

**FLOOD CONTROL  
DISTRICT**

**of  
MARICOPA  
COUNTY  
1959**

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**GILA BEND AREA  
FLOODPLAIN DELINEATION STUDY**

FCD 90-67

**TECHNICAL DATA NOTEBOOK  
HYDRAULICS**

BOOK 1 OF 2

Prepared For:

**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY**  
2801 West Durango Street  
Phoenix, Arizona 85009  
(602) 506-1501

Prepared By:

**BURGESS & NIPLE, INC.**  
5025 E. Washington Street  
Phoenix, AZ 85034  
(602) 244-8100

Project No. 11358

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**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY**  
**GILA BEND AREA**  
**FLOODPLAIN DELINEATION STUDY**

**INTRODUCTION**

**Purpose of Study**

The purpose of this Floodplain Delineation Study is to investigate the existence and severity of flood hazards in southwestern Maricopa County for the following:

- \* Sand Tank Wash from Indian Road (North line of Section 24, T.5S., R.5W.) to Interstate 8
- \* Scott Avenue Wash from Watermelon Road to Interstate 8
- \* Bender Wash from its mouth at Sand Tank Wash to Interstate 8
- \* Unnamed Wash No. 1 from its mouth at Bender Wash to the East line of Section 9, T.6S., R.4W
- \* Unnamed Wash No. 2 from its mouth at Unnamed Wash No. 1 to the East line of Section 4, T.6S., R.4W.

The area studied includes the Town of Gila Bend, Arizona and portions of unincorporated areas of Maricopa County, Arizona.

**Coordination and Acknowledgements**

References used in this study are described in Section 6 of Study Documentation.

The Flood Control District of Maricopa County provided copies of two, six, and 24 hour rainfall distributions and miscellaneous articles on the Green and Ampt procedure.

Soil information was obtained from the Soil Conservation Service. The rainfall distributions based on watershed area for the 6-hour duration storm were furnished by the Flood Control District of Maricopa County and are listed in the Design Manual. The 24-hour rainfall distribution used for this study is the SCS Type II.

The study was publicized in local print media, with no subsequent response from the public. Intermediate review meetings have been held between personnel of Burgess & Niple, the Flood Control District of Maricopa County, and the Arizona Department of Water Resources.

## **AREA STUDIED**

### **Scope of Study**

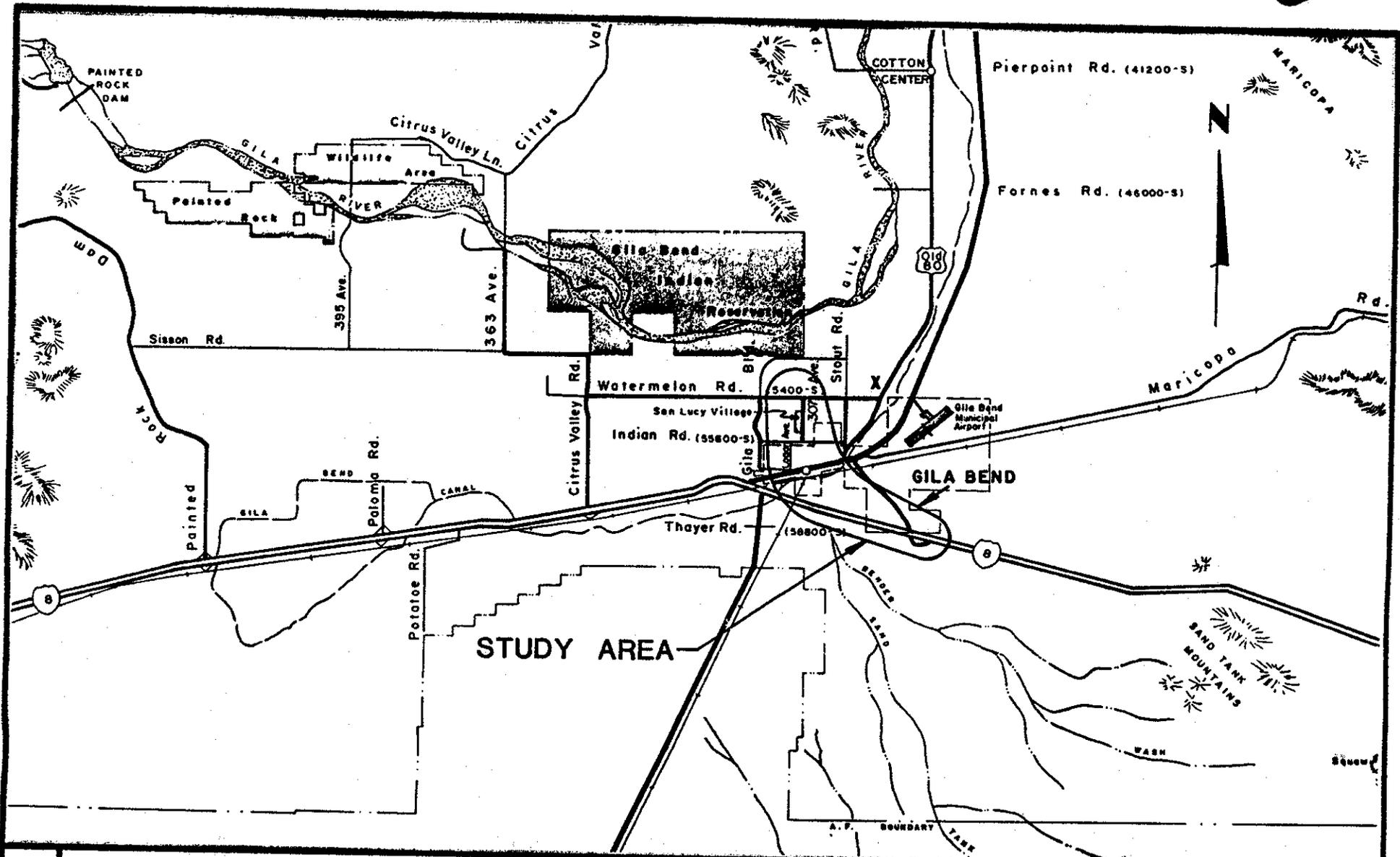
Areas selected for study were based upon potential for future development. This floodplain delineation study covers the Town of Gila Bend and unincorporated areas of Maricopa County as described below:

- Sand Tank Wash from Indian Road (River Mile 0.931) to Interstate 8 (River Mile 4.936)
- Scott Avenue Wash from Watermelon Road (River Mile 2.261) to Interstate 8 (River Mile 5.308)
- Bender Wash from its mouth at Sand Tank Wash (River Mile 0) to Interstate 8 (River Mile 2.041)
- Unnamed Wash No. 1 from its mouth at Bender Wash (River Mile 0) to the East line of Section 9, T.6S., R.4W. (River Mile 3.260)
- Unnamed Wash No. 2 from its mouth at Unnamed Wash No. 1 (River Mile 0) to the East line of Section 4, T.6S., R.4W. (River Mile 2.785)
- Ponding areas upstream of the Gila Bend Canal between State Route 85 to the west and U.S. Route 80 to the east.

The study area is shown in Figure 1 on page 3.

### **Community Description**

Maricopa County has a total area of 9,238 square miles and is located in the south central region of Arizona. Total Maricopa County population in 1990 was 2,122,101. The area is experiencing rapid population growth, having grown from 1,509,262 in 1980.

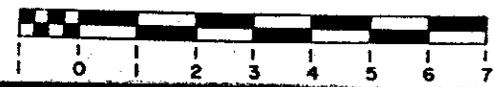


**FIGURE 1**

**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY**

**GILA BEND AREA FLOODPLAIN DELINEATION STUDY  
MARICOPA COUNTY**

GRAPHIC SCALE IN MILES



**VICINITY MAP**

Terrain in Maricopa County varies from mountains to plains. Numerous small, intermittent streams and washes traverse the county. Major streams include the Gila, Salt, Agua Fria, New and Hassayampa Rivers.

The area is located within the Sonoran Desert with mild, short winters and long, hot summers.

### **Principal Flood Problems**

Storms during summer months generally originate in the Gulf of Mexico area and tend to be intense and of short duration. Storms at other times of the year generally originate in the Pacific Ocean and tend to be gentler rains of longer duration. Flooding may occur at any time of the year.

Flood hazards along the streams result when the channels overflow and inundate development which may occur along the streams. Flood hazards upstream of the Gila Bend Canal embankment result when floodwaters are impounded upstream of the canal and metered through structures to the downstream side of the canal.

### **Flood Protection Measures**

No flood protection measures exist within the study area. Drainage structures through the Gila Bend Canal serve to reduce downstream flood peaks by storing floodwater upstream of the Gila Bend Canal.

## **ENGINEERING METHODS**

### **Hydrologic Analyses**

The watershed was modeled using the U.S. Army, Corps of Engineers HEC-1 computer program. The program (Version 4.6) is dated April, 1991, as implemented by Dodson and Associates, Inc. ProHEC1. Modeling was accomplished using the SCS Unit Hydrograph, Initial and Uniform Losses, and routing, combining and diversion of sub-basin hydrographs. Derivation of input data, assumptions and procedures used in preparation of the computer model are discussed in the accompanying Hydrology Technical Data Notebook prepared by Burgess & Niple, Inc.

**Table 1**  
**Summary of Discharges**

<u>Flooding Source and Location</u>	<u>D.A.</u> <u>(S.M.)</u>	<u>100-YR</u> <u>(cfs)</u>
<b>Sand Tank Wash</b>		
At North Indian Road	342	18,100
Below Bender Wash @ RM 3.18	334	18,200
Above Bender Wash @ RM 3.18	334	15,100
Above Pima Street (Includes Bender Wash)	334	18,300
Below Gila Bend Canal	334	18,300
Below Interstate 8	330	14,900
Above Interstate 8	330	23,700
<b>Bender Wash</b>		
Mouth	N/A <sup>1</sup>	3,100
Below Gila Bend Canal	N/A <sup>1</sup>	3,100
Above Gila Bend Canal	89	4,900
Below Interstate 8	85	5,000
Above Interstate 8	85	5,500
<b>Scott Avenue Wash</b>		
At Watermelon Road	N/A <sup>2</sup>	2,600
Below Gila Bend Canal	N/A <sup>2</sup>	2,700
Above Gila Bend	N/A <sup>2</sup>	3,500
Below Gravel Road @ RM	N/A <sup>2</sup>	3,500
Above Gravel Road @ RM	N/A <sup>2</sup>	1,400
Below Interstate 8	N/A <sup>2</sup>	1,400
Above Interstate 8	N/A <sup>2</sup>	8,100
<b>Unnamed Wash No. 1</b>		
Mouth	2.9	900
Below Unnamed Wash No. 2	2.8	870
Above Unnamed Wash No. 2	0.7	640*
1.5 Miles Above Mouth	0.5	620
At Interstate 8 WB on-ram	0.1	220
At east line of Section 9, T6S, R4W	0.0	50
<b>Unnamed Wash No. 2</b>		
Mouth	2.1	670
At Business Route 8	1.5	730
At east line of Section 4, T6S, R4W	0.5	460

<sup>1</sup> Below the Gila Bend Canal, Bender Wash derives its peak 100-year discharge from split flow from Sand Tank Wash

<sup>2</sup> Scott Avenue Wash derives the majority of its peak 100-year discharge from flow diverted from Sand Tank Wash above Interstate 8

## Hydraulic Analyses

Standard hydraulic methods were used to determine 100-year recurrence interval flood hazards for this study. Analyses reported herein reflect current conditions of the streams.

Cross sections for the backwater analysis are digitized from aerial mapping at 1:4800 scale with a contour interval of 4 feet and 1:2400 scale with a contour interval of 2 feet (Reference 1). Locations of selected cross sections used in the hydraulic analysis are shown in the Flood Profiles (Exhibit 1). Cross section locations are also shown on the Flood Boundary/Floodway Map (Exhibit 2). Mannings "n" values were obtained during a field reconnaissance October 4, 1991. Values ranged from 0.025 to 0.08.

Flood profiles are drawn showing computed water surface elevations to an accuracy of 0.5 feet for a flood of 100-year frequency. Water surface elevations for Sand Tank Wash, Scott Avenue Wash, Bender Wash, Unnamed Wash No. 1 and Unnamed Wash No. 2 are computed through the use of the Department of the Army, Corps of Engineers HEC-2 Water Surface Profiles computer program as implemented by Dodson and Associates, Inc. in their May 1991 Version 4.6.2 of ProHEC2. Starting elevations were obtained using normal depth. Elevations used are referenced to the National Geodetic Vertical Datum of 1929. Locations of Elevation Reference Marks used in this study are shown on the maps (Exhibit 2) and are described in the Elevation Reference Marks Table.

Ponded flood boundaries for structures through the Gila Bend Canal not modeled above were obtained by routing the 100-year storm through the structures. Upstream storage volumes were computed by average end areas planimetered from contour mapping (Reference 1). The HEC-1 computer program was used to perform the routing and compute the maximum ponded flood elevation upstream of the canal. Hydraulic rating curves for the structures were computed using the computer program: "Hydraulics of Bridge and Culvert Waterways." (Reference 12)

Hydraulic analyses are based upon unobstructed flow conditions. Flood elevations presented herein are considered valid only if the Gila Bend Canal structures remain unobstructed, and the Gila Bend Canal embankment does not fail.

## FLOODPLAIN MANAGEMENT APPLICATIONS

This study has been performed to meet the standards of the National Flood Insurance Program as defined by Reference 12.

A prime purpose of the National Flood Insurance Program is to encourage state and local governments to adopt sound floodplain management programs. This study, therefore, includes a flood boundary map designed to assist communities in developing sound floodplain management measures.

### Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the Federal Emergency Management Agency (FEMA) as the base flood for purposes of floodplain management measures. The boundary of the 100-year flood has been delineated using flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:4800 with a contour interval of 4 feet and 1:2400 scale with a contour interval of 2 feet (Reference 1).

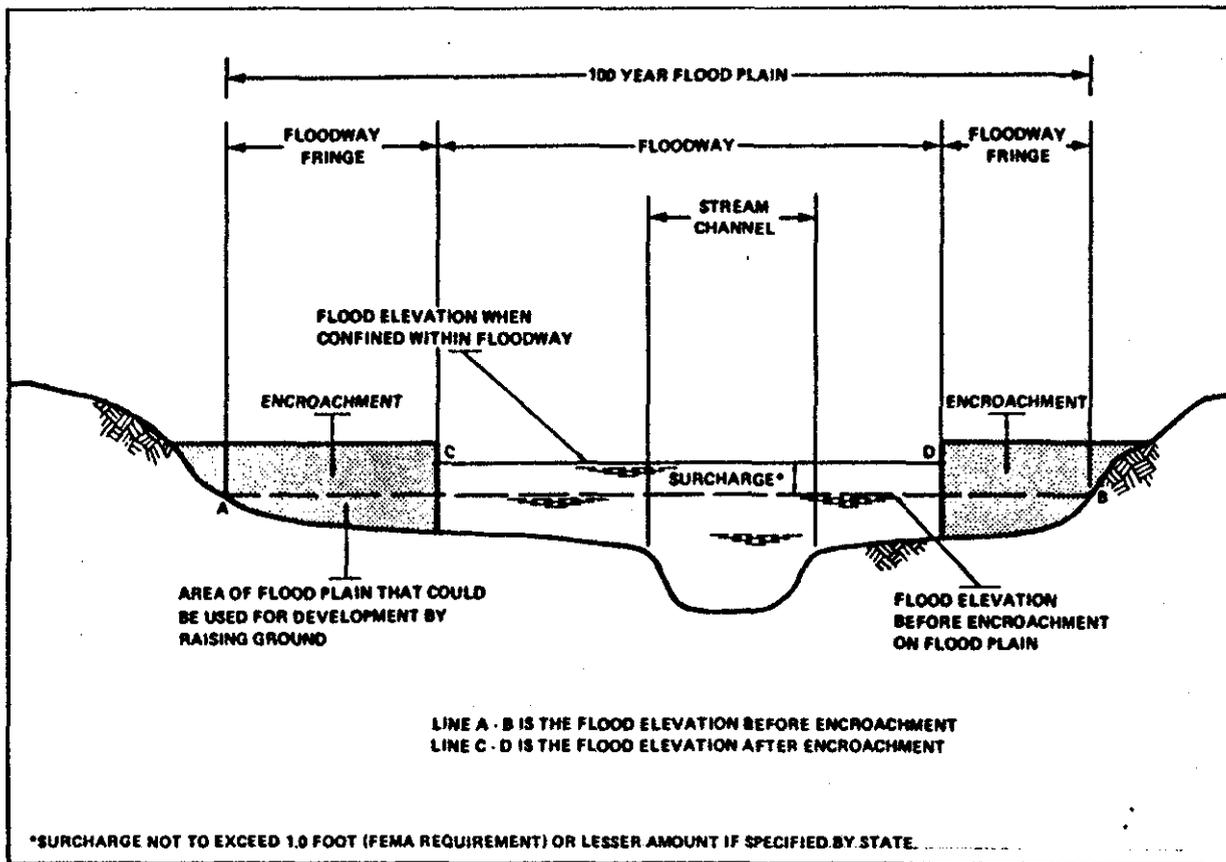
The boundary of the 100-year flood is shown on the Flood Boundary and Floodway Map (Exhibit 2). Small areas within the flood boundaries may lie above the flood elevations, and therefore, may not be subject to flooding. Due to limitations of the map scale and lack of detailed topographic data, such areas are not shown.

### Floodways

Encroachment on floodplains, such as artificial fill, reduces the flood carrying capacity, increases flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas

be kept free of encroachment in order that the 100-year flood can be carried without substantial increase in flood heights. Minimum federal standards limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown below in Figure 2.

The floodway presented for this study was computed on the basis of equal conveyance reduction from each side of the floodplain and adjusted for high velocities and physical discontinuities. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 2).



**FLOODWAY SCHEMATIC**  
 Figure 2

FLOODING SOURCE		FLOODWAY			WATER SURFACE ELEVATION <sup>2</sup>		
Cross Section	Distance <sup>1</sup>	Width (Feet)	Section Area (Sq. Ft.)	Mean Velocity (Feet/Sec.)	With Floodway	Without Floodway	Increase
A	0.926	431.	2814.	6.5	663.1	662.1	1.0
B	1.053	500.	2475.	7.4	666.5	666.3	.2
C	1.241	500.	2864.	6.4	670.8	670.3	.5
D	1.435	500.	1711.	10.6	676.0	676.0	.0
E	1.608	700.	3170.	5.7	680.5	679.6	.9
F	1.791	750.	2857.	6.4	682.7	682.2	.5
G	1.980	850.	2475.	7.4	690.3	689.4	.9
H	2.147	804.	2835.	6.4	694.5	693.9	.6
I	2.329	850.	2388.	7.6	698.8	698.0	.8
J	2.522	900.	2771.	6.6	704.7	704.0	.7
K	2.686	1000.	2957.	6.2	709.9	709.0	.9
L	2.864	1200.	3366.	5.4	714.5	713.7	.8
M	3.039	1400.	3919.	4.6	717.6	716.7	.9
N	3.180	1750.	2789.	6.5	720.3	719.7	.6
O	3.277	1650.	3707.	4.1	722.6	721.8	.8
P	3.372	1480.	2861.	5.3	723.8	723.0	.8
Q	3.470	1450.	3118.	4.8	726.3	725.6	.7
R	3.563	1250.	2605.	5.8	728.4	728.2	.2
S	3.657	1100.	2055.	7.3	732.9	732.2	.7
T	3.747	1320.	4868.	3.8	735.2	735.1	.1
U	3.836	1750.	8711.	2.1	739.4	739.2	.2

<sup>1</sup> Miles above mouth

<sup>2</sup> Feet, NGVD 1929

TABLE 2

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

BURGES  
& NIPLE

ENGINEERS  
ARCHITECTS

FLOODWAY DATA

SAND TANK WASH

FLOODING SOURCE		FLOODWAY			WATER SURFACE ELEVATION <sup>2</sup>		
Cross Section	Distance <sup>1</sup>	Width (Feet)	Section Area (Sq. Ft.)	Mean Velocity (Feet/Sec.)	With Floodway	Without Floodway	Increase
V	4.076	1780.	10118.	1.8	748.2	747.2	1.0
W	4.277	1045.	2375.	7.7	749.5	749.3	.2
X	4.461	900.	2320.	7.9	755.3	754.3	1.0
Y	4.638	900.	2403.	6.2	760.1	759.6	.5
Z	4.822	1200.	2306.	6.5	764.3	764.1	.2

<sup>1</sup> Miles above mouth

<sup>2</sup> Feet, NGVD 1929

TABLE 2

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

BURGES S  
& NIPLE

ENGINEERS  
ARCHITECTS

FLOODWAY DATA

SAND TANK WASH

FLOODING SOURCE		FLOODWAY			WATER SURFACE ELEVATION <sup>2</sup>		
Cross Section	Distance <sup>1</sup>	Width (Feet)	Section Area (Sq. Ft.)	Mean Velocity (Feet/Sec.)	With Floodway	Without Floodway	Increase
A	0.037	56.	374.	8.3	722.0	721.0	1.0
B	0.129	55.	281.	11.0	723.2	722.9	.3
C	0.224	70.	380.	8.1	726.1	725.4	.7
D	0.320	70.	390.	7.9	727.6	726.8	.8
E	0.415	78.	355.	8.7	729.6	729.5	.1
THE FLOODWAY BETWEEN PIMA STREET (U.S. ROUTE 80) AND RIVER MILE 0.95 +/- IS SUPERCEDED BY THE SAND TANK WASH FLOODWAY							
F	1.011	300.	950.	5.3	748.8	748.1	.7
G	1.172	530.	754.	6.6	753.6	752.7	.9
H	1.380	460.	924.	5.4	760.6	759.7	.9
I	1.576	450.	727.	6.9	766.8	766.4	.4
J	1.738	480.	901.	5.5	771.9	770.9	1.0
K	1.903	169.	397.	8.1	777.0	777.0	.0

<sup>1</sup>Miles above mouth

<sup>2</sup>Feet. NGVD 1929

TABLE 2

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

BURGESSES

& NIPLE

ENGINEERS

ARCHITECTS

FLOODWAY DATA

BENDER WASH

FLOODING SOURCE		FLOODWAY			WATER SURFACE ELEVATION <sup>2</sup>		
Cross Section	Distance <sup>1</sup>	Width (Feet)	Section Area (Sq. Ft.)	Mean Velocity (Feet/Sec.)	With Floodway	Without Floodway	Increase
A	2.261	158.	511.	5.1	677.5	676.7	.8
B	2.505	280.	407.	6.4	683.3	683.3	.0
C	2.677	412.	893.	2.9	689.5	688.7	.8
D	2.867	211.	468.	5.6	694.8	694.8	.0
E	3.105	228.	607.	4.3	700.2	699.3	.9
F	3.292	110.	351.	7.4	706.5	705.7	.8
G	3.492	120.	545.	4.8	713.6	712.8	.8
H	3.570	140.	513.	5.1	714.9	714.0	.9
I	3.677	130.	424.	6.1	717.3	716.4	.9
J	3.772	120.	489.	5.3	720.0	719.2	.8
K	3.863	140.	439.	5.9	722.2	721.2	1.0
L	3.957	91.	364.	7.1	724.8	724.1	.7
M	4.053	120.	503.	5.2	727.9	726.9	1.0
N	4.147	109.	433.	6.0	730.0	729.1	.9
O	4.216	205.	465.	5.6	734.1	733.6	.5
P	4.287	200.	964.	2.7	735.1	734.4	.7
Q	4.395	300.	1559.	1.7	740.9	740.0	.9
R	4.477	200.	2141.	1.2	746.0	745.0	1.0
S	4.537	168.	1444.	2.4	746.0	745.0	1.0
T	4.591	190.	1357.	2.6	746.3	745.5	.8
U	4.727	220.	1286.	2.7	746.7	745.7	1.0
V	4.911	135.	374.	9.4	749.1	749.1	.0
W	5.137	100.	455.	3.1	754.0	753.3	.7

<sup>1</sup> Miles above mouth<sup>2</sup> Feet, NGVD 1929

TABLE 2

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

B U R G E S S

&amp; N I P L E

E N G I N E E R S

A R C H I T E C T S

FLOODWAY DATA

SCOTT AVENUE WASH

FLOODING SOURCE		FLOODWAY			WATER SURFACE ELEVATION <sup>2</sup>		
Cross Section	Distance <sup>1</sup>	Width (Feet)	Section Area (Sq. Ft.)	Mean Velocity (Feet/Sec.)	With Floodway	Without Floodway	Increase
A	0.061	37.	135.	6.7	743.3	742.3 <sup>3</sup>	1.0
B	0.150	130.	333.	2.7	744.9	744.2 <sup>3</sup>	.7
C	0.337	235.	562.	1.6	746.2	745.3 <sup>3</sup>	.9
D	0.555	160.	121.	5.3	750.1	750.1	.0
E	0.769	126.	201.	3.2	756.0	756.0	.0
F	0.959	165.	125.	5.1	761.4	761.4	.0
G	1.151	180.	206.	3.1	768.5	768.3	.2
H	1.347	165.	159.	4.0	773.9	773.9	.0
I	1.540	100.	146.	4.2	781.7	781.6	.1
J	1.723	60.	99.	5.5	788.7	788.3	.4
K	1.921	42.	94.	5.1	795.9	795.9	.0
L	2.127	56.	73.	5.5	803.6	803.6	.0
M	2.337	35.	67.	4.9	813.3	812.8	.5
N	2.565	30.	34.	4.1	821.4	821.2	.2
O	2.649	10.	36.	3.1	828.7	828.7	.0
P	2.746	30.	45.	1.8	832.3	832.2	.1
Q	2.936	26.	28.	2.7	836.5	836.4	.1
R	3.080	13.	8.	4.4	842.4	842.4	.0
S	3.148	27.	60.	1.3	848.7	848.7	.0
T	3.260	15.	10.	4.8	852.2	852.2	.0

<sup>1</sup> Miles above mouth<sup>3</sup> Regulatory Elevation = 746.2<sup>2</sup> Feet, NGVD 1929

TABLE 2

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

B U R G E S S  
& N I P L EE N G I N E E R S  
A R C H I T E C T S

FLOODWAY DATA

UNNAMED WASH NO. 1

FLOODING SOURCE		FLOODWAY			WATER SURFACE ELEVATION <sup>2</sup>		
Cross Section	Distance <sup>1</sup>	Width (Feet)	Section Area (Sq. Ft.)	Mean Velocity (Feet/Sec.)	With Floodway	Without Floodway	Increase
A	0.192	383.	562.	1.2	744.8	743.8 <sup>3</sup>	1.0
B	0.385	281.	691.	1.0	745.9	745.6 <sup>3</sup>	.3
C	0.618	100.	112.	6.0	756.7	756.7	.0
D	0.821	148.	136.	5.1	767.4	766.7	.7
E	1.043	108.	133.	5.3	777.4	776.6	.8
F	1.240	118.	154.	4.6	785.2	784.5	.7
G	1.453	122.	189.	3.7	790.7	789.7	1.0
H	1.676	683.	169.	4.3	798.8	798.8	.0
I	1.739	236.	550.	1.3	802.5	801.6	.9
J	1.905	83.	117.	5.7	806.6	805.9	.7
K	2.138	113.	176.	3.5	814.1	813.2	.9
L	2.335	60.	85.	6.7	820.9	820.9	.0
M	2.534	38.	97.	5.4	829.8	829.1	.7
N	2.776	46.	70.	6.6	839.1	838.7	.4

<sup>1</sup> Miles above mouth<sup>3</sup> Regulatory Elevation = 746.2<sup>2</sup> Feet, NGVD 1929

TABLE 2

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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FLOODWAY DATA

UNNAMED WASH NO. 2

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close, together or colinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point.

### **INSURANCE APPLICATION**

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

- Zone A:** Zone A is the flood insurance rate zone that corresponds to 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. No base flood elevations or depths are shown within this zone.
- Zone AE:** Zone AE is the flood insurance rate zone that corresponds to 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot based flood elevations derived from detailed hydraulic analyses are shown at selected intervals within this zone.
- Zone AH:** Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.
- Zone AO:** Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within this zone.

**Zone X:** Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

#### **OTHER STUDIES**

Previous floodplain and drainage studies include:

- Flood Insurance Study, Maricopa County, Arizona and Incorporated Areas, Revised September 29, 1989.
- Drainage Design Report of Interstate 8, I-IG-8-2(22), date unknown.
- Flood Control Report, Section II, Western Maricopa County, Hassayampa River, Buckeye Watershed, Centennial Wash, Bender Wash, Sand Tank Wash, December 31, 1992.

Peak 100-year flood discharges were presented in the Flood Insurance Study for Sand Tank Wash at the Gila Bend Canal (a.k.a. Gillespie Canal) and at Interstate 8. Flood boundaries are shown on Flood Insurance Rate Maps for portions of Gila Bend as Zone A (approximate), and Zone AH (detailed ponding). Computations used to develop the Flood Insurance Study could not be located. Floodway data for streams in Gila Bend is not presented in the Flood Insurance Study.

This study is not in exact agreement with flood boundaries and ponded flood elevations presented in the September 29, 1989 revision of the Flood Insurance Study. This study represents the most recent and most detailed methodology to date and supersedes previous studies.

This study abuts a previous study of flood hazards along the Gila Bend Canal from Gillespie Dam to the Town of Gila Bend. The study was performed by the Flood Control District of Maricopa County under Contract FCD 90-06 and was completed in 1991. This study is in exact agreement with the 1991 study of the Gila Bend Canal.

## LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study may be obtained from the Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona 85009.

**ERM FOR MARICOPA COUNTY  
FLOOD CONTROL DISTRICT GILA BEND**

ERM#1           ERM EL = 659.524

This station is located at the northwest section corner of Section 19. The mark is a brass cap.

ERM#2           ERM EL = 685.204

This station is located at the intersection of 307 Avenue on Watermelon Road. The mark is a brass cap in a hand hole "Maricopa County Section Corner (24,19,25,30).

ERM#3           ERM EL = 717.889

This station is located 41.60 feet south of intersection at 307 Avenue and Indian Road. Then 69.60 feet west. The mark is a brass cap stamped M.C.F.C.D. E.R.M. EL. 717.889 R.L.S. 18436.

ERM#4           ERM EL = 727.682

This station is located 1.1 miles west along the Southern Pacific Railroad from the depot at Gila Bend to a bridge, 8 feet north of the north rail of the north track set in a drill hole in the top of the northwest concrete abutment and about 5 inches lower than the track. The mark is a brass cap stamped Coast & Geodetic Survey K354.

ERM#5           ERM EL = 741.885

This station is located 0.85 miles east along the Southern Pacific Railroad. From the northwest rail of the main track, 134 feet southwest of the center of the junction of U.S. Highway 80 and Arlington - Hassayampa Road, 105 feet southeast of the centerline of U.S. Highway 80, 191 feet southwest of the south corner of a concrete highway bridge over the Gila Bend Canal, 8 feet south of a large metal post which supports a signboard, 1.0 foot north of a metal witness post. About 3 feet below the level of the highway and set in the top of a concrete post projecting 6 inches. The mark is a brass cap stamped U.S. Coast and Geodetic Survey B84.

ERM#6           ERM EL = 764.014

This station is located 1.7 miles east along the Southern Pacific Railroad from the station at Gila Bend in S32 T5S R4W, 4½ rails east of railroad bridge 857.41, 39 feet

north of the north rail of the main track, 91 feet south of the centerline of a graveled road, 9 feet west of a telephone pole in line with a row of poles, 1.6 feet east of a metal witness post, about 2 feet below the level of the tracks, and set in the top of a concrete post, projecting 5 inches. The mark is a brass cap stamped "US Coast and Geodetic Survey N285".

ERM#7           ERM EL = 751.914

"Standard Triangulation Disk" - This station is located 1.0 miles south on State Highway 85 from the junction of U.S. Highway 80 at Gila Bend, 150 feet west of the centerline of the highway, 56.78 feet northwest of R.M.2, 55.45 feet northwest of R.M.1, 4 feet north of a metal witness post with sign, set in a cylinder concrete post projecting 4 inches. The mark is a brass cap stamped "Coast and Geodetic Survey COY".

ERM#8           ERM EL = 742.589

This station is located at Section Corner (36,31,1,6). The mark is a Glo Brass Cap.

ERM#9           ERM EL = 793.627

This station is located 2.7 miles east along the Southern Pacific Railroad from the station at Gila Bend, in S33 T5S R4W, 11-1/8 rails west of a small wooden railroad trestle, 38 feet north of the north rail of the main track, 96 feet south of the center line of a graveled road, 15 feet north of the centerline of a track road, 14 feet west of a telephone pole 31-M, in line with a row of telephone poles, 2.0 feet east of a metal witness post, about 2 feet below the level of the tracks, and on the top of a 5/8 inch copper coated rod that is driven to a depth of 16 feet and encased in a 5-inch iron pipe which projects 5 inches. The mark is a brass cap stamped "US Coast & Geodetic Survey A360".

ERM#10          ERM EL - 806.557

This station is located 2.6 miles east along State Highway 84 from the Southern Pacific Company Railroad Station at Gila Bend, about 0.3 miles east of a ranch house, 50 feet north of the centerline of the highway, 1 foot north of the highway boundary line, and about 1 foot above the surface of the highway; set in the top of a concrete post projecting 3 inches above ground. The mark is a brass cap stamped "US Coast & Geodetic Survey A84".

ERM#11          ERM EL - 859.618

This station is located 3.0 miles southeast on State Highway 84 from the junction of US Highway 80. 1.0 miles east of Gila Bend, 94 feet southwest of the centerline of

the east bound traffic lane, 3.2 feet southeast of a metal witness post with sign, 2.1 feet northeast of a fence, set in a cylindrical concrete post projecting 8 inches. The mark is a brass cap stamped "Cost and Geodetic Survey N354".

ERM#12

ERM EL - 819.244

This station is located 2.5 miles southeast on State Highway 84 from the junction of US Highway 80. 1.0 miles east of Gila Bend, to a gate in right-of-way fence, pass thru gate and go 0.2 miles southerly to the proposed Interstate Route, thence 0.5 miles on the proposed route, 70.19 feet north of R.M. 2, 52.85 feet southwest of R.M.1, 4 feet south of a metal witness post with sign, set in a cylindrical concrete post projecting 4 inches. The mark is a brass cap stamped "Coast and Geodetic Survey GIANT".

ERM#13

ERM EL - 795.674

This station is located 0.3 miles south along State Highway 85 from the Southern Pacific Company Railroad Station at Gila Bend, thence 1.9 miles south along a graded road at the "T" junction of a graded road leading east of a fence corner, 51 feet north of the centerline of the road east, 45 feet east of the centerline of the road south, 36 feet north of the fence corner 2.8 feet north of a witness post 2.4 feet west of a fence, and set in the top of a concrete post projecting 0.6 feet above the ground, and level with the road. The mark is a brass cap stamped "US Coast & Geodetic Survey N298".

ERM#14

ERM EL - 766.895

This station is located 0.3 miles south along State Highway 85 from the Southern Pacific County Railroad Station at Gila Bend. Thence 0.7 miles south along a graded road on a small barren patch, 59 feet south of the centerline of the road, 2.4 feet north of a witness post and set in the top of a concrete post projecting 0.5 foot above the ground, and about 1½ feet higher than the road. The mark is a brass cap stamped "US Coast and Geodetic Survey M298".

ERM#15

ERM EL - 827.023

This station is a Section Corner. The mark is a brass cap (8,9,17,16).

ERM#16

ERM EL - 804.277

This station is located 0.3 mile south along State Highway 85 from the Southern Pacific Railroad Station at Gila Bend. Thence 1.9 miles south along a graded road, thence 0.7 mile east along a graded road at a gravel pit and a large mound of dirt at the junction of a track road leading south along a fence line, 86 feet north of the remains of a fence corner. 111 feet north of the junction of the traced road, 18 feet east of the dirt mound, 5.0 feet northwest of a 6 foot high wooden post, 1.6 feet southwest of a witness post, set in the top of a concrete post projecting 0.4 foot above the ground, and level with the roads. The mark is a brass cap stamped "US Coast and Geodetic Survey R60".

**FLOOD PROFILES**

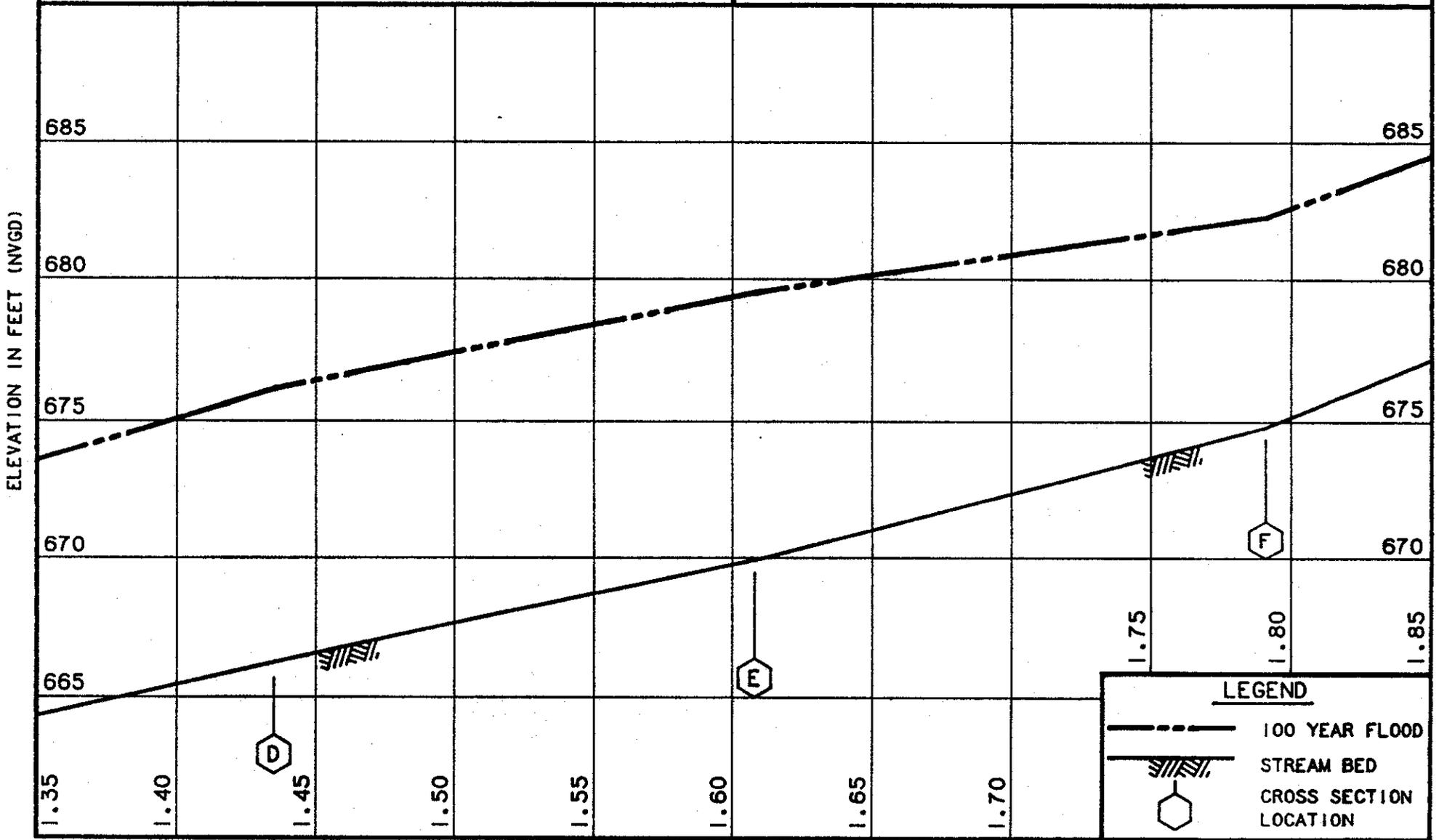
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



ENGINEERS  
ARCHITECTS

# FLOOD PROFILES

## SAND TANK WASH



DISTANCE IN MILES ABOVE MOUTH

### LEGEND

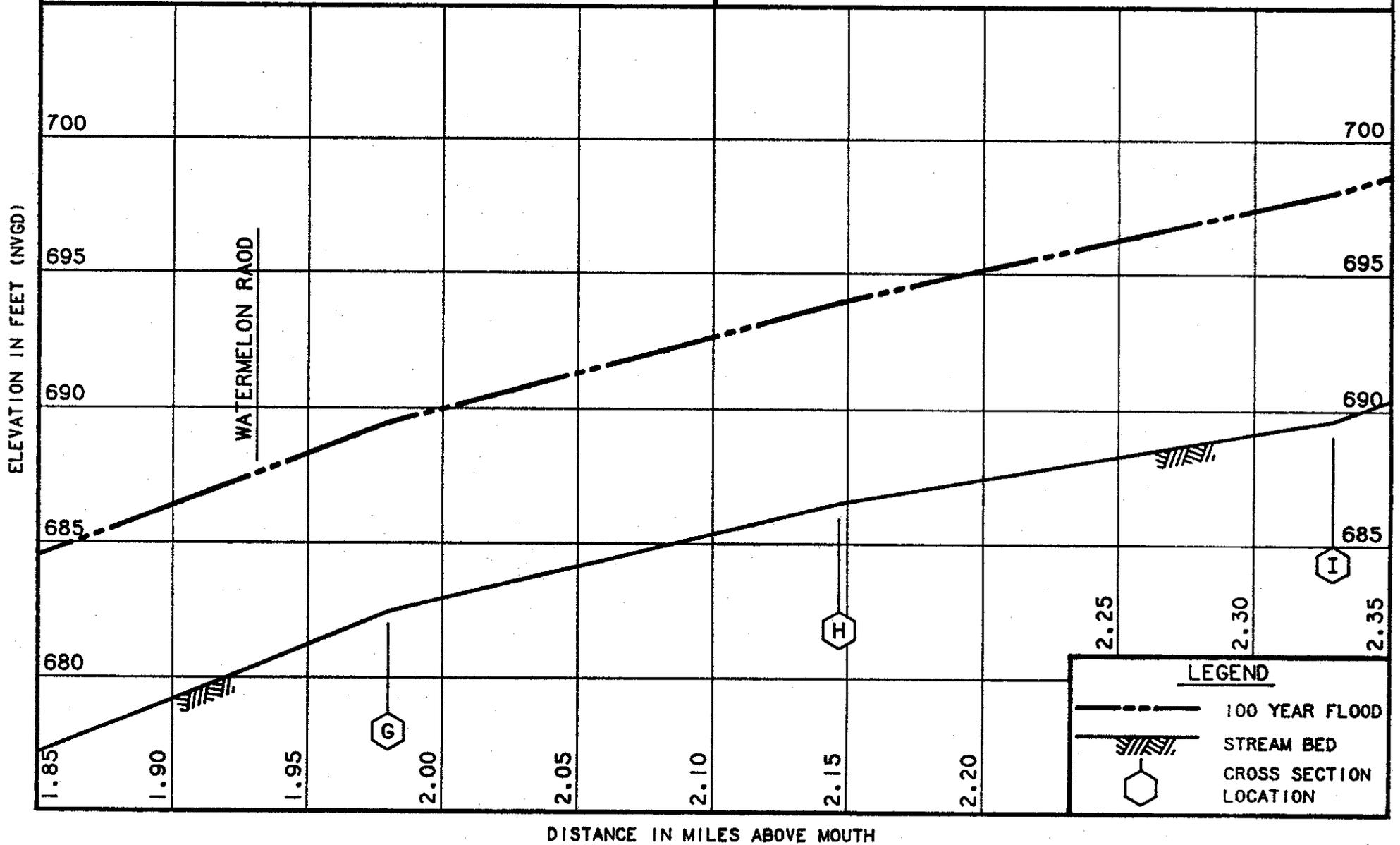
- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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# FLOOD PROFILES

## SAND TANK WASH



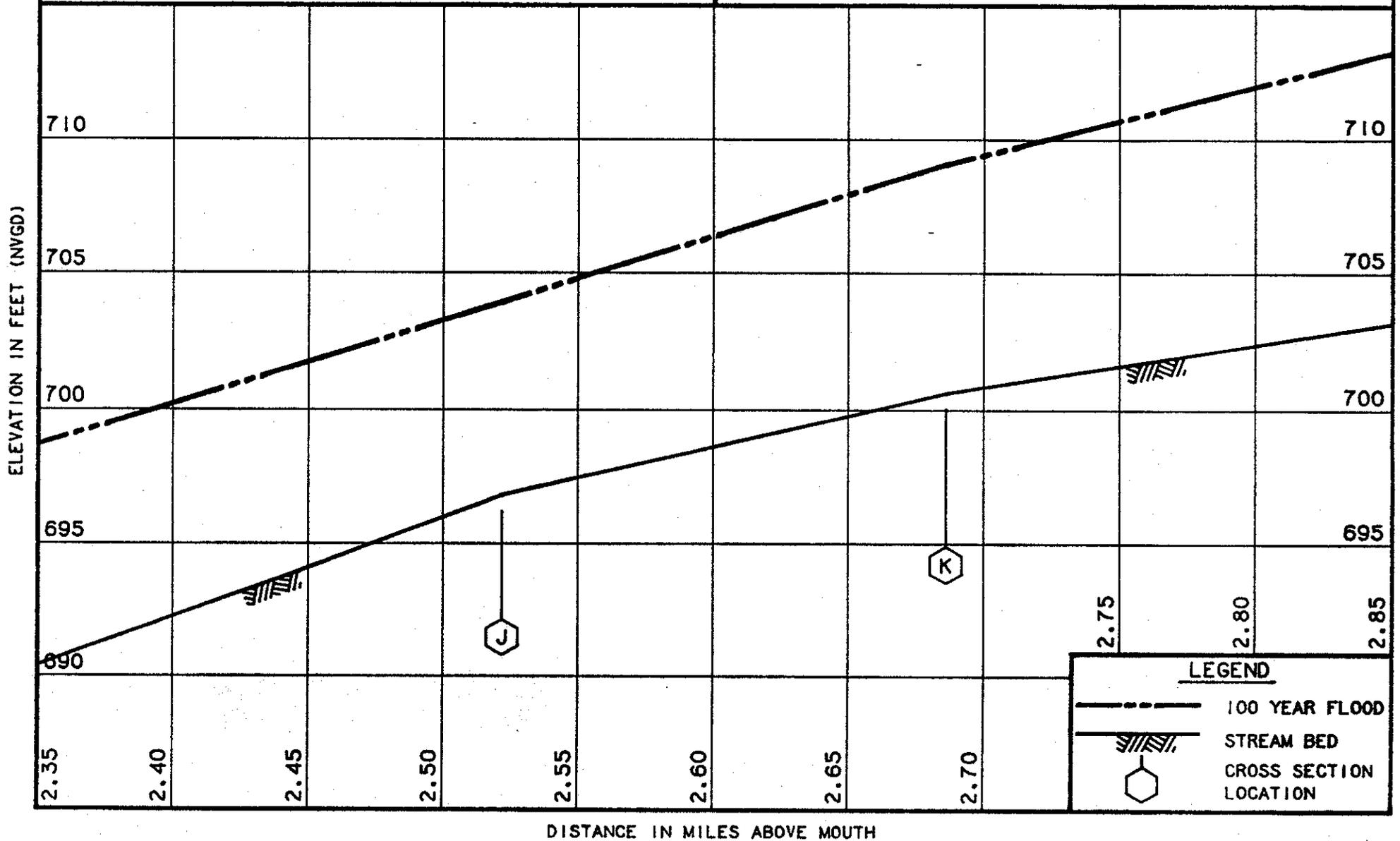
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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# FLOOD PROFILES

## SAND TANK WASH



DISTANCE IN MILES ABOVE MOUTH

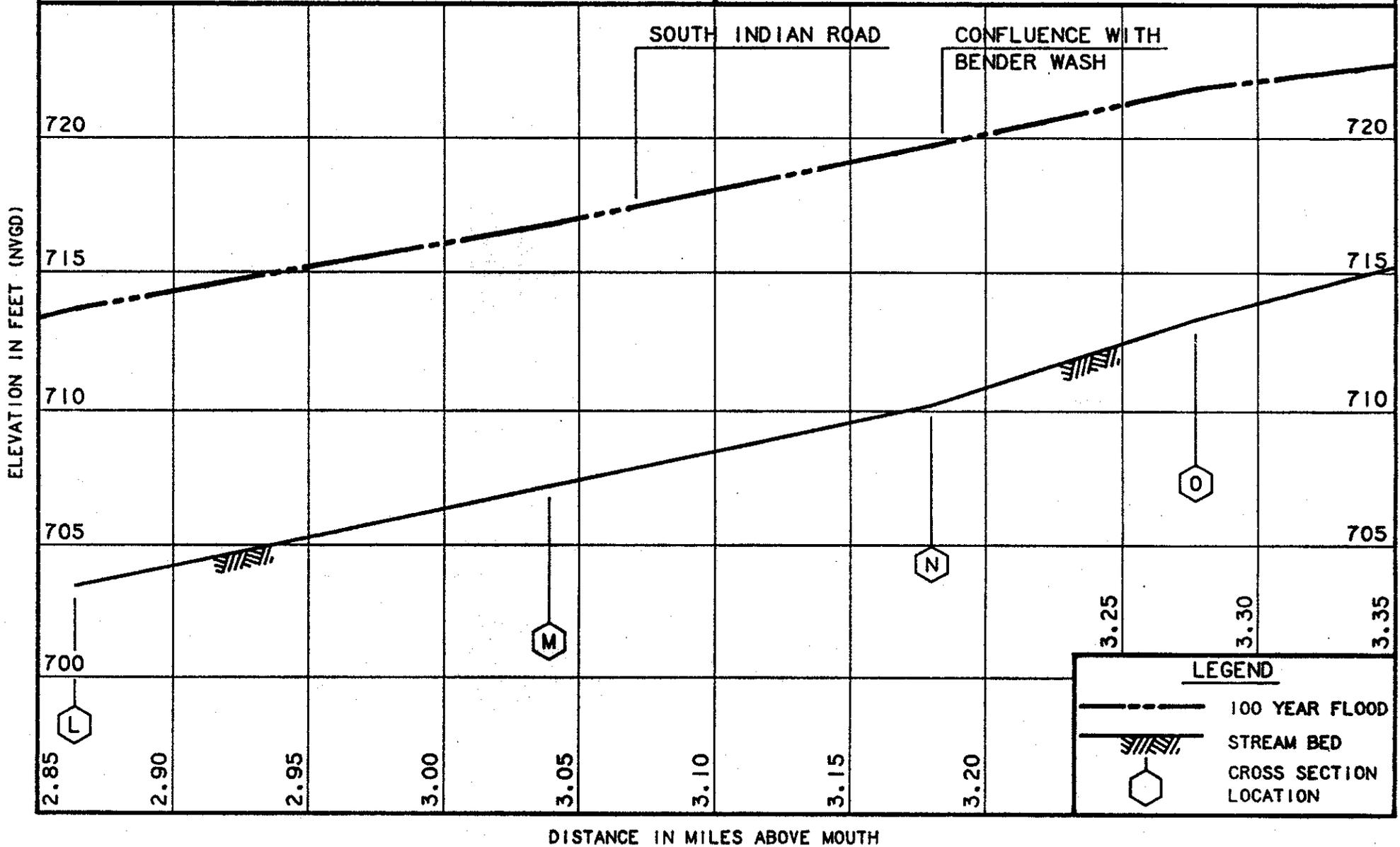
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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# FLOOD PROFILES

## SAND TANK WASH



**LEGEND**

- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

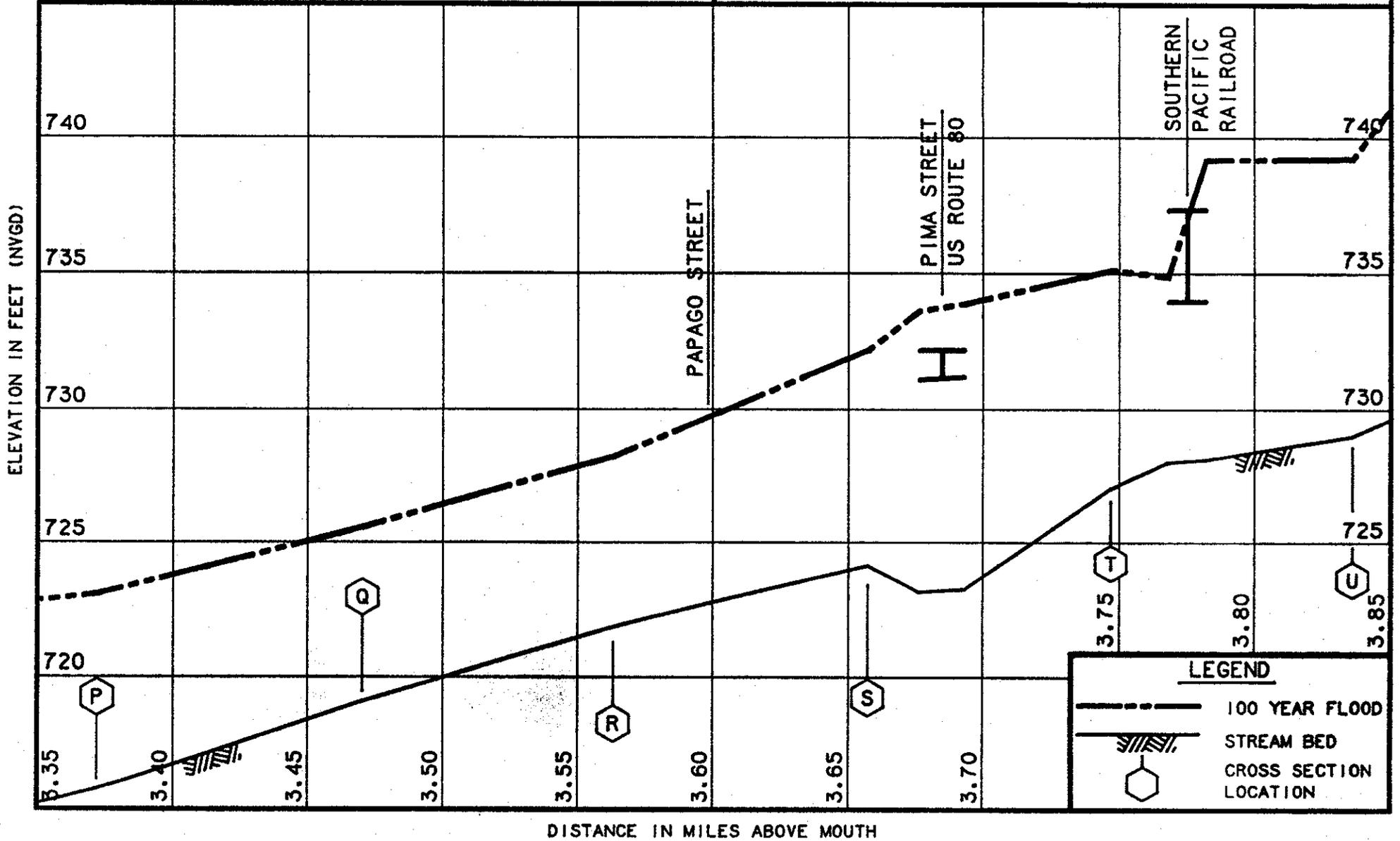
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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# FLOOD PROFILES

## SAND TANK WASH



**LEGEND**

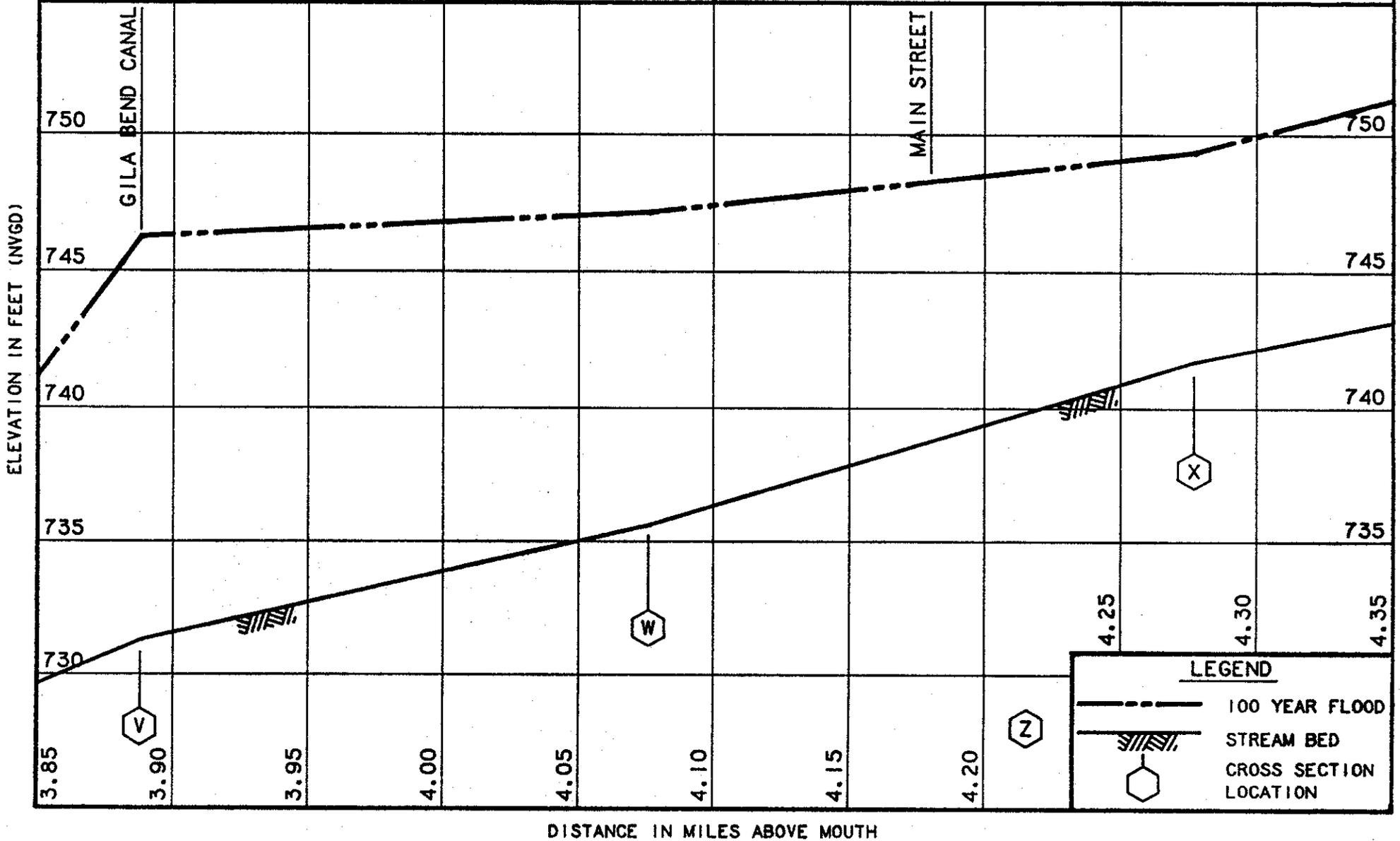
- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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# FLOOD PROFILES

## SAND TANK WASH

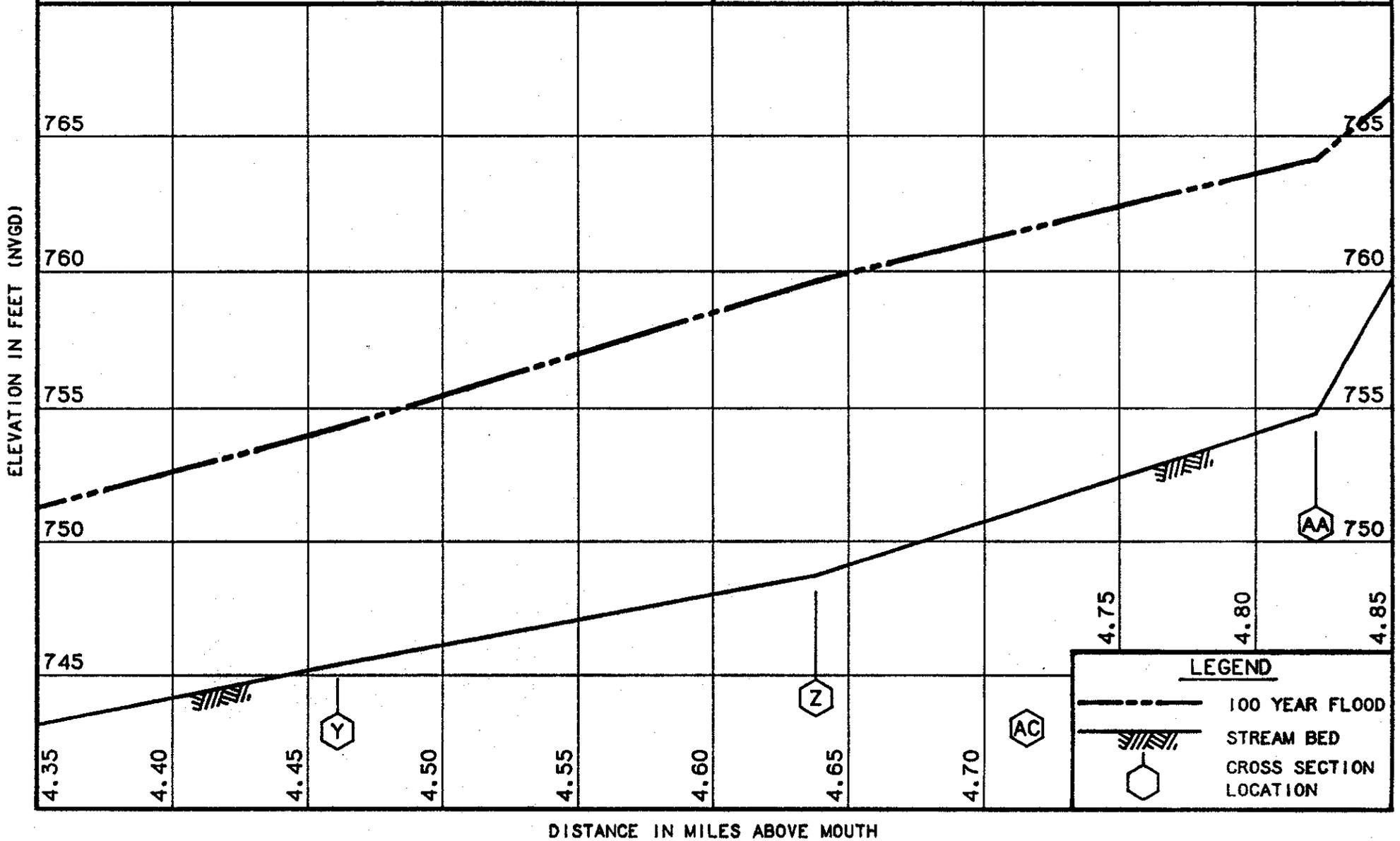


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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# FLOOD PROFILES

## SAND TANK WASH



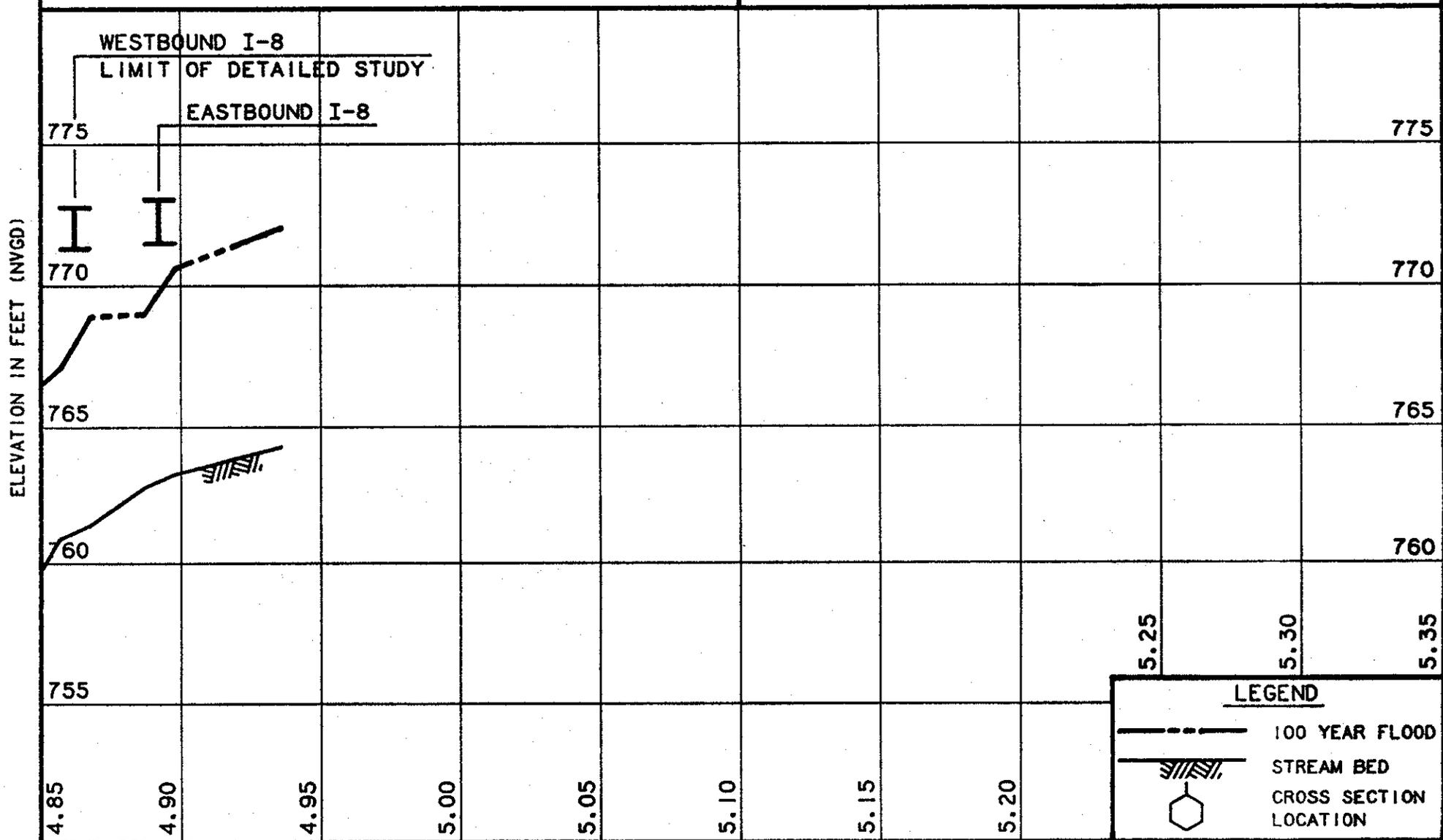
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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# FLOOD PROFILES

## SAND TANK WASH



DISTANCE IN MILES ABOVE MOUTH

**LEGEND**

- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

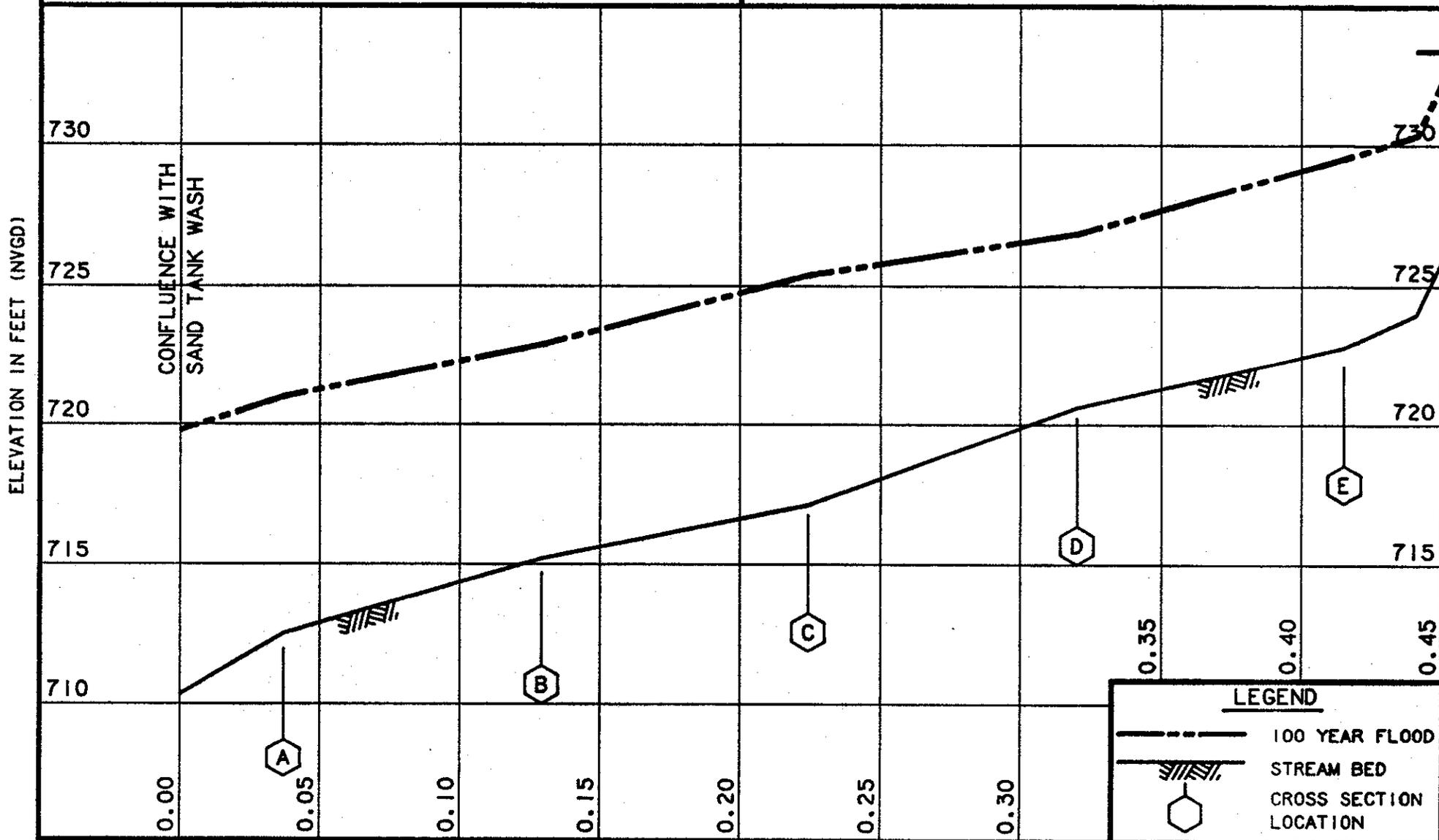
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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# FLOOD PROFILES

## BENDER WASH



ELEVATION IN FEET (NVGD)

CONFLUENCE WITH  
SAND TANK WASH

### LEGEND

- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

DISTANCE IN MILES ABOVE MOUTH

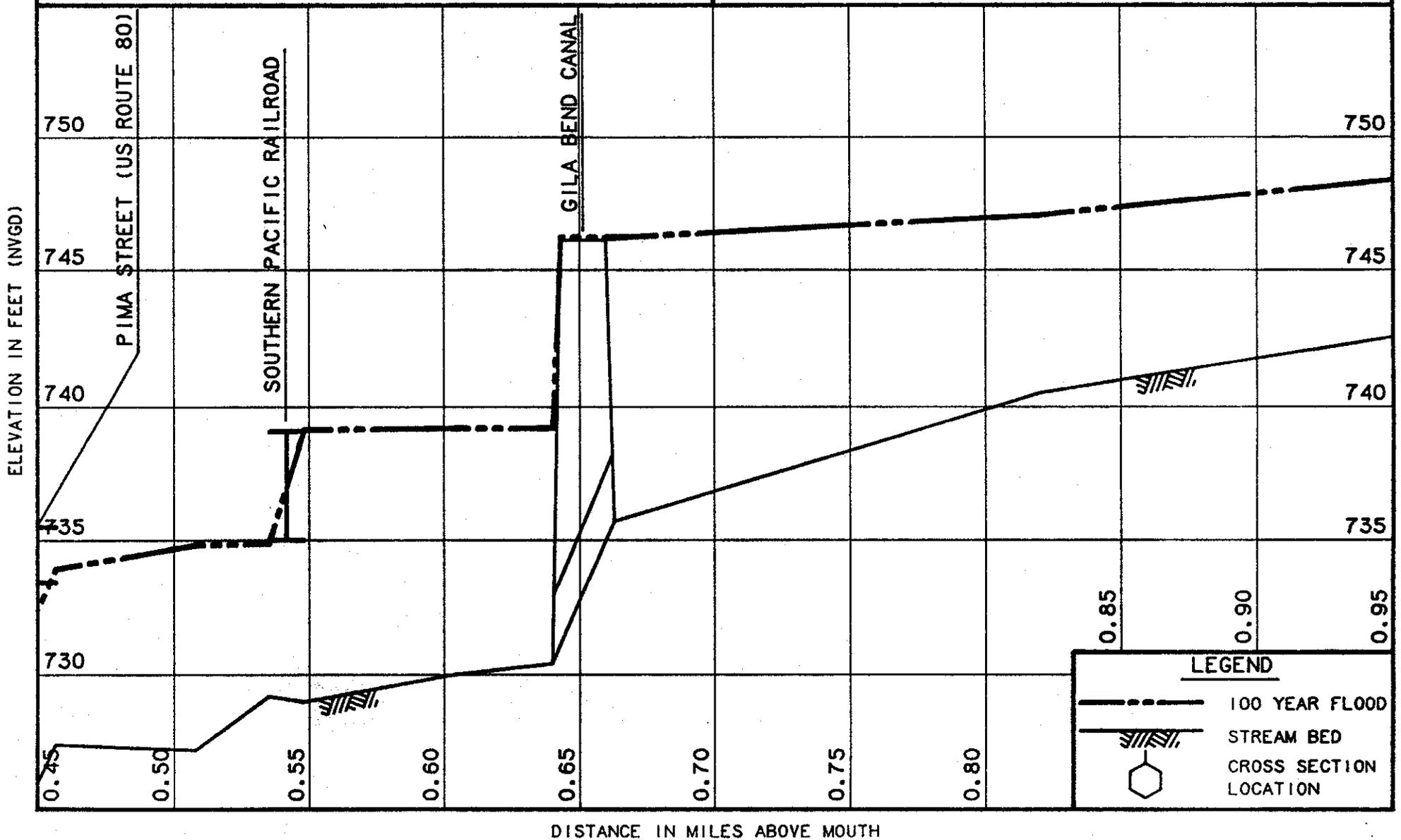
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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# FLOOD PROFILES

## BENDER WASH



**LEGEND**

- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

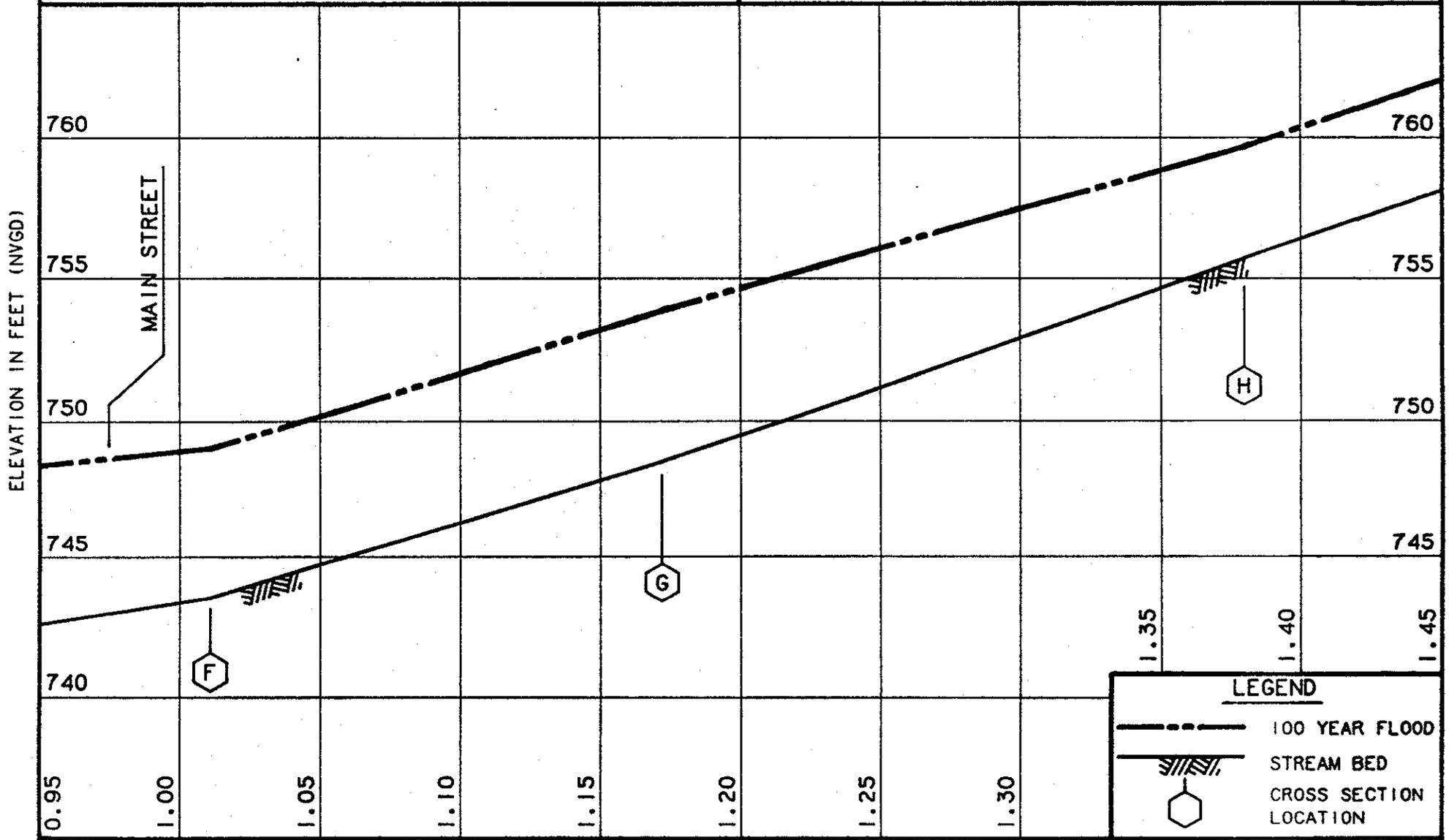
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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# FLOOD PROFILES

## BENDER WASH



ELEVATION IN FEET (NVGD)

MAIN STREET

F

G

H

### LEGEND

- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

DISTANCE IN MILES ABOVE MOUTH

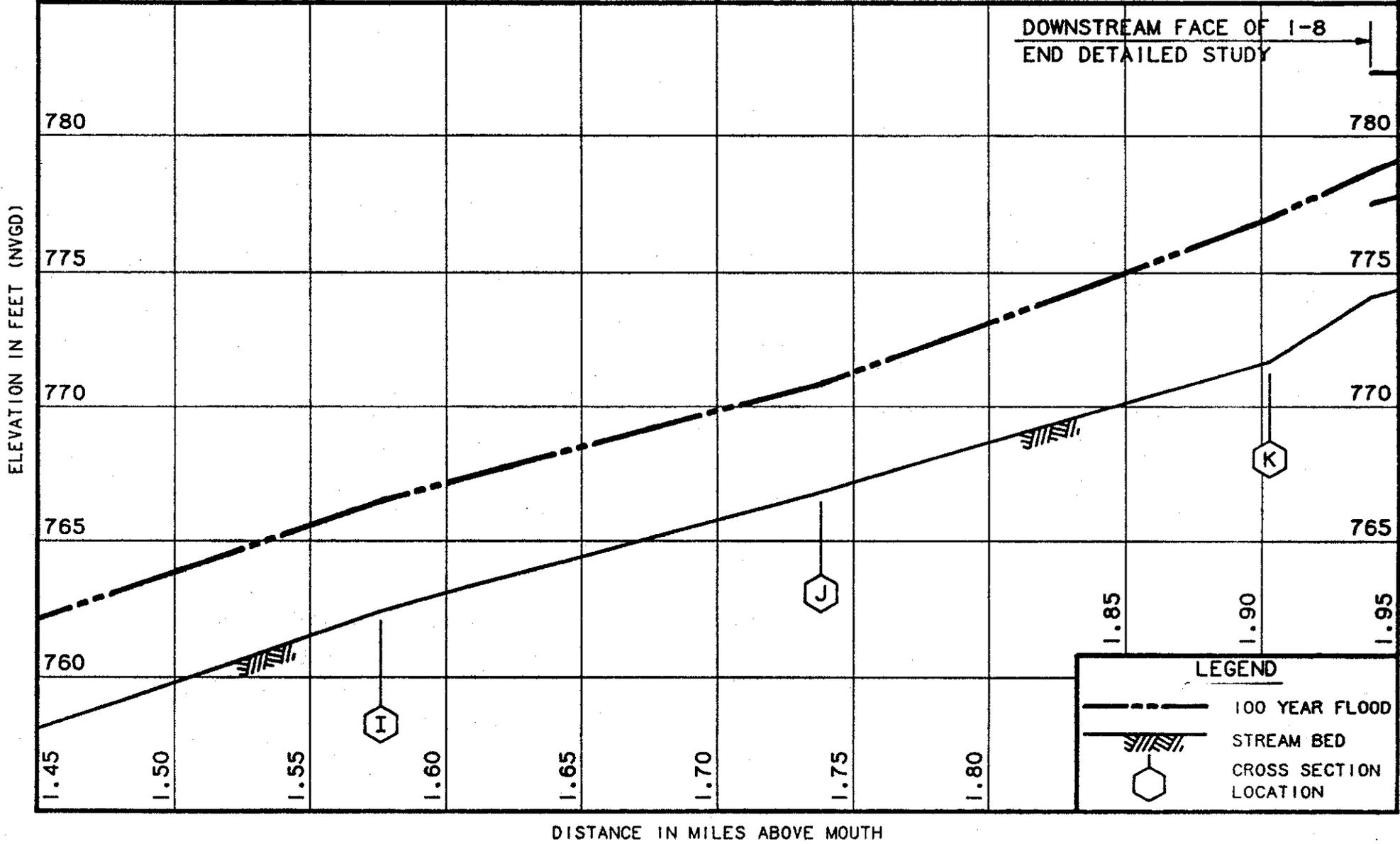
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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# FLOOD PROFILES

## BENDER WASH



DOWNSTREAM FACE OF I-8  
END DETAILED STUDY

ELEVATION IN FEET (NVGD)

DISTANCE IN MILES ABOVE MOUTH

**LEGEND**

- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

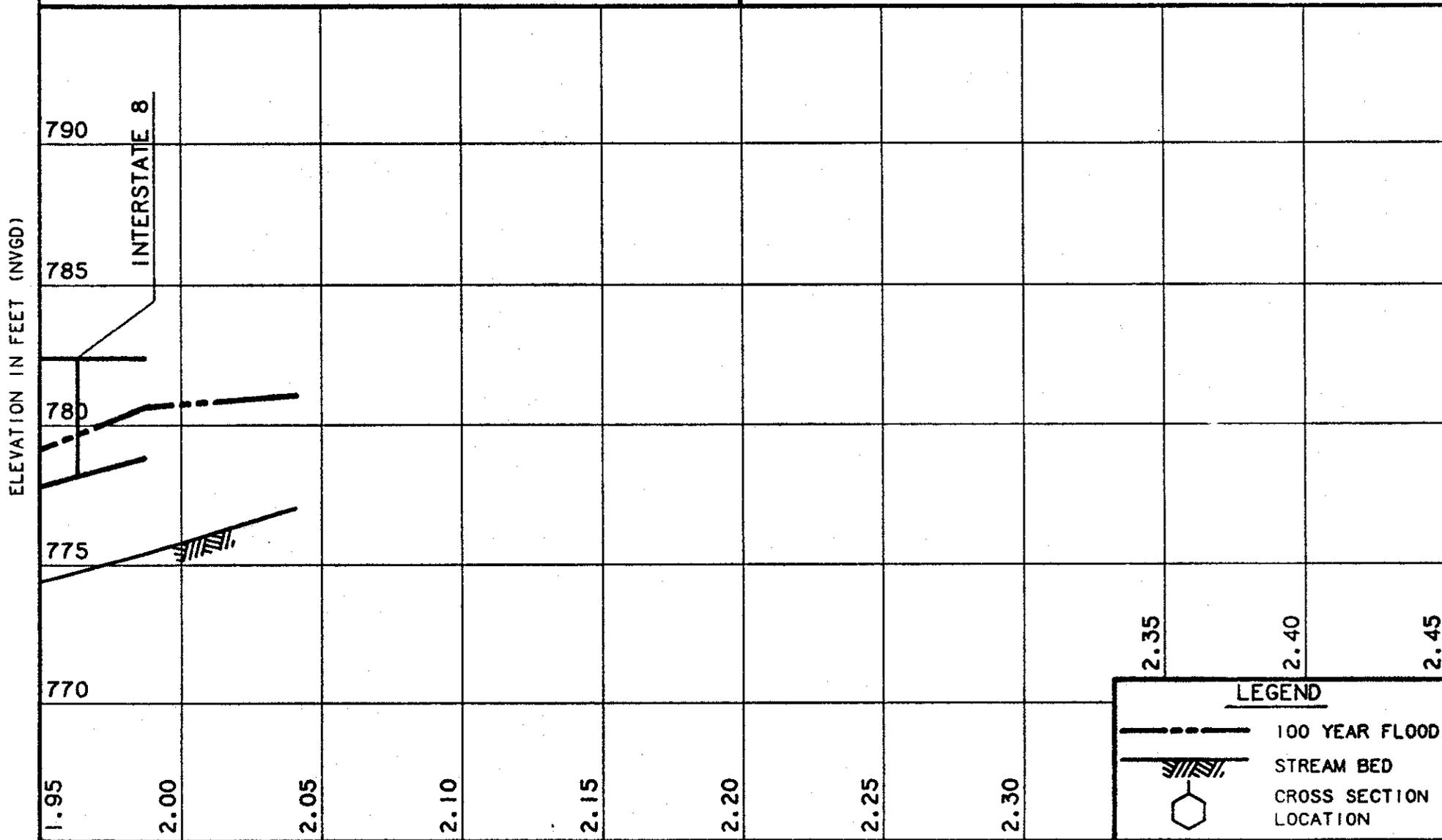
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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# FLOOD PROFILES

## BENDER WASH



ELEVATION IN FEET (NVGD)

INTERSTATE 8

### LEGEND

- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

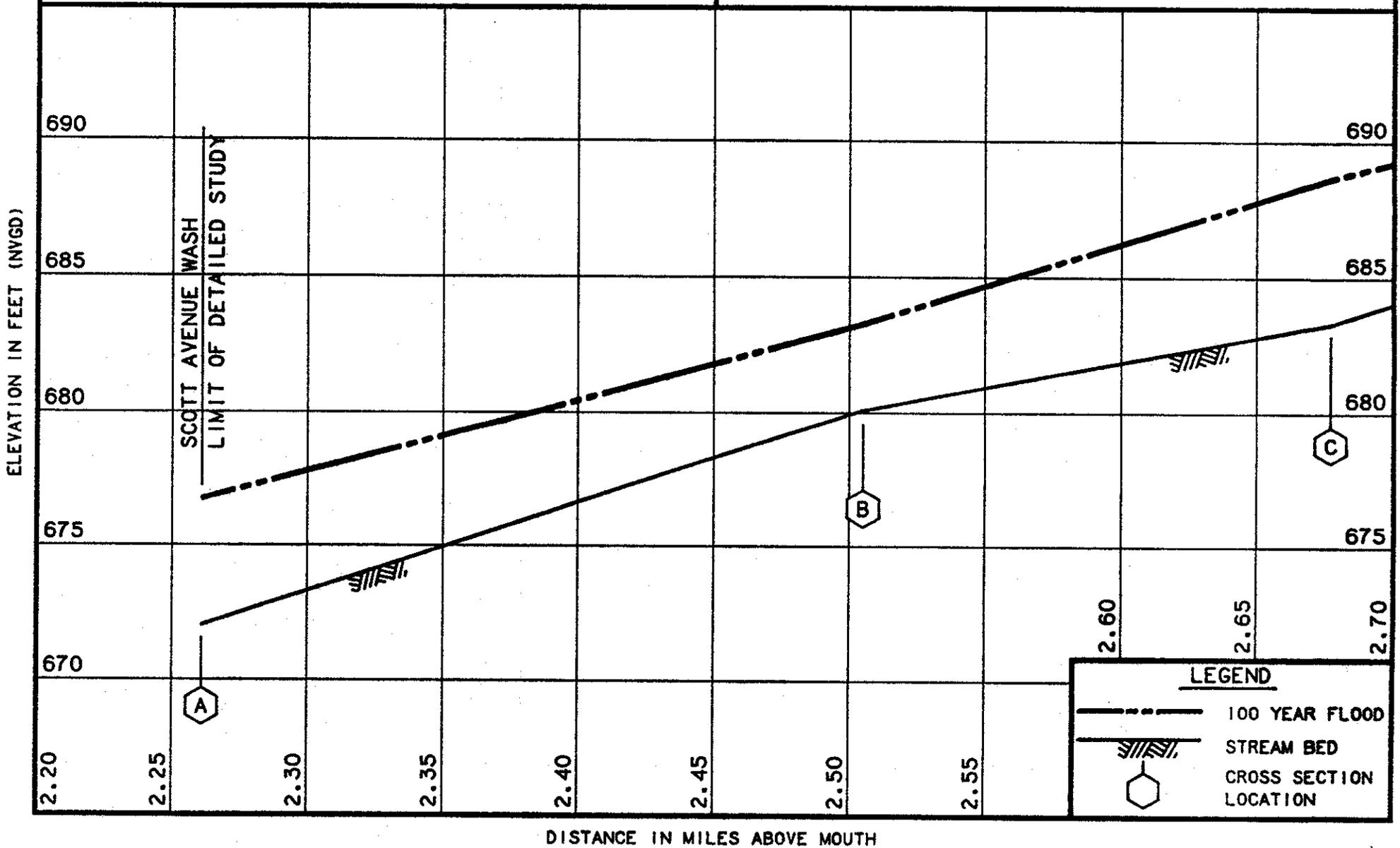
DISTANCE IN MILES ABOVE MOUTH

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ENGINEERS  
ARCHITECTS

# FLOOD PROFILES

## SCOTT AVENUE WASH



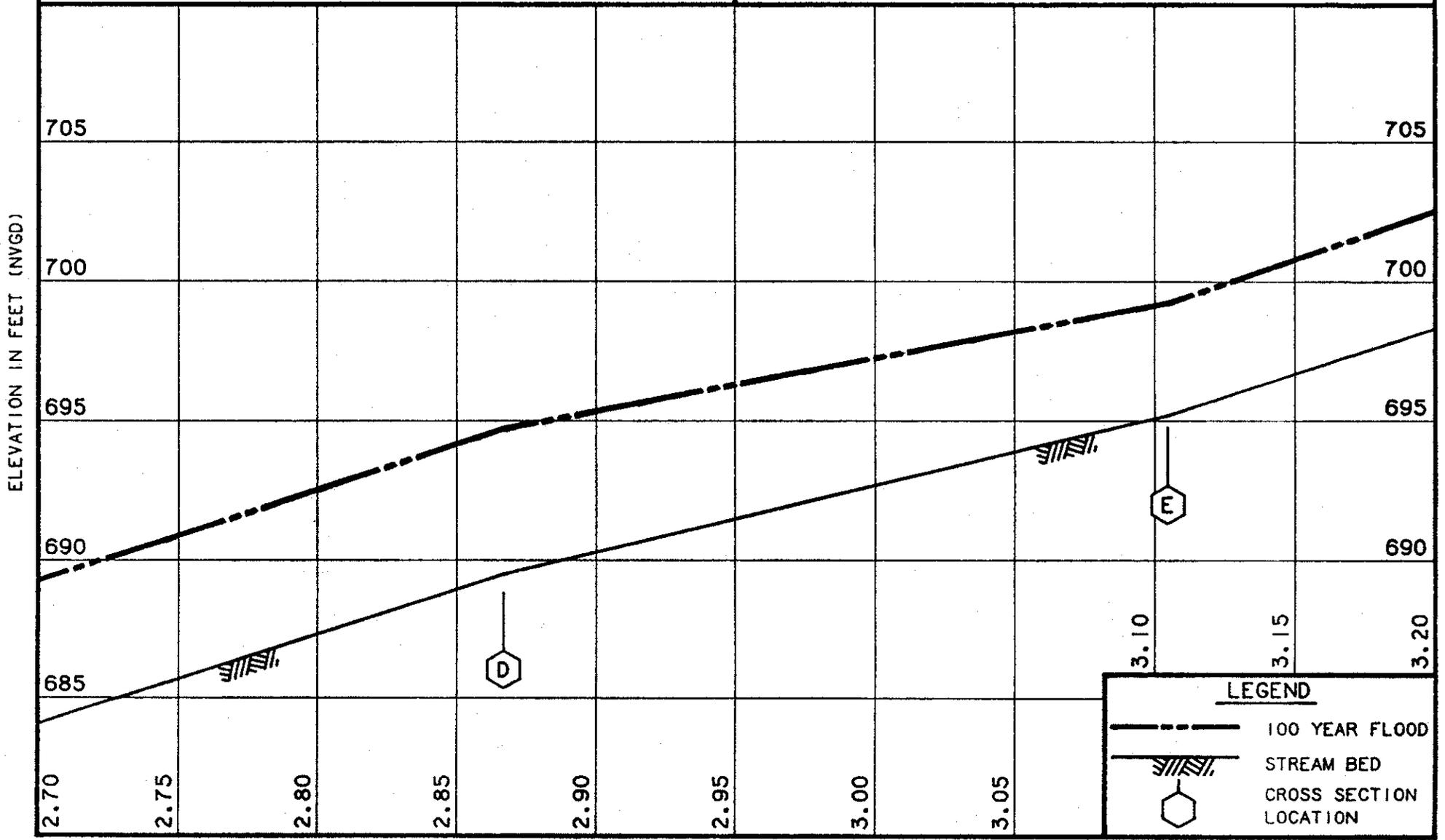
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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# FLOOD PROFILES

## SCOTT AVENUE WASH



ELEVATION IN FEET (NVGD)

DISTANCE IN MILES ABOVE MOUTH

### LEGEND

- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

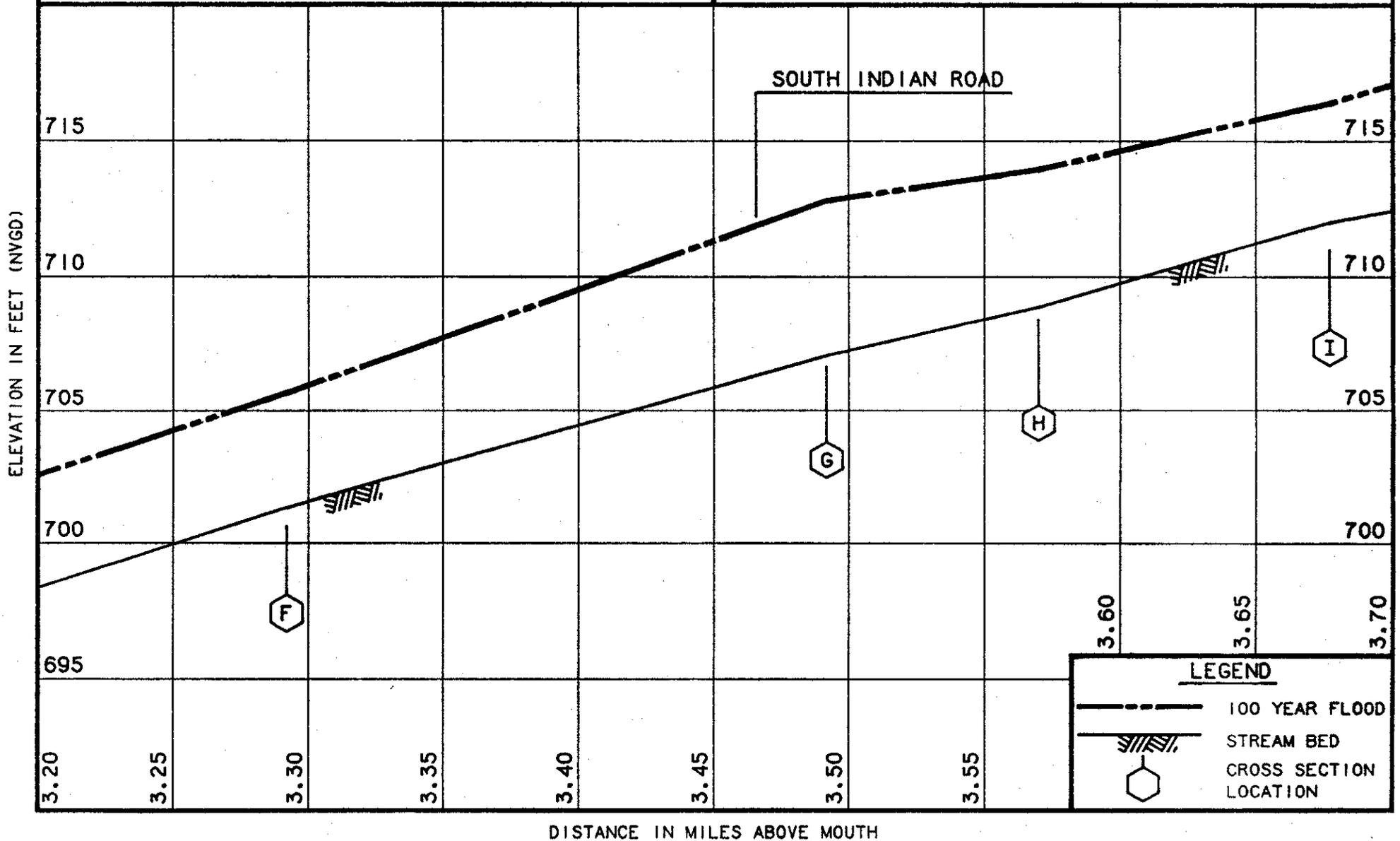
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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# FLOOD PROFILES

## SCOTT AVENUE WASH



DISTANCE IN MILES ABOVE MOUTH

### LEGEND

- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

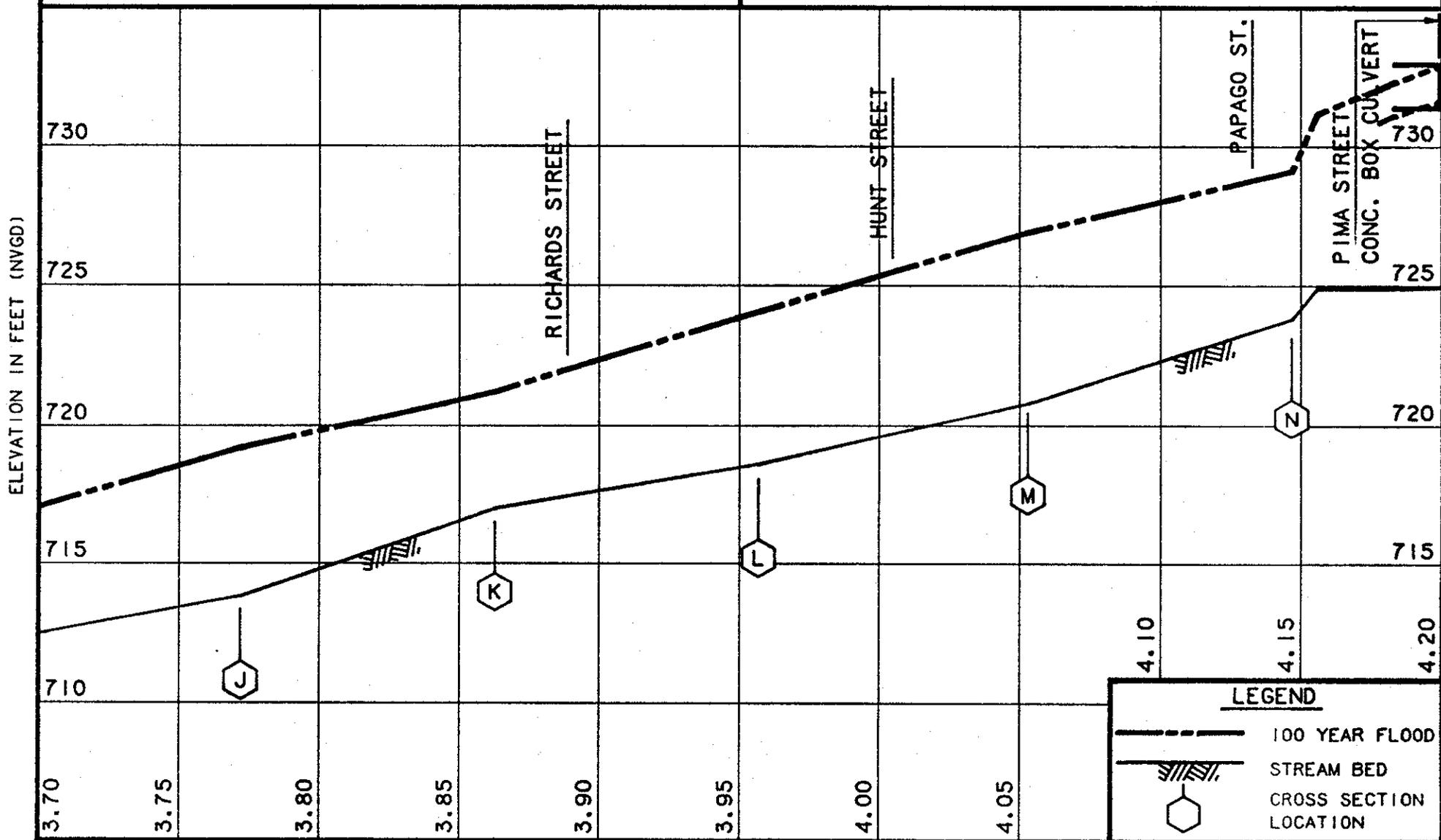
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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# FLOOD PROFILES

## SCOTT AVENUE WASH



DISTANCE IN MILES ABOVE MOUTH

### LEGEND

- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

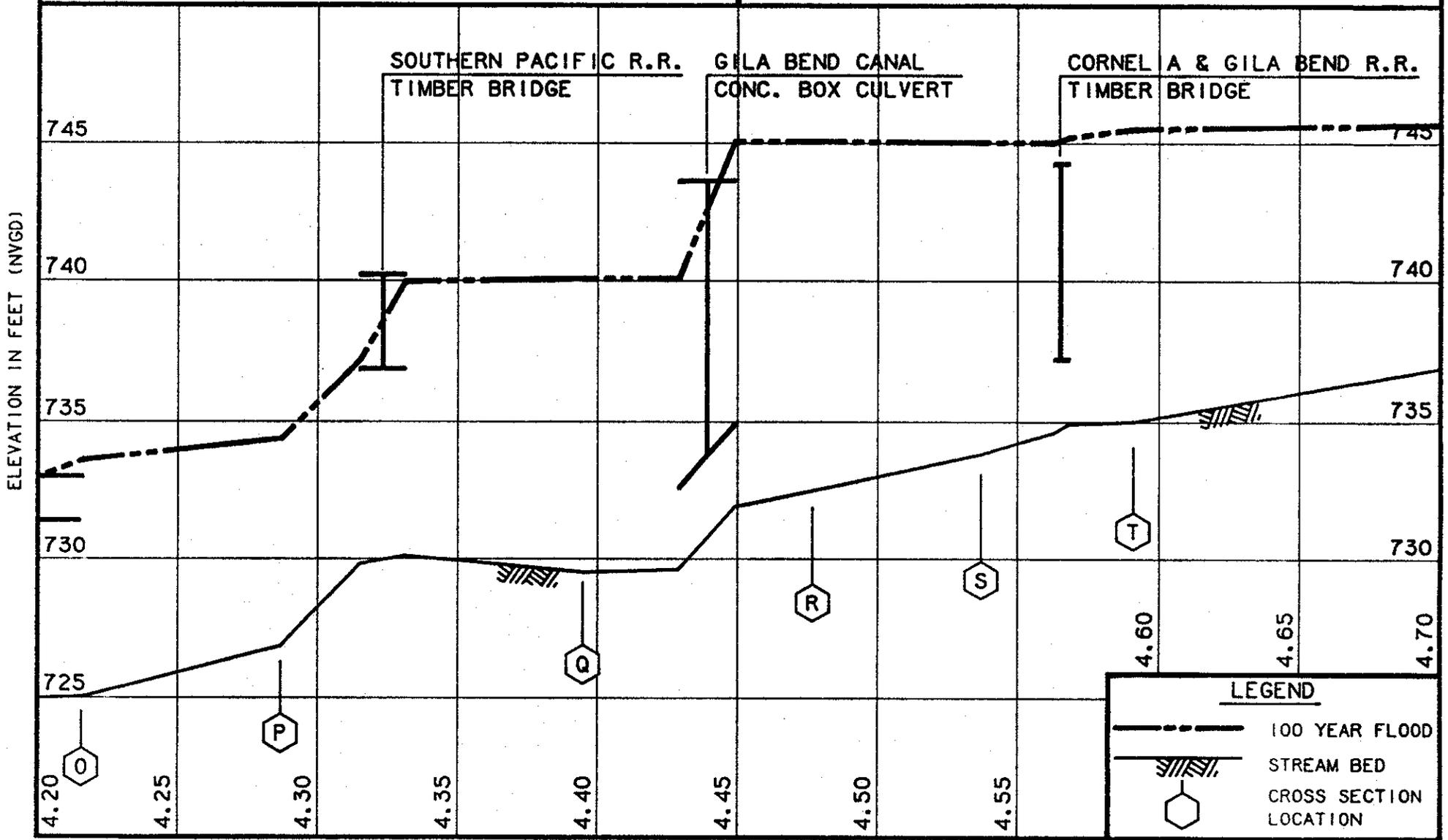
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# FLOOD PROFILES

## SCOTT AVENUE WASH



DISTANCE IN MILES ABOVE MOUTH

### LEGEND

- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

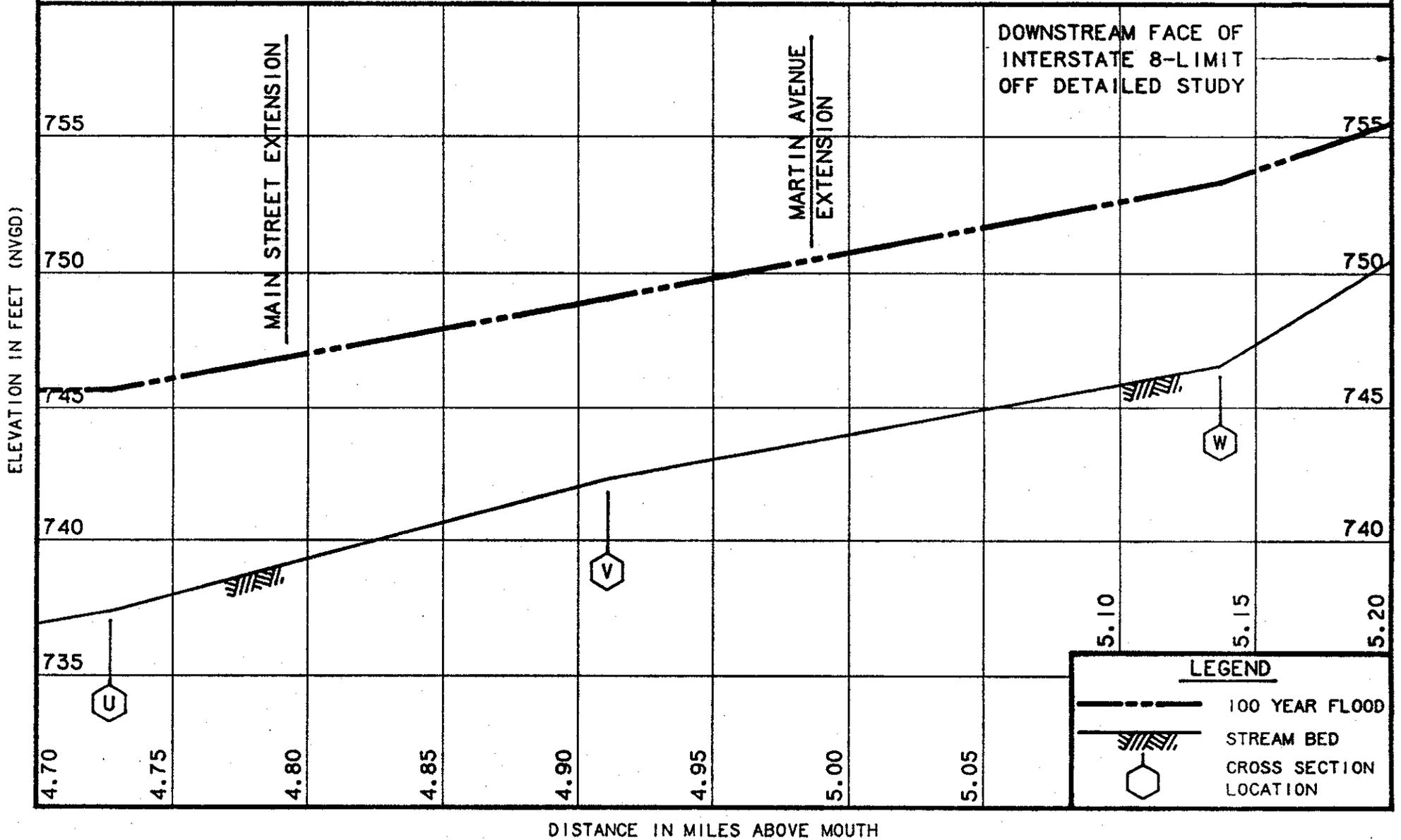
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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# FLOOD PROFILES

## SCOTT AVENUE WASH



DISTANCE IN MILES ABOVE MOUTH

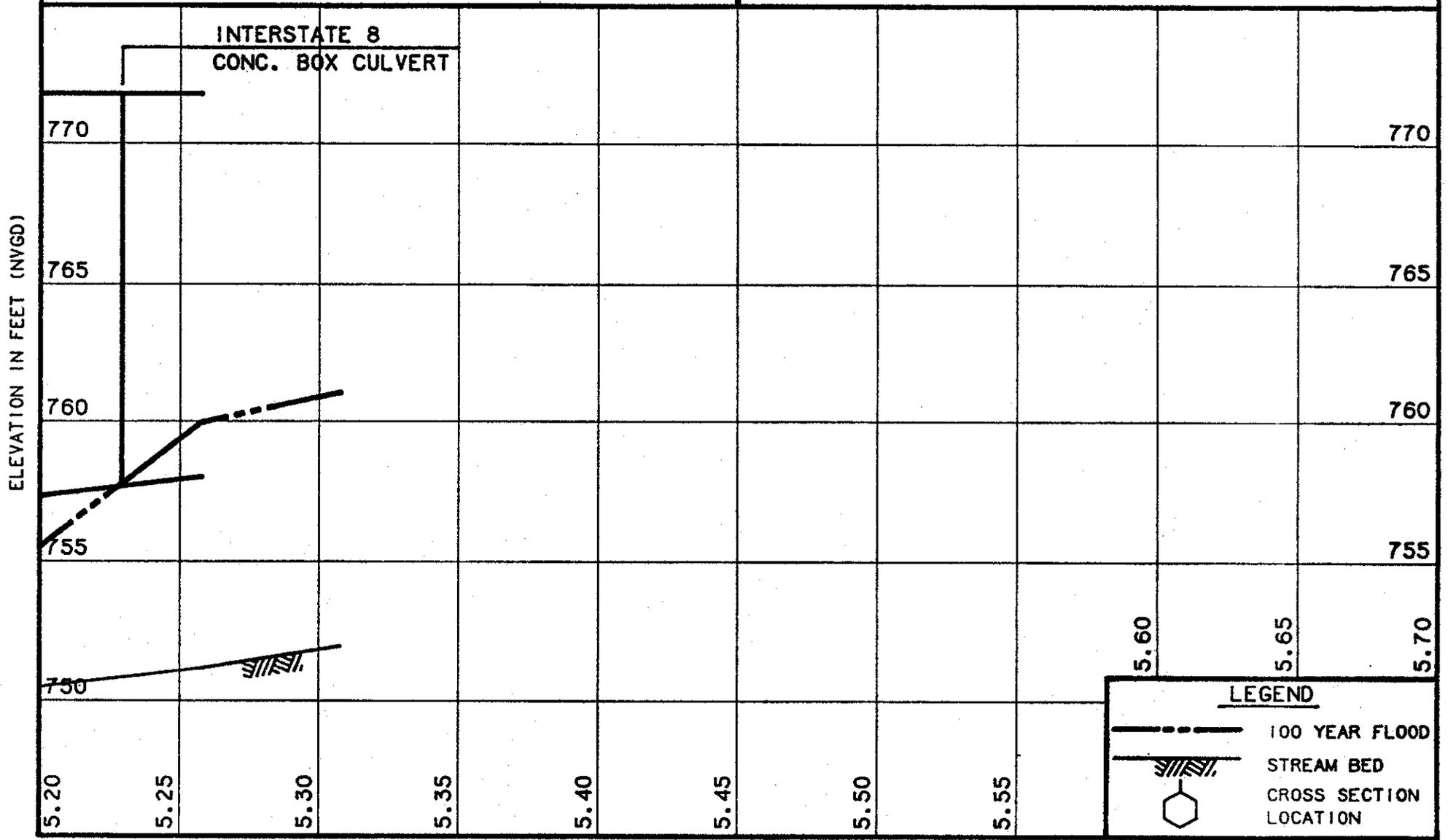
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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# FLOOD PROFILES

## SCOTT AVENUE WASH



DISTANCE IN MILES ABOVE MOUTH

**LEGEND**

- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

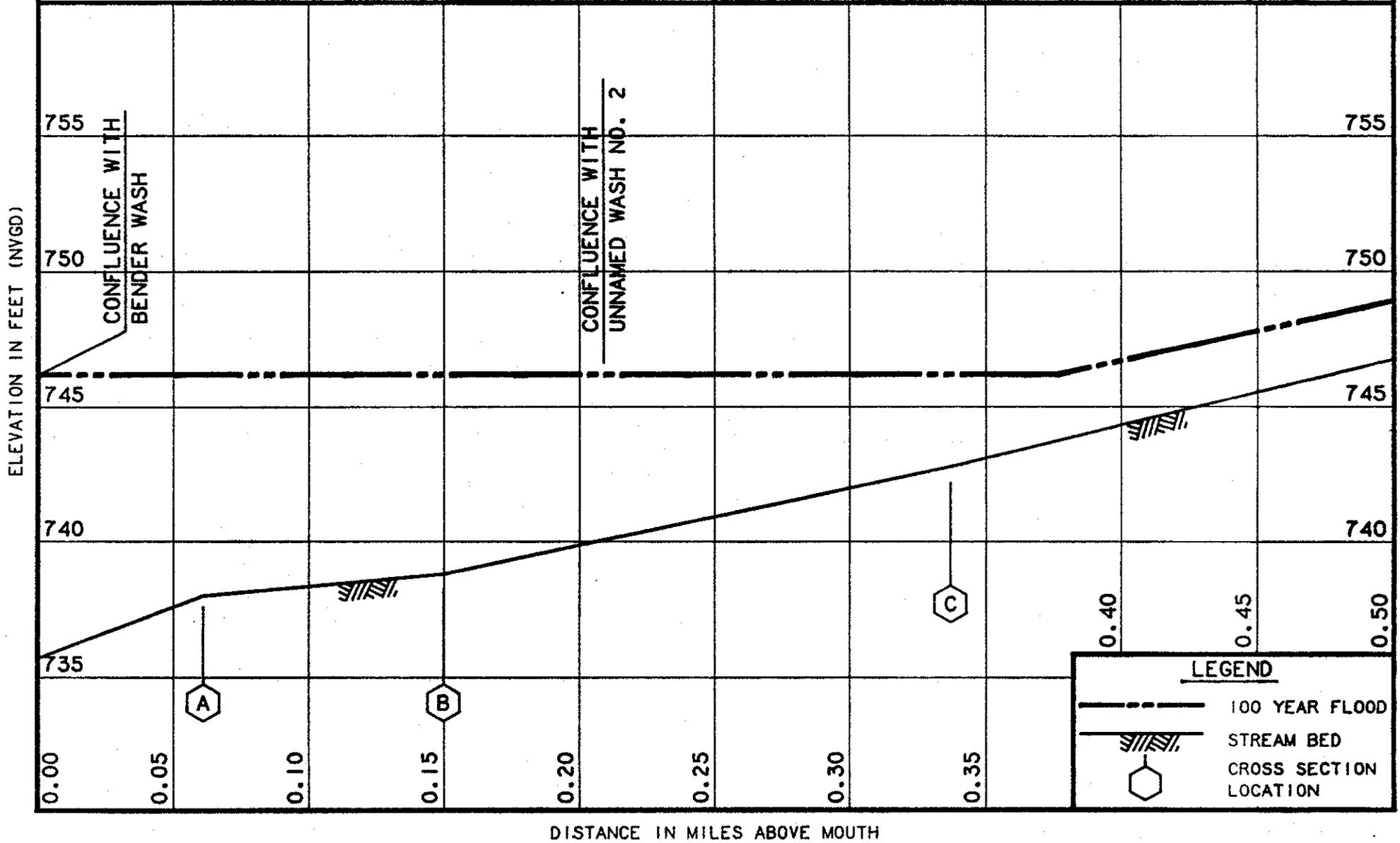
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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# FLOOD PROFILES

## UNNAMED WASH NO. 1



DISTANCE IN MILES ABOVE MOUTH

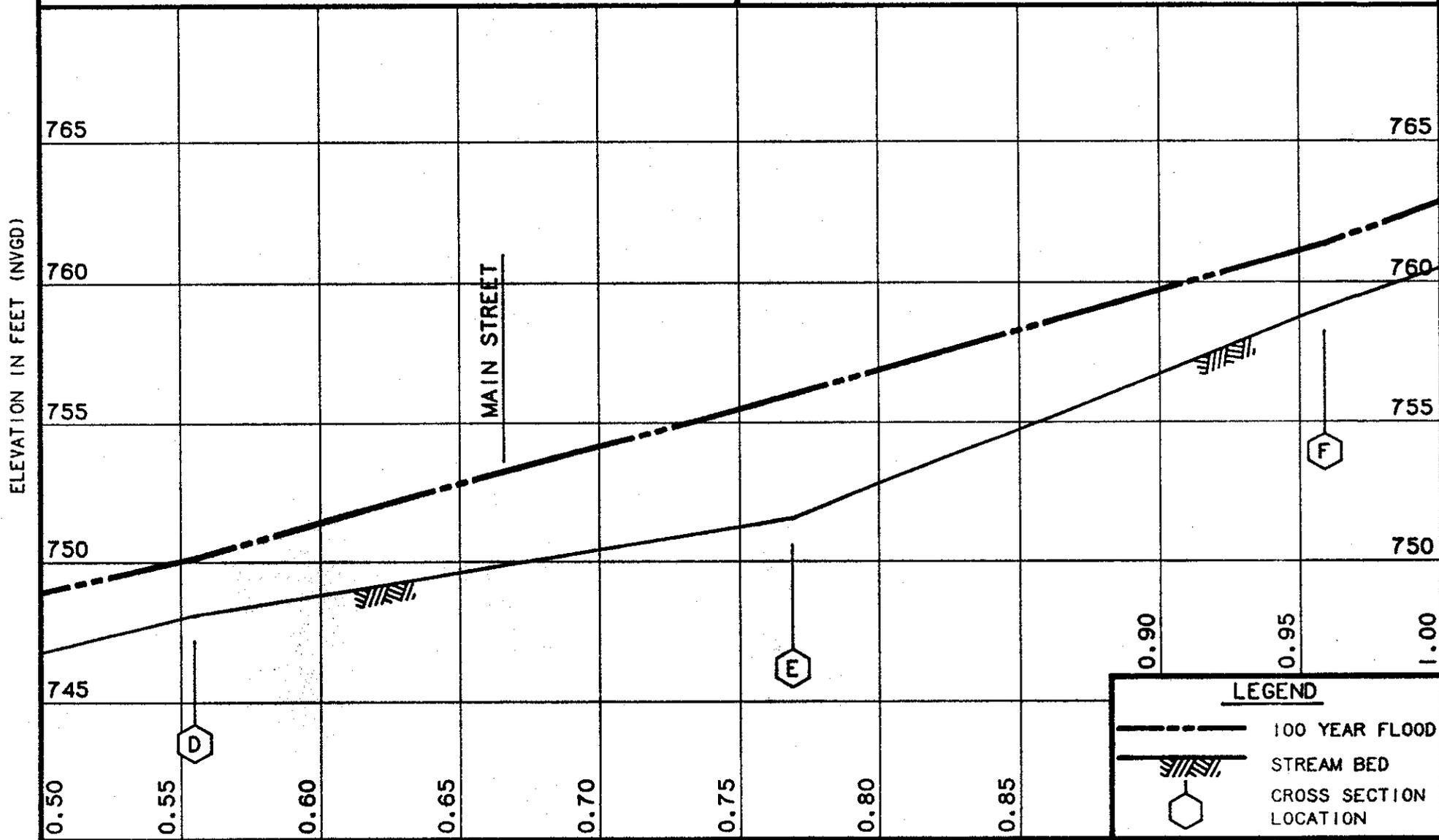
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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# FLOOD PROFILES

## UNNAMED WASH NO. 1



DISTANCE IN MILES ABOVE MOUTH

### LEGEND

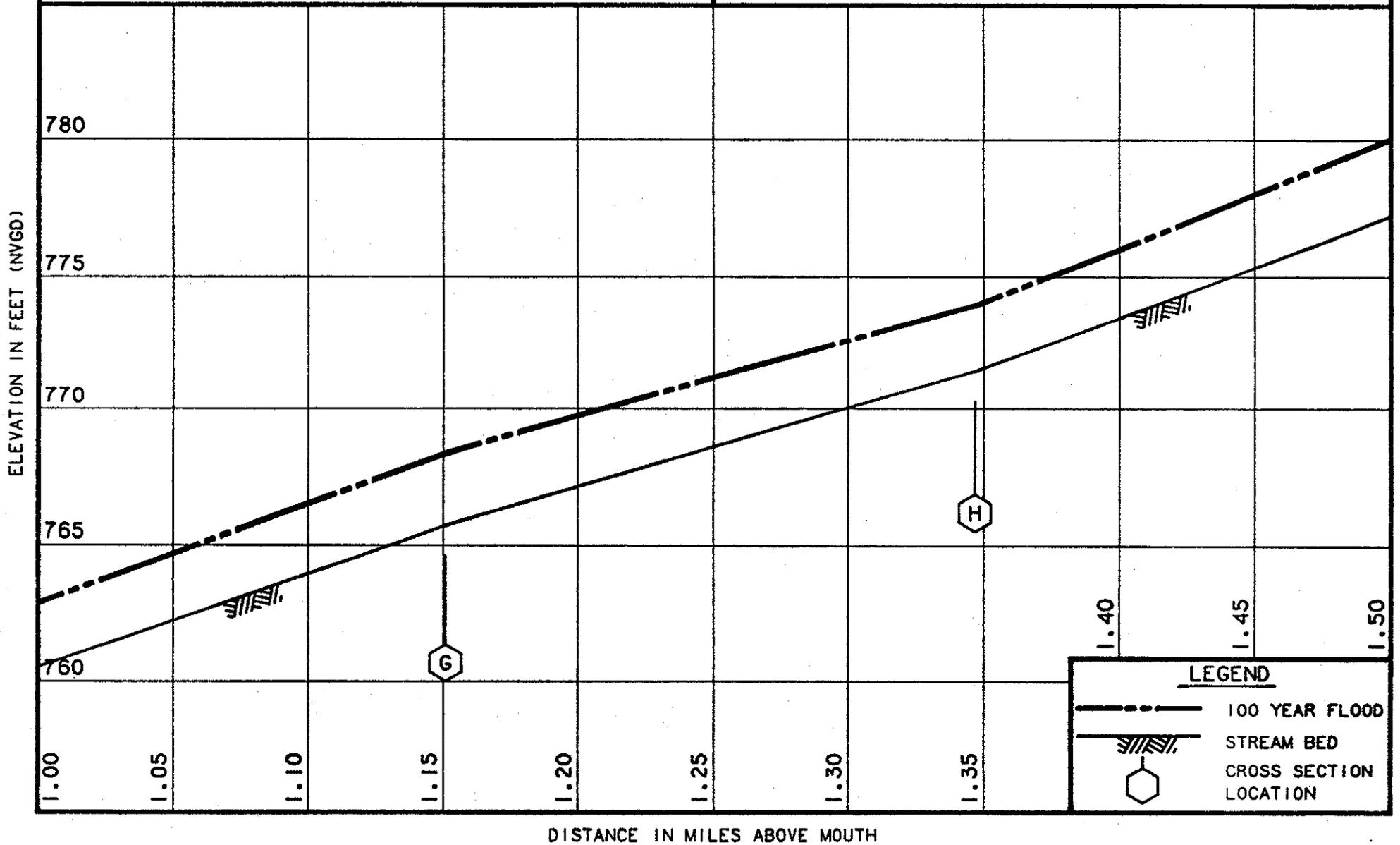
- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ENGINEERS  
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# FLOOD PROFILES

## UNNAMED WASH NO. 1



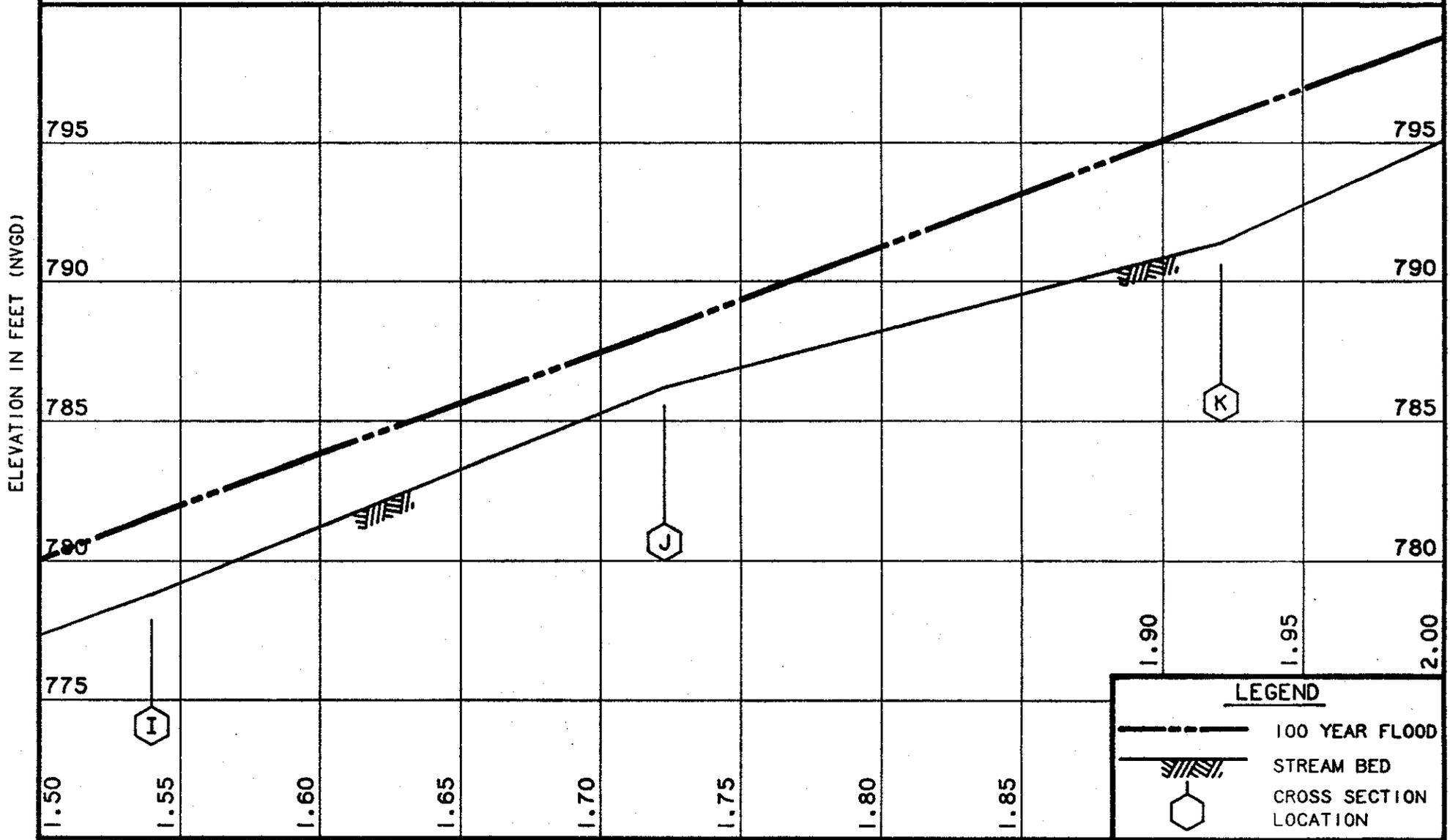
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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# FLOOD PROFILES

## UNNAMED WASH NO. 1



DISTANCE IN MILES ABOVE MOUTH

### LEGEND

- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

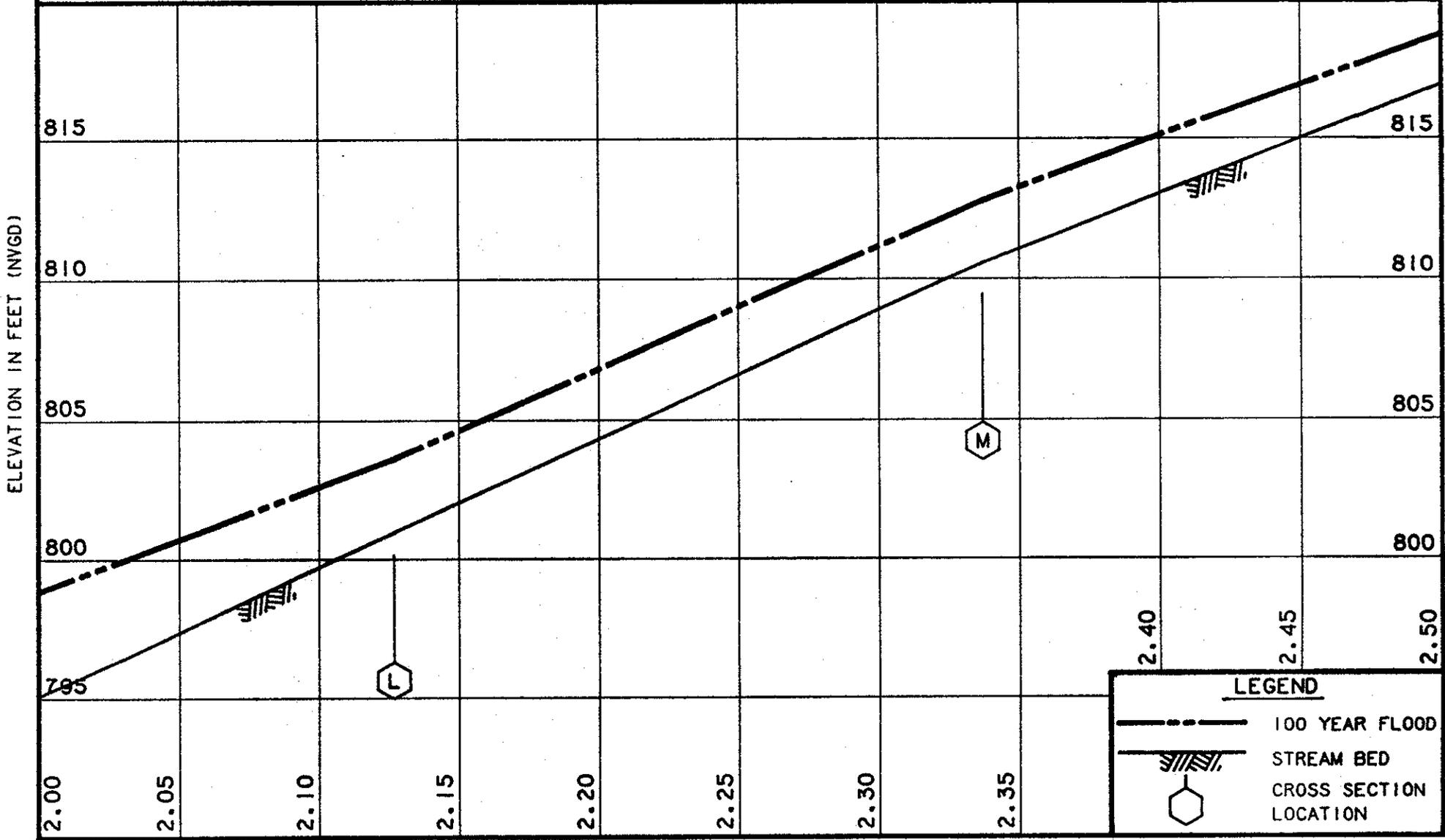
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



ENGINEERS  
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# FLOOD PROFILES

## UNNAMED WASH NO. 1



ELEVATION IN FEET (NYGD)

DISTANCE IN MILES ABOVE MOUTH

**LEGEND**

- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

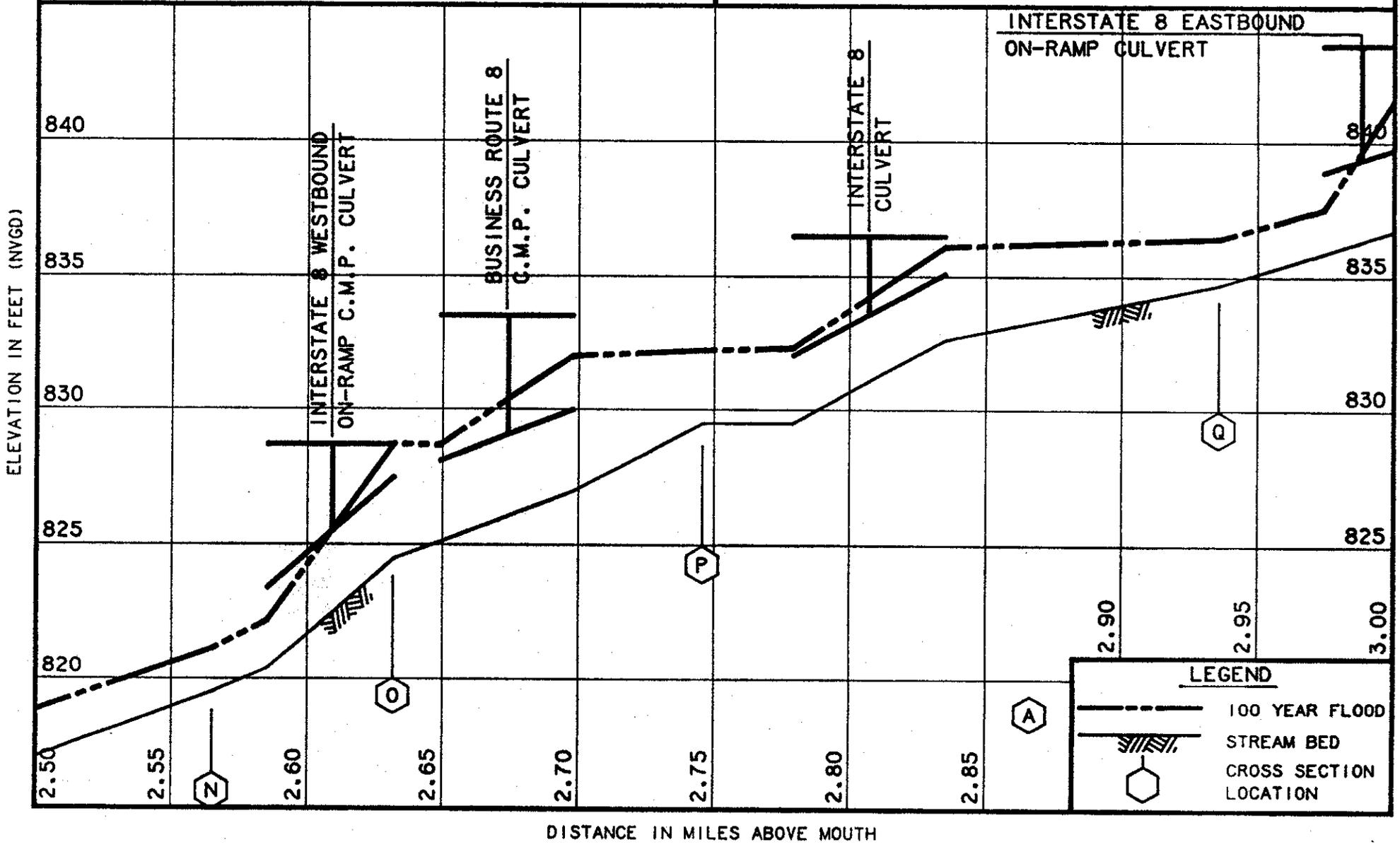
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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# FLOOD PROFILES

## UNNAMED WASH NO. 1

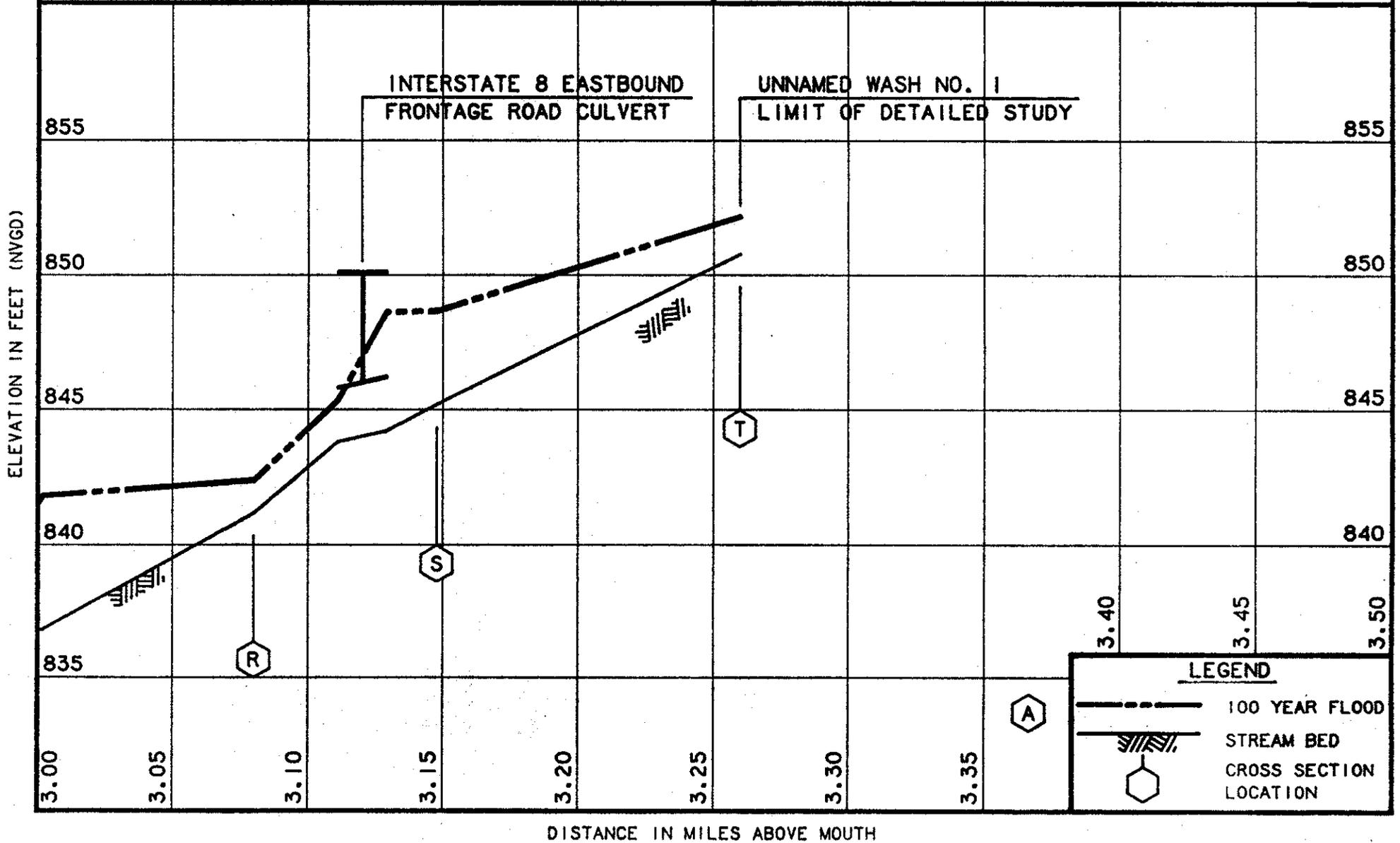


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

**[REDACTED]**  
ENGINEERS  
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# FLOOD PROFILES

## UNNAMED WASH NO. 1



**LEGEND**

- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

DISTANCE IN MILES ABOVE MOUTH

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

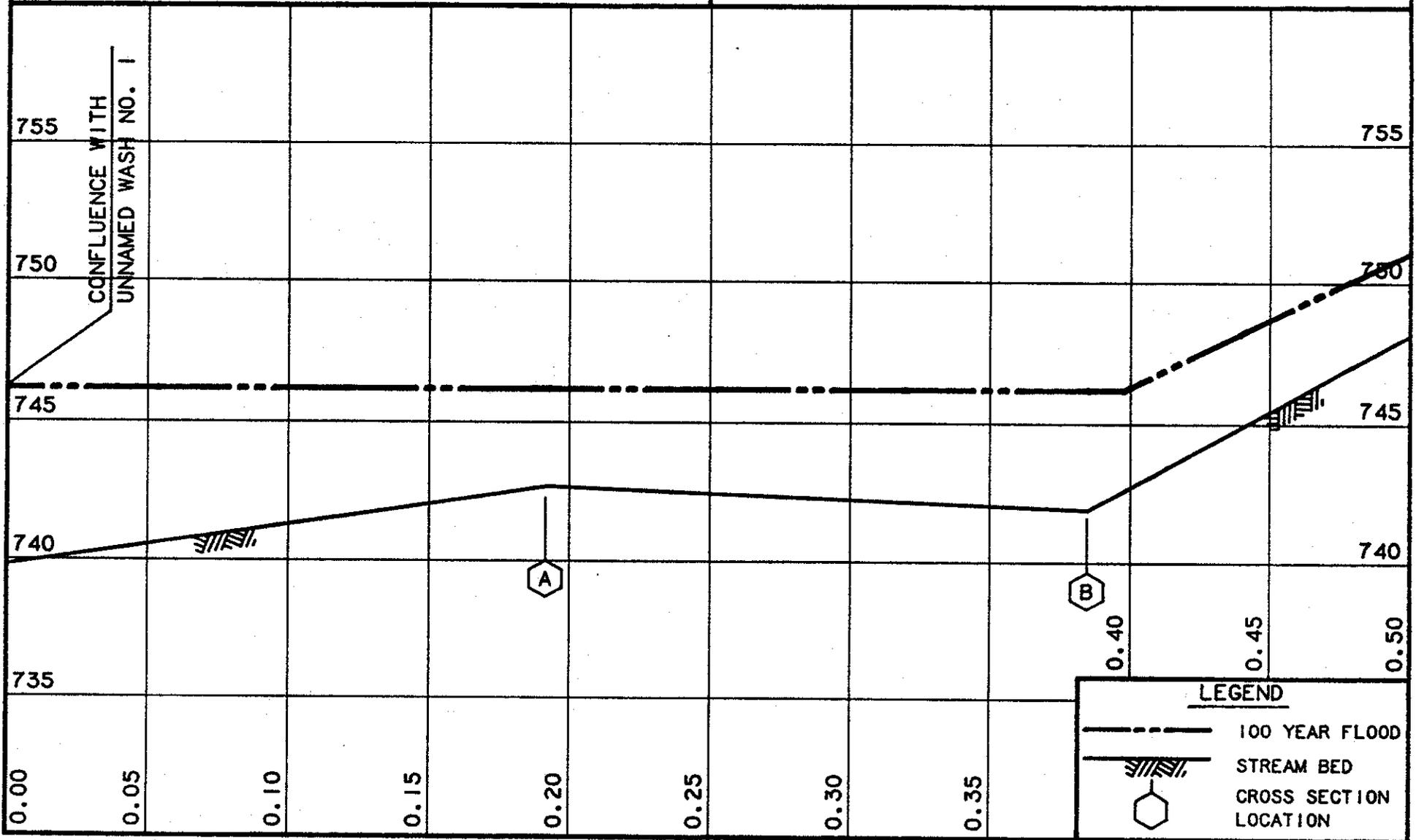


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# FLOOD PROFILES

## UNNAMED WASH NO. 2

ELEVATION IN FEET (NVGD)



DISTANCE IN MILES ABOVE MOUTH

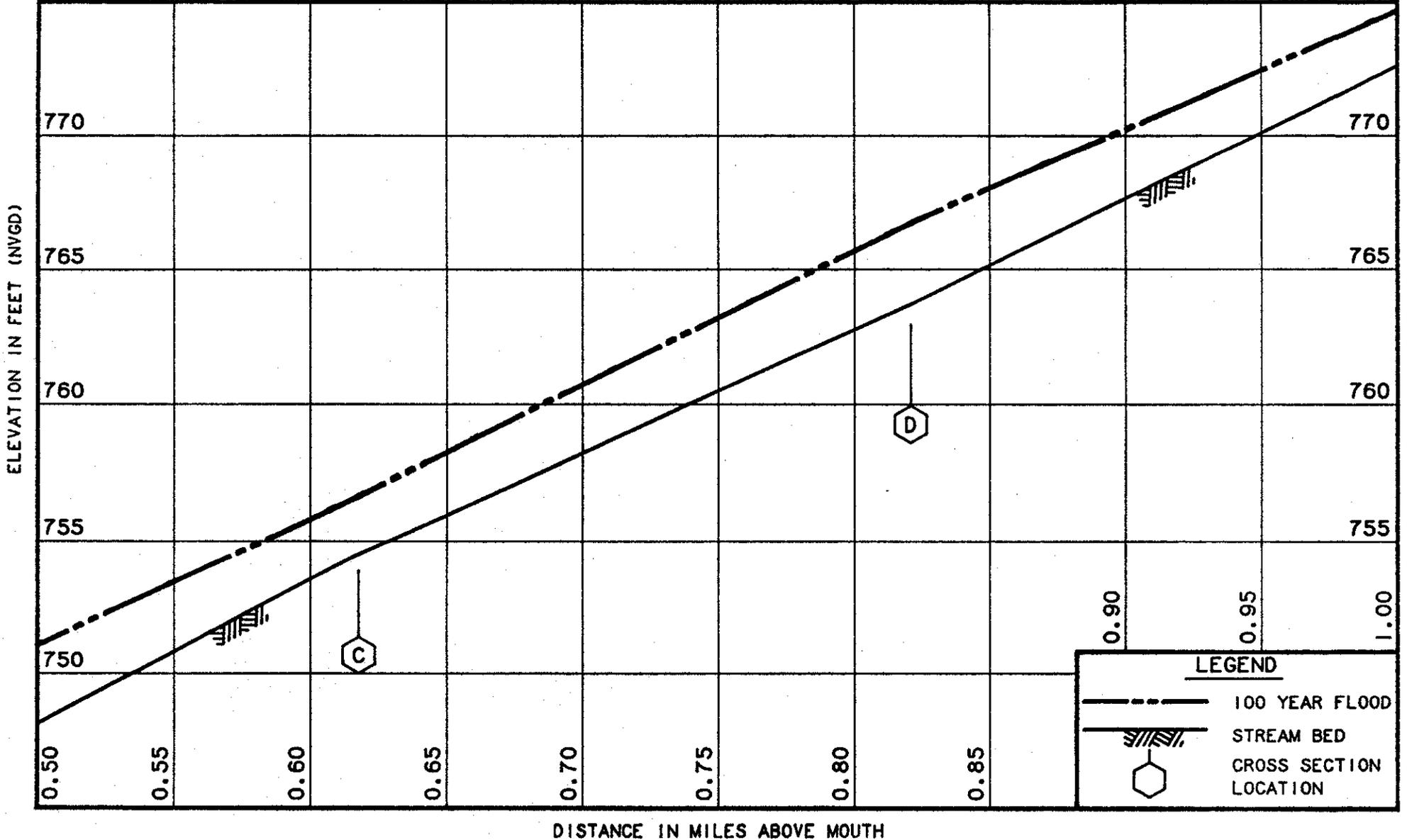
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



ENGINEERS  
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# FLOOD PROFILES

## UNNAMED WASH NO. 2



**LEGEND**

- 100 YEAR FLOOD
- STREAM BED
- ⬡ CROSS SECTION LOCATION

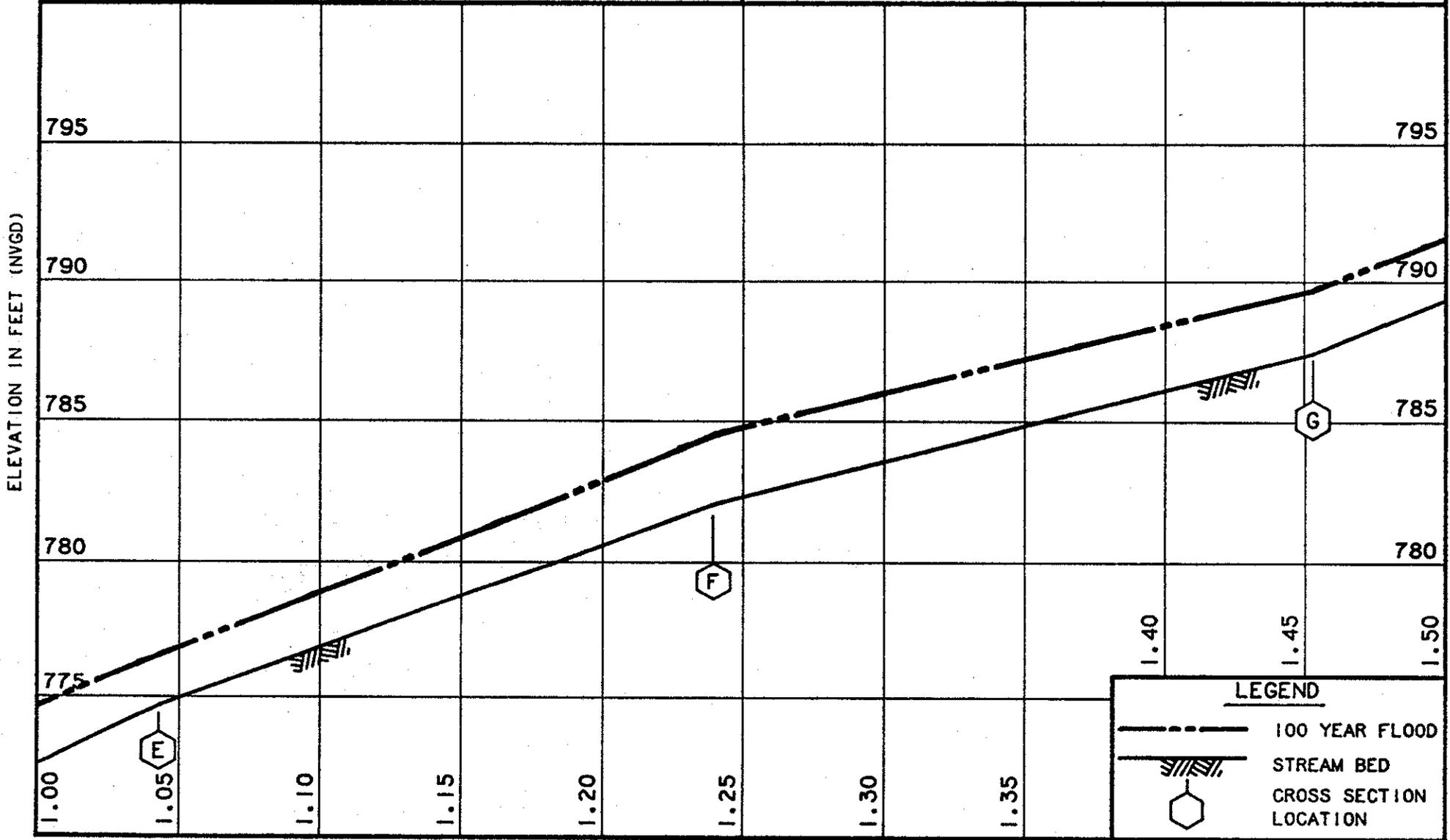
DISTANCE IN MILES ABOVE MOUTH

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

**[REDACTED]**  
ENGINEERS  
ARCHITECTS

# FLOOD PROFILES

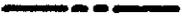
## UNNAMED WASH NO. 2



ELEVATION IN FEET (NVGD)

DISTANCE IN MILES ABOVE MOUTH

### LEGEND

-  100 YEAR FLOOD
-  STREAM BED
-  CROSS SECTION LOCATION

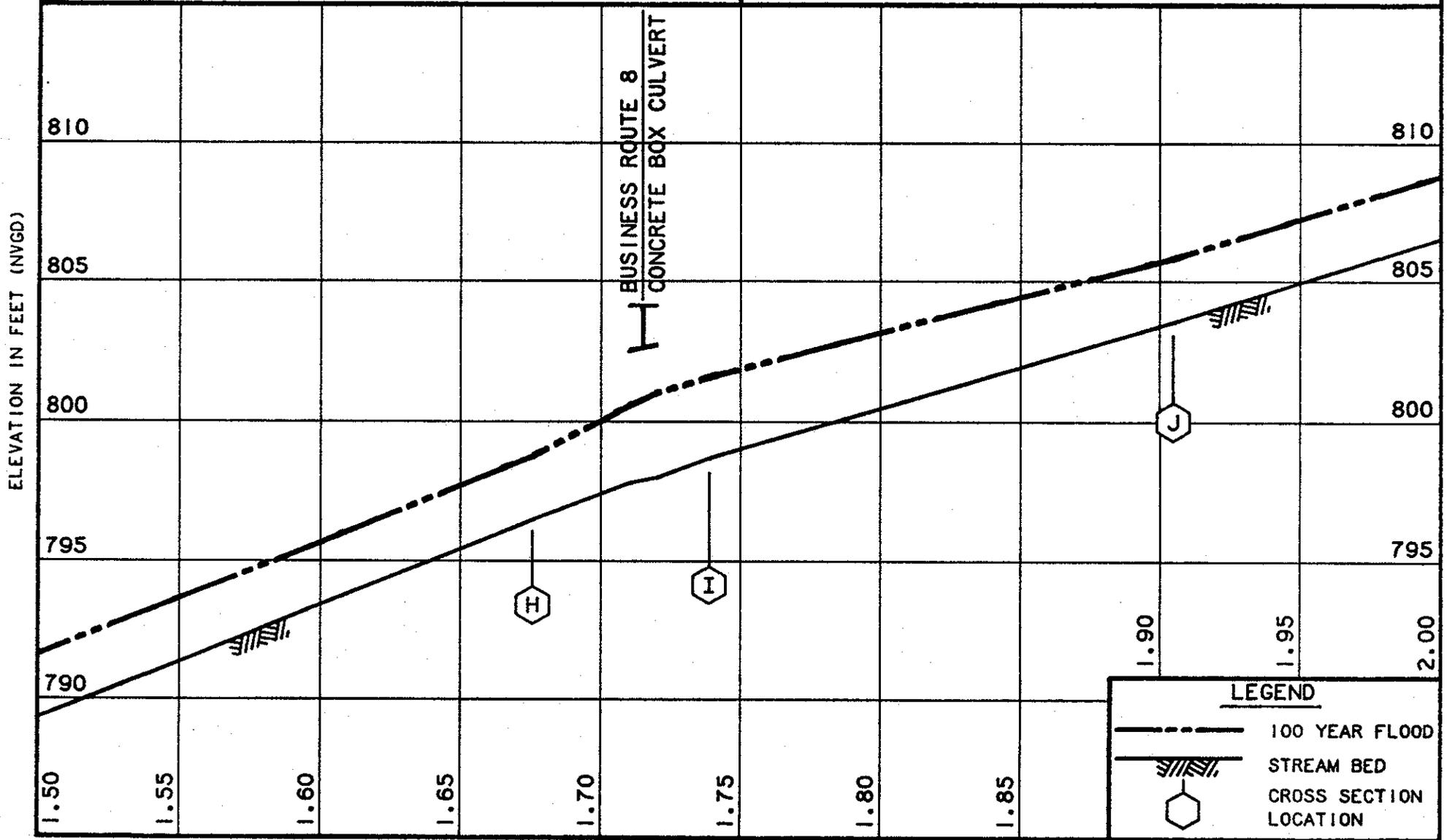
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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# FLOOD PROFILES

## UNNAMED WASH NO. 2



DISTANCE IN MILES ABOVE MOUTH

### LEGEND

- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

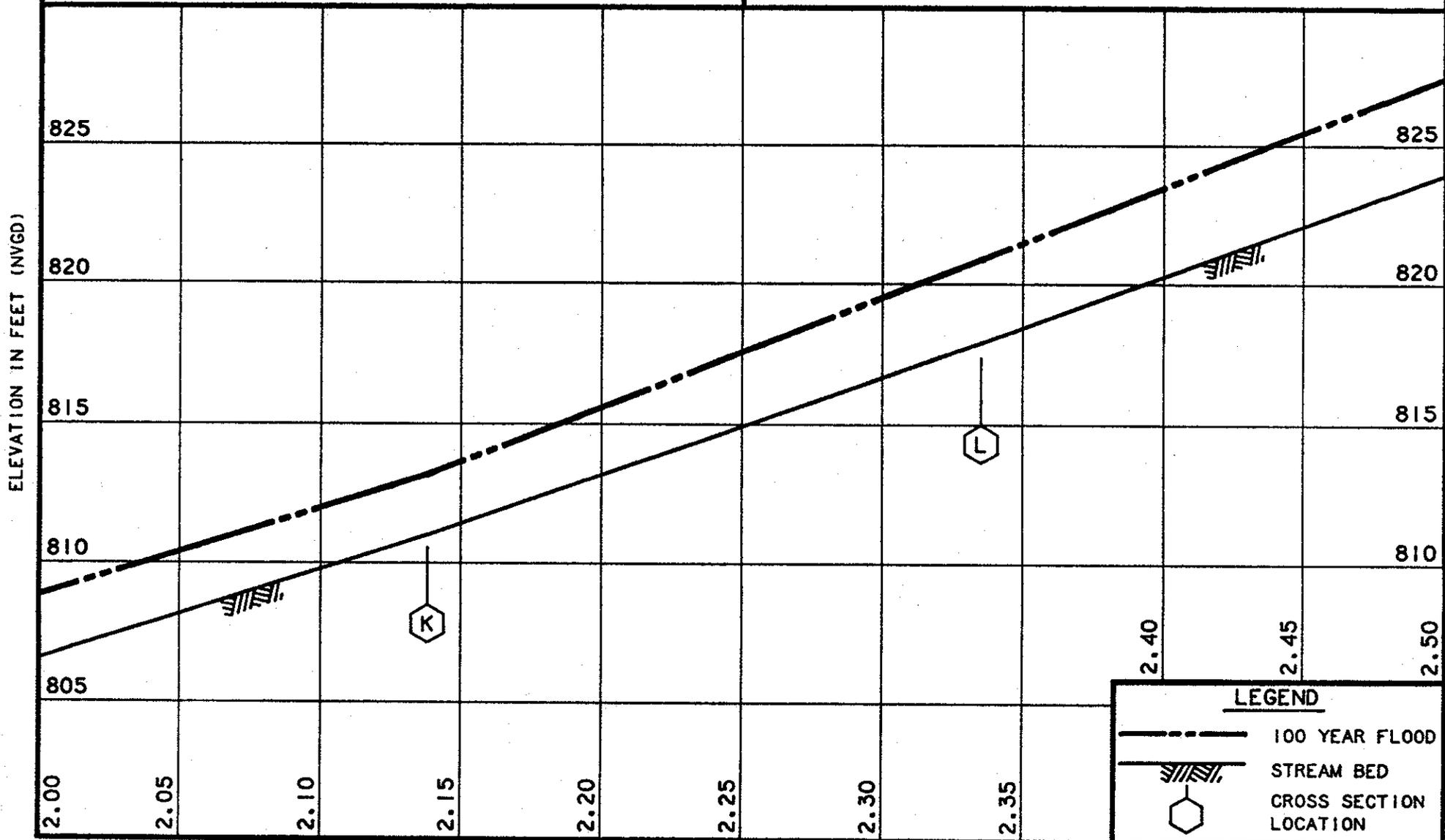
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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ARCHITECTS

# FLOOD PROFILES

## UNNAMED WASH NO. 2



ELEVATION IN FEET (NVGD)

DISTANCE IN MILES ABOVE MOUTH

**LEGEND**

- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

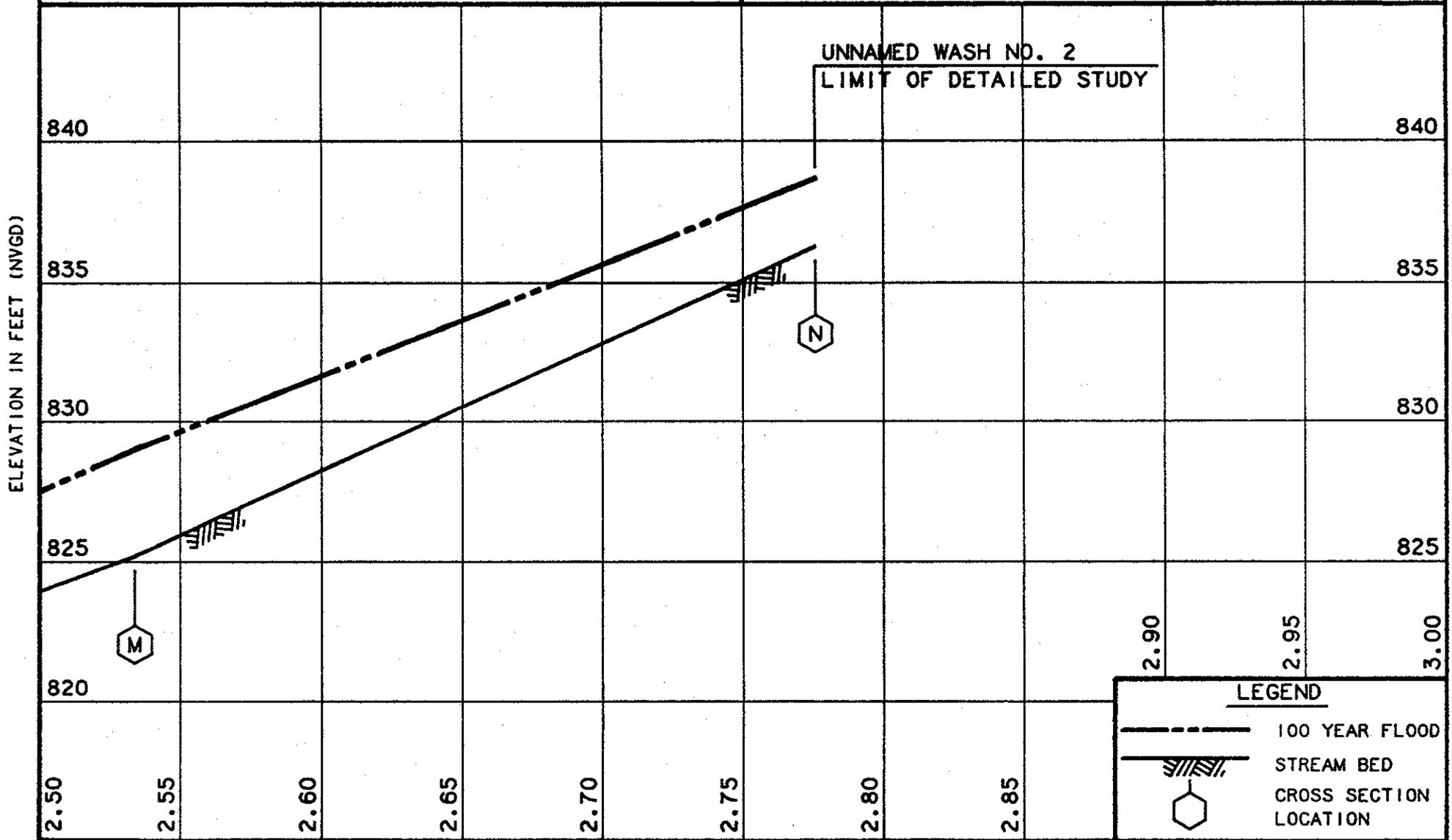
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



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ARCHITECTS

# FLOOD PROFILES

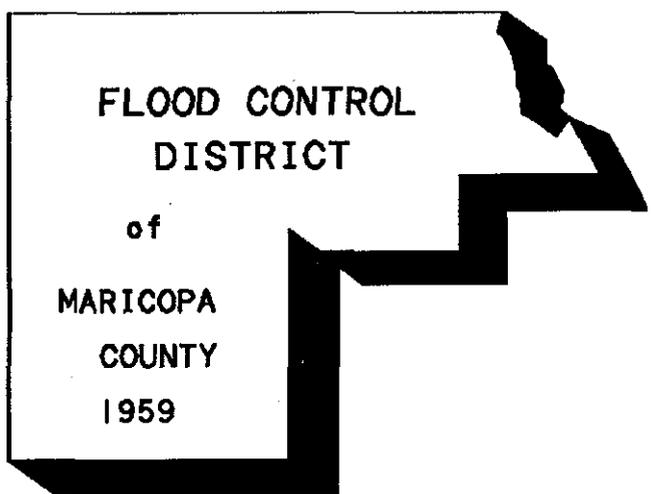
## UNNAMED WASH NO. 2



DISTANCE IN MILES ABOVE MOUTH

### LEGEND

- 100 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION



**GILA BEND  
FLOODPLAIN DELINEATION STUDY  
FCD 90-67**

**SECTION 1: General Documentation  
and Correspondence**

Community: Maricopa County, Arizona

NFIP Community Number: 040037

County: Maricopa

State: Arizona

Date Study Accepted by FEMA: Pending

Study Contractor: Burgess & Niple, Inc.

Attn: Mr. James E. Mischler, P.E.  
5025 East Washington Street, Suite 212  
Phoenix, Arizona 85034  
(602) 244-8100  
FCD Contract 90-67

Subconsultants: Aerial Mapping Co., Inc.  
McKuen Global Positioning Systems, Inc.

FEMA Technical Reviewer: Pending

FEMA Regional Reviewer: Pending

State Reviewer: Mr. James R. Morris, P.E.  
(602) 542-1541

Local Reviewer: Mr. Pedro Calza  
(602) 506-1501

River or Stream Name: \* Sand Tank Wash  
\* Bender Wash  
\* Scott Avenue Wash  
\* Unnamed Wash No. 1  
\* Unnamed Wash No. 2

Reach Description: The following areas are included on FIRM panel numbers 3480 and 3490.

\* Sand Tank Wash, Indian Road (North Line of Section 24, T5S, R5W) to Interstate 8 (Approximately 4.3 miles)

\* Scott Avenue Wash, Watermelon Road to Interstate 8 (Approximately 3.4 Miles)

- \* Bender Wash, its mouth at Sand Tank Wash to Interstate 8 (Approximately 2.0 Miles)
- \* Unnamed Wash No. 1, its mouth at Bender Wash to the East Line of Section 9, T6S, R4W (Approximately 3.2 Miles)
- \* Unnamed Wash No. 2, its mouth at Unnamed Wash No. 1 to the East Line of Section 4, T6S, R4W (Approximately 2.8 Miles)

**Study Type:** Sand Tank Wash, Scott Avenue Wash, Bender Wash, Unnamed Wash No. 1, Unnamed Wash No. 2 - Detailed riverine using HEC-2.

**SECTION 1: General Documentation  
and Correspondence**

*1.2 Contact (Telephone) Reports*



# Federal Emergency Management Agency

Washington, D.C. 20472

RECEIVED

MAR - 8 1993

MAR 05 1993

BURGESS & NIPLE, INC.

CERTIFIED MAIL  
RETURN RECEIPT REQUESTED

IN REPLY REPLY REFER TO:

Case No.: 93-09-092P

Mr. Ron Nevitt  
Floodplain Administrator  
Flood Control District of Maricopa  
County  
2801 West Durango Street  
Phoenix, Arizona 85009

Community: Maricopa County, Arizona  
and Incorporated Areas  
Community No.: 04013C

106

Dear Mr. Nevitt:

This is in response to a letter dated December 17, 1992, from Mr. James E. Mischler, P.E., of Burgess and Niple, Inc. (B&N), regarding the effective Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. With his December 17 letter, Mr. Mischler submitted additional data to support your November 6, 1992, request for a revision to the effective FIRM for the following: Sand Tank Wash, Scott Avenue Wash, Bender Wash, and two unnamed tributaries, all between Indian Road and Interstate Highway 8. This request is based on updated hydrologic and hydraulic analyses. All data required to review this revision request were submitted with your November 6 letter, and with Mr. Mischler's December 17 letter.

We have completed our review of the data submitted and have determined that the items listed below represent the best available data for the flooding sources listed above.

- Sheets 1 through 9 of topographic work maps entitled "Work Map, Gila Bend Area Floodplain Delineation Study," prepared by B&N, dated April 12, 1992.
- Report entitled "Gila Bend Area Floodplain Delineation Study - Technical Data Notebook Hydrology," prepared for the Flood Control District of Maricopa County by B&N, dated March 1992.
- Report entitled "Gila Bend Area Floodplain Delineation Study - Technical Data Notebook Hydraulics," prepared for the Flood Control District of Maricopa County by B&N, dated March 1992.

Due to the statutory processing timeframe for the addition of new base flood elevations, this information will not be included in the current physical map revision of the FIRM for Maricopa County, Arizona and Incorporated Areas, scheduled to become effective on September 15, 1993. We will include this information in our next physical map revision. The tentative date for the next preliminary FIRM is Fall 1994. In the interim, your community may utilize these data in its floodplain management programs.

If you have any questions regarding this matter, please contact Mr. John Magnotti of my staff in Washington, DC, at (202) 646-3932, or by facsimile at (202) 646-3445.

Sincerely,



William R. Locke  
Chief, Risk Studies Division  
Federal Insurance Administration

cc: The Honorable Duke Fox  
Mayor, Town of Gila Bend

Mr. James E. Mischler, P.E.  
Burgess & Niple, Inc.

B U R G E S S  
& N I P L E  
E N G I N E E R S  
A R C H I T E C T S

FAX COVER SHEET

Burgess & Niple, Inc.

Suite 212

5025 East Washington Street

Phoenix, AZ 85034

602 244-8100

Fax 602 244-1915

TO: *Patty Sexton*  
*Michael Baker Engineers*

Date: *Jan. 6, 1993*

Job Number: *11358*

Re: *Gila Bend Area*  
*(Phone Request)*

FAX PHONE NUMBER: *703-960-9125*

We are sending you 1 additional pages, not counting this cover sheet.  
If all pages are not received, please call us as soon as possible.

COMMENTS:

*Attached is a part of the Gila Bend, Ariz. 7.5' Topo map, showing the 661 ft pool level for Pointed Rock Reservoir. This was used to extend the flood plain delineation, on the west side of Sand Tanks Wash below Indian Road, to connect with the previous study shown on FIRM 3480.*

Signed: \_\_\_\_\_

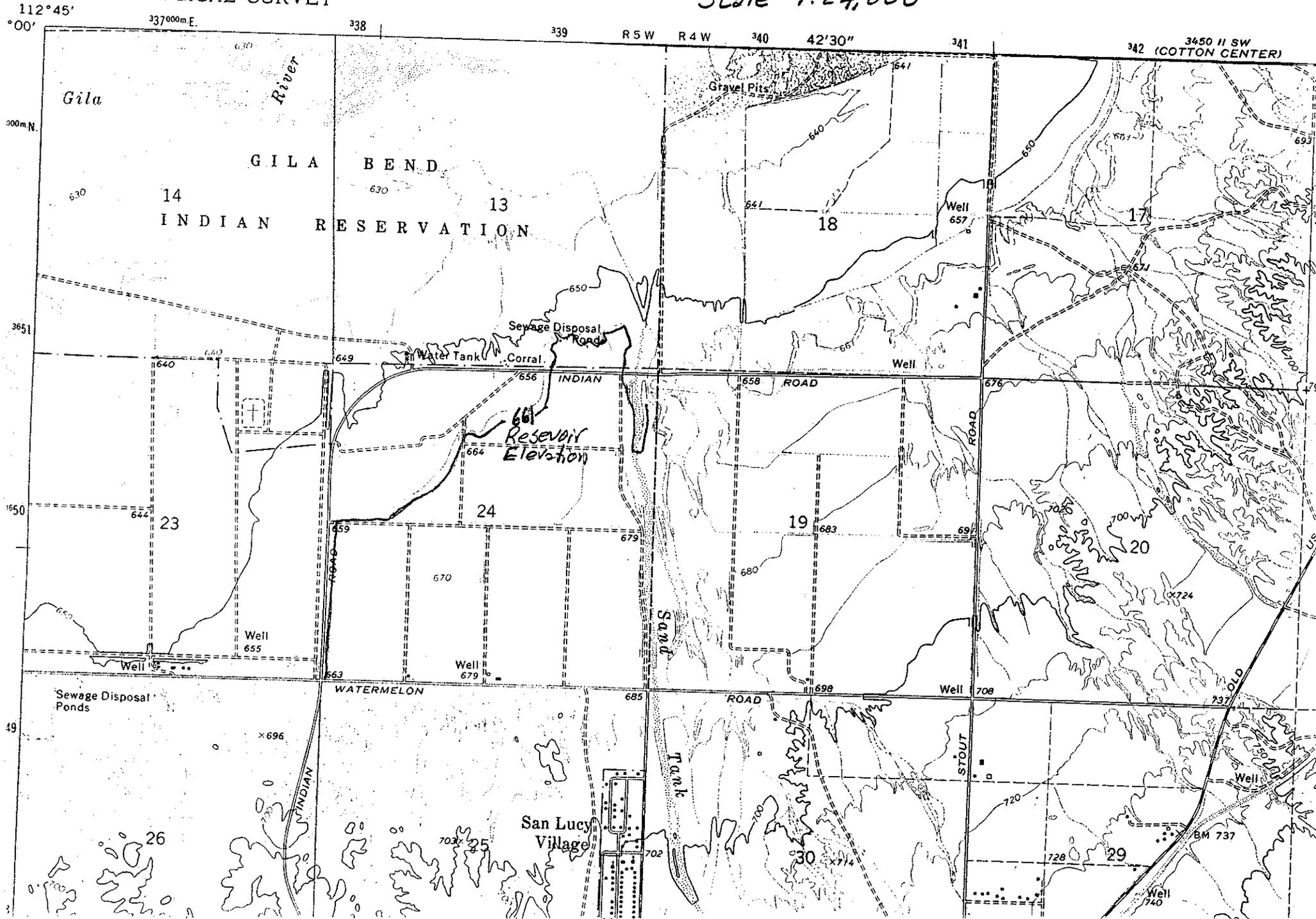
*Russ Cruff*

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

GILA BEND, ARIZ

7.5'

Scale 1:24,000





# Federal Emergency Management Agency

Washington, D.C. 20472

November 19, 1992

RECEIVED

NOV 23 1992

BURGESS & NIPLE, INC

Mr. Ron Nevitt  
Floodplain Administrator  
Maricopa County Flood  
Control District  
2801 West Durango Street  
Phoenix, Arizona 85009

IN REPLY REFER TO:  
Case No.: 93-09-092P  
Community: Maricopa County,  
Arizona and  
Incorporated Areas  
Community No.: 040043

316-ACK

Dear Mr. Nevitt:

This is in response to your request, dated November 6, 1992, for a revision to the Flood Insurance Rate Map (FIRM) for the above-referenced community. Pertinent information about the request is listed below.

Identifier:	Gila Bend Area
Flooding Source:	Sand Tank, Scott Avenue, and Bender Washes; two unnamed tributaries; and ponding behind Gila Bend Canal
FIRM Panel(s) Affected:	04013C3480D, 3490D

On October 1, 1992, the Federal Emergency Management Agency (FEMA) implemented the use of detailed application and certification forms for requesting revisions or amendments to National Flood Insurance Program (NFIP) maps. These forms outline technical and NFIP-related considerations in a fashion that facilitates an efficient review.

Using the previously referenced certification forms, we have completed an inventory of the items that you submitted. The items identified below are required before we can begin a detailed review of the request.

## ITEM

- X 1. We have received all of the data and initial fees we require to begin a detailed technical review of your request. If additional data are required, we will inform you within 30 days of the date of this letter.
2. We must receive the [remainder of the] initial fees, \$          , before we will begin our review. Payment must be in the form of a check or money order made payable to the National Flood Insurance Program. For identification purposes, the case number referenced above must be included on the check or money order.

- \_\_\_ 3. Based on our initial review of your request, we have determined that the total processing costs will exceed [\$1,500/\$2,500/\$5,000]. Please provide written authorization for us to proceed with our review to a limit of \$\_\_\_\_\_.
- \_\_\_ 4. All applicable forms from the enclosed "Application/Certification Forms" package and the necessary supporting data, as described in the package instructions, must be submitted.
- \_\_\_ 5. The following forms, which were omitted from your previous submittal, must be provided:
- \_\_\_ a. Form 1, entitled "Revision Requestor and Community Official Form."
  - \_\_\_ b. Form 2, entitled "Certification by Registered Professional Engineer and/or Land Surveyor."
  - \_\_\_ c. Form 3, entitled "Hydrologic Analysis Form."
  - \_\_\_ d. Form 4, entitled "Riverine Hydraulic Analysis Form."
  - \_\_\_ e. Form 5, entitled "Riverine Mapping Form."
  - \_\_\_ f. Form 6, entitled "Channelization Form."
  - \_\_\_ g. Form 7, entitled "Bridge/Culvert Form." (one form per new/revised bridge/culvert)
- \_\_\_ 6. With this letter we are returning the original package indicating those forms that have not been completed in their entirety or on which data were requested. The item(s) that must be completed and/or statement(s) requesting data have/has been marked with an asterisk (\*). Please revise and resubmit the form package.
- \_\_\_ 7. Other: \_\_\_\_\_

All required data and questions concerning your request are to be directed to our Technical Evaluation Contractor at the following address:

Michael Baker Jr., Inc.  
3601 Eisenhower Avenue  
Suite 600  
Alexandria, Virginia 22304  
(703) 960-8800

Attention: Mr. Massoud Rezakhani

When you write us about your request, please include the case number referenced above in your letter.

If you have any questions concerning FEMA policy, or the NFIP in general, please contact Mr. John Magnotti of our Headquarters staff in Washington, DC, at (202) 646-3932, or by facsimile at (202) 646-3445.

Sincerely,

*William R. Locke*

William R. Locke  
Chief, Risk Studies Division  
Federal Insurance Administration

Enclosures

cc: The Honorable Julius A. Fox  
Mayor, Town of Gila Bend

The Honorable Betsey Bayless  
Chairperson, Maricopa County Board  
of Supervisors

✓ Mr. James E. Mischler, P.E.  
Burgess and Niple, Inc.

**LETTER OF TRANSMITTAL**

DATE	July 7 1992	JOB NO	11358
RE:	Mita Bend Area Floodplain Delineation Study		

TO Mr. Tim Murphy  
Flood Control District of Maricopa Co.

(Hand Delivered)

WE ARE SENDING YOU  Attached  Under separate cover via \_\_\_\_\_ the following items:

- Shop drawings       Prints       Plans       Samples       Specifications  
 Copy of letter       Change order       \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
3			Copies of report & plan rolls, ready for submission to FEMA.

**THESE ARE TRANSMITTED:**

- For approval       Approved as submitted       Resubmit \_\_\_\_\_ copies for approval  
 For your use       Approved as noted       Submit \_\_\_\_\_ copies for distribution  
 As requested       Returned for corrections       Return \_\_\_\_\_ corrected prints  
 For review and comment       \_\_\_\_\_

REMARKS \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

COPY TO \_\_\_\_\_

SIGNED James E Mischler

CONVERSATION RECORD

Job No. 11358 Job Name Gila Bend FCD Date 12/17/91

By Tom Loomis Time 2:00

With Amir Motamedi

By Telephone  Incoming  Outgoing Telephone No. (602) 500-1501

Visit, Site \_\_\_\_\_ City \_\_\_\_\_

Regarding: Parameter calculations.

Conversation Items: We discussed our approach to estimating  
the % of Valley / Hillslope / + Mountain, per the sample  
calcs I faxed to FCD on 12/16/91. Amir is still checking  
out the procedure. We agreed to use a consistent method  
for adjusting Tc slopes for both models. I am to recommend  
a method to use. The County will revise their model to  
use my nomenclature.

Action Required: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Action Taken: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CONVERSATION RECORD

Job No. 11358 Job Name Gila Bend FPDS Date 12/17/91

By Tom Loomis Time 10:30 a.m.

With AFshim - FCDMC

By Telephone  Incoming  Outgoing Telephone No. (602) 506-1501

Visit, Site \_\_\_\_\_ City \_\_\_\_\_

Regarding: Status of County changes to Basins 1 + 2 HEC-1 Models.

Conversation Items: Alshin gave me a status report on FCD progress. They anticipate being done with their revisions by 12/20/91.

Action Required: None

Action Taken:

CONVERSATION RECORD

Job No. 11358 Job Name FLDMC - Gila Bend Date 11/14/91

By Tom Loomis Time 9:45

With Phil Pearce

By Telephone  Incoming  Outgoing Telephone No. (602) 882-4795 ~~882-4795~~

Visit, Site \_\_\_\_\_ City \_\_\_\_\_

Regarding: Geologic maps for Gila Bend - Ajo Area

Conversation Items: Phil says there is an AZ Geologic Survey Report for the Gila Bend - Ajo Area which has additional detail for the alluvium area. It is gen file report no. 84-1, 1983.

Action Required: Order for \$5.00 including shipping + handling

Action Taken: Done ordered it!



CONVERSATION RECORD

Job No. 11358 Job Name FCNMC - Gila Bend Date 9/11/91

By Tom Time 10:15

With Afshin Ahouraiyan

By Telephone  Incoming  Outgoing Telephone No. (602) 262-4501

Visit, Site \_\_\_\_\_ City \_\_\_\_\_

Regarding: Reports.

Conversation Items: Afshin has a report re located on Gila Bend for our inspection. I asked him to also give us a copy of the 1989 USGS Compilation Study for Maricopa Co. and the original FEMA FIS for Gila Bend. Jim Mischler will bring them to the Phoenix office.

Action Required: None.

Action Taken:

# LETTER OF TRANSMITTAL

DATE	8/28/91	JOB NO	11358
RE:	Gila Bend Floodplain Delineation Study		

TO Flood Control District of Maricopa Co.  
3335 West Durango Street  
Phoenix, AZ 85001  
Attn: Pedro Calza

WE ARE SENDING YOU  Attached  Under separate cover via \_\_\_\_\_ the following item

- Shop drawings       Prints       Plans       Samples       Specifications  
 Copy of letter       Change order       \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
1	8/27/91		Phone Conv. Record
1	8/22/91		" " "

**THESE ARE TRANSMITTED:**

- For approval       Approved as submitted       Resubmit \_\_\_\_\_ copies for approval  
 For your use       Approved as noted       Submit \_\_\_\_\_ copies for distribution  
 As requested       Returned for corrections       Return \_\_\_\_\_ corrected prints  
 For review and comment       \_\_\_\_\_

REMARKS Pedro:  
Please let me know if there are any changes in  
approach to this item.  
Thanks!  
Jim

COPY TO P-File  
Jim Mischler

SIGNED Thomas R. Jones

If enclosures are not as noted, kindly notify us at once.

CONVERSATION RECORD

Job No. 11358 Job Name FCDMC - Gila Bend Date 8/28/91

By Tom Loomis Time 11:00

With Sam Campos

By Telephone  Incoming  Outgoing Telephone No. (213) 894-5420

Visit, Site \_\_\_\_\_ City \_\_\_\_\_

Regarding: 1968 CORPS Study for Gila Bend.

Conversation Items: Sam says the Corps does not have a copy of the report. It was referenced in the 1979 FEMA study for Gila Bend. A consultant did the work.

Action Required: Obtain a copy of the 1979 FEMA study for Gila Bend. (± 6 pages)

Action Taken: \_\_\_\_\_

CONVERSATION RECORD

Job No. 11358 Job Name FCDMC - Gila Bend Date 8/28/91

By Tom Loomis Time 8:30

With Captain Chris Ward

By Telephone  Incoming  Outgoing Telephone No. (602) 683-0202

Visit, Site \_\_\_\_\_ City \_\_\_\_\_

Regarding: Access To Range

Conversation Items: I gave Chris the dates I will be on the range: 9/14-15, 9/21-22, 9/28-29. He said they will be flying on the 21st but probably not in my area. We set up an appointment for 1:00 on 9/13/91 for my safety briefing and orientation. Directions to the base are:

1. Go south on SR-85 for 4 miles (Turn at McDonalds in G.B.)
2. Give Capt Ward's name & # to security
3. Drive down base road for 2 miles. Will see a hangar on the left & a building marked "Range Ops". That's it. We'll be in the "East Tactical Area"

Action Required: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Action Taken: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CONVERSATION RECORD

Job No. 11358 Job Name FCDMC - Gila Bend Date 8/28/91

By Tom Loomis Time 8:20

With Julia @ Phelps Dodge

By Telephone  Incoming  Outgoing Telephone No. (602) 234-8100

Visit, Site \_\_\_\_\_ City \_\_\_\_\_

Regarding: Tucson Corralia and Gila Bend Railroad

Conversation Items: Asked for person to talk with concerning  
as-built plans on the RR south of Gila Bend, parallel  
to SR-85. An engineer called me back and gave me  
the name Jim Armstrong in Ajo @ 387-7451 to  
contact. Phelps Dodge owns the RR. Jim is the  
president of the railroad

Action Required: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Action Taken: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CONVERSATION RECORD

Job No. 11358 Job Name FCOMC - Gila Bend Date 8/27/91

By Tom Loomis Time 3:15

With Mike Vyne SAST

By Telephone  Incoming  Outgoing Telephone No. (602) 947-3598

Visit, Site \_\_\_\_\_ City \_\_\_\_\_

Regarding: ARC-INFO ← ACAD conversion.

Conversation Items: 5644 E Thomas Rd.

Phoenix AZ 85018

1. All sub-taxins and side boundaries must be closed polygons, using P-Lines
2. All channels must be digitized in a downstream direction.

Action Required: Send same NCHD file.

Action Taken: Dme.

CONVERSATION RECORD

Job No. 11358 Job Name FCDMC Gila Bend Date 8/27/91

By Tom Loomis Time 10:30 a.m.

With Amir Motamedi

By Telephone  Incoming  Outgoing Telephone No. (602) 202-1501

Visit, Site \_\_\_\_\_ City \_\_\_\_\_

Regarding: Hydrology mapping coordinate system

Conversation Items: Amir and I discussed the problem of the state plane coordinate system used for the AutoCAD files which the FCD furnished B&N. We agreed to use NAD-27, as provided by the FCD, as the base for the Hydrology maps, and not NAD-83. The FCD will convert the files to NAD-83 after we submit the final files.

Action Required: None

Action Taken:

cc: Pedro Calza  
Jim Mischler

CONVERSATION RECORD

Job No. 11358 Job Name FCDMC Gila Bend Date 8/22/91

By Tom Loomis Time 2:00 p.m.

With Pedro Calza

By Telephone  Incoming  Outgoing Telephone No. (602) 262-1501

Visit, Site \_\_\_\_\_ City \_\_\_\_\_

Regarding: Hydrology maps provided by County in DXF format.

Conversation Items: I let Pedro know that the files furnished by FCDMC used NAD-27 state plane coordinates. If we cannot "easily" convert the files to NAD-83, then there could be a request for a Contract Amendment if the County wants us to convert the files. Pedro instructed me to prepare the hydrology maps using NAD-27 if we cannot "easily" convert the base files to NAD-83. The County will then do the conversion later "in-house".

Action Required: Try to convert the files.

Action Taken: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

cc: Pedro Calza, FCDMC  
Jim Mischler





CONVERSATION RECORD

Job No. 2 Job Name FCDMC Gila Bend Date 7/12/91

By Tom Loomis Time 9:55

With John Forest - USAF

By Telephone  Incoming  Outgoing Telephone No. (602) 856-3621

Visit, Site \_\_\_\_\_ City \_\_\_\_\_

Regarding: Access to Military Reserve

Conversation Items: I explained who BTN is and why we will need access to the range. I asked if he had any concerns regarding our access. He said no, other than the ones already brought forth by Capt. Ward. I gave him Pedro's phone number, because he would like to receive a copy of the final report.

Action Required: None.

Action Taken: \_\_\_\_\_

cc: Jim Mischler

CONVERSATION RECORD

Job No. 2 Job Name FCDMC - Gila Bend Date 7/8/91

By Tom Loomis Time 11:23

With Luke Air Force Base - Secretary @ Environmental Office

By Telephone  Incoming  Outgoing Telephone No. (602) 856-7093

Visit, Site \_\_\_\_\_ City \_\_\_\_\_

Regarding: Access to Bombing Range

Conversation Items: Both John Forrest and Capt. Rafferty are out of the office until 7/11/91. Left a message for one of them to call me.

Action Required: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Action Taken: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

cc: Jim Mischer  
Pedro Calza

CONVERSATION RECORD

Job No. 2 Job Name FCDMC - Gila Bend Date 7/8/91

By Tom Loomis Time 11:15 a.m.

With Hector Abrego

By Telephone  Incoming  Outgoing Telephone No. (602) 863-4464

Visit, Site \_\_\_\_\_ City \_\_\_\_\_

Regarding: Access to Gila Bend Bombing Range

Conversation Items: Explained who we are and why we need access. He requested we send a letter with an explanation of the activities we intend to perform in the area, a map of the watershed area, and who we are under contract with. They will make a determination of what from the access permit will be issued under, set restrictions if necessary.

Send letter to:

BLM attn: Ken Drew  
2015 West Deer Valley Road  
Phoenix, AZ 85027

Action Required: Write letter

Action Taken:

cc: Jim Mischler  
Pedro Calza

CONVERSATION RECORD

Job No. 2 Job Name FCDMC - Gila Bend Date 7/8/91

By Tom Loomis Time 11:00

With Capt. Chris Ward, USAF

By Telephone  Incoming  Outgoing Telephone No. (602) 683-6202

Visit, Site \_\_\_\_\_ City \_\_\_\_\_

Regarding: Access to bombing range.

Conversation Items: Capt. Ward stated that approximately 2/3 of the watershed (per map I sent him) is in their active bombing area. They fly Mon - Fri., 8:00 a.m. - 10:00 p.m. We can have access on the weekends, but must sign hold-harmless agreement and attend a safety orientation/briefing. We needs 2-weeks notice for scheduling class. We must also coordinate with the BLM for access to the range: Mr. Hector Abrego, BLM - 856-4464. The Environmental Office at Luke Air Force Base must also be contacted: John Forrest or Capt. Rafferty. 856-7293

Action Required: Make designated contacts.

Action Taken: \_\_\_\_\_

cc: Jim Mischler  
Pedro Calza.





CONVERSATION RECORD

Job No. 2 Job Name FCDMC - Gila Bend Date 5/22/91

By Tom Loomis Time 7:59

With Jerry Francis - Aerial Mapping

By Telephone  Incoming  Outgoing Telephone No. (602) 263-5728

Visit, Site \_\_\_\_\_ City \_\_\_\_\_

Regarding: Base Map costs.

Conversation Items: 23 quad maps photo mosaiced-

Make 8 - 36" x 42" 2000 scale base maps

1 - 24" x 36" 10000 scale base map

Make 2 sets.

Jerry quoted a fee of \$2110

Action Required: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Action Taken: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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\_\_\_\_\_

\_\_\_\_\_

CONVERSATION RECORD

Job No. 2 Job Name FCDMC - Gila Bend Date 5/20/91

By TOM LOOMIS Time 4:25

With Jim Downing - Paloma Ranch Water Users Association

By Telephone  Incoming  Outgoing Telephone No. (602) 859-3647

Visit, Site \_\_\_\_\_ City \_\_\_\_\_

Regarding: Gila Bend Canal from Theba to east side of Gila Bend

Conversation Items: I asked Jim if there is contour mapping available for our study reach of the canal. He said no. There is tops available, covering the canal from the outside of levee road to outside of levee road downstream from Gila Bend to the 1<sup>st</sup> siphon west of the SR 85 crossing (approx. 1/2 to 3/4 mile). There is not info available from prior to Fall, 1988, as the last engineer took it with him. He is no deceased. He says there is no history of cross drainage flooding problems that have been brought to his attention. There are ranch hands available who have been employed for a number of years who could be a source of information.

Action Required: Contact Jim for names and phone numbers prior to going into the field.

Action Taken: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CONVERSATION RECORD

Job No. 2 Job Name FCDMC Gila Bend Date 5/15/91

By Tom Loomis Time 2:20

With Captain Chris Ward

By Telephone  Incoming  Outgoing Telephone No. (602) 683-6258

Visit, Site \_\_\_\_\_ City \_\_\_\_\_

Regarding: Access to Bombing Range

Conversation Items: Discussed access to the watershed. I am to send a map marked up with the approximate watershed boundaries. He will highlight the areas we can't access. We'll need to sign a "Hold Harmless" agreement, and obtain a "Range Pass".

Captain Chris Ward  
832 CSS/OT  
Gila Bend AFAF, AZ 85337  
683-6258

Action Required: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Action Taken: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# **SECTION 1: General Documentation and Correspondence**

## ***1.3 Meeting Minutes & Reports***

**MINUTES OF MEETING**

**Project:** Gila Bend Area Floodplain Delineation Study, 90-67  
**Date:** September 4, 1991  
**Time:** 10:30 AM  
**Subject:** Progress Meeting No. 1

**Attendees:** Mr. Pedro Calza, MCFCD  
Mr. Tim Murphy, MCFCD  
Mr. Amir Motamedi, MCFCD  
Mr. Afshin Ahouraiyan, MCFCD  
Ms. Marta Dent, MCFCD  
Mr. James Mischler, B&N

**Burgess & Niple, Inc.**  
5025 East Washington Street  
Suite 212  
Phoenix, AZ 85034  
602 244-8100  
Fax 602 244-1915

1. Tim Murphy will be the project manager for the District. Afshin Ahouraiyan will be the point of contact for hydrology coordination.
2. Detailed topographic mapping will be used when it becomes available to confirm assumptions made in the hydrologic analysis.
3. Mr. Ahouraiyan has found a copy of the 1969 report by SCS - not COE as previously thought. He will provide a copy to Burgess & Niple.
4. Mr. Mischler informed the District that Mantech, the firm selected by Burgess & Niple to provide Arc-Info translation, was going out of business. Burgess & Niple is currently discussing the project with GIS consultants of Arizona Ltd. If discussions are successful, Burgess & Niple will request that the District allow this substitution of Arc-Info consultants.
5. Floodplain maps will be plotted on pre-made mylars. Title blocks and borders will not be a part of the electronic file. Ms. Dent will investigate whether the District will desire a standard sheet layout to meet with their plans for future use of electronic files. Information text on each floodplain sheet (ERM table, discharge table, key index, match lines, etc) will be in digital format and will be a part of the plot file.
6. Watershed maps will be digitized for Arc-Info with features of "major" or "minor" and the watershed name. Section corners provided by the District will be included. Additional information, such as flow lengths, times of concentration, etc. will be added by conventional drafting methods to make informative blue-line prints for the Hydrology TDN, and will not become a part of the Arc-Info file.

Minutes of Meeting No. 1  
Page 2

7. Soil maps will be digitized for Arc-Info with features of "major" or "minor", soil type, and texture type. Section corners provided by the District will be included. Additional data added to make informative blueline prints for the Hydrology TDN will be added by conventional methods and will not become a part of the Arc-Info file.
8. Mr. Mischler presented a proposed work schedule to the District. A copy is attached to these minutes. Major milestones include:

Aerial mapping flight	9/13/91
Draft Hydrology TDN	12/13/91
District comments on draft TDN	1/10/92
Hydraulics TDN	2/14/92
Final Hydrology TDN & FEMA submittal	2/28/92

9. Mr. Mischler noted that digital watershed data provided by the District was not formatted to fit 7-1/2 minute quadrangle maps. New data provided by the District fits reasonably well. Because data provided by the District was in NAD 27 format, additional work by Burgess & Niple will also be NAD 27.
10. An attempt will be made to place the notice of intent to restudy the area in a local Gila Bend newspaper.

Respectfully submitted,

**BURGESS & NIPLE, INC.**

*James E Mischler*

James E. Mischler, P.E.  
Project Manager

JEM:sk/11358

**MINUTES OF MEETING**

**Project:** Gila Bend Area Floodplain Delineation Study, 90-67  
**Date:** September 11, 1991  
**Time:** 2:00 P.M.  
**Subject:** Progress Meeting No. 2

**Burgess & Niple, Inc.**  
5025 East Washington Street  
Suite 212  
Phoenix, AZ 85034  
602-244-8100  
Fax 602 244-1915

**Attendees:** Mr. Tim Murphy, MCFCD  
Mr. Amir Motamedi, MCFCD  
Mr. Afshin Houraiyan, MCFCD  
Ms. Marta Dent, MCFCD  
Mr. James Mischler, B&N

1. The purpose of this meeting was to discuss the September 9th letter from Mr. Mischler to Mr. Murphy regarding ARC/INFO deliverables. (Letter is attached.)
2. The District is in agreement with Burgess & Niple's understanding of project requirements as stated in the letter.
3. Mr. Mischler noted that ARC/INFO streets are a single line with attribute for width, but mapped streets are proposed to be shown as two lines showing actual width. District staff agreed that two lines are more accurate and preferred for mapping. The District already has single street lines from other sources, and can add them to this file at a later date, if desired.
4. The District has not yet identified a standard sheet layout. (Per a telephone conversation September 23rd with Mr. Murphy, Mr. Mischler requested an 18" x 27" or larger mapping window so as to match assumptions made during fee negotiations regarding sheet number and layout).
5. Burgess & Niple proposes to complete ARC/INFO translations of soils, watershed, and base mapping prior to the FEMA submittal scheduled for late February. Floodplain information will be transferred to ARC/INFO format following FEMA approval. District personnel indicated they would consider the project substantially complete when the FEMA submittal was made.

6. Mr. Mischler noted that a local newspaper, "Gila Bend Sun", would be contacted regarding public notification of a floodplain study in addition to the Arizona Republic.
7. Mr. Murphy provided a copy of a standard letter for access, to be used if found necessary to gain access for surveying.

Respectfully submitted,

**BURGESS & NIPLE, INC.**

*James E Mischler*

James E. Mischler, P.E.  
Project Manager

JEM:lmw/11358

copy: Attendees  
Tom Loomis

**SECTION 1: General Documentation  
and Correspondence**

*1.4 General Correspondence*



# TOWN OF GILA BEND

*The Heart of Arizona*

March 26, 1992

RECEIVED

MAR 27 1992

BURGESS & NIPLE, INC.

Mr. Carl Uphoff  
Burgess & Niple, Inc.  
5025 E. Washington Str. #212  
Phoenix, AZ 85034

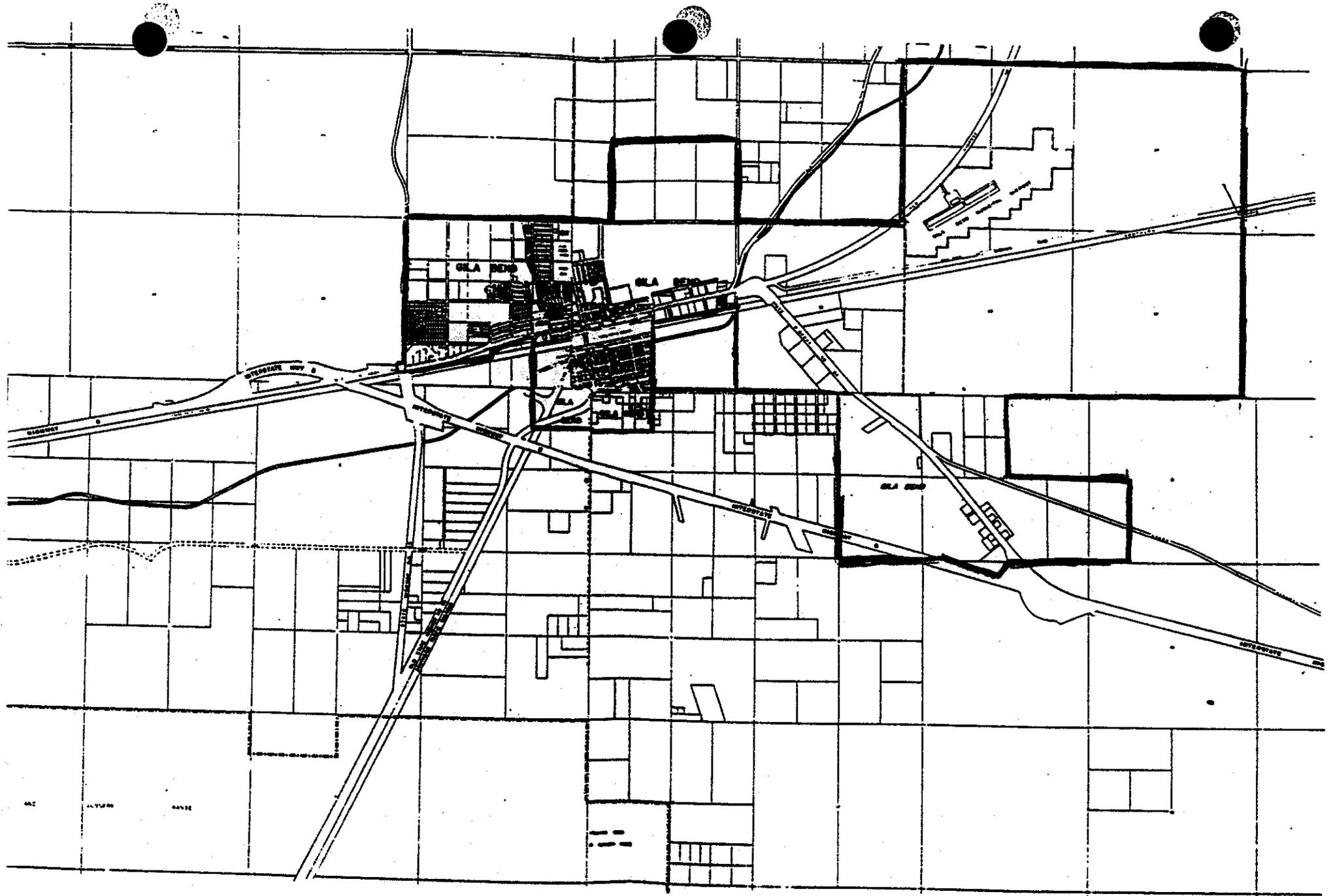
Dear Mr. Uphoff:

Enclosed are the corporate limit maps you requested. If we can be of further assistance, please call me at (602) 683-2255.

Sincerely,

*Lisa Grabbi*

Lisa Grabbi  
Secretary, Town of Gila Bend



TOWNSHIP 6 SOUTH-RANGE 5 WEST, G. & S.R.S.V.  
 NORTH HALF  
 MARICOPA COUNTY DEPARTMENT OF PLANNING & DEVELOPMENT  
 1998

Gila Bend, AZ Corporate Limits

BURGESSES  
& NIPLE  
ENGINEERS  
ARCHITECTS

FAX COVER SHEET

Burgess & Niple, Inc.

1106 North Beeline Highway

Payson, AZ 85541

602 474-5313

Fax 602 474-3511

Date: 3/25/92

Job Number: 11358

Re: Gila Bend F.I.S.  
FCD 90-67

TO: Flood Control District of Maricopa County  
Attn: Amir Motamedi

FAX PHONE NUMBER:

We are sending you 2 additional pages, not counting this cover sheet.  
If all pages are not received, please call us as soon as possible.

COMMENTS: Notes on HEC-1 problem for your info.

FAX SENT

Signed: \_\_\_\_\_

*Tom Lomax*

JOB NO. 11358 JOB NAME Gila Bend FIS SHEET 1 OF 2 SHEETS  
 SUBJECT Diversion Calculation PREPARED BY TRL DATE 3/25/92  
Problems with HEC-1 using JD's CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_

A problem was encountered with the Bender Wash and Sand Tank Wash 6-hour model at operations DC150L and DC150R. The total peak entering the diversion was 1655 cfs with an associated area of 330.40 s.m. The diversion table input to the model on DI and DQ records should force 0 cfs to be diverted for this case. The model was outputting diverted flows of 678 cfs to the left branch and 1190 cfs to the right branch. These two flow rates total 1868 cfs which is greater than the inflow peak.

The JD records used in the model which bracket 330 s.m. were 90 and 500 s.m. Obviously, the 24-hour model is more appropriate because the Design Manual recommends use of the 6-hour distributions for watersheds less than 100 s.m. This situation could also happen for the 24-hour model. The 24-hour models were checked. In some cases the two diverted flows do not total to the inflow peak, but the differences are insignificant.

The problem appears to stem from insufficient definition of the aerial reduction curve.

In the B&ST 6-hr. model, the operations exhibiting this problem are:

C79 = 8419 <sup>241</sup>	C82 = 2823 <sup>213</sup>	BC132L = 1655 <sup>213</sup>
DC79 L = 4527 <sup>241</sup>	DC82L = 21 <sup>213</sup>	DC150L = 678 <sup>213</sup>
DC79 R = 3645	DC82R = 2810	DC150R = 1190 <sup>should be 0</sup>
A = 77.13 s.m.	A = 85.07 s.m.	A = 330.4
C81 = 3400 <sup>221</sup>	C132 = 11499 <sup>192</sup>	C1420 = 897 <sup>17</sup>
DC81L = 2778	DC132L = 1655 <sup>192</sup>	DC142L = 174 <sup>17</sup>
DC81R = 6000	DC132R = 7852	DC142R = 740
A = 79.75 s.m.	A = 330.4 s.m.	A = 336.59

## BURGESS &amp; NIPLE, INC. - COMPUTATION SHEET

JOB NO. \_\_\_\_\_ JOB NAME \_\_\_\_\_ SHEET 2 OF 2 SHEETS  
SUBJECT \_\_\_\_\_ PREPARED BY \_\_\_\_\_ DATE \_\_\_\_\_  
CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_

The JD records used were:

Area

0.01

0.5

2.8

15.8

90.0

500.0

Additional definition was added as follows:

0.01

0.5

2.8

15.8

50.0

90.0

200.0

300.0

350.0

500.0

This approach cleared up the problem of not having a zero outflow for DC150L and DC82L. The other operations still do not total correctly. I input linear interpolated hyetographs for each JD record by the way. The problem does not occur in the 64-hour models. I think it is related to interpolation using JD records & different precipitation patterns. Since the 60-hour results do not control for the FIS, I am not pursuing this any further.

## Interoffice Memorandum

Subject: Gila Bend FDS

File: FCD 90-67

To: TMM  
CC: AMM

From: AA

Date: 01-30-92

The following are comments on the submittal of hydrology parameters dated 01-23-92.

- 1- Why are the interpolated values for DTHETA and PSIF values in Table S-1 done for XKSAT values of up to 0.4? It would be helpful to have the interpolations of these values for XKSAT values higher than 0.4.
  - 2- In table S-2 there is no need to have the Green And Ampt values for soil map units of the 500 series. The numbers have been related to the 300 series and the soil maps do not use the 500 series.
  - 3- In table S-3 add another row called Percent area of Soil Map units.
  - 4- In the hydrology documentation explain the assumptions used for percent vegetation cover.
  - 5- Check all DTHETA and PSIF values in table S-3 with table S-1 as some of the values differ between the two tables.
  - 6- There are some discrepancies between the IA values calculated by the FCD and the values in table S-4. These values need to be checked. The IA values used to get the weighted IA values should be noted either in the final hydrology documentation or as a footnote to the table.
  - 7- As part of the documentation reasons behind all the weighted and adjusted values are needed. ( e.g. Reason behind Adjustment of valley areas.)
  - 8- A discussion of S-graphs chosen is needed as part of the documentation.
  - 9- In table S-5 under the column Surface Characteristics add a row for the Kn values used for each category.
  - 10- The values in table S-6 are off by one row and has been corrected as per conversation with Tom Loomis on 01-29-92.
  - 11- The modeling diagram is in order.
  - 12- I need to see the precipitation calculations and the routing parameters calculations.
  - 13- Please submit the documentation with future submittals.
- If there are any questions please let me know.

**FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY**  
3335 West Durango Street  
PHOENIX, ARIZONA 85009

**LETTER OF TRANSMITTAL**

(602) 262-1501

TO Tom Loomis  
Burges & Niples

DATE <u>01-09-92</u>	JOB NO. <u>FCD 98-67</u>
ATTENTION	
RE:	

WE ARE SENDING YOU  Attached  Under separate cover via \_\_\_\_\_ the following items:

- Shop drawings       Prints       Plans       Samples       Specifications  
 Copy of letter       Change order       \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
<u>2</u>	<u>01-09-92</u>		<u>Corrected Sub-basin Boundaries</u>
<u>1</u>	<u>01-09-92</u>		<u>Floppy disk containing HEC-2 programs</u>
<u>2</u>	<u>01-09-92</u>		<u>Parameter Calculation sheets. (2 pages).</u>

THESE ARE TRANSMITTED as checked below:

- For approval       Approved as submitted       Resubmit \_\_\_\_\_ copies for approval  
 For your use       Approved as noted       Submit \_\_\_\_\_ copies for distribution  
 As requested       Returned for corrections       Return \_\_\_\_\_ corrected prints  
 For review and comment       \_\_\_\_\_  
 FOR BIDS DUE \_\_\_\_\_ 19 \_\_\_\_\_  PRINTS RETURNED AFTER LOAN TO US

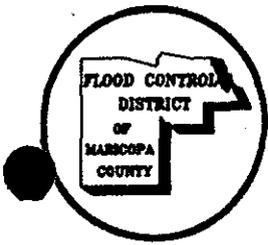
REMARKS \_\_\_\_\_  
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 \_\_\_\_\_

COPY TO \_\_\_\_\_

SIGNED: A. Abonija

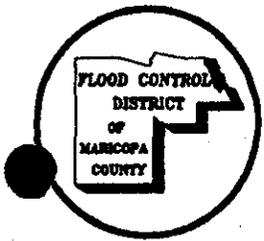
# FLOOD CONTROL DISTRICT C. MARICOPA COUNTY

PROJECT \_\_\_\_\_ PAGE \_\_\_\_\_ OF \_\_\_\_\_  
DETAIL \_\_\_\_\_ COMPUTED \_\_\_\_\_ DATE \_\_\_\_\_  
\_\_\_\_\_ CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_



Tom: Enclosed you'll find the corrected maps with new parameter calculations. As we discussed I have left some of the cards for HEC-2 program blanks. I hope that this will be O.K. and your program can pick up all the blank entries. Note that in the Border file (BS24.dat) the split needs to be retrieved later on in your part of the study for subbasin 2SS. The Data Storage System (DSS) was used to store the split flow. To retrieve it use ZR Card anywhere within the program. The green marker on the map is how the subbasin should be and subbasin 2DD has totally changed. The HEC-2 program itself should be in the right order. Thank you for your patience. Call me for any question. Afshin

Received 1/10/92  
TRC



# FLOOD CONTROL DISTRICT O. MARICOPA COUNTY

PROJECT Gila Bend PAGE \_\_\_\_ OF \_\_\_\_  
 DETAIL LG Card Parameters COMPUTED \_\_\_\_\_ DATE \_\_\_\_\_  
 \_\_\_\_\_ CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_

## S2CC

Map Unit	Area (Acres)	Area (mi <sup>2</sup> )	% Area	XKSAT	log (XKSAT) * (% Area)
✓ 301	490.24	0.766	17.49	0.50	-0.053
✓ 324	526.08	0.822	18.76	0.84	-0.014
✓ 321	714.24	1.116	25.47	0.40	-0.101
✓ 329	359.04	0.561	12.81	0.25	-0.077
✓ 266	166.4	0.026	0.59	0.44	-0.002
✓ Valley	<u>697.60</u>	<u>1.09</u>	<u>24.88</u>	<u>0.25</u>	<u>-0.150</u>
	2803.84	4.381			

122,135,710.4

XKSAT = 0.40  
 IA = 0.35  
 PSIF = 4.3  
 DTHETA = 0.35  
 RTIMP = 0

## S2DD

Map Unit	Area (Acres)	Area (mi <sup>2</sup> )	% Area	XKSAT	log (XKSAT) * (% Area)
✓ 301	32	0.05	9.17	0.50	-0.028
✓ 234	130.56	0.204	37.43	0.49	-0.116
✓ 266	97.28	0.152	27.89	0.44	-0.099
✓ 329	44.80	0.070	14.13	0.25	-0.085
✓ 263	25.60	0.040	7.34	0.56	-0.018
✓ 269	14.08	0.022	4.04	0.84	-0.003
	<u>344.32</u>	<u>0.538</u>			

14,998,579.2

XKSAT = 0.45 PSIF = 4.16  
 DTHETA = 0.35 IA = 0.35  
 RTIMP = 0

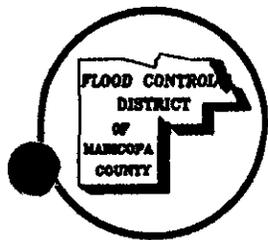
## S2FF

Map Unit	Area	% Area	XKSAT	log (XKSAT) * % Area
301	398.08	0.622	0.50	-0.034
329	247.04	0.386	0.25	-0.042
324	419.20	0.655	0.84	-0.009
Valley	<u>2462.08</u>	<u>3.847</u>	<u>0.25</u>	<u>-0.420</u>
	3526.40	5.510		

RTIMP = 0 XKSAT = 0.31 DTHETA = 0.35  
 PSIF = 3.82 IA = 0.35

# FLOOD CONTROL DISTRICT 0, MARICOPA COUNTY

PROJECT Gila Bend PAGE \_\_\_\_ OF \_\_\_\_  
 DETAIL Lag Calculations COMPUTED \_\_\_\_\_ DATE \_\_\_\_\_  
 \_\_\_\_\_ CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_



21.2

## S2CC

$L = 7.07$      $L_{ca} = 3.62$      $S = 50.2$      $K_n = 0.05$

Lag = 11.7 minutes

## S2FF

$L = 13.37$      $L_{ca} = 6.44$      $S = 54.8$      $K_n = 0.05$

Lag = 18.3 minutes

## S2DD

$L = 2.10$      $L_{ca} = 0.93$     Slope = 32.38     $K_n = 0.05$

Lag = 4.8 minutes

CC: TRL, Payso  
Orig - JEMV

WOOLSEY FLOOD PROTECTION DISTRICT  
County of Maricopa, State of Arizona

Reply to:

Douglas C. Nelson, P.C.  
1001 North Central Avenue  
Suite 601  
Phoenix, Arizona 85004  
(602) 258-8401

Deon Layton  
President

Polly Getzwiller  
Vice-President

Charles Miccia  
Secretary-Treasurer

December 5, 1991

FLOOD CONTROL DISTRICT	
RECEIVED	
DEC 9 1991	
CH ETR	P & PM
DEP	HYDRO
ADM	LMOT
FINANCE	FILE
C & C	1 TIM W
ENGR	
REMARKS	

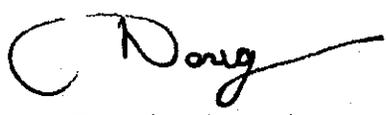
Timothy M. Murphy  
Hydrologist  
Flood Control District of Maricopa County  
2801 West Durango  
Phoenix, Arizona 85009

Re: Minutes of December 3, 1991

Dear Tim:

As you requested I enclose a copy of the draft Minutes of the December 3, 1991 meeting of the Woolsey Flood Protection District. Thank you, Frank and Sandra for your presentations.

Sincerely,



Douglas C. Nelson  
Legal Counsel

DCN/ms

Enclosure

c: Deon Layton  
President

MINUTES

Draft  
12/5/91

Woolsey Flood Protection District  
County of Maricopa, State of Arizona

Meeting of December 3, 1991  
1:30 p.m. to 3:30 p.m.

Agri Center Conference Room  
25560 West Highway 85  
Buckeye, Arizona 85326

---

Directors Present:

Polly Getzwiller  
Deon Layton

Director Absent:

Charles Miccia

Others Present:

Douglas C. Nelson  
District Legal Counsel

Timothy M. Murphy  
Hydrologist  
Maricopa County Flood Control District

Frank M. Vasquez, P.E., RLS  
Project Manager  
Donohue Engineers

Sandra Story  
Hydrologist  
Maricopa County Flood Control District

Presentation on the "Gila Bend Canal Floodplain Delineation Study"

Mr. Frank Vasquez of Donohue Engineering made a presentation on the completion of the "Gila Bend Canal Floodplain Delineation Study," FCD 90-06. The study resulted in the completion of two reports, one is entitled the "Hydrology Report," and the other is entitled "Hydraulic Analysis and Floodplain Delineation Report." The study also includes several sets of aerial maps which correspond to these two reports.

Concentration points on the Gila Bend Canal are named and cross-referenced on the maps and in the reports. This study modeled the watershed which used the HEC-1 (an hydrological model from the U.S. Corp of Engineers) which gives the flexibility in adjusting variables and running various determinants, affecting conditions in the area. There are 19 concentration points on the Gila Bend Canal, and the study used a six-hour and 24-hour storms in reviewing the cubic feet per second flows and the ponding in areas of inundation along the upstream side of the Gila Bend Canal.

The study area encompasses a 297 square-mile area with 100 sub-basins and 87 channels which were routed to the major construction points. Five of the channels discharge water in more than one direction. In reference to the impacts of Highway 85, Mr. Donohue reported that the highway is apparently an insignificant factor because during the six-hour and 24-hour storms the flow is large enough so that the water is generally dispersed across the highway. But the highway may be of a more significant impact during smaller storms when it serves as a barrier and source of concentration of water in selected channels.

Six gauging stations were used that were located near the watershed. None were actually found in the study area itself. The values derived from those gauging stations were used in calibrating the model mentioned previously.

The study of the flood delineation covered solely the upstream (east) side of the Gila Bend Canal. It did not address the discharge of water flowing downstream (west) of the Gila Bend Canal.

The study prepared by Donohue Engineering on behalf of the Maricopa County Flood Control District will be submitted to the Federal Emergency Management Agency (FEMA) for approval.

#### Presentation on the Rainbow Wash Study Area

Tim Murphy of the Maricopa County Flood Control District made a presentation on the progress of the study on Rainbow Wash. It consists of 11 linear miles with the width to be determined by the 100-year flood area for FEMA purposes. This study will use the hydrology developed by Donohue Engineering in conjunction with the Gila Bend Canal study project. This study was requested by the Woolsey Flood Protection District in response to the landfill site in that wash area.

The expected completion date of this study is the summer of 1992. The landfill is in the design phase and Gary Sherbert of Donohue Engineering is in charge of designing that facility.

Presentation on the Gila Bend Floodplain Delineation Study

Mr. Murphy made a presentation on the progress of the Gila Bend Floodplain Delineation Study. It consists of approximately 13 square miles with 15 miles of linear delineation. All new hydrology data will be developed in order to complete this project. The preliminary hydrology is expected to be completed during the latter part of January, 1992 with the completion of the report sometime during the summer of 1992 for submission to FEMA for approval.

Conclusion

The Board members complimented Mr. Vasquez, Mr. Murphy and Ms. Sandra Story for the efforts of the Maricopa County Flood Control District in completing the Gila Bend Canal Floodplain Study. The Board indicated it would be sending a letter of thanks to the Maricopa County Flood Control District for its study efforts.

DATED as of December 3, 1991.

---

Deon Layton, President  
Woolsey Flood Protection District,  
Maricopa County, Arizona

I hereby certify that these are the Minutes and duly adopted Resolutions of the Board of Directors of the Woolsey Flood Protection District, County of Maricopa, State of Arizona, dated as of December 3, 1991.

---

Charles Miccia,  
Secretary-Treasurer  
Woolsey Flood Protection District,  
Maricopa County, Arizona



# LETTER OF TRANSMITTAL

DATE	<i>October 7, 1991</i>	JOB NO	11358
RE:	Gila Bend Area		
	FCD 90-67		

**TO** Mr. Timothy Murphy  
Flood Control District of Maricopa County  
3335 West Durango  
Phoenix, Arizona 85009

**WE ARE SENDING YOU**  Attached  Under separate cover via \_\_\_\_\_ the following items:

- Shop drawings       Prints       Plans       Samples       Specifications  
 Copy of letter       Change order       \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
1	<i>9/27/91</i>		<i>Affidavit of Publication for Announcement of Intent to perform study</i>

**THESE ARE TRANSMITTED:**

- |  |   |   |
|--|---|---|
| <input type="checkbox"/> For approval            | <input type="checkbox"/> Approved as submitted    | <input type="checkbox"/> Resubmit _____ copies for approval   |
| <input checked="" type="checkbox"/> For your use | <input type="checkbox"/> Approved as noted        | <input type="checkbox"/> Submit _____ copies for distribution |
| <input checked="" type="checkbox"/> As requested | <input type="checkbox"/> Returned for corrections | <input type="checkbox"/> Return _____ corrected prints        |
| <input type="checkbox"/> For review and comment  | <input type="checkbox"/> _____                    |   |

**REMARKS** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**COPY TO** \_\_\_\_\_

SIGNED *James E. Mischler*  
James E. Mischler, P.E.

The Arizona Republic/The Phoenix Gazette

STATE OF ARIZONA }  
COUNTY OF MARICOPA } SS.

JOAN LOHR, being first duly sworn, upon oath deposes and says: That she is the legal advertising manager of the Arizona Business Gazette, a newspaper of general circulation in the county of Maricopa, State of Arizona, published at Phoenix, Arizona, by Phoenix Newspapers Inc., which also publishes The Arizona Republic and The Phoenix Gazette, and that the copy hereto attached is a true copy of the advertisement published in the said paper on the dates as indicated.

The Arizona Republic  
~~The Phoenix Gazette~~

SEPT. 27, 1991

*Joan Lohr*

Sworn to before me this

2nd day of

October A.D. 19 91



*Mary Lee Booher*  
Notary Public

#11358

INVOICE NO. 91787  
ANNOUNCEMENT OF INTENT  
TO PERFORM FLOOD  
ELEVATION STUDY

The Flood Control District of Maricopa County (FCDMC) has contracted Burgess & Niele, Inc. to perform a floodplain delineation for Gila Bend and surrounding areas.

This study will examine and evaluate flood hazard areas in the community to determine the flood elevation for those areas. These elevations will then be used to determine flood insurance rates used by the Federal Emergency Management Agency (FEMA).

This announcement is intended to inform all interested persons and communities of the commencement of this study so that they may have an opportunity to bring any relevant information to the attention of FCDMC/FEMA, so that they could be considered during the course of this study. Your comments should be addressed to Mr. Pedro Calza or Mr. Timothy Murphy, Hydrologists at the Flood Control District of Maricopa County. Published: Arizona Republic, September 27, 1991.

**FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY**

3335 West Durango Street  
PHOENIX, ARIZONA 85009

(602) 262-1501

**LETTER OF TRANSMITTAL**

TO Burgess & Niple  
5025 E. Washington # 212  
Phoenix, AZ 85034

DATE 09-11-91	JOB NO. FCD 90-67
ATTENTION Tom Loomis	
RE: Gila Bend Study	

WE ARE SENDING YOU  Attached  Under separate cover via \_\_\_\_\_ the following items:

- Shop drawings     Prints     Plans     Samples     Specifications  
 Copy of letter     Change order     Report

COPIES	DATE	NO.	DESCRIPTION
1		1	U.S. Geological Survey Water-Resources Investigations Report 91-4041 Basin Characteristics & Streamflow Statistics in AZ as of 1989.

THESE ARE TRANSMITTED as checked below:

- For approval     Approved as submitted     Resubmit \_\_\_\_\_ copies for approval  
 For your use     Approved as noted     Submit \_\_\_\_\_ copies for distribution  
 As requested     Returned for corrections     Return \_\_\_\_\_ corrected prints  
 For review and comment     \_\_\_\_\_  
 FOR BIDS DUE \_\_\_\_\_ 19 \_\_\_\_\_  PRINTS RETURNED AFTER LOAN TO US

REMARKS This is the only copy we have and would like to get it back by 09-13-91.  
Hope it is useful in your research.

COPY TO \_\_\_\_\_

SIGNED: A. Ahouigan

**B U R G E S S  
& N I P L E**

**E N G I N E E R S  
A R C H I T E C T S**

Mr. Timothy Murphy  
Flood Control District of  
Maricopa County  
3335 West Durango  
Phoenix, Arizona 85009

Re: Gila Bend Area  
No. 90-67

September 9, 1991

Dear Mr. Murphy:

**Burgess & Niple, Inc.**  
5025 East Washington Street  
Suite 212  
Phoenix, AZ 85034  
602 244-8100  
Fax 602 244-1915

This letter is to expand and clarify our understanding of the scope of work as it relates to electronic and hardcopy Arc-Info deliverables.

**Base Maps**

Base maps will include the following coverages:

- Index
- Topography
- Control points
- Transportation
- Municipal boundaries
- Bridges

Control points will include horizontal and vertical control, spot elevations and section corners. Property corners will not be included. Roads will be shown at a level of detail appropriate to the scale. Scale will be 1"=200' or 1"=400', as described in the Scope of Work.

Arc-Info plot files will be created which include a sheet index and sheet numbers. Base maps will be plotted on pre-made mylars which contain a border and Burgess & Niple's logo. Deliverables will include mylars and digital Arc-Info files.

**Floodplain Delineation Maps**

Floodplain delineation maps will include coverages on base maps and the following:

- Floodway/floodplain boundaries
- Flood hazard zones
- FEMA reference marks
- Flood elevation lines

Arc-Info plot files will be created which include a sheet index and sheet numbers. Base maps will be plotted on pre-made mylars which contain a border and Burgess & Niple's logo. Deliverables will include mylars and digital Arc-Info files.

September 9, 1991  
Page 2

**Watershed Maps and Soil Maps**

Watershed maps will include the following coverages:

- Watershed basins and subwatersheds
- Control points (section corners only)

Soil maps will include the following coverages:

- Soils
- Control points (section corners only)

Check-plots will be made of watershed and soils Arc-Info files to assure that data matches boundaries included on 1" = 2000' scale maps in the Hydrology TDN. Maps in the Hydrology TDN will contain additional information useful to reviews of the TDN, but not required by Arc-Info coverages. Deliverables will include digital Arc-Info files and folded prints in the Hydrology TDN.

I would like to meet with you in the near future to discuss our understanding of the work to make sure it meets with your expectations.

Very truly yours,

**BURGESS & NIPLE, INC.**

*James E. Mischler*

James E. Mischler, P.E.  
Project Manager

JEM:sk/11358

**FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY**

3335 West Durango Street  
PHOENIX, ARIZONA 85009

(602) 262-1501

**LETTER OF TRANSMITTAL**

TO Burgess & Niple 244-8100  
5025 E. Washington #212  
Phoenix, AZ 85034

DATE	9-29-91	JOB NO.	FCD 90-67
ATTENTION	Tom Loomis		
RE:	Gila Bend Study.		

WE ARE SENDING YOU  Attached  Under separate cover via \_\_\_\_\_ the following items:

- Shop drawings       Prints       Plans       Samples       Specifications  
 Copy of letter       Change order       \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
1		1	Water Resources Report Number thirty-Nine

THESE ARE TRANSMITTED as checked below:

- For approval       Approved as submitted       Resubmit \_\_\_\_\_ copies for approval  
 For your use       Approved as noted       Submit \_\_\_\_\_ copies for distribution  
 As requested       Returned for corrections       Return \_\_\_\_\_ corrected prints  
 For review and comment       \_\_\_\_\_  
 FOR BIDS DUE \_\_\_\_\_ 19 \_\_\_\_\_  PRINTS RETURNED AFTER LOAN TO US

REMARKS I was told that you were looking for this report.  
Please return this by the end of two weeks. This belongs to our  
hydrology library.

COPY TO \_\_\_\_\_

SIGNED: A. Ahonayon



# United States Department of the Interior



BUREAU OF LAND MANAGEMENT  
PHOENIX DISTRICT OFFICE  
2015 WEST DEER VALLEY ROAD  
PHOENIX, ARIZONA 85027

IN REPLY REFER TO:

2920  
(026)

September 4, 1991

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

DECISION

Maricopa County  
Flood Control District  
3335 West Durango St.  
Phoenix, AZ. 85009

Land Use Permit  
AZA-25639

Land Use Authorization Issued

Enclosed is a copy of Land Use Authorization AZA- 25639 which was approved by the Bureau of Land Management (BLM) on September 4, 1991. Luke AFB has concurred with the project and the issuance of this permit constitutes a final decision by the BLM.

Within 30 days of receipt of this decision, you have the right of appeals to the Board of Land Appeals, Office of the Secretary, in accordance with the regulation 43 CFR 4.400. If an appeal is taken, you must follow the procedures outlined in the enclosed Form 1842-1, Information on Taking Appeals to the Board of Land Appeals. The applicant has the burden of showing that the decision appealed from is in error.

Kenneth R. Drew  
Area Manager  
Lower Gila Resource Area

Act-4

cc: Burgess & Niple, Inc.

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

FORM APPROVED  
OMB NO. 1004-0009  
Expires: July 31, 1992

FOR BLM USE ONLY

LAND USE APPLICATION AND PERMIT

Sec. 302(b) of P.L. 94-579, October 21, 1976, 43 U.S.C. 1732

Application Number

AZA-25639

APPLICATION

1. Name (first, middle initial, and last) Flood Control District of Maricopa County	Address (include zip code). 3335 W. Durango Street Phoenix, Arizona 85009.	Phone (include area code) (602) 262-1501
---	--	---

2. Attach map or sketch showing public lands for which you are applying Attached

3. Proposed date(s) of use: from Sept. 8, 1991 to Dec. 31, 1991

4. Give legal basis for holding interest in lands in the state of Arizona  
(Check appropriate box and explain.)

<input type="checkbox"/> Resident	<input type="checkbox"/> Partnership
<input type="checkbox"/> Corporation	<input checked="" type="checkbox"/> County
<input type="checkbox"/> Local Government	<input type="checkbox"/> State Government
<input type="checkbox"/> Other	

5. Are the lands now improved, occupied, or used?  Yes  No (If "yes," describe improvements and purposes, identify users and occupants.)

Military withdrawal.

6. Do you need access to the land?  Yes  No (Describe needed or existing access)

Existing roads and trails.

7a. What do you propose to use the lands for?

Hydrologic study.

b. What improvements and/or land development do you propose? (To complete application processing, engineering and construction drawings may be required.)

None (no surface disturbance proposed).

c. What is the estimated capital cost? \$ N/A	d. What is the source of water for the proposed use? None
--	--

I CERTIFY That the information given by me in this application is true, complete, and correct to the best of my knowledge and belief and is given in good faith.

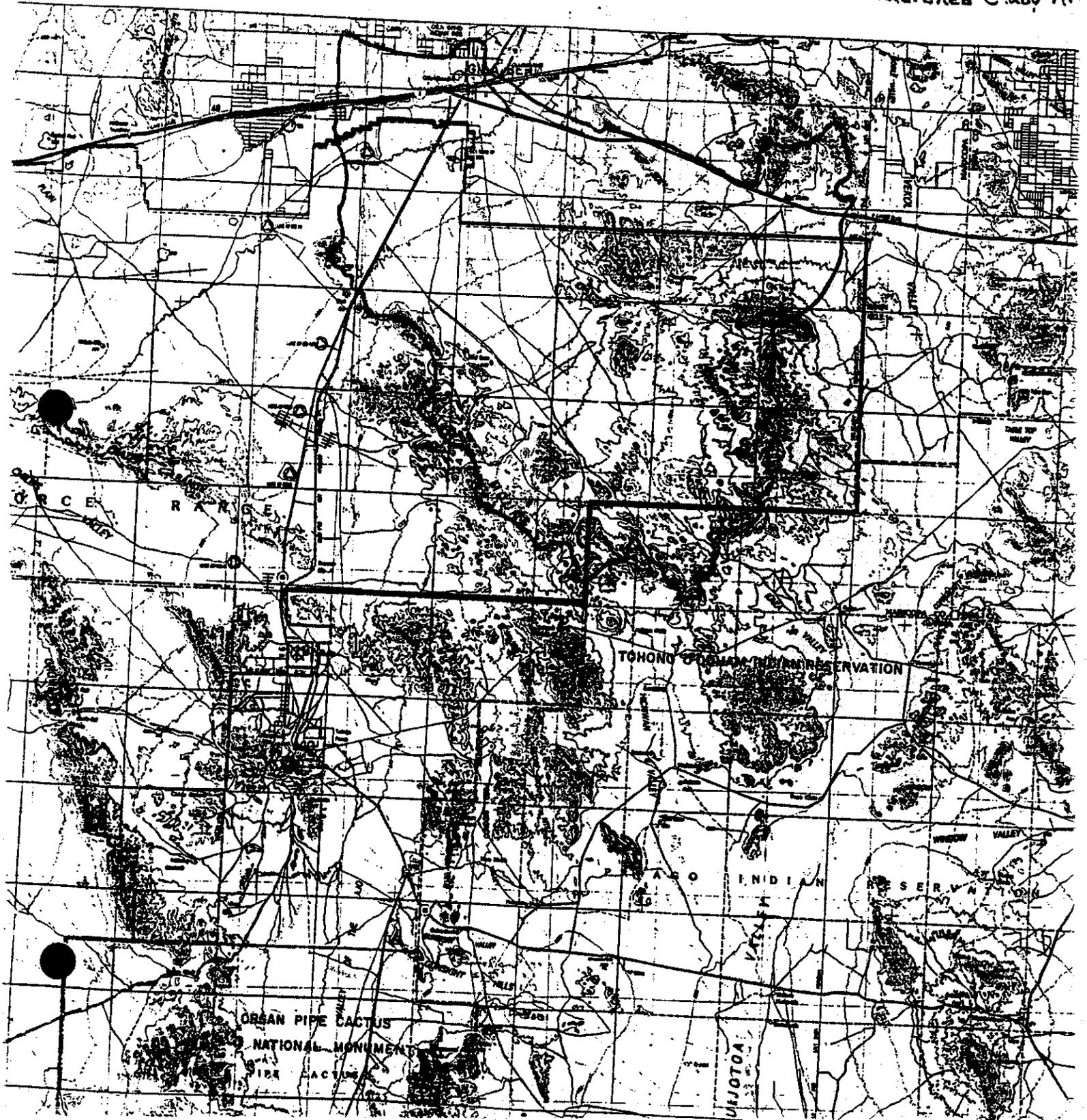
  
(Signature of Applicant)

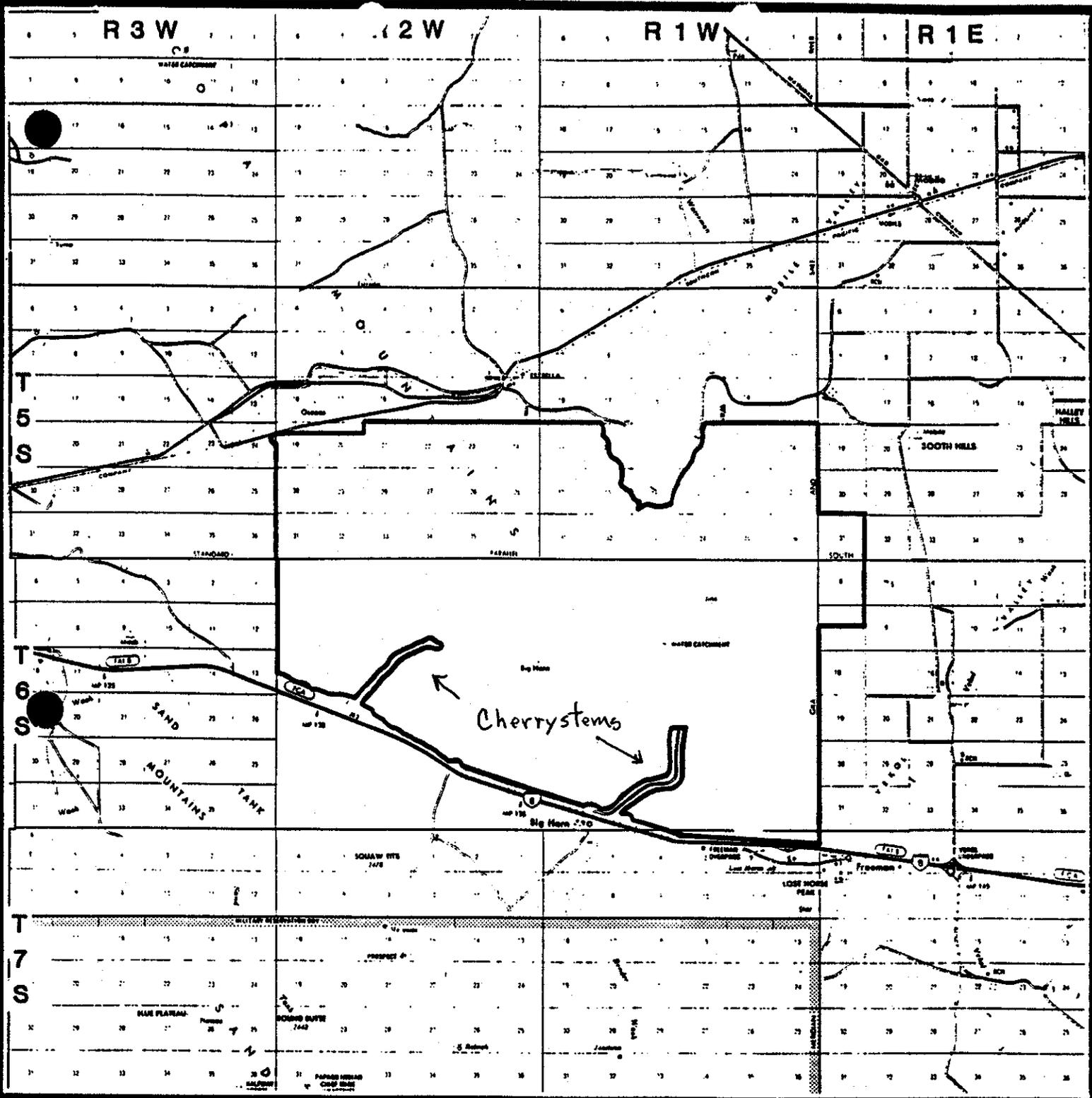
8-19-91  
(Date)

### SPECIAL STIPULATIONS

1. No mechanical surface disturbance is authorized off road.
2. No off road travel except along major wash bottoms and only when necessary to accomplish the study transects.
3. Use of vehicles or mechanical equipment is not authorized within the Maricopa Mountains Wilderness Area. Only the cherrystemmed roads may be used for accessing the area to be studied.
4. Prior to entering the Barry M. Goldwater Air Force Range proper notification and permits shall be obtained from Luke Air Force Base (Gila Bend Air Station).
5. Any cultural sites encountered during the study shall not be disturbed.
6. A copy of the final results of the study shall be forwarded to the Lower Gila Resource Area Manager and to the Luke Environmental Quality Branch, 832 CSG/DEV, Luke AFB 85309.

— BGR Boundary  
— Watershed Study Area



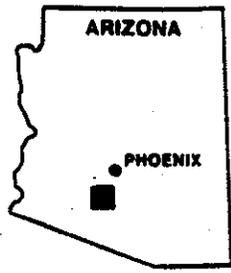


U.S. Department of the Interior  
Bureau of Land Management  
Phoenix District

**SOUTH  
MARICOPA MOUNTAINS  
WILDERNESS AREA**

Basemap © ADOT

**— WILDERNESS AREA  
BOUNDARY**



**LOCATION MAP**



(602) 262-1501

TO Burgess & Niple  
5025 E. Washington, #212  
Phoenix, AZ 85034

DATE	8-29-91	JOB NO.	FCD 90-67
ATTENTION	Tom Leomus		
RE	Bender & Sand Tank Leakes		
	Gila Bend, AZ		

WE ARE SENDING YOU  Attached  Under separate cover via \_\_\_\_\_ the following items:

- Shop drawings     Prints     Plans     Samples     Specifications  
 Copy of letter     Change order     Floppy Disk

COPIES	DATE	NO.	DESCRIPTION
1		1	5 1/4" Disk

THESE ARE TRANSMITTED as checked below:

- For approval     Approved as submitted     Resubmit \_\_\_\_\_ copies for approval  
 For your use     Approved as noted     Submit \_\_\_\_\_ copies for distribution  
 As requested     Returned for corrections     Return \_\_\_\_\_ corrected prints  
 For review and comment     \_\_\_\_\_  
 FOR BIDS DUE \_\_\_\_\_ 19 \_\_\_\_\_  PRINTS RETURNED AFTER LOAN TO US

REMARKS: Providing Auto Caded DXF file of Bender & Sand Tank Wash:

1. Swis Delinication } I believe this file  
 2. Watershed } is under state plain  
 3. Section Cors } coordinate system reference  
 any past efforts to make these plots match U.S.G.S maps were done at the plotting stage using <sup>plot</sup> scale. -- trial & error.  
 Use PC Tools Ver 5.5 to unzip (expand & unload) to dos.

Good Luck!

COPY TO Pedro Calza / Annic Motamedi  
Eric Feldman

SIGNED: Thomas E. Guillo

**B U R G E S S  
& N I P L E**

**E N G I N E E R S  
A R C H I T E C T S**

Mr. Ken Drew  
Bureau of Land Management  
2015 West Deer Valley Road  
Phoenix, AZ 85027

Re: Gila Bend Floodplain Delineation Study  
Project No. 2

July 9, 1991

Dear Mr. Drew:

**Burgess & Niple, Inc.**  
5025 East Washington Street  
Suite 212  
Phoenix, AZ 85034  
602 244-8100  
Fax 602 244-1915

Burgess & Niple, Inc. will be under contract with the Flood Control District of Maricopa County (FCDMC) by September, 1991, to prepare a floodplain delineation study of the Town of Gila Bend, Arizona. Our contract scope of work will include preparation of a detailed hydrologic computer model of the 620 square mile watershed contributory to Bender Wash, Sand Tank Wash, Saucedo Wash, and Quilotosa Wash. This effort will require access to the Barry M. Goldwater Air Force Range which comprises the majority of the watershed area. I talked with Mr. Hector Abrego of your office by telephone today. He asked that I write to you regarding our study, and explain the details of the activities we must perform in the field to meet the terms of our contract with the FCDMC.

Our contract calls for preparation of contour mapping of the Town of Gila Bend and adjacent areas at a scale of 1" = 400', with a 4-foot contour interval. Refer to the area highlighted in blue on the enclosed map. This is the area where our field survey crews will be placing panels for aerial mapping control, and actively working to set horizontal and vertical control for the floodplain delineation.

The area outlined in orange on the map is the 620 square mile watershed contributory to the area highlighted in blue. A field reconnaissance will be performed on the watershed, which will involve the following:

1. Verify drainage channel locations which will be used for routing runoff hydrographs downstream through the watershed.
2. Verify questionable drainage basin boundaries which can't be determined accurately using USGS quadrangle maps.
3. Take representative cross sections of washes used for hydrograph routing. This will involve approximately 40 cross sections taken throughout the 620 square mile area, using a laser level and paced distances.

July 9, 1991  
Page 2

4. Vegetation transects will be taken at representative locations to establish average vegetation cover densities.
5. Surface soils will be observed at representative locations in order to estimate soil texture characteristics.

The work listed in items 1 through 5 will be done by one man and on some days two men, over a twelve day period. A four-wheel drive truck will be used for access to the watershed, using existing roads. Access to the more remote washes will be obtained using a four-wheel drive all-terrain vehicle, operated typically in wash bottoms. Other areas will be accessed on foot. We anticipate performing the watershed reconnaissance work during the last part of September, 1991. The field survey work in the blue highlighted area could begin as early as August, 1991.

Please advise us as to special requirements or permit procedures which must be fulfilled before we begin our work. Our contact at the FCDMC is Mr. Pedro Calza, who can be reached at (602) 262-1501. Feel free to give me a call if you need additional information, or if you have any questions.

Sincerely,

**BURGESS & NIPLE, INC.**

Thomas R. Loomis, P.E.  
Project Engineer

TRL:lmw\2-FCDMC

Enclosure

copy: Pedro Calza  
Jim Mischler  
P/File

# LETTER OF TRANSMITTAL

DATE	7/8/91	JOB NO	2
RE:	Gila Bend Flood plain Delineation Study		

**TO** Flood Control District of Maricopa Co.  
3335 West Durango Street  
Phoenix, AZ 85009  
Attn: Mr. Pedro Calza

WE ARE SENDING YOU  Attached  Under separate cover via \_\_\_\_\_ the following items:

- |   |                                       |                                |                                  |   |
|---|---------------------------------------|--------------------------------|----------------------------------|---|
| <input type="checkbox"/> Shop drawings  | <input type="checkbox"/> Prints       | <input type="checkbox"/> Plans | <input type="checkbox"/> Samples | <input type="checkbox"/> Specifications |
| <input type="checkbox"/> Copy of letter | <input type="checkbox"/> Change order | <input type="checkbox"/> _____ |                                  |   |

COPIES	DATE	NO.	DESCRIPTION
1	7/8/91		Conversation Records

**THESE ARE TRANSMITTED:**

- |  |   |   |
|--|---|---|
| <input type="checkbox"/> For approval            | <input type="checkbox"/> Approved as submitted    | <input type="checkbox"/> Resubmit _____ copies for approval   |
| <input checked="" type="checkbox"/> For your use | <input type="checkbox"/> Approved as noted        | <input type="checkbox"/> Submit _____ copies for distribution |
| <input type="checkbox"/> As requested            | <input type="checkbox"/> Returned for corrections | <input type="checkbox"/> Return _____ corrected prints        |
| <input type="checkbox"/> For review and comment  | <input type="checkbox"/> _____                    |   |

REMARKS Pedro: I don't see any major problems yet. I will arrange my field schedule to include 3 weekends. We'll continue pursuit of the necessary permits to obtain access to the gunnery range.

COPY TO Jim Mischler

SIGNED Tom Jones

**B U R G E S S  
& N I P L E**

**E N G I N E E R S  
A R C H I T E C T S**

**E . . . . .  
JUN 3 - 1991**

**BURGESS & NIPLE, INC.**

**Captain Chris Ward  
U.S. Air Force  
832 CSS/OT  
Gila Bend AFAF, AZ 85337**

**Re: Gila Bend Floodplain  
Delineation Study  
Project No. 2**

**May 30, 1991**

**Dear Captain Ward:**

**Burgess & Niple, Inc.  
1106 North Beeline Highway  
Payson, AZ 85541  
602 474-5313  
Fax 602 474-3511**

I am writing in reference to our telephone conversation on May 15, 1991. We discussed the Air Force requirements to obtain access to your military reservation for evaluation of the watershed. We are currently negotiating with the Flood Control District of Maricopa County for a floodplain delineation study for Gila Bend. During the course of this study, we will need to access your reservation for the purpose of performing field surveys. Our tentative schedule calls for the field survey portion of our contract to commence in August, 1991.

I have enclosed 2 copies of a map of the study watershed. The military reservation boundary is highlighted in yellow, and the watershed boundary in orange. Per our discussion, please delineate the areas which are not accessible and the areas which will require scheduling. We anticipate that we will be working in the area for approximately three (3) weeks. Please return one marked up copy and the necessary release forms and permit application which we must fill out.

Feel free to call me if you have any questions regarding this matter. Also, I wish to thank you for your help and consideration.

Sincerely,

**BURGESS & NIPLE, INC.**

**Thomas R. Loomis, P.E.**

**TRL:sj**

**Enclosures**

**copy: Jim Mischler  
Pedro Calza, FCDMC  
Tom Granillo, FCDMC**

FLOOD CONTROL DIST.  
OF MARICOPA COUNTY  
3335 West Durango Street  
PHOENIX, ARIZONA 85009

LETTER OF TRANSMITTAL

(602) 262-1501

TO Burgess & Niple Inc.  
5025 East Washington Street  
Phoenix, Az 85034

DATE	05-21-91	JOB NO.
ATTENTION	Tom Loomis	
RE:	Bender & Sand Tank Washes ~ Gila Bend FDS	

WE ARE SENDING YOU  Attached  Under separate cover via \_\_\_\_\_ the following items:

- Shop drawings   
  Prints   
  Plans   
  Samples   
  Specifications  
 Copy of letter   
  Change order   
  \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
1		5	Sub-watershed Delineation, Scale 1"=2000'
1		1	Index Map for Sub-watershed Delineation
1		1	Sample of Final (Redline) To Flow paths
1		3	Original Watershed Map by Valerie Rice
1		~	Various Tables for Technical Data Notebook "Errata"
1		1	Soil Sample Descriptions 5-14-91

THESE ARE TRANSMITTED as checked below:

- For approval   
  Approved as submitted   
  Resubmit \_\_\_\_\_ copies for approval  
 For your use   
  Approved as noted   
  Submit \_\_\_\_\_ copies for distribution  
 As requested   
  Returned for corrections   
  Return \_\_\_\_\_ corrected prints  
 For review and comment   
  \_\_\_\_\_  
 FOR BIDS DUE \_\_\_\_\_ 19 \_\_\_\_\_  PRINTS RETURNED AFTER LOAN TO US

REMARKS Original watershed map is undergoing rework  
as seen by sub-watershed maps (5/21/91)

COPY TO \_\_\_\_\_

SIGNED: Thomas E. Conillo

BURGESS  
R NIPLE  
ENGINEERS  
ARCHITECTS

# FAX COVER SHEET

Burgess & Niple, Inc.

Suite 212

5025 East Washington Street

Phoenix, AZ 85034

602 244-8100

Fax 602 244-1915

Date: 5/20/91

Job Number: 02

Re: Gula Bend Study

TO: Steve Perham

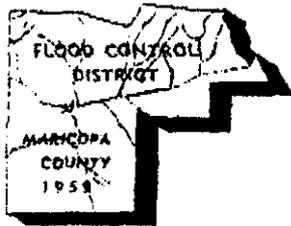
## FAX PHONE NUMBER:

We are sending you 3 additional pages, not counting this cover sheet.  
If all pages are not received, please call us as soon as possible.

## COMMENTS:

Steve,  
Please forward to correct individuals

Signed: Sherris Per JEM



# FLOOD CONTROL DISTRICT

of

Maricopa County

3335 West Durango Street • Phoenix, Arizona 85009  
Telephone (602) 262-1501

D. E. Sagramoso, P.E., Chief Engineer and General Manager

CC: TAS

FAX { BCM % S  
Perham-Pe  
TRL-Pay

BOARD OF DIRECTORS

Betsy Bayless  
James D. Bruner  
Carole Carpenter  
Tom Freestone  
Ed Pastor

**RECEIVED**

**MAY 17 1991**

**BURGESS & NIPLE, INC.**

MAY 16 1991

Mr. James E. Mischler, P.E.  
Project Manager  
Burgess & Niple, Inc.  
5025 East Washington Street, Suite 212  
Phoenix, Arizona 85034

SUBJECT: Contract FCD 90-67, Flood Insurance Study, Gila Bend Area

Dear Mr. Mischler:

Enclosed is the Aerial Topography Survey Control, Proposed Man Hours and Cost sheets 1 & 2 for your use. Please submit along with your fee proposal on Wednesday, May 29, 1991.

Any additional information or clarification needed should be directed to the attention of Mr. Pedro Calza or myself.

Sincerely,

Leanna Cumberland  
Chief, Contracting Branch

Enclosures: (1)

**Aerial Topography Survey Control  
Proposed Man Hours and Cost**

All Work per FEMA Document #37  
Guidelines and Specifications for Study Contractors

WORK	MAN-HOURS	RATE/HR	TOTAL COST
<u>Administration</u>			
Principal	_____	_____	_____
Office Surveyor	_____	_____	_____
Clerical	_____	_____	_____
<u>Set Panels</u> # of Panels _____			
Survey Supervisor	_____	_____	_____
Survey Team Member	_____	_____	_____
Survey Team Member	_____	_____	_____
Survey Team Member	_____	_____	_____
<u>Establish Control Values</u> (coordinate elevation at site)			
Survey Supervisor	_____	_____	_____
Survey Team Member	_____	_____	_____
Survey Team Member	_____	_____	_____
Survey Team Member	_____	_____	_____
<u>Horizontal &amp; Vertical Control</u> # of Points _____			
Survey Supervisor	_____	_____	_____
Survey Team Member	_____	_____	_____
Survey Team Member	_____	_____	_____
Survey Team Member	_____	_____	_____
<u>Office Research/Note Reduction and Calculations</u>			
Survey Supervisor	_____	_____	_____
Survey Team Member	_____	_____	_____
Survey Team Member	_____	_____	_____
Survey Team Member	_____	_____	_____
<u>Survey Improvements</u> # number of Structures (Improvements) _____			
Survey Supervisor	_____	_____	_____
Survey Team Member	_____	_____	_____
Survey Team Member	_____	_____	_____
Survey Team Member	_____	_____	_____
<u>Field Verification of X-Sections</u> # of Sections _____ : Avg Length _____ ft.			
Survey Supervisor	_____	_____	_____
Survey Team Member	_____	_____	_____
Survey Team Member	_____	_____	_____
Survey Team Member	_____	_____	_____

<u>Set ERMs</u>	<u># of ERMs</u>	_____	_____	_____
Survey Supervisor		_____	_____	_____
Survey Team Member		_____	_____	_____
Survey Team Member		_____	_____	_____
Survey Team Member		_____	_____	_____

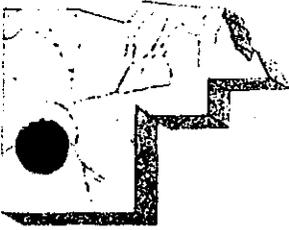
	Total Labor	_____
+	Overhead	_____
+	Profit	_____
	Total	_____

Number of linear feet of survey \_\_\_\_\_

Number of instrument set ups \_\_\_\_\_

Survey Hours (field time only) per work day = \_\_\_\_\_

A narrative explaining any extenuating circumstances in addition to a USGS map indicating location of proposed Map panels, control Points and ERMs Should be submitted. The horizontal and vertical control values/locations of base monuments shall be shown on the USGS map. Survey work should be to a minimum as outlined by FEMA Document 37 or in accordance with the requirements of the publications "Minimum Standards for Arizona Land Boundary Surveys", as adopted by the Arizona State Board of Technical Registration, whichever procedure has the more stringent requirements.



# FLOOD CONTROL DISTRICT

of

Maricopa County

3335 West Durango Street • Phoenix, Arizona 85009

Telephone (602) 262-1501

## BOARD OF DIRECTORS

Betsy Bayless  
James D. Bruner  
Carole Carpenter  
Tom Freestone  
Ed Pastor

D. E. Sagramoso, P.E., Chief Engineer and General Manager

MAY 09 1991

Gene Merritt, Floodplain Administrator  
Town of Gila Bend  
202 N. Euclid  
Gila Bend, Arizona 85311

Subject: Gila Bend Area FIS

Dear Mr. Merritt:

The District has been authorized to perform a flood insurance study in the Gila Bend area. The purpose of the study is to identify areas that may be susceptible to flooding during a regulatory flood event including a re-evaluation of the existing 100-year delineations especially Bender and Sand Tank Washes.

From a description of the work to be performed (preliminary scope of work), a consultant has been chosen and a detailed scope of work is being prepared to perform portions of the study later this year.

The consultant will place a notice of the study in a local publication and advertise for technical information or potential flood problem areas to be incorporated into the study.

Should you or your Town Council desire a briefing on this project, please let me know. Whether or not a pre-study briefing is held, we will be coordinating with you at the time we receive the preliminary flood study work maps from the consultant. After we have reviewed the study maps for compliance with FEMA flood study standards and criteria, we will contact you to request that we be given the opportunity to present the preliminary results to the Town at a meeting to which concerned citizens and property owners are included.

Sincerely,

D. E. Sagramoso, P.E.  
Floodplain Administrator

Ron Nevitt,  
Floodplain Representative

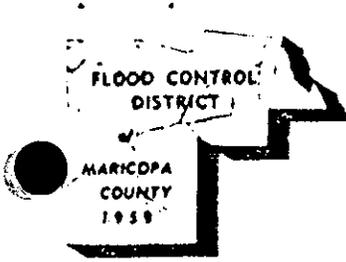
Info: PAC  
SR Y  
PMS  
JMP

copy to: Jim Morris, ADWR

File: Town of Gila Bend (anna)

**SECTION 1: General Documentation  
and Correspondence**

*1.5 Contract Scope of Work*



**FLOOD CONTROL DISTRICT**  
of  
**Maricopa County**

3335 West Durango Street • Phoenix, Arizona 85009  
Telephone (602) 262-1501

---

**BOARD OF DIRECTORS**  
Betsey Bayless  
James D. Bruner  
Carole Carpenter  
Tom Freestone  
Ed Pastor

D. E. Sagramoso, P.E., Chief Engineer and General Manager

**SEP 17 1991**

Mr. Terrence A. Sack  
President  
Burgess & Niple, Inc.  
5025 East Washington Street  
Phoenix, Arizona 85034

**SUBJECT: Contract FCD 90-67, Gila bEnd Area Flood Insurance Study**

Dear Mr. Sack:

This letter will serve as confirmation of the September 3, 1991, verbal Notice To Proceed for the work under the above-referenced contract that was approved by the Board of Directors on September 3, 1991.

A fully executed contract is enclosed for your use. If you have any questions, please do not hesitate to contact Pedro Calza at 262-1501.

Sincerely,

Leanna Cumberland  
Chief, Contracting Branch

Enclosure (1)

Copy to: James Mischler

#11358

## CONTRACT FCD 90-67

Pursuant to the provisions of the Arizona Revised Statutes (A.R.S.), 48-3603, the Board of Directors has the authority to enter into contracts.

The Flood Control District of Maricopa County, Arizona, hereinafter called the "DISTRICT", is desirous of having certain professional services performed in connection with the Gila Bend Area Flood Insurance Study, hereinafter called the "PROJECT" and as more fully described in Exhibit A, Scope of Work, attached, and

BURGESS & NIPLE, INC., hereinafter called "CONSULTANT", is desirous of performing said services;

THEREFORE, the parties hereto mutually agree as follows:

SECTION I - SERVICES OF THE CONSULTANT

The CONSULTANT, under the general supervision of the Chief Hydrologist of the DISTRICT's Hydrology Division, shall prepare studies, reports, surveys, plans, drawings, specifications and cost estimates as are necessary for the PROJECT and according to the directions and designated standards of the DISTRICT and in accordance with Exhibit A. It is understood and agreed that the DISTRICT's authorized representative shall be the Chief Hydrologist or his duly authorized representative, hereinafter called the "AGENT" and that he/she shall be the sole contact for administering this contract.

The CONSULTANT shall meet periodically with the AGENT so as to keep the DISTRICT informed of the progress of the work in accordance with the schedule defined in Exhibit A.

The CONSULTANT shall promptly advise the AGENT of any factors, which may develop during the PROJECT, that would likely result in construction or design costs in excess of budgetary constraints.

SECTION II - PERIOD OF SERVICE

The CONSULTANT shall complete all work per the schedule provided in Exhibit A, Scope of Work within 340 calendar days after receipt of the Notice to Proceed, exclusive of DISTRICT review time. The DISTRICT is expected to require up to 60 calendar days for review time, for a total contract time period of 400 calendar days. Should extension of this contract period be necessary, and any such extension(s) continue the date of contract expiration for a time period of more than one year from the date of contract execution, adjustment(s) of the consultant's fee(s) may, upon agreement by both the DISTRICT and the CONSULTANT, be made in accordance with the Consumer Price Index for Urban Consumers, Western

Division published by the U.S. Department of Labor, Bureau of Labor Statistics, using the published edition coinciding with the initial contract expiration date. Any such fee adjustment shall only apply to the extended contract time period.

### SECTION III - PAYMENTS TO THE CONSULTANT

The CONSULTANT shall be paid for work under this Contract a lump sum fee of \$361,100.00 plus any adjustments that have been approved in writing in accordance with the Maricopa County Procurement Code.

The DISTRICT shall pay the CONSULTANT upon completion of the work as accepted by the DISTRICT, except that progress payments may be made as billed by the CONSULTANT based on approved monthly progress reports subject to the limitations set forth in Exhibit 'A', Scope of Work. Ten percent of all contract payments made on an interim basis shall be retained by the DISTRICT as insurance of proper performance of the contract or, at the option of the CONSULTANT, a substitute security may be provided by the CONSULTANT in an authorized form pursuant to procedures established by the DISTRICT. The CONSULTANT is entitled to all interest from any such substitute security.

When the contract is fifty percent (50%) completed, one-half (1/2) of the amount retained will be paid to the CONSULTANT provided the CONSULTANT is making satisfactory progress on the contract and there is no specific cause or claim requiring a greater amount to be retained. After the contract is fifty percent (50%) completed, no more than five percent (5%) of the amount of any subsequent progress payments shall be retained providing the CONSULTANT is making satisfactory progress on the project, except if at any time the DISTRICT determines satisfactory progress is not being made, ten percent (10%) retention shall be reinstated for all progress payments made under the contract subsequent to the determination.

Any retention monies shall be paid or substitute security returned or released, as applicable, to the CONSULTANT within forty-five (45) calendar days after: (1) Completion of the work in Exhibit A through the submittal of District accepted/ approved documents to FEMA, (2) receipt of a completed "Certificate of Substantial Performance" form, (3) the CONSULTANT's statement that no project disputes exist; and (4) invoicing for any retained monies has been received by the DISTRICT. Upon acceptance and approval of the project by FEMA and the completion of all final work required by the DISTRICT, the CONSULTANT shall submit a final Certificate of Performance and its invoice for any sums remaining due and payable under this Contract.

If the CONSULTANT desires a partial payment in accordance with the provisions above, the CONSULTANT will complete and forward, a DISTRICT provided form, indicating payment distribution to MBE/WBE firms.

### SECTION IV - THE DISTRICT'S RESPONSIBILITIES

The DISTRICT shall furnish the CONSULTANT, at no cost to the CONSULTANT, the following information or services for this PROJECT:

A. The copy of on-hand maps, records, survey ties, bench marks or other data pertinent to the PROJECT. This does not, however, relieve the CONSULTANT of the responsibility of searching records for additional information, for requesting specific information or for verification of that information provided. The DISTRICT does not warrant the accuracy or comprehensiveness of any such information.

B. All available information and data relative to policies, standards, criteria, and studies, etc. impacting the PROJECT as identified by the CONSULTANT.

C. Availability of staff for consultation with the CONSULTANT during the performance of studies and plan development in order to identify the problems, needs, and other functional aspects of the PROJECT.

D. Examination of documents submitted by the CONSULTANT and rendering of decisions pertaining thereto promptly, to avoid unreasonable delay in the progress of the work by the CONSULTANT. The DISTRICT will keep the CONSULTANT advised concerning the progress of the DISTRICT's review of work.

#### SECTION V - ALTERATION IN SCOPE OF WORK

Any alteration in the scope of work that will result in a substantial change in the nature of the PROJECT so as to materially increase or decrease the contract fee will require negotiation of an amendment to the contract to be executed by the DISTRICT and the CONSULTANT. No work shall commence on the change until the contract amendment has been approved by the DISTRICT and the CONSULTANT has been notified to proceed by the AGENT. It is distinctly understood and agreed that no claim for extra work done or materials furnished by the CONSULTANT will be allowed by the DISTRICT except as provided herein, nor shall the CONSULTANT do any work or furnish any materials not covered by this agreement unless such work is first authorized in writing in accordance with the Maricopa County Procurement Code. Any such work or materials furnished by the CONSULTANT without such written authorization first being given shall be at his own risk, cost, and expense, and he hereby agrees that without such written authorization he will make no claim for compensation for such work or materials furnished.

#### SECTION VI - RECORDS

Records of the CONSULTANT's payroll expense pertaining to this PROJECT and records of accounts between the DISTRICT and the CONSULTANT shall be kept on a generally recognized accounting basis and shall be available upon request to the DISTRICT or its authorized representative for audit during normal business hours. The records shall be subject to audit by appropriate grantor agency if the PROJECT is funded all or in part by a grant.

#### SECTION VII - PROJECT COMPLETION

If during the course of this contract situations arise which prevent completion within the allotted time, an extension may be granted by the AGENT.

## SECTION VIII - TERMINATION

The DISTRICT may terminate this contract at any time upon reimbursement to the CONSULTANT of expenses which include reasonable charges for time and material for the percentage of work satisfactorily completed and turned over to the DISTRICT.

The DISTRICT reserves the right to postpone, terminate or abandon this PROJECT for the CONSULTANT's failure to complete the PROJECT on time, or failure to comply with the provisions of the contract. The DISTRICT also reserves the right to terminate any or all parts of this contract for its own convenience as the DISTRICT may determine at its sole discretion.

The DISTRICT hereby gives notice that pursuant to A.R.S. Section 38-511 "A" this contract may be cancelled without penalty or further obligation within three years after execution if any person significantly involved in initiation, negotiation, securing, drafting, or creating a contract on behalf of the DISTRICT is, at anytime while the contract or any extension of the contract is in effect, an employer, agent, or any other party to the contract in any capacity or a consultant to any other party of the contract with respect to the subject matter of the contract. Cancellation under this section shall be effective when written notice from the Chief Engineer and General Manager of the DISTRICT is received by all of the parties of the contract. In addition, the DISTRICT may recoup any fee for commission paid or due to any person significantly involved in initiation, negotiation, securing, drafting, or creating the contract on behalf of the DISTRICT from any other party to the contract arising as a result of the contract.

The CONSULTANT may terminate this contract in the event of nonpayment of fees as specified in Section III, PAYMENTS TO THE CONSULTANT.

## SECTION IX - OWNERSHIP OF DOCUMENTS

All original documents including, but not limited to studies, reports, tracings, drawings, physical and computer models, estimates, field notes, investigations, design analyses, calculations, computer software, and specifications, prepared in the performance of this Contract are to be and remain the property of the DISTRICT and are to be delivered to the AGENT before final payment is made to the CONSULTANT. The DISTRICT reserves the right to reuse the documents as it sees fit. However, the DISTRICT will not reuse, alter, or modify these documents without noting such alterations, modifications, or intent of their reuse, and will hold the CONSULTANT harmless from any claims arising from the reuse, alteration, or modification of the documents. The CONSULTANT may retain reproducible copies of all such documents delivered to the DISTRICT.

The CONSULTANT hereby releases all Subcontractors/Subconsultants employed for this project from any liability or prior notice and authorization for providing information or copies of records requested by the DISTRICT subsequent to the completion of this Contract.

## SECTION X - COMPLIANCE WITH LAWS

The CONSULTANT is required to comply with all Federal, State and local laws, local ordinances and regulations. The CONSULTANT's signature on this contract certifies compliance with the provisions of the I-9 requirements of the Immigration Reform and Control Act of 1986 for all personnel that the CONSULTANT and any subconsultants employ to complete this PROJECT. It is understood that the DISTRICT shall conduct itself in accordance with the provisions of the Maricopa County Procurement Code.

## SECTION XI - GENERAL CONSIDERATIONS

A. Prior to beginning the work, the CONSULTANT shall furnish the DISTRICT for approval the names of its key employees, and of its sub-consultants and their key employees to be used on this PROJECT. Any subsequent changes are subject to the written approval of the DISTRICT.

The CONSULTANT in replacing a MBE/WBE subcontractor should attempt to contract with another MBE/WBE.

B. The CONSULTANT agrees during the execution of this contract that no clients other than the DISTRICT, or the Federal Emergency Management Agency, will be retained within the area of the 100-year floodplain for the area without expressed written authority from the chief Engineer and General Manager of the DISTRICT.

C. The failure of either party to enforce any of the provisions of this Contract or to require performance of the other party of any of the provisions hereof shall not be construed to be a waiver of such provisions, nor shall it affect the validity of this Contract or any part thereof, or the right of either party to thereafter enforce each and every provision.

D. The CONSULTANT shall be responsible for the cost of any additional design, field layout, testing, construction and supervision necessary to correct those errors or omissions attributable to the CONSULTANT and for any damage incurred by the DISTRICT as a result of additional construction costs caused by such CONSULTANT errors or omissions.

E. The fact that the DISTRICT has accepted or approved the CONSULTANT's work shall in no way relieve the CONSULTANT's responsibility.

F. It is mutually understood and agreed that this Contract shall be governed by the laws of the State of Arizona, both as to interpretation and performance. Any action at law, suit in equity, or judicial proceeding for the enforcement of this Contract, or any provision thereof, shall be instituted only in the courts of the State of Arizona.

SECTION XII - SUCCESSORS AND ASSIGNS

This Contract shall not be assigned by either party without prior written approval of the other except that the CONSULTANT may use in the performance of this Contract without prior approval of the DISTRICT, personnel or services of its related entities and affiliated companies as if they were an integral part of the CONSULTANT; and it shall extend to and be binding upon the heirs, executors, administrators, successors and assigns of the parties hereto.

SECTION XIII - NO KICK-BACK CERTIFICATION

The CONSULTANT warrants that no person has been employed or retained to solicit or secure this Contract upon any agreement or understanding for a commission, percentage, brokerage, or contingent fee; and that no member of the Board of Directors/Supervisors or any employee of the DISTRICT has any interest, financially or otherwise, in the CONSULTANT firm.

For breach or violation of this warranty, the DISTRICT shall have the right to annul this Contract without liability, or at its discretion to deduct from the Contract price or consideration, the full amount of such commission, percentage, brokerage, or contingent fee.

SECTION XIV - ANTI-DISCRIMINATION PROVISION

The Flood Control District of Maricopa County will endeavor to ensure in every way possible that minority and women-owned business enterprises shall have every opportunity to participate in providing professional services, purchased goods, and contractual services to the Flood Control District of Maricopa County without being discriminated against on the grounds of race, religion, sex, age, or national origin.

The CONSULTANT agrees not to discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, or handicap and further agrees not to engage in any unlawful employment practices. The CONSULTANT further agrees to insert the foregoing provisions in all subcontracts hereunder.

SECTION XV - AMENDMENTS

This Contract may be amended by mutual written agreement of the DISTRICT and the CONSULTANT.

SECTION XVI - INDEMNIFICATION AND INSURANCE

A. The CONSULTANT shall provide and maintain the following minimum insurance requirements:

1. Professional Liability. The CONSULTANT shall show evidence of maintaining continuous insurance for the past three (3) years with a minimum coverage limit of \$1,000,000.00 each claim and/or in the aggregate.

The CONSULTANT shall provide and maintain Professional Liability Insurance with a minimum single limit of \$1,000,000.00 for each claim made and an aggregate limit of \$1,000,000.00 for all claims made through this contract's completion date or the policy's life, whichever is longer.

2. Commercial General Liability. Commercial general liability insurance with a minimum single limit of \$1,000,000.00 for each coverage/occurrence. The policy shall include coverage for bodily injury and personal injury, broad form property damage and blanket contractual coverage.

3. Automobile Liability. Automobile liability insurance, with an individual single limit for bodily injury and property damage of no less than \$1,000,000.00, each occurrence, with respects to CONSULTANT's vehicles (whether owned, hired, non-owned), assigned to or used in the performance of this contract.

4. Workers' Compensation Insurance. This insurance shall be maintained during the life of the contract.

5. Additional Insured. The policies, except professional liability and workers' compensation, required by this section shall name the DISTRICT as Additional Insured, and shall specify that insurance afforded the CONSULTANT shall be primary insurance, and that any insurance coverage carried by the DISTRICT or its employees shall be excess coverage, and not contributory coverage to that provided by the CONSULTANT. No policy issued under this contract shall lapse, be cancelled, allowed to expire, or be materially changed to affect the coverage available to the DISTRICT without thirty (30) days written notice to the DISTRICT.

6. DISTRICT approved documentation outlining the coverages specified in this section shall be filed with the DISTRICT prior to issuance of the Notice to Proceed.

B. The CONSULTANT agrees to indemnify and save harmless the DISTRICT, any of its departments, agencies, officers, or employees from all suits, including attorney's fees and costs of litigation, actions, loss, damage, expense, cost or claims, of any character or any nature arising out of the CONSULTANT's wanton, willful or negligent acts, errors or omissions in the performance of work under this Contract, and any wanton, willful or negligent acts, errors or omissions by any subconsultant or other agent used by the CONSULTANT in the performance of work under this Contract.

IN WITNESS WHEREOF, the parties herein have executed this Contract.

BURGESS & NIPLE, INC.

Terrence A. Sack James E. Mischler  
Principal

TERRENCE A. SACK James E. Mischler  
Printed Name

PRESIDENT Vice President  
Title

Date: June 24, 1991

86-0143433  
Federal Tax Identification Number

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY:

D. E. Sacramento  
D. E. Sacramento, P.E.  
Chief Engineer and General Manager

Date: 8-13-91

ACCEPTED AND APPROVED:

Thomas H. Grayson  
Chairman, Board of Directors

ATTEST:

Ivan McCullough  
Clerk of the Board

Date: 9.3.91

LEGAL REVIEW

Approved as to form and within the powers and authority granted under the laws of the State of Arizona to the Flood Control District of Maricopa County.

[Signature]  
General Counsel, District

Date: 8-14-91

**SCOPE OF WORK  
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY  
TOPOGRAPHIC MAPPING AND  
FLOODPLAIN DELINEATION STUDY  
FOR THE GILA BEND AREA  
FCD 90-67**

General

The project consists of approximately 13 square miles of topographic mapping and approximately 15 river miles of floodplain and floodway delineations, as described below and shown on Exhibit 1. An additional area, shown on Exhibit 2 south of the base mapping area, will be photographed at 1"=400' scale.

- \* Sand Tanks Wash
- \* Unnamed Tributary to the Gila River (No. 1)
- \* Unnamed Tributary to Sand Tank Wash (No. 2)
- \* Unnamed Tributary to No. 2 (No. 3)
- \* Unnamed Tributary to No. 3 (No. 4)

The Consultant will develop the hydrology using the Corps of Engineer's HEC-1 computer model and back water analysis using the HEC-2 computer model to determine floodplain and floodway delineations for the 100-year peak flood. Work must be reviewed and accepted by the Federal Emergency Management Agency (FEMA) prior to the finalization of this contract. As part of this requirement, the Consultant shall be responsible for Public Notification regarding this project. Work under this Scope will be completed within 340 calendar days from the date of the Notice to Proceed, including 60 days for Flood Control District reviews.

Floodplain and floodway limits will be reconciled with the current flood insurance study delineation for the Gila River.

Task 1 Data Collection

- 1.1 The Consultant will collect and review pertinent data from the District and other outside sources. Data to be collected will include previous flood hazard reports and hydrology for the study area; existing topographic mapping; historical flooding information; as-built plans for existing structures; FEMA Flood Hazard Boundary Maps and Letters of Map Amendment and/or Revisions and other pertinent information.
- 1.2 A written summary of the data collection effort will be submitted to the District for information purposes.
- 1.3 The Consultant will submit a project schedule showing coordination meetings and completion dates for each of the tasks in the contract.

## Task 2 Topographic Mapping

- 2.1 The Consultant will notify property owners and obtain necessary Rights-of-Entry for the study area. The District will assist Consultant as may be necessary to complete this task.
- 2.2 An aerial survey subconsultant shall be retained by the firm as part of this contract. The Consultant shall coordinate the aerial surveying work with the aerial surveying consultant to ensure that the specifications of the aerial surveying work are met. Quality control on surveys will be per FEMA 37, Flood Insurance Study Guidelines and Specifications for Study Contractors, dated March, 1991.
  - 2.2.1 Prepare topographic mapping with a 4-foot contour interval, 1"=400' scale; except Section 31, R4W, T5S, and Section 36, R5W, T5S, which will be mapped at a 2-foot contour interval, 1"=200' scale. Provide spot elevations on section line and mid-section line roads.
  - 2.2.2 Ground Control:
    - a. The Consultant shall provide survey control using 1983 NAD.
    - b. The Consultant shall systematically set panel points and establish horizontal and vertical control throughout the areas to be mapped for use in compilation by the aerial survey consultant. Where readily available, surveys will tie into the State Plane Coordinate System. Field control shall be sufficient to readily allow for compilation of maps by the aerial survey consultant at the desired map scale and contour interval and will be based on the National Geodetic Vertical Datum (NGVD).
    - c. The horizontal and vertical control points shall be located and marked by the Consultant. The controls for the area mapping shall be in sufficient numbers and shall be in locations which will be compatible with the accuracy of the mapping requirements. The controls shall be of at least third order accuracy. Section corners, quarter corners, and mid-section points shall be used for control points wherever possible.
  - 2.2.3 Digital contour and planimetric data developed for this project shall be delivered in the format as specified in the attached Appendix A-GIS Data Specification Document.
  - 2.2.4 The Consultant shall provide permanent non-erasable topographic mylar sheets 24" x 36" at the specified scale and contour interval per 2.2.1 for mapping. A cover sheet will be provided with the project title, date of topographic mapping, and a location map showing geographic range covered by each specific mapping sheet. Each manuscript shall include a minimum of north arrow, scale, section corners and quarter corners, current and proposed streets and highway names, State Plane Coordinate System, major drainage features, corporate boundaries, cross-section lines, channel station center line, index map, description and elevation of control points and ERM's and reference marks used in ground control. The mapping will have an accuracy such that ninety percent (90%) of contours shall be within one-half contour of the true elevations and the remaining ten percent (10%) of the contours shall not be in error by more than one contour interval.

- 2.2.5 The Consultant shall provide permanent non-erasable topographic mylars as described above in Section 2.2.4 with delineated floodplains included.
- 2.2.6 Sketch maps no larger than 11" x 17" for the study area must be included in the final narrative report along with the flood profiles.
- 2.2.7 Hydrologic Work Maps should be at a scale of 1 inch = 2000 feet and shall include: reproducible transparent overlay maps of existing drainage patterns, subwatersheds, soils and landuse boundaries, major flow paths, and general topographic maps.

### Task 3 Hydrology

- 3.1 The hydrologic study of the watershed will be delivered to the District under separate cover from the hydraulic analysis. The watershed areas requiring detailed analysis are:
  - a. The Bender Wash watershed downstream from Section 21, T6S, R3W to the confluence with Sand Tank Wash;
  - b. The Sand Tank Wash watershed from Section 17, T6S, R4W to the confluence with the Gila River floodplain at Indian Road;
  - c. All of the Quilotosa Wash watershed to the confluence with the Gila River floodplain at Watermelon Road;
  - d. All of the Saucedo Wash watershed to the confluence with the Gila River floodplain at Watermelon Road; and
  - e. All of the watershed west of Saucedo Wash contributory to the Gila River floodplain, the westerly boundary of which crosses Interstate 8 approximately at the Smurr horizontal and vertical control marker.

The watershed areas which have been modeled previously by the District, and which are to be reviewed and checked, are:

- a. The Bender Wash watershed upstream from Section 21, T6S, R3W; and
- b. The Sand Tank Wash watershed upstream from Section 17, T6S, R4W.

The Consultant will use the U.S. Army Corps of Engineers (COE) computer program HEC-1, 1991 Version, to develop a 100-year hydrologic model or models for the area. Using appropriate hydrologic judgment, sub-basins will be identified that provide a reasonable depiction of the watershed condition. The sub-basins will be as homogeneous as possible, using watershed area, watershed type (mountain versus valley), and time of concentration as criteria. Sub-basin break-downs will be done in sufficient detail to provide peak discharges at the following locations:

- a. Drainage structures along the Gila Bend Canal and Southern Pacific Railroad;
- b. Drainage structures along S.R. 85 and the Tucson, Cornelia, and Gila Bend Railroad with contributing watershed areas in excess of five (5) square miles;
- c. Drainage structures along Interstate 8 with contributing watershed areas in excess of five (5) square miles;
- d. At county road crossings and City of Gila Bend street crossings mutually agreed upon with the District; and
- e. Tributary confluences along the following washes where a significant change in peak discharge will occur:
  - \* Bender Wash
  - \* Sand Tank Wash
  - \* Quilotosa Wash
  - \* Saucedá Wash
  - \* Unnamed Washes west of Saucedá Wash

The watershed for Bender and Sand Tank washes will be broken into sub-basins with an average size of 3.5 square miles, to remain consistent with the watershed modeling previously completed by the District. The remaining watersheds will be broken into sub-basins with a median area of eight (8) square miles. The average minimum will be approximately five (5) square miles.

An appropriate hydrograph time increment and number of hydrograph ordinates will be selected to allow for complete calculation of the flood hydrograph without sacrificing resolution of the flood peak. Calculations, or assumptions used in developing sub-basin and routing parameters, will be documented and made a part of the hydrology report.

3.2 The specific hydrologic techniques to be used in this study are:

- a. Rainfall: Peak discharges for the 100-year 6-hour storm will be estimated using rainfall distributions provided by the District. The peak discharge and peak volume for the 100-year 24-hour storm will be estimated using the SCS Type II 24-hour rainfall distribution.

Point precipitation values will be derived using the information and procedures contained in the Hydrologic Design Manual for Maricopa County, Arizona (Design Manual). The most current edition as of the date of Notice to Proceed will be utilized for this contract.

- b. Areal Reduction: The point precipitation values will be areally reduced using the JD option under HEC-1. The U.S. Army Corps of Engineers (COE) Queen Creek areal reduction curve will be applied for the 6-hour duration storm in conjunction with the family of 6-hour mass curves for Maricopa County contained in the Design Manual. NOAA Hydro-40 will be used for the 24-hour duration storm.

- c. **Rainfall Excess:** The Green and Ampt Infiltration Equation will be utilized for estimation of rainfall losses. This method will be applied in conformance with the Design Manual procedures using available soil texture data. It is anticipated that the "Preliminary" SCS Soils Survey of Maricopa County, Arizona: Gila Bend-Ajo Area will be utilized for this effort in combination with additional data obtained during the initial records search. Where soils texture data is not available, such as the Barry M. Goldwater Air Force Range area, approximate methods will be used to estimate Green and Ampt parameters.

Composite parameter values for each soil map unit will be taken from the hydrologic modeling for Bender and Sand Tank washes, previously done by the District. Parameters for soil map units which were not evaluated by the District will be estimated using procedures similar to those used by the District.

- d. **Unit Hydrograph:** The S-Graph method will be used for this project.
- e. **Lag Time:** Lag times for each sub-basin will be estimated using the relationship given by Equation 5.11 in the Design Manual. The COE coefficient values for C and m will be used in lieu of the USBR Values.
- f. **Hydrograph Channel Routing:** Channel routing will be accomplished using the Normal Depth option under HEC-1. Average cross sections will be developed utilizing available mapping and field reconnaissance data. Sufficient field cross sections will be taken to ensure that reasonable, representative sections can be assigned to reaches which are not evaluated in the field.

This process will be complicated by access problems caused by the Air Force Range. Certain areas cannot be accessed at all because of the danger from undetonated ordinance. Other areas are accessible, but only during specific times. Every effort will be made to obtain sufficient data to provide a reasonable model, but this may not be possible in all areas of the watershed.

The reach routing parameters for the reaches modeled using HEC-2 for floodplain delineation will be adjusted after the HEC-2 cross sections are available. The HEC-2 cross sections will be compared and a typical cross section estimated.

Reach route cross sections and parameters for the watershed area previously modeled by the District will be checked in detail during the field reconnaissance portion of the study. Special attention will be given to flow split areas which are deemed to have a significant effect on downstream peak discharges at critical locations.

Flow splits in distributary flow channels throughout the watershed will be identified and evaluated using the following criteria:

1. Determine if the split is isolated to a particular wash, or if flow can be diverted into a separate watershed resulting in significant changes in peak discharges or volumes at a critical downstream location; and

2. Determine if the split can be expected to function in a similar hydraulic manner from one storm event to the next.

If the split is deemed significant, then cross sections will be taken during field reconnaissance, unless the area is to be mapped as a part of the study. Flow splits will be modeled hydraulically using a relative conveyance curve, estimated using the cross section data, if it appears that the split can be expected to function similarly from one event to the next. For the other case, a probability analysis will be applied.

- g. **Hydrograph Reservoir Routing:** Detailed reservoir analysis of the backwater ponding areas against the upstream embankment of the Gila Bend Canal will be done for the canal reach between the SR 85 crossing and the US 80 crossing at the Interstate 8 Business Route intersection. The analysis and establishment of peak water surface elevations will be done using the level-pool reservoir routing option of HEC-1. Elevation and surface area data will be calculated in CADD using the digital contour mapping generated by aerial mapping. Stage versus discharge tables for low-level outlets, channel overchutes, and canal bank overtopping conditions will be estimated using appropriate hydraulic methodology. These curves will then be incorporated into the HEC-1 computer model. The end result of this effort will be to define Zone A 100-year floodplain limits for ponding on the upstream side of the Gila Bend Canal Study Reach, and to identify canal bank overtopping locations.

It is anticipated that ponding areas against the remaining length of the Gila Bend Canal and wash crossings of SR 85 may significantly effect downstream peak discharges. Ponding areas may also overlap from one wash to the next, causing transfer of flood volumes between washes. These areas will be identified and the potential impact on critical downstream concentration points determined. The ponding areas deemed significant will then be modeled in a similar manner to that used for the detailed study reach of the Gila Bend Canal.

There is no available detailed contour mapping available for these areas, except the USGS quadrangle maps. Therefore, as-builts of the canal and SR 85 will be used to set the spillover elevations. Stage versus volume relationships will be estimated using the quadrangle maps and observations made during the field reconnaissance.

- h. **Channel Transmission Losses:** Channel transmission losses for each routing reach will be included in the model if deemed appropriate by the Consultant, and if sufficient data is available. Existing field data, or the literature, will be used as the basis for this effort. An average percolation rate for each routing reach considered will be estimated by calculating a composite by area of overbank soils versus channel bed soils in the reach. Separate average values will be estimated for each storm frequency modeled. The losses will be modeled using the Channel Loss option under HEC-1. The SCS National Engineering Handbook, Section 4 Hydrology, Chapter 19 will be used as the base reference for estimating the loss parameter. Mr. Dave Creighton of ADWR and Mr. Harry Milsaps of the SCS will be consulted in this effort.

- 3.3 The District will provide appropriate references to facilitate parameter estimation. The District will provide as much information as possible for the watershed areas already modeled, in a digital format.
- 3.4 The output of the computer model will be reviewed to determine if peak flows and volumes are realistic. This will be done by comparing the results with available gage data, previous studies and USGS gage regression analysis results. Also, calculated flooding widths and depths in routing reaches will be evaluated for reasonableness as an additional check. Adjustments to the input data areas of precipitation loss, routing, and transmission losses will be made in order to obtain realistic and justifiable results.
- 3.5 Attempts will be made to recover historic stream gage data where available and compare the data with the results obtained by the hydrologic model. Major differences will be discussed in the final report.
- 3.6 The Consultant will obtain the approval of the District at each of the following steps:
- a. Soil and watershed boundary maps.
  - b. HEC-1 parameter estimation.
  - c. HEC-1 flow diagram and input parameters.
  - d. HEC-1 results.
- 3.7 The final report will include the following sections arranged according to the State Standard Attachment SSA-90-1, Instructions for Organizing And Submitting Technical Documentation For Flood Study:
- a. Scope of the study.
  - b. Description of the watershed.
  - c. Previous studies and reports.
  - d. Methodology.
  - e. Assumptions.
  - f. Results.
  - g. Comparison of the results with other studies and/or stream gages.
  - h. Conclusion.
  - i. List of references and agencies contacted.

**3.7.1 Tables and figures for the main text:**

- a. Watershed area (24x36) foldout map at a scale of 1"=10000'.
- b. Table showing the flow peaks and volumes at critical concentration points for different frequency and duration storms.
- c. Table showing the critical peaks and volumes for major concentration points as compared to previous studies (where available).
- d. Spreadsheet showing sub-basins and their major parameters (slope, area, friction, total rainfall, time of concentration or Lag, major structures, soil types, Green and Ampt parameters, etc).

**3.7.2 Tables and figures for the appendices:**

- a. Topographic base map showing the sub-watershed delineations, routing reaches, Lag flow paths, major man-made structures, and references (i.e. street names, Township Range Section, etc.) at a scale of 1"=2000'.
- b. Soils and land-use map at the same scale as the base map.
- c. Schematic map for the HEC-1 computer model which depicts the sub-basins (area, Lag), the flow paths, the routing reaches (length, slope, friction, width, associated velocities, associated transmission losses, etc.), order of combining the hydrographs, channel, pipe or culvert dimensions (where appropriate).
- d. Pertinent data on structures in the watershed (such as spillway elevation, rating curves, etc.).

**3.8 The proposed approach to performing the hydrology portion of the contract is presented as follows, organized by work task:**

- a. **Data Collection:** Research records and obtain Luke Air Force Military Reservation access privileges. Research records of the following agencies:
  - \* Flood Control District of Maricopa County (District)
  - \* Maricopa County Highway Department (MCHD)
  - \* Arizona Department of Water Resources (ADWR)
  - \* Arizona Department of Transportation
  - \* U.S. Bureau of Reclamation (USBR)
  - \* U.S. Geological Survey (USGS)
  - \* U.S. Soil Conservation Service (SCS)
  - \* Paloma Ranch Water User's Association
  - \* Southern Pacific Railroad
  - \* Tucson Cornelia and Gila Bend Railroad
  - \* U. S. Air Force
  - \* City of Gila Bend

Prepare a summary of findings for submittal to the District. Included under this task is a field trip with District personnel at the start of the project to identify the critical points on the watershed and problem areas.

- b. **Preliminary Sub-Basin Delineation:** Prepare two sets of 1"=2000' scale base maps and one 1"=10000' scale base map from 7.5 minute USGS quadrangle maps. The 2000 scale maps will be on 8 - 36"x42" sheets, and the 10000 scale map will be on 1 - 24"x36" sheet.

The soils map unit boundaries will be digitized for ultimate plotting on one set of 2000 scale maps, and the preliminary sub-basin delineations will be digitized for ultimate plotting on the second set. Tentative Lag flow paths and routing paths will be determined and digitized.

The hydrologic model previously prepared by the District will be reviewed for accuracy and consistency. The sub-basin delineations and parameters, and soils parameter computations will be given a cursory evaluation. The data will be reformatted to match the final report format for the other watersheds. The reach route data will be checked in detail. It is anticipated that representative cross sections for this watershed will be taken in the same proportion as for the previously unstudied watersheds. The District's model will be updated as a part of the work under Section 3.8h. The sub-basin identifiers in the District's model will also be changed to reflect the naming scheme used for the entire watershed.

Sample parameter calculation forms will be prepared for review by the District.

- c. **Meeting Number One with the District:** Copies of the base maps and parameter calculation forms will be submitted to the District for review one week prior to the meeting. These maps, the proposed parameter calculations and the findings of the records search will be discussed.
- d. **Field Investigation:** A detailed field reconnaissance will be done to accomplish the following:
  - 1. Verify questionable sub-basin boundaries;
  - 2. Verify Lag flow path locations.
  - 3. Verify routing path locations. Estimate reach route cross sections for use in determining HEC-1 Normal Depth parameters. Distances will be paced, and relative elevations obtained using a laser level. This will be done for approximately 40% of the routing reaches. The data obtained will be used to estimate average cross section configurations for the remainder of the reaches. This will be done by comparing the observed data with the USGS quadrangle maps and visually matching similar reaches;

4. Observe routing reach channel bed and overbank soils. Check for consistency with the SCS mapping. Evaluate watershed soil types in the areas where SCS mapping is unavailable. Use visual observations to supplement the general procedure used by the District for the Bender and Sand Tank washes model.
5. Vegetation transects will be taken in the watershed at representative locations to establish average vegetation cover densities. The regions will be established based on visual observations in the field;
6. The Lag data, routing reach data, and vegetation cover data will be documented and summarized for input to the parameter estimation spreadsheets where appropriate; and
7. The sub-basin delineation and soils boundary maps will be revised to reflect the findings of the field reconnaissance.

District personnel may accompany the Consultant at any time during the field reconnaissance phase.

- e. Meeting Number Two with the District and ADWR: Meeting number two will be held after the hydrologic field reconnaissance is accomplished and the sub-basin delineations are completed. The proposed approach to parameter estimation, routing methodology and channel transmission loss estimates will be discussed and finalized at this meeting. A copy of the parameter estimations will be delivered to the District at least one week prior to the meeting.
- f. Final Sub-Basin Delineation: The areas of sub-basins, and soil map units in sub-basins, will be calculated in CADD. Lag flow paths and sub-basin centroids will be determined in CADD. Elevations for the top and bottom of lag flow paths and routing reaches will be determined from the base maps. The data collected will then be placed into the parameter estimation and summary spreadsheets. Sub-basin identifiers, Lag path data, and routing reach data will be drafted in CADD on separate layers from the sub-basin layer and the soils layer. Final plots will be made onto the base maps.
- g. Parameter Estimations: The following parameters will be estimated under this task:
  1. Green and Ampt Coefficients - Green and Ampt values for each soil map unit in each sub-basin will be input to the parameter spreadsheet, and composite values for each sub-basin calculated;
  2. Lag Times and Base HEC-1 Files - Lag times will be estimated in a spreadsheet. The Green and Ampt values, sub-basin areas and Lag times will then be input to the MCUHP2 computer program and the base HEC-1 input data files created; and
  3. Reach Routing Data - The Normal Depth channel cross sections will be plotted, average velocities estimated for each reach, and the number of routing steps calculated.

- h. Channel Losses:** The average percolation rates for the routing reaches will be estimated as follows. This will be done after peak discharges are obtained from the initial HEC-1 runs made without transmission losses:
1. The average inundation width for each storm will be estimated for each reach. The soils areas for channel bed soils versus channel overbank soils will then be estimated using the soil maps to obtain a proportion of soils types across the cross section;
  2. Average percolation values for each reach for each storm will then be calculated in a spreadsheet; and
  3. The same process will be used for percolation losses in the ponding areas upstream of the Gila Bend Canal Study Reach, where deemed appropriate.
- i. Meeting Number Three with the District:** Meeting number three will be held after all the parameters except transmission losses have been estimated. A draft copy of parameter estimations will be submitted to the District at least one week prior to this meeting.
- j. HEC-1 Diagram:** The HEC-1 schematic diagram will be prepared as described in Section 3.7.2C.
- k. HEC-1 Computer Models:** The HEC-1 computer input data files, created under Task 3g, will be made into working models by the addition of hydrograph routing and combination control operations in accordance with the routing diagram. Comments on logic, assumptions, and watershed identification will also be added to the files. The models will then be run, debugged, the results checked for reasonableness, and adjustments made accordingly.
- l. Preliminary Hydrology Report:** The preliminary hydrology report will be prepared as described under Section 3.7 and bound in a format suitable for review. Three (3) copies will be submitted to the District for review.
- m. Meeting Number Four with the District:** Meeting number four will be held after the preliminary HEC-1 results have been obtained and a draft report has been prepared. A copy of the draft report and the copy of the HEC-1 input files on a floppy disk (compatible with the District's IBM-AT computer) will be delivered to the District one week prior to the meeting. A second copy will be forwarded to ADWR for their review and comment, if required by the District.
- n. Hydraulics of Structures and Storage Routing:** Hydraulic structures and crossings along the Gila Bend Canal Study Reach, SR 85, Interstate 8, and the railroads, will be analyzed utilizing the field survey and field reconnaissance data. Stage versus discharge and stage versus storage volume curves for each structure and crossing which can cause significant attenuation will be developed for input to the HEC-1 models. The new contour mapping will be used in conjunction with the USGS quadrangle maps and as-built plans for estimation of available ponding volumes.

- o. Add Storage Routing to HEC-1 Model:** The stage versus discharge and stage versus volume curves will be added to the HEC-1 models as reservoir routing operations. The results will be checked for reasonableness and locations of overtopping of the Gila Bend Canal banks determined.

The hydrology results will then be compared with previous studies and available gage data. The models will be calibrated or adjusted if necessary.

- p. Meeting Number Five with the District:** Meeting number five will be held following inclusion of reservoir routing to review comments by the District and ADWR one week after the Consultant has received the District's comments. The District will require a minimum of two weeks to review the report and the models.

The second field trip may be scheduled for the same week as meeting number five so that the results obtained can be discussed in the field.

- q. Final Hydrology Report:** The final hydrology report will be prepared as described under Section 3.7, and will reflect the review comments from the District and ADWR. The reach routing parameters for the lower reaches, modeled using HEC-2, will be adjusted using the HEC-2 cross sections. The HEC-2 cross sections available for each routing reach will be compared and a typical average cross section estimated. The final report will reflect this effort. Six (6) copies will be submitted to the District.
- r. FEMA Revisions and Coordination:** The response from FEMA will be reviewed and all comments addressed. This task will include revisions which are necessary to obtain FEMA approval both to the HEC-1 models and the final report.

#### Task 4 Field Survey

- 4.1** Prepare topographic mapping to contour interval and scale per 2.2.1, with spot elevations on section line and mid-section line roads, for floodplain/floodway delineation areas as identified in Task 2 or FEMA criteria, whichever is more stringent.
- 4.2** Ground Control for Floodplain Delineations:
  - a.** Topographic mapping and survey work shall meet or exceed Federal Emergency Management Agency (FEMA) minimum criteria as defined in FEMA Document 37, Flood Insurance Study Guidelines and Specifications for Study Contractors, Appendix 4, March, 1991. This would include, but is not limited to: the establishment of "permanent" elevation reference marks (ERM's); field control; and verification of profiles by the ground survey profile procedure.
  - b.** Horizontal and Vertical Control: Systematically set panel points and establish horizontal and vertical control throughout the area to be mapped using the Global Positioning system supplemented by conventional field methods for use in compilation by the aerial survey consultant. Surveys will tie into the State Plane Coordinate System, 1983 NAD. Field control shall be sufficient, at least one "permanent" point per mile, such point(s) being used as Elevation Reference Marks (ERM's). Surveys

will be based on National Geodetic Vertical Datum (NGVD), per FEMA guidelines. "Permanent" survey points shall consist of existing monumentation, such as brass caps or similar survey monuments. Where additional monumentation is needed, survey markers conforming to Maricopa Association of Governments (MAG) Uniform Standard Details for Public Works Construction, Detail 120-1, Type C, shall be placed 2" +/- above grade. Elevation Reference Marks will be labeled on available maps and described in a manner which allows them to be readily located in the field.

- c. "As-Built" plans or surveys of bridges and hydraulic structures are to be obtained by the Study Consultant.
  - d. The Consultant shall verify profiles for mapped floodplains. The ground survey profile procedure as described in FEMA Document 37 or other methods approved by FEMA shall be used.
  - e. The Consultant shall remove aerial targets placed on the ground, except painted targets, upon completion of aerial mapping.
- 4.3 The consultant will conduct field reconnaissance of the full study reach. This will include observation of channel and floodplain conditions for estimation of Manning's "n" values; photographic documentation of floodplain characteristics; determination of channel bank stations; observation of possible overflow areas; inspection of levees or other flood control structures; and measurement of bridge dimensions.
- 4.3.1 A written summary of the field inspection, including photographs to document "n" value estimation will be submitted to the District for review and approval.

#### Task 5 Floodplain and Floodway Delineation

- 5.1 Floodway and Floodway delineations will be determined for the 100-year flood using the U.S. Army Corps of Engineers HEC-2 Water Surface Profiles computer model, 1991 Version 4.6.0, and using methodology acceptable to FEMA. This model will simulate the effects of floodplain geomorphology, flow changes, bridges and culverts, hydraulic roughness factors, effective flow limitations, split-flows, and other considerations. The Consultant will prepare the study using the guidelines established in "The Flood Insurance Study Guidelines and Specification for Study Contractors", dated March, 1991 and "Appeals, Revisions, and Amendments to Flood Insurance Maps".
- 5.2 Bridges and Culverts will be modeled in compliance with HEC-2 modeling requirements for the selected routine. Where multiple bridges occur, each bridge will be modeled separately.
- 5.3 Cross Sections - Stationing will be from left to right looking downstream. Cross sections will be spaced approximately every 1000 feet, unless geographic or structural constraints dictate otherwise. Cross sections from the Gila Bend Canal downstream to Indian Road will be spaced at approximately 500 feet. Identification of cross sections will be in river miles, increasing upstream. The stationing will tie into the specified river mile of the existing FEMA studies. The location and alignment of cross sections and channel centerline will be submitted for the Flood Control District's review and

approval prior to digitizing cross section data. Cross section orientation may need to be altered after running of the HEC-2 model to make sure that they are perpendicular to direction of flow per FEMA criteria.

- 5.3.1 Cross sections will be plotted using a pen plotter. The cross section plots will show water surface profiles, ineffective flow areas, "n" values, encroachments, channel stationing and other pertinent information. These plots will be available at reviews.
- 5.4 For floodplains identified as ponding areas, the area will be analyzed using the HEC-1 model, which will provide the District with water-surface-elevations.
- 5.5 Flood zones will be determined according to FEMA criteria.
- 5.6 The Consultant will prepare working maps and models of the 100-year floodplain and floodway during the course of the hydraulic modeling analysis for review by the Flood Control District at progress meetings. Floodways will be determined using equal conveyance encroachment methods to start with, but only encroachment method 1 will be used in the final analysis.
- 5.7 The delineation work shall meet requirements for floodplain delineations as prescribed by FEMA and the Arizona Department of Water Resources.
- 5.8 The final report for the floodplain/floodway delineation study will include, but is not limited to the following:
  - I. Introduction
    - a. Purpose of study
    - b. Authority for study
    - c. Coordination and acknowledgments
  - II. Area Studied
    - a. Scope of study
    - b. Community description
    - c. Principal flood problems
    - d. Flood protection measures
  - III. Engineering methods
    - a. Hydrologic analyses
    - b. Hydraulic analyses
  - IV. Floodplain Management applications
    - a. Flood boundaries
    - b. Floodways
  - V. Insurance applications

**VI. Other Studies**

**VII. Location of data**

**VIII. Bibliography**

**Task 6 Coordination**

- 6.1 The Consultant shall participate in regular coordination meetings (at least every three weeks) with the District's Project Manager and in milestone coordination meetings in the development of the hydrologic and hydraulic analyses.**
- 6.2 Prior to finalizing the hydraulic analysis, the Consultant will submit maps, report, and HEC-1 model to the District, ADWR and other applicable government agency reviewers through the District. The Consultant will respond to questions by the reviewers and make modifications to the hydrologic maps, model, and report if necessary.**
- 6.3 The Consultant will submit maps, report, and HEC-2 model to the District and other applicable government agency reviewers. The District will submit the work for review by the FEMA Technical Evaluation Contractor (TEC). The Consultant will respond to questions by the reviewers and make modifications to maps, models and report if required.**

**Task 7 Final Products**

- 7.1 Mapping:**
  - a. One complete set of 9" x 9" contact prints of the aerial stereo photographs sequentially numbered and catalogued.**
  - b. One complete set of contour maps, blue-line, draft copy for Flood Control District reference during the project, delivered immediately following the topographic mapping.**
  - c. One complete set of contour maps at 1" = 200' scale with the floodplain delineations in reproducible form (mylar) and six blue-line copies as outlined in Task 2.**
  - d. One set of transparent overlays of photo-mylars.**
  - e. One complete set of mylars for the foldout maps (no larger than 11" x 17") used in the report.**
- 7.2 One-half inch magnetic tape formatted at 1600 bpi containing the topographic data and the digitized floodplain/floodway boundaries in the format as specified in the attached Appendix A-GIS Data Specification Document.**
- 7.3 Six hardcopies of the HEC-2 and HEC-1 printouts and a copy of the HEC-2 and HEC-1 model input/output files on 5-1/4", 1.2 Mb or 3-1/2" Mb diskettes compatible with an IBM-AT personal computer.**

- 7.4 **Tabular list of control points (ERM's) used with descriptions, elevations, and coordinates.**
- 7.5 **Reports:**
- a. **The Consultant will produce a final report incorporating the comments of the District, FEMA and other reviewers. Six copies of the Hydrology and Hydraulics reports as outlined in Tasks 3 and 5 respectively, will be delivered.**
- 7.6 **Documentation for this study will be as outlined in Instructions for Organizing and Submitting Technical Documentation for Flood Studies as required by ADWR.**

## **APPENDIX A - GIS DATA SPECIFICATION**

1. Topographic mapping, floodplain delineation mapping, hydrologic watershed boundaries, and soils group boundaries shall be submitted in a digital format acceptable to the Flood Control District of Maricopa County. The requirement for digital submission is in addition to any requirements for written (hard-copy) data and reports which may be required elsewhere in the scope, in this Appendix, or by law.
2. Data required by this scope of work or by this or other Appendix or Supplement to this scope of work shall be prepared as ESRI Arc-Info coverages in accordance with the instructions in this specification. Hardcopy maps, drawings, renderings, plots, and related items required by this scope or its supplements or be law shall represent final data which as been or is being delivered in fulfillment of the requirements of the scope of work. The maps, drawings, renderings, plots, or related items shall be reproducible at the time of submission and acceptance on the target computer system from the data, AML macros, and other information delivered.

### **3. COVERAGES SPECS**

#### **3.1 GENERAL INFORMATION**

- 3.1.1. The Arc-Info coverages should have defined spatial relationships. (Built Topology - Area Definition, Connectivity and Contiguity)
- 3.1.2. The FCDMC will supply a coverage with the State Plane Section Corners and a coverage with the County border. Attributes on the PAT of the Section corners are the type of marker and the source of the point. If more accurate points are located by this study (GPS or surveyed), then the coverage supplied by the FCD should be revised and updated with the new and more accurate information. The new updated section corners should be used as the registration Tics of ALL the coverages. Labeling of the Tics should be done according to the file supplied by the FCD.
- 3.1.3. Annotation should be placed in different levels depending on the map scale. For example when annotating roads, the main mile road names should be in one level and the minor road names should be in a different level. The AAT and the PAT files should also include an item that identifies the features that have been labeled with annotation. For example, the road.pat should have an item :Road-Name that includes the name of the road.
- 3.1.4. When digitizing from different map sources, if the source map is using a projection different than State Plane (Transverse Mercator, etc), appropriate steps should be taken to ensure that the digitized lines are projected back to State Plane.

### 3.2 COVERAGES:

#### A. INDEX

This coverage should have the page layout as presented in the plotted mylars.

Coverage Name: WTINDEX  
Coverage Type: Polygon

Codes: The following codes should be added to the PAT

Item Name:	Page#
Item Width, Output Width and type	3,3,1
Information:	Page Layout

#### B. TOPOGRAPHY

Coverage Name: CONTOURS  
Coverage Type: Line

ITEMS:	MAJOR1	4,4,1
	MINOR1	4,4,1
	MAJOR2	4,4,1
	MINOR2	4,4,1
	MAJOR3	4,4,1
	MINOR3	4,4,1

Codes:	Feature		Description		Parameter	
	MAJOR1	MINOR1	MAJOR2	MINOR2	MAJOR3	MINOR3
Index Contour	020	0200	020	0600	021	(elev.)
Hidden Indx Cont	020	0200	020	0650	021	(elev.)
Depression Idx Cont	020	0200	020	0611	021	(elev.)
Intermediate Cont	020	0250	020	0600	021	(elev.)
Hidden " "	020	0250	020	0650	021	(elev.)
Depression " "	020	0250	020	0611	021	(elev.)

NOTE: (elev.) should be the contour elevation.

### C. CONTROL POINTS

Coverage Name: CONTROLPNTS  
 Coverage Type: point

ITEMS: MAJOR1 4,4,I  
 MINOR1 4,4,I  
 MAJOR2 4,4,I  
 MINOR2 4,4,I  
 MAJOR3 4,4,I  
 MINOR3 4,4,I

Codes:	Feature		Description		Parameter	
	MAJOR1	MINOR1	MAJOR2	MINOR2	MAJOR3	MINOR3
Horizontal Control	300	0050	020	060L	021	(elev.)
Vertical Control	300	0051	020	060L	021	(elev.)
Spot Elevation	020	0300	020	060L	021	(elev.)
Section Corner	300	0001	020	060L	021	(elev.)
Property Corner	300	0052	020	060L	021	(elev.)

NOTE: L=value of the decimal fraction of the spot elevation.  
 (elev.) = integer part of the elevation

Example: an spot elevation of 1325.8 ft should be coded as follows:  
 300 0050 020 0608 021 1325

### D. TRANSPORTATION

Coverage Name: ROADS  
 Coverage Type: Line

ITEMS: MAJOR1 4,4,I  
 MINOR1 4,4,I  
 MAJOR2 4,4,I  
 MINOR2 4,4,I  
 MAJOR3 4,4,I  
 MINOR3 4,4,I  
 RDNNAME 23,23,C

Codes:	Feature		Description		Parameter	
	MAJOR1	MINOR1	MAJOR2	MINOR2	MAJOR3	MINOR3
Roads (Conc/Asph)	170	0209*	0	0	0	0
Improved Dirt Rd	170	0250	170	064	0	0
Trails	170	0211	0	0	0	0
Pavement Edge	170	0300	0	0	0	0
Railroads	180	0201	0	0	0	0

\*NOTE: 209 for Road or Street Class 3  
 210 for Road or Street Class 4

Roads should be annotated in 2 different levels depending on the class type.

**E. WATER FLOW LINES**

Coverage Name: FLOW  
Coverage Type: Line

For future modeling of water flow within ARC-INFO it is required that the lines that describe the water flow are digitized in the direction that the water is flowing.

ITEMS: MAJOR1 4,4,I  
MINOR1 4,4,I  
MAJOR2 4,4,I  
MINOR2 4,4,I  
MAJOR3 4,4,I  
MINOR3 4,4,I

Codes:	Feature		Description		Parameter	
	MAJOR1	MINOR1	MAJOR2	MINOR2	MAJOR3	MINOR3
Water Flow lines	050	0470	0	0	0	0

**F. MUNICIPAL BOUNDARIES**

Coverage Name: MUNICIPAL  
Coverage Type: Polygon

ITEMS: MAJOR1 4,4,I  
MINOR1 4,4,I  
MAJOR2 4,4,I  
MINOR2 4,4,I  
MAJOR3 4,4,I  
MINOR3 4,4,I  
NAME 23,23,C

Codes:	Feature		Description		Parameter	
	MAJOR1	MINOR1	MAJOR2	MINOR2	MAJOR3	MINOR3
Boundaries	090	0100	0	0	0	0

**G. WATERSHEDS BASINS AND SUBWATERSHEDS**

Coverage Name: WATERSHED-NAME  
Coverage Type: Polygon

ITEMS: MAJOR1 4,4,I  
MINOR1 4,4,I  
MAJOR2 4,4,I  
MINOR2 4,4,I  
MAJOR3 4,4,I  
MINOR3 4,4,I  
WSNAME 10,10,C

Codes:	Feature		Description		Parameter	
	MAJOR1	MINOR1	MAJOR2	MINOR2	MAJOR3	MINOR3
Boundaries	050	0150	0	0	0	0

The coding scheme of the WSNAME should provide the capability of being able to redefine items in INFO and be able to group the subwatersheds into the watersheds.

## H. SOILS

Soil types should adhere to SCS coding scheme.

Coverage Name: SOILS  
Coverage Type: Polygon

ITEMS:	MAJOR1	4,4,I
	MINOR1	4,4,I
	MAJOR2	4,4,I
	MINOR2	4,4,I
	MAJOR3	4,4,I
	MINOR3	4,4,I
	SOILTYPE	5,5,C
	TEXTURETYPE	4,4,I

Codes:	Feature		Description		Parameter	
	MAJOR1	MINOR1	MAJOR2	MINOR2	MAJOR3	MINOR3
Boundaries	090	0170	0	0	0	0

### SOIL DESCRIPTION TABLE:

A table that relates Soil Type Codes with their description should also be supplied.

ITEMS:	SOILTYPE	5,5,C
	DESCRIPTION	50,50,C

### TEXTURE DESCRIPTION TABLE:

A table that relates Texture Type codes with their description should also be supplied.

ITEMS:	TEXTURETYPE	4,4,I
	DESCRIPTION	50,50,C

## I. FLOODWAY

Coverage Name: FLOODWAY  
Coverage Type: Polygon

ITEMS:	MAJOR1	4,4,I
	MINOR1	4,4,I
	MAJOR2	4,4,I
	MINOR2	4,4,I
	MAJOR3	4,4,I
	MINOR3	4,4,I

Codes:	Feature		Description		Parameter	
	MAJOR1	MINOR1	MAJOR2	MINOR2	MAJOR3	MINOR3
Floodway	050	0670				
Floodway Fringe	050	0671				

**J. HAZARD ZONES**

	Coverage Name:		ZONES			
	Coverage Type:		Polygon			
ITEMS:	MAJOR1	4,4,I				
	MINOR1	4,4,I				
	MAJOR2	4,4,I				
	MINOR2	4,4,I				
	MAJOR3	4,4,I				
	MINOR3	4,4,I				
	ZONENAME	4,4,C				
Codes:	Feature		Description		Parameter	
	MAJOR1	MINOR1	MAJOR2	MINOR2	MAJOR3	MINOR3
Zones	050	0170	0	0	0	0

The Zone name should be annotated in level one and also be included in the PAT file.

**K. FEMA REFERENCE MARKS**

	Coverage Name:		BM			
	Coverage Type:		Point			
ITEMS:	MAJOR1	4,4,I				
	MINOR1	4,4,I				
	MAJOR2	4,4,I				
	MINOR2	4,4,I				
	MAJOR3	4,4,I				
	MINOR3	4,4,I				
	BM-ID	4,5,B				
Codes:	Feature		Description		Parameter	
	MAJOR1	MINOR1	MAJOR2	MINOR2	MAJOR3	MINOR3
Benchmarks	020	0300	020	060L	02N	(elev.)

**BENCHMARK DESCRIPTION TABLE:**

A table that relates the benchmark to the description and remarks should also be supplied:

ITEMS:	BM-ID	4,5,B
	DESCRIPTION	200,200,C

**L. FLOOD ELEVATION LINES:**

Coverage Name: SWE  
Coverage type: Line

ITEMS: MAJOR1 4,4,1  
MINOR1 4,4,1  
MAJOR2 4,4,1  
MINOR2 4,4,1  
MAJOR3 4,4,1  
MINOR3 4,4,1

Codes:	Feature		Description		Parameter	
	MAJOR1	MINOR1	MAJOR2	MINOR2	MAJOR3	MINOR3
Elev at X-Sec	020	0270	020	060L	02N	(elev.)
SWE (As per FIRM)	020	0271	020	060L	02N	(elev.)

Lines should be annotated with the appropriate elevation in the coverage.  
The FCD will supply the symbol set file for SWE (As per FIRM) lines, to ensure uniformity at plotting time.

**M. MAN MADE FEATURES (bridges/Culverts)**

Coverage Name: BRIDGES  
Coverage type: Line  
Codes for man made feature are still pending.

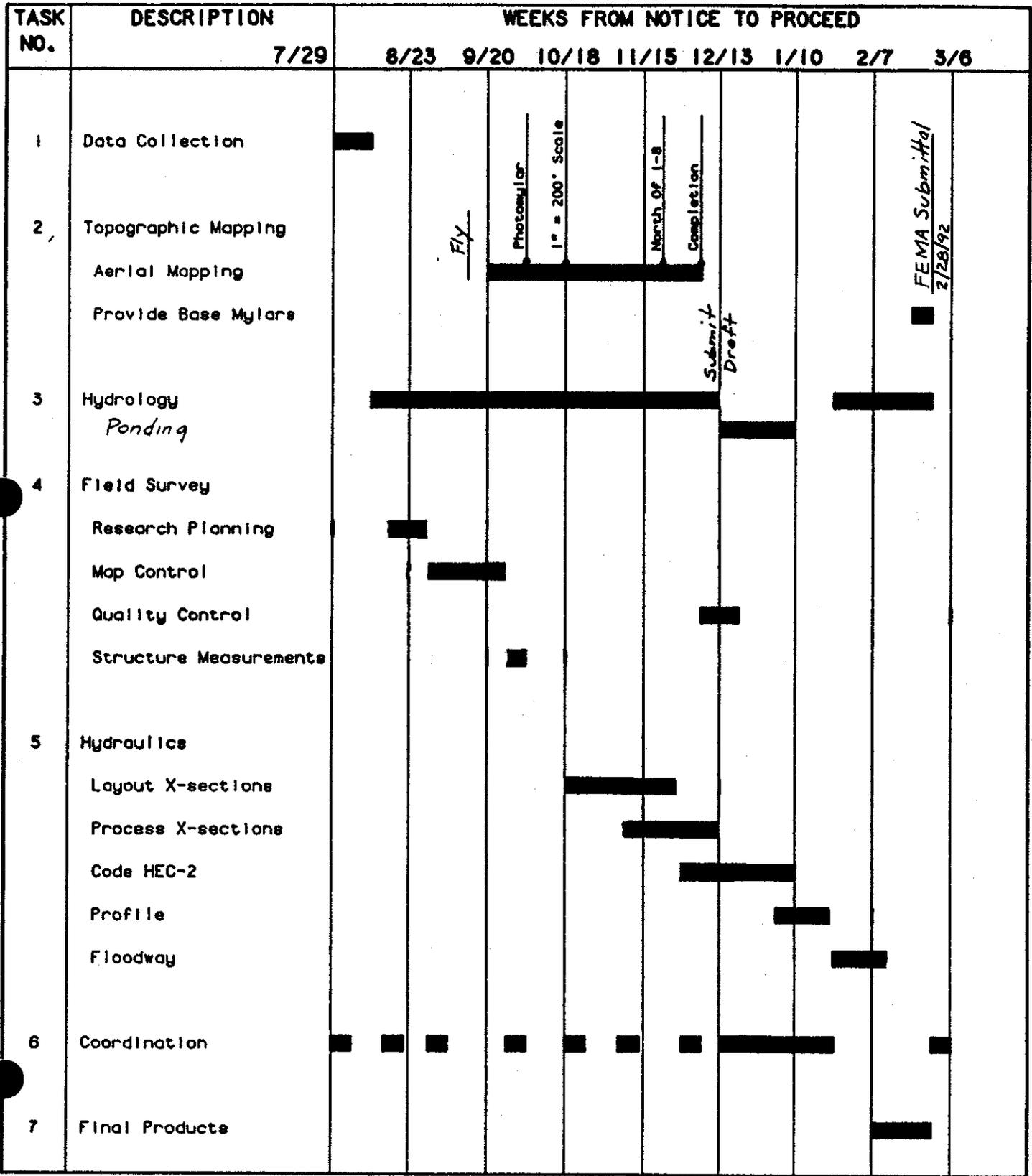
**3.3 NOTES:**

This is a preliminary list that describe 13 different coverages that would cover the total of the information that is presented in Hard copy form. If there is additional information that makes part of the mylar and is not included in this list, then these features should be added to one of the above coverages or to a new one, as coordinated with the District.

4. Arc-Info coverages shall be prepared in accordance with procedures and practices of Release 5.01 or later of the Arc-Info software running on a Data General Avion 410 DG/UX workstation or a hardware platform capable of producing coverages and files which can be transferred to the target system without any loss of data or data integrity or reliability modification. Use of single precision m=numbers to allow data development on personal computes systems is permitted if the consultant determines that use of single precision numbers will not adversely affect the quality or reliability of the data.

5. Consultant may develop or manipulate data on any system of his choosing and convert that data to the required Arc-Info coverages. However, the Arc-Info coverages, text, and data shall be the official version of the data submitted in fulfillment of the contract. The District will not consider payment for services rendered by the consultant in the transfer of data from other CAD System to ARC-INFO format unless the consultant can clearly show that original development of the data under the ARC-INFO system is not technical or economically feasible. See paragraph 3 above for related stipulations.
6. Features for which there is an entry in an AAT or PAT file must have a User-ID assigned to it. Where coding is required, features in a coverage shall be attributed in the AAT or PAT files with descriptive codes taken from the publication, "Appendix D, Digital Line Graphs from 1:100000 - Scale Maps - Data Users Guide 2, National Mapping Program, Technical Instructions, US Department of Interior, USGS, National Mapping Division". If this scope requires identification of a feature for which no appropriate code exists (such as floodplain limits) the code shall be taken from the Flood Control District which shall assign a code to the feature. Coverages containing codes not obtained through one of these methods will be returned for correction.
7. Consultants shall document the data structure of each coverage provided and shall endeavor to use a similar table structure, column labeling conventions, column data types, and so forth from coverage to coverage. Documentation shall be prepared in accordance with paragraph 1 of this Appendix.
8. Consultant may select or design symbols, line types, annotation style, and fill patterns and colors, Arc Macro Language routines, and the like to produce attractive and useful maps. These elements must be submitted to the FCD in appropriate exchange files such that the provisions of paragraph 3 can be met. Full textural documentation of these elements is required.
9. Data required by the contract and amendments thereto shall be submitted in the Arc-Info release 5.01 "EXPORT" (.e00) file format. Arc-Info coverages shall be prepared in accordance with Arc-Info Release 5.01 or later running on a Data General Avion 410 workstation (target system) or on a computer system capable of producing Arc-Info "EXPORT" files which can be transferred to the target system using the Arc-Info "IMPORT" utility. EXPORT files shall be copied to QIC-150 formatted, 150 MB, 1/2-inch data cartridges in a POSIX-compliant TAR format. Floppy disks, reel-to-reel, CD-ROM, and other media are not acceptable.

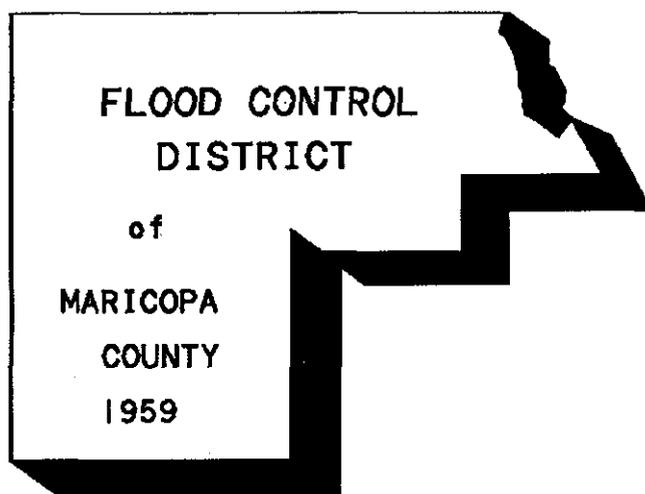
**PROPOSED SCHEDULE**  
**GILA BEND AREA FLOODPLAIN DELINEATION STUDY**  
**BURGESS & NIPLE, INC.**  
**FCD 90-67**  
**PROJECT NO. 11358**



Photomylar  
 1" = 200' Scale  
 North of 1-8  
 Completion

Submit  
 Draft

FEMA Submittal  
 2/28/92



**GILA BEND  
FLOODPLAIN DELINEATION STUDY  
FCD 90-67**

## **SECTION 2: Mapping and Surveying Information**

## **SECTION 2: Mapping and Surveying Information**

### ***2.1 General***

## **Hydrologic Mapping**

Exhibits "A", "B" and "C" - The base mapping used for these exhibits consists of United States Geological Survey (USGS) 7.5 minute quadrangle maps. The maps were photo-mosaicked at full 2000 scale for use for Exhibits "B" and "C." A composite of all the USGS quadrangle maps was reduced to 10000 scale for Exhibit "A." Refer to the Hydrology Technical Data Notebook for more detailed information.

## **Hydraulic Mapping**

Mapping at a scale of 1:4800 with a 4-foot contour interval and 1:2400 scale with a 2-foot contour interval was prepared by Aerial Mapping Company, Inc. under subcontract to Burgess & Niple, Inc. Digitized cross sections at locations selected by Burgess & Niple were also provided by Aerial Mapping Company, Inc. The Aerial Mapping Company job number is 91124 and the flight date was September 13, 1991 and September 20, 1991.

## **Mapping Control**

Standard field survey methods were used to establish control for aerial mapping. A Wild T-2 theodolite and Topcon DMS-2 were used. McKuen Global Positioning Systems, Inc. was employed to provide horizontal control for selected locations using satellite global positioning tied to the National Geodetic Control Net.

Vertical control was based on the U.S.C. & G.S. third order control survey by W.L. Settlemyer, in 1957. Adjusted field elevations are on NGVD 1929 datum.

Horizontal control was placed on the Arizona State Plane Coordinate System on NAD 1983 datum.

Seven stream cross sections were obtained by both field and aerial mapping methods. Distribution of the sections is as follows:

<u>Cross Section</u>	<u>Stream</u>	<u>Section</u>
1	Sand Tank Wash	0.926
2	Scott Avenue Wash	3.470
3	Sand Tank Wash and Bender Wash	3.599 0.360
4	Scott Avenue Wash	4.591
5	Sand Tank Wash Bender Wash and	4.164 0.951
6	Unnamed Wash No. 2	1.603
7	Unnamed Wash No. 1	3.279

Field surveys were made between August and October, 1991. Field crews included the following personnel:

- Steve Perham, RLS
- John Davis, RLS
- Richard Dudley
- Brook Davis
- William Ingram
- Richard Meier
- Tom Loomis, PE, RLS

The vertical datum is NGVD 1929. Horizontal control was placed on the Arizona State Plane Coordinate System, NAD 1983 datum.

Following are copies of the field books.

## **SECTION 2: Mapping and Surveying Information**

### *2.2 Index of Maps*

**See Plan Roll**

## **SECTION 2: Mapping and Surveying Information**

### ***2.3 Survey Field Notes***

Pr  
Ac  
Te  
  
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5C  
an

Book  
142

①

INDEX		
PAGE	Job #	DESCRIPTION
4-80	11358	Gila Bend Flood Control Leavels for North Half of Job. USING Southern Pacific R.R. as Divider

4

Sept. 12, 1991

Job #

1358

P.C.

B. Davis

Pd

F. Dudley

visit loop for  
Gila Bend Flood Plane.

Inst. used - Wild NA 2 # 517249  
Pd used - NEDD # 2 13' Rd.

Sta.	B.S.	H.I.	F.S.	E/CV	ADS. ELEV.
B.M.	4.565			727.682	
	4.185	731.867			
	3.810				
T.P. # 2			10.190		
			9.800	722.067	
			9.400		
	5.225				
	4.695	726.762			
	4.165				
A.P.			4.855		
			4.340	722.422	
			3.830		
			5.480		
S.S.			4.970	721.792	
			4.460		
	5.055				
	4.550	726.972			
	4.040				

DISCRPTION

B.M. = GEODETIC B.C. # K-354 (1.1 Miles west along the Southern Pacific Railroad from the east @ GILB BEND to a Bridge, 8' North of the North Rail of the North Track of NW Drill hole in the top of the Northwest 3/4 sec about 200' and about 5 inches lower than the track, EL = 727.682.

T.P. # 2 Spike Nail

A.P. # X-21 Top of Bolt.

Nat GR S.S.



STA	B.S.	H.I.	F.S.	Elev	ADS Elev.
	1.985				
	1.660	732.667			
	1.330				
T.P. # 3			7.830		
			7.490	725.197	
			7.150		
	3.375				
	2.570	727.769			
	1.765				
T.P. # 4			7.560		
			6.745	721.022	
			5.935		
	4.835				
	4.060	725.082			
	3.285				
			7.125		
T.P. # 5			6.345	718.737	
			5.565		
	5.265				
	4.345	723.082			
	3.430				
			7.410		
T.P. # 6			6.515	716.567	
			5.625		

Description		(7)
T.P. # 3	SPike Nail Random	"GILA BLVD"
T.P. # 4	SPike Nail	"GILA BLVD"
T.P. # 5	SPike Nail	"GILA BLVD"
T.P. # 6	SPike Nail	"GILA BLVD"

Sta	B.S.	I.F.	F.S.	Elev	ADJ. Elev
	4.900				
	3.880	720.447			
	2.865				
			8.120		
A.P.			6.865	713.582	
X-21			5.620		
	5.900				
	5.175	718.257			
	4.450				
			7.180		
T.P. #7			6.450	712.307	
			5.725		
	5.300				
	4.300	716.607			
	3.300				
			8.350		
T.P. #8			7.365	709.242	
			6.380		
	4.425				
	3.470	712.712			
	2.570				
			9.555		
T.P. #9			7.585	705.129	
			6.625		

(8)

Description -

A.P. "X-21"  $\pm$  200' N of Intersection  
of GILA BLVD & Robert E. Lee

T.P. #7 SPIKE Nail "GILA BLVD."

T.P. #8 SPIKE Nail "GILA BLVD."

T.P. #9 SPIKE Nail "GILA BLVD"

Sta	B.S.	H.I.	F.S.	Elev	ADI Elev
	4.880				
	3.940	709.067		705.127	
	3.00				
			7.590		
T.P. #10			6.660	702.407	
			5.730		
	5.000				
	3.960	706.367			
	2.910				
			7.000		
T.P. #11			5.975	700.392	
			4.950		
	5.525				
	4.580	704.972			
	3.635				
			6.750		
T.P. #12			5.805	699.167	
			4.865		
	6.260				
	5.030	704.192			
	3.810				
			6.265		
A.P.			4.985	699.212	
V-21			3.700		
	19.51		23.425		

(9)

Discription -

T.P. #10	SPike Nail	GILA BIND.
T.P. #11	SPike Nail	"GILA BIND"
T.P. #12	SPike Nail	" " "
A.P. # V-21		"Gila BIND" Indian Rd

STA	B.S.	H. I	F.S.	Elev	ADS. Elev
V-21	6.910			699.212	
	5.750	704.962			
	4.585				
			4.090		
T.P. # 13			2.920	702.092	
			1.945		
	10.570				
	9.440	711.482			
	8.310				
			4.290		
T.P. # 14			3.220	708.262	
			2.150		
	7.400				
	6.250	714.512			
	5.100				
			6.910		
T.P. # 15			5.490	709.022	✓
			4.270		
	21.44		11.63	DIFF.	9.81

Discription	
A.P. # V-21 @ Intersection "GILA BND" Indian Rd.	
T.P. # 13 SPIKE Nail GOING EAST on Indian Rd.	
T.P. # 14 SPIKE Nail Indian Rd.	
T.P. # 15 SPIKE Nail " "	

Sta	B.S.	I.I.	F.S.	Elev	ADJ. Elev
	3.710			709.022	
	2.585	711.607			
	1.460				
			3.070		
T.P. # 16			1.920	709.687	
			0.765		
	9.020				
	8.110	717.797			
	7.205				
			5.720		
T.P. # 17			4.990	713.007	
			3.810		
	9.970				
	8.980	721.987			
	7.980				
			8.520		
T.P. # 18			7.520	714.467	
			6.520		
	7.510				
	6.325	720.792			
	5.140				
			9.770		
T.P. # 19			8.61	712.182 ✓	
			7.44		
	26.00		22.84	Diff	3.16

Description			
T.P. # 16	SPIKE NAIL	INDIAN ED.	
T.P. # 17	" "	" "	
T.P. # 18	" "	" "	
T.P. # 19	" "	" "	

Sta	B.S.	H.I.	F.S.	Elev	ADS EI
	6.200			712.182	
	5.780	719.962			
	5.355				
			5.560		
TEST Pan. "C"			5.080	712.882	
			4.590		
	3.320				
	2.615	715.497			
	1.865				
			8.370		
T.P. # 20			7.600	707.897	
			6.820		
	11.255				
	10.750	718.647			
	9.745				
			5.430		
TEST Pan. "D"			4.430	714.217	
			3.430		
	7.130				
	6.000	720.217			
	4.865				
			6.025		
T.P. # 21			4.880	715.337	
			3.74		
	25.14		21.99	Diff	3.15

(12)

Discription
TEST Pan. "C" on Indian Rd.
T.P. # 20 Spike Nail Indian Rd.
TEST Pan "D" T.B.M. P.K Nail
T.P. # 21 Spike Nail Indian Rd.

Sta	B.S.	I. I.	F. S.	Elev	ADS.
	6.900			715.337	
	5.550	720.887			
	4.190				
			7.130		
T.T.P. # 22			5.785	715.102	
			4.440		
	7.140				
	6.240	721.342			
	5.340				
			5.310		
A.P. V-25			4.405	716.937	
			3.500		
	4.570				
	3.310	720.247			
	2.050				
			8.260		
T.T.P. # 23			6.920	713.327	
			5.570		
	4.865				
	3.935	717.262			
	3.005				
			6.190		
T.T.P. # 24			5.260	712.002 ✓	
			4.325		
	19.035		22.37	Diff	3.335

(13)

Description			
T.P. # 22	Spike Nail	Indian Rd	
A.P. V-25	@ Intersection of Indian Rd		
	307 AVE. Sec Cor 25, 30, 36 & 31		
	Iron Pin or Badly Rusted 1/4" Rebar - (PMT# 11/182)		
T.P. # 23	Spike Nail	Indian Rd	
T.P. # 24	"	"	"

Sta -	B.S.	H.I.	F.S.	Elev.	ADS.
	8.270				
	7.200	719.202		712.002	
	6.130				
			4.295		
T.P. #25			3.280	715.922	
			2.260		
	7.670				
	6.445	722.367			
	5.220				
			5.880		
T.P. #26			4.720	717.647	
			3.560		
	7.680				
	6.580	724.227			
	5.480				
			6.300		
T.P. #27			5.190	719.037	
			4.080		
	10.970				
	9.13				
	7.080	728.167			
	7.840				
			2.660		
A.P. #2 W-3			1.690	726.477	
			0.72		
	29.355		14.88		14.975

Discription

(14)

T.P. #25 SPIKE Nail

T.P. #26 SPIKE Nail

T.P. #27 " "

A.P. #2 Sect N 1/2 Sec 31 T5S R.4W  
W-3

Sta	B.S.	H.I.	F.S	Elev	ADS
	2100				
	1.640	728.117		726.477	
	1.170				
			6.840		
T.P. # 28			6.340	721.727	
			5.840		
	6.300				
	5.150	726.927			
	4.000				
			4.370		
T.P. # 29			3.225	723.702	
			2.080		
	5.700				
	4.590	728.292			
	3.48				
			8.490		
T.P. # 30			7.37	720.922	
			6.25		
	7.51				
	6.25	727.192			
	5.00				
			7.37		
T.P. 31			6.06	721.112 ✓	
			4.75		
	17.63		22.995		5.365

Discriptions -	
T.P. # 28	Spike Nail
T.P. 29	Nail
T.P. 30	Spike Nail
T.P. # 31	P.K Nail

Sta	B.S	I.I	F.S.	Elev	ADSI
	8.78				
	7.37	728.482		721.112	
	5.95		4.76		
T.P. 32			3.28	725.202	
			1.80		
	7.70				
	6.61	731.812			
	5.53				
			5.340		
T.P. 33			4.25	727.562	
			3.17		
	7.885				
	6.850	734.412			
	5.825				
			4.615		
A.P. X-25			3.910	730.502	
			3.21		
			<del>2.81</del>		
	7.990				
	6.575	737.077			
	5.165				
			6.11		
T.P. 34			4.69	732.387	
			3.28		
	27.405		16.13		11.275

Description	
T.P. 32	P.K. Nail
T.P. 33	Spike Nail
A.P. X-25	E. 1/4 Cor Sec. 36
T.P. # 34	P.K. Nail

STA	B.S.	H.I	F.S.	Elev	ADS
	5.830				
	5.000	732.387		732.387	
	4.16				
			6.655		
T.P. # 35			5.830	731.557	
			5.005		
	3.310				
	2.490	734.047			
	1.665				
			8.35		
T.P. # 36			7.525	726.522	
			6.695		
	7.930				
	6.930	733.452			
	5.930				
			2.155		
T.P. # 37			1.19	732.262	
			0.22		
	7.180				
	6.100	738.362			
	5.020				
			6.490		
T.P. 38			5.430	732.932	
			4.37		
	20.52		19.975		0.545

Description		(17)
T.P. # 35	SPike Nail Going <sup>West</sup> <del>East</del> on PARRAGO Rd	
T.P. # 36	P.K. Nail	
T.P. # 37	P.K. Nail	
T.P. # 38	SPike Nail	

Sta	B.S.	I.I.	F.S.	Elev	ADJ
	2.525				
	6.355	739.287		732.932	
	5.190				
			5.615		
T.P. # 39	-		4.465	734.822	
			3.315		
	5.790				
	4.925	739.747			
	4.055				
			8.290		
T.P. # 40			7.460	732.287	
			6.630		
	5.010				
	4.020	736.307			
	3.030				
			11.535		
T.P. # 41			10.610	725.697	
			9.68		
	5.685				
	5.385	731.082			
	5.085				
			5.780		
A-P Y-23			5.55	725.532	
			5.315		
	20.685		28.095		7.40

Description		(18)
T.P. # 39	SPike Nail going West on PAPPAGO	
T.P. # 40	SPike Nail " " " "	
T.P. # 41	SPike Nail	
A.P. = Vert Y-23 Control only So 1/4 COR Sec. 36.		

sta	B.S	H.I	F.S.	Elev	ADS
	4.740				
	3.765	729.297		725.530	
	2.790				
			7.150		
T.P. #42			6.880	723.117	
			5.205		
	4.995				
	3.925	727.042			
	2.865				
			8.585		
T.P. #43			7.295	719.747	
			6.215		
	5.765				
	4.80	724.547			
	3.83				
			7.145		
T.P. #44			6.180	718.367	
			5.205		
	6.87				
	5.84	724.207			
	4.80				
			5.48		
T.P. 45			4.45	719.757	
			3.425		
	18.33		24.105		5.775

Discription

(19)

VERT. Y-23

T.P. #42 P.K. Nail

T.P. #43 Spike Nail

T.P. #44 Spike Nail

T.P. 45 Spike Nail

Sta	B.S.	I.I.	F.S.	Elev	ADJ
	6.890				
	5.830	725.587		719.757	
	4.770				
			6.575		
T.P.		*	5.46	720.127	
			4.405		
	7.320				
	6.250	726.377			
	5.170				
			6.28		
T.P.#			5.22	721.157	
			4.16		
	7.390				
	6.475	727.632			
	5.555				
			2.19		
T.P.#			1.395	726.237	
			0.595		
	10.780				
	9.75	735.987			
	8.72				
			36		
			9.39		
T.P.#			8.34	727.647	
			7.32		
	28.305				

Description		
T.P.	Spike	Nail
T.P.	Spike	Nail
T.P.#	Spike	Nail
T.P.#	Spike	Nail

STA	B.S.	H.I.	F.S.	Elev	ADS
	2975				
	2.27	729.917		722.647	
	1.56				
			3.68		
7 CK-IN			2.21	722.707	
			0.73		

Discription

CK-IN B.M. (K-354) Page 5 El=722682  
.025 High

(22)

SEPT 16-1991  
Job # 1135B  
P.C. B. Davis  
Rd R. Dudley

Level Run for  
GILB BEND Flood PLANE.  
FROM TEST PAV. "C" TO Vert W.  $\frac{1}{2}$  BACK.

INST. USED Wild NA-2 # 517249  
Rd used NEDO # 2 15' Rd.

(23)

Sta.	B.S.	H.I.	F.S.	Elev	Adj
	7.135			712.882	
	6.380	719.262			
	5.620				
			4.685		
T.P. #2			3.925	715.337	
			3.160		
	7.265				
	6.245	721.577			
	5.225				
			4.550		
T.P. #2			3.540	718.037	
			2.530		
	10.725				
	9.70	727.737			
	8.67				
			7.08		
A.P. W-23			5.85	721.887	
			4.63		
	6.81				
	5.58	727.467			
	4.36				
			10.45		
T.P. 3			9.43	718.037	
			8.91		
	27.905		22.745		5.16

## Description

TEST PAN "C" SPIKE Nail. on Indian Rd.	
T.P. #2	SPIKE Nail
T.P. #2	SPIKE Nail
A.P. W-23	VERT Control. 1' x 12' (N-1/16 COR SEC 36.)
T.P. #3	SPIKE Nail

Sta	B.S.	H.I	F.S.	Elev	ADJ
	4.34				
	3.33	721.369		718.037	
	2.31				
			7.05		
T.P. 4			6.025	715.342	
			5.00		
	4.72				
	3.955	719.297			
	3.190				
			7.17		
CK-IN			6.41	712.887	
			5.65		.005 high
Sta	B.S.	H.I	F.S.	Elev	ADJ
	5.440				
	5.120	722.057		716.937	
	4.800				
			6.010		
VERT "O" I.D.			5.990	716.287	
			5.535		
	6.065				
	5.825	722.112			
	5.590				
			5.49		
CK-IN			5.17	716.942	
			4.85		

Description	
T.P. 4	SPIKE NAIL
CK-IN	TEST PAN. "C" Ref. PAGE 23 Elev = 712.882
A. Panel	V-25 S.E. COR 25 Elev = 716.937 PVMT = 717.182
VERT I.D. "O"	located APPROX 105' N.W. of A Panel V-25
A.P.	V-25

Sta	B.S	H.I.	F.S.	ELV	ADS
	8.54				
	7.96	749.845		741.885	
	7.38				
			6.76		
T.P. # 1			6.14	743.705	
			5.52		
	7.38				
	5.91	749.615			
	7.44				
			8.53		
T.P. # 2			7.00	742.615	
			5.46		
	4.56				
	3.83	746.445			
	3.10				
			7.45		
T.P. # 3			6.715	739.730	
			5.98		
	4.705				
	3.785	743.515			
	2.865				
			7.53		
T.P. # 4			6.62	736.895	
			5.21		
	21.985		26.475		4.99

Description -		
Bench MARK (B-84)(X-5) E 1/4 COR		
SEC 31 T5S R.4W		
T.P. # 1	SPIKE Nail	
T.P. # 2	P.K Nail @ street Rd	
T.P. # 3	SPIKE Nail street Rd	
T.P. # 4	SPIKE Nail street Rd	

Sta	B.S.	H.I.	F.S.	Elev
	5.305			
	4.280	741.175		736.895
	3.260			
			7.290	
T.P. # 5			6.280	734.895
			5.270	
	5.195			
	4.455	739.350		
	3.715			
			6.825	
T.P. # 6			6.09	733.260
			5.36	
	5.280			
	5.155	738.415		
	4.535			
			6.630	
A.P. # 7.85			5.955	732.460
			5.285	
	5.865			
	5.675	738.135		
	5.485			
			6.855	
A.P. "100"			6.285	731.850
			5.710	
	19.565		24.61	5.045

Discription

(26)

T.P. # 5 SPIKE Nail ON STROUT Rd

T.P. # 6 P.K. Nail ON STROUT Rd

A.P. # 1-5 So East Cor Sec 30 (T.S.S.)  
R 4 W. "REBAR" PAVEMENT = 732.785

VERT I.D. "N" 100' N.W. of V-5.

(27)

Sta	B.S.	H.I	F.S.	Elev
	8.320			
	7.245	739.095		731.850
	6.170		4.535	
T.P. # 7.			3.480	735.615
			2.420	
	6.685			
	5.505	741.120		
	4.330			
			8.145	
T.P. # 8			7.110	734.010
			6.085	
	10.310			
	9.365	743.325		
	8.430			
			4.590	
CK-B.C. M.H.D.			4.220	739.155
			3.855	

Description

T.P. # 7. spike nail

T.P. # 8 spike nail

"CK" B.C. IN Headwall West side of of  
 OLD US 80 Hwy 0.50 Miles N.E. of  
 Intersection Arlington MASSAVERA Rd &  
 US 80 Hwy. MARICOPA Hwy Dept.  
 B.C. Stamped Elev 739.16

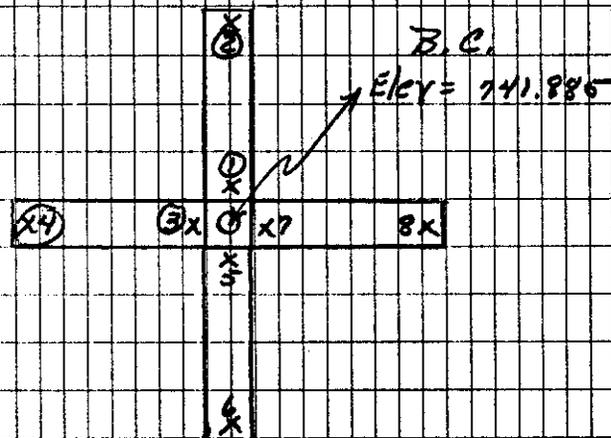
STA	B.S.	H.I.	F.S.	Elev
	3.33			
	3.145	745.030		741.885
	2.955			
SS. 1			3.78	741.250
SS. 2			4.09	740.940
SS. 3			3.83	741.200
SS. 4			4.22	740.810
SS. 5			3.78	741.250
SS. 6			4.14	740.890
SS. 7			3.74	741.290
SS. 8			4.21	740.820

Description

(28)

B. 84 (X-5) E 1/4 COR SEC. 31  
T 5 S. R. 4 W.

↑  
N  
↓





Sta	B.S.	I.I	F.S.	Elev
	5.535			
	4.35	762.524		763.174
	3.17			
			5.565	
T.P. #4			4.345	763.179
			3.125	
	3.19			
	2.215	765.394		
	1.245			
			12.72	
T.P. #5			11.745	753.649
			10.99	
	4.905			
	4.63	758.229		
	4.35			
			5.42	
A.P. V-7			5.13	753.149
			4.85	
	5.63			
	5.34	758.489		
	5.05			
			5.105	
T.P. #6			4.835	753.654 ✓
			4.565	
	16.535		26.055	9.52

Description

T.P. #4	Spike Nail
T.P. #5	" "
A. Panel V-7	
T.P. #6	Spike Nail

Sta	B.S.	I.I.	F.S.	Elev.
	12.12			
	11.22	764.874		753.654
	10.32			
			2.73	
T.P. # 7			1.69	763.184
			0.65	
	5.465			
	4.26	767.444		
	3.055			
			5.445	
T.P. # 8			4.265	763.179
			3.085	
	2.28			
	1.42	764.599		
	0.57			
			5.14	
T.P. # 9			4.08	760.579
			3.02	
	7.345			
	6.33	766.849		
	5.315			
			6.39	
T.P. # 10			5.405	761.444
			4.42	
	23.23		15.44	7.79

Description	
T.P. # 7	Spike Nail
T.P. # 8	" "
T.P. # 9	Spike Nail
T.P. # 10	" "



Sept 18, 1991  
Job # 11358  
P.C. B. Davis  
Rd R. Dudley

Levels for  
Gila Bend Flood Plain

From - Intersection of Gila Rd &  
Indian Rd North to watermelon.  
Then East.

Sta	B.S.	H.I.	F.S.	Elev	ADJ
	9.385				
	8.355	707.567		699.212	
	7.33				
			6.085		
T.P. # 1			5.05	702.517	
			4.015		
	6.365				
	5.495	708.012			
	4.63				
			7.76		
T.P. # 2			6.89	701.122	
			6.025		
	6.27				
	5.265	706.387			
	4.26				
			3.07		
T.P. # 3			2.05	704.337	
			1.03		
	2.99				
	6.83	711.167			
	5.89				
			7.94		
T.P. # 4			7.005	704.162	
			6.07		
	25.945		20.995		4.95

DESCRIPTION

35

A.P. # 1-21	@ Intersection	Gilez Rd			
& Indian Rd	S.W. Cor. Sec. 25 E1		699.212		
T.P. # 1	Set	Spike Nail			
T.P. # 2	"	"			
T.P. # 3	"	Spike Nail			
T.P. # 4	"	Spike Nail			



Sta.	B.S.	H. I	F.S.	Elev	ADS
	5.355				
	4.265	706.127		701.862	
	3.17				
			10.885		
T.P. # 8			9.80	696.307	
			8.75		
	1.83				
	1.04	697.347			
	0.255				
			10.09		
T.P. # 9			9.30	688.047	
			8.51		
	3.062				
	2.19	690.237			
	1.323				
			10.95		
T.P. # 10			10.08	680.157	
			9.21		
	4.105				
	2.53	682.687			
	0.965				
			8.905		
T.P. # 11			9.35	675.337	
			5.805		
	10.025		36.55		26.525

Description	
T.P. # 8	Spike Nail
T.P. # 9	Spike Nail
T.P. # 10	" "
T.P. # 11	Spike Nail

Sta	B.S.	H.I.	F.S.	Elev.	ADS
	3.94				
	3.00	678.337		675.337	
	2.06				
			10.175		
T.P. # 12			9.19	669.147	
			8.21		
	2.935				
	1.91	671.057			
	0.885				
			7.963		
A.P. R-21			7.10	663.957	
			6.232		
	6.345				
	5.26	669.217			
	4.17				
			4.04		
T.P. # 13			2.90	666.371	
			1.76		
	7.59				
	6.37	672.687			
	5.14				
			5.23		
T.P. # 14			4.04	668.647	
			2.85		
	16.54		23.23		6.69

DESCRIPTION

(38)

T.P. # 12 SPIKE Nail

A.P. R-21 @ NE Cor Sec 26

T.P. # 13 SPIKE Nail GOING E. on Watermelon Rd

T.P. # 14 " "

Sta	B.S.	H.I.	F.S.	Elev	WDS
	6.84				
	5.68	674.327		668.647	
	4.52				
			4.445		
T.P. #15			3.29	671.037	
			2.13		
	8.170				
	6.765	677.802			
	5.355				
			5.845		
T.P. #16			4.43	673.372	
			3.02		
	6.91				
	5.72	679.092			
	4.53				
			5.225		
T.P. #17			4.03	675.062	
			2.84		
	7.52				
	6.57	681.632			
	5.62				
			5.945		
A.P. R-23			5.000	676.632	
			4.165		
S.S. *			4.47	677.162	
	24.935		16.75		7.985

(39)

Description	
T.P. #15	SPIKE NAIL
T.P. #16	" "
T.P. #17	" "
A.P. R-23	1/4" x 1/4" COR Sec 25
T.S.S. R 5 W.	TOP of 3/4 REBAR
PUMT =	677.162

Sta	B.S.	H.I.	F.S.	Elev	ADS
	8.085				
	6.90	683.532		676.632	
	5.71				
			5.54		
T.P. # 18			4.31	679.222	
			3.08		
	6.925				
	5.79	685.012			
	4.655				
			5.865		
T.P. # 19			4.74	680.272	
			3.61		
	6.77				
	5.75	686.022			
	4.73				
			4.385		
T.P. # 20			3.37	682.652	
			2.35		
	7.255				
	6.175	688.827			
	5.095				
			3.97		
T.P. # 21			2.90	685.927	
			1.82		
	24.615		15.32		9.295

Description		
T.P. # 18	SPike	Nail
T.P. # 19	"	"
T.P. # 20	SPike	Nail
T.P. # 21	SPike	Nail

STA	BS.	H. I.	ES.	ELEV	ADS
	6.405				
	5.20	691.127		685.927	
	3.995		6.15		
T.P. #22			4.98	686.147	
			3.80		
	6.69				
	5.985	691.632			
	4.285				
			7.59		
T.P. #23			6.42	686.212	
			5.245		
	7.07				
	5.83	691.042			
	4.59				
			5.54		
T.P. #24			4.30	686.742	
			3.07		
	6.05				
	4.945	691.687			
	3.84				
			7.35		
T.P. #25			6.26	686.427	
			5.16		
	21.46		21.96		0.50

Description

T.P. #22	Spike Nail
T.P. #23	" "
T.P. #24	" "
T.P. #25	Spike Nail

Sta	B.S.	H.I	F.S.	Elev	ADS
	6.305				
	5.30	690.727		685.427	
	4.305				
			4.76		
A.P. R-2			3.82	686.907	
			2.88		
	6.87				
	5.745	692.652			
	4.62				
			5.37		
T.P. # 26			4.24	688.412	
			3.11		
	7.765				
	6.85	695.262			
	5.93				
			3.92		
T.P. # 27			3.02	692.242	
			2.12		
	9.845				
	8.60	700.842			
	7.345				
			5.62		
T.P. # 28			4.385	696.457	
			3.15		
	26.495		15.465		11.03

Description

(42)

A.P. "R-2" T.SS R/W N $\frac{1}{4}$  Sec  
30. (P.K. N/4)

T.P. # 26 SPIKE N/4

T.P. # 27 " "

T.P. # 28 " "

Sta	B.S.	H.I.	F.S.	Elev	ADS
	6.20				
	5.03	701.487		696.457	
	3.87				
			5.50		
T.P. # 29			4.33	697.157	
			3.17		
	6.44				
	5.40	702.557			
	4.36				
			4.86		
T.P. # 30			3.84	698.717	
			2.815		
	6.55				
	5.61	704.327			
	4.68				
			4.45		
T.P. # 31			3.52	700.807	
			2.595		
	6.66				
	5.52	706.327			
	4.38				
			5.12		
T.P. # 32			4.00	702.327	
			2.88		
	21.56		15.69		5.87

Description	
T.P. # 30	SPiKe Nail
T.P. # 30	SPiKe Nail
T.P. # 31	" "
T.P. # 32	SPiKe Nail

Sta	B.S.	I.I.	F.S.	Elev	ADS
	6.88				
	5.79	708.117		702.327	
	4.745				
			4.45		
T.P.# 33			3.38	704.737	
			2.32		
	6.39				
	5.58	710.317			
	4.77				
			4.88		
T.P.# 34			4.08	706.237	
			3.28		
	6.44				
	5.70	711.937			
	4.95				
			5.53		
A.P. R-5			4.99	706.947	
			4.445		
S.S.			3.66	708.277	
	8.31				
	7.225	714.172			
	6.145				
			5.74		
T.P.# 35			4.635	709.537	
			3.53		
	24.295		19.085		7.21

Description

T.P.# 33	Spike Nail
T.P.# 34	Spike Nail
A.P. R-5	T.S.S. R4W SE. COR SEC. 19 ON THE B.C. PUNT = 708.277 PUNT.
T.P.# 35	Spike Nail

Sta	B.S.	H.I	F.S.	Elev	#DS
	2.54				
	6.465	716.002		709.537	
	5.39				
			5.47		
T.P. # 36			4.38	711.622	
			3.29		
	8.425				
	7.38	719.002			
	6.342				
			5.37		
T.P. # 37			4.345	714.657	
			3.32		
	7.97				
	6.82	721.477			
	5.67				
			8.57		
T.P. # 38			7.405	714.072	
			6.27		
	10.045				
	8.81	722.882			
	7.58				
			6.35		
T.P. # 39			5.125	717.757	
			3.90		
	29.475		21.255		8.22

Description	
T.P. # 36	Spike Nail
T.P. # 37	Spike Nail
T.P. # 38	Spike Nail
T.P. # 39	Spike Nail

Sta	B.S.	H.I.	F.S.	Elev	ADS
	5.61				
	4.50	722.257		719.257	
	3.39				
			10.03		
A.P. R-7			8.96	713.297	
			7.89		
	13.03				
	11.73	725.029			
	10.43				
			5.20		
T.P. # 40			3.945	721.082	
			2.69		
	12.43				
	11.07	732.152			
	9.21				
			4.99		
T.P. # 41			3.63	728.522	
			2.28		
	10.195				
	8.685	737.209			
	7.18				
			5.045		
T.P. # 42			3.56	733.649	
			2.07		
	35.985		20.095		15.89

Description
A.P. # R-7. NY Sec 29 T.S.S. 24W 1/2" REBAR FLUSH WITH P.U.M.T.
T.P. # 40 SPIKE NAIL
T.P. # 41 SPIKE NAIL
T.P. # 42

Sta	D.S.	H.I	F.S.	Elev	ADS
	11.12				
	10.06	743.709		733.647	
	9.00		4.57		
T.P. #43			3.39	740.312	
			2.20		
	5.763				
	4.822	745.139			
	3.885				
			6.57		
T.P. #44			5.62	739.519	
			4.67		
	3.82				
	3.19	742.709			
	2.57				
			6.165		
CK-IN			5.69	737.019	.072 High
			5.215		

Description

T.P. #43	Spike Nail
T.P. #44	Spike Nail
CK-IN BM A-361	EI = 736.947
1.25 miles Northeast along old Hwy 80 in Sec	
29 T 5 S R 4 W	

Sta	B.S.	H.I.	F.S.	Elev	ADS
	7.025				
	6.64	691.852		685.212	
	6.20				
			7.062		
B.M. #1			6.648	685.204	
			6.235		
	6.86				
	6.445	691.649			
	6.03				
			7.43		
CK-IN			5.52	686.129	.018 Low
			3.59		

Description

T.P. # 23 Spike Nail Elev: 685.212

B.M. #1 "Maricopa County B.C. Found in N.H.  
@ Intersection of Watermelon & 307 AVE.

CK-IN T.P. # 20 Spike Nail 686.147

48

49

Sept. 19-1991

Job 11358

P.O. B. Davis

Rd. R. Dudley

Laval Run for  
Gila Bend Flood Plain

from 307 Ave  $\frac{1}{2}$  Watermelon  
North

Sta	B.S.	I.I.	F.S.	Elev	ADS
	10.18				
	9.365	694.569		685.204	
	8.55				
			7.30		
T.P. #1			6.415	688.154	
			5.53		
	1.67				
	3.55	691.704			
	2.43				
			8.04		
T.P. #2			6.96	684.744	
			5.88		
	5.25				
	4.325	689.069			
	2.905				
			7.60		
T.P. #3			6.20	682.869	
			4.80		
	5.41				
	4.30	687.169			
	3.19				
			6.90		
T.P. #4			5.985	681.384	
			4.67		
	21.54		25.36		3.82

B.M. #1	B.C. Maricopa County @
307 AVE. $\frac{1}{2}$ Watermelon Rd.	Elev 685.204
located N.W. Cor Sec. 30.	
T.P. #1	Spike Nail
T.P. #2	Spike Nail
T.P. #3	Spike Nail
T.P. #4	Spike Nail

Sta	B.S.	H.I.	F.S.	Elev	ADS
	5.26				
	4.04	685.424		681.384	
	2.82				
			6.94		
T.P. # 5			5.24	679.684	
			4.53		
	5.59				
	4.52	684.204			
	3.45				
			11.70		
A.P. P.25			10.45	673.754	
			9.19		
	4.195				
	2.86	676.614			
	1.52				
			7.60		
T.P. # 6			6.28	670.334	
			4.95		
	5.37				
	4.28	674.614			
	3.19				
			5.06		
T.P. # 7			3.95	670.664	
			2.85		
	15.70		26.42		10.72

Description

(57)

T.P. # 5 Spike Nail

A.P. P.25 E 1/4 Sec 24 T.55 R.5W

T.P. # 6 Spike Nail

T.P. # 7 Spike Nail

Sta.	B.S.	I.F.	F.S.	Elev	ADJ
	7.37				
	5.795	676.459		670.664	
	4.22				
			11.55		
T.P. #8			9.975	666.484	
			8.40		
	5.945				
	4.67	671.154			
	3.40				
			7.11		
T.P. #9			5.84	665.314	
			4.57		
	6.23				
	4.97	670.784			
	3.70				
			6.97		
TEST A			5.62	664.664	
			4.27		
	7.79				
	6.73	671.394			
	5.67				
			7.005		
T.P. #10			5.92	665.474	
			4.84		
	22.165		27.355		5.19

Description

T.P. #8	Spike Nail
T.P. #9	Spike Nail
TEST PART "A"	
T.P. #10	Spike Nail Going West To A. Panel #

Sta	B.S.	I.L	F.S.	Elev	ADS
	3.03				
	2.02	667.494		665.474	
	1.01				
			6.88		
T.P. # 11			5.865	661.629	
			4.845		
	5.17				
	4.015	665.644			
	2.855				
			9.78		
T.P. # 12			8.615	657.029	
			7.45		
	6.58				
	5.62	662.649			
	4.66				
			8.14		
T.P. # 13			7.17	655.479	
			6.20		
	3.56				
	2.79	658.269			
	2.02				
			6.18		
T.P. # 14			5.385	652.884	
			4.59		
	14.445		27.035		12.59

Description	
T.P. # 11	SPiKE Nail
T.P. # 12	SPiKE Nail
T.P. # 13	SPiKE Nail

Sta.	B.S.	H.I.	F.S.	Elev	ADJ
	6.765				
	5.92	658.804		652.884	
	5.075				
			7.20		
A.P. N-23			6.77	652.034	
			6.34		
	6.98				
	6.555	658.589			
	6.13				
			6.55		
T.P. <sup>15</sup>			5.905	652.884	
			4.86		
	6.08				
	5.28	658.164			
	4.485				
			3.455		
T.P. <sup>16</sup>			2.685	655.479	
			1.92		
	8.045				
	7.09	662.569			
	6.13				
			6.51		
T.P. <sup>17</sup>			5.54	657.029	
			4.57		
	24.845		20.70		4.145

Description

(54)

A.P. N-23

T.P.<sup>15</sup>

Spike Nail

T.P.<sup>16</sup>

T.P.<sup>17</sup>

Sta.	B.S.	H.I.	F.S.	Elev	ADS
	9.82				
	8.66	665.689		657.029	
	7.50				
T.P. #18			5.215		
			4.055	661.634	
			2.90		
	6.88				
	5.87	667.504			
	4.86				
T.P. #19			3.04		
			2.03	665.474	
			1.02		
	6.93				
	5.84	671.314			
	4.75				
			7.70		
CK-IN			6.65	664.664	664.664
			5.60		
	4.685				
	3.92	668.584			
	3.16				
			12.433		
T.P. #20			11.75	656.834	
			11.065		
	24.29		24.485		.195

Description

T.P. #18	Spike Nail
T.P. #19	" "
CK-Back	Test Pan "A"
T.P. #20	Spike Nail

Sta	B.S.	H.I.	F.S.	Elev	ADJ
	8.67				
	7.27	664.104		656.934	
	5.87				
			5.60		
BM #2			4.58	659.524	
			3.56		
	6.735				
	5.88	665.404			
	5.02				
			4.28		
TEST "B"			2.91	662.444	
			1.545		
	7.415				
	6.365	668.859			
	5.31				
			5.70		
T.P. #21			4.63	664.229	
			3.57		
	1.13				
	3.29	667.519			
	2.445				
			9.765		
T.P. #22			8.923	658.596	
			8.082		
	22.805		21.043		1.762

Description	
B.M. #2	B.C. NW Sec Cor 19 T 5 S R. 4 W.
TEST Panel "B"	Spike Nail
T.P. #21	Spike Nail
T.P. #22	Spike Nail

Sta	B.S.	H.I	F.S.	Elev	ADJ
	5.63				
	5.095	663.691		658.596	
	4.56				
			6.662		
I A.P. N-2			6.241	657.450	
			5.82		
	6.45				
	6.03	663.48			
	5.601				
			5.42		
T.P. # 23			4.883	658.597	
			4.348		
	9.645				
	8.80	667.397			
	7.96				
			4.01		
T.P. # 23			3.167	661.230	
			2.325		
	5.683				
	4.62	668.850			
	3.55				
			7.403		
TEST "B"			6.35	662.500	
			5.29		
	24.545	20.641			3.904

Description		(57)
A.P. Pond N-2	N $\frac{1}{2}$ COR SEC 19	
T.S.S.	R.H.W.	
T.P. # 23	SPike	NAS1
T.P. # 23	"	"
TEST "B"		



Sta	B.S.	H.I	F.S	Elev	ADS
	4.067				
	3.475	654.040		650.565	
	2.885				
			6.188		
A.P.			5.57	648.470	
			4.958		
	5.93				
	5.31	653.780			
	4.69				
			3.80		
T.P. # 27			3.215	650.565	
			2.627		
	11.403				
	10.65	661.215			
	9.90				
			5.755		
T.P. # 28			5.01	656.205	
			4.27		
	7.505				
	6.24	662.445			
	4.95				
			5.58		
T.P. # 29			4.32	658.125	
			3.06		
	25.675			18.115	7.56

Description	
A.P. # 11-1	SW: 1/16 COR SEC 18
T. 5 S	R. 4 W.
T.P. # 27	SPike Nail
T.P. # 28	" "
T.P. # 29	" "

Sta	B.S.	H.I	F.S.	Elev	ADS
	7.823				
	6.51	664.635		658.125	
	5.20				
			6.33		
B.M. # 2			5.105	659.530	—
			3.885		
	5.59				
	4.55	664.080			
	3.51				
			8.63		
T.P. # 30			7.25	656.830	
			5.87		
	12.285				
	11.567	668.397			
	10.85				
			5.25		
T.P. # 31			3.09	665.307	
			0.93		
	6.905				
	5.88	671.187			
	4.86				
			6.23		
T.P. # 32			4.72	666.467	/
			3.21		
	28.507		20.165		8.342

(60)

Description			
B.M. # 2	Ref Page	56	
T.P. # 30	Spike Nail		
T.P. # 31	" "	" "	
T.P. # 32	Spike Nail		

Sta	B.S.	I.I.	F.S.	Elev	ADS
	10.94				
	9.38	625.847		666.467	
	7.82				
			6.79		
T.P. # 33			5.19	670.657	
			3.59		
	5.785				
	4.41	625.067			
	3.04				
			5.27		
T.P. # 34			4.74	670.327	
			3.90		
	7.225				
	5.84	676.167			
	4.45				
			3.69		
A.P. P. 25			2.42	673.747	
			1.15		
	11.21				
	10.14	683.887			
	9.07				
			5.47		
T.P. # 35			4.21	679.677	
			2.95		
	29.77		16.56		13.21

Description	
T.P. # 33	SPiKe Nail
T.P. # 34	" "
A.P. P-25	Ref Page 51
T.P. # 35	SPiKe Nail

Sta	B.S.	H.I	F.S	Elev	ODS
	6.89				
	5.70	685.377		679.677	
	4.505				
			5.23		
T.P. # 36			4.00	681.377	
			2.77		
	7.02				
	5.66	687.037			
	4.30				
			5.04		
T.P. # 37			4.173	682.864	
			3.31		
	7.21				
	5.91	688.174			
	4.61				
			5.58		
T.P. # 38			4.045	684.729	
			2.52		
	7.97				
	6.90	691.629			
	5.83				
			4.622		
T.P. # 39			3.49	688.139	
			2.365		
	24.17		15.708		84.62

(62)

Description

T.P. # 36	Spike Nail
T.P. # 37	" "
T.P. # 38	Spike Nail
T.P. # 39	Spike Nail

Sta	B.S.	H.I.	F.S.	Elev	ADJ
	7.50				
	6.34	694.479		688.139	
	5.18				
			9.84		
CK-10			9.28	685.199	Low .005
			8.72		

Description

CK-10 B.C. Ref Page 50  
B.M. # 1 ELEV = 685.204

(64)

Sept. 25, 1991

Job 11358

P.C. B. Davis

Rd. R. Dudley

Level Row  
Gila Bend Flood Plane

From A.P. W-3 To B.M. B-84

Sta-	B.S.	H.I	F.S.	Elev	ADS
	2.98				
	1.72	728.197		726.477	
	0.45				
			5.785		
T.P. <sup>1</sup>			4.550	723.647	
			3.32		
	9.245				
	8.090	721.737			
	6.942				
			6.085		
T.P. <sup>2</sup>			4.885	726.852	
			3.685		
	7.265				
	6.30	733.152			
	5.33				
			6.01		
TEST Panel E			4.60	728.552	
			3.18		
	6.185				
	4.750	733.302			
	3.310				
			11.29		
T.P. 3			9.86	723.442	
			8.43		
	20.86				
		23.895			
					3.035

(65)

Description

A.P. W-3. Jcet. N<sup>1</sup>/<sub>2</sub> Sec 31 T5S  
R 4W.

T.P. <sup>1</sup> Nail

T.P. <sup>2</sup> Nail

TEST Panel "E" P.K. Nail

T.P. <sup>\*</sup>

Sta	B.S.	I.F.	F.S.	Elev	ADS
	11.57				
	10.44	733.882		723.442	
	9.305				
			6.90	728.137	
T.P. 4			5.745		
			4.59		
	3.89				
	2.25	730.387			
	0.61				
			2.615		
TEST Panel "F"			1.635	728.252	
			0.66		
	4.95				
	3.825	732.577			
	2.70				
			3.21		
T.P. 5			2.09	730.487	
			0.98		
	10.16				
	8.80	737.287			
	7.43				
			5.41		
T.P. 6			4.09	735.197	
			2.77		
	25.315				
		13.56			
					11.755

Description

(66)

T.P. 4

S. Nail

Test Panel

"F"

Spike Nail

T.P. 5

Nail

T.P. 6

Nail

Sta	B.S.	H.I.	F.S.	Elev	ADS
	648				
	5.50	740.697		735.197	
	4.52				
			3.63		
T.P. 7			2.63	738.067	
			1.63		
	8.07				
	6.97	745.037			
	5.88				
			6.91		
T.P. 8			5.79	739.247	
			4.67		
	7.32				
	6.89	746.137			
	6.47				
			5.25		
CK-IN			4.35	741.787	.098
			3.45		LOW

Description	
T.P. 7	Nail
T.P. 8	Nail
CK-IN B.M. "B-84"	Elev = 741.885
Ref	PAGE 28

Sta	B.S.	I.I.	F.S.	Elev	ADS
	8.25				
	7.36	813.917		806.557	
	6.47	*	7.96	806.057	S.S. N.G.R.
			5.30		
T.P. #1			4.36	809.557	
			3.42		
	5.40				
	4.415	813.922			
	3.435				
			10.79		
T.P. #2			9.86	804.112	
			8.925		
	12.29				
	11.43	815.542			
	10.57				
			8.77		
T.P. #3			7.82	807.722	
			6.87		
	7.925				
	6.91	814.632			
	5.895				
			7.65		
T.P. #4			6.58	808.052	
			5.57		
	30.115		28.62		1.495

Description

(68)

B.M. "A-84" (2.6 miles east along Hwy 84 from the S. Pacific Co. Railroad station @ Gila Bend about 0.3 mile east of a Ranch House, 50' N. of the E of the Hwy, 1' N. of the Hwy Boundary line and about 1' above the surface of the Hwy in conc. Post. 3" above ground. Elev = 806.557

T.P. #1

Nail

T.P. #2

Nail

T.P. #3

Nail

T.P. #4

Nail

Sta	B.S.	H.I.	F.S.	Elev	ADS
	8.505				
	7.64	815.692		808.052	
	6.77				
			7.06		
T.P. # 5			6.21	809.482	
			5.36		
	5.80				
	4.725	814.207			
	3.645				
			6.00		
T.P. # 6			4.89	809.317	
			3.78		
	6.53				
	5.45	814.767			
	4.36				
			8.905		
T.P. # 7			7.78	806.987	
			6.66		
	10.25				
	9.145	816.132			
	8.045				
			5.95		
T.P. # 8			4.83	811.302	
			3.71		
	26.96		23.71		3.25

Description	
T.P. # 5	nail
T.P. # 6	nail
T.P. # 7	nail
T.P. # 8	nail

(70)

Sta	B.S.	I.I.	F.S.	Elev	ADS
	9.83				
	8.765	820.067		811.302	
	7.70				
			4.965		
T.P. # 9			3.745	816.322	
			2.630		
	8.23				
	7.00	823.322			
	5.77				
			5.33		
T.P. # 10			4.15	819.172	
			2.96		
	9.37				
	7.81	826.982			
	6.24				
			5.43		
T.P. # 11			3.85	823.132	
			2.29		
	7.825				
	6.655	829.787			
	5.485				
			4.625		
T.P. # 12			3.46	826.327	
			2.315		
	30.23		15.205		15.025

Description	
T.P. # 9	Nail
T.P. # 10	Nail
T.P. # 11	Nail
T.P. # 12	Nail

Sta	BS.	H.I	I.S.	Elev	ADS
	6.363				
	6.09	832.417		826.327	
	5.82				
			4.235		
A.P.			3.88	828.537	
			3.52		
	4.375				
	4.02	832.557	4.13	828.427	*
	3.665				
			6.51		
T.P. 13			6.235	826.322	
			5.963		
	4.72				
	3.63	829.952			
	2.55				
			8.06		
T.P. 14			6.82	823.132	
			5.58		
	5.44				
	3.91	827.042			
	2.38				
			9.45		
T.P. * 15			7.86	819.182	
			6.27		
	17.65		24.795		7.145

Description	
A.P.	
S.S. Nat Ge.	
T.P. # 13	Nail
T.P. 14	Nail
T.P. 15	Nail

Sta.	B.S.	H.I.	F.S.	Elev.	ADS
	5.38				
	4.00	823.182		819.182	
	2.62				
			7.85		
T.P. 16			6.85	816.332	
			5.85		
	4.89				
	3.87	820.202			
	2.85				
			10.05		
T.P. 17			8.89	811.312	
			7.73		
	5.945				
	4.83	816.142			
	3.71				
			10.25		
T.P. 18			9.14	807.002	
			8.04		
	9.09				
	7.79	814.792			
	6.49				
			6.38		
T.P. 19			5.46	809.332	
			4.54		
	20.49		30.34		9.85

(72)

Description

T.P. 16	Nail
T.P. 17	Nail
T.P. 18	Nail
T.P. 19	Nail

S. STA	B.S.	H.I.	F.S.	Elev	ADS
	6.425				
	5.42	814.752		809.332	
	4.42				
			6.44		
T.P. 20			5.25	809.502	
			4.07		
	7.17				
	6.32	815.822			
	5.47				
			8.61		
T.P. 21			7.75	808.072	
			6.89		
	7.61				
	6.58	814.162			
	5.55				
			7.97		
T.P. 22			6.915	807.737	
			5.86		
	7.58				
	6.37	814.107			
	5.16				
			10.60		
T.P. 23			9.98	804.127	
			9.36		
	24.69				
		29.595			
				5.205	

Description	
T.P. * 20	Nail
T.P. 21	Nail
T.P. 22	Nail
T.P. 23	Nail

Sta	B.S.	I.I.	F.S.	Elev	ADS
	12.67			804.127	
	11.23	815.357			
	9.80				
			6.26		
T.P. 24			5.785	809.572	
			5.31		
	5.26				
	4.355	813.927			
	3.45				
			8.30		
CK-IN			7.36	806.567	01
			6.42		high

Description			
T.P. 24			Nail
CK-IN	BM.	A-84	Ref Page 68
			806.557

(75)

9-26-91  
Job # 11358  
P.C. B. Davis  
Rd R. Dudley

Level Run  
For Gila Bend Flood Plans  
FROM B.M. A-84 To Test Ponds  
J & K Then Back To B.M. A-84

Sta	B.S.	H.I	F.S	Elev	ADS
	5.85				
	4.66	811.217		806.557	
	3.47				
			10.02		
T.P. 1			8.89	802.347	
			7.72		
	7.08				
	5.89	808.237			
	4.70				
			10.00		
Test Panel K			9.04	799.197	
			8.07		
	5.055				
	4.345	803.542			
	3.640				
			7.525		
T.P. 2			6.795	796.747	
			6.065		
	10.51				
	9.325	806.072			
	8.14				
			6.895		
Test Panel S			5.71	800.362	
			4.53		
	24.22				
			30.415		
					6.195

Description			
B.M.	A-84	Ref Page 68	Elev
			806.657
T.P. #1	Nail		
Test Panel "K"	SPike Nail		
T.P. 2	Nail		
Test Panel "J"			

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Sta	B.S.	H.I.	F.S.	ELCV	ADJ
	6.65				
	5.47	805.832		800.362	
	4.29				
			10.27		
T.P. 3			9.085	796.747	
			7.90		
	7.345				
	6.57	803.317			
	5.79				
			4.80		
TEST PAN K			4.12	799.197	
			3.44		
	11.34				
	10.22	809.417			
	9.10				
			8.145		
T.P. 4			7.07	802.347	
			6.00		
	10.005				
	8.85	811.197			
	7.70				
			5.84		
CK-IN			4.65	806.547	.01
			3.46		Low.

(77)

Description	
T.P. 3	Nail
TEST PAN "K"	
T.P. 4	Nail
CK-IN	B.M. A-84 EI = 806.557

Sta	B.S.	H.I.	F.S.	Elev	ADS
	3.69				
	2.705	768.150		765.445	
	1.725				
			7.085		
T.P. 1			6.163	762.047	
			5.125		
	5.85				
	5.16	767.207			
	4.465				
			7.68		
T.P. 2			6.99	760.217	
			6.30		
	5.725				
	4.18	764.997			
	3.845				
			6.88		
T.P. 3			5.99	759.027	
			5.065		
	5.41				
	4.32	763.347			
	3.23				
			7.83		
T.P. 4			6.725	766.622	
			5.63		
	16.965	25.788			8.823

DESCRIPTION

B.M. 5-331 "Ref Book 143 Page 41"  
Elev = 765.445

T.P. # 1 side Nail

T.P. # 2 Nail

T.P. # 3 Nail

T.P. # 4 Nail

(78)

Sta	B.S.	I.I.	F.S.	Elev
	5.42			
	4.748	761.370		756.622
	4.025		7.925	
T.P. # 5			7.20	754.170
			6.48	
	5.32			
	4.53	758.700		
	3.74			
			6.51	
T.P. # 6			5.725	752.925
			4.93	
	5.53			
	4.665	757.64		
	3.80			
			5.985	
T.P. # 7			5.105	752.535
			4.22	
	4.94			
	4.125	756.660		
	3.315			
			12.20	
T.P. # 8			11.425	745.235
			10.64	
	18.068		29.455	11.387

(79)

Description
T.P. # 5 Nail
T.P. # 6 Nail
T.P. # 7 Nail
T.P. # 8 Nail

Sta	B.S.	H.I.	F.S.	Elev	
	11.90				
	10.31	755.545		745.235	
	8.93				
			4.07		
CK-IN			3.60	751.885 751.901	
			3.25	016 Low-	
Sta	B.S.	H.I.	F.S.	Elev.	ADS
	4.29	720.577		716.287	
			4.615	715.962	
	4.87	720.832			
CK-IN			4.55	716.282 716.287	
				Low .005	

Description

80

CK-IN B.M. A-36 EL = 751.901

Description

V. ID. "O" Ref. PAGE 24 ELEV = 716.287  
 ERM - "A" Located 446' West  
 of Island 1-25 Sec Cor - S.E. Sec 25  
 To a checked Box on the N. Co. of 515'  
 CONCRETE. D/GUY 4' 24' So of E/PUNT.



BOOK 143  
JOB #11358

M.C.F.C.D. 61A BEND  
BENCH LOOP FOR AERIAL  
PANELS

9/12/91

Ⓜ - S. PERHAM  
Ⓞ - R. MEYER





STA.	B.S.	H.I.	I.S.	ELEV.
TP. 5	4.128			760.739
	3.135	763.874		
	2.142			
			9.315	
TP. 6			8.311	755.563
			7.309	
	7.061			
	6.061	761.624		
	5.06			
			6.50	
TP. 7			5.518	756.106
			4.538	
	2.622			
	1.648	757.754		
	.682			
			7.67	
TP. 8			6.702	751.052
			5.732	
	9.827			
	8.831	759.883		
	7.84			
			6.56	
TP. 9			5.58	754.303 ✓
			4.60	
	† 19.675		26.111	DIFF. 6.436

DESCRIPTION
NAIL
NAIL
NAIL
ROCK







STA.	+ B.S.	H.I.	- F.S.	BLEU.
TP. 18	4.73			741.614
	3.742	745.356		
	2.762			
			7.067	
TP. 19			6.045	739.311
			5.022	
	5.145			
	4.45	743.761		
	3.758			
			5.545	
TP. 20			4.812	738.949
			4.078	
	5.915			
	4.96	743.909		
	4.002			
			5.664	
TP. 21			5.295	738.614
			4.926	
	6.92			
	6.68	745.294		
	6.442			
			5.52	
PANEL Y-2			5.347	739.947
			5.175	
	+19.832		-21.499	DIFF. 1.667

DESCRIPTION	10
NAIL	
NAIL	
NAIL	
SPIKE NAIL @ CENTER OF JERT PANEL SOUTH OF CANAL IN SEC. 31 T.5S. R.4W	







Sta	B.S.	H.I	F.S.	Elev
	5.945			
	5.02	755.094		750.074
	4.10			
			5.84	
T.P. #31			4.905	750.189
			3.915	
	5.415			
	4.63	754.819		
	3.765			
			3.825	
			2.93	751.889
			2.04	.025 Low
SS.			3.22	751.579

Description	
T.P. #31	SPike Nail
Bench Mark COY = Elev = 757.914 T 65 R 5 W	
Sec 1 TRY Sta. COY EL = 757.914	
N.G. @ Bench Mark. COY	

(15)

Sept 24 1991

Job # N358

P.C. B. Davis

Rd. R. Dudley

Gila Bend Flood Plain

Level Run

from G10 A360 to Aerial Photo V-13

to G10 C360

STA.	B.S.	H.I.	F.S.	Elev	ADS
	5.74				
	4.80	798.427		793.627	
	3.865				
			5.845		
T.P. 1 Nail			4.93	793.497	
			4.01		
	6.69 -				
	5.685	799.182			
	4.68 -				
			4.630		
T.P. 2			3.560	795.622	
			2.485		
	8.23				
	6.781	802.403			
	5.33				
			2.885		
T.P. 3			1.505	800.898	
			0.13		
	7.90				
	7.125	808.023			
	6.35				
			5.48		
A.P. V-13			4.53	803.493	
			3.58		
	24.391		14.525		9.866

DESCRIPTION

(16)

B.M. A360 - 2.7 miles east along the  
S.P. Railroad a small wooden railroad trestle  
38' North of the North Rail of the North Track  
96' So. of the E of a gravel road 15' N. of the  
E of a Track. Ed. 14' west of El. Pole 31-M

T.P. 1 Nail

T.P. 2 Nail

T.P. 3 Nail

A.P. V-13 N-E COR SEC 33 T 53 R 94







Sta	B.S.	H.I.	F.S.	Elev	ADJ
	5.68				
	4.79	808.296		803.506	
	3.905				
			8.245		
T.P. 14			7.385	800.911	
			6.53		
	3.725				
	2.52	803.431			
	1.31				
			9.425		
T.P. 15			7.80	795.631	
			6.17		
	4.76				
	3.63	799.261			
	2.505				
			6.71		
T.P. 16			5.76	793.501	
			4.805		
	5.91				
	5.095	798.546			
	4.18				
			5.91		
CK-IN			4.92	793.626	.001
			3.925		Low

Description	
T.P. 14	Nail
T.P. 15	Nail
T.P. 16	Nail
CK-IN	B.M. A-360 Ref Page 15 793.627

Sta	B.S.	H.I.	F.S.	Elev	ADS
	9.415				
	8.331	755.949		747.618	
	7.25				
			4.05		
T.P. 1			2.953	752.996	
			1.86		
	6.225				
	5.39	758.386			
	4.555				
			8.93		
T.P. 2			8.065	750.321	
			2.20		
	9.61				
	8.68	759.001			
	7.74				
			4.94		
CK-IN			4.19	754.811	.014
			3.445		high

Description					
CK Panel	"I" Rd. Edge B				
Spike Nail	Elev = 747.618				
T.P. 1	Nail				
T.P. 2	Nail				
CK-IN	Panel Z-5	Elev = 754.797			



Sta	B.S.	H.I	F.S.	Elev	ADJ
	1.165				
	3.170	786.592		783.422	
	2.18				
			8.03		
T.P. 5			6.945	779.647	
			5.855		
	6.762				
	5.655	785.302			
	4.55				
			6.46		
T.P. 6			5.34	779.962	
			4.225		
	3.53				
	2.26	782.222			
	0.98				
			7.125		
T.P. 7			5.86	776.326	
			4.59		
	7.14				
	6.165	782.527			
	5.19				
			7.24		
T.P. 8			6.24	776.287	
			5.24		
	17.25		24.385		7.135

Description	
T.P. 5	Nail
T.P. 6	Nail
T.P. 7	Nail
T.P. 8	Nail

Sta	B.S.	H.I	F.S.	Elev	ADT
	5.065				
	4.03	780.317		776.287	
	3.00				
			10.665		
T.P. 9			9.59	770.727	
			8.52		
	4.22				
	3.33	774.057			
	2.44				
			8.545		
T.P. 10			7.665	766.392	
			8.785		
	8.335				
	7.485	773.877			
	6.63				
			7.61		
T.P. 11			6.75	767.127	
			6.89		
	4.825				
	3.625	770.752			
	2.425				
			8.43		
CK-IN			6.78	763.972	0.042
			5.13		Low
	18.47		30.785		12.315

Description

T.P. 9	Nail
T.P. 10	Nail
T.P. 11	Nail
B.M. N285	764.014

(25)

Sept 26 1991  
Job # 1135B  
P.C. B. JAVIS  
Pd R. Dudley

Level Run for  
Gila Bend Flood Plane

From B.M. "N354" To

Sta	B.S	H.I.	F.S.	Elev
	3.205			
	2.21	861.828		859.618
	1.21		7.565	
T.P. #1			6.55	855.278
			5.54	
	6.19			
	5.48	860.758		
	4.77			
TEST PANEL L.			5.88	
			5.155	855.603
			4.43	
	4.34			
	3.305	858.908		
	2.27			
T.P. 2			7.395	
			6.345	852.563
			5.29	
	9.25			
	8.10	860.663		
	6.945			
T.P. 3			8.565	
			7.37	853.293
			6.183	
	19.095			
			25.42	
				6.325

DESCRIPTION  
 B.M. # N 354 - 3.0 mile Southeast on Hwy 84 from  
 the Junction of U.S. Hwy 80 1.0 miles east of Gile Bend,  
 94' Southeast of a metal Witness Post with Sign 2.1'  
 2.1' N-E of Fence Set in a Conc. Post. About 8" above G.  
 T.P. #1 Nail

Test. Panel "L"

T.P. 2 Nail

T.P. # 3 Nail

Sta	B.S.	I.I.	F.S.	Elev
	5.41			
	4.46	857.253		853.293
	3.51			
			3.71	
T.P. 4			2.76	854.993
			1.81	
	8.29			
	7.10	862.093		
	5.91			
			3.825	
TEST Pan M			3.06	859.033
			2.295	
	3.47			
	2.775	861.808		
	2.08			
			6.173	
T.P. 5			6.03	855.778
			5.33	
	8.63			
	7.55	863.328		
	6.465			
			6.645	
T.P. # 6			5.52	857.808
			4.39	
	2.985			
			17.37	
				4.515

Description

T.P. # 4 Nail

TEST PANEL "M"

T.P. # 5 Nail

T.P. # 6

Sta	B.S.	H. I.	F.S.	Elcv	Description
	7.555				
	6.300	864.108		857.808	
	5.040				
			4.92		
T.P. 7			3.64	860.468	Nail
			2.35		
	9.065				
	7.76	868.228			
	6.96				
			7.47		
A.P. J-13			5.55	862.678	A. Panel J-13 TGS. R/W S/W
			3.63		Cor Sec 10. 7/16 Pipe.
	4.61				
	3.69	866.368	3.87	862.498	S.S. Not Ground @ J-13
	2.76				
			8.48		
T.P. 8			7.53	858.838	T.P. 8 Spike nail
			6.58		
	4.59				
	3.59	862.428			
	2.59				
			7.87		
T.P. 9			6.88	855.548	
			5.89		
	21.34				
			23.60		
				2.26	

Sta.	B.S.	H.I.	F.S.	Elev.	Description
	4.505				
	3.55	859.098		855.548	
	2.60				
			6.70		
T.P. 10			5.725	853.373	T.P. 10
			4.75		
	5.63				
	4.60	859.973			
	3.56				
			8.655		
T.P. 11			7.61	850.363	T.P. 11
			6.57		
	3.88				
	2.90	853.163			
	1.72				
			8.43		
T.P. 12			7.34	845.823	T.P. 12
			6.25		
	4.185				
	3.265	849.088			
	2.34				
			7.945		
T.P. 13			6.995	842.093	T.P. 13
			6.04		
	14.215				
			29.67		
				13.455	

Sta	B.S.	H.I	F.S.	Elev
	6.89			
	5.52	847.613		842.093
	4.15			
			6.22	
T.P. 14			4.92	842.693
			3.62	
	5.65			
	4.72	847.412		
	3.79			
			6.05	
T.P. 15			5.105	842.308
			4.165	
	4.53			
	3.52	845.928		
	2.51			
			6.98	
T.P. 16			5.955	839.873
			4.94	
	5.19			
	4.40	844.273		
	3.61			
			7.64	
T.P. 17			6.845	837.428
			6.05	
	18.16			
			22.825	
				4.665

Description

T.P. 14 Nail

T.P. 15 Nail

T.P. 16 Nail

T.P. 17 Nail

Sta	B.S.	I.F.	F.S.	Elev
	5.27			
	4.40	841.828		837.428
	3.53			
			7.965	
T.P. 18			7.09	834.238
			6.22	
	5.26			
	4.09	838.828		
	2.925			
			10.97	
T.P. 19			9.82	829.008
			8.67	
	4.585			
	3.71	832.718		
	2.84			
			7.71	
T.P. 20			6.85	825.868
			6.00	
	7.11			
	6.045	831.913		
	4.98			
			5.925	
T.P. 21			4.83	827.083
			3.745	
	18.245			
			28.59	
				10.345

Description
T.P. # 18
Nail
T.P. 19
Nail
T.P. 20
Nail
T.P. 21
Nail

Sta	B.S.	H.I.	F.S.	Elev
	5.285			
	4.965	832.048		827.083
	4.64			
			5.29	
B.M.			5.025	827.023
			4.76	
	4.425			
	3.345	830.368		
	2.27			
			9.31	
T.P. 22			8.185	822.183
			7.065	
	7.07			
	6.165	828.348		
	5.26			
			6.245	
T.P. 23			5.32	823.028
			4.40	
	5.965			
	4.67	827.698		
	3.38			
			6.60	
T.P. 24			5.305	822.393
			4.01	
	19.145			
			23.835	
				4.69

Description				
B.M.	B.C.	Sec. Cor.	S/E Cor	Sec 8
T.P. 22				Nail
T.P. 23				Nail
T.P. 24				Nail

Description

Sta	B.S.	I.I	F.S	Elev
	5.085			
	3.745	826.138		822.393
	2.405			
			7.88	
T.P. 25			6.59	819.548
			5.30	
	6.20			
	5.25	824.798		
	4.30			
			6.84	
T.P. 26			5.87	818.928
			4.90	
	5.23			
	4.77	823.638		
	4.19			
			7.94	
T.P. 27			7.39	816.248
			6.85	
	5.67			
	4.865	821.113		
	4.06			
			9.085	
A.P. 5-7			8.03	813.083
			6.98	
	18.57			
			27.88	
				9.31

T.P. 25 Nail

T.P. 26 Nail

T.P. 27 Nail

A.P. 5-7

Sta	B.S.	H.I.	F.S.	Elev	ADS
	7.78				
	6.00	819.083		813.083	
	4.21				
			8.88		
T.P. 28			7.10	811.983	
			5.32		
	4.87				
	3.37	815.353			
	1.87				
			8.985		
T.P. 29			7.51	807.843	
			6.025		
	8.065				
	6.545	814.388			
	5.025				
			8.625		
T.P. 30			7.125	807.623	
			5.625		
	6.065				
	4.10	811.963			
	3.33				
			6.84		
T.P. 31			5.27	806.693	
			3.71		
	20.615		27.005		6.39

Description
T.P. 28 Spike Nail
T.P. 29 Spike Nail
T.P. 30 Spike Nail
T.P. 31 B.C. N.E. COR Sec 18

STA.	B.S.	H.I.	F.S.	Elev	ADJ	Description
	6.38					
	4.88	811.573		806.693		
	3.38					
			13.17			
Z T.P. # 32			11.70	799.873		T.P. # 32 Spike Nail
			10.23			
	10.64					
	9.42	809.293				
	8.20					
			6.15			
			4.94	809.353		T.P. 33 " "
			3.73			
	5.608					
	5.03	809.383				
	4.45					
			5.57			
			5.09	804.293	804.277	T.B.M. # 2 USGS B.C. R-60
			4.605		.016 high.	Elev = 804.277
	5.49					
	4.79	809.083				
	4.085					
			9.00			
			8.265	800.818		T.P. # 34 Spike Nail
			7.54			
	24.12					
			29.995			
					5.875	

STA.	B.S.	H.I.	F.S.	Elev	ADJ	Description
	7.87					
	6.52	807.338		800.818		
	5.16					
			10.00			
T.P. #35			8.61	798.728		T.P. #35
			7.23			SPIKE nail
	9.47					
	8.30	801.028				
	7.13					
			6.93			
T.P. #36			5.79	801.238		T.P. #36
			4.66			" "
	6.02					
	5.07	806.308				
	4.11					
			8.04			
T.P. #37			7.07	799.238		T.P. #37
			6.10			" "
	6.30					
	5.13	804.368				
	3.97					
			7.98			
T.P. #38			6.80	797.568		T.P. #38
			5.60			" "
	25.02					
			28.27			
					3.25	

STA.	B.S.	H.I.	F.S.	Elev	ADJ	Descriptions
	7.985					
	6.88	804.448		797.564		
	5.77					
			7.22			
T.P. #39			6.10	798.348		T.P. #39 Spike Nail
			4.99			
	6.46					
	5.485	803.833				
	4.57					
			6.39			
T.P. 40			5.53	798.303		T.P. 40 " "
			4.68			
	6.98					
	5.975	804.278				
	4.97					
			7.86			
T.P. 41			6.865	797.413		T.P. 41 " "
			5.87			
	4.65					
	3.77	801.183				
	2.89					
			6.77			
			5.91	795.273		T.P. 42 " "
			5.06			
	22.11		24.405		2.295	

STA	B.S.	H.I.	F.S.	Elev	ADJ	Description
	5.40					
	4.72	799.993		795.273		
	4.045					
			4.225			
A.P. J-1			3.69	796.303		A.P. J-1
			3.15			SAKE Nail
	3.965					
	3.43	799.733				
	2.90					
			4.45			
CK-IN			4.025	795.708	.034	CK-IN B.C. N-298 U.S.G.S.
			3.60		high.	Elev 795.674
S.S.			4.76	794.973		Nat. Ground @ B.M. N-298

Pg 39  
Blank

(40)

Sept. 27 1991

Job # 11358

P.C. B. Davis

Rd R. Dudley

Level Run for  
Silo Flood Plane

From B.M. J-331 To Panel E-21  
Back - To J-331

Sta	B.S.	H. I	F.S.	Elev	ADS
	4.39				
	3.11	768.555		765.445	
	1.83		8.42		
T.P. 1			7.11	761.445	
			5.80		
	4.985				
	3.75	765.195			
	2.525		8.41		
T.P. 2			7.17	758.025	
			5.92		
	6.55				
	5.48	763.505			
	4.41		6.50		
T.P. 3			5.45	758.055	
			4.40		
	6.265				
	5.06	763.115			
	3.865		10.84		
T.P. 4			9.61	753.505	
			8.38		
	17.40		29.34		11.91

Description  
 B.M. "J-331" 1.8 miles so. along state Hwy 85  
 From The S.P. Co. Railroad station @ Gila Bend 2 Poles  
 So. of Tucson, Cornelia's Gila Bend Railroad  
 mile pole 2. at a dip in the Hwy 195.5 N.W. of The  
 N.W. corner of Railroad Bridge 21. 95.4' west of  
 The west rail of The Track 46' east of The E  
 of the Hwy.

T.P. # 1                      SPIKE Nail

T.P. # 2                      SPIKE Nail

T.P. # 3                      " "

T.P. # 4                      " "

Sta	B.S.	H.I.	F.S.	Elev
	8.54			
	6.965	760.470		753.505
	5.39			
			5.11	
A.P. E-21			3.855	756.615
			2.60	
	5.245			
	3.99	760.605		
	2.74			
			8.68	
T.P. 5			7.10	753.505
			5.52	
	10.65			
	9.48	762.985		
	8.305			
			6.19	
T.P. 6			4.93	758.055
			3.68	
	6.19			
	5.02	763.075		
	3.85			
			6.01	
T.P. 7			5.05	758.025
			4.10	
	25.455			
			20.935	
				4.52

Description

Aired PUNCH "E-21"

T.P. 5 Nail

T.P. 6 Nail

T.P. 7 Nail

Sta.	B.S.	I.I.	F.S.	Elev
I	2.025			
	6.965	764.990		758.025
	5.91			
			4.985	
I			3.56	761.430
			2.14	
	8.60			
	7.26	768.690		
	5.92			
			4.53	
			3.26	765.430
			1.99	

.015  
LOW

Description	
T.P. #8	SPICE Nail
CK-IN	B.M. J-331

(44)

10-1-91  
Job # 11358  
P.C. B. Davis  
R& R. Dudley

Gila Bend  
Flood Plane -

Level Run  
From A-84 TO BM Gila

Sta	B.S.	H.I.	F.S.	elev	ADS
I	4.91				
	3.41	809.967		806.557	
	2.12				
			3.87		
I T.P. 1			2.63	807.337	
			1.40		
	9.27				
	8.15	815.487			
	7.04				
			4.27		
I T.P. # 2			3.08	812.407	
			1.89		
	9.33				
	7.885	820.292			
	6.44				
			5.00		
I T.P. # 3			3.55	816.742	
			2.08		
	7.06				
	5.58	822.322			
	4.09				
			5.045		
I T.P. 4			3.61	818.712	
			2.17		
	25.025		12.87		12.155

Description

B.M. A-84 "Ref Book 142  
PAGE 68 Elev 806.557

T.P. # 1 SPIKE Nail

T.P. # 2 " "

T.P. 3 SPIKE Nail

T.P. 4 " "

STA	B.S.	H.I	F.S	Elev	Description
	4.95				
	3.74	822.452		818.712	
	2.53				
			6.85		
T.P. 5			5.65	816.802	T.P. 5 Spike Nail
			4.45		
	6.87				
	5.75	822.552			
	4.63				
			11.79		
T.P. 6			10.68	811.872	T.P. 6 " "
			9.57		
	14.44				
	12.99	824.862			
	11.54				
			2.37		
CK-IN			5.64	819.222	CK-IN B.M. Giant Elev = 819.244
			3.94	819.244	
				.022	
				Low.	
S.S.			5.91	818.952	Nat. Gr.

(47)

10-2-91  
Job # 11358  
P.C. B. Davis  
Rd R. Dudley

Level Run for  
"Gila Bend Flood Control"

From B.M. 17-298 To  
To B.M. L-354

STA	B.S.	H.I.	F.S.	Elev	ADJ	Description
	4.505					B.C. M-298 " USGS B.C. 0.3 miles So. Along
	3.76	770.655		766.895		State Hwy 85 from the Southern Pacific R.R.
	3.005					Station @ Gib Bend, thence 0.7 miles So Along
S.S.			4.34	766.315	NAT GROUND - @ B.M.	A Graded Cd. on a small barrow path 59' So of
			6.56			The E of the Rd. 2.4 North of a witness
T.P. # 1			5.805	764.850		Post. About .50' Above G.I. Elev = 766.895
			5.05			
	8.29					T.P. # 1 Spike Nail
	7.385	772.235				
	6.49					
			5.685			
T.P. 2			4.85	767.385		T.P. 2 Spike Nail
			4.005			
	6.79					
	5.98	773.365				
	5.17					
			5.58			
T.P. 3			4.78	768.585		T.P. 3 Spike Nail
			3.98			
	7.07					
	6.21	774.795				
	5.36					
			5.13			
T.P. 4			4.36	770.435		T.P. 4 Spike Nail
			3.59			
	23.335		19.195			
					3.59	

Sta- B.S. H. I. F.S. Elev ADJ

Description

7.77  
6.82 777.255 770.435  
5.86

A.P. E-2

5.40  
4.18 773.075  
2.95

A.P. E-2

6.30  
5.22 778.295  
4.14

T.P. 5

8.35  
7.25 771.045  
6.15

T.P. 5

Spike Nail

6.19  
4.58 775.625  
2.98

T.P. 6

7.30  
6.02 769.605  
4.74

T.P. # 6

Spike Nail

6.185  
5.275 774.880  
4.37

T.P. 7

6.53  
5.685 769.195  
4.84

T.P. 7

Spike Nail

21.895

23.135

1.24

Sta.	B.S.	H.I.	F.S.	Elev	ADS
	6.18				
	5.25	774.445		769.195	
	4.33				
			6.565	768.875	
T.P. #8			5.57		
			4.585		
	5.62				
	5.00	773.875			
	4.38				
			7.045		
T.P. #9			6.45	767.425	
			5.85		
	5.40				
	4.65	772.075			
	3.90				
			6.825		
CK-IN			6.17	765.905	.038
			5.52		LOW
			6.55	765.525	

(50)

Description

T.P. #8 Spike Nail

T.P. #9 Spike Nail

CK-IN B.M L-354 G.I.O. Elev = 765.943

Nat. Ground-

(57)

10-3-91

Job # 11358

P.C. B. Davis

Rd R. Dudley

" Gila Bend Flood Flow -  
Level Run -

From Giant To A.P. E-7  
Back To Giant.



Sta	B.S.	H.I.	F.S.	Elev	#DS	Description
	4.42					
	2.95	805.979		803.029		
	1.50					
			2.085			
T.P. #5			5.71	800.269		T.P. #5 Spike Nail
			4.33			
	5.79					
	4.635	804.904				
	3.48					
			8.23			
T.P. 6			7.11	797.794		T.P. 6 Spike Nail
			6.00			
	6.11					
	4.95	802.744				
	3.80					
			8.71			
T.P. 7			7.52	795.224		T.P. 7 Spike Nail
			6.32			
	3.71					
	2.465	797.689				
	1.22					
A.P.			6.08			
			4.76	792.929		A.P. E-7 B.C. N 1/4 Sec. 8
			3.44			
S.S.			5.25	792.439		S.S. Nat Ground
	5.00		25.10		10.10	

54

Sta	B.S.	H.I	F.S.	Elev	Description	
	5.89					
	4.58	797.569		792.929		
	3.26					
			3.52			
T.P. 8			2.28	795.229	T.P. 8	SPike Nail
			1.03			
	8.61					
	7.41	802.639				
	6.21					
			5.99			
T.P. 9			4.84	797.799	T.P. 9	SPike Nail
			3.70			
	8.21					
	7.09	804.889				
	5.97					
			5.765			
T.P. 10			4.61	800.279	T.P. 10	" "
			3.46			
	7.08					
	5.70	805.979				
	4.32					
			4.41			
T.P. 11			2.95	803.029	T.P. 11	SPike Nail
			1.485			
	24.78					
			14.68			
				10.10		

Sta	B.S.	H.I.	F.S.	Elev
	8.36			
	2.05	810.079		803.029
	5.75			
			3.34	
T.P. 12			2.04	808.039
			0.74	
	9.04			
	7.72	815.759		
	6.40			
			4.92	
T.P. 13			3.69	812.069
			2.46	
	8.28			
	7.25	819.319		
	6.22			
			4.865	
T.P. 13			3.665	815.654
			2.465	
	9.125			
	7.94	823.594		
	6.75			
			5.225	
CK-IN			4.35	819.244
			3.47	

Description		
T.P. #12	Spike Nail	3
T.P. 13	Spike Nail	2
T.P. 13	" "	1
CK-IN	B.M. Giant	
819.244		

(56)

10-3-91

Job # 1135B

PC. B. Davis

Rd. R. Dudley

Gila Bend Flood Plane  
Approx 5.5 mile Run on  
South Side of Canal "T. Harris"

Sta	B.S.	H.I	F.S.	Elev	ADS
	6.845				
	6.03	728.452		722.422	
	5.225				
T.P. 1			6.75		
			6.025	722.429	
			5.30		
	13.95				
	12.43	734.857			
	10.92				
T.P. 2			3.63		
			2.445	732.412	
			1.26		
	11.06				
	10.05	742.462			
	9.04				
T.P. 3			4.63		
			3.62	738.842	
			2.61		
	8.41				
	7.37	746.212			
	6.34				
T.P. * 4			5.985		
			4.965	741.249	
			3.94		
	35.88				
			17.055		
				18.825	

Description

B. M. AIRC3/ Pond A-21 Top of Bolt, Elev = 722.422 Ref. Page 5 Book 142 ✓

T.P. # 1 Spike Nail

T.P. 2 Spike Nail

T.P. 3 Spike Nail

T.P. 4 Spike Nail

(58)

Sta	B.S.	H.I.	F.S.	Elev
	9.20			
	7.25	748.497		741.247
	5.29			
T.P. #5			6.72	
			5.52	742.917
			4.32	
	6.285			
225.5	5.155	748.132		
	4.03			
T.P. 6			6.25	
			5.13	743.002
			4.02	
	6.665			
251.5	5.405	748.407		
	4.15			
T.P. 7			6.89	
			5.62	742.787
			4.35	
	6.73			
231	5.58	748.367		
	4.42			
T.P. 8			6.665	
			5.51	742.857
			4.36	
	23.39			
		21.78		
			1.61	

Description

\* 1  
 T.P. #5 Spike Nail & So Side Cannel  
 285.5' West of E Hwy 85-

T.P. #4 Spike Nail 734'  
 West of E Hwy 85

T.P. #7 254'  
 Spike Nail  
 1,239.00 West of E 85-

T.P. #8 230.5'  
 " "  
 1,701.00 West of E 85

Sta	B.S.	H.I.	F.S.	Elev
	6.58			
	286' 5.40	748.257		742.857
	4.22			
T.P. # 9			6.89	
			5.725	742.532
			4.56	
	288' 6.96			
	5.55	748.082		
	4.14			
T.P. # 10			7.04	
			5.60	742.482
			4.15	
	320' 7.20			
	5.60	748.082		
	4.00			
T.P. # 11			7.20	
			5.59	742.492
			3.98	
	326' 7.55			
	5.92	748.412		
	4.29			
T.P. # 12			7.33	
			5.74	742.672
			4.15	
	22.47			
			22.655	
			0.185	

Description

T.P. 9      233'  
2190.00 west of Spike Nail of # 85

T.P. 10      289'  
2741.00 west of " " of # 85

T.P. # 11      322'  
3383.00 west of Spike Nail of # 85

T.P. 12      318'  
4027 west of " " of # 85

Sta.	B.S.	H.I.	F.S.	Elev
	7.31			
	303			
	5.79	748.462		742.672
	4.28			
			7.10	
T.P. #13			5.62	742.842
			4.14	
	318'			
	6.82			
	5.225	748.067		
	3.64			
			7.20	
T.P. #14			5.52	742.547
			3.84	
	325'			
	7.69			
	6.06	748.607		
	4.44			
			7.30	
T.P. #15			5.68	742.927
			4.06	
	214			
	6.38			
	5.31	748.237		
	4.24			
			6.10	
T.B.M. #1			5.72	742.517
			5.34	
			22.54	
	22.385			

DESCRIPTION

T.P. #13 <sup>296'</sup> Spike Nail  
4626 West of E 85

T.P. #14 <sup>336</sup> Spike Nail  
5280 West of E 85

T.P. #15 <sup>324</sup> Spike Nail  
5929 West of E 85

T.B.M. #1 <sup>76'</sup> ORANGE SPRAY PAINT with  
Black Marker located @ N-West End  
of Structure 6,219.00 West of E 85

0.155

Sta	B.S.	I.F.	F.S.	Elev	ADS
	7.27				
292,	5.91	748.427		742.517	
	4.55				
			7.09		
T.P. 16			5.72	742.707	
			4.34		
	6.26				
126	5.625	748.332			
	5.00				
			6.525		
T.P. 17			5.70	742.632	
			5.07		
S.S. A			11.60	736.732	
	6.40				
249	5.15	747.782			
	3.91				
			6.705		
T.P. 18			5.46	742.322	
			4.22		
	6.73				
238	5.48	747.802			
	4.23				
			5.89		
T.P. 19			4.67	743.132	
			3.45		
			21.55		
	22.165				
					0.615

Description

T.P. # 16 Spike Nail  
547' west of CP-11.

T.P. # 17 Spike Nail  
198.5' west of CP-11  
SS. A = Nat. Ge. @ V Ditch So of Channel

T.P. # 18 Spike Nail  
1296.00' west of CP-11

T.P. # 19 Spike Nail  
1290.00' west of CP-11

Sta	B.S.	H.I.	F.S.	Elev	ADS
	5.95				
	245 4.73	747.862		743.132	
	3.50				
			7.30		
T.P. 20			6.08	741.782	
			4.86		
SS. B			12.2	735.662	
	6.69				
	250 5.41	747.192			
	4.14				
			6.75		
T.P. 21			5.48	741.712	
			4.20		
	6.565				
	258 5.27	746.982			
	3.985				
			6.945		
T.P. 22			5.67	741.312	
			4.405		
	6.52				
	146 5.79	747.102			
	5.06				
			6.53		
T.P. 23			5.79	741.312	
			5.06		
	21.20		23.02		1.82

Description

T.P. 20 Spike Nail  
2279.00' west of CP-11  
S.S. "B" Nat. Gr. E Ditch So of Channel

T.P. 21 Spike Nail  
2789' west of CP-11

T.P. 22 Spike Nail  
3301.00' west of CP-11

T.P. # 23 Spike Nail  
3594.00 west of CP-11

Sta	B.S.	H.I.	F.S.	Elev
	6.86			
189	5.92	747.232		741.312
	4.99			
SS. "C"			12.35	
			6.53	
T.P. 24			5.59	741.642
			4.65	
	6.90			
223.5	5.785	747.427		
	4.665			
			6.38	
T.P. 25			5.24	742.187
			4.10	
	6.54			
256	5.26	747.447		
	3.98			
			6.85	
T.P. 26			5.565	741.882
			4.28	
SS "D"			14.3	
	16.965			
		16.395		
			0.57	

Description

SS. "C" E V Ditch South of Canal

T.P. #24 Spike Nail  
3969.00' west of CP-11

T.P. #25 Spike Nail  
4420.5' west of CP-11

T.P. 26 Spike Nail  
4933.50' west of CP-11  
SS. D E V Ditch So of Canal  
212' So of E DIRT Rd of Canal

(64)

Sta	B.S.	H.F.	F.S.	Eleu	RDS
	7.25				
302	5.74	747.622		741.882	
	4.23				
			7.24		
T.P. # 27			5.72	741.902	
			4.20		
	6.80				
263	5.48	747.382			
	4.17				
			4.87		
T.P. # 28			3.61	743.772	
			2.35		
	5.52				
277	4.43	748.202			
	3.35				
			15.94		
T.B.M. 2			15.09	733.132	
			14.20		
	15.72				
224	14.60	747.732			
	13.48				
			7.14		
T.P. 29			6.00	741.732	
			4.87		
	30.25				
			30.40		
					0.15

Description

T.P. # 27 Spike Nail  
5539.00' west of CP 11

T.P. # 28 Spike Nail  
6054.00 west of CP-11

T.B.M. # 2 Florescent ORANGE Point  
with P.K. Nail @ N. West End  
of  $\Phi$  wash about 6' above wash.  
6097.50' west of CP-11. CP-36

T.P. # 29 Spike Nail  
451' west of CP-36

STA.	B.S.	H.I.	F.S.	ELEV	ADS
	6.67				
235	5.50	747.232		741.232	
	4.32				
			7.17		
T T.P. # 30			6.00	741.232	
			4.84		
	6.45				
272	5.085	746.317	.		
	3.73				
SS. "E"			12.20	734.117	
			6.67		
T.P. 31			5.30	741.017	
			3.94		
	7.165				
240.5	5.96	746.977			
	4.76				
			6.61		
T.P. 32			5.40	741.577	
			4.20		
	7.08				
265	5.75	747.327			
	4.43				
			6.86		
T.P. 33			5.55	741.777	
			4.24		
	22.295		22.25		

.045

DESCRIPTION

233 T.P. # 30 SPIKE Nail  
919' west of CP 36

232 S.S. "E" A Ditch So of Canal  
1191 West of CP-36

233 T.P. # 31 SPIKE Nail  
1464.00 West of CP-36

241 T.P. # 32 SPIKE Nail  
1995.50 West of CP-36

242 T.P. # 33 SPIKE Nail  
2472.50 West of CP-36

STA	B.S.	H.F.	F.S.	Elev	ADJ
	6.61				
206	5.58	747.357		741.777	
	4.55		6.465		
T.P. 34			5.435	741.922	
			4.41		
	6.98				
326	5.35	747.272			
	3.72				
S.S. "F"			11.15	736.122	
			7.12		
T.P. # 35			5.52	741.752	
			3.92		
	6.48				
149	5.485	747.237			
	4.49		6.485		
T.P. 36			5.50	741.737	
			4.515		
	6.69				
206	5.66	747.397			
	4.63				
			6.505		
T.P. 37			5.475	741.922	
			4.44		
	22.075		21.93		0.145

DESCRIPTION

205.50 T.P. # 34 spike nail  
2884.00 west of CP. - 36

S.S. "F" E of Ditch So of corner  
2884.00 west of CP. - 36.

320 T.P. # 35 spike nail  
3204.00 west of CP. - 36

197 T.P. # 36 spike nail  
3600.00 west of CP. - 36

206.5 T.P. 37 spike nail  
4012.50 west of CP. - 36

Sta	B.S.	H.I.	F.S.	Elev
	6.43			
204	5.41	747.332		741.922
	4.39			
			6.43	
T.P. #38			5.41	741.922
			4.40	
	6.07			
206	5.04	746.962		
	4.01			
			6.485	
T.P. #39			5.47	741.492
			4.45	
	6.44			
205	5.415	746.802		
	4.39			
			6.49	
T.P. 40			5.52	741.387
			4.55	
	6.44			
205.5	5.41	746.797		
	4.385			
S.S. "G"			12.90	733.897
			6.26	
T.P. 41			5.225	741.572
			4.19	
	21.275		21.625	0.35

Description	
203	T.P. #38 Spike Nail 4419.5' west of CP-36
203.5	T.P. #39 Spike Nail 4829.00 west of CP-36
194	T.P. 40 Spike Nail west of CP-36
207	S.S. "G" E & E of Ditch south of canal 5433.5' west of CP-36
	T.P. #41 5640.50 west of CP-36

(67)

Sta	B.S.	H.I	F.S.	Elev	Description
	6.71				
223.5	5.595	741.167		741.572	
	4.475				
			6.845		
T.P. # 42			5.75	741.417	219.50 T.P. 42
			4.65		6083.5' Spike Nail west of CP-36
	5.96				
207	4.925	746.342			
	3.89				
			6.28		
T.P. 43			5.275	741.067	220.5 T.P. # 43
			4.275		6491.00 Spike Nail west of CP-36
	6.43				
209.70	5.903	746.470			
	4.383				
			6.445		
T.P. 44			5.465	741.005	196 T.P. 44
			4.485		6891.70' Spike Nail west of CP-36
	6.50				
210	5.45	746.455			
	4.40				
			6.245		
T.P. 45			5.23	741.225	222.50 T.P. 45
			4.22		7304.20' Spike Nail west of CP-36
	21.373				
			21.72		
				0.347	

Sta	B.S.	M.I.	F.S.	Elev
201.5	6.01 5.062 3.995	746.227		741.225
T.P. 46			6.14 5.136 4.132	741.091
202.5	6.105 5.09 4.08	746.181		
T.P. 47			6.24 5.23 4.218	740.951
201.7	6.31 5.30 4.293	746.251		
T.P. 48			5.95 7.97 3.985	741.281
199	6.02 5.025 4.03	746.306		
T.P. 49			6.35 5.365 4.38	740.941
20.417				20.701

DESCRIPTION

200.80  
7670.50 TO E of CP 53  
T.P. # 46 SPIKE Nail  
36' west of CP 53  
El = 741.09 Nat GR. @ E CP-53

202.2  
T.P. 47 SPIKE Nail  
440.70 west of CP 53

76.5  
T.P. 49 SPIKE Nail  
838.90 west of CP. -53

CP  
T.P. 49 SPIKE Nail  
1234.90 west of CP. -53

STA	B.S.	H.I.	I.S.	Elev
	5.98			
120	5.38	746.321		740.947
	4.78			
			6.93	
T.B.M. #4			6.31	740.011
			5.69	
	6.915			
204.5	5.895	745.906		
	4.87			
			6.195	
T.P. 50			5.225	740.681
			4.255	
	6.43			
256	5.15	745.831		
	3.87			
			6.55	
T.P. # 51			5.29	740.541
			4.03	
	6.475			
259.5	5.18	745.721		
	3.88			
			6.55	
T.P. 52			5.28	740.441
			4.01	
	21.605			
			22.105	
				0.50

DESCRIPTION

124 chiseled x in S/west Head wall of  
1478.90 West of CP-53

194.0  
T.P. # 50 SPIKE Nail  
1877.40 West of CP-53

252  
T.P. # 51 SPIKE Nail

254  
T.P. 52 SPIKE Nail

Sta	B.S.	H.I.	F.S.	Elev
	6.69			
256	5.41	745.851		740.441
	4.13			
			6.35	
T.P. # 53			5.10	740.751
			3.85	
	6.48			
259	5.185	745.936		
	3.89			
			6.69	
T.P. 53			5.47	740.466
			4.25	
	6.435			
	5.16	745.626		
	3.88			
SIDE CH 7			5.83	
CP 52			5.275	740.351
			4.72	
			6.62	
TP. 54			5.44	740.186
			4.265	
	15.755		16.01	.255

Description
250 T.P. # 53 SPIKE Nail
244 T.P. 53 SPIKE Nail
S.S. @ Road @ CP 52
T.P. # 54 SPIKE Nail

Sta	B.S.	H.I.	F.S.	Elev
	258.5			
	6.39			
	5.10	745.284		740.186
	3.805			
			6.675	
T.P. 55			5.425	739.861
			4.175	
	254'			
	7.065			
	5.795	745.656		
	4.525			
			6.505	
T.P. # 56			5.30	740.356
			4.095	
	257'			
	6.625			
	5.34	745.696		
	4.06			
			6.62	
T.P. 57			5.38	740.316
			4.15	
	254			
	6.55			
	5.28	745.596		
	4.01			
			6.555	
TP. 58			5.365	740.231 ✓
			4.175	
	221.515		21A7	DIFF .045

Description
250 T.P. # 55 SPIKE Nail
241 T.P. # 56 SPIKE Nail
247 T.P. # 57 400 NAIL
238 TP # 58 400 NAIL

S. STA.	B.S.	H.I.	I.S.	EL&J.
54' TP. 58	6.66 5.37 4.125	745.651		740.231
TP. 59			6.63 5.415 4.20	40.006
250'	6.47 5.22 3.97	745.426		
TP. 60			6.51 5.14 3.77	740.236
251'	6.39 5.14 3.39	745.426		
TP. 61			6.645 5.385 4.125	740.041
54'	5.89 4.62 3.35	744.661		
TP. 62			6.20 4.935 3.67	739.726
	20.37			
			20.875	DIFF. .505

243'	TP. 59	400 NAIL
274'	TP. 60	400 NAIL
252'	TP. 61	400 NAIL
253'	TP. 62	400 NAIL



Sta	I.S.	H.I	F.S.	Elev
	6.89			
	5.35	744.881		739.531
	3.81			
T.P. 66			6.855	
			5.35	739.531
			3.875	
	6.82			
	5.315	744.846		
	3.815			
T.P. 67			6.72	
			5.22	739.626
			3.72	
	7.09			
	5.55	745.176		
	4.01			
T.P. 68			6.955	
			5.435	739.741
			3.915	
	7.35			
	5.81	745.581		
	4.03			
T.P. 69			6.43	
			4.93	740.651
			3.425	
	22.055		20.935	

Description

T.P. \* 66 Spike Nail

T.P. \* 67 Spike Nail

T.P. \* 68

1.12

Sta.	B.S.	I.I.	F.S.	Elev
	5.50			
	3.99	744.641		740.651
	2.48			
T.P. # 70			5.615	
			4.145	740.496
			3.67	
	7.73			
	6.20	746.696		
	4.50			
T.P. # 71			5.74	
			4.305	742.391
			2.71	
	8.32			
	6.80	749.191		
	5.28			
T.P. # 72			5.54	
			4.01	745.181
			2.475	
	8.085			
	6.58	757.761		
	5.07			
CK-IN			6.52	
			4.615	747.146
			2.73	

.011  
LOW

Description

T.P. # 70

Spike Nail

T.P. # 71

Spike Nail

T.P. # 72

Spike Nail

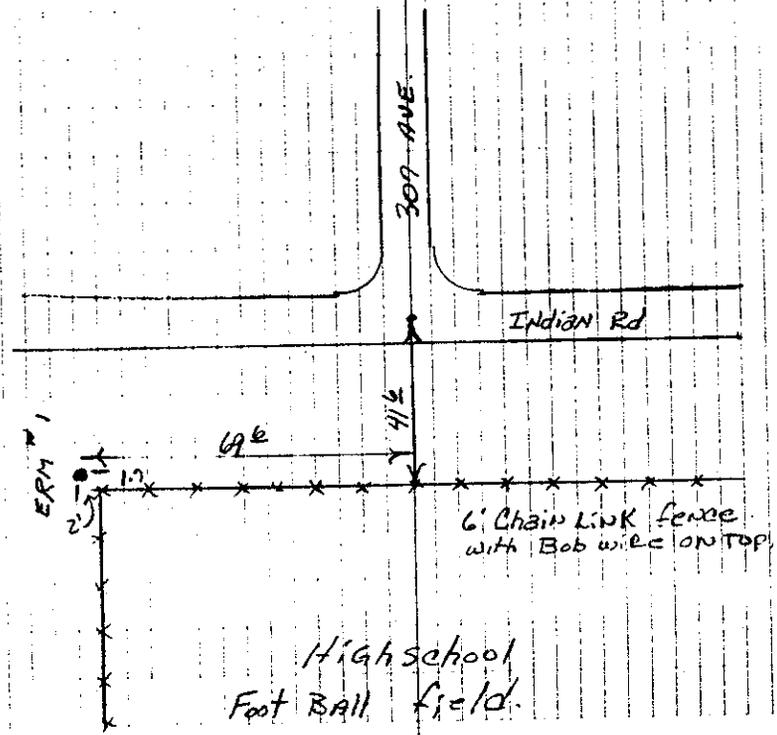
CK-IN B.M. SMURR E1 = 747.157

Sta.	B.S.	H.I.	F.S.	Elev	ADS
	6.26	722.547		716.287	
ERM.			4.658	717.889	
	4.45	722.342			
CK - BK			6.06	716.282	.005 Low.

DESCRIPTION  
 VERT I.D. "O" Ref Book 142 Page 24  
 ERM #1

VERT ID "O" Ref Book 142 Page 24

E.R.M. #1 is located 41.60 South of intersect  
 of 309 AVE & Indian Rd then 69.60 West.  
 Approx 2' x 2' N.W. of 6' chain link fence  
 Cor. Elev 717.892



(2)

Book # 144

Job # 11358

Topography of Structure  
Gita Bend M.C.F.C.D.

Date 10-9-91

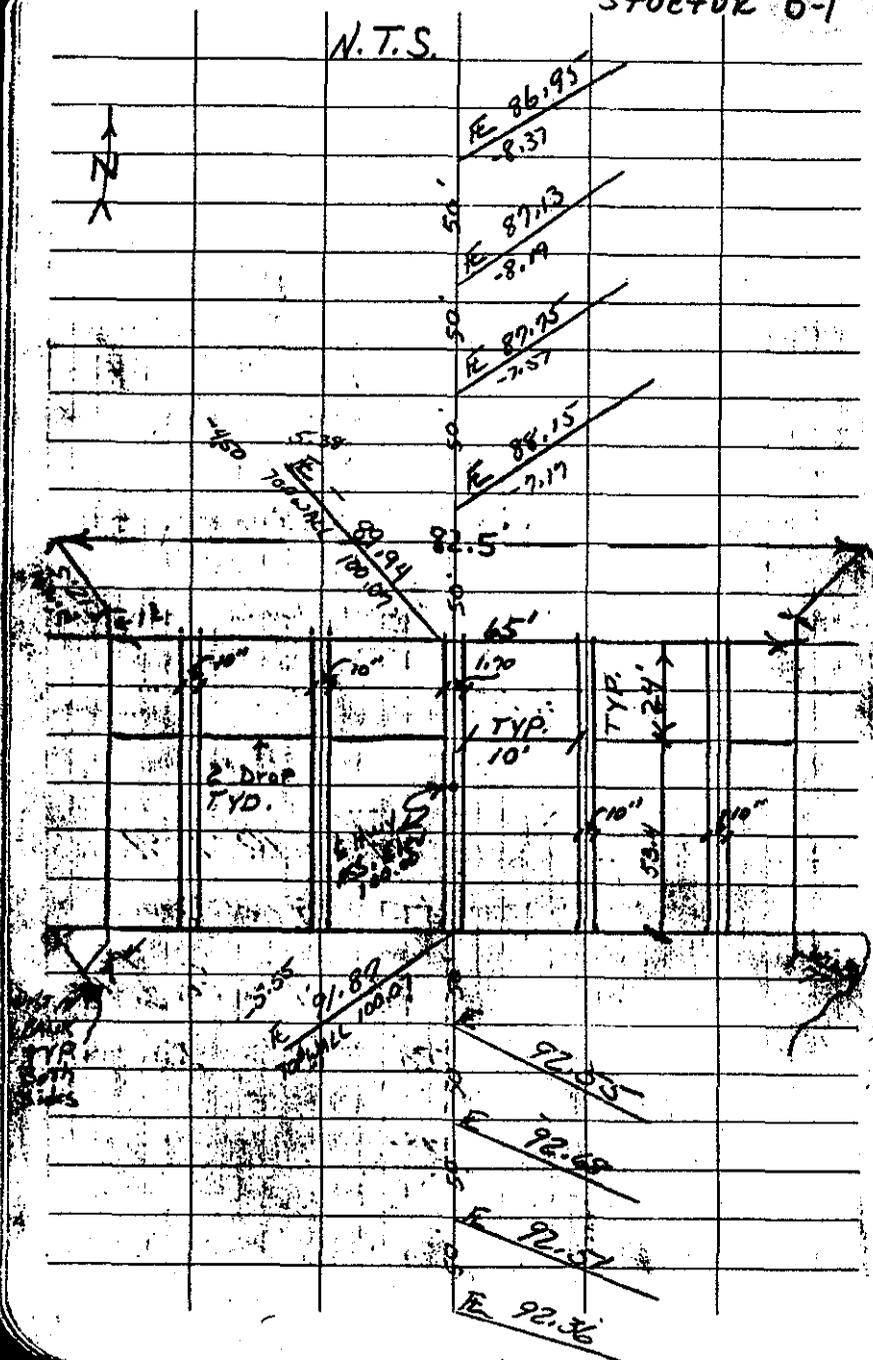
□ Brook Davis

K Steve Perham

Rd Willie Ingram

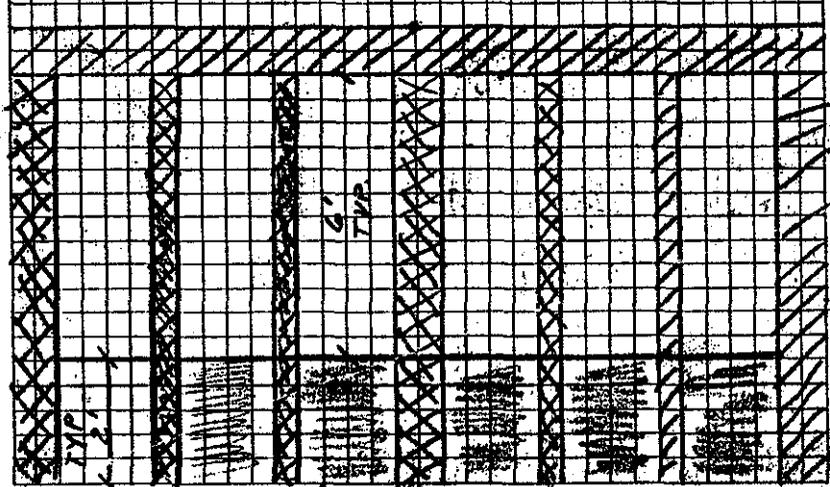
Structure B-1

N.T.S.

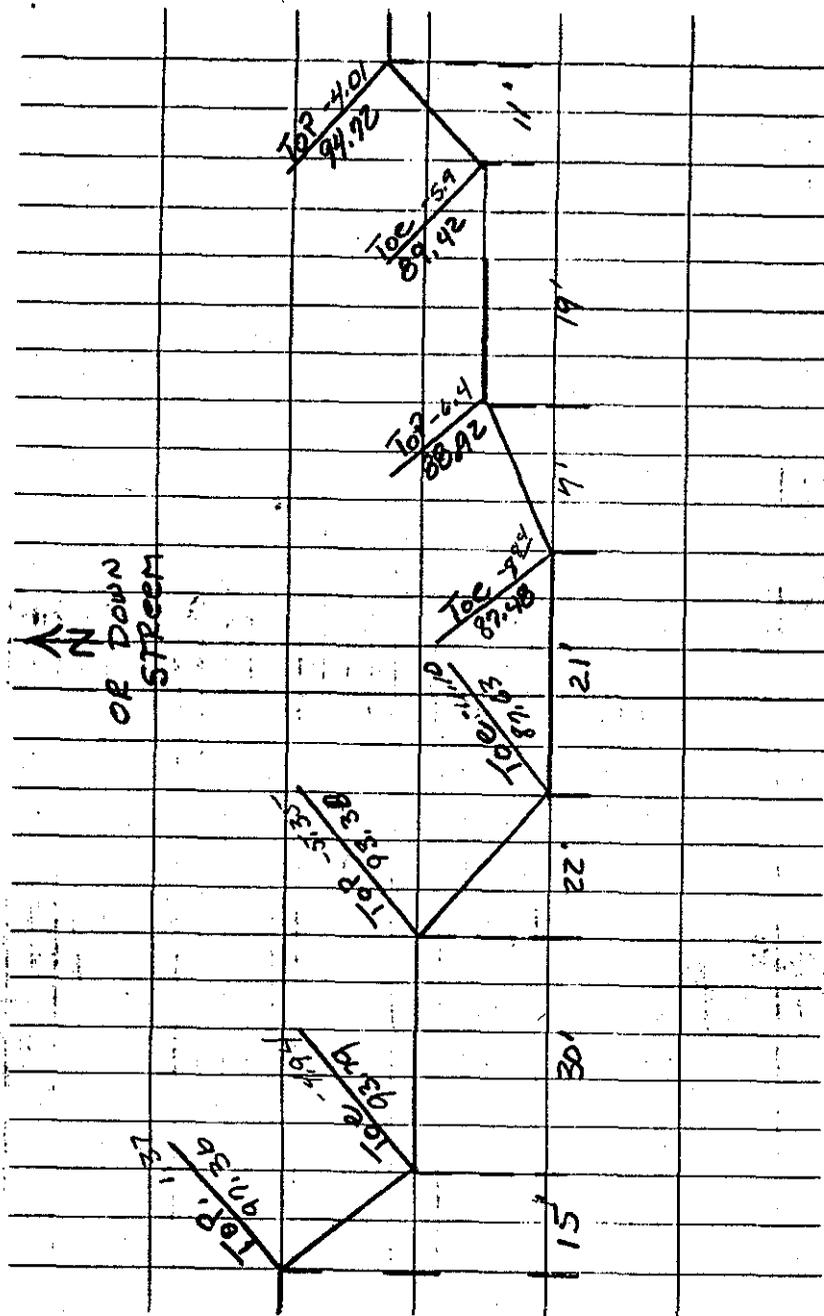


3

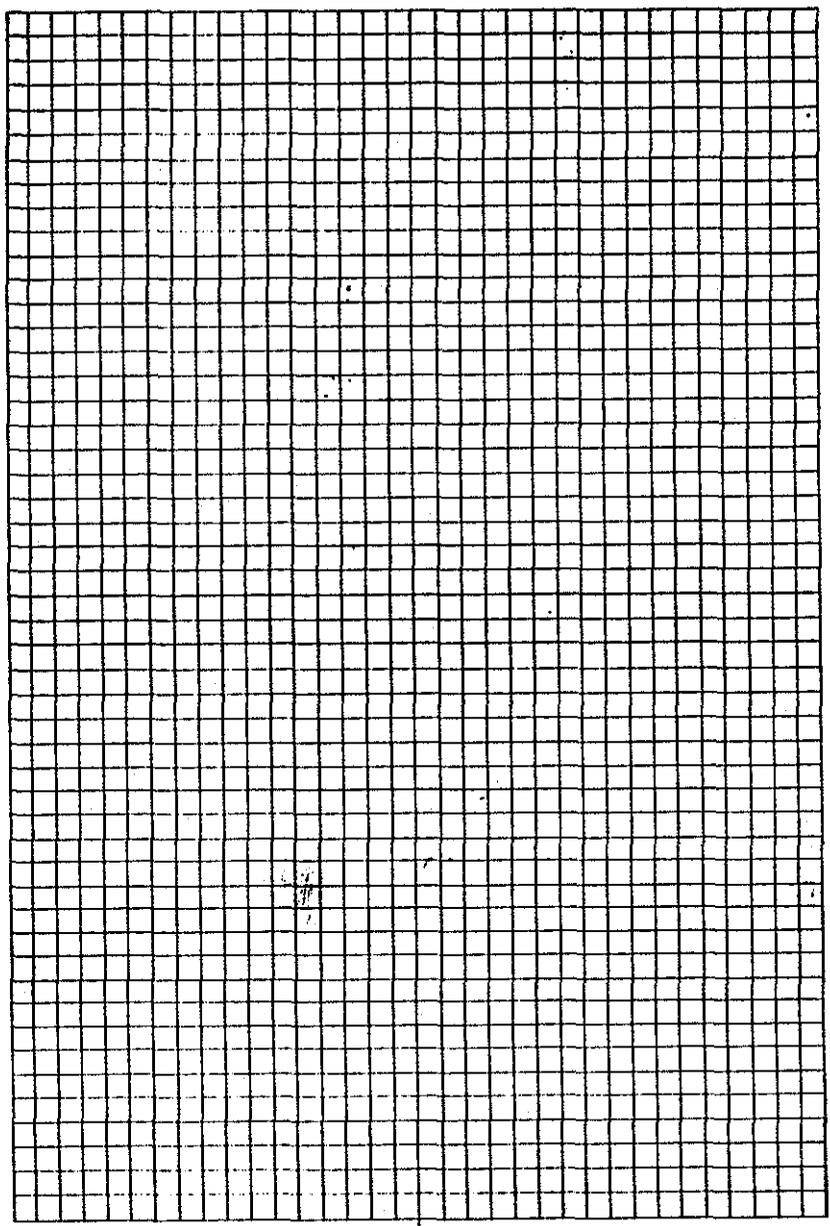
END VIEW LOOKING So.  
B-1



CONC. R

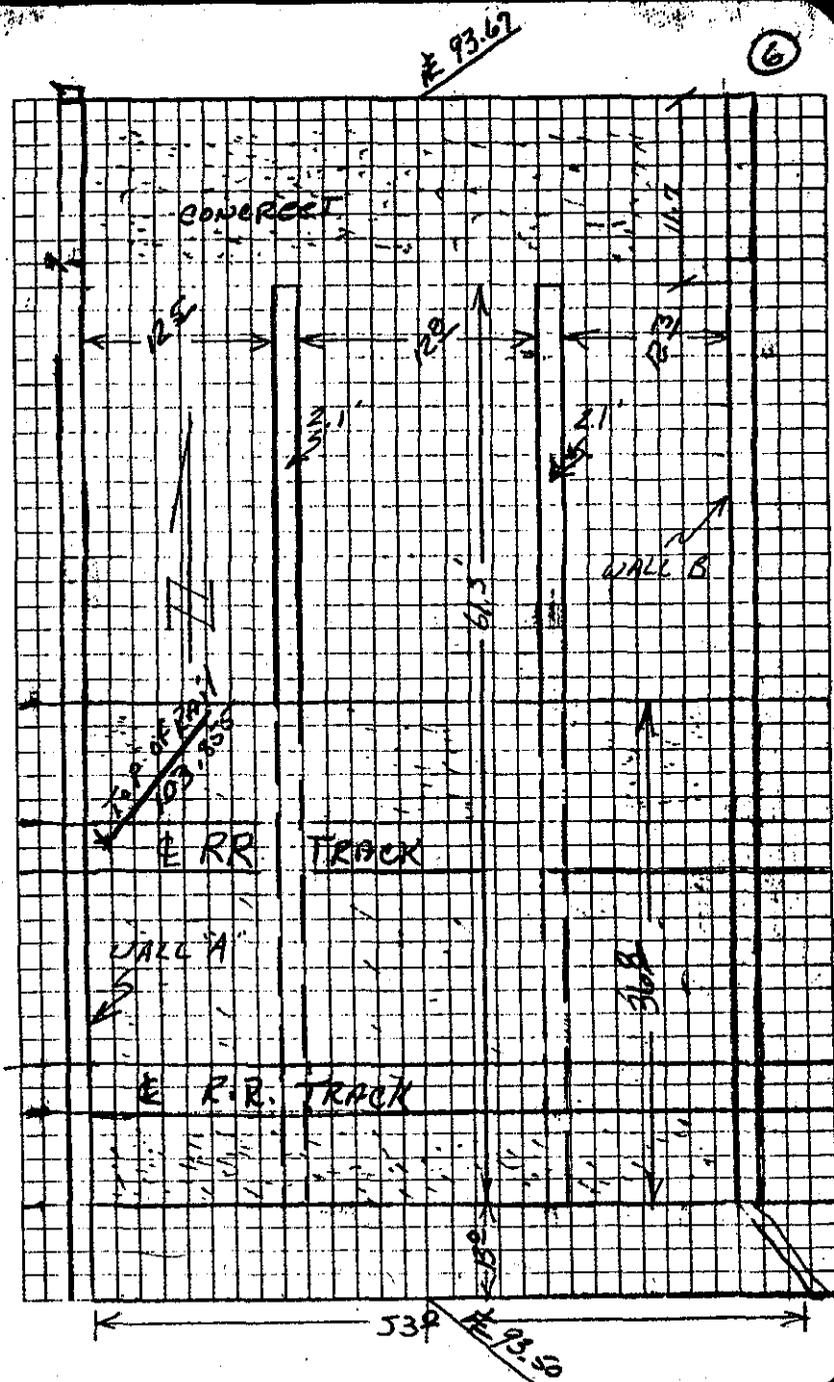


④



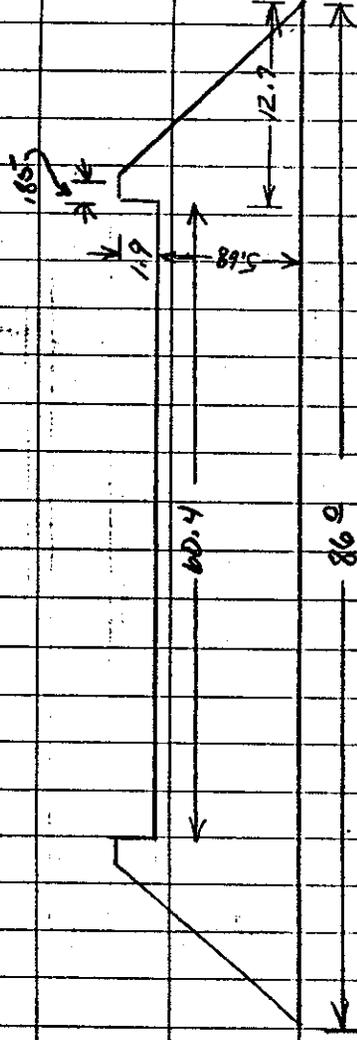


STRUCTURE TOPO  
FOR C-1

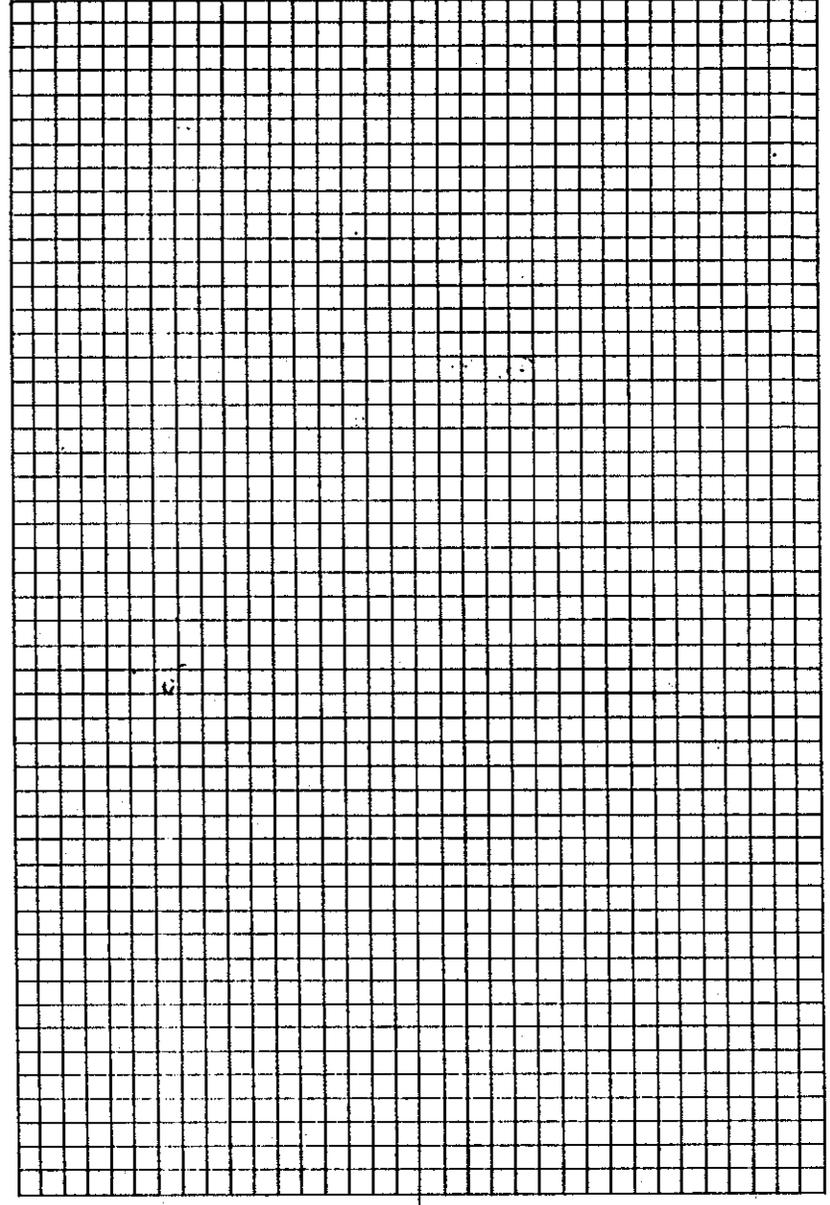


SIDE VIEW

WALL "A" & "B"



Center Concrete Columns ARE 1.35 Lower Than Wall A & B.  
" " " " 5.33 Tall



STA	B.S.	H.I.	F.S.	ELEV.	
	5.84	97.71		91.87	
0+50			4.74	92.97	
1+00			5.17	92.54	
1+50			5.43	92.28	
2+00			5.36	92.35	
T.P. 1			3.95	93.67	
	5.51	99.27			
			5.68	93.59	
0+50			5.31	93.96	
1+00			4.55	94.72	
1+50			4.73	94.54	
2+00			4.55	94.72	
T.P. 2			5.51	93.76	
	3.87	97.63			
CK-10			5.76	91.87	—
	11.31	104.98		93.67	
SS.			1.125	103.855	
CK-11			11.495	93.485	0.15 Low

Leaves for C-1

Description

8

* B.M.	FE STRUCTURE B-1	So END	ELEV	91.87
50'	North of STRUCTURE C-1	FE of WASH		
100'	North of STRUCTURE C-1	FE of WASH		
150'	" "	" "	FE of WASH	
200'	" "	" "	FE of WASH	

T.P. "1 No. FE of C-1

FE of Box C-1

50'	So of STRUCTURE C-1	FE of WASH		
100'	So of "	" "	" "	" "
150'	So of "	" "	" "	" "
200'	So of "	" "	" "	" "

B.M. FE North

TOP of RAIL

CK-10 FE South 93.50

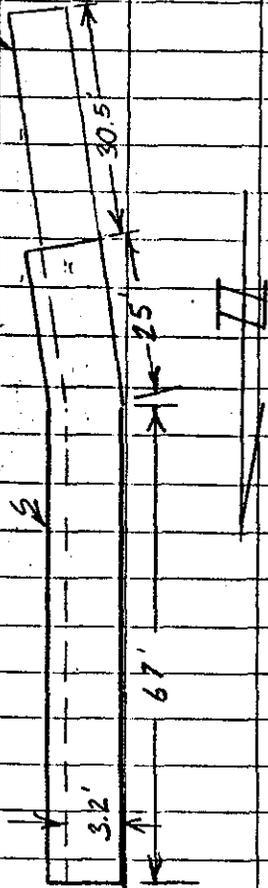




SIDE VIEW STRUCTURE D-1

90° E.M.P.S

CONC. STRUCTURE

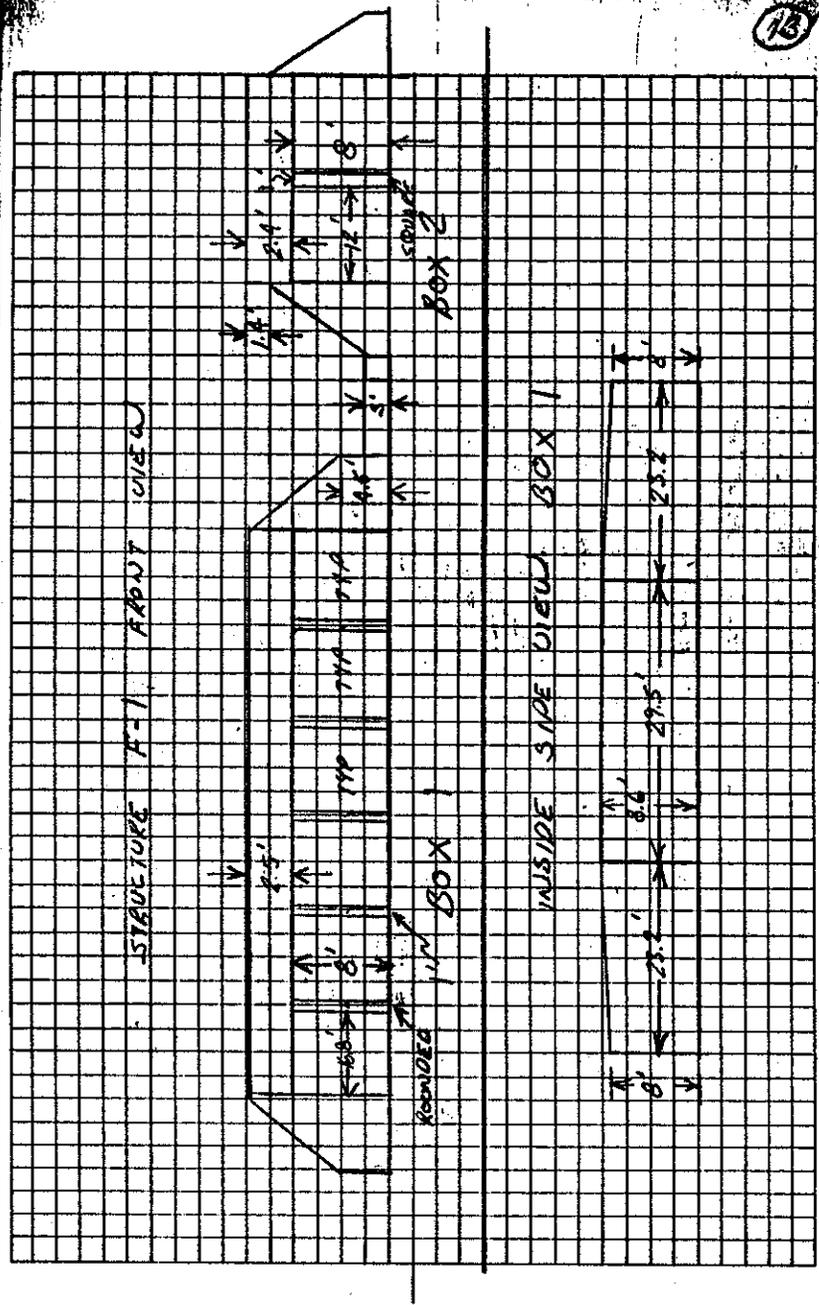
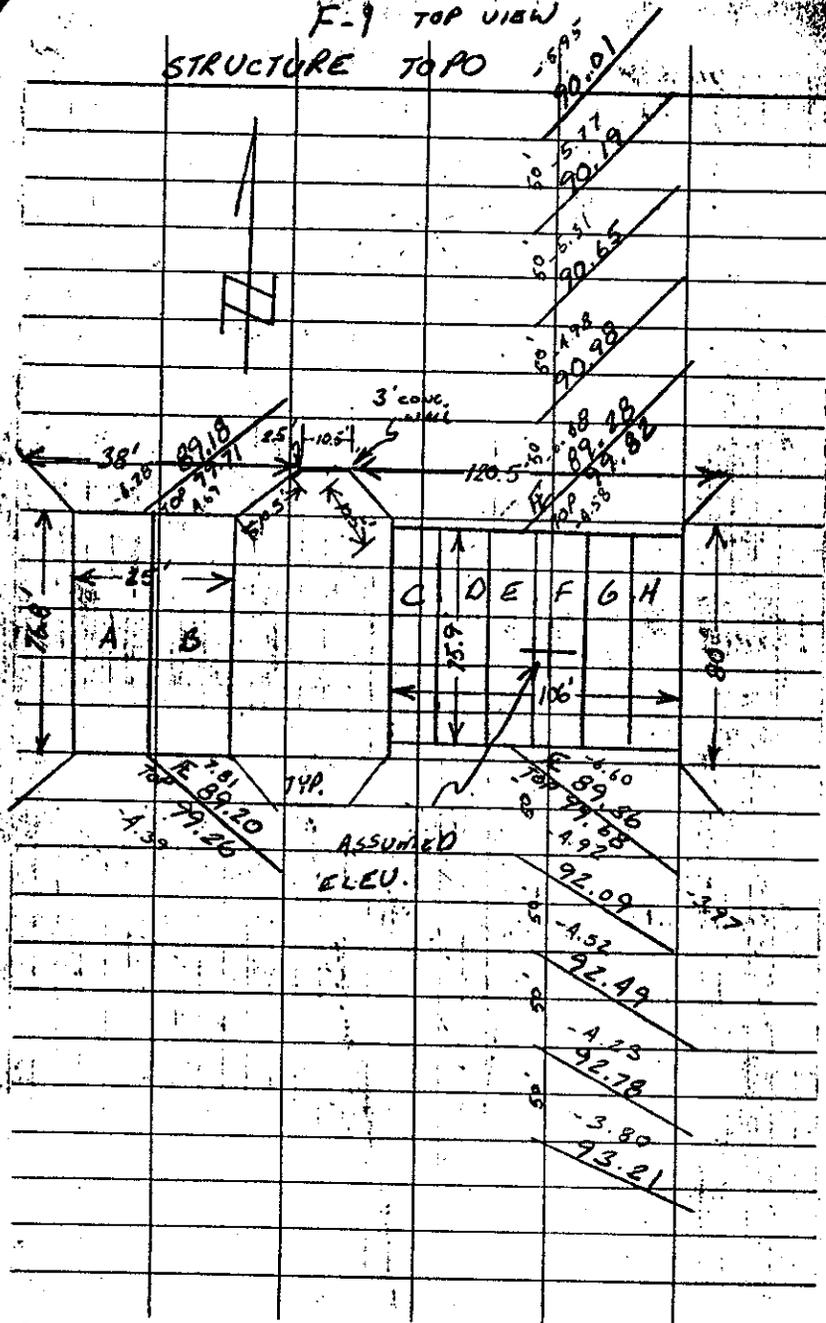


NORTH END STRUCTURE D-1





F-9 TOP VIEW  
STRUCTURE TOPO





STA.	B.S.	H.I.	F.S.	ELEV.
BM.				100.00
	4.40	104.40		
TP. 1			10.985	93.415
	2.545	95.96		
A NORTH END			4.19	91.77
B "			4.55	91.41
C "			4.76	91.20
D "			4.34	91.62
E "			4.69	91.27
F "			5.18	90.78
G "			4.11	91.85
H "			2.55	93.41
K			6.60	89.36
TP. 2			5.95	90.01
	7.475	97.485		
TP. 2			7.48	90.005
	7.00	97.005		
A SOUTH END			4.91	92.10
B "			5.42	91.59
C "			5.73	91.28
D "			4.91	92.10
E "			5.21	91.80
F "			5.88	91.13
G "			4.87	92.14
H "			3.09	93.92

LEVELS FOR F-1

(15)

DESCRIPTION

ASSUMED ELEV. @ G: POINT. OVER STRUCTURE				
BOX 1 STRUCTURE F-1				
TOP CONC.				
TOP SILT	N. END	BOX A		
"	"	BOX B		
"	"	BOX C		
"	"	BOX D		
"	"	BOX E		
"	"	BOX F		
"	"	BOX G		
"	"	BOX H		
TOP SILT	S. END	BOX A		
"	"	BOX B		
"	"	BOX C		
"	"	BOX D		
"	"	BOX E		
"	"	BOX F		
"	"	BOX G		
"	"			



BOOK 144

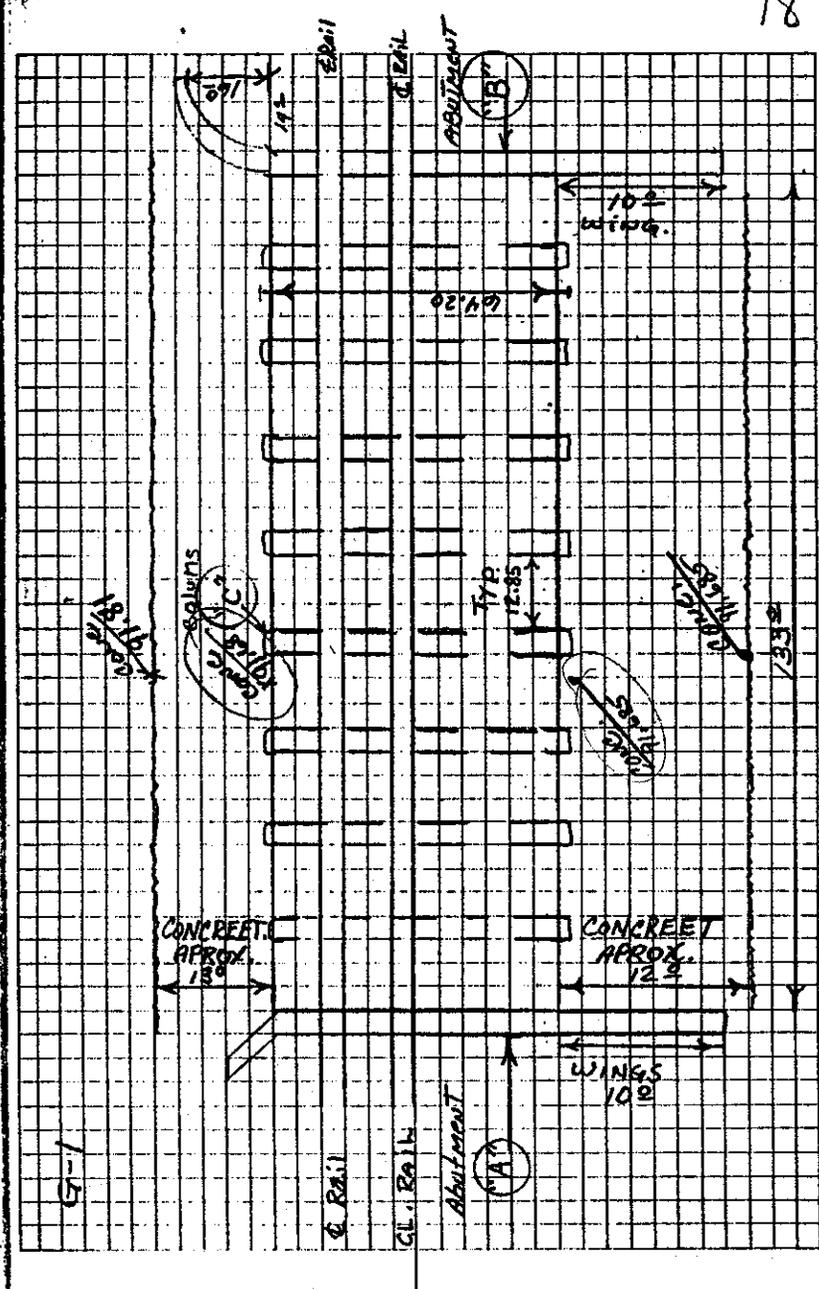
JOB # 1135E

Topo Graphy of Structure  
Gila Bend M.C.F.C.D.

DATE 10-11-91

B. JAVIS  
 S. PERHAM  
RD. W. INGRAM.

STRUCTURE (4-)





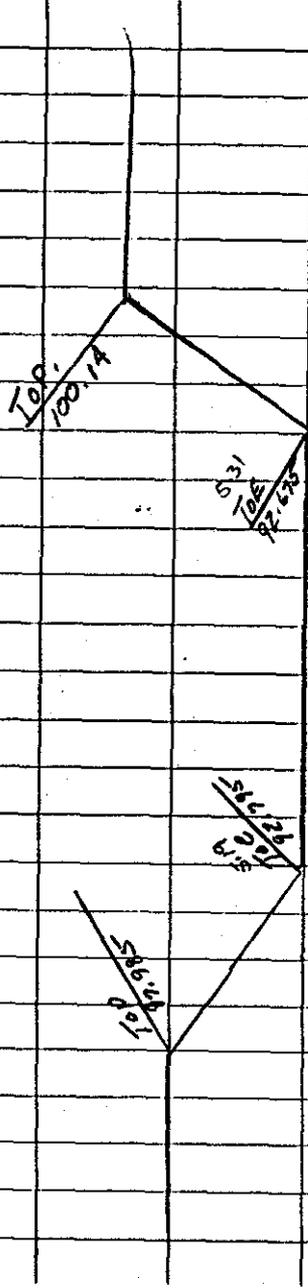
Sta	B.S.	I.F.	F.S.	Elev
	4.60	97.985		93.385
2+00 N			4.78	93.205
1+50 N			4.58	93.405
1+00 N			4.47	93.515
0+50 N			4.36	93.625
0+00 N.			4.12	93.86
T.P. 1			3.89	94.095
	4.98	99.075		
0+50 S			4.60	94.47
1+00 S.			4.40	94.67
1+50 S.			4.32	94.75
2+00 S.			4.27	94.80
T.P. #2			2.27	96.805
	10.44	109.245		
S.S. 1			2.90	104.345
S.S. 2			3.70	103.545
CR-IN			7.28	99.985 .015 Low

20

G-1

Description
T.B.M. = T.P. #3 for Structure F-1
200 No. of Structure
T.P. Rock -
F.P. #2 Rock.
SS. 1 Top of South Rails Nor. Rail
SS 2 Nor Rail of The Nor. Rails
CR-IN B.M. & H.M. of Box F-1 Ass. 100.00

and looking so.  
G-1

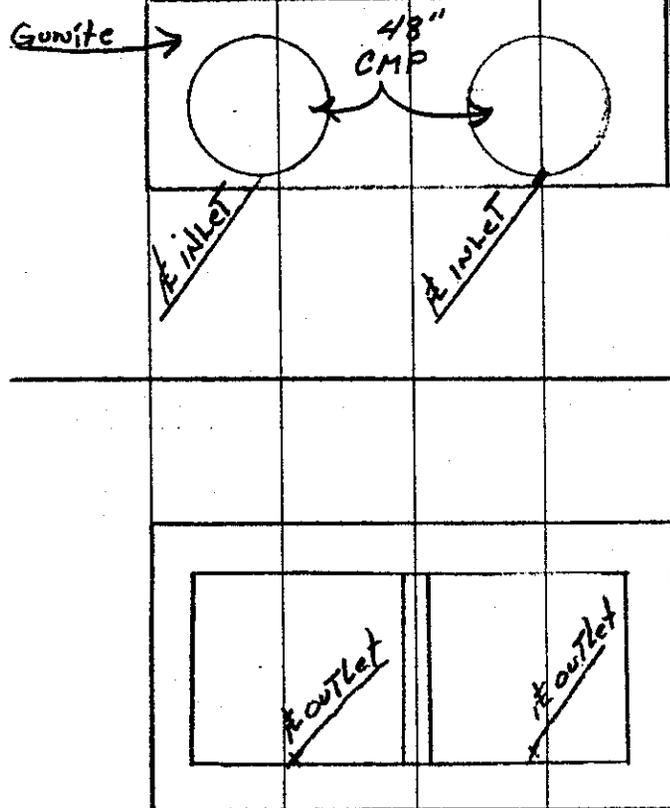


Book 144  
Job # 11358

TOPOGRAPHY of STRUCTURE  
Gila Bend M.C.F.C.D.

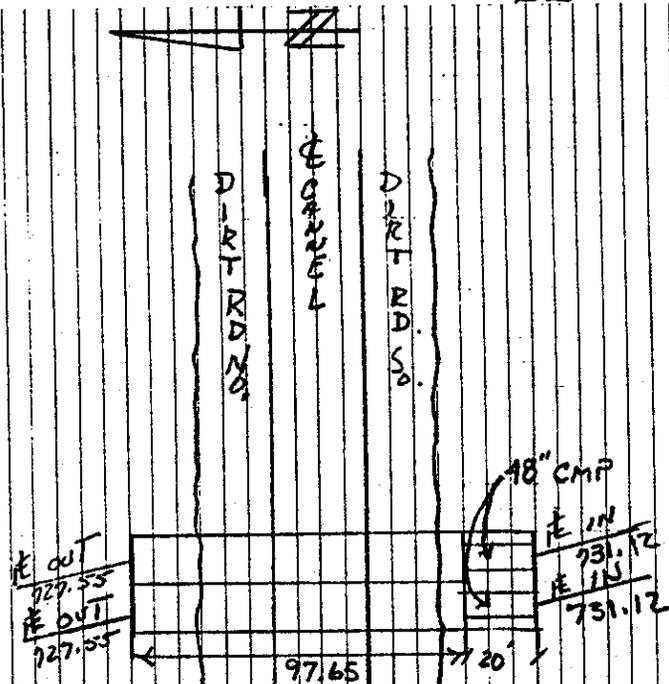
Date 10-14-91  
P.C. B. Davis  
T R. Dudley  
R.J. W. INGRAM.

South End Looking North. 27



North End Looking South

22



Sta	B.S.	H.I.	F.S.	Elev
	6.01	748.987		742.977
T.P.			4.93	744.057
	4.90	748.957		
S.S.			21.40	727.557
S.S.			17.83	731.127
T.P.			5.98	742.977
	5.72	748.697		
T.P.			4.64	744.057
	4.73	748.787		
CK-IN			5.81	742.977

(23)

DESCRIPTION Structure 22

T.P. # 5 (Book # 143 P. 58) EL = 742.977

SS. # Box outlet No.

SS. # of 48" CMP. INLET SO.

T.P. Spike Wall

CK-IN T.P. # 5 EL (Book 143 P. 58)





Sta	B.S.	H.I.	F.S.	Elev
	8.52	100.33		91.81
T.P. 1			4.41	95.92
	20.69	116.61		
SS			19.60	97.01
SS			19.40	97.21
S.S			19.65	96.96
S.S			17.60	97.01
T.P. 2			20.68	95.93
	4.11	100.04		
CK-IN			8.22	91.82 .01 High

(29)

DESCRIPTION

T.B.M. So End of Concrete Slab "12 18"  
 Elev 91.81  
 TR ROCK

WEST outlet N. PIPE  
 WEST outlet S. PIPE  
 EAST INLET N. PIPE  
 EAST INLET S. PIPE  
 T.P. ROCK.

CK-IN Elev = 91.81 T.B.M.

Book # 144  
Job # 11358

Profile of Test Sections  
Gib Board M.C.F.C.D.

Date 10-15-91  
P.C. B. Davis  
T. R. Dudley  
Ed. W. Ingram.

Instrument.	—	T. 2000
Weather	—	95°
Elev	—	660.00
P.P.M	—	16

		H.I = 5.29			
		664.664			
T@ A.	B.S. "B"	00-00-00			
F.S. Pt.	Dist.	VERT Diff	Elev	Description-	
Pt "B"	1202.11	-2.23	662.434	TEST Pt. "B"	
	1128.36	-3.44	661.224	Nat Gr.	
	1023.77	-4.69	659.974	Toe of Slope	
	976.79	-4.72	659.944	So. Edg of Rd.	
	868.39	-4.87	659.794	E Dirt. Rd	
	771.03	-5.06	659.604	" "	
	680.62	-6.99	657.674	" "	
	567.20	-6.49	658.174	Gr. BRK	
	452.26	-8.31	656.354	" "	
	419.89	-11.15	653.514	FE Wash	
	416.86	-10.05	654.614	TOP BANK	
	383.39	-9.81	654.854	" "	
	377.77	-10.75	653.914	Toe of Wash	
	326.58	-11.70	652.964	" " "	
	298.79	-5.56	659.104	TOP of BANK.	
	182.14	-4.47	660.194	Toe of Slope	
	129.47	-0.90	663.764	TOP of Slope	

TEST Panel "A" Ref Book 142 - PAGE 52  
 TEST Panel "B" Ref Book 142 P-56 / ELEV: 662.434



Book 144  
Job # 11358

Profile of Test Sections.  
Gibs Bend M.C.F.C.D.

Date 10-16-91  
PC B. DAVIS  
PI R. Dudley  
RD W. INGRAM.

Instrument  
Weather Temo  
P.P.M. 15

T-2000  
80<sup>0</sup>

T@F

B.S. "E" 00-00-00

F.S. Pt.

Dist	VERT DIFF	Elev	Description -
		728.752	
1553.92	-0.27	728.482	Test Panel E
1513.65	-1.28	727.472	End Point of Rd
1459.05	-2.25	726.502	Low Pt. in Rd.
1366.58	-1.58	727.172	Pt on Slope
1262.11	-1.00	727.752	Crown of Slope
1127.75	-2.81	725.942	Pt on Down Slope
1001.47	-5.33	723.422	Wash So Edge Rd
772.16	-0.13	728.622	So. Edge of Rd
642.01	-0.57	728.242	GR-BRK.
434.32	-0.04	728.712	" "
252.06	-6.34	722.412	Wash of Rd
71.03	+0.84	729.592	GR-BRK

TEST Panel F Elev = 728.752

TEST Panel E Elev = 728.552

P.P.M. = 15

H.I. = 5.17

X@ "G"

744.704

B.S. G1080 00-00-00

F.S. P1 Dist.

vert Diff

Elev

Description

628.14	-2.10	742.604	G10. B.C.
628.14	-2.83	741.874	Nat GR. @ B.C.
531.27	-3.10	741.604	Nat. G.
437.26	-2.51	742.194	" "
357.85	-4.06	740.644	" "
281.31	-6.04	738.664	Top of Bank
276.23	-7.17	737.534	GR-BRK
259.28	-8.17	736.534	Top Bank
256.51	-9.52	735.184	Toe of Bank.
248.55	-9.74	734.964	" " "
246.08	-8.17	736.534	TOP of BANK.
237.07	-7.14	737.564	GR. BRK.
195.62	-6.41	738.294	GR. BRK
172.89	-5.23	739.474	Toe
157.12	-1.29	743.414	TOP.
146.58	-0.97	742.444	E.R.R. TRACKS
134.29	-1.08	741.364	TOP
120.18	-4.59	740.114	Toe
107.72	-6.09	738.614	GR-BRK
85.73	-6.45	738.254	" "
51.78	-5.48	739.224	Toe
26.69	-0.86	743.844	TOP.

Test Panel "G" Book 143 Page 13 Elev = 744.704  
 G10 B.C. Book 143 Page 12 Elev = 742.589

P.P.M. 15		H.I. =	5.45	
X@ I			<del>745.63</del>	747.62
B.S. H	00-00-00	VERT	Elev	DESCRIPTION
F.S. Pt.	Dist	DIFF		
	1607.19	-2.06	743.571	Test Panel H
	1550.28	-2.66	742.971	TOP BANK
	1511.24	-8.48	737.151	TOE
	1443.05	-7.88	737.751	FE of WASH
	1379.06	-7.16	738.471	TOE
	1356.23	-5.78	739.851	GR-BRK
	1286.29	-6.62	739.011	TOE of BURN.
	1271.02	-3.38	742.251	TOP of BURN
	1253.91	-2.90	742.731	" " "
	1226.53	-7.55	738.051	TOE " "
	1195.91	-7.66	737.971	" " "
	1179.35	-5.03	740.601	TOP
	1093.10	-3.92	741.711	NAT. GR.
	1037.55	-3.09	742.541	TOP
	1022.44	-4.61	741.021	TOE
	1012.78	-4.81	740.821	TOE
	1002.70	-3.56	742.071	TOP
	905.42	-2.75	742.881	GR-BRK
	816.88	-4.32	741.311	GR-BRK
	710.87	-1.97	743.661	GR-BRK
	666.99	-2.85	742.781	GR-BRK
	605.10	-2.12	743.511	NAT GR.

Add 2.01

34

Test Panel I Book 143 Page 9 Elev = 747.618  
 Test Panel H Book 143 Page 8 Elev = 745.636

P.P.M. 15

H.I. 5.45

K@ I

B.S. H

F.S.

00-00-00

Dist.

VERT.  
D.F.

Elev

Description

~~745.131~~

480.34 -1.71 743.921

Nat. GL.

385.01 -1.47 744.161

" "

332.36 -3.05 742.581

Æ of WASH

320.89 -2.07 743.561

TOP.

308.31 -3.12 742.511

Æ of WASH

272.39 -1.30 744.531

TOP OR GL. BRIL

225.95 -1.67 743.961

TOP

204.28 -3.87 741.761

Toe

180.84 -4.13 741.501

Toe of BURM

151.91 +0.16 745.791

TOP of BURM

138.08 -1.98 743.651

Toe of BURM

68.29 -1.24 744.391

Nat. GL.

Add 2.0'

P.P.M = 15

H.I = 5.39

T@K	BS. "J"	Dist.	Vert Diff	Elev	Description
	00-00-00			799.197	
				800.362	
F.S. Pt.					
		760.96	+1.18	800.377	Test Panel J
		707.11	+0.70	799.897	
		695.81	+1.37	800.567	Wedge Diet Rd
		666.93	+1.15	800.347	E " "
		663.44	+0.59	799.787	2' wide V Ditch
		658.98	+1.15	800.347	Top of V Ditch
		601.21	-1.50	797.697	GR - Brk.
		541.17	+1.46	800.657	" "
		483.16	+1.92	801.117	" "
		457.65	-0.43	798.767	TOP OF BANK
		440.20	-3.01	796.187	Toe
		414.92	-4.25	794.947	FE WASH
		411.16	-4.36	794.837	Toe
		401.29	-2.72	796.477	TOP OF BANK
		333.84	-1.92	797.277	GR - BRK
		323.73	-3.03	796.167	" "
		311.92	-1.95	797.247	" "
		237.66	-2.52	796.977	" "
		217.55	-3.08	796.117	" "
		206.05	-2.20	796.997	" "
		103.75	-0.80	798.397	Net. GR.

TEST Panel K Ref Book 142 Page 16 EI = 799.797  
 TEST Panel J " " " " 75 EI = 800.362

P.P.M 15

H.I = 5.27

TO L				
			855.603	
B.S. M	00-00-00		859.033	
F.S. Pt.	Dist.	VERT Diff	Elev	Description
	1615.24	+3.41	859.013	Test Panel M.
	1562.33	+3.05	858.653	GR BRK
	1519.32	+0.82	856.423	GR - BRK
	1500.29	+0.15	855.753	" "
	1473.55	+0.77	856.373	" "
	1397.89	-0.70	854.903	" "
	1292.79	+1.34	856.943	" "
	1223.31	+1.16	856.763	" "
	1188.63	+0.11	855.903	" "
	1134.45	-0.04	855.563	TOP OF BANK
	1117.19	-1.51	854.093	GR-BRK
	1107.97	-3.40	852.203	# 8' wide Ditch
	1094.59	-2.04	853.663	TOP OF BANK
	1023.80	-1.57	854.033	" " "
	1015.67	-2.60	853.003	# of Wash
	1006.54	-1.56	854.043	TOP
	992.94	-1.76	853.843	TOP
	986.67	-2.86	852.743	# of Wash
	978.35	-1.84	853.763	TOP
	954.64	-2.45	853.153	GR - BRK
	898.89	-1.96	853.643	TOP OF BANK

(37)

Test Panel "L" Book 143 Page 26 Elev 855.603  
 TEST Panel "M" " " " 27 Elev 859.033

P.P.M. = 15

H.I. = 5.27

38

T@L

855.603

B.S. M 00-00-00

F.S. Pt.

Dist.

VERT  
Diff

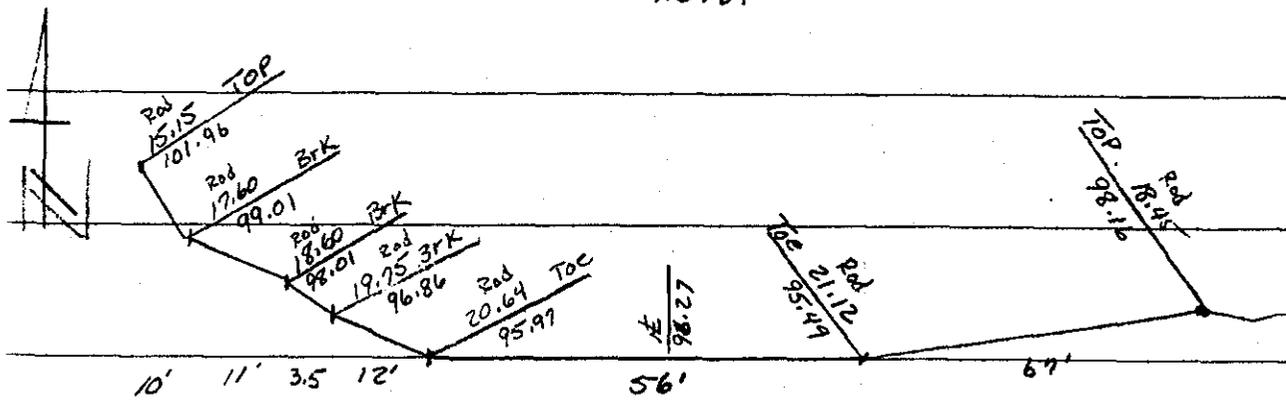
Elev

Description

894.78	-3.61	851.993	Æ of wash
890.44	-1.34	854.263	TOP of BANK
812.55	-0.42	855.183	GR-BRK
724.91	+0.62	856.223	Net. GR.
616.69	+0.80	856.403	Net. GR.
511.98	+0.91	856.513	" "
353.24	-0.59	855.013	TOP of BANK
347.54	-3.53	852.073	Toe " "
334.02	-3.93	851.673	Toe " "
325.25	+0.04	855.613	Top " "
314.55	-0.32	855.283	TOP OR GR-BRK
303.83	-2.36	853.243	Toe
261.72	-3.88	857.723	GR-BRK
250.17	-4.57	851.033	Æ
231.57	-3.68	851.923	GR-BRK
204.86	-1.83	853.773	GR-BRK
154.00	-1.40	854.203	Net. GR.
119.77	-0.21	853.993	Net. GR.

Looking North

H.I = 116.61



Down stream 2+00 CROSS SECTION

1-71

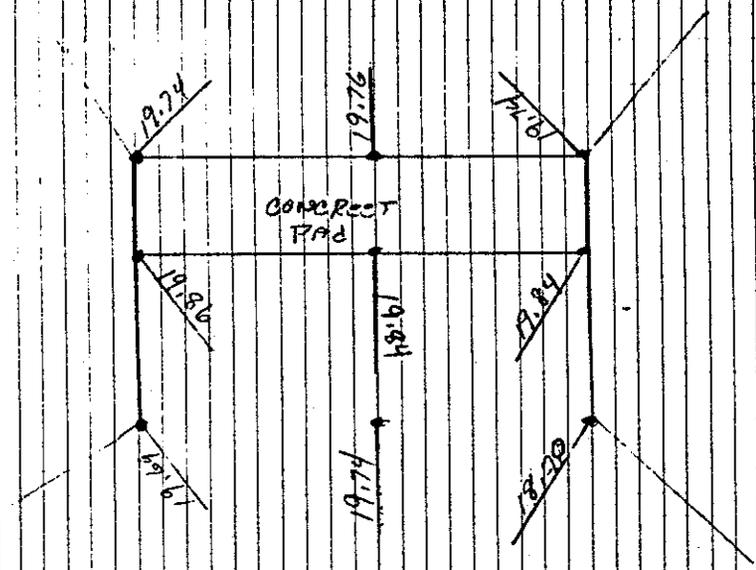
Book 144  
Job # 11358

H-1  
TOPOGRAPHY OF STRUCTURE'S  
Gila Bend M.C.F.C.D.

Date 10-17-91  
P.C. B. DAVIS  
T R. DUDLEY  
RD W. INGRAM.

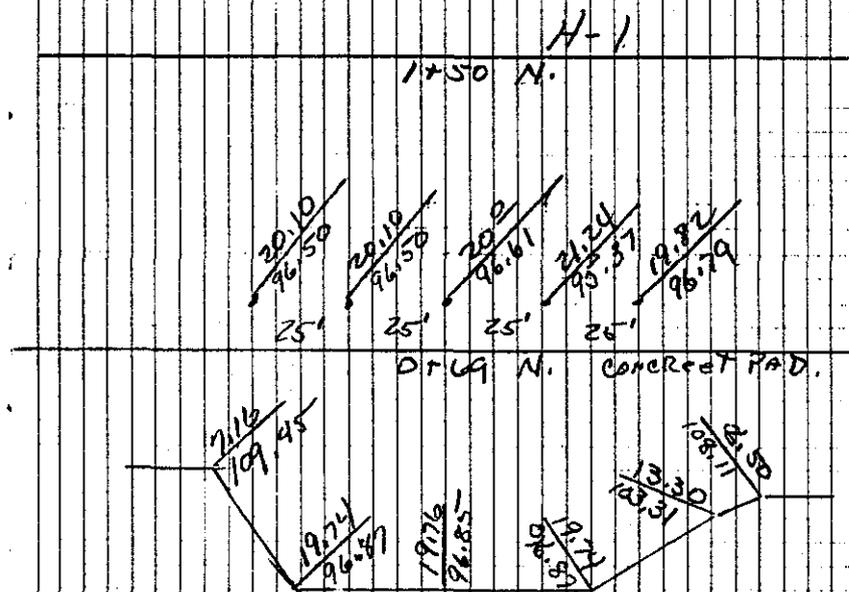
H I = 116.61

H-1



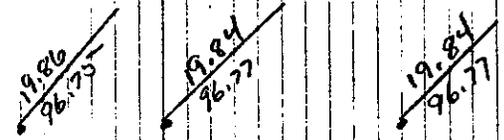
H.I = 116.61

41

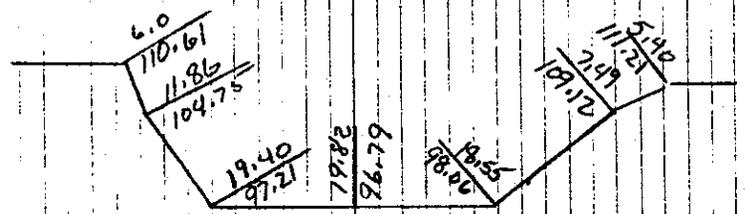


H-1

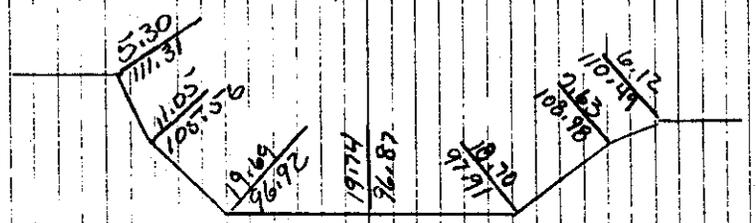
0+27 N. Concrete Rd



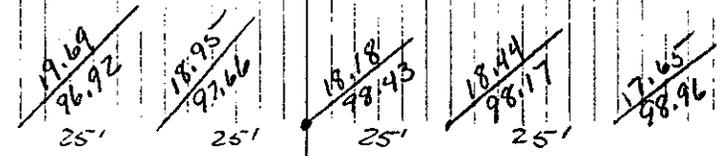
0+00 N



0+25 So



0+85 So



(56)

10-3-91

Job # 11358

FC B. Davis

Rd R. Dudley

Gila Bend Flood Plane  
Approx 5.5 mile Run on  
South Side of Canal "T. Harris"

Sta	B.S.	H.I.	F.S.	Elev	ADS
	6.845				
	6.03	728.452		722.422	
	5.225				
T.P. 1			6.75		
			6.025	722.429	
			5.30		
	13.95				
	12.43	734.857			
	10.92				
T.P. 2			3.63		
			2.445	732.412	
			1.26		
	11.06				
	10.05	742.412			
	9.04				
T.P. 3			4.63		
			3.62	738.842	
			2.61		
	8.41				
	2.37	746.212			
	6.34				
T.P. *4			5.985		
			4.965	741.247	
			3.99		
	35.88		17.055		18.825

Description	
(3) M. ... Aircal Pond A-21	Top of Bolt. Elev = 722.422 Ref. Page 5
	Book 142 ✓
T.P. #1	Spike Nail
T.P. 2	Spike Nail
T.P. 3	Spike Nail
T.P. 4	Spike Nail

Sta	B.S.	H.I.	F.S	Elev.
1	9.20			
	7.25	748.497		741.247
	5.29			
			6.72	
1	T.P. 5		5.52	742.997
			4.32	
	225.5			
	6.285			
	5.155	748.132		
	4.03			
			6.25	
	T.P. 6		5.13	743.002
			4.02	
	251.5			
	6.665			
	5.405	748.407		
	4.15			
			6.89	
	T.P. 7		5.62	742.787
			4.35	
			6.73	
	231			
	5.58	748.367		
	4.42			
			6.665	
	T.P. 8		5.51	742.857
			4.36	
			23.39	
			21.78	
				1.61

Description

\* 1  
T.P. 5 SPIKE Nail @ So Side Canal  
285.5' West of @ Hwy 85

T.P. 6 SPIKE Nail 734'  
West of @ Hwy 85

254'  
T.P. 7 SPIKE Nail  
6239.00 West of @ 85

230.5'  
T.P. 8 " "  
1,701.00' West of @ 85

(58)

Sta	B.S.	H.I.	F.S.	Elev
	6.58			
286	5.40	748.257		742.857
	4.22			
			6.89	
T.P. # 9			5.725	742.532
			4.56	
	6.96			
282	5.55	748.082		
	4.14			
			7.04.	
T.P. # 10			5.60	742.482
			4.15	
	7.20			
320	5.60	748.082		
	4.00			
			7.20	
T.P. # 11			5.59	742.492
			3.98	
	7.55			
326	5.92	748.412		
	4.29			
			7.33	
T.P. # 12			5.74	742.672
			4.15	
	22.47		22.655	0.185

(59)

Description	
	233'
T.P. # 9	Spike Nail
2170.00	west of $\$$ 85
	289'
T.P. # 10	" "
2741.00	west of $\$$ 85
	322'
T.P. # 11	Spike Nail
3383.00	west of $\$$ 85
	318'
T.P. # 12	" "
4027	west of $\$$ 85



Sta	B.S.	H.I.	F.S.	Elev	ADS
	7.27				
272	5.91	748.427		742.517	
	4.55		7.09		
T.P. 16			5.72	742.707	
			4.34		
126	6.26				
	5.625	748.332			
	5.00				
			6.525		
T.P. 17			5.70	742.632	
			5.07		
S.S. A			11.60	736.732	
	6.40				
249	5.15	747.782			
	3.91				
			6.705		
T.P. 18			5.46	742.322	
			4.22		
230	6.73				
	5.48	747.802			
	4.23				
			5.89		
T.P. 19			4.67	743.132	
			3.45		
			21.55		
	22.165				0.615

Description
T.P. # 16 Spike Nail 547' west of CP-11
T.P. 17 Spike Nail 798.5' west of CP-11
S.S. A = E Nat. Ge. @ V Ditch So of Channel
T.P. # 18 Spike Nail 1296.00' west of CP-11
T.P. # 19 Spike Nail 1790.00' west of CP-11

Sta	B.S.	H.I.	F.S.	Elev	ADS
1	5.95				
	26 4.73	747.862		743.132	
	3.50				
			7.30		
2	T.P. 20		6.08	741.782	
			4.86		
	SS. B		12.2	735.662	
	6.69				
	8 5.41	747.192			
	4 4.14				
			6.75		
	T.P. 21		5.48	741.712	
			4.20		
	6.565				
	25 5.27	746.982			
	3.985				
			6.945		
	T.P. 22		5.67	741.312	
			4.405		
	6.52				
	146 5.79	747.102			
	5.06				
			6.53		
	T.P. 23		5.79	741.312	
			5.06		
	21.20		23.02		1.82

(62)

Description	
244	T.P. 20 Spike Nail 2279.00' west of CP-11 S.S. "B" Nat. Gr. E V Ditch S of Canal
253	T.P. 21 Spike Nail 2789' west of CP-11
262	T.P. 22 Spike Nail 3301.00' west of CP-11
277	T.P. 23 Spike Nail 3594.00' west of CP-11



Sta	B.S.	I.F.	F.S.	Elev	RDS
	7.25				
302	5.24	747.622		741.882	
	4.23				
			7.24		
T.P. # 27			5.72	741.902	
			4.20		
	6.80				
203	5.48	747.382			
	4.17				
			1.87		
T.P. # 28			3.61	743.772	
			2.35		
	5.52				
217	4.43	748.202			
	3.35				
			15.94		
T.B.M. 2			15.07	733.132	
			14.20		
	15.72				
224	14.60	747.732			
	13.48				
			2.14		
T.P. 29			6.00	741.732	
			4.87		
	30.25		30.40		0.15

Description	
67	
T.P. # 27	Spike Nail 5539.00 west of CP 11
T.P. # 28	Spike Nail 6054.00 west of CP-11
T.B.M. # 2	Florescent, ORANGE POINT with P.K. Nail @ N. West End of E. wash about 6' above wash. 6097.50' west of CP-11. CP-31
T.P. # 29	Spike Nail 451' west of CP-36

STA.	B.S.	H.I.	I.S.	ELEV.	ADS	DESCRIPTION
	6.67					
235	5.50	747.232		741.232		
	4.32					
			7.17			
T.P. # 30			6.00	741.232		T.P. # 30 SPIKE Nail
			4.84			919' west of CP 36
	6.45					
272	5.085	746.317				
	3.73					
SS. "E"			12.20	734.117		S.S. "E" E Ditch So of Canal
			6.67			1191' west of CP-36
T.P. 31			5.30	741.017		T.P. # 31 SPIKE Nail
			3.94			1464.00 west of CP-36
	2.165					
240.5	5.96	746.977				
	4.76					
			6.61			
T.P. 32			5.40	741.577		T.P. # 32 SPIKE Nail
			4.20			1995.50 west of CP-36
	7.08					
265	5.75	747.327				
	4.43					
			6.86			
T.P. 33			5.55	741.777		T.P. # 33 SPIKE Nail
			4.24			2472.50' west of CP-36
	22.295		22.25			
					.045	

STA	B.S.	H.F.	F.S.	Elev	ADJ
	6.61				
206	5.58	747.357		741.777	
	4.55				
			6.465		
T.P. 34			5.435	741.922	
			4.41		
	6.98				
226	5.35	747.272			
	3.72				
S.S. "F"			11.15	736.122	
			7.12		
T.P. # 35			5.52	741.752	
			3.92		
	6.48				
199	5.485	747.237			
	4.49				
			6.485		
T.P. 36			5.50	741.737	
			4.515		
	6.69				
206	5.66	747.397			
	4.63				
			6.505		
I.P. 37			5.475	741.922	
			4.44		
	22.075		21.93		0.145

DESCRIPTION

2887.50 T.P. # 34 spike nail  
2884.00 west of CP. - 36

S.S. "F" # of Ditch so of corner  
2884.00 west of CP. - 36.

3204 T.P. # 35 spike nail  
3204.00' west of CP. - 36

3600 T.P. # 36 spike nail  
3600.00' west of CP. - 36

4012.50 T.P. 37 spike nail  
4012.50' west of CP. - 36

Sta	B.S.	H.I.	F.S.	Elev
	6.43			
204	5.41	747.332		741.922
	4.39			
			6.43	
T.P. # 38			5.41	741.922
			4.40	
	6.07			
206	5.04	746.962		
	4.01			
			6.485	
T.P. # 39			5.47	741.492
			4.45	
	6.44			
205	5.415	746.907		
	4.39			
			6.49	
T.P. 40			5.52	741.387
			4.55	
	6.44			
205.5	5.41	746.797		
	4.385			
S.S. 'G'			12.90	733.897
			6.26	
T.P. 41			5.225	741.572
			4.19	
	21.275		21.625	0.35

Description	
203	T.P. # 38 Spike Nail 4419.5' west of CP-36
203.5	T.P. # 39 Spike Nail 4829.00 west of CP-36
199	T.P. 40 Spike Nail west of CP-36
201	S.S. 'G' E & E of Ditch south of canal 5433.5' west of CP-36
201	T.P. # 41 5640.50 west of CP-36

Sta	B.S.	H.I	F.S.	Elev
233.5	6.71			
	5.595	747.167		741.572
	4.475		6.845	
T.P. 42			5.75	741.417
			4.65	
	5.96			
207	4.925	746.342		
	3.89		6.28	
			5.275	741.067
T.P. 43			4.275	
	6.43			
	5.903	746.970		
204.70	4.383		6.445	
			5.465	741.005
			4.485	
T.P. 44	6.50			
	5.45	746.455		
	4.40		6.245	
210			5.23	741.225
			4.22	
T.P. 45				
21.373		21.72	0.347	

Description

68

25.672	T.P. 42	Spike Nail
	6093.5'	west of CP-36
1.682	T.P. 43	Spike Nail
	6491.00	west of CP-36
96	T.P. 44	Spike Nail
	6891.70	west of CP-36
25.202	T.P. 45	Spike Nail
	7304.20	west of CP-36

Sta	B.S.	M.I.	F.S	Elev
201.5	6.01 5.002 3.995	746.227		741.225
T.P. 46			6.14 5.136 4.132	741.091
202.5	6.105 5.09 4.08	746.181		
T.P. 47			6.24 5.23 4.218	740.951
201.7	6.31 5.30 4.293	746.251		
T.P. 48			5.95 4.97 3.985	741.281
199	6.02 5.025 4.03	746.306		
T.P. 49			6.35 5.365 4.38	740.941
20.417				20.701

Description	
200.80	7670.50 To E of CP 53 T.P. 46 SPIKE Nail 36' West of CP 53 El = 741.09 Nat Gr @ E of CP-53
202.2	T.P. 47 SPIKE Nail 440.70 West of CP 53
206.4	T.P. 49 SPIKE Nail 838.90 West of CP 53
199	T.P. 49 SPIKE Nail 1234.90 West of CP 53

284

STA	B.S.	H.I	F.S.	Elev
	5.98			
120	5.38	746.321		740.941
	4.78			
			6.93	
T.B.P. #4			6.31	740.011
			5.69	
	6.915			
209.5	5.895	745.906		
	4.87			
			6.195	
T.P. 50			5.225	740.681
			4.255	
	6.43			
256	5.15	745.831		
	3.87			
			6.55	
T.P. #51			5.29	740.541
			4.03	
	6.475			
259.5	5.18	745.721		
	3.88			
			6.55	
T.P. 52			5.28	740.441
			4.01	
21.605			22.105	0.50

(40)

DESCRIPTION	ELEV
chiseled x IN S/west Head Wall of West of CP-53	1478.90
T.P. # 50 SPIKE Nail West of CP-53	1877.40
T.P. # 51 SPIKE Nail	
T.P. 52 SPIKE Nail	

Sta	B.S.	H.I.	F.S.	Elev
	6.69			
256	5.41	745.851		740.441
	4.13			
			6.35	
T.P. # 53			5.10	740.757
			3.85	
	6.48			
259	5.185	745.936		
	3.89			
			6.69	
T.P. 53			5.47	740.466
			4.25	
	6.435			
	5.16	745.626		
	3.88			
SIDE SHOT			5.83	
CP 52			5.275	740.351
			4.72	
			6.62	
TP. 54			5.44	740.186
			4.265	
	15.755		16.01	.255

(71)

Description	
253	T.P. # 53 SPIKE Nail
244	T.P. 53 SPIKE Nail
	S.S. @ Road @ CP 52
	T.P. # 54 SPIKE Nail

Sta	B.S.	H.I.	F.S.	Elev
258.5	6.39			
	5.10	745.284		740.186
	3.805			
			6.675	
T.P. 55			5.425	739.861
			4.175	
254	2.065			
	5.795	745.656		
	4.525			
			6.505	
T.P. # 56			5.30	740.356
			4.095	
257	6.625			
	5.34	745.696		
	4.06			
			6.62	
T.P. 57			5.38	740.316
			4.15	
254	6.55			
	5.28	745.596		
	4.01			
			6.555	
TP. 58			5.365	740.231 ✓
			4.175	
	21.515		21.17	DIFF. .045

Description	
250	T.P. # 55 SPIKE Nail
241	T.P. # 56 SPIKE Nail
247	TP # 57 40D NAIL
238	TP # 58 40D NAIL





Sta	B.S.	H.I	F.S.	Elev
	6.89			
	5.35	744.881		739.531
	3.81			
			6.855	
T.P. 66			5.35	739.531
			3.845	
	6.82			
	5.315	744.846		
	3.815			
			6.72	
T.P. 67			5.22	739.626
			3.72	
	7.09			
	5.55	745.176		
	4.01			
			6.955	
T.P. 68			5.435	739.741
			3.915	
	7.35			
	5.84	745.581		
	4.23			
			6.43	
T.P. 69			4.93	740.657
			3.425	
	22.055		20.935	1.12

(75)

Description

T.P. # 66

Spike Nail

T.P. # 67

Spike Nail

T.P. # 68

Sta.	B.S.	H.I.	F.S.	Elev	
	5.50				
	3.99	744.641		740.651	
	2.48				
			5.615		
T.P. # 70			4.145	740.496	
			2.67		
	7.73				
	6.20	746.696			
	4.67				
			5.74		
T.P. # 71			4.305	742.391	
			2.87		
	8.32				
	6.80	749.191			
	5.28				
			5.54		
T.P. # 72			4.01	745.181	
			2.475		
	8.085				
	6.58	757.761			
	5.07				
			6.52		
CK-IN			4.615	747.146	.011 LOW
			2.73		

(76)

Description

T.P. # 70

Spike Nail

T.P. # 71

Spike Nail

T.P. # 72

Spike Nail

CK-IN

B.M. SMURR EI = 747.157

Job No 11358 Book No. 145

1

Projects (continued)

GILA BEND FLOOD CONTROL

TOP OF STRUCTURES ALONG WASH No 1

GILA BEND, AZ

10-09-91

SUNNY, HOT 70-105°

J. DAVIS

R. DUDLEY

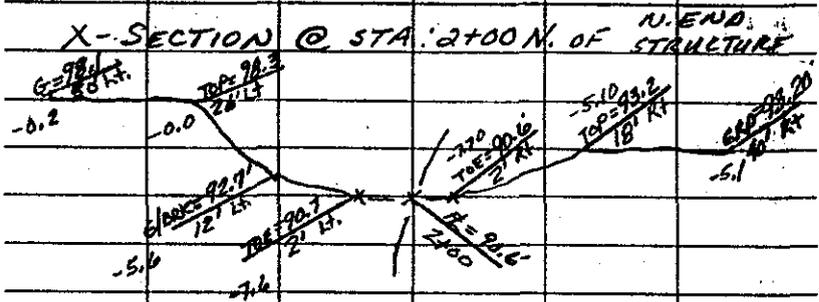
T  
S  
W  
D

NOTES: WASH No 1 & RICHARDS  
"I" STREET - NO STRUCTURES  
SEE AERIAL

WASH. No 1 & HUNT  
"J" STREET - NO STRUCTURES  
SEE AERIAL

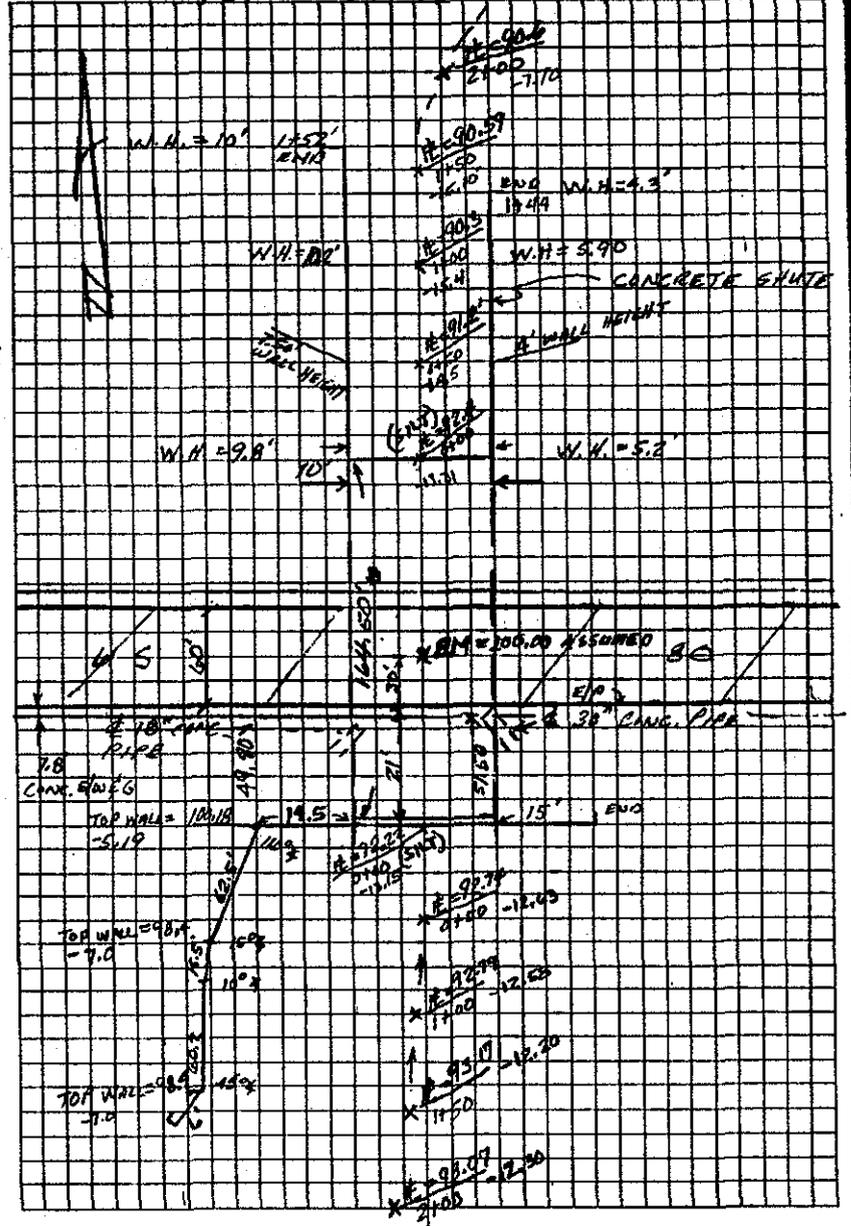
WASH No. 1 & PAPAGO  
"K" STREET - NO STRUCTURES  
SEE AERIAL

# WASH No 1 & US 80 STRUCTURE



	98.31	HI FOR STA 2+00 X-SECT		
	7.45	15.30		
TP 1	7.26 ✓	14.64	91.05	ROCK
	7.07	15.98		
	105.69	HI FOR 0+00 TO 1+50		
	6.39			
TBM "L"	5.69		100.00	± Pmt. US 80
	5.00			
	HI = 105.37 = FOR SOUTH END ONLY			
	5.60			
TBM "L"	5.37		100.00	± Pmt. US 80
	5.15			
	BS	HI	FS	ELEV.

# TOP VIEW 1 "L"

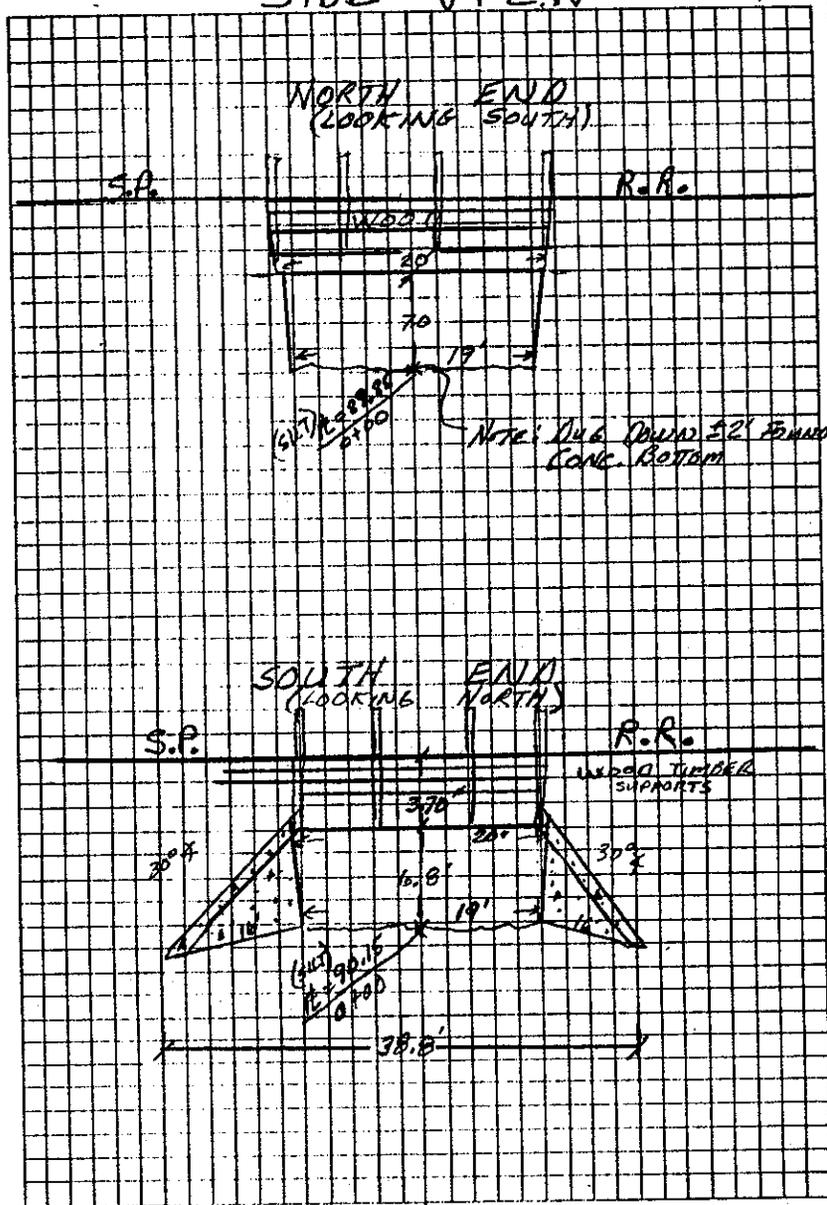




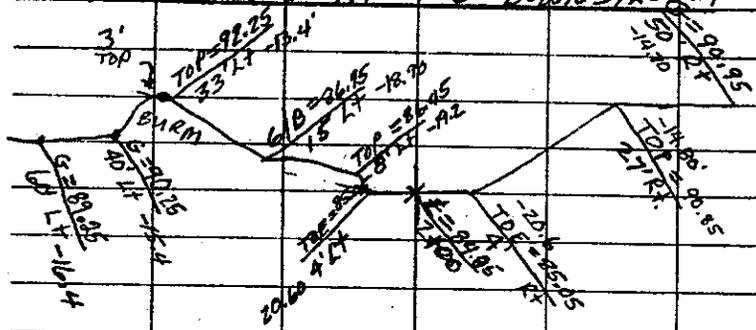


WASH No. 1 & SOUTHERN PACIFIC  
RAILROAD

"M,"  
SIDE VIEW 16

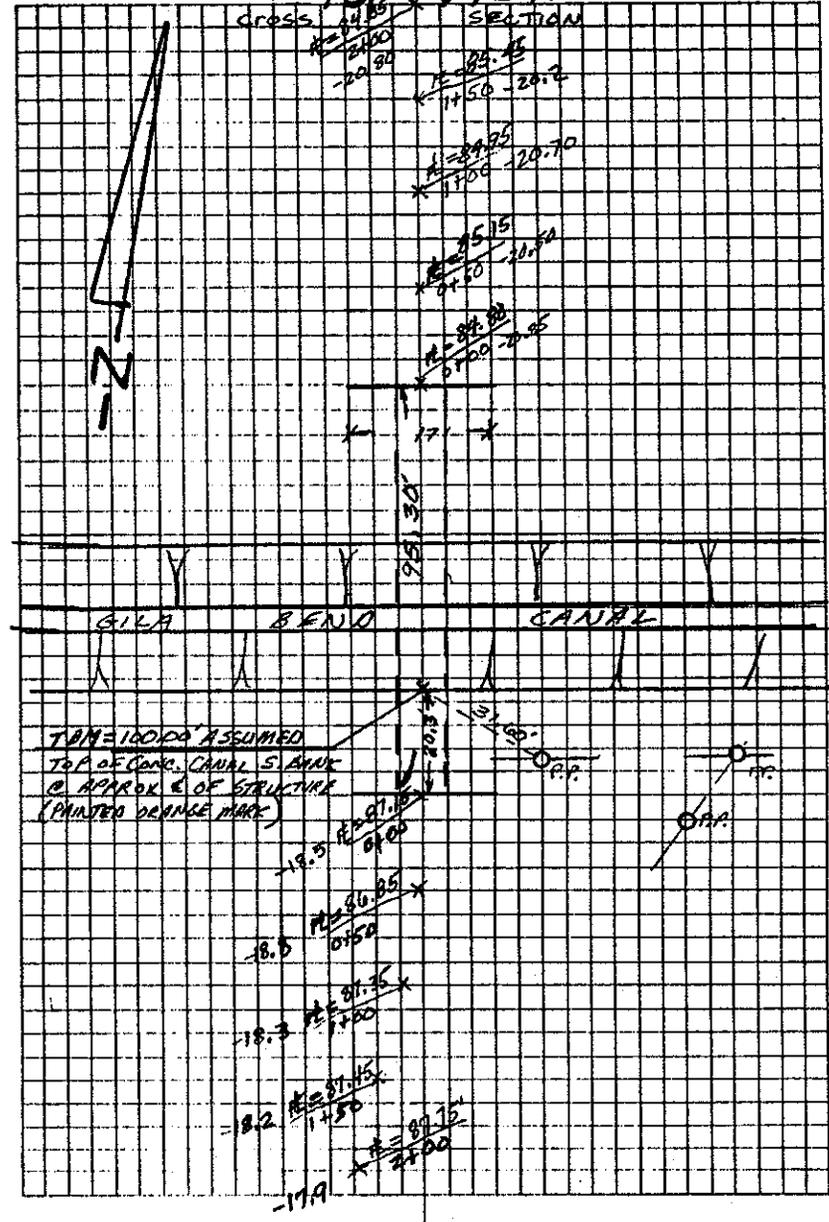


WASH No. 1 & GILA BEND CANAL  
X-SECTION @ STA. 2400 DOWNSTREAM



	6.10	105.65	HI FOR ALL SHOTS	
TBM	5.65			100.00
	5.20			
BS		HI	FS	ELF.U.

'N'  
TOP VIEW

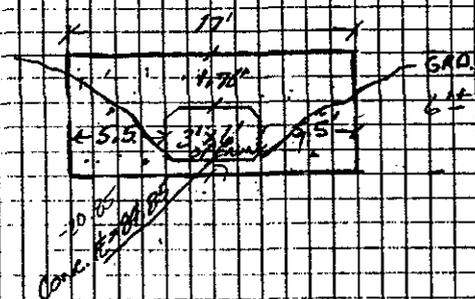


WASH No. 1 & GYLA BEND CANAL

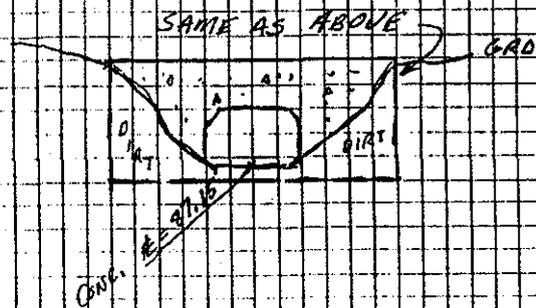
"N."  
SIDE VIEW

8

NORTH END  
LOOKING SOUTH

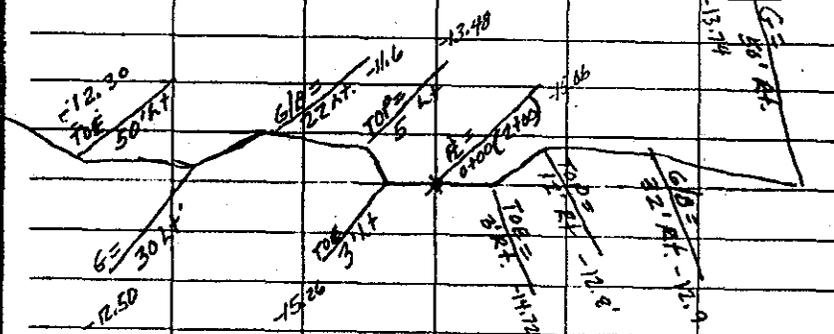


SOUTH END  
LOOKING NORTH



WASH No. 1 & CORNELIA AND GILA  
BEND RAILROAD

X-SECTION @ STA: 2400 DOWNSTREAM

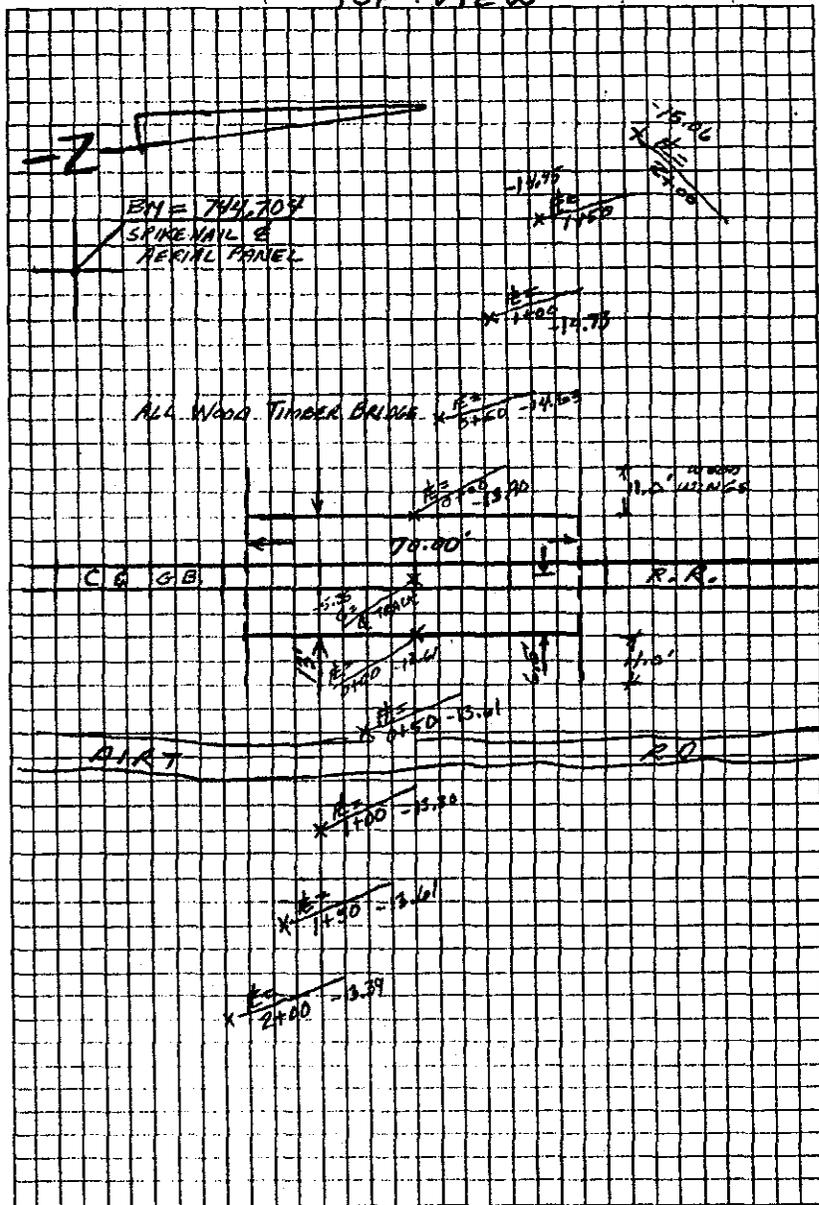


BM "G"	9.87
PANEL	3.77
	2.67

TOP SPIKE  
NAIL @  
744.704  
PANEL

"01"  
TOP VIEW

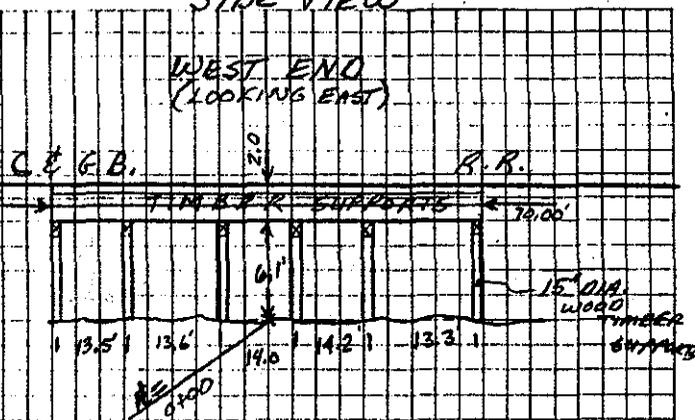
9



WASH No 1 E CORNELIA AND GILA  
BEND RAILROAD

"O."  
SIDE VIEW

10

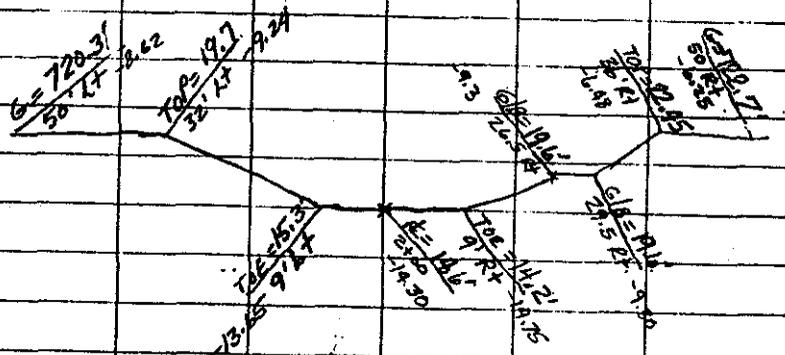


EAST END  
(LOOKING WEST)

SAME AS ABOVE

WASH No. # U.S. 80  
(WEST END PROJ.)

X-SECTION @ STA: 2+00 DOWNSTREAM



CK HUB -13.05 715.00 HUB

728.93

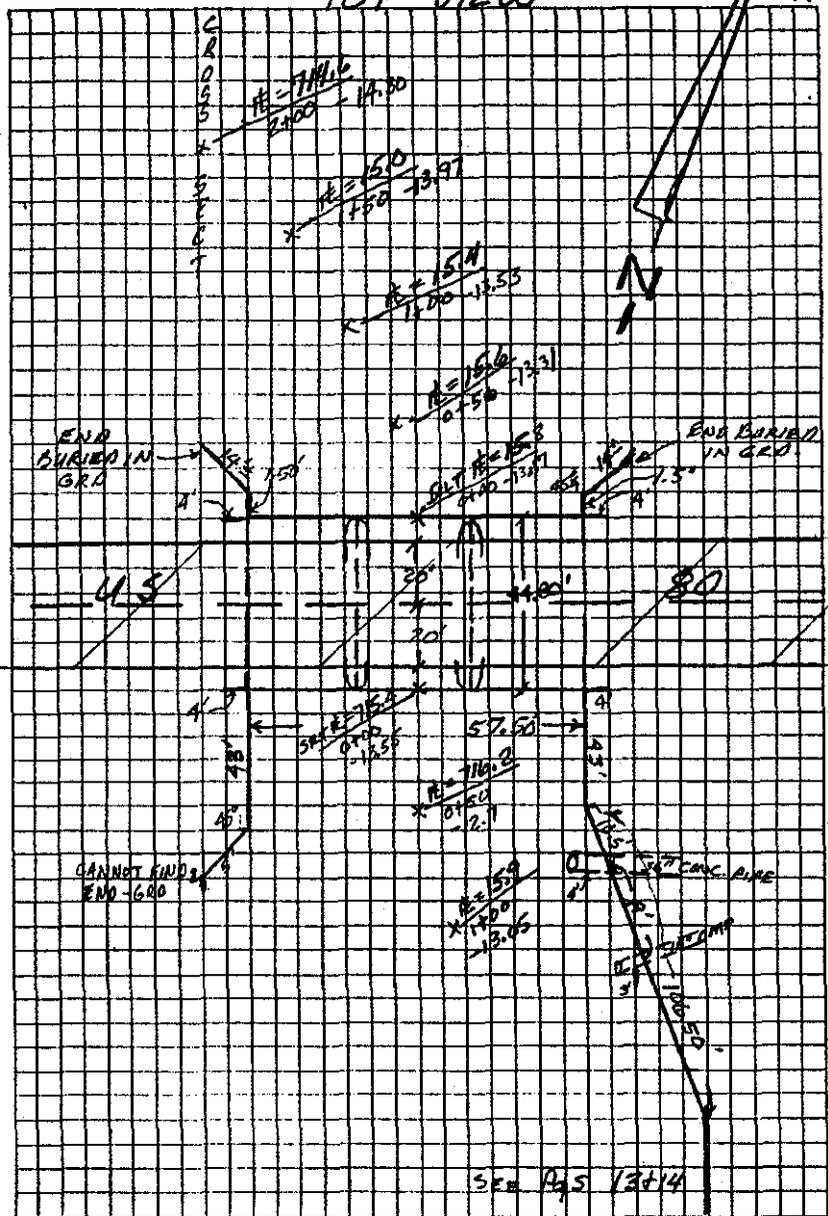
2.06

BM "K354" 1.25

727.688

0.44

"P1"  
TOP VIEW



R.R.

WASH No.		U.S. 80	
Sta 1400			
Lt 14.5 TOE		-13.06	
Lt 15.0 WALL		-5.43	LOOKING SOUTH
Lt 15.5 TOP GRD.		-10.77	
Lt 30' G/B		-10.57	
Lt 50		-10.03	
16 Rt TOE G/B		-12.9	
29 Rt TOE		-11.4	
41 TOP 3' TOE		-4.45	
53 TOE		-8.00	

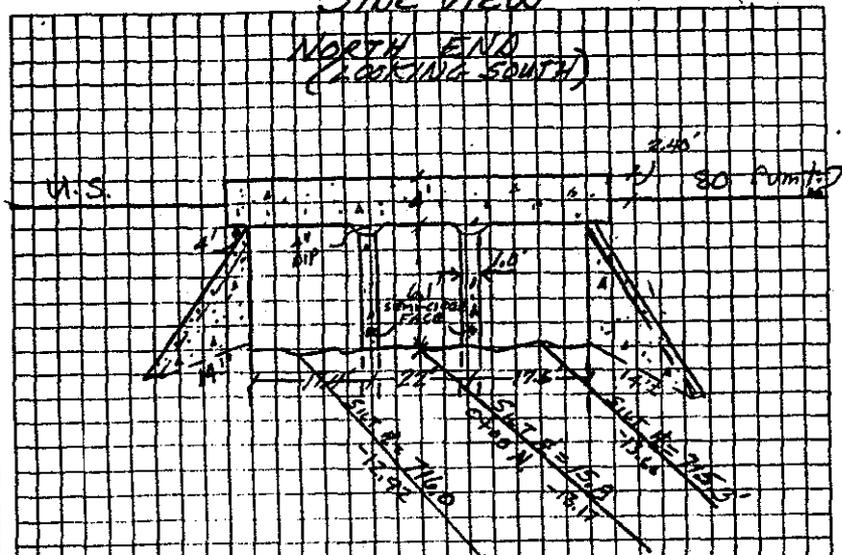
"A"

5.43

12

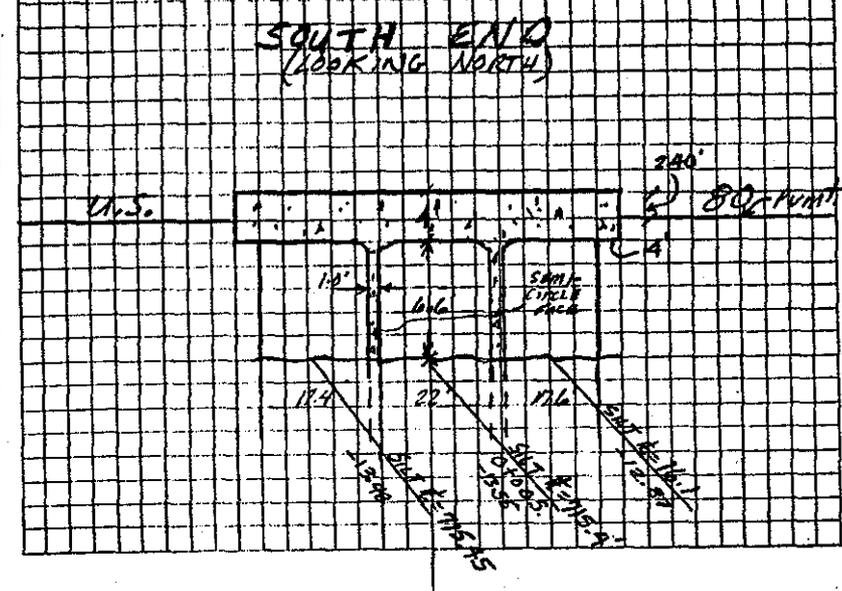
SIDE VIEW

NORTH END  
(LOOKING SOUTH)



NOTE: DUG DOWN 4-5' BELOW SILT, AND NOT FOUND ANY CONC. BOTTOM

SOUTH END  
(LOOKING NORTH)

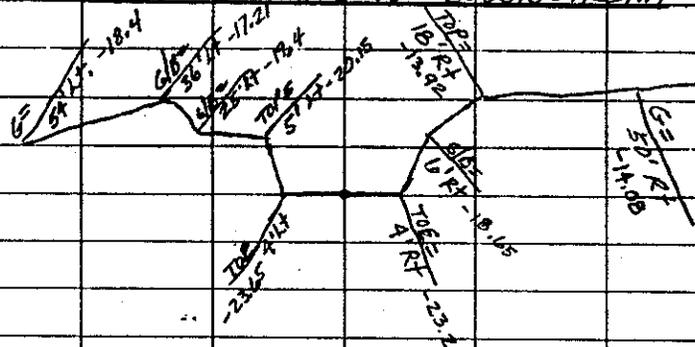






WASH No & GILA BEND CANAL

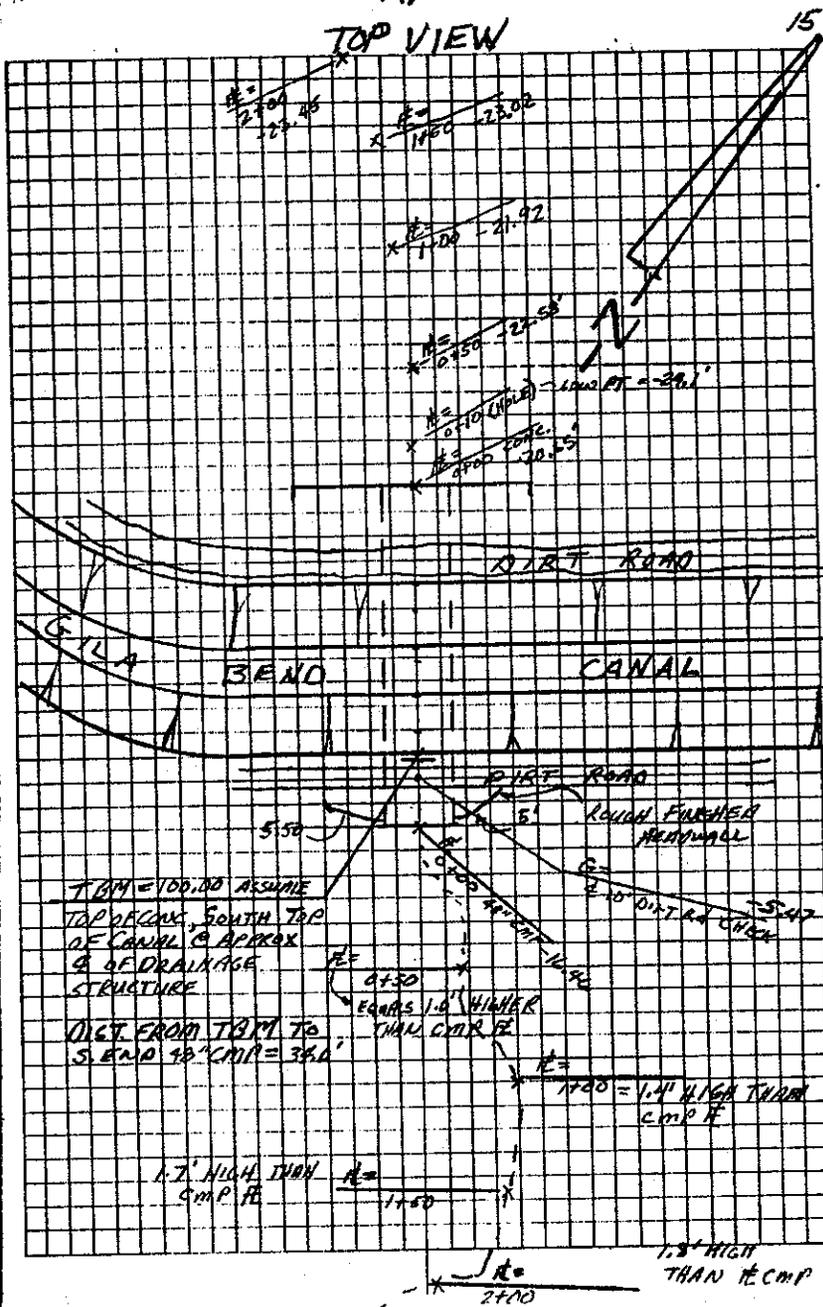
X-SECTION @ STA' 2400 DOWNSTREAM



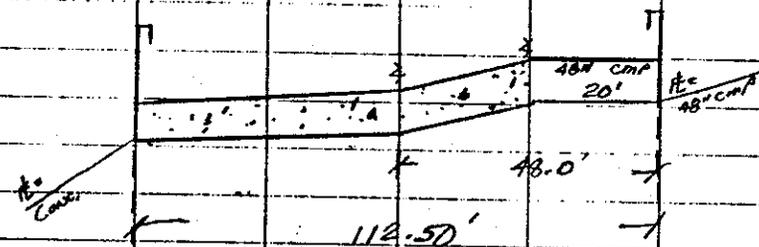
NOTE: 0+50 TO 2+00, SOUTH OF STRUCTURE  
HAD TO USE HAND LEVEL - BM =  
CMP #

	4.88			
TBM	4.13		100.00	
	3.39			
BS	H)	FS	ELEV.	

"R1"  
TOP VIEW



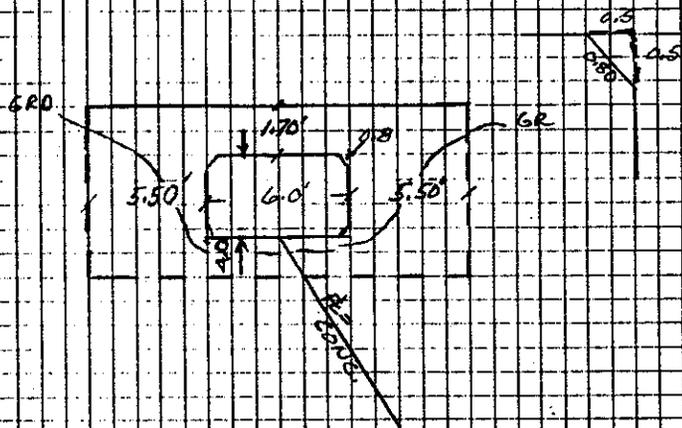
WASH NO 6 GILA BEND CANAL



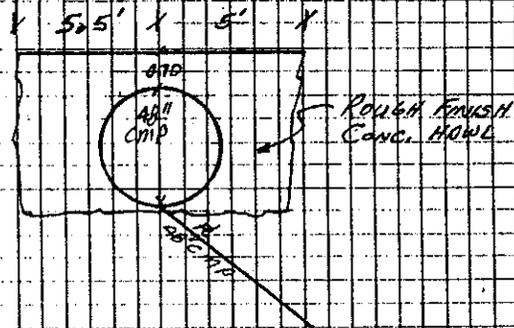
"R."  
SIDE VIEW

16

NORTH END  
(LOOKING SOUTH)



SOUTH END  
(LOOKING NORTH)

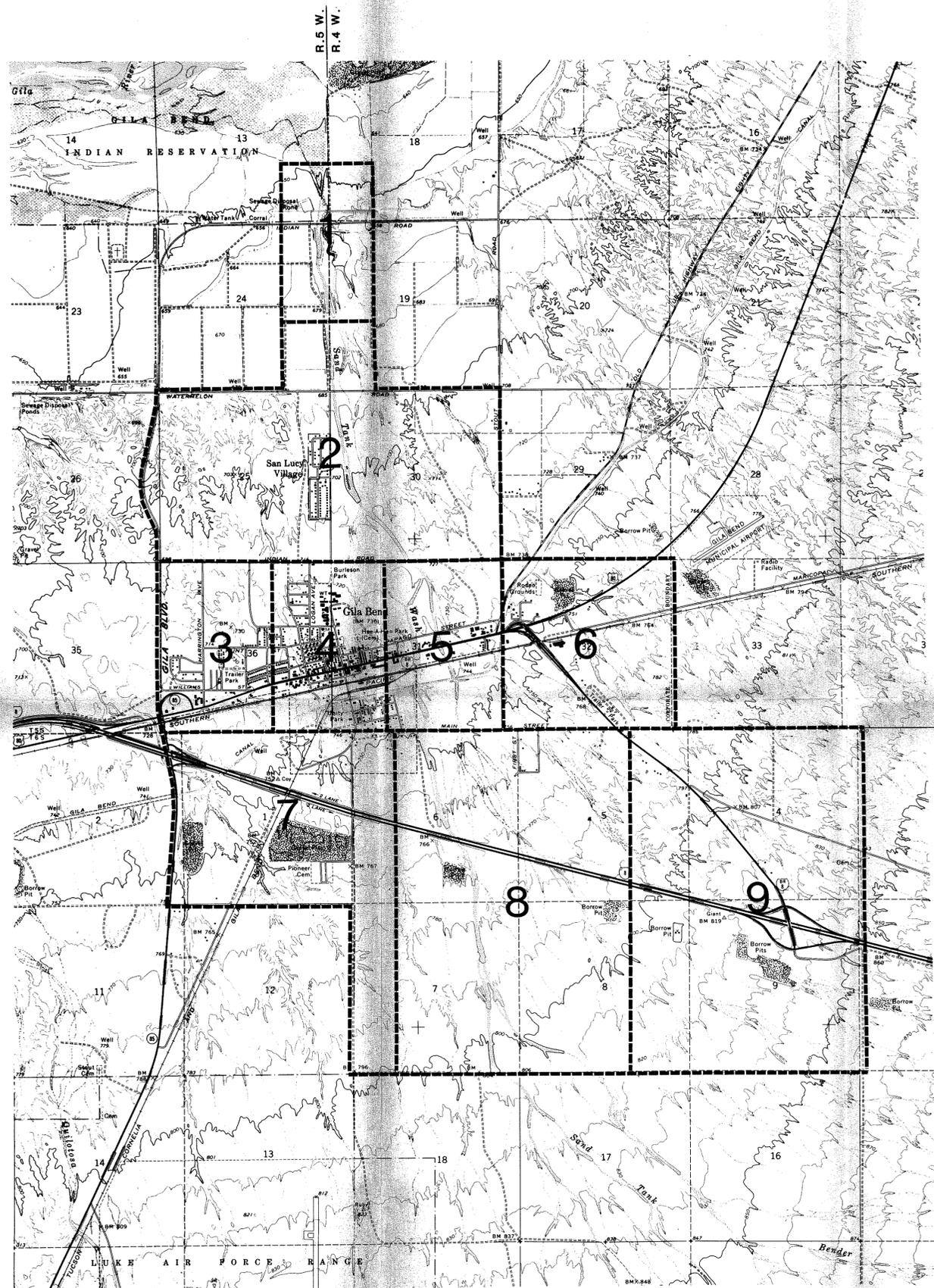


## **SECTION 2: Mapping and Surveying Information**

*2.5 Hydraulic Analysis Maps*

*2.6 FIRM/FHBM Draft Maps*

# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



**SAND TANK WASH**  
**SCOTT AVENUE WASH**  
**BENDER WASH**  
**UNNAMED TRIBUTARY OF BENDER WASH**  
**(NO. 1)**  
**UNNAMED TRIBUTARY OF NO. 1**  
**(NO. 2)**

## **GILA BEND AREA FLOODPLAIN DELINEATION STUDY**

### **FCD 90-67**

  
**VICINITY MAP**  
**1" = 2000'**

AERIAL MAPPING CO., INC.  
FLOWN 9-13-91 & 9-20-91  
STUDY DATE: MARCH 1992

*James E. Mischler*  
4-12-92

**BURGESS  
& NIPLE**  
ENGINEERS  
ARCHITECTS

**FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY**  
FLOOD DELINEATION STUDY OF  
GILA BEND FIS  
F.C.D. CONTRACT NO. 90-67

**LEGEND**

100-YR FLOODPLAIN BOUNDARY	---
FLOODWAY BOUNDARY	---
HYDRAULIC BASE LINE WITH RIVER MILE	M12.0 M13.0
CROSS SECTION	A N=100 Yr WSE A F=Floodway WSE
ELEVATION REFERENCE MARK	ERM#3 X
BASE FLOOD ELEVATIONS	1221'
ZONE DESIGNATIONS	ZONE AE
CORPORATE LIMITS	Corporate Limits
COUNTY, PARISH, STATE OR INTERNATIONAL BOUNDARY	County Boundary

**ELEVATION REFERENCE MARKS**

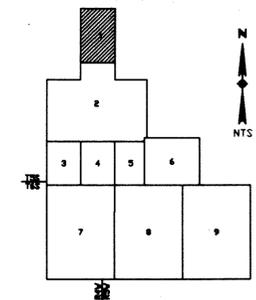
NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
-------------	----------------	----------------------

ERM#1 ERM EL = 659.524

This station is located at the northwest section corner of Section 19. The mark is a brass cap.

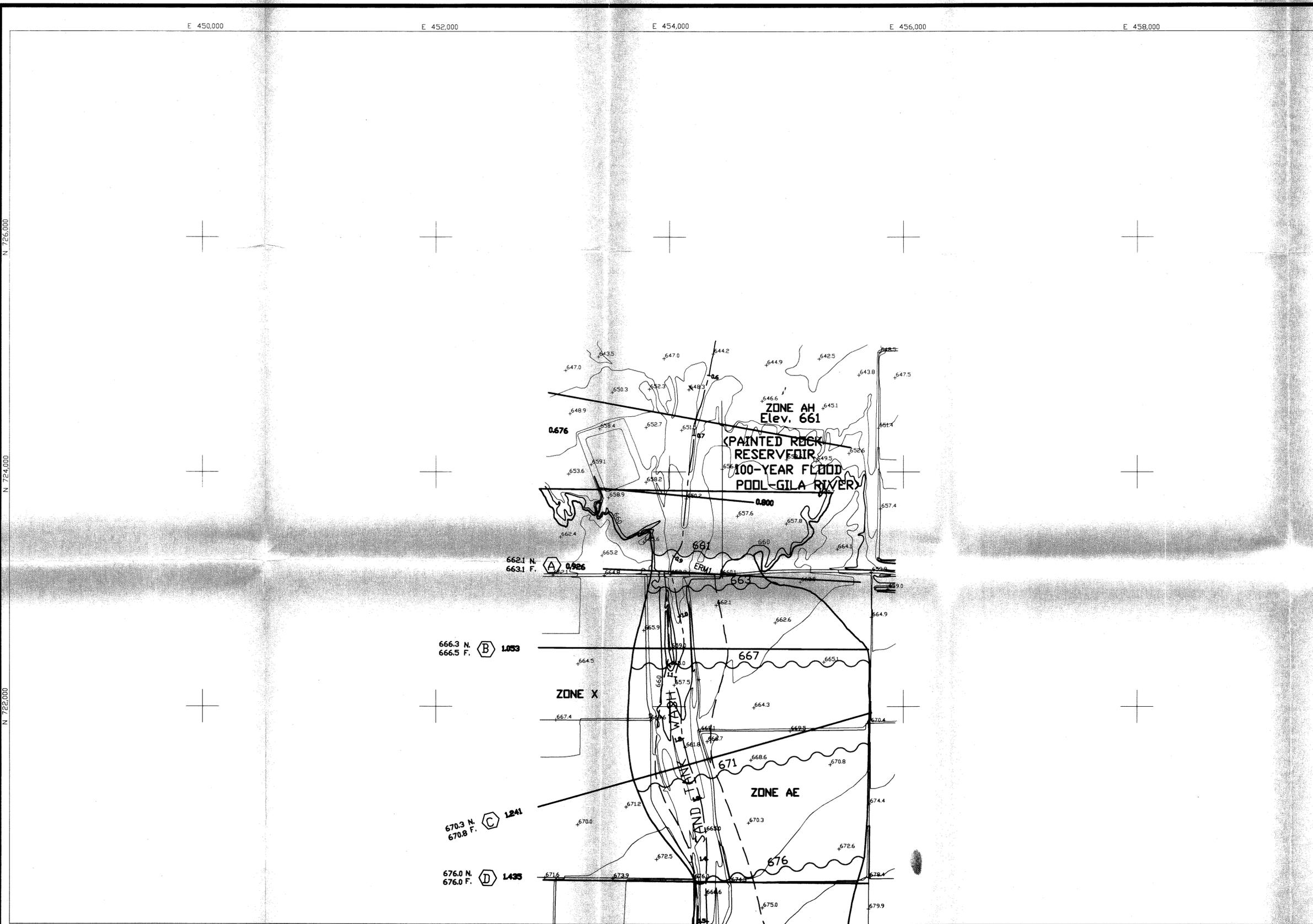
**INDEX MAP**



SCALE: 1" = 400'  
CONTOUR INTERVAL = 4' FEET

**BURGESS & NIPLE, INC.**

DESIGN	BY	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.			RECOMMENDED BY: DATE
PLANS			APPROVED BY: DATE
PLANS CHK.			CHIEF ENGINEER AND GENERAL MANAGER
SUBMITTED BY:			DATE
			SHEET 1 OF 9



PHOTOGRAPHY BY: AERIAL MAPPING CO.  
SURVEY BY: BURGESS & NIPLE  
FLIGHT DATE: 10-25-91

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS  
1" = 400' HORIZONTAL SCALE AND 4' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY  
DATA PROVIDED BY BURGESS & NIPLE

ADJUDICATED REV. DEC. 10, 1991

**FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY**  
FLOOD DELINEATION STUDY OF  
GILA BEND FIS  
F.C.D. CONTRACT NO. 90-67

**LEGEND**

100-YR FLOODPLAIN BOUNDARY	---
FLOODWAY BOUNDARY	---
HYDRAULIC BASE LINE WITH RIVER MILE	M12.0 M13.0
CROSS SECTION	A N=100 Yr WSE F=Floodway WSE
ELEVATION REFERENCE MARK	ERM3 X
BASE FLOOD ELEVATIONS	1221
ZONE DESIGNATIONS	ZONE AE
CORPORATE LIMITS	Corporate Limits
COUNTY, PARISH, STATE OR INTERNATIONAL BOUNDARY	County Boundary

**ELEVATION REFERENCE MARKS**

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
-------------	----------------	----------------------

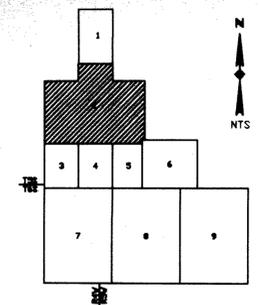
ERM#2 ERM EL = 685.204

This station is located at the intersection of 307 Avenue on Watermelon Road. The mark is a brass cap in a hand hole "Maricopa County Section Corner (24,19,25,30).

ERM#3 ERM EL = 717.889

This station is located 41.60 feet south of intersection of 307 Avenue and Indian Road. Then 69.60 feet west. The mark is a brass cap stamped M.C.F.C.D. E.R.M. EL. 717.889 R.L.S. 18436.

**INDEX MAP**



-400 0' 400 800  
SCALE: 1" = 400'  
CONTOUR INTERVAL = 4' FEET

**BURGESS & NIPLE, INC.**

DESIGN	BY	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.			
PLANS			
PLANS CHK.			
SUBMITTED BY:			
RECOMMENDED BY:			DATE
APPROVED BY:			DATE
CHIEF ENGINEER AND GENERAL MANAGER			
SHEET			2 OF 9



SEE SHEET 4

COMMUNITY DESIGNATED  
FLOOD HAZARD ZONE



PHOTOGRAPHY BY AERIAL MAPPING CO.  
SURVEY BY BURGESS & NIPLE  
PLOT DATE: 10-25-91

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS  
1" = 400' HORIZONTAL SCALE AND 4' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY  
DATA PROVIDED BY BURGESS & NIPLE

ARIZONA REG. DEC. 10, 1991

**FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY  
FLOOD DELINEATION STUDY OF  
GILA BEND FIS  
F.C.D. CONTRACT NO. 90-67**

**LEGEND**

- 100-YR FLOODPLAIN BOUNDARY
- FLOODWAY BOUNDARY
- HYDRAULIC BASE LINE WITH RIVER MILE
- CROSS SECTION
- ELEVATION REFERENCE MARK
- BASE FLOOD ELEVATIONS
- ZONE DESIGNATIONS
- CORPORATE LIMITS
- COUNTY, PARISH, STATE OR INTERNATIONAL BOUNDARY

**ELEVATION REFERENCE MARKS**

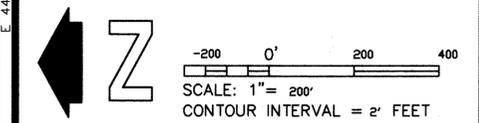
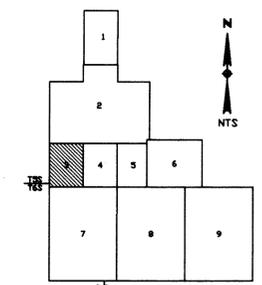
NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
-------------	----------------	----------------------

ERM#4 ERM EL = 727.682

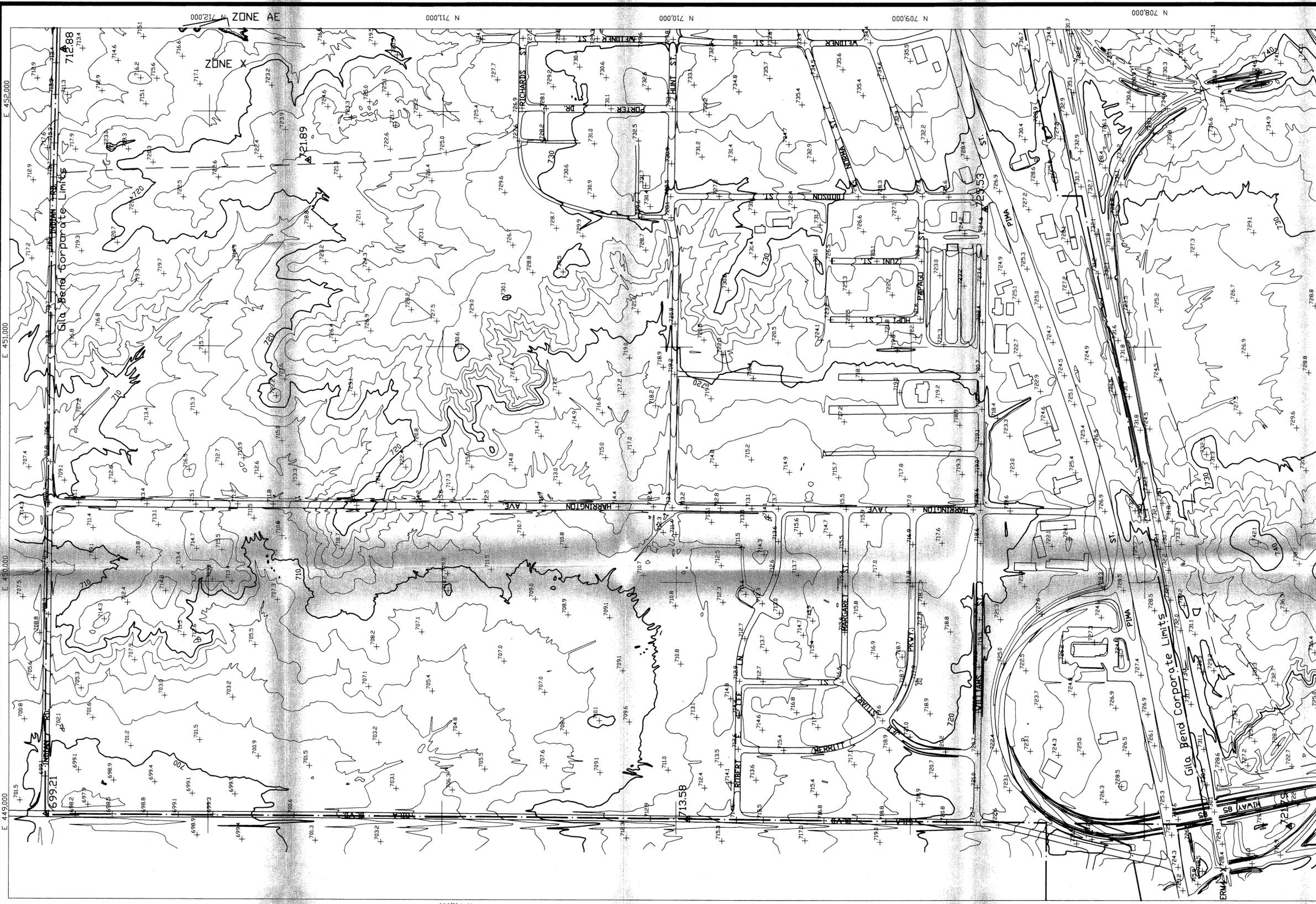
This station is located 1.1 miles west along the Southern Pacific Railroad from the depot at Gila Bend to a bridge, 8 feet north of the north rail of the north track set in a drill hole in the top of the northwest concrete abutment and about 5 inches lower than the track. The mark is a brass cap stamped Coast & Geodetic Survey K354.

**INDEX MAP**



**BURGESS & NIPLÉ, INC.**

DESIGN	BY	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.			
PLANS			RECOMMENDED BY: DATE
PLANS CHK.			APPROVED BY: DATE
SUBMITTED BY:			CHIEF ENGINEER AND GENERAL MANAGER
		DATE:	SHEET 3 OF 9



PHOTOGRAPHY BY: AERIAL MAPPING CO.  
SURVEY BY: BURGESS & NIPLÉ  
FLIGHT DATE: 10-25-91

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS  
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY  
DATA PROVIDED BY BURGESS & NIPLÉ

AONJMB REV. DEC. 10, 1991

**FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY**  
FLOOD DELINEATION STUDY OF  
GILA BEND FIS  
F.C.D. CONTRACT NO. 90-67

**LEGEND**

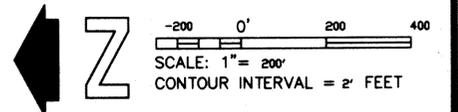
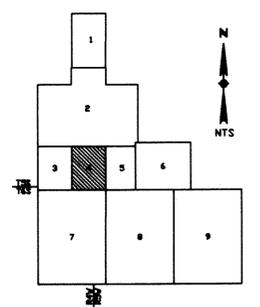
- 100-YR FLOODPLAIN BOUNDARY
- FLOODWAY BOUNDARY
- HYDRAULIC BASE LINE WITH RIVER MILE
- CROSS SECTION
- ELEVATION REFERENCE MARK
- BASE FLOOD ELEVATIONS
- ZONE DESIGNATIONS
- CORPORATE LIMITS
- COUNTY, PARISH, STATE OR INTERNATIONAL BOUNDARY

**ELEVATION REFERENCE MARKS**

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

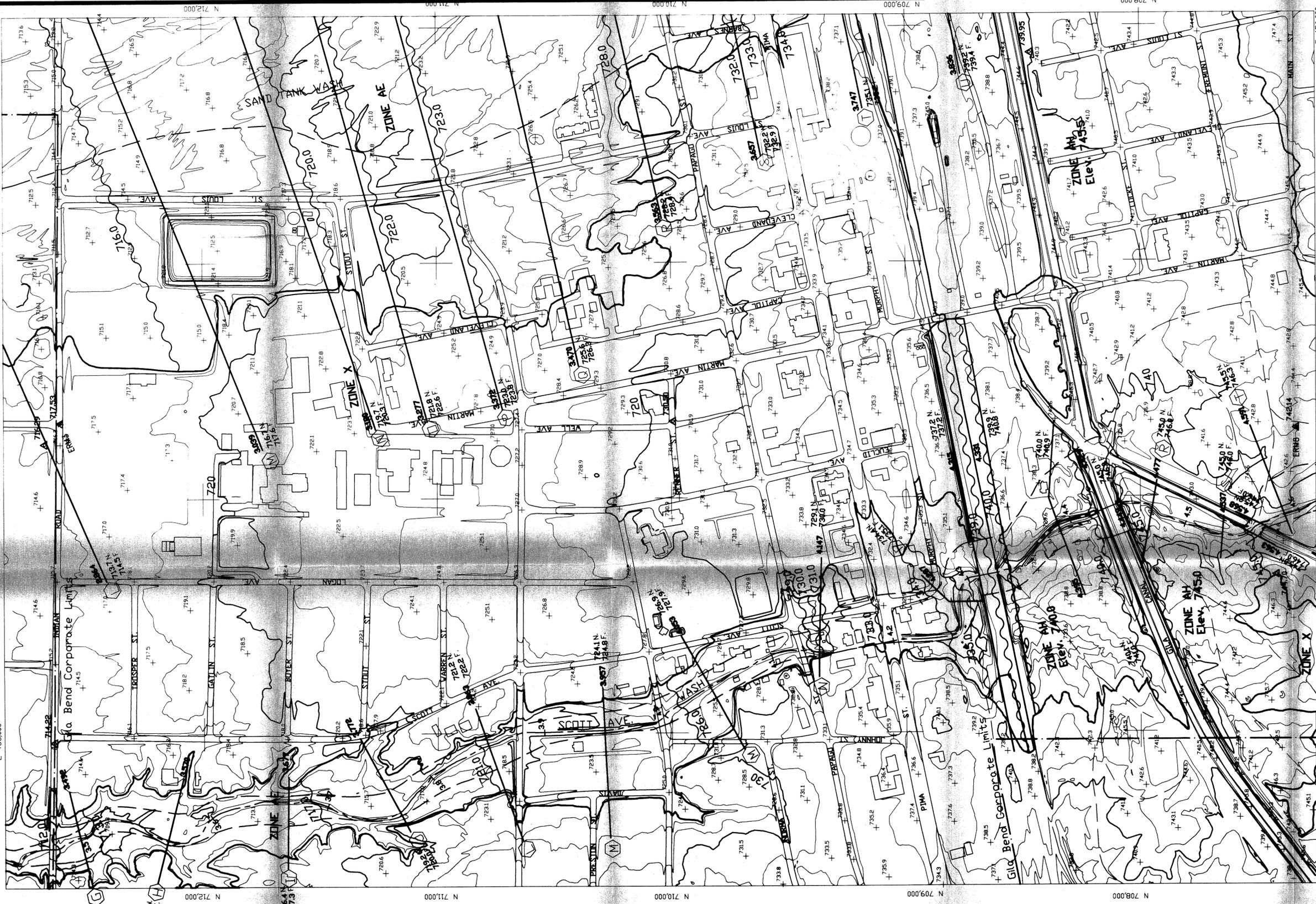
I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM#3	ERM EL = 717.889	This station is located 41.60 feet south of intersection at 307 Avenue and Indian Road. Then 69.60 feet west. The mark is a brass cap stamped M.C.F.C.D. E.R.M. EL. 717.889 R.L.S. 18436.
ERM#8	ERM EL = 742.589	This station is located at Section Corner (36.31,1.6). The mark is a GLD Brass Cap.

**INDEX MAP**



**BURGESS & NIPLE, INC.**

DESIGN	BY	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.			RECOMMENDED BY:
PLANS			DATE
PLANS CHK.			APPROVED BY:
SUBMITTED BY:			DATE
			CHIEF ENGINEER AND GENERAL MANAGER
			SHEET 4 OF 9



PHOTOGRAPHY BY AERIAL MAPPING CO.  
SURVEY BY BURGESS & NIPLE  
FLIGHT DATA 8-28-81

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS  
1" = 200' HORIZONTAL SCALE AND 2" = 200' VERTICAL SCALE AND IS BASED ON GROUND CONTROL SURVEY  
DATA PROVIDED BY BURGESS & NIPLE.

AWLMB REV. DEC. 10, 1991

# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## FLOOD DELINEATION STUDY OF GILA BEND FIS

### F.C.D. CONTRACT NO. 90-67

#### LEGEND

100-YR FLOODPLAIN BOUNDARY	---
FLOODWAY BOUNDARY	---
HYDRAULIC BASE LINE WITH RIVER MILE	M12.0 M13.0
CROSS SECTION	A N=100 Yr WSE F=Floodway WSE
ELEVATION REFERENCE MARK	ERM3 X
BASE FLOOD ELEVATIONS	1221'
ZONE DESIGNATIONS	ZONE AE
CORPORATE LIMITS	Corporate Limits
COUNTY, PARISH, STATE OR INTERNATIONAL BOUNDARY	County Boundary

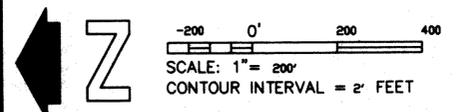
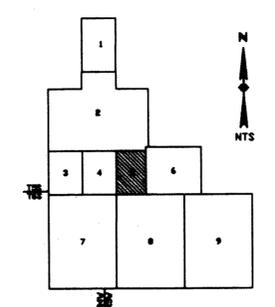
#### ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
-------------	----------------	----------------------

ERM#5 ERM EL = 741.855  
 This station is located 0.85 miles east along the Southern Pacific Railroad from the northwest rail of the main track, 134 feet southwest of the center of the junction of U.S. Highway 80 and Arlington - Hasayampa Road, 105 feet southeast of the centerline of U.S. Highway 80-84, 191 feet southwest of the south corner of a concrete highway bridge over the Gila Bend Canal, 5 feet south of a large metal post which supports a signboard, 1.0 foot north of a metal witness post, about 3 feet below the level of the highway and set in the top of a concrete post projecting 6 inches. The mark is a brass cap stamped U.S. Coast and Geodetic Survey 664.

#### INDEX MAP



#### BURGESS & NIPLE, INC.

DESIGN	BY	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.			RECOMMENDED BY:
PLANS			DATE
PLANS CHK.			APPROVED BY:
SUBMITTED BY:			DATE
			CHIEF ENGINEER AND GENERAL MANAGER
			SHEET 5 OF 9



PHOTOGRAPHY BY: AERIAL MAPPING CO.  
 SURVEY BY: BURGESS & NIPLE  
 FLIGHT DATE: 10-25-91

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS  
 1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY  
 DATA PROVIDED BY BURGESS & NIPLE.

ADJ. 1000 REV. DEC. 10, 1991

**FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY**  
FLOOD DELINEATION STUDY OF  
GILA BEND FIS  
F.C.D. CONTRACT NO. 90-67

**LEGEND**

100-YR FLOODPLAIN BOUNDARY	---
FLOODWAY BOUNDARY	---
HYDRAULIC BASE LINE WITH RIVER MILE	M12.0 M13.0
CROSS SECTION	A N=100 Yr WSE A F=Floodway WSE
ELEVATION REFERENCE MARK	ERM.3 X
BASE FLOOD ELEVATIONS	~1221~
ZONE DESIGNATIONS	ZONE AE
CORPORATE LIMITS	Corporate Limits
COUNTY, PARISH, STATE OR INTERNATIONAL BOUNDARY	County Boundary

**ELEVATION REFERENCE MARKS**

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
-------------	----------------	----------------------

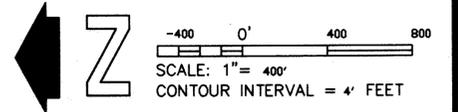
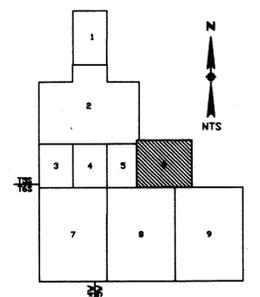
ERM#5 ERM EL = 741.885

This station is located 0.85 miles east along the Southern Pacific Railroad from the northwest rail of the main track, 134 feet southwest of the center of the junction of U.S. Highway 80 and Arlington - Hassayampa Road, 105 feet southeast of the centerline of U.S. Highway 80-84, 191 feet southwest of the south corner of a concrete highway bridge over the Gila Bend Canal, 8 feet south of a large metal post which supports a signboard, 1.0 foot north of a metal witness post, about 3 feet below the level of the highway and set in the top of a concrete post projecting 6 inches. The mark is a brass cap stamped U.S. Coast and Geodetic Survey B84.

ERM#6 ERM EL = 764.014

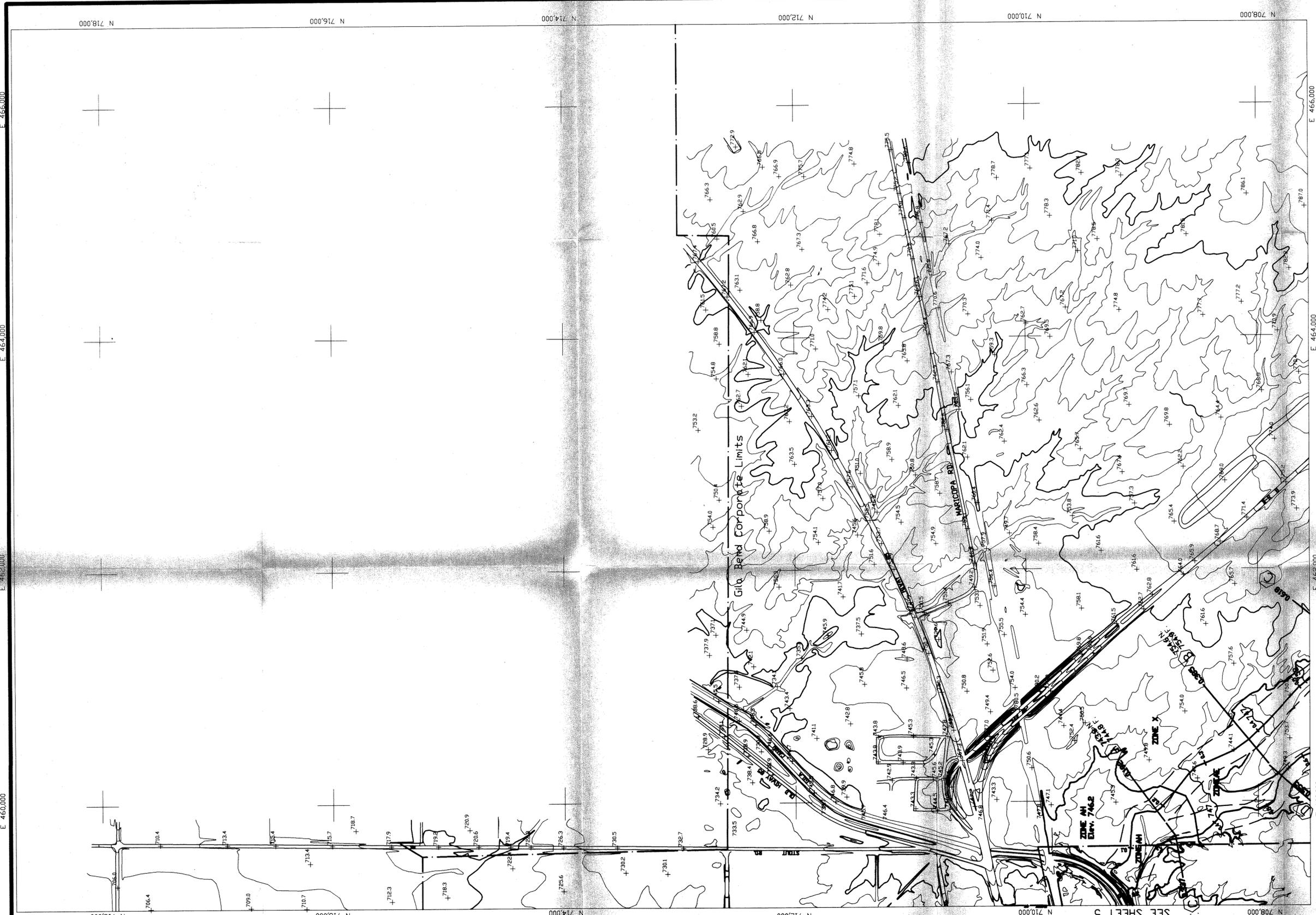
This station is located 1.7 miles east along the Southern Pacific Railroad from the station at Gila Bend in S32 T5S R4W, 4 rails east of railroad bridge 857.41, 39 feet north of the north rail of the main track, 91 feet south of the centerline of a groveled road, 9 feet west of a telephone pole in line with a row of poles, 1.6 feet east of a metal witness post, about 2 feet below the level of the tracks and set in the top of a concrete post projecting 5 inches. The mark is a brass cap stamped "US Coast and Geodetic Survey N285".

**INDEX MAP**



**BURGESS & NIPLÉ, INC.**

DESIGN	BY	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.			
PLANS			RECOMMENDED BY: DATE
PLANS CHK.			APPROVED BY: DATE
SUBMITTED BY:			CHEF ENGINEER AND GENERAL MANAGER
			SHEET 6 OF 9

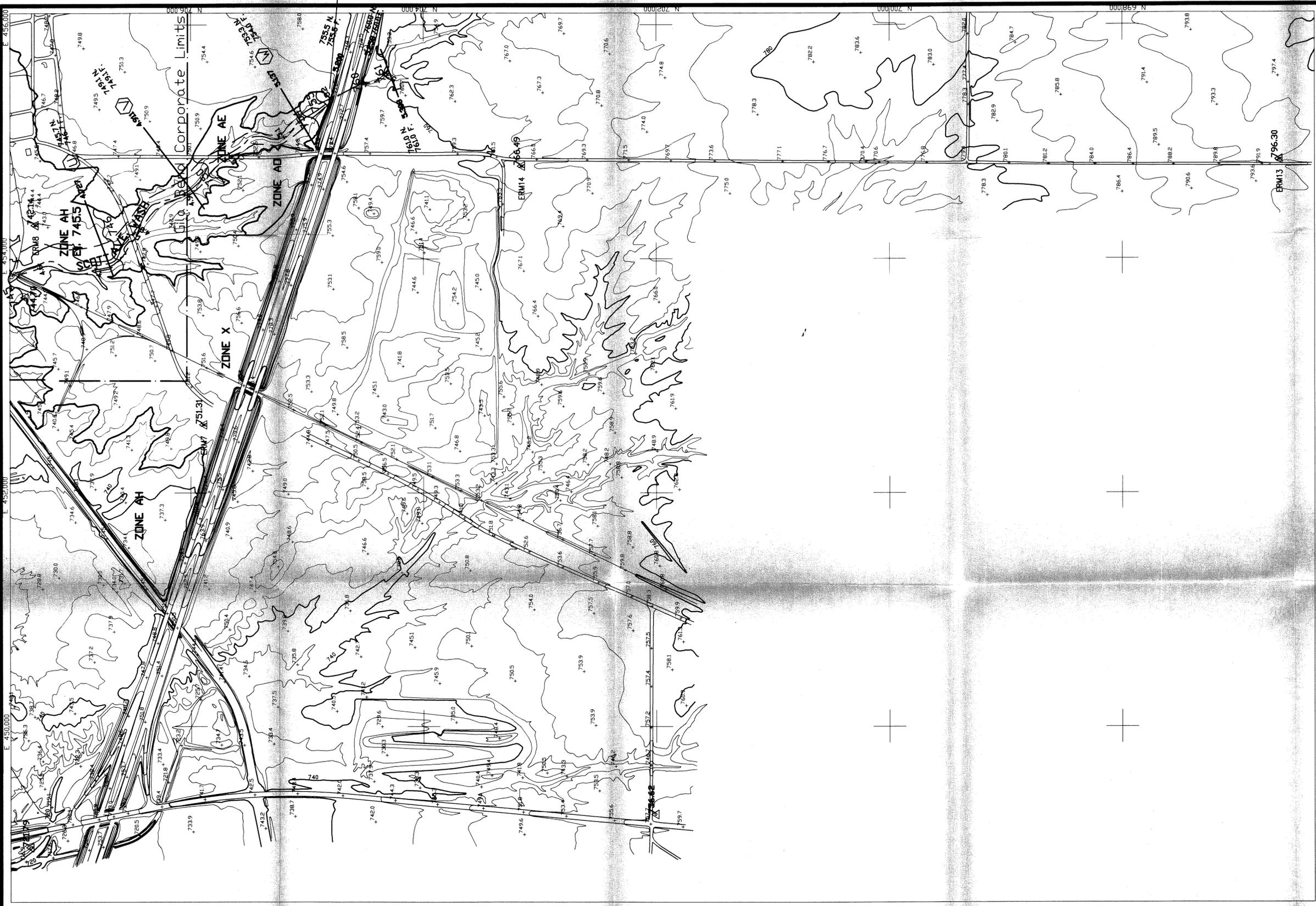


PHOTOGRAPHY BY: AERIAL MAPPING CO.  
SURVEY BY: BURGESS & NIPLÉ  
FLIGHT DATE: 10-25-91

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS  
1" = 400' HORIZONTAL SCALE AND 4' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY  
DATA PROVIDED BY BURGESS & NIPLÉ

ADJ. 10/88 REV. DEC. 10, 1991

END OF DETAIL STUDY



# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## FLOOD DELINEATION STUDY OF GILA BEND FIS

### F.C.D. CONTRACT NO. 90-67

**LEGEND**

100-YR FLOODPLAIN BOUNDARY	---
FLOODWAY BOUNDARY	---
HYDRAULIC BASE LINE WITH RIVER MILE	M12.0 M13.0
CROSS SECTION	A N=100 Yr WSE F=Floodway WSE
ELEVATION REFERENCE MARK	ERM3 X
BASE FLOOD ELEVATIONS	1221
ZONE DESIGNATIONS	ZONE AE
CORPORATE LIMITS	Corporate Limits
COUNTY, PARISH, STATE OR INTERNATIONAL BOUNDARY	County Boundary

**ELEVATION REFERENCE MARKS**

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

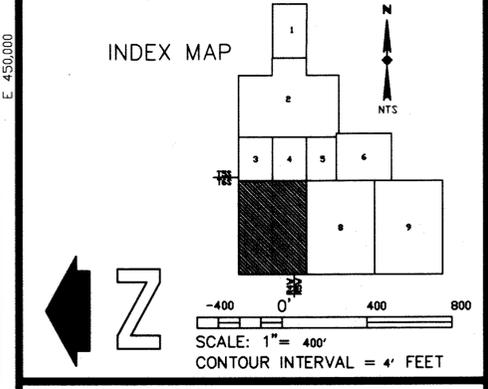
I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
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**ERM#7** ERM EL = 751.914  
 "Standard Triangulation Disk" - This station is located 1.0 miles south on State Highway 85 from the junction of U.S. Highway 80 at Gila Bend, 150 feet west of the centerline of the highway, 56.78 feet northwest of R.M.2, 55.45 feet northwest of R.M.1, 4 feet north of a metal witness post with sign, set in a cylinder concrete post projecting 4 inches. The mark is a brass cap stamped "Coast and Geodetic Survey COY".

**ERM#8** ERM EL = 742.589  
 This station is located at Section Corner (36,31,1,6). The mark is a GLO Brass Cap.

**ERM#13** ERM EL = 795.674  
 This station is located 0.3 miles south along State Highway 85 from the Southern Pacific Company Railroad Station at Gila Bend; thence 1.9 miles south along a graded road at the "T" junction of a graded road leading east of a fence corner, 51 feet north of the centerline of the road east, 45 feet east of the centerline of the road south, 36 feet north of the fence corner 2.8 feet north of a witness post 2.4 feet west of a fence, and set in the top of a concrete post projecting 0.6 feet above the ground and level with the road. The mark is a brass cap stamped "U.S. Coast & Geodetic Survey N298".

**ERM#14** ERM EL = 766.895  
 This station is located 0.3 miles south along State Highway 85 from the Southern Pacific Company Railroad Station at Gila Bend. Thence 0.7 mile south along a graded road on a small barren patch, 59 feet south of the centerline of the road, 2.4 feet north of a witness post and set in the top of a concrete post projecting 0.5 foot above the ground and about 1 feet higher than the road. The mark is a brass cap stamped "U.S. Coast and Geodetic Survey M298".



PHOTOGRAPHY BY: AERIAL MAPPING CO.  
 SURVEY BY: BURGESS & NIPLE  
 FLIGHT DATE: 10-25-91

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS  
 1" = 400' HORIZONTAL SCALE AND 4' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY  
 DATA PROVIDED BY BURGESS & NIPLE

**BURGESS & NIPLE, INC.**

DESIGN	BY	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.			
PLANS			DATE
PLANS CHK.			DATE
SUBMITTED BY:			CHIEF ENGINEER AND GENERAL MANAGER
			SHEET 7 OF 9

ADJ. 10/28/98 REV. DEC. 10, 1991

**FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY**  
FLOOD DELINEATION STUDY OF  
GILA BEND FIS  
F.C.D. CONTRACT NO. 90-67

**LEGEND**

100-YR FLOODPLAIN BOUNDARY	---
FLOODWAY BOUNDARY	---
HYDRAULIC BASE LINE WITH RIVER MILE	M12.0 M13.0
CROSS SECTION	A N=100 Yr WSE F=Floodway WSE A
ELEVATION REFERENCE MARK	ERM3 X
BASE FLOOD ELEVATIONS	1221'
ZONE DESIGNATIONS	ZONE AE
CORPORATE LIMITS	Corporate Limits
COUNTY, PARISH, STATE OR INTERNATIONAL BOUNDARY	County Boundary

**ELEVATION REFERENCE MARKS**

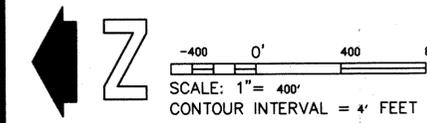
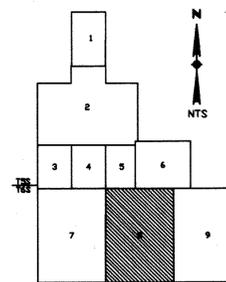
NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
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ERM#16 ERM EL = 804.277

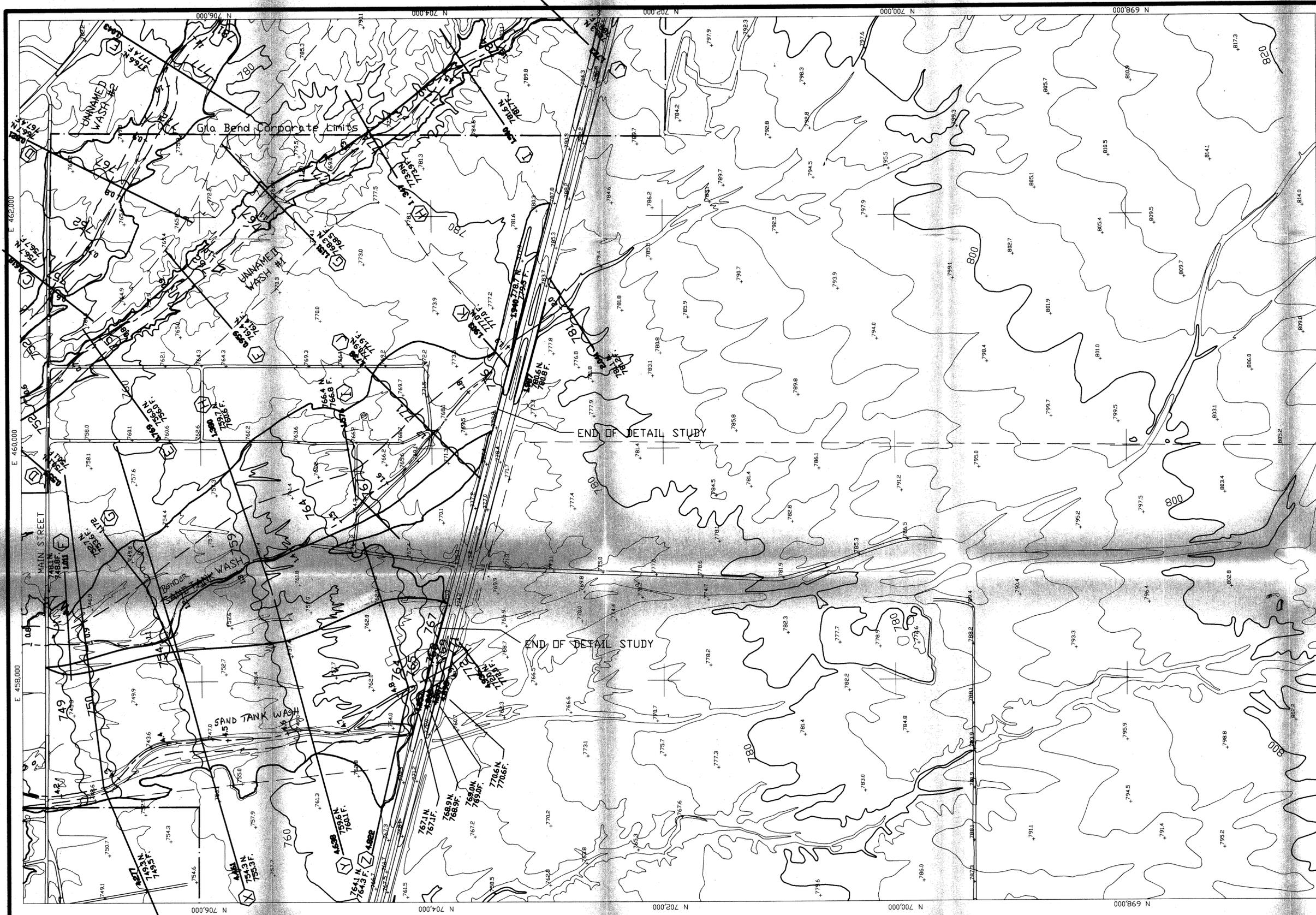
This station is located 0.3 mile south along State Highway 85 from the Southern Pacific Railroad Station at Gila Bend. Thence 1.9 miles south along a graded road, thence 0.7 mile east along a graded road at a gravel pit and a large mound of dirt at the junction of a track road leading south along a fence line, 86 feet north of the remains of a fence corner, 111 feet north of the junction of the tracked road, 18 feet east of the dirt mound, 5.0 feet northwest of a 6 foot high wooden post, 1.6 feet southwest of a witness post, set in the top of a concrete post projecting 0.4 foot above the ground and level with the roads. The mark is a brass cap stamped "U.S. Coast & Geodetic Survey R60".

**INDEX MAP**



**BURGESS & NIPLE, INC.**

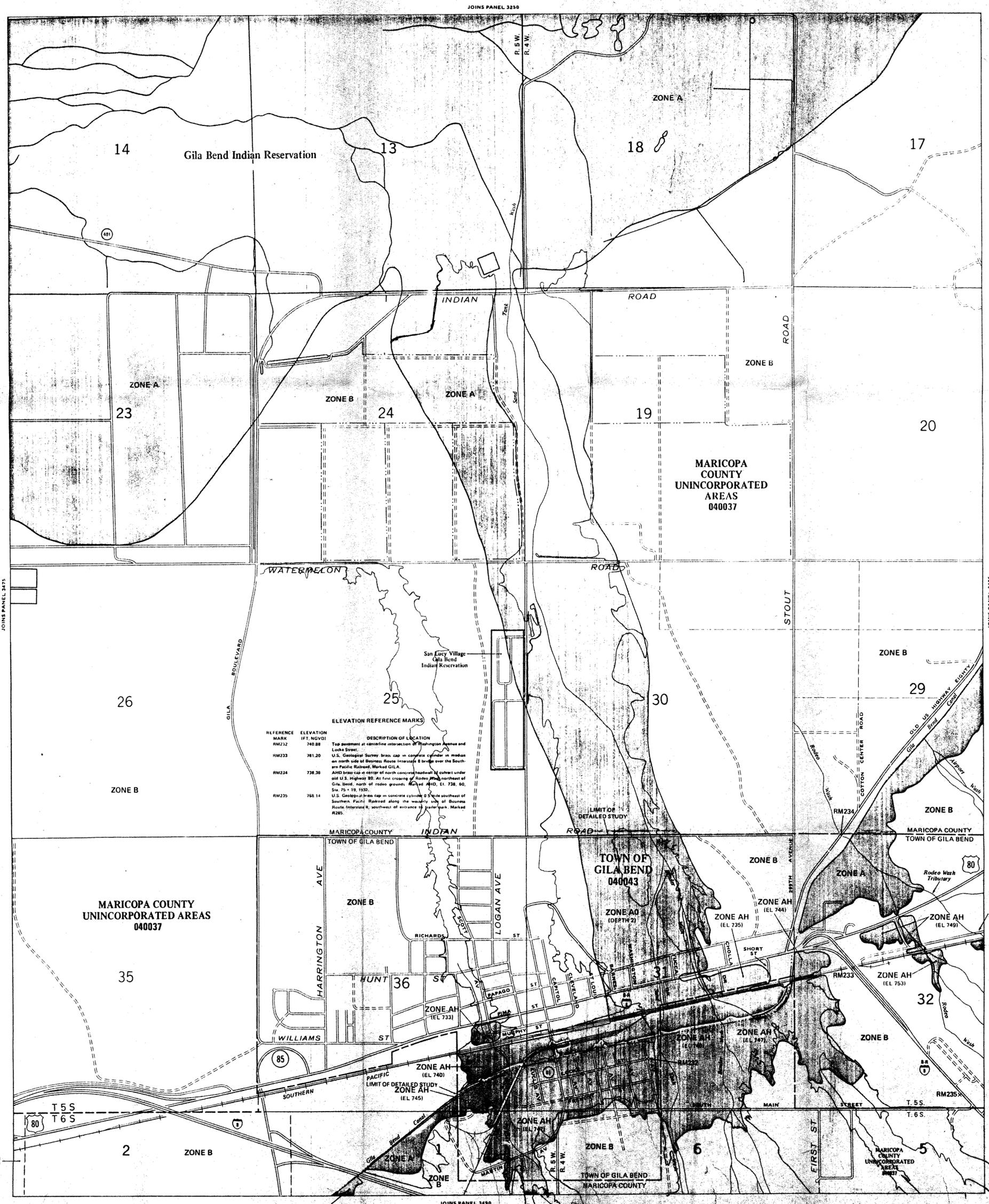
DESIGN	BY	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.			RECOMMENDED BY:
PLANS			DATE
PLANS CHK.			APPROVED BY:
SUBMITTED BY:			DATE
			CHEF ENGINEER AND GENERAL MANAGER
			SHEET 8 OF 9



PHOTOGRAPHY BY: AERIAL MAPPING CO.  
SURVEY BY: BURGESS & NIPLE  
FLIGHT DATE: 10-25-91

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS  
1" = 400' HORIZONTAL SCALE AND 4' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY  
DATA PROVIDED BY BURGESS & NIPLE

ADMJRB REV. DEC. 10, 1991



**KEY TO MAP**

500-Year Flood Boundary	Zone B
100-Year Flood Boundary	Zone B
Zone Designations	Zone B
100-Year Flood Boundary	Zone B
500-Year Flood Boundary	Zone B
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation In Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7x
Zone D Boundary	
River Mile	M1.5

\*\* Referenced to the National Geodetic Vertical Datum of 1929

- EXPLANATION OF ZONE DESIGNATIONS**
- ZONE**
- A** Areas of 100-year flood, base flood elevations and flood hazard factors not determined.
  - A0** Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
  - AH** Areas of 100-year shallow flooding, where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
  - A1-A30** Areas of 100-year flood, base flood elevations and flood hazard factors determined.
  - A99** Areas of 100-year flood to be protected by flood protection systems under construction; base flood elevations and flood hazard factors not determined.
  - B** Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
  - C** Areas of minimal flooding. (No shading)
  - D** Areas of undetermined, but possible, flood hazards.
  - V** Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
  - V1-V30** Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

**NOTES TO USER**

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly in rural and unincorporated areas of small size, or all planimetric features outside Special Flood Hazard Areas.

Certain areas not in the Special Flood Hazard Areas (Zones A and V) may be protected by flood control structures.

Coastal base flood elevations apply only landward of the shoreline.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have been changed subsequent to the issuance of the map.

For community map revision history prior to countywide mapping, see Section 5.4 of the Flood Insurance Study Report.

For adjoining map panels, see separately printed Map Index.

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP: APRIL 15, 1988

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown on this map to determine when actual rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620.



**NATIONAL FLOOD INSURANCE PROGRAM**

**FIRM FLOOD INSURANCE RATE MAP**

**MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS**

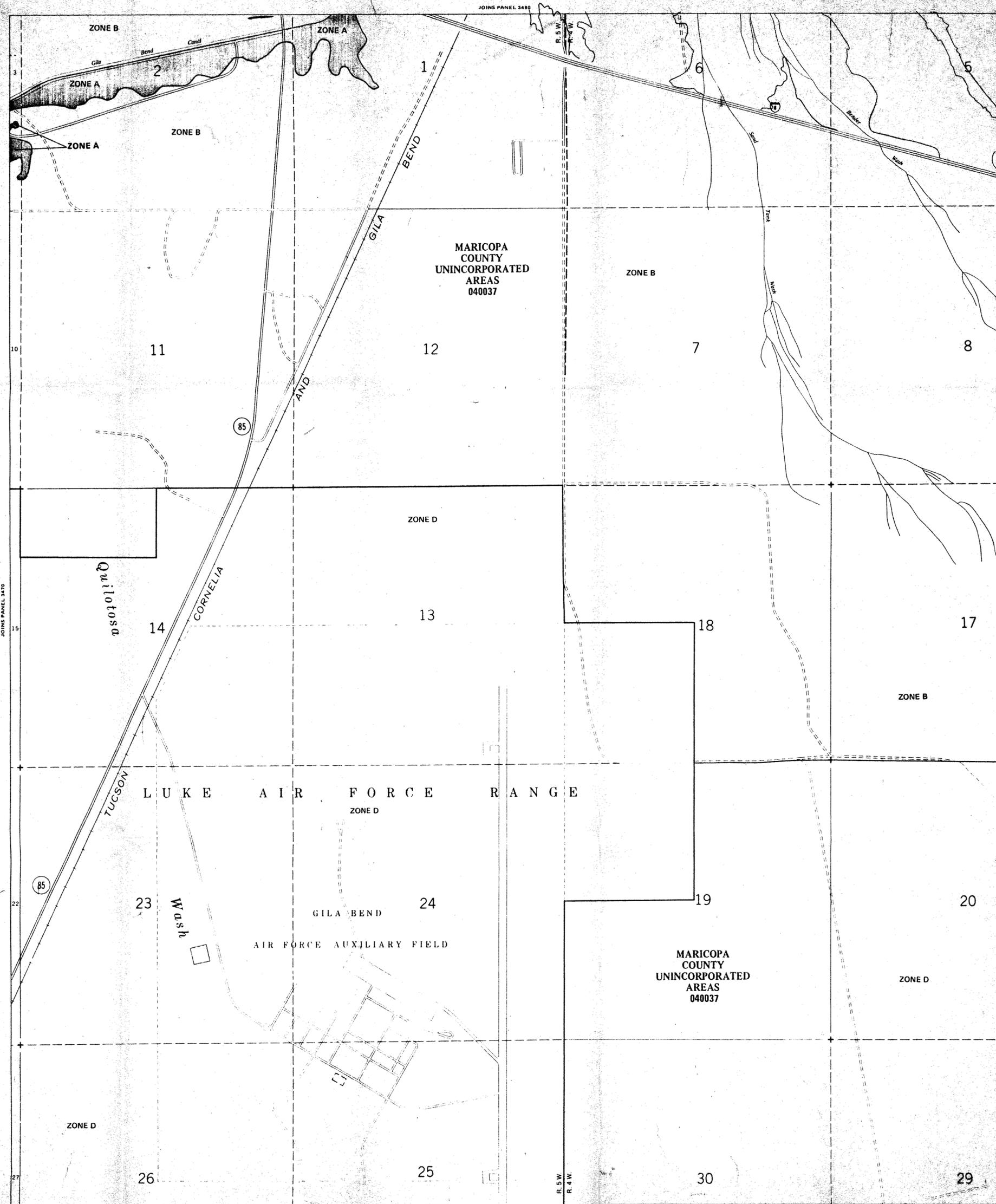
**PANEL 3480 OF 4350**

CONTAINS	COMMUNITY	NUMBER	PANEL	SUFFIX
GILA BEND, TOWN OF	040037	3480	D	
MARICOPA COUNTY, UNINCORPORATED AREAS	040037	3480	D	

**MAP NUMBER 04013C3480 D**

**EFFECTIVE DATE: APRIL 15, 1988**

Federal Emergency Management Agency



**KEY TO MAP**

100-Year Flood Boundary	ZONE A
100-Year Flood Boundary	ZONE B
Zone Designation	
100-Year Flood Boundary	ZONE D
500-Year Flood Boundary	
Base Flood Elevation Same With Elevation in Feet	11.5
Base Flood Elevation in Feet With Uniform Within Zone**	11.5
Elevation Reference Mark	BM7
Zone D Boundary	
River Mile	401.5

\*\*Referenced to the National Geodetic Vertical Datum of 1929

**EXPLANATION OF ZONE DESIGNATIONS**

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A30	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

**NOTES TO USER**

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas.

Certain areas not in the Special Flood Hazard Areas (zones A and V) may be protected by flood control structures.

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For community map revision history prior to countywide mapping, see Section 5.4 of the Flood Insurance Study Report.

For adjoining map panels, see separately printed Map Index.

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP:  
APRIL 15, 1988

EFFECTIVE DATE(S) OF REVISION IS( ) TO THIS PANEL:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine when actual rates apply to structures in the zones where elevations of depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620.



**NATIONAL FLOOD INSURANCE PROGRAM**

**FIRM FLOOD INSURANCE RATE MAP**

**MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS**

**PANEL 3490 OF 4350**

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY UNINCORPORATED AREAS	4000	3490	D

**MAP NUMBER 04013C3490 D**

**EFFECTIVE DATE: APRIL 15, 1988**

Federal Emergency Management Agency

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 6 SOUTH, RANGE 4 WEST AND TOWNSHIP 6 SOUTH, RANGE 5 WEST

**SEE PLAN ROLL**