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Project No. 101885

February 2004

Draft Final Bridge Scour Analysis Report

Central Phoenix/East Valley Light Rail Transit Project

Submitted to:

Valley Metro Rail, Inc.

Submitted by:

Michael Baker Jr., Inc.
Phoenix, Arizona 85014

CENTRAL PHOENIX/EAST VALLEY LIGHT RAIL TRANSIT PROJECT

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Prepared by:

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Suite 150
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February 9, 2004

Baker

PB 100 YEARS PARSONS BRINCKERHOFF

Valley Metro RAIL

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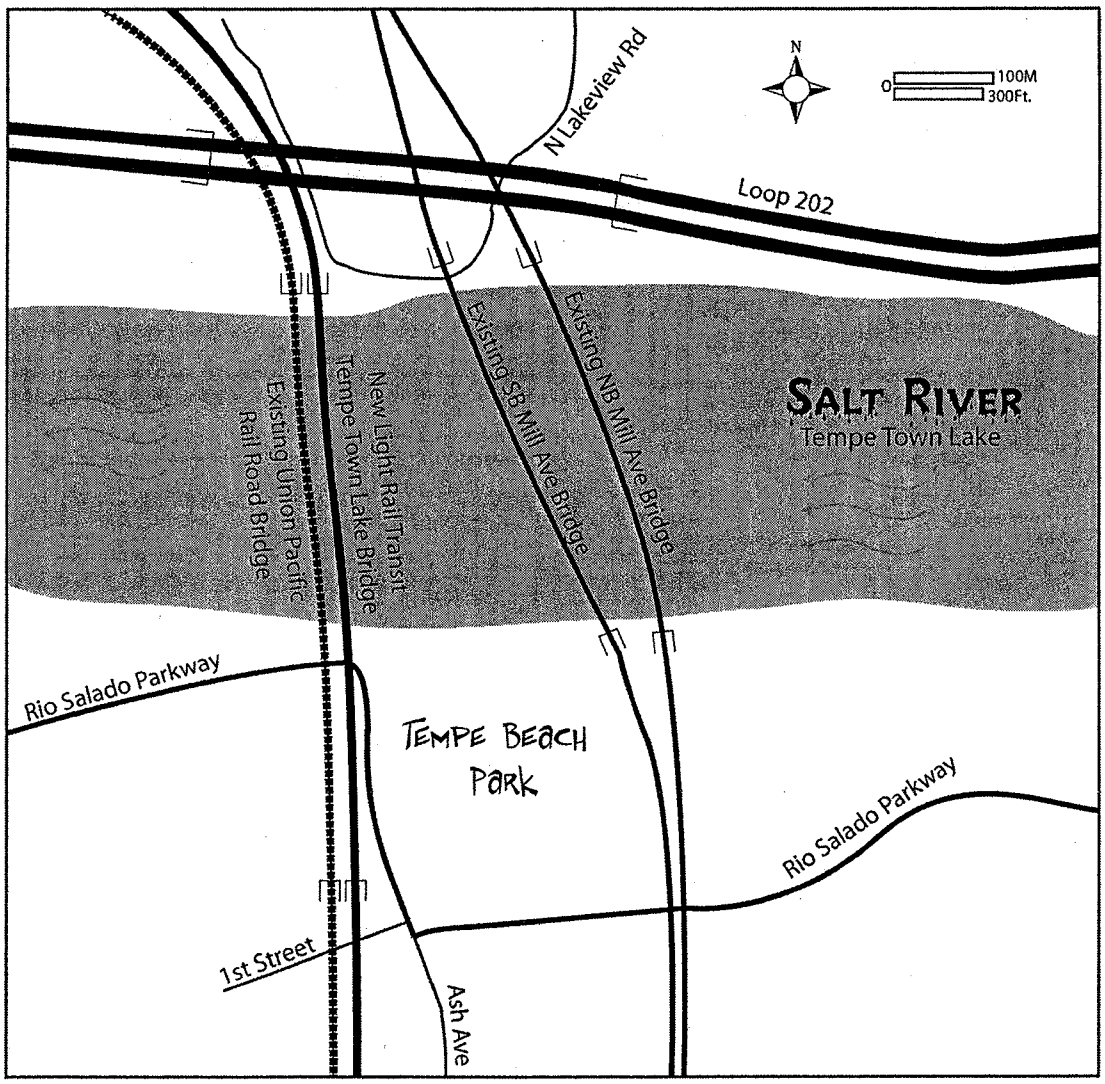
1.0 INTRODUCTION

This report has been prepared to document the hydraulic and scour analyses for the Light Rail Transit (LTR) Tempe Town Lake Bridge over Salt River at upstream Union Pacific Railroad (UPRR) Bridge. The impact of the LRT Bridge to the UPRR Bridge is also discussed in this report. Figure 1-1 shows the bridge location.

Figure 1-1 LRT Bridge Location



2.0 THE LRT BRIDGE AND SITE LOCATION

The proposed LRT Bridge is an 11-span bridge. Its total length is approximately 1,533 feet. There are 10 piers. The diameter of each of the piers is eight feet. The spans of the bridge vary from 97 feet to 163 feet. The lowest low chord elevation is 1,164.0 feet. The bridge plans of the preliminary design (provided by TY Lin International) are given in Appendix A.

The LRT Bridge is located approximately 74 feet upstream from the existing UPRR Bridge that was built in 1912. The new piers are located upstream of the existing piers of the UPRR Bridge. The spans of the LRT Bridge are about the same as the spans of the UPRR Bridge. Two other bridges (Mill Avenue South Bound and Mill Avenue North Bound) are located at approximately 630 feet and 940 feet upstream from the proposed bridge, respectively. The proposed bridge alignment is generally parallel with the UPRR Bridge and it is not perpendicular with flow direction but has approximately a four-degree skew angle.

Two inflated dams were built in 2000 to create an artificial lake for recreational purposes. The two inflated dams are located approximately 0.3 miles downstream and 1.6 miles upstream from the LRT Bridge. The lake is approximately 1.9 miles long and 900 feet wide. The normal water elevation of the lake is 1,148.0 feet. Riverbanks in the lake are relatively straight and concrete paved. During a higher flood event, the dams will be deflated to allow the flow to pass through. The installation of the inflated dams will cause the water surface elevation (WSEL) to rise approximately 0.5 feet and make the water surface slope flattened at the LRT Bridge location.

The bridge location experienced an historical high flooding event in 1980's and the water level reached the UPRR Bridge south bank abutment. There is no scour record for the flood event but the UPRR Bridge foundations were stabilized in 1990 and piers No. 1 to No. 8 were all set on bedrock. Field photos shows that the channel bed adjacent to the bridge site has an armored layer. However, the bore hole information indicates that there are silty sand or poorly graded sand with gravel and cobbles layers 10 to 30 feet below the boring surface. D_{50} of the soil layer below the channel surface is much smaller compared to the D_{50} of the armored surface soil layer. Bedrock elevations vary from 1132 to 1095 feet from the north bank abutment to the south bank abutment. A summary of soil particle sizes and boring information are given in Appendix E.

3.0 HYDROLOGIC DATA

Hydrologic information was provided by Maricopa County Flood Control District. The discharges for 50-, 100-, and 500-year storm events in the study area are shown in Table 3-1.

Table 3-1 Discharges of Salt River at Tempe Town Lake Area

	PEAK DISCHARGE FREQUENCY		
LOCATION	50-year	100-year	500-year
Upstream Mill Avenue Bridge	145,000 cfs	172,000 cfs	250,000 cfs
Downstream Mill Avenue Bridge	145,000 cfs	169,000 cfs	250,000 cfs

A hydrology report "GILA RIVER BASIN ARIZONA SECTION 7 STUDY FOR MODIFIED ROOSEVELT DAM, ARIZONA, HYDROLOGIC EVALUATION OF WATER CONTROL PLANS SALT RIVER PROJECT TO GILA RIVER AT GILLESPIE DAM" (Reference 1) was prepared by U.S. ARMY CORPS OF ENGINEERS, March 1996. Selected discharge information is included in Appendix B. The 100-year event discharges are the same as the discharges used in latest Federal Emergency Management Agency (FEMA) Tempe Rio Salado Town Lake Project Letter of Map Revision (LOMR) model, and the 100-year peak discharges are used to verify the floodplain changes in the future condition. The 50- and 500-year event discharges are used for the LRT Bridge scour analysis.

4.0 HYDRAULIC ANALYSIS

In the vicinity of the proposed LRT Tempe Town Lake Bridge, the area is in a FEMA designated floodplain. The existing hydraulic analysis, Tempe Rio Salado Town Lake Project LOMR, was done by Michael Baker Jr., Inc. in February 2001. A HEC-RAS computer program (Reference 2) was used to analyze the LOMR project. A HEC-RAS model for the LOMR was obtained from Michael Baker Jr., Inc. A new HEC-RAS model (LRT Bridge model) was generated based on the LOMR model for the LRT Bridge hydraulic analysis.

The LRT Bridge model includes two sets of geometry data, both without and with the LRT Bridge.

The geometry data without the LRT Bridge was used as a revised existing condition model. The geometry data of two new cross sections located upstream and downstream of the LRT Bridge were cut using MicroStation InRoads (Reference 3) from the Digital Terrain Model (DTM) files provided to Baker by TY Lin. For the

channel portion of the cross sections, data was obtained from boring log information provided by ATL Inc. (Reference 4). Manning's "n" values of the two new cross sections for the main channel and over-banks are the same as the "n" values at the upstream and downstream cross sections because of no roughness changes in this reach.

The geometry data of the LRT Bridge was used as a proposed condition model. The proposed bridge dimensions are based on preliminary design data provided by TY Lin International. Low chord elevations, high chord elevations, pier sizes and locations were inserted into the revised existing condition geometry data. Soil particle size distribution curves provided by ATL Inc. were used to obtain D_{50} and D_{90} for the scour analysis.

A total of five scenarios of modeling were run for the hydraulic analyses. Those include:

1) Revised existing condition of the 100-year floodplain and floodway;

2) Proposed condition of the 100-year floodplain and floodway;

3) Revised existing condition UPRR Bridge scour depth;

4) Proposed condition UPRR Bridge scour depth, and

5) Proposed condition LRT Bridge scour depth.

Refer to Appendix C for the HEC-RAS model reports.

5.0 FLOODPLAIN CONSIDERATIONS

The effect of the proposed LRT Bridge to the FEMA floodplain boundary was evaluated because the new bridge is located in the 100-year floodplain zone area (FEMA designated Zone AE). The comparisons of the 100-year water surface elevations for revised existing and proposed conditions for the 100-year event are shown in Table 5-1. A 100-year floodplain map is included in Appendix D.

Table 5-1 **Results of LRT Bridge Floodplain Analysis**

Cross Section No.	Location	WATER SURFACE ELEVATION (WSEL)			
		LOMR Model	Revised Ex	Proposed	Floodplain Width Change*
		ft	ft	ft	ft
221.80		1157.24	1157.27	1157.28	0.5
221.70		1156.60	1156.63	1156.65	0.24
221.61		1155.62	1155.66	1155.69	0.15
221.50		1154.64	1154.69	1154.73	0.21
221.40		1153.71	1153.78	1153.85	1.07
221.31		1152.52	1152.61	1152.71	2.16
221.26		1152.72	1152.81	1152.9	7.37
221.25	NB Mill Ave. Bridge				
221.24		1152.44	1152.54	1152.63	5.71
221.2		1152.30	1152.40	1152.49	24.51
221.195	SB Mill Ave. Bridge				
221.19		1152.02	1152.12	1152.22	10.06
221.068			1151.52	1151.64	36.58
221.064	LRT Bridge				
221.061			1151.26	1151.26	0
221.06		1151.40	1151.38	1151.38	0
221.055	UPRR Bridge				
221.05		1151.15	1151.11	1151.11	0
221.02		1150.81	1150.81	1150.81	0

* Floodplain width changes based on Proposed versus Revised Existing WSEL.

The maximum elevation change between the LOMR model and the revised existing model is 0.1 feet that was caused by new inserted cross sections. The maximum elevation change between revised existing model and the proposed model is 0.12 feet that was caused by the new inserted LRT Bridge. The maximum floodplain increase between Revised Existing model and Proposed model is approximately 37 feet at cross section 221.068, which is mainly due to recent re-grading of the area. The floodplain increase area is in an ineffective flow area of Tempe Lake Park and no structure is affected.

Changes in floodplain occur in flow x-section regardless of scour. Floodway.

There are no changes on floodway widths along the reach. The water surface elevations for floodway analysis are listed in Table 5-2. The surcharge of floodway run is zero in the study area.

Table 5-2 Results of LRT Bridge Floodway Analysis

Cross Section No.	Location	FLOODWAY WSEL		
		LOMR Model	Revised Exist	Proposed
		ft	ft	ft
221.8		1157.24	1157.27	1157.28
221.7		1156.60	1156.63	1156.65
221.61		1155.62	1155.66	1155.69
221.5		1154.64	1154.69	1154.73
221.4		1153.71	1153.78	1153.85
221.31		1152.52	1152.61	1152.71
221.26		1152.72	1152.81	1152.9
221.25	NB Mill Bridge			
221.24		1152.44	1152.54	1152.63
221.2		1152.30	1152.40	1152.50
221.195	SB Mill Bridge			
221.19		1152.02	1152.12	1152.22
221.068			1151.52	1151.64
221.064	LRT Bridge			
221.061			1151.26	1151.26
221.06		1151.40	1151.38	1151.38
221.055	UPRR Bridge			
221.05		1151.15	1151.11	1151.11
221.02		1150.81	1150.81	1150.81

The FEMA required minimum freeboard of three feet (four feet at bridge structures) are satisfied at the levee location in the affected area. Table 5-3 lists South Bank Levee freeboard from cross section 221.24 to 221.31.

Table 5-3 South Bank Levee Freeboard

CROSS SECTION	LOCATION	100-YEAR WSEL	LEVEE CREST	FREEBOARD
		ft	ft	ft
221.31	Upper end	1152.71	1160.00	7.29
221.26		1152.90	1160.00	7.10
221.24	Lower end	1152.63	1160.00	7.37

6.0 THE LRT BRIDGE SCOUR ANALYSIS

Scour analysis includes contraction scour, local scour at piers, local scour at abutments, and long term degradation analysis. Scour analysis was performed for the 50-year and 500-year events. Soil particle sizes were obtained from Particle Size Distribution Curves provided by ATL Inc. (Reference 4). The results of the HEC-RAS models used in determining the scour depths are included in Appendix F.

6.1 CONTRACTION SCOUR

Contraction Scour occurs when a natural contraction or a bridge constricting the flow reduces the flow area of a stream. There appears to be no meandering of the channel and the bridge alignment is approximately perpendicular to the flow direction. The obstructed areas produced by the piers appear to be relatively small when compared with the total channel width. The contraction scour for the LRT Bridge is expected to be small. Contraction scour depth at the LRT Bridge was calculated using HEC-RAS Version 3.0 (Reference 2). The maximum contraction scour depth is 4.08 feet (500-year live bed) located at south (left) over-bank of the LRT Bridge site. The contraction scour depths are listed in Table 5.

6.2 LOCAL SCOUR AT PIERS

Pier scour is due to the acceleration of flow around the pier and the formation of flow vortices. HEC-RAS software was used in the computation of local scour at piers for the LRT Bridge. Debris effect is not considered in local scour analysis. The pier scour depths are listed in the Table 5.

Why not? Pier-width = 15'

6.3 LOCAL SCOUR AT ABUTMENTS

Bank elev 2.

No local scour occurs at north (right) bank abutment of the LRT Bridge because the 500-year WSEL is below the ground elevation. On the south (left) abutment, flow distribution data was input into the HEC-RAS model to estimate local scour depth. Froehlich's Equation was used and scour depth at south (left) abutment was calculated to be 4.0 feet.

6.4 LONG TERM RIVER BED ELEVATION CHANGES

Aggradation and degradation are long-term stream elevation changes due to natural or manmade causes. Aggradation involves the deposition of material eroded from the channel or watershed upstream of the bridge; whereas degradation involves the lowering or scouring of the streambed due to a deficiency in sediment supply from upstream.

Salt River experienced a major flood in the 1980's. The channel bed has an armored layer and surface material size is relatively large. The two inflated dams at 0.3 miles downstream and 1.6 miles upstream of the LRT Bridge make local stream water surface elevation slope flat in the study area. Due to the dams, there is not flow

during normal operation. Therefore, the long-term degradation is zero or negligible in study site.

6.5 SUMMARY OF SCOUR ANALYSIS

Total scour is composed of long term, contraction, and local scour components at the abutments or pier locations. The total scour depths at abutments and piers for LRT bridges are given in the Table 5. The results show that the local scour has reached bedrock elevation from the HEC-RAS model for piers No. 5 to No. 8 (bridge drawing piers No. 3 to No. 6). Therefore, recommended foundation elevations for piers in the channel should be below the bedrock elevations. Debris effect was not considered in the analysis because scour depth has reached bedrock. Recommended design elevations for all piers and abutments are given in the Table 6-1.

Sec 6.7

Table 6-1 LRT Bridge Scour Analysis Results

EVENT	SCOUR COMPONENT	SCOUR LOCATION											
	Pier No. in model	Left AB	Pier #1	Pier #2	Pier #3	Pier #4	Pier #5	Pier #6	Pier #7	Pier #8	Pier #9	Pier #10	Right AB
	Pier No. on Bridge Drawing	S Abut2	Pier #10	Pier #9	Pier #8	Pier #7	Pier #6	Pier #5	Pier #4	Pier #3	Pier #2	Pier #1	N Abut1
500-year WSEL = 1156.72 ft	Long-term Degradation (ft)	0	0	0	0	0	0	0	0	0	0	0	-
	Contraction Scour (ft)	4.08	4.08	4.08	4.08	4.08	0	0	0	0	0	0.68	-
	Local Scour (ft)	4.0	7.9	9.73	10.08	13.4	17.28	17.28	17.78	17.78	15.12	5.86	-
	Total Scour (ft)	8.08	11.98	13.81	14.16	17.48	17.28	17.28	17.78	17.78	15.12	6.54	-
	Channel Bed/Ground Elevation (ft)	1153.0	1150.0	1146.5	1146.0	1152.0	1130.0	1130.0	1128.0	1128.0	1130.0	1152.0	1158.0
	Calculated Scour Elevation (ft)	1144.9	1138.0	1132.7	1131.8	1134.5	1112.7	1112.7	1110.2	1110.2	1114.9	1145.5	
	Bed Rock Elevation (ft)	1095.7	1102.8	1108	1109	1121.7	1118	1120.0	1116.0	1108.0	1099.0	1116.2	1132.3
	Recommended Design Elevation	1144	1137	1132	1131	1131	To Bed Rock Elevation					1144	
50-year WSEL = 1150.04 ft	Long-term Degradation (ft)	-	0	0	0	0	0	0	0	0	0	0	-
	Contraction Scour (ft)	-	0	0	0	0	0	0	0	0	0	0	-
	Local Scour (ft)	-	0	0	0	10.75	15.33	15.33	15.94	15.92	13.12	0	-
	Total Scour (ft)	-	0	0	0	10.75	15.33	15.33	15.94	15.92	13.12	0	-
	Channel Bed/Ground Elevation (ft)	1153.0	1150.0	1146.5	1146.0	1152.0	1130.0	1130.0	1128.0	1128.0	1130.0	1152.0	1158.0
	Calculated Scour Elevation (ft)	1153	1150	1146.5	1146	1141.25	1114.67	1114.67	1112.06	1112.08	1116.88	1152	1158
	Bed Rock Elevation (ft)	1095.7	1102.8	1108	1109	1121.7	1118	1120.0	1116.0	1108.0	1099.0	1116.2	1132.3
	Recommended Design Elevation						To Bed Rock Elevation						

- WSEL is below the ground elevation

7.0 IMPACTS TO EXISTING UPRR BRIDGE

The LRT Bridge is located approximately 74 feet upstream of the UPRR Bridge. The UPRR bridge scour analyses under conditions without and with the LRT Bridge were conducted to analyze the impact of new bridge to the existing UPRR Bridge. Cross section 221.068 was used as the upstream cross section, and the results show that there is no scour depth increase at the UPRR Bridge (See Table 7-1). This result is because the channel has been confined and the new bridge will not cause flow distribution changes.

The piers of the new LRT Bridge are located upstream of the piers of the UPRR Bridge. This may reduce debris depositing on the piers of UPRR Bridge.

The north bank abutment will not have an impact on the UPRR Bridge because it is higher than 500-year WSEL. The south bank abutment of the new LRT Bridge may reduce the potential scour at south abutment of the UPRR Bridge because it will decrease flow contraction at the UPRR Bridge abutment.

The new bridge piers were set upstream of the piers of the UPRR Bridge and the pier width is the same as the pier width of the UPRR Bridge. From an hydraulics point of view, there is no negative impact to the existing bridge.

Table 7-1 Comparisons of Scour Depths of the UPRR Bridge

Piers No. and Location	50-year Combined Scour Depths		500-year Combined Scour Depths	
	Existing	Proposed	Existing	Proposed
Pier : #1 (CL = 19133.34) (Contr + Pier) (ft):			4.9	4.76
Pier : #2 (CL = 19165.06) (Contr + Pier) (ft):			5.19	5.05
Pier : #3 (CL = 19193.7) (Contr + Pier) (ft):			5.28	5.14
Pier : #4 (CL = 19228.41) (Contr + Pier) (ft):			5.55	5.41
Pier : #5 (CL = 19260.04) (Contr + Pier) (ft):			5.76	5.62
Pier : #6 (CL = 19291.76) (Contr + Pier) (ft):			5.84	5.7
Pier : #7 (CL = 19323.59) (Contr + Pier) (ft):			6.1	6.01
Pier : #8 (CL = 19424.89) (Contr + Pier) (ft):			11.26	11.11
Pier : #9 (CL = 19576.55) (Contr + Pier) (ft):	10.65	10.56	12.81	12.67
Pier : #10 (CL = 19728.61) (Contr + Pier) (ft):	17.96	17.87	19.65	19.5
Pier : #11 (CL = 19879.97) (Contr + Pier) (ft):	18.31	18.22	19.95	19.8
Pier : #12 (CL = 20031.94) (Contr + Pier) (ft):	18.26	18.17	19.9	19.76
Pier : #13 (CL = 20192.95) (Contr + Pier) (ft):	15.93	15.84	17.93	17.79
Pier : #14 (CL = 20355.05) (Contr + Pier) (ft):	14.44	14.35	16.51	16.37
Pier : #15 (CL = 20506.31) (Contr + Pier) (ft):			8.67	8.53
Pier : #16 (CL = 20608.15) (Contr + Pier) (ft):				

8.0 REFERENCES

1) U.S. Army Corps of Engineers, GILA RIVER BASIN ARIZONA SECTION 7 STUDY FOR MODIFIED ROOSEVELT DAM, ARIZONA, HYDROLOGIC EVALUATION OF WATER CONTROL PLANS SALT RIVER PROJECT TO GILA RIVER AT GILLESPIE DAM, March 1996.

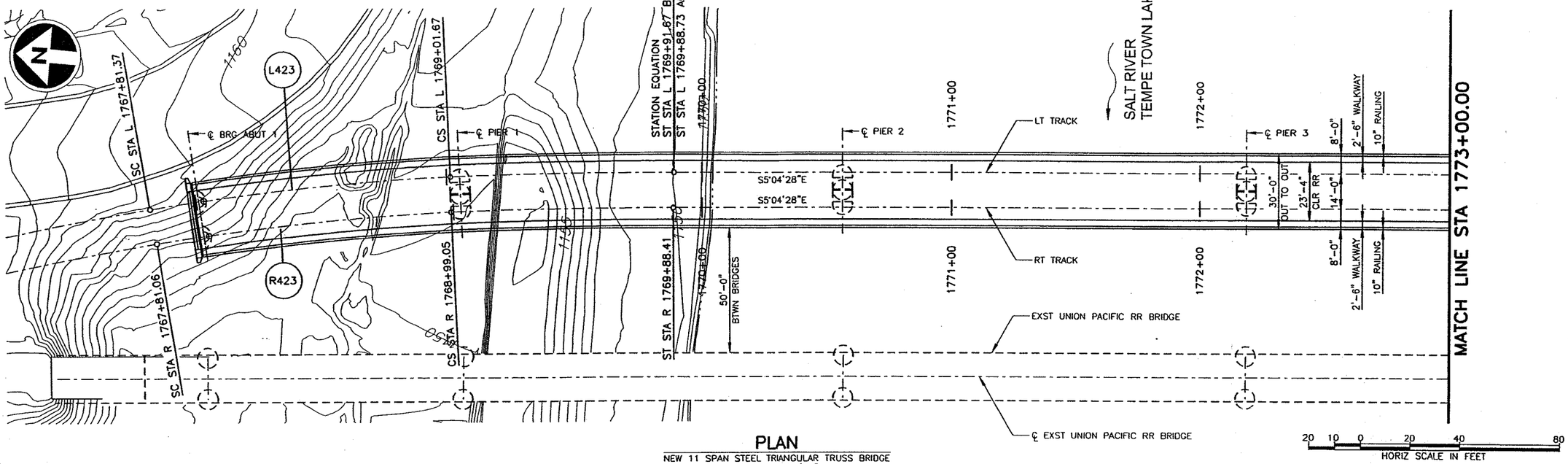
2) U.S. Army Corps of Engineers, Hydrologic Engineer Center, HEC-RAS River Analysis System, Version 3.01, March 2001.

3) Bentley Systems, Incorporated, MicroStation, Version 8.01, 1990-2003.

4) ATL Inc., Design Phase Geotechnical Investigation Report, Valley Metro Rail, Tempe Town Lake Bridge, Phoenix Arizona, January, 2004.

5) U.S. Department of Transportation, Federal Highway Administration, Evaluating Scour at Bridges, Hydraulic Engineering Circular No. 18, November 1995.

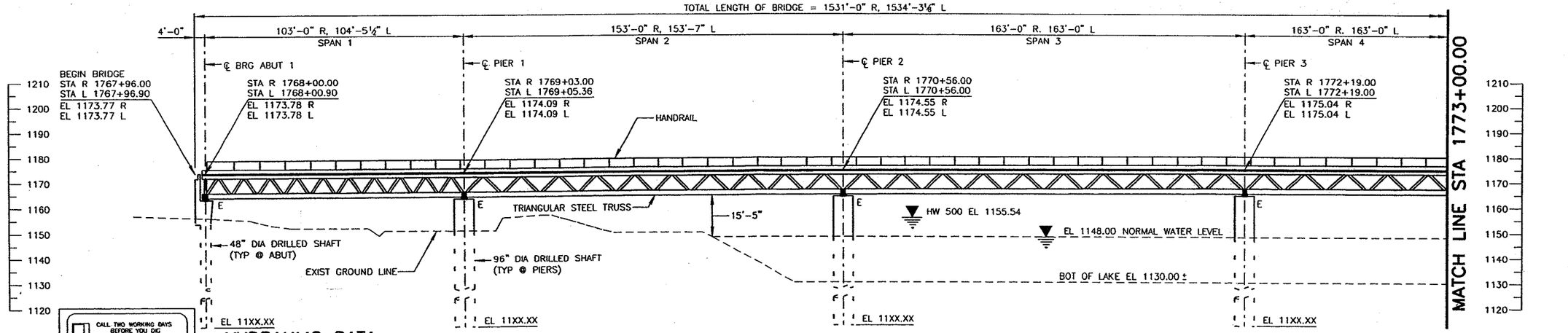
APPENDIX A BRIDGE PLANS



PLAN

NEW 11 SPAN STEEL TRIANGULAR TRUSS BRIDGE
SKEW = 0°00'00"
CONTOUR INTERVAL = 1'-0"
SCALE: 1"=20'-0"

TOTAL LENGTH OF BRIDGE = 1531'-0" R, 1534'-3⅛" L



CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
OUTSIDE MARICOPA COUNTY

HYDRAULIC DATA:

DRAINAGE AREA =

Q50 =	CFS	HW50	= 11XX.XX
Q100 =	CFS	HW100	= 11XX.XX
Q500 =	CFS	HW500	= 1155.54

LONGITUDINAL ELEVATION

SCALE: 1"=20'-0"

NOTE:
ELEVATION DRAWN ALONG ℄ RT TRACK
PROFILE GRADE IS TOP OF TRACK
FOR CURVE DATA SEE DRAWING NO SC8-0554, GEOMETRICS

20 10 0 20 40 80
HORIZ SCALE IN FEET

REV	DATE	BY	DESCRIPTION
	010CT03	RPC	INITIAL DRAWING SUBMITTAL - ON BOARD REVIEW
A	05FEB04	RPC	REVISED FOR 75% SUBMITTAL

REVISIONS

TY-LIN INTERNATIONAL
Civil and Structural Engineers
SUBMITTED | DATE

PRELIMINARY
NOT FOR CONSTRUCTION

PARSONS BRINCKERHOFF
APPROVED | DATE

Valley Metro RAIL

DESIGNED BY: D. J. TREFREN
DRAWN BY: R. P. CROOKS
CHECKED BY: J. R. PYNE
APPROVED BY:
SCALE: AS NOTED
DATE: 05 FEB 04

CENTRAL PHOENIX / EAST VALLEY LRT
TOWN LAKE BRIDGE - 75% SUBMITTAL

TOWN LAKE BRIDGE
LOCATION PLAN 1

DRAWING NO: SC8-0551
REVISION: A
CONTRACT NO:
SHEET NO:

P:\VR\1563 New Light Rail\CUD 3.6.1 75% Submittal\Drawings\TTLBR002.DGN
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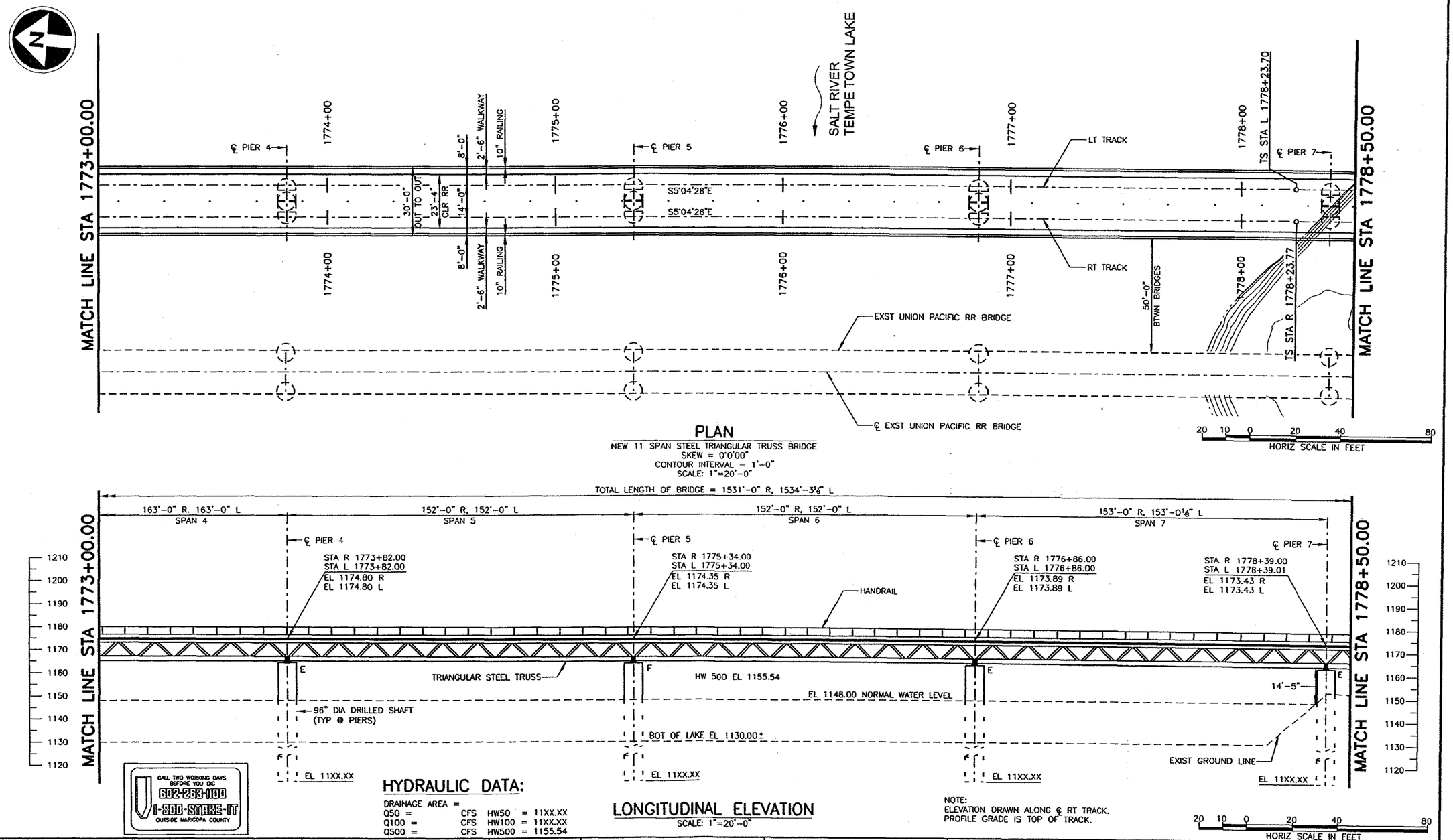
DATE MODIFIED: 01/26/04, BY: R. P. CROOKS
TTLBR002.DGN



PLAN

NEW 11 SPAN STEEL TRIANGULAR TRUSS BRIDGE
SKEW = 0°0'00"
CONTOUR INTERVAL = 1'-0"
SCALE: 1"=20'-0"

HYDRAULIC DATA:

DRAINAGE AREA =
Q50 = CFS HW50 = 11XX.XX
Q100 = CFS HW100 = 11XX.XX
Q500 = CFS HW500 = 1155.54

LONGITUDINAL ELEVATION

SCALE: 1"=20'-0"

NOTE:
ELEVATION DRAWN ALONG ℄ RT TRACK.
PROFILE GRADE IS TOP OF TRACK.

REVISIONS

REV	DATE	BY	DESCRIPTION
	01OCT03	RPC	INITIAL DRAWING REVIEW - ON BOARD REVIEW
A	05FEB04	RPC	REVISED FOR 75% SUBMITTAL

TY·LIN INTERNATIONAL
Civil and Structural Engineers
SUBMITTED DATE

PRELIMINARY
NOT FOR CONSTRUCTION

PARSONS BRINCKERHOFF
APPROVED DATE

Valley Metro RAIL

DESIGNED BY: D. J. TREFREN
DRAWN BY: R. P. CROOKS
CHECKED BY: J. R. PYNE
APPROVED BY:
SCALE: AS NOTED
DATE: 05 FEB 04

CENTRAL PHOENIX / EAST VALLEY LRT
TOWN LAKE BRIDGE - 75% SUBMITTAL

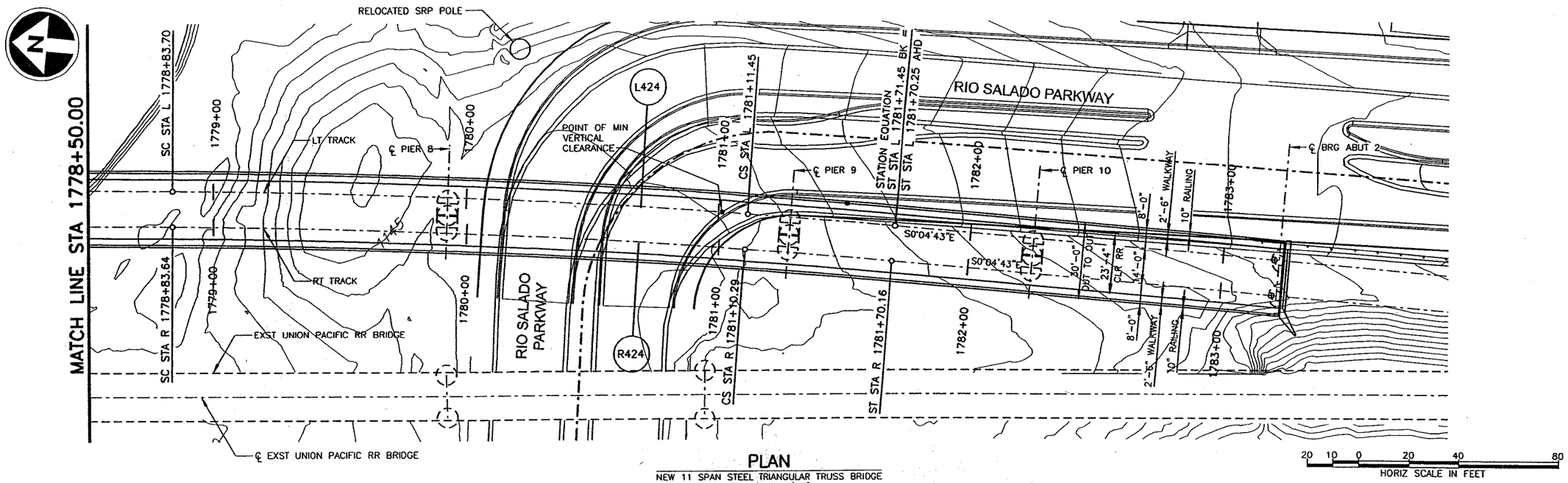
TOWN LAKE BRIDGE
LOCATION PLAN 2

DRAWING NO: SCB-0552
REVISION: A
CONTRACT NO:
SHEET NO:

TTLBR003.DGN

P:\V8\1563 New Light Rail\CUD 3.6.1 75% Submittal\Drawings\TTLBR003.DGN
01/29/2004 11:19:39 am
rpto_half_mono.tbl
USER

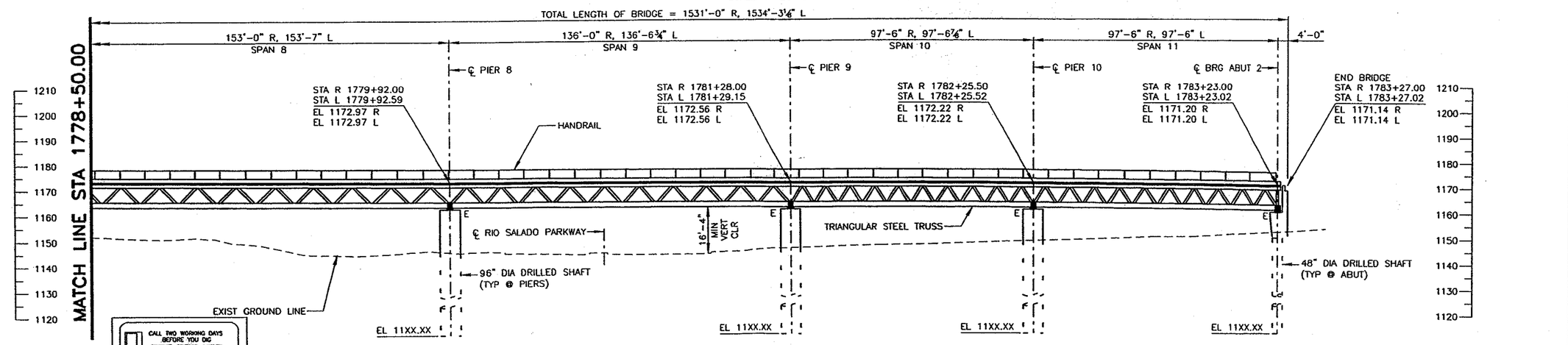
DATE MODIFIED: 01/26/04, BY: R. W. KENNEY



PLAN

NEW 11 SPAN STEEL TRIANGULAR TRUSS BRIDGE
SKEW = 0°00'00"
CONTOUR INTERVAL = 1'-0"
SCALE: 1"=20'-0"

20 10 0 20 40 80
HORIZ SCALE IN FEET



CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
OUTSIDE MARICOPA COUNTY

LONGITUDINAL ELEVATION

SCALE: 1"=20'-0"

NOTE:
ELEVATION DRAWN ALONG ℄ RT TRACK
PROFILE GRADE IS TOP OF TRACK
FOR CURVE DATA SEE DRAWING NO SC8-0554, GEOMETRICS

20 10 0 20 40 80
HORIZ SCALE IN FEET

REV	DATE	BY	DESCRIPTION
	010CT03	RPC	INITIAL DRAWING SUBMITTAL -- ON BOARD REVIEW
A	05FEB04	RPC	REVISED FOR 75% SUBMITTAL

REVISIONS

DATE MODIFIED: 01/26/04, BY: R. P. CROOKS

TY·LIN INTERNATIONAL
Civil and Structural Engineers
SUBMITTED | DATE

PRELIMINARY
NOT FOR CONSTRUCTION

PARSONS BRINCKERHOFF
APPROVED | DATE

Valley Metro RAIL

DESIGNED BY: D. J. TREFREN
DRAWN BY: R. P. CROOKS
CHECKED BY: J. R. PYNE
APPROVED BY:
SCALE: AS NOTED
DATE: 05 FEB 04

CENTRAL PHOENIX / EAST VALLEY LRT
TOWN LAKE BRIDGE – 75% SUBMITTAL

TOWN LAKE BRIDGE
LOCATION PLAN 3

DRAWING NO: SC8-0553
REVISION: A
CONTRACT NO:
SHEET NO:

P:\V&\1563 New Light Rail\CUD 3.6.1 75% Submittal\Drawings\TTLBR004.DGN
01/29/2004 rpto_half_mono.tbl
USER:
TTLBR004.DGN

APPENDIX B HYDROLOGIC INFORMATION

Flood Control District
of Maricopa County

FACSIMILE TRANSMITTAL COVER SHEET

To: Wei Cui, P.E.	From: Amir M. Motamedi
Company/Dept: Michael baker Jr., Inc.	Company/Dept: FCDMC
Phone: 602-279-1234 Fax: 602-279-1411	Phone: 602-506-4871 Fax: 602-506-4601
Re: Valley Metro, Light rail Bridge, Tempe Town Lakes	Date: 9/25/03 Number of Pages: 8

Remarks

Wei,

Herewith I am transmitting portions of three reports as requested. The First two reports, (CRSS, 1993 and COE, 1982) deal with the design flow of the existing Levees. It appears that 250,000 cfs is the design in this vicinity, and it was based on the channel capacity at Rural Road.

Your plans will show the amount of freeboard at each cross section. It is important that the existing Freeboard at SPF be maintained. Additionally, due to levee conditions in several locations, FEMA will require a minimum freeboard of three feet (4 feet at Bridge Structures).

The Third Report (COE, 1993) includes the multi-frequency flows along Salt River as requested. Your area of interest is CP-110 (Mill Avenue Bridge). W/P means with New Roosevelt Dam, which is the basis of FEMA Regulatory flow.

I will be out of the office until Tuesday, October 14th. Please contact Bil Haas at 602-506-1501 if you have any other questions.

Sincerely,

Amir M. Motamedi, P.E.
Hydrology and Hydraulics Branch Manager

Cc Don Rerick, FCDMC

2801 West Durango Street Phoenix, Arizona 85009 Phone: 602-506-1501 Fax: 602-506-4601

Technical Data Notebook (TDN)

Salt River Channelization
Floodplain Delineation Study
Southern Pacific Railroad Salt River Bridge
to McClintock Drive Bridge

Project No. 906345B
Salt River Flood Plain Revisions

prepared for

Rio Salado Task Force
City of Tempe
Tempe, Arizona

by

CRSS Civil Engineers, Inc.
4041 North Central Avenue, Suite 650
Phoenix, Arizona 85012

November 23, 1993

A126.014.001

IV. HYDROLOGIC ANALYSIS

The basis for the current hydrology on the Salt River is the report of May 1982, "Gila River and Tributaries, Central Arizona Water Control Study, Hydrology" by the Los Angeles District, U.S. Army Corps of Engineers. That report (referred to herein as the "CAWCS Hydrology") provides the hydrology (discharge/frequency) for the existing conditions on the Salt River. This hydrology was adopted for the Flood Insurance Study and is the hydrology used for all channel improvements to the Salt River in the City of Tempe. For the Tempe reach of the Salt River, the CAWCS study provides the following discharge/frequency relationship at the Mill Avenue bridge:

Table 1

Discharge/Frequency Salt River at Mill Avenue Bridge*

Frequency	Discharge
5	40,000
10	93,000
20	135,000
50	160,000
100	215,000
200	275,000
500	330,000

*from Table 1, LA ACE (1988)

The Corps of Engineers has set a Standard Project Flood discharge of 296,000 cfs for the Salt River at Mill Avenue. Because of the elevation of existing bridge low cords (primarily at Rural Road), the maximum design discharge was set equal to the maximum capacity of the Salt River at the minimum low chord elevation. A study of channel profile and cross section was conducted to determine this maximum discharge which was found to be 250,000 cfs. Design criteria were developed based on both the water-surface profile due to the maximum discharge and the 100-year flood.

The CAWCS hydrology routed Granite Reef hydrographs through the downstream reaches of the Salt River. Tributary inflows are not included in the reach from Granite Reef Dam to the I-10 Salt River bridge, and the hydrograph peak gradually attenuates as it moves through this reach presumably due to floodplain storage alone. The flood hydrographs, routed to Tempe's jurisdictional boundary, are used as the basis for design following the recommendation of the Flood Control District of Maricopa County (Johnson to Bond, November 1991).

To complete the discussion of available hydrology on the Salt River, the following facts should also be noted:

1. Operationally, nearly all low flows on the Salt River are diverted or stored when possible. For the period between 1941 and 1966, there was zero discharge to the Salt River channel below Granite Reef Dam. According to the CAWCS hydrology, such a period of zero flow should be extremely rare. However, periods of low or no-flow are common, indicating that flood discharges for more frequent floods (25 years and less) are overestimated.

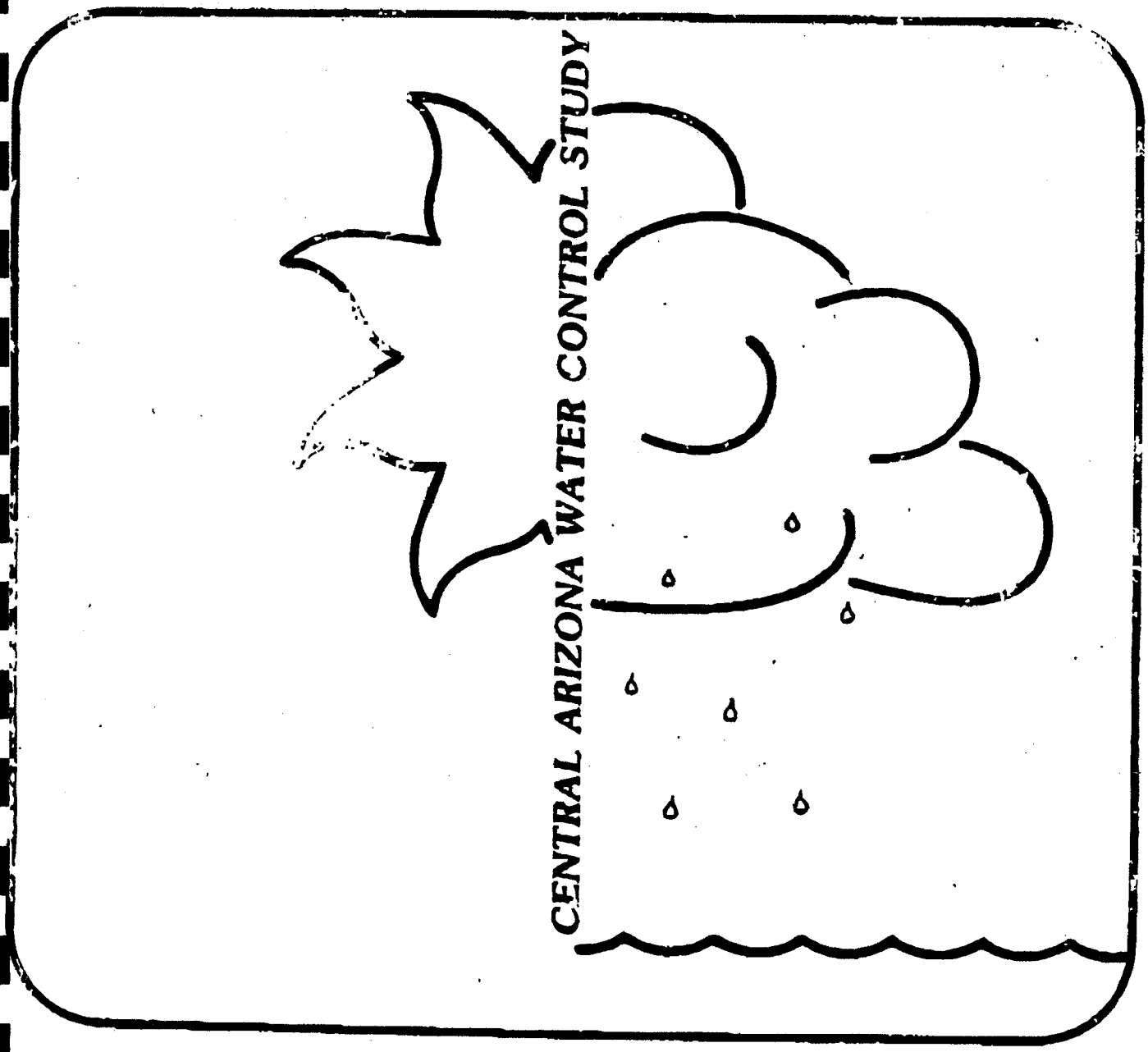
2. CAWCS hydrology was revised (LACOE, 1988) following the rejection of Plan 6 of the Central Arizona Project. This plan called for the construction of an additional dam on the Verde River called Cliff Dam. The subsequent hydrology is based on Plan 9, which provides for the modification of Roosevelt Dam on the Salt River for dam safety and flood control. This plan will not be operational until 1995, therefore this revised hydrology was not incorporated into the channel improvements for the Salt River in Tempe.

The original 11x17 maps have been reduced to 8 1/2 x 11. The original book is in the library. Book #37.2-00-1-05/82.

US Army Corps of Engineers
Los Angeles District

Gila River & Tributaries

HYDRO LIBRARY



HYDROLOGY

May 1982

TABLE 14

STANDARD PROJECT FLOOD

PEAK DISCHARGES

EXISTING CONDITIONS

Location	Peak Discharge, cfs
Salt River at:	
CP 40 - Below confl. w/Verde River	295,000
CP 109 - Gilbert Road	292,000
CP 110 - Tempe Bridge	289,000
CP 111 - Central Ave.	285,000
CP 112 - 67th Ave.	283,000
CP 113 - Above confl. w/Gila River	281,000
Gila River at:	
CP 1310 - Below confl. w/Salt River	312,000
CP 1216 - Below confl. w/Waterman W.	315,000
CP 1217 - Below confl. w/Hassayampa River	309,000
CP 1218 - Gillespie Dam	311,000
CP 12191- Midway From Gillespie to Painted Rock	304,000
CP 1219 - Painted Rock Dam	298,000

TABLE 2-4. DISCHARGE FREQUENCY VALUES
SALT RIVER AND GILA RIVER
RECOMMENDED PLAN (P6OP2) VERSUS W/O PROJECT

LOCATION		RETURN PERIOD						
		500-YR	200-YR	100-YR	50-YR	20-YR	10-YR	5-YR
PEAK DISCHARGES (ft^3/s) IN SALT RIVER AT:								
CP-40	W/P	250,000	210,000	175,000	150,000	100,000	60,000	22,000
	WO/P	360,000	290,000	245,000	175,000	141,000	102,000	45,000
CP-109	W/P	246,000	207,000	172,000	145,000	95,000	58,000	21,000
	WO/P	345,000	285,000	230,000	170,000	139,000	100,000	44,000
CP-110	W/P	243,000	204,000	169,000	140,000	90,000	55,000	20,500
	WO/P	330,000	275,000	215,000	160,000	135,000	93,000	40,000
CP-111	W/P	240,000	202,000	166,000	135,000	87,000	53,000	20,200
	WO/P	325,000	265,000	200,000	155,000	130,000	91,000	39,000
CP-112	W/P	237,000	200,000	164,000	132,000	84,000	51,000	20,000
	WO/P	315,000	255,000	190,000	150,000	126,000	90,000	38,000
CP-113	W/P	235,000	198,000	162,000	130,000	82,000	49,000	19,500
	WO/P	310,000	250,000	185,000	145,000	125,000	85,000	36,000
PEAK DISCHARGES (ft^3/s) IN GILA RIVER AT:								
CP-1310	W/P	285,000	243,000	227,000	185,000	92,000	57,000	23,500
	WO/P	360,000	295,000	250,000	200,000	135,000	95,000	40,000
CP-1216	W/P	270,000	225,000	210,000	160,000	68,000	46,000	17,000
	WO/P	350,000	290,000	245,000	195,000	133,000	88,000	39,000
CP-1217	W/P	270,000	220,000	203,000	153,000	67,000	42,000	15,000
	WO/P	340,000	280,000	240,000	190,000	129,000	82,000	38,000
CP-1218	W/P	270,000	215,000	195,000	145,000	65,000	38,000	12,000
	WO/P	335,000	277,000	235,000	186,000	124,000	78,000	37,000

DEFINITIONS:
W/P = Recommended Plan, P6OP2. WO/P = without project/existing conditions per 1982 CAWCS Hydrology Report, Table 23.
CP-40, at Granite Reef Dam
CP-109, at Gilbert Road
CP-110, at Tempe Bridge
CP-111, at Central Avenue
CP-112, at 67th Avenue
CP-113, above confluence with Gila River
CP-1310, below confluence with Salt River
CP-1216, below confluence with Waterman Wash
CP-1217, below confluence with Hassayampa River
CP-1218, at Gillespie Dam

GILA RIVER BASIN

ARIZONA

SECTION 7 STUDY FOR MODIFIED ROOSEVELT DAM, ARIZONA

(THEODORE ROOSEVELT DAM)

HYDROLOGIC EVALUATION OF WATER CONTROL PLANS

SALT RIVER PROJECT TO GILA RIVER AT GILLESPIE DAM

U.S. ARMY CORPS OF ENGINEERS

LOS ANGELES DISTRICT

MARCH 1996

APPENDIX C HYDRAULIC CALCULATIONS

C.1 HEC-RAS Model Reports (Revised Existing)

C.2 HEC-RAS Model Reports (Proposed)

HEC-RAS Version 3.0.1 Mar 2001
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

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

PROJECT DATA
Project Title: LRT Bridge 100-yearFW&ScourAnalyses
Project File : Lrt100FW.prj
Run Date and Time: 11/24/2003 5:26:36 PM

Project in English units

Project Description:
Tempe Town Lake Light Rail Bridge

This model is prepared for Tempe Town Lake
Light Rail Bridge Project by Michael Baker Jr., Inc. in December, 2003
The
Purpose of this modeling is to analyze the impact of new bridge to FEMA
100-year floodplain and floodway boundary. 50 and 500-year event scour
analysis is also conducted.

February 2001 FEMA LOMR model(North.prj) was
used as a base model. Addition cross sections were added at the new bridge
location.

100-Year Profile with Landscaping Plans Reflected and
Skews in cross sections.

PLAN DATA

Plan Title: EX100FW
Plan File : t:\LRT Town Lake\Engfiles\Drainage\HecRas\Lrt100FW.p03

Geometry Title: Revised Existing Condition
Geometry File : t:\LRT Town Lake\Engfiles\Drainage\HecRas\Lrt100FW.g02

Flow Title : 100-yearFW
Flow File : t:\LRT Town Lake\Engfiles\Drainage\HecRas\Lrt100FW.f01

Plan Summary Information:
Number of: Cross Sections = 118 Mulitple Openings = 0
Culverts = 0 Inline Weirs = 0
Bridges = 12

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

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only

```
    Friction Slope Method:          Average Conveyance
    Computational Flow Regime:      Subcritical Flow

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

River = Salt River        Reach = Reach 4
RS       Profile           Method  Value1  Value2
223.08   PF#2                  1    19332   20356
223.02   PF#2                  119353.5720446.57
222.93   PF#2                  119406.3820352.33
222.83   PF#2                  119479.6820443.27
222.74   PF#2                  119531.3120569.62
222.70   PF#2                  119591.7520559.75
222.695  PF#2                  119591.7520559.75
222.69   PF#2                  119591.7520559.75
222.67   PF#2                  119591.7520559.75
222.66   PF#2                  119591.7520559.75
222.65   PF#2                  119561.4120640.75
222.55   PF#2                  119524.82   20795
222.45   PF#2                  119473.2120860.59
222.36   PF#2                  119467.0420649.46
222.27   PF#2                  119515.4420592.52
222.17   PF#2                  119489.1420498.83
222.09   PF#2                  1 19457.320524.35
222.08   PF#2                  1 19457.320523.66
221.99   PF#2                  119415.5920427.83
221.89   PF#2                  119381.2920367.66
221.80   PF#2                  119421.4720357.31
221.70   PF#2                  119451.3720391.39
221.61   PF#2                  119472.9520399.29
221.50   PF#2                  119527.5120456.38
221.40   PF#2                  119511.6620460.87
221.31   PF#2                  119574.2620507.95
221.26   PF#2                  119535.06   20417
221.24   PF#2                  119524.2820423.14
221.2    PF#2                  119496.8820375.14
221.19   PF#2                  119495.0720368.44
221.068  PF#2                  1   19545   20403
221.061  PF#2                  1 19582.9   20404
221.06   PF#2                  119571.2920400.39
221.05   PF#2                  119584.7820398.81
221.02   PF#2                  119511.5820381.47
220.92   PF#2                  119547.3220410.59
220.82   PF#2                  119505.8420374.17
220.756  PF#2                  1   19547   20453
220.755  PF#2                  1   19547   20453
220.752  PF#2                  1   19547   20453
220.75   PF#2                  1   19547   20453
220.74   PF#2                  1   19547   20453
220.735  PF#2                  1   19547   20453
220.73   PF#2                  119490.1120495.14
220.63   PF#2                  119531.1820437.64
220.54   PF#2                  119531.3720446.62
220.45   PF#2                  119539.67 20451.8
220.35   PF#2                  119544.1320460.75
220.25   PF#2                  119549.1220468.77
220.16   PF#2                  119561.2420473.91
220.06   PF#2                  119565.9120475.44
220.05   PF#2                  119567.2120473.83
220.03   PF#2                  119567.2120473.83
219.88   PF#2                  119562.9620481.47
219.79   PF#2                  119514.2320446.13
219.70   PF#2                  119566.9120512.06
219.61   PF#2                  119564.3220553.08
219.51   PF#2                  119541.3920547.55
219.42   PF#2                  119488.9720499.14
219.33   PF#2                  119430.3720455.23
219.24   PF#2                  119468.0920500.54
219.14   PF#2                  119481.8420505.11
219.03   PF#2                  119340.4520367.12
219.02   PF#2                  119342.4120364.57
219.01   PF#2                  119342.4120364.57
218.97   PF#2                  119490.0620499.86
```

218.96	PF#2	119477.8720498.31
218.80	PF#2	119492.0120503.75
218.71	PF#2	119509.9120496.68
218.61	PF#2	119503.38 20500.7
218.52	PF#2	119500.4720508.59
218.42	PF#2	119506.7820514.58
218.33	PF#2	119490.0520541.51
218.24	PF#2	119418.1720453.03
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218.04	PF#2	119390.1220428.81
217.95	PF#2	119437.7320479.87
217.86	PF#2	119497.4120541.23
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217.66	PF#2	119569.8920590.58
217.57	PF#2	119521.5120562.51
217.48	PF#2	119436.4220482.19
217.38	PF#2	119463.0120497.48
217.29	PF#2	119510.7820509.77
217.19	PF#2	119562.0520511.37
217.10	PF#2	119607.3520517.16
217.00	PF#2	119612.3420517.43
216.91	PF#2	119604.8920509.34
216.81	PF#2	1 19606.320501.51
216.72	PF#2	119596.8720494.78
216.62	PF#2	1 19591.620542.92
216.52	PF#2	1 19519.920519.62
216.49	PF#2	119567.4420516.46
216.42	PF#2	1 19535.320482.14
216.33	PF#2	119399.9120426.24
216.23	PF#2	1 19329.520413.21
216.13	PF#2	1 19324.320437.98
216.04	PF#2	119397.8520467.69
215.94	PF#2	119572.3520479.02
215.84	PF#2	119571.9820442.79
215.82	PF#2	119550.04 20410.9
215.81	PF#2	119550.06 20410.9
215.75	PF#2	1 19576.720431.51
215.65	PF#2	119594.8420484.84
215.56	PF#2	119587.3720495.25
215.46	PF#2	119599.3720516.22
215.36	PF#2	1 19618 20537
215.27	PF#2	1 19610.6 20553.9
215.18	PF#2	119683.2220277.12
215.09	PF#2	1 19674.220293.22
214.99	PF#2	119601.52 20329.1
214.9	PF#2	119563.8820374.38
214.79	PF#2	119461.7320518.14
214.785	PF#2	119462.6420517.08
214.78	PF#2	119462.6420517.08
214.71	PF#2	119640.2920541.86
214.61	PF#2	119685.1720477.61
214.52	PF#2	119525.2620453.48
214.42	PF#2	119382.0820423.77
214.33	PF#2	119492.0720391.61
214.23	PF#2	119614.3420352.34
214.14	PF#2	119654.9820381.82

FLOW DATA

Flow Title: 100-yearFW
Flow File : t:\LRT Town Lake\Engfiles\Drainage\HecRas\Lrt100FW.f01

Flow Data (cfs)

River	Reach	RS	PF#1	PF#2
Salt River	Reach 4	223.08	172000	172000
Salt River	Reach 4	221.26	169000	169000

Boundary Conditions

River	Reach	Profile	Upstream	Downstream

```
 Salt River      Reach 4         PF#1                                          Known WS = 1075.49
 Salt River      Reach 4         PF#2                                           Known WS = 1075.5
```

file shows the data of cross section from 222.08 to 220.45 only.

GEOMETRY DATA

Geometry Title: Revised Existing Condition
Geometry File : t:\LRT Town Lake\Engfiles\Drainage\HecRas\Lrt100FW.g02

CROSS SECTION RIVER: Salt River
REACH: Reach 4 RS: 222.08

INPUT
Description: Downstream face of Rural Road Bridge

```
Station Elevation Data    num=      78
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   18210    1164   19030    1164   19200    1168 19457.2  1171.819459.15    1163
19461.35    116219463.95    116119466.55    116019469.15    115919473.15    1158
19476.95    115719480.95    115619485.15    115519489.15    115419493.25    1153
19531.15    115319551.15    115319551.15    115419553.15    115419553.15    1152
 19556.3 1146.33 19557.8 1146.33 19635.4  1138.8 19692.9  1136.4 19698.9  1136.4
 19736.9    1136 19745.9    1136 19764.9  1136.2 19792.4    1137 19813.9  1136.7
 19819.9  1136.7 19839.9  1136.2 19859.9  1136.2 19890.9  1136.7 19913.4    1137
 19934.9  1137.1 19940.9  1137.1 19998.4  1137.1 20055.9  1136.9 20061.9  1136.9
 20092.9  1137.6 20102.9  1137.8 20106.9  1137.8 20131.9    1138 20146.9    1138
 20176.9    1138 20182.9    1138 20240.4  1138.9 20297.9    1139 20303.9    1139
 20361.4  1139.4 20418.9  1140.8 20424.9  1140.8 20448.4  1141.120450.31 1146.33
20451.81 1146.3320454.96    115220454.96    115420456.96    115420456.96    1153
20479.65    1153 20515.9  1157.5 20530.9  1162.1 20539.9  1166.7 20545.9  1166.7
 20564.4  1165.4 20580.4  1162.3 20601.4    1157 20660.9    1156 20666.9    1156
 20669.9    1156 20728.9  1156.4 20769.9  1155.9 20781.6  1157.4 20781.7    1165
 20781.8  1171.7   21050    1168   21220    1164

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

   18210     .0519459.15     .03 20545.9     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19459.15 20545.9              580  440.56     330              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

CROSS SECTION RIVER: Salt River
REACH: Reach 4 RS: 221.99

INPUT
Description:
Station Elevation Data    num=     216
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

 17228.1  1167.317258.96  1166.117291.63 1169.2217293.52 1169.2917354.45  1166.5
17358.04  1166.517386.91 1165.9417430.53 1165.4517465.42 1164.7717504.19 1164.11
 17517.7  1163.817557.37  1163.117568.46 1162.9917596.15 1163.2317646.22 1163.04
17664.33  1162.917731.94 1162.7717764.84 1162.5317842.88 1162.3817895.13 1162.14
   17950  1161.817992.32  1161.618008.74 1161.4718042.78  1161.318085.64 1161.18
18095.78  1161.218181.67  1161.618206.63 1161.5818296.43 1161.3918335.79 1161.37
18389.47  1161.418419.45 1161.3218459.39 1161.0518508.93 1160.9918618.73 1161.02
18725.56  1160.9 18734.5 1160.8618810.21 1161.3518837.68 1161.38 18936.6 1161.27
18955.95  1161.3 19027.2 1161.5919072.68 1161.6519091.72 1161.7819107.22 1161.43
19117.15    116119125.19 1161.4319167.72 1161.1819170.23 1161.22 19204.7 1160.86
19214.48  1160.419272.73  1160.3 19280.4 1159.8619312.77  1158.419334.57 1157.04
19340.24    115519354.44    116019368.84    116519373.04    116619387.24    1167
19388.44    116619389.84    116519400.84    116019404.24    115919409.64    1158
19415.04    115719420.24    115619425.84    115519431.04    115419436.24    1153
19488.24    115219508.24    115219508.24    115319510.24    115319510.24    1151
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19513.39 1146.3319514.89 1146.3319522.21 1145.7319526.03  1145.919542.04 1145.98
19548.13 1143.7619549.74  1142.819578.31 1142.7219608.92  1142.319622.35 1142.55
 19625.8 1142.4319629.95  1141.919662.92 1140.93 19757.8 1138.1419790.37 1138.34
19889.34 1139.2220013.16  1138.7 20021.4 1138.6820046.59 1139.2720150.57 1141.48
20168.42 1141.4120279.22  1139.720311.82 1140.8520339.33 1142.08   20388 1146.33
 20389.5 1146.3320392.65    115220392.65    115420394.65    115420394.65    1153
20398.23 1153.3420408.91    115520451.75    116420464.34 1166.74 20474.1 1168.58
20520.34  1161.820524.22  1161.5 20551.1 1161.72   20569 1158.5420579.56 1158.19
20581.69 1157.8220619.68  1158.120624.32 1158.2720636.26 1158.2420682.65 1158.22
20708.27 1159.6520747.43  1165.120810.38 1169.0920865.53 1168.6120878.38 1168.59
20925.02 1169.0420977.87  1168.520990.49 1168.5121017.94 1163.9121020.96 1162.22
21027.69 1160.1121041.39  1160.221048.88 1164.4621051.31 1164.7321103.84 1164.33
21113.72  1164.221167.12  1164.321199.72 1164.3321238.15  1164.721244.69 1165.51
21250.07 1165.4721255.82  1165.121263.75 1162.5921273.81 1162.5321441.29 1161.92
21461.92 1162.6221468.87  1162.721483.54 1163.6221530.74 1164.7821532.64 1165.61
21578.49 1184.4721580.42  1185.3 21583.3 1185.1521603.14 1184.67 21614.3 1183.99
21640.68 1182.5821655.09  1182.321667.69 1183.0721684.27 1183.8121707.08 1185.46
21717.84 1185.8421729.19  1185.721758.49  1174.321786.72 1161.7321788.91 1161.41
21814.08 1161.2521824.13  1161.621829.11 1162.3821843.37 1161.5321858.77 1161.61
21885.49 1161.8121909.83  1161.921920.48 1162.5721936.69 1162.9721976.35 1162.16
22029.88 1162.2722120.51  1161.822128.67 1161.8122133.27  1161.722196.18  1161.7
22222.92 1162.5122230.32  1162.322238.27 1161.4122269.18 1161.3222332.41 1161.21
22339.87 1161.4822350.41  1161.222441.19 1161.62   22490 1162.0622504.47 1163.38
 22519.1 1163.0422613.27  1163.222638.03 1163.1522664.13 1163.0222668.84 1163.15
22699.98 1163.5622742.99  1164.122775.57 1163.9622823.75 1164.1222840.56 1164.36
22888.81 1164.8822942.19  1167.3 22960.9 1168.0822991.37 1168.8923023.13 1170.19
23043.49 1170.5623080.41  1171.5 23092.3 1171.8823129.53 1172.7523168.04 1173.24
23174.01  1173.4 23188.8  1174.123254.98 1175.0523286.26 1175.3623307.91 1175.31
23338.46 1175.78

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

 17228.1     .0519510.24     .03 20474.1     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19510.24 20474.1              560   510.5     470             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 221.89

INPUT
Description:
Station Elevation Data    num=     183
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

18161.32    118918182.36  1186.318272.19  1173.418277.68 1174.3718296.84 1174.62
18327.04  1175.418351.63 1176.5318365.81 1176.4718388.58 1173.4518404.71 1171.92
18446.03  1166.118461.79 1165.9918502.06 1164.7218528.23 1163.6618553.47 1163.24
18598.41  1161.818644.49 1161.0318701.92 1161.2718748.85 1160.9118822.97 1160.98
 18837.4  1160.818915.81 1159.6318968.45 1158.7418983.15 1158.6718996.08 1157.52
19009.62  1160.319015.83 1160.0819057.14 1158.8119066.94 1159.5119089.99 1160.29
19119.06  1159.219179.93 1157.8919232.08 1150.4919251.46  1147.819253.61 1147.74
19274.36  1149.419275.56 1149.6919284.25    115019299.65    115519315.05    1160
19329.45    116519335.85    116619344.05    116619347.65    116519353.25    1163
19362.85    116019365.75    115919368.85    115819371.65    115719377.05    1156
19382.05    115519387.25    115419392.65    115319397.65    115219405.05    1152
19447.05 1151.6719467.05 1151.6719467.05 1152.6719469.05 1152.6719469.05 1150.67
 19472.2 1146.33 19473.7 1146.3319483.77 1143.0219487.24 1139.7219528.76 1138.45
19558.85  1136.219601.29 1140.0819609.97 1140.8919619.19  1141.219633.53 1141.98
19640.82  1141.419722.43 1138.7719766.05 1141.1319851.35 1141.2319899.11 1141.41
 19971.6  1141.820028.47  1142.120089.74 1140.2420162.05 1138.7520164.13 1138.79
20287.09  1142.320291.34 1143.1220323.06 1146.3320324.56 1146.3320327.71 1151.25
20327.71 1153.2520329.71 1153.2520329.71 1152.2520349.67 1152.2520368.68  1158.4
20396.08 1167.7520399.15 1167.0620418.06 1166.1520493.63 1157.1520555.01  1161.6
20570.26 1159.6820578.82 1159.4920608.46 1159.2220621.68 1159.4220638.74  1159.6
20651.79 1161.3820659.22 1161.8620698.49 1161.6220728.25 1161.3720744.67  1160.9
20770.67 1161.38   20785 1161.5120804.72 1162.2620819.52 1162.0920838.48  1161.4
20858.28 1161.1520886.14 1161.6320893.59 1161.6620905.54  1163.3 20935.3  1163.7
21015.06 1163.9621093.11 1165.0121110.98 1164.8221127.65 1165.4221134.25  1164.6
21296.92 1164.5921311.66 1164.5421316.66 1164.72 21334.9 1164.5621355.48  1175.6
21391.39 1177.2321394.96 1177.2821400.07 1178.5621427.55 1188.0921450.73  1186.8
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21483.68  1187.721495.96 1188.6621508.88 1189.3621573.43 1189.89 21580.3  1189.8
21592.27  1188.121680.11 1173.1221681.99 1169.9721688.73 1162.2521708.44  1162.3
21714.52 1160.2821755.73 1161.1921799.28 1163.7121812.85 1164.1821862.85  1163.6
21920.72 1164.5221934.83 1164.5521954.46 1164.7422023.38 1165.1522048.76  1165.3
22090.36 1165.2922124.89 1164.7122171.39 1164.9422212.98 1165.0322233.83  1164.1
22262.05 1162.5922302.38 1163.9522321.75 1164.4222378.71 1165.5822439.74  1166.4
22445.13 1166.3922478.45 1167.1722486.73  1167.2 22585.5 1167.3422634.36  1167.4
22668.78 1167.2822679.97    116722713.73  1166.422753.65 1173.5222759.09  1173.5
 22832.7 1173.2523002.71 1173.8423015.32 1173.7923050.61 1173.3123077.36  1174.2
23124.52 1175.3623128.21  1175.623147.58  1177.823156.31 1178.9523182.18  1179.2
23220.56 1178.5423281.93 1178.4623334.21 1178.64

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

18161.32     .0519469.05     .0320396.08     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19469.0520396.08              520  490.84     460             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 221.80

INPUT
Description:
Station Elevation Data    num=     208
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

18195.87  1210.618206.33 1210.0618268.65  1207.718276.94 1206.4918283.96 1202.79
18294.72  1196.1   18328  1195.6 18348.1 1194.8518356.04 1193.3918362.14  1191.1
18363.55  1190.418376.79 1190.8918403.03 1190.6118417.69 1191.3818420.16 1190.98
18433.12  1187.718482.24 1174.0618510.47 1165.9118531.57 1164.6418556.08 1164.03
18589.61  1163.318608.83 1162.9318655.29 1161.9618713.56  1162.2 18738.5 1162.31
 18742.4  1162.318799.21 1161.8518835.11 1161.9618846.72 1157.9818857.05  1160.4
18899.99  1159.618937.49 1161.0518945.96 1158.9318992.28 1157.1618998.83 1156.99
19066.83  1148.419070.07 1148.4619150.04 1151.3119165.16 1159.1819179.04 1164.33
19192.16  1166.319195.49 1166.4219232.95 1150.4219238.01 1148.57 19280.9 1149.18
 19284.1  1149.219286.96 1149.88 19289.2    1147 19298.6    1150 19313.8    1155
   19329    1160 19344.1    1165 19357.8    1165 19360.6    1164 19369.2    1163
 19375.2    1162 19398.8    1161 19403.8    1160 19408.2    1159 19413.4    1158
   19418    1157 19422.8    1156 19427.6    1155 19432.2    1154   19437    1153
 19441.8    1152 19446.2    1151 19459.8    1151 19479.8    1151 19479.8    1152
 19481.8    1152 19481.8    115019484.95 1146.3319486.45 1146.3319502.11 1140.44
19505.02 1138.54 19552.6  1138.419570.23 1136.3519606.09  1141.819612.72 1142.84
19636.74 1140.3619648.42  1139.419749.09 1138.8419776.44 1138.3319782.55 1138.43
19887.19 1138.8319912.95    113920001.53 1137.4320047.61 1136.6720132.52 1139.68
20179.34 1141.16 20233.4  1141.520271.09 1141.6720287.08 1145.2820317.36 1146.33
20318.86 1146.3320322.01    115120322.01    115320324.01    115320324.01    1152
20343.75  1152.320373.84 1163.6320381.57 1166.2920391.18 1165.1620399.13 1164.63
20408.31  1165.320429.06 1164.8320451.18 1164.1920458.79 1162.2720470.36 1159.85
20477.35  1159.820491.93 1160.07 20518.7 1160.9620526.46 1161.0320538.42 1161.44
 20552.5  1161.820568.77 1161.75 20595.3 1161.5320629.76 1161.6620662.92 1161.53
20708.54  1161.520747.81 1161.5320775.58 1161.73 20798.6 1161.5520821.58 1161.65
20884.34  1161.320914.55 1161.0420959.94 1159.8621031.24 1160.4221040.75 1160.45
21059.65  1160.321087.69 1159.5921099.74  1159.821116.21 1161.7621127.28 1162.66
21137.95    116321140.46 1163.6321200.32 1166.2921210.81 1167.1421271.48 1170.41
21287.77  1171.821295.81 1172.3821342.69 1174.3721350.38 1174.6321426.93 1178.54
21434.63  1178.5 21457.9 1171.0921479.51 1164.5221490.56 1163.8421503.06 1162.78
21513.46  1162.721527.74 1162.0521536.21 1161.2321562.56 1160.8921573.78    1161
 21584.6  1161.721591.93 1162.0521606.96 1162.16 21640.1 1163.16 21656.9 1163.53
21703.98  1163.921707.22 1164.0321726.09 1163.98 21805.8    116321849.97 1162.23
21891.14  1161.821947.27 1161.3421979.38 1161.2621998.69 1160.9922060.89 1162.34
22079.78  1162.422113.99 1163.1622118.49 1161.5122131.71  1162.422155.67  1162.8
22201.25  1163.722220.21 1164.2622245.94 1164.9722262.29 1166.2322281.29 1165.81
22306.73  1166.222343.14 1166.6422360.44 1166.5522371.75 1165.9922383.67 1165.02
22420.14  1165.822446.45 1166.5522468.98 1166.7222538.97 1167.4122578.44 1167.76
 22579.7  1168.1 22607.9 1172.3422616.63 1172.59 22677.7 1173.5722730.96 1173.31
   22777  1173.722794.36 1173.9222872.47 1174.3122927.16 1174.42 22933.6  1174.9
23008.51  1175.123039.74 1174.8823081.93  1176.123090.79  1176.523108.08 1178.43
23114.74    117923130.35 1178.9223148.09 1179.07

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

18195.87     .05 19481.8     .0320381.57     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       19481.820381.57               520  512.31     500             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 221.70

INPUT
Description:
Station Elevation Data    num=     187
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

 18313.4  1207.718331.21 1190.5518353.07  1178.818357.74 1176.4918383.22 1173.02
18388.14  1172.318425.75 1170.5818484.17 1168.7218551.42 1167.0518573.43 1166.72
18584.11  1166.418612.02  1166.118666.45 1165.1418709.95 1164.5718726.98 1164.56
18729.96  1164.218733.93 1163.2518741.54 1162.5318742.43 1162.1818754.36 1163.08
18794.42  1162.618812.28 1162.6918870.65 1154.7118917.38 1147.9218947.73 1148.51
18977.47  1147.618991.82 1147.9819043.31 1149.0519071.02 1149.34 19075.1 1149.34
19218.77  1147.519309.85 1147.1419352.26    114619363.66    115019378.06    1155
19392.06    116019403.26    116419416.26    116419426.26    116219431.26    1161
19436.26    116019456.06    115619460.76    115519465.86    115419468.86    1153
19494.46    115219520.26 1151.6719540.26 1151.6719540.26 1152.6719542.26 1152.67
19542.26 1150.6719545.41 1146.3319546.91 1146.3319565.71 1139.8519619.86 1137.57
19624.35  1137.419634.06 1138.1619660.31 1140.4219662.96 1140.1519791.68  1137.6
19926.34  1134.319979.53  1136.720001.72 1137.3420058.56 1139.0320103.44 1138.63
20193.46  1137.320218.21 1137.9220297.42 1140.9920315.77 1140.8320327.65 1141.87
20331.56  1143.420336.16 1143.5320352.08 1146.3320353.58 1146.3320356.73 1150.75
20356.73 1152.7520358.73 1152.7520358.73 1151.7520366.55 1151.7520376.48 1153.55
20406.45    116020424.35 1163.9820429.66 1164.0320438.47 1163.4820446.38 1162.45
20476.02    115920483.23  1158.6 20515.8 1158.9820530.06 1159.9620558.19 1161.28
20591.52  1160.420616.24 1159.9120664.46 1158.5620680.13 1158.6420702.62 1158.97
20737.58    115920784.83 1158.7320829.13 1157.4720912.47 1159.31 20933.1 1159.79
20954.93  1168.120977.63 1177.37 20995.9 1178.3420999.53 1178.6321081.63 1178.23
21083.63  1178.321093.55 1179.7221128.13 1178.7621190.62 1177.2721209.18 1169.86
21229.58  1162.821237.19 1161.4921239.52  1160.521268.55 1159.9721291.89 1164.94
21301.26  1164.621306.68 1160.4621324.48 1162.9221348.89 1164.3721402.27 1165.51
21434.96  1171.321449.56  1172.621463.69 1174.8121490.56 1175.2421526.24 1176.75
21542.59  1176.9 21555.5 1177.5721594.85 1177.4521622.38 1182.0421629.26 1182.57
21641.43  1185.221667.39 1189.6221680.98 1193.8521697.93 1199.2921733.38 1207.61
21756.81  1212.3 21768.5    120821815.78  1183.421825.94 1181.6921855.64 1176.17
21869.96  1173.421875.52 1172.6721880.58 1172.5221930.63 1170.1321938.76 1170.01
 22003.3  1170.822072.34 1170.32 22089.3 1170.2822143.78 1170.4722201.32 1171.17
22221.23  1171.122291.67 1171.4622308.03 1171.6122363.53  1171.522371.52 1171.81
22441.39  1173.922459.63 1172.9122477.06 1172.7122511.23  1172.422515.43 1172.41
22546.13  1171.8 22567.5 1171.8222627.63 1172.7922675.51 1172.3122686.47 1172.26
22704.37  1171.522733.97 1171.2722742.09 1170.6222760.68 1176.4922765.21 1177.15
22771.49    117722794.55  1175.722832.55 1176.3922848.45 1175.4222869.41 1174.44
22880.16  1176.522885.04 1177.5922896.93 1177.4722930.49 1176.9222938.35 1177.12
22981.95  1177.623029.34 1178.5123071.34 1179.2223088.16 1179.47 23096.5  1179.4
23160.94  1179.423225.52 1179.55

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

 18313.4     .0519542.26     .0320429.66     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19542.2620429.66               480  491.61     500             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 221.61

INPUT
Description:
Station Elevation Data    num=     200
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     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

 18678.5  1212.418683.01 1211.0318689.82 1208.6518703.07 1203.7518715.48 1197.08
18718.55  1195.818720.66  1195.518744.02 1195.4518748.36 1194.6518750.08  1194.6
18759.03  1190.218792.02  1157.918804.93 1145.3418829.12 1143.2718856.12 1158.13
18869.54  1164.718908.36 1164.2118915.11 1164.0518951.93 1163.4818960.49 1163.42
18973.47  1163.718982.88 1159.4319016.44 1146.2119049.87 1145.7719063.08 1145.72
19079.13  1146.119082.86 1146.0219107.73 1144.8919133.21 1145.2419143.93 1145.87
19188.53  1147.319247.86 1145.4819284.38 1143.8519314.17 1148.4419314.76 1148.92
19372.29  1147.919378.44    114719388.64    115019403.64    115519417.84    1160
19426.84    116319433.44    116419440.64    116419453.84    116019470.44    1155
19476.84    115319480.44    115219484.84    115119532.84    115119542.84    1151
19562.84    115119562.84    115219564.84    115219564.84    115019567.99 1146.33
19569.49 1146.3319583.11 1139.9319591.56 1134.3919648.21  1136.719677.11 1137.81
19809.86 1133.9819916.35 1134.7919935.06  1134.919990.46    113920010.96 1140.74
20062.96  1140.820076.44  1140.7 20137.2 1140.7420205.46  1141.5 20305.7 1140.73
20341.53 1140.2220343.81 1140.6620353.78  1143.720361.52 1146.3320363.02 1146.33
20366.17 1149.6720366.17 1151.6720368.17 1151.6720368.17 1150.6720380.41    1152
20388.69  1152.720419.66  1161.520433.82 1165.4620447.28 1164.4220458.72  1163.6
20475.45 1161.0720499.06 1157.2720531.49 1159.46 20545.4 1157.9820571.87  1157.5
20578.81 1157.4320606.24 1157.4420616.16 1157.3220640.05  1157.820691.04  1159.2
20694.58 1159.3920702.31 1160.6720707.85 1161.2620714.52 1162.1820723.12  1167.3
20734.57  1173.620755.69 1173.7420780.53 1173.7520796.22 1174.0120840.73  1174.2
 20850.6 1174.0920857.79 1173.8920868.54 1174.3120895.56 1174.7820907.19  1172.4
20920.14 1169.14 20926.2 1169.7520939.07 1165.5220960.36 1163.3220975.48  1163.4
20989.85  1161.321006.64  1160.321028.57 1158.06 21060.5 1158.4421092.06  1158.4
21120.46 1158.39 21145.3  1158.321150.14 1158.4421173.57 1162.2921204.33  1166.6
21232.66 1165.1321234.44  1163.821241.62  1161.221250.13 1163.07 21260.5  1164.1
21290.65 1165.0921299.98 1165.7321315.94 1168.1721326.38 1170.7221348.18    1174
21409.65  1182.721454.08 1187.7721464.71  1188.721505.76 1190.3721573.42  1179.9
21596.51  1181.6 21602.4 1181.9321622.23 1184.8221655.45 1189.3221671.98  1191.6
21711.23 1194.45 21728.2 1197.1321777.27 1203.8321788.71 1204.2621819.26  1205.6
21841.15 1206.0321867.01 1203.1921903.18 1197.41 21932.3 1194.88 21945.8    1193
21985.87 1185.7222004.02 1184.45   22027 1184.1422057.67 1187.79 22075.1  1189.9
22085.84 1188.5622113.34 1185.4522115.25  1184.122125.69 1182.8322154.69  1179.7
 22155.4 1179.7422176.65 1181.88   22200 1182.5622220.51 1182.0322230.57  1181.2
22264.92 1177.4222278.13 1178.0922302.74 1178.9722350.33 1177.4322381.18  1175.5
22383.12 1176.0522397.28 1175.3622403.14 1174.6822437.65 1172.3822439.41  1172.4
22472.76 1174.72 22494.1 1175.0622505.84 1175.9322516.42 1175.1422553.24  1180.5
22562.01 1180.8922577.08 1180.9622612.44  1183.222617.73 1183.3822632.53    1185
22658.81 1185.2322669.56 1185.0522713.55 1181.8422715.82 1182.1722718.59  1183.9
22723.52 1182.7522735.39 1183.0422743.11 1182.4122776.65 1180.9922777.91    1181

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

 18678.5     .0519564.84     .0320433.82     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19564.8420433.82              420   571.5     760              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 221.50

INPUT
Description:
Station Elevation Data    num=     111
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

18724.69  1224.318736.78 1219.5918740.72 1217.9418746.27 1217.0418762.15 1207.06
18762.87  1206.718779.35 1201.5318780.37 1201.4418804.96 1196.5818807.77 1195.77
 18813.4  1193.418835.21  1186.218863.88 1163.3718883.84 1146.59 18910.1 1145.79
18943.52  1162.218976.58 1161.2319025.23 1159.8119050.06 1159.0519062.67 1155.45
19088.81  1148.419103.99 1147.8719122.88 1146.9819152.74 1146.2419167.01 1146.34
19212.01    114619222.05  1145.919247.66 1143.7919287.05 1144.0419295.73 1144.26
19308.12    114519350.49 1146.95 19384.7 1147.3819388.07 1147.3819414.13 1154.24
19421.77  1156.319446.99 1162.6919452.98 1164.4319460.46 1168.1319464.91  1166.3
19478.02  1160.419495.41 1160.5219508.22 1160.4419514.49 1158.7319535.89 1151.98
19549.16  1150.819564.95 1151.31 19579.7 1152.1919584.23    115119584.23    1152
19586.23    115219586.23    115019589.38 1146.3319590.88 1146.3319590.95 1145.02
19596.41 1141.2219623.73  1140.819639.47 1140.6119660.34 1139.6819721.27 1136.87
 19768.9 1134.0819897.56  1136.119971.91 1135.1120028.81 1134.2520038.11  1134.6
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20049.15 1134.8620117.01  1139.220150.41 1141.0120157.19 1142.5520260.17 1138.98
20290.02 1138.3520365.62  1141.320376.07  1141.720395.01 1146.3320396.51 1146.33
20399.66  1149.620399.66  1151.620401.66  1151.620401.66  1150.620405.82 1151.54
20446.21 1151.9420448.54 1152.3520489.79  1164.320506.63 1164.7320509.77 1164.73
 20520.6 1162.9220538.53 1168.6620542.37  1169.820552.68 1169.0720605.25 1166.09
20627.64 1167.6620657.69 1167.3620681.46  1166.720690.88 1166.4620703.82 1164.01
20710.31 1162.1920726.22 1162.62 20744.7  1162.720753.41 1160.0420774.01 1167.28
20778.57 1169.3120780.54 1169.8220811.33  1168.3 20827.3 1167.9420859.08 1166.63
20875.49  1164.420883.33 1165.7720891.67  1168.620906.56 1171.6420926.89 1172.53
20993.81 1186.59

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

18724.69     .0419460.46     .0320506.63     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19460.4620506.63              510  506.96     520              .1       .3
Ineffective Flow     num=        2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

CROSS SECTION           RIVER: Salt River
REACH: Reach 4            RS: 221.40

INPUT
Description:
Station Elevation Data    num=     266
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev

 18652.1     120518671.59 1200.55 18699.2 1192.2318707.99 1189.4118714.68 1186.79
18723.36     118518763.39 1171.9318779.65  1168.318828.27 1168.4118858.97 1168.65
18906.14  1168.718911.84  1168.8 18935.5  1168.318948.16 1164.5318978.02 1157.09
18991.43  1153.918993.58 1154.1419033.37 1154.6919043.37 1154.2719048.94 1154.21
19058.77  1155.4   19061 1155.4319072.37 1156.3719083.23 1155.7119097.13 1154.73
19138.46  1157.519155.07 1158.69 19166.8 1160.4819213.05 1159.5419241.37 1159.48
19249.06  1159.719254.05 1160.3219283.37 1155.5219311.47 1150.07   19324 1147.37
19346.26     114319354.28 1142.1619356.11 1143.0319383.67 1149.5519407.07 1154.11
19408.59  1154.519441.58 1164.73   19445 1164.1819449.43 1164.8919456.36    1167
19480.62  1155.819493.16 1155.2619503.91 1155.0919516.58 1152.8119532.23  1150.2
19549.14  1149.419559.75 1150.4919570.58 1151.7319577.91 1151.2619580.88    1151
19580.88     115219582.88     115219582.88     115019586.03 1146.3319587.53 1146.33
19594.37 1142.4919600.79  1143.519607.14 1144.8319609.31 1143.8919614.57  1142.9
 19642.3 1142.5519646.34 1142.3119655.98 1142.2319677.03 1141.2619785.47  1136.2
19807.92 1135.8319895.92 1136.1519914.19 1136.14 20045.5 1133.7620050.59  1133.8
20171.35 1133.2120255.63 1134.7920306.82 1135.7920337.14 1138.0420387.05  1141.8
20396.05 1145.87 20405.2 1146.33 20406.7 1146.3320409.85  1149.520409.85  1151.5
20411.85  1151.520411.85  1150.520422.65 1151.3220452.05 1152.8720470.54  1154.6
20487.47  1155.920500.27 1157.3720515.11 1158.7220540.48 1158.5520565.02  1164.5
20574.62 1165.2420584.25 1172.1720634.72 1172.0620641.89 1172.4320707.14  1172.3
20716.33 1172.3720721.03  1172.320750.05  1170.120764.44  1169.420772.33  1167.6
20776.01 1167.4420794.23 1162.0120800.86  1161.7 20810.3 1161.98 20838.2  1163.3
20845.54 1160.1720866.66 1166.5920871.05 1167.99 20875.8  1166.220899.66  1165.7
20912.01 1164.9220916.66 1164.9320938.55 1165.6820948.58 1166.4520975.14  1171.2
21020.84 1175.8221052.25 1177.7721102.75 1181.2521116.56 1182.6821155.53  1188.3
21201.77 1195.6521207.52 1195.9721276.43 1202.8821289.39 1204.1321317.85  1200.1
21330.02 1198.3121339.16 1199.1121370.97 1200.8721397.84 1202.1421460.04  1212.6
21461.59 1212.93 21511.7 1221.68 21546.9 1227.7821568.77 1231.3221596.38  1236.7
21640.13 1248.9921665.43 1254.4621692.78 1259.56 21697.2 1261.0321707.51  1262.8
21716.32 1264.1421791.55 1258.9721850.25 1252.0221857.65 1251.19 21863.4  1250.9
21873.08 1249.5221962.35  1236.321967.51 1234.8822016.88 1223.2522023.23    1221
22031.27 1218.5822051.75 1221.3922060.31 1222.41 22065.8 1221.8822075.24  1221.8
22110.52  1220.622144.58  1217.822155.42 1217.2122158.53 1218.5122163.19  1217.9
22183.22 1217.3822190.13 1217.5522193.29 1217.3122226.28 1216.9722232.43  1216.4
22242.46  1216.522284.81 1216.1322320.94 1222.5322333.23 1223.1222342.68  1222.8
22351.29 1224.6722382.67 1218.2622390.51 1216.7722398.53 1216.1922438.98    1212
22481.19 1205.9622485.17 1205.8422495.98 1207.0122527.13 1211.0922538.15  1210.5
22559.76 1210.6422596.84 1207.2322607.16 1206.6422631.18 1207.7522642.13  1208.9
22661.99 1211.4922692.22 1215.9622711.98 1218.9922736.36 1222.4422759.23  1226.6
22790.77 1230.6122805.91 1232.9622825.04 1233.1522836.73 1232.6822882.49    1227
   22887  1226.622917.78 1225.0722938.05 1223.2122955.82 1221.4922986.03  1220.1
22992.72 1219.9423006.88 1220.1423022.46 1219.8223026.55 1219.5423080.52  1217.3
23088.12 1216.7923104.31 1216.5723143.27 1215.0623148.76 1213.0923210.02  1216.3
23269.57 1218.8923283.38  1221.523289.05 1222.3223321.66 1224.7923339.03  1223.9
23382.95 1229.7323387.74 1229.7423463.23  1228.723483.01 1229.1223493.93  1229.1
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23502.63 1230.1723505.14 1230.0323546.35 1228.46 23548.8 1228.3923564.58  1228.6
23601.96 1229.2423609.11 1229.5323678.59 1231.4823685.07     1231 23726.3  1231.6
23727.36 1231.35 23756.2 1229.7323766.62 1230.4923771.63 1230.4423785.18  1231.5
23801.99 1230.46 23826.7 1232.6923886.44 1237.0223911.27 1238.2223924.45  1235.9
23934.49 1236.5723940.75 1237.1523973.91 1242.3323982.18  1242.124021.62    1242
24040.01 1246.7524072.75 1251.9524101.71 1252.04 24161.4 1253.5524168.61  1253.7
24171.81 1255.3924181.98 1263.1424201.38  1262.624227.48 1260.6424240.14  1254.9
24260.47 1254.1824287.05 1247.7624294.26 1248.0924294.86 1247.7524296.66  1255.9
 24312.7 1255.49

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

 18652.1     .0519456.36    .03520584.25     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19456.3620584.25              460   504.7     540             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 221.31

INPUT
Description:
Station Elevation Data    num=     267
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

14992.66    116815026.77 1165.5815030.91 1165.4315037.28 1165.7915069.86 1165.82
15070.88  1165.415076.04 1166.05 15112.2 1165.5615117.18 1165.4215176.25 1165.01
15268.31  1164.915278.91 1164.6415310.35 1164.4715385.32 1164.7515490.94 1165.08
15609.05  1165.415625.53 1165.2915743.82 1165.4515753.35 1165.4515780.48 1165.01
15782.39    116515782.71 1165.6115787.31  1165.615811.68 1165.0215873.21 1164.99
15876.97  1165.215893.61 1165.5815958.36 1166.1215987.66 1165.4815998.23  1165.4
16040.32  1164.616069.32 1164.2116070.86  1164.116186.62  1164.716236.42  1164.9
16259.59  1165.216271.17 1164.7416276.84 1164.6116297.25 1164.4116321.85 1164.32
16329.32  1164.416345.93 1164.9116406.44 1165.3116457.25 1164.3716498.72 1164.04
16502.17  1164.416544.29 1164.36 16621.4 1164.5616666.91  1163.616685.69 1163.52
 16694.4  1163.816717.07 1164.3616743.19 1164.8116765.72 1164.1516823.31 1163.91
 16851.5  1163.816935.43 1163.8416940.48 1163.7917003.31 1163.5117032.32 1163.48
17077.17  1163.317096.38 1163.1517107.31 1163.3917112.64 1163.2117125.84 1163.24
17161.34  1163.517169.83 1163.4217179.29 1163.5617207.69 1163.2117221.38 1162.96
17239.25  1163.117363.03 1164.3317429.76 1164.3517603.57 1163.9817646.95 1164.09
17662.19  1163.417722.37 1164.3217801.03 1165.3117825.03 1166.6117856.64 1166.07
17901.38  1165.317920.15  1165.317958.22 1165.9118003.49 1166.1918024.75  1170.8
18038.49  1173.918053.57 1174.2818097.69 1178.8118109.61 1179.78 18124.8 1180.63
18152.51  1181.818164.97 1181.25 18180.7 1181.3718206.05 1183.77 18213.6 1183.47
 18219.9  1182.118233.66 1176.7818241.03  1176.418270.87 1176.4518283.06  1176.9
18335.33  1176.818373.63 1176.5118418.06 1176.2318454.07 1175.5818466.72 1174.93
18495.09  1174.418504.69 1173.4118523.54 1171.2718563.58 1165.3718572.61 1163.79
18588.35  1162.818593.96 1161.4218608.67 1160.4218622.35 1160.4518651.41 1161.09
18709.57  1159.218728.59 1158.67 18749.8 1157.6618796.71 1157.2618803.75 1157.23
18846.73  1156.118868.26 1155.6818901.47 1155.89   18906 1156.0818912.34 1155.78
18948.25  1154.718955.06 1155.9418961.51 1156.8218967.74 1155.5618980.99 1153.68
19023.11  1154.319073.86 1154.52   19114 1153.94 19122.7 1153.8519156.14 1152.27
19180.43  1151.519195.14 1153.55 19209.9 1154.8619219.29  1153.919227.23 1151.53
19234.54  1149.819264.72 1148.6119301.88 1149.1819312.66 1149.2419321.63 1153.07
19345.79  1160.519359.34 1163.9319372.89 1160.0119413.94 1149.2719424.31 1150.02
19429.24  1151.419449.21 1156.05 19463.2 1155.7519470.75 1155.3719482.11 1155.91
19490.16  1156.519515.24 1157.13 19531.2 1156.8519538.57 1156.7519557.52 1156.05
19569.37  1154.319572.26    115319572.26    115419574.26    115419574.26    1152
19577.41 1146.3319578.91 1146.3319621.52 1135.6919639.77 1137.6619664.83 1138.36
19683.76  1139.619696.55  1140.219792.75 1135.9519801.48 1135.6319809.81 1135.64
19930.61  1135.6 19952.6 1135.0220048.27 1131.9820062.35 1131.4320118.13 1132.03
20188.61  1132.820256.01 1133.8320328.23 1134.9920344.49 1135.7320377.75 1143.58
 20388.1 1142.9420393.85 1146.3320395.35 1146.33 20398.5  1149.5 20398.5  1151.5
 20400.5  1151.5 20400.5  1150.520469.34  1150.5   20504  1151.220521.88 1157.01
20586.22 1159.9120592.78 1160.9720601.99 1167.9620608.04  1168.520623.32  1170.4
20633.95 1185.3520664.73 1188.4320691.02  1193.520695.44  1193.7 20731.2 1194.65
20757.37 1194.1520802.53 1193.12 20875.7 1170.62 20935.8  1151.821005.31 1151.38
21015.06  1151.421032.49 1159.2121042.59 1162.2821067.91  1162.121078.72 1162.04
21087.43 1159.8321108.55 1164.4321119.27 1166.3721136.51  1168.821156.97 1171.78
21181.55 1173.1721224.13 1174.0921225.45 1174.0321237.16  1172.621259.28 1173.37
21263.15  1173.921265.76 1174.5421290.93  1181.321294.11  1181.721307.93  1184.1
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21311.44 1183.8721323.42 1186.2721330.86    1188 21350.2  1190.6 21383.8 1193.88
21398.66  1195.921412.73 1196.4821457.15 1199.4621465.59  1200.321472.67  1200.3
21494.72 1199.7621504.66 1199.8721507.38 1199.5221513.07  1199.421550.52 1198.95
21556.04 1198.42 21565.5    119721600.52 1193.2121641.91  1195.521657.62 1196.55
21668.48 1196.7721700.06 1197.98 21737.6  1200.921761.14  1203.221776.72 1202.99
21809.75 1199.2721823.95 1196.4121841.35 1193.7221860.33  1190.621870.81 1190.21
 21876.3 1189.2721877.32 1189.73 21886.4 1182.7921889.31  1181.921924.92 1198.54
 21961.7 1215.7921975.74 1215.31

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

14992.66     .0519515.24    .03520521.88     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19515.2420521.88              220  262.31     780             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 221.26

INPUT
Description: Upstream face of New Mill Ave Bridge

Station Elevation Data    num=     103
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

 18929.8  1153.318961.36 1153.0518978.03 1153.2619019.15 1152.7419033.39 1152.96
19054.85  1152.719066.41 1152.5819083.79 1152.9919109.33 1152.5219128.66 1151.78
19139.43  1152.219175.53 1152.2619186.22 1151.5219196.19 1150.3719200.65 1149.88
19210.93  1153.519221.32 1155.7619243.17 1159.1619248.85    1160 19281.3    1160
   19297  1157.419321.56 1153.4819326.46 1152.6619341.45    115019362.38 1149.76
19387.78  1148.419403.37    114819420.53    114819431.08 1150.0319439.29    1151
19457.74  1151.719474.83 1152.2719503.16    115319512.68    115319522.93 1153.56
19524.34    115419533.18    115319533.18    115419535.06    115419535.06    1152
19537.97 1146.3319539.38 1146.33 19563.1 1136.9519641.28  1134.4 19688.2 1134.81
 19787.1 1134.0319835.67 1132.6619929.08 1131.1719982.57 1130.0120059.41 1129.66
20132.81 1129.2420168.05 1130.1720215.61 1131.5120269.26  1131.420316.63 1134.36
20387.64 1136.4720412.67 1146.3320414.08 1146.33   20417    1149   20417    1151
20418.88    115120418.88    115020450.13    115020458.81 1152.6820489.52 1160.85
20498.91  1160.920576.83 1159.2120584.83 1159.3520599.93 1159.2120648.73  1159.1
20693.51  1157.920698.38 1157.6920706.17 1157.4120719.65 1159.7320857.84 1178.63
20870.91  1193.2 20877.1 1193.42 20922.7 1195.33 20935.7 1195.4420945.54 1192.59
20947.95  1191.220959.18 1189.4620983.86 1186.1421006.11 1177.3921024.17 1173.15
   21040  1169.821056.36 1174.0321066.18 1175.3321088.59 1175.9121100.47 1178.77
21145.34  1184.621172.67 1187.71 21203.2 1190.5921220.52 1192.7321225.66 1193.22
21234.93  1193.921270.81 1194.4521301.72 1194.3521306.81 1194.4921373.56 1186.64
21402.68  1182.821418.97    118321436.65 1182.98

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

 18929.8     .0519535.06    .035   20417     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19535.06   20417          101.04  101.04  101.04             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F

BRIDGE                 RIVER: Salt River
REACH: Reach 4            RS: 221.25

INPUT
Description: New Mill Avenue Bridge (North Bound)
Distance from Upstream XS =    26.5
Deck/Roadway Width        =      48
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=      23
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
```

```
19250.65    1175    115019250.66    1175    116419321.13 1175.65 1170.65
19391.61 1175.95    116419462.08 1176.25 1171.2519532.56 1176.55  1164.8
19603.04 1176.85 1171.8519673.52 1177.15  1165.219743.99 1177.45 1172.45
19814.47 1177.82  1165.819884.95 1177.52 1172.5219955.43 1177.22  1165.2
 20025.9 1176.92 1171.9220096.38 1176.62  1164.820166.86 1176.32 1171.32
20237.34 1176.02    116420307.81 1175.72 1170.7220378.29 1175.42  1163.5
20448.77 1175.12 1170.1220519.25 1174.82    116320589.72 1174.52 1169.52
20660.19 1174.22    1163 20660.2 1174.22    1150

Upstream Bridge Cross Section Data
Station Elevation Data    num=     103
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

 18929.8  1153.318961.36 1153.0518978.03 1153.2619019.15 1152.7419033.39 1152.96
19054.85  1152.719066.41 1152.5819083.79 1152.9919109.33 1152.5219128.66 1151.78
19139.43  1152.219175.53 1152.2619186.22 1151.5219196.19 1150.3719200.65 1149.88
19210.93  1153.519221.32 1155.7619243.17 1159.1619248.85    1160 19281.3    1160
   19297  1157.419321.56 1153.4819326.46 1152.6619341.45    115019362.38 1149.76
19387.78  1148.419403.37    114819420.53    114819431.08 1150.0319439.29    1151
19457.74  1151.719474.83 1152.2719503.16    115319512.68    115319522.93 1153.56
19524.34    115419533.18    115319533.18    115419535.06    115419535.06    1152
19537.97 1146.3319539.38 1146.33 19563.1 1136.9519641.28  1134.4 19688.2 1134.81
 19787.1 1134.0319835.67 1132.6619929.08 1131.1719982.57 1130.0120059.41 1129.66
20132.81 1129.2420168.05 1130.1720215.61 1131.5120269.26  1131.420316.63 1134.36
20387.64 1136.4720412.67 1146.3320414.08 1146.33   20417    1149   20417    1151
20418.88    115120418.88    115020450.13    115020458.81 1152.6820489.52 1160.85
20498.91  1160.920576.83 1159.2120584.83 1159.3520599.93 1159.2120648.73  1159.1
20693.51  1157.920698.38 1157.6920706.17 1157.4120719.65 1159.7320857.84 1178.63
20870.91  1193.2 20877.1 1193.42 20922.7 1195.33 20935.7 1195.4420945.54 1192.59
20947.95  1191.220959.18 1189.4620983.86 1186.1421006.11 1177.3921024.17 1173.15
   21040  1169.821056.36 1174.0321066.18 1175.3321088.59 1175.9121100.47 1178.77
21145.34  1184.621172.67 1187.71 21203.2 1190.5921220.52 1192.7321225.66 1193.22
21234.93  1193.921270.81 1194.4521301.72 1194.3521306.81 1194.4921373.56 1186.64
21402.68  1182.821418.97    118321436.65 1182.98

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

 18929.8     .0519535.06    .035   20417     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
      19535.06   20417             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

Downstream  Deck/Roadway Coordinates
    num=      23
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord

19250.65    1175    115019250.66    1175    116419321.13 1175.65 1170.65
19391.61 1175.95    116419462.08 1176.25 1171.2519532.56 1176.55  1164.8
19603.04 1176.85 1171.8519673.52 1177.15  1165.219743.99 1177.45 1172.45
19814.47 1177.82  1165.819884.95 1177.52 1172.5219955.43 1177.22  1165.2
 20025.9 1176.92 1171.9220096.38 1176.62  1164.820166.86 1176.32 1171.32
20237.34 1176.02    116420307.81 1175.72 1170.7220378.29 1175.42  1163.5
20448.77 1175.12 1170.1220519.25 1174.82    116320589.72 1174.52 1169.52
20660.19 1174.22    1163 20660.2 1174.22    1150

Downstream Bridge Cross Section Data
Station Elevation Data    num=      62
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

19181.03    117519192.28    117019212.28    116519222.28    116019245.78    1153
19295.78    115219342.28    115119372.28    115019417.28    115019450.78    1151
19507.28    115219522.28  1152.919522.28  1153.919524.28  1153.919524.28  1151.9
19527.19 1146.33 19528.6 1146.3319528.92 1144.09 19563.1 1136.9519641.28  1134.4
 19688.2 1134.81 19787.1 1134.0319835.67 1132.6619929.08 1131.1719982.57 1130.01
20059.41 1129.6620132.81 1129.2420168.05 1130.1720215.61 1131.5120269.26  1131.4
20316.63 1134.3620387.64 1136.4720418.82 1146.3320420.23 1146.3320423.14    1149
20423.14    115120425.02    115120425.02  1148.520437.02  1148.5 20545.91158.299
20570.511156.76220600.261156.767 20653.4 1155.3920723.84  1154.620730.99 1155.62
20765.68 1194.1620778.45  1194.520834.04 1195.4420850.47  1195.620883.86 1195.66
20913.36 1195.5920930.14 1195.55 20943.4  1195.420974.45  1189.220979.37 1183.41
20988.19 1177.0120997.96    117620998.93 1175.7921017.46  1174.421043.85  1175.3
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21079.14 1175.5721086.63 1176.03

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

19181.03     .0519524.28    .03520423.14     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
      19524.2820423.14              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F

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

Number of Piers =  9

Pier Data
Pier Station     Upstream=19391.61    Downstream=19391.61
Upstream     num=       2
    Width   Elev    Width   Elev

      10    1140      10    1165
Downstream     num=       2
    Width   Elev    Width   Elev

      10    1140      10    1165

Pier Data
Pier Station     Upstream=19532.56    Downstream=19532.56
Upstream     num=       2
    Width   Elev    Width   Elev

      10    1140      10    1165
Downstream     num=       2
    Width   Elev    Width   Elev

      10    1140      10    1165

Pier Data
Pier Station     Upstream=19673.52    Downstream=19673.52
Upstream     num=       2
    Width   Elev    Width   Elev

      10    1130      10    1166
Downstream     num=       2
    Width   Elev    Width   Elev

      10    1130      10    1166

Pier Data
Pier Station     Upstream=19814.47    Downstream=19814.47
Upstream     num=       2
    Width   Elev    Width   Elev

      10    1130      10    1166
Downstream     num=       2
    Width   Elev    Width   Elev

      10    1130      10    1166

Pier Data
Pier Station     Upstream=19955.43    Downstream=19955.43
Upstream     num=       2
    Width   Elev    Width   Elev

      10    1028      10    1166
Downstream     num=       2
    Width   Elev    Width   Elev
```

```
      10    1028      10    1166

Pier Data
Pier Station     Upstream=20096.38    Downstream=20096.38
Upstream     num=       2
    Width   Elev    Width   Elev

      10    1025      10    1166
Downstream     num=       2
    Width   Elev    Width   Elev

      10    1025      10    1166

Pier Data
Pier Station     Upstream=20237.34    Downstream=20237.34
Upstream     num=       2
    Width   Elev    Width   Elev

      10    1125      10    1165
Downstream     num=       2
    Width   Elev    Width   Elev

      10    1125      10    1165

Pier Data
Pier Station     Upstream=20378.29    Downstream=20378.29
Upstream     num=       2
    Width   Elev    Width   Elev

      10    1128      10    1165
Downstream     num=       2
    Width   Elev    Width   Elev

      10    1128      10    1165

Pier Data
Pier Station     Upstream=20519.25    Downstream=20519.25
Upstream     num=       2
    Width   Elev    Width   Elev

      10    1125      10    1165
Downstream     num=       2
    Width   Elev    Width   Elev

      10    1125      10    1165

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum                Cd   =     1.2
       Yarnell                 KVal =    1.05
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

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

BRIDGE OUTPUT    Profile #PF#1
Opening : Single BR

 E.G. US. (ft)              1154.28   Element                Inside BR US Inside BR DS
 W.S. US. (ft)              1152.81   E.G. Elev (ft)            1154.22      1154.13
 Q Total (cfs)            169000.00   W.S. Elev (ft)            1152.45      1152.38
 Q Bridge (cfs)           169000.00   Crit W.S. (ft)            1143.95      1143.92
 Q Weir (cfs)                         Max Chl Dpth (ft)           23.21        23.14
 Weir Sta Lft (ft)                    Vel Total (ft/s)            10.67        10.61
 Weir Sta Rgt (ft)                    Flow Area (sq ft)        15842.78     15923.85
 Weir Submerg                         Froude # Chl                0.43         0.43
```

Weir Max Depth (ft)		Specif Force (cu ft)	213672.30	213302.50
Min El Weir Flow (ft)	1156.98	Hydr Depth (ft)	19.33	19.21
Min El Prs (ft)	1172.52	W.P. Total (ft)	1070.31	1091.48
Delta EG (ft)	0.27	Conv. Total (cfs)	4054835.0	4036425.0
Delta WS (ft)	0.27	Top Width (ft)	1004.74	1112.68
BR Open Area (sq ft)	35095.42	Frctn Loss (ft)	0.08	0.04
BR Open Vel (ft/s)	10.67	C & E Loss (ft)	0.01	0.08
Coef of Q		Shear Total (lb/sq ft)	1.61	1.60
Br Sel Method	Energy only	Power Total (lb/ft s)	17.12	16.95

Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.

BRIDGE OUTPUT Profile #PF#2
Opening : Single BR

		Element	Inside BR US	Inside BR DS
E.G. US. (ft)	1154.28	E.G. Elev (ft)	1154.22	1154.13
W.S. US. (ft)	1152.81	W.S. Elev (ft)	1152.45	1152.38
Q Total (cfs)	169000.00	Crit W.S. (ft)	1143.95	1143.92
Q Bridge (cfs)	169000.00	Max Chl Dpth (ft)	23.21	23.14
Q Weir (cfs)		Vel Total (ft/s)	10.67	10.61
Weir Sta Lft (ft)		Flow Area (sq ft)	15843.69	15924.76
Weir Sta Rgt (ft)		Froude # Chl	0.43	0.43
Weir Submerg		Specif Force (cu ft)	213686.50	213316.80
Weir Max Depth (ft)		Hydr Depth (ft)	19.33	19.21
Min El Weir Flow (ft)	1156.98	W.P. Total (ft)	1070.32	1091.50
Min El Prs (ft)	1172.52	Conv. Total (cfs)	4055184.0	4036768.0
Delta EG (ft)	0.27	Top Width (ft)	1004.80	1112.76
Delta WS (ft)	0.27	Frctn Loss (ft)	0.08	0.04
BR Open Area (sq ft)	35095.42	C & E Loss (ft)	0.01	0.08
BR Open Vel (ft/s)	10.67	Shear Total (lb/sq ft)	1.61	1.60
Coef of Q		Power Total (lb/ft s)	17.12	16.94
Br Sel Method	Energy only			

Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.

CROSS SECTION RIVER: Salt River
REACH: Reach 4 RS: 221.24

INPUT
Description: Downstream face of New Mill Ave Bridge

Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
19181.03	117519192.28		117019212.28		116519222.28		116019245.78		1153
19295.78	115219342.28		115119372.28		115019417.28		115019450.78		1151
19507.28	115219522.28		1152.919522.28		1153.919524.28		1153.919524.28		1151.9
19527.19	1146.33	19528.6	1146.3319528.92		1144.09	19563.1	1136.9519641.28		1134.4
19688.2	1134.81	19787.1	1134.0319835.67		1132.6619929.08		1131.1719982.57		1130.01
20059.41	1129.6620132.81		1129.2420168.05		1130.1720215.61		1131.5120269.26		1131.4
20316.63	1134.3620387.64		1136.4720418.82		1146.3320420.23		1146.3320423.14		1149
20423.14	115120425.02		115120425.02		1148.520437.02		1148.5	20545.91	1158.299
20570.51	1156.76	20600.26	1156.767	20653.4	1155.3920723.84		1154.620730.99		1155.62
20765.68	1194.1620778.45		1194.520834.04		1195.4420850.47		1195.620883.86		1195.66
20913.36	1195.5920930.14		1195.55	20943.4	1195.420974.45		1189.220979.37		1183.41
20988.19	1177.0120997.96		117620998.93		1175.7921017.46		1174.421043.85		1175.3
21079.14	1175.5721086.63		1176.03						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
19181.03	.05	19524.28	.035	20423.14	.06

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
19524.28	20423.14	185.11	185.11	185.11	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
888			F
888			F

CROSS SECTION RIVER: Salt River

```
REACH: Reach 4            RS: 221.2

INPUT
Description: Upstream face of Old Mill Ave Bridge

Station Elevation Data    num=      88
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

19151.75    117319162.17    117019175.77    116519190.49    116019207.04    1155
19210.21    115419250.54    1153 19352.5    115319495.24  1152.419495.24  1153.4
19496.88  1153.419496.88  1151.419499.69  1146.319501.05  1146.319510.34    1140
19518.41  1138.419520.86  1138.319530.74  1135.8 19541.7    113519562.09  1133.1
19589.92    113219604.42  1131.819611.22  1131.4 19619.1  1131.519649.46    1131
19658.43    113119682.63    113119704.66    113119713.07    1131 19754.5    1131
19776.89    113119797.37    1131 19817.4  1130.119836.52    113019839.42    1130
19861.27  1129.419867.06  1129.419900.87    112919922.35    112919945.55    1129
19963.49  1128.219984.25    112820003.37  1128.720014.97  1128.8 20036.9    1129
20062.37  1129.220084.03  1129.420099.26  1129.820128.71    113020145.21    1130
20161.79  1131.120183.09    113220199.13  1132.820227.41  1133.420254.78  1134.4
20274.45  1135.120298.28    113620315.23  1137.320321.57    1138 20342.6  1143.7
20347.59    114520352.93    114620370.97 1146.3320372.33 1146.3320375.14    1151
20375.14    115220376.95    115220376.95  1149.520388.95  1149.520466.761155.561
20485.691154.15220500.521152.76820551.131152.84620556.67  1159.5 20609.9 1162.36
20617.41 1163.5220629.18 1164.4420705.63 1170.3720709.49  1170.720740.31 1172.13
 20747.1 1172.1420813.79 1173.6620827.11 1173.9320876.18  1174.920885.58 1174.97
20935.47 1176.6120939.65 1176.6420963.78 1176.08

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

19151.75     .0519496.88    .03520375.14     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19496.8820375.14            91.95   91.95   91.95             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

BRIDGE                  RIVER: Salt River
REACH: Reach 4            RS: 221.195

INPUT
Description: Old Mill Avenue Bridge (South Bound)
Distance from Upstream XS =   22.98
Deck/Roadway Width        =      46
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=      23
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord

19154.58 1175.53 1149.4919191.08 1175.69 1149.4919266.08 1175.87 1159.67
19341.58 1176.15 1149.9519415.83 1176.42 1170.2219490.08 1176.69 1150.49
19560.06 1176.89 1170.6919628.48 1177.19 1150.9919696.46 1177.25 1171.05
19764.16 1177.31 1151.1119831.22 1177.35 1171.1519897.65  1177.4  1151.2
19964.72 1177.37 1171.0420031.61 1177.35 1151.1520099.31 1177.24 1171.04
20167.28 1177.18 1150.9820234.62 1176.89 1170.6920301.87 1176.72 1150.52
20371.22 1176.45 1170.2520444.72 1176.18 1149.9820519.22 1175.92 1169.72
20593.72 1175.66 1149.4620631.92 1175.54 1149.46

Upstream Bridge Cross Section Data
Station Elevation Data    num=      88
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

19151.75    117319162.17    117019175.77    116519190.49    116019207.04    1155
19210.21    115419250.54    1153 19352.5    115319495.24  1152.419495.24  1153.4
19496.88  1153.419496.88  1151.419499.69  1146.319501.05  1146.319510.34    1140
19518.41  1138.419520.86  1138.319530.74  1135.8 19541.7    113519562.09  1133.1
19589.92    113219604.42  1131.819611.22  1131.4 19619.1  1131.519649.46    1131
19658.43    113119682.63    113119704.66    113119713.07    1131 19754.5    1131
19776.89    113119797.37    1131 19817.4  1130.119836.52    113019839.42    1130
19861.27  1129.419867.06  1129.419900.87    112919922.35    112919945.55    1129
19963.49  1128.219984.25    112820003.37  1128.720014.97  1128.8 20036.9    1129
20062.37  1129.220084.03  1129.420099.26  1129.820128.71    113020145.21    1130
20161.79  1131.120183.09    113220199.13  1132.820227.41  1133.420254.78  1134.4
20274.45  1135.120298.28    113620315.23  1137.320321.57    1138 20342.6  1143.7
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20347.59    114520352.93    114620370.97 1146.3320372.33 1146.3320375.14    1151
20375.14    115220376.95    115220376.95  1149.520388.95  1149.520466.761155.561
20485.691154.15220500.521152.76820551.131152.84620556.67  1159.5 20609.9 1162.36
20617.41 1163.5220629.18 1164.4420705.63 1170.3720709.49  1170.720740.31 1172.13
 20747.1 1172.1420813.79 1173.6620827.11 1173.9320876.18  1174.920885.58 1174.97
20935.47 1176.6120939.65 1176.6420963.78 1176.08

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

19151.75     .0519496.88    .03520375.14     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
      19496.8820375.14             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

Downstream  Deck/Roadway Coordinates
    num=      23
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord

19154.58 1175.53 1149.4919191.08 1175.69 1149.4919266.08 1175.87 1159.67
19341.58 1176.15 1149.9519415.83 1176.42 1170.2219490.08 1176.69 1150.49
19560.06 1176.89 1170.6919628.48 1177.19 1150.9919696.46 1177.25 1171.05
19764.16 1177.31 1151.1119831.22 1177.35 1171.1519897.65  1177.4  1151.2
19964.72 1177.37 1171.0420031.61 1177.35 1151.1520099.31 1177.24 1171.04
20167.28 1177.18 1150.9820234.62 1176.89 1170.6920301.87 1176.72 1150.52
20371.22 1176.45 1170.2520444.72 1176.18 1149.9820519.22 1175.92 1169.72
20593.72 1175.66 1149.4620631.92 1175.54 1149.46

Downstream Bridge Cross Section Data
Station Elevation Data    num=     112
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

19136.35    117119139.97    117219153.57    117219155.38    1171 19157.2    1170
19165.35    1165 19172.6    116019176.23    115719236.95    115719262.33    1156
19268.67    115519275.01    115419376.52    115319493.43 1151.6719493.43 1152.67
19495.07 1152.6719495.07 1150.6719497.88 1146.3319499.24 1146.3319510.34    1140
19518.41  1138.419520.86  1138.319530.74  1135.8 19541.7    113519562.09  1133.1
19589.92    113219604.42  1131.819611.22  1131.4 19619.1  1131.519649.46    1131
19658.43    113119682.63    113119704.66    113119713.07    1131 19754.5    1131
19776.89    113119797.37    1131 19817.4  1130.119836.52    113019839.42    1130
19861.27  1129.419867.06  1129.419900.87    112919922.35    112919945.55    1129
19963.49  1128.219984.25    112820003.37  1128.720014.97  1128.8 20036.9    1129
20062.37  1129.220084.03  1129.420099.26  1129.820128.71    113020145.21    1130
20161.79  1131.120183.09    113220199.13  1132.820227.41  1133.420254.78  1134.4
20274.45  1135.120298.28    113620315.23  1137.320321.57    1138 20342.6  1143.7
20347.59    114520352.93    114620364.27 1146.3320365.63 1146.3320368.44  1148.5
20368.44    115120370.26    115120370.26  1148.520382.26  1148.520452.05 1153.99
20519.011154.69420533.381157.83720550.471158.89420620.75  1170.520643.43  1172.2
20660.88 1173.6320669.08 1174.3220688.98 1174.8120700.28 1176.22 20703.7  1177.1
20715.51  1177.520718.07 1179.2720725.74 1180.3820776.61  1182.220792.04  1182.5
20843.33 1182.8320868.71 1183.6620901.02  1183.620918.46 1181.9520925.98  1180.7
20985.54 1181.4620988.38  1181.521004.93 1178.4621023.04  1178.921062.81    1179
21073.56 1178.98 21092.5 1179.12 21172.2 1180.2821191.25  1180.621257.23  1180.9
21264.74 1180.8521321.62  1181.321324.15 1181.2521396.66 1182.5721401.59  1182.7
21419.15 1182.8721430.86 1182.71

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

19136.35     .0519495.07    .03520368.44     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
      19495.0720368.44             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
```

```
Energy head used in spillway design          =
Spillway height used in design               =
Weir crest shape                             = Broad Crested

Number of Piers =  9

Pier Data
Pier Station     Upstream=19341.58    Downstream=19341.58
Upstream     num=       2
    Width   Elev    Width   Elev

      14    1125      14    1155
Downstream     num=       2
    Width   Elev    Width   Elev

      14    1125      14    1155

Pier Data
Pier Station     Upstream=19490.08    Downstream=19490.08
Upstream     num=       2
    Width   Elev    Width   Elev

       9    1125       9    1155
Downstream     num=       2
    Width   Elev    Width   Elev

       9    1125       9    1155

Pier Data
Pier Station     Upstream=19628.48    Downstream=19628.48
Upstream     num=       2
    Width   Elev    Width   Elev

       9    1125       9    1155
Downstream     num=       2
    Width   Elev    Width   Elev

       9    1125       9    1155

Pier Data
Pier Station     Upstream=19764.16    Downstream=19764.16
Upstream     num=       2
    Width   Elev    Width   Elev

       9    1125       9    1155
Downstream     num=       2
    Width   Elev    Width   Elev

       9    1125       9    1155

Pier Data
Pier Station     Upstream=19897.65    Downstream=19897.65
Upstream     num=       2
    Width   Elev    Width   Elev

       9    1125       9    1155
Downstream     num=       2
    Width   Elev    Width   Elev

       9    1125       9    1155

Pier Data
Pier Station     Upstream=20031.61    Downstream=20031.61
Upstream     num=       2
    Width   Elev    Width   Elev

       9    1125       9    1155
Downstream     num=       2
    Width   Elev    Width   Elev

       9    1125       9    1155

Pier Data
Pier Station     Upstream=20167.28    Downstream=20167.28
Upstream     num=       2
    Width   Elev    Width   Elev
```

```
       9    1125       9    1155
Downstream     num=        2
    Width   Elev    Width   Elev

       9    1125       9    1155

Pier Data
Pier Station     Upstream=20301.87    Downstream=20301.87
Upstream     num=        2
    Width   Elev    Width   Elev

       9    1125       9    1155
Downstream     num=        2
    Width   Elev    Width   Elev

       9    1125       9    1155

Pier Data
Pier Station     Upstream=20444.72    Downstream=20444.72
Upstream     num=        2
    Width   Elev    Width   Elev

      14    1125      14    1155
Downstream     num=        2
    Width   Elev    Width   Elev

      14    1125      14    1155

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum                Cd   =    1.2
       Yarnell                 KVal =    1.05
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

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

BRIDGE OUTPUT    Profile #PF#1
Opening : Single BR

 E.G. US. (ft)              1153.81   Element                Inside BR US Inside BR DS
 W.S. US. (ft)              1152.40   E.G. Elev (ft)             1153.69      1153.61
 Q Total (cfs)            169000.00   W.S. Elev (ft)             1152.01      1151.91
 Q Bridge (cfs)           169000.00   Crit W.S. (ft)             1142.85      1142.84
 Q Weir (cfs)                         Max Chl Dpth (ft)            24.01        23.91
 Weir Sta Lft (ft)                    Vel Total (ft/s)             10.41        10.47
 Weir Sta Rgt (ft)                    Flow Area (sq ft)         16241.12     16145.16
 Weir Submerg                         Froude # Chl                 0.05         0.05
 Weir Max Depth (ft)                  Specif Force (cu ft)     222158.60    220930.50
 Min El Weir Flow (ft)       1171.01  Hydr Depth (ft)              19.73        19.72
 Min El Prs (ft)             1171.15  W.P. Total (ft)            1084.38      1077.21
 Delta EG (ft)                  0.23  Conv. Total (cfs)        4189526.0    4166761.0
 Delta WS (ft)                  0.27  Top Width (ft)              869.06       888.59
 BR Open Area (sq ft)       26852.25  Frctn Loss (ft)
 BR Open Vel (ft/s)            10.47  C & E Loss (ft)
 Coef of Q                            Shear Total (lb/sq ft)        1.52         1.54
 Br Sel Method              Momentum  Power Total (lb/ft s)        15.83        16.11


BRIDGE OUTPUT    Profile #PF#2
Opening : Single BR

 E.G. US. (ft)              1153.81   Element                Inside BR US Inside BR DS
 W.S. US. (ft)              1152.40   E.G. Elev (ft)             1153.69      1153.61
 Q Total (cfs)            169000.00   W.S. Elev (ft)             1152.01      1151.91
 Q Bridge (cfs)           169000.00   Crit W.S. (ft)             1142.85      1142.84
```

Q Weir (cfs)		Max Chl Dpth (ft)	24.01	23.91
Weir Sta Lft (ft)		Vel Total (ft/s)	10.41	10.47
Weir Sta Rgt (ft)		Flow Area (sq ft)	16241.32	16145.36
Weir Submerg		Froude # Chl	0.05	0.05
Weir Max Depth (ft)		Specif Force (cu ft)	222161.90	220933.80
Min El Weir Flow (ft)	1171.01	Hydr Depth (ft)	19.73	19.72
Min El Prs (ft)	1171.15	W.P. Total (ft)	1084.39	1077.21
Delta EG (ft)	0.23	Conv. Total (cfs)	4189600.0	4166830.0
Delta WS (ft)	0.28	Top Width (ft)	869.06	888.61
BR Open Area (sq ft)	26852.25	Frctn Loss (ft)		
BR Open Vel (ft/s)	10.47	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	1.52	1.54
Br Sel Method	Momentum	Power Total (lb/ft s)	15.83	16.11

CROSS SECTION RIVER: Salt River
REACH: Reach 4 RS: 221.19

INPUT
Description: Downstream face of Old Mill Ave Bridge

Station Elevation Data num= 112

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
19136.35	117	119139.97	117	219153.57	117	219155.38	1171	19157.2	1170
19165.35	1165	19172.6	116	019176.23	115	719236.95	115	719262.33	1156
19268.67	115	519275.01	115	419376.52	115	319493.43	1151.67	19493.43	1152.67
19495.07	1152.67	19495.07	1150.67	19497.88	1146.33	19499.24	1146.33	19510.34	1140
19518.41	1138.41	9520.86	1138.31	9530.74	1135.8	19541.7	113	519562.09	1133.1
19589.92	113	219604.42	1131.81	9611.22	1131.4	19619.1	1131.51	9649.46	1131
19658.43	113	119682.63	113	119704.66	113	119713.07	1131	19754.5	1131
19776.89	113	119797.37	1131	19817.4	1130.11	9836.52	113	019839.42	1130
19861.27	1129.41	9867.06	1129.41	9900.87	112	919922.35	112	919945.55	1129
19963.49	1128.21	9984.25	112	820003.37	1128.72	0014.97	1128.8	20036.9	1129
20062.37	1129.22	0084.03	1129.42	0099.26	1129.82	0128.71	113	020145.21	1130
20161.79	1131.12	0183.09	113	220199.13	1132.82	0227.41	1133.42	0254.78	1134.4
20274.45	1135.12	0298.28	113	620315.23	1137.32	0321.57	1138	20342.6	1143.7
20347.59	114	520352.93	114	620364.27	1146.33	20365.63	1146.33	20368.44	1148.5
20368.44	115	120370.26	115	120370.26	1148.52	0382.26	1148.52	0452.05	1153.99
20519.01	1154.69	420533.38	1157.83	720550.47	1158.89	420620.75	1170.52	0643.43	1172.2
20660.88	1173.63	20669.08	1174.32	20688.98	1174.81	20700.28	1176.22	20703.7	1177.1
20715.51	1177.52	0718.07	1179.27	20725.74	1180.38	20776.61	1182.22	0792.04	1182.5
20843.33	1182.83	20868.71	1183.66	20901.02	1183.62	0918.46	1181.95	20925.98	1180.7
20985.54	1181.46	20988.38	1181.52	1004.93	1178.46	21023.04	1178.92	1062.81	1179
21073.56	1178.98	21092.5	1179.12	21172.2	1180.28	21191.25	1180.62	1257.23	1180.9
21264.74	1180.85	21321.62	1181.32	1324.15	1181.25	21396.66	1182.57	21401.59	1182.7
21419.15	1182.87	21430.86	1182.71						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
19136.35	.05	19495.07	.03	20368.44	.06

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
19495.07	20368.44	731	591.87	380	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
888	F		
888	F		

CROSS SECTION RIVER: Salt River
REACH: Reach 4 RS: 221.068

INPUT
Description: downstream face of LRT bridge

Station Elevation Data num= 147

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
18938	1157	18938	1155.91	18940.6	1155.85	18944.5	1155.79	18948.4	1155.73
18955.2	1155.62	18996.2	1155.17	19001.3	1155.1	19005.6	1155.04	19045.6	1154.53
19055.9	1154.3	19064.8	1154.07	19127.5	1152.64	19141.7	1152.23	19144	1152.16
19156.4	1151.74	19168.4	1151.33	19194.9	1150.28	19198.2	1150.13	19213.9	1149.45
19236.9	1148.65	19242	1148.43	19250.8	1148.07	19265.2	1147.47	19290.4	1146.57

19300.7	1146.23	19304.2	1146.11	19307.6	1146	19314.7	1145.79	19316.5	1145.74
19320.4	1145.64	19331.1	1145.38	19336.4	1145.3	19336.5	1145.86	19337.2	1145.83
19341.1	1145.67	19344.5	1145.54	19345.3	1144.99	19351.5	1144.97	19360.4	1144.98
19383.6	1145.28	19386	1145.18	19390.5	1144.97	19390.6	1145.16	19390.7	1145.55
19396.7	1145.61	19409.7	1145.77	19412.6	1145.91	19414.7	1146	19417.1	1146.1
19419.3	1145.46	19419.9	1145.29	19420.7	1145.4	19423.9	1145.83	19425.7	1145.33
19426	1145.25	19428.4	1145.15	19429.9	1145.08	19440.5	1144.74	19444.1	1144.65
19445.9	1144.52	19452.1	1144	19457.4	1144.15	19463.1	1144.4	19470.8	1144.73
19474.6	1145.2	19476.7	1145.58	19482.6	1146.62	19495.9	1148.87	19498.8	1149.43
19503.6	1150.56	19506	1150.89	19508.2	1151.24	19512	1151.59	19528	1151.77
19537.6	1152.3	19539.3	1152.37	19544.2	1152.62	19546.6	1150.32	19547.3	1149.73
19547.9	1149.16	19548	1149.07	19549.2	1147.93	19603	1132	19722	1130
19874	1130	20026	1128	20189	1128	20352	1130	20402	1145.85
20403	1153.5	20404	1153.5	20405	1148.55	20412.7	1148.55	20413.6	1149
20414.6	1149.49	20415.7	1150	20445.2	1150	20466.1	1151	20469.6	1151.73
20472.2	1152.04	20473.6	1152	20482.3	1153.11	20485.6	1153.54	20487.9	1153.72
20493	1153.86	20493.9	1153.69	20495.7	1153.02	20495.8	1153	20505.3	1153
20506.1	1152.87	20514.3	1152.87	20533.1	1152.65	20535.7	1152	20536.6	1151.66
20537.2	1152	20539.7	1152.66	20540.5	1153	20541.3	1153.37	20548.6	1154
20555.3	1154.26	20557.8	1154.39	20564.1	1154.97	20564.5	1155.01	20569	1156
20570.4	1156.28	20574.7	1157	20576.2	1157.35	20579.5	1158	20581.5	1158.37
20584.8	1159	20585.6	1159.57	20592.1	1159.92	20594.5	1160	20598.5	1160.26
20605.7	1160.87	20607.3	1160.93	20607.5	1160.6	20607.7	1160.39	20611.5	1160.56
20629.8	1161.02	20639.7	1161.52	20648.4	1162.06	20662.1	1162.7	20749.3	1167.05
20756.9	1167.43	20809.5	1170.06						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
18938	.05	19544.2	.035	20403	.06

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
19544.2	20403	59	59	59	.1	.3

Ineffective Flow num= 3

Sta L	Sta R	Elev	Permanent
888	F		
888	F		
888	F		

CROSS SECTION RIVER: Salt River
REACH: Reach 4 RS: 221.061

INPUT
Description: downstream face of LRT bridge

Station Elevation Data num= 209

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
19071	1157	19071	1156.15	19081.7	1155.91	19082.2	1155.69	19089.5	1155.14
19093.6	1154.36	19107.3	1151.47	19123.9	1150.31	19143.2	1149.66	19147	1150.23
19149.1	1150.14	19152.1	1150.04	19156.3	1149.8	19159.8	1149.72	19163.9	1149.57
19170.4	1149.38	19184.7	1148.79	19188.4	1148.62	19190.7	1148.37	19192.3	1148.29
19200	1148.02	19204.1	1147.99	19211.6	1147.87	19216	1147.83	19218.7	1147.79
19222.9	1147.79	19224	1147.64	19225.7	1147.45	19229.4	1147.46	19233.1	1147.34
19241.9	1147.01	19245.3	1146.98	19246.1	1146.97	19249.4	1146.95	19256.9	1146.92
19262.7	1146.91	19265.9	1146.81	19269.2	1146.7	19273.9	1146.52	19276.7	1146.47
19277.6	1146.23	19282.2	1146.07	19284.9	1145.65	19288.7	1145.4	19293.5	1145.44
19295	1145.49	19298.7	1145.6	19302.2	1145.73	19302.5	1145.87	19304.2	1145.48
19306.1	1145.21	19308.3	1144.95	19310.9	1144.61	19311.5	1144.97	19311.8	1144.65
19315.1	1144.5	19321.5	1144.52	19321.7	1143.98	19327.4	1144.03	19353.2	1144.42
19355.6	1145	19363	1145.08	19364	1145.1	19364.4	1144.45	19394.2	1145.06
19394.4	1145.27	19403.4	1145.82	19404.4	1145.71	19405.5	1145.6	19405.6	1145.58
19406.5	1145.45	19407	1145.34	19407.5	1145.35	19411	1145.7	19415	1146.1
19416.4	1146.28	19420.3	1146.57	19426.6	1146.67	19430.2	1146.72	19432.3	1146.33
19438.3	1146.21	19442.3	1145.82	19446.7	1145.48	19450.4	1145.41	19452.9	1145.44
19454.3	1145.52	19462.3	1145.74	19470.5	1146.09	19474.3	1146.37	19477.3	1146.63
19479.4	1146.95	19485.5	1147.87	19486.9	1148.08	19490.7	1148.4	19503.5	1149.52
19507.8	1150.29	19509.7	1150.61	19514	1151.35	19521.4	1152.66	19524.2	1152.47
19527.4	1152.21	19528.9	1152.09	19529.6	1152.03	19531.9	1151.84	19538.8	1151.36
19541.9	1151.1	19544.6	1151.01	19555.7	1151.19	19570.6	1151.93	19582.9	1152.56
19586.2	1149.42	19586.8	1148.92	19587	1148.72	19587.5	1148.17	19587.8	1147.9
19588.2	1147.63	19589.2	1146.91	19589.9	1146.56	19590.4	1146.71	19626	1132
19722	1130	19874	1130	20026	1128	20189	1128	20352	1130
20390	1145.85	20404	1153.5	20405	1153.5	20406.5	1148.36	20407.6	1149

20409.1	1149.77	20409.5	1150	20415.3	1150	20435.8	1150	20444.5	1150.45
20446.9	1150.53	20447.2	1150.64	20447.6	1150.7	20449.5	1151	20450.7	1151.34
20452.9	1152	20454.5	1152.41	20456.5	1153	20458.3	1153.51	20460.1	1154
20463.9	1154.99	20467.3	1156	20469.8	1157.16	20470.5	1157.43	20470.7	1157.17
20473.1	1157	20482.2	1157	20486	1156.52	20490.3	1156	20490.5	1153.18
20490.7	1155.38	20490.9	1155	20491.1	1154.7	20491.5	1154	20492.1	1153.12
20492.2	1153	20492.5	1152.39	20492.8	1152	20492.9	1151.81	20493.3	1151
20498.4	1151	20521.1	1150.61	20532.3	1150.68	20533.7	1150.64	20539.2	1150.65
20543.9	1150	20545.8	1150.34	20548.2	1151	20549.8	1151.47	20552	1151.31
20553.5	1151	20559.3	1151	20560.4	1151.15	20565.8	1151.32	20579.5	1151.8
20584.1	1152	20590.4	1152.5	20597.4	1152.69	20602.3	1153	20603.7	1153
20606.4	1153.16	20611.2	1153.52	20615.1	1153.82	20618.2	1154	20625.9	1154.36
20632.1	1155	20634	1155.19	20639.3	1155.35	20641.5	1155.24	20646.2	1155.81
20647.7	1156	20652.2	1156.82	20652.8	1157	20656.6	1157.7	20657.7	1158
20661.7	1159	20679.1	1163.41	20680.9	1164.05	20683.1	1164.78	20683.8	1165
20692.7	1165.29	20729.4	1165.73	20755.8	1166.01	20763.2	1166.09		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
19071	.05	19582.9	.035	20404	.06

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
19582.9	20404	1	1	1	.1	.3

Ineffective Flow num= 4

Sta L	Sta R	Elev	Permanent
888	F		
888	F		
888	F		
888	F		

CROSS SECTION RIVER: Salt River
REACH: Reach 4 RS: 221.06

INPUT
Description: Upstream face of UPRR bridge

Station Elevation Data num= 210

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
19071	1157	19071	1156.15	19081.7	1155.91	19082.2	1155.69	19089.5	1155.14
19093.6	1154.36	19107.3	1151.47	19123.9	1150.31	19143.2	1149.66	19147	1150.23
19149.1	1150.14	19152.1	1150.04	19156.3	1149.8	19159.8	1149.72	19163.9	1149.57
19170.4	1149.38	19184.7	1148.79	19188.4	1148.62	19190.7	1148.37	19192.3	1148.29
19200	1148.02	19204.1	1147.99	19211.6	1147.87	19216	1147.83	19218.7	1147.79
19222.9	1147.79	19224	1147.64	19225.7	1147.45	19229.4	1147.46	19233.1	1147.34
19241.9	1147.01	19245.3	1146.98	19246.1	1146.97	19249.4	1146.95	19256.9	1146.92
19262.7	1146.91	19265.9	1146.81	19269.2	1146.7	19273.9	1146.52	19276.7	1146.47
19277.6	1146.23	19282.2	1146.07	19284.9	1145.65	19288.7	1145.4	19293.5	1145.44
19295	1145.49	19298.7	1145.6	19302.2	1145.73	19302.5	1145.87	19304.2	1145.48
19306.1	1145.21	19308.3	1144.95	19310.9	1144.61	19311.5	1144.97	19311.8	1144.65
19315.1	1144.5	19321.5	1144.52	19321.7	1143.98	19327.4	1144.03	19353.2	1144.42
19355.6	1145	19363	1145.08	19364	1145.1	19364.4	1144.45	19394.2	1145.06
19394.4	1145.27	19403.4	1145.82	19404.4	1145.71	19405.5	1145.6	19405.6	1145.58
19406.5	1145.45	19407	1145.34	19407.5	1145.35	19411	1145.7	19415	1146.1
19416.4	1146.28	19420.3	1146.57	19426.6	1146.67	19430.2	1146.72	19432.3	1146.33
19438.3	1146.21	19442.3	1145.82	19446.7	1145.48	19450.4	1145.41	19452.9	1145.44
19454.3	1145.52	19462.3	1145.74	19470.5	1146.09	19474.3	1146.37	19477.3	1146.63
19479.4	1146.95	19485.5	1147.87	19486.9	1148.08	19490.7	1148.4	19503.5	1149.52
19507.8	1150.29	19509.7	1150.61	19514	1151.35	19521.4	1152.66	19524.2	1152.47
19527.4	1152.21	19528.9	1152.09	19529.6	1152.03	19531.9	1151.84	19538.8	1151.36
19541.9	1151.1	19544.6	1151.01	19555.7	1151.19	19569.31	1152	19571.3	1152
19571.3	1149.5	19582.21	1146.33	19583.71	1146.33	19629.89	1132.11	19692.54	1126
19733.61	1128	19741.57	1128	19811.88	1126.8	19884.97	1126	19892.93	1126
19963.04	1126	20036.94	1126.1	20044.89	1126.1	20120.17	1130	20197.95	1133.4
20206.3	1133.4	20282.28	1135	20360.05	1135.2	20368.01	1135.2	20390.68	1135
20400.1	1145.8	520400.29	1153.5	20401.46	1153.5	20401.46	1151	20433.01	1151
20444.5	1150.45	20446.9	1150.53	20447.2	1150.64	20447.6	1150.7	20449.5	1151
20450.7	1151.34	20452.9	1152	20454.5	1152.41	20456.5	1153	20458.3	1153.51
20460.1	1154	20463.9	1154.99	20467.3	1156	20469.8	1157.16	20470.5	1157.43
20470.7	1157.17	20473.1	1157	20482.2	1157	20486	1156.52	20490.3	1156
20490.5	1153.18	20490.7	1155.38	20490.9	1155	20491.1	1154.7	20491.5	1154
20492.1	1153.12	20492.2	1153	20492.5	1152.39	20492.8	1152	20492.9	1151.81
20493.3	1151	20498.4	1151	20521.1	1150.61	20532.3	1150.68	20533.7	1150.64

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 20539.2 1150.65 20543.9    1150 20545.8 1150.34 20548.2    1151 20549.8 1151.47
   20552 1151.31 20553.5    1151 20559.3    1151 20560.4 1151.15 20565.8 1151.32
 20579.5  1151.8 20584.1    1152 20590.4  1152.5 20597.4 1152.69 20602.3    1153
 20603.7    1153 20606.4 1153.16 20611.2 1153.52 20615.1 1153.82 20618.2    1154
 20625.9 1154.36 20632.1    1155   20634 1155.19 20639.3 1155.35 20641.5 1155.24
 20646.2 1155.81 20647.7    1156 20652.2 1156.82 20652.8    1157 20656.6  1157.7
 20657.7    1158 20661.7    1159 20679.1 1163.41 20680.9 1164.05 20683.1 1164.78
 20683.8    1165 20692.7 1165.29 20729.4 1165.73 20755.8 1166.01 20763.2 1166.09

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

   19071     .05 19571.3    .03520400.29     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       19571.320400.29            84.74   84.74   84.74             .1       .3
Ineffective Flow     num=       3
   Sta L   Sta R    Elev  Permanent
888       F
888       F
888       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev

   19510   19595  1152.5

BRIDGE                  RIVER: Salt River
REACH: Reach 4            RS: 221.055

INPUT
Description: Union Pacific Railraod
Distance from Upstream XS =      31
Deck/Roadway Width        =      23
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=      20
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord

   18840  1164.7  1164.719100.66 1166.53 1166.5319100.76 1166.53 1162.23
19131.19  1166.6  1162.319162.91 1166.65 1162.3519194.54 1166.72 1162.42
19226.26 1166.78  1162.519257.89 1166.84 1162.5419289.61 1167.09 1161.79
19321.44 1167.09 1161.7919419.89 1167.45 1162.1519571.55 1167.45 1162.15
19723.61 1167.46 1162.1619874.97 1167.48 1162.1820026.94 1167.51 1162.21
20187.95 1167.53 1162.2320350.05 1167.55 1162.2520501.31 1167.57 1162.27
20603.15  1167.5  1162.220631.99 1167.52 1163.07

Upstream Bridge Cross Section Data
Station Elevation Data    num=     210
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   19071    1157   19071 1156.15 19081.7 1155.91 19082.2 1155.69 19089.5 1155.14
 19093.6 1154.36 19107.3 1151.47 19123.9 1150.31 19143.2 1149.66   19147 1150.23
 19149.1 1150.14 19152.1 1150.04 19156.3  1149.8 19159.8 1149.72 19163.9 1149.57
 19170.4 1149.38 19184.7 1148.79 19188.4 1148.62 19190.7 1148.37 19192.3 1148.29
   19200 1148.02 19204.1 1147.99 19211.6 1147.87   19216 1147.83 19218.7 1147.79
 19222.9 1147.79   19224 1147.64 19225.7 1147.45 19229.4 1147.46 19233.1 1147.34
 19241.9 1147.01 19245.3 1146.98 19246.1 1146.97 19249.4 1146.95 19256.9 1146.92
 19262.7 1146.91 19265.9 1146.81 19269.2  1146.7 19273.9 1146.52 19276.7 1146.47
 19277.6 1146.23 19282.2 1146.07 19284.9 1145.65 19288.7  1145.4 19293.5 1145.44
   19295 1145.49 19298.7  1145.6 19302.2 1145.73 19302.5 1145.87 19304.2 1145.48
 19306.1 1145.21 19308.3 1144.95 19310.9 1144.61 19311.5 1144.97 19311.8 1144.65
 19315.1  1144.5 19321.5 1144.52 19321.7 1143.98 19327.4 1144.03 19353.2 1144.42
 19355.6    1145   19363 1145.08   19364  1145.1 19364.4 1144.45 19394.2 1145.06
 19394.4 1145.27 19403.4 1145.82 19404.4 1145.71 19405.5  1145.6 19405.6 1145.58
 19406.5 1145.45   19407 1145.34 19407.5 1145.35   19411  1145.7   19415  1146.1
 19416.4 1146.28 19420.3 1146.57 19426.6 1146.67 19430.2 1146.72 19432.3 1146.33
 19438.3 1146.21 19442.3 1145.82 19446.7 1145.48 19450.4 1145.41 19452.9 1145.44
 19454.3 1145.52 19462.3 1145.74 19470.5 1146.09 19474.3 1146.37 19477.3 1146.63
 19479.4 1146.95 19485.5 1147.87 19486.9 1148.08 19490.7  1148.4 19503.5 1149.52
 19507.8 1150.29 19509.7 1150.61   19514 1151.35 19521.4 1152.66 19524.2 1152.47
 19527.4 1152.21 19528.9 1152.09 19529.6 1152.03 19531.9 1151.84 19538.8 1151.36
 19541.9  1151.1 19544.6 1151.01 19555.7 1151.1919569.31    1152 19571.3    1152
 19571.3  1149.519582.21 1146.3319583.71 1146.3319629.89  1132.119692.54    1126
19733.61    112819741.57    112819811.88  1126.819884.97    112619892.93    1126
19963.04    112620036.94  1126.120044.89  1126.120120.17    113020197.95  1133.4
 20206.3  1133.420282.28    113520360.05  1135.220368.01  1135.220390.68    1135
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 20400.1 1145.8520400.29  1153.520401.46  1153.520401.46    115120433.01    1151
 20444.5 1150.45 20446.9 1150.53 20447.2 1150.64 20447.6  1150.7 20449.5    1151
 20450.7 1151.34 20452.9    1152 20454.5 1152.41 20456.5    1153 20458.3 1153.51
 20460.1    1154 20463.9 1154.99 20467.3    1156 20469.8 1157.16 20470.5 1157.43
 20470.7 1157.17 20473.1    1157 20482.2    1157   20486 1156.52 20490.3    1156
 20490.5 1153.18 20490.7 1155.38 20490.9    1155 20491.1  1154.7 20491.5   ·1154
 20492.1 1153.12 20492.2    1153 20492.5 1152.39 20492.8    1152 20492.9 1151.81
 20493.3    1151 20498.4    1151 20521.1 1150.61 20532.3 1150.68 20533.7 1150.64
 20539.2 1150.65 20543.9    1150 20545.8 1150.34 20548.2    1151 20549.8 1151.47
   20552 1151.31 20553.5    1151 20559.3    1151 20560.4 1151.15 20565.8 1151.32
 20579.5  1151.8 20584.1    1152 20590.4  1152.5 20597.4 1152.69 20602.3    1153
 20603.7    1153 20606.4 1153.16 20611.2 1153.52 20615.1 1153.82 20618.2    1154
 20625.9 1154.36 20632.1    1155   20634 1155.19 20639.3 1155.35 20641.5 1155.24
 20646.2 1155.81 20647.7    1156 20652.2 1156.82 20652.8    1157 20656.6  1157.7
 20657.7    1158 20661.7    1159 20679.1 1163.41 20680.9 1164.05 20683.1 1164.78
 20683.8    1165 20692.7 1165.29 20729.4 1165.73 20755.8 1166.01 20763.2 1166.09

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

   19071     .05 19571.3    .03520400.29     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
       19571.320400.29             .1       .3
Ineffective Flow     num=       3
   Sta L   Sta R    Elev  Permanent
888       F
888       F
888       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev

   19510   19595  1152.5

Downstream  Deck/Roadway Coordinates
    num=      20
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord

   18840  1164.7  1164.719100.66 1166.53 1166.5319100.76 1166.53 1162.23
19131.19  1166.6  1162.319162.91 1166.65 1162.3519194.54 1166.72 1162.42
19226.26 1166.78  1162.519257.89 1166.84 1162.5419289.61 1167.09 1161.79
19321.44 1167.09 1161.7919419.89 1167.45 1162.1519571.55 1167.45 1162.15
19723.61 1167.46 1162.1619874.97 1167.48 1162.1820026.94 1167.51 1162.21
20187.95 1167.53 1162.2320350.05 1167.55 1162.2520501.31 1167.57 1162.27
20603.15  1167.5  1162.220631.99 1167.52 1163.07

Downstream Bridge Cross Section Data
Station Elevation Data    num=      73
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

18854.04  1164.719113.27 1166.5319113.37  1162.219113.46  1158.719143.63  1154.4
19145.91  1154.419175.17    115219177.45    115219206.63  1148.619207.81  1148.6
19209.01  1148.619238.17    114819240.45    114819269.63    114819272.01    1148
 19296.6  1148.519366.22  1148.519392.32    114719398.79    114819403.76    1149
19488.29    115019492.77    114919495.75    114919508.18    115019516.88    1152
 19523.6    115319528.07  1153.519538.02    115319547.96    115219582.77  1149.5
19582.77    115219584.76    115219584.76    114719592.84 1146.3319594.34 1146.33
19629.89  1132.119692.54    112619733.61    112819741.57    112819811.88  1126.8
19884.97    112619892.93    112619963.04    112620036.94  1126.120044.89  1126.1
20120.17    113020197.95  1133.4 20206.3  1133.420282.28    113520360.05  1135.2
20368.01  1135.220390.68    113520397.21 1146.3320398.81 1146.3320398.81  1153.5
20399.98  1153.520399.98    115120438.28    115120459.681157.05420482.721157.049
 20483.51150.76720539.571150.93520582.951151.42620583.19 1152.0120617.43  1155.4
20666.23 1163.9320682.11 1164.57 20739.1 1166.3620758.09 1170.8720759.88  1171.1
20787.72 1172.1820807.96 1175.0920827.44 1173.62

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

18854.04     .0519584.76    .03520398.81     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
      19584.7620398.81             .1       .3
Ineffective Flow     num=       3
   Sta L   Sta R    Elev  Permanent
888       F
```

```
888       F
888       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev

   19510   19607  1151.5

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

Number of Abutments =  1

Abutment Data
Upstream     num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   19520    1151   19607    1151 19607.1  1153.5   19608  1153.5   19610    1149
 19618.5  1143.5   19629    1130
Downstream     num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   19520    1151   19607    1151 19607.1  1153.5   19608  1153.5   19610    1149
 19618.5  1143.5   19629    1130

Number of Piers =  16

Pier Data
Pier Station     Upstream=19133.34    Downstream=19133.34
Upstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163
Downstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163

Pier Data
Pier Station     Upstream=19165.06    Downstream=19165.06
Upstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163
Downstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163

Pier Data
Pier Station     Upstream= 19193.7    Downstream= 19193.7
Upstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163
Downstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163

Pier Data
Pier Station     Upstream=19228.41    Downstream=19228.41
Upstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163
Downstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163

Pier Data
```

```
Pier Station      Upstream=19260.04    Downstream=19260.04
Upstream     num=        2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163
Downstream     num=        2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163

Pier Data
Pier Station      Upstream=19291.76    Downstream=19291.76
Upstream     num=        2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163
Downstream     num=        2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163

Pier Data
Pier Station      Upstream=19323.59    Downstream=19323.59
Upstream     num=        2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163
Downstream     num=        2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163

Pier Data
Pier Station      Upstream=19424.89    Downstream=19424.89
Upstream     num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163
Downstream     num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163

Pier Data
Pier Station      Upstream=19576.55    Downstream=19576.55
Upstream     num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163
Downstream     num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163

Pier Data
Pier Station      Upstream=19728.61    Downstream=19728.61
Upstream     num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163
Downstream     num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163

Pier Data
Pier Station      Upstream=19879.97    Downstream=19879.97
Upstream     num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163
Downstream     num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163
```

```
Pier Data
Pier Station     Upstream=20031.94    Downstream=20031.94
Upstream     num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163
Downstream     num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163

Pier Data
Pier Station     Upstream=20192.95    Downstream=20192.95
Upstream     num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163
Downstream     num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163

Pier Data
Pier Station     Upstream=20355.05    Downstream=20355.05
Upstream     num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163
Downstream     num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163

Pier Data
Pier Station     Upstream=20506.31    Downstream=20506.31
Upstream     num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163
Downstream     num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163

Pier Data
Pier Station     Upstream=20608.15    Downstream=20608.15
Upstream     num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163
Downstream     num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum                Cd   =     1.2
       Yarnell                 KVal =    1.05
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       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 water surface

BRIDGE OUTPUT    Profile #PF#1
Opening : Single BR
```

E.G. US. (ft)	1152.87	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1151.38	E.G. Elev (ft)	1152.80	1152.77
Q Total (cfs)	169000.00	W.S. Elev (ft)	1151.04	1150.99
Q Bridge (cfs)	169000.00	Crit W.S. (ft)	1141.38	1141.38
Q Weir (cfs)		Max Chl Dpth (ft)	25.04	24.99
Weir Sta Lft (ft)		Vel Total (ft/s)	10.66	10.70
Weir Sta Rgt (ft)		Flow Area (sq ft)	15849.43	15787.73
Weir Submerg		Froude # Chl	0.41	0.41
Weir Max Depth (ft)		Specif Force (cu ft)	229892.10	229176.40
Min El Weir Flow (ft)	1157.96	Hydr Depth (ft)	20.77	21.06
Min El Prs (ft)	1166.53	W.P. Total (ft)	994.61	978.18
Delta EG (ft)	0.20	Conv. Total (cfs)	4261033.0	4280691.0
Delta WS (ft)	0.27	Top Width (ft)	1237.02	1107.06
BR Open Area (sq ft)	31854.00	Frctn Loss (ft)	0.04	0.04
BR Open Vel (ft/s)	10.70	C & E Loss (ft)	0.00	0.07
Coef of Q		Shear Total (lb/sq ft)	1.56	1.57
Br Sel Method	Energy only	Power Total (lb/ft s)	16.69	16.81

BRIDGE OUTPUT Profile #PF#2
Opening : Single BR

E.G. US. (ft)	1152.87	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1151.38	E.G. Elev (ft)	1152.80	1152.77
Q Total (cfs)	169000.00	W.S. Elev (ft)	1151.04	1150.99
Q Bridge (cfs)	169000.00	Crit W.S. (ft)	1141.38	1141.38
Q Weir (cfs)		Max Chl Dpth (ft)	25.04	24.99
Weir Sta Lft (ft)		Vel Total (ft/s)	10.66	10.70
Weir Sta Rgt (ft)		Flow Area (sq ft)	15849.15	15787.45
Weir Submerg		Froude # Chl	0.41	0.41
Weir Max Depth (ft)		Specif Force (cu ft)	229887.30	229171.50
Min El Weir Flow (ft)	1157.96	Hydr Depth (ft)	20.77	21.06
Min El Prs (ft)	1166.53	W.P. Total (ft)	994.61	978.18
Delta EG (ft)	0.20	Conv. Total (cfs)	4260920.0	4280578.0
Delta WS (ft)	0.27	Top Width (ft)	1237.01	1107.03
BR Open Area (sq ft)	31854.00	Frctn Loss (ft)	0.04	0.04
BR Open Vel (ft/s)	10.70	C & E Loss (ft)	0.00	0.07
Coef of Q		Shear Total (lb/sq ft)	1.57	1.57
Br Sel Method	Energy only	Power Total (lb/ft s)	16.69	16.81

CROSS SECTION RIVER: Salt River
REACH: Reach 4 RS: 221.05

INPUT
Description: Downstream face of UPRR bridge
Station Elevation Data num= 73

```
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

18854.04  1164.719113.27 1166.5319113.37  1162.219113.46  1158.719143.63  1154.4
19145.91  1154.419175.17    115219177.45    115219206.63  1148.619207.81  1148.6
19209.01  1148.619238.17    114819240.45    114819269.63    114819272.01    1148
 19296.6  1148.519366.22  1148.519392.32    114719398.79    114819403.76    1149
19488.29    115019492.77    114919495.75    114919508.18    115019516.88    1152
 19523.6    115319528.07  1153.519538.02    115319547.96    115219582.77  1149.5
19582.77    115219584.76    115219584.76    114719592.84 1146.3319594.34 1146.33
19629.89  1132.119692.54    112619733.61    112819741.57    112819811.88  1126.8
19884.97    112619892.93    112619963.04    112620036.94  1126.120044.89  1126.1
20120.17    113020197.95  1133.4 20206.3  1133.420282.28    113520360.05  1135.2
20368.01  1135.220390.68    113520397.21 1146.3320398.81 1146.3320398.81  1153.5
20399.98  1153.520399.98    115120438.28    115120459.681157.05420482.721157.049
 20483.51150.76720539.571150.93520582.951151.42620583.19 1152.0120617.43  1155.4
20666.23 1163.9320682.11 1164.57 20739.1 1166.3620758.09 1170.8720759.88  1171.1
20787.72 1172.1820807.96 1175.0920827.44 1173.62
```

Manning's n Values num= 3

```
     Sta   n Val     Sta   n Val     Sta   n Val

18854.04     .0519584.76    .03520398.81     .06
```

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

```
      19584.7620398.81              210  167.68      80              .1       .3
```

Ineffective Flow num= 3

```
   Sta L   Sta R    Elev  Permanent
888        F
888        F
```

```
888        F
Blocked Obstructions      num=        1
   Sta L    Sta R     Elev

   19510    19607   1151.5

CROSS SECTION           RIVER: Salt River
REACH: Reach 4             RS: 221.02

INPUT
Description:
Station Elevation Data     num=      198
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev

 15044.3     116115046.74 1160.8115054.99 1160.9915067.31 1160.6915118.09 1159.67
15188.86  1159.915261.54 1159.9715295.45 1160.1415332.02 1158.6115339.82 1158.24
15380.65  1157.715388.69 1157.7615513.83 1159.1115577.72 1158.4215622.59 1158.37
15670.19  1158.315740.55 1159.1815755.81 1159.1915780.94 1158.42 15794.9 1158.07
15840.15     1157 15862.8 1158.0415868.58 1158.2515878.24 1158.2715931.25 1157.44
16026.39  1158.3 16042.1 1158.3516063.87 1158.0616173.44 1157.7216198.77 1157.57
16240.13  1156.916263.89 1157.7716286.32 1156.4916315.25 1157.6816425.38 1156.64
 16472.1  1156.216481.97 1156.1316484.62 1156.2416543.72 1155.97 16656.3 1155.75
16680.03  1156.416701.67 1155.6816728.06 1157.12 16750.9 1156.9516855.76 1157.05
16901.91  1157.116958.94 1156.6217074.38 1155.6617090.35 1156.28 17098.2 1156.49
17121.74  1155.117157.02 1155.3917177.67 1155.3717290.67 1155.8117359.48 1156.44
17401.65  1156.617496.83 1157.4717533.23 1157.7117610.32 1157.9617651.54 1158.27
17781.11  1158.517812.58 1158.8317889.77 1158.4817945.95 1158.4318065.89 1158.44
18105.38  1158.318202.28 1157.8818260.45 1157.8418310.83 1158.05   18378 1158.54
 18419.2  1157.718429.86 1157.3818444.45 1157.7718468.43 1158.2518483.22 1156.71
18487.84  1156.7   18552 1157.6218598.58 1157.51 18671.6 1157.4718724.73 1157.28
18802.71  1157.118855.51 1156.8918882.85  1156.418939.89 1157.0118962.01  1156.9
18980.67  1156.718996.52 1156.7519046.82 1156.3919054.65 1155.9519125.72 1152.64
 19144.8  1157.3 19147.3 1157.8119158.87 1158.7819187.22 1152.7319199.35 1150.01
19201.06  1149.319221.83  1148.519291.83  1148.519366.58    114719374.98    1148
19380.98    114919402.58    115019466.58    115019473.98    115119509.58  1149.5
19509.58    115219511.58    115219511.58 1146.33   19519 1146.3319549.33 1135.36
19552.87  1133.419554.34 1133.5319573.39 1132.4719596.68 1135.0219601.53 1134.82
19702.75    113119732.46 1130.5319814.47 1130.3419836.04 1130.1819975.05  1131.8
20064.35  1130.620095.86 1130.06 20155.2 1130.7520233.83 1131.55 20325.5 1131.38
20376.39 1136.8620379.97 1146.3320381.47 1146.3320381.47  1153.520383.47  1153.5
20383.47    115120395.47    115120492.961152.07820513.381152.71520550.411159.938
20562.131160.92920642.55 1164.38 20670.1 1166.0620685.24  1168.820694.24 1171.25
20759.53 1195.5820766.38 1193.5620794.56 1193.4920802.53    119320860.02 1192.48
20891.04 1189.0320921.83 1184.5520973.53 1176.5821007.78  1169.7 21020.9  1166.7
21043.59 1167.8621058.76 1167.3921077.96  1165.121084.16  1164.521125.91 1172.49
21137.04 1175.4421155.09 1177.0621179.84 1178.32 21199.1  1179.721217.63 1179.96
21324.45 1182.8521329.09 1182.8921337.12 1180.9721339.29  1181.321359.14 1183.27
21368.63 1182.1621379.89  1181.421410.49 1180.9921439.46  1180.821455.92 1180.06
21468.95 1179.3121470.21 1179.7421475.48 1179.9821499.92  1177.321505.23  1176.9
 21509.4 1177.8421555.88 1191.1721570.26 1193.9721572.09  1194.821600.37 1195.61
21610.52  1195.621618.72 1196.1321666.21 1196.3721680.57  1195.721714.58 1194.78
21730.11 1194.5121742.46 1194.7221795.72 1191.81 21831.3  1190.321844.02 1190.21
 21857.8 1193.4321868.24 1193.7721900.08 1195.1721920.57    119521934.48 1195.09
21969.69 1194.5221976.39 1193.8721983.44 1192.33

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

 15044.3      .0519511.58     .03520381.47      .06

Bank Sta: Left    Right     Lengths: Left Channel    Right      Coeff Contr.    Expan.
      19511.5820381.47                530  503.55     450              .1        .3
Ineffective Flow      num=        2
   Sta L    Sta R     Elev  Permanent
888        F
888        F
Blocked Obstructions      num=        1
   Sta L    Sta R     Elev

 15044.3   19150    1156

CROSS SECTION           RIVER: Salt River
REACH: Reach 4             RS: 220.92

INPUT
Description:
```

```
Station Elevation Data     num=      256
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev

15056.94  1158.315076.82 1156.2415078.01  1156.515085.42 1156.98 15091.4 1157.54
15092.38  1157.715132.68 1156.1915136.58 1156.0115142.69 1156.0415285.82 1156.09
15333.21  1155.415354.33 1154.7815385.82  1155.3   15402 1155.4715501.97 1156.32
15525.24  1156.115590.72  1155.4 15610.6 1155.3415746.64  1155.415775.17 1154.91
15792.22  1154.915831.19  1154.715850.08 1154.5815854.93 1154.5115860.35 1153.76
15861.43  1153.815883.33 1156.1415928.57 1155.6115962.04 1155.2815975.13 1155.33
15996.69  1155.316126.78 1154.9316218.25  1154.616274.39  1155.216288.62 1155.19
16354.88  1154.616404.13  1154.616519.19 1154.5716521.31 1154.67 16544.3 1155.19
16674.08  1156.216693.66 1155.3916704.58 1155.2116754.43 1154.7516767.64 1154.51
16947.93  1153.917054.56 1153.2917089.35 1154.5817115.83 1153.75 17124.3 1154.05
17152.88  1154.717229.24 1155.1717259.62  1155.517358.95 1154.9317368.96 1155.12
17384.65  1156.217408.17  1154.917428.41 1156.2717434.19 1156.3417506.93 1156.38
 17532.5  1156.617643.84 1156.4817662.16 1156.6117702.03  1156.7 17817.4 1156.92
17830.58    115717917.79 1157.63 17979.7 1157.6518018.43 1157.5218084.18 1157.06
18143.35  1157.518147.32 1157.5318297.14 1157.2318301.96 1157.2118323.41 1156.76
18375.77  1155.818380.73 1155.7918409.33 1155.7318422.82 1155.5118452.23 1155.53
18468.78  1155.918481.68 1155.8618496.53 1156.0318551.56 1155.6718647.29 1154.57
18693.89  1153.918707.39 1153.6418754.24 1153.7618813.55 1153.8718864.59 1154.06
18887.41  1154.718913.94 1155.0118934.68 1156.2318984.13 1150.57 18986.8 1150.32
19004.77  1153.319026.27 1156.8819040.29 1157.5319050.92 1155.8519073.98 1152.34
19092.01  1151.619116.39 1150.0519123.92 1149.3619138.68 1149.3619192.02 1149.53
19214.34  1149.919229.37 1152.6419252.46 1158.11 19262.2 1158.8719297.45 1157.11
19318.87  1155.819324.16 1154.7919335.92    115019342.12    115119347.02    1152
19349.72    115219355.32    115119362.92    115019372.32    114919414.12    1148
19445.32    114819453.52    114719458.12    114719467.12    114819475.12    1149
19482.32    115019490.72    115119497.72    115219508.12    115219514.12    1151
19545.32  1148.519545.32    115119547.32    115119547.32 1146.3319548.82 1146.33
19576.51  1134.619587.17 1129.16 19608.3 1130.0919676.46 1131.71 19705.2 1131.96
19733.24  1131.719838.63 1130.3519914.22 1131.5819977.78 1132.5720015.93 1131.94
20098.73  1130.320220.32 1131.4420236.84 1131.5620266.69  1131.620358.46 1131.61
20387.17  1140.320398.68 1143.6220407.79 1143.9820409.09 1146.3320410.59 1146.33
20410.59    115120412.59    115120412.59  1148.520424.59  1148.520540.671153.943
20550.22 1155.9220575.351158.1992059 5.031162.23620673.67  1178.6 20722.4  1187.4
20757.73 1190.3320774.83 1191.3720800.66  1191.2 20804.1 1190.8820824.56 1189.42
20851.13 1190.8420874.18 1191.0820941.46  1192.220978.01 1191.07 20982.4 1190.85
21008.46 1193.5321016.52  1192.821033.82  1192.721056.09 1192.7321105.45 1178.51
21154.97 1162.9421224.56 1163.9221300.76  1165.7 21334.6 1167.8121348.51 1166.74
21358.61 1165.4721385.06 1167.9521409.45    1166 21414.6 1165.77 21417.4 1168.55
21429.15 1178.6621433.72 1178.4321441.24  1177.721447.86 1177.93 21464.7  1178.4
21471.88 1177.9321486.87 1177.4521524.71  1176.721570.22 1175.1221579.81 1175.27
21582.09  1175.221594.81 1172.4521597.81  1172.421618.81 1176.85 21623.8  1177.7
21636.86 1177.4221646.82 1176.7321679.65  1174.821702.01 1174.2221704.67 1174.74
21721.42 1174.9421740.46 1176.1321746.66  1176.321773.81 1176.5921787.05  1176.1
21792.77 1175.4521822.28 1176.8621838.23  1177.121868.53 1177.9421871.44  1178.1
21877.86 1177.8521903.56  1176.521908.69  1173.621921.88 1172.56 21936.7 1176.72
21952.08  1177.821957.85 1178.3621978.05  1179.621987.23 1181.3221991.73 1181.86
22001.18  1181.922022.78 1184.1222029.69    118522051.86 1185.91 22081.2 1187.06
22087.57 1187.4522112.52 1185.6622122.29  1184.322146.68 1182.1622172.21  1180.5
22189.25 1177.5122196.21 1176.8622204.41  1176.422207.61  1176.522229.25 1175.36
22252.83 1180.4922263.35 1181.2422272.03  1180.522326.75 1180.1922330.68  1180.4
22367.48 1183.9222408.32 1184.9122434.33  1185.422440.61 1185.34 22461.3 1184.78
22481.54 1184.43

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

15056.94     .0519547.32    .03520410.59     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19547.3220410.59              560  518.52     450              .1       .3
Ineffective Flow     num=        3
   Sta L   Sta R    Elev  Permanent
888        F
888        F
888        F
Blocked Obstructions     num=        1
   Sta L   Sta R    Elev

15056.94   19035    1156

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 220.82
```

```
INPUT
Description:
Station Elevation Data     num=      259
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev

14966.67  1155.7 14994.9 1155.2315013.71 1154.0115021.11 1153.2415050.66 1152.65
15099.94  1152.7 15126.2 1152.59 15191.9 1152.8615243.19 1152.4715250.24 1152.37
   15320  1152.915352.84 1153.5415386.05 1153.4815392.04  1153.2   15408 1152.23
15416.37  1152.315429.68 1152.5715444.43 1152.3415469.09 1152.2515557.75 1151.86
15628.53  1152.5 15672.2 1152.9815686.44 1151.5315728.08 1152.1615748.26 1152.35
15782.75  1153.415803.31 1152.7815849.34 1152.4115922.54 1151.5415965.71 1151.57
16105.59  1151.516112.76 1151.6116148.28 1154.0316175.63 1153.9116187.03 1153.49
16210.44  1153.416219.87 1153.1616229.03 1153.4316231.92 1153.7216303.07 1152.63
16354.15  1152.716380.98 1152.7216394.77 1152.6216430.95 1152.8916514.83 1153.13
16560.89  1153.416578.84 1152.5816629.65 1150.4216648.01 1150.4516695.46 1150.95
 16724.6  1151.116832.81 1151.8416937.42 1151.7816970.15 1152.3916981.11 1152.48
16989.67  1152.917011.25 1152.7717034.73  1153.117039.76 1153.3217062.09 1155.14
 17147.1  1153.917172.08 1154.0217193.39 1155.5217202.14 1155.8817248.97  1155.9
17265.63  1155.717297.38 1154.7617315.73 1153.8717319.73  1153.617352.48 1154.26
17361.43  1154.417372.68 1154.3117442.96 1153.6417471.11 1154.4117499.21 1155.65
17565.37  1155.417596.88 1155.26 17615.1 1155.8517640.73 1156.4517653.51 1156.31
 17664.8  1156.1   17677 1156.53 17703.8 1156.6217762.99 1156.09 17805.4 1156.21
17842.82  1156.417871.78 1156.8517885.61 1156.3717937.13 1156.8617965.61 1157.26
17997.08  1157.118162.42 1157.1318212.41 1157.0118217.42 1156.9518247.84 1155.01
18291.62  1156.818294.91 1157.0618323.51  1154.6 18349.5    115418364.36 1153.56
18380.47  1154.618411.31 1153.6718465.27 1153.4618533.94 1152.5818551.54 1152.58
18577.54  1152.418629.65 1152.66 18635.6 1152.8318686.63 1153.7818723.07 1154.13
18733.12  1154.818806.96 1153.9518815.49 1153.6318848.51 1149.7218861.19 1148.53
18876.01  1148.818879.55 1149.3218908.05 1153.79 18919.3  1153.418983.58  1152.3
 19000.8  1151.8   19010 1153.7419023.73 1156.2719034.07 1157.2919037.58 1156.53
19073.99  1149.119089.08 1149.2819093.85 1149.0719102.34 1150.4219115.72 1150.38
19135.01  1150.619152.18 1149.5919196.97 1148.9719202.14 1148.8119216.01 1149.13
19228.26  1148.919235.07 1147.76 19299.3 1147.9219335.62 1148.2519357.09 1148.57
19390.82  1155.419394.26 1155.99 19404.6 1156.6619422.48 1152.7119456.86 1145.22
 19466.2  1146.6 19492.6 1150.1519503.84    115119503.84  1153.519505.84  1153.5
19505.84 1146.3319507.34 1146.33 19513.3 1145.1319521.34  1137.919535.91  1139.4
19554.48 1132.9419565.22 1129.5619593.76  1130.319639.73 1131.7319657.19  1131.5
19773.87 1129.9819873.48 1130.9819913.76 1131.1919944.72    113120035.35    1130
20064.49 1130.0120174.19 1130.0420216.93 1129.9920301.27 1129.7120329.01  1130.7
20343.21 1135.1620357.45 1138.5320368.79 1141.7720372.67 1146.3320374.17 1146.33
20374.17    115120376.17    115120376.17  1148.520388.17  1148.520487.49 1155.96
20520.961155.87220561.271162.43520587.051168.34620624.24 1179.3220645.69 1177.93
20650.23  1177.920654.43 1179.0820672.84 1182.9820691.43 1182.5320711.77 1182.31
20726.85  1180.620751.98 1176.5320790.42 1177.8320866.31  1179.420886.86 1179.88
20891.78  1179.9 20945.2 1178.3320946.24 1178.4620970.97    118320977.55  1183.6
20990.97  1182.421016.54 1183.8421027.23 1184.24 21049.3 1185.5921139.77 1162.31
21157.79  1157.721160.49  1157.421179.51 1154.7321238.31 1153.52 21243.5 1153.81
21315.86  1157.321324.45 1157.58 21363.1 1159.4821380.83 1160.4721399.61  1165.3
21437.88    116421447.56 1160.68 21454.8 1158.03 21473.7 1158.38 21494.5  1158.6
21549.92  1158.321575.58 1159.9421603.97  1164.921625.71 1169.4721631.47 1171.18
21647.04  1167.921667.64 1170.4121673.43 1170.9721685.04 1170.7221720.26 1171.33
21734.34  1171.521777.94 1171.02 21794.5 1171.1321803.73 1171.3421815.17 1171.71
21830.12  1169.921841.34 1168.2821848.75 1169.5321866.74 1173.4221873.12 1174.92
21919.28  1175.321939.52  1175.221987.72 1175.3522008.71 1176.0722022.69 1176.31
22044.47  1176.422061.01 1176.7122105.28 1176.9222127.76 1176.78 22155.6 1177.46
22185.01  1176.722253.65  1177.122327.29 1175.3722341.26 1175.3422408.59 1175.97
22420.56  1182.122430.93 1184.4122455.02 1185.5422498.64 1186.42

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

14966.67    .03519505.84    .03520374.17     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19505.8420374.17              197  191.93     187              .1       .3
Ineffective Flow     num=        2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

CROSS SECTION           RIVER: Salt River
REACH: Reach 4             RS: 220.756

INPUT
Description: Upstream End of Apron
Station Elevation Data     num=        6
```

```
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   19547    1155   19547    1147 19578.5    1129 20421.5    1129   20453    1147
   20453    1155

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

   19547    .015   19547    .015   20453    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         19547   20453                6       6       6             .1       .3

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 220.755

INPUT
Description: Downstream Bladder
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   19547    1155   19547    1147 19578.5    1132 20421.5    1132   20453    1147
   20453    1155

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

   19547    .015   19547    .015   20453    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         19547   20453                54      54      54             .1       .3

BRIDGE                 RIVER: Salt River
REACH: Reach 4            RS: 220.752

INPUT
Description:
Distance from Upstream XS =       1
Deck/Roadway Width        =      52
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord

   19547    1175    1174   20453    1175    1174

Upstream Bridge Cross Section Data
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   19547    1155   19547    1147 19578.5    1132 20421.5    1132   20453    1147
   20453    1155

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

   19547    .015   19547    .015   20453    .015

Bank Sta: Left   Right    Coeff Contr.   Expan.
         19547   20453             .1       .3

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord

   19547    1175    1174   20453    1175    1174

Downstream Bridge Cross Section Data
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   19547    1155   19547    1147 19578.5 1131.67 20421.5 1131.67   20453    1147
   20453    1155

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
```

```
   19547    .015   19547    .015   20453    .015

Bank Sta: Left   Right    Coeff Contr.   Expan.
         19547   20453            .1       .3

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

Number of Piers =  3

Pier Data
Pier Station     Upstream=   19772    Downstream=   19772
Upstream     num=       3
    Width   Elev    Width   Elev    Width   Elev

   27.33    1132    5.66  1153.5    5.66 1161.17
Downstream     num=       3
    Width   Elev    Width   Elev    Width   Elev

   27.33 1131.67    5.66  1153.5    5.66 1161.17

Pier Data
Pier Station     Upstream=   20000    Downstream=   20000
Upstream     num=       3
    Width   Elev    Width   Elev    Width   Elev

   27.33    1132    5.66  1153.5    5.66    1161
Downstream     num=       3
    Width   Elev    Width   Elev    Width   Elev

   27.33 1131.67    5.66  1153.5    5.66    1161

Pier Data
Pier Station     Upstream=   20228    Downstream=   20228
Upstream     num=       3
    Width   Elev    Width   Elev    Width   Elev

   27.33    1132    5.66  1153.5    5.66    1161
Downstream     num=       3
    Width   Elev    Width   Elev    Width   Elev

   27.33 1131.67    5.66  1153.5    5.66    1161

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum                Cd   =     1.6
       Yarnell                 KVal =      .9
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

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

BRIDGE OUTPUT    Profile #PF#1
Opening : Single BR

 E.G. US. (ft)              1150.73   Element                Inside BR US Inside BR DS
 W.S. US. (ft)              1148.66   E.G. Elev (ft)             1150.53      1150.18
 Q Total (cfs)            169000.00   W.S. Elev (ft)             1147.92      1147.55
 Q Bridge (cfs)           169000.00   Crit W.S. (ft)             1143.32      1142.98
 Q Weir (cfs)                         Max Chl Dpth (ft)            15.92        15.88
 Weir Sta Lft (ft)                    Vel Total (ft/s)             12.97        13.02
```

Weir Sta Rgt (ft)		Flow Area (sq ft)	13029.56	12976.25
Weir Submerg		Froude # Chl	0.59	0.59
Weir Max Depth (ft)		Specif Force (cu ft)	169378.00	169012.90
Min El Weir Flow (ft)	1175.01	Hydr Depth (ft)	14.94	14.89
Min El Prs (ft)	1174.00	W.P. Total (ft)	939.62	938.54
Delta EG (ft)	0.57	Conv. Total (cfs)	7449955.0	7404858.0
Delta WS (ft)	0.66	Top Width (ft)	872.16	871.30
BR Open Area (sq ft)	36387.56	Frctn Loss (ft)		
BR Open Vel (ft/s)	13.02	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	0.45	0.45
Br Sel Method	Momentum	Power Total (lb/ft s)	5.78	5.86

BRIDGE OUTPUT Profile #PF#2
Opening : Single BR

		Element	Inside BR US	Inside BR DS
E.G. US. (ft)	1150.73	E.G. Elev (ft)	1150.53	1150.18
W.S. US. (ft)	1148.66	W.S. Elev (ft)	1147.92	1147.55
Q Total (cfs)	169000.00	Crit W.S. (ft)	1143.32	1142.98
Q Bridge (cfs)	169000.00	Max Chl Dpth (ft)	15.92	15.88
Q Weir (cfs)		Vel Total (ft/s)	12.97	13.02
Weir Sta Lft (ft)		Flow Area (sq ft)	13029.35	12976.04
Weir Sta Rgt (ft)		Froude # Chl	0.59	0.59
Weir Submerg		Specif Force (cu ft)	169375.90	169010.90
Weir Max Depth (ft)		Hydr Depth (ft)	14.94	14.89
Min El Weir Flow (ft)	1175.01	W.P. Total (ft)	939.61	938.54
Min El Prs (ft)	1174.00	Conv. Total (cfs)	7449761.0	7404659.0
Delta EG (ft)	0.57	Top Width (ft)	872.16	871.30
Delta WS (ft)	0.66	Frctn Loss (ft)		
BR Open Area (sq ft)	36387.56	C & E Loss (ft)		
BR Open Vel (ft/s)	13.02	Shear Total (lb/sq ft)	0.45	0.45
Coef of Q		Power Total (lb/ft s)	5.78	5.86
Br Sel Method	Momentum			

CROSS SECTION RIVER: Salt River
REACH: Reach 4 RS: 220.75

INPUT
Description: Downstream Bladder
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
19547	1155	19547	1147	19578.5	1131.67	20421.5	1131.67	20453	1147
20453	1155								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
19547	.015	19547	.015	20453	.015

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
19547	20453	31	31	31	.1	.3

CROSS SECTION RIVER: Salt River
REACH: Reach 4 RS: 220.74

INPUT
Description: Downstream End of Apron
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
19547	1155	19547	1147	19578.5	1129	20421.5	1129	20453	1147
20453	1155								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
19547	.032	19547	.032	20453	.032

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
19547	20453	30	30	30	.1	.3

CROSS SECTION RIVER: Salt River
REACH: Reach 4 RS: 220.735

INPUT
Description: Downstrem End of Rip-Rap
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
19547	1155	19547	1147	19578.5	1129	20421.5	1129	20453	1147
20453	1155								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
19547	.035	19547	.035	20453	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
19547	20453	182	182	182	.1	.3

CROSS SECTION RIVER: Salt River
REACH: Reach 4 RS: 220.73

INPUT
Description:
Station Elevation Data num= 313

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
14797.3	1154.3	14913.57	1152.42	14944.1	1152.26	14944.42	1151.47	14966.97	1151.88
14980.8	1152.3	15003.23	1152.21	5059.05	1152.19	15081.02	1152.11	15093.12	1152.34
15126.06	1152.1	15181.19	1151.61	15210.79	1150.47	15233.66	1151.47	15251.43	1150.94
15273.4	11511	5362.88	1150.59	15379.06	1150.05	15423.88	1149.95	15459.88	1149.65
15539.57	1149.3	15572.44	1149.28	15584.29	1149.5	15599.68	1150.44	15612.48	1148.8
15672.24	1149.4	15700.28	1151.35	15798	1151.37	15867.6	1150.99	15916.69	1151.03
15952.86	11511	6008.14	1150.91	16080.12	1151.75	16088.31	1151.84	16116.46	1153.28
16139.26	1152.9	16148.32	1152.62	16153.19	1153.23	16160.23	1153.56	16218.88	1151.88
16243.62	1151.3	16274.61	1151.3	16363.6	1151.49	16393.63	1151.52	16435.51	1151.52
16490.57	1151.8	16564.86	1151.81	16567.24	1151.77	16703.9	1151.52	16710.5	1151.66
16724.61	1151.7	16797.96	1151.77	16899.05	1151.75	16906.7	1152.02	16932.49	1152.13
16942.39	1152.2	16955.5	1152.76	16971.52	1153.25	16982.43	1153.08	16998.31	1153.1
17049.19	1153.1	17072.46	1153.08	17121.46	1152.89	17145.41	1153.03	17192.67	1153.2
17215.62	1153.2	17238.43	1153.03	17247.66	1152.63	17269.82	1153.19	17281.82	1153.38
17364.73	1153.4	17374.5	1153.64	17397.24	1153.36	17437.21	1153.78	17481	1154.3
17525.1	1153.8	17548.55	1153.43	17626.8	1154.29	17747.58	1156.28	17767.79	1154.13
17778.06	1154.2	17792.77	1154.55	17840.7	1154.96	17896.44	1155.19	17915.02	1155.09
17924.66	1154.9	17968.81	1154.31	18001.48	1154.43	18082.98	1154.32	18106.55	1154.56
18117.14	1154.6	18144.52	1155.13	18166.73	1155.06	18183.2	1155.13	18210.02	1155.28
18218.19	1155.2	18251.96	1154.51	18271.92	1154.17	18289.25	1153.69	18309.93	1154.27
18348.27	1153.3	18353.67	1153.17	18492.05	1153.31	18501.57	1153.27	18558.69	1153.22
18604.41	1153.2	18618.27	1152.91	18676.89	1152.15	18726.4	1149.04	18748.84	1147.58
18787.16	1146.9	18832.85	1146.21	18862.62	1152.72	18869.61	1154.01	18945.35	1153.81
18952.13	1152.5	18954.69	1152.24	18985.94	1152.96	19036.14	1153.25	19045.15	1154.09
19057.29	1152.3	19087.96	1150.45	19132.13	1150.49	19162.52	1150.91	19192.54	1151.69
19218.75	1151.2	19232.69	1151.84	19251.32	1151.43	19302.95	1151.56	19341.3	1150.74
19381.97	1149.6	19439.95	1151.67	19450.97	1151.96	19479.57	11581	9490.11	1159.02
19492.12	1158.5	19515.2	1153.56	19531.14	1150.79	19555.44	1133.36	19557.72	1132.21
19576.93	1131.5	19658.15	1128.96	19701.95	1127.69	19712.81	1128.35	19715.3	1128.61
19760.95	1129.3	19803.61	1129.34	19851.53	1129.51	19950.1	1130.61	19973.26	1130.69
20100.83	1130.9	20112.26	1130.99	20141.19	1130.47	20222.72	1129.06	20239.48	1128.75
20265.71	1129.5	20365.39	1132.38	20374.45	1134.07	20381.94	1136.31	20423.81	1148.67
20441.46	1153.6	20453.82	1155.55	20476.74	1158.07	20495.14	1160.26	20503.4	1162.18
20564.01	1175.5	20578.57	1176.65	20595.22	1178.91	20620.06	1178.54	20631.53	1178.69
20644.53	1178.7	20676.97	1173.58	20739.84	1163.1	20756.44	1163.61	20786.35	1163.92
20833.99	1164.9	20861.4	1164.23	20868.64	1164.33	20875.76	1164.24	20907.84	1164.16
20926.94	1165.9	20936.61	1166.42	20963.09	1168.25	20978.69	1174.43	21014.75	1188.53
21036.74	1188.6	21049.33	1188.61	21126.03	1167.39	21141.74	1163.46	21147.25	1162.17
21162.06	1159.5	21169.27	1159.28	21221.77	1159.61	21288.72	1159.11	21296.9	1160.02
21311.98	1162.2	21324.94	1161.83	21345.92	1161.38	21351.63	1158.53	21364.03	1152
21386.28	1152.2	21402.73	1143.16	21406.95	1140.73	21424.81	1142.25	21442.17	1149.28
21451.75	1153.3	21477.29	1153.24	21492.55	1153.1	21565.24	1152.78	21589.18	1151.51
21648.09	11512	1676.81	1150.71	21687.2	1153.03	21691.96	1153.87	21694	1153.58
21705.22	1153.5	21747.92	1152.74	21763.65	1155.18	21768.74	1156.06	21780.97	1157.01
21785.19	1157.7	21799.01	1160.84	21849.66	1162.7	21868.62	1160.99	21880.15	1161.95
21897.96	1164.4	21923.34	1164.55	21939.34	1165.09	21967.35	1166.13	21991.87	1166.37
22036.99	1167.1	22046.99	1168.09	22070.54	1166.34	22091.72	1167.65	22094	1167.89
22100.85	1167.6	22114.57	1167.48	22158.49	1166.67	22173.5	11672	2193.46	1166.44
22234.87	1166.2	22258.75	1166.45	22292.82	1167.3	22320.1	1167.43	22329.22	1167.07
22352.2	1166.4	22366.09	1167.14	22415.22	1167.47	22453.69	1167.77	22492.16	1168.56
22642.92	1170.2	22688.53	1170.48	22739.89	1170.76	22822.87	1170.76	22871.73	1170.39
22889.98	1170.7	22937.42	1171.88	23028.91	1173.81	23031.57	1173.91	23070.19	1175.98

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23095.28  1176.523102.86 1176.88 23148.1  1179.423163.39 1179.8523165.07    1180
23188.47  1180.423213.41  1179.723249.54 1179.9323278.98 1180.03 23290.4 1180.18
23363.69  1180.823383.38 1180.4223401.79 1180.0723419.41 1180.2123433.68 1178.29
23452.43  1175.523471.84 1176.6323487.22 1174.6823499.32 1176.0923523.76 1176.96
23530.78    117723580.84 1178.8723599.92 1179.7323610.68 1180.2423668.01  1183.3
23684.49  1183.123737.23 1183.1823753.82 1183.9923771.45 1184.5123788.82 1185.45
23802.17  1184.923805.38 1184.6723809.24 1184.8723813.53 1184.6423851.27 1183.72
23864.52  1183.823891.02 1183.2623892.96 1183.3223897.08  1182.723973.88 1172.66
24039.67  1173.424085.52  1187.324090.47 1189.0824151.58 1190.7824165.54 1191.26
24172.71  1191.424192.87 1191.5924242.54 1192.2624276.93 1192.6124289.34 1195.49
24302.68  1197.9   24332 1197.6224347.55 1198.15

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

 14797.3    .03519490.11    .03520495.14    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19490.1120495.14              510  501.55     490             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 220.63

INPUT
Description:
Station Elevation Data    num=     293
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   14824  1150.314870.19 1149.9714906.61 1150.46 14934.6 1150.2714996.54 1149.63
 15005.4  1149.3 15035.6 1149.7215073.05  1149.715119.49  1149.515140.51 1148.65
15164.17  1149.515176.48  1149.815188.71 1149.7615222.37 1149.9215284.22 1149.41
15311.03  1149.715339.76 1150.2615407.72  1149.715469.64 1149.4815540.95 1149.31
15601.47  1148.5 15631.9 1149.3115681.89 1149.8615766.94 1149.9815791.74 1149.81
15882.72  1150.615969.23 1150.4816026.97 1151.3716037.23 1150.8716047.44 1150.22
16051.03  1150.216077.31 1149.2216098.49 1151.2216164.63  1150.5 16172.4 1150.53
16267.84  1150.416308.54  1150.716383.35 1151.4916440.92 1151.5216503.85 1151.17
 16547.1  1151.116625.17 1151.0116666.85  1151.616686.26 1152.1516703.27 1151.91
16750.45  1151.516831.13  1151.716846.42 1151.6516860.48 1151.3716872.44 1151.59
16891.43  1151.516919.41 1152.1416929.14 1152.2317034.57 1152.1617112.73 1152.31
17151.56    115317174.16 1152.4717213.39  1152.617256.25 1152.1517300.25 1151.98
17312.74  1152.617370.38 1154.2517456.04 1154.2317496.26 1154.1117547.83  1153.9
17604.31  1153.817688.93 1153.5717722.82 1153.2717729.13  1153.5 17744.1 1153.57
 17804.7  1154.117925.11 1154.3217981.54 1154.5718023.62 1154.5918059.13 1154.52
18113.05  1154.118137.88 1154.1318140.35 1154.1918159.61 1154.6618172.45 1154.58
 18185.1  1154.318215.34 1153.5718233.36 1153.9918307.25 1153.1518360.97 1153.08
18408.08  1153.518500.25 1153.0518520.71  1152.718535.53 1152.6918539.52 1152.17
18551.01  1151.718558.74 1151.5318573.36 1151.0118611.78 1150.64 18625.8 1150.46
18647.75    1153 18657.7 1153.8318674.43 1152.7718723.13 1152.7418734.97 1152.54
18743.63  1152.318780.43 1150.66   18816 1152.1118843.95 1154.4218864.43 1154.66
18922.43  1156.418936.63 1156.4318972.93  1153.519047.63 1154.08 19180.2 1154.87
19184.81  1154.819228.77 1154.5319245.97 1154.4819262.55  1154.519312.33 1154.65
19339.84  1154.719364.44  1154.119384.69 1152.6419429.36 1143.5519434.17 1143.26
19437.42    114419487.14 1156.1819502.33 1159.1819508.86 1156.1319533.27 1145.86
19545.56    114719552.18 1142.2519562.89 1133.6419591.04 1132.3719650.01 1129.14
19773.79  1129.519790.22 1129.4919802.35 1129.2519912.09 1127.17 19968.5  1127.1
19998.74  1127.320051.26 1129.3720068.85  1129.420178.63 1128.86 20268.5  1129.8
20304.69  1130.520328.46 1130.7120359.22 1130.6120416.92 1138.2420430.96 1145.24
20440.58  1147.420475.73 1155.9620483.75 1156.0920494.25 1156.7520495.83 1156.24
20517.61  1161.220571.44 1174.4720606.77 1174.2720610.81 1174.1320641.95 1166.52
20689.44    115520692.07 1155.0820726.24 1156.4420766.82 1157.2520783.96  1157.5
20815.62  1157.220830.99 1157.1320842.11 1156.8720875.53 1156.8520911.76 1160.68
20935.56  1160.520937.82 1160.6120985.04 1183.8420990.99 1183.96 21011.6 1182.74
21099.54  1158.421115.04 1154.1821117.51 1154.2621170.33 1155.5921193.48 1158.99
21199.07  1159.921207.28 1159.7521228.86 1158.6121250.98 1150.8821272.44 1151.36
 21291.3  1141.221314.36  1141.121321.72 1145.03 21333.2 1151.5321348.91 1151.86
21376.92  1151.521411.05 1151.4221474.01 1151.0921553.59 1151.1121637.39 1150.79
21722.63  1150.721785.67 1150.7321874.62 1151.9921878.38 1152.0321921.19 1159.69
21948.69  1160.721992.61 1162.1922000.71  1160.522008.81 1158.6122018.63 1159.95
 22032.5  1161.722048.31 1161.6422055.74 1161.93   22094 1163.0822134.12 1164.39
22143.98  1165.122154.38 1163.8722176.46 1161.48 22190.1 1164.8922195.05 1164.95
22228.55  1165.122302.09 1165.7922385.05 1167.1522394.52 1167.2222452.52 1166.41
22520.66  1165.622561.39 1165.1922580.78 1165.3522602.39  1165.622636.28 1164.69
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22655.55  1164.422690.77 1163.5122697.75 1163.3822702.64  1162.322753.06 1152.71
 22801.2    115422825.88 1154.6122880.79 1160.43 22884.4 1160.7322888.09 1161.52
   22924  1165.522955.81  1163.922967.88 1163.3822985.75 1163.4523003.91 1166.93
 23020.6  1168.423039.26 1170.1523047.39  1171.7   23059 1174.3223113.46 1183.75
23129.96  1186.623137.87 1187.1623234.39 1195.15 23268.4 1196.11 23278.9 1196.22
23289.67  1196.623300.62 1197.46   23329    119523354.08 1190.0723359.12 1190.93
23364.81  1192.823377.13 1196.3123381.26 1196.9523402.82 1194.9923412.98  1193.6
23418.94  1192.523442.23 1187.8523455.44 1185.93 23473.3 1182.7723480.12 1183.18
23500.09  1183.523511.29 1183.9223528.38 1179.1323531.54 1177.8723542.35 1178.74
23558.13  1179.723564.97 1179.9723576.86  1179.4 23611.1  1177.423628.94  1181.9
 23666.9  1192.123690.06 1192.8823754.42  1196.123759.24 1196.8323774.42  1193.2
23805.81  1186.423842.08 1186.1223884.13 1185.9323889.09 1185.6423923.01 1182.75
23994.76  1183.224012.39 1183.04 24030.1 1180.4624046.96 1185.0124084.61 1190.55
 24101.8    119124136.25 1191.4224170.43 1192.0824211.66 1193.0424220.01 1193.29
24252.23  1192.824282.41 1193.1324299.04 1193.29

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

   14824    .03519502.33    .03520494.25    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19502.3320494.25              490  501.08     510              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

CROSS SECTION           RIVER: Salt River
REACH: Reach 4            RS: 220.54

INPUT
Description:
Station Elevation Data    num=     318
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

14801.12  1148.114812.54 1148.0714917.34 1147.3814942.26 1146.5114971.01 1147.44
14987.16  1147.615014.67  1147.515087.52 1147.2715174.13 1146.9115179.25 1146.71
15198.73    114515227.13 1146.9415255.43 1148.1715326.06 1148.5315350.94 1148.42
15371.84  1147.715395.39 1147.66 15403.6 1147.5815438.23 1147.87 15442.3 1149.14
15474.44    114815485.49 1148.2415528.24 1149.0615544.24 1148.7615568.11 1147.38
 15645.6  1147.2 15695.2 1147.4415712.03 1150.0915760.49 1149.2715778.54 1148.93
15796.55  1148.915878.15 1149.4315936.34 1149.4616036.67 1148.9516081.24 1148.97
16132.26  1149.4 16138.4  1149.416193.74 1149.9316245.08 1150.1616287.42 1149.78
16328.17  1149.916408.16 1150.1916436.34 1149.1816469.09 1150.5516478.31 1150.91
16494.71  1150.116516.71 1150.0116578.93 1150.0616592.92 1150.0416698.21 1150.06
16766.45  1150.816795.37 1151.5816822.36 1151.3416839.56 1150.8616850.28 1150.99
16914.07  1151.516976.42 1151.4917033.22 1151.6917080.06 1151.6217109.07 1151.67
17180.95  1151.717204.63 1151.8517265.71 1151.9317282.42 1151.89 17301.8 1151.62
17351.35  1151.817381.17 1151.7117423.14 1151.8517451.37 1151.5517471.72 1151.43
17490.39  1151.217550.02 1151.4317577.93 1151.8517591.81  1152.317603.93 1153.05
17616.04  1153.617638.31    115417648.83 1154.0917661.78 1153.8517698.43 1153.35
17750.33  1152.917802.96 1152.5817845.63 1152.3317856.54 1152.7617871.73 1153.13
17899.64  1153.417932.91 1153.4218011.33 1152.7118028.57 1152.71 18060.3  1152.8
 18070.9  1152.218125.61  1152.418139.99 1152.3718143.34 1152.6218154.39 1153.04
 18165.9  1151.818176.18 1150.8618193.98  1152.218210.24 1153.2818363.83 1153.68
18515.17  1151.318533.63 1151.1518547.59 1150.9318583.44 1149.8718589.14 1149.66
18591.13  1149.818623.29 1151.3918643.25 1151.8818663.74 1152.2118689.11  1152.2
 18762.5  1153.218764.59 1154.0118797.54 1153.8518841.07 1153.6818888.92 1153.68
18894.16  1154.518906.46 1156.0118923.78 1154.1618930.74 1153.33 18931.5 1153.54
18944.76  1153.718973.23 1154.4819043.11 1154.46 19057.5 1154.41 19086.5 1154.14
19126.25  1154.119221.41 1155.1819262.48  1155.419316.88 1155.9219322.58 1155.97
19351.74    115619373.63 1146.84 19398.6 1135.7119415.07 1133.4519418.42 1133.67
19443.87  1140.8 19492.1 1154.0819508.34  1157.819536.59 1143.1319546.11 1145.24
19563.04  1133.219565.48 1131.5419567.11 1131.5719586.71 1130.7919664.41 1129.89
19726.79  1129.619754.39 1129.2519798.54 1128.6919848.54 1128.0119888.08 1128.08
19987.58  1127.820102.16 1127.3920114.83 1127.3220125.16 1127.3820240.77 1127.91
20326.68  1128.420349.68 1128.48 20357.7 1128.5720425.53 1139.1520428.07 1139.71
20437.09  1143.820447.18 1145.9620460.57 1149.8520481.21 1155.3120491.27  1156.3
 20505.8  1155.520544.78 1163.9720582.75 1163.9320596.25 1163.6320608.52 1160.71
20642.57  1152.3 20672.4 1152.4620684.76 1152.5220753.51 1154.3220766.23  1154.3
20791.41  1154.120805.86  1153.820841.26 1153.7220868.87 1156.8320900.95 1156.86
 20917.6  1158.720924.05 1159.2720934.41  1159.920951.83 1161.3620968.01 1154.61
20989.78  1146.5 21025.2 1145.4321038.38 1147.04   21076 1157.7221110.76 1156.47
21129.93  1151.621132.61 1150.8521158.94 1153.3721176.73 1153.6221197.09  1154.4
21203.78  1150.121217.27 1140.3621245.34 1139.7921262.49 1139.6821275.44 1145.24
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 21284.3  1150.721302.26 1150.4721311.98 1150.8221327.71 1151.0821377.48 1150.22
21401.21  1149.8   21454 1149.8521556.04 1149.7321633.17 1149.7321650.47 1149.83
21796.34  1150.221872.57 1150.2121917.66 1149.9321954.45 1149.8721974.64 1154.51
 21994.3  1158.722036.34  1159.522058.49 1155.5322082.22 1159.6522098.66 1158.78
22143.89  1160.722168.86 1159.9122182.01 1159.4222189.91 1159.8422193.83 1159.44
22212.89  1157.9 22227.2 1159.9722231.65 1160.35   22233 1161.4522274.63 1161.04
22292.93  1157.122314.39 1152.5522336.43  1152.722394.74 1152.7222536.32 1152.44
22549.68  1154.122578.44 1156.5522587.09 1157.5922601.62 1158.3222634.03 1160.85
22649.16  1163.222652.36 1164.7622698.86 1170.8822732.02  1178.522750.13 1180.51
22764.69  1183.822786.36 1185.0922801.42 1186.7722807.62 1186.9522821.79  1185.8
22837.43  1182.4 22869.3 1183.02 22895.2 1182.5222904.25 1179.5822933.69 1169.33
 22950.9  1170.822965.88  1173.222982.72 1171.5723029.35 1168.28 23037.9 1169.19
23050.74  1171.323094.46 1178.9623104.35 1180.55 23113.1 1181.4323129.31 1184.41
23158.01  1185.823167.19 1186.1223175.38 1186.0823251.08 1186.5223315.44 1186.17
23330.46  1186.923340.75 1188.0823347.56 1187.9923361.34  1188.323374.98 1185.09
23384.93  1182.523392.12 1183.48 23403.1  1183.123417.07 1183.02 23439.8 1181.66
23467.05  1173.623510.61 1166.0723546.75  1173.923560.99 1175.2423605.58  1179.9
23610.35  1180.223648.59 1176.5123658.04 1177.0623679.04 1179.3723737.48 1184.35
23746.68  1185.423757.51 1186.2123782.27 1187.8323806.71 1188.2923814.08 1187.68
23822.57  1185.6 23836.1 1184.4523839.74 1183.76 23876.7 1183.32 23932.7 1183.22
23939.22  1185.2 23942.1 1185.6123948.18 1186.9323956.29  1188.123973.47 1189.62
23995.43  1189.424030.29 1190.38 24061.1  1191.724079.65 1192.3124092.29 1193.11
24108.39  1192.1 24116.9 1191.9224122.12 1191.1124132.53 1189.8524183.32 1184.77
24208.61  1178.324227.19 1182.9124228.22  1183.1

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

14801.12    .03519508.34    .03520491.27    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19508.3420491.27              470  492.46     510             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 220.45

INPUT
Description:
Station Elevation Data    num=     300
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

14746.98  1146.214752.11 1146.1614851.06 1146.0614881.09 1144.1414910.13  1145.7
 14925.3  1146.214999.81 1146.2415023.75 1146.2715115.38 1145.8115137.82 1145.45
15144.01  1145.315160.69 1145.3815176.34 1145.6815184.15 1146.3315241.95 1146.63
15281.17  1146.915309.12  1146.715343.83    114715371.59 1147.2715386.45 1147.23
15467.17  1146.815478.24 1147.0415519.72 1147.2615566.17 1147.44 15703.9 1148.08
15879.53  1149.315903.48 1149.4416002.54 1148.8216043.15  1148.716096.54 1148.58
16155.73  1148.316205.69  1148.416292.19 1148.4916344.01 1148.0616355.56 1149.08
 16366.8  1149.516377.57 1150.2516384.06 1149.3116467.03 1150.6416629.45 1154.53
16647.95  1154.4 16654.8 1154.4816671.82 1152.76 16685.8 1149.8216704.38  1150.2
16731.97  1150.516753.89 1149.6616759.47 1149.5416774.45 1150.0116781.12 1150.37
 16822.5  1150.216914.48 1150.3916964.07 1150.2517015.87 1150.1817115.48 1150.27
17187.88  1150.717261.47 1150.67 17330.5 1150.5317389.14 1150.5417454.55 1150.76
 17484.6  1150.717564.97 1150.2817593.47 1150.3217606.17 1150.2717616.31    1150
17625.19  1150.517645.56 1151.2317649.08 1151.2317705.84 1152.0317761.81 1152.59
17778.02  1151.717799.36 1151.1417813.13 1151.0917884.85 1151.54 17965.3 1150.68
18001.45  1150.418020.96 1150.1318030.58 1149.7618070.55 1149.5518080.22 1149.88
18090.73  1150.118108.23 1149.2918115.98 1148.8418187.96 1148.5718459.38 1149.73
18486.51  1149.818492.09 1149.6618519.46 1148.9918529.99 1150.0518545.81 1150.22
18609.17  1148.218628.58 1148.6118662.47  1151.718721.65 1156.1918808.58 1156.99
18824.67  1156.718860.42 1155.8618934.66 1154.0418956.18 1153.3718972.54 1154.24
18977.64  1154.918986.44 1154.3919001.14 1153.6219022.53  1154.219085.01  1153.2
19149.05  1152.419204.31 1151.8819229.04 1153.6719242.84  1154.819261.71 1156.74
19263.03  1156.919275.24 1157.38 19303.4    115819310.63 1156.9519326.37 1154.84
19333.35  1154.419355.52 1153.5919361.74 1154.7619392.06 1140.4819416.73 1129.63
19490.61  1151.619495.17 1152.9419510.69 1154.9219520.68 1151.3319544.52 1143.35
19553.74  1145.619572.14 1129.7819665.24  1130.6 19786.7 1126.5519856.98 1127.38
19925.41  1128.220052.36 1125.95   20178 1126.88 20308.6 1125.4320337.05 1126.91
20359.69  1128.1 20418.9 1136.7720433.54 1138.95 20442.6 1142.9720452.11 1145.04
20459.98    114720486.73 1153.9820501.85  1152.220505.69 1151.8420508.94 1152.23
20520.58  1154.920536.79 1154.8820579.49 1153.9820596.08 1152.7320626.31 1153.04
20638.92    115320676.95 1152.0420712.89 1150.9420732.98 1151.7420744.81  1151.6
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20771.95  1151.720800.57 1150.8220804.59 1150.6620830.42 1153.22   20875 1152.73
 20887.8  1152.8 20896.5 1150.8620922.93 1145.5220938.03 1144.7720957.31 1143.67
20981.34  1145.2 21015.1  1155.521034.51 1153.2821041.76 1152.6621066.29 1144.28
21135.83    114421154.19 1144.24 21225.1 1144.7721232.85 1146.0921249.91 1149.32
21275.87  1149.621280.71 1149.5421284.16 1148.1521300.98 1140.5821329.25 1140.09
 21345.2  1140.121351.19 1143.0121365.21 1149.0121385.23 1148.6221389.35 1148.63
21391.53  1148.321406.85 1147.2221414.28 1147.4621430.38 1147.5121459.89 1147.66
21501.59  1148.421669.43 1148.6921698.08 1148.7121706.27 1148.7621828.84 1149.75
21966.13  1148.821975.32 1148.8421988.33 1149.16 22026.1 1156.0122047.67 1158.88
22052.31  1158.922066.78 1157.4622089.29 1162.0122094.55 1163.0222102.22 1160.22
22108.11  1160.522126.83 1162.3522134.31 1162.3122140.23 1162.1422171.87 1161.82
22185.25  1161.822223.04 1161.0622229.65 1160.8922241.59 1158.9322247.22 1158.16
22263.02  1155.722277.72 1160.44   22295 1158.7122312.49 1164.6222323.46 1167.71
22326.51  1168.422334.35 1169.15 22354.2 1171.2822358.34 1170.9122366.27 1170.67
22389.93  1162.722426.46 1165.3522447.68 1166.6122460.42  1164.922478.36 1161.88
22493.23  1158.822548.65 1168.96 22557.7 1170.7722571.15 1171.6722589.76  1171.8
 22608.2  1171.822632.49 1165.5422655.97 1165.2122666.17 1165.2122706.69 1158.21
22733.65  1159.722770.59 1156.4322796.01 1159.7722799.92 1160.1522833.84 1160.25
 22864.9  1161.2 22880.6 1162.6722890.85  1164.422917.15 1165.0522930.23 1166.18
 22940.6  1166.122971.53 1172.2822986.71 1172.4923002.29 1172.9423015.56 1171.39
23034.78  1168.723058.87 1169.2223069.85 1169.3623104.84 1169.6223151.57 1170.04
23174.83  1169.823201.95 1169.7423205.45 1168.8823214.31 1167.4123241.36 1161.69
 23247.9  1164.623269.96 1170.2123283.36 1169.65   23293 1169.8223295.79 1169.72
23312.61  1169.923326.72 1172.2923338.48 1174.1123365.04 1174.7823374.67 1175.28
23401.49  1178.323428.88 1181.8923450.92 1183.1123467.59 1185.44 23529.2 1187.78
23533.18  1187.7 23583.4 1181.3623609.86 1183.1123613.57 1183.2923632.88 1182.66
23672.89  1182.4 23712.1 1182.3223727.43 1181.9423751.66 1181.0823776.53 1180.43
23781.57  1180.223801.96 1180.4923855.26 1180.9723873.06 1182.9523882.04 1182.85
23890.47  1182.2 23941.5 1180.4824011.76 1178.4824062.88  1178.924078.81 1178.99

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

14746.98    .03519510.69    .03520486.73    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19510.6920486.73              500  506.77     520              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F

information downstream of Cross-section 220.45 is not provided


SUMMARY OF MANNING'S N VALUES

River:Salt River

     Reach          River Sta.      n1       n2       n3

Reach 4              223.08           .05     .035      .05
Reach 4              223.02           .05     .035      .05
Reach 4              222.93           .05     .035      .05
Reach 4              222.83           .05     .035      .05
Reach 4              222.74           .05     .035      .05
Reach 4              222.70          .015     .015     .015
Reach 4              222.695         .015     .015     .015
Reach 4              222.69          .015     .015     .015
Reach 4              222.68      Bridge
Reach 4              222.67          .015     .015     .015
Reach 4              222.66           .05     .035      .05
Reach 4              222.65           .05     .035      .05
Reach 4              222.55           .04      .03      .04
Reach 4              222.45           .04      .03      .04
Reach 4              222.36           .04      .03      .04
Reach 4              222.27           .04      .03      .04
Reach 4              222.17           .04      .03      .04
Reach 4              222.09           .05      .03      .04
Reach 4              222.085     Bridge
Reach 4              222.08           .05      .03      .04
Reach 4              221.99           .05      .03      .04
Reach 4              221.89           .05      .03      .04
Reach 4              221.80           .05      .03      .04
Reach 4              221.70           .05      .03      .04
Reach 4              221.61           .05      .03      .04
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Reach 4	221.50	.04	.03	.04
Reach 4	221.40	.05	.035	.05
Reach 4	221.31	.05	.035	.05
Reach 4	221.26	.05	.035	.05
Reach 4	221.25	Bridge		
Reach 4	221.24	.05	.035	.06
Reach 4	221.2	.05	.035	.06
Reach 4	221.195	Bridge		
Reach 4	221.19	.05	.035	.06
Reach 4	221.068	.05	.035	.06
Reach 4	221.061	.05	.035	.06
Reach 4	221.06	.05	.035	.06
Reach 4	221.055	Bridge		
Reach 4	221.05	.05	.035	.06
Reach 4	221.02	.05	.035	.06
Reach 4	220.92	.05	.035	.06
Reach 4	220.82	.035	.035	.06
Reach 4	220.756	.015	.015	.015
Reach 4	220.755	.015	.015	.015
Reach 4	220.752	Bridge		
Reach 4	220.75	.015	.015	.015
Reach 4	220.74	.032	.032	.032
Reach 4	220.735	.035	.035	.035
Reach 4	220.73	.035	.035	.035
Reach 4	220.63	.035	.035	.035
Reach 4	220.54	.035	.035	.035
Reach 4	220.45	.035	.035	.035

Profile Output Table - Standard Table 1

Reach	River Sta	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 4	222.08	172000.00	1136.00	1159.77	1148.68	1160.90	0.000593	8.52	20182.46	1247.37	0.34
Reach 4	222.08	172000.00	1136.00	1159.77	1148.68	1160.90	0.000593	8.52	20183.11	1056.16	0.34
Reach 4	221.99	172000.00	1138.14	1158.80	1151.13	1160.51	0.001000	10.53	16752.71	1194.44	0.44
Reach 4	221.99	172000.00	1138.14	1158.81	1151.13	1160.51	0.000999	10.52	16745.39	1011.43	0.44
Reach 4	221.89	172000.00	1136.20	1157.89	1151.48	1159.90	0.001286	11.44	15416.72	1148.74	0.49
Reach 4	221.89	172000.00	1136.20	1157.89	1151.48	1159.90	0.001285	11.43	15400.15	985.81	0.49
Reach 4	221.80	172000.00	1136.35	1157.27	1150.47	1159.28	0.001224	11.41	15311.54	1215.85	0.49
Reach 4	221.80	172000.00	1136.35	1157.27	1150.47	1159.28	0.001223	11.40	15311.03	935.47	0.49
Reach 4	221.70	172000.00	1134.30	1156.63	1149.53	1158.66	0.001189	11.45	15304.09	1463.86	0.48
Reach 4	221.70	172000.00	1134.30	1156.63	1149.53	1158.66	0.001188	11.45	15304.90	937.85	0.48
Reach 4	221.61	172000.00	1133.98	1155.66	1149.64	1157.97	0.001460	12.25	14356.96	1401.22	0.53
Reach 4	221.61	172000.00	1133.98	1155.66	1149.64	1157.97	0.001460	12.25	14353.95	926.16	0.53
Reach 4	221.50	172000.00	1134.08	1154.69	1149.12	1157.06	0.001723	12.36	13910.69	1333.62	0.56
Reach 4	221.50	172000.00	1134.08	1154.69	1149.12	1157.06	0.001722	12.36	13910.57	928.87	0.56
Reach 4	221.40	172000.00	1133.21	1153.78	1147.88	1156.04	0.002222	12.07	14255.06	1063.62	0.55
Reach 4	221.40	172000.00	1133.21	1153.78	1147.89	1156.04	0.002218	12.07	14256.05	949.21	0.55
Reach 4	221.31	172000.00	1131.43	1152.61	1146.72	1154.91	0.002236	12.17	14128.33	1188.39	0.55
Reach 4	221.31	172000.00	1131.43	1152.61	1146.72	1154.92	0.002234	12.17	14130.01	933.69	0.55
Reach 4	221.26	169000.00	1129.24	1152.81	1143.39	1154.28	0.001007	9.74	17357.60	1250.62	0.39
Reach 4	221.26	169000.00	1129.24	1152.81	1143.39	1154.28	0.001009	9.74	17358.57	881.94	0.39
Reach 4	221.25	Bridge									
Reach 4	221.24	169000.00	1129.24	1152.54	1143.40	1154.01	0.001036	9.75	17338.57	1204.83	0.39
Reach 4	221.24	169000.00	1129.24	1152.54	1143.40	1154.01	0.001038	9.75	17339.44	898.86	0.39
Reach 4	221.2	169000.00	1128.00	1152.40	1142.32	1153.81	0.000938	9.55	17699.62	929.24	0.37
Reach 4	221.2	169000.00	1128.00	1152.40	1142.32	1153.81	0.000939	9.55	17700.26	878.26	0.37
Reach 4	221.195	Bridge									
Reach 4	221.19	169000.00	1128.00	1152.12	1142.32	1153.58	0.000978	9.69	17438.92	972.81	0.38
Reach 4	221.19	169000.00	1128.00	1152.12	1142.32	1153.58	0.000979	9.69	17439.12	873.37	0.38
Reach 4	221.068	169000.00	1129.00	1151.52	1141.63	1153.00	0.000978	9.76	17313.16	1270.17	0.38
Reach 4	221.068	169000.00	1129.00	1151.52	1141.63	1153.00	0.000978	9.76	17312.85	857.40	0.38
Reach 4	221.061	169000.00	1129.00	1151.26	1141.89	1152.92	0.001115	10.36	16308.68	1347.74	0.41
Reach 4	221.061	169000.00	1129.00	1151.26	1141.89	1152.92	0.001115	10.36	16308.38	815.62	0.41

Reach 4	221.06	169000.00	1126.00	1151.38	1140.97	1152.87	0.000925	9.80	17244.70	1328.65	0.37
Reach 4	221.06	169000.00	1126.00	1151.38	1140.97	1152.87	0.000925	9.80	17244.40	805.24	0.37
Reach 4	221.055	Bridge									
Reach 4	221.05	169000.00	1126.00	1151.11	1140.98	1152.67	0.000975	10.03	16855.77	1226.50	0.38
Reach 4	221.05	169000.00	1126.00	1151.11	1140.98	1152.67	0.000975	10.03	16855.48	791.81	0.38
Reach 4	221.02	169000.00	1130.06	1150.81	1142.42	1152.47	0.001226	10.35	16325.69	1177.79	0.42
Reach 4	221.02	169000.00	1130.06	1150.81	1142.42	1152.47	0.001226	10.35	16325.37	869.89	0.42
Reach 4	220.92	169000.00	1129.16	1149.91	1142.46	1151.78	0.001456	10.97	15403.00	1137.52	0.46
Reach 4	220.92	169000.00	1129.16	1149.91	1142.46	1151.78	0.001456	10.97	15402.79	863.27	0.46
Reach 4	220.82	169000.00	1129.56	1149.18	1141.71	1151.02	0.001435	10.88	15531.54	1149.43	0.45
Reach 4	220.82	169000.00	1129.56	1149.18	1141.71	1151.02	0.001435	10.88	15531.33	868.33	0.45
Reach 4	220.756	169000.00	1129.00	1149.43		1150.81	0.000172	9.42	17939.75	906.00	0.37
Reach 4	220.756	169000.00	1129.00	1149.43		1150.81	0.000172	9.42	17939.53	906.00	0.37
Reach 4	220.755	169000.00	1132.00	1148.66	1142.67	1150.73	0.000339	11.56	14620.50	906.00	0.51
Reach 4	220.755	169000.00	1132.00	1148.66	1142.67	1150.73	0.000339	11.56	14620.27	906.00	0.51
Reach 4	220.752	Bridge									
Reach 4	220.75	169000.00	1131.67	1148.00		1150.16	0.000363	11.81	14310.61	906.00	0.52
Reach 4	220.75	169000.00	1131.67	1148.00		1150.16	0.000363	11.81	14310.39	906.00	0.52
Reach 4	220.74	169000.00	1129.00	1148.43		1149.95	0.000930	9.92	17032.54	906.00	0.40
Reach 4	220.74	169000.00	1129.00	1148.43		1149.95	0.000930	9.92	17032.31	906.00	0.40
Reach 4	220.735	169000.00	1129.00	1148.39		1149.92	0.001121	9.94	16995.38	906.00	0.40
Reach 4	220.735	169000.00	1129.00	1148.38		1149.92	0.001121	9.94	16995.16	906.00	0.40
Reach 4	220.73	169000.00	1127.69	1147.59	1141.05	1149.62	0.001715	11.43	14783.62	1018.40	0.49
Reach 4	220.73	169000.00	1127.69	1147.59	1141.05	1149.62	0.001715	11.43	14783.41	884.56	0.49
Reach 4	220.63	169000.00	1127.10	1146.74	1140.24	1148.75	0.001734	11.37	14858.26	981.98	0.49
Reach 4	220.63	169000.00	1127.10	1146.74	1140.24	1148.75	0.001734	11.37	14858.04	903.30	0.49
Reach 4	220.54	169000.00	1127.32	1145.84	1139.51	1147.87	0.001789	11.42	14797.04	1107.09	0.50
Reach 4	220.54	169000.00	1127.32	1145.84	1139.51	1147.87	0.001789	11.42	14796.82	915.25	0.50
Reach 4	220.45	169000.00	1125.43	1144.97	1138.53	1146.99	0.001758	11.39	14838.27	1293.75	0.50
Reach 4	220.45	169000.00	1125.43	1144.97	1138.53	1146.99	0.001758	11.39	14838.04	908.84	0.50

Profile Output Table - Standard Table 2

Reach	River Sta	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)

Reach 4	222.08	1160.90	1159.77	1.13	0.33	0.06		172000.00	1247.37
Reach 4	222.08	1160.90	1159.77	1.13	0.33	0.06		172000.00	1056.16
Reach 4	221.99	1160.51	1158.80	1.71	0.58	0.03	1612.98	170387.00	1194.44
Reach 4	221.99	1160.51	1158.81	1.70	0.58	0.03	1656.86	170343.20	1011.43
Reach 4	221.89	1159.90	1157.89	2.01	0.62	0.00	1652.84	170347.20	1148.74
Reach 4	221.89	1159.90	1157.89	2.01	0.62	0.00	1665.31	170334.70	985.81
Reach 4	221.80	1159.28	1157.27	2.01	0.62	0.00	909.19	171090.80	1215.85
Reach 4	221.80	1159.28	1157.27	2.01	0.62	0.00	934.01	171066.00	935.47
Reach 4	221.70	1158.66	1156.63	2.02	0.65	0.03	937.37	171062.60	1463.86
Reach 4	221.70	1158.66	1156.63	2.02	0.65	0.03	937.60	171062.40	937.85
Reach 4	221.61	1157.97	1155.66	2.31	0.90	0.01	1215.50	170784.50	1401.22
Reach 4	221.61	1157.97	1155.66	2.31	0.90	0.01	1228.14	170771.90	926.16
Reach 4	221.50	1157.06	1154.69	2.37	0.99	0.03		172000.00	1333.62
Reach 4	221.50	1157.06	1154.69	2.37	0.99	0.03		172000.00	928.87
Reach 4	221.40	1156.04	1153.78	2.26	1.13	0.00		172000.00	1063.62
Reach 4	221.40	1156.04	1153.78	2.26	1.12	0.00		172000.00	949.21
Reach 4	221.31	1154.91	1152.61	2.30	0.38	0.25		172000.00	1188.39
Reach 4	221.31	1154.92	1152.61	2.30	0.38	0.25		172000.00	933.69
Reach 4	221.26	1154.28	1152.81	1.47	0.03	0.03		169000.00	1250.62
Reach 4	221.26	1154.28	1152.81	1.47	0.03	0.03		169000.00	881.94
Reach 4	221.25	Bridge							
Reach 4	221.24	1154.01	1152.54	1.48	0.18	0.02		169000.00	1204.83
Reach 4	221.24	1154.01	1152.54	1.48	0.18	0.02		169000.00	898.86
Reach 4	221.2	1153.81	1152.40	1.42				169000.00	929.24
Reach 4	221.2	1153.81	1152.40	1.42				169000.00	878.26
Reach 4	221.195	Bridge							
Reach 4	221.19	1153.58	1152.12	1.46	0.58	0.00		169000.00	972.81
Reach 4	221.19	1153.58	1152.12	1.46	0.58	0.00		169000.00	873.37
Reach 4	221.068	1153.00	1151.52	1.48	0.06	0.02		169000.00	1270.17
Reach 4	221.068	1153.00	1151.52	1.48	0.06	0.02		169000.00	857.40
Reach 4	221.061	1152.92	1151.26	1.67	0.00	0.05		169000.00	1347.74
Reach 4	221.061	1152.92	1151.26	1.67	0.00	0.05		169000.00	815.62
Reach 4	221.06	1152.87	1151.38	1.49	0.04	0.03		169000.00	1328.65
Reach 4	221.06	1152.87	1151.38	1.49	0.04	0.03		169000.00	805.24
Reach 4	221.055	Bridge							

Reach 4	221.05	1152.67	1151.11	1.56	0.18	0.01	169000.00	1226.50
Reach 4	221.05	1152.67	1151.11	1.56	0.18	0.01	169000.00	791.81
Reach 4	221.02	1152.47	1150.81	1.66	0.67	0.02	169000.00	1177.79
Reach 4	221.02	1152.47	1150.81	1.66	0.67	0.02	169000.00	869.89
Reach 4	220.92	1151.78	1149.91	1.87	0.75	0.01	169000.00	1137.52
Reach 4	220.92	1151.78	1149.91	1.87	0.75	0.01	169000.00	863.27
Reach 4	220.82	1151.02	1149.18	1.84	0.07	0.14	169000.00	1149.43
Reach 4	220.82	1151.02	1149.18	1.84	0.07	0.14	169000.00	868.33
Reach 4	220.756	1150.81	1149.43	1.38	0.00	0.07	169000.00	906.00
Reach 4	220.756	1150.81	1149.43	1.38	0.00	0.07	169000.00	906.00
Reach 4	220.755	1150.73	1148.66	2.07			169000.00	906.00
Reach 4	220.755	1150.73	1148.66	2.07			169000.00	906.00
Reach 4	220.752	Bridge						
Reach 4	220.75	1150.16	1148.00	2.17	0.02	0.19	169000.00	906.00
Reach 4	220.75	1150.16	1148.00	2.17	0.02	0.19	169000.00	906.00
Reach 4	220.74	1149.95	1148.43	1.53	0.03	0.00	169000.00	906.00
Reach 4	220.74	1149.95	1148.43	1.53	0.03	0.00	169000.00	906.00
Reach 4	220.735	1149.92	1148.39	1.54	0.25	0.05	169000.00	906.00
Reach 4	220.735	1149.92	1148.38	1.54	0.25	0.05	169000.00	906.00
Reach 4	220.73	1149.62	1147.59	2.03	0.86	0.01	169000.00	1018.40
Reach 4	220.73	1149.62	1147.59	2.03	0.86	0.01	169000.00	884.56
Reach 4	220.63	1148.75	1146.74	2.01	0.88	0.00	169000.00	981.98
Reach 4	220.63	1148.75	1146.74	2.01	0.88	0.00	169000.00	903.30
Reach 4	220.54	1147.87	1145.84	2.03	0.87	0.00	169000.00	1107.09
Reach 4	220.54	1147.87	1145.84	2.03	0.87	0.00	169000.00	915.25
Reach 4	220.45	1146.99	1144.97	2.01	0.84	0.05	169000.00	1293.75
Reach 4	220.45	1146.99	1144.97	2.01	0.84	0.05	169000.00	908.84

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : EX100FW

River: Salt River Reach: Reach 4 RS: 222.08 Profile: PF#1
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
River: Salt River Reach: Reach 4 RS: 222.08 Profile: PF#2

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     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 221.99     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 221.89     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 221.80     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 221.70     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 221.61     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 221.50     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 221.50     Profile: PF#2
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 221.40     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 221.40     Profile: PF#2
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 221.31     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 221.31     Profile: PF#2
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 221.26     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 221.25     Profile: PF#1
     Note:   Momentum answer is not valid if the water surface is above the low chord or if there is weir flow.  The momentum
             answer has been disregarded.
River: Salt River  Reach: Reach 4     RS: 221.25     Profile: PF#2
     Note:   Momentum answer is not valid if the water surface is above the low chord or if there is weir flow.  The momentum
             answer has been disregarded.
River: Salt River  Reach: Reach 4     RS: 221.24     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 221.19     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 221.068     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 221.061     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 221.06     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 221.05     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
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River: Salt River  Reach: Reach 4     RS: 221.02     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 220.92     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 220.82     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 220.82     Profile: PF#2
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 220.756     Profile: PF#1
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 220.756     Profile: PF#2
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 220.755     Profile: PF#1
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 220.755     Profile: PF#2
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 220.75     Profile: PF#1
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 220.75     Profile: PF#2
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 220.73     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 220.63     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 220.63     Profile: PF#2
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 220.54     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 220.45     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 220.45     Profile: PF#2
     Warning:Divided flow computed for this cross-section.
```
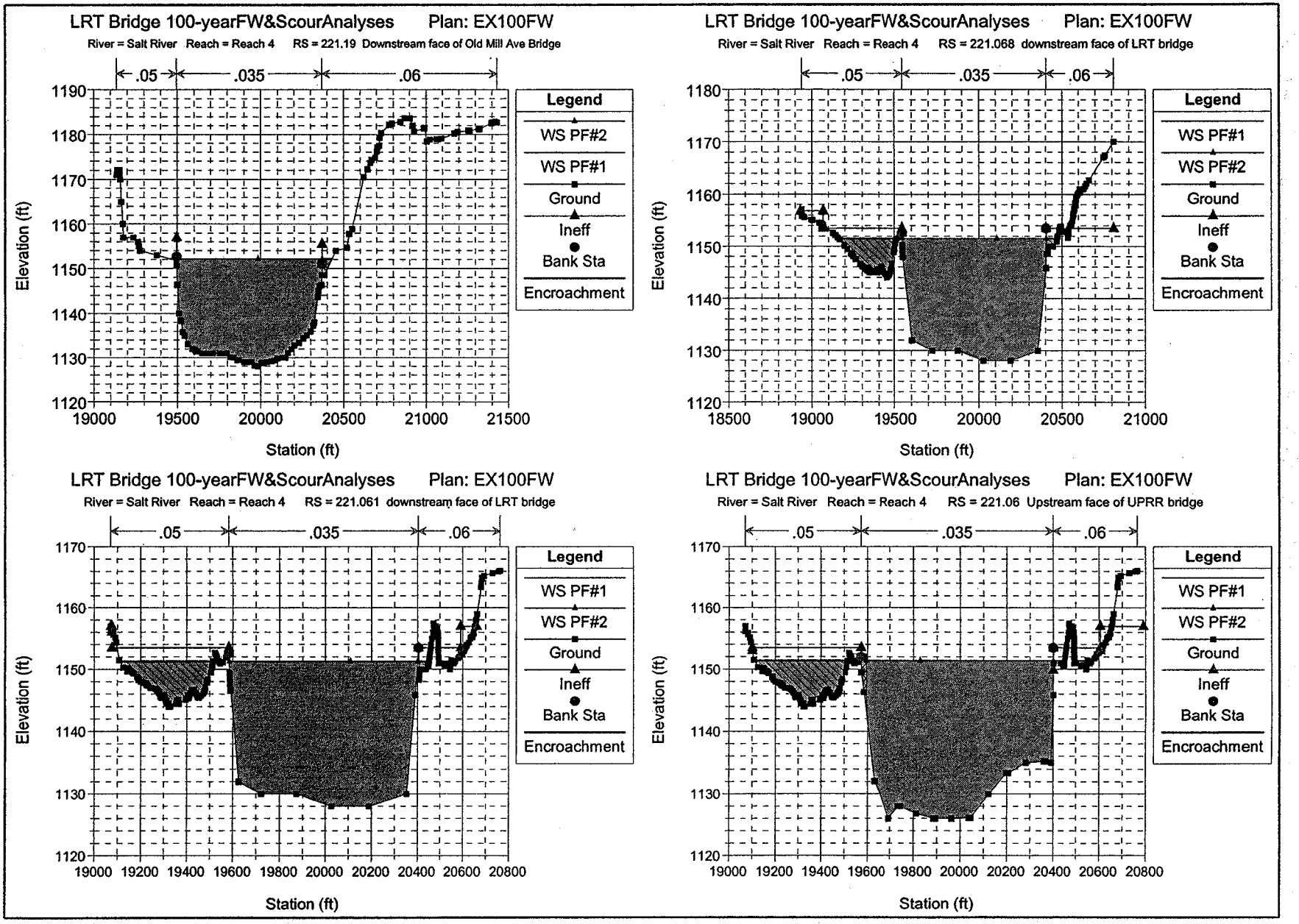
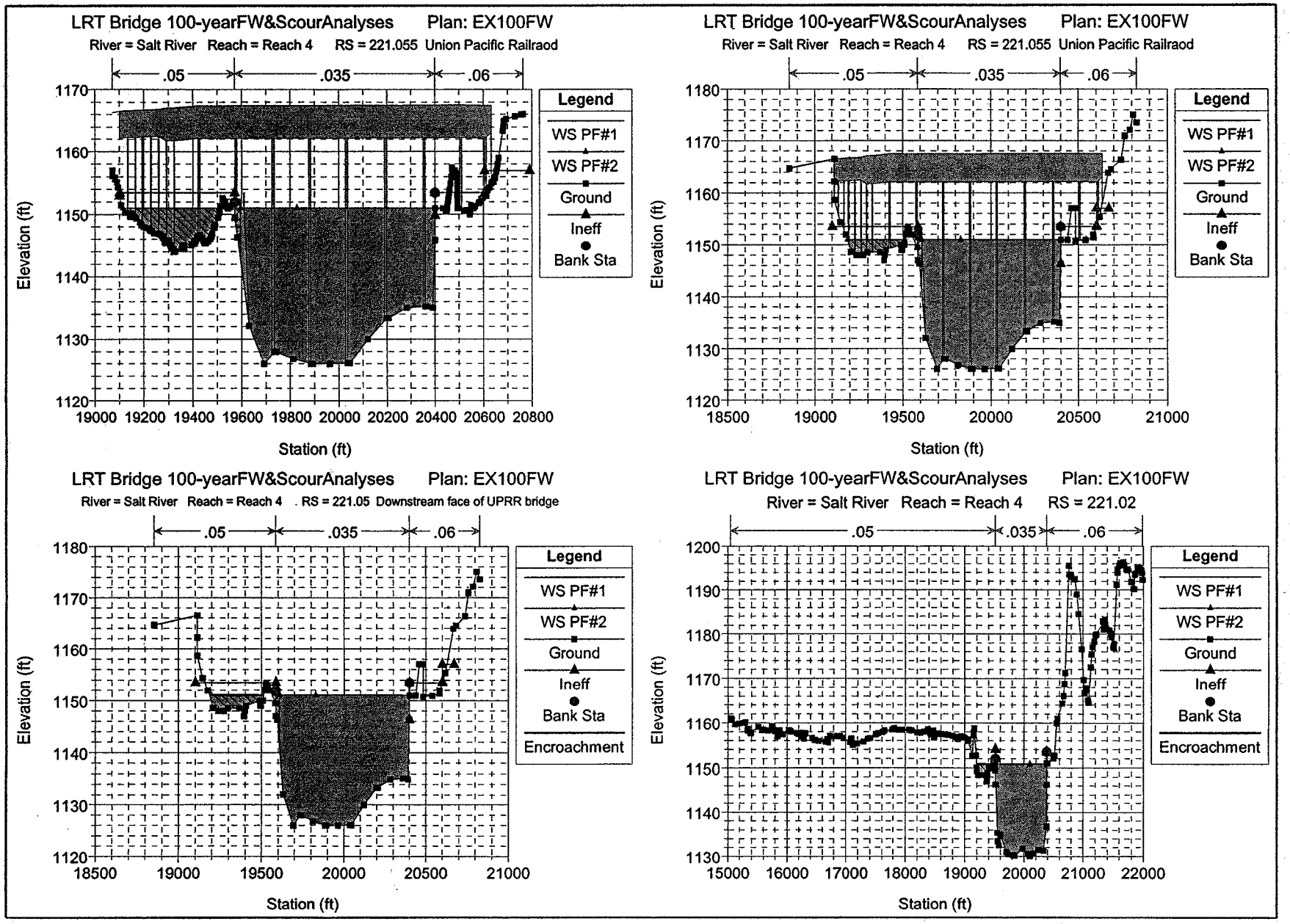


LRT Bridge 100-yearFW&ScourAnalyses Plan: EX100FW
River = Salt River Reach = Reach 4 RS = 221.19 Downstream face of Old Mill Ave Bridge
.05
.035
.06
Elevation (ft)
Station (ft)
Legend
WS PF#2
WS PF#1
Ground
Ineff
Bank Sta
Encroachment
LRT Bridge 100-yearFW&ScourAnalyses Plan: EX100FW
River = Salt River Reach = Reach 4 RS = 221.068 downstream face of LRT bridge
.05
.035
.06
Elevation (ft)
Station (ft)
Legend
WS PF#1
WS PF#2
Ground
Ineff
Bank Sta
Encroachment
LRT Bridge 100-yearFW&ScourAnalyses Plan: EX100FW
River = Salt River Reach = Reach 4 RS = 221.061 downstream face of LRT bridge
.05
.035
.06
Elevation (ft)
Station (ft)
Legend
WS PF#1
WS PF#2
Ground
Ineff
Bank Sta
Encroachment
LRT Bridge 100-yearFW&ScourAnalyses Plan: EX100FW
River = Salt River Reach = Reach 4 RS = 221.06 Upstream face of UPRR bridge
.05
.035
.06
Elevation (ft)
Station (ft)
Legend
WS PF#1
WS PF#2
Ground
Ineff
Bank Sta
Encroachment


LRT Bridge 100-yearFW&ScourAnalyses Plan: EX100FW
River = Salt River Reach = Reach 4 RS = 221.055 Union Pacific Railraod
.05
.035
.06
Elevation (ft)
Station (ft)
Legend
WS PF#1
WS PF#2
Ground
Ineff
Bank Sta
LRT Bridge 100-yearFW&ScourAnalyses Plan: EX100FW
River = Salt River Reach = Reach 4 RS = 221.055 Union Pacific Railraod
.05
.035
.06
Elevation (ft)
Station (ft)
Legend
WS PF#1
WS PF#2
Ground
Ineff
Bank Sta
LRT Bridge 100-yearFW&ScourAnalyses Plan: EX100FW
River = Salt River Reach = Reach 4 RS = 221.05 Downstream face of UPRR bridge
.05
.035
.06
Elevation (ft)
Station (ft)
Legend
WS PF#1
WS PF#2
Ground
Ineff
Bank Sta
Encroachment
LRT Bridge 100-yearFW&ScourAnalyses Plan: EX100FW
River = Salt River Reach = Reach 4 RS = 221.02
.05
.035
.06
Elevation (ft)
Station (ft)
Legend
WS PF#1
WS PF#2
Ground
Ineff
Bank Sta
Encroachment

APPENDIX C HYDRAULIC CALCULATIONS

C.1 HEC-RAS Model Reports (Revised Existing)

C.2 HEC-RAS Model Reports (Proposed)

HEC-RAS Version 3.0.1 Mar 2001
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

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

PROJECT DATA
Project Title: LRT Bridge 100-yearFW&ScourAnalyses
Project File : Lrt100FW.prj
Run Date and Time: 01/12/2004 5:00:48 PM

Project in English units

Project Description:
Tempe Town Lake Light Rail Bridge

This model is prepared for Tempe Town Lake
Light Rail Bridge Project by Michael Baker Jr., Inc. in December, 2003
The
Purpose of this modeling is to analyze the impact of new bridge to FEMA
100-year floodplain and floodway boundary. 50 and 500-year event scour
analysis is also conducted.

February 2001 FEMA LOMR model(North.prj) was
used as a base model. Addition cross sections were added at the new bridge
location.

100-Year Profile with Landscaping Plans Reflected and
Skews in cross sections.

PLAN DATA

Plan Title: **Props100FW**
Plan File : t:\LRT Town Lake\Engfiles\Drainage\HecRas\Lrt100FW.p08

Geometry Title: Proposed Condition LRT in
Geometry File : t:\LRT Town Lake\Engfiles\Drainage\HecRas\Lrt100FW.g03

Flow Title : 100-yearFW
Flow File : t:\LRT Town Lake\Engfiles\Drainage\HecRas\Lrt100FW.f01

Plan Summary Information:
Number of: Cross Sections = 118 Mulitple Openings = 0
Culverts = 0 Inline Weirs = 0
Bridges = 13

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

Computation Options
Critical depth computed only where necessary

Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

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

River = Salt River Reach = Reach 4

RS	Profile	Method	Value1	Value2
221.50	PF#2		119527.5	120456.38
221.40	PF#2		119511.6	620460.87
221.31	PF#2		119574.2	620507.95
221.26	PF#2		119535.06	20417
221.24	PF#2		119524.2	820423.14
221.2	PF#2		119496.8	820375.14
221.19	PF#2		119495.0	720368.44
221.068	PF#2		1 19545	20403
221.061	PF#2		1 19582.9	20404
221.06	PF#2		119571.2	920400.39
221.05	PF#2		119584.7	820398.81
221.02	PF#2		119511.5	820381.47
220.92	PF#2		119547.3	220410.59
220.82	PF#2		119505.8	420374.17
220.756	PF#2		1 19547	20453
220.755	PF#2		1 19547	20453
220.752	PF#2		1 19547	20453
220.75	PF#2		1 19547	20453
220.74	PF#2		1 19547	20453
220.735	PF#2		1 19547	20453
220.73	PF#2		119490.1	120495.14
220.63	PF#2		119531.1	820437.64

FLOW DATA

Flow Title: 100-yearFW
Flow File : t:\LRT Town Lake\Engfiles\Drainage\HecRas\Lrt100FW.f01

Flow Data (cfs)

River	Reach	RS	PF#1	PF#2
Salt River	Reach 4	223.08	172000	172000
Salt River	Reach 4	221.26	169000	169000

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Salt River	Reach 4	PF#1		Known WS = 1075.49
Salt River	Reach 4	PF#2		Known WS = 1075.5

File shows the data of cross section from 221.50 to 220.63 only.

GEOMETRY DATA

Geometry Title: Proposed Condition LRT in
Geometry File : t:\LRT Town Lake\Engfiles\Drainage\HecRas\Lrt100FW.g03

CROSS SECTION RIVER: Salt River
REACH: Reach 4 RS: 221.50

INPUT
Description:
Station Elevation Data num= 111

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

```
18724.69  1224.318736.78 1219.5918740.72 1217.9418746.27 1217.0418762.15 1207.06
18762.87  1206.718779.35 1201.5318780.37 1201.4418804.96 1196.5818807.77 1195.77
 18813.4  1193.418835.21  1186.218863.88 1163.3718883.84 1146.59 18910.1 1145.79
18943.52  1162.218976.58 1161.2319025.23 1159.8119050.06 1159.0519062.67 1155.45
19088.81  1148.419103.99 1147.8719122.88 1146.9819152.74 1146.2419167.01 1146.34
19212.01    114619222.05  1145.919247.66 1143.7919287.05 1144.0419295.73 1144.26
19308.12    114519350.49 1146.95 19384.7 1147.3819388.07 1147.3819414.13 1154.24
19421.77  1156.319446.99 1162.6919452.98 1164.4319460.46 1168.1319464.91  1166.3
19478.02  1160.419495.41 1160.5219508.22 1160.4419514.49 1158.7319535.89 1151.98
19549.16  1150.819564.95 1151.31 19579.7 1152.1919584.23    115119584.23    1152
19586.23    115219586.23    115019589.38 1146.3319590.88 1146.3319590.95 1145.02
19596.41 1141.2219623.73  1140.819639.47 1140.6119660.34 1139.6819721.27 1136.87
 19768.9 1134.0819897.56  1136.119971.91 1135.1120028.81 1134.2520038.11  1134.6
20049.15 1134.8620117.01  1139.220150.41 1141.0120157.19 1142.5520260.17 1138.98
20290.02 1138.3520365.62  1141.320376.07  1141.720395.01 1146.3320396.51 1146.33
20399.66  1149.620399.66  1151.620401.66  1151.620401.66  1150.620405.82 1151.54
20446.21 1151.9420448.54 1152.3520489.79  1164.320506.63 1164.7320509.77 1164.73
 20520.6 1162.9220538.53 1168.6620542.37  1169.820552.68 1169.0720605.25 1166.09
20627.64 1167.6620657.69 1167.3620681.46  1166.720690.88 1166.4620703.82 1164.01
20710.31 1162.1920726.22 1162.62 20744.7  1162.720753.41 1160.0420774.01 1167.28
20778.57 1169.3120780.54 1169.8220811.33  1168.3 20827.3 1167.9420859.08 1166.63
20875.49  1164.420883.33 1165.7720891.67  1168.620906.56 1171.6420926.89 1172.53
20993.81 1186.59

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

18724.69     .0419460.46     .0320506.63     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19460.4620506.63              510  506.96     520             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 221.40

INPUT
Description:
Station Elevation Data    num=     266
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

 18652.1    120518671.59 1200.55 18699.2 1192.2318707.99 1189.4118714.68 1186.79
18723.36    118518763.39 1171.9318779.65  1168.318828.27 1168.4118858.97 1168.65
18906.14  1168.718911.84  1168.8 18935.5  1168.318948.16 1164.5318978.02 1157.09
18991.43  1153.918993.58 1154.1419033.37 1154.6919043.37 1154.2719048.94 1154.21
19058.77  1155.4   19061 1155.4319072.37 1156.3719083.23 1155.7119097.13 1154.73
19138.46  1157.519155.07 1158.69 19166.8 1160.4819213.05 1159.5419241.37 1159.48
19249.06  1159.719254.05 1160.3219283.37 1155.5219311.47 1150.07   19324 1147.37
19346.26    114319354.28 1142.1619356.11 1143.0319383.67 1149.5519407.07 1154.11
19408.59  1154.519441.58 1164.73   19445 1164.1819449.43 1164.8919456.36    1167
19480.62  1155.819493.16 1155.2619503.91 1155.0919516.58 1152.8119532.23  1150.2
19549.14  1149.419559.75 1150.4919570.58 1151.7319577.91 1151.2619580.88    1151
19580.88    115219582.88    115219582.88    115019586.03 1146.3319587.53 1146.33
19594.37 1142.4919600.79  1143.519607.14 1144.8319609.31 1143.8919614.57  1142.9
 19642.3 1142.5519646.34 1142.3119655.98 1142.2319677.03 1141.2619785.47  1136.2
19807.92 1135.8319895.92 1136.1519914.19 1136.14 20045.5 1133.7620050.59  1133.8
20171.35 1133.2120255.63 1134.7920306.82 1135.7920337.14 1138.0420387.05  1141.8
20396.05 1145.87 20405.2 1146.33 20406.7 1146.3320409.85  1149.520409.85  1151.5
20411.85  1151.520411.85  1150.520422.65 1151.3220452.05 1152.8720470.54  1154.6
20487.47  1155.920500.27 1157.3720515.11 1158.7220540.48 1158.5520565.02  1164.5
20574.62 1165.2420584.25 1172.1720634.72 1172.0620641.89 1172.4320707.14  1172.3
20716.33 1172.3720721.03  1172.320750.05  1170.120764.44  1169.420772.33  1167.6
20776.01 1167.4420794.23 1162.0120800.86  1161.7 20810.3 1161.98 20838.2  1163.3
20845.54 1160.1720866.66 1166.5920871.05 1167.99 20875.8  1166.220899.66  1165.7
20912.01 1164.9220916.66 1164.9320938.55 1165.6820948.58 1166.4520975.14  1171.2
21020.84 1175.8221052.25 1177.7721102.75 1181.2521116.56 1182.6821155.53  1188.3
21201.77 1195.6521207.52 1195.9721276.43 1202.8821289.39 1204.1321317.85  1200.1
21330.02 1198.3121339.16 1199.1121370.97 1200.8721397.84 1202.1421460.04  1212.6
21461.59 1212.93 21511.7 1221.68 21546.9 1227.7821568.77 1231.3221596.38  1236.7
21640.13 1248.9921665.43 1254.4621692.78 1259.56 21697.2 1261.0321707.51  1262.8
21716.32 1264.1421791.55 1258.9721850.25 1252.0221857.65 1251.19 21863.4  1250.9
21873.08 1249.5221962.35  1236.321967.51 1234.8822016.88 1223.2522023.23    1221
22031.27 1218.5822051.75 1221.3922060.31 1222.41 22065.8 1221.8822075.24  1221.8
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22110.52  1220.622144.58  1217.822155.42 1217.2122158.53 1218.5122163.19  1217.9
22183.22 1217.3822190.13 1217.5522193.29 1217.3122226.28 1216.9722232.43  1216.4
22242.46  1216.522284.81 1216.1322320.94 1222.5322333.23 1223.1222342.68  1222.8
22351.29 1224.6722382.67 1218.2622390.51 1216.7722398.53 1216.1922438.98    1212
22481.19 1205.9622485.17 1205.8422495.98 1207.0122527.13 1211.0922538.15  1210.5
22559.76 1210.6422596.84 1207.2322607.16 1206.6422631.18 1207.7522642.13  1208.9
22661.99 1211.4922692.22 1215.9622711.98 1218.9922736.36 1222.4422759.23  1226.6
22790.77 1230.6122805.91 1232.9622825.04 1233.1522836.73 1232.6822882.49    1227
   22887  1226.622917.78 1225.0722938.05 1223.2122955.82 1221.4922986.03  1220.1
22992.72 1219.9423006.88 1220.1423022.46 1219.8223026.55 1219.5423080.52  1217.3
23088.12 1216.7923104.31 1216.5723143.27 1215.0623148.76 1213.0923210.02  1216.3
23269.57 1218.8923283.38  1221.523289.05 1222.3223321.66 1224.7923339.03  1223.9
23382.95 1229.7323387.74 1229.7423463.23  1228.723483.01 1229.1223493.93  1229.1
23502.63 1230.1723505.14 1230.0323546.35 1228.46 23548.8 1228.3923564.58  1228.6
23601.96 1229.2423609.11 1229.5323678.59 1231.4823685.07    1231 23726.3  1231.6
23727.36 1231.35 23756.2 1229.7323766.62 1230.4923771.63 1230.4423785.18  1231.5
23801.99 1230.46 23826.7 1232.6923886.44 1237.0223911.27 1238.2223924.45  1235.9
23934.49 1236.5723940.75 1237.1523973.91 1242.3323982.18  1242.124021.62    1242
24040.01 1246.7524072.75 1251.9524101.71 1252.04 24161.4 1253.5524168.61  1253.7
24171.81 1255.3924181.98 1263.1424201.38  1262.624227.48 1260.6424240.14  1254.9
24260.47 1254.1824287.05 1247.7624294.26 1248.0924294.86 1247.7524296.66  1255.9
 24312.7 1255.49

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

 18652.1     .0519456.36    .03520584.25     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19456.3620584.25              460   504.7     540             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 221.31

INPUT
Description:
Station Elevation Data    num=     267
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

14992.66    116815026.77 1165.5815030.91 1165.4315037.28 1165.7915069.86 1165.82
15070.88  1165.415076.04 1166.05 15112.2 1165.5615117.18 1165.4215176.25 1165.01
15268.31  1164.915278.91 1164.6415310.35 1164.4715385.32 1164.7515490.94 1165.08
15609.05  1165.415625.53 1165.2915743.82 1165.4515753.35 1165.4515780.48 1165.01
15782.39    116515782.71 1165.6115787.31  1165.615811.68 1165.0215873.21 1164.99
15876.97  1165.215893.61 1165.5815958.36 1166.1215987.66 1165.4815998.23  1165.4
16040.32  1164.616069.32 1164.2116070.86  1164.116186.62  1164.716236.42  1164.9
16259.59  1165.216271.17 1164.7416276.84 1164.6116297.25 1164.4116321.85 1164.32
16329.32  1164.416345.93 1164.9116406.44 1165.3116457.25 1164.3716498.72 1164.04
16502.17  1164.416544.29 1164.36 16621.4 1164.5616666.91  1163.616685.69 1163.52
 16694.4  1163.816717.07 1164.3616743.19 1164.8116765.72 1164.1516823.31 1163.91
 16851.5  1163.816935.43 1163.8416940.48 1163.7917003.31 1163.5117032.32 1163.48
17077.17  1163.317096.38 1163.1517107.31 1163.3917112.64 1163.2117125.84 1163.24
17161.34  1163.517169.83 1163.4217179.29 1163.5617207.69 1163.2117221.38 1162.96
17239.25  1163.117363.03 1164.3317429.76 1164.3517603.57 1163.9817646.95 1164.09
17662.19  1163.417722.37 1164.3217801.03 1165.3117825.03 1166.6117856.64 1166.07
17901.38  1165.317920.15  1165.317958.22 1165.9118003.49 1166.1918024.75  1170.8
18038.49  1173.918053.57 1174.2818097.69 1178.8118109.61 1179.78 18124.8 1180.63
18152.51  1181.818164.97 1181.25 18180.7 1181.3718206.05 1183.77 18213.6 1183.47
 18219.9  1182.118233.66 1176.7818241.03  1176.418270.87 1176.4518283.06  1176.9
18335.33  1176.818373.63 1176.5118418.06 1176.2318454.07 1175.5818466.72 1174.93
18495.09  1174.418504.69 1173.4118523.54 1171.2718563.58 1165.3718572.61 1163.79
18588.35  1162.818593.96 1161.4218608.67 1160.4218622.35 1160.4518651.41 1161.09
18709.57  1159.218728.59 1158.67 18749.8 1157.6618796.71 1157.2618803.75 1157.23
18846.73  1156.118868.26 1155.6818901.47 1155.89   18906 1156.0818912.34 1155.78
18948.25  1154.718955.06 1155.9418961.51 1156.8218967.74 1155.5618980.99 1153.68
19023.11  1154.319073.86 1154.52   19114 1153.94 19122.7 1153.8519156.14 1152.27
19180.43  1151.519195.14 1153.55 19209.9 1154.8619219.29  1153.919227.23 1151.53
19234.54  1149.819264.72 1148.6119301.88 1149.1819312.66 1149.2419321.63 1153.07
19345.79  1160.519359.34 1163.9319372.89 1160.0119413.94 1149.2719424.31 1150.02
19429.24  1151.419449.21 1156.05 19463.2 1155.7519470.75 1155.3719482.11 1155.91
19490.16  1156.519515.24 1157.13 19531.2 1156.8519538.57 1156.7519557.52 1156.05
19569.37  1154.319572.26    115319572.26    115419574.26    115419574.26    1152
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19577.41 1146.3319578.91 1146.3319621.52 1135.6919639.77 1137.6619664.83 1138.36
19683.76  1139.619696.55  1140.219792.75 1135.9519801.48 1135.6319809.81 1135.64
19930.61  1135.6 19952.6 1135.0220048.27 1131.9820062.35 1131.4320118.13 1132.03
20188.61  1132.820256.01 1133.8320328.23 1134.9920344.49 1135.7320377.75 1143.58
 20388.1 1142.9420393.85 1146.3320395.35 1146.33 20398.5  1149.5 20398.5  1151.5
 20400.5  1151.5 20400.5  1150.520469.34  1150.5   20504  1151.220521.88 1157.01
20586.22 1159.9120592.78 1160.9720601.99 1167.9620608.04  1168.520623.32  1170.4
20633.95 1185.3520664.73 1188.4320691.02  1193.520695.44  1193.7 20731.2 1194.65
20757.37 1194.1520802.53 1193.12 20875.7 1170.62 20935.8  1151.821005.31 1151.38
21015.06  1151.421032.49 1159.2121042.59 1162.2821067.91  1162.121078.72 1162.04
21087.43 1159.8321108.55 1164.4321119.27 1166.3721136.51  1168.821156.97 1171.78
21181.55 1173.1721224.13 1174.0921225.45 1174.0321237.16  1172.621259.28 1173.37
21263.15  1173.921265.76 1174.5421290.93  1181.321294.11  1181.721307.93  1184.1
21311.44 1183.8721323.42 1186.2721330.86    1188 21350.2  1190.6 21383.8 1193.88
21398.66  1195.921412.73 1196.4821457.15 1199.4621465.59  1200.321472.67  1200.3
21494.72 1199.7621504.66 1199.8721507.38 1199.5221513.07  1199.421550.52 1198.95
21556.04 1198.42 21565.5    119721600.52 1193.2121641.91  1195.521657.62 1196.55
21668.48 1196.7721700.06 1197.98 21737.6  1200.921761.14  1203.221776.72 1202.99
21809.75 1199.2721823.95 1196.4121841.35 1193.7221860.33  1190.621870.81 1190.21
 21876.3 1189.2721877.32 1189.73 21886.4 1182.7921889.31  1181.921924.92 1198.54
 21961.7 1215.7921975.74 1215.31

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

14992.66     .0519515.24    .03520521.88     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19515.2420521.88              220  262.31     780              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 221.26

INPUT
Description: Upstream face of New Mill Ave Bridge

Station Elevation Data    num=     103
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

 18929.8  1153.318961.36 1153.0518978.03 1153.2619019.15 1152.7419033.39 1152.96
19054.85  1152.719066.41 1152.5819083.79 1152.9919109.33 1152.5219128.66 1151.78
19139.43  1152.219175.53 1152.2619186.22 1151.5219196.19 1150.3719200.65 1149.88
19210.93  1153.519221.32 1155.7619243.17 1159.1619248.85    1160 19281.3    1160
   19297  1157.419321.56 1153.4819326.46 1152.6619341.45    115019362.38 1149.76
19387.78  1148.419403.37    114819420.53    114819431.08 1150.0319439.29    1151
19457.74  1151.719474.83 1152.2719503.16    115319512.68    115319522.93 1153.56
19524.34    115419533.18    115319533.18    115419535.06    115419535.06    1152
19537.97 1146.3319539.38 1146.33 19563.1 1136.9519641.28  1134.4 19688.2 1134.81
 19787.1 1134.0319835.67 1132.6619929.08 1131.1719982.57 1130.0120059.41 1129.66
20132.81 1129.2420168.05 1130.1720215.61 1131.5120269.26  1131.420316.63 1134.36
20387.64 1136.4720412.67 1146.3320414.08 1146.33   20417    1149   20417    1151
20418.88    115120418.88    115020450.13    115020458.81 1152.6820489.52 1160.85
20498.91  1160.920576.83 1159.2120584.83 1159.3520599.93 1159.2120648.73  1159.1
20693.51  1157.920698.38 1157.6920706.17 1157.4120719.65 1159.7320857.84 1178.63
20870.91  1193.2 20877.1 1193.42 20922.7 1195.33 20935.7 1195.4420945.54 1192.59
20947.95  1191.220959.18 1189.4620983.86 1186.1421006.11 1177.3921024.17 1173.15
   21040  1169.821056.36 1174.0321066.18 1175.3321088.59 1175.9121100.47 1178.77
21145.34  1184.621172.67 1187.71 21203.2 1190.5921220.52 1192.7321225.66 1193.22
21234.93  1193.921270.81 1194.4521301.72 1194.3521306.81 1194.4921373.56 1186.64
21402.68  1182.821418.97    118321436.65 1182.98

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

 18929.8     .0519535.06    .035   20417     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19535.06   20417           101.04  101.04  101.04              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F
```

```
BRIDGE                    RIVER: Salt River
REACH: Reach 4               RS: 221.25

INPUT
Description: New Mill Avenue Bridge (North Bound)
Distance from Upstream XS =     26.5
Deck/Roadway Width        =       48
Weir Coefficient          =      2.6
Upstream  Deck/Roadway Coordinates
    num=       23
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord

19250.65    1175    115019250.66    1175    116419321.13 1175.65 1170.65
19391.61 1175.95    116419462.08 1176.25 1171.2519532.56 1176.55  1164.8
19603.04 1176.85 1171.8519673.52 1177.15  1165.219743.99 1177.45 1172.45
19814.47 1177.82  1165.819884.95 1177.52 1172.5219955.43 1177.22  1165.2
 20025.9 1176.92 1171.9220096.38 1176.62  1164.820166.86 1176.32 1171.32
20237.34 1176.02    116420307.81 1175.72 1170.7220378.29 1175.42  1163.5
20448.77 1175.12 1170.1220519.25 1174.82    116320589.72 1174.52 1169.52
20660.19 1174.22    1163 20660.2 1174.22    1150

Upstream Bridge Cross Section Data
Station Elevation Data    num=     103
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

 18929.8  1153.318961.36 1153.0518978.03 1153.2619019.15 1152.7419033.39 1152.96
19054.85  1152.719066.41 1152.5819083.79 1152.9919109.33 1152.5219128.66 1151.78
19139.43  1152.219175.53 1152.2619186.22 1151.5219196.19 1150.3719200.65 1149.88
19210.93  1153.519221.32 1155.7619243.17 1159.1619248.85    1160 19281.3    1160
   19297  1157.419321.56 1153.4819326.46 1152.6619341.45    115019362.38 1149.76
19387.78  1148.419403.37    114819420.53    114819431.08 1150.0319439.29    1151
19457.74  1151.719474.83 1152.2719503.16    115319512.68    115319522.93 1153.56
19524.34    115419533.18    115319533.18    115419535.06    115419535.06    1152
19537.97 1146.3319539.38 1146.33 19563.1 1136.9519641.28  1134.4 19688.2 1134.81
 19787.1 1134.0319835.67 1132.6619929.08 1131.1719982.57 1130.0120059.41 1129.66
20132.81 1129.2420168.05 1130.1720215.61 1131.5120269.26  1131.420316.63 1134.36
20387.64 1136.4720412.67 1146.3320414.08 1146.33   20417    1149   20417    1151
20418.88    115120418.88    115020450.13    115020458.81 1152.6820489.52 1160.85
20498.91  1160.920576.83 1159.2120584.83 1159.3520599.93 1159.2120648.73  1159.1
20693.51  1157.920698.38 1157.6920706.17 1157.4120719.65 1159.7320857.84 1178.63
20870.91  1193.2 20877.1 1193.42 20922.7 1195.33 20935.7 1195.4420945.54 1192.59
20947.95  1191.220959.18 1189.4620983.86 1186.1421006.11 1177.3921024.17 1173.15
   21040  1169.821056.36 1174.0321066.18 1175.3321088.59 1175.9121100.47 1178.77
21145.34  1184.621172.67 1187.71 21203.2 1190.5921220.52 1192.7321225.66 1193.22
21234.93  1193.921270.81 1194.4521301.72 1194.3521306.81 1194.4921373.56 1186.64
21402.68  1182.821418.97    118321436.65 1182.98

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

 18929.8     .0519535.06    .035   20417     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
      19535.06   20417             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

Downstream  Deck/Roadway Coordinates
    num=       23
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord

19250.65    1175    115019250.66    1175    116419321.13 1175.65 1170.65
19391.61 1175.95    116419462.08 1176.25 1171.2519532.56 1176.55  1164.8
19603.04 1176.85 1171.8519673.52 1177.15  1165.219743.99 1177.45 1172.45
19814.47 1177.82  1165.819884.95 1177.52 1172.5219955.43 1177.22  1165.2
 20025.9 1176.92 1171.9220096.38 1176.62  1164.820166.86 1176.32 1171.32
20237.34 1176.02    116420307.81 1175.72 1170.7220378.29 1175.42  1163.5
20448.77 1175.12 1170.1220519.25 1174.82    116320589.72 1174.52 1169.52
20660.19 1174.22    1163 20660.2 1174.22    1150

Downstream Bridge Cross Section Data
Station Elevation Data    num=      62
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

```
19181.03    117519192.28    117019212.28    116519222.28    116019245.78    1153
19295.78    115219342.28    115119372.28    115019417.28    115019450.78    1151
19507.28    115219522.28  1152.919522.28  1153.919524.28  1153.919524.28  1151.9
19527.19 1146.33 19528.6 1146.3319528.92 1144.09 19563.1 1136.9519641.28  1134.4
 19688.2 1134.81 19787.1 1134.0319835.67 1132.6619929.08 1131.1719982.57 1130.01
20059.41 1129.6620132.81 1129.2420168.05 1130.1720215.61 1131.5120269.26  1131.4
20316.63 1134.3620387.64 1136.4720418.82 1146.3320420.23 1146.3320423.14    1149
20423.14    115120425.02    115120425.02  1148.520437.02  1148.5 20545.91158.299
20570.511156.76220600.261156.767 20653.4 1155.3920723.84  1154.620730.99 1155.62
20765.68 1194.1620778.45  1194.520834.04 1195.4420850.47  1195.620883.86 1195.66
20913.36 1195.5920930.14 1195.55 20943.4  1195.420974.45  1189.220979.37 1183.41
20988.19 1177.0120997.96    117620998.93 1175.7921017.46  1174.421043.85  1175.3
21079.14 1175.5721086.63 1176.03

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

19181.03     .0519524.28    .03520423.14     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
      19524.2820423.14             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F

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

Number of Piers =  9

Pier Data
Pier Station     Upstream=19391.61    Downstream=19391.61
Upstream     num=       2
    Width   Elev    Width   Elev

      10    1140      10    1165
Downstream     num=       2
    Width   Elev    Width   Elev

      10    1140      10    1165

Pier Data
Pier Station     Upstream=19532.56    Downstream=19532.56
Upstream     num=       2
    Width   Elev    Width   Elev

      10    1140      10    1165
Downstream     num=       2
    Width   Elev    Width   Elev

      10    1140      10    1165

Pier Data
Pier Station     Upstream=19673.52    Downstream=19673.52
Upstream     num=       2
    Width   Elev    Width   Elev

      10    1130      10    1166
Downstream     num=       2
    Width   Elev    Width   Elev

      10    1130      10    1166

Pier Data
Pier Station     Upstream=19814.47    Downstream=19814.47
Upstream     num=       2
    Width   Elev    Width   Elev

      10    1130      10    1166
```

```
Downstream      num=        2
    Width   Elev    Width   Elev

      10    1130      10    1166

Pier Data
Pier Station     Upstream=19955.43    Downstream=19955.43
Upstream      num=        2
    Width   Elev    Width   Elev

      10    1028      10    1166
Downstream      num=        2
    Width   Elev    Width   Elev

      10    1028      10    1166

Pier Data
Pier Station     Upstream=20096.38    Downstream=20096.38
Upstream      num=        2
    Width   Elev    Width   Elev

      10    1025      10    1166
Downstream      num=        2
    Width   Elev    Width   Elev

      10    1025      10    1166

Pier Data
Pier Station     Upstream=20237.34    Downstream=20237.34
Upstream      num=        2
    Width   Elev    Width   Elev

      10    1125      10    1165
Downstream      num=        2
    Width   Elev    Width   Elev

      10    1125      10    1165

Pier Data
Pier Station     Upstream=20378.29    Downstream=20378.29
Upstream      num=        2
    Width   Elev    Width   Elev

      10    1128      10    1165
Downstream      num=        2
    Width   Elev    Width   Elev

      10    1128      10    1165

Pier Data
Pier Station     Upstream=20519.25    Downstream=20519.25
Upstream      num=        2
    Width   Elev    Width   Elev

      10    1125      10    1165
Downstream      num=        2
    Width   Elev    Width   Elev

      10    1125      10    1165

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum                Cd   =     1.2
       Yarnell                 KVal =    1.05
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
```

Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF#1
Opening : Single BR

E.G. US. (ft)	1154.31	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1152.84	E.G. Elev (ft)	1154.24	1154.16
Q Total (cfs)	169000.00	W.S. Elev (ft)	1152.48	1152.41
Q Bridge (cfs)	169000.00	Crit W.S. (ft)	1143.95	1143.92
Q Weir (cfs)		Max Chl Dpth (ft)	23.24	23.17
Weir Sta Lft (ft)		Vel Total (ft/s)	10.65	10.60
Weir Sta Rgt (ft)		Flow Area (sq ft)	15868.59	15950.36
Weir Submerg		Froude # Chl	0.43	0.43
Weir Max Depth (ft)		Specif Force (cu ft)	214080.60	213719.70
Min El Weir Flow (ft)	1156.98	Hydr Depth (ft)	19.37	19.24
Min El Prs (ft)	1172.52	W.P. Total (ft)	1070.72	1091.96
Delta EG (ft)	0.27	Conv. Total (cfs)	4064814.0	4046444.0
Delta WS (ft)	0.27	Top Width (ft)	1006.24	1115.16
BR Open Area (sq ft)	35095.42	Frctn Loss (ft)	0.08	0.03
BR Open Vel (ft/s)	10.65	C & E Loss (ft)	0.01	0.08
Coef of Q		Shear Total (lb/sq ft)	1.60	1.59
Br Sel Method	Energy only	Power Total (lb/ft s)	17.03	16.85

Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.

BRIDGE OUTPUT Profile #PF#2
Opening : Single BR

E.G. US. (ft)	1154.31	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1152.84	E.G. Elev (ft)	1154.25	1154.16
Q Total (cfs)	169000.00	W.S. Elev (ft)	1152.48	1152.41
Q Bridge (cfs)	169000.00	Crit W.S. (ft)	1143.95	1143.92
Q Weir (cfs)		Max Chl Dpth (ft)	23.24	23.17
Weir Sta Lft (ft)		Vel Total (ft/s)	10.65	10.59
Weir Sta Rgt (ft)		Flow Area (sq ft)	15869.39	15951.17
Weir Submerg		Froude # Chl	0.43	0.43
Weir Max Depth (ft)		Specif Force (cu ft)	214093.30	213732.40
Min El Weir Flow (ft)	1156.98	Hydr Depth (ft)	19.37	19.24
Min El Prs (ft)	1172.52	W.P. Total (ft)	1070.73	1091.98
Delta EG (ft)	0.27	Conv. Total (cfs)	4065123.0	4046750.0
Delta WS (ft)	0.27	Top Width (ft)	1006.29	1115.24
BR Open Area (sq ft)	35095.42	Frctn Loss (ft)	0.08	0.04
BR Open Vel (ft/s)	10.65	C & E Loss (ft)	0.01	0.08
Coef of Q		Shear Total (lb/sq ft)	1.60	1.59
Br Sel Method	Energy only	Power Total (lb/ft s)	17.03	16.85

Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.

CROSS SECTION RIVER: Salt River
REACH: Reach 4 RS: 221.24

INPUT
Description: Downstream face of New Mill Ave Bridge

Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
19181.03	117519192.28		117019212.28		116519222.28		116019245.78		1153
19295.78	115219342.28		115119372.28		115019417.28		115019450.78		1151
19507.28	115219522.28		1152.919522.28		1153.919524.28		1153.919524.28		1151.9
19527.19	1146.33	19528.6	1146.3319528.92		1144.09	19563.1	1136.9519641.28		1134.4
19688.2	1134.81	19787.1	1134.0319835.67		1132.6619929.08		1131.1719982.57		1130.01
20059.41	1129.6620132.81		1129.2420168.05		1130.1720215.61		1131.5120269.26		1131.4
20316.63	1134.3620387.64		1136.4720418.82		1146.3320420.23		1146.3320423.14		1149
20423.14	115120425.02		115120425.02		1148.520437.02		1148.5	20545.91	1158.299
20570.51	1156.76	20600.26	1156.767	20653.4	1155.3920723.84		1154.620730.99		1155.62
20765.68	1194.1620778.45		1194.520834.04		1195.4420850.47		1195.620883.86		1195.66
20913.36	1195.5920930.14		1195.55	20943.4	1195.420974.45		1189.220979.37		1183.41
20988.19	1177.0120997.96		117620998.93		1175.7921017.46		1174.421043.85		1175.3
21079.14	1175.5721086.63		1176.03						

```
Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val

19181.03     .0519524.28    .03520423.14     .06

Bank Sta: Left   Right    Lengths: Left Channel  Right     Coeff Contr.   Expan.
      19524.2820423.14            185.11  185.11  185.11              .1       .3
Ineffective Flow     num=        2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

CROSS SECTION           RIVER: Salt River
REACH: Reach 4             RS: 221.2

INPUT
Description: Upstream face of Old Mill Ave Bridge

Station Elevation Data     num=       88
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

19151.75    117319162.17    117019175.77    116519190.49    116019207.04    1155
19210.21    115419250.54    1153 19352.5    115319495.24  1152.419495.24  1153.4
19496.88  1153.419496.88  1151.419499.69  1146.319501.05  1146.319510.34    1140
19518.41  1138.419520.86  1138.319530.74  1135.8 19541.7    113519562.09  1133.1
19589.92    113219604.42  1131.819611.22  1131.4 19619.1  1131.519649.46    1131
19658.43    113119682.63    113119704.66    113119713.07    1131 19754.5    1131
19776.89    113119797.37    1131 19817.4  1130.119836.52    113019839.42    1130
19861.27  1129.419867.06  1129.419900.87    112919922.35    112919945.55    1129
19963.49  1128.219984.25    112820003.37  1128.720014.97  1128.8 20036.9    1129
20062.37  1129.220084.03  1129.420099.26  1129.820128.71    113020145.21    1130
20161.79  1131.120183.09    113220199.13  1132.820227.41  1133.420254.78  1134.4
20274.45  1135.120298.28    113620315.23  1137.320321.57    1138 20342.6  1143.7
20347.59    114520352.93    114620370.97 1146.3320372.33 1146.3320375.14    1151
20375.14    115220376.95    115220376.95  1149.520388.95  1149.520466.761155.561
20485.691154.15220500.521152.76820551.131152.84620556.67  1159.5 20609.9 1162.36
20617.41 1163.5220629.18 1164.4420705.63 1170.3720709.49  1170.720740.31 1172.13
 20747.1 1172.1420813.79 1173.6620827.11 1173.9320876.18  1174.920885.58 1174.97
20935.47 1176.6120939.65 1176.6420963.78 1176.08

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

19151.75     .0519496.88    .03520375.14     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19496.8820375.14             91.95   91.95   91.95              .1       .3
Ineffective Flow     num=        2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

BRIDGE                  RIVER: Salt River
REACH: Reach 4             RS: 221.195

INPUT
Description: Old Mill Avenue Bridge (South Bound)
Distance from Upstream XS =   22.98
Deck/Roadway Width        =      46
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       23
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord

19154.58 1175.53 1149.4919191.08 1175.69 1149.4919266.08 1175.87 1159.67
19341.58 1176.15 1149.9519415.83 1176.42 1170.2219490.08 1176.69 1150.49
19560.06 1176.89 1170.6919628.48 1177.19 1150.9919696.46 1177.25 1171.05
19764.16 1177.31 1151.1119831.22 1177.35 1171.1519897.65  1177.4  1151.2
19964.72 1177.37 1171.0420031.61 1177.35 1151.1520099.31 1177.24 1171.04
20167.28 1177.18 1150.9820234.62 1176.89 1170.6920301.87 1176.72 1150.52
20371.22 1176.45 1170.2520444.72 1176.18 1149.9820519.22 1175.92 1169.72
20593.72 1175.66 1149.4620631.92 1175.54 1149.46

Upstream Bridge Cross Section Data
Station Elevation Data     num=       88
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

```
19151.75    117319162.17    117019175.77    116519190.49    116019207.04    1155
19210.21    115419250.54    1153 19352.5    115319495.24  1152.419495.24  1153.4
19496.88  1153.419496.88  1151.419499.69  1146.319501.05  1146.319510.34    1140
19518.41  1138.419520.86  1138.319530.74  1135.8 19541.7    113519562.09  1133.1
19589.92    113219604.42  1131.819611.22  1131.4 19619.1  1131.519649.46    1131
19658.43    113119682.63    113119704.66    113119713.07    1131 19754.5    1131
19776.89    113119797.37    1131 19817.4  1130.119836.52    113019839.42    1130
19861.27  1129.419867.06  1129.419900.87    112919922.35    112919945.55    1129
19963.49  1128.219984.25    112820003.37  1128.720014.97  1128.8 20036.9    1129
20062.37  1129.220084.03  1129.420099.26  1129.820128.71    113020145.21    1130
20161.79  1131.120183.09    113220199.13  1132.820227.41  1133.420254.78  1134.4
20274.45  1135.120298.28    113620315.23  1137.320321.57    1138 20342.6  1143.7
20347.59    114520352.93    114620370.97 1146.3320372.33 1146.3320375.14    1151
20375.14    115220376.95    115220376.95  1149.520388.95  1149.520466.761155.561
20485.691154.15220500.521152.76820551.131152.84620556.67  1159.5 20609.9 1162.36
20617.41 1163.5220629.18 1164.4420705.63 1170.3720709.49  1170.720740.31 1172.13
 20747.1 1172.1420813.79 1173.6620827.11 1173.9320876.18  1174.920885.58 1174.97
20935.47 1176.6120939.65 1176.6420963.78 1176.08

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

19151.75     .0519496.88    .03520375.14     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
      19496.8820375.14             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F

Downstream  Deck/Roadway Coordinates
    num=      23
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord

19154.58 1175.53 1149.4919191.08 1175.69 1149.4919266.08 1175.87 1159.67
19341.58 1176.15 1149.9519415.83 1176.42 1170.2219490.08 1176.69 1150.49
19560.06 1176.89 1170.6919628.48 1177.19 1150.9919696.46 1177.25 1171.05
19764.16 1177.31 1151.1119831.22 1177.35 1171.1519897.65  1177.4  1151.2
19964.72 1177.37 1171.0420031.61 1177.35 1151.1520099.31 1177.24 1171.04
20167.28 1177.18 1150.9820234.62 1176.89 1170.6920301.87 1176.72 1150.52
20371.22 1176.45 1170.2520444.72 1176.18 1149.9820519.22 1175.92 1169.72
20593.72 1175.66 1149.4620631.92 1175.54 1149.46

Downstream Bridge Cross Section Data
Station Elevation Data    num=     112
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

19136.35    117119139.97    117219153.57    117219155.38    1171 19157.2    1170
19165.35    1165 19172.6    116019176.23    115719236.95    115719262.33    1156
19268.67    115519275.01    115419376.52    115319493.43 1151.6719493.43 1152.67
19495.07 1152.6719495.07 1150.6719497.88 1146.3319499.24 1146.3319510.34    1140
19518.41  1138.419520.86  1138.319530.74  1135.8 19541.7    113519562.09  1133.1
19589.92    113219604.42  1131.819611.22  1131.4 19619.1  1131.519649.46    1131
19658.43    113119682.63    113119704.66    113119713.07    1131 19754.5    1131
19776.89    113119797.37    1131 19817.4  1130.119836.52    113019839.42    1130
19861.27  1129.419867.06  1129.419900.87    112919922.35    112919945.55    1129
19963.49  1128.219984.25    112820003.37  1128.720014.97  1128.8 20036.9    1129
20062.37  1129.220084.03  1129.420099.26  1129.820128.71    113020145.21    1130
20161.79  1131.120183.09    113220199.13  1132.820227.41  1133.420254.78  1134.4
20274.45  1135.120298.28    113620315.23  1137.320321.57    1138 20342.6  1143.7
20347.59    114520352.93    114620364.27 1146.3320365.63 1146.3320368.44  1148.5
20368.44    115120370.26    115120370.26  1148.520382.26  1148.520452.05 1153.99
20519.011154.69420533.381157.83720550.471158.89420620.75  1170.520643.43  1172.2
20660.88 1173.6320669.08 1174.3220688.98 1174.8120700.28 1176.22 20703.7  1177.1
20715.51  1177.520718.07 1179.2720725.74 1180.3820776.61  1182.220792.04  1182.5
20843.33 1182.8320868.71 1183.6620901.02  1183.620918.46 1181.9520925.98  1180.7
20985.54 1181.4620988.38  1181.521004.93 1178.4621023.04  1178.921062.81    1179
21073.56 1178.98 21092.5 1179.12 21172.2 1180.2821191.25  1180.621257.23  1180.9
21264.74 1180.8521321.62  1181.321324.15 1181.2521396.66 1182.5721401.59  1182.7
21419.15 1182.8721430.86 1182.71

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
```

```
19136.35     .0519495.07    .03520368.44     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
      19495.0720368.44             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F

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

Number of Piers =  9

Pier Data
Pier Station     Upstream=19341.58    Downstream=19341.58
Upstream     num=       2
    Width   Elev    Width   Elev

      14    1125      14    1155
Downstream     num=       2
    Width   Elev    Width   Elev

      14    1125      14    1155

Pier Data
Pier Station     Upstream=19490.08    Downstream=19490.08
Upstream     num=       2
    Width   Elev    Width   Elev

       9    1125       9    1155
Downstream     num=       2
    Width   Elev    Width   Elev

       9    1125       9    1155

Pier Data
Pier Station     Upstream=19628.48    Downstream=19628.48
Upstream     num=       2
    Width   Elev    Width   Elev

       9    1125       9    1155
Downstream     num=       2
    Width   Elev    Width   Elev

       9    1125       9    1155

Pier Data
Pier Station     Upstream=19764.16    Downstream=19764.16
Upstream     num=       2
    Width   Elev    Width   Elev

       9    1125       9    1155
Downstream     num=       2
    Width   Elev    Width   Elev

       9    1125       9    1155

Pier Data
Pier Station     Upstream=19897.65    Downstream=19897.65
Upstream     num=       2
    Width   Elev    Width   Elev

       9    1125       9    1155
Downstream     num=       2
    Width   Elev    Width   Elev

       9    1125       9    1155

Pier Data
Pier Station     Upstream=20031.61    Downstream=20031.61
```

```
Upstream      num=        2
    Width   Elev    Width   Elev

       9    1125       9    1155
Downstream      num=        2
    Width   Elev    Width   Elev

       9    1125       9    1155

Pier Data
Pier Station     Upstream=20167.28    Downstream=20167.28
Upstream      num=        2
    Width   Elev    Width   Elev

       9    1125       9    1155
Downstream      num=        2
    Width   Elev    Width   Elev

       9    1125       9    1155

Pier Data
Pier Station     Upstream=20301.87    Downstream=20301.87
Upstream      num=        2
    Width   Elev    Width   Elev

       9    1125       9    1155
Downstream      num=        2
    Width   Elev    Width   Elev

       9    1125       9    1155

Pier Data
Pier Station     Upstream=20444.72    Downstream=20444.72
Upstream      num=        2
    Width   Elev    Width   Elev

      14    1125      14    1155
Downstream      num=        2
    Width   Elev    Width   Elev

      14    1125      14    1155

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum                Cd   =     1.2
       Yarnell                 KVal =    1.05
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

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

BRIDGE OUTPUT    Profile #PF#1
Opening : Single BR

 E.G. US. (ft)              1153.84   Element                Inside BR US Inside BR DS
 W.S. US. (ft)              1152.43   E.G. Elev (ft)             1153.72      1153.64
 Q Total (cfs)            169000.00   W.S. Elev (ft)             1152.04      1151.95
 Q Bridge (cfs)           169000.00   Crit W.S. (ft)             1142.85      1142.84
 Q Weir (cfs)                         Max Chl Dpth (ft)            24.04        23.95
 Weir Sta Lft (ft)                    Vel Total (ft/s)             10.39        10.45
 Weir Sta Rgt (ft)                    Flow Area (sq ft)         16269.15     16173.44
 Weir Submerg                         Froude # Chl                 0.05         0.05
 Weir Max Depth (ft)                  Specif Force (cu ft)     222618.10    221392.70
 Min El Weir Flow (ft)       1171.01  Hydr Depth (ft)              19.77        19.76
 Min El Prs (ft)             1171.15  W.P. Total (ft)            1085.00      1077.88
 Delta EG (ft)                  0.23  Conv. Total (cfs)        4199990.0    4177200.0
 Delta WS (ft)                  0.27  Top Width (ft)             869.27       891.64
```

BR Open Area (sq ft)	26852.25	Frctn Loss (ft)		
BR Open Vel (ft/s)	10.45	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	1.52	1.53
Br Sel Method	Momentum	Power Total (lb/ft s)	15.74	16.02

BRIDGE OUTPUT Profile #PF#2
Opening : Single BR

E.G. US. (ft)	1153.84	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1152.43	E.G. Elev (ft)	1153.72	1153.64
Q Total (cfs)	169000.00	W.S. Elev (ft)	1152.04	1151.95
Q Bridge (cfs)	169000.00	Crit W.S. (ft)	1142.85	1142.84
Q Weir (cfs)		Max Chl Dpth (ft)	24.04	23.95
Weir Sta Lft (ft)		Vel Total (ft/s)	10.39	10.45
Weir Sta Rgt (ft)		Flow Area (sq ft)	16269.25	16173.54
Weir Submerg		Froude # Chl	0.05	0.05
Weir Max Depth (ft)		Specif Force (cu ft)	222619.80	221394.30
Min El Weir Flow (ft)	1171.01	Hydr Depth (ft)	19.77	19.76
Min El Prs (ft)	1171.15	W.P. Total (ft)	1085.00	1077.88
Delta EG (ft)	0.23	Conv. Total (cfs)	4200025.0	4177231.0
Delta WS (ft)	0.27	Top Width (ft)	869.27	891.65
BR Open Area (sq ft)	26852.25	Frctn Loss (ft)		
BR Open Vel (ft/s)	10.45	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	1.52	1.53
Br Sel Method	Momentum	Power Total (lb/ft s)	15.74	16.02

CROSS SECTION RIVER: Salt River
REACH: Reach 4 RS: 221.19

INPUT
Description: Downstream face of Old Mill Ave Bridge

Station Elevation Data num= 112

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
19136.35	117	119139.97	117	219153.57	117	219155.38	1171	19157.2	1170
19165.35	1165	19172.6	116	019176.23	115	719236.95	115	719262.33	1156
19268.67	115	519275.01	115	419376.52	115	319493.43	1151.67	19493.43	1152.67
19495.07	1152.67	19495.07	1150.67	19497.88	1146.33	19499.24	1146.33	19510.34	1140
19518.41	1138.41	9520.86	1138.31	9530.74	1135.8	19541.7	113	519562.09	1133.1
19589.92	113	219604.42	1131.81	9611.22	1131.4	19619.1	1131.51	9649.46	1131
19658.43	113	119682.63	113	119704.66	113	119713.07	1131	19754.5	1131
19776.89	113	119797.37	1131	19817.4	1130.11	9836.52	113	019839.42	1130
19861.27	1129.41	9867.06	1129.41	9900.87	112	919922.35	112	919945.55	1129
19963.49	1128.21	9984.25	112	820003.37	1128.72	0014.97	1128.8	20036.9	1129
20062.37	1129.22	0084.03	1129.42	0099.26	1129.82	0128.71	113	020145.21	1130
20161.79	1131.12	0183.09	113	220199.13	1132.82	0227.41	1133.42	0254.78	1134.4
20274.45	1135.12	0298.28	113	620315.23	1137.32	0321.57	1138	20342.6	1143.7
20347.59	114	520352.93	114	620364.27	1146.33	20365.63	1146.33	20368.44	1148.5
20368.44	115	120370.26	115	120370.26	1148.52	0382.26	1148.52	0452.05	1153.99
20519.01	1154.69	420533.38	1157.83	720550.47	1158.89	420620.75	1170.52	0643.43	1172.2
20660.88	1173.63	20669.08	1174.32	20688.98	1174.81	20700.28	1176.22	20703.7	1177.1
20715.51	1177.52	0718.07	1179.27	20725.74	1180.38	20776.61	1182.22	0792.04	1182.5
20843.33	1182.83	20868.71	1183.66	20901.02	1183.62	0918.46	1181.95	20925.98	1180.7
20985.54	1181.46	20988.38	1181.52	1004.93	1178.46	21023.04	1178.92	1062.81	1179
21073.56	1178.98	21092.5	1179.12	21172.2	1180.28	21191.25	1180.62	1257.23	1180.9
21264.74	1180.85	21321.62	1181.32	1324.15	1181.25	21396.66	1182.57	21401.59	1182.7
21419.15	1182.87	21430.86	1182.71						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
19136.35	.05	19495.07	.03	20368.44	.06

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
19495.07	20368.44	731	591.87	380	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
888	F		
888	F		

CROSS SECTION RIVER: Salt River
REACH: Reach 4 RS: 221.068

INPUT
Description: upstream face of LRT bridge

Station Elevation Data num= 220

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
18938	1157	18938	1154.66	18941.3	1154.62	18942.1	1154.61	18951.2	1154.5
18953.1	1154.47	18961.1	1154.37	18963.2	1154.35	18971.2	1154.25	18973.3	1154.22
18981.2	1154.12	18991.4	1154	19001.4	1153.87	19003.6	1153.84	19011.4	1153.74
19021.4	1153.62	19023.6	1153.59	19031.4	1153.49	19040.8	1153.37	19042.6	1153.35
19050.5	1153.23	19052.3	1153.21	19060.4	1153.08	19062	1153.05	19070.3	1152.91
19073.8	1152.84	19082.1	1152.68	19090.4	1152.51	19092	1152.48	19100.3	1152.29
19102	1152.25	19110.3	1152.06	19112	1152.01	19120.3	1151.8	19122	1151.76
19130.3	1151.54	19132	1151.49	19140.2	1151.25	19142	1151.2	19150.2	1150.95
19152	1150.9	19160.2	1150.64	19162	1150.58	19170.2	1150.31	19172	1150.25
19180.2	1149.96	19182	1149.9	19190.2	1149.61	19192	1149.54	19200.2	1149.24
19202	1149.18	19210.1	1148.88	19212	1148.82	19220.1	1148.52	19222	1148.45
19230.1	1148.16	19232	1148.09	19240.1	1147.8	19242	1147.73	19250.1	1147.44
19252	1147.37	19253.1	1147.33	19261.2	1147.04	19262.2	1147	19263.3	1146.96
19265.7	1146.87	19267.7	1146.81	19272.2	1146.64	19273.4	1146.6	19277.2	1146.46
19278.4	1146.42	19282.2	1146.28	19283.5	1146.23	19287.2	1146.1	19288.6	1146.05
19292.3	1145.92	19293.7	1145.87	19297.3	1145.74	19298.9	1145.68	19301.6	1145.56
19303.3	1145.49	19305.9	1145.38	19307.7	1145.31	19309.4	1145.2	19311.4	1145.14
19312.9	1145.05	19315.3	1144.98	19316.7	1144.9	19319.3	1144.84	19320.6	1144.78
19323.7	1144.72	19324.9	1144.66	19325.9	1144.62	19329.5	1144.58	19330.4	1144.54
19334.7	1144.51	19335.4	1144.49	19340.5	1144.47	19348.8	1144.46	19349	1144.9
19349	1144.96	19350.5	1144.95	19357.4	1144.98	19358.1	1144.66	19358.1	1144.48
19359.8	1144.53	19364	1144.56	19372.4	1144.65	19376.2	1144.69	19378.4	1144.73
19389.1	1144.87	19391.8	1144.91	19397	1145	19397	1145.11	19397.1	1145.5
19399	1145.51	19402.9	1145.56	19405.1	1145.59	19406.4	1145.69	19409.7	1145.77
19412.6	1145.91	19414.7	1146	19417.1	1146.1	19419.3	1145.46	19419.9	1145.29
19420.7	1145.4	19423.9	1145.83	19425.7	1145.33	19426	1145.25	19428.4	1145.15
19429.9	1145.08	19440.5	1144.74	19444.1	1144.65	19445.9	1144.52	19452.1	1144
19457.4	1144.15	19463.1	1144.4	19470.8	1144.73	19474.6	1145.2	19476.7	1145.58
19482.6	1146.62	19495.9	1148.87	19498.8	1149.43	19503.6	1150.56	19506	1150.89
19508.2	1151.24	19512	1151.59	19528	1151.77	19537.6	1152.3	19539.3	1152.37
19544.2	1152.62	19546.6	1150.32	19547.3	1149.73	19547.9	1149.16	19548	1149.07
19549.2	1147.93	19603	1132	19722	1130	19874	1130	20026	1128
20189	1128	20352	1130	20402	1145.85	20403	1153.5	20404	1153.5
20405	1148.55	20412.7	1148.55	20413.6	1149	20414.6	1149.49	20415.7	1150
20445.2	1150	20466.1	1151	20469.6	1151.73	20472.2	1152.04	20473.6	1152
20482.3	1153.11	20485.6	1153.54	20487.9	1153.72	20493	1153.86	20493.9	1153.69
20495.7	1153.02	20495.8	1153	20505.3	1153	20506.1	1152.87	20514.3	1152.87
20533.1	1152.65	20535.7	1152	20536.6	1151.66	20537.2	1152	20539.7	1152.66
20540.5	1153	20541.3	1153.37	20548.6	1154	20555.3	1154.26	20557.8	1154.39
20564.1	1154.97	20564.5	1155.01	20569	1156	20570.4	1156.28	20574.7	1157
20576.2	1157.35	20579.5	1158	20581.5	1158.37	20584.8	1159	20585.6	1159.57
20592.1	1159.92	20594.5	1160	20598.5	1160.26	20605.7	1160.87	20607.3	1160.93
20607.5	1160.6	20607.7	1160.39	20611.5	1160.56	20629.8	1161.02	20639.7	1161.52
20648.4	1162.06	20662.1	1162.7	20749.3	1167.05	20756.9	1167.43	20809.5	1170.06

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
18938	.05	19544.2	.035	20403	.06

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
19544.2	20403	59	59	59	.1	.3

Ineffective Flow num= 3

Sta L	Sta R	Elev	Permanent
888	F		
888	F		
888	F		

BRIDGE RIVER: Salt River
REACH: Reach 4 RS: 221.064

INPUT
Description: Tempe Town Lake LRT Bridge
Distance from Upstream XS = 25.4
Deck/Roadway Width = 14
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 17

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
18900	1176.16	1120	19085	1176.16	1120	19085	1176.16	1163.16
19182.5	1177.22	1164.22	19280	1177.57	1164.57	19415	1177.97	1164.97
19416	1177.97	1162.97	19569	1178.43	1163.43	19722	1178.89	1163.89
19874	1179.35	1164.35	20026	1179.8	1164.8	20189	1180.04	1165.04
20352	1179.55	1164.55	20505	1179.09	1164.09	20608	1178.78	1163.78
20608	1178.78	1120	20690	1178.78	1120			

Upstream Bridge Cross Section Data
Station Elevation Data num= 220

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
18938	1157	18938	1154.66	18941.3	1154.62	18942.1	1154.61	18951.2	1154.5
18953.1	1154.47	18961.1	1154.37	18963.2	1154.35	18971.2	1154.25	18973.3	1154.22
18981.2	1154.12	18991.4	1154	19001.4	1153.87	19003.6	1153.84	19011.4	1153.74
19021.4	1153.62	19023.6	1153.59	19031.4	1153.49	19040.8	1153.37	19042.6	1153.35
19050.5	1153.23	19052.3	1153.21	19060.4	1153.08	19062	1153.05	19070.3	1152.91
19073.8	1152.84	19082.1	1152.68	19090.4	1152.51	19092	1152.48	19100.3	1152.29
19102	1152.25	19110.3	1152.06	19112	1152.01	19120.3	1151.8	19122	1151.76
19130.3	1151.54	19132	1151.49	19140.2	1151.25	19142	1151.2	19150.2	1150.95
19152	1150.9	19160.2	1150.64	19162	1150.58	19170.2	1150.31	19172	1150.25
19180.2	1149.96	19182	1149.9	19190.2	1149.61	19192	1149.54	19200.2	1149.24
19202	1149.18	19210.1	1148.88	19212	1148.82	19220.1	1148.52	19222	1148.45
19230.1	1148.16	19232	1148.09	19240.1	1147.8	19242	1147.73	19250.1	1147.44
19252	1147.37	19253.1	1147.33	19261.2	1147.04	19262.2	1147	19263.3	1146.96
19265.7	1146.87	19267.7	1146.81	19272.2	1146.64	19273.4	1146.6	19277.2	1146.46
19278.4	1146.42	19282.2	1146.28	19283.5	1146.23	19287.2	1146.1	19288.6	1146.05
19292.3	1145.92	19293.7	1145.87	19297.3	1145.74	19298.9	1145.68	19301.6	1145.56
19303.3	1145.49	19305.9	1145.38	19307.7	1145.31	19309.4	1145.2	19311.4	1145.14
19312.9	1145.05	19315.3	1144.98	19316.7	1144.9	19319.3	1144.84	19320.6	1144.78
19323.7	1144.72	19324.9	1144.66	19325.9	1144.62	19329.5	1144.58	19330.4	1144.54
19334.7	1144.51	19335.4	1144.49	19340.5	1144.47	19348.8	1144.46	19349	1144.9
19349	1144.96	19350.5	1144.95	19357.4	1144.98	19358.1	1144.66	19358.1	1144.48
19359.8	1144.53	19364	1144.56	19372.4	1144.65	19376.2	1144.69	19378.4	1144.73
19389.1	1144.87	19391.8	1144.91	19397	1145	19397	1145.11	19397.1	1145.5
19399	1145.51	19402.9	1145.56	19405.1	1145.59	19406.4	1145.69	19409.7	1145.77
19412.6	1145.91	19414.7	1146	19417.1	1146.1	19419.3	1145.46	19419.9	1145.29
19420.7	1145.4	19423.9	1145.83	19425.7	1145.33	19426	1145.25	19428.4	1145.15
19429.9	1145.08	19440.5	1144.74	19444.1	1144.65	19445.9	1144.52	19452.1	1144
19457.4	1144.15	19463.1	1144.4	19470.8	1144.73	19474.6	1145.2	19476.7	1145.58
19482.6	1146.62	19495.9	1148.87	19498.8	1149.43	19503.6	1150.56	19506	1150.89
19508.2	1151.24	19512	1151.59	19528	1151.77	19537.6	1152.3	19539.3	1152.37
19544.2	1152.62	19546.6	1150.32	19547.3	1149.73	19547.9	1149.16	19548	1149.07
19549.2	1147.93	19603	1132	19722	1130	19874	1130	20026	1128
20189	1128	20352	1130	20402	1145.85	20403	1153.5	20404	1153.5
20405	1148.55	20412.7	1148.55	20413.6	1149	20414.6	1149.49	20415.7	1150
20445.2	1150	20466.1	1151	20469.6	1151.73	20472.2	1152.04	20473.6	1152
20482.3	1153.11	20485.6	1153.54	20487.9	1153.72	20493	1153.86	20493.9	1153.69
20495.7	1153.02	20495.8	1153	20505.3	1153	20506.1	1152.87	20514.3	1152.87
20533.1	1152.65	20535.7	1152	20536.6	1151.66	20537.2	1152	20539.7	1152.66
20540.5	1153	20541.3	1153.37	20548.6	1154	20555.3	1154.26	20557.8	1154.39
20564.1	1154.97	20564.5	1155.01	20569	1156	20570.4	1156.28	20574.7	1157
20576.2	1157.35	20579.5	1158	20581.5	1158.37	20584.8	1159	20585.6	1159.57
20592.1	1159.92	20594.5	1160	20598.5	1160.26	20605.7	1160.87	20607.3	1160.93
20607.5	1160.6	20607.7	1160.39	20611.5	1160.56	20629.8	1161.02	20639.7	1161.52
20648.4	1162.06	20662.1	1162.7	20749.3	1167.05	20756.9	1167.43	20809.5	1170.06

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
18938	.05	19544.2	.035	20403	.06

Bank Sta: Left	Right	Coeff Contr.	Expan.
19544.2	20403	.1	.3

Ineffective Flow num= 3

Sta L	Sta R	Elev	Permanent
888	F		
888	F		
888	F		

Downstream Deck/Roadway Coordinates
num= 17

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
18900	1176.16	1120	19084	1176.16	1120	19084	1176.16	1163.16

19181.5	1177.22	1164.22	19279	1177.57	1164.57	19415	1177.97	1164.97
19415	1177.97	1162.97	19568	1178.43	1163.43	19721	1178.89	1163.89
19873	1179.35	1164.35	20025	1179.8	1164.8	20188	1180.04	1165.04
20351	1179.55	1164.55	20504	1179.09	1164.09	20607	1178.78	1163.78
20607	1178.78	1120	20690	1178.78	1120			

Downstream Bridge Cross Section Data
Station Elevation Data num= 221

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
19071	1157	19071	1156.15	19081.7	1155.91	19082.2	1155.69	19089.5	1155.14
19093.6	1154.36	19107.3	1151.47	19123.9	1150.31	19143.2	1149.66	19147	1150.23
19149.1	1150.14	19152.1	1150.04	19156.3	1149.8	19159.8	1149.72	19163.9	1149.57
19170.4	1149.38	19184.7	1148.79	19188.4	1148.62	19190.7	1148.37	19192.3	1148.29
19200	1148.02	19204.1	1147.99	19211.6	1147.87	19216	1147.83	19218.7	1147.79
19222.9	1147.79	19224	1147.64	19225.7	1147.45	19229.4	1147.46	19233.1	1147.34
19241.9	1147.01	19245.3	1146.98	19246.1	1146.97	19249.4	1146.95	19256.9	1146.92
19262.7	1146.91	19265.9	1146.81	19269.2	1146.7	19273.9	1146.52	19276.7	1146.47
19277.6	1146.23	19282.2	1146.07	19284.9	1145.65	19288.7	1145.4	19293.5	1145.44
19295	1145.49	19298.7	1145.6	19302.2	1145.73	19302.5	1145.87	19304.2	1145.48
19306.1	1145.21	19308.3	1144.95	19310.9	1144.61	19311.5	1144.97	19311.8	1144.65
19314.3	1144.44	19316.2	1143.99	19322.6	1143.9	19324	1143.88	19325.1	1143.38
19329.4	1143.44	19348.4	1143.83	19353.4	1143.93	19354.9	1144.08	19354.9	1144.46
19364.4	1144.64	19365	1144.47	19365	1144.14	19366.4	1144.2	19381.7	1144.51
19389	1144.65	19392.2	1144.71	19394	1144.75	19394	1144.93	19394.1	1145.25
19399.6	1145.33	19402.6	1145.37	19403.1	1145.51	19404.1	1145.75	19404.4	1145.71
19405.5	1145.6	19405.6	1145.58	19406.5	1145.45	19407	1145.34	19407.5	1145.35
19411	1145.7	19415	1146.1	19416.4	1146.28	19420.3	1146.57	19426.6	1146.67
19430.2	1146.72	19432.3	1146.33	19438.3	1146.21	19442.3	1145.82	19446.7	1145.48
19450.4	1145.41	19452.9	1145.44	19454.3	1145.52	19462.3	1145.74	19470.5	1146.09
19474.3	1146.37	19477.3	1146.63	19479.4	1146.95	19485.5	1147.87	19486.9	1148.08
19490.7	1148.4	19503.5	1149.52	19507.8	1150.29	19509.7	1150.61	19514	1151.35
19521.4	1152.66	19524.2	1152.47	19527.4	1152.21	19528.9	1152.09	19529.6	1152.03
19531.9	1151.84	19538.8	1151.36	19541.9	1151.1	19544.6	1151.01	19555.7	1151.19
19570.6	1151.93	19582.9	1152.56	19586.2	1149.42	19586.8	1148.92	19587	1148.72
19587.5	1148.17	19587.8	1147.9	19588.2	1147.63	19589.2	1146.91	19589.9	1146.56
19590.4	1146.71	19626	1132	19722	1130	19874	1130	20026	1128
20189	1128	20352	1130	20390	1145.85	20404	1153.5	20405	1153.5
20406.5	1148.36	20407.6	1149	20409.1	1149.77	20409.5	1150	20415.3	1150
20435.8	1150	20444.5	1150.45	20446.9	1150.53	20447.2	1150.64	20447.6	1150.7
20449.5	1151	20450.7	1151.34	20452.9	1152	20454.5	1152.41	20456.5	1153
20458.3	1153.51	20460.1	1154	20463.9	1154.99	20467.3	1156	20469.8	1157.16
20470.5	1157.43	20470.7	1157.17	20473.1	1157	20482.2	1157	20486	1156.52
20490.3	1156	20490.5	1153.18	20490.7	1155.38	20490.9	1155	20491.1	1154.7
20491.5	1154	20492.1	1153.12	20492.2	1153	20492.5	1152.39	20492.8	1152
20492.9	1151.81	20493.3	1151	20498.4	1151	20521.1	1150.61	20532.3	1150.68
20533.7	1150.64	20539.2	1150.65	20543.9	1150	20545.8	1150.34	20548.2	1151
20549.8	1151.47	20552	1151.31	20553.5	1151	20559.3	1151	20560.4	1151.15
20565.8	1151.32	20579.5	1151.8	20584.1	1152	20590.4	1152.5	20597.4	1152.69
20602.3	1153	20603.7	1153	20606.4	1153.16	20611.2	1153.52	20615.1	1153.82
20618.2	1154	20625.9	1154.36	20632.1	1155	20634	1155.19	20639.3	1155.35
20641.5	1155.24	20646.2	1155.81	20647.7	1156	20652.2	1156.82	20652.8	1157
20656.6	1157.7	20657.7	1158	20661.7	1159	20679.1	1163.41	20680.9	1164.05
20683.1	1164.78	20683.8	1165	20692.7	1165.29	20729.4	1165.73	20755.8	1166.01
20763.2	1166.09								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
19071	.05	19582.9	.035	20404	.06

Bank Sta: Left	Right	Coeff Contr.	Expan.
19582.9	20404	.1	.3

Ineffective Flow num= 4

Sta L	Sta R	Elev	Permanent
888	F		
888	F		
888	F		
888	F		

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

```
Weir crest shape                          = Broad Crested

Number of Abutments =  2

Abutment Data
Upstream     num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   19083    1166   19087    1166   19087    1150   19090    1120
Downstream     num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   19083    1166   19087    1166   19087    1150   19090    1120

Abutment Data
Upstream     num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   20600    1120   20606    1150   20606    1166   20610    1166
Downstream     num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   20600    1120   20606    1150   20606    1166   20610    1166

Number of Piers =  10

Pier Data
Pier Station     Upstream= 19182.5    Downstream= 19182.5
Upstream     num=       2
    Width   Elev    Width   Elev

        8    1120       8    1166
Downstream     num=       2
    Width   Elev    Width   Elev

        8    1120       8    1166

Pier Data
Pier Station     Upstream=   19280    Downstream=   19280
Upstream     num=       2
    Width   Elev    Width   Elev

        8    1120       8    1166
Downstream     num=       2
    Width   Elev    Width   Elev

        8    1120       8    1166

Pier Data
Pier Station     Upstream=   19416    Downstream=   19416
Upstream     num=       2
    Width   Elev    Width   Elev

        8    1120       8    1166
Downstream     num=       2
    Width   Elev    Width   Elev

        8    1120       8    1166

Pier Data
Pier Station     Upstream=   19569    Downstream=   19569
Upstream     num=       2
    Width   Elev    Width   Elev

        8    1120       8    1166
Downstream     num=       2
    Width   Elev    Width   Elev

        8    1120       8    1166

Pier Data
Pier Station     Upstream=   19722    Downstream=   19722
Upstream     num=       2
    Width   Elev    Width   Elev

        8    1120       8    1166
```

```
Downstream     num=       2
    Width   Elev.   Width   Elev

       8    1120       8    1166

Pier Data
Pier Station     Upstream=   19874    Downstream=   19874
Upstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1166
Downstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1166

Pier Data
Pier Station     Upstream=   20026    Downstream=   20026
Upstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1166
Downstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1166

Pier Data
Pier Station     Upstream=   20189    Downstream=   20189
Upstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1166
Downstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1166

Pier Data
Pier Station     Upstream=   20352    Downstream=   20352
Upstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1166
Downstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1166

Pier Data
Pier Station     Upstream=   20505    Downstream=   20505
Upstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1166
Downstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1166

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum                Cd    =     1.2
       Yarnell                 KVal =    1.05
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       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 water surface

BRIDGE OUTPUT Profile #PF#1
Opening : Single BR

E.G. US. (ft)	1153.04	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1151.69	E.G. Elev (ft)	1153.00	1152.96
Q Total (cfs)	169000.00	W.S. Elev (ft)	1151.45	1151.24
Q Bridge (cfs)	169000.00	Crit W.S. (ft)	1141.25	1141.49
Q Weir (cfs)		Max Chl Dpth (ft)	23.45	23.24
Weir Sta Lft (ft)		Vel Total (ft/s)	9.98	10.52
Weir Sta Rgt (ft)		Flow Area (sq ft)	16926.79	16057.75
Weir Submerg		Froude # Chl	0.38	0.41
Weir Max Depth (ft)		Specif Force (cu ft)	235493.70	228158.00
Min El Weir Flow (ft)	1165.21	Hydr Depth (ft)	20.92	20.70
Min El Prs (ft)	1165.04	W.P. Total (ft)	1059.78	1003.13
Delta EG (ft)	0.16	Conv. Total (cfs)	4557645.0	4330083.0
Delta WS (ft)	0.34	Top Width (ft)	1226.16	1274.04
BR Open Area (sq ft)	36213.46	Frctn Loss (ft)	0.02	0.02
BR Open Vel (ft/s)	10.52	C & E Loss (ft)	0.02	0.06
Coef of Q		Shear Total (lb/sq ft)	1.37	1.52
Br Sel Method	Energy only	Power Total (lb/ft s)	13.69	16.02

Warning: For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy. This is not physically possible, the momentum answer has been disregarded.
Warning: During momentum computations with the weight force on, an upstream energy was computed lower than the downstream energy. The weight force was turned off and the momentum answer was recalculated.

BRIDGE OUTPUT Profile #PF#2
Opening : Single BR

E.G. US. (ft)	1153.04	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1151.69	E.G. Elev (ft)	1153.00	1152.96
Q Total (cfs)	169000.00	W.S. Elev (ft)	1151.45	1151.24
Q Bridge (cfs)	169000.00	Crit W.S. (ft)	1141.25	1141.49
Q Weir (cfs)		Max Chl Dpth (ft)	23.45	23.24
Weir Sta Lft (ft)		Vel Total (ft/s)	9.98	10.52
Weir Sta Rgt (ft)		Flow Area (sq ft)	16926.49	16057.47
Weir Submerg		Froude # Chl	0.38	0.41
Weir Max Depth (ft)		Specif Force (cu ft)	235488.40	228153.10
Min El Weir Flow (ft)	1165.21	Hydr Depth (ft)	20.91	20.70
Min El Prs (ft)	1165.04	W.P. Total (ft)	1059.77	1003.13
Delta EG (ft)	0.16	Conv. Total (cfs)	4557531.0	4329968.0
Delta WS (ft)	0.34	Top Width (ft)	1226.14	1274.01
BR Open Area (sq ft)	36213.46	Frctn Loss (ft)	0.02	0.02
BR Open Vel (ft/s)	10.52	C & E Loss (ft)	0.02	0.06
Coef of Q		Shear Total (lb/sq ft)	1.37	1.52
Br Sel Method	Energy only	Power Total (lb/ft s)	13.69	16.02

Warning: For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy. This is not physically possible, the momentum answer has been disregarded.
Warning: During momentum computations with the weight force on, an upstream energy was computed lower than the downstream energy. The weight force was turned off and the momentum answer was recalculated.

CROSS SECTION RIVER: Salt River
REACH: Reach 4 RS: 221.061

INPUT
Description: downstream face of LRT bridge

Station Elevation Data num= 221

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
19071	1157	19071	1156.15	19081.7	1155.91	19082.2	1155.69	19089.5	1155.14
19093.6	1154.36	19107.3	1151.47	19123.9	1150.31	19143.2	1149.66	19147	1150.23
19149.1	1150.14	19152.1	1150.04	19156.3	1149.8	19159.8	1149.72	19163.9	1149.57
19170.4	1149.38	19184.7	1148.79	19188.4	1148.62	19190.7	1148.37	19192.3	1148.29
19200	1148.02	19204.1	1147.99	19211.6	1147.87	19216	1147.83	19218.7	1147.79

19222.9	1147.79	19224	1147.64	19225.7	1147.45	19229.4	1147.46	19233.1	1147.34
19241.9	1147.01	19245.3	1146.98	19246.1	1146.97	19249.4	1146.95	19256.9	1146.92
19262.7	1146.91	19265.9	1146.81	19269.2	1146.7	19273.9	1146.52	19276.7	1146.47
19277.6	1146.23	19282.2	1146.07	19284.9	1145.65	19288.7	1145.4	19293.5	1145.44
19295	1145.49	19298.7	1145.6	19302.2	1145.73	19302.5	1145.87	19304.2	1145.48
19306.1	1145.21	19308.3	1144.95	19310.9	1144.61	19311.5	1144.97	19311.8	1144.65
19314.3	1144.44	19316.2	1143.99	19322.6	1143.9	19324	1143.88	19325.1	1143.38
19329.4	1143.44	19348.4	1143.83	19353.4	1143.93	19354.9	1144.08	19354.9	1144.46
19364.4	1144.64	19365	1144.47	19365	1144.14	19366.4	1144.2	19381.7	1144.51
19389	1144.65	19392.2	1144.71	19394	1144.75	19394	1144.93	19394.1	1145.25
19399.6	1145.33	19402.6	1145.37	19403.1	1145.51	19404.1	1145.75	19404.4	1145.71
19405.5	1145.6	19405.6	1145.58	19406.5	1145.45	19407	1145.34	19407.5	1145.35
19411	1145.7	19415	1146.1	19416.4	1146.28	19420.3	1146.57	19426.6	1146.67
19430.2	1146.72	19432.3	1146.33	19438.3	1146.21	19442.3	1145.82	19446.7	1145.48
19450.4	1145.41	19452.9	1145.44	19454.3	1145.52	19462.3	1145.74	19470.5	1146.09
19474.3	1146.37	19477.3	1146.63	19479.4	1146.95	19485.5	1147.87	19486.9	1148.08
19490.7	1148.4	19503.5	1149.52	19507.8	1150.29	19509.7	1150.61	19514	1151.35
19521.4	1152.66	19524.2	1152.47	19527.4	1152.21	19528.9	1152.09	19529.6	1152.03
19531.9	1151.84	19538.8	1151.36	19541.9	1151.1	19544.6	1151.01	19555.7	1151.19
19570.6	1151.93	19582.9	1152.56	19586.2	1149.42	19586.8	1148.92	19587	1148.72
19587.5	1148.17	19587.8	1147.9	19588.2	1147.63	19589.2	1146.91	19589.9	1146.56
19590.4	1146.71	19626	1132	19722	1130	19874	1130	20026	1128
20189	1128	20352	1130	20390	1145.85	20404	1153.5	20405	1153.5
20406.5	1148.36	20407.6	1149	20409.1	1149.77	20409.5	1150	20415.3	1150
20435.8	1150	20444.5	1150.45	20446.9	1150.53	20447.2	1150.64	20447.6	1150.7
20449.5	1151	20450.7	1151.34	20452.9	1152	20454.5	1152.41	20456.5	1153
20458.3	1153.51	20460.1	1154	20463.9	1154.99	20467.3	1156	20469.8	1157.16
20470.5	1157.43	20470.7	1157.17	20473.1	1157	20482.2	1157	20486	1156.52
20490.3	1156	20490.5	1153.18	20490.7	1155.38	20490.9	1155	20491.1	1154.7
20491.5	1154	20492.1	1153.12	20492.2	1153	20492.5	1152.39	20492.8	1152
20492.9	1151.81	20493.3	1151	20498.4	1151	20521.1	1150.61	20532.3	1150.68
20533.7	1150.64	20539.2	1150.65	20543.9	1150	20545.8	1150.34	20548.2	1151
20549.8	1151.47	20552	1151.31	20553.5	1151	20559.3	1151	20560.4	1151.15
20565.8	1151.32	20579.5	1151.8	20584.1	1152	20590.4	1152.5	20597.4	1152.69
20602.3	1153	20603.7	1153	20606.4	1153.16	20611.2	1153.52	20615.1	1153.82
20618.2	1154	20625.9	1154.36	20632.1	1155	20634	1155.19	20639.3	1155.35
20641.5	1155.24	20646.2	1155.81	20647.7	1156	20652.2	1156.82	20652.8	1157
20656.6	1157.7	20657.7	1158	20661.7	1159	20679.1	1163.41	20680.9	1164.05
20683.1	1164.78	20683.8	1165	20692.7	1165.29	20729.4	1165.73	20755.8	1166.01
20763.2	1166.09								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
19071	.05	19582.9	.035	20404	.06

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
19582.9	20404	1	1	1	.1	.3

Ineffective Flow num= 4

Sta L	Sta R	Elev	Permanent
888	F		
888	F		
888	F		
888	F		

CROSS SECTION RIVER: Salt River
REACH: Reach 4 RS: 221.06

INPUT
Description: Upstream face of UPRR bridge

Station Elevation Data num= 222

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
19071	1157	19071	1156.15	19081.7	1155.91	19082.2	1155.69	19089.5	1155.14
19093.6	1154.36	19107.3	1151.47	19123.9	1150.31	19143.2	1149.66	19147	1150.23
19149.1	1150.14	19152.1	1150.04	19156.3	1149.8	19159.8	1149.72	19163.9	1149.57
19170.4	1149.38	19184.7	1148.79	19188.4	1148.62	19190.7	1148.37	19192.3	1148.29
19200	1148.02	19204.1	1147.99	19211.6	1147.87	19216	1147.83	19218.7	1147.79
19222.9	1147.79	19224	1147.64	19225.7	1147.45	19229.4	1147.46	19233.1	1147.34
19241.9	1147.01	19245.3	1146.98	19246.1	1146.97	19249.4	1146.95	19256.9	1146.92
19262.7	1146.91	19265.9	1146.81	19269.2	1146.7	19273.9	1146.52	19276.7	1146.47
19277.6	1146.23	19282.2	1146.07	19284.9	1145.65	19288.7	1145.4	19293.5	1145.44
19295	1145.49	19298.7	1145.6	19302.2	1145.73	19302.5	1145.87	19304.2	1145.48

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 19306.1 1145.21 19308.3 1144.95 19310.9 1144.61 19311.5 1144.97 19311.8 1144.65
 19314.3 1144.44 19316.2 1143.99 19322.6  1143.9   19324 1143.88 19325.1 1143.38
 19329.4 1143.44 19348.4 1143.83 19353.4 1143.93 19354.9 1144.08 19354.9 1144.46
 19364.4 1144.64   19365 1144.47   19365 1144.14 19366.4  1144.2 19381.7 1144.51
   19389 1144.65 19392.2 1144.71   19394 1144.75   19394 1144.93 19394.1 1145.25
 19399.6 1145.33 19402.6 1145.37 19403.1 1145.51 19404.1 1145.75 19404.4 1145.71
 19405.5  1145.6 19405.6 1145.58 19406.5 1145.45   19407 1145.34 19407.5 1145.35
   19411  1145.7   19415  1146.1 19416.4 1146.28 19420.3 1146.57 19426.6 1146.67
 19430.2 1146.72 19432.3 1146.33 19438.3 1146.21 19442.3 1145.82 19446.7 1145.48
 19450.4 1145.41 19452.9 1145.44 19454.3 1145.52 19462.3 1145.74 19470.5 1146.09
 19474.3 1146.37 19477.3 1146.63 19479.4 1146.95 19485.5 1147.87 19486.9 1148.08
 19490.7  1148.4 19503.5 1149.52 19507.8 1150.29 19509.7 1150.61   19514 1151.35
 19521.4 1152.66 19524.2 1152.47 19527.4 1152.21 19528.9 1152.09 19529.6 1152.03
 19531.9 1151.84 19538.8 1151.36 19541.9  1151.1 19544.6 1151.01 19555.7 1151.19
19569.31    1152 19571.3    1152 19571.3  1149.519582.21 1146.3319583.71 1146.33
19629.89  1132.119692.54    112619733.61    112819741.57    112819811.88  1126.8
19884.97    112619892.93    112619963.04    112620036.94  1126.120044.89  1126.1
20120.17    113020197.95  1133.4 20206.3  1133.420282.28    113520360.05  1135.2
20368.01  1135.220390.68    1135 20400.1 1145.8520400.29  1153.520401.46  1153.5
20401.46    115120433.01    1151 20444.5 1150.45 20446.9 1150.53 20447.2 1150.64
 20447.6  1150.7 20449.5    1151 20450.7 1151.34 20452.9    1152 20454.5 1152.41
 20456.5    1153 20458.3 1153.51 20460.1    1154 20463.9 1154.99 20467.3    1156
 20469.8 1157.16 20470.5 1157.43 20470.7 1157.17 20473.1    1157 20482.2    1157
   20486 1156.52 20490.3    1156 20490.5 1153.18 20490.7 1155.38 20490.9    1155
 20491.1  1154.7 20491.5    1154 20492.1 1153.12 20492.2    1153 20492.5 1152.39
 20492.8    1152 20492.9 1151.81 20493.3    1151 20498.4    1151 20521.1 1150.61
 20532.3 1150.68 20533.7 1150.64 20539.2 1150.65 20543.9    1150 20545.8 1150.34
 20548.2    1151 20549.8 1151.47   20552 1151.31 20553.5    1151 20559.3    1151
 20560.4 1151.15 20565.8 1151.32 20579.5  1151.8 20584.1    1152 20590.4  1152.5
 20597.4 1152.69 20602.3    1153 20603.7    1153 20606.4 1153.16 20611.2 1153.52
 20615.1 1153.82 20618.2    1154 20625.9 1154.36 20632.1    1155   20634 1155.19
 20639.3 1155.35 20641.5 1155.24 20646.2 1155.81 20647.7    1156 20652.2 1156.82
 20652.8    1157 20656.6  1157.7 20657.7    1158 20661.7    1159 20679.1 1163.41
 20680.9 1164.05 20683.1 1164.78 20683.8    1165 20692.7 1165.29 20729.4 1165.73
 20755.8 1166.01 20763.2 1166.09

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

   19071     .05 19571.3    .03520400.29     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       19571.320400.29            84.74   84.74   84.74             .1       .3
Ineffective Flow     num=       3
   Sta L   Sta R    Elev  Permanent
888       F
888       F
888       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev

   19510   19595  1152.5

BRIDGE                  RIVER: Salt River
REACH: Reach 4            RS: 221.055

INPUT
Description: Union Pacific Railraod
Distance from Upstream XS =      31
Deck/Roadway Width        =      23
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=      20
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord

   18840  1164.7  1164.719100.66 1166.53 1166.5319100.76 1166.53 1162.23
19131.19  1166.6  1162.319162.91 1166.65 1162.3519194.54 1166.72 1162.42
19226.26 1166.78  1162.519257.89 1166.84 1162.5419289.61 1167.09 1161.79
19321.44 1167.09 1161.7919419.89 1167.45 1162.1519571.55 1167.45 1162.15
19723.61 1167.46 1162.1619874.97 1167.48 1162.1820026.94 1167.51 1162.21
20187.95 1167.53 1162.2320350.05 1167.55 1162.2520501.31 1167.57 1162.27
20603.15  1167.5  1162.220631.99 1167.52 1163.07

Upstream Bridge Cross Section Data
Station Elevation Data    num=     222
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
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   19071     1157    19071 1156.15 19081.7 1155.91 19082.2 1155.69 19089.5 1155.14
 19093.6 1154.36 19107.3 1151.47 19123.9 1150.31 19143.2 1149.66   19147 1150.23
 19149.1 1150.14 19152.1 1150.04 19156.3  1149.8 19159.8 1149.72 19163.9 1149.57
 19170.4 1149.38 19184.7 1148.79 19188.4 1148.62 19190.7 1148.37 19192.3 1148.29
   19200 1148.02 19204.1 1147.99 19211.6 1147.87   19216 1147.83 19218.7 1147.79
 19222.9 1147.79   19224 1147.64 19225.7 1147.45 19229.4 1147.46 19233.1 1147.34
 19241.9 1147.01 19245.3 1146.98 19246.1 1146.97 19249.4 1146.95 19256.9 1146.92
 19262.7 1146.91 19265.9 1146.81 19269.2  1146.7 19273.9 1146.52 19276.7 1146.47
 19277.6 1146.23 19282.2 1146.07 19284.9 1145.65 19288.7  1145.4 19293.5 1145.44
   19295 1145.49 19298.7  1145.6 19302.2 1145.73 19302.5 1145.87 19304.2 1145.48
 19306.1 1145.21 19308.3 1144.95 19310.9 1144.61 19311.5 1144.97 19311.8 1144.65
 19314.3 1144.44 19316.2 1143.99 19322.6  1143.9   19324 1143.88 19325.1 1143.38
 19329.4 1143.44 19348.4 1143.83 19353.4 1143.93 19354.9 1144.08 19354.9 1144.46
 19364.4 1144.64   19365 1144.47   19365 1144.14 19366.4  1144.2 19381.7 1144.51
   19389 1144.65 19392.2 1144.71   19394 1144.75   19394 1144.93 19394.1 1145.25
 19399.6 1145.33 19402.6 1145.37 19403.1 1145.51 19404.1 1145.75 19404.4 1145.71
 19405.5  1145.6 19405.6 1145.58 19406.5 1145.45   19407 1145.34 19407.5 1145.35
   19411  1145.7   19415  1146.1 19416.4 1146.28 19420.3 1146.57 19426.6 1146.67
 19430.2 1146.72 19432.3 1146.33 19438.3 1146.21 19442.3 1145.82 19446.7 1145.48
 19450.4 1145.41 19452.9 1145.44 19454.3 1145.52 19462.3 1145.74 19470.5 1146.09
 19474.3 1146.37 19477.3 1146.63 19479.4 1146.95 19485.5 1147.87 19486.9 1148.08
 19490.7  1148.4 19503.5 1149.52 19507.8 1150.29 19509.7 1150.61   19514 1151.35
 19521.4 1152.66 19524.2 1152.47 19527.4 1152.21 19528.9 1152.09 19529.6 1152.03
 19531.9 1151.84 19538.8 1151.36 19541.9  1151.1 19544.6 1151.01 19555.7 1151.19
19569.31     1152 19571.3    1152 19571.3  1149.519582.21 1146.3319583.71 1146.33
19629.89  1132.119692.54    112619733.61    112819741.57    112819811.88  1126.8
19884.97    112619892.93    112619963.04    112620036.94  1126.120044.89  1126.1
20120.17    113020197.95  1133.4 20206.3  1133.420282.28    113520360.05  1135.2
20368.01  1135.220390.68    1135 20400.1 1145.8520400.29  1153.520401.46  1153.5
20401.46    115120433.01    1151 20444.5 1150.45 20446.9 1150.53 20447.2 1150.64
 20447.6  1150.7 20449.5    1151 20450.7 1151.34 20452.9    1152 20454.5 1152.41
 20456.5    1153 20458.3 1153.51 20460.1    1154 20463.9 1154.99 20467.3    1156
 20469.8 1157.16 20470.5 1157.43 20470.7 1157.17 20473.1    1157 20482.2    1157
   20486 1156.52 20490.3    1156 20490.5 1153.18 20490.7 1155.38 20490.9    1155
 20491.1  1154.7 20491.5    1154 20492.1 1153.12 20492.2    1153 20492.5 1152.39
 20492.8    1152 20492.9 1151.81 20493.3    1151 20498.4    1151 20521.1 1150.61
 20532.3 1150.68 20533.7 1150.64 20539.2 1150.65 20543.9    1150 20545.8 1150.34
 20548.2    1151 20549.8 1151.47   20552 1151.31 20553.5    1151 20559.3    1151
 20560.4 1151.15 20565.8 1151.32 20579.5  1151.8 20584.1    1152 20590.4  1152.5
 20597.4 1152.69 20602.3    1153 20603.7    1153 20606.4 1153.16 20611.2 1153.52
 20615.1 1153.82 20618.2    1154 20625.9 1154.36 20632.1    1155   20634 1155.19
 20639.3 1155.35 20641.5 1155.24 20646.2 1155.81 20647.7    1156 20652.2 1156.82
 20652.8    1157 20656.6  1157.7 20657.7    1158 20661.7    1159 20679.1 1163.41
 20680.9 1164.05 20683.1 1164.78 20683.8    1165 20692.7 1165.29 20729.4 1165.73
 20755.8 1166.01 20763.2 1166.09

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

   19071     .05 19571.3    .03520400.29     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
       19571.320400.29             .1       .3
Ineffective Flow     num=       3
   Sta L   Sta R    Elev  Permanent
888       F
888       F
888       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev

   19510   19595  1152.5

Downstream  Deck/Roadway Coordinates
    num=      20
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord

   18840  1164.7  1164.719100.66 1166.53 1166.5319100.76 1166.53 1162.23
19131.19  1166.6  1162.319162.91 1166.65 1162.3519194.54 1166.72 1162.42
19226.26 1166.78  1162.519257.89 1166.84 1162.5419289.61 1167.09 1161.79
19321.44 1167.09 1161.7919419.89 1167.45 1162.1519571.55 1167.45 1162.15
19723.61 1167.46 1162.1619874.97 1167.48 1162.1820026.94 1167.51 1162.21
20187.95 1167.53 1162.2320350.05 1167.55 1162.2520501.31 1167.57 1162.27
20603.15  1167.5  1162.220631.99 1167.52 1163.07
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Downstream Bridge Cross Section Data
Station Elevation Data    num=      73
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

18854.04  1164.719113.27 1166.5319113.37  1162.219113.46  1158.719143.63  1154.4
19145.91  1154.419175.17    115219177.45    115219206.63  1148.619207.81  1148.6
19209.01  1148.619238.17    114819240.45    114819269.63    114819272.01    1148
 19296.6  1148.519366.22  1148.519392.32    114719398.79    114819403.76    1149
19488.29    115019492.77    114919495.75    114919508.18    115019516.88    1152
 19523.6    115319528.07  1153.519538.02    115319547.96    115219582.77  1149.5
19582.77    115219584.76    115219584.76    114719592.84 1146.3319594.34 1146.33
19629.89  1132.119692.54    112619733.61    112819741.57    112819811.88  1126.8
19884.97    112619892.93    112619963.04    112620036.94  1126.120044.89  1126.1
20120.17    113020197.95  1133.4 20206.3  1133.420282.28    113520360.05  1135.2
20368.01  1135.220390.68    113520397.21 1146.3320398.81 1146.3320398.81  1153.5
20399.98  1153.520399.98    115120438.28    115120459.681157.05420482.721157.049
 20483.51150.76720539.571150.93520582.951151.42620583.19 1152.0120617.43  1155.4
20666.23 1163.9320682.11 1164.57 20739.1 1166.3620758.09 1170.8720759.88  1171.1
20787.72 1172.1820807.96 1175.0920827.44 1173.62

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

18854.04     .0519584.76    .03520398.81     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
      19584.7620398.81             .1       .3
Ineffective Flow     num=       3
   Sta L   Sta R    Elev  Permanent
888       F
888       F
888       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev

   19510   19607  1151.5

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

Number of Abutments =  1

Abutment Data
Upstream     num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   19520    1151   19607    1151 19607.1  1153.5   19608  1153.5   19610    1149
 19618.5  1143.5   19629    1130
Downstream     num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   19520    1151   19607    1151 19607.1  1153.5   19608  1153.5   19610    1149
 19618.5  1143.5   19629    1130

Number of Piers =  16

Pier Data
Pier Station     Upstream=19133.34    Downstream=19133.34
Upstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163
Downstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163

Pier Data
Pier Station     Upstream=19165.06    Downstream=19165.06
Upstream     num=       2
    Width   Elev    Width   Elev
```

```
     2.3    1120     2.3    1163
Downstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163

Pier Data
Pier Station     Upstream= 19193.7    Downstream= 19193.7
Upstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163
Downstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163

Pier Data
Pier Station     Upstream=19228.41    Downstream=19228.41
Upstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163
Downstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163

Pier Data
Pier Station     Upstream=19260.04    Downstream=19260.04
Upstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163
Downstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163

Pier Data
Pier Station     Upstream=19291.76    Downstream=19291.76
Upstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163
Downstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163

Pier Data
Pier Station     Upstream=19323.59    Downstream=19323.59
Upstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163
Downstream     num=       2
    Width   Elev    Width   Elev

     2.3    1120     2.3    1163

Pier Data
Pier Station     Upstream=19424.89    Downstream=19424.89
Upstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1163
Downstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1163

Pier Data
Pier Station     Upstream=19576.55    Downstream=19576.55
Upstream     num=       2
```

```
    Width   Elev    Width   Elev

       8    1120       8    1163
Downstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1163

Pier Data
Pier Station     Upstream=19728.61    Downstream=19728.61
Upstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1163
Downstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1163

Pier Data
Pier Station     Upstream=19879.97    Downstream=19879.97
Upstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1163
Downstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1163

Pier Data
Pier Station     Upstream=20031.94    Downstream=20031.94
Upstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1163
Downstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1163

Pier Data
Pier Station     Upstream=20192.95    Downstream=20192.95
Upstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1163
Downstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1163

Pier Data
Pier Station     Upstream=20355.05    Downstream=20355.05
Upstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1163
Downstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1163

Pier Data
Pier Station     Upstream=20506.31    Downstream=20506.31
Upstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1163
Downstream     num=       2
    Width   Elev    Width   Elev

       8    1120       8    1163

Pier Data
Pier Station     Upstream=20608.15    Downstream=20608.15
```

```
Upstream      num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163
Downstream      num=        2
    Width   Elev    Width   Elev

       8    1120       8    1163

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum                Cd   =     1.2
       Yarnell                 KVal =    1.05
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       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 water surface

BRIDGE OUTPUT    Profile #PF#1
Opening : Single BR

 E.G. US. (ft)              1152.87   Element                Inside BR US Inside BR DS
 W.S. US. (ft)              1151.38   E.G. Elev (ft)             1152.80      1152.77
 Q Total (cfs)            169000.00   W.S. Elev (ft)             1151.04      1150.99
 Q Bridge (cfs)           169000.00   Crit W.S. (ft)             1141.38      1141.38
 Q Weir (cfs)                         Max Chl Dpth (ft)            25.04        24.99
 Weir Sta Lft (ft)                    Vel Total (ft/s)             10.66        10.70
 Weir Sta Rgt (ft)                    Flow Area (sq ft)         15849.43     15787.73
 Weir Submerg                         Froude # Chl                 0.41         0.41
 Weir Max Depth (ft)                  Specif Force (cu ft)     229892.10    229176.40
 Min El Weir Flow (ft)       1157.96  Hydr Depth (ft)              20.77        21.06
 Min El Prs (ft)             1166.53  W.P. Total (ft)             994.61       978.18
 Delta EG (ft)                  0.20  Conv. Total (cfs)        4261033.0    4280691.0
 Delta WS (ft)                  0.27  Top Width (ft)             1237.02      1107.06
 BR Open Area (sq ft)       31854.00  Frctn Loss (ft)              0.04         0.04
 BR Open Vel (ft/s)            10.70  C & E Loss (ft)              0.00         0.07
 Coef of Q                            Shear Total (lb/sq ft)       1.56         1.57
 Br Sel Method           Energy only  Power Total (lb/ft s)        16.69        16.81


BRIDGE OUTPUT    Profile #PF#2
Opening : Single BR

 E.G. US. (ft)              1152.87   Element                Inside BR US Inside BR DS
 W.S. US. (ft)              1151.38   E.G. Elev (ft)             1152.80      1152.77
 Q Total (cfs)            169000.00   W.S. Elev (ft)             1151.04      1150.99
 Q Bridge (cfs)           169000.00   Crit W.S. (ft)             1141.38      1141.38
 Q Weir (cfs)                         Max Chl Dpth (ft)            25.04        24.99
 Weir Sta Lft (ft)                    Vel Total (ft/s)             10.66        10.70
 Weir Sta Rgt (ft)                    Flow Area (sq ft)         15849.15     15787.45
 Weir Submerg                         Froude # Chl                 0.41         0.41
 Weir Max Depth (ft)                  Specif Force (cu ft)     229887.30    229171.50
 Min El Weir Flow (ft)       1157.96  Hydr Depth (ft)              20.77        21.06
 Min El Prs (ft)             1166.53  W.P. Total (ft)             994.61       978.18
 Delta EG (ft)                  0.20  Conv. Total (cfs)        4260920.0    4280578.0
 Delta WS (ft)                  0.27  Top Width (ft)             1237.01      1107.03
 BR Open Area (sq ft)       31854.00  Frctn Loss (ft)              0.04         0.04
 BR Open Vel (ft/s)            10.70  C & E Loss (ft)              0.00         0.07
 Coef of Q                            Shear Total (lb/sq ft)       1.57         1.57
 Br Sel Method           Energy only  Power Total (lb/ft s)        16.69        16.81


CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 221.05

INPUT
Description: Downstream face of UPRR bridge
```

```
Station Elevation Data    num=      73
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

18854.04  1164.719113.27 1166.5319113.37  1162.219113.46  1158.719143.63  1154.4
19145.91  1154.419175.17    115219177.45    115219206.63  1148.619207.81  1148.6
19209.01  1148.619238.17    114819240.45    114819269.63    114819272.01    1148
 19296.6  1148.519366.22  1148.519392.32    114719398.79    114819403.76    1149
19488.29    115019492.77    114919495.75    114919508.18    115019516.88    1152
 19523.6    115319528.07  1153.519538.02    115319547.96    115219582.77  1149.5
19582.77    115219584.76    115219584.76    114719592.84 1146.3319594.34 1146.33
19629.89  1132.119692.54    112619733.61    112819741.57    112819811.88  1126.8
19884.97    112619892.93    112619963.04    112620036.94  1126.120044.89  1126.1
20120.17    113020197.95  1133.4 20206.3  1133.420282.28    113520360.05  1135.2
20368.01  1135.220390.68    113520397.21 1146.3320398.81 1146.3320398.81  1153.5
20399.98  1153.520399.98    115120438.28    115120459.681157.05420482.721157.049
 20483.51150.76720539.571150.93520582.951151.42620583.19 1152.0120617.43  1155.4
20666.23 1163.9320682.11 1164.57 20739.1 1166.3620758.09 1170.8720759.88  1171.1
20787.72 1172.1820807.96 1175.0920827.44 1173.62

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

18854.04     .0519584.76    .03520398.81     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19584.7620398.81              210  167.68      80              .1       .3
Ineffective Flow     num=       3
   Sta L   Sta R    Elev  Permanent
888        F
888        F
888        F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev

   19510   19607  1151.5

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 221.02

INPUT
Description:
Station Elevation Data    num=     198
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

 15044.3    116115046.74 1160.8115054.99 1160.9915067.31 1160.6915118.09 1159.67
15188.86  1159.915261.54 1159.9715295.45 1160.1415332.02 1158.6115339.82 1158.24
15380.65  1157.715388.69 1157.7615513.83 1159.1115577.72 1158.4215622.59 1158.37
15670.19  1158.315740.55 1159.1815755.81 1159.1915780.94 1158.42 15794.9 1158.07
15840.15    1157 15862.8 1158.0415868.58 1158.2515878.24 1158.2715931.25 1157.44
16026.39  1158.3 16042.1 1158.3516063.87 1158.0616173.44 1157.7216198.77 1157.57
16240.13  1156.916263.89 1157.7716286.32 1156.4916315.25 1157.6816425.38 1156.64
 16472.1  1156.216481.97 1156.1316484.62 1156.2416543.72 1155.97 16656.3 1155.75
16680.03  1156.416701.67 1155.6816728.06 1157.12 16750.9 1156.9516855.76 1157.05
16901.91  1157.116958.94 1156.6217074.38 1155.6617090.35 1156.28 17098.2 1156.49
17121.74  1155.117157.02 1155.3917177.67 1155.3717290.67 1155.8117359.48 1156.44
17401.65  1156.617496.83 1157.4717533.23 1157.7117610.32 1157.9617651.54 1158.27
17781.11  1158.517812.58 1158.8317889.77 1158.4817945.95 1158.4318065.89 1158.44
18105.38  1158.318202.28 1157.8818260.45 1157.8418310.83 1158.05   18378 1158.54
 18419.2  1157.718429.86 1157.3818444.45 1157.7718468.43 1158.2518483.22 1156.71
18487.84  1156.7   18552 1157.6218598.58 1157.51 18671.6 1157.4718724.73 1157.28
18802.71  1157.118855.51 1156.8918882.85  1156.418939.89 1157.0118962.01  1156.9
18980.67  1156.718996.52 1156.7519046.82 1156.3919054.65 1155.9519125.72 1152.64
 19144.8  1157.3 19147.3 1157.8119158.87 1158.7819187.22 1152.7319199.35 1150.01
19201.06  1149.319221.83  1148.519291.83  1148.519366.58    114719374.98    1148
19380.98    114919402.58    115019466.58    115019473.98    115119509.58  1149.5
19509.58    115219511.58    115219511.58 1146.33   19519 1146.3319549.33 1135.36
19552.87  1133.419554.34 1133.5319573.39 1132.4719596.68 1135.0219601.53 1134.82
19702.75    113119732.46 1130.5319814.47 1130.3419836.04 1130.1819975.05  1131.8
20064.35  1130.620095.86 1130.06 20155.2 1130.7520233.83 1131.55 20325.5 1131.38
20376.39 1136.8620379.97 1146.3320381.47 1146.3320381.47  1153.520383.47  1153.5
20383.47    115120395.47    115120492.961152.07820513.381152.71520550.411159.938
20562.131160.92920642.55 1164.38 20670.1 1166.0620685.24  1168.820694.24 1171.25
20759.53 1195.5820766.38 1193.5620794.56 1193.4920802.53    119320860.02 1192.48
20891.04 1189.0320921.83 1184.5520973.53 1176.5821007.78  1169.7 21020.9  1166.7
21043.59 1167.8621058.76 1167.3921077.96  1165.121084.16  1164.521125.91 1172.49
21137.04 1175.4421155.09 1177.0621179.84 1178.32 21199.1  1179.721217.63 1179.96
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21324.45 1182.8521329.09 1182.8921337.12 1180.9721339.29  1181.321359.14 1183.27
21368.63 1182.1621379.89  1181.421410.49 1180.9921439.46  1180.821455.92 1180.06
21468.95 1179.3121470.21 1179.7421475.48 1179.9821499.92  1177.321505.23  1176.9
 21509.4 1177.8421555.88 1191.1721570.26 1193.9721572.09  1194.821600.37 1195.61
21610.52  1195.621618.72 1196.1321666.21 1196.3721680.57  1195.721714.58 1194.78
21730.11 1194.5121742.46 1194.7221795.72 1191.81 21831.3  1190.321844.02 1190.21
 21857.8 1193.4321868.24 1193.7721900.08 1195.1721920.57    119521934.48 1195.09
21969.69 1194.5221976.39 1193.8721983.44 1192.33

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

 15044.3     .0519511.58    .03520381.47     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19511.5820381.47              530  503.55     450             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev

 15044.3   19150    1156

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 220.92

INPUT
Description:
Station Elevation Data    num=     256
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

15056.94  1158.315076.82 1156.2415078.01  1156.515085.42 1156.98 15091.4 1157.54
15092.38  1157.715132.68 1156.1915136.58 1156.0115142.69 1156.0415285.82 1156.09
15333.21  1155.415354.33 1154.7815385.82  1155.3   15402 1155.4715501.97 1156.32
15525.24  1156.115590.72  1155.4 15610.6 1155.3415746.64  1155.415775.17 1154.91
15792.22  1154.915831.19  1154.715850.08 1154.5815854.93 1154.5115860.35 1153.76
15861.43  1153.815883.33 1156.1415928.57 1155.6115962.04 1155.2815975.13 1155.33
15996.69  1155.316126.78 1154.9316218.25  1154.616274.39  1155.216288.62 1155.19
16354.88  1154.616404.13  1154.616519.19 1154.5716521.31 1154.67 16544.3 1155.19
16674.08  1156.216693.66 1155.3916704.58 1155.2116754.43 1154.7516767.64 1154.51
16947.93  1153.917054.56 1153.2917089.35 1154.5817115.83 1153.75 17124.3 1154.05
17152.88  1154.717229.24 1155.1717259.62  1155.517358.95 1154.9317368.96 1155.12
17384.65  1156.217408.17  1154.917428.41 1156.2717434.19 1156.3417506.93 1156.38
 17532.5  1156.617643.84 1156.4817662.16 1156.6117702.03  1156.7 17817.4 1156.92
17830.58    115717917.79 1157.63 17979.7 1157.6518018.43 1157.5218084.18 1157.06
18143.35  1157.518147.32 1157.5318297.14 1157.2318301.96 1157.2118323.41 1156.76
18375.77  1155.818380.73 1155.7918409.33 1155.7318422.82 1155.5118452.23 1155.53
18468.78  1155.918481.68 1155.8618496.53 1156.0318551.56 1155.6718647.29 1154.57
18693.89  1153.918707.39 1153.6418754.24 1153.7618813.55 1153.8718864.59 1154.06
18887.41  1154.718913.94 1155.0118934.68 1156.2318984.13 1150.57 18986.8 1150.32
19004.77  1153.319026.27 1156.8819040.29 1157.5319050.92 1155.8519073.98 1152.34
19092.01  1151.619116.39 1150.0519123.92 1149.3619138.68 1149.3619192.02 1149.53
19214.34  1149.919229.37 1152.6419252.46 1158.11 19262.2 1158.8719297.45 1157.11
19318.87  1155.819324.16 1154.7919335.92    115019342.12    115119347.02    1152
19349.72    115219355.32    115119362.92    115019372.32    114919414.12    1148
19445.32    114819453.52    114719458.12    114719467.12    114819475.12    1149
19482.32    115019490.72    115119497.72    115219508.12    115219514.12    1151
19545.32  1148.519545.32    115119547.32    115119547.32 1146.3319548.82 1146.33
19576.51  1134.619587.17 1129.16 19608.3 1130.0919676.46 1131.71 19705.2 1131.96
19733.24  1131.719838.63 1130.3519914.22 1131.5819977.78 1132.5720015.93 1131.94
20098.73  1130.320220.32 1131.4420236.84 1131.5620266.69  1131.620358.46 1131.61
20387.17  1140.320398.68 1143.6220407.79 1143.9820409.09 1146.3320410.59 1146.33
20410.59    115120412.59    115120412.59  1148.520424.59  1148.520540.671153.943
20550.22 1155.9220575.351158.19920595.031162.23620673.67  1178.6 20722.4  1187.4
20757.73 1190.3320774.83 1191.3720800.66  1191.2 20804.1 1190.8820824.56 1189.42
20851.13 1190.8420874.18 1191.0820941.46  1192.220978.01 1191.07 20982.4 1190.85
21008.46 1193.5321016.52  1192.821033.82  1192.721056.09 1192.7321105.45 1178.51
21154.97 1162.9421224.56 1163.9221300.76  1165.7 21334.6 1167.8121348.51 1166.74
21358.61 1165.4721385.06 1167.9521409.45    1166 21414.6 1165.77 21417.4 1168.55
21429.15 1178.6621433.72 1178.4321441.24  1177.721447.86 1177.93 21464.7  1178.4
21471.88 1177.9321486.87 1177.4521524.71  1176.721570.22 1175.1221579.81 1175.27
21582.09  1175.221594.81 1172.4521597.81  1172.421618.81 1176.85 21623.8  1177.7
21636.86 1177.4221646.82 1176.7321679.65  1174.821702.01 1174.2221704.67 1174.74
21721.42 1174.9421740.46 1176.1321746.66  1176.321773.81 1176.5921787.05  1176.1
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21792.77 1175.4521822.28 1176.8621838.23  1177.121868.53 1177.9421871.44  1178.1
21877.86 1177.8521903.56  1176.521908.69  1173.621921.88 1172.56 21936.7 1176.72
21952.08  1177.821957.85 1178.3621978.05  1179.621987.23 1181.3221991.73 1181.86
22001.18  1181.922022.78 1184.1222029.69    118522051.86 1185.91 22081.2 1187.06
22087.57 1187.4522112.52 1185.6622122.29  1184.322146.68 1182.1622172.21  1180.5
22189.25 1177.5122196.21 1176.8622204.41  1176.422207.61  1176.522229.25 1175.36
22252.83 1180.4922263.35 1181.2422272.03  1180.522326.75 1180.1922330.68  1180.4
22367.48 1183.9222408.32 1184.9122434.33  1185.422440.61 1185.34 22461.3 1184.78
22481.54 1184.43

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

15056.94     .0519547.32    .03520410.59     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19547.3220410.59              560  518.52     450             .1       .3
Ineffective Flow     num=       3
   Sta L   Sta R    Elev  Permanent
888       F
888       F
888       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev

15056.94   19035    1156

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 220.82

INPUT
Description:
Station Elevation Data    num=     259
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

14966.67  1155.7 14994.9 1155.2315013.71 1154.0115021.11 1153.2415050.66 1152.65
15099.94  1152.7 15126.2 1152.59 15191.9 1152.8615243.19 1152.4715250.24 1152.37
   15320  1152.915352.84 1153.5415386.05 1153.4815392.04  1153.2   15408 1152.23
15416.37  1152.315429.68 1152.5715444.43 1152.3415469.09 1152.2515557.75 1151.86
15628.53  1152.5 15672.2 1152.9815686.44 1151.5315728.08 1152.1615748.26 1152.35
15782.75  1153.415803.31 1152.7815849.34 1152.4115922.54 1151.5415965.71 1151.57
16105.59  1151.516112.76 1151.6116148.28 1154.0316175.63 1153.9116187.03 1153.49
16210.44  1153.416219.87 1153.1616229.03 1153.4316231.92 1153.7216303.07 1152.63
16354.15  1152.716380.98 1152.7216394.77 1152.6216430.95 1152.8916514.83 1153.13
16560.89  1153.416578.84 1152.5816629.65 1150.4216648.01 1150.4516695.46 1150.95
 16724.6  1151.116832.81 1151.8416937.42 1151.7816970.15 1152.3916981.11 1152.48
16989.67  1152.917011.25 1152.7717034.73  1153.117039.76 1153.3217062.09 1155.14
 17147.1  1153.917172.08 1154.0217193.39 1155.5217202.14 1155.8817248.97  1155.9
17265.63  1155.717297.38 1154.7617315.73 1153.8717319.73  1153.617352.48 1154.26
17361.43  1154.417372.68 1154.3117442.96 1153.6417471.11 1154.4117499.21 1155.65
17565.37  1155.417596.88 1155.26 17615.1 1155.8517640.73 1156.4517653.51 1156.31
 17664.8  1156.1   17677 1156.53 17703.8 1156.6217762.99 1156.09 17805.4 1156.21
17842.82  1156.417871.78 1156.8517885.61 1156.3717937.13 1156.8617965.61 1157.26
17997.08  1157.118162.42 1157.1318212.41 1157.0118217.42 1156.9518247.84 1155.01
18291.62  1156.818294.91 1157.0618323.51  1154.6 18349.5    115418364.36 1153.56
18380.47  1154.618411.31 1153.6718465.27 1153.4618533.94 1152.5818551.54 1152.58
18577.54  1152.418629.65 1152.66 18635.6 1152.8318686.63 1153.7818723.07 1154.13
18733.12  1154.818806.96 1153.9518815.49 1153.6318848.51 1149.7218861.19 1148.53
18876.01  1148.818879.55 1149.3218908.05 1153.79 18919.3  1153.418983.58  1152.3
 19000.8  1151.8   19010 1153.7419023.73 1156.2719034.07 1157.2919037.58 1156.53
19073.99  1149.119089.08 1149.2819093.85 1149.0719102.34 1150.4219115.72 1150.38
19135.01  1150.619152.18 1149.5919196.97 1148.9719202.14 1148.8119216.01 1149.13
19228.26  1148.919235.07 1147.76 19299.3 1147.9219335.62 1148.2519357.09 1148.57
19390.82  1155.419394.26 1155.99 19404.6 1156.6619422.48 1152.7119456.86 1145.22
 19466.2  1146.6 19492.6 1150.1519503.84    115119503.84  1153.519505.84  1153.5
19505.84 1146.3319507.34 1146.33 19513.3 1145.1319521.34  1137.919535.91  1139.4
19554.48 1132.9419565.22 1129.5619593.76  1130.319639.73 1131.7319657.19  1131.5
19773.87 1129.9819873.48 1130.9819913.76 1131.1919944.72    113120035.35    1130
20064.49 1130.0120174.19 1130.0420216.93 1129.9920301.27 1129.7120329.01  1130.7
20343.21 1135.1620357.45 1138.5320368.79 1141.7720372.67 1146.3320374.17 1146.33
20374.17    115120376.17    115120376.17  1148.520388.17  1148.520487.49 1155.96
20520.961155.87220561.271162.43520587.051168.34620624.24 1179.3220645.69 1177.93
20650.23  1177.920654.43 1179.0820672.84 1182.9820691.43 1182.5320711.77 1182.31
20726.85  1180.620751.98 1176.5320790.42 1177.8320866.31  1179.420886.86 1179.88
20891.78  1179.9 20945.2 1178.3320946.24 1178.4620970.97    118320977.55  1183.6
20990.97  1182.421016.54 1183.8421027.23 1184.24 21049.3 1185.5921139.77 1162.31
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21157.79  1157.721160.49  1157.421179.51 1154.7321238.31 1153.52 21243.5 1153.81
21315.86  1157.321324.45 1157.58 21363.1 1159.4821380.83 1160.4721399.61  1165.3
21437.88    116421447.56 1160.68 21454.8 1158.03 21473.7 1158.38 21494.5  1158.6
21549.92  1158.321575.58 1159.9421603.97  1164.921625.71 1169.4721631.47 1171.18
21647.04  1167.921667.64 1170.4121673.43 1170.9721685.04 1170.7221720.26 1171.33
21734.34  1171.521777.94 1171.02 21794.5 1171.1321803.73 1171.3421815.17 1171.71
21830.12  1169.921841.34 1168.2821848.75 1169.5321866.74 1173.4221873.12 1174.92
21919.28  1175.321939.52  1175.221987.72 1175.3522008.71 1176.0722022.69 1176.31
22044.47  1176.422061.01 1176.7122105.28 1176.9222127.76 1176.78 22155.6 1177.46
22185.01  1176.722253.65  1177.122327.29 1175.3722341.26 1175.3422408.59 1175.97
22420.56  1182.122430.93 1184.4122455.02 1185.5422498.64 1186.42

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

14966.67    .03519505.84    .03520374.17     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19505.8420374.17               197  191.93     187              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 220.756

INPUT
Description: Upstream End of Apron
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   19547    1155   19547    1147 19578.5    1129 20421.5    1129   20453    1147
   20453    1155

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

   19547    .015   19547    .015   20453    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         19547   20453                 6       6       6              .1       .3

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 220.755

INPUT
Description: Downstream Bladder
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   19547    1155   19547    1147 19578.5    1132 20421.5    1132   20453    1147
   20453    1155

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

   19547    .015   19547    .015   20453    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         19547   20453                54      54      54              .1       .3

BRIDGE                 RIVER: Salt River
REACH: Reach 4            RS: 220.752

INPUT
Description:
Distance from Upstream XS =       1
Deck/Roadway Width        =      52
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord

   19547    1175    1174   20453    1175    1174
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Upstream Bridge Cross Section Data
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   19547    1155   19547    1147 19578.5    1132 20421.5    1132   20453    1147
   20453    1155

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

   19547    .015   19547    .015   20453    .015

Bank Sta: Left   Right    Coeff Contr.   Expan.
         19547   20453             .1       .3

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord

   19547    1175    1174   20453    1175    1174

Downstream Bridge Cross Section Data
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   19547    1155   19547    1147 19578.5 1131.67 20421.5 1131.67   20453    1147
   20453    1155

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

   19547    .015   19547    .015   20453    .015

Bank Sta: Left   Right    Coeff Contr.   Expan.
         19547   20453             .1       .3

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

Number of Piers =  3

Pier Data
Pier Station     Upstream=   19772    Downstream=   19772
Upstream     num=       3
    Width   Elev    Width   Elev    Width   Elev

   27.33    1132     5.66  1153.5     5.66 1161.17
Downstream     num=       3
    Width   Elev    Width   Elev    Width   Elev

   27.33 1131.67     5.66  1153.5     5.66 1161.17

Pier Data
Pier Station     Upstream=   20000    Downstream=   20000
Upstream     num=       3
    Width   Elev    Width   Elev    Width   Elev

   27.33    1132     5.66  1153.5     5.66    1161
Downstream     num=       3
    Width   Elev    Width   Elev    Width   Elev

   27.33 1131.67     5.66  1153.5     5.66    1161

Pier Data
Pier Station     Upstream=   20228    Downstream=   20228
Upstream     num=       3
    Width   Elev    Width   Elev    Width   Elev

   27.33    1132     5.66  1153.5     5.66    1161
Downstream     num=       3
    Width   Elev    Width   Elev    Width   Elev
```

```
   27.33 1131.67    5.66  1153.5    5.66    1161

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum                Cd   =     1.6
       Yarnell                 KVal =      .9
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

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

BRIDGE OUTPUT    Profile #PF#1
Opening : Single BR

 E.G. US. (ft)              1150.73   Element                Inside BR US Inside BR DS
 W.S. US. (ft)              1148.66   E.G. Elev (ft)             1150.53      1150.18
 Q Total (cfs)            169000.00   W.S. Elev (ft)             1147.92      1147.55
 Q Bridge (cfs)           169000.00   Crit W.S. (ft)             1143.32      1142.98
 Q Weir (cfs)                         Max Chl Dpth (ft)            15.92        15.88
 Weir Sta Lft (ft)                    Vel Total (ft/s)             12.97        13.02
 Weir Sta Rgt (ft)                    Flow Area (sq ft)         13029.56     12976.25
 Weir Submerg                         Froude # Chl                 0.59         0.59
 Weir Max Depth (ft)                  Specif Force (cu ft)     169378.00    169012.90
 Min El Weir Flow (ft)       1175.01  Hydr Depth (ft)              14.94        14.89
 Min El Prs (ft)             1174.00  W.P. Total (ft)             939.62       938.54
 Delta EG (ft)                  0.57  Conv. Total (cfs)        7449955.0    7404858.0
 Delta WS (ft)                  0.66  Top Width (ft)              872.16       871.30
 BR Open Area (sq ft)       36387.56  Frctn Loss (ft)
 BR Open Vel (ft/s)            13.02  C & E Loss (ft)
 Coef of Q                            Shear Total (lb/sq ft)        0.45         0.45
 Br Sel Method             Momentum   Power Total (lb/ft s)         5.78         5.86


BRIDGE OUTPUT    Profile #PF#2
Opening : Single BR

 E.G. US. (ft)              1150.73   Element                Inside BR US Inside BR DS
 W.S. US. (ft)              1148.66   E.G. Elev (ft)             1150.53      1150.18
 Q Total (cfs)            169000.00   W.S. Elev (ft)             1147.92      1147.55
 Q Bridge (cfs)           169000.00   Crit W.S. (ft)             1143.32      1142.98
 Q Weir (cfs)                         Max Chl Dpth (ft)            15.92        15.88
 Weir Sta Lft (ft)                    Vel Total (ft/s)             12.97        13.02
 Weir Sta Rgt (ft)                    Flow Area (sq ft)         13029.35     12976.04
 Weir Submerg                         Froude # Chl                 0.59         0.59
 Weir Max Depth (ft)                  Specif Force (cu ft)     169375.90    169010.90
 Min El Weir Flow (ft)       1175.01  Hydr Depth (ft)              14.94        14.89
 Min El Prs (ft)             1174.00  W.P. Total (ft)             939.61       938.54
 Delta EG (ft)                  0.57  Conv. Total (cfs)        7449761.0    7404659.0
 Delta WS (ft)                  0.66  Top Width (ft)              872.16       871.30
 BR Open Area (sq ft)       36387.56  Frctn Loss (ft)
 BR Open Vel (ft/s)            13.02  C & E Loss (ft)
 Coef of Q                            Shear Total (lb/sq ft)        0.45         0.45
 Br Sel Method             Momentum   Power Total (lb/ft s)         5.78         5.86


CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 220.75

INPUT
Description: Downstream Bladder
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   19547    1155   19547    1147 19578.5 1131.67 20421.5 1131.67   20453    1147
   20453    1155
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Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val

   19547    .015   19547    .015   20453    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         19547   20453               31      31      31             .1       .3

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 220.74

INPUT
Description: Downstream End of Apron
Station Elevation Data     num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   19547    1155   19547    1147 19578.5    1129 20421.5    1129   20453    1147
   20453    1155

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

   19547    .032   19547    .032   20453    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         19547   20453               30      30      30             .1       .3

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 220.735

INPUT
Description: Downstrem End of Rip-Rap
Station Elevation Data     num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

   19547    1155   19547    1147 19578.5    1129 20421.5    1129   20453    1147
   20453    1155

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

   19547    .035   19547    .035   20453    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         19547   20453              182     182     182             .1       .3

CROSS SECTION          RIVER: Salt River
REACH: Reach 4            RS: 220.73

INPUT
Description:
Station Elevation Data     num=     313
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev

 14797.3  1154.314913.57 1152.42 14944.1 1152.2614944.42 1151.4714966.97 1151.88
 14980.8  1152.315003.23  1152.215059.05 1152.1915081.02 1152.1115093.12 1152.34
15126.06  1152.115181.19 1151.6115210.79 1150.4715233.66 1151.4715251.43 1150.94
 15273.4    115115362.88 1150.5915379.06 1150.0515423.88 1149.9515459.88 1149.65
15539.57  1149.315572.44 1149.2815584.29  1149.515599.68 1150.4415612.48  1148.8
15672.24  1149.415700.28 1151.35   15798 1151.37 15867.6 1150.9915916.69 1151.03
15952.86    115116008.14 1150.9116080.12 1151.7516088.31 1151.8416116.46 1153.28
16139.26  1152.916148.32 1152.6216153.19 1153.2316160.23 1153.5616218.88 1151.88
16243.62  1151.316274.61  1151.3 16363.6 1151.4916393.63 1151.5216435.51 1151.52
16490.57  1151.816564.86 1151.8116567.24 1151.77 16703.9 1151.52 16710.5 1151.66
16724.61  1151.716797.96 1151.7716899.05 1151.75 16906.7 1152.0216932.49 1152.13
16942.39  1152.2 16955.5 1152.7616971.52 1153.2516982.43 1153.0816998.31  1153.1
17049.19  1153.117072.46 1153.0817121.46 1152.8917145.41 1153.0317192.67  1153.2
17215.62  1153.217238.43 1153.0317247.66 1152.6317269.82 1153.1917281.82 1153.38
17364.73  1153.4 17374.5 1153.6417397.24 1153.3617437.21 1153.78   17481  1154.3
 17525.1  1153.817548.55 1153.43 17626.8 1154.2917747.58 1156.2817767.79 1154.13
17778.06  1154.217792.77 1154.55 17840.7 1154.9617896.44 1155.1917915.02 1155.09
17924.66  1154.917968.81  1154.318001.48 1154.4318082.98 1154.3218106.55 1154.56
18117.14  1154.618144.52 1155.1318166.73 1155.06 18183.2 1155.1318210.02 1155.28
18218.19  1155.218251.96 1154.5118271.92 1154.1718289.25 1153.6918309.93 1154.27
18348.27  1153.318353.67 1153.1718492.05 1153.3118501.57 1153.2718558.69 1153.22
18604.41  1153.218618.27 1152.9118676.89 1152.15 18726.4 1149.0418748.84 1147.58
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18787.16  1146.918832.85 1146.2118862.62 1152.7218869.61 1154.0118945.35 1153.81
18952.13  1152.518954.69 1152.2418985.94 1152.9619036.14 1153.2519045.15 1154.09
19057.29  1152.319087.96 1150.4519132.13 1150.4919162.52  1150.919192.54 1151.69
19218.75  1151.219232.69 1151.8419251.32 1151.4319302.95 1151.56 19341.3 1150.74
19381.97  1149.619439.95 1151.6719450.97 1151.9619479.57    115819490.11 1159.02
19492.12  1158.5 19515.2 1153.5619531.14 1150.7919555.44 1133.3619557.72 1132.21
19576.93  1131.519658.15 1128.9619701.95 1127.6919712.81 1128.35 19715.3 1128.61
19760.95  1129.319803.61 1129.3419851.53 1129.51 19950.1  1130.619973.26 1130.69
20100.83  1130.920112.26 1130.9920141.19 1130.4720222.72 1129.0620239.48 1128.75
20265.71  1129.520365.39 1132.3820374.45 1134.0720381.94 1136.3120423.81 1148.67
20441.46  1153.620453.82 1155.5520476.74 1158.0720495.14 1160.26 20503.4 1162.18
20564.01  1175.520578.57 1176.6520595.22 1178.9120620.06 1178.5420631.53 1178.69
20644.53  1178.720676.97 1173.5820739.84  1163.120756.44 1163.6120786.35 1163.92
20833.99  1164.9 20861.4 1164.2320868.64 1164.3320875.76 1164.2420907.84 1164.16
20926.94  1165.920936.61  1166.420963.09 1168.2520978.69 1174.4321014.75 1188.53
21036.74  1188.621049.33 1188.6121126.03 1167.3921141.74 1163.4621147.25 1162.17
21162.06  1159.521169.27 1159.2821221.77 1159.6121288.72 1159.11 21296.9 1160.02
21311.98  1162.221324.94 1161.8321345.92 1161.3821351.63 1158.5321364.03    1152
21386.28  1152.221402.73 1143.1621406.95 1140.7321424.81 1142.2521442.17 1149.28
21451.75  1153.321477.29 1153.2421492.55  1153.121565.24 1152.7821589.18 1151.51
21648.09    115121676.81 1150.71 21687.2 1153.0321691.96 1153.87   21694 1153.58
21705.22  1153.521747.92 1152.7421763.65 1155.1821768.74 1156.0621780.97 1157.01
21785.19  1157.721799.01 1160.8421849.66  1162.721868.62 1160.9921880.15 1161.95
21897.96  1164.421923.34 1164.5521939.34 1165.0921967.35 1166.1321991.87 1166.37
22036.99  1167.122046.99 1168.0922070.54 1166.3422091.72 1167.65   22094 1167.89
22100.85  1167.622114.57 1167.4822158.49 1166.67 22173.5    116722193.46 1166.44
22234.87  1166.222258.75 1166.4522292.82  1167.3 22320.1 1167.4322329.22 1167.07
 22352.2  1166.422366.09 1167.1422415.22 1167.4722453.69 1167.7722492.16 1168.56
22642.92  1170.222688.53 1170.4822739.89 1170.7622822.87 1170.7622871.73 1170.39
22889.98  1170.722937.42 1171.8823028.91 1173.8123031.57 1173.9123070.19 1175.98
23095.28  1176.523102.86 1176.88 23148.1  1179.423163.39 1179.8523165.07    1180
23188.47  1180.423213.41  1179.723249.54 1179.9323278.98 1180.03 23290.4 1180.18
23363.69  1180.823383.38 1180.4223401.79 1180.0723419.41 1180.2123433.68 1178.29
23452.43  1175.523471.84 1176.6323487.22 1174.6823499.32 1176.0923523.76 1176.96
23530.78    117723580.84 1178.8723599.92 1179.7323610.68 1180.2423668.01  1183.3
23684.49  1183.123737.23 1183.1823753.82 1183.9923771.45 1184.5123788.82 1185.45
23802.17  1184.923805.38 1184.6723809.24 1184.8723813.53 1184.6423851.27 1183.72
23864.52  1183.823891.02 1183.2623892.96 1183.3223897.08  1182.723973.88 1172.66
24039.67  1173.424085.52  1187.324090.47 1189.0824151.58 1190.7824165.54 1191.26
24172.71  1191.424192.87 1191.5924242.54 1192.2624276.93 1192.6124289.34 1195.49
24302.68  1197.9   24332 1197.6224347.55 1198.15

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

 14797.3    .03519490.11    .03520495.14    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19490.1120495.14              510  501.55     490             .1       .3
Ineffective Flow     num=        2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

CROSS SECTION           RIVER: Salt River
REACH: Reach 4            RS: 220.63

INPUT
Description:
Station Elevation Data    num=     293
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev

   14824  1150.314870.19 1149.9714906.61 1150.46 14934.6 1150.2714996.54 1149.63
 15005.4  1149.3 15035.6 1149.7215073.05  1149.715119.49  1149.515140.51 1148.65
15164.17  1149.515176.48  1149.815188.71 1149.7615222.37 1149.9215284.22 1149.41
15311.03  1149.715339.76 1150.2615407.72  1149.715469.64 1149.4815540.95 1149.31
15601.47  1148.5 15631.9 1149.3115681.89 1149.8615766.94 1149.9815791.74 1149.81
15882.72  1150.615969.23 1150.4816026.97 1151.3716037.23 1150.8716047.44 1150.22
16051.03  1150.216077.31 1149.2216098.49 1151.2216164.63  1150.5 16172.4 1150.53
16267.84  1150.416308.54  1150.716383.35 1151.4916440.92 1151.5216503.85 1151.17
 16547.1  1151.116625.17 1151.0116666.85  1151.616686.26 1152.1516703.27 1151.91
16750.45  1151.516831.13  1151.716846.42 1151.6516860.48 1151.3716872.44 1151.59
16891.43  1151.516919.41 1152.1416929.14 1152.2317034.57 1152.1617112.73 1152.31
17151.56    115317174.16 1152.4717213.39  1152.617256.25 1152.1517300.25 1151.98
17312.74  1152.617370.38 1154.2517456.04 1154.2317496.26 1154.1117547.83  1153.9
17604.31  1153.817688.93 1153.5717722.82 1153.2717729.13  1153.5 17744.1 1153.57
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 17804.7  1154.117925.11 1154.3217981.54 1154.5718023.62 1154.5918059.13 1154.52
18113.05  1154.118137.88 1154.1318140.35 1154.1918159.61 1154.6618172.45 1154.58
 18185.1  1154.318215.34 1153.5718233.36 1153.9918307.25 1153.1518360.97 1153.08
18408.08  1153.518500.25 1153.0518520.71  1152.718535.53 1152.6918539.52 1152.17
18551.01  1151.718558.74 1151.5318573.36 1151.0118611.78 1150.64 18625.8 1150.46
18647.75    1153 18657.7 1153.8318674.43 1152.7718723.13 1152.7418734.97 1152.54
18743.63  1152.318780.43 1150.66   18816 1152.1118843.95 1154.4218864.43 1154.66
18922.43  1156.418936.63 1156.4318972.93  1153.519047.63 1154.08 19180.2 1154.87
19184.81  1154.819228.77 1154.5319245.97 1154.4819262.55  1154.519312.33 1154.65
19339.84  1154.719364.44  1154.119384.69 1152.6419429.36 1143.5519434.17 1143.26
19437.42    114419487.14 1156.1819502.33 1159.1819508.86 1156.1319533.27 1145.86
19545.56    114719552.18 1142.2519562.89 1133.6419591.04 1132.3719650.01 1129.14
19773.79  1129.519790.22 1129.4919802.35 1129.2519912.09 1127.17 19968.5  1127.1
19998.74  1127.320051.26 1129.3720068.85  1129.420178.63 1128.86 20268.5  1129.8
20304.69  1130.520328.46 1130.7120359.22 1130.6120416.92 1138.2420430.96 1145.24
20440.58  1147.420475.73 1155.9620483.75 1156.0920494.25 1156.7520495.83 1156.24
20517.61  1161.220571.44 1174.4720606.77 1174.2720610.81 1174.1320641.95 1166.52
20689.44    115520692.07 1155.0820726.24 1156.4420766.82 1157.2520783.96  1157.5
20815.62  1157.220830.99 1157.1320842.11 1156.8720875.53 1156.8520911.76 1160.68
20935.56  1160.520937.82 1160.6120985.04 1183.8420990.99 1183.96 21011.6 1182.74
21099.54  1158.421115.04 1154.1821117.51 1154.2621170.33 1155.5921193.48 1158.99
21199.07  1159.921207.28 1159.7521228.86 1158.6121250.98 1150.8821272.44 1151.36
 21291.3  1141.221314.36  1141.121321.72 1145.03 21333.2 1151.5321348.91 1151.86
21376.92  1151.521411.05 1151.4221474.01 1151.0921553.59 1151.1121637.39 1150.79
21722.63  1150.721785.67 1150.7321874.62 1151.9921878.38 1152.0321921.19 1159.69
21948.69  1160.721992.61 1162.1922000.71  1160.522008.81 1158.6122018.63 1159.95
 22032.5  1161.722048.31 1161.6422055.74 1161.93   22094 1163.0822134.12 1164.39
22143.98  1165.122154.38 1163.8722176.46 1161.48 22190.1 1164.8922195.05 1164.95
22228.55  1165.122302.09 1165.7922385.05 1167.1522394.52 1167.2222452.52 1166.41
22520.66  1165.622561.39 1165.1922580.78 1165.3522602.39  1165.622636.28 1164.69
22655.55  1164.422690.77 1163.5122697.75 1163.3822702.64  1162.322753.06 1152.71
 22801.2    115422825.88 1154.6122880.79 1160.43 22884.4 1160.7322888.09 1161.52
   22924  1165.522955.81  1163.922967.88 1163.3822985.75 1163.4523003.91 1166.93
 23020.6  1168.423039.26 1170.1523047.39  1171.7   23059 1174.3223113.46 1183.75
23129.96  1186.623137.87 1187.1623234.39 1195.15 23268.4 1196.11 23278.9 1196.22
23289.67  1196.623300.62 1197.46   23329    119523354.08 1190.0723359.12 1190.93
23364.81  1192.823377.13 1196.3123381.26 1196.9523402.82 1194.9923412.98  1193.6
23418.94  1192.523442.23 1187.8523455.44 1185.93 23473.3 1182.7723480.12 1183.18
23500.09  1183.523511.29 1183.9223528.38 1179.1323531.54 1177.8723542.35 1178.74
23558.13  1179.723564.97 1179.9723576.86  1179.4 23611.1  1177.423628.94  1181.9
 23666.9  1192.123690.06 1192.8823754.42  1196.123759.24 1196.8323774.42  1193.2
23805.81  1186.423842.08 1186.1223884.13 1185.9323889.09 1185.6423923.01 1182.75
23994.76  1183.224012.39 1183.04 24030.1 1180.4624046.96 1185.0124084.61 1190.55
 24101.8    119124136.25 1191.4224170.43 1192.0824211.66 1193.0424220.01 1193.29
24252.23  1192.824282.41 1193.1324299.04 1193.29

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

   14824    .03519502.33    .03520494.25    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      19502.3320494.25              490  501.08     510              .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F


SUMMARY OF MANNING'S N VALUES

River:Salt River

     Reach          River Sta.      n1       n2       n3

Reach 4              221.50           .04      .03      .04
Reach 4              221.40           .05     .035      .05
Reach 4              221.31           .05     .035      .05
Reach 4              221.26           .05     .035      .05
Reach 4              221.25      Bridge
Reach 4              221.24           .05     .035      .06
Reach 4              221.2            .05     .035      .06
Reach 4              221.195     Bridge
Reach 4              221.19           .05     .035      .06
Reach 4              221.068          .05     .035      .06
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Reach 4	221.064	Bridge		
Reach 4	221.061	.05	.035	.06
Reach 4	221.06	.05	.035	.06
Reach 4	221.055	Bridge		
Reach 4	221.05	.05	.035	.06
Reach 4	221.02	.05	.035	.06
Reach 4	220.92	.05	.035	.06
Reach 4	220.82	.035	.035	.06
Reach 4	220.756	.015	.015	.015
Reach 4	220.755	.015	.015	.015
Reach 4	220.752	Bridge		
Reach 4	220.75	.015	.015	.015
Reach 4	220.74	.032	.032	.032
Reach 4	220.735	.035	.035	.035
Reach 4	220.73	.035	.035	.035
Reach 4	220.63	.035	.035	.035

Profile Output Table - Standard Table 1

Reach	River Sta	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 4	221.50	172000.00	1134.08	1154.71	1149.12	1157.07	0.001717	12.35	13927.03	1333.93	0.56
Reach 4	221.50	172000.00	1134.08	1154.71	1149.12	1157.07	0.001716	12.35	13926.55	928.87	0.56
Reach 4	221.40	172000.00	1133.21	1153.80	1147.88	1156.06	0.002212	12.05	14276.42	1064.21	0.55
Reach 4	221.40	172000.00	1133.21	1153.80	1147.89	1156.06	0.002207	12.05	14277.37	949.21	0.55
Reach 4	221.31	172000.00	1131.43	1152.64	1146.72	1154.94	0.002221	12.15	14157.41	1189.96	0.55
Reach 4	221.31	172000.00	1131.43	1152.65	1146.72	1154.94	0.002219	12.15	14159.08	933.69	0.55
Reach 4	221.26	169000.00	1129.24	1152.84	1143.39	1154.31	0.001002	9.72	17383.87	1261.77	0.39
Reach 4	221.26	169000.00	1129.24	1152.84	1143.39	1154.31	0.001004	9.72	17384.73	881.94	0.39
Reach 4	221.25	Bridge									
Reach 4	221.24	169000.00	1129.24	1152.57	1143.40	1154.04	0.001031	9.73	17366.88	1207.28	0.39
Reach 4	221.24	169000.00	1129.24	1152.57	1143.40	1154.04	0.001033	9.73	17367.64	898.86	0.39
Reach 4	221.2	169000.00	1128.00	1152.43	1142.32	1153.84	0.000934	9.53	17727.93	936.19	0.37
Reach 4	221.2	169000.00	1128.00	1152.43	1142.32	1153.84	0.000934	9.53	17728.57	878.26	0.37
Reach 4	221.195	Bridge									
Reach 4	221.19	169000.00	1128.00	1152.15	1142.33	1153.61	0.000972	9.67	17468.34	976.20	0.38
Reach 4	221.19	169000.00	1128.00	1152.15	1142.33	1153.61	0.000974	9.67	17468.45	873.37	0.38
Reach 4	221.068	169000.00	1128.00	1151.69	1140.81	1153.04	0.000845	9.34	18094.53	1318.68	0.36
Reach 4	221.068	169000.00	1128.00	1151.69	1140.81	1153.04	0.000845	9.34	18094.22	857.59	0.36
Reach 4	221.064	Bridge									
Reach 4	221.061	169000.00	1128.00	1151.35	1141.05	1152.88	0.000966	9.93	17024.96	1357.16	0.38
Reach 4	221.061	169000.00	1128.00	1151.35	1141.05	1152.88	0.000966	9.93	17024.66	815.88	0.38
Reach 4	221.06	169000.00	1126.00	1151.38	1140.97	1152.87	0.000925	9.80	17244.70	1328.65	0.37
Reach 4	221.06	169000.00	1126.00	1151.38	1140.97	1152.87	0.000925	9.80	17244.40	805.24	0.37
Reach 4	221.055	Bridge									
Reach 4	221.05	169000.00	1126.00	1151.11	1140.98	1152.67	0.000975	10.03	16855.77	1226.50	0.38
Reach 4	221.05	169000.00	1126.00	1151.11	1140.98	1152.67	0.000975	10.03	16855.48	791.81	0.38
Reach 4	221.02	169000.00	1130.06	1150.81	1142.42	1152.47	0.001226	10.35	16325.69	1177.79	0.42
Reach 4	221.02	169000.00	1130.06	1150.81	1142.42	1152.47	0.001226	10.35	16325.37	869.89	0.42
Reach 4	220.92	169000.00	1129.16	1149.91	1142.46	1151.78	0.001456	10.97	15403.00	1137.52	0.46
Reach 4	220.92	169000.00	1129.16	1149.91	1142.46	1151.78	0.001456	10.97	15402.79	863.27	0.46
Reach 4	220.82	169000.00	1129.56	1149.18	1141.71	1151.02	0.001435	10.88	15531.54	1149.43	0.45
Reach 4	220.82	169000.00	1129.56	1149.18	1141.71	1151.02	0.001435	10.88	15531.33	868.33	0.45

Reach 4	220.756	169000.00	1129.00	1149.43		1150.81	0.000172	9.42	17939.75	906.00	0.37
Reach 4	220.756	169000.00	1129.00	1149.43		1150.81	0.000172	9.42	17939.53	906.00	0.37
Reach 4	220.755	169000.00	1132.00	1148.66	1142.67	1150.73	0.000339	11.56	14620.50	906.00	0.51
Reach 4	220.755	169000.00	1132.00	1148.66	1142.67	1150.73	0.000339	11.56	14620.27	906.00	0.51
Reach 4	220.752	Bridge									
Reach 4	220.75	169000.00	1131.67	1148.00		1150.16	0.000363	11.81	14310.61	906.00	0.52
Reach 4	220.75	169000.00	1131.67	1148.00		1150.16	0.000363	11.81	14310.39	906.00	0.52
Reach 4	220.74	169000.00	1129.00	1148.43		1149.95	0.000930	9.92	17032.54	906.00	0.40
Reach 4	220.74	169000.00	1129.00	1148.43		1149.95	0.000930	9.92	17032.31	906.00	0.40
Reach 4	220.735	169000.00	1129.00	1148.39		1149.92	0.001121	9.94	16995.38	906.00	0.40
Reach 4	220.735	169000.00	1129.00	1148.38		1149.92	0.001121	9.94	16995.16	906.00	0.40
Reach 4	220.73	169000.00	1127.69	1147.59	1141.05	1149.62	0.001715	11.43	14783.62	1018.40	0.49
Reach 4	220.73	169000.00	1127.69	1147.59	1141.05	1149.62	0.001715	11.43	14783.41	884.56	0.49
Reach 4	220.63	169000.00	1127.10	1146.74	1140.24	1148.75	0.001734	11.37	14858.26	981.98	0.49
Reach 4	220.63	169000.00	1127.10	1146.74	1140.24	1148.75	0.001734	11.37	14858.04	903.30	0.49

Profile Output Table - Standard Table 2

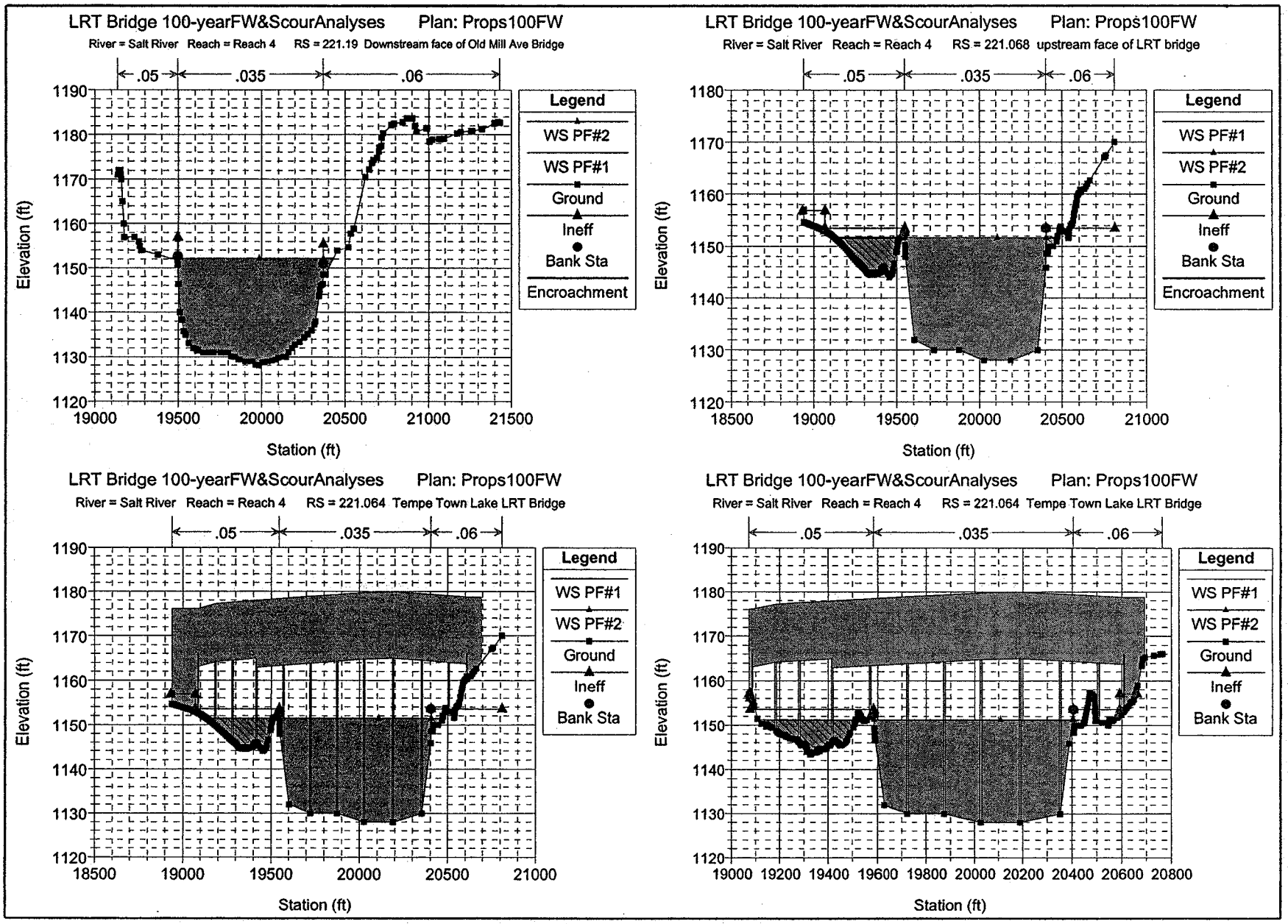
Reach	River Sta	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Reach 4	221.50	1157.07	1154.71	2.37	0.98	0.03		172000.00		1333.93
Reach 4	221.50	1157.07	1154.71	2.37	0.98	0.03		172000.00		928.87
Reach 4	221.40	1156.06	1153.80	2.25	1.12	0.00		172000.00		1064.21
Reach 4	221.40	1156.06	1153.80	2.25	1.12	0.00		172000.00		949.21
Reach 4	221.31	1154.94	1152.64	2.29	0.38	0.25		172000.00		1189.96
Reach 4	221.31	1154.94	1152.65	2.29	0.38	0.25		172000.00		933.69
Reach 4	221.26	1154.31	1152.84	1.47	0.03	0.03		169000.00		1261.77
Reach 4	221.26	1154.31	1152.84	1.47	0.03	0.03		169000.00		881.94
Reach 4	221.25	Bridge								
Reach 4	221.24	1154.04	1152.57	1.47	0.18	0.02		169000.00		1207.28
Reach 4	221.24	1154.04	1152.57	1.47	0.18	0.02		169000.00		898.86
Reach 4	221.2	1153.84	1152.43	1.41				169000.00		936.19
Reach 4	221.2	1153.84	1152.43	1.41				169000.00		878.26
Reach 4	221.195	Bridge								

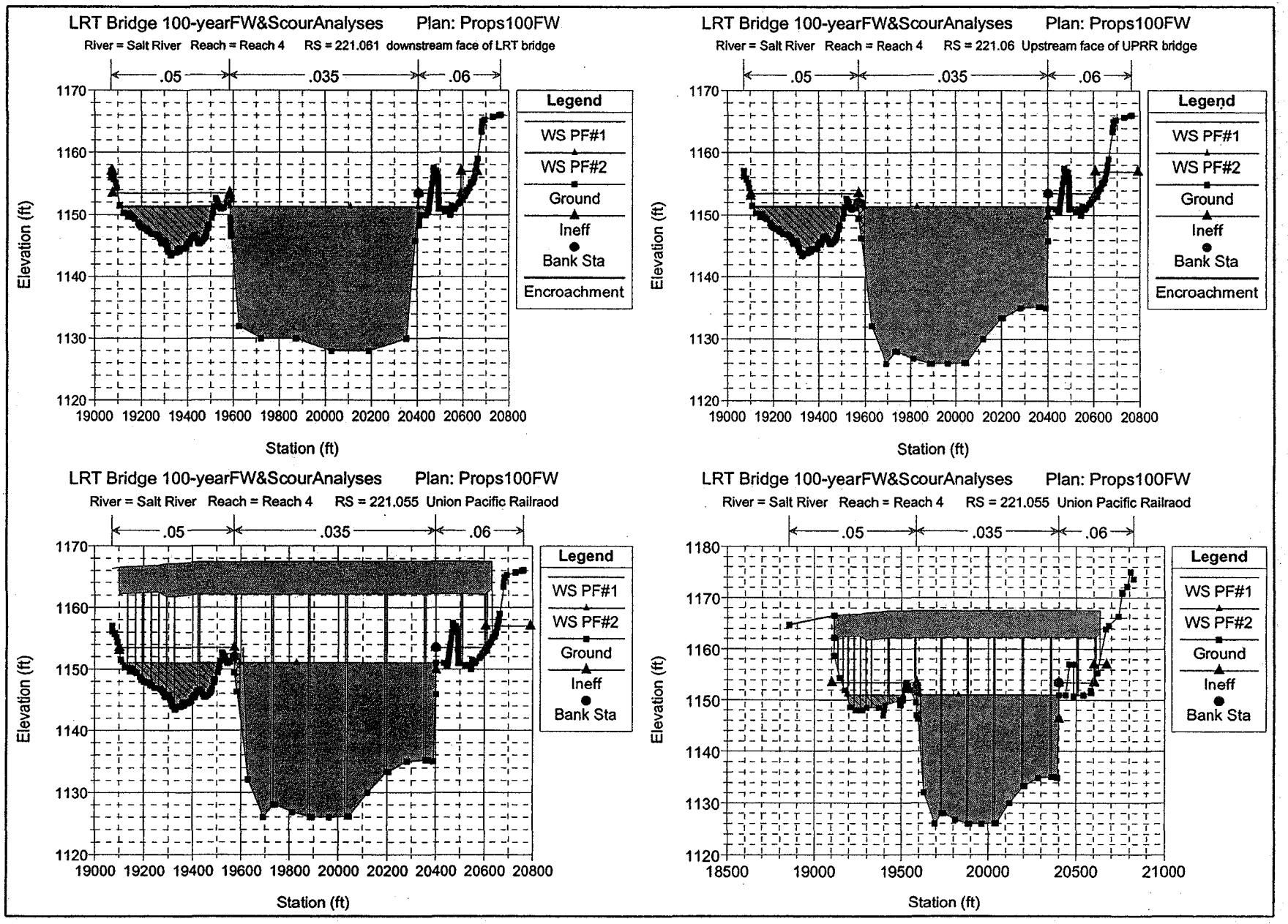
Reach 4	221.19	1153.61	1152.15	1.45	0.54	0.03	169000.00	976.20
Reach 4	221.19	1153.61	1152.15	1.45	0.54	0.03	169000.00	873.37
Reach 4	221.068	1153.04	1151.69	1.35	0.03	0.02	169000.00	1318.68
Reach 4	221.068	1153.04	1151.69	1.35	0.03	0.02	169000.00	857.59
Reach 4	221.064	Bridge						
Reach 4	221.061	1152.88	1151.35	1.53	0.00	0.01	169000.00	1357.16
Reach 4	221.061	1152.88	1151.35	1.53	0.00	0.01	169000.00	815.88
Reach 4	221.06	1152.87	1151.38	1.49	0.04	0.03	169000.00	1328.65
Reach 4	221.06	1152.87	1151.38	1.49	0.04	0.03	169000.00	805.24
Reach 4	221.055	Bridge						
Reach 4	221.05	1152.67	1151.11	1.56	0.18	0.01	169000.00	1226.50
Reach 4	221.05	1152.67	1151.11	1.56	0.18	0.01	169000.00	791.81
Reach 4	221.02	1152.47	1150.81	1.66	0.67	0.02	169000.00	1177.79
Reach 4	221.02	1152.47	1150.81	1.66	0.67	0.02	169000.00	869.89
Reach 4	220.92	1151.78	1149.91	1.87	0.75	0.01	169000.00	1137.52
Reach 4	220.92	1151.78	1149.91	1.87	0.75	0.01	169000.00	863.27
Reach 4	220.82	1151.02	1149.18	1.84	0.07	0.14	169000.00	1149.43
Reach 4	220.82	1151.02	1149.18	1.84	0.07	0.14	169000.00	868.33
Reach 4	220.756	1150.81	1149.43	1.38	0.00	0.07	169000.00	906.00
Reach 4	220.756	1150.81	1149.43	1.38	0.00	0.07	169000.00	906.00
Reach 4	220.755	1150.73	1148.66	2.07			169000.00	906.00
Reach 4	220.755	1150.73	1148.66	2.07			169000.00	906.00
Reach 4	220.752	Bridge						
Reach 4	220.75	1150.16	1148.00	2.17	0.02	0.19	169000.00	906.00
Reach 4	220.75	1150.16	1148.00	2.17	0.02	0.19	169000.00	906.00
Reach 4	220.74	1149.95	1148.43	1.53	0.03	0.00	169000.00	906.00
Reach 4	220.74	1149.95	1148.43	1.53	0.03	0.00	169000.00	906.00
Reach 4	220.735	1149.92	1148.39	1.54	0.25	0.05	169000.00	906.00
Reach 4	220.735	1149.92	1148.38	1.54	0.25	0.05	169000.00	906.00
Reach 4	220.73	1149.62	1147.59	2.03	0.86	0.01	169000.00	1018.40
Reach 4	220.73	1149.62	1147.59	2.03	0.86	0.01	169000.00	884.56
Reach 4	220.63	1148.75	1146.74	2.01	0.88	0.00	169000.00	981.98
Reach 4	220.63	1148.75	1146.74	2.01	0.88	0.00	169000.00	903.30

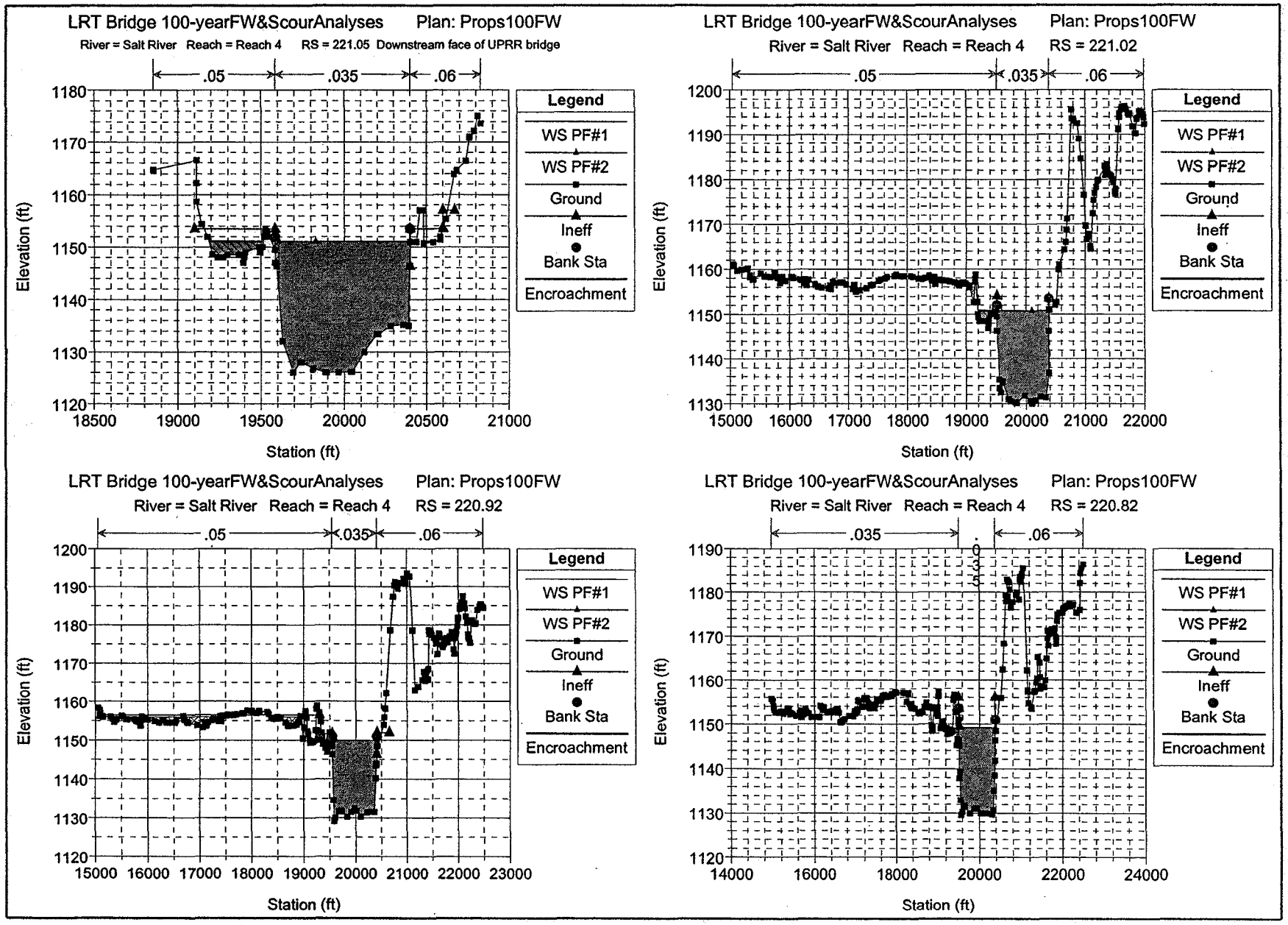
ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : pro100FW

River: Salt River Reach: Reach 4 RS: 221.50 Profile: PF#1
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: Salt River Reach: Reach 4 RS: 221.50 Profile: PF#2
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: Salt River Reach: Reach 4 RS: 221.40 Profile: PF#1
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: Salt River Reach: Reach 4 RS: 221.40 Profile: PF#2
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: Salt River Reach: Reach 4 RS: 221.31 Profile: PF#1
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Salt River Reach: Reach 4 RS: 221.31 Profile: PF#2
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Salt River Reach: Reach 4 RS: 221.26 Profile: PF#1
Warning:Divided flow computed for this cross-section.
River: Salt River Reach: Reach 4 RS: 221.25 Profile: PF#1
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
River: Salt River Reach: Reach 4 RS: 221.25 Profile: PF#2
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
River: Salt River Reach: Reach 4 RS: 221.24 Profile: PF#1
Warning:Divided flow computed for this cross-section.
River: Salt River Reach: Reach 4 RS: 221.2 Profile: PF#1
Warning:Divided flow computed for this cross-section.
River: Salt River Reach: Reach 4 RS: 221.19 Profile: PF#1
Warning:Divided flow computed for this cross-section.
River: Salt River Reach: Reach 4 RS: 221.068 Profile: PF#1
Warning:Divided flow computed for this cross-section.
River: Salt River Reach: Reach 4 RS: 221.064 Profile: PF#1
Warning:For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy. This is not physically possible, the momentum answer has been disregarded.
Warning:During momentum computations with the weight force on, an upstream energy was computed lower than the downstream energy. The weight force was turned off and the momentum answer was recalculated.
River: Salt River Reach: Reach 4 RS: 221.064 Profile: PF#2
Warning:For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy. This is not physically possible, the momentum answer has been disregarded.
Warning:During momentum computations with the weight force on, an upstream energy was computed lower than the downstream energy. The weight force was turned off and the momentum answer was recalculated.
River: Salt River Reach: Reach 4 RS: 221.061 Profile: PF#1
Warning:Divided flow computed for this cross-section.

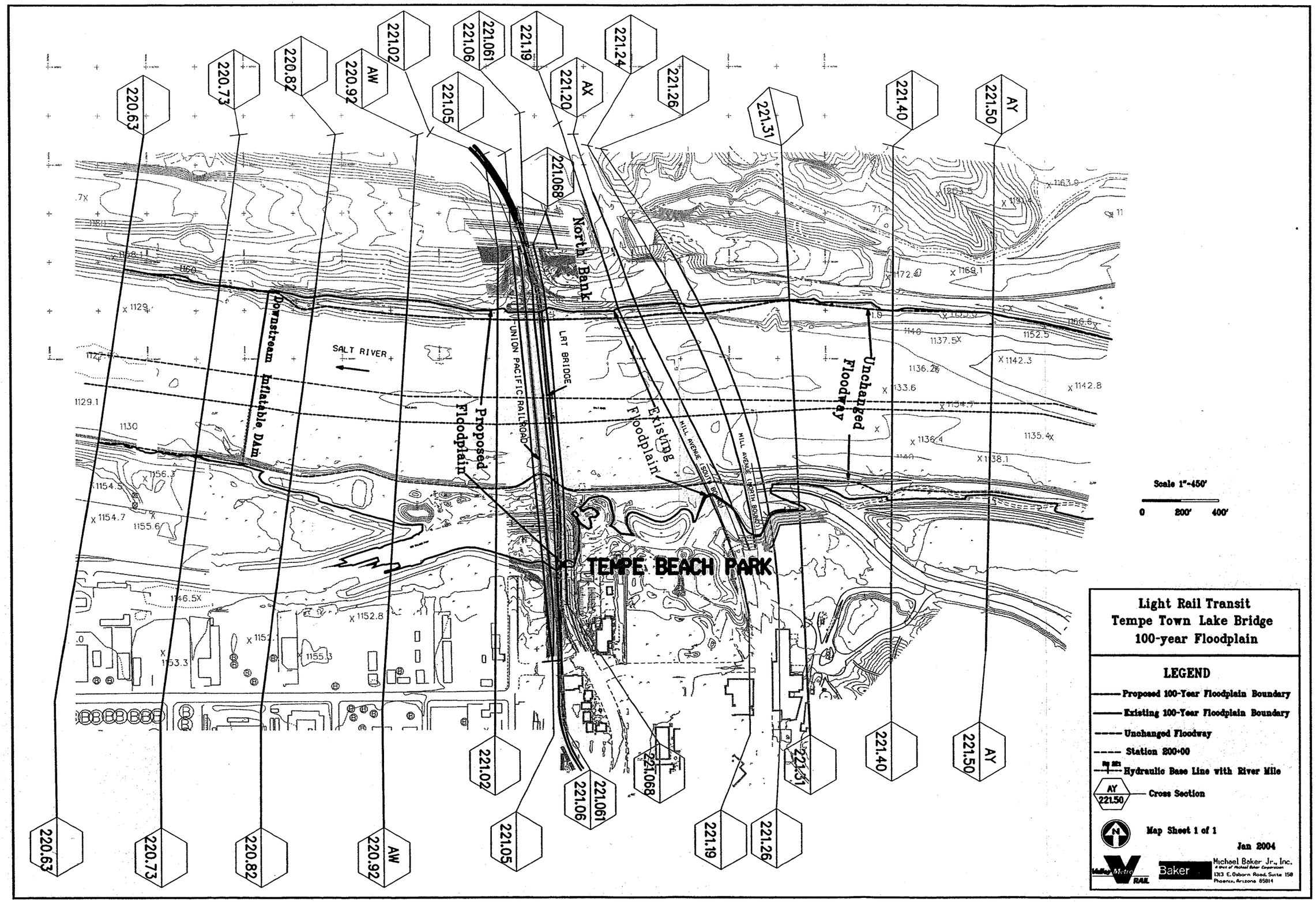
```
River: Salt River  Reach: Reach 4     RS: 221.06     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 221.05     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 221.02     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 220.92     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 220.82     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 220.82     Profile: PF#2
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 220.756     Profile: PF#1
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 220.756     Profile: PF#2
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 220.755     Profile: PF#1
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 220.755     Profile: PF#2
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 220.75     Profile: PF#1
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 220.75     Profile: PF#2
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Salt River  Reach: Reach 4     RS: 220.73     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 220.63     Profile: PF#1
     Warning:Divided flow computed for this cross-section.
River: Salt River  Reach: Reach 4     RS: 220.63     Profile: PF#2.
```


LRT Bridge 100-yearFW&ScourAnalyses Plan: Props100FW
River = Salt River Reach = Reach 4 RS = 221.19 Downstream face of Old Mill Ave Bridge
.05
.035
.06
Legend
WS PF#2
WS PF#1
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
LRT Bridge 100-yearFW&ScourAnalyses Plan: Props100FW
River = Salt River Reach = Reach 4 RS = 221.068 upstream face of LRT bridge
.05
.035
.06
Legend
WS PF#1
WS PF#2
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
LRT Bridge 100-yearFW&ScourAnalyses Plan: Props100FW
River = Salt River Reach = Reach 4 RS = 221.064 Tempe Town Lake LRT Bridge
.05
.035
.06
Legend
WS PF#1
WS PF#2
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
LRT Bridge 100-yearFW&ScourAnalyses Plan: Props100FW
River = Salt River Reach = Reach 4 RS = 221.064 Tempe Town Lake LRT Bridge
.05
.035
.06
Legend
WS PF#1
WS PF#2
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


LRT Bridge 100-yearFW&ScourAnalyses Plan: Props100FW
River = Salt River Reach = Reach 4 RS = 221.061 downstream face of LRT bridge
.05
.035
.06
Elevation (ft)
Station (ft)
Legend
WS PF#1
WS PF#2
Ground
Ineff
Bank Sta
Encroachment
LRT Bridge 100-yearFW&ScourAnalyses Plan: Props100FW
River = Salt River Reach = Reach 4 RS = 221.06 Upstream face of UPRR bridge
LRT Bridge 100-yearFW&ScourAnalyses Plan: Props100FW
River = Salt River Reach = Reach 4 RS = 221.055 Union Pacific Railraod
LRT Bridge 100-yearFW&ScourAnalyses Plan: Props100FW
River = Salt River Reach = Reach 4 RS = 221.055 Union Pacific Railraod


LRT Bridge 100-yearFW&ScourAnalyses Plan: Props100FW
River = Salt River Reach = Reach 4 RS = 221.05 Downstream face of UPRR bridge
.05
.035
.06
Elevation (ft)
Station (ft)
Legend
WS PF#1
WS PF#2
Ground
Ineff
Bank Sta
Encroachment
LRT Bridge 100-yearFW&ScourAnalyses Plan: Props100FW
River = Salt River Reach = Reach 4 RS = 221.02
.05
.035
.06
Elevation (ft)
Station (ft)
Legend
WS PF#1
WS PF#2
Ground
Ineff
Bank Sta
Encroachment
LRT Bridge 100-yearFW&ScourAnalyses Plan: Props100FW
River = Salt River Reach = Reach 4 RS = 220.92
.05
.035
.06
Elevation (ft)
Station (ft)
Legend
WS PF#1
WS PF#2
Ground
Ineff
Bank Sta
Encroachment
LRT Bridge 100-yearFW&ScourAnalyses Plan: Props100FW
River = Salt River Reach = Reach 4 RS = 220.82
.035
.06
Elevation (ft)
Station (ft)
Legend
WS PF#1
WS PF#2
Ground
Ineff
Bank Sta
Encroachment

APPENDIX D 100-YEAR FLOODPLAIN MAP

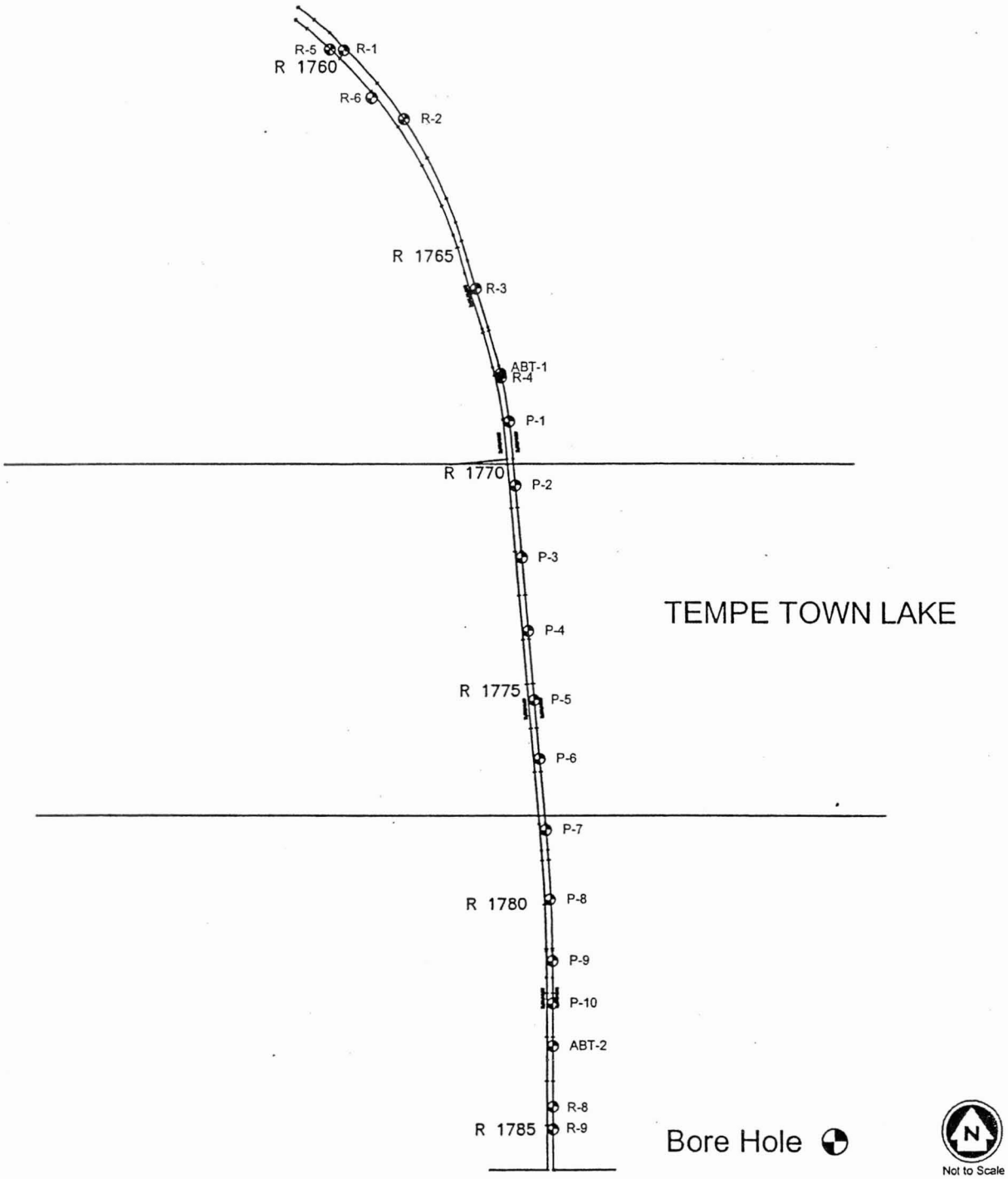

Light Rail Transit
Tempe Town Lake Bridge
100-year Floodplain
LEGEND
Proposed 100-Year Floodplain Boundary
Existing 100-Year Floodplain Boundary
Unchanged Floodway
Station 200+00
Hydraulic Base Line with River Mile
Cross Section
Map Sheet 1 of 1
Jan 2004
Scale 1"=450'
0 200' 400'
Michael Baker Jr., Inc.
1313 E. Osborn Road, Suite 150
Phoenix, Arizona 85014
Valley Metro RAIL
Baker
TEMPE BEACH PARK
SALT RIVER
Downstream Inflatable Dam
Proposed Floodplain
Existing Floodplain
Unchanged Floodway
North Bank
UNION PACIFIC RAILROAD
LRT BRIDGE
MILL AVENUE (SOUTH BOUND)
MILL AVENUE (NORTH BOUND)
220.63
220.73
220.82
AW 220.92
221.02
221.05
221.061
221.06
221.068
221.19
AX 221.20
221.24
221.26
221.31
221.40
AY 221.50

APPENDIX E SOIL PARTICLE SIZE AND BORING INFORMATION

Soil Particle Size and Boring Information

No. of Boring	Pier No. In Model	Location	Sample Depth ft	Boring ft	Lake Bed ft	Rock Bed ft	D_{50} mm	D_{50} ft	D_{50used} ft	D_{90} mm	D_{90} ft	D_{90used} ft
R3	RR/LRT	North of Abut1		1172.93		below 1143						
Abut1	16/	NB AB1	7 to 12	1158.31		1132.31	0.1	0.00033	0.00033	0.23	0.00075	0.00075
P-1	15/10	NB over bank P1	2.5	1151.75		1116.25	0.44	0.00144	0.00144	10.2	0.03346	0.03346
P-1		NB P1	4 to 8	1151.75		1116.25	0.23	0.00075		4.4	0.01444	
P-1		NB P1	12.5 to 13.5	1151.75		1116.25	8.3	0.02723		31	0.10171	
P-2	14/9	NB in Channel P2	7.5 to 8.5	1148	1130	1099	0.95	0.00312	0.00385	18	0.05906	0.00473
P-2		NB in Channel P2	26	1148	1130	1099	1.4	0.00459		7.8	0.02559	
P-3	13/8	in Channel	4 to 5	1148	1128	1108	1.9	0.00623	0.00623	8.4	0.02756	0.02756
P-4	12/7	in Channel	9 to 10	1148	1128	1116	0.69	0.00226	0.00226	8.1	0.02657	0.02657
P-5	11/6	in Channel		1148	1130	1120			0.00417*			0.026*
P-6	10/5	SB in channel P6	5 to 7	1148	1130	1118	1.1	0.00361	0.00361	7.4	0.02428	0.02428
P-7	9/4	SB over bank P7	1 to 10	1151.75		1121.75	1.5	0.00492	0.00492	8.2	0.02690	0.02690
P-7		SB P7	23.5 to 25	1151.75		1121.75	22	0.07218		45	0.14764	
P-8	8/3	SB P8	2.5 to 3.5	1145		1109	7	0.02297	0.01340	20	0.06562	0.04100
P-8		SB P8	32 to 33	1145		1109	1.2	0.00394		5	0.01640	0.01640
P-9	7/2	SB P9	37.5	1147		1108	0.21	0.00069	0.00069	1.8	0.00591	0.00591
P-10	/1	SB P10	17.5 to 18.5	1150.85		1102.85	1.8	0.00591	0.00375	26	0.08530	0.05926
P-10		SB P10	37.5 to 38.5	1150.85		1102.85	0.45	0.00148		10.4	0.03412	
Abut2	1-6/	SB Abutment	5 to 10	1153.78		1095.78	0.053	0.00017	0.00023	0.12	0.00039	0.00053
Abut2		SB Abutment	12.5 to 13.5	1153.78		1095.78	0.087	0.00029		0.2	0.00066	
Abut2		SB Abutment	47.5	1153.78		1095.78	1.1	0.00361		5.8	0.01903	
R8		South of Abut2		1156.19		below 1126						

* Average value for channel



BORE LOCATION MAP

VALLEY METRO RAIL
TEMPE TOWN LAKE BRIDGE
TEMPE, ARIZONA

ATL JOB NO. 103010-15

PLATE NO. 4

APPENDIX F BRIDGE SCOUR CALCULATIONS

F.1 Used Grain Size Data

F.1.1 Used Soil Particle Size Data

F.1.2 Left Bank Flow Distribution Data

F.2 Proposed LRT Bridge Scour Analysis Report

F.2.1 50-year Scour Analysis Report

F.2.2 500-year Scour Analysis Report

F.3 The UPRR Bridge Scour Analysis Report

F.3.1 Revised Existing Condition 50-year Scour Analysis Report

F.3.2 Revised Existing Condition 500-year Scour Analysis Report

F.3.3 Proposed Condition 50-year Scour Analysis Report

F.3.4 Proposed Condition 50-year Scour Analysis Report

Soil Particle Size and Boring Information

No. of Boring	Pier No. In Model	Location	Sample Depth ft	Boring ft	Lake Bed ft	Rock Bed ft	D_{50} mm	D_{50} ft	D_{50used} ft	D_{90} mm	D_{90} ft	D_{90used} ft
R3	RR/LRT	North of Abut1		1172.93		below 1143						
Abut1	16/	NB AB1	7 to 12	1158.31		1132.31	0.1	0.00033	0.00033	0.23	0.00075	0.00075
		Right Bank Average							0.00089			0.01711
P-1	15/10	NB over bank P1	2.5	1151.75		1116.25	0.44	0.00144	0.00144	10.2	0.03346	0.03346
P-1		NB P1	4 to 8	1151.75		1116.25	0.23	0.00075		4.4	0.01444	
P-1		NB P1	12.5 to 13.5	1151.75		1116.25	8.3	0.02723		31	0.10171	
P-2	14/9	NB in Channel P2	7.5 to 8.5	1148	1130	1099	0.95	0.00312	0.00385	18	0.05906	0.00473
P-2		NB in Channel P2	26	1148	1130	1099	1.4	0.00459		7.8	0.02559	
P-3	13/8	in Channel	4 to 5	1148	1128	1108	1.9	0.00623	0.00623	8.4	0.02756	0.02756
P-4	12/7	in Channel	9 to 10	1148	1128	1116	0.69	0.00226	0.00226	8.1	0.02657	0.02657
P-5	11/6	in Channel		1148	1130	1120			0.00417*			0.026*
P-6	10/5	SB in channel P6	5 to 7	1148	1130	1118	1.1	0.00361	0.00361	7.4	0.02428	0.02428
P-7	9/4	SB over bank P7	1 to 10	1151.75		1121.75	1.5	0.00492	0.00492	8.2	0.02690	0.02690
P-7		SB P7	23.5 to 25	1151.75		1121.75	22	0.07218		45	0.14764	
P-8	8/3	SB P8	2.5 to 3.5	1145		1109	7	0.02297	0.01340	20	0.06562	0.04100
P-8		SB P8	32 to 33	1145		1109	1.2	0.00394		5	0.01640	
P-9	7/2	SB P9	37.5	1147		1108	0.21	0.00069	0.00069	1.8	0.00591	0.00591
P-10	/1	SB P10	17.5 to 18.5	1150.85		1102.85	1.8	0.00591	0.00375	26	0.08530	0.05926
P-10		SB P10	37.5 to 38.5	1150.85		1102.85	0.45	0.00148		10.4	0.03412	
		Left Bank Average							0.00460			0.02672
Abut2	1-6/	SB Abutment	5 to 10	1153.78		1095.78	0.053	0.00017	0.00023	0.12	0.00039	0.00053
Abut2		SB Abutment	12.5 to 13.5	1153.78		1095.78	0.087	0.00029		0.2	0.00066	
Abut2		SB Abutment	47.5	1153.78		1095.78	1.1	0.00361		5.8	0.01903	
R8		South of Abut2		1156.19		below 1126						

* Average value for channel

APPENDIX F BRIDGE SCOUR CALCULATIONS

F.1 Used Grain Size Data

F.1.1 Used Soil Particle Size Data

F.1.2 Left Bank Flow Distribution Data

F.2 Proposed LRT Bridge Scour Analysis Report

F.2.1 50-year Scour Analysis Report

F.2.2 500-year Scour Analysis Report

F.3 The UPRR Bridge Scour Analysis Report

F.3.1 Revised Existing Condition 50-year Scour Analysis Report

F.3.2 Revised Existing Condition 500-year Scour Analysis Report

F.3.3 Proposed Condition 50-year Scour Analysis Report

F.3.4 Proposed Condition 50-year Scour Analysis Report

Left (south) Bank Flow Distribution Data

Plan: POLRTscour Salt River Reach 4 RS: 221.068 Profile: PF#2							
Left Sta	Right Sta	Flow	Area	W.P.	% Conv.	Hydr D.	Velocity
(ft)	(ft)	(cfs)	(sq ft)	(ft)		(ft)	(ft/s)
18938	18959.67	0	47.51	23.73	0	2.19	0
18959.67	18981.33	0	53.35	21.67	0	2.46	0
18981.33	19003	0	59.18	21.67	0	2.73	0
19003	19024.67	0	65.14	21.67	0	3.01	0
19024.67	19046.33	0	71.09	21.67	0	3.28	0
19046.33	19068	0	77.8	21.67	0	3.59	0
19068	**19089.64**	**170.46**	**86.07**	**21.65**	**0.07**	**3.98**	**1.98**
19089.64	19111.29	204.34	95.97	21.65	0.08	4.43	2.13
19111.29	19132.94	246.86	107.5	21.65	0.1	4.97	2.3
19132.94	19154.58	299.3	120.68	21.66	0.12	5.57	2.48
19154.58	19176.23	362.3	135.33	21.66	0.14	6.25	2.68
19176.23	19197.87	437.44	151.54	21.66	0.17	7	2.89
19197.87	19219.52	521.88	168.47	21.66	0.21	7.78	3.1
19219.52	19241.16	612.52	185.47	21.66	0.25	8.57	3.3
19241.16	19262.81	708.15	202.33	21.66	0.28	9.35	3.5
19262.81	19284.46	809.57	219.25	21.66	0.32	10.13	3.69
19284.46	19306.1	917.06	236.28	21.66	0.37	10.92	3.88
19306.1	19327.74	1041.56	255.04	21.66	0.42	11.78	4.08
19327.74	19349.39	1094.57	264.35	21.99	0.44	12.21	4.14
19349.39	19371.04	1065.41	259.64	21.9	0.43	12	4.1
19371.04	19392.68	1066.01	258.55	21.65	0.43	11.94	4.12
19392.68	19414.33	943.52	242.15	22.07	0.38	11.19	3.9
19414.33	19435.97	966.87	244.91	21.89	0.39	11.31	3.95
19435.97	19457.62	1116.75	266.01	21.68	0.45	12.29	4.2
19457.62	19479.26	1059.97	258.21	21.76	0.42	11.93	4.11
19479.26	19500.91	635.68	190.81	22	0.25	8.82	3.33
19500.91	19522.55	286.79	117.91	21.79	0.11	5.45	2.43
19522.55	19544.2	219.53	100.22	21.67	0.09	4.63	2.19
LB 19544.20	19715.96	35589.77	3833.02	175.94	14.24	22.32	9.29
19715.96	19887.72	48837.65	4590.1	171.76	19.54	26.72	10.64
19887.72	20059.48	52740.78	4806.94	171.77	21.1	27.99	10.97
20059.48	20231.24	54858.93	4921.74	171.76	21.94	28.65	11.15
20231.24	RB 20403.00	41699.24	4262.7	180.94	16.68	24.82	9.78
20403	20484.3	1076.5	503.33	85.89	0.43	6.19	2.14
20484.3	20565.6	408.02	276.1	82.03	0.16	3.4	1.48
20565.6	20646.9	2.58	5.1	7.56	0	0.69	0.51

APPENDIX F BRIDGE SCOUR CALCULATIONS

F.1 Used Grain Size Data

F.1.1 Used Soil Particle Size Data

F.1.2 Left Bank Flow Distribution Data

F.2 Proposed LRT Bridge Scour Analysis Report

F.2.1 50-year Scour Analysis Report

F.2.2 500-year Scour Analysis Report

F.3 The UPRR Bridge Scour Analysis Report

F.3.1 Revised Existing Condition 50-year Scour Analysis Report

F.3.2 Revised Existing Condition 500-year Scour Analysis Report

F.3.3 Proposed Condition 50-year Scour Analysis Report

F.3.4 Proposed Condition 50-year Scour Analysis Report

50 year event LRT bridge scour result, Proposed condition

Hydraulic Design Data

Contraction Scour

		Left	Channel	Right
Input Data				
	Average Depth (ft):		18.33	
	Approach Velocity (ft/s):		9.06	
	Br Average Depth (ft):		19.36	
	BR Opening Flow (cfs):		145000	
	BR Top WD (ft):		807.35	
	Grain Size D50 (ft):	0.0046	0.0042	0.00089
	Approach Flow (cfs):		145000	
	Approach Top WD (ft):		873.25	
	K1 Coefficient:		0.64	
Results				
	Scour Depth Ys (ft):		0	
	Critical Velocity (ft/s):		2.88	
	Equation:		Live	

Pier Scour

Pier: #1 (CL = 19182.5)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00375
Depth Upstream (ft):	0.15
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.05926
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #2 (CL = 19280)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00069
Depth Upstream (ft):	3.67
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00591
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #3 (CL = 19416)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.0134
Depth Upstream (ft):	3.98
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.041
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #4 (CL = 19569)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00492
Depth Upstream (ft):	7.97
Velocity Upstream (ft/s):	5.11
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.0269
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	10.75
Froude #:	0.32
Equation:	CSU equation

Pier: #5 (CL = 19722)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00361
Depth Upstream (ft):	20.04
Velocity Upstream (ft/s):	8.72
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.02428
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	15.33
Froude #:	0.34
Equation:	CSU equation

Pier: #6 (CL = 19874)

Input Data

Pier Shape:	Round nose

Pier Width (ft):	8
Grain Size D50 (ft):	0.00417
Depth Upstream (ft):	20.04
Velocity Upstream (ft/s):	8.73
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.026
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	15.33
Froude #:	0.34
Equation:	CSU equation

Pier: #7 (CL = 20026)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00226
Depth Upstream (ft):	22.04
Velocity Upstream (ft/s):	9.28
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.02657
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	15.94
Froude #:	0.35
Equation:	CSU equation

Pier: #8 (CL = 20189)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00623
Depth Upstream (ft):	22.04
Velocity Upstream (ft/s):	9.24
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.02756
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	15.92
Froude #:	0.35
Equation:	CSU equation

Pier: #9 (CL = 20352)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00385
Depth Upstream (ft):	20.04

Velocity Upstream (ft/s):	6.07
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.0473
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	13.12
Froude #:	0.24
Equation:	CSU equation

Pier: #10 (CL = 20505)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00144
Depth Upstream (ft):	-2.96
Velocity Upstream (ft/s):	
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.03346
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier : #1 (CL = 19182.5) (Pier) (ft):	0
Pier : #2 (CL = 19280) (Pier) (ft):	0
Pier : #3 (CL = 19416) (Pier) (ft):	0
Pier : #4 (CL = 19569) (Pier) (ft):	10.75
Pier : #5 (CL = 19722) (Pier) (ft):	15.33
Pier : #6 (CL = 19874) (Pier) (ft):	15.33
Pier : #7 (CL = 20026) (Pier) (ft):	15.94
Pier : #8 (CL = 20189) (Pier) (ft):	15.92
Pier : #9 (CL = 20352) (Pier) (ft):	13.12
Pier : #10 (CL = 20505) (Pier) (ft):	0

APPENDIX F BRIDGE SCOUR CALCULATIONS

F.1 Used Grain Size Data

F.1.1 Used Soil Particle Size Data

F.1.2 Left Bank Flow Distribution Data

F.2 Proposed LRT Bridge Scour Analysis Report

F.2.1 50-year Scour Analysis Report

F.2.2 500-year Scour Analysis Report

F.3 The UPRR Bridge Scour Analysis Report

F.3.1 Revised Existing Condition 50-year Scour Analysis Report

F.3.2 Revised Existing Condition 500-year Scour Analysis Report

F.3.3 Proposed Condition 50-year Scour Analysis Report

F.3.4 Proposed Condition 50-year Scour Analysis Report

500 year event LRT bridge scour result, Proposed condition

Hydraulic Design Data

Contraction Scour

		Left	Channel	Right
Input Data				
	Average Depth (ft):	3.65	24.82	4.35
	Approach Velocity (ft/s):	2.23	11.37	2.07
	Br Average Depth (ft):	8.7	25.92	4.47
	BR Opening Flow (cfs):	16542.34	231693.5	1764.17
	BR Top WD (ft):	433.2	810.8	160.69
	Grain Size D50 (ft):	0.0046	0.0042	0.0009
	Approach Flow (cfs):	2094.95	246453.7	1451.32
	Approach Top WD (ft):	257.55	873.37	161.01
	K1 Coefficient:	0.59	0.64	0.69
Results				
	Scour Depth Ys (ft):	4.08	0	0.68
	Critical Velocity (ft/s):	2.26	3.03	1.35
	Equation:	Clear	Live	Live

Pier Scour

Pier: #1 (CL = 19182.5)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00375
Depth Upstream (ft):	6.84
Velocity Upstream (ft/s):	2.62
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.05926
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	7.9
Froude #:	0.18
Equation:	CSU equation

Pier: #2 (CL = 19280)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00069
Depth Upstream (ft):	10.36
Velocity Upstream (ft/s):	3.73
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00591
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	9.73
Froude #:	0.2
Equation:	CSU equation

Pier: #3 (CL = 19416)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.0134
Depth Upstream (ft):	10.66
Velocity Upstream (ft/s):	4.01
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.041
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	10.08
Froude #:	0.22
Equation:	CSU equation

Pier: #4 (CL = 19569)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00492
Depth Upstream (ft):	14.65
Velocity Upstream (ft/s):	7.04
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.0269
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	13.4
Froude #:	0.32
Equation:	CSU equation

Pier: #5 (CL = 19722)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00361
Depth Upstream (ft):	26.72
Velocity Upstream (ft/s):	10.53
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.02428
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	17.28
Froude #:	0.36
Equation:	CSU equation

Pier: #6 (CL = 19874)

Input Data

Pier Shape:	Round nose

Pier Width (ft):	8
Grain Size D50 (ft):	0.00417
Depth Upstream (ft):	26.72
Velocity Upstream (ft/s):	10.54
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.026
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	17.28
Froude #:	0.36
Equation:	CSU equation

Pier: #7 (CL = 20026)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00226
Depth Upstream (ft):	28.72
Velocity Upstream (ft/s):	11.04
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.02657
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	17.8
Froude #:	0.36
Equation:	CSU equation

Pier: #8 (CL = 20189)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00623
Depth Upstream (ft):	28.72
Velocity Upstream (ft/s):	11
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.02756
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	17.78
Froude #:	0.36
Equation:	CSU equation

Pier: #9 (CL = 20352)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00385
Depth Upstream (ft):	26.72

Velocity Upstream (ft/s):	7.72
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.0473
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	15.12
Froude #:	0.26
Equation:	CSU equation

Pier: #10 (CL = 20505)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00144
Depth Upstream (ft):	3.72
Velocity Upstream (ft/s):	1.54
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	8
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.03346
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	5.79
Froude #:	0.14
Equation:	CSU equation

Abutment Scour

Input Data

	Left	Right
Station at Toe (ft):	19087	20606
Toe Sta at appr (ft):	19037.87	20571.44
Abutment Length (ft):	17	4.89
Depth at Toe (ft):	4.14	-4.16
K1 Shape Coef:	) - Vertical abutment	
Degree of Skew (degrees):	90	90
K2 Skew Coef:	1	1
Projected Length L' (ft):	0	4.89
Avg Depth Obstructed Ya (ft):	4	2.25
Flow Obstructed Qe (cfs):	170	13.94
Area Obstructed Ae (sq ft):	86	11.02

Results

Scour Depth Ys (ft):	4	
Qe/Ae = Ve:	1.98	1.26
Froude #:	0.17	0.15
Equation:	Froehlich	Froehlich

Combined Scour Depths

Pier : #1 (CL = 19182.5) (Contr + Pier) (ft):	11.97
Pier : #2 (CL = 19280) (Contr + Pier) (ft):	13.8
Pier : #3 (CL = 19416) (Contr + Pier) (ft):	14.15
Pier : #4 (CL = 19569) (Contr + Pier) (ft):	17.47

Pier : #5 (CL = 19722) (Contr + Pier) (ft):	21.35
Pier : #6 (CL = 19874) (Contr + Pier) (ft):	21.36
Pier : #7 (CL = 20026) (Contr + Pier) (ft):	21.88
Pier : #8 (CL = 20189) (Contr + Pier) (ft):	21.86
Pier : #9 (CL = 20352) (Contr + Pier) (ft):	19.2
Pier : #10 (CL = 20505) (Contr + Pier) (ft):	9.87

Left abutment scour + contraction 8.08

APPENDIX F BRIDGE SCOUR CALCULATIONS

F.1 Used Grain Size Data

F.1.1 Used Soil Particle Size Data

F.1.2 Left Bank Flow Distribution Data

F.2 Proposed LRT Bridge Scour Analysis Report

F.2.1 50-year Scour Analysis Report

F.2.2 500-year Scour Analysis Report

F.3 The UPRR Bridge Scour Analysis Report

F.3.1 Revised Existing Condition 50-year Scour Analysis Report

F.3.2 Revised Existing Condition 500-year Scour Analysis Report

F.3.3 Proposed Condition 50-year Scour Analysis Report

F.3.4 Proposed Condition 50-year Scour Analysis Report

50 year event UPRR bridge scour result, revised existing condition

Hydraulic Design Data

Contraction Scour

		Left	Channel	Right
Input Data				
	Average Depth (ft):		19.49	
	Approach Velocity (ft/s):		8.69	
	Br Average Depth (ft):		19.57	
	BR Opening Flow (cfs):		145000	
	BR Top WD (ft):		750.41	
	Grain Size D50 (ft):	0.0046	0.0042	0.00089
	Approach Flow (cfs):		145000	
	Approach Top WD (ft):		855.61	
	K1 Coefficient:		0.64	
Results				
	Scour Depth Ys (ft):		1.63	
	Critical Velocity (ft/s):		2.91	
	Equation:		Live	

Pier Scour

Pier: #1 (CL = 19133.34)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	-0.21
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #2 (CL = 19165.06)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	0.24
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	

Equation:	CSU equation

Pier: #3 (CL = 19193.7)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	1.54
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #4 (CL = 19228.41)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	2.32
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #5 (CL = 19260.04)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	2.86
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #6 (CL = 19291.76)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	4.35
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #7 (CL = 19323.59)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00069
Depth Upstream (ft):	5.89
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00591
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #8 (CL = 19424.89)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.0134
Depth Upstream (ft):	3.14
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.041
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #9 (CL = 19576.55)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00492
Depth Upstream (ft):	1.8
Velocity Upstream (ft/s):	5.41
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.0269
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	9.02
Froude #:	0.71
Equation:	CSU equation

Pier: #10 (CL = 19728.61)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00361
Depth Upstream (ft):	22.02
Velocity Upstream (ft/s):	9.82
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.02428
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	16.33
Froude #:	0.37
Equation:	CSU equation

Pier: #11 (CL = 19879.97)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00417
Depth Upstream (ft):	23.72
Velocity Upstream (ft/s):	10.07
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.026
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	16.68
Froude #:	0.36
Equation:	CSU equation

Pier: #12 (CL = 20031.94)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00226
Depth Upstream (ft):	23.69
Velocity Upstream (ft/s):	10
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.02657
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	16.63
Froude #:	0.36
Equation:	CSU equation

Pier: #13 (CL = 20192.95)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00623
Depth Upstream (ft):	16.6
Velocity Upstream (ft/s):	7.88
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.02756
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	14.3
Froude #:	0.34
Equation:	CSU equation

Pier: #14 (CL = 20355.05)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00385
Depth Upstream (ft):	14.59
Velocity Upstream (ft/s):	6.34
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.0473
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	12.81
Froude #:	0.29
Equation:	CSU equation

Pier: #15 (CL = 20506.31)

Input Data

Pier Shape:	Round nose

Pier Width (ft):	8
Grain Size D50 (ft):	0.00144
Depth Upstream (ft):	-1.09
Velocity Upstream (ft/s):	.
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.03346
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #16 (CL = 20608.15)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00033
Depth Upstream (ft):	-3.51
Velocity Upstream (ft/s):	
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00075
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Combined Scour Depths

Pier : #1 (CL = 19133.34) (Contr + Pier) (ft):		
Pier : #2 (CL = 19165.06) (Contr + Pier) (ft):		
Pier : #3 (CL = 19193.7) (Contr + Pier) (ft):		
Pier : #4 (CL = 19228.41) (Contr + Pier) (ft):		
Pier : #5 (CL = 19260.04) (Contr + Pier) (ft):		
Pier : #6 (CL = 19291.76) (Contr + Pier) (ft):		
Pier : #7 (CL = 19323.59) (Contr + Pier) (ft):		
Pier : #8 (CL = 19424.89) (Contr + Pier) (ft):		
Pier : #9 (CL = 19576.55) (Contr + Pier) (ft):	9.02	10.65
Pier : #10 (CL = 19728.61) (Contr + Pier) (ft):	16.33	17.96
Pier : #11 (CL = 19879.97) (Contr + Pier) (ft):	16.68	18.31
Pier : #12 (CL = 20031.94) (Contr + Pier) (ft):	16.63	18.26
Pier : #13 (CL = 20192.95) (Contr + Pier) (ft):	14.3	15.93
Pier : #14 (CL = 20355.05) (Contr + Pier) (ft):	12.81	14.44
Pier : #15 (CL = 20506.31) (Contr + Pier) (ft):		
Pier : #16 (CL = 20608.15) (Contr + Pier) (ft):		

APPENDIX F BRIDGE SCOUR CALCULATIONS

F.1 Used Grain Size Data

F.1.1 Used Soil Particle Size Data

F.1.2 Left Bank Flow Distribution Data

F.2 Proposed LRT Bridge Scour Analysis Report

F.2.1 50-year Scour Analysis Report

F.2.2 500-year Scour Analysis Report

F.3 The UPRR Bridge Scour Analysis Report

F.3.1 Revised Existing Condition 50-year Scour Analysis Report

F.3.2 Revised Existing Condition 500-year Scour Analysis Report

F.3.3 Proposed Condition 50-year Scour Analysis Report

F.3.4 Proposed Condition 50-year Scour Analysis Report

500 year event UPRR bridge scour result, revised existing condition

Hydraulic Design Data

Contraction Scour

		Left	Channel	Right
Input Data				
	Average Depth (ft):	8.08	25.97	4.5
	Approach Velocity (ft/s):	3.42	10.56	1.89
	Br Average Depth (ft):	7.88	25.29	4.58
	BR Opening Flow (cfs):	15344.29	232633.2	2022.54
	BR Top WD (ft):	472.38	780.99	173.53
	Grain Size D50 (ft):	0.0046	0.0042	0.0009
	Approach Flow (cfs):	13157.66	235399.3	1443.09
	Approach Top WD (ft):	476.2	858.8	169.22
	K1 Coefficient:	0.64	0.64	0.69
Results				
	Scour Depth Ys (ft):	1.39	2.03	1.33
	Critical Velocity (ft/s):	2.59	3.05	1.36
	Equation:	Live	Live	Live

Pier Scour

Pier: #1 (CL = 19133.34)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	6.42
Velocity Upstream (ft/s):	2.66
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	3.51
Froude #:	0.19
Equation:	CSU equation

Pier: #2 (CL = 19165.06)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	6.88
Velocity Upstream (ft/s):	3.15
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	3.81
Froude #:	0.21

Equation:	CSU equation

Pier: #3 (CL = 19193.7)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	8.18
Velocity Upstream (ft/s):	3.15
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	3.9
Froude #:	0.19
Equation:	CSU equation

Pier: #4 (CL = 19228.41)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	8.96
Velocity Upstream (ft/s):	3.58
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	4.17
Froude #:	0.21
Equation:	CSU equation

Pier: #5 (CL = 19260.04)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	9.5
Velocity Upstream (ft/s):	3.92
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	4.37
Froude #:	0.22
Equation:	CSU equation

Pier: #6 (CL = 19291.76)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	10.99
Velocity Upstream (ft/s):	3.92
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	4.46
Froude #:	0.21
Equation:	CSU equation

Pier: #7 (CL = 19323.59)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	12.42
Velocity Upstream (ft/s):	4.3
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	4.71
Froude #:	0.21
Equation:	CSU equation

Pier: #8 (CL = 19424.89)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.0134
Depth Upstream (ft):	9.77
Velocity Upstream (ft/s):	3.93
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.041
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	9.87
Froude #:	0.22
Equation:	CSU equation

Pier: #9 (CL = 19576.55)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00492
Depth Upstream (ft):	8.44
Velocity Upstream (ft/s):	5.77
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.0269
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	11.42
Froude #:	0.35
Equation:	CSU equation

Pier: #10 (CL = 19728.61)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00361
Depth Upstream (ft):	28.66
Velocity Upstream (ft/s):	11.72
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.02428
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	18.26
Froude #:	0.39
Equation:	CSU equation

Pier: #11 (CL = 19879.97)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00417
Depth Upstream (ft):	30.36
Velocity Upstream (ft/s):	11.95
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.026
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	18.56
Froude #:	0.38
Equation:	CSU equation

Pier: #12 (CL = 20031.94)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00226
Depth Upstream (ft):	30.32
Velocity Upstream (ft/s):	11.89
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.02657
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	18.52
Froude #:	0.38
Equation:	CSU equation

Pier: #13 (CL = 20192.95)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00623
Depth Upstream (ft):	23.23
Velocity Upstream (ft/s):	9.95
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.02756
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	16.55
Froude #:	0.36
Equation:	CSU equation

Pier: #14 (CL = 20355.05)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00385
Depth Upstream (ft):	21.23
Velocity Upstream (ft/s):	8.3
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.0437
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	15.12
Froude #:	0.32
Equation:	CSU equation

Pier: #15 (CL = 20506.31)

Input Data

Pier Shape:	Round nose

Pier Width (ft):	8
Grain Size D50 (ft):	0.00144
Depth Upstream (ft):	5.55
Velocity Upstream (ft/s):	2.31
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.03346
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	7.29
Froude #:	0.17
Equation:	CSU equation

Pier: #16 (CL = 20608.15)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00033
Depth Upstream (ft):	3.12
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00075
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Combined Scour Depths

Pier : #1 (CL = 19133.34) (Contr + Pier) (ft):	4.9
Pier : #2 (CL = 19165.06) (Contr + Pier) (ft):	5.19
Pier : #3 (CL = 19193.7) (Contr + Pier) (ft):	5.28
Pier : #4 (CL = 19228.41) (Contr + Pier) (ft):	5.55
Pier : #5 (CL = 19260.04) (Contr + Pier) (ft):	5.76
Pier : #6 (CL = 19291.76) (Contr + Pier) (ft):	5.84
Pier : #7 (CL = 19323.59) (Contr + Pier) (ft):	6.1
Pier : #8 (CL = 19424.89) (Contr + Pier) (ft):	11.26
Pier : #9 (CL = 19576.55) (Contr + Pier) (ft):	12.81
Pier : #10 (CL = 19728.61) (Contr + Pier) (ft):	19.65
Pier : #11 (CL = 19879.97) (Contr + Pier) (ft):	19.95
Pier : #12 (CL = 20031.94) (Contr + Pier) (ft):	19.9
Pier : #13 (CL = 20192.95) (Contr + Pier) (ft):	17.93
Pier : #14 (CL = 20355.05) (Contr + Pier) (ft):	16.51
Pier : #15 (CL = 20506.31) (Contr + Pier) (ft):	8.67
Pier : #16 (CL = 20608.15) (Contr + Pier) (ft):	

APPENDIX F BRIDGE SCOUR CALCULATIONS

F.1 Used Grain Size Data

F.1.1 Used Soil Particle Size Data

F.1.2 Left Bank Flow Distribution Data

F.2 Proposed LRT Bridge Scour Analysis Report

F.2.1 50-year Scour Analysis Report

F.2.2 500-year Scour Analysis Report

F.3 The UPRR Bridge Scour Analysis Report

F.3.1 Revised Existing Condition 50-year Scour Analysis Report

F.3.2 Revised Existing Condition 500-year Scour Analysis Report

F.3.3 Proposed Condition 50-year Scour Analysis Report

F.3.4 Proposed Condition 50-year Scour Analysis Report

50 year event UPRR bridge scour result, Proposed condition

Hydraulic Design Data

Contraction Scour

		Left	Channel	Right
Input Data				
	Average Depth (ft):		19.41	
	Approach Velocity (ft/s):		8.73	
	Br Average Depth (ft):		19.57	
	BR Opening Flow (cfs):		145000	
	BR Top WD (ft):		750.41	
	Grain Size D50 (ft):	0.0046	0.0042	0.0009
	Approach Flow (cfs):		145000	
	Approach Top WD (ft):		855.5	
	K1 Coefficient:		0.64	
Results				
	Scour Depth Ys (ft):		1.54	
	Critical Velocity (ft/s):		2.9	
	Equation:		Live	

Pier Scour

Pier: #1 (CL = 19133.34)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	-0.21
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #2 (CL = 19165.06)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	0.24
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	

Equation:	CSU equation

Pier: #3 (CL = 19193.7)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	1.54
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	[illegible]
Froude #:	
Equation:	CSU equation

Pier: #4 (CL = 19228.41)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	2.32
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	[illegible]
Froude #:	
Equation:	CSU equation

Pier: #5 (CL = 19260.04)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	2.86
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	[illegible]
Froude #:	
Equation:	CSU equation

Pier: #6 (CL = 19291.76)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	4.35
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #7 (CL = 19323.59)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00069
Depth Upstream (ft):	5.89
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00591
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #8 (CL = 19424.89)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.0134
Depth Upstream (ft):	3.14
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.041
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #9 (CL = 19576.55)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00492
Depth Upstream (ft):	1.8
Velocity Upstream (ft/s):	5.41
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.0269
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	9.02
Froude #:	0.71
Equation:	CSU equation

Pier: #10 (CL = 19728.61)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00361
Depth Upstream (ft):	22.02
Velocity Upstream (ft/s):	9.82
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.02428
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	16.33
Froude #:	0.37
Equation:	CSU equation

Pier: #11 (CL = 19879.97)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00417
Depth Upstream (ft):	23.72
Velocity Upstream (ft/s):	10.07
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.026
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	16.68
Froude #:	0.36
Equation:	CSU equation

Pier: #12 (CL = 20031.94)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00226
Depth Upstream (ft):	23.69
Velocity Upstream (ft/s):	10
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.02657
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	16.63
Froude #:	0.36
Equation:	CSU equation

Pier: #13 (CL = 20192.95)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00623
Depth Upstream (ft):	16.6
Velocity Upstream (ft/s):	7.88
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.02756
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	14.3
Froude #:	0.34
Equation:	CSU equation

Pier: #14 (CL = 20355.05)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00385
Depth Upstream (ft):	14.59
Velocity Upstream (ft/s):	6.34
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.0473
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	12.81
Froude #:	0.29
Equation:	CSU equation

Pier: #15 (CL = 20506.31)

Input Data

Pier Shape:	Round nose

Pier Width (ft):	8
Grain Size D50 (ft):	0.00144
Depth Upstream (ft):	-1.09
Velocity Upstream (ft/s):	
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.03346
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #16 (CL = 20608.15)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00033
Depth Upstream (ft):	-3.51
Velocity Upstream (ft/s):	
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00075
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Combined Scour Depths

Pier : #1 (CL = 19133.34) (Contr + Pier) (ft):		
Pier : #2 (CL = 19165.06) (Contr + Pier) (ft):		
Pier : #3 (CL = 19193.7) (Contr + Pier) (ft):		
Pier : #4 (CL = 19228.41) (Contr + Pier) (ft):		
Pier : #5 (CL = 19260.04) (Contr + Pier) (ft):		
Pier : #6 (CL = 19291.76) (Contr + Pier) (ft):		
Pier : #7 (CL = 19323.59) (Contr + Pier) (ft):		
Pier : #8 (CL = 19424.89) (Contr + Pier) (ft):		
Pier : #9 (CL = 19576.55) (Contr + Pier) (ft):	9.02	10.56
Pier : #10 (CL = 19728.61) (Contr + Pier) (ft):	16.33	17.87
Pier : #11 (CL = 19879.97) (Contr + Pier) (ft):	16.68	18.22
Pier : #12 (CL = 20031.94) (Contr + Pier) (ft):	16.63	18.17
Pier : #13 (CL = 20192.95) (Contr + Pier) (ft):	14.3	15.84
Pier : #14 (CL = 20355.05) (Contr + Pier) (ft):	12.81	14.35
Pier : #15 (CL = 20506.31) (Contr + Pier) (ft):		
Pier : #16 (CL = 20608.15) (Contr + Pier) (ft):		

APPENDIX F BRIDGE SCOUR CALCULATIONS

F.1 Used Grain Size Data

F.1.1 Used Soil Particle Size Data

F.1.2 Left Bank Flow Distribution Data

F.2 Proposed LRT Bridge Scour Analysis Report

F.2.1 50-year Scour Analysis Report

F.2.2 500-year Scour Analysis Report

F.3 The UPRR Bridge Scour Analysis Report

F.3.1 Revised Existing Condition 50-year Scour Analysis Report

F.3.2 Revised Existing Condition 500-year Scour Analysis Report

F.3.3 Proposed Condition 50-year Scour Analysis Report

F.3.4 Proposed Condition 50-year Scour Analysis Report

500 year event UPRR bridge scour result, Proposed condition

Hydraulic Design Data

Contraction Scour

		Left	Channel	Right
Input Data				
	Average Depth (ft):	8.75	26.1	4.61
	Approach Velocity (ft/s):	3.55	10.43	1.9
	Br Average Depth (ft):	7.96	25.3	4.58
	BR Opening Flow (cfs):	15612.32	232362.6	2025.04
	BR Top WD (ft):	472.77	780.99	173.63
	Grain Size D50 (ft):	0.0046	0.0042	0.0009
	Approach Flow (cfs):	14786.52	233726.4	1487.1
	Approach Top WD (ft):	476.2	858.8	170.02
	K1 Coefficient:	0.64	0.64	0.69
Results				
	Scour Depth Ys (ft):	1.25	2.3	1.34
	Critical Velocity (ft/s):	2.62	3.05	1.37
	Equation:	Live	Live	Live

Pier Scour

Pier: #1 (CL = 19133.34)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	6.43
Velocity Upstream (ft/s):	2.66
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	3.51
Froude #:	0.18
Equation:	CSU equation

Pier: #2 (CL = 19165.06)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	6.89
Velocity Upstream (ft/s):	3.14
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	3.8
Froude #:	0.21

Equation:	CSU equation

Pier: #3 (CL = 19193.7)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	8.18
Velocity Upstream (ft/s):	3.14
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	3.89
Froude #:	0.19
Equation:	CSU equation

Pier: #4 (CL = 19228.41)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	8.96
Velocity Upstream (ft/s):	3.57
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	4.16
Froude #:	0.21
Equation:	CSU equation

Pier: #5 (CL = 19260.04)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	9.51
Velocity Upstream (ft/s):	3.91
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	4.37
Froude #:	0.22
Equation:	CSU equation

Pier: #6 (CL = 19291.76)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	11
Velocity Upstream (ft/s):	3.91
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	4.45
Froude #:	0.21
Equation:	CSU equation

Pier: #7 (CL = 19323.59)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	2.3
Grain Size D50 (ft):	0.00023
Depth Upstream (ft):	12.54
Velocity Upstream (ft/s):	4.39
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00053
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	4.76
Froude #:	0.22
Equation:	CSU equation

Pier: #8 (CL = 19424.89)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.0134
Depth Upstream (ft):	9.78
Velocity Upstream (ft/s):	3.92
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.041
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	9.86
Froude #:	0.22
Equation:	CSU equation

Pier: #9 (CL = 19576.55)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00492
Depth Upstream (ft):	8.45
Velocity Upstream (ft/s):	5.77
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.0269
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	11.42
Froude #:	0.35
Equation:	CSU equation

Pier: #10 (CL = 19728.61)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00361
Depth Upstream (ft):	28.67
Velocity Upstream (ft/s):	11.7
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.02428
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	18.25
Froude #:	0.39
Equation:	CSU equation

Pier: #11 (CL = 19879.97)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00417
Depth Upstream (ft):	30.37
Velocity Upstream (ft/s):	11.94
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.026
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	18.55
Froude #:	0.38
Equation:	CSU equation

Pier: #12 (CL = 20031.94)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00226
Depth Upstream (ft):	30.33
Velocity Upstream (ft/s):	11.88
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.02657
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	18.51
Froude #:	0.38
Equation:	CSU equation

Pier: #13 (CL = 20192.95)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00623
Depth Upstream (ft):	23.24
Velocity Upstream (ft/s):	9.94
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.02756
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	16.54
Froude #:	0.36
Equation:	CSU equation

Pier: #14 (CL = 20355.05)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00385
Depth Upstream (ft):	21.23
Velocity Upstream (ft/s):	8.29
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.0437
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	15.12
Froude #:	0.32
Equation:	CSU equation

Pier: #15 (CL = 20506.31)

Input Data

Pier Shape:	Round nose

Pier Width (ft):	8
Grain Size D50 (ft):	0.00144
Depth Upstream (ft):	5.56
Velocity Upstream (ft/s):	2.31
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.03346
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	7.28
Froude #:	0.17
Equation:	CSU equation

Pier: #16 (CL = 20608.15)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (ft):	0.00033
Depth Upstream (ft):	3.13
Velocity Upstream (ft/s):	0
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	23
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.00075
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Combined Scour Depths

Pier : #1 (CL = 19133.34) (Contr + Pier) (ft):	4.76
Pier : #2 (CL = 19165.06) (Contr + Pier) (ft):	5.05
Pier : #3 (CL = 19193.7) (Contr + Pier) (ft):	5.14
Pier : #4 (CL = 19228.41) (Contr + Pier) (ft):	5.41
Pier : #5 (CL = 19260.04) (Contr + Pier) (ft):	5.62
Pier : #6 (CL = 19291.76) (Contr + Pier) (ft):	5.7
Pier : #7 (CL = 19323.59) (Contr + Pier) (ft):	6.01
Pier : #8 (CL = 19424.89) (Contr + Pier) (ft):	11.11
Pier : #9 (CL = 19576.55) (Contr + Pier) (ft):	12.67
Pier : #10 (CL = 19728.61) (Contr + Pier) (ft):	19.5
Pier : #11 (CL = 19879.97) (Contr + Pier) (ft):	19.8
Pier : #12 (CL = 20031.94) (Contr + Pier) (ft):	19.76
Pier : #13 (CL = 20192.95) (Contr + Pier) (ft):	17.79
Pier : #14 (CL = 20355.05) (Contr + Pier) (ft):	16.37
Pier : #15 (CL = 20506.31) (Contr + Pier) (ft):	8.53
Pier : #16 (CL = 20608.15) (Contr + Pier) (ft):	