BRIDGE HYDRAULICS REPORT

PIMA FREEWAY CROSSING

OF THE SALT RIVER

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PIMA FREEWAY CROSSING

OF THE SALT RIVER

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I. INTRODUCTION

This report was prepared by Simons, Li & Associates, Inc., for the Arizona Department of Transportation (ADOT) under subcontract to Parsons, Brinckerhoff, Quade & Douglas, Inc. (PBQD). The contents of this report present the results of a detailed hydraulic analysis for the proposed bridge crossings of the Salt River in conjunction with the Red Mountain Traffic Interchange (RMTI). The bridge crossings consist of the main freeway and adjacent ramp structures. A site map showing the project reach of the Salt River and the general location of the proposed bridge structures is provided as Figure 1.1 of this report.

This report includes a hydraulic analysis to determine the effects of both the proposed bridges and the associated bank stabilization on the 100-year water-surface profile and flow velocities within the Salt River. In addition, this report presents freeboard calculations for the proposed bridge structures under 100-year flood conditions, as well as a hydraulic analysis for the "Superflood."

The hydraulic analysis was performed for the channel configuration and bank alignment of the August, 1992 East Papago Freeway bank protection plans. A scour analysis was performed to quantify the total scour that can be expected to impact the bridge substructures during both a 100-year flood and a "Superflood". Based on the results of these analyses, recommendations were made with respect to the total scour at bridge piers and abutments.

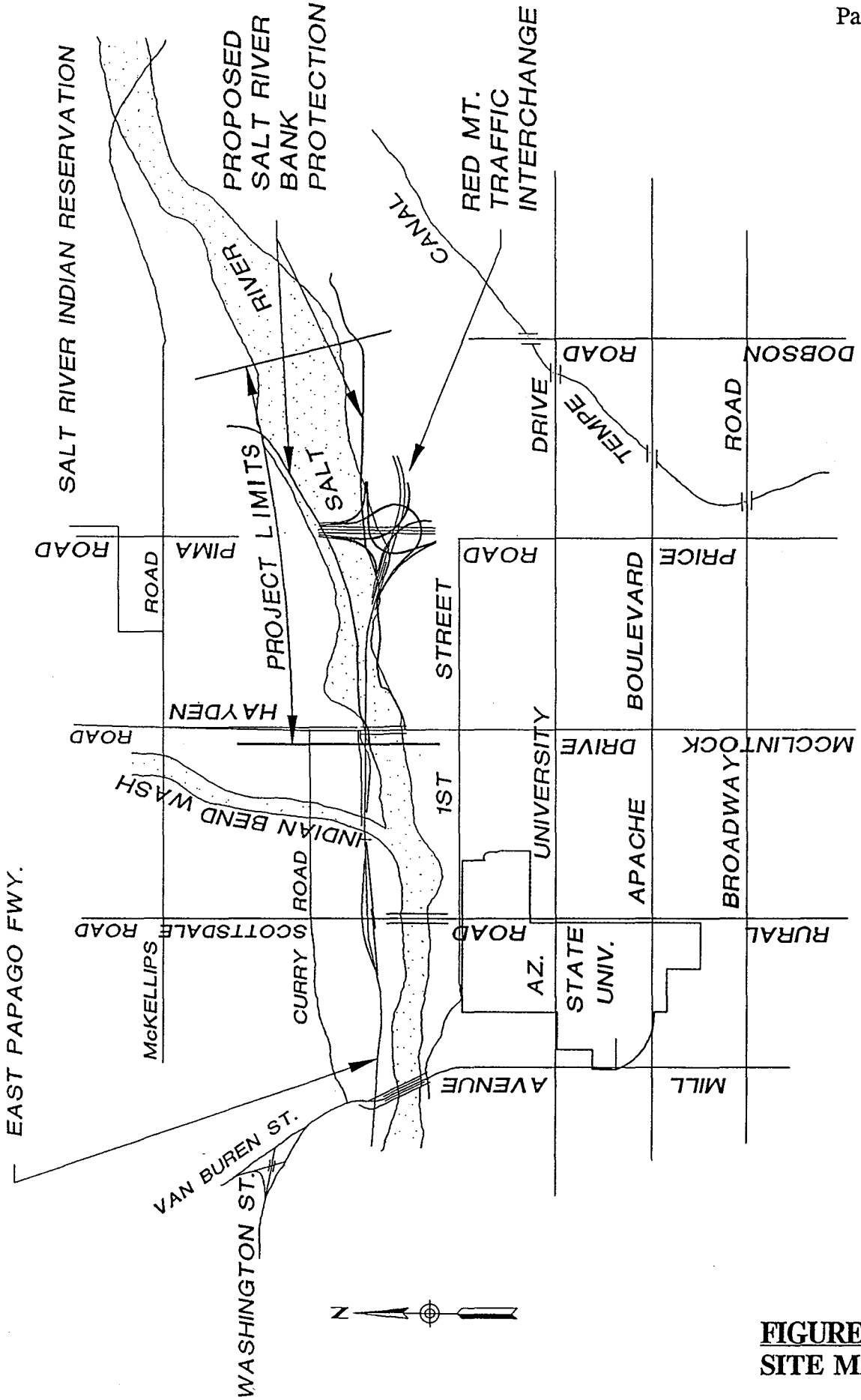

FIGURE 1.1
SITE MAP

II. HYDROLOGY

The 100-year flood peak discharges used in the Salt River hydraulic analyses were based on values presented in the May, 1982, Central Arizona Water Control Study [CAWCS, (1)]. Table 2.1 presents a summary of the CAWCS peak discharges. Interpolated values were utilized for intermediate points along the Salt River that are situated between the locations listed in Table 2.1. The values utilized match the values of the U.S. Army Corps of Engineers (COE) Salt River Flood Insurance Study (2). A peak discharge of 250,000 cfs was designated the "Superflood" for this reach of the Salt River.

Table 2.1: CAWCS 100-Year Flood Peak Discharges for the Salt River

Location	100-Year Discharge (cfs)
Mill Avenue	215,000
Gilbert Road	230,000

A 100-year flood hydrograph for the Salt River, having a base time of 10 days, was developed based on the COE balanced hydrograph for the regulated 100-year flow routed through the existing Salt River Project (SRP) system. The hydrograph was obtained from the COE hydrologic analysis titled, "Study for Flood Control Alternatives to Cliff Dam" (3). The hydrograph was utilized as input for a sediment-routing computer program used to estimate general scour during the passage of a 100-year flood. Figure 2.1 of this report presents a graphical representation of the 100-year flood hydrograph utilized in the general scour analysis. As part of this analysis, a hydrograph for the "Superflood" was also developed and utilized for the general scour analysis.

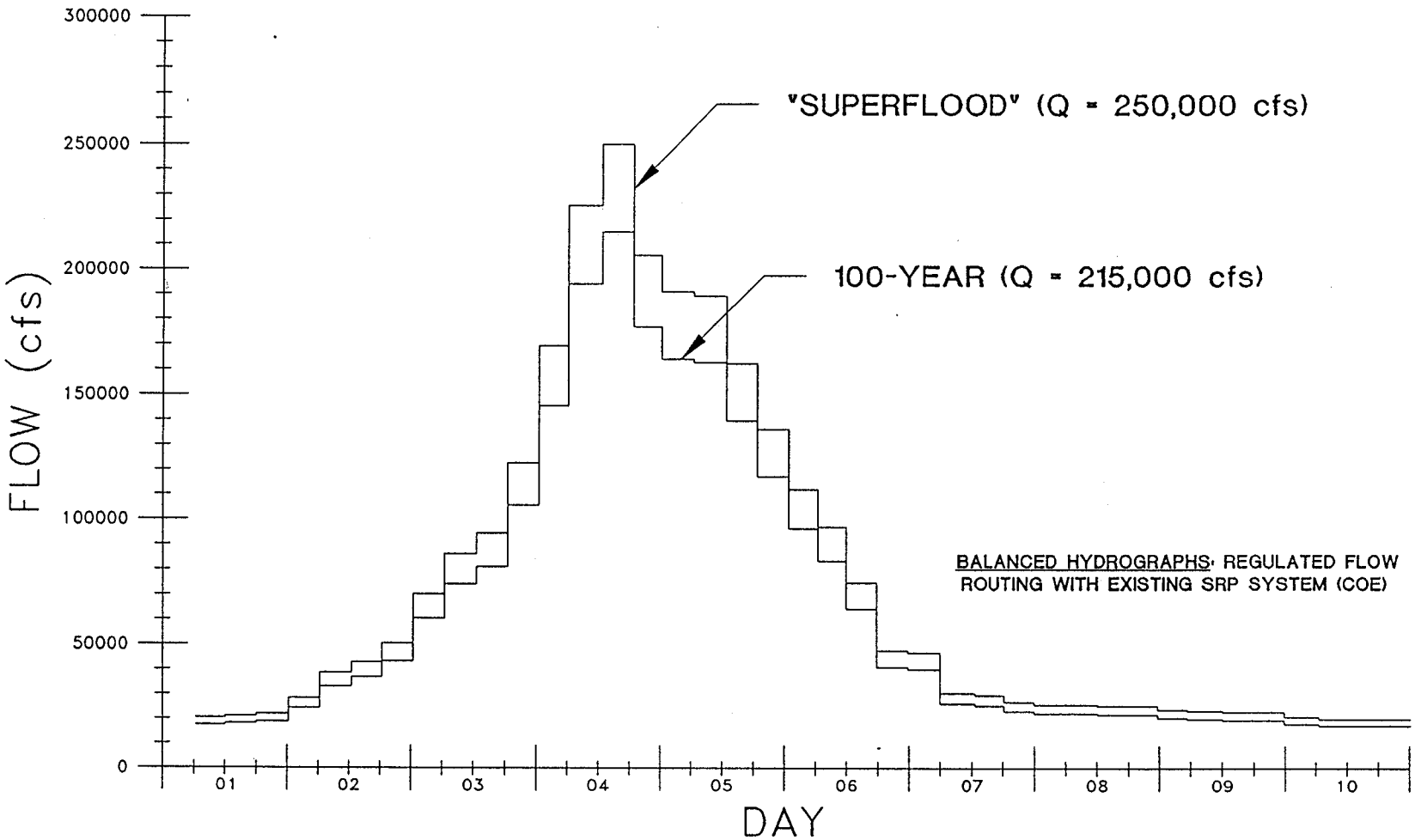

FIGURE 2.1
100-YEAR & SUPERFLOOD HYDROGRAPHS FOR THE SALT RIVER

Simons, Li & Associates, Inc.
Water Resources & Civil Engineering Consultants

III. HYDRAULIC ANALYSIS

The U.S. Army Corps of Engineers computer program "HEC-2 Water Surface Profiles" (4) was utilized to calculate the hydraulic conditions for the Salt River at the project site. Initially, the baseline hydraulics were established for the 100-year peak flow event using the existing, available topographic mapping (ADOT 1990, Cooper Aerial 1990, Kenney Aerial 1986). The backwater calculations started downstream of the McClintock Drive bridge at Grade-Control Structure No. 5, which was constructed in conjunction with the Rio Salado project. The Dobson Road alignment was the upstream limit of the hydraulic analysis.

The HEC-2 Special Bridge Method was used to analyze the hydraulics of the proposed bridge structures associated with the RMTI. These structures were modeled as three separate bridge crossings: 1) the S-E & S-W Ramps, 2) the mainline Pima Freeway, and 3) the E-N & W-N Ramps. The concept plans for these proposed bridge structures, prepared by PBQD, are provided within Appendix A of this report. In addition to modeling the proposed bridge structures, the "design conditions" model includes proposed bank protection for the Salt River between McClintock Drive and Dobson Road. The design conditions incorporate the following levels of bank protection (per The Letter of Intent between the ADOT, the Flood Control District of Maricopa County, and the City of Tempe, dated February 18, 1992):

- The north bank from McClintock Drive to the Pima Freeway, provides 10-year flood protection (Q = 93,000 cfs) with one foot of freeboard.
- The north bank from the Pima Freeway structures to a point about three-quarters of a mile upstream, provides 100-year flood protection (Q = 215,000 cfs) with three feet of freeboard.
- The south bank from McClintock Drive to the Old Tempe Landfill, provides (at a minimum) 10-year flood protection.
- The south bank from the Old Tempe Landfill to Dobson Road, provides 100-year flood protection with three feet of freeboard.

Figure 3.1 of this report presents topographic maps of the project site which depict HEC-2 cross-section locations, a plan view of the proposed bridge structures, and the locations of the proposed bank-stabilization measures. Table 3.1 of this report summarizes and compares the hydraulic parameters for the 100-year baseline and design conditions. The average velocity and

depth through the proposed bridge structures during a 100-year flood is approximately 8.2 feet-per-second (fps) and 28.4 feet, respectively. These hydraulic conditions, which do not vary significantly from the baseline conditions, were used in the local-scour computations for the 100-year flood.

The "Superflood" (Q = 250,000 cfs) hydraulic parameters for the design conditions were also determined in order to estimate local scour. Table 3.2 of this report presents a summary of the results of the hydraulic analysis for the "Superflood". The average velocity and depth through the proposed bridge structures during a "Superflood", is approximately 8.7 fps and 30.5 feet, respectively. The HEC-2 input and output files for the baseline (100-year) and design conditions (100-year and "Superflood") are provided within Appendix B of this report.

Table 3.3 of this report presents the hydraulic parameters in the immediate vicinity of the proposed RMTI bridge structures crossing the Salt River. ADOT design criteria requires a minimum of two feet of clearance above the design 100-year water-surface elevation (5). Using the low-chord elevations provided by PBQD in conjunction with the results of the hydraulic analysis, the 100-year freeboard for the proposed RMTI bridge structures were calculated. The results of these calculations are presented within Table 3.4 of this report.

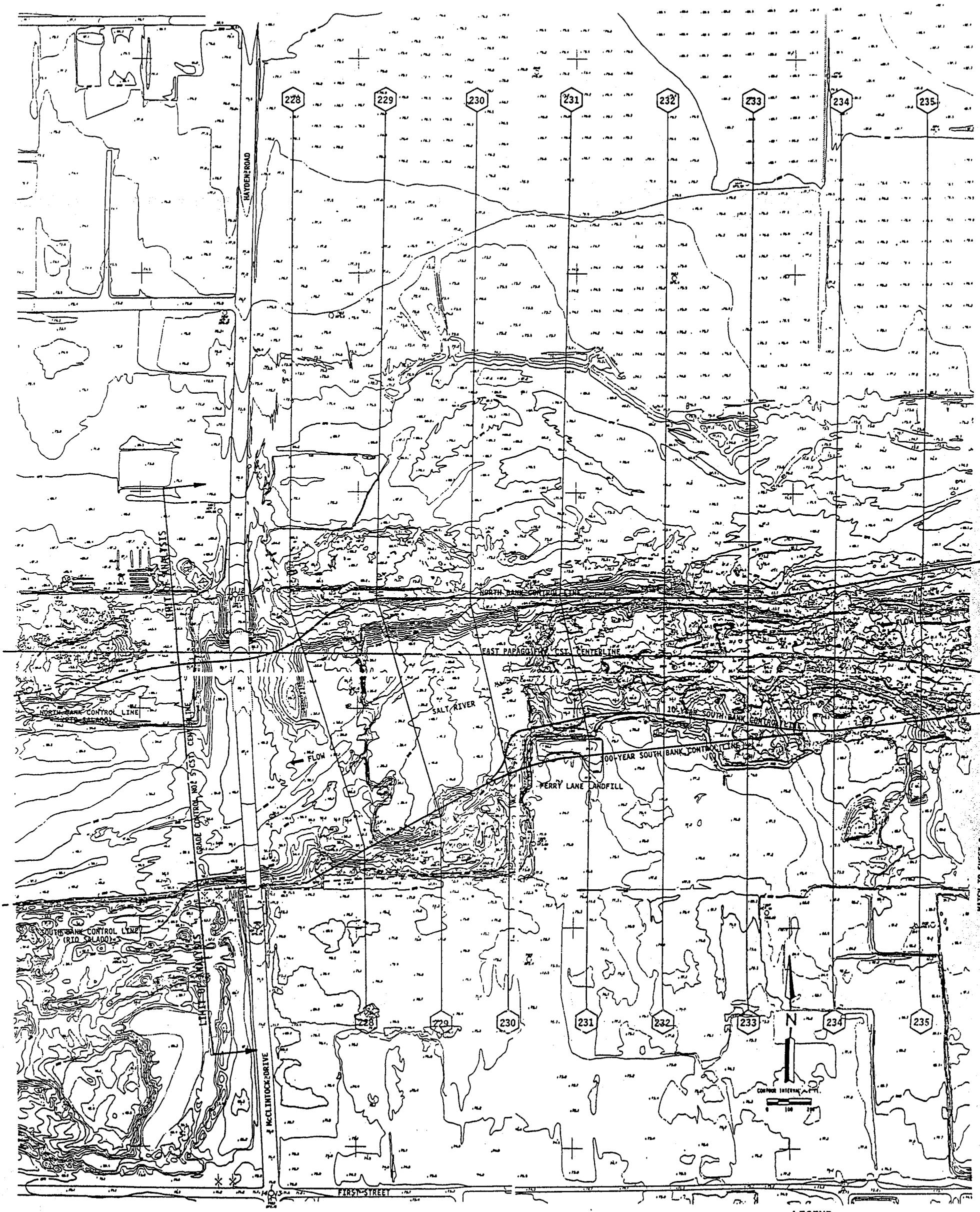

FIGURE 3.1
1 of 3

Project No.	AZ-DRUM-03
Date:	5-30-91
Design:	
Drawn:	JRM
Check:	
Revisions:	
CONTROL LINES (10-17-91)	
S. CONTROL LINE (5-14-92)	

HEC-2 CROSS-SECTION LOCATIONS
EAST PAPAGO FREEWAY & RED MT. T.I.

sla Simons, Li & Associates, Inc.
Newport Beach, CA. • Phoenix, AZ. • Tucson, AZ. • Fort Collins, CO.

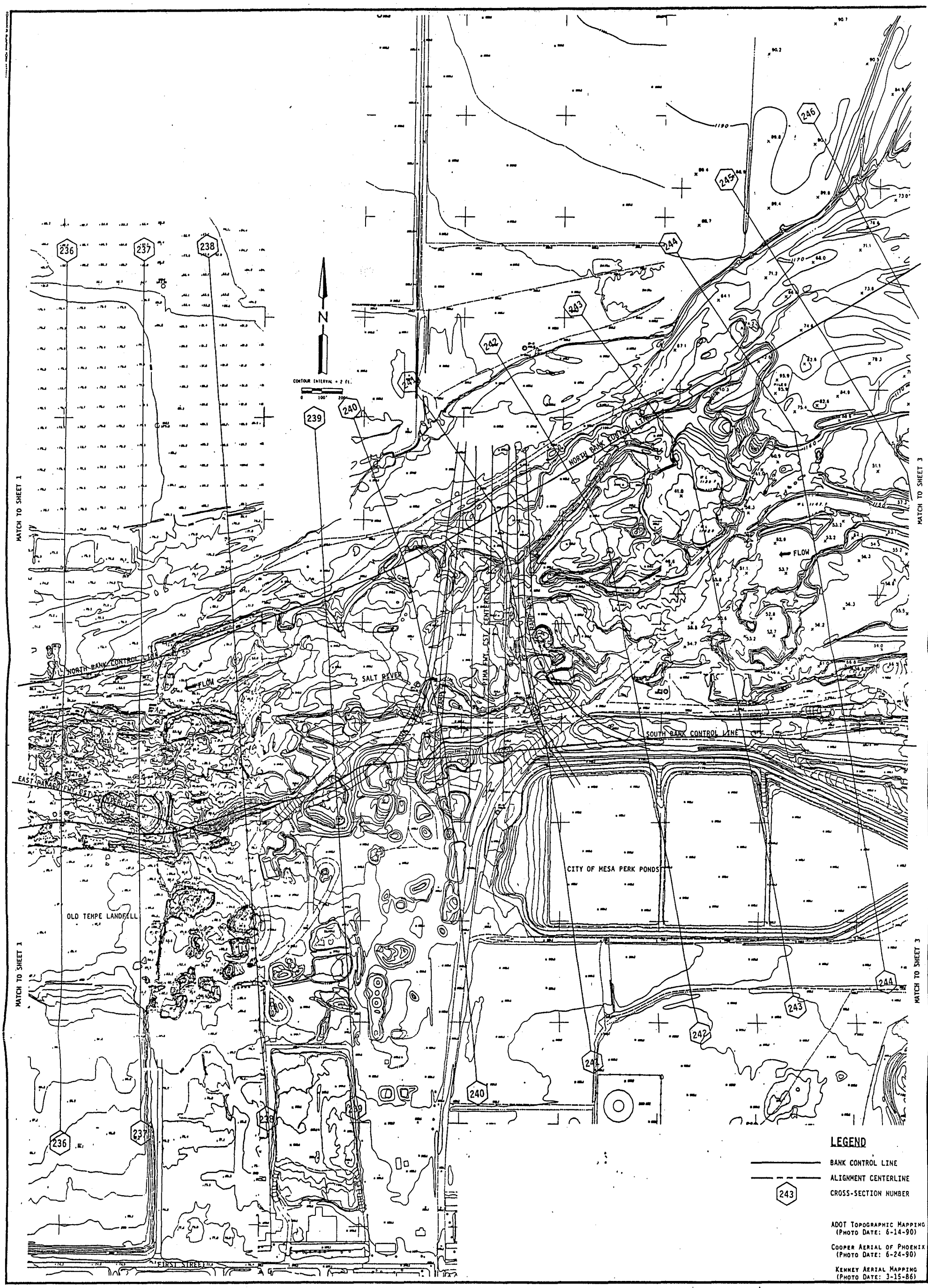

FIGURE 3.1
2 of 3

Project No.	AZ-DMJM-03
Date:	5-30-91
Design:	
Drawn:	JRM
Check:	
Revisions:	
CONTROL LINES (10-17-91)	

HEC-2 CROSS-SECTION LOCATIONS
EAST PAPAGO FREEWAY & RED MT. T.I.

sla SIMONS, LI & ASSOCIATES, INC.
NEWPORT BEACH, CA. • PHOENIX, AZ. • TUCSON, AZ. • FORT COLLINS, CO.
sla

FIGURE 3.1
3 of 3

Project No. AZ-DM3M-03
Date: 5-30-91
Design:
Drawn: JRM
Check:
Revisions:
South Bank Control Line (P.M.-T.)

HEC-2 CROSS-SECTION LOCATIONS
EAST PAPAGO FREEWAY & RED MT. T.I.

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TABLE 3.1: Summary of Hydraulic Parameters for the 100-Year Flood (Q = 215,000 cfs)

HEC-2 Cross-Section Number	Baseline Condition			Design Condition			Design Minus Baseline	
	WSEL (ft)	Velocity (fps)	Depth (ft)	WSEL (ft)	Velocity (fps)	Depth (ft)	Δ Velocity (ft)	Δ Depth (ft)
120.5	1166.5	11.9	19.5	1166.5	11.9	19.5	0.0	0.0
122.0	1166.7	12.2	19.5	1166.7	12.1	19.5	-0.1	0.0
122.7	1166.8	12.2	19.6	1166.8	12.2	19.6	0.0	0.0
123.6	1168.4	11.0	21.1	1168.4	11.0	21.1	0.0	0.0
228.0	1168.8	11.6	21.1	1169.0	10.7	21.3	-0.9	0.2
229.0	1169.5	12.1	21.4	1169.4	11.3	21.3	-0.8	-0.1
230.0	1170.0	14.4	21.6	1169.4	14.4	21.0	0.0	-0.6
231.0	1170.9	15.4	22.1	1167.6	22.9	18.8	7.5	-3.3
232.0	1172.5	15.1	23.2	1172.6	18.7	23.4	3.6	0.2
233.0	1174.5	13.1	24.8	1176.5	13.3	26.9	0.2	2.1
234.0	1174.2	17.8	24.1	1177.4	12.1	27.4	-5.7	3.3
235.0	1178.5	10.3	28.0	1178.1	11.6	27.7	1.3	-0.3
236.0	1179.2	9.0	28.4	1178.5	11.3	27.7	2.3	-0.7
237.0	1179.5	8.9	28.3	1179.4	9.7	28.2	0.8	-0.1
238.0	1180.1	8.0	28.4	1180.0	8.5	28.3	0.5	-0.1
239.0	1180.2	9.2	28.0	1180.2	8.6	28.0	-0.6	0.0
240.0	1180.8	8.6	28.2	1180.4	9.8	27.6	1.2	-0.6
241.0	1181.6	6.9	28.4	1182.0	7.3	28.8	0.4	0.4
242.0	1182.0	5.6	28.4	1182.5	6.2	29.1	0.6	0.7
243.0	1182.4	4.5	28.2	1182.9	5.0	29.2	0.5	1.0
244.0	1182.5	4.9	27.8	1183.0	5.7	28.9	0.8	1.1
245.0	1182.6	5.5	27.3	1183.1	6.2	27.9	0.7	0.6
246.0	1182.8	5.8	27.0	1183.7	3.8	28.7	-2.0	1.7
247.0	1183.0	7.6	26.6	1183.8	4.9	28.4	-2.7	1.8
248.0	1182.7	14.5	25.8	1183.8	8.3	26.9	-6.2	1.1
249.0	1185.7	12.1	28.3	1184.4	9.3	27.0	-2.8	-1.3
250.0	1187.5	12.4	29.5	1185.4	11.3	27.4	-1.1	-2.1
251.0	1188.7	17.6	30.1	1188.7	20.2	30.1	2.6	0.0
252.0	1193.3	12.0	29.3	1195.3	8.7	31.3	-3.3	2.0
253.0	1195.7	6.4	25.7	1196.5	4.6	26.5	-1.8	0.8

TABLE 3.2: Summary of Hydraulic Parameters for the "Superflood" (Q = 250,000 cfs)

HEC-2 Cross-Section Number	WSEL (ft)	Velocity (fps)	Depth (ft)
120.5	1168.6	12.2	21.6
122.0	1168.8	12.4	21.6
122.7	1168.9	12.5	21.7
123.6	1170.7	11.2	23.4
228.0	1171.2	11.1	23.5
229.0	1171.6	11.6	23.5
230.0	1171.5	14.7	23.1
231.0	1169.5	23.2	20.7
232.0	1174.3	19.3	25.1
233.0	1178.6	13.4	29.0
234.0	1179.3	12.6	29.3
235.0	1179.9	12.2	29.5
236.0	1180.3	12.0	29.5
237.0	1181.2	10.4	30.0
238.0	1181.8	9.2	30.1
239.0	1182.1	9.0	29.9
240.0	1182.3	10.4	29.5
241.0	1184.1	7.7	30.9
242.0	1184.7	6.5	31.3
243.0	1185.1	5.3	31.3
244.0	1185.2	5.8	31.0
245.0	1185.3	6.3	30.1

TABLE 3.3: 100-Year & "Superflood" Red Mt. T.I. Bridge Hydraulics

HEC-2 Cross-Section Number	Q = 215,000 cfs			Q = 250,000 cfs			Physical Feature
	WSEL (ft)	Velocity (fps)	Depth (ft)	WSEL (ft)	Velocity (fps)	Depth (ft)	
240.1	1180.4	9.8	27.6	1182.3	10.4	29.5	
240.2	1180.9	9.4	28.1	1182.8	10.0	30.0	Ramps S-E & S-W
240.3	1181.2	8.7	28.3	1183.2	9.2	30.3	
240.4	1181.4	8.1	28.4	1183.4	8.6	30.4	
240.5	1181.8	7.8	28.7	1183.9	8.2	30.8	Pima Fwy. Mainline
240.6	1181.9	7.5	28.7	1184.0	7.9	30.8	
241.1	1182.0	7.3	28.8	1184.1	7.7	30.9	
241.2	1182.1	7.1	28.9	1184.3	7.5	31.0	Ramps E-N & W-N

TABLE 3.4: 100-Year Freeboard at Red Mt. T.I. Bridge Structures

Bridge	Low-Chord Elev. (ft)	100-Year WSEL (ft)	Freeboard (ft)
Ramps S-E & S-W	1199.0	1180.9	18.1
Pima Mainline	1190.0	1181.8	8.2
Ramps E-N & W-N	1184.8	1182.1	2.7

IV. BRIDGE SCOUR ANALYSIS

This section of the report presents the procedures, methodology, assumptions, and results of the scour analysis for the proposed RMTI structures crossing the Salt River. Several scour components were considered in determining the total scour potential at the proposed bridge site during the design floods. These components included long-term degradation; general or contraction scour; low-flow incisement; bed-form scour; local (i.e., pier and abutment) scour; and scour associated with sand and gravel mining.

Scour depths were predicted for the 100-year design flood. As a part of this analysis, scour depths for the "Superflood" were also predicted in order to help ensure that the proposed foundations will not fail due to scour during this larger event.

4.1 LONG-TERM DEGRADATION

Long-term degradation was computed using the concepts of equilibrium slope or streambed armoring (6), depending upon which approach controlled the long-term channel profile of the Salt River upstream of McClintock Drive. With Grade-Control Structure No. 5 providing the pivot point, it was determined that the river's equilibrium slope would be the controlling factor for the design reach.

The dominant discharge was used in the long-term degradation analysis. The dominant discharge is defined as that discharge which, if allowed to flow constantly over the long term, would have the same overall channel shaping effect as natural, fluctuating discharges occurring over the long term. The dominant discharge is typically defined as lying between a 5-year and a 10-year event for ephemeral channels (6). For the design reach of the Salt River, the 10-year event approximates bankfull discharge under baseline conditions. Therefore, the design hydraulic conditions for the 10-year event were used in determining the long-term degradational response for the design reach of the Salt River located upstream of McClintock Drive. The long-term degradation depth was estimated to be 3.9 feet at the proposed RMTI bridge structures.

4.2 LOW-FLOW INCISEMENT

The large width-depth ratios for the design reach of the Salt River require that consideration be given to the development of low-flow channels. There are no rigorous methodologies for the prediction of low-flow channel incisement. A review of existing field conditions and experience from previous projects along the Salt River indicate that a low-flow incisement depth of two feet is reasonable for the design reach.

4.3 GENERAL SCOUR

General scour refers to the vertical lowering of the channel bed over relatively short time periods (e.g., the scour in a given reach after passage of a single flood event). Contraction scour can be defined as a special case of general scour. General scour from a contraction occurs because the flow area becomes smaller than the normal channel, which in turn, causes the average velocity and bed shear stress to increase. Hence, there is an increase in stream power (τV) at the contraction, and more bed material is transported through the contracted section than is transported into the section. In this analysis, the GFLUVIAL (7) sediment-routing computer program was used to quantify the local imbalance between sediment supply and transport capacity. Bed-material sediment supply to the study reach was assumed to be non-existent, due to the extensive gravel mining that exists immediately upstream of the proposed bridge crossings. This assumption was made because it is reasonable to expect that the in-stream pits associated with this mining activity will capture nearly all of the bed-material sediment supplied from the upstream watershed and river system during a single flood event.

The GFLUVIAL sediment-routing computer program requires a characteristic sediment gradation for the design reach as input when quantifying the general scour depths. Twelve geotechnical data sets containing boring logs and sieve analyses were compiled for the Salt River between 40th Street and Dobson Road (8). From these data sets, a characteristic sediment gradation was developed for the design reach of the Salt River. The sediment gradation is presented in Table 4.1 of this report.

Table 4.2 of this report presents a summary of the results from the GFLUVIAL sediment-routing computer program for the proposed RMTI bridge structures crossing the Salt River. The general scour depths provided in Table 4.2 represent the average depths for the sub-reach which includes the proposed RMTI Salt River structures (i.e., HEC-2 cross sections 237 to 245), rather than the actual depth computed at a given cross-section. The GFLUVIAL output results for both the 100-year flood and "Superflood" are provided in Appendix C of this report.

Table 4.1: Salt River Characteristic Sediment Gradation (McClintock Drive to Dobson Road)

Particle Size (mm)	Cumulative Percent Passing (%)
0.15	5
0.30	10
0.60	18
1.18	25
2.36	30
4.75	36
12.5	46
25.0	62
50.0	70
75.0	78
152.4	88
228.6	96
304.8	100

TABLE 4.2: Summary of GFLUVIAL Results (General Scour)

Design Frequency	General Scour Depth (ft)
100-Year (Q = 215,000 cfs)	0.6
"Superflood" (Q = 250,000 cfs)	0.8

4.4 BED-FORM SCOUR

The bed-form scour component was estimated by calculating both dune and antidune height. Dune height was calculated using a relationship developed by Allen (9). Antidune height was calculated using a relationship based upon work by Kennedy (6). The actual type of bed form present in the design reach is a function of the flow regime. Since the flow regime will change with the fluctuating discharges of the flood hydrograph, both types of bed forms could be present at different locations within the design reach during the same flood event. Accordingly, the maximum scour depth calculated for the design hydraulic conditions was used as the bed-form scour depth for the design reach. The bed-form scour was estimated to be 2 feet at the proposed RMTI bridge structures.

4.5 LOCAL SCOUR

Local scour at bridge piers was analyzed for both the 100-year peak flow conditions and for "Superflood" conditions. Based on the bridge plan sheets included within Appendix A of this report, there are four pier types proposed to be located within the active channel of the Salt River. These four types are described below:

1) 10-foot-diameter circular drilled shafts;
2) 8-foot-diameter circular drilled shafts;
3) 9-foot-diameter circular columns; and
4) 8-foot-diameter circular columns.

From a local-scour perspective, there is no difference between a circular column and a circular drilled shaft. Therefore, scour calculations were performed for 8, 9, and 10-foot circular piers. Four feet was added to each of these diameters to account for debris accumulation. Additionally, where applicable, factors for "square-nose" piers were applied to account for the "shape effects" of debris accumulation.

Two independent methodologies, the CSU Equation (10) and the Laursen Equation (11), were utilized to estimate pier scour. A summary of the results for the pier scour analyses is presented in Tables 4.3 and 4.4 of this report. Detailed calculations are provided in Appendix C of this report. Due to the small differences in calculated scour depths between the three sizes

of piers analyzed, it is recommended that a single design pier scour depth be utilized for all pier columns associated with these structures for each flow event analyzed. The results of the pier scour analysis supports using a single pier scour value of 22 feet for the 100-year flood, and 23 feet for the "Superflood."

TABLE 4.3: 100-Year Pier Scour Depths

Method	8' diameter	9' diameter	10' diameter
CSU	20.4	21.5	22.5
Larsen	20.3	21.1	21.9

TABLE 4.4: "Superflood" Pier Scour Depths

Method	8' diameter	9' diameter	10' diameter
CSU	21.1	22.2	23.3
Larsen	21.0	21.9	22.7

4.6 MINING IMPACTS

Sand and gravel mining operations dominate the Salt River upstream of McClintock Drive. Therefore, longitudinal migration of the existing pits was considered. For the reach of the Salt River located between McClintock Drive and the Pima Freeway, no additional mining will be permitted. Grade-Control Structure No. 5, located immediately downstream of the McClintock Drive Bridge, will improve vertical stability of the streambed along this reach.

Upstream of the proposed RMTI, a sand and gravel mining setback distance has been established. No sand and gravel mining will be permitted any closer than this setback distance. This recommended setback distance was developed utilizing results from both a research study completed for ADOT (12) and the results from a physical model study for the Salt River channelization project at Sky Harbor International Airport (13). The recommended sand and gravel mining setback distance from the RMTI Salt River structures is 1300 feet.

4.7 TOTAL PIER SCOUR

The total scour that can be expected at the proposed RMTI bridge piers was determined by first adding all of the calculated scour components, and then applying a factor of safety. A summary of these values is provided in Table 4.5. of this report. The factor of safety equals 30% of the sum of the general scour, bed-form scour, and pier scour components. This safety factor is included to account for the non-uniform flow distribution that is typical of alluvial channels. Table 4.6 presents the design pier scour elevation for the proposed RMTI bridge structures crossing the Salt River.

TABLE 4.5: Total Scour Depths at the RMTI Bridge Piers

Flood Event	Long-term Degradation (ft)	Low-flow Incisement (ft)	General Scour (ft)	Bed-form Scour (ft)	Pier Scour (ft)	Factor of Safety (ft)	Total Pier Scour (ft)
100-Year	3.9	2	0.6	2	22	7.4	37.9
"Superflood"	3.9	2	0.8	2	23	7.7	39.4

TABLE 4.6: RMTI Design Pier Scour Elevations

Flood Event	Design Invert Elev. (ft)	Total Pier Scour (ft)	Pier Scour Elev. (ft)
100-Year	1153.2	37.9	1115.3
"Superflood"	1153.2	39.4	1113.8

4.8 ABUTMENT SCOUR

Classical abutment scour is the result of a change in local flow direction/velocity and increased flow turbulence caused either by (1) the abutment projecting into the flow of a watercourse; (2) overbank flow being intercepted and forced back into the channel by the abutment embankment; or by (3) a combination of these conditions.

Abutment scour is not applicable for the design condition (100-year event) since bank protection is proposed along the north bank and the south bank of the Salt River, both upstream and downstream of the proposed RMTI bridge crossings. Therefore, no projecting abutments will exist, and no overbank flow will be locally forced through the proposed bridge opening for the design conditions. The bank protection toe-down depths were based on the scour depth for the 100-year event.

One important effect that the proposed structures will have on the proposed bank protection is in the "zone-of-influence" of the proposed bridge piers. At some locations, the proposed bridge piers will be unavoidably located in close proximity to the toe of the proposed bank protection. A definition sketch for this "zone-of-influence" is provided on Figure 4.1 of this report. The need for additional bank protection toe-down depth due to the "zone-of-influence" from bridge pier scour was evaluated and incorporated into the bank protection plans prepared for Section 6 of the East Papago Freeway. (Note: The design parameters associated with the proposed bank protection were analyzed under a separate contract, and will be presented in a separate report).

The abutment scour depth recommended for the "Superflood" condition is 39.4 feet. This depth is based on abutments with 8-foot to 10-foot diameter drilled shafts. For this event, all bank protection and approach embankments were assumed to have failed. With these assumptions, the abutment substructure will behave like a pier and will experience the same flow conditions as a pier. Therefore, the abutment scour depth will equal the total pier scour depth for the "Superflood".

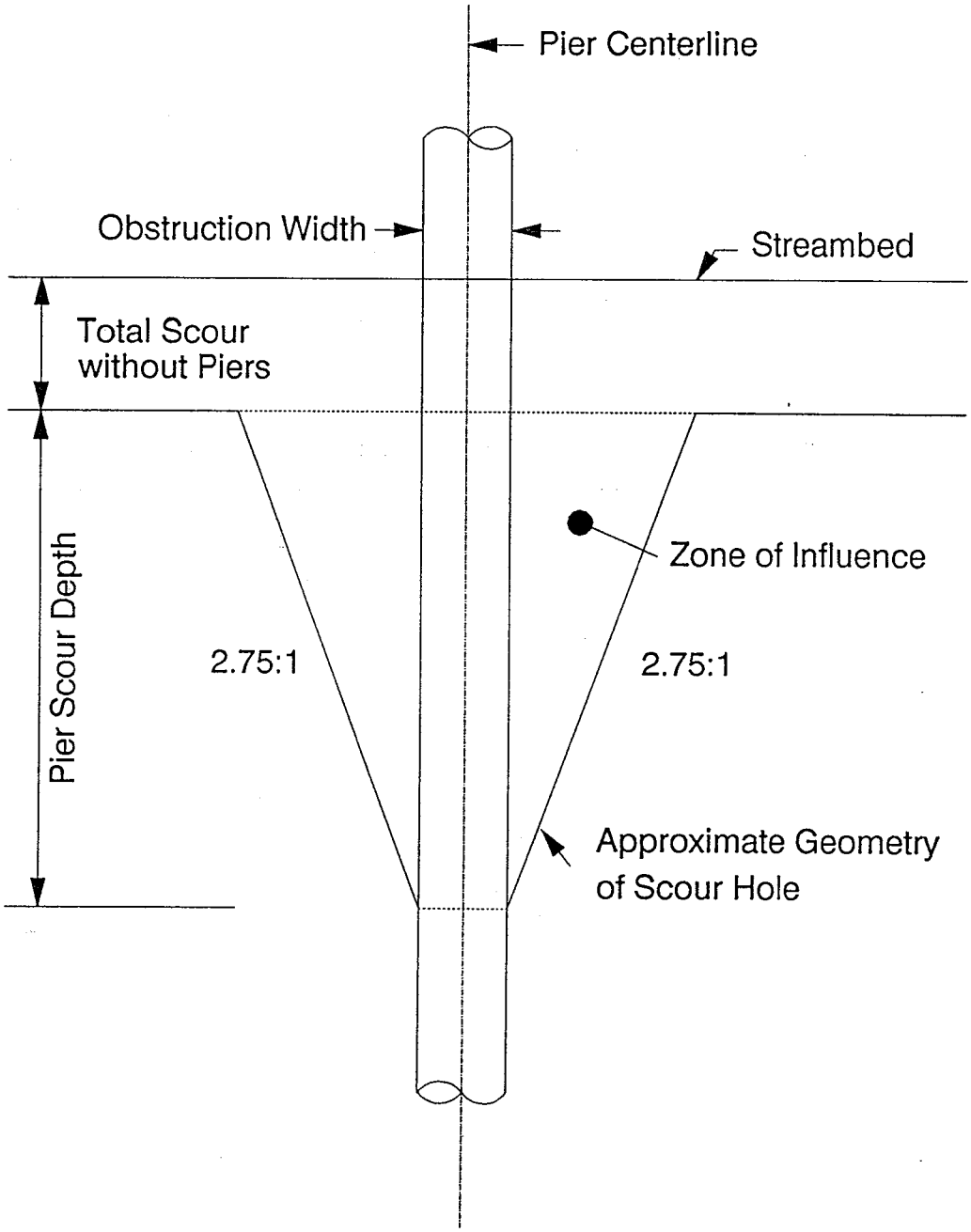

Pier Centerline
Obstruction Width
Streambed
Total Scour
without Piers
Pier Scour Depth
Zone of Influence
2.75:1
2.75:1
Approximate Geometry
of Scour Hole

FIGURE 4.1

V. SUMMARY

"Baseline" and "design conditions" hydraulic models were developed for both the 100-year flood and "Superflood" on the Salt River. These analyses demonstrated the hydraulic effects of the proposed bank stabilization and the proposed bridge structures associated with the Red Mountain Traffic Interchange (RMTI). Freeboard between the 100-year water-surface elevation and the bridge low-chord elevations were established based on preliminary bridge plans prepared by PBQD. Additionally, hydraulic parameters were developed for use in the bridge scour analysis.

The bridge scour analysis consisted of estimating the various scour components associated with the proposed RMTI bridge structures crossing the Salt River. The analysis quantified long-term degradation, general scour, low-flow incisement, bed-form scour, and pier scour. A total pier scour depth of 37.9 feet for the 100-year flood (including a safety factor), and 39.4 feet for the "Superflood" (including a safety factor), is recommended for design purposes. The 100-year and "Superflood" scour elevations are 1115.3 feet and 1113.8 feet, respectively. Upstream of the RMTI structures, a sand and gravel mining setback distance of 1300 feet is recommended.

Abutment scour is not applicable on this project, due to the proposed extent of bank stabilization both upstream and downstream of the proposed bridge structures. However, certain sections of the proposed bank stabilization will be within the "zone-of-influence" of local scour due to bridge piers. Special considerations will be incorporated into the bank-protection design at these locations. The abutment scour depth recommended for the "Superflood" condition is 39.4 feet.

VI. REFERENCES

1. U.S. Army Corps of Engineers, Los Angeles District, "Gila River and Tributaries, Central Arizona Water Control Study, Hydrology Report", May, 1982.

2. U.S. Army Corps of Engineers, Los Angeles District, "Salt River Flood Insurance Study, Agua Fria River to Country Club Drive, Maricopa County, Arizona," 1983-84.

3. U.S. Army Corps of Engineers, Los Angeles District, "Study for Flood Control Alternatives to Cliff Dam," October 1988.

4. U.S. Army Corps of Engineers, Hydrologic Engineering Center, "HEC-2 Water Surface Profiles," Computer Program, September 1990.

5. State of Arizona, Department of Transportation, Highways Division, Urban Highways Section, "Design Procedures Manual," 1990 Edition.

6. Simons, Li & Associates, Inc., "Design Manual for Engineering Analysis of Fluvial Systems," prepared for the Arizona Department of Water Resources, March, 1985.

7. Chang, Howard H.,Ph.D., P.E., "Generalized Computer Program GFLUVIAL Mathematical Model for Erodible Channels," April 1990 Updated Version.

8. Sergent, Hauskins & Beckwith, "Data Sets A through L," Transmittal Letter No. 1017 to Thomas M. Monchak (DMJM), Job No. E87-56, June 9, 1992.

9. Simons, D. B. and F. Senturk, Sediment Transport Technology, Water Resources Publications, Fort Collins, Colorado, 1977.

10. Federal Highway Administration, "Evaluating Scour at Bridges," Hydraulic Engineering Circular No. 18, Publication No. FHWA-IP-90-017, February, 1991.

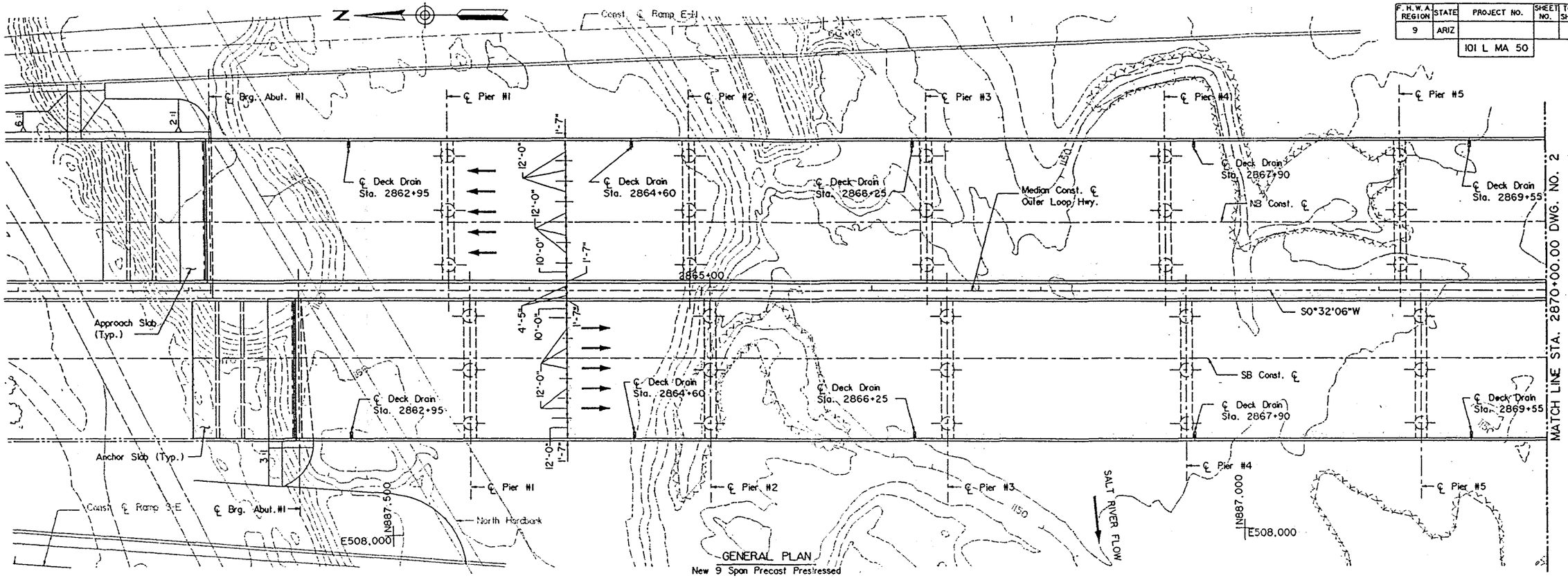
11. Federal Highway Administration, "Scour Around Bridge Piers", Report No. FHWA-RD-79-103, February, 1980.

12. Simons, Li & Associates, Inc., "Effects of In-Stream Mining on Channel Stability," prepared for the Arizona Department of Transportation, June, 1989.

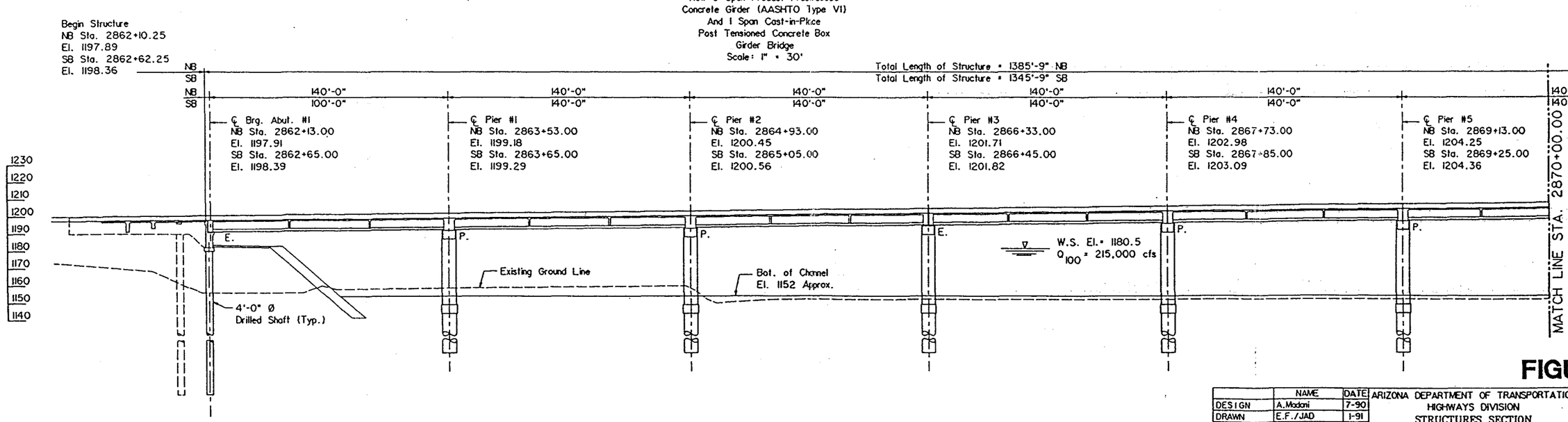
13. Colorado State University Engineering Research Center, "Investigation of Gravel Mining Effects, Salt River Channelization Project at Sky Harbor International Airport," prepared for Anderson-Nichols, December, 1980.

APPENDIX A: CONCEPT BRIDGE PLANS FOR RMTI

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ	101 L MA 50			



GENERAL PLAN
New 9 Span Precast Prestressed Concrete Girder (AASHTO Type VI) And 1 Span Cast-in-Place Post Tensioned Concrete Box Girder Bridge
Scale: 1" = 30'



LONGITUDINAL SECTION ALONG CONST. ℄ NB OUTER LOOP HWY.
Scale: 1" = 30'

FIGURE 13

	NAME	DATE
DESIGN	A. Madani	7-90
DRAWN	E.F./JAD	1-91
CHECKED	ASW/DFG	1-91

Parsons Brinckerhoff ® 100 YEARS

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STRUCTURES SECTION

OUTER LOOP OVER SALT RIVER
PLAN AND SECTION

LOCATION: RED MOUNTAIN TRAFFIC INT.

NOT FOR CONSTRUCTION

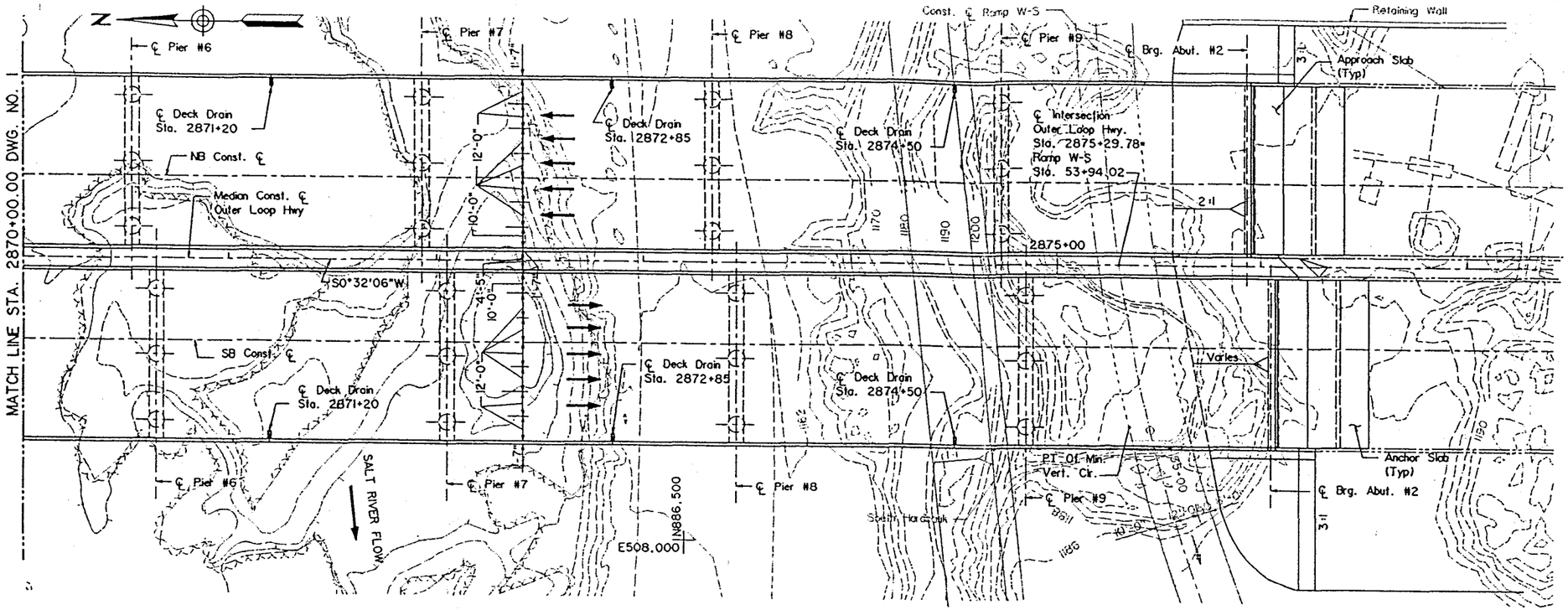
DWG. NO. 1

ROUTE | MILEPOST | STRUCTURE NO.

TRACS NO. H-2414-01-C | BRIDGE NO. 11 | 6 OF 20

JAD 30171 K430 811PSA 811PSA 14JAN91-13.05.20 STRUC

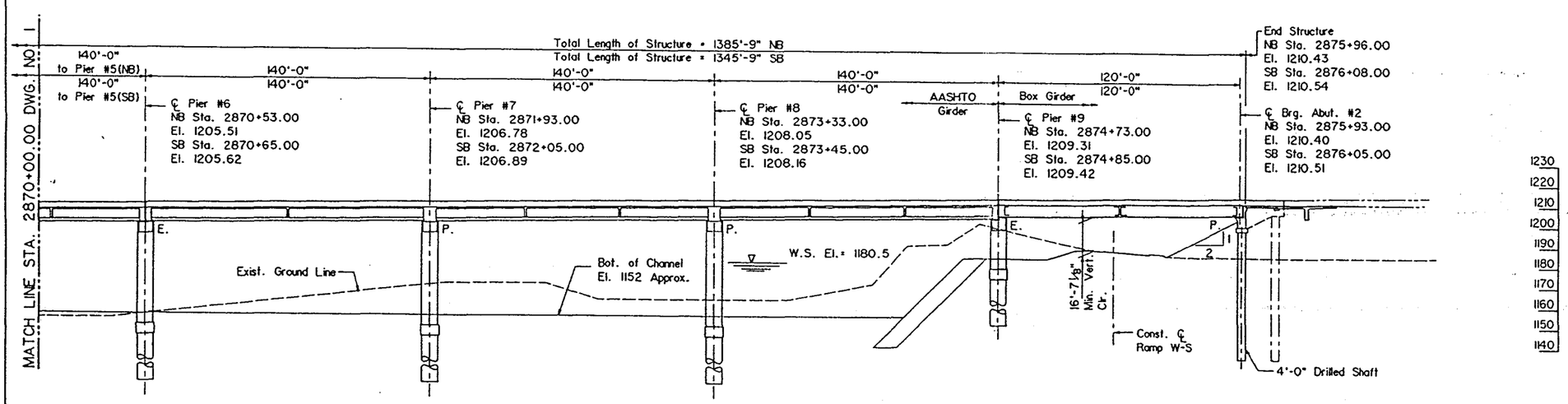
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ	101 L MA 50			



GENERAL PLAN

New 9 Span Precast Prestressed Concrete Girder (AASHTO Type VI) And 1 Span Cast-in-Place Post Tensioned Concrete Box Girder Bridge

Scale: 1" = 30'



LONGITUDINAL SECTION ALONG CONST. ℄ NB OUTER LOOP HWY.

Scale: 1" = 30'

FIGURE 14

	NAME	DATE
DESIGN	A. Modani	7-90
DRAWN	E.F./JAD	1-91
CHECKED	ASW/BFG	1-91

Parsons Brinckerhoff ® 100 YEARS

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STRUCTURES SECTION

OUTER LOOP OVER SALT RIVER
PLAN AND SECTION

LOCATION: RED MOUNTAIN TRAFFIC INT.

ROUTE | MILEPOST | STRUCTURE NO.

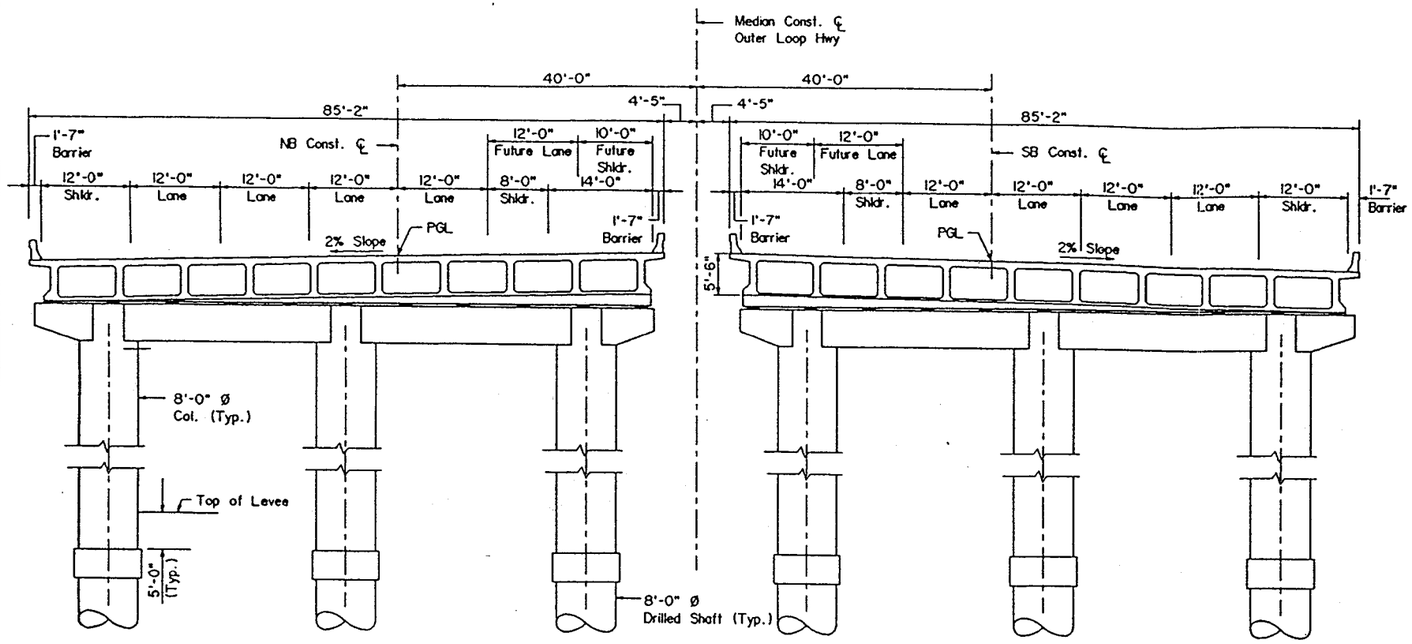
NOT FOR CONSTRUCTION

DWG. NO. 2

TRACS NO. H-2414-01-C | BRIDGE NO. 11 | 7 OF 20

JAD 5017: K430 811F58 811F58 14JUN91-13.39.10 STRUC

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ	101 L MA 50			

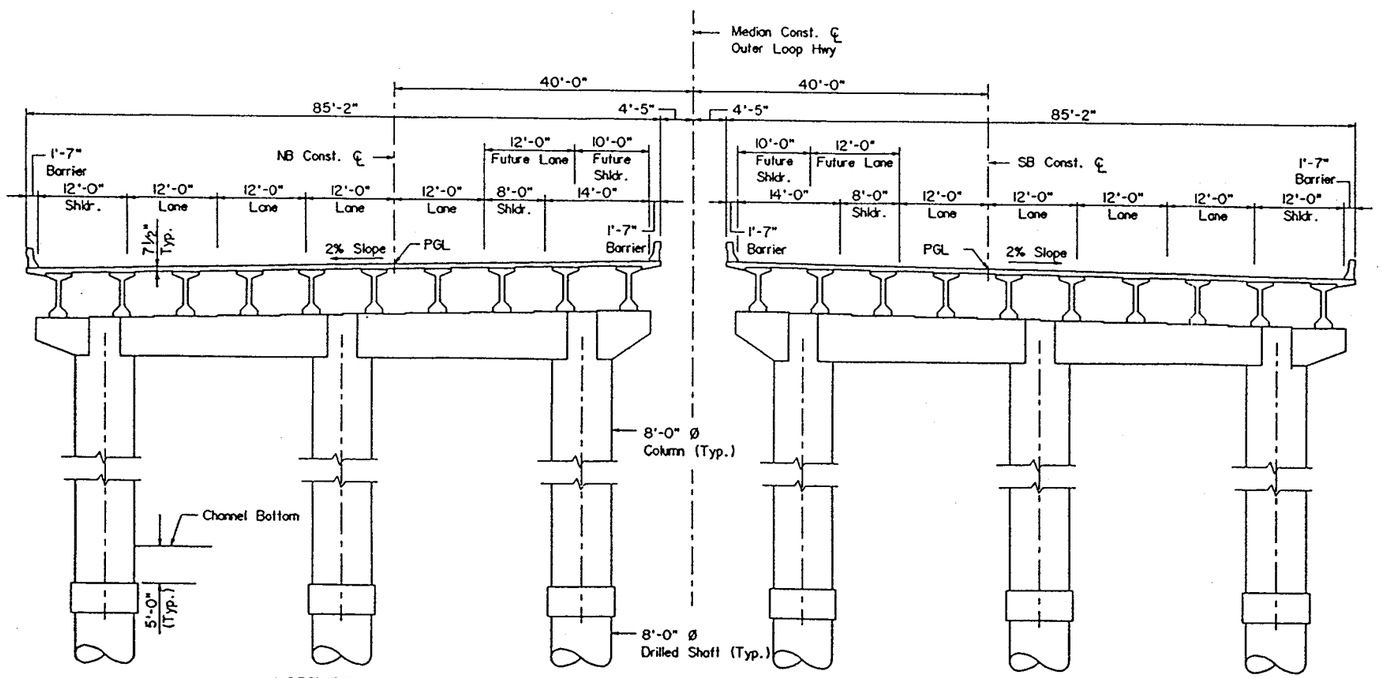


NORTHBOUND

TYPICAL SECTION - BOX GIRDER

Scale : 1" = 10'

SOUTHBOUND

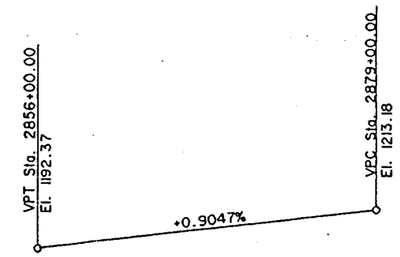


NORTHBOUND

TYPICAL SECTION - AASHTO TYPE VI GIRDER

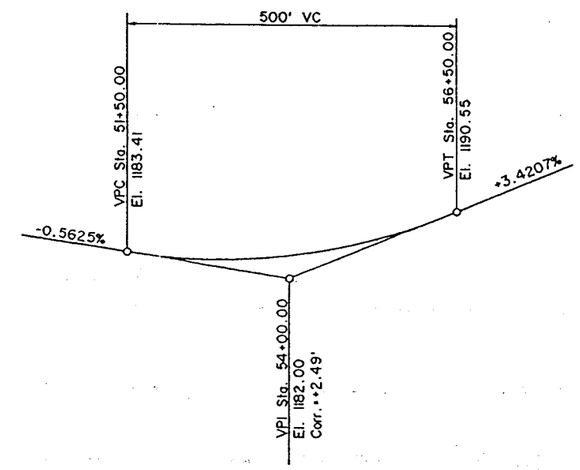
Scale: 1" = 10'

SOUTHBOUND



OUTER LOOP HIGHWAY

CONST. ℄ AND PROFILE GRADE



RAMP W-S CONST. ℄ AND PROFILE GRADE

FIGURE 15

	NAME	DATE
DESIGN	A. Modani	6-90
DRAWN	E.F./JAD	1-91
CHECKED	ASW/DFG	1-91

Parsons Brinckerhoff ® 100 YEARS

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STRUCTURES SECTION

OUTER LOOP OVER SALT RIVER
TYPICAL SECTIONS

NOT FOR CONSTRUCTION

ROUTE | MILEPOST | STRUCTURE NO.

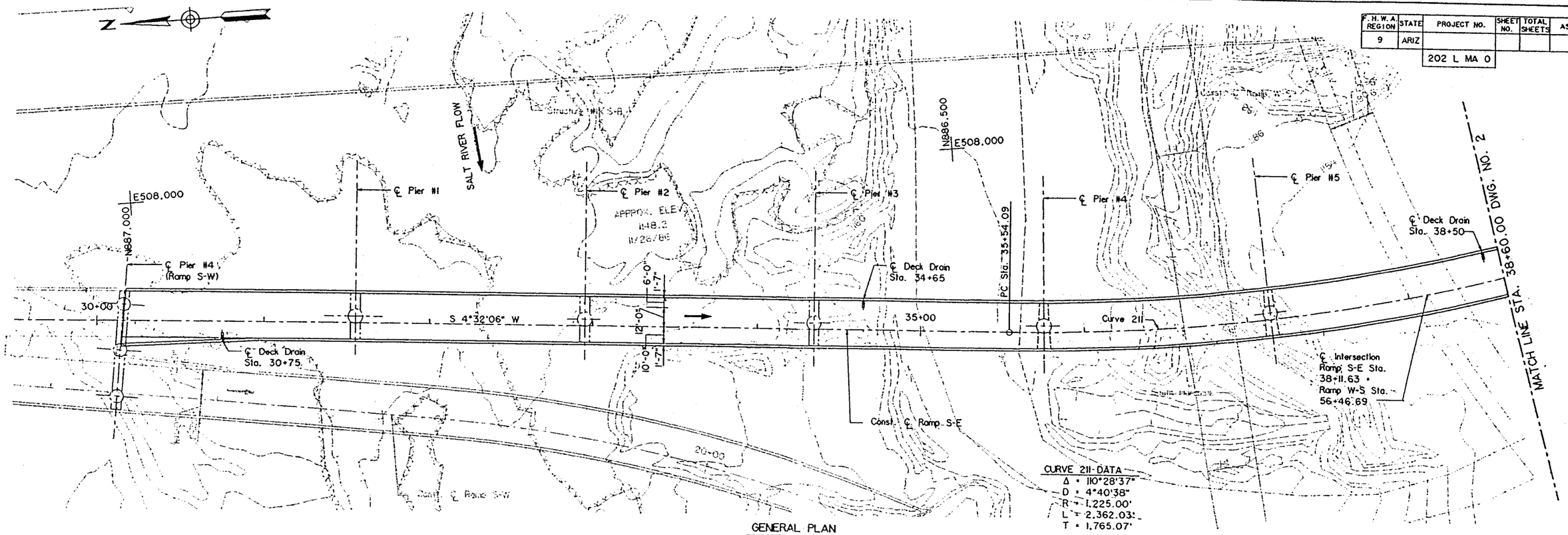
LOCATION: RED MOUNTAIN TRAFFIC INT.

DWG. NO. 3

TRACS NO. H-2414-01-C | BRIDGE NO. 11 | 8 OF 20

JAD 3017: K430 BIITS BIITS 14JAN91-14.21.10 STRUC

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ	202 L MA 0			



CURVE 211 DATA
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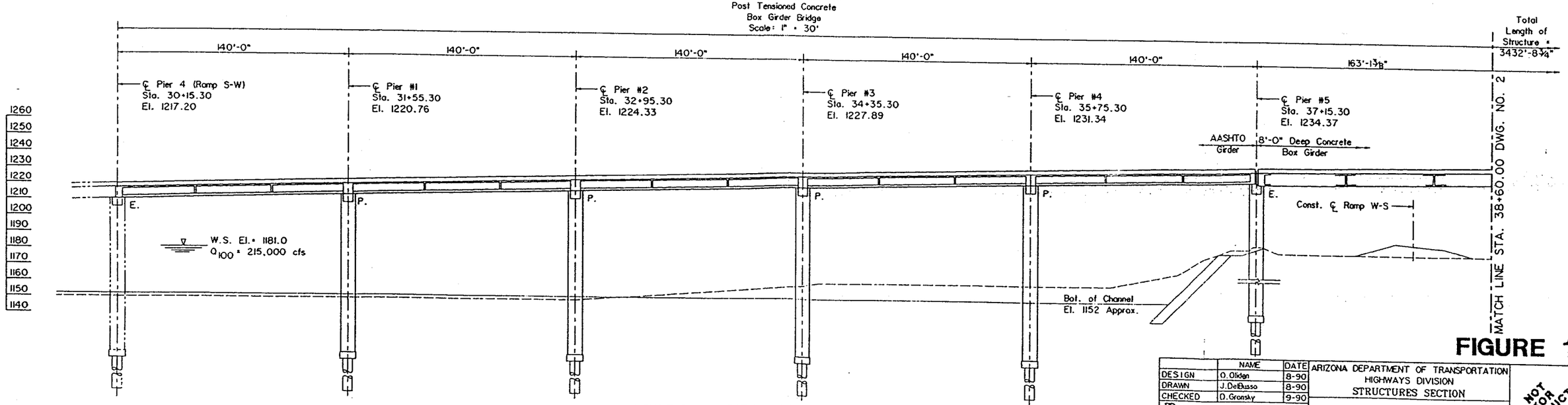
D = 4°40'38"
R = 1,225.00'
L = 2,362.03'
T = 1,765.07'

GENERAL PLAN
New 5 Span Precast Prestressed Concrete Girder (AASHTO Type VI) and 16 Span Cast-In-Place Post Tensioned Concrete Box Girder Bridge
Scale: 1" = 30'



LONGITUDINAL SECTION ALONG CONST. ℄ RAMP S-E
Scale: 1" = 30'

FIGURE 16

	NAME	DATE
DESIGN	O. Olden	8-90
DRAWN	J. DeBusso	8-90
CHECKED	D. Gronsky	9-90

Parsons Brinckerhoff ® 100 YEARS

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STRUCTURES SECTION

RAMP S-E VIADUCT
PLAN AND SECTION

NOT FOR CONSTRUCTION

XX	XXX	
ROUTE	MILEPOST	STRUCTURE NO.

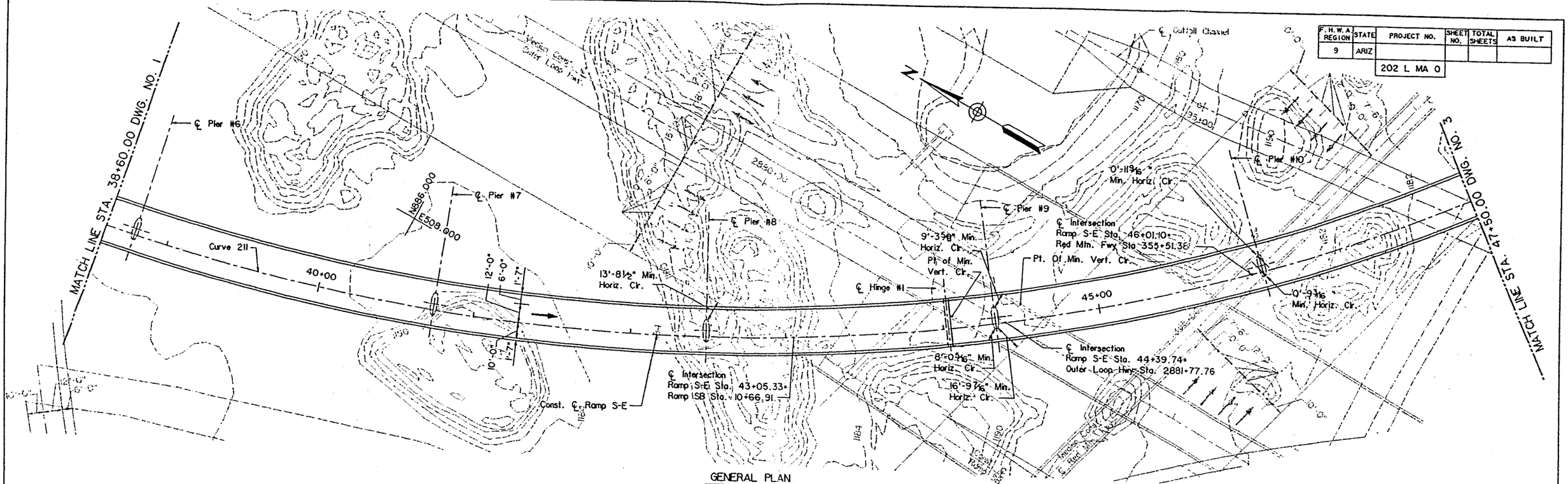
LOCATION: RED MOUNTAIN TRAFFIC INT.

DWG. NO. 1

TRACS NO. H-0896-01-C | BRIDGE NO. 13

JAD 3017: M330 81 SPSA 81 SPSA 173EP00-14.02.20 STRUC

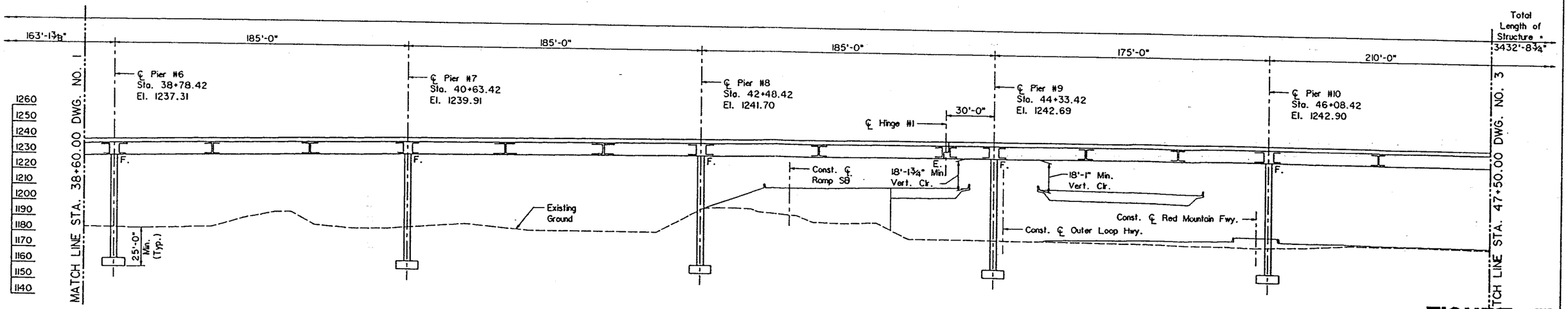
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ	202 L MA 0			



GENERAL PLAN

New 5 Span Precast Prestressed Concrete Girder (AASHTO Type VI) and 16 Span Cast-in-Place Post Tensioned Concrete Box Girder Bridge

Scale: 1" = 30'



LONGITUDINAL SECTION ALONG CONST. ℄ RAMP S-E

Scale: 1" = 30'

FIGURE 17

	NAME	DATE
DESIGN	O. Olden	8-90
DRAWN	J. DeBusso	8-90
CHECKED	D. Gronsky	9-90

Parsons Brinckerhoff ® 100 YEARS

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STRUCTURES SECTION

RAMP S-E VIADUCT
PLAN AND SECTION

XX	XXX	
ROUTE	MILEPOST	STRUCTURE NO.

LOCATION: RED MOUNTAIN TRAFFIC INT.

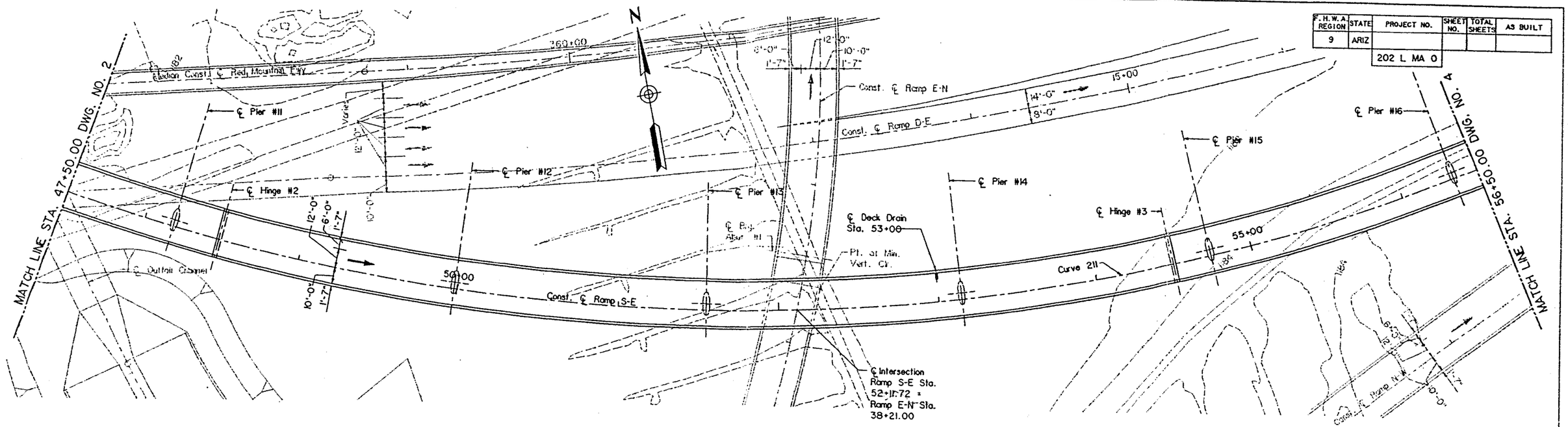
NOT FOR CONSTRUCTION

DWG. NO. 2

TRACS NO. H-0896-01-C | BRIDGE NO. 13 | OF

JAD 30171 M330 81SP58 81SP58 145EP90-14.45.00 STRUC

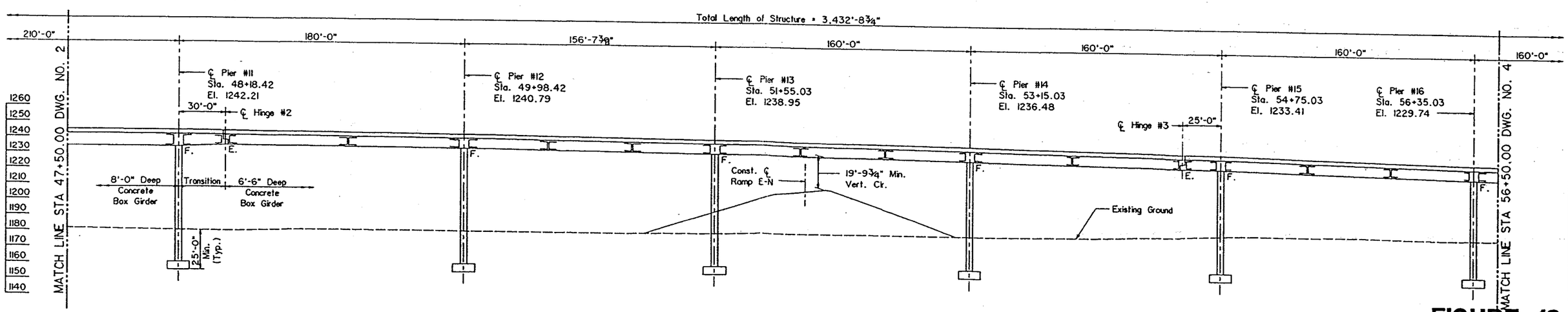
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ	202 L MA 0			



GENERAL PLAN

New 5 Span Precast Prestressed Concrete Girder (AASHTO Type VI) and 16 Span Cast-In-Place Post Tensioned Concrete Box Girder Bridge

Scale: 1" = 30'



LONGITUDINAL SECTION ALONG CONST. ℄ RAMP S-E

Scale: 1" = 30'

FIGURE 18

	NAME	DATE
DESIGN	O.Olden	8-90
DRAWN	J.DelBusso	8-90
CHECKED	D.Gronsky	9-90

Parsons Brinckerhoff ® 100 YEARS

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STRUCTURES SECTION

RAMP S-E VIADUCT
PLAN AND SECTION

NOT FOR CONSTRUCTION

XX	XXX	
ROUTE	MILEPOST	STRUCTURE NO.

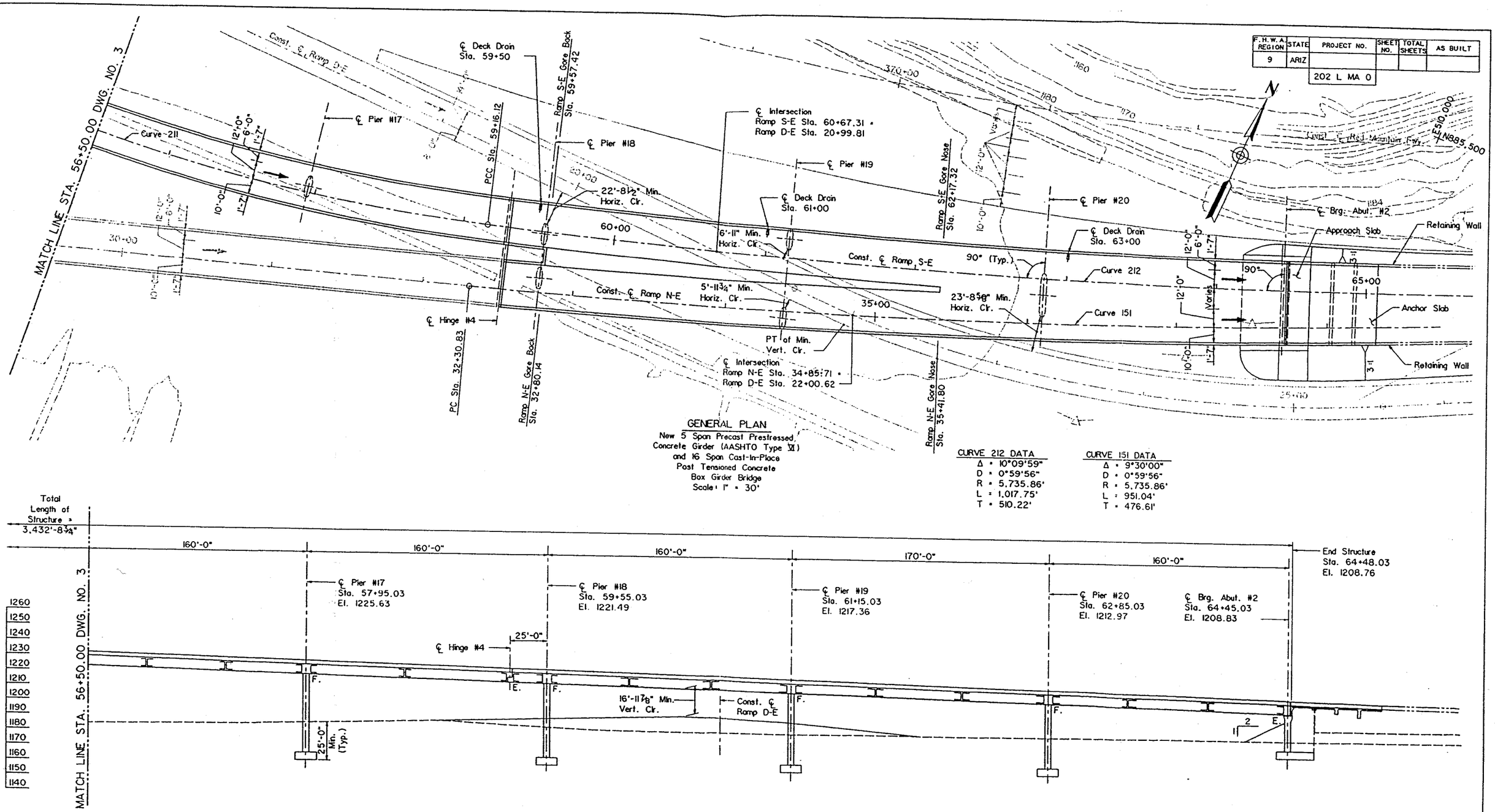
LOCATION: RED MOUNTAIN TRAFFIC INT.

DWG. NO. 3

TRACS NO. H-0896-01-C

BRIDGE NO. 13

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ	202 L MA 0			



GENERAL PLAN

New 5 Span Precast Prestressed, Concrete Girder (AASHTO Type VI) and 16 Span Cast-In-Place Post Tensioned Concrete Box Girder Bridge

Scale: 1" = 30'

CURVE 212 DATA	CURVE 151 DATA
Δ = 10°09'59"	Δ = 9°30'00"
D = 0°59'56"	D = 0°59'56"
R = 5,735.86'	R = 5,735.86'
L = 1,017.75'	L = 951.04'
T = 510.22'	T = 476.61'

LONGITUDINAL SECTION ALONG CONST. ℄ RAMP S-E

Scale: 1" = 30'

FIGURE 19

	NAME	DATE
DESIGN	O. Olden	8-90
DRAWN	J. DelBusso	8-90
CHECKED	O. Gronsky	9-90

Parsons Brinckerhoff ® 100 YEARS

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STRUCTURES SECTION

RAMP S-E VIADUCT
PLAN AND SECTION

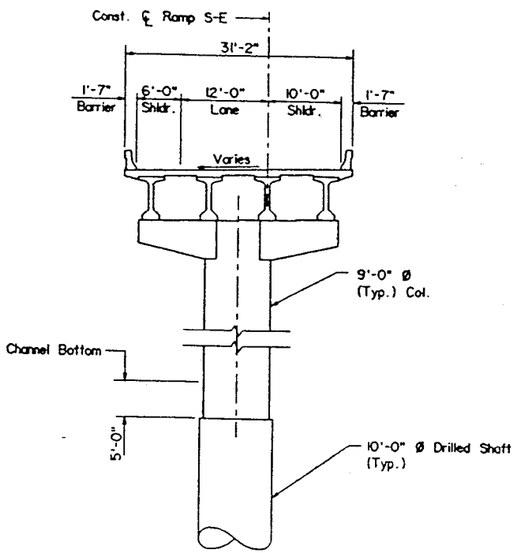
XX	XXX	
ROUTE	MILEPOST	STRUCTURE NO.

LOCATION: RED MOUNTAIN TRAFFIC INT.

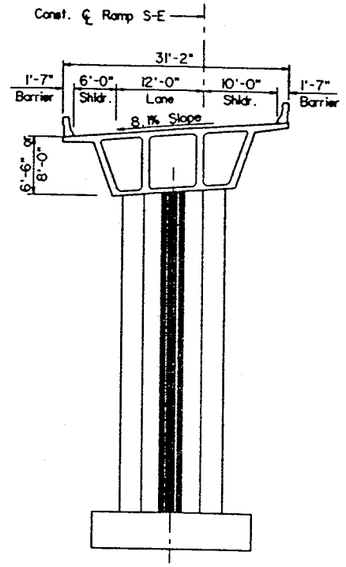
NOT FOR CONSTRUCTION

DWG. NO. 4

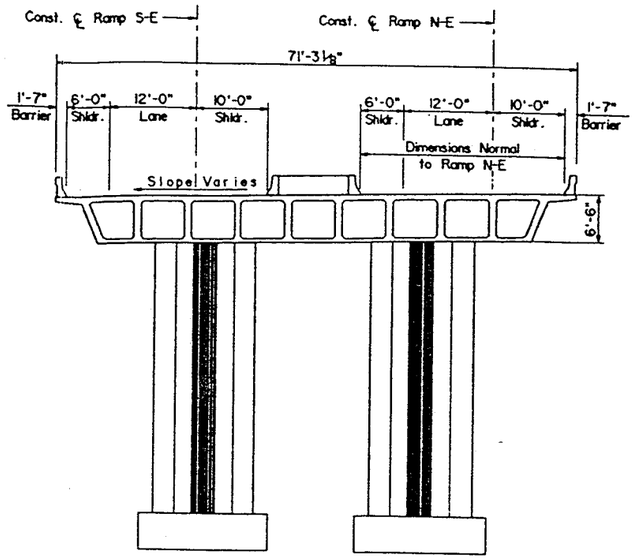
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ	202 L MA 0			



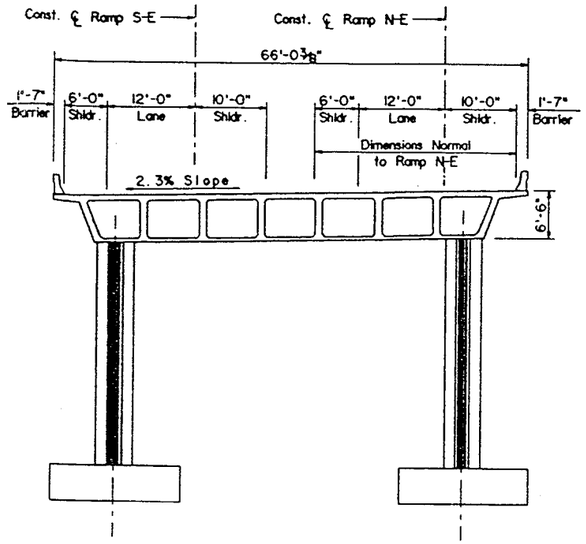
TYPICAL SECTION
AASHTO Grider Type VI
Scale: 1" = 10'



TYPICAL SECTION
Box Girder
Scale: 1" = 10'



SECTION AT PIER #18
Scale: 1"=10'



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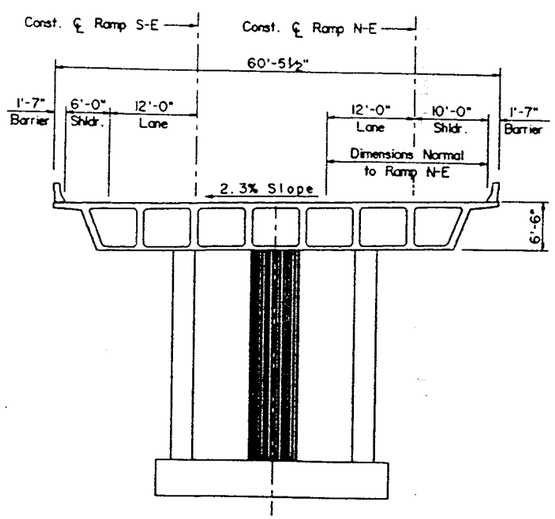
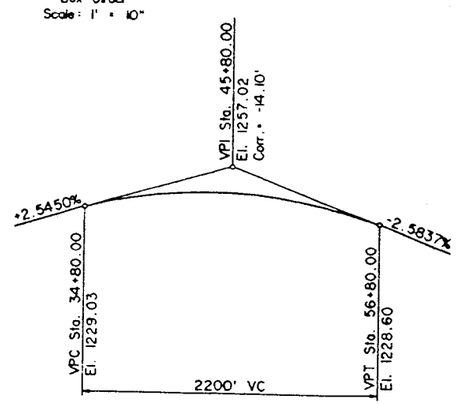
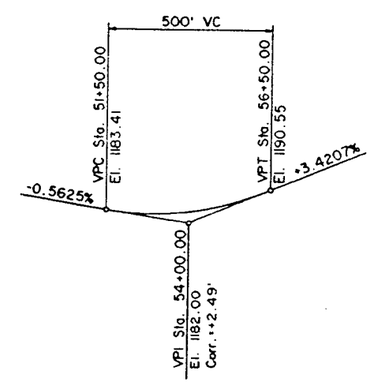
Scale: 1"=10'



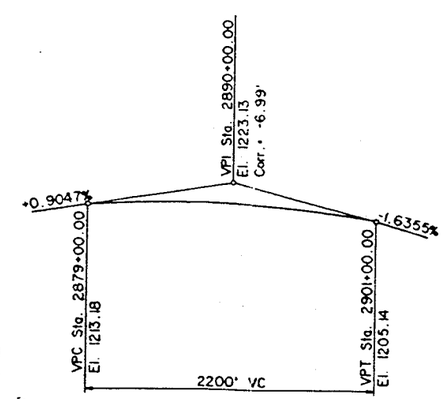
SECTION AT PIER #20
Scale: 1"=10'



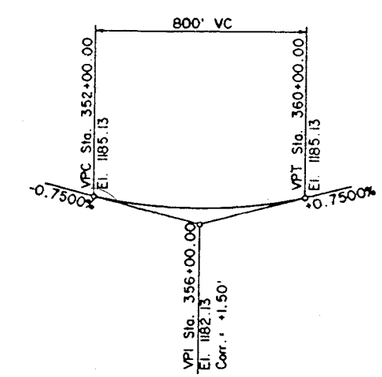
RAMP S-E
CONST. ℄ AND PROFILE GRADE



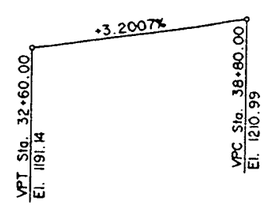
RAMP W-S
CONST. ℄ AND PROFILE GRADE



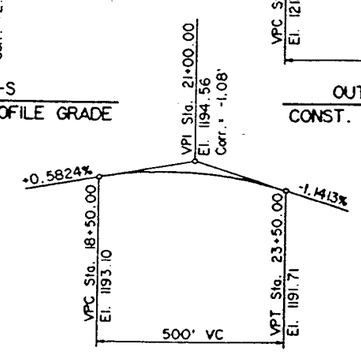
OUTER LOOP HIGHWAY
CONST. ℄ AND PROFILE GRADE



RED MOUNTAIN FWY
CONST. ℄ AND PROFILE GRADE



RAMP E-N
CONST. ℄ AND PROFILE GRADE



RAMP D-E
CONST. ℄ AND PROFILE GRADE

FIGURE 20

	NAME	DATE
DESIGN	O. Olden	8-90
DRAWN	J. DeBusso	8-90
CHECKED	D. Gromsky	9-90

Parsons Brinckerhoff ® 100 YEARS

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STRUCTURES SECTION

RAMP S-E VIADUCT
TYPICAL SECTIONS

LOCATION: RED MOUNTAIN TRAFFIC INT.

NOT FOR CONSTRUCTION

DWG. NO. 5

ROUTE | MILEPOST | STRUCTURE NO.

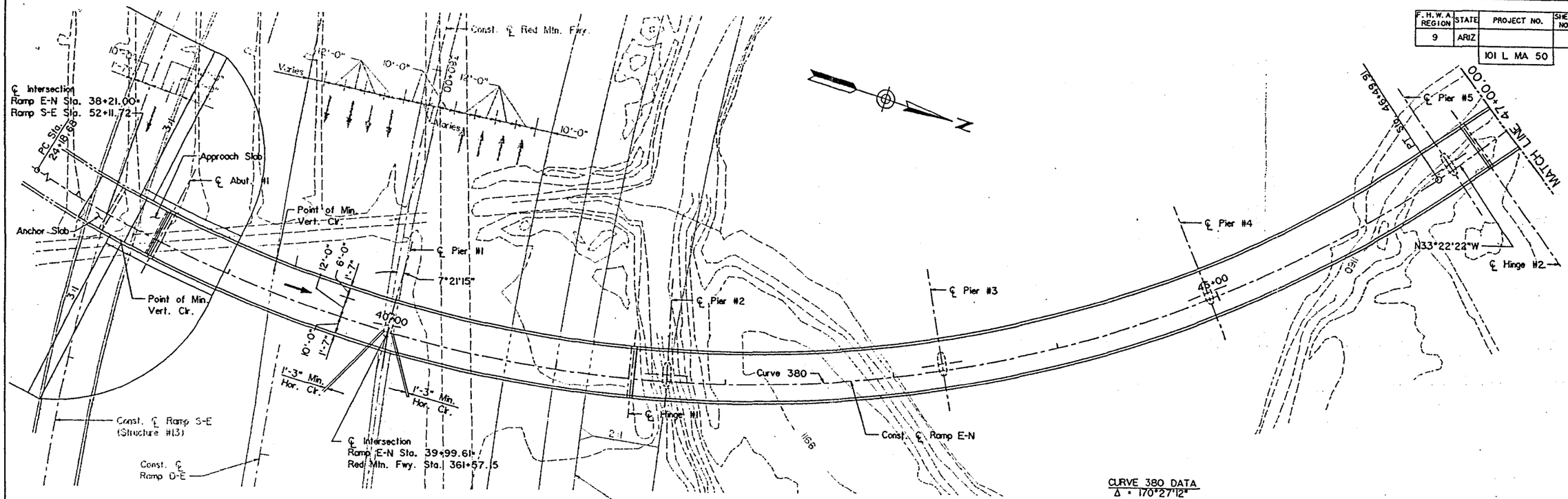
TRACS NO. H-0896-01-C | BRIDGE NO. 13 | ___OF___

DATE	REV #	REVISION	DSGN	DRWN	CHKD	A.-PD
	1					

SURVEY NO.	FINISHED PLANS	REVISIONS	LOCATION	DATE

JAO 3017: [H630] 813T3A 813T3A 14JAN91-08.12.90 STRUC

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ	101 L MA 50			

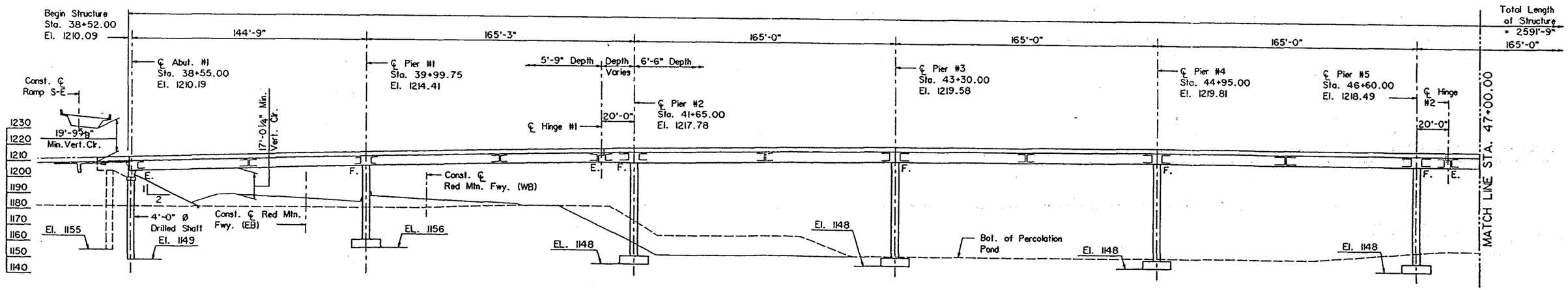


GENERAL PLAN

New 8 Span Cast-In-Place
Post Tensioned Concrete Box Girder and
10 Span Precast Prestressed
Concrete Girder (AASHTO Type VI) Bridge
Scale 1" = 30'

CURVE 380 DATA

Δ = 170°27'12"
D = 7°38'22"
R = 750.00'
L = 2231.23'
T = 8981.54'



LONGITUDINAL SECTION ALONG CONST. ℄ RAMP E-N

Scale: 1" = 30'

FIGURE 21

	NAME	DATE
DESIGN	O. Olden	7-90
DRAWN	E. Fafitis	7-90
CHECKED	W. Elliott	9-90

Parsons Brinckerhoff ® 100 YEARS

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STRUCTURES SECTION

RAMP E-N VIADUCT
PLAN AND SECTION

LOCATION
RED MOUNTAIN TRAFFIC INT.

NOT FOR CONSTRUCTION

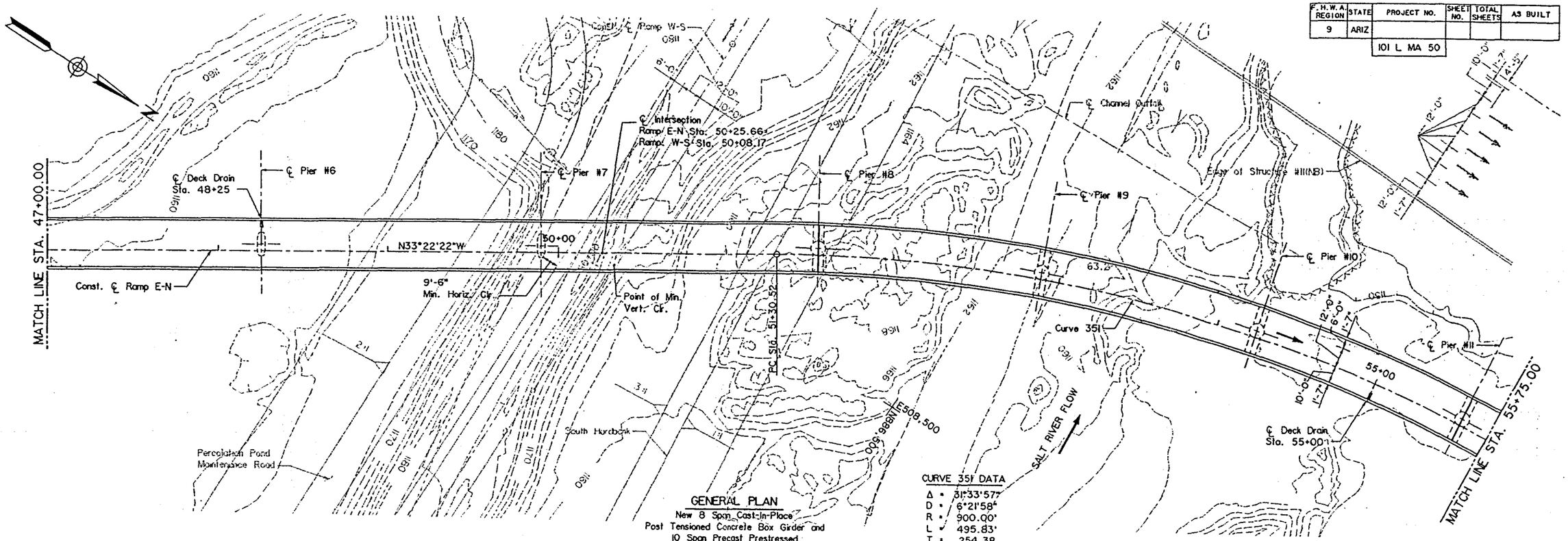
DWG. NO. 1

ROUTE | MILEPOST | STRUCTURE NO.

TRACS NO. H-2414-01-C | BRIDGE NO. 14

JAD 30171 R430 81.4FSA 81.4FSA 23JAN91-15.47.00 STRUC

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ	101 L MA 50			

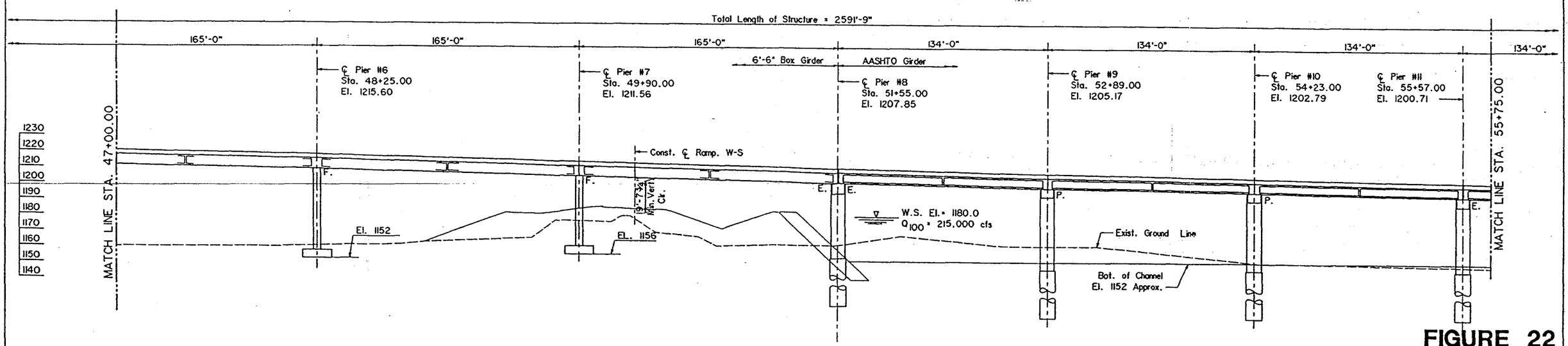


GENERAL PLAN

New 8 Span Cast-in-Place Post Tensioned Concrete Box Girder and 10 Span Precast Prestressed Concrete Girder (AASHTO Type VI) Bridge
Scale 1" = 30'

CURVE 351 DATA

Δ = 31°33'57"
D = 6°21'58"
R = 900.00'
L = 495.83'
T = 254.38



LONGITUDINAL SECTION ALONG CONST. ℄ RAMP E-N

Scale: 1" = 30'

FIGURE 22

	NAME	DATE
DESIGN	OA.O./N.M.	7-90
DRAWN	JAD/E.F.	7-90
CHECKED	N.M./W.V.E.	12-00

Parsons Brinckerhoff ® 100 YEARS

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STRUCTURES SECTION

RAMP E-N VIADUCT
PLAN AND SECTION

NOT FOR CONSTRUCTION

ROUTE | MILEPOST | STRUCTURE NO.

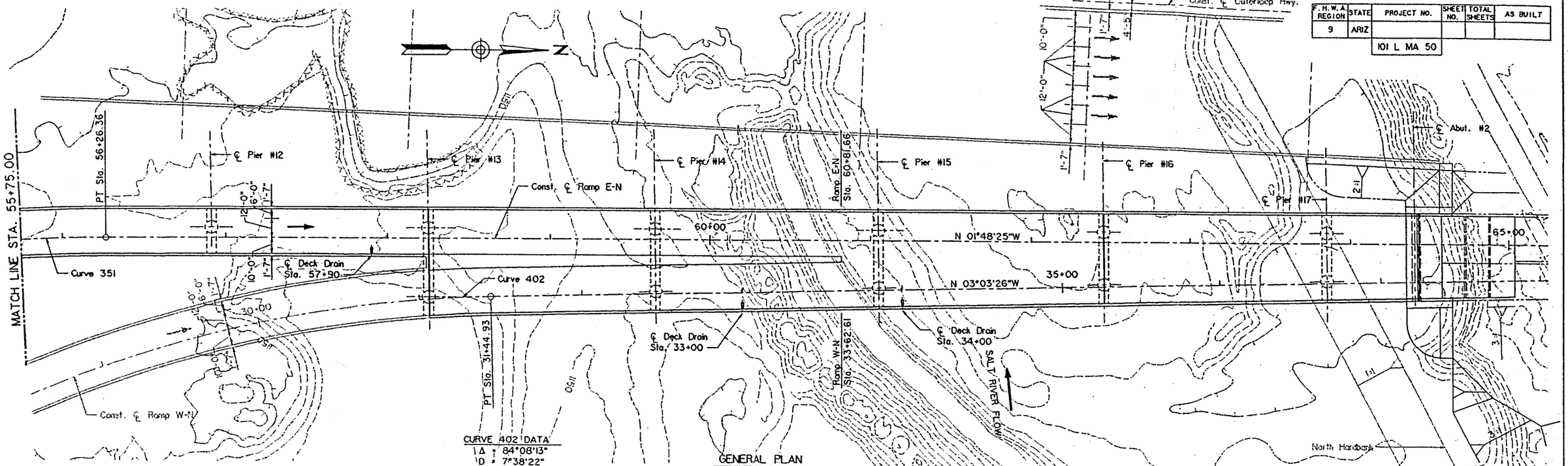
LOCATION: RED MOUNTAIN TRAFFIC INT.

DWG. NO. 2

TRACS NO. H-2414-01-C | BRIDGE NO. 14 | 10 OF 20

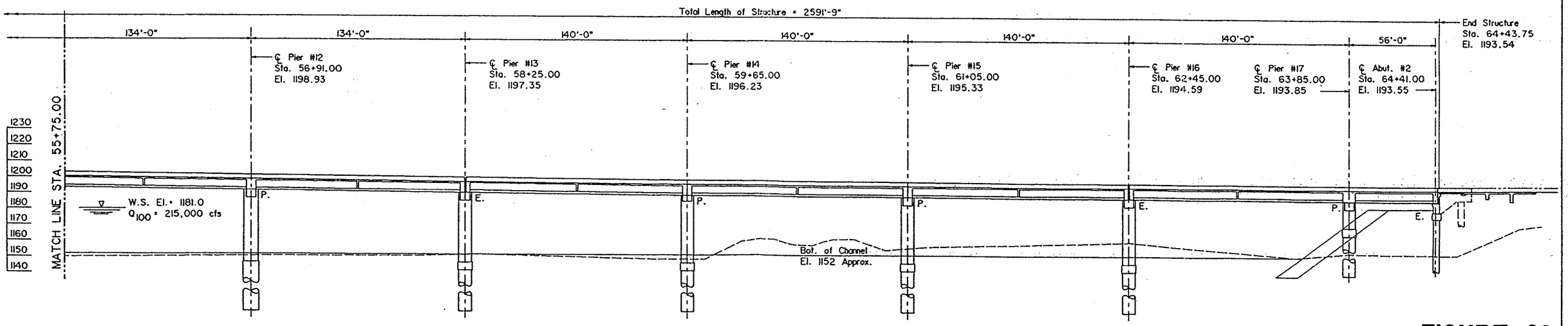
JAQ 30171 [N430] 81 4P58 81 4P58 23-JAN-91-15.36.30 STRUC

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ	101 L MA 50			



CURVE 402 DATA
Δ = 84°08'13"
D = 7°38'22"
R = 750.00'
L = 1101.35'
T = 676.93'

GENERAL PLAN
New 8 Span Cast-In-Place
Post Tensioned Concrete Box Girder Bridge and
10 Span Precast Prestressed
Concrete Girder (AASHTO Type VI) Bridge
Scale 1" = 30'



LONGITUDINAL SECTION ALONG CONST. ℄ RAMP E-N
Scale: 1" = 30'

FIGURE 23

	NAME	DATE
DESIGN	A. Modani	7-90
DRAWN	J. DeBusso	7-90
CHECKED	A. Wójakiewicz	9-90

Parsons Brinckerhoff ® 100 YEARS

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STRUCTURES SECTION

RAMP E-N VIADUCT
PLAN AND SECTION

NOT FOR CONSTRUCTION

ROUTE	MILEPOST	STRUCTURE NO.	LOCATION
			RED MOUNTAIN TRAFFIC INT.

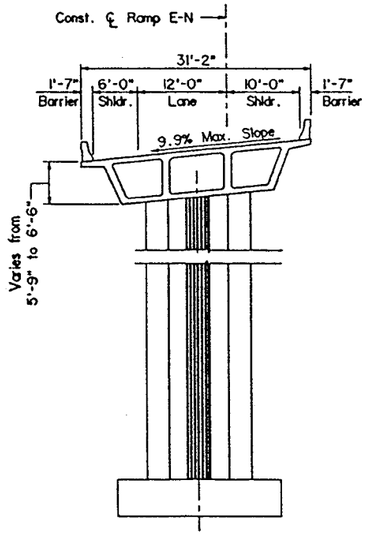
DWG. NO. 3

TRACS NO. H-2414-01-C

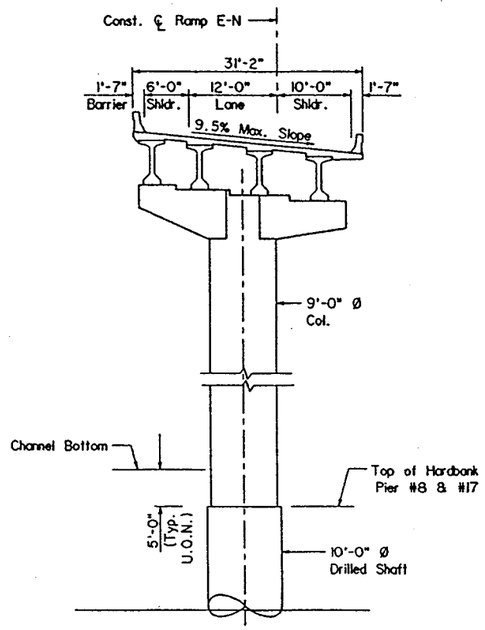
BRIDGE NO. 14

JAD 3017: [M430] 814PSC 814PSC 23JAN91-15.09.00 STRUC

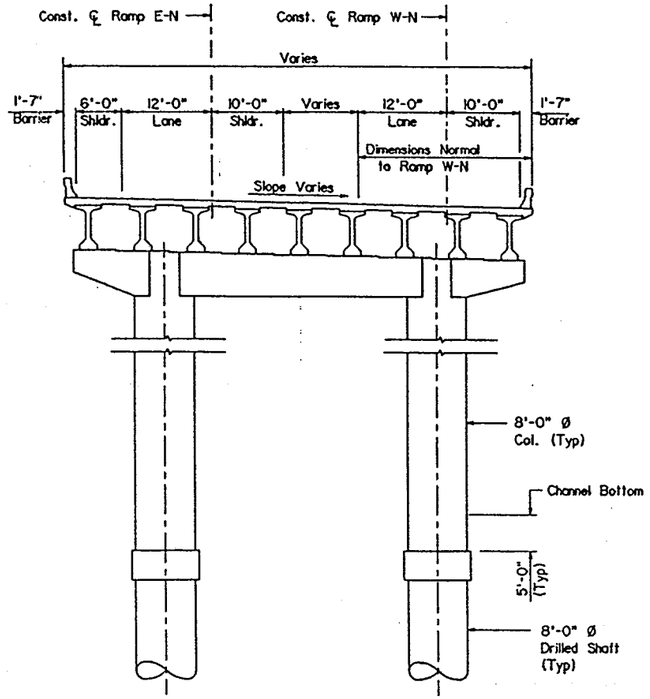
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ	101 L MA 50			



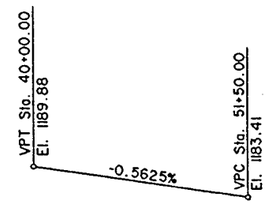
TYPICAL SECTION AT PIER #1 THRU #8
Scale: 1" = 10'



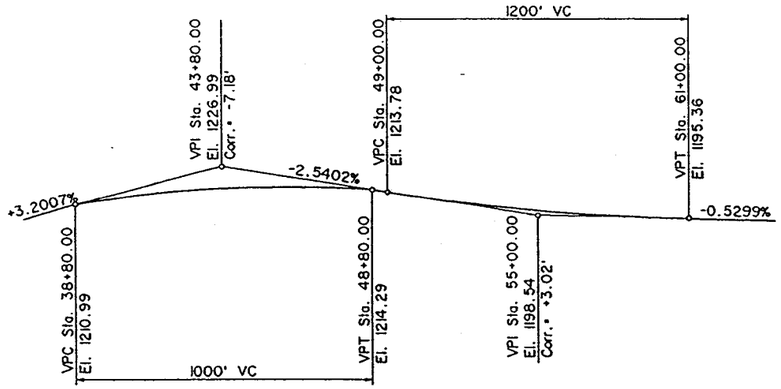
TYPICAL SECTION AT PIER #8 THRU #12
Scale: 1" = 10'



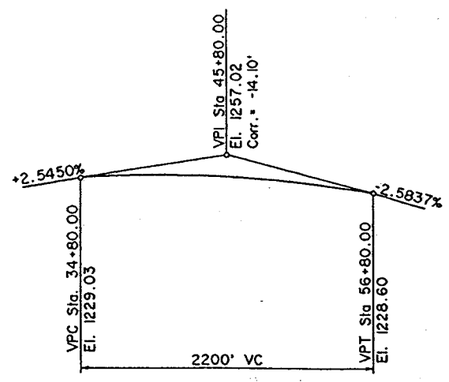
SECTION AT PIER #13 THRU ABUT #2
Scale: 1" = 10'



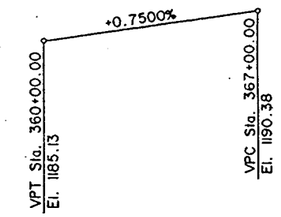
RAMP W-S
CONST. ℄ AND PROFILE GRADE



RAMP E-N
CONST. ℄ AND PROFILE GRADE



RAMP S-E
CONST. ℄ AND PROFILE GRADE



RED MOUNTAIN
CONST. ℄ AND PROFILE GRADE

FIGURE 24

	NAME	DATE
DESIGN	A. Modoni	7-90
DRAWN	J. DeBusso	7-90
CHECKED	A. Wojckiewicz	7-90

Parsons Brinckerhoff ® 100 YEARS

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STRUCTURES SECTION

RAMP E-N VIADUCT
TYPICAL SECTIONS

NOT FOR CONSTRUCTION

ROUTE | MILEPOST | STRUCTURE NO.

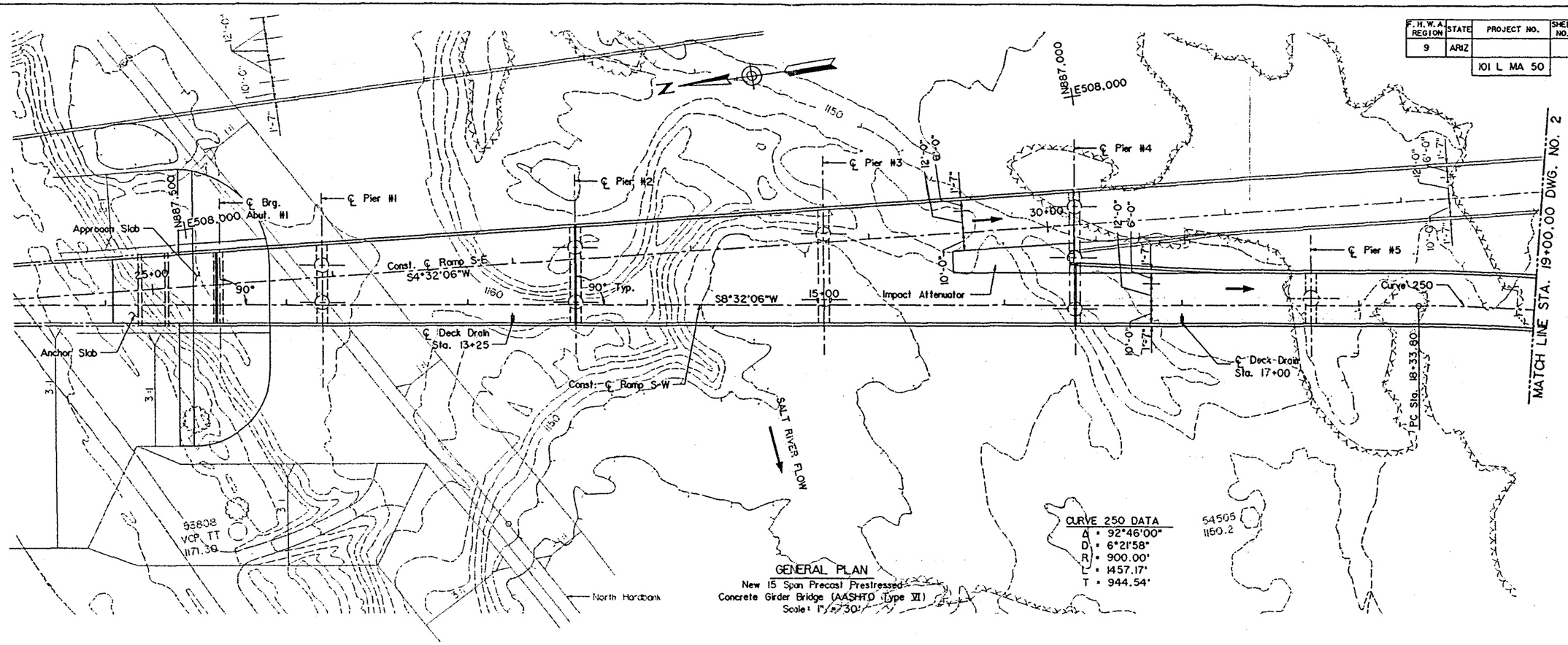
LOCATION
RED MOUNTAIN TRAFFIC INT.

DWG. NO. 4

TRACS NO. H-2414-01-C | BRIDGE NO. 14 | 12 OF 20

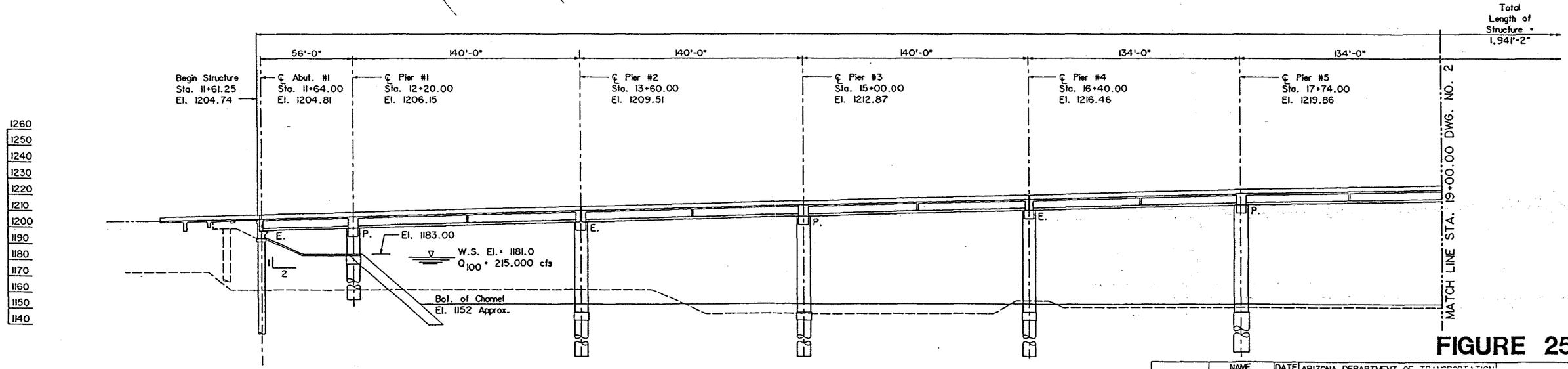
JAB 3017: H430 814CR3 814CR3 23JAN91-18.01.50 STRUC

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ	101 L MA 50			



CURVE 250 DATA
Δ = 92°46'00"
D = 6°21'58"
R = 900.00'
L = 1457.17'
T = 944.54'

GENERAL PLAN
New 15 Span Precast Prestressed Concrete Girder Bridge (AASHTO Type VI)
Scale: 1" = 30'



LONGITUDINAL SECTION ALONG CONST. ℄ RAMP S-W
Scale: 1" = 30'

FIGURE 25

	NAME	DATE
DESIGN	A. Modani	8/90
DRAWN	J. DelBusso	8/90
CHECKED	Wojcikiewicz	9/90

Parsons Brinckerhoff ® 100 YEARS

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STRUCTURES SECTION

RAMP S-W OVER SALT RIVER
PLAN AND SECTION

NOT FOR CONSTRUCTION

ROUTE | MILEPOST | STRUCTURE NO.

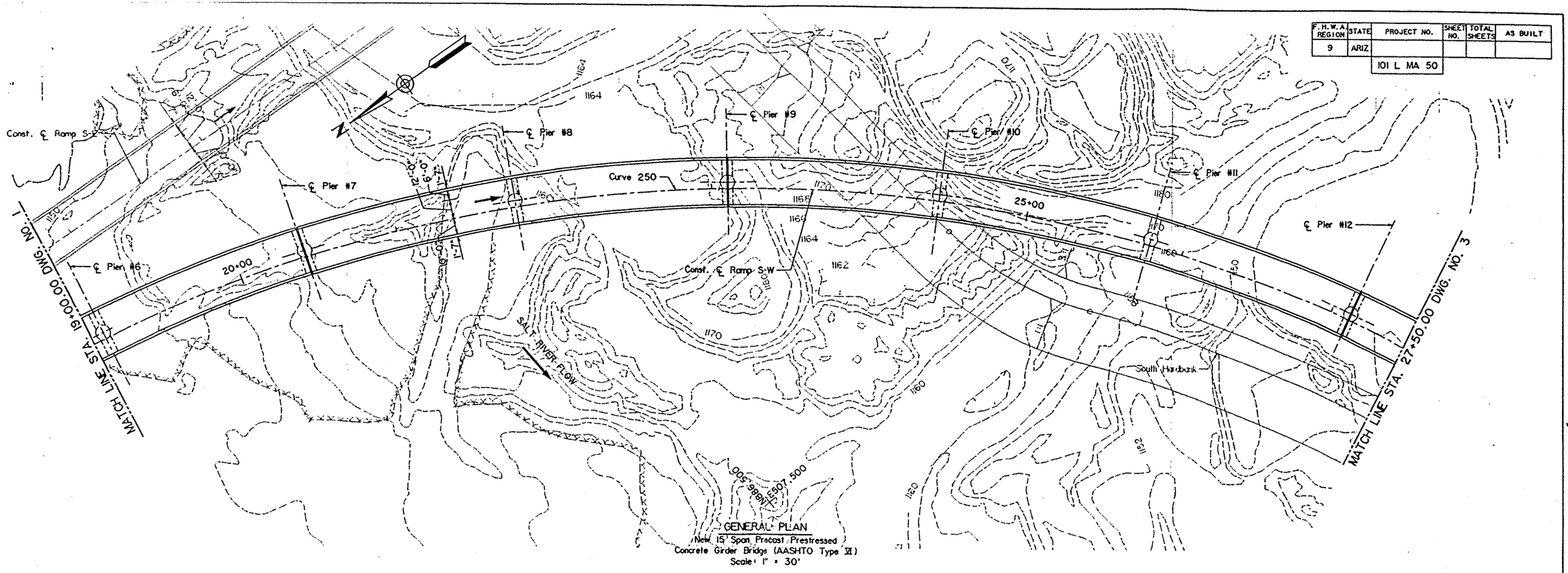
LOCATION: RED MOUNTAIN TRAFFIC INT.

DWG. NO. 1

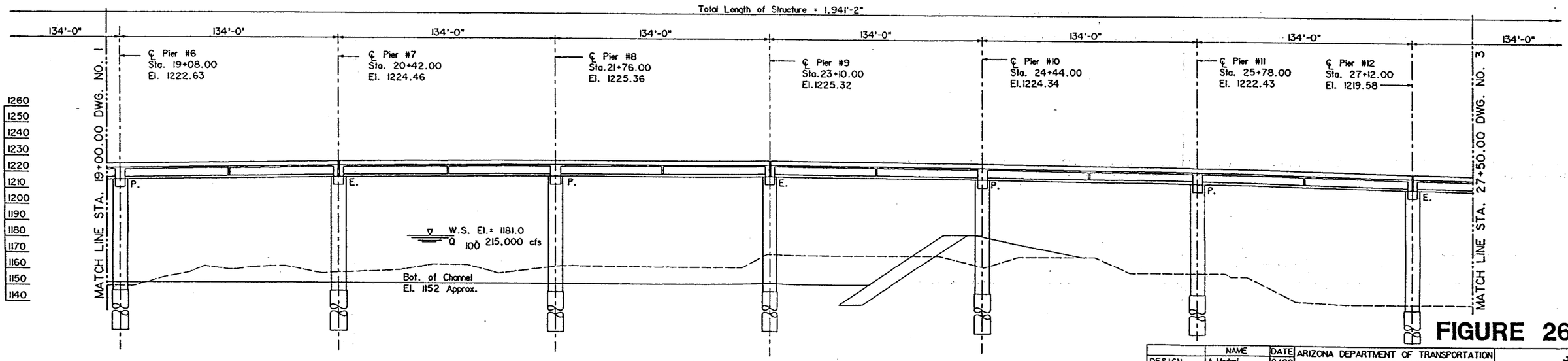
TRACS NO. H-2414-01-C | BRIDGE NO. 15 | 13 OF 20

JAG 3017: 0+30 B15FSA B15FSA 14JAN91-09.17.20 STRUC

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ	101 L MA 50			



GENERAL PLAN
New 15' Span Precast Prestressed Concrete Girder Bridge (AASHTO Type VI)
Scale: 1" = 30'



LONGITUDINAL SECTION ALONG CONST. ℄ RAMP S-W
Scale: 1" = 30'

FIGURE 26

	NAME	DATE
DESIGN	A. Modani	8/90
DRAWN	J. DeBusso	8/90
CHECKED	Wojatiewicz	9/90

Parsons Brinckerhoff ® 100 YEARS

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STRUCTURES SECTION

RAMP S-W OVER SALT RIVER
PLAN AND SECTION

LOCATION
RED MOUNTAIN TRAFFIC INT.

ROUTE | MILEPOST | STRUCTURE NO.

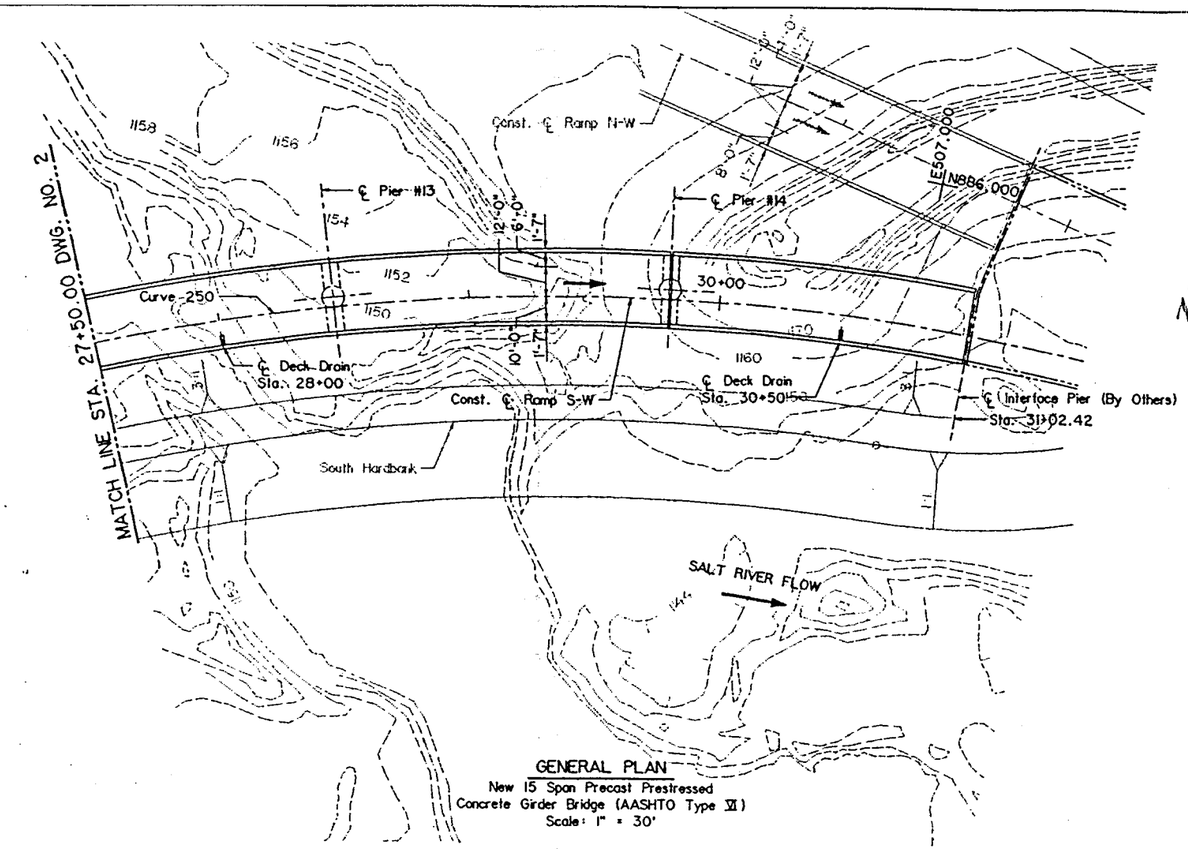
NOT FOR CONSTRUCTION

DWG. NO. 2

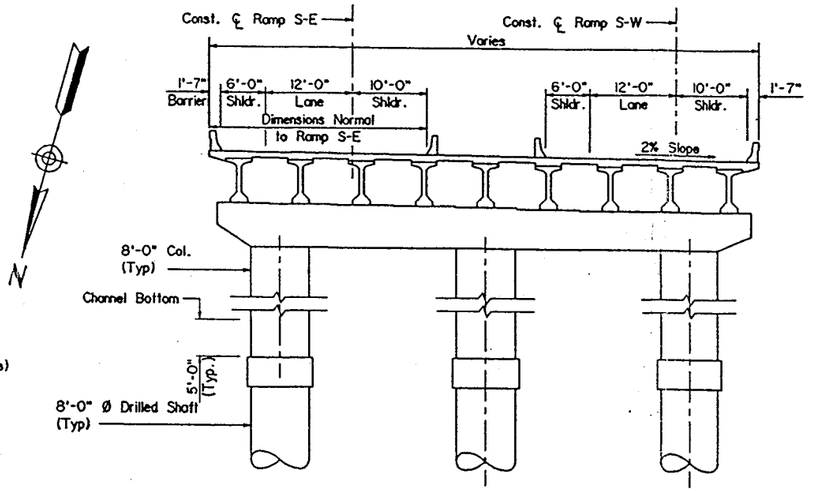
JAD 3017: 0430 81SP38 81SP38 14JAN91-08.28.00 STRUC

TRACS NO. H-2414-01-C | BRIDGE NO. 15 | 14 OF 20

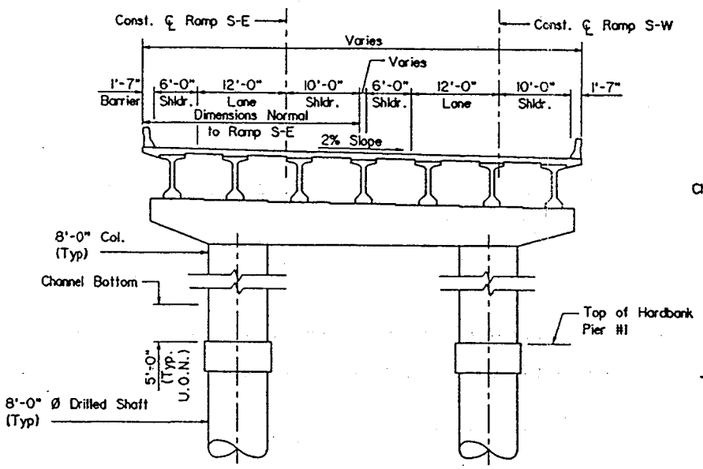
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ	101 L MA 50			



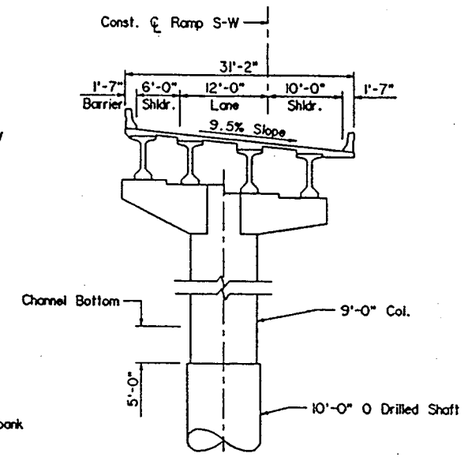
GENERAL PLAN
New 15 Span Precast Prestressed Concrete Girder Bridge (AASHTO Type VI)
Scale: 1" = 30'



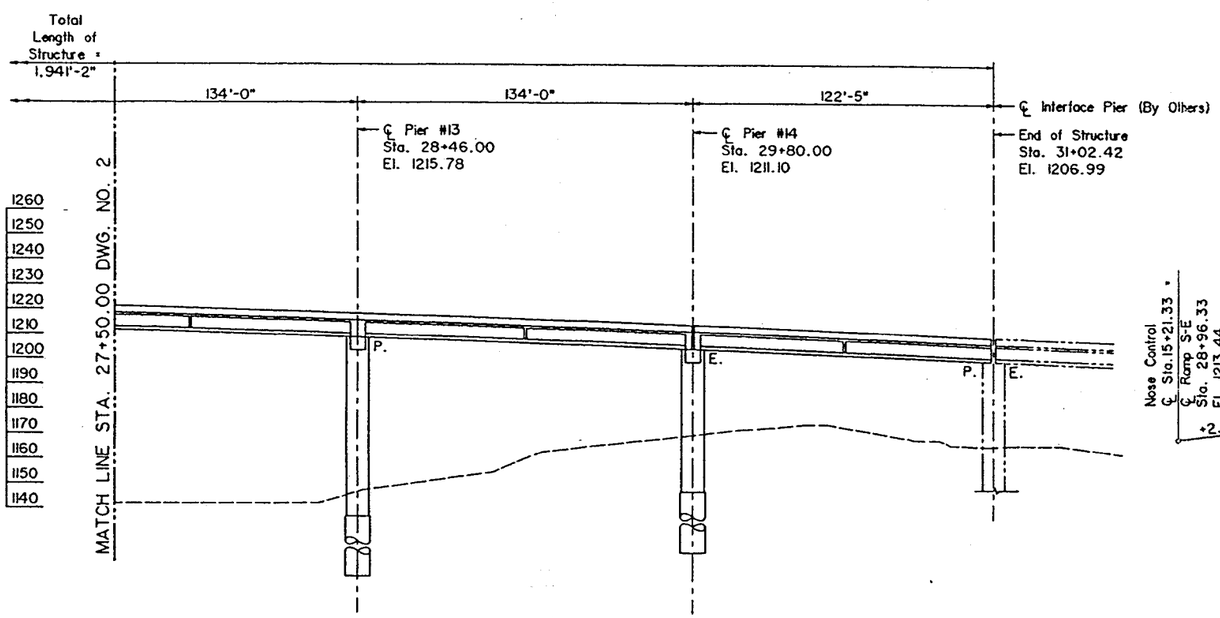
SECTION AT PIER #4
Scale: 1" = 10'



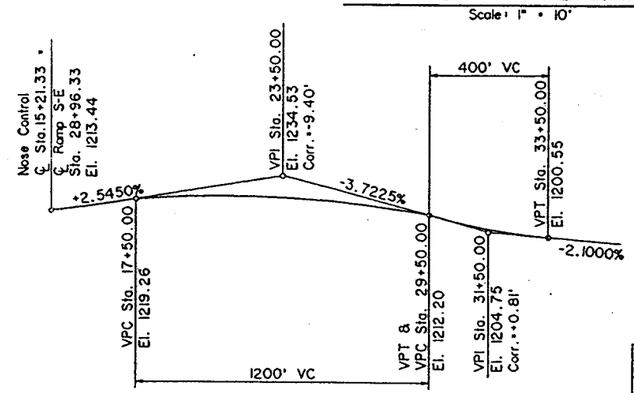
TYPICAL SECTION AT PIER #1 THRU #3
Scale: 1" = 10'



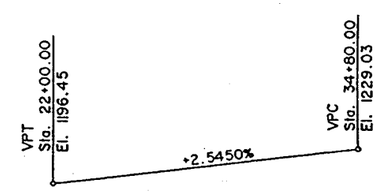
TYPICAL SECTION AT PIER #4 THRU PIER #14
Scale: 1" = 10"



LONGITUDINAL SECTION ALONG CONST. ℄ RAMP S-W
Scale: 1" = 30'



RAMP S-W
CONST. ℄ AND PROFILE GRADE



RAMP S-E
CONST. ℄ AND PROFILE GRADE

FIGURE 27

	NAME	DATE
DESIGN	A. Modani	8/90
DRAWN	J. DeBusso	8/90
CHECKED	Wojdkiewicz	9/90

Parsons Brinckerhoff ⊙ 100 YEARS

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STRUCTURES SECTION

RAMP S-W OVER SALT RIVER
PLAN AND SECTIONS

ROUTE | MILEPOST | STRUCTURE NO.

LOCATION: RED MOUNTAIN TRAFFIC INT.

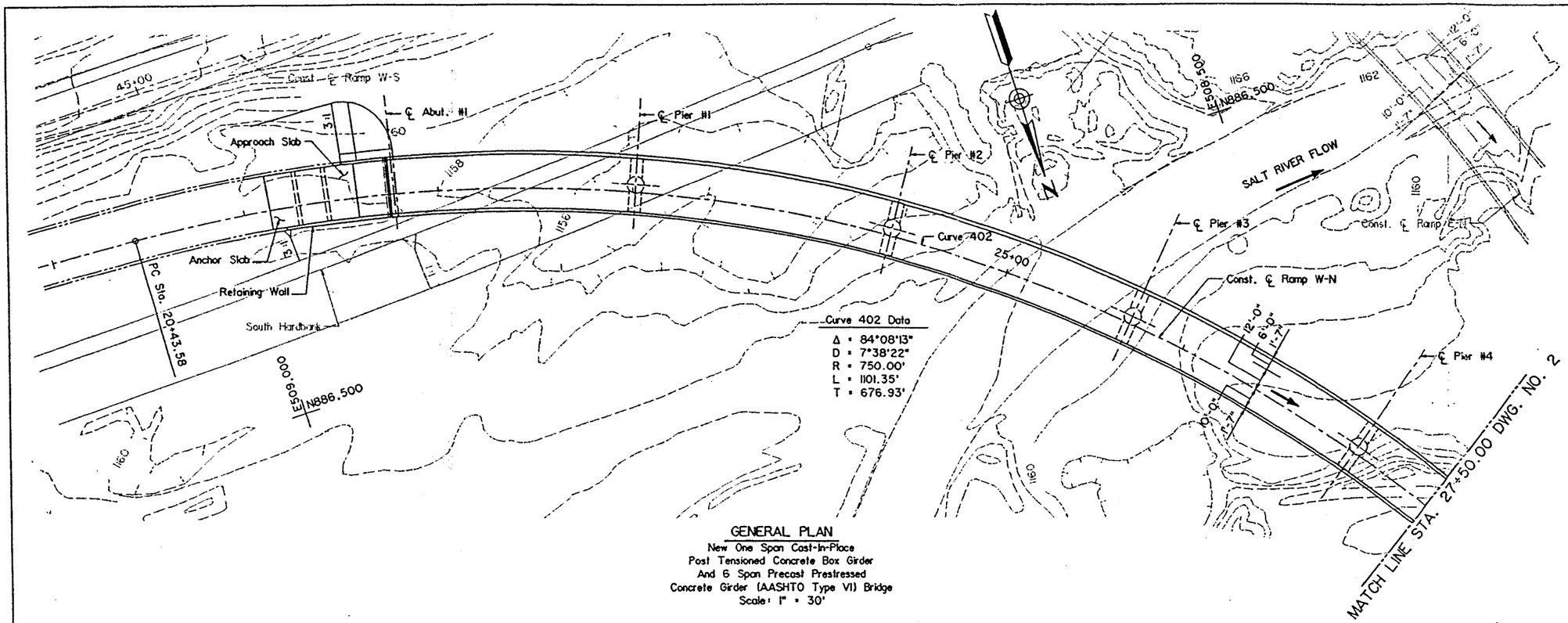
NOT FOR CONSTRUCTION

DWG. NO. 3

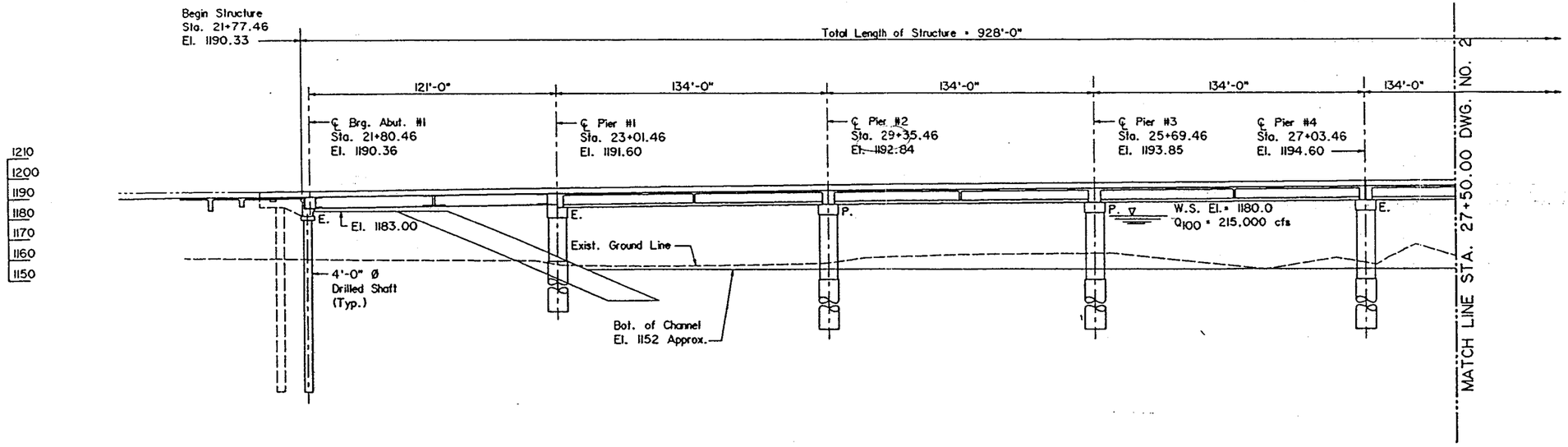
TRACS NO. H-2414-01-C | BRIDGE NO. 15 | 15 OF 20

RCHE 3017: 9430 B15P3C B16P3C 280EC90-15.01.90 STRUC

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ	202 L MA 0			



GENERAL PLAN
New One Span Cast-In-Place
Post Tensioned Concrete Box Girder
And 6 Span Precast Prestressed
Concrete Girder (AASHTO Type VI) Bridge
Scale: 1" = 30'



LONGITUDINAL SECTION ALONG CONST. ℄ RAMP W-N
Scale: 1" = 30'

FIGURE 28

	NAME	DATE
DESIGN	A. Madani	8-90
DRAWN	E. Fafilis	8-90
CHECKED	A. Wojkiewicz	9-90

Parsons Brinckerhoff ® 100 YEARS

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STRUCTURES SECTION

RAMP W-N
PLAN AND SECTION

ROUTE | MILEPOST | STRUCTURE NO.

LOCATION
RED MOUNTAIN TRAFFIC INT.

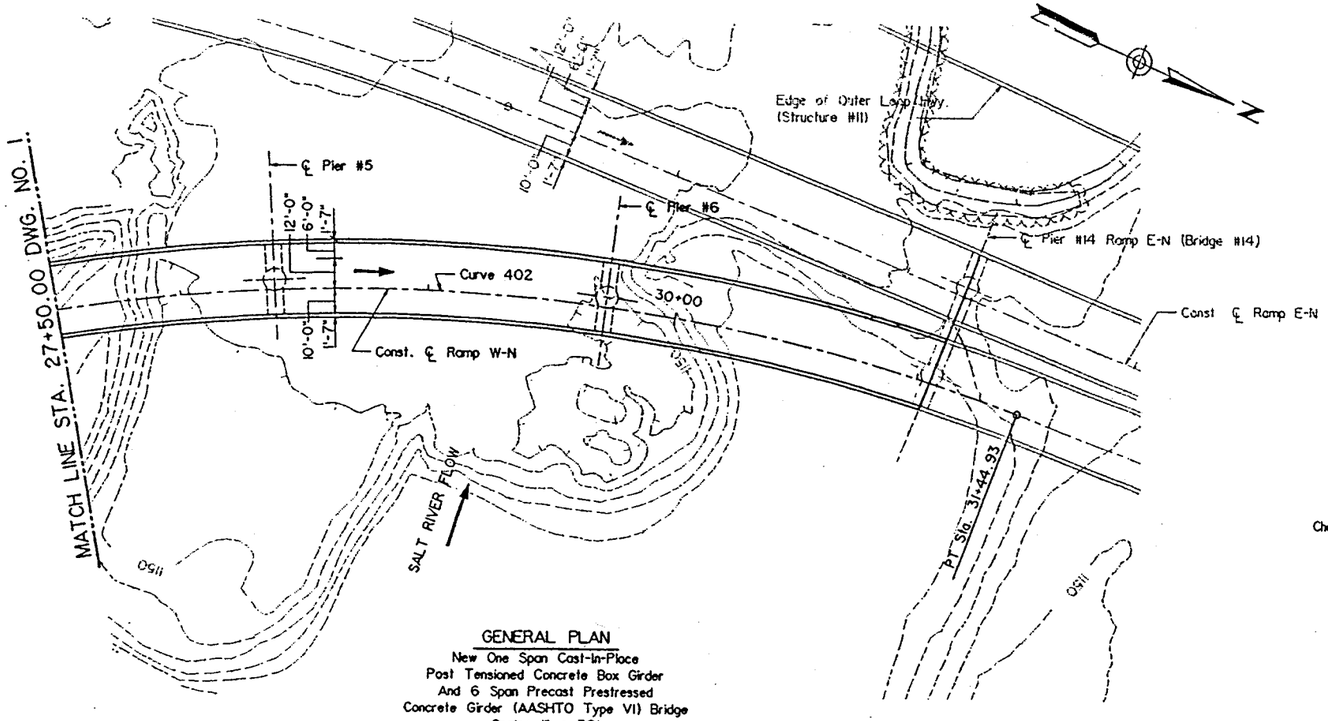
NOT FOR CONSTRUCTION

DWG. NO. 1

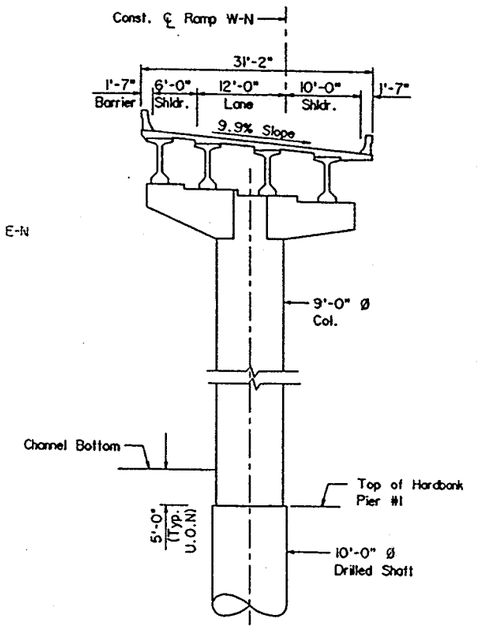
TRACS NO. H-0896-01-C | BRIDGE NO. 16 | 16 OF 20

JAD 3017: F530 818FSA 818FSA 14JAN91-10.49.00 STRUC

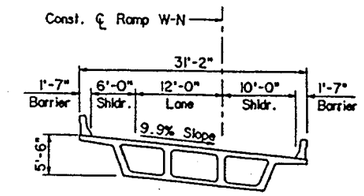
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ	202 L MA 0			



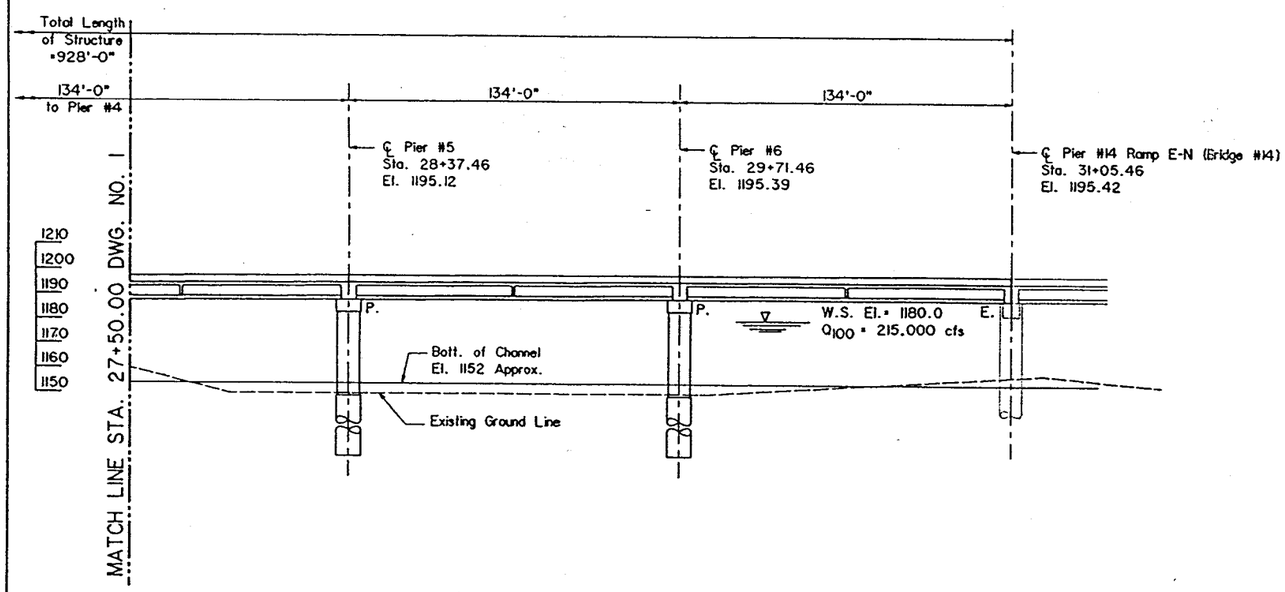
GENERAL PLAN
New One Span Cast-In-Place
Post Tensioned Concrete Box Girder
And 6 Span Precast Prestressed
Concrete Girder (AASHTO Type VI) Bridge
Scale: 1" = 30'



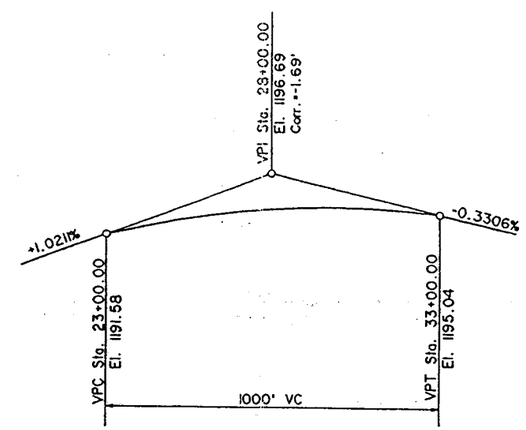
TYPICAL SECTION PIER #1 THRU END OF STRUCTURE
Scale: 1" = 10"



TYPICAL SECTION ABUT. #1 TO PIER #1
Scale: 1" = 10"



LONGITUDINAL SECTION ALONG CONST. ℄ RAMP W-N
Scale: 1" = 30'



RAMP W-N CONST. ℄ AND PROFILE GRADE

FIGURE 29

	NAME	DATE
DESIGN	A. Madani	8-90
DRAWN	E. Falitis	8-90
CHECKED	A. Wojakiewicz	9-90

Parsons Brinckerhoff ® 100 YEARS

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STRUCTURES SECTION

RAMP W-N
PLAN AND SECTIONS

LOCATION: RED MOUNTAIN TRAFFIC INT.

NOT FOR CONSTRUCTION

DWG. NO. 2

ROUTE | MILEPOST | STRUCTURE NO.

TRACS NO. H-0896-01-C | BRIDGE NO. 16

JAB 30171 PS30 816PSB 816PSB 14JAN91-10.07.00 STRUC

APPENDIX B: HEC-2 INPUT/OUTPUT FILES

```
*****************************************
*  HEC-2 WATER SURFACE PROFILES          *
*                                        *
*  Version   4.6.2;  May 1991            *
*                                        *
*  RUN DATE    28OCT92    TIME   15:08:21 *
*****************************************
```

```
****************************************
*  U.S. ARMY CORPS OF ENGINEERS        *
*  HYDROLOGIC ENGINEERING CENTER       *
*  609 SECOND STREET, SUITE D          *
*  DAVIS, CALIFORNIA 95616-4687        *
*          (916) 756-1104              *
****************************************
```

```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
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Job # PAZ-PBQD-02
EAST PAPAGO FWY & RED MTN. TRAFFIC INTERCHANGE

100-YEAR FLOW - BASELINE CONDITIONS

THIS RUN EXECUTED 28OCT92 15:08:21

```
************************************
HEC-2 WATER SURFACE PROFILES

rsion   4.6.2;  May 1991
************************************


IT FLOW BEING PERFORMED


     SPLIT FLOW ANALYSIS -- EAST PAPAGO FWY & RED MT. T.I.


     SECNO 251 TO 252
    2     251     252     245     2.7
 2795    1186    3240    1186

     SECNO 250 TO 251
    2     250     251     245     2.7
WC 2250    1184    2795    1186

     SECNO 249 TO 250
S    2     249     250     245     2.7
WC 1835    1186    2250    1184

     SECNO 248 TO 249
WS   2     248     249     245     2.7
 1325    1186    1835    1186

W    SECNO 247 TO 248
    2     247     248     245     2.7
  690    1184    1325    1186

TW   SECNO 246 TO 247
    3     246     247     245     2.7
    0    1180     250    1184     690    1184

     SECNO 234 TO 235
    3     234     235     228   0.050  0.0011
G 900    1176    1245    1176    1290    1182
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     LAST REVISED: 4-9-92

     EXISTING GROUND POINT DATA TAKEN FROM ADOT 1990 TOPO

     SIMONS, LI & ASSOCIATES, INC. (PAZ-DMJM-03.24)
     SALT RIVER HEC-2 ANALYSIS (SECTIONS 121.0 - 253.0)
T3   EXIST.DAT       100-YEAR DISCHARGE (CAWCS HYDROLOGY)

  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

     0        2         0         0         4         0         0    213770     1166        0

                          **************RATING CURVE DATA**************

  3000   1157.45    135000   1161.02    160000   1162.90    215000   1166.59

J2   NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     -1        0         -1        0         0         0         -1        0         0         0


  VARIABLE CODES FOR SUMMARY PRINTOUT

     38        1         55        26        56        13        14        15        43        4
     53        54        0         38        1         2         3         42        8         5
     33        39        67        68

J6   IHLEQ     ICOPY     SUBDIV    STRTDS    RMILE

     1


     0.035     0.035     0.035     0.1       0.3
X1   120.50    9         443.5     1485.0    0         0         0
     1171.5    367.0     1171.46   382.0     1158.96   419.5     1158.72   443.5     1150.00   469.7
     1147.0    926.5     1150.00   1420.7    1171.42   1485.0    1171.42   1500.0

X1   122.00    9         441.5     1460.0    155.0     150.0     152.0
     1171.6    365.0     1171.61   380.0     1159.11   417.5     1158.87   441.5     1150.16   467.6
     1147.2    941.0     1150.15   1395.7    1171.58   1460.0    1171.58   1475.0

     0.035     0.035     0.035     0.3       0.5
     122.65    9         441.5     1460.0    65.0      65.0      65.0
X3   10.
     1171.7    365.0     1171.68   380.0     1159.18   417.5     1158.94   441.5     1150.22   490.3
     1147.2    952.0     1150.22   1395.7    1171.65   1460.0    1171.65   1475.0
```

SB	1.05	1.56	3.0	0	790	193	27088	6.5	1147.31	1147.2
	123.55	20	441.5	1460.0	90.0	90.0	90.0			
	0.	.00	1.	1180.61	1181.80					
X3	10.									
	-11	316.0	1181.80	1174.13	436.0	1184.23	1176.56	554.0	1185.93	1178.26
	0	672.0	1187.37	1179.70	790.0	1188.15	1180.48	908.0	1188.28	1180.61
BT	0	1026.0	1188.15	1180.48	1144.0	1187.37	1179.70	1262.0	1185.93	1178.26
BT	0	1380.0	1184.23	1176.56	1500.0	1181.80	1174.13			
	1174.1	316.0	1171.77	371.0	1171.77	386.0	1159.27	423.5	1159.10	436.0
	1159.0	441.5	1150.31	500.1	1149.97	554.0	1149.22	672.0	1148.48	790.0
GR	1147.7	908.0	1147.31	975.0	1147.64	1026.0	1148.42	1144.0	1149.19	1262.0
	1150.0	1380.0	1150.31	1433.3	1171.75	1460.0	1171.75	1475.0	1174.13	1500.0
X1	124.00	9	436.5	1465.0	45.0	45.0	45.0			
	1171.8	360.0	1171.81	375.0	1159.31	412.5	1159.07	436.5	1150.36	464.2
	1147.4	983.0	1150.35	1400.7	1171.79	1465.0	1171.79	1480.0		
ET		9.1	9.1						1595	2765
	228.0	26	1415	2680	355	205	320			
	1174.0	0	1174.0	670	1170.8	690	1170.8	1290	1170.0	1330
GR	1170.0	1415	1150.0	1510	1150.0	1620	1147.7	1980	1150.0	2275
	1150.0	2465	1160.0	2505	1170.0	2680	1178.0	2765	1170.0	2780
	1166.0	2785	1166.0	3035	1170.0	3055	1172.0	3085	1174.0	3265
GR	1172.0	3375	1170.0	3400	1170.0	3425	1172.0	3600	1176.0	3815
GR	1178.0	4735								
	0.050	0.050	0.040							
ET		9.1	9.1						1745	2715
	229.0	31	1375	2660	350	420	380			
		1148.05								
GR	1175.0	0	1175.0	540	1174.0	640	1172.0	660	1171.0	700
	1171.0	1290	1170.0	1310	1170.0	1375	1160.0	1510	1160.0	1510
	1150.0	1630	1142.0	1745	1140.0	2015	1140.0	2475	1150.0	2525
GR	1150.0	2525	1160.0	2555	1170.0	2660	1180.0	2685	1184.0	2715
GR	1180.0	2735	1170.0	2755	1170.0	2995	1166.0	3005	1166.0	3055
	1168.0	3235	1170.0	3255	1170.0	3475	1172.0	3645	1176.0	4115
	1178.0	4605								
		9.1	9.1						1615	2570
	230.0	33	1090	2415	310	410	375			
X3		1148.43								
GR	1174.0	0	1172.0	335	1172.0	930	1173.0	1020	1172.0	1080
	1170.0	1090	1160.0	1385	1150.0	1455	1150.0	1555	1146.0	1575
GR	1144.0	1635	1144.0	1765	1146.0	2195	1150.0	2250	1160.0	2290
GR	1170.0	2410	1172.0	2415	1174.0	2570	1172.0	2690	1170.0	2715
	1168.4	2805	1168.0	2925	1168.0	2960	1170.0	3055	1170.6	3160
	1170.0	3255	1169.4	3325	1170.0	3415	1172.0	3450	1174.0	3475
GR	1174.0	3560	1174.0	3950	1176.0	3995				

NG				0.1	0.3					
		9.1	9.1						2020	2945
X1	231.0	27	2020	2760	350	460	400			
X3		1148.83								
	1176.0	570.0	1176.0	1815.0	1178.0	1855.0	1178.0	2020.0	1160.0	2060.0
	1150.0	2130.0	1140.0	2255.0	1130.0	2360.0	1120.0	2530.0	1116.0	2565.0
GR	1120.0	2590.0	1150.0	2655.0	1160.0	2700.0	1170.0	2750.0	1172.0	2760.0
	1174.0	2910.0	1174.0	2945.0	1172.0	3100.0	1169.0	3375.0	1170.0	3430.0
	1170.1	3490.0	1170.0	3590.0	1170.0	3740.0	1174.0	3775.0	1174.0	3940.0
GR	1176.0	4420.0	1178.0	4435.0						
		9.1	9.1						2050	2970
	232.0	29	2050	2800	340	470	420			
X3		1149.25								
	1178.0	660.0	1178.0	1340.0	1176.0	1490.0	1178.0	1740.0	1176.0	1960.0
	1176.0	2050.0	1174.0	2080.0	1170.0	2090.0	1160.0	2115.0	1150.0	2250.0
GR	1130.0	2300.0	1120.8	2345.0	1130.0	2410.0	1128.0	2460.0	1124.0	2510.0
GR	1124.0	2610.0	1140.0	2655.0	1150.0	2700.0	1160.0	2740.0	1170.0	2800.0
	1172.0	2920.0	1173.0	2970.0	1172.0	3020.0	1171.8	3210.0	1170.0	3380.0
GR	1170.0	3500.0	1174.0	3520.0	1176.0	4420.0	1178.0	4510.0		
	2	215000	93000							
		9.1	9.1						1755	3635
X1	233.0	33	1870	2785	390	385	385			
		1149.63		2085	1176					
	1180.0	760.0	1180.0	1300.0	1178.0	1370.0	1176.0	1755.0	1174.0	1870.0
GR	1170.0	1880.0	1150.0	1930.0	1146.0	1940.0	1148.0	1970.0	1142.0	2010.0
GR	1146.0	2040.0	1146.0	2135.0	1140.0	2170.0	1140.0	2320.0	1138.0	2325.0
	1138.0	2380.0	1140.0	2390.0	1140.0	2465.0	1130.0	2515.0	1130.0	2560.0
	1140.0	2600.0	1150.0	2625.0	1160.0	2710.0	1170.0	2785.0	1170.0	2960.0
GR	1170.0	3190.0	1172.0	3260.0	1172.0	3260.0	1174.0	3370.0	1174.0	3510.0
	1176.0	3620.0	1178.0	4550.0	1180.0	4575.0				
ET		9.1	9.1						1880	3670
	234.0	30	2230	2835	400	400	400			
		1150.03		2215	1176					
GR	1184.0	1000	1184.0	1065	1182.0	1320	1174.0	1345	1172.0	1590
GR	1170.0	1710	1170.0	1990	1176.0	1995	1182.0	2000	1178.0	2020
	1180.0	2100	1178.0	2110	1178.0	2215	1176.0	2230	1150.0	2280
	1140.0	2365	1130.0	2470	1130.0	2530	1134.0	2580	1140.0	2590
GR	1150.0	2650	1160.0	2680	1168.0	2835	1170.0	3040	1172.0	3125
G	1174.0	3215	1174.0	3460	1176.0	3555	1178.0	4015	1180.0	4750
ET		9.1	9.1						1890	3620
	235.0	29	1890	2720	400	400	400			
		1150.43								
GR	1190.0	1230	1186.0	1275	1184.0	1375	1184.0	1605	1188.0	1625
GR	1188.0	1740	1184.0	1775	1182.0	1890	1170.0	1900	1160.0	2000
	1150.0	2060	1148.0	2080	1132.0	2110	1132.0	2205	1140.0	2265
	1130.0	2295	1122.0	2340	1122.0	2370	1124.0	2435	1130.0	2450
GR	1134.0	2490	1158.0	2540	1160.0	2640	1168.0	2720	1170.0	2955
G	1174.0	3115	1176.0	3480	1178.0	3800	1180.0	4675		

ET		9.1	9.1						1880	3640
X	236.0	25	1880	2780	400	400	400			
X		1150.83								
GR	1198.0	1060.0	1190.0	1190.0	1188.0	1250.0	1187.0	1310.0	1186.0	1840.0
G	1180.0	1880.0	1146.0	1930.0	1144.0	2010.0	1142.0	2040.0	1140.0	2120.0
G	1130.0	2220.0	1140.0	2330.0	1130.0	2470.0	1130.0	2490.0	1156.0	2560.0
GR	1160.0	2660.0	1170.0	2780.0	1170.0	2900.0	1172.0	3080.0	1174.0	3110.0
GR	1176.0	3240.0	1176.0	3410.0	1178.0	3440.0	1179.5	4550.0	1180.0	4590.0
ET		9.1	9.1						1920	3690
X1	237.0	31	1850	2850	390	390	390			
		1151.22								
GR	1198.0	1030.0	1196.0	1085.0	1190.0	1180.0	1190.0	1310.0	1189.0	1350.0
GR	1188.0	1820.0	1186.0	1850.0	1152.0	1905.0	1150.0	1920.0	1140.0	1985.0
GR	1130.0	2005.0	1122.0	2090.0	1130.0	2150.0	1140.0	2195.0	1134.0	2235.0
GR	1134.0	2330.0	1140.0	2420.0	1144.0	2445.0	1140.0	2470.0	1150.0	2560.0
GR	1156.0	2575.0	1162.0	2660.0	1164.0	2770.0	1170.0	2850.0	1172.0	3000.0
GR	1172.0	3150.0	1174.0	3170.0	1176.0	3270.0	1180.0	3350.0	1180.0	4450.0
GR	1182.0	4650.0								
ET		9.1	9.1						2130	3775
X1	238.0	21	2070	3060	550	470	500			
		1151.72								
GR	1182.0	1280.0	1182.0	1590.0	1180.0	1620.0	1178.0	1740.0	1178.0	2070.0
GR	1152.0	2170.0	1146.0	2270.0	1140.0	2430.0	1138.0	2480.0	1140.0	2530.0
R	1150.0	2750.0	1150.0	3020.0	1170.0	3060.0	1170.0	3220.0	1174.0	3240.0
R	1176.0	3310.0	1178.0	3400.0	1178.0	3490.0	1180.0	3600.0	1181.5	4530.0
GR	1182.0	4575.0								
T	2	220000	95300							
ET		9.1	9.1						2035	3585
X1	239.0	18	1720	2995	455	470	460			
3		1152.18								
GR	1180.0	1410.0	1182.0	1450.0	1182.0	1720.0	1140.0	1785.0	1140.0	1920.0
GR	1150.0	2035.0	1160.0	2195.0	1164.0	2250.0	1160.0	2300.0	1150.0	2365.0
R	1150.0	2780.0	1160.0	2890.0	1170.0	2940.0	1172.0	2995.0	1176.0	3260.0
R	1180.0	3460.0	1182.0	3940.0	1184.0	4350.0				
T		9.1	9.1						5015	6510
1	240	18	5015	6070	580	370	480			
X3		1152.66								
GR	1206	4975	1206	5015	1200	5025	1180	5055	1170	5075
R	1170	5145	1164	5160	1160	5230	1160	5395	1152	5410
GR	1150	5710	1150	6030	1170	6070	1172	6120	1174	6280
GR	1174	6460	1180	6480	1182	6510				
T		9.1	9.1						4935	6725
X1	241	24	4935	6285	540	450	500			
X3		1153.16								
R	1184	4900	1184	4935	1180	4950	1170	5045	1160	5195
GR	1154	5225	1154	5450	1158	5460	1158	5505	1152	5620
GR	1152	5755	1150	5790	1150	5840	1158	5970	1160	6045
R	1160	6120	1162	6260	1170	6280	1172	6285	1174	6375

GR	1176	6685	1178	6695	1180	6720	1182	6725		
		9.1	9.1						4910	6975
	242	36	4910	6480	510	420	505			
X3		1153.67								
	1184	4880	1184	4910	1180	4920	1160	4975	1160	5010
	1162	5105	1164	5125	1162	5325	1160	5450	1158	5555
GR	1152	5610	1150	5645	1150	5700	1152	5720	1160	5740
	1160	5755	1150	5790	1150	5825	1156	5855	1150	5890
	1150	6050	1152	6085	1152	6165	1158	6200	1150	6220
GR	1150	6250	1154	6260	1156	6435	1160	6450	1170	6470
GR	1172	6480	1174	6565	1176	6705	1176	6965	1180	6975
	1184	6980								
ET		9.1	9.1						4885	7125
	243	20	4885	6830	500	500	490			
		1154.16								
GR	1184	4885	1180	4900	1170	4925	1162	4950	1162	5085
GR	1160	5180	1160	5520	1154	5545	1154	5630	1150	5960
	1140	6240	1140	6480	1150	6505	1150	6660	1160	6730
	1170	6830	1176	6970	1178	7100	1180	7120	1184	7125
		9.1	9.1						4875	7405
	244	31	4875	6535	495	550	535			
X3		1154.69								
	1184	4830	1184	4875	1160	4920	1160	5045	1170	5130
	1170	5175	1160	5315	1160	5500	1156	5745	1156	5910
GR	1152	6000	1160	6025	1162	6040	1162	6085	1160	6105
GR	1150	6125	1150	6230	1160	6320	1160	6440	1170	6460
	1174	6535	1170	6830	1150	6865	1144	6880	1144	6960
	1150	6980	1170	7005	1170	7330	1172	7380	1180	7395
GR	1186	7405								
		9.1	9.1						4830	7855
X1	245	38	4830	6710	550	390	550			
X2		1155.24								
	1184	4790	1184	4830	1180	4850	1170	4905	1160	4955
GR	1160	5035	1168	5150	1168	5190	1170	5200	1176	5245
GR	1176	5330	1170	5335	1162	5490	1162	5560	1164	5610
	1168	5720	1168	5785	1166	5905	1160	6030	1150	6070
	1148	6115	1150	6160	1160	6220	1150	6260	1150	6300
GR	1160	6655	1170	6670	1176	6680	1178	6710	1178	7000
G	1176	7065	1174	7380	1170	7390	1170	7520	1172	7660
	1180	7685	1188	7710	1190	7855				
OT	2	127837	82030							
		9.1	9.1						4970	6085
	246	38	4970	6950	410	450	600			
X3		1155.84								
	1184	4970	1180	5000	1168	5005	1168	5115	1180	5145
	1184	5160	1180	5170	1170	5280	1150	5300	1170	5430
GR	1166	5735	1162	5825	1162	5960	1164	6035	1160	6150
G	1154	6165	1152	6210	1152	6810	1160	6830	1162	6840
	1170	6940	1176	6950	1176	7150	1174	7270	1174	7430

GR	1176	7470	1176	7520	1172	7560	1172	7760	1176	7790
GR	1176	7825	1174	7850	1172	7890	1172	7945	1174	8005
	1180	8020	1188	8100	1190	8160				
ET		9.1	9.1						5020	5825
	247	47	5020	5825	420	560	495			
		1156.34								
GR	1190	5020	1180	5035	1178	5045	1176	5165	1170	5180
GR	1160	5220	1150	5240	1150	5265	1156	5350	1170	5495
	1162	5590	1162	5750	1170	5780	1180	5800	1182	5810
	1184	5825	1186	5870	1186	6070	1180	6170	1160	6255
GR	1160	6310	1170	6335	1180	6350	1186	6440	1186	6540
	1180	6555	1160	6570	1160	6700	1170	6740	1160	6780
	1160	6900	1170	6970	1180	7030	1180	7065	1178	7190
GR	1176	7270	1170	7415	1176	7450	1176	7570	1170	7695
	1170	7870	1176	7885	1176	8070	1170	8080	1170	8250
	1180	8290	1190	8330						
ET		9.1	9.1						5010	5600
	248	47	5010	5600	610	550	615			
		1156.95								
GR	1182	5010	1180	5015	1176	5030	1174	5180	1172	5215
	1170	5225	1164	5260	1164	5450	1170	5490	1176	5535
	1178	5580	1180	5585	1186	5600	1180	5630	1170	5700
GR	1160	5760	1160	5790	1170	5810	1180	5940	1186	5950
GR	1186	6265	1180	6280	1150	6315	1142	6340	1142	6505
	1146	6660	1150	6670	1170	7010	1172	7055	1170	7080
	1162	7100	1160	7485	1160	7610	1150	7700	1150	7795
GR	1160	8005	1170	8015	1174	8030	1174	8210	1176	8250
	1178	8310	1178	8410	1176	8575	1180	8590	1184	8610
	1186	8830	1190	8855						
F		9.1	9.1						4980	5580
	249	44	4980	5580	470	500	495			
X3		1157.45								
GR	1184	4980	1180	4990	1170	5020	1164	5135	1164	5210
	1170	5270	1172	5300	1174	5420	1178	5530	1180	5555
	1186	5580	1188	5670	1186	5700	1180	5710	1170	6010
GR	1160	6245	1160	6415	1150	6440	1146	6490	1146	6660
	1150	6760	1152	7070	1152	7140	1150	7165	1142	7220
	1144	7300	1150	7350	1170	7400	1178	7425	1170	7485
GR	1160	7500	1152	7600	1158	7815	1160	8020	1170	8030
G	1170	8055	1170	8345	1180	8355	1182	8365	1170	8420
	1170	8530	1180	8580	1188	8640	1188	8755		
ET		9.1	9.1						4910	5540
	250	29	4910	5540	720	440	555			
		1158.00								
GR	1190	4910	1180	4940	1170	4985	1170	5120	1166	5130
	1166	5175	1170	5240	1178	5380	1180	5500	1184	5540
	1184	5610	1180	5640	1170	5810	1150	5830	1150	5980
GR	1160	6085	1170	6100	1174	6110	1174	6220	1170	6250
GR	1160	6320	1156	6340	1156	6410	1160	7075	1150	7110
	1150	7500	1160	7660	1180	7700	1190	7850		

ET		9.1	9.1						4820	5320
	251	33	4820	5320	680	410	600			
		1158.60								
GR	1194	4590	1194	4820	1192	4855	1190	4860	1180	4870
GR	1168	4895	1168	4980	1170	4990	1172	5080	1176	5095
	1174	5125	1180	5260	1186	5320	1188	5330	1186	5560
GR	1190	5940	1190	6295	1180	6310	1160	6345	1152	6820
GR	1152	6920	1160	7050	1164	7120	1160	7145	1160	7215
	1150	7230	1150	7425	1180	7470	1182	7485	1180	7610
R	1180	7670	1186	7860	1190	8080				
		9.1	9.1						4945	5580
	252	30	4945	5580	550	190	485			
X3		1159.09								
GR	1194	4760	1192	4945	1190	4950	1180	4965	1170	5045
	1170	5115	1174	5160	1174	5240	1176	5280	1178	5310
GR	1180	5325	1178	5340	1178	5360	1180	5540	1186	5580
GR	1180	5605	1170	5620	1170	5815	1180	5840	1190	5855
	1190	6530	1170	6560	1164	6580	1164	6800	1170	6820
R	1170	7085	1180	7150	1170	7370	1180	7405	1190	7555
		9.1	9.1						5000	6070
	253	23	5000	6070	495	550	635			
X3		1159.72								
GR	1190	5000	1180	5070	1178	5085	1178	5155	1180	5170
	1182	5190	1180	5230	1178	5290	1176	5300	1176	5590
GR	1180	5600	1170	5795	1170	5940	1180	5960	1186	6050
GR	1188	6070	1180	6110	1180	6260	1176	6510	1176	6740
	1180	6810	1190	6840	1190	8320				

IHLEQ = 1. THEREFORE FRICTION LOSS (HL) IS CALCULATED AS A FUNCTION OF
X FILE TYPE, WHICH CAN VARY FROM REACH TO REACH. SEE DOCUMENTATION FOR
X AILS.

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

OF 1

TICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CHV= .100 CEHV= .300

*SECNO 120.500

120.500	19.51	1166.51	1160.02	1166.00	1168.69	2.18	.00	.00	1158.72
213770.0	1625.2	212144.8	.0	269.5	17852.3	.0	.0	.0	1171.42
.00	6.03	11.88	.00	.035	.035	.000	.000	1147.00	396.86
.001748	0.	0.	0.	0	19	0	.00	1073.40	1470.25

*SECNO 122.000

122.000	19.51	1166.71	1160.40	.00	1168.99	2.28	.27	.03	1158.87
213770.0	1681.1	212088.9	.0	271.8	17463.0	.0	62.6	3.7	1171.58
.00	6.19	12.15	.00	.035	.035	.000	.000	1147.20	394.71
.001825	155.	152.	150.	0	14	0	.00	1050.67	1445.38

C V= .300 CEHV= .500

CNO 122.650

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1158.94 ELREA= 1171.65

122.650	19.62	1166.82	1160.55	.00	1169.11	2.29	.12	.01	1158.94
213770.0	1708.1	212061.9	.0	274.0	17411.8	.0	89.0	5.3	1171.65
.00	6.23	12.18	.00	.035	.035	.000	.000	1147.20	394.57
.001841	65.	65.	65.	2	19	0	.00	1050.95	1445.52

PECIAL BRIDGE

DOWNSTREAM ELEV IS 1156.26 , NOT 1166.82 HYDRAULIC JUMP OCCURS DOWNSTREAM (IF LOW FLOW CONTROLS)

SB	XK	XKOR	COFQ	RDLEN	BWC	BWP	BAREA	SS	ELCHU	ELCHD
	1.05	1.56	3.00	.00	790.00	193.00	27088.00	6.50	1147.31	1147.20

ECNO 123.550

SS B LOW FLOW

20 BRIDGE W.S.= 1162.23 BRIDGE VELOCITY= 20.56 CALCULATED CHANNEL AREA= 10352.

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

EGPRS	EGLWC	H3	QWEIR	QLOW	BAREA	TRAPEZOID AREA	ELLC	ELTRD	WEIRLN
.00	1170.27	.00	0.	213770.	27088.	27088.	1180.61	1181.80	0.

5 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1159.00 ELREA= 1171.75

123.550	21.10	1168.41	.00	.00	1170.27	1.87	1.16	.00	1159.00
13770.0	1655.2	212114.8	.0	292.0	19297.2	.0	127.5	7.5	1171.75
.01	5.67	10.99	.00	.035	.035	.000	.000	1147.31	396.09
.001332	90.	90.	90.	0	0	0	.00	1059.75	1455.84

*SECNO 124.000

124.000	21.06	1168.46	1160.51	.00	1170.34	1.87	.06	.00	1159.07
13770.0	2053.1	211716.8	.0	348.2	19215.0	.0	147.7	8.6	1171.79
.01	5.90	11.02	.00	.035	.035	.000	.000	1147.40	385.04
.001348	45.	45.	45.	2	14	0	.00	1069.98	1455.02

*SECNO 228.000

ENCROACHMENT STATIONS= 1595.0 2765.0 TYPE= 1 TARGET= 1170.000

228.000	21.14	1168.84	1161.40	1168.84	1170.94	2.10	.49	.11	100000.00
13770.0	.0	213770.0	.0	.0	18378.9	.0	287.2	16.4	1170.00
.02	.00	11.63	.00	.000	.035	.000	.000	1147.70	1595.00
.001725	355.	320.	205.	2	14	0	.00	1064.66	2659.66

SECNO 229.000

ENCROACHMENT STATIONS= 1745.0 2715.0 TYPE= 1 TARGET= 970.000

229.000	21.42	1169.47	1161.26	1169.47	1171.76	2.29	.73	.09	100000.00
213586.5	.0	213586.5	.0	.0	17605.6	.0	444.2	25.0	1170.00
.02	.00	12.13	.00	.000	.040	.000	.000	1148.05	1745.00
.002123	350.	380.	420.	2	14	0	.00	909.47	2654.47

NO 230.000

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SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


3301 HV CHANGED MORE THAN HVINS


470 ENCROACHMENT STATIONS=     1615.0    2570.0  TYPE=      1  TARGET=      955.000
  230.000     21.55   1169.98   1163.63   1169.98   1173.19      3.21       .97       .46 100000.00
 13586.5        .0  213586.5       .0       .0   14863.4        .0     584.0      32.4   1172.00
     .03       .00     14.37       .00      .000      .040      .000      .000   1148.43   1615.00
 .003132      310.      375.      410.         2        15         0       .00    794.75   2409.75


CHV=     .100 CEHV=     .300
*SECNO 231.000

470 ENCROACHMENT STATIONS=     2020.0    2945.0  TYPE=      1  TARGET=      925.000
  231.000     22.11   1170.94   1165.16   1170.94   1174.63      3.68      1.30       .14   1178.00
 13586.5        .0  213586.5       .0       .0   13865.8        .0     715.9      39.3   1172.00
     .04       .00     15.40       .00      .000      .040      .000      .000   1148.83   2035.68
 .003358      350.      400.      460.         2        15         0       .00    719.04   2754.72


SECNO 232.000

0 ENCROACHMENT STATIONS=     2050.0    2970.0  TYPE=      1  TARGET=      920.000
 232.000     23.23   1172.48   1166.31   1172.48   1176.00      3.52      1.36       .02   1176.00
213586.5        .0  213202.2     384.4       .0   14151.8     182.9     851.9      47.0   1170.00
     .05       .00     15.07      2.10      .000      .040      .050      .000   1149.25   2083.81
 .003107      340.      420.      470.         3        15         0       .00    860.04   2943.85


NO 233.000

3301 HV CHANGED MORE THAN HVINS


470 ENCROACHMENT STATIONS=     2085.0    4575.0  TYPE=      1  TARGET=    -2085.000
ENCL=   1176.00  ELENCR= 100000.00
 33.000     24.83   1174.46   1165.91   1174.46   1177.05      2.59       .95       .09   1176.00
214816.5        .0  207145.1    7671.4       .0   15767.8    2275.2     995.0      57.2   1170.00
     .06       .00     13.14      3.37      .000      .040      .050      .000   1149.63   2085.00
 .002064      390.      385.      385.         3        16         0       .00   1450.00   3535.00
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SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

CNO 234.000

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .68

3470 ENCROACHMENT STATIONS=     2215.0    4750.0  TYPE=      1  TARGET=    -2215.000
ENCL=   1176.00  ELENCR= 100000.00
234.000     24.13   1174.16   1171.19   1174.16   1178.91      4.75      1.22       .65   1176.00
214816.5       .0  207109.0    7707.5       .0   11641.7    1473.5    1138.1      69.5   1168.00
   .06       .00     17.79      5.23      .000      .040      .050      .000   1150.03   2233.53
004488      400.      400.      400.         2         9         0       .00   1234.29   3467.82

*SECNO 235.000

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.97

3470 ENCROACHMENT STATIONS=     1890.0    3620.0  TYPE=      1  TARGET=     1730.000
235.000     28.02   1178.45   1167.64   1178.45   1179.97      1.52       .74       .32   1182.00
5000.0       .0  197968.1   17031.9       .0   19268.8    4790.2    1308.7      83.1   1168.00
   .07       .00     10.27      3.56      .000      .040      .050      .000   1150.43   1892.96
.001163     400.      400.      400.         3        15         0       .00   1727.04   3620.00

SECNO 236.000

3470 ENCROACHMENT STATIONS=     1880.0    3640.0  TYPE=      1  TARGET=     1760.000
236.000     28.36   1179.19   1165.67   1179.19   1180.39      1.20       .39       .03   1180.00
215000.0       .0  202755.1   12244.9       .0   22444.4    4125.4    1541.2      99.1   1170.00
   .09       .00      9.03      2.97      .000      .040      .050      .000   1150.83   1881.19
000822      400.      400.      400.         2        11         0       .00   1758.81   3640.00

NO 237.000

3470 ENCROACHMENT STATIONS=     1920.0    3690.0  TYPE=      1  TARGET=     1770.000
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 SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
 Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
 TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
 SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

 237.000     28.32   1179.54   1166.17   1179.54   1180.71      1.18       .32       .00 100000.00
215000.0       .0  205124.3    9875.7       .0   23088.0    3121.3    1777.5     113.4   1170.00
     .10      .00      8.88      3.16      .000      .040      .050      .000   1151.22   1920.00
.000823     390.      390.      390.         2        11         0       .00   1420.77   3340.77

CNO 238.000

470 ENCROACHMENT STATIONS=     2130.0    3775.0  TYPE=      1  TARGET=     1645.000
 238.000     28.38   1180.10   1164.03   1180.10   1181.07       .97       .34       .02 100000.00
15000.0       .0  207670.7    7329.3       .0   25839.7    2727.3    2089.8     130.0   1170.00
     .12      .00      8.04      2.69      .000      .040      .050      .000   1151.72   2130.00
.000575     550.      500.      470.         2        14         0       .00   1532.22   3662.22

*SECNO 239.000

0 ENCROACHMENT STATIONS=     2035.0    3585.0  TYPE=      1  TARGET=     1550.000
 239.000     28.04   1180.22   1167.26   1180.22   1181.51      1.29       .34       .10 100000.00
220000.0       .0  214280.5    5719.5       .0   23186.6    2098.0    2374.7     146.0   1172.00
     .13      .00      9.24      2.73      .000      .040      .050      .000   1152.18   2035.00
.000924     455.      460.      470.         2        11         0       .00   1477.73   3512.73

CNO 240.000

0 ENCROACHMENT STATIONS=     5015.0    6510.0  TYPE=      1  TARGET=     1495.000
240.000     28.18   1180.84   1167.22   1180.84   1181.94      1.10       .40       .02   1206.00
220000.0       .0  210220.0    9780.0       .0   24507.5    3058.1    2659.4     160.9   1170.00
     .15      .00      8.58      3.20      .000      .040      .050      .000   1152.66   5053.75
000775     580.      480.      370.         2        11         0       .00   1438.80   6492.54

NO 241.000

470 ENCROACHMENT STATIONS=     4935.0    6725.0  TYPE=      1  TARGET=     1790.000
41.000     28.41   1181.57   1166.97   1181.57   1182.29       .72       .32       .04   1184.00
0000.0       .0  212696.2    7303.8       .0   30715.7    2919.2    3007.2     178.8   1172.00
     .17      .00      6.92      2.50      .000      .040      .050      .000   1153.16   4944.13
000536     540.      500.      450.         2        11         0       .00   1779.79   6723.91
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 SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
 Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
 TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
 SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

ECNO 242.000

3470 ENCROACHMENT STATIONS=     4910.0    6975.0  TYPE=      1  TARGET=     2065.000
 242.000     28.37   1182.04   1165.94   1182.04   1182.52       .48       .21       .02   1184.00
220000.0        .0  213354.8    6645.2        .0   37808.1    3363.7    3434.7     200.2   1172.00
     .19       .00      5.64      1.98      .000      .040      .050      .000   1153.67   4914.91
 .000334      510.      505.      420.         2        18         0       .00   2060.09   6975.00

*SECNO 243.000

470 ENCROACHMENT STATIONS=     4885.0    7125.0  TYPE=      1  TARGET=     2240.000
 243.000     28.19   1182.35   1164.11   1182.35   1182.66       .30       .12       .02   1234.00
20000.0        .0  216629.3    3370.7        .0   48639.6    2076.1    3952.1     224.4   1170.00
     .22       .00      4.45      1.62      .000      .040      .050      .000   1154.16   4891.17
 .000196      500.      490.      500.         2        22         0       .00   2231.77   7122.94

**SECNO 244.000

0 ENCROACHMENT STATIONS=     4875.0    7405.0  TYPE=      1  TARGET=     2530.000
 244.000     27.77   1182.46   1166.74   1182.46   1182.80       .34       .13       .01   1184.00
220000.0        .0  180602.6   39397.4        .0   36730.0   12318.5    4567.3     253.8   1174.00
     .25       .00      4.92      3.20      .000      .040      .050      .000   1154.69   4877.89
 .000284      495.      535.      550.         2        15         0       .00   2521.21   7399.10

CNO 245.000

3470 ENCROACHMENT STATIONS=     4830.0    7855.0  TYPE=      1  TARGET=     3025.000
 245.000     27.34   1182.58   1169.63   1182.58   1183.02       .44       .19       .03   1184.00
220000.0        .0  200090.4   19909.6        .0   36136.1    7611.4    5116.5     284.3   1178.00
     .28       .00      5.54      2.62      .000      .040      .050      .000   1155.24   4837.12
 .000433      550.      550.      390.         2        11         0       .00   2855.93   7693.05

*SECNO 246.000

*65 DIVIDED FLOW

 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .39
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SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


3470 ENCROACHMENT STATIONS=     4970.0    6085.0  TYPE=      1  TARGET=     1115.000
  246.000     26.99   1182.83   1172.07   1182.83   1183.36       .52       .32       .02   1234.00
 02590.0        .0  102590.0        .0        .0   17660.3        .0    5526.3     309.9 100000.00
     .31       .00      5.81       .00      .000      .040      .000      .000   1155.84   4978.74
 .000632      410.      600.      450.         2        14         0       .00   1098.97   6085.00


*SECNO 247.000

  0 ENCROACHMENT STATIONS=     5020.0    5825.0  TYPE=      1  TARGET=      805.000
  247.000     26.62   1182.96   1171.84   1182.96   1183.86       .90       .39       .11   1240.00
 103513.6        .0  103513.6        .0        .0   13629.7        .0    5704.1     320.6 100000.00
     .33       .00      7.59       .00      .000      .040      .000      .000   1156.34   5030.55
 .000946      420.      495.      560.         2        11         0       .00    786.68   5817.24


CNO 248.000

3 1 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .42


3470 ENCROACHMENT STATIONS=     5010.0    5600.0  TYPE=      1  TARGET=      590.000
  248.000     25.76   1182.71   1180.60   1182.71   1185.96      3.25      1.39       .71   1232.00
 03513.6        .0  103513.6        .0        .0    7150.3        .0    5850.8     330.3 100000.00
     .34       .00     14.48       .00      .000      .040      .000      .000   1156.95   5010.00
 005414      610.      615.      550.         2        10         0       .00    581.79   5591.79


*SECNO 249.000

  HV CHANGED MORE THAN HVINS


  ENCROACHMENT STATIONS=     4980.0    5580.0  TYPE=      1  TARGET=      600.000
 249.000     28.29   1185.74   1181.29   1185.74   1188.02      2.28      1.96       .10   1234.00
103513.6        .0  103513.6        .0        .0    8546.5        .0    5940.0     337.0 100000.00
     .35       .00     12.11       .00      .000      .040      .000      .000   1157.45   4980.00
 .003120      470.      495.      500.         3        10         0       .00    598.90   5578.90
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 SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
 Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
 TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
 SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

ECNO 250.000

3470 ENCROACHMENT STATIONS=     4910.0    5540.0  TYPE=      1  TARGET=      630.000
 250.000     29.48   1187.48   1183.52   1187.48   1189.87      2.39      1.82       .03   1240.00
106219.9        .0  106219.9        .0        .0    8558.7        .0    6048.9     344.8 100000.00
     .36       .00     12.41       .00      .000      .040      .000      .000   1158.00   4917.55
.003439      720.      555.      440.         2        10         0       .00    622.45   5540.00

ECNO 251.000

3301 HV CHANGED MORE THAN HVINS

470 ENCROACHMENT STATIONS=     4820.0    5320.0  TYPE=      1  TARGET=      500.000
 251.000     30.08   1188.68   1187.11   1188.68   1193.47      4.79      2.88       .72   1194.00
114188.1        .0  114188.1        .0        .0    6501.2        .0    6152.7     352.2 100000.00
     .37       .00     17.56       .00      .000      .040      .000      .000   1158.60   4861.31
.006711      680.      600.      410.         2        10         0       .00    458.68   5320.00

SECNO 252.000
3280 CROSS SECTION    252.00 EXTENDED      3.26 FEET

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.83

470 ENCROACHMENT STATIONS=     4945.0    5580.0  TYPE=      1  TARGET=      635.000
 252.000     29.26   1193.26   1187.00   1193.26   1195.49      2.24      1.77       .26   1192.00
127837.0        .0  127837.0        .0        .0   10649.2        .0    6248.1     358.3 100000.00
     .39       .00     12.00       .00      .000      .040      .000      .000   1164.00   4945.00
.002502      550.      485.      190.         2        19         0       .00    635.00   5580.00

SECNO 253.000
3280 CROSS SECTION    253.00 EXTENDED      5.64 FEET
```

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.00

70 ENCROACHMENT STATIONS= 5000.0 6070.0 TYPE= 1 TARGET= 1070.000

253.000	25.65	1195.65	1184.29	1195.65	1196.29	.64	.64	.16	1240.00
27837.0	.0	127837.0	.0	.0	19880.7	.0	6470.7	370.7	100000.00
.41	.00	6.43	.00	.000	.040	.000	.000	1170.00	5000.00
.000627	495.	635.	550.	2	11	0	.00	1070.00	6070.00

TW SECNO 251 TO 252

ASQ	QCOMP	ERRAC	TASQ	TCQ	TABER	NITER	DSWS	USWS	DSSNO	USSNO
13648.88	13661.77	.09	13648.88	13661.77	.09	7	1188.681	1193.256	251.000	252.000

TW SECNO 250 TO 251

ASQ	QCOMP	ERRAC	TASQ	TCQ	TABER	NITER	DSWS	USWS	DSSNO	USSNO
7968.24	7966.61	.02	21617.13	21628.38	.05	7	1187.477	1188.681	250.000	251.000

TW SECNO 249 TO 250

ASQ	QCOMP	ERRAC	TASQ	TCQ	TABER	NITER	DSWS	USWS	DSSNO	USSNO
2706.27	2703.52	.10	24323.39	24331.90	.03	7	1185.739	1187.477	249.000	250.000

TW SECNO 248 TO 249

ASQ	QCOMP	ERRAC	TASQ	TCQ	TABER	NITER	DSWS	USWS	DSSNO	USSNO
.00	.00	.00	24323.39	24331.90	.03	7	1182.706	1185.739	248.000	249.000

TW SECNO 247 TO 248

ASQ	QCOMP	ERRAC	TASQ	TCQ	TABER	NITER	DSWS	USWS	DSSNO	USSNO
.00	.00	.00	24323.39	24331.90	.03	7	1182.965	1182.706	247.000	248.000

TW SECNO 246 TO 247

ASQ	QCOMP	ERRAC	TASQ	TCQ	TABER	NITER	DSWS	USWS	DSSNO	USSNO
923.64	923.74	.01	25247.03	25255.64	.03	7	1182.834	1182.965	246.000	247.000

IN SECNO 234 TO 235

TOTAL AREA	AVG VELOCITY	MAX DEPTH	AVG DEPTH	TOF WIDTH	TOP WIDTH
189.1	.97	1.95	.98	390.0	193.6

ASQ	QCOMP	ERRAC	TASQ	TCQ	TABER	NITER	DSWS	USWS	DSSNO	USSNO
183.47	183.47	.00	25430.50	25439.12	.03	7	1174.159	1178.449	234.000	235.000

THIS RUN EXECUTED 28OCT92 15:08:37

****
HEC-2 WATER SURFACE PROFILES

rsion 4.6.2; May 1991
****

IOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

XTST.DAT 100-YEAR

S MARY PRINTOUT

SECNO	CWSEL	VLOB	VCH	VROB	QLOB	QCH	QROB	Q	TOPWID	SSTA	ENDST
120.500	1166.51	6.03	11.88	.00	1625.21	212144.80	.00	213770.00	1073.40	396.86	1470.25
122.000	1166.71	6.19	12.15	.00	1681.13	212088.90	.00	213770.00	1050.67	394.71	1445.38
122.650	1166.82	6.23	12.18	.00	1708.09	212061.90	.00	213770.00	1050.95	394.57	1445.52
123.550	1168.41	5.67	10.99	.00	1655.19	212114.80	.00	213770.00	1059.75	396.09	1455.84
124.000	1168.46	5.90	11.02	.00	2053.15	211716.80	.00	213770.00	1069.98	385.04	1455.02
228.000	1168.84	.00	11.63	.00	.00	213770.00	.00	213770.00	1064.66	1595.00	2659.66
229.000	1169.47	.00	12.13	.00	.00	213586.50	.00	213586.50	909.47	1745.00	2654.47
230.000	1169.98	.00	14.37	.00	.00	213586.50	.00	213586.50	794.75	1615.00	2409.75
231.000	1170.94	.00	15.40	.00	.00	213586.50	.00	213586.50	719.04	2035.68	2754.72
232.000	1172.48	.00	15.07	2.10	.00	213202.20	384.36	213586.50	860.04	2083.81	2943.85
233.000	1174.46	.00	13.14	3.37	.00	207145.10	7671.42	214816.50	1450.00	2085.00	3535.00
* 234.000	1174.16	.00	17.79	5.23	.00	207109.00	7707.54	214816.50	1234.29	2233.53	3467.82
235.000	1178.45	.00	10.27	3.56	.00	197968.10	17031.90	215000.00	1727.04	1892.96	3620.00
236.000	1179.19	.00	9.03	2.97	.00	202755.10	12244.89	215000.00	1758.81	1881.19	3640.00
237.000	1179.54	.00	8.88	3.16	.00	205124.30	9875.74	215000.00	1420.77	1920.00	3340.77
238.000	1180.10	.00	8.04	2.69	.00	207670.70	7329.31	215000.00	1532.22	2130.00	3662.22
239.000	1180.22	.00	9.24	2.73	.00	214280.50	5719.52	220000.00	1477.73	2035.00	3512.73

SECNO	CWSEL	VLOB	VCH	VROB	QLOB	QCH	QROB	Q	TOPWID	SSTA	ENDST
240.000	1180.84	.00	8.58	3.20	.00	210220.00	9780.04	220000.00	1438.80	5053.75	6492.54
241.000	1181.57	.00	6.92	2.50	.00	212696.20	7303.82	220000.00	1779.79	4944.13	6723.91
242.000	1182.04	.00	5.64	1.98	.00	213354.80	6645.24	220000.00	2060.09	4914.91	6975.00
243.000	1182.35	.00	4.45	1.62	.00	216629.30	3370.69	220000.00	2231.77	4891.17	7122.94
244.000	1182.46	.00	4.92	3.20	.00	180602.60	39397.45	220000.00	2521.21	4877.89	7399.10
245.000	1182.58	.00	5.54	2.62	.00	200090.40	19909.59	220000.00	2855.93	4837.12	7693.05
246.000	1182.83	.00	5.81	.00	.00	102590.00	.00	102590.00	1098.97	4978.74	6085.00
247.000	1182.96	.00	7.59	.00	.00	103513.60	.00	103513.60	786.68	5030.55	5817.24
* 248.000	1182.71	.00	14.48	.00	.00	103513.60	.00	103513.60	581.79	5010.00	5591.79
249.000	1185.74	.00	12.11	.00	.00	103513.60	.00	103513.60	598.90	4980.00	5578.90
250.000	1187.48	.00	12.41	.00	.00	106219.90	.00	106219.90	622.45	4917.55	5540.00
251.000	1188.68	.00	17.56	.00	.00	114188.10	.00	114188.10	458.68	4861.31	5320.00
252.000	1193.26	.00	12.00	.00	.00	127837.00	.00	127837.00	635.00	4945.00	5580.00
* 253.000	1195.65	.00	6.43	.00	.00	127837.00	.00	127837.00	1070.00	5000.00	6070.00

ISTING.DAT 100-YEAR

MMARY PRINTOUT

SECNO	CWSEL	CRIWS	EG	ELMIN	DEPTH	10*KS	K*CHSL	XLCH	SHEAR	FRCH
120.500	1166.51	1160.02	1168.69	1147.00	19.51	17.48	.00	.00	1.90	.50
122.000	1166.71	1160.40	1168.99	1147.20	19.51	18.25	1.32	152.00	1.98	.51
122.650	1166.82	1160.55	1169.11	1147.20	19.62	18.41	.00	65.00	1.99	.52
123.550	1168.41	.00	1170.27	1147.31	21.10	13.32	1.22	90.00	1.58	.44
124.000	1168.46	1160.51	1170.34	1147.40	21.06	13.48	2.00	45.00	1.59	.45
228.000	1168.84	1161.40	1170.94	1147.70	21.14	17.25	.94	320.00	1.86	.49
229.000	1169.47	1161.26	1171.76	1148.05	21.42	21.23	.92	380.00	2.56	.49
230.000	1169.98	1163.63	1173.19	1148.43	21.55	31.32	1.01	375.00	3.65	.59
231.000	1170.94	1165.16	1174.63	1148.83	22.11	33.58	1.00	400.00	4.04	.62
232.000	1172.48	1166.31	1176.00	1149.25	23.23	31.07	1.00	420.00	3.83	.60
233.000	1174.46	1165.91	1177.05	1149.63	24.83	20.64	.99	385.00	2.90	.49
234.000	1174.16	1171.19	1178.91	1150.03	24.13	44.88	1.00	400.00	5.42	.71
* 235.000	1178.45	1167.64	1179.97	1150.43	28.02	11.63	1.00	400.00	1.69	.38
236.000	1179.19	1165.67	1180.39	1150.83	28.36	8.22	1.00	400.00	1.28	.32
237.000	1179.54	1166.17	1180.71	1151.22	28.32	8.23	1.00	390.00	1.28	.31
238.000	1180.10	1164.03	1181.07	1151.72	28.38	5.75	1.00	500.00	1.00	.27
239.000	1180.22	1167.26	1181.51	1152.18	28.04	9.24	1.00	460.00	1.39	.33
240.000	1180.84	1167.22	1181.94	1152.66	28.18	7.75	1.00	480.00	1.17	.31
241.000	1181.57	1166.97	1182.29	1153.16	28.41	5.36	1.00	500.00	.77	.25
242.000	1182.04	1165.94	1182.52	1153.67	28.37	3.34	1.01	505.00	.50	.20
243.000	1182.35	1164.11	1182.66	1154.16	28.19	1.96	1.00	490.00	.31	.16
244.000	1182.46	1166.74	1182.80	1154.69	27.77	2.84	.99	535.00	.39	.18
245.000	1182.58	1169.63	1183.02	1155.24	27.34	4.33	1.00	550.00	.52	.22
246.000	1182.83	1172.07	1183.36	1155.84	26.99	6.32	1.00	600.00	.63	.26

	SECNO	CWSEL	CRIWS	EG	ELMIN	DEPTH	10*KS	K*CHSL	XLCH	SHEAR	FRCH
	247.000	1182.96	1171.84	1183.86	1156.34	26.62	9.46	1.01	495.00	1.02	.32
*	248.000	1182.71	1180.60	1185.96	1156.95	25.76	54.14	.99	615.00	4.15	.73
	249.000	1185.74	1181.29	1188.02	1157.45	28.29	31.20	1.01	495.00	2.78	.57
	250.000	1187.48	1183.52	1189.87	1158.00	29.48	34.39	.99	555.00	2.95	.59
	251.000	1188.68	1187.11	1193.47	1158.60	30.08	67.11	1.00	600.00	5.94	.82
	252.000	1193.26	1187.00	1195.49	1164.00	29.26	25.02	11.13	485.00	2.62	.52
*	253.000	1195.65	1184.29	1196.29	1170.00	25.65	6.27	9.45	635.00	.73	.26

SUMMARY OF ERRORS AND SPECIAL NOTES

UTION SECNO=	123.550	PROFILE=	1	HYDRAULIC JUMP D.S.
WARNING SECNO=	234.000	PROFILE=	1	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
RNING SECNO=	235.000	PROFILE=	1	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=	246.000	PROFILE=	1	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
RNING SECNO=	248.000	PROFILE=	1	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
RNING SECNO=	252.000	PROFILE=	1	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=	253.000	PROFILE=	1	CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

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*****************************************
*  HEC-2 WATER SURFACE PROFILES          *
*                                        *
   Version   4.6.2;  May 1991            *
                                         *
*  RUN DATE    28OCT92    TIME   14:24:11 *
*****************************************
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****************************************
*  U.S. ARMY CORPS OF ENGINEERS        *
*  HYDROLOGIC ENGINEERING CENTER       *
*  609 SECOND STREET, SUITE D          *
*  DAVIS, CALIFORNIA 95616-4687        *
*          (916) 756-1104              *
****************************************
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X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
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Job # PAZ-PBQD-02
EAST PAPAGO FWY & RED MTN. TRAFFIC INTERCHANGE

100-YEAR FLOW - DESIGN CONDITIONS

THIS RUN EXECUTED 28OCT92 14:24:11

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**********************************
HEC-2 WATER SURFACE PROFILES

rsion  4.6.2;  May 1991
**********************************


IT FLOW BEING PERFORMED


     SPLIT FLOW ANALYSIS -- EAST PAPAGO FWY & RED MT. T.I.


     SECNO 251 TO 252
   2     251     252     245     2.7
2795    1186    3240    1186

     SECNO 250 TO 251
   2     250     251     245     2.7
2250    1184    2795    1186

     SECNO 249 TO 250
   2     249     250     245     2.7
1835    1186    2250    1184

     SECNO 248 TO 249
   2     248     249     245     2.7
1325    1186    1835    1186

     SECNO 247 TO 248
   2     247     248     245     2.7
 690    1184    1325    1186

     SECNO 246 TO 247
   3     246     247     245     2.7
   0    1180     250    1184     690    1184

     SECNO 234 TO 235
   3     234     235     228   0.050  0.0010
 900    1176    1245    1176    1290    1182

     SECNO 233 TO 234
   2     233     234     228   0.050  0.0012
 485    1176     900    1176

     SECNO 232 TO 233
   2     232     233     228   0.050  0.0015
   0    1176     485    1176
```

LAST REVISED: 7-12-92

T1 SIMONS, LI & ASSOCIATES, INC. (PAZ-DMJM-03.24)
SALT RIVER HEC-2 ANALYSIS (SECTIONS 121.0 - 253.0)
10YRBANK.DAT 100-YEAR DISCHARGE (CAWCS HYDROLOGY)

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	2	0	0	4	0	0	213630	1166	0

**********RATING CURVE DATA**********

93000	1157.45	135000	1161.02	160000	1162.90	215000	1166.59

NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
-1	0	-1	0	0	0	-1	0	0	0

J3 VARIABLE CODES FOR SUMMARY PRINTOUT

38	1	55	26	56	13	14	15	43	4
53	54	0	38	1	2	3	42	8	5
33	39	67	68						

J6	IHLEQ	ICOPY	SUBDIV	STRTDS	RMILE
	1				

	.035	.035	.035	0.1	0.3					
	120.50	9	443.5	1485.0	.0	.0	.0			
GR	1171.5	367.0	1171.46	382.0	1158.96	419.5	1158.72	443.5	1150.00	469.7
GR	1147.0	926.5	1150.00	1420.7	1171.42	1485.0	1171.42	1500.0		
	122.00	9	441.5	1460.0	155.0	150.0	152.0			
GR	1171.6	365.0	1171.61	380.0	1159.11	417.5	1158.87	441.5	1150.16	467.6
	1147.2	941.0	1150.15	1395.7	1171.58	1460.0	1171.58	1475.0		
NC	.035	.035	.035	0.3	0.5					
	122.65	9	441.5	1460.0	65.0	65.0	65.0			
	10.							.00	.00	
GR	1171.7	365.0	1171.68	380.0	1159.18	417.5	1158.94	441.5	1150.22	490.3
GR	1147.2	952.0	1150.22	1395.7	1171.65	1460.0	1171.65	1475.0		

S[redacted]	1.050	1.56	3.00	.00	790.00	193.00	27088.00	6.500	1147.31	1147.20
X[redacted]	123.55	20	441.5	1460.0	90.0	90.0	90.0			
X2	0.	.00	1.	1180.61	1181.80	.00		.000		.000
X3	10.							.00	.00	
B[redacted]	-11	316.0	1181.80	1174.13	436.0	1184.23	1176.56	554.0	1185.93	1178.26
B[redacted]	0	672.0	1187.37	1179.70	790.0	1188.15	1180.48	908.0	1188.28	1180.61
BT	0	1026.0	1188.15	1180.48	1144.0	1187.37	1179.70	1262.0	1185.93	1178.26
B[redacted]	0	1380.0	1184.23	1176.56	1500.0	1181.80	1174.13			
[redacted]	1174.1	316.0	1171.77	371.0	1171.77	386.0	1159.27	423.5	1159.10	436.0
[redacted]R	1159.0	441.5	1150.31	500.1	1149.97	554.0	1149.22	672.0	1148.48	790.0
GR	1147.7	908.0	1147.31	975.0	1147.64	1026.0	1148.42	1144.0	1149.19	1262.0
[redacted]	1150.0	1380.0	1150.31	1433.3	1171.75	1460.0	1171.75	1475.0	1174.13	1500.0
X1	124.00	9	436.5	1465.0	45.0	45.0	45.0			
G[redacted]	1171.8	360.0	1171.81	375.0	1159.31	412.5	1159.07	436.5	1150.36	464.2
[redacted]	1147.4	983.0	1150.35	1400.7	1171.79	1465.0	1171.79	1480.0		
N[redacted]	0.050	0.050								
[redacted]		7.1	9.1				1595	2765	1755	2765
[redacted]T	228.0	27	1581	2602	355	205	320			
X4	4	1147.7	2423.8	1180.0	2423.9	1180.0	2475.9	1147.7	2476.0	
[redacted]	1174.0	0	1174.0	670	1170.8	690	1170.8	1290	1170.0	1330
[redacted]	1170.0	1415	1150.0	1510	1172.4	1566.0	1172.1	1581.0	1147.7	1605.4
[redacted]GR	1147.7	2577.7	1172.1	2602.0	1172.4	2617.0	1172.7	2680	1178.0	2765
G[redacted]	1170.0	2780	1166.0	2785	1166.0	3035	1170.0	3055	1172.0	3085
[redacted]	1174.0	3265	1172.0	3375	1170.0	3400	1170.0	3425	1172.0	3600
[redacted]R	1176.0	3815	1178.0	4735						
[redacted]		7.1	9.1				1745	2715	1840	2715
[redacted]T	229.0	29	1674	2695	350	420	380			
X4	4	1148.1	2392.0	1180.0	2392.1	1180.0	2445.9	1148.1	2446.0	
[redacted]	1175.0	0	1175.0	540	1174.0	640	1172.0	660	1171.0	700
[redacted]	1171.0	1290	1170.0	1310	1170.0	1375	1160.0	1510	1160.0	1510
[redacted]GR	1150.0	1630	1172.8	1659.0	1172.5	1674.0	1148.1	1698.5	1148.1	2670.5
G[redacted]	1172.5	2695.0	1172.8	2710.0	1184.0	2715	1180.0	2735	1170.0	2755
[redacted]	1170.0	2995	1166.0	3005	1166.0	3055	1168.0	3235	1170.0	3255
[redacted]R	1170.0	3475	1172.0	3645	1176.0	4115	1178.0	4605		
[redacted]		7.1	9.1				1615	2570	1703	2570
[redacted]T	230.0	32	1555	2375.3	310	410	375			
X4	4	1148.4	2102.0	1180.0	2102.1	1180.0	2155.9	1148.4	2156.0	
G[redacted]	1174.0	0	1172.0	335	1172.0	930	1173.0	1020	1172.0	1080
[redacted]	1170.0	1090	1160.0	1385	1150.0	1455	1172.6	1540.0	1172.3	1555.0
[redacted]R	1148.4	1578.9	1148.4	2361.1	1162.6	2375.3	1162.9	2390.3	1170.0	2410
G[redacted]	1172.0	2415	1174.0	2570	1172.0	2690	1170.0	2715	1168.4	2805
[redacted]	1168.0	2925	1168.0	2960	1170.0	3055	1170.6	3160	1170.0	3255
[redacted]R	1169.4	3325	1170.0	3415	1172.0	3450	1174.0	3475	1174.0	3560
GR	1174.0	3950	1176.0	3995						

NC				0.1	0.3					
	231.0	24	2118.0	2674.5	350	460	400			
X3	10					2945				
X4	4	1148.8	2402.0	1180.0	2402.1	1180.0	2455.9	1148.8	2456.0	
	1176.0	570.0	1176.0	1815.0	1178.0	1855.0	1178.0	2020.0	1163.5	2103.0
	1163.2	2118.0	1148.8	2132.4	1148.8	2660.1	1163.2	2674.5	1163.5	2689.5
GR	1170.0	2750.0	1172.0	2760.0	1174.0	2910.0	1174.0	2945.0	1172.0	3100.0
	1169.0	3375.0	1170.0	3430.0	1170.1	3490.0	1170.0	3590.0	1170.0	3740.0
	1174.0	3775.0	1174.0	3940.0	1176.0	4420.0	1178.0	4435.0		
X1	232.0	24	2128.0	2666.5	340	470	420			
	10			2050		2970				
	4	1149.2	2402.0	1180.0	2402.1	1180.0	2455.9	1149.2	2456.0	
GR	1178.0	660.0	1178.0	1340.0	1176.0	1490.0	1178.0	1740.0	1176.0	1960.0
	1176.0	2050.0	1174.0	2080.0	1170.0	2090.0	1165.4	2113.0	1165.1	2128.0
	1149.2	2143.9	1149.2	2650.6	1165.1	2666.5	1165.4	2681.5	1170.0	2800.0
GR	1172.0	2920.0	1173.0	2970.0	1172.0	3020.0	1171.8	3210.0	1170.0	3380.0
GR	1170.0	3500.0	1174.0	3520.0	1176.0	4420.0	1178.0	4510.0		
	2	215000	93000							
X1	233.0	23	2069.0	2653.5	390	385	385			
	10			1755		3620				
	4	1149.6	2387.0	1180.0	2387.1	1180.0	2440.9	1149.6	2441.0	
GR	1180.0	760.0	1180.0	1300.0	1178.0	1370.0	1176.0	1755.0	1174.0	1870.0
	1170.0	1880.0	1167.3	1930.0	1167.2	2054.0	1166.9	2069.0	1149.6	2086.4
	1149.6	2636.1	1166.9	2653.5	1167.2	2668.5	1170.0	2785.0	1170.0	2960.0
GR	1170.0	3190.0	1172.0	3260.0	1172.0	3260.0	1174.0	3370.0	1174.0	3510.0
GR	1176.0	3620.0	1178.0	4550.0	1180.0	4575.0				
	234.0	20	2045.3	2701.7	400	400	400			
X3	10			1880		3670				
	4	1150.0	2372.0	1180.0	2372.1	1180.0	2425.9	1150.0	2426.0	
	1184.0	1000	1184.0	1065	1182.0	1320	1176.0	1345	1176.0	1995
GR	1182.0	2000	1178.0	2020	1168.5	2030.3	1168.2	2045.3	1150.0	2063.5
	1150.0	2683.5	1168.2	2701.7	1168.5	2716.7	1170.0	3040	1172.0	3125
	1174.0	3215	1174.0	3460	1176.0	3555	1178.0	4015	1180.0	4750
X1	235.0	20	1998.2	2676.8	400	400	400			
	10			1890		3620				
	4	1150.4	2263.8	1182.0	2263.9	1182.0	2315.9	1150.4	2316.0	
GR	1190.0	1230	1186.0	1275	1184.0	1375	1184.0	1605	1188.0	1625
	1188.0	1740	1184.0	1775	1182.0	1890	1170.0	1900	1169.1	1983.2
	1168.8	1998.2	1150.4	2016.6	1150.4	2658.4	1168.8	2676.8	1169.1	2691.8
GR	1170.0	2955	1174.0	3115	1176.0	3480	1178.0	3800	1180.0	4675
	236.0	21	2003.8	2705.2	400	400	400			
	10			1988	1170.8	3440				
X4	4	1150.8	2148.8	1186.0	2148.9	1186.0	2200.9	1150.8	2201.0	
	1198.0	1060.0	1190.0	1190.0	1188.0	1250.0	1187.0	1310.0	1186.0	1840.0
	1180.0	1880.0	1169.6	1988.8	1169.3	2003.8	1150.8	2022.3	1150.8	2686.7
GR	1169.3	2705.2	1169.6	2720.2	1170.0	2780.0	1170.0	2900.0	1172.0	3080.0
	1174.0	3110.0	1176.0	3240.0	1176.0	3410.0	1178.0	3440.0	1179.5	4550.0
	1180.0	4590.0								

```
X1   237.0      20     1939   2789.4     390      390      390
[redacted]    10                                   3350
X4     4    1151.2   2019.8   1188.0   2019.9   1188.0   2097.9   1151.2   2098.0
GR  1198.0  1030.0   1196.0   1085.0   1190.0   1180.0   1190.0   1310.0   1189.0   1350.0
[redacted]  1188.0  1820.0   1186.0   1850.0   1180.9   1924.0   1180.6   1939.0   1151.2   1968.4
[redacted]  1151.2  2770.6   1170.0   2789.4   1170.3   2804.4   1172.0   3000.0   1172.0   3150.0
GR  1174.0  3170.0   1176.0   3270.0   1180.0   3350.0   1180.0   4450.0   1182.0   4650.0

[redacted]   238.0      18     2102   2989.0     550      470      500
X3    10                                   3600
GR  1182.0  1280.0   1182.0   1590.0   1180.0   1620.0   1178.0   1740.0   1178.0   2070.0
[redacted]  1181.8  2087.0   1181.5   2102.0   1151.7   2131.8   1151.7   2970.2   1170.5   2989.0
[redacted]  1170.8  3004.0   1174.0   3240.0   1176.0   3310.0   1178.0   3400.0   1178.0   3490.0
GR  1180.0  3600.0   1181.5   4530.0   1182.0   4575.0

[redacted]     2    220000    95300
X1   239.0      16     2005   2913.9     455      470      460
X3    10                                   3460
[redacted]  1180.0  1410.0   1182.0   1450.0   1182.0   1720.0   1140.0   1785.0   1140.0   1920.0
[redacted]  1182.1  1990.0   1181.8   2005.0   1152.2   2034.6   1152.2   2895.4   1170.7   2913.9
GR  1171.0  2928.9   1172.0   2995.0   1176.0   3260.0   1180.0   3460.0   1182.0   3940.0
[redacted]  1184.0  4350.0
```

SPECIAL BRIDGE ROUTINE FOR RAMPS S-E & S-W

```
[redacted]                          0.3      0.5
X1   240.1       4     5000   5850      580      370      570
[redacted]                          5000                5850
[redacted]  1183.1    5000   1152.75  5030.4   1152.75  5819.7   1183.1   5850

[redacted]    1.05     1.56      2.6      0      790      125    27619        1  1152.78  1152.18
[redacted]   240.2       4     5000   5867       32       32       32
X2                       1     1192   1206
[redacted]                          5000                5867
[redacted]  1183.1    5000   1152.78  5030.3   1152.78  5836.7   1183.1   5867

X1   240.3       4     5000   5925      106      106      106
[redacted]                          5000                5925
[redacted]  1183.3    5000   1152.89  5030.4   1152.89  5894.6   1183.3   5925
```

SPECIAL BRIDGE ROUTINE FOR PIMA FWY. MAINLINE STRUCTURES

```
X1   240.4       4     5000   5984      106      106      106
[redacted]                          5000                5984
[redacted]  1183.4    5000   1152.99  5030.4   1152.99  5953.6   1183.4   5984
```

```
SB    1.05      1.56      2.6       0         900       180       23218     1         1153.08   1152.99
      240.5     4         5000      6020      85        85        85
                          1         1184      1199
X3                                  5000                6020
      1183.5    5000      1153.08   5030.4    1153.08   5989.6    1183.5    6020

X1    240.6     4         5000      6052      58        58        58
X3                                  5000                6052
      1183.6    5000      1153.14   5030.5    1153.14   6021.5    1183.6    6052

      SPECIAL BRIDGE ROUTINE FOR RAMPS W-N & E-N

X1    241.1     4         5000      6084      59        59        59
                                    5000                6084
      1183.6    5000      1153.20   5030.4    1153.20   6053.6    1183.6    6084

SB    1.05      1.56      2.6       0         1025      130       28486     1         1153.23   1153.20
      241.2     4         5000      6100      29        29        29
                          1         1184      1192
X3                                  5000                6100
      1183.7    5000      1153.23   5030.5    1153.23   6069.5    1183.7    6100

X1    242.00    45        5000.0    6480.0    510.0     420.0     440.0
                                    5000                6390
      1184.0    4880.0    1184.00   4910.0    1180.00   4920.0    1184.20   4985.0    1183.90   5000.0
      1153.4    5031.0    1162.00   5105.0    1164.00   5125.0    1162.00   5325.0    1160.00   5450.0
GR    1158.0    5555.0    1153.67   5594.7    1153.67   5610.0    1153.67   5645.0    1153.67   5700.0
      1153.7    5720.0    1153.67   5724.2    1160.00   5740.0    1160.00   5755.0    1153.67   5777.2
      1153.7    5790.0    1153.67   5825.0    1153.67   5843.4    1156.00   5855.0    1153.67   5868.6
GR    1153.7    5890.0    1153.67   6050.0    1153.67   6085.0    1153.67   6165.0    1153.67   6174.7
      1158.0    6200.0    1153.67   6210.8    1153.67   6220.0    1153.67   6250.0    1153.67   6259.2
      1154.0    6260.0    1156.00   6435.0    1160.00   6450.0    1170.00   6470.0    1172.00   6480.0
GR    1174.0    6565.0    1176.00   6705.0    1176.00   6965.0    1180.00   6975.0    1184.00   6980.0

                          0.040     0.1       0.3
      243.00    25        5000.0    6830.0    500.0     500.0     490.0
X3                                  5000                6645
      1184.0    4885.0    1180.00   4900.0    1170.00   4925.0    1164.00   4945.0    1184.80   4985.0
      1184.5    5000.0    1153.73   5031.0    1162.00   5085.0    1160.00   5180.0    1160.00   5520.0
GR    1154.2    5544.3    1154.16   5545.0    1154.16   5630.0    1154.16   5960.0    1154.16   6240.0
      1154.2    6480.0    1154.16   6505.0    1154.16   6660.0    1154.16   6689.1    1160.00   6730.0
      1170.0    6830.0    1176.00   6970.0    1178.00   7100.0    1180.00   7120.0    1184.00   7125.0

X1    244.00    41        5000.0    6535.0    495.0     550.0     535.0
                                    5000                6945
      1184.0    4830.0    1184.00   4875.0    1160.00   4920.0    1160.00   4935.0    1185.10   4985.0
GR    1184.8    5000.0    1154.14   5031.0    1160.00   5045.0    1170.00   5130.0    1170.00   5175.0
      1160.0    5315.0    1160.00   5500.0    1156.00   5745.0    1156.00   5910.0    1154.70   5939.5
      1154.7    6000.0    1154.69   6008.4    1160.00   6025.0    1162.00   6040.0    1162.00   6085.0
GR    1160.0    6105.0    1154.69   6115.6    1154.69   6125.0    1154.69   6230.0    1154.69   6272.2
      1160.0    6320.0    1160.00   6440.0    1170.00   6460.0    1174.00   6535.0    1170.00   6830.0
      1154.7    6856.8    1154.69   6865.0    1154.69   6880.0    1154.69   6960.0    1154.69   6980.0
```

GR	1154.7	6985.9	1170.00	7005.0	1170.00	7330.0	1172.00	7380.0	1180.00	7395.0
GR	1186.0	7405.0								
	245.00	44	4830.0	6710.0	550.0	390.0	550.0			
X3				5000		7215				
	1184.0	4790.0	1184.00	4830.0	1180.00	4850.0	1170.00	4905.0	1165.00	4945.0
	1185.4	4985.0	1185.10	5000.0	1160.00	5035.0	1168.00	5150.0	1168.00	5190.0
GR	1170.0	5200.0	1176.00	5245.0	1176.00	5330.0	1170.00	5335.0	1162.00	5490.0
	1162.0	5560.0	1164.00	5610.0	1168.00	5720.0	1168.00	5785.0	1166.00	5905.0
	1160.0	6030.0	1155.24	6049.0	1155.24	6070.0	1155.24	6115.0	1155.24	6160.0
	1155.2	6191.4	1160.00	6220.0	1155.24	6239.0	1155.24	6260.0	1155.24	6300.0
GR	1155.2	6486.0	1160.00	6655.0	1170.00	6670.0	1176.00	6680.0	1178.00	6710.0
	1178.0	7000.0	1176.00	7065.0	1174.00	7380.0	1170.00	7390.0	1170.00	7520.0
	1172.0	7660.0	1180.00	7685.0	1188.00	7710.0	1190.00	7855.0		
	2	96840	63000							
	246.00	42	5000.0	6950.0	410.0	450.0	600.0			
.3				5000		6085				
GR	1184.0	4970.0	1185.70	4985.0	1185.40	5000.0	1154.99	5031.0	1180.00	5145.0
	1184.0	5160.0	1180.00	5170.0	1170.00	5280.0	1155.84	5294.2	1155.84	5300.0
	1155.8	5338.0	1170.00	5430.0	1166.00	5735.0	1162.00	5825.0	1162.00	5960.0
GR	1164.0	6035.0	1160.00	6150.0	1155.84	6160.4	1155.84	6165.0	1155.84	6210.0
	1155.8	6810.0	1155.84	6819.6	1160.00	6830.0	1162.00	6840.0	1170.00	6940.0
	1176.0	6950.0	1176.00	7150.0	1174.00	7270.0	1174.00	7430.0	1176.00	7470.0
GR	1176.0	7520.0	1172.00	7560.0	1172.00	7760.0	1176.00	7790.0	1176.00	7825.0
	1174.0	7850.0	1172.00	7890.0	1172.00	7945.0	1174.00	8005.0	1180.00	8020.0
	1188.0	8100.0	1190.00	8160.0						
X1	247.00	49	5000.0	5825.0	420.0	560.0	495.0			
				5000		5825				
	1185.9	4985.0	1185.60	5000.0	1155.35	5030.0	1177.00	5073.0	1176.00	5165.0
GR	1170.0	5180.0	1160.00	5220.0	1156.34	5227.3	1156.34	5240.0	1156.34	5265.0
	1156.3	5353.5	1170.00	5495.0	1162.00	5590.0	1162.00	5750.0	1170.00	5780.0
	1180.0	5800.0	1182.00	5810.0	1184.00	5825.0	1186.00	5870.0	1186.00	6070.0
GR	1180.0	6170.0	1160.00	6255.0	1160.00	6310.0	1170.00	6335.0	1180.00	6350.0
	1186.0	6440.0	1186.00	6540.0	1180.00	6555.0	1160.00	6570.0	1160.00	6700.0
	1170.0	6740.0	1160.00	6780.0	1160.00	6900.0	1170.00	6970.0	1180.00	7030.0
	1180.0	7065.0	1178.00	7190.0	1176.00	7270.0	1170.00	7415.0	1176.00	7450.0
GR	1176.0	7570.0	1170.00	7695.0	1170.00	7870.0	1176.00	7885.0	1176.00	8070.0
	1170.0	8080.0	1170.00	8250.0	1180.00	8290.0	1190.00	8330.0		
X1	248.00	51	5000.0	5600.0	610.0	550.0	615.0			
X				5000		5600				
	1186.2	4985.0	1185.90	5000.0	1164.00	5022.0	1174.00	5180.0	1172.00	5215.0
	1170.0	5225.0	1164.00	5260.0	1164.00	5450.0	1170.00	5490.0	1176.00	5535.0
	1178.0	5580.0	1180.00	5585.0	1186.00	5600.0	1180.00	5630.0	1170.00	5700.0
	1160.0	5760.0	1160.00	5790.0	1170.00	5810.0	1180.00	5940.0	1186.00	5950.0
	1186.0	6265.0	1180.00	6280.0	1156.95	6306.9	1156.95	6315.0	1156.95	6340.0
GR	1157.0	6505.0	1156.95	6660.0	1156.95	6670.0	1156.95	6788.2	1170.00	7010.0
	1172.0	7055.0	1170.00	7080.0	1162.00	7100.0	1160.00	7485.0	1160.00	7610.0
	1157.0	7637.4	1156.95	7700.0	1156.95	7795.0	1156.95	7941.0	1160.00	8005.0
GR	1170.0	8015.0	1174.00	8030.0	1174.00	8210.0	1176.00	8250.0	1178.00	8310.0
	1178.0	8410.0	1176.00	8575.0	1180.00	8590.0	1184.00	8610.0	1186.00	8830.0
	1190.0	8855.0								

X1	249.00	49	5000.0	5580.0	470.0	500.0	495.0			
				5000		5580				
	1184.0	4980.0	1186.50	4985.0	1186.20	5000.0	1164.00	5022.0	1164.00	5135.0
GR	1164.0	5210.0	1170.00	5270.0	1172.00	5300.0	1174.00	5420.0	1178.00	5530.0
	1180.0	5555.0	1186.00	5580.0	1188.00	5670.0	1186.00	5700.0	1180.00	5710.0
	1170.0	6010.0	1160.00	6245.0	1160.00	6415.0	1157.45	6421.4	1157.45	6440.0
GR	1157.5	6490.0	1157.45	6660.0	1157.45	6760.0	1157.45	7070.0	1157.45	7140.0
GR	1157.5	7165.0	1157.45	7220.0	1157.45	7300.0	1157.45	7350.0	1157.45	7368.6
	1170.0	7400.0	1178.00	7425.0	1170.00	7485.0	1160.00	7500.0	1157.45	7531.9
	1157.5	7600.0	1157.45	7795.3	1158.00	7815.0	1160.00	8020.0	1170.00	8030.0
GR	1170.0	8055.0	1170.00	8345.0	1180.00	8355.0	1182.00	8365.0	1170.00	8420.0
	1170.0	8530.0	1180.00	8580.0	1188.00	8640.0	1188.00	8755.0		
X1	250.00	37	5000.0	5540.0	720.0	440.0	555.0			
				5000		5540				
	1190.0	4910.0	1180.00	4940.0	1186.70	4985.0	1186.40	5000.0	1166.00	5020.0
GR	1170.0	5120.0	1166.00	5130.0	1166.00	5175.0	1170.00	5240.0	1178.00	5380.0
GR	1180.0	5500.0	1184.00	5540.0	1184.00	5610.0	1180.00	5640.0	1170.00	5810.0
	1158.0	5822.0	1158.00	5830.0	1158.00	5980.0	1158.00	6064.0	1160.00	6085.0
	1170.0	6100.0	1174.00	6110.0	1174.00	6220.0	1170.00	6250.0	1160.00	6320.0
GR	1158.0	6330.0	1158.00	6340.0	1158.00	6410.0	1158.00	6742.5	1160.00	7075.0
	1158.0	7082.0	1158.00	7110.0	1158.00	7500.0	1158.00	7628.0	1160.00	7660.0
	1180.0	7700.0	1190.00	7850.0						
X1	251.00	39	5000.0	5320.0	680.0	410.0	600.0			
				5000		5320				
	1194.0	4590.0	1194.00	4820.0	1192.00	4855.0	1190.00	4860.0	1180.00	4870.0
GR	1168.0	4895.0	1168.00	4947.0	1187.20	4985.0	1186.90	5000.0	1168.00	5019.0
	1172.0	5080.0	1176.00	5095.0	1174.00	5125.0	1180.00	5260.0	1186.00	5320.0
	1188.0	5330.0	1186.00	5560.0	1190.00	5940.0	1190.00	6295.0	1180.00	6310.0
GR	1160.0	6345.0	1158.60	6428.1	1158.60	6820.0	1158.60	6920.0	1158.60	7027.3
	1160.0	7050.0	1164.00	7120.0	1160.00	7145.0	1160.00	7215.0	1158.60	7217.1
	1158.6	7230.0	1158.60	7425.0	1158.60	7437.9	1180.00	7470.0	1182.00	7485.0
GR	1180.0	7610.0	1180.00	7670.0	1186.00	7860.0	1190.00	8080.0		
	252.00	33	5000.0	5580.0	550.0	190.0	485.0			
				5000		5580				
GR	1194.0	4760.0	1192.00	4945.0	1190.00	4950.0	1180.00	4965.0	1187.60	4985.0
	1187.3	5000.0	1170.00	5017.0	1170.00	5045.0	1170.00	5115.0	1174.00	5160.0
	1174.0	5240.0	1176.00	5280.0	1178.00	5310.0	1180.00	5325.0	1178.00	5340.0
GR	1178.0	5360.0	1180.00	5540.0	1186.00	5580.0	1180.00	5605.0	1170.00	5620.0
G	1170.0	5815.0	1180.00	5840.0	1190.00	5855.0	1190.00	6530.0	1170.00	6560.0
	1164.0	6580.0	1164.00	6800.0	1170.00	6820.0	1170.00	7085.0	1180.00	7150.0
GR	1170.0	7370.0	1180.00	7405.0	1190.00	7555.0				
	253.00	25	5000.0	6070.0	495.0	550.0	635.0			
				5000		6070				
GR	1188.2	4985.0	1187.90	5000.0	1176.00	5012.0	1180.00	5070.0	1178.00	5085.0
	1178.0	5155.0	1180.00	5170.0	1182.00	5190.0	1180.00	5230.0	1178.00	5290.0
	1176.0	5300.0	1176.00	5590.0	1180.00	5600.0	1170.00	5795.0	1170.00	5940.0
GR	1180.0	5960.0	1186.00	6050.0	1188.00	6070.0	1180.00	6110.0	1180.00	6260.0
	1176.0	6510.0	1176.00	6740.0	1180.00	6810.0	1190.00	6840.0	1190.00	8320.0

IHLEQ = 1. THEREFORE FRICTION LOSS (HL) IS CALCULATED AS A FUNCTION OF PROFILE TYPE, WHICH CAN VARY FROM REACH TO REACH. SEE DOCUMENTATION FOR DETAILS.

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SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

DF 1

ICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CHV=     .100 CEHV=     .300
*SECNO 120.500
120.500     19.50   1166.50   1160.01   1166.00   1168.68      2.18       .00       .00   1158.72
13630.0    1621.8  212008.2        .0     269.0   17842.7        .0        .0        .0   1171.42
    .00      6.03     11.88       .00      .035      .035      .000      .000   1147.00    396.89
001749        0.        0.        0.         0        19         0       .00   1073.34   1470.22

*SECNO 122.000
122.000     19.50   1166.70   1160.39       .00   1168.98      2.28       .27       .03   1158.87
213630.0    1677.7  211952.3        .0     271.4   17453.6        .0      62.5       3.7   1171.58
    .00      6.18     12.14       .00      .035      .035      .000      .000   1147.20    394.74
001826       155.      152.      150.         0        14         0       .00   1050.62   1445.35

CHV=     .300 CEHV=     .500
SECNO 122.650

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=     1158.94 ELREA=     1171.65

122.650     19.61   1166.81   1160.54       .00   1169.10      2.29       .12       .01   1158.94
213630.0    1704.6  211925.4        .0     273.6   17402.6        .0      89.0       5.3   1171.65
    .00      6.23     12.18       .00      .035      .035      .000      .000   1147.20    394.59
001842        65.       65.       65.         2        19         0       .00   1050.90   1445.49

PECIAL BRIDGE

DOWNSTREAM ELEV IS    1156.26 , NOT    1166.81 HYDRAULIC JUMP OCCURS DOWNSTREAM (IF LOW FLOW CONTROLS)

SB  XK        XKOR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
  1.05      1.56      3.00       .00    790.00    193.00  27088.00      6.50   1147.31   1147.20

SECNO 123.550
CLASS B LOW FLOW

20 BRIDGE W.S.=    1162.22 BRIDGE VELOCITY=     20.56     CALCULATED CHANNEL AREA=     10346.
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

EGPRS	EGLWC	H3	QWEIR	QLOW	BAREA	TRAPEZOID AREA	ELLC	ELTRD	WEIRLN
.00	1170.26	.00	0.	213630.	27088.	27088.	1180.61	1181.80	0.

5 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1159.00 ELREA= 1171.75

123.550	21.09	1168.40	.00	.00	1170.26	1.86	1.16	.00	1159.00
13630.0	1652.3	211977.7	.0	291.6	19288.7	.0	127.4	7.5	1171.75
.01	5.67	10.99	.00	.035	.035	.000	.000	1147.31	396.12
.001332	90.	90.	90.	0	0	0	.00	1059.71	1455.83

*SECNO 124.000

124.000	21.06	1168.46	1160.50	.00	1170.33	1.87	.06	.00	1159.07
13630.0	2049.7	211580.3	.0	347.8	19206.4	.0	147.7	8.6	1171.79
.01	5.89	11.02	.00	.035	.035	.000	.000	1147.40	385.06
.001349	45.	45.	45.	2	14	0	.00	1069.93	1455.00

*SECNO 228.000

5 DIVIDED FLOW

0 ENCROACHMENT STATIONS= 1595.0 2765.0 TYPE= 1 TARGET= 1170.000

228.000	21.29	1168.99	1159.49	1168.99	1170.76	1.78	.41	.03	100000.00
213630.0	.0	213630.0	.0	.0	19980.7	.0	293.0	16.0	1172.10
.02	.00	10.69	.00	.000	.035	.000	.000	1147.70	1595.00
.001198	355.	320.	205.	2	11	0	.00	951.83	2598.90

CNO 229.000

3 5 DIVIDED FLOW

3470 ENCROACHMENT STATIONS= 1745.0 2715.0 TYPE= 1 TARGET= 970.000

229.000	21.26	1169.36	1160.32	1169.36	1171.36	1.99	.49	.11	100000.00
212421.1	.0	212421.1	.0	.0	18760.5	.0	462.0	24.1	1172.50
.03	.00	11.32	.00	.000	.035	.000	.000	1148.10	1745.00
.001361	350.	380.	420.	2	11	0	.00	892.98	2691.85

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 SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
 Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
 TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
 SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

CNO 230.000

5 DIVIDED FLOW

301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS=     1615.0    2570.0  TYPE=      1  TARGET=      955.000
 230.000     21.02   1169.42   1162.61   1169.42   1172.61      3.19       .66       .60 100000.00
12421.1        .0  211745.5     675.6        .0   14747.4     159.0     607.0      31.1   1162.60
    .03       .00     14.36      4.25      .000      .035      .050      .000   1148.40   1615.00
.002252      310.      375.      410.         2        14         0       .00    739.53   2408.39

CCHV=     .100 CEHV=     .300
CNO 231.000

3265 DIVIDED FLOW

301 HV CHANGED MORE THAN HVINS

302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .57

0 ENCROACHMENT STATIONS=         .0    2945.0  TYPE=      1  TARGET=     2944.999
 231.000     18.75   1167.55   1167.12   1167.55   1175.65      8.10      1.57      1.47   1163.20
12421.1     585.4  211134.0     701.7     110.0    9216.2     139.4     719.0      37.2   1163.20
    .04      5.32     22.91      5.03      .050      .035      .050      .000   1148.80   2079.81
.006820      350.      400.      460.         4        11         0       .00    593.52   2727.21

CNO 232.000

5 DIVIDED FLOW

1 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS=     2050.0    2970.0  TYPE=      1  TARGET=      920.000
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST
232.000	23.38	1172.58	1168.19	1172.58	1177.87	5.30	1.94	.28	1165.10
212421.1	1303.1	207017.8	4100.2	230.4	11074.9	885.2	823.7	44.1	1165.10
.04	5.66	18.69	4.63	.050	.035	.050	.000	1149.20	2083.56
.003490	340.	420.	470.	4	5	0	.00	811.41	2948.82

CNO 233.000

3265 DIVIDED FLOW

HV CHANGED MORE THAN HVINS

WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.55

ENCROACHMENT STATIONS= 1755.0 3620.0 TYPE= 1 TARGET= 1865.000

233.000	26.93	1176.53	1167.54	1176.53	1178.96	2.43	.80	.29	1166.90
213799.1	8693.4	186261.6	18844.2	1906.8	13985.4	5004.4	970.0	55.7	1166.90
.05	4.56	13.32	3.77	.050	.035	.050	.000	1149.60	1755.00
.001473	390.	385.	385.	4	11	0	.00	1811.18	3620.00

NO 234.000

DIVIDED FLOW

ENCROACHMENT STATIONS= 1880.0 3670.0 TYPE= 1 TARGET= 1790.000

34.000	27.40	1177.40	1166.23	1177.40	1179.51	2.11	.52	.03	1168.20
4201.8	903.3	196322.5	16975.9	341.4	16180.6	4909.7	1164.4	71.9	1168.20
.06	2.65	12.13	3.46	.050	.035	.050	.000	1150.00	1880.00
001175	400.	400.	400.	2	14	0	.00	1711.71	3670.00

NO 235.000

DIVIDED FLOW

ENCROACHMENT STATIONS= 1890.0 3620.0 TYPE= 1 TARGET= 1730.000

235.000	27.67	1178.07	1166.29	1178.07	1179.98	1.91	.44	.02	1168.80
5000.0	3466.2	196278.3	15255.5	873.0	16997.4	4701.1	1366.4	87.5	1168.80
.07	3.97	11.55	3.25	.050	.035	.050	.000	1150.40	1893.27
.001046	400.	400.	400.	2	11	0	.00	1674.70	3620.00

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

CNO 236.000

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS= 1988.0 3440.0 TYPE= 1 TARGET= 1452.000

ENCL= 1170.80 ELENCR= 100000.00

236.000	27.73	1178.53	1166.28	1178.53	1180.39	1.86	.41	.00	1169.30
215000.0	1380.4	199803.9	13815.7	494.2	17663.0	4139.0	1572.4	102.0	1169.30
.08	2.79	11.31	3.34	.050	.035	.050	.000	1150.80	1897.24
.000996	400.	400.	400.	2	11	0	.00	1490.71	3440.00

CNO 237.000

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS= .0 3350.0 TYPE= 1 TARGET= 3349.999

OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1180.60 ELREA= 1170.00

237.000	28.17	1179.37	1165.06	1179.37	1180.76	1.39	.32	.05	1180.60
5000.0	.0	204607.4	10392.6	.0	21147.8	3530.2	1782.7	114.6	1170.00
.10	.00	9.68	2.94	.000	.035	.050	.000	1151.20	1940.23
.000711	390.	390.	390.	2	8	0	.00	1319.15	3337.42

SECNO 238.000

ENCROACHMENT STATIONS= .0 3600.0 TYPE= 1 TARGET= 3599.999

495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1181.50 ELREA= 1170.50

38.000	28.28	1179.98	1164.28	1179.98	1181.08	1.10	.29	.03	1181.50
215000.0	.0	208710.9	6289.1	.0	24466.6	2832.9	2078.8	130.3	1170.50
.11	.00	8.53	2.22	.000	.035	.050	.000	1151.70	2103.52
000497	550.	500.	470.	2	14	0	.00	1495.49	3599.01

NO 239.000

470 ENCROACHMENT STATIONS= .0 3460.0 TYPE= 1 TARGET= 3459.999

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1181.80 ELREA= 1170.70

239.000	28.00	1180.20	1164.79	1180.20	1181.32	1.12	.23	.01	1181.80
220000.0	.0	213709.1	6290.9	.0	24847.9	2802.3	2369.6	146.0	1170.70
.13	.00	8.60	2.24	.000	.035	.050	.000	1152.20	2006.59
.000511	455.	460.	470.	3	14	0	.00	1453.41	3460.00

CGHV= .300 CEHV= .500
CNO 240.100

3470 ENCROACHMENT STATIONS= 5000.0 5850.0 TYPE= 1 TARGET= 850.000

240.100	27.61	1180.36	1166.09	1180.36	1181.84	1.48	.34	.18	1233.10
20000.0	.0	220000.0	.0	.0	22555.5	.0	2691.7	159.8	100000.00
.14	.00	9.75	.00	.000	.035	.000	.000	1152.75	5002.74
.000685	580.	570.	370.	2	11	0	.00	844.52	5847.26

CIAL BRIDGE

SB	XK	XKOR	COFQ	RDLEN	BWC	BWP	BAREA	SS	ELCHU	ELCHD
	1.05	1.56	2.60	.00	790.00	125.00	27619.00	1.00	1152.78	1152.18

*SECNO 240.200
CLASS A LOW FLOW

3420 BRIDGE W.S.= 1179.96 BRIDGE VELOCITY= 11.56 CALCULATED CHANNEL AREA= 18812.

RS	EGLWC	H3	QWEIR	QLOW	BAREA	TRAPEZOID AREA	ELLC	ELTRD	WEIRLN
.00	1182.22	.49	0.	220000.	27619.	27619.	1192.00	1206.00	0.

3470 ENCROACHMENT STATIONS= 5000.0 5867.0 TYPE= 1 TARGET= 867.000

40.200	28.07	1180.85	.00	1180.85	1182.22	1.37	.38	.00	1233.10
220000.0	.0	220000.0	.0	.0	23420.3	.0	2708.5	160.4	100000.00
.14	.00	9.39	.00	.000	.035	.000	.000	1152.78	5002.25
000621	32.	32.	32.	0	0	0	.00	862.50	5864.75

SECNO 240.300

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 SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
 Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
 TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
 SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

3470 ENCROACHMENT STATIONS=     5000.0    5925.0  TYPE=      1  TARGET=      925.000
  240.300     28.26   1181.15   1165.41   1181.15   1182.33      1.18       .06       .06   1233.30
 220000.0        .0  220000.0        .0        .0   25223.5        .0    2767.7     162.6 100000.00
     .15       .00      8.72       .00      .000      .035      .000      .000   1152.89   5002.15
 .000528      106.      106.      106.         2        14         0       .00    920.71   5922.85

*SECNO 240.400

 0 ENCROACHMENT STATIONS=     5000.0    5984.0  TYPE=      1  TARGET=      984.000
  240.400     28.41   1181.40   1165.00   1181.40   1182.43      1.03       .05       .05   1233.40
 220000.0        .0  220000.0        .0        .0   27038.8        .0    2831.3     164.9 100000.00
     .15       .00      8.14       .00      .000      .035      .000      .000   1152.99   5002.00
 .000455      106.      106.      106.         2        14         0       .00    980.01   5982.00

SPECIAL BRIDGE

 XK        XKOR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
  1.05      1.56      2.60       .00    900.00    180.00  23218.00      1.00   1153.08   1152.99

 CNO 240.500
 SS A LOW FLOW

 0 BRIDGE W.S.=    1180.70 BRIDGE VELOCITY=      10.64     CALCULATED CHANNEL AREA=     20650.

EGPRS     EGLWC     H3        QWEIR     QLOW      BAREA     TRAPEZOID     ELLC      ELTRD     WEIRLN
                                                            AREA
     .00   1182.72       .38        0.   220000.    23218.    23218.     1184.00   1199.00        0.

 0 ENCROACHMENT STATIONS=     5000.0    6020.0  TYPE=      1  TARGET=      1020.000
  240.500     28.70   1181.78       .00   1181.78   1182.72       .93       .28       .00   1233.50
 20000.0        .0  220000.0        .0        .0   28353.1        .0    2885.4     166.9 100000.00
     .15       .00      7.76       .00      .000      .035      .000      .000   1153.08   5001.72
 .000407       85.       85.       85.         0         0         0       .00   1016.56   6018.28

ECNO 240.600

 ENCROACHMENT STATIONS=     5000.0    6052.0  TYPE=      1  TARGET=      1052.000
 40.600     28.74   1181.88   1164.58   1181.88   1182.76       .87       .02       .02   1233.60
 220000.0        .0  220000.0        .0        .0   29310.4        .0    2923.8     168.3 100000.00
     .16       .00      7.51       .00      .000      .035      .000      .000   1153.14   5001.72
 000380       58.       58.       58.         2        18         0       .00   1048.56   6050.28
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 SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
 Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
 TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
 SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

CNO 241.100

3470 ENCROACHMENT STATIONS=     5000.0    6084.0  TYPE=      1  TARGET=     1084.000
 241.100     28.77   1181.97   1164.40   1181.97   1182.79       .82       .02       .02   1233.60
 20000.0        .0  220000.0       .0       .0   30269.9        .0    2964.1     169.7 100000.00
     .16       .00      7.27       .00      .000      .035      .000      .000   1153.20   5001.63
 .000355       59.       59.       59.         2        18         0       .00   1080.75   6082.37

CIAL BRIDGE

SB  XK        XKOR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
    1.05      1.56      2.60       .00   1025.00    130.00  28486.00     1.00   1153.23   1153.20

*SECNO 241.200
CLASS A LOW FLOW

3420 BRIDGE W.S.=    1181.72 BRIDGE VELOCITY=       8.36     CALCULATED CHANNEL AREA=     26307.

 RS       EGLWC       H3       QWEIR      QLOW      BAREA   TRAPEZOID      ELLC      ELTRD     WEIRLN
                                                            AREA
     .00   1182.92      .16        0.   220000.    28486.    28486.     1184.00   1192.00        0.

3470 ENCROACHMENT STATIONS=     5000.0    6100.0  TYPE=      1  TARGET=     1100.000
 241.200     28.91   1182.14       .00   1182.14   1182.92       .79       .13       .00   1233.70
 20000.0        .0  220000.0       .0       .0   30868.6        .0    2984.5     170.4 100000.00
     .16       .00      7.13       .00      .000      .035      .000      .000   1153.23   5001.57
 000339       29.       29.       29.         0         0         0       .00   1096.87   6098.43

*SECNO 242.000

3470 ENCROACHMENT STATIONS=     5000.0    6390.0  TYPE=      1  TARGET=     1390.000
 242.000     29.11   1182.51   1166.13   1182.51   1183.12       .60       .14       .06   1183.90
 0000.0        .0  220000.0       .0       .0   35251.6        .0    3318.4     183.0 100000.00
     .18       .00      6.24       .00      .000      .035      .000      .000   1153.40   5001.41
 .000302      510.      440.      420.         2        18         0       .00   1388.59   6390.00

CHV=     .100 CEHV=     .300
*SECNO 243.000
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 SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
 Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
 TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
 SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


3470 ENCROACHMENT STATIONS=     5000.0    6645.0  TYPE=      1  TARGET=     1645.000
  243.000     29.15   1182.88   1164.22   1182.88   1183.27       .39       .13       .02   1184.50
 20000.0        .0  220000.0        .0        .0   43870.0        .0    3763.4     200.0 100000.00
     .21       .00      5.01       .00      .000      .040      .000      .000   1153.73   5001.63
 .000236      500.      490.      500.         2        22         0       .00   1643.37   6645.00


*SECNO 244.000

0 ENCROACHMENT STATIONS=     5000.0    6945.0  TYPE=      1  TARGET=     1945.000
  244.000     28.85   1182.99   1167.26   1182.99   1183.45       .46       .16       .02   1184.80
 220000.0        .0  197747.8  22252.2        .0   35019.6    6290.6    4287.6     222.1   1174.00
     .23       .00      5.65      3.54      .000      .040      .050      .000   1154.14   5001.83
 .000362      495.      535.      550.         2        18         0       .00   1943.17   6945.00


CNO 245.000

3470 ENCROACHMENT STATIONS=     5000.0    7215.0  TYPE=      1  TARGET=     2215.000
  245.000     27.94   1183.14   1170.05   1183.14   1183.73       .58       .24       .04 100000.00
 220000.0        .0  213202.2   6797.8        .0   34352.3    3034.2    4767.3     246.7   1178.00
     .26       .00      6.21      2.24      .000      .040      .050      .000   1155.20   5002.73
 .000517      550.      550.      390.         2        11         0       .00   2212.27   7215.00


*CNO 246.000

265 DIVIDED FLOW


2 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .47


 ENCROACHMENT STATIONS=     5000.0    6085.0  TYPE=      1  TARGET=     1085.000
  246.000     28.74   1183.73   1170.03   1183.73   1183.96       .23       .20       .04   1185.40
 72049.3        .0   72049.3        .0        .0   18806.0        .0    5149.0     268.5 100000.00
     .30       .00      3.83       .00      .000      .040      .000      .000   1154.99   5001.70
 .000249      410.      600.      450.         2        11         0       .00   1081.64   6085.00


NO 247.000
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 SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
 Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
 TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
 SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


3470 ENCROACHMENT STATIONS=     5000.0    5825.0  TYPE=      1  TARGET=      825.000
 247.000     28.44   1183.79   1169.43   1183.79   1184.15       .36       .15       .04   1185.60
 73877.9       .0   73877.9       .0       .0   15241.4        .0    5342.5     279.3 100000.00
     .33       .00      4.85       .00      .000      .040      .000      .000   1155.35   5001.80
 .000361     420.      495.      560.         2        11         0       .00    821.62   5823.42


*SECNO 248.000

1 HV CHANGED MORE THAN HVINS


2 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .51


0 ENCROACHMENT STATIONS=     5000.0    5600.0  TYPE=      1  TARGET=      600.000
 248.000     26.88   1183.83   1175.94   1183.83   1184.90      1.07       .53       .21   1185.90
 73877.9       .0   73877.9       .0       .0    8914.7        .0    5513.0     289.3 100000.00
     .35       .00      8.29       .00      .000      .040      .000      .000   1156.95   5002.08
 .001374     610.      615.      550.         2        19         0       .00    592.49   5594.57


CNO 249.000

3470 ENCROACHMENT STATIONS=     5000.0    5580.0  TYPE=      1  TARGET=      580.000
 249.000     26.99   1184.44   1177.91   1184.44   1185.77      1.33       .80       .08   1186.20
 73877.9       .0   73877.9       .0       .0    7979.6        .0    5609.0     295.9 100000.00
     .37       .00      9.26       .00      .000      .040      .000      .000   1157.45   5001.74
 .001890     470.      495.      500.         2        19         0       .00    571.77   5573.51


*SECNO 250.000

1 HV CHANGED MORE THAN HVINS


0 ENCROACHMENT STATIONS=     5000.0    5540.0  TYPE=      1  TARGET=      540.000
 250.000     27.39   1185.39   1181.41   1185.39   1187.36      1.96      1.39       .19   1186.40
 74226.0       .0   74226.0       .0       .0    6599.4        .0    5701.9     303.0 100000.00
     .38       .00     11.25       .00      .000      .040      .000      .000   1158.00   5000.99
 .003336     720.      555.      440.         2        10         0       .00    539.01   5540.00
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SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

ECNO 251.000

3301 HV CHANGED MORE THAN HVINS

85 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

70 ENCROACHMENT STATIONS=     5000.0    5320.0  TYPE=      1  TARGET=      320.000
251.000     30.07   1188.67   1188.67   1188.67   1194.97      6.30      6.65     -1.70   1186.90
78543.0       .0   78543.0       .0        .0    3898.4        .0    5774.2     308.9 100000.00
   .39       .00     20.15       .00      .000      .040      .000      .000   1158.60   5000.00
.011080     680.      600.      410.         0         8         0       .00    320.00   5320.00

ECNO 252.000
3280 CROSS SECTION    252.00 EXTENDED      5.30 FEET

3301 HV CHANGED MORE THAN HVINS

02 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  3.86

70 ENCROACHMENT STATIONS=     5000.0    5580.0  TYPE=      1  TARGET=      580.000
252.000     31.31   1195.31   1185.60   1195.31   1196.48      1.17       .99       .51   1187.30
96840.0       .0   96840.0       .0        .0   11139.0        .0    5857.9     313.9 100000.00
   .40       .00      8.69       .00      .000      .040      .000      .000   1164.00   5000.00
.001128     550.      485.      190.         2        16         0       .00    580.00   5580.00

CNO 253.000
3280 CROSS SECTION    253.00 EXTENDED      6.53 FEET

3301 HV CHANGED MORE THAN HVINS

02 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.98

0 ENCROACHMENT STATIONS=     5000.0    6070.0  TYPE=      1  TARGET=     1070.000
253.000     26.54   1196.54   1182.57   1196.54   1196.86       .32       .29       .09   1187.90
96840.0       .0   96840.0       .0        .0   21276.9        .0    6094.2     325.9 100000.00
   .44       .00      4.55       .00      .000      .040      .000      .000   1170.00   5000.00
.000288     495.      635.      550.         2        18         0       .00   1070.00   6070.00
```

TW SECNO 251 TO 252

ASQ	QCOMP	ERRAC	TASQ	TCQ	TABER	NITER	DSWS	USWS	DSSNO	USSNO
18297.01	18295.67	.01	18297.01	18295.67	.01	7	1188.672	1195.307	251.000	252.000

TW SECNO 250 TO 251

ASQ	QCOMP	ERRAC	TASQ	TCQ	TABER	NITER	DSWS	USWS	DSSNO	USSNO
4317.03	4317.48	.01	22614.04	22613.15	.00	7	1185.394	1188.672	250.000	251.000

SECNO 249 TO 250

ASQ	QCOMP	ERRAC	TASQ	TCQ	TABER	NITER	DSWS	USWS	DSSNO	USSNO
348.02	348.29	.08	22962.06	22961.44	.00	7	1184.443	1185.394	249.000	250.000

SECNO 248 TO 249

ASQ	QCOMP	ERRAC	TASQ	TCQ	TABER	NITER	DSWS	USWS	DSSNO	USSNO
.00	.00	.00	22962.06	22961.44	.00	7	1183.831	1184.443	248.000	249.000

TW SECNO 247 TO 248

ASQ	QCOMP	ERRAC	TASQ	TCQ	TABER	NITER	DSWS	USWS	DSSNO	USSNO
.00	.00	.00	22962.06	22961.44	.00	7	1183.789	1183.831	247.000	248.000

TW SECNO 246 TO 247

ASQ	QCOMP	ERRAC	TASQ	TCQ	TABER	NITER	DSWS	USWS	DSSNO	USSNO
1828.63	1827.71	.05	24790.69	24789.15	.01	7	1183.734	1183.789	246.000	247.000

TN SECNO 234 TO 235

TOTAL AREA	AVG VELOCITY	MAX DEPTH	AVG DEPTH	TOF WIDTH	TOP WIDTH
601.1	1.33	1.99	1.67	390.0	360.1

ASQ	QCOMP	ERRAC	TASQ	TCQ	TABER	NITER	DSWS	USWS	DSSNO	USSNO
798.20	798.14	.01	25588.89	25587.30	.01	7	1177.403	1178.071	234.000	235.000

TN SECNO 233 TO 234

TOTAL AREA	AVG VELOCITY	MAX DEPTH	AVG DEPTH	TOF WIDTH	TOP WIDTH
400.5	1.01	1.40	.97	415.0	415.0

ASQ	QCOMP	ERRAC	TASQ	TCQ	TABER	NITER	DSWS	USWS	DSSNO	USSNO
402.68	402.64	.01	25991.57	25989.93	.01	7	1176.527	1177.403	233.000	234.000

TN SECNO 232 TO 233

TOTAL AREA	AVG VELOCITY	MAX DEPTH	AVG DEPTH	TOF WIDTH	TOP WIDTH
17.0	.47	.53	.26	485.0	64.7

ASQ	QCOMP	ERRAC	TASQ	TCQ	TABER	NITER	DSWS	USWS	DSSNO	USSNO
8.06	8.05	.06	25999.63	25997.98	.01	7	1172.577	1176.527	232.000	233.000

THIS RUN EXECUTED 28OCT92 14:24:28

****
HEC-2 WATER SURFACE PROFILES

rsion 4.6.2; May 1991
****

TE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

RBANK.DAT 100-YEAR

SUMMARY PRINTOUT

SECNO	CWSEL	VLOB	VCH	VROB	QLOB	QCH	QROB	Q	TOPWID	SSTA	ENDST
120.500	1166.50	6.03	11.88	.00	1621.82	212008.20	.00	213630.00	1073.34	396.89	1470.22
122.000	1166.70	6.18	12.14	.00	1677.65	211952.30	.00	213630.00	1050.62	394.74	1445.35
122.650	1166.81	6.23	12.18	.00	1704.64	211925.40	.00	213630.00	1050.90	394.59	1445.49
123.550	1168.40	5.67	10.99	.00	1652.33	211977.70	.00	213630.00	1059.71	396.12	1455.83
124.000	1168.46	5.89	11.02	.00	2049.72	211580.30	.00	213630.00	1069.93	385.06	1455.00
228.000	1168.99	.00	10.69	.00	.00	213630.00	.00	213630.00	951.83	1595.00	2598.90
229.000	1169.36	.00	11.32	.00	.00	212421.10	.00	212421.10	892.98	1745.00	2691.85
230.000	1169.42	.00	14.36	4.25	.00	211745.50	675.60	212421.10	739.53	1615.00	2408.39
231.000	1167.55	5.32	22.91	5.03	585.41	211134.00	701.65	212421.10	593.52	2079.81	2727.21
232.000	1172.58	5.66	18.69	4.63	1303.14	207017.80	4100.16	212421.10	811.41	2083.56	2948.82
233.000	1176.53	4.56	13.32	3.77	8693.38	186261.60	18844.16	213799.10	1811.18	1755.00	3620.00
234.000	1177.40	2.65	12.13	3.46	903.35	196322.50	16975.93	214201.80	1711.71	1880.00	3670.00
235.000	1178.07	3.97	11.55	3.25	3466.22	196278.30	15255.52	215000.00	1674.70	1893.27	3620.00
236.000	1178.53	2.79	11.31	3.34	1380.37	199803.90	13815.75	215000.00	1490.71	1897.24	3440.00
237.000	1179.37	.00	9.68	2.94	.00	204607.40	10392.58	215000.00	1319.15	1940.23	3337.42
238.000	1179.98	.00	8.53	2.22	.00	208710.90	6289.07	215000.00	1495.49	2103.52	3599.01
239.000	1180.20	.00	8.60	2.24	.00	213709.10	6290.87	220000.00	1453.41	2006.59	3460.00

SECNO	CWSEL	VLOB	VCH	VROB	QLOB	QCH	QROB	Q	TOPWID	SSTA	ENDST
240.100	1180.36	.00	9.75	.00	.00	220000.00	.00	220000.00	844.52	5002.74	5847.26
240.200	1180.85	.00	9.39	.00	.00	220000.00	.00	220000.00	862.50	5002.25	5864.75
240.300	1181.15	.00	8.72	.00	.00	220000.00	.00	220000.00	920.71	5002.15	5922.85
240.400	1181.40	.00	8.14	.00	.00	220000.00	.00	220000.00	980.01	5002.00	5982.00
240.500	1181.78	.00	7.76	.00	.00	220000.00	.00	220000.00	1016.56	5001.72	6018.28
240.600	1181.88	.00	7.51	.00	.00	220000.00	.00	220000.00	1048.56	5001.72	6050.28
241.100	1181.97	.00	7.27	.00	.00	220000.00	.00	220000.00	1080.75	5001.63	6082.37
241.200	1182.14	.00	7.13	.00	.00	220000.00	.00	220000.00	1096.87	5001.57	6098.43
242.000	1182.51	.00	6.24	.00	.00	220000.00	.00	220000.00	1388.59	5001.41	6390.00
243.000	1182.88	.00	5.01	.00	.00	220000.00	.00	220000.00	1643.37	5001.63	6645.00
244.000	1182.99	.00	5.65	3.54	.00	197747.80	22252.24	220000.00	1943.17	5001.83	6945.00
245.000	1183.14	.00	6.21	2.24	.00	213202.20	6797.84	220000.00	2212.27	5002.73	7215.00
246.000	1183.73	.00	3.83	.00	.00	72049.31	.00	72049.31	1081.64	5001.70	6085.00
247.000	1183.79	.00	4.85	.00	.00	73877.95	.00	73877.95	821.62	5001.80	5823.42
248.000	1183.83	.00	8.29	.00	.00	73877.95	.00	73877.95	592.49	5002.08	5594.57
249.000	1184.44	.00	9.26	.00	.00	73877.95	.00	73877.95	571.77	5001.74	5573.51
250.000	1185.39	.00	11.25	.00	.00	74225.96	.00	74225.96	539.01	5000.99	5540.00
251.000	1188.67	.00	20.15	.00	.00	78542.99	.00	78542.99	320.00	5000.00	5320.00
* 252.000	1195.31	.00	8.69	.00	.00	96840.01	.00	96840.00	580.00	5000.00	5580.00
253.000	1196.54	.00	4.55	.00	.00	96840.01	.00	96840.00	1070.00	5000.00	6070.00

RBANK.DAT 100-YEAR

MMARY PRINTOUT

SECNO	CWSEL	CRIWS	EG	ELMIN	DEPTH	10*KS	K*CHSL	XLCH	SHEAR	FRCH
120.500	1166.50	1160.01	1168.68	1147.00	19.50	17.49	.00	.00	1.90	.50
122.000	1166.70	1160.39	1168.98	1147.20	19.50	18.26	1.32	152.00	1.98	.51
122.650	1166.81	1160.54	1169.10	1147.20	19.61	18.42	.00	65.00	1.99	.52
123.550	1168.40	.00	1170.26	1147.31	21.09	13.32	1.22	90.00	1.58	.44
124.000	1168.46	1160.50	1170.33	1147.40	21.06	13.49	2.00	45.00	1.59	.45
228.000	1168.99	1159.49	1170.76	1147.70	21.29	11.98	.94	320.00	1.49	.42
229.000	1169.36	1160.32	1171.36	1148.10	21.26	13.61	1.05	380.00	1.68	.45
230.000	1169.42	1162.61	1172.61	1148.40	21.02	22.52	.80	375.00	2.73	.57
231.000	1167.55	1167.12	1175.65	1148.80	18.75	68.20	1.00	400.00	7.05	.99
232.000	1172.58	1168.19	1177.87	1149.20	23.38	34.90	.95	420.00	4.48	.73
233.000	1176.53	1167.54	1178.96	1149.60	26.93	14.73	1.04	385.00	2.20	.48
234.000	1177.40	1166.23	1179.51	1150.00	27.40	11.75	1.00	400.00	1.81	.43
235.000	1178.07	1166.29	1179.98	1150.40	27.67	10.46	1.00	400.00	1.63	.41
236.000	1178.53	1166.28	1180.39	1150.80	27.73	9.96	1.00	400.00	1.56	.40
237.000	1179.37	1165.06	1180.76	1151.20	28.17	7.11	1.03	390.00	1.11	.34
238.000	1179.98	1164.28	1181.08	1151.70	28.28	4.97	1.00	500.00	.86	.29
239.000	1180.20	1164.79	1181.32	1152.20	28.00	5.11	1.09	460.00	.87	.29
240.100	1180.36	1166.09	1181.84	1152.75	27.61	6.85	.96	570.00	1.14	.33
240.200	1180.85	.00	1182.22	1152.78	28.07	6.21	.94	32.00	1.05	.32
240.300	1181.15	1165.41	1182.33	1152.89	28.26	5.28	1.04	106.00	.90	.29
240.400	1181.40	1165.00	1182.43	1152.99	28.41	4.55	.94	106.00	.78	.27
240.500	1181.78	.00	1182.72	1153.08	28.70	4.07	1.06	85.00	.71	.26
240.600	1181.88	1164.58	1182.76	1153.14	28.74	3.80	1.04	58.00	.66	.25
241.100	1181.97	1164.40	1182.79	1153.20	28.77	3.55	1.02	59.00	.62	.24

SECNO	CWSEL	CRIWS	EG	ELMIN	DEPTH	10*KS	K*CHSL	XLCH	SHEAR	FRCH
241.200	1182.14	.00	1182.92	1153.23	28.91	3.39	1.04	29.00	.59	.24
242.000	1182.51	1166.13	1183.12	1153.40	29.11	3.02	.39	440.00	.48	.22
243.000	1182.88	1164.22	1183.27	1153.73	29.15	2.36	.67	490.00	.39	.17
244.000	1182.99	1167.26	1183.45	1154.14	28.85	3.62	.77	535.00	.52	.21
245.000	1183.14	1170.05	1183.73	1155.20	27.94	5.17	1.93	550.00	.65	.24
246.000	1183.73	1170.03	1183.96	1154.99	28.74	2.49	-.35	600.00	.27	.16
247.000	1183.79	1169.43	1184.15	1155.35	28.44	3.61	.73	495.00	.42	.20
248.000	1183.83	1175.94	1184.90	1156.95	26.88	13.74	2.60	615.00	1.29	.38
249.000	1184.44	1177.91	1185.77	1157.45	26.99	18.90	1.01	495.00	1.65	.44
250.000	1185.39	1181.41	1187.36	1158.00	27.39	33.36	.99	555.00	2.55	.57
251.000	1188.67	1188.67	1194.97	1158.60	30.07	110.80	1.00	600.00	8.42	1.02
252.000	1195.31	1185.60	1196.48	1164.00	31.31	11.28	11.13	485.00	1.35	.35
253.000	1196.54	1182.57	1196.86	1170.00	26.54	2.88	9.45	635.00	.36	.18

UMMARY OF ERRORS AND SPECIAL NOTES

UTION SECNO= 123.550 PROFILE= 1 HYDRAULIC JUMP D.S.

WARNING SECNO= 231.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

NING SECNO= 233.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 246.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

NING SECNO= 248.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

TION SECNO= 251.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
TION SECNO= 251.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

WARNING SECNO= 252.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

NING SECNO= 253.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

```
*****************************************
*  HEC-2 WATER SURFACE PROFILES          *
*                                        *
*  Version   4.6.2;  May 1991            *
*                                        *
*  RUN DATE    04SEP92    TIME   15:58:46 *
*****************************************
```

```
****************************************
*  U.S. ARMY CORPS OF ENGINEERS        *
*  HYDROLOGIC ENGINEERING CENTER       *
*  609 SECOND STREET, SUITE D          *
*  DAVIS, CALIFORNIA 95616-4687        *
*          (916) 756-1104              *
****************************************
```

```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
```

Job # PAZ-PBQD-02
EAST PAPAGO FWY & RED MTN. TRAFFIC INTERCHANGE

"SUPERFLOOD" - DESIGN CONDITIONS

THIS RUN EXECUTED 04SEP92 15:58:46

```
*************************************
HEC-2 WATER SURFACE PROFILES

Version   4.6.2;  May 1991
*************************************


IT FLOW BEING PERFORMED


     SPLIT FLOW ANALYSIS -- EAST PAPAGO FWY & RED MT. T.I.


T      SECNO 234 TO 235
     3     234     235     228   0.050  0.0011
NG   900    1176    1245    1176    1290    1182

       SECNO 233 TO 234
S    2     233     234     228   0.050  0.0012
NG   485    1176     900    1176

       SECNO 232 TO 233
NS     2     232     233     228   0.050  0.0014
N      0    1176     485    1176
```

```
     LAST REVISED: 9-4-92

T1   SIMONS, LI & ASSOCIATES, INC. (PAZ-DMJM-03.25)
     SALT RIVER HEC-2 ANALYSIS (SECTIONS 121.0 - 245.0)
     SPF.DAT                ADOT "SUPERFLOOD" DISCHARGE

 ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

    0        2         0         0         5         0         0    245560     1168        0

                          **************RATING CURVE DATA**************

 93000   1157.45   135000   1161.02   160000   1162.90   215000   1166.59   250000   1168.88

 NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

  -1        0        -1        0         0         0        -1         0         0         0


J3 VARIABLE CODES FOR SUMMARY PRINTOUT

   38        1        55        26        56        13        14        15        43        4
   53       54         0        38         1         2         3        42         8        5
   33       39        67        68

J6 IHLEQ     ICOPY     SUBDIV    STRTDS    RMILE

   1


   .035      .035      .035       0.1       0.3
  120.50        9     443.5    1485.0        .0        .0        .0
GR 1171.5    367.0   1171.46     382.0   1158.96     419.5   1158.72     443.5   1150.00     469.7
   1147.0    926.5   1150.00    1420.7   1171.42    1485.0   1171.42    1500.0

X1 122.00        9     441.5    1460.0     155.0     150.0     152.0
G  1171.6    365.0   1171.61     380.0   1159.11     417.5   1158.87     441.5   1150.16     467.6
   1147.2    941.0   1150.15    1395.7   1171.58    1460.0   1171.58    1475.0

NC   .035      .035      .035       0.3       0.5
  122.65        9     441.5    1460.0      65.0      65.0      65.0
    10.                                                                  .00       .00
GR 1171.7    365.0   1171.68     380.0   1159.18     417.5   1158.94     441.5   1150.22     490.3
   1147.2    952.0   1150.22    1395.7   1171.65    1460.0   1171.65    1475.0
```

	1.050	1.56	3.00	.00	790.00	193.00	27088.00	6.500	1147.31	1147.20
	123.55	20	441.5	1460.0	90.0	90.0	90.0			
X2	0.	.00	1.	1180.61	1181.80	.00		.000		.000
X3	10.							.00	.00	
	-11	316.0	1181.80	1174.13	436.0	1184.23	1176.56	554.0	1185.93	1178.26
TT	0	672.0	1187.37	1179.70	790.0	1188.15	1180.48	908.0	1188.28	1180.61
BT	0	1026.0	1188.15	1180.48	1144.0	1187.37	1179.70	1262.0	1185.93	1178.26
	0	1380.0	1184.23	1176.56	1500.0	1181.80	1174.13			
	1174.1	316.0	1171.77	371.0	1171.77	386.0	1159.27	423.5	1159.10	436.0
GR	1159.0	441.5	1150.31	500.1	1149.97	554.0	1149.22	672.0	1148.48	790.0
	1147.7	908.0	1147.31	975.0	1147.64	1026.0	1148.42	1144.0	1149.19	1262.0
	1150.0	1380.0	1150.31	1433.3	1171.75	1460.0	1171.75	1475.0	1174.13	1500.0
X1	124.00	9	436.5	1465.0	45.0	45.0	45.0			
	1171.8	360.0	1171.81	375.0	1159.31	412.5	1159.07	436.5	1150.36	464.2
GR	1147.4	983.0	1150.35	1400.7	1171.79	1465.0	1171.79	1480.0		
	0.050	0.050								
		7.1	9.1				1595	2765	1755	2765
X1	228.0	27	1581	2602	355	205	320			
X4	4	1147.7	2423.8	1180.0	2423.9	1180.0	2475.9	1147.7	2476.0	
	1174.0	0	1174.0	670	1170.8	690	1170.8	1290	1170.0	1330
GR	1170.0	1415	1150.0	1510	1172.4	1566.0	1172.1	1581.0	1147.7	1605.4
GR	1147.7	2577.7	1172.1	2602.0	1172.4	2617.0	1172.7	2680	1178.0	2765
	1170.0	2780	1166.0	2785	1166.0	3035	1170.0	3055	1172.0	3085
	1174.0	3265	1172.0	3375	1170.0	3400	1170.0	3425	1172.0	3600
GR	1176.0	3815	1178.0	4735						
		7.1	9.1				1745	2715	1840	2715
X1	229.0	29	1674	2695	350	420	380			
X4	4	1148.1	2392.0	1180.0	2392.1	1180.0	2445.9	1148.1	2446.0	
	1175.0	0	1175.0	540	1174.0	640	1172.0	660	1171.0	700
GR	1171.0	1290	1170.0	1310	1170.0	1375	1160.0	1510	1160.0	1510
GR	1150.0	1630	1172.8	1659.0	1172.5	1674.0	1148.1	1698.5	1148.1	2670.5
	1172.5	2695.0	1172.8	2710.0	1184.0	2715	1180.0	2735	1170.0	2755
	1170.0	2995	1166.0	3005	1166.0	3055	1168.0	3235	1170.0	3255
GR	1170.0	3475	1172.0	3645	1176.0	4115	1178.0	4605		
		7.1	9.1				1615	2570	1703	2570
X1	230.0	32	1555	2375.3	310	410	375			
X4	4	1148.4	2102.0	1180.0	2102.1	1180.0	2155.9	1148.4	2156.0	
	1174.0	0	1172.0	335	1172.0	930	1173.0	1020	1172.0	1080
GR	1170.0	1090	1160.0	1385	1150.0	1455	1172.6	1540.0	1172.3	1555.0
GR	1148.4	1578.9	1148.4	2361.1	1162.6	2375.3	1162.9	2390.3	1170.0	2410
	1172.0	2415	1174.0	2570	1172.0	2690	1170.0	2715	1168.4	2805
	1168.0	2925	1168.0	2960	1170.0	3055	1170.6	3160	1170.0	3255
GR	1169.4	3325	1170.0	3415	1172.0	3450	1174.0	3475	1174.0	3560
	1174.0	3950	1176.0	3995						

				0.1	0.3					
	231.0	24	2118.0	2674.5	350	460	400			
X3	10					2945				
X4	4	1148.8	2402.0	1180.0	2402.1	1180.0	2455.9	1148.8	2456.0	
	1176.0	570.0	1176.0	1815.0	1178.0	1855.0	1178.0	2020.0	1163.5	2103.0
	1163.2	2118.0	1148.8	2132.4	1148.8	2660.1	1163.2	2674.5	1163.5	2689.5
GR	1170.0	2750.0	1172.0	2760.0	1174.0	2910.0	1174.0	2945.0	1172.0	3100.0
	1169.0	3375.0	1170.0	3430.0	1170.1	3490.0	1170.0	3590.0	1170.0	3740.0
	1174.0	3775.0	1174.0	3940.0	1176.0	4420.0	1178.0	4435.0		
X1	232.0	24	2128.0	2666.5	340	470	420			
	10			2050		2970				
X4	4	1149.2	2402.0	1180.0	2402.1	1180.0	2455.9	1149.2	2456.0	
GR	1178.0	660.0	1178.0	1340.0	1176.0	1490.0	1178.0	1740.0	1176.0	1960.0
	1176.0	2050.0	1174.0	2080.0	1170.0	2090.0	1165.4	2113.0	1165.1	2128.0
	1149.2	2143.9	1149.2	2650.6	1165.1	2666.5	1165.4	2681.5	1170.0	2800.0
GR	1172.0	2920.0	1173.0	2970.0	1172.0	3020.0	1171.8	3210.0	1170.0	3380.0
	1170.0	3500.0	1174.0	3520.0	1176.0	4420.0	1178.0	4510.0		
WT	5	250000	250000	250000	250000	250000				
X1	233.0	23	2069.0	2653.5	390	385	385			
	10			1755		3620				
X4	4	1149.6	2387.0	1180.0	2387.1	1180.0	2440.9	1149.6	2441.0	
GR	1180.0	760.0	1180.0	1300.0	1178.0	1370.0	1176.0	1755.0	1174.0	1870.0
	1170.0	1880.0	1167.3	1930.0	1167.2	2054.0	1166.9	2069.0	1149.6	2086.4
	1149.6	2636.1	1166.9	2653.5	1167.2	2668.5	1170.0	2785.0	1170.0	2960.0
GR	1170.0	3190.0	1172.0	3260.0	1172.0	3260.0	1174.0	3370.0	1174.0	3510.0
	1176.0	3620.0	1178.0	4550.0	1180.0	4575.0				
X1	234.0	20	2045.3	2701.7	400	400	400			
X3	10			1880		3670				
	4	1150.0	2372.0	1180.0	2372.1	1180.0	2425.9	1150.0	2426.0	
	1184.0	1000	1184.0	1065	1182.0	1320	1176.0	1345	1176.0	1995
GR	1182.0	2000	1178.0	2020	1168.5	2030.3	1168.2	2045.3	1150.0	2063.5
	1150.0	2683.5	1168.2	2701.7	1168.5	2716.7	1170.0	3040	1172.0	3125
	1174.0	3215	1174.0	3460	1176.0	3555	1178.0	4015	1180.0	4750
X1	235.0	20	1998.2	2676.8	400	400	400			
	10			1890		3620				
X4	4	1150.4	2263.8	1182.0	2263.9	1182.0	2315.9	1150.4	2316.0	
GR	1190.0	1230	1186.0	1275	1184.0	1375	1184.0	1605	1188.0	1625
	1188.0	1740	1184.0	1775	1182.0	1890	1170.0	1900	1169.1	1983.2
	1168.8	1998.2	1150.4	2016.6	1150.4	2658.4	1168.8	2676.8	1169.1	2691.8
GR	1170.0	2955	1174.0	3115	1176.0	3480	1178.0	3800	1180.0	4675
	236.0	21	2003.8	2705.2	400	400	400			
X3	10			1988	1170.8	3440				
X4	4	1150.8	2148.8	1186.0	2148.9	1186.0	2200.9	1150.8	2201.0	
	1198.0	1060.0	1190.0	1190.0	1188.0	1250.0	1187.0	1310.0	1186.0	1840.0
	1180.0	1880.0	1169.6	1988.8	1169.3	2003.8	1150.8	2022.3	1150.8	2686.7
GR	1169.3	2705.2	1169.6	2720.2	1170.0	2780.0	1170.0	2900.0	1172.0	3080.0
	1174.0	3110.0	1176.0	3240.0	1176.0	3410.0	1178.0	3440.0	1179.5	4550.0
	1180.0	4590.0								

```
   237.0      20    1939  2789.4     390     390     390
    10                    1939            3350
X4   4    1151.2  2019.8  1188.0  2019.9  1188.0  2097.9  1151.2  2098.0
GR 1198.0  1030.0  1196.0  1085.0  1190.0  1180.0  1190.0  1310.0  1189.0  1350.0
   1188.0  1820.0  1186.0  1850.0  1180.9  1924.0  1180.6  1939.0  1151.2  1968.4
GR 1151.2  2770.6  1170.0  2789.4  1170.3  2804.4  1172.0  3000.0  1172.0  3150.0
GR 1174.0  3170.0  1176.0  3270.0  1180.0  3350.0  1180.0  4450.0  1182.0  4650.0

   238.0      18    2102  2989.0     550     470     500
X3  10                    2102            3600
GR 1182.0  1280.0  1182.0  1590.0  1180.0  1620.0  1178.0  1740.0  1178.0  2070.0
   1181.8  2087.0  1181.5  2102.0  1151.7  2131.8  1151.7  2970.2  1170.5  2989.0
GR 1170.8  3004.0  1174.0  3240.0  1176.0  3310.0  1178.0  3400.0  1178.0  3490.0
GR 1180.0  3600.0  1181.5  4530.0  1182.0  4575.0

   239.0      16    2005  2913.9     455     470     460
X3  10                    2005            3460
   1180.0  1410.0  1182.0  1450.0  1182.0  1720.0  1140.0  1785.0  1140.0  1920.0
   1182.1  1990.0  1181.8  2005.0  1152.2  2034.6  1152.2  2895.4  1170.7  2913.9
GR 1171.0  2928.9  1172.0  2995.0  1176.0  3260.0  1180.0  3460.0  1182.0  3940.0
GR 1184.0  4350.0

   SPECIAL BRIDGE ROUTINE FOR RAMPS S-E & S-W

                            0.3     0.5
X1 240.1      4    5000    5850     580     370     570
                            5000            5850
   1183.1  5000  1152.75  5030.4  1152.75  5819.7  1183.1  5850

SB   1.05   1.56     2.6       0     790     125   27619       1  1152.78  1152.18
   240.2      4    5000    5867      32      32      32
                      1    1192    1206
X3                          5000            5867
   1183.1  5000  1152.78  5030.3  1152.78  5836.7  1183.1  5867

X1 240.3      4    5000    5925     106     106     106
                            5000            5925
   1183.3  5000  1152.89  5030.4  1152.89  5894.6  1183.3  5925

   SPECIAL BRIDGE ROUTINE FOR PIMA FWY. MAINLINE STRUCTURES

X1 240.4      4    5000    5984     106     106     106
                            5000            5984
   1183.4  5000  1152.99  5030.4  1152.99  5953.6  1183.4  5984

SB   1.05   1.56     2.6       0     900     180   24786       1  1153.08  1152.99
   240.5      4    5000    6020      85      85      85
                      1    1186    1199
X3                          5000            6020
   1183.5  5000  1153.08  5030.4  1153.08  5989.6  1183.5  6020
```

```
    240.6        4     5000     6052       58       58       58
                               5000                6052
GR  1183.6     5000  1153.14  5030.5  1153.14   6021.5   1183.6     6052

    SPECIAL BRIDGE ROUTINE FOR RAMPS W-N & E-N

    241.1        4     5000     6084       59       59       59
                               5000                6084
GR  1183.6     5000  1153.20  5030.4  1153.20   6053.6   1183.6     6084

    1.05      1.56      2.6        0     1025      130    30403        1  1153.23  1153.20
X1  241.2        4     5000     6100       29       29       29
X2                        1     1186     1192
                               5000                6100
    1183.7     5000  1153.23  5030.5  1153.23   6069.5   1183.7     6100

    242.00       45    5000.0   6480.0   510.0    420.0    440.0
                               5000                6390
GR  1184.0   4880.0  1184.00   4910.0  1180.00   4920.0  1184.20   4985.0  1183.90   5000.0
    1153.4   5031.0  1162.00   5105.0  1164.00   5125.0  1162.00   5325.0  1160.00   5450.0
    1158.0   5555.0  1153.67   5594.7  1153.67   5610.0  1153.67   5645.0  1153.67   5700.0
GR  1153.7   5720.0  1153.67   5724.2  1160.00   5740.0  1160.00   5755.0  1153.67   5777.2
GR  1153.7   5790.0  1153.67   5825.0  1153.67   5843.4  1156.00   5855.0  1153.67   5868.6
    1153.7   5890.0  1153.67   6050.0  1153.67   6085.0  1153.67   6165.0  1153.67   6174.7
    1158.0   6200.0  1153.67   6210.8  1153.67   6220.0  1153.67   6250.0  1153.67   6259.2
GR  1154.0   6260.0  1156.00   6435.0  1160.00   6450.0  1170.00   6470.0  1172.00   6480.0
    1174.0   6565.0  1176.00   6705.0  1176.00   6965.0  1180.00   6975.0  1184.00   6980.0

wC                    0.040      0.1      0.3
X1  243.00       25    5000.0   6830.0   500.0    500.0    490.0
                               5000                6645
    1184.0   4885.0  1180.00   4900.0  1170.00   4925.0  1164.00   4945.0  1184.80   4985.0
GR  1184.5   5000.0  1153.73   5031.0  1162.00   5085.0  1160.00   5180.0  1160.00   5520.0
    1154.2   5544.3  1154.16   5545.0  1154.16   5630.0  1154.16   5960.0  1154.16   6240.0
    1154.2   6480.0  1154.16   6505.0  1154.16   6660.0  1154.16   6689.1  1160.00   6730.0
GR  1170.0   6830.0  1176.00   6970.0  1178.00   7100.0  1180.00   7120.0  1184.00   7125.0

    244.00       41    5000.0   6535.0   495.0    550.0    535.0
X3                             5000                6945
GR  1184.0   4830.0  1184.00   4875.0  1160.00   4920.0  1160.00   4935.0  1185.10   4985.0
    1184.8   5000.0  1154.14   5031.0  1160.00   5045.0  1170.00   5130.0  1170.00   5175.0
    1160.0   5315.0  1160.00   5500.0  1156.00   5745.0  1156.00   5910.0  1154.70   5939.5
GR  1154.7   6000.0  1154.69   6008.4  1160.00   6025.0  1162.00   6040.0  1162.00   6085.0
    1160.0   6105.0  1154.69   6115.6  1154.69   6125.0  1154.69   6230.0  1154.69   6272.2
    1160.0   6320.0  1160.00   6440.0  1170.00   6460.0  1174.00   6535.0  1170.00   6830.0
GR  1154.7   6856.8  1154.69   6865.0  1154.69   6880.0  1154.69   6960.0  1154.69   6980.0
    1154.7   6985.9  1170.00   7005.0  1170.00   7330.0  1172.00   7380.0  1180.00   7395.0
    1186.0   7405.0
```

X	245.00	44	5000	6710.0	550.0	390.0	550.0			
				5000		7215				
GR	1184.0	4790.0	1184.00	4830.0	1180.00	4850.0	1170.00	4905.0	1165.00	4945.0
GR	1185.4	4985.0	1185.10	5000.0	1160.00	5035.0	1168.00	5150.0	1168.00	5190.0
	1170.0	5200.0	1176.00	5245.0	1176.00	5330.0	1170.00	5335.0	1162.00	5490.0
R	1162.0	5560.0	1164.00	5610.0	1168.00	5720.0	1168.00	5785.0	1166.00	5905.0
GR	1160.0	6030.0	1155.24	6049.0	1155.24	6070.0	1155.24	6115.0	1155.24	6160.0
	1155.2	6191.4	1160.00	6220.0	1155.24	6239.0	1155.24	6260.0	1155.24	6300.0
	1155.2	6486.0	1160.00	6655.0	1170.00	6670.0	1176.00	6680.0	1178.00	6710.0
GR	1178.0	7000.0	1176.00	7065.0	1174.00	7380.0	1170.00	7390.0	1170.00	7520.0
G	1172.0	7660.0	1180.00	7685.0	1188.00	7710.0	1190.00	7855.0		

IHLEQ = 1. THEREFORE FRICTION LOSS (HL) IS CALCULATED AS A FUNCTION OF PROFILE TYPE, WHICH CAN VARY FROM REACH TO REACH. SEE DOCUMENTATION FOR DETAILS.

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= .100 CEHV= .300

*SECNO 120.500

120.500	21.59	1168.59	1161.13	1168.00	1170.87	2.28	.00	.00	1158.72
245560.0	2453.3	243106.7	.0	373.1	19996.6	.0	.0	.0	1171.42
.00	6.58	12.16	.00	.035	.035	.000	.000	1147.00	390.61
.001586	0.	0.	0.	0	14	0	.00	1085.89	1476.50

*SECNO 122.000

122.000	21.56	1168.76	1161.51	.00	1171.15	2.39	.25	.03	1158.87
245560.0	2523.8	243036.3	.0	374.2	19530.5	.0	70.3	3.8	1171.58
.00	6.74	12.44	.00	.035	.035	.000	.000	1147.20	388.55
.001665	155.	152.	150.	2	14	0	.00	1062.99	1451.54

CCHV= .300 CEHV= .500

SECNO 122.650

3465 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1158.94 ELREA= 1171.65

122.650	21.66	1168.86	1161.68	.00	1171.26	2.40	.11	.01	1158.94
245560.0	2552.6	243007.4	.0	375.8	19463.6	.0	99.9	5.3	1171.65
.00	6.79	12.49	.00	.035	.035	.000	.000	1147.20	388.46
.001682	65.	65.	65.	2	14	0	.00	1063.18	1451.63

SPECIAL BRIDGE

XK	XKOR	COFQ	RDLEN	BWC	BWP	BAREA	SS	ELCHU	ELCHD
1.05	1.56	3.00	.00	790.00	193.00	27088.00	6.50	1147.31	1147.20

SECNO 123.550

PASS A LOW FLOW

3400 BRIDGE W.S.= 1165.30 BRIDGE VELOCITY= 19.06 CALCULATED CHANNEL AREA= 12841.

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

EGPRS	EGLWC	H3	QWEIR	QLOW	BAREA	TRAPEZOID AREA	ELLC	ELTRD	WEIRLN
.00	1172.66	1.85	0.	245560.	27088.	27088.	1180.61	1181.80	0.

495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1159.00 ELREA= 1171.75

123.550	23.40	1170.71	.00	.00	1172.66	1.95	1.39	.00	1159.00
245560.0	2458.2	243101.8	.0	404.6	21637.9	.0	143.2	7.5	1171.75
.01	6.08	11.24	.00	.035	.035	.000	.000	1147.31	389.18
.001200	90.	90.	90.	0	0	0	.00	1069.53	1458.71

*SECNO 124.000

124.000	23.36	1170.76	1161.62	.00	1172.71	1.95	.05	.00	1159.07
245560.0	3004.6	242555.4	.0	474.5	21565.2	.0	166.0	8.7	1171.79
.01	6.33	11.25	.00	.035	.035	.000	.000	1147.40	378.14
.001216	45.	45.	45.	2	14	0	.00	1083.78	1461.92

*SECNO 228.000

265 DIVIDED FLOW

470 ENCROACHMENT STATIONS= 1595.0 2765.0 TYPE= 1 TARGET= 1170.000

228.000	23.48	1171.18	1160.63	1171.18	1173.10	1.92	.38	.01	100000.00
245560.0	.0	245560.0	.0	.0	22066.5	.0	328.2	16.2	1172.10
.02	.00	11.13	.00	.000	.035	.000	.000	1147.70	1595.00
.001151	355.	320.	205.	2	11	0	.00	954.03	2601.08

SECNO 229.000

5 DIVIDED FLOW

0 ENCROACHMENT STATIONS= 1745.0 2715.0 TYPE= 1 TARGET= 970.000

229.000	23.46	1171.56	1161.33	1171.56	1173.63	2.07	.46	.08	100000.00
239606.7	.0	239606.7	.0	.0	20729.6	.0	514.8	24.2	1172.50
.03	.00	11.56	.00	.000	.035	.000	.000	1148.10	1745.00
.001258	350.	380.	420.	1	11	0	.00	895.21	2694.06

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SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

SECNO 230.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS=     1615.0    2570.0  TYPE=      1  TARGET=      955.000
 230.000     23.14   1171.54   1163.81   1171.54   1174.87      3.33       .61       .63 100000.00
 39606.7        .0  238453.5    1153.2        .0   16242.9     235.0     675.1      31.3   1162.60
     .03       .00     14.68      4.91      .000      .035      .050      .000   1148.40   1615.00
 .002092      310.      375.      410.         2        14         0       .00    744.99   2413.84

CEHV=     .100 CEHV=     .300
SECNO 231.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .58

3470 ENCROACHMENT STATIONS=         .0    2945.0  TYPE=      1  TARGET=     2944.999
 231.000     20.72   1169.52   1168.73   1169.52   1177.78      8.26      1.44      1.48   1163.20
 39606.7    1230.3  236826.8    1549.6     196.9   10212.2     262.1     800.0      37.6   1163.20
     .04      6.25     23.19      5.91      .050      .035      .050      .000   1148.80   2068.47
 .006154      350.      400.      460.         3        12         0       .00    623.32   2745.65

SECNO 232.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS=     2050.0    2970.0  TYPE=      1  TARGET=      920.000
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 SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
 Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
 TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
 SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

 232.000     25.13    1174.33    1170.01    1174.33    1179.89      5.57       1.84        .27    1165.10
239606.7    2013.0   229999.2     7594.5      312.6   11922.7    1411.6      917.7       44.8    1165.10
     .04      6.44      19.29       5.38       .050       .035      .050       .000    1149.20    2075.11
 .003398      340.       420.       470.          4          5         0        .00     841.05    2970.00

CNO 233.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.62

470 ENCROACHMENT STATIONS=     1755.0    3620.0  TYPE=      1  TARGET=     1865.000
 233.000     29.02    1178.62    1170.75    1178.62    1180.96      2.34        .74        .32    1166.90
44562.9    12574.1   201709.0    30279.9     2563.6   15095.4    7026.0     1087.3       56.6    1166.90
     .05      4.90      13.36       4.31       .050       .035      .050       .000    1149.60    1755.00
 .001352      390.       385.       385.          4         11         0        .00    1811.19    3620.00

SECNO 234.000

5 DIVIDED FLOW

0 ENCROACHMENT STATIONS=     1880.0    3670.0  TYPE=      1  TARGET=     1790.000
234.000     29.26    1179.26    1167.83    1179.26    1181.48      2.22        .50        .01    1168.20
247135.8    1819.1   218558.8    26757.9      608.3   17295.4    6701.0     1313.6       72.8    1168.20
     .06      2.99      12.64       3.99       .050       .035      .050       .000    1150.00    1880.00
.001175      400.       400.       400.          2         11         0        .00    1720.19    3670.00

CNO 235.000

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS=     1890.0    3620.0  TYPE=      1  TARGET=     1730.000
235.000     29.48    1179.88    1167.85    1179.88    1181.94      2.06        .45        .02    1168.80
50000.0    4844.2   220895.2    24260.6     1063.7   18128.3    6403.5     1544.1       88.4    1168.80
     .07      4.55      12.19       3.79       .050       .035      .050       .000    1150.40    1891.77
 .001076      400.       400.       400.          2         14         0        .00    1676.22    3620.00
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SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

SECNO 236.000

DIVIDED FLOW

3280 CROSS SECTION    236.00 EXTENDED       .30 FEET

470 ENCROACHMENT STATIONS=     1988.0    3440.0  TYPE=      1  TARGET=     1452.000
ELENCL=   1170.80  ELENCR= 100000.00
236.000     29.50   1180.30   1167.93   1180.30   1182.37      2.06       .42       .00   1169.30
50000.0    2252.3  226493.4   21254.3     701.2   18814.0    5441.4    1776.2     103.0   1169.30
.08         3.21     12.04      3.91      .050      .035      .050      .000   1150.80   1877.98
.001043     400.      400.      400.         2        11         0       .00   1509.99   3440.00

*SECNO 237.000

DIVIDED FLOW

ENCROACHMENT STATIONS=     1939.0    3350.0  TYPE=      1  TARGET=     1411.000
237.000     29.97   1181.17   1166.50   1181.17   1182.76      1.58       .34       .05   1180.60
50000.0        .0  234222.6   15777.4        .0   22539.9    4537.3    2009.1     115.7   1170.00
.09         .00     10.39      3.48      .000      .035      .050      .000   1151.20   1939.00
.000761     390.      390.      390.         2        11         0       .00   1332.96   3350.00

SECNO 238.000

ENCROACHMENT STATIONS=     2102.0    3600.0  TYPE=      1  TARGET=     1498.000
238.000     30.14   1181.84   1165.60   1181.84   1183.10      1.26       .31       .03   1181.50
250000.0        .0  239580.6   10419.4        .0   26116.2    3969.9    2334.2     131.6   1170.50
.11         .00      9.17      2.62      .000      .035      .050      .000   1151.70   2102.00
.000529     550.      500.      470.         2        14         0       .00   1498.00   3600.00

SECNO 239.000

3470 ENCROACHMENT STATIONS=     2005.0    3460.0  TYPE=      1  TARGET=     1455.000
239.000     29.93   1182.13   1165.86   1182.13   1183.34      1.22       .24       .00   1181.80
50000.0        .0  239823.0   10177.0        .0   26600.5    3856.1    2654.8     147.3   1170.70
.12         .00      9.02      2.64      .000      .035      .050      .000   1152.20   2005.00
.000515     455.      460.      470.         3        14         0       .00   1455.00   3460.00
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 SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
 Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
 TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
 SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

CHV=     .300 CEHV=     .500
*SECNO 240.100

0 ENCROACHMENT STATIONS=     5000.0    5850.0  TYPE=      1  TARGET=      850.000
 240.100     29.50   1182.25   1167.25   1182.25   1183.91      1.66       .35       .22   1233.10
50000.0        .0  250000.0        .0        .0   24155.9        .0    3003.3     161.1 100000.00
    .14       .00     10.35       .00      .000      .035      .000      .000   1152.75   5000.85
 .000710     580.      570.      370.         2        11         0       .00    848.30   5849.15


SPECIAL BRIDGE

 XK        XKOR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
  1.05      1.56      2.60       .00    790.00    125.00  27619.00      1.00   1152.78   1152.18

CNO 240.200
LASS A LOW FLOW

0 BRIDGE W.S.=    1181.75 BRIDGE VELOCITY=      12.30     CALCULATED CHANNEL AREA=     20107.

EGPRS      EGLWC      H3       QWEIR      QLOW      BAREA   TRAPEZOID      ELLC      ELTRD     WEIRLN
                                                            AREA
    .00   1184.35       .56        0.   250000.    27619.    27619.     1192.00   1206.00        0.


470 ENCROACHMENT STATIONS=     5000.0    5867.0  TYPE=      1  TARGET=      867.000
 240.200     30.03   1182.81       .00   1182.81   1184.35      1.54       .44       .00   1233.10
50000.0        .0  250000.0        .0        .0   25120.7        .0    3021.4     161.7 100000.00
    .14       .00      9.95       .00      .000      .035      .000      .000   1152.78   5000.29
 .000640      32.       32.       32.         0         0         0       .00    866.43   5866.71


SECNO 240.300

0 ENCROACHMENT STATIONS=     5000.0    5925.0  TYPE=      1  TARGET=      925.000
 240.300     30.26   1183.15   1166.52   1183.15   1184.48      1.32       .06       .06   1233.30
250000.0        .0  250000.0        .0        .0   27069.4        .0    3084.9     163.9 100000.00
    .14       .00      9.24       .00      .000      .035      .000      .000   1152.89   5000.15
 .000543     106.      106.      106.         2        14         0       .00    924.71   5924.85


CNO 240.400
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 SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
 Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
 TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
 SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

0 CROSS SECTION    240.40 EXTENDED       .03 FEET

0 ENCROACHMENT STATIONS=     5000.0    5984.0  TYPE=      1  TARGET=      984.000
 240.400     30.44   1183.43   1166.05   1183.43   1184.58      1.15       .05       .05   1233.40
250000.0       .0  250000.0       .0       .0   29030.3       .0    3153.1     166.2 100000.00
    .15       .00      8.61       .00      .000      .035      .000      .000   1152.99   5000.00
.000467      106.      106.      106.         2        14         0       .00    984.00   5984.00


SPECIAL BRIDGE

 XK        XKOR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
  1.05      1.56      2.60       .00    900.00    180.00  24786.00      1.00   1153.08   1152.99

CNO 240.500
0 CROSS SECTION    240.50 EXTENDED       .36 FEET

SS A LOW FLOW

3420 BRIDGE W.S.=    1182.63 BRIDGE VELOCITY=      11.27     CALCULATED CHANNEL AREA=     22153.

PRS       EGLWC       H3       QWEIR      QLOW      BAREA   TRAPEZOID      ELLC      ELTRD     WEIRLN
                                                            AREA
    .00   1184.91      .43        0.   250000.    24786.    24786.     1186.00   1199.00        0.


0 ENCROACHMENT STATIONS=     5000.0    6020.0  TYPE=      1  TARGET=     1020.000
240.500     30.78   1183.86       .00   1183.86   1184.91      1.05       .32       .00   1233.50
250000.0       .0  250000.0       .0       .0   30472.1       .0    3211.2     168.2 100000.00
    .15       .00      8.20       .00      .000      .035      .000      .000   1153.08   5000.00
.000417       85.       85.       85.         0         0         0       .00   1020.00   6020.00


CNO 240.600
0 CROSS SECTION    240.60 EXTENDED       .37 FEET

0 ENCROACHMENT STATIONS=     5000.0    6052.0  TYPE=      1  TARGET=     1052.000
 240.600     30.83   1183.97   1165.59   1183.97   1184.95       .98       .02       .02   1233.60
250000.0       .0  250000.0       .0       .0   31506.5       .0    3252.4     169.6 100000.00
    .15       .00      7.93       .00      .000      .035      .000      .000   1153.14   5000.00
.000388       58.       58.       58.         2        18         0       .00   1052.00   6052.00
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 SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
 Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
 TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
 SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

SECNO 241.100
3280 CROSS SECTION    241.10 EXTENDED       .47 FEET

3470 ENCROACHMENT STATIONS=     5000.0    6084.0  TYPE=      1  TARGET=     1084.000
  241.100     30.87   1184.07   1165.39   1184.07   1184.99       .92       .02       .02   1233.60
 250000.0        .0  250000.0        .0        .0   32543.5        .0    3295.8     171.0 100000.00
     .15       .00      7.68       .00      .000      .035      .000      .000   1153.20   5000.00
 .000362       59.       59.       59.         2        18         0       .00   1084.00   6084.00

SPECIAL BRIDGE

SB  XK        XKOR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
    1.05      1.56      2.60       .00   1025.00    130.00  30403.00      1.00   1153.23   1153.20

SECNO 241.200
3280 CROSS SECTION    241.20 EXTENDED       .56 FEET

CLASS A LOW FLOW

3470 BRIDGE W.S.=    1183.78 BRIDGE VELOCITY=       8.84     CALCULATED CHANNEL AREA=     28279.

 EGPRS      EGLWC       H3       QWEIR      QLOW      BAREA   TRAPEZOID      ELLC     ELTRD     WEIRLN
                                                                  AREA
     .00   1185.14       .18        0.   250000.    30403.    30403.     1186.00   1192.00        0.

3470 ENCROACHMENT STATIONS=     5000.0    6100.0  TYPE=      1  TARGET=     1100.000
  241.200     31.03   1184.26       .00   1184.26   1185.14       .88       .15       .00   1233.70
 250000.0        .0  250000.0        .0        .0   33199.3        .0    3317.7     171.7 100000.00
     .15       .00      7.53       .00      .000      .035      .000      .000   1153.23   5000.00
 .000346       29.       29.       29.         0         0         0       .00   1100.00   6100.00

SECNO 242.000
3280 CROSS SECTION    242.00 EXTENDED       .68 FEET

3470 ENCROACHMENT STATIONS=     5000.0    6390.0  TYPE=      1  TARGET=     1390.000
  242.000     31.28   1184.68   1166.95   1184.68   1185.34       .66       .14       .07   1183.90
 250000.0        .0  250000.0        .0        .0   38260.4        .0    3678.6     184.3 100000.00
     .17       .00      6.53       .00      .000      .035      .000      .000   1153.40   5000.00
 .000298      510.      440.      420.         2        18         0       .00   1390.00   6390.00
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SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

CHV=     .100 CEHV=     .300
*SECNO 243.000
0 CROSS SECTION    243.00 EXTENDED      1.06 FEET

0 ENCROACHMENT STATIONS=     5000.0    6645.0  TYPE=      1  TARGET=     1645.000
243.000     31.33   1185.06   1164.96   1185.06   1185.49       .43       .13       .02   1184.50
250000.0        .0  250000.0        .0        .0   47460.7        .0    4160.7     201.4 100000.00
    .20       .00      5.27       .00      .000      .040      .000      .000   1153.73   5000.00
.000236      500.      490.      500.         2        22         0       .00   1645.00   6645.00

CNO 244.000

470 ENCROACHMENT STATIONS=     5000.0    6945.0  TYPE=      1  TARGET=     1945.000
244.000     31.03   1185.17   1168.11   1185.17   1185.67       .49       .15       .02   1184.80
50000.0        .0  223588.4   26411.6        .0   38373.8    7187.0    4733.2     223.5   1174.00
    .22       .00      5.83      3.67      .000      .040      .050      .000   1154.14   5000.00
.000342      495.      535.      550.         2        14         0       .00   1945.00   6945.00

*SECNO 245.000

0 ENCROACHMENT STATIONS=     5000.0    7215.0  TYPE=      1  TARGET=     2215.000
245.000     30.12   1185.32   1170.92   1185.32   1185.91       .59       .22       .03   1185.10
250000.0        .0  239331.3   10668.7        .0   38076.3    4134.7    5266.5     248.1   1178.00
    .25       .00      6.29      2.58      .000      .040      .050      .000   1155.20   5000.00
.000464      550.      550.      390.         2         8         0       .00   2215.00   7215.00
```

TN SECNO 234 TO 235

TOTAL AREA	AVG VELOCITY	MAX DEPTH	AVG DEPTH	TOF WIDTH	TOP WIDTH
272.7	2.25	3.80	3.40	390.0	373.9

ASQ	QCOMP	ERRAC	TASQ	TCQ	TABER	NITER	DSWS	USWS	DSSNO	USSNO
2864.22	2865.57	.05	2864.22	2865.57	.05	7	1179.255	1179.876	234.000	235.000

TN SECNO 233 TO 234

TOTAL AREA	AVG VELOCITY	MAX DEPTH	AVG DEPTH	TOF WIDTH	TOP WIDTH
219.1	2.11	3.26	2.94	415.0	415.0

ASQ	QCOMP	ERRAC	TASQ	TCQ	TABER	NITER	DSWS	USWS	DSSNO	USSNO
2572.84	2574.34	.06	5437.06	5439.91	.05	7	1178.620	1179.255	233.000	234.000

TN SECNO 232 TO 233

TOTAL AREA	AVG VELOCITY	MAX DEPTH	AVG DEPTH	TOF WIDTH	TOP WIDTH
387.7	1.33	2.62	1.31	485.0	296.0

ASQ	QCOMP	ERRAC	TASQ	TCQ	TABER	NITER	DSWS	USWS	DSSNO	USSNO
516.26	516.12	.03	5953.32	5956.03	.05	7	1174.327	1178.620	232.000	233.000

THIS RUN EXECUTED 04SEP92 15:59:18

****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

SPF.DAT

SUMMARY PRINTOUT

SECNO	CWSEL	VLOB	VCH	VROB	QLOB	QCH	QROB	Q	TOPWID	SSTA	ENDST
120.500	1168.59	6.58	12.16	.00	2453.35	243106.70	.00	245560.00	1085.89	390.61	1476.50
122.000	1168.76	6.74	12.44	.00	2523.75	243036.30	.00	245560.00	1062.99	388.55	1451.54
122.650	1168.86	6.79	12.49	.00	2552.64	243007.40	.00	245560.00	1063.18	388.46	1451.63
123.550	1170.71	6.08	11.24	.00	2458.20	243101.80	.00	245560.00	1069.53	389.18	1458.71
124.000	1170.76	6.33	11.25	.00	3004.57	242555.40	.00	245560.00	1083.78	378.14	1461.92
228.000	1171.18	.00	11.13	.00	.00	245560.00	.00	245560.00	954.03	1595.00	2601.08
229.000	1171.56	.00	11.56	.00	.00	239606.70	.00	239606.70	895.21	1745.00	2694.06
230.000	1171.54	.00	14.68	4.91	.00	238453.50	1153.16	239606.70	744.99	1615.00	2413.84
231.000	1169.52	6.25	23.19	5.91	1230.27	236826.80	1549.59	239606.70	623.32	2068.47	2745.65
232.000	1174.33	6.44	19.29	5.38	2013.02	229999.20	7594.47	239606.70	841.05	2075.11	2970.00
233.000	1178.62	4.90	13.36	4.31	12574.11	201709.00	30279.87	244562.90	1811.19	1755.00	3620.00
234.000	1179.26	2.99	12.64	3.99	1819.10	218558.80	26757.92	247135.80	1720.19	1880.00	3670.00
235.000	1179.88	4.55	12.19	3.79	4844.21	220895.20	24260.62	250000.00	1676.22	1891.77	3620.00
236.000	1180.30	3.21	12.04	3.91	2252.32	226493.40	21254.25	250000.00	1509.99	1877.98	3440.00
237.000	1181.17	.00	10.39	3.48	.00	234222.60	15777.41	250000.00	1332.96	1939.00	3350.00
238.000	1181.84	.00	9.17	2.62	.00	239580.60	10419.42	250000.00	1498.00	2102.00	3600.00
239.000	1182.13	.00	9.02	2.64	.00	239823.00	10177.01	250000.00	1455.00	2005.00	3460.00

SECNO	CWSEL	VLOB	VCH	VROB	QLOB	QCH	QROB	Q	TOPWID	SSTA	ENDST
240.100	1182.25	.00	10.35	.00	.00	250000.00	.00	250000.00	848.30	5000.85	5849.15
240.200	1182.81	.00	9.95	.00	.00	250000.00	.00	250000.00	866.43	5000.29	5866.71
240.300	1183.15	.00	9.24	.00	.00	250000.00	.00	250000.00	924.71	5000.15	5924.85
240.400	1183.43	.00	8.61	.00	.00	250000.00	.00	250000.00	984.00	5000.00	5984.00
240.500	1183.86	.00	8.20	.00	.00	250000.00	.00	250000.00	1020.00	5000.00	6020.00
240.600	1183.97	.00	7.93	.00	.00	250000.00	.00	250000.00	1052.00	5000.00	6052.00
241.100	1184.07	.00	7.68	.00	.00	250000.00	.00	250000.00	1084.00	5000.00	6084.00
241.200	1184.26	.00	7.53	.00	.00	250000.00	.00	250000.00	1100.00	5000.00	6100.00
242.000	1184.68	.00	6.53	.00	.00	250000.00	.00	250000.00	1390.00	5000.00	6390.00
243.000	1185.06	.00	5.27	.00	.00	250000.00	.00	250000.00	1645.00	5000.00	6645.00
244.000	1185.17	.00	5.83	3.67	.00	223588.40	26411.64	250000.00	1945.00	5000.00	6945.00
245.000	1185.32	.00	6.29	2.58	.00	239331.30	10668.69	250000.00	2215.00	5000.00	7215.00

SPF.DAT

MARY PRINTOUT

SECNO	CWSEL	CRIWS	EG	ELMIN	DEPTH	10*KS	K*CHSL	XLCH	SHEAR	FRCH
120.500	1168.59	1161.13	1170.87	1147.00	21.59	15.86	.00	.00	1.92	.49
122.000	1168.76	1161.51	1171.15	1147.20	21.56	16.65	1.32	152.00	2.01	.50
122.650	1168.86	1161.68	1171.26	1147.20	21.66	16.82	.00	65.00	2.02	.50
123.550	1170.71	.00	1172.66	1147.31	23.40	12.00	1.22	90.00	1.59	.43
124.000	1170.76	1161.62	1172.71	1147.40	23.36	12.16	2.00	45.00	1.60	.43
228.000	1171.18	1160.63	1173.10	1147.70	23.48	11.51	.94	320.00	1.58	.42
229.000	1171.56	1161.33	1173.63	1148.10	23.46	12.58	1.05	380.00	1.72	.44
230.000	1171.54	1163.81	1174.87	1148.40	23.14	20.92	.80	375.00	2.79	.56
231.000	1169.52	1168.73	1177.78	1148.80	20.72	61.54	1.00	400.00	7.05	.95
232.000	1174.33	1170.01	1179.89	1149.20	25.13	33.98	.95	420.00	4.69	.72
* 233.000	1178.62	1170.75	1180.96	1149.60	29.02	13.52	1.04	385.00	2.18	.46
234.000	1179.26	1167.83	1181.48	1150.00	29.26	11.75	1.00	400.00	1.93	.43
235.000	1179.88	1167.85	1181.94	1150.40	29.48	10.76	1.00	400.00	1.79	.42
236.000	1180.30	1167.93	1182.37	1150.80	29.50	10.43	1.00	400.00	1.75	.41
237.000	1181.17	1166.50	1182.76	1151.20	29.97	7.61	1.03	390.00	1.26	.36
238.000	1181.84	1165.60	1183.10	1151.70	30.14	5.29	1.00	500.00	.97	.30
239.000	1182.13	1165.86	1183.34	1152.20	29.93	5.15	1.09	460.00	.94	.29
240.100	1182.25	1167.25	1183.91	1152.75	29.50	7.10	.96	570.00	1.26	.34
240.200	1182.81	.00	1184.35	1152.78	30.03	6.40	.94	32.00	1.16	.33
240.300	1183.15	1166.52	1184.48	1152.89	30.26	5.43	1.04	106.00	.99	.30
240.400	1183.43	1166.05	1184.58	1152.99	30.44	4.67	.94	106.00	.86	.28
240.500	1183.86	.00	1184.91	1153.08	30.78	4.17	1.06	85.00	.78	.26
240.600	1183.97	1165.59	1184.95	1153.14	30.83	3.88	1.04	58.00	.73	.26
241.100	1184.07	1165.39	1184.99	1153.20	30.87	3.62	1.02	59.00	.68	.25

SECNO	CWSEL	CRIWS	EG	ELMIN	DEPTH	10*KS	K*CHSL	XLCH	SHEAR	FRCH
241.200	1184.26	.00	1185.14	1153.23	31.03	3.46	1.04	29.00	.65	.24
242.000	1184.68	1166.95	1185.34	1153.40	31.28	2.98	.39	440.00	.51	.22
243.000	1185.06	1164.96	1185.49	1153.73	31.33	2.36	.67	490.00	.42	.17
244.000	1185.17	1168.11	1185.67	1154.14	31.03	3.42	.77	535.00	.53	.21
245.000	1185.32	1170.92	1185.91	1155.20	30.12	4.64	1.93	550.00	.64	.23

MMARY OF ERRORS AND SPECIAL NOTES

NING SECNO= 231.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 233.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

APPENDIX C: SCOUR CALCULATIONS

100-YEAR EVENT GFLUVIAL RESULTS

SECTION	INIT EL	90.55	234.55	MIN ELEV	SCOUR
120.50	1147.00	1147.00	1147.00	1147.00	0.00
122.00	1147.20	1147.95	1148.68	1147.95	0.75
122.60	1147.20	1146.93	1147.64	1146.93	-0.27
124.00	1147.40	1148.65	1149.47	1148.65	1.25
228.00	1147.70	1151.14	1150.81	1150.81	3.11
229.00	1148.10	1151.77	1150.49	1150.49	2.39
230.00	1148.40	1149.05	1148.42	1148.42	0.02
231.00	1148.80	1145.47	1144.20	1144.20	-4.60
232.00	1149.30	1145.41	1144.73	1144.73	-4.57
233.00	1149.60	1145.37	1145.11	1145.11	-4.49
234.00	1150.00	1147.39	1145.40	1145.40	-4.60
235.00	1150.40	1147.81	1146.54	1146.54	-3.86
236.00	1150.80	1148.42	1147.38	1147.38	-3.42
237.00	1151.20	1150.55	1149.53	1149.53	-1.67
238.00	1151.69	1151.10	1150.21	1150.21	-1.48
239.00	1152.20	1151.91	1151.96	1151.91	-0.29
240.00	1152.70	1152.70	1152.70	1152.70	0.00
241.00	1153.20	1153.20	1153.20	1153.20	0.00
242.00	1150.00	1150.05	1150.82	1150.05	0.05
243.00	1140.00	1145.30	1148.85	1145.30	5.30
244.00	1150.00	1148.42	1147.71	1147.71	-2.29
245.00	1148.00	1148.12	1148.39	1148.12	0.12
246.00	1150.00	1154.47	1154.78	1154.47	4.47
247.00	1150.00	1146.76	1146.76	1146.76	-3.24
248.00	1142.00	1142.03	1142.07	1142.03	0.03
249.00	1142.00	1142.25	1143.19	1142.25	0.25
250.00	1150.00	1152.34	1154.18	1152.34	2.34
251.00	1149.99	1154.55	1154.27	1154.27	4.28
252.00	1164.00	1156.30	1156.37	1156.30	-7.70
253.00	1170.00	1162.02	1162.07	1162.02	-7.98
254.00	1138.50	1143.00	1143.00	1143.00	4.50
255.00	1148.10	1148.10	1148.10	1148.10	0.00
256.00	1150.00	1151.22	1151.69	1151.22	1.22
257.00	1157.50	1154.29	1153.09	1153.09	-4.41

$\frac{-5.73}{9} = 0.64'$

"SUPERFLOOD" GFLUVIAL RESULTS

SECTION	INIT EL	90.55	234.55	MIN ELEV	SCOUR
120.50	1147.00	1147.00	1147.00	1147.00	0.00
122.00	1147.20	1148.41	1148.71	1148.41	1.21
122.60	1147.20	1146.55	1145.87	1145.87	-1.33
124.00	1147.40	1149.62	1148.54	1148.54	1.14
228.00	1147.70	1151.49	1149.70	1149.70	2.00
229.00	1148.10	1151.90	1149.80	1149.80	1.70
230.00	1148.40	1148.96	1148.21	1148.21	-0.19
231.00	1148.80	1145.88	1143.79	1143.79	-5.01
232.00	1149.30	1144.66	1144.22	1144.22	-5.08
233.00	1149.60	1143.98	1146.13	1143.98	-5.62
234.00	1150.00	1146.94	1144.86	1144.86	-5.14
235.00	1150.40	1147.40	1145.83	1145.83	-4.57
236.00	1150.80	1148.21	1146.74	1146.74	-4.06
237.00	1151.20	1150.58	1149.02	1149.02	-2.18
238.00	1151.70	1150.79	1149.43	1149.43	-2.27
239.00	1152.20	1151.81	1151.93	1151.81	-0.39
240.00	1152.70	1152.70	1152.70	1152.70	0.00
241.00	1153.20	1153.20	1153.20	1153.20	0.00
242.00	1150.00	1150.09	1151.20	1150.09	0.09
243.00	1140.00	1146.79	1150.44	1146.79	6.79
244.00	1150.00	1148.43	1148.03	1148.03	-1.97
245.00	1148.00	1148.10	1148.36	1148.10	0.10
246.00	1150.00	1154.03	1154.38	1154.03	4.03
247.00	1150.00	1146.16	1146.16	1146.16	-3.84
248.00	1142.00	1142.04	1142.09	1142.04	0.04
249.00	1142.00	1142.32	1143.96	1142.32	0.32
250.00	1150.00	1152.85	1156.16	1152.85	2.85
251.00	1150.00	1155.17	1155.96	1155.17	5.17
252.00	1164.00	1155.99	1156.00	1155.99	-8.01
253.00	1170.00	1162.09	1162.15	1162.09	-7.91
254.00	1138.50	1143.00	1143.00	1143.00	4.50
255.00	1148.10	1148.10	1148.10	1148.10	0.00
256.00	1150.00	1151.37	1151.92	1151.37	1.37
257.00	1157.50	1153.78	1152.17	1152.17	-5.33

$\frac{-6.81}{9} = 0.76'$

I) 100-YEAR HYDRAULIC CONDITIONS:

DEPTH = 28.8 ft
AVERAGE VELOCITY = 7.3 fps

DUNE SCOUR:

$$A = 0.0655\, d^{1.209} \quad \text{(ALLEN, 1963)}$$

$$A = 0.0655\,(28.8)^{1.209}$$
$$A = 3.8 \text{ ft}$$

$$Y_s = \tfrac{1}{2}(3.8') = \underline{1.9 \text{ ft}}$$

ANTIDUNE SCOUR:

$$Y_s = \left(\frac{V}{8.56}\right)^2 \quad \text{(ADWR, 1985)}$$

$$Y_s = \left(\frac{7.3}{8.56}\right)^2$$

$$\underline{Y_s = 0.7 \text{ ft}}$$

II) "SUPERFLOOD" HYDRAULIC CONDITIONS:

DEPTH = 30.9 ft
AVERAGE VELOCITY = 7.7 fps

DUNE SCOUR: $Y_s = \frac{1}{2}\left[0.0655\,(30.9)^{1.209}\right]$

$$Y_s = \underline{2.1 \text{ ft}}$$

ANTIDUNE SCOUR: $Y_s = \left(\frac{7.7}{8.56}\right)^2$

$$Y_s = \underline{0.8 \text{ ft}}$$

DESIGN BED-FORM SCOUR DEPTH = $\underline{\underline{2.0 \text{ ft}}}$

CSU EQUATION:

PIER DIAMETER (ft)	100-YEAR SCOUR DEPTH (ft)	SUPERFLOOD SCOUR DEPTH (ft)
8	20.4	21.1
9	21.5	22.2
10	22.5	23.3

LARSEN EQUATION:

PIER DIAMETER (ft)	100-YEAR SCOUR DEPTH (ft)	"SUPERFLOOD" SCOUR DEPTH (ft)
8	20.3	21.0
9	21.1	21.9
10	21.9	22.7

RECOMMENDATIONS: USE A SINGLE PIER SCOUR DEPTH FOR EACH FLOOD EVENT.

"100-YEAR" FLOOD = 22 ft

"SUPERFLOOD" = 23 ft

GENERAL / ASSUMPTIONS:

1. PIER SCOUR WILL BE CALCULATED FOR THREE PIER DIAMETERS OF 8', 9', AND 10' (CIRCULAR PIERS).
2. A DEBRIS WIDTH OF 4 FEET IS ASSUMED.
3. SQUARE NOSE PIERS ARE ASSUMED DUE TO DEBRIS.

AVERAGE HYDRAULIC CONDITIONS:

FREQUENCY	VELOCITY (fps)	DEPTH (ft)
100-YEAR	8.2	28.4
"SUPERFLOOD"	8.7	30.5

CSU EQN: (HEC-18)

$$Y_s = 2.2 \left(\frac{a}{Y_1}\right)^{0.65} F_r^{0.43} Y_1$$

WHERE:
Y_s = LOCAL PIER SCOUR DEPTH, ft
a = EFFECTIVE PIER WIDTH, ft
Y_1 = FLOW DEPTH U/S OF PIER, ft
F_r = FROUDE NUMBER

$a = 8'\phi$ PIER + 4' DEBRIS = 12'

$$Y_s = 2.2 \left(\frac{12}{28.4}\right)^{0.65} \left[\frac{8.2}{(32.2(28.4))^{1/2}}\right]^{0.43} (28.4)$$

$Y_s = 20.4$ ft

LARSEN EQN: (FHWA-RD-79-103)

$$\frac{a}{D} = 5.5\,\frac{Y_s}{D}\left[\left(\frac{Y_s}{11.5D}+1\right)^{1.7}-1\right]$$

$$\frac{a}{Y_s} = 5.5\left[\left(\frac{Y_s}{11.5D}+1\right)^{1.7}-1\right]$$

$$Y_s = a\Big/5.5\left[\left(\frac{Y_s}{11.5D}+1\right)^{1.7}-1\right]$$

WHERE: Y_s = LOCAL PIER SCOUR DEPTH, ft
a = EFFECTIVE PIER WIDTH, ft
D = FLOW DEPTH, ft

$a = 8'\phi$ PIER + 4' DEBRIS = 12'

TRY: $Y_s = 21'$

$$Y_s = 12\Big/5.5\left[\left(\frac{21}{11.5(28.4)}+1\right)^{1.7}-1\right]$$

$$Y_s = 19.52 < 21$$

TRY: $Y_s = 20.25$

$$Y_s = 12\Big/5.5\left[\left(\frac{20.25}{11.5(28.4)}+1\right)^{1.7}-1\right]$$

$$\underline{\underline{Y_s = 20.26}} \simeq 20.25$$