

HYDRAULIC DESIGN STUDY REPORT
FOR PROPOSED REPLACEMENT OF
BRIDGE OVER BUFFALO CREEK
CHEROKEE COUNTY, SOUTH CAROLINA
SECONDARY ROAD 83 BLACKSBURG HIGHWAY
SCDOT REQUIREMENTS FOR HYDRAULIC DESIGN STUDIES MAY 26, 2009

FILE NO. 11.040188 PROJECT NO. 60191787



COMPLETED: 09/07/2011

Prepared by: Andrew Wilson, EIT

Checked by: Bryan Dick, PE, PH

PRELIMINARY - SUBJECT TO CHANGE

AECOM

701 Corporate Center Drive, Suite 475,
Raleigh, NC 27607
919-854-6200

INDEX

<u>Description</u>	<u>Page</u>
Narrative	1-3
Engineering “No Impact” Certification	4
Water Surface Elevations Brief Summary	5
Vicinity Map	6
USGS Quadrangle Map	7
Flood Hazard Boundary Map (FEMA-FIRM)	8
HEC RAS Bridge Section Figures	9-15
HEC RAS Output Tables	16-33
HEC RAS Scour Analysis Output	32-33
HEC RAS Generated Report	34-118

FLOODPLAIN ANALYSIS NARRATIVE

I. BACKGROUND

The South Carolina Department of Transportation (SCDOT) has entered into a contract with AECOM to perform hydraulic analysis for the proposed highway bridge replacement on S-83 over Buffalo Creek within the county line of Cherokee County, SC, due east of the town of Blacksburg, SC.

II. FLOOD HISTORY AND HYDROLOGY

According to the Flood Insurance Study for Cherokee County, Lake Whelhel outside of Gaffney in Cherokee County has a flood retarding effect on peak flows downstream, other streams in Cherokee County that are not influenced by control structures generally have small drainage areas and flooding can be caused by local rainstorms however overall flooding in Cherokee County is rare.

III. BRIDGE SITE SCOUR HISTORY

A field site investigation was conducted on September 2, 2011. There is no observed scour present in the channel or around pilings. However minor erosion was observed on rip rap abutment slopes of the bridge. This is probably due to the sandy, non-cohesive soils present at the bridge location.

IV. HYDROLOGY

The 2-, 10-, 50-, 100-, and 500-year frequency discharges for Buffalo Creek were obtained from the Flood Insurance Study for Cherokee County.

V. COMPARATIVE DATA

The SCDOT Comparative Data Form which compares existing, proposed, and additional bridge on Buffalo Creek is attached.

VI. EVALUATE FIELD CONDITIONS

A complete field conditions and site evaluation was completed on September 2, 2011. Details can be found in the attached field site inspection forms.

VII. COMPARATIVE BRIDGE SITES

An additional bridge site was compared to the existing and proposed S-83 Bridge in the attached comparative data sheet.

VIII. JOB SITE INSPECTION

A job site inspection was performed on September 2, 2011. Data collected can be viewed in the attached Site Inspection Form.

IX. HYDRAULIC ANALYSIS

The project site is located in a FEMA detailed study, map number: 4500450061B, effective date July 2, 1981. The hydraulic analysis modeling program HEC-RAS (Version 4.1.0) was used for floodplain analysis. The duplicate effect, corrected effective, and proposed conditions, were generated for the 10, 50, 100, and 500 year storms.

X. FEMA ANALYSIS

The effective profile model and effective floodway outputs were provided by FEMA in HEC-2. A duplicate effective model was created by mimicking the effective model inputs in order to recreate the effective outputs (One cross section's encroachment stations had to be changed minutely in order to match the effective model). The effective model was imported into HEC-RAS, then we matched the duplicate effective model output BFE's to those of the effective to within 0.5' (This is the difference allowable because the effective was imported from HEC-2 to HEC-RAS). Next, the corrected effective was created by incorporating new cross sections (6.1-6.4; all taken from a CADD TIN file) and updating the existing bridge configuration because HEC-RAS provides a more accurate bridge configuration than HEC-2. The proposed condition was created by integrating the proposed bridge configuration into the corrected effective model. The new bridge geometry causes an overall difference in BFEs of no more than 0.1 ft between the corrected effective and the proposed conditions. The proposed conditions 100 year water surface elevations match the corrected effective models water surface elevations to within 0.1 feet. The proposed conditions floodway widths match the corrected effective floodway widths to within 1.0 foot. Therefore a "no-impact" certification can be validated as defined by SCDOT's "Requirement for hydraulic design studies", section 1.1.2.

XI. BED AND BANK MATERIAL

Soil borings were taken by boring crews at pier and bent locations by Geotechnical Engineer.

XII. EVALUATE WATERSHED SEDIMENT YIELD

No signs of recent aggradation or degradation were observed during the field site investigation and there is no evidence of any recent change in land use within this largely rural watershed; thus there was no concern with potential change in sediment supply that could affect the proposed structure. Therefore a sediment yield analysis was not conducted.

XIII. INCIPIENT MOTION ANALYSIS

The bed of Buffalo Creek was observed to be primarily composed of sand. Since the stream bed is primarily a sand channel it is assumed that the stream will have the competency to move the largest particle during bankfull events, therefore the channel should be relatively stable based on the particle size.

XIV. EVALUATE ARMORING POTENTIAL

Based off of field site visit, there is no presence of bed material that is too large for flood flows to move.

XV. EVALUATE RATING CURVE SHIFTS

Rating curve shifts were not evaluated because no USGS gage is located on Buffalo Creek.

XVI. DESIGN BRIDGE

The proposed bridge is to be raised an average of 9.5' above the existing bridge and approximately 22' downstream. The proposed length of the new bridge will be 390', composed of five spans at 60', 88', 66', 88', and 88' in length per span. The existing bridge length consists of eleven spans at 61', 61', and nine at 25' in length from South to North respectively.

XVII. SCOUR ANALYSIS

A scour analysis was performed using HECRAS version 4.1.0. Data inputs included D50 and D85 particle sizes determined during geotechnical investigations. The overall combined scour depths were determined to be 9.60' for the left bank, 21.07' for the channel, and 9.60' for the right bank. For more detailed information see attached Scour Analysis.

XVIII. RISK ASSESSMENT

A Risk Assessment was performed and is documented in the attached SCDOT risk assessment form.

XIX. SUMMARY

Based on the floodplain analysis, the proposed replacement of the S-83 Bridge over Buffalo Creek in Cherokee county, SC; results in a "no-impact" condition. The proposed bridge creates a minimal change in backwater in comparison to the existing bridge. Enclosed with this package is all of the relevant information justifying the hydraulic analysis results supporting the "no-impact" condition for the aforesaid project.

ENGINEERING "NO-IMPACT" CERTIFICATION

This is to certify that I am a duly qualified engineer licensed to practice in the State of South Carolina.

It is to further certify that the attached technical data supports the fact that the proposed

Secondary Road 83 Blacksburg Highway Bridge Replacement
(Name of Development)

will not impact the 100-year flood elevations, floodway elevations and floodway widths on

Buffalo Creek
(Name of Stream)

at published sections in the Flood Insurance Study (FIS) for

Cherokee County, S.C.
(Name of Community)

July 2, 1981
(Dated)

and will not impact the 100-year flood elevations, floodway elevations, and floodway widths at unpublished cross-sections in the vicinity of the proposed development.

9/7/2011
(Date)

Bryan M. Dick, PE, PH
(Signature)

MANAGER - WATER/NATURAL RESOURCES
(Title)

701 Corporate Center Dr., Ste 475
(Address)

Raleigh, NC 27670
(City/State/Zip)



Buffalo Creek

100- Year Water Surface Elevations Brief Summary

HEC-RAS Station WSE Existing Condition (ft.) WSE Proposed Condition (ft.)

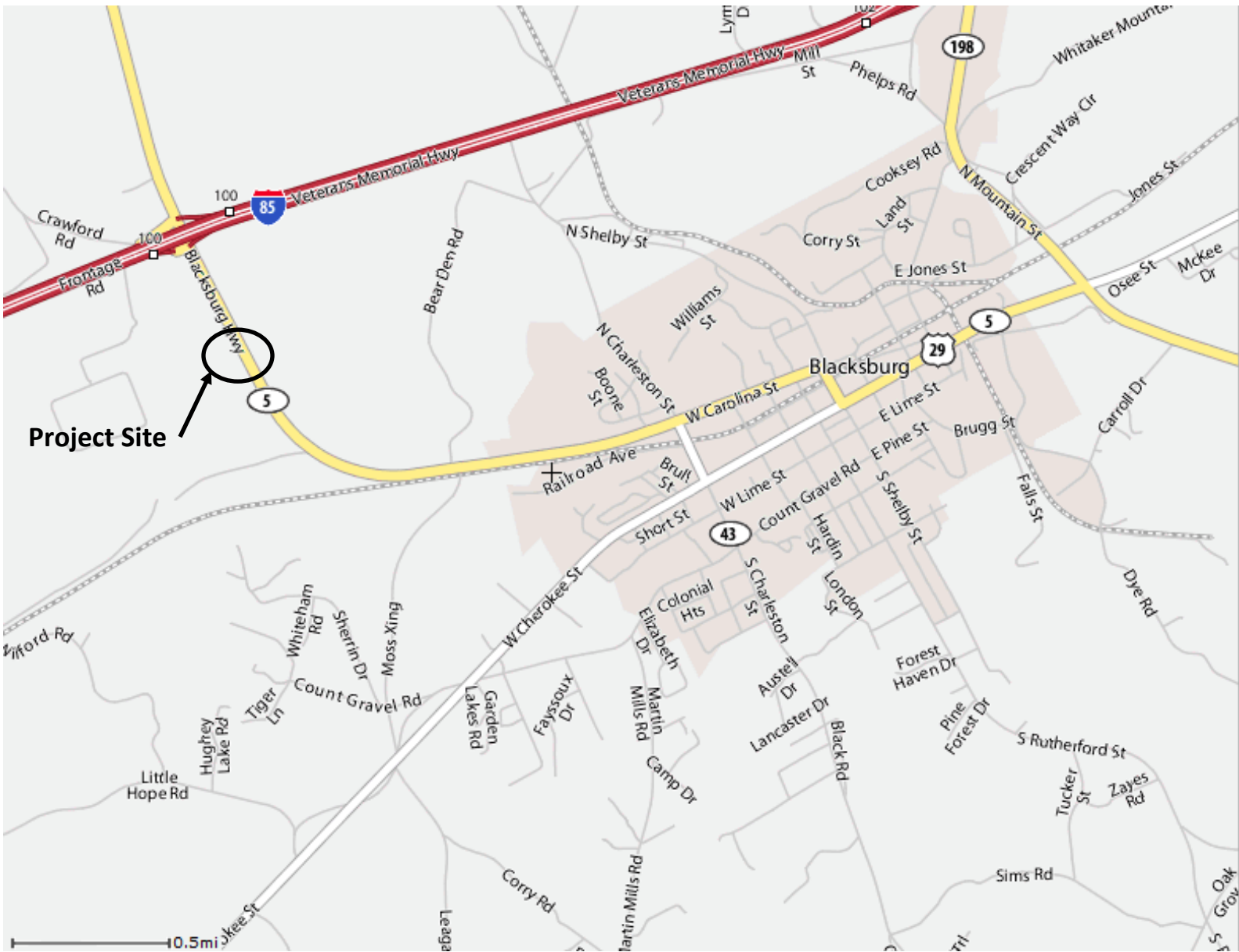
6.1	567.01	567.01
6.2	567.10	567.12
S-83 Bridge	---	---
6.3	567.71	567.81
7	569.51	569.51

VICINITY MAP

BRIDGE REPLACEMENT OVER THE BUFFALO CREEK

STATE OF SOUTH CAROLINA

SECONDARY ROAD 83 BLACKSBURG HIGHWAY





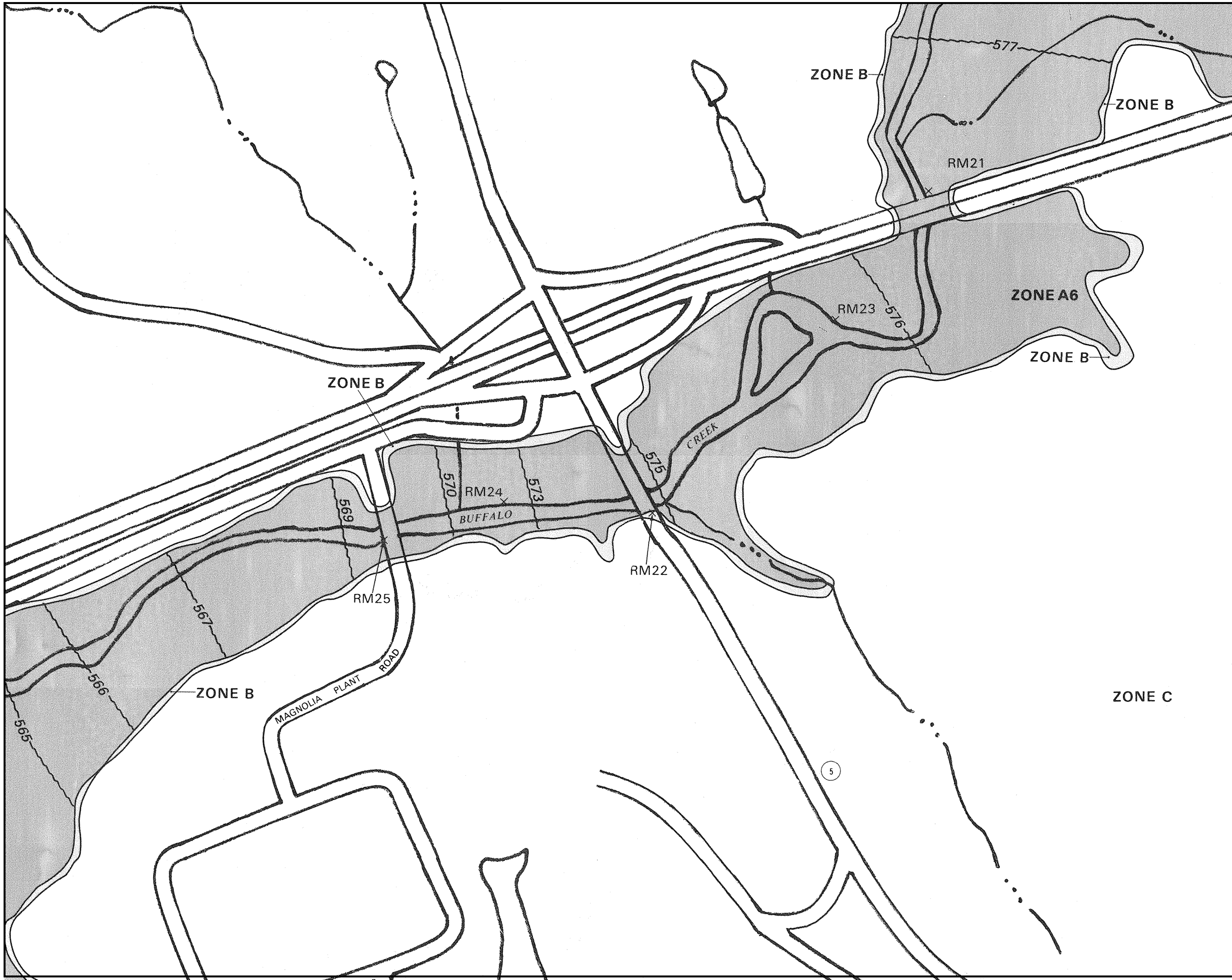
Project Site

0 1,350 2,700 Feet

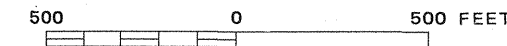
AECOM

S-83 Bridge over Buffalo Creek
Quadrangle Map

July 28th, 2011



APPROXIMATE SCALE



NATIONAL FLOOD INSURANCE PROGRAM

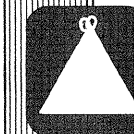
FIRM
FLOOD INSURANCE RATE MAP

**CHEROKEE COUNTY,
SOUTH CAROLINA
(UNINCORPORATED AREAS)**

PANEL 61 OF 175

**COMMUNITY-PANEL NUMBER
450045 0061 B**

**EFFECTIVE DATE:
JULY 2, 1981**

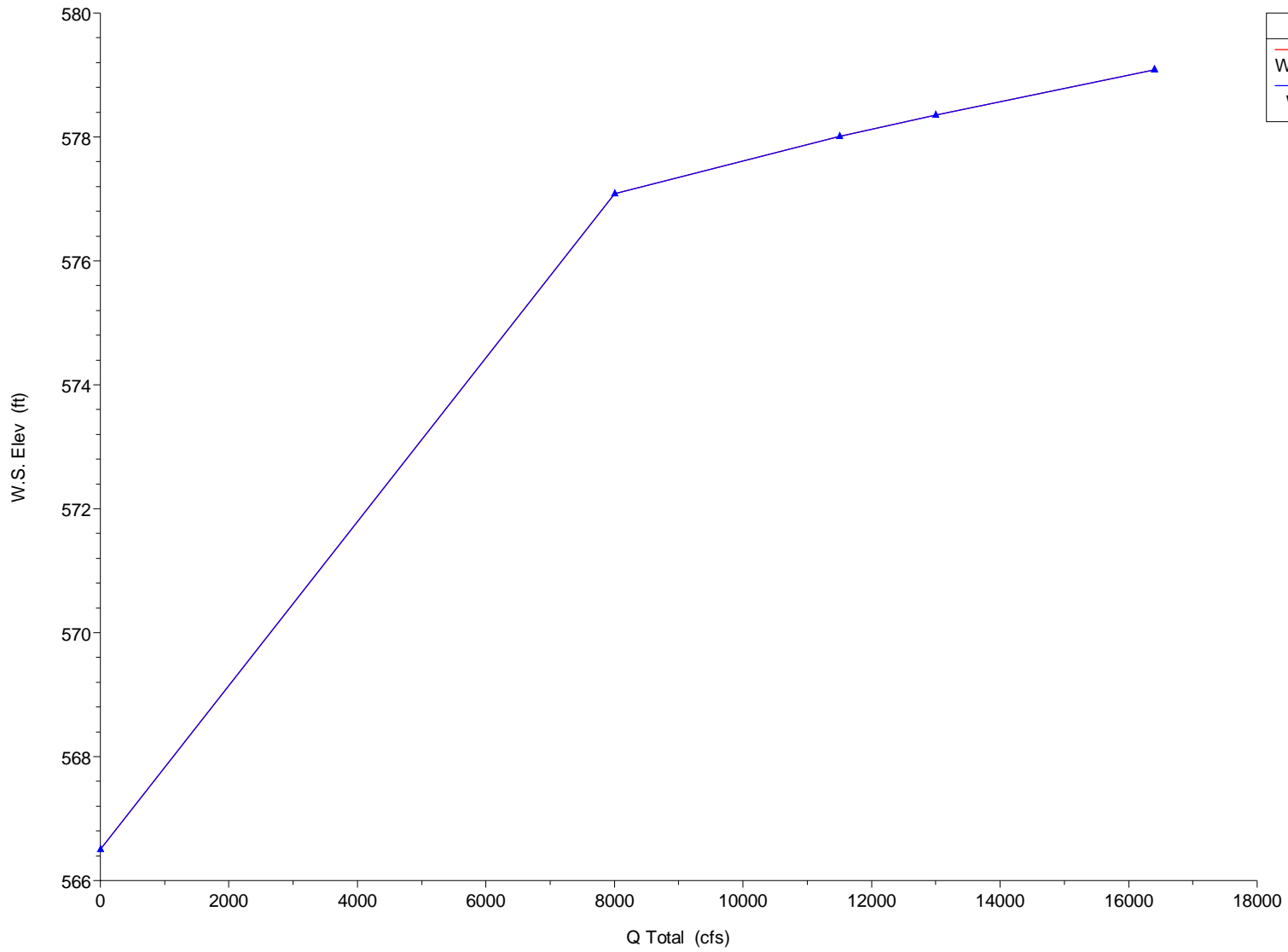


federal emergency management agency
federal insurance administration

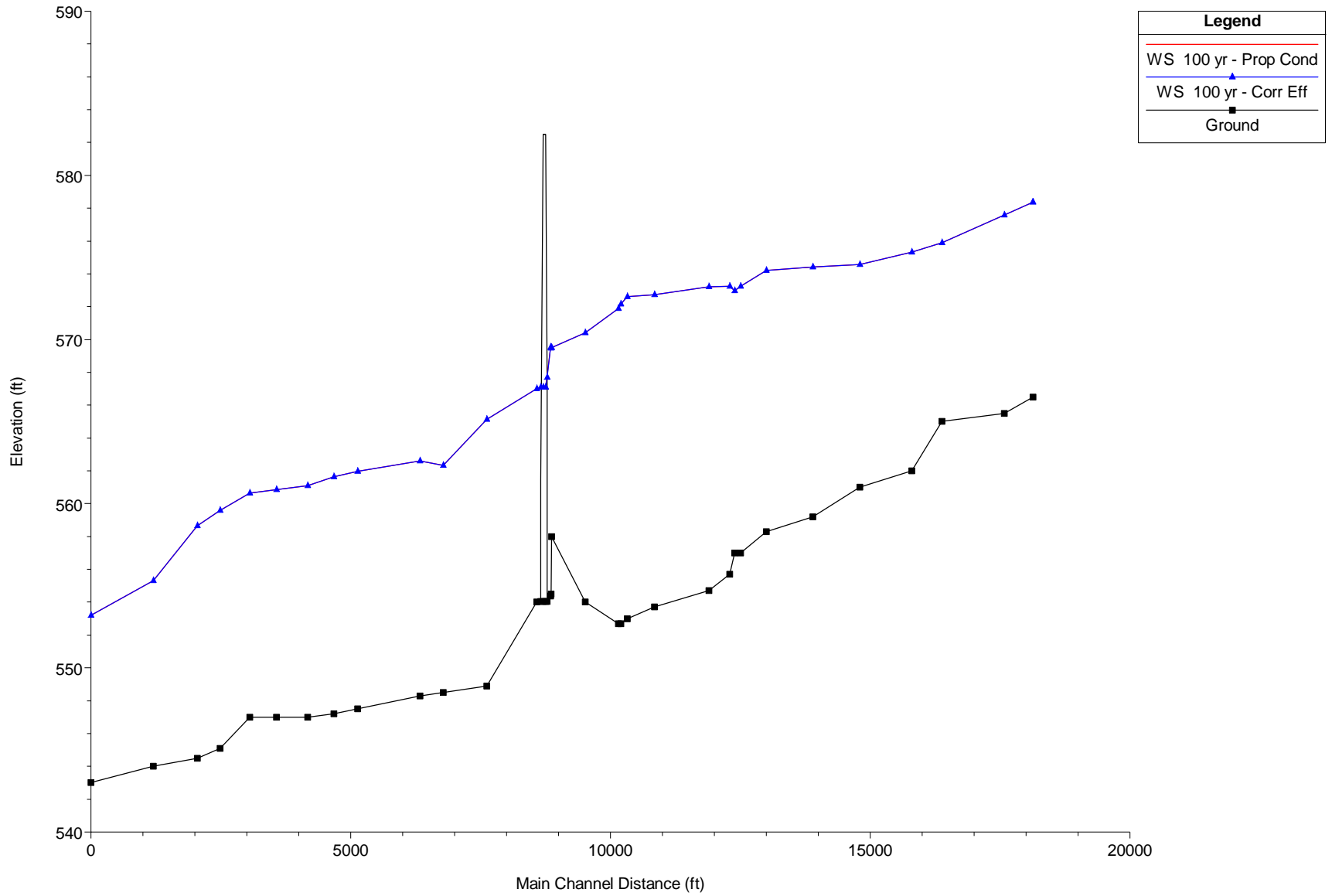
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

1) Prop Cond 9/6/2011 2) Corr Eff 9/6/2011

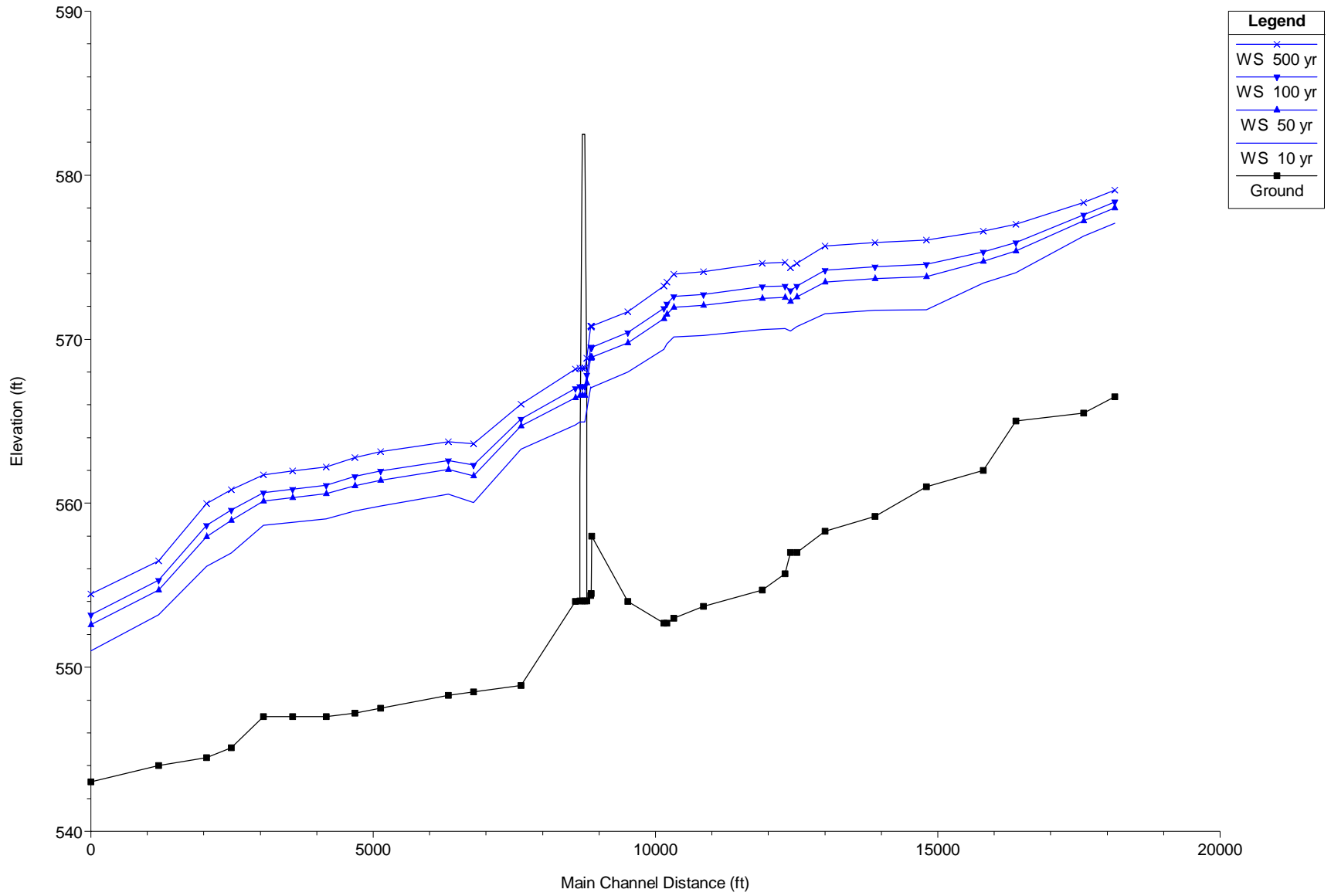
Geom: Proposed Conditions Flow: Effective Flows



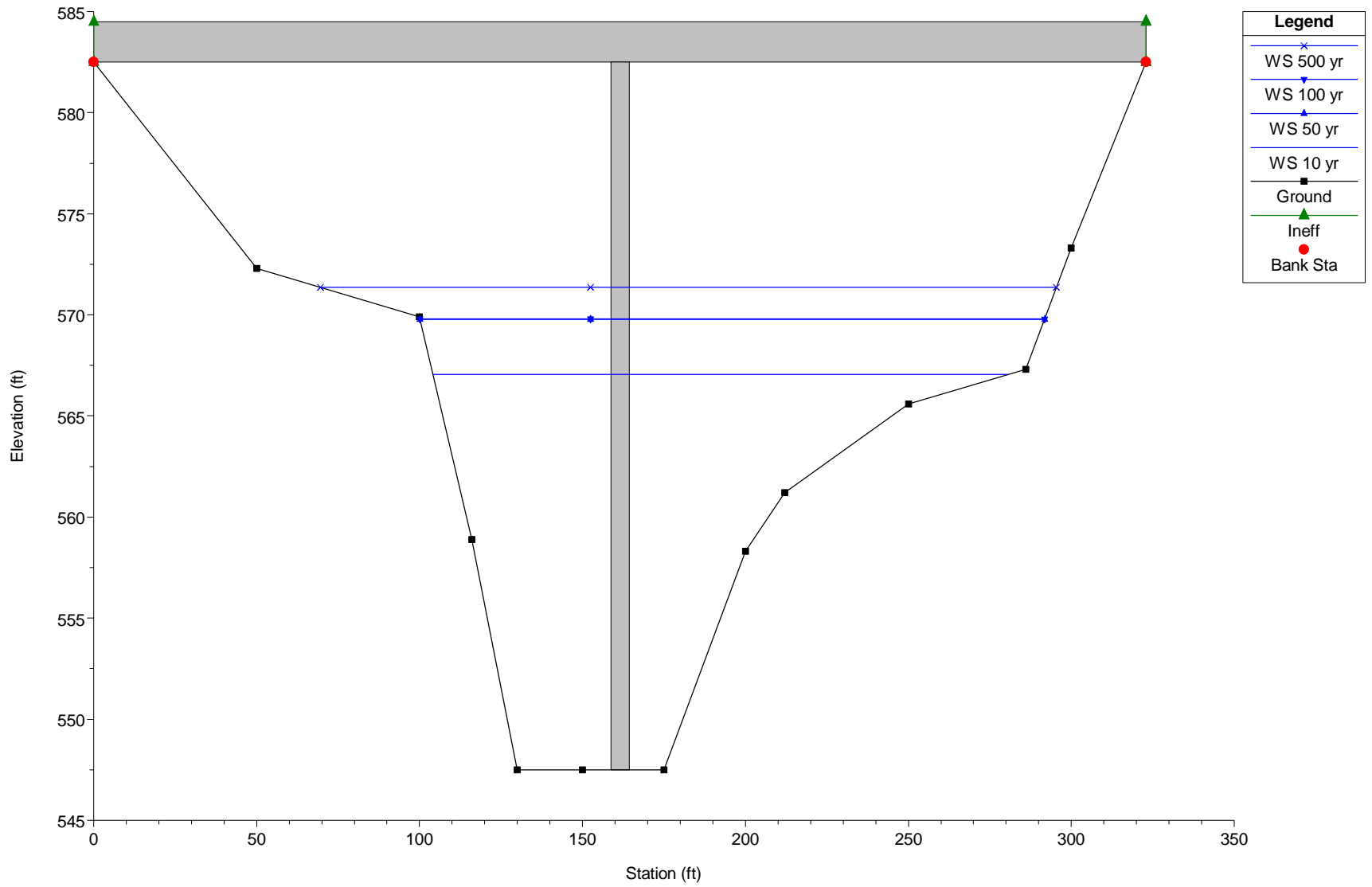
1) Prop Cond 9/6/2011 2) Corr Eff 9/6/2011
Geom: Proposed Conditions Flow: Effective Flows



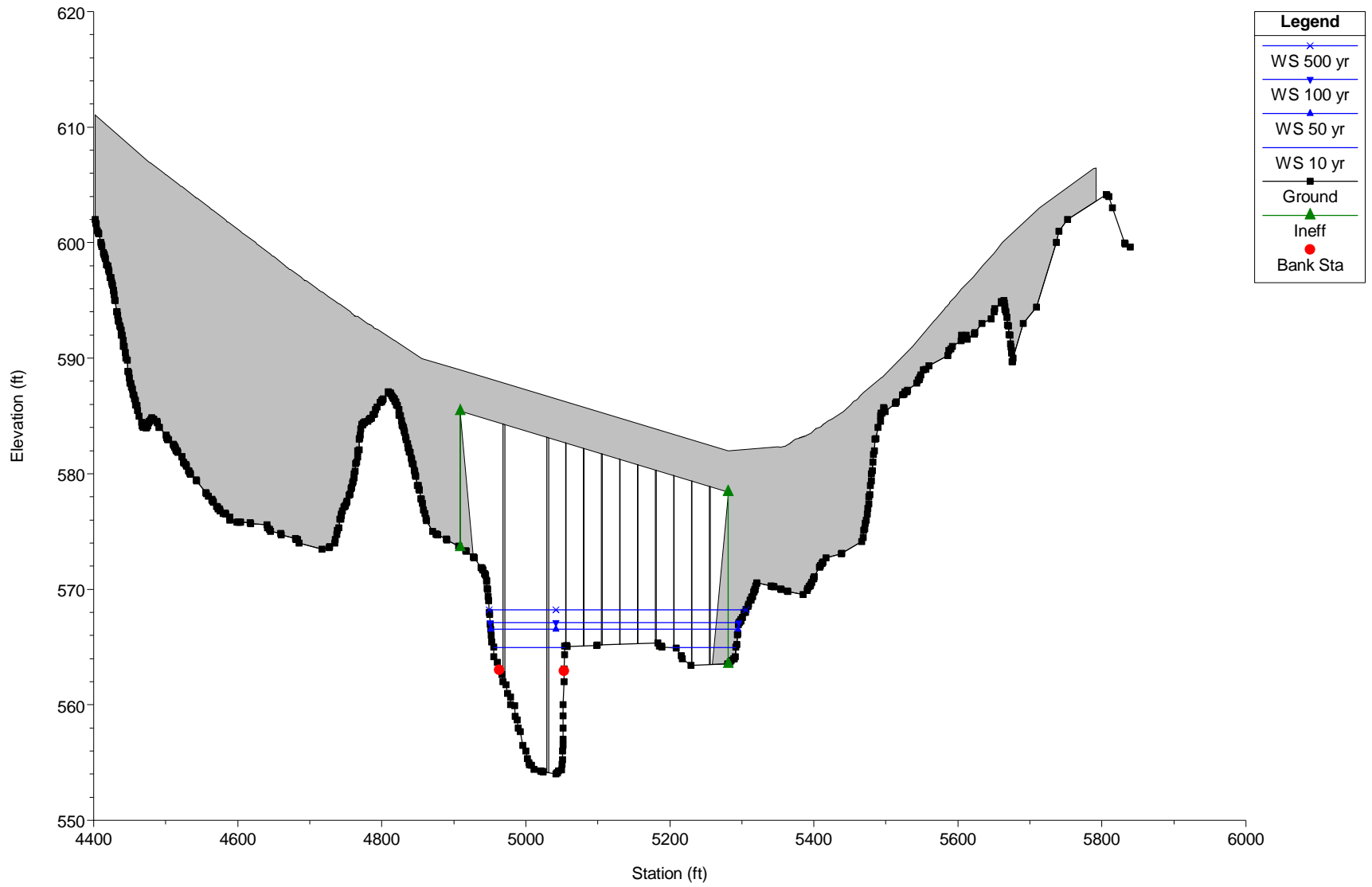
Proposed Conditions 9/6/2011
Geom: Proposed Conditions Flow: Effective Flows



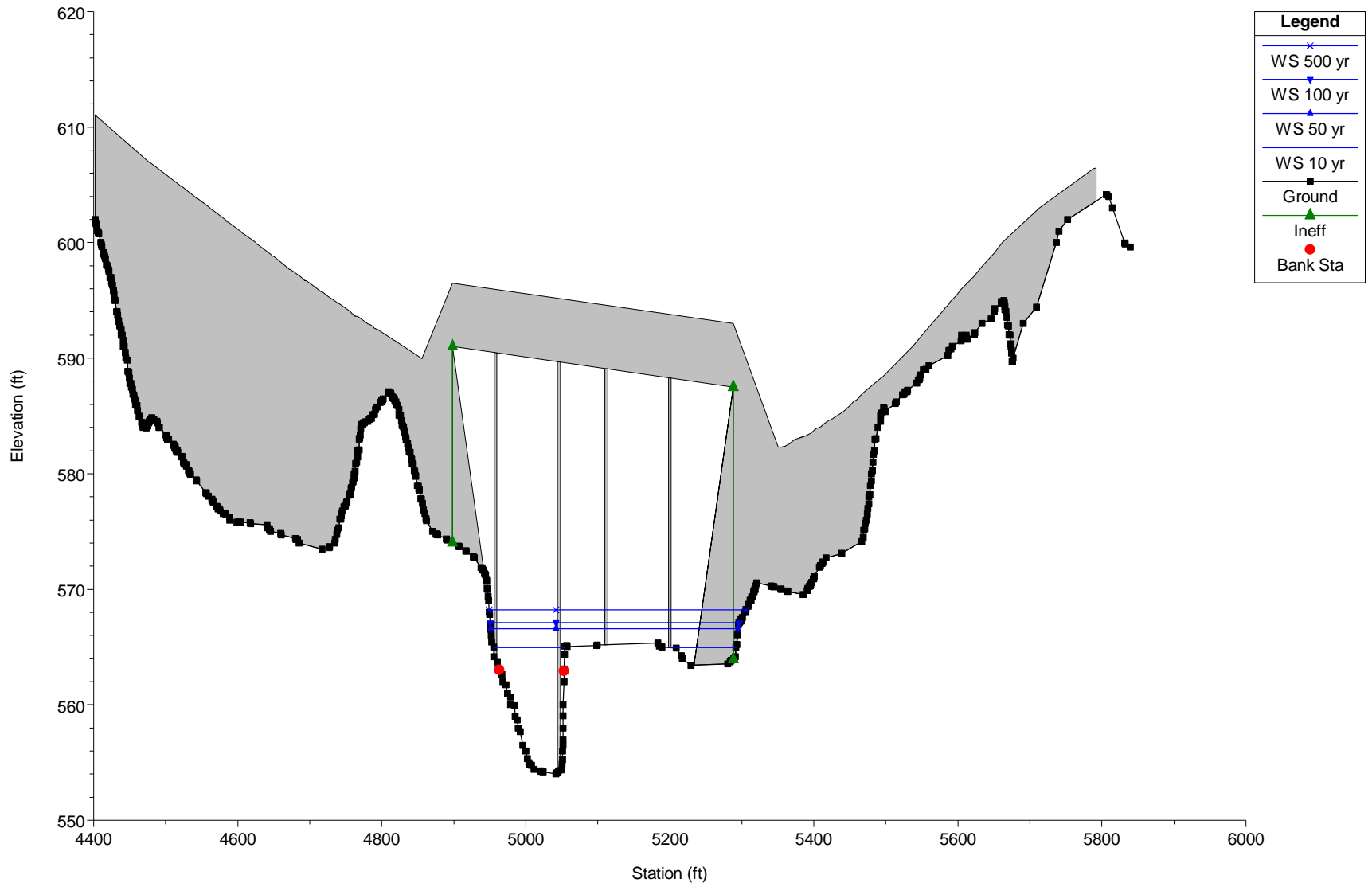
Duplicate Effective 8/16/2011
Geom: Imported Geom 11 Flow: Effective Flows
Bridge #1



Corrected Effective 8/16/2011
Geom: Corrected Effective Flow: Effective Flows
Bridge #1



Proposed Conditions 9/6/2011
Geom: Proposed Conditions Flow: Effective Flows
Bridge #1



HEC-RAS River: RIVER-1 Reach: Reach-1 (Continued)

Table with 14 columns: Reach, River Sta, Profile, Plan, Q Total (cfs), Min Ch El (ft), W.S. Elev (ft), Crit W.S. (ft), E.G. Elev (ft), E.G. Slope (ft/ft), Vel Chnl (ft/s), Flow Area (sq ft), Top Width (ft), Froude # Chl. Rows include data for reaches 4.3, 3.8, 3.7, 3.4, and 3.3 with various profiles like Prop Cond, Corr Eff, and Duplicate Eff.

HEC-RAS River: RIVER-1 Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	2.1	10 yr	Prop Cond	8000.00	544.50	556.16		556.69	0.001879	6.40	2263.09	687.81	0.36
Reach-1	2.1	10 yr	Corr Eff	8000.00	544.50	556.16		556.69	0.001879	6.40	2263.09	687.81	0.36
Reach-1	2.1	10 yr	Duplicate Eff.	8000.00	544.50	557.49		557.88	0.002070	5.49	3281.99	833.18	0.29
Reach-1	2.1	50 yr	Prop Cond	11500.00	544.50	557.96		558.47	0.001640	6.70	3681.44	883.67	0.35
Reach-1	2.1	50 yr	Corr Eff	11500.00	544.50	557.96		558.47	0.001640	6.70	3681.44	883.67	0.35
Reach-1	2.1	50 yr	Duplicate Eff.	11500.00	544.50	559.71		560.32	0.002470	6.78	2905.69	370.00	0.33
Reach-1	2.1	100 yr	Prop Cond	13000.00	544.50	558.65		559.15	0.001544	6.76	4320.81	958.96	0.34
Reach-1	2.1	100 yr	Corr Eff	13000.00	544.50	558.65		559.15	0.001544	6.76	4320.81	958.96	0.34
Reach-1	2.1	100 yr	Duplicate Eff.	13000.00	544.50	560.08		560.51	0.002006	6.22	5795.55	1112.81	0.30
Reach-1	2.1	500 yr	Prop Cond	16400.00	544.50	559.97		560.45	0.001426	6.96	5677.94	1101.87	0.33
Reach-1	2.1	500 yr	Corr Eff	16400.00	544.50	559.97		560.45	0.001426	6.96	5677.94	1101.87	0.33
Reach-1	2.1	500 yr	Duplicate Eff.	16400.00	544.50	561.18		561.67	0.002172	6.82	7084.75	1224.24	0.31
Reach-1	2	10 yr	Prop Cond	8000.00	544.00	553.19		554.21	0.004955	8.11	986.80	148.88	0.56
Reach-1	2	10 yr	Corr Eff	8000.00	544.00	553.19		554.21	0.004955	8.11	986.80	148.88	0.56
Reach-1	2	10 yr	Duplicate Eff.	8000.00	544.00	554.60		555.29	0.004882	6.66	1214.23	200.16	0.42
Reach-1	2	50 yr	Prop Cond	11500.00	544.00	554.71		556.09	0.005427	9.43	1237.44	209.12	0.60
Reach-1	2	50 yr	Corr Eff	11500.00	544.00	554.71		556.09	0.005427	9.43	1237.44	209.12	0.60
Reach-1	2	50 yr	Duplicate Eff.	11500.00	544.00	556.35		557.28	0.005630	7.71	1491.76	172.21	0.46
Reach-1	2	100 yr	Prop Cond	13000.00	544.00	555.30		556.80	0.005733	9.86	1375.36	260.33	0.61
Reach-1	2	100 yr	Corr Eff	13000.00	544.00	555.30		556.80	0.005733	9.86	1375.36	260.33	0.61
Reach-1	2	100 yr	Duplicate Eff.	13000.00	544.00	556.90	552.68	557.84	0.005506	7.93	2452.11	1214.59	0.46
Reach-1	2	500 yr	Prop Cond	16400.00	544.00	556.48	553.80	558.19	0.005870	10.61	1975.58	1033.92	0.63
Reach-1	2	500 yr	Corr Eff	16400.00	544.00	556.48	553.80	558.19	0.005870	10.61	1975.58	1033.92	0.63
Reach-1	2	500 yr	Duplicate Eff.	16400.00	544.00	558.02	553.80	558.97	0.005150	8.28	3865.00	1315.97	0.45
Reach-1	1	10 yr	Prop Cond	8000.00	543.00	550.99	546.84	551.23	0.001313	3.96	2020.65	334.81	0.28
Reach-1	1	10 yr	Corr Eff	8000.00	543.00	550.99	546.84	551.23	0.001313	3.96	2020.65	334.81	0.28
Reach-1	1	10 yr	Duplicate Eff.	8000.00	543.00	550.99	546.84	551.23	0.002334	3.96	2020.65	334.81	0.28
Reach-1	1	50 yr	Prop Cond	11500.00	543.00	552.61	547.76	552.92	0.001327	4.44	2587.23	363.15	0.29
Reach-1	1	50 yr	Corr Eff	11500.00	543.00	552.61	547.76	552.92	0.001327	4.44	2587.23	363.15	0.29
Reach-1	1	50 yr	Duplicate Eff.	11500.00	543.00	552.61	547.75	552.92	0.002360	4.44	2587.23	363.15	0.29
Reach-1	1	100 yr	Prop Cond	13000.00	543.00	553.20	548.11	553.53	0.001340	4.64	2804.10	372.00	0.30
Reach-1	1	100 yr	Corr Eff	13000.00	543.00	553.20	548.11	553.53	0.001340	4.64	2804.10	372.00	0.30
Reach-1	1	100 yr	Duplicate Eff.	13000.00	543.00	553.20	548.11	553.53	0.002382	4.64	2804.10	372.00	0.30
Reach-1	1	500 yr	Prop Cond	16400.00	543.00	554.48	548.85	554.87	0.001336	4.98	3292.54	391.20	0.30
Reach-1	1	500 yr	Corr Eff	16400.00	543.00	554.48	548.85	554.87	0.001336	4.98	3292.54	391.20	0.30
Reach-1	1	500 yr	Duplicate Eff.	16400.00	543.00	554.48	548.84	554.87	0.002375	4.98	3292.54	391.20	0.30

HEC-RAS Plan: Duplicate Eff. River: RIVER-1 Reach: Reach-1

Reach	River Sta	Profile	Top Width Act (ft)	Area (sq ft)	Vel Total (ft/s)	W.S. Elev (ft)	Base WS (ft)	Prof Delta WS (ft)
Reach-1	17	100 yr	1837.20	9703.47	1.34	580.90	580.90	
Reach-1	17	100 yr Floodway	656.29	4914.98	2.64	581.71	580.90	0.8
Reach-1	16	100 yr	2441.29	13310.27	0.98	580.16	580.16	
Reach-1	16	100 yr Floodway	900.00	7525.01	1.73	580.75	580.16	0.6
Reach-1	15	100 yr	2629.35	14470.79	0.90	579.10	579.10	
Reach-1	15	100 yr Floodway	1374.57	10636.31	1.22	579.76	579.10	0.7
Reach-1	14	100 yr	2483.76	15834.55	0.82	578.71	578.71	
Reach-1	14	100 yr Floodway	900.00	8780.95	1.48	579.39	578.71	0.7
Reach-1	13	100 yr	2239.54	15709.28	0.83	578.00	578.00	
Reach-1	13	100 yr Floodway	957.25	8610.74	1.51	578.75	578.00	0.7
Reach-1	12.1	100 yr	2264.80	22163.40	0.59	577.65	577.65	
Reach-1	12.1	100 yr Floodway	601.00	8158.97	1.59	578.36	577.65	0.7
Reach-1	12	100 yr	1190.74	12650.84	1.03	577.28	577.28	
Reach-1	12	100 yr Floodway	411.75	5742.82	2.26	577.94	577.28	0.7
Reach-1	11.3	100 yr	326.84	3293.31	3.95	576.68	576.68	
Reach-1	11.3	100 yr Floodway	186.00	2640.01	4.92	577.30	576.68	0.6
Reach-1	11.2	100 yr	326.43	3264.80	3.98	576.59	576.59	
Reach-1	11.2	100 yr Floodway	254.90	3102.33	4.19	577.22	576.59	0.6
Reach-1	10.1	100 yr	774.09	8325.64	1.56	576.59	576.59	
Reach-1	10.1	100 yr Floodway	604.34	7748.18	1.68	577.22	576.59	0.6
Reach-1	10	100 yr	954.77	11953.24	1.09	576.48	576.48	
Reach-1	10	100 yr Floodway	500.00	7361.84	1.77	577.05	576.48	0.6
Reach-1	9.3	100 yr	819.15	8548.05	1.52	576.01	576.01	
Reach-1	9.3	100 yr Floodway	686.38	8721.23	1.49	576.61	576.01	0.6
Reach-1	9.2	100 yr	802.47	9746.38	1.33	575.82	575.82	
Reach-1	9.2	100 yr Floodway	727.82	10041.77	1.29	576.45	575.82	0.6
Reach-1	9.1	100 yr	342.67	3752.83	3.46	575.60	575.60	
Reach-1	9.1	100 yr Floodway	327.00	3923.54	3.31	576.25	575.60	0.7
Reach-1	9	100 yr	341.95	3663.80	3.55	575.34	575.34	
Reach-1	9	100 yr Floodway	169.00	2230.15	5.83	575.51	575.34	0.2
Reach-1	8	100 yr	638.35	5479.89	2.37	572.95	572.95	
Reach-1	8	100 yr Floodway	350.00	4084.17	3.18	573.26	572.95	0.3
Reach-1	7	100 yr	579.02	4180.74	3.11	569.47	569.47	
Reach-1	7	100 yr Floodway	262.48	2474.02	5.25	570.44	569.47	1.0
Reach-1	6.5	100 yr	578.98	4155.94	3.13	569.45	569.45	
Reach-1	6.5	100 yr Floodway	277.57	2507.88	5.18	570.42	569.45	1.0
Reach-1	6.4	100 yr	500.77	4011.99	3.24	569.99	569.99	
Reach-1	6.4	100 yr Floodway	400.00	3910.07	3.32	570.82	569.99	0.8
Reach-1	6.3	100 yr	191.88	2246.32	5.79	569.85	569.85	

HEC-RAS Plan: Duplicate Eff. River: RIVER-1 Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Top Wdth Act (ft)	Area (sq ft)	Vel Total (ft/s)	W.S. Elev (ft)	Base WS (ft)	Prof Delta WS (ft)
Reach-1	6.3	100 yr Floodway	211.71	2426.90	5.36	570.75	569.85	0.9
Reach-1	6.25 BR U	100 yr	186.07	2110.81	6.16	569.80	569.80	
Reach-1	6.25 BR U	100 yr Floodway	205.12	2287.93	5.68	570.71	569.80	0.9
Reach-1	6.25 BR D	100 yr	186.07	2110.81	6.16	569.80	569.80	
Reach-1	6.25 BR D	100 yr Floodway	205.12	2287.93	5.68	570.71	569.80	0.9
Reach-1	6.2	100 yr	191.67	2235.67	5.81	569.80	569.80	
Reach-1	6.2	100 yr Floodway	210.72	2417.88	5.38	570.71	569.80	0.9
Reach-1	6.1	100 yr	596.08	4565.07	2.85	568.99	568.99	
Reach-1	6.1	100 yr Floodway	405.00	3796.64	3.42	569.72	568.99	0.7
Reach-1	5	100 yr	602.13	4117.60	3.16	567.02	567.02	
Reach-1	5	100 yr Floodway	388.46	3672.04	3.54	567.97	567.02	0.9
Reach-1	4.4	100 yr	932.20	5141.40	2.53	565.21	565.21	
Reach-1	4.4	100 yr Floodway	500.00	3819.98	3.40	566.16	565.21	1.0
Reach-1	4.3	100 yr	1143.32	10153.86	1.28	564.89	564.89	
Reach-1	4.3	100 yr Floodway	578.69	7409.27	1.75	565.83	564.89	0.9
Reach-1	4	100 yr	2230.53	12961.90	1.00	564.04	564.04	
Reach-1	4	100 yr Floodway	951.49	9015.50	1.44	564.94	564.04	0.9
Reach-1	3.8	100 yr	882.87	7917.61	1.64	563.58	563.58	
Reach-1	3.8	100 yr Floodway	700.00	7321.31	1.78	564.49	563.58	0.9
Reach-1	3.7	100 yr	689.68	5963.99	2.18	562.90	562.90	
Reach-1	3.7	100 yr Floodway	456.96	5036.85	2.58	563.83	562.90	0.9
Reach-1	3.4	100 yr	1025.72	8937.47	1.45	562.60	562.60	
Reach-1	3.4	100 yr Floodway	500.00	6323.07	2.06	563.53	562.60	0.9
Reach-1	3.3	100 yr	1069.58	9189.93	1.41	562.28	562.28	
Reach-1	3.3	100 yr Floodway	500.00	5588.09	2.33	563.02	562.28	0.7
Reach-1	3	100 yr	1111.97	5508.77	2.36	561.22	561.22	
Reach-1	3	100 yr Floodway	724.34	4695.21	2.77	561.93	561.22	0.7
Reach-1	2.1	100 yr	1112.81	5795.55	2.24	560.08	560.08	
Reach-1	2.1	100 yr Floodway	370.00	3186.83	4.08	560.47	560.08	0.4
Reach-1	2	100 yr	1214.64	2452.26	5.30	556.90	556.90	
Reach-1	2	100 yr Floodway	173.00	1605.56	8.10	557.01	556.90	0.1
Reach-1	1	100 yr	372.00	2804.10	4.64	553.20	553.20	
Reach-1	1	100 yr Floodway	387.00	3183.60	4.08	554.20	553.20	1.0

HEC-RAS River: RIVER-1 Reach: Reach-1

Reach	River Sta	Profile	Plan	Top Wthd Act (ft)	Area (sq ft)	Vel Total (ft/s)	W.S. Elev (ft)	Base WS (ft)	Prof Delta WS (ft)
Reach-1	17	100 yr.	Floodway Pro Con	1591.70	5242.08	2.48	578.36	578.36	
Reach-1	17	100 yr.	Floodway Cor Eff	1591.72	5242.28	2.48	578.36	578.36	
Reach-1	17	100 yr. Floodway	Floodway Pro Con	540.05	3698.06	3.52	579.27	578.36	0.92
Reach-1	17	100 yr. Floodway	Floodway Cor Eff	540.05	3697.92	3.52	579.27	578.36	0.92
Reach-1	16	100 yr.	Floodway Pro Con	2287.48	7177.85	1.81	577.57	577.57	
Reach-1	16	100 yr.	Floodway Cor Eff	2287.49	7178.41	1.81	577.57	577.57	
Reach-1	16	100 yr. Floodway	Floodway Pro Con	708.96	4706.65	2.76	578.51	577.57	0.94
Reach-1	16	100 yr. Floodway	Floodway Cor Eff	708.96	4706.39	2.76	578.51	577.57	0.94
Reach-1	15	100 yr.	Floodway Pro Con	2497.23	6090.36	2.13	575.89	575.89	
Reach-1	15	100 yr.	Floodway Cor Eff	2498.49	6094.18	2.13	575.89	575.89	
Reach-1	15	100 yr. Floodway	Floodway Pro Con	654.50	3915.19	3.32	576.80	575.89	0.91
Reach-1	15	100 yr. Floodway	Floodway Cor Eff	654.50	3914.63	3.32	576.80	575.89	0.91
Reach-1	14	100 yr.	Floodway Pro Con	2320.14	7535.15	1.73	575.33	575.33	
Reach-1	14	100 yr.	Floodway Cor Eff	2321.25	7540.68	1.72	575.33	575.33	
Reach-1	14	100 yr. Floodway	Floodway Pro Con	586.96	4657.09	2.79	576.26	575.33	0.93
Reach-1	14	100 yr. Floodway	Floodway Cor Eff	586.96	4656.49	2.79	576.25	575.33	0.93
Reach-1	13	100 yr.	Floodway Pro Con	2187.45	8051.24	1.61	574.55	574.55	
Reach-1	13	100 yr.	Floodway Cor Eff	2187.54	8060.32	1.61	574.56	574.56	
Reach-1	13	100 yr. Floodway	Floodway Pro Con	1218.26	6342.90	2.05	575.48	574.55	0.93
Reach-1	13	100 yr. Floodway	Floodway Cor Eff	1218.26	6341.04	2.05	575.48	574.56	0.92
Reach-1	12.1	100 yr.	Floodway Pro Con	2212.00	14877.38	0.87	574.40	574.40	
Reach-1	12.1	100 yr.	Floodway Cor Eff	2212.07	14886.96	0.87	574.40	574.40	
Reach-1	12.1	100 yr. Floodway	Floodway Pro Con	1575.00	13246.30	0.98	575.36	574.40	0.96
Reach-1	12.1	100 yr. Floodway	Floodway Cor Eff	1575.00	13243.71	0.98	575.36	574.40	0.95
Reach-1	12	100 yr.	Floodway Pro Con	1165.43	8999.76	1.44	574.19	574.19	
Reach-1	12	100 yr.	Floodway Cor Eff	1165.48	9005.24	1.44	574.19	574.19	
Reach-1	12	100 yr. Floodway	Floodway Pro Con	490.00	5232.93	2.48	575.03	574.19	0.84
Reach-1	12	100 yr. Floodway	Floodway Cor Eff	490.00	5232.04	2.48	575.02	574.19	0.83
Reach-1	11.3	100 yr.	Floodway Pro Con	307.20	2206.96	5.89	573.25	573.25	
Reach-1	11.3	100 yr.	Floodway Cor Eff	307.23	2208.85	5.89	573.26	573.26	
Reach-1	11.3	100 yr. Floodway	Floodway Pro Con	176.00	2007.95	6.47	574.12	573.25	0.87
Reach-1	11.3	100 yr. Floodway	Floodway Cor Eff	176.00	2007.55	6.48	574.12	573.26	0.86
Reach-1	11.2	100 yr.	Floodway Pro Con	305.59	2122.15	6.13	572.97	572.97	
Reach-1	11.2	100 yr.	Floodway Cor Eff	305.63	2124.28	6.12	572.98	572.98	
Reach-1	11.2	100 yr. Floodway	Floodway Pro Con	186.00	2013.16	6.46	573.93	572.97	0.96
Reach-1	11.2	100 yr. Floodway	Floodway Cor Eff	186.00	2012.70	6.46	573.93	572.98	0.95
Reach-1	10.1	100 yr.	Floodway Pro Con	723.16	5827.00	2.23	573.25	573.25	
Reach-1	10.1	100 yr.	Floodway Cor Eff	723.26	5831.77	2.23	573.25	573.25	
Reach-1	10.1	100 yr. Floodway	Floodway Pro Con	450.13	4806.94	2.70	574.14	573.25	0.89
Reach-1	10.1	100 yr. Floodway	Floodway Cor Eff	450.13	4805.87	2.71	574.14	573.25	0.88
Reach-1	10	100 yr.	Floodway Pro Con	928.13	8854.38	1.47	573.19	573.19	
Reach-1	10	100 yr.	Floodway Cor Eff	928.19	8860.67	1.47	573.20	573.20	
Reach-1	10	100 yr. Floodway	Floodway Pro Con	724.01	7931.48	1.64	574.09	573.19	0.90
Reach-1	10	100 yr. Floodway	Floodway Cor Eff	724.01	7929.67	1.64	574.09	573.20	0.89
Reach-1	9.3	100 yr.	Floodway Pro Con	696.56	6066.09	2.14	572.73	572.73	
Reach-1	9.3	100 yr.	Floodway Cor Eff	696.85	6071.41	2.14	572.74	572.74	
Reach-1	9.3	100 yr. Floodway	Floodway Pro Con	375.78	4830.01	2.69	573.61	572.73	0.87
Reach-1	9.3	100 yr. Floodway	Floodway Cor Eff	375.78	4828.96	2.69	573.61	572.74	0.86
Reach-1	9.2	100 yr.	Floodway Pro Con	750.58	7267.64	1.79	572.60	572.60	
Reach-1	9.2	100 yr.	Floodway Cor Eff	750.61	7273.59	1.79	572.61	572.61	
Reach-1	9.2	100 yr. Floodway	Floodway Pro Con	605.00	7144.21	1.82	573.52	572.60	0.92
Reach-1	9.2	100 yr. Floodway	Floodway Cor Eff	605.00	7142.43	1.82	573.52	572.61	0.91
Reach-1	9.1	100 yr.	Floodway Pro Con	332.96	2592.12	5.02	572.16	572.16	
Reach-1	9.1	100 yr.	Floodway Cor Eff	332.99	2595.17	5.01	572.17	572.17	
Reach-1	9.1	100 yr. Floodway	Floodway Pro Con	243.00	2330.65	5.58	573.04	572.16	0.88

HEC-RAS River: RIVER-1 Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Plan	Top Wtdh Act (ft)	Area (sq ft)	Vel Total (ft/s)	W.S. Elev (ft)	Base WS (ft)	Prof Delta WS (ft)
Reach-1	9.1	100 yr. Floodway	Floodway Cor Eff	243.00	2329.82	5.58	573.03	572.17	0.86
Reach-1	9	100 yr.	Floodway Pro Con	331.93	2502.08	5.20	571.89	571.89	
Reach-1	9	100 yr.	Floodway Cor Eff	331.97	2505.55	5.19	571.90	571.90	
Reach-1	9	100 yr. Floodway	Floodway Pro Con	238.00	2224.73	5.84	572.74	571.89	0.85
Reach-1	9	100 yr. Floodway	Floodway Cor Eff	238.00	2223.82	5.85	572.74	571.90	0.84
Reach-1	8	100 yr.	Floodway Pro Con	559.86	3912.75	3.32	570.38	570.38	
Reach-1	8	100 yr.	Floodway Cor Eff	560.74	3923.93	3.31	570.40	570.40	
Reach-1	8	100 yr. Floodway	Floodway Pro Con	337.86	3458.19	3.76	571.34	570.38	0.96
Reach-1	8	100 yr. Floodway	Floodway Cor Eff	337.86	3456.07	3.76	571.34	570.40	0.94
Reach-1	7	100 yr.	Floodway Pro Con	579.06	4190.14	3.10	569.48	569.48	
Reach-1	7	100 yr.	Floodway Cor Eff	579.12	4207.00	3.09	569.51	569.51	
Reach-1	7	100 yr. Floodway	Floodway Pro Con	362.00	3481.71	3.73	570.46	569.48	0.98
Reach-1	7	100 yr. Floodway	Floodway Cor Eff	362.00	3478.66	3.74	570.45	569.51	0.94
Reach-1	6.5	100 yr.	Floodway Pro Con	578.95	4148.06	3.13	569.43	569.43	
Reach-1	6.5	100 yr.	Floodway Cor Eff	579.02	4165.19	3.12	569.46	569.46	
Reach-1	6.5	100 yr. Floodway	Floodway Pro Con	352.00	3528.47	3.68	570.44	569.43	1.00
Reach-1	6.5	100 yr. Floodway	Floodway Cor Eff	352.00	3525.48	3.69	570.43	569.46	0.96
Reach-1	6.4	100 yr.	Floodway Pro Con	659.99	4309.66	3.02	569.49	569.49	
Reach-1	6.4	100 yr.	Floodway Cor Eff	660.25	4328.72	3.00	569.52	569.52	
Reach-1	6.4	100 yr. Floodway	Floodway Pro Con	320.00	3198.74	4.06	570.50	569.49	1.00
Reach-1	6.4	100 yr. Floodway	Floodway Cor Eff	320.00	3196.07	4.07	570.49	569.52	0.96
Reach-1	6.3	100 yr.	Floodway Pro Con	337.87	1779.19	7.40	567.73	567.73	
Reach-1	6.3	100 yr.	Floodway Cor Eff	330.86	1774.21	7.54	567.71	567.71	
Reach-1	6.3	100 yr. Floodway	Floodway Pro Con	203.14	1490.56	8.72	568.72	567.73	1.00
Reach-1	6.3	100 yr. Floodway	Floodway Cor Eff	203.14	1487.49	8.74	568.71	567.71	1.00
Reach-1	6.25 BR U	100 yr.	Floodway Pro Con	279.61	1300.02	10.00	567.12	567.12	
Reach-1	6.25 BR U	100 yr.	Floodway Cor Eff	300.44	1380.16	9.42	567.10	567.10	
Reach-1	6.25 BR U	100 yr. Floodway	Floodway Pro Con	194.88	1281.72	10.14	568.04	567.12	0.93
Reach-1	6.25 BR U	100 yr. Floodway	Floodway Cor Eff	193.54	1283.30	10.13	568.04	567.10	0.95
Reach-1	6.25 BR D	100 yr.	Floodway Pro Con	279.61	1300.02	10.00	567.12	567.12	
Reach-1	6.25 BR D	100 yr.	Floodway Cor Eff	299.60	1377.13	9.44	567.10	567.10	
Reach-1	6.25 BR D	100 yr. Floodway	Floodway Pro Con	132.88	1105.93	11.75	568.04	567.12	0.93
Reach-1	6.25 BR D	100 yr. Floodway	Floodway Cor Eff	133.21	1112.25	11.69	568.04	567.10	0.95
Reach-1	6.2	100 yr.	Floodway Pro Con	337.48	1566.67	8.38	567.12	567.12	
Reach-1	6.2	100 yr.	Floodway Cor Eff	330.46	1560.06	8.55	567.10	567.10	
Reach-1	6.2	100 yr. Floodway	Floodway Pro Con	140.88	1177.25	11.04	568.04	567.12	0.93
Reach-1	6.2	100 yr. Floodway	Floodway Cor Eff	140.88	1177.25	11.04	568.04	567.10	0.95
Reach-1	6.1	100 yr.	Floodway Pro Con	462.55	2048.53	6.35	567.01	567.01	
Reach-1	6.1	100 yr.	Floodway Cor Eff	462.55	2048.53	6.35	567.01	567.01	
Reach-1	6.1	100 yr. Floodway	Floodway Pro Con	247.30	1605.22	8.10	568.00	567.01	0.99
Reach-1	6.1	100 yr. Floodway	Floodway Cor Eff	247.30	1605.22	8.10	568.00	567.01	0.99
Reach-1	5	100 yr.	Floodway Pro Con	585.21	3001.97	4.33	565.14	565.14	
Reach-1	5	100 yr.	Floodway Cor Eff	585.21	3001.97	4.33	565.14	565.14	
Reach-1	5	100 yr. Floodway	Floodway Pro Con	160.00	1890.15	6.88	566.08	565.14	0.93
Reach-1	5	100 yr. Floodway	Floodway Cor Eff	160.00	1890.15	6.88	566.08	565.14	0.93
Reach-1	4.4	100 yr.	Floodway Pro Con	820.52	2573.82	5.05	562.33	562.33	
Reach-1	4.4	100 yr.	Floodway Cor Eff	820.52	2573.82	5.05	562.33	562.33	
Reach-1	4.4	100 yr. Floodway	Floodway Pro Con	320.00	1867.72	6.96	563.29	562.33	0.96
Reach-1	4.4	100 yr. Floodway	Floodway Cor Eff	320.00	1867.72	6.96	563.29	562.33	0.96
Reach-1	4.3	100 yr.	Floodway Pro Con	1051.87	7676.37	1.69	562.61	562.61	
Reach-1	4.3	100 yr.	Floodway Cor Eff	1051.87	7676.37	1.69	562.61	562.61	
Reach-1	4.3	100 yr. Floodway	Floodway Pro Con	520.00	5597.94	2.32	563.60	562.61	0.99
Reach-1	4.3	100 yr. Floodway	Floodway Cor Eff	520.00	5597.94	2.32	563.60	562.61	0.99
Reach-1	4	100 yr.	Floodway Pro Con	1902.86	8674.37	1.50	561.97	561.97	

HEC-RAS River: RIVER-1 Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Plan	Top Wdth Act (ft)	Area (sq ft)	Vel Total (ft/s)	W.S. Elev (ft)	Base WS (ft)	Prof Delta WS (ft)
Reach-1	4	100 yr.	Floodway Cor Eff	1902.86	8674.37	1.50	561.97	561.97	
Reach-1	4	100 yr. Floodway	Floodway Pro Con	870.00	6401.31	2.03	562.92	561.97	0.95
Reach-1	4	100 yr. Floodway	Floodway Cor Eff	870.00	6401.31	2.03	562.92	561.97	0.95
Reach-1	3.8	100 yr.	Floodway Pro Con	849.64	6224.23	2.09	561.63	561.63	
Reach-1	3.8	100 yr.	Floodway Cor Eff	849.64	6224.23	2.09	561.63	561.63	
Reach-1	3.8	100 yr. Floodway	Floodway Pro Con	586.47	5433.02	2.39	562.58	561.63	0.95
Reach-1	3.8	100 yr. Floodway	Floodway Cor Eff	586.47	5433.02	2.39	562.58	561.63	0.95
Reach-1	3.7	100 yr.	Floodway Pro Con	674.29	4728.98	2.75	561.09	561.09	
Reach-1	3.7	100 yr.	Floodway Cor Eff	674.29	4728.98	2.75	561.09	561.09	
Reach-1	3.7	100 yr. Floodway	Floodway Pro Con	417.25	3857.39	3.37	562.02	561.09	0.92
Reach-1	3.7	100 yr. Floodway	Floodway Cor Eff	417.25	3857.39	3.37	562.02	561.09	0.92
Reach-1	3.4	100 yr.	Floodway Pro Con	1010.56	7174.37	1.81	560.86	560.86	
Reach-1	3.4	100 yr.	Floodway Cor Eff	1010.56	7174.37	1.81	560.86	560.86	
Reach-1	3.4	100 yr. Floodway	Floodway Pro Con	473.32	5251.44	2.48	561.80	560.86	0.94
Reach-1	3.4	100 yr. Floodway	Floodway Cor Eff	473.32	5251.44	2.48	561.80	560.86	0.94
Reach-1	3.3	100 yr.	Floodway Pro Con	1048.48	7471.14	1.74	560.65	560.65	
Reach-1	3.3	100 yr.	Floodway Cor Eff	1048.48	7471.14	1.74	560.65	560.65	
Reach-1	3.3	100 yr. Floodway	Floodway Pro Con	930.00	7980.71	1.63	561.66	560.65	1.00
Reach-1	3.3	100 yr. Floodway	Floodway Cor Eff	930.00	7980.71	1.63	561.66	560.65	1.00
Reach-1	3	100 yr.	Floodway Pro Con	1062.55	3720.61	3.49	559.58	559.58	
Reach-1	3	100 yr.	Floodway Cor Eff	1062.55	3720.61	3.49	559.58	559.58	
Reach-1	3	100 yr. Floodway	Floodway Pro Con	430.00	2457.67	5.29	560.46	559.58	0.88
Reach-1	3	100 yr. Floodway	Floodway Cor Eff	430.00	2457.67	5.29	560.46	559.58	0.88
Reach-1	2.1	100 yr.	Floodway Pro Con	958.96	4320.81	3.01	558.65	558.65	
Reach-1	2.1	100 yr.	Floodway Cor Eff	958.96	4320.81	3.01	558.65	558.65	
Reach-1	2.1	100 yr. Floodway	Floodway Pro Con	220.00	2001.26	6.50	558.91	558.65	0.25
Reach-1	2.1	100 yr. Floodway	Floodway Cor Eff	220.00	2001.26	6.50	558.91	558.65	0.25
Reach-1	2	100 yr.	Floodway Pro Con	260.34	1375.40	9.45	555.30	555.30	
Reach-1	2	100 yr.	Floodway Cor Eff	260.34	1375.40	9.45	555.30	555.30	
Reach-1	2	100 yr. Floodway	Floodway Pro Con	167.86	1355.23	9.59	555.55	555.30	0.25
Reach-1	2	100 yr. Floodway	Floodway Cor Eff	167.86	1355.23	9.59	555.55	555.30	0.25
Reach-1	1	100 yr.	Floodway Pro Con	372.00	2804.10	4.64	553.20	553.20	
Reach-1	1	100 yr.	Floodway Cor Eff	372.00	2804.10	4.64	553.20	553.20	
Reach-1	1	100 yr. Floodway	Floodway Pro Con	376.60	3179.10	4.09	554.20	553.20	1.00
Reach-1	1	100 yr. Floodway	Floodway Cor Eff	376.60	3179.10	4.09	554.20	553.20	1.00

Plan: Duplicate Eff. RIVER-1 Reach-1 RS: 6.25 Profile: 10 yr

E.G. US. (ft)	567.41	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	567.08	E.G. Elev (ft)	567.43	567.43
Q Total (cfs)	8000.00	W.S. Elev (ft)	567.05	567.05
Q Bridge (cfs)	8000.00	Crit W.S. (ft)	556.87	556.87
Q Weir (cfs)		Max Chl Dpth (ft)	19.55	19.55
Weir Sta Lft (ft)		Vel Total (ft/s)	4.96	4.96
Weir Sta Rgt (ft)		Flow Area (sq ft)	1614.26	1614.26
Weir Submerg		Froude # Chl	0.28	0.28
Weir Max Depth (ft)		Specif Force (cu ft)	13548.18	13548.18
Min El Weir Flow (ft)	584.51	Hydr Depth (ft)	9.45	9.45
Min El Prs (ft)	582.50	W.P. Total (ft)	219.44	219.44
Delta EG (ft)	0.03	Conv. Total (cfs)	151214.6	151214.6
Delta WS (ft)	0.04	Top Width (ft)	170.89	170.89
BR Open Area (sq ft)	5497.00	Frctn Loss (ft)		
BR Open Vel (ft/s)	4.96	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	1.29	1.29
Br Sel Method	Yarnell	Power Total (lb/ft s)	0.00	0.00

Plan: Duplicate Eff. RIVER-1 Reach-1 RS: 6.25 Profile: 50 yr

E.G. US. (ft)	570.23	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	569.82	E.G. Elev (ft)	570.25	570.25
Q Total (cfs)	11500.00	W.S. Elev (ft)	569.79	569.79
Q Bridge (cfs)	11500.00	Crit W.S. (ft)	559.11	559.11
Q Weir (cfs)		Max Chl Dpth (ft)	22.29	22.29
Weir Sta Lft (ft)		Vel Total (ft/s)	5.45	5.45
Weir Sta Rgt (ft)		Flow Area (sq ft)	2108.95	2108.95
Weir Submerg		Froude # Chl	0.29	0.29
Weir Max Depth (ft)		Specif Force (cu ft)	19355.63	19355.63
Min El Weir Flow (ft)	584.51	Hydr Depth (ft)	11.34	11.34
Min El Prs (ft)	582.50	W.P. Total (ft)	241.42	241.42
Delta EG (ft)	0.04	Conv. Total (cfs)	221531.2	221531.2
Delta WS (ft)	0.04	Top Width (ft)	186.03	186.03
BR Open Area (sq ft)	5497.00	Frctn Loss (ft)		
BR Open Vel (ft/s)	5.45	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	1.47	1.47
Br Sel Method	Yarnell	Power Total (lb/ft s)	0.00	0.00

Plan: Duplicate Eff. RIVER-1 Reach-1 RS: 6.25 Profile: 100 yr

E.G. US. (ft)	570.37	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	569.85	E.G. Elev (ft)	570.38	570.38
Q Total (cfs)	13000.00	W.S. Elev (ft)	569.80	569.80
Q Bridge (cfs)	13000.00	Crit W.S. (ft)	559.98	559.99
Q Weir (cfs)		Max Chl Dpth (ft)	22.30	22.30
Weir Sta Lft (ft)		Vel Total (ft/s)	6.16	6.16
Weir Sta Rgt (ft)		Flow Area (sq ft)	2110.81	2110.81
Weir Submerg		Froude # Chl	0.32	0.32
Weir Max Depth (ft)		Specif Force (cu ft)	19915.73	19915.73
Min El Weir Flow (ft)	584.51	Hydr Depth (ft)	11.34	11.34
Min El Prs (ft)	582.50	W.P. Total (ft)	241.49	241.49
Delta EG (ft)	0.05	Conv. Total (cfs)	221818.7	221818.7
Delta WS (ft)	0.06	Top Width (ft)	186.07	186.07
BR Open Area (sq ft)	5497.00	Frctn Loss (ft)		
BR Open Vel (ft/s)	6.16	C & E Loss (ft)		

Plan: Duplicate Eff. RIVER-1 Reach-1 RS: 6.25 Profile: 100 yr (Continued)

Coef of Q		Shear Total (lb/sq ft)	1.87	1.87
Br Sel Method	Yarnell	Power Total (lb/ft s)	0.00	0.00

Plan: Duplicate Eff. RIVER-1 Reach-1 RS: 6.25 Profile: 500 yr

E.G. US. (ft)	572.06	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	571.43	E.G. Elev (ft)	572.07	572.07
Q Total (cfs)	16400.00	W.S. Elev (ft)	571.36	571.36
Q Bridge (cfs)	16400.00	Crit W.S. (ft)	561.85	561.86
Q Weir (cfs)		Max Chl Dpth (ft)	23.86	23.86
Weir Sta Lft (ft)		Vel Total (ft/s)	6.76	6.76
Weir Sta Rgt (ft)		Flow Area (sq ft)	2426.54	2426.54
Weir Submerg		Froude # Chl	0.36	0.36
Weir Max Depth (ft)		Specif Force (cu ft)	24406.71	24406.71
Min El Weir Flow (ft)	584.51	Hydr Depth (ft)	11.02	11.02
Min El Prs (ft)	582.50	W.P. Total (ft)	279.15	279.15
Delta EG (ft)	0.06	Conv. Total (cfs)	254058.7	254058.7
Delta WS (ft)	0.07	Top Width (ft)	220.22	220.22
BR Open Area (sq ft)	5497.00	Frctn Loss (ft)		
BR Open Vel (ft/s)	6.76	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	2.26	2.26
Br Sel Method	Yarnell	Power Total (lb/ft s)	0.00	0.00

Plan: Corr Eff RIVER-1 Reach-1 RS: 6.25 Profile: 10 yr

E.G. US. (ft)	567.01	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	565.59	E.G. Elev (ft)	566.88	566.89
Q Total (cfs)	8000.00	W.S. Elev (ft)	564.95	564.95
Q Bridge (cfs)	8000.00	Crit W.S. (ft)	563.16	563.16
Q Weir (cfs)		Max Chl Dpth (ft)	10.92	10.92
Weir Sta Lft (ft)		Vel Total (ft/s)	10.34	10.35
Weir Sta Rgt (ft)		Flow Area (sq ft)	773.91	772.68
Weir Submerg		Froude # Chl	0.68	0.69
Weir Max Depth (ft)		Specif Force (cu ft)	6089.25	6089.72
Min El Weir Flow (ft)	584.50	Hydr Depth (ft)	5.15	5.17
Min El Prs (ft)	582.50	W.P. Total (ft)	194.63	193.79
Delta EG (ft)	0.35	Conv. Total (cfs)	76435.7	76415.0
Delta WS (ft)	0.63	Top Width (ft)	150.35	149.51
BR Open Area (sq ft)	6268.84	Frctn Loss (ft)		
BR Open Vel (ft/s)	10.35	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	2.72	2.73
Br Sel Method	Yarnell	Power Total (lb/ft s)	4402.15	4402.15

Plan: Corr Eff RIVER-1 Reach-1 RS: 6.25 Profile: 50 yr

E.G. US. (ft)	568.86	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	567.22	E.G. Elev (ft)	568.89	568.89
Q Total (cfs)	11500.00	W.S. Elev (ft)	566.56	566.56
Q Bridge (cfs)	11500.00	Crit W.S. (ft)	566.02	566.02
Q Weir (cfs)		Max Chl Dpth (ft)	12.52	12.52
Weir Sta Lft (ft)		Vel Total (ft/s)	9.44	9.46
Weir Sta Rgt (ft)		Flow Area (sq ft)	1217.61	1215.04
Weir Submerg		Froude # Chl	0.71	0.71
Weir Max Depth (ft)		Specif Force (cu ft)	9173.79	9174.48
Min El Weir Flow (ft)	584.50	Hydr Depth (ft)	4.07	4.08
Min El Prs (ft)	582.50	W.P. Total (ft)	376.60	375.76
Delta EG (ft)	0.23	Conv. Total (cfs)	105305.2	105240.7
Delta WS (ft)	0.67	Top Width (ft)	298.99	298.15
BR Open Area (sq ft)	6268.84	Frctn Loss (ft)		
BR Open Vel (ft/s)	9.46	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	2.41	2.41
Br Sel Method	Yarnell	Power Total (lb/ft s)	4402.15	4402.15

Plan: Corr Eff RIVER-1 Reach-1 RS: 6.25 Profile: 100 yr

E.G. US. (ft)	569.49	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	567.71	E.G. Elev (ft)	569.57	569.58
Q Total (cfs)	13000.00	W.S. Elev (ft)	567.10	567.10
Q Bridge (cfs)	13000.00	Crit W.S. (ft)	566.67	566.67
Q Weir (cfs)		Max Chl Dpth (ft)	13.06	13.06
Weir Sta Lft (ft)		Vel Total (ft/s)	9.42	9.44
Weir Sta Rgt (ft)		Flow Area (sq ft)	1380.16	1377.13
Weir Submerg		Froude # Chl	0.72	0.72
Weir Max Depth (ft)		Specif Force (cu ft)	10539.20	10539.86
Min El Weir Flow (ft)	584.50	Hydr Depth (ft)	4.59	4.60
Min El Prs (ft)	582.50	W.P. Total (ft)	390.35	389.51
Delta EG (ft)	0.20	Conv. Total (cfs)	116933.5	116850.7
Delta WS (ft)	0.61	Top Width (ft)	300.44	299.60
BR Open Area (sq ft)	6268.84	Frctn Loss (ft)		
BR Open Vel (ft/s)	9.44	C & E Loss (ft)		

Plan: Corr Eff RIVER-1 Reach-1 RS: 6.25 Profile: 100 yr (Continued)

Coef of Q		Shear Total (lb/sq ft)	2.73	2.73
Br Sel Method	Yarnell	Power Total (lb/ft s)	4402.15	4402.15

Plan: Corr Eff RIVER-1 Reach-1 RS: 6.25 Profile: 500 yr

E.G. US. (ft)	570.79	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	568.76	E.G. Elev (ft)	570.95	570.96
Q Total (cfs)	16400.00	W.S. Elev (ft)	568.20	568.20
Q Bridge (cfs)	16400.00	Crit W.S. (ft)	567.80	567.78
Q Weir (cfs)		Max Chl Dpth (ft)	14.17	14.17
Weir Sta Lft (ft)		Vel Total (ft/s)	9.58	9.60
Weir Sta Rgt (ft)		Flow Area (sq ft)	1712.69	1708.73
Weir Submerg		Froude # Chl	0.74	0.74
Weir Max Depth (ft)		Specif Force (cu ft)	13795.19	13795.61
Min El Weir Flow (ft)	584.50	Hydr Depth (ft)	5.64	5.64
Min El Prs (ft)	582.50	W.P. Total (ft)	418.59	417.75
Delta EG (ft)	0.18	Conv. Total (cfs)	142491.5	142366.9
Delta WS (ft)	0.56	Top Width (ft)	303.57	302.73
BR Open Area (sq ft)	6268.84	Frctn Loss (ft)		
BR Open Vel (ft/s)	9.60	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	3.38	3.39
Br Sel Method	Yarnell	Power Total (lb/ft s)	4402.15	4402.15

Plan: Prop Cond RIVER-1 Reach-1 RS: 6.25 Profile: 10 yr

		Element	Inside BR US	Inside BR DS
E.G. US. (ft)	567.04			
W.S. US. (ft)	565.66	E.G. Elev (ft)	566.95	566.95
Q Total (cfs)	8000.00	W.S. Elev (ft)	564.96	564.96
Q Bridge (cfs)	8000.00	Crit W.S. (ft)	563.27	563.27
Q Weir (cfs)		Max Chl Dpth (ft)	10.92	10.92
Weir Sta Lft (ft)		Vel Total (ft/s)	10.88	10.88
Weir Sta Rgt (ft)		Flow Area (sq ft)	734.97	734.97
Weir Submerg		Froude # Chl	0.70	0.70
Weir Max Depth (ft)		Specif Force (cu ft)	6075.15	6075.15
Min El Weir Flow (ft)	587.51	Hydr Depth (ft)	5.84	5.84
Min El Prs (ft)	582.50	W.P. Total (ft)	159.81	159.81
Delta EG (ft)	0.39	Conv. Total (cfs)	77374.9	77374.9
Delta WS (ft)	0.71	Top Width (ft)	125.82	125.82
BR Open Area (sq ft)	8453.63	Frctn Loss (ft)		
BR Open Vel (ft/s)	10.88	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	3.07	3.07
Br Sel Method	Yarnell	Power Total (lb/ft s)	4402.15	4402.15

Plan: Prop Cond RIVER-1 Reach-1 RS: 6.25 Profile: 50 yr

		Element	Inside BR US	Inside BR DS
E.G. US. (ft)	568.88			
W.S. US. (ft)	567.32	E.G. Elev (ft)	569.03	569.03
Q Total (cfs)	11500.00	W.S. Elev (ft)	566.57	566.57
Q Bridge (cfs)	11500.00	Crit W.S. (ft)	566.03	566.03
Q Weir (cfs)		Max Chl Dpth (ft)	12.54	12.54
Weir Sta Lft (ft)		Vel Total (ft/s)	10.08	10.08
Weir Sta Rgt (ft)		Flow Area (sq ft)	1140.40	1140.40
Weir Submerg		Froude # Chl	0.73	0.73
Weir Max Depth (ft)		Specif Force (cu ft)	9166.77	9166.77
Min El Weir Flow (ft)	587.51	Hydr Depth (ft)	4.17	4.17
Min El Prs (ft)	582.50	W.P. Total (ft)	321.13	321.13
Delta EG (ft)	0.27	Conv. Total (cfs)	108077.3	108077.3
Delta WS (ft)	0.75	Top Width (ft)	273.75	273.75
BR Open Area (sq ft)	8453.63	Frctn Loss (ft)		
BR Open Vel (ft/s)	10.08	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	2.51	2.51
Br Sel Method	Yarnell	Power Total (lb/ft s)	4402.15	4402.15

Plan: Prop Cond RIVER-1 Reach-1 RS: 6.25 Profile: 100 yr

		Element	Inside BR US	Inside BR DS
E.G. US. (ft)	569.50			
W.S. US. (ft)	567.81	E.G. Elev (ft)	569.74	569.74
Q Total (cfs)	13000.00	W.S. Elev (ft)	567.12	567.12
Q Bridge (cfs)	13000.00	Crit W.S. (ft)	566.74	566.74
Q Weir (cfs)		Max Chl Dpth (ft)	13.08	13.08
Weir Sta Lft (ft)		Vel Total (ft/s)	10.07	10.07
Weir Sta Rgt (ft)		Flow Area (sq ft)	1290.60	1290.60
Weir Submerg		Froude # Chl	0.74	0.74
Weir Max Depth (ft)		Specif Force (cu ft)	10528.25	10528.25
Min El Weir Flow (ft)	587.51	Hydr Depth (ft)	4.68	4.68
Min El Prs (ft)	582.50	W.P. Total (ft)	327.69	327.69
Delta EG (ft)	0.24	Conv. Total (cfs)	120625.5	120625.5
Delta WS (ft)	0.69	Top Width (ft)	275.61	275.61
BR Open Area (sq ft)	8453.63	Frctn Loss (ft)		
BR Open Vel (ft/s)	10.07	C & E Loss (ft)		

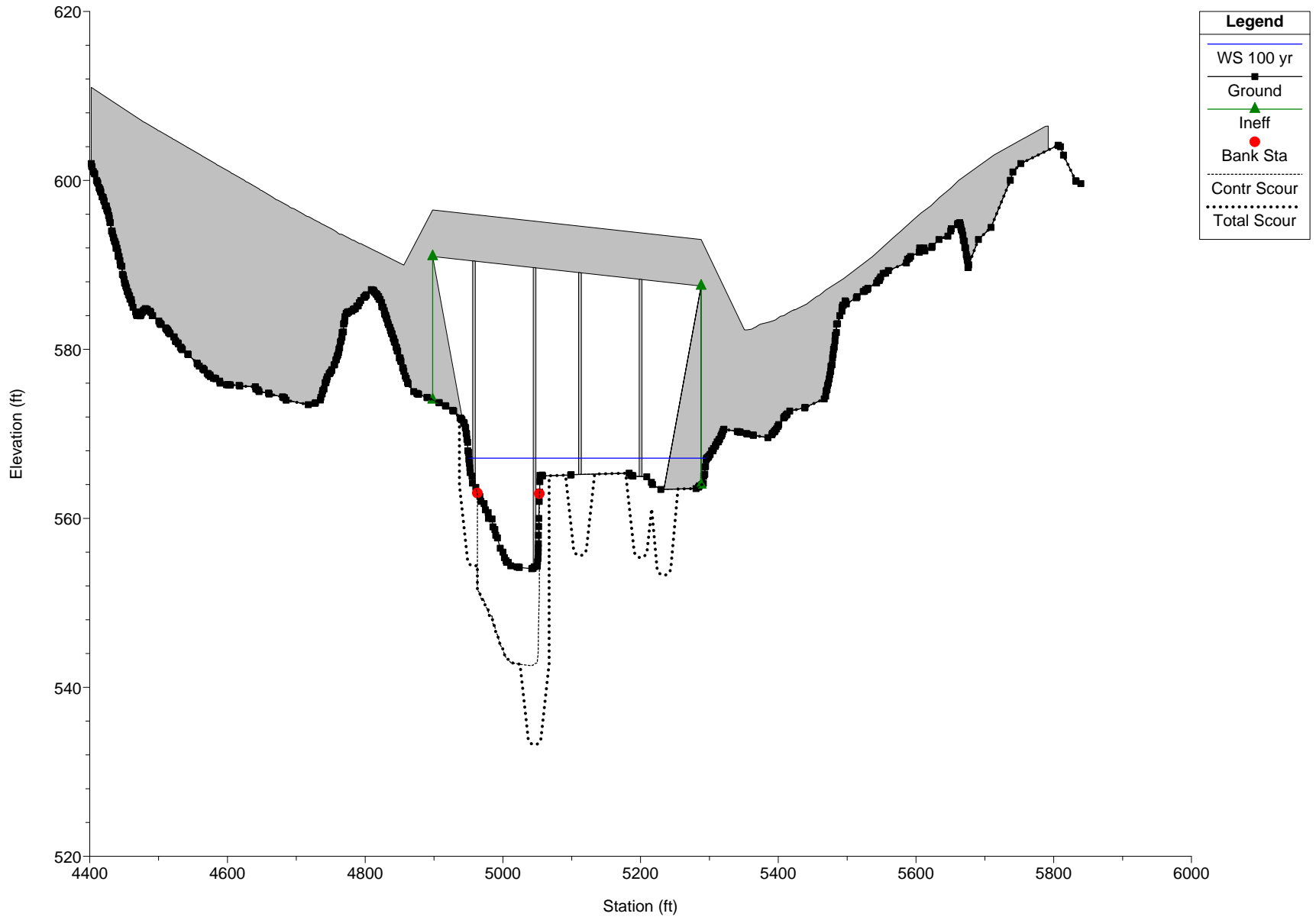
Plan: Prop Cond RIVER-1 Reach-1 RS: 6.25 Profile: 100 yr (Continued)

Coef of Q		Shear Total (lb/sq ft)	2.86	2.86
Br Sel Method	Yarnell	Power Total (lb/ft s)	4402.15	4402.15

Plan: Prop Cond RIVER-1 Reach-1 RS: 6.25 Profile: 500 yr

E.G. US. (ft)	570.79	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	568.86	E.G. Elev (ft)	571.15	571.15
Q Total (cfs)	16400.00	W.S. Elev (ft)	568.23	568.23
Q Bridge (cfs)	16400.00	Crit W.S. (ft)	567.92	567.92
Q Weir (cfs)		Max Chl Dpth (ft)	14.19	14.19
Weir Sta Lft (ft)		Vel Total (ft/s)	10.26	10.26
Weir Sta Rgt (ft)		Flow Area (sq ft)	1598.73	1598.73
Weir Submerg		Froude # Chl	0.76	0.76
Weir Max Depth (ft)		Specif Force (cu ft)	13756.72	13756.72
Min El Weir Flow (ft)	587.51	Hydr Depth (ft)	5.72	5.72
Min El Prs (ft)	582.50	W.P. Total (ft)	341.34	341.34
Delta EG (ft)	0.21	Conv. Total (cfs)	148697.2	148697.2
Delta WS (ft)	0.63	Top Width (ft)	279.59	279.59
BR Open Area (sq ft)	8453.63	Frctn Loss (ft)		
BR Open Vel (ft/s)	10.26	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	3.56	3.56
Br Sel Method	Yarnell	Power Total (lb/ft s)	4402.15	4402.15

Bridge Scour RS = 6.25



Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):	4.30	9.78	4.26
Approach Velocity (ft/s):	1.09	4.17	1.10
Br Average Depth (ft):	2.36	10.32	2.12
BR Opening Flow (cfs):	39.29	11969.34	991.37
BR Top WD (ft):	8.52	85.85	181.25
Grain Size D50 (mm):	2.3	2.3	2.3
Approach Flow (cfs):	251.06	11197.47	1551.47
Approach Top WD (ft):	53.80	274.54	331.93
K1 Coefficient:	0.590	0.640	0.590
Results			
Scour Depth Ys (ft):	0.00	11.47	0.00
Critical Velocity (ft/s):	2.80	3.21	2.80
Equation:	Clear	Live	Clear

Pier Scour

All piers have the same scour depth

Input Data

Pier Shape:	Round nose
Pier Width (ft):	4.00
Grain Size D50 (mm):	2.30000
Depth Upstream (ft):	11.12
Velocity Upstream (ft/s):	11.21
K1 Nose Shape:	1.00
Pier Angle:	0.00
Pier Length (ft):	48.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	14.60000
K4 Armouring Coef:	1.00

Results

Scour Depth Ys (ft):	9.60
Froude #:	0.59
Equation:	CSU equation
Pier Scour Limited to Maximum of $Y_s = 2.4 * a$	

Abutment Scour

	Left	Right
Input Data		
Station at Toe (ft):	4941.90	5233.86
Toe Sta at appr (ft):	4838.07	5314.72
Abutment Length (ft):	53.80	331.93
Depth at Toe (ft):	-3.68	4.37
K1 Shape Coef:	0.55 - Spill-through abutment	
Degree of Skew (degrees):	90.00	90.00
K2 Skew Coef:	1.00	1.00
Projected Length L' (ft):	53.80	331.93
Avg Depth Obstructed Ya (ft):	4.30	4.26
Flow Obstructed Qe (cfs):	251.06	1551.47
Area Obstructed Ae (sq ft):	231.07	1414.66
Results		
Scour Depth Ys (ft):		10.17
Froude #:		0.19
Equation:	Default	HIRE
Combined Scour Depths		
Pier Scour + Contraction Scour (ft):		
	Left Bank:	9.60
	Channel:	21.07
	Right Bank:	9.60
Right abutment scour + contraction scour (ft):	10.17	

HEC-RAS Versi on 4. 1. 0 Jan 2010
U. S. Army Corps of Engi neers
Hydrol ogi c Engi neeri ng Center
609 Second Street
Davi s, Cal i forni a

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

PROJECT DATA

Project Title: 8. 10. 11 - Buffal o Creek S83 - ABW
Project File : 81011_Buffal oCreekS83_ABW. prj
Run Date and Time: 8/25/2011 10: 40: 56 AM

Project i n Engl i sh uni ts

Project Descri pti on:

BUFFALO CREEK
WATER SURFACE PROFILE
BUFFALO CREEK, CHEROKEE CO. 10-YEAR
FLOOD

PLAN DATA

Pl an Ti tle: Dupli cate Effecti ve

Pl an Fi le : q: \60191787\400 Tech I nfo_Di sci pl i nes\405 Hydrol ogy &
Drai nage\HecRas\81011_Buffal oCreekS83_ABW. p04

Geometry Ti tle: I mported Geom 11

Geometry Fi le : q: \60191787\400 Tech I nfo_Di sci pl i nes\405 Hydrol ogy &
Drai nage\HecRas\81011_Buffal oCreekS83_ABW. g05

Flow Ti tle : Effecti ve Fl ows

Flow Fi le : q: \60191787\400 Tech I nfo_Di sci pl i nes\405 Hydrol ogy &
Drai nage\HecRas\81011_Buffal oCreekS83_ABW. f02

Pl an Descri pti on:

BUFFALO CREEK
WATER SURFACE PROFILE
BUFFALO CREEK, CHEROKEE CO. 10-YEAR
FLOOD

BUFFALO CREEK
WATER SURFACE PROFILE
BUFFALO CREEK, CHEROKEE CO.
10-YEAR FLOOD

BUFFALO CREEK
WATER SURFACE PROFILE
BUFFALO CREEK, CHEROKEE
CO. 10-YEAR FLOOD

BUFFALO CREEK
 WATER SURFACE PROFILE
 BUFFALO CREEK,
 CHEROKEE CO. 10-YEAR FLOOD
 BUFFALO CREEK
 WATER SURFACE PROFILE
 BUFFALO
 CREEK, CHEROKEE CO. 10-YEAR FLOOD
 BUFFALO CREEK
 WATER SURFACE PROFILE

 BUFFALO CREEK, CHEROKEE CO. 100-YEAR FLOOD FW
 BUFFALO CREEK
 WATER SURFACE
 PROFILE
 BUFFALO CREEK, CHEROKEE CO. 100-YEAR
 BUFFALO CREEK
 WATER SURFACE
 PROFILE
 BUFFALO CREEK, CHEROKEE CO. 100-YEAR
 BUFFALO CREEK
 WATER SURFACE
 PROFILE
 BUFFALO CREEK, CHEROKEE CO. 100-YEAR
 BUFFALO CREEK
 WATER SURFACE
 PROFILE
 BUFFALO CREEK, CHEROKEE CO. 100-YEAR
 BUFFALO CREEK
 WATER SURFACE
 PROFILE
 BUFFALO CREEK, CHEROKEE CO. 100-YEAR
 BUFFALO CREEK
 WATER SURFACE
 PROFILE
 BUFFALO CREEK, CHEROKEE CO. 100-YEAR

Plan Summary Information:

Number of:	Cross Sections =	34	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

Encroachment Data

Equal Conveyance =	True
Left Offset =	0
Right Offset =	0

River =	RIVER-1	Reach =	Reach-1	
RS	Profile	Method	Value1	Value2
17	50 yr	1	645	1301.29
16	50 yr	1	950	1850
15	50 yr	1	1177.08	2551.65

81011_BuffaloCreekS83_ABWD. rep

14	50 yr	1	1500	2400
13	50 yr	1	1271.53	2228.78
12.1	50 yr	1	1632	2233
12	50 yr	1	978.25	1390
11.3	50 yr	1	214	400
11.2	50 yr	1	145.1	400
10.1	50 yr	1	155	759.34
10	50 yr	1	430	930
9.3	50 yr	1	63.48	749.86
9.2	50 yr	1	142.3	870.12
9.1	50 yr	1	25.5	352.5
9	50 yr	1	40	209
8	50 yr	1	25	375
7	50 yr	1	91.52	354
6.5	50 yr	1	77.43	355
6.4	50 yr	1	50	450
6.3	50 yr	1	0	323
6.2	50 yr	1	0	323
6.1	50 yr	1	125	530
5	50 yr	1	280.39	668.85
4.4	50 yr	1	455	955
4.3	50 yr	1	751.31	1330
4	50 yr	1	724.35	1675.84
3.8	50 yr	1	256	956
3.7	50 yr	1	143.04	600
3.4	50 yr	1	50	550
3.3	50 yr	1	120	620
3	50 yr	1	292.83	1017.17
2.1	50 yr	1	82	452
2	50 yr	1	1120	1293
1	50 yr	1	678	1092

FLOW DATA

Flow Title: Effective Flows
 Flow File : g:\60191787\400 Tech Info_Disciplines\405 Hydrology & Drainage\HecRas\81011_BuffaloCreekS83_ABW. f02

Flow Data (cfs)

River	Reach	RS	10 yr	50 yr
100 yr RIVER-1	500 yr Reach-1	17	8000	11500
13000	16400			

Boundary Conditions

River Downstream	Reach	Profile	Upstream
RIVER-1	Reach-1	10 yr	
Known WS = 550.99			
RIVER-1	Reach-1	50 yr	
Known WS = 552.61			
RIVER-1	Reach-1	100 yr	

Known WS = 553.2
 RIVER-1 Reach-1 500 yr
 Known WS = 554.48

GEOMETRY DATA

Geometry Title: Imported Geom 11
 Geometry File : q:\60191787\400 Tech Info_Disciplines\405 Hydrology & Drainage\HecRas\81011_BuffaloCreekS83_ABW. g05

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 17

INPUT

Description:

Station		Elevation		Data		num= 15			
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	584	20	580	50	576	550	574	810	572
825	568	830	566.5	890	566.5	895	568	910	572
935	576	1100	577.5	1300	576	1850	580	1910	600

Manning's n		Values		num= 4			
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	1000	550	.2	810	.06	935	.2

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	810	910		630	550		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 16

INPUT

Description:

Station		Elevation		Data num= 14					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	587.5	249	584	395	580	578	576	1655	572
1700	568	1720	565.5	1763	566	1785	568	1800	572
1960	576	2770	576	2830	580	2870	600		

Manning's n		Values		num= 4			
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	1000	1234	.2	1700	.06	1785	.2

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1700	1785		1140	1200		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 15

81011_BuffaloCreekS83_ABWD. rep

INPUT

Description:

Station	Elevation	Data	num=	18	Station	Elevation	Station	Elevation	Station	Elevation
0	584	59	580	91	576	1100	574.6	1551	572	
2080	572	2160	568	2170	565	2240	565	2248	568	
2260	572	2680	576	2700	580	2730	584	2780	588	
2900	592	3470	596	3550	600					

Manning's n Values

Station	n Value	Station	n Value	Station	n Value	Station	n Value
0	1000	1100	.2	2080	.06	2260	.2

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 2080 2260 480 580 680 .1 .3
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 14

INPUT

Description:

Station	Elevation	Data	num=	22	Station	Elevation	Station	Elevation	Station	Elevation
0	584	10	580	36	576	260	572	450	572	
980	575.5	1100	575	1300	574	1540	573	1650	572	
1750	572	2230	568	2240	564	2250	563	2300	562	
2350	563	2357	564	2365	568	2400	572	2475	576	
2515	580	2580	600							

Manning's n Values

Station	n Value	Station	n Value	Station	n Value	Station	n Value
0	1000	1100	.2	2230	.06	2365	.2

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 2230 2365 1030 1000 910 .1 .3
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 13

INPUT

Description:

Station	Elevation	Data	num=	39	Station	Elevation	Station	Elevation	Station	Elevation
0	584.8	41	584.5	51	584	59	580	80	576	
104	574.5	183	572.5	268	573	346	572.5	393	572	
427	571.5	536	571	634	571.5	722	570.5	779	572	
1143	572	1236	569	1348	569.5	1418	571.5	1470	571	
1535	571	1590	570.7	1647	571.6	1658	562.2	1664	561	
1710	561	1733	561.8	1760	566.3	1770	570.3	1821	572.2	
1900	570	1943	571	2044	571.5	2141	570.5	2230	569.8	
2274	572	2300	576	2318	580	2440	600			

Manning's n Values

Station	n Value	Station	n Value	Station	n Value	Station	n Value

81011_BuffaloCreekS83_ABWD.rep

0 1000 1236 .2 1647 .06 1770 .2

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 1647 1770 940 910 890 .1 .3
 Sedi ment El evati on = 0

CROSS SECTI ON

RIVER: RIVER-1
 REACH: Reach-1 RS: 12.1

INPUT

Descri pti on:

Stati on El evati on Data num= 16

Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	580	20	576	40	572	430	568	1340	569
1850	564	1868	560	1880	559.2	1990	559.2	1997	560
2015	564	2129	568	2210	572	2260	576	2300	580
2410	600								

Manni ng' s n Val ues num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	1000	1340	.2	1850	.06	2015	.2

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 1850 2015 810 890 970 .1 .3
 Sedi ment El evati on = 0

CROSS SECTI ON

RIVER: RIVER-1
 REACH: Reach-1 RS: 12

INPUT

Descri pti on:

Stati on El evati on Data num= 28

Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	599	204	599	227	596	240	592	252	588
275	584	292	580	301	576	314	572	355	571
428	568	477	568	620	566.5	737	567	870	566.5
998	566	1114	566	1212	566	1254	564	1275	558.9
1315	558.3	1357	558.9	1375	564	1390	567.6	1450	571
1485	576	1497	580	1653	600				

Manni ng' s n Val ues num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	1000	870	.2	1212	.06	1390	.2

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 1212 1390 450 500 550 .1 .3
 Sedi ment El evati on = 0

CROSS SECTI ON

RIVER: RIVER-1
 REACH: Reach-1 RS: 11.3

INPUT

Descri pti on: Thi s i s a REPEATED secti on.

81011_BuffaloCreekS83_ABWD.rep

Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	584.3	120	584.2	138	576.9	153	570.8	164	569.7
214	570.2	264	564.4	314	559.2	344	557	373	559
380	570.5	400	570	450	572	465	576.5	482	584.2
600	584.4								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	1000	138	.2	214	.06	400	.2

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 Sedi ment El evati on = 0 214 400 110 110 110 .3 .5

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 11.2

INPUT

Descripti on:

Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	584.3	120	584.2	138	576.9	153	570.8	164	569.7
214	570.2	264	564.4	314	559.2	344	557	373	559
380	570.5	400	570	450	572	465	576.5	482	584.2
600	584.4								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	214	.06	400	.06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 Sedi ment El evati on = 0 214 400 120 100 80 .3 .5

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 10.1

INPUT

Descripti on:

Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	580	60	576	105	572	135	568	155	564
186	560	190	556	223	555.7	242	556	260	560
280	564	790	568	810	572	845	582.5	960	582.5

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	1000	105	.2	155	.06	280	.2

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 Sedi ment El evati on = 0 155 280 470 400 340 .3 .5

CROSS SECTION

81011_BuffaloCreekS83_ABWD. rep

RIVER: RIVER-1
REACH: Reach-1

RS: 10

INPUT

Description:

Station		Elevation		Data		num= 32			
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	580	17	576	38	572	57	568	74	564
101	563	184	563.5	233	564	260	564.5	338	566
416	565.5	479	564.5	495	564	566	564	588	564.5
609	564	626	560	638	557	675	554.7	711	557
722	560	751	563.5	817	563	877	563.8	911	564
932	565.5	944	568	956	572	969	576	975	580
982	583	1025	583						

Manning's n		Values		num= 3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.2	609	.06	751	.2

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	609	751		600	1040	1070	.1	.5

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1

RS: 9.3

INPUT

Description:

Station		Elevation		Data num= 17					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	580	30	576	60	572	110	568	150	564
220	560	235	553.9	261	553.7	296	554.3	307	560
480	564	681	568	729	572	849	576	882	580
923	584	945	588						

Manning's n		Values		num= 3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.2	220	.06	307	.2

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	220	307		540	530	510	.1	.5

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1

RS: 9.2

INPUT

Description:

Station		Elevation		Data num= 22					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	586.4	24	584	48	581.5	62	580	83	576
106	574.5	127	574.5	133	572	169	568	190	564
217	563.5	350	563	382	561	425	553	485	553
500	562	579	563.5	795	564	851	568	881	572
896	580	936	589.8						

Manning's n		Values		num= 4	

81011_BuffaloCreekS83_ABWD.rep

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.2	382	.06	500	.2	896	1000

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 382 500 130 120 110 .3 .5
 Sedi ment El evati on = 0

CROSS SECTI ON

RIVER: RIVER-1
 REACH: Reach-1 RS: 9.1

INPUT
 Descri pti on: Thi s i s a REPEATED secti on.

Stati on El evati on Data		num= 13		Sta	El ev	Sta	El ev	Sta	El ev
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	590	23	572.3	42	562.9	55	561.4	79	556.7
104	552.7	129	566.3	188	566.8	239	565.8	288	565.9
344	566.5	356	572	371	582				

Manni ng' s n Val ues		num= 4		Sta	n Val	Sta	n Val
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.2	93	.06	165	.2	365	1000

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 42 129 52 52 52 .3 .5
 Sedi ment El evati on = 0

CROSS SECTI ON

RIVER: RIVER-1
 REACH: Reach-1 RS: 9

INPUT
 Descri pti on:

Stati on El evati on Data		num= 13		Sta	El ev	Sta	El ev	Sta	El ev
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	590	23	572.3	42	562.9	55	561.4	79	556.7
104	552.7	129	566.3	188	566.8	239	565.8	288	565.9
344	566.5	356	572	371	582				

Manni ng' s n Val ues		num= 4		Sta	n Val	Sta	n Val
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.2	93	.06	165	.2	365	1000

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 42 129 650 640 640 .3 .5
 Sedi ment El evati on = 0

CROSS SECTI ON

RIVER: RIVER-1
 REACH: Reach-1 RS: 8

INPUT
 Descri pti on:

Stati on El evati on Data		num= 24		Sta	El ev	Sta	El ev	Sta	El ev
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	580	10	576	22	572	28	569.5	65	562.6

81011_BuffaloCreekS83_ABWD. rep

93	562	103	554	140	554	155	556.5	165	564.2
190	564.1	220	562.1	365	562.4	420	562.8	431	563
448	564	487	568	653	572	672	576	692	580
707	581.5	724	584	740	587.5	760	587.5		

Manning's n Values	num=	4
Station Val	Station Val	Station Val
0 .2	93 .06	165 .2
		365
		1000

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
93	165	650	640	640		.3	.5
Sediment Elevation = 0							

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1
 RS: 7

INPUT

Description:

Station Elevation Data	num=	24
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev		
0 582 4 582 8 579 18 578 22 575		
32 574 38 569 94 567 98 565 118 564		
118 556 148 566 148 564 149.5 564 149.5 558		
227 558 227 564 228.5 564 352 560 600 564		
615 568 619 572 630 576 660 580		

Manning's n Values	num=	4
Station Val	Station Val	Station Val
0 .2	148 .06	228.5 .2
		352
		1000

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
148	228.5	9	9	9		.1	.3
Sediment Elevation = 0							

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1
 RS: 6.5

INPUT

Description:

Station Elevation Data	num=	24
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev		
0 582 4 582 8 579 18 578 22 575		
32 574 38 569 94 567 98 565 118 564		
118 566 148 566 148 564 149.5 564 149.5 558		
227 554.5 227 564 228.5 564 352 560 600 564		
615 568 619 572 630 576 660 580		

Manning's n Values	num=	4
Station Val	Station Val	Station Val
0 .2	148 .06	228.5 .2
		352
		1000

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
148	228.5	11	11	11		.1	.3
Sediment Elevation = 0							

CROSS SECTION

81011_BuffaloCreekS83_ABWD. rep

RIVER: RIVER-1
 REACH: Reach-1 RS: 6.4

INPUT

Description:

Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	576	30	572	60	568	90	566.3	100	564
130	560	135	553.8	140	550	185	550.5	235	553.8
240	560	340	564	360	568	500	563.5	560	572
570	576	580	580						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.2	130	.06	240	.2

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

130	240	30	30	30	.3	.5
-----	-----	----	----	----	----	----

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 6.3

INPUT

Description: This is a REPEATED section.

Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	582.5	50	572.3	100	569.9	116	558.9	130	547.5
150	547.5	175	547.5	200	558.3	212	561.2	250	565.6
286	567.3	300	573.3	323	582.5				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.2	0	.06	323	.2

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

0	323	50	50	50	.3	.5
---	-----	----	----	----	----	----

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	0	584.5	F
323	323	584.5	F

Sediment Elevation = 0

BRIDGE

RIVER: RIVER-1
 REACH: Reach-1 RS: 6.25

INPUT

Description: Bridge #1

Distance from Upstream XS = 1
 Deck/Roadway Width = 48
 Weir Coefficient = 3

Upstream Deck/Roadway Coordinates

num= 3

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
0		584.5		582.5	150		584.5		582.5	323		584.5		582.5

81011_BuffaloCreekS83_ABWD. rep

Upstream Bridge Cross Section Data

Station Elevation Data num= 13									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	582.5	50	572.3	100	569.9	116	558.9	130	547.5
150	547.5	175	547.5	200	558.3	212	561.2	250	565.6
286	567.3	300	573.3	323	582.5				

Manning's n Values num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
0	.2	0	.06	323	.2

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
	0	323		.3	.5

Ineffective Flow num= 2				
Sta L	Sta R	Elev	Permanent	
0	0	584.5	F	
323	323	584.5	F	

Sediment Elevation = 0

Downstream Deck/Roadway Coordinates

num= 3									
Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
0		584.5		582.5	150		584.5		582.5
					323		584.5		582.5

Downstream Bridge Cross Section Data

Station Elevation Data num= 13									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	582.5	50	572.3	100	569.9	116	558.9	130	547.5
150	547.5	175	547.5	200	558.3	212	561.2	250	565.6
286	567.3	300	573.3	323	582.5				

Manning's n Values num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
0	.2	0	.06	323	.2

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
	0	323		.3	.5

Ineffective Flow num= 2				
Sta L	Sta R	Elev	Permanent	
0	0	582.5	F	
323	323	582.5	F	

Sediment Elevation = 0

Upstream Embankment side slope = 0 hori z. to 1.0 verti cal
 Downstream Embankment side slope = 0 hori z. to 1.0 verti cal
 Maximum allowable submergence for weir flow = .98
 Elevation at which weir flow begins = 584.5
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Piers = 1

Pier Data					
Pier Station	Upstream=	Downstream=			
	161.5	161.5			
Upstream num= 2					
Width	Elev	Width	Elev		
5.6	547.5	5.6	582.5		
Downstream num= 2					
Width	Elev	Width	Elev		
5.6	547.5	5.6	582.5		

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Yarnell KVal = 1.05

Selected Low Flow Methods = Yarnell

High Flow Method

Pressure and Weir flow

Submerged Inlet Cd =

Submerged Inlet + Outlet Cd = .8164966

Max Low Cord = 582.5

Additional Bridge Parameters

Add Friction component to Momentum

Do not add Weight component to Momentum

Class B flow critical depth computations use critical depth inside the bridge at the upstream end

Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 6.2

INPUT

Description:

Station		Elevation		Data		num=		13	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	582.5	50	572.3	100	569.9	116	558.9	130	547.5
150	547.5	175	547.5	200	558.3	212	561.2	250	565.6
286	567.3	300	573.3	323	582.5				

Manning's n		Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.2	0	.06	323	.2		

Bank	Sta	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	0		323		300	300	300		.3	.5
Ineffective Flow				num=	2					
	Sta L	Sta R	Elev	Permanent						
	0	0	582.5	F						
	323	323	582.5	F						
Sediment Elevation	= 0									

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 6.1

INPUT

Description:

Station		Elevation		Data		num=		11	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	584	120	568	170	564	355	560	370	551
390	548.5	411	550	420	560	450	560	690	564
750	580								

Manning's n		Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.2	355	.06	420	.2		

81011_BuffaloCreekS83_ABWD.rep

Bank Sta: Left 355 Right 420 Lengths: Left 880 Channel 960 Right 1040 Coeff Contr. .3 Expan. .5

CROSS SECTION

RIVER: RIVER-1 REACH: Reach-1 RS: 5

INPUT

Description:

Station		Elevation		Data		num= 15			
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	584	35	580	70	576	109	572	141	568
158	565.8	170	563.8	540	560	550	552.4	585	548.9
640	552	650	560	745	564	775	580	815	600

Manning's n		Values		num= 3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.2	540	.06	650	.2

Bank Sta: Left 540 Right 650 Lengths: Left 840 Channel 840 Right 820 Coeff Contr. .1 Expan. .3

CROSS SECTION

RIVER: RIVER-1 REACH: Reach-1 RS: 4.4

INPUT

Description:

Station		Elevation		Data num= 23					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	580	45	576	80	572	111	568	138	564
183	560	540	560	655	560	670	556	690	552
699	548.5	727	548.5	730	550.6	742	552	755	556
775	560	825	560	873	560	1052	564	1085	568
1110	572	1121	576	1192	580				

Manning's n		Values		num= 3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.2	655	.06	755	.2

Bank Sta: Left 655 Right 755 Lengths: Left 450 Channel 450 Right 440 Coeff Contr. .1 Expan. .3

CROSS SECTION

RIVER: RIVER-1 REACH: Reach-1 RS: 4.3

INPUT

Description:

Station		Elevation		Data num= 19					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	576	60	572	105	568	335	564	430	560
639.9	556	640	556	1255	552	1270	548.3	1320	548.3
1330	552	1340	556	1350	560	1410	560	1425	564
1435	568	1445	572	1450	576	1455	580		

Manning's n		Values		num= 3	

81011_BuffaloCreekS83_ABWD.rep

Sta n Val Sta n Val Sta n Val
 0 .2 1255 .06 1330 .2

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 1255 1330 1200 1200 1200 .1 .3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 4

INPUT

Descripti on:

Stati on Elevati on Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	576	20	572	135	568	160	564	555	560
715	556	730	556	740	560	770	560	805	556
855	555	965	555	1020	555.5	1110	556	1160	557
1210	556	1235	552	1260	548	1300	547.5	1345	552
1355	556	1854	558.5	2140	560	2390	564	2415	568
2450	572	2470	576	2490	580				

Manni ng' s n Val ues num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	1000	555	.2	1210	.06	1355	.2	1854	1000

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 1210 1355 450 450 440 .1 .3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 3.8

INPUT

Descripti on:

Stati on Elevati on Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	568	80	564	120	560	143	556	290	552
385	552	444	552	490	556	540	556	570	552
584	548	591	547.2	628	547.2	635	548	642	552
660	556	735	556	920	556	942	560	970	564
1000	568	1060	572	1095	576	1130	580		

Manni ng' s n Val ues num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	1000	120	.2	570	.06	642	.2	942	1000

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 570 642 510 510 520 .1 .3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 3.7

INPUT

Descripti on:

Stati on Elevati on Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

81011_BuffaloCreekS83_ABWD. rep

0	568	10	564	30	560	50	556	210	552
450	556	500	552	520	548	523	547	568	547
570	548	580	552	600	556	695	560	765	580

Manning's n Values

num=	3
Station Val	Station Val
0 .2	450 .06
	600 .2

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

450	600	530	600	720	.1	.3
-----	-----	-----	-----	-----	----	----

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.4

INPUT

Description:

Station Elevation Data num= 17

Station	Elev	Station	Elev	Station	Elev	Station	Elev	Station	Elev
0	568	12	564	32	560	49	556	80	552
160	550	250	547	320	547	330	548	341	552
790	556	1035	560	1050	564	1068	568	1078	572
1089	576	1100	580						

Manning's n Values

num=	3
Station Val	Station Val
0 .2	80 .06
	341 .2

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

80	341	600	510	400	.1	.3
----	-----	-----	-----	-----	----	----

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.3

INPUT

Description:

Station Elevation Data num= 13

Station	Elev	Station	Elev	Station	Elev	Station	Elev	Station	Elev
0	572	60	568	95	564	110	560	120	556
135	552	145	547	210	547	230	552	750	554
1110	556	1150	560	1335	580				

Manning's n Values

num=	3
Station Val	Station Val
0 .2	135 .06
	230 .2

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

135	230	580	570	560	.1	.3
-----	-----	-----	-----	-----	----	----

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3

INPUT

Description:

Station Elevation Data num= 27

81011_BuffaloCreekS83_ABWD.rep

Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	572.6	16	572	73	568	97	564	110	560
163	557.4	248	557.7	284	556	308	552	321	556
397	557.3	421	556	441	549.8	477	547.8	503	545.1
529	548	531	558.5	604	557.9	680	556.8	830	556.6
927	556.2	1015	556.2	1116	557.1	1192	560	1292	564.7
1370	570	1420	580						

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.2	421	.06	604	.2

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

421	604	450	440	400	.1	.3
-----	-----	-----	-----	-----	----	----

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.1

INPUT

Description:

Station Elevation Data

Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	563	51	564	75	560	139	556	165	554
212	552.9	239	545.3	243	544.5	296	544.5	321	552
810	556	1180	560	1560	564				

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.2	212	.06	321	.2

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

212	321	580	850	820	.1	.3
-----	-----	-----	-----	-----	----	----

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2

INPUT

Description:

Station Elevation Data

Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	569	32	568	80	564	244	560	300	556.5
368	556	448	554	516	556	600	556.2	876	556.2
1020	556.6	1120	556.9	1130	550	1150	544	1200	544
1260	550	1270	552	1280	554.8	1293	555.8	1373	555.8
1453	556	1521	557.1	1629	558.5	1749	559	1845	559
1925	560	2045	564	2450	566	2508	581		

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.2	1120	.06	1293	.2

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

1120	1293	400	1200	1240	.1	.3
------	------	-----	------	------	----	----

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1

RS: 1

INPUT

Description:

Station		Elevation		Data		num= 28			
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	600	40	590	80	580	120	570	247	563
280	560	388	556.2	505	559.2	646	557.6	678	556
690	552	744	543	887	543	954	545.2	992	548
1044	552	1092	556	1136	559	1241	559	1281	600
1345	560	1373	559	1473	556	1666	556	1803	556.6
1936	557.3	2500	564	2600	587				

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
0	.2	678	.06
		1092	.2

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	678	1092		0	0	0		.1	.3

SUMMARY OF MANNING'S N VALUES

River: RIVER-1

Reach	River Sta.	n1	n2	n3	n4	n5
Reach-1	17	1000	.2	.06	.2	
Reach-1	16	1000	.2	.06	.2	
Reach-1	15	1000	.2	.06	.2	
Reach-1	14	1000	.2	.06	.2	
Reach-1	13	1000	.2	.06	.2	
Reach-1	12.1	1000	.2	.06	.2	
Reach-1	12	1000	.2	.06	.2	
Reach-1	11.3	1000	.2	.06	.2	
Reach-1	11.2	.06	.06	.06		
Reach-1	10.1	1000	.2	.06	.2	
Reach-1	10	.2	.06	.2		
Reach-1	9.3	.2	.06	.2		
Reach-1	9.2	.2	.06	.2	1000	
Reach-1	9.1	.2	.06	.2	1000	
Reach-1	9	.2	.06	.2	1000	
Reach-1	8	.2	.06	.2	1000	

81011_BuffaloCreekS83_ABWD. rep

Reach-1	7	. 2	. 06	. 2	1000
Reach-1	6. 5	. 2	. 06	. 2	1000
Reach-1	6. 4	. 2	. 06	. 2	
Reach-1	6. 3	. 2	. 06	. 2	
Reach-1	6. 25	Bri dge			
Reach-1	6. 2		. 2	. 06	. 2
Reach-1	6. 1	. 2	. 06	. 2	
Reach-1	5	. 2	. 06	. 2	
Reach-1	4. 4	. 2	. 06	. 2	
Reach-1	4. 3	. 2	. 06	. 2	
Reach-1	4	1000	. 2	. 06	. 2 1000
Reach-1	3. 8	1000	. 2	. 06	. 2 1000
Reach-1	3. 7	. 2	. 06	. 2	
Reach-1	3. 4	. 2	. 06	. 2	
Reach-1	3. 3	. 2	. 06	. 2	
Reach-1	3	. 2	. 06	. 2	
Reach-1	2. 1	. 2	. 06	. 2	
Reach-1	2	. 2	. 06	. 2	
Reach-1	1	. 2	. 06	. 2	

SUMMARY OF REACH LENGTHS

Ri ver: RIVER-1

Reach	Ri ver Sta.	Left	Channel	Ri ght
Reach-1	17	630	550	470
Reach-1	16	1140	1200	1000
Reach-1	15	480	580	680
Reach-1	14	1030	1000	910
Reach-1	13	940	910	890
Reach-1	12. 1	810	890	970
Reach-1	12	450	500	550
Reach-1	11. 3	110	110	110
Reach-1	11. 2	120	100	80
Reach-1	10. 1	470	400	340
Reach-1	10	600	1040	1070
Reach-1	9. 3	540	530	510
Reach-1	9. 2	130	120	110
Reach-1	9. 1	52	52	52

81011_BuffaloCreekS83_ABWD.rep

Reach-1	9	650	640	640
Reach-1	8	650	640	640
Reach-1	7	9	9	9
Reach-1	6.5	11	11	11
Reach-1	6.4	30	30	30
Reach-1	6.3	50	50	50
Reach-1	6.25	Bridge		
Reach-1	6.2	300	300	300
Reach-1	6.1	880	960	1040
Reach-1	5	840	840	820
Reach-1	4.4	450	450	440
Reach-1	4.3	1200	1200	1200
Reach-1	4	450	450	440
Reach-1	3.8	510	510	520
Reach-1	3.7	530	600	720
Reach-1	3.4	600	510	400
Reach-1	3.3	580	570	560
Reach-1	3	450	440	400
Reach-1	2.1	580	850	820
Reach-1	2	400	1200	1240
Reach-1	1	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
 River: RIVER-1

Reach	River Sta.	Contr.	Expan.
Reach-1	17	.1	.3
Reach-1	16	.1	.3
Reach-1	15	.1	.3
Reach-1	14	.1	.3
Reach-1	13	.1	.3
Reach-1	12.1	.1	.3
Reach-1	12	.1	.3
Reach-1	11.3	.3	.5
Reach-1	11.2	.3	.5
Reach-1	10.1	.3	.5
Reach-1	10	.1	.5
Reach-1	9.3	.1	.5
Reach-1	9.2	.3	.5
Reach-1	9.1	.3	.5
Reach-1	9	.3	.5
Reach-1	8	.3	.5
Reach-1	7	.1	.3
Reach-1	6.5	.1	.3
Reach-1	6.4	.3	.5
Reach-1	6.3	.3	.5
Reach-1	6.25	Bridge	
Reach-1	6.2	.3	.5
Reach-1	6.1	.3	.5
Reach-1	5	.1	.3
Reach-1	4.4	.1	.3
Reach-1	4.3	.1	.3
Reach-1	4	.1	.3
Reach-1	3.8	.1	.3
Reach-1	3.7	.1	.3
Reach-1	3.4	.1	.3
Reach-1	3.3	.1	.3
Reach-1	3	.1	.3

81011_BuffaloCreekS83_ABWD. rep

Reach-1	2. 1	. 1	. 3
Reach-1	2	. 1	. 3
Reach-1	1	. 1	. 3

HEC-RAS Versi on 4. 1. 0 Jan 2010
U. S. Army Corps of Engi neers
Hydrol ogi c Engi neeri ng Center
609 Second Street
Davi s, Cal i forni a

```

X      X  XXXXXXX  XXXX      XXXX      XX      XXXX
X      X  X      X      X      X  X      X  X      X
X      X  X      X      X      X  X      X  X      X
XXXXXXXX XXXX      X      XXX XXXX      XXXXXXX  XXXX
X      X  X      X      X      X  X      X  X      X
X      X  X      X      X      X  X      X  X      X
X      X  XXXXXXX  XXXX      X      X      X  X      XXXXX

```

PROJECT DATA

Project Title: 8. 10. 11 - Buffal o Creek S83 - ABW
Project File : 81011_Buffal oCreekS83_ABW. prj
Run Date and Time: 8/25/2011 10: 40: 13 AM

Project i n Engl i sh uni ts

Project Descri pti on:

BUFFALO CREEK
WATER SURFACE PROFILE
BUFFALO CREEK, CHEROKEE CO. 10-YEAR
FLOOD

PLAN DATA

Plan Title: Corrected Effective

Plan File : q:\60191787\400 Tech I nfo_Di sci pl i nes\405 Hydrol ogy &
Drai nage\HecRas\81011_Buffal oCreekS83_ABW. p21

Geometry Title: Corrected Effective

Geometry File : q:\60191787\400 Tech I nfo_Di sci pl i nes\405 Hydrol ogy &
Drai nage\HecRas\81011_Buffal oCreekS83_ABW. g16

Flow Title : Effective Flows

Flow File : q:\60191787\400 Tech I nfo_Di sci pl i nes\405 Hydrol ogy &
Drai nage\HecRas\81011_Buffal oCreekS83_ABW. f02

Plan Summary I nformati on:

Number of:	Cross Sections = 34	Multiple Openings = 0
	Culverts = 0	Inline Structures = 0
	Bridges = 1	Lateral Structures = 0

Computati onal I nformati on

Water surface calculati on tolerance	= 0. 01
Critical depth calculati on tolerance	= 0. 01
Maximum number of iterati ons	= 20
Maximum di fference tolerance	= 0. 3
Flow tolerance factor	= 0. 001

Computati on Opti ons

81011_BuffaloCreekS83_ABWC. rep
 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: Effective Flows
 Flow File : q:\60191787\400 Tech Info_Disciplines\405 Hydrology &
 Drainage\HecRas\81011_BuffaloCreekS83_ABW. f02

Flow Data (cfs)

River	Reach	RS	10 yr	50 yr
100 yr RIVER-1	500 yr Reach-1	17	8000	11500
13000	16400			

Boundary Conditions

River Downstream	Reach	Profile	Upstream
RIVER-1	Reach-1	10 yr	
Known WS = 550.99			
RIVER-1	Reach-1	50 yr	
Known WS = 552.61			
RIVER-1	Reach-1	100 yr	
Known WS = 553.2			
RIVER-1	Reach-1	500 yr	
Known WS = 554.48			

GEOMETRY DATA

Geometry Title: Corrected Effective
 Geometry File : q:\60191787\400 Tech Info_Disciplines\405 Hydrology &
 Drainage\HecRas\81011_BuffaloCreekS83_ABW. g16

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 17

INPUT

Description:

Station Elevation Data		num=		15					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	584	20	580	50	576	550	574	810	572
825	568	830	566.5	890	566.5	895	568	910	572
935	576	1100	577.5	1300	576	1850	580	1910	600

81011_BuffaloCreekS83_ABWC. rep

Manning's n Values num= 4
 Sta n Val Sta n Val Sta n Val
 0 .1 550 .1 810 .045 935 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 810 910 630 550 470 .1 .3
 Sedi ment El evati on = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 16

INPUT
 Descri pti on:
 Stati on El evati on Data num= 14
 Sta El ev Sta El ev Sta El ev Sta El ev Sta El ev
 0 587.5 249 584 395 580 578 576 1655 572
 1700 568 1720 565.5 1763 566 1785 568 1800 572
 1960 576 2770 576 2830 580 2870 600

Manning's n Values num= 4
 Sta n Val Sta n Val Sta n Val
 0 .1 1655 .1 1700 .045 1785 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 1700 1785 1140 1200 1000 .1 .3
 Sedi ment El evati on = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 15

INPUT
 Descri pti on:
 Stati on El evati on Data num= 18
 Sta El ev Sta El ev Sta El ev Sta El ev Sta El ev Sta El ev
 0 584 59 580 91 576 1100 574.6 1551 572
 2080 572 2160 568 2170 565 2240 565 2248 568
 2260 572 2680 576 2700 580 2730 584 2780 588
 2900 592 3470 596 3550 600

Manning's n Values num= 4
 Sta n Val Sta n Val Sta n Val
 0 .1 1100 .1 2080 .045 2260 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 2080 2260 480 580 680 .1 .3
 Sedi ment El evati on = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 14

INPUT
 Descri pti on:
 Stati on El evati on Data num= 22

81011_BuffaloCreekS83_ABWC.rep

Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	584	10	580	36	576	260	572	450	572
980	575.5	1100	575	1300	574	1540	573	1650	572
1750	572	2230	568	2240	564	2250	563	2300	562
2350	563	2357	564	2365	568	2400	572	2475	576
2515	580	2580	600						

Manning's n Values		num=	4	
Sta	n Val	Sta	n Val	Sta
0	.1	1100	.1	2230
				2365

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	2230	2365		1030	1000	910		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 13

INPUT

Description:

Station Elevation Data		num=	39	
Sta	El ev	Sta	El ev	Sta
0	584.8	41	584.5	51
104	574.5	183	572.5	268
427	571.5	536	571	634
1143	572	1236	569	1348
1535	571	1590	570.7	1647
1710	561	1733	561.8	1760
1900	570	1943	571	2044
2274	572	2300	576	2318
				2440

Manning's n Values		num=	4	
Sta	n Val	Sta	n Val	Sta
0	.1	1236	.1	1647
				1770

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	1647	1770		940	910	890		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 12.1

INPUT

Description:

Station Elevation Data		num=	16	
Sta	El ev	Sta	El ev	Sta
0	580	20	576	40
1850	564	1868	560	1880
2015	564	2129	568	2210
2410	600			2260
				2300

Manning's n Values		num=	4	
Sta	n Val	Sta	n Val	Sta
0	.1	1340	.1	1850
				2015

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	1850	2015		810	890	970		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 12

INPUT

Description:

Station		Elevation		Data		num=		28	
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	599	204	599	227	596	240	592	252	588
275	584	292	580	301	576	314	572	355	571
428	568	477	568	620	566.5	737	567	870	566.5
998	566	1114	566	1212	566	1254	564	1275	558.9
1315	558.3	1357	558.9	1375	564	1390	567.6	1450	571
1485	576	1497	580	1653	600				

Manning's n		Values		num=		4	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	870	.1	1212	.045	1390	.1

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	1212	1390		450	500	550		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 11.3

INPUT

Description: This is a REPEATED section.

Station		Elevation		Data		num=		16	
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	584.3	120	584.2	138	576.9	153	570.8	164	569.7
214	570.2	264	564.4	314	559.2	344	557	373	559
380	570.5	400	570	450	572	465	576.5	482	584.2
600	584.4								

Manning's n		Values		num=		4	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	138	.1	214	.045	400	.1

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	214	400		110	110	110		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 11.2

INPUT

Description:

Station		Elevation		Data		num=		16	
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	584.3	120	584.2	138	576.9	153	570.8	164	569.7
214	570.2	264	564.4	314	559.2	344	557	373	559
380	570.5	400	570	450	572	465	576.5	482	584.2

81011_BuffaloCreekS83_ABWC. rep

600 584.4

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 214 .045 400 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 214 400 120 100 80 .1 .3
 Sedi ment El evati on = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 10.1

INPUT

Descripti on:

Stati on El evati on Data num= 15
 Sta El ev Sta El ev Sta El ev Sta El ev Sta El ev
 0 580 60 576 105 572 135 568 155 564
 186 560 190 556 223 555.7 242 556 260 560
 280 564 790 568 810 572 845 582.5 960 582.5

Manning's n Values num= 4
 Sta n Val Sta n Val Sta n Val Sta n Val
 0 .1 105 .1 155 .045 280 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 155 280 470 400 340 .1 .3
 Sedi ment El evati on = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 10

INPUT

Descripti on:

Stati on El evati on Data num= 32
 Sta El ev Sta El ev Sta El ev Sta El ev Sta El ev
 0 580 17 576 38 572 57 568 74 564
 101 563 184 563.5 233 564 260 564.5 338 566
 416 565.5 479 564.5 495 564 566 564 588 564.5
 609 564 626 560 638 557 675 554.7 711 557
 722 560 751 563.5 817 563 877 563.8 911 564
 932 565.5 944 568 956 572 969 576 975 580
 982 583 1025 583

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 609 .045 751 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 609 751 600 1040 1070 .1 .3
 Sedi ment El evati on = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 9.3

81011_BuffaloCreekS83_ABWC. rep

INPUT

Description:

Station		Elevation		Data		num= 17			
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	580	30	576	60	572	110	568	150	564
220	560	235	553.9	261	553.7	296	554.3	307	560
480	564	681	568	729	572	849	576	882	580
923	584	945	588						

Manning's n		Values		num= 3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.1	220	.045	307	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	220	307		540	530		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 9.2

INPUT

Description:

Station		Elevation		Data num= 22					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	586.4	24	584	48	581.5	62	580	83	576
106	574.5	127	574.5	133	572	169	568	190	564
217	563.5	350	563	382	561	425	553	485	553
500	562	579	563.5	795	564	851	568	881	572
896	580	936	589.8						

Manning's n		Values		num= 4			
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	382	.045	500	.1	896	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	382	500		130	120		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 9.1

INPUT

Description: This is a REPEATED section.

Station		Elevation		Data num= 13					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	590	23	572.3	42	562.9	55	561.4	79	556.7
104	552.7	129	566.3	188	566.8	239	565.8	288	565.9
344	566.5	356	572	371	582				

Manning's n		Values		num= 4			
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	104	.045	188	.1	371	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	42	129		52	52		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 9

INPUT

Description:

Station		Elevation		Data		num=		13	
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	590	23	572.3	42	562.9	55	561.4	79	556.7
104	552.7	129	566.3	188	566.8	239	565.8	288	565.9
344	566.5	356	572	371	582				

Manning's n		Values		num=		4	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	104	.045	188	.1	371	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 42 129 650 640 640 .1 .3
 Sedi ment El evati on = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 8

INPUT

Description:

Station		Elevation		Data		num=		24	
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	580	10	576	22	572	28	569.5	65	562.6
93	562	103	554	140	554	155	556.5	165	564.2
190	564.1	220	562.1	365	562.4	420	562.8	431	563
448	564	487	568	653	572	672	576	692	580
707	581.5	724	584	740	587.5	760	587.5		

Manning's n		Values		num=		4	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	93	.045	165	.1	365	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 93 165 650 640 640 .1 .3
 Sedi ment El evati on = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 7

INPUT

Description:

Station		Elevation		Data		num=		24	
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	582	4	582	8	579	18	578	22	575
32	574	38	569	94	567	98	565	118	564
118	556	148	566	148	564	149.5	564	149.5	558
227	558	227	564	228.5	564	352	560	600	564
615	568	619	572	630	576	660	580		

81011_BuffaloCreekS83_ABWC.rep

Manning's n Values num= 3
 Sta n Val Sta n Val
 0 .1 148 .045 228.5 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 148 228.5 9 9 9 .1 .3
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 6.5

INPUT

Description:

Station Elevation Data num= 24
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 582 4 582 8 579 18 578 22 575
 32 574 38 569 94 567 98 565 118 564
 118 566 148 566 148 564 149.5 564 149.5 558
 227 554.5 227 564 228.5 564 352 560 600 564
 615 568 619 572 630 576 660 580

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 148 .045 228.5 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 148 228.5 11 11 11 .1 .3
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 6.4

INPUT

Description:

Station Elevation Data num= 419
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 4600 584.251 4600.35 584.236 4602.08 584.198 4602.92 583.937 4605.08 583.926
 4605.52 583.737 4606.92 583.697 4607.58 583.574 4609.24 583.444 4609.64 583.371
 4610.69 583.337 4610.93 583.247 4611.13 583.227 4612.35 583.211 4612.53 583.099
 4613.62 583.093 4613.95 582.975 4615.19 582.972 4615.35 582.869 4615.54 582.856
 4617.12 582.839 4617.5 582.709 4617.88 582.677 4619.35 582.644 4620.05 582.522
 4621.18 582.46 4622.14 582.358 4623.7 582.278 4624.06 582.137 4625.23 582.106
 4626.01 581.942 4627.83 581.933 4628.22 581.78 4629.63 581.748 4630.24 581.633
 4631.29 581.586 4632.04 581.505 4633.72 581.369 4634.05 581.349 4634.46 581.343
 4635.51 581.352 4636.02 581.317 4636.54 581.33 4637.11 581.318 4637.83 581.336
 4638.48 581.339 4648.48 581.612 4648.89 581.609 4649.18 581.613 4649.5 581.609
 4649.85 581.592 4650.19 581.565 4650.59 581.555 4651.07 581.516 4651.25 581.463
 4651.83 581.453 4651.99 581.378 4652.85 581.284 4653.85 581.167 4654.8 581.149
 4655.27 581.047 4655.73 581 4656.07 580.826 4656.67 580.699 4656.98 580.477
 4657.94 580.365 4658.03 580 4658.96 579.967 4659.71 579.629 4660.08 579.346
 4660.64 579.213 4661.69 579 4661.97 578.845 4662.55 578.807 4664.22 578.728
 4665.93 578.489 4666.54 578.258 4667.82 578.172 4668.87 578 4669.08 577.899
 4671 577.879 4671.62 577.695 4672.92 577.638 4673.85 577.513 4675.13 577.426
 4675.79 577.304 4677.28 577.241 4677.46 577.095 4678.21 577.078 4678.89 577
 4679.11 576.918 4680.35 576.901 4680.78 576.759 4682.52 576.594 4684.98 576.43
 4685.23 575.963 4687.34 575.948 4687.81 575.495 4688.52 575.415 4689.44 575.206
 4690.09 575.151 4690.9 575.117 4691.67 575.092 4691.88 575.063 4693.38 575.055

81011_BuffaloCreekS83_ABWC.rep

4694	575.029	4694.95	575.006	4695.18	575.006	4696.28	574.973	4697.78	574.971
4699.32	574.93	4699.63	574.888	4701.23	574.878	4701.73	574.833	4703.32	574.817
4704.04	574.77	4705.54	574.748	4711.86	574.515	4713.36	574.486	4713.85	574.439
4715.51	574.415	4715.97	574.362	4716.4	574.336	4718.13	574.31	4718.5	574.256
4720.17	574.233	4720.44	574.181	4721.89	574.164	4723	574.117	4724.55	574.001
4726.05	574	4726.23	573.904	4727.73	573.899	4728.06	573.801	4729.45	573.792
4729.87	573.703	4730.2	573.693	4730.42	573.683	4730.68	573.676	4735.14	573.457
4737.06	573.302	4737.81	573.22	4738.29	573.16	4739.28	573.062	4739.44	573.061
4739.6	573.083	4739.78	573.093	4739.96	573.142	4740.28	573.204	4741.08	573.236
4741.37	573.412	4741.68	573.476	4743.29	573.554	4743.7	574	4746.36	574.305
4746.79	574.725	4747.55	574.819	4748.85	575	4749.91	575.292	4750.74	575.543
4751.87	575.73	4752.53	576	4752.84	576.146	4753.96	576.221	4754.84	576.464
4755.19	576.68	4755.46	576.752	4756.18	576.796	4757.78	577	4758.75	577.364
4758.93	577.584	4759.56	577.626	4760.61	577.684	4762.54	577.846	4762.87	577.964
4763.21	578	4764.11	578.019	4768.5	578.253	4768.96	578.307	4769.85	578.317
4770.43	578.364	4771.19	578.374	4771.82	578.412	4772.42	578.421	4773.66	578.478
4774.28	578.486	4776.06	578.58	4776.36	578.606	4776.7	578.605	4778.22	578.58
4779.25	578.538	4780.52	578.465	4780.89	578.405	4781.74	578.412	4781.93	578.333
4782.38	578.347	4783.24	578.356	4783.4	578.251	4783.69	578.266	4783.86	578.286
4784.57	578.296	4784.6	578.145	4785.37	578	4785.5	577.826	4785.85	577.728
4786.25	577.501	4786.71	577.172	4786.91	577	4787.43	576.936	4787.66	576.779
4788.08	576.708	4788.59	576.57	4788.85	576.399	4789.64	576.3	4789.85	575.948
4790.6	575.917	4791.24	575.603	4791.59	575.333	4792.01	575.181	4792.67	575
4793.4	574.715	4793.89	574.398	4794.31	574.185	4795	574	4795.48	573.691
4796.51	573.472	4796.87	573	4797.15	572.836	4797.83	572.703	4798.63	572.38
4798.93	571.924	4799.85	571.855	4800.75	571.419	4800.81	570.983	4801.62	570.973
4802.11	570.614	4802.46	570.41	4803.11	570.264	4803.17	570.015	4804.18	570
4805.31	569.641	4805.67	569.245	4806.02	569.122	4807.42	569	4808.94	568.519
4809.55	568	4810.71	567.79	4811.87	567.395	4812.59	567	4814.81	566.755
4815.28	566	4817.75	565.842	4822.65	565	4830.02	564.565	4846.18	564.502
4846.29	564.208	4848.35	564.208	4857.27	564.039	4857.72	563.959	4859.21	563.943
4860.4	563.734	4861.37	563.604	4864.69	563.466	4865.02	563.132	4867.62	563
4867.83	562.86	4869.91	562.855	4870.38	562.729	4871.76	562.725	4872.36	562.64
4873.38	562.635	4874.02	562.579	4874.72	562.574	4875.1	562.539	4876.62	562.49
4878.43	562.472	4878.64	562.466	4879.52	562.456	4879.71	562.448	4880.54	562.437
4880.89	562.417	4881.16	562.41	4882.18	562.404	4882.58	562.371	4884.08	562.362
4884.53	562.313	4885.04	562.303	4887.02	562.291	4887.46	562.224	4890.08	562.214
4890.34	562.122	4890.58	562.116	4893.58	562.11	4893.85	561.947	4895.46	561.896
4896.09	561.261	4900.5	561	4900.7	560.034	4900.89	560.02	4901.09	560
4901.46	560.057	4902.26	560.207	4908.29	561.487	4913.07	562.403	4913.55	562.418
4914.12	562.516	4914.72	562.504	4915.29	562.585	4916.06	562.552	4916.62	562.617
4917.5	562.574	4918.08	562.626	4919.02	562.58	4919.6	562.624	4920.56	562.578
4921.13	562.614	4922.09	562.571	4923.06	562.621	4924.05	562.583	4924.66	562.609
4924.87	562.609	4925.09	562.595	4925.79	562.554	4928.2	562.447	4929.21	562.387
4929.78	562.362	4931.16	562.276	4931.54	562.258	4933.7	562.124	4935.6	562
4935.94	561.924	4940.36	560.934	4942.09	560.525	4944.95	559.796	4946.24	559.426
4947.28	559.092	4948.51	558.661	4950.29	558	4952.85	557	4954.03	557.051
4955.49	558	4960.71	561	4961	561.161	4962.7	562.043	4964.78	563
4972.52	563.193	4972.68	563.192	4972.97	563.183	4976.73	563	4986.02	562.423
5013.71	561	5014.33	560.873	5014.49	560.839	5018.5	560	5023	559.456
5026.19	559	5043.39	557	5044.8	556.966	5045.12	556.966	5050.92	556.854
5054.21	556.856	5097.06	556	5115.35	555	5117.1	554.63	5117.31	554.581
5117.48	554.518	5117.72	554.366	5117.93	554.374	5118.21	554.432	5120.12	554.755
5121.49	555	5124.23	557	5124.83	557.452	5125.53	558	5125.88	558.277
5126.86	559	5128.78	560	5129.15	560.204	5130.25	560.846	5130.49	561
5131.58	561.769	5131.88	562	5132.9	563.004	5133.75	564	5134.98	564.839
5135.23	565	5137.02	566	5138.12	566.403	5138.33	566.469	5138.5	566.502
5147.92	566.756	5160.99	566.725	5161.19	566.738	5161.39	566.742	5161.62	566.741
5206.98	566	5250.79	564	5272.78	563.788	5354.44	564	5393.07	565
5445.56	567	5477.43	571	5489.07	572	5497.34	573	5499.04	574
5514.12	582	5522.58	586.75	5523.02	587	5529.65	589	5533.39	589
5539.77	590	5548.7	591	5616.12	591.543	5643.62	591.968	5644.05	591.973
5644.31	591.972	5645.3	592	5666.31	593	5691.74	594		

81011_BuffaloCreekS83_ABWC.rep

Manning's n Values num= 3
 Sta n Val Sta n Val
 4600 .1 4859.21 .045 5133.75 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 4859.21 5133.75 70 70 70 .1 .3
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 6.3

INPUT

Description: This is a REPEATED section.
 Station Elevation Data num= 480

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4402.15	602	4402.58	601.71	4403.4	601.596	4405.11	601.043	4406.32	600.845
4407.23	600.763	4409.79	600	4410.77	599.851	4411.63	599.664	4413.47	599.156
4414.3	599	4415.09	598.916	4415.6	598.726	4416.23	598.607	4417.95	598.065
4419.5	598	4420.22	597.682	4421.03	597.513	4422.57	596.978	4424.09	596.967
4424.75	596.614	4425.38	596.463	4426.26	596.317	4427.35	595.867	4427.82	595.817
4428.47	595.517	4429.26	595.038	4429.85	595	4431.51	594.009	4432.43	594
4433.1	593.693	4434.18	593.268	4434.81	593.183	4435.78	592.827	4436.74	592.712
4438.11	592.435	4438.19	591.985	4439.59	591.972	4441.01	591.534	4441.16	591.026
4442.58	591	4443.84	590.496	4444.31	590	4446.61	589.833	4447.43	588.881
4448.86	588.743	4449.81	588.292	4450.54	587.851	4451.59	587.792	4452.35	587.496
4453.48	587.296	4454.36	586.892	4455.74	586.794	4456.34	586.47	4457.84	586.332
4458.33	585.949	4460.33	585.897	4461.04	585.48	4462.83	584.982	4466.53	584.429
4467.56	584.124	4468.47	584	4472.79	583.964	4473.75	584	4474.72	584.138
4475.4	584.384	4476.29	584.389	4477.23	584.548	4477.96	584.554	4478.98	584.655
4479.55	584.662	4480.83	584.83	4483.07	584.727	4483.59	584.733	4487.44	584.519
4488.56	584.386	4490.62	583.995	4491.43	583.994	4500.27	583.363	4501.47	583.115
4502.03	583.1	4502.53	582.967	4503.77	582.961	4510.24	582.546	4510.98	582.453
4511.9	582.424	4512.41	582.3	4513.39	582.279	4514.21	582.124	4514.69	581.966
4515.79	581.962	4516.7	581.836	4522.09	581.481	4522.59	581.464	4524.37	581.019
4524.91	580.927	4528.14	580.779	4528.63	580.654	4531.78	580.253	4532.5	580.226
4533.54	580.054	4534.06	580.046	4534.61	579.962	4542.34	579.461	4542.84	579.379
4555.83	578.373	4556.32	578.276	4559	578.031	4563.93	577.78	4564.44	577.684
4565.7	577.627	4566.24	577.545	4570.5	577.157	4572.11	577.131	4572.59	576.971
4574.73	576.968	4575.19	576.78	4579.79	576.575	4580.29	576.619	4582.33	576.586
4582.94	576.514	4588.69	576.244	4589.24	576	4598.59	575.807	4600.71	575.821
4601.3	575.794	4603.47	575.807	4604.09	575.782	4616.92	575.739	4617.94	575.65
4640.4	575.588	4641.25	575.325	4644.42	575.207	4645.82	575	4659.65	574.835
4660.62	574.714	4680.11	574.385	4681.13	574.288	4682.81	574.282	4685.17	573.994
4717.25	573.455	4727.16	573.614	4727.76	573.681	4734.84	574	4735.65	574.319
4737.52	574.735	4738.2	575.119	4740.17	575.313	4741.79	576.054	4743.12	576.073
4743.63	576.386	4744.24	576.494	4745.2	576.768	4747.65	577.124	4748.71	577.153
4749.27	577.28	4751.1	577.461	4751.64	577.602	4754.82	578.162	4755.68	578.211
4757.48	578.728	4758.16	578.806	4759.26	579.179	4760.22	579.335	4761.28	579.636
4761.85	580	4763	580.2	4763.94	580.88	4765	581	4766.31	581.434
4766.48	582	4768.53	582.073	4768.69	583	4769.25	583.074	4770.31	583.353
4770.57	583.869	4772.38	584.261	4773.61	584.248	4774.17	584.416	4775.73	584.383
4776.35	584.48	4780.68	584.544	4782.67	584.727	4783.17	584.73	4784.35	584.812
4785.64	584.813	4787.88	585.123	4789.86	585.148	4791.59	585.532	4793.46	585.777
4797.95	586.167	4799.52	586.191	4800.03	586.326	4801.16	586.368	4801.75	586.464
4809	587.082	4811.23	586.998	4811.92	586.998	4812.38	586.901	4813.72	586.74
4815.73	586.603	4816.29	586.516	4817.48	586.47	4818.18	586.265	4819.59	586.234
4820.05	585.945	4821.65	585.899	4823.75	585.549	4824.16	585.049	4826.11	585
4827.72	584.576	4828.18	584.229	4828.77	584.129	4830.05	584	4830.72	583.726
4831.62	583.579	4832.85	583.153	4833.74	582.934	4835.64	582.606	4836.78	582.248

81011_Buffal oCreekS83_ABWC. rep

4837.53	582.186	4838.24	581.883	4839.26	581.826	4840.6	581.35	4841.55	581.238
4842.24	580.891	4843.39	580.829	4844.8	580.289	4845.57	580.191	4846.4	579.865
4847.34	579.794	4849.65	578.989	4850.84	578.985	4851.34	578.688	4852	578.562
4854.38	577.828	4855.17	577.769	4856.14	577.418	4858.06	576.859	4859.63	576.566
4861.46	576.102	4862.34	575.945	4870.58	574.999	4875.19	574.796	4875.66	574.748
4876.95	574.731	4877.61	574.683	4889.75	574.327	4890.37	574.273	4906.99	573.721
4907.52	573.671	4916.55	573.336	4917.1	573.278	4927.19	572.797	4927.64	572.731
4928.62	572.697	4937.82	571.861	4939.15	571.835	4939.68	571.708	4940.61	571.657
4942.9	571.357	4943.51	571.319	4943.97	571.229	4945.38	570.78	4945.85	570.689
4946.6	570.07	4947.36	570	4947.78	569.359	4948.75	569	4949.14	568
4950.07	567.815	4950.6	567	4951.2	566.535	4951.99	566	4952.59	565.422
4955.22	565	4955.75	564.167	4960.7	563.667	4963.04	563	4966.49	562.598
4968.07	562	4972.76	561.746	4974.61	561	4978.66	560.689	4979.12	560
4984.19	559.918	4985.56	559	4988.41	558.683	4989.55	558	4992.03	557.686
4996.11	556.464	5000	556	5002.16	555.355	5004.59	555	5005.31	554.802
5007.9	554.782	5011.4	554.39	5020.5	554.27	5021.06	554.238	5023.38	554.232
5023.84	554.199	5041.93	554.033	5043.04	554.097	5043.85	554.086	5045.68	554.269
5049.9	554.358	5050.21	554.867	5051.09	555.262	5051.28	556	5051.44	556.504
5051.47	557	5051.54	558	5051.82	559.025	5052.1	560	5052.85	562
5052.89	562.915	5053.32	563.101	5053.74	564.347	5053.8	565.077	5057	565.134
5057.5	565.022	5098.43	565.13	5099.04	565.166	5183.48	565.351	5185.84	565.069
5188.39	565.069	5188.99	565	5209.03	564.919	5215.75	564.26	5217.27	564
5229.44	563.427	5280.57	563.528	5284.16	563.7	5285.52	563.854	5288.94	564
5289.56	564	5291.16	564.15	5291.59	565	5293.18	565.216	5293.48	566.062
5294.34	566.146	5295.24	566.934	5295.74	567.116	5296.25	567.108	5297.22	567.208
5298.49	567.245	5299.07	567.383	5301.07	567.577	5303.28	568.007	5305.21	568.009
5305.9	568.262	5308.59	568.524	5309.18	568.707	5311.24	569.044	5313.07	569.058
5313.67	569.302	5314.71	569.382	5316.72	569.744	5317.2	569.798	5317.85	569.986
5318.5	570	5319.16	570.275	5320.43	570.501	5320.94	570.545	5340.51	570.291
5341.29	570.247	5344.02	570.232	5344.6	570.182	5353.81	570.047	5354.59	569.986
5363.36	569.866	5363.92	569.824	5384.88	569.552	5390.71	569.894	5391.36	570.054
5393.46	570.235	5394.79	570.278	5395.51	570.419	5397.41	570.599	5399.1	570.886
5399.81	570.913	5400.67	571.095	5407.74	571.911	5408.48	571.921	5409.27	572.069
5411.04	572.218	5412.12	572.261	5412.82	572.365	5416.61	572.706	5438.25	573.079
5438.74	573.132	5466.7	574.141	5468.82	574.462	5469.39	575.086	5470.74	575.219
5471.44	575.734	5472.72	576	5473.92	576.506	5474.84	577	5476.13	577.406
5476.51	578	5478.02	578.19	5478.68	579	5479.67	579.395	5480.1	580
5481.28	580.268	5482.34	581	5482.88	581.663	5484.41	582	5484.54	583
5486	583.044	5489.3	584	5492.35	584.532	5492.55	585	5493.66	585.23
5494.43	585.23	5497.09	585.741	5497.92	585.645	5498.75	585.384	5513.35	586.102
5514.35	586.233	5523.21	586.852	5525.2	586.871	5526.78	587.075	5529.38	587.088
5530.19	587.234	5542.8	587.857	5544.88	588.129	5546.64	588.162	5547.42	588.346
5548.72	588.567	5552.29	589	5555.88	589.02	5559.85	589.334	5586.17	590.236
5587.63	590.683	5590.32	590.79	5592.19	591	5604.66	591.499	5605.21	592
5611.44	592	5612.39	591.72	5612.88	591.652	5622.84	592.071	5623.5	592.198
5633.28	593	5646.35	593.413	5650.44	594	5651.33	594.29	5660.17	594.749
5660.65	594.905	5663.55	595	5664.41	594.766	5665.13	594.447	5665.6	594.176
5666.83	594	5668.17	593.522	5668.67	592.887	5670.26	592.801	5670.73	592.037
5672.03	592	5672.86	591.231	5673.82	590.991	5674.37	590.662	5674.83	590.468
5675.46	589.677	5675.96	589.697	5676.46	590.016	5690.72	593	5708.93	594.429
5736.95	600.011	5740.63	601	5752.21	602	5806.39	604.164	5806.92	604.118
5809.72	604	5814.25	603	5831.86	599.963	5832.41	599.902	5839.44	599.631

Mann ng' s n Val ues num= 3
 Sta n Val Sta n Val Sta n Val
 4402.15 .1 4963.04 .045 5052.89 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 4963.04 5052.89 120 120 120 .3 .5
 Ineffectiv e Flow num= 2
 Sta L Sta R Elev Permanent
 4402.15 4908.5 585.417 F
 5281 5839.44 578.417 F

Sediment Elevation = 0

BRI DGE

RIVER: RIVER-1

REACH: Reach-1

RS: 6.25

INPUT

Description: Bridge #1

Distance from Upstream XS = 30

Deck/Roadway Width = 48

Weir Coefficient = 3

Upstream Deck/Roadway Coordinates

num= 231

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
4370	612.	763			4476	776	607			4478	579	606.	894	
4479	28	606.	886		4479	822	606.	865		4497	811		606	
4498	863	605.	936		4498	942	605.	935		4499	569	605.	894	
4500	566	605.	88		4519	117	605			4520	151	604.	934	
4520	283	604.	932		4521	139	604.	877		4522	094	604.	861	
4540	407	604			4541	072	603.	952		4541	183	603.	95	
4542	396	603.	866		4543	326	603.	852		4543	481	603.	847	
4561	587	603			4562	208	602.	947		4562	302	602.	948	
4562	544	602.	943		4564	119	602.	843		4564	93	602.	828	
4582	446	602			4583	764	601.	913		4583	845	601.	911	
4584	758	601.	851		4584	906	601.	849		4585	634	601.	8	
4586	6	601.	788		4603	723	601			4605	019	600.	908	
4605	154	600.	906		4605	817	600.	86		4606	025	600.	857	
4606	648	600.	815		4607	951	600.	788		4624	852		600	
4626	133	599.	902		4626	353	599.	898		4627	247	599.	832	
4628	575	599.	808		4645	848	599			4646	416	598.	956	
4646	533	598.	954		4648	032	598.	849		4649	385	598.	823	
4649	524	598.	818		4666	249	598			4668	414	597.	855	
4668	689	597.	849		4670	876	597.	714		4671	95	597.	696	
4672	992	597.	682		4688	179	597			4690	699	596.	83	
4692	466	596.	744		4692	64	596.	741		4692	994	596.	721	
4694	949	596.	7		4697	001	596.	636		4710	626		596	
4713	039	595.	857		4713	151	595.	856		4713	911	595.	812	
4714	33	595.	812		4715	026	595.	772		4718	673	595.	684	
4725	538	595.	357		4725	676	595.	349		4734	268		595	
4735	861	594.	913		4736	152	594.	905		4737	549	594.	831	
4738	239	594.	81		4739	523	594.	743		4741	469	594.	685	
4756	843	594			4759	022	593.	852		4759	209	593.	848	
4760	695	593.	751		4760	784	593.	749		4760	873	593.	749	
4761	907	593.	682		4762	018	593.	682		4762	556	593.	647	
4762	673	593.	648		4762	922	593.	631		4763	118	593.	634	
4763	262	593.	642		4763	346	593.	644		4766	283	593.	609	
4780	208	593			4780	357	592.	987		4780	596	592.	972	
4781	528	592.	943		4782	348	592.	941		4782	735	592.	934	
4783	092	592.	915		4783	284	592.	912		4783	99	592.	873	
4784	135	592.	871		4784	202	592.	869		4784	647	592.	864	
4784	752	592.	865		4788	582	592.	678		4788	791	592.	67	
4790	643	592.	578		4790	906	592.	57		4791	372	592.	544	
4792	236	592.	524		4793	373	592.	521		4793	766	592.	513	
4816	319	591.	583		4817	042	591.	561		4817	415	591.	555	
4855	993	589.	983		4856	062	589.	982		4908	5		589	
4908	5	589		585. 417	5281		582	578. 417	5281				582	
5350	707	582.	316		5353	528	582.	303		5353	634	582.	305	
5356	29	582.	329		5359	836	582.	379		5360	309	582.	392	
5361	318	582.	401		5362	693	582.	451		5364	399	582.	548	
5365	203	582.	558		5365	92	582.	605		5366	61	582.	614	

81011_BuffaloCreekS83_ABWC.rep

5367.385	582.669	5367.934	582.677	5368.77	582.738
5369.166	582.744	5370.071	582.808	5370.324	582.812
5371.31	582.874	5371.586	582.88	5372.427	582.922
5372.526	582.924	5374.506	583	5379.924	583.101
5379.995	583.105	5382.082	583.142	5382.242	583.149
5384.218	583.184	5384.53	583.197	5386.348	583.23
5386.789	583.248	5388.406	583.279	5388.971	583.301
5390.352	583.329	5391.022	583.354	5392.145	583.378
5396.498	583.526	5397.53	583.596	5397.811	583.606
5401.495	583.832	5401.66	583.844	5402.486	583.875
5402.898	583.905	5403.067	583.913	5403.245	583.918
5407.872	584	5410.222	584.105	5411.326	584.171
5411.72	584.185	5412.861	584.255	5413.458	584.275
5414.549	584.341	5415.331	584.367	5416.305	584.423
5417.219	584.452	5421.03	584.629	5421.319	584.639
5422.991	584.69	5423.067	584.662	5425.686	584.751
5425.886	584.754	5427.058	584.799	5427.124	584.8
5441.253	585.371	5450.049	585.915	5450.573	585.938
5451.38	586	5455.37	586.237	5459.565	586.4
5460.804	586.483	5461.361	586.51	5462.993	586.623
5463.232	586.636	5465.17	586.772	5465.346	586.782
5468.437	587	5494.061	588.334	5494.422	588.35
5536.993	591	5567.21	593.242	5567.84	593.28
5569.585	593.413	5582.019	594.305	5582.614	594.354
5584.18	594.456	5585.016	594.527	5586.122	594.6
5587.164	594.689	5587.857	594.736	5589.087	594.841
5596.638	595.358	5602.395	595.799	5604.143	595.942
5607.8	596.164	5621.635	597	5634.258	598
5650.276	599.08	5661.888	600	5713.07	603
5757.046	605	5757.255	605.014	5757.317	605.013
5788.125	606.408	5788.253	606.412	5791.957	606.439

Upstream Bridge Cross Section Data

Station		Elevation Data		num= 480		Station		Elevation		Station		Elevation	
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
4402.15	602	4402.58	601.71	4403.4	601.596	4405.11	601.043	4406.32	600.845				
4407.23	600.763	4409.79	600	4410.77	599.851	4411.63	599.664	4413.47	599.156				
4414.3	599	4415.09	598.916	4415.6	598.726	4416.23	598.607	4417.95	598.065				
4419.5	598	4420.22	597.682	4421.03	597.513	4422.57	596.978	4424.09	596.967				
4424.75	596.614	4425.38	596.463	4426.26	596.317	4427.35	595.867	4427.82	595.817				
4428.47	595.517	4429.26	595.038	4429.85	595	4431.51	594.009	4432.43	594				
4433.1	593.693	4434.18	593.268	4434.81	593.183	4435.78	592.827	4436.74	592.712				
4438.11	592.435	4438.19	591.985	4439.59	591.972	4441.01	591.534	4441.16	591.026				
4442.58	591	4443.84	590.496	4444.31	590	4446.61	589.833	4447.43	588.881				
4448.86	588.743	4449.81	588.292	4450.54	587.851	4451.59	587.792	4452.35	587.496				
4453.48	587.296	4454.36	586.892	4455.74	586.794	4456.34	586.47	4457.84	586.332				
4458.33	585.949	4460.33	585.897	4461.04	585.48	4462.83	584.982	4466.53	584.429				
4467.56	584.124	4468.47	584	4472.79	583.964	4473.75	584	4474.72	584.138				
4475.4	584.384	4476.29	584.389	4477.23	584.548	4477.96	584.554	4478.98	584.655				
4479.55	584.662	4480.83	584.83	4483.07	584.727	4483.59	584.733	4487.44	584.519				
4488.56	584.386	4490.62	583.995	4491.43	583.994	4500.27	583.363	4501.47	583.115				
4502.03	583.1	4502.53	582.967	4503.77	582.961	4510.24	582.546	4510.98	582.453				
4511.9	582.424	4512.41	582.3	4513.39	582.279	4514.21	582.124	4514.69	581.966				
4515.79	581.962	4516.7	581.836	4522.09	581.481	4522.59	581.464	4524.37	581.019				
4524.91	580.927	4528.14	580.779	4528.63	580.654	4531.78	580.253	4532.5	580.226				
4533.54	580.054	4534.06	580.046	4534.61	579.962	4542.34	579.461	4542.84	579.379				
4555.83	578.373	4556.32	578.276	4559	578.031	4563.93	577.78	4564.44	577.684				
4565.7	577.627	4566.24	577.545	4570.5	577.157	4572.11	577.131	4572.59	576.971				
4574.73	576.968	4575.19	576.78	4579.79	576.575	4580.29	576.619	4582.33	576.586				
4582.94	576.514	4588.69	576.244	4589.24	576	4598.59	575.807	4600.71	575.821				
4601.3	575.794	4603.47	575.807	4604.09	575.782	4616.92	575.739	4617.94	575.65				
4640.4	575.588	4641.25	575.325	4644.42	575.207	4645.82	575	4659.65	574.835				
4660.62	574.714	4680.11	574.385	4681.13	574.288	4682.81	574.282	4685.17	573.994				

81011_BuffaloCreekS83_ABWC.rep

4717. 25 573. 455 4727. 16 573. 614 4727. 76 573. 681 4734. 84 574 4735. 65 574. 319
 4737. 52 574. 735 4738. 2 575. 119 4740. 17 575. 313 4741. 79 576. 054 4743. 12 576. 073
 4743. 63 576. 386 4744. 24 576. 494 4745. 2 576. 768 4747. 65 577. 124 4748. 71 577. 153
 4749. 27 577. 28 4751. 1 577. 461 4751. 64 577. 602 4754. 82 578. 162 4755. 68 578. 211
 4757. 48 578. 728 4758. 16 578. 806 4759. 26 579. 179 4760. 22 579. 335 4761. 28 579. 636
 4761. 85 580 4763 580. 2 4763. 94 580. 88 4765 581 4766. 31 581. 434
 4766. 48 582 4768. 53 582. 073 4768. 69 583 4769. 25 583. 074 4770. 31 583. 353
 4770. 57 583. 869 4772. 38 584. 261 4773. 61 584. 248 4774. 17 584. 416 4775. 73 584. 383
 4776. 35 584. 48 4780. 68 584. 544 4782. 67 584. 727 4783. 17 584. 73 4784. 35 584. 812
 4785. 64 584. 813 4787. 88 585. 123 4789. 86 585. 148 4791. 59 585. 532 4793. 46 585. 777
 4797. 95 586. 167 4799. 52 586. 191 4800. 03 586. 326 4801. 16 586. 368 4801. 75 586. 464
 4809 587. 082 4811. 23 586. 998 4811. 92 586. 998 4812. 38 586. 901 4813. 72 586. 74
 4815. 73 586. 603 4816. 29 586. 516 4817. 48 586. 47 4818. 18 586. 265 4819. 59 586. 234
 4820. 05 585. 945 4821. 65 585. 899 4823. 75 585. 549 4824. 16 585. 049 4826. 11 585
 4827. 72 584. 576 4828. 18 584. 229 4828. 77 584. 129 4830. 05 584 4830. 72 583. 726
 4831. 62 583. 579 4832. 85 583. 153 4833. 74 582. 934 4835. 64 582. 606 4836. 78 582. 248
 4837. 53 582. 186 4838. 24 581. 883 4839. 26 581. 826 4840. 6 581. 35 4841. 55 581. 238
 4842. 24 580. 891 4843. 39 580. 829 4844. 8 580. 289 4845. 57 580. 191 4846. 4 579. 865
 4847. 34 579. 794 4849. 65 578. 989 4850. 84 578. 985 4851. 34 578. 688 4852 578. 562
 4854. 38 577. 828 4855. 17 577. 769 4856. 14 577. 418 4858. 06 576. 859 4859. 63 576. 566
 4861. 46 576. 102 4862. 34 575. 945 4870. 58 574. 999 4875. 19 574. 796 4875. 66 574. 748
 4876. 95 574. 731 4877. 61 574. 683 4889. 75 574. 327 4890. 37 574. 273 4906. 99 573. 721
 4907. 52 573. 671 4916. 55 573. 336 4917. 1 573. 278 4927. 19 572. 797 4927. 64 572. 731
 4928. 62 572. 697 4937. 82 571. 861 4939. 15 571. 835 4939. 68 571. 708 4940. 61 571. 657
 4942. 9 571. 357 4943. 51 571. 319 4943. 97 571. 229 4945. 38 570. 78 4945. 85 570. 689
 4946. 6 570. 07 4947. 36 570 4947. 78 569. 359 4948. 75 569 4949. 14 568
 4950. 07 567. 815 4950. 6 567 4951. 2 566. 535 4951. 99 566 4952. 59 565. 422
 4955. 22 565 4955. 75 564. 167 4960. 7 563. 667 4963. 04 563 4966. 49 562. 598
 4968. 07 562 4972. 76 561. 746 4974. 61 561 4978. 66 560. 689 4979. 12 560
 4984. 19 559. 918 4985. 56 559 4988. 41 558. 683 4989. 55 558 4992. 03 557. 686
 4996. 11 556. 464 5000 556 5002. 16 555. 355 5004. 59 555 5005. 31 554. 802
 5007. 9 554. 782 5011. 4 554. 39 5020. 5 554. 27 5021. 06 554. 238 5023. 38 554. 232
 5023. 84 554. 199 5041. 93 554. 033 5043. 04 554. 097 5043. 85 554. 086 5045. 68 554. 269
 5049. 9 554. 358 5050. 21 554. 867 5051. 09 555. 262 5051. 28 556 5051. 44 556. 504
 5051. 47 557 5051. 54 558 5051. 82 559. 025 5052. 1 560 5052. 85 562
 5052. 89 562. 915 5053. 32 563. 101 5053. 74 564. 347 5053. 8 565. 077 5057 565. 134
 5057. 5 565. 022 5098. 43 565. 13 5099. 04 565. 166 5183. 48 565. 351 5185. 84 565. 069
 5188. 39 565. 069 5188. 99 565 5209. 03 564. 919 5215. 75 564. 26 5217. 27 564
 5229. 44 563. 427 5280. 57 563. 528 5284. 16 563. 7 5285. 52 563. 854 5288. 94 564
 5289. 56 564 5291. 16 564. 15 5291. 59 565 5293. 18 565. 216 5293. 48 566. 062
 5294. 34 566. 146 5295. 24 566. 934 5295. 74 567. 116 5296. 25 567. 108 5297. 22 567. 208
 5298. 49 567. 245 5299. 07 567. 383 5301. 07 567. 577 5303. 28 568. 007 5305. 21 568. 009
 5305. 9 568. 262 5308. 59 568. 524 5309. 18 568. 707 5311. 24 569. 044 5313. 07 569. 058
 5313. 67 569. 302 5314. 71 569. 382 5316. 72 569. 744 5317. 2 569. 798 5317. 85 569. 986
 5318. 5 570 5319. 16 570. 275 5320. 43 570. 501 5320. 94 570. 545 5340. 51 570. 291
 5341. 29 570. 247 5344. 02 570. 232 5344. 6 570. 182 5353. 81 570. 047 5354. 59 569. 986
 5363. 36 569. 866 5363. 92 569. 824 5384. 88 569. 552 5390. 71 569. 894 5391. 36 570. 054
 5393. 46 570. 235 5394. 79 570. 278 5395. 51 570. 419 5397. 41 570. 599 5399. 1 570. 886
 5399. 81 570. 913 5400. 67 571. 095 5407. 74 571. 911 5408. 48 571. 921 5409. 27 572. 069
 5411. 04 572. 218 5412. 12 572. 261 5412. 82 572. 365 5416. 61 572. 706 5438. 25 573. 079
 5438. 74 573. 132 5466. 7 574. 141 5468. 82 574. 462 5469. 39 575. 086 5470. 74 575. 219
 5471. 44 575. 734 5472. 72 576 5473. 92 576. 506 5474. 84 577 5476. 13 577. 406
 5476. 51 578 5478. 02 578. 19 5478. 68 579 5479. 67 579. 395 5480. 1 580
 5481. 28 580. 268 5482. 34 581 5482. 88 581. 663 5484. 41 582 5484. 54 583
 5486 583. 044 5489. 3 584 5492. 35 584. 532 5492. 55 585 5493. 66 585. 23
 5494. 43 585. 23 5497. 09 585. 741 5497. 92 585. 645 5498. 75 585. 384 5513. 35 586. 102
 5514. 35 586. 233 5523. 21 586. 852 5525. 2 586. 871 5526. 78 587. 075 5529. 38 587. 088
 5530. 19 587. 234 5542. 8 587. 857 5544. 88 588. 129 5546. 64 588. 162 5547. 42 588. 346
 5548. 72 588. 567 5552. 29 589 5555. 88 589. 02 5559. 85 589. 334 5586. 17 590. 236
 5587. 63 590. 683 5590. 32 590. 79 5592. 19 591 5604. 66 591. 499 5605. 21 592
 5611. 44 592 5612. 39 591. 72 5612. 88 591. 652 5622. 84 592. 071 5623. 5 592. 198
 5633. 28 593 5646. 35 593. 413 5650. 44 594 5651. 33 594. 29 5660. 17 594. 749
 5660. 65 594. 905 5663. 55 595 5664. 41 594. 766 5665. 13 594. 447 5665. 6 594. 176

81011_BuffaloCreekS83_ABWC.rep

5666.83	594	5668.17	593.522	5668.67	592.887	5670.26	592.801	5670.73	592.037
5672.03	592	5672.86	591.231	5673.82	590.991	5674.37	590.662	5674.83	590.468
5675.46	589.677	5675.96	589.697	5676.46	590.016	5690.72	593	5708.93	594.429
5736.95	600.011	5740.63	601	5752.21	602	5806.39	604.164	5806.92	604.118
5809.72	604	5814.25	603	5831.86	599.963	5832.41	599.902	5839.44	599.631

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 4402.15 .1 4963.04 .045 5052.89 .1

Bank Sta: Left Right Coeff Contr. Expan.
 4963.04 5052.89 .3 .5

Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 4402.15 4908.5 585.417 F
 5281 5839.44 578.417 F

Sediment Elevation = 0

Downstream Deck/Roadway Coordinates num= 231

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
4370	612.763		4476	776	607	4478	579	606.894
4479	28	606.886	4479	822	606.865	4497	811	606
4498	863	605.936	4498	942	605.935	4499	569	605.894
4500	566	605.88	4519	117	605	4520	151	604.934
4520	283	604.932	4521	139	604.877	4522	094	604.861
4540	407	604	4541	072	603.952	4541	183	603.95
4542	396	603.866	4543	326	603.852	4543	481	603.847
4561	587	603	4562	208	602.947	4562	302	602.948
4562	544	602.943	4564	119	602.843	4564	93	602.828
4582	446	602	4583	764	601.913	4583	845	601.911
4584	758	601.851	4584	906	601.849	4585	634	601.8
4586	6	601.788	4603	723	601	4605	019	600.908
4605	154	600.906	4605	817	600.86	4606	025	600.857
4606	648	600.815	4607	951	600.788	4624	852	600
4626	133	599.902	4626	353	599.898	4627	247	599.832
4628	575	599.808	4645	848	599	4646	416	598.956
4646	533	598.954	4648	032	598.849	4649	385	598.823
4649	524	598.818	4666	249	598	4668	414	597.855
4668	689	597.849	4670	876	597.714	4671	95	597.696
4672	992	597.682	4688	179	597	4690	699	596.83
4692	466	596.744	4692	64	596.741	4692	994	596.721
4694	949	596.7	4697	001	596.636	4710	626	596
4713	039	595.857	4713	151	595.856	4713	911	595.812
4714	33	595.812	4715	026	595.772	4718	673	595.684
4725	538	595.357	4725	676	595.349	4734	268	595
4735	861	594.913	4736	152	594.905	4737	549	594.831
4738	239	594.81	4739	523	594.743	4741	469	594.685
4756	843	594	4759	022	593.852	4759	209	593.848
4760	695	593.751	4760	784	593.749	4760	873	593.749
4761	907	593.682	4762	018	593.682	4762	556	593.647
4762	673	593.648	4762	922	593.631	4763	118	593.634
4763	262	593.642	4763	346	593.644	4766	283	593.609
4780	208	593	4780	357	592.987	4780	596	592.972
4781	528	592.943	4782	348	592.941	4782	735	592.934
4783	092	592.915	4783	284	592.912	4783	99	592.873
4784	135	592.871	4784	202	592.869	4784	647	592.864
4784	752	592.865	4788	582	592.678	4788	791	592.67
4790	643	592.578	4790	906	592.57	4791	372	592.544
4792	236	592.524	4793	373	592.521	4793	766	592.513
4816	319	591.583	4817	042	591.561	4817	415	591.555
4855	993	589.983	4856	062	589.982	4908	5	589
4908	5	589	585.417	5281	582	578.417	5281	582

81011_BuffaloCreekS83_ABWC.rep

5350.707	582.316	5353.528	582.303	5353.634	582.305
5356.29	582.329	5359.836	582.379	5360.309	582.392
5361.318	582.401	5362.693	582.451	5364.399	582.548
5365.203	582.558	5365.92	582.605	5366.61	582.614
5367.385	582.669	5367.934	582.677	5368.77	582.738
5369.166	582.744	5370.071	582.808	5370.324	582.812
5371.31	582.874	5371.586	582.88	5372.427	582.922
5372.526	582.924	5374.506	583	5379.924	583.101
5379.995	583.105	5382.082	583.142	5382.242	583.149
5384.218	583.184	5384.53	583.197	5386.348	583.23
5386.789	583.248	5388.406	583.279	5388.971	583.301
5390.352	583.329	5391.022	583.354	5392.145	583.378
5396.498	583.526	5397.53	583.596	5397.811	583.606
5401.495	583.832	5401.66	583.844	5402.486	583.875
5402.898	583.905	5403.067	583.913	5403.245	583.918
5407.872	584	5410.222	584.105	5411.326	584.171
5411.72	584.185	5412.861	584.255	5413.458	584.275
5414.549	584.341	5415.331	584.367	5416.305	584.423
5417.219	584.452	5421.03	584.629	5421.319	584.639
5422.991	584.69	5423.067	584.662	5425.686	584.751
5425.886	584.754	5427.058	584.799	5427.124	584.8
5441.253	585.371	5450.049	585.915	5450.573	585.938
5451.38	586	5455.37	586.237	5459.565	586.4
5460.804	586.483	5461.361	586.51	5462.993	586.623
5463.232	586.636	5465.17	586.772	5465.346	586.782
5468.437	587	5494.061	588.334	5494.422	588.35
5536.993	591	5567.21	593.242	5567.84	593.28
5569.585	593.413	5582.019	594.305	5582.614	594.354
5584.18	594.456	5585.016	594.527	5586.122	594.6
5587.164	594.689	5587.857	594.736	5589.087	594.841
5596.638	595.358	5602.395	595.799	5604.143	595.942
5607.8	596.164	5621.635	597	5634.258	598
5650.276	599.08	5661.888	600	5713.07	603
5757.046	605	5757.255	605.014	5757.317	605.013
5788.125	606.408	5788.253	606.412	5791.957	606.439

Downstream Bridge Cross Section Data

Station Elevation Data		num= 480		Sta		El ev		Sta		El ev	
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
4402.15	602	4402.58	601.71	4403.4	601.596	4405.11	601.043	4406.32	600.845		
4407.23	600.763	4409.79	600	4410.77	599.851	4411.63	599.664	4413.47	599.156		
4414.3	599	4415.09	598.916	4415.6	598.726	4416.23	598.607	4417.95	598.065		
4419.5	598	4420.22	597.682	4421.03	597.513	4422.57	596.978	4424.09	596.967		
4424.75	596.614	4425.38	596.463	4426.26	596.317	4427.35	595.867	4427.82	595.817		
4428.47	595.517	4429.26	595.038	4429.85	595	4431.51	594.009	4432.43	594		
4433.1	593.693	4434.18	593.268	4434.81	593.183	4435.78	592.827	4436.74	592.712		
4438.11	592.435	4438.19	591.985	4439.59	591.972	4441.01	591.534	4441.16	591.026		
4442.58	591	4443.84	590.496	4444.31	590	4446.61	589.833	4447.43	588.881		
4448.86	588.743	4449.81	588.292	4450.54	587.851	4451.59	587.792	4452.35	587.496		
4453.48	587.296	4454.36	586.892	4455.74	586.794	4456.34	586.47	4457.84	586.332		
4458.33	585.949	4460.33	585.897	4461.04	585.48	4462.83	584.982	4466.53	584.429		
4467.56	584.124	4468.47	584	4472.79	583.964	4473.75	584	4474.72	584.138		
4475.4	584.384	4476.29	584.389	4477.23	584.548	4477.96	584.554	4478.98	584.655		
4479.55	584.662	4480.83	584.83	4483.07	584.727	4483.59	584.733	4487.44	584.519		
4488.56	584.386	4490.62	583.995	4491.43	583.994	4500.27	583.363	4501.47	583.115		
4502.03	583.1	4502.53	582.967	4503.77	582.961	4510.24	582.546	4510.98	582.453		
4511.9	582.424	4512.41	582.3	4513.39	582.279	4514.21	582.124	4514.69	581.966		
4515.79	581.962	4516.7	581.836	4522.09	581.481	4522.59	581.464	4524.37	581.019		
4524.91	580.927	4528.14	580.779	4528.63	580.654	4531.78	580.253	4532.5	580.226		
4533.54	580.054	4534.06	580.046	4534.61	579.962	4542.34	579.461	4542.84	579.379		
4555.83	578.373	4556.32	578.276	4559	578.031	4563.93	577.78	4564.44	577.684		
4565.7	577.627	4566.24	577.545	4570.5	577.157	4572.11	577.131	4572.59	576.971		
4574.73	576.968	4575.19	576.78	4579.79	576.575	4580.29	576.619	4582.33	576.586		

81011_BuffaloCreekS83_ABWC.rep

4582.94 576.514 4588.69 576.244 4589.24 576.4598.59 575.807 4600.71 575.821
 4601.3 575.794 4603.47 575.807 4604.09 575.782 4616.92 575.739 4617.94 575.65
 4640.4 575.588 4641.25 575.325 4644.42 575.207 4645.82 575.4659.65 574.835
 4660.62 574.714 4680.11 574.385 4681.13 574.288 4682.81 574.282 4685.17 573.994
 4717.25 573.455 4727.16 573.614 4727.76 573.681 4734.84 574.4735.65 574.319
 4737.52 574.735 4738.2 575.119 4740.17 575.313 4741.79 576.054 4743.12 576.073
 4743.63 576.386 4744.24 576.494 4745.2 576.768 4747.65 577.124 4748.71 577.153
 4749.27 577.28 4751.1 577.461 4751.64 577.602 4754.82 578.162 4755.68 578.211
 4757.48 578.728 4758.16 578.806 4759.26 579.179 4760.22 579.335 4761.28 579.636
 4761.85 580.4763 580.2 4763.94 580.88 4765.581 4766.31 581.434
 4766.48 582.4768.53 582.073 4768.69 583.4769.25 583.074 4770.31 583.353
 4770.57 583.869 4772.38 584.261 4773.61 584.248 4774.17 584.416 4775.73 584.383
 4776.35 584.48 4780.68 584.544 4782.67 584.727 4783.17 584.73 4784.35 584.812
 4785.64 584.813 4787.88 585.123 4789.86 585.148 4791.59 585.532 4793.46 585.777
 4797.95 586.167 4799.52 586.191 4800.03 586.326 4801.16 586.368 4801.75 586.464
 4809 587.082 4811.23 586.998 4811.92 586.998 4812.38 586.901 4813.72 586.74
 4815.73 586.603 4816.29 586.516 4817.48 586.47 4818.18 586.265 4819.59 586.234
 4820.05 585.945 4821.65 585.899 4823.75 585.549 4824.16 585.049 4826.11 585
 4827.72 584.576 4828.18 584.229 4828.77 584.129 4830.05 584.4830.72 583.726
 4831.62 583.579 4832.85 583.153 4833.74 582.934 4835.64 582.606 4836.78 582.248
 4837.53 582.186 4838.24 581.883 4839.26 581.826 4840.6 581.35 4841.55 581.238
 4842.24 580.891 4843.39 580.829 4844.8 580.289 4845.57 580.191 4846.4 579.865
 4847.34 579.794 4849.65 578.989 4850.84 578.985 4851.34 578.688 4852.578.562
 4854.38 577.828 4855.17 577.769 4856.14 577.418 4858.06 576.859 4859.63 576.566
 4861.46 576.102 4862.34 575.945 4870.58 574.999 4875.19 574.796 4875.66 574.748
 4876.95 574.731 4877.61 574.683 4889.75 574.327 4890.37 574.273 4906.99 573.721
 4907.52 573.671 4916.55 573.336 4917.1 573.278 4927.19 572.797 4927.64 572.731
 4928.62 572.697 4937.82 571.861 4939.15 571.835 4939.68 571.708 4940.61 571.657
 4942.9 571.357 4943.51 571.319 4943.97 571.229 4945.38 570.78 4945.85 570.689
 4946.6 570.07 4947.36 570.4947.78 569.359 4948.75 569.4949.14 568
 4950.07 567.815 4950.6 567.4951.2 566.535 4951.99 566.4952.59 565.422
 4955.22 565.4955.75 564.167 4960.7 563.667 4963.04 563.4966.49 562.598
 4968.07 562.4972.76 561.746 4974.61 561.4978.66 560.689 4979.12 560
 4984.19 559.918 4985.56 559.4988.41 558.683 4989.55 558.4992.03 557.686
 4996.11 556.464 5000.556 5002.16 555.355 5004.59 555.5005.31 554.802
 5007.9 554.782 5011.4 554.39 5020.5 554.27 5021.06 554.238 5023.38 554.232
 5023.84 554.199 5041.93 554.033 5043.04 554.097 5043.85 554.086 5045.68 554.269
 5049.9 554.358 5050.21 554.867 5051.09 555.262 5051.28 556.5051.44 556.504
 5051.47 557.5051.54 558.5051.82 559.025 5052.1 560.5052.85 562
 5052.89 562.915 5053.32 563.101 5053.74 564.347 5053.8 565.077 5057.565.134
 5057.5 565.022 5098.43 565.13 5099.04 565.166 5183.48 565.351 5185.84 565.069
 5188.39 565.069 5188.99 565.5209.03 564.919 5215.75 564.26 5217.27 564
 5229.44 563.427 5280.57 563.528 5284.16 563.7 5285.52 563.854 5288.94 564
 5289.56 564.5291.16 564.15 5291.59 565.5293.18 565.216 5293.48 566.062
 5294.34 566.146 5295.24 566.934 5295.74 567.116 5296.25 567.108 5297.22 567.208
 5298.49 567.245 5299.07 567.383 5301.07 567.577 5303.28 568.007 5305.21 568.009
 5305.9 568.262 5308.59 568.524 5309.18 568.707 5311.24 569.044 5313.07 569.058
 5313.67 569.302 5314.71 569.382 5316.72 569.744 5317.2 569.798 5317.85 569.986
 5318.5 570.5319.16 570.275 5320.43 570.501 5320.94 570.545 5340.51 570.291
 5341.29 570.247 5344.02 570.232 5344.6 570.182 5353.81 570.047 5354.59 569.986
 5363.36 569.866 5363.92 569.824 5384.88 569.552 5390.71 569.894 5391.36 570.054
 5393.46 570.235 5394.79 570.278 5395.51 570.419 5397.41 570.599 5399.1 570.886
 5399.81 570.913 5400.67 571.095 5407.74 571.911 5408.48 571.921 5409.27 572.069
 5411.04 572.218 5412.12 572.261 5412.82 572.365 5416.61 572.706 5438.25 573.079
 5438.74 573.132 5466.7 574.141 5468.82 574.462 5469.39 575.086 5470.74 575.219
 5471.44 575.734 5472.72 576.5473.92 576.506 5474.84 577.5476.13 577.406
 5476.51 578.5478.02 578.19 5478.68 579.5479.67 579.395 5480.1 580
 5481.28 580.268 5482.34 581.5482.88 581.663 5484.41 582.5484.54 583
 5486 583.044 5489.3 584.5492.35 584.532 5492.55 585.5493.66 585.23
 5494.43 585.23 5497.09 585.741 5497.92 585.645 5498.75 585.384 5513.35 586.102
 5514.35 586.233 5523.21 586.852 5525.2 586.871 5526.78 587.075 5529.38 587.088
 5530.19 587.234 5542.8 587.857 5544.88 588.129 5546.64 588.162 5547.42 588.346
 5548.72 588.567 5552.29 589.5555.88 589.02 5559.85 589.334 5586.17 590.236

81011_BuffaloCreekS83_ABWC.rep

5587.63 590.683 5590.32 590.79 5592.19 591 5604.66 591.499 5605.21 592
 5611.44 592 5612.39 591.72 5612.88 591.652 5622.84 592.071 5623.5 592.198
 5633.28 593 5646.35 593.413 5650.44 594 5651.33 594.29 5660.17 594.749
 5660.65 594.905 5663.55 595 5664.41 594.766 5665.13 594.447 5665.6 594.176
 5666.83 594 5668.17 593.522 5668.67 592.887 5670.26 592.801 5670.73 592.037
 5672.03 592 5672.86 591.231 5673.82 590.991 5674.37 590.662 5674.83 590.468
 5675.46 589.677 5675.96 589.697 5676.46 590.016 5690.72 593 5708.93 594.429
 5736.95 600.011 5740.63 601 5752.21 602 5806.39 604.164 5806.92 604.118
 5809.72 604 5814.25 603 5831.86 599.963 5832.41 599.902 5839.44 599.631

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 4402.15 .1 4963.04 .045 5052.89 .1

Bank Sta: Left Right Coeff Contr. Expan.
 4963.04 5052.89 .3 .5

Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 4402.15 4908.5 585.417 F
 5281 5839.44 578.417 F
 Sediment Elevation = 0

Upstream Embankment side slope = 2 hori z. to 1.0 vertical
 Downstream Embankment side slope = 2 hori z. to 1.0 vertical
 Maximum allowable submergence for weir flow = .98
 Elevation at which weir flow begins = 584.5
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Abutments = 2

Abutment Data
 Upstream num= 2
 Sta Elev Sta Elev
 4908.5 585.417 5058.5 485.417
 Downstream num= 2
 Sta Elev Sta Elev
 4908.5 585.417 5058.5 485.417

Abutment Data
 Upstream num= 2
 Sta Elev Sta Elev
 5131 478.11 5281 578.11
 Downstream num= 2
 Sta Elev Sta Elev
 5131 478.67 5281 578.67

Number of Piers = 11

Pier Data
 Pier Station Upstream= 4969.5 Downstream= 4969.5
 Upstream num= 2
 Width Elev Width Elev
 3 547.5 3 590
 Downstream num= 2
 Width Elev Width Elev
 3 547.5 3 590

Pier Data
 Pier Station Upstream= 5030.5 Downstream= 5030.5
 Upstream num= 2
 Width Elev Width Elev

3 547.5 3 590
 Downstream num= 2
 Width Elev Width Elev
 3 547.5 3 590

Pier Data
 Pier Station Upstream= 5055.5 Downstream= 5055.5
 Upstream num= 2
 Width Elev Width Elev
 .833 547.5 .833 590
 Downstream num= 2
 Width Elev Width Elev
 .833 547.5 .833 590

Pier Data
 Pier Station Upstream= 5080.5 Downstream= 5080.5
 Upstream num= 2
 Width Elev Width Elev
 .833 547.5 .833 590
 Downstream num= 2
 Width Elev Width Elev
 .833 547.5 .833 590

Pier Data
 Pier Station Upstream= 5105.5 Downstream= 5105.5
 Upstream num= 2
 Width Elev Width Elev
 .833 547.5 .833 590
 Downstream num= 2
 Width Elev Width Elev
 .833 547.5 .833 590

Pier Data
 Pier Station Upstream= 5130.5 Downstream= 5130.5
 Upstream num= 2
 Width Elev Width Elev
 .833 547.5 .833 590
 Downstream num= 2
 Width Elev Width Elev
 .833 547.5 .833 590

Pier Data
 Pier Station Upstream= 5155.5 Downstream= 5155.5
 Upstream num= 2
 Width Elev Width Elev
 .833 547.5 .833 590
 Downstream num= 2
 Width Elev Width Elev
 .833 547.5 .833 590

Pier Data
 Pier Station Upstream= 5180.5 Downstream= 5180.5
 Upstream num= 2
 Width Elev Width Elev
 .833 547.5 .833 590
 Downstream num= 2
 Width Elev Width Elev
 .833 547.5 .833 590

Pier Data
 Pier Station Upstream= 5205.5 Downstream= 5205.5
 Upstream num= 2
 Width Elev Width Elev

81011_BuffaloCreekS83_ABWC.rep

.833 547.5 .833 590
 Downstream num= 2
 Width Elev Width Elev
 .833 547.5 .833 590

Pier Data
 Pier Station Upstream= 5230.5 Downstream= 5230.5
 Upstream num= 2
 Width Elev Width Elev
 .833 547.5 .833 590
 Downstream num= 2
 Width Elev Width Elev
 .833 547.5 .833 590

Pier Data
 Pier Station Upstream= 5255.5 Downstream= 5255.5
 Upstream num= 2
 Width Elev Width Elev
 .833 547.5 .833 590
 Downstream num= 2
 Width Elev Width Elev
 .833 547.5 .833 590

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Yarnell KVal = 1.05
 Selected Low Flow Methods = Yarnell

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8164966
 Max Low Cord = 582.5

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

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 6.2

INPUT

Description:

Station		Elevation Data		num= 480	
Sta	Elev	Sta	Elev	Sta	Elev
4402.15	602	4402.58	601.71	4403.4	601.596
4407.23	600.763	4409.79	600	4410.77	599.851
4414.3	599	4415.09	598.916	4415.6	598.726
4419.5	598	4420.22	597.682	4421.03	597.513
4424.75	596.614	4425.38	596.463	4426.26	596.317
4428.47	595.517	4429.26	595.038	4429.85	595
4433.1	593.693	4434.18	593.268	4434.81	593.183
4438.11	592.435	4438.19	591.985	4439.59	591.972
4442.58	591	4443.84	590.496	4444.31	590
4448.86	588.743	4449.81	588.292	4450.54	587.851
4453.48	587.296	4454.36	586.892	4455.74	586.794
4405.11	601.043	4406.32	600.845	4411.63	599.664
4413.47	599.156	4417.95	598.065	4422.57	596.978
4424.09	596.967	4427.82	595.817	4431.51	594.009
4432.43	594	4436.74	592.712	4441.01	591.534
4441.16	591.026	4447.43	588.881	4451.59	587.792
4452.35	587.496	4457.84	586.332		

81011_BuffaloCreekS83_ABWC.rep

4458.33 585.949 4460.33 585.897 4461.04 585.48 4462.83 584.982 4466.53 584.429
 4467.56 584.124 4468.47 584 4472.79 583.964 4473.75 584 4474.72 584.138
 4475.4 584.384 4476.29 584.389 4477.23 584.548 4477.96 584.554 4478.98 584.655
 4479.55 584.662 4480.83 584.83 4483.07 584.727 4483.59 584.733 4487.44 584.519
 4488.56 584.386 4490.62 583.995 4491.43 583.994 4500.27 583.363 4501.47 583.115
 4502.03 583.1 4502.53 582.967 4503.77 582.961 4510.24 582.546 4510.98 582.453
 4511.9 582.424 4512.41 582.3 4513.39 582.279 4514.21 582.124 4514.69 581.966
 4515.79 581.962 4516.7 581.836 4522.09 581.481 4522.59 581.464 4524.37 581.019
 4524.91 580.927 4528.14 580.779 4528.63 580.654 4531.78 580.253 4532.5 580.226
 4533.54 580.054 4534.06 580.046 4534.61 579.962 4542.34 579.461 4542.84 579.379
 4555.83 578.373 4556.32 578.276 4559 578.031 4563.93 577.78 4564.44 577.684
 4565.7 577.627 4566.24 577.545 4570.5 577.157 4572.11 577.131 4572.59 576.971
 4574.73 576.968 4575.19 576.78 4579.79 576.575 4580.29 576.619 4582.33 576.586
 4582.94 576.514 4588.69 576.244 4589.24 576 4598.59 575.807 4600.71 575.821
 4601.3 575.794 4603.47 575.807 4604.09 575.782 4616.92 575.739 4617.94 575.65
 4640.4 575.588 4641.25 575.325 4644.42 575.207 4645.82 575 4659.65 574.835
 4660.62 574.714 4680.11 574.385 4681.13 574.288 4682.81 574.282 4685.17 573.994
 4717.25 573.455 4727.16 573.614 4727.76 573.681 4734.84 574 4735.65 574.319
 4737.52 574.735 4738.2 575.119 4740.17 575.313 4741.79 576.054 4743.12 576.073
 4743.63 576.386 4744.24 576.494 4745.2 576.768 4747.65 577.124 4748.71 577.153
 4749.27 577.28 4751.1 577.461 4751.64 577.602 4754.82 578.162 4755.68 578.211
 4757.48 578.728 4758.16 578.806 4759.26 579.179 4760.22 579.335 4761.28 579.636
 4761.85 580 4763 580.2 4763.94 580.88 4765 581 4766.31 581.434
 4766.48 582 4768.53 582.073 4768.69 583 4769.25 583.074 4770.31 583.353
 4770.57 583.869 4772.38 584.261 4773.61 584.248 4774.17 584.416 4775.73 584.383
 4776.35 584.48 4780.68 584.544 4782.67 584.727 4783.17 584.73 4784.35 584.812
 4785.64 584.813 4787.88 585.123 4789.86 585.148 4791.59 585.532 4793.46 585.777
 4797.95 586.167 4799.52 586.191 4800.03 586.326 4801.16 586.368 4801.75 586.464
 4809 587.082 4811.23 586.998 4811.92 586.998 4812.38 586.901 4813.72 586.74
 4815.73 586.603 4816.29 586.516 4817.48 586.47 4818.18 586.265 4819.59 586.234
 4820.05 585.945 4821.65 585.899 4823.75 585.549 4824.16 585.049 4826.11 585
 4827.72 584.576 4828.18 584.229 4828.77 584.129 4830.05 584 4830.72 583.726
 4831.62 583.579 4832.85 583.153 4833.74 582.934 4835.64 582.606 4836.78 582.248
 4837.53 582.186 4838.24 581.883 4839.26 581.826 4840.6 581.35 4841.55 581.238
 4842.24 580.891 4843.39 580.829 4844.8 580.289 4845.57 580.191 4846.4 579.865
 4847.34 579.794 4849.65 578.989 4850.84 578.985 4851.34 578.688 4852 578.562
 4854.38 577.828 4855.17 577.769 4856.14 577.418 4858.06 576.859 4859.63 576.566
 4861.46 576.102 4862.34 575.945 4870.58 574.999 4875.19 574.796 4875.66 574.748
 4876.95 574.731 4877.61 574.683 4889.75 574.327 4890.37 574.273 4906.99 573.721
 4907.52 573.671 4916.55 573.336 4917.1 573.278 4927.19 572.797 4927.64 572.731
 4928.62 572.697 4937.82 571.861 4939.15 571.835 4939.68 571.708 4940.61 571.657
 4942.9 571.357 4943.51 571.319 4943.97 571.229 4945.38 570.78 4945.85 570.689
 4946.6 570.07 4947.36 570 4947.78 569.359 4948.75 569 4949.14 568
 4950.07 567.815 4950.6 567 4951.2 566.535 4951.99 566 4952.59 565.422
 4955.22 565 4955.75 564.167 4960.7 563.667 4963.04 563 4966.49 562.598
 4968.07 562 4972.76 561.746 4974.61 561 4978.66 560.689 4979.12 560
 4984.19 559.918 4985.56 559 4988.41 558.683 4989.55 558 4992.03 557.686
 4996.11 556.464 5000 556 5002.16 555.355 5004.59 555 5005.31 554.802
 5007.9 554.782 5011.4 554.39 5020.5 554.27 5021.06 554.238 5023.38 554.232
 5023.84 554.199 5041.93 554.033 5043.04 554.097 5043.85 554.086 5045.68 554.269
 5049.9 554.358 5050.21 554.867 5051.09 555.262 5051.28 556 5051.44 556.504
 5051.47 557 5051.54 558 5051.82 559.025 5052.1 560 5052.85 562
 5052.89 562.915 5053.32 563.101 5053.74 564.347 5053.8 565.077 5057 565.134
 5057.5 565.022 5098.43 565.13 5099.04 565.166 5183.48 565.351 5185.84 565.069
 5188.39 565.069 5188.99 565 5209.03 564.919 5215.75 564.26 5217.27 564
 5229.44 563.427 5280.57 563.528 5284.16 563.7 5285.52 563.854 5288.94 564
 5289.56 564 5291.16 564.15 5291.59 565 5293.18 565.216 5293.48 566.062
 5294.34 566.146 5295.24 566.934 5295.74 567.116 5296.25 567.108 5297.22 567.208
 5298.49 567.245 5299.07 567.383 5301.07 567.577 5303.28 568.007 5305.21 568.009
 5305.9 568.262 5308.59 568.524 5309.18 568.707 5311.24 569.044 5313.07 569.058
 5313.67 569.302 5314.71 569.382 5316.72 569.744 5317.2 569.798 5317.85 569.986
 5318.5 570 5319.16 570.275 5320.43 570.501 5320.94 570.545 5340.51 570.291
 5341.29 570.247 5344.02 570.232 5344.6 570.182 5353.81 570.047 5354.59 569.986

81011_BuffaloCreekS83_ABWC.rep

5363.36	569.866	5363.92	569.824	5384.88	569.552	5390.71	569.894	5391.36	570.054
5393.46	570.235	5394.79	570.278	5395.51	570.419	5397.41	570.599	5399.1	570.886
5399.81	570.913	5400.67	571.095	5407.74	571.911	5408.48	571.921	5409.27	572.069
5411.04	572.218	5412.12	572.261	5412.82	572.365	5416.61	572.706	5438.25	573.079
5438.74	573.132	5466.7	574.141	5468.82	574.462	5469.39	575.086	5470.74	575.219
5471.44	575.734	5472.72	576	5473.92	576.506	5474.84	577	5476.13	577.406
5476.51	578	5478.02	578.19	5478.68	579	5479.67	579.395	5480.1	580
5481.28	580.268	5482.34	581	5482.88	581.663	5484.41	582	5484.54	583
5486	583.044	5489.3	584	5492.35	584.532	5492.55	585	5493.66	585.23
5494.43	585.23	5497.09	585.741	5497.92	585.645	5498.75	585.384	5513.35	586.102
5514.35	586.233	5523.21	586.852	5525.2	586.871	5526.78	587.075	5529.38	587.088
5530.19	587.234	5542.8	587.857	5544.88	588.129	5546.64	588.162	5547.42	588.346
5548.72	588.567	5552.29	589	5555.88	589.02	5559.85	589.334	5586.17	590.236
5587.63	590.683	5590.32	590.79	5592.19	591	5604.66	591.499	5605.21	592
5611.44	592	5612.39	591.72	5612.88	591.652	5622.84	592.071	5623.5	592.198
5633.28	593	5646.35	593.413	5650.44	594	5651.33	594.29	5660.17	594.749
5660.65	594.905	5663.55	595	5664.41	594.766	5665.13	594.447	5665.6	594.176
5666.83	594	5668.17	593.522	5668.67	592.887	5670.26	592.801	5670.73	592.037
5672.03	592	5672.86	591.231	5673.82	590.991	5674.37	590.662	5674.83	590.468
5675.46	589.677	5675.96	589.697	5676.46	590.016	5690.72	593	5708.93	594.429
5736.95	600.011	5740.63	601	5752.21	602	5806.39	604.164	5806.92	604.118
5809.72	604	5814.25	603	5831.86	599.963	5832.41	599.902	5839.44	599.631

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 4402.15 .1 4963.04 .045 5052.89 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 4963.04 5052.89 80 80 80 .3 .5
 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 4402.15 4908.5 585.417 F
 5281 5839.44 578.417 F
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 6.1

INPUT

Description:

Station Elevation Data num= 471

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4815	602	4815.52	601	4818	600.871	4818.83	600.247	4818.99	600.039		
4819.43	600	4822.88	599.886	4825.33	599	4826.37	598.359	4826.7	598.088		
4829.71	598	4830.52	597.212	4833.33	597	4834.41	596.28	4834.95	596		
4838.14	595.856	4840.06	595	4841.87	594.486	4843.88	594	4845.61	593.464		
4847.5	593	4849.34	592.493	4850.89	592	4853.06	591.583	4856.53	591		
4856.79	590.069	4857.4	590	4860.51	589.837	4862.12	589	4864.23	588.569		
4867.6	588	4867.96	587.097	4868.64	587	4870.91	586.822	4871.78	586.225		
4874.49	586	4875.45	585.253	4877.47	585	4878.17	584.257	4878.75	584		
4880.42	583.79	4880.94	583.188	4882.61	583	4883.7	582.395	4886.21	582		
4886.45	581.09	4886.9	581	4889.2	580.839	4891.5	580	4891.94	579.161		
4893.12	579	4894.68	578.568	4895.22	578	4897.43	577.805	4898.97	577		
4900.19	576.44	4902.37	576	4903.02	575.227	4904.68	575	4905.95	574.428		
4906.4	574	4906.81	573.851	4907.93	573.717	4909.08	573.359	4909.83	573		
4912.32	572.768	4912.35	572.002	4914.74	572	4915.67	571.278	4917.96	571		
4919.01	570.313	4921.15	570	4922.35	569.358	4925.42	569	4925.58	568.082		
4925.69	568.032	4927.69	568	4929.03	567.402	4930.37	567	4932.37	566.6		
4933.24	566	4935.32	565.739	4935.58	565.114	4935.7	565.036	4936.53	565		
4938.71	564.722	4938.88	564	4940.75	564	4941.78	564.43	4942.09	565		

81011_BuffaloCreekS83_ABWC.rep

4948.83 565 4949 564.966 4951.39 564.944 4952.62 564.735 4954.33 564.625
 4954.79 564.359 4955.19 564.306 4956.62 564.259 4957.18 564 4957.47 563.342
 4957.84 563 4958.32 562.563 4958.76 562 4959.18 561.492 4959.88 561
 4960.04 560.187 4960.29 560 4960.9 559.7 4961.27 559 4961.76 558.573
 4962.25 558 4962.65 557.456 4963.33 557 4963.55 556.243 4968.34 556
 4968.5 555.033 4968.57 554.996 4974.09 554.993 4976.5 554.48 4977.39 554.261
 4979.2 554.179 4979.36 554.014 4979.64 554 5025.31 554 5025.98 554.799
 5027.9 555 5028.18 555.141 5029.08 555.188 5029.79 555.313 5031.32 555.436
 5033.02 555.704 5034.17 556 5034.91 556.4 5035.94 556.655 5036.78 557.182
 5037.54 557.278 5038 557.53 5038.42 557.682 5038.54 557.82 5038.74 557.859
 5038.75 557.925 5039.12 557.931 5039.8 558.079 5045.42 558.392 5047 560.902
 5048.17 561.655 5049.09 562.217 5049.19 562.653 5049.46 562.666 5050.04 562.699
 5051.28 562.767 5052.06 562.91 5053.04 563 5053.18 563.067 5054.69 563.078
 5055.91 563.184 5056.58 563.273 5057.61 563.322 5058.81 563.4 5059.57 563.489
 5060.07 563.55 5062.01 563.594 5062.22 563.735 5062.31 563.756 5065.4 563.768
 5065.4 563.985 5065.61 563.985 5068.51 564 5070.43 564.219 5071.96 564.366
 5073.25 564.482 5076.01 564.583 5076.54 564.792 5078.74 564.834 5080.06 565
 5080.49 565.136 5081.3 565.185 5083.93 565.274 5085.69 565.558 5086.48 565.746
 5088.19 565.833 5088.26 566 5089.18 566.003 5089.8 566.04 5090.21 566.055
 5090.46 566.059 5090.58 566.058 5090.72 566.056 5091.07 566.053 5091.71 566.043
 5092.49 566 5092.54 565.954 5093.33 565.959 5093.44 565.859 5094.21 565.869
 5094.32 565.784 5096.41 565.789 5096.46 565.833 5096.57 565.831 5096.77 565.83
 5098.51 565.828 5098.98 565.758 5100.64 565.755 5101.38 565.69 5102.94 565.689
 5103.95 565.632 5105.39 565.63 5106.67 565.581 5107.98 565.58 5109.05 565.539
 5110.67 565.506 5111.61 565.505 5112.33 565.479 5114.2 565.458 5114.77 565.458
 5115.13 565.443 5117.14 565.434 5131.62 565.432 5131.8 565.431 5131.88 565.43
 5132.04 565.429 5132.38 565.428 5133.85 565.418 5135.1 565.407 5136.45 565.391
 5139.1 565.355 5140.52 565.326 5140.79 565.319 5140.9 565.316 5141.04 565.315
 5141.28 565.314 5141.99 565.309 5142.79 565.307 5143.21 565.307 5145.68 565.301
 5147.82 565.292 5184.67 565.09 5190.91 565.04 5191.44 565 5193.3 564.983
 5196.3 564.875 5198.51 564.802 5199.37 564.776 5200.55 564.745 5200.84 564.741
 5201.01 564.74 5201.09 564.742 5201.35 564.745 5201.66 564.75 5202.13 564.761
 5202.86 564.783 5203.76 564.824 5204.91 564.881 5205.5 564.959 5206.8 565
 5215.58 565 5215.64 564.979 5216.62 564.978 5216.75 564.953 5216.86 564.95
 5216.93 564.947 5217.02 564.945 5217.12 564.942 5217.22 564.939 5217.34 564.935
 5217.47 564.931 5217.62 564.927 5217.78 564.922 5217.98 564.915 5218.19 564.908
 5218.43 564.899 5218.7 564.888 5219.44 564.86 5220.87 564.814 5224.22 564.775
 5225.94 564.645 5228.69 564.569 5230.62 564.456 5232.65 564.375 5233.78 564.287
 5236.95 564.238 5237.33 564.105 5237.57 564.089 5239.5 564.079 5240.94 564
 5241.05 563.897 5243.61 563.89 5244.15 563.71 5246.04 563.675 5247.39 563.545
 5248.69 563.46 5249.56 563.373 5251.6 563.314 5252.05 563.194 5254.9 563.165
 5254.91 563.004 5254.98 563.004 5255.05 563 5257.05 562.985 5257.88 562.596
 5258.33 562.438 5258.55 562.357 5258.68 562.32 5258.74 562.302 5258.82 562.292
 5258.91 562.288 5259.06 562.282 5259.26 562.273 5259.52 562.263 5259.78 562.252
 5260.02 562.244 5260.25 562.238 5260.45 562.234 5260.6 562.23 5260.86 562.229
 5261.19 562.23 5261.32 562.231 5261.73 562.225 5261.99 562.228 5262.45 562.226
 5262.96 562.23 5263.48 562.238 5264.32 562.243 5265.24 562.267 5265.91 562.3
 5266.87 562.306 5267.62 562.342 5268.54 562.349 5269.31 562.383 5270.16 562.412
 5270.78 562.419 5271.19 562.441 5272.03 562.454 5273.32 562.469 5273.67 562.474
 5274.11 562.479 5274.6 562.488 5275.13 562.499 5275.66 562.512 5276.65 562.541
 5277.01 562.554 5277.81 562.564 5277.89 562.401 5278.1 562.404 5278.53 562.413
 5280.81 562.455 5285.97 562.564 5296.85 562.774 5298.41 562.956 5300.53 563
 5310.26 563 5310.66 563.014 5311.44 563.028 5312.44 563.052 5313.51 563.082
 5313.87 563.116 5315 563.115 5315.99 563.148 5316.57 563.179 5317.43 563.177
 5318.1 563.204 5318.63 563.202 5318.88 563.22 5318.98 563.241 5320.08 563.243
 5320.9 563.29 5321.65 563.294 5322.33 563.302 5323.35 563.316 5324.24 563.313
 5326.33 563.359 5327.36 563.356 5328.5 563.383 5329.56 563.381 5330.67 563.407
 5331.69 563.405 5332.72 563.431 5333.66 563.429 5334.57 563.452 5335.37 563.45
 5336.1 563.47 5336.58 563.469 5337.82 563.47 5338.49 563.486 5340.87 563.489
 5343.48 563.496 5345.17 563.505 5345.82 563.511 5346.28 563.517 5346.72 563.526
 5346.85 563.528 5347.16 563.53 5347.71 563.535 5350.16 563.565 5352.11 563.597
 5366.18 563.854 5366.25 563.964 5367.73 563.965 5370.45 564 5373.71 564.33
 5374.88 564.71 5376.21 564.848 5378.89 565 5380.65 565.296 5385.17 565.488

81011_Buffal oCreekS83_ABWC. rep

5385.32	565.984	5385.9	566	5392.78	566.08	5392.82	566.996	5392.82	567
5394.02	567.165	5394.67	567.25	5394.96	567.287	5395.16	567.311	5395.63	567.366
5397.36	567.559	5398.94	567.727	5399.87	567.832	5400.17	567.864	5401.4	568
5402.04	568.069	5404.15	568.294	5404.93	568.379	5406.36	568.532	5408.01	568.711
5409.05	568.821	5414.6	569.417	5416.73	569.643	5418.73	569.859	5420.99	570.099
5421.3	570.133	5427.82	570.829	5427.96	570.845	5428.06	570.855	5435.76	571.678
5435.92	571.694	5435.98	571.701	5443.06	572.456	5443.81	572.537	5443.89	572.546
5448.71	573.06	5448.96	573.086	5451.07	573.312	5452.68	573.484	5452.8	573.498
5458.87	574.142	5466.88	575	5467.14	575.015	5467.29	575.024	5467.37	575.026
5467.54	575.029	5467.59	575.029	5467.68	575.028	5467.78	575.031	5467.84	575.034
5467.91	575.038	5468.04	575.045	5485.83	576	5491.94	576.164	5493.31	576.205
5500.13	576.392	5503.18	576.487	5507.15	576.598	5511.42	576.734	5514.21	576.814
5518.58	576.958	5518.72	576.962	5518.77	576.964	5519.86	577	5551.82	577.882
5555.54	577.99								

Manning's n Values	num=	3
Sta n Val	Sta n Val	Sta n Val
4815 .1	4958.76	.045 5049.09 .1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
4958.76	5049.09	880	960	1040	.1	.3	

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 5

INPUT

Description:

Station Elevation Data	num=	15		
Sta Elev	Sta Elev	Sta Elev	Sta Elev	Sta Elev
0 584	35 580	70 576	109 572	141 568
158 565.8	170 563.8	540 560	550 552.4	585 548.9
640 552	650 560	745 564	775 580	815 600

Manning's n Values	num=	3
Sta n Val	Sta n Val	Sta n Val
0 .1	540 .045	650 .1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
540	650	840	840	820	.1	.3	

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 4.4

INPUT

Description:

Station Elevation Data	num=	23		
Sta Elev	Sta Elev	Sta Elev	Sta Elev	Sta Elev
0 580	45 576	80 572	111 568	138 564
183 560	540 560	655 560	670 556	690 552
699 548.5	727 548.5	730 550.6	742 552	755 556
775 560	825 560	873 560	1052 564	1085 568
1110 572	1121 576	1192 580		

Manning's n Values	num=	3
Sta n Val	Sta n Val	Sta n Val
0 .1	655 .045	755 .1

81011_BuffaloCreekS83_ABWC.rep

Bank Sta: Left 655 Right 755 Lengths: Left 450 Channel 450 Right 440 Coeff Contr. .1 Expan. .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 4.3

INPUT

Description:

Station		Elevation		Data		num= 19			
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	576	60	572	105	568	335	564	430	560
639.9	556	640	556	1255	552	1270	548.3	1320	548.3
1330	552	1340	556	1350	560	1410	560	1425	564
1435	568	1445	572	1450	576	1455	580		

Manning's n Values		num= 3			
Sta	n Val	Sta	n Val	Sta	n Val
0	.1	1255	.045	1330	.1

Bank Sta: Left 1255 Right 1330 Lengths: Left 1200 Channel 1200 Right 1200 Coeff Contr. .1 Expan. .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 4

INPUT

Description:

Station		Elevation		Data num= 28					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	576	20	572	135	568	160	564	555	560
715	556	730	556	740	560	770	560	805	556
855	555	965	555	1020	555.5	1110	556	1160	557
1210	556	1235	552	1260	548	1300	547.5	1345	552
1355	556	1854	558.5	2140	560	2390	564	2415	568
2450	572	2470	576	2490	580				

Manning's n Values		num= 5			
Sta	n Val	Sta	n Val	Sta	n Val
0	.1	555	.1	1210	.045
				1355	.1
				1854	.1

Bank Sta: Left 1210 Right 1355 Lengths: Left 450 Channel 450 Right 440 Coeff Contr. .1 Expan. .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.8

INPUT

Description:

Station		Elevation		Data num= 24					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	568	80	564	120	560	143	556	290	552
385	552	444	552	490	556	540	556	570	552
584	548	591	547.2	628	547.2	635	548	642	552
660	556	735	556	920	556	942	560	970	564

81011_BuffaloCreekS83_ABWC.rep

1000 568 1060 572 1095 576 1130 580

Manning's n Values num= 5
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 0 .1 120 .1 570 .045 642 .1 942 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 570 642 510 510 520 .1 .3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 3.7

INPUT

Description:
 Station Elevation Data num= 15
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 568 10 564 30 560 50 556 210 552
 450 556 500 552 520 548 523 547 568 547
 570 548 580 552 600 556 695 560 765 580

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 450 .045 600 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 450 600 530 600 720 .1 .3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 3.4

INPUT

Description:
 Station Elevation Data num= 17
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 568 12 564 32 560 49 556 80 552
 160 550 250 547 320 547 330 548 341 552
 790 556 1035 560 1050 564 1068 568 1078 572
 1089 576 1100 580

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 80 .045 341 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 80 341 600 510 400 .1 .3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 3.3

INPUT

Description:
 Station Elevation Data num= 13
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 572 60 568 95 564 110 560 120 556

81011_BuffaloCreekS83_ABWC.rep

135	552	145	547	210	547	230	552	750	554
1110	556	1150	560	1335	580				

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 135 .045 230 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 135 230 580 570 560 .1 .3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 3

INPUT

Description:

Station		Elevation		Data		num= 27			
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	572.6	16	572	73	568	97	564	110	560
163	557.4	248	557.7	284	556	308	552	321	556
397	557.3	421	556	441	549.8	477	547.8	503	545.1
529	548	531	558.5	604	557.9	680	556.8	830	556.6
927	556.2	1015	556.2	1116	557.1	1192	560	1292	564.7
1370	570	1420	580						

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 421 .045 604 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 421 604 450 440 400 .1 .3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 2.1

INPUT

Description:

Station		Elevation		Data		num= 13			
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	563	51	564	75	560	139	556	165	554
212	552.9	239	545.3	243	544.5	296	544.5	321	552
810	556	1180	560	1560	564				

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 212 .045 321 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 212 321 580 850 820 .1 .3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 2

INPUT

Description:

81011_BuffaloCreekS83_ABWC. rep

Station		Elevation		Data		num= 29			
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	569	32	568	80	564	244	560	300	556. 5
368	556	448	554	516	556	600	556. 2	876	556. 2
1020	556. 6	1120	556. 9	1130	550	1150	544	1200	544
1260	550	1270	552	1280	554. 8	1293	555. 8	1373	555. 8
1453	556	1521	557. 1	1629	558. 5	1749	559	1845	559
1925	560	2045	564	2450	566	2508	581		

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
0	. 1	1120	. 045
		1293	. 1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1120	1293		400	1200	1240	. 1	. 3

CROSS SECTION

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

INPUT

Description:

Station		Elevation		num= 28					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	600	40	590	80	580	120	570	247	563
280	560	388	556. 2	505	559. 2	646	557. 6	678	556
690	552	744	543	887	543	954	545. 2	992	548
1044	552	1092	556	1136	559	1241	559	1281	600
1345	560	1373	559	1473	556	1666	556	1803	556. 6
1936	557. 3	2500	564	2600	587				

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
0	. 1	678	. 045
		1092	. 1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	678	1092		0	0	0	. 1	. 3

SUMMARY OF MANNING'S N VALUES

River: RIVER-1

Reach	River Sta.	n1	n2	n3	n4	n5
Reach-1	17	. 1	. 1	. 045	. 1	
Reach-1	16	. 1	. 1	. 045	. 1	
Reach-1	15	. 1	. 1	. 045	. 1	
Reach-1	14	. 1	. 1	. 045	. 1	
Reach-1	13	. 1	. 1	. 045	. 1	
Reach-1	12. 1	. 1	. 1	. 045	. 1	

81011_BuffaloCreekS83_ABWC. rep						
Reach-1	12		. 1	. 1	. 045	. 1
Reach-1	11. 3		. 1	. 1	. 045	. 1
Reach-1	11. 2		. 1	. 045	. 1	
Reach-1	10. 1		. 1	. 1	. 045	. 1
Reach-1	10		. 1	. 045	. 1	
Reach-1	9. 3		. 1	. 045	. 1	
Reach-1	9. 2		. 1	. 045	. 1	. 1
Reach-1	9. 1		. 1	. 045	. 1	. 1
Reach-1	9		. 1	. 045	. 1	. 1
Reach-1	8		. 1	. 045	. 1	. 1
Reach-1	7		. 1	. 045	. 1	
Reach-1	6. 5		. 1	. 045	. 1	
Reach-1	6. 4		. 1	. 045	. 1	
Reach-1	6. 3		. 1	. 045	. 1	
Reach-1	6. 25	Bri dge				
Reach-1	6. 2		. 1	. 045	. 1	
Reach-1	6. 1		. 1	. 045	. 1	
Reach-1	5		. 1	. 045	. 1	
Reach-1	4. 4		. 1	. 045	. 1	
Reach-1	4. 3		. 1	. 045	. 1	
Reach-1	4		. 1	. 1	. 045	. 1 . 1
Reach-1	3. 8		. 1	. 1	. 045	. 1 . 1
Reach-1	3. 7		. 1	. 045	. 1	
Reach-1	3. 4		. 1	. 045	. 1	
Reach-1	3. 3		. 1	. 045	. 1	
Reach-1	3		. 1	. 045	. 1	
Reach-1	2. 1		. 1	. 045	. 1	
Reach-1	2		. 1	. 045	. 1	
Reach-1	1		. 1	. 045	. 1	

81011_BuffaloCreekS83_ABWC. rep

River: RIVER-1

Reach	River Sta.	Left	Channel	Right
Reach-1	17	630	550	470
Reach-1	16	1140	1200	1000
Reach-1	15	480	580	680
Reach-1	14	1030	1000	910
Reach-1	13	940	910	890
Reach-1	12.1	810	890	970
Reach-1	12	450	500	550
Reach-1	11.3	110	110	110
Reach-1	11.2	120	100	80
Reach-1	10.1	470	400	340
Reach-1	10	600	1040	1070
Reach-1	9.3	540	530	510
Reach-1	9.2	130	120	110
Reach-1	9.1	52	52	52
Reach-1	9	650	640	640
Reach-1	8	650	640	640
Reach-1	7	9	9	9
Reach-1	6.5	11	11	11
Reach-1	6.4	70	70	70
Reach-1	6.3	120	120	120
Reach-1	6.25	Bridge		
Reach-1	6.2	80	80	80
Reach-1	6.1	880	960	1040
Reach-1	5	840	840	820
Reach-1	4.4	450	450	440
Reach-1	4.3	1200	1200	1200
Reach-1	4	450	450	440
Reach-1	3.8	510	510	520
Reach-1	3.7	530	600	720
Reach-1	3.4	600	510	400
Reach-1	3.3	580	570	560
Reach-1	3	450	440	400
Reach-1	2.1	580	850	820
Reach-1	2	400	1200	1240
Reach-1	1	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: RIVER-1

Reach	River Sta.	Contr.	Expan.
Reach-1	17	.1	.3
Reach-1	16	.1	.3
Reach-1	15	.1	.3
Reach-1	14	.1	.3
Reach-1	13	.1	.3
Reach-1	12.1	.1	.3
Reach-1	12	.1	.3
Reach-1	11.3	.1	.3
Reach-1	11.2	.1	.3
Reach-1	10.1	.1	.3
Reach-1	10	.1	.3
Reach-1	9.3	.1	.3
Reach-1	9.2	.1	.3

81011_BuffaloCreekS83_ABWC. rep

Reach-1	9.1	.1	.3
Reach-1	9	.1	.3
Reach-1	8	.1	.3
Reach-1	7	.1	.3
Reach-1	6.5	.1	.3
Reach-1	6.4	.1	.3
Reach-1	6.3	.3	.5
Reach-1	6.25	Bridge	
Reach-1	6.2	.3	.5
Reach-1	6.1	.1	.3
Reach-1	5	.1	.3
Reach-1	4.4	.1	.3
Reach-1	4.3	.1	.3
Reach-1	4	.1	.3
Reach-1	3.8	.1	.3
Reach-1	3.7	.1	.3
Reach-1	3.4	.1	.3
Reach-1	3.3	.1	.3
Reach-1	3	.1	.3
Reach-1	2.1	.1	.3
Reach-1	2	.1	.3
Reach-1	1	.1	.3

HEC-RAS Versi on 4. 1. 0 Jan 2010
U. S. Army Corps of Engi neers
Hydrol ogi c Engi neeri ng Center
609 Second Street
Davi s, Cal i forni a

```

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

```

PROJECT DATA

Project Title: 8. 10. 11 - Buffal o Creek S83 - ABW
Project File : 81011_Buffal oCreekS83_ABW. prj
Run Date and Time: 9/6/2011 1: 34: 26 PM

Project i n Engl i sh uni ts

Project Descri pti on:

BUFFALO CREEK
WATER SURFACE PROFILE
BUFFALO CREEK, CHEROKEE CO. 10-YEAR
FLOOD

PLAN DATA

Pl an Ti tle: Proposed Condi ti ons

Pl an Fi le : q:\60191787\400 Tech I nfo_Di sci pl i nes\405 Hydrol ogy &
Drai nage\HecRas\81011_Buffal oCreekS83_ABW. p20

Geometry Ti tle: Proposed Condi ti ons

Geometry Fi le : q:\60191787\400 Tech I nfo_Di sci pl i nes\405 Hydrol ogy &
Drai nage\HecRas\81011_Buffal oCreekS83_ABW. g15

Flow Ti tle : Effective Fl ows

Flow Fi le : q:\60191787\400 Tech I nfo_Di sci pl i nes\405 Hydrol ogy &
Drai nage\HecRas\81011_Buffal oCreekS83_ABW. f02

Pl an Summary I nformati on:

Number of:	Cross Secti ons =	34	Mul ti ple Openi ngs =	0
	Culverts =	0	I nline Structures =	0
	Bri dges =	1	Lateral Structures =	0

Computati onal I nformati on

Water surface calculati on tolerance	=	0. 01
Cri ti cal depth calculati on tolerance	=	0. 01
Maxi mum number of i terati ons	=	20
Maxi mum di fference tolerance	=	0. 3
Flow tolerance factor	=	0. 001

Computati on Opti ons

81011_BuffaloCreekS83_ABW.rep

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: Effective Flows
 Flow File : q:\60191787\400 Tech Info_Disciplines\405 Hydrology &
 Drainage\HecRas\81011_BuffaloCreekS83_ABW.f02

Flow Data (cfs)

River	Reach	RS	10 yr	50 yr
100 yr RIVER-1	500 yr Reach-1	17	8000	11500
13000	16400			

Boundary Conditions

River Downstream	Reach	Profile	Upstream
RIVER-1 Known WS = 550.99	Reach-1	10 yr	
RIVER-1 Known WS = 552.61	Reach-1	50 yr	
RIVER-1 Known WS = 553.2	Reach-1	100 yr	
RIVER-1 Known WS = 554.48	Reach-1	500 yr	

GEOMETRY DATA

Geometry Title: Proposed Conditions
 Geometry File : q:\60191787\400 Tech Info_Disciplines\405 Hydrology &
 Drainage\HecRas\81011_BuffaloCreekS83_ABW.g15

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 17

INPUT

Description:

Station Elevation Data		num=		15					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	584	20	580	50	576	550	574	810	572
825	568	830	566.5	890	566.5	895	568	910	572
935	576	1100	577.5	1300	576	1850	580	1910	600

81011_BuffaloCreekS83_ABW.rep

Manning's n Values num= 4
 Sta n Val Sta n Val Sta n Val
 0 .1 550 .1 810 .045 935 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 810 910 630 550 470 .1 .3
 Sedi ment El evati on = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 16

INPUT

Descripti on:
 Stati on El evati on Data num= 14
 Sta El ev Sta El ev Sta El ev Sta El ev Sta El ev
 0 587.5 249 584 395 580 578 576 1655 572
 1700 568 1720 565.5 1763 566 1785 568 1800 572
 1960 576 2770 576 2830 580 2870 600

Manning's n Values num= 4
 Sta n Val Sta n Val Sta n Val
 0 .1 1655 .1 1700 .045 1785 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 1700 1785 1140 1200 1000 .1 .3
 Sedi ment El evati on = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 15

INPUT

Descripti on:
 Stati on El evati on Data num= 18
 Sta El ev Sta El ev Sta El ev Sta El ev Sta El ev Sta El ev
 0 584 59 580 91 576 1100 574.6 1551 572
 2080 572 2160 568 2170 565 2240 565 2248 568
 2260 572 2680 576 2700 580 2730 584 2780 588
 2900 592 3470 596 3550 600

Manning's n Values num= 4
 Sta n Val Sta n Val Sta n Val
 0 .1 1100 .1 2080 .045 2260 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 2080 2260 480 580 680 .1 .3
 Sedi ment El evati on = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 14

INPUT

Descripti on:
 Stati on El evati on Data num= 22

81011_BuffaloCreekS83_ABW.rep

Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	584	10	580	36	576	260	572	450	572
980	575.5	1100	575	1300	574	1540	573	1650	572
1750	572	2230	568	2240	564	2250	563	2300	562
2350	563	2357	564	2365	568	2400	572	2475	576
2515	580	2580	600						

Manning's n Values		num=	4	
Sta	n Val	Sta	n Val	Sta
0	.1	1100	.1	2230
				2365

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	2230	2365		1030	1000	910		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 13

INPUT

Description:

Station Elevation Data		num=	39	
Sta	El ev	Sta	El ev	Sta
0	584.8	41	584.5	51
104	574.5	183	572.5	268
427	571.5	536	571	634
1143	572	1236	569	1348
1535	571	1590	570.7	1647
1710	561	1733	561.8	1760
1900	570	1943	571	2044
2274	572	2300	576	2318
				2440

Manning's n Values		num=	4	
Sta	n Val	Sta	n Val	Sta
0	.1	1236	.1	1647
				1770

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	1647	1770		940	910	890		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 12.1

INPUT

Description:

Station Elevation Data		num=	16	
Sta	El ev	Sta	El ev	Sta
0	580	20	576	40
1850	564	1868	560	1880
2015	564	2129	568	2210
2410	600			2260
				2300

Manning's n Values		num=	4	
Sta	n Val	Sta	n Val	Sta
0	.1	1340	.1	1850
				2015

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	1850	2015		810	890	970		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 12

INPUT

Description:

Station		Elevation		Data		num= 28			
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	599	204	599	227	596	240	592	252	588
275	584	292	580	301	576	314	572	355	571
428	568	477	568	620	566.5	737	567	870	566.5
998	566	1114	566	1212	566	1254	564	1275	558.9
1315	558.3	1357	558.9	1375	564	1390	567.6	1450	571
1485	576	1497	580	1653	600				

Manning's n		Values		num= 4			
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	870	.1	1212	.045	1390	.1

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	1212	1390		450	500	550		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 11.3

INPUT

Description: This is a REPEATED section.

Station		Elevation		Data num= 16					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	584.3	120	584.2	138	576.9	153	570.8	164	569.7
214	570.2	264	564.4	314	559.2	344	557	373	559
380	570.5	400	570	450	572	465	576.5	482	584.2
600	584.4								

Manning's n		Values		num= 4			
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	138	.1	214	.045	400	.1

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	214	400		110	110	110		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 11.2

INPUT

Description:

Station		Elevation		Data num= 16					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	584.3	120	584.2	138	576.9	153	570.8	164	569.7
214	570.2	264	564.4	314	559.2	344	557	373	559
380	570.5	400	570	450	572	465	576.5	482	584.2

600 584.4

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 214 .045 400 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 214 400 120 100 80 .1 .3
 Sedi ment El evati on = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 10.1

INPUT

Descripti on:

Stati on El evati on Data num= 15

Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	580	60	576	105	572	135	568	155	564
186	560	190	556	223	555.7	242	556	260	560
280	564	790	568	810	572	845	582.5	960	582.5

Manning's n Values num= 4
 Sta n Val Sta n Val Sta n Val Sta n Val
 0 .1 105 .1 155 .045 280 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 155 280 470 400 340 .1 .3
 Sedi ment El evati on = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 10

INPUT

Descripti on:

Stati on El evati on Data num= 32

Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	580	17	576	38	572	57	568	74	564
101	563	184	563.5	233	564	260	564.5	338	566
416	565.5	479	564.5	495	564	566	564	588	564.5
609	564	626	560	638	557	675	554.7	711	557
722	560	751	563.5	817	563	877	563.8	911	564
932	565.5	944	568	956	572	969	576	975	580
982	583	1025	583						

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 609 .045 751 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 609 751 600 1040 1070 .1 .3
 Sedi ment El evati on = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 9.3

INPUT

Description:

Station		Elevation		Data		num= 17			
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	580	30	576	60	572	110	568	150	564
220	560	235	553.9	261	553.7	296	554.3	307	560
480	564	681	568	729	572	849	576	882	580
923	584	945	588						

Manning's n		Values		num= 3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.1	220	.045	307	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	220	307		540	530		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 9.2

INPUT

Description:

Station		Elevation		Data num= 22					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	586.4	24	584	48	581.5	62	580	83	576
106	574.5	127	574.5	133	572	169	568	190	564
217	563.5	350	563	382	561	425	553	485	553
500	562	579	563.5	795	564	851	568	881	572
896	580	936	589.8						

Manning's n		Values		num= 4			
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	382	.045	500	.1	896	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	382	500		130	120		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 9.1

INPUT

Description: This is a REPEATED section.

Station		Elevation		Data num= 13					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	590	23	572.3	42	562.9	55	561.4	79	556.7
104	552.7	129	566.3	188	566.8	239	565.8	288	565.9
344	566.5	356	572	371	582				

Manning's n		Values		num= 4			
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	104	.045	188	.1	371	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	42	129		52	52		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 9

INPUT

Description:

Station		Elevation		Data		num=		13	
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	590	23	572.3	42	562.9	55	561.4	79	556.7
104	552.7	129	566.3	188	566.8	239	565.8	288	565.9
344	566.5	356	572	371	582				

Manning's n		Values		num=		4	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	104	.045	188	.1	371	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 42 129 650 640 640 .1 .3
 Sedi ment El evati on = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 8

INPUT

Description:

Station		Elevation		Data		num=		24	
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	580	10	576	22	572	28	569.5	65	562.6
93	562	103	554	140	554	155	556.5	165	564.2
190	564.1	220	562.1	365	562.4	420	562.8	431	563
448	564	487	568	653	572	672	576	692	580
707	581.5	724	584	740	587.5	760	587.5		

Manning's n		Values		num=		4	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	93	.045	165	.1	365	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 93 165 650 640 640 .1 .3
 Sedi ment El evati on = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 7

INPUT

Description:

Station		Elevation		Data		num=		24	
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	582	4	582	8	579	18	578	22	575
32	574	38	569	94	567	98	565	118	564
118	556	148	566	148	564	149.5	564	149.5	558
227	558	227	564	228.5	564	352	560	600	564
615	568	619	572	630	576	660	580		

81011_BuffaloCreekS83_ABW.rep

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 148 .045 228.5 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 148 228.5 9 9 9 .1 .3
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 6.5

INPUT

Description:

Station Elevation Data num= 24
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 582 4 582 8 579 18 578 22 575
 32 574 38 569 94 567 98 565 118 564
 118 566 148 566 148 564 149.5 564 149.5 558
 227 554.5 227 564 228.5 564 352 560 600 564
 615 568 619 572 630 576 660 580

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 148 .045 228.5 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 148 228.5 11 11 11 .1 .3
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 6.4

INPUT

Description:

Station Elevation Data num= 419
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 4600 584.251 4600.35 584.236 4602.08 584.198 4602.92 583.937 4605.08 583.926
 4605.52 583.737 4606.92 583.697 4607.58 583.574 4609.24 583.444 4609.64 583.371
 4610.69 583.337 4610.93 583.247 4611.13 583.227 4612.35 583.211 4612.53 583.099
 4613.62 583.093 4613.95 582.975 4615.19 582.972 4615.35 582.869 4615.54 582.856
 4617.12 582.839 4617.5 582.709 4617.88 582.677 4619.35 582.644 4620.05 582.522
 4621.18 582.46 4622.14 582.358 4623.7 582.278 4624.06 582.137 4625.23 582.106
 4626.01 581.942 4627.83 581.933 4628.22 581.78 4629.63 581.748 4630.24 581.633
 4631.29 581.586 4632.04 581.505 4633.72 581.369 4634.05 581.349 4634.46 581.343
 4635.51 581.352 4636.02 581.317 4636.54 581.33 4637.11 581.318 4637.83 581.336
 4638.48 581.339 4648.48 581.612 4648.89 581.609 4649.18 581.613 4649.5 581.609
 4649.85 581.592 4650.19 581.565 4650.59 581.555 4651.07 581.516 4651.25 581.463
 4651.83 581.453 4651.99 581.378 4652.85 581.284 4653.85 581.167 4654.8 581.149
 4655.27 581.047 4655.73 581 4656.07 580.826 4656.67 580.699 4656.98 580.477
 4657.94 580.365 4658.03 580 4658.96 579.967 4659.71 579.629 4660.08 579.346
 4660.64 579.213 4661.69 579 4661.97 578.845 4662.55 578.807 4664.22 578.728
 4665.93 578.489 4666.54 578.258 4667.82 578.172 4668.87 578 4669.08 577.899
 4671 577.879 4671.62 577.695 4672.92 577.638 4673.85 577.513 4675.13 577.426
 4675.79 577.304 4677.28 577.241 4677.46 577.095 4678.21 577.078 4678.89 577
 4679.11 576.918 4680.35 576.901 4680.78 576.759 4682.52 576.594 4684.98 576.43
 4685.23 575.963 4687.34 575.948 4687.81 575.495 4688.52 575.415 4689.44 575.206
 4690.09 575.151 4690.9 575.117 4691.67 575.092 4691.88 575.063 4693.38 575.055

81011_BuffaloCreekS83_ABW.rep

4694	575.029	4694.95	575.006	4695.18	575.006	4696.28	574.973	4697.78	574.971
4699.32	574.93	4699.63	574.888	4701.23	574.878	4701.73	574.833	4703.32	574.817
4704.04	574.77	4705.54	574.748	4711.86	574.515	4713.36	574.486	4713.85	574.439
4715.51	574.415	4715.97	574.362	4716.4	574.336	4718.13	574.31	4718.5	574.256
4720.17	574.233	4720.44	574.181	4721.89	574.164	4723	574.117	4724.55	574.001
4726.05	574	4726.23	573.904	4727.73	573.899	4728.06	573.801	4729.45	573.792
4729.87	573.703	4730.2	573.693	4730.42	573.683	4730.68	573.676	4735.14	573.457
4737.06	573.302	4737.81	573.22	4738.29	573.16	4739.28	573.062	4739.44	573.061
4739.6	573.083	4739.78	573.093	4739.96	573.142	4740.28	573.204	4741.08	573.236
4741.37	573.412	4741.68	573.476	4743.29	573.554	4743.7	574	4746.36	574.305
4746.79	574.725	4747.55	574.819	4748.85	575	4749.91	575.292	4750.74	575.543
4751.87	575.73	4752.53	576	4752.84	576.146	4753.96	576.221	4754.84	576.464
4755.19	576.68	4755.46	576.752	4756.18	576.796	4757.78	577	4758.75	577.364
4758.93	577.584	4759.56	577.626	4760.61	577.684	4762.54	577.846	4762.87	577.964
4763.21	578	4764.11	578.019	4768.5	578.253	4768.96	578.307	4769.85	578.317
4770.43	578.364	4771.19	578.374	4771.82	578.412	4772.42	578.421	4773.66	578.478
4774.28	578.486	4776.06	578.58	4776.36	578.606	4776.7	578.605	4778.22	578.58
4779.25	578.538	4780.52	578.465	4780.89	578.405	4781.74	578.412	4781.93	578.333
4782.38	578.347	4783.24	578.356	4783.4	578.251	4783.69	578.266	4783.86	578.286
4784.57	578.296	4784.6	578.145	4785.37	578	4785.5	577.826	4785.85	577.728
4786.25	577.501	4786.71	577.172	4786.91	577	4787.43	576.936	4787.66	576.779
4788.08	576.708	4788.59	576.57	4788.85	576.399	4789.64	576.3	4789.85	575.948
4790.6	575.917	4791.24	575.603	4791.59	575.333	4792.01	575.181	4792.67	575
4793.4	574.715	4793.89	574.398	4794.31	574.185	4795	574	4795.48	573.691
4796.51	573.472	4796.87	573	4797.15	572.836	4797.83	572.703	4798.63	572.38
4798.93	571.924	4799.85	571.855	4800.75	571.419	4800.81	570.983	4801.62	570.973
4802.11	570.614	4802.46	570.41	4803.11	570.264	4803.17	570.015	4804.18	570
4805.31	569.641	4805.67	569.245	4806.02	569.122	4807.42	569	4808.94	568.519
4809.55	568	4810.71	567.79	4811.87	567.395	4812.59	567	4814.81	566.755
4815.28	566	4817.75	565.842	4822.65	565	4830.02	564.565	4846.18	564.502
4846.29	564.208	4848.35	564.208	4857.27	564.039	4857.72	563.959	4859.21	563.943
4860.4	563.734	4861.37	563.604	4864.69	563.466	4865.02	563.132	4867.62	563
4867.83	562.86	4869.91	562.855	4870.38	562.729	4871.76	562.725	4872.36	562.64
4873.38	562.635	4874.02	562.579	4874.72	562.574	4875.1	562.539	4876.62	562.49
4878.43	562.472	4878.64	562.466	4879.52	562.456	4879.71	562.448	4880.54	562.437
4880.89	562.417	4881.16	562.41	4882.18	562.404	4882.58	562.371	4884.08	562.362
4884.53	562.313	4885.04	562.303	4887.02	562.291	4887.46	562.224	4890.08	562.214
4890.34	562.122	4890.58	562.116	4893.58	562.11	4893.85	561.947	4895.46	561.896
4896.09	561.261	4900.5	561	4900.7	560.034	4900.89	560.02	4901.09	560
4901.46	560.057	4902.26	560.207	4908.29	561.487	4913.07	562.403	4913.55	562.418
4914.12	562.516	4914.72	562.504	4915.29	562.585	4916.06	562.552	4916.62	562.617
4917.5	562.574	4918.08	562.626	4919.02	562.58	4919.6	562.624	4920.56	562.578
4921.13	562.614	4922.09	562.571	4923.06	562.621	4924.05	562.583	4924.66	562.609
4924.87	562.609	4925.09	562.595	4925.79	562.554	4928.2	562.447	4929.21	562.387
4929.78	562.362	4931.16	562.276	4931.54	562.258	4933.7	562.124	4935.6	562
4935.94	561.924	4940.36	560.934	4942.09	560.525	4944.95	559.796	4946.24	559.426
4947.28	559.092	4948.51	558.661	4950.29	558	4952.85	557	4954.03	557.051
4955.49	558	4960.71	561	4961	561.161	4962.7	562.043	4964.78	563
4972.52	563.193	4972.68	563.192	4972.97	563.183	4976.73	563	4986.02	562.423
5013.71	561	5014.33	560.873	5014.49	560.839	5018.5	560	5023	559.456
5026.19	559	5043.39	557	5044.8	556.966	5045.12	556.966	5050.92	556.854
5054.21	556.856	5097.06	556	5115.35	555	5117.1	554.63	5117.31	554.581
5117.48	554.518	5117.72	554.366	5117.93	554.374	5118.21	554.432	5120.12	554.755
5121.49	555	5124.23	557	5124.83	557.452	5125.53	558	5125.88	558.277
5126.86	559	5128.78	560	5129.15	560.204	5130.25	560.846	5130.49	561
5131.58	561.769	5131.88	562	5132.9	563.004	5133.75	564	5134.98	564.839
5135.23	565	5137.02	566	5138.12	566.403	5138.33	566.469	5138.5	566.502
5147.92	566.756	5160.99	566.725	5161.19	566.738	5161.39	566.742	5161.62	566.741
5206.98	566	5250.79	564	5272.78	563.788	5354.44	564	5393.07	565
5445.56	567	5477.43	571	5489.07	572	5497.34	573	5499.04	574
5514.12	582	5522.58	586.75	5523.02	587	5529.65	589	5533.39	589
5539.77	590	5548.7	591	5616.12	591.543	5643.62	591.968	5644.05	591.973
5644.31	591.972	5645.3	592	5666.31	593	5691.74	594		

81011_BuffaloCreekS83_ABW.rep

Manning's n Values num= 3
 Sta n Val Sta n Val
 4600 .1 4859.21 .045 5133.75 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 4859.21 5133.75 70 70 70 .1 .3
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 6.3

INPUT

Description: This is a REPEATED section.
 Station Elevation Data num= 480

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4402.15	602	4402.58	601.71	4403.4	601.596	4405.11	601.043	4406.32	600.845
4407.23	600.763	4409.79	600	4410.77	599.851	4411.63	599.664	4413.47	599.156
4414.3	599	4415.09	598.916	4415.6	598.726	4416.23	598.607	4417.95	598.065
4419.5	598	4420.22	597.682	4421.03	597.513	4422.57	596.978	4424.09	596.967
4424.75	596.614	4425.38	596.463	4426.26	596.317	4427.35	595.867	4427.82	595.817
4428.47	595.517	4429.26	595.038	4429.85	595	4431.51	594.009	4432.43	594
4433.1	593.693	4434.18	593.268	4434.81	593.183	4435.78	592.827	4436.74	592.712
4438.11	592.435	4438.19	591.985	4439.59	591.972	4441.01	591.534	4441.16	591.026
4442.58	591	4443.84	590.496	4444.31	590	4446.61	589.833	4447.43	588.881
4448.86	588.743	4449.81	588.292	4450.54	587.851	4451.59	587.792	4452.35	587.496
4453.48	587.296	4454.36	586.892	4455.74	586.794	4456.34	586.47	4457.84	586.332
4458.33	585.949	4460.33	585.897	4461.04	585.48	4462.83	584.982	4466.53	584.429
4467.56	584.124	4468.47	584	4472.79	583.964	4473.75	584	4474.72	584.138
4475.4	584.384	4476.29	584.389	4477.23	584.548	4477.96	584.554	4478.98	584.655
4479.55	584.662	4480.83	584.83	4483.07	584.727	4483.59	584.733	4487.44	584.519
4488.56	584.386	4490.62	583.995	4491.43	583.994	4500.27	583.363	4501.47	583.115
4502.03	583.1	4502.53	582.967	4503.77	582.961	4510.24	582.546	4510.98	582.453
4511.9	582.424	4512.41	582.3	4513.39	582.279	4514.21	582.124	4514.69	581.966
4515.79	581.962	4516.7	581.836	4522.09	581.481	4522.59	581.464	4524.37	581.019
4524.91	580.927	4528.14	580.779	4528.63	580.654	4531.78	580.253	4532.5	580.226
4533.54	580.054	4534.06	580.046	4534.61	579.962	4542.34	579.461	4542.84	579.379
4555.83	578.373	4556.32	578.276	4559	578.031	4563.93	577.78	4564.44	577.684
4565.7	577.627	4566.24	577.545	4570.5	577.157	4572.11	577.131	4572.59	576.971
4574.73	576.968	4575.19	576.78	4579.79	576.575	4580.29	576.619	4582.33	576.586
4582.94	576.514	4588.69	576.244	4589.24	576	4598.59	575.807	4600.71	575.821
4601.3	575.794	4603.47	575.807	4604.09	575.782	4616.92	575.739	4617.94	575.65
4640.4	575.588	4641.25	575.325	4644.42	575.207	4645.82	575	4659.65	574.835
4660.62	574.714	4680.11	574.385	4681.13	574.288	4682.81	574.282	4685.17	573.994
4717.25	573.455	4727.16	573.614	4727.76	573.681	4734.84	574	4735.65	574.319
4737.52	574.735	4738.2	575.119	4740.17	575.313	4741.79	576.054	4743.12	576.073
4743.63	576.386	4744.24	576.494	4745.2	576.768	4747.65	577.124	4748.71	577.153
4749.27	577.28	4751.1	577.461	4751.64	577.602	4754.82	578.162	4755.68	578.211
4757.48	578.728	4758.16	578.806	4759.26	579.179	4760.22	579.335	4761.28	579.636
4761.85	580	4763	580.2	4763.94	580.88	4765	581	4766.31	581.434
4766.48	582	4768.53	582.073	4768.69	583	4769.25	583.074	4770.31	583.353
4770.57	583.869	4772.38	584.261	4773.61	584.248	4774.17	584.416	4775.73	584.383
4776.35	584.48	4780.68	584.544	4782.67	584.727	4783.17	584.73	4784.35	584.812
4785.64	584.813	4787.88	585.123	4789.86	585.148	4791.59	585.532	4793.46	585.777
4797.95	586.167	4799.52	586.191	4800.03	586.326	4801.16	586.368	4801.75	586.464
4809	587.082	4811.23	586.998	4811.92	586.998	4812.38	586.901	4813.72	586.74
4815.73	586.603	4816.29	586.516	4817.48	586.47	4818.18	586.265	4819.59	586.234
4820.05	585.945	4821.65	585.899	4823.75	585.549	4824.16	585.049	4826.11	585
4827.72	584.576	4828.18	584.229	4828.77	584.129	4830.05	584	4830.72	583.726
4831.62	583.579	4832.85	583.153	4833.74	582.934	4835.64	582.606	4836.78	582.248

81011_BuffaloCreekS83_ABW.rep

4837.53	582.186	4838.24	581.883	4839.26	581.826	4840.6	581.35	4841.55	581.238
4842.24	580.891	4843.39	580.829	4844.8	580.289	4845.57	580.191	4846.4	579.865
4847.34	579.794	4849.65	578.989	4850.84	578.985	4851.34	578.688	4852	578.562
4854.38	577.828	4855.17	577.769	4856.14	577.418	4858.06	576.859	4859.63	576.566
4861.46	576.102	4862.34	575.945	4870.58	574.999	4875.19	574.796	4875.66	574.748
4876.95	574.731	4877.61	574.683	4889.75	574.327	4890.37	574.273	4906.99	573.721
4907.52	573.671	4916.55	573.336	4917.1	573.278	4927.19	572.797	4927.64	572.731
4928.62	572.697	4937.82	571.861	4939.15	571.835	4939.68	571.708	4940.61	571.657
4942.9	571.357	4943.51	571.319	4943.97	571.229	4945.38	570.78	4945.85	570.689
4946.6	570.07	4947.36	570	4947.78	569.359	4948.75	569	4949.14	568
4950.07	567.815	4950.6	567	4951.2	566.535	4951.99	566	4952.59	565.422
4955.22	565	4955.75	564.167	4960.7	563.667	4963.04	563	4966.49	562.598
4968.07	562	4972.76	561.746	4974.61	561	4978.66	560.689	4979.12	560
4984.19	559.918	4985.56	559	4988.41	558.683	4989.55	558	4992.03	557.686
4996.11	556.464	5000	556	5002.16	555.355	5004.59	555	5005.31	554.802
5007.9	554.782	5011.4	554.39	5020.5	554.27	5021.06	554.238	5023.38	554.232
5023.84	554.199	5041.93	554.033	5043.04	554.097	5043.85	554.086	5045.68	554.269
5049.9	554.358	5050.21	554.867	5051.09	555.262	5051.28	556	5051.44	556.504
5051.47	557	5051.54	558	5051.82	559.025	5052.1	560	5052.85	562
5052.89	562.915	5053.32	563.101	5053.74	564.347	5053.8	565.077	5057	565.134
5057.5	565.022	5098.43	565.13	5099.04	565.166	5183.48	565.351	5185.84	565.069
5188.39	565.069	5188.99	565	5209.03	564.919	5215.75	564.26	5217.27	564
5229.44	563.427	5280.57	563.528	5284.16	563.7	5285.52	563.854	5288.94	564
5289.56	564	5291.16	564.15	5291.59	565	5293.18	565.216	5293.48	566.062
5294.34	566.146	5295.24	566.934	5295.74	567.116	5296.25	567.108	5297.22	567.208
5298.49	567.245	5299.07	567.383	5301.07	567.577	5303.28	568.007	5305.21	568.009
5305.9	568.262	5308.59	568.524	5309.18	568.707	5311.24	569.044	5313.07	569.058
5313.67	569.302	5314.71	569.382	5316.72	569.744	5317.2	569.798	5317.85	569.986
5318.5	570	5319.16	570.275	5320.43	570.501	5320.94	570.545	5340.51	570.291
5341.29	570.247	5344.02	570.232	5344.6	570.182	5353.81	570.047	5354.59	569.986
5363.36	569.866	5363.92	569.824	5384.88	569.552	5390.71	569.894	5391.36	570.054
5393.46	570.235	5394.79	570.278	5395.51	570.419	5397.41	570.599	5399.1	570.886
5399.81	570.913	5400.67	571.095	5407.74	571.911	5408.48	571.921	5409.27	572.069
5411.04	572.218	5412.12	572.261	5412.82	572.365	5416.61	572.706	5438.25	573.079
5438.74	573.132	5466.7	574.141	5468.82	574.462	5469.39	575.086	5470.74	575.219
5471.44	575.734	5472.72	576	5473.92	576.506	5474.84	577	5476.13	577.406
5476.51	578	5478.02	578.19	5478.68	579	5479.67	579.395	5480.1	580
5481.28	580.268	5482.34	581	5482.88	581.663	5484.41	582	5484.54	583
5486	583.044	5489.3	584	5492.35	584.532	5492.55	585	5493.66	585.23
5494.43	585.23	5497.09	585.741	5497.92	585.645	5498.75	585.384	5513.35	586.102
5514.35	586.233	5523.21	586.852	5525.2	586.871	5526.78	587.075	5529.38	587.088
5530.19	587.234	5542.8	587.857	5544.88	588.129	5546.64	588.162	5547.42	588.346
5548.72	588.567	5552.29	589	5555.88	589.02	5559.85	589.334	5586.17	590.236
5587.63	590.683	5590.32	590.79	5592.19	591	5604.66	591.499	5605.21	592
5611.44	592	5612.39	591.72	5612.88	591.652	5622.84	592.071	5623.5	592.198
5633.28	593	5646.35	593.413	5650.44	594	5651.33	594.29	5660.17	594.749
5660.65	594.905	5663.55	595	5664.41	594.766	5665.13	594.447	5665.6	594.176
5666.83	594	5668.17	593.522	5668.67	592.887	5670.26	592.801	5670.73	592.037
5672.03	592	5672.86	591.231	5673.82	590.991	5674.37	590.662	5674.83	590.468
5675.46	589.677	5675.96	589.697	5676.46	590.016	5690.72	593	5708.93	594.429
5736.95	600.011	5740.63	601	5752.21	602	5806.39	604.164	5806.92	604.118
5809.72	604	5814.25	603	5831.86	599.963	5832.41	599.902	5839.44	599.631

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 4402.15 .1 4963.04 .045 5052.89 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 4963.04 5052.89 120 120 120 .3 .5
 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 4402.15 4898 591 F
 5288 5839.44 587.5 F

Sediment Elevation = 0

BRI DGE

RIVER: RIVER-1
 REACH: Reach-1

RS: 6.25

INPUT

Description: Bridge #1

Distance from Upstream XS = 30
 Deck/Roadway Width = 48
 Weir Coefficient = 3

Upstream Deck/Roadway Coordinates
 num= 231

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
4370	612.	763			4476	776	607			4478	579	606.	894	
4479	28	606.	886		4479	822	606.	865		4497	811		606	
4498	863	605.	936		4498	942	605.	935		4499	569	605.	894	
4500	566	605.	88		4519	117	605			4520	151	604.	934	
4520	283	604.	932		4521	139	604.	877		4522	094	604.	861	
4540	407	604			4541	072	603.	952		4541	183	603.	95	
4542	396	603.	866		4543	326	603.	852		4543	481	603.	847	
4561	587	603			4562	208	602.	947		4562	302	602.	948	
4562	544	602.	943		4564	119	602.	843		4564	93	602.	828	
4582	446	602			4583	764	601.	913		4583	845	601.	911	
4584	758	601.	851		4584	906	601.	849		4585	634	601.	8	
4586	6	601.	788		4603	723	601			4605	019	600.	908	
4605	154	600.	906		4605	817	600.	86		4606	025	600.	857	
4606	648	600.	815		4607	951	600.	788		4624	852		600	
4626	133	599.	902		4626	353	599.	898		4627	247	599.	832	
4628	575	599.	808		4645	848	599			4646	416	598.	956	
4646	533	598.	954		4648	032	598.	849		4649	385	598.	823	
4649	524	598.	818		4666	249	598			4668	414	597.	855	
4668	689	597.	849		4670	876	597.	714		4671	95	597.	696	
4672	992	597.	682		4688	179	597			4690	699	596.	83	
4692	466	596.	744		4692	64	596.	741		4692	994	596.	721	
4694	949	596.	7		4697	001	596.	636		4710	626		596	
4713	039	595.	857		4713	151	595.	856		4713	911	595.	812	
4714	33	595.	812		4715	026	595.	772		4718	673	595.	684	
4725	538	595.	357		4725	676	595.	349		4734	268		595	
4735	861	594.	913		4736	152	594.	905		4737	549	594.	831	
4738	239	594.	81		4739	523	594.	743		4741	469	594.	685	
4756	843	594			4759	022	593.	852		4759	209	593.	848	
4760	695	593.	751		4760	784	593.	749		4760	873	593.	749	
4761	907	593.	682		4762	018	593.	682		4762	556	593.	647	
4762	673	593.	648		4762	922	593.	631		4763	118	593.	634	
4763	262	593.	642		4763	346	593.	644		4766	283	593.	609	
4780	208	593			4780	357	592.	987		4780	596	592.	972	
4781	528	592.	943		4782	348	592.	941		4782	735	592.	934	
4783	092	592.	915		4783	284	592.	912		4783	99	592.	873	
4784	135	592.	871		4784	202	592.	869		4784	647	592.	864	
4784	752	592.	865		4788	582	592.	678		4788	791	592.	67	
4790	643	592.	578		4790	906	592.	57		4791	372	592.	544	
4792	236	592.	524		4793	373	592.	521		4793	766	592.	513	
4816	319	591.	583		4817	042	591.	561		4817	415	591.	555	
4855	993	589.	983		4856	062	589.	982		4898		596.	5	
4898	596.	5			591	5288	593			587.5	5288	593		
5350	707	582.	316		5353	528	582.	303		5353	634	582.	305	
5356	29	582.	329		5359	836	582.	379		5360	309	582.	392	
5361	318	582.	401		5362	693	582.	451		5364	399	582.	548	
5365	203	582.	558		5365	92	582.	605		5366	61	582.	614	

81011_BuffaloCreekS83_ABW.rep

5367.385	582.669	5367.934	582.677	5368.77	582.738
5369.166	582.744	5370.071	582.808	5370.324	582.812
5371.31	582.874	5371.586	582.88	5372.427	582.922
5372.526	582.924	5374.506	583	5379.924	583.101
5379.995	583.105	5382.082	583.142	5382.242	583.149
5384.218	583.184	5384.53	583.197	5386.348	583.23
5386.789	583.248	5388.406	583.279	5388.971	583.301
5390.352	583.329	5391.022	583.354	5392.145	583.378
5396.498	583.526	5397.53	583.596	5397.811	583.606
5401.495	583.832	5401.66	583.844	5402.486	583.875
5402.898	583.905	5403.067	583.913	5403.245	583.918
5407.872	584	5410.222	584.105	5411.326	584.171
5411.72	584.185	5412.861	584.255	5413.458	584.275
5414.549	584.341	5415.331	584.367	5416.305	584.423
5417.219	584.452	5421.03	584.629	5421.319	584.639
5422.991	584.69	5423.067	584.662	5425.686	584.751
5425.886	584.754	5427.058	584.799	5427.124	584.8
5441.253	585.371	5450.049	585.915	5450.573	585.938
5451.38	586	5455.37	586.237	5459.565	586.4
5460.804	586.483	5461.361	586.51	5462.993	586.623
5463.232	586.636	5465.17	586.772	5465.346	586.782
5468.437	587	5494.061	588.334	5494.422	588.35
5536.993	591	5567.21	593.242	5567.84	593.28
5569.585	593.413	5582.019	594.305	5582.614	594.354
5584.18	594.456	5585.016	594.527	5586.122	594.6
5587.164	594.689	5587.857	594.736	5589.087	594.841
5596.638	595.358	5602.395	595.799	5604.143	595.942
5607.8	596.164	5621.635	597	5634.258	598
5650.276	599.08	5661.888	600	5713.07	603
5757.046	605	5757.255	605.014	5757.317	605.013
5788.125	606.408	5788.253	606.412	5791.957	606.439

Upstream Bridge Cross Section Data

Station		Elevation Data		num= 480		Station		Elevation		Station		Elevation	
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
4402.15	602	4402.58	601.71	4403.4	601.596	4405.11	601.043	4406.32	600.845				
4407.23	600.763	4409.79	600	4410.77	599.851	4411.63	599.664	4413.47	599.156				
4414.3	599	4415.09	598.916	4415.6	598.726	4416.23	598.607	4417.95	598.065				
4419.5	598	4420.22	597.682	4421.03	597.513	4422.57	596.978	4424.09	596.967				
4424.75	596.614	4425.38	596.463	4426.26	596.317	4427.35	595.867	4427.82	595.817				
4428.47	595.517	4429.26	595.038	4429.85	595	4431.51	594.009	4432.43	594				
4433.1	593.693	4434.18	593.268	4434.81	593.183	4435.78	592.827	4436.74	592.712				
4438.11	592.435	4438.19	591.985	4439.59	591.972	4441.01	591.534	4441.16	591.026				
4442.58	591	4443.84	590.496	4444.31	590	4446.61	589.833	4447.43	588.881				
4448.86	588.743	4449.81	588.292	4450.54	587.851	4451.59	587.792	4452.35	587.496				
4453.48	587.296	4454.36	586.892	4455.74	586.794	4456.34	586.47	4457.84	586.332				
4458.33	585.949	4460.33	585.897	4461.04	585.48	4462.83	584.982	4466.53	584.429				
4467.56	584.124	4468.47	584	4472.79	583.964	4473.75	584	4474.72	584.138				
4475.4	584.384	4476.29	584.389	4477.23	584.548	4477.96	584.554	4478.98	584.655				
4479.55	584.662	4480.83	584.83	4483.07	584.727	4483.59	584.733	4487.44	584.519				
4488.56	584.386	4490.62	583.995	4491.43	583.994	4500.27	583.363	4501.47	583.115				
4502.03	583.1	4502.53	582.967	4503.77	582.961	4510.24	582.546	4510.98	582.453				
4511.9	582.424	4512.41	582.3	4513.39	582.279	4514.21	582.124	4514.69	581.966				
4515.79	581.962	4516.7	581.836	4522.09	581.481	4522.59	581.464	4524.37	581.019				
4524.91	580.927	4528.14	580.779	4528.63	580.654	4531.78	580.253	4532.5	580.226				
4533.54	580.054	4534.06	580.046	4534.61	579.962	4542.34	579.461	4542.84	579.379				
4555.83	578.373	4556.32	578.276	4559	578.031	4563.93	577.78	4564.44	577.684				
4565.7	577.627	4566.24	577.545	4570.5	577.157	4572.11	577.131	4572.59	576.971				
4574.73	576.968	4575.19	576.78	4579.79	576.575	4580.29	576.619	4582.33	576.586				
4582.94	576.514	4588.69	576.244	4589.24	576	4598.59	575.807	4600.71	575.821				
4601.3	575.794	4603.47	575.807	4604.09	575.782	4616.92	575.739	4617.94	575.65				
4640.4	575.588	4641.25	575.325	4644.42	575.207	4645.82	575	4659.65	574.835				
4660.62	574.714	4680.11	574.385	4681.13	574.288	4682.81	574.282	4685.17	573.994				

81011_BuffaloCreekS83_ABW.rep

4717.25	573.455	4727.16	573.614	4727.76	573.681	4734.84	574	4735.65	574.319
4737.52	574.735	4738.2	575.119	4740.17	575.313	4741.79	576.054	4743.12	576.073
4743.63	576.386	4744.24	576.494	4745.2	576.768	4747.65	577.124	4748.71	577.153
4749.27	577.28	4751.1	577.461	4751.64	577.602	4754.82	578.162	4755.68	578.211
4757.48	578.728	4758.16	578.806	4759.26	579.179	4760.22	579.335	4761.28	579.636
4761.85	580	4763	580.2	4763.94	580.88	4765	581	4766.31	581.434
4766.48	582	4768.53	582.073	4768.69	583	4769.25	583.074	4770.31	583.353
4770.57	583.869	4772.38	584.261	4773.61	584.248	4774.17	584.416	4775.73	584.383
4776.35	584.48	4780.68	584.544	4782.67	584.727	4783.17	584.73	4784.35	584.812
4785.64	584.813	4787.88	585.123	4789.86	585.148	4791.59	585.532	4793.46	585.777
4797.95	586.167	4799.52	586.191	4800.03	586.326	4801.16	586.368	4801.75	586.464
4809	587.082	4811.23	586.998	4811.92	586.998	4812.38	586.901	4813.72	586.74
4815.73	586.603	4816.29	586.516	4817.48	586.47	4818.18	586.265	4819.59	586.234
4820.05	585.945	4821.65	585.899	4823.75	585.549	4824.16	585.049	4826.11	585
4827.72	584.576	4828.18	584.229	4828.77	584.129	4830.05	584	4830.72	583.726
4831.62	583.579	4832.85	583.153	4833.74	582.934	4835.64	582.606	4836.78	582.248
4837.53	582.186	4838.24	581.883	4839.26	581.826	4840.6	581.35	4841.55	581.238
4842.24	580.891	4843.39	580.829	4844.8	580.289	4845.57	580.191	4846.4	579.865
4847.34	579.794	4849.65	578.989	4850.84	578.985	4851.34	578.688	4852	578.562
4854.38	577.828	4855.17	577.769	4856.14	577.418	4858.06	576.859	4859.63	576.566
4861.46	576.102	4862.34	575.945	4870.58	574.999	4875.19	574.796	4875.66	574.748
4876.95	574.731	4877.61	574.683	4889.75	574.327	4890.37	574.273	4906.99	573.721
4907.52	573.671	4916.55	573.336	4917.1	573.278	4927.19	572.797	4927.64	572.731
4928.62	572.697	4937.82	571.861	4939.15	571.835	4939.68	571.708	4940.61	571.657
4942.9	571.357	4943.51	571.319	4943.97	571.229	4945.38	570.78	4945.85	570.689
4946.6	570.07	4947.36	570	4947.78	569.359	4948.75	569	4949.14	568
4950.07	567.815	4950.6	567	4951.2	566.535	4951.99	566	4952.59	565.422
4955.22	565	4955.75	564.167	4960.7	563.667	4963.04	563	4966.49	562.598
4968.07	562	4972.76	561.746	4974.61	561	4978.66	560.689	4979.12	560
4984.19	559.918	4985.56	559	4988.41	558.683	4989.55	558	4992.03	557.686
4996.11	556.464	5000	556	5002.16	555.355	5004.59	555	5005.31	554.802
5007.9	554.782	5011.4	554.39	5020.5	554.27	5021.06	554.238	5023.38	554.232
5023.84	554.199	5041.93	554.033	5043.04	554.097	5043.85	554.086	5045.68	554.269
5049.9	554.358	5050.21	554.867	5051.09	555.262	5051.28	556	5051.44	556.504
5051.47	557	5051.54	558	5051.82	559.025	5052.1	560	5052.85	562
5052.89	562.915	5053.32	563.101	5053.74	564.347	5053.8	565.077	5057	565.134
5057.5	565.022	5098.43	565.13	5099.04	565.166	5183.48	565.351	5185.84	565.069
5188.39	565.069	5188.99	565	5209.03	564.919	5215.75	564.26	5217.27	564
5229.44	563.427	5280.57	563.528	5284.16	563.7	5285.52	563.854	5288.94	564
5289.56	564	5291.16	564.15	5291.59	565	5293.18	565.216	5293.48	566.062
5294.34	566.146	5295.24	566.934	5295.74	567.116	5296.25	567.108	5297.22	567.208
5298.49	567.245	5299.07	567.383	5301.07	567.577	5303.28	568.007	5305.21	568.009
5305.9	568.262	5308.59	568.524	5309.18	568.707	5311.24	569.044	5313.07	569.058
5313.67	569.302	5314.71	569.382	5316.72	569.744	5317.2	569.798	5317.85	569.986
5318.5	570	5319.16	570.275	5320.43	570.501	5320.94	570.545	5340.51	570.291
5341.29	570.247	5344.02	570.232	5344.6	570.182	5353.81	570.047	5354.59	569.986
5363.36	569.866	5363.92	569.824	5384.88	569.552	5390.71	569.894	5391.36	570.054
5393.46	570.235	5394.79	570.278	5395.51	570.419	5397.41	570.599	5399.1	570.886
5399.81	570.913	5400.67	571.095	5407.74	571.911	5408.48	571.921	5409.27	572.069
5411.04	572.218	5412.12	572.261	5412.82	572.365	5416.61	572.706	5438.25	573.079
5438.74	573.132	5466.7	574.141	5468.82	574.462	5469.39	575.086	5470.74	575.219
5471.44	575.734	5472.72	576	5473.92	576.506	5474.84	577	5476.13	577.406
5476.51	578	5478.02	578.19	5478.68	579	5479.67	579.395	5480.1	580
5481.28	580.268	5482.34	581	5482.88	581.663	5484.41	582	5484.54	583
5486	583.044	5489.3	584	5492.35	584.532	5492.55	585	5493.66	585.23
5494.43	585.23	5497.09	585.741	5497.92	585.645	5498.75	585.384	5513.35	586.102
5514.35	586.233	5523.21	586.852	5525.2	586.871	5526.78	587.075	5529.38	587.088
5530.19	587.234	5542.8	587.857	5544.88	588.129	5546.64	588.162	5547.42	588.346
5548.72	588.567	5552.29	589	5555.88	589.02	5559.85	589.334	5586.17	590.236
5587.63	590.683	5590.32	590.79	5592.19	591	5604.66	591.499	5605.21	592
5611.44	592	5612.39	591.72	5612.88	591.652	5622.84	592.071	5623.5	592.198
5633.28	593	5646.35	593.413	5650.44	594	5651.33	594.29	5660.17	594.749
5660.65	594.905	5663.55	595	5664.41	594.766	5665.13	594.447	5665.6	594.176

81011_BuffaloCreekS83_ABW.rep

5666.83	594	5668.17	593.522	5668.67	592.887	5670.26	592.801	5670.73	592.037
5672.03	592	5672.86	591.231	5673.82	590.991	5674.37	590.662	5674.83	590.468
5675.46	589.677	5675.96	589.697	5676.46	590.016	5690.72	593	5708.93	594.429
5736.95	600.011	5740.63	601	5752.21	602	5806.39	604.164	5806.92	604.118
5809.72	604	5814.25	603	5831.86	599.963	5832.41	599.902	5839.44	599.631

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 4402.15 .1 4963.04 .045 5052.89 .1

Bank Sta: Left Right Coeff Contr. Expan.
 4963.04 5052.89 .3 .5

Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 4402.15 4898 591 F
 5288 5839.44 587.5 F

Sediment Elevation = 0

Downstream Deck/Roadway Coordinates num= 231

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
4370	612.763		4476.776	607		4478.579	606.894	
4479.28	606.886		4479.822	606.865		4497.811	606	
4498.863	605.936		4498.942	605.935		4499.569	605.894	
4500.566	605.88		4519.117	605		4520.151	604.934	
4520.283	604.932		4521.139	604.877		4522.094	604.861	
4540.407	604		4541.072	603.952		4541.183	603.95	
4542.396	603.866		4543.326	603.852		4543.481	603.847	
4561.587	603		4562.208	602.947		4562.302	602.948	
4562.544	602.943		4564.119	602.843		4564.93	602.828	
4582.446	602		4583.764	601.913		4583.845	601.911	
4584.758	601.851		4584.906	601.849		4585.634	601.8	
4586.6	601.788		4603.723	601		4605.019	600.908	
4605.154	600.906		4605.817	600.86		4606.025	600.857	
4606.648	600.815		4607.951	600.788		4624.852	600	
4626.133	599.902		4626.353	599.898		4627.247	599.832	
4628.575	599.808		4645.848	599		4646.416	598.956	
4646.533	598.954		4648.032	598.849		4649.385	598.823	
4649.524	598.818		4666.249	598		4668.414	597.855	
4668.689	597.849		4670.876	597.714		4671.95	597.696	
4672.992	597.682		4688.179	597		4690.699	596.83	
4692.466	596.744		4692.64	596.741		4692.994	596.721	
4694.949	596.7		4697.001	596.636		4710.626	596	
4713.039	595.857		4713.151	595.856		4713.911	595.812	
4714.33	595.812		4715.026	595.772		4718.673	595.684	
4725.538	595.357		4725.676	595.349		4734.268	595	
4735.861	594.913		4736.152	594.905		4737.549	594.831	
4738.239	594.81		4739.523	594.743		4741.469	594.685	
4756.843	594		4759.022	593.852		4759.209	593.848	
4760.695	593.751		4760.784	593.749		4760.873	593.749	
4761.907	593.682		4762.018	593.682		4762.556	593.647	
4762.673	593.648		4762.922	593.631		4763.118	593.634	
4763.262	593.642		4763.346	593.644		4766.283	593.609	
4780.208	593		4780.357	592.987		4780.596	592.972	
4781.528	592.943		4782.348	592.941		4782.735	592.934	
4783.092	592.915		4783.284	592.912		4783.99	592.873	
4784.135	592.871		4784.202	592.869		4784.647	592.864	
4784.752	592.865		4788.582	592.678		4788.791	592.67	
4790.643	592.578		4790.906	592.57		4791.372	592.544	
4792.236	592.524		4793.373	592.521		4793.766	592.513	
4816.319	591.583		4817.042	591.561		4817.415	591.555	
4855.993	589.983		4856.062	589.982		4898	596.5	
4898	596.5	591	5288	593	587.5	5288	593	

81011_BuffaloCreekS83_ABW.rep

5350.707	582.316	5353.528	582.303	5353.634	582.305
5356.29	582.329	5359.836	582.379	5360.309	582.392
5361.318	582.401	5362.693	582.451	5364.399	582.548
5365.203	582.558	5365.92	582.605	5366.61	582.614
5367.385	582.669	5367.934	582.677	5368.77	582.738
5369.166	582.744	5370.071	582.808	5370.324	582.812
5371.31	582.874	5371.586	582.88	5372.427	582.922
5372.526	582.924	5374.506	583	5379.924	583.101
5379.995	583.105	5382.082	583.142	5382.242	583.149
5384.218	583.184	5384.53	583.197	5386.348	583.23
5386.789	583.248	5388.406	583.279	5388.971	583.301
5390.352	583.329	5391.022	583.354	5392.145	583.378
5396.498	583.526	5397.53	583.596	5397.811	583.606
5401.495	583.832	5401.66	583.844	5402.486	583.875
5402.898	583.905	5403.067	583.913	5403.245	583.918
5407.872	584	5410.222	584.105	5411.326	584.171
5411.72	584.185	5412.861	584.255	5413.458	584.275
5414.549	584.341	5415.331	584.367	5416.305	584.423
5417.219	584.452	5421.03	584.629	5421.319	584.639
5422.991	584.69	5423.067	584.662	5425.686	584.751
5425.886	584.754	5427.058	584.799	5427.124	584.8
5441.253	585.371	5450.049	585.915	5450.573	585.938
5451.38	586	5455.37	586.237	5459.565	586.4
5460.804	586.483	5461.361	586.51	5462.993	586.623
5463.232	586.636	5465.17	586.772	5465.346	586.782
5468.437	587	5494.061	588.334	5494.422	588.35
5536.993	591	5567.21	593.242	5567.84	593.28
5569.585	593.413	5582.019	594.305	5582.614	594.354
5584.18	594.456	5585.016	594.527	5586.122	594.6
5587.164	594.689	5587.857	594.736	5589.087	594.841
5596.638	595.358	5602.395	595.799	5604.143	595.942
5607.8	596.164	5621.635	597	5634.258	598
5650.276	599.08	5661.888	600	5713.07	603
5757.046	605	5757.255	605.014	5757.317	605.013
5788.125	606.408	5788.253	606.412	5791.957	606.439

Downstream Bridge Cross Section Data

Station Elevation Data		num= 480		Sta		El ev		Sta		El ev	
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
4402.15	602	4402.58	601.71	4403.4	601.596	4405.11	601.043	4406.32	600.845		
4407.23	600.763	4409.79	600	4410.77	599.851	4411.63	599.664	4413.47	599.156		
4414.3	599	4415.09	598.916	4415.6	598.726	4416.23	598.607	4417.95	598.065		
4419.5	598	4420.22	597.682	4421.03	597.513	4422.57	596.978	4424.09	596.967		
4424.75	596.614	4425.38	596.463	4426.26	596.317	4427.35	595.867	4427.82	595.817		
4428.47	595.517	4429.26	595.038	4429.85	595	4431.51	594.009	4432.43	594		
4433.1	593.693	4434.18	593.268	4434.81	593.183	4435.78	592.827	4436.74	592.712		
4438.11	592.435	4438.19	591.985	4439.59	591.972	4441.01	591.534	4441.16	591.026		
4442.58	591	4443.84	590.496	4444.31	590	4446.61	589.833	4447.43	588.881		
4448.86	588.743	4449.81	588.292	4450.54	587.851	4451.59	587.792	4452.35	587.496		
4453.48	587.296	4454.36	586.892	4455.74	586.794	4456.34	586.47	4457.84	586.332		
4458.33	585.949	4460.33	585.897	4461.04	585.48	4462.83	584.982	4466.53	584.429		
4467.56	584.124	4468.47	584	4472.79	583.964	4473.75	584	4474.72	584.138		
4475.4	584.384	4476.29	584.389	4477.23	584.548	4477.96	584.554	4478.98	584.655		
4479.55	584.662	4480.83	584.83	4483.07	584.727	4483.59	584.733	4487.44	584.519		
4488.56	584.386	4490.62	583.995	4491.43	583.994	4500.27	583.363	4501.47	583.115		
4502.03	583.1	4502.53	582.967	4503.77	582.961	4510.24	582.546	4510.98	582.453		
4511.9	582.424	4512.41	582.3	4513.39	582.279	4514.21	582.124	4514.69	581.966		
4515.79	581.962	4516.7	581.836	4522.09	581.481	4522.59	581.464	4524.37	581.019		
4524.91	580.927	4528.14	580.779	4528.63	580.654	4531.78	580.253	4532.5	580.226		
4533.54	580.054	4534.06	580.046	4534.61	579.962	4542.34	579.461	4542.84	579.379		
4555.83	578.373	4556.32	578.276	4559	578.031	4563.93	577.78	4564.44	577.684		
4565.7	577.627	4566.24	577.545	4570.5	577.157	4572.11	577.131	4572.59	576.971		
4574.73	576.968	4575.19	576.78	4579.79	576.575	4580.29	576.619	4582.33	576.586		

81011_BuffaloCreekS83_ABW.rep

4582.94	576.514	4588.69	576.244	4589.24	576	4598.59	575.807	4600.71	575.821
4601.3	575.794	4603.47	575.807	4604.09	575.782	4616.92	575.739	4617.94	575.65
4640.4	575.588	4641.25	575.325	4644.42	575.207	4645.82	575	4659.65	574.835
4660.62	574.714	4680.11	574.385	4681.13	574.288	4682.81	574.282	4685.17	573.994
4717.25	573.455	4727.16	573.614	4727.76	573.681	4734.84	574	4735.65	574.319
4737.52	574.735	4738.2	575.119	4740.17	575.313	4741.79	576.054	4743.12	576.073
4743.63	576.386	4744.24	576.494	4745.2	576.768	4747.65	577.124	4748.71	577.153
4749.27	577.28	4751.1	577.461	4751.64	577.602	4754.82	578.162	4755.68	578.211
4757.48	578.728	4758.16	578.806	4759.26	579.179	4760.22	579.335	4761.28	579.636
4761.85	580	4763	580.2	4763.94	580.88	4765	581	4766.31	581.434
4766.48	582	4768.53	582.073	4768.69	583	4769.25	583.074	4770.31	583.353
4770.57	583.869	4772.38	584.261	4773.61	584.248	4774.17	584.416	4775.73	584.383
4776.35	584.48	4780.68	584.544	4782.67	584.727	4783.17	584.73	4784.35	584.812
4785.64	584.813	4787.88	585.123	4789.86	585.148	4791.59	585.532	4793.46	585.777
4797.95	586.167	4799.52	586.191	4800.03	586.326	4801.16	586.368	4801.75	586.464
4809	587.082	4811.23	586.998	4811.92	586.998	4812.38	586.901	4813.72	586.74
4815.73	586.603	4816.29	586.516	4817.48	586.47	4818.18	586.265	4819.59	586.234
4820.05	585.945	4821.65	585.899	4823.75	585.549	4824.16	585.049	4826.11	585
4827.72	584.576	4828.18	584.229	4828.77	584.129	4830.05	584	4830.72	583.726
4831.62	583.579	4832.85	583.153	4833.74	582.934	4835.64	582.606	4836.78	582.248
4837.53	582.186	4838.24	581.883	4839.26	581.826	4840.6	581.35	4841.55	581.238
4842.24	580.891	4843.39	580.829	4844.8	580.289	4845.57	580.191	4846.4	579.865
4847.34	579.794	4849.65	578.989	4850.84	578.985	4851.34	578.688	4852	578.562
4854.38	577.828	4855.17	577.769	4856.14	577.418	4858.06	576.859	4859.63	576.566
4861.46	576.102	4862.34	575.945	4870.58	574.999	4875.19	574.796	4875.66	574.748
4876.95	574.731	4877.61	574.683	4889.75	574.327	4890.37	574.273	4906.99	573.721
4907.52	573.671	4916.55	573.336	4917.1	573.278	4927.19	572.797	4927.64	572.731
4928.62	572.697	4937.82	571.861	4939.15	571.835	4939.68	571.708	4940.61	571.657
4942.9	571.357	4943.51	571.319	4943.97	571.229	4945.38	570.78	4945.85	570.689
4946.6	570.07	4947.36	570	4947.78	569.359	4948.75	569	4949.14	568
4950.07	567.815	4950.6	567	4951.2	566.535	4951.99	566	4952.59	565.422
4955.22	565	4955.75	564.167	4960.7	563.667	4963.04	563	4966.49	562.598
4968.07	562	4972.76	561.746	4974.61	561	4978.66	560.689	4979.12	560
4984.19	559.918	4985.56	559	4988.41	558.683	4989.55	558	4992.03	557.686
4996.11	556.464	5000	556	5002.16	555.355	5004.59	555	5005.31	554.802
5007.9	554.782	5011.4	554.39	5020.5	554.27	5021.06	554.238	5023.38	554.232
5023.84	554.199	5041.93	554.033	5043.04	554.097	5043.85	554.086	5045.68	554.269
5049.9	554.358	5050.21	554.867	5051.09	555.262	5051.28	556	5051.44	556.504
5051.47	557	5051.54	558	5051.82	559.025	5052.1	560	5052.85	562
5052.89	562.915	5053.32	563.101	5053.74	564.347	5053.8	565.077	5057	565.134
5057.5	565.022	5098.43	565.13	5099.04	565.166	5183.48	565.351	5185.84	565.069
5188.39	565.069	5188.99	565	5209.03	564.919	5215.75	564.26	5217.27	564
5229.44	563.427	5280.57	563.528	5284.16	563.7	5285.52	563.854	5288.94	564
5289.56	564	5291.16	564.15	5291.59	565	5293.18	565.216	5293.48	566.062
5294.34	566.146	5295.24	566.934	5295.74	567.116	5296.25	567.108	5297.22	567.208
5298.49	567.245	5299.07	567.383	5301.07	567.577	5303.28	568.007	5305.21	568.009
5305.9	568.262	5308.59	568.524	5309.18	568.707	5311.24	569.044	5313.07	569.058
5313.67	569.302	5314.71	569.382	5316.72	569.744	5317.2	569.798	5317.85	569.986
5318.5	570	5319.16	570.275	5320.43	570.501	5320.94	570.545	5340.51	570.291
5341.29	570.247	5344.02	570.232	5344.6	570.182	5353.81	570.047	5354.59	569.986
5363.36	569.866	5363.92	569.824	5384.88	569.552	5390.71	569.894	5391.36	570.054
5393.46	570.235	5394.79	570.278	5395.51	570.419	5397.41	570.599	5399.1	570.886
5399.81	570.913	5400.67	571.095	5407.74	571.911	5408.48	571.921	5409.27	572.069
5411.04	572.218	5412.12	572.261	5412.82	572.365	5416.61	572.706	5438.25	573.079
5438.74	573.132	5466.7	574.141	5468.82	574.462	5469.39	575.086	5470.74	575.219
5471.44	575.734	5472.72	576	5473.92	576.506	5474.84	577	5476.13	577.406
5476.51	578	5478.02	578.19	5478.68	579	5479.67	579.395	5480.1	580
5481.28	580.268	5482.34	581	5482.88	581.663	5484.41	582	5484.54	583
5486	583.044	5489.3	584	5492.35	584.532	5492.55	585	5493.66	585.23
5494.43	585.23	5497.09	585.741	5497.92	585.645	5498.75	585.384	5513.35	586.102
5514.35	586.233	5523.21	586.852	5525.2	586.871	5526.78	587.075	5529.38	587.088
5530.19	587.234	5542.8	587.857	5544.88	588.129	5546.64	588.162	5547.42	588.346
5548.72	588.567	5552.29	589	5555.88	589.02	5559.85	589.334	5586.17	590.236

81011_BuffaloCreekS83_ABW.rep

5587.63	590.683	5590.32	590.79	5592.19	591	5604.66	591.499	5605.21	592
5611.44	592	5612.39	591.72	5612.88	591.652	5622.84	592.071	5623.5	592.198
5633.28	593	5646.35	593.413	5650.44	594	5651.33	594.29	5660.17	594.749
5660.65	594.905	5663.55	595	5664.41	594.766	5665.13	594.447	5665.6	594.176
5666.83	594	5668.17	593.522	5668.67	592.887	5670.26	592.801	5670.73	592.037
5672.03	592	5672.86	591.231	5673.82	590.991	5674.37	590.662	5674.83	590.468
5675.46	589.677	5675.96	589.697	5676.46	590.016	5690.72	593	5708.93	594.429
5736.95	600.011	5740.63	601	5752.21	602	5806.39	604.164	5806.92	604.118
5809.72	604	5814.25	603	5831.86	599.963	5832.41	599.902	5839.44	599.631

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 4402.15 .1 4963.04 .045 5052.89 .1

Bank Sta: Left Right Coeff Contr. Expan.
 4963.04 5052.89 .3 .5

Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 4402.15 4898 591 F
 5288 5839.44 587.5 F

Sediment Elevation = 0

Upstream Embankment side slope = 2 hori z. to 1.0 vertical
 Downstream Embankment side slope = 2 hori z. to 1.0 vertical
 Maximum allowable submergence for weir flow = .98
 Elevation at which weir flow begins = 584.5
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Abutments = 2

Abutment Data

Upstream num= 2
 Sta Elev Sta Elev
 4898 591 4944570.5555
 Downstream num= 2
 Sta Elev Sta Elev
 4898 591 4944570.5555

Abutment Data

Upstream num= 2
 Sta Elev Sta Elev
 5063 487.5 5288 587.5
 Downstream num= 2
 Sta Elev Sta Elev
 5063 487.5 5288 587.5

Number of Piers = 4

Pier Data

Pier Station Upstream= 4958 Downstream= 4958
 Upstream num= 2
 Width Elev Width Elev
 4 547.5 4 595
 Downstream num= 2
 Width Elev Width Elev
 4 547.5 4 595

Pier Data

Pier Station Upstream= 5046 Downstream= 5046
 Upstream num= 2
 Width Elev Width Elev

4 547.5 4 595
 Downstream num= 2
 Width Elev Width Elev
 4 547.5 4 595

Pier Data
 Pier Station Upstream= 5112 Downstream= 5112
 Upstream num= 2
 Width Elev Width Elev
 4 547.5 4 595
 Downstream num= 2
 Width Elev Width Elev
 4 547.5 4 595

Pier Data
 Pier Station Upstream= 5200 Downstream= 5200
 Upstream num= 2
 Width Elev Width Elev
 4 547.5 4 595
 Downstream num= 2
 Width Elev Width Elev
 4 547.5 4 595

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Yarnell KVal = 1.05
 Selected Low Flow Methods = Yarnell

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8164966
 Max Low Cord = 582.5

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

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 6.2

INPUT

Description:

Station Elevation Data num= 480

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4402.15	602	4402.58	601.71	4403.4	601.596	4405.11	601.043	4406.32	600.845
4407.23	600.763	4409.79	600	4410.77	599.851	4411.63	599.664	4413.47	599.156
4414.3	599	4415.09	598.916	4415.6	598.726	4416.23	598.607	4417.95	598.065
4419.5	598	4420.22	597.682	4421.03	597.513	4422.57	596.978	4424.09	596.967
4424.75	596.614	4425.38	596.463	4426.26	596.317	4427.35	595.867	4427.82	595.817
4428.47	595.517	4429.26	595.038	4429.85	595	4431.51	594.009	4432.43	594
4433.1	593.693	4434.18	593.268	4434.81	593.183	4435.78	592.827	4436.74	592.712
4438.11	592.435	4438.19	591.985	4439.59	591.972	4441.01	591.534	4441.16	591.026
4442.58	591	4443.84	590.496	4444.31	590	4446.61	589.833	4447.43	588.881
4448.86	588.743	4449.81	588.292	4450.54	587.851	4451.59	587.792	4452.35	587.496
4453.48	587.296	4454.36	586.892	4455.74	586.794	4456.34	586.47	4457.84	586.332

81011_Buffal oCreekS83_ABW.rep

4458.33	585.949	4460.33	585.897	4461.04	585.48	4462.83	584.982	4466.53	584.429
4467.56	584.124	4468.47	584	4472.79	583.964	4473.75	584	4474.72	584.138
4475.4	584.384	4476.29	584.389	4477.23	584.548	4477.96	584.554	4478.98	584.655
4479.55	584.662	4480.83	584.83	4483.07	584.727	4483.59	584.733	4487.44	584.519
4488.56	584.386	4490.62	583.995	4491.43	583.994	4500.27	583.363	4501.47	583.115
4502.03	583.1	4502.53	582.967	4503.77	582.961	4510.24	582.546	4510.98	582.453
4511.9	582.424	4512.41	582.3	4513.39	582.279	4514.21	582.124	4514.69	581.966
4515.79	581.962	4516.7	581.836	4522.09	581.481	4522.59	581.464	4524.37	581.019
4524.91	580.927	4528.14	580.779	4528.63	580.654	4531.78	580.253	4532.5	580.226
4533.54	580.054	4534.06	580.046	4534.61	579.962	4542.34	579.461	4542.84	579.379
4555.83	578.373	4556.32	578.276	4559	578.031	4563.93	577.78	4564.44	577.684
4565.7	577.627	4566.24	577.545	4570.5	577.157	4572.11	577.131	4572.59	576.971
4574.73	576.968	4575.19	576.78	4579.79	576.575	4580.29	576.619	4582.33	576.586
4582.94	576.514	4588.69	576.244	4589.24	576	4598.59	575.807	4600.71	575.821
4601.3	575.794	4603.47	575.807	4604.09	575.782	4616.92	575.739	4617.94	575.65
4640.4	575.588	4641.25	575.325	4644.42	575.207	4645.82	575	4659.65	574.835
4660.62	574.714	4680.11	574.385	4681.13	574.288	4682.81	574.282	4685.17	573.994
4717.25	573.455	4727.16	573.614	4727.76	573.681	4734.84	574	4735.65	574.319
4737.52	574.735	4738.2	575.119	4740.17	575.313	4741.79	576.054	4743.12	576.073
4743.63	576.386	4744.24	576.494	4745.2	576.768	4747.65	577.124	4748.71	577.153
4749.27	577.28	4751.1	577.461	4751.64	577.602	4754.82	578.162	4755.68	578.211
4757.48	578.728	4758.16	578.806	4759.26	579.179	4760.22	579.335	4761.28	579.636
4761.85	580	4763	580.2	4763.94	580.88	4765	581	4766.31	581.434
4766.48	582	4768.53	582.073	4768.69	583	4769.25	583.074	4770.31	583.353
4770.57	583.869	4772.38	584.261	4773.61	584.248	4774.17	584.416	4775.73	584.383
4776.35	584.48	4780.68	584.544	4782.67	584.727	4783.17	584.73	4784.35	584.812
4785.64	584.813	4787.88	585.123	4789.86	585.148	4791.59	585.532	4793.46	585.777
4797.95	586.167	4799.52	586.191	4800.03	586.326	4801.16	586.368	4801.75	586.464
4809	587.082	4811.23	586.998	4811.92	586.998	4812.38	586.901	4813.72	586.74
4815.73	586.603	4816.29	586.516	4817.48	586.47	4818.18	586.265	4819.59	586.234
4820.05	585.945	4821.65	585.899	4823.75	585.549	4824.16	585.049	4826.11	585
4827.72	584.576	4828.18	584.229	4828.77	584.129	4830.05	584	4830.72	583.726
4831.62	583.579	4832.85	583.153	4833.74	582.934	4835.64	582.606	4836.78	582.248
4837.53	582.186	4838.24	581.883	4839.26	581.826	4840.6	581.35	4841.55	581.238
4842.24	580.891	4843.39	580.829	4844.8	580.289	4845.57	580.191	4846.4	579.865
4847.34	579.794	4849.65	578.989	4850.84	578.985	4851.34	578.688	4852	578.562
4854.38	577.828	4855.17	577.769	4856.14	577.418	4858.06	576.859	4859.63	576.566
4861.46	576.102	4862.34	575.945	4870.58	574.999	4875.19	574.796	4875.66	574.748
4876.95	574.731	4877.61	574.683	4889.75	574.327	4890.37	574.273	4906.99	573.721
4907.52	573.671	4916.55	573.336	4917.1	573.278	4927.19	572.797	4927.64	572.731
4928.62	572.697	4937.82	571.861	4939.15	571.835	4939.68	571.708	4940.61	571.657
4942.9	571.357	4943.51	571.319	4943.97	571.229	4945.38	570.78	4945.85	570.689
4946.6	570.07	4947.36	570	4947.78	569.359	4948.75	569	4949.14	568
4950.07	567.815	4950.6	567	4951.2	566.535	4951.99	566	4952.59	565.422
4955.22	565	4955.75	564.167	4960.7	563.667	4963.04	563	4966.49	562.598
4968.07	562	4972.76	561.746	4974.61	561	4978.66	560.689	4979.12	560
4984.19	559.918	4985.56	559	4988.41	558.683	4989.55	558	4992.03	557.686
4996.11	556.464	5000	556	5002.16	555.355	5004.59	555	5005.31	554.802
5007.9	554.782	5011.4	554.39	5020.5	554.27	5021.06	554.238	5023.38	554.232
5023.84	554.199	5041.93	554.033	5043.04	554.097	5043.85	554.086	5045.68	554.269
5049.9	554.358	5050.21	554.867	5051.09	555.262	5051.28	556	5051.44	556.504
5051.47	557	5051.54	558	5051.82	559.025	5052.1	560	5052.85	562
5052.89	562.915	5053.32	563.101	5053.74	564.347	5053.8	565.077	5057	565.134
5057.5	565.022	5098.43	565.13	5099.04	565.166	5183.48	565.351	5185.84	565.069
5188.39	565.069	5188.99	565	5209.03	564.919	5215.75	564.26	5217.27	564
5229.44	563.427	5280.57	563.528	5284.16	563.7	5285.52	563.854	5288.94	564
5289.56	564	5291.16	564.15	5291.59	565	5293.18	565.216	5293.48	566.062
5294.34	566.146	5295.24	566.934	5295.74	567.116	5296.25	567.108	5297.22	567.208
5298.49	567.245	5299.07	567.383	5301.07	567.577	5303.28	568.007	5305.21	568.009
5305.9	568.262	5308.59	568.524	5309.18	568.707	5311.24	569.044	5313.07	569.058
5313.67	569.302	5314.71	569.382	5316.72	569.744	5317.2	569.798	5317.85	569.986
5318.5	570	5319.16	570.275	5320.43	570.501	5320.94	570.545	5340.51	570.291
5341.29	570.247	5344.02	570.232	5344.6	570.182	5353.81	570.047	5354.59	569.986

81011_BuffaloCreekS83_ABW.rep

5363.36	569.866	5363.92	569.824	5384.88	569.552	5390.71	569.894	5391.36	570.054
5393.46	570.235	5394.79	570.278	5395.51	570.419	5397.41	570.599	5399.1	570.886
5399.81	570.913	5400.67	571.095	5407.74	571.911	5408.48	571.921	5409.27	572.069
5411.04	572.218	5412.12	572.261	5412.82	572.365	5416.61	572.706	5438.25	573.079
5438.74	573.132	5466.7	574.141	5468.82	574.462	5469.39	575.086	5470.74	575.219
5471.44	575.734	5472.72	576	5473.92	576.506	5474.84	577	5476.13	577.406
5476.51	578	5478.02	578.19	5478.68	579	5479.67	579.395	5480.1	580
5481.28	580.268	5482.34	581	5482.88	581.663	5484.41	582	5484.54	583
5486	583.044	5489.3	584	5492.35	584.532	5492.55	585	5493.66	585.23
5494.43	585.23	5497.09	585.741	5497.92	585.645	5498.75	585.384	5513.35	586.102
5514.35	586.233	5523.21	586.852	5525.2	586.871	5526.78	587.075	5529.38	587.088
5530.19	587.234	5542.8	587.857	5544.88	588.129	5546.64	588.162	5547.42	588.346
5548.72	588.567	5552.29	589	5555.88	589.02	5559.85	589.334	5586.17	590.236
5587.63	590.683	5590.32	590.79	5592.19	591	5604.66	591.499	5605.21	592
5611.44	592	5612.39	591.72	5612.88	591.652	5622.84	592.071	5623.5	592.198
5633.28	593	5646.35	593.413	5650.44	594	5651.33	594.29	5660.17	594.749
5660.65	594.905	5663.55	595	5664.41	594.766	5665.13	594.447	5665.6	594.176
5666.83	594	5668.17	593.522	5668.67	592.887	5670.26	592.801	5670.73	592.037
5672.03	592	5672.86	591.231	5673.82	590.991	5674.37	590.662	5674.83	590.468
5675.46	589.677	5675.96	589.697	5676.46	590.016	5690.72	593	5708.93	594.429
5736.95	600.011	5740.63	601	5752.21	602	5806.39	604.164	5806.92	604.118
5809.72	604	5814.25	603	5831.86	599.963	5832.41	599.902	5839.44	599.631

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 4402.15 .1 4963.04 .045 5052.89 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 4963.04 5052.89 80 80 80 .3 .5
 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 4402.15 4898 591 F
 5288 5839.44 587.5 F
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 6.1

INPUT

Description:

Station Elevation Data num= 471

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4815	602	4815.52	601	4818	600.871	4818.83	600.247	4818.99	600.039		
4819.43	600	4822.88	599.886	4825.33	599	4826.37	598.359	4826.7	598.088		
4829.71	598	4830.52	597.212	4833.33	597	4834.41	596.28	4834.95	596		
4838.14	595.856	4840.06	595	4841.87	594.486	4843.88	594	4845.61	593.464		
4847.5	593	4849.34	592.493	4850.89	592	4853.06	591.583	4856.53	591		
4856.79	590.069	4857.4	590	4860.51	589.837	4862.12	589	4864.23	588.569		
4867.6	588	4867.96	587.097	4868.64	587	4870.91	586.822	4871.78	586.225		
4874.49	586	4875.45	585.253	4877.47	585	4878.17	584.257	4878.75	584		
4880.42	583.79	4880.94	583.188	4882.61	583	4883.7	582.395	4886.21	582		
4886.45	581.09	4886.9	581	4889.2	580.839	4891.5	580	4891.94	579.161		
4893.12	579	4894.68	578.568	4895.22	578	4897.43	577.805	4898.97	577		
4900.19	576.44	4902.37	576	4903.02	575.227	4904.68	575	4905.95	574.428		
4906.4	574	4906.81	573.851	4907.93	573.717	4909.08	573.359	4909.83	573		
4912.32	572.768	4912.35	572.002	4914.74	572	4915.67	571.278	4917.96	571		
4919.01	570.313	4921.15	570	4922.35	569.358	4925.42	569	4925.58	568.082		
4925.69	568.032	4927.69	568	4929.03	567.402	4930.37	567	4932.37	566.6		
4933.24	566	4935.32	565.739	4935.58	565.114	4935.7	565.036	4936.53	565		
4938.71	564.722	4938.88	564	4940.75	564	4941.78	564.43	4942.09	565		

81011_BuffaloCreekS83_ABW.rep

4948.83 565 4949 564.966 4951.39 564.944 4952.62 564.735 4954.33 564.625
 4954.79 564.359 4955.19 564.306 4956.62 564.259 4957.18 564 4957.47 563.342
 4957.84 563 4958.32 562.563 4958.76 562 4959.18 561.492 4959.88 561
 4960.04 560.187 4960.29 560 4960.9 559.7 4961.27 559 4961.76 558.573
 4962.25 558 4962.65 557.456 4963.33 557 4963.55 556.243 4968.34 556
 4968.5 555.033 4968.57 554.996 4974.09 554.993 4976.5 554.48 4977.39 554.261
 4979.2 554.179 4979.36 554.014 4979.64 554 5025.31 554 5025.98 554.799
 5027.9 555 5028.18 555.141 5029.08 555.188 5029.79 555.313 5031.32 555.436
 5033.02 555.704 5034.17 556 5034.91 556.4 5035.94 556.655 5036.78 557.182
 5037.54 557.278 5038 557.53 5038.42 557.682 5038.54 557.82 5038.74 557.859
 5038.75 557.925 5039.12 557.931 5039.8 558.079 5045.42 558.392 5047 560.902
 5048.17 561.655 5049.09 562.217 5049.19 562.653 5049.46 562.666 5050.04 562.699
 5051.28 562.767 5052.06 562.91 5053.04 563 5053.18 563.067 5054.69 563.078
 5055.91 563.184 5056.58 563.273 5057.61 563.322 5058.81 563.4 5059.57 563.489
 5060.07 563.55 5062.01 563.594 5062.22 563.735 5062.31 563.756 5065.4 563.768
 5065.4 563.985 5065.61 563.985 5068.51 564 5070.43 564.219 5071.96 564.366
 5073.25 564.482 5076.01 564.583 5076.54 564.792 5078.74 564.834 5080.06 565
 5080.49 565.136 5081.3 565.185 5083.93 565.274 5085.69 565.558 5086.48 565.746
 5088.19 565.833 5088.26 566 5089.18 566.003 5089.8 566.04 5090.21 566.055
 5090.46 566.059 5090.58 566.058 5090.72 566.056 5091.07 566.053 5091.71 566.043
 5092.49 566 5092.54 565.954 5093.33 565.959 5093.44 565.859 5094.21 565.869
 5094.32 565.784 5096.41 565.789 5096.46 565.833 5096.57 565.831 5096.77 565.83
 5098.51 565.828 5098.98 565.758 5100.64 565.755 5101.38 565.69 5102.94 565.689
 5103.95 565.632 5105.39 565.63 5106.67 565.581 5107.98 565.58 5109.05 565.539
 5110.67 565.506 5111.61 565.505 5112.33 565.479 5114.2 565.458 5114.77 565.458
 5115.13 565.443 5117.14 565.434 5131.62 565.432 5131.8 565.431 5131.88 565.43
 5132.04 565.429 5132.38 565.428 5133.85 565.418 5135.1 565.407 5136.45 565.391
 5139.1 565.355 5140.52 565.326 5140.79 565.319 5140.9 565.316 5141.04 565.315
 5141.28 565.314 5141.99 565.309 5142.79 565.307 5143.21 565.307 5145.68 565.301
 5147.82 565.292 5184.67 565.09 5190.91 565.04 5191.44 565 5193.3 564.983
 5196.3 564.875 5198.51 564.802 5199.37 564.776 5200.55 564.745 5200.84 564.741
 5201.01 564.74 5201.09 564.742 5201.35 564.745 5201.66 564.75 5202.13 564.761
 5202.86 564.783 5203.76 564.824 5204.91 564.881 5205.5 564.959 5206.8 565
 5215.58 565 5215.64 564.979 5216.62 564.978 5216.75 564.953 5216.86 564.95
 5216.93 564.947 5217.02 564.945 5217.12 564.942 5217.22 564.939 5217.34 564.935
 5217.47 564.931 5217.62 564.927 5217.78 564.922 5217.98 564.915 5218.19 564.908
 5218.43 564.899 5218.7 564.888 5219.44 564.86 5220.87 564.814 5224.22 564.775
 5225.94 564.645 5228.69 564.569 5230.62 564.456 5232.65 564.375 5233.78 564.287
 5236.95 564.238 5237.33 564.105 5237.57 564.089 5239.5 564.079 5240.94 564
 5241.05 563.897 5243.61 563.89 5244.15 563.71 5246.04 563.675 5247.39 563.545
 5248.69 563.46 5249.56 563.373 5251.6 563.314 5252.05 563.194 5254.9 563.165
 5254.91 563.004 5254.98 563.004 5255.05 563 5257.05 562.985 5257.88 562.596
 5258.33 562.438 5258.55 562.357 5258.68 562.32 5258.74 562.302 5258.82 562.292
 5258.91 562.288 5259.06 562.282 5259.26 562.273 5259.52 562.263 5259.78 562.252
 5260.02 562.244 5260.25 562.238 5260.45 562.234 5260.6 562.23 5260.86 562.229
 5261.19 562.23 5261.32 562.231 5261.73 562.225 5261.99 562.228 5262.45 562.226
 5262.96 562.23 5263.48 562.238 5264.32 562.243 5265.24 562.267 5265.91 562.3
 5266.87 562.306 5267.62 562.342 5268.54 562.349 5269.31 562.383 5270.16 562.412
 5270.78 562.419 5271.19 562.441 5272.03 562.454 5273.32 562.469 5273.67 562.474
 5274.11 562.479 5274.6 562.488 5275.13 562.499 5275.66 562.512 5276.65 562.541
 5277.01 562.554 5277.81 562.564 5277.89 562.401 5278.1 562.404 5278.53 562.413
 5280.81 562.455 5285.97 562.564 5296.85 562.774 5298.41 562.956 5300.53 563
 5310.26 563 5310.66 563.014 5311.44 563.028 5312.44 563.052 5313.51 563.082
 5313.87 563.116 5315 563.115 5315.99 563.148 5316.57 563.179 5317.43 563.177
 5318.1 563.204 5318.63 563.202 5318.88 563.22 5318.98 563.241 5320.08 563.243
 5320.9 563.29 5321.65 563.294 5322.33 563.302 5323.35 563.316 5324.24 563.313
 5326.33 563.359 5327.36 563.356 5328.5 563.383 5329.56 563.381 5330.67 563.407
 5331.69 563.405 5332.72 563.431 5333.66 563.429 5334.57 563.452 5335.37 563.45
 5336.1 563.47 5336.58 563.469 5337.82 563.47 5338.49 563.486 5340.87 563.489
 5343.48 563.496 5345.17 563.505 5345.82 563.511 5346.28 563.517 5346.72 563.526
 5346.85 563.528 5347.16 563.53 5347.71 563.535 5350.16 563.565 5352.11 563.597
 5366.18 563.854 5366.25 563.964 5367.73 563.965 5370.45 564 5373.71 564.33
 5374.88 564.71 5376.21 564.848 5378.89 565 5380.65 565.296 5385.17 565.488

81011_Buffal oCreekS83_ABW.rep

5385.32	565.984	5385.9	566	5392.78	566.08	5392.82	566.996	5392.82	567
5394.02	567.165	5394.67	567.25	5394.96	567.287	5395.16	567.311	5395.63	567.366
5397.36	567.559	5398.94	567.727	5399.87	567.832	5400.17	567.864	5401.4	568
5402.04	568.069	5404.15	568.294	5404.93	568.379	5406.36	568.532	5408.01	568.711
5409.05	568.821	5414.6	569.417	5416.73	569.643	5418.73	569.859	5420.99	570.099
5421.3	570.133	5427.82	570.829	5427.96	570.845	5428.06	570.855	5435.76	571.678
5435.92	571.694	5435.98	571.701	5443.06	572.456	5443.81	572.537	5443.89	572.546
5448.71	573.06	5448.96	573.086	5451.07	573.312	5452.68	573.484	5452.8	573.498
5458.87	574.142	5466.88	575	5467.14	575.015	5467.29	575.024	5467.37	575.026
5467.54	575.029	5467.59	575.029	5467.68	575.028	5467.78	575.031	5467.84	575.034
5467.91	575.038	5468.04	575.045	5485.83	576	5491.94	576.164	5493.31	576.205
5500.13	576.392	5503.18	576.487	5507.15	576.598	5511.42	576.734	5514.21	576.814
5518.58	576.958	5518.72	576.962	5518.77	576.964	5519.86	577	5551.82	577.882
5555.54	577.99								

Manning's n Values			num=	3	
Sta	n Val	Sta	n Val	Sta	n Val
4815	.1	4958.76	.045	5049.09	.1

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	4958.76	5049.09		880	960	1040		.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1
RS: 5

INPUT

Description:

Station Elevation Data										num=	15
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	584	35	580	70	576	109	572	141	568		
158	565.8	170	563.8	540	560	550	552.4	585	548.9		
640	552	650	560	745	564	775	580	815	600		

Manning's n Values			num=	3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.1	540	.045	650	.1

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	540	650		840	840	820		.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1
RS: 4.4

INPUT

Description:

Station Elevation Data										num=	23
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
0	580	45	576	80	572	111	568	138	564		
183	560	540	560	655	560	670	556	690	552		
699	548.5	727	548.5	730	550.6	742	552	755	556		
775	560	825	560	873	560	1052	564	1085	568		
1110	572	1121	576	1192	580						

Manning's n Values			num=	3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.1	655	.045	755	.1

Bank Sta: Left 655 Right 755 Lengths: Left 450 Channel 450 Right 440 Coeff Contr. .1 Expan. .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 4.3

INPUT

Description:

Station		Elevation		Data		num= 19			
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	576	60	572	105	568	335	564	430	560
639.9	556	640	556	1255	552	1270	548.3	1320	548.3
1330	552	1340	556	1350	560	1410	560	1425	564
1435	568	1445	572	1450	576	1455	580		

Manning's n		Values		num= 3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.1	1255	.045	1330	.1

Bank Sta: Left 1255 Right 1330 Lengths: Left 1200 Channel 1200 Right 1200 Coeff Contr. .1 Expan. .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 4

INPUT

Description:

Station		Elevation		Data num= 28					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	576	20	572	135	568	160	564	555	560
715	556	730	556	740	560	770	560	805	556
855	555	965	555	1020	555.5	1110	556	1160	557
1210	556	1235	552	1260	548	1300	547.5	1345	552
1355	556	1854	558.5	2140	560	2390	564	2415	568
2450	572	2470	576	2490	580				

Manning's n		Values		num= 5			
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	555	.1	1210	.045	1355	.1
						1854	.1

Bank Sta: Left 1210 Right 1355 Lengths: Left 450 Channel 450 Right 440 Coeff Contr. .1 Expan. .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.8

INPUT

Description:

Station		Elevation		Data num= 24					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	568	80	564	120	560	143	556	290	552
385	552	444	552	490	556	540	556	570	552
584	548	591	547.2	628	547.2	635	548	642	552
660	556	735	556	920	556	942	560	970	564

81011_BuffaloCreekS83_ABW.rep

1000 568 1060 572 1095 576 1130 580

Manning's n Values num= 5
 Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
 0 .1 120 .1 570 .045 642 .1 942 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 570 642 510 510 520 .1 .3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 3.7

INPUT

Description:
 Station Elevation Data num= 15
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 568 10 564 30 560 50 556 210 552
 450 556 500 552 520 548 523 547 568 547
 570 548 580 552 600 556 695 560 765 580

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 450 .045 600 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 450 600 530 600 720 .1 .3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 3.4

INPUT

Description:
 Station Elevation Data num= 17
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 568 12 564 32 560 49 556 80 552
 160 550 250 547 320 547 330 548 341 552
 790 556 1035 560 1050 564 1068 568 1078 572
 1089 576 1100 580

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 80 .045 341 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 80 341 600 510 400 .1 .3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 3.3

INPUT

Description:
 Station Elevation Data num= 13
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 572 60 568 95 564 110 560 120 556

81011_BuffaloCreekS83_ABW.rep

135	552	145	547	210	547	230	552	750	554
1110	556	1150	560	1335	580				

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 135 .045 230 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 135 230 580 570 560 .1 .3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 3

INPUT

Description:

Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	572.6	16	572	73	568	97	564	110	560
163	557.4	248	557.7	284	556	308	552	321	556
397	557.3	421	556	441	549.8	477	547.8	503	545.1
529	548	531	558.5	604	557.9	680	556.8	830	556.6
927	556.2	1015	556.2	1116	557.1	1192	560	1292	564.7
1370	570	1420	580						

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 421 .045 604 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 421 604 450 440 400 .1 .3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 2.1

INPUT

Description:

Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	563	51	564	75	560	139	556	165	554
212	552.9	239	545.3	243	544.5	296	544.5	321	552
810	556	1180	560	1560	564				

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 212 .045 321 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 212 321 580 850 820 .1 .3

CROSS SECTION

RIVER: RIVER-1
 REACH: Reach-1 RS: 2

INPUT

Description:

81011_BuffaloCreekS83_ABW.rep

Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	569	32	568	80	564	244	560	300	556.5
368	556	448	554	516	556	600	556.2	876	556.2
1020	556.6	1120	556.9	1130	550	1150	544	1200	544
1260	550	1270	552	1280	554.8	1293	555.8	1373	555.8
1453	556	1521	557.1	1629	558.5	1749	559	1845	559
1925	560	2045	564	2450	566	2508	581		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	1120	.045	1293	.1

Bank Sta: Left 1120 Right 1293 Lengths: Left 400 Channel 1200 Right 1240 Coeff Contr. .1 Expan. .3

CROSS SECTION

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

INPUT

Description:

Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	600	40	590	80	580	120	570	247	563
280	560	388	556.2	505	559.2	646	557.6	678	556
690	552	744	543	887	543	954	545.2	992	548
1044	552	1092	556	1136	559	1241	559	1281	600
1345	560	1373	559	1473	556	1666	556	1803	556.6
1936	557.3	2500	564	2600	587				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	678	.045	1092	.1

Bank Sta: Left 678 Right 1092 Lengths: Left 0 Channel 0 Right 0 Coeff Contr. .1 Expan. .3

SUMMARY OF MANNING'S N VALUES

River: RIVER-1

Reach	River Sta.	n1	n2	n3	n4	n5
Reach-1	17	.1	.1	.045	.1	
Reach-1	16	.1	.1	.045	.1	
Reach-1	15	.1	.1	.045	.1	
Reach-1	14	.1	.1	.045	.1	
Reach-1	13	.1	.1	.045	.1	
Reach-1	12.1	.1	.1	.045	.1	

		81011_BuffaloCreekS83_ABW.rep				
Reach-1	12	.1	.1	.045	.1	
Reach-1	11.3	.1	.1	.045	.1	
Reach-1	11.2	.1	.045	.1		
Reach-1	10.1	.1	.1	.045	.1	
Reach-1	10	.1	.045	.1		
Reach-1	9.3	.1	.045	.1		
Reach-1	9.2	.1	.045	.1	.1	
Reach-1	9.1	.1	.045	.1	.1	
Reach-1	9	.1	.045	.1	.1	
Reach-1	8	.1	.045	.1	.1	
Reach-1	7	.1	.045	.1		
Reach-1	6.5	.1	.045	.1		
Reach-1	6.4	.1	.045	.1		
Reach-1	6.3	.1	.045	.1		
Reach-1	6.25					
Reach-1	6.2		Bridge	.1	.045	.1
Reach-1	6.1	.1	.045	.1		
Reach-1	5	.1	.045	.1		
Reach-1	4.4	.1	.045	.1		
Reach-1	4.3	.1	.045	.1		
Reach-1	4	.1	.1	.045	.1	.1
Reach-1	3.8	.1	.1	.045	.1	.1
Reach-1	3.7	.1	.045	.1		
Reach-1	3.4	.1	.045	.1		
Reach-1	3.3	.1	.045	.1		
Reach-1	3	.1	.045	.1		
Reach-1	2.1	.1	.045	.1		
Reach-1	2	.1	.045	.1		
Reach-1	1	.1	.045	.1		

SUMMARY OF REACH LENGTHS

River: RIVER-1

Reach	River Sta.	Left	Channel	Right
Reach-1	17	630	550	470
Reach-1	16	1140	1200	1000
Reach-1	15	480	580	680
Reach-1	14	1030	1000	910
Reach-1	13	940	910	890
Reach-1	12.1	810	890	970
Reach-1	12	450	500	550
Reach-1	11.3	110	110	110
Reach-1	11.2	120	100	80
Reach-1	10.1	470	400	340
Reach-1	10	600	1040	1070
Reach-1	9.3	540	530	510
Reach-1	9.2	130	120	110
Reach-1	9.1	52	52	52
Reach-1	9	650	640	640
Reach-1	8	650	640	640
Reach-1	7	9	9	9
Reach-1	6.5	11	11	11
Reach-1	6.4	70	70	70
Reach-1	6.3	120	120	120
Reach-1	6.25	Bridge		
Reach-1	6.2	80	80	80
Reach-1	6.1	880	960	1040
Reach-1	5	840	840	820
Reach-1	4.4	450	450	440
Reach-1	4.3	1200	1200	1200
Reach-1	4	450	450	440
Reach-1	3.8	510	510	520
Reach-1	3.7	530	600	720
Reach-1	3.4	600	510	400
Reach-1	3.3	580	570	560
Reach-1	3	450	440	400
Reach-1	2.1	580	850	820
Reach-1	2	400	1200	1240
Reach-1	1	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: RIVER-1

Reach	River Sta.	Contr.	Expan.
Reach-1	17	.1	.3
Reach-1	16	.1	.3
Reach-1	15	.1	.3
Reach-1	14	.1	.3
Reach-1	13	.1	.3
Reach-1	12.1	.1	.3
Reach-1	12	.1	.3
Reach-1	11.3	.1	.3
Reach-1	11.2	.1	.3
Reach-1	10.1	.1	.3
Reach-1	10	.1	.3
Reach-1	9.3	.1	.3
Reach-1	9.2	.1	.3

81011_BuffaloCreekS83_ABW.rep

Reach-1	9.1	.1	.3
Reach-1	9	.1	.3
Reach-1	8	.1	.3
Reach-1	7	.1	.3
Reach-1	6.5	.1	.3
Reach-1	6.4	.1	.3
Reach-1	6.3	.3	.5
Reach-1	6.25	Bridge	
Reach-1	6.2	.3	.5
Reach-1	6.1	.1	.3
Reach-1	5	.1	.3
Reach-1	4.4	.1	.3
Reach-1	4.3	.1	.3
Reach-1	4	.1	.3
Reach-1	3.8	.1	.3
Reach-1	3.7	.1	.3
Reach-1	3.4	.1	.3
Reach-1	3.3	.1	.3
Reach-1	3	.1	.3
Reach-1	2.1	.1	.3
Reach-1	2	.1	.3
Reach-1	1	.1	.3

1.5.4 Hydrology Data Sheet for Bridges

MEMORANDUM TO:		Submittal Date: _____	
		Supersedes Submittal Date: _____	
RPG ROAD DESIGN TEAM LEADER:		<u>Charlene Cassidy (LPA)</u>	
RPG STRUCTURAL ENGINEER:		<u>Benjamin Shealy (AECOM)</u>	
From:	Hydraulic Design Squad / Engineer <u>AECOM</u>		
Subject:	Hydrology Data for Bridge over <u>Buffalo Creek</u>		
County:	<u>CHEROKEE</u>	Rd/Rte:	<u>S-11-83</u>
Structure No:	_____	Const. Pin:	<u>40188</u>
Bridge Data:			
Bridge Length:	<u>390</u> ft.	Bridge Width:	<u>48</u> ft.
Beg. Station:	<u>123+29</u>	Ending Station:	<u>127+19</u>
Pier/Pile Type:	<u>Circular Pier</u>	Pier/Pipe Width:	<u>4</u> ft.
Skew Angle:	<u>0</u> °		
Bridge Span Configuration:	<u>5 Spans, @ 60', 88', 66', 88' and 88'</u>		
Bridge Span Type:	<u>Flat Concrete Slab</u>		
Min. F.G. Elev.:	<u>590.0</u> ft.	Min. Low Steel Elev.	<u>585.5</u> ft.
Min. Bottom Interior Bent Cap Elev. (For Tidal Bridges Only) _____ ft.			
Br. End Fill Slope:	<u>2:1</u>	Riprap Req'd:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> To Elevation: _____ ft.
Comments: _____ _____ _____ _____			
Historic High Water Information:			
Elevation of High Water:	_____ ft.	Discharge: (if available)	_____ ft.
Date of occurrence:	_____	Source of Data:	_____

Design High Water and Backwater Information: (Show high water elevations including backwater on plans)		
If 'Secondary Road' provide 25-yr high water elevation including backwater:	<u>NA</u>	ft.
If 'Primary Road' provide 50-yr high water elevation including backwater:	<u>567.32</u>	ft.
For all roads provide 100-yr high water elevation including backwater:	<u>567.81</u>	ft.
Hydrology Data for Tidal Bridges: (Only complete this section if tidal flow is the dominant flow) (show on plans)		
Mean Higher high tide elevation	= _____	ft.
Mean Lower low tide elevation	= _____	ft.
10-year tidal surge height	= _____	ft. (includes wave height)
100-year stillwater height	= _____	ft.
500-year stillwater height	= _____	ft.
Maximum vel. within bridge	=	100-yr. tidal surge velocity: _____ fps 500-yr. tidal surge velocity: _____ fps
Hydrology Data for Riverine Bridges: (Only complete this section if riverine flow is the dominant flow) (show on plans)		
D.A. =	<u>147</u>	sq. mi. (or acres)
Q _{Design} =	<u>11500</u>	cfs
Vel. Design =	<u>10.08</u>	ft./sec.
Design Headwater Elevation =	<u>567.32</u>	ft.
Including _____		ft. backwater
Q ₁₀₀ =	<u>13000</u>	cfs
Vel ₁₀₀ =	<u>10.07</u>	ft/sec
100 Year Headwater Elev. =	<u>567.81</u>	ft.
Including _____		ft. backwater
Overtopping Flood: Overtopping discharge greater than the 500-year		
Q = <u>> 500-year Storm</u> cfs	Probability =	<u>< 0.002</u> %
cc: Environmental Engineer <u>Lou Raymond (AECOM)</u>		
<small>Note: Probability may be determined by plotting the 2-, 10-, 25-, 50-, 100-, and 500-year discharges on Gumble paper and reading the probability corresponding to the overtopping discharge. For discharges greater than 500-year, the probability should be stated as less than (<) 0.002. Profiles of the computed scour for the 100-year and 500-year floods should be shown on the bridge plan and profile sheet. The shape of these profiles should be based on the methods described in the HEC-18. A plot of the 100- and 500-year scour lines on a bridge plan and profile sheet must be provided.</small>		

1.6.1 Title Sheet

**HYDRAULIC DESIGN AND RISK ASSESSMENT FOR
BRIDGE / BRIDGE REPLACEMENT OVER**

(enter stream name here)

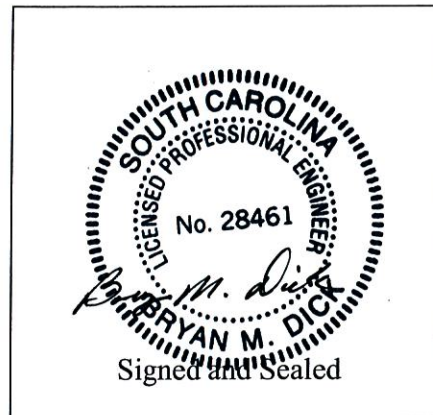
ROUTE / ROAD NUMBER: S-83
FILE NO.: 11.040188
PROJECT NO.: BEN11 (031)
PIN: 40188
COUNTY NAME: CHEROKEE
DATE: 09 / 07 / 2011

PREPARED BY: ANDREW WILSON, EI
CHECKED BY: BRYAN M. DICK, PE, PH

Hydraulic Design Reference for
this study is the :

2009

Edition of SCDOT's
"Requirements for Hydraulic
Design Studies."



1.6.2 Comparative Data Sheet

COMPARATIVE DATA			
PROJECT DESCRIPTION			
County:	<u>CHEROKEE</u>	Rt. / Rd. No.:	<u>5-83</u>
Stream:	<u>BUFFALO CREEK</u>	File No:	<u>11.040188</u>
Project No:		PIN:	<u>40188</u>
Charge Code:		Road Squad:	
Project Engineer:	<u>BRYAN M. DICK, PE, PH</u>		

By: <u>ANDREW WILSON, EI</u>	Date: <u>9/7/2011</u>
Checked By: <u>BRYAN DICK, PE, PH</u>	Date: _____

	ROUTE/ROAD NO.'s				
	EXISTING 5-83	PROPOSED 5-83	S-94-215		
DISTANCE FROM NEW BR. (mi.)	0	0			
DRAINAGE AREA (sq. mi.)	147	147	10.9		
ZONE	A6	A6-PIEDMONT	PIEDMONT		
Q ₁₀ (cfs)	8000	8000	1740		
Q ₂₅ (cfs)	—	—	2280		
Q ₅₀ (cfs)	11500	11500	2770		
Q ₁₀₀ (cfs)	13000	13000	3210		
Q ₅₀₀ (cfs)	16400	16400	3640		
BRIDGE LENGTH (ft.)	372.5'	390'	120'		
AVG. FINISHED GRADE (ft.)	585'	595'	408		
OPENING FURNISHED (sq.ft.)	6268.84	8453.63	470		
VELOCITY (ft./sec)	9.4	10.07	6.8		
HIGHWATER ELEV. (ft.)	567.1	—	399.7		
HIGHWATER DATE	—	—	—		
HIGHWATER DEPTH (ft.)	—	—	8.5		
OBSERVED WATER ELEV. (ft.)		—	391.7		
OBSERVED WATER DATE	09/02/11	—	02/07/11		
OBSERVED WATER DEPTH (ft.)	2-3'	—	0.5		
FILE/DOCKET/PROJECT NO.	—	—	—		
DATUM/DATUM TIE	NAVD88/NAVD83	NAVD88/NAVD83	NAVD88/NAVD83		

1.6.3 Site Inspection Form

SITE INSPECTION FORM

PROJECT DESCRIPTION

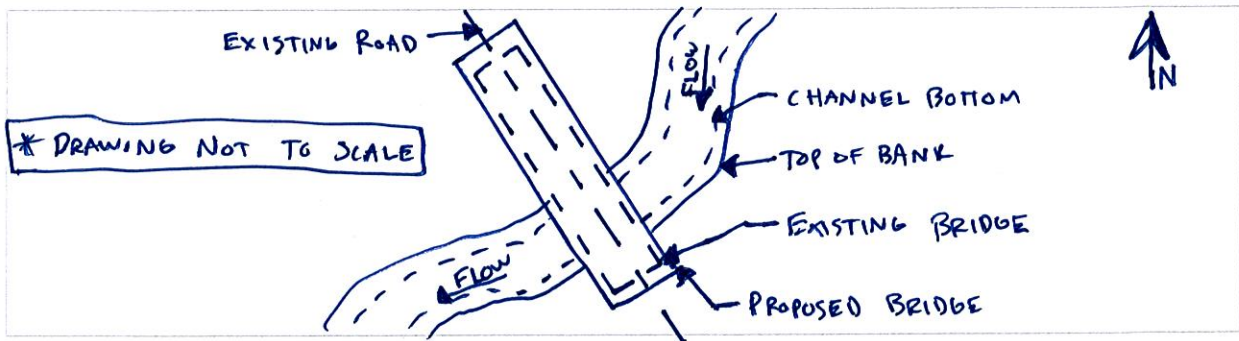
County: CHEROKEE Rt. / Rd. No.: 5-83
 Stream: BUFFALO CREEK File No: 11.040188
 Project No: _____ PIN: 40188
 By: ANDREW WILSON Date: 09 / 02 / 2011

Note: All references to left and right are looking in the direction of flow.

EXISTING BRIDGE

Length: 372.5 ft. Width: 48 ft. Max. Span Length: 61 ft.
 Alignment: Tangent Curved
 Bridge skewed? Yes No Angle: _____
 End Abutment Type: SPILL THROUGH WITH RIP RAP
 Riprap on Fills? Yes No Condition: POOR, SOME ERODING ON FILL SLOPES
 Superstructure Type: REINFORCED CONCRETE AND STRUCTURAL STEEL BEAMS
 Substructure Type: CONCRETE AND TIMBER PILING WITH OUTSIDE STEEL PILING
 Utilities Present? Yes No Describe: POWER/TELEPHONE
OVERHEAD LINES DOWNSTREAM SIDE OF BRIDGE.
 Debris Accumulations on Bridge: Percent Blocked (Horizontal): 0 %
 Percent Blocked (Vertical): 0 %
 Hydraulic Problems? Yes No Describe: _____

Draw Sketch of Bridge and Stream Below: (Show north arrow and direction of flow)



1.6.3.1 Site Characteristics Form

SITE CHARACTERISTICS FORM			
General Topography	PIEDMONT, MODERATE SLOPES, NARROW FLOODPLAIN		
Stream Type (circle one)			
Straight	Braided	Anabranched	Meandering
Are channel banks stable?	Yes	<input checked="" type="checkbox"/>	No <input type="checkbox"/>
If No, describe:	N/A		
Soil Type	SANDY CHANNEL		
Exposed Rock?	Yes	<input type="checkbox"/>	No <input checked="" type="checkbox"/>
If Yes, give description and location:	N/A		
Describe potential for debris:	VERY LITTLE DEBRIS WAS OBSERVED IN CHANNEL / NEAR BRIDGE		
Give description and location of any structures or other property that could be damaged by backwater:	NO INSURABLE STRUCTURES VISIBLE IN FLOOD PLAIN		
Describe any other features that might affect or be affected by the hydraulic performance of the proposed bridge:	NONE		

1.6.3.2 Manning's "n" Values – for Channels

MANNING'S "n" VALUES – FOR CHANNELS							
$n = [(n_b + n_1 + n_2 + n_3 + n_4) m]$							
Channel	n_b – Base n for soil			Channel	n_1 – Degree of Irregularity		
Earth	.020			Smooth	.000		
Rock Cut	.025			Minor	.001-.005		
Fine Gravel	.024			Moderate	.006-.010		
Course Gravel	.028			Severe	.011-.020		
	n_2 – Variations of Channel Cross Sections				n_3 – Relative Effect of Obstructions		
Gradual	.000			Negligible	.000-.004		
Alternating	.001-.005			Minor	.010-.015		
Occasionally	.010-.015			Appreciable	.020-.030		
Frequently				Severe	.040-.060		
	n_4 – Vegetation				m – Degree of Meandering		
Low	.002-.010			Minor	1.00		
Medium	.010-.025			Appreciable	1.15		
High	.025-.050			Severe	1.30		
Very High	.050-.100						
SITE OBSERVATIONS FOR CHANNELS							
Channel Depth	n_b	n_1	n_2	n_3	n_4	m	Computed n
SURFACE / BED	.022	.003	.003	.002	.050	1.15	0.092

1.6.4 Risk Assessment

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION FLOODPLAIN AND RISK ASSESSMENT

Regulation 23 CFR 650 shall apply to all encroachment and to all actions which affect base floodplains, except for repairs made with emergency funds. (See HEC-17) Note: These studies shall be summarized in the environmental review document prepared pursuant to 23 CFR 771.

Project Description: PROPOSED HIGHWAY BRIDGE REPLACEMENT.
REPLACING THE EXISTING STRUCTURALLY DEFICIENT BRIDGE.

A. Narrative Describing Purpose and Need for Project:

a. Relevant Project History: EXISTING BRIDGE IS STRUCTURALLY DEFICIENT AND NEEDS TO BE REPLACED

b. Project Location (attach Location and Project Map):

S-11-83 JUST OFF I-85 OUTSIDE OF BLACKSBURG SOUTH CAROLINA.

c. Major Issues and Concerns: NONE

B. Are there any floodplain(s) regulated by FEMA located in the project area?

Yes

No

C. Will fill be placed within a 100-year floodplain?

Yes

No

D. Will the existing profile grade be raised within the floodplain?

Yes

No

E. If applicable, please discuss the practicability of alternatives to any longitudinal encroachments.

NA, REPLACEMENT BRIDGE

F. Please include a discussion of the following: commensurate with the significance of the risk or environmental impact for all alternatives containing encroachments and those actions which would support base floodplain development:

i. What are the flood-related risks associated with implementation of the action?

NONE,

ii. What are the impacts on the natural and beneficial floodplain values?

NONE, REPLACEMENT BRIDGE.

iii. Will the bridge entice people to build in floodplains?

NO, REPLACEMENT BRIDGE.

iv. What measures were used to minimize floodplain impacts associated with the action?

NEW BRIDGE IS DESIGN WITH A LARGER HYDRAULIC OPENING.

v. Were any measures used to restore and preserve the natural and beneficial floodplain values impacted by the action?

NA

G. Please discuss the practicability of alternatives to any significant encroachments or to support of incompatible floodplain development.

NA

H. List local, state, and federal water resources and floodplain management agencies consulted to determine if the proposed highway action is consistent with existing watershed and floodplain management programs. Describe any information obtained on development and proposed actions in the affected area. Please include agency documentation.

NA REPLACEMENT BRIDGE,

I. BACKWATER DAMAGE FORM

Major flood damage applies to shopping centers, hospitals, industrial facilities, residential areas, schools, farming operations, etc.

1. Does the maximum flood cause major damage to upstream property?

Yes - (Go to 2.)

No - (Go to 3.)

2. Would this damage occur if the road were not there?

Yes - (Go to 3.)

No - (Perform a limited Least Total Expected Cost (LTEC) (HEC-17) analysis to see if the bridge opening should be increased and/or grades raised to minimize the damage potential. Go to II.)

3. Was this a bridge replacement? If so, was the bridge opening increased enough to increase the discharge passed through the bridge?

Yes - (Go to 4.)

No - (Go to II.)

4. Does the increased flow cause major damage downstream?

Yes - (Perform a limited LTEC analysis to determine if the bridge opening should be reduced, the floodway redefined, and flood easements purchased upstream or if flood easements should be purchased downstream. Go to II.)

No - (Go to II)

II. TRAFFIC RELATED LOSSES

1. Is the overtopping flood greater than the 100-year flood?

Yes - (Go to III.)

No - (Go to 2.)

2. Does the ADT exceed 50 vehicles per day?

Yes - (Go to 3.)

No - (Go to III.)

3. Does the duration of road closure in days, multiplied by the difference in length, in miles between the normal route and the detour, exceed 20?

Yes - (Go to 4.)

No - (Go to III.)

4. Does the annual risk cost for traffic related costs exceed 10% of the estimated annual capital costs?

Yes - (Perform a limited LTEC analysis to compare the cost to raise the grades and if necessary increase the bridge length with the traffic related costs. Go to III.)

No - (Go to III.)

III. ROADWAY AND/OR STRUCTURE REPAIR COST

1. Is the overtopping flood less than the 100-year flood?

Yes - (Go to 2)

No - (Go to 3)

2. Is the overtopping flood less than 0.5 foot over the low point on the roadway and duration no more than 1.0 hour?

Yes - (Go to 3)

No - (perform a limited LTEC analysis to determine if the grades should be raised and/or the bridge opening increased or that the repair cost for embankment erosion are less significant. Traffic cost should be included in this evaluation.)

3. Is the proposed bridge or culvert structure subject to potential damage due to debris?

Yes - (Go to 4)

No (Go to 5)

4. Perform a limited LTEC analysis to determine if the structure should be modified. (Go to 5.)

5. The risk assessment has determined the most economical design for the crossing within the design constraints.

Revised 3/16/09

Page 5 of 5