main	2123	22	25	24
Main	2098	25	25	25
Main	2073	159	154	159
Main	2000	Bridge		
Main	1919	25	25	25
Main	1894	25	25	25
Main	1869	31	25	24
Main	1844	40	29	10
Main	1815	50	69	56
Main	1744	43	24	32
Main	1720	60	76	90
Main	1644	84	53	34
Main	1591	98	119	131

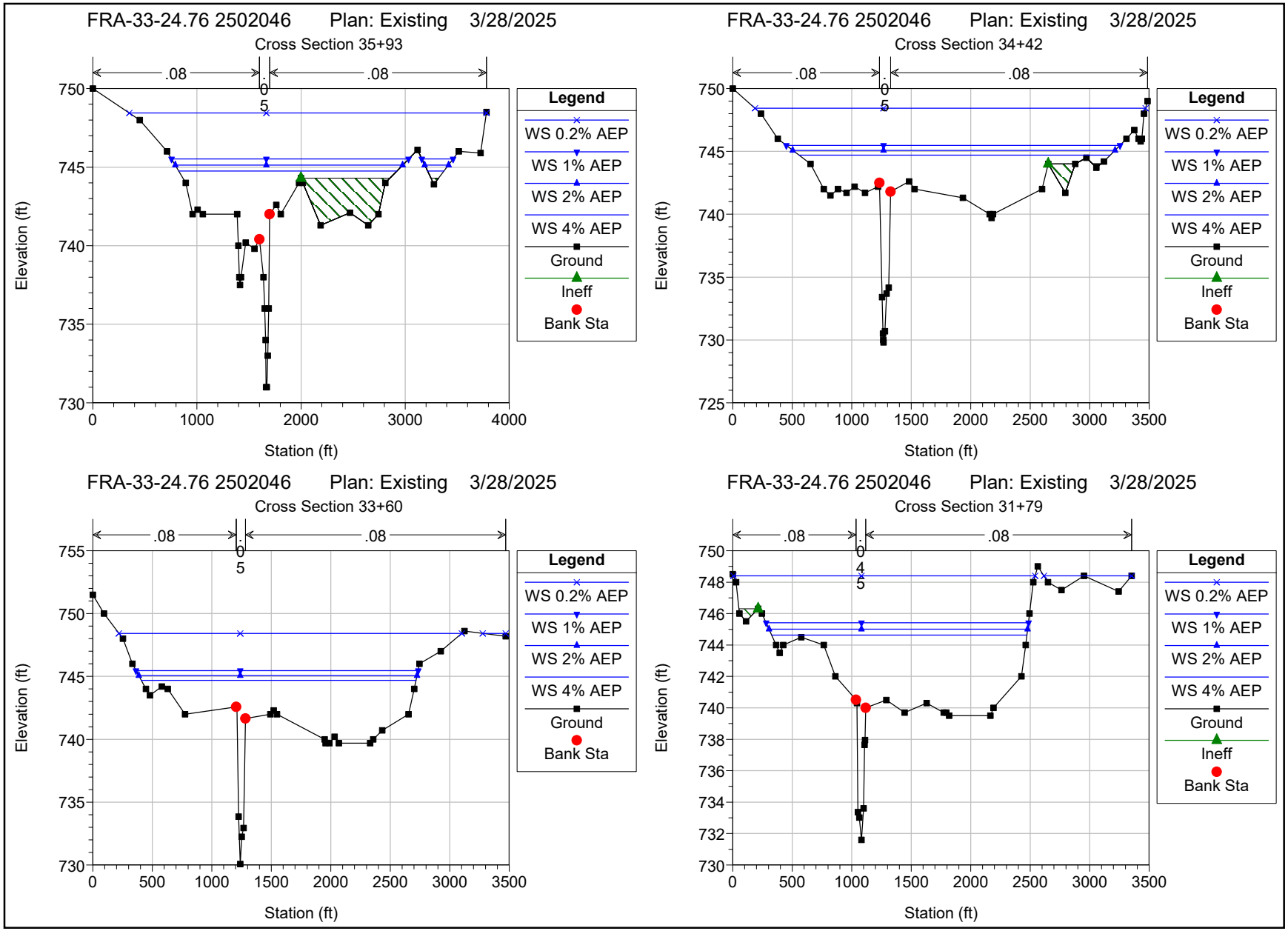
Main	1472	112	131	166
Main	1341	100	103	93
Main	1238	206	202	201
Main	1036	190	199	207
Main	837	221	212	197
Main	625	223	204	202
Main	421	182	192	199
Main	229	0	0	0

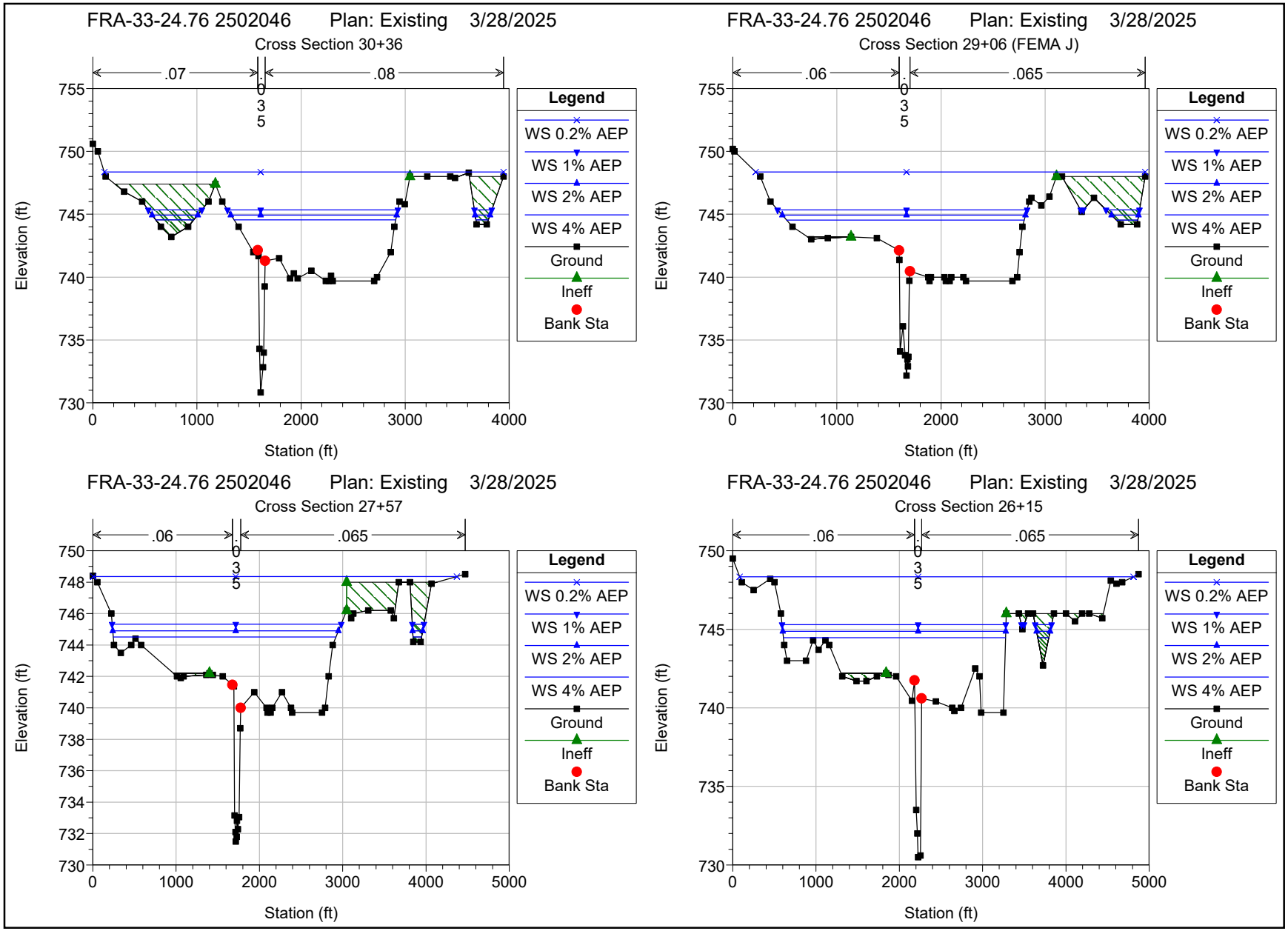
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Blacklick Creek

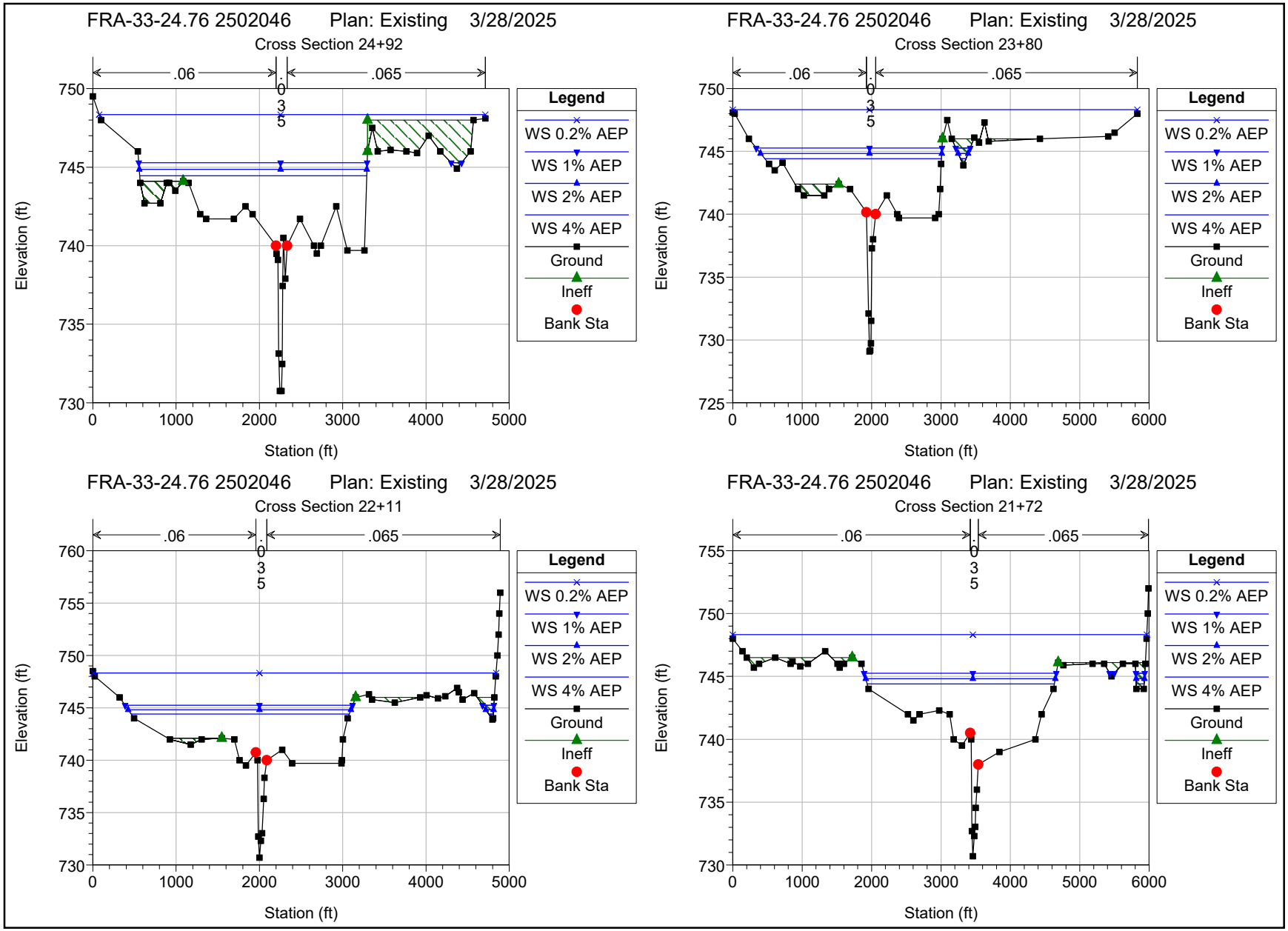
Reach	River Sta.	Contr.	Expan.
Main	4600	.1	.3
Main	4365	.1	.3
Main	3960	.1	.3
Main	3797	.1	.3
Main	3593	.1	.3
Main	3442	.1	.3
Main	3360	.1	.3
Main	3179	.1	.3
Main	3036	.1	.3
Main	2906	.3	.5
Main	2757	.3	.5
Main	2615	.3	.5
Main	2492	.3	.5
Main	2380	.3	.5
Main	2211	.3	.5
Main	2172	.3	.5
Main	2148	.3	.5
Main	2123	.3	.5
Main	2098	.3	.5
Main	2073	.3	.5
Main	2000	Bridge	
Main	1919	.3	.5
Main	1894	.3	.5
Main	1869	.3	.5
Main	1844	.3	.5
Main	1815	.3	.5
Main	1744	.3	.5
Main	1720	.3	.5
Main	1644	.3	.5
Main	1591	.3	.5
Main	1472	.1	.3
Main	1341	.1	.3
Main	1238	.1	.3
Main	1036	.1	.3
Main	837	.1	.3
Main	625	.1	.3
Main	421	.1	.3
Main	229	.1	.3

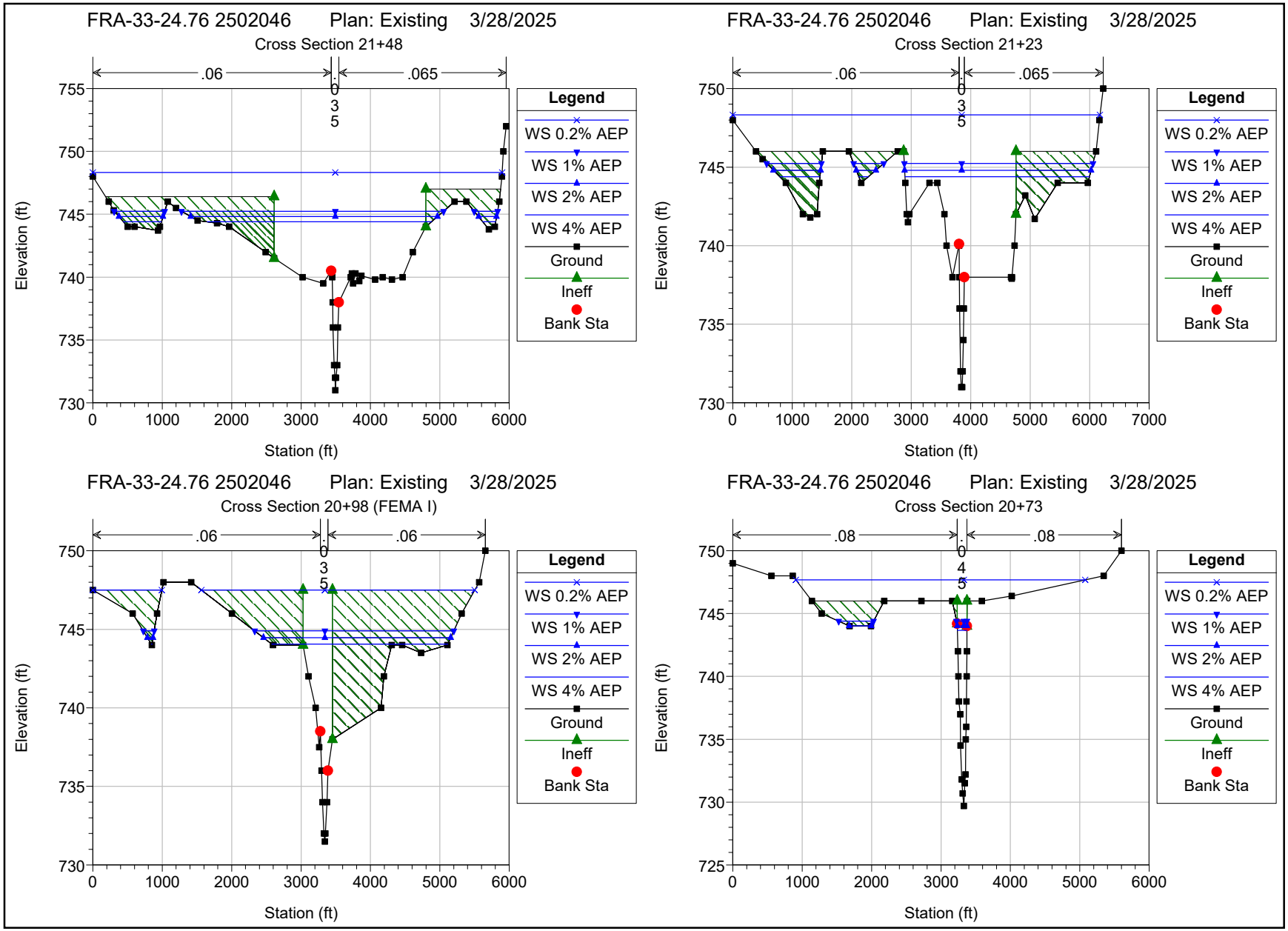

FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Blacklick Creek Main
Legend
WS 0.2% AEP
WS 1% AEP
WS 4% AEP
WS 2% AEP
Ground
Elevation (ft)
750
745
740
735
730
725
0
1000
2000
3000
4000
5000
Main Channel Distance (ft)

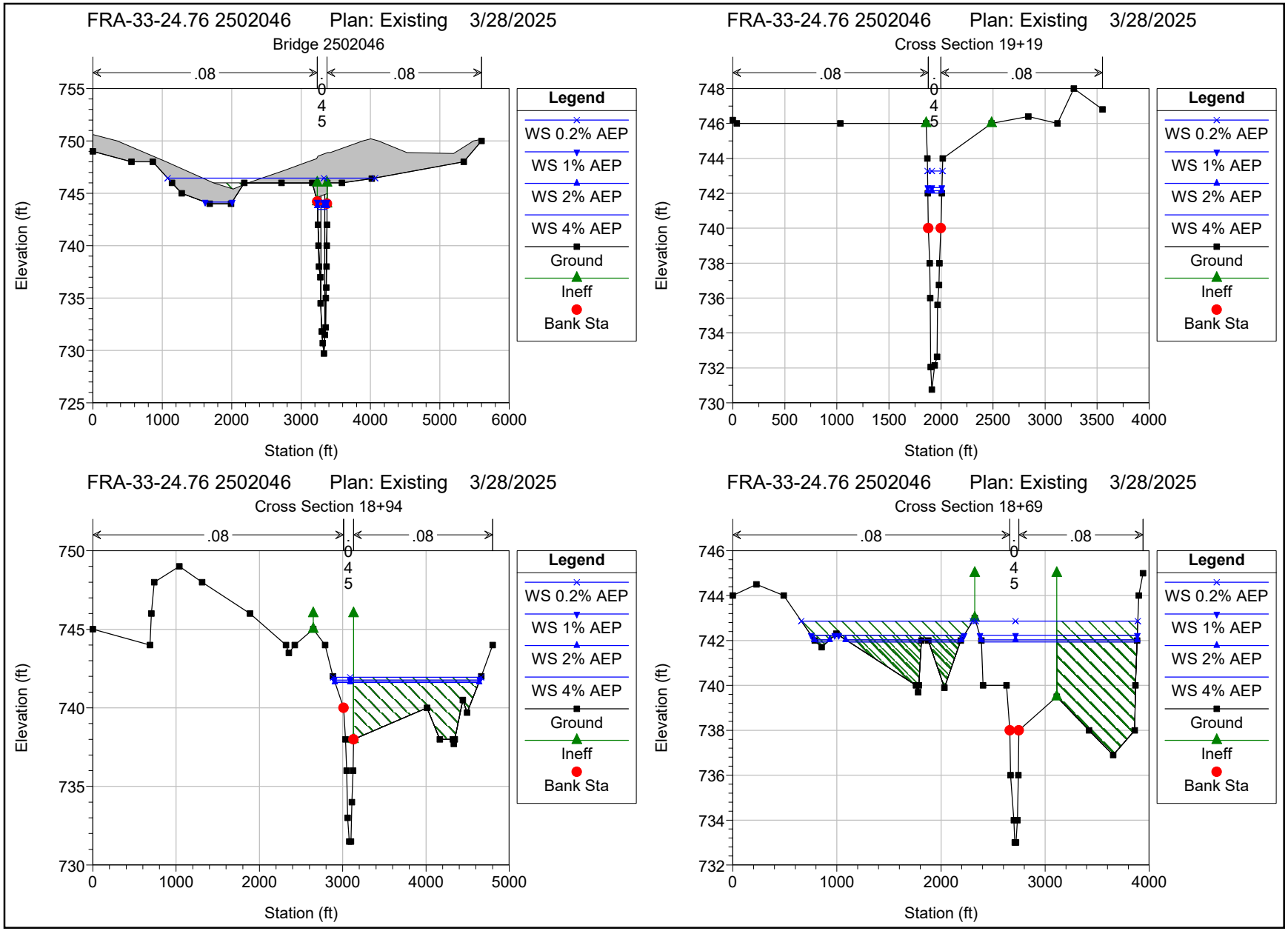

FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 46+00 (FEMA K)
.08
.05
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 43+65
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 39+60
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 37+97

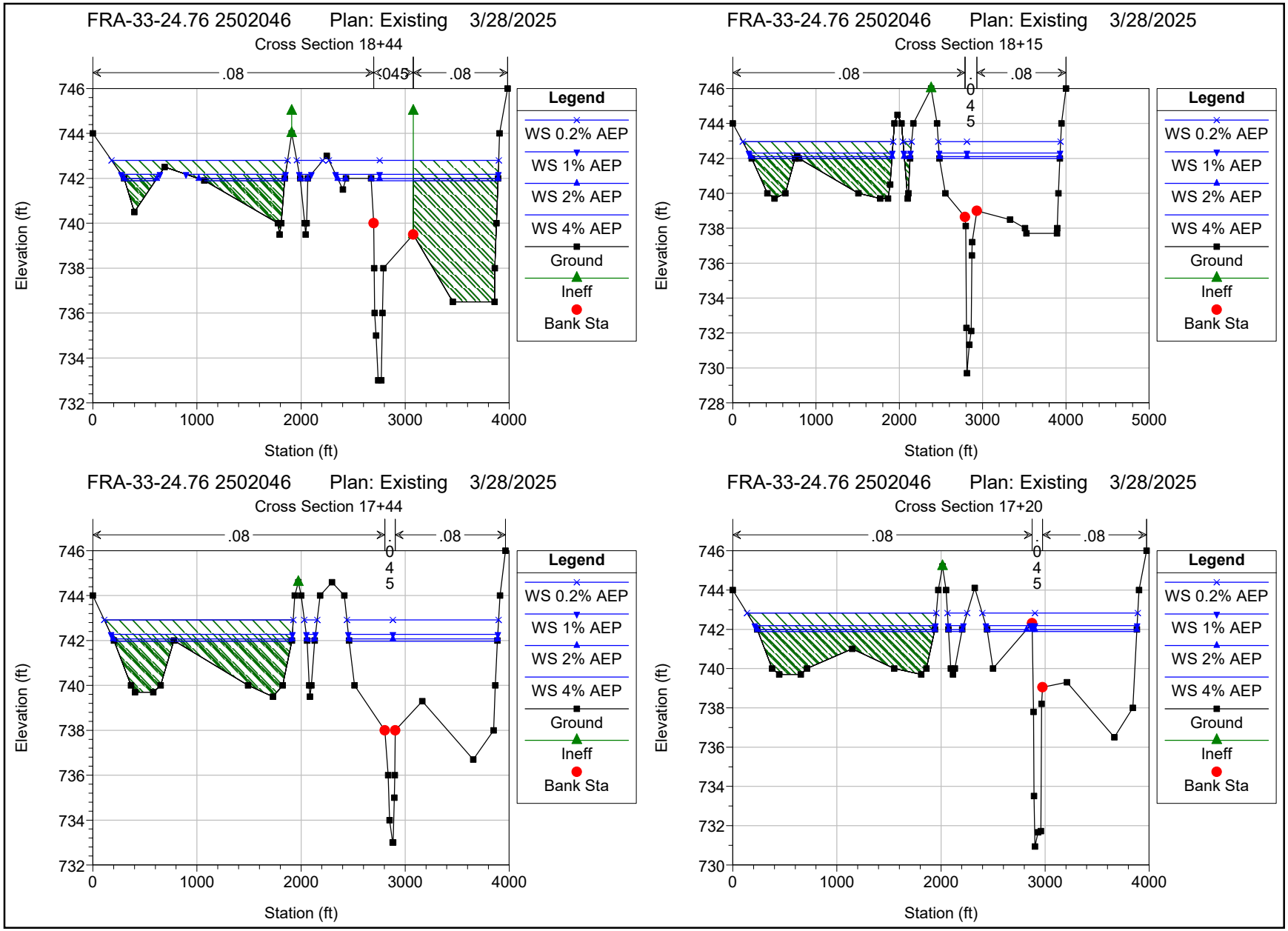

FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 35+93
.08
.05
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 34+42
.08
.05
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 33+60
.08
.05
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 31+79
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta

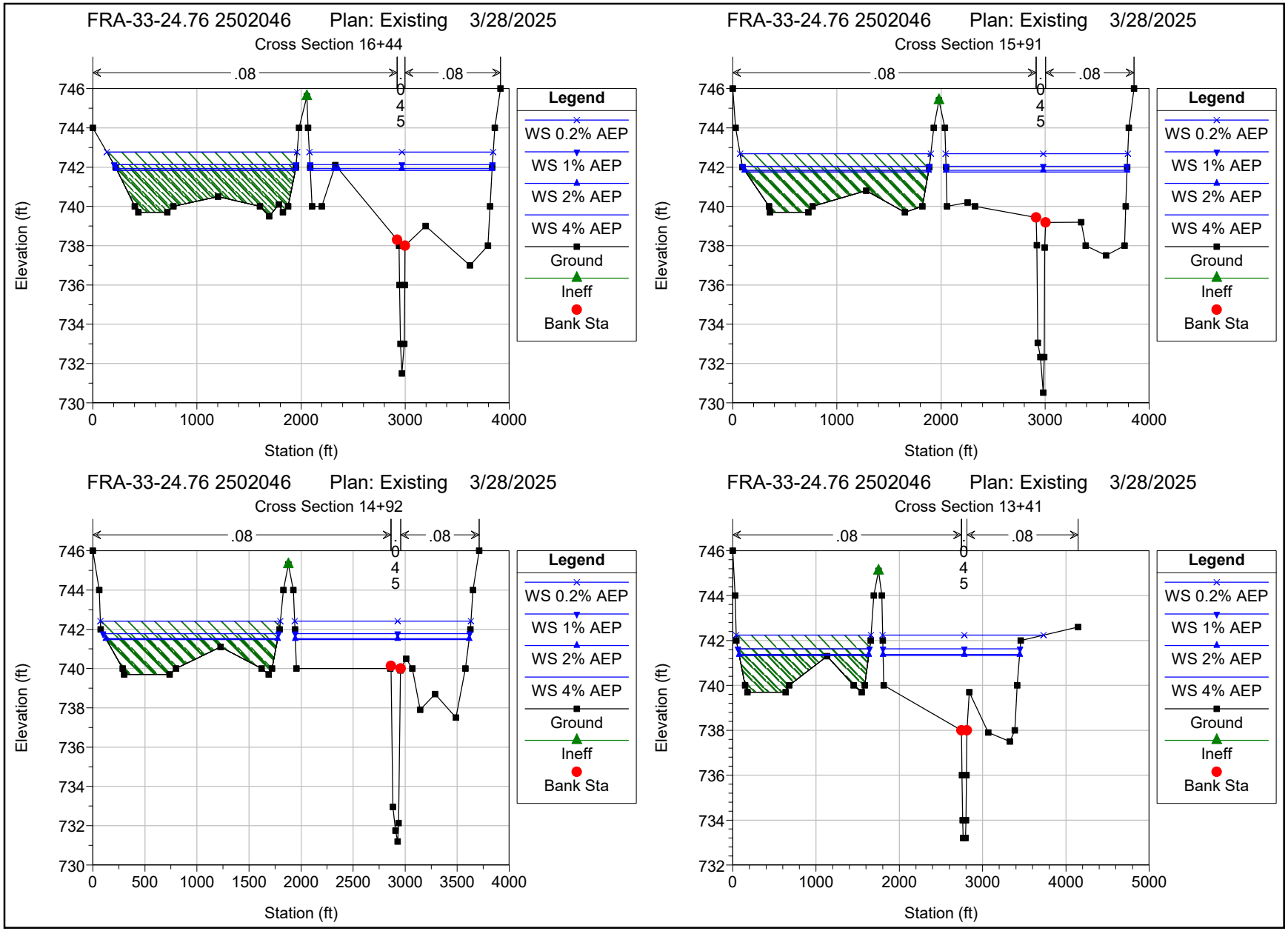

FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 30+36
.07
.035
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 29+06 (FEMA J)
.06
.035
.065
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 27+57
.06
.035
.065
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 26+15
.06
.035
.065
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta

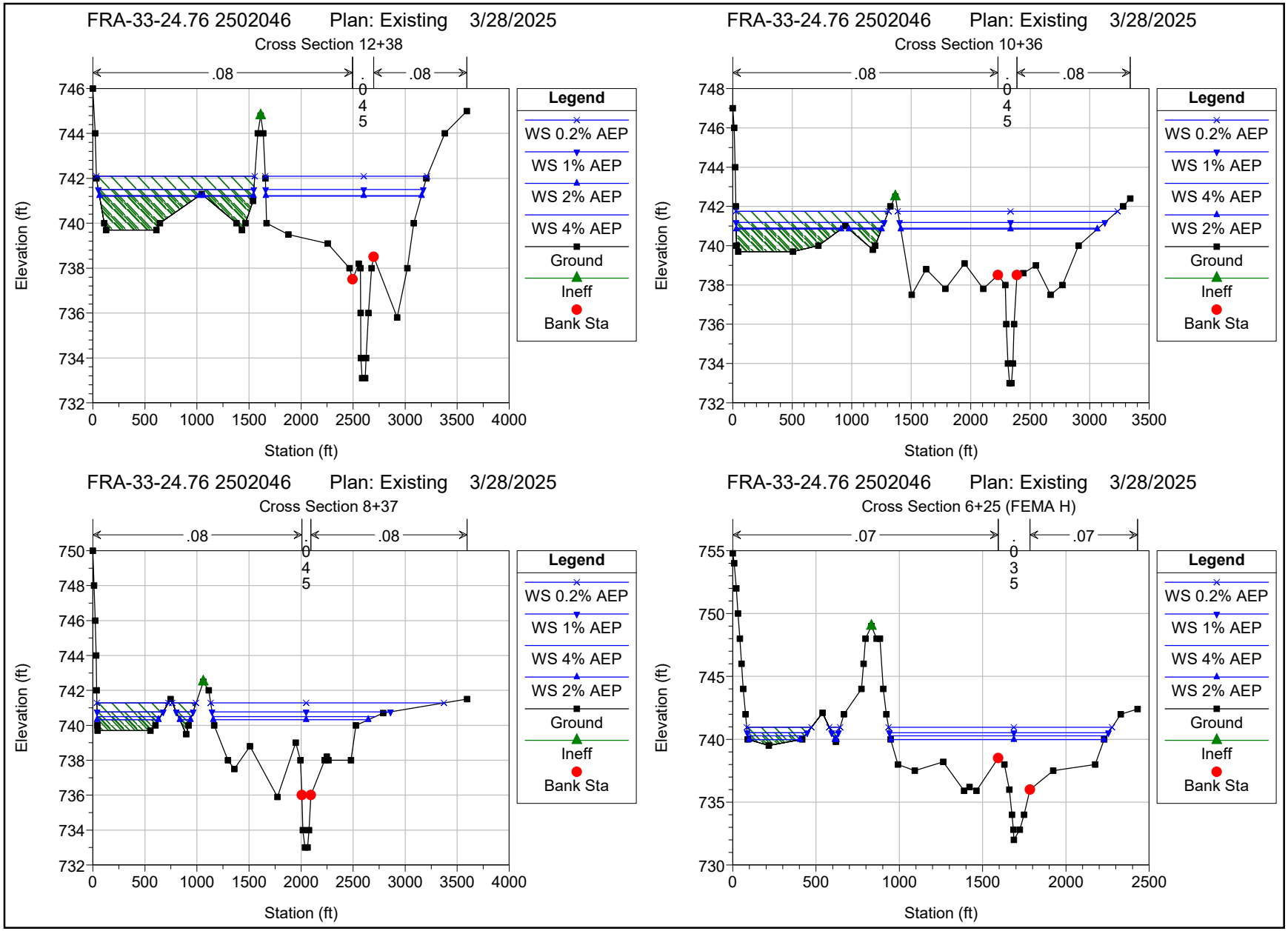

FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 24+92
.06
.035
.065
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 23+80
.06
.035
.065
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 22+11
.06
.035
.065
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 21+72
.06
.035
.065
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta

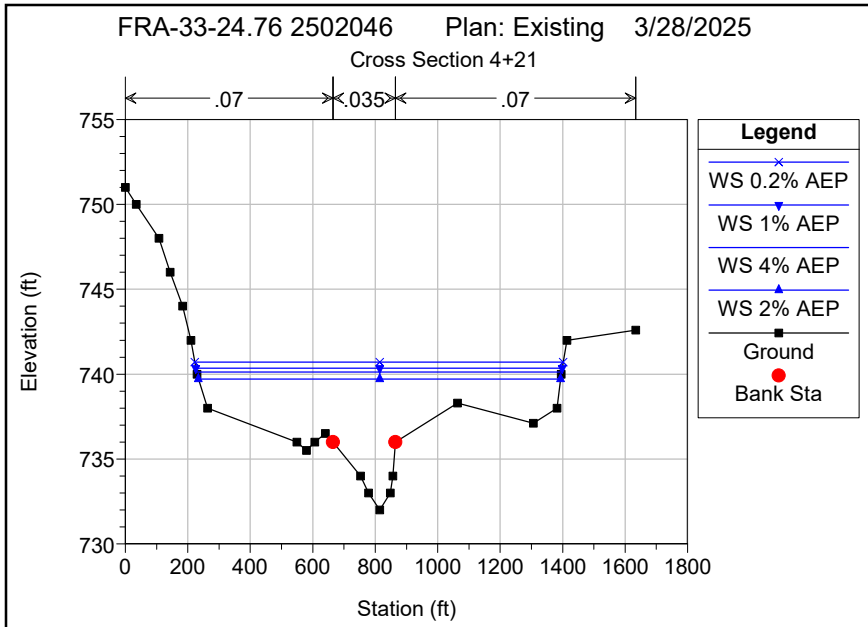

FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 21+48
.06
.065
.035
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 21+23
.06
.065
.035
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 20+98 (FEMA I)
.06
.06
.035
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 20+73
.08
.08
.045
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta

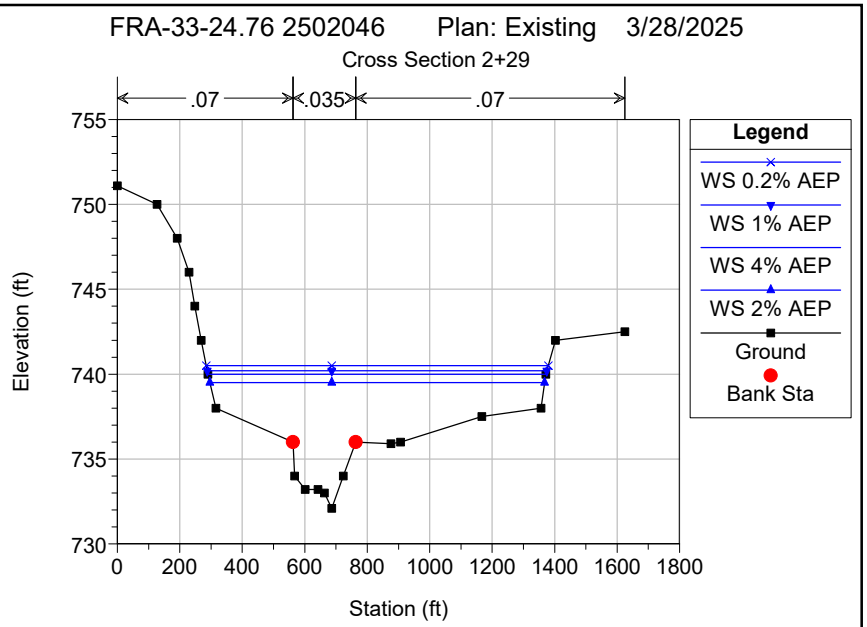

FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Bridge 2502046
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 19+19
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 18+94
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 18+69


FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 18+44
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 18+15
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 17+44
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 17+20
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta


FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 16+44
.08
.08
0
4
5
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 15+91
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 14+92
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 13+41


FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 12+38
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 10+36
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 4% AEP
WS 2% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 8+37
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 4% AEP
WS 2% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 6+25 (FEMA H)
.07
.035
.07
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 4% AEP
WS 2% AEP
Ground
Ineff
Bank Sta


FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 4+21
.07
.035
.07
Elevation (ft)
755
750
745
740
735
730
0
200
400
600
800
1000
1200
1400
1600
1800
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 4% AEP
WS 2% AEP
Ground
Bank Sta


FRA-33-24.76 2502046 Plan: Existing 3/28/2025
Cross Section 2+29
.07
.035
.07
Elevation (ft)
755
750
745
740
735
730
0
200
400
600
800
1000
1200
1400
1600
1800
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 4% AEP
WS 2% AEP
Ground
Bank Sta

HEC-RAS Plan: Existing River: Blacklick Creek Reach: Main

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)	
Main	4600	4% AEP	7400.00	732.00	745.51		745.64	0.000976	3.76	4234.80	1709.10	0.23
Main	4600	2% AEP	8000.00	732.00	745.80		745.92	0.000897	3.69	4734.49	1719.98	0.22
Main	4600	1% AEP	8600.00	732.00	746.12		746.22	0.000809	3.59	5275.85	1730.47	0.21
Main	4600	0.2% AEP	11500.00	732.00	748.68		748.72	0.000303	2.60	9847.83	2416.35	0.13
Main	4365	4% AEP	7400.00	732.00	745.39		745.47	0.000595	3.33	5246.70	1435.83	0.18
Main	4365	2% AEP	8000.00	732.00	745.69		745.76	0.000568	3.31	5674.65	1455.55	0.18
Main	4365	1% AEP	8600.00	732.00	746.01		746.08	0.000533	3.28	6144.03	1477.41	0.18
Main	4365	0.2% AEP	11500.00	732.00	748.63		748.67	0.000243	2.56	10563.31	2171.07	0.12
Main	3960	4% AEP	7400.00	732.00	745.14		745.20	0.000716	3.24	5393.69	1831.51	0.19
Main	3960	2% AEP	8000.00	732.00	745.45		745.51	0.000659	3.18	5873.33	1963.81	0.19
Main	3960	1% AEP	8600.00	732.00	745.79		745.85	0.000597	3.11	6399.39	2107.04	0.18
Main	3960	0.2% AEP	11500.00	732.00	748.52		748.56	0.000301	2.62	11769.69	3210.01	0.13
Main	3797	4% AEP	7400.00	732.00	745.03		745.09	0.000692	3.36	5614.96	2192.93	0.19
Main	3797	2% AEP	8000.00	732.00	745.35		745.41	0.000632	3.28	6143.66	2324.72	0.18
Main	3797	1% AEP	8600.00	732.00	745.70		745.76	0.000568	3.18	6725.55	2467.21	0.17
Main	3797	0.2% AEP	11500.00	732.00	748.48		748.51	0.000291	2.67	12186.87	3199.78	0.13
Main	3593	4% AEP	7400.00	731.00	744.76		744.90	0.001296	4.26	4228.10	2255.70	0.26
Main	3593	2% AEP	8000.00	731.00	745.13		745.25	0.001079	4.01	5075.18	2411.42	0.24
Main	3593	1% AEP	8600.00	731.00	745.52		745.61	0.000880	3.72	6037.57	2576.77	0.22
Main	3593	0.2% AEP	11500.00	731.00	748.44		748.46	0.000180	2.03	15145.67	3429.79	0.10
Main	3442	4% AEP	7400.00	729.81	744.71		744.76	0.000465	2.93	7206.70	2616.88	0.16
Main	3442	2% AEP	8000.00	729.81	745.08		745.13	0.000395	2.76	8205.70	2707.69	0.15
Main	3442	1% AEP	8600.00	729.81	745.48		745.52	0.000333	2.60	9299.48	2803.74	0.14
Main	3442	0.2% AEP	11500.00	729.81	748.43		748.44	0.000092	1.60	18436.19	3282.47	0.08
Main	3360	4% AEP	7400.00	730.08	744.69		744.72	0.000385	2.53	7570.26	2310.21	0.14
Main	3360	2% AEP	8000.00	730.08	745.07		745.10	0.000334	2.41	8443.96	2339.71	0.13
Main	3360	1% AEP	8600.00	730.08	745.46		745.49	0.000287	2.30	9381.12	2370.94	0.13
Main	3360	0.2% AEP	11500.00	730.08	748.42		748.43	0.000104	1.63	17119.32	3075.14	0.08
Main	3179	4% AEP	7400.00	731.60	744.63		744.66	0.000281	2.47	7765.33	2144.99	0.14
Main	3179	2% AEP	8000.00	731.60	745.01		745.04	0.000253	2.40	8589.24	2173.98	0.13
Main	3179	1% AEP	8600.00	731.60	745.42		745.44	0.000225	2.32	9472.63	2204.65	0.13
Main	3179	0.2% AEP	11500.00	731.60	748.40		748.42	0.000086	1.69	17043.53	3273.36	0.08
Main	3036	4% AEP	7400.00	730.83	744.55		744.62	0.000376	3.47	6246.76	2037.44	0.20
Main	3036	2% AEP	8000.00	730.83	744.94		745.00	0.000342	3.40	6857.14	2174.37	0.19
Main	3036	1% AEP	8600.00	730.83	745.35		745.41	0.000308	3.32	7519.12	2319.08	0.18
Main	3036	0.2% AEP	11500.00	730.83	748.36		748.40	0.000186	3.07	14193.62	3834.50	0.15
Main	2906	4% AEP	7400.00	732.16	744.54		744.58	0.000197	2.55	7357.77	2487.57	0.15
Main	2906	2% AEP	8000.00	732.16	744.93		744.96	0.000175	2.47	8260.78	2598.36	0.14
Main	2906	1% AEP	8600.00	732.16	745.34		745.37	0.000153	2.38	9237.57	2739.79	0.13
Main	2906	0.2% AEP	11500.00	732.16	748.36		748.38	0.000071	1.93	17687.31	3740.91	0.09
Main	2757	4% AEP	7400.00	731.50	744.51		744.55	0.000197	2.54	8038.14	2778.40	0.15
Main	2757	2% AEP	8000.00	731.50	744.90		744.94	0.000169	2.42	9102.09	2833.10	0.14
Main	2757	1% AEP	8600.00	731.50	745.32		745.35	0.000144	2.29	10239.09	2890.75	0.13
Main	2757	0.2% AEP	11500.00	731.50	748.35		748.36	0.000063	1.82	19429.13	4363.06	0.09
Main	2615	4% AEP	7400.00	730.50	744.47		744.52	0.000189	2.79	7965.79	2800.72	0.15
Main	2615	2% AEP	8000.00	730.50	744.87		744.91	0.000160	2.63	9043.31	2841.32	0.14
Main	2615	1% AEP	8600.00	730.50	745.29		745.33	0.000135	2.47	10177.75	2916.51	0.13
Main	2615	0.2% AEP	11500.00	730.50	748.34		748.36	0.000051	1.77	21647.23	4728.79	0.08
Main	2492	4% AEP	7400.00	730.75	744.45		744.49	0.000221	2.50	7709.79	2724.13	0.15
Main	2492	2% AEP	8000.00	730.75	744.85		744.89	0.000181	2.34	8819.44	2732.21	0.14
Main	2492	1% AEP	8600.00	730.75	745.28		745.31	0.000149	2.19	9984.40	2866.40	0.13
Main	2492	0.2% AEP	11500.00	730.75	748.33		748.35	0.000063	1.73	19453.21	4635.00	0.09
Main	2380	4% AEP	7400.00	729.09	744.43		744.47	0.000164	2.37	8071.12	2627.52	0.14
Main	2380	2% AEP	8000.00	729.09	744.84		744.87	0.000142	2.26	9125.97	2752.60	0.13
Main	2380	1% AEP	8600.00	729.09	745.26		745.29	0.000122	2.16	10255.73	2883.30	0.12
Main	2380	0.2% AEP	11500.00	729.09	748.33		748.34	0.000040	1.47	24851.79	5830.00	0.07
Main	2211	4% AEP	7400.00	730.70	744.40		744.43	0.000157	2.17	8742.44	2675.05	0.13
Main	2211	2% AEP	8000.00	730.70	744.82		744.84	0.000134	2.08	9832.74	2770.11	0.12
Main	2211	1% AEP	8600.00	730.70	745.25		745.27	0.000115	1.98	10995.13	2869.31	0.11
Main	2211	0.2% AEP	11500.00	730.70	748.32		748.33	0.000039	1.39	23751.36	4834.00	0.07
Main	2172	4% AEP	7400.00	730.70	744.40		744.43	0.000122	2.09	9505.42	2809.17	0.12
Main	2172	2% AEP	8000.00	730.70	744.81		744.84	0.000106	2.01	10625.74	2851.63	0.11
Main	2172	1% AEP	8600.00	730.70	745.24		745.26	0.000092	1.92	11809.83	2961.40	0.10
Main	2172	0.2% AEP	11500.00	730.70	748.32		748.33	0.000035	1.40	26483.51	5966.42	0.07

HEC-RAS Plan: Existing River: Blacklick Creek Reach: Main (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)	
Main	2148	4% AEP	7400.00	731.00	744.40		744.42	0.000113	2.00	9441.09	3963.37	0.11
Main	2148	2% AEP	8000.00	731.00	744.81		744.83	0.000100	1.94	10342.50	4449.35	0.11
Main	2148	1% AEP	8600.00	731.00	745.24		745.26	0.000089	1.88	11283.13	4840.95	0.10
Main	2148	0.2% AEP	11500.00	731.00	748.32		748.33	0.000045	1.59	24314.84	5897.51	0.08
Main	2123	4% AEP	7400.00	731.00	744.39		744.42	0.000109	2.14	8474.09	3937.99	0.11
Main	2123	2% AEP	8000.00	731.00	744.80		744.83	0.000101	2.11	9243.70	4261.52	0.11
Main	2123	1% AEP	8600.00	731.00	745.23		745.26	0.000093	2.07	10049.63	4599.33	0.11
Main	2123	0.2% AEP	11500.00	731.00	748.32		748.33	0.000041	1.60	25338.14	6172.52	0.07
Main	2098	4% AEP	7400.00	731.50	744.06		744.34	0.000592	4.82	2353.34	2547.56	0.27
Main	2098	2% AEP	8000.00	731.50	744.47		744.75	0.000579	4.89	2525.54	2780.07	0.27
Main	2098	1% AEP	8600.00	731.50	744.90		745.18	0.000559	4.94	2707.24	3025.40	0.26
Main	2098	0.2% AEP	11500.00	731.50	747.50	740.63	748.14	0.000799	6.80	3815.46	4934.37	0.33
Main	2073	4% AEP	7400.00	729.70	743.67	738.44	744.23	0.001899	6.01	1231.55	139.00	0.36
Main	2073	2% AEP	8000.00	729.70	744.02	738.71	744.62	0.001989	6.25	1280.81	457.93	0.37
Main	2073	1% AEP	8600.00	729.70	744.40	739.03	745.04	0.002021	6.44	1334.41	654.67	0.37
Main	2073	0.2% AEP	11500.00	729.70	747.68	740.28	747.91	0.000684	4.58	7176.81	4170.09	0.23
Main	2000		Bridge									
Main	1919	4% AEP	7400.00	730.76	742.02		743.03	0.004222	8.09	925.67	133.12	0.52
Main	1919	2% AEP	8000.00	730.76	742.14		743.29	0.004664	8.59	942.70	134.14	0.55
Main	1919	1% AEP	8600.00	730.76	742.32		743.58	0.004989	9.02	966.73	135.57	0.57
Main	1919	0.2% AEP	11500.00	730.76	743.27		745.05	0.006064	10.74	1099.04	143.16	0.64
Main	1894	4% AEP	7400.00	731.50	741.61		742.84	0.005775	8.97	897.59	1727.36	0.60
Main	1894	2% AEP	8000.00	731.50	741.64		743.06	0.006642	9.65	904.41	1731.59	0.65
Main	1894	1% AEP	8600.00	731.50	741.77	740.22	743.34	0.007164	10.15	934.73	1749.92	0.68
Main	1894	0.2% AEP	11500.00	731.50	741.95	741.72	744.59	0.011687	13.18	977.37	1774.62	0.87
Main	1869	4% AEP	7400.00	733.00	741.93		742.32	0.002710	6.43	2348.12	2600.50	0.42
Main	1869	2% AEP	8000.00	733.00	742.03		742.45	0.002937	6.75	2419.47	2760.99	0.44
Main	1869	1% AEP	8600.00	733.00	742.23		742.66	0.002939	6.87	2565.17	2943.87	0.44
Main	1869	0.2% AEP	11500.00	733.00	742.86		743.38	0.003424	7.82	3044.19	3205.01	0.48
Main	1844	4% AEP	7400.00	733.00	741.89		742.22	0.002943	4.61	1700.98	2418.40	0.40
Main	1844	2% AEP	8000.00	733.00	741.99		742.35	0.003188	4.87	1751.29	2515.44	0.42
Main	1844	1% AEP	8600.00	733.00	742.18		742.56	0.003173	5.01	1907.46	3003.28	0.42
Main	1844	0.2% AEP	11500.00	733.00	742.80		743.28	0.003450	5.69	2501.78	3572.01	0.45
Main	1815	4% AEP	7400.00	729.70	742.00		742.06	0.000571	2.88	5412.07	3148.82	0.19
Main	1815	2% AEP	8000.00	729.70	742.10		742.17	0.000617	3.02	5564.25	3215.43	0.20
Main	1815	1% AEP	8600.00	729.70	742.31		742.37	0.000616	3.08	5856.23	3254.07	0.20
Main	1815	0.2% AEP	11500.00	729.70	742.96		743.05	0.000711	3.50	6812.22	3379.63	0.22
Main	1744	4% AEP	7400.00	733.00	741.97		742.02	0.000657	3.04	5470.50	3187.87	0.20
Main	1744	2% AEP	8000.00	733.00	742.07		742.13	0.000709	3.19	5624.55	3222.93	0.21
Main	1744	1% AEP	8600.00	733.00	742.27		742.33	0.000704	3.24	5929.90	3264.19	0.21
Main	1744	0.2% AEP	11500.00	733.00	742.92		743.00	0.000800	3.66	6939.12	3397.19	0.23
Main	1720	4% AEP	7400.00	730.94	741.89		741.99	0.000780	3.64	4669.96	3186.70	0.22
Main	1720	2% AEP	8000.00	730.94	741.99		742.09	0.000849	3.82	4815.38	3221.78	0.23
Main	1720	1% AEP	8600.00	730.94	742.19		742.29	0.000849	3.86	5128.97	3308.99	0.23
Main	1720	0.2% AEP	11500.00	730.94	742.83		742.95	0.000969	4.32	6179.65	3501.43	0.25
Main	1644	4% AEP	7400.00	731.50	741.83		741.91	0.000968	3.78	4919.82	3396.31	0.25
Main	1644	2% AEP	8000.00	731.50	741.92		742.01	0.001046	3.96	5074.87	3429.89	0.26
Main	1644	1% AEP	8600.00	731.50	742.12		742.21	0.001020	3.98	5428.76	3499.94	0.25
Main	1644	0.2% AEP	11500.00	731.50	742.76		742.86	0.001083	4.33	6551.68	3593.81	0.27
Main	1591	4% AEP	7400.00	730.52	741.75		741.85	0.000902	3.90	4929.68	3490.96	0.24
Main	1591	2% AEP	8000.00	730.52	741.84		741.95	0.000975	4.09	5078.89	3505.77	0.25
Main	1591	1% AEP	8600.00	730.52	742.05		742.15	0.000937	4.07	5444.93	3537.18	0.25
Main	1591	0.2% AEP	11500.00	730.52	742.68		742.80	0.001006	4.43	6552.01	3580.33	0.26
Main	1472	4% AEP	7400.00	731.19	741.47		741.68	0.001670	5.09	3777.68	3311.28	0.33
Main	1472	2% AEP	8000.00	731.19	741.53		741.76	0.001840	5.37	3873.13	3321.09	0.34
Main	1472	1% AEP	8600.00	731.19	741.77		741.98	0.001668	5.22	4284.47	3363.24	0.33
Main	1472	0.2% AEP	11500.00	731.19	742.42		742.62	0.001667	5.50	5371.71	3421.27	0.33
Main	1341	4% AEP	7400.00	733.20	741.33		741.44	0.001385	4.44	4533.24	3193.40	0.30
Main	1341	2% AEP	8000.00	733.20	741.37		741.49	0.001555	4.72	4596.99	3197.93	0.31
Main	1341	1% AEP	8600.00	733.20	741.63		741.74	0.001389	4.57	5025.54	3228.31	0.30
Main	1341	0.2% AEP	11500.00	733.20	742.24		742.37	0.001680	5.30	6059.00	3552.19	0.33
Main	1238	4% AEP	7400.00	733.10	741.21		741.30	0.001278	3.39	4201.57	2920.26	0.27

HEC-RAS Plan: Existing River: Blacklick Creek Reach: Main (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)	
Main	1238	2% AEP	8000.00	733.10	741.23		741.34	0.001465	3.64	4231.76	2934.06	0.29
Main	1238	1% AEP	8600.00	733.10	741.50		741.61	0.001316	3.57	4642.31	3006.41	0.28
Main	1238	0.2% AEP	11500.00	733.10	742.09		742.22	0.001437	4.01	5546.44	3076.34	0.29
Main	1036	4% AEP	7400.00	733.00	740.89		741.00	0.001793	3.88	4082.50	2840.92	0.32
Main	1036	2% AEP	8000.00	733.00	740.84		740.98	0.002207	4.28	4004.33	2807.88	0.35
Main	1036	1% AEP	8600.00	733.00	741.18		741.30	0.001784	4.03	4575.88	2969.00	0.32
Main	1036	0.2% AEP	11500.00	733.00	741.76		741.89	0.001850	4.42	5602.26	3129.90	0.33
Main	837	4% AEP	7400.00	733.00	740.50		740.65	0.001681	4.80	4016.82	2295.93	0.33
Main	837	2% AEP	8000.00	733.00	740.32		740.52	0.002323	5.54	3733.20	2178.75	0.38
Main	837	1% AEP	8600.00	733.00	740.77		740.94	0.001814	5.12	4452.05	2509.94	0.34
Main	837	0.2% AEP	11500.00	733.00	741.28		741.49	0.002173	5.87	5458.46	3155.15	0.38
Main	625	4% AEP	7400.00	732.00	740.28		740.39	0.000865	3.72	4026.90	1670.18	0.29
Main	625	2% AEP	8000.00	732.00	739.97		740.14	0.001344	4.46	3633.22	1596.23	0.36
Main	625	1% AEP	8600.00	732.00	740.52		740.66	0.000944	4.01	4347.92	1715.57	0.30
Main	625	0.2% AEP	11500.00	732.00	740.96		741.14	0.001183	4.73	4933.90	1797.06	0.35
Main	421	4% AEP	7400.00	732.00	740.12		740.24	0.000608	3.54	4041.39	1168.27	0.25
Main	421	2% AEP	8000.00	732.00	739.71		739.90	0.000982	4.31	3570.44	1159.30	0.31
Main	421	1% AEP	8600.00	732.00	740.34		740.49	0.000694	3.88	4301.41	1172.49	0.27
Main	421	0.2% AEP	11500.00	732.00	740.71		740.92	0.000955	4.72	4736.17	1179.52	0.32
Main	229	4% AEP	7400.00	732.10	740.00	737.26	740.13	0.000586	3.55	3926.85	1082.00	0.25
Main	229	2% AEP	8000.00	732.10	739.51	737.37	739.71	0.001000	4.40	3396.26	1071.65	0.32
Main	229	1% AEP	8600.00	732.10	740.20	737.47	740.35	0.000686	3.92	4143.79	1087.30	0.27
Main	229	0.2% AEP	11500.00	732.10	740.50	738.33	740.73	0.001001	4.88	4468.29	1095.18	0.33

HEC-RAS Plan: Existing River: Blacklick Creek Reach: Main

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
Main	4600	4% AEP	745.64	745.51	0.13	0.16	0.01	727.71	4019.31	2652.98	1709.10
Main	4600	2% AEP	745.92	745.80	0.12	0.15	0.01	1009.33	4077.58	2913.09	1719.98
Main	4600	1% AEP	746.22	746.12	0.11	0.13	0.01	1326.15	4107.69	3166.16	1730.47
Main	4600	0.2% AEP	748.72	748.68	0.04	0.06	0.00	3644.52	3817.96	4037.52	2416.35
Main	4365	4% AEP	745.47	745.39	0.08	0.26	0.01	1972.40	3155.30	2272.30	1435.83
Main	4365	2% AEP	745.76	745.69	0.08	0.25	0.01	2227.38	3233.72	2538.90	1455.55
Main	4365	1% AEP	746.08	746.01	0.07	0.23	0.01	2493.49	3294.12	2812.39	1477.41
Main	4365	0.2% AEP	748.67	748.63	0.04	0.11	0.00	3997.46	3195.36	4307.18	2171.07
Main	3960	4% AEP	745.20	745.14	0.06	0.11	0.00	3550.83	2283.77	1565.40	1831.51
Main	3960	2% AEP	745.51	745.45	0.06	0.10	0.00	3935.40	2325.47	1739.13	1963.81
Main	3960	1% AEP	745.85	745.79	0.05	0.09	0.00	4327.54	2356.37	1916.09	2107.04
Main	3960	0.2% AEP	748.56	748.52	0.03	0.05	0.00	6959.70	2574.52	1965.78	3210.01
Main	3797	4% AEP	745.09	745.03	0.06	0.18	0.01	3183.37	2097.40	2119.23	2192.93
Main	3797	2% AEP	745.41	745.35	0.06	0.16	0.01	3536.67	2117.06	2346.26	2324.72
Main	3797	1% AEP	745.76	745.70	0.05	0.14	0.00	3897.76	2126.43	2575.81	2467.21
Main	3797	0.2% AEP	748.51	748.48	0.03	0.05	0.00	6654.38	2266.70	2578.92	3199.78
Main	3593	4% AEP	744.90	744.76	0.15	0.11	0.03	3396.58	3423.15	580.27	2255.70
Main	3593	2% AEP	745.25	745.13	0.12	0.10	0.02	3652.61	3359.14	988.25	2411.42
Main	3593	1% AEP	745.61	745.52	0.09	0.08	0.02	3875.49	3265.50	1459.02	2576.77
Main	3593	0.2% AEP	748.46	748.44	0.02	0.02	0.00	4260.80	2359.81	4879.39	3429.79
Main	3442	4% AEP	744.76	744.71	0.06	0.03	0.01	1069.61	2814.44	3515.95	2616.88
Main	3442	2% AEP	745.13	745.08	0.05	0.03	0.01	1220.96	2753.72	4025.32	2707.69
Main	3442	1% AEP	745.52	745.48	0.04	0.02	0.00	1380.30	2688.16	4531.55	2803.74
Main	3442	0.2% AEP	748.44	748.43	0.01	0.01	0.00	2375.71	2098.44	7025.85	3282.47
Main	3360	4% AEP	744.72	744.69	0.03	0.06	0.00	778.43	1876.22	4745.35	2310.21
Main	3360	2% AEP	745.10	745.07	0.03	0.05	0.00	979.65	1860.92	5159.43	2339.71
Main	3360	1% AEP	745.49	745.46	0.03	0.05	0.00	1192.38	1842.59	5565.03	2370.94
Main	3360	0.2% AEP	748.43	748.42	0.01	0.02	0.00	2585.28	1681.67	7233.05	3075.14
Main	3179	4% AEP	744.66	744.63	0.03	0.04	0.00	351.84	1972.59	5075.57	2144.99
Main	3179	2% AEP	745.04	745.01	0.03	0.04	0.00	501.38	1992.74	5505.89	2173.98
Main	3179	1% AEP	745.44	745.42	0.03	0.03	0.00	669.34	2005.39	5925.28	2204.65
Main	3179	0.2% AEP	748.42	748.40	0.01	0.02	0.00	1922.12	1865.86	7712.02	3273.36
Main	3036	4% AEP	744.62	744.55	0.07	0.03	0.01	180.40	2322.13	4897.47	2037.44
Main	3036	2% AEP	745.00	744.94	0.06	0.03	0.01	238.46	2370.86	5390.68	2174.37
Main	3036	1% AEP	745.41	745.35	0.06	0.03	0.01	307.72	2411.00	5881.28	2319.08
Main	3036	0.2% AEP	748.40	748.36	0.04	0.01	0.01	1132.14	2897.09	7470.77	3834.50
Main	2906	4% AEP	744.58	744.54	0.04	0.03	0.00	623.17	2481.33	4295.51	2487.57
Main	2906	2% AEP	744.96	744.93	0.04	0.03	0.00	879.80	2502.66	4617.54	2598.36
Main	2906	1% AEP	745.37	745.34	0.03	0.02	0.00	1164.26	2512.51	4923.23	2739.79
Main	2906	0.2% AEP	748.38	748.36	0.02	0.01	0.00	3554.90	2647.01	5298.09	3740.91
Main	2757	4% AEP	744.55	744.51	0.04	0.03	0.00	1220.70	2360.33	3818.97	2778.40
Main	2757	2% AEP	744.94	744.90	0.03	0.02	0.00	1593.91	2345.32	4060.77	2833.10
Main	2757	1% AEP	745.35	745.32	0.03	0.02	0.00	1983.66	2324.16	4292.19	2890.75
Main	2757	0.2% AEP	748.36	748.35	0.01	0.01	0.00	4726.35	2403.55	4370.10	4363.06
Main	2615	4% AEP	744.52	744.47	0.05	0.02	0.00	1530.01	2625.92	3244.08	2800.72
Main	2615	2% AEP	744.91	744.87	0.04	0.02	0.00	1942.35	2564.50	3493.15	2841.32
Main	2615	1% AEP	745.33	745.29	0.03	0.02	0.00	2366.34	2502.87	3730.79	2916.51
Main	2615	0.2% AEP	748.36	748.34	0.01	0.01	0.00	4553.40	2245.57	4701.03	4728.79
Main	2492	4% AEP	744.49	744.45	0.04	0.02	0.00	1643.95	2778.30	2977.75	2724.13
Main	2492	2% AEP	744.89	744.85	0.03	0.02	0.00	2078.19	2728.33	3193.47	2732.21
Main	2492	1% AEP	745.31	745.28	0.03	0.02	0.00	2518.36	2681.99	3399.65	2866.40
Main	2492	0.2% AEP	748.35	748.33	0.01	0.01	0.00	5534.65	2832.19	3133.16	4635.00
Main	2380	4% AEP	744.47	744.43	0.04	0.03	0.01	1351.65	2927.53	3120.83	2627.52
Main	2380	2% AEP	744.87	744.84	0.03	0.02	0.00	1704.61	2924.23	3371.16	2752.60
Main	2380	1% AEP	745.29	745.26	0.03	0.02	0.00	2075.04	2914.55	3610.41	2883.30
Main	2380	0.2% AEP	748.34	748.33	0.01	0.01	0.00	4297.29	2588.19	4614.52	5830.00

HEC-RAS Plan: Existing River: Blacklick Creek Reach: Main (Continued)

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
Main	2211	4% AEP	744.43	744.40	0.03	0.01	0.00	1899.26	2428.43	3072.31	2675.05
Main	2211	2% AEP	744.84	744.82	0.03	0.00	0.00	2278.42	2433.14	3288.45	2770.11
Main	2211	1% AEP	745.27	745.25	0.02	0.00	0.00	2665.89	2434.97	3499.15	2869.31
Main	2211	0.2% AEP	748.33	748.32	0.01	0.00	0.00	4727.90	2266.67	4505.43	4834.00
Main	2172	4% AEP	744.43	744.40	0.03	0.00	0.00	1695.66	2360.17	3344.17	2809.17
Main	2172	2% AEP	744.84	744.81	0.02	0.00	0.00	2053.03	2359.50	3587.47	2851.63
Main	2172	1% AEP	745.26	745.24	0.02	0.00	0.00	2419.94	2355.89	3824.18	2961.40
Main	2172	0.2% AEP	748.33	748.32	0.01	0.00	0.00	4467.53	2224.65	4807.82	5966.42
Main	2148	4% AEP	744.42	744.40	0.02	0.00	0.00	2289.49	2025.64	3084.87	3963.37
Main	2148	2% AEP	744.83	744.81	0.02	0.00	0.00	2529.61	2048.38	3422.01	4449.35
Main	2148	1% AEP	745.26	745.24	0.02	0.00	0.00	2770.24	2069.29	3760.47	4840.95
Main	2148	0.2% AEP	748.33	748.32	0.01	0.00	0.00	4252.10	2264.81	4983.09	5897.51
Main	2123	4% AEP	744.42	744.39	0.03	0.01	0.08	933.44	2060.84	4405.72	3937.99
Main	2123	2% AEP	744.83	744.80	0.02	0.00	0.08	1179.17	2109.01	4711.82	4261.52
Main	2123	1% AEP	745.26	745.23	0.02	0.00	0.08	1441.78	2150.23	5007.99	4599.33
Main	2123	0.2% AEP	748.33	748.32	0.01	0.00	0.19	4068.87	2107.10	5324.03	6172.52
Main	2098	4% AEP	744.34	744.06	0.28	0.02	0.09	1003.48	5378.89	1017.64	2547.56
Main	2098	2% AEP	744.75	744.47	0.28	0.02	0.10	1216.29	5679.02	1104.68	2780.07
Main	2098	1% AEP	745.18	744.90	0.28	0.02	0.11	1446.20	5962.64	1191.17	3025.40
Main	2098	0.2% AEP	748.14	747.50	0.64	0.02	0.20	1109.72	10164.48	225.80	4934.37
Main	2073	4% AEP	744.23	743.67	0.56	0.02	0.04		7400.00		139.00
Main	2073	2% AEP	744.62	744.02	0.61	0.02	0.05		8000.00		457.93
Main	2073	1% AEP	745.04	744.40	0.65	0.02	0.05		8600.00		654.67
Main	2073	0.2% AEP	747.91	747.68	0.24	0.02	0.28	2454.43	8242.71	802.87	4170.09
Main	2000		Bridge								
Main	1919	4% AEP	743.03	742.02	1.01	0.12	0.07	5.86	7385.76	8.38	133.12
Main	1919	2% AEP	743.29	742.14	1.15	0.14	0.08	7.26	7982.54	10.20	134.14
Main	1919	1% AEP	743.58	742.32	1.26	0.15	0.09	9.29	8577.79	12.92	135.57
Main	1919	0.2% AEP	745.05	743.27	1.78	0.20	0.26	25.54	11437.41	37.04	143.16
Main	1894	4% AEP	742.84	741.61	1.23	0.10	0.42	102.32	7297.68		1727.36
Main	1894	2% AEP	743.06	741.64	1.43	0.11	0.50	115.36	7884.64		1731.59
Main	1894	1% AEP	743.34	741.77	1.57	0.11	0.57	147.33	8452.67		1749.92
Main	1894	0.2% AEP	744.59	741.95	2.64	0.14	1.06	242.94	11257.06		1774.62
Main	1869	4% AEP	742.32	741.93	0.39	0.07	0.03	836.48	4137.51	2426.01	2600.50
Main	1869	2% AEP	742.45	742.03	0.42	0.08	0.03	937.77	4404.91	2657.32	2760.99
Main	1869	1% AEP	742.66	742.23	0.43	0.08	0.02	1063.72	4604.73	2931.55	2943.87
Main	1869	0.2% AEP	743.38	742.86	0.52	0.09	0.02	1649.35	5674.83	4175.81	3205.01
Main	1844	4% AEP	742.22	741.89	0.33	0.03	0.13	130.52	7269.48		2418.40
Main	1844	2% AEP	742.35	741.99	0.36	0.03	0.15	153.24	7846.76		2515.44
Main	1844	1% AEP	742.56	742.18	0.38	0.03	0.16	170.27	8429.73		3003.28
Main	1844	0.2% AEP	743.28	742.80	0.48	0.03	0.20	572.99	10927.01		3572.01
Main	1815	4% AEP	742.06	742.00	0.06	0.04	0.00	546.74	2933.89	3919.38	3148.82
Main	1815	2% AEP	742.17	742.10	0.07	0.04	0.00	610.34	3124.41	4265.25	3215.43
Main	1815	1% AEP	742.37	742.31	0.07	0.04	0.00	693.90	3267.69	4638.42	3254.07
Main	1815	0.2% AEP	743.05	742.96	0.08	0.04	0.00	1071.92	4037.77	6390.32	3379.63
Main	1744	4% AEP	742.02	741.97	0.05	0.02	0.01	892.04	2108.57	4399.39	3187.87
Main	1744	2% AEP	742.13	742.07	0.06	0.02	0.01	983.87	2244.97	4771.16	3222.93
Main	1744	1% AEP	742.33	742.27	0.06	0.02	0.01	1097.18	2345.32	5157.50	3264.19
Main	1744	0.2% AEP	743.00	742.92	0.08	0.03	0.01	1626.44	2889.38	6984.19	3397.19
Main	1720	4% AEP	741.99	741.89	0.10	0.07	0.01	269.97	2973.52	4156.51	3186.70
Main	1720	2% AEP	742.09	741.99	0.10	0.08	0.01	317.97	3157.53	4524.50	3221.78
Main	1720	1% AEP	742.29	742.19	0.11	0.08	0.01	399.22	3273.74	4927.04	3308.99
Main	1720	0.2% AEP	742.95	742.83	0.12	0.08	0.01	838.48	3940.67	6720.84	3501.43
Main	1644	4% AEP	741.91	741.83	0.08	0.05	0.01	1020.67	2061.23	4318.10	3396.31

HEC-RAS Plan: Existing River: Blacklick Creek Reach: Main (Continued)

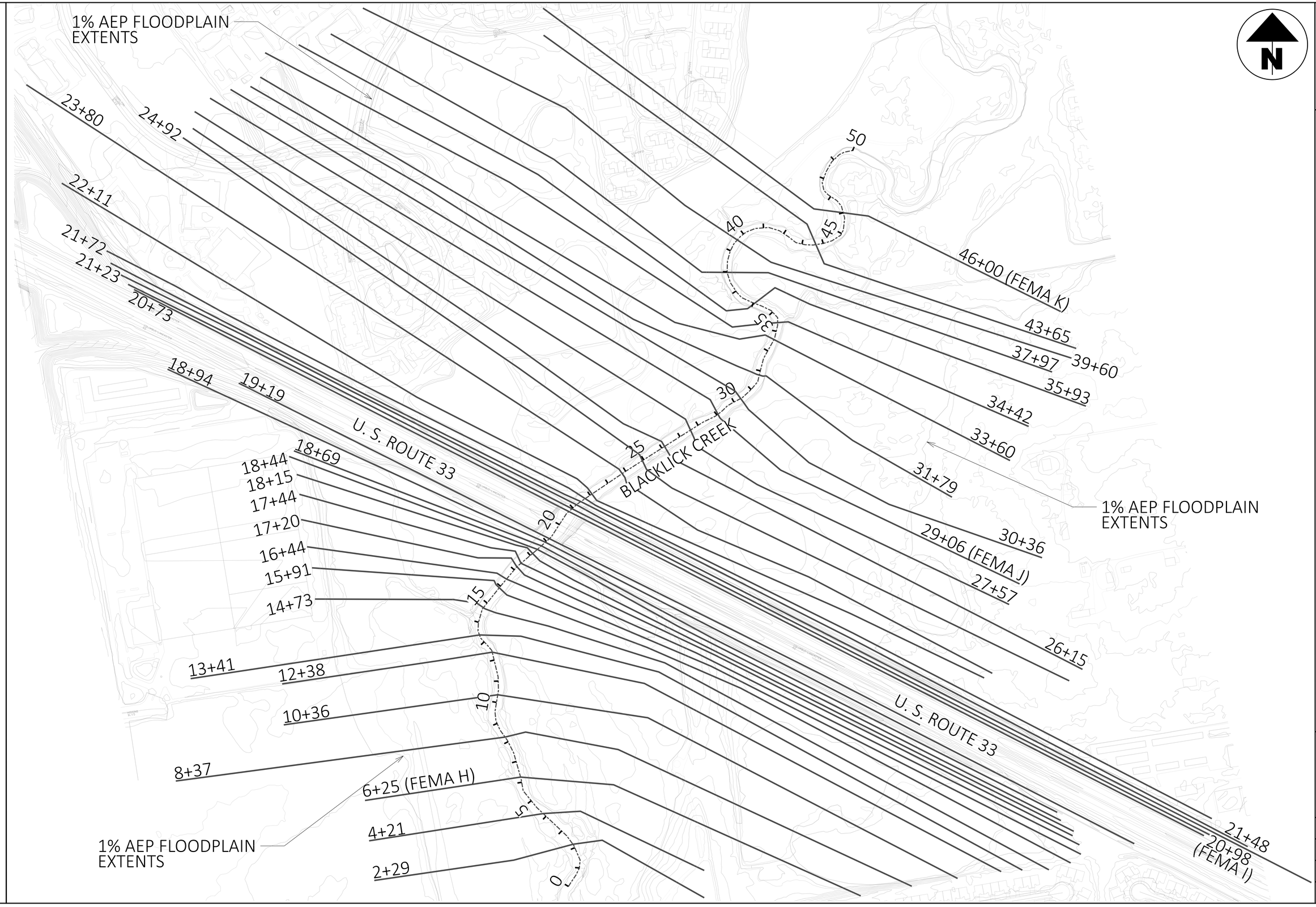
Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
Main	1644	2% AEP	742.01	741.92	0.09	0.05	0.01	1142.08	2187.61	4670.32	3429.89
Main	1644	1% AEP	742.21	742.12	0.09	0.05	0.01	1315.94	2261.21	5022.85	3499.94
Main	1644	0.2% AEP	742.86	742.76	0.10	0.05	0.01	2244.63	2667.02	6588.35	3593.81
Main	1591	4% AEP	741.85	741.75	0.10	0.14	0.03	1410.12	2865.76	3124.12	3490.96
Main	1591	2% AEP	741.95	741.84	0.11	0.16	0.04	1577.44	3032.02	3390.55	3505.77
Main	1591	1% AEP	742.15	742.05	0.11	0.15	0.03	1826.51	3098.82	3674.67	3537.18
Main	1591	0.2% AEP	742.80	742.68	0.12	0.15	0.03	2882.54	3622.78	4994.68	3580.33
Main	1472	4% AEP	741.68	741.47	0.21	0.21	0.03	1315.32	3580.92	2503.77	3311.28
Main	1472	2% AEP	741.76	741.53	0.23	0.23	0.03	1471.80	3807.27	2720.93	3321.09
Main	1472	1% AEP	741.98	741.77	0.20	0.21	0.03	1797.26	3821.39	2981.35	3363.24
Main	1472	0.2% AEP	742.62	742.42	0.20	0.23	0.02	3015.03	4356.49	4128.48	3421.27
Main	1341	4% AEP	741.44	741.33	0.10	0.13	0.00	2644.15	2047.43	2708.42	3193.40
Main	1341	2% AEP	741.49	741.37	0.12	0.15	0.00	2880.18	2189.75	2930.07	3197.93
Main	1341	1% AEP	741.74	741.63	0.11	0.13	0.00	3238.82	2199.00	3162.19	3228.31
Main	1341	0.2% AEP	742.37	742.24	0.13	0.15	0.00	5029.15	2761.76	3709.09	3552.19
Main	1238	4% AEP	741.30	741.21	0.10	0.31	0.00	1797.36	3358.38	2244.26	2920.26
Main	1238	2% AEP	741.34	741.23	0.11	0.36	0.00	1956.31	3620.54	2423.16	2934.06
Main	1238	1% AEP	741.61	741.50	0.10	0.31	0.00	2281.47	3754.04	2564.49	3006.41
Main	1238	0.2% AEP	742.22	742.09	0.12	0.33	0.00	3471.60	4692.80	3335.60	3076.34
Main	1036	4% AEP	741.00	740.89	0.11	0.34	0.00	2910.86	2890.32	1598.82	2840.92
Main	1036	2% AEP	740.98	740.84	0.13	0.45	0.01	3130.63	3152.42	1716.96	2807.88
Main	1036	1% AEP	741.30	741.18	0.11	0.35	0.01	3475.85	3190.09	1934.06	2969.00
Main	1036	0.2% AEP	741.89	741.76	0.13	0.39	0.01	4814.48	3902.55	2782.97	3129.90
Main	837	4% AEP	740.65	740.50	0.15	0.25	0.01	3220.04	2735.60	1444.37	2295.93
Main	837	2% AEP	740.52	740.32	0.21	0.37	0.01	3360.38	3069.11	1570.52	2178.75
Main	837	1% AEP	740.94	740.77	0.17	0.27	0.01	3919.93	3033.82	1646.26	2509.94
Main	837	0.2% AEP	741.49	741.28	0.21	0.33	0.01	5595.43	3734.48	2170.09	3155.15
Main	625	4% AEP	740.39	740.28	0.12	0.15	0.00	2310.05	3673.88	1416.07	1670.18
Main	625	2% AEP	740.14	739.97	0.17	0.24	0.00	2393.30	4135.79	1470.91	1596.23
Main	625	1% AEP	740.66	740.52	0.14	0.17	0.00	2762.44	4146.28	1691.28	1715.57
Main	625	0.2% AEP	741.14	740.96	0.18	0.22	0.00	3849.82	5290.90	2359.28	1797.06
Main	421	4% AEP	740.24	740.12	0.12	0.11	0.00	1607.19	4418.62	1374.20	1168.27
Main	421	2% AEP	739.90	739.71	0.19	0.19	0.00	1651.20	5023.28	1325.52	1159.30
Main	421	1% AEP	740.49	740.34	0.15	0.13	0.00	1914.17	5006.69	1679.14	1172.49
Main	421	0.2% AEP	740.92	740.71	0.21	0.19	0.00	2649.95	6441.52	2408.53	1179.52
Main	229	4% AEP	740.13	740.00	0.13			781.18	4590.60	2028.22	1082.00
Main	229	2% AEP	739.71	739.51	0.21			755.31	5253.70	1990.99	1071.65
Main	229	1% AEP	740.35	740.20	0.15			943.17	5226.64	2430.19	1087.30
Main	229	0.2% AEP	740.73	740.50	0.23			1325.47	6793.07	3381.46	1095.18

HEC-RAS Plan: Existing River: Blacklick Creek Reach: Main

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)
Main	2098	4% AEP	744.34	744.06		0.02	0.09	2547.56	1003.48	5378.89	1017.64	4.82
Main	2098	2% AEP	744.75	744.47		0.02	0.10	2780.07	1216.29	5679.02	1104.68	4.89
Main	2098	1% AEP	745.18	744.90		0.02	0.11	3025.40	1446.20	5962.64	1191.17	4.94
Main	2098	0.2% AEP	748.14	747.50	740.63	0.02	0.20	4934.37	1109.72	10164.48	225.80	6.80
Main	2073	4% AEP	744.23	743.67	738.44	0.02	0.04	139.00		7400.00		6.01
Main	2073	2% AEP	744.62	744.02	738.71	0.02	0.05	457.93		8000.00		6.25
Main	2073	1% AEP	745.04	744.40	739.03	0.02	0.05	654.67		8600.00		6.44
Main	2073	0.2% AEP	747.91	747.68	740.28	0.02	0.28	4170.09	2454.43	8242.71	802.87	4.58
Main	2000 BR U	4% AEP	744.16	743.46	738.84	0.65	0.22	129.46		7400.00		6.71
Main	2000 BR U	2% AEP	744.55	743.80	739.18	0.70	0.26	129.80		8000.00		6.98
Main	2000 BR U	1% AEP	744.97	744.16	739.51	0.74	0.30	130.16		8600.00		7.21
Main	2000 BR U	0.2% AEP	747.62	746.46	740.93	1.54	0.47	853.71	301.44	11198.56		8.77
Main	2000 BR D	4% AEP	743.29	741.87	739.22	0.06	0.20	95.67	6.26	7393.75		9.57
Main	2000 BR D	2% AEP	743.59	741.97	739.60	0.06	0.24	95.91	7.50	7992.50		10.23
Main	2000 BR D	1% AEP	743.93	742.11	739.93	0.07	0.28	96.28	9.25	8590.75		10.81
Main	2000 BR D	0.2% AEP	745.61	742.89	741.36	0.09	0.47	98.22	21.68	11478.32		13.25
Main	1919	4% AEP	743.03	742.02		0.12	0.07	133.12	5.86	7385.76	8.38	8.09
Main	1919	2% AEP	743.29	742.14		0.14	0.08	134.14	7.26	7982.54	10.20	8.59
Main	1919	1% AEP	743.58	742.32		0.15	0.09	135.57	9.29	8577.79	12.92	9.02
Main	1919	0.2% AEP	745.05	743.27		0.20	0.26	143.16	25.54	11437.41	37.04	10.74
Main	1894	4% AEP	742.84	741.61		0.10	0.42	1727.36	102.32	7297.68		8.97
Main	1894	2% AEP	743.06	741.64		0.11	0.50	1731.59	115.36	7884.64		9.65
Main	1894	1% AEP	743.34	741.77	740.22	0.11	0.57	1749.92	147.33	8452.67		10.15
Main	1894	0.2% AEP	744.59	741.95	741.72	0.14	1.06	1774.62	242.94	11257.06		13.18

APPENDIX D

HEC-RAS – PROPOSED



FRA-33-24.76

BLACKLICK CREEK - CROSS-SECTION MAP

DESIGN AGENCY

.

DESIGNER ECH

REVIEWER JWE 04-08-25

PROJECT ID 119387

SHEET XS-1 | TOTAL 1

HEC-RAS HEC-RAS 6.3.1 September 2022
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: FRA-33-24.76 2502046
Project File : FRA3324762502046.prj
Run Date and Time: 3/28/2025 11:20:43 AM

Project in English units

PLAN DATA

Plan Title: Proposed
Plan File : C:\HEC-RAS\FRA-33-2476-2502046\FRA3324762502046.p02

Geometry Title: Proposed
Geometry File : C:\HEC-RAS\FRA-33-2476-2502046\FRA3324762502046.g02

Flow Title : Existing
Flow File : C:\HEC-RAS\FRA-33-2476-2502046\FRA3324762502046.f01

Plan Description:
Proposed bridge - widened on inside in each direction. Total width out-to-out remains the same as existing.

Plan Summary Information:

Number of:	Cross Sections	= 37	Multiple Openings	=	0
	Culverts	= 0	Inline Structures	=	0
	Bridges	= 1	Lateral Structures	=	0

Computational Information

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

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

FLOW DATA

Flow Title: Existing
Flow File : C:\HEC-RAS\FRA-33-2476-2502046\FRA3324762502046.f01

Flow Data (cfs)

River	Reach	RS	4% AEP	2% AEP	1% AEP	0.2% AEP

Blacklick Creek Main	4600	7400	8000	8600	11500

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Blacklick Creek	Main	4% AEP	Known WS = 740	
Blacklick Creek	Main	2% AEP	Normal S = 0.001	
Blacklick Creek	Main	1% AEP	Known WS = 740.2	
Blacklick Creek	Main	0.2% AEP	Normal S = 0.001	

GEOMETRY DATA

Geometry Title: Proposed
Geometry File : C:\HEC-RAS\FRA-33-2476-2502046\FRA3324762502046.g02

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 4600

INPUT
Description: Cross Section 46+00 (FEMA K)
Station Elevation Data num= 42

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	750	47	748	88	746	150	744	356	742
534	742	564	744.3	681	743.7	824	744.5	912	743.5
984	744.5	1006	744	1019	743.5	1044	744.2	1056	744
1085	742	1094	736	1110	734	1120	732	1133	732
1145	734	1154	735	1157	738	1165	740	1212	742
1340	743	1424	742	1438	741.5	1495	742.5	1532	742
1554	741.7	1781	741.7	1790	742	1828	748	1854	748
1983	749	2006	747.6	2083	750.2	2331	747.8	2504	749
2654	747.8	2828	749						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	1085	.05	1212	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1085	1212	255	235	139	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	824	744.5	T
1983	2828	749	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 4365

INPUT
Description: Cross Section 43+65
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	750	217	748	527	746	649	744	815	742
841	739.7	874	742	953	742.5	1009	742	1022	739.7
1035	740	1086	742	1236	742.5	1282	742	1290	740
1296	738	1310	734	1325	733	1338	732	1350	732
1355	733	1360	734	1368	738	1375	742	1388	742.5
1421	741.9	1455	742.3	1498	742	1650	741.5	1719	742.2
1737	742	1769	741.7	1977	741.7	1981	742	2026	750
2213	750	2282	747.7	2370	748.5	2443	747.7	2516	748
2661	750.3								

Manning's n Values num= 3

```
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08    1282     .05    1375     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1282    1375             384     405     422             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
    2026    2661     750       T

CROSS SECTION


RIVER: Blacklick Creek
REACH: Main              RS: 3960

INPUT
Description: Cross Section 39+60
Station Elevation Data    num=      44
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     750     420     748     567     746     663     744     746   741.9
     875   742.5     931     742     952   739.7     973     742     994   742.4
    1013     742    1018     740    1027   739.7    1033     740    1079     742
    1137   742.5    1199     742    1469     741    1610     741    1632     740
    1633     739    1645     734    1655     732    1666     732    1675     735
    1685     738    1692     742    1737   742.5    1771     742    1838   741.5
    2080   741.5    2089     742    2115     744    2143     746    2248     748
    2470     748    2521     744    2653   741.8    2759     746    2835   747.5
    2940     746    3078   744.9    3295     746    3520   748.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08    1610     .05    1692     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1610    1692             144     163     180             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
    2248    3520     748       T

CROSS SECTION


RIVER: Blacklick Creek
REACH: Main              RS: 3797

INPUT
Description: Cross Section 37+97
Station Elevation Data    num=      45
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     750     393     748     515     746     650     744     727     742
     772   741.7     830     742     945   744.1     959     744     986     742
     992     740    1002   739.7    1010     740    1088   740.5    1176   737.9
    1272     741    1402   740.5    1556   742.1    1567     740    1569     738
    1571     736    1580     733    1590     732    1600     732    1610     734
    1614     736    1621     742    1711   742.4    1779     742    1894     741
    2132     741    2143     742    2263   748.1    2339     742    2384   741.5
    2518   743.5    2651     741    2728     742    2752     744    2804     746
    2834   746.5    3072   744.7    3267     746    3464     748    3500   748.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08    1556     .05    1621     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1556    1621             182     196     227             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     945   744.1       T
    2263    3500   748.1       T

CROSS SECTION
```

RIVER: Blacklick Creek
REACH: Main RS: 3593

INPUT
Description: Cross Section 35+93
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	750	451	748	713	746	892	744	958	742
1006	742.3	1057	742	1386	742	1398	740	1408	738
1414	737.5	1422	738	1469	740.2	1552	739.8	1601	740.4
1639	738	1650	736	1660	734	1665	731	1670	731
1681	733	1690	736	1698	742	1761	742.6	1806	742
1981	744	2000	744.3	2018	744	2188	741.3	2469	742.1
2646	741.3	2743	742	2809	744	3118	746.1	3277	743.9
3515	746	3724	745.9	3782	748.5				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	1601	.05	1698	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1601	1698	190	149	132	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
2000	3782	744.3	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 3442

INPUT
Description: Cross Section 34+42
Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	750	238	748	379	746	653	744	765	742
821	741.5	885	742	956	741.7	1023	742.2	1112	741.7
1222	742.2	1233	742.5	1254	733.4	1262	730.5	1265	730
1267	729.81	1278	730.7	1293	733.7	1310	734.16	1327	741.8
1482	742.6	1528	742	1934	741.3	2160	740	2175	739.7
2187	740	2600	742	2652	744	2794	741.7	2878	744
2972	744.5	3056	743.7	3120	744.2	3309	746	3375	746.7
3411	746	3428	745.8	3438	746	3456	748	3487	749

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	1233	.05	1327	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1233	1327	103	82	63	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
2652	3487	744	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 3360

INPUT
Description: Cross Section 33+60
Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	751.5	93	750	253	748	333	746	446	744
480	743.5	580	744.2	630	744	775	742	1206	742.57
1212	742.59	1226	733.85	1239	730.08	1251	732.24	1267	732.95
1283	741.65	1493	742	1520	742.3	1548	742	1949	740
1957	739.7	1988	739.7	2031	740.2	2068	739.7	2331	739.7
2356	740	2433	740.7	2654	742	2702	744	2746	746
2924	747	3124	748.6	3470	748.2				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	1206	.05	1283	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1206	1283	168	181	.1	.3

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 3179

INPUT
Description: Cross Section 31+79
Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	748.5	28	748	55	746	111	745.5	214	746.3
246	746	365	744	395	743.5	425	744	576	744.5
765	744	863	742	1036	740.52	1043	740.3	1051	733.37
1064	733.02	1081	731.6	1099	733.6	1107	737.65	1111	737.95
1117	740	1290	740.5	1445	739.7	1629	740.3	1773	739.7
1794	739.7	1819	739.5	2165	739.5	2192	740	2426	742
2462	744	2495	746	2526	748	2564	749	2649	748
2763	747.5	2952	748.4	3243	747.4	3352	748.4		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	1036	.045	1117	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1036	1117	173	143	119	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	214	746.3	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 3036

INPUT
Description: Cross Section 30+36
Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	750.6	48	750	124	748	300	746.8	473	746
654	744	754	743.2	916	744	1112	746	1176	747.4
1242	746	1400	744	1541	742	1584	742.15	1592	741.67
1601	734.3	1612	730.83	1635	732.82	1641	734	1650	739.25
1656	741.3	1789	741.5	1893	739.9	1930	740.3	1966	739.9
2099	740.5	2238	739.7	2268	739.7	2288	740.1	2305	739.7
2703	739.7	2730	740	2861	742	2896	744	2945	746
2997	745.8	3046	748	3212	748	3432	748	3479	747.9
3611	748.3	3686	744.2	3783	744.2	3945	748		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.07	1584	.035	1656	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1584	1656	127	130	123	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1176	747.4	T
3046	3945	748	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 2906

INPUT
Description: Cross Section 29+06 (FEMA J)
Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	750.2	15	750	265	748	361	746	574	744
754	743	912	743.1	1136	743.2	1384	743.1	1598	742.13
1601	741.36	1608	734.1	1634	736.09	1654	733.79	1669	732.16
1678	733.45	1683	732.91	1687	733.65	1696	739.71	1702	740.46
1878	740	1890	739.7	1904	740	2032	740	2046	739.7
2082	739.7	2100	740	2215	740	2240	739.7	2686	739.7
2733	740	2754	742	2781	744	2849	746	2869	746.3
2964	745.7	3041	746.4	3109	748	3163	748	3352	745.2
3469	746.3	3726	744.2	3883	744.2	3961	748		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	1598	.035	1702	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1598	1702	158	149	143	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1136	743.2	T
3109	3961	748	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 2757

INPUT
Description: Cross Section 27+57
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	748.4	54	748	221	746	252	744	336	743.5
460	744	513	744.4	580	744	1011	742	1055	741.9
1091	742	1363	742.1	1399	742.2	1441	742.1	1559	742
1675	741.47	1692	741.37	1703	733.15	1713	732.1	1717	731.5
1727	731.8	1731	732.82	1742	732.27	1755	733.05	1770	738.7
1777	740	1939	741	2085	740	2098	739.7	2134	739.7
2153	740	2270	741	2378	740	2393	739.7	2751	739.7
2788	740	2831	742	2879	744	3049	746.2	3101	745.7
3128	746	3306	746.2	3577	746.2	3614	745.7	3674	748
3807	748	3847	744.2	3937	744.2	4067	747.9	4470	748.5

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	1675	.035	1777	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1675	1777	139	142	154	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1399	742.2	T
3049	4470	748	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 2615

INPUT
Description: Cross Section 26+15
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	749.5	107	748	251	747.5	451	748.2	502	748
577	746	617	744	652	743	880	743	966	744.3
1031	743.7	1112	744.3	1159	744	1316	742	1486	741.7
1604	741.7	1731	742	1840	742.2	1871	742.1	1961	742
2152	740.45	2183	741.75	2202	733.5	2216	732	2224	730.5
2254	730.6	2268	740.6	2440	740.4	2635	740	2660	739.8

2741	740	2912	742.5	2962	742	2982	739.7	3250	739.7
3283	746	3436	746	3477	745	3547	746	3607	746
3724	742.7	3856	746	4002	746	4110	745.5	4195	746
4279	746	4437	745.7	4538	748.1	4608	747.9	4676	748
4873	748.5								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	2183	.035	2268	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
2183	2268	133	123	110	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1840	742.2	T
3283	4873	746	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 2492

INPUT
Description: Cross Section 24+92
Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	749.5	99	748	542	746	570	744	619	742.7
810	742.7	888	744	916	744	989	743.5	1085	744.1
1151	744	1288	742	1361	741.7	1693	741.7	1833	742.5
1918	742	2199	740	2205	739.49	2222	739.09	2230	733.14
2245	730.75	2264	730.75	2275	732.48	2280	737.44	2287	740.5
2311	737.9	2334	740	2487	741.7	2656	740	2690	739.5
2737	740	2923	742.5	3057	739.7	3260	739.7	3297	746
3354	747.5	3421	746	3575	746.1	3766	746	3894	745.9
4032	747	4171	746	4371	744.9	4536	746	4570	748
4712	748.1								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	2199	.035	2334	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
2199	2334	114	112	117	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1085	744.1	T
3297	4712	748	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 2380

INPUT
Description: Cross Section 23+80
Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	748.1	27	748	232	746	521	744	605	743.5
716	744.1	938	742	1024	741.5	1319	741.5	1386	742
1527	742.4	1689	742	1925	740.15	1956	732.11	1971	729.09
1982	729.16	1990	729.73	1995	731.53	2006	737.29	2023	738
2058	740	2219	741.5	2371	740	2395	739.7	2915	739.7
2969	740	2988	742	3003	744	3022	746	3089	747.5
3155	746	3323	743.9	3481	746.1	3548	745.7	3628	747.3
3687	745.8	4425	746	5410	746.2	5500	746.5	5830	748

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	1925	.035	2058	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.

```
          1925    2058              160     169     168             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    1527   742.4       T
    3022    5830     746       T

CROSS SECTION


RIVER: Blacklick Creek
REACH: Main               RS: 2211

INPUT
Description: Cross Section 22+11
Station Elevation Data    num=      46
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   748.5      23     748     321     746     496     744     924     742
    1176   741.5    1307     742    1549   742.1    1698     742    1761     740
    1837   739.5    1959  740.75    1979     740    1986  732.72    2000   730.7
    2018  732.31    2033  733.03    2051  736.32    2059  738.33    2090     740
    2274     741    2393   739.7    2984   739.7    2991     740    3003     742
    3059     744    3156     746    3315   746.3    3353   745.8    3625   745.5
    3931     746    4006   746.2    4143   745.9    4231   746.1    4374   746.9
    4393   746.5    4439   745.8    4579   746.4    4797   743.9    4807     744
    4822     746    4839     748    4858     750    4873     752    4881     754
    4893     756

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06    1959    .035    2090    .065

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1959    2090              25      39      54             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    1549   742.1       T
    3156    4893     746       T

CROSS SECTION


RIVER: Blacklick Creek
REACH: Main               RS: 2172

INPUT
Description: Cross Section 21+72
Station Elevation Data    num=      50
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     748     140     747     200   746.5     303   745.7     380     746
     610   746.5     832     746     862   746.2     973   745.8    1082     746
    1332     747    1510     746    1539   745.7    1603     746    1720   746.5
    1854     746    1957     744    2522     742    2602   741.5    2690     742
    2976   742.3    3125     742    3181     740    3301   739.5    3421   740.5
    3434     740    3445   732.7    3458   730.7    3479   732.3    3494  733.03
    3500  734.54    3516     736    3538     738    3843     739    4361     740
    4450     742    4621     744    4689   746.1    4763   745.9    5184     746
    5351     746    5457     745    5620     746    5803     746    5816     744
    5920     744    5945     746    5964     748    5979     750    5991     752

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06    3421    .035    3538    .065

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          3421    3538              18      24      30             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    1720   746.5       T
    4689    5991   746.1       T

CROSS SECTION
```

RIVER: Blacklick Creek
REACH: Main RS: 2148

INPUT
Description: Cross Section 21+48
Station Elevation Data num= 47

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	748	230	746	300	745.3	502	744	602	744
939	743.7	965	744	1079	746	1198	745.5	1508	744.5
1790	744.3	1964	744	2490	742	2613	741.5	3023	740
3321	739.5	3437	740.5	3450	740	3455	738	3460	736
3478	733	3490	732	3495	731	3505	732	3520	733
3532	736	3543	738	3714	740	3731	740.3	3750	739.5
3783	740.3	3837	739.7	3870	740.1	4068	739.8	4177	740
4310	739.8	4463	740	4610	742	4799	744	5211	746
5382	746	5708	743.8	5790	744	5857	746	5894	748
5916	750	5956	752						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	3437	.035	3543	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
3437	3543	27	25	19	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	2613	746.4	T
4799	5956	747	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 2123

INPUT
Description: Cross Section 21+23
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	748	390	746	500	745.5	894	744	1178	742
1301	741.8	1420	742	1455	744	1515	746	1951	746
2161	744	2771	746	2874	746	2900	744	2926	742
2945	741.5	2967	742	3305	744	3440	744	3556	742
3595	740	3693	738	3803	740.1	3804	740	3808	738
3812	736	3830	732	3841	731	3855	731	3865	732
3877	734	3885	736	3892	738	4679	738	4688	737.9
4692	738	4736	740	4760	742	4918	743.2	5077	741.7
5461	744	5970	744	6109	746	6162	748	6228	750

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	3803	.035	3892	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
3803	3892	22	25	24	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	2874	746	T
4760	6228	746	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 2098

INPUT
Description: Cross Section 20+98 (FEMA I)
Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	747.5	574	746	851	744	924	746	1019	748
1416	748	2005	746	2596	744	3030	744	3106	742
3210	740	3261	737.5	3279	738.5	3295	736	3310	734

```
    3330     732    3343   731.5    3350     732    3375     734    3389     736
    3454     738    4154     740    4193     742    4307     744    4456     744
    4730   743.5    5109     744    5313     746    5565     748    5654     750

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06    3279    .035    3389     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          3279    3389               25      25      25             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    3030   747.5       T
    3454    5654   747.5       T

CROSS SECTION


RIVER: Blacklick Creek
REACH: Main               RS: 2073

INPUT
Description: Cross Section 20+73
Station Elevation Data    num=      32
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     749     557     748     864     748    1142     746    1282     745
    1684     744    1992     744    2181     746    2717     746    3162     746
    3233   744.2    3244     742    3250     740    3257     738    3277     737
    3282   734.5    3299   731.8    3314   730.7    3330   729.7    3343   731.5
    3352   732.2    3357     735    3365     736    3368     738    3371     740
    3373     742    3375     744    3377     746    3590     746    4021   746.4
    5346     748    5600     750

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08    3233    .045    3375     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          3233    3375               159     154     159             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    3233     746       T
    3375    5600     746       T

BRIDGE


RIVER: Blacklick Creek
REACH: Main               RS: 2000

INPUT
Description: Bridge 2502046 - Proposed
Distance from Upstream XS =    9.24
Deck/Roadway Width        =   134.4
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       21
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0   750.6       0     351     750       0    1060     748       0
    1737     746       0    2023   745.4       0    2237     746       0
    2763   747.2       0    3096     748       0    3224   748.3       0
  3242.9  748.56       0    3243  748.56  744.63    3384   748.9  745.01
  3384.1   748.9       0    3421   748.9       0    3888     750       0
    4004   750.2       0    4114     750       0    4525   748.9       0
    5196   748.8       0    5485     750       0    5634   750.2       0

Upstream Bridge Cross Section Data
Station Elevation Data    num=      32
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     749     557     748     864     748    1142     746    1282     745
    1684     744    1992     744    2181     746    2717     746    3162     746
    3233   744.2    3244     742    3250     740    3257     738    3277     737
    3282   734.5    3299   731.8    3314   730.7    3330   729.7    3343   731.5
```

```
    3352   732.2    3357     735    3365     736    3368     738    3371     740
    3373     742    3375     744    3377     746    3590     746    4021   746.4
    5346     748    5600     750

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08    3233    .045    3375     .08

Bank Sta: Left   Right    Coeff Contr.   Expan.
          3233    3375             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    3233     746       T
    3375    5600     746       T

Downstream  Deck/Roadway Coordinates
    num=      17
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0     747       0     325     746       0     611   745.4       0
     825     746       0    1351   747.2       0    1684     748       0
    1812   748.3       0  1830.9  748.56       0    1831  748.56  744.63
    1972   748.9  745.01  1972.1   748.9       0    2009   748.9       0
    2476     750       0    2592   750.2       0    2702     750       0
    3113   748.9       0    3552  748.85       0

Downstream Bridge Cross Section Data
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   746.2      38     746    1034     746    1857     746    1869     744
    1874     742    1879     740    1891     738    1897     736    1900  732.05
    1913  730.76    1940  732.15    1963  732.63    1967   735.6    1981  736.75
    1986     738    2000     740    2007     742    2018     744    2487     746
    2840   746.4    3119     746    3275     748    3552   746.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08    1879    .045    2000     .08

Bank Sta: Left   Right    Coeff Contr.   Expan.
          1879    2000             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0    1857     746       T
    2487    3552     746       T

Upstream Embankment side slope              =       2 horiz. to 1.0 vertical
Downstream Embankment side slope            =       2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Abutments =  1

Abutment Data
Upstream     num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    3235     744    3266     738    3287     737 3287.01     727 3358.99     727
    3359     736    3377     744
Downstream     num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    1823     744    1858     738    1862     727 1966.99     727    1967   735.6
    2018     744

Number of Piers =  2

Pier Data
Pier Station     Upstream=    3287    Downstream=    1875
Upstream     num=       2
    Width   Elev    Width   Elev
       1     730        1     746
Downstream     num=       2
```

```
    Width   Elev    Width   Elev
       1     730       1     746

Pier Data
Pier Station     Upstream=    3341    Downstream=    1929
Upstream     num=        2
    Width   Elev    Width   Elev
       1     730       1     746
Downstream     num=        2
    Width   Elev    Width   Elev
       1     730       1     746

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

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

CROSS SECTION


RIVER: Blacklick Creek
REACH: Main              RS: 1919

INPUT
Description: Cross Section 19+19
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   746.2      38     746    1034     746    1857     746    1869     744
    1874     742    1879     740    1891     738    1897     736    1900  732.05
    1913  730.76    1940  732.15    1963  732.63    1967   735.6    1981  736.75
    1986     738    2000     740    2007     742    2018     744    2487     746
    2840   746.4    3119     746    3275     748    3552   746.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08    1879    .045    2000     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1879    2000               25      25      25             .3       .5
Ineffective Flow     num=        2
   Sta L   Sta R    Elev  Permanent
       0    1857     746       T
    2487    3552     746       T

CROSS SECTION


RIVER: Blacklick Creek
REACH: Main              RS: 1894

INPUT
Description: Cross Section 18+94
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     745     687     744     702     746     738     748    1038     749
    1313     748    1888     746    2319     744    2353   743.5    2426     744
    2647     745    2788     744    2882     742    3012     740    3033     738
    3048     736    3060     733    3080   731.5    3100   731.5    3110     734
    3125     736    3131     738    4013     740    4166     738    4322     738
    4334   737.7    4345     738    4443   740.5    4494   739.7    4664     742
    4800     744
```

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	3012	.045	3131	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
3012	3131	25	25	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	2647	746	T
3131	4800	746	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 1869

INPUT
Description: Cross Section 18+69
Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	744	227	744.5	490	744	787	742	853	741.7
994	742.3	1760	740	1780	739.7	1786	740	1812	742
1879	742	2033	739.9	2191	742	2325	743	2388	742
2403	740	2629	740	2661	738	2668	736	2700	734
2710	733	2720	733	2735	734	2744	736	2749	738
3113	739.5	3421	738	3653	736.9	3860	738	3869	740
3885	742	3899	744	3940	745				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	2661	.045	2749	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
2661	2749	31	25	24	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	2325	745	T
3113	3940	745	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 1844

INPUT
Description: Cross Section 18+44
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	744	300	742	399	740.5	690	742.5	1071	741.9
1777	740	1795	739.5	1809	740	1844	742	1910	744
1991	742	2035	740	2044	739.5	2053	740	2066	742
2246	743	2402	741.5	2431	742	2673	742	2698	740
2703	738	2708	736	2720	735	2740	733	2770	733
2783	736	2790	738	3078	739.5	3458	736.5	3858	736.5
3861	738	3877	740	3894	742	3906	744	3983	746

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	2698	.045	3078	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
2698	3078	40	29	10	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	1910	745	T
3078	3983	745	T

CROSS SECTION

RIVER: Blacklick Creek

REACH: Main RS: 1815

INPUT
Description: Cross Section 18+15
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	744	229	742	415	740	502	739.7	632	740
749	742	773	742.1	795	742	1508	740	1769	739.7
1864	739.7	1890	740.5	1941	744	1978	744.5	2026	744
2100	739.7	2110	740	2129	742	2169	744	2383	746
2452	744	2482	742	2552	740	2790	738.64	2797	738.13
2805	732.29	2812	729.7	2840	731.32	2864	732.11	2870	736.45
2874	737.2	2932	739	3330	738.5	3509	738	3525	737.7
3894	737.7	3897	738	3911	740	3926	742	3947	744
4001	746								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	2790	.045	2932	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
2790	2932	50	69	56	.3	.5

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	2383	746	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 1744

INPUT
Description: Cross Section 17+44
Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	744	202	742	366	740	406	739.7	581	739.7
650	740	778	742	1491	740	1731	739.5	1823	740
1913	742	1939	744	1973	744.6	2001	744	2058	742
2079	740	2086	739.5	2100	740	2130	742	2184	744
2296	744.6	2415	744	2461	742	2514	740	2805	738
2836	736	2850	734	2880	733	2885	733	2895	735
2901	736	2906	738	3164	739.3	3654	736.7	3849	738
3865	740	3887	742	3911	744	3963	746		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	2805	.045	2906	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
2805	2906	43	24	32	.3	.5

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	1973	744.6	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 1720

INPUT
Description: Cross Section 17+20
Station Elevation Data num= 36

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	744	235	742	377	740	446	739.7	654	739.7
713	740	1148	741	1551	740	1811	739.7	1860	740
1943	742	1974	744	2015	745.2	2049	744	2072	742
2095	740	2116	739.7	2134	740	2204	742	2325	744.1
2443	742	2500	740	2876	742.31	2889	737.79	2893	733.51
2902	730.94	2933	731.67	2960	731.72	2967	738.2	2976	739.05
3210	739.3	3665	736.5	3843	738	3881	742	3902	744
3975	746								

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08    2876    .045    2976     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          2876    2976              60      76      90             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0    2015   745.2       T

CROSS SECTION


RIVER: Blacklick Creek
REACH: Main               RS: 1644

INPUT
Description: Cross Section 16+44
Station Elevation Data    num=      35
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     744     218     742     404     740     438   739.7     715   739.7
     773     740    1202   740.5    1606     740    1693   739.5    1787   740.1
    1826   739.7    1877     740    1952     742    1981     744    2056   745.6
    2067     744    2088     742    2105     740    2199     740    2328   742.1
    2924   738.3    2941     738    2946     736    2955     733    2969   731.5
    2991     733    2995     736    2999     738    3196     739    3623     737
    3796     738    3816     740    3836     742    3862     744    3915     746

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08    2924    .045    2999     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          2924    2999              84      53      34             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0    2056   745.6       T

CROSS SECTION


RIVER: Blacklick Creek
REACH: Main               RS: 1591

INPUT
Description: Cross Section 15+91
Station Elevation Data    num=      34
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     746      28     744      94     742     349     740     358   739.7
     726   739.7     767     740    1282   740.8    1652   739.7    1822     740
    1888     742    1931     744    1980   745.4    2037     744    2049     742
    2059     740    2257   740.2    2326     740    2914  739.43    2922  738.02
    2930  733.05    2955  732.33    2983  730.52    2991  732.33    2997   737.9
    3004  739.18    3347   739.2    3391     738    3586   737.5    3764     738
    3775     740    3789     742    3804     744    3855     746

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08    2914    .045    3004     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          2914    3004              98     119     131             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0    1980   745.4       T

CROSS SECTION


RIVER: Blacklick Creek
REACH: Main               RS: 1472
```

INPUT
Description: Cross Section 14+92
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	746	61	744	75	742	286	740	300	739.7
738	739.7	798	740	1228	741.1	1620	740	1689	739.7
1721	740	1793	742	1830	744	1879	745.3	1927	744
1942	742	1955	740	2857	740	2865	740.14	2882	732.96
2907	731.75	2927	731.19	2936	732.14	2954	739.91	2958	740
3010	740.5	3069	740	3143	737.9	3287	738.7	3487	737.5
3579	740	3626	742	3652	744	3711	746		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	2865	.045	2958	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
2865	2958	112	131	166	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	1879	745.3	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 1341

INPUT
Description: Cross Section 13+41
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	746	29	744	42	742	149	740	177	739.7
635	739.7	678	740	1132	741.3	1451	740	1547	739.7
1584	740	1656	742	1693	744	1751	745.1	1790	744
1801	742	1813	740	2746	738	2752	736	2760	734
2765	733.2	2794	733.2	2800	734	2806	736	2812	738
2840	739.7	3069	737.9	3326	737.5	3387	738	3416	740
3458	742	4147	742.6						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	2746	.045	2812	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
2746	2812	100	103	93	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	1751	745.1	T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 1238

INPUT
Description: Cross Section 12+38
Station Elevation Data num= 37

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	746	23	744	35	742	109	740	127	739.7
611	739.7	645	740	1045	741.3	1379	740	1433	739.7
1467	740	1539	741	1585	744	1611	744.8	1637	744
1657	742	1669	740	1879	739.5	2255	739.1	2466	738
2495	737.5	2555	738.2	2571	738	2573	736	2575	734
2587	733.1	2616	733.1	2625	734	2647	736	2678	738
2697	738.5	2923	735.8	3021	738	3083	740	3203	742
3380	744	3593	745						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	2495	.045	2697	.08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2495 2697 206 202 201 .1 .3
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 1611 744.8 T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 1036

INPUT
Description: Cross Section 10+36
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	747	12	746	20	744	26	742	31	740
46	739.7	506	739.7	719	740	946	741	1178	739.8
1198	740	1325	742	1367	742.5	1504	737.5	1625	738.8
1787	737.8	1949	739.1	2106	737.8	2229	738.5	2290	738
2298	736	2312	734	2326	733	2342	733	2355	734
2364	736	2389	738.5	2442	738.6	2547	739	2672	737.5
2771	738	2907	740	3280	742	3340	742.4		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	2229	.045	2389	.08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2229 2389 190 199 207 .1 .3
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 1367 742.5 T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 837

INPUT
Description: Cross Section 8+37
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	750	12	748	22	746	32	744	36	742
43	740	45	739.7	554	739.7	600	740	747	741.5
897	739.5	919	740	1060	742.5	1113	742	1165	740
1298	738	1360	737.5	1509	738.8	1773	735.9	1948	739
1995	738	2009	736	2016	734	2037	733	2062	733
2076	734	2094	736	2227	738	2246	738.2	2262	738
2479	738	2528	740	2788	740.7	3595	741.5		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	2009	.045	2094	.08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2009 2094 221 212 197 .1 .3
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 1060 742.5 T

CROSS SECTION

RIVER: Blacklick Creek
REACH: Main RS: 625

INPUT
Description: Cross Section 6+25 (FEMA H)
Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	754.8	9	754	21	752	32	750	42	748

```
      53     746      62     744      77     742      90     740     216   739.5
     417     740     539   742.1     619   739.8     668     742     772     744
     785     746     797     748     832     749     864     748     883     748
     903     744     922     742     948     740     992     738    1093   737.5
    1264   738.2    1389   735.9    1421   736.2    1463   735.9    1594   738.5
    1630     738    1660     736    1676     734    1684   732.8    1687     732
    1723   732.8    1749     734    1785     736    1924   737.5    2176     738
    2229     740    2329     742    2430   742.4

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .07    1594    .035    1785     .07

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1594    1785              223     204     202             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0     832     749       T

CROSS SECTION


RIVER: Blacklick Creek
REACH: Main               RS: 421

INPUT
Description: Cross Section 4+21
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     751      35     750     108     748     143     746     183     744
     210     742     229     740     263     738     549     736     580   735.5
     607     736     640   736.5     665     736     753     734     779     733
     814     732     848     733     856     734     865     736    1063   738.3
    1306   737.1    1382     738    1395     740    1414     742    1634   742.6

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .07     665    .035     865     .07

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           665     865              182     192     199             .1       .3

CROSS SECTION


RIVER: Blacklick Creek
REACH: Main               RS: 229

INPUT
Description: Cross Section 2+29
Station Elevation Data    num=      23
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   751.1     127     750     192     748     229     746     248     744
     268     742     290     740     316     738     562     736     568     734
     601   733.2     642   733.2     663     733     686   732.1     723     734
     763     736     876   735.9     907     736    1167   737.5    1356     738
    1372     740    1403     742    1625   742.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .07     562    .035     763     .07

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           562     763                0       0       0             .1       .3


SUMMARY OF MANNING'S N VALUES

River:Blacklick Creek

      Reach          River Sta.       n1        n2        n3
```

Main	4600	.08	.05	.08
Main	4365	.08	.05	.08
Main	3960	.08	.05	.08
Main	3797	.08	.05	.08
Main	3593	.08	.05	.08
Main	3442	.08	.05	.08
Main	3360	.08	.05	.08
Main	3179	.08	.045	.08
Main	3036	.07	.035	.08
Main	2906	.06	.035	.065
Main	2757	.06	.035	.065
Main	2615	.06	.035	.065
Main	2492	.06	.035	.065
Main	2380	.06	.035	.065
Main	2211	.06	.035	.065
Main	2172	.06	.035	.065
Main	2148	.06	.035	.065
Main	2123	.06	.035	.065
Main	2098	.06	.035	.06
Main	2073	.08	.045	.08
Main	2000	Bridge		
Main	1919	.08	.045	.08
Main	1894	.08	.045	.08
Main	1869	.08	.045	.08
Main	1844	.08	.045	.08
Main	1815	.08	.045	.08
Main	1744	.08	.045	.08
Main	1720	.08	.045	.08
Main	1644	.08	.045	.08
Main	1591	.08	.045	.08
Main	1472	.08	.045	.08
Main	1341	.08	.045	.08
Main	1238	.08	.045	.08
Main	1036	.08	.045	.08
Main	837	.08	.045	.08
Main	625	.07	.035	.07
Main	421	.07	.035	.07
Main	229	.07	.035	.07

SUMMARY OF REACH LENGTHS

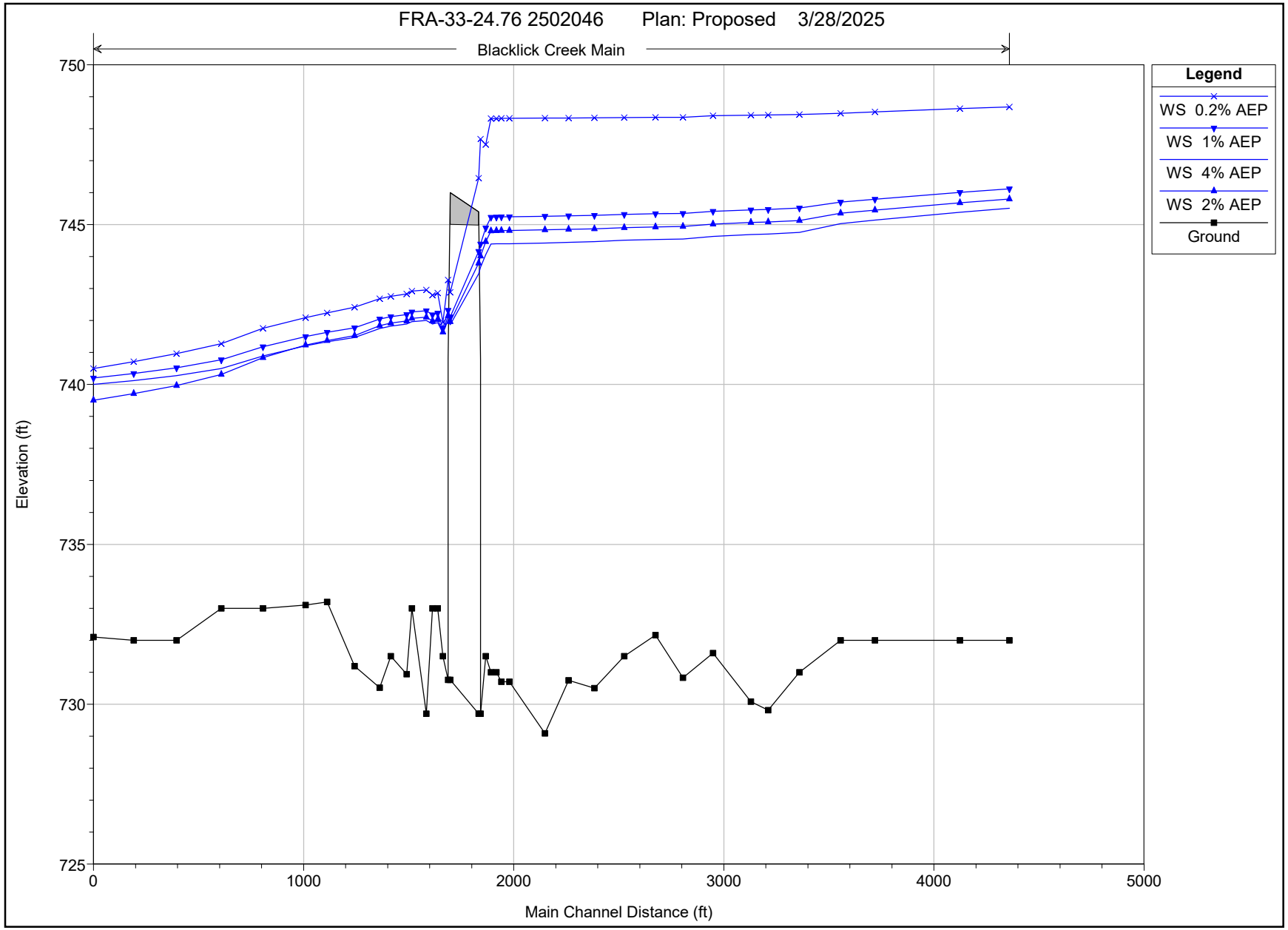
River: Blacklick Creek

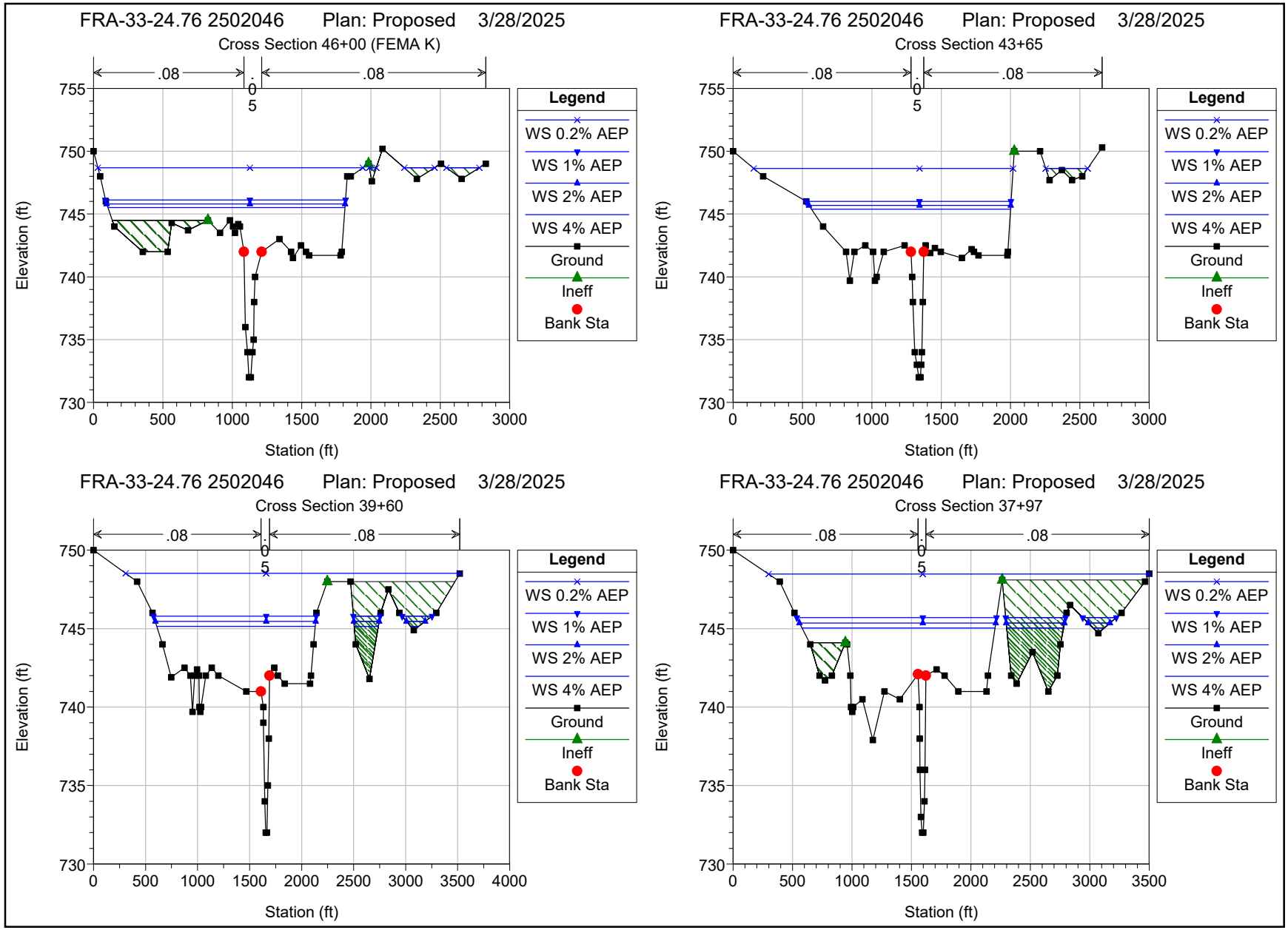
Reach	River Sta.	Left	Channel	Right
Main	4600	255	235	139
Main	4365	384	405	422
Main	3960	144	163	180
Main	3797	182	196	227
Main	3593	190	149	132
Main	3442	103	82	63
Main	3360	168	181	184
Main	3179	173	143	119
Main	3036	127	130	123
Main	2906	158	149	143
Main	2757	139	142	154
Main	2615	133	123	110
Main	2492	114	112	117
Main	2380	160	169	168
Main	2211	25	39	54
Main	2172	18	24	30
Main	2148	27	25	19
Main	2123	22	25	24
Main	2098	25	25	25
Main	2073	159	154	159
Main	2000	Bridge		
Main	1919	25	25	25
Main	1894	25	25	25
Main	1869	31	25	24
Main	1844	40	29	10

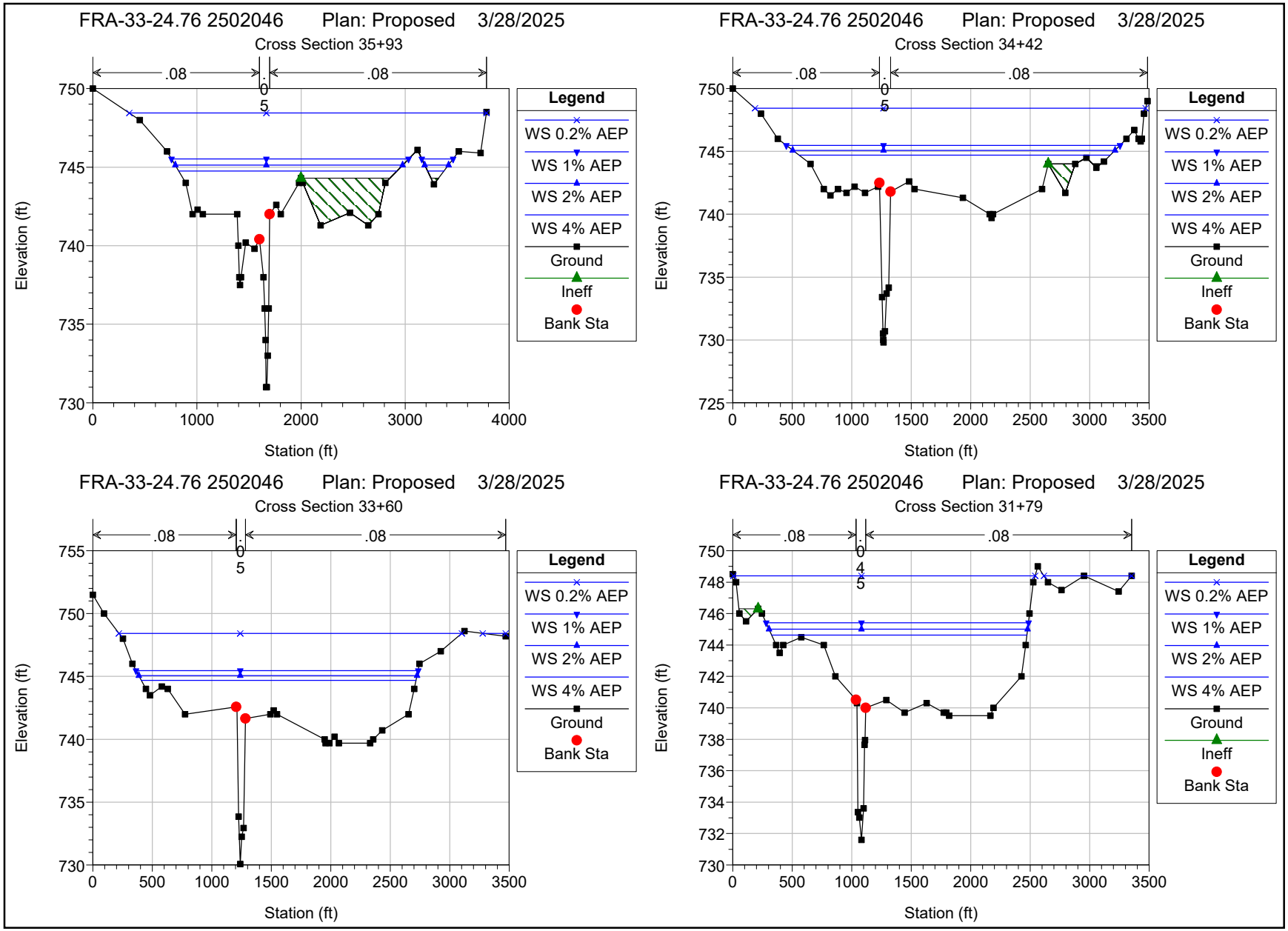
Main	1815	50	69	56
Main	1744	43	24	32
Main	1720	60	76	90
Main	1644	84	53	34
Main	1591	98	119	131
Main	1472	112	131	166
Main	1341	100	103	93
Main	1238	206	202	201
Main	1036	190	199	207
Main	837	221	212	197
Main	625	223	204	202
Main	421	182	192	199
Main	229	0	0	0

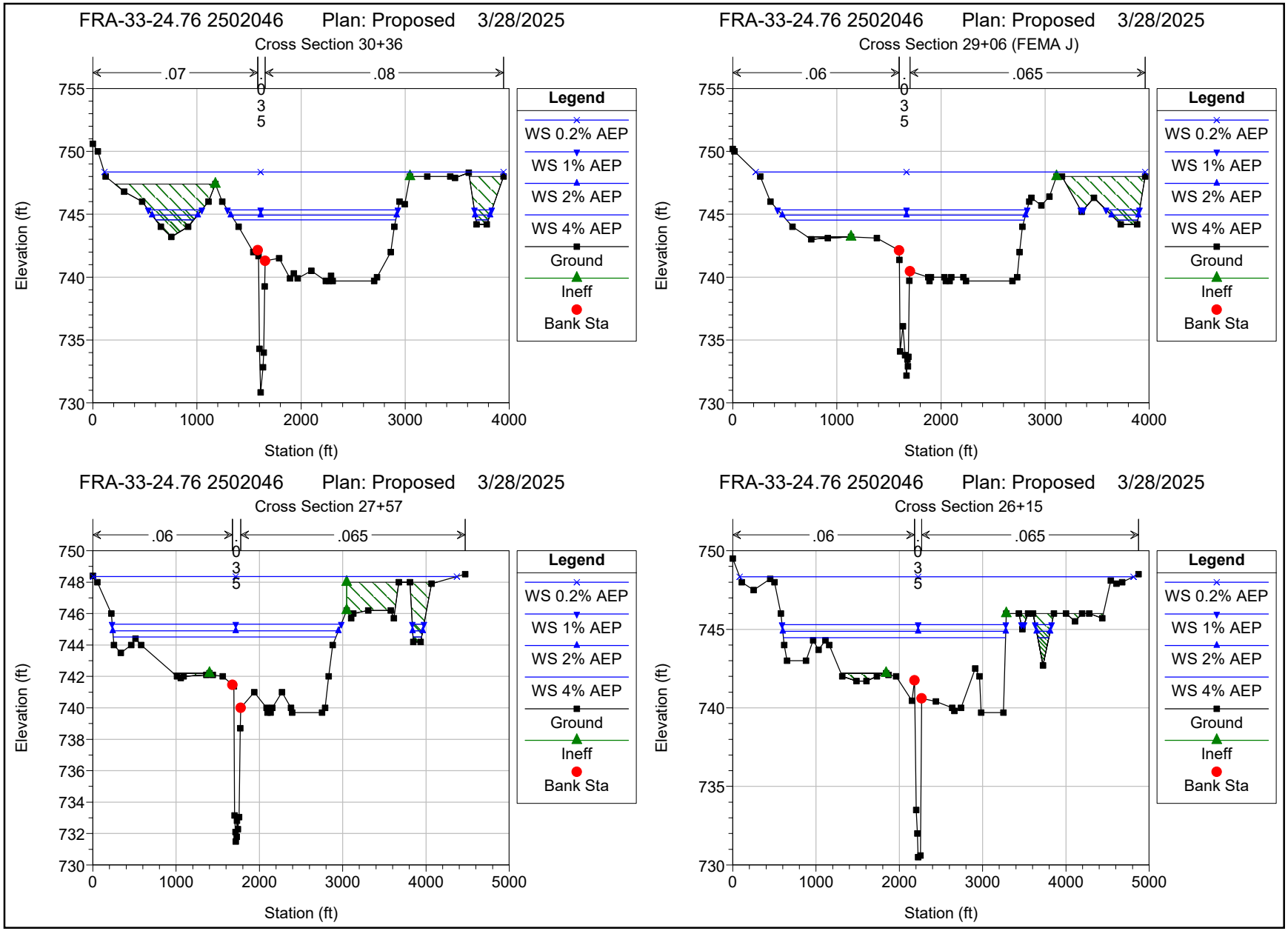
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Blacklick Creek

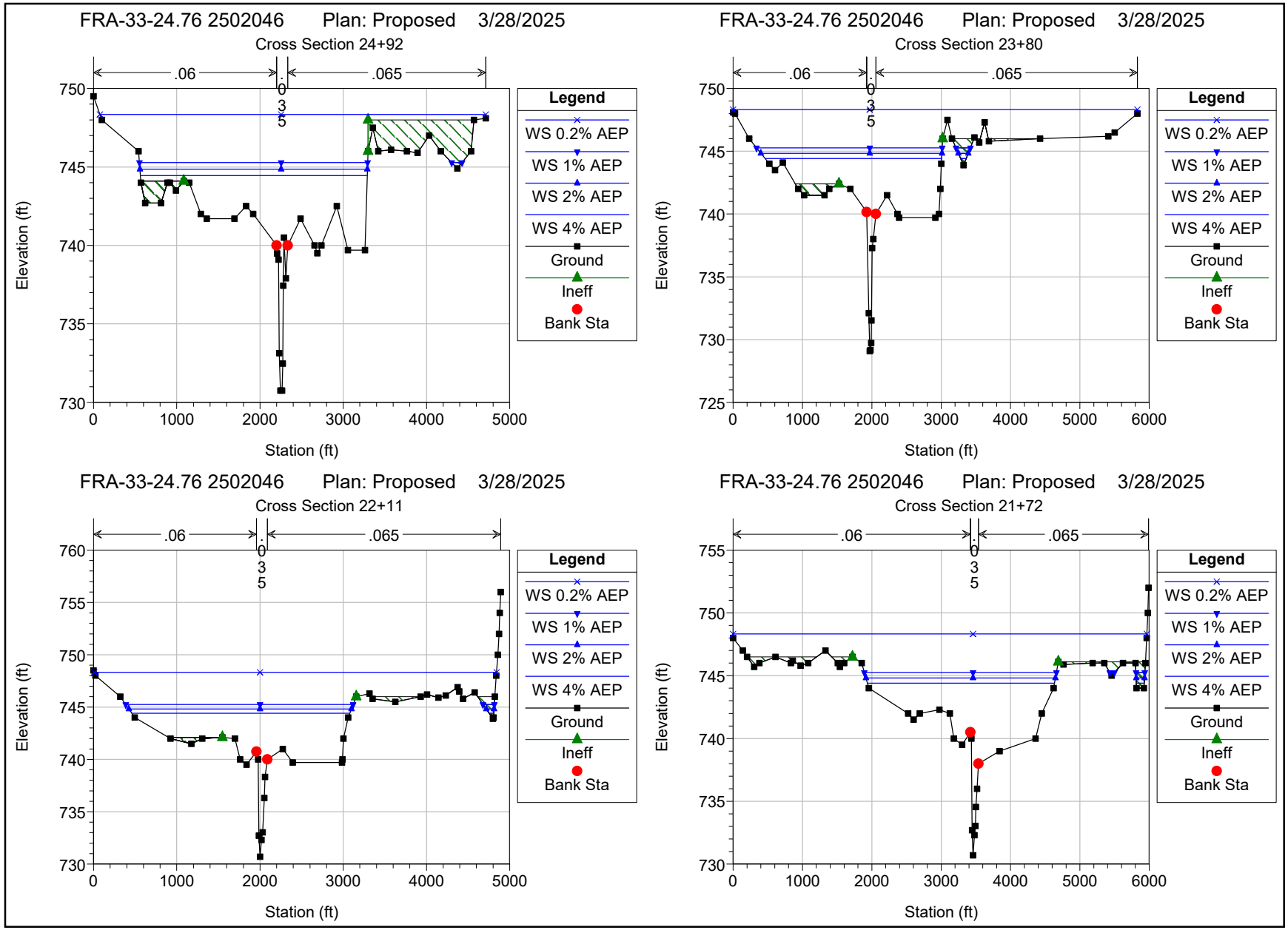
Reach	River Sta.	Contr.	Expan.
Main	4600	.1	.3
Main	4365	.1	.3
Main	3960	.1	.3
Main	3797	.1	.3
Main	3593	.1	.3
Main	3442	.1	.3
Main	3360	.1	.3
Main	3179	.1	.3
Main	3036	.1	.3
Main	2906	.3	.5
Main	2757	.3	.5
Main	2615	.3	.5
Main	2492	.3	.5
Main	2380	.3	.5
Main	2211	.3	.5
Main	2172	.3	.5
Main	2148	.3	.5
Main	2123	.3	.5
Main	2098	.3	.5
Main	2073	.3	.5
Main	2000	Bridge	
Main	1919	.3	.5
Main	1894	.3	.5
Main	1869	.3	.5
Main	1844	.3	.5
Main	1815	.3	.5
Main	1744	.3	.5
Main	1720	.3	.5
Main	1644	.3	.5
Main	1591	.3	.5
Main	1472	.1	.3
Main	1341	.1	.3
Main	1238	.1	.3
Main	1036	.1	.3
Main	837	.1	.3
Main	625	.1	.3
Main	421	.1	.3
Main	229	.1	.3

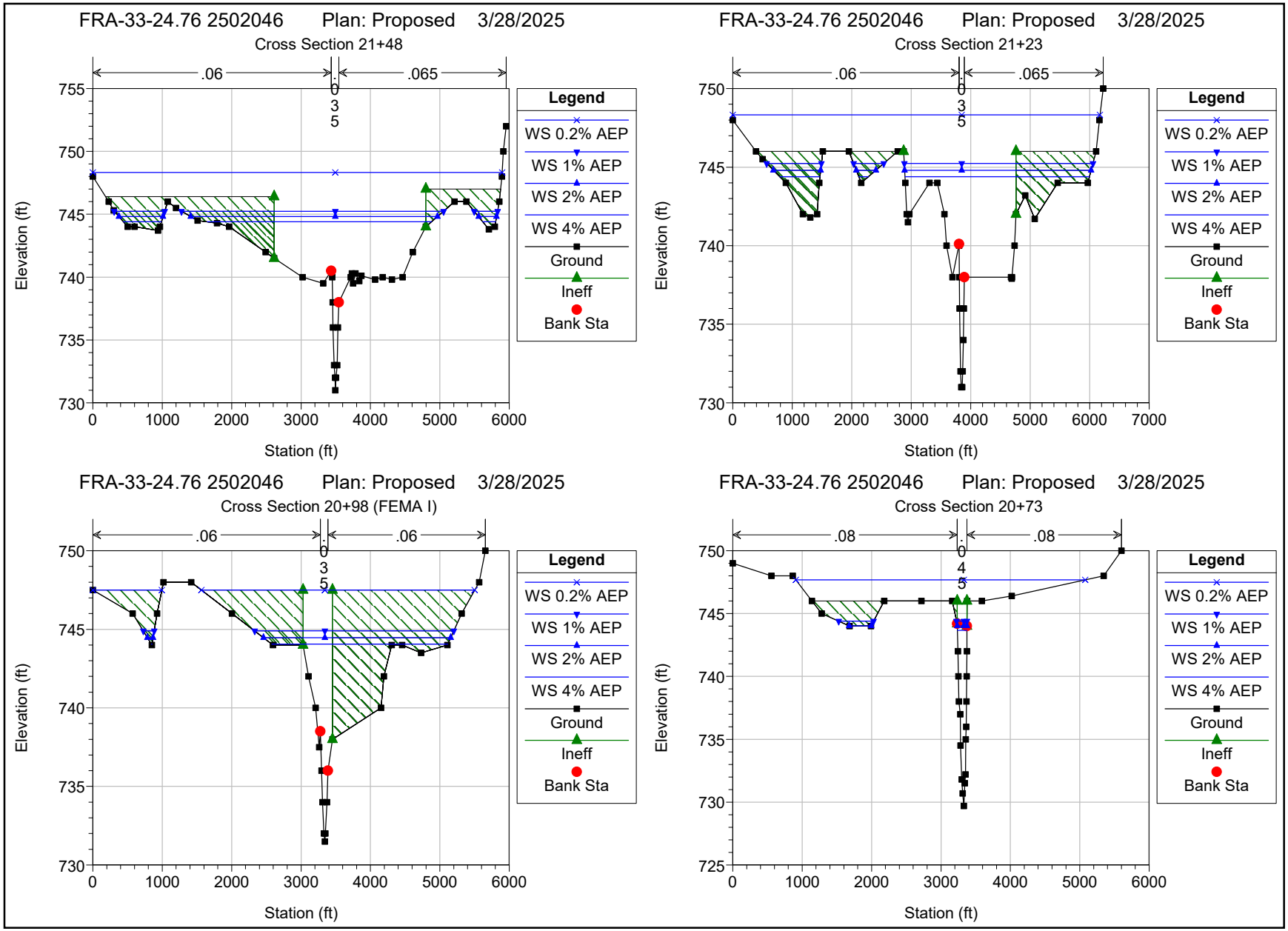

FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Blacklick Creek Main
Legend
WS 0.2% AEP
WS 1% AEP
WS 4% AEP
WS 2% AEP
Ground
Elevation (ft)
750
745
740
735
730
725
0
1000
2000
3000
4000
5000
Main Channel Distance (ft)

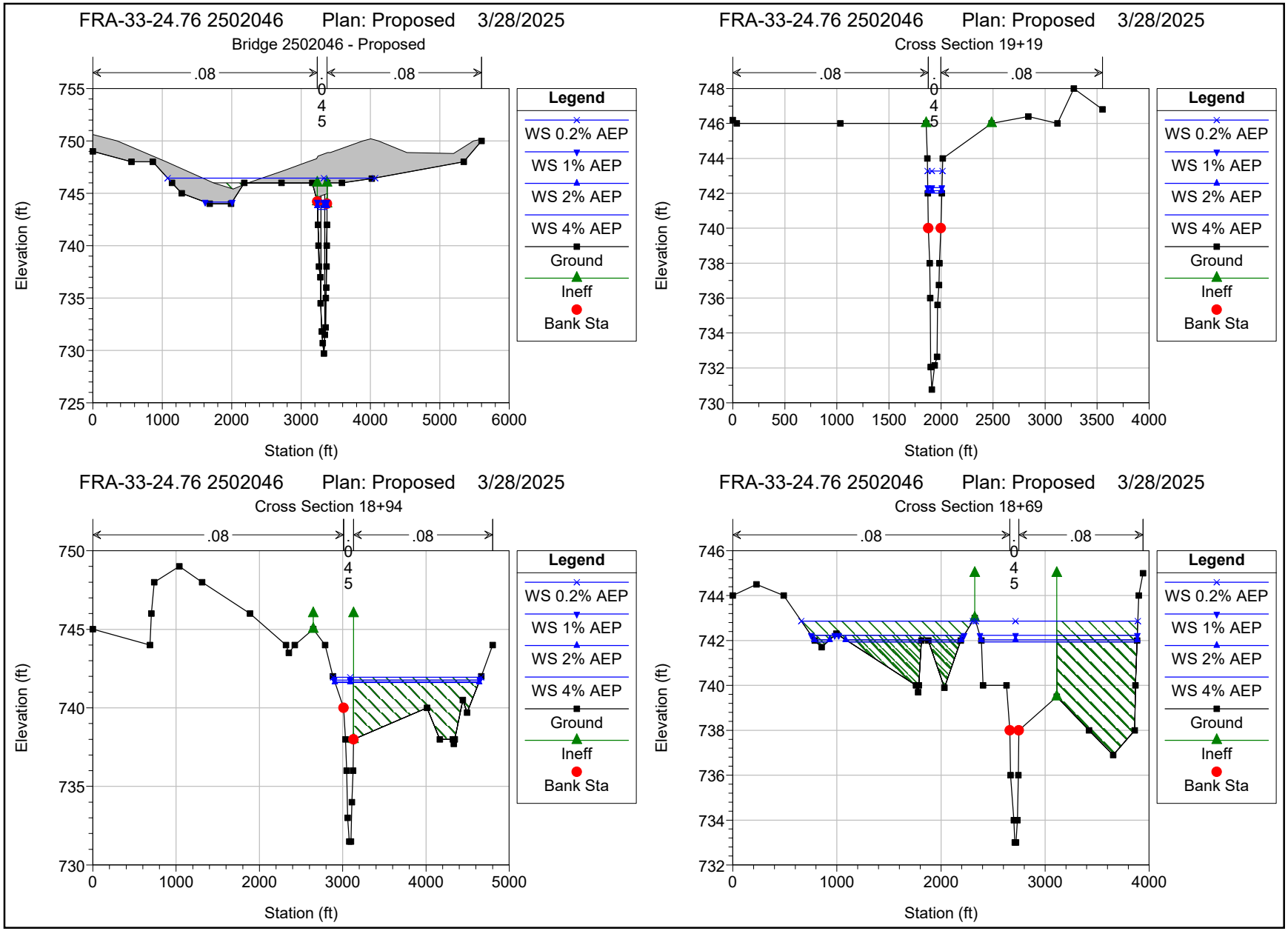

FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 46+00 (FEMA K)
.08
.05
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 43+65
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 39+60
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 37+97

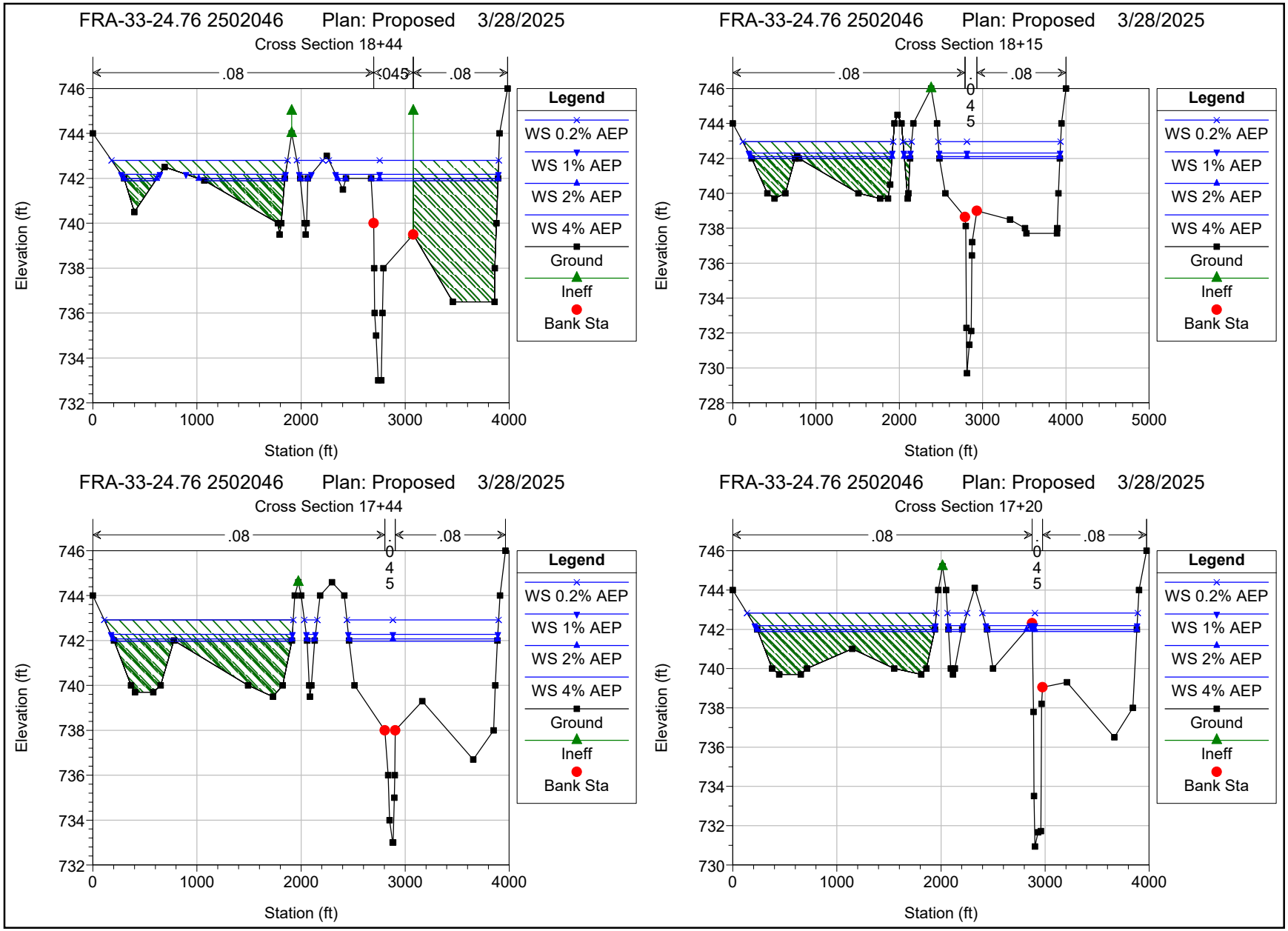

FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 35+93
.08
.05
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 34+42
.08
.05
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 33+60
.08
.05
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Bank Sta
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 31+79
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta

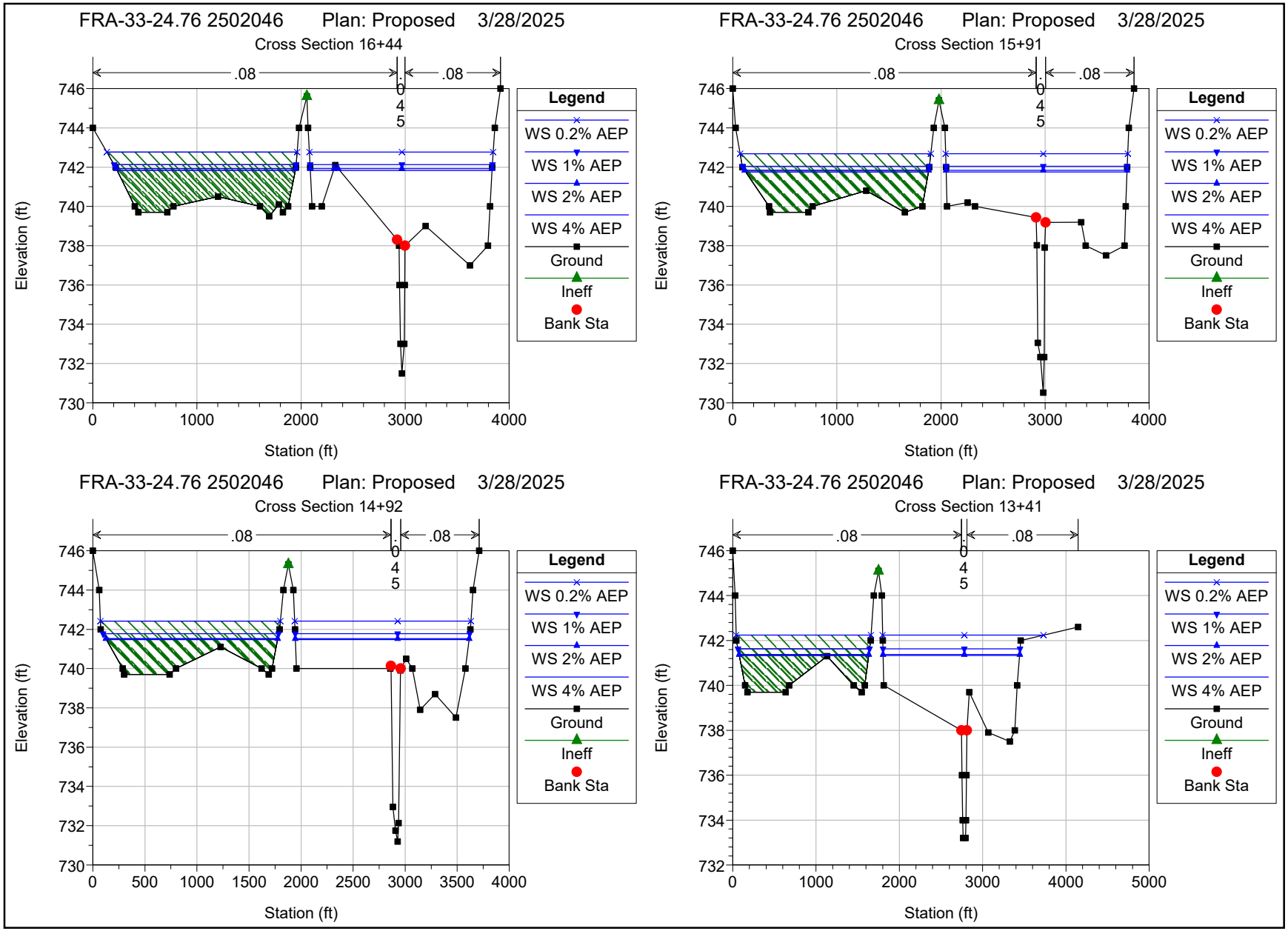

FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 30+36
.07
.035
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 29+06 (FEMA J)
.06
.035
.065
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 27+57
.06
.035
.065
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 26+15
.06
.035
.065
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta

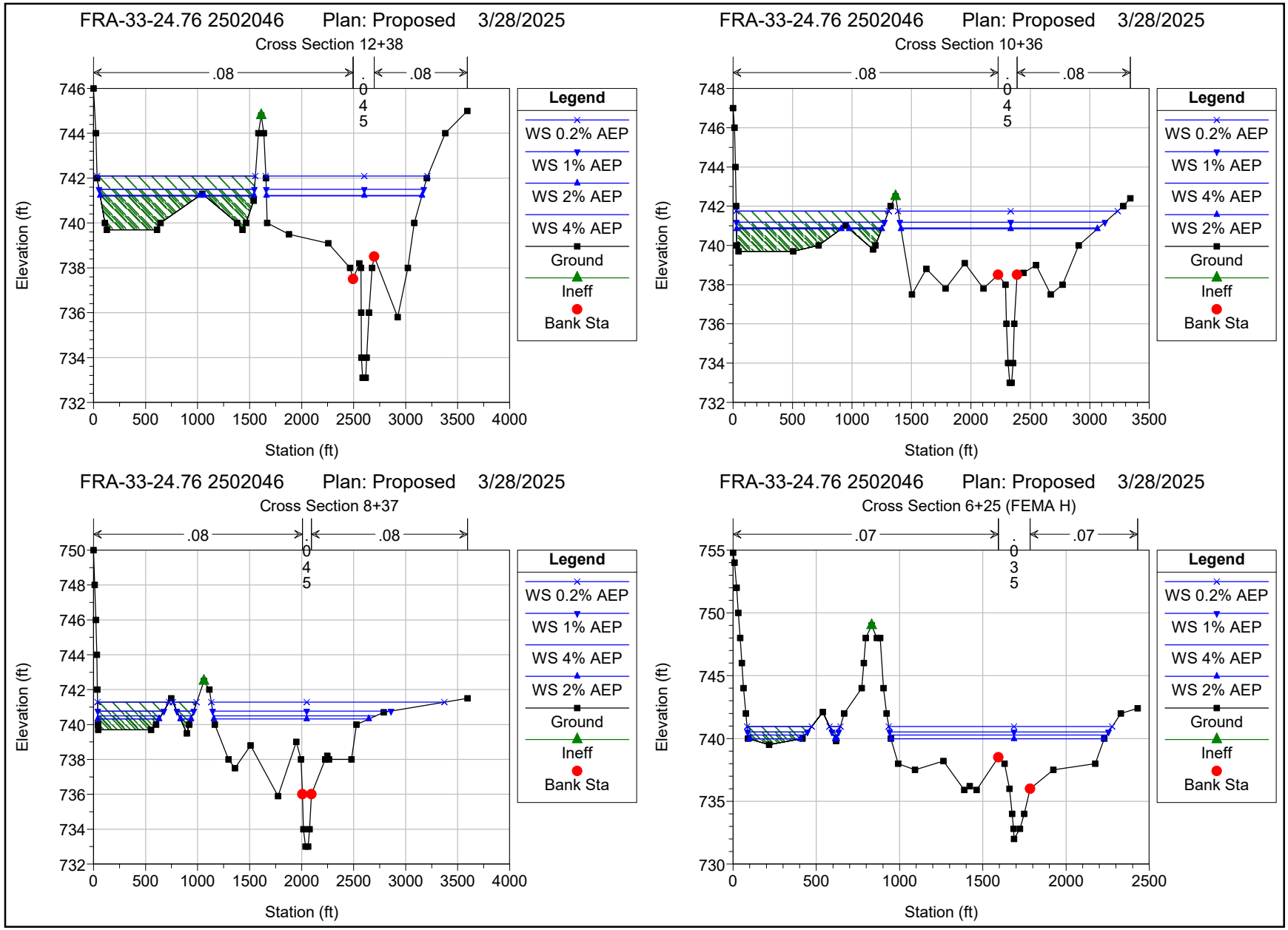

FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 24+92
.06
.035
.065
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 23+80
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 22+11
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 21+72

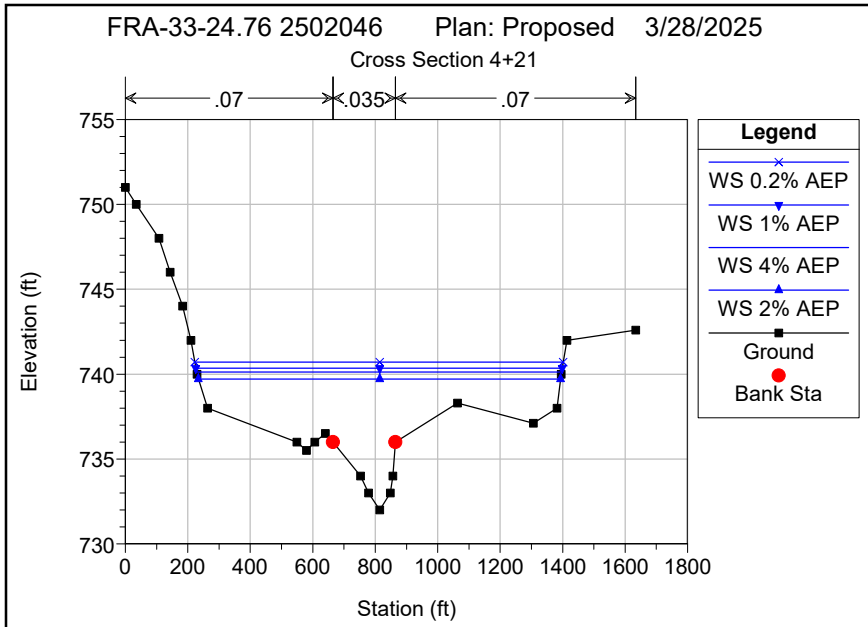

FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 21+48
.06
.065
.035
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 21+23
.06
.065
.035
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 20+98 (FEMA I)
.06
.06
.035
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 20+73
.08
.08
.045
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

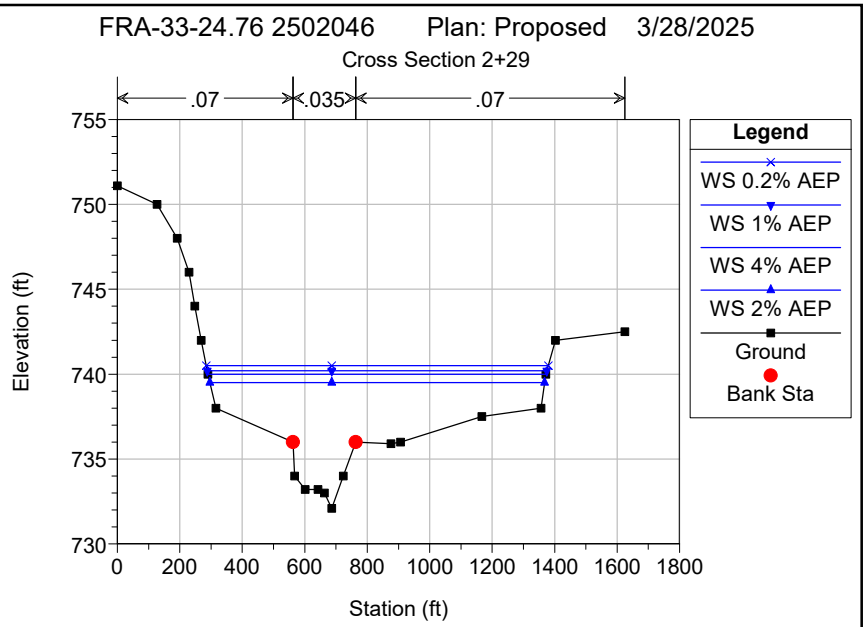

FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Bridge 2502046 - Proposed
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 19+19
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 18+94
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 18+69


FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 18+44
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 18+15
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 17+44
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 17+20
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta


FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 16+44
.08
.08
0
4
5
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 15+91
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 14+92
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 13+41


FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 12+38
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 2% AEP
WS 4% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 10+36
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 4% AEP
WS 2% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 8+37
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 4% AEP
WS 2% AEP
Ground
Ineff
Bank Sta
FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 6+25 (FEMA H)
.07
.035
.07
Elevation (ft)
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 4% AEP
WS 2% AEP
Ground
Ineff
Bank Sta


FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 4+21
.07
.035
.07
Elevation (ft)
755
750
745
740
735
730
0
200
400
600
800
1000
1200
1400
1600
1800
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 4% AEP
WS 2% AEP
Ground
Bank Sta


FRA-33-24.76 2502046 Plan: Proposed 3/28/2025
Cross Section 2+29
.07
.035
.07
Elevation (ft)
755
750
745
740
735
730
0
200
400
600
800
1000
1200
1400
1600
1800
Station (ft)
Legend
WS 0.2% AEP
WS 1% AEP
WS 4% AEP
WS 2% AEP
Ground
Bank Sta

HEC-RAS Plan: Proposed River: Blacklick Creek Reach: Main

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)	
Main	4600	4% AEP	7400.00	732.00	745.51		745.64	0.000976	3.76	4234.80	1709.10	0.23
Main	4600	2% AEP	8000.00	732.00	745.80		745.92	0.000897	3.69	4734.49	1719.98	0.22
Main	4600	1% AEP	8600.00	732.00	746.12		746.22	0.000809	3.59	5275.85	1730.47	0.21
Main	4600	0.2% AEP	11500.00	732.00	748.68		748.72	0.000303	2.60	9847.83	2416.35	0.13
Main	4365	4% AEP	7400.00	732.00	745.39		745.47	0.000595	3.33	5246.70	1435.83	0.18
Main	4365	2% AEP	8000.00	732.00	745.69		745.76	0.000568	3.31	5674.65	1455.55	0.18
Main	4365	1% AEP	8600.00	732.00	746.01		746.08	0.000533	3.28	6144.03	1477.41	0.18
Main	4365	0.2% AEP	11500.00	732.00	748.63		748.67	0.000243	2.56	10563.31	2171.07	0.12
Main	3960	4% AEP	7400.00	732.00	745.14		745.20	0.000716	3.24	5393.69	1831.51	0.19
Main	3960	2% AEP	8000.00	732.00	745.45		745.51	0.000659	3.18	5873.33	1963.81	0.19
Main	3960	1% AEP	8600.00	732.00	745.79		745.85	0.000597	3.11	6399.39	2107.04	0.18
Main	3960	0.2% AEP	11500.00	732.00	748.52		748.56	0.000301	2.62	11769.69	3210.01	0.13
Main	3797	4% AEP	7400.00	732.00	745.03		745.09	0.000692	3.36	5614.96	2192.93	0.19
Main	3797	2% AEP	8000.00	732.00	745.35		745.41	0.000632	3.28	6143.66	2324.72	0.18
Main	3797	1% AEP	8600.00	732.00	745.70		745.76	0.000568	3.18	6725.55	2467.21	0.17
Main	3797	0.2% AEP	11500.00	732.00	748.48		748.51	0.000291	2.67	12186.87	3199.78	0.13
Main	3593	4% AEP	7400.00	731.00	744.76		744.90	0.001296	4.26	4228.10	2255.70	0.26
Main	3593	2% AEP	8000.00	731.00	745.13		745.25	0.001079	4.01	5075.18	2411.42	0.24
Main	3593	1% AEP	8600.00	731.00	745.52		745.61	0.000880	3.72	6037.57	2576.77	0.22
Main	3593	0.2% AEP	11500.00	731.00	748.44		748.46	0.000180	2.03	15145.67	3429.79	0.10
Main	3442	4% AEP	7400.00	729.81	744.71		744.76	0.000465	2.93	7206.70	2616.88	0.16
Main	3442	2% AEP	8000.00	729.81	745.08		745.13	0.000395	2.76	8205.70	2707.69	0.15
Main	3442	1% AEP	8600.00	729.81	745.48		745.52	0.000333	2.60	9299.48	2803.74	0.14
Main	3442	0.2% AEP	11500.00	729.81	748.43		748.44	0.000092	1.60	18436.19	3282.47	0.08
Main	3360	4% AEP	7400.00	730.08	744.69		744.72	0.000385	2.53	7570.26	2310.21	0.14
Main	3360	2% AEP	8000.00	730.08	745.07		745.10	0.000334	2.41	8443.96	2339.71	0.13
Main	3360	1% AEP	8600.00	730.08	745.46		745.49	0.000287	2.30	9381.12	2370.94	0.13
Main	3360	0.2% AEP	11500.00	730.08	748.42		748.43	0.000104	1.63	17119.32	3075.14	0.08
Main	3179	4% AEP	7400.00	731.60	744.63		744.66	0.000281	2.47	7765.33	2144.99	0.14
Main	3179	2% AEP	8000.00	731.60	745.01		745.04	0.000253	2.40	8589.24	2173.98	0.13
Main	3179	1% AEP	8600.00	731.60	745.42		745.44	0.000225	2.32	9472.63	2204.65	0.13
Main	3179	0.2% AEP	11500.00	731.60	748.40		748.42	0.000086	1.69	17043.53	3273.36	0.08
Main	3036	4% AEP	7400.00	730.83	744.55		744.62	0.000376	3.47	6246.76	2037.44	0.20
Main	3036	2% AEP	8000.00	730.83	744.94		745.00	0.000342	3.40	6857.14	2174.37	0.19
Main	3036	1% AEP	8600.00	730.83	745.35		745.41	0.000308	3.32	7519.12	2319.08	0.18
Main	3036	0.2% AEP	11500.00	730.83	748.36		748.40	0.000186	3.07	14193.62	3834.50	0.15
Main	2906	4% AEP	7400.00	732.16	744.54		744.58	0.000197	2.55	7357.77	2487.57	0.15
Main	2906	2% AEP	8000.00	732.16	744.93		744.96	0.000175	2.47	8260.78	2598.36	0.14
Main	2906	1% AEP	8600.00	732.16	745.34		745.37	0.000153	2.38	9237.57	2739.79	0.13
Main	2906	0.2% AEP	11500.00	732.16	748.36		748.38	0.000071	1.93	17687.31	3740.91	0.09
Main	2757	4% AEP	7400.00	731.50	744.51		744.55	0.000197	2.54	8038.14	2778.40	0.15
Main	2757	2% AEP	8000.00	731.50	744.90		744.94	0.000169	2.42	9102.09	2833.10	0.14
Main	2757	1% AEP	8600.00	731.50	745.32		745.35	0.000144	2.29	10239.09	2890.75	0.13
Main	2757	0.2% AEP	11500.00	731.50	748.35		748.36	0.000063	1.82	19429.13	4363.06	0.09
Main	2615	4% AEP	7400.00	730.50	744.47		744.52	0.000189	2.79	7965.79	2800.72	0.15
Main	2615	2% AEP	8000.00	730.50	744.87		744.91	0.000160	2.63	9043.31	2841.32	0.14
Main	2615	1% AEP	8600.00	730.50	745.29		745.33	0.000135	2.47	10177.75	2916.51	0.13
Main	2615	0.2% AEP	11500.00	730.50	748.34		748.36	0.000051	1.77	21647.23	4728.79	0.08
Main	2492	4% AEP	7400.00	730.75	744.45		744.49	0.000221	2.50	7709.79	2724.13	0.15
Main	2492	2% AEP	8000.00	730.75	744.85		744.89	0.000181	2.34	8819.44	2732.21	0.14
Main	2492	1% AEP	8600.00	730.75	745.28		745.31	0.000149	2.19	9984.40	2866.40	0.13
Main	2492	0.2% AEP	11500.00	730.75	748.33		748.35	0.000063	1.73	19453.21	4635.00	0.09
Main	2380	4% AEP	7400.00	729.09	744.43		744.47	0.000164	2.37	8071.12	2627.52	0.14
Main	2380	2% AEP	8000.00	729.09	744.84		744.87	0.000142	2.26	9125.97	2752.60	0.13
Main	2380	1% AEP	8600.00	729.09	745.26		745.29	0.000122	2.16	10255.73	2883.30	0.12
Main	2380	0.2% AEP	11500.00	729.09	748.33		748.34	0.000040	1.47	24851.79	5830.00	0.07
Main	2211	4% AEP	7400.00	730.70	744.40		744.43	0.000157	2.17	8742.44	2675.05	0.13
Main	2211	2% AEP	8000.00	730.70	744.82		744.84	0.000134	2.08	9832.74	2770.11	0.12
Main	2211	1% AEP	8600.00	730.70	745.25		745.27	0.000115	1.98	10995.13	2869.31	0.11
Main	2211	0.2% AEP	11500.00	730.70	748.32		748.33	0.000039	1.39	23751.36	4834.00	0.07
Main	2172	4% AEP	7400.00	730.70	744.40		744.43	0.000122	2.09	9505.42	2809.17	0.12
Main	2172	2% AEP	8000.00	730.70	744.81		744.84	0.000106	2.01	10625.74	2851.63	0.11
Main	2172	1% AEP	8600.00	730.70	745.24		745.26	0.000092	1.92	11809.83	2961.40	0.10
Main	2172	0.2% AEP	11500.00	730.70	748.32		748.33	0.000035	1.40	26483.51	5966.42	0.07

HEC-RAS Plan: Proposed River: Blacklick Creek Reach: Main (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)	
Main	2148	4% AEP	7400.00	731.00	744.40		744.42	0.000113	2.00	9441.09	3963.37	0.11
Main	2148	2% AEP	8000.00	731.00	744.81		744.83	0.000100	1.94	10342.50	4449.35	0.11
Main	2148	1% AEP	8600.00	731.00	745.24		745.26	0.000089	1.88	11283.13	4840.95	0.10
Main	2148	0.2% AEP	11500.00	731.00	748.32		748.33	0.000045	1.59	24314.84	5897.51	0.08
Main	2123	4% AEP	7400.00	731.00	744.39		744.42	0.000109	2.14	8474.09	3937.99	0.11
Main	2123	2% AEP	8000.00	731.00	744.80		744.83	0.000101	2.11	9243.70	4261.52	0.11
Main	2123	1% AEP	8600.00	731.00	745.23		745.26	0.000093	2.07	10049.63	4599.33	0.11
Main	2123	0.2% AEP	11500.00	731.00	748.32		748.33	0.000041	1.60	25338.14	6172.52	0.07
Main	2098	4% AEP	7400.00	731.50	744.06		744.34	0.000592	4.82	2353.34	2547.56	0.27
Main	2098	2% AEP	8000.00	731.50	744.47		744.75	0.000579	4.89	2525.54	2780.07	0.27
Main	2098	1% AEP	8600.00	731.50	744.90		745.18	0.000559	4.94	2707.24	3025.40	0.26
Main	2098	0.2% AEP	11500.00	731.50	747.50	740.63	748.14	0.000799	6.80	3815.46	4934.37	0.33
Main	2073	4% AEP	7400.00	729.70	743.67	738.44	744.23	0.001899	6.01	1231.55	139.00	0.36
Main	2073	2% AEP	8000.00	729.70	744.02	738.71	744.62	0.001989	6.25	1280.81	457.93	0.37
Main	2073	1% AEP	8600.00	729.70	744.40	739.03	745.04	0.002021	6.44	1334.41	654.67	0.37
Main	2073	0.2% AEP	11500.00	729.70	747.68	740.28	747.91	0.000684	4.58	7176.81	4170.09	0.23
Main	2000		Bridge									
Main	1919	4% AEP	7400.00	730.76	742.02		743.03	0.004222	8.09	925.67	133.12	0.52
Main	1919	2% AEP	8000.00	730.76	742.14		743.29	0.004664	8.59	942.70	134.14	0.55
Main	1919	1% AEP	8600.00	730.76	742.32		743.58	0.004989	9.02	966.73	135.57	0.57
Main	1919	0.2% AEP	11500.00	730.76	743.27		745.05	0.006064	10.74	1099.04	143.16	0.64
Main	1894	4% AEP	7400.00	731.50	741.61		742.84	0.005775	8.97	897.59	1727.36	0.60
Main	1894	2% AEP	8000.00	731.50	741.64		743.06	0.006642	9.65	904.41	1731.59	0.65
Main	1894	1% AEP	8600.00	731.50	741.77	740.22	743.34	0.007164	10.15	934.73	1749.92	0.68
Main	1894	0.2% AEP	11500.00	731.50	741.95	741.72	744.59	0.011687	13.18	977.37	1774.62	0.87
Main	1869	4% AEP	7400.00	733.00	741.93		742.32	0.002710	6.43	2348.12	2600.50	0.42
Main	1869	2% AEP	8000.00	733.00	742.03		742.45	0.002937	6.75	2419.47	2760.99	0.44
Main	1869	1% AEP	8600.00	733.00	742.23		742.66	0.002939	6.87	2565.17	2943.87	0.44
Main	1869	0.2% AEP	11500.00	733.00	742.86		743.38	0.003424	7.82	3044.19	3205.01	0.48
Main	1844	4% AEP	7400.00	733.00	741.89		742.22	0.002943	4.61	1700.98	2418.40	0.40
Main	1844	2% AEP	8000.00	733.00	741.99		742.35	0.003188	4.87	1751.29	2515.44	0.42
Main	1844	1% AEP	8600.00	733.00	742.18		742.56	0.003173	5.01	1907.46	3003.28	0.42
Main	1844	0.2% AEP	11500.00	733.00	742.80		743.28	0.003450	5.69	2501.78	3572.01	0.45
Main	1815	4% AEP	7400.00	729.70	742.00		742.06	0.000571	2.88	5412.07	3148.82	0.19
Main	1815	2% AEP	8000.00	729.70	742.10		742.17	0.000617	3.02	5564.25	3215.43	0.20
Main	1815	1% AEP	8600.00	729.70	742.31		742.37	0.000616	3.08	5856.23	3254.07	0.20
Main	1815	0.2% AEP	11500.00	729.70	742.96		743.05	0.000711	3.50	6812.22	3379.63	0.22
Main	1744	4% AEP	7400.00	733.00	741.97		742.02	0.000657	3.04	5470.50	3187.87	0.20
Main	1744	2% AEP	8000.00	733.00	742.07		742.13	0.000709	3.19	5624.55	3222.93	0.21
Main	1744	1% AEP	8600.00	733.00	742.27		742.33	0.000704	3.24	5929.90	3264.19	0.21
Main	1744	0.2% AEP	11500.00	733.00	742.92		743.00	0.000800	3.66	6939.12	3397.19	0.23
Main	1720	4% AEP	7400.00	730.94	741.89		741.99	0.000780	3.64	4669.96	3186.70	0.22
Main	1720	2% AEP	8000.00	730.94	741.99		742.09	0.000849	3.82	4815.38	3221.78	0.23
Main	1720	1% AEP	8600.00	730.94	742.19		742.29	0.000849	3.86	5128.97	3308.99	0.23
Main	1720	0.2% AEP	11500.00	730.94	742.83		742.95	0.000969	4.32	6179.65	3501.43	0.25
Main	1644	4% AEP	7400.00	731.50	741.83		741.91	0.000968	3.78	4919.82	3396.31	0.25
Main	1644	2% AEP	8000.00	731.50	741.92		742.01	0.001046	3.96	5074.87	3429.89	0.26
Main	1644	1% AEP	8600.00	731.50	742.12		742.21	0.001020	3.98	5428.76	3499.94	0.25
Main	1644	0.2% AEP	11500.00	731.50	742.76		742.86	0.001083	4.33	6551.68	3593.81	0.27
Main	1591	4% AEP	7400.00	730.52	741.75		741.85	0.000902	3.90	4929.68	3490.96	0.24
Main	1591	2% AEP	8000.00	730.52	741.84		741.95	0.000975	4.09	5078.89	3505.77	0.25
Main	1591	1% AEP	8600.00	730.52	742.05		742.15	0.000937	4.07	5444.93	3537.18	0.25
Main	1591	0.2% AEP	11500.00	730.52	742.68		742.80	0.001006	4.43	6552.01	3580.33	0.26
Main	1472	4% AEP	7400.00	731.19	741.47		741.68	0.001670	5.09	3777.68	3311.28	0.33
Main	1472	2% AEP	8000.00	731.19	741.53		741.76	0.001840	5.37	3873.13	3321.09	0.34
Main	1472	1% AEP	8600.00	731.19	741.77		741.98	0.001668	5.22	4284.47	3363.24	0.33
Main	1472	0.2% AEP	11500.00	731.19	742.42		742.62	0.001667	5.50	5371.71	3421.27	0.33
Main	1341	4% AEP	7400.00	733.20	741.33		741.44	0.001385	4.44	4533.24	3193.40	0.30
Main	1341	2% AEP	8000.00	733.20	741.37		741.49	0.001555	4.72	4596.99	3197.93	0.31
Main	1341	1% AEP	8600.00	733.20	741.63		741.74	0.001389	4.57	5025.54	3228.31	0.30
Main	1341	0.2% AEP	11500.00	733.20	742.24		742.37	0.001680	5.30	6059.00	3552.19	0.33
Main	1238	4% AEP	7400.00	733.10	741.21		741.30	0.001278	3.39	4201.57	2920.26	0.27

HEC-RAS Plan: Proposed River: Blacklick Creek Reach: Main (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)	
Main	1238	2% AEP	8000.00	733.10	741.23		741.34	0.001465	3.64	4231.76	2934.06	0.29
Main	1238	1% AEP	8600.00	733.10	741.50		741.61	0.001316	3.57	4642.31	3006.41	0.28
Main	1238	0.2% AEP	11500.00	733.10	742.09		742.22	0.001437	4.01	5546.44	3076.34	0.29
Main	1036	4% AEP	7400.00	733.00	740.89		741.00	0.001793	3.88	4082.50	2840.92	0.32
Main	1036	2% AEP	8000.00	733.00	740.84		740.98	0.002207	4.28	4004.33	2807.88	0.35
Main	1036	1% AEP	8600.00	733.00	741.18		741.30	0.001784	4.03	4575.88	2969.00	0.32
Main	1036	0.2% AEP	11500.00	733.00	741.76		741.89	0.001850	4.42	5602.26	3129.90	0.33
Main	837	4% AEP	7400.00	733.00	740.50		740.65	0.001681	4.80	4016.82	2295.93	0.33
Main	837	2% AEP	8000.00	733.00	740.32		740.52	0.002323	5.54	3733.20	2178.75	0.38
Main	837	1% AEP	8600.00	733.00	740.77		740.94	0.001814	5.12	4452.05	2509.94	0.34
Main	837	0.2% AEP	11500.00	733.00	741.28		741.49	0.002173	5.87	5458.46	3155.15	0.38
Main	625	4% AEP	7400.00	732.00	740.28		740.39	0.000865	3.72	4026.90	1670.18	0.29
Main	625	2% AEP	8000.00	732.00	739.97		740.14	0.001344	4.46	3633.22	1596.23	0.36
Main	625	1% AEP	8600.00	732.00	740.52		740.66	0.000944	4.01	4347.92	1715.57	0.30
Main	625	0.2% AEP	11500.00	732.00	740.96		741.14	0.001183	4.73	4933.90	1797.06	0.35
Main	421	4% AEP	7400.00	732.00	740.12		740.24	0.000608	3.54	4041.39	1168.27	0.25
Main	421	2% AEP	8000.00	732.00	739.71		739.90	0.000982	4.31	3570.44	1159.30	0.31
Main	421	1% AEP	8600.00	732.00	740.34		740.49	0.000694	3.88	4301.41	1172.49	0.27
Main	421	0.2% AEP	11500.00	732.00	740.71		740.92	0.000955	4.72	4736.17	1179.52	0.32
Main	229	4% AEP	7400.00	732.10	740.00	737.26	740.13	0.000586	3.55	3926.85	1082.00	0.25
Main	229	2% AEP	8000.00	732.10	739.51	737.37	739.71	0.001000	4.40	3396.26	1071.65	0.32
Main	229	1% AEP	8600.00	732.10	740.20	737.47	740.35	0.000686	3.92	4143.79	1087.30	0.27
Main	229	0.2% AEP	11500.00	732.10	740.50	738.33	740.73	0.001001	4.88	4468.29	1095.18	0.33

HEC-RAS Plan: Proposed River: Blacklick Creek Reach: Main

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
Main	4600	4% AEP	745.64	745.51	0.13	0.16	0.01	727.71	4019.31	2652.98	1709.10
Main	4600	2% AEP	745.92	745.80	0.12	0.15	0.01	1009.33	4077.58	2913.09	1719.98
Main	4600	1% AEP	746.22	746.12	0.11	0.13	0.01	1326.15	4107.69	3166.16	1730.47
Main	4600	0.2% AEP	748.72	748.68	0.04	0.06	0.00	3644.52	3817.96	4037.52	2416.35
Main	4365	4% AEP	745.47	745.39	0.08	0.26	0.01	1972.40	3155.30	2272.30	1435.83
Main	4365	2% AEP	745.76	745.69	0.08	0.25	0.01	2227.38	3233.72	2538.90	1455.55
Main	4365	1% AEP	746.08	746.01	0.07	0.23	0.01	2493.49	3294.12	2812.39	1477.41
Main	4365	0.2% AEP	748.67	748.63	0.04	0.11	0.00	3997.46	3195.36	4307.18	2171.07
Main	3960	4% AEP	745.20	745.14	0.06	0.11	0.00	3550.83	2283.77	1565.40	1831.51
Main	3960	2% AEP	745.51	745.45	0.06	0.10	0.00	3935.40	2325.47	1739.13	1963.81
Main	3960	1% AEP	745.85	745.79	0.05	0.09	0.00	4327.54	2356.37	1916.09	2107.04
Main	3960	0.2% AEP	748.56	748.52	0.03	0.05	0.00	6959.70	2574.52	1965.78	3210.01
Main	3797	4% AEP	745.09	745.03	0.06	0.18	0.01	3183.37	2097.40	2119.23	2192.93
Main	3797	2% AEP	745.41	745.35	0.06	0.16	0.01	3536.67	2117.06	2346.26	2324.72
Main	3797	1% AEP	745.76	745.70	0.05	0.14	0.00	3897.76	2126.43	2575.81	2467.21
Main	3797	0.2% AEP	748.51	748.48	0.03	0.05	0.00	6654.38	2266.70	2578.92	3199.78
Main	3593	4% AEP	744.90	744.76	0.15	0.11	0.03	3396.58	3423.15	580.27	2255.70
Main	3593	2% AEP	745.25	745.13	0.12	0.10	0.02	3652.61	3359.14	988.25	2411.42
Main	3593	1% AEP	745.61	745.52	0.09	0.08	0.02	3875.49	3265.50	1459.02	2576.77
Main	3593	0.2% AEP	748.46	748.44	0.02	0.02	0.00	4260.80	2359.81	4879.39	3429.79
Main	3442	4% AEP	744.76	744.71	0.06	0.03	0.01	1069.61	2814.44	3515.95	2616.88
Main	3442	2% AEP	745.13	745.08	0.05	0.03	0.01	1220.96	2753.72	4025.32	2707.69
Main	3442	1% AEP	745.52	745.48	0.04	0.02	0.00	1380.30	2688.16	4531.55	2803.74
Main	3442	0.2% AEP	748.44	748.43	0.01	0.01	0.00	2375.71	2098.44	7025.85	3282.47
Main	3360	4% AEP	744.72	744.69	0.03	0.06	0.00	778.43	1876.22	4745.35	2310.21
Main	3360	2% AEP	745.10	745.07	0.03	0.05	0.00	979.65	1860.92	5159.43	2339.71
Main	3360	1% AEP	745.49	745.46	0.03	0.05	0.00	1192.38	1842.59	5565.03	2370.94
Main	3360	0.2% AEP	748.43	748.42	0.01	0.02	0.00	2585.28	1681.67	7233.05	3075.14
Main	3179	4% AEP	744.66	744.63	0.03	0.04	0.00	351.84	1972.59	5075.57	2144.99
Main	3179	2% AEP	745.04	745.01	0.03	0.04	0.00	501.38	1992.74	5505.89	2173.98
Main	3179	1% AEP	745.44	745.42	0.03	0.03	0.00	669.34	2005.39	5925.28	2204.65
Main	3179	0.2% AEP	748.42	748.40	0.01	0.02	0.00	1922.12	1865.86	7712.02	3273.36
Main	3036	4% AEP	744.62	744.55	0.07	0.03	0.01	180.40	2322.13	4897.47	2037.44
Main	3036	2% AEP	745.00	744.94	0.06	0.03	0.01	238.46	2370.86	5390.68	2174.37
Main	3036	1% AEP	745.41	745.35	0.06	0.03	0.01	307.72	2411.00	5881.28	2319.08
Main	3036	0.2% AEP	748.40	748.36	0.04	0.01	0.01	1132.14	2897.09	7470.77	3834.50
Main	2906	4% AEP	744.58	744.54	0.04	0.03	0.00	623.17	2481.33	4295.51	2487.57
Main	2906	2% AEP	744.96	744.93	0.04	0.03	0.00	879.80	2502.66	4617.54	2598.36
Main	2906	1% AEP	745.37	745.34	0.03	0.02	0.00	1164.26	2512.51	4923.23	2739.79
Main	2906	0.2% AEP	748.38	748.36	0.02	0.01	0.00	3554.90	2647.01	5298.09	3740.91
Main	2757	4% AEP	744.55	744.51	0.04	0.03	0.00	1220.70	2360.33	3818.97	2778.40
Main	2757	2% AEP	744.94	744.90	0.03	0.02	0.00	1593.91	2345.32	4060.77	2833.10
Main	2757	1% AEP	745.35	745.32	0.03	0.02	0.00	1983.66	2324.16	4292.19	2890.75
Main	2757	0.2% AEP	748.36	748.35	0.01	0.01	0.00	4726.35	2403.55	4370.10	4363.06
Main	2615	4% AEP	744.52	744.47	0.05	0.02	0.00	1530.01	2625.92	3244.08	2800.72
Main	2615	2% AEP	744.91	744.87	0.04	0.02	0.00	1942.35	2564.50	3493.15	2841.32
Main	2615	1% AEP	745.33	745.29	0.03	0.02	0.00	2366.34	2502.87	3730.79	2916.51
Main	2615	0.2% AEP	748.36	748.34	0.01	0.01	0.00	4553.40	2245.57	4701.03	4728.79
Main	2492	4% AEP	744.49	744.45	0.04	0.02	0.00	1643.95	2778.30	2977.75	2724.13
Main	2492	2% AEP	744.89	744.85	0.03	0.02	0.00	2078.19	2728.33	3193.47	2732.21
Main	2492	1% AEP	745.31	745.28	0.03	0.02	0.00	2518.36	2681.99	3399.65	2866.40
Main	2492	0.2% AEP	748.35	748.33	0.01	0.01	0.00	5534.65	2832.19	3133.16	4635.00
Main	2380	4% AEP	744.47	744.43	0.04	0.03	0.01	1351.65	2927.53	3120.83	2627.52
Main	2380	2% AEP	744.87	744.84	0.03	0.02	0.00	1704.61	2924.23	3371.16	2752.60
Main	2380	1% AEP	745.29	745.26	0.03	0.02	0.00	2075.04	2914.55	3610.41	2883.30
Main	2380	0.2% AEP	748.34	748.33	0.01	0.01	0.00	4297.29	2588.19	4614.52	5830.00

HEC-RAS Plan: Proposed River: Blacklick Creek Reach: Main (Continued)

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
Main	2211	4% AEP	744.43	744.40	0.03	0.01	0.00	1899.26	2428.43	3072.31	2675.05
Main	2211	2% AEP	744.84	744.82	0.03	0.00	0.00	2278.42	2433.14	3288.45	2770.11
Main	2211	1% AEP	745.27	745.25	0.02	0.00	0.00	2665.89	2434.97	3499.15	2869.31
Main	2211	0.2% AEP	748.33	748.32	0.01	0.00	0.00	4727.90	2266.67	4505.43	4834.00
Main	2172	4% AEP	744.43	744.40	0.03	0.00	0.00	1695.66	2360.17	3344.17	2809.17
Main	2172	2% AEP	744.84	744.81	0.02	0.00	0.00	2053.03	2359.50	3587.47	2851.63
Main	2172	1% AEP	745.26	745.24	0.02	0.00	0.00	2419.94	2355.89	3824.18	2961.40
Main	2172	0.2% AEP	748.33	748.32	0.01	0.00	0.00	4467.53	2224.65	4807.82	5966.42
Main	2148	4% AEP	744.42	744.40	0.02	0.00	0.00	2289.49	2025.64	3084.87	3963.37
Main	2148	2% AEP	744.83	744.81	0.02	0.00	0.00	2529.61	2048.38	3422.01	4449.35
Main	2148	1% AEP	745.26	745.24	0.02	0.00	0.00	2770.24	2069.29	3760.47	4840.95
Main	2148	0.2% AEP	748.33	748.32	0.01	0.00	0.00	4252.10	2264.81	4983.09	5897.51
Main	2123	4% AEP	744.42	744.39	0.03	0.01	0.08	933.44	2060.84	4405.72	3937.99
Main	2123	2% AEP	744.83	744.80	0.02	0.00	0.08	1179.17	2109.01	4711.82	4261.52
Main	2123	1% AEP	745.26	745.23	0.02	0.00	0.08	1441.78	2150.23	5007.99	4599.33
Main	2123	0.2% AEP	748.33	748.32	0.01	0.00	0.19	4068.87	2107.10	5324.03	6172.52
Main	2098	4% AEP	744.34	744.06	0.28	0.02	0.09	1003.48	5378.89	1017.64	2547.56
Main	2098	2% AEP	744.75	744.47	0.28	0.02	0.10	1216.29	5679.02	1104.68	2780.07
Main	2098	1% AEP	745.18	744.90	0.28	0.02	0.11	1446.20	5962.64	1191.17	3025.40
Main	2098	0.2% AEP	748.14	747.50	0.64	0.02	0.20	1109.72	10164.48	225.80	4934.37
Main	2073	4% AEP	744.23	743.67	0.56	0.02	0.04		7400.00		139.00
Main	2073	2% AEP	744.62	744.02	0.61	0.02	0.05		8000.00		457.93
Main	2073	1% AEP	745.04	744.40	0.65	0.02	0.05		8600.00		654.67
Main	2073	0.2% AEP	747.91	747.68	0.24	0.02	0.28	2454.43	8242.71	802.87	4170.09
Main	2000		Bridge								
Main	1919	4% AEP	743.03	742.02	1.01	0.12	0.07	5.86	7385.76	8.38	133.12
Main	1919	2% AEP	743.29	742.14	1.15	0.14	0.08	7.26	7982.54	10.20	134.14
Main	1919	1% AEP	743.58	742.32	1.26	0.15	0.09	9.29	8577.79	12.92	135.57
Main	1919	0.2% AEP	745.05	743.27	1.78	0.20	0.26	25.54	11437.41	37.04	143.16
Main	1894	4% AEP	742.84	741.61	1.23	0.10	0.42	102.32	7297.68		1727.36
Main	1894	2% AEP	743.06	741.64	1.43	0.11	0.50	115.36	7884.64		1731.59
Main	1894	1% AEP	743.34	741.77	1.57	0.11	0.57	147.33	8452.67		1749.92
Main	1894	0.2% AEP	744.59	741.95	2.64	0.14	1.06	242.94	11257.06		1774.62
Main	1869	4% AEP	742.32	741.93	0.39	0.07	0.03	836.48	4137.51	2426.01	2600.50
Main	1869	2% AEP	742.45	742.03	0.42	0.08	0.03	937.77	4404.91	2657.32	2760.99
Main	1869	1% AEP	742.66	742.23	0.43	0.08	0.02	1063.72	4604.73	2931.55	2943.87
Main	1869	0.2% AEP	743.38	742.86	0.52	0.09	0.02	1649.35	5674.83	4175.81	3205.01
Main	1844	4% AEP	742.22	741.89	0.33	0.03	0.13	130.52	7269.48		2418.40
Main	1844	2% AEP	742.35	741.99	0.36	0.03	0.15	153.24	7846.76		2515.44
Main	1844	1% AEP	742.56	742.18	0.38	0.03	0.16	170.27	8429.73		3003.28
Main	1844	0.2% AEP	743.28	742.80	0.48	0.03	0.20	572.99	10927.01		3572.01
Main	1815	4% AEP	742.06	742.00	0.06	0.04	0.00	546.74	2933.89	3919.38	3148.82
Main	1815	2% AEP	742.17	742.10	0.07	0.04	0.00	610.34	3124.41	4265.25	3215.43
Main	1815	1% AEP	742.37	742.31	0.07	0.04	0.00	693.90	3267.69	4638.42	3254.07
Main	1815	0.2% AEP	743.05	742.96	0.08	0.04	0.00	1071.92	4037.77	6390.32	3379.63
Main	1744	4% AEP	742.02	741.97	0.05	0.02	0.01	892.04	2108.57	4399.39	3187.87
Main	1744	2% AEP	742.13	742.07	0.06	0.02	0.01	983.87	2244.97	4771.16	3222.93
Main	1744	1% AEP	742.33	742.27	0.06	0.02	0.01	1097.18	2345.32	5157.50	3264.19
Main	1744	0.2% AEP	743.00	742.92	0.08	0.03	0.01	1626.44	2889.38	6984.19	3397.19
Main	1720	4% AEP	741.99	741.89	0.10	0.07	0.01	269.97	2973.52	4156.51	3186.70
Main	1720	2% AEP	742.09	741.99	0.10	0.08	0.01	317.97	3157.53	4524.50	3221.78
Main	1720	1% AEP	742.29	742.19	0.11	0.08	0.01	399.22	3273.74	4927.04	3308.99
Main	1720	0.2% AEP	742.95	742.83	0.12	0.08	0.01	838.48	3940.67	6720.84	3501.43
Main	1644	4% AEP	741.91	741.83	0.08	0.05	0.01	1020.67	2061.23	4318.10	3396.31

HEC-RAS Plan: Proposed River: Blacklick Creek Reach: Main (Continued)

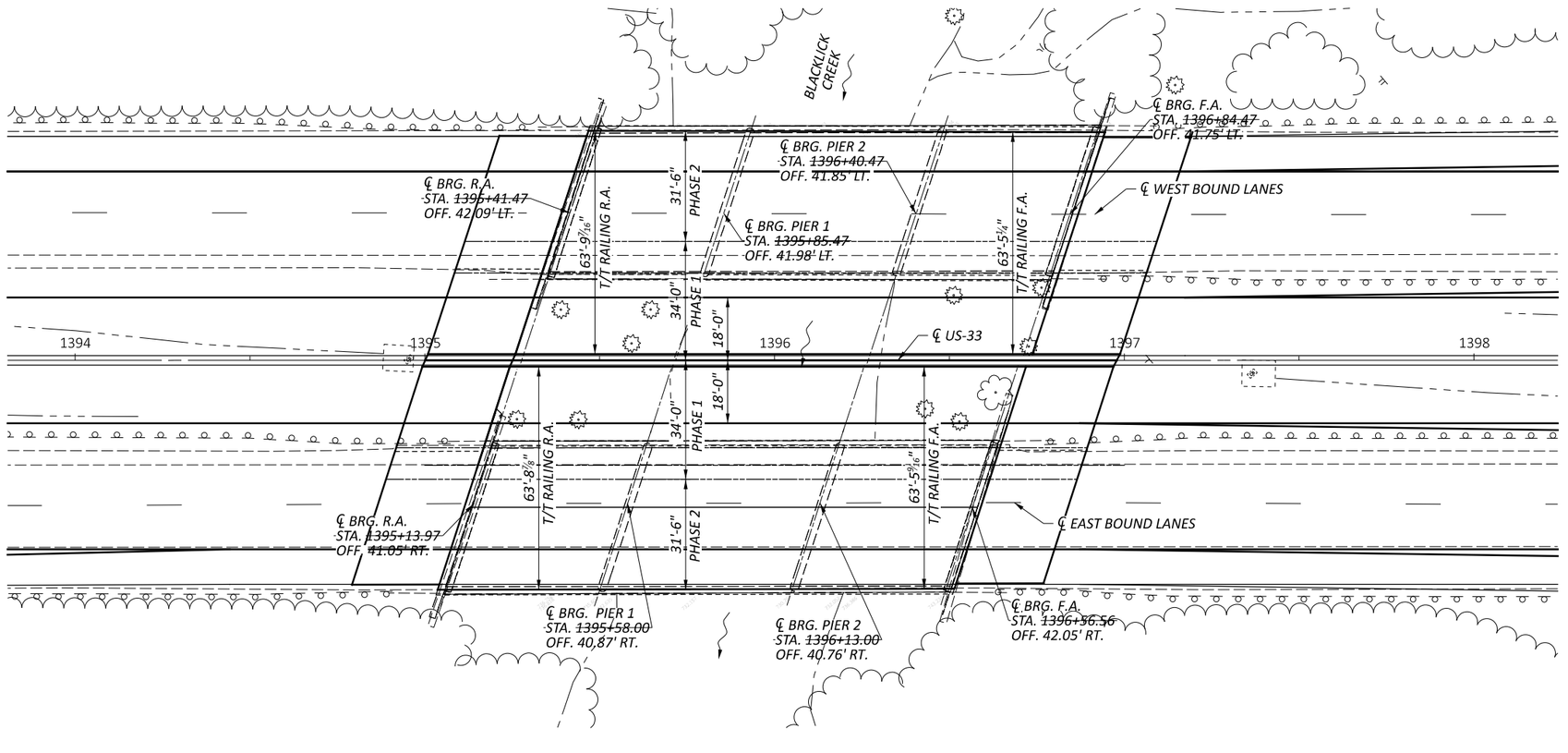
Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
Main	1644	2% AEP	742.01	741.92	0.09	0.05	0.01	1142.08	2187.61	4670.32	3429.89
Main	1644	1% AEP	742.21	742.12	0.09	0.05	0.01	1315.94	2261.21	5022.85	3499.94
Main	1644	0.2% AEP	742.86	742.76	0.10	0.05	0.01	2244.63	2667.02	6588.35	3593.81
Main	1591	4% AEP	741.85	741.75	0.10	0.14	0.03	1410.12	2865.76	3124.12	3490.96
Main	1591	2% AEP	741.95	741.84	0.11	0.16	0.04	1577.44	3032.02	3390.55	3505.77
Main	1591	1% AEP	742.15	742.05	0.11	0.15	0.03	1826.51	3098.82	3674.67	3537.18
Main	1591	0.2% AEP	742.80	742.68	0.12	0.15	0.03	2882.54	3622.78	4994.68	3580.33
Main	1472	4% AEP	741.68	741.47	0.21	0.21	0.03	1315.32	3580.92	2503.77	3311.28
Main	1472	2% AEP	741.76	741.53	0.23	0.23	0.03	1471.80	3807.27	2720.93	3321.09
Main	1472	1% AEP	741.98	741.77	0.20	0.21	0.03	1797.26	3821.39	2981.35	3363.24
Main	1472	0.2% AEP	742.62	742.42	0.20	0.23	0.02	3015.03	4356.49	4128.48	3421.27
Main	1341	4% AEP	741.44	741.33	0.10	0.13	0.00	2644.15	2047.43	2708.42	3193.40
Main	1341	2% AEP	741.49	741.37	0.12	0.15	0.00	2880.18	2189.75	2930.07	3197.93
Main	1341	1% AEP	741.74	741.63	0.11	0.13	0.00	3238.82	2199.00	3162.19	3228.31
Main	1341	0.2% AEP	742.37	742.24	0.13	0.15	0.00	5029.15	2761.76	3709.09	3552.19
Main	1238	4% AEP	741.30	741.21	0.10	0.31	0.00	1797.36	3358.38	2244.26	2920.26
Main	1238	2% AEP	741.34	741.23	0.11	0.36	0.00	1956.31	3620.54	2423.16	2934.06
Main	1238	1% AEP	741.61	741.50	0.10	0.31	0.00	2281.47	3754.04	2564.49	3006.41
Main	1238	0.2% AEP	742.22	742.09	0.12	0.33	0.00	3471.60	4692.80	3335.60	3076.34
Main	1036	4% AEP	741.00	740.89	0.11	0.34	0.00	2910.86	2890.32	1598.82	2840.92
Main	1036	2% AEP	740.98	740.84	0.13	0.45	0.01	3130.63	3152.42	1716.96	2807.88
Main	1036	1% AEP	741.30	741.18	0.11	0.35	0.01	3475.85	3190.09	1934.06	2969.00
Main	1036	0.2% AEP	741.89	741.76	0.13	0.39	0.01	4814.48	3902.55	2782.97	3129.90
Main	837	4% AEP	740.65	740.50	0.15	0.25	0.01	3220.04	2735.60	1444.37	2295.93
Main	837	2% AEP	740.52	740.32	0.21	0.37	0.01	3360.38	3069.11	1570.52	2178.75
Main	837	1% AEP	740.94	740.77	0.17	0.27	0.01	3919.93	3033.82	1646.26	2509.94
Main	837	0.2% AEP	741.49	741.28	0.21	0.33	0.01	5595.43	3734.48	2170.09	3155.15
Main	625	4% AEP	740.39	740.28	0.12	0.15	0.00	2310.05	3673.88	1416.07	1670.18
Main	625	2% AEP	740.14	739.97	0.17	0.24	0.00	2393.30	4135.79	1470.91	1596.23
Main	625	1% AEP	740.66	740.52	0.14	0.17	0.00	2762.44	4146.28	1691.28	1715.57
Main	625	0.2% AEP	741.14	740.96	0.18	0.22	0.00	3849.82	5290.90	2359.28	1797.06
Main	421	4% AEP	740.24	740.12	0.12	0.11	0.00	1607.19	4418.62	1374.20	1168.27
Main	421	2% AEP	739.90	739.71	0.19	0.19	0.00	1651.20	5023.28	1325.52	1159.30
Main	421	1% AEP	740.49	740.34	0.15	0.13	0.00	1914.17	5006.69	1679.14	1172.49
Main	421	0.2% AEP	740.92	740.71	0.21	0.19	0.00	2649.95	6441.52	2408.53	1179.52
Main	229	4% AEP	740.13	740.00	0.13			781.18	4590.60	2028.22	1082.00
Main	229	2% AEP	739.71	739.51	0.21			755.31	5253.70	1990.99	1071.65
Main	229	1% AEP	740.35	740.20	0.15			943.17	5226.64	2430.19	1087.30
Main	229	0.2% AEP	740.73	740.50	0.23			1325.47	6793.07	3381.46	1095.18

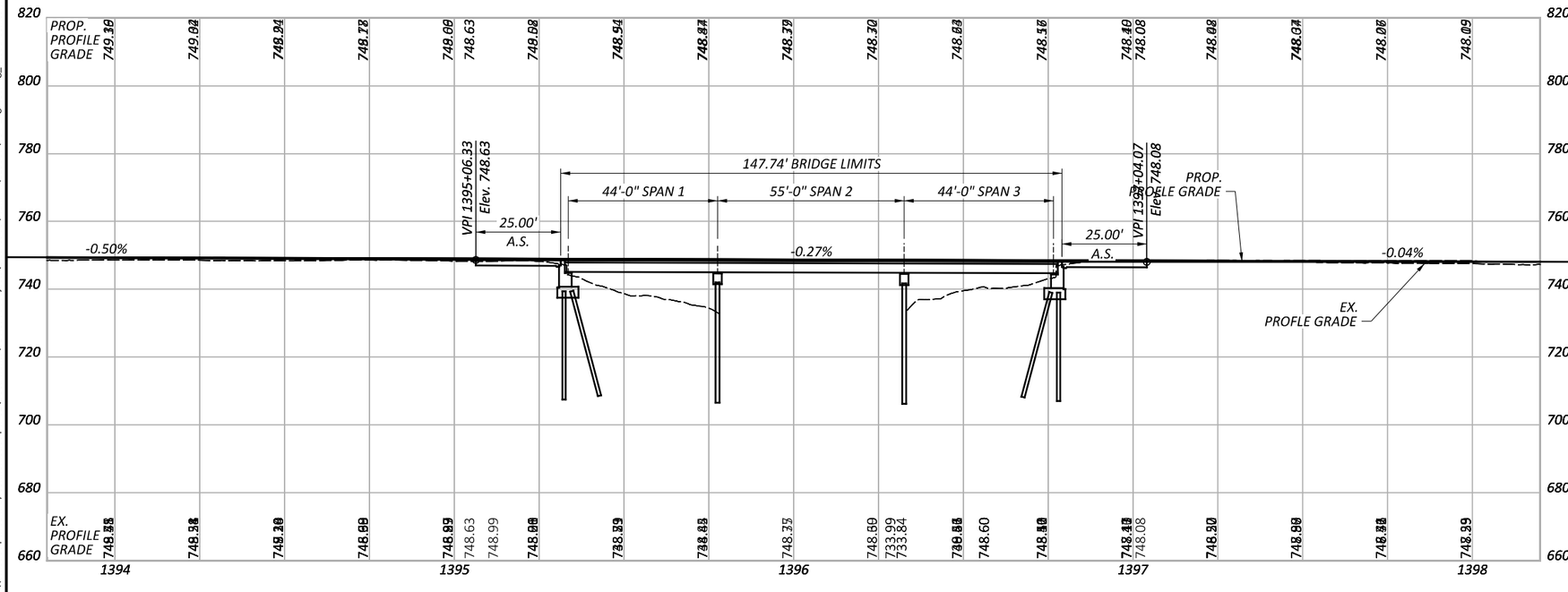
HEC-RAS Plan: Proposed River: Blacklick Creek Reach: Main

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)
Main	2098	4% AEP	744.34	744.06		0.02	0.09	2547.56	1003.48	5378.89	1017.64	4.82
Main	2098	2% AEP	744.75	744.47		0.02	0.10	2780.07	1216.29	5679.02	1104.68	4.89
Main	2098	1% AEP	745.18	744.90		0.02	0.11	3025.40	1446.20	5962.64	1191.17	4.94
Main	2098	0.2% AEP	748.14	747.50	740.63	0.02	0.20	4934.37	1109.72	10164.48	225.80	6.80
Main	2073	4% AEP	744.23	743.67	738.44	0.02	0.04	139.00		7400.00		6.01
Main	2073	2% AEP	744.62	744.02	738.71	0.02	0.05	457.93		8000.00		6.25
Main	2073	1% AEP	745.04	744.40	739.03	0.02	0.05	654.67		8600.00		6.44
Main	2073	0.2% AEP	747.91	747.68	740.28	0.02	0.28	4170.09	2454.43	8242.71	802.87	4.58
Main	2000 BR U	4% AEP	744.16	743.46	738.84	0.65	0.22	129.46		7400.00		6.71
Main	2000 BR U	2% AEP	744.55	743.80	739.18	0.70	0.26	129.80		8000.00		6.98
Main	2000 BR U	1% AEP	744.97	744.16	739.51	0.74	0.30	130.16		8600.00		7.21
Main	2000 BR U	0.2% AEP	747.62	746.46	740.93	1.54	0.47	853.71	301.44	11198.56		8.77
Main	2000 BR D	4% AEP	743.29	741.87	739.22	0.06	0.20	95.67	6.26	7393.75		9.57
Main	2000 BR D	2% AEP	743.59	741.97	739.60	0.06	0.24	95.91	7.50	7992.50		10.23
Main	2000 BR D	1% AEP	743.93	742.11	739.93	0.07	0.28	96.28	9.25	8590.75		10.81
Main	2000 BR D	0.2% AEP	745.61	742.89	741.36	0.09	0.47	98.22	21.68	11478.32		13.25
Main	1919	4% AEP	743.03	742.02		0.12	0.07	133.12	5.86	7385.76	8.38	8.09
Main	1919	2% AEP	743.29	742.14		0.14	0.08	134.14	7.26	7982.54	10.20	8.59
Main	1919	1% AEP	743.58	742.32		0.15	0.09	135.57	9.29	8577.79	12.92	9.02
Main	1919	0.2% AEP	745.05	743.27		0.20	0.26	143.16	25.54	11437.41	37.04	10.74
Main	1894	4% AEP	742.84	741.61		0.10	0.42	1727.36	102.32	7297.68		8.97
Main	1894	2% AEP	743.06	741.64		0.11	0.50	1731.59	115.36	7884.64		9.65
Main	1894	1% AEP	743.34	741.77	740.22	0.11	0.57	1749.92	147.33	8452.67		10.15
Main	1894	0.2% AEP	744.59	741.95	741.72	0.14	1.06	1774.62	242.94	11257.06		13.18

APPENDIX E

SITE PLAN





BENCHMARK DATA

BM #1 STA.	,	ELEV.	,	OFFSET	,
BM #2 STA.	,	ELEV.	,	OFFSET	,
BM #3 STA.	,	ELEV.	,	OFFSET	,
BM #4 STA.	,	ELEV.	,	OFFSET	,

FOR ADDITIONAL BENCHMARK INFORMATION. SEE ROADWAY PLAN SHEET

NOTES

EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.

DESIGN TRAFFIC:
20XX ADT = *20XX ADTT =*
20XX ADT = *20XX ADTT =*
DIRECTIONAL DISTRIBUTION =

LEGEND

- BORING LOCATION
- - CHANNEL EXCAVATION
- * - PHASE 1 CONSTRUCTION
- ** - PHASE 2 CONSTRUCTION
- ● 16'-6" REQUIRED MINIMUM VERTICAL CLEARANCE
- 15'-9¼" ACTUAL MINIMUM VERTICAL CLEARANCE

HYDRAULIC DATA

DRAINAGE AREA = *SQ. MILES*
Q ( ) = *CFS* *V ( ) =* *FT/S*
Q ( ) = *CFS* *V ( ) =* *FT/S*
STRUCTURE CLEARS THE *YEAR*
DESIGN HW BY *FEET.*

EXISTING STRUCTURE

TYPE: CONTINUOUS STEEL BEAM WITH REINFORCED CONCRETE DECK

SPANS: 44'-0", 55'-0", 44'-0" C/C BEARINGS
ROADWAY: 41'-0" F/F PARAPET
LOADING: HS-20-44 & ALTERNATE MILITARY LOADING
SKEW: 18° L.F.
WEARING SURFACE: 1.75" CONCRETE OVERLAY
APPROACH SLABS: 25'-0" LONG
ALIGNMENT: TANGENT
CROWN: 0.016
STRUCTURE FILE NUMBER: 2502046/2502070 (L/R)
DATE BUILT: 1963
DISPOSITION: SUPERSTRUCTURE WIDENING

PROPOSED STRUCTURE

TYPE: CONTINUOUS STEEL BEAM WITH REINFORCED CONCRETE DECK

SPANS:
ROADWAY: TOE/TOE PARAPET
LOADING: HL93 AND _____ FUTURE WEARING SURFACE
SKEW:
WEARING SURFACE:
APPROACH SLABS: LONG (AS-1-15, AS-2-15)
ALIGNMENT:
CROWN: FT/FT
DECK AREA: SF
COORDINATES: LATITUDE
LONGITUDE

HORIZONTAL SCALE IN FEET
0 5 10 20

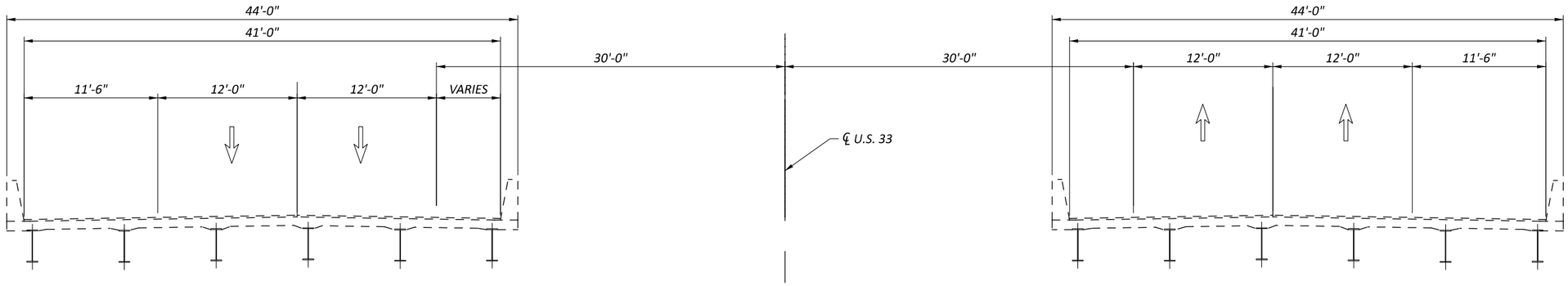
SITE PLAN
BRIDGE NO. FRA-33-2649 L/R
OVER BLACKLICK CREEK

SFN 2502046
SFN 2502070
DESIGN AGENCY

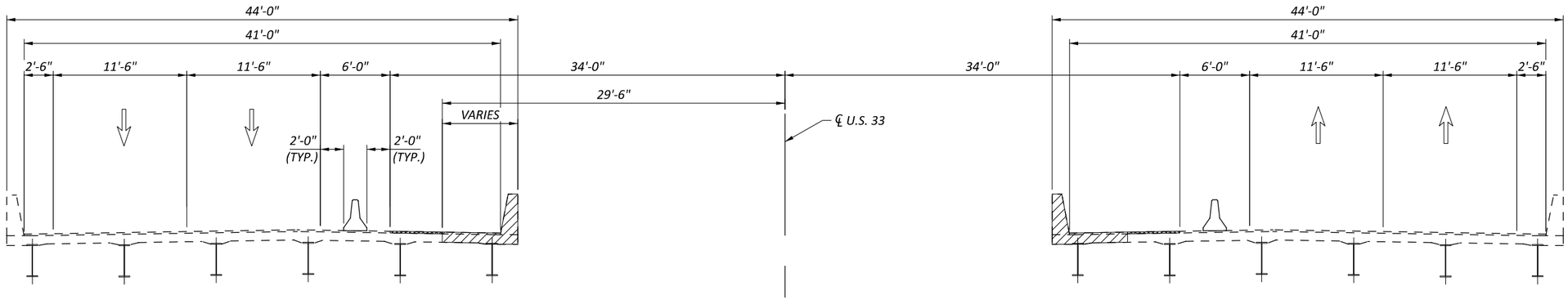
DESIGNER	CHECKER
MMS	EDW

REVIEWER JWE 09/01/24
PROJECT ID 119.87
SUBSET 0 TOTAL 0
SHEET P.0 TOTAL 0

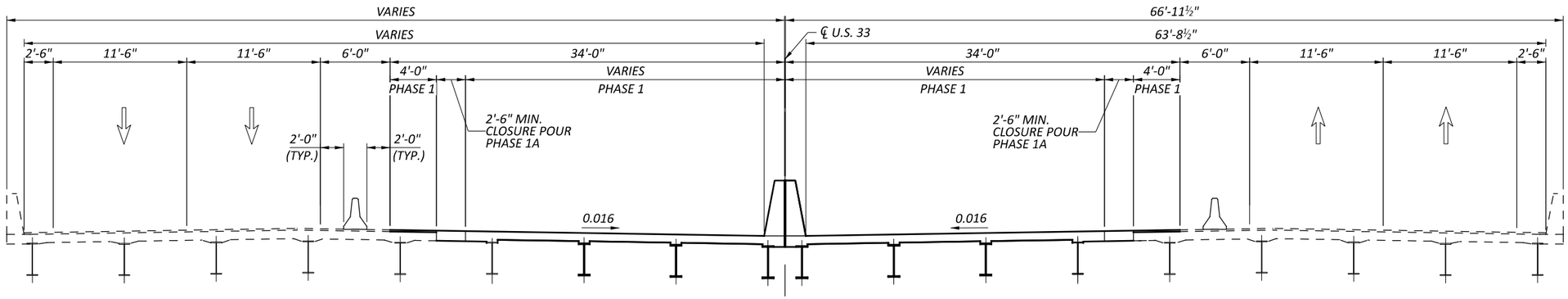
FRA-33-24.27



EXISTING



PHASE 1 REMOVAL



PHASE 1 & 1A CONSTRUCTION

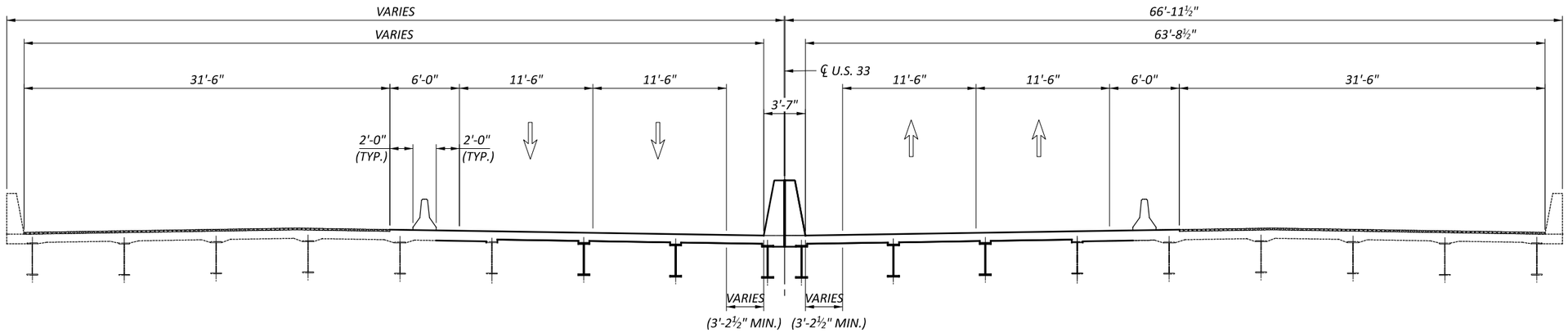
- ITEM 202- PORTIONS OF STRUCTURE REMOVED

- ITEM 808 - SURFACE PREPARATION USING HYDRODEMOLITION

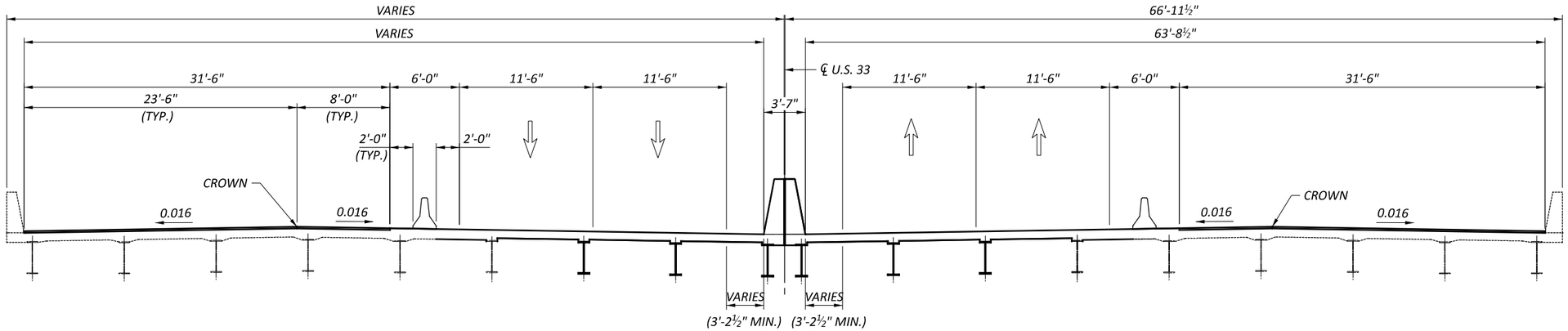
CTY-RTE-SECTION

SHEET TITLE
SHEET SUB-TITLE
SHEET SUB-TITLE 2

SFN	0
SFN	0
DESIGN AGENCY	
DESIGNER	XXX
CHECKER	XXX
REVIEWER	XXX MM-DD-YY
PROJECT ID	0
SUBSET	0
TOTAL	0
SHEET	P.0
TOTAL	0



PHASE 2 REMOVAL



PHASE 2 CONSTRUCTION

SHEET TITLE
SHEET SUB-TITLE
SHEET SUB-TITLE 2

CTY-RTE-SECTION

MODEL: Sheet_SurvFt PAPERSIZE: 17x11 (in.) DATE: 3/4/2025 TIME: 10:38:03 AM USER: meets
pw:\\ohiodot-pw.bentley.com:ohiodot-pw-02\Documents\01 Active Projects\District 06\Franklin\119387\404-Engineering_ResourceInternational\Structures\SFN_2502046\Sheets\119387_SFN_2502046_ST002.dgn

SFN	0
SFN	0
DESIGN AGENCY	
DESIGNER	XXX
CHECKER	XXX
REVIEWER	XXX MM-DD-YY
PROJECT ID	0
SUBSET	0
TOTAL	0
SHEET	P.0
TOTAL	0

APPENDIX F

NO-RISE CERTIFICATE

Form LD-50
Revised July 2024

No-Rise Certification Form

This is to certify that I am a qualified licensed professional engineer in the State of Ohio.

It is to further certify that the attached technical data supports the fact that the proposed roadway project: FRA-33-24.76 will not create any increase to the 1-percent-annual-chance flood elevations on the Blacklick Creek at published cross-sections in the Flood Insurance Study (FIS) for Franklin County and Incorporated Areas (39049CV001D) dated 16th June 2011 and will not create any increase to the 1-percent-annual-chance flood elevations at unpublished cross-sections in the vicinity of the proposed roadway project.

(Name of Project)

(Name of Stream)

(Name of Community/FIS)

Engineer's Name: Erich C Horn

Signature: [signature] **Date:** 7th Apr 2025

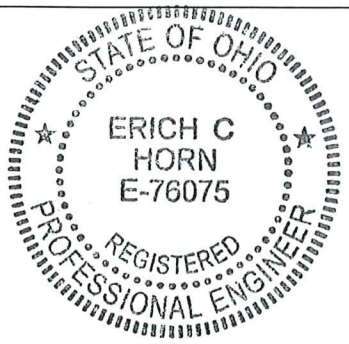
Phone Number: 614 823-4949 **E-MAIL:** erichh@resourceinternational.com

Agency/Firm: Resource International Inc.

Address: 6350 Presidential Gateway

City: Columbus **State:** Ohio **Zip Code:** 43231

ENGINEERS SEAL:



APPENDIX G

SITE PHOTOS

Blacklick Creek – Upstream Channel

Blacklick Creek – Downstream Channel

Blacklick Creek – Structure Opening

(Looking Upstream from Median)

Blacklick Creek – Structure Opening

(Looking Upstream from Eastbound Existing Structure)