

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

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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 Whelchel 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, P.H.
(Signature)

MANAGER - WATER/NATURAL RESOURCES
(Title)

701 Corporate Center Dr., Ste 475
(Address)

Raleigh, NC 27670
(City/State/Zip)

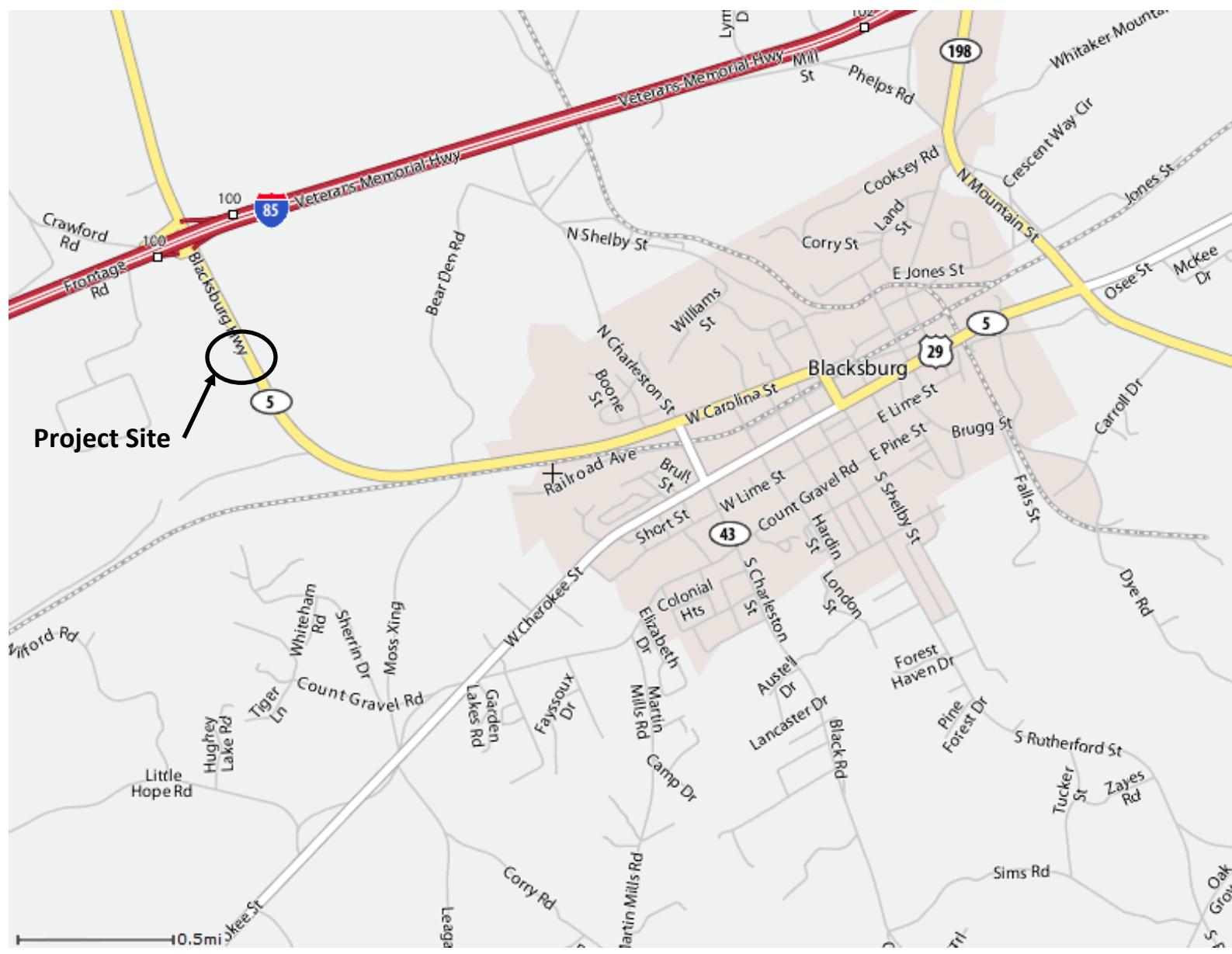


Buffalo Creek
100- Year Water Surface Elevations Brief Summary

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

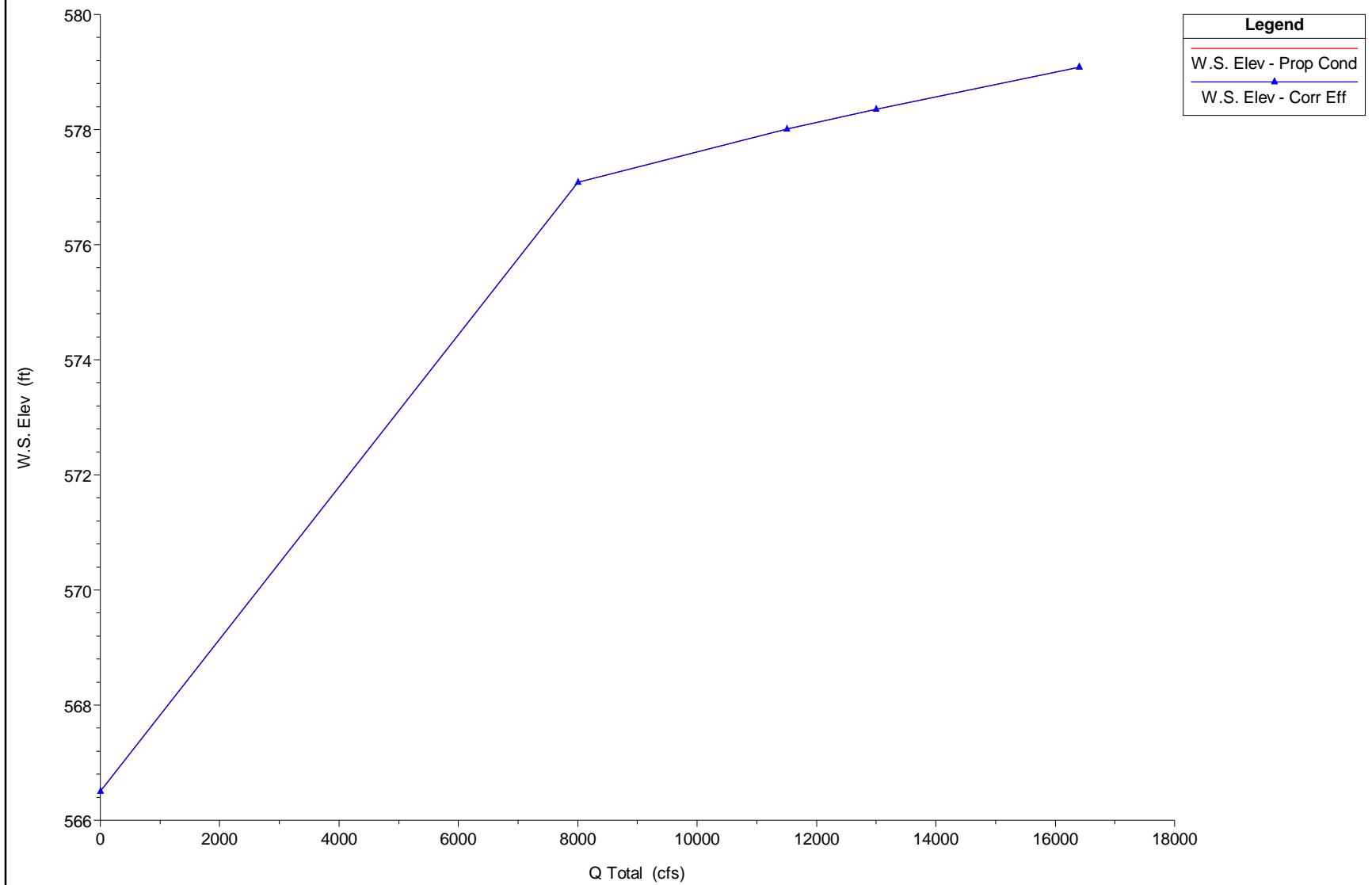
BRIDGE REPLACEMENT OVER THE BUFFALO CREEK
STATE OF SOUTH CAROLINA
SECONDARY ROAD 83 BLACKSBURG HIGHWAY

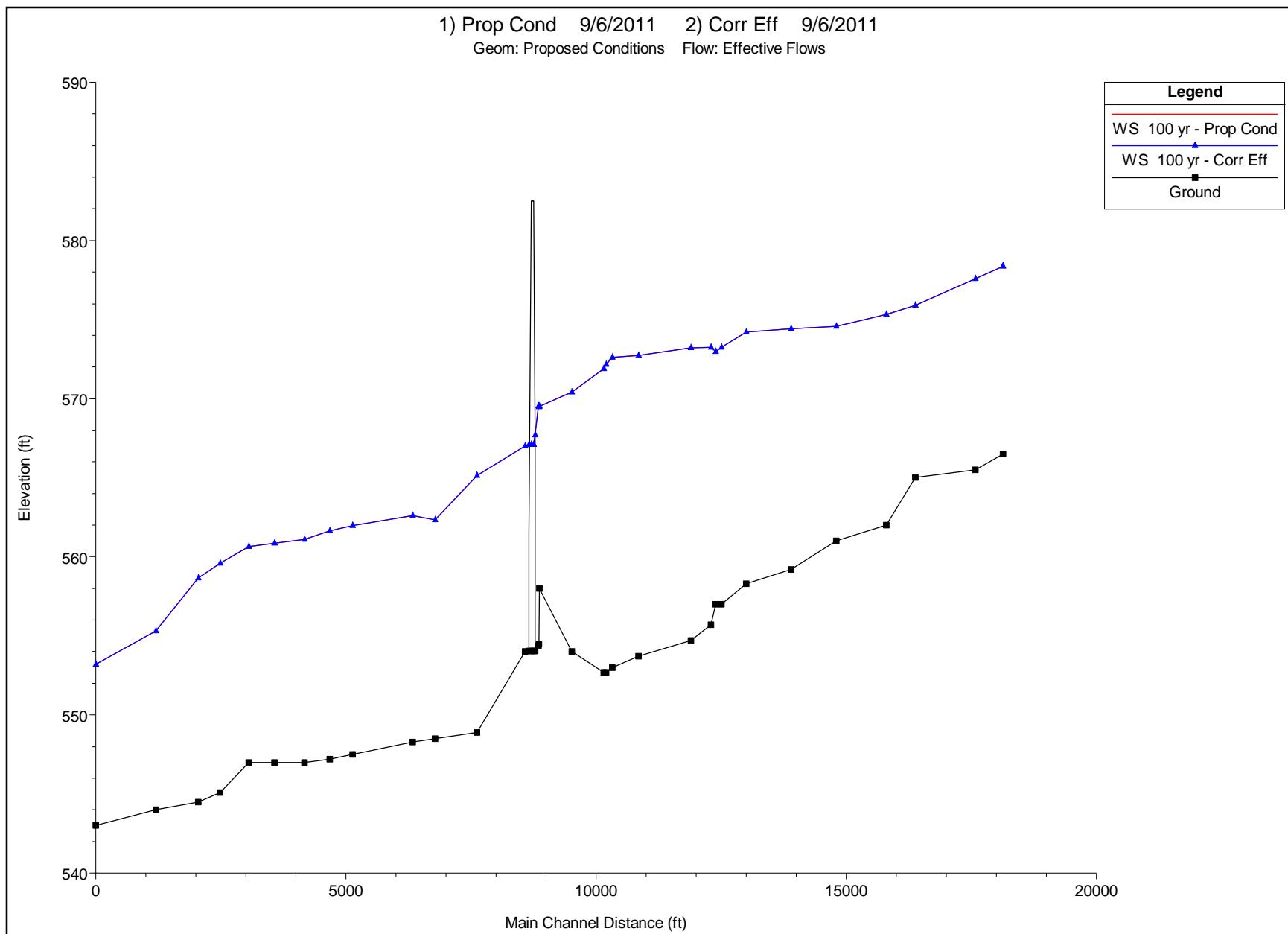


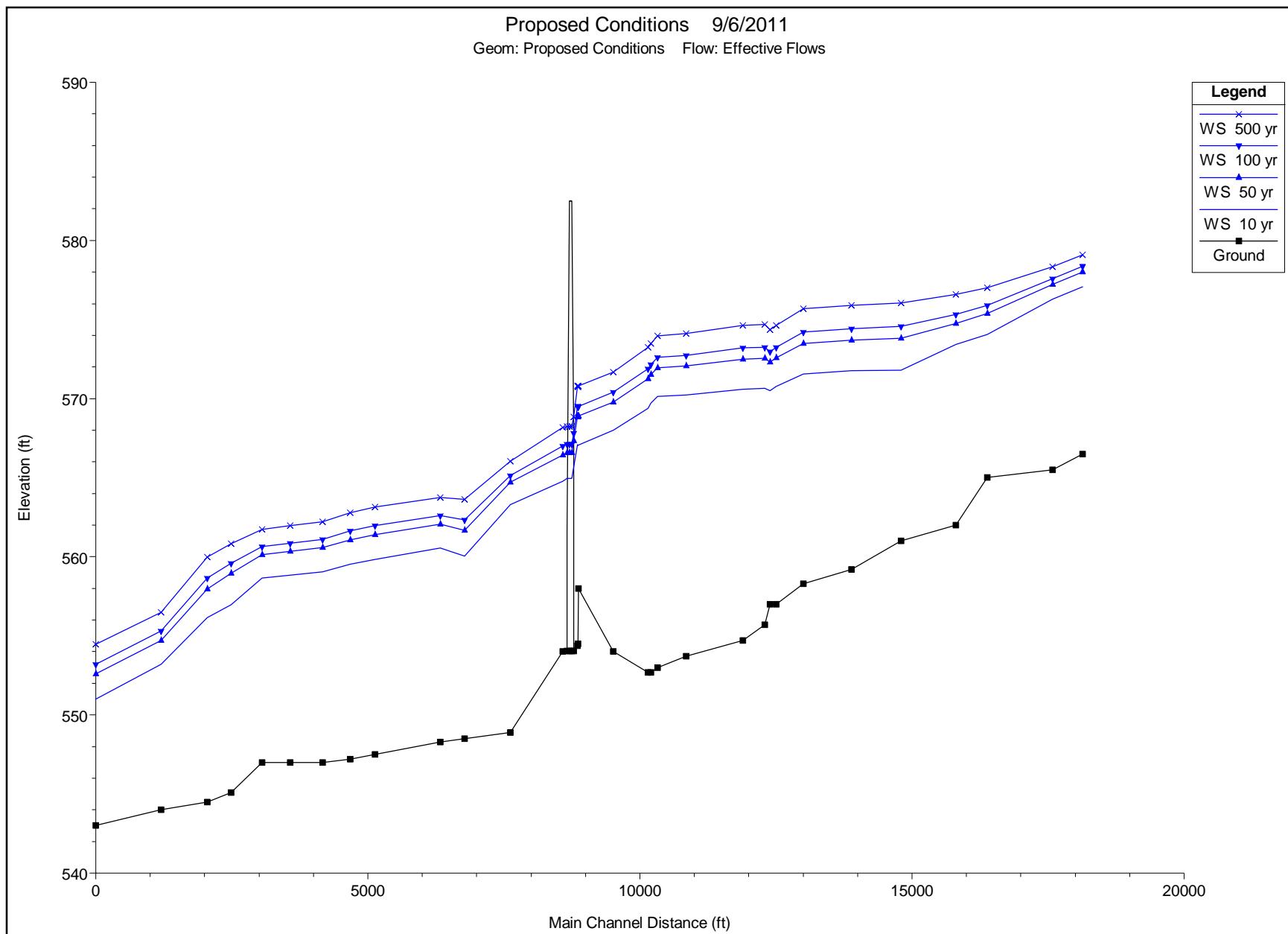




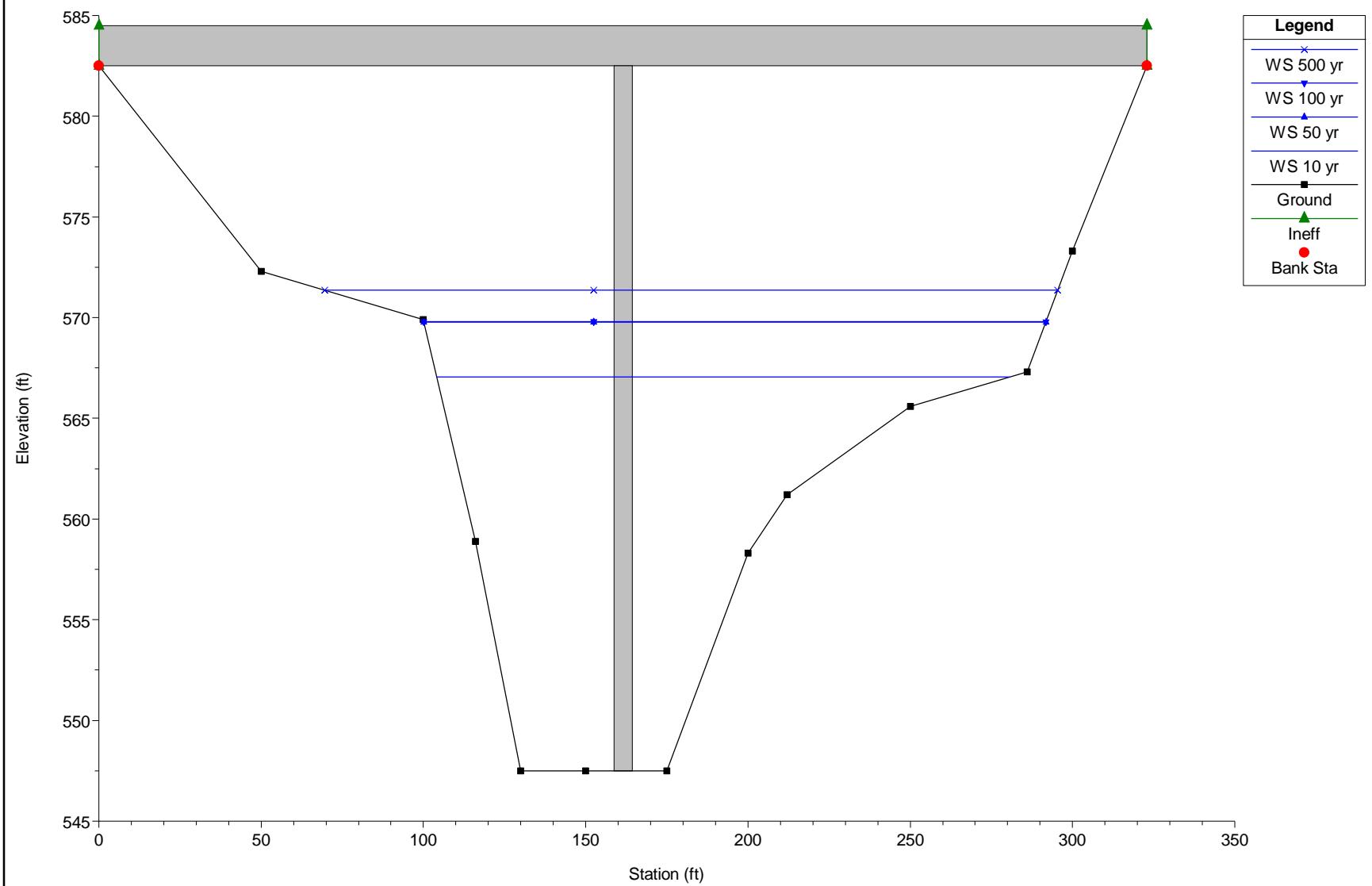
1) Prop Cond 9/6/2011 2) Corr Eff 9/6/2011
Geom: Proposed Conditions Flow: Effective Flows

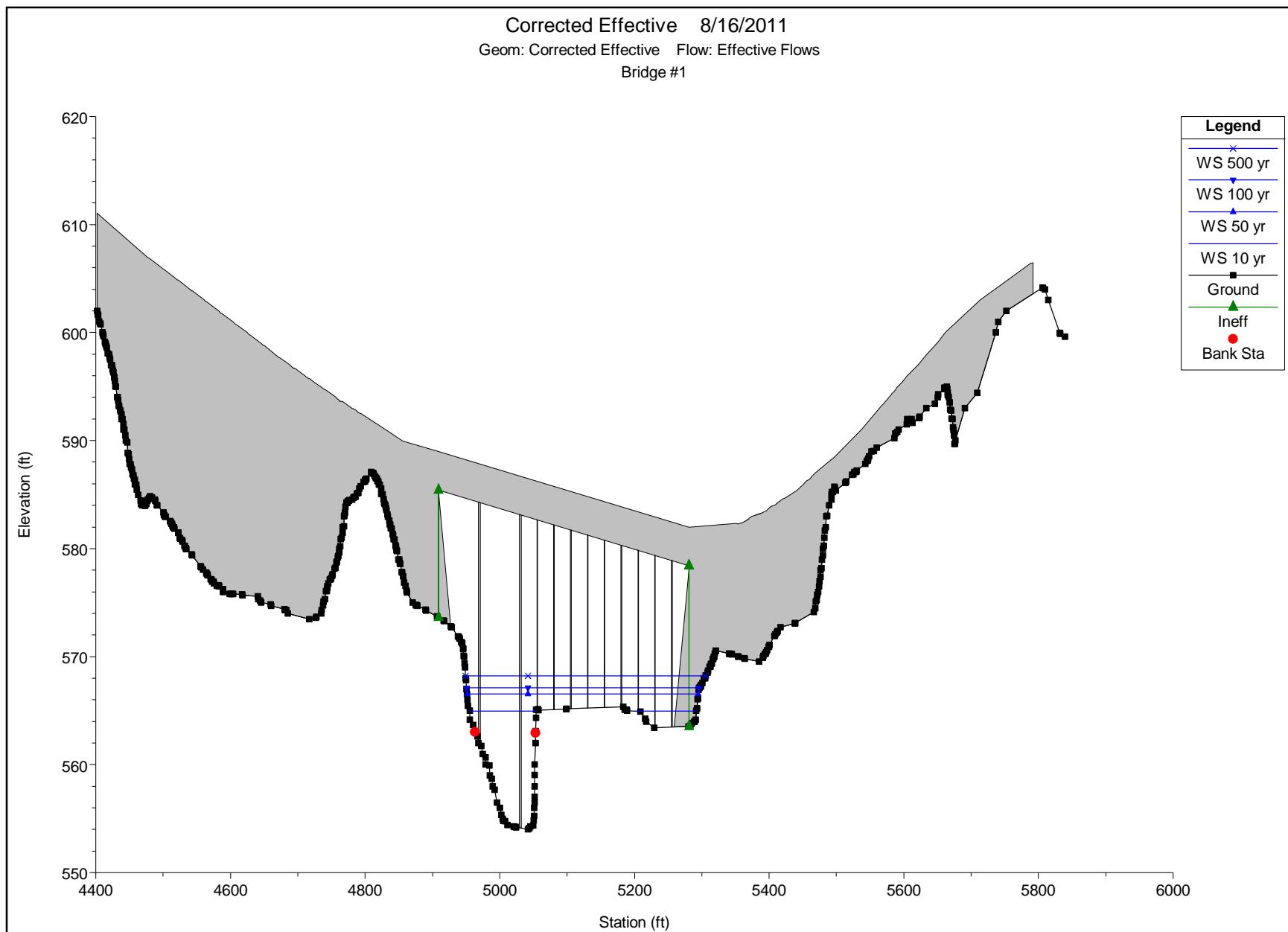


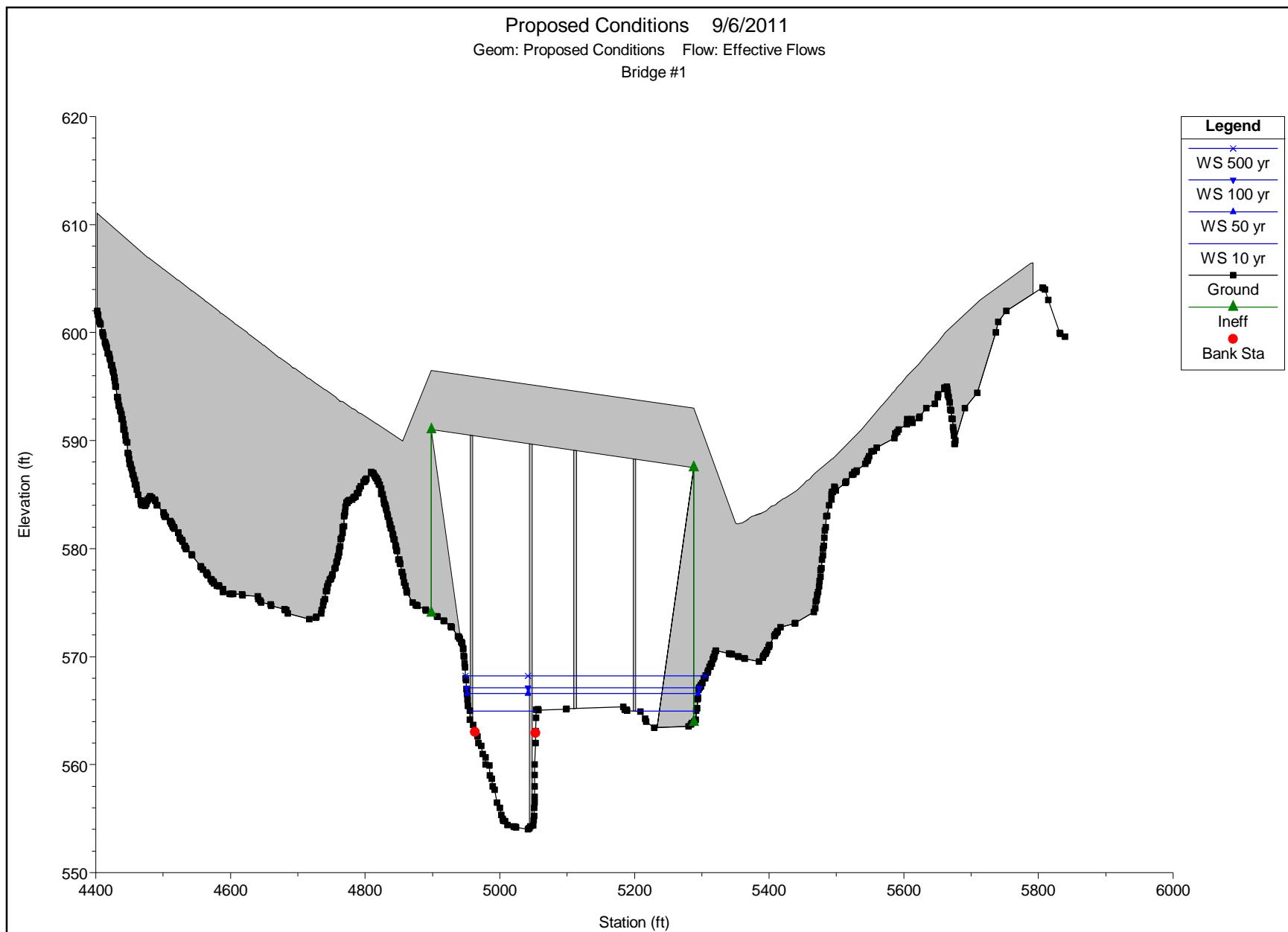




Duplicate Effective 8/16/2011
Geom: Imported Geom 11 Flow: Effective Flows
Bridge #1







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

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	17	10 yr	Prop Cond	8000.00	566.50	577.08		577.40	0.001434	5.54	3352.43	1305.19	0.32
Reach-1	17	10 yr	Corr Eff	8000.00	566.50	577.08		577.40	0.001434	5.54	3352.43	1305.19	0.32
Reach-1	17	10 yr	Duplicate Eff.	8000.00	566.50	578.60		578.90	0.001847	5.20	5626.56	1626.35	0.28
Reach-1	17	50 yr	Prop Cond	11500.00	566.50	578.01		578.37	0.001624	6.27	4703.78	1541.89	0.34
Reach-1	17	50 yr	Corr Eff	11500.00	566.50	578.01		578.37	0.001624	6.27	4703.69	1541.88	0.34
Reach-1	17	50 yr	Duplicate Eff.	11500.00	566.50	580.87		581.25	0.001874	5.94	4365.64	656.29	0.29
Reach-1	17	100 yr	Prop Cond	13000.00	566.50	578.36		578.73	0.001678	6.52	5242.28	1591.72	0.35
Reach-1	17	100 yr	Corr Eff	13000.00	566.50	578.36		578.73	0.001678	6.52	5242.28	1591.72	0.35
Reach-1	17	100 yr	Duplicate Eff.	13000.00	566.50	580.90		581.21	0.001752	5.76	9703.47	1837.20	0.28
Reach-1	17	500 yr	Prop Cond	16400.00	566.50	579.09		579.47	0.001741	6.93	6440.66	1697.38	0.36
Reach-1	17	500 yr	Corr Eff	16400.00	566.50	579.09		579.47	0.001741	6.93	6440.97	1697.41	0.36
Reach-1	17	500 yr	Duplicate Eff.	16400.00	566.50	582.43		582.71	0.001538	5.80	12518.61	1849.42	0.27
Reach-1	16	10 yr	Prop Cond	8000.00	565.50	576.27		576.59	0.001399	5.71	4259.67	2208.62	0.32
Reach-1	16	10 yr	Corr Eff	8000.00	565.50	576.27		576.59	0.001399	5.71	4259.67	2208.62	0.32
Reach-1	16	10 yr	Duplicate Eff.	8000.00	565.50	577.68		577.91	0.001614	5.02	7415.39	2293.78	0.26
Reach-1	16	50 yr	Prop Cond	11500.00	565.50	577.22		577.50	0.001360	5.98	6374.51	2266.04	0.32
Reach-1	16	50 yr	Corr Eff	11500.00	565.50	577.22		577.50	0.001360	5.98	6374.37	2266.04	0.32
Reach-1	16	50 yr	Duplicate Eff.	11500.00	565.50	579.88		580.21	0.001775	5.93	6745.81	900.00	0.28
Reach-1	16	100 yr	Prop Cond	13000.00	565.50	577.57		577.84	0.001340	6.06	7178.41	2287.49	0.32
Reach-1	16	100 yr	Corr Eff	13000.00	565.50	577.57		577.84	0.001340	6.06	7178.41	2287.49	0.32
Reach-1	16	100 yr	Duplicate Eff.	13000.00	565.50	580.16		580.35	0.001277	5.09	13310.27	2441.29	0.24
Reach-1	16	500 yr	Prop Cond	16400.00	565.50	578.34		578.58	0.001269	6.16	8951.70	2334.11	0.31
Reach-1	16	500 yr	Corr Eff	16400.00	565.50	578.34		578.58	0.001268	6.16	8952.70	2334.14	0.31
Reach-1	16	500 yr	Duplicate Eff.	16400.00	565.50	581.82		581.98	0.001065	5.02	17398.37	2504.93	0.22
Reach-1	15	10 yr	Prop Cond	8000.00	565.00	574.06		574.44	0.002425	5.54	2827.04	1283.21	0.39
Reach-1	15	10 yr	Corr Eff	8000.00	565.00	574.06		574.44	0.002426	5.55	2826.73	1283.14	0.39
Reach-1	15	10 yr	Duplicate Eff.	8000.00	565.00	576.02		576.17	0.001351	3.71	6418.06	2589.23	0.23
Reach-1	15	50 yr	Prop Cond	11500.00	565.00	575.38		575.68	0.001808	5.43	4919.07	2074.10	0.35
Reach-1	15	50 yr	Corr Eff	11500.00	565.00	575.38		575.68	0.001808	5.43	4918.31	2073.79	0.35
Reach-1	15	50 yr	Duplicate Eff.	11500.00	565.00	578.77		578.88	0.000737	3.32	9276.09	1374.57	0.18
Reach-1	15	100 yr	Prop Cond	13000.00	565.00	575.89		576.16	0.001576	5.29	6094.48	2498.59	0.33
Reach-1	15	100 yr	Corr Eff	13000.00	565.00	575.89		576.16	0.001576	5.29	6094.18	2498.49	0.33
Reach-1	15	100 yr	Duplicate Eff.	13000.00	565.00	579.10		579.21	0.000773	3.46	14470.79	2629.35	0.18
Reach-1	15	500 yr	Prop Cond	16400.00	565.00	577.02		577.21	0.001109	4.84	9008.54	2602.20	0.28
Reach-1	15	500 yr	Corr Eff	16400.00	565.00	577.02		577.21	0.001109	4.83	9011.72	2602.22	0.28
Reach-1	15	500 yr	Duplicate Eff.	16400.00	565.00	580.96		581.05	0.000622	3.44	19367.80	2662.27	0.17
Reach-1	14	10 yr	Prop Cond	8000.00	562.00	573.42		573.66	0.000831	4.47	3911.93	1470.15	0.25
Reach-1	14	10 yr	Corr Eff	8000.00	562.00	573.42		573.66	0.000831	4.47	3911.21	1469.92	0.25
Reach-1	14	10 yr	Duplicate Eff.	8000.00	562.00	575.46		575.62	0.000751	3.60	7863.55	2385.21	0.18
Reach-1	14	50 yr	Prop Cond	11500.00	562.00	574.76		575.01	0.000843	4.89	6289.84	2064.75	0.25
Reach-1	14	50 yr	Corr Eff	11500.00	562.00	574.76		575.01	0.000843	4.89	6288.45	2064.46	0.25
Reach-1	14	50 yr	Duplicate Eff.	11500.00	562.00	578.37		578.51	0.000582	3.65	7870.84	900.00	0.16
Reach-1	14	100 yr	Prop Cond	13000.00	562.00	575.33		575.56	0.000781	4.85	7541.10	2321.33	0.24
Reach-1	14	100 yr	Corr Eff	13000.00	562.00	575.33		575.56	0.000781	4.85	7540.68	2321.25	0.24
Reach-1	14	100 yr	Duplicate Eff.	13000.00	562.00	578.71		578.84	0.000577	3.68	15834.55	2483.76	0.16
Reach-1	14	500 yr	Prop Cond	16400.00	562.00	576.59		576.77	0.000610	4.58	10607.27	2448.79	0.22
Reach-1	14	500 yr	Corr Eff	16400.00	562.00	576.59		576.77	0.000609	4.58	10611.16	2448.81	0.22
Reach-1	14	500 yr	Duplicate Eff.	16400.00	562.00	580.62		580.74	0.000514	3.76	20595.60	2508.55	0.16
Reach-1	13	10 yr	Prop Cond	8000.00	561.00	571.81		572.37	0.002129	6.39	2462.83	1462.87	0.38
Reach-1	13	10 yr	Corr Eff	8000.00	561.00	571.81		572.37	0.002133	6.39	2459.17	1462.32	0.38
Reach-1	13	10 yr	Duplicate Eff.	8000.00	561.00	574.51		574.71	0.001108	4.12	7965.01	2186.56	0.21
Reach-1	13	50 yr	Prop Cond	11500.00	561.00	573.83		574.07	0.001028	5.09	6481.87	2155.46	0.27
Reach-1	13	50 yr	Corr Eff	11500.00	561.00	573.83		574.07	0.001029	5.09	6478.71	2155.39	0.27
Reach-1	13	50 yr	Duplicate Eff.	11500.00	561.00	577.69		577.85	0.000753	3.99	7601.96	957.25	0.18
Reach-1	13	100 yr	Prop Cond	13000.00	561.00	574.56		574.75	0.000815	4.73	8060.98	2187.55	0.24
Reach-1	13	100 yr	Corr Eff	13000.00	561.00	574.56		574.74	0.000815	4.73	8060.32	2187.54	0.24
Reach-1	13	100 yr	Duplicate Eff.	13000.00	561.00	578.00		578.17	0.000792	4.15	15709.28	2239.54	0.19
Reach-1	13	500 yr	Prop Cond	16400.00	561.00	576.04		576.17	0.000558	4.24	11329.64	2220.40	0.21
Reach-1	13	500 yr	Corr Eff	16400.00	561.00	576.04		576.17	0.000557	4.23	11334.39	2220.42	0.21
Reach-1	13	500 yr	Duplicate Eff.	16400.00	561.00	579.98		580.14	0.000706	4.26	20154.23	2258.81	0.18
Reach-1	12.1	10 yr	Prop Cond	8000.00	559.20	571.77		571.82	0.000178	2.29	9132.16	2143.39	0.12
Reach-1	12.1	10 yr	Corr Eff	8000.00	559.20	571.77		571.82	0.000178	2.29	9126.93	2143.10	0.12
Reach-1	12.1	10 yr	Duplicate Eff.	8000.00	559.20	574.17		574.23	0.000269	2.39	14359.02	2207.89	0.11
Reach-1	12.1	50 yr	Prop Cond	11500.00	559.20	573.69		573.73	0.000147	2.30	13309.08	2199.55	0.11
Reach-1	12.1	50 yr	Corr Eff	11500.00	559.20	573.69		573.73	0.000147	2.30	13305.58	2199.53	0.11
Reach-1	12.1	50 yr	Duplicate Eff.	11500.00	559.20	577.30		577.41	0.000320	2.97	7526.86	601.00	0.13
Reach-1	12.1	100 yr	Prop Cond	13000.00	559.20	574.40		574.44	0.000140	2.32	14887.64	2212.08	0.11
Reach-1	12.1	100 yr	Corr Eff	13000.00	559.20	574.40		574.44	0.000140	2.32	14886.96	2212.07	0.11
Reach-1	12.1	100 yr	Duplicate Eff.	13000.00	559.20	577.65		577.73	0.000285	2.84	22163.40	2264.80	0.12
Reach-1	12.1	500 yr	Prop Cond	16400.00	559.20	575.89		575.92	0.000128	2.37	18183.23	2238.00	0.10
Reach-1	12.1	500 yr	Corr Eff	16400.00	559.20	575.89		575.93	0.000128	2.37	18188.15	2238.04	0.10
Reach-1	12.1	500 yr	Duplicate Eff.	16400.00	559.20	579.63		579.72	0.000295	3.10	26663.47	2294.41	0.12
Reach-1	12	10 yr	Prop Cond	8000.00	558.30	571.54		571.62	0.000317	2.75	5954.62	1121.00	0.15
Reach-1	12	10 yr	Corr Eff	8000.00	558.30	571.54		571.62	0.000318	2.75	5951.54	1120.87	0.15
Reach-1	12	10 yr	Duplicate Eff.	8000.00	558.30	573.83		573.92	0.000451	2.81	8579.68	1161.73	0.14

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	12	50 yr	Prop Cond	11500.00	558.30	573.47		573.55	0.000287	2.94	8170.41	1158.12	0.15
Reach-1	12	50 yr	Corr Eff	11500.00	558.30	573.47		573.55	0.000287	2.94	8168.43	1158.10	0.15
Reach-1	12	50 yr	Duplicate Eff.	11500.00	558.30	576.90		577.05	0.000528	3.40	5315.17	411.75	0.15
Reach-1	12	100 yr	Prop Cond	13000.00	558.30	574.19		574.27	0.000281	3.02	9005.59	1165.49	0.15
Reach-1	12	100 yr	Corr Eff	13000.00	558.30	574.19		574.27	0.000281	3.02	9005.24	1165.48	0.15
Reach-1	12	100 yr	Duplicate Eff.	13000.00	558.30	577.28		577.41	0.000470	3.38	12650.84	1190.74	0.15
Reach-1	12	500 yr	Prop Cond	16400.00	558.30	575.68		575.76	0.000272	3.19	10746.54	1180.70	0.15
Reach-1	12	500 yr	Corr Eff	16400.00	558.30	575.68		575.77	0.000272	3.19	10749.28	1180.72	0.15
Reach-1	12	500 yr	Duplicate Eff.	16400.00	558.30	579.24		579.39	0.000484	3.70	14985.19	1200.98	0.15
Reach-1	11.3	10 yr	Prop Cond	8000.00	557.00	570.78		571.26	0.001995	5.59	1480.47	266.13	0.36
Reach-1	11.3	10 yr	Corr Eff	8000.00	557.00	570.77		571.26	0.001998	5.59	1479.51	266.00	0.36
Reach-1	11.3	10 yr	Duplicate Eff.	8000.00	557.00	573.29		573.55	0.001328	4.13	2219.41	307.43	0.23
Reach-1	11.3	50 yr	Prop Cond	11500.00	557.00	572.59		573.21	0.001952	6.37	2005.24	303.37	0.36
Reach-1	11.3	50 yr	Corr Eff	11500.00	557.00	572.59		573.20	0.001954	6.37	2004.55	303.36	0.36
Reach-1	11.3	50 yr	Duplicate Eff.	11500.00	557.00	576.29		576.63	0.001316	4.69	2452.30	186.00	0.23
Reach-1	11.3	100 yr	Prop Cond	13000.00	557.00	573.26		573.93	0.001954	6.67	2208.98	307.23	0.37
Reach-1	11.3	100 yr	Corr Eff	13000.00	557.00	573.26		573.93	0.001954	6.67	2208.85	307.23	0.37
Reach-1	11.3	100 yr	Duplicate Eff.	13000.00	557.00	576.68		577.03	0.001274	4.90	3293.31	326.84	0.23
Reach-1	11.3	500 yr	Prop Cond	16400.00	557.00	574.63		575.41	0.001968	7.28	2635.04	315.16	0.38
Reach-1	11.3	500 yr	Corr Eff	16400.00	557.00	574.63		575.41	0.001967	7.28	2636.00	315.18	0.38
Reach-1	11.3	500 yr	Duplicate Eff.	16400.00	557.00	578.58		579.00	0.001271	5.34	3923.80	335.73	0.24
Reach-1	11.2	10 yr	Prop Cond	8000.00	557.00	570.50		571.02	0.002262	5.81	1408.07	256.35	0.38
Reach-1	11.2	10 yr	Corr Eff	8000.00	557.00	570.49		571.02	0.002263	5.81	1407.06	256.05	0.38
Reach-1	11.2	10 yr	Duplicate Eff.	8000.00	557.00	573.16		573.40	0.001266	4.00	2179.34	306.67	0.22
Reach-1	11.2	50 yr	Prop Cond	11500.00	557.00	572.31		572.98	0.002169	6.59	1922.00	301.77	0.38
Reach-1	11.2	50 yr	Corr Eff	11500.00	557.00	572.31		572.97	0.002171	6.59	1921.25	301.76	0.38
Reach-1	11.2	50 yr	Duplicate Eff.	11500.00	557.00	576.20		576.47	0.001068	4.29	2842.72	254.90	0.21
Reach-1	11.2	100 yr	Prop Cond	13000.00	557.00	572.98		573.70	0.002158	6.88	2124.42	305.64	0.39
Reach-1	11.2	100 yr	Corr Eff	13000.00	557.00	572.98		573.70	0.002158	6.88	2124.28	305.63	0.39
Reach-1	11.2	100 yr	Duplicate Eff.	13000.00	557.00	576.59		576.87	0.001054	4.44	3264.80	326.43	0.21
Reach-1	11.2	500 yr	Prop Cond	16400.00	557.00	574.35		575.18	0.002151	7.49	2547.28	313.55	0.39
Reach-1	11.2	500 yr	Corr Eff	16400.00	557.00	574.35		575.18	0.002149	7.49	2548.37	313.57	0.39
Reach-1	11.2	500 yr	Duplicate Eff.	16400.00	557.00	578.51		578.82	0.000992	4.71	3901.27	335.42	0.21
Reach-1	10.1	10 yr	Prop Cond	8000.00	555.70	570.66		570.82	0.000509	3.83	4001.28	688.19	0.20
Reach-1	10.1	10 yr	Corr Eff	8000.00	555.70	570.65		570.82	0.000510	3.83	3998.63	688.15	0.20
Reach-1	10.1	10 yr	Duplicate Eff.	8000.00	555.70	573.15		573.26	0.000478	3.16	5758.74	721.78	0.15
Reach-1	10.1	50 yr	Prop Cond	11500.00	555.70	572.55		572.74	0.000519	4.27	5331.23	713.09	0.20
Reach-1	10.1	50 yr	Corr Eff	11500.00	555.70	572.55		572.74	0.000519	4.27	5329.53	713.06	0.20
Reach-1	10.1	50 yr	Duplicate Eff.	11500.00	555.70	576.20		576.33	0.000509	3.49	7129.86	604.34	0.15
Reach-1	10.1	100 yr	Prop Cond	13000.00	555.70	573.25		573.45	0.000525	4.44	5832.12	723.26	0.21
Reach-1	10.1	100 yr	Corr Eff	13000.00	555.70	573.25		573.45	0.000525	4.44	5831.77	723.26	0.21
Reach-1	10.1	100 yr	Duplicate Eff.	13000.00	555.70	576.59		576.73	0.000505	3.75	8325.64	774.09	0.16
Reach-1	10.1	500 yr	Prop Cond	16400.00	555.70	574.68		574.90	0.000540	4.79	6882.88	744.15	0.21
Reach-1	10.1	500 yr	Corr Eff	16400.00	555.70	574.69		574.91	0.000539	4.79	6885.29	744.20	0.21
Reach-1	10.1	500 yr	Duplicate Eff.	16400.00	555.70	578.51		578.68	0.000524	4.09	9851.95	809.44	0.16
Reach-1	10	10 yr	Prop Cond	8000.00	554.70	570.60		570.66	0.000216	2.58	6478.66	907.17	0.13
Reach-1	10	10 yr	Corr Eff	8000.00	554.70	570.60		570.66	0.000216	2.58	6475.12	907.14	0.13
Reach-1	10	10 yr	Duplicate Eff.	8000.00	554.70	573.05		573.10	0.000241	2.30	8722.76	926.92	0.11
Reach-1	10	50 yr	Prop Cond	11500.00	554.70	572.50		572.58	0.000231	2.93	8216.16	922.27	0.14
Reach-1	10	50 yr	Corr Eff	11500.00	554.70	572.50		572.57	0.000231	2.93	8213.91	922.25	0.14
Reach-1	10	50 yr	Duplicate Eff.	11500.00	554.70	576.03		576.15	0.000384	3.29	6853.91	500.00	0.14
Reach-1	10	100 yr	Prop Cond	13000.00	554.70	573.20		573.28	0.000238	3.08	8861.12	928.19	0.14
Reach-1	10	100 yr	Corr Eff	13000.00	554.70	573.20		573.28	0.000239	3.08	8860.67	928.19	0.14
Reach-1	10	100 yr	Duplicate Eff.	13000.00	554.70	576.48		576.55	0.000267	2.78	11953.24	954.77	0.11
Reach-1	10	500 yr	Prop Cond	16400.00	554.70	574.63		574.72	0.000254	3.37	10198.72	940.36	0.15
Reach-1	10	500 yr	Corr Eff	16400.00	554.70	574.63		574.73	0.000254	3.37	10201.77	940.39	0.15
Reach-1	10	500 yr	Duplicate Eff.	16400.00	554.70	578.41		578.49	0.000282	3.06	13802.16	965.84	0.12
Reach-1	9.3	10 yr	Prop Cond	8000.00	553.70	570.23		570.39	0.000372	3.87	4420.52	625.71	0.17
Reach-1	9.3	10 yr	Corr Eff	8000.00	553.70	570.23		570.38	0.000373	3.87	4417.73	625.60	0.17
Reach-1	9.3	10 yr	Duplicate Eff.	8000.00	553.70	572.66		572.79	0.000438	3.47	6013.78	693.74	0.14
Reach-1	9.3	50 yr	Prop Cond	11500.00	553.70	572.07		572.27	0.000440	4.53	5613.56	671.76	0.19
Reach-1	9.3	50 yr	Corr Eff	11500.00	553.70	572.07		572.27	0.000440	4.53	5611.80	671.66	0.19
Reach-1	9.3	50 yr	Duplicate Eff.	11500.00	553.70	575.60		575.74	0.000438	3.84	8029.99	686.38	0.15
Reach-1	9.3	100 yr	Prop Cond	13000.00	553.70	572.74		572.96	0.000470	4.80	6071.79	696.87	0.20
Reach-1	9.3	100 yr	Corr Eff	13000.00	553.70	572.74		572.96	0.000470	4.80	6071.41	696.85	0.20
Reach-1	9.3	100 yr	Duplicate Eff.	13000.00	553.70	576.01		576.19	0.000539	4.31	8548.05	819.15	0.17
Reach-1	9.3	500 yr	Prop Cond	16400.00	553.70	574.12		574.38	0.000527	5.34	7067.49	748.53	0.21
Reach-1	9.3	500 yr	Corr Eff	16400.00	553.70	574.12		574.38	0.000526	5.34	7070.23	748.67	0.21
Reach-1	9.3	500 yr	Duplicate Eff.	16400.00	553.70	577.91		578.11	0.000570	4.70	10129.20	849.01	0.17
Reach-1	9.2	10 yr	Prop Cond	8000.00	553.00	570.13		570.22	0.000224	2.96	5443.57	717.09	0.13
Reach-1	9.2	10 yr	Corr Eff	8000.00	553.00	570.12		570.22	0.000224	2.97	5440.24	717.02	0.13
Reach-1	9.2	10 yr	Duplicate Eff.	8000.00	553.00	572.51		572.59	0.000265	2.66	7196.51	750.17	0.11
Reach-1	9.2	50 yr	Prop Cond	11500.00	553.00	571.95		572.07	0.000269	3.51	6776.60	747.14	0.15
Reach-1	9.2	50 yr	Corr Eff	11500.00	553.00	571.94		572.07	0.000269	3.51	6774.55	747.09	0.15
Reach-1	9.2	50 yr	Duplicate Eff.	11500.00	553.00	575.45		575.54	0.000275	3.01	9313.02	727.82	0.12

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	9.2	100 yr	Prop Cond	13000.00	553.00	572.61		572.74	0.000286	3.71	7274.05	750.61	0.16
Reach-1	9.2	100 yr	Corr Eff	13000.00	553.00	572.61		572.74	0.000286	3.71	7273.59	750.61	0.16
Reach-1	9.2	100 yr	Duplicate Eff.	13000.00	553.00	575.82		575.94	0.000332	3.35	9746.38	802.47	0.13
Reach-1	9.2	500 yr	Prop Cond	16400.00	553.00	573.98		574.14	0.000318	4.11	8303.72	756.46	0.17
Reach-1	9.2	500 yr	Corr Eff	16400.00	553.00	573.98		574.14	0.000318	4.11	8306.63	756.47	0.17
Reach-1	9.2	500 yr	Duplicate Eff.	16400.00	553.00	577.70		577.84	0.000363	3.71	11270.60	817.64	0.14
Reach-1	9.1	10 yr	Prop Cond	8000.00	552.70	569.71		570.12	0.004566	5.77	1789.50	322.78	0.30
Reach-1	9.1	10 yr	Corr Eff	8000.00	552.70	569.71		570.11	0.004579	5.78	1787.66	322.75	0.30
Reach-1	9.1	10 yr	Duplicate Eff.	8000.00	552.70	572.30		572.47	0.004945	3.95	2637.33	333.43	0.19
Reach-1	9.1	50 yr	Prop Cond	11500.00	552.70	571.52		571.96	0.004205	6.11	2380.43	330.38	0.30
Reach-1	9.1	50 yr	Corr Eff	11500.00	552.70	571.52		571.95	0.004211	6.12	2379.34	330.37	0.30
Reach-1	9.1	50 yr	Duplicate Eff.	11500.00	552.70	575.25		575.43	0.003945	4.01	3597.90	327.00	0.17
Reach-1	9.1	100 yr	Prop Cond	13000.00	552.70	572.17		572.63	0.004165	6.28	2595.43	332.99	0.30
Reach-1	9.1	100 yr	Corr Eff	13000.00	552.70	572.17		572.63	0.004166	6.28	2595.17	332.99	0.30
Reach-1	9.1	100 yr	Duplicate Eff.	13000.00	552.70	575.60		575.81	0.004547	4.36	3752.83	342.67	0.19
Reach-1	9.1	500 yr	Prop Cond	16400.00	552.70	573.50		574.01	0.004120	6.65	3039.47	336.80	0.30
Reach-1	9.1	500 yr	Corr Eff	16400.00	552.70	573.50		574.01	0.004114	6.64	3040.95	336.81	0.30
Reach-1	9.1	500 yr	Duplicate Eff.	16400.00	552.70	577.46		577.70	0.004464	4.63	4395.87	347.89	0.19
Reach-1	9	10 yr	Prop Cond	8000.00	552.70	569.39		569.85	0.005364	6.14	1685.64	321.42	0.33
Reach-1	9	10 yr	Corr Eff	8000.00	552.70	569.38		569.85	0.005383	6.15	1683.38	321.39	0.33
Reach-1	9	10 yr	Duplicate Eff.	8000.00	552.70	572.00		572.20	0.005516	4.11	2540.20	332.41	0.20
Reach-1	9	50 yr	Prop Cond	11500.00	552.70	571.25		571.72	0.004711	6.38	2289.52	329.22	0.31
Reach-1	9	50 yr	Corr Eff	11500.00	552.70	571.24		571.72	0.004718	6.38	2288.26	329.21	0.31
Reach-1	9	50 yr	Duplicate Eff.	11500.00	552.70	574.56		575.05	0.008334	5.67	2069.53	169.00	0.25
Reach-1	9	100 yr	Prop Cond	13000.00	552.70	571.90		572.40	0.004622	6.53	2505.81	331.97	0.31
Reach-1	9	100 yr	Corr Eff	13000.00	552.70	571.90		572.40	0.004623	6.53	2505.55	331.97	0.31
Reach-1	9	100 yr	Duplicate Eff.	13000.00	552.70	575.34		575.56	0.004892	4.48	3663.80	341.95	0.19
Reach-1	9	500 yr	Prop Cond	16400.00	552.70	573.23		573.78	0.004505	6.87	2951.40	336.06	0.31
Reach-1	9	500 yr	Corr Eff	16400.00	552.70	573.24		573.78	0.004497	6.86	2953.04	336.08	0.31
Reach-1	9	500 yr	Duplicate Eff.	16400.00	552.70	577.20		577.46	0.004749	4.73	4307.88	347.18	0.19
Reach-1	8	10 yr	Prop Cond	8000.00	554.00	568.00		568.37	0.001256	5.93	2706.13	450.89	0.30
Reach-1	8	10 yr	Corr Eff	8000.00	554.00	567.98		568.35	0.001263	5.94	2699.41	450.66	0.30
Reach-1	8	10 yr	Duplicate Eff.	8000.00	554.00	569.89		570.28	0.001779	5.82	3643.23	538.32	0.27
Reach-1	8	50 yr	Prop Cond	11500.00	554.00	569.78		570.23	0.001375	6.79	3585.30	533.57	0.32
Reach-1	8	50 yr	Corr Eff	11500.00	554.00	569.77		570.22	0.001378	6.80	3581.39	533.25	0.32
Reach-1	8	50 yr	Duplicate Eff.	11500.00	554.00	572.34		572.83	0.001892	6.68	3761.81	350.00	0.29
Reach-1	8	100 yr	Prop Cond	13000.00	554.00	570.40		570.88	0.001427	7.12	3924.76	560.80	0.33
Reach-1	8	100 yr	Corr Eff	13000.00	554.00	570.40		570.88	0.001428	7.12	3923.93	560.74	0.33
Reach-1	8	100 yr	Duplicate Eff.	13000.00	554.00	572.95		573.50	0.002089	7.19	5479.89	638.35	0.30
Reach-1	8	500 yr	Prop Cond	16400.00	554.00	571.69		572.23	0.001508	7.74	4683.91	617.38	0.34
Reach-1	8	500 yr	Corr Eff	16400.00	554.00	571.70		572.24	0.001504	7.73	4689.38	617.77	0.34
Reach-1	8	500 yr	Duplicate Eff.	16400.00	554.00	574.63		575.30	0.002277	7.99	6566.60	651.41	0.32
Reach-1	7	10 yr	Prop Cond	8000.00	558.00	567.07		567.35	0.001954	5.61	2852.97	519.58	0.33
Reach-1	7	10 yr	Corr Eff	8000.00	558.00	567.05		567.32	0.001977	5.64	2840.58	518.83	0.33
Reach-1	7	10 yr	Duplicate Eff.	8000.00	558.00	566.72		567.81	0.010202	9.36	2668.21	515.62	0.57
Reach-1	7	50 yr	Prop Cond	11500.00	558.00	568.90		569.19	0.001762	6.04	3851.23	574.97	0.33
Reach-1	7	50 yr	Corr Eff	11500.00	558.00	568.88		569.18	0.001769	6.05	3844.98	574.65	0.33
Reach-1	7	50 yr	Duplicate Eff.	11500.00	558.00	569.51		570.56	0.007059	9.41	2231.65	262.48	0.49
Reach-1	7	100 yr	Prop Cond	13000.00	558.00	569.51		569.82	0.001745	6.24	4208.20	579.13	0.33
Reach-1	7	100 yr	Corr Eff	13000.00	558.00	569.51		569.82	0.001746	6.24	4207.00	579.12	0.33
Reach-1	7	100 yr	Duplicate Eff.	13000.00	558.00	569.47		570.81	0.009240	10.74	4180.74	579.02	0.56
Reach-1	7	500 yr	Prop Cond	16400.00	558.00	570.80		571.14	0.001717	6.65	4954.75	581.96	0.33
Reach-1	7	500 yr	Corr Eff	16400.00	558.00	570.81		571.15	0.001710	6.64	4962.03	581.98	0.33
Reach-1	7	500 yr	Duplicate Eff.	16400.00	558.00	571.07		572.51	0.008660	11.36	5112.22	582.55	0.56
Reach-1	6.5	10 yr	Prop Cond	8000.00	554.50	567.03		567.33	0.001604	5.56	2814.47	518.11	0.30
Reach-1	6.5	10 yr	Corr Eff	8000.00	554.50	567.00		567.31	0.001623	5.58	2801.76	517.33	0.30
Reach-1	6.5	10 yr	Duplicate Eff.	8000.00	554.50	566.73		567.69	0.006872	8.46	2659.97	515.69	0.47
Reach-1	6.5	50 yr	Prop Cond	11500.00	554.50	568.85		569.17	0.001521	6.02	3811.12	573.67	0.30
Reach-1	6.5	50 yr	Corr Eff	11500.00	554.50	568.84		569.16	0.001527	6.03	3804.79	573.35	0.30
Reach-1	6.5	50 yr	Duplicate Eff.	11500.00	554.50	569.50		570.48	0.005467	8.86	2252.30	277.57	0.43
Reach-1	6.5	100 yr	Prop Cond	13000.00	554.50	569.47		569.80	0.001534	6.24	4166.43	579.02	0.31
Reach-1	6.5	100 yr	Corr Eff	13000.00	554.50	569.46		569.80	0.001535	6.25	4165.19	579.02	0.31
Reach-1	6.5	100 yr	Duplicate Eff.	13000.00	554.50	569.45		570.71	0.007088	10.06	4155.94	578.98	0.49
Reach-1	6.5	500 yr	Prop Cond	16400.00	554.50	570.75		571.12	0.001553	6.69	4911.00	581.85	0.31
Reach-1	6.5	500 yr	Corr Eff	16400.00	554.50	570.76		571.13	0.001546	6.68	4918.39	581.87	0.31
Reach-1	6.5	500 yr	Duplicate Eff.	16400.00	554.50	571.03		572.43	0.007049	10.83	5072.24	582.46	0.50
Reach-1	6.4	10 yr	Prop Cond	8000.00	554.37	567.08		567.28	0.000917	3.71	2750.51	633.79	0.24
Reach-1	6.4	10 yr	Corr Eff	8000.00	554.37	567.06		567.26	0.000928	3.72	2735.39	633.56	0.24
Reach-1	6.4	10 yr	Duplicate Eff.	8000.00	550.00	567.18		567.47	0.000907	4.42	2677.82	422.04	0.20
Reach-1	6.4	50 yr	Prop Cond	11500.00	554.37	568.91		569.13	0.000797	4.01	3925.46	653.07	0.23
Reach-1	6.4	50 yr	Corr Eff	11500.00	554.37	568.90		569.12	0.000801	4.01	3918.41	652.95	0.23
Reach-1	6.4	50 yr	Duplicate Eff.	11500.00	550.00	569.90		570.28	0.001018	5.22	3539.20	400.00	0.22
Reach-1	6.4	100 yr	Prop Cond	13000.00	554.37	569.53		569.76	0.000791	4.17	4330.13	660.27	0.24
Reach-1	6.4	100 yr	Corr Eff	13000.00	554.37	569.52		569.76	0.000792	4.17	4328.72	660.25	0.24
Reach-1	6.4	100 yr	Duplicate Eff.	13000.00	550.00	569.99		570.44	0.001214	5.72	4011.99	500.77	0.24

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	6.4	500 yr	Prop Cond	16400.00	554.37	570.81		571.08	0.000781	4.50	5187.27	674.08	0.24
Reach-1	6.4	500 yr	Corr Eff	16400.00	554.37	570.82		571.09	0.000778	4.49	5195.62	674.19	0.24
Reach-1	6.4	500 yr	Duplicate Eff.	16400.00	550.00	571.60		572.14	0.001347	6.38	4838.05	524.24	0.25
Reach-1	6.3	10 yr	Prop Cond	8000.00	554.03	565.66	562.94	567.04	0.005053	9.58	1061.81	341.00	0.56
Reach-1	6.3	10 yr	Corr Eff	8000.00	554.03	565.59	562.94	567.01	0.005266	9.72	1022.43	340.89	0.57
Reach-1	6.3	10 yr	Duplicate Eff.	8000.00	547.50	567.08	556.29	567.41	0.001792	4.62	1729.99	177.29	0.26
Reach-1	6.3	50 yr	Prop Cond	11500.00	554.03	567.32	564.79	568.88	0.004978	10.64	1619.65	348.42	0.57
Reach-1	6.3	50 yr	Corr Eff	11500.00	554.03	567.22	564.79	568.86	0.005238	10.85	1562.62	347.31	0.59
Reach-1	6.3	50 yr	Duplicate Eff.	11500.00	547.50	569.82	558.42	570.23	0.001742	5.13	2241.20	191.78	0.26
Reach-1	6.3	100 yr	Prop Cond	13000.00	554.03	567.81	566.44	569.50	0.005207	11.21	1783.77	352.18	0.59
Reach-1	6.3	100 yr	Corr Eff	13000.00	554.03	567.71	566.43	569.49	0.005474	11.43	1723.79	351.62	0.61
Reach-1	6.3	100 yr	Duplicate Eff.	13000.00	547.50	569.85	559.26	570.37	0.002211	5.79	2246.32	191.88	0.30
Reach-1	6.3	500 yr	Prop Cond	16400.00	554.03	568.86	567.53	570.79	0.005530	12.27	2139.89	361.30	0.62
Reach-1	6.3	500 yr	Corr Eff	16400.00	554.03	568.76	567.55	570.79	0.005815	12.51	2071.46	360.66	0.63
Reach-1	6.3	500 yr	Duplicate Eff.	16400.00	547.50	571.43	561.00	572.06	0.002770	6.37	2576.19	227.46	0.33
Reach-1	6.25		Bridge										
Reach-1	6.2	10 yr	Prop Cond	8000.00	554.03	564.96	562.94	566.65	0.006854	10.56	857.13	190.11	0.65
Reach-1	6.2	10 yr	Corr Eff	8000.00	554.03	564.95	562.94	566.66	0.006884	10.58	848.02	189.14	0.65
Reach-1	6.2	10 yr	Duplicate Eff.	8000.00	547.50	567.05	556.30	567.38	0.001803	4.64	1723.72	176.49	0.26
Reach-1	6.2	50 yr	Prop Cond	11500.00	554.03	566.57	564.79	568.61	0.006893	11.92	1366.40	343.67	0.67
Reach-1	6.2	50 yr	Corr Eff	11500.00	554.03	566.56	564.79	568.63	0.006993	12.00	1341.83	343.63	0.67
Reach-1	6.2	50 yr	Duplicate Eff.	11500.00	547.50	569.79	558.41	570.20	0.001759	5.15	2233.75	191.63	0.27
Reach-1	6.2	100 yr	Prop Cond	13000.00	554.03	567.12	566.44	569.26	0.006936	12.40	1550.76	345.81	0.68
Reach-1	6.2	100 yr	Corr Eff	13000.00	554.03	567.10	566.43	569.29	0.007060	12.49	1520.88	345.15	0.68
Reach-1	6.2	100 yr	Duplicate Eff.	13000.00	547.50	569.80	559.26	570.32	0.002242	5.81	2235.67	191.67	0.30
Reach-1	6.2	500 yr	Prop Cond	16400.00	554.03	568.23	567.53	570.58	0.007018	13.34	1926.21	356.75	0.69
Reach-1	6.2	500 yr	Corr Eff	16400.00	554.03	568.20	567.55	570.62	0.007185	13.48	1885.58	356.67	0.70
Reach-1	6.2	500 yr	Duplicate Eff.	16400.00	547.50	571.36	561.00	571.99	0.002802	6.41	2560.14	225.82	0.34
Reach-1	6.1	10 yr	Prop Cond	8000.00	554.00	564.78		565.99	0.004120	9.02	1112.86	282.96	0.52
Reach-1	6.1	10 yr	Corr Eff	8000.00	554.00	564.78		565.99	0.004120	9.02	1112.86	282.96	0.52
Reach-1	6.1	10 yr	Duplicate Eff.	8000.00	548.50	566.21		566.73	0.002240	6.52	2964.08	555.97	0.30
Reach-1	6.1	50 yr	Prop Cond	11500.00	554.00	566.43	563.88	567.89	0.004281	10.24	1782.42	460.18	0.54
Reach-1	6.1	50 yr	Corr Eff	11500.00	554.00	566.43	563.88	567.89	0.004281	10.24	1782.42	460.18	0.54
Reach-1	6.1	50 yr	Duplicate Eff.	11500.00	548.50	568.84		569.51	0.002422	7.58	3440.27	405.00	0.32
Reach-1	6.1	100 yr	Prop Cond	13000.00	554.00	567.01		568.51	0.004272	10.58	2048.53	462.55	0.55
Reach-1	6.1	100 yr	Corr Eff	13000.00	554.00	567.01		568.51	0.004272	10.58	2048.53	462.55	0.55
Reach-1	6.1	100 yr	Duplicate Eff.	13000.00	548.50	568.99		569.59	0.002437	7.64	4565.07	596.08	0.32
Reach-1	6.1	500 yr	Prop Cond	16400.00	554.00	568.18		569.77	0.004273	11.28	2596.33	477.48	0.55
Reach-1	6.1	500 yr	Corr Eff	16400.00	554.00	568.18		569.77	0.004273	11.28	2596.33	477.48	0.55
Reach-1	6.1	500 yr	Duplicate Eff.	16400.00	548.50	570.52		571.19	0.002537	8.25	5493.93	613.36	0.33
Reach-1	5	10 yr	Prop Cond	8000.00	548.90	563.30		563.79	0.001238	5.81	1953.20	509.74	0.30
Reach-1	5	10 yr	Corr Eff	8000.00	548.90	563.30		563.79	0.001238	5.81	1953.20	509.74	0.30
Reach-1	5	10 yr	Duplicate Eff.	8000.00	548.90	564.54		564.91	0.001502	5.13	2648.98	580.44	0.25
Reach-1	5	50 yr	Prop Cond	11500.00	548.90	564.72		565.37	0.001506	6.91	2752.49	581.84	0.34
Reach-1	5	50 yr	Corr Eff	11500.00	548.90	564.72		565.37	0.001506	6.91	2752.49	581.84	0.34
Reach-1	5	50 yr	Duplicate Eff.	11500.00	548.90	567.14		567.60	0.001518	5.83	3350.27	388.46	0.26
Reach-1	5	100 yr	Prop Cond	13000.00	548.90	565.14		565.87	0.001644	7.38	3001.97	585.21	0.35
Reach-1	5	100 yr	Corr Eff	13000.00	548.90	565.14		565.87	0.001644	7.38	3001.97	585.21	0.35
Reach-1	5	100 yr	Duplicate Eff.	13000.00	548.90	567.02		567.54	0.001815	6.34	4117.60	602.13	0.28
Reach-1	5	500 yr	Prop Cond	16400.00	548.90	566.04		566.91	0.001909	8.30	3529.42	592.68	0.38
Reach-1	5	500 yr	Corr Eff	16400.00	548.90	566.04		566.91	0.001909	8.30	3529.42	592.68	0.38
Reach-1	5	500 yr	Duplicate Eff.	16400.00	548.90	568.43		569.03	0.001960	6.98	4971.43	615.71	0.30
Reach-1	4.4	10 yr	Prop Cond	8000.00	548.50	560.03	557.85	561.66	0.006533	10.27	834.20	691.68	0.65
Reach-1	4.4	10 yr	Corr Eff	8000.00	548.50	560.03	557.85	561.66	0.006533	10.27	834.20	691.68	0.65
Reach-1	4.4	10 yr	Duplicate Eff.	8000.00	548.50	562.58		563.12	0.003183	6.49	2776.02	834.21	0.36
Reach-1	4.4	50 yr	Prop Cond	11500.00	548.50	561.68	559.57	563.14	0.005242	10.46	2053.06	784.18	0.60
Reach-1	4.4	50 yr	Corr Eff	11500.00	548.50	561.68	559.57	563.14	0.005242	10.46	2053.06	784.18	0.60
Reach-1	4.4	50 yr	Duplicate Eff.	11500.00	548.50	565.32		565.93	0.002679	6.97	3400.82	500.00	0.34
Reach-1	4.4	100 yr	Prop Cond	13000.00	548.50	562.33	561.72	563.64	0.004624	10.27	2573.82	820.52	0.57
Reach-1	4.4	100 yr	Corr Eff	13000.00	548.50	562.33	561.72	563.64	0.004624	10.27	2573.82	820.52	0.57
Reach-1	4.4	100 yr	Duplicate Eff.	13000.00	548.50	565.21		565.72	0.002637	6.88	5141.40	932.20	0.34
Reach-1	4.4	500 yr	Prop Cond	16400.00	548.50	563.64		564.72	0.003699	9.96	3692.99	893.65	0.52
Reach-1	4.4	500 yr	Corr Eff	16400.00	548.50	563.64		564.72	0.003699	9.96	3692.99	893.65	0.52
Reach-1	4.4	500 yr	Duplicate Eff.	16400.00	548.50	566.66		567.16	0.002457	7.13	6508.05	953.94	0.33
Reach-1	4.3	10 yr	Prop Cond	8000.00	548.30	560.55		560.65	0.000496	3.74	5568.36	995.23	0.19
Reach-1	4.3	10 yr	Corr Eff	8000.00	548.30	560.55		560.65	0.000496	3.74	5568.36	995.23	0.19
Reach-1	4.3	10 yr	Duplicate Eff.	8000.00	548.30	562.32		562.42	0.000676	3.60	7372.70	1043.90	0.17
Reach-1	4.3	50 yr	Prop Cond	11500.00	548.30	562.07		562.18	0.000534	4.21	7109.10	1036.93	0.20
Reach-1	4.3	50 yr	Corr Eff	11500.00	548.30	562.07		562.18	0.000534	4.21	7109.10	1036.93	0.20
Reach-1	4.3	50 yr	Duplicate Eff.	11500.00	548.30	565.00		565.13	0.000907	4.24	6929.27	578.69	0.19
Reach-1	4.3	100 yr	Prop Cond	13000.00	548.30	562.61		562.73	0.000554	4.41	7676.37	1051.87	0.21
Reach-1	4.3	100 yr	Corr Eff	13000.00	548.30	562.61		562.73	0.000554	4.41	7676.37	1051.87	0.21
Reach-1	4.3	100 yr	Duplicate Eff.	13000.00	548.30	564.89		565.02	0.000789	4.37	10153.86	1143.32	0.19
Reach-1	4.3	500 yr	Prop Cond	16400.00	548.30	563.76		563.89	0.000587	4.79	8898.27	1083.34	0.22

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	4.3	500 yr	Corr Eff	16400.00	548.30	563.76		563.89	0.000587	4.79	8898.27	1083.34	0.22
Reach-1	4.3	500 yr	Duplicate Eff.	16400.00	548.30	566.30		566.45	0.000867	4.84	11822.86	1227.79	0.20
Reach-1	4	10 yr	Prop Cond	8000.00	547.50	559.84		559.98	0.000631	3.71	4987.85	1515.78	0.21
Reach-1	4	10 yr	Corr Eff	8000.00	547.50	559.84		559.98	0.000631	3.71	4987.85	1515.78	0.21
Reach-1	4	10 yr	Duplicate Eff.	8000.00	547.50	561.52		561.62	0.000655	3.16	7829.58	1829.87	0.17
Reach-1	4	50 yr	Prop Cond	11500.00	547.50	561.41		561.54	0.000541	3.80	7635.94	1812.72	0.20
Reach-1	4	50 yr	Corr Eff	11500.00	547.50	561.41		561.54	0.000541	3.80	7635.94	1812.72	0.20
Reach-1	4	50 yr	Duplicate Eff.	11500.00	547.50	564.12		564.24	0.000615	3.52	8239.86	951.49	0.17
Reach-1	4	100 yr	Prop Cond	13000.00	547.50	561.97		562.09	0.000517	3.84	8674.37	1902.86	0.20
Reach-1	4	100 yr	Corr Eff	13000.00	547.50	561.97		562.09	0.000517	3.84	8674.37	1902.86	0.20
Reach-1	4	100 yr	Duplicate Eff.	13000.00	547.50	564.04		564.16	0.000647	3.59	12961.90	2230.53	0.17
Reach-1	4	500 yr	Prop Cond	16400.00	547.50	563.14		563.26	0.000471	3.91	11018.57	2092.10	0.19
Reach-1	4	500 yr	Corr Eff	16400.00	547.50	563.14		563.26	0.000471	3.91	11018.57	2092.10	0.19
Reach-1	4	500 yr	Duplicate Eff.	16400.00	547.50	565.41		565.53	0.000665	3.88	16016.83	2247.59	0.18
Reach-1	3.8	10 yr	Prop Cond	8000.00	547.20	559.52		559.67	0.000728	4.45	4472.90	816.61	0.23
Reach-1	3.8	10 yr	Corr Eff	8000.00	547.20	559.52		559.67	0.000728	4.45	4472.90	816.61	0.23
Reach-1	3.8	10 yr	Duplicate Eff.	8000.00	547.20	561.11		561.26	0.001000	4.27	5787.46	840.86	0.21
Reach-1	3.8	50 yr	Prop Cond	11500.00	547.20	561.08		561.25	0.000753	4.93	5762.02	840.34	0.24
Reach-1	3.8	50 yr	Corr Eff	11500.00	547.20	561.08		561.25	0.000753	4.93	5762.02	840.34	0.24
Reach-1	3.8	50 yr	Duplicate Eff.	11500.00	547.20	563.68		563.88	0.001068	4.97	6757.86	700.00	0.22
Reach-1	3.8	100 yr	Prop Cond	13000.00	547.20	561.63		561.81	0.000774	5.14	6224.23	849.64	0.25
Reach-1	3.8	100 yr	Corr Eff	13000.00	547.20	561.63		561.81	0.000774	5.14	6224.23	849.64	0.25
Reach-1	3.8	100 yr	Duplicate Eff.	13000.00	547.20	563.58		563.77	0.001143	5.12	7917.61	882.87	0.23
Reach-1	3.8	500 yr	Prop Cond	16400.00	547.20	562.78		562.98	0.000810	5.55	7214.38	869.23	0.26
Reach-1	3.8	500 yr	Corr Eff	16400.00	547.20	562.78		562.98	0.000810	5.55	7214.38	869.23	0.26
Reach-1	3.8	500 yr	Duplicate Eff.	16400.00	547.20	564.90		565.12	0.001247	5.65	9104.21	914.84	0.24
Reach-1	3.7	10 yr	Prop Cond	8000.00	547.00	559.05		559.24	0.001004	4.20	3379.22	637.71	0.26
Reach-1	3.7	10 yr	Corr Eff	8000.00	547.00	559.05		559.24	0.001004	4.20	3379.22	637.71	0.26
Reach-1	3.7	10 yr	Duplicate Eff.	8000.00	547.00	560.54		560.70	0.001190	3.84	4355.09	669.56	0.22
Reach-1	3.7	50 yr	Prop Cond	11500.00	547.00	560.57		560.80	0.001026	4.76	4377.85	669.84	0.27
Reach-1	3.7	50 yr	Corr Eff	11500.00	547.00	560.57		560.80	0.001026	4.76	4377.85	669.84	0.27
Reach-1	3.7	50 yr	Duplicate Eff.	11500.00	547.00	563.05		563.28	0.001277	4.50	4680.47	456.96	0.23
Reach-1	3.7	100 yr	Prop Cond	13000.00	547.00	561.09		561.34	0.001057	5.01	4728.98	674.29	0.28
Reach-1	3.7	100 yr	Corr Eff	13000.00	547.00	561.09		561.34	0.001057	5.01	4728.98	674.29	0.28
Reach-1	3.7	100 yr	Duplicate Eff.	13000.00	547.00	562.90		563.13	0.001338	4.71	5963.99	689.68	0.24
Reach-1	3.7	500 yr	Prop Cond	16400.00	547.00	562.20		562.49	0.001109	5.49	5479.91	683.69	0.29
Reach-1	3.7	500 yr	Corr Eff	16400.00	547.00	562.20		562.49	0.001109	5.49	5479.91	683.69	0.29
Reach-1	3.7	500 yr	Duplicate Eff.	16400.00	547.00	564.15		564.43	0.001459	5.25	6828.56	699.88	0.25
Reach-1	3.4	10 yr	Prop Cond	8000.00	547.00	558.85		558.93	0.000264	2.48	5194.01	927.69	0.14
Reach-1	3.4	10 yr	Corr Eff	8000.00	547.00	558.85		558.93	0.000264	2.48	5194.01	927.69	0.14
Reach-1	3.4	10 yr	Duplicate Eff.	8000.00	547.00	560.27		560.34	0.000319	2.23	6577.54	1005.38	0.12
Reach-1	3.4	50 yr	Prop Cond	11500.00	547.00	560.35		560.45	0.000305	2.93	6655.56	1006.06	0.15
Reach-1	3.4	50 yr	Corr Eff	11500.00	547.00	560.35		560.45	0.000305	2.93	6655.56	1006.06	0.15
Reach-1	3.4	50 yr	Duplicate Eff.	11500.00	547.00	562.76		562.86	0.000378	2.77	5938.85	500.00	0.13
Reach-1	3.4	100 yr	Prop Cond	13000.00	547.00	560.86		560.98	0.000322	3.10	7174.37	1010.56	0.16
Reach-1	3.4	100 yr	Corr Eff	13000.00	547.00	560.86		560.98	0.000322	3.10	7174.37	1010.56	0.16
Reach-1	3.4	100 yr	Duplicate Eff.	13000.00	547.00	562.60		562.69	0.000397	2.82	8937.47	1025.72	0.13
Reach-1	3.4	500 yr	Prop Cond	16400.00	547.00	561.96		562.09	0.000352	3.43	8286.40	1020.15	0.17
Reach-1	3.4	500 yr	Corr Eff	16400.00	547.00	561.96		562.09	0.000352	3.43	8286.40	1020.15	0.17
Reach-1	3.4	500 yr	Duplicate Eff.	16400.00	547.00	563.81		563.93	0.000451	3.18	10189.50	1036.34	0.15
Reach-1	3.3	10 yr	Prop Cond	8000.00	547.00	558.65		558.75	0.000532	3.69	5392.55	1023.07	0.20
Reach-1	3.3	10 yr	Corr Eff	8000.00	547.00	558.65		558.75	0.000532	3.69	5392.55	1023.07	0.20
Reach-1	3.3	10 yr	Duplicate Eff.	8000.00	547.00	560.00		560.11	0.000772	3.60	6788.73	1039.99	0.18
Reach-1	3.3	50 yr	Prop Cond	11500.00	547.00	560.14		560.26	0.000550	4.09	6939.69	1041.87	0.20
Reach-1	3.3	50 yr	Corr Eff	11500.00	547.00	560.14		560.26	0.000550	4.09	6939.69	1041.87	0.20
Reach-1	3.3	50 yr	Duplicate Eff.	11500.00	547.00	562.28		562.54	0.001248	5.14	5219.62	500.00	0.24
Reach-1	3.3	100 yr	Prop Cond	13000.00	547.00	560.65		560.78	0.000571	4.28	7471.14	1048.48	0.21
Reach-1	3.3	100 yr	Corr Eff	13000.00	547.00	560.65		560.78	0.000571	4.28	7471.14	1048.48	0.21
Reach-1	3.3	100 yr	Duplicate Eff.	13000.00	547.00	562.28		562.42	0.000902	4.36	9189.93	1069.58	0.20
Reach-1	3.3	500 yr	Prop Cond	16400.00	547.00	561.74		561.88	0.000603	4.64	8618.30	1062.61	0.22
Reach-1	3.3	500 yr	Corr Eff	16400.00	547.00	561.74		561.88	0.000603	4.64	8618.30	1062.61	0.22
Reach-1	3.3	500 yr	Duplicate Eff.	16400.00	547.00	563.45		563.62	0.001001	4.85	10459.75	1084.90	0.22
Reach-1	3	10 yr	Prop Cond	8000.00	545.10	556.97	553.84	558.01	0.004081	8.32	1281.84	675.17	0.50
Reach-1	3	10 yr	Corr Eff	8000.00	545.10	556.97	553.84	558.01	0.004081	8.32	1281.84	675.17	0.50
Reach-1	3	10 yr	Duplicate Eff.	8000.00	545.10	558.78	559.19	0.004711	5.65	2881.43	1025.09	0.39	
Reach-1	3	50 yr	Prop Cond	11500.00	545.10	558.96	559.55	0.004020	7.09	3072.18	1033.73	0.49	
Reach-1	3	50 yr	Corr Eff	11500.00	545.10	558.96	559.55	0.004020	7.09	3072.18	1033.73	0.49	
Reach-1	3	50 yr	Duplicate Eff.	11500.00	545.10	561.15	561.50	0.002876	5.45	4129.05	724.34	0.32	
Reach-1	3	100 yr	Prop Cond	13000.00	545.10	559.58	560.10	0.003308	6.83	3720.61	1062.55	0.45	
Reach-1	3	100 yr	Corr Eff	13000.00	545.10	559.58	560.10	0.003308	6.83	3720.61	1062.55	0.45	
Reach-1	3	100 yr	Duplicate Eff.	13000.00	545.10	561.22	561.55	0.002932	5.53	5508.77	1111.97	0.33	
Reach-1	3	500 yr	Prop Cond	16400.00	545.10	560.82	561.25	0.002448	6.53	5062.82	1102.09	0.40	
Reach-1	3	500 yr	Corr Eff	16400.00	545.10	560.82	561.25	0.002448	6.53	5062.82	1102.09	0.40	
Reach-1	3	500 yr	Duplicate Eff.	16400.00	545.10	562.38	562.73	0.002730	5.79	6814.43	1140.41	0.32	

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	986.60	148.88	0.56
Reach-1	2	10 yr	Corr Eff	8000.00	544.00	553.19		554.21	0.004955	8.11	986.60	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 Wdth Act	Area	Vel Total	W.S. Elev	Base WS	Prof Delta WS
			(ft)	(sq ft)	(ft/s)	(ft)	(ft)	(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	Area	Vel Total	W.S. Elev	Base WS	Prof Delta WS
			(ft)	(sq ft)	(ft/s)	(ft)	(ft)	(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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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

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

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	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 Wdth 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

E.G. US. (ft)	567.04	Element	Inside BR US	Inside BR DS
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

E.G. US. (ft)	568.88	Element	Inside BR US	Inside BR DS
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

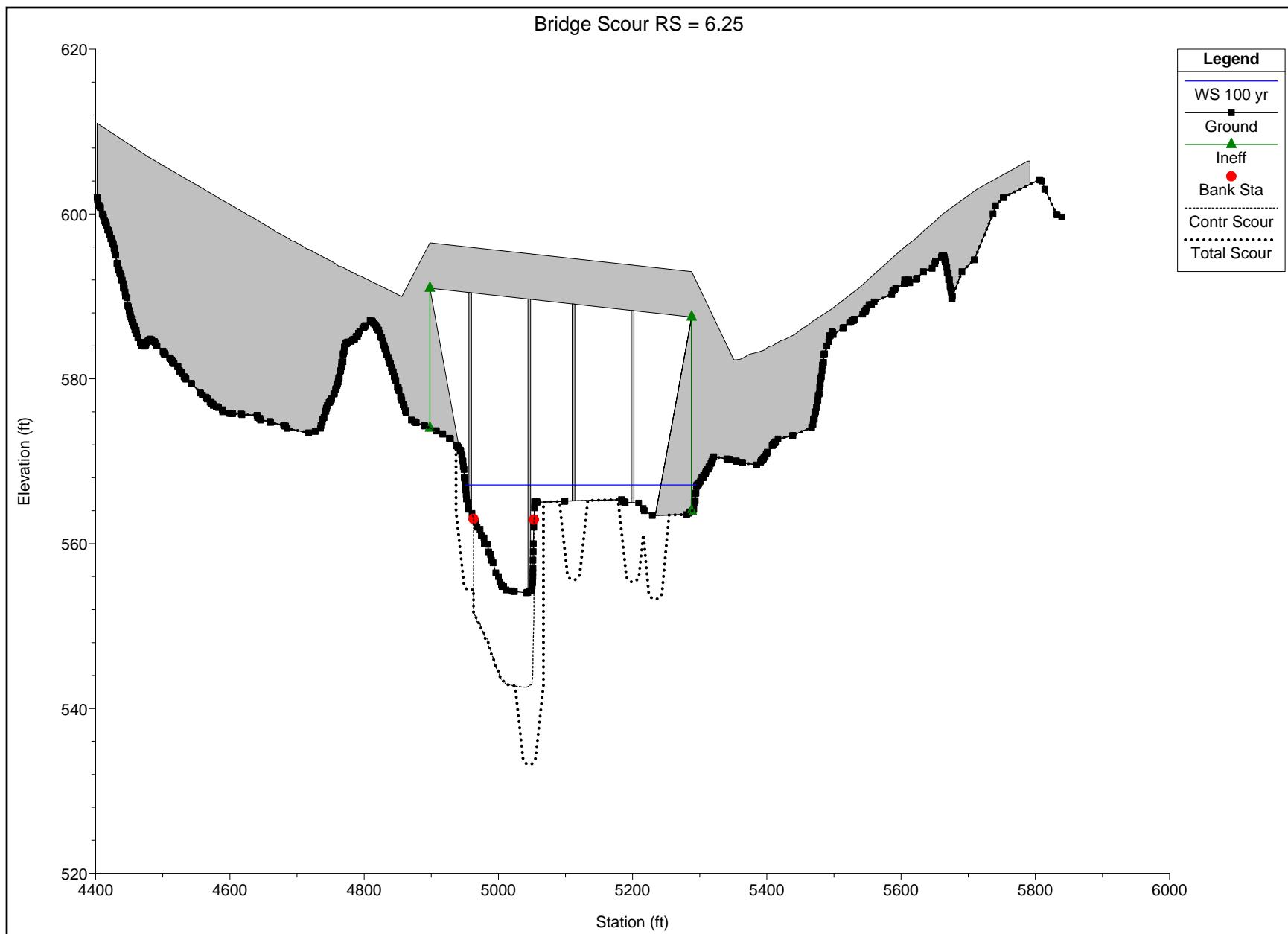
E.G. US. (ft)	569.50	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	567.81	E.G. Elev (ft)	569.74	569.74
Q Total (cfs)	13000.00	W.S. Elev (ft)	567.12	567.12
Q Bridge (cfs)	13000.00	Crit W.S. (ft)	566.74	566.74
Q Weir (cfs)		Max Chl Dpth (ft)	13.08	13.08
Weir Sta Lft (ft)		Vel Total (ft/s)	10.07	10.07
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



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 Ys = 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

81011_BuffaloCreekS83_ABWD.rep

HEC-RAS Version 4.1.0 Jan 2010
U. S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

X	X	XXXXXX	XXXX	XXXX	XX	XXXX
X	X	X	X	X	X	X
X	X	X	X	X	X	X
XXXXXXX	XXXX	X	XXX	XXXX	XXXXXX	XXXX
X	X	X	X	X	X	X
X	X	X	X	X	X	X
X	X	XXXXXX	XXXX	X	X	XXXX

PROJECT DATA

Project Title: 8.10.11 - Buffalo Creek S83 - ABW

Project File : 81011_BuffaloCreekS83_ABW.prj

Run Date and Time: 8/25/2011 10:40:56 AM

Project in English units

Project Description:

BUFFALO CREEK

WATER SURFACE PROFILE

BUFFALO CREEK, CHEROKEE CO. 10-YEAR

FLOOD

PLAN DATA

Plan Title: Duplicate Effective

Plan File : q:\60191787\400_Tech_Info_Displays\405_Hydrology & Drainage\HecRas\81011_BuffaloCreekS83_ABW.p04

Geometry Title: Imported Geom 11

Geometry File : q:\60191787\400_Tech_Info_Displays\405_Hydrology &

Drainage\HecRas\81011_BuffaloCreekS83_ABW.g05

Flow Title : Effective Flows

Flow File : q:\60191787\400_Tech_Info_Displays\405_Hydrology &

Drainage\HecRas\81011_BuffaloCreekS83_ABW.f02

Plan Description:

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

81011_BuffaloCreekS83_ABWD.rep

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

Plan Summary Information:

Number of:	Cross Sections	=	34	Multiple Openings	=	0
	Culverts	=	0	Line 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 values only
Fraction 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 : q:\60191787\400_Tech_Info_Disiplines\405_Hydrology & Drainage\HecRas\81011_BuffaloCreekS83_ABW.f02

Flow Data (cfs)

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

Boundary Conditions

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

Known WS = 553.2
 RI VER-1 Reach-1 500 yr
 Known WS = 554.48

GEOMETRY DATA

Geometry Title: Imported Geom 11
 Geometry File : q:\60191787\400 Tech Info_Di sci pl i nes\405 Hydrology &
 Drainge\HecRas\81011_Buffal oCreekS83_ABW.g05

CROSS SECTION

RI VER: RI VER-1
 REACH: Reach-1 RS: 17

I NPUT

Description:

Station	El evation	Data	num=	15	Sta	El ev	Sta	El ev	Sta	El ev
0	584	20		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	

Manni ng' s n Val ues

Sta	n Val						
0	1000	550	.2	810	.06	935	.2

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 810 910 630 550 470 .1 .3
 Sediment El evation = 0

CROSS SECTION

RI VER: RI VER-1
 REACH: Reach-1 RS: 16

I NPUT

Description:

Station	El evation	Data	num=	14	Sta	El ev	Sta	El ev	Sta	El ev
0	587.5	249		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			

Manni ng' s n Val ues

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 1000 .1 .3
 Sediment El evation = 0

CROSS SECTION

RI VER: RI VER-1
 REACH: Reach-1 RS: 15

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INPUT

Description:

Station	Elevation	Data	num=	18	Station	Elevation	Station	Elevation	Station	Elevation
0	584	59	El ev	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

Sta	n	Val	Sta	n	Val	Sta	n	Val
0	1000		1100	.2		2080	.06	

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	El ev	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

Sta	n	Val	Sta	n	Val	Sta	n	Val
0	1000		1100	.2		2230	.06	

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	El ev	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

Sta	n	Val	Sta	n	Val	Sta	n	Val

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0	1000	1236	.2	1647	.06	1770	.2
Bank Sta:	Left 1647	Right 1770	Lengths:	Left 940	Channel 910	Right 890	Coeff .1
Sediment El elevation = 0							Expan. .3

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1 RS: 12.1

I INPUT

Description:

Station	El elevation	Data	num=	16	Sta	El ev						
Sta	El ev	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											

Mannings' n	Values	num=	4	Sta	n Val	Sta	n Val	Sta	n Val
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	1000	1340	.2	1850	.06	2015	.2		
Bank Sta:	Left 1850	Right 2015	Lengths:	Left 810	Channel 890	Right 970	Coeff .1		Expan. .3
Sediment El elevation = 0									

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1 RS: 12

I INPUT

Description:

Station	El elevation	Data	num=	28	Sta	El ev						
Sta	El ev	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							

Mannings' n	Values	num=	4	Sta	n Val	Sta	n Val	Sta	n Val
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	1000	870	.2	1212	.06	1390	.2		
Bank Sta:	Left 1212	Right 1390	Lengths:	Left 450	Channel 500	Right 550	Coeff .1		Expan. .3
Sediment El elevation = 0									

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1 RS: 11.3

I INPUT

Description: This is a REPEATED section.

81011_BuffaloCreekS83_ABWD.rep

Station	Elevation	Data	num=	16	Station	Elevation	Station	Elevation	Station	Elevation
Sta 0	584.3	120	El ev 584.2	138	Sta 153	576.9	Sta 153	570.8	Sta 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									

Mannings' s	n	Values	num=	4	Station	n	Val	Station	n	Val
Sta 0	n Val 1000	138	n Val .2	214	n Val .06	400	n Val .2			

Bank Sta: Left Right
214 400
Sediment Elevation = 0

CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1

RS: 11.2

I INPUT

Description:

Station	Elevation	Data	num=	16	Station	Elevation	Station	Elevation	Station	Elevation
Sta 0	584.3	120	El ev 584.2	138	Sta 153	576.9	Sta 153	570.8	Sta 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									

Mannings' s	n	Values	num=	3	Station	n	Val
Sta 0	n Val .06	214	n Val .06	400	n Val .06		

Bank Sta: Left Right
214 400
Sediment Elevation = 0

CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1

RS: 10.1

I INPUT

Description:

Station	Elevation	Data	num=	15	Station	Elevation	Station	Elevation	Station	Elevation
Sta 0	580	60	El ev 576	105	Sta 135	572	Sta 135	568	Sta 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	

Mannings' s	n	Values	num=	4	Station	n	Val	Station	n	Val
Sta 0	n Val 1000	105	n Val .2	155	n Val .06	280	n Val .2			

Bank Sta: Left Right
155 280
Sediment Elevation = 0

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1 RS: 10

I NPUT

Description:

Station	Elevation	Data	num=	32	Station	Elevation	Station	Elevation	Station	Elevation
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						

Manni ng' s n Val ues

Station	n Val	Station	n Val	num=	3	Station	n Val
0	.2	609	.06		751		.2

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

Sedi ment Elevation = 0

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1 RS: 9.3

I NPUT

Description:

Station	Elevation	Data	num=	17	Station	Elevation	Station	Elevation	Station	Elevation
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						

Manni ng' s n Val ues

Station	n Val	Station	n Val	num=	3	Station	n Val
0	.2	220	.06		307		.2

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

Sedi ment Elevation = 0

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1 RS: 9.2

I NPUT

Description:

Station	Elevation	Data	num=	22	Station	Elevation	Station	Elevation	Station	Elevation
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						

Manni ng' s n Val ues

num= 4

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
 Sediment El evati on = 0

CROSS SECTION

RI VER: RI VER-1
 REACH: Reach-1 RS: 9.1

I INPUT

Description: This is a REPEATED section.

Station	El evati on	Data	num=	13	Station	El ev	Station	El ev	Station	El ev
Sta 0	El ev 590	Sta 23	El ev 572.3	Sta 42	El ev 562.9	Sta 55	El ev 561.4	Sta 79	El ev 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	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
Sta 0	n Val .2	93	n Val .06	165	n Val .2	365	n Val 1000		

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

CROSS SECTION

RI VER: RI VER-1
 REACH: Reach-1 RS: 9

I INPUT

Description:

Station	El evati on	Data	num=	13	Station	El ev	Station	El ev	Station	El ev
Sta 0	El ev 590	Sta 23	El ev 572.3	Sta 42	El ev 562.9	Sta 55	El ev 561.4	Sta 79	El ev 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	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
Sta 0	n Val .2	93	n Val .06	165	n Val .2	365	n Val 1000		

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

CROSS SECTION

RI VER: RI VER-1
 REACH: Reach-1 RS: 8

I INPUT

Description:

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

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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		
Mannings' s	n Values	Sta n	Val Sta	num= n	4 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.		
Sediment	Elevation = 0		650	640	640	.3	.5		

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1

RS: 7

INPUT

Description:

Station	Elevation	Data	num=	24	Station	Elevation	Station	Elevation	Station	Elevation
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			

Mannings' s	n Values	Sta n	Val Sta	num= n	4 Sta	n Val	Sta	n Val	
0	.2	148	.06	228.5	.2	352	1000		
Bank Sta:	Left Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.		
Sediment	Elevation = 0		9	9	9	.1	.3		

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1

RS: 6.5

INPUT

Description:

Station	Elevation	Data	num=	24	Station	Elevation	Station	Elevation	Station	Elevation
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	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			

Mannings' s	n Values	Sta n	Val Sta	num= n	4 Sta	n Val	Sta	n Val	
0	.2	148	.06	228.5	.2	352	1000		
Bank Sta:	Left Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.		
Sediment	Elevation = 0		11	11	11	.1	.3		

CROSS SECTION

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RI VER: RI VER-1
REACH: Reach-1

RS: 6. 4

I NPUT

Description:

Station	Elevation	Data	num=	17	Station	Elevation	Station	Elevation	Station	Elevation
Sta 0	576	30	El ev 572	60	Sta 140	568	Sta 500	566.3	Sta 560	100
130	560	135	553.8	140	550	185	550.5	235	553.8	
240	560	340	564	360	568		563.5	560	572	
570	576	580	580							

Manni ng's n Val ues

Sta n	Val	Sta n	Val	num=	3
Sta 0 n	.2	Sta 130 n	.06	Sta 240 n	.2

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	130	240		30	30	30	.3		.5

Sediment Elevation = 0

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1

RS: 6. 3

I NPUT

Description: This is a REPEATED section.

Station	Elevation	Data	num=	13	Station	Elevation	Station	Elevation	Station	Elevation
Sta 0	582.5	50	El ev 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					

Manni ng's n Val ues

Sta n	Val	Sta n	Val	num=	3
Sta 0 n	.2	Sta 0 n	.06	Sta 323 n	.2

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	0	323		50	50	50	.3		.5

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

Sediment Elevation = 0

BRI DGE

RI VER: RI VER-1
REACH: Reach-1

RS: 6. 25

I NPUT

Description: Bridge #1

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

Upstream Deck/Roadway Coordinates

num=	3	
Sta Hi Cord	584.5	582.5

Sta	Hi	Cord	Lo	Cord
150	584.5		582.5	

Sta	Hi	Cord	Lo	Cord
323	584.5		582.5	

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Upstream Bridge Cross Section Data
 Station El evat ion Data num= 13
 Sta
 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 El ev Permanent
 0 0 584.5 F
 323 323 584.5 F

Sediment El evation = 0

Downstream 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

Downstream Bridge Cross Section Data

Station El evat ion Data num= 13
 Sta
 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 El ev Permanent
 0 0 582.5 F
 323 323 582.5 F

Sediment El evation = 0

Upstream Embankment side slope = 0 horiz. to 1.0 vertical

Downstream Embankment side slope = 0 horiz. to 1.0 vertical

Maximum allowable submergence for weir flow = .98

El evation 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= 161.5 Downstream= 161.5
 Upstream num= 2
 Wi dth El ev Wi dth El ev
 5.6 547.5 5.6 582.5
 Downstream num= 2
 Wi dth El ev Wi dth El ev
 5.6 547.5 5.6 582.5

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Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Yarnell I KVal = 1.05
Selected Low Flow Methods = Yarnell I

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	Station	Elevation	Station	Elevation	Station	Elevation
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

Station	n Val	Station	n Val	num=	3	Station	n Val
0	.2	0	.06		323		.2

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

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

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 6.1

INPUT

Description:

Station	Elevation	Data	num=	11	Station	Elevation	Station	Elevation	Station	Elevation
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

Station	n Val	Station	n Val	num=	3	Station	n Val
0	.2	355	.06		420		.2

Bank Sta: Left 355 Right 420 81011_BuffaloCreekS83_ABWD. rep
Lengths: Left 880 Channel 960 Right 1040 Coeff .3 Contr. .5 Expan. .5

CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1

RS: 5

INPUT

Description:

Station	Elevation	Data	num=	15	Sta	Elev	Sta	Elev	Sta	Elev
0	584	35			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

Sta	n	Val	Sta	n	Val	3		
0	.2		540	.06		Sta	n	Val

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

CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1

RS: 4.4

INPUT

Description:

Station	Elevation	Data	num=	23	Sta	Elev	Sta	Elev	Sta	Elev
0	580	45			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

Sta	n	Val	Sta	n	Val	3		
0	.2		655	.06		Sta	n	Val

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

CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1

RS: 4.3

INPUT

Description:

Station	Elevation	Data	num=	19	Sta	Elev	Sta	Elev	Sta	Elev
0	576	60			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
 0 .2 1255
 n Val Sta n Val
 .06 1330 .2
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr.
 1255 1330 1200 1200 1200 .1 Expan.
 .3

CROSS SECTION

RI VER: RI VER-1
 REACH: Reach-1 RS: 4

INPUT

Description:

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

Mannings' s	n	Values	num=	5	Station	n	Val	Station	n	Val	Station	n	Val
0	1000	555	El ev	.2	1210	.06	1355	.2	1854	1000			

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

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1 RS: 3.8

INPUT

Description:

Station	Elevation	Data	num=	24	Sta	Elev	Sta	Elev	Sta	Elev
0	568	80	Elev	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		

Manning's n Values num= 5

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

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

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

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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		
Mannings' s	n	Values		num=	3						
Sta	n	Val		Sta	600	n	Val				
0	.2			450		.06					
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	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev		
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								
Mannings'	s	n	Values		3						
Sta	n	Val		Sta	341	n	Val				
0	.2			80		.06					
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	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev		
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						
Mannings'	s	n	Values		3						
Sta	n	Val		Sta	230	n	Val				
0	.2			135		.06					
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							
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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						

Mannings' s	n	Val	ues	num=	3				
Sta	n	Val		Sta	n	Val		Sta	
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

RI VER: RI VER-1

REACH: Reach-1

RS: 2. 1

I INPUT

Description:

Station	El elevation	Data	num=	13					
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				

Mannings' s	n	Val	ues	num=	3				
Sta	n	Val		Sta	n	Val		Sta	
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

RI VER: RI VER-1

REACH: Reach-1

RS: 2

I INPUT

Description:

Station	El 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		

Mannings' s	n	Val	ues	num=	3				
Sta	n	Val		Sta	n	Val		Sta	
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
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

Sta	n Val	Sta	n Val	3	Sta	n Val
0	.2	678	.06	1092	0	.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	

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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
Reach-1	3.8	1000		.2	.06	.2
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

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

81011_BuffaloCreekS83_ABWD. rep				
Reach-1	9		650	640
Reach-1	8		650	640
Reach-1	7		9	9
Reach-1	6. 5		11	11
Reach-1	6. 4		30	30
Reach-1	6. 3		50	50
Reach-1	6. 25	Bri dge		
Reach-1	6. 2		300	300
Reach-1	6. 1		880	960
Reach-1	5		840	840
Reach-1	4. 4		450	450
Reach-1	4. 3		1200	1200
Reach-1	4		450	450
Reach-1	3. 8		510	510
Reach-1	3. 7		530	600
Reach-1	3. 4		600	510
Reach-1	3. 3		580	570
Reach-1	3		450	440
Reach-1	2. 1		580	850
Reach-1	2		400	1200
Reach-1	1		0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
 Ri ver: RI VER-1

Reach	Ri ver	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	Bri dge	
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

Reach-1 2.1 .1 .3
Reach-1 2 .1 .3
Reach-1 1 .1 .3

81011_BuffaloCreekS83_ABWC.rep

HEC-RAS Version 4.1.0 Jan 2010
U. S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

X	X	XXXXXX	XXXX	XXXX	XX	XXXX
X	X	X	X	X	X	X
X	X	X	X	X	X	X
XXXXXXX	XXXX	X	XXX	XXXX	XXXXXX	XXXX
X	X	X	X	X	X	X
X	X	X	X	X	X	X
X	X	XXXXXX	XXXX	X	X	XXXX

PROJECT DATA

Project Title: 8.10.11 - Buffalo Creek S83 - ABW

Project File : 81011_BuffaloCreekS83_ABW.prj

Run Date and Time: 8/25/2011 10:40:13 AM

Project in English units

Project Description:

BUFFALO CREEK

WATER SURFACE PROFILE

BUFFALO CREEK, CHEROKEE CO. 10-YEAR

FLOOD

PLAN DATA

Plan Title: Corrected Effective

Plan File : q:\60191787\400_Tech_Info_Displays\405_Hydrology & Drainage\HecRas\81011_BuffaloCreekS83_ABW.p21

Geometry Title: Corrected Effective

Geometry File : q:\60191787\400_Tech_Info_Displays\405_Hydrology &

Drainage\HecRas\81011_BuffaloCreekS83_ABW.g16

Flow Title : Effective Flows

Flow File : q:\60191787\400_Tech_Info_Displays\405_Hydrology &

Drainage\HecRas\81011_BuffaloCreekS83_ABW.f02

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

81011_BuffaloCreekS83_ABWC.rep
 Critical depth computed only where necessary
 Conveyance Calculation Method: At breaks in values only
 Fraction Slope Method: Average Conveyance
 Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Effective Flows
 Flow File: q:\60191787\400_Tech_Info_Displines\405_Hydrology &
 Drainage\HecRas\81011_BuffaloCreekS83_ABW.f02

Flow Data (cfs)

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

Boundary Conditions

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

GEOMETRY DATA

Geometry Title: Corrected Effective
 Geometry File: q:\60191787\400_Tech_Info_Displines\405_Hydrology &
 Drainage\HecRas\81011_BuffaloCreekS83_ABW.g16

CROSS SECTION

RI VER: RI VER-1
 REACH: Reach-1 RS: 17

INPUT

Description:

Station	Elev	Data	num=	15	Sta	Elev	Sta	Elev	Sta	Elev
0	584	20			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

Mannings' s	n	Values	Sta	n	Val	Sta	n	Val	Sta	n	Val
0	.1		550	.1		810	.045		935	.1	

4

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
810	910		630	550	470		.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	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			

Mannings'	s	n	Values	Sta	n	Val	Sta	n	Val	Sta	n	Val
0	.1		1655	.1		1700	.045		1785	.1		

4

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
1700	1785		1140	1200	1000		.1	.3	

Sediment Elevation = 0

CROSS SECTION

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

INPUT

Description:

Station	Elevation	Data	num=	18	Sta	Elev	Sta	Elev	Sta	Elev
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
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					

Mannings'	s	n	Values	Sta	n	Val	Sta	n	Val	Sta	n	Val
0	.1		1100	.1		2080	.045		2260	.1		

4

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
---------	-----------	------	------	----

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						

Mannings' n Values				num=	4				
Sta	n Val	Sta	n Val	n Val	Sta	n Val	Sta	n Val	Sta
0	.1	1100	.1	.1	2230	.045	2365	.1	
Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	2230	2365		1030	1000	910	.1	.1	.3
Sediment	El elevation = 0								

CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1

RS: 13

INPUT

Description:

Station El elevation Data num= 39									
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
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		

Mannings' n Values				num=	4				
Sta	n Val	Sta	n Val	n Val	Sta	n Val	Sta	n Val	Sta
0	.1	1236	.1	.1	1647	.045	1770	.1	
Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	1647	1770		940	910	890	.1	.1	.3
Sediment	El elevation = 0								

CROSS SECTION

RI VER: RI VER-1

REACH: Reach-1

RS: 12.1

INPUT

Description:

Station El elevation 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								

Mannings' n Values				num=	4				
Sta	n Val	Sta	n Val	n Val	Sta	n Val	Sta	n Val	Sta
0	.1	1340	.1	.1	1850	.045	2015	.1	
Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	1850	2015		810	890	970	.1	.1	.3
Sediment	El elevation = 0								

81011_BuffaloCreekS83_ABWC.rep

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 12

INPUT

Description:

Station	Elevation	Data	num=	28	Sta	Elev	Sta	Elev	Sta	Elev
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

Sta	n Val	Sta	num=	4	Sta	n Val	Sta	n Val
0	.1	870			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	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

Sta	n Val	Sta	num=	4	Sta	n Val	Sta	n Val
0	.1	138			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	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

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 214	Right 400	Lengths: Left 120	Channel 100	Right 80	Coeff .1	Contr. .1	Expan. .3
Sediment Elevation = 0								

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 10.1

INPUT

Description:

Station El elevation 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

Sta n Val	Sta n Val	Sta n Val
0 .1	105 .1	155 .045
		280 .1

Bank Sta:	Left 155	Right 280	Lengths: Left 470	Channel 400	Right 340	Coeff .1	Contr. .1	Expan. .3
Sediment Elevation = 0								

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 10

INPUT

Description:

Station El 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

Sta n Val	Sta n Val	Sta n Val
0 .1	609 .045	751 .1

Bank Sta:	Left 609	Right 751	Lengths: Left 600	Channel 1040	Right 1070	Coeff .1	Contr. .1	Expan. .3
Sediment Elevation = 0								

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 9.3

81011_BuffaloCreekS83_ABWC.rep

INPUT

Description:

Station	Elevation	Data	num=	17	Station	Elevation	Station	Elevation	Station	Elevation
0	580	30	El ev	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

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	510		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 9.2

INPUT

Description:

Station	Elevation	Data	num=	22	Station	Elevation	Station	Elevation	Station	Elevation
0	586.4	24	El ev	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

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	110		.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	Station	Elevation	Station	Elevation	Station	Elevation
0	590	23	El ev	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

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	52		.1	.3

Sediment Elevation = 0

81011_BuffaloCreekS83_ABWC.rep

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1

RS: 9

I INPUT

Description:

Station	El elevation	Data	num=	13	Station	El ev	Station	El ev	Station	El ev
Sta 0	590	23	El ev 572.3		Sta 42	562.9	Sta 55	561.4	Sta 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

Sta 0	n Val .1	Sta 104	n Val .045	4	Sta 188	n Val .1	Sta 371	n Val .1
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Bank Sta: Left 42	Right 129	Lengths: Left 650	Channel 640	Right 640	Coeff .1	Contr. .1	Expan. .3
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Sediment El elevation = 0

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1

RS: 8

I INPUT

Description:

Station	El elevation	Data	num=	24	Station	El ev	Station	El ev	Station	El ev
Sta 0	580	10	El ev 576		Sta 22	572	Sta 28	569.5	Sta 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

Sta 0	n Val .1	Sta 93	n Val .045	4	Sta 165	n Val .1	Sta 365	n Val .1
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Bank Sta: Left 93	Right 165	Lengths: Left 650	Channel 640	Right 640	Coeff .1	Contr. .1	Expan. .3
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Sediment El elevation = 0

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1

RS: 7

I INPUT

Description:

Station	El elevation	Data	num=	24	Station	El ev	Station	El ev	Station	El ev
Sta 0	582	4	El ev 582		Sta 8	579	Sta 18	578	Sta 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= 81011_BuffaloCreekS83_ABWC.rep
 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

RI VER: RI VER-1
 REACH: Reach-1 RS: 6.5

INPUT

Description:

Station	Elevation	Data	num=	24	Station	Elevation	Station	Elevation	Station	Elevation
Sta 0	El ev 582	Sta 4	El ev 582	Sta 8	El ev 579	Sta 18	El ev 578	Sta 22	El ev 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

RI VER: RI VER-1
 REACH: Reach-1 RS: 6.4

INPUT

Description:

Station	Elevation	Data	num=	419	Station	Elevation	Station	Elevation	Station	Elevation
Sta 4600	El ev 584.251	Sta 4600.35	El ev 584.236	Sta 4602.08	El ev 584.198	Sta 4602.92	El ev 583.937	Sta 4605.08	El ev 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	

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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								

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Mannings' s	n	Values	num=	3							
Sta	n	Val	Sta	n	Val	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

RI VER: RI VER-1

REACH: Reach-1

RS: 6.3

INPUT

Description: This is a REPEATED section.

Station El evation Data num= 480

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
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
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
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
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
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
4766.48	582	4768.53	582.073	4768.69		583	4769.25	583.074	4770.31
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	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
4831.62	583.579	4832.85	583.153	4833.74	582.934	4835.64	582.606	4836.78	582.248

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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	

Mannings' 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	.5		
Ineffective Flow	num=	2	Permanent								
Sta L	Sta R	El ev									
4402.	15	4908.	5	585.	417	F					
5281	5839.	44	578.	417	F						

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Sediment Elevation = 0

BRI DGE

RI VER: RI VER-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		5281				582	
5350.	707	582.	316		5353.	528		582.	303	5353.	634		582.	305	
	5356.	29		582.	329			5359.	836	582.	379		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	

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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						
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

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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		

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 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

Mannings' 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 El evation = 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		

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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	
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

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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

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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	5905.5663.55	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 El ev Permanent
 4402.15 4908.5 585.417 F
 5281 5839.44 578.417 F

Sediment Elevation = 0

Upstream Embankment side slope = 2 horiz. to 1.0 vertical
 Downstream Embankment side slope = 2 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .98
 Elevation at which weir flow begins = 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 El ev Sta El ev
 4908.5 585.417 5058.5 485.417
 Downstream num= 2
 Sta El ev Sta El ev
 4908.5 585.417 5058.5 485.417

Abutment Data

Upstream num= 2
 Sta El ev Sta El ev
 5131 478.11 5281 578.11
 Downstream num= 2
 Sta El ev Sta El ev
 5131 478.67 5281 578.67

Number of Piers = 11

Pier Data

Pier Station Upstream= 4969.5 Downstream= 4969.5
 Upstream num= 2
 Wi dth El ev Wi dth El ev
 3 547.5 3 590
 Downstream num= 2
 Wi dth El ev Wi dth El ev
 3 547.5 3 590

Pier Data

Pier Station Upstream= 5030.5 Downstream= 5030.5
 Upstream num= 2
 Wi dth El ev Wi dth El ev

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Downstream	3	547.5	num=	3	590	
Width	El ev		Width	2	El ev	
3	547.5		3		590	

Pier Data

Pier Station	Upstream=	5055.5	Downstream=	5055.5
Upstream	num=	2		
Width	El ev	Width	El ev	
.833	547.5	.833	590	

Downstream	num=	2		
Width	El ev	Width	El ev	
.833	547.5	.833	590	

Pier Data

Pier Station	Upstream=	5080.5	Downstream=	5080.5
Upstream	num=	2		
Width	El ev	Width	El ev	
.833	547.5	.833	590	

Downstream	num=	2		
Width	El ev	Width	El ev	
.833	547.5	.833	590	

Pier Data

Pier Station	Upstream=	5105.5	Downstream=	5105.5
Upstream	num=	2		
Width	El ev	Width	El ev	
.833	547.5	.833	590	

Downstream	num=	2		
Width	El ev	Width	El ev	
.833	547.5	.833	590	

Pier Data

Pier Station	Upstream=	5130.5	Downstream=	5130.5
Upstream	num=	2		
Width	El ev	Width	El ev	
.833	547.5	.833	590	

Downstream	num=	2		
Width	El ev	Width	El ev	
.833	547.5	.833	590	

Pier Data

Pier Station	Upstream=	5155.5	Downstream=	5155.5
Upstream	num=	2		
Width	El ev	Width	El ev	
.833	547.5	.833	590	

Downstream	num=	2		
Width	El ev	Width	El ev	
.833	547.5	.833	590	

Pier Data

Pier Station	Upstream=	5180.5	Downstream=	5180.5
Upstream	num=	2		
Width	El ev	Width	El ev	
.833	547.5	.833	590	

Downstream	num=	2		
Width	El ev	Width	El ev	
.833	547.5	.833	590	

Pier Data

Pier Station	Upstream=	5205.5	Downstream=	5205.5
Upstream	num=	2		
Width	El ev	Width	El ev	

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.833	547.5	.833	590
Downstream	num=	2	
Width	El ev	Width	El ev
.833	547.5	.833	590

Pier Data

Pier Station	Upstream=	5230.5	Downstream=	5230.5
Upstream	num=	2		
Width	El ev	Width	El ev	
.833	547.5	.833	590	
Downstream	num=	2		
Width	El ev	Width	El ev	
.833	547.5	.833	590	

Pier Data

Pier Station	Upstream=	5255.5	Downstream=	5255.5
Upstream	num=	2		
Width	El ev	Width	El ev	
.833	547.5	.833	590	
Downstream	num=	2		
Width	El ev	Width	El ev	
.833	547.5	.833	590	

Number of Bridge Coefficient Sets = 1

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

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	El elevation	Data num=	480						
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

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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

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 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 El ev Permanent
 4402.15 4908.5 585.417 F
 5281 5839.44 578.417 F

Sediment El ev ation = 0

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 6.1

INPUT

Description:

Station	El evation	Data	num=	471					
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
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

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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

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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								

Mannings' 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

RI VER: RI VER-1

REACH: Reach-1

RS: 5

INPUT

Description:

Station	Elev	Data	num=	15	Sta	Elev	Sta	Elev	Sta	Elev
0	584	35			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

Mannings' 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

RI VER: RI VER-1

REACH: Reach-1

RS: 4. 4

INPUT

Description:

Station	Elev	Data	num=	23	Sta	Elev	Sta	Elev	Sta	Elev
0	580	45			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				

Mannings' 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 .1 Contr. .1 Expan. .3

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 4.3

INPUT

Description:

Station	Elevation	Data	num=	19	Station	Elevation	Station	Elevation	Station	Elevation
Sta 0	576	60	El ev	572	Sta 105	568	Sta 335	564	Sta 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

Sta 0	n Val .1	Sta 1255	n Val .045	3	Sta 1330	n Val .1
-------	----------	----------	------------	---	----------	----------

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

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 4

INPUT

Description:

Station	Elevation	Data	num=	28	Station	Elevation	Station	Elevation	Station	Elevation
Sta 0	576	20	El ev	572	Sta 135	568	Sta 160	564	Sta 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

Sta 0	n Val .1	Sta 555	n Val .1	5	Sta 1210	n Val .045	Sta 1355	n Val .1	Sta 1854	n Val .1
-------	----------	---------	----------	---	----------	------------	----------	----------	----------	----------

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

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 3.8

INPUT

Description:

Station	Elevation	Data	num=	24	Station	Elevation	Station	Elevation	Station	Elevation
Sta 0	568	80	El ev	564	Sta 120	560	Sta 143	556	Sta 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

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1000	568	1060	572	1095	576	1130	580
Manni ng' s	n Val ues		num=	5			
Sta 0	n Val .1	Sta 120	n Val .1	Sta 570	n Val .045	Sta 642	n Val .1
Bank Sta:	Left 570	Right 642	Lengths:	Left 510	Channel 510	Right 520	Coeff .1
							Contr. .3

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1 RS: 3.7

INPUT

Description:

Station	El evati on	Data	num=	15				
Sta 0	El ev 568	Sta 10	El ev 564	Sta 30	El ev 560	Sta 50	El ev 556	Sta 210
450	556	500	552	520	548	523	547	568
570	548	580	552	600	556	695	560	765
Manni ng' s	n Val ues		num=	3				
Sta 0	n Val .1	Sta 450	n Val .045	Sta 600	n Val .1			
Bank Sta:	Left 450	Right 600	Lengths:	Left 530	Channel 600	Right 720	Coeff .1	Expan. .3

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1 RS: 3.4

INPUT

Description:

Station	El evati on	Data	num=	17				
Sta 0	El ev 568	Sta 12	El ev 564	Sta 32	El ev 560	Sta 49	El ev 556	Sta 80
160	550	250	547	320	547	330	548	341
790	556	1035	560	1050	564	1068	568	1078
1089	576	1100	580					572
Manni ng' s	n Val ues		num=	3				
Sta 0	n Val .1	Sta 80	n Val .045	Sta 341	n Val .1			
Bank Sta:	Left 80	Right 341	Lengths:	Left 600	Channel 510	Right 400	Coeff .1	Expan. .3

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1 RS: 3.3

INPUT

Description:

Station	El evati on	Data	num=	13				
Sta 0	El ev 572	Sta 60	El ev 568	Sta 95	El ev 564	Sta 110	El ev 560	Sta 120

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135	552	145	547	210	547	230	552	750	554		
1110	556	1150	560	1335	580						
Mannings' 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	Station	Elevation	Station	Elevation	Station	Elevation
Sta 0	572.6	16	El ev	572	Sta 73	568	Sta 97	564	Sta 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							

Mannings' s

Values

num=

3

Sta 0

n Val .1

Sta 421

n Val .045

Sta 604

n Val .1

Bank Sta: Left

421 Right

Lengths:

604

Left

450

Channel

440

Right

400

Coeff

.1

Expan.

.3

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 2.1

INPUT

Description:

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

Mannings' s

Values

num=

3

Sta 0

n Val .1

Sta 212

n Val .045

Sta 321

n Val .1

Bank Sta: Left

212 Right

Lengths:

321

Left

580

Channel

850

Right

820

Coeff

.1

Expan.

.3

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 2

INPUT

Description:

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Station	Elevation	Data	num=	29	Station	Elevation	Station	Elevation	Station	Elevation
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			

Mannings' s	n	Values	num=	3	Station	n	Val
Sta	n	Val	Sta	n	Val	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	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1

RS: 1

INPUT

Description:

Station	Elevation	Data	num=	28	Station	Elevation	Station	Elevation	Station	Elevation
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					

Mannings' s	n	Values	num=	3	Station	n	Val
Sta	n	Val	Sta	n	Val	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	.1	.3

SUMMARY OF MANNINGS' 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	

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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		

SUMMARY OF REACH LENGTHS

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Ri ver: RI VER-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
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		Bri dge		
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

Ri ver: RI VER-1

Reach	Ri ver	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

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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	Bri dge	
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

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HEC-RAS Version 4.1.0 Jan 2010
U. S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

X	X	XXXXXX	XXXX	XXXX	XX	XXXX
X	X	X	X	X	X	X
X	X	X	X	X	X	X
XXXXXXX	XXXX	X	XXX	XXXX	XXXXXX	XXXX
X	X	X	X	X	X	X
X	X	X	X	X	X	X
X	X	XXXXXX	XXXX	X	X	XXXX

PROJECT DATA

Project Title: 8.10.11 - Buffalo Creek S83 - ABW

Project File : 81011_BuffaloCreekS83_ABW.prj

Run Date and Time: 9/7/2011 1:34:26 PM

Project in English units

Project Description:

BUFFALO CREEK

WATER SURFACE PROFILE

BUFFALO CREEK, CHEROKEE CO. 10-YEAR

FLOOD

PLAN DATA

Plan Title: Proposed Conditions

Plan File : q:\60191787\400_Tech_Info_Displays\405_Hydrology & Drainage\HecRas\81011_BuffaloCreekS83_ABW.p20

Geometry Title: Proposed Conditions

Geometry File : q:\60191787\400_Tech_Info_Displays\405_Hydrology &

Drainage\HecRas\81011_BuffaloCreekS83_ABW.g15

Flow Title : Effective Flows

Flow File : q:\60191787\400_Tech_Info_Displays\405_Hydrology &

Drainage\HecRas\81011_BuffaloCreekS83_ABW.f02

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

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

FLOW DATA

Flow Title: Effective Flows
 Flow File : q:\60191787\400_Tech_Info_Displines\405_Hydrology &
 Drainage\HecRas\81011_BuffaloCreekS83_ABW.f02

Flow Data (cfs)

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

Boundary Conditions

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

GEOMETRY DATA

Geometry Title: Proposed Conditions
 Geometry File : q:\60191787\400_Tech_Info_Displines\405_Hydrology &
 Drainage\HecRas\81011_BuffaloCreekS83_ABW.g15

CROSS SECTION

RI VER: RI VER-1
 REACH: Reach-1 RS: 17

INPUT

Description:

Station	Elev	Data	num=	15	Sta	Elev	Sta	Elev	Sta	Elev
0	584	20			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

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Manning's n Values			num= 4			n Val			n Val		
Sta 0	n Val .1	Sta 550	Sta 810	n Val .1	Sta 935	n Val .1	Sta 935	n Val .045	Sta 935	n Val .1	
Bank Sta: Left 810	Right 910		Lengths: Left 630	Channel 550	Ri ght 470		Coeff .1	Contr. .1	Expan. .3		
Sediment El evation = 0											

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1 RS: 16

I NPUT

Descri ption:

Station El evation Data			num= 14			n Val			n Val		
Sta 0	El ev 587.5	Sta 249	Sta 395	El ev 580	Sta 578	El ev 576	Sta 1655	El ev 572	Sta 1800	El ev 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			n Val			n Val		
Sta 0	n Val .1	Sta 1655	Sta 1700	n Val .045	Sta 1785	n Val .1	Sta 1785	n Val .1	Sta 1785	n Val .1	
Bank Sta: Left 1700	Right 1785		Lengths: Left 1140	Channel 1200	Ri ght 1000		Coeff .1	Contr. .1	Expan. .3		
Sediment El evation = 0											

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1 RS: 15

I NPUT

Descri ption:

Station El evation Data			num= 18			n Val			n Val		
Sta 0	El ev 584	Sta 59	Sta 91	El ev 576	Sta 1100	El ev 574.6	Sta 1551	El ev 572	Sta 2248	El ev 568	
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			n Val			n Val		
Sta 0	n Val .1	Sta 1100	Sta 2080	n Val .045	Sta 2260	n Val .1	Sta 2260	n Val .1	Sta 2260	n Val .1	
Bank Sta: Left 2080	Right 2260		Lengths: Left 480	Channel 580	Ri ght 680		Coeff .1	Contr. .1	Expan. .3		
Sediment El evation = 0											

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1 RS: 14

I NPUT

Descri ption:

Station El evation Data	num= 22
-------------------------	---------

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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						

Mannings' n Values				num=	4				
Sta	n Val	Sta	n Val	n Val	Sta	n Val	Sta	n Val	Sta
0	.1	1100	.1	.1	2230	.045	2365	.1	

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

2230 2365 1030 1000 910 .1 .3

Sediment El elevation = 0

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1

RS: 13

INPUT

Description:

Station El elevation Data num= 39									
Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
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		

Mannings' n Values				num=	4				
Sta	n Val	Sta	n Val	n Val	Sta	n Val	Sta	n Val	Sta
0	.1	1236	.1	.1	1647	.045	1770	.1	

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

1647 1770 940 910 890 .1 .3

Sediment El elevation = 0

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1

RS: 12.1

INPUT

Description:

Station El elevation 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								

Mannings' n Values				num=	4				
Sta	n Val	Sta	n Val	n Val	Sta	n Val	Sta	n Val	Sta
0	.1	1340	.1	.1	1850	.045	2015	.1	

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

1850 2015 810 890 970 .1 .3

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Sediment El evati on = 0

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 12

INPUT

Description:

Station	El evation	Data	num=	28	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	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					

Mannin g's n Val ues

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

Sediment El evati on = 0

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 11.3

INPUT

Description: This is a REPEATED section.

Station	El evation	Data	num=	16	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	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									

Mannin g's n Val ues

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

Sediment El evati on = 0

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 11.2

INPUT

Description:

Station	El evation	Data	num=	16	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	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	

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600 584.4

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

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

214 400 120 100 80 .1 .3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 10.1

INPUT

Description:

Station El elevation 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	155 564 280 568 280 568 280 568 280 568	155 564 280 568 280 568 280 568 280 568				

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

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 10

INPUT

Description:

Station El 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			

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

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 9.3

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INPUT

Description:

Station	Elevation	Data	num=	17	Station	Elevation	Station	Elevation	Station	Elevation
0	580	30	El ev	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

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	510		.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 9.2

INPUT

Description:

Station	Elevation	Data	num=	22	Station	Elevation	Station	Elevation	Station	Elevation
0	586.4	24	El ev	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

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	110		.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	Station	Elevation	Station	Elevation	Station	Elevation
0	590	23	El ev	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

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	52		.1	.3

Sediment Elevation = 0

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CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1

RS: 9

I INPUT

Description:

Station	El elevation	Data	num=	13	Station	El ev	Station	El ev	Station	El ev
Sta 0	590	23	El ev 572.3		Sta 42	562.9	Sta 55	561.4	Sta 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

Sta 0	n Val .1	Sta 104	n Val .045	4	Sta 188	n Val .1	Sta 371	n Val .1
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Bank Sta: Left 42	Right 129	Lengths: Left 650	Channel 640	Ri ght 640	Coeff .1	Contr. .1	Expan. .3
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Sediment El elevation = 0

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1

RS: 8

I INPUT

Description:

Station	El elevation	Data	num=	24	Station	El ev	Station	El ev	Station	El ev
Sta 0	580	10	El ev 576		Sta 22	572	Sta 28	569.5	Sta 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

Sta 0	n Val .1	Sta 93	n Val .045	4	Sta 165	n Val .1	Sta 365	n Val .1
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Bank Sta: Left 93	Right 165	Lengths: Left 650	Channel 640	Ri ght 640	Coeff .1	Contr. .1	Expan. .3
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Sediment El elevation = 0

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1

RS: 7

I INPUT

Description:

Station	El elevation	Data	num=	24	Station	El ev	Station	El ev	Station	El ev
Sta 0	582	4	El ev 582		Sta 8	579	Sta 18	578	Sta 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		

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Manning's n Values	num= 3	
Sta 0 n Val .1	Sta 148 n Val .045	Sta 228.5 n Val .1
Bank Sta: Left 148 Right 228.5	Lengths: Left 9 Channel 9 Right 9	Coeff .1 Contr. .1 Expan. .3
Sediment Elevation = 0		

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1 RS: 6.5

INPUT

Description:

Station El elevation Data num= 24	Sta 0 El ev 582 Sta 4 El ev 582 Sta 8 El ev 579 Sta 18 El ev 578 Sta 22 El ev 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 0 n Val .1	Sta 148 n Val .045	Sta 228.5 n Val .1
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Bank Sta: Left 148 Right 228.5	Lengths: Left 11 Channel 11 Right 11	Coeff .1 Contr. .1 Expan. .3
Sediment Elevation = 0		

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1 RS: 6.4

INPUT

Description:

Station El elevation Data num= 419	Sta 4600 El ev 584.251 Sta 4600.35 El ev 584.236 Sta 4602.08 El ev 584.198 Sta 4602.92 El ev 583.937 Sta 4605.08 El ev 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 4655.73 581.456.07 580.826 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

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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								

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Mannings' s	n	Values		num=	3			
Sta	n	Val	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

RI VER: RI VER-1

REACH: Reach-1

RS: 6.3

INPUT

Description: This is a REPEATED section.

Station El evation Data num= 480

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	
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	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	

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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	

Mannings' 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	. 3	. 5	
Ineffective Flow	num=	2	Permanent						
Sta L	Sta R	Elev							
4402.	15	4898	591	F					
5288	5839.	44	587.	5	F				

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Sediment Elevation = 0

BRI DGE

RI VER: RI VER-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	

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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						
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

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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		

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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 ing'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 Coeff Contr. Expan.
 4963. 04 5052. 89 . 3 . 5

Ineffecti ve Fl ow num= 2
 Sta L Sta R El ev Permanent
 4402. 15 4898 591 F
 5288 5839. 44 587. 5 F
 Sedi ment El ev ation = 0

Downstream Deck/Roadway Coordi nates

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	4497.	811	606	4499.	569	605. 894	4520.	151	604. 934
4479. 28	606. 886	4479.	822	606. 865	4497.	811	606	4522.	094	604. 861	4541.	183	603. 95	4543.	481	603. 847
4498. 863	605. 936	4498.	942	605. 935	4519.	117	605	4562.	302	602. 948	4564.	93	602. 828	4583.	845	601. 911
4500. 566	605. 88	4519.	117	605	4521.	139	604. 877	4584.	906	601. 849	4585.	634	601. 8	4605.	019	600. 908
4520. 283	604. 932	4521.	139	604. 877	4541.	072	603. 952	4605.	817	600. 86	4606.	025	600. 857	4624.	852	600
4540. 407	604	4541.	072	603. 952	4543.	326	603. 852	4607.	951	600. 788	4626.	353	599. 898	4645.	848	598. 956
4542. 396	603. 866	4543.	326	603. 852	4562.	208	602. 947	4646.	032	598. 849	4649.	385	598. 823	4668.	414	597. 855
4561. 587	603	4562.	208	602. 947	4564.	119	602. 843	4666.	249	598	4671.	95	597. 696	4690.	699	596. 83
4562. 544	602. 943	4564.	119	602. 843	4583.	764	601. 913	4670.	876	597. 714	4692.	994	596. 721	4710.	626	596
4582. 446	602	4583.	764	601. 913	4584.	906	601. 849	4688.	179	597	4713.	151	595. 856	4718.	673	595. 684
4584. 758	601. 851	4584.	906	601. 849	4603.	723	601	4692.	64	596. 741	4725.	676	595. 349	4734.	268	595
4586. 6	601. 788	4603.	723	601	4605.	817	600. 86	4607.	951	600. 788	4736.	152	594. 905	4737.	549	594. 831
4605. 154	600. 906	4605.	817	600. 86	4626.	353	599. 898	4645.	848	599	4739.	523	594. 743	4741.	469	594. 685
4606. 648	600. 815	4626.	353	599. 898	4648.	032	598. 849	4666.	249	598	4759.	022	593. 852	4760.	873	593. 749
4626. 133	599. 902	4645.	848	599	4668.	876	597. 714	4688.	179	597	4774.	001	596. 636	4782.	735	592. 934
4628. 575	599. 808	4648.	032	598. 849	4692.	64	596. 741	4697.	001	596. 636	4783.	99	592. 873	4784.	647	592. 864
4646. 533	598. 954	4666.	249	598	4713.	151	595. 856	4713.	151	595. 856	4788.	582	592. 678	4788.	791	592. 67
4649. 524	598. 818	4688.	179	597	4715.	026	595. 772	4725.	676	595. 349	4790.	906	592. 57	4791.	372	592. 544
4668. 689	597. 849	4692.	64	596. 741	4725.	676	595. 349	4736.	152	594. 905	4793.	373	592. 521	4793.	766	592. 513
4672. 992	597. 682	4697.	001	596. 636	4736.	152	594. 905	4782.	348	592. 941	4817.	042	591. 561	4817.	415	591. 555
4692. 466	596. 744	4713.	151	595. 856	4783.	284	592. 912	4784.	202	592. 869	4856.	062	589. 982	4898		596. 5
4694. 949	596. 7	4715.	026	595. 772	4784.	202	592. 869	4788.	582	592. 678	4935.	001	591. 561	4935.	766	592. 513
4713. 039	595. 857	4725.	676	595. 349	4788.	582	592. 678	4790.	906	592. 57	4944.	373	592. 544	4944.	766	592. 513
4714. 33	595. 812	4736.	152	594. 905	4793.	373	592. 521	4817.	415	591. 555	4988.	209	593. 848	4988.	791	592. 67
4725. 538	595. 357	4736.	152	594. 905	4856.	062	589. 982	4898		596. 5	5035.	001	591. 561	5035.	766	592. 513
4735. 861	594. 913	4739.	523	594. 743	5035.	001	591. 561	5035.	001	591. 561	5088.	209	593. 848	5088.	791	592. 67
4738. 239	594. 81	4759.	022	593. 852	5088.	209	593. 848	5088.	209	593. 848	5135.	001	591. 561	5135.	766	592. 513
4756. 843	594	4760.	784	593. 749	5135.	001	591. 561	5135.	001	591. 561	5188.	209	593. 848	5188.	791	592. 67
4760. 695	593. 751	4762.	018	593. 682	5188.	209	593. 848	5188.	209	593. 848	5235.	001	591. 561	5235.	766	592. 513
4761. 907	593. 682	4762.	922	593. 631	5235.	001	591. 561	5235.	001	591. 561	5288.	209	593. 848	5288.	791	592. 67
4762. 673	593. 648	4763.	346	593. 644	5288.	209	593. 848	5288.	209	593. 848	5335.	001	591. 561	5335.	766	592. 513
4763. 262	593. 642	4780.	357	592. 987	5335.	001	591. 561	5335.	001	591. 561	5388.	209	593. 848	5388.	791	592. 67
4780. 208	593	4782.	348	592. 941	5388.	209	593. 848	5388.	209	593. 848	5435.	001	591. 561	5435.	766	592. 513
4781. 528	592. 943	4783.	284	592. 912	5435.	001	591. 561	5435.	001	591. 561	5488.	209	593. 848	5488.	791	592. 67
4783. 092	592. 915	4784.	202	592. 869	5488.	209	593. 848	5488.	209	593. 848	5535.	001	591. 561	5535.	766	592. 513
4784. 135	592. 871	4788.	582	592. 678	5535.	001	591. 561	5535.	001	591. 561	5588.	209	593. 848	5588.	791	592. 67
4784. 752	592. 865	4790.	906	592. 57	5588.	209	593. 848	5588.	209	593. 848	5635.	001	591. 561	5635.	766	592. 513
4790. 643	592. 578	4793.	373	592. 521	5635.	001	591. 561	5635.	001	591. 561	5688.	209	593. 848	5688.	791	592. 67
4792. 236	592. 524	4817.	042	591. 561	5688.	209	593. 848	5688.	209	593. 848	5735.	001	591. 561	5735.	766	592. 513
4816. 319	591. 583	4856.	062	589. 982	5735.	001	591. 561	5735.	001	591. 561	5788.	209	593. 848	5788.	791	592. 67
4855. 993	589. 983	5898.			5788.	209	593. 848	5788.	209	593. 848	5835.	001	591. 561	5835.	766	592. 513
4898	596. 5	591	5288	593	587. 5	587. 5	5288	587. 5	5288	593						

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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			
4402.	15	602	4402.	58	601.	71	4403.	4	601.	596	4405.	11		
4407.	23	600.	763	4409.	79	600	4410.	77	599.	851	4411.	63		
	4414.	3	599	4415.	09	598.	916	4415.	6	598.	726	4416.	23	
	4419.	5	598	4420.	22	597.	682	4421.	03	597.	513	4422.	57	
	4424.	75	596.	614	4425.	38	596.	463	4426.	26	596.	317	4427.	35
	4428.	47	595.	517	4429.	26	595.	038	4429.	85		595	4431.	51
	4433.	1	593.	693	4434.	18	593.	268	4434.	81	593.	183	4435.	78
	4438.	11	592.	435	4438.	19	591.	985	4439.	59	591.	972	4441.	01
	4442.	58	591	4443.	84	590.	496	4444.	31		590	4446.	61	
	4448.	86	588.	743	4449.	81	588.	292	4450.	54		587.	851	4451.
	4453.	48	587.	296	4454.	36	586.	892	4455.	74		586.	794	4456.
	4458.	33	585.	949	4460.	33	585.	897	4461.	04		585.	48	4462.
	4467.	56	584.	124	4468.	47		584	4472.	79		583.	964	4473.
	4475.	4	584.	384	4476.	29	584.	389	4477.	23		584.	548	4477.
	4479.	55	584.	662	4480.	83	584.	83	4483.	07		584.	727	4483.
	4488.	56	584.	386	4490.	62	583.	995	4491.	43		583.	994	4500.
	4502.	03	583.	1	4502.	53	582.	967	4503.	77		582.	961	4510.
	4511.	9	582.	424	4512.	41	582.	3	4513.	39		582.	279	4514.
	4515.	79	581.	962	4516.	7	581.	836	4522.	09		581.	481	4522.
	4524.	91	580.	927	4528.	14	580.	779	4528.	63		580.	654	4531.
	4533.	54	580.	054	4534.	06	580.	046	4534.	61		579.	962	4542.
	4555.	83	578.	373	4556.	32	578.	276		4559		578.	031	4563.
	4565.	7	577.	627	4566.	24	577.	545	4570.	5		577.	157	4572.
	4574.	73	576.	968	4575.	19	576.	78	4579.	79		576.	575	4580.

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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	

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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	5905.5663.55	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 El ev Permanent
 4402.15 4898 591 F
 5288 5839.44 587.5 F

Sediment Elevation = 0

Upstream Embankment side slope = 2 horiz. to 1.0 vertical
 Downstream Embankment side slope = 2 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .98
 Elevation at which weir flow begins = 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	El ev	Sta	El ev
4898	591	4944570.	5555
Downstream	num=	2	
Sta	El ev	Sta	El ev
4898	591	4944570.	5555

Abutment Data

Upstream	num=	2	
Sta	El ev	Sta	El ev
5063	487.5	5288	587.5
Downstream	num=	2	
Sta	El ev	Sta	El ev
5063	487.5	5288	587.5

Number of Piers = 4

Pier Data

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

Pier Data

Pier Station	Upstream=	5046	Downstream=	5046
Upstream	num=	2		
Width	El ev	Width	El ev	

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4	547.5		4	595
Downstream	num=		2	
Width	El ev	Width	El ev	
4	547.5	4	595	

Pier Data

Pier Station	Upstream=	5112	Downstream=	5112
Upstream	num=	2		
Width	El ev	Width	El ev	
4	547.5	4	595	
Downstream	num=	2		
Width	El ev	Width	El ev	
4	547.5	4	595	

Pier Data

Pier Station	Upstream=	5200	Downstream=	5200
Upstream	num=	2		
Width	El ev	Width	El ev	
4	547.5	4	595	
Downstream	num=	2		
Width	El ev	Width	El ev	
4	547.5	4	595	

Number of Bridge Coefficient Sets = 1

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

High Flow Method

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

Additonal 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	El elevation	Data	num=	480					
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

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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

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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

Mannings' 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	El ev	Permanent							
4402.15	4898	591	F							
5288	5839.44	587.5	F							
Sediment	El evat i on	=	0							

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 6.1

INPUT

Description:

Station	El evation	Data	num=	471	Sta	El ev	Sta	El ev	Sta	El ev	Sta	El ev
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	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	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	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			

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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

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 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

Manni ng' s n Val ues 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

RI VER: RI VER-1

REACH: Reach-1

RS: 5

I NPUT

Descripti on:

Station	Elevati on	Data	num=	15	Sta	Elev	Sta	Elev	Sta	Elev
0	584	35		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	

Manni ng' s n Val ues

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

RI VER: RI VER-1

REACH: Reach-1

RS: 4. 4

I NPUT

Descripti on:

Station	Elevati on	Data	num=	23	Sta	Elev	Sta	Elev	Sta	Elev
0	580	45		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					

Manni ng' s n Val ues

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 .1 Contr. .1 Expan. .3

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 4.3

INPUT

Description:

Station	Elevation	Data	num=	19	Station	Elevation	Station	Elevation	Station	Elevation
Sta 0	576	60	El ev	572	Sta 105	568	Sta 335	564	Sta 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

Sta 0	n Val .1	Sta 1255	n Val .045	3	Sta 1330	n Val .1
-------	----------	----------	------------	---	----------	----------

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

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 4

INPUT

Description:

Station	Elevation	Data	num=	28	Station	Elevation	Station	Elevation	Station	Elevation
Sta 0	576	20	El ev	572	Sta 135	568	Sta 160	564	Sta 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

Sta 0	n Val .1	Sta 555	n Val .1	5	Sta 1210	n Val .045	Sta 1355	n Val .1	Sta 1854	n Val .1
-------	----------	---------	----------	---	----------	------------	----------	----------	----------	----------

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

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1

RS: 3.8

INPUT

Description:

Station	Elevation	Data	num=	24	Station	Elevation	Station	Elevation	Station	Elevation
Sta 0	568	80	El ev	564	Sta 120	560	Sta 143	556	Sta 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

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1000	568	1060	572	1095	576	1130	580
Manni ng' s	n Val ues		num=	5			
Sta 0	n Val .1	Sta 120	n Val .1	Sta 570	n Val .045	Sta 642	n Val .1
Bank Sta:	Left 570	Right 642	Lengths:	Left 510	Channel 510	Right 520	Coeff .1
							Contr. .3
Expan. .3							

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1 RS: 3.7

INPUT

Description:

Station	El evati on	Data	num=	15				
Sta 0	El ev 568	Sta 10	El ev 564	Sta 30	El ev 560	Sta 50	El ev 556	Sta 210
450	556	500	552	520	548	523	547	568
570	548	580	552	600	556	695	560	547
Manni ng' s	n Val ues		num=	3				
Sta 0	n Val .1	Sta 450	n Val .045	Sta 600	n Val .1			
Bank Sta:	Left 450	Right 600	Lengths:	Left 530	Channel 600	Right 720	Coeff .1	Expan. .3

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1 RS: 3.4

INPUT

Description:

Station	El evati on	Data	num=	17				
Sta 0	El ev 568	Sta 12	El ev 564	Sta 32	El ev 560	Sta 49	El ev 556	Sta 80
160	550	250	547	320	547	330	548	341
790	556	1035	560	1050	564	1068	568	1078
1089	576	1100	580					572
Manni ng' s	n Val ues		num=	3				
Sta 0	n Val .1	Sta 80	n Val .045	Sta 341	n Val .1			
Bank Sta:	Left 80	Right 341	Lengths:	Left 600	Channel 510	Right 400	Coeff .1	Expan. .3

CROSS SECTION

RI VER: RI VER-1
REACH: Reach-1 RS: 3.3

INPUT

Description:

Station	El evati on	Data	num=	13				
Sta 0	El ev 572	Sta 60	El ev 568	Sta 95	El ev 564	Sta 110	El ev 560	Sta 120
								El ev 556

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

Manni ng' s	n	Val ues	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	Elev ation	Data	num=	27					
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						

Manni ng' s	n	Val ues	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	Elev ation	Data	num=	13					
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				

Manni ng' s	n	Val ues	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:

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

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

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

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1

RS: 1

INPUT

Description:

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

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

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

SUMMARY OF MANNINGS' 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	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		

SUMMARY OF REACH LENGTHS

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Ri ver: RI VER-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
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		Bri dge		
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

Ri ver: RI VER-1

Reach	Ri ver	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

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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	Bri dge	
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: _____	

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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 500-yr. tidal surge velocity: _____ fps 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 = > 500-year Storm cfs	Probability = < 0.002	%
cc: Environmental Engineer <u>Lou Raymond (AECOM)</u>		
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.		
Revised 3/16/09		

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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.: BRN11 (031)

PIN: 40188

COUNTY NAME: CHEROKEE

DATE: 09 / 07 / 2011

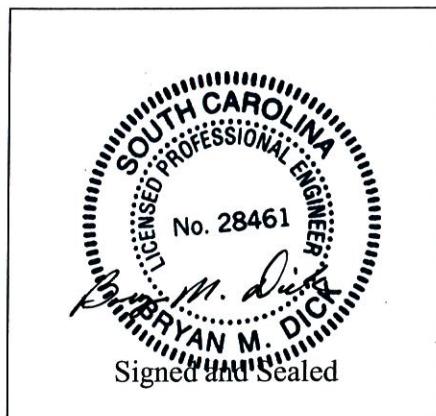
PREPARED BY: ANDREW WILSON, EI

CHECKED BY: BRYAN M. DICK, PE, PTOE

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>S-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, PHT</u>		

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

	ROUTE/ROAD NO.'s		
	EXISTING S-83	PROPOSED S-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/NAVD88	NAVD88/NAVD88	NAVD88/NAVD88

1.6.3 Site Inspection Form

SITE INSPECTION FORM			
<u>PROJECT DESCRIPTION</u>			
County:	<u>CHEROKEE</u>	Rt. / Rd. No.:	<u>S-83</u>
Stream:	<u>BUFFALO CREEK</u>	File No.:	<u>11.040188</u>
Project No:		PIN:	<u>40188</u>
By:	<u>ANDREW WILSON</u>	Date:	<u>09 / 02 / 2011</u>
Note: All references to left and right are looking in the direction of flow.			
<u>EXISTING BRIDGE</u>			
Length:	<u>372.5</u> ft.	Width:	<u>48</u> ft.
Alignment:	Tangent <input checked="" type="checkbox"/>	Curved <input type="checkbox"/>	
Bridge skewed?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Angle: _____
End Abutment Type:	<u>SPILL THROUGH WITH RIP RAP</u>		
Riprap on Fills?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Condition: <u>POOR, SOME ERODING ON FILL SLOPES</u>
Superstructure Type:	<u>REINFORCED CONCRETE AND STRUCTURAL STEEL BEAMS</u>		
Substructure Type:	<u>CONCRETE AND TIMBER PILINGS WITH OUTSIDE STEEL PILINGS</u>		
Utilities Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Describe: <u>POWER/TELEPHONE OVERHEAD LINES DOWNSTREAM SIDE OF BRIDGE.</u>
Debris Accumulations on Bridge:	Percent Blocked (Horizontal):		<u>0</u> %
	Percent Blocked (Vertical):		<u>0</u> %
Hydraulic Problems?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Describe: _____
Draw Sketch of Bridge and Stream Below: (Show north arrow and direction of flow)			
<p>* DRAWING NOT TO SCALE</p> <p>EXISTING ROAD</p> <p>CHANNEL BOTTOM</p> <p>TOP OF BANK</p> <p>EXISTING BRIDGE</p> <p>PROPOSED BRIDGE</p> <p>Flow</p> <p>N</p>			

1.6.3.1 Site Characteristics Form

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

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	$n_b - \text{Base } n \text{ for soil}$		Channel	$n_1 - \text{Degree of Irregularity}$			
Earth	.020		Smooth	.000			
Rock Cut	.025		Minor	.001-.005			
Fine Gravel	.024		Moderate	.006-.010			
Course Gravel	.028		Severe	.011-.020			
		$n_2 - \text{Variations of Channel Cross Sections}$			$n_3 - \text{Relative Effect of Obstructions}$		
Gradual	.000		Negligible	.000-.004			
Alternating		.001-.005	Minor	.010-.015			
Occasionally			Appreciable	.020-.030			
Frequently	.010-.015		Severe	.040-.060			
		$n_4 - \text{Vegetation}$			$m - \text{Degree of Meandering}$		
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	<i>Computed n</i>
<i>SURFACE/BED</i>	<i>.022</i>	<i>.003</i>	<i>.003</i>	<i>.002</i>	<i>.050</i>	<i>1.15</i>	<i>0.092</i>

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

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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.)

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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

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