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FINAL DRAINAGE REPORT
FOR
UNION HILLS DRIVE BRIDGE
AT NEW RIVER

JULY 13, 1995

PREPARED FOR:
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION

PREPARED BY:

HDR Engineering
5353 North 16th Street, Suite 205
Phoenix, AZ 85016-3226
(602)248-6600

Registered Professional Engineer (Civil)
CERTIFICATE NO.
25972
MICHAEL D.
HEATON
Date Signed 7-13-95
ARIZONA, U.S.A.

PEO7

FINAL DRAINAGE REPORT
FOR
UNION HILLS DRIVE BRIDGE
AT NEW RIVER

JULY 13, 1995

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INITIAL DRAINAGE REPORT
For
PROPOSED UNION HILLS BRIDGE AT NEW RIVER

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HDR ENGINEERING, INC. • OFFICES NATIONWIDE • 1-800-366-4411

METRIC CONVERSIONS

	MULTIPLY	BY	TO OBTAIN
LENGTH	inches (in)	25.40	millimeters (mm)
	feet (ft)	0.3048	meters (m)
	yards (yd)	0.9144	meters (m)
	miles (mi)	1.609	kilometers (km)
AREA	square inches (in²)	645.2	square millimeter (mm²)
	square feet (ft²)	0.09290	square meters (m²)
	acre (ac)	0.4047	hectares (ha)
	square miles (mi²)	2.590	square kilometers (km²)
VOLUME	gallons (gal)	3.785	Liter (L)
	cubic feet (ft³)	0.02832	cubic meters (m³)
	cubic yards (yd³)	0.7646	cubic meters (m³)
	acre-feet (ac-ft)	1233	m³
MASS	pound (lb)	0.4536	kilogram (kg)
	short ton (2000 lb)	907.2	kilogram (kg)
ENERGY	1000 Btu	0.2931	kilowatt-hr (kW-h)
	horsepower (hp)	0.7457	kilowatts (kW)
PRESSURE	atmosphere (atm)	101.3	kilopascal (kPa)
	feet water (ft H_2O)	0.3048	meters water (m H_2O)
	pounds per square inch (psi)	6.895	kilopascal (kPa)
	inches mercury (in Hg)	3.377	kilopascal (kPa)
PREFIXES	$\mu = 10^{-6}$; $m = 10^{-3}$; $k = 10^{3}$; $M = 10^{6}$		

METRIC CONVERSIONS

	MULTIPLY	BY	TO OBTAIN
FLOW	mgd	3.785	megaliter per day (ML/d)
	mgd	3785	cubic meter per day (m³/d)
	gpm	0.2271	cubic meter per hour (m³/h)
	cfs	0.02832	cubic meter per second (m³/s)
	cfm	0.4719	liter per second (L/s)
VELOCITY	ft/sec	0.3048	meter per second (m/s)
LOADING RATES	gpd/ft²	0.04074	m³/(m²-d) or m/d
	gpm/ft²	2.445	m³/(m²-h) or m/h
	lb/(d-ft²)	4.882	kg/(m²-d)
	lb/1000 ft³	0.01602	kg/m³
	lb/(ac-d)	1.121	kg/(ha-d)
	hp/1000 ft³	0.02633	kW/m³
MIXING TEMPERATURE	°C = (°F − 32)/1.8		

CONSTANTS	METRIC		ENGLISH	
Water density @ 4 °C	1000	kg/m³	62.4	lb/ft³
Dynamic viscosity @ 20 °C	1.002×10^{-3}	N-s/m	2.05×10^{-5}	lb-sec/ft
Kinematic viscosity @ 20 °C	1.003×10^{-6}	m²/s	1.06×10^{-5}	ft²/sec
Gravity acceleration	9.81	m/s²	32.2	ft/sec²
Atmospheric pressure	101.3	kPa	14.7	psi
Atmospheric pressure	10.3	m H_2O	33.9	ft H_2O

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1.0 Introduction

1.1 Location

Union Hills Drive crosses New River immediately east of 83rd Avenue in Glendale Arizona. As seen on the Location Map (figure 1), this location is west of the City of Glendale's Arrowhead Waste Water Treatment Plant and SR 101 freeway. The immediate area is developing very rapidly and the need for an all weather crossing of the New River along Union Hills is essential. The area west of 83rd Avenue and between New River and 83rd Avenue North of Union Hills Drive is in the City of Peoria.

1.2 Background

The existing Union Hills Drive and 83rd Avenue crossings of New River are roadway dip sections, common to the desert southwest. Even the smallest of flows in New River inundate both the Union Hills Drive and 83rd Avenue roadways causing hazardous driving conditions. New River flows are controlled by New River Dam, eight miles (13 km) upstream. This dam provides peak flow attenuation. These reduced discharges however, continue over several weeks following significant rainfall events. Union Hills Drive and 83rd Avenue experience regular roadway closures following storms in the New River watershed. The nearest alternate route for both the motoring public and emergency vehicles is Bell Road, one mile to the South.

Maricopa County Highway Department has contracted with HDR to design a new bridge crossing on Union Hills Drive and a new 83rd Avenue dip section. The new bridge will be designed to pass flows in excess of the 100-year event. The 83rd Avenue dip section will be a dry weather crossing. Flows will pass over an improved roadway dip section. A storm drain which currently outlets downstream of the 83rd Avenue crossing will be extended to outlet downstream of the new crossing to prevent nuisance water from ponding along the roadway.

The existing HEC-2 Water Surface Profile hydraulic computer model analyzes the 100-year flood condition. The model provided by the Flood Control District of Maricopa County (FCDMC) was completed in 1985. The U. S. Army Corps of Engineers (COE) prepared the FIS study analysis. The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) are based on the results of the COE hydraulic model. The COE also modeled the New River Dam's impact on the flood's peak flow rate downstream of the dam. This analysis was for the future, fully developed watershed condition. Intergovernmental agreements between FCDMC and the COE established the criteria of no significant increase in the flood plain for the future fully developed condition for improvements to the wash. The model takes into consideration the flow rate exiting the New River Flood Control Dam constructed approximately eight miles (13 km) north of the Union Hills Crossing.

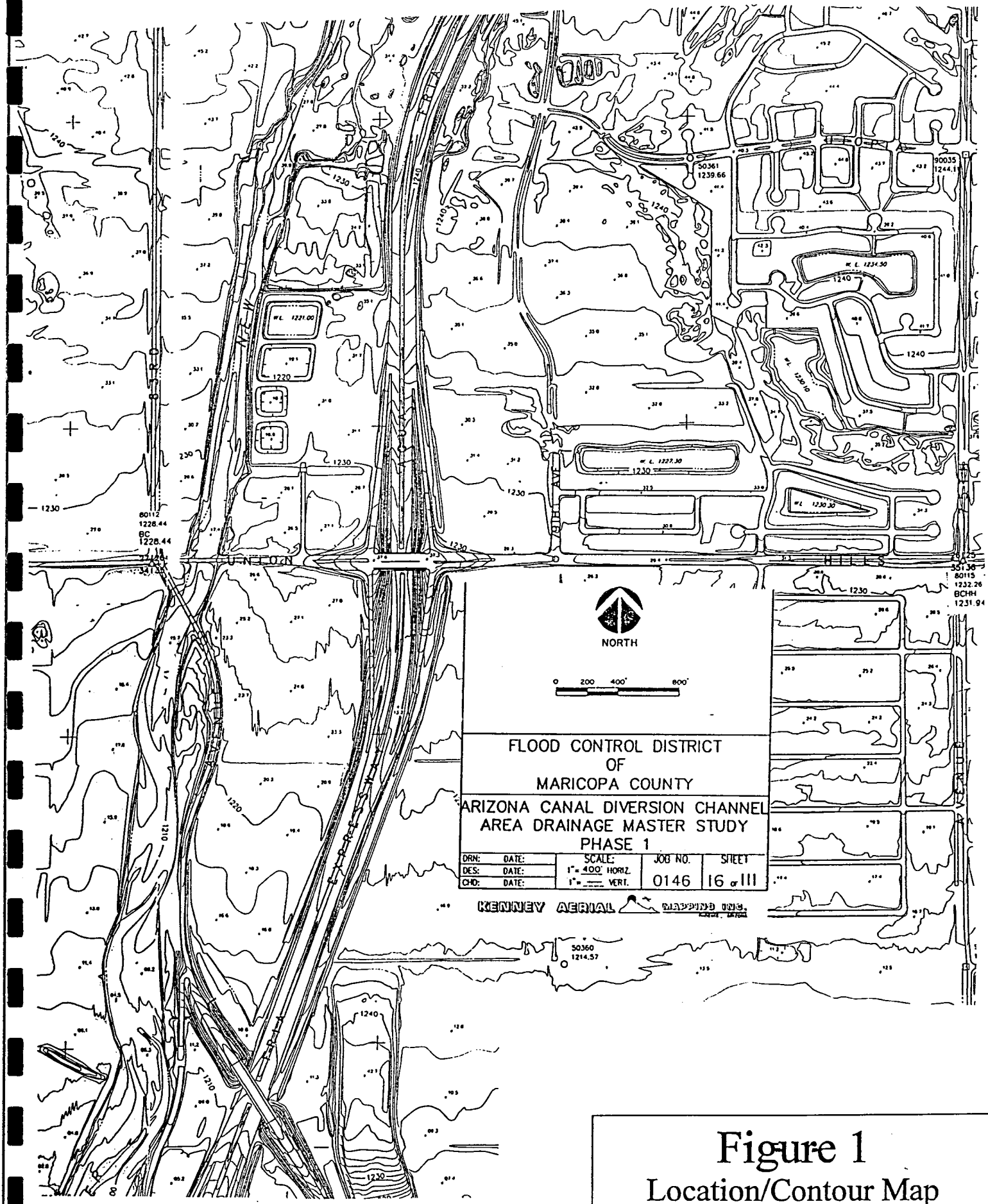


Figure 1
Location/Contour Map

HDR

1.3 Purpose

The purpose of this drainage report is to document the preliminary hydraulic analysis of New River, the preliminary design of the proposed Union Hills Drive bridge, and the proposed improvements for 83rd Avenue. This report presents the results of the hydraulic modeling of New River for both the existing and proposed bridge conditions. The Flood Insurance Study (FIS) hydraulic model provided by the Flood Control District of Maricopa County is used as the basis of this analysis.

This report also presents the hydrologic investigation for the on-site drainage for the bridge and the adjoining roadways. The design for roadway drainage, storm drains and bank stabilization included in this project is covered herein.

2.0 Existing Conditions

2.1 Bridge Site

The existing Union Hills Drive crossing of New River is a 2-lane, asphalt paved, at grade crossing. The invert of the road is slightly elevated above New River channel to allow for pavement drainage. All storm water that reaches Union Hills Drive must cross the paved surface or be impounded upstream of the roadway embankment. The river bed invert is approximately 150 feet (45.7 m) wide and 10 to 12 feet (3.1 to 3.7 m) deep. The channel is armored with 6" to 12" cobbles and a modest amount of vegetation is growing along the banks.

2.2 New River

The river banks have been stabilized upstream and downstream with gabion bank protection from the City of Glendale's Arrowhead Waste Water Reclamation Facility and also the development south of Union Hills Drive on the West. The design plans for the City of Glendale's Arrowhead Waste Water Reclamation Facility (AWWRF) indicate that the New River Channel Invert was modified during the bank stabilization activity for the treatment plant. One foot thick, wire tied gabion blankets were used along the east bank of New River, upstream of Union Hills Drive. The protection begins at the north end of the current AWWRF and continues south along the east bank of New River and ends 600 feet (182.9 m) upstream of Union Hills. The protection extends 12 feet (3.7 m) out into the river bottom and up the east bank to the top of the embankment, several feet above the 100-year water surface elevation. The modified topography reflecting this protected bank was included in the original COE FIS hydraulic model. Modified cross sections were added to the COE model as shown on the construction plans. These cross-sections were developed from the design plans and inserted in the model.

The west bank of New River has also been protected along a newly developed residential area. The bank protection in this area is also a wire tied gabion blanket. This bank protection was completed recently and is not reflected in the existing FIS HEC-2 model.

Downstream of the Union Hills Drive, a storm drain discharges into the river. The headwall at the outlet is within the channel, causing an adverse impact on the storm drain headwall and New River hydraulics

3.0 Design Criteria

3.1 Hydraulic Model

The existing FIS hydraulic model (COE, 1985) was modified to account for development changes to the river and also the proposed bridge over New River at Union Hills Drive. The construction plans for the bridge and associated roadways are in metric units. The HEC-2 program is able to analyze stream profiles using either English or metric data. However, because the existing FIS study was done in English units, and because regulatory agencies are required to utilize existing FIS mapping, the HEC-2 analysis was done in English for comparison to the existing, regulatory elevations. The results of the modeling effort will be converted to metric for the bridge and roadway plans.

3.2 Elevation Datum

The Union Hills Bridge project will be designed using the Maricopa County Highway Department metric design criteria. All plans will be done using the metric system. The HEC-2 data has been converted to metric for design purposes. The existing HEC-2 model for New River, as well as the regulatory elevations are on the FEMA elevation datum. FEMA requires that all information be on the National Geodetic Vertical Datum (NGVD) of 1929. Maricopa County Highway Department employs a project specific datum for each of their jobs. In this case the Maricopa County Highway Department datum is 1.64 feet (0.5 m) lower than the NGVD 1929 datum (1929NGVD+1.64ft=MCDOT). This equation was determined by comparing Elevation Reference Marks (ERMs) from the Arizona Canal Diversion Channel Area Drainage Master Study and the Maricopa County Highway Department project elevation datum.

Other datum in the area are the City of Glendale and the City of Peoria. To convert from the Maricopa County Highway Department datum to the City of Peoria, 1.403 feet must be subtracted. . To convert from the Maricopa County Highway Department datum to the City of Glendale, 1.363 feet must be subtracted. The basis of surveys for the Union Hills Bridge project is a brass cap in 83rd Avenue 105.5 feet north of Union Hills.

3.3 Cross Sections Verification

In order to verify datum conversions and account for topographic changes to the river bed, several of the FIS cross sections were re-surveyed for comparison purposes.

Additional cross sections were surveyed in the vicinity of the bridge in order to better determine the bridge's impact on the FIS water surface profiles. After making the conversion to NGVD, the surveyed cross sections were compared to the FIS cross sections. Figure 2 shows the comparison between the two sets of data.

3.4 Flow Rates

The existing condition 100-year peak is usually the regulatory flow rate for flood insurance purposes and is the discharge that FEMA requires local agencies to regulate. When the U. S. Army Corps of Engineers (COE) built the New River Dam, a more restrictive criteria was contractually agreed upon. The COE requires that the future condition storm water runoff for the 100-year event be regulated. Therefore, in this design, both flow rates were analyzed to determine the impact of the bridge on both water surface profiles. The existing condition flow rate for the 100-year storm is 10,500 cfs (297.4 cms). The future developed condition discharge as predicted by the COE is 15,500 cfs (439.0 cms). The existing condition (10,500cfs - 297.4cms) is the design flow for this project.

3.5 Flood Hazard Zone & Flood Plain Impact Criteria

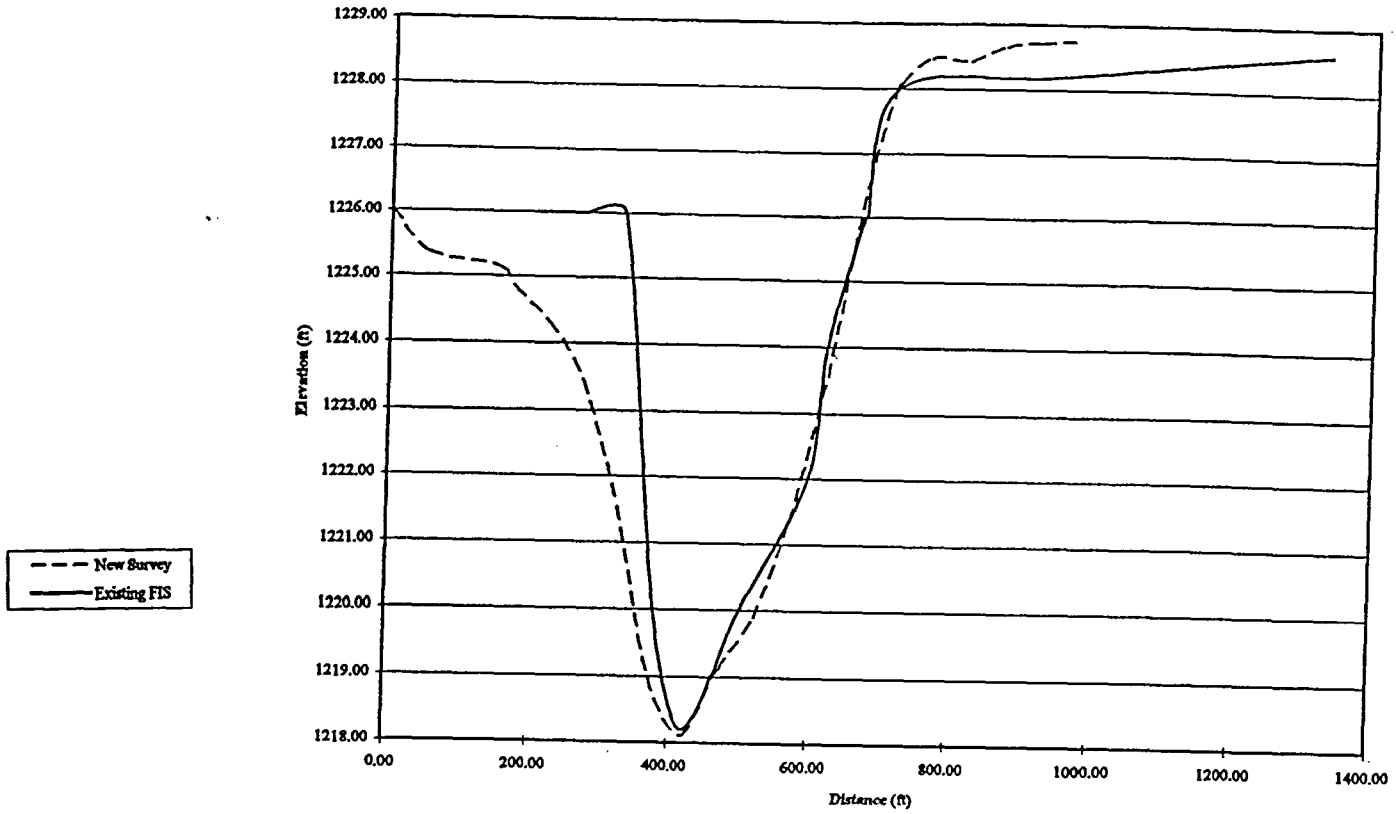
The area where the bridge will be built is in a FEMA regulated flood AE zone. The Flood Insurance Rate Map (FIRM) is for incorporated areas of Maricopa County (map number 1190F). Figure 3 shows a section of the FIRM for New River at Union Hills Drive. FCDMC along with the Cities of Glendale and Peoria are the regulatory agencies for New River. Normally, FEMA allows for encroachments within the flood plain that equate to up to 1 foot of elevation increase in the existing 100-year flood profile. As part of the intergovernmental agreement between the Flood Control District of Maricopa County and the Corps of Engineers for the construction of New River Dam, the allowable 1 foot increase in flood elevation was already accounted for in the COE study. A one-half foot elevation increase was agreed upon between the FCDMC and the MCDOT as a reasonable allowance for an increase in elevation for the new bridge structure. This criterion allows for an economical bridge length. The one-half foot of increase must stay within the channel upstream and not impact adjacent properties.

3.6 Freeboard

FCDMC has published guidelines for other criteria regarding bridge design including bridge freeboard. According to FCDMC Drainage Design Manual, Volume II, Hydraulics (September 1992), the minimum allowance for freeboard for a 50-year or greater flow is two feet plus the velocity head for the flow through the bridge. This is an agency guideline and the FCDMC and MCDOT agreed to allow some latitude in this guideline. Several governing criteria were imposed upon the bridge and roadway designers. The freeboard guideline caused the Union Hills Drive and 83rd Avenue intersection to be raised substantially. This meant that a large amount of existing roadway would have to be rebuilt with this project. Also, 83rd Avenue dip section, for

the design speed desired would not meet New River invert elevation within the channel. Therefore, an agreement between FCDMC and MCDOT was made to adopt a minimum freeboard guideline for this project of one half foot above the COE future condition profile for the flow rate of 15,500 cfs (439.0 cms). This condition is for the proposed bridge condition. This allows the FEMA 100-year flow rate to pass with approximately 2 feet (0.610 m) of freeboard.

Union Hills C/L Cross Section 10.989



FIS Cross Section 11.188

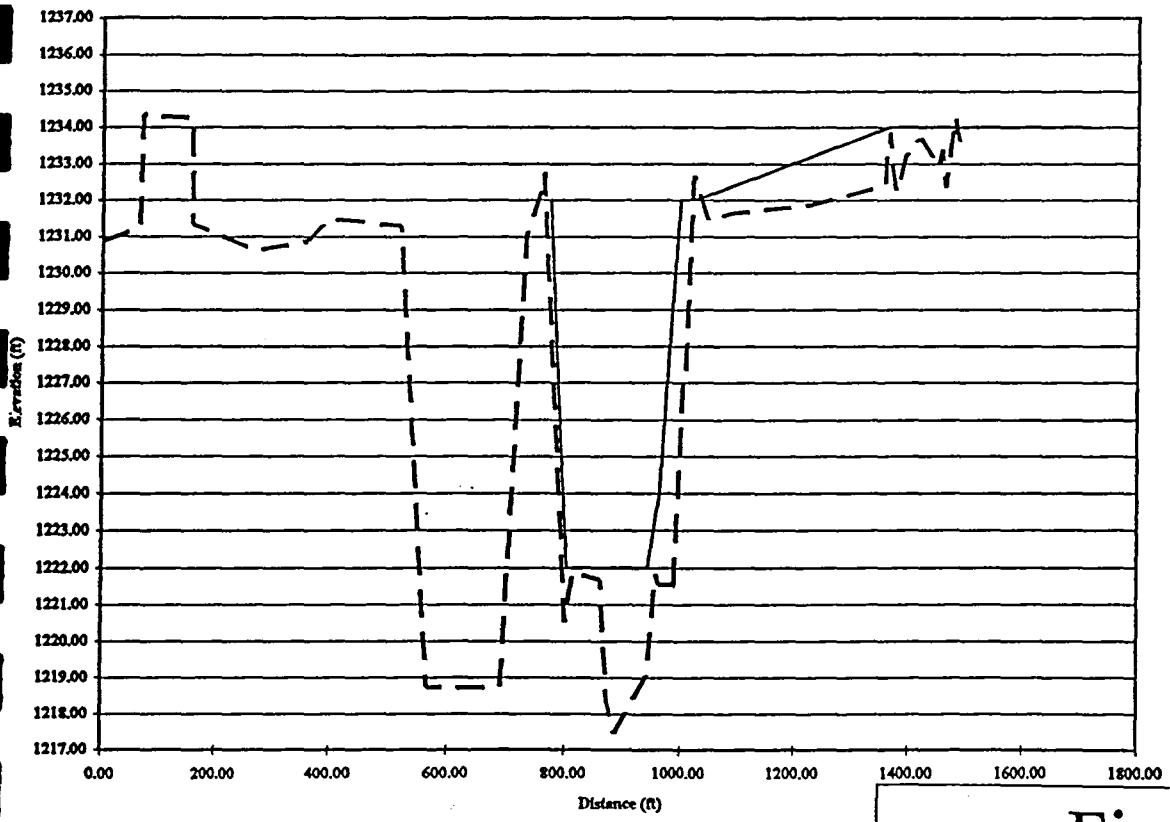


Figure 2
Verified Cross Sections

HDR

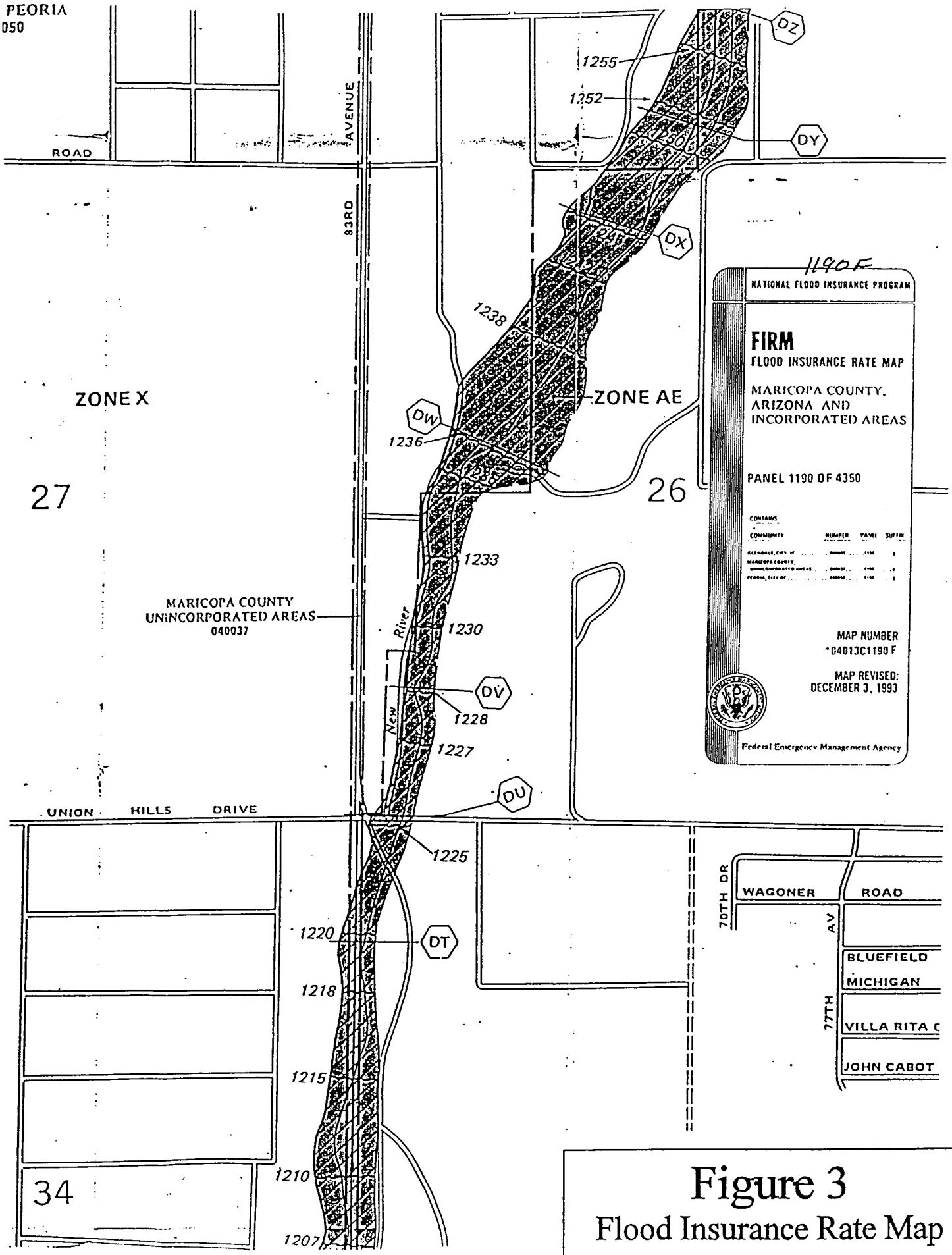


Figure 3
Flood Insurance Rate Map

HDR

4.0 HEC-2 Modeling

4.1 Base Model

The COE HEC-2 version 4.6.2 (May 1991) was used for the hydraulic analysis. To insure the stability of the hydraulic model, the entire HEC-2 model was run to model effects of the proposed bridge and 83rd Avenue crossing. The existing condition hydraulic model (HEC-2) was given to HDR in hard copy format. HDR typed in the existing conditions HEC-2 Model. The typed in existing condition HEC-2 model output matched the FIS model water surface elevations from the New River Flood Study exactly. This became the base for all modelling.

The surveyed cross sections were added to the existing condition model in the area near Union Hills Drive. New surveyed cross sections were added immediately upstream and downstream of Union Hills Drive to better define the hydraulics at the bridge location (See Figure 4). Cross sections 10.083, 10.989, 11.129, 11.188 and 11.328 were all in the original FIS model. Cross sections 11.005, 11.045 and 11.328 were added to the model to define the bridge hydraulics. Some sections were modified to account for proposed bridge conditions.

Additional cross 10.933, 10.934,10.935 and 10.936 were added to model the new crossing of 83rd Avenue. This will better define the effects of the new roadway on the bridge structure. The existing 83rd Avenue was not modeled in the COE FIS model.

4.2 Methodology

The bridge will be designed to pass the design flows below the bridge low chord elevation without overtopping or submergence and the "normal bridge" method of analysis was employed. This necessitated that the piers be coded into the model for the bridge cross section. This was done for several bridge types. The pier bent is assumed to be parallel with the flow under the bridge, thus lessening the impact of the number piers in each bent. The bridge is skewed approximately 17 degrees to the river so the cross section was adjusted to account for the reduction in flow area. The west abutment location will require roadway fill in an ineffective flow area at 83rd Avenue. This will help to keep the design flood within the existing bank alignment. Both the upstream and downstream banks will require protection. Wire tied gabion baskets will be used to protect the bridge abutments. The east abutment protection will extend upstream of Union Hills Drive to match the existing bank protection along the Arrowhead Waste Water Reclamation Facility. The west abutment protection of Union Hills Drive Bridge extend downstream to the existing bank protection downstream of the bridge location.

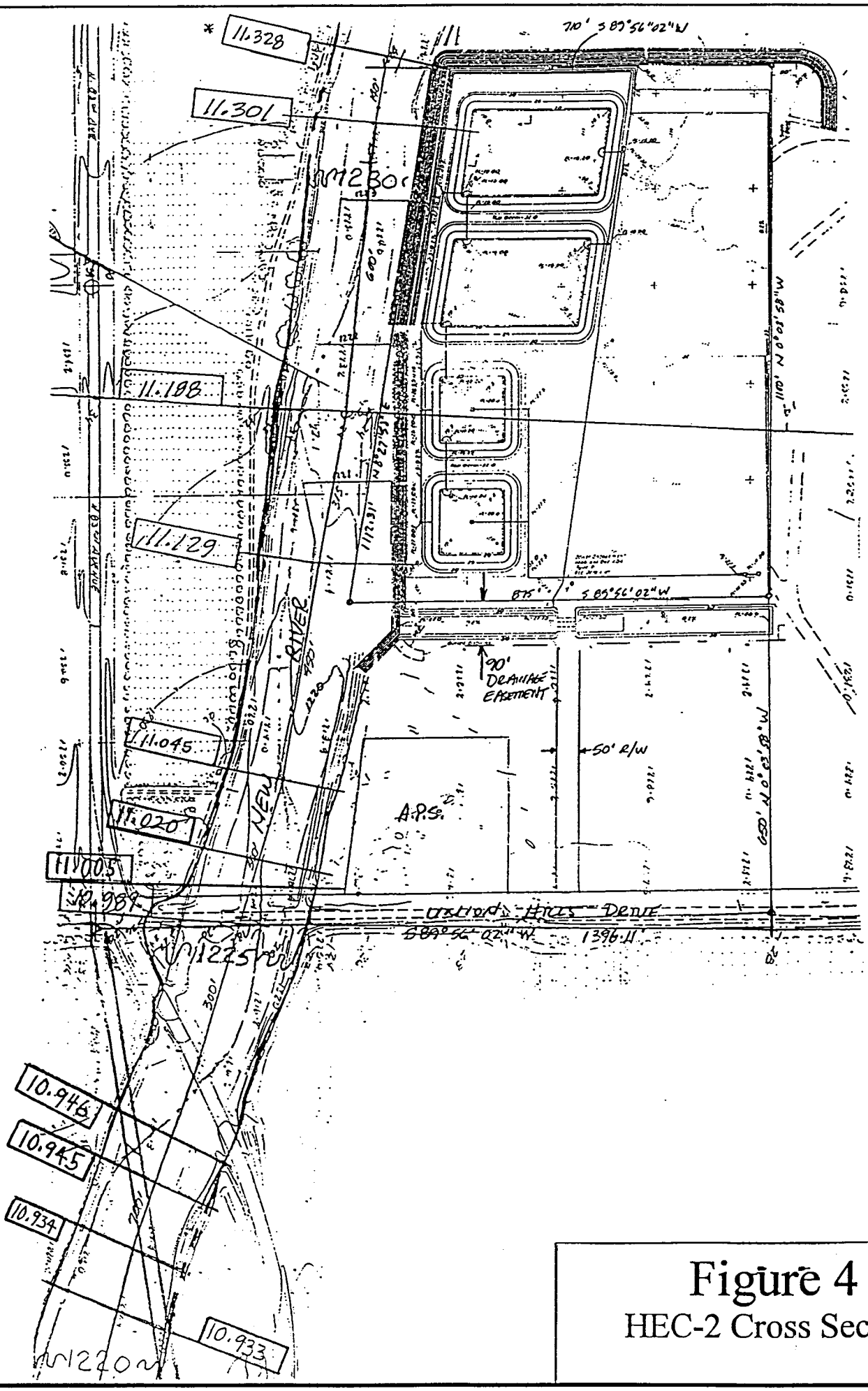


Figure 4
HEC-2 Cross Section

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5.0 Results

The results for the various HEC-2 models are shown in Tables 2 through 4. These tables are taken from summary printouts (SUMPO) from the HEC-2 model output. HEC-2 model output printouts for this portion of the river are included in the appendix of this report. Digital copies of all input and output files are provided for FCDMC review. Table 1 summarizes the water surface elevations for the various HEC-2 model runs.

TABLE 1 - Summary of HEC-2 Model Results

Cross Section No.	Discharge (cfs)	FIS Model (CWSEL)	Revised Cross Section Model (CWSEL)	Bridge Model (CWSEL)
10.803	10,900	1219.74	1219.74	1219.74
10.933	10,900	1223.56*	1223.23	1221.55
10.989	10,900	1225.21	1224.71	1223.90
11.005	10,900	1225.48*	1224.93	1225.06
11.020	10,900	1225.72*	1224.87	1225.13
11.045	10,900	1226.14*	1225.17	1225.35
11.129	10,900	1227.53	1226.71	1226.75
11.188	10,350	1228.09	1226.98	1227.01

* Interpolated Elevations

The FIS Model is the existing COE study water surface elevations. In the revised model, existing cross sections were updated according to new survey data and cross sections were added to more accurately define the water surface for this particular location. In the bridge model the bridge geometry was added to the appropriate cross sections within the model. The 85 foot (25.4 m) wide bridge is located between sections 10.989 and 11.005..

The water surface at the bridge location varies with the different conditions. The interpolated water surface elevation at the upstream face of the bridge site (at section 11.005) according to the FIRM is approximately 1225.30 (373.95 m). The FIRM shows water surface to only the nearest foot and must be interpolated at any given point. The elevation according to the FIS model (existing conditions) is 1225.48 (374.01 m).

Table 2

Existing Conditions Model

UHEXST.SMP Page 1

```
*-----------------------------*
|          S U M P O          |
|                             |
| Interactive Summary Printout |
| for MS/PC-DOS micro computers |
|          May 1991           |
*-----------------------------*
```

NOTE - Asterisk (*) at left of profile number indicates message in summary of errors list

Existing Conditions

Summary Printout

	SECNO	Q	TOPWID	DEPTH	VCH	EG	CWSEL
	10.80	10900.00	264.01	5.64	10.13	1221.33	1219.74
	10.80	15500.00	265.00	6.69	11.43	1222.82	1220.79
	10.99	10900.00	318.88	7.01	8.06	1226.22	1225.21
	10.99	15500.00	345.00	8.14	8.96	1227.59	1226.34
	11.13	10900.00	274.83	5.83	7.45	1228.39	1227.53
	11.13	15500.00	281.45	6.97	8.72	1229.85	1228.67
	11.19	10350.00	196.77	6.09	9.84	1229.59	1228.09
	11.19	13750.00	205.46	7.29	10.63	1231.05	1229.29
	11.30	10350.00	183.04	8.33	9.81	1232.02	1230.53
	11.30	13750.00	189.40	9.41	10.93	1233.46	1231.61
	11.39	10350.00	253.22	9.81	7.56	1233.70	1232.81
	11.39	13750.00	258.69	11.08	8.12	1235.10	1234.08
	11.48	10350.00	359.58	7.35	6.32	1235.37	1234.75
	11.48	13750.00	368.98	8.48	6.71	1236.58	1235.88
*	11.57	10350.00	821.86	6.28	3.28	1236.15	1235.98
*	11.57	13750.00	827.13	7.35	3.40	1237.23	1237.05
*	11.76	10350.00	522.81	3.20	8.67	1239.37	1238.20
*	11.76	13750.00	524.54	3.69	9.48	1240.09	1238.69
*	11.95	10350.00	866.00	4.23	5.99	1246.76	1246.23
*	11.95	13750.00	559.15	4.85	6.88	1247.58	1246.85
	12.13	10350.00	663.12	3.46	6.54	1252.13	1251.46
	12.13	13750.00	674.18	4.03	7.00	1252.79	1252.03

Table 3

Added Cross Sections Model

UHILLS.SMP Page 1

```
*-----------------------------*
|          S U M P O          |
|                             |
| Interactive Summary Printout |
| for MS/PC-DOS micro computers |
|          May 1991           |
*-----------------------------*
```

NOTE - Asterisk (*) at left of profile number indicates message in summary of errors list

Added Cross Sections

Summary Printout

	SECNO	Q	TOPWID	DEPTH	VCH	EG	CWSEL
	10.80	10900.00	264.01	5.64	10.13	1221.33	1219.74
	10.80	15500.00	265.00	6.69	11.43	1222.82	1220.79
	10.93	10900.00	208.58	7.83	9.10	1224.52	1223.23
	10.93	15500.00	229.68	9.09	10.55	1226.22	1224.49
	10.99	10900.00	321.61	8.31	7.13	1225.49	1224.71
*	10.99	15500.00	365.54	9.90	7.85	1227.23	1226.30
	11.01	10900.00	327.74	8.53	6.86	1225.65	1224.93
	11.01	15500.00	385.61	10.11	7.62	1227.38	1226.51
	11.02	10900.00	225.74	8.87	7.99	1225.87	1224.87
	11.02	15500.00	231.81	10.35	9.11	1227.64	1226.35
	11.05	10900.00	204.35	7.37	9.06	1226.44	1225.17
	11.05	15500.00	211.57	8.79	10.35	1228.25	1226.59
*	11.13	10900.00	272.59	8.91	5.96	1227.26	1226.71
*	11.13	15500.00	281.08	10.58	6.77	1229.09	1228.38
	11.19	10350.00	224.83	9.48	7.41	1227.83	1226.98
	11.19	13750.00	237.69	11.18	7.67	1229.60	1228.68
*	11.30	10350.00	188.38	8.46	9.98	1229.70	1228.16
*	11.30	13750.00	196.04	9.81	10.60	1231.26	1229.51
	11.33	10350.00	184.59	8.12	10.25	1230.66	1229.02
	11.33	13750.00	191.11	9.34	11.11	1232.15	1230.24
*	11.39	10350.00	229.60	7.95	11.34	1232.95	1230.95
*	11.39	13750.00	248.81	9.00	11.84	1234.17	1232.00

Table 4

5-Span Bridge Model

FIS Present, COE Future 100-Yr & 500-Yr Flow

UNIONBR6.SKP


```
*-----------------------------------*
|              S U M P O            |
|                                   |
| Interactive Summary Printout      |
| for MS/PC-DOS micro computers     |
|              May 1991             |
*-----------------------------------*
```

NOTE - Asterisk (*) at left of profile number indicates message in summary of errors list

Union Hills Bridge

Summary Printout

	SECNO	Q	TOPWID	DEPTH	VCH	EG	CWSEL
	10.80	10900.00	264.01	5.64	10.13	1221.33	1219.74
	10.80	15500.00	265.00	6.69	11.43	1222.82	1220.79
*	10.80	18530.00	820.05	7.81	10.12	1223.35	1221.91
*	10.93	10900.00	404.24	7.58	4.43	1221.86	1221.55
*	10.93	15500.00	406.84	9.01	5.10	1223.38	1222.98
*	10.93	18530.00	406.84	9.34	5.83	1223.84	1223.31
*	10.93	10900.00	374.46	5.87	5.88	1222.01	1221.48
*	10.93	15500.00	380.06	7.28	6.50	1223.54	1222.89
	10.93	18530.00	381.26	7.58	7.41	1224.04	1223.19
	10.94	10900.00	336.50	6.06	6.36	1222.30	1221.67
	10.94	15500.00	348.04	7.43	7.09	1223.82	1223.04
	10.94	18530.00	349.09	7.76	8.04	1224.37	1223.37
*	10.94	10900.00	246.58	5.72	10.65	1223.09	1221.33
*	10.94	15500.00	267.29	6.92	11.63	1224.63	1222.53
*	10.94	18530.00	274.69	7.26	13.01	1225.50	1222.87
	10.99	10900.00	191.30	7.50	9.69	1225.36	1223.90
	10.99	15500.00	198.57	8.51	11.72	1227.04	1224.91
	10.99	18530.00	205.15	9.44	12.28	1228.18	1225.84
	11.00	10900.00	196.85	8.27	8.55	1225.81	1224.67
	11.00	15500.00	207.28	9.74	9.87	1227.65	1226.14
	11.00	18530.00	214.23	10.71	10.45	1228.80	1227.11
*	11.01	10900.00	230.90	8.66	7.42	1225.91	1225.06
*	11.01	15500.00	236.93	10.29	8.44	1227.79	1226.69
*	11.01	18530.00	240.97	11.32	8.94	1228.95	1227.72
	11.02	10900.00	227.06	9.13	7.67	1226.04	1225.13
	11.02	15500.00	233.09	10.77	8.61	1227.92	1226.77
	11.02	18530.00	236.22	11.80	9.08	1229.08	1227.80
	11.05	10900.00	205.25	7.55	8.80	1226.55	1225.35
	11.05	15500.00	216.07	9.12	9.88	1228.44	1226.92
	11.05	18530.00	267.56	10.12	10.37	1229.58	1227.92
*	11.13	10900.00	272.81	8.95	5.93	1227.30	1226.75
*	11.13	15500.00	281.64	10.69	6.67	1229.18	1228.49
*	11.13	18530.00	286.94	11.74	7.07	1230.31	1229.54
	11.19	10350.00	224.98	9.51	7.38	1227.85	1227.01
	11.19	13750.00	238.14	11.27	7.58	1229.66	1228.77
	11.19	17595.00	243.15	12.21	8.62	1230.87	1229.71
*	11.30	10350.00	188.57	8.49	9.92	1229.72	1228.19
*	11.30	13750.00	196.42	9.88	10.50	1231.29	1229.58
*	11.30	17595.00	202.09	10.88	11.65	1232.69	1230.58
	11.33	10350.00	183.74	7.97	10.56	1230.60	1228.87
	11.33	13750.00	190.45	9.22	11.33	1232.11	1230.12
	11.33	17595.00	195.88	10.23	12.49	1233.55	1231.13
*	11.39	10350.00	228.83	7.91	11.46	1232.95	1230.91
*	11.39	13750.00	245.71	8.82	12.28	1234.16	1231.82
*	11.39	17595.00	728.21	10.54	11.05	1235.39	1233.54

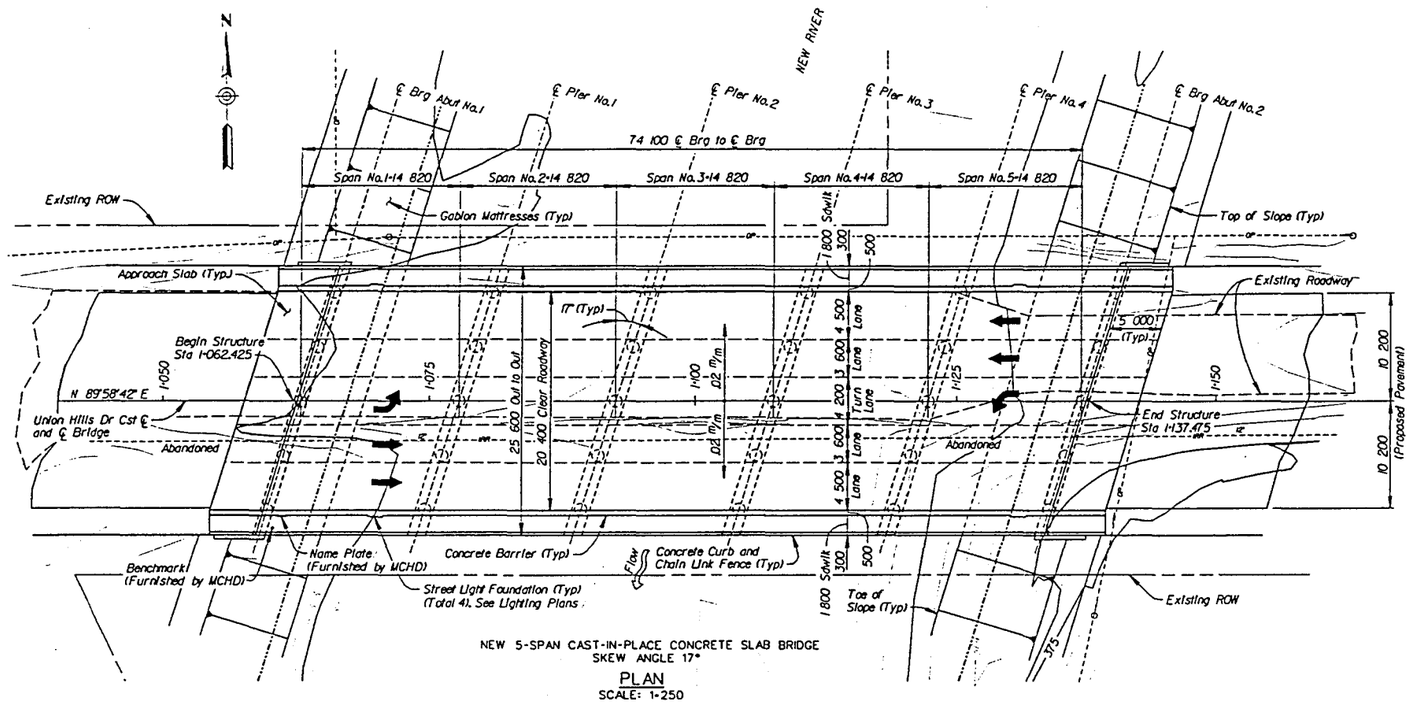
The surveyed cross sections entered into the model resulted in a lower water surface elevation by nearly one-half of a foot. The water surface dropped due better definition of river features.

Various bridge configurations were modeled for the reach of New River at the Union Hills. A 5-span, 243 foot (74 m) bridge with piers at 48.5 foot (14.8 m) centers gave the greatest flexibility to the roadway designers in matching existing road elevations (See Figure 5). The bridge created an upstream water surface elevation of 1225.06 (373.825). The impact on the water surface elevation is negligible when compared to the existing conditions model.

In conclusion, the addition of a 5-span, 243 foot (74 m) bridge at the Union Hills Road crossing will have a negligible effect on the upstream flood areas under the 100-year flow conditions. The water surface profile is less than the original elevation shown on the FIRM. The water surface after the construction of the Union Hills Dam and the water surface after construction of the proposed Union Hills Bridge is contained with in the banks of the New River channel.

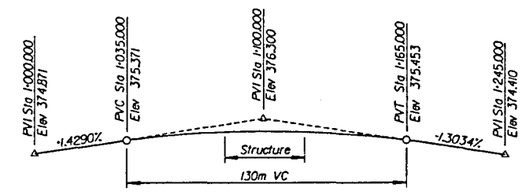
One notable item was discovered while developing this model. While working with this section of the river and adding cross-sections, it appears that there may be some overbank flooding on the west side of the river near the current and new 83rd Avenue alignments. Surveys for this project indicate a bank elevation of 1220.53 for cross-section 10.933. The water surface elevation interpolated from the original model shown in Table 1 for that cross section is 1223.56. This indicates a possibility of 3 feet of flooding. The existing model had cross-sections 250' downstream and 730' upstream but no cross-sections were taken in this area. Also the existing 83rd Avenue crossing accounted for in the original model. The Union Hills bridge does not contribute overtopping bridge since the bridge is upstream of this location. Also it would not be affected by any over topping downstream of the bridge.

F.W.H.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ..	68858			

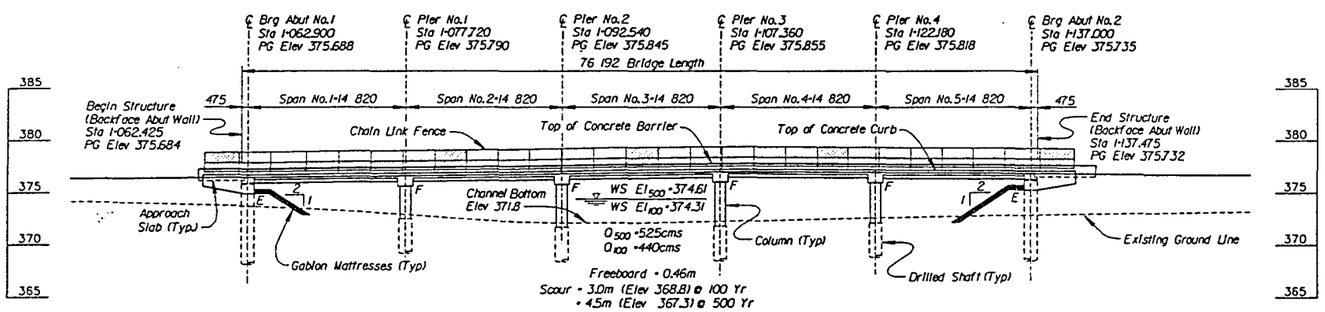


NEW 5-SPAN CAST-IN-PLACE CONCRETE SLAB BRIDGE
SKEW ANGLE 17°

PLAN
SCALE: 1=250



UNION HILLS DRIVE CST ℄ PROFILE



ELEVATION
SCALE: 1=250

FIGURE 5

NO.	REVISION	BY	DATE
1			
2			
3			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

UNION HILLS DRIVE BRIDGE
AT NEW RIVER
PROJECT NO. 68858

	BY	DATE
DESIGNED	M. GILLILAND	7/13/95
DRAWN	D. STONE	7/13/95
CHECKED		

PRELIMINARY NOT FOR CONSTRUCTION

HDR Engineering, Inc.

GENERAL PLAN & ELEVATION

SHEET 2 OF 12

TRACS NO.

FILE: pi\unhills\68858S2.dgn

c:/dgn/unhills/68858s2.dgn Jul. 12, 1995 12:06:41

6.0 On-Site Drainage.

6.1 General Information

On-site drainage for the bridge and portions of Union Hills and 83rd Avenue was completed using the guidelines and procedures as outlined in the Flood Control District of Maricopa County Drainage Design Manual. Volume I, Hydrology, was used to develop the design discharge for the pavement drainage. Volume II, Hydraulics, was used to design the catch basins and size the storm drains. Various computer generated spreadsheets and modeling programs were also used to aid in the design. The design storm for the on-site roadway design is the 10-year storm.

6.2 Drainage Areas

The on-site drainage consists of the paved area on Union Hills Road between Sta. 1+900 on the west and the Loop 101 Freeway on the east. This area includes the bridge deck drainage and a very small portion of 83rd Avenue pavement but excludes most of the intersection. The intersection and the south half of Union Hills west of the intersection (drainage area 1a) flows to the New River via the new 83rd Avenue. Figure 6 shows the general location of the drainage areas and the catch basins. The drainage areas are numbered and coincide with the catch basins to which they flow.

6.3 Hydrology

Runoff for each drainage area was computed using the Rational Method as recommended in the MCFCD hydrology manual. Appendix D contains spreadsheets developed for each drainage area. The determination of flow rates is an iterative process. The spreadsheets allow for quick iteration using the Phoenix Metro Area IDF curves shown on page 3-6 of the Hydrology Manual. Table 5 summarizes the results from the spreadsheets. Time of Concentration (T_c) is calculated by using Equation 3-2 from the Hydrology Manual:

$$T_c = 11.4\, L^{0.5}\, K_b^{0.52}\, S^{-0.31}\, i^{-0.38}$$

where;

T_c = the time of concentration, in hours,
L = the length of the longest flow path, in miles,
K_b = the watershed resistance coefficient,
S = the slope of the longest flow path, in ft./mile, and
i = the average rainfall intensity, in inches/hr.

The minimum T_c is 5 minutes.

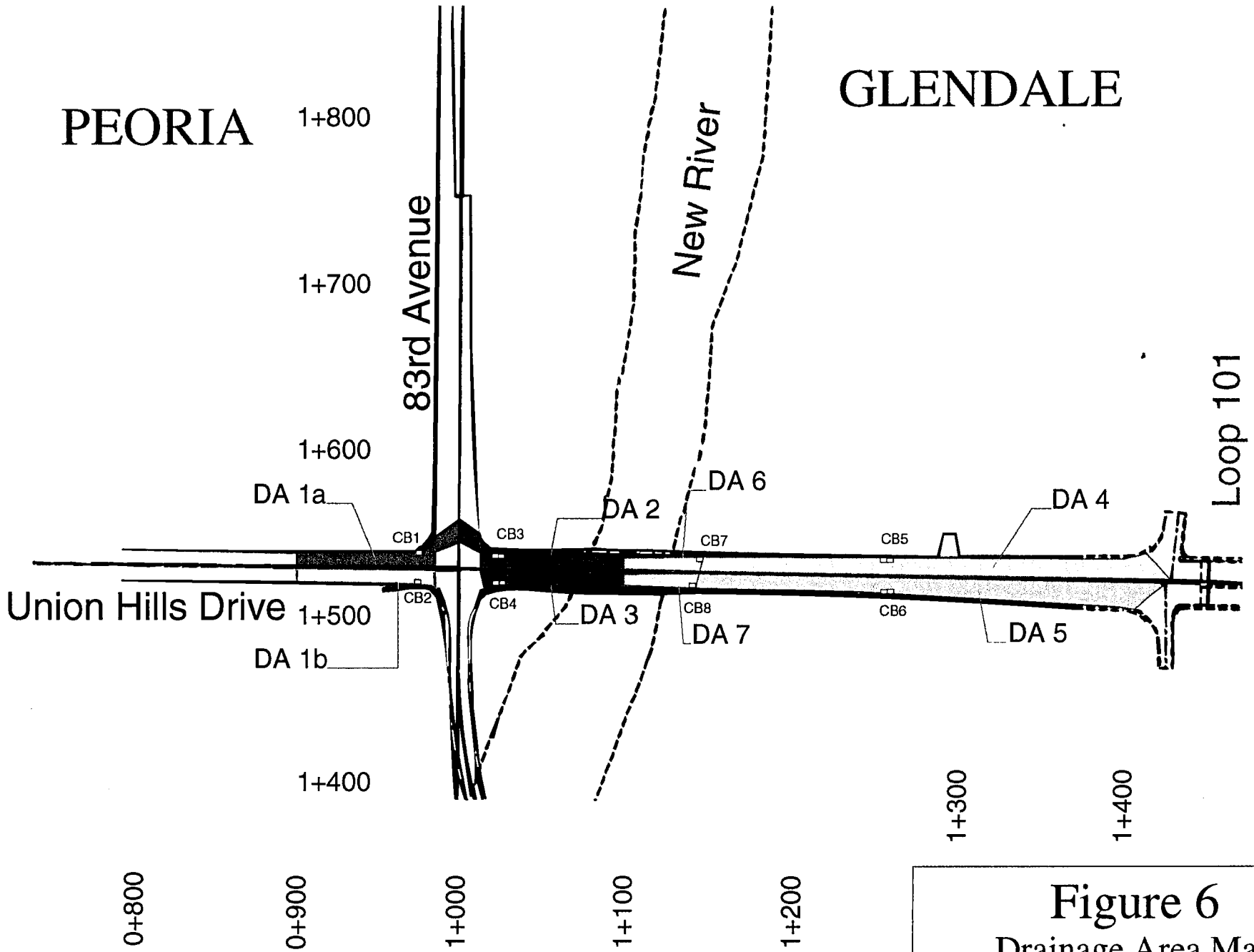


Figure 6
Drainage Area Map

HDR

TABLE 5 - Summary of Rational Method Results

Drainage Area	Area (acres)	Slope (%)	T_c (minutes)	Intensity (inches/hour)	Flow Rate (cfs/cms)
1a	0.19	0.32	11.9	3.45	0.54
1b	0.19	0.32	11.9	3.45	0.54
2	0.23	1.43	7.5	4.54	0.83
3	0.23	1.43	7.5	4.54	0.83
4	0.82	1.74	10.9	4.06	2.66
5	0.82	1.74	10.9	4.06	2.66
6	0.10	1.30	5.0	4.93	0.40
7	0.10	1.30	5.0	4.93	0.40

6.4 Hydraulics

Catch basins and the connecting storm drains are designed to carry the 10-year storm. The catch basin locations were determined by the geometric layout of the new roadway sag sections and the bridge abutments. Stormwater will be collected near the abutments of the bridge, and at the four corners of the intersection. The spread criteria of one dry lane was not violated at any of the locations. Refer to Table 6 for a summary of catch basin information. A general layout of the storm drainage system is shown in Figure 7.

6.5 Catch Basin/Inlet Design

The following steps were used to locate and design inlets in the pavement curbed sections:

1. Estimate location of catch basin. Delineate and measure drainage area. Determine intensity and runoff coefficient. Compute runoff using Rational Method.

2. Compute spread and depth of flow for design Q (10-year), using computer version of HEC-12.

3. If flow spread exceeds allowable criteria, move inlet location upstream, reducing drainage area. Repeat steps 1 and 2. If pavement spread is less than allowable spread, move inlet downstream and repeat steps 1 and 2. Iterate steps until solution is found without overtopping of curb.

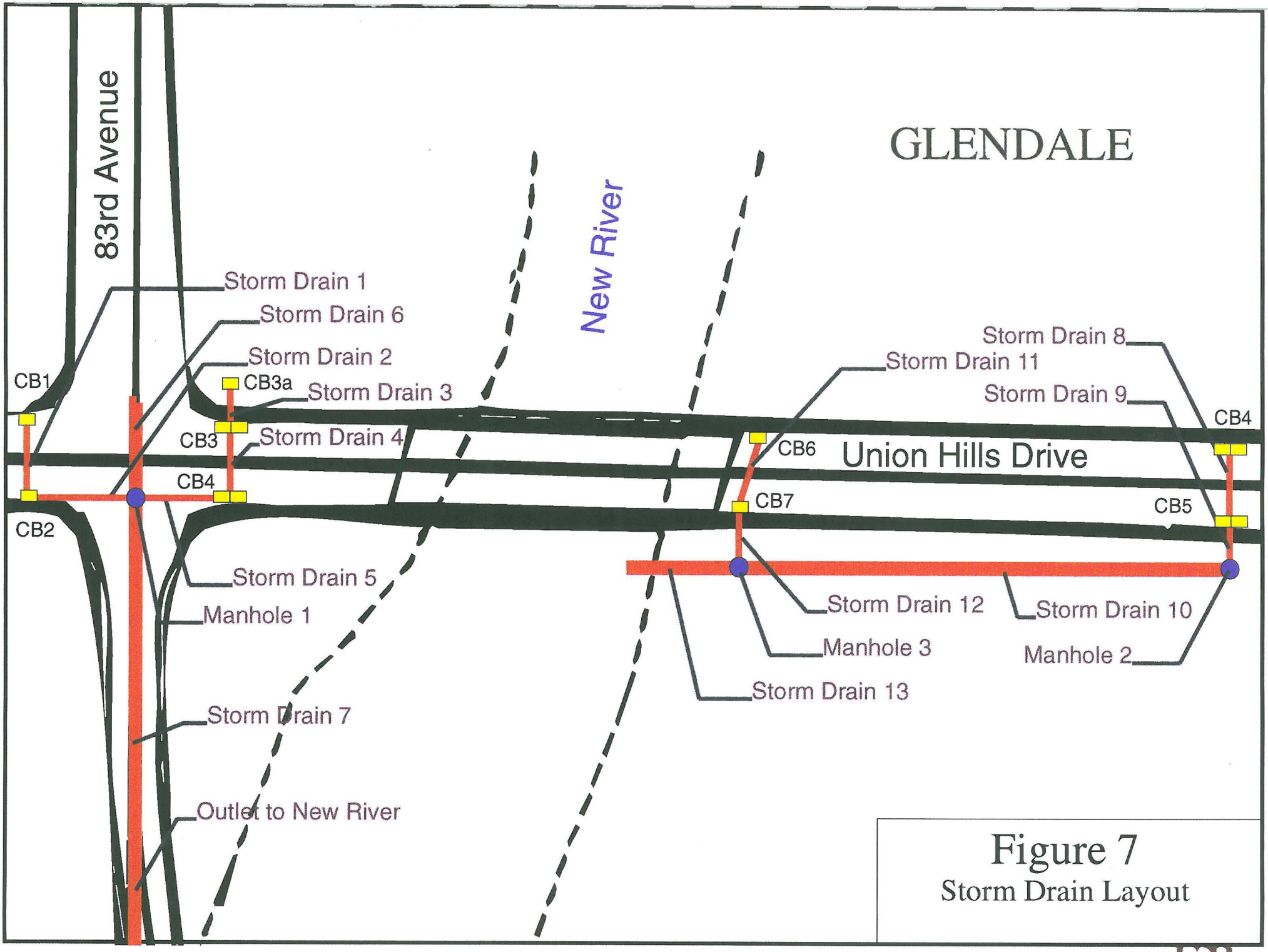


Figure 7
Storm Drain Layout

FDR

4. Size the catch basin needed to intercept 80-90% of on-grade flow. Apply the appropriate clogging efficiency as follows:

Inlet Type	Efficiency Due to Clogging (%)	
	Sump	Continuous Grade
Grate Inlet	50	60 - 75
Curb Inlet	80	80
Combined	65	65

5. The above procedures are repeated for the next downstream inlet, adding in any flow-by from the upstream inlet directly to the new peak flow.

This process was done using HEC-12 Pavement Drainage Program. The output from the computer program is presented in Appendix E. Nine catch basins are included in the system. Catch basins 1 and 2 are combination catch basins with one 3' wing, catch basins 4, 5, 7, and 8 are ADOT type 4 catch basins with for installation next to barrier walls Catch basins 5 and 6 are combination catch basins with two 3' wings. Catch basin 3a is installed to control nuisance flows only.

TABLE - 6 Summary of Catch Basins

Catch Basin	Type	Q intercepted (cfs)	Spread (feet)
1	"D" w/1 3' wing	0.6	4.48
2	"D" w/1 3' wing	0.6	4.48
3a	ADOT Median	N/A	N/A
3	ADOT "4"	0.8	6.00
4	ADOT "4"	0.8	6.00
5	"D" w/2 3' wings	2.8	4.65
6	"D" w/2 3' wings	2.8	4.65
7	ADOT "4"	0.3	8.06
8	ADOT "4"	0.3	8.06

6.6 Storm Drain Design

Storm drain pipelines are designed as a main line system only, with the pipeline passing through each catch basin on the way to the outlet. This is possible because of the small flow rates within each pipe. The maximum flow rate for the east side storm drain is 6.2 cfs and for the west side system is 2.2 cfs. The storm drain in 83rd Avenue has been designed to accept future flows from the roadway north of Union Hills for 1/2 mile. A spreadsheet showing the assumptions made for in inflow is included in Appendix E. The storm drain design is based on two tailwater conditions. The best condition is when the New River is not flowing. This condition is the most probable since even under major storm events the pavement will drain before the river has any significant flow. The other condition is when the river is flowing at the 100-year flow rate. Under both conditions the roadway will drain completely. Storm drain pipe profiles and design worksheets are in Appendix F. While the

pipe size could be smaller, the City of Glendale requested a 2 foot (610 mm) pipe minimum to allow for future improvements.

6.7 Westbrook Village Storm Drain

Westbrook Village drains stormwater runoff through a 42" storm drain which outlets in the New River just downstream of the existing 83rd Avenue crossing. This outlet will be relocated to the downstream side of the proposed 83rd Avenue crossing to reduce nuisance flow across the roadway. The profile of the proposed 83rd Avenue is very close to grade through the main channel of New River precluding culverts under the roadway.

7.0 Bank Protection

To ensure the stability of the new bridge abutments, bank protection will be incorporated as recommended in HEC-20, Stream Stability At Highway Structures. At the Union Hills Bridge location there is no restricting of the channel and the minimum would be sufficient. At this location, however, bank protection of a similar nature exists upstream on the east bank and downstream on the west bank. The bank protection for the bridge will be extended to, and tied into the existing protection providing an integrated system of bank stabilization.

Manufacture information from Maccaferri Gabions Inc. was used to determine an adequate cross section for the gabion mattresses. Gabion bank protection one foot thick, filled with rock (D_{50} = 0.5 feet (0.15 m)) were found to be adequate for the flows predicted by the HEC-2 model. A polymeric filter fabric placed on the surface before gabion installation will prevent the loss of fines through the mattress when flooding occurs. This design is consistent with the gabions on the east bank and is slightly larger than the design of the gabions on the west bank. Gabion protection will also be installed and wrapped around where 83rd Avenue penetrates the existing protection. Gabion locations and design worksheets are contained in Appendix G.

8.0 Scour Analysis

Scour analysis was performed for the Union Hills bridge using the output of the HEC-2 for New River under 100-year and 500-year flooding conditions. Because the bridge does not constrict the river cross section, and there is no overbank flow upstream of the bridge, there is no contraction scour or abutment scour. The bridge opening is slightly larger than the upstream channel and so the effect of the piers doesn't even cause a contraction in the bridge section. The 100-year pier scour is estimated to be between 10.7 (3.3 m) and 12.6 (3.8 m) feet depending upon which K3 factor is used. Because the bed form is difficult to determine under the bridge the lower number is typically used. Long term degradation is much more difficult to adequately determine. Because the river is in an armoring mode

with cobbles of 4" to 12" (102 mm to 304 mm) diameter, significant long term scour is not anticipated. With a long term scour estimate of 2.5 feet for the 100-year event, the total scour would be about 13.2 feet (4.0 m). If the bed material is 15% cobbles, nearly 3 feet (0.9 m) of amour would develop during this 13.2 feet (4.0m) of scouring.

The pier scour for the 500-year storm event was 11.8 (3.6 m) to 13.9 (4.3 m) feet. The long term scour was estimated to be 5 feet (1.5 m). This would produce a total scour of about 16.8 feet (5.1 m). Again, for a 15% cobble bed material, the total armoring would be over 3.5 feet (1.1 m) for the 16.8 feet of scour. Scour worksheets are contained in Appendix H.

APPENDIX A

Existing Conditions HEC-2 Model

```
1*****************************************
 *  HEC-2 WATER SURFACE PROFILES          *
 *                                        *
 *  Version   4.6.2;  May 1991            *
 *                                        *
 *  RUN DATE    10MAR95    TIME   11:11:04 *
 *****************************************
```

```
*************************************
*  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
```

1

10MAR95 11:11:04 PAGE 1

THIS RUN EXECUTED 10MAR95 11:11:04

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

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

REVISED HEC-2 FILE NRIVER.DAT TO HAVE INPUT DATA MATCH WITH THE HARDCOPY
PRINTOUT OF THE HEC-2 FILE IN THE FLOOD CONTROL DISTRICT LIBRARY THAT
CORRESPONDS WITH PUBLISHED FEMA DATA.
THE HEC-2 MODEL ON THE PRINTOUT WAS WAS RUN ON 9 OCTOBER 1985 USING THE
MAY 1984 UPDATED VERSION OF HEC-2.
THIS HEC-2 MODEL APPEARS TO BE THE BEST MATCH WITH PUBLISHED FEMA DATA
FOR NEW RIVER FROM BELL ROAD UPSTREAM TO THE NEW RIVER DAM.
THE RESULTS GENERATED BY THIS HEC-2 MODEL DOWNSTREAM OF BELL ROAD SHOUDN'T
BE USED.
THE PUBLISHED FEMA DATA FOR THE REACH BELOW BELL ROAD MATCHES CLOSELY WITH
HEC-2 MODEL REVSB., WHICH WAS DEVELOPED BY COE & VAN LOO.
THE CROSS SECTIONS BELOW BELL ROAD WHERE RETAINED FOR HISTORICAL REASONS.
THIS HEC-2 MODEL HASN'T BEEN UPDATED FOR ANY CHANGES THAT MIGHT OCCURED
SINCE THE MODEL WAS ORIGINALLY CREATED.

```
T1      NEW RIVER ABOVE SKUNK CREEK, PHOENIX, ARIZ., SEPT 1985  (UHEXST.DAT)
T2      Edited by HDR (1-95) for Union Hills Drive Bridge Analysis
T3      Existing Conditions     (As Recieved and Reconstituted by HDR)
        Existing Condition Flood Plain Model FIS & CORPS Q's
        Estimated starting WSEL from FIS Profiles for 100-yr.

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ
              2                                                               1170.5

J2  NPROF     IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE
     1                 -1                                                                15

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

     38       43       53       21       55       26       56       22       54       4
      1       50

NC    .045     .045     .035     .200     .400
QT      2    41000    41000
        1985 TOPO - DIGITIZED DATA SEC.8.655 THRU SEC.9.129
        DOWNSTREAM STUDY LIMIT
```

1

10MAR95 11:11:04 PAGE 2

```
          NEW RIVER-SKUNK CREEK CONFLUENCE
X1     8.655        36     9581.4    10224.3       750       150       400
X3        10
GR    1173.9    8649.5    1172.8     8725.6    1173.6    8761.4    1172.8    8805.7    1171.9    8882.4
GR    1171.9    8973.3    1171.7     9029.3    1170.9    9157.1    1170.5      9250    1170.8      9322
GR    1170.3    9369.5    1169.5     9443.6    1169.3    9488.5    1171.5    9503.3    1167.1    9548.1
GR    1171.6    9581.4    1166.9     9605.5    1161.4      9624    1157.9      9660    1156.6    9716.3
GR    1155.1    9744.7    1156.1     9761.1    1155.3    9864.2    1155.3    9905.7    1156.2    9954.8
GR    1156.3     10000    1156.3      10071    1156.7   10091.4    1155.7   10121.5    1155.7   10154.7
GR    1164.5   10193.7    1171.2    10224.3    1172.3   10244.2    1171.2     10247    1171.1   10299.3
GR    1170.6   10403.3

NC                                     .100      .300
QT         2     12000     19000
ET                          9.1                                                        9762.5   10213.5
          BEGIN DISCHARGE FOR NEW RIVER ONLY
X1     8.731        45     9762.5    10213.5       400       400       400
X3        10
GR    1174.8      8627    1174.1     8663.6    1172.6    8666.7    1174.4    8670.4    1172.1    8683.8
GR    1170.8    8831.8    1170.4      9040      1170    9196.9    1168.3    9265.9      1167    9305.7
GR    1166.8      9321    1173.5      9346    1167.4    9377.8    1160.3    9401.7    1156.9    9425.5
GR    1157.6      9463    1156.3     9473.2    1158.8    9489.1      1166    9510.2    1169.2    9519.8
GR    1168.9    9553.9    1169.2     9595.9    1168.6    9640.2    1168.3    9678.4    1173.6    9692.1
GR    1171.9    9727.6    1171.4     9748.3    1172.8    9762.5    1172.6      9771    1167.8    9795.5
GR      1160    9831.2    1157.1      9844    1156.1    9894.9    1156.9     10000    1157.8   10055.6
GR    1157.3   10089.1    1156.7    10123.2    1157.3     10151    1164.7   10183.1    1170.6   10206.7
GR    1172.2   10213.5    1173.3    10246.5      1172   10250.5    1171.9   10342.2    1171.3     10403

     REVISED THE ELEVATION OF STATION 9478.8 FROM 117039 TO 1170.9 (TMM 3-94)

                                                                                        9771.3   10219.2
ET                          9.1
X1     8.807        58     9771.3    10219.2       400       390       400
X3        10
GR    1174.2      8591    1174.2     8613.7    1174.8    8626.5    1174.6    8637.8    1173.1    8640.4
GR    1174.2    8644.4    1172.8     8658.6    1172.4    8867.9      1172    9015.9    1171.9    9044.3
GR    1172.4    9063.6    1170.8     9080.6    1170.8    9093.1    1174.4    9117.5      1175    9131.2
GR    1172.2    9150.5    1164.2     9172.6    1160.1    9193.9    1158.6    9221.8    1157.7    9249.9
GR    1159.2    9261.8    1157.9     9281.7    1159.2    9293.1    1164.6    9312.1    1171.3    9327.1
GR    1170.8      9359    1170.5     9382.8    1171.1    9406.1    1170.6    9448.1    1170.9    9478.8
GR    1171.6      9539    1171.9     9588.1    1172.4    9618.2    1172.2    9646.1    1172.1    9673.9
GR    1178.4    9688.1    1187.7     9701.7    1193.4    9715.9    1194.1    9729.6    1186.6    9749.4
GR    1174.7    9771.3    1169.2      9792    1162.1    9826.7    1158.7      9848    1158.4    9918.7
GR    1158.3    9957.1    1158.8      10000    1158.6   10069.8    1158.4   10113.6    1158.5   10146.5
GR    1163.7   10172.1    1170.8    10201.6    1173.9   10219.2    1174.4   10248.2    1173.2   10258.1
GR    1173.9   10328.3    1173.6    10380.5      1173   10402.7

                                                                                        9824.7   10216.9
ET                          9.1
X1     8.883        55     9824.7    10216.9       280       400       400
X3        10
GR    1176.2    8580.8    1175.3     8595.6    1173.7    8597.9    1174.9    8600.1    1173.5    8625.1
GR    1174.4    8705.8    1174.1     8768.8    1175.2    8824.2    1179.5    8846.4    1180.4    8864.3
GR    1177.5    8878.5    1167.9     8905.2    1162.9    8926.2    1159.6    8943.8    1159.9    8977.9
GR    1158.5    8985.3    1161.3     9000.6    1158.4    9027.9    1158.8    9040.4    1162.1    9058.5
1
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GR    1169.4    9075.9    1173.3     9086.9      1174    9126.4      1173    9140.3      1173    9167.6
GR    1172.7    9204.5    1174.4     9252.2    1173.6    9288.3    1173.9      9325    1173.7    9357.3
GR    1174.3    9422.7    1174.7     9473.8    1173.9    9529.7    1173.9    9563.4    1175.1    9610.3
GR    1174.9    9680.1    1175.9     9745.5    1174.9    9824.7    1169.4    9860.8    1166.1    9911.3
GR    1163.8    9955.6    1163.1     9984.3    1163.1     10000    1160.2   10004.5    1160.9   10056.5
GR    1160.1   10106.7    1160.4    10145.4    1163.8   10164.1    1171.6   10191.4    1176.3   10216.9
GR      1177   10247.6    1175.5    10249.9    1176.3   10292.2    1176.1   10347.6    1175.3   10404.7

ET                          9.1                                                        9809.4   10213.2
          OLD CORP STATION NO. 8.95=0.6
X1     8.936        60     9809.4    10213.2       300       300       290
X3        10
GR      1180    8590.6    1174.5     8616.4    1165.7    8644.6    1162.8    8656.8    1162.9    8675.8
GR    1163.3    8691.1      1163     8713.3    1162.3      8740    1166.9    8754.2    1173.7    8779.8
GR      1179    8797.9    1177.6     8810.7    1177.4    8832.3    1175.7    8843.9    1174.6    8913.5
GR    1175.6    8920.6    1174.6     8947.9    1175.5    9022.3    1175.5      9091    1175.9    9152.4
GR    1176.4    9222.8      1177     9261.2    1177.8      9274    1177.1      9322    1177.8    9335.9
GR    1178.2    9360.6    1175.8     9370.5    1176.9    9389.9    1177.8    9408.3    1175.5    9452.4
GR      1177    9483.3    1176.2     9535.9    1175.6    9543.2    1176.6    9575.3      1176    9615.4
GR    1177.8    9634.7    1176.7     9680.7    1177.8      9708    1176.9      9754      1176    9785.5
GR    1176.1    9797.7    1177.3     9809.4      1176      9817    1167.6    9825.6    1166.8    9859.6
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```
GR   1166.7      9894    1165.7    9939.7     1165.3     9959.9     1165.7    9994.3    1162.2     10000
GR   1162.3   10069.8    1161.8   10110.7     1162.1    10143.1     1167.9   10169.2      1174   10192.8
GR   1178.2   10213.2    1178.2   10244.2     1177.7    10247.6     1177.1   10309.8    1176.6   10402.1

     REVISED THE ELEVATION OF STATION 8934.8 FROM 1744.7 TO 1174.7 (TMM 3-94)
       "     "     "     "     "   9747.2  "   117732 "  1177.2    "
       "     "     "     "     "   9765.9  "   117835 "  1178.5    "
       "     "     "     "     "   9792    "   117838 "  1178.8    "
       "     "     "     "     "   9802.3  "   117936 "  1179.6    "
       "     "     "     "     "  10000.0  "   116535 "  1165.5    "

                                                                                 9886.1   10212.7
ET                        9.1
X1   8.977        58    9886.1   10212.7       220        200        210
X3      10
GR   1177.7    8605.6    1175.6    8628.1     1174.7     8658.4     1174.4    8712.7    1174.6    8744.5
GR   1175.6    8767.2    1174.1    8802.4     1175.6     8841.6     1174.9    8864.9      1175    8878.6
GR   1174.7    8934.8    1174.7    8953.5     1175.5     8991.6     1175.7    9030.5    1176.4      9064
GR   1178.2    9075.1    1176.8    9084.2     1176.6     9130.2     1176.8    9179.1    1177.1    9252.3
GR     1176    9330.2    1176.4    9370.6     1177.8     9377.4     1176.8    9385.9    1176.8    9448.7
GR   1177.3      9491    1176.4      9537     1176.4     9556.3     1176.9    9609.7    1176.8    9662.3
GR   1176.3    9713.1    1177.2    9747.2     1178.5     9765.9     1178.8      9792    1179.6    9802.3
GR   1178.3      9821    1180.8    9828.4     1176.5     9836.1     1176.5    9867.6    1177.2    9886.1
GR   1168.4      9900    1167.1    9909.3     1165.7       9938     1164.9    9976.1    1165.5     10000
GR   1163.6   10007.3    1163.7   10066.4       1164    10103.3     1163.5   10128.9    1163.5   10137.4
GR   1168.4   10163.5    1173.3     10188     1178.5      10209     1179.3   10212.7    1180.9   10243.9
GR   1180.1   10248.2    1179.7   10281.7     1179.8    10401.6
1
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                                                                                 9764.5     10207
ET                        9.1
        GREENWAY ROAD AREA
X1   9.009        34    9764.5     10207       330        180        180
X3      10
GR     1177    8740    1176.9    8817.3       1177     8883.2     1177.1    8937.1    1177.2    9008.7
GR   1177.5    9075.7    1177.5    9150.2     1177.5     9213.2     1177.7    9285.6    1177.7    9368.3
GR   1177.9      9462    1178.2    9547.2     1178.2     9614.3     1178.3    9675.6    1178.3    9725.9
GR     1178    9764.5    1174.2    9786.1     1167.1     9821.6     1164.9    9852.3      1166    9886.3
GR   1164.6      9921    1163.6    9960.8     1162.9      10000     1164.1   10055.9    1164.8   10109.6
GR   1164.8   10149.3    1169.2   10162.4     1178.6    10177.2     1179.9     10207    1180.3   10253.3
GR   1179.5   10304.1    1180.2   10353.8     1179.8    10424.8     1179.3   10475.4

                                                                                 9689.8     10113.8
ET                        9.1
X1   9.047        44    9689.8   10113.8       280        160        200
X3      10
GR   1179.8    8601.2    1179.8      8619     1180.6      8633     1179.4    8721.9    1179.5    8798.8
GR   1179.2    8858.5    1178.9    8933.2     1178.7     9004.2     1173.2    9070.4    1178.8    9154.1
GR   1178.8    9233.1    1178.8    9306.9       1179     9377.9     1179.1    9475.6    1178.6    9532.5
GR   1178.7    9570.5    1180.6    9579.9       1180     9593.2     1181.6    9616.5    1180.5      9660
GR   1177.5    9689.8    1171.4    9715.9     1166.4     9742.1     1166.2    9751.1    1166.9    9756.8
GR   1162.3    9762.5      1162      9781     1163.2     9794.9     1163.3    9845.4      1164    9880.4
GR   1162.9    9904.5    1161.7    9907.9     1161.2     9937.7     1161.9    9971.5    1162.6     10000
GR     1165   10050.5    1165.7   10084.6       1171    10101.3     1177.6   10113.8    1178.2   10168.4
GR   1178.2   10218.1    1178.1   10298.2     1178.7    10354.4     1178.2   10401.6

NC                .060
ET                        9.1                                                              9641.2      10090
        OLD CORP STATION NO. 9.15=9.8
        END 1985 TOPO DIGITIZED SECTIONS, END C/L = 10000
X1   9.129        51    9641.2     10090       290        460        420
X3      10
GR   1182.2    8558.3    1182.2    8569.9       1183     8580.4     1181.8    8652.3    1181.8    8719.9
GR   1182.2    8785.2    1181.7    8844.6     1181.3     8932.3     1180.6    8995.9    1180.5    9075.5
GR     1181      9134      1181    9205.5     1181.5     9271.4     1181.2    9370.8    1180.3    9477.1
GR   1180.3    9499.5    1180.1    9524.8     1180.8     9562.3     1180.3    9599.2    1180.9    9629.9
GR   1180.6    9641.2    1176.6    9662.3       1173     9666.8     1173.4      9673    1164.9    9688.4
GR   1165.5    9712.2    1166.2    9768.2     1166.3     9795.2     1167.5    9799.7    1164.8    9814.5
GR   1164.2    9836.1    1165.2    9889.5     1165.1     9919.9     1166.3    9971.3    1167.1    9982.6
GR   1168.1    9987.7    1167.9     10000     1168.9    10061.6     1171.8   10079.8    1178.7     10090
GR     1179   10117.8      1179   10195.1     1178.6    10241.7     1178.5   10245.1    1179.7   10304.1
GR   1179.2   10370.6    1179.6   10407.5     1179.9    10429.4     1178.7   10432.2    1180.1   10433.6
GR   1179.5   10439.6

     REVISED THE ELEVATION OF STATION 18380 FROM  185.2 TO 1185.2 (TMM 3-94)
       "     "     "     "     "  20015  "   118135 "  1181.5    "

NC    .050      .060      .035      .100       .300
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ET                          9.1                                                                  19660      20015
1
   10MAR95      11:11:04                                                                                    PAGE    5

        BEGIN STATION C/L = 20000
X1    9.318        39      19660      20015       1000       1000       1000
X3       10
GR     1192     16150       1170      16210       1170      16310     1194.6      16420       1186      16465
GR   1186.8     16560       1184      16830     1185.2      16920       1184      17065       1184      17120
GR     1186     17130       1186      17150       1184      17160     1183.7      17360       1184      17470
GR     1185     17855     1185.2      18380     1185.3      18430       1185      18460     1185.1      19440
GR     1186     19660       1184      19685       1178      19710       1178      19865       1176      19945
GR     1174     19985     1173.2      20000       1174      20010     1181.5      20015     1181.3      20105
GR     1182     20360       1184      20370       1186      21110       1186      21150       1184      21595
GR     1182     22220       1180      22940       1180      23725     1181.2      23740

QT        2     11450      17250
ET                          9.1                                                                  19770      20235
X1    9.492        40      19770      20235        910        890        920
X3       10
GR   1197.2     16090       1178      16135       1178      16185     1193.2      16240       1192      16250
GR     1190     16470       1188      17185       1187      17360       1188      17710     1188.6      17900
GR   1189.3     18260       1189      18870     1188.8      18885       1190      18900       1190      18920
GR   1189.2     19030     1189.5      19300       1188      19610       1185      19635       1186      19650
GR     1188     19700       1188      19770       1186      19905       1184      19930       1184      19950
GR     1180     19970       1179      20000       1180      20055       1182      20160       1184      20195
GR   1193.9     20235       1186      20255     1185.4      20310       1186      20785       1188      20800
GR   1188.8     21100       1190      21450       1190      22860       1188      23130       1188      24240

NC     .040      .060       .035
ET                          9.1                                                                  19840      20060
X1    9.692        31      19840      20060       1050       1040       1056
X3       10
GR     1194     15930       1192      16660       1190      17050     1189.8      17130       1190      17440
GR     1192     18040       1194      18880       1195      19040     1194.4      19150       1194      19280
GR     1194     19680       1192      19790       1192      19830       1195      19840       1186      19880
GR   1184.1     20000       1186      20015       1188      20020       1190      20040     1196.1      20060
GR     1194     20060     1193.2      20090       1194      20195       1194      21315       1196      21690
GR     1196     21725       1194      22305       1192      24380       1190      24790       1190      25100
GR     1192     25440

NC     .060      .060       .035       .300       .500
ET                          9.1                                                                  19840      20080
X1    9.889        31      19840      20080       1100       1050       1040
X3       10
GR     1200     14530       1198      15330       1196      17370       1198      17830       1200      18620
GR   1201.6     19190       1200      19460       1198      19490       1196      19510       1196      19570
GR     1198     19590       1198      19810       1200      19820       1200      19840       1198      19850
GR     1196     19870       1190      19890       1188      19900       1190      19920       1190      19965
GR   1188.2     20000       1190      20050       1200      20080       1200      20970     1198.6      21620
GR     1200     21710       1200      21730       1198      22710     1196.1      23410       1198      24490
GR     1198     26950

     REVISED THE ELEVATION OF STATION 15520 FROM 120034 TO 1200.4 (TMM 3-94)

1
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NC     .060      .060       .030       .300       .500
ET                          9.1                                                                  19790      20032
        BELL ROAD
X1    9.953        27      19790      20032        335        335        335
X3       10
GR     1202     15050     1200.4      15520       1200      16550       1200      16890     1200.5      17285
GR     1200     17540       1200      17610       1202      18770       1202      18860     1202.4      19045
GR     1200     19515       1200      19790       1194      19805       1192      19840       1192      19910
GR     1190     19990     1188.6      20010       1200      20030       1202      20032       1202      20050
GR     1200     21475       1200      21785       1198      22680       1198      24780       1200      25390
GR     1200     26215     1200.6      26810

ET                          9.110                                                                19825      20110
SB     .900     1.560        2.6                   213         20       2800      1.880    1188.61     1188.6
        SPECIAL BRIDGE
X1    9.967        29      19825      20110         75         75         75
X2                            1     1200.9     1207.5
X3       10
BT       21     15025       1204                15450     1203.5                 16410       1202
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BT    16635    1201.4                16805     1202                17990     1204                18530
BT    1205.6                19065   1204                19325     1204                19800     1205
BT             19825    1207.5   1200.9    20110   1207.5   1200.9    20110   1205.8
BT    20635    1204                21810     1202                22850     1200                24300
BT    1198                 24630   1198                25270     1200                26275     1202
BT             27010    1202.1
GR    1204     15025    1203.5   15450     1202    16410    1201.4   16635     1202      16805
GR    1204     17990    1205.6   18530     1204    19065    1204     19325     1205      19800
GR    1204     19825    1196     19845     1194    19860    1192     19890     1192      19980
GR    1190     20015    1188.6   20025     1190    20035    1194     20060     1204      20110
GR    1205.8   20130    1204     20635     1202    21810    1200     22850     1198      24300
GR    1198     24630    1200     25270     1202    26275    1202.1   27010
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REVISED THE ELEVATION OF STATION 23690 FROM 199.6 TO 1199.6 (TMM 3-94)

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NC                                .100      .300
ET                      9.1                                          19635     20055
X1    10.096   38       19635    20055     610     650      645
X3    10
GR    1206     14890    1204     14935     1203    15070    1204     16230     1204.8    16600
GR    1204.4   17760    1205.1   18700     1205    19025    1204     19260     1204      19275
GR    1206     19285    1208     19335     1208    19435    1206     19545     1202      19555
GR    1201     19635    1198     19665     1196    19970    1195.7   20000     1196      20010
GR    1198     20020    1200     20040     1206    20055    1206     20090     1206      20675
GR    1204     21060    1202     22510     1200    23200    1199.6   23690     1200      24210
GR    1202     24600    1202     24615     1200    24890    1199     25180     1200      25545
GR    1202     25900    1206     25910     1206    26020
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QT    2        10900    15500
ET                      9.1                                          19820     20320
X1    10.271   40       19820    20320     920     925      925
X3    10
GR    1208     14700    1206     15620     1206    16020    1208     16520     1208      16790
GR    1209.6   17735    1209.7   18290     1208    19090    1208     19750     1212.5    19820
GR    1204     19870    1202     19930     1200    19980    1198.2   20000     1200      20020
GR    1202     20230    1204     20295     1208    20320    1208     20365     1206      20375
GR    1206     20680    1208     20685     1208.4  21370    1208     22660     1206      22930
GR    1204     23700    1204     24115     1206    25190    1206     25220     1204      25230
GR    1204     26490    1206     26520     1206    26865    1207     26870     1207      26880
GR    1206     26895    1204     26930     1204    27050    1206     27210     1208      27230
ET                      9.1                                          19655     20110
X1    10.443   34       19655    20110     930     900      910
X3    10
GR    1213.5   14830    1212     15205     1210.5  15830    1212     16220     1213.9    17660
GR    1212     19220    1211     19560     1212    19590    1216     19605     1216      19655
GR    1210     19670    1210     19740     1208    19750    1206     19950     1205.6    20000
GR    1206     20100    1210     20110     1212    20600    1212     22030     1210      22740
GR    1208     23440    1207.8   23780     1208    24260    1208.6   25120     1208      25140
GR    1206     25145    1206     26400     1208    26810    1208     27000     1206      27080
GR    1206     27180    1208     27190     1212    27205    1214     27415
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REVISED THE ELEVATION OF STATION 16705 FROM 1318 TO 1218 (TMM 3-94)
" " " " " 18050 " 121935 " 1219.5 "

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ET                      9.1                                          19955     20300
X1    10.612   34       19955    20300     880     900      890
X3    10
GR    1217     15010    1216     16240     1216    16325    1218     16705     1219.5    18050
GR    1219     18420    1218     19580     1216    19885    1216     19895     1222      19910
GR    1222     19955    1210     19985     1209.6  20000    1210     20010     1212      20295
GR    1218     20300    1218     20325     1216    20330    1216     20740     1218      20760
GR    1218     21655    1216     22770     1214    23050    1212.4   23730     1214      24140
GR    1214     24250    1214     25455     1212    25530    1210     26540     1212      26790
GR    1212     27110    1214     27420     1214    28550    1216     28650
ET                      9.1                                          19750     20015
X1    10.803   52       19750    20015     1020    1010     1010
X3    10
GR    1225.5   14775    1225     15010     1225    15545    1224     15710     1223      16085
GR    1224     16185    1223.8   16830     1222    16900    1222     16920     1224      16955
GR    1224     17030    1223.2   17280     1224    17460    1224.6   19160     1224      19280
GR    1223     19435    1224     19450     1230    19465    1230     19530     1220      19565
GR    1220     19575    1220     19585     1220    19595    1220     19750     1216      19760
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GR    1216      19888     1214.1    20000     1216      20010     1220      20015     1220      20190
GR    1222      20405     1224      20480     1224      20555     1222      21230     1220      22410
GR    1218      23155     1217.8    23290     1218      23405     1220      23875     1220      23910
GR    1218      25030     1218      25155     1220      25180     1220.6    25210     1220      25240
GR    1218      25935     1218      27130     1220      27370     1220      27690     1222      28035
GR    1222      28610     1223      28690
1
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ET                          9.1                                                       19905     20250
        UNION HILLS DRIVE
X1   10.989        37      19905     20250      920      1000      980
X3      10
GR    1232      15130     1231      15330     1231      15900     1230      16280     1228.3    16485
GR    1228      16700     1227      16970     1227.7    17355     1228      18930     1228      19575
GR    1226      19780     1226      19850     1226      19905     1220      19955     1218.2    20000
GR    1220      20080     1222      20175     1224      20200     1226      20250     1226      20251
GR    1226      20252     1228      20295     1228.2    20530     1228.6    20910     1228      21640
GR    1226      22470     1225      22630     1224.6    22820     1224.2    23230     1226      24300
GR    1226      24490     1224      24995     1222      25830     1221.2    26800     1222      27800
GR    1224      28070     1226      28380

ET                          9.1                                                       19820     20115
NC     .045      .045
        NEW SECTION - LEFT BANK TAKEN FROM ARROWHEAD RANCH
        WASTEWATER TREATMENT PLANT GRADING PLAN-DIBBLE & ASSOC.
X1   11.129         7      19820     20115      710       710       710
X3      10
GR    1232      19820     1225      19840     1222      19850     1221.7    20000     1222      20090
GR    1225      20100     1230      20115

QT       2      10350     13750
ET                          9.1                                                       19830     20055
X1   11.188        23      19830     20055      310       310       320
X3      10
GR    1232      19830     1225      19850     1222      19860     1222      19975     1222      20000
GR    1224      20020     1232      20055     1232      20080     1234      20420     1234      20770
GR   1234.4     21080     1234      21335     1232      22210     1230      23060     1229.5    23110
GR    1230      23225     1232      24360     1232      24390     1230      25130     1228      25580
GR    1226      26990     1226      27460     1228      28315

ET                          9.1                                                       19900     20120
X1   11.301        10      19900     20120      600       600       600
X3      10
GR    1232      19890     1235      19900     1235      19905     1232      19915     1226      19930
GR    1224      19938     1222.2    20000     1226      20070     1230      20100     1236      20120

NC     .045      .060      .035
ET                          9.1                                                       19900     20175
X1   11.386        32      19900     20175      440       420       450
X3      10
GR    1240      16820     1238      17220     1238      18760     1240      18800     1244      18850
GR    1244      18915     1238      18950     1238      19040     1236      19280     1236      19420
GR    1233      19430     1233      19890     1233      19892     1233      19900     1228      19905
GR    1228      19912     1226      19975     1223      20000     1226      20030     1228      20085
GR    1230      20115     1232      20150     1238      20175     1239.5    20820     1238      22925
GR   1238.8     23655     1240      24780     1240      24805     1238      25705     1236.8    26140
GR    1238      26800     1240      27485
1
   10MAR95      11:11:04                                                                          PAGE    9


ET                          9.1                                                       19780     20170
X1   11.481        15      19780     20170      480       540       520
X3      10
GR    1240      19130     1238      19305     1230      19320     1228      19380     1228      19550
GR    1230      19710     1236      19780     1230      19800     1232      19860     1230      19900
GR    1228      19950     1227.4    20000     1230      20060     1234      20140     1240      20170

ET                          9.1                                                       19470     20310
X1   11.566        37      19470     20310      280       530       460
X3      10
GR    1241      17270     1240      18790     1242      18940     1242      19140     1240      19170
GR    1240      19470     1236      19480     1234      19550     1234      19760     1230      19775
GR    1230      19790     1232      19810     1234      19820     1234      19855     1232      19860
GR    1232      19940     1230      19980     1229.7    20000     1230      20010     1230      20180
GR    1232      20295     1240      20310     1240      20335     1242      20780     1244      21030
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GR   1244.2    21620    1244.2    21960     1244     22190    1243.6    23225     1244     23470
GR   1244.9    24495      1246    25220     1245     25570      1244    26550     1244     26660
GR     1246    27240    1246.7    27420

ET                        9.1                                                    19925     20510
X1   11.759       35     19925    20510     1050       980      1020
X3       10
GR     1246    17890     1245    18190     1246     18510      1246    18920    1246.5     18930
GR     1246    18950     1246    19120     1244     19230      1244    19255     1244     19880
GR     1244    19900     1244    19925     1236     19940      1235    20000     1236     20040
GR     1236    20455     1242    20465     1244     20495      1248    20510     1248     20525
GR     1246    20540     1246    20620     1246     20760      1246    20800     1246     20820
GR     1246    21070     1248    21460     1250     21630      1250    21870    1219.6    22350
GR     1249    22980   1249.2    23620     1250     25015      1250    25960    1250.4    27420

NC     .060     .060     .035
ET                        9.1                                                    19865     20510
X1   11.949       35     19865    20510      990      1000      1000
X3       10
X4        1   1247.4    20700
GR   1250.8    18670   1250.4    18895   1250.4     19275      1251    19500     1251     19535
GR     1250    19865     1248    19920     1246     19974      1244    19976     1243     20000
GR     1244    20045     1244    20215     1242     20280      1242    20470     1244     20480
GR     1246    20510     1246    20520     1246     20530      1246    20590     1246     20600
GR     1248    20925     1250    20940     1252     21660      1254    22180     1254     22280
GR   1252.8    22630     1254    22985   1252.5     23380      1254    23685     1244     23750
GR   1252.4    24515     1254    25865     1254     26540      1256    27550   1256.5     27760

ET                        9.1                                                    19890     20680
X1   12.125       37     19890    20680      910      1000       930
X3       10
GR     1256    19305    1256.1    19430     1256     19805      1256    19860     1258     19875
GR     1258    19890     1256    19920     1254     19923      1250    19930   1248.2     19950
GR   1248.5    20000     1250    20025     1250     20090      1248    20140     1248     20160
GR     1250    20230     1250    20320     1248     20330      1248    20440     1250     20565
GR     1252    20600     1254    20640     1258     20680      1258    20710     1254     20730
GR     1254    20800     1254    20810     1254     20860      1253    21155     1254     21455
GR     1256    22190     1258    22395     1258     22940      1259    24160     1260     26290
1
   10MAR95     11:11:04                                                                    PAGE    10

GR     1260    27215    1261.7    27800

QT        2     9800    12000
ET                        9.1                                                    19830     20240
X1   12.313       28     19830    20240     1010       980       990
X3       10
GR     1261    18650     1260    19080     1260     19800      1262    19810     1262     19830
GR     1260    19835     1258    19840     1256     19935      1254    19950   1252.2     20000
GR     1254    20220     1260    20240     1260     20260      1258    20300     1258     20320
GR     1258    20360     1258    20362     1258     20440      1258    20450     1258     20455
GR   1258.6    21090     1259    21610     1260     22140    1261.5    22890   1261.9     23990
GR     1262    24500     1262    27100   1263.3     27570

ET                        9.1                                                    19810     20280
X1   12.511       35     19810    20280     1000      1020      1056
X3       10
GR     1266    18920     1266    19115     1266     19240      1264    19385     1263     19600
GR     1262    19700     1262    19710     1262     19720    1263.6    19810     1260     19865
GR     1258    19905   1257.3    20000     1258     20070      1264    20110     1264     20140
GR     1262    20210     1260    20220     1260     20265      1264    20280     1264     20350
GR     1262    20365     1260    20400     1260     20440      1264    20460     1264     20610
GR   1263.6    20830     1264    20995     1265     21585      1265    22640     1266     23100
GR     1266    24600   1265.7    24880     1266     26000    1265.7    26670     1266     27380

ET                 4.1      9.1              20980                                 19810     20330
X1   12.701       34     19810    20330     1030      1020      1000
X3       10
X4        1   1269.6    20500
GR   1270.6    19190     1270    19700     1270     19810      1268    19820     1266     19985
GR   1264.7    20000     1265    20070     1266     20290      1268    20330     1270     20600
GR     1269    20660     1270    20740     1270     20980      1266    20990     1266     21090
GR     1268    21100     1268    21150     1262     21190      1262    21200     1270     21230
GR     1270    21260   1269.6    21510     1270     21770    1271.4    23220   1270.6     23800
GR     1270    23910     1270    23920   1270.7     24130    1268.8    24900   1269.1     26070
GR   1269.6    26710     1270    27000     1270     27650    1270.7    27740

ET                 4.1      9.1              21135                                 19845     20360
X1   12.896       40     19845    20360     1010      1010      1030
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X3      10
X4       1      1274     20420
GR    1276     18670      1274     18750    1275.6     19330      1274     19845      1272     19850
GR    1270     19965    1268.8     20000      1270     20020      1270     20350      1273     20360
GR    1274     20585      1276     20620      1276     20670      1274     20675      1274     21135
GR    1270     21165      1270     21180      1274     21200      1274     21250      1270     21260
GR    1270     21350      1264     21365      1264     21390      1274     21410      1274     21495
GR    1276     21560    1277.2     21900      1276     22520    1275.6     22660      1276     23015
GR    1277     23610      1276     24190      1276     24280    1274.9     24440    1275.7     25428
GR  1274.2     25910    1274.9     26740      1274     26945      1274     27000      1276     27660
1
   10MAR95     11:11:04                                                                          PAGE   11


QT       2      7900      9539
ET              4.1       9.1                21645                                     19930     20350
X1  13.076       32     19930     20350       950       980       950
X3      10
GR    1280     19510      1278     19930      1274     19940    1272.6     20000      1274     20050
GR    1276     20090      1276     20210      1274     20260      1272     20270      1272     20315
GR    1274     20335      1278     20350      1279     20480      1278     21020      1278     21150
GR    1280     21645      1280     21660    1278.6     21740    1278.6     21760      1278     21780
GR    1278     21800      1280     21960      1280     22825    1279.6     23250      1280     23630
GR    1280     24220      1278     24835    1278.6     25040    1278.6     26370      1278     26740
GR    1278     26920      1280     27585

ET              4.1       9.1                21410                                     19810     20120
X1  13.227       26     19810     20120       800       670       800
X3      10
GR    1284     18690      1282     19260      1282     19690    1281.5     19810      1276     19845
GR    1274     19970    1273.9     20000      1274     20030      1278     20090      1280     20100
GR    1282     20120      1282     21410      1276     21425      1276     21440      1282     21455
GR  1282.2     21900      1284     22160    1282.6     22860      1284     23350    1284.7     23820
GR    1284     24080      1282     24510      1282     24580    1281.8     24730    1281.5     25780
GR    1282     27300

ET              4.1       9.1                21425                                     19870     20170
X1  13.420       33     19870     20170       970      1000      1020
X3      10
X4       2    1187.2     19750      1186     19700
GR    1290     18215      1288     19350      1288     19490      1286     19560    1287.5     19870
GR    1284     19880      1282     19975    1281.8     20000      1282     20040      1282     20080
GR    1286     20100      1288     20150      1290     20170      1290     20185      1288     20195
GR    1288     20315      1288     20490      1288     20780      1287     20840      1286     21425
GR    1284     21570      1282     21580      1282     21610      1286     21650      1286     21760
GR    1288     21875      1297     21900      1288     21940      1288     23570    1288.7     23780
GR  1289.6     25395      1290     26450    1290.7     26525

NC    .050      .050      .035
ET              4.1       9.1                21380                                     19870     20455
X1  13.619       39     19870     20455      1090      1020      1056
X3      10
GR    1296     18690      1294     19490      1294     19835      1294     19870      1294     19890
GR    1286     19910      1286     19995      1285     20000      1286     20005      1290     20105
GR    1290     20315      1292     20360      1292     20445      1290     20450      1292     20455
GR    1293     20456      1292     20457      1292     20470      1290     20480      1290     20520
GR    1294     20540      1294     20600      1294     21380      1292     21680      1290     21690
GR    1290     21710      1292     21755      1294     21780      1294     21850      1290     21880
GR    1290     21895      1292     21905      1294     22680    1295.4     23340    1295.7     24310
GR    1294     24400      1294     25040    1294.8     25580      1296     26565

ET              4.1       9.1                21430                                     19890     20340
X1  13.818       33     19890     20340      1050      1050      1056
GR    1302     18660      1300     19320      1300     19890      1298     19895      1296     19970
GR  1295.5     20000      1296     20015      1296     20130      1294     20250      1294     20325
GR    1298     20340      1298     20450      1296     20460      1296     20630      1298     20740
GR    1300     20750      1300     20870    1299.2     21160      1300     21305    1300.3     21430
1
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GR    1300     21580      1298     21820      1294     21840      1294     21850      1296     21860
GR    1296     22050      1298     22060      1300     22865      1300     23030    1300.6     23470
GR  1300.8     23985      1300     24550      1300     26150

      REVISED THE ELEVATION OF STATION 22245 FROM 2300 TO 1300 (TMM 3-94)


QT       2      6100      7207
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ET		4.1	9.1		22160				19915	20270
X1	14.013	39	19915	20270	1020	1055	1030			
X4	5	1304	20900	1302.3	20930	1304	20960	1304	21100	1302
X4	21170									
GR	1306	19285	1304	19690	1304	19915	1302	19940	1302	19960
GR	1300	19962	1299	20000	1300	20010	1302	20035	1300	20120
GR	1302	20190	1302	20250	1303	20270	1302	20300	1302	20625
GR	1300	20645	1300	20660	1302	20720	1305	20725	1304	21145
GR	1306	21170	1306	22160	1304	22225	1300	22245	1298	22255
GR	1298	22270	1302	22285	1302	22350	1304	22390	1304	22460
GR	1302	22480	1304	22505	1306	22680	1306	23465	1307.7	24010
GR	1306.2	24750	1306	25400	1306	25520	1306.3	26000		
ET		4.1	9.1		21710				19715	20015
X1	14.197	36	19715	20015	990	920	970			
GR	1316	18385	1314	18590	1312	19130	1310	19550	1308	19565
GR	1308.5	19715	1306	19730	1304	19732	1304	19755	1306	19800
GR	1307	19850	1306	20000	1310	20015	1310	20240	1308	20242
GR	1308	20310	1310	20330	1310	20460	1308	20465	1308	20745
GR	1310	20780	1310	20810	1308	20815	1308	20830	1310	20832
GR	1310	21710	1308	21930	1306	21970	1306	22035	1308	22060
GR	1310	22550	1310	22640	1310.6	22800	1310	22910	1310	25290
GR	1311	25560								
ET		4.1	9.1		21420				19540	20250
X1	14.379	38	19540	20095	940	1000	960			
X4	3	1316	21150	1315	21030	1315.3	20970			
GR	1324	18115	1322	18320	1320	18550	1318	19100	1316	19540
GR	1314	19550	1314	19635	1312	19655	1310	19665	1310	19690
GR	1316	19705	1316	19950	1312	19960	1310.4	20000	1312	20020
GR	1314	20095	1314	20430	1316	20535	1316	20580	1314	20750
GR	1314	20820	1314	20860	1312	20900	1312	20945	1314	20950
GR	1316	21420	1316	22060	1314	22065	1312	22075	1312	22150
GR	1314	22180	1316	22385	1316	23115	1318	23325	1318	23600
GR	1316	24180	1316	24290	1318	25135				
ET		4.1	9.1		20045				19220	20045
X1	14.559	39	19220	20045	950	915	950			
X4	2	1320	20035	1320.8	20045					
GR	1326	18225	1324	18540	1322	18690	1322	19220	1318	19225
GR	1316	19230	1318	19300	1320	19360	1320	19415	1318	19425
GR	1318	19450	1320	19550	1320	19740	1318	19760	1318	19780
GR	1318	19940	1316	19960	1315.4	20000	1316	20020	1318	20025
GR	1320	20065	1320	20210	1320.6	20375	1320	20875	1319.9	21150
GR	1320	21220	1320.4	21370	1320	21515	1320	21790	1318	21792
GR	1318	21820	1320	21840	1320	22190	1322	22800	1322	23050

GR	1320	23620	1320	23650	1322	23970	1322.4	24200		
ET		4.1	9.1		22000				19670	20170
X1	14.752	36	19670	20170	1010	1010	1020			
X3	10									
GR	1336	17740	1334	18200	1332	18480	1330	18820	1328	19010
GR	1326	19300	1326	19670	1322	19680	1322	19910	1320	19988
GR	1318.8	20000	1320	20010	1322	20015	1322	20080	1324	20090
GR	1324	20125	1326	20170	1326	20580	1324	21260	1324	21550
GR	1326	21780	1328	21820	1328	22005	1326	22060	1322	22070
GR	1322	22120	1324	22190	1326	22230	1328	22580	1328	23035
GR	1236.4	23615	1328	24120	1330	24470	1332	24710	1334	24950
GR	1336	25220								
QT	2	4200	4746							
ET		4.1	9.1		20720				19865	20050
X1	14.945	49	19865	20050	1005	1000	1020			
GR	1350	17110	1348	17265	1346	17660	1344	18190	1342	18415
GR	1340	18830	1338	19040	1336	19350	1334	19650	1332	19770
GR	1330	19865	1328	19940	1326	19950	1324	19970	1322.5	20000
GR	1324	20020	1330	20050	1330	20245	1328	20370	1328	20400
GR	1330	20420	1332	20615	1332.8	20720	1332	21050	1332	21960
GR	1330	22110	1330	22200	1331.3	22400	1330	22550	1330	22750
GR	1324	22770	1324	22790	1328	22800	1330	22845	1332	22875
GR	1332	23060	1333	23245	1333	23450	1334	23850	1336	24040
GR	1338	24310	1338	24610	1340	24915	1342	25050	1344	25120
GR	1346	25270	1348	25480	1348	26190	1350	26250		
ET		4.1	9.1		21800				19955	20382
X1	15.144	55	19955	20382	900	890	1056	.89		

X3	10									
GR	1360	16750	1358	16880	1356	17180	1354	17540	1352	17750
GR	1350	17905	1350	18105	1348	18410	1346	18630	1344	18950
GR	1342	19115	1342	19250	1340	19555	1338	19660	1338	19720
GR	1334	19724	1334	19830	1334	19832	1332	19850	1336	19865
GR	1336	19900	1336	19955	1330	19975	1329	20000	1330	20070
GR	1332	20080	1334	20315	1334	20350	1332	20380	1336	20382
GR	1338	21510	1338	21800	1336	22035	1336	22315	1334	22350
GR	1334	22370	1336	22390	1336	22470	1334	22515	1332	22530
GR	1332	22570	1334	22625	1336	22640	1336	22700	1334	22810
GR	1332	22820	1332	22840	1334	22880	1336	22960	1338	23815
GR	1340	23960	1342	24145	1344	24305	1350	24455	1360	24660
ET		4.1	9.1		21750				19770	20100
X1	15.333	53	19770	20100	900	890	1000			
X3	10									
GR	1358	17825	1356	18010	1354	18370	1352	18530	1350	18570
GR	1348	18605	1348	18620	1350	18630	1350	18725	1348	18900
GR	1346	18930	1346	19010	1348	19040	1348	19060	1344	19070
GR	1344	19080	1346	19090	1346	19305	1344	19335	1340	19350
GR	1340	19770	1338	19790	1336	19880	1336	19980	1335	20000
GR	1336	20010	1338	20090	1342	20100	1342	21750	1338	21765
GR	1338	21790	1340	21810	1340	22045	1340	22046	1338	22060
GR	1338	22080	1340	22120	1340	22150	1336	22170	1336	22180

GR	1340	22190	1342	22270	1342	22300	1340	22540	1340	22590
GR	1342	22760	1342	23065	1344	23360	1345	23420	1348	23530
GR	1348	23690	1350	23710	1360	23930				
ET		4.1	9.1		20960				19950	20320
X1	15.519	48	19950	20320	940	960	980			
X3	10									
X4	1	1345	20320							
GR	1360	18730	1358	18760	1358	18965	1356	19050	1354	19115
GR	1354	19390	1352	19460	1352	19515	1350	19540	1350	19680
GR	1348	19950	1342	19970	1340	19995	1340	20005	1342	20015
GR	1342	20130	1340	20215	1340	20225	1344	20250	1344.5	20338
GR	1346	20595	1350	20960	1350	21080	1348	21965	1344	21985
GR	1344	22005	1346	22020	1348	22080	1346	22110	1346	22135
GR	1348	22145	1346	22275	1346	22530	1342	22545	1344	22560
GR	1346	22630	1346	22855	1344	22860	1344	22875	1346	22895
GR	1346	22925	1342	22930	1346	22945	1348	23615	1348	23765
GR	1350	23950	1352	24140	1360	24300				
ET		4.1	9.1		20900				19870	20085
X1	15.699	37	19870	20085	935	920	950			
GR	1364	18850	1362	18960	1360	19070	1358	19220	1356	19230
GR	1356	19260	1358	19270	1358	19345	1356	19490	1354	19870
GR	1352	19880	1350	19885	1348	19950	1346	19980	1345	20000
GR	1346	20030	1346	20065	1348	20075	1350	20085	1350	20700
GR	1348	20760	1348	20885	1354	20900	1354	21715	1348	21790
GR	1348	21880	1352	21930	1352	23430	1350	23435	1350	23445
GR	1352	23450	1352	23550	1356	23920	1360	24120	1362	24170
GR	1362	24470	1364	24650						
QT	2	2350	2350							
ET		4.1	9.1		2690				1985	2430
X1	15.966	40	1985	2430	1450	1200	1410			
X4	9	1359	1900	1352	2280	1354	2300	1356	2325	1356
X4	2400	1357	2430	1357.3	2530	1352	2600	1354	2620	
GR	1364	1080	1362	1180	1360	1585	1360	1725	1358	1985
GR	1356	1990	1354	1995	1354	2005	1356	2010	1356	2040
GR	1355	2060	1354	2150	1354	2250	1356	2560	1356	2670
GR	1358	2675	1360	2690	1360	3205	1358	3505	1358	4225
GR	1356	4415	1356	5380	1354	5381	1354	5395	1356	5405
GR	1356	5495	1358	5610	1358	5745	1360	5850	1362	5925
GR	1362	6150	1364	6270	1366	6410	1368	6580	1370	6615
GR	1372	6755	1374	6795	1376	6835	1376	6965	1378	7010
ET		4.1	9.1		2865				1970	2350
X1	16.066	48	1970	2350	565	480	570			
X4	3	1360.4	1970	1356.2	2560	1358	2580			
GR	1368	1090	1368	1150	1366	1305	1364	1560	1362	1650
GR	1362	1780	1360	1820	1360	1980	1356	2000	1358	2060
GR	1360	2150	1360	2210	1358	2240	1358	2280	1360	2350
GR	1360	2435	1358	2465	1358	2690	1360	2710	1362	2760
GR	1364	2865	1364	2915	1362	3310	1360	3545	1358	3550

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GR     1358      3730      1360      3745      1360      4670      1358      4920      1358      5145
GR     1356      5355      1354      5356      1354      5365      1356      5368      1358      5375
1
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GR     1358      5570      1360      5720      1362      5800      1364      5915      1364      6005
GR     1366      6110      1368      6380      1368      6570      1370      6680      1372      6780
GR     1374      6830      1374      6870      1376      6920

ET                 4.1       9.1                3030                                      1950      2200
X1   16.167        22      1950      2130       530       530       530
X4        2    1359.7      2030      1362      2130
GR     1370      1020      1370      1095      1368      1245      1366      1255      1366      1270
GR     1368      1290      1368      1420      1366      1665    1364.8      1950      1360      1955
GR     1360      2040      1362      2110      1362      2170      1362      2250      1362      2370
GR     1360      2550      1360      2590      1358      2600      1360      2610      1362      2620
GR     1364      2630      1365      2650

ET                 4.1       9.1                2645                                      1925      2030
X1   16.248        40      1925      2030       450       340       430
GR     1372      1090      1370      1100      1370      1115      1370      1120      1370      1130
GR     1370      1365      1368      1590      1366      1660      1367      1925      1362      1940
GR     1362      1985      1361      2000      1362      2013      1364      2030      1364      2230
GR     1362      2240      1362      2250      1364      2300      1364      2630      1366      2645
GR     1366      2943      1364      2950      1364      3045      1366      3055      1366      3690
GR     1364      3755      1364      3770      1365      4105      1364      4218      1362      4765
GR     1360      5045      1358      5055    1356.1      5095      1358      5105      1360      5115
GR     1362      5328      1364      5485      1366      5755      1368      5810      1370      6160

ET                 4.1       9.1                2665                                      1915      2240
X1   16.328        45      1915      2240       440       250       410
X4        1    1367.4      2240
GR     1374       980      1372       990      1372      1010      1372      1015      1372      1020
GR     1372      1250      1370      1520      1368      1790      1367      1835      1366      1915
GR     1364      1940    1362.8      2000      1364      2050      1366      2150      1366      2335
GR     1364      2339      1364      2370      1366      2397      1366      2403      1368      2665
GR     1366      2680      1366      2715      1368      2735      1368      3345      1366      3530
GR     1366      3730      1367      3890      1366      4145      1366      4310      1364      4355
GR     1364      4505      1362      4760      1362      4885      1360      4910      1358      4920
GR   1357.5      4925      1358      4937      1360      4947      1362      5050      1362      5278
GR     1364      5335      1366      5455      1368      5645      1370      5695      1370      5780

ET                 4.1       9.1                2460                                      1885      2055
X1   16.411        46      1885      2055       510       350       450
X3       10
X4        1    1369.2      1885
GR     1378       610      1376       760      1376       761      1376       762      1376       763
GR     1374      1090      1372      1370      1370      1500      1370      1650      1368      1665
GR     1368      1920      1366      1948    1364.3      2000      1366      2048      1370      2055
GR     1370      2210      1368      2223      1368      2240      1370      2260      1370      2390
GR     1368      2425      1368      2450      1370      2460      1370      2980      1368      3125
GR     1368      3390      1369      3520      1369      3580      1369      3645      1368      3830
GR     1366      4025      1366      4200      1364      4520      1362      4545      1360      4545
GR   1359.5      4555      1360      4561      1362      4565      1362      4588      1360      4594
GR     1360      4600      1362      4601      1364      4758      1366      4885      1368      4995
GR     1370      5185

     REVISED THE ELEVATION OF STATION 2000 FROM 1365 TO 1365.8 (TMM 3-94)
        "     "     "     "     "     3560  "   1970 "  1370     "
1
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        "     "     "     "     "     3960  "   1398 "  1368     "

ET                                    9.1                                                   1835      2035
X1   16.504        33      1835      2035       460       300       490
X3       10
GR     1380       680      1378       695      1378       712      1378       720      1378       743
GR     1376       980      1374      1180      1374      1315      1372      1625      1370      1630
GR     1370      1665      1372      1670      1372      1770      1370      1780      1370      1835
GR     1368      1915      1366      1980    1365.8      2000      1366      2018      1372      2035
GR     1372      2110      1370      2140      1370      2160      1372      2195      1372      2390
GR   1370.7      2880    1371.8      3295      1370      3560      1368      3960      1366      4225
GR     1364      4310      1364      4340      1390      4340

ET                                    9.1                                                   1910      2110
X1   16.608        30      1910      2110       485       450       530
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X3        10
X4         2     1376.5      1910     1374.2      2110
GR      1382        920      1380       1000      1380      1050      1380      1150      1380      1151
GR      1378       1280      1376       1520      1376      1920      1374      1925      1372      1930
GR      1370       1935      1370       1980      1368      1995    1367.8      2000      1368      2015
GR      1370       2020      1370       2080      1372      2090      1372      2200      1370      2210
GR      1369       2220      1370       2235      1372      2270      1374      2310      1374      2375
GR      1372       2385      1372       2395      1374      2400      1376      2410      1376      2550

ET                   4.1       9.1                 2300                                      1950      2110
X1    16.732        18      1950       2115       640       420       685
X3        10
X4         4       1375      2000       1380      1950      1376      2040      1379      2300
GR      1382       1650      1376       1960      1376      2110      1378      2115      1378      2370
GR      1376       2470      1376       2480      1378      2490      1378      2550      1376      2570
GR      1376       2620      1378       2630      1378      2850      1376      2880      1375      2885
GR      1376       2890      1378       2910      1380      2920

ET                           9.1                                                           1935      2045
X1    16.818        14      1935       2045       430       750       455
X4         1     1381.2      2240
GR      1390       1145      1388       1340      1386      1490      1384      1640      1382      1935
GR      1376       1980    1375.7       2000      1376      2030    1380.4      2045      1380      2097
GR      1378       2105      1378       2190      1380      2210      1382      2350
1
   10MAR95      11:11:04                                                                          PAGE   17

    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
0

    10.803      5.64   1219.74       .00       .00   1221.33      1.59      4.97       .18   1220.00
   10900.0        .0   10900.0        .0        .0    1075.8        .0     525.2     119.3   1220.00
       .48       .00     10.13       .00      .000      .030      .000      .000   1214.10  19750.66
   .006501     1020.     1010.     1010.         3         0         0       .00    264.01  20014.67


FLOW DISTRIBUTION FOR SECNO=     10.80          CWSEL=   1219.74

STA=   19751.   20015.
  PER Q=    100.0
   AREA=   1075.8
    VEL=     10.1
  DEPTH=      4.1

*SECNO 10.989

3301 HV CHANGED MORE THAN HVINS


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1226.00 ELREA=      1226.00

        UNION HILLS DRIVE
    10.989      7.01   1225.21       .00       .00   1226.22      1.01      4.83       .06   1226.00
   10900.0        .0   10900.0        .0        .0    1352.4        .0     552.5     125.8   1226.00
       .52       .00      8.06       .00      .000      .030      .000      .000   1218.20  19911.53
   .003864      920.      980.     1000.         2         0         0       .00    318.88  20230.41


FLOW DISTRIBUTION FOR SECNO=     10.99          CWSEL=   1225.21

STA=   19912.   20250.
  PER Q=    100.0
   AREA=   1352.4
    VEL=      8.1
  DEPTH=      4.2

1
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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
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   SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

*SECNO 11.129

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1232.00 ELREA=      1230.00

        NEW SECTION - LEFT BANK TAKEN FROM ARROWHEAD RANCH
        WASTEWATER TREATMENT PLANT GRADING PLAN-DIBBLE & ASSOC.
   11.129      5.83   1227.53      .00       .00   1228.39      .86      2.16       .01   1232.00
  10900.0        .0   10900.0       .0        .0    1463.0       .0     575.4     130.6   1230.00
      .55       .00      7.45      .00      .000      .030     .000      .000   1221.70  19832.77
  .002454      710.      710.     710.         3         0        0       .00    274.83  20107.59

FLOW DISTRIBUTION FOR SECNO=     11.13          CWSEL=   1227.53

STA=   19833.   20115.
  PER Q=    100.0
   AREA=   1463.0
    VEL=      7.5
  DEPTH=      5.3

*SECNO 11.188
3280 CROSS SECTION     11.19 EXTENDED       .10 FEET

3301 HV CHANGED MORE THAN HVINS

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1232.00 ELREA=      1232.00

   11.188      6.09   1228.09      .00       .00   1229.59     1.50      1.01       .19   1232.00
  10350.0        .0   10350.0       .0        .0    1051.9       .0     584.7     132.4   1232.00
      .55       .00      9.84      .00      .000      .030     .000      .000   1222.00  19841.15
  .004264      310.      320.     310.         2         0        0       .00    196.77  20037.92

FLOW DISTRIBUTION FOR SECNO=     11.19          CWSEL=   1228.09

STA=   19841.   20055.
  PER Q=    100.0
   AREA=   1051.9
    VEL=      9.8
  DEPTH=      5.3
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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 11.301

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1235.00 ELREA=      1236.00

   11.301      8.33   1230.53      .00       .00   1232.02     1.49      2.42       .00   1235.00
  10350.0        .0   10350.0       .0        .0    1055.5       .0     599.2     135.0   1236.00
      .57       .00      9.81      .00      .000      .030     .000      .000   1222.20  19918.70
  .003833      600.      600.     600.         2         0        0       .00    183.04  20101.74

FLOW DISTRIBUTION FOR SECNO=     11.30          CWSEL=   1230.53

STA=   19919.   20120.
  PER Q=    100.0
   AREA=   1055.5
    VEL=      9.8
  DEPTH=      5.8

*SECNO 11.386

3301 HV CHANGED MORE THAN HVINS

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1233.00 ELREA=      1238.00
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   11.386      9.81   1232.81      .00       .00   1233.70      .89      1.62      .06   1233.00
  10350.0       .0   10350.0       .0        .0    1368.4       .0     611.7    137.2   1238.00
     .59       .00      7.56      .00      .000      .035     .000      .000  1223.00  19900.18
 .003392      440.      450.     420.         2         0        0       .00   253.22  20153.40

FLOW DISTRIBUTION FOR SECNO=     11.39          CWSEL=   1232.81

STA=   19900.   20175.
  PER Q=    100.0
   AREA=   1368.4
    VEL=      7.6
  DEPTH=      5.4

*SECNO 11.481
1
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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


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1236.00 ELREA=      1240.00

   11.481      7.35   1234.75      .00       .00   1235.37      .62      1.64      .03   1236.00
  10350.0       .0   10350.0       .0        .0    1637.0       .0     629.6    140.9   1240.00
     .61       .00      6.32      .00      .000      .035     .000      .000  1227.40  19784.17
 .002951      480.      520.     540.         2         0        0       .00   359.58  20143.75

FLOW DISTRIBUTION FOR SECNO=     11.48          CWSEL=   1234.75

STA=   19784.   20170.
  PER Q=    100.0
   AREA=   1637.0
    VEL=      6.3
  DEPTH=      4.6

*SECNO 11.566

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.72

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1240.00 ELREA=      1240.00

   11.566      6.28   1235.98      .00       .00   1236.15      .17       .73      .05   1240.00
  10350.0       .0   10350.0       .0        .0    3155.1       .0     654.9    147.1   1240.00
     .65       .00      3.28      .00      .000      .035     .000      .000  1229.70  19480.61
 .000997      280.      460.     530.         2         0        0       .00   821.86  20302.47

FLOW DISTRIBUTION FOR SECNO=     11.57          CWSEL=   1235.98

STA=   19481.   20310.
  PER Q=    100.0
   AREA=   3155.1
    VEL=      3.3
  DEPTH=      3.8

*SECNO 11.759
1
   10MAR95      11:11:04                                                                          PAGE   31

    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

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
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3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1244.00 ELREA= 1248.00

11.759	3.20	1238.20	1238.20	.00	1239.37	1.17	2.53	.30	1244.00
10350.0	.0	10350.0	.0	.0	1194.2	.0	705.9	162.9	1248.00
.68	.00	8.67	.00	.000	.035	.000	.000	1235.00	19935.87
.013895	1050.	1020.	980.	4	11	0	.00	522.81	20458.68

FLOW DISTRIBUTION FOR SECNO= 11.76 CWSEL= 1238.20

STA= 19936. 20510.
PER Q= 100.0
AREA= 1194.2
VEL= 8.7
DEPTH= 2.3

*SECNO 11.949

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.75

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1250.00 ELREA= 1246.00

11.949	4.23	1246.23	.00	.00	1246.76	.54	7.33	.06	1250.00
10350.0	.0	9903.0	447.0	.0	1652.9	264.8	741.6	178.8	1246.00
.73	.00	5.99	1.69	.000	.035	.060	.000	1242.00	19967.82
.004517	990.	1000.	1000.	6	0	0	.00	866.00	23952.99

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

FLOW DISTRIBUTION FOR SECNO= 11.95 CWSEL= 1246.23

STA=	19968.	20510.	20520.	20530.	20590.	20600.	23750.	23953.
PER Q=	95.7	.0	.0	.1	.0	.3	3.9	
AREA=	1652.9	2.3	2.3	13.7	2.3	18.0	226.2	
VEL=	6.0	.6	.6	.6	.6	1.6	1.8	
DEPTH=	3.0	.2	.2	.2	.2	.0	1.1	

*SECNO 12.125

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1258.00 ELREA= 1258.00

12.125	3.46	1251.46	.00	.00	1252.13	.66	5.32	.04	1258.00
10350.0	.0	10350.0	.0	.0	1582.2	.0	779.1	195.4	1258.00
.77	.00	6.54	.00	.000	.035	.000	.000	1248.00	19927.44
.007458	910.	930.	1000.	3	0	0	.00	663.12	20590.56

FLOW DISTRIBUTION FOR SECNO= 12.13 CWSEL= 1251.46

STA= 19927. 20680.
PER Q= 100.0
AREA= 1582.2
VEL= 6.5
DEPTH= 2.4

PROF 2

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 10.803

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS= 19750.0 20015.0 TYPE= 1 TARGET= 265.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1220.00 ELREA= 100000.00

10.803	6.69	1220.79	.00	1219.74	1222.82	2.03	5.24	.19	1220.00
15500.0	.0	15500.0	.0	.0	1356.4	.0	592.2	93.1	100000.00
.38	.00	11.43	.00	.000	.030	.000	.000	1214.10	19750.00
.006154	1020.	1010.	1010.	3	0	0	.00	265.00	20015.00

FLOW DISTRIBUTION FOR SECNO= 10.80 CWSEL= 1220.79

STA= 19750. 20015.
PER Q= 100.0
AREA= 1356.4
VEL= 11.4
DEPTH= 5.1

*SECNO 10.989
3280 CROSS SECTION 10.99 EXTENDED .34 FEET

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS= 19905.0 20250.0 TYPE= 1 TARGET= 345.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1226.00 ELREA= 100000.00

UNION HILLS DRIVE

10.989	8.14	1226.34	.00	1225.21	1227.59	1.25	4.69	.08	1226.00
15500.0	.0	15500.0	.0	.0	1730.8	.0	626.9	99.9	100000.00
.41	.00	8.96	.00	.000	.030	.000	.000	1218.20	19905.00
.003824	920.	980.	1000.	2	0	0	.00	345.00	20250.00

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

FLOW DISTRIBUTION FOR SECNO= 10.99 CWSEL= 1226.34

STA= 19905. 20250.
PER Q= 100.0
AREA= 1730.8
VEL= 9.0
DEPTH= 5.0

*SECNO 11.129

3470 ENCROACHMENT STATIONS= 19820.0 20115.0 TYPE= 1 TARGET= 295.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1282.00 ELREA= 100000.00

NEW SECTION - LEFT BANK TAKEN FROM ARROWHEAD RANCH
WASTEWATER TREATMENT PLANT GRADING PLAN-DIBBLE & ASSOC.

11.129	6.97	1228.67	.00	1227.53	1229.85	1.18	2.26	.01	1282.00
15500.0	.0	15500.0	.0	.0	1777.6	.0	655.5	105.0	100000.00
.43	.00	8.72	.00	.000	.030	.000	.000	1221.70	19829.54
.002681	710.	710.	710.	2	0	0	.00	281.45	20110.99

FLOW DISTRIBUTION FOR SECNO= 11.13 CWSEL= 1228.67

STA= 19830. 20115.
PER Q= 100.0
AREA= 1777.6
VEL= 8.7
DEPTH= 6.3

```
*SECNO 11.188
3280 CROSS SECTION     11.19 EXTENDED      1.30 FEET

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS=    19830.0   20055.0  TYPE=      1  TARGET=      225.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1282.00 ELREA=    100000.00

1
   10MAR95      11:11:04                                                                                    PAGE   62

    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

    11.188      7.29   1229.29       .00   1228.09   1231.05      1.75      1.03       .17   1282.00
   13750.0       .0   13750.0       .0       .0      1293.4       .0      666.8     106.8 100000.00
       .44      .00     10.63       .00      .000      .030      .000      .000   1222.00  19837.72
   .004010     310.      320.      310.        2         0         0       .00    205.46  20043.18

FLOW DISTRIBUTION FOR SECNO=     11.19          CWSEL=   1229.29

STA=   19838.   20055.
  PER Q=    100.0
   AREA=   1293.4
    VEL=     10.6
  DEPTH=      6.3

*SECNO 11.301

3470 ENCROACHMENT STATIONS=    19900.0   20120.0  TYPE=      1  TARGET=      220.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1235.00 ELREA=    100000.00

    11.301      9.41   1231.61       .00   1230.53   1233.46      1.85      2.39       .03   1235.00
   13750.0       .0   13750.0       .0       .0      1258.5       .0      684.4     109.5 100000.00
       .45      .00     10.93       .00      .000      .030      .000      .000   1222.20  19915.97
   .003948     600.      600.      600.        2         0         0       .00    189.40  20105.37

FLOW DISTRIBUTION FOR SECNO=     11.30          CWSEL=   1231.61

STA=   19916.   20120.
  PER Q=    100.0
   AREA=   1258.5
    VEL=     10.9
  DEPTH=      6.6

*SECNO 11.386

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS=    19900.0   20175.0  TYPE=      1  TARGET=      275.000
1
   10MAR95      11:11:04                                                                                    PAGE   63

    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=      1233.00 ELREA=    100000.00

    11.386     11.08   1234.08       .00   1232.81   1235.10      1.02      1.55       .08   1233.00
   13750.0       .0   13750.0       .0       .0      1693.6       .0      699.6     111.8 100000.00
       .47      .00      8.12       .00      .000      .035      .000      .000   1223.00  19900.00
   .003046     440.      450.      420.        2         0         0       .00    258.69  20158.69
```

FLOW DISTRIBUTION FOR SECNO= 11.39 CWSEL= 1234.08

STA= 19900. 20175.
PER Q= 100.0
AREA= 1693.6
VEL= 8.1
DEPTH= 6.5

*SECNO 11.481

3470 ENCROACHMENT STATIONS= 19780.0 20170.0 TYPE= 1 TARGET= 390.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1236.00 ELREA= 100000.00

11.481	8.48	1235.88	.00	1234.75	1236.58	.70	1.45	.03	1236.00
13750.0	.0	13750.0	.0	.0	2047.8	.0	722.0	115.6	100000.00
.49	.00	6.71	.00	.000	.035	.000	.000	1227.40	19780.41
.002557	480.	520.	540.	1	0	0	.00	368.98	20149.39

FLOW DISTRIBUTION FOR SECNO= 11.48 CWSEL= 1235.88

STA= 19780. 20170.
PER Q= 100.0
AREA= 2047.8
VEL= 6.7
DEPTH= 5.5

*SECNO 11.566

3301 HV CHANGED MORE THAN HVINS

1
10MAR95 11:11:04 PAGE 64

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

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.81

3470 ENCROACHMENT STATIONS= 19470.0 20310.0 TYPE= 1 TARGET= 840.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1240.00 ELREA= 100000.00

11.566	7.35	1237.05	.00	1235.98	1237.23	.18	.59	.05	1240.00
13750.0	.0	13750.0	.0	.0	4041.8	.0	754.1	121.9	100000.00
.53	.00	3.40	.00	.000	.035	.000	.000	1229.70	19477.36
.000778	280.	460.	530.	1	0	0	.00	827.13	20304.48

FLOW DISTRIBUTION FOR SECNO= 11.57 CWSEL= 1237.05

STA= 19477. 20310.
PER Q= 100.0
AREA= 4041.8
VEL= 3.4
DEPTH= 4.9

*SECNO 11.759

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= 19925.0 20510.0 TYPE= 1 TARGET= 585.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1244.00 ELREA= 100000.00

11.759	3.69	1238.69	1238.69	1238.20	1240.09	1.40	2.05	.36	1244.00
13750.0	.0	13750.0	.0	.0	1450.2	.0	818.4	137.7	100000.00
.56	.00	9.48	.00	.000	.035	.000	.000	1235.00	19934.95
.012897	1050.	1020.	980.	20	8	0	.00	524.54	20459.49

```
FLOW DISTRIBUTION FOR SECNO=     11.76          CWSEL=   1238.69

1
  10MAR95      11:11:04                                                                                                PAGE   65

   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

STA=   19935.   20510.
  PER Q=    100.0
   AREA=   1450.2
    VEL=      9.5
  DEPTH=      2.8

*SECNO 11.949

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.64

3470 ENCROACHMENT STATIONS=    19865.0   20510.0  TYPE=      1  TARGET=      645.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1250.00 ELREA=    100000.00

    11.949      4.85   1246.85       .00   1246.23   1247.58       .73      7.43       .07   1250.00
   13750.0        .0   13750.0        .0        .0    1999.1        .0     858.0     150.2 100000.00
       .60       .00      6.88       .00      .000      .035      .000      .000   1242.00  19950.84
   .004823      990.     1000.     1000.         3         0         0       .00    559.15  20510.00

FLOW DISTRIBUTION FOR SECNO=     11.95          CWSEL=   1246.85

STA=   19951.   20510.
  PER Q=    100.0
   AREA=   1999.1
    VEL=      6.9
  DEPTH=      3.6

*SECNO 12.125

3470 ENCROACHMENT STATIONS=    19890.0   20680.0  TYPE=      1  TARGET=      790.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1258.00 ELREA=    100000.00

    12.125      4.03   1252.03       .00   1251.46   1252.79       .76      5.20       .01   1258.00
   13750.0        .0   13750.0        .0        .0    1963.7        .0     900.3     163.3 100000.00
       .64       .00      7.00       .00      .000      .035      .000      .000   1248.00  19926.45
   .006551      910.      930.     1000.         3         0         0       .00    674.18  20600.62

1
  10MAR95      11:11:04                                                                                                PAGE   66

   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

FLOW DISTRIBUTION FOR SECNO=     12.13          CWSEL=   1252.03

STA=   19926.   20680.
  PER Q=    100.0
   AREA=   1963.7
    VEL=      7.0
  DEPTH=      2.9

*SECNO 12.313

3470 ENCROACHMENT STATIONS=    19830.0   20240.0  TYPE=      1  TARGET=      410.000
```

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1262.00 ELREA= 100000.00

12.313	5.84	1258.04	.00	1257.61	1259.03	.99	6.17	.07	1262.00
12000.0	.0	12000.0	.0	.0	1506.4	.0	939.8	175.5	100000.00
.67	.00	7.97	.00	.000	.035	.000	.000	1252.20	19839.89
.005895	1010.	990.	980.	3	0	0	.00	393.58	20233.47

FLOW DISTRIBUTION FOR SECNO= 12.31 CWSEL= 1258.04

STA= 19840. 20240.
PER Q= 100.0
AREA= 1506.4
VEL= 8.0
DEPTH= 3.8

THIS RUN EXECUTED 10MAR95 11:11:26

****
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

Existing Conditions

SUMMARY PRINTOUT

	SECNO	Q	SSTA	STCHL	VLOB	VCH	VROB	STCHR	ENDST	TOPWID	CWSEL	DIFWSP
	8.655	41000.00	9587.04	9581.40	.00	5.01	.00	10224.30	10221.10	634.06	1170.50	.00
	8.655	41000.00	9587.04	9581.40	.00	5.01	.00	10224.30	10221.10	634.06	1170.50	.00
*	8.731	12000.00	9779.38	9762.50	.00	2.33	.00	10213.50	10208.22	428.84	1170.96	.00
*	8.731	19000.00	9779.93	9762.50	.00	3.72	.00	10213.50	10207.76	427.83	1170.85	-.11
	8.807	12000.00	9785.25	9771.30	.00	2.67	.00	10219.20	10202.70	417.45	1170.99	.00
	8.807	19000.00	9785.44	9771.30	.00	4.24	.00	10219.20	10202.41	416.96	1170.94	-.05
*	8.883	12000.00	9850.57	9824.70	.00	4.70	.00	10216.90	10189.15	338.58	1170.96	.00
*	8.883	19000.00	9851.30	9824.70	.00	7.55	.00	10216.90	10188.76	337.46	1170.85	-.11
	8.936	12000.00	9821.91	9809.40	.00	5.09	.00	10213.20	10181.98	360.07	1171.20	.00
	8.936	19000.00	9821.60	9809.40	.00	7.69	.00	10213.20	10183.17	361.58	1171.51	.31
	8.977	12000.00	9895.40	9886.10	.00	6.84	.00	10212.70	10178.07	282.68	1171.31	.00
	8.977	19000.00	9894.70	9886.10	.00	10.11	.00	10212.70	10180.27	285.57	1171.75	.44
*	9.009	12000.00	9797.15	9764.50	.00	4.63	.00	10207.00	10166.79	369.65	1171.99	.00
*	9.009	19000.00	9790.86	9764.50	.00	6.21	.00	10207.00	10168.77	377.91	1173.24	1.25
	9.047	12000.00	9712.28	9689.80	.00	3.71	.00	10113.80	10103.66	391.38	1172.25	.00
	9.047	19000.00	9706.22	9689.80	.00	5.00	.00	10113.80	10106.34	400.12	1173.66	1.42
*	9.129	12000.00	9674.75	9641.20	.00	4.88	.00	10090.00	10080.74	405.98	1172.43	.00
*	9.129	19000.00	9665.63	9641.20	.00	6.17	.00	10090.00	10082.96	417.32	1173.93	1.50
*	9.318	12000.00	19695.41	19660.00	.00	6.59	1.70	20015.00	23740.00	1824.29	1181.50	.00
*	9.318	19000.00	19693.99	19660.00	.00	12.55	.00	20015.00	20015.00	321.00	1181.84	.34
*	9.492	11450.00	19912.16	19770.00	.00	9.81	.00	20235.00	20200.77	288.61	1185.42	.00
*	9.492	17250.00	19770.00	19770.00	.00	7.23	.00	20235.00	20214.01	444.01	1188.70	3.28

1

	SECNO	Q	SSTA	STCHL	VLOB	VCH	VROB	STCHR	ENDST	TOPWID	CWSEL	DIFWSP
	9.692	11450.00	19852.36	19840.00	.00	9.94	.00	20060.00	20047.27	194.91	1192.22	.00
*	9.692	17250.00	19850.95	19840.00	.00	14.20	.00	20060.00	20048.32	197.37	1192.54	.31
	9.889	11450.00	19860.24	19840.00	.00	8.30	.00	20080.00	20070.93	210.69	1196.98	.00
*	9.889	17250.00	19841.51	19840.00	.00	8.65	.00	20080.00	20079.09	237.58	1199.69	2.72
	9.953	11450.00	19795.05	19790.00	.00	8.06	.00	20032.00	20026.45	231.40	1197.97	.00

	9.953	17250.00	19790.00	19790.00	.00	8.64	.00	20032.00	20030.41	240.41	1200.41	2.44
	9.967	11450.00	19839.52	19825.00	.00	8.21	.00	20110.00	20080.96	241.44	1198.19	.00
	9.967	17250.00	19833.39	19825.00	.00	8.59	.00	20110.00	20093.21	259.81	1200.64	2.45
*	10.096	11450.00	19639.38	19635.00	.00	8.33	.00	20055.00	20041.40	402.03	1200.56	.00
	10.096	17250.00	19635.00	19635.00	.00	8.21	.00	20055.00	20045.85	410.85	1202.34	1.78
	10.271	10900.00	19863.81	19820.00	.00	7.01	.00	20320.00	20301.58	437.77	1205.06	.00
	10.271	15500.00	19860.09	19820.00	.00	8.45	.00	20320.00	20305.53	445.44	1205.69	.63
*	10.443	10900.00	19742.09	19655.00	.00	9.85	.00	20110.00	20108.96	366.87	1209.58	.00
	10.443	15500.00	19668.44	19655.00	.00	10.10	.00	20110.00	20110.00	441.56	1210.62	1.04
*	10.612	10900.00	19972.01	19955.00	.00	7.97	.00	20300.00	20297.66	325.65	1215.19	.00
	10.612	15500.00	19970.04	19955.00	.00	9.53	.00	20300.00	20298.32	328.28	1215.98	.79
	10.803	10900.00	19750.66	19750.00	.00	10.13	.00	20015.00	20014.67	264.01	1219.74	.00
	10.803	15500.00	19750.00	19750.00	.00	11.43	.00	20015.00	20015.00	265.00	1220.79	1.06
	10.989	10900.00	19911.53	19905.00	.00	8.06	.00	20250.00	20230.41	318.88	1225.21	.00
	10.989	15500.00	19905.00	19905.00	.00	8.96	.00	20250.00	20250.00	345.00	1226.34	1.13
	11.129	10900.00	19832.77	19820.00	.00	7.45	.00	20115.00	20107.59	274.83	1227.53	.00
	11.129	15500.00	19829.54	19820.00	.00	8.72	.00	20115.00	20110.99	281.45	1228.67	1.14
	11.188	10350.00	19841.15	19830.00	.00	9.84	.00	20055.00	20037.92	196.77	1228.09	.00
	11.188	13750.00	19837.72	19830.00	.00	10.63	.00	20055.00	20043.18	205.46	1229.29	1.20
	11.301	10350.00	19918.70	19900.00	.00	9.81	.00	20120.00	20101.74	183.04	1230.53	.00
	11.301	13750.00	19915.97	19900.00	.00	10.93	.00	20120.00	20105.37	189.40	1231.61	1.08
	11.386	10350.00	19900.18	19900.00	.00	7.56	.00	20175.00	20153.40	253.22	1232.81	.00
	11.386	13750.00	19900.00	19900.00	.00	8.12	.00	20175.00	20158.69	258.69	1234.08	1.27
	11.481	10350.00	19784.17	19780.00	.00	6.32	.00	20170.00	20143.75	359.58	1234.75	.00
	11.481	13750.00	19780.41	19780.00	.00	6.71	.00	20170.00	20149.39	368.98	1235.88	1.13
*	11.566	10350.00	19480.61	19470.00	.00	3.28	.00	20310.00	20302.47	821.86	1235.98	.00
*	11.566	13750.00	19477.36	19470.00	.00	3.40	.00	20310.00	20304.48	827.13	1237.05	1.07
*	11.759	10350.00	19935.87	19925.00	.00	8.67	.00	20510.00	20458.68	522.81	1238.20	.00
*	11.759	13750.00	19934.95	19925.00	.00	9.48	.00	20510.00	20459.49	524.54	1238.69	.49

	SECNO	Q	SSTA	STCHL	VLOB	VCH	VROB	STCHR	ENDST	TOPWID	CWSEL	DIFWSP
*	11.949	10350.00	19967.82	19865.00	.00	5.99	1.69	20510.00	23952.99	866.00	1246.23	.00
*	11.949	13750.00	19950.84	19865.00	.00	6.88	.00	20510.00	20510.00	559.15	1246.85	.62
	12.125	10350.00	19927.44	19890.00	.00	6.54	.00	20680.00	20590.56	663.12	1251.46	.00
	12.125	13750.00	19926.45	19890.00	.00	7.00	.00	20680.00	20600.62	674.18	1252.03	.57
	12.313	9800.00	19858.21	19830.00	.00	7.30	.00	20240.00	20232.05	373.85	1257.61	.00
	12.313	12000.00	19839.89	19830.00	.00	7.97	.00	20240.00	20233.47	393.58	1258.04	.43
	12.511	9800.00	19818.12	19810.00	.00	6.95	.00	20280.00	20276.51	389.57	1263.08	.00
	12.511	12000.00	19810.00	19810.00	.00	7.14	.00	20280.00	20278.97	427.51	1263.72	.65
	12.701	9800.00	19816.07	19810.00	.00	6.89	1.10	20330.00	20413.61	597.54	1268.79	.00
	12.701	12000.00	19814.13	19810.00	.00	7.42	.00	20330.00	20330.00	515.87	1269.17	.38
*	12.896	9800.00	19845.78	19845.00	.00	5.48	.68	20360.00	20401.32	555.54	1273.69	.00
*	12.896	12000.00	19845.00	19845.00	.00	5.96	.00	20360.00	20360.00	515.00	1274.12	.43
*	13.076	7900.00	19931.63	19930.00	.00	6.45	.00	20350.00	20347.55	415.92	1277.34	.00
*	13.076	9539.00	19930.63	19930.00	.00	6.86	.00	20350.00	20349.05	418.42	1277.75	.41
*	13.227	7900.00	19818.09	19810.00	.00	5.84	.00	20120.00	20102.29	284.19	1280.23	.00
*	13.227	9539.00	19815.01	19810.00	.00	6.39	.00	20120.00	20107.13	292.12	1280.71	.48
*	13.420	7900.00	19874.30	19870.00	.00	10.45	.00	20170.00	20099.96	225.66	1285.99	.00
*	13.420	9539.00	19872.84	19870.00	.00	10.90	.00	20170.00	20112.63	239.78	1286.51	.51
*	13.619	7900.00	19893.97	19870.00	.00	4.40	2.35	20455.00	20532.06	636.92	1292.41	.00
*	13.619	9539.00	19892.76	19870.00	.00	4.78	.00	20455.00	20455.00	562.23	1292.90	.49

*	13.818	7900.00	19916.12	19890.00	.00	7.82	4.04	20340.00	20709.02	677.97	1297.44	.00
*	13.818	9539.00	19897.12	19890.00	.00	8.90	.00	20340.00	20339.79	442.67	1297.94	.51
*	14.013	6100.00	19918.26	19915.00	.00	3.90	2.05	20270.00	21600.50	1285.94	1303.74	.00
*	14.013	7207.00	19915.00	19915.00	.00	5.45	.00	20270.00	20270.00	355.00	1304.99	1.24
*	14.197	6100.00	19559.21	19715.00	1.63	6.88	2.10	20015.00	20830.77	840.82	1308.77	.00
*	14.197	7207.00	19715.00	19715.00	.00	8.19	.00	20015.00	20011.68	296.68	1309.11	.34
	14.379	6100.00	19544.77	19540.00	.00	5.52	2.68	20095.00	21035.58	1010.34	1315.05	.00
	14.379	7207.00	19540.00	19540.00	.00	5.03	3.68	20095.00	20250.00	710.00	1316.28	1.23
	14.559	6100.00	19222.21	19220.00	.00	4.48	.00	20045.00	20037.93	815.72	1320.23	.00
	14.559	7207.00	19221.72	19220.00	.00	4.29	.00	20045.00	20042.82	821.11	1320.62	.40
	14.752	6100.00	19673.36	19670.00	.00	4.85	.00	20170.00	20139.80	466.45	1324.66	.00
	14.752	7207.00	19673.14	19670.00	.00	5.56	.00	20170.00	20141.72	468.57	1324.74	.08
*	14.945	4200.00	19901.58	19865.00	.00	8.57	2.20	20050.00	20410.24	247.81	1329.02	.00
*	14.945	4746.00	19873.85	19865.00	.00	8.04	.00	20050.00	20048.82	174.97	1329.76	.74

	SECNO	Q	SSTA	STCHL	VLOB	VCH	VROB	STCHR	ENDST	TOPWID	CWSEL	DIFWSP
*	15.144	4200.00	19605.97	19602.45	.00	4.32	.00	19982.48	19981.95	375.98	1334.82	.00
	15.144	4746.00	19955.00	19602.45	.00	10.73	4.36	19982.48	20382.00	427.00	1338.24	3.42
*	15.333	4200.00	19781.38	19770.00	.00	5.93	.00	20100.00	20092.16	310.78	1338.85	.00
*	15.333	4746.00	19770.00	19770.00	.00	3.41	.00	20100.00	20097.48	327.48	1340.99	2.14
	15.519	4200.00	19962.68	19950.00	.00	5.35	.00	20320.00	20263.76	301.08	1344.19	.00
*	15.519	4746.00	19965.10	19950.00	.00	8.24	.00	20320.00	20246.69	281.59	1343.47	-.72
	15.699	4200.00	19899.14	19870.00	.00	7.16	3.36	20085.00	20888.91	359.55	1349.57	.00
*	15.699	4746.00	19882.94	19870.00	.00	6.54	.00	20085.00	20085.00	202.06	1350.82	1.25
	15.966	2350.00	1989.23	1985.00	.00	2.69	2.35	2430.00	2670.77	537.87	1356.31	.00
*	15.966	2350.00	1988.81	1985.00	.00	3.14	.00	2430.00	2414.23	425.41	1356.47	.16
*	16.066	2350.00	1986.60	1970.00	.00	6.00	5.12	2350.00	2696.80	419.99	1358.68	.00
*	16.066	2350.00	1982.52	1970.00	.00	6.78	.00	2350.00	2332.38	259.67	1359.50	.81
*	16.167	2350.00	1952.47	1950.00	.00	3.50	2.20	2130.00	2622.15	669.68	1362.43	.00
*	16.167	2350.00	1951.62	1950.00	.00	4.58	1.92	2130.00	2200.00	248.38	1363.25	.82
*	16.248	2350.00	1932.67	1925.00	.00	6.86	2.31	2030.00	2633.33	700.66	1364.44	.00
*	16.248	2350.00	1931.21	1925.00	.00	8.59	.00	2030.00	2030.00	98.79	1364.93	.49
*	16.328	2350.00	1873.19	1915.00	.66	3.67	2.27	2240.00	2471.46	482.32	1366.52	.00
*	16.328	2350.00	1915.00	1915.00	.00	2.99	.00	2240.00	2236.81	321.81	1367.35	.83
*	16.411	2350.00	1915.48	1885.00	.00	6.97	.00	2055.00	2051.77	136.29	1368.15	.00
*	16.411	2350.00	1912.69	1885.00	.00	6.71	.00	2055.00	2051.94	139.25	1368.25	.10
*	16.504	2350.00	1628.55	1835.00	.96	4.06	.00	2035.00	2030.98	291.78	1370.58	.00
*	16.504	2350.00	1835.00	1835.00	.00	4.14	.00	2035.00	2030.99	195.99	1370.59	.01
*	16.608	2350.00	1929.53	1910.00	.00	5.92	.00	2110.00	2091.70	162.17	1372.19	.00
*	16.608	2350.00	1929.44	1910.00	.00	5.83	.00	2110.00	2092.04	162.61	1372.23	.05
*	16.732	2350.00	1955.62	1950.00	.00	7.57	.00	2115.00	2114.38	158.76	1377.75	.00
*	16.732	2350.00	1955.68	1950.00	.00	7.76	.00	2115.00	2110.00	154.31	1377.73	-.02
*	16.818	2350.00	1945.20	1935.00	.00	4.61	2.36	2045.00	2226.00	280.80	1380.64	.00
*	16.818	2350.00	1942.85	1935.00	.00	6.05	.00	2045.00	2045.00	102.15	1380.95	.31

SUMMARY OF ERRORS AND SPECIAL NOTES

WARNING SECNO= 8.731 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO= 8.731 PROFILE= 2 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

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WARNING SECNO=      8.883  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      8.883  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      9.009  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      9.009  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      9.129  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      9.129  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=      9.318  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      9.318  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=      9.318  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=      9.318  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      9.318  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=      9.318  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=      9.492  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      9.492  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=      9.692  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      9.692  PROFILE=  2  MINIMUM SPECIFIC ENERGY

WARNING SECNO=      9.889  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     10.096  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     10.443  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     10.443  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=     10.612  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     11.566  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.566  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     11.759  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     11.759  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     11.759  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     11.759  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     11.759  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=     11.949  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.949  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     12.896  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     12.896  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     13.076  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     13.076  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
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WARNING SECNO=     13.227  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     13.227  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     13.420  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     13.420  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     13.420  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     13.420  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     13.420  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=     13.619  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     13.619  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     13.818  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     13.818  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     13.818  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     13.818  PROFILE=  2  MINIMUM SPECIFIC ENERGY

WARNING SECNO=     14.013  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     14.013  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     14.197  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     14.197  PROFILE=  1  MINIMUM SPECIFIC ENERGY
WARNING SECNO=     14.197  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     14.945  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     14.945  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
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WARNING SECNO=     15.144  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     15.333  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     15.333  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     15.519  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     15.519  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     15.519  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=     15.699  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     15.966  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     16.066  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
CAUTION SECNO=     16.066  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     16.066  PROFILE=  2  MINIMUM SPECIFIC ENERGY

WARNING SECNO=     16.167  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     16.167  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     16.248  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     16.248  PROFILE=  1  MINIMUM SPECIFIC ENERGY
WARNING SECNO=     16.248  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     16.328  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     16.328  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
1
   10MAR95      11:11:04                                                          PAGE   88


WARNING SECNO=     16.411  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     16.411  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     16.504  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     16.504  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     16.608  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     16.608  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     16.732  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     16.732  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     16.818  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     16.818  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
```

APPENDIX B

Added Cross Section HEC-2 Model

```
1*****************************************
 *  HEC-2 WATER SURFACE PROFILES          *
 *                                        *
 *  Version   4.6.2;  May 1991            *
 *                                        *
 *  RUN DATE    10MAR95    TIME   11:24:38 *
 *****************************************
```

```
*************************************
 *  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
```

1

10MAR95 11:24:38 PAGE 1

THIS RUN EXECUTED 10MAR95 11:24:38

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

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

```
    REVISED HEC-2 FILE NRIVER.DAT TO HAVE INPUT DATA MATCH WITH THE HARDCOPY
    PRINTOUT OF THE HEC-2 FILE IN THE FLOOD CONTROL DISTRICT LIBRARY THAT
    CORRESPONDS WITH PUBLISHED FEMA DATA.
    THE HEC-2 MODEL ON THE PRINTOUT WAS WAS RUN ON 9 OCTOBER 1985 USING THE
    MAY 1984 UPDATED VERSION OF HEC-2.
    THIS HEC-2 MODEL APPEARS TO BE THE BEST MATCH WITH PUBLISHED FEMA DATA
    FOR NEW RIVER FROM BELL ROAD UPSTREAM TO THE NEW RIVER DAM.
    THE RESULTS GENERATED BY THIS HEC-2 MODEL DOWNSTREAM OF BELL ROAD SHOUDN'T
    BE USED.
    THE PUBLISHED FEMA DATA FOR THE REACH BELOW BELL ROAD MATCHES CLOSELY WITH
    HEC-2 MODEL REVSB., WHICH WAS DEVELOPED BY COE & VAN LOO.
    THE CROSS SECTIONS BELOW BELL ROAD WHERE RETAINED FOR HISTORICAL REASONS.
    THIS HEC-2 MODEL HASN'T BEEN UPDATED FOR ANY CHANGES THAT MIGHT OCCURED
    SINCE THE MODEL WAS ORIGINALLY CREATED.

T1      NEW RIVER ABOVE SKUNK CREEK, PHOENIX, ARIZ., SEPT 1985    (UHILLS.DAT)
T2      Edited by HDR (1-95) for Union Hills Drive Bridge Analysis
T3      Added Cross Sections    Added by HDR Engineering from survey Feb. 1995
        Existing Condition Flood Plain Model FIS & CORPS Q's
        Estimated starting WSEL from FIS Profiles for 100-yr.

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

              2                                                             1170.5

J2  NPROF     IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE

     1                -1                                                              15

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    38       43       53       21       55       26       56       22       54       4
     1       50

NC    .045     .045     .035     .200     .400
QT      2    41000    41000
        1985 TOPO - DIGITIZED DATA SEC.8.655 THRU SEC.9.129
        DOWNSTREAM STUDY LIMIT
```

1

10MAR95 11:24:38 PAGE 2

Cross Section below the Union Hills crossing @ 83rd Ave. crosses the river

1


```
X1   10.933      13      80.1     393.8      770      660      700
X3       10
GR   1223.7     0.0    1223.8      57.8   1226.4     69.2   1226.4     80.1   1227.4    106.5
GR   1216.0   164.1    1216.3     165.9   1216.0    187.7   1215.9    204.0   1215.4    205.9
GR   1218.7   326.0    1224.2     338.3   1225.5    393.8
```

Cross Section on the down stream side of the Union Hills Crossing
Modified to include the Proposed Bridge Structure
****

```
ET                        9.1                                                   0.0    633.5
        UNION HILLS DRIVE
X1   10.989      15      60.1     335.9      370      370      370
X3       10
GR   1225.5     0.0    1229.7      60.1   1219.2    104.4   1217.0    137.4   1216.5    183.0
GR   1216.4   210.8    1217.4     233.9   1218.4    271.4   1222.1    297.8   1222.8    335.9
GR   1223.5   374.5    1228.1     482.1   1228.5    524.3   1228.4    580.9   1228.7    633.5

X1   11.005                                 85       85       85

X1   11.020      31     362.3     603.7     66.9     66.9     66.9
X2
X3       10                                          603.7
GR   1227.2     0.0    1227.2      45.4   1226.9     98.5   1227.2    150.7   1226.4    196.4
GR   1227.0   243.5    1227.5     348.4   1229.5    362.3   1220.8    388.8   1219.4    395.2
GR   1216.8   404.7    1216.0     431.7   1217.7    487.6   1218.5    493.3   1218.2    507.3
GR   1218.1   529.4    1217.9     531.9   1220.8    546.5   1221.6    595.0   1225.6    603.7
GR   1224.5   649.8    1225.1     761.8   1226.7    765.0   1226.7    770.6   1226.0    773.2
GR   1225.3   774.6    1225.4     784.3   1227.8    797.2   1229.2    825.7   1229.3    853.2
GR   1228.3  894.14
```

Cross Section 300' upstream of the Union Hills alignment

```
X1   11.045      16      89.6     307.6     178.7    178.7    178.7
X3       10
GR   1226.6     0.0    1228.4      82.2   1229.8     89.6   1218.6    108.3   1217.8    184.5
GR   1218.6   225.8    1221.0     230.8   1220.7    241.1   1219.5    248.6   1219.3    251.4
GR   1219.3   271.5    1219.1     278.8   1223.5    291.5   1223.8    297.0   1226.9    307.6
GR   1227.3   360.3


ET                        9.1                                                   0.0    381.6
NC     .045     .045
        NEW SECTION - LEFT BANK TAKEN FROM ARROWHEAD RANCH
        WASTEWATER TREATMENT PLANT GRADING PLAN-DIBBLE & ASSOC.
X1   11.129      15       5.6     330.9     410.2    410.2    410.2
X3       10
GR   1230.9     0.0    1230.0       5.6   1220.2     34.7   1221.2     77.8   1221.0    106.8
GR   1217.8   131.6    1217.9     207.9   1218.3    220.8   1221.0    244.8   1221.0    248.8
GR   1221.5   273.8    1221.2     276.4   1231.3    297.6   1230.1    330.9   1229.8    381.6
```

1


```
QT        2    10350    13750
ET                        9.1                                                 758.7   1228.7
X1   11.188      18     761.6    1020.9     325.8    325.8    325.8
X3       10
GR   1232.3   758.7    1232.8     761.6   1220.5    800.6   1221.9    814.1   1221.7    860.6
GR   1218.4   873.4    1217.5     888.0   1219.1    943.9   1221.8    958.7   1221.5    962.5
GR   1221.6   986.5    1221.3     988.7   1227.2   1005.5   1227.4   1009.6   1232.7   1020.9
GR   1231.5  1045.5    1231.6    1088.8   1231.9   1228.7


ET                        9.1                                                   0.0    361.8
X1   11.301      21      72.7     297.9     591.2    591.2    591.2
```

```
X3      10
GR   1218.2      0.0   1231.3     44.9   1231.5     63.8   1233.3     72.7   1232.9     80.2
GR   1221.4    116.6   1222.9    128.2   1221.9    132.7   1222.2    161.9   1220.4    177.2
GR   1219.7    194.3   1221.0    219.5   1223.4    230.0   1223.5    233.5   1224.1    255.5
GR   1223.8    266.8   1227.8    276.7   1227.2    281.2   1233.9    297.9   1234.3    320.5
GR   1235.1    361.8
```

Cross Section at the beginning of the Treatment Plant protection dike

```
X1   11.328       18      5.6    214.4    210.8    210.8    210.8
X3      10
GR   1233.9      0.0   1233.6      5.6   1222.3     45.2   1224.0     61.9   1222.3     74.2
GR   1222.5     88.8   1221.2     99.7   1220.9    109.8   1222.3    150.6   1225.5    163.3
GR   1225.3    164.6   1225.8    190.8   1225.7    200.0   1233.4    214.4   1231.4    222.6
GR   1236.7    240.0   1236.4    266.1   1236.5    296.1


NC     .045     .060     .035
ET                       9.1                                                  19900     20175
X1   11.386       15    19900    20175      315      270      310
X3      10
GR    1233    19430     1233    19890     1233    19892     1233    19900     1228     19905
GR    1228    19912     1226    19975     1223    20000     1226    20030     1228     20085
GR    1230    20115     1232    20150     1238    20175   1239.5    20820     1238     22925

ET                       9.1                                                  19780     20170
X1   11.481       15    19780    20170      480      540      520
X3      10
GR    1240    19130     1238    19305     1230    19320     1228    19380     1228     19550
GR    1230    19710     1236    19780     1230    19800     1232    19860     1230     19900
GR    1228    19950   1227.4    20000     1230    20060     1234    20140     1240     20170
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ET                       9.1                                                  19470     20310
X1   11.566       37    19470    20310      280      530      460
X3      10
GR    1241    17270     1240    18790     1242    18940     1242    19140     1240     19170
GR    1240    19470     1236    19480     1234    19550     1234    19760     1230     19775
GR    1230    19790     1232    19810     1234    19820     1234    19855     1232     19860
GR    1232    19940     1230    19980   1229.7    20000     1230    20010     1230     20180
GR    1232    20295     1240    20310     1240    20335     1242    20780     1244     21030
GR  1244.2    21620   1244.2    21960     1244    22190   1243.6    23225     1244     23470
GR  1244.9    24495     1246    25220     1245    25570     1244    26550     1244     26660
GR    1246    27240   1246.7    27420

ET                       9.1                                                  19925     20510
X1   11.759       35    19925    20510     1050      980     1020
X3      10
GR    1246    17890     1245    18190     1246    18510     1246    18920   1246.5     18930
GR    1246    18950     1246    19120     1244    19230     1244    19255     1244     19880
GR    1244    19900     1244    19925     1236    19940     1235    20000     1236     20040
GR    1236    20455     1242    20465     1244    20495     1248    20510     1248     20525
GR    1246    20540     1246    20620     1246    20760     1246    20800     1246     20820
GR    1246    21070     1248    21460     1250    21630     1250    21870   1219.6     22350
GR    1249    22980   1249.2    23620     1250    25015     1250    25960   1250.4     27420

NC     .060     .060     .035
ET                       9.1                                                  19865     20510
X1   11.949       35    19865    20510      990     1000     1000
X3      10
X4       1   1247.4    20700
GR  1250.8    18670   1250.4    18895   1250.4    19275     1251    19500     1251     19535
GR    1250    19865     1248    19920     1246    19974     1244    19976     1243     20000
GR    1244    20045     1244    20215     1242    20280     1242    20470     1244     20480
GR    1246    20510     1246    20520     1246    20530     1246    20590     1246     20600
GR    1248    20925     1250    20940     1252    21660     1254    22180     1254     22280
GR  1252.8    22630     1254    22985   1252.5    23380     1254    23685     1244     23750
GR  1252.4    24515     1254    25865     1254    26540     1256    27550   1256.5     27760

ET                       9.1                                                  19890     20680
X1   12.125       37    19890    20680      910     1000      930
X3      10
GR    1256    19305   1256.1    19430     1256    19805     1256    19860     1258     19875
```

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*PROF 1
0

    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 10.803

3301 HV CHANGED MORE THAN HVINS


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1220.00 ELREA=      1220.00

    10.803      5.64   1219.74       .00       .00   1221.33      1.59      4.97       .18   1220.00
   10900.0        .0   10900.0        .0        .0    1076.2        .0     525.2     119.3   1220.00
       .48       .00     10.13       .00      .000      .030      .000      .000   1214.10  19750.66
   .006493     1020.     1010.     1010.         3         0         0       .00    264.01  20014.67


FLOW DISTRIBUTION FOR SECNO=     10.80          CWSEL=   1219.74

STA=   19751.   20015.
  PER Q=    100.0
   AREA=   1076.2
    VEL=     10.1
  DEPTH=      4.1

*SECNO 10.933

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1226.40 ELREA=      1225.50

    10.933      7.83   1223.23       .00       .00   1224.52      1.29      3.16       .03   1226.40
   10900.0        .0   10900.0        .0        .0    1198.0        .0     543.4     123.0   1225.50
       .51       .00      9.10       .00      .000      .030      .000      .000   1215.40    127.55
   .003318      770.      700.      660.         2         0         0       .00    208.58    336.14


FLOW DISTRIBUTION FOR SECNO=     10.93          CWSEL=   1223.23

STA=     128.     394.
  PER Q=    100.0
   AREA=   1198.0
    VEL=      9.1
  DEPTH=      5.7

*SECNO 10.989
1
   10MAR95      11:24:38                                                                                PAGE   29


    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


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1229.70 ELREA=      1222.80

        UNION HILLS DRIVE
    10.989      8.31   1224.71       .00       .00   1225.49       .78       .92       .05   1229.70
   10900.0        .0   10798.6     101.4        .0    1514.0      77.2     555.3     125.3   1222.80
       .52       .00      7.13      1.31      .000      .030      .060      .000   1216.40     81.16
   .001936      370.      370.      370.         2         0         0       .00    321.61    402.77


FLOW DISTRIBUTION FOR SECNO=     10.99          CWSEL=   1224.71

STA=      81.     336.     375.     403.
  PER Q=     99.1       .8       .1
   AREA=   1514.0     60.2     17.1
    VEL=      7.1      1.5       .8
```

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  DEPTH=      5.9      1.6      .6

*SECNO 11.005
    11.005      8.53   1224.93      .00      .00   1225.65      .72      .15      .01   1229.70
   10900.0        .0   10776.9    123.1       .0    1570.7     92.7    558.5    125.9   1222.80
       .52       .00      6.86     1.33     .000      .030     .060     .000  1216.40     80.22
   .001714       85.       85.      85.        0         0        0      .00   327.74    407.96

FLOW DISTRIBUTION FOR SECNO=     11.01          CWSEL=   1224.93

STA=      80.     336.     375.     408.
  PER Q=     98.9       .9       .2
   AREA=   1570.7     68.7     23.9
    VEL=      6.9      1.5       .8
  DEPTH=      6.1      1.8       .7

*SECNO 11.020

3470 ENCROACHMENT STATIONS=          .0     603.7  TYPE=      1  TARGET=      603.699
1
   10MAR95      11:24:38                                                                          PAGE   30

    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=      1229.50 ELREA=    100000.00

    11.020      8.87   1224.87      .00      .00   1225.87      .99      .13      .08   1229.50
   10900.0        .0   10900.0       .0       .0    1364.0       .0    560.8    126.4 100000.00
       .53       .00      7.99      .00     .000      .030     .000     .000  1216.00    376.39
   .002396       67.       67.      67.        2         0        0      .00   225.74    602.12

FLOW DISTRIBUTION FOR SECNO=     11.02          CWSEL=   1224.87

STA=     376.     604.
  PER Q=    100.0
   AREA=   1364.0
    VEL=      8.0
  DEPTH=      6.0

*SECNO 11.045

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1229.80 ELREA=      1226.90

    11.045      7.37   1225.17      .00      .00   1226.44     1.28      .49      .09   1229.80
   10900.0        .0   10900.0       .0       .0    1202.7       .0    566.0    127.2   1226.90
       .53       .00      9.06      .00     .000      .030     .000     .000  1217.80     97.33
   .003220      179.      179.     179.        2         0        0      .00   204.35    301.68

FLOW DISTRIBUTION FOR SECNO=     11.05          CWSEL=   1225.17

STA=      97.     308.
  PER Q=    100.0
   AREA=   1202.7
    VEL=      9.1
  DEPTH=      5.9

*SECNO 11.129

3301 HV CHANGED MORE THAN HVINS

1
   10MAR95      11:24:38                                                                          PAGE   31

    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
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3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.66

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1230.00 ELREA=      1230.10

        NEW SECTION - LEFT BANK TAKEN FROM ARROWHEAD RANCH
        WASTEWATER TREATMENT PLANT GRADING PLAN-DIBBLE & ASSOC.
   11.129      8.91   1226.71       .00       .00   1227.26       .55       .74       .07   1230.00
  10900.0        .0   10900.0        .0        .0    1827.4        .0     580.3     129.5   1230.10
      .55       .00      5.96       .00      .000      .030      .000      .000   1217.80     15.37
  .001162      410.      410.      410.         2         0         0       .00    272.59    287.96

FLOW DISTRIBUTION FOR SECNO=     11.13          CWSEL=   1226.71

STA=      15.     331.
  PER Q=    100.0
   AREA=   1827.4
    VEL=      6.0
  DEPTH=      6.7

*SECNO 11.188

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1232.80 ELREA=      1232.70

   11.188      9.48   1226.98       .00       .00   1227.83       .85       .48       .09   1232.80
  10350.0        .0   10350.0        .0        .0    1396.9        .0     592.4     131.3   1232.70
      .56       .00      7.41       .00      .000      .030      .000      .000   1217.50    780.05
  .001991      326.      326.      326.         2         0         0       .00    224.83   1004.88

FLOW DISTRIBUTION FOR SECNO=     11.19          CWSEL=   1226.98

STA=     780.    1021.
  PER Q=    100.0
   AREA=   1396.9
    VEL=      7.4
  DEPTH=      6.2

1
   10MAR95      11:24:38                                                                          PAGE   32

    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 11.301
3280 CROSS SECTION      11.30 EXTENDED      9.96 FEET

3301 HV CHANGED MORE THAN HVINS

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

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1233.30 ELREA=      1233.90

   11.301      8.46   1228.16       .00       .00   1229.70      1.55      1.66       .21   1233.30
  10350.0        .0   10350.0        .0        .0    1036.6        .0     608.9     134.2   1233.90
      .58       .00      9.98       .00      .000      .030      .000      .000   1219.70     95.21
  .004261      591.      591.      591.         2         0         0       .00    188.38    283.59

FLOW DISTRIBUTION FOR SECNO=     11.30          CWSEL=   1228.16

STA=      95.     298.
  PER Q=    100.0
   AREA=   1036.6
    VEL=     10.0
  DEPTH=      5.5

*SECNO 11.328

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1233.60 ELREA=      1233.40

   11.328      8.12   1229.02       .00       .00   1230.66      1.63       .93       .03   1233.60
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  10350.0       .0   10350.0       .0       .0    1009.4       .0     613.8     135.1   1233.40
      .59       .00     10.25      .00     .000      .030     .000      .000   1220.90     21.63
  .004528      211.     211.      211.        2         0        0       .00    184.59    206.22

FLOW DISTRIBUTION FOR SECNO=     11.33          CWSEL=   1229.02

STA=      22.     214.
  PER Q=    100.0
   AREA=   1009.4
    VEL=     10.3
  DEPTH=      5.5
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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 11.386
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1233.00 ELREA=      1238.00

   11.386      7.95   1230.95   1230.95       .00   1232.95      2.00      2.12       .11   1233.00
  10350.0        .0   10350.0       .0        .0     912.6        .0     620.7     136.5   1238.00
      .59       .00     11.34       .00      .000      .035      .000      .000   1223.00  19902.05
  .011446      315.     310.      270.         3         8         0       .00    229.60  20131.65

FLOW DISTRIBUTION FOR SECNO=     11.39          CWSEL=   1230.95

STA=   19902.   20175.
  PER Q=    100.0
   AREA=    912.6
    VEL=     11.3
  DEPTH=      4.0

*SECNO 11.481

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.12

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1236.00 ELREA=      1240.00

   11.481      7.57   1234.97       .00       .00   1235.53       .56      2.44       .14   1236.00
  10350.0        .0   10350.0       .0        .0    1716.8        .0     636.4     140.1   1240.00
      .62       .00      6.03       .00      .000      .035      .000      .000   1227.40  19783.43
  .002535      480.     520.      540.         2         0         0       .00    361.43  20144.86

FLOW DISTRIBUTION FOR SECNO=     11.48          CWSEL=   1234.97

STA=   19783.   20170.
  PER Q=    100.0
   AREA=   1716.8
    VEL=      6.0
  DEPTH=      4.8
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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 11.566

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.66
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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

Added Cross Sections

SUMMARY PRINTOUT

	SECNO	Q	SSTA	STCHL	VLOB	VCH	VROB	STCHR	ENDST	TOPWID	CWSEL	DIFWSP
	8.655	41000.00	9587.04	9581.40	.00	5.01	.00	10224.30	10221.10	634.06	1170.50	.00
	8.655	41000.00	9587.04	9581.40	.00	5.01	.00	10224.30	10221.10	634.06	1170.50	.00
*	8.731	12000.00	9779.38	9762.50	.00	2.33	.00	10213.50	10208.22	428.84	1170.96	.00
*	8.731	19000.00	9779.93	9762.50	.00	3.72	.00	10213.50	10207.76	427.83	1170.85	-.11
	8.807	12000.00	9785.25	9771.30	.00	2.67	.00	10219.20	10202.70	417.45	1170.99	.00
	8.807	19000.00	9785.44	9771.30	.00	4.24	.00	10219.20	10202.41	416.96	1170.94	-.05
*	8.883	12000.00	9850.57	9824.70	.00	4.70	.00	10216.90	10189.15	338.58	1170.96	.00
*	8.883	19000.00	9851.30	9824.70	.00	7.55	.00	10216.90	10188.76	337.46	1170.85	-.11
	8.936	12000.00	9821.91	9809.40	.00	5.09	.00	10213.20	10181.98	360.07	1171.20	.00
	8.936	19000.00	9821.60	9809.40	.00	7.69	.00	10213.20	10183.17	361.58	1171.51	.31
	8.977	12000.00	9895.40	9886.10	.00	6.84	.00	10212.70	10178.07	282.68	1171.31	.00
	8.977	19000.00	9894.70	9886.10	.00	10.11	.00	10212.70	10180.27	285.57	1171.75	.44
*	9.009	12000.00	9797.15	9764.50	.00	4.63	.00	10207.00	10166.79	369.65	1171.99	.00
*	9.009	19000.00	9790.86	9764.50	.00	6.21	.00	10207.00	10168.77	377.91	1173.24	1.25
	9.047	12000.00	9712.28	9689.80	.00	3.71	.00	10113.80	10103.66	391.38	1172.25	.00
	9.047	19000.00	9706.22	9689.80	.00	5.00	.00	10113.80	10106.34	400.12	1173.66	1.42
*	9.129	12000.00	9674.75	9641.20	.00	4.88	.00	10090.00	10080.74	405.98	1172.43	.00
*	9.129	19000.00	9665.63	9641.20	.00	6.17	.00	10090.00	10082.96	417.32	1173.93	1.50
*	9.318	12000.00	19695.41	19660.00	.00	6.59	1.70	20015.00	23740.00	1824.29	1181.50	.00
*	9.318	19000.00	19693.99	19660.00	.00	12.55	.00	20015.00	20015.00	321.00	1181.84	.34
*	9.492	11450.00	19912.16	19770.00	.00	9.81	.00	20235.00	20200.77	288.61	1185.42	.00
*	9.492	17250.00	19770.00	19770.00	.00	7.23	.00	20235.00	20214.01	444.01	1188.70	3.28

	SECNO	Q	SSTA	STCHL	VLOB	VCH	VROB	STCHR	ENDST	TOPWID	CWSEL	DIFWSP
	9.692	11450.00	19852.36	19840.00	.00	9.94	.00	20060.00	20047.27	194.91	1192.22	.00
*	9.692	17250.00	19850.95	19840.00	.00	14.20	.00	20060.00	20048.32	197.37	1192.54	.31
	9.889	11450.00	19860.24	19840.00	.00	8.30	.00	20080.00	20070.93	210.69	1196.98	.00
*	9.889	17250.00	19841.51	19840.00	.00	8.65	.00	20080.00	20079.09	237.58	1199.69	2.72
	9.953	11450.00	19795.05	19790.00	.00	8.06	.00	20032.00	20026.45	231.40	1197.97	.00
	9.953	17250.00	19790.00	19790.00	.00	8.64	.00	20032.00	20030.41	240.41	1200.41	2.44
	9.967	11450.00	19839.52	19825.00	.00	8.21	.00	20110.00	20080.96	241.44	1198.19	.00
	9.967	17250.00	19833.39	19825.00	.00	8.59	.00	20110.00	20093.21	259.81	1200.64	2.45
*	10.096	11450.00	19639.38	19635.00	.00	8.33	.00	20055.00	20041.40	402.03	1200.56	.00
	10.096	17250.00	19635.00	19635.00	.00	8.21	.00	20055.00	20045.85	410.85	1202.34	1.78
	10.271	10900.00	19863.81	19820.00	.00	7.01	.00	20320.00	20301.58	437.77	1205.06	.00
	10.271	15500.00	19860.09	19820.00	.00	8.45	.00	20320.00	20305.53	445.44	1205.69	.63
*	10.443	10900.00	19742.09	19655.00	.00	9.85	.00	20110.00	20108.96	366.87	1209.58	.00
	10.443	15500.00	19668.44	19655.00	.00	10.10	.00	20110.00	20110.00	441.56	1210.62	1.04
*	10.612	10900.00	19972.01	19955.00	.00	7.97	.00	20300.00	20297.66	325.65	1215.19	.00
	10.612	15500.00	19970.04	19955.00	.00	9.53	.00	20300.00	20298.32	328.28	1215.98	.79

	10.803	10900.00	19750.66	19750.00	.00	10.13	.00	20015.00	20014.67	264.01	1219.74	.00
	10.803	15500.00	19750.00	19750.00	.00	11.43	.00	20015.00	20015.00	265.00	1220.79	1.06
	10.933	10900.00	127.55	80.10	.00	9.10	.00	393.80	336.14	208.58	1223.23	.00
	10.933	15500.00	121.18	80.10	.00	10.55	.00	393.80	350.86	229.68	1224.49	1.26
	10.989	10900.00	81.16	60.10	.00	7.13	1.31	335.90	402.77	321.61	1224.71	.00
*	10.989	15500.00	74.45	60.10	.00	7.85	1.83	335.90	439.98	365.54	1226.30	1.59
	11.005	10900.00	80.22	60.10	.00	6.86	1.33	335.90	407.96	327.74	1224.93	.00
	11.005	15500.00	.00	60.10	.60	7.62	1.81	335.90	444.80	385.61	1226.51	1.58
	11.020	10900.00	376.39	362.30	.00	7.99	.00	603.70	602.12	225.74	1224.87	.00
	11.020	15500.00	371.89	362.30	.00	9.11	.00	603.70	603.70	231.81	1226.35	1.47
	11.045	10900.00	97.33	89.60	.00	9.06	.00	307.60	301.68	204.35	1225.17	.00
	11.045	15500.00	94.96	89.60	.00	10.35	.00	307.60	306.53	211.57	1226.59	1.42
*	11.129	10900.00	15.37	5.60	.00	5.96	.00	330.90	287.96	272.59	1226.71	.00
*	11.129	15500.00	10.40	5.60	.00	6.77	.00	330.90	291.48	281.08	1228.38	1.67
	11.188	10350.00	780.05	761.60	.00	7.41	.00	1020.90	1004.88	224.83	1226.98	.00
	11.188	13750.00	774.65	761.60	.00	7.67	.00	1020.90	1012.34	237.69	1228.68	1.70
*	11.301	10350.00	95.21	72.70	.00	9.98	.00	297.90	283.59	188.38	1228.16	.00
*	11.301	13750.00	90.93	72.70	.00	10.60	.00	297.90	286.96	196.04	1229.51	1.36

	SECNO	Q	SSTA	STCHL	VLOB	VCH	VROB	STCHR	ENDST	TOPWID	CWSEL	DIFWSP
	11.328	10350.00	21.63	5.60	.00	10.25	.00	214.40	206.22	184.59	1229.02	.00
	11.328	13750.00	17.38	5.60	.00	11.11	.00	214.40	208.49	191.11	1230.24	1.21
*	11.386	10350.00	19902.05	19900.00	.00	11.34	.00	20175.00	20131.65	229.60	1230.95	.00
*	11.386	13750.00	19901.01	19900.00	.00	11.84	.00	20175.00	20149.82	248.81	1232.00	1.04
*	11.481	10350.00	19783.43	19780.00	.00	6.03	.00	20170.00	20144.86	361.43	1234.97	.00
*	11.481	13750.00	19780.21	19780.00	.00	6.64	.00	20170.00	20149.69	369.48	1235.94	.97
*	11.566	10350.00	19479.81	19470.00	.00	3.20	.00	20310.00	20302.64	822.83	1236.07	.00
*	11.566	13750.00	19477.30	19470.00	.00	3.39	.00	20310.00	20304.52	827.22	1237.08	1.01
*	11.759	10350.00	19935.85	19925.00	.00	8.63	.00	20510.00	20458.69	522.85	1238.22	.00
*	11.759	13750.00	19934.96	19925.00	.00	9.49	.00	20510.00	20459.48	524.53	1238.69	.47
*	11.949	10350.00	19968.03	19865.00	.00	6.01	1.69	20510.00	23952.29	864.50	1246.22	.00
*	11.949	13750.00	19950.79	19865.00	.00	6.87	.00	20510.00	20510.00	559.21	1246.86	.64
	12.125	10350.00	19927.44	19890.00	.00	6.53	.00	20680.00	20590.65	663.22	1251.46	.00
	12.125	13750.00	19926.45	19890.00	.00	7.00	.00	20680.00	20600.62	674.18	1252.03	.56
	12.313	9800.00	19858.50	19830.00	.00	7.31	.00	20240.00	20232.04	373.53	1257.60	.00
	12.313	12000.00	19839.89	19830.00	.00	7.97	.00	20240.00	20233.47	393.58	1258.04	.44
	12.511	9800.00	19818.01	19810.00	.00	6.93	.00	20280.00	20276.53	390.01	1263.08	.00
	12.511	12000.00	19810.00	19810.00	.00	7.14	.00	20280.00	20278.97	427.51	1263.72	.65
	12.701	9800.00	19816.10	19810.00	.00	6.90	1.09	20330.00	20412.96	596.86	1268.78	.00
	12.701	12000.00	19814.13	19810.00	.00	7.42	.00	20330.00	20330.00	515.87	1269.17	.39
*	12.896	9800.00	19845.77	19845.00	.00	5.47	.69	20360.00	20401.53	555.76	1273.69	.00
*	12.896	12000.00	19845.00	19845.00	.00	5.96	.00	20360.00	20360.00	515.00	1274.12	.43
*	13.076	7900.00	19931.64	19930.00	.00	6.46	.00	20350.00	20347.54	415.90	1277.34	.00
*	13.076	9539.00	19930.63	19930.00	.00	6.86	.00	20350.00	20349.05	418.42	1277.75	.41
*	13.227	7900.00	19818.08	19810.00	.00	5.84	.00	20120.00	20102.30	284.22	1280.23	.00
*	13.227	9539.00	19815.01	19810.00	.00	6.39	.00	20120.00	20107.13	292.12	1280.71	.48
*	13.420	7900.00	19874.31	19870.00	.00	10.46	.00	20170.00	20099.96	225.66	1285.99	.00
*	13.420	9539.00	19872.84	19870.00	.00	10.90	.00	20170.00	20112.63	239.78	1286.51	.51
*	13.619	7900.00	19893.97	19870.00	.00	4.40	2.35	20455.00	20532.06	636.92	1292.41	.00
*	13.619	9539.00	19892.76	19870.00	.00	4.78	.00	20455.00	20455.00	562.23	1292.90	.49
*	13.818	7900.00	19916.13	19890.00	.00	7.82	4.04	20340.00	20709.01	677.95	1297.44	.00
*	13.818	9539.00	19897.12	19890.00	.00	8.90	.00	20340.00	20339.79	442.67	1297.94	.51

*	14.013	6100.00	19918.26	19915.00	.00	3.90	2.05	20270.00	21600.53	1285.97	1303.74	.00
*	14.013	7207.00	19915.00	19915.00	.00	5.45	.00	20270.00	20270.00	355.00	1304.99	1.24

	SECNO	Q	SSTA	STCHL	VLOB	VCH	VROB	STCHR	ENDST	TOPWID	CWSEL	DIFWSP
*	14.197	6100.00	19559.21	19715.00	1.63	6.88	2.10	20015.00	20830.77	840.79	1308.77	.00
*	14.197	7207.00	19715.00	19715.00	.00	8.19	.00	20015.00	20011.68	296.68	1309.11	.34
	14.379	6100.00	19544.76	19540.00	.00	5.52	2.68	20095.00	21035.65	1010.64	1315.05	.00
	14.379	7207.00	19540.00	19540.00	.00	5.03	3.68	20095.00	20250.00	710.00	1316.28	1.23
	14.559	6100.00	19222.21	19220.00	.00	4.48	.00	20045.00	20037.92	815.71	1320.23	.00
	14.559	7207.00	19221.72	19220.00	.00	4.29	.00	20045.00	20042.82	821.11	1320.62	.40
	14.752	6100.00	19673.36	19670.00	.00	4.85	.00	20170.00	20139.81	466.45	1324.66	.00
	14.752	7207.00	19673.14	19670.00	.00	5.56	.00	20170.00	20141.72	468.57	1324.74	.08
*	14.945	4200.00	19901.60	19865.00	.00	8.57	2.20	20050.00	20410.24	247.75	1329.02	.00
*	14.945	4746.00	19873.85	19865.00	.00	8.04	.00	20050.00	20048.82	174.97	1329.76	.74
*	15.144	4200.00	19605.97	19602.45	.00	4.32	.00	19982.48	19981.95	375.98	1334.82	.00
	15.144	4746.00	19955.00	19602.45	.00	10.73	4.36	19982.48	20382.00	427.00	1338.24	3.42
*	15.333	4200.00	19781.38	19770.00	.00	5.93	.00	20100.00	20092.16	310.78	1338.85	.00
*	15.333	4746.00	19770.00	19770.00	.00	3.41	.00	20100.00	20097.48	327.48	1340.99	2.14
	15.519	4200.00	19962.68	19950.00	.00	5.35	.00	20320.00	20263.75	301.07	1344.20	.00
*	15.519	4746.00	19965.10	19950.00	.00	8.24	.00	20320.00	20246.69	281.59	1343.47	-.72
	15.699	4200.00	19899.13	19870.00	.00	7.15	3.36	20085.00	20888.91	359.55	1349.57	.00
*	15.699	4746.00	19882.94	19870.00	.00	6.54	.00	20085.00	20085.00	202.06	1350.82	1.25
	15.966	2350.00	1989.23	1985.00	.00	2.69	2.35	2430.00	2670.77	537.86	1356.31	.00
*	15.966	2350.00	1988.81	1985.00	.00	3.14	.00	2430.00	2414.23	425.41	1356.47	.16
*	16.066	2350.00	1986.60	1970.00	.00	6.00	5.12	2350.00	2696.80	420.04	1358.68	.00
*	16.066	2350.00	1982.52	1970.00	.00	6.78	.00	2350.00	2332.38	259.67	1359.50	.81
*	16.167	2350.00	1952.47	1950.00	.00	3.50	2.20	2130.00	2622.15	669.68	1362.42	.00
*	16.167	2350.00	1951.62	1950.00	.00	4.58	1.92	2130.00	2200.00	248.38	1363.25	.82
*	16.248	2350.00	1932.67	1925.00	.00	6.86	2.31	2030.00	2633.33	700.66	1364.44	.00
*	16.248	2350.00	1931.21	1925.00	.00	8.59	.00	2030.00	2030.00	98.79	1364.93	.49
*	16.328	2350.00	1873.19	1915.00	.66	3.67	2.27	2240.00	2471.46	482.32	1366.52	.00
*	16.328	2350.00	1915.00	1915.00	.00	2.99	.00	2240.00	2236.81	321.81	1367.35	.83
*	16.411	2350.00	1915.48	1885.00	.00	6.97	.00	2055.00	2051.77	136.29	1368.15	.00
*	16.411	2350.00	1912.69	1885.00	.00	6.71	.00	2055.00	2051.94	139.25	1368.25	.10
*	16.504	2350.00	1628.55	1835.00	.96	4.06	.00	2035.00	2030.98	291.78	1370.58	.00
*	16.504	2350.00	1835.00	1835.00	.00	4.14	.00	2035.00	2030.99	195.99	1370.59	.01
*	16.608	2350.00	1929.53	1910.00	.00	5.92	.00	2110.00	2091.70	162.17	1372.19	.00
*	16.608	2350.00	1929.44	1910.00	.00	5.83	.00	2110.00	2092.04	162.61	1372.23	.05

	SECNO	Q	SSTA	STCHL	VLOB	VCH	VROB	STCHR	ENDST	TOPWID	CWSEL	DIFWSP
*	16.732	2350.00	1955.62	1950.00	.00	7.57	.00	2115.00	2114.38	158.76	1377.75	.00
*	16.732	2350.00	1955.68	1950.00	.00	7.76	.00	2115.00	2110.00	154.31	1377.73	-.02
*	16.818	2350.00	1945.20	1935.00	.00	4.61	2.36	2045.00	2226.00	280.80	1380.64	.00
*	16.818	2350.00	1942.85	1935.00	.00	6.05	.00	2045.00	2045.00	102.15	1380.95	.31

SUMMARY OF ERRORS AND SPECIAL NOTES

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WARNING SECNO=      8.731  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      8.731  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      8.883  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      8.883  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      9.009  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      9.009  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      9.129  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      9.129  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=      9.318  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      9.318  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=      9.318  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=      9.318  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      9.318  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=      9.318  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=      9.492  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      9.492  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=      9.692  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      9.692  PROFILE=  2  MINIMUM SPECIFIC ENERGY

WARNING SECNO=      9.889  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     10.096  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     10.443  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     10.443  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=     10.612  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     10.989  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     11.129  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.129  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     11.301  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.301  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     11.386  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     11.386  PROFILE=  1  MINIMUM SPECIFIC ENERGY
WARNING SECNO=     11.386  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     11.481  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.481  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     11.566  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.566  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
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CAUTION SECNO=     11.759  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     11.759  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     11.759  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=     11.759  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     11.759  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     11.759  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=     11.949  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.949  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     12.896  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     12.896  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     13.076  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     13.076  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     13.227  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     13.227  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     13.420  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     13.420  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     13.420  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
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CAUTION SECNO=     13.420  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     13.420  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     13.420  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=     13.619  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     13.619  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     13.818  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     13.818  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     13.818  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     13.818  PROFILE=  2  MINIMUM SPECIFIC ENERGY

WARNING SECNO=     14.013  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     14.013  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     14.197  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     14.197  PROFILE=  1  MINIMUM SPECIFIC ENERGY
WARNING SECNO=     14.197  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     14.945  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     14.945  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     15.144  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     15.333  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     15.333  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     15.519  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     15.519  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     15.519  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL
1
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WARNING SECNO=     15.699  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     15.966  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     16.066  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
CAUTION SECNO=     16.066  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     16.066  PROFILE=  2  MINIMUM SPECIFIC ENERGY

WARNING SECNO=     16.167  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     16.167  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     16.248  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     16.248  PROFILE=  1  MINIMUM SPECIFIC ENERGY
WARNING SECNO=     16.248  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     16.328  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     16.328  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     16.411  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     16.411  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     16.504  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     16.504  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     16.608  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     16.608  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     16.732  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     16.732  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     16.818  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     16.818  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
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APPENDIX C

Proposed 5-Span Bridge HEC-2 Model

HDR

No.

Job No.

Date

Computed

Project

Date

Checked

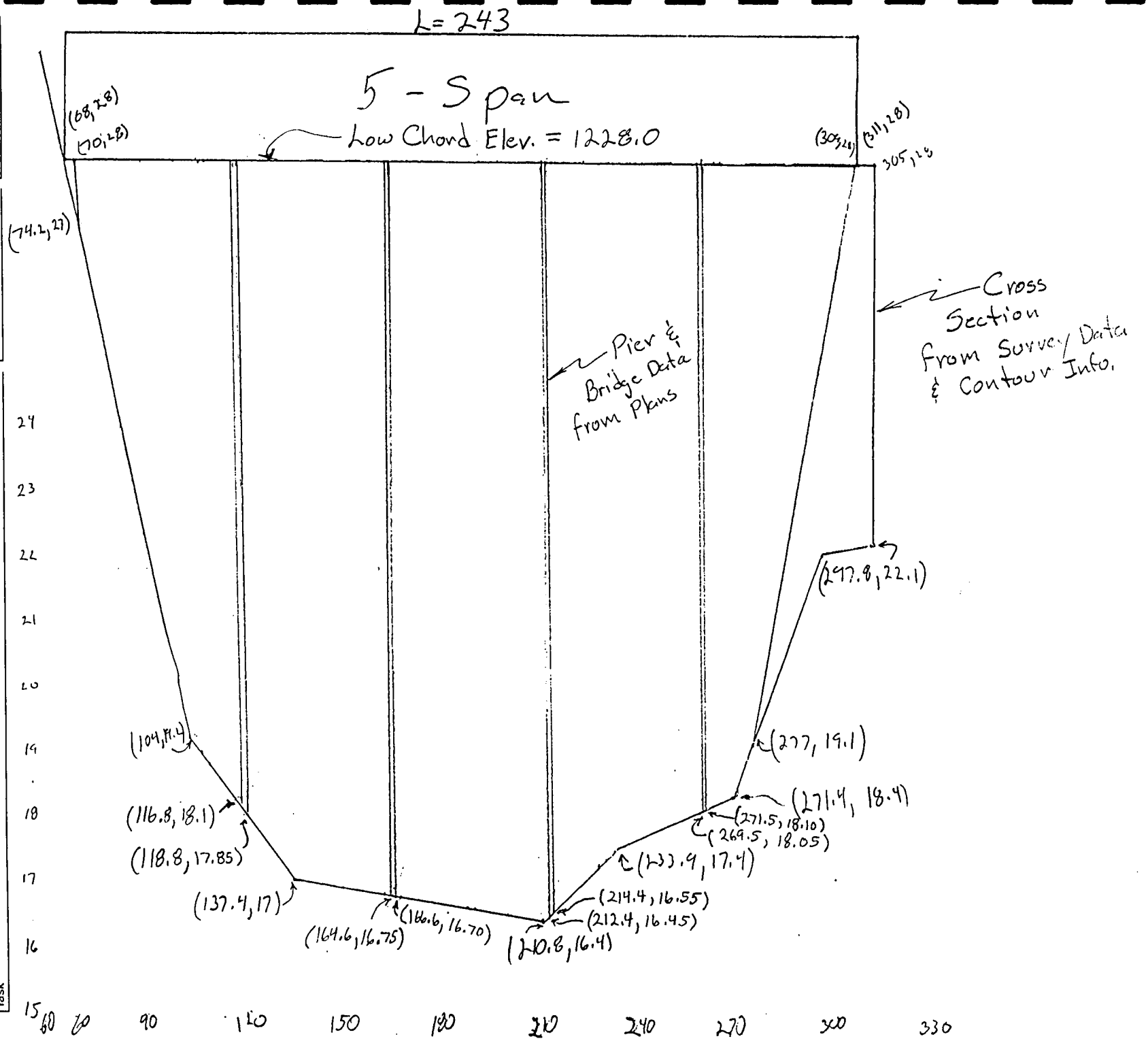
Subject

Of

Sheet

Task

Computation



```
1*****************************************
 *  HEC-2 WATER SURFACE PROFILES          *
 *                                        *
 *  Version   4.6.2;  May 1991            *
 *                                        *
 *  RUN DATE    11JUL95    TIME   19:13:06 *
 *****************************************
```

```
*************************************
*  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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THIS RUN EXECUTED 11JUL95 19:13:06

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

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

REVISED HEC-2 FILE NRIVER.DAT TO HAVE INPUT DATA MATCH WITH THE HARDCOPY
PRINTOUT OF THE HEC-2 FILE IN THE FLOOD CONTROL DISTRICT LIBRARY THAT
CORRESPONDS WITH PUBLISHED FEMA DATA.
THE HEC-2 MODEL ON THE PRINTOUT WAS WAS RUN ON 9 OCTOBER 1985 USING THE
MAY 1984 UPDATED VERSION OF HEC-2.
THIS HEC-2 MODEL APPEARS TO BE THE BEST MATCH WITH PUBLISHED FEMA DATA
FOR NEW RIVER FROM BELL ROAD UPSTREAM TO THE NEW RIVER DAM.
THE RESULTS GENERATED BY THIS HEC-2 MODEL DOWNSTREAM OF BELL ROAD SHOUDN'T
BE USED.
THE PUBLISHED FEMA DATA FOR THE REACH BELOW BELL ROAD MATCHES CLOSELY WITH
HEC-2 MODEL REVSB., WHICH WAS DEVELOPED BY COE & VAN LOO.
THE CROSS SECTIONS BELOW BELL ROAD WHERE RETAINED FOR HISTORICAL REASONS.
THIS HEC-2 MODEL HASN'T BEEN UPDATED FOR ANY CHANGES THAT MIGHT OCCURED
SINCE THE MODEL WAS ORIGINALLY CREATED.

```
T1      NEW RIVER ABOVE SKUNK CREEK, PHOENIX, ARIZ., SEPT 1985   (UNIONBR6.DAT)
T2      Edited by HDR (5-95) for Union Hills Drive Bridge Analysis
T3      Union Hills Bridge      5-Span Structure (Includes 83rd Ave. Crossing)
        Existing Condition Flood Plain Model FIS, COE 100-yr & 500-yr Q's
        Estimated starting WSEL from FIS Profiles for 100-yr 500-yr.

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ
                2                                                                1170.5

J2  NPROF     IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE
     1                 -1                                                              15

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    38       43       53       21       55       26       56       22       54       4
     1       50

NC    .045     .045     .035     .200     .400
QT      3    41000    41000    69700
        1985 TOPO - DIGITIZED DATA SEC.8.655 THRU SEC.9.129
        DOWNSTREAM STUDY LIMIT
```

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May 1995 - HDR Engineering Inc. under contract to the Maricopa County Highway Department to bridge the Union Hills corssing of the New River.
HDR modified this model to determine the impact the new bridge would have on the existing floodplain. This reach originally contained only 3 cross sections in the model. Sections were added to better define the water surface thru this reach. Normal bridge method is used to model the new 5 span bridge.

The bridge spans bank to bank (e.g. no abutments extend into the channel). The section data is taken from new survey done in February 1995.
****

Cross Sections 10.933 thru 10.936 represent the channel geometry at the proposed crossing of 83rd Ave.

```
X1   10.933      8      0.0    406.84      164      241      244
X3       10
GR   1222.2    0.0   1217.25     19.7   1217.25    68.90   1215.61    85.31   1213.97   104.99
GR   1214.0 134.52   1215.61   387.16   1220.53   406.84

X1   10.934      8      0.0    390.44       82       92       85
X3       10
GR   1225.5    0.0   1217.25    32.81   1216.43    88.59   1216.93    98.43   1216.93   141.08
GR   1216.4 150.93   1215.61   370.75   1220.53   390.44

X1   10.935     11      0.0    383.88      131      154      144
X3       10
GR   1227.1    0.0   1226.11    26.25   1215.61    59.06   1215.61   206.70   1217.91   213.27
GR   1217.9 265.76   1215.61   272.32   1215.61   334.66   1217.25   351.07   1220.53   360.93
GR   1222.2 383.88

X1   10.936      9      0.0    324.82      131      154      137
X3       10
GR   1225.5    0.0   1227.1    22.97   1222.17    32.81   1218.89    75.46   1215.61   111.55
GR   1217.3 275.60   1218.89   285.45   1222.17   292.01   1223.81   324.82
```

****
Cross Section on the down stream face of the Union Hills Crossing
Modified To Include A Proposed 5-Span Proposed Bridge Structure
The Bridge Spans the New River Bank to Bank. The Channel is not
restricted and expansion and contraction is not critical to the model.
****

```
NC                                  .3       .5
        UNION HILLS DRIVE
X1   10.989     35    60.1    309.0      370      370      370    0.956
X2                            1228     1230                                      15
X3       10
GR   1225.5    0.0  1229.7    60.1  1227.98     68.0  1227.98     70.0   1227.0    74.2
GR   1219.2  104.4  1218.1   116.8  1227.98    116.8  1227.98    118.8  1217.85   118.8
GR   1217.0  137.4  1216.75  164.6  1227.98    164.6  1227.98    166.6  1216.70   166.6
GR   1216.4  210.8  1216.45  212.4  1227.98    212.4  1227.98    214.4  1216.55   214.4
GR   1217.4  233.9  1218.05  260.2  1227.98    260.2  1227.98    262.2   1218.1   262.2
GR   1218.4  271.4  1219.1   277.0  1227.98    309.0  1227.98    311.0  1222.8    335.9
GR   1223.5  374.5  1228.1   482.0  1228.5     524.3  1228.4     580.9  1228.7    633.5
```

Upstream Face of the Union Hills Bridge


```
X1   11.004     35    60.1    309.0       85       85       85    0.956
X2                            1228     1230                                      15
X3       10
GR   1225.5    0.0  1229.7    60.1  1227.98     68.0  1227.98     70.0   1227.0    74.2
GR   1219.2  104.4  1218.1   116.8  1227.98    116.8  1227.98    118.8  1217.85   118.8
GR   1217.0  137.4  1216.75  164.6  1227.98    164.6  1227.98    166.6  1216.70   166.6
GR   1216.4  210.8  1216.45  212.4  1227.98    212.4  1227.98    214.4  1216.55   214.4
GR   1217.4  233.9  1218.05  260.2  1227.98    260.2  1227.98    262.2   1218.1   262.2
GR   1218.4  271.4  1219.1   277.0  1227.98    309.0  1227.98    311.0  1222.8    335.9
GR   1223.5  374.5  1228.1   482.0  1228.5     524.3  1228.4     580.9  1228.7    633.5
```

```
X1   11.005      15      60.1     309.0       5       5       5    0.956
X2                                                                      15
X3      10                                     309.0  1230.0
GR   1225.5     0.0    1229.7      60.1    1228.0    68.0  1228.0     70.0   1227.0    74.2
GR   1219.2   104.4    1217.0     137.4    1216.4   210.8  1217.4    233.9   1218.4   271.4
GR   1222.1   297.8   1222.15     309.0    1222.8   335.9  1223.5    374.5   1228.7   633.5

NC                              0.1      0.3
X1   11.020      31     362.3     603.7        60      60      60
X2
X3      10                                     603.7  1230.3
GR   1227.2     0.0    1227.2      45.4    1226.9    98.5  1227.2    150.7   1226.4   196.4
GR   1227.0   243.5    1227.5     348.4    1229.5   362.3  1220.8    388.8   1219.4   395.2
GR   1216.8   404.7    1216.0     431.7    1217.7   487.6  1218.5    493.3   1218.2   507.3
GR   1218.1   529.4    1217.9     531.9    1220.8   546.5  1221.6    595.0   1225.6   603.7
GR   1224.5   649.8    1225.1     761.8    1226.7   765.0  1226.7    770.6   1226.0   773.2
GR   1225.3   774.6    1225.4     784.3    1227.8   797.2  1229.2    825.7   1229.3   853.2
GR   1228.3  894.14
```

Cross Section 300' upstream of the Union Hills alignment

```
X1   11.045      16      89.6     307.6       170     170     170
X2                                                                      15
X3      10
GR   1226.6     0.0    1228.4      82.2    1229.8    89.6  1218.6    108.3   1217.8   184.5
GR   1218.6   225.8    1221.0     230.8    1220.7   241.1  1219.5    248.6   1219.3   251.4
GR   1219.3   271.5    1219.1     278.8    1223.5   291.5  1223.8    297.0   1226.9   307.6
GR   1227.3   360.3

ET                        9.1                                           0.0     381.6
NC     .045    .045
```

This section was re-surveyed and updated by HDR using data taken during
the Union Hills project

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NEW SECTION - LEFT BANK TAKEN FROM ARROWHEAD RANCH
WASTEWATER TREATMENT PLANT GRADING PLAN-DIBBLE & ASSOC.

```
X1   11.129      15       5.6     330.9       395     395     395
X2                                                                      15
X3      10
GR   1230.9     0.0    1230.0       5.6    1220.2    34.7  1221.2     77.8   1221.0   106.8
GR   1217.8   131.6    1217.9     207.9    1218.3   220.8  1221.0    244.8   1221.0   248.8
GR   1221.5   273.8    1221.2     276.4    1231.3   297.6  1230.1    330.9   1229.8   381.6

QT       3   10350     13750     17595
ET                        9.1                                         758.7     1228.
```

This section was re-surveyed and updated by HDR using data taken during
the Union Hills project

```
X1   11.188      18     761.6    1020.9       320     320     320
X2                                                                      15
X3      10
GR   1232.3   758.7    1232.8     761.6    1220.5   800.6  1221.9    814.1   1221.7   860.6
GR   1218.4   873.4    1217.5     888.0    1219.1   943.9  1221.8    958.7   1221.5   962.5
GR   1221.6   986.5    1221.3     988.7    1227.2  1005.5  1227.4   1009.6   1232.7  1020.9
GR   1231.5  1045.5    1231.6    1088.8    1231.9  1228.7

ET                        9.1                                           0.0     361.8
```

This section was re-surveyed and updated by HDR using data taken during
the Union Hills project

```
X1   11.301      21      72.7     297.9       600     600     600
X3      10
GR   1218.2     0.0    1231.3      44.9    1231.5   63.8  1233.3     72.7   1232.9    80.2
GR   1221.4   116.6    1222.9     128.2    1221.9   132.7  1222.2    161.9   1220.4   177.2
GR   1219.7   194.3    1221.0     219.5    1223.4   230.0  1223.5    233.5   1224.1   255.5
```

```
GR   1223.8     266.8     1227.8     276.7     1227.2     281.2     1233.9     297.9     1234.3     320.5
GR   1235.1     361.8
```

Cross Section at the beginning of the Treatment Plant protection dike

```
X1   11.328       18        5.6      214.4       180       180       180
X3       10
GR   1233.9      0.0     1233.6       5.6     1222.3      45.2     1224.0      61.9     1222.3      74.2
GR   1222.5     88.8     1221.2      99.7     1220.9     109.8     1222.3     150.6     1225.5     163.3
GR   1225.3    164.6     1225.8     190.8     1225.7     200.0     1233.4     214.4     1231.4     222.6
GR   1236.7    240.0     1236.4     266.1     1236.5     296.1
```

End of HDR Engineering Inc. Modifications
****


```
NC     .045      .060      .035
ET                         9.1                                                    19900     20175
X1   11.386        32     19900     20175       315       240       270
X3       10
GR    1240     16820      1238     17220      1238     18760      1240     18800      1244     18850
GR    1244     18915      1238     18950      1238     19040      1236     19280      1236     19420
GR    1233     19430      1233     19890      1233     19892      1233     19900      1228     19905
GR    1228     19912      1226     19975      1223     20000      1226     20030      1228     20085
GR    1230     20115      1232     20150      1238     20175    1239.5     20820      1238     22925
GR  1238.8     23655      1240     24780      1240     24805      1238     25705    1236.8     26140
GR    1238     26800      1240     27485

ET                         9.1                                                    19780     20170
X1   11.481        15     19780     20170       480       540       520
X3       10
GR    1240     19130      1238     19305      1230     19320      1228     19380      1228     19550
GR    1230     19710      1236     19780      1230     19800      1232     19860      1230     19900
GR    1228     19950    1227.4     20000      1230     20060      1234     20140      1240     20170

ET                         9.1                                                    19470     20310
X1   11.566        37     19470     20310       280       530       460
X3       10
GR    1241     17270      1240     18790      1242     18940      1242     19140      1240     19170
GR    1240     19470      1236     19480      1234     19550      1234     19760      1230     19775
GR    1230     19790      1232     19810      1234     19820      1234     19855      1232     19860
GR    1232     19940      1230     19980    1229.7     20000      1230     20010      1230     20180
GR    1232     20295      1240     20310      1240     20335      1242     20780      1244     21030
GR  1244.2     21620    1244.2     21960      1244     22190    1243.6     23225      1244     23470
GR  1244.9     24495      1246     25220      1245     25570      1244     26550      1244     26660
GR    1246     27240    1246.7     27420

ET                         9.1                                                    19925     20510
X1   11.759        35     19925     20510      1050       980      1020
X3       10
GR    1246     17890      1245     18190      1246     18510      1246     18920    1246.5     18930
GR    1246     18950      1246     19120      1244     19230      1244     19255      1244     19880
GR    1244     19900      1244     19925      1236     19940      1235     20000      1236     20040
GR    1236     20455      1242     20465      1244     20495      1248     20510      1248     20525
GR    1246     20540      1246     20620      1246     20760      1246     20800      1246     20820
GR    1246     21070      1248     21460      1250     21630      1250     21870    1219.6     22350
GR    1249     22980    1249.2     23620      1250     25015      1250     25960    1250.4     27420

NC     .060      .060      .035
ET                         9.1                                                    19865     20510
X1   11.949        35     19865     20510       990      1000      1000
X3       10
X4        1    1247.4     20700
GR  1250.8     18670    1250.4     18895    1250.4     19275      1251     19500      1251     19535
GR    1250     19865      1248     19920      1246     19974      1244     19976      1243     20000
GR    1244     20045      1244     20215      1242     20280      1242     20470      1244     20480
GR    1246     20510      1246     20520      1246     20530      1246     20590      1246     20600
```



```
GR    1248     20925      1250     20940      1252     21660      1254     22180      1254     22280
```

```
   10.443      3.98   1209.58   1209.58       .00   1211.09      1.51      5.02       .22   1216.00
  10900.0        .0   10900.0       .0        .0    1106.4        .0     471.5     105.3   1210.00
     .43       .00      9.85       .00      .000      .030      .000      .000   1205.60  19742.09
  .009108     930.      910.      900.         2        11         0       .00    366.87  20108.96

FLOW DISTRIBUTION FOR SECNO=     10.44          CWSEL=   1209.58

STA=   19742.   20110.
  PER Q=    100.0
   AREA=   1106.4
    VEL=      9.9
  DEPTH=      3.0

*SECNO 10.612

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.54

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1222.00 ELREA=      1218.00

   10.612      5.59   1215.19       .00       .00   1216.18       .99      5.04       .05   1222.00
  10900.0        .0   10900.0       .0        .0    1368.2        .0     496.8     112.4   1218.00
     .46       .00      7.97       .00      .000      .030      .000      .000   1209.60  19972.01
  .003854     880.      890.      900.         3         0         0       .00    325.65  20297.66

FLOW DISTRIBUTION FOR SECNO=     10.61          CWSEL=   1215.19

STA=   19972.   20300.
  PER Q=    100.0
   AREA=   1368.2
    VEL=      8.0
  DEPTH=      4.2
```



```
   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 10.803

3301 HV CHANGED MORE THAN HVINS

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1220.00 ELREA=      1220.00

   10.803      5.64   1219.74       .00       .00   1221.33      1.59      4.97       .18   1220.00
  10900.0        .0   10900.0       .0        .0    1076.2        .0     525.2     119.3   1220.00
     .48       .00     10.13       .00      .000      .030      .000      .000   1214.10  19750.66
  .006493    1020.     1010.     1010.         3         0         0       .00    264.01  20014.67

FLOW DISTRIBUTION FOR SECNO=     10.80          CWSEL=   1219.74

STA=   19751.   20015.
  PER Q=    100.0
   AREA=   1076.2
    VEL=     10.1
  DEPTH=      4.1

*SECNO 10.933
3280 CROSS SECTION     10.93 EXTENDED      1.02 FEET

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.99
```

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1222.20 ELREA= 1220.53

10.933	7.58	1221.55	.00	.00	1221.86	.30	.40	.13	1222.20
10900.0	.0	10900.0	.0	.0	2460.5	.0	535.1	121.1	1220.53
.50	.00	4.43	.00	.000	.030	.000	.000	1213.97	2.60
.000725	164.	244.	241.	2	0	0	.00	404.24	406.84

FLOW DISTRIBUTION FOR SECNO= 10.93 CWSEL= 1221.55

1

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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

STA= 3. 407.
PER Q= 100.0
AREA= 2460.5
VEL= 4.4
DEPTH= 6.1

*SECNO 10.934
3280 CROSS SECTION 10.93 EXTENDED .95 FEET

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .66

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1225.50 ELREA= 1220.53

10.934	5.87	1221.48	.00	.00	1222.01	.54	.09	.07	1225.50
10900.0	.0	10900.0	.0	.0	1854.2	.0	539.3	121.9	1220.53
.50	.00	5.88	.00	.000	.030	.000	.000	1215.61	15.98
.001681	82.	85.	92.	2	0	0	.00	374.46	390.44

FLOW DISTRIBUTION FOR SECNO= 10.93 CWSEL= 1221.48

STA= 16. 390.
PER Q= 100.0
AREA= 1854.2
VEL= 5.9
DEPTH= 5.0

*SECNO 10.935

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1227.10 ELREA= 1222.20

10.935	6.06	1221.67	.00	.00	1222.30	.63	.26	.03	1227.10
10900.0	.0	10900.0	.0	.0	1714.9	.0	545.2	123.1	1222.20
.51	.00	6.36	.00	.000	.030	.000	.000	1215.61	40.12
.001895	131.	144.	154.	2	0	0	.00	336.50	376.62

FLOW DISTRIBUTION FOR SECNO= 10.94 CWSEL= 1221.67

1

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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

STA= 40. 384.
PER Q= 100.0
AREA= 1714.9
VEL= 6.4
DEPTH= 5.1

*SECNO 10.936

3301 HV CHANGED MORE THAN HVINS

```
3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .52

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1225.50 ELREA=      1223.81

    10.936      5.72   1221.33       .00       .00   1223.09      1.76       .45       .34   1225.50
   10900.0        .0   10900.0        .0        .0    1023.3        .0     549.5     124.0   1223.81
       .51       .00     10.65       .00      .000      .030      .000      .000   1215.61     43.74
   .006970      131.      137.      154.         3         0         0       .00    246.58    290.33

FLOW DISTRIBUTION FOR SECNO=     10.94          CWSEL=   1221.33

STA=      44.     325.
  PER Q=    100.0
   AREA=   1023.3
    VEL=     10.7
  DEPTH=      4.1

CCHV=     .300 CEHV=     .500
*SECNO 10.989

3265 DIVIDED FLOW

3370 NORMAL BRIDGE, NRD=   0 MIN ELTRD=  1230.00 MAX ELLC=  1228.00

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1229.70 ELREA=      1227.98
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        UNION HILLS DRIVE
    10.989      7.50   1223.90       .00       .00   1225.36      1.46      2.18       .09   1229.70
   10900.0        .0   10900.0        .0        .0    1124.4        .0     558.6     125.8   1227.98
       .52       .00      9.69       .00      .000      .030      .000      .000   1216.40     82.41
   .005033      370.      370.      370.         3         0         0       .00    191.30    281.35

FLOW DISTRIBUTION FOR SECNO=     10.99          CWSEL=   1223.90

STA=      82.     295.
  PER Q=    100.0
   AREA=   1124.4
    VEL=      9.7
  DEPTH=      5.9

*SECNO 11.004

3265 DIVIDED FLOW

3370 NORMAL BRIDGE, NRD=   0 MIN ELTRD=  1230.00 MAX ELLC=  1228.00

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1229.70 ELREA=      1227.98

    11.004      8.27   1224.67       .00       .00   1225.81      1.13       .36       .10   1229.70
   10900.0        .0   10900.0        .0        .0    1275.3        .0     560.9     126.2   1227.98
       .53       .00      8.55       .00      .000      .030      .000      .000   1216.40     79.53
   .003525       85.       85.       85.         2         0         0       .00    196.85    284.03

FLOW DISTRIBUTION FOR SECNO=     11.00          CWSEL=   1224.67

STA=      80.     295.
  PER Q=    100.0
   AREA=   1275.3
    VEL=      8.5
  DEPTH=      6.5

*SECNO 11.005

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.41
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3470 ENCROACHMENT STATIONS= .0 309.0 TYPE= 1 TARGET= 308.999

1

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= 1229.70 ELREA= 1222.15

11.005	8.66	1225.06	.00	.00	1225.91	.85	.01	.09	1229.70
10900.0	.0	10832.0	68.0	.0	1460.5	37.3	561.1	126.2	1222.15
.53	.00	7.42	1.82	.000	.030	.060	.000	1216.40	78.10
.001780	5.	5.	5.	2	0	0	.00	230.90	309.00

FLOW DISTRIBUTION FOR SECNO= 11.01 CWSEL= 1225.06

STA=	78.	295.	309.
PER Q=	99.4	.6	
AREA=	1460.5	37.3	
VEL=	7.4	1.8	
DEPTH=	6.7	2.7	

CCHV= .100 CEHV= .300

*SECNO 11.020

3470 ENCROACHMENT STATIONS= .0 603.7 TYPE= 1 TARGET= 603.699

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1229.50 ELREA= 1230.30

11.020	9.13	1225.13	.00	.00	1226.04	.91	.12	.02	1229.50
10900.0	.0	10900.0	.0	.0	1421.3	.0	563.1	126.6	1230.30
.53	.00	7.67	.00	.000	.030	.000	.000	1216.00	375.62
.002106	60.	60.	60.	2	0	0	.00	227.06	602.67

FLOW DISTRIBUTION FOR SECNO= 11.02 CWSEL= 1225.13

STA=	376.	604.
PER Q=	100.0	
AREA=	1421.3	
VEL=	7.7	
DEPTH=	6.3	

*SECNO 11.045

1

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= 1229.80 ELREA= 1226.90

11.045	7.55	1225.35	.00	.00	1226.55	1.20	.42	.09	1229.80
10900.0	.0	10900.0	.0	.0	1238.9	.0	568.3	127.4	1226.90
.54	.00	8.80	.00	.000	.030	.000	.000	1217.80	97.04
.002936	170.	170.	170.	2	0	0	.00	205.25	302.29

FLOW DISTRIBUTION FOR SECNO= 11.05 CWSEL= 1225.35

STA=	97.	308.
PER Q=	100.0	
AREA=	1238.9	
VEL=	8.8	
DEPTH=	6.0	

*SECNO 11.129

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.61

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1230.00 ELREA= 1230.10

NEW SECTION - LEFT BANK TAKEN FROM ARROWHEAD RANCH
WASTEWATER TREATMENT PLANT GRADING PLAN-DIBBLE & ASSOC.

11.129	8.95	1226.75	.00	.00	1227.30	.55	.68	.07	1230.00
10900.0	.0	10900.0	.0	.0	1839.0	.0	582.3	129.6	1230.10
.55	.00	5.93	.00	.000	.030	.000	.000	1217.80	15.25
.001139	395.	395.	395.	2	0	0	.00	272.81	288.05

FLOW DISTRIBUTION FOR SECNO= 11.13 CWSEL= 1226.75

STA= 15. 331.
PER Q= 100.0
AREA= 1839.0
VEL= 5.9
DEPTH= 6.7

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 11.188

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1232.80 ELREA= 1232.70

11.188	9.51	1227.01	.00	.00	1227.85	.85	.47	.09	1232.80
10350.0	.0	10350.0	.0	.0	1402.6	.0	594.2	131.4	1232.70
.57	.00	7.38	.00	.000	.030	.000	.000	1217.50	779.97
.001966	320.	320.	320.	2	0	0	.00	224.98	1004.95

FLOW DISTRIBUTION FOR SECNO= 11.19 CWSEL= 1227.01

STA= 780. 1021.
PER Q= 100.0
AREA= 1402.6
VEL= 7.4
DEPTH= 6.2

*SECNO 11.301
3280 CROSS SECTION 11.30 EXTENDED 9.99 FEET

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .69

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1233.30 ELREA= 1233.90

11.301	8.49	1228.19	.00	.00	1229.72	1.53	1.66	.21	1233.30
10350.0	.0	10350.0	.0	.0	1042.9	.0	611.0	134.2	1233.90
.58	.00	9.92	.00	.000	.030	.000	.000	1219.70	95.10
.004182	600.	600.	600.	2	0	0	.00	188.57	283.67

FLOW DISTRIBUTION FOR SECNO= 11.30 CWSEL= 1228.19

STA= 95. 298.
PER Q= 100.0
AREA= 1042.9
VEL= 9.9
DEPTH= 5.5

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 11.328

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1233.60 ELREA= 1233.40

11.328	7.97	1228.87	.00	.00	1230.60	1.73	.82	.06	1233.60
10350.0	.0	10350.0	.0	.0	980.5	.0	615.2	135.0	1233.40
.59	.00	10.56	.00	.000	.030	.000	.000	1220.90	22.18
.004956	180.	180.	180.	2	0	0	.00	183.74	205.93

FLOW DISTRIBUTION FOR SECNO= 11.33 CWSEL= 1228.87

STA= 22. 214.
PER Q= 100.0
AREA= 980.5
VEL= 10.6
DEPTH= 5.3

*SECNO 11.386
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1233.00 ELREA= 1238.00

11.386	7.91	1230.91	1230.91	.00	1232.95	2.04	1.97	.09	1233.00
10350.0	.0	10350.0	.0	.0	903.0	.0	621.0	136.3	1238.00
.59	.00	11.46	.00	.000	.035	.000	.000	1223.00	19902.09
.011800	315.	270.	240.	3	5	0	.00	228.83	20130.92

FLOW DISTRIBUTION FOR SECNO= 11.39 CWSEL= 1230.91

STA= 19902. 20175.
PER Q= 100.0
AREA= 903.0
VEL= 11.5
DEPTH= 3.9

*SECNO 11.481

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 = 2.17

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1236.00 ELREA= 1240.00

11.481	7.58	1234.98	.00	.00	1235.55	.56	2.45	.15	1236.00
10350.0	.0	10350.0	.0	.0	1721.3	.0	636.7	139.8	1240.00
.62	.00	6.01	.00	.000	.035	.000	.000	1227.40	19783.39
.002514	480.	520.	540.	2	0	0	.00	361.53	20144.92

FLOW DISTRIBUTION FOR SECNO= 11.48 CWSEL= 1234.98

STA= 19783. 20170.
PER Q= 100.0
AREA= 1721.3
VEL= 6.0
DEPTH= 4.8

*SECNO 11.566

3470 ENCROACHMENT STATIONS= 19955.0 20300.0 TYPE= 1 TARGET= 345.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1222.00 ELREA= 100000.00

10.612	6.38	1215.98	.00	1215.19	1217.39	1.41	5.17	.02	1222.00
15500.0	.0	15500.0	.0	.0	1626.3	.0	557.6	86.2	100000.00
.35	.00	9.53	.00	.000	.030	.000	.000	1209.60	19970.04
.004438	880.	890.	900.	2	0	0	.00	328.28	20298.32

FLOW DISTRIBUTION FOR SECNO= 10.61 CWSEL= 1215.98

STA= 19970. 20300.
PER Q= 100.0
AREA= 1626.3
VEL= 9.5
DEPTH= 5.0

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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 10.803

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS= 19750.0 20015.0 TYPE= 1 TARGET= 265.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1220.00 ELREA= 100000.00

10.803	6.69	1220.79	.00	1219.74	1222.82	2.03	5.24	.19	1220.00
15500.0	.0	15500.0	.0	.0	1356.4	.0	592.2	93.1	100000.00
.38	.00	11.43	.00	.000	.030	.000	.000	1214.10	19750.00
.006154	1020.	1010.	1010.	3	0	0	.00	265.00	20015.00

FLOW DISTRIBUTION FOR SECNO= 10.80 CWSEL= 1220.79

STA= 19750. 20015.
PER Q= 100.0
AREA= 1356.4
VEL= 11.4
DEPTH= 5.1

*SECNO 10.933
3280 CROSS SECTION 10.93 EXTENDED 2.45 FEET

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.89

10.933	9.01	1222.98	.00	1221.55	1223.38	.40	.40	.16	1222.20
15500.0	.0	15500.0	.0	.0	3041.2	.0	604.5	94.9	1220.53
.39	.00	5.10	.00	.000	.030	.000	.000	1213.97	.00
.000735	164.	244.	241.	2	0	0	.00	406.84	406.84

FLOW DISTRIBUTION FOR SECNO= 10.93 CWSEL= 1222.98

STA= 0. 407.
PER Q= 100.0
AREA= 3041.2
VEL= 5.1
DEPTH= 7.5

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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 10.934
3280 CROSS SECTION 10.93 EXTENDED 2.36 FEET

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .70

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1225.50 ELREA= 1220.53

10.934	7.28	1222.89	.00	1221.48	1223.54	.66	.09	.08	1225.50
15500.0	.0	15500.0	.0	.0	2385.6	.0	609.8	95.7	1220.53
.39	.00	6.50	.00	.000	.030	.000	.000	1215.61	10.38
.001505	82.	85.	92.	2	0	0	.00	380.06	390.44

FLOW DISTRIBUTION FOR SECNO= 10.93 CWSEL= 1222.89

STA= 10. 390.
PER Q= 100.0
AREA= 2385.6
VEL= 6.5
DEPTH= 6.3

*SECNO 10.935
3280 CROSS SECTION 10.94 EXTENDED .84 FEET

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1227.10 ELREA= 1222.20

10.935	7.43	1223.04	.00	1221.67	1223.82	.78	.24	.04	1227.10
15500.0	.0	15500.0	.0	.0	2187.0	.0	617.4	96.9	1222.20
.40	.00	7.09	.00	.000	.030	.000	.000	1215.61	35.84
.001789	131.	144.	154.	1	0	0	.00	348.04	383.88

FLOW DISTRIBUTION FOR SECNO= 10.94 CWSEL= 1223.04

STA= 36. 384.
PER Q= 100.0
AREA= 2187.0
VEL= 7.1
DEPTH= 6.3

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 10.936

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .52

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1225.50 ELREA= 1223.81

10.936	6.92	1222.53	.00	1221.33	1224.63	2.10	.42	.40	1225.50
15500.0	.0	15500.0	.0	.0	1332.7	.0	622.9	97.9	1223.81
.40	.00	11.63	.00	.000	.030	.000	.000	1215.61	32.08
.006512	131.	137.	154.	3	0	0	.00	267.29	299.37

FLOW DISTRIBUTION FOR SECNO= 10.94 CWSEL= 1222.53

STA= 32. 325.
PER Q= 100.0
AREA= 1332.7
VEL= 11.6
DEPTH= 5.0

```
CCHV=     .300 CEHV=     .500
*SECNO 10.989

3265 DIVIDED FLOW


3370 NORMAL BRIDGE, NRD=   0 MIN ELTRD=  1230.00 MAX ELLC=  1228.00


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1229.70 ELREA=      1227.98

        UNION HILLS DRIVE
   10.989      8.51   1224.91       .00   1223.90   1227.04      2.13      2.39       .02   1229.70
  15500.0        .0   15500.0        .0        .0    1322.7        .0     634.2      99.9   1227.98
     .41       .00     11.72       .00      .000      .030      .000      .000   1216.40     78.64
 .006432      370.      370.      370.         2         0         0       .00    198.57    284.86


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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


FLOW DISTRIBUTION FOR SECNO=     10.99          CWSEL=   1224.91

STA=      79.     295.
  PER Q=    100.0
   AREA=   1322.7
    VEL=     11.7
  DEPTH=      6.7

*SECNO 11.004

3265 DIVIDED FLOW

3280 CROSS SECTION     11.00 EXTENDED       .64 FEET


3301 HV CHANGED MORE THAN HVINS


3370 NORMAL BRIDGE, NRD=   0 MIN ELTRD=  1230.00 MAX ELLC=  1228.00


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1229.70 ELREA=      1227.98

   11.004      9.74   1226.14       .00   1224.67   1227.65      1.51       .42       .19   1229.70
  15500.0        .0   15500.0        .0        .0    1570.1        .0     637.0     100.3   1227.98
     .41       .00      9.87       .00      .000      .030      .000      .000   1216.40     74.13
 .003985       85.       85.       85.         3         0         0       .00    207.28    289.06


FLOW DISTRIBUTION FOR SECNO=     11.00          CWSEL=   1226.14

STA=      74.     295.
  PER Q=    100.0
   AREA=   1570.1
    VEL=      9.9
  DEPTH=      7.6

*SECNO 11.005

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.49

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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= .0 309.0 TYPE= 1 TARGET= 308.999

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1229.70 ELREA= 1222.15

11.005	10.29	1226.69	.00	1225.06	1227.79	1.10	.01	.12	1229.70
15500.0	.0	15361.0	139.0	.0	1819.4	59.4	637.2	100.3	1222.15
.41	.00	8.44	2.34	.000	.030	.060	.000	1216.40	72.07
.001787	5.	5.	5.	3	0	0	.00	236.93	309.00

FLOW DISTRIBUTION FOR SECNO= 11.01 CWSEL= 1226.69

STA=	72.	295.	309.
PER Q=	99.1	.9	
AREA=	1819.4	59.4	
VEL=	8.4	2.3	
DEPTH=	8.1	4.4	

CCHV= .100 CEHV= .300
*SECNO 11.020

3470 ENCROACHMENT STATIONS= .0 603.7 TYPE= 1 TARGET= 603.699

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1229.50 ELREA= 1230.30

11.020	10.77	1226.77	.00	1225.13	1227.92	1.15	.11	.02	1229.50
15500.0	.0	15500.0	.0	.0	1799.8	.0	639.8	100.6	1230.30
.42	.00	8.61	.00	.000	.030	.000	.000	1216.00	370.61
.002025	60.	60.	60.	2	0	0	.00	233.09	603.70

FLOW DISTRIBUTION FOR SECNO= 11.02 CWSEL= 1226.77

STA=	371.	604.
PER Q=	100.0	
AREA=	1799.8	
VEL=	8.6	
DEPTH=	7.7	

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 11.045
3280 CROSS SECTION 11.05 EXTENDED .32 FEET

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1229.80 ELREA= 1226.90

11.045	9.12	1226.92	.00	1225.35	1228.44	1.52	.41	.11	1229.80
15500.0	.0	15500.0	.0	.0	1568.6	.0	646.3	101.5	1226.90
.42	.00	9.88	.01	.000	.030	.060	.000	1217.80	94.41
.002853	170.	170.	170.	2	0	0	.00	216.07	310.48

FLOW DISTRIBUTION FOR SECNO= 11.05 CWSEL= 1226.92

STA=	94.	308.
PER Q=	100.0	
AREA=	1568.6	
VEL=	9.9	
DEPTH=	7.4	

*SECNO 11.129

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.60

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1230.00 ELREA= 1230.10

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        NEW SECTION - LEFT BANK TAKEN FROM ARROWHEAD RANCH
        WASTEWATER TREATMENT PLANT GRADING PLAN-DIBBLE & ASSOC.
    11.129     10.69   1228.49       .00   1226.75   1229.18       .69       .66       .08   1230.00
   15500.0        .0   15500.0        .0        .0    2322.2        .0     664.0     103.7   1230.10
       .44       .00      6.67       .00      .000      .030      .000      .000   1217.80     10.07
   .001108      395.      395.      395.         2         0         0       .00    281.64    291.71

FLOW DISTRIBUTION FOR SECNO=     11.13          CWSEL=   1228.49

STA=      10.     331.
  PER Q=    100.0
   AREA=   2322.2
    VEL=      6.7
  DEPTH=      8.2

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   11JUL95      19:13:06                                                                          PAGE   74

    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 11.188

3470 ENCROACHMENT STATIONS=      758.7    1228.0  TYPE=      1  TARGET=      469.300

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1232.80 ELREA=      1232.70

    11.188     11.27   1228.77       .00   1227.01   1229.66       .89       .42       .06   1232.80
   13750.0        .0   13750.0        .0        .0    1813.0        .0     679.2     105.6   1232.70
       .45       .00      7.58       .00      .000      .030      .000      .000   1217.50    774.38
   .001595      320.      320.      320.         2         0         0       .00    238.14   1012.52

FLOW DISTRIBUTION FOR SECNO=     11.19          CWSEL=   1228.77

STA=     774.    1021.
  PER Q=    100.0
   AREA=   1813.0
    VEL=      7.6
  DEPTH=      7.6

*SECNO 11.301
3280 CROSS SECTION     11.30 EXTENDED     11.38 FEET

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .66

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1233.30 ELREA=      1233.90

    11.301      9.88   1229.58       .00   1228.19   1231.29      1.71      1.39       .25   1233.30
   13750.0        .0   13750.0        .0        .0    1309.9        .0     700.7     108.6   1233.90
       .47       .00     10.50       .00      .000      .030      .000      .000   1219.70     90.71
   .003655      600.      600.      600.         0         0         0       .00    196.42    287.13

FLOW DISTRIBUTION FOR SECNO=     11.30          CWSEL=   1229.58

STA=      91.     298.
  PER Q=    100.0
   AREA=   1309.9
    VEL=     10.5
  DEPTH=      6.7

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   11JUL95      19:13:06                                                                          PAGE   75

    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
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*SECNO 11.328

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1233.60 ELREA=      1233.40

    11.328      9.22   1230.12       .00   1228.87   1232.11      1.99       .73       .08   1233.60
   13750.0        .0   13750.0        .0        .0   1214.0        .0     705.9     109.4   1233.40
       .47       .00     11.33       .00      .000      .030      .000      .000   1220.90     17.81
   .004514      180.     180.      180.         2         0         0       .00    190.45    208.26


FLOW DISTRIBUTION FOR SECNO=     11.33          CWSEL=   1230.12

STA=      18.     214.
  PER Q=    100.0
   AREA=   1214.0
    VEL=     11.3
  DEPTH=      6.4

*SECNO 11.386
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=    19900.0   20175.0  TYPE=      1  TARGET=      275.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1233.00 ELREA=    100000.00

    11.386      8.82   1231.82   1231.82   1230.91   1234.16      2.34      1.82       .11   1233.00
   13750.0        .0   13750.0        .0        .0   1119.5        .0     713.1     110.8 100000.00
       .48       .00     12.28       .00      .000      .035      .000      .000   1223.00  19901.18
   .011204      315.     270.      240.         3        11         0       .00    245.71  20146.89


FLOW DISTRIBUTION FOR SECNO=     11.39          CWSEL=   1231.82

STA=   19901.   20175.
  PER Q=    100.0
   AREA=   1119.5
    VEL=     12.3
  DEPTH=      4.6

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   11JUL95      19:13:06                                                                          PAGE   76

    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 11.481

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.16


3470 ENCROACHMENT STATIONS=    19780.0   20170.0  TYPE=      1  TARGET=      390.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1236.00 ELREA=    100000.00

    11.481      8.59   1235.99       .00   1234.98   1236.66       .67      2.33       .17   1236.00
   13750.0        .0   13750.0        .0        .0   2090.3        .0     732.3     114.5 100000.00
       .50       .00      6.58       .00      .000      .035      .000      .000   1227.40  19780.02
   .002397      480.     520.      540.         3         0         0       .00    369.94  20149.96


FLOW DISTRIBUTION FOR SECNO=     11.48          CWSEL=   1235.99

STA=   19780.   20170.
  PER Q=    100.0
   AREA=   2090.3
    VEL=      6.6
  DEPTH=      5.7

*SECNO 11.566
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   .000635      930.      910.      900.       20       25        0      .00   4954.19  27197.85

FLOW DISTRIBUTION FOR SECNO=     10.44          CWSEL=   1210.09
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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

STA=   19670.   20110.   23780.   24260.   25120.   26400.   26810.   27080.   27180.   27198.
  PER Q=    18.0      7.0      6.0      7.7     44.6      9.1      4.0      3.5       .2
   AREA=  1301.2   1513.9   1052.9   1542.4   5188.7   1268.3    645.2    409.4     39.2
    VEL=     2.6       .9      1.1       .9      1.6      1.3      1.1      1.6      1.2
  DEPTH=     3.0       .4      2.2      1.8      4.1      3.1      2.4      4.1      2.2

*SECNO 10.612

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=     1222.00 ELREA=     1218.00

    10.612      6.03   1215.63   1215.63       .00   1217.97      2.34      1.38       .69   1222.00
   18530.0        .0   18530.0       .0        .0    1511.0        .0     892.0     239.9   1218.00
       .50       .00     12.26       .00      .000      .030      .000      .000   1209.60  19970.92
   .008058      880.      890.      900.        20        11         0       .00    327.11  20298.03

FLOW DISTRIBUTION FOR SECNO=     10.61          CWSEL=   1215.63

STA=   19971.   20300.
  PER Q=   100.0
   AREA=  1511.0
    VEL=    12.3
  DEPTH=     4.6

*SECNO 10.803
3280 CROSS SECTION     10.80 EXTENDED      1.91 FEET

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.48

    10.803      7.81   1221.91       .00       .00   1223.35      1.44      5.30       .09   1220.00
   18530.0     766.6   16707.2    1056.2     333.8    1651.4     529.4     938.8      253.2   1220.00
       .53      2.30     10.12      2.00      .060      .030      .060      .000    1214.10  19575.00
   .003681     1020.     1010.     1010.         2         0         0       .00     820.05  20395.05
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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

FLOW DISTRIBUTION FOR SECNO=     10.80          CWSEL=   1221.91

STA=   19575.   19585.   19595.   19750.   20015.   20190.   20395.
  PER Q=      .2       .2      3.7     90.2      4.2      1.5
   AREA=    19.1     19.1    295.7   1651.4    333.8    195.6
    VEL=     2.1      2.3      2.3     10.1      2.3      1.5
  DEPTH=     1.9      1.9      1.9      6.2      1.9      1.0

*SECNO 10.933
3280 CROSS SECTION     10.93 EXTENDED      2.78 FEET
```

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.01

10.933	9.34	1223.31	.00	.00	1223.84	.53	.39	.09	1222.20
18530.0	.0	18530.0	.0	.0	3176.1	.0	954.4	256.5	1220.53
.54	.00	5.83	.00	.000	.030	.000	.000	1213.97	.00
.000911	164.	244.	241.	2	0	0	.00	406.84	406.84

FLOW DISTRIBUTION FOR SECNO= 10.93 CWSEL= 1223.31

STA= 0. 407.
PER Q= 100.0
AREA= 3176.1
VEL= 5.8
DEPTH= 7.8

*SECNO 10.934
3280 CROSS SECTION 10.93 EXTENDED 2.66 FEET

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1225.50 ELREA= 1220.53

10.934	7.58	1223.19	.00	.00	1224.04	.85	.11	.10	1225.50
18530.0	.0	18530.0	.0	.0	2500.2	.0	959.9	257.3	1220.53
.54	.00	7.41	.00	.000	.030	.000	.000	1215.61	9.18
.001849	82.	85.	92.	2	0	0	.00	381.26	390.44

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

FLOW DISTRIBUTION FOR SECNO= 10.93 CWSEL= 1223.19

STA= 9. 390.
PER Q= 100.0
AREA= 2500.2
VEL= 7.4
DEPTH= 6.6

*SECNO 10.935
3280 CROSS SECTION 10.94 EXTENDED 1.18 FEET

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1227.10 ELREA= 1222.20

10.935	7.76	1223.37	.00	.00	1224.37	1.00	.29	.05	1227.10
18530.0	.0	18530.0	.0	.0	2304.3	.0	967.8	258.5	1222.20
.55	.00	8.04	.00	.000	.030	.000	.000	1215.61	34.79
.002160	131.	144.	154.	1	0	0	.00	349.09	383.88

FLOW DISTRIBUTION FOR SECNO= 10.94 CWSEL= 1223.37

STA= 35. 384.
PER Q= 100.0
AREA= 2304.3
VEL= 8.0
DEPTH= 6.6

*SECNO 10.936

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1225.50 ELREA= 1223.81

10.936	7.26	1222.87	1222.87	.00	1225.50	2.63	.51	.49	1225.50
18530.0	.0	18530.0	.0	.0	1423.9	.0	973.7	259.5	1223.81
.55	.00	13.01	.00	.000	.030	.000	.000	1215.61	31.40
.007744	131.	137.	154.	4	11	0	.00	274.69	306.10

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

FLOW DISTRIBUTION FOR SECNO= 10.94 CWSEL= 1222.87

STA= 31. 325.
PER Q= 100.0
AREA= 1423.9
VEL= 13.0
DEPTH= 5.2

CCHV= .300 CEHV= .500
*SECNO 10.989

3265 DIVIDED FLOW

3280 CROSS SECTION 10.99 EXTENDED .34 FEET

3370 NORMAL BRIDGE, NRD= 0 MIN ELTRD= 1230.00 MAX ELLC= 1228.00

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1229.70 ELREA= 1227.98

UNION HILLS DRIVE

10.989	9.44	1225.84	.00	.00	1228.18	2.34	2.59	.09	1229.70
18530.0	.0	18530.0	.0	.0	1508.7	.0	986.2	261.5	1227.98
.56	.00	12.28	.00	.000	.030	.000	.000	1216.40	75.23
.006363	370.	370.	370.	2	0	0	.00	205.15	288.03

FLOW DISTRIBUTION FOR SECNO= 10.99 CWSEL= 1225.84

STA= 75. 295.
PER Q= 100.0
AREA= 1508.7
VEL= 12.3
DEPTH= 7.4

*SECNO 11.004

3265 DIVIDED FLOW

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

3280 CROSS SECTION 11.00 EXTENDED 1.60 FEET

3301 HV CHANGED MORE THAN HVINS

3370 NORMAL BRIDGE, NRD= 0 MIN ELTRD= 1230.00 MAX ELLC= 1228.00

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1229.70 ELREA= 1227.98

11.004	10.71	1227.11	.00	.00	1228.80	1.69	.43	.19	1229.70
18530.0	.0	18530.0	.0	.0	1774.0	.0	989.4	261.9	1227.98
.56	.00	10.45	.00	.000	.030	.000	.000	1216.40	70.51

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   .004064      85.      85.      85.       3       0       0     .00   214.23   292.39

FLOW DISTRIBUTION FOR SECNO=     11.00          CWSEL=   1227.11

STA=      71.     295.
  PER Q=    100.0
   AREA=   1774.0
    VEL=     10.4
  DEPTH=      8.3

*SECNO 11.005

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.52

3470 ENCROACHMENT STATIONS=          .0     309.0  TYPE=      1  TARGET=      308.999

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1229.70 ELREA=      1222.15

    11.005     11.32   1227.72      .00      .00   1228.95     1.23      .01      .14   1229.70
   18530.0        .0   18341.5    188.5       .0    2051.6     73.4    989.6    261.9   1222.15
       .56       .00      8.94     2.57     .000      .030     .060     .000  1216.40     68.03
   .001749        5.        5.       5.        3         0        0      .00   240.97    309.00

FLOW DISTRIBUTION FOR SECNO=     11.01          CWSEL=   1227.72

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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

STA=      68.     295.     309.
  PER Q=     99.0      1.0
   AREA=   2051.6     73.4
    VEL=      8.9      2.6
  DEPTH=      9.0      5.4

CCHV=     .100 CEHV=     .300
*SECNO 11.020

3470 ENCROACHMENT STATIONS=          .0     603.7  TYPE=      1  TARGET=      603.699

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1229.50 ELREA=      1230.30

    11.020     11.80   1227.80      .00      .00   1229.08     1.28      .11      .01   1229.50
   18530.0        .0   18530.0       .0       .0    2041.6       .0    992.5    262.3   1230.30
       .56       .00      9.08      .00     .000      .030     .000     .000  1216.00    367.48
   .001947       60.       60.      60.        2         0        0      .00   236.22    603.70

FLOW DISTRIBUTION FOR SECNO=     11.02          CWSEL=   1227.80

STA=     367.     604.
  PER Q=    100.0
   AREA=   2041.6
    VEL=      9.1
  DEPTH=      8.6

*SECNO 11.045
3280 CROSS SECTION     11.05 EXTENDED      1.32 FEET

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1229.80 ELREA=      1226.90

    11.045     10.12   1227.92      .00      .00   1229.58     1.67      .39      .12   1229.80
   18530.0        .0   18482.1    47.9       .0    1781.5     43.0   1000.0    263.2   1226.90
       .57       .00     10.37     1.11     .000      .030     .060     .000  1217.80     92.74
   .002686      170.      170.     170.        2         0        0      .00   267.56    360.30

FLOW DISTRIBUTION FOR SECNO=     11.05          CWSEL=   1227.92

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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

STA=      93.     308.     360.
  PER Q=    99.7      .3
   AREA=  1781.5    43.0
    VEL=    10.4     1.1
  DEPTH=     8.3      .8

*SECNO 11.129

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.57

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1230.00 ELREA=      1230.10

        NEW SECTION - LEFT BANK TAKEN FROM ARROWHEAD RANCH
        WASTEWATER TREATMENT PLANT GRADING PLAN-DIBBLE & ASSOC.
   11.129     11.74   1229.54       .00       .00   1230.31       .78       .64       .09   1230.00
  18530.0        .0   18530.0        .0        .0    2619.6        .0    1020.2     265.8   1230.10
      .58       .00      7.07       .00      .000      .030      .000      .000   1217.80      6.96
  .001088      395.      395.      395.         2         0         0       .00    286.94    293.91

FLOW DISTRIBUTION FOR SECNO=     11.13          CWSEL=   1229.54

STA=       7.     331.
  PER Q=   100.0
   AREA=  2619.6
    VEL=     7.1
  DEPTH=     9.1

*SECNO 11.188

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1232.80 ELREA=      1232.70

   11.188     12.21   1229.71       .00       .00   1230.87      1.15       .44       .11   1232.80
  17595.0        .0   17595.0        .0        .0    2040.2        .0    1037.3     267.7   1232.70
      .59       .00      8.62       .00      .000      .030      .000      .000   1217.50    771.39
  .001814      320.      320.      320.         2         0         0       .00    243.15   1014.53
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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

FLOW DISTRIBUTION FOR SECNO=     11.19          CWSEL=   1229.71

STA=     771.    1021.
  PER Q=   100.0
   AREA=  2040.2
    VEL=     8.6
  DEPTH=     8.4

*SECNO 11.301
3280 CROSS SECTION     11.30 EXTENDED     12.38 FEET

3301 HV CHANGED MORE THAN HVINS

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

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1233.30 ELREA=      1233.90
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   11.301      10.88   1230.58       .00       .00   1232.69      2.11      1.54       .29   1233.30
 17595.0         .0   17595.0        .0        .0    1509.7        .0    1061.7     270.8   1233.90
     .61        .00     11.65       .00      .000      .030      .000      .000   1219.70     87.54
 .003879       600.      600.      600.         0         0         0       .00    202.09    289.63


FLOW DISTRIBUTION FOR SECNO=     11.30          CWSEL=   1230.58

STA=      88.     298.
  PER Q=    100.0
   AREA=   1509.7
    VEL=     11.7
  DEPTH=      7.5

*SECNO 11.328

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1233.60 ELREA=      1233.40

   11.328      10.23   1231.13       .00       .00   1233.55      2.42       .77       .09   1233.60
 17595.0         .0   17595.0        .0        .0    1409.0        .0    1067.8     271.6   1233.40
     .61        .00     12.49       .00      .000      .030      .000      .000   1220.90     14.27
 .004680       180.      180.      180.         2         0         0       .00    195.88    210.15


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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


FLOW DISTRIBUTION FOR SECNO=     11.33          CWSEL=   1231.13

STA=      14.     214.
  PER Q=    100.0
   AREA=   1409.0
    VEL=     12.5
  DEPTH=      7.2

*SECNO 11.386

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1233.00 ELREA=      1238.00

   11.386      10.54   1233.54   1233.54       .00   1235.39      1.85      1.45       .06   1233.00
 17595.0       436.8   17158.2        .0     253.5    1552.5        .0    1077.8     274.7   1238.00
     .62        1.72     11.05       .00      .045      .035      .000      .000   1223.00  19428.21
 .006228       315.      270.      240.         3         8         0       .00    728.21  20156.41


FLOW DISTRIBUTION FOR SECNO=     11.39          CWSEL=   1233.54

STA=   19428.   19890.   19892.   19900.   20175.
  PER Q=      2.4       .0       .0     97.5
   AREA=    248.1      1.1      4.3   1552.5
    VEL=      1.7      1.7      1.7     11.1
  DEPTH=       .5       .5       .5      6.1

*SECNO 11.481

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  3.08


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=      1236.00 ELREA=      1240.00

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   11JUL95       19:13:06
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

Union Hills Bridge

SUMMARY PRINTOUT

	SECNO	Q	SSTA	STCHL	VLOB	VCH	VROB	STCHR	ENDST	TOPWID	CWSEL	DIFWSP
	8.655	41000.00	9587.04	9581.40	.00	5.01	.00	10224.30	10221.10	634.06	1170.50	.00
	8.655	41000.00	9587.04	9581.40	.00	5.01	.00	10224.30	10221.10	634.06	1170.50	.00
	8.655	69700.00	9587.04	9581.40	.00	8.52	.00	10224.30	10221.10	634.06	1170.50	.00
*	8.731	12000.00	9779.38	9762.50	.00	2.33	.00	10213.50	10208.22	428.84	1170.96	.00
*	8.731	19000.00	9779.93	9762.50	.00	3.72	.00	10213.50	10207.76	427.83	1170.85	-.11
*	8.731	20400.00	9774.92	9762.50	.00	3.69	.00	10213.50	10211.94	437.02	1171.83	.98
	8.807	12000.00	9785.25	9771.30	.00	2.67	.00	10219.20	10202.70	417.45	1170.99	.00
	8.807	19000.00	9785.44	9771.30	.00	4.24	.00	10219.20	10202.41	416.96	1170.94	-.05
	8.807	20400.00	9781.79	9771.30	.00	4.18	.00	10219.20	10207.92	426.14	1171.91	.97
*	8.883	12000.00	9850.57	9824.70	.00	4.70	.00	10216.90	10189.15	338.58	1170.96	.00
*	8.883	19000.00	9851.30	9824.70	.00	7.55	.00	10216.90	10188.76	337.46	1170.85	-.11
*	8.883	20400.00	9844.87	9824.70	.00	7.16	.00	10216.90	10192.64	347.77	1171.83	.98
	8.936	12000.00	9821.91	9809.40	.00	5.09	.00	10213.20	10181.98	360.07	1171.20	.00
	8.936	19000.00	9821.60	9809.40	.00	7.69	.00	10213.20	10183.17	361.58	1171.51	.31
	8.936	20400.00	9820.75	9809.40	.00	7.36	.00	10213.20	10186.38	365.64	1172.34	.83
	8.977	12000.00	9895.40	9886.10	.00	6.84	.00	10212.70	10178.07	282.68	1171.31	.00
	8.977	19000.00	9894.70	9886.10	.00	10.11	.00	10212.70	10180.27	285.57	1171.75	.44
	8.977	20400.00	9893.58	9886.10	.00	9.78	.00	10212.70	10183.84	290.26	1172.47	.71
*	9.009	12000.00	9797.15	9764.50	.00	4.63	.00	10207.00	10166.79	369.65	1171.99	.00
*	9.009	19000.00	9790.86	9764.50	.00	6.21	.00	10207.00	10168.77	377.91	1173.24	1.25
*	9.009	20400.00	9788.08	9764.50	.00	6.23	.00	10207.00	10169.65	381.57	1173.80	.56
	9.047	12000.00	9712.28	9689.80	.00	3.71	.00	10113.80	10103.66	391.38	1172.25	.00
	9.047	19000.00	9706.22	9689.80	.00	5.00	.00	10113.80	10106.34	400.12	1173.66	1.42
	9.047	20400.00	9703.91	9689.80	.00	5.08	.00	10113.80	10107.36	403.45	1174.20	.54

	SECNO	Q	SSTA	STCHL	VLOB	VCH	VROB	STCHR	ENDST	TOPWID	CWSEL	DIFWSP
*	9.129	12000.00	9674.75	9641.20	.00	4.88	.00	10090.00	10080.74	405.98	1172.43	.00
*	9.129	19000.00	9665.63	9641.20	.00	6.17	.00	10090.00	10082.96	417.32	1173.93	1.50
	9.129	20400.00	9664.97	9641.20	.00	6.19	.00	10090.00	10083.73	418.76	1174.46	.53
*	9.318	12000.00	19695.41	19660.00	.00	6.59	1.70	20015.00	23740.00	1824.29	1181.50	.00
*	9.318	19000.00	19693.99	19660.00	.00	12.55	.00	20015.00	20015.00	321.00	1181.84	.34
*	9.318	20400.00	19693.74	19660.00	.00	9.45	2.59	20015.00	23740.00	2115.97	1181.90	.06
*	9.492	11450.00	19912.16	19770.00	.00	9.81	.00	20235.00	20200.77	288.61	1185.42	.00
*	9.492	17250.00	19770.00	19770.00	.00	7.23	.00	20235.00	20214.01	444.01	1188.70	3.28
	9.492	19465.00	19791.31	19770.00	.00	10.04	.00	20235.00	20209.89	418.58	1187.69	-1.01
	9.692	11450.00	19852.36	19840.00	.00	9.94	.00	20060.00	20047.27	194.91	1192.22	.00
*	9.692	17250.00	19850.95	19840.00	.00	14.20	.00	20060.00	20048.32	197.37	1192.54	.31
	9.692	19465.00	19843.75	19840.00	.00	12.61	.00	20060.00	20053.62	209.87	1194.16	1.62
	9.889	11450.00	19860.24	19840.00	.00	8.30	.00	20080.00	20070.93	210.69	1196.98	.00
*	9.889	17250.00	19841.51	19840.00	.00	8.65	.00	20080.00	20079.09	237.58	1199.69	2.72
*	9.889	19465.00	19840.75	19840.00	.00	9.59	.00	20080.00	20079.55	238.80	1199.85	.16
	9.953	11450.00	19795.05	19790.00	.00	8.06	.00	20032.00	20026.45	231.40	1197.97	.00
	9.953	17250.00	19790.00	19790.00	.00	8.64	.00	20032.00	20030.41	240.41	1200.41	2.44
*	9.953	19465.00	15216.64	19790.00	.88	7.11	.00	20032.00	20031.43	4021.36	1201.43	1.02
	9.967	11450.00	19839.52	19825.00	.00	8.21	.00	20110.00	20080.96	241.44	1198.19	.00
	9.967	17250.00	19833.39	19825.00	.00	8.59	.00	20110.00	20093.21	259.81	1200.64	2.45
	9.967	19465.00	19831.22	19825.00	.00	8.70	.00	20110.00	20097.56	266.34	1201.51	.87
*	10.096	11450.00	19639.38	19635.00	.00	8.33	.00	20055.00	20041.40	402.03	1200.56	.00
	10.096	17250.00	19635.00	19635.00	.00	8.21	.00	20055.00	20045.85	410.85	1202.34	1.78
	10.096	19465.00	15057.69	19635.00	1.61	7.99	.00	20055.00	20047.73	613.54	1203.09	.75

	10.271	10900.00	19863.81	19820.00	.00	7.01	.00	20320.00	20301.58	437.77	1205.06	.00
	10.271	15500.00	19860.09	19820.00	.00	8.45	.00	20320.00	20305.53	445.44	1205.69	.63
*	10.271	18530.00	19858.43	19820.00	.00	9.45	.00	20320.00	20307.29	448.86	1205.97	.28
*	10.443	10900.00	19742.09	19655.00	.00	9.85	.00	20110.00	20108.96	366.87	1209.58	.00
	10.443	15500.00	19668.44	19655.00	.00	10.10	.00	20110.00	20110.00	441.56	1210.62	1.04
*	10.443	18530.00	19669.77	19655.00	.00	2.57	1.30	20110.00	27197.85	4954.19	1210.09	-.53
*	10.612	10900.00	19972.01	19955.00	.00	7.97	.00	20300.00	20297.66	325.65	1215.19	.00
	10.612	15500.00	19970.04	19955.00	.00	9.53	.00	20300.00	20298.32	328.28	1215.98	.79
*	10.612	18530.00	19970.92	19955.00	.00	12.26	.00	20300.00	20298.03	327.11	1215.63	-.35
	10.803	10900.00	19750.66	19750.00	.00	10.13	.00	20015.00	20014.67	264.01	1219.74	.00
	10.803	15500.00	19750.00	19750.00	.00	11.43	.00	20015.00	20015.00	265.00	1220.79	1.06
*	10.803	18530.00	19575.00	19750.00	2.30	10.12	2.00	20015.00	20395.05	820.05	1221.91	1.12
*	10.933	10900.00	2.60	.00	.00	4.43	.00	406.84	406.84	404.24	1221.55	.00
*	10.933	15500.00	.00	.00	.00	5.10	.00	406.84	406.84	406.84	1222.98	1.43
*	10.933	18530.00	.00	.00	.00	5.83	.00	406.84	406.84	406.84	1223.31	.33

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	SECNO	Q	SSTA	STCHL	VLOB	VCH	VROB	STCHR	ENDST	TOPWID	CWSEL	DIFWSP
*	10.934	10900.00	15.98	.00	.00	5.88	.00	390.44	390.44	374.46	1221.48	.00
*	10.934	15500.00	10.38	.00	.00	6.50	.00	390.44	390.44	380.06	1222.89	1.41
	10.934	18530.00	9.18	.00	.00	7.41	.00	390.44	390.44	381.26	1223.19	.30
	10.935	10900.00	40.12	.00	.00	6.36	.00	383.88	376.62	336.50	1221.67	.00
	10.935	15500.00	35.84	.00	.00	7.09	.00	383.88	383.88	348.04	1223.04	1.36
	10.935	18530.00	34.79	.00	.00	8.04	.00	383.88	383.88	349.09	1223.37	.33
*	10.936	10900.00	43.74	.00	.00	10.65	.00	324.82	290.33	246.58	1221.33	.00
*	10.936	15500.00	32.08	.00	.00	11.63	.00	324.82	299.37	267.29	1222.53	1.21
*	10.936	18530.00	31.40	.00	.00	13.01	.00	324.82	306.10	274.69	1222.87	.34
	10.989	10900.00	82.41	57.46	.00	9.69	.00	295.40	281.35	191.30	1223.90	.00
	10.989	15500.00	78.64	57.46	.00	11.72	.00	295.40	284.86	198.57	1224.91	1.02
	10.989	18530.00	75.23	57.46	.00	12.28	.00	295.40	288.03	205.15	1225.84	.93
	11.004	10900.00	79.53	57.46	.00	8.55	.00	295.40	284.03	196.85	1224.67	.00
	11.004	15500.00	74.13	57.46	.00	9.87	.00	295.40	289.06	207.28	1226.14	1.47
	11.004	18530.00	70.51	57.46	.00	10.45	.00	295.40	292.39	214.23	1227.11	.97
*	11.005	10900.00	78.10	57.46	.00	7.42	1.82	295.40	309.00	230.90	1225.06	.00
*	11.005	15500.00	72.07	57.46	.00	8.44	2.34	295.40	309.00	236.93	1226.69	1.64
*	11.005	18530.00	68.03	57.46	.00	8.94	2.57	295.40	309.00	240.97	1227.72	1.03
	11.020	10900.00	375.62	362.30	.00	7.67	.00	603.70	602.67	227.06	1225.13	.00
	11.020	15500.00	370.61	362.30	.00	8.61	.00	603.70	603.70	233.09	1226.77	1.64
	11.020	18530.00	367.48	362.30	.00	9.08	.00	603.70	603.70	236.22	1227.80	1.03
	11.045	10900.00	97.04	89.60	.00	8.80	.00	307.60	302.29	205.25	1225.35	.00
	11.045	15500.00	94.41	89.60	.00	9.88	.01	307.60	310.48	216.07	1226.92	1.58
	11.045	18530.00	92.74	89.60	.00	10.37	1.11	307.60	360.30	267.56	1227.92	.99
*	11.129	10900.00	15.25	5.60	.00	5.93	.00	330.90	288.05	272.81	1226.75	.00
*	11.129	15500.00	10.07	5.60	.00	6.67	.00	330.90	291.71	281.64	1228.49	1.74
*	11.129	18530.00	6.96	5.60	.00	7.07	.00	330.90	293.91	286.94	1229.54	1.04
	11.188	10350.00	779.97	761.60	.00	7.38	.00	1020.90	1004.95	224.98	1227.01	.00
	11.188	13750.00	774.38	761.60	.00	7.58	.00	1020.90	1012.52	238.14	1228.77	1.76
	11.188	17595.00	771.39	761.60	.00	8.62	.00	1020.90	1014.53	243.15	1229.71	.94
*	11.301	10350.00	95.10	72.70	.00	9.92	.00	297.90	283.67	188.57	1228.19	.00
*	11.301	13750.00	90.71	72.70	.00	10.50	.00	297.90	287.13	196.42	1229.58	1.39
*	11.301	17595.00	87.54	72.70	.00	11.65	.00	297.90	289.63	202.09	1230.58	1.00
	11.328	10350.00	22.18	5.60	.00	10.56	.00	214.40	205.93	183.74	1228.87	.00
	11.328	13750.00	17.81	5.60	.00	11.33	.00	214.40	208.26	190.45	1230.12	1.25
	11.328	17595.00	14.27	5.60	.00	12.49	.00	214.40	210.15	195.88	1231.13	1.01
*	11.386	10350.00	19902.09	19900.00	.00	11.46	.00	20175.00	20130.92	228.83	1230.91	.00
*	11.386	13750.00	19901.18	19900.00	.00	12.28	.00	20175.00	20146.89	245.71	1231.82	.91
*	11.386	17595.00	19428.21	19900.00	1.72	11.05	.00	20175.00	20156.41	728.21	1233.54	1.72

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	SECNO	Q	SSTA	STCHL	VLOB	VCH	VROB	STCHR	ENDST	TOPWID	CWSEL	DIFWSP
*	11.481	10350.00	19783.39	19780.00	.00	6.01	.00	20170.00	20144.92	361.53	1234.98	.00
*	11.481	13750.00	19780.02	19780.00	.00	6.58	.00	20170.00	20149.96	369.94	1235.99	1.01
*	11.481	17595.00	19308.49	19780.00	3.15	3.49	.00	20170.00	20150.70	842.21	1236.15	.16
*	11.566	10350.00	19479.79	19470.00	.00	3.19	.00	20310.00	20302.66	822.87	1236.08	.00
*	11.566	13750.00	19477.24	19470.00	.00	3.37	.00	20310.00	20304.57	827.34	1237.10	1.02
*	11.566	17595.00	19478.91	19470.00	.00	4.99	.00	20310.00	20303.32	824.40	1236.43	-.68
*	11.759	10350.00	19935.85	19925.00	.00	8.63	.00	20510.00	20458.69	522.84	1238.21	.00
*	11.759	13750.00	19934.96	19925.00	.00	9.51	.00	20510.00	20459.48	524.51	1238.69	.47
*	11.759	17595.00	19933.43	19925.00	.00	9.37	.00	20510.00	20460.84	527.41	1239.51	.82
*	11.949	10350.00	19967.99	19865.00	.00	6.01	1.69	20510.00	23952.42	864.78	1246.22	.00
*	11.949	13750.00	19950.71	19865.00	.00	6.87	.00	20510.00	20510.00	559.29	1246.86	.64
	11.949	17595.00	19945.05	19865.00	.00	7.65	2.29	20510.00	24029.77	1031.26	1247.07	.21
	12.125	10350.00	19927.44	19890.00	.00	6.53	.00	20680.00	20590.63	663.20	1251.46	.00
	12.125	13750.00	19926.45	19890.00	.00	7.00	.00	20680.00	20600.61	674.16	1252.03	.56
	12.125	17595.00	19925.52	19890.00	.00	7.58	.00	20680.00	20611.18	685.66	1252.56	.53
	12.313	9800.00	19858.45	19830.00	.00	7.31	.00	20240.00	20232.04	373.59	1257.60	.00
	12.313	12000.00	19839.89	19830.00	.00	7.96	.00	20240.00	20233.48	393.59	1258.04	.44
	12.313	16660.00	19838.28	19830.00	.00	9.46	.00	20240.00	20235.63	397.35	1258.68	.64
	12.511	9800.00	19818.02	19810.00	.00	6.93	.00	20280.00	20276.53	389.97	1263.08	.00
	12.511	12000.00	19810.00	19810.00	.00	7.15	.00	20280.00	20278.96	427.47	1263.72	.65
*	12.511	16660.00	19346.40	19810.00	1.98	6.63	2.10	20280.00	21309.09	1962.68	1264.53	.81
	12.701	9800.00	19816.09	19810.00	.00	6.90	1.09	20330.00	20413.00	596.90	1268.78	.00
	12.701	12000.00	19814.13	19810.00	.00	7.42	.00	20330.00	20330.00	515.87	1269.17	.39
*	12.701	16660.00	19813.96	19810.00	.00	7.71	3.44	20330.00	26208.59	2392.66	1269.21	.04
*	12.896	9800.00	19845.77	19845.00	.00	5.47	.69	20360.00	20401.51	555.74	1273.69	.00
*	12.896	12000.00	19845.00	19845.00	.00	5.96	.00	20360.00	20360.00	515.00	1274.12	.43
*	12.896	16660.00	18743.13	19845.00	.27	5.94	3.73	20360.00	27056.72	1844.39	1274.16	.04
*	13.076	7900.00	19931.64	19930.00	.00	6.46	.00	20350.00	20347.54	415.91	1277.34	.00
*	13.076	7900.00	19931.11	19930.00	.00	6.03	.00	20350.00	20348.33	417.22	1277.55	.22
*	13.076	13430.00	19930.06	19930.00	.00	9.03	.00	20350.00	20349.92	419.86	1277.98	.43
*	13.227	7900.00	19818.08	19810.00	.00	5.84	.00	20120.00	20102.30	284.21	1280.23	.00
	13.227	7900.00	19818.54	19810.00	.00	5.92	.00	20120.00	20101.58	283.04	1280.16	-.07
*	13.227	13430.00	19702.22	19810.00	.47	7.19	.00	20120.00	20119.49	417.27	1281.95	1.79
*	13.420	7900.00	19874.30	19870.00	.00	10.45	.00	20170.00	20099.97	225.67	1285.99	.00
*	13.420	7900.00	19874.29	19870.00	.00	10.43	.00	20170.00	20100.00	225.71	1286.00	.01
*	13.420	13430.00	19506.19	19870.00	.72	.22	.00	20170.00	20138.44	632.25	1287.54	1.54
*	13.619	7900.00	19893.97	19870.00	.00	4.40	2.35	20455.00	20532.06	636.91	1292.41	.00
*	13.619	7900.00	19893.84	19870.00	.00	4.50	.00	20455.00	20455.00	561.15	1292.47	.06
*	13.619	13430.00	19895.00	19870.00	.00	8.30	4.09	20455.00	21905.33	748.48	1292.00	-.47

1

	SECNO	Q	SSTA	STCHL	VLOB	VCH	VROB	STCHR	ENDST	TOPWID	CWSEL	DIFWSP
*	13.818	7900.00	19916.12	19890.00	.00	7.82	4.04	20340.00	20709.03	677.98	1297.44	.00
*	13.818	7900.00	19908.40	19890.00	.00	8.41	.00	20340.00	20338.66	430.26	1297.64	.21
*	13.818	13430.00	19892.98	19890.00	.00	5.66	3.14	20340.00	22385.61	1513.75	1298.81	1.17
*	14.013	6100.00	19918.26	19915.00	.00	3.90	2.05	20270.00	21600.47	1285.90	1303.74	.00
*	14.013	9539.00	19915.00	19915.00	.00	6.93	.00	20270.00	20270.00	355.00	1305.13	1.38
*	14.013	10370.00	19920.24	19915.00	.00	6.01	3.55	20270.00	22499.76	1428.94	1303.58	-1.54
*	14.197	6100.00	19559.21	19715.00	1.63	6.88	2.10	20015.00	20830.77	840.79	1308.77	.00
	14.197	9539.00	19715.00	19715.00	.00	8.27	.00	20015.00	20015.00	300.00	1310.03	1.26
	14.197	10370.00	19555.32	19715.00	2.32	6.97	3.02	20015.00	22376.33	1452.93	1309.29	-.74
	14.379	6100.00	19544.76	19540.00	.00	5.52	2.68	20095.00	21035.65	1010.64	1315.05	.00
	14.379	9539.00	19540.00	19540.00	.00	5.85	4.25	20095.00	20250.00	710.00	1316.58	1.53
	14.379	10370.00	19543.29	19540.00	.00	6.48	3.51	20095.00	22317.61	1400.09	1315.34	-1.23
	14.559	6100.00	19222.21	19220.00	.00	4.48	.00	20045.00	20037.92	815.71	1320.23	.00

	14.559	9539.00	19221.18	19220.00	.00	4.68	.00	20045.00	20045.00	823.82	1321.07	.84
	14.559	10370.00	19221.68	19220.00	.00	4.81	1.55	20045.00	23754.51	3482.71	1320.65	-.41
	14.752	6100.00	19673.36	19670.00	.00	4.85	.00	20170.00	20139.81	466.45	1324.66	.00
	14.752	9539.00	19672.08	19670.00	.00	6.37	.00	20170.00	20151.29	479.21	1325.17	.51
	14.752	10370.00	19671.62	19670.00	.00	6.54	.00	20170.00	20155.42	483.80	1325.36	.19
*	14.945	4200.00	19901.60	19865.00	.00	8.57	2.20	20050.00	20410.24	247.75	1329.02	.00
*	14.945	4746.00	19865.00	19865.00	.00	7.14	.00	20050.00	20050.00	185.00	1330.17	1.15
	14.945	7140.00	19849.93	19865.00	.59	6.88	3.25	20050.00	22849.76	1099.97	1330.32	.14
*	15.144	4200.00	19605.97	19602.45	.00	4.32	.00	19982.48	19981.95	375.98	1334.82	.00
*	15.144	4746.00	19955.00	19602.45	.00	10.68	4.35	19982.48	20382.00	427.00	1338.25	3.43
	15.144	7140.00	19604.70	19602.45	.00	6.30	.00	19982.48	19982.14	377.45	1335.24	-3.01
*	15.333	4200.00	19781.38	19770.00	.00	5.93	.00	20100.00	20092.16	310.78	1338.85	.00
*	15.333	4746.00	19770.00	19770.00	.00	3.41	.00	20100.00	20097.47	327.47	1341.00	2.14
	15.333	7140.00	19349.68	19770.00	.39	6.49	.00	20100.00	20095.21	745.53	1340.09	-.91
	15.519	4200.00	19962.68	19950.00	.00	5.35	.00	20320.00	20263.75	301.07	1344.20	.00
*	15.519	4746.00	19965.10	19950.00	.00	8.24	.00	20320.00	20246.69	281.59	1343.47	-.73
	15.519	7140.00	19959.91	19950.00	.00	6.39	2.20	20320.00	22941.35	606.39	1345.03	1.56
	15.699	4200.00	19899.13	19870.00	.00	7.15	3.36	20085.00	20888.91	359.55	1349.57	.00
*	15.699	4746.00	19882.94	19870.00	.00	6.54	.00	20085.00	20085.00	202.06	1350.82	1.25
	15.699	7140.00	19884.06	19870.00	.00	6.91	3.03	20085.00	23445.94	1168.19	1350.38	-.44
	15.966	2350.00	1989.23	1985.00	.00	2.69	2.35	2430.00	2670.77	537.86	1356.31	.00
*	15.966	2350.00	1988.82	1985.00	.00	3.14	.00	2430.00	2414.22	425.40	1356.47	.16
	15.966	3995.00	1988.68	1985.00	.00	3.32	1.63	2430.00	5525.33	1711.07	1356.53	.05
*	16.066	2350.00	1986.60	1970.00	.00	6.00	5.12	2350.00	2696.80	420.04	1358.68	.00
*	16.066	2350.00	1982.51	1970.00	.00	6.78	.00	2350.00	2332.40	259.72	1359.50	.81
*	16.066	3995.00	1986.48	1970.00	.00	3.47	2.90	2350.00	5622.85	1401.08	1358.70	-.80

	SECNO	Q	SSTA	STCHL	VLOB	VCH	VROB	STCHR	ENDST	TOPWID	CWSEL	DIFWSP
*	16.167	2350.00	1952.47	1950.00	.00	3.50	2.20	2130.00	2622.15	669.68	1362.42	.00
*	16.167	2350.00	1951.62	1950.00	.00	4.58	1.92	2130.00	2200.00	248.38	1363.25	.82
	16.167	3995.00	1952.41	1950.00	.00	5.75	3.59	2130.00	2622.42	670.01	1362.48	-.76
*	16.248	2350.00	1932.67	1925.00	.00	6.86	2.31	2030.00	2633.33	700.66	1364.44	.00
*	16.248	2350.00	1931.21	1925.00	.00	8.59	.00	2030.00	2030.00	98.79	1364.93	.49
*	16.248	3995.00	1935.31	1925.00	.00	1.73	1.73	2030.00	5450.71	1261.13	1363.56	-1.37
*	16.328	2350.00	1873.19	1915.00	.66	3.67	2.27	2240.00	2471.46	482.32	1366.52	.00
*	16.328	2350.00	1915.00	1915.00	.00	2.99	.00	2240.00	2236.79	321.79	1367.35	.83
*	16.328	3995.00	1945.71	1915.00	.00	1.40	2.59	2240.00	5331.75	911.73	1363.89	-3.46
*	16.411	2350.00	1915.48	1885.00	.00	6.97	.00	2055.00	2051.77	136.29	1368.15	.00
*	16.411	2350.00	1912.68	1885.00	.00	6.71	.00	2055.00	2051.94	139.26	1368.25	.10
*	16.411	3995.00	1898.10	1885.00	.00	9.42	.00	2055.00	2052.81	154.71	1368.75	.51
*	16.504	2350.00	1628.55	1835.00	.96	4.06	.00	2035.00	2030.98	291.78	1370.58	.00
*	16.504	2350.00	1835.00	1835.00	.00	4.14	.00	2035.00	2030.99	195.99	1370.59	.01
*	16.504	3995.00	1625.51	1835.00	1.80	4.55	.00	2035.00	2034.43	307.40	1371.80	1.21
*	16.608	2350.00	1929.53	1910.00	.00	5.92	.00	2110.00	2091.70	162.17	1372.19	.00
*	16.608	2350.00	1929.44	1910.00	.00	5.83	.00	2110.00	2092.04	162.61	1372.23	.05
*	16.608	3995.00	1927.35	1910.00	.00	7.36	.00	2110.00	2099.63	172.28	1373.06	.82
*	16.732	2350.00	1955.62	1950.00	.00	7.57	.00	2115.00	2114.38	158.76	1377.75	.00
*	16.732	2350.00	1955.68	1950.00	.00	7.76	.00	2115.00	2110.00	154.31	1377.72	-.02
	16.732	3995.00	1954.62	1950.00	.00	6.88	3.39	2115.00	2910.75	739.57	1378.15	.42
*	16.818	2350.00	1945.20	1935.00	.00	4.61	2.36	2045.00	2226.00	280.80	1380.64	.00
*	16.818	2350.00	1942.85	1935.00	.00	6.05	.00	2045.00	2045.00	102.15	1380.95	.31
*	16.818	3995.00	1941.11	1935.00	.00	6.41	3.38	2045.00	2239.64	298.54	1381.20	.25

SUMMARY OF ERRORS AND SPECIAL NOTES

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WARNING SECNO=     8.731  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     8.731  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     8.731  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     8.883  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     8.883  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     8.883  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     9.009  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     9.009  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     9.009  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     9.129  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     9.129  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     9.318  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.318  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     9.318  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=     9.318  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.318  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     9.318  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=     9.318  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.318  PROFILE=  3  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     9.318  PROFILE=  3  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=     9.492  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     9.492  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     9.692  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     9.692  PROFILE=  2  MINIMUM SPECIFIC ENERGY

WARNING SECNO=     9.889  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     9.889  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     9.953  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=    10.096  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=    10.271  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=    10.443  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    10.443  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    10.443  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    10.443  PROFILE=  3  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    10.443  PROFILE=  3  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=    10.612  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
CAUTION SECNO=    10.612  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    10.612  PROFILE=  3  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=    10.612  PROFILE=  3  20 TRIALS ATTEMPTED TO BALANCE WSEL
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WARNING SECNO=    10.803  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=    10.933  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    10.933  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    10.933  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=    10.934  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    10.934  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=    10.936  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    10.936  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
CAUTION SECNO=    10.936  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    10.936  PROFILE=  3  MINIMUM SPECIFIC ENERGY

WARNING SECNO=    11.005  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    11.005  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    11.005  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=    11.129  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    11.129  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=    11.129  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=    11.301  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
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WARNING SECNO=     11.301  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.301  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     11.386  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     11.386  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     11.386  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     11.386  PROFILE=  2  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     11.386  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     11.386  PROFILE=  3  MINIMUM SPECIFIC ENERGY

WARNING SECNO=     11.481  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.481  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.481  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     11.566  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.566  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.566  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     11.759  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     11.759  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     11.759  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=     11.759  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     11.759  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     11.759  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL
WARNING SECNO=     11.759  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     11.949  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     11.949  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     12.511  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
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WARNING SECNO=     12.701  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     12.896  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     12.896  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     12.896  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     13.076  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     13.076  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     13.076  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     13.227  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     13.227  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     13.420  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     13.420  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     13.420  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=     13.420  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     13.420  PROFILE=  2  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     13.420  PROFILE=  2  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION SECNO=     13.420  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     13.420  PROFILE=  3  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     13.420  PROFILE=  3  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=     13.619  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     13.619  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
CAUTION SECNO=     13.619  PROFILE=  3  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     13.619  PROFILE=  3  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     13.619  PROFILE=  3  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO=     13.818  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     13.818  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     13.818  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     13.818  PROFILE=  2  MINIMUM SPECIFIC ENERGY
WARNING SECNO=     13.818  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     14.013  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     14.013  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     14.013  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     14.197  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     14.197  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=     14.945  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=     14.945  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
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   11JUL95      19:13:06                                                    PAGE  140

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CAUTION SECNO=     16.066  PROFILE=  2  MINIMUM SPECIFIC ENERGY
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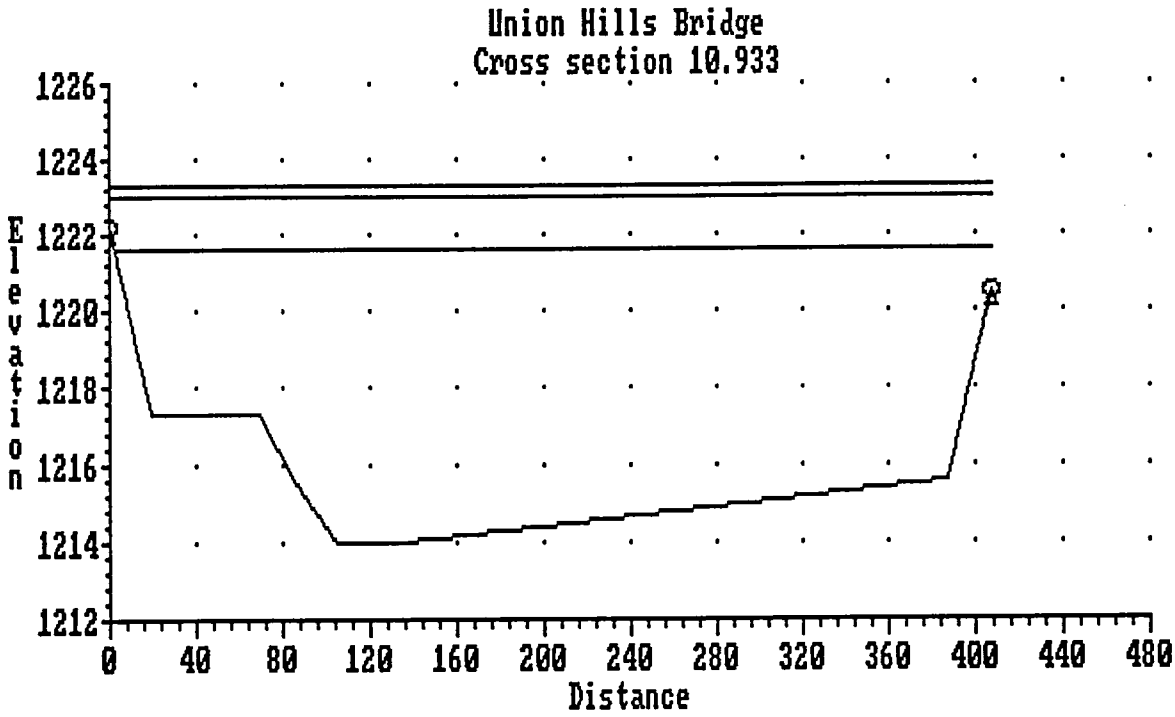
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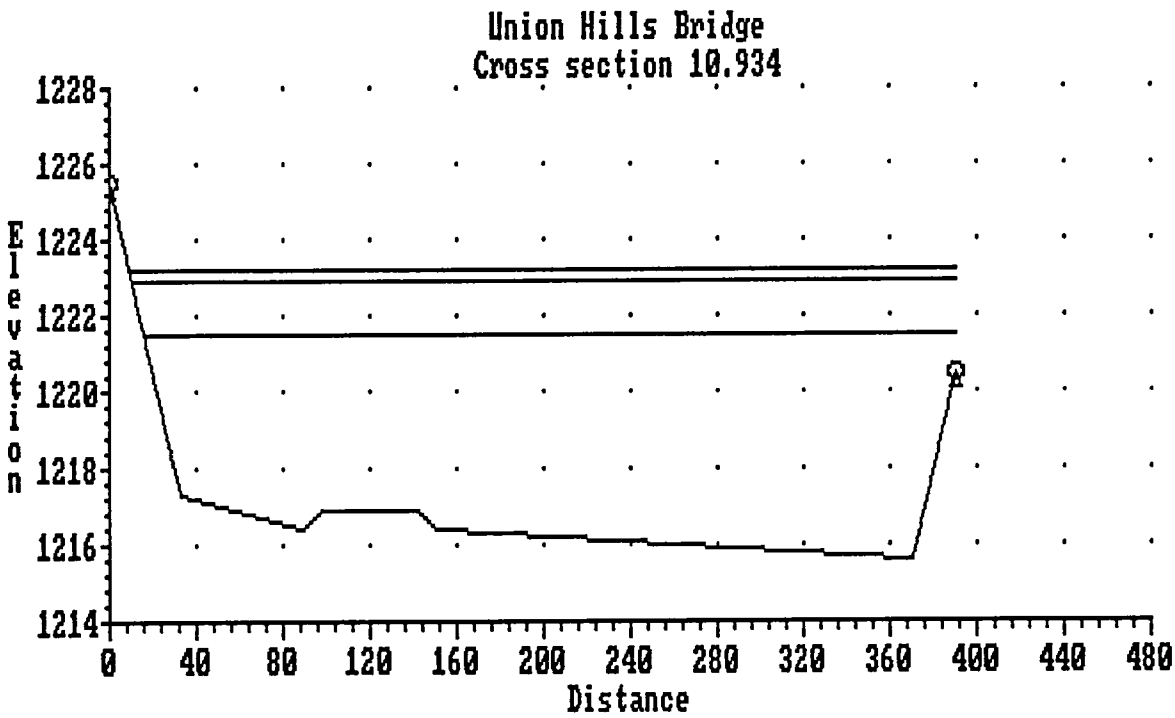
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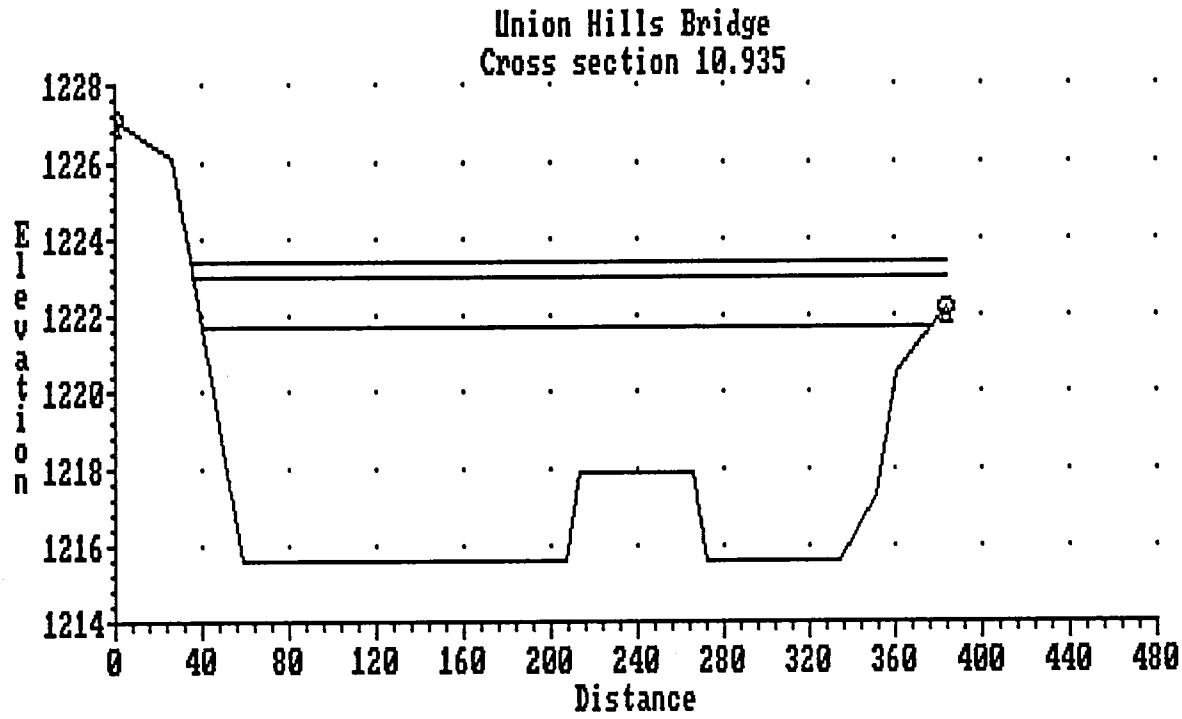
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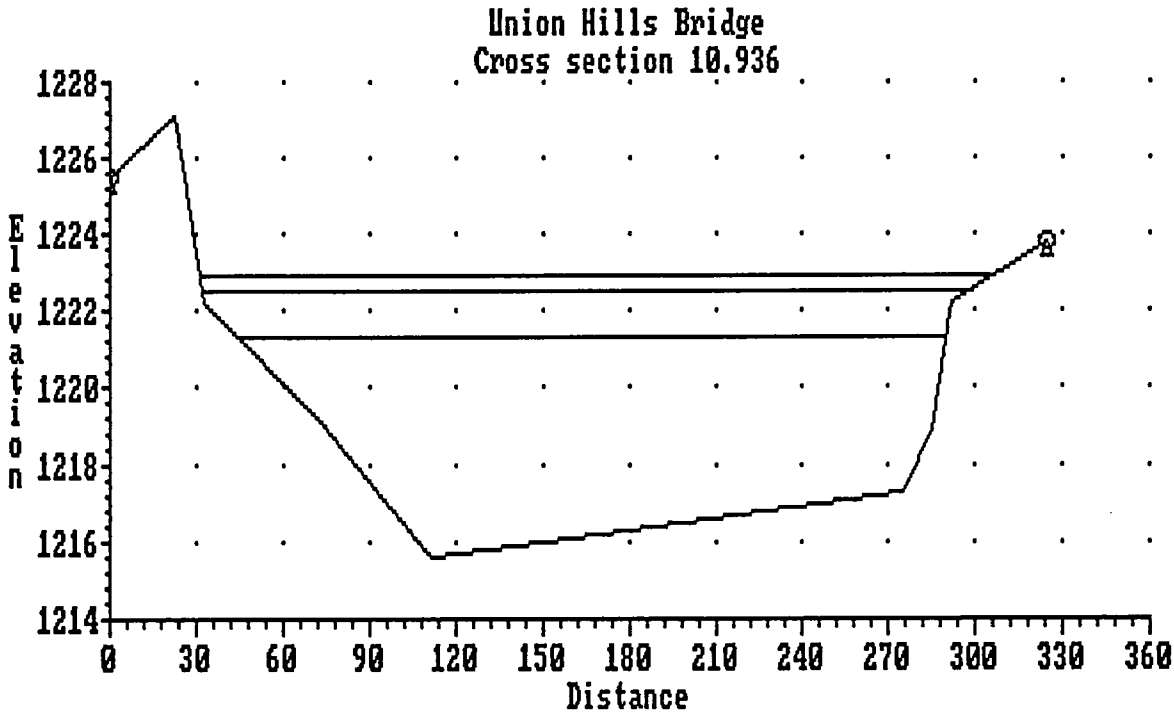
Distance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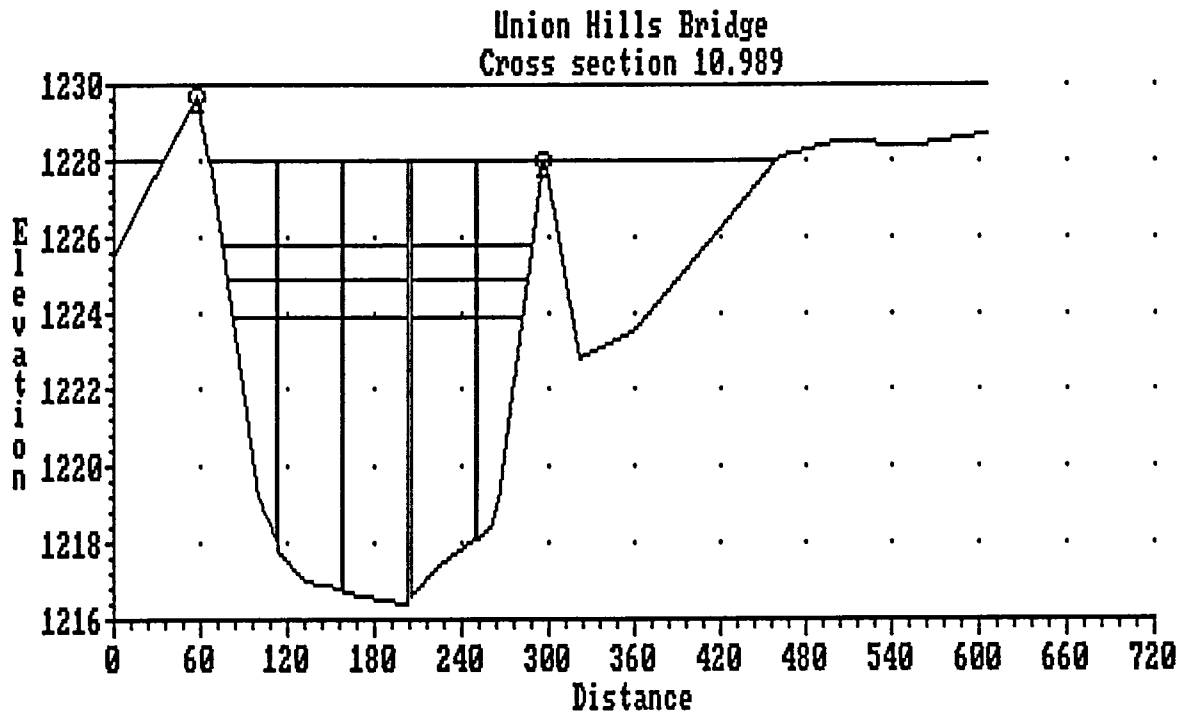
300
330
360
Distance


Union Hills Bridge
Cross section 10.989
Elevation
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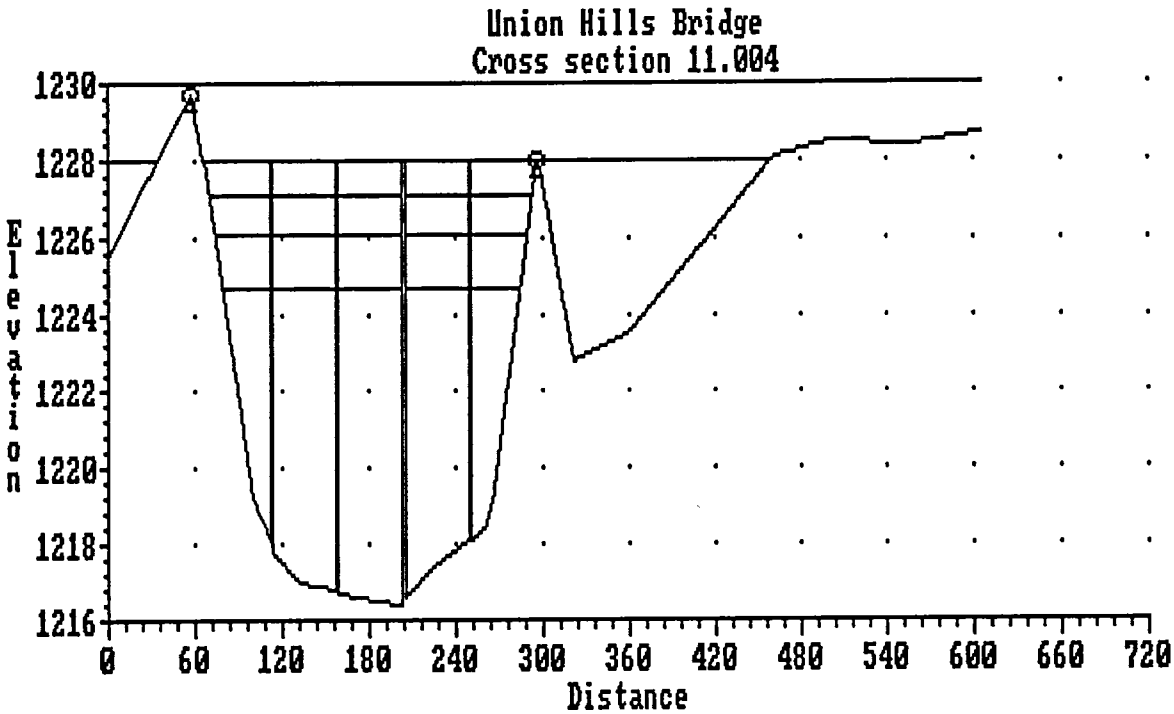
600
660
720
Distance


Union Hills Bridge
Cross section 11.004
Elevation
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1228
1226
1224
1222
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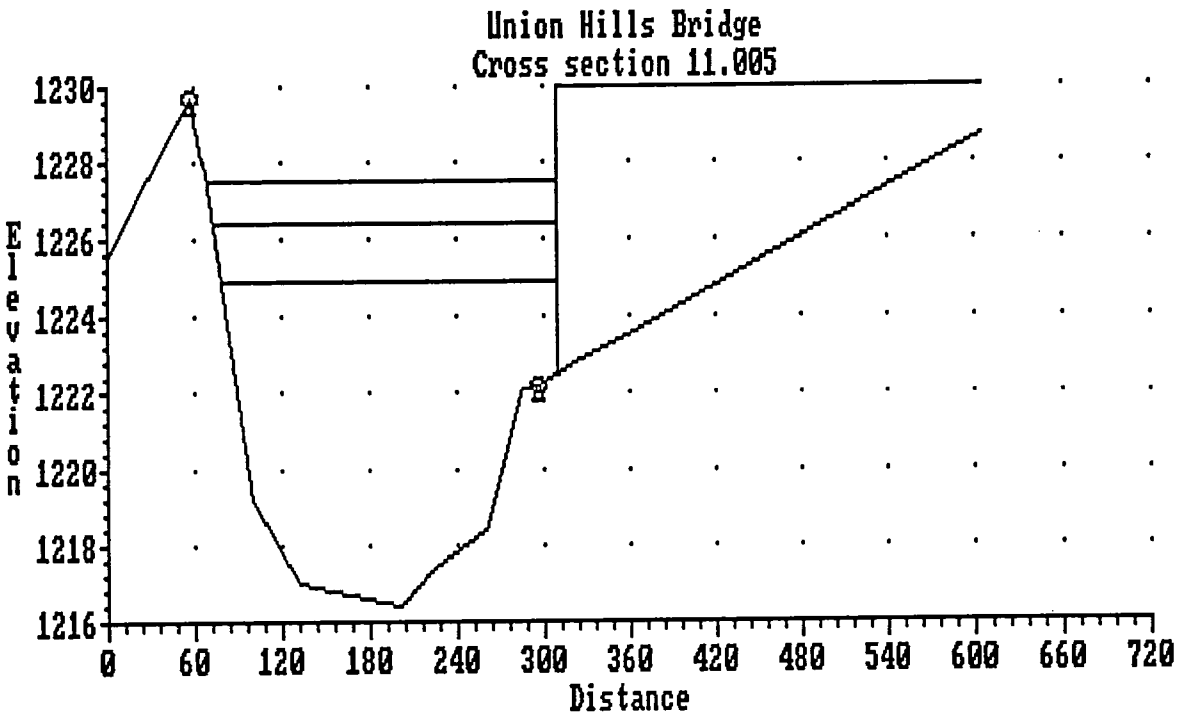
600
660
720
Distance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Elevation
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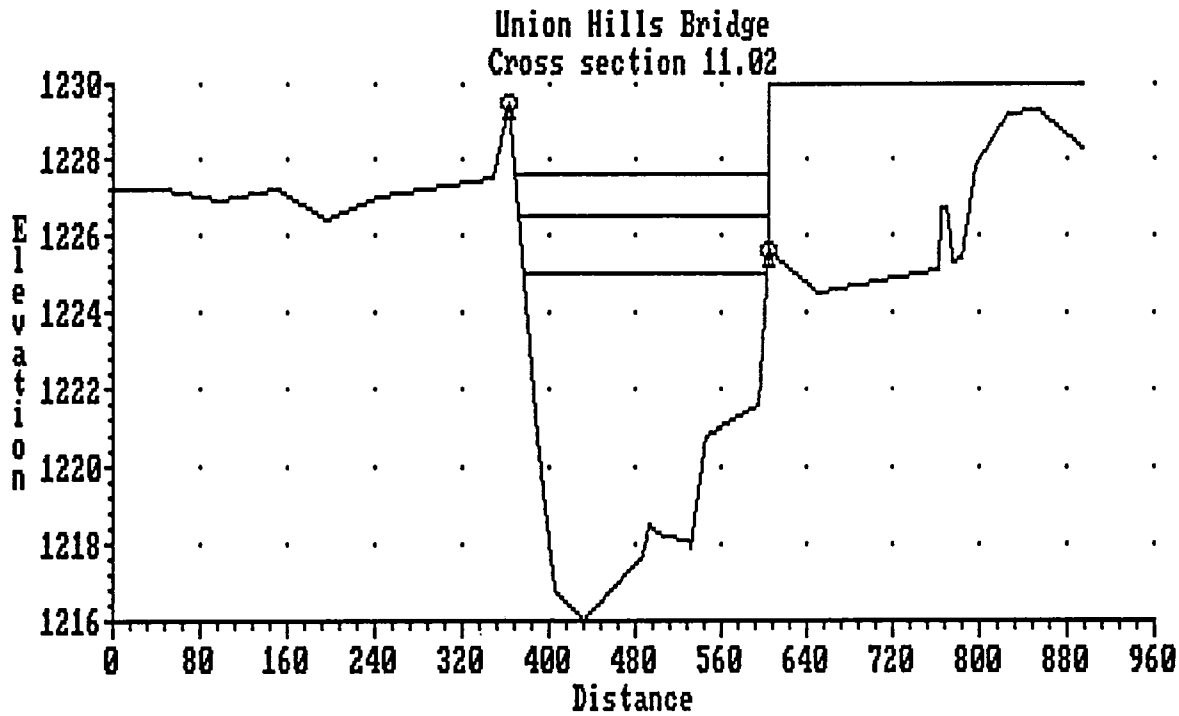
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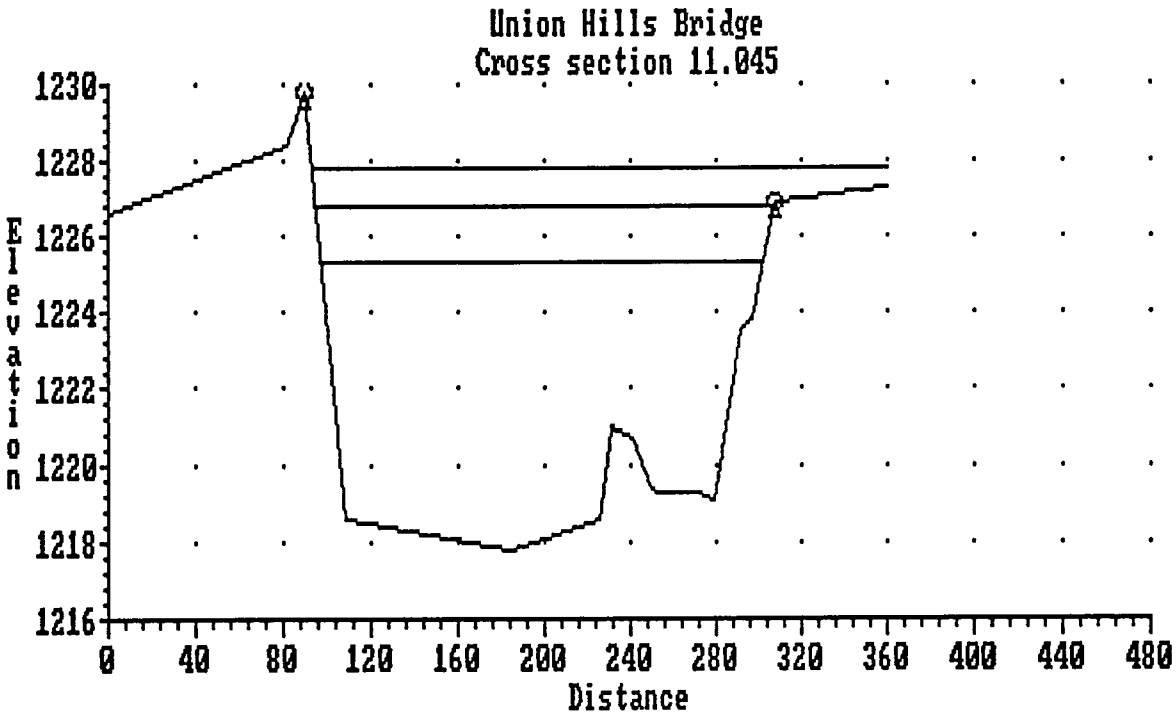
720
800
880
960
Distance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Elevation
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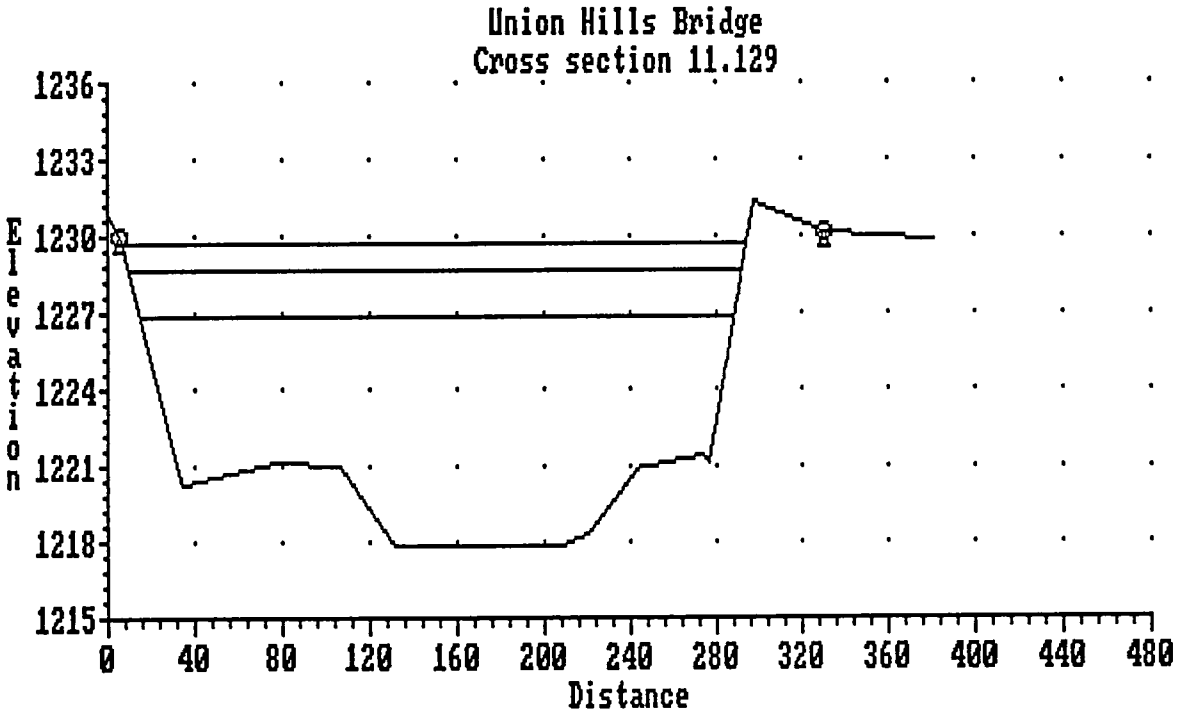
Distance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Cross section 11.129
Elevation
1236
1233
1230
1227
1224
1221
1218
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200
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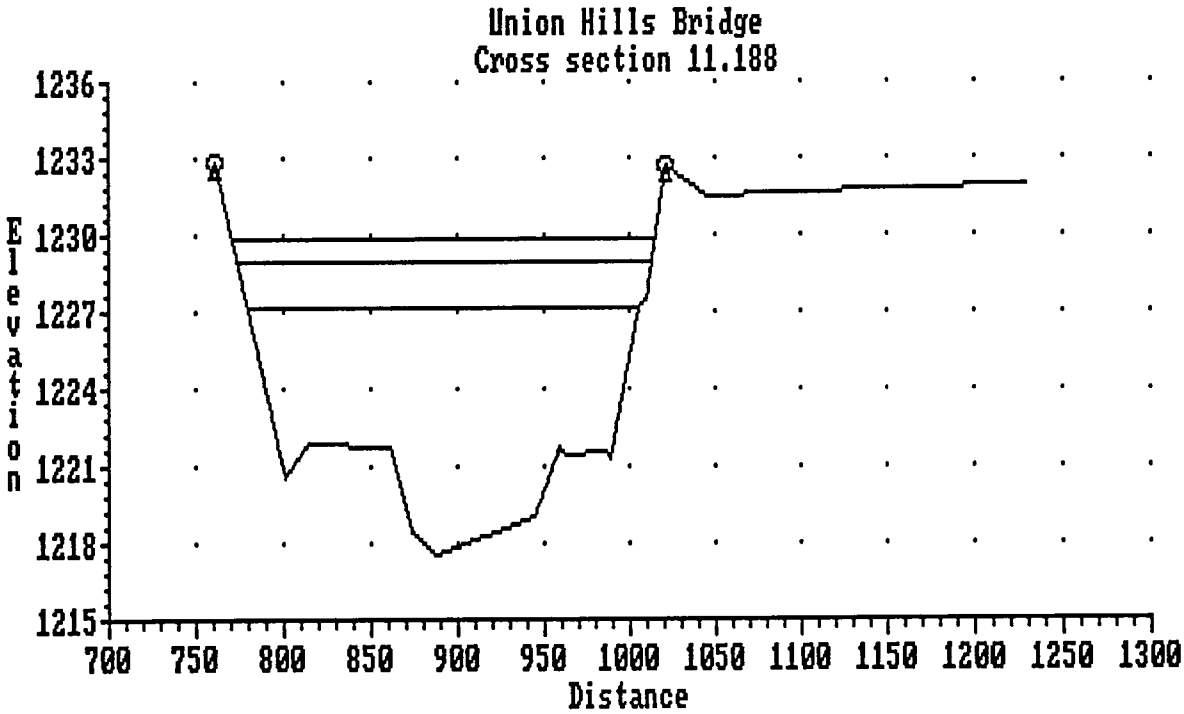
280
320
360
400
440
480
Distance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Cross section 11.188
Elevation
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1233
1230
1227
1224
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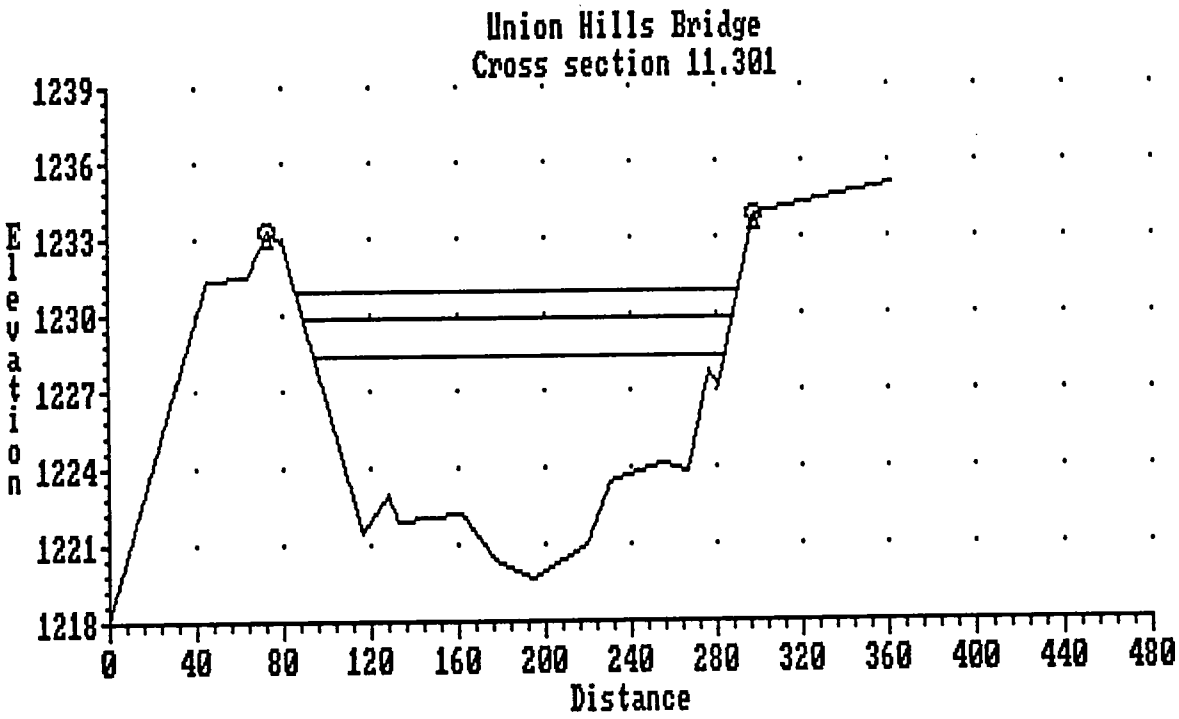
850
900
950
1000
1050
1100
1150
1200
1250
1300
Distance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Cross section 11.301
Elevation
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1236
1233
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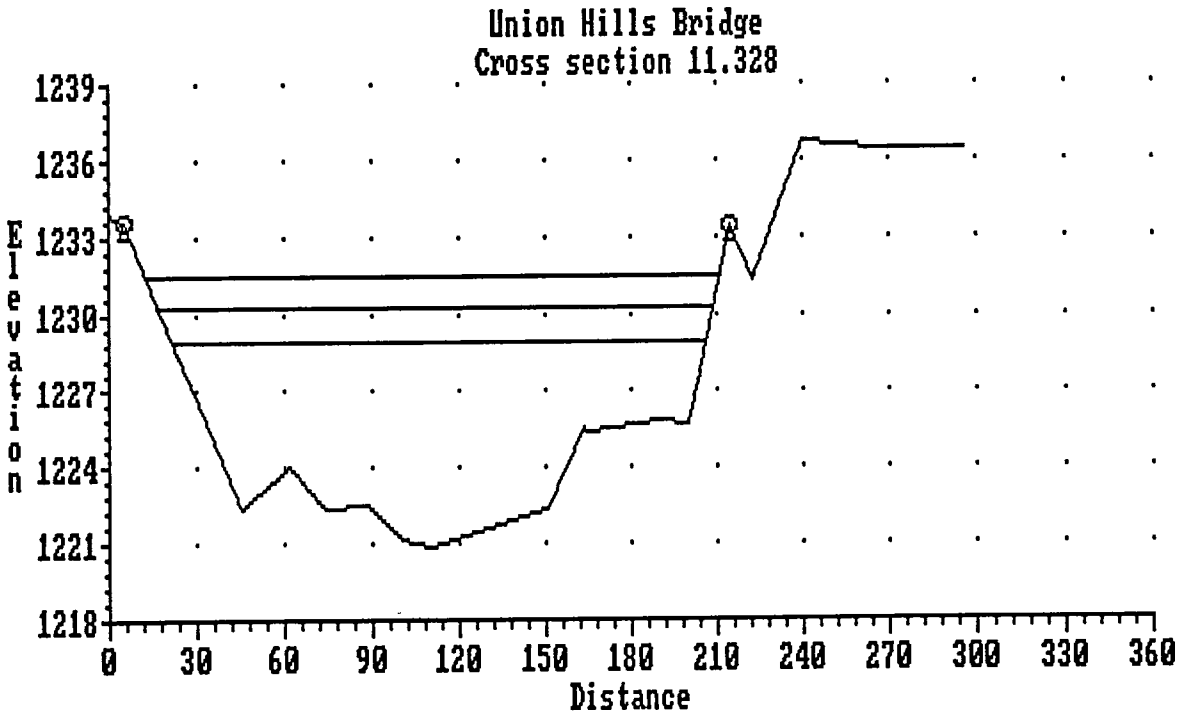
Distance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Cross section 11.328
Elevation
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1236
1233
1230
1227
1224
1221
1218
0
30
60
90
120
150
180
210
240
270
300
330
360
Distance

APPENDIX D

Hydrology

MARICOPA COUNTY RATIONAL EQUATION METHOD

Concentration Point: CB-1 & 2

5/11/95

Basin Characteristics				
	L=	250	feet	Sta. 1+140 to1+420
	A=	0.19	Acres	
	S=	0.32%		
	C=	0.8		From FCDMC Hydraulics Manual Pg. 11
	P=	2.6	inches	100-yr, 2-hr depth - Hydrology Man. p. 3.8
Special Parameters				
	m=	-0.01375		From FCDMC Hydrology Manual Pg. 3.3
	b=	0.08		From FCDMC Hydrology Manual Pg. 3.3
	ip (2-yr) =	3	in/ hr	From Fig. 3.2 FCDMC Manual
	ip (10-yr) =	3.57	in/ hr	From Fig. 3.2 FCDMC Manual
	P^6 10=	2.00	inches	NOAA Atlas, 10-Year 6-Hour Depth

2-YEAR EVENT

i=	ip(P^6 10)/2.07 =	2.90	in/ hr
Kb=	m(log A) + b =	0.090	
Tc=	11.4(L^0.5)(Kb^0.52)(S^-0.31)(i^-0.38) =	0.20	hours
		11.9	minutes
V (100-yr, 2-hr) =	C(P/12)A =	0.03	acre feet
Q peak =	CiA =	0.45	cfs

10-YEAR EVENT

i=	ip(P^6 10)/2.07 =	3.45	in/ hr
Kb=	m(log A) + b =	0.090	
Tc=	11.4(L^0.5)(Kb^0.52)(S^-0.31)(i^-0.38) =	0.18	hours
		11.1	minutes
V (100-yr, 2-hr) =	C(P/12)A =	0.03	acre feet
Q peak =	CiA =	0.54	cfs

COMMENTS:

This spreadsheet calculates the peak flow rates (2 & 10-yr) and volume for the paved area of Union Hills Drive from a high point west of the intersection to the curb return on the west of the intersection. Includes the eastbound and westbound lanes. Runoff flows easterly to catch basins CB-1 and CB-2.

HD/FILE:RATIONAL.XLS

MARICOPA COUNTY RATIONAL EQUATION METHOD

Concentration Point: CB-~~2~~3 & CB-~~3~~4

5/11/95

Basin Characteristics				
	L =	295	feet	Sta. 1+010 to 1+100
	A =	0.23	Acres	
	S =	1.43%		
	C =	0.8		From FCDMC Hydraulics Manual Pg. 11
	P =	2.6	inches	100-yr, 2-hr depth - Hydrology Man. p. 3.8
Special Parameters				
	m =	-0.01375		From FCDMC Hydrology Manual Pg. 3.3
	b =	0.08		From FCDMC Hydrology Manual Pg. 3.3
	ip (2-yr) =	3.52	in/ hr	From Fig. 3.2 FCDMC Manual
	ip (10-yr) =	4.70	in/ hr	From Fig. 3.2 FCDMC Manual
	P^6 10 =	2.00	inches	NOAA Atlas, 10-Year 6-Hour Depth

2-YEAR EVENT

i =	ip(P^6 10)/2.07 =	3.40	in/ hr
Kb =	m(log A) + b =	0.089	
Tc =	11.4(L^0.5)(Kb^0.52)(S^-0.31)(i^-0.38) =	0.13	hours
		7.5	minutes
V (100-yr, 2-hr) =	C(P/12)A =	0.04	acre feet
Q peak =	CiA =	0.62	cfs

10-YEAR EVENT

i =	ip(P^6 10)/2.07 =	4.54	in/ hr
Kb =	m(log A) + b =	0.089	
Tc =	11.4(L^0.5)(Kb^0.52)(S^-0.31)(i^-0.38) =	0.11	hours
		6.8	minutes
V (100-yr, 2-hr) =	C(P/12)A =	0.04	acre feet
Q peak =	CiA =	0.83	cfs

COMMENTS:

This spreadsheet calculates the peak flow rates (2 & 10-yr) and volume for the paved area of Union Hills Drive from the mid-point of the bridge east of the intersection to the intersection. Includes the eastbound and westbound lanes. Runoff flows westerly to catch basins CB-2 and CB-3.

HDR\FILE:RATIONAL.XLS

MARICOPA COUNTY RATIONAL EQUATION METHOD

Concentration Point: CB-~~4~~5 & CB-~~5~~6

5/11/95

Basin Characteristics				
	L=	606	feet	Sta. 1+140 to1+420
	A=	0.82	Acres	
	S=	1.74%		
	C=	0.8		From FCDMC Hydraulics Manual Pg. 11
	P=	2.6	inches	100-yr, 2-hr depth - Hydrology Man. p. 3.8
Special Parameters				
	m=	-0.01375		From FCDMC Hydrology Manual Pg. 3.3
	b=	0.08		From FCDMC Hydrology Manual Pg. 3.3
	ip (2-yr) =	2.6	in/ hr	From Fig. 3.2 FCDMC Manual
	ip (10-yr) =	4.20	in/ hr	From Fig. 3.2 FCDMC Manual
	P^6 10=	2.00	inches	NOAA Atlas, 10-Year 6-Hour Depth

2-YEAR EVENT

i=	ip(P^6 10)/2.07 =	2.51	in/ hr
Kb=	m(log A) + b =	0.081	
Tc=	11.4(L^0.5)(Kb^0.52)(S^-0.31)(i^-0.38) =	0.18	hours
		10.9	minutes
V (100-yr, 2-hr) =	C(P/12)A =	0.14	acre feet
Q peak =	CiA =	1.65	cfs

10-YEAR EVENT

i=	ip(P^6 10)/2.07 =	4.06	in/ hr
Kb=	m(log A) + b =	0.081	
Tc=	11.4(L^0.5)(Kb^0.52)(S^-0.31)(i^-0.38) =	0.15	hours
		9.1	minutes
V (100-yr, 2-hr) =	C(P/12)A =	0.14	acre feet
Q peak =	CiA =	2.66	cfs

COMMENTS:

This spreadsheet calculates the peak flow rates (2 & 10-yr) and volume for the paved area of Union Hills Drive from the east end of the bridge to a sag east of the bridge. Includes the eastbound and westbound lanes. Runoff flows easterly to catch basins CB-4 and CB-5. The other half of the drainage area is from the sag to the intersection with Loop 101.

HDFILE:RATIONAL.XLS

MARICOPA COUNTY RATIONAL EQUATION METHOD

Concentration Point: CB-~~6~~ 7 & CB-~~7~~ 8

5/11/95

Basin Characteristics				
	L=	131	feet	Sta. 1+140 to1+420
	A=	0.10	Acres	
	S=	1.30%		
	C=	0.8		From FCDMC Hydraulics Manual Pg. 11
	P=	2.6	inches	100-yr, 2-hr depth - Hydrology Man. p. 3.8
Special Parameters				
	m=	-0.01375		From FCDMC Hydrology Manual Pg. 3.3
	b=	0.08		From FCDMC Hydrology Manual Pg. 3.3
	ip (2-yr) =	4.1	in/ hr	From Fig. 3.2 FCDMC Manual
	ip (10-yr) =	5.10	in/ hr	From Fig. 3.2 FCDMC Manual
	P^6 10=	2.00	inches	NOAA Atlas, 10-Year 6-Hour Depth

2-YEAR EVENT

i=	ip(P^6 10)/2.07 =	3.96	in/ hr
Kb=	m(log A) + b =	0.094	
Tc=	11.4(L^0.5)(Kb^0.52)(S^-0.31)(i^-0.38) =	0.08	hours
		5.0	minutes
V (100-yr, 2-hr) =	C(P/12)A =	0.02	acre feet
Q peak =	CiA =	0.32	cfs

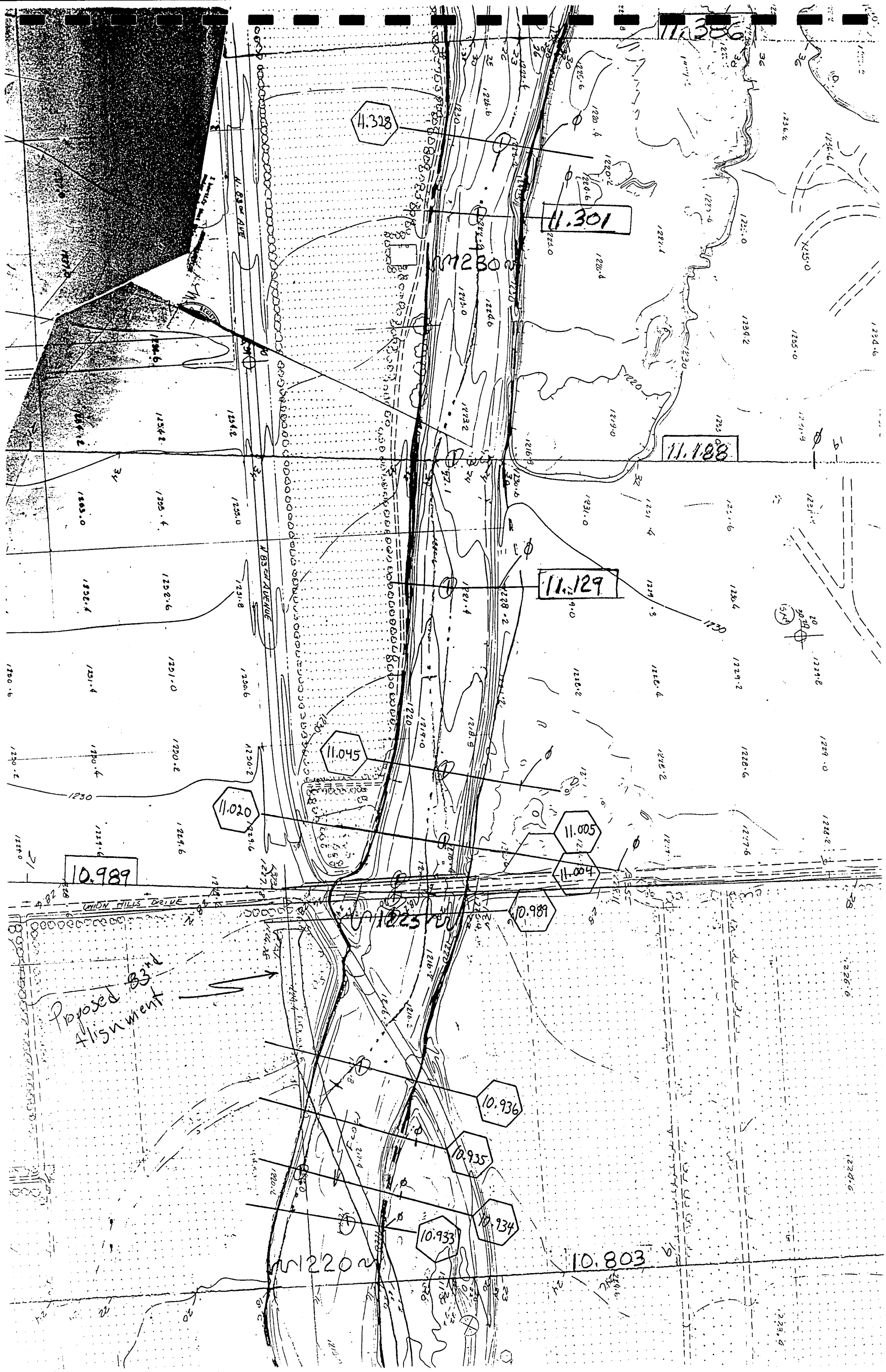
10-YEAR EVENT

i=	ip(P^6 10)/2.07 =	4.93	in/ hr
Kb=	m(log A) + b =	0.094	
Tc=	11.4(L^0.5)(Kb^0.52)(S^-0.31)(i^-0.38) =	0.08	hours
		4.6	minutes
V (100-yr, 2-hr) =	C(P/12)A =	0.02	acre feet
Q peak =	CiA =	0.40	cfs

COMMENTS:

This spreadsheet calculates the peak flow rates (2 & 10-yr) and volume for the paved area of Union Hills Drive from the mid-point of the bridge to the east end of the bridge. Includes the eastbound and westbound lanes. Runoff flows easterly to catch basins CB-6 and CB-7.

HDRFILE:RATIONAL.XLS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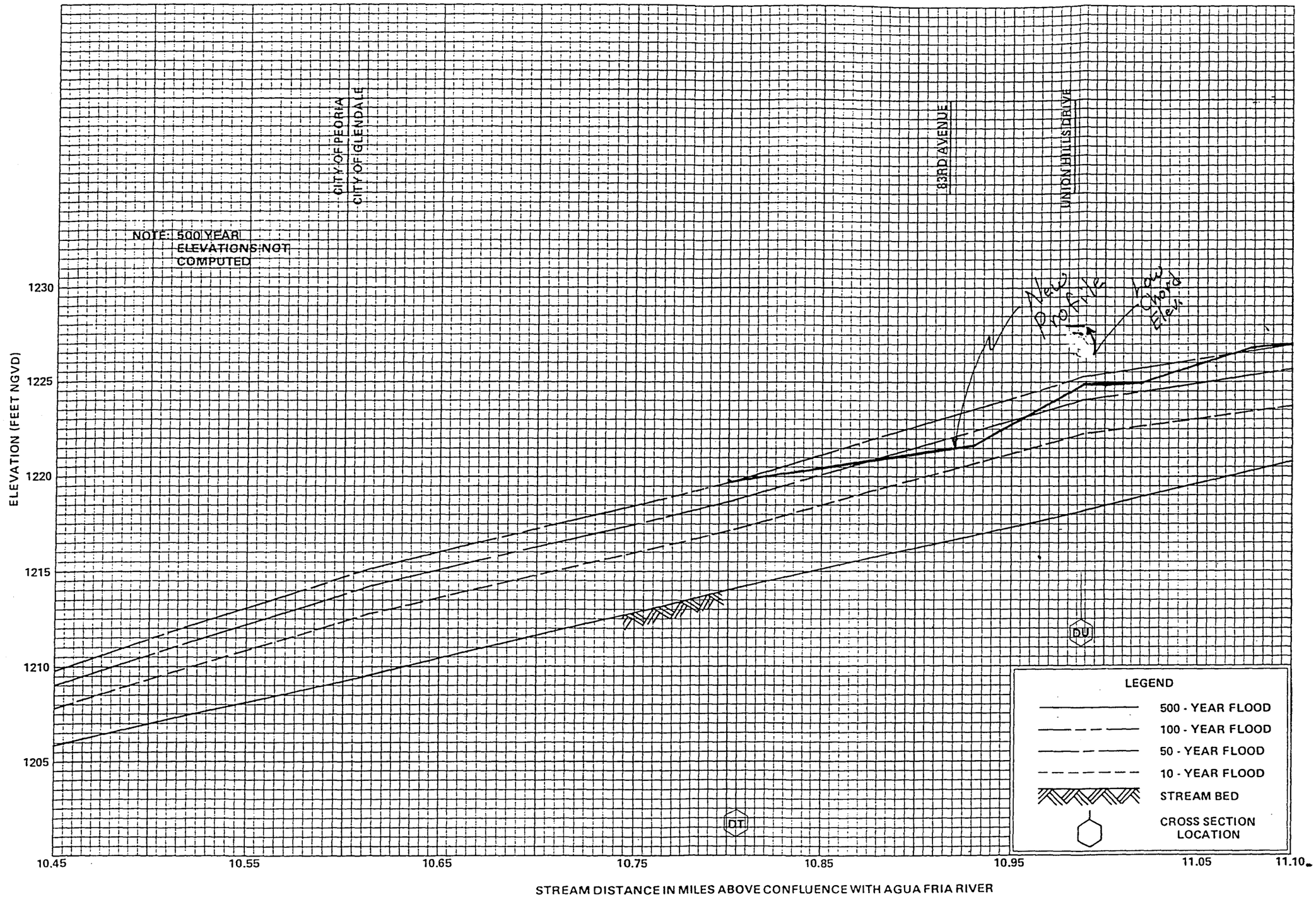
10.933
10.803
N 83rd AVENUE
UNION HILLS DRIVE
Proposed 83rd Alignment

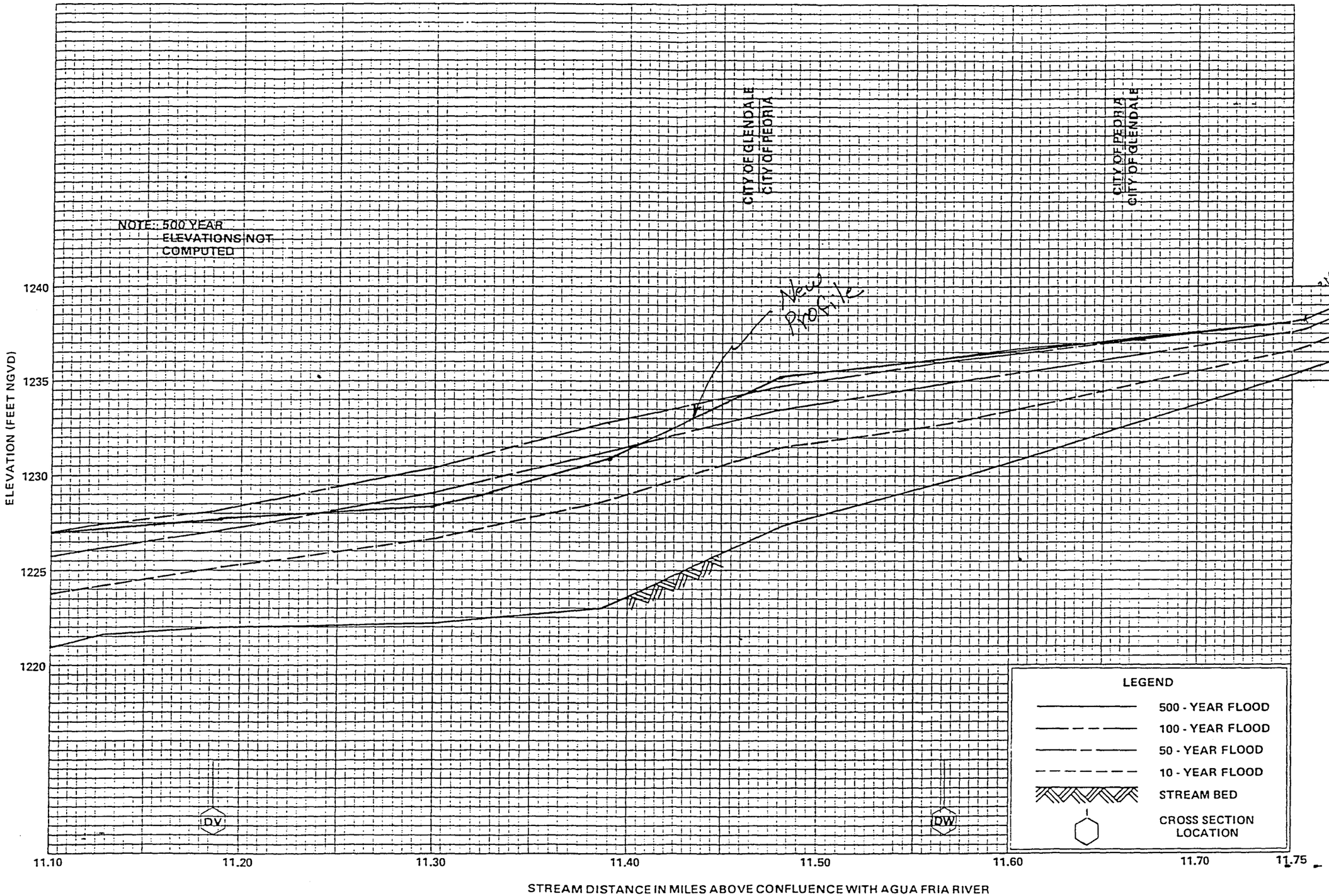


FLOOD PROFILES

NEW RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS



FLOOD PROFILES

NEW RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

APPENDIX E

Storm Drain Hydraulics (HEC-12)

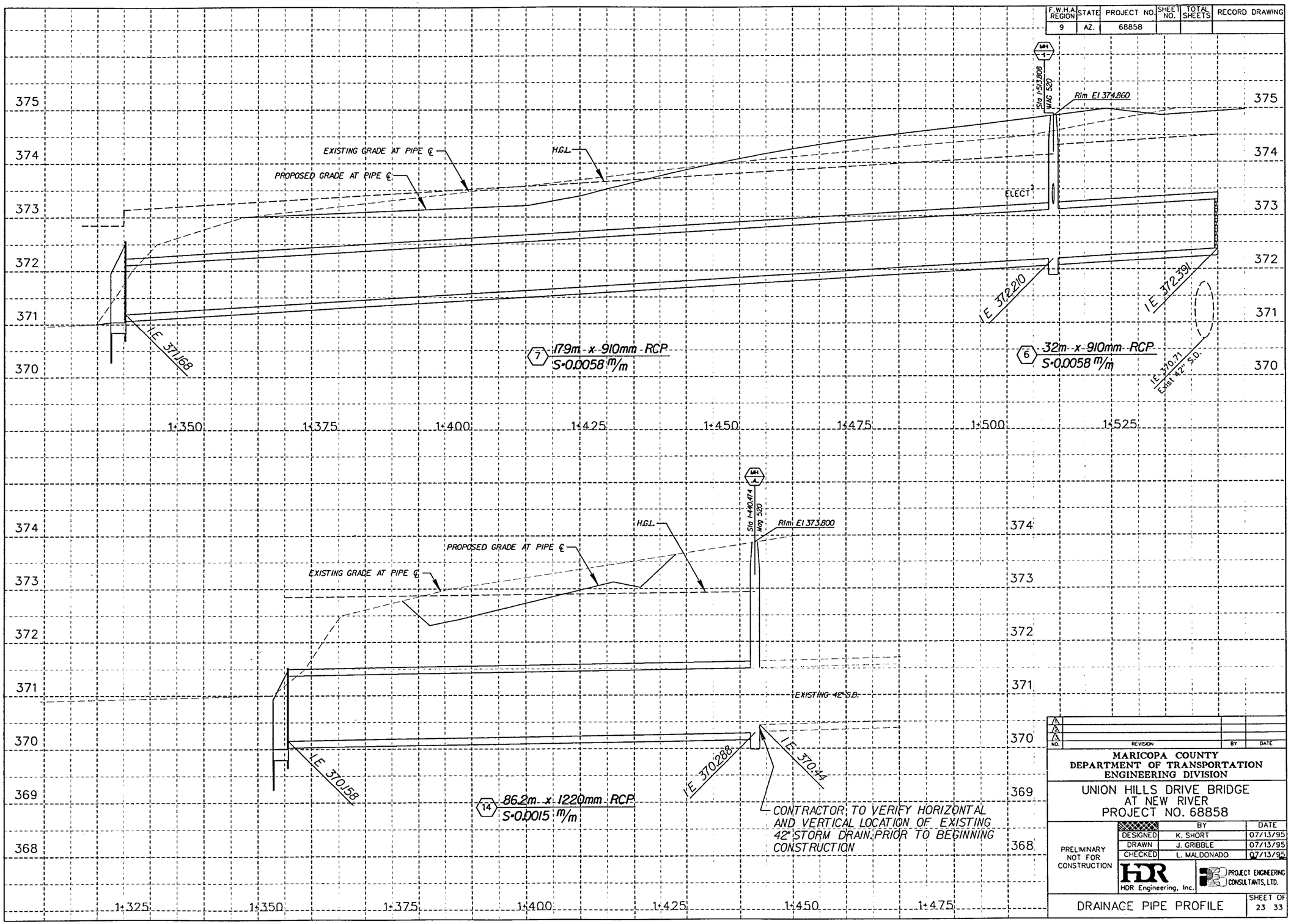
Licensed to: HDR Engineering, Phoenix, AZ 85016
Project : Union Hills Bridge

```
Sta 1+022+/-                                    INPUT
Intens.= 4.54 C1=0.80  A1= 0.23 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.50 Area  = 4.64
CB ID  = 3,4  C2=0.00  A2= 0.00 Qrunoff=  0.8    Slope2= 0.0200 a     = 0.00 Perim = 7.20
Grt P-1-7/8   C3=0.00  A3= 0.00 Grade  =  0.0143 Slope3= 0.0200 W     = 0.00 Length= 6.66
.......................................................................................
                                                OUTPUT
Flowby=  0.0 Qtotal=  0.8 Qint=  0.8 Flowby dn=  0.1 Depth=0.12 Spread=  6.00 Veloc= 2.32
---------------------------------------------------------------------------------------
Sta 0+972+/-                                    INPUT
Intens.= 3.45 C1=0.80  A1= 0.19 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.50 Area  = 4.64
CB ID  = 1,2  C2=0.00  A2= 0.00 Qrunoff=  0.5    Slope2= 0.0200 a     = 0.00 Perim = 3.90
Grt P-1-7/8   C3=0.00  A3= 0.00 Grade  =  0.0000 Slope3= 0.0200 W     = 0.00 Length= 3.33
.......................................................................................
                                                OUTPUT
Flowby=  0.1 Qtotal=  0.6 Qint=  0.6 Flowby dn=  0.0 Depth=0.09 Spread=  4.48 Veloc= 0.00
---------------------------------------------------------------------------------------
Sta 1+140+/-                                    INPUT
Intens.= 4.93 C1=0.80  A1= 0.10 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.50 Area  = 2.32
CB ID  = 7,8  C2=0.00  A2= 0.00 Qrunoff=  0.4    Slope2= 0.0200 a     = 0.00 Perim = 3.90
Grt P-1-7/8   C3=0.00  A3= 0.00 Grade  =  0.0130 Slope3= 0.0200 W     = 0.00 Length= 3.33
.......................................................................................
                                                OUTPUT
Flowby=  0.0 Qtotal=  0.4 Qint=  0.3 Flowby dn=  0.1 Depth=0.09 Spread=  4.65 Veloc= 1.87
---------------------------------------------------------------------------------------
Sta 1+245+/-                                    INPUT
Intens.= 4.06 C1=0.80  A1= 0.82 Qadd   =  0.0    Slope1= 6.0000 Gutter= 1.50 Area  = 9.28
CB ID  = 5,6  C2=0.00  A2= 0.00 Qrunoff=  2.7    Slope2= 0.0200 a     = 0.00 Perim = 7.20
Grt P-1-7/8   C3=0.00  A3= 0.00 Grade  =  0.0000 Slope3= 0.0200 W     = 0.00 Length= 6.66
.......................................................................................
                                                OUTPUT
Flowby=  0.1 Qtotal=  2.8 Qint=  2.8 Flowby dn=  0.0 Depth=0.16 Spread=  8.06 Veloc= 0.00
---------------------------------------------------------------------------------------
                                          CRITERIA
Runoff computed by Rational Method   Manning's n Gutter=0.014  Manning's n Pavement=0.016
Clogging Factors in Sag Location:
----- Curb Opening= 0.80 Grate= 0.50 Slotted Drain= 0.80 Comb-Curb= 0.65 Comb-Grate= 0.65
Clogging Factors on Continuous Grade:
----- Curb Opening= 0.80 Grate= 0.60 Slotted Drain= 0.80 Comb-Curb= 0.80 Comb-Grate= 0.50
---------------------------------------------------------------------------------------
Prepared by:         Date:07/06/95    Time:10:40:20     Checked by:        Date:
```

APPENDIX F

Storm Drain Profiles & Worksheets

F.W.H.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ.	68858			



NO.	REVISION	BY	DATE
1			
2			
3			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

UNION HILLS DRIVE BRIDGE
AT NEW RIVER
PROJECT NO. 68858

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	K. SHORT	07/13/95
DRAWN	J. GRIBBLE	07/13/95
CHECKED	L. MALDONADO	07/13/95

HDR Engineering, Inc.

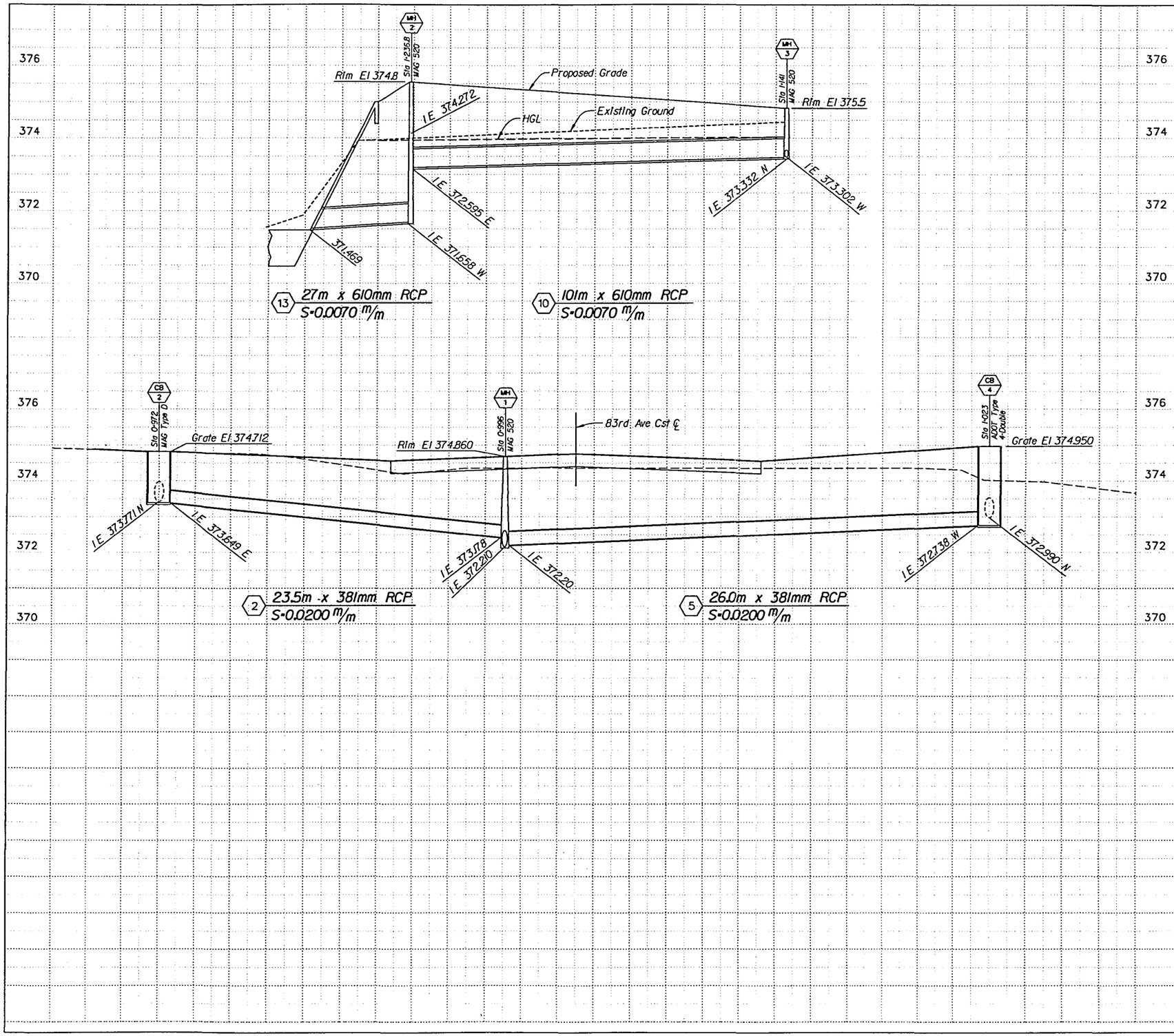
PROJECT ENGINEERING CONSULTANTS, LTD.

DRAINACE PIPE PROFILE

SHEET 23 OF 33

FILE: d:\unhills\68858b.dgn
DATE: 19-May-95 14:36

c:/dgn/drainpp.dgn Jul. 13, 1995 09:35:43



F.W.H.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ.	68858			

☐ REMOVAL/RELOCATE ☐

NO.	REVISION	BY	DATE
1			
2			
3			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

UNION HILLS DRIVE BRIDGE
AT NEW RIVER
PROJECT NO. 68858

	BY	DATE
DESIGNED	M. HEATON	7/13/95
DRAWN	K. JACOBSON	7/13/95
CHECKED		

PRELIMINARY
NOT FOR
CONSTRUCTION

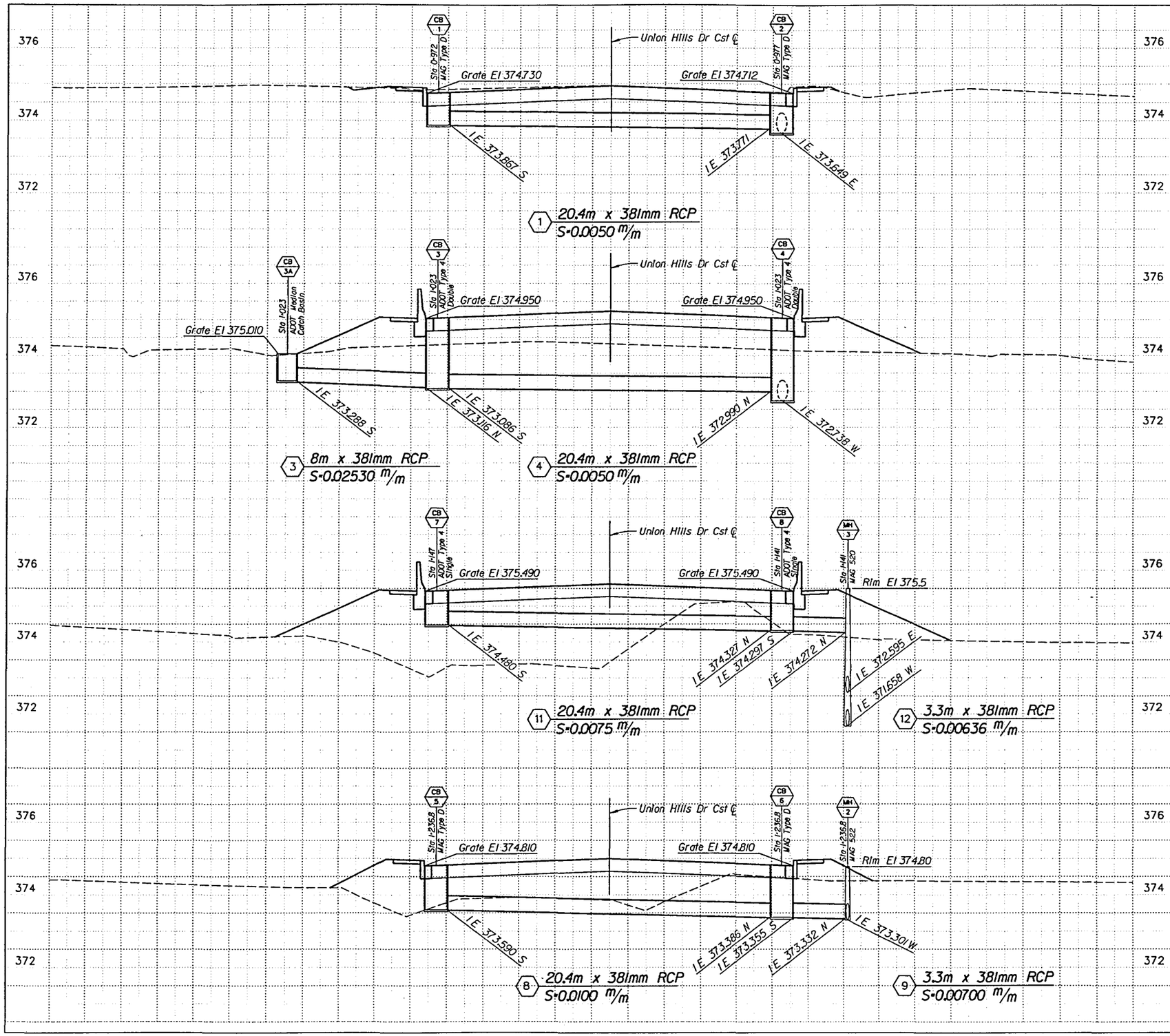
HDR Engineering, Inc.

DRAINAGE PIPE PROFILES

SHEET 24 OF 33

FILE: d:\unhills\drainpp.dgn
DATE: 1-Jun-95 17:16

c:/dgn/drainpp.dgn Jul. 13, 1995 09:38:16



F.W.H.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ.	68858			

☐ REMOVAL/RELOCATE ☐

NO.	REVISION	BY	DATE
1			
2			
3			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

UNION HILLS DRIVE BRIDGE
AT NEW RIVER
PROJECT NO. 68858

	BY	DATE
DESIGNED	M. HEATON	7/13/95
DRAWN	K. JACOBSON	7/13/95
CHECKED		

PRELIMINARY
NOT FOR
CONSTRUCTION

HDR Engineering, Inc.

DRAINAGE PIPE PROFILES

SHEET 25 OF 33

FILE: d:\unhills\drainpp.dgn
DATE: 11-Jun-95 17:16

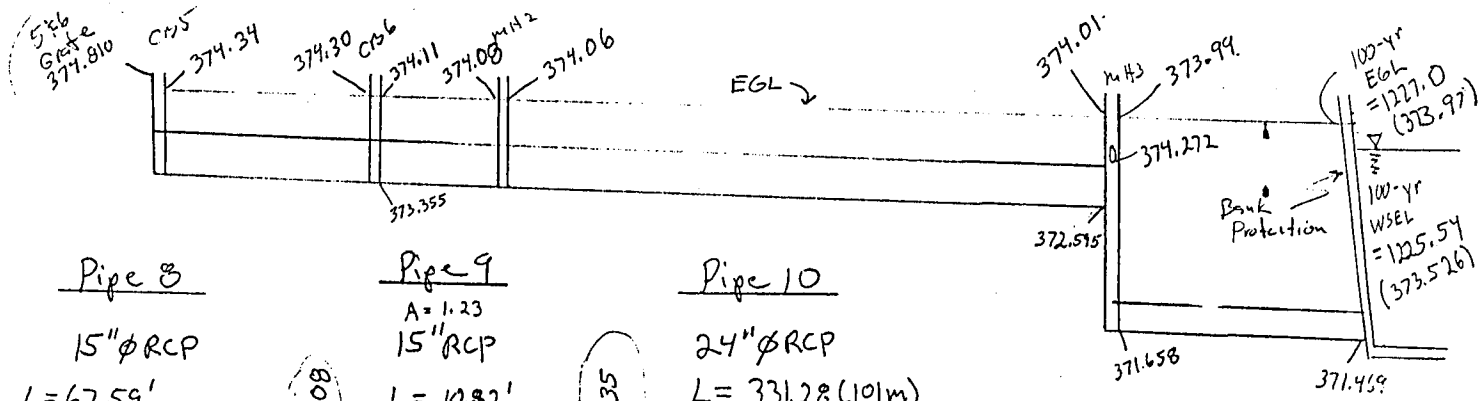
c:/dgn/drainpp.dgn Jul. 13, 1995 10:28:22

Computation

HDR

Project: Union Hills Bridge
Subject: Storm Drain East of Bridge
Task: Flow Calculations

Job No. | No. | Computed MDH | Date 6-95 | Checked | Date | Sheet 2 | Of



Pipe 8

15"ø RCP

$L = 67.59'$

$Q = 2.8$

$S = 0.0106$

$V = 2.28$ fps

$\frac{V^2}{2g} = 0.080$

$h_f = .030\left(\frac{67.59}{1.25}\right)0.08$

$= .130$

$US_{EGL} = 1228.21$

CB6 $h_L = 2(0.323) = 0.646'$ (Fig 4.9) EGL = 1228.08

Full Pipe Design

Pipe 9

A = 1.23

15" RCP

$L = 10.82'$

$Q = 5.6$

$S = 0.0070$

$V = 4.56$ f/s

$\frac{V^2}{2g} = 0.323$

$h_f = .032\left(\frac{10.82}{1.25}\right).323$

$= 0.089$

$US_{EGL} = 1227.44$

MH2 $h_L = (1.04 * 0.049 = 0.051')$ Fig 4.13 EGL = 1227.35

Pipe 10

24"ø RCP

$L = 331.28$ (101m)

$Q = 5.6$

$S = 0.0070$

$V = 1.78$ fps

$\frac{V^2}{2g} = 0.049$

$h_f = .022\left(\frac{331.28}{2}\right).049$

$h_f = 0.178$

$US_{EGL} = 1227.12 + 0.18$

$= 1227.30$

MH3 $h_L = 0.06$ ($K_L \times M_L$ Fig 4.13) EGL = 1227.12

Pipe 13

24"ø pipe

$L = 88.59'$ (27m)

$Q = 6.2$

$S = 0.0070$

$V = 1.97$ fps

$\frac{V^2}{2g} = 0.06'$

$h_f = f\frac{L}{D}\frac{V^2}{2g} = .025\left(\frac{88.59}{2}\right)(0.06)$

$h_f = 0.058$

$US_{EGL} = 100yr\ EGL + h_f$

$= 1227.00 + 0.058 = 1227.06$

(figures refer to FCDMC Hydraulics Manual)

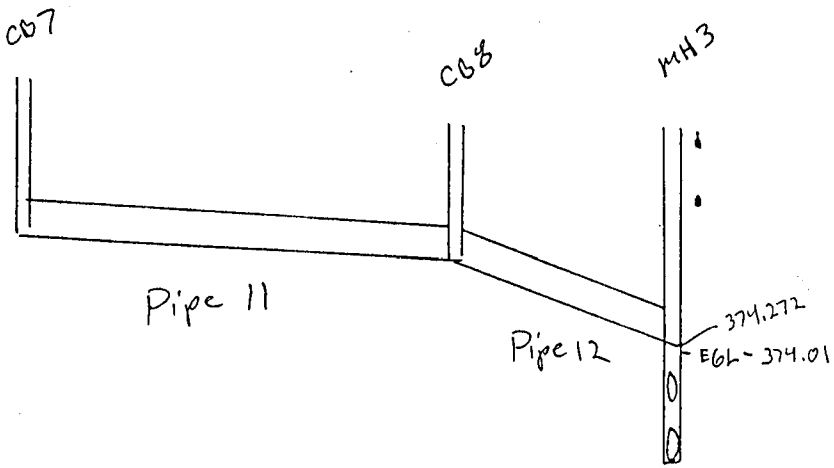
Partially Full Pipe Design

	Pipe 8	Pipe 9	Pipe 10	Pipe 13
V	5.08 fps	5.0	5.25	5.39
d	0.58 ft	1.07	0.75'	0.79

Computation

HDR

Job No.	
No.	
Project	Union Hills Bridge
Subject	Storm Drain East of Bridge
Task	Flow Calculations
Computed	MDH
Date	6-95
Checked	
Date	
Sheet	2
Of	2



* Pipes 11 & 12 Not affected by New River Tailwater
Flow is open channel - Non-Pressure

Pipe 11

15" ø RCP
L = 66.93'
Q = 0.3 cfs
S = 0.0075 ft/ft
V = 2.43 fps*
$\frac{V^2}{2g}$ = 0.09 ft

Pipe 12

15" ø RCP
L = 10.83'
Q = 0.6 cfs
S = 0.636 ft/ft
V = 2.81 fps
$\frac{V^2}{2g}$ = 0.12 ft

* Q too small to obtain 5 fps. without causing CB8 to become excessively deep

PROJECT ENGINEERING
CONSULTANTS, LTD.
3130 N. 35th AVENUE, SUITE 1
PHOENIX, ARIZONA 85017

UNION HILLS BRIDGE

Sht: 1 OF 6
Job# 94032
By: K. SHORT
Date: 7-7-95
Chkd: LMM
Date: 7-12-95

COMPARISON OF HGL @ PROPOSED MANHOLE (STA 1+442)

EXISTING CONDITIONS :

D = 42" = 3.5 ft = 1.07 m
INV. OUTFALL = 370.40 m
SOF. OUTFALL = 371.47 m
HGL OUTFALL (FROM HDR HEC MODEL) = 372.85 m
LENGTH = 39 m
S_F = 0.0025 m/m

$H_L = S_F \times \ell = 0.0025 \times 39 = 0.10$ m

HGL @ manhole = 372.85 + 0.10 = 372.95 m

Registered Professional Engineer (Civil)
CERTIFICATE NO. 12892
LARRY M. MALDONADO
Date Signed 7-12-95
ARIZONA, U.S.A.

PROPOSED CONDITIONS :

D = 48" = 4 ft = 1.22 m
INV. OUTFALL = 370.16 m
SOF OUTFALL = 371.38 m
HGL OUTFALL (FROM HDR HEC MODEL) = 372.81 m
LENGTH = ±90 m
S_F = 0.0012 m/m

$H_L = S_F \times \ell = 0.0012 \times 90 = 0.11$ m

H_L(manhole) = 0.02 m

HGL @ manhole = 372.81 + 0.11 + 0.02 = 372.94 m

THE HEAD LOSS AT THE OUTLET WILL BE DECREASED, DUE TO THE ANGLED WINGWALLS PRODUCE A LESS ABRUPT CHANGE THAN STRAIGHT WINGWALLS. THIS IMPROVEMENT TO EXISTING CONDITIONS WAS IGNORED TO BE CONSERVATIVE.

IMPROVEMENT IN HGL = $HGL_{EXIST} - HGL_{PROPOSED}$

= 372.95 - 372.94 = 0.01 m

∴ EXISTING CONDITIONS WILL NOT BE ADVERSELY AFFECTED.

PROJECT ENGINEERING
CONSULTANTS, LTD.
3130 N. 35th AVENUE, SUITE 1
PHOENIX, ARIZONA 85017

Job# 94032
By: K. SHORT
Date: 7-7-95
Chkd: LMM
Date: 7-12-95

UNION HILLS BRIDGE
NEW 36" PIPE
HGL DETERMINATION

CONDITIONS :

$D = 36'' = 3 \cdot ft = 0.91\ m$
$L = 205\ m = 673\ ft$
$Q = 55\ cfs$ (FROM HDR)
$n = 0.012$
$S = 0.0058\ m/m$
$HGL_{OUTFALL}$ (FROM HDR HEC MODEL) $= 372.85\ m$
EXIT LOSS $= V^2/2g = \frac{(7.78)^2}{64.4} = 0.94\ ft = 0.29\ m$

$EGL = HGL + V^2/2g$
$EGL_{IN} = EGL_{OUT} + H_L$
$H_L = S_F \times l$
$HGL = EGL - V^2/2g$

$A = \pi r^2 = \pi(1.5')^2 = 7.07\ ft^2 = 0.67\ m^2$

$V = \frac{Q}{A} = \frac{55\ cfs}{7.07\ ft^2} = 7.78\ ft/s > 5$ O.K. $= 2.37\ m/s$

$$EGL_{OUT} = \frac{372.85 + 0.29}{0.3048\ m/ft} + \frac{(7.78\ ft/s)^2}{2 \cdot 32.2\ ft/s^2} = 1225.15\ ft = 373.43\ m$$

FROM MANNING'S EQN :

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2} \Rightarrow S_F = \left(\frac{Qn}{K' D^{8/3}}\right)^2 \qquad K' = 0.463 \text{ (flow full)}$$

$$S_F = \left(\frac{55 \cdot 0.012}{0.463 \cdot (3)^{8/3}}\right)^2 = 0.0058\ ft/ft = 0.0058\ m/m$$

$H_L = 0.0058 \times 205\ m = 1.19\ m$

$EGL_{IN} = EGL_{OUT} + H_L = 373.43 + 1.19 = 374.62\ m$

$$HGL_{IN} = \frac{374.62\ m}{0.3048\ m/ft} - \frac{(7.78)^2}{2 \cdot 32.2} = 1228.13\ ft = 374.33\ m$$
(IF NO MANHOLE)

HGL @ MANHOLE (APPROX 30.6 m FROM INPUT)

INVERT ELEV $= 372.39 - 30.6(0.0058) = 372.21\ m$

$HGL = 374.33 - 30.6(0.0058) = 374.16\ m$

MANHOLE $H_L = 3 \times 0.2 \frac{V_0^2}{2g} = 0.56\ ft = 0.17\ m$

PROJECT ENGINEERING
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PHOENIX, ARIZONA 85017

Job# 94032
By: K. SHORT
Date: 7-12-95
Chkd: LMM
Date: 7-12-95

UNION HILLS BRIDGE

CB 1 & CB 2

HGL @ MANHOLE = 374.16 + 0.17 = 374.33

HEAD LOSS IN LATERAL 2 :

$$S_F = \left(\frac{Q\,n}{K' D^{8/3}}\right)^2 = \left(\frac{1.2 \times 0.012}{0.463 \cdot (1.25)^{8/3}}\right)^2 = 0.0003 \text{ m/m}$$

$$H_L = S_F \times \ell = 0.0003 \times 23.5 = 0.01 \text{ m}$$

HGL @ CB2 (OUTLET) = 374.33 + 0.01 = 374.34 m

HEAD LOSS IN CB2 :

$Q_s/Q_o = 0.5$ $\quad Q_u/Q_o = 0.5$ $\quad \therefore K_u = 2.0$ from Fig 8.4

$$H_L = K_u \frac{V^2}{2g} = 2.0 \times \frac{\left(1.2/\pi(0.625)^2\right)^2}{64.4} = 0.03 \text{ ft} = 0.01 \text{ m}$$

HGL @ CB2 (INLET) = 374.34 + 0.01 = 374.35 m

HEAD LOSS IN LATERAL 1 :

$$S_F = \left(\frac{Q\,n}{0.463 \cdot D^{8/3}}\right)^2 = \left(\frac{0.6 \times 0.012}{0.463\,(1.25)^{8/3}}\right)^2 = 0.0001 \text{ m/m}$$

$$H_L = S_F \times \ell = 0.0001 \times 20.4 \text{ m} = 0.002 \cong 0.0$$

HEAD LOSS IN CB1 :

$K_G = 5.0$ FOR SIDE OUTLET

$$H_L = K_G \frac{V^2}{2g} = 5.0 \cdot \frac{\left(0.6/\pi(0.625)^2\right)^2}{64.4} = 0.02 \text{ ft} = 0.01 \text{ m}$$

HGL @ CB1 = 374.35 + 0.0 + 0.01 = 374.36 m

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PHOENIX, ARIZONA 85017

Sht: 4 of 6
Job# 94032
By: K. SHORT
Date: 7-12-95
Chkd: CMM
Date: 7-12-95

UNION HILLS BRIDGE

CB1 & CB2

CB1 :

GRATE ELEV. = 374.730
INV ELEV. = 373.867
HGL ELEV. = 374.36

FREEBOARD = 374.73 - 374.36 = 0.37 m = 1.21 ft
OK

CB2 :

GRATE ELEV = 374.712
INV ELEV = 373.763
HGL ELEV = 374.35

FREEBOARD = 374.71 - 374.35 = 0.36 m = 1.18 ft
OK

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UNION HILLS BRIDGE

Job# 94032

By: K. SHORT

CB3 & CB4

Date: 7-12-95

Chkd: LMM

Date: 7-12-95

HGL @ MANHOLE = 374.16 + 0.17 = 374.33 m

HEAD LOSS IN LATERAL 4 :

$$S_F = \left(\frac{Q\,n}{K'\,D^{8/3}}\right)^2 = \left(\frac{1.6 \cdot 0.012}{0.463 \cdot (1.25)^{8/3}}\right)^2 = 0.0005 \ m/m$$

$$H_L = S_F \cdot \ell = 0.0005 \times 26 \ m = 0.01 \ m$$

HGL @ CB4 (OUTLET) = 374.33 + 0.01 = 374.34 m

HEAD LOSS IN CB4 :

$Q_s/Q_o = 0.5$ $\quad Q_u/Q_o = 0.5$ $\quad \therefore K_u = 2.0$ (from Fig. 4.)

$$H_L = K_u \frac{V^2}{2g} = 2.0 \cdot \frac{\left(1.6/\pi(0.625)^2\right)^2}{64.4} = 0.05 \ ft = 0.02 \ m$$

HGL @ CB4 (INLET) = 374.34 + 0.02 = 374.36 m

HEAD LOSS IN LATERAL 3 :

$$S_F = \left(\frac{Q\,n}{K'\,D^{2/3}}\right)^2 = \left(\frac{0.8 \cdot 0.012}{0.463 \cdot (1.25)^{8/3}}\right)^2 = 0.0001 \ m/m$$

$$H_L = S_F \times L = 0.0001 \times 20.4 \ m = 0.003 \ m \cong 0.0$$

HEAD LOSS IN CB3 :

$K_G = 5.0$ FOR SIDE OUTLET

$$H_L = K_G \times \frac{V^2}{2g} = 5.0 \times \frac{\left(0.8/\pi(0.625)^2\right)^2}{64.4} = 0.03 \ ft = 0.01 \ m$$

HGL @ CB3 = 374.36 + 0.0 + 0.01 = 374.37 m.

PROJECT ENGINEERING
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PHOENIX, ARIZONA 85017

UNION HILLS BRIDGE

Job# 94032

By: K. SHORT

CB3 : CB4

Date: 7-12-95

Chkd: LMM

Date: 7-12-95

CB3 :

GRATE ELEV = 374.950 m
INV. ELEV = 374.086 m
HGL. ELEV = 374.37 m (CALCULATED ASSUMING FLOWING FULL)

THE LATERAL PIPE IS NOT FLOWING FULL. TO BE CONSERVATIVE THE SOFFIT OF THE PIPE IS ASSUMED TO BE THE HGL. THEREFORE FREEBOARD = 374.95 - 374.086 - 0.381
= 0.483 m = 1.58 ft
OK

CB4 :

GRATE ELEV = 374.950 m
INV. ELEV = 373.984 m
HGL ELEV = 374.35 m (CALCULATED ASSUMING FLOWING FULL)

DUE TO THE FACT THAT THE HGL IS BELOW THE LATERAL SOFFIT, THE LATERAL PIPE IS NOT FLOWING FULL, THEREFORE, CONSERVATIVE FREEBOARD IS THE DISTANCE BETWEEN THE SOFFIT OF THE PIPE AND THE GRATE. FREEBOARD = 374.95 - 373.984 - 0.381 = 0.585 m
= 1.92 ft
OK

UNION HILLS DRIVE BRIDGE PROJECT

TIME OF CONCENTRATION AND DISCHARGE CALCULATIONS

For 83rd Avenue

Location	Distance	Elevation	Slope	DA Width	Area	C Coeff.
Union Hills		1228				
1/2 mile	2640	1243	0.0057	300	18.18	0.85
Beardsley	2640	1256	0.0049	300	18.18	0.85
	5280	1256	0.0053	300	36.36	0.85

Calculate Time of Concentration for 0.5 miles

Tc = 11.4 L^0.5 Kb^0.52 s^-0.31 i^-0.38

L=	0.5	mi		
m =	-0.00625			
b =	0.04			
Kb =	0.032			
s =	30.0	ft/mi		
i =	3.35	in/hr for	18	minutes
Tc =	0.30	hrs		
	17.81	min		

Calculate Q10 for 1/2 mile of roadway

Q = C i A

Q10 =	51.77	cfs

Calculate Time of Concentration for 0.5 miles

Tc = 11.4 L^0.5 Kb^0.52 s^-0.31 i^-0.38

L=	1	mi		
m =	-0.00625			
b =	0.04			
Kb =	0.030			
s =	28.0	ft/mi		
i =	2.75	in/hr for	28	minutes
Tc =	0.45	hrs		
	26.88	min		

Calculate Q10 for 1 mile of roadway

Q = C i A

Q10 =	85.00	cfs

Estimated Pipe Diameter

Dia =	36	inches
Area =	7.07	ft^2
WP =	9.42	ft
n =	0.012	
s =	0.0045	ft/ft
Q =	86.09	cfs
V =	12.18	fps

APPENDIX G

Gabion Abutment Protection

STAGE-DISCHARGE - DESIGN DATA

Geometry of the section :

- Bed width	b	= ft	230
- Width of left berm	a1	= ft	0
- Width of right berm	a2	= ft	0
- Height of berm (above bed)	H1	= ft	6.5
- Total height of section (above bed)	Ht	= ft	6.5
- Angle of left lower slope	Õ1	= deg	18.4
- Angle of right lower slope	Õ2	= deg	18.4
- Angle of left upper slope	Ã1	= deg	18.4
- Angle of right upper slope	Ã2	= deg	18.4
- Roughness of low flow bed (Gauckler)	c1	= ft^/3/s	28.5
- Roughness of berm (Gauckler)	c2	= ft^/3/s	52
- Design discharge	Q	= ft3/s	10900
- Slope of bed	i	= %	.2

HYDRAULIC FLOW SCALE - RESULTS

- Water level (above bed)	Y	= ft	6.908
- Area of cross-section	A	= ft2	1643.5
- Wetted perimeter	B	= ft	271.69
- Hydraulic radius	R	= ft	6.05
- Average water velocity	Vm	= ft/s	4.232
- Velocity in bed	V1	= ft/s	4.232
- Velocity in the left berm	V2	= ft/s	
- Velocity in the right berm	V3	= ft/s	
- Design discharge	Q	= ft3/s	6953.1
- Froude number	F	=	.303

H[ft	A[ft2	B[ft	R[ft	V[ft/s	Q[ft3/s
.33	75.996	232.08	.327	.605	45.97
.66	152.64	234.16	.652	.958	146.11
.99	229.94	236.25	.973	1.251	287.52
1.32	307.88	238.33	1.292	1.511	464.97
1.64	386.48	240.42	1.607	1.748	675.26
1.97	465.73	242.50	1.920	1.968	916.18
2.30	545.63	244.59	2.230	2.175	1186.0
2.63	626.19	246.67	2.538	2.370	1483.6
2.96	707.39	248.75	2.843	2.556	1807.7
3.29	789.24	250.84	3.146	2.735	2157.6
3.62	871.74	252.92	3.446	2.906	2532.4
3.95	954.90	255.01	3.744	3.071	2931.6
4.28	1038.7	257.09	4.039	3.231	3354.6
4.61	1123.1	259.18	4.333	3.385	3800.9
4.93	1208.2	261.26	4.624	3.535	4270.1
5.26	1294.0	263.34	4.913	3.681	4761.8
5.59	1380.4	265.43	5.200	3.823	5275.7
5.92	1467.4	267.51	5.485	3.962	5811.4
6.25	1555.1	269.60	5.768	4.097	6368.7
6.58	1643.5	271.68	6.048	4.232	6953.1

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The program takes into account the physical characteristics of materials as manufactured by MACCAFERRI GROUP ; its results will not be realistic if a different material is used. Please contact the nearest MACCAFERRI Office, before running this program, to check if materials to be used are compatible, to get updated values of the MACCAFERRI GABIONS physical characteristics for data entry and for general information on the interpretation of the results.
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CHECK FOR LINING - DESIGN DATA

Hydraulic parameters of flow

- Water level at the point considered	Y	= ft	6.908
- Average water velocity	Vm	= ft/s	4.232
- Allowable velocity for the base soil	Ve	= ft/s	3
- Froude number	F	=	.303
- Bed slope	i	= %	.2

Geometric parameters of section

- Bank slope at the point considered	Ō	= deg	18.4
- Multiplying factor for bends (·1)	K	=	1

Lining characteristics

- Average diameter for stone fill	dm	= ft	.5
- Unit weight of stone fill	pr	= lb/ft3	140
- Thickness of lining	t	= ft	1

CHECK FOR LINING - RESULTS

Check for tractive forces (for Ō < 35)

- Actual shear stress	Ōb	= lb/ft2	.645
- Critical shear stress	Ōc	= lb/ft2	3.431

[Check satisfied (Ōb<Ōc)]

Check for water velocities

- Average water velocity	Vm	= ft/s	4.232
- Allowable critical velocity	Vc	= ft/s	19.592

[Check satisfied (Vm<Vc)]

Check for residual velocities under lining

- Average water velocity under lining	Vb	= ft/s	1.320
- Max allowable velocity at bed-lining interface .	Ve	= ft/s	3.000

[Check satisfied : no filter is required]

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The program takes into account the physical characteristics of materials as manufactured by MACCAFERRI GROUP ; its results will not be realistic if a different material is used. Please contact the nearest MACCAFERRI Office, before running this program, to check if materials to be used are compatible, to get updated values of the MACCAFERRI GABIONS physical characteristics for data entry and for general information on the interpretation of the results.
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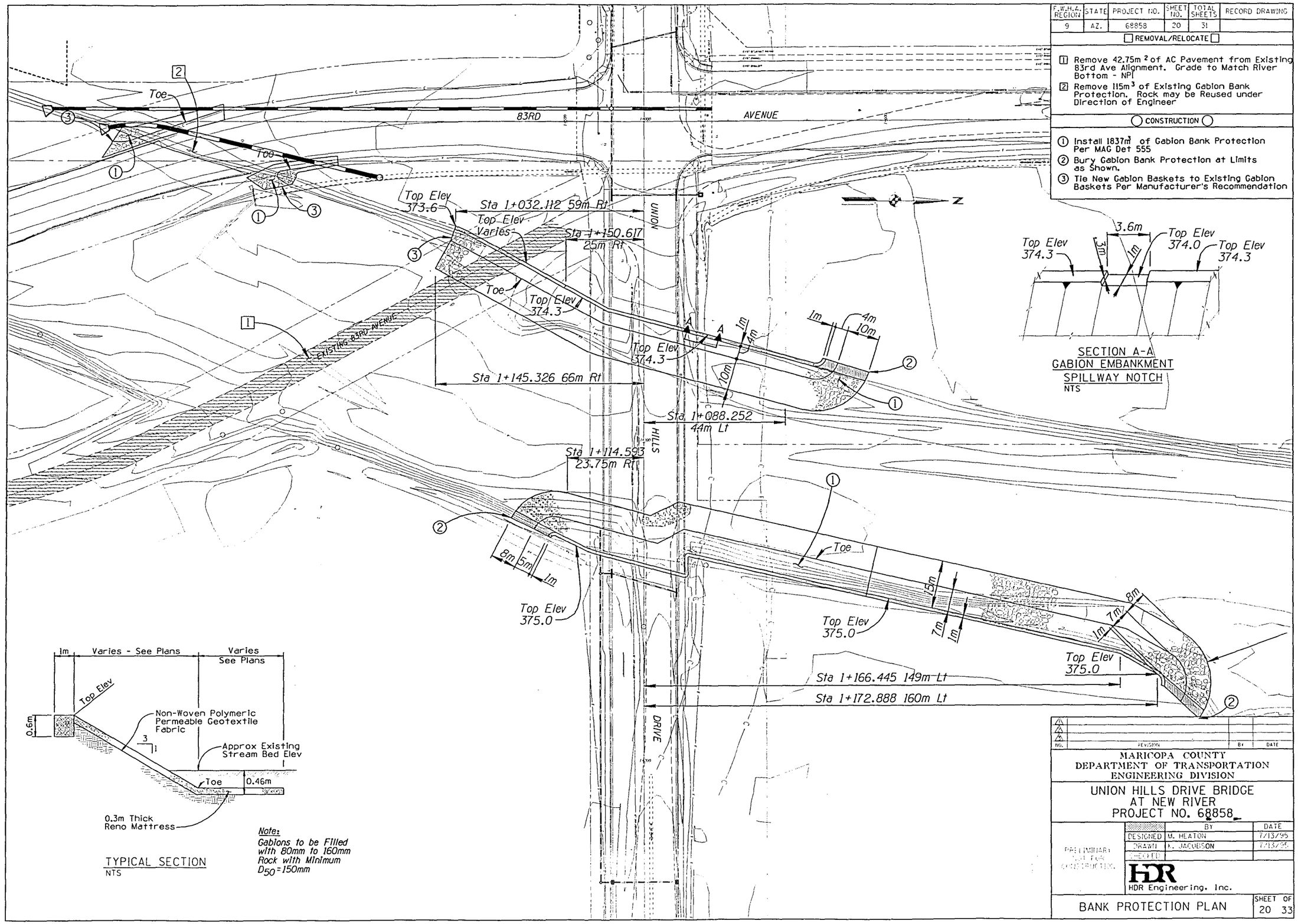
F.W.H.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ.	68858	20	31	

☐ REMOVAL/RELOCATE ☐

1. Remove 42.75m² of AC Pavement from Existing 83rd Ave Alignment. Grade to Match River Bottom - NPI
2. Remove 115m³ of Existing Gabion Bank Protection. Rock may be Reused under Direction of Engineer

◯ CONSTRUCTION ◯

1. Install 1837m³ of Gabion Bank Protection Per MAG Det 555
2. Bury Gabion Bank Protection at Limits as Shown.
3. Tie New Gabion Baskets to Existing Gabion Baskets Per Manufacturer's Recommendation



NO.	REVISION	BY	DATE
1			
2			
3			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION

UNION HILLS DRIVE BRIDGE
AT NEW RIVER
PROJECT NO. 68858

	BY	DATE
DESIGNED	M. HEATON	7/13/95
DRAWN	K. JACOBSON	7/13/95
CHECKED		

PRELIMINARY NOT FOR CONSTRUCTION

HDR Engineering, Inc.

BANK PROTECTION PLAN

SHEET 20 OF 33

APPENDIX H

Scour Worksheets

Union Hills Drive Bridge over New River
ESTIMATE BRIDGE SCOUR AT UNION HILLS BRIDGE – NEW RIVER

100–YEAR PEAK FLOW CONDITION
CONTRACTION SCOUR ESTIMATE

X–Section No.:	11.020	10.989
	Upstream of Union Hills Dr.	Located at Union Hills Drive
Q :	10900 cfs	10900 cfs
Topwidth:	226.2 ft	191.3 ft
Area:	1385.8 ft^2	1124.4 ft^2
y1 = dave:	6.1 ft	5.9 ft
V(ave):	7.9 ft/sec	9.7 ft/sec
Toe lt:	595 ft	311 ft
Toe rt:	388.8 ft	68 ft
W1 :	206.2 ft	243 ft
		Pier Dia: 2 ft
		No. Piers: 4
		W2 : 235 ft

ESTIMATE CONTRACTION SCOUR
For k1 = 0.69

W1 = 206.2 ft
Q1 = 10900 cfs
W2 = 235 ft
Q2 = 10900 cfs
Y1 ave = 6.1 ft

Y2 = ((Q2/Q1)^6/7*(W1/W2)^k1)*Y1
Y2 = 5.6 ft
Ys = –0.5 ft

THEREFORE:
No Contraction scour @ bridge.B101

ESTIMATED PIER SCOUR Use Cross Section 11.005
CSU Equation

WSEL = 1224.8 ft
El(min) = 1216.4 ft
Y1(max) = 8.48 ft.
Q : 10900 cfs
Area: 1419.2 ft^2
K1 = 1
K2 = 1
K3 = 1.1 to 1.3
a = 2 ft.
Debris = 4 ft
Max a = 6 ft
V1ave = 7.7 fps
Fr1 = 0.46

Ys=Y1(2.0*K1*K2*K3*(a/Y1)^.65*Fr1^.43)
Ys = 10.72 ft. to 12.67 ft.

ABUTMENT SCOUR
No Abutment scour for the 100–year flow condition

Union Hills Drive Bridge over New River – Preliminary Analysis

500–YEAR PEAK FLOW CONDITION
CONTRACTION SCOUR ESTIMATE

X–Section No.:	11.020	10.989
	Upstream of Union Hills Dr.	Located at Union Hills Drive
Q :	18530 cfs	18530 cfs
Topwidth:	235.5 ft	205.15 ft
Area:	1983.2 ft^2	1508.7 ft^2
y1 = dave:	8.4 ft	7.35 ft
V(ave):	9.3 ft/sec	12.3 ft/sec
Toe lt:	595 ft	311 ft
Toe rt:	388.8 ft	68 ft
W1 :	206.2 ft	243 ft
		Pier Dia: 2 ft
		No. Piers: 4
		W2 : 235 ft

ESTIMATE CONTRACTION SCOUR
For k1 = 0.69

W1 = 206.2 ft
Q1 = 18530 cfs
W2 = 235 ft
Q2 = 18530 cfs
Y1 ave = 8.4 ft

Y2 = ((Q2/Q1)^6/7*(W1/W2)^k1)*Y1
Y2 = 7.7 ft
Ys = –0.7 ft

THEREFORE:
No Contraction Scour @ bridge.

ESTIMATED PIER SCOUR Use Cross Section 11.005
CSU Equation

WSEL = 1227.4 ft
El(min) = 1216.40 ft
Y1(max) = 11.06 ft.
Q : 18530 cfs
Area: 1989.5 ft^2
K1 = 1
K2 = 1
K3 = 1.1 to 1.3
a = 2 ft.
Debris = 4 ft
Max a = 6 ft
V1ave = 9.31 fps
Fr1 = 0.46

Ys=Y1(2.0*K1*K2*K3*(a/Y1)^.65*Fr1^.43)
Ys = 11.8 ft. to 13.9 ft.

ABUTMENT SCOUR
No Abutment scour for the 500–year flow condition

LONG TERM SCOUR

The stream is armouring itself with cobbles of 4"–12" diameter stones. Currently there is about 1 foot of arnouring. With a p scour of 10' @ 15% cobble sized stones, an additional 1.5 feet of armouring could be expected with 10' of scour.

Significant Long Term Scour is not anticipated below the estimated pier and contraction scour estimates at this site.

100–year	2.5 ft
500–year	5 ft

Foundation Units could be based on the following criteria.

100–year maximum	13.2 ft
500–year maximum	16.8 ft

USE Neill's Equation to determine size of material being transported:

Vc = 11.52 * y1 ^ (1/6) * D50 ^ (1/3)

D50 = 7.52 in. Use actual average velocity and depth.

USE Lauren's Equation to determine size of material being transported:

Vc = 10.95 * y1 ^ (1/6) * D50 ^ (1/3)

D50 = 7.91 in. Use actual average velocity and depth.