AGUA FRIA RIVER FLOODPLAIN DELINEATION RE-STUDY

Between the Gila River Confluence and the New Waddell Dam

FCDMC CONTRACT #95-05

TECHNICAL DATA NOTEBOOK

October 31, 1996

Prepared for:

Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009
(602) 506-1501

Prepared by:

Coe & Van Loo Consultants, Inc.
4550 N. 12th Street
Phoenix, AZ 85014
(602) 264-6831
CVL # 95-0067-01

CVL

Federal Emergency Management Agency

Washington, D.C. 20472

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 97-09-246P

The Honorable Don Stapley
Chairperson, Maricopa County
Board of Supervisors
301 West Jefferson Street
Phoenix, Arizona 85003

Community: Maricopa County, Arizona
Community No.: 040037
Panels Affected: 04013C0735 F, 0745 F, 1160 F, 1165 G, 1170 F, 1605 G, 1610 G, 1615 H, 1620 F, 2080 G, 2085 E, and 2090 F

Effective Date of This Revision: AUG0 51997

102-I-A-C

Dear Mr. Stapley:

This responds to a request that the Federal Emergency Management Agency (FEMA) revise the effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for Maricopa County, Arizona and Incorporated Areas, in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated November 27, 1996, Mr. Kofi Awumah, Ph.D., P.E., Engineering Division, Flood Control District of Maricopa County, requested that FEMA revise the FIRM and FIS report to show the effects of construction of the New Waddell Dam and updated topography along the Agua Fria River from its confluence with the Gila River to the New Waddell Dam.

All data required to complete our review of this request were submitted with letters from Dr. Awumah.

We have completed our review of the submitted data and the flood data shown on the effective FIRM and FIS report. We have revised the FIRM and FIS report to modify the elevations and floodplain and floodway boundary delineations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along the Agua Fria River.

As a result of the modifications, the base flood elevations (BFEs) for the Agua Fria River increased in some areas and decreased in other areas; the width of the Special Flood Hazard Area (SFHA), the area that would be inundated by the base flood, increased in some areas and decreased in other areas; and the width of the regulatory floodway increased in some areas and decreased in other areas. The BFEs for Morgan City Wash, Caterpillar Tanks Wash, Twin Buttes Wash, and the New River decreased as a result of the decrease in BFE along the Agua Fria River. The modifications are shown on the enclosed annotated copies of FIRM Panel(s) 04013C1170 F, 04013C1620 F, and 04013C2085 E, all dated September 4, 1991; 04013C0735 F, 04013C0745 F, 04013C1160 F, and 04013C1610 G, all dated December 3, 1993; 04013C1165 G, 04013C1605 G, 04013C1615 H, 04013C2080 G, and 04013C2090 F, all dated September 30, 1995; Profile Panel(s) 06P through 32P, 237P, 383P, 491P, and 538P; and affected portions of the Floodway Data Table. This Letter of Map Revision (LOMR) hereby revises the above-referenced panel(s) of the effective FIRM and the affected portions of the FIS report dated September 30, 1995.

Because this revision request also affects the Cities of Avondale, El Mirage, Glendale, Goodyear, Peoria, Phoenix, and Surprise, and the Town of Youngtown, separate LOMRs for those communities were issued on the same date as this LOMR.

The modifications are effective as of the date shown above. The map panel(s) as listed above and as modified by this letter will be used for all flood insurance policies and renewals issued for your community.

The following table is a partial listing of existing and modified BFEs:

Location	Existing BFE (feet)*	Modified BFE (feet)*
Agua Fria River:		
At confluence with Gila River	923[4,9]	923[4,9]
Approximately 400 feet downstream of Litchfield Road	924[4,9]	923[4,9]
Just downstream of Broadway Road	936[1]	933[1]
Just downstream of Lower Buckeye Road	950[9]	948[9]
Just downstream of Van Buren Street	971[1]	969[1]
Just downstream of Thomas Road	999[1,9]	997[1,9]
Approximately 150 feet upstream of Indian School Road	1,009[6,9]	1,007[6,9]
Just upstream of Camelback Road	1,024[9]	1,023[9]
Approximately 3,790 feet upstream of confluence with New River	1,042[3,9]	1,035[3,9]
Approximately 100 feet upstream of Glendale Road	1,056[9]	1,052[9]
Approximately 760 feet downstream of Northern Avenue	1,061[9]	1,065[9]
Approximately 100 feet downstream of Northern Avenue	1,062[3]	1,066[3]
Approximately 400 feet downstream of Olive Avenue	1,081[2]	1,075[2]
Approximately 3,700 feet downstream of Grand Avenue	1,116[2,8]	1,110[2,8]
Approximately 1,590 feet downstream of Grand Avenue	1,119[2,8]	1,114[2,8]
Approximately 100 feet upstream of 115th Avenue	1,137[2]	1,131[2]
Approximately 950 feet downstream of Bell Road	1,156[7]	1,153[7]
Approximately 1,150 feet upstream of Bell Road	1,163[9]	1,159[9]
Approximately 8,150 feet downstream of Beardsley Canal	1,314[5,9]	1,310[5,9]
Approximately 1,800 feet downstream of Beardsley Canal	1,335[5,9]	1,330[5,9]
Approximately 50 feet downstream of Granite Reef Aqueduct	1,347[9]	1,340[9]
Just upstream of Carefree Highway	1,366[5,9]	1,357[5,9]
Approximately 1,100 feet downstream of State Route 74	1,396[5]	1,384[5]
Approximately 4,380 feet upstream of State Route 74	1,425[9]	1,403[9]
Morgan City Wash:		
At confluence with Agua Fria River	1,420[9]	1,400[9]
Caterpillar Tanks Wash:		
At confluence with Agua Fria River	1,267[9]	1,262[9]
Twin Buttes Wash:		
At confluence with Agua Fria River	1,240[9]	1,238[9]
New River:		
At confluence with Agua Fria River	1,032[6,9]	1,028[6,9]

[1]Within the City of Avondale
[2]Within the City of El Mirage
[3]Within the City of Glendale
[4]Within the City of Goodyear
[5]Within the City of Peoria
[6]Within the City of Phoenix
[7]Within the City of Surprise
[8]Within the Town of Youngtown
[9]Within the unincorporated areas of Maricopa County

*Referenced to the National Geodetic Vertical Datum, rounded to the nearest whole foot

Public notification of the proposed modified BFEs will be given in *The Arizona Republic* on or about August 12 and August 19, 1997. A copy of this notification is enclosed. In addition, a notice of changes will be published in the *Federal Register*. Within 90 days of the second publication in *The Arizona Republic*, a citizen may request that FEMA reconsider the determination made by this LOMR. Any request for reconsideration must be based on scientific or technical data. All interested parties are on notice that, until the 90-day period elapses, the determination to modify the BFEs presented in this LOMR may itself be modified.

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout the community, so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare a related article for publication in your community's local newspaper. This article should describe the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

We are preparing a revised FIRM and FIS report for Maricopa County, Arizona and Incorporated Areas; therefore, we will not physically revise and republish the FIRM and FIS report for your community to incorporate the modifications made by this LOMR at this time. Preliminary copies of the FIRM and FIS report will be distributed for review in fall 1997. We will incorporate the modifications made by this LOMR into the preliminary FIRM before it is distributed, and the modifications will be included when the FIRM becomes effective.

The floodway is provided to your community as a tool to regulate floodplain development. Therefore, the floodway modifications described in this LOMR, while acceptable to FEMA, must also be acceptable to your community and adopted by appropriate community action, as specified in Paragraph 60.3(d) of the NFIP regulations.

This LOMR is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development, and for ensuring all necessary permits required by Federal or State law have been received. State, county, and community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction in the SFHA. If the State, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed minimum NFIP criteria. These criteria are the minimum and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM to which the regulations apply and the modifications described in this LOMR. Our records show that your community has met this requirement.

A Consultation Coordination Officer (CCO) has been designated to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Dorothy M. Lacey
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
The Presidio of San Francisco, Building 105
San Francisco, California 94129-1250
(415) 923-7177

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the CCO for your community at the telephone number cited above. If you have any technical questions regarding this LOMR, please contact Mr. John Magnotti of our staff in Washington, DC, either by telephone at (202) 646-3932 or by facsimile at (202) 646-4596.

Sincerely,

For Frederick H. Sharrocks, Jr., Chief
Hazard Identification Branch
Mitigation Directorate

Enclosure(s)

cc: Mr. Kofi Awumah, Ph.D., P.E.
Engineering Division
Flood Control District of Maricopa County

Mr. Jack K. Moody, P.E.
Project Manager
Coe & Van Loo Consultants, Inc.

AGUA FRIA RIVER FLOODPLAIN DELINEATION RE-STUDY TECHNICAL DATA NOTEBOOK

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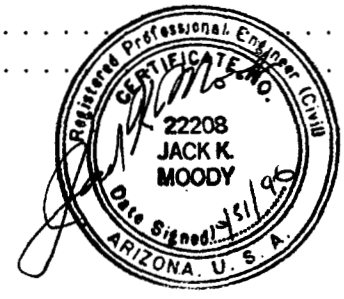

AGUA FRIA RIVER FLOODPLAIN DELINEATION RE-STUDY TECHNICAL DATA NOTEBOOK

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(continued)

APPENDIX

Preface

Coe & Van Loo Consultants, Inc., (CVL) has contracted with the Flood Control District of Maricopa County (FCDMC) to perform a Floodplain Delineation Re-Study (FDR) for the Agua Fria River located in Maricopa County, Arizona. The specific scope of this Floodplain Delineation Re-Study is to evaluate the existence and severity of flood hazards for the Agua Fria River within Maricopa County. The study reach crosses unincorporated areas of Maricopa County and numerous communities within Maricopa County. The communities include Peoria, Surprise, El Mirage, Youngtown, Glendale, Phoenix, Avondale, and Goodyear.

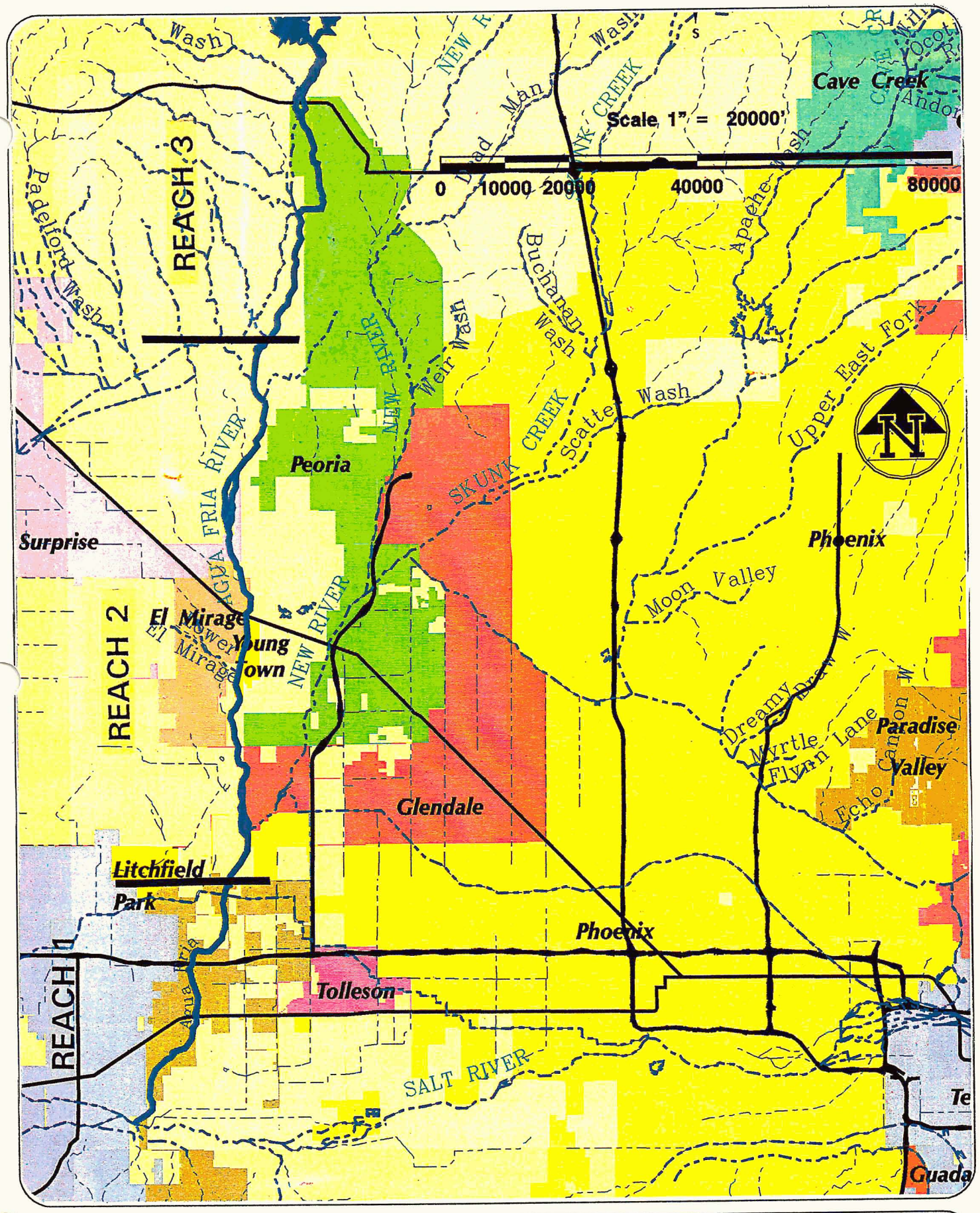
The project consists of floodplain and floodway delineation of approximately 34 river miles of the Agua Fria River from the Gila River Confluence to the outlet of the New Waddell Dam. The U.S. Army Corps of Engineers (CORPS) has developed the hydrology for the Agua Fria River within the study area using the CORPS HEC-1 computer model. The hydrology has been revised, from the currently effective Flood Insurance Study (FIS), by the CORPS to model the effect of the recently constructed New Waddell Dam. The hydrologic analysis for this study reach was documented in a report, *Hydrologic Evaluation of Impacts of New Waddell Dam on Downstream Peak Discharges in the Agua Fria River*, (Ref. 21). This analysis indicates that the 100-year peak flows have substantially reduced due to the construction of the New Waddell Dam. In addition, new topographic mapping has been provided by the FCDMC for much of the study reach.

The project has been divided into three distinct reaches for conducting the study. Reach 1 extends from the Gila River upstream to Indian School Road. Much of this reach has been channelized, therefore, it is expected that the floodplain boundaries will remain unchanged with

the exception of the first few miles. Topographic mapping used for this reach is from the 1989 study by Jerry R. Jones.

Reach 2 extends from Indian School Road to Jomax Road. It is expected that this reach will experience the most change in the floodplain resulting from the reduced flows from Lake Pleasant, the gravel pit operations, new development and from the bridge construction. This reach utilizes new topographic mapping due primarily to extensive gravel pit operations and new development.

Reach 3 covers the area between Jomax Road and New Waddell Dam. This reach is relatively undisturbed and minimal changes have occurred. Therefore, the topographic mapping from the Jerry R. Jones 1989 study is to be used for this reach.



AGUA FRIA RIVER FLOODPLAIN DELINEATION RE-STUDY

Between the Gila River Confluence and the Outlet of the New Waddell Dam

STUDY AREA LOCATION MAP

CVL

JOB #51-0026-03 12-95

V

Study Documentation Abstract

STUDY DOCUMENTATION ABSTRACT		INITIAL STUDY		RESTUDY	X	LOMR		OTHER	
SECTION 1: GENERAL INFORMATION									
1A	COMMUNITY	MARICOPA COUNTY, AZ, AND INCORPORATED AREAS							
1B	COMMUNITY NUMBERS	040037, 040050, 045053, 040041, 040057, 040045, 040051, 040038, 040046							
1C	COUNTY	MARICOPA COUNTY							
1D	STATE	ARIZONA							
1E	DATE STUDY ACCEPTED								
1F	STUDY CONTRACTOR CONTACT(S) ADDRESS PHONE	COE & VAN LOO CONSULTANTS, INC. JACK K. MOODY, P.E., DOUG BOTH 4550 N. 12TH STREET, PHOENIX, AZ 85014 (602) 264-6831							
1G	TECH. REVIEWER (FEMA) PHONE								
1H	FEMA REGIONAL REVIEWER PHONE								
1I	STATE REVIEWER PHONE								
1J	LOCAL REVIEWER CONTACT ADDRESS PHONE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY KOFI AWUMAH 2801 W. DURANGO, PHOENIX, AZ 85009 (602) 506-1501							
1K	RIVER OR STREAM NAME	AGUA FRIA RIVER							
1L	REACH DESCRIPTION	BETWEEN THE GILA RIVER FLOODPLAIN AND THE OUTLET OF THE NEW WADDELL DAM							
1M	STUDY TYPE	RIVERINE							
SECTION 2: MAPPING INFORMATION									
2A	USGS QUAD SHEET(S)	7.5 MINUTE BALDY MOUNTAIN, AZ 1964, PHOTOREVISED 1981. CALDERWOOD BUTTE, AZ 1957, PHOTOREVISED 1981. EL MIRAGE, AZ 1957. PHOTOREVISED 1982. GOVERNORS PEAK, AZ 1978, PHOTOINSPECTED 1978. TOLLESON, AZ 1957, PHOTOREVISED 1982.							
2B	MAPPING FOR HYDROLOGIC STUDY	REFER TO *HYDROLOGIC EVALUATION OF IMPACTS OF NEW WADDELL DAM ON DOWNSTREAM PEAK DISCHARGES IN THE AGUA FRIA RIVER,* BY THE U.S. ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT, JULY 1995 (REFERENCE 13).							

STUDY DOCUMENTATION ABSTRACT		
2C	MAPPING FOR HYDRAULIC STUDY	
	TYPE/SOURCE	REACH 2 AERIAL TOPOGRAPHY BY AERIAL MAPPING COMPANY, INC. 3141 W. CLARENDON AVE. PHOENIX, AZ 85017
	SCALE	1"=200', 2' CONTOUR INTERVAL
	DATE	PHOTOGRAPH DATE - FEBRUARY 1995
	TYPE/SOURCE	REACH 1 AND 3 AERIAL TOPOGRAPHY BY COOPER AERIAL OF PHOENIX, INC. 4621 N. 16TH STREET, SUITE C-315 PHOENIX, AZ 85016
	SCALE	1"=400', 4' CONTOUR INTERVAL
	DATE	PHOTOGRAPH DATE–1987 and 1988
SECTION 3: HYDROLOGY		
HYDROLOGY FOR THE AGUA FRIA RIVER WITHIN THIS STUDY AREA WAS PERFORMED BY THE U.S. ARMY CORPS OF ENGINEERS, LOS ANGELES DISTRICT, IN THE REPORT *HYDROLOGIC EVALUATION OF IMPACTS OF NEW WADDELL DAM ON DOWNSTREAM PEAK DISCHARGES IN THE AGUA FRIA RIVER*, JULY 1995 (REFERENCE 13).		
SECTION 4: HYDRAULICS		
4A	MODEL OR METHOD USED (including vendor and version description)	U.S. ARMY CORPS OF ENGINEERS WATER SURFACE PROFILES HEC-2 VERSION 4.6.2, MAY 1991 AS SUPPLIED BY NTIS
4B	REGIME	SUBCRITICAL
4C	FREQUENCIES FOR WHICH PROFILES WERE COMPUTED	100-YEAR
4D	METHOD OF FLOODWAY CALCULATION	EQUAL CONVEYANCE (HEC-2 METHOD 4) INITIALLY, THEN SMOOTHED AND ADJUSTED USING HEC-2 METHOD 1.
4E	UNIQUE CONDITIONS AND PROBLEMS	GRAVEL MINE OPERATIONS NUMEROUS BRIDGES NUMEROUS ENGINEERED AND NON-ENGINEERED LEVEES TRIBUTARIES EXTENSIVE NON-EFFECTIVE FLOW AREAS

SECTION 1 GENERAL DOCUMENTATION AND CORRESPONDENCE

1.1 Special Problem Reports

During the course of this flood insurance study, several unique situations were identified. Although there were not any special problem reports, these special problems and solutions were documented in other sections of the Technical Data Notebook (TDN). Hydraulic Special Problems are documented in the TDN section 4.5.

1.2 Contact (Telephone) Reports, Memoranda, and Letters

The majority of the coordination between the FCDMC and CVL, including submittals for this flood insurance study were made through meetings. However, some coordination was made over the telephone, by facsimile machine, by memoranda, or by letter. Typically, meeting times were coordinated by telephone, and the draft minutes to the meetings were sent to the FCDMC by facsimile machine for a verbal acceptance or modifications. Telephone coordination agreements were often followed up with memoranda or letters. Copies of these Communication Documentation, Memoranda, and letters are included in the appendix.

1.3 Meeting Minutes

Numerous meetings were held between the FCDMC and CVL to discuss the flood insurance study and to make technical decisions. CVL prepared minutes of these meetings. Copies of these minutes are included in the appendix.

1.4 General Correspondence

1.4.1 Community

CVL and the FCDMC attempted to notify the public of the commencement of the Agua Fria Floodplain Delineation Re-Study. The purpose of this notification was to

inform residents in the area of the flood insurance re-study, and allow them to comment on the process.

There were two aspects to this notification process. One aspect consisted of publishing a Public Notice in local newspapers as discussed in section 1.4.7. All phases of this process were coordinated between FCDMC and CVL. Another aspect was to hold a public meeting prior to the commencement of the study to inform interested parties about the study.

When the flood insurance study was substantially complete, a public meeting was held to inform the public of the results of the study and to discuss the results with the local residents. Public notification documents from the local newspapers, as well as public meeting documents are included in the appendix.

1.4.2 State Coordinator

The Arizona Department of Water Resources (ADWR) is the state coordinator for the flood insurance studies performed within Arizona. The FCDMC and CVL has coordinated with ADWR. Relevant information is included in the appendix.

1.4.3 Other Agencies

Research and coordination was made with other agencies throughout the course of this flood insurance study. The Arizona Department of Transportation and the Maricopa County Department of Transportation were contacted and their files researched for hydrologic and hydraulic information on highways within the watershed.

1.4.4 FEMA Regional Officer

There has not been any coordination between the FEMA Region IX Officer and the FCDMC or CVL at this time.

1.4.5 FEMA Washington

There has not been any coordination between FEMA in Washington and the FCDMC or CVL at this time.

1.4.6 FEMA Technical Consultant

There has not been any coordination between FEMA's Technical Consultant and the FCDMC or CVL at this time. The FEMA forms are included in the appendix.

1.4.7 Copy of Public Notices

A public notice was cooperatively drafted and agreed upon by the FCDMC and CVL. Newspapers were researched, and it was determined that the Public Notice would be published in the Arizona Republic on October 6, 1995, and in the Daily News-Sun on October 10, 1995 and in the West Valley View and West Valley Business on October 11, 1995. Copies of the Affidavits of Publication are included in the appendix.

1.5 Contract Documents

The contract documents between the FCDMC and CVL, including the scope of work are included in the appendix.

SECTION 2 MAPPING & SURVEY INFORMATION

2.1 Description of Mapping

Topographic mapping for the Reach 1 and Reach 3 hydraulic analysis was supplied by the Flood Control District. This mapping is from the 1989 floodplain study for the Agua Fria River by Jerry R. Jones & Associates (JRJ, Reference 8 & 12). The mapping was compiled by Cooper Aerial of Phoenix, Inc. for the JRJ study. This mapping scale is 1"=400' with a 4' contour interval. The vertical control was based on 1929 NGVD and the horizontal control was based on 1927 NAD. This mapping has been converted to a digital format and to the 1983 NAD horizontal coordinate system.

Topographic mapping for the Reach 2 hydraulic analysis was prepared specifically for this floodplain delineation re-study by Aerial Mapping Company, Inc (AMC, Reference 1). The mapping is 1"=200' aerial topography with 2' contour intervals and was based on photographs taken in February of 1995. The horizontal datum for this project is NAD 83, Arizona State Plane Coordinate System, Central Zone. Vertical elevations are based on the mean sea level datum of 1929 as monumented by the United States National Geodetic Survey. Horizontal and vertical control tabulation for Reach 2 has been provided to the District by AMC.

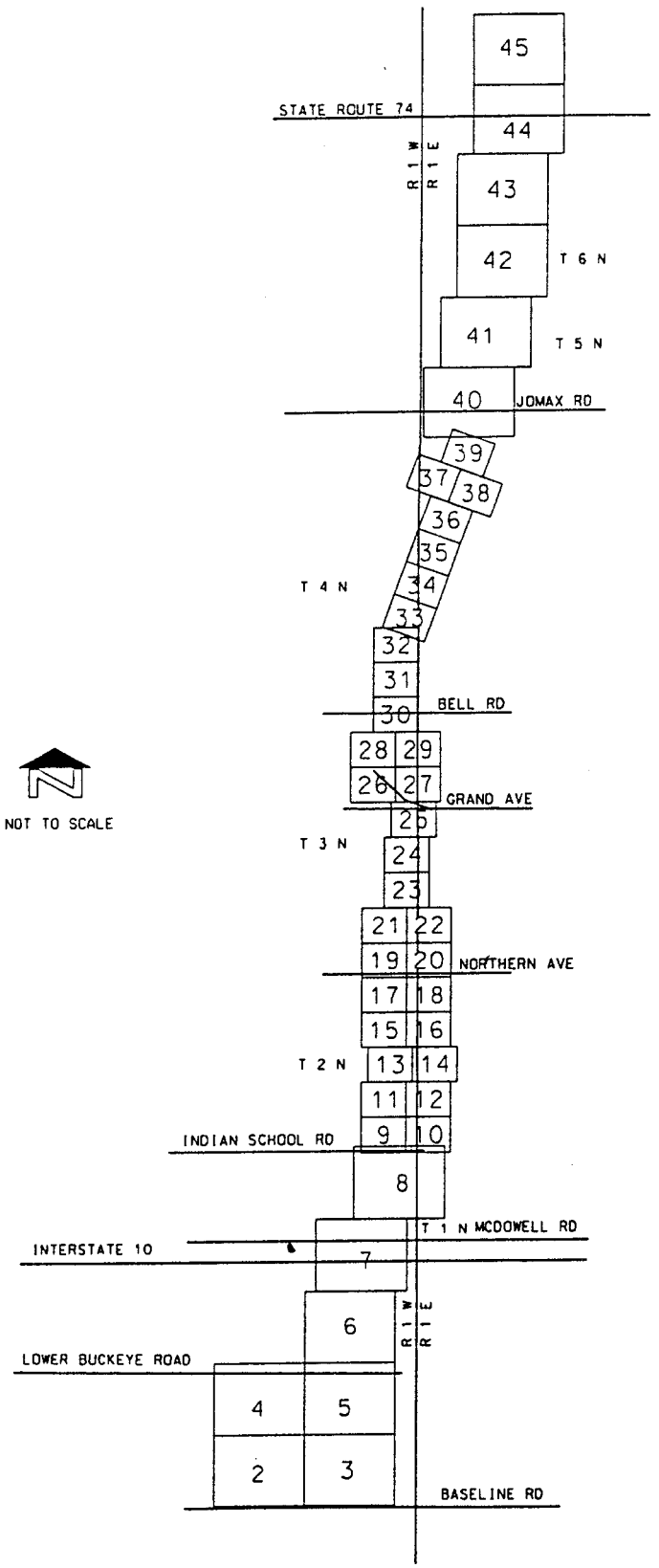
2.2 Index of Maps

Refer to page 5 for the index of maps.

2.3 Survey Field Notes

Survey control for Reach 1 and Reach 3 is shown on the original JRJ floodplain study for the Agua Fria River in the form of Elevation Reference Marks.

Survey control for the Reach 2 aerial mapping was performed by Aerial Mapping Company, Inc. Survey data has been provided by AMC to the District.



AGUA FRIA RIVER FLOODPLAIN DELINEATION RE-STUDY

Between the Gila River Confluence and the Outlet of the New Waddell Dam

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Elevation Reference Marks for the entire study reach are shown on the Floodplain Delineation Maps, and are compiled in a table in the appendix.

2.4 Watershed Maps

A hydrologic analysis was not within the scope of this flood insurance study and is not included with this TDN. Refer to the CORPS report *Hydrologic Evaluation of Impacts of New Waddell Dam on Downstream Peak Discharges in the Agua Fria River* (Reference 21) for hydrologic analysis work maps.

2.5 Hydraulic Analysis Maps

The floodplain delineation maps for this flood insurance study are in the Technical Data Notebook Section 4, Hydraulic Analysis, under separate cover.

2.6 FIRM Maps

The current regulatory Flood Insurance Rate Maps for the study area are: Maricopa County, Arizona and Incorporated Areas, Map numbers:

04013C0735F; Map Revised: December 3, 1993;

04013C0745F; Map Revised: December 3, 1993;

04013C1160F; Map Revised: December 3, 1993;

04013C1165G; Map Revised: September 30, 1995;

04013C1170F; Map Revised: September 4, 1991;

04013C1605G; Map Revised: September 30, 1995;

04013C1610G; Map Revised: December 3, 1993;

04013C1615H; Map Revised: September 30, 1995;

04013C1620F; Map Revised: September 4, 1991;

04013C2080G; Map Revised: September 30, 1995;

04013C2085E; Map Revised: September 4, 1991;

04013C2090F; Map Revised: September 30, 1995.

Refer to Section 4 for copies of the current regulatory Flood Insurance Rate Map, and the proposed floodplain superimposed on copies of the Flood Insurance Rate Maps.

2.7 Community Map

Refer to the Study Area Location Map page v for an illustration of the affected communities.

2.8 Miscellaneous Maps

Other maps including drainage area maps, schematic flow diagram maps, and precipitation maps have provided in Reference 21.

SECTION 3 HYDROLOGIC ANALYSIS

The hydrologic analysis was not a part of this study. The peak flows used for this study were evaluated by the U.S. Army Corps of Engineers, Los Angeles District, in the report *Hydrologic Evaluation of Impacts of New Waddell Dam on Downstream Peak Discharges in the Agua Fria River,* July 1995 (Reference 21). Copy of this report is included with this submittal package.

SECTION 5 EROSION/SEDIMENT TRANSPORT ANALYSIS

The erosion and sediment transport characteristic of the Agua Fria River were not analyzed for this Floodplain Delineation Re-Study.

SECTION 4 HYDRAULIC ANALYSIS

The Technical Data Notebook Section 4, Hydraulic Analysis, is under separate cover.

SECTION 6 REFERENCE MATERIALS

6.1 Other Published Flood Studies

Other published flood studies have been performed on the Agua Fria River within the study area. A floodplain information report published in 1968 by the CORPS studied the river between Camelback Road and the Beardsley Canal flume (see Reference 20). In 1984 the CORPS studied the portion of the Agua Fria River between the confluence with the Gila River and Jomax Road.

In 1980 the USGS studied the February 1980 flood along the Agua Fria River. This study was used to check modeling parameters, especially those relating to the 10-year flow (see Reference 24). Two studies were prepared by Simons, Li & Associates in 1984 and 1985 to evaluate ponding adjacent to the levees and also to design outlets through these levees to discharge this ponding (see References 14 and 15).

6.2 Previous FEMA Studies

There have been two previous FEMA studies for the Agua Fria River within the study areas. The first was a Flood Insurance Study for the unincorporated areas of Maricopa County, published in 1979 which studied a 24 mile reach from the confluence with the Gila River and Pinnacle Peak Road (see Reference 25). The second was a Flood Insurance Study for the Agua Fria River, Maricopa County, Arizona, published in 1989, which studied the Agua Fria River from the confluence with the Gila River to the Waddell Dam (see Reference 12). The primary differences between this current study and these previous studies is the changes in the hydrology, construction of new bridges, and changes to the topography due to the gravel mine operations and new development.

6.3 Other Applicable Studies

There have been other applicable studies in the vicinity of this flood insurance study. The report *Agua Fria Sediment Transport Study* was prepared for the Agua Fria River in December 1991 (see Reference 5). In addition, the report *Preliminary Bridge Scour Assessment Report for Eight Maricopa County Bridge Group 1* was prepared in July 1995 for MCDOT (see Reference 4).

6.4 Historical Flood Information

Several floods of the Agua Fria River have been documented by report and aerial photographs. Aerial Mapping Company of Phoenix has collected aerial photographs of numerous flow events within the Agua Fria River.

6.5 Technical Papers/Documents

Technical papers and documents pertaining to the methodology used in this study are referenced in the Technical Data Notebook, Section 4, under separate cover.

6.6 Bibliography and References

1. Aerial Mapping Company, Inc. topographic mapping prepared for the Agua Fria River under contract with the FCDMC, photographs taken in February 1995.

2. AGK Engineers, Inc. *CAP Overchutes FCD 90-09, Agua Fria Floodplain Delineation (Caterpillar Tank Wash),* June 1991.

3. AGK Engineers, Inc. *CAP Overchutes FCD 90-09, Agua Fria Floodplain Delineation (Twin Buttes Wash)*, June 1991.

4. Canon & Associates, Inc. Consulting Engineers, *Preliminary Bridge Scour Assessment Report for Eight Maricopa County Bridges, Group 1,* July 1995.

5. Civil Engineering Department Arizona State University, *Agua Fria River Sediment Transport Study Training Material No. 1,* December 1991.

6. Coe & Van Loo Consultants, Inc. *Agua Fria River Floodplain Delineation Re-Study, N Value Determination Report*, August 1996.

7. Coe & Van Loo Consultants, Inc. *New River Floodplain Delineation*, October 1987.

8. Cooper Aerial Survey Company, 400 scale, 4' contour interval Topographic Maps Prepared for Jerry R. Jones & Associates, photographs taken in 1987 and 1988.

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11. Federal Emergency Management Agency, *Flood Insurance Study, Maricopa County, Arizona, and Incorporated Area, Volumes 1 through 12,* revised September 30, 1995.

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13. Michael Baker, Jr., Inc. *Floodplain Delineation Study of Morgan City Wash*, August 1990.

14. Simons, Li & Associates, *Agua Fria River Channelization Side Drainage Analysis*, Tucson, Arizona, November 1984.

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16. State of Arizona, Department of Water Resources, Engineering Division, *Instructions for Organizing and Submitting Technical Documentation for Flood Studies*, revised September 1991.

17. The WLB Group, Inc., *White Tanks/ Agua Fria Area Drainage Master Study (AT&SF Railroad Channel, Wash 12),* October 1992.

18. The WLB Group, Inc., *White Tanks/ Agua Fria Area Drainage Master Study (Lower El Mirage Wash, Wash 13),* October 1992.

19. The WLB Group, Inc., *Wittman ADMS (McMicken Dam Outlet Wash).*

20. U.S. Army Corps of Engineers, Los Angeles District, *Flood Plain Information Study, Agua Fria River,* Maricopa County, Arizona, Los Angeles, California, March 1968.

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22. U.S. Army Corps of Engineers, The Hydrologic Engineering Center, *HEC-2 Water Surface Profiles Users Manual*, September 1982.

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24. U.S. Department of the Interior, Geological Survey, Water-Resources Investigations, Open-File Report 80-767, *Flood of February 1980 Along The Agua Fria River, Maricopa County, Arizona*, Tucson, Arizona, June 1980.

25. U.S. Department of Housing and Urban Development, Federal Insurance Administration, *Flood Insurance Study, Maricopa County, Arizona*, Washington, D.C., May 1979.

26. U.S. Geological Survey, Water Resources Division, *Estimated Manning's Roughness Coefficients for Stream Channels and Floodplains in Maricopa County, Arizona*, April 1991.

SECTION 7 CROSS-REFERENCING AND LABELING INFORMATION

7.1 Other Studies Impacted

The other flood studies in the area that would be affected by the results of this study are as follows:

1. New River Floodplain Delineation
2. White Tanks/Agua Fria Area Drainage Master Study (Lower El Mirage Wash, Wash 13)
3. White Tanks/Agua Fria Area Drainage Master Study (A.T. & S.F. Railroad Channel, Wash 12)
4. Wittman ADMS (McMicken Dam Outlet Wash)
5. CAP Overchutes FCD 90-09, Agua Fria Floodplain Delineation (Caterpillar Tank Wash)
6. CAP Overchutes FCD 90-09, Agua Fria Floodplain Delineation (Twin Buttes Wash)
7. Floodplain Delineation Study of Morgan City Wash

7.2 Key to Cross-Section Labeling

All cross-sections are stationed from left to right looking downstream with the control line set at station 10,000. Cross-section numbers for the Agua Fria River are stationed in river miles upstream from the confluence with the Gila River. A key to cross-section labeling is included in the appendix.

SECTION 8 DRAFT FIS REPORT - REVISED TEXT

Insert 1, Volume 1 of 12, Section 1.2, insert after paragraph 13

Revised Hydrologic and hydraulic analyses for the Agua Fria River (between the Gila River Floodplain and the New Waddell Dam) were performed for the Flood Control District of Maricopa County. The hydrologic work was performed by the U.S. Army Corps of Engineers, Los Angeles District, in the report; *Hydrologic Evaluation of Impacts of New Waddell Dam on Downstream Peak Discharges in the Agua Fria River*. The hydraulic work was performed by *Coe & Van Loo Consultants, Inc.,* and was completed in October 1996.

Insert 2, Volume 1 of 12, Table 1, revise

Flooding Source	Limits of Study
Agua Fria River	From confluence with Gila River to New Waddell Dam

Insert 3, Volume 1 of 12, Section 2.2, revise paragraph 6

...The river is usually dry because flows are regulated by the New Waddell Dam and Lake Pleasant reservoir...

Insert 4, Volume 1 of 12, Section 2.4, revise paragraph 3

...New Waddell Dam was completed on the Agua Fria River in 1993. It controls runoff...

Insert 5, Volume 1 of 12, Table 3, insert after last entry

Flooding Source and Location	Drainage Area (square miles)	Peak Discharge (cfs) 10-year	50-year	100-year	500-year
At Confluence with Gila River	485	14,200	35,000	48,200	110,000
At Avondale	485	15,000	37,000	50,900	115,000
At I-10 Freeway	474	15,300	38,000	52,000	125,000
Below New River	392	16,100	39,000	54,400	130,000

Flooding Source and Location	Drainage Area (square miles)	Peak Discharge (cfs) 10-year	50-year	100-year	500-year
Above New River	231	8,700	23,000	30,000	48,000
At Grand Avenue	183	10,000	26,500	34,500	53,000
At Bell Road	171	11,000	29,000	37,500	59,000
Below New Waddell Dam	0	0	9,000	9,000	46,500
Above New Waddell dam	1459	48,000	110,000	135,000	182,000

Insert 6, Volume 1 of 12, Section 3.2, revise paragraph 3

Cross section data for the Agua Fria River was taken from two sources of mapping. A 1988 topographic map by Cooper Aerial of Phoenix, Inc. was used for the river section between the Gila River and Indian School Road and from Jomax Road to New Waddell Dam. A digital terrain model was provided by Aerial Mapping Company, Inc. for the reach between Indian School Road and Jomax Road.

Insert 7, Volume 1 of 12, Table 4, insert alphabetically

Flooding Source	Channel	Overbanks
Agua Fria River	0.030-0.050	0.035-0.15

APPENDIX

Communication Documentation, Memoranda, and Letters
Meeting Minutes
Public Notices
State Coordinator
Contract Documents
Elevation Reference Marks
Key to Cross-Section Labeling
FEMA Forms

Communication Documentation, Memoranda, and Letters

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Russell MacDonald, R.L.A.

July 3, 1995

Mr. Jose Salarez, Town Manager
City of El Mirage
P. O. Box 26
El Mirage, AZ 85335

Dear Mr. Salarez:

The Flood Control District of Maricopa County (District) has selected Coe & Van Loo Consultants, Inc. (CVL) to conduct a restudy of the floodplain for the Agua Fria River. The study reach extends from the confluence with the Gila River to the New Wadell Dam. It can be anticipated that the new floodplain limits will decrease due to the lower 100-year peak discharge. The 100-year peak discharge for the study reach has decreased due to the construction of the New Wadell Dam.

The District would like to invite representatives from all of the affected communities to attend a presentation and discussion about the project scope of work and schedule. In addition, the District would like to solicit input from the communities regarding existing or future planned floodplain uses.

A meeting has been scheduled at 10:00 a.m. on Thursday, July 13, 1995, at the District's Adobe conference room. It can be anticipated that the meeting will run one to one and one-half hours. Please notify me or Mr. Jack Moody by telephone or by fax (264-0928) to let us know if your community will be represented.

Sincerely,

COE & VAN LOO
Consultants, Inc.

Paul W. R. Hoskin, P.E.
Vice President

PWRH:ljd

Enclosure

c: Kofi Awumah, FCDMC
Pedro Calza, FCDMC

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Russell MacDonald, R.L.A.

July 3, 1995

Mr. Jesse Mendez, Public Works Director
City of Youngtown
12030 Clubhouse Square
Youngtown, AZ 85363

Dear Mr. Mendez:

The Flood Control District of Maricopa County (District) has selected Coe & Van Loo Consultants, Inc. (CVL) to conduct a restudy of the floodplain for the Agua Fria River. The study reach extends from the confluence with the Gila River to the New Wadell Dam. It can be anticipated that the new floodplain limits will decrease due to the lower 100-year peak discharge. The 100-year peak discharge for the study reach has decreased due to the construction of the New Wadell Dam.

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July 3, 1995

Mr. Grant Anderson, Eng. Dir.
City of Glendale
5850 W. Glendale Avenue
Glendale, AZ 85301

Dear Mr. Anderson:

The Flood Control District of Maricopa County (District) has selected Coe & Van Loo Consultants, Inc. (CVL) to conduct a restudy of the floodplain for the Agua Fria River. The study reach extends from the confluence with the Gila River to the New Wadell Dam. It can be anticipated that the new floodplain limits will decrease due to the lower 100-year peak discharge. The 100-year peak discharge for the study reach has decreased due to the construction of the New Wadell Dam.

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Russell MacDonald, R.L.A.

July 3, 1995

Mr. Dan Nissen, City Engineer
City of Peoria
8401 W. Monroe St.
Peoria, AZ 85345

Dear Mr. Nissen:

The Flood Control District of Maricopa County (District) has selected Coe & Van Loo Consultants, Inc. (CVL) to conduct a restudy of the floodplain for the Agua Fria River. The study reach extends from the confluence with the Gila River to the New Wadell Dam. It can be anticipated that the new floodplain limits will decrease due to the lower 100-year peak discharge. The 100-year peak discharge for the study reach has decreased due to the construction of the New Wadell Dam.

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July 3, 1995

Mr. Raymond U. Acuna, Floodplain Admin.
City of Phoenix
200 West Washington
Phoenix, AZ. 85004

Dear Mr. Acuna:

The Flood Control District of Maricopa County (District) has selected Coe & Van Loo Consultants, Inc. (CVL) to conduct a restudy of the floodplain for the Agua Fria River. The study reach extends from the confluence with the Gila River to the New Wadell Dam. It can be anticipated that the new floodplain limits will decrease due to the lower 100-year peak discharge. The 100-year peak discharge for the study reach has decreased due to the construction of the New Wadell Dam.

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July 3, 1995

Mr. Mike Springfield, Public Works
City of Avondale
525 N. Central Avenue
Avondale, AZ 85323

Dear Mr. Springfield:

The Flood Control District of Maricopa County (District) has selected Coe & Van Loo Consultants, Inc. (CVL) to conduct a restudy of the floodplain for the Agua Fria River. The study reach extends from the confluence with the Gila River to the New Wadell Dam. It can be anticipated that the new floodplain limits will decrease due to the lower 100-year peak discharge. The 100-year peak discharge for the study reach has decreased due to the construction of the New Wadell Dam.

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Russell MacDonald, R.L.A.

July 3, 1995

Mr. Harvey Krauss, Community Development Manager
City of Goodyear
119 N. Litchfield Rd.
Goodyear, AZ 85338

Dear Mr. Krauss:

The Flood Control District of Maricopa County (District) has selected Coe & Van Loo Consultants, Inc. (CVL) to conduct a restudy of the floodplain for the Agua Fria River. The study reach extends from the confluence with the Gila River to the New Wadell Dam. It can be anticipated that the new floodplain limits will decrease due to the lower 100-year peak discharge. The 100-year peak discharge for the study reach has decreased due to the construction of the New Wadell Dam.

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David Lucas, R.L.S.
Russell MacDonald, R.L.A.

July 3, 1995

Ms. Shirley Berg, Director of Community Dev. Dept.
Town of Surprise
12604 Santa Fe Drive
Surprise, AZ 85345

Dear Ms. Berg:

The Flood Control District of Maricopa County (District) has selected Coe & Van Loo Consultants, Inc. (CVL) to conduct a restudy of the floodplain for the Agua Fria River. The study reach extends from the confluence with the Gila River to the New Wadell Dam. It can be anticipated that the new floodplain limits will decrease due to the lower 100-year peak discharge. The 100-year peak discharge for the study reach has decreased due to the construction of the New Wadell Dam.

The District would like to invite representatives from all of the affected communities to attend a presentation and discussion about the project scope of work and schedule. In addition, the District would like to solicit input from the communities regarding existing or future planned floodplain uses.

A meeting has been scheduled at 10:00 a.m. on Thursday, July 13, 1995, at the District's Adobe conference room. It can be anticipated that the meeting will run one to one and one-half hours. Please notify me or Mr. Jack Moody by telephone or by fax (264-0928) to let us know if your community will be represented.

Sincerely,

COE & VAN LOO
Consultants, Inc.

Paul W. R. Hoskin, P.E.
Vice President

PWRH:ljd

Enclosure

c: Kofi Awumah, FCDMC
Pedro Calza, FCDMC
Jack Moody, CVL

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August 3, 1995

Mr. Jim Phipps
Flood Control District of Maricopa County
2801 W. Durango
Phoenix, AZ 85009

Re: Agua Fria River Floodplain Restudy
Contract FCD 95-05
CVL #95-0067-01

Dear Mr. Phipps:

A Community information meeting was held on July 13, 1995 to discuss the District's restudy of the Agua Fria River floodplain. Attached is a copy of the minutes from that meeting.

If you have any further input or information relevant to this study, please feel free to give me a call. We will follow-up with you individually to further discuss the project.

Sincerely,

COE & VAN LOO
Consultants, Inc.

Jack K. Moody, P.E.
Project Manager

JKM:ljd

Enclosure

Q:\950067\ADMIN\67-006LT.PF

COE & VAN LOO CONSULTANTS, INC.
4550 N. 12th St.
Phoenix, AZ 85014
(602) 264-6831

MEETING MINUTES

DATE: July 13, 1995

TIME: 10:00 A.M.

ATTENDEES: Kofi Awumah (FCDMC)
Jim Phipps (FCDMC)
Jesse Mendez (Youngtown)
Dan Sherwood (Glendale)
Ray Acuña (Phoenix)
Jack Moody (CVL)
Paul Hoskin (CVL)

RE: Agua Fria River Floodplain Restudy
Contract FCD 95-05
CVL #95-0067-01

LOCATION: Flood Control District of Maricopa County
Adobe Conference Room

PURPOSE: A meeting was held to present the scope of the study to each of the community floodplain representatives. In addition, any comments or concerns were encouraged.

DISCUSSION:

Kofi Awumah, the District's assigned project manager for this study thanked those in attendance and introduced the study team members. A sign-in sheet was passed and each individual introduced themselves. Mr. Paul Hoskin and Mr. Jack Moody from Coe & Van Loo Consultants, Inc. introduced the study and gave an explanation of project issues.

CVL has been awarded the contract to perform a restudy of the 100-year floodplain for the Agua Fria River. The restudy is being performed due to anticipated changes in the floodplain which have resulted from the construction of New Waddell Dam and subsequent changes in the downstream hydrology. The U.S. Army Corps of Engineers (Corps) has released preliminary discharge information for the Agua Fria River.

The restudy will be for approximately 33 river miles and will extend from the confluence with the Gila River, north to the outlet works of New Waddell Dam (see attached exhibit). The study has been divided into three study reaches as follows:

Reach 1 - Gila River confluence to Indian School Road.

Existing topographic mapping at a scale of 1" = 400' with a contour interval of 4 feet was flown in 1985 for the previous study by David Evans & Associates (formerly Jerry R. Jones & Associates).

This reach of the river has been extensively channelized and hence the floodplain boundaries are likely to remain fixed. Changes may result from a reduction in ponding areas behind the levees.

CVL will be conducting field surveys of cross-sections at selected locations within Reach 1 and Reach 3. These cross-sections will be used to evaluate how much the river bed has changed since the original aerial flight.

Reach 2 - Indian School Road to Jomax Road

New topographic mapping at a scale of 1" = 200 with a contour interval of 2 feet is currently being produced by Aerial Mapping Company (AMC) under contract to the District. The District decided that new mapping would be appropriate for this reach of the river due to significant changes in the river bed. There are many ongoing gravel mining operations within this reach of the river. In addition, the Grand Avenue bridge has been constructed since the previous mapping was completed.

A reduction in the Agua Fria River discharges will likely reduce the floodplain limits near the confluence with the New River. As a result, the lower reaches of the New River will also be evaluated.

Reach 3 - Jomax Road to New Waddell Dam

Existing topographic, from the same source as Reach 1, will be used for this study reach. This reach is relatively undisturbed. Significant features include the Beardsley Canal flume crossing of the river and the SR87 road bridge.

The study crosses nine jurisdictional boundaries as follows:

Avondale
El Mirage
Glendale
Goodyear
Peoria
Phoenix
Surprise
Unincorporated Maricopa County
Youngtown

Study Schedule

A study schedule has been developed based upon a twelve month time frame submittal to FEMA is scheduled for the end of May 1996. (See attached)

Community Input

Mr. Dan Sherwood (City of Glendale) indicated that the City recently received approval for a Letter of Map Revision (LOMR) request by FEMA for the city landfill located near the east bank of the river and north of Glendale Avenue.

Community Involvement

Mr. Jim Phipps is the public information officer with the District. The District will make arrangements to advertise the study in two local newspapers. Members of the public will be invited to a public information meeting where their questions may be answered and their concerns voiced.

The number of river miles within each jurisdiction have been provided by the GIS Group. CVL will measure the east and west bank limits based upon existing USGS mapping and provide the District with a cross check.

PWRH:ljd

Attachments: Attendance Roster
Study Location Map
Study Schedule
Study Announcement

c: Attendees
Community Officials

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Russell MacDonald, R.L.A.

August 3, 1995

Mr. Jesse Mendez, Public Works Director
City of Youngtown
12030 Clubhouse Square
Youngtown, AZ 85363

Re: Agua Fria River Floodplain Restudy
Contract FCD 95-05
CVL #95-0067-01

Dear Mr. Mendez:

A Community information meeting was held on July 13, 1995 to discuss the District's restudy of the Agua Fria River floodplain. Attached is a copy of the minutes from that meeting.

If you have any further input or information relevant to this study, please feel free to give me a call. We will follow-up with you individually to further discuss the project.

Sincerely,

COE & VAN LOO
Consultants, Inc.

Jack K. Moody, P.E.
Project Manager

JKM:ljd

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Russell MacDonald, R.L.A.

August 3, 1995

Mr. Dan Sherwood
City of Glendale
5850 W. Glendale Avenue
Glendale, AZ 85301

Re: Agua Fria River Floodplain Restudy
Contract FCD 95-05
CVL #95-0067-01

Dear Mr. Sherwood:

A Community information meeting was held on July 13, 1995 to discuss the District's restudy of the Agua Fria River floodplain. Attached is a copy of the minutes from that meeting.

If you have any further input or information relevant to this study, please feel free to give me a call. We will follow-up with you individually to further discuss the project.

Sincerely,

COE & VAN LOO
Consultants, Inc.

Jack K. Moody, P.E.
Project Manager

JKM:ljd

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Russell MacDonald, R.L.A.

August 3, 1995

Mr. Raymond U. Acuña, Floodplain Admin.
City of Phoenix
200 West Washington
Phoenix, AZ. 85004

Re: Agua Fria River Floodplain Restudy
Contract FCD 95-05
CVL #95-0067-01

Dear Mr. Acuña:

A Community information meeting was held on July 13, 1995 to discuss the District's restudy of the Agua Fria River floodplain. Attached is a copy of the minutes from that meeting.

If you have any further input or information relevant to this study, please feel free to give me a call. We will follow-up with you individually to further discuss the project.

Sincerely,

COE & VAN LOO
Consultants, Inc.

Jack K. Moody, P.E.
Project Manager

JKM:ljd

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August 3, 1995

Mr. Kofi Awumah, Project Manager
Flood Control District of Maricopa County
2801 W. Durango
Phoenix, AZ 85009

Re: Agua Fria River Floodplain Restudy
Contract FCD 95-05
CVL #95-0067-01

Dear Mr. Awumah:

A Community information meeting was held on July 13, 1995 to discuss the District's restudy of the Agua Fria River floodplain. Attached is a copy of the minutes from that meeting.

If you have any further input or information relevant to this study, please feel free to give me a call. We will follow-up with you individually to further discuss the project.

Sincerely,

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Consultants, Inc.

Jack K. Moody

Jack K. Moody, P.E.
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David Lucas, R.L.S.
Russell MacDonald, R.L.A.

August 7, 1995

Mr. Harvey Krauss, Community Development Manager
City of Goodyear
119 N. Litchfield Rd.
Goodyear, AZ 85338

Re: Agua Fria River Floodplain Restudy
Contract FCD 95-05
CVL #95-0067-01

Dear Mr. Krauss:

A Community information meeting was held on July 13, 1995 to discuss the District's restudy of the Agua Fria River floodplain. Attached is a copy of the minutes from that meeting.

If you have any further input or information relevant to this study, please feel free to give me a call. We will follow-up with you individually to further discuss the project.

Sincerely,

COE & VAN LOO
Consultants, Inc.

Jack K. Moody, P.E.
Project Manager

JKM:ljd

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David Lucas, R.L.S.
Russell MacDonald, R.L.A.

August 7, 1995

Mr. Mike Springfield, Public Works
City of Avondale
525 N. Central Avenue
Avondale, AZ 85323

Re: Agua Fria River Floodplain Restudy
Contract FCD 95-05
CVL #95-0067-01

Dear Mr. Springfield:

A Community information meeting was held on July 13, 1995 to discuss the District's restudy of the Agua Fria River floodplain. Attached is a copy of the minutes from that meeting.

If you have any further input or information relevant to this study, please feel free to give me a call. We will follow-up with you individually to further discuss the project.

Sincerely,

COE & VAN LOO
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Jack K. Moody, P.E.
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JKM:ljd

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David Lucas, R.L.S.
Russell MacDonald, R.L.A.

August 7, 1995

Mr. Dan Nissen, City Engineer
City of Peoria
8401 W. Monroe St.
Peoria, AZ 85345

Re: Agua Fria River Floodplain Restudy
Contract FCD 95-05
CVL #95-0067-01

Dear Mr. Nissen:

A Community information meeting was held on July 13, 1995 to discuss the District's restudy of the Agua Fria River floodplain. Attached is a copy of the minutes from that meeting.

If you have any further input or information relevant to this study, please feel free to give me a call. We will follow-up with you individually to further discuss the project.

Sincerely,

COE & VAN LOO
Consultants, Inc.

Jack K. Moody, P.E.
Project Manager

JKM:ljd

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David Lucas, R.L.S.
Russell MacDonald, R.L.A.

August 7, 1995

Mr. Grant Anderson, Eng. Dir.
City of Glendale
5850 W. Glendale Avenue
Glendale, AZ 85301

Re: Agua Fria River Floodplain Restudy
Contract FCD 95-05
CVL #95-0067-01

Dear Mr. Anderson:

A Community information meeting was held on July 13, 1995 to discuss the District's restudy of the Agua Fria River floodplain. Attached is a copy of the minutes from that meeting.

If you have any further input or information relevant to this study, please feel free to give me a call. We will follow-up with you individually to further discuss the project.

Sincerely,

COE & VAN LOO
Consultants, Inc.

Jack K. Moody, P.E.
Project Manager

JKM:ljd

Enclosure

Q:\950067\ADMIN\67-006LT.PF

COE & VAN LOO

Land Planning
Civil Engineering
Water Resources Engineering
Environmental Sciences
Computer Services
Landscape Architecture
Surveying

Founded in 1958 by
P.E. Coe, P.E. (1915-1977)
H.W. Van Loo, P.E.

John B. Ne[illegible] P.E., R.L.S.
David L. M[illegible]re, R.L.A.
Ken Knickerbocker, P.E., R.L.S.
Paul W.R. Hoskin, P.E.
Paul E. Siders, P.E., R.L.S.
David W. Dust, P.E.
Glen W. Roth, P.E.
Richard Lee Knudson, R.L.S.
E. Thompson Van Loo, P.E., R.L.S.
Gerald Rasmussen, R.L.S.
Michael J. Samer, P.E., R.L.S.
David P. Forney, R.L.S.
Duane M. Hunn, P.E.

Ronald J. Mlnarik, R.L.A.
Les F. Olson, P.E., R.L.S.
Larry E. Sullivan, R.L.S.
Newell J. Roundy, R.L.A.
Earl J. Swetland, R.L.A.
Michael R. Havill, P.E., R.L.S.
Jack K. Moody, P.E.
F. Richard Jones, Jr., P.E., R.L.S.
Brad D. O'Neill, R.L.S.
Christine Taratsas, R.L.A.
William T. Miller, P.E.
Charles E. McElwain, R.L.S.
David Lucas, R.L.S.
Russell MacDonald, R.L.A.

August 7, 1995

Mr. Jose Salarez, Town Manager
City of El Mirage
P. O. Box 26
El Mirage, AZ 85335

Re: Agua Fria River Floodplain Restudy
Contract FCD 95-05
CVL #95-0067-01

Dear Mr. Salarez:

A Community information meeting was held on July 13, 1995 to discuss the District's restudy of the Agua Fria River floodplain. Attached is a copy of the minutes from that meeting.

If you have any further input or information relevant to this study, please feel free to give me a call. We will follow-up with you individually to further discuss the project.

Sincerely,

COE & VAN LOO
Consultants, Inc.

Jack K. Moody, P.E.
Project Manager

JKM:ljd

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David Lucas, R.L.S.
Russell MacDonald, R.L.A.

August 7, 1995

Ms. Shirley Berg, Director of Community Dev. Dept.
Town of Surprise
12604 Santa Fe Drive
Surprise, AZ 85345

Re: Agua Fria River Floodplain Restudy
Contract FCD 95-05
CVL #95-0067-01

Dear Ms. Berg:

A Community information meeting was held on July 13, 1995 to discuss the District's restudy of the Agua Fria River floodplain. Attached is a copy of the minutes from that meeting.

If you have any further input or information relevant to this study, please feel free to give me a call. We will follow-up with you individually to further discuss the project.

Sincerely,

COE & VAN LOO
Consultants, Inc.

Jack K. Moody, P.E.
Project Manager

JKM:ljd

Enclosure

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William T. Miller, P.E.
Charles E. McElwain, R.L.S.
David Lucas, R.L.S.
Russell MacDonald, R.L.A.

August 7, 1995

Mr. Pedro Calza, Chief of Hydraulics Branch
Flood Control District of Maricopa County
2801 W. Durango
Phoenix, AZ 85009

Re: Agua Fria River Floodplain Restudy
Contract FCD 95-05
CVL #95-0067-01

Dear Mr. Calza:

A Community information meeting was held on July 13, 1995 to discuss the District's restudy of the Agua Fria River floodplain. Attached is a copy of the minutes from that meeting.

If you have any further input or information relevant to this study, please feel free to give me a call. We will follow-up with you individually to further discuss the project.

Sincerely,

COE & VAN LOO
Consultants, Inc.

Jack K. Moody, P.E.
Project Manager

JKM:ljd

Enclosure

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August 9, 1995

Kofi Awumah
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

Facsimile # 506-4601

Re: AGUA FRIA RIVER FLOODPLAIN STUDY

Dear Sir:

I am writing this letter on behalf of the City of El Mirage in regards to the above-mentioned floodplain. The City of El Mirage has been trying for nearly three years to have this study done in order to show the actual impact caused by the upstream construction of the New Waddell Dam. The City of El Mirage clearly believes that the floodplain was drastically reduced by the construction of the dam. This was verified by the construction of the Grand Avenue bridge on the river back in 1993.
The Arizona Department of Transportation (ADOT) conducted a hydrology study showing the impact of the new dam and thus reducing the floodplain. This study was accepted by the Federal Highway Administration, which led to constructing a smaller version of the bridge, saving more than $1 million plus dollars. I believe that your agency should acquire a copy of this study if they have not requested one from ADOT.

Numerous taxpayers have been acquiring flood insurance and have been impacted by more stringent building requirements due to the floodplain not being adjusted when the New Waddell Dam was constructed and put into operation. Our taxpayers have been paying out funds that they should have not.

If you have any questions, please feel free to contact me.

Sinceramente,

Jose Solarez
City Manager

JS/s

Facsimile Cover Sheet

TO: Kofi Awumah
Maricopa County Flood Control

506-4601

FROM: Jose Solarez
City of El Mirage
1-602-972-8110

DATE: 08/09/1995

Number of Pages: 2

Message:

Here are the City of El Mirage comments for the upcoming public meeting to be held in Youngtown. If you have any further questions, please contact me at 972-8116.

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

August 30, 1995

Mr. Jack Moody, Project Manager
Coe & Van Loo Consultants, Inc.
4550 North 12th Street
Phoenix, Arizona 85014

Dear Mr. Moody:

SUBJECT: Agua Fria River Floodplain Redelineation - Contract No: FCD 95-05

I have received a request from Aerial Mapping Company, Inc., the firm producing the mapping for the Agua Fria River, asking for a time extension for the delivery of the mapping data. They expect to provide the DTM about September 18, 1995.

Please contact me to set up schedules for field trips regarding Mannings N value evaluation for the study.

We have received the final report of the post New Waddell Dam hydrology from the Corps. The discharges are the same as in the draft report. I will provide you with a copy when we meet next time.

I would also like to thank you for helping with the Public Meeting on Monday in Youngtown. You did a great job with your presentation and in answering the questions.

Sincerely,

Kofi Awumah

Kofi Awumah, Ph.D., P.E.
Project Manager

SUN CITY HOME OWNERS ASSOCIATION

Sun City's Advocate Since 1963

City of Volunteers

Jack McLaughlin
President

September 26, 1995

Stan Smith, Acting Director
Flood Control District
2801 W. Durango St.
Phoenix, AZ 85009

Dear Mr. Smith:

On August 28, 1995, representatives of your organization held a public meeting in Youngtown to discuss your flood plain studies for the Aqua Fria River.

A representative of our organization asked how projected subsidence in the vicinity of El Mirage, Peoria, Youngtown, Glendale (Luke Air Force Base) and Sun City would be taken into account. Your representative explained that Federal regulations prohibits any such projections.

It is our view that this is a most short sighted position given: the taxpayer supported costs of reconstructing the Dysart Drain; and, the recent study by the Department of Water Resources which concluded that damaging subsidence is likely to occur in the area South of Grand Avenue.

We would appreciate it if you will provide us with copies of the Federal regulation which were cited. We also urge that you reexamine your position on this matter. A meeting with representatives of the State Department of Water Resources and the several communities would be helpful.

Sincerely,

Jack McLaughlin
President

cc: Bob Stump, M.C. Dist. 3
Jerry Overton, AZ State Rep Dist. 15
Ed Cirillo, President PORA
Preston Welch, President SCTA

10401 WEST COGGINS DRIVE • SUN CITY, ARIZONA 85351 • (602) 974-4718 • FAX (602) 977-7095

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

October 12, 1995

Mr. Jack McLaughlin, President
Sun City Home Owners Association
10401 West Coggins Drive
Sun City, Arizona 85351

Dear Mr. McLaughlin:

SUBJECT: Agua Fria River Floodplain Redelineation - Future Subsidence of Land

I am writing you in response to your letter of September 26, 1995 concerning the District's redelineation of the Agua Fria floodplain. You have very valid and understandable concerns about land subsidence in your area.

With regard to the Agua Fria Floodplain Redelineation Study, we are required by Arizona Statute to delineate floodplains "consistent with the criteria developed by the director of water resources" (*ARS 48-3605/3609*). These criteria are the guidelines and specifications set forth by the Federal Emergency Management Agency (FEMA) for flood insurance studies (an extract is enclosed). By complying with these specifications when performing floodplain delineation studies, we maintain the County's good standing in the National Flood Insurance Program (NFIP).

The NFIP is the federal program which establishes rules and guidelines for regulating land uses within 100-year floodplains. By adhering to these rules, County residents are eligible for flood insurance and for federal disaster assistance. Flood Insurance Rate Maps are published by FEMA using the information developed from our floodplain delineation studies.

The FEMA guidelines require us to delineate floodplains based on existing conditions (*NFIP Regulations, Page 353, Part 65.6, Paragraph 3*). Future conditions may be considered if such conditions are the result of structural flood control projects in progress at the time of the study. Even then, such projects are to be completed within 12 months of the study.

We recognize that future land subsidence near the Agua Fria River could result in topographic changes that might change the delineated floodplain, but showing property to be in a "projected floodplain" based on conditions that do not currently exist violates the FEMA criteria and would create an unjustified financial burden on the property owners. Affected property owners would be subjected to flood insurance requirements and development restrictions based on a speculative future condition. You can imagine the ramifications of such an act, especially if the "projected floodplain" never materialized. Instead, redelineations are performed where significant topographic changes have occurred, and all changes, including subsidence, are accounted for at that time.

The exclusion of subsidence factors from floodplain delineation studies does not mean flood hazards caused by subsidence are taken lightly. Land subsidence was an important consideration when we were studying ways to protect Luke Air Force Base from flooding. The project that resulted from our studies, the Dysart Drain Improvement Project, has been designed to account for anticipated subsidence over a 40-year horizon.

Geological investigations also were performed when planning the Colter Channel recently constructed north of Camelback Road between the Agua Fria River and Litchfield Road. In this case, however, the analysis determined that subsidence problems were not projected for the area of the channel.

So be assured that the District takes the issue of subsidence seriously when planning flood control projects in your area. In fact, as a result of District efforts, the *Floodplain Regulations for Maricopa County* contain language enabling the District to designate areas of "high velocity flows, erosion, sediment transport, deposition, unstable soil conditions or land subsidence" on locally produced flood management maps (not FEMA maps) if these conditions pose a flood hazard. However, such language was only recently added to the regulations and technical criteria and rules and regulations must still be developed before any meaningful regulation can occur. In the meantime, more and more information about such hazards is being collected as a result of projects like the Dysart Drain Improvement Project, the Colter Channel and the Agua Fria Floodplain Redelineation Study.

I have enclosed copies of the statutes, FEMA guidelines and local floodplain regulations cited in this letter. If you should have further questions, please feel free to contact me at 506-1501.

Sincerely,

Stanley L. Smith Jr., P.E.
Acting Chief Engineer and General Manager

Copies to: Rep. Bob Stump, U. S. House of Representatives, District 3
Rep. Jerry Overton, Arizona House of Representatives, District 15
Ed Cirillo, President, Property Owners Residents Association
Preston Welch, President, Sun City Taxpayer's Association

Enclosures

Historical Note

Source:
Laws 1973, Ch. 106, § 3.
A.R.S. former §§ 45–2342, 45–2802.
Laws 1975, Ch. 66, §§ 2, 4.
Laws 1976, Ch. 45, § 1.
Laws 1979, Ch. 217, § 6.
Laws 1980, 4th S.S., Ch. 1, §§ 117, 160.

§ 48–3606. Assistance for topographic mapping

If sufficient monies have been appropriated, state monies or assistance allowed by this chapter may be provided to a district to aid in preparing topographic maps or to gather other elevation or channel cross-sectional data necessary, as determined by the director, for making hydraulic and hydrologic computations for determining floodplain and floodway limits.

Added as § 45–2346 by Laws 1984, Ch. 259, § 2. Renumbered as § 48–3606 by Laws 1985, Ch. 190, § 23.

Historical Note

Source:
Laws 1975, Ch. 66, § 4.
A.R.S. former § 45–2803.
Laws 1980, 4th S.S., Ch. 1, § 161.

§ 48–3607. Director may contract for work

The director may contract with private persons, firms or other governmental agencies to carry out his duties under this article.

Added as § 45–2347 by Laws 1984, Ch. 259, § 2. Renumbered as § 48–3607 by Laws 1985, Ch. 190, § 23.

Historical Note

Source:
Laws 1975, Ch. 66, § 4.
A.R.S. former § 45–2804.
Laws 1980, 4th S.S., Ch. 1, § 162.

§ 48–3608. Assistance in flood insurance program

A. The director is designated as the state coordinator of the national flood insurance program to assist local jurisdictions in complying with the requirements of such program and state law.

B. The director is designated as the state coordinator of the United States army corps of engineers floodplain management services program and shall coordinate floodplain information studies of federal, state and local agencies and make recommendations to such agencies.

Added as § 45–2348 by Laws 1984, Ch. 259, § 2. Renumbered as § 48–3608 by Laws 1985, Ch. 190, § 23.

Historical Note

Source:
Laws 1974, Ch. 66, § 4.
A.R.S. former § 45–2805.
Laws 1980, 4th S.S., Ch. 1, § 163.

§ 48–3609. Floodplain delineation; regulation of use

A. Except as provided in § 48–3610, the board within its area of jurisdiction shall delineate or may by rule require developers of land to delineate for

KON

FEDERAL EMERGENCY MANAGEMENT AGENCY

Revised as of October 1, 1989 and 1990*

National Flood Insurance Program and Related Regulations

*The changes effective in 1990 can be found on pages 322A through 322C (App. A, Part 62); page 374 (§72.3(a)(1) and (a)(2)), (§72.3(b)(1) through (b)(6)), (§72.4(c) introductory text); and page 374A (§72.4(c)(2) through (c)(5)).

[41 FR 46986, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, and amended at 48 FR 44552, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984]

§ 64.6 List of eligible communities.

The sale of flood insurance pursuant to the National Flood Insurance Program (42 U.S.C. 4001–4128) is authorized for the communities set forth under this section. Previous listings under this part continue in effect until revised.

[41 FR 46986, Oct. 25, 1976]

EDITORIAL NOTE: For references to FR pages showing lists of eligible communities, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

PART 65—IDENTIFICATION AND MAPPING OF SPECIAL HAZARD AREAS

Sec.
65.1 Purpose of part.
65.2 Definitions.
65.3 Requirement to submit new technical data.
65.4 Right to submit new technical data.
65.5 Revision to special hazard area boundaries with no change to base flood elevation determinations.
65.6 Revision of base flood elevation determinations.
65.7 Floodway revisions.
65.8 Review of proposed projects.
65.9 Review and response by the Administrator.
65.10 Mapping of areas protected by levee systems.
65.11 Evaluation of sand dunes in mapping coastal flood hazard areas.
65.12 Revision of flood insurance rate maps to reflect base flood elevations caused by proposed encroachments.
65.13 List of communities submitting new technical data.

AUTHORITY: 42 U.S.C. 4001 *et seq.*; Reorganization Plan No. 3 of 1978; E.O. 12127.

§ 65.1 Purpose of part.

42 U.S.C. 4104 authorizes the Director to identify and publish information with respect to all areas within the United States having special flood, mudslide (i.e., mudflow) and flood-related erosion hazards. The purpose of this part is to outline the steps a community needs to take in order to assist the Agency's effort in providing up-to-date identification and publication, in the form of the maps described in Part 64, on special flood, mudslide (i.e., mudflow) and flood-related erosion hazards.

[48 FR 28278, June 21, 1983]

§ 65.2 Definitions.

(a) Except as otherwise provided in this part, the definitions set forth in Part 59 of this subchapter are applicable to this part.

(b) For the purpose of this part, a certification by a registered professional engineer or other party does not constitute a warranty or guarantee of performance, expressed or implied. Certification of data is a statement that the data is accurate to the best of the certifier's knowledge. Certification of analyses is a statement that the analyses have been performed correctly and in accordance with sound engineering practices. Certification of structural works is a statement that the works are designed in accordance with sound engineering practices to provide protection from the base flood. Certification of "as built" conditions is a statement that the structure(s) has been built according to the plans being certified, is in place, and is fully functioning.

[51 FR 30313, Aug. 25, 1986]

§ 65.3 Requirement to submit new technical data.

A community's base flood elevations may increase or decrease resulting from physical changes affecting flooding conditions. As soon as practicable, but not later than six months after the date such information becomes available, a community shall notify the Administrator of the changes by submitting technical or scientific data in accordance with this part. Such a submission is necessary so that upon confirmation of those physical changes affecting flooding conditions, risk premium rates and flood plain management requirements will be based upon current data.

[51 FR 30313, Aug. 25, 1986]

§ 65.4 Right to submit new technical data.

(a) A community has a right to request changes to any of the information shown on an effective map that does not impact flood plain or floodway delineations, or base flood elevations, such as community boundary changes, labeling, or planimetric details. Such a submission shall include appropriate supporting documentation in accordance with this part and may be submitted at any time.

(b) All requests for changes to effective maps, other than those initiated by FEMA, must be made in writing by the Chief Executive Officer of the community (CEO) or an official designated by the CEO. Should the CEO refuse to submit such a request on behalf of another party, FEMA will agree to review it only if written evidence is provided indicating the CEO or designee has been requested to do so.

[51 FR 30313, Aug. 25, 1986]

§ 65.5 Revision to special hazard area boundaries with no change to base flood elevation determinations.

(a) *Data requirements for topographic changes.* In many areas of special flood hazard (excluding V zones and floodways) it may be feasible to elevate areas with earth fill above the base flood elevation. Scientific and technical information to support a request to gain exclusion from an area of special flood hazard of a structure or parcel of land that has been elevated by the placement of fill shall include the following:

(1) A copy of the recorded deed indicating the legal description of the property and the official recordation information (deed book volume and page number) and bearing the seal of the appropriate recordation official (e.g., County Clerk or Recorder of Deeds).

(2) If the property is recorded on a plat map, a copy of the recorded plat indicating both the location of the property and the official recordation information (plat book volume and page number) and bearing the seal of the appropriate recordation official. If the property is not recorded on a plat map, copies of the tax map or other suitable maps are required to aid FEMA in accurately locating the property.

(3) If a legally defined parcel of land is involved, a topographic map indicating present ground elevations and date of fill. FEMA's determination as to whether a legally defined parcel of land is to be excluded from the area of special flood hazard shall be based upon a comparison of the ground elevations of the parcel with the elevations of the base flood. If the ground elevations of the entire legally defined parcel of land are at or above the elevations of the base flood, the parcel may be excluded from the area of special flood hazard.

(4) If a structure is involved, a topographic map indicating structure location and ground elevations including the elevations of the lowest floor (including basement) and the lowest adjacent grade to the structure. FEMA's determination as to whether a structure is to be excluded from the area of special flood hazard shall be based upon a comparison of the elevation of the lowest floor (including basement) and the elevation of the lowest adjacent grade with the elevation of the base flood. If the entire structure and the lowest adjacent grade are at or above the elevation of the base flood, the structure may be excluded from the area of special flood hazard.

(5) Data to substantiate the base flood elevation. If FEMA has completed a Flood Insurance Study (FIS), that data will be used to substantiate the base flood. Otherwise, data provided by an authoritative source, such as the U.S. Army Corps of Engineers, U.S. Geological Survey, U.S. Soil Conservation Service, state and local water resource departments, or technical data prepared and certified by a registered professional engineer may be submitted. If base flood elevations have not previously been established, hydraulic calculations may also be requested.

(6) Where fill has been placed to raise the ground surface to or above the base flood elevation and the request to gain exclusion from an area of special flood hazard includes more than a single structure or a single lot, it must be demonstrated that fill will

not settle below the elevation of the base flood, and that the fill is adequately protected from the forces of erosion, scour, or differential settlement as described below:

(i) Fill must be compacted to 95 percent of the maximum density obtainable with the Standard Proctor Test method issued by the American Society for Testing and Materials (ASTM Standard D-698). This requirement applies to fill pads prepared for residential or commercial structure foundations and does not apply to filled areas intended for other uses.

(ii) Fill slopes for granular materials are not steeper than one vertical on one-and-one-half horizontal unless substantiating data justifying steeper slopes is submitted.

(iii) Adequate protection is provided fill slopes exposed to flood waters with expected velocities during the occurrence of the base flood of five feet per second or less by covering them with grass, vines, weeds, or similar vegetation undergrowth.

(iv) Adequate protection is provided fill slopes exposed to flood waters with velocities during the occurrence of the base flood of greater than five feet per second by armoring them with stone or rock slope protection.

(7) A revision of flood plain delineations based on fill must demonstrate that any such fill has not resulted in a floodway encroachment.

(b) *New topographic data.* The procedures described in paragraphs (a) (1) through (5) of this section may be also followed to request a map revision when no physical changes have occurred in the area of special flood hazard, when no fill has been placed, and when the natural ground elevations, as evidenced by new topographic maps, more detailed or more accurate than those used to prepare the map to be revised, are shown to be above the elevation of the base flood.

(c) *Certification requirements.* The items required in paragraphs (a) (3) and (4) and (b) of this section shall be certified by a registered professional engineer or licensed land surveyor. Items required in paragraph (a)(6) of this section shall be certified by the community's NFIP permit official, a registered professional engineer, or an accredited soils engineer. Such certifications are subject to the provisions of § 65.2 of this subchapter.

(d) *Submission procedures.* All requests shall be submitted to the appropriate FEMA Regional Office servicing the community's geographic area.

[51 FR 30313, Aug. 25, 1986]

§ 65.6 Revision of base flood elevation determinations.

(a) *General conditions and data requirements.* (1) The supporting data must include all the information FEMA needs to review and evaluate the request. This may involve the requestor's performing new hydrologic and hydraulic analysis and delineation of new flood plain boundaries and floodways, as necessary.

(2) To avoid discontinuities between the revised and unrevised flood data, the necessary hydrologic and hydraulic analyses submitted by the map revision requestor must be extensive enough to ensure that a logical transition can be shown between the revised flood elevations, flood plain boundaries, and floodways and those developed previously for areas not affected by the revision. Unless it is demonstrated that it would not be appropriate, the revised and unrevised base flood elevations must match within one-half foot where such transitions occur.

(3) Revisions cannot be made based on the effects of proposed projects or future conditions. Section 65.8 of this subchapter contains provisions for obtaining conditional approval of proposed projects that may effect map changes when they are completed.

(4) The datum and date of releveling of benchmarks, if any, to which the elevations are referenced must be indicated.

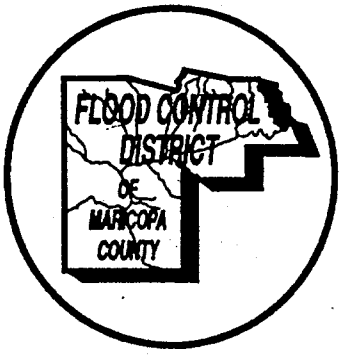
(5) Maps will not be revised when discharges change as a result of the use of an alternative methodology or data for computing flood discharges unless the change is statistically significant as measured by a confidence limits analysis of the new discharge estimates.

(6) Any computer program used to perform hydrologic or hydraulic analyses in support of a flood insurance map revision must meet all of the following criteria:

(i) It must have been reviewed and accepted by a governmental agency responsible for the implementation of programs for flood control and/or the regulation of flood plain lands. For computer programs adopted by non-Federal agencies, certification by a responsible

Floodplain Regulations for Maricopa County

As adopted August 4, 1986
and subsequently amended



Published by:

The Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

ARTICLE VIII. FLOOD HAZARD BOUNDARIES

Section 801. Minimum Area for Floodplain Delineation.

All zones designated A, AH, AO, AE or A1 through A30 on the current Flood Insurance Study, the Flood Insurance Rate Maps and Flood Boundary and Floodway Maps for Maricopa County, Arizona shall, constitute the minimum area for management under this Regulation.

Section 802. Other Delineations.

In areas without delineated flood hazard zones A, AH, AO, AE or A1 through A30, where development is imminent or ongoing, the District may require developers of land to delineate floodplains to be administered under this Regulation. Such delineations shall be consistent with criteria established by the Director, State Department of Water Resources and may be forwarded to the Federal Emergency Management Agency for adoption.

The District may forward to the Federal Emergency Management Agency other delineations obtained from other sources, provided they are determined to be consistent with criteria established by the Director, State Department of Water Resources.

Sources include but are not limited to (1) a developer of floodplain property, (2) County agency, (3) any agency which must delineate a floodplain as a result of completion of a flood control structure, or (4) the Federal Insurance Administration.

1. Such delineations shall be submitted to the Floodplain Administrator to be reviewed for technical adequacy. The Floodplain Administrator shall forward all such delineations to the Arizona Department of Water Resources and to the Federal Emergency Management Agency with his recommendation for approval or denial.

2. All delineations approved by the Federal Emergency Management Agency are hereby adopted as referenced and shall be included on the Flood Management Maps for Maricopa County.

Section 803. Other Flood Hazard Boundaries.

Whenever the District determines through a flood hazard study, watercourse master plan or other flood related study authorized by the Board that a flood related hazard exists due to such factors as high-velocity flows, erosion, sediment transport, deposition, unstable soil conditions or land subsidence, the Floodplain Administrator shall designate such hazard areas on the Flood Management Maps for Maricopa County and shall establish technical criteria and enforce rules and regulations for subsequent development that meet or exceed criteria adopted by the Director, State Department of Water Resources and when appropriate such studies may be forwarded to the Federal Emergency Management Agency.

COE & VAN LOO

Land Planning
Civil Engineering
Water Resources Engineering
Environmental Sciences
Computer Services
Landscape Architecture
Surveying

Founded in 1958 by
P.E. Coe, P.E. (1915-1977)
H.W. Van Loo, P.E.

John Nelson, P.E., R.L.S.
David L. Maguire, R.L.A.
Ken Knickerbocker, P.E., R.L.S.
Paul W.R. Hoskin, P.E.
Paul E. Siders, P.E., R.L.S.
David W. Dust, P.E.
Glen W. Roth, P.E.
Richard Lee Knudson, R.L.S.
E. Thompson Van Loo, P.E., R.L.S.
Gerald Rasmussen, R.L.S.
Michael J. Samer, P.E., R.L.S.
David P. Forney, R.L.S.
Duane M. Hunn, P.E.

Ronald J. Mlnarik, R.L.A.
Les F. Olson, P.E., R.L.S.
Larry E. Sullivan, R.L.S.
Newell J. Roundy, R.L.A.
Earl J. Swetland, R.L.A.
Michael R. Havill, P.E., R.L.S.
Jack K. Moody, P.E.
F. Richard Jones, Jr., P.E., R.L.S.
Brad D. O'Neill, R.L.S.
Christine Taratsas, R.L.A.
William T. Miller, P.E.
Charles E. McElwain, R.L.S.
David Lucas, R.L.S.

November 9, 1995

Mr. Kofi Awumah
Flood Control District of Maricopa County
2801 W. Durango St.
Phoenix, AZ 85009

Re: Agua Fria River Floodplain Delineation Re-Study
Contract FCD 95-05
Cross Section and Thalweg Delineation for Reaches 1 & 3

Dear Kofi:

The letter is to inform you that, based on our previous discussion, CVL intends to use the thalweg and cross sections for Reach 1 and Reach 3 that were used in the Jerry R. Jones 1989 study. Based on our field visits and review of aerial photography, it appears there is no appreciable differences in the horizontal alignment of the river. Therefore, CVL will use this available data instead of delineating new information.

If you have any further questions regarding this letter, please do not hesitate to call.

Sincerely,

COE & VAN LOO
Consultants, Inc.

Jack K. Moody, P.E.
Project Manager

JKM:ljd

Q:\950067\ADMIN\67-022LT.WP5

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

November 16, 1995

Mr. Jack Moody, Project Manager
Coe & Van Loo Consultants, Inc.
4550 N. 12th Street
Phoenix, Arizona 85014

Dear Mr. Moody:

SUBJECT: Agua Fria River Floodplain Redelineation - Contract No: FCD 95-05
Cross Section and Thalweg Delineation for Reaches 1 and 3

This is to approve your proposal for the use of the same cross section locations and thalweg delineation of the previous Jerry Jones 1989 study for reaches 1 and 3.

This proposal is acceptable since both reaches are well defined reaches where minimum changes are expected to occur. With no change in land use and with no appreciable and sustained flows occurring in the river during this time interval, the horizontal alignment of the river should remain virtually unchanged.

You may therefore proceed with the delineation as you proposed..

Yours Sincerely,

Kofi Awumah

Kofi Awumah, Ph.D., P.E.
Project Manager

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

December 14, 1995

Mr. Jack Moody, Project Manager
Coe & Van Loo Consultants, Inc.
4550 N. 12th Street
Phoenix, Arizona 85014

Dear Jack:

SUBJECT: Agua Fria River Floodplain Redelineation - Contract No: FCD 95-05
Survey Results of Unmapped Reaches 1 and 3 and other Questions.

The results of your recent survey of Reaches 1 and 3 have shown that the channel has not changed significantly in these reaches. You may therefore proceed with the floodplain delineation in these reaches.

Regarding the delineation behind the levees, ponding areas on the west side has been recently delineated during the White Tanks/Agua Fria ADMS. The new delineations have been noted on the revised FIRM panels. There is therefore no need to consider these locations in this FIS. Also, the ongoing Meryville ADMS is going to delineate, with new topographic mapping, the ponding areas behind the East Levee from Indian School Road to I-10 freeway. These areas may therefore be ignored. The area behind the east levee between I-10 freeway and Buckeye Road is the only location that may need some attention at this time.

If you need further clarification or additional data on these issues, please give me a phone call.

Yours Sincerely,

Kofi Awumah

Kofi Awumah, Ph.D., P.E.
Project Manager

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

January 9, 1996

Mr. Jack Moody, Project Manager
Coe & Van Loo Consultants, Inc.
4550 N. 12th Street
Phoenix, Arizona 85014

Dear Jack:

SUBJECT: Agua Fria River Floodplain Redelineation - Contract No: FCD 95-05
Flow Distribution from the dam outlet to Bell Road

In the hydrology report released by the Corps, the discharge from the dam was 9000 cfs until at Bell Road before it increases to 37,500 cfs, although Morgan City Wash discharges about 19,000 cfs just downstream of the Dam.

For the purpose of hydraulic modeling, use the 9000 cfs for the dam outlet, then increase the discharge to 19000 cfs at the Morgan City Wash location. Next, linearly interpolate the discharge from 19000 cfs to 37,500 cfs between Morgan City Wash location and Bell Road. The basis of the interpolation should be distance. You do not have to change the discharge at every cross section, use your judgement to lump cross sections together for this change.

If you need further clarification or have any comments, please call. Thanks.

Yours Sincerely,

Kofi Awumah

Kofi Awumah, Ph.D., P.E.
Project Manager

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

August 15, 1996

Mr. Jack Moody, Project Manager
Coe & Van Loo Consultants, Inc.
4550 N. 12th Street
Phoenix, Arizona 85014

Dear Jack:

SUBJECT: Agua Fria River Floodplain Redelineation - Contract No: FCD 95-05 Review of Reach 2 Delineation.

The following are my comments after a review of the work maps.

1. The sand and gravel mine locations need attention to explain how they were delineated. Most of the pits were determined to be ineffective flow areas. The model should include comment cards to explain how the ineffectiveness was modeled (asterisk comments just before these cross sections). It is not possible to show the ineffectiveness using X3 cards in the floodway runs. Cross section plots at these locations look 'bizarre'. To make these look good, it may be necessary to modify the GR data to eliminate the deep profile of the pits.

2. The floodway boundaries shift away from the channel centerline was suggested at several locations. These were depicted on the workmaps using red pencil marks.

3. Cross Section 11.428 GR data needs to be reviewed. This is a bridge location and a cross section plot does not appear to be correct.

4. Cross Section 17.37 to 18.00 need their left encroachment stations revised in the HEC-2 model to reflect the actual locations shown on the work maps.

5. In the Technical Data Notebook, the table "Key to Cross Section Labeling" should exclude the column "EPA Reach No.".

6 The bridge modeling would not require an independent check. The flows are well within the bridge abutments due to the reduced discharges. The HEC-2 model results at the bridge locations appear to be accurate.

7. I have enclosed two copies of the "Agency Evaluation Forms" that you have to fill.

If you need further clarification or additional data on these issues, please give me a phone call.

Yours Sincerely,

Kofi Awumah

Kofi Awumah, Ph.D., P.E.
Project Manager

COE & VAN LOO

Land Planning
Civil Engineering
Water Resources Engineering
Environmental Sciences
Computer Services
Landscape Architecture
Surveying

Founded in 1958 by
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Paul E. Siders, P.E., R.L.S.
Michael R. Havill, P.E., R.L.S.
E. Thompson Van Loo, P.E., R.L.S.
David P. Forney, R.L.S.
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Earl J. Swetland, R.L.A.
F. Richard Jones, Jr., P.E., R.L.S.
Brad D. O'Neill, R.L.S.
Michael J. Vinson, P.E.
Jeffrey M. Engelmann, R.L.A.
Roger D. Pryor, P.E.
Nasir Raza, P.E.

September 5, 1996

Mr. Kofi Awumah
Flood Control District of Maricopa County
2801 W. Durango St.
Phoenix, AZ 85009

Re: Agua Fria River Floodplain Redelineation - Review of Reach 2 Delineation

FCD#: 95-05
CVL#: 95-0067-01

Dear Kofi:

We have made revisions or corrections to the Reach 2 mapping and the TDN based on your review comments from August 15, 1996. The district's review comment is shown in italics and CVL's response follows.

1. FCDMC - *The sand and gravel mine locations need attention to explain how they were delineated. Most of the pits were determined to be ineffective flow areas. The model should include comment cards to explain how the ineffectiveness was modeled (asterisk comments just before these cross sections). It is not possible to show the ineffectiveness using X3 cards in the floodway runs. Cross section plots at these locations look 'bizarre'. To make these look good, it may be necessary to modify the GR data to eliminate the deep profile of the pits.*

   CVL - Comment cards were added to explain ineffective flow areas, including the "pits."

2. FCDMC - *The floodway boundaries shift away from the channel centerline was suggested at several locations. These were depicted on the work maps using red pencil marks.*

   CVL - CVL has made these changes to the floodway on the maps and in the HEC-2 run.

3. FCDMC - *Cross Section 11.428 GR data needs to be reviewed. This is a bridge location and a cross section plot does not appear to be correct.*

   CVL - We reviewed this and it appears appropriate.

4. FCDMC - *Cross Section 17.37 to 18.00 need their left encroachment stations revised in the HEC-2 model to reflect the actual locations shown on the work maps.*

   CVL - We reviewed these sections and feel the encroachments in the HEC-2 correspond to the location shown on the work map.

N:\950067\ADMIN\67-055LT.W61

5. FCDCM - *In the Technical Data Notebook, the table "Key to Cross Section Labeling" should exclude the column "EPA Reach No."*

   CVL - We have removed the column "EPA Reach No." in the "Key to Cross Section Labeling" in the revised TDN.

6. FCDMC - *The bridge modeling would not require an independent check. The flows are well within the bridge abutments due to the reduced discharges. The HEC-2 model results at the bridge locations appear to be accurate.*

   CVL - We will not provide an independent check of the bride modeling.

7. FCDMC - *I have enclosed two copies of the "Agency Evaluation Forms" that you have to fill.*

   CVL - We will submit completed Agency Evaluation Forms to the district.

Sincerely,

COE & VAN LOO
Consultants, Inc.

J. Doug Both
Assistant Project Manager

JDB:ljd

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

October 14, 1996

Carlos Palma
City Manager, City of Avondale
525 North Central Avenue
Avondale, Arizona 85323

Dear Mr. Palma:

SUBJECT: Agua Fria River Floodplain Delineation Re-Study - FCD 95-05
Federal Emergency Management Agency Revised FIRM Panels

Enclosed is a copy of the new floodplain maps we will be sending to the Federal Emergency Management Agency (FEMA) to revise the Flood Insurance Rate Maps for your municipality. The study was prompted by requests by all affected communities to revise the floodplain following the completion of the New Waddell Dam.

The study shows that the floodplain was reduced by 32 percent and the floodway corridor by 43 percent. A public meeting was held on September 30, 1996 to inform interested landowners of the study results.

As part of the map revision process, the consent of your jurisdiction is required. A signature block of the "Revision Requestor and Community Official Form" form is enclosed for your signature.

If you disagree with any portion of the revised map, please let me know so that we can arrange a meeting to discuss your concerns. If you approve of the new changes, please sign the signature block and return the form to me so that the new study can be forwarded to FEMA for approval.

If you have any questions, please call me.

Sincerely,

Kofi Awumah

Kofi Awumah, Ph.D., P.E.
Project Manager

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

October 14, 1996

Mr. Tim Edward
Public Works Director, City of Goodyear
119 North Litchfield Road
Goodyear, Arizona 85338

Dear Mr. Palma:

SUBJECT: Agua Fria River Floodplain Delineation Re-Study - FCD 95-05
Federal Emergency Management Agency Revised FIRM Panels

Enclosed is a copy of the new floodplain maps we will be sending to the Federal Emergency Management Agency (FEMA) to revise the Flood Insurance Rate Maps for your municipality. The study was prompted by requests by all affected communities to revise the floodplain following the completion of the New Waddell Dam.

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If you have any questions, please call me.

Sincerely,

Kofi Awumah

Kofi Awumah, Ph.D., P.E.
Project Manager

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

October 4, 1996

Grant Anderson, P.E, City Engineer
City of Glendale
5850 West Glendale Avenue
Glendale, Arizona 85301

Dear Mr. Anderson:

SUBJECT: Agua Fria River Floodplain Delineation Re-Study - FCD 95-05
Federal Emergency Management Agency Revised FIRM Panels

Enclosed is a copy of the new floodplain maps we will be sending to the Federal Emergency Management Agency (FEMA) to revise the Flood Insurance Rate Maps for your municipality. The study was prompted by requests by all affected communities to revise the floodplain following the completion of the New Waddell Dam.

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If you have any questions, please call me.

Sincerely,

Kofi Awumah

Kofi Awumah, Ph.D., P.E.
Project Manager

FLOOD CONTROL DISTRICT
of
Maricopa County
2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

October 4, 1996

Jose Solarez, Jr., City Manager
14405 N. Palm Street
P.O. Box 26
El Mirage, Arizona 85335

Dear Mr. Solarez:

SUBJECT: Agua Fria River Floodplain Delineation Re-Study - FCD 95-05
Federal Emergency Management Agency Revised FIRM Panels

Enclosed is a copy of the new floodplain maps we will be sending to the Federal Emergency Management Agency (FEMA) to revise the Flood Insurance Rate Maps for your municipality. The study was prompted by requests by all affected communities to revise the floodplain following the completion of the New Waddell Dam.

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If you have any questions, please call me.

Sincerely,

Kofi Awumah

Kofi Awumah, Ph.D., P.E.
Project Manager

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

October 4, 1996

Shirley Berg, Director of Community Development
City of Surprise
12425 W. Bell Road, Suite D-100
Surprise, Arizona 85374

Dear Ms. Berg:

SUBJECT: Agua Fria River Floodplain Delineation Re-Study - FCD 95-05
Federal Emergency Management Agency Revised FIRM Panels

Enclosed is a copy of the new floodplain maps we will be sending to the Federal Emergency Management Agency (FEMA) to revise the Flood Insurance Rate Maps for your municipality. The study was prompted by requests by all affected communities to revise the floodplain following the completion of the New Waddell Dam.

The study shows that the floodplain was reduced by 32 percent and the floodway corridor by 43 percent. A public meeting was held on September 30, 1996 to inform interested landowners of the study results.

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If you have any questions, please call me.

Sincerely,

Kofi Awumah

Kofi Awumah, Ph.D., P.E.
Project Manager

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

October 4, 1996

Burnatt Miller, Building Inspector
Town of Youngtown
12030 Clubhouse Square
Youngtown, Arizona 85363

Dear Mr. Miller:

SUBJECT: Agua Fria River Floodplain Delineation Re-Study - FCD 95-05
Federal Emergency Management Agency Revised FIRM Panels

Enclosed is a copy of the new floodplain maps we will be sending to the Federal Emergency Management Agency (FEMA) to revise the Flood Insurance Rate Maps for your municipality. The study was prompted by requests by all affected communities to revise the floodplain following the completion of the New Waddell Dam.

The study shows that the floodplain was reduced by 32 percent and the floodway corridor by 43 percent. A public meeting was held on September 30, 1996 to inform interested landowners of the study results.

As part of the map revision process, the consent of your jurisdiction is required. A signature block of the "Revision Requestor and Community Official Form" form is enclosed for your signature.

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If you have any questions, please call me.

Sincerely,

Kofi Awumah

Kofi Awumah, Ph.D., P.E.
Project Manager

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
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TT (602) 506-5859

October 4, 1996

Dan Nissen, City Engineer
City of Peoria
Engineering Department, Room 210
8401 West Monroe Street
Peoria, Arizona 85345

Dear Mr. Nissen:

SUBJECT: Agua Fria River Floodplain Delineation Re-Study - FCD 95-05
Federal Emergency Management Agency Revised FIRM Panels

Enclosed is a copy of the new floodplain maps we will be sending to the Federal Emergency Management Agency (FEMA) to revise the Flood Insurance Rate Maps for your municipality. The study was prompted by requests by all affected communities to revise the floodplain following the completion of the New Waddell Dam.

The study shows that the floodplain was reduced by 32 percent and the floodway corridor by 43 percent. A public meeting was held on September 30, 1996, to inform interested landowners of the study results.

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If you disagree with any portion of the revised map, please let me know so that we can arrange a meeting to discuss your concerns. If you approve of the new changes, please sign the signature block and return the form to me so that the new study can be forwarded to FEMA for approval.

If you have any questions, please call me.

Sincerely,

Kofi Awumah

Kofi Awumah, Ph.D., P.E.
Project Manager

Enclosure

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

October 4, 1996

Raymond Acuna, P.E.
Floodplain Manager
City of Phoenix, Street Transportation Dept.
200 West Washington St.
Phoenix, Arizona 85003-1161

Dear Ray:

SUBJECT: Agua Fria River Floodplain Delineation Re-Study - FCD 95-05
Federal Emergency Management Agency Revised FIRM Panels

Enclosed is a copy of the new floodplain maps we will be sending to the Federal Emergency Management Agency (FEMA) to revise the Flood Insurance Rate Maps for your municipality. The study was prompted by requests by all affected communities to revise the floodplain following the completion of the New Waddell Dam.

The study shows that the floodplain was reduced by 32 percent and the floodway corridor by 43 percent. A public meeting was held on September 30, 1996 to inform interested landowners of the study results.

As part of the map revision process, the consent of your jurisdiction is required. A signature block of the "Revision Requestor and Community Official Form" form is enclosed for your signature.

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If you have any questions, please call me.

Sincerely,

Kofi Awumah

Kofi Awumah, Ph.D., P.E.
Project Manager

GLENDALE

October 16, 1996

Kofi Awumah, Ph.D., P.E.
Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, Arizona 85009

SUBJECT: AQUA FRIA RIVER FLOODPLAIN DELINEATION RESTUDY

Dear Mr. Awumah:

Enclosed is the completed Revision Requestor and Community Official Form for the restudy of the Aqua Fria River. We have reviewed the information on the Flood Insurance Rate Maps (FIRM). There are two sheets, 1615 and 1620, which affect the City of Glendale. We agree with the floodplain and floodway information shown on the maps.

The only discrepancy we find with the maps is in the City Limit boundaries shown. Since the original mapping, several areas have been annexed into the City. We have enclosed copies of the two maps showing the revised City Limit lines. Please make these corrections before the next publication of the FIRM.

We appreciate the opportunity to comment on the restudy of the Aqua Fria River floodplain. Please feel free to contact either myself or Mr. Dan Sherwood at 930-3630 should you have any questions or require additional information.

Sincerely,

Grant I. Anderson P.E.
City Engineer

DAS/mdm
Enclosure

Meeting Minutes

COE & VAN LOO CONSULTANTS, INC.
4550 North 12th Street
Phoenix, AZ 85014
02) 264-6831

MEETING MINUTES

DATE: June 28, 1995, 9:30 A.M.

ATTENDEES: Kofi Awumah (FCDMC)
Pedro Calza (FCDMC)
Mark Brewer (FCDMC)
Jack Moody (CVL)
Paul Hoskin (CVL)

RE: Agua Fria River Study
Contract FCD 95-05
CVL #95-0067-01

LOCATION: Flood Control District of Maricopa County

PURPOSE: A meeting was held to discuss initiation of the contract. A contract notice to proceed was received last week and was set for June 22, 1995.

DISCUSSION:

- The District provided CVL with a list of landowners that are encompassed by the floodplain of the Agua Fria River. Mark Brewer will provide CVL with a Word Perfect file containing this information.

- The District wishes to hold the first Agency coordination meeting. This meeting is planned for July 13 at 10:00 A.M. at the District. CVL will provide a draft copy of the letter inviting all community officials. The District will provide CVL with a list of names of all the floodplain managers and the room within which the meeting will be held. A draft of this letter will be provided to Kofi on Friday.

- CVL will attempt to arrange a meeting with Aerial Mapping Company and Cooper Aerial Mapping Company to discuss the project and coordination between the two aerial mappers. The meeting was tentatively set for 1:30 P.M. on Thursday, July 6, 1995 at CVL's office. CVL will provide Cooper with a notice to proceed.

- The District will contact David Evans and Associates in order to arrange for release of the topographic information that was used in the previous Agua Fria River study.

- Jim Phipps, with the District, will contact each of the cities and municipalities affected by the study and will make a decision as to whether project presentations will be made at council meetings or public meetings.

- CVL will provide the District with a list of data that is anticipated to be required for the study.

- The Corps of Engineers Hydrology is not yet complete although a preliminary hydrology report has been issued. The hydrology for the Agua Fria River has been reviewed by the District and some comments are forthcoming to the Corps. It can be anticipated that changes to the hydrology may occur during this study. A review of the project schedule indicates that hydrology should be made available by the beginning of October prior to finalization of the floodplain maps and the hydraulic analysis. If the Corps hydrology has not been finalized prior to completion of this floodplain study then a submittal will be made to FEMA on the basis that this is the best available information. Care needs to be taken in moving forward during the delineation stage so as to insure that the hydrology will not result in any redo of the work. Pedro does not want to consider a change order for this work. CVL will notify Pedro when a critical point is reached in the study beyond which any change in hydrology may result in additional work effort.

- Pedro asked that work be finished on the floodplain delineation south of Indian School Road before proceeding further to the north. This portion of the river is less likely to result in any changes in floodplain that might occur as a result of changes in hydrology.

- The District provided CVL with copies of the Corps hydrology in its draft form. Also included is an addendum sheet for the discharge summary.

- The District provided CVL with the most recent HIS specifications.

- Field surveys for cross-section checks may commence any time.

PWRH:ljd

c: Attendees
Larry Sullivan, CVL

COE & VAN LOO CONSULTANTS, INC.
4550 N. 12th St.
Phoenix, AZ 85014
(602) 264-6831

MEETING MINUTES

DATE: July 10, 1995

TIME: 2:30 P.M.

ATTENDEES:
Kofi Awumah (FCDMC)
Pedro Calza (FCDMC)
Richard Cook (AMC)
Robert Parks (AMC)
Jeff Cooper (CAS)
Luke Bingham (CAS)
Jack Moody (CVL)
Larry Sullivan (CVL)
Paul Hoskin (CVL)

RE: Agua Fria River Study
Contract FCD 95-05
CVL #95-0067-01

LOCATION: Office of Coe & Van Loo

PURPOSE: A meeting was held to discuss coordination between the two aerial mapping companies, Cooper Aerial Survey (CAS) and Aerial Mapping Company (AMC).

DISCUSSION:

- AMC will complete the compilation of the topographic mapping for Reach 2 (Indian School Road to Jomax Road) by the end of August 1995.
- CAS needs a letter of release from David Evans and Associates before they can provide the topographic mapping either to the District or CVL. CAS has already retrieved the data files and will begin to proceed with conversion.
- CVL will conduct cross-section checks for Reaches 1 and 3. Cross-section locations will be determined from field review and will be taken along existing HEC-2 cross-section locations. Cooper can provide CVL with the coordinate locations for the end points of each cross-section.

- The topographic mapping for Reaches 1 and 3 needs to be translated to the 1983 NAD horizontal datum. Cooper can achieve this by matching to the AMC topography at each end of Reach 2. For the translation at the north end of Reach 3 and the south end of Reach 1, it will be necessary for CVL to horizontally locate some identifiable features. This work will be performed by CVL in exchange for performing less cross-section checks.

- Topographic mapping is available for the Gila River from Michael Baker, Jr. This mapping can be provided to CAS in digital form and matched in. The District is not sure which horizontal datum this mapping is in.

A meeting was scheduled with CAS for July 17, 1995 at 9:30 A.M.

COE & VAN LOO CONSULTANTS, INC.
4550 N. 12th St.
Phoenix, AZ 85014
(602) 264-6831

MEETING MINUTES

DATE: July 13, 1995

TIME: 10:00 A.M.

ATTENDEES: Kofi Awumah (FCDMC)
Jim Phipps (FCDMC)
Jesse Mendez (Youngtown)
Dan Sherwood (Glendale)
Ray Acuña (Phoenix)
Jack Moody (CVL)
Paul Hoskin (CVL)

RE: Agua Fria River Floodplain Restudy
Contract FCD 95-05
CVL #95-0067-01

LOCATION: Flood Control District of Maricopa County
Adobe Conference Room

PURPOSE: A meeting was held to present the scope of the study to each of the community floodplain representatives. In addition, any comments or concerns were encouraged.

DISCUSSION:

Kofi Awumah, the District's assigned project manager for this study thanked those in attendance and introduced the study team members. A sign-in sheet was passed and each individual introduced themselves. Mr. Paul Hoskin and Mr. Jack Moody from Coe & Van Loo Consultants, Inc. introduced the study and gave an explanation of project issues.

CVL has been awarded the contract to perform a restudy of the 100-year floodplain for the Agua Fria River. The restudy is being performed due to anticipated changes in the floodplain which have resulted from the construction of New Waddell Dam and subsequent changes in the downstream hydrology. The U.S. Army Corps of Engineers (Corps) has released preliminary discharge information for the Agua Fria River.

The restudy will be for approximately 33 river miles and will extend from the confluence with the Gila River, north to the outlet works of New Waddell Dam (see attached exhibit). The study has been divided into three study reaches as follows:

Reach 1 - Gila River confluence to Indian School Road.

Existing topographic mapping at a scale of 1" = 400' with a contour interval of 4 feet was flown in 1985 for the previous study by David Evans & Associates (formerly Jerry R. Jones & Associates).

This reach of the river has been extensively channelized and hence the floodplain boundaries are likely to remain fixed. Changes may result from a reduction in ponding areas behind the levees.

CVL will be conducting field surveys of cross-sections at selected locations within Reach 1 and Reach 3. These cross-sections will be used to evaluate how much the river bed has changed since the original aerial flight.

Reach 2 - Indian School Road to Jomax Road

New topographic mapping at a scale of 1" = 200 with a contour interval of 2 feet is currently being produced by Aerial Mapping Company (AMC) under contract to the District. The District decided that new mapping would be appropriate for this reach of the river due to significant changes in the river bed. There are many ongoing gravel mining operations within this reach of the river. In addition, the Grand Avenue bridge has been constructed since the previous mapping was completed.

A reduction in the Agua Fria River discharges will likely reduce the floodplain limits near the confluence with the New River. As a result, the lower reaches of the New River will also be evaluated.

Reach 3 - Jomax Road to New Waddell Dam

Existing topographic, from the same source as Reach 1, will be used for this study reach. This reach is relatively undisturbed. Significant features include the Beardsley Canal flume crossing of the river and the SR87 road bridge.

The study crosses nine jurisdictional boundaries as follows:

Avondale
El Mirage
Glendale
Goodyear
Peoria
Phoenix
Surprise
Unincorporated Maricopa County
Youngtown

Study Schedule

A study schedule has been developed based upon a twelve month time frame submittal to FEMA is scheduled for the end of May 1996. (See attached)

Community Input

Mr. Dan Sherwood (City of Glendale) indicated that the City recently received approval for a Letter of Map Revision (LOMR) request by FEMA for the city landfill located near the east bank of the river and north of Glendale Avenue.

Community Involvement

Mr. Jim Phipps is the public information officer with the District. The District will make arrangements to advertise the study in two local newspapers. Members of the public will be invited to a public information meeting where their questions may be answered and their concerns voiced.

The number of river miles within each jurisdiction have been provided by the GIS Group. CVL will measure the east and west bank limits based upon existing USGS mapping and provide the District with a cross check.

PWRH:ljd

Attachments: Attendance Roster
Study Location Map
Study Schedule
Study Announcement

c: Attendees
Community Officials

COE & VAN LOO CONSULTANTS, INC.
4550 North 12th Street
Phoenix, AZ 85014
(602) 264-6831

MEETING MINUTES

DATE: July 17, 1995, 9:30 A.M.

PLACE: Office of Coe & Van Loo Consultants, Inc.

ATTENDEES: Luke Bingham, Cooper Aerial Survey
Jeff Cooper, Cooper Aerial Survey
Jack Moody, Coe & Van Loo Consultants, Inc.
Paul Hoskin, Coe & Van Loo Consultants, Inc.

RE: Agua Fria River Floodplain Re-Study
Topographic Mapping

DISCUSSION:

(1) CVL will identify a physical feature at each end of the project which will be used to rotate the mapping to 1983 NAD.

(2) Cooper will look at the possibility of recreating the contours using a DTM so that the lines are continuous.

(3) Cooper will provide CVL with digital data for cross-sections. Cooper will provide cross-section plots in CADD.

(4) The ARC/INFO conversion by Cooper will be done for the whole project. CVL will provide edited data.

(5) Cooper needs to discuss the CADD deliverables prior to ARC/INFO conversion. Cooper will meet with CVL again to define the form in which digital data should be submitted to Cooper.

(6) The District has contacted David Evans & Associates (DEA) and Roger Baile has agreed to release the mapping data. A letter is expected from DEA shortly. Cooper cannot release the data without a letter from DEA.

(7) Cooper's contract is to provide ARC/INFO mapping coverage for a band of topography which will extend just outside of the current floodplain limits. Any additional coverage would be an extra to Cooper's contract.

c: File
Cooper Aerial Survey
Kofi Awumah - FCDMC
Jack Moody - CVL

Agua Fria River Delineation Study
Public Meeting
Town of Youngtown Clubhouse
Monday August 28, 1995
6:30pm-8:00pm

ATTENDANCE

Flood Control District
Kofi Awumah, Project Manager
Jim Phipps, Public Involvement Coordinator

Consultant
Jack Moody, Project Manager, Coe & Van Loo Consultants, Inc.
Doug Both, Project Designer, Coe & Van Loo Consultants, Inc.

Town of Yountown
Daphne Green, Mayor
Art Semick, Councilman
Jim Trollen, Councilman
Burnett Miller, Building Inspector
William Kasanovich, Civil Defense Director
Bill Pressley, Planning & Zoning

City of El Mirage
Jose Solarez, Town Manager

Other
Sally Russell, County Planning & Zoning Commission
Eileen Greiss, Youngtown Civic Association
Gene Jensen, Sun City Homeowners Association

Residents (See attached attendance roster)

MEETING SUMMARY

The meeting was convened at 6:30 p.m. by Jim Phipps who welcomed those in attendance and reviewed the evening's agenda. He said the purpose of the meeting was to explain and answer questions about a floodplain delineation study being performed along the Agua Fria River between New Waddell Dam and the Gila River.

Mr Phipps said the study is prompted by changes to the existing 100-year floodplain resulting from construction of New Waddell Dam. He said the study will take approximately 11 months and will be followed by another public meeting to announce the results. He said the study could not begin until the Corps of Engineers released the official "numbers" telling the District how much water would be released from the dam during a 100-year storm event. This information was not available until recently.

Jack Moody of Coe & Van Loo Consultants explained the process to be used in conducting the study. He said the study area can be divided into three distinct "reaches". Reach one extends from the Gila River upstream to Indian School Road. This reach has been extensively channelized and hence the floodplain boundaries are likely to remain unchanged.

Reach 2 extends from Indian School Road to Jomax Road and is the area most likely to experience changes in the floodplain. Mr. Moody said gravel operations, new development, bridge construction and reduced flows from Lake Pleasant will impact the floodplain. He said new topographic mapping is being produced for this reach of the river to account for the numerous changes. New mapping will not be needed for the other reaches.

Reach 3 covers the area between Jomax Road and New Waddell Dam. Mr. Moody said this reach is relatively undisturbed and minimal changes to the channel have occurred since the last mapping was developed.

He said average flows along the river before the new dam was constructed was 95,000 cubic feet per second (cfs). He said these flows have been reduced by approximately two-thirds above Camelback Road (where New River joins the Agua Fria River) and by about half below the New River confluence. He cautioned the audience not to assume the floodplain boundaries in these areas will shrink by the same percentage. He said the percentage reduction in flows does not directly correlate to a similar reduction in the floodplain boundaries.

Mr. Moody said the results of the study will be submitted by the District to the Federal Emergency Management Agency (FEMA) for use in updating Flood Insurance Rate Maps (FIRMs). He said it will probably be two years before any new floodplain boundaries are "officially" adopted by FEMA.

At this point in the meeting, a number of questions were asked by those in attendance. Some people wondered if their property is currently in the Agua Fria floodplain. Staff offered to stay after the meeting to review current FIRM maps to determine the status of their property.

Several residents wondered what would happen to Youngtown if New Waddell Dam burst. They were told that a "dam break analysis" would have to be performed to determine the area of inundation such a catastrophe would cause. Such a study would be the responsibility of the dam operator.

Others asked if the impacts of New River Dam and the Arizona Canal Diversion Channel will be considered when performing the study. Mr. Moody explained the reason for these structures and said their impacts on the Agua Fria River have been taken into account.

Ronald Rayner, a local property owner, asked if changes in the Gila River floodplain resulting from modifications to Roosevelt Dam will be considered when determining floodplain boundaries at the confluence of the Agua Fria and Gila Rivers. The consultant said a new delineation for the Gila River is being performed by the District and the information will be used in the Agua Fria study.

Another person asked if there is space behind New Waddell Dam set aside for flood control. Mr. Moody said the flood control benefits of the larger dam are a "side benefit". The dam was not constructed for purposes of flood control. However, the operators of the new dam have adopted an "operating procedure" which allows for increased storage of stormwater. It is this operating procedure which determines how much water will be released during storm events. The releases to occur during a 100-year flood event are the numbers being used by the District to define the new 100-year floodplain boundaries.

Jose Solarez, the El Mirage City Manager, expressed the hope that the study will identify the need for additional channelization along the Agua Fria River. Kofi Awumah, the project manager for the study, said no such project is currently planned. Mr. Phipps said floodplain delineation studies do not propose structural solutions to flooding problems. Such studies simply define the boundaries of the floodplain. Identifying needed flood control projects is a separate process. Communities such as El Mirage are invited each year to submit proposed flood control projects to the District for consideration. Such projects compete for funding with other projects submitted by other communities or developed through the District's Area Drainage Master Study program.

In response to questions about on-going development in the floodplain, residents were told that floodplain use permits for Surprise and Youngtown are handled by the District, but other communities along the river do their own floodplain management. Until the District's floodplain delineation study is completed, the old floodplain maps will be used to manage development along the Agua Fria River.

AGUA FRIA FLOODPLAIN DELINEATION STUDY
PUBLIC MEETING
Youngtown Clubhouse, 12030 Alabama Avenue
Monday August 28, 1995

SIGN-IN SHEET

Name	Address	Affiliation (if any)
William Kosanovich		Youngtown Civil Defense Director
Richard Wehbe	Rose Garden Lane	
Geneva B. Montanez	11207 Alabama Ave.	
Stan & Virginia Crouch	11113 Pennsylvania Ave.	Y.T.
Ben Biery		RPD District 4 COAC
Youngtown councilman Barbara J. Lemieux		Councilwoman Youngtown
Youngtown mayor Daphne Green		Mayor of Youngtown
Bob Holland		RV STG FAC INC
Gene Jensen		Sun City HOA
Bill Pressley		Planning & Zoning
Faye Farmer	11112 W. Montana Ave	P. & Z
John S. Russell	11960 N. 113th Dr	
Sally E Russell	11960 N. 113th Dr.	Planning & Zoning
Lageschulte Ross	3625 S. Litchfield Rd	
Ronald Rayner	PO Box 1509 Goodyear Az. 85338	
Jean Bostic	12411 N 22 Ave Phoenix AZ	85029
Karl & Geneviow	10232 N. 112th.	Sun City 85351

Agua Fria Public Meeting

Name	Address	Affiliation (if any)
[illegible]	10224 N. 113th Ave. Sun City 85351	
[illegible]	11113 W. Maryland Ave. Y.T. 85363	
Joe Hull c/o	Realty Executives 20165 N. 67 Ave Ste 129	Glendale Az 85308
Quilla Dodd	11435 W Illinois Ave YT 85363	
[illegible]	[illegible]	
Rosen Jones	P.O. Box 2037	Litchfield Park 85340
James Aclunh	11503 LANGFORD CT.	YT
JAY DeWITT	11771 W Indian Sch Phx 85037	
L.J. DeWitt	1564 N. Alma Sch	Mesa 85201
RF Barkley	12856 W Orange Dr	Litchfield
Gordon Jones	9541 No. 43rd St	Phx. 85018
Cheryl Wyclucki	11518 W Tanglina Ct	Surprise Az 85374
Jack Duran (new Jay Minutes	13236 N 113th Ave	youngtown
Maureen M. Senick	11830 N. 112th Dr.	Youngtown Ag. concerned citizen
[illegible]	5405 Cedar Hill	SC 85351
[illegible]	11501 Kansas Ave.	YT Az 85363
Delores Walker	P.O Box 1340	Sun City Az 85372
Jim Wehmueller	3612 W Dunlap	Phx 85051
Kris Wehmueller	3612 W. Dunlap	Phx 85051

President of Youngtown Civic Association

Agua Fria Public Meeting

Name	Address	Affiliation (if any)
Jose Solarez (El Mirage Mayor)	P.O. Box 26 El Mirage 85335	City of El Mirage
Pat Driehl	11435 W. Illinois	Youngtown

Agua Fria Public Meeting

Name	Address	Affiliation (if any)
Dudley + Sheila Jones	19035 N. 116th Lane, Surprise AZ 85374	
Jim T Sullen	11825 114 ave	councilman, Youngtown

COE & VAN LOO CONSULTANTS, INC.
4550 N. 12th St.
Phoenix, AZ 85014
(602) 264-6831

MEETING MINUTES

DATE: October 6, 1995

TIME: 2:00 P.M.

ATTENDEES: Kofi Awumah (FCDMC)
Pedro Calza (FCDMC)
Jack Moody (CVL)
Doug Both (CVL)

RE: Agua Fria River Study
Contract FCD 95-05
CVL #95-0067-01

LOCATION: Flood Control District of Maricopa County

DISCUSSION:

1) Jack Moody requested that FCDMC provide the following items to be used in the study:

- Manual used for determination of Manning's N; *Estimated Manning's Roughness Coefficients for Stream Channels and Floodplains in Maricopa County, Arizona* by USGS. This was received by CVL.
- Aerial stereo photographs of the project. This was received by CVL 10/10/95.
- As-builts for levees. This was received by CVL.
- Hydrology for the Agua Fria River. The report Agua Fria River Study New Waddel Dam to Gila River Confluence, Arizona by U.S. Army Corps of Engineers L.A. District was received by CVL.
- Latest FIRM Maps with changes including LOMR's. This was received by CVL.

2) Jack mentioned that CVL was still waiting for topographic mapping of Reaches 1 and 3 from Cooper Aerial.

3) It was also mentioned that CVL has received 100% of the mapping produced by Aerial Mapping Co.

4) CVL asked for ERM coordinates from the Jerry R. Jones Study of the Agua Fria River. The FCDMC said that they would look for this.

5) CVL said that the first quarterly estimation of the projected billing for project would be provided next week.

6) CVL discussed the revised project schedule with the district.

7) Kofi mentioned that a resident who attended the first public hearing recently contacted the District. The resident thought the study should take into account the subsidence. Kofi wrote a letter to the resident explaining that it would not be feasible to continually update the study to account for changes in topography.

8) It was discussed that CVL would acquire the bridge As-Builts for the entire study reach from both ADOT and Maricopa County Highway Department.

c: All Attendees

COE & VAN LOO CONSULTANTS, INC.
4550 N. 12th St.
Phoenix, AZ 85014
(602) 264-6831

MEETING MINUTES

DATE: November 30, 1995

TIME: 10:30 A.M.

ATTENDEES: Kofi Awumah (FCDMC)
Pedro Calza (FCDMC)
Jack Moody (CVL)
Doug Both (CVL)

RE: Agua Fria River Study
Contract FCD 95-05
CVL #95-0067-01

LOCATION: Flood Control District of Maricopa County

DISCUSSION/ACTION:

- CVL submitted the Data Collection Report to the District.
- CVL submitted a blueline copy of the proposed control line and cross sections for Reach 2 to the District for their review.
- CVL discussed the progress made on Reach 1 and expects to complete the modeling within one or two weeks.
- CVL recommended using the bank stations from the 1989 Jerry R. Jones study for Reach 1. The FCDMC agreed that these bank stations would be appropriate.
- It was discussed that CVL would contact Cooper Aerial Survey to find out status of missing portions of DTM data.

c: All Attendees

COE & VAN LOO CONSULTANTS, INC.
4550 N. 12th St.
Phoenix, AZ 85014
(602) 264-6831

MEETING MINUTES

DATE: December 7, 1995

TIME: 3:30 P.M.

ATTENDEES: Kofi Awumah (FCDMC)
Jack Moody (CVL)
Doug Both (CVL)

RE: Agua Fria River Study
Contract FCD 95-05
CVL #95-0067-01

LOCATION: Flood Control District of Maricopa County

DISCUSSION/ACTION:

- CVL submitted two copies of cross section check plots to the District. These plots showed a comparison of the topography from the 1989 Jerry R. Jones Study and current field data. It was determined by the District the cross section 30.07 should be discarded because of an apparent erroneous point. Kofi said that he would have a discussion with Pedro Calza of the District about the noticeable scour on some of the cross section checks. Kofi said he would follow up his review of these cross section checks with an official letter.

- CVL asked the District for a copy of the Gila River floodplain boundary so that it could be tied into the New Agua Fria Floodplain boundary. Kofi said that he would try to locate this mapping and have it delivered to CVL.

- CVL asked which Q's would be appropriate to use for the study. Since in some areas the flow decreases downstream it was difficult to determine the location for the Q changes. It was decided to use the higher more conservative Q.

- CVL asked which expansion and contraction coefficients to use at bridges in channelized areas. CVL and the District agreed that since there is little to no expansion and contraction at these locations the coefficients would have minimal effect. However, it was decided to use coefficients of 0.3 and 0.5 so FEMA reviewers would not question this aspect of the model.

- There is a number of locations in the channelized portion of Reach 1 where there is ponding outside the channel banks. It isn't readily apparent where the water surfaces shown in these ponding areas came from. It doesn't look like these water surfaces came from backwater caused by the Agua Fria River. Kofi said that he would research this and find mapping which shows how these ponding areas were generated.

- There is a location west of the Agua Fria River near McDowell Road where the ponding outside the channel is shown differently on the Jerry R. Jones study and the latest FIRM map. CVL asked the District if they had information which documents this change. Kofi said he would look for information on this and get back to CVL. (Subsequent to this meeting Kofi informed CVL that the White Tanks ADMS generated this information.)

- CVL received the work map showing the control line alignment and the HEC-2 cross section locations that were reviewed by the District.

c: All Attendees
Pedro Calza (FCDMC)

COE & VAN LOO CONSULTANTS, INC.
4550 North 12th Street
Phoenix, AZ 85014
(602) 264-6831

MEETING MINUTES

Date: January 5, 1996
Time: 9:00 a.m.
Attendees: Jeff Cooper (Cooper Aerial)
Jack Moody (CVL)
Doug Both (CVL)

Re: Agua Fria River Re-study
Contract FCD 95-05
CVL # 95-0067-01

Location: Cooper Aerial of Phoenix

Discussion:

The purpose of the meeting was to discuss the status of retrieving missing digital data from the archives for Reaches 1 and 2 for the Agua Fria River Re-study. Jeff Cooper said he would have someone from his office working on recovering this missing data immediately. Jeff felt he would know the status of whether this data is recoverable or not by mid next week (January 10) and would contact CVL.

CVL further intended this meeting to impress upon Cooper Aerial of Phoenix the immediate need for recovering this data and its conversion to microstation format. CVL is currently ready to plot the floodplain in digital format for Reach 1. Within one or two weeks CVL will be ready to plot the floodplain in digital format for Reach 3.

c: All attendees
Kofi Awumah (FCD)
John Nelson (CVL)

Coe & Van Loo Consultants, Inc.
4550 North 12th Street
Phoenix, AZ 85014
(602) 264-6831

MEMO

TO: Kofi Awumah (FCDMC)

FROM: Doug Both (CVL)

DATE: January 25, 1996

RE: Agua Fria Flood Delineation Study (FCD #95-05, CVL #95-0067)

On January 25, 1996, I had a phone conversation with Hans Channaraj at Cooper Aerial of Phoenix. Hans indicated that they expect to deliver to CVL the Reach 1 and Reach 3 topography in microstation digital format and translated to the 1983 NAD horizontal coordinate system by February 12, 1996.

DB/ljd

cc: John Nelson (CVL)
Jack Moody (CVL)
Jeff Cooper (Cooper Aerial)

COE & VAN LOO CONSULTANTS, INC.
4550 N. 12th St.
Phoenix, AZ 85014
(602) 264-6831

MEETING MINUTES

DATE: June 17, 1996

TIME: 9:00 A.M.

ATTENDEES: Robert Moon (Cooper Aerial of Phoenix)
Jack Moody (CVL)
Doug Both (CVL)

RE: Agua Fria River Study
Contract FCD 95-05
CVL #95-0067-01

LOCATION: CVL

DISCUSSION/ACTION:

- The digitized topo of Reach 1 prepared by Cooper Aerial was determined to be unacceptable by CVL and the FCD. Therefore, this meeting was held to point out the problems to Cooper Aerial and have these problems corrected.

- The following problems with the digitized drawings were discussed:

    1. At many locations there are crossing contours which may have been caused by the drawings being rotated at an incorrect angle.

    2. Contours are too jagged which may have been caused by editing out too many points.

    3. Some contours are missing. Missing contours will be added.

- Cooper Aerial stated they would do everything necessary to correct the problems and turn in a good product.

c: Kofi Awumah (FCDMC)

COE & VAN LOO CONSULTANTS, INC.
4550 N. 12th St.
Phoenix, AZ 85014
(602) 264-6831

MEETING MINUTES

DATE: July 23, 1996

TIME: 3:30 P.M.

ATTENDEES: Pedro Calza (FCDMC)
Kofi Awumah (FCDMC)
Jack Moody (CVL)
Doug Both (CVL)

RE: Agua Fria River Study
Contract FCD 95-05
CVL #95-0067-01

LOCATION: CVL

DISCUSSION/ACTION:

- The following problems with the digitized drawings by Cooper Aerial need to be corrected.

    1. Shifts in the contours caused problems in some areas, therefore they did not line up with other contours or plane metrics.

    2. All sheets are missing corporate boundaries, street names, RM locations and section corners.

c: Kofi Awumah (FCDMC)

Cooper Aerial of Phoenix, Inc.

To
Jack Moody,
Project Manager
Coe and Van Loo
4550 N 12th Street
Phoenix, AZ 85014

From:
Hans Channaraj
Cooper Aerial of Phoenix, Inc

Re **Minutes of the meeting held at Coe and Van Loo** today

Date July 24, 1996

The following services will be provided by Cooper Aerial to resolve the issues presented during the discussion:

Broken contour lines will be joined in Arc INFO; this will not pose a problem in the currently existing format
Several of the sheets will be modified to ensure the continuity of levee contours; also excessive contour shifts in some of these sheets will be corrected
Street names will be appended to these sheets as shown on the source mylars for sheets 1 through 8
The digitized sections of the mapping will be tied in with the pre-existing mapping to provide seamless map-data
The RMs will be inserted into digitized sheets 1 through 8
Expected day of delivery: 7 days from today

Hans Channaraj

11402 N. CAVE CREEK ROAD / PHOENIX, ARIZONA 85020
(602) 678-5111 / FAX (602) 678-5228

COE & VAN LOO CONSULTANTS, INC.
4550 N. 12th St.
Phoenix, AZ 85014
(602) 264-6831

MEETING MINUTES

DATE: August 15, 1996

TIME: 11:30 A.M.

ATTENDEES: Kofi Awumah (FCDMC)
Jack Moody (CVL)
Doug Both (CVL)

RE: Agua Fria River Floodplain Delineation Re-Study (FDR)
Contract FCD 95-05
CVL #95-0067-01

LOCATION: CVL

DISCUSSION/ACTION:

- The following items were discussed by CVL and the FCDMC.

  1. CVL received review comments from the FCDMC for Reach 2 for the Agua Fria River (FDR).

  2. The FCDMC reviewed the Reach 1 topo maps (8 sheets) that were digitized by Cooper Aerial for change order #1. The district determined the digitized mapping to be acceptable for final product.

c: Kofi Awumah (FCDMC)

COE & VAN LOO CONSULTANTS, INC.
4550 N. 12th St.
Phoenix, AZ 85014
(602) 264-6831

MEETING MINUTES

DATE: August 29, 1996

TIME: 10:30 A.M.

ATTENDEES: Pedro Calza (FCDMC)
Kofi Awumah (FCDMC)
Jack Moody (CVL)
Doug Both (CVL)

RE: Agua Fria River Floodplain Delineation Re-Study (FDR)
Contract FCD 95-05
CVL #95-0067-01

LOCATION: FCDMC

DISCUSSION/ACTION:

- The following items were discussed by CVL and the FCDMC.

  1. CVL explained to the FCDMC that the tic marks and stationing along the thalweg for Reach 1 and Reach 3 would not correspond accurately with the cross section stationing. The FCDMC said the tic marks and stationing along the thalweg is desirable but not required. However, the control line reach lengths from the HEC-2 should add up to a measured length along he thalweg.

     The FCDMC said they would investigate the percentage difference or margin that would be allowable to FEMA. If we couldn't meet this margin we could document why we had the discrepancy. (In a subsequent telephone conversation with Kofi Awumah, he said a 10% discrepency is the maximum allowable.)

c: Kofi Awumah (FCDMC)

COE & VAN LOO CONSULTANTS, INC.
4550 N. 12th St.
Phoenix, AZ 85014
(602) 264-6831

MEETING MINUTES

DATE: October 4, 1996

TIME: 7:30 A.M.

ATTENDEES: Pedro Calza (FCDMC)
Kofi Awumah (FCDMC)
Jack Moody (CVL)
Doug Both (CVL)

RE: Agua Fria River Floodplain Delineation Re-Study (FDR)
Contract FCD 95-05
CVL #95-0067-01

LOCATION: FCDMC

DISCUSSION/ACTION:

This meeting was held as a result of the public hearing for the Agua Fria River FDR on September 30, 1996. Ron Raynor, a farmer with property west of Agua Fria and south of Broadway Road, disputed the results presented at the hearing. Therefore, CVL has rechecked the HEC-2 model and made comparisons with the Jerry R. Jones model.

These comparisons were presented to the FCDMC in this meeting. A change in the n values was made to the model between sections 0.16 and 1.40. This change was significant in the overbanks where there is farmland. CVL used an n value of 0.10 where Jerry R. Jones used 0.04. The n value of 0.10 is defendable for the low flow depths expected in the overbank areas which are typically crops of cotton or alfalfa. These n values are based on very large vegetation which is documented in the manual *Estimated Mannning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona* by the U.S. Geological Survey.

Another difference to the HEC-2 model was for the starting conditions. CVL used the slope area method which caused a convergence to a starting water surface of 916.56. The slope area method is appropriate due to the timing differences for the Gila River and the Agua Fria River. The Jerry R. Jones HEC-2 used a starting water surface elevation of 919.0 which is based on the Gila River backwater.

It was also discussed that the non-engineered levees cannot be counted on for remaining intact with the expected, velocities and the potentially high depths of flow.

Public Notices

AFFIDAVIT OF PUBLICATION

The Arizona Republic/The Phoenix Gazette

STATE OF ARIZONA
COUNTY OF MARICOPA } SS.

TOM BIANCO, being first duly sworn, upon oath deposes and says: That he is the assistant 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~~

OCTOBER 6, 1995

PUBLIC NOTICE
YOUR RIGHT TO KNOW
ANNOUNCEMENT OF FLOOD HAZARD STUDY

The Flood Control District, under the authority of the National Flood Insurance Act of 1968 (P.L. 90448), as amended, and the Flood Control Disaster Protection Act of 1973 (P.L. 234), is funding a detailed re-study of Flood Hazard for the Agua Fria River from the outlet of New Waddell Dam to the confluence of Gila River. The study is being performed for Flood Control District by Coe and Van Loo Consultants, Inc. of Phoenix.

This study will examine and evaluate the flood hazard areas in the communities to determine the flood elevation for this area. Those elevations will then be used to determine the flood insurance rates used by the Federal Emergency Management Agency (FEMA). The re-study is to evaluate the effect of the reduced flows in the Agua Fria River, due to the recent completion of the New Waddell Dam.

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 technical information to the attention of FCDMC/FEMA, so that they could be considered during the course of the study. Your comments should be addressed to Mr. Kofi Awumah or Mr. Pedro Calza, hydrologists at the Flood Control District of Maricopa County.

Published: Arizona Republic, October 6, 1995.

Sworn to before me this

16TH day of

OCTOBER A.D. 19 95

OFFICIAL SEAL
MARY LEE BOOHER
Notary Public - State of Arizona
MARICOPA COUNTY
My Comm. Expires March 17, 1999

Notary Public

Daily News-Sun

P.O. Box 1779, Sun City, Arizona 85372 • 10102 Santa Fe Drive
Telephone: 602-977-8351 Fax: 602-876-3698

OE & VAN LOO CONSULTANTS 2932
TTN ALITA CORCOS
550 N 12TH STREET
HOENIX AZ 85014

AFFIDAVIT OF PUBLICATION

TATE OF ARIZONA,
OUNTY OF MARICOPA SS.

, CHERYL J. WILSON,
LEGAL MANAGER OF NEWS-SUN, INC.
EWSPAPER OF GENERAL CIRCULATION,
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ARICOPA, STATE OF ARIZONA, DO
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cheryl j wilson
EGAL MANAGER
WORN TO BEFORE ME THIS 16
AY OF October , 1995.

Shirley Ann G. Oureh
OTARY PUBLIC
/ COMMISSION EXPIRES

OFFICIAL SEAL
SHIRLEY ANN G. OUREH
NOTARY PUBLIC-State of Arizona
MARICOPA COUNTY
My Comm. Exp. Aug. 27, 1997

PUBLIC NOTICE
YOUR RIGHT TO KNOW
ANNOUNCEMENT OF FLOOD HAZARD STUDY

The Flood Control District, under the authority of the National Flood Insurance Act of 1968 (P.L. 90 448), as amended, and the Flood Disaster Protection Act of 1973 (P.L. 93 234), is funding a detailed re-study of Flood Hazard for the Agua Fria River from the outlet of New Waddell Dam to the confluence of Gila River. The study is being performed for Flood Control District by Coe and Van Loo Consultants, Inc. of Phoenix.

This study will examine and evaluate the flood hazard areas in the communities to determine the flood elevation for this area. Those elevations will then be used to determine the flood insurance rates used by the Federal Emergency Management Agency (FEMA). The re-study is to evaluate the effect of the reduced flows in the Agua Fria River, due to the recent completion of the New Waddell Dam.

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 technical 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. Kofi Awumah or Mr. Pedro Calza, hydrologists at the Flood Control District of Maricopa County.

Publish: Daily News-Sun
October 10, 1995

BLICATION	EXPIRE DATE	AD CAPTION	# TIMES	AMOUNT
NEWS-SUN	10/10/95	FLOOD HAZARD	1	34.65
'10/95				

Public Notice

PUBLIC NOTICE
YOUR RIGHT TO KNOW
ANNOUNCEMENT OF
FLOOD HAZARD STUDY

The Flood Control District, under the authority of the Nati[illegible] Flood Insurance Act of [illegible] (P.L. 90448), as am[illegible]d, and the Flood Disaster Protection Act of 1973 (P.L. 93234), is funding a detailed re-study of Flood Hazard for the Agua Fria River from the outlet of New Waddell Dam to the confluence of Gila River. The study is being performed for Flood Control District by Coe and Van Loo Consultants, Inc. of Phoenix.

This study will examine and evaluate the flood hazard areas in the communities to determine the flood elevation for this area. Those elevations will then be used to determine the flood insurance rates used by the Federal Emergency Management Agency (FEMA). The re-study is to evaluate the effect of the reduced flows in the Agua Fria River, due to the recent completion of the New Waddell Dam.

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 technical information to the attention of FCDMC/FEMA, so that they could be considered during the course of this study. Your comments [illegible] addressed to Mr. [illegible]nah or Mr. Pedro [illegible]alza, Hydrologists at the Flood Control District of Maricopa County.

Published in West Valley View and West Valley Business on October 11, 1995.

WEST VALLEY BUSINESS
[illegible] Dysart Rd. Avondale, Arizona 85323 (602) 932-5555

AFFIDAVIT OF PUBLICATION

State of Arizona

County of Maricopa

I, Elliott Freireich, publisher of West Valley View and West Valley Business, newspapers of general circulation in Avondale, Buckeye, Goodyear, Litchfield Park and Tolleson, Arizona, attest that the legal advertisement for

Coe & Van Loo Consultants, Inc.

was published on Oct. 11, 1995

Public Notice Your Right To Know

E Freireich
Elliott Freireich

Oct. 11, 1995
Date

Sworn and Subscribed to before me,

this 11th Day of Oct., 1995

Terry L. Galus
Notary Public

My Commission Expires

OFFICIAL SEAL
TERRY L. GALUS
Notary Public - State of Arizona
MARICOPA COUNTY
My Comm. Expires March 14, 1999

NEWSCOUNT
(602) 957-7995

	Publication	Page	Date	Circulation
❑	Buckeye Valley News			2,300
☒	Sun City Daily News - Sun	A-3	6/18/95	21,525
❑	Sun Cities Independent			36,650
❑	The Wester			8,000
❑	West Valley View			24,455
❑	Wickenburg Sun			3,660

County set to study local flood plain

By BRUCE ELLISON
Staff writer

Completion of the New Waddell Dam at Lake Pleasant two years ago probably has reduced the chances of flooding along the Agua Fria River that forms the boundary between Sun City and Sun City West.

The Agua Fria (Spanish for "cold water") feeds Lake Pleasant from the north, above the dam.

With the new dam holding back several times as much water as the old, it may be possible for development to occur in parts of the river bottom where it now is prohibited, officials believe.

That's one reason the Flood Control District of Maricopa County is about to hire an engineering firm to study the river and its potential to flood.

"Everybody's assuming that the flood plain (where building is limited or prohibited) will shrink," said Pedro Calza, an engineer at the district. "But we have to quantify the threat and document that it's been reduced."

After the study is completed in about a year, Calza said, the results will be sent to the Federal Emergency Management Agency, which has its own rules for defining a flood plain. That definition also affects whether loans can be granted for construction in flood-prone areas, and whether federal flood insurance is available or required on property.

The land area involved is not large, at least north of Grand Avenue, but some of the lower river could prove attractive to developers, especially if they use the remaining flood plain for recreational amenities, as Glendale has done with its Paseo Park.

The zoning changes, if they occur, probably won't be certain until late 1996. Several tracts of land that abut the flood plain are up for sale.

One site that could be put to use is a 160-acre tract on the south side of the river, running from Peoria to Olive avenues.

There has been talk that it could be used for a golf course and for housing. Similar land just to the south is in Peoria or unincorporated parts of the county. Now a horse and cattle farm, with irrigated pastures, it also has for-sale signs posted.

NEWS RELEASE

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

For information call:
Jim Phipps, PIO
Kofi Awumah, Project Manager

For Immediate Release
August 8, 1995

AGUA FRIA RIVER IS FOCUS OF FLOODPLAIN STUDY

The Flood Control District of Maricopa County has begun a 12-month study to update maps showing the limits of the 100-year floodplain along the Agua Fria River from its confluence with the Gila River upstream to New Waddell Dam. A meeting to explain the study and accept public comment will be held from 6:30-7:30 p.m., Monday, August 28, 1995, at the Town of Youngtown Clubhouse, 12030 Alabama Avenue.

The year-long study is prompted by changes to the existing floodplain resulting from construction of New Waddell Dam. The bigger dam, with Lake Pleasant's large reservoir, absorbs more stormwater inflow, thereby reducing the volume of water that must be released during times of heavy rains. This reduction in flows will change the boundaries of the 100-year floodplain below the dam, prompting the need for new floodplain maps.

The study, which will cost $177.000. will establish new flood elevations for approximately 35 river miles along the Agua Fria River. Twenty-three river miles lie in unincorporated areas of the County with the remaining areas crossing eight separate jurisdictions, namely; the cities of Surprise, Youngtown, El Mirage, Peoria, Glendale, Phoenix, Avondale and Goodyear. The engineering firm of Coe & Van Loo Consultants is on contract with the Flood Control District to perform the study.

Technical data and other information relevant to the study is being accepted by the District for review and consideration. Persons wishing to provide information or comments should contact Kofi Awumah, Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona, 85009, telephone (602) 506-1501.

* * *

FLOOD CONTROL DISTRICT of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009
Telephone: 506-1501/FAX: 506-4601

Flood Control District

AGUA FRIA RIVER FLOODPLAIN STUDY

A floodplain delineation study to update maps showing the limits of the 100-year floodplain along the Agua Fria River is being performed by the Flood Control District of Maricopa County.

The study involves hydraulic analysis of the Agua Fria River from its confluence with the Gila River, upstream to New Waddell Dam. The year-long study is prompted by changes to the existing floodplain resulting from construction of the new dam. With its larger reservoir (Lake Pleasant), the dam absorbs more stormwater inflow, thereby reducing the volume of water that must be released during times of heavy rains. This reduction in flows will change the boundaries of the 100-year floodplain below the dam, prompting the need for new floodplain maps.

A public meeting to explain the study and accept comments will be held from 6:30-7:30 p.m., Monday, August 28, 1995, at the Town of Youngtown Clubhouse, 12030 Alabama Avenue. Technical and other information relevant to the study will be accepted for review and consideration during the study. Such information should be submitted to Kofi Awumah, Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona, 85009, telephone 602-506-1501.

August 1995

Agua Fria River Delineation Study
Public Meeting
Town of Youngtown Clubhouse
Monday August 28, 1995
6:30pm-8:00pm

ATTENDANCE

Flood Control District
Kofi Awumah, Project Manager
Jim Phipps, Public Involvement Coordinator

Consultant
Jack Moody, Project Manager, Coe & Van Loo Consultants, Inc.
Doug Both, Project Designer, Coe & Van Loo Consultants, Inc.

Town of Yountown
Daphne Green, Mayor
Art Semick, Councilman
Jim Trollen, Councilman
Burnett Miller, Building Inspector
William Kasanovich, Civil Defense Director
Bill Pressley, Planning & Zoning

City of El Mirage
Jose Solarez, Town Manager

Other
Sally Russell, County Planning & Zoning Commission
Eileen Greiss, Youngtown Civic Association
Gene Jensen, Sun City Homeowners Association

Residents (See attached attendance roster)

MEETING SUMMARY

The meeting was convened at 6:30 p.m. by Jim Phipps who welcomed those in attendance and reviewed the evening's agenda. He said the purpose of the meeting was to explain and answer questions about a floodplain delineation study being performed along the Agua Fria River between New Waddell Dam and the Gila River.

Mr Phipps said the study is prompted by changes to the existing 100-year floodplain resulting from construction of New Waddell Dam. He said the study will take approximately 11 months and will be followed by another public meeting to announce the results. He said the study could not begin until the Corps of Engineers released the official "numbers" telling the District how much water would be released from the dam during a 100-year storm event. This information was not available until recently.

Jack Moody of Coe & Van Loo Consultants explained the process to be used in conducting the study. He said the study area can be divided into three distinct "reaches". Reach one extends from the Gila River upstream to Indian School Road. This reach has been extensively channelized and hence the floodplain boundaries are likely to remain unchanged.

Reach 2 extends from Indian School Road to Jomax Road and is the area most likely to experience changes in the floodplain. Mr. Moody said gravel operations, new development, bridge construction and reduced flows from Lake Pleasant will impact the floodplain. He said new topographic mapping is being produced for this reach of the river to account for the numerous changes. New mapping will not be needed for the other reaches.

Reach 3 covers the area between Jomax Road and New Waddell Dam. Mr. Moody said this reach is relatively undisturbed and minimal changes to the channel have occurred since the last mapping was developed.

He said average flows along the river before the new dam was constructed was 95,000 cubic feet per second (cfs). He said these flows have been reduced by approximately two-thirds above Camelback Road (where New River joins the Agua Fria River) and by about half below the New River confluence. He cautioned the audience not to assume the floodplain boundaries in these areas will shrink by the same percentage. He said the percentage reduction in flows does not directly correlate to a similar reduction in the floodplain boundaries.

Mr. Moody said the results of the study will be submitted by the District to the Federal Emergency Management Agency (FEMA) for use in updating Flood Insurance Rate Maps (FIRMs). He said it will probably be two years before any new floodplain boundaries are "officially" adopted by FEMA.

At this point in the meeting, a number of questions were asked by those in attendance. Some people wondered if their property is currently in the Agua Fria floodplain. Staff offered to stay after the meeting to review current FIRM maps to determine the status of their property.

Several residents wondered what would happen to Youngtown if New Waddell Dam burst. They were told that a "dam break analysis" would have to be performed to determine the area of inundation such a catastrophe would cause. Such a study would be the responsibility of the dam operator.

Others asked if the impacts of New River Dam and the Arizona Canal Diversion Channel will be considered when performing the study. Mr. Moody explained the reason for these structures and said their impacts on the Agua Fria River have been taken into account.

Ronald Rayner, a local property owner, asked if changes in the Gila River floodplain resulting from modifications to Roosevelt Dam will be considered when determining floodplain boundaries at the confluence of the Agua Fria and Gila Rivers. The consultant said a new delineation for the Gila River is being performed by the District and the information will be used in the Agua Fria study.

Another person asked if there is space behind New Waddell Dam set aside for flood control. Mr. Moody said the flood control benefits of the larger dam are a "side benefit". The dam was not constructed for purposes of flood control. However, the operators of the new dam have adopted an "operating procedure" which allows for increased storage of stormwater. It is this operating procedure which determines how much water will be released during storm events. The releases to occur during a 100-year flood event are the numbers being used by the District to define the new 100-year floodplain boundaries.

Jose Solarez, the El Mirage City Manager, expressed the hope that the study will identify the need for additional channelization along the Agua Fria River. Kofi Awumah, the project manager for the study, said no such project is currently planned. Mr. Phipps said floodplain delineation studies do not propose structural solutions to flooding problems. Such studies simply define the boundaries of the floodplain. Identifying needed flood control projects is a separate process. Communities such as El Mirage are invited each year to submit proposed flood control projects to the District for consideration. Such projects compete for funding with other projects submitted by other communities or developed through the District's Area Drainage Master Study program.

In response to questions about on-going development in the floodplain, residents were told that floodplain use permits for Surprise and Youngtown are handled by the District, but other communities along the river do their own floodplain management. Until the District's floodplain delineation study is completed, the old floodplain maps will be used to manage development along the Agua Fria River.

AGUA FRIA FLOODPLAIN DELINEATION STUDY
PUBLIC MEETING
Youngtown Clubhouse, 12030 Alabama Avenue
Monday August 28, 1995

SIGN-IN SHEET

Name	Address	Affiliation (if any)
William Kosanovich		Youngtown Civil Defense Director
Richard Wehbe	Rose Garden Lane	
Geneva B Montanez	11207 N Lakeside Lane Montana Ave	
Stan & Virginia Crouch	11113 Pennsylvania Ave, Y.T.	
Ben Biery	RED District 4 COAC	
Youngtown councilman Arthur J. Lemick	Councilman of Youngtown.	
Mayor Daphne Green	Mayor of Youngtown	
Bob Holland	RV St & Fal Inc	
Gene Jensen	Sun City HOA	
Bill Prossley	Planning & Zoning	
Faye Farmer	11112 W. Montana Ave P.A.Z.	
John S. Russell	11360 N. 113th Dr	
Sally E Russell	11360 N. 113th Dr.	Planning & Zoning
Lageschulte Ross	3625 S. Litchfield Rd	
Ronald Rayner	PO Box 1509 Goodyear Az. 85338	
Jean Bartin	12411 N 22 Ave Phoenix AZ 85029	
Karl & Gerrion	10232 N. 112th.	Sun City 85351

Aqua Fria Public Meeting

Name	Address	Affiliation (if any)
Sandra Lindsay	10224 N. 113th Ave. Sun City 85351	
Hubert Hall	11113 W. Maryland Ave. Y.T. 85363	
Joe Hull c/o	Realty Executives 20165 N. 67 Ave Ste 129	Glendale Az 85308
Dale Dodd	11435 W Illinois Ave YT 85363	
Bill Miller	Black Canyon Youngtown Lions	
Roger Jones	P.O. Box 2037	Litchfield Park 85340
James Schmidt	11503 Langford Ct.	YT
Jay DeWitt	11771 W Indian Sch	Phx 85037
L.J. DeWitt	1564 N. Alma Sch	Mesa 85201
R F Barkley	12856 W Orange Dr	Litchfield
Gordon Jones	4541 No. 43rd St	Phx. 85018
Cheryl Wychocki	11518 W Tayalina Ct	Surprise Az 85374
Jack Duran (new)	Jay Ministries	13236 N 113th Ave Youngtown
Maureen M. Senick	11830 N. 112th Dr.	Youngtown Az. concerned citizen
[illegible]	5405 Cedarhill	SC 85351
Edward Knaus	11501 Kansas Ave.	YT Az 85363
Doloris Walker	PO Box 1340	Sun City Az 85372
Jim Wehmueller	3612 W Dunlap	Phx 85051
Kris Wehmueller	3612 W. Dunlap	Phx 85051

President of Youngtown Civic Association

Agua Fria Public Meeting

Name	Address	Affiliation (if any)
Jose Solarez (El Mirage City Manager)	P.O. Box 26 El Mirage 85335	City of El Mirage
Pat Driehl	11435 W. Illinois	Youngtown

Agua Fria Public Meeting

Name	Address	Affiliation (if any)
Dudley + Sheila Jones	19035 N. 116th Ln, Surprise Az 85374	
Jim T Dalen	11825 114 ave	councilman, Youngtown

News...

From the Flood Control District of Maricopa County

MEDIA ADVISORY

Contact: Elyse Coffey, 602-506-1501

FOR IMMEDIATE RELEASE
September 18, 1996

PHOENIX -- The Flood Control District of Maricopa County has concluded its one-year study of changes to the floodplain along the Agua Fria River. A meeting to explain the findings of the study will take place September 30 at 5:30 p.m. in Youngtown's town Clubhouse, 12030 Alabama Ave.

The recently concluded study was prompted by changes to the existing floodplain due to the construction of the New Waddell Dam that was completed in 1994.

Floodplains are areas along rivers that have limited potential for development because of the likelihood they will flood. The floodplain designation also affects insurance rates and the types of development that can occur in these areas.

The study examined a 35-mile area along the Agua Fria River and crosses the boundaries of eight municipalities. They include: Surprise, Youngtown, El Mirage, Peoria, Glendale, Phoenix, Avondale and Goodyear. Twenty-three river miles lie in unincorporated areas of the County.

The engineering firm hired by the District to conduct the study, Coe & Van Loo Consultants, will be on-hand to explain the results of the study.

# # #

Agua Fria Re-Study

Public Meeting Minutes
September 30, 1996
Youngtown Clubhouse

X Those in attendance: Kofi Awumah, Project Manager
Elyse Coffey, PIO
Jack Moody, Coe & Van Loo Consultants, Phoenix
Doug Both, Coe & Van Loo
Dave Johnson, Regulatory
Ron Nevitt, Floodplain
Shanna Yager, Floodplain
Residents (See attached attendance roster)

X The meeting was convened at 5:35 p.m. Elyse introduced the panel and Jack Moody was the first to speak. He said the study looked at changes to the floodplain caused by the completion of the New Waddell Dam. He explained the floodplain had been reduced by 30 percent and the floodway by 40 percent.

X Residents were given the opportunity to view the new floodplain maps that will be submitted to FEMA and to meet personally with and ask questions of the consultants and FCD employees.

Questions:

1. John Keegan: What is the study's affect on 404 and 401 permitting?
2. Doug Nelson: If the floodway shrinks, is the new floodplain set in stone? When will the new (MAPS) be sent to FEMA?
3. Burnett Miller: How does this reduction (of the floodplain) affect the channelization of the river? The "FCD has $146 million to spend. Why can't we spend some at the Agua Fria?" (This comment was raised in response to a woman's complaint that she wants all-weather crossings built at her very remote section along the Agua Fria.) Can we expect to see some channelization along the Agua Fria in the next 10 years?
4. Ben Biery: Who decides (the FCD's project) priorities?

PLEASE PRINT

MEETING ATTENDANCE ROSTER

MEETING: Agua Fria Re-Study LOCATION: Youngtown

DATE: 9/30/96

NAME	ADDRESS	PHONE
B. Biery	11395 112th Dr. YT	972-9886
J. Nelson	16156 W Olive Waddell Az	935 3845
Ron Nemeth	FCD	
Del Busch	10090 N. 112th Ave	933 4090
S. Trotter	18018 132nd AVE SCW	584-2107
K Hall	SCW	
C Emerson	3523 W. Cir R-9 wx Phx	841-1953
William Mahaffey	25811 N. 113th AVE Sun City	566-8449
Helene Mahaffey	25811 N. 113th AVE Sun City 85373-9777	566-8449
K. Ginnow	10232 N. 112th AVE Sun City 85351	974-5010
R Hulbert	11332 N Lanyford Youngtown	876 8690
RCa Joy Jones	13344 W. Southern Avondale	85323
Grant Anderson	5850 W Glendale, Apt 8 Glendale AZ	85301
Delores Walker	P.O. Box 1340 Sun City	85372
John Keegan	P.O. Box 672, Peoria Az 85381	815-7535
L. Lackner	10708 El Dorado Dr. S.C 85351	815-0137
K [illegible]		789-7251
B Boutin	11838 W Rose Garden Ln Sun City	85323
Larry Walker	P.O. Box 1340 Sun City	85372

6910-004 1-92

PLEASE PRINT

MEETING ATTENDANCE ROSTER

MEETING: Agua Fria Re-Study LOCATION: Youngtown

DATE: 9/30/96

NAME	ADDRESS	PHONE
B Melton	Town of Youngtown	—
Ronald Rayner	P.O Box 1509 Goodyear AZ 85338	932-1834

6910-004 1-92

PUBLIC MEETING NOTICE

Flood Control District of Maricopa County •2801 West Durango•Phoenix,•AZ 85009

Agua Fria River Re-Study

The Flood Control District of Maricopa County has completed its re-study of the floodplain along the Agua Fria River from its confluence with the Gila River upstream to the New Waddell Dam. The construction of the new dam has changed the existing floodplain delineation. If you own property in the existing floodplain, you are encouraged to attend a public meeting on:

Monday, September 30, 1996
5:30 to 7:30 p.m.
The Town of Youngtown's
Club House
12030 Clubhouse Square

For more information, please contact:
Kofi Awumah, Project Manager, or
Elyse Coffey, Public Involvement Coordinator,
at 506-1501.

A sign language interpreter will be made available upon request within 72 hours notice. Alternative format materials or FM or Infrared Listening Devices are also available upon request within 72 hours of notice. Additional reasonable accommodations will be made available to the extent possible within the time frame of the request. Contact David Brozovsky, Flood Control District ADA Coordinator, at 602•506•1501, if any of these services are required.

Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009
(602) 506-1501

FACT SHEET

Floodplain delineation

The Flood Control District is required by state law (ARS 48-3609) to delineate 100-year floodplains, and to regulate floodplain uses.

The floodplain delineation program began in 1973, when the Federal Emergency Management Agency (FEMA) completed several delineations. Since then, Federal budgeting has shifted the burden to the local level, forcing the District to become more active in this role. Since 1986, the District has delineated more than 800 miles of 100-year floodplain in over 40 studies.

The purpose of floodplain delineation is to identify potential flood hazard areas in order to safeguard life and property.

The benefits of floodplain delineation are:

- Identification of flood hazards before significant development occurs;
- Identification of flood hazards caused by existing development;
- Determination of areas in need of flood protection, and structures that may require flood insurance;
- Minimize loss of life and property by regulating floodplain development;
- Development of hydrological information to address existing and future drainage problems.

The District's fiscal policy, adopted by the Board of Directors in 1988, suggests that up to 2% of the annual budget be allocated for floodplain management. With these funds, staff identifies areas to be studied, contracts for studies, conducts public meetings in the study areas, and develops floodplain maps based on the best available technical information.

The Board approves the contracts for studies in public meetings, for which its agenda is posted in a public place. Because floodplain delineations follow stringent technical guidelines, however, the Board is not asked to act on the study results.

Instead, the floodplain studies are submitted for review and approval to FEMA, which ultimately will issue a Flood Insurance Rate Map (FIRM) on the basis of the study finding, after a 90-day review period for technical comments.

Community involvement is an important aspect of a floodplain delineation. City and town officials are advised, and public meetings are conducted at the outset of a study and/or when a floodplain map is developed in an attempt to advise residents that floodplains have been identified. The District uses any of several means to alert residents to its study results: articles and legal ads in local and regional newspapers, association newsletters, cable television, utility bills, and posters.

Floodplain delineation results in safer, wiser development of our resources, and can have monetary rewards, too. Our active floodplain delineation program is partly responsible for the 15% reduction in flood insurance premiums for residents of the unincorporated area of the county.

The District received national recognition for its progressive actions to protect life and property by identifying flood hazard areas and by enforcing floodplain regulations from the Association of State Floodplain Managers as recipient of its Local Award for Excellence in 1992.

Agua Fria Re-Study

The completion of the New Waddell Dam has had a major impact on the flow of waters within the Agua Fria River. The current official floodplain maps do not reflect the new dam's impact on the river's floodplain. The larger dam impounds more stormwater, thereby reducing the volume of water that must be released during times of heavy rains. This reduction in flows has changed the boundaries of the 100-year floodplain along some areas of the Agua Fria River. These changes, and where they occur, are contained in the results of the Agua Fria Re-Study.

The study establishes new flood elevations for about 36 miles of the river, extending from the New Waddell Dam to the Gila River. Twenty-three river miles lie in unincorporated areas of the County. The remaining area crosses eight jurisdictions. They are: Surprise, Youngtown, El Mirage, Peoria, Glendale, Phoenix, Avondale and Goodyear.

The study was requested by theses cities and was performed by a consulting firm on contract with the Flood Control District, Coe & Van Loo Consultants, Inc. New topographic mapping was also needed and was produced by Aerial Mapping Company, Inc.

The study was divided into these reaches:
- Reach 1- Gila River to Indian School Road. This reach of the river has already been extensively channelized.

- Reach 2 - Indian School Road to Jomax Road. There are many on-going gravel mining operations within this reach of the river. In addition, the Grand Avenue bridge has been constructed since the original floodplain delineation was completed in the 1980s.

- Reach 3 - Jomax Road to the New Waddell Dam. This reach is relatively undisturbed.

The study has concluded that the floodplain has been reduced from 15,250 to 10,285 acres. This represents a 32 percent reduction in the floodplain. Also the floodway corridor has been reduced from 8,720 to 4,940 acres, or a reduction of 43 percent.

The results of the study will be submitted to the Federal Emergency Management Agency (FEMA) for use in revising Flood Insurance Rate Maps.

Fact Sheet

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2014 E Pebble Beach Dr

Tempe Az 85282

MAHAFFEY WILLIAM J;HELENE J
5811 N 113th Ave
un City Az 85373

MANCILLAS ANGEL JR;MARY
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Nipomo Ca 93444

MARCIOPA HABITAT FOR HUMAINTY INC
PO Box 189
Sun City Az 85372

MARICOPA CNTY MUN WATER CONS DIST NO 1
PO Box 260
Waddell Az 85355

MARICOPA CO OF
111 S 3rd Ave
Phoenix Az 85003

MARICOPA COUNTY
301 W Jefferson St
9th Floor
Phoenix Az 85003

MARICOPA COUNTY HIGHWAY DEPT
3325 W Durango St
hoenix Az 85009

MARICOPA COUNTY MUN WTR CONS DIST 1
PO Box 730
Peoria Az 85380

MARICOPA COUNTY MUNI WATER CONS DIST #1
PO Box 260
Waddell Az 85355

MARONEY ELLEN J
5646 S Dysart Rd
Avondale Az 85323

MARSHALL LAYWONDER
13325 Main St
El Mirage Az 85335

MCCLURE RONALD L;ROY E 4405 N 103rd Ave #148
Phoenix Az 85037

MCKINNEY ROBERT S;DONNA
12891 W Pasadena Ave
Litchfield Park Az 85340

NDOZA JOSE A;MARIA E Box 344
El Mirage Az 85335

MERCADO FILEMON;VIOLETA 3143 W Echo Ln
Phoenix Az 85051

[redacted]ERON GREGORY W;CHRISTINA D
[redacted]1101 W Campbell Ave
[redacted]hoenix Az 85039

MESTA HECTOR;MARLEA
20816 N 119th Ave
Peoria Az 85345

MILLER EDMUND;MARY A 12000 W Northern Ave
Peoriax Az 85345

MILLER H DARRON;DEBRA K 718 E Calle Adobe Ln
Goodyear Az 85338

MINNICKS JAMES F;SUZAN D 4417 N 106th Ave
Phoenix Az 85037

MIRANDA NATIVIDAD PENA 16045 N Verde St
Surprise Az 85374

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[redacted]IRELES ARTHUR V;NONA T PO Box 861
El Mirage Az 85335

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MITCHELL DENNIS STUART;GAIL SHARRON 1221 N 8th St #62
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Glendale Az 85302

MONTGOMERY JAMES D;NANCY 12817 W Orange Dr
Litchfield Park Az 85340

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Martinez Lake Az 85364

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MOORE OLIVER;IRENE
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Colleson Az 85353

MORALES CESAR I;MATILDE
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MORGAN GENE;PAULA
PO Box 181
Avondale Az 85323

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1111 Las Vegas Blvd S
Las Vegas Nv 89104

MUCHO DINERO INC
1555 E Flamingo Rd
Las Vegas Nv 89119

MUCHO DINERO INC
111 Las Vegas Blvd S
Las Vegas Nv 89101

MULLAN GERALD J;DEBORAH
21731 Greater Mack Ave
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McGuire Gloria Lee
Youngtown Az 85363

Mullan Gerald J & Deborah L
St Clair Shores Mi 480

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2600 W Magnolia Blvd
Burbank Ca 91505

NEONATAL SPECIALISTS LTD 2244 E State Ave
Phoenix Az 85020

NEW JOY MINISTRIES
11304 N 91st Dr
Peoria Az 85345

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3808 S Vermeersch Rd
Avondale Az 85323

NOVAK STANLEY B;EMILY 7050 NW Grand Ave
Glendale Az 85301

Niedner Elsie O
Youngtown Az 85363

OCCHILINE MARIA
13324 Main St
El Mirage Az 85335

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Arleta Ca 91331

OLSEN WALLACE S JR TR 255 Cadwell Dr
Springfield Ma 01104

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PO Box 306
Cashion Az 85329

OLYMPIA LAND COMPANY 3741 E Pasadena Ave
Phoenix Az 85018

[redacted]FORD JACK C JR
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P V S ASSOC LTD
1359 Brentwood St
Lakewood Co 80215

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Riviera Az 86442

PACIFIC AMERICAN PROPERTY EXCHANGE
2100 Main St #400
Irvine Ca 92714

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PO Box 884
El Mirage Az 85335

PARKER WILLIAM G;SHARON
157 E La Cienega Ave
Goodyear Az 85338

[redacted]RKS;SONS OF SUN CITY INC
PO Box 1158
Sun City Az 85372

PARKS;SONS OF SUN CITY INC
11217 W Nevada Ave
Youngtown Az 85363

[redacted]TTINI ALICE
[redacted]542 W Roeser Rd
Phoenix Az 85041

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1112 41st Pl NE
Bellevue Wa 98007

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PEDROZA ROGELIO R;ESPERANZA R
13325 B St
El Mirage Az 85335

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PENNY RICHARD J;ENID BERNARD
Rr 2
West Point NE 68788

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PO Box 4038
[redacted]oria Az 85380

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Litchfield Park Az 85340

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Sun City Az 85351

PHILLIPS ALICE
12865 W Pasadena Ave
Litchfield Park Az 85340

PHILLIPS JOHN J
6710 N 58th Dr
Glendale Az 85301

PHOENIX CITY OF
324 W Adams St
Phoenix Az 85003

[redacted]OENIX CITY OF
[redacted]34 N Central Ave #415
Phoenix Az 85004

PHOENIX GOSPEL MISSION INC
440 W Washington St
Phoenix Az 85003

PHOENIX REALTY PARTNERS L P
27540 Detroit Rd #201
Westlake Oh 44145

PHOENIX WESTERN GATEWAY ASSOC LTD PART
7505 E 6th Ave #100
Scottsdale Az 85251

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El Mirage Az 85335

PIONEER TRUST CO OF AZ TR 11265
PO Box 26200
Tucson Az 85726

PIONEER TRUST CO OF AZ TR 11265
6245 E Broadway Blvd #400
Tucson Az 85711

PIONEER TRUST CO TR 20779
2020 N Central Ave #170 Phoenix Az 85004

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Youngtown Az 85363

Poindexter Ailex & Joyce Youngtown Az 85363

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RAMIREZ JUAN;ENEDINA 13321 Ast
El Mirage Az 85335

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Madison Wi 53703

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San Ramon Ca 94583

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San Rafael Ca 94901

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El Mirage Az 85335

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Laveen Az 85339

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Phoenix Az 85004

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PO Box 95
Buckeye Az 85326

ROSE JACK W;FERN AGNES PO Box 995
Imperial Ca 92251

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Phoenix Az 85037

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1715 Arapahoe St
Denver Co 80202

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11713 Valentine St
El Mirage Az 85335

Rangel Ysidro & Jesse 11713 Valentine St
El Mirage Az 85335

Raquet Violet M
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Ray E & Lentice L Hofeldt
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Glendale Az 85301

Roberts R C & Barbel San Rafael Ca 94901

Roles Inn Of America Inc Glendale Az 85311

se Jack W
perial Ca 92251

S R P A I;P D
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8338 W Edwards St
Peoria Az 85345

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Rr 1 Box 216
Scottsdale Az 85256

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PO Box 1980
Phoenix Az 85001

SALT RIVER PROJECT AIPD PO Box 1980
Phoenix Az 85001

LVATION ARMY
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Phoenix Az 85036

SANDERS ZEPADEE;JOHNNIE FAYE
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[redacted]ANTOY CECILIA
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El Mirage Az 85335

SANTOY JOVITA
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12030 N 113th Ave
Youngtown Az 85363

SCHWAN PROP;PARTNERSHIP QUAL AFF HOUS
2999 N 44th St #600
Phoenix Az 85018

SCOTT JOHN J;SONYA C 8822 W Columbus Ave
Phoenix Az 85037

SCOTT SUSAN JANE
2506 W Obispo Cir
Mesa Az 85202

[redacted]RRANO CECILIA B
[redacted]220 W Hatcher Rd
Peoria Az 85345

SEWALK RICHARD M;IRMA R PO Box 4364
Bisbee Az 85603

SHANTI HOLDINGS INC
PO Box 1084
Phoenix Az 85001

SHARGANI KAMRAN
19423 N Conquistador Dr Sun City West Az 85375

SHEMER W BARRY
5230 E Shangri La Rd
Scottsdale Az 85254

SHIELDS LUCILLE M
10090 N 112th Ave
Sun City Az 85351

SINGER LINCOLN E
[redacted]113 W Campbell Ave
[redacted]enix Az 85039

SLATER PAUL V TR

3100 Henderson Dr #7
Cheyenne Wy 82001

[redacted]MT PARTNERS
[redacted]303 S 40th St
[redacted]hoenix Az 85040

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El Mirage Az 85335

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Litchfield Park Az 85340

SOTELO ALVARO;NICOLASA PO Box 1385
El Mirage Az 85335

SOTO ANGEL FELICIANO;MIGUELA P
PO Box 871
El Mirage Az 85335

SOUTHERN PACIFIC TRANSPORTATION CO
1 Market Plz
San Francisco Ca 94105

SPANN WILLIE
13233 S Main
El Mirage Az 85335

STAGGERS THOMAS R;LINDA
12607 W Rio Vista Ln
Avondale Az 85323

STERNER ETHEL E TR
14537 W Broadway Rd
Goodyear Az 85338

STEVENS JERRY
PO Box 1315
El Mirage Az 85335

STEWART TITLE;TR CO TR 7227 N 16th St #215
Phoenix Az 85020

STEWART TITLE;TR OF PHOENIX TR
244 W Osborn Rd
Phoenix Az 85013

STEWART TITLE;TR OF PHX TR
2700 N 3rd St #2008
Phoenix Az 85004

[redacted]EWART TITLE;TR OF PHX TR
3319 N Central Ave
Phoenix Az 85012

STOVALL CORAL MAY
5534 Echo St
Highland Park Ca 90042

STYCZYNSKI ADALBERT
5001 W Harrison St
Chicago Il 60644

SUN CITIES ANIMAL RESCUE INC
PO Box 1
Sun City Az 85372

SUN CITIES TRAVEL;REC VEHICLES STORAGE
PO Box 1263
Sun City Az 85372

SUN CITY ROCK LLC
2005 W 14th St #105
Tempe Az 85281

SUN CITY ROCK LLC
2005 W 14th St #105
Tempe Az 85281

SUN CITY STADIUM ASSOCIATES LP
13440 N 111th Ave
Sun City Az 85351

SUN CITY TRAVEL;REC VEHICLES STORAGE
PO Box 1263
Sun City Az 85372

SUN CITY WEST UTILITIES 968 White Plains Rd
Trumbull Ct 06611

SUN CITY WEST UTILITIES COMPANY
2600 N Central Ave #632 Phoenix Az 85004

SUN VALLEY VISTA ESTATES 5531 W Golden Ln
Glendale Az 85302

SUNCOR DEVELOPMENT CO 2828 N Central Ave #900 Phoenix Az 85004

SUNCOR DEVELOPMENT COMPANY
PO Box 52160
Phoenix Az 85072

SUNDEEN NEAL S;JANE W TR 1902 E Loma Ln
Phoenix Az 85020

Sweloum Fred M & Edith M Youngtown Az 85363

Scp Construction

5340 W Luke Ave
Glendale Az 85301

Sun City West Utilities Co
Trumbull Ct 06611

T P I LAND INVESTORS II LTD
5110 N 44th St #120-L
Phoenix Az 85018

TAMFIN INC
11311 W Grand Ave
Youngtown Az 85363

TANKERSLEY RONALD;JAY L PO Box 31748
Tucson Az 85751

TERRONES MANUEL;ESPERANZA
PO Box 340
El Mirage Az 85335

TERRONES SERAPIO V;LUCY D TR
PO Box 11
El Mirage Az 85335

THE CARIOCA CO
2601 W Dunlap Ave #10
Phoenix Az 85021

THOMAS CECIL L;OLA M 11702 W Rose Garden Ln
Sun City Az 85373

THOMAS G;VERYL J DUNBABIN TRUST
77096 Iroquois Dr
Indian Wells Ca 92210

THOMAS RALPH W;CAROLEE 7323 E Jackrabbit Rd
Scottsdale Az 85250

THUNDERBIRD MGT LTD PARTSHIP
6008 N 83rd Ave #208
Glendale Az 85303

TIERRA BUENA WATER CO 3200 E Camelback Rd #259 Phoenix Az 85018

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PO Box 26
El Mirage Az 85335

TOWN OF YOUNGTOWN

12026 N Club House Sq
Youngtown Az 85363

[redacted]ROUT FRANCES O
[redacted]23 N 29th St
[redacted]Phoenix Az 85008

TRUMAN N COOK FAMILY TRUST
10314 W Burns Dr
Sun City Az 85351

TUCSON GAS;ELECTRIC CO PO Box 711
Tucson Az 85702

TUTTLE ROY;JANE
Rte 3a Box 202
Springfield Ky 40069

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Laveen Az 85339

Thetaz Margaret
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Treguboff John A & Wilma Youngtown Az 85363

Tudor Robert D & Virginia M
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201 E Indianola Ave #275 Phoenix Az 85012

U S A -C A P-
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Phoenix Az 85073

UNION ROCK;MATERIAL CORP PO Box 8007
Phoenix Az 85066

UNITED COLUMBIA CORP 7228 E 1st Ave
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UNITED STATES OF AMERICA 135 N 2nd Ave
Phoenix Az 85003

UNITED STATES OF AMERICA 3003 N Central #900
Phoenix Az 85012

USLIFE TITLE COMPANY OF ARIZONA TR
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VALLEY NATIONAL BANK OF ARIZONA
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VALLEY NATIONAL BANK TR 2700 N 3rd St #2008
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Youngtown Az 85363

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Peoria Az 85345

WESTERN SECURITY BANK 7401 E Camelback Rd
Scottsdale Az 85251

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WHITE JERRY B;MELVA T 12613 W Rio Vista
Casa Grande Az 85329

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4520 N Central Ave #500 Phoenix Az 85012

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Litchfield Park Az 85340

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Phoenix Az 85014

WILSON MAX W;JUDITH A;W D LONG
1250 E Missouri Ave #2
Phoenix Az 85014

WUSICH ELIZABETH
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Paradise Valley Az 85253

Walker Deloris C
Paradise Valley Az 852

Walker William A & Deloris C
Sun City Az 85372

Water Cons Buckeye
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Buckeye Az 85326

YOUNGTOWN TOWN OF
12026 N Club House Sq
Youngtown Az 85363

Yates Clinton T & Phyllis R
Council Id 83612

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11830 W Sun Valley Ln
Sun City Az 85373

ZANNELLI TRUST
12833 W Orange Dr
Litchfield Park Az 85340

ZAPIEN CARLOS R;GUADALUPE
15427 N Jersey St #F4
Surprise Az 85374

ZELLMER PAUL D;DARLENE D 7920 W Glendale Ave #45 Glendale Az 85303

ZOHNER KARL V;AMY L
11109 W Campbell Ave
Phoenix Az 85037

UPNICK JACK J;JODY G TR 1526 W Milagro Ave
esa Az 85202

ZUTELL EUGENE G;JOSEPHINE F
12801 W Pasadena Ave
Litchfield Park Az 85340

State Coordinator

FLOOD CONTROL DISTRICT
of
Maricopa County
2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

October 21, 1996

Mr. Dave Creighton
Arizona State Department of Water Resources
500 North 3rd Street
Phoenix, Arizona 85004

Dear Mr. Creighton:

SUBJECT: Agua Fria River Floodplain Delineation Re-Study - FCD 95-05
Federal Emergency Management Agency Revised FIRM Panels

Flood Control District contracted with Coe and Van Loo Consultants, Inc. of Phoenix to perform floodplain re-study for Agua Fria River. This was due to the completion of the New Waddell Dam and the subsequent revision of the hydrology of the river by the United States Army Corps of Engineers. The construction of this larger dam provides 'incidental flood protection' and therefore reduced peak discharges along the river.

The Agua Fria River floodplain lies within nine jurisdictional boundaries, the majority of which is in Maricopa County Unincorporated Areas. Flood Control District. The study was prompted by requests by all affected communities to revise the floodplain. The study shows that the floodplain was reduced by 32 percent and the floodway corridor by 43 percent. A public meeting was held on September 30, 1996 to inform interested landowners of the study results.

Enclosed is a copy of the new floodplain maps we will be sending to the Federal Emergency Management Agency (FEMA) to revise the Flood Insurance Rate Maps for the river. Note that these changes do not become effective until FEMA reviews and approves the submittal.

If you have any comments or need any clarifications, please call me as soon as possible.

Sincerely,

Kofi Awumah

Kofi Awumah, Ph.D., P.E.
Project Manager

Contract Documents

AGUA FRIA RIVER FDR

SIGNED CONTRACT
AND
SCOPE OF WORK

FLOOD CONTROL DISTRICT
OF
MARICOPA COUNTY

CONTRACT FCD 95-05

CVL # 95-0067-01

Coe & Van Loo Consultants, Inc.
4550 N. 12th Street
Phoenix, AZ 85014
(602) 264-6831

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

June 27, 1995

Coe & Van Loo Consultants, Inc.
4550 North 12th Street
Phoenix, Arizona 85014-4291

Attention: Mr. Paul W. R. Hoskin, P.E.
Vice President

Subject: Confirmation of Notice to Proceed
Contract FCD 95-05, Agua Fria River FDR

Dear Mr. Hoskin:

This letter will serve as confirmation of the June 22, 1995 verbal notice to proceed with the work covered by the subject contract.

A fully executed contract document is enclosed for your file. Should you have any questions, please contact Kofi Awumah or me at telephone 506-1501.

Sincerely,

Leanna Cumberland
Chief, Contracting Branch

Enclosures (1)

CS95-5-187

CONTRACT FOR CONSULTANT SERVICES
FLOODPLAIN DELINEATION STUDIES

FCD 95-05 AGUA FRIA RIVER FLOODPLAIN DELINEATION RE-STUDY

Pursuant to the provisions of the Arizona Revised Statutes Section 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 **Agua Fria River Floodplain Delineation Re-Study,** hereinafter called the **"PROJECT"** and as more fully described in Exhibit "A", Scope of Work, attached; and

Coe & Van Loo Consultants, 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 Manager, Engineering 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 Manager, Engineering Division 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 Part A of Exhibit "A", Scope of Work within 305 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 for Part A of 365 calendar days. Part B of Exhibit "A" Scope of Work will require an additional 120 days following FEMA approval and acceptance of Part A.** The total contract schedule for both Part A and Part B is 485 days. Should extension of this contract period be necessary, and any such extension(s) continue the date of contract for a time period of more than one year from the date of contract expiration, 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 $155,000 for Part A Scope of Work (Exhibit A), and a lump sum fee of $22,000 for Part B Scope of Work (Exhibit A) for a total contract value of $177,000,** 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.

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.

FOR PART A OF EXHIBIT A WORK: 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 Part A of 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 Part A and Part B of Exhibit A of this Contract. **No retention monies shall be paid or substitute security returned or released as to Part B of Exhibit A until the final Certificate of Performance is completed.**

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. One 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 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.

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.

With the exception of the DISTRICT or the Federal Emergency Management Agency, the CONSULTANT agrees not to accept any clients within the area of the 100-year floodplain for the project, during the period of the Contract, without the expressed written authority from the Chief Engineer and General Manager of the District.

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

B. 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.

C. 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.

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

E. 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, disability, or national origin.

The CONSULTANT agrees not to discriminate against any employee or applicant for employment because of race, religion, color, sex, age, disability , or national origin 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.

COE & VAN LOO CONSULTANTS, INC.

Principal

PAUL W.R. HOSKIN
Printed Name

VICE PRESIDENT
Title

Date: 5/9/95

86-0455672
Federal Tax Identification Number

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY:

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

Date: 5-12-95

ACCEPTED AND APPROVED:

Tom Rawles
Chairman, Board of Directors

ATTEST:

Clerk of the Board

Date: JUN 21 1995

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.

General Counsel, District

Date: 5/15/95

EXHIBIT A

SCOPE OF WORK
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FLOODPLAIN DELINEATION
FOR AGUA FRIA RIVER
FCD 95-05

PART 'A' & PART 'B'

PART A

SCOPE OF WORK
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FLOODPLAIN DELINEATION
FOR AGUA FRIA RIVER
FCD 95-05

GENERAL

The project consists of approximately 33 river miles of floodplain delineation for the AGUA FRIA RIVER from the Outlet of the New Waddel Dam to the Gila River Confluence, as shown on Exhibit A. The consultant will use the Corps of Engineer's HEC-2 computer model to develop the floodplain and floodway delineations. The consultant must use sound engineering judgement in the development of the hydraulic model. The results of the model must be analyzed carefully and refinements made to the input parameters in order to obtain the most realistic results. All work must meet Arizona Department of Water Resources (ADWR) and Federal Emergency Management Agency (FEMA) requirements for floodplain delineations. The results of this study must be reviewed and accepted by FEMA prior to the finalization of this contract. All work under this Scope will be completed within 365 calendar days from the date of Notice to Proceed, including 60 days for District reviews.

TASK 1 - COORDINATION

1.1 The consultant will submit a project schedule showing coordination meetings and completion dates for each of the tasks in the scope within 14 days of Notice To Proceed. The consultant shall update this project schedule when appropriate.

1.2 The consultant shall participate in regular coordination meetings (at least every 6 weeks) with the District's Project Manager and in milestone and coordination meetings in the development of the hydraulic analysis. The consultant is responsible for the minutes of any meetings. Whenever possible, coordination and milestone meetings should be combined.

1.3 The consultant will submit a quarterly estimation of the projected billing within 14 days of Notice to Proceed. Thereafter, this estimation will be updated and submitted to the District's project manager at least 10 days prior to the end of each quarter.

1.4 The consultant shall submit monthly progress reports at least 5 days before submittal of monthly invoices. The report shall be brief and should be no longer than two typed pages. At a minimum, the monthly report shall contain the following:

a. A description of the work accomplished by task during the reporting month.

b. Percent (%) completed for the month and percent (%) cumulative completed for each task.

c. A brief description of the work to be accomplished the following month.

d. A description of any problems encountered and a discussion of how these problems were or are to be addressed.

1.5 The consultant is responsible for placing the legal advertising at the beginning of the study, notifying the public of the study. The ad will be run once in a widely circulated newspaper for a period of approximately one week. The ad must also be run one time in two local newspapers that serve the area being studied. After the ad is run the consultant will supply the District with the original affidavit of publication from each of the newspapers for each day that the ad ran.

1.6 The consultant will notify property owners to obtain any necessary Rights of Entry for the study area. The District will obtain parcel and property ownership information and will notify property owners about the project and any public meetings. The consultant will furnish the District with a list of all the property owners notified and a sample Right of Entry letter.

1.7 The consultant shall meet with officials from the 9 jurisdictions (see attached list). The purpose of this meeting is to identify local flooding problems and obtain information on current and planned public works projects, channel modifications, storm-drainage systems, development, and corporate limits.

1.8 The District will plan and conduct two public meetings in conjunction with this study. The first meeting will be to inform the public of the purpose and scope of the study. The second meeting will be to inform the public and obtain public comment on the study results, and shall take place prior to the submittal of the final report to FEMA. The District will be responsible for the preparation of the graphic displays for these meetings. One representative from the consultant will attend each of the meetings. The consultant will respond to the public's comments and make revisions to the study if necessary.

1.9 Consultant/District Performance Evaluations will be performed. An informal evaluation will be performed at the completion of the hydraulic analysis (after floodway delineation). A formal evaluation will be performed at the completion of the project upon receipt of all deliverables.

TASK 2 - DATA COLLECTION

2.1 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 any Letters of Map Amendment and/or Revisions, and other pertinent information.

2.2 A written report summarizing the data collected will be submitted to the District for information purposes. A preliminary draft of this report is due within 90 days of Notice to Proceed.

TASK 3 - TOPOGRAPHIC MAPPING

3.1 Topographic mapping will be supplied by the Flood Control District for this project. The mapping for the Upper reach (from New Waddel Dam to Jomax Road) and the Lower reach (From Indian School Road to the confluence with Gila River) are in the form of hard copy contour map, of the previous 1989 study. These are 400 scale 4 foot contour mapping, vertical control on 1929 NGVD and horizontal control on 1927 NAD. The Middle reach (from Jomax Road to Indian School Road) is a new mapping in digital format as Digital Terrain Model. The vertical datum is also 1929 NGVD while the horizontal controls are on 1983 NAD.

3.2 The consultant shall convert the old mapping to the 1983 NAD horizontal coordinate system using any appropriate methodology. The Aerial mapping company producing the new mapping will provide a conversion factor to allow comparison of the 1929 NGVD elevations to 1988 NAVD elevations. This information shall be included in the Technical Data Notebook.

3.3 Edit the existing mapping for the Lower and Upper reaches to be ready for conversion to ARC-INFO GIS format. The conversion to ARC-INFO GIS will be accomplished as Part B.

TASK 4 - FIELD SURVEY

4.1 The consultant shall spot check the accuracy of the existing topography for the Upper reach and the Lower reaches. Thirty two (32) cross section checks shall be taken across the full extent of the 100-year floodplain at approximately one-half (½) mile intervals. Plots comparing the field surveyed cross-sections with the existing topography will be submitted to the District for review.

4.2 Where information is not already provided by the District, the following will be applicable. Field surveys of bridges, culverts, and hydraulic structures are to be obtained by the consultant when as-built plans are not available or when changes significant to the HEC-2 modeling, such as sedimentation, have occurred since the date of as-built. This information should be reduced and compiled into an 11"x 17" (maximum size) drawing for inclusion in the final report. The information presented in the drawing should be in a format appropriate for use in the HEC-2 model. It may be necessary to field survey some structures since the as-built plans may not be on 1929 NGVD. The consultant shall therefore check for such structures and convert them to the 1929 NGVD datum.

TASK 5 - HYDROLOGY

5.1 Hydrologic information on the project area will be supplied by the District.

TASK 6 - FLOODPLAIN DELINEATION

6.1 Floodplain delineations must be obtained for the 100-year flood event using the U.S. Army Corps of Engineers HEC-2 Water Surface Profiles computer model, version 4.6.2, May 1991, and methodology acceptable to FEMA. The District will provide the consultant with diskettes of the HEC-2 input/output files used for the effective Flood Insurance Rate Maps (FIRM). This model will simulate the effects of floodplain geomorphology, flow changes, bridges, culverts, hydraulic roughness factors, effective flow limitations, split-flows, and other considerations. The consultant will prepare the study using the guidelines established in FEMA Document 37, Flood Insurance Study Guidelines and Specification for Study Contractors, January 1995, and FIA Document 12, Appeals, Revisions, and Amendments to Flood Insurance Maps, January 1990.

6.2 The delineation work shall meet requirements for floodplain and floodway delineations as prescribed by FEMA and the Arizona Department of Water Resources (State Standard No. 1).

6.3 The consultant is to make refinements to the HEC-2 model based on review of the model results by the District, FEMA, and the Technical Evaluation Contractor. The consultant shall review the HEC-2 model results for reasonableness. Adjustments to the input parameters for obtaining the most realistic results is normal to the scope.

6.4 Floodways are to be determined using equal conveyance encroachment method 4 to start with, but only encroachment method 1 will be used in the final analysis. The floodway encroachment is to be as near the one foot maximum rise in elevation as possible.

6.5 The consultant must obtain District approval at each of the following steps:

a. Field reconnaissance report and estimation of Manning's "n" values.

b. Proposed location and alignment of the cross sections and channel centerline.

c. Floodplain (natural) delineation.

d. Floodway delineation using equal conveyance encroachment.

e. Floodway delineation using encroachment method 1.

f. Final Hydraulics Report.

6.7 Field Reconnaissance

6.7.1 The consultant will conduct a 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.

6.7.2 Mannings "n" values are to be determined using the methodology in the USGS report, Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona, April 1991. Copies of the report are available through the District.

6.7.3 A draft report on the field reconnaissance will be submitted to the District for review and approval prior to beginning the HEC-2 modeling. The report will present the determination of channel and overbank "n" values using captioned color photographs or color photocopies. The report will also discuss floodplain conditions affecting the delineation, describe structures and obstructions, and provide color photos or photocopies of major hydraulic structures. Photo locations, structures, and "n" values will be displayed on reduced scale mapping and included in the Final Report.

6.8 Cross Sections

6.8.1 The location and alignment of cross sections and channel centerline will be submitted for the District's review and approval prior to digitizing the cross section data. Cross section stationing will be from left to right looking downstream with the thalweg as station 10,000. Cross sections will be spaced approximately every 500 feet, unless geographic or structural constraints dictate otherwise, and will extend the full width of the area inundated by 100-year flood waters. 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. Cross section orientation may need to be altered after running of HEC-2 model to ensure that sections are perpendicular to flow per FEMA criteria.

6.8.2 All cross sections will be plotted using a pen, laser, or electrostatic plotter. The cross section plots will show water surface profiles, ineffective flow areas, "n" values, encroachments, channel stationing and other pertinent information. All plots are to be accompanied by a legend. These plots are to be available at all reviews.

6.8.3 Cross section plots are limited to one plot at the following three stages of work: (a.) a plot of digitized "GR", STCHL, STCHR, centerline (station 10,000) to be used as a check of input data and for working sections during compilation of the floodplain model; (b.) a plot of the cross section for the completed floodplain run which shows the floodplain water surface elevation, ineffective flow areas, "n"

factor, and encroachments to be used as working sections for development of the floodway model; (c.) a plot of the final floodway model cross sections which will show Type 1 encroachments and encroached water surface, in addition to data covered in items (a.) and (b.). These cross sections, generated under (c.), will be submitted as part of the Final Report.

6.9 Bridges and culverts must be modeled in compliance with HEC-2 modeling requirements for the selected routine. Where multiple bridges occur, each bridge will be modeled separately. The HEC-2 modeling results for bridges, culverts, and other hydraulic structures must be checked by using an independent method approved by the District to analyze these structures.

6.10 The applicability of the existing ponding analysis behind levees will be evaluated with respect to the reduced water surface within the Agua Fria River. If warranted, a revised hydraulic analysis will be performed using existing hydrology supplied by the District. A ponding analysis based upon new hydrology will not be performed.

6.11 Flood zones must be determined according to FEMA criteria and clearly labelled on the final drawings.

6.12 The total area of the floodplain and floodway must be determined for each reach in square miles and acres.

6.13 The findings of the floodplain/floodway delineation study will be presented in Section 4 of the Technical Data Notebook and will be prepared in accordance with ADWR State Standards Attachment 1-90 (SSA 1-90). The report will be organized as specified by the District standards, following SSA 1-90 format.

TASK 7 - HIS DATA (SEE PART B)

TASK 8 - DELIVERABLES

8.1 FEMA Submittal: The consultant will submit the following items to the District for review by FEMA and any other appropriate governmental agency. All of the following products are considered deliverables for the FEMA submittal:

8.1.1 Original Affidavits of Publication

8.1.2 Two (2) complete sets of blueline topographic base maps with the floodplain/floodway delineations shown. All drawings will be signed and sealed by persons of appropriate professional registration(s). Each registrant will provide a specific statement as to what service they performed.

8.1.3 Two (2) complete copies of the Technical Data Notebook, including HEC-2 input/output files on diskettes. The Technical Data Notebook will be prepared in accordance with ADWR State Standards Attachment 1-90 (SSA 1-90). The notebook will be organized as specified by the District, following SSA 1-90 format.

8.1.4 Two (2) sets of completed FEMA forms will be submitted in a notebook separate from the Final Report.

8.1.5 Two (2) copies of the current FIRM panels showing the proposed delineation.

8.2 Final Submittal: The following products are considered deliverables for the final submittal to the District after FEMA approval is issued:

8.2.1 One (1) complete sets of mylars and four (4) complete sets of sealed blueline topographic base maps with the floodplain/floodway delineations shown. All drawings will be signed and sealed by persons of appropriate professional registration(s). Each registrant will provide a specific statement as to what service they performed.

8.2.2 Digital topographic data and floodplain/floodway boundaries. Conversion to the District's HIS will be accomplished as Part B.

8.2.3 Four (4) complete copies of the Technical Data Notebook including HEC-2 input/output files on diskettes. The Technical Data Notebook will be prepared in accordance with ADWR State Standards Attachment 1-90 (SSA 1-90). The notebook will be organized as specified by the District, following SSA 1-90 format. This submittal of the Technical Data Notebook shall include any correspondence and/or meeting minutes with the reviewing agencies and shall reflect any revisions required by those reviewing agencies. Revisions may include, but are not limited to, modifications to the delineation maps, the HEC-2 model, and/or the Final Report.

Agua Fria River Floodplain Delineation Re-Study
FCD Proj. No. 95-05

Jurisdictional Communities

1. Town of Surprise
2. City of El Mirage
3. Youngtown
4. City of Peoria
5. City of Glendale
6. City of Phoenix
7. City of Avondale
8. City of Goodyear
9. Maricopa County Unincorporated Areas

PART B

SCOPE OF WORK
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FLOODPLAIN DELINEATION
FOR AGUA FRIA RIVER
FCD 95-05

TASK 7 - HIS DATA

7.1 Floodplain related digital data for all three study reaches, will be prepared in conformance with the District's HIS Data Delivery Specifications, Revision 2.0, dated February 6, 1995, for the following themes:

a. Floodplain Baseline Route System (LP-22 / flbln)

b. FEMA Control Survey Points (LP-=23 / fpctrl)

c. Floodplain FCD Water Surface Elevation (LP-25 / fpsrffcd)

d. Floodplain Cross Sections (LP-26 / fpxfcd)

e. Floodplain FCD Zone (LP-28 / fpznfcd)

f. FCD Project Map Index (LP-41 / ndxprj)

g. FCD Project Boundary (LP-54 / prj)

7.2 Topographic mapping related digital data, for the Upper and Lower study reaches, will be prepared in conformance with the District's HIS Data Delivery Specifications, Revision 2.0, for the following themes:

a. Miscellaneous Control Survey Points (LP-10 / ctrl)

b. Structures (LP-61 /strct)

c. Cartographic Arc Coverage (LP-4 / cartoarc)

d. Cartographic Point Coverage (LP-6 / cartopnt)

e. Elevation (LP-17 / elv)

f. Canal System (LP-7 / cnl)

g. FCD Project Facilities (LP-21 / flty)

h. Railroad System (LP-58 / rr)

i. Street Detail (LP-63 / strtdtl)

j. Utility (LP-65 / utlty)

k. Lakes (LP-33 / lake)

7.3 Separate check plots will be produced from either Arc-Info or Arc-CAD from the digital database(s) of each theme in 7.1 and 7.2. The check plots will be prepared with a minimum of annotation and will serve only to verify the information in the data base. If the delineation maps were not derived directly from the digital data delivered to the District, then the consultant will certify that the check plots have been examined and that the check plots faithfully represent the data and maps used in the report and/or work maps.

J —
J Hoss
Admin

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

April 18, 1996

John B. Nelson, President
Coe & Van Loo Consultants, Inc.
4550 North 12th Street
Phoenix, Arizona 85014

Subject: Change Order #1 to Contract FCD 95-05
Agua Fria River Floodplain Delineation Re-study

The subject fully executed change order is enclosed for your file.

Dortha Klaahsen

Dortha Klaahsen
Contracts Coordinator

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Contract Change Order No. 1

Date: 4/10/1996 FCD Contract No./Name: FCD 95-05

To: Coe & Van Loo Consultants, Inc., Contractor/Consultant.

You are hereby directed to make the herein described changes from the plans and specifications or do the following described work not included in the plans and specifications on the above-mentioned project.

Changes requested by: Kofi Awumah, Project Manager

Provide description of work to be done, estimate of quantities, and prices to be paid. Segregate between additional work at contract price, agreed price, and actual cost. Unless otherwise stated, rates for rental of equipment on actual cost work cover only such time as equipment is actually used and no allowance will be made for idle times.

* (1) Estimate of increases and/or decreases in contract items at contract prices.
** (2) Estimate of extra work at agreed price and/or actual cost.

Sheet No. 1 of 1

Due to the fact that parts of the digital data of the 1989 Jerry R. Jones Floodplain Delineation Study topographic work maps could not be recovered, it is necessary to digitize portions of the Agua Fria River for this current study. Cooper Aerial of Phoenix, Inc., per Coe & Van Loo Consultants Limited, should therefore perform the following tasks, for the sum of $3625.00:

1. Set an arbitrary coordinate base for orientation of 8 sheets (Sheets 1 through 8) of the 1989 Jerry R. Jones study topographic maps of the Agua Fria River
2. Digitize 8 mylar sheets of the above topopgraphic maps
3. Shift and rotate the final data.
4. Deliver the final data in Micro Station format.

We, the undersigned Contractor/Consultant, having given careful consideration to the change(s) proposed, hereby agree, if this proposal is approved, that we will provide all equipment, furnish all material (except as may otherwise be noted above), and perform all services necessary for the work above specified, and we will accept as full payment therefor the prices shown above.

By reason of this proposed change 0 days extension of time will be allowed.
Total new contract amount through this Change Order No. 1 is $180,625.00

Contractor/Consultant: Coe & Van Loo Consultants, Inc.
4550 North 12th Street
Phoenix, AZ 85014

By: [signature]
Title: [illegible]
Date: 4-17-96

Recommended by: Kofi Awumah
Date: 4 | 17 | 96

Approved by: [signature]
Acting Chief Engineer and General Manager
Date: 4/17/96

JC
Jim
File 95-0067-01

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

August 1, 1996

John Nelson, P.E., R.L.S., President
Coe & Van Loo Consulting Engineers, Inc.
4550 North 12th Street
Phoenix, AZ 85014-4291

Subject: Change Order #2 to Contract FCD 95-05
Agua Fria River Floodplain Delineation Re-study

The subject fully executed change order is enclosed for your file.

Dortha Klaahsen

Dortha Klaahsen
Contracts Coordinator

LOOD CONTROL DISTRICT OF MARICO. COUNTY

Contract Change Order No. 2

Date: 7/22/1996 FCD Contract No./Name: FCD 95-05

To: Coe & Van Loo Consultants, Inc., Contractor/Consultant.

You are hereby directed to make the herein described changes from the plans and specifications or do the following described work not included in the plans and specifications on the above-mentioned project.

Changes requested by: Kofi Awumah, Project Manager

Provide description of work to be done, estimate of quantities, and prices to be paid. Segregate between additional work at contract price, agreed price, and actual cost. Unless otherwise stated, rates for rental of equipment on actual cost work cover only such time as equipment is actually used and no allowance will be made for idle times.

* (1) Estimate of increases and/or decreases in contract items at contract prices.
** (2) Estimate of extra work at agreed price and/or actual cost.

Sheet No. 1 of 1

Description of Change Order
Extend this contract to October 30, 1996. This is due to the delay encountered in the execution of tasks in Change Order Number 1, i.e. digitizing portions of the Agua Fria River for this current study by Cooper Aerial of Phoenix, Inc., per Coe & Van Loo Consultants ~~Limited.~~ Inc

We, the undersigned Contractor/Consultant, having given careful consideration to the change(s) proposed, hereby agree, if this proposal is approved, that we will provide all equipment, furnish all material (except as may otherwise be noted above), and perform all services necessary for the work above specified, and we will accept as full payment therefor the prices shown above.

By reason of this proposed change 130 days extension of time will be allowed.
Total new contract amount through this Change Order No. 2 is $180,625.00

Contractor/Consultant: Coe & Van Loo Consultants, Inc.
4550 North 12th Street
Phoenix, AZ 85014

By: [signature]
Title: VP
Date: 7-26-96

Recommended by: [signature]
Date: 7/25/96

Approved by: [signature]
Chief Engineer and General Manager
Date: 7-30-96

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Contract Change Order No.3

Date: 10/29/1996 FCD Contract No./Name: FCD 95-05

To: Coe and Van Loo Consultants, Inc., Contractor/Consultant.

You are hereby directed to make the herein described changes from the plans and specifications or do the following described work not included in the plans and specifications on the above-mentioned project.

Changes requested by: Kofi Awumah, Project Manager

Provide description of work to be done, estimate of quantities, and prices to be paid. Segregate between additional work at contract price, agreed price, and actual cost. Unless otherwise stated, rates for rental of equipment on actual cost work cover only such time as equipment is actually used and no allowance will be made for idle times.

* (1) Estimate of increases and/or decreases in contract items at contract prices.
** (2) Estimate of extra work at agreed price and/or actual cost.

Sheet No. 1 of 1

Description of Change Order
Extend this contract to May 31, 1997. This change order corrects the expiration date as shown on Change Order No. 2 to read February 25, 1997 and extends that date to May 31, 1997. The additional time extension is required because this contract is two phased. Part A which is the actual delineation work is now complete. FEMA review is now to take place after which Part B, which is the preparation of the GIS products will be performed.This time extension is required to keep the contract active until the FEMA review is completed and Part B is implemented.

We, the undersigned Contractor/Consultant, having given careful consideration to the change(s) proposed, hereby agree, if this proposal is approved, that we will provide all equipment, furnish all material (except as may otherwise be noted above), and perform all services necessary for the work above specified, and we will accept as full payment therefor the prices shown above.

By reason of this proposed change 95 days extension of time will be allowed.
Total new contract amount through this Change Order No. 3 is $180,625

Contractor/Consultant: Coe and Van Loo Consultants., Inc.
4550 North 12th Street
Phoenix, AZ 85014

By: Lodney Billeson
Title: Pres
Date: 10-31-96

Recommended by: _____
Date: _____

Approved by: _____
Interim Chief Engineer and General Manager
Date: _____

Elevation Reference Marks

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL
GEODETIC VERTICAL DATUM OF 1929
TO OBTAIN NAVD 88 ELEVATIONS, ADD 2.061 FEET

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
ERM 1	916.83	U.S. Army Corps of Engineers-brass cap on a 2" pipe at the intersection of Southern Ave. & Litchfield Rd.
ERM 2	927.45	Brass cap in parapet at Northeast corner of Bullard Rd. bridge over the Gila River.
ERM 3	929.63	Brass cap in hand hole at the intersection of Southern Ave. & Dysart Rd.
ERM 4	933.58	Brass cap in hand hole at the intersection of Broadway Rd. and Dysart Rd.
ERM 5	944.24	Cotton spindle flush with pavement at the intersection of Lower Buckeye and Dysart Roads.
ERM 6	973.58	Brass cap West end of Buckeye Rd. bridge over Agua Fria River.
ERM 7	982.19	½" rebar in hand hole at the intersection of Van Buren St. & Dysart Rd.
ERM 8	994.71	A.D.O.T. Brass cap at Northeast corner of Interstate Highway 10 bridge over the Agua Fria River.
ERM 9	993.98	Brass cap in hand hole at the intersection of McDowell & Dysart Rd.
ERM 10	979.21	5/8" rebar flush with pavement at the intersection of McDowell & El Mirage Roads.
ERM 11	995.24	1-1/2" iron pin at the intersection of Thomas & El Mirage Roads.
ERM 12	1016.04 (1016.03 per 1987 survey)	Brass cap in hand hole at the intersection of Indian School and El Mirage Rd.

ERM 13	1025.38	Brass cap in hand hole at the centerline of El Mirage Rd. and projection of Campbell Ave.
ERM 14	1014.11	Brass cap at the intersection of 115th Ave. and Indian School Rd.
ERM 15	1017.26	Brass cap in hand hole at the intersection of 111th Ave. and Indian School Rd.
ERM 16	1019.18	Cotton picker spindle at the centerline of Indian School Rd. in line to the south with East wall of Salt River Project substation.
ERM 17	1026.36	Brass cap in hand hole at the intersection of 119th Ave. and Camelback Rd.
ERM 18	1033.41	Cotton picker spindle at the centerline of Camelback at approximately 109th Ave.
ERM 19	1036.30	Pipe set in concrete at the intersection at Bethany Home Rd. and El Mirage Rd.
ERM 20	1042.55	½" rebar with aluminum cap on the west side of berm for fence around airport.
ERM 21	1063.67	Brass cap in hand hole at the intersection of El Mirage Rd. and Glendale Ave.
ERM 22	1055.80	Brass cap flush with paving in the south, west bound travel lane of Glendale Ave.
ERM 23	1053.92	Brass cap in hand hole at the intersection of Glendale Ave. & 115th Ave.
ERM 24	1054.59	Brass cap in the south, westbound travel lane of Glendale Ave. & 111th Ave.
ERM 25	1088.02	Brass cap in hand hole at the intersection of El Mirage Rd. and Northern Ave.
ERM 26	1089.53	Brass cap flush at the intersection of Butler Ave. and El Mirage Rd.
ERM 27	1080.08	Brass cap in hand hole at 111th Ave. and Northern Ave.

ERM 28	1083.58	½" rebar. 1500' ± East of 111th Ave. & ½ mile ± north of Northern Ave.
ERM 29	1096.40	Brass cap in hand hole at the intersection of Olive Ave. and El Mirage Rd.
ERM 30	1090.09	Brass cap in hand hole at the intersection of Olive Ave. and 115th Ave.
ERM 31	1106.08	Brass cap in hand hole at the intersection of 111th Ave. & Olive Ave.
ERM 32	1105.83	Brass cap in hand hole at the intersection of Peoria Ave. & El Mirage Rd.
ERM 33	1118.53	Brass cap in hand hole at the intersection of Peoria Ave. and 99th Ave.
ERM 34	1107.92	Brass cap at the intersection of Varney Rd. and El Mirage Rd.
ERM 35	1117.41	Brass cap in hand hole at the intersection of El Mirage Rd. & Cactus Rd.
ERM 36	1136.59	Brass cap on southeast footer of Santa Fe railroad bridge.
ERM 37	1148.77	Brass cap in headwall at northeast corner of intersection of Grand Ave. & 111th Ave.
ERM 38	1148.85	Aluminum cap in top of headwall at northwest corner of intersection of Grand Ave. & 111th Ave.
ERM 39	1135.38	Brass cap in hand hole at the intersection of El Mirage Rd. and Thunderbird Rd.
ERM 40	1153.91	½" rebar with aluminum cap 150' west of bank of Agua Fria River 70' east of berm for evaporation pond.
ERM 41	1176.19	Brass cap in hand hole at the intersection of Bell Rd. & El Mirage Rd.
ERM 42	1172.34	½" rebar with aluminum cap 100' north of Bell Rd. 700' ± east of El Mirage Rd. north of flood control ditch.

ERM 43	1163.12	PK nail at the bull nose of median curb ¼ mile 115th Ave., just west of the intersection entrance to Coyote Springs subdivision.
ERM 44	1197.68	½" rebar with aluminum cap 200' east of El Mirage Rd. 3/4 mile north of Bell Rd.
ERM 45	1164.90	½" rebar in river bed 2000' north and 200' west of west line of Coyote Springs subdivision.
ERM 46	1212.32	½" rebar with aluminum cap at a point east of El Mirage Rd. approximately 800' on finger leading to river.
ERM 47	1176.56	½" rebar with aluminum cap unrecoverable at a point ¼ mile west and ¼ south of 115th Ave. and Beardsley Rd.
ERM 48	1201.98	½" rebar with aluminum cap 100' ± west of 115th Ave. & 50' north of Harmony Ln.
ERM 49	1225.73	½" rebar with aluminum cap 500' west of 115th Ave. and ¼ mile north of Deer Valley Rd. in raw desert.
ERM 50	1209.71	½" rebar in the bottom of the Agua Fria River 500' west of bank 300' north of old road crossing river.
ERM 51	1221.92	½" rebar with aluminum cap at a point 3/4 mile west of 107th Ave. 60' north of wooden pole power line in the bottom of the Agua Fria River.
ERM 52	1259.61	½" rebar with aluminum cap at a point 4500' ± west of 107th ave. on Hatfield Rd. on west bank of Agua Fria River 100' south of centerline of Hatfield Rd., approximately 40' east of fence.
ERM 53	1232.37	½" rebar with aluminum cap approximately 1500' SW of Hatfield Rd. and 107th Ave. 40' north of 4 strand barbed wire fence.
ERM 54	1236.18	½" rebar with aluminum cap at a point 800' SW of Hatfield Rd. and 107th Ave. 50' south of steel electric tower.

ERM 55	1245.36	½" rebar with aluminum cap ¼ mile west and ½ mile north of the intersection of 107th Ave. and Hatfield Rd. 250' west of 109th Ave.
ERM 56	1291.86	½" rebar with aluminum cap at the top of ledge east of 107th Ave. approximately 1000' ± 50' north of south ¼ corner of Sec. 5.
ERM 57	1257.15	½" rebar with aluminum cap 500' ± SE of intersection on Jomax Rd. and 107th Ave. SW of old canal by well foundation.
ERM 58	1270.37	½" rebar with aluminum cap approximately 1500' north of Jomax Rd. 500' east of rock outcrop west bank of river on sand bar approximately 60' southwest of Juniper tree 10' high.
ERM 59	1359.88	Brass cap (LS 6177) at the North quarter corner of Section 5, Township 4 North, Range 1 East.
ERM 60	1277.88	Brass cap (U.S. C. & G.S.) L-266 in concrete 100' + East and 1900' + North of Southwest corner of Section 32, Township 5 North, Range 1 East.
ERM 61	1355.76	Cross on Northeast corner of cattle guard at the North side of orchard on Beardsley Canal Road located 1950' ± East and 400' ± North of Southwest corner Section 17, Township 5 North, Range 1 East.
ERM 62	1372.18	Found ½" rebar at the South ¼ corner, Section 8, Township 5 North, Range 1 East, also 500' ± North and 1900' ± West of flume.
ERM 63	1454.47	Found 5/8" bar at South ¼ corner, Section 4, Township 5 North, Range 1 East, 400' ± East of road, top of hill.
ERM 64	1412.88	Found stone with marking at the Northeast corner, Section 5, Township 5 North, Range 1 East.
ERM 65	1469.31	A.D.O.T. brass cap top headwall at the Northeast corner of the East bridge on Lake Pleasant.

ERM DATA SHEETS
FOR REACH 2

(NEW TOPOGRAPHIC MAPPING, 1995)

ERM 12

(1966)

COUNTRY	TYPE OF MARK	STATION	
USA	BRASS CAP	NE COR SEC 26 T2N R1W	
CITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT)
	METAL NAME	MCDOT	1016.04 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
X X	X X		
(NORTHING)(EASTING) (FT)	(EASTING)(NORTHING) (FT)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
907217.53 (M)	575901.42 (M)		AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

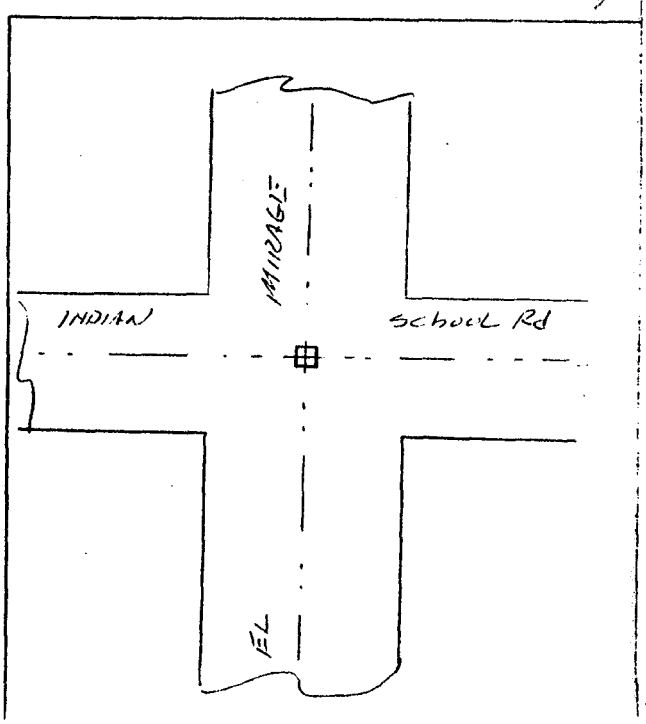
TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near LITCHFIELD PARK (city), MARICOPA (county), ARIZONA (state)

To reach this station from the INTERSECTION OF OLD LITCHFIELD Rd & INDIAN SCHOOL Rd GO EAST TWO MILES ON INDIAN SCHOOL Rd

This station is located at THE INTERSECTION OF INDIAN SCHOOL Rd and EL MIRAGE Rd.



This station is a BRASS CAP IN HAND HOLE

ERM 13

COUNTRY	TYPE OF MARK	STATION	
USA	Brass Cap.	E 1/4 Sec 23	
CALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
			1025.38
LATITUDE	LONGITUDE	DATUM	DATUM
X	X		
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
909821.14	575882.20		ANICE
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

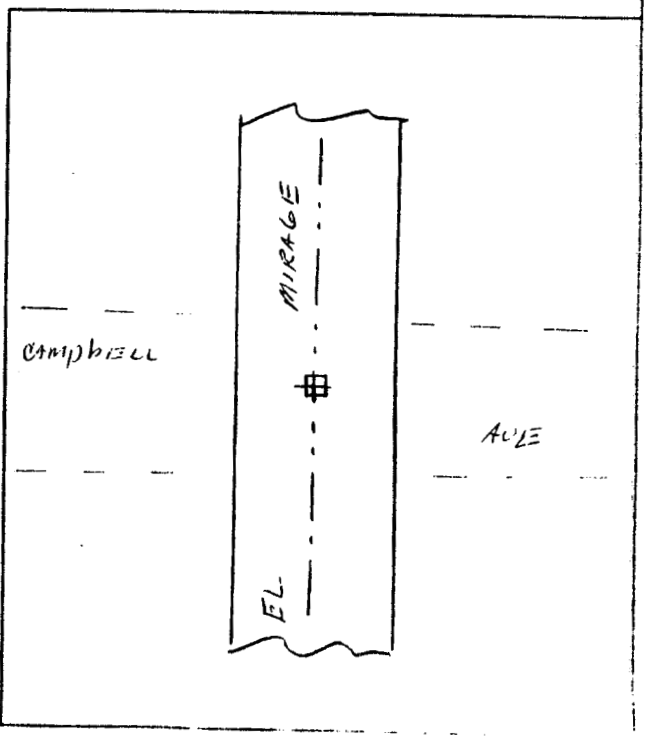
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near LITCHFIELD PARK (city), MARICOPA (county), ARIZONA (state)

To reach this station from the INTERSECTION OF OLD LITCHFIELD Road and INDIAN SCHOOL Rd go EAST TWO MILES TO EL MIRAGE Rd, THEN NORTH ONE HALF MILE.

This station is located at CENTER LINE OF EL MIRAGE Rd and Projection of Campbell AVE.

This station is a BRASS Cap in hand HOLE



ERM 14

(7060)

COUNTRY	TYPE OF MARK	STATION	
USA	BRASS CAP	NE COR OF SEC 25 T2N R1W HIV	
CITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) 1014.11 (M)
LATITUDE X	LONGITUDE X	DATUM	DATUM
(NORTHING)(EASTING) (FT) 907139.64 (M)	(EASTING)(NORTHING) (FT) 581104.34 (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY) AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

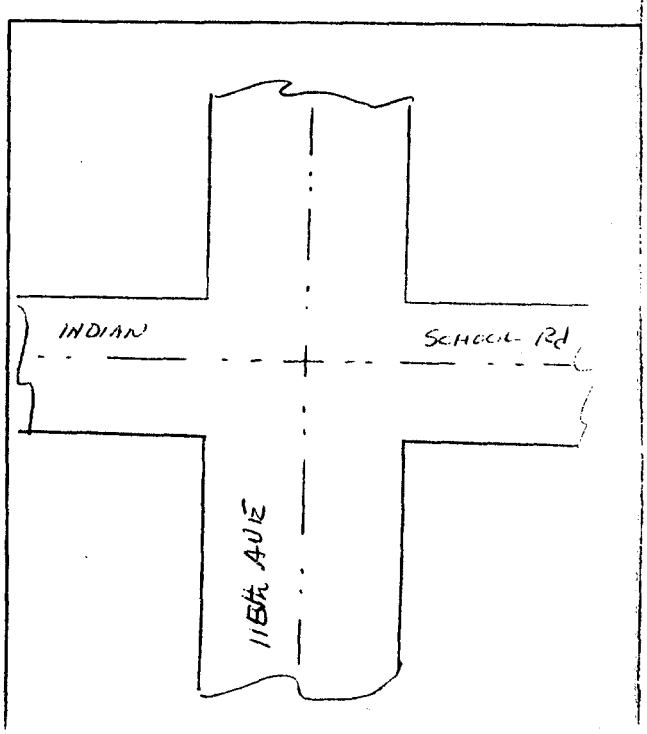
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near LITCHFIELD PARK (city), MARICOPA (county), ARIZONA (state)

To reach this station from the INTERSECTION OF Old Litch Field Park Rd & INDIAN SCHOOL Road go EAST ON INDIAN SCHOOL Rd Three miles.

This station is located at INTERSECTION OF 115th AVE & INDIAN SCHOOL Rd.

This station is o



ERM 15

(1068)

COUNTRY	TYPE OF MARK	STATION	
USA	BC HH	S 1/4 SEC 19 T2N R1E	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) 1017.26 (M)
LATITUDE ° ' "	LONGITUDE ° ' "	DATUM	DATUM
(NORTHING)(EASTING) (FT) 907238.98 (M)	(EASTING)(NORTHING) (FT) 583588.30 (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

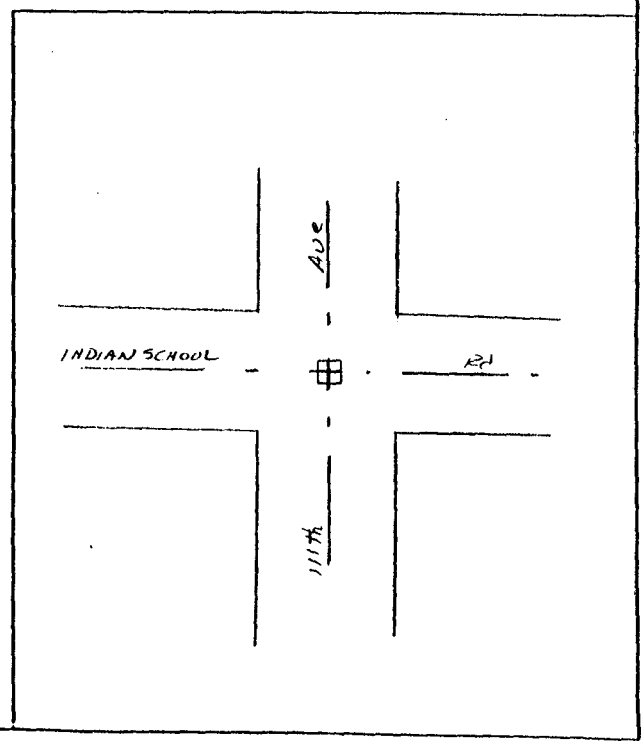
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near VILLA DE PAZ (city), MARICOPA (county), ARIZONA (state)

To reach this station from the INTERSECTION OF 107th AVE AND INDIAN SCHOOL Rd GO WEST TO 111th AVE

This station is located at 111th AVE AND INDIAN SCHOOL Rd

This station is a BC IN HH



ERM 16

(247)

COUNTRY	TYPE OF MARK	STATION	
USA	Cotton Picker Spindle	AF 47	H & Y
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT)
	NONE	NONE	1019.182 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
X X	X X		
(NORTHING)(EASTING) (FT)	(EASTING)(NORTHING) (FT)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
907287.96 (M)	584806.19 (M)		
(NORTHING)(EASTING) (FT)	(EASTING)(NORTHING) (FT)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(M)	(M)		

TO OBTAIN GRID AZIMUTH, ADD • ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) • ' " TO THE GEODETIC AZIMUTH

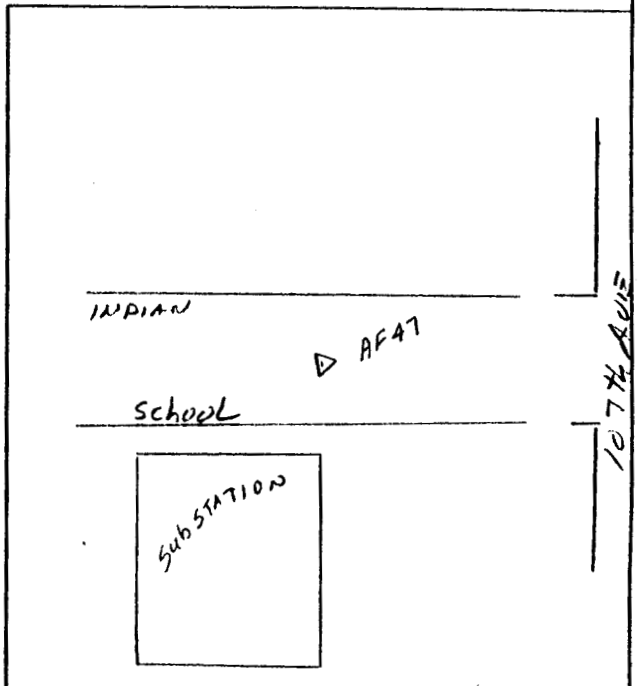
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	• ' "	• ' "		

This station is located near Villa De Paz (city) . Maricopa (county) . Arizona (state)

To reach this station from the INTERSECTION OF 107th AVE AND INDIAN SCHOOL Rd GO West 0.25 MILE

This station is located at ℄ INDIAN School Rd IN LINE TO THE South WITH East WALL OF SALT RIVER PROJECT SUB STATION

This station is a COTTON PICKER SPINDLE



ERM 17

(7061)

COUNTRY	TYPE OF MARK	STATION	
USA	Brass Cap	1/4 COR SEC 24 T2N R1E	H&V
QUALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
			1026.36
LATITUDE	LONGITUDE	DATUM	DATUM
X X	X X		
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
912410.26	578489.65		AMICI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near Litchfield Park (city) · Maricopa (county) · Arizona (state)

To reach this station from the

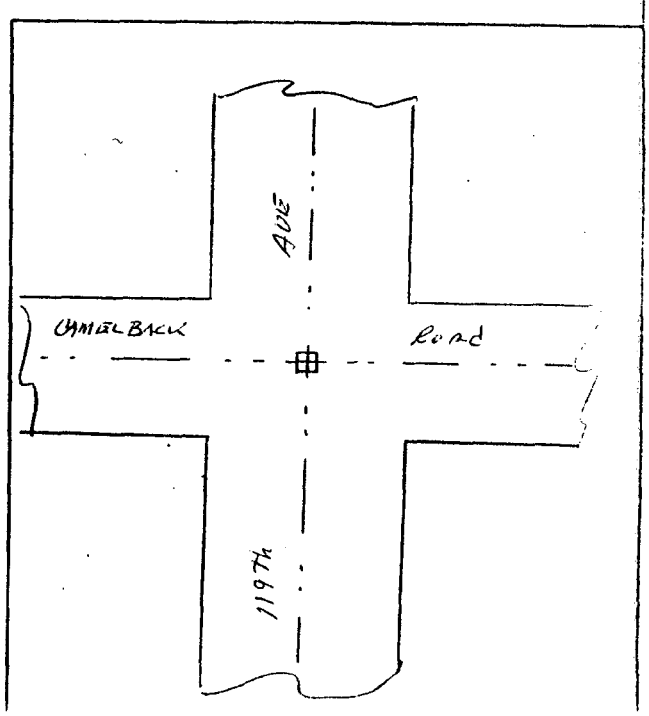
INTERSECTION OF OLD LITCHFIELD Rd and INDIAN SCHOOL RD go NORTH ONE MILE TO Camelback Rd Then EAST TWO and ONE HALF MILES.

This station is located at

The INTERSECTION OF 119TH AVE and Camelback Road

This station is a

BRASS CAP IN A HAND HOLE



ERM 18

(246)

COUNTRY	TYPE OF MARK	STATION	
USA	COTTON PICKER SPINDLE	AF 46 H&V	
LITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) 1033.413 (M)
ATITUDE	LONGITUDE	DATUM	DATUM
(NORTHING)(EASTING) (FT) 912 571.53 (M)	(EASTING)(NORTHING) (FT) 584 902.93 (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near LITCHFIELD PARK (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

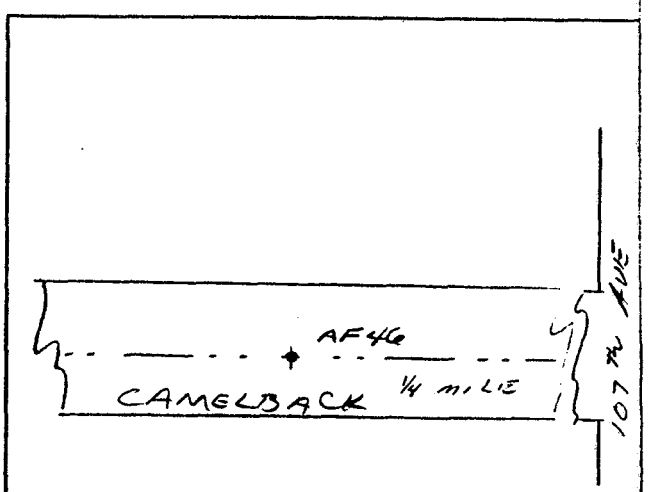
1300' +/- W. OF INTERSECTION OF 107th & CAMELBACK

This station is located at

℄ CAMELBACK APROX 109th AVE

This station is a

COTTON PICKER SPINDLE



ERM 19

GPS
(7062)

COUNTRY	TYPE OF MARK	STATION	
USA	BAR	NE COR SEC 15 T2N R 1W	H&V
CITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) 1036.30 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
(NORTHING)(EASTING) (FT) 917711.74 (M)	(EASTING)(NORTHING) (FT) 575892.00 (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY) AMCI
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

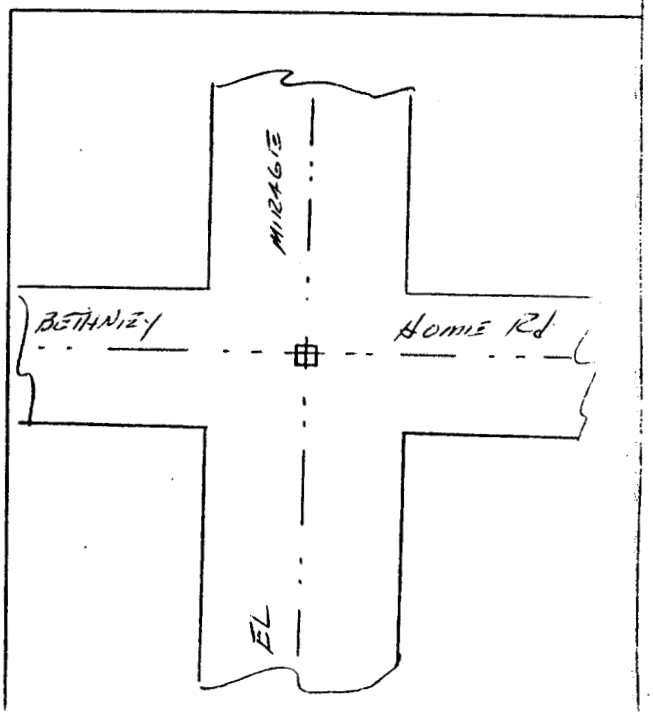
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near LITCHFIELD PARK (city), MARICOPA (county), ARIZONA (state)

To reach this station from the INTERSECTION OF OLD Litchfield Rd & INDIAN SCHOOL Rd GO EAST TWO MILES TO EL MIRAGE Rd, THEN NORTH ~~E~~ TWO Miles TO BETHNEY HOMIE Rd.

This station is located at

INTERSECTION OF Bethney Homie Rd & EL MIRAGE Rd.



This station is a

IRON BAR IN Pot HOLE
GPS Pt

ERM20

(244)

COUNTRY	TYPE OF MARK	STATION	
USA	½" RB ALUM CAP	AF 44	H & V
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	AF 44	AERIAL MAPPING CO	1042.55
LATITUDE	LONGITUDE	DATUM	DATUM
X	X		
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
917590.80	582771.74		
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

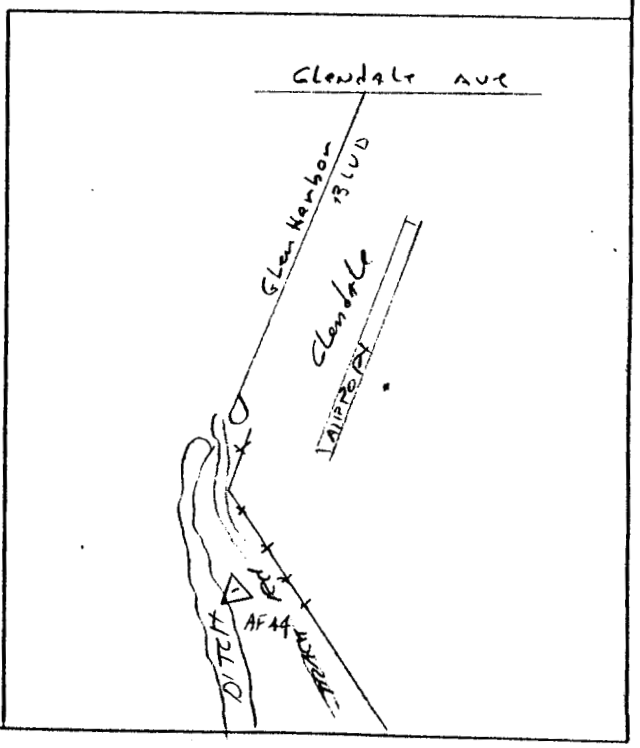
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near Villa De Paz (city), Maricopa (county), Arizona (state)

To reach this station from the INTERSECTION OF
Glendale Ave and Glen Harbor BLVD
GO SOUTH ALONG WEST SIDE OF
Glendale AIRPORT to END OF ROAD

This station is located at
ON WEST SIDE OF BIRM FOR
FENCE AROUND AIRPORT

This station is a
½" RB & ALUM CAP.



ERM 22

COUNTRY	TYPE OF MARK	STATION	
USA.	BRASS CAP	N1/4 COR SEC. 12 T2N R1W	
CITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) 1055.80 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
(NORTHING) (EASTING) (FT) 922966.16 (M)	(EASTING) (NORTHING) (FT) 578497.24 (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY) AMCI
(NORTHING) (EASTING) (FT) (M)	(EASTING) (NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

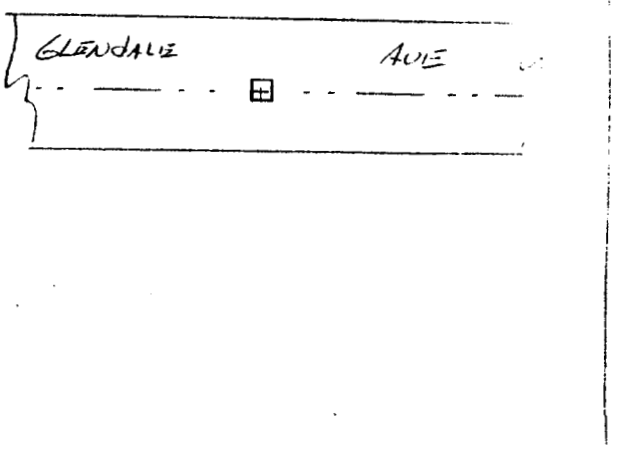
This station is located near LITCHFIELD PARK (city), MARICOPA (county), ARIZONA (state)

To reach this station from the INTERSECTION OF OLD Litchfield Rd & INDIAN School Rd go NORTH THREE MILES TO GLENDALE AVE THEN EAST TWO AND ONE HALF MILES

This station is located at the SOUTH WEST bound TRUEL LANE OF GLENDALE AVE.

This station is a

BRASS CAP FLUSH with PAVING.



ERM 23

GPS
(704)

COUNTRY	TYPE OF MARK	STATION	
USA	BRASS CAP	NE COR SEC 12 T2N R1W	
CITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) 1053.92 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
NORTHING (EASTING) (FT) 922947.17 (M)	EASTING (NORTHING) (FT) 581080.53 (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY) AHIC I
NORTHING (EASTING) (FT) (M)	EASTING (NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

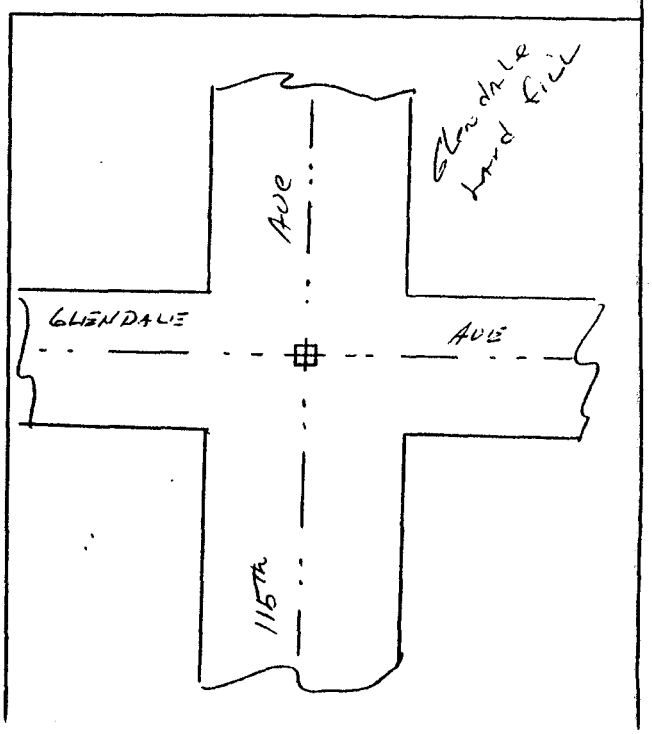
TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near LITCHFIELD PARK (city), MARICOPA (county), ARIZONA (state)

To reach this station from the INTERSECTION OF OLD LITCHFIELD Rd & INDIAN SCHOOL Rd go NORTH THREE MILES TO GLENDALE AVE, then EAST THREE MILES to 115th AVE

This station is located at THE INTERSECTION OF GLENDALE AVE & 115TH AVE



This station is a

BRASS CAP IN HAND HOLE
GPS Pt

ERM 24

(7075)

COUNTRY	TYPE OF MARK	STATION	
USA	Brass Cap	N 1/4 SEC 7 T2N R1E	V
STATE	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
			1054.59
LATITUDE	LONGITUDE	DATUM	DATUM
NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

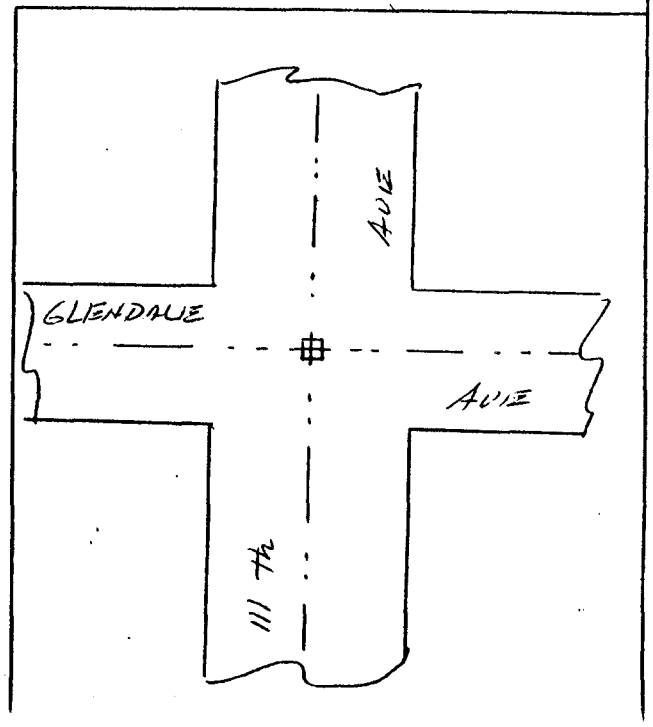
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near Litchfield Park (city) . Maricopa (county) . Arizona (state)

To reach this station from the INTERSECTION OF old Litchfield Rd & Indian School Rd Go NORTH 3 miles to Glendale AVE, then EAST 3 ½ miles to 111th AVE

This station is located ~~at~~ in the South, West bound TRAVEL LANE OF Glendale AVE & 111th Ave

This station is a BRASS Cap.



ERM 25

GPS
(7040)

COUNTRY	TYPE OF MARK	STATION	
USA	BRASS CAP	NE COR SEC 2 T2NR1W	1121
[redacted]	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) 1088.02 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near Litchfield Park (city) . Maricopa (county) . Arizona (state)

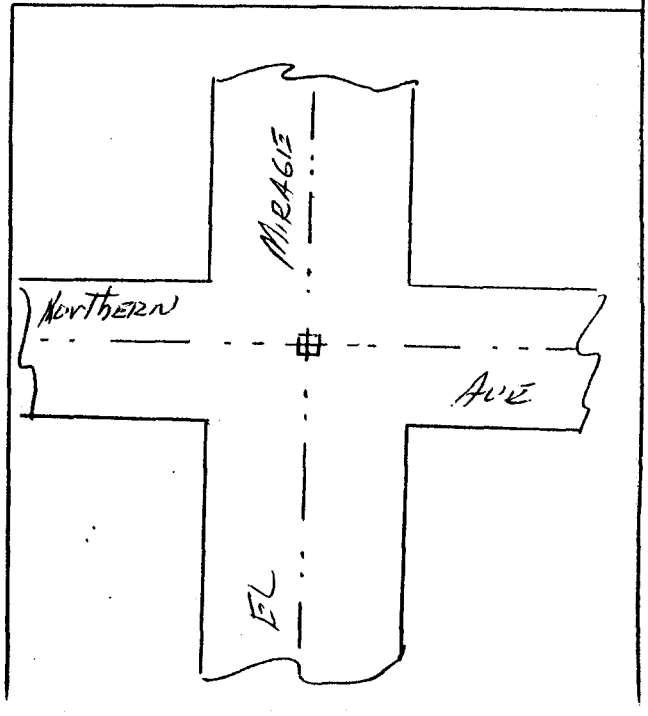
To reach this station from the INTERSECTION OF OLD Litchfield Rd & INDIAN SCHOOL Rd GO East 2 miles to El MIRAGE Rd, then NORTH 4 miles to NORTHERN Ave.

This station is located at the INTERSECTION OF EL MIRAGE Rd & NORTHERN AVE

This station is a

BRASS CAP in HAND HOLE

GPS PT



ERM 26

(7039)

COUNTRY	TYPE OF MARK	STATION	
USA	Brass Cap	E¼ Sec 35 T3N R1W	H
SOCIETY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) 1089.527 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

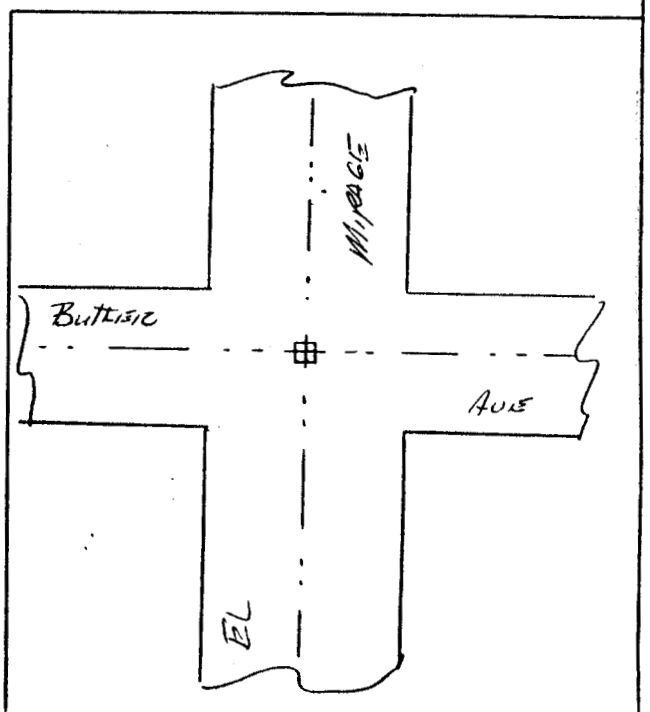
TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near EL MIRAGE (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the Post OFFICE IN EL MIRAGE
Go West on Thunderbird Road ½ mile to
EL MIRAGE Rd, then South 3 MILES to
OLIVE AVE, Point is ½ mile South
OF OLIVE.

This station is located at The INTERSECTION OF
BUTLER AVE & EL MIRAGE Rd.



This station is a
BRASS Cap FLUSH.

ERM 27

(1074)

COUNTRY	TYPE OF MARK	STATION	
USA	BRASS CAP	N 1/4 SEC 6 T2N R1E	V
STATE	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M) 1080.079
LATITUDE	LONGITUDE	DATUM	DATUM
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

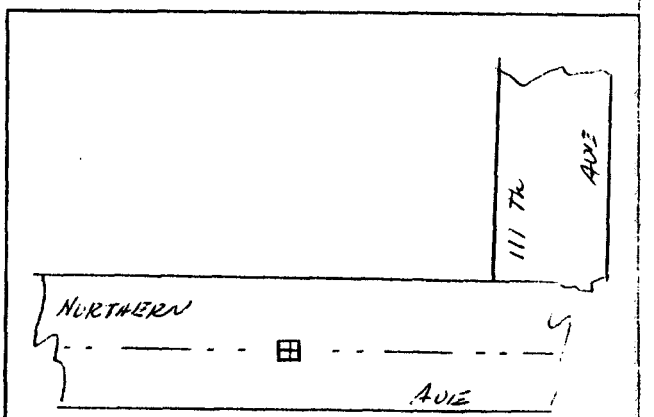
TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near Litchfield Park (city) . Maricopa (county) . Arizona (state)

To reach this station from the INTERSECTION OF OLD Litchfield Rd & Indian School GO NORTH 4 MILES TO NORTHERN AVE, THEN EAST 3½ MILES TO 111 Th AVE & Northern.

This station is located at 111th Ave & Northern



This station is a

BRASS CAP in HAND HOLE

ERM 28

(243)

COUNTRY	TYPE OF MARK ½" REBAR	STATION AF 43 V	
CITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) 1083.577 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

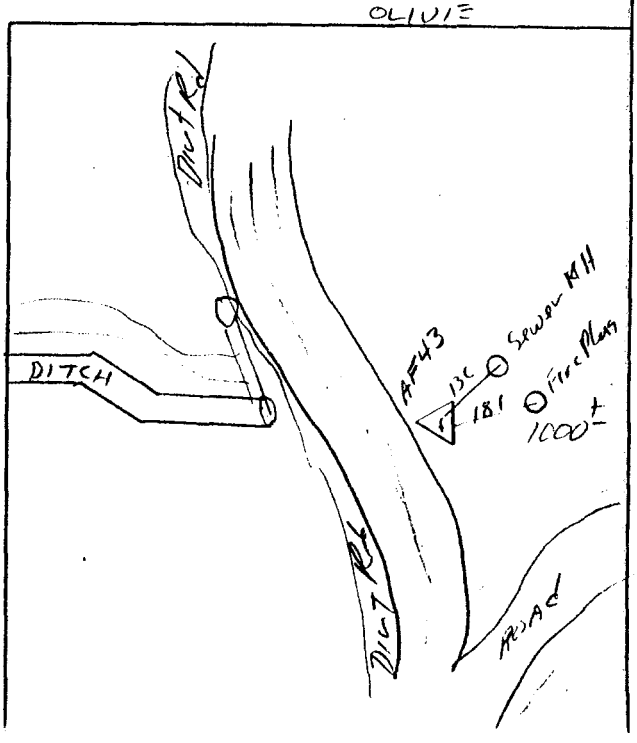
This station is located near PEORIA (city), MARICOPA (county), ARIZONA (state)

To reach this station from the

This station is located at

This station is a

½" RB



111AU0

ERM 29

COUNTRY: USA	TYPE OF MARK: BRASS CAP	STATION: SW SEC 25 T3N R1W (7038)	
QUALITY	STAMPING ON MARK: MC HD	AGENCY (CAST IN MARK): MCHD	ELEVATION: 1096.402 (FT) (M)
[redacted]	LONGITUDE	DATUM: NAD 83 (92)	DATUM: NGVD 1929
NORTHING (EASTING): 933513.819 (FT) (M)	(EASTING) (NORTHING): 575781.795 (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
NORTHING (EASTING): (FT) (M)	(EASTING) (NORTHING): (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD) (SUB) ° ' " TO THE GEODETIC AZIMUTH

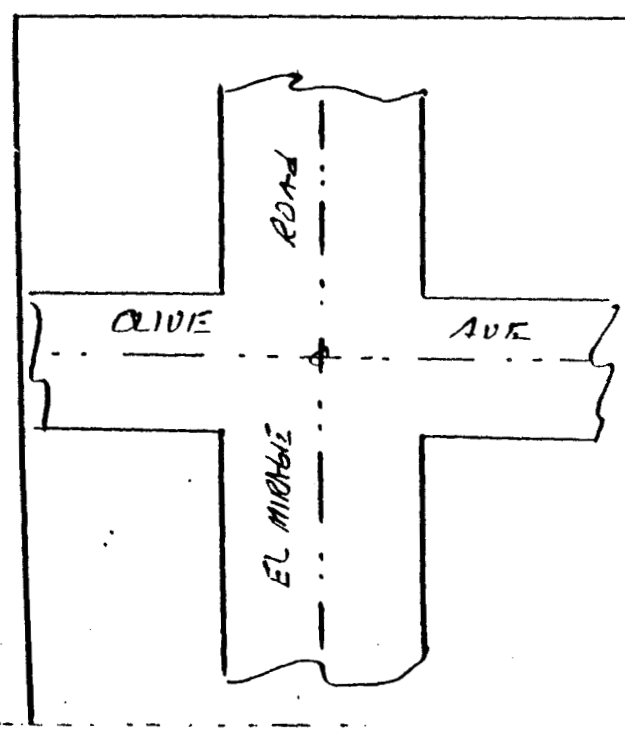
OBJECT	AZIMUTH OR DIRECTION (GEODETIC) (GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near SUN CITY (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the

POST OFFICE IN EL MIRAGE GO WEST APROX ½ MI TO EL MIRAGE ROAD, THEN SOUTH 3 MILES. TO STA.

This station is located at INTERSECTION OF EL MIRAGE AND OLIVE ROAD



This station is a

BRASS CAP IN HANDHOLE

ERM 30

(7042)

COUNTRY	TYPE OF MARK	STATION	
USA.	BRASS CAP	NE COR SEC 36 T3N R1W	H&V
	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
			1090.086
LATITUDE	LONGITUDE	DATUM	DATUM
NORTHING (EASTING) (FT) (M)	(EASTING) (NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
NORTHING (EASTING) (FT) (M)	(EASTING) (NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near EL MIRAGE (city) . MARICOPA (county) . ARIZONA (state)

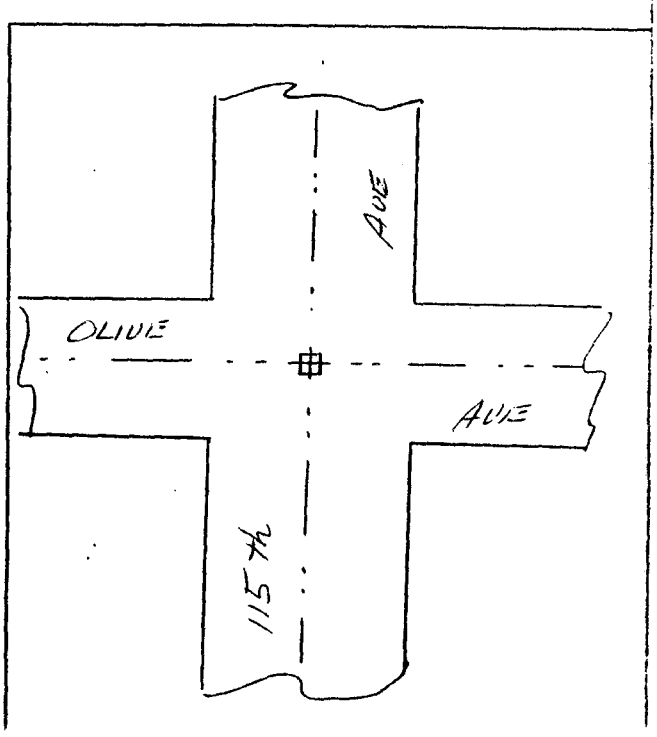
To reach this station from the Post OFFICE IN EL MIRAGE Go ½ mile West To EL MIRAGE Road, Then South 3 MILES TO OLIVE AVE, Then EAST 1 MILE TO 115th AVE

This station is located at

INTERSECTION OF OLIVE AVE & 115th AVE

This station is a

BRASS CAP IN HAND HOLE



ERM 32

GPS
(7035)

COUNTRY	TYPE OF MARK	STATION	
USA	BRASS CAP	NE COR SEC 26 T3N R1W	H&V
[redacted]	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) 1105.830 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
NORTHING(EASTING) (FT) 938783.01 (M)	(EASTING)(NORTHING) (FT) 575780.19 (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
NORTHING(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

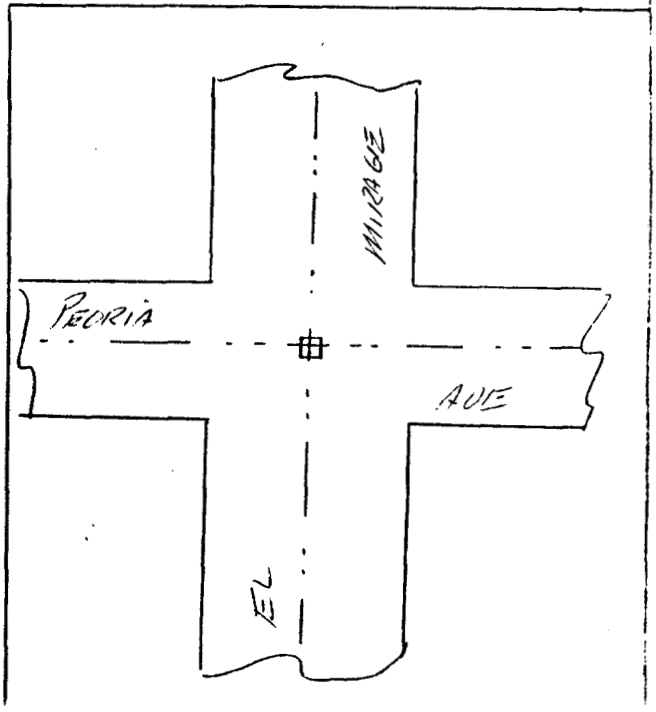
TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near EL MIRAGE (city) . Maricopa (county) . ARIZONA (state)

To reach this station from the POST OFFICE IN EL MIRAGE go east ½ mile to EL MIRAGE RD, then South 2 miles to PEORIA AVE.

This station is located at The INTERSECTION OF PEORIA AVE & EL MIRAGE,



This station is a BRASS CAP IN HAND HOLE

ERM 34

(7034)

COUNTRY	TYPE OF MARK	STATION	
USA	Brass Cap	E¼ Cor Sec 23 T3N R1W H&V	
LOCALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) 1107.920 (M)
LATITUDE	LONGITUDE	DATUM NAD 83 (92)	DATUM NAVD '29
(NORTHING)(EASTING) (FT) 9414-19.931 (M)	(EASTING)(NORTHING) (FT) 575 773.855 (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

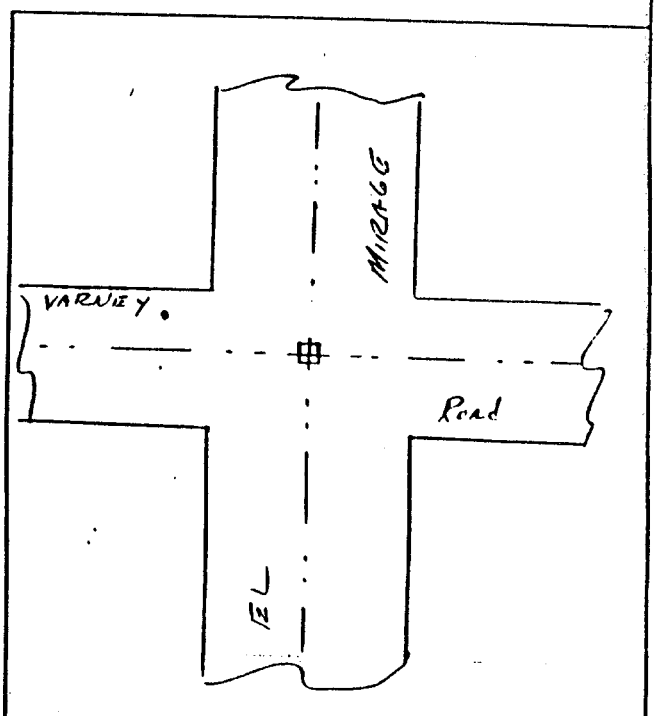
This station is located near EL MIRAGE (city), MARICOPA (county), ARIZONA (state)

To reach this station from the Post Office in EL MIRAGE Go west ½ Mile to EL MIRAGE Rd, Then South to VARNEY Rd which is 1½ miles south of Thunderbird Rd

This station is located at the INTERSECTION OF VARNEY Rd with EL MIRAGE Rd.

This station is a

BRASS CAP.



ERM 35

GPS

(7033)

COUNTRY	TYPE OF MARK	STATION	
USA	BRASS CAP	NE COR SEC 23 T3N R1W	HAY
	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) 1117.410 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
NORTHING (EASTING) (FT) 944057.33 (M)	(EASTING) (NORTHING) (FT) 575768.70 (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
NORTHING (EASTING) (FT) (M)	(EASTING) (NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD) (SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC) (GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

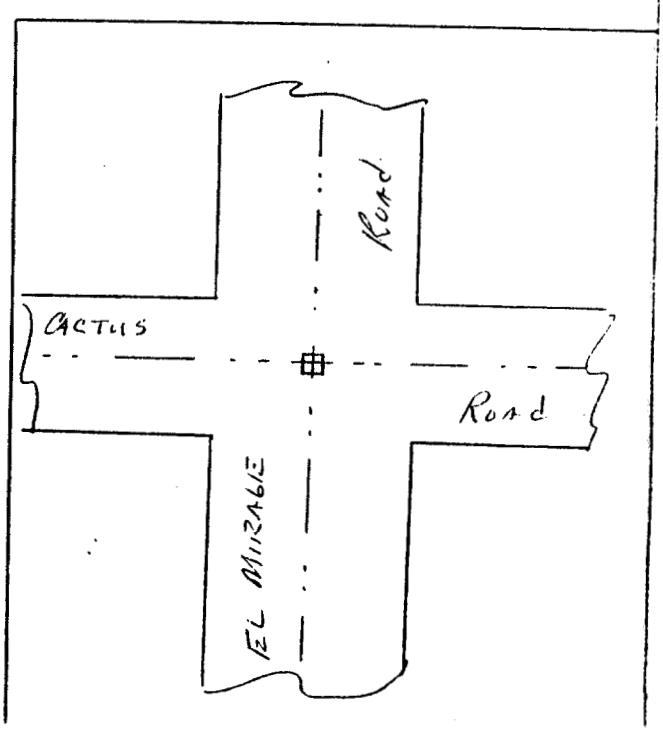
This station is located near EL MIRAGE (city), MARICOPA (county), ARIZONA (state)

To reach this station from the POST OFFICE in EL MIRAGE Go west ½ mile to EL MIRAGE Rd, Then South one mile to CACTUS Rd

This station is located at THE INTERSECTION OF EL MIRAGE Rd & CACTUS Rd.

This station is a

BRASS Cap in Hand HOLE



ERM 36

COUNTRY: USA	TYPE OF MARK: MONEL RIVET	STATION: RV 87 (UNSTABLE) (8005)	
LOCALITY:	STAMPING ON MARK: NONE	AGENCY (CAST IN MARK): NONE	ELEVATION (FT) (M): 1136.586
LATITUDE: 33° 36' 25" N	LONGITUDE: 112° 18' 14" W	DATUM: NAD 83 (92)	DATUM: NGVD 29
(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ... TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ... TO THE GEODETIC AZIMUTH

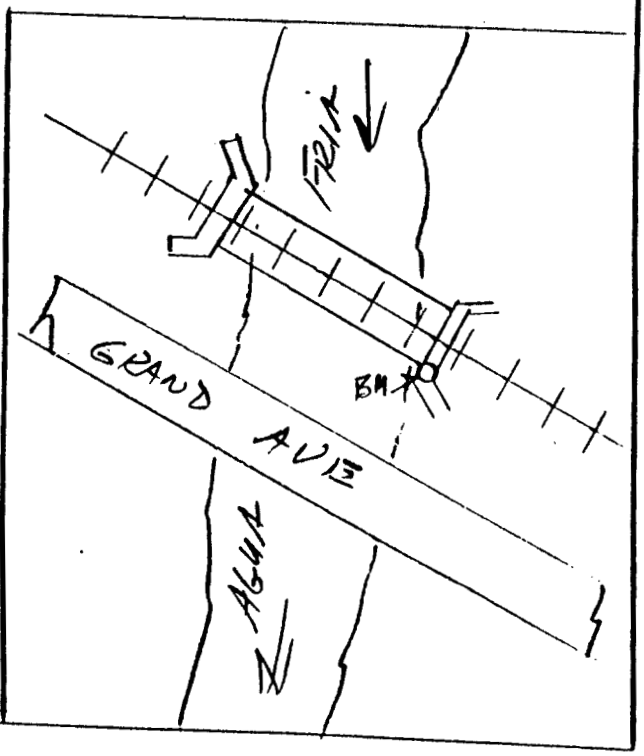
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near SUN CITY (city), MARICOPA (county), ARIZONA (state)

To reach this station from the
INTERSECTION OF 111th AVE & GRAND AVE GO NW ALONG GRAND AVE 1000' TO RAILROAD BRIDGE ON THE RIGHT OVER AGUA FRIA RIVER.

This station is located at
THE TOP OF THE SE FOOTER OF R/R BRIDGE.
FOOTER CRACKED AND MOVING DOWN.

This station is a
BRASS CAP



ERM 37

UNTRY USA	TYPE OF MARK ALUM DISK	STATION U-23 (UNSTABLE) (800T)	
CALITY	STAMPING ON MARK U-23	AGENCY (CAST IN MARK) C&GS	ELEVATION (FT) 1148.768 (M)
ITUDE	LONGITUDE	DATUM NAD 83(92)	DATUM NGVD '29
NG)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
RTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

his station is located near SUN CITY (city) . MARICOPA (county) . ARIZONA (state)

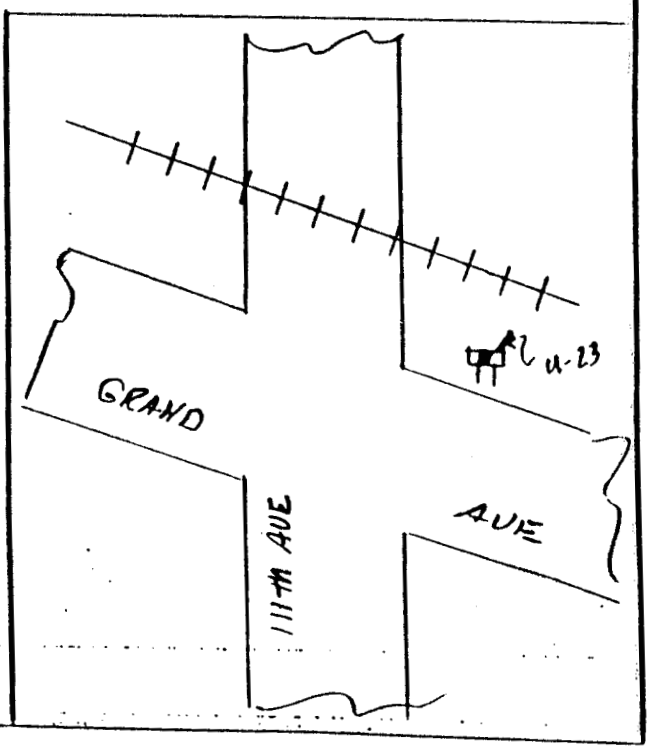
ch this station from the

his station is located at

INTERSECTION OF 111 AVE & GRAND AVE ON CONCRETE HEADWALL at NE COR OF INTERSECTION

his station is a

BRASS CAP set in Headwall



ERM 38

COUNTRY: USA	TYPE OF MARK: ALUM CAP	STATION: BM 2346F (800G)	
LOCALITY:	STAMPING ON MARK: 2346 F	AGENCY (CAST IN MARK): ADOT	ELEVATION: 1148.847 (FT) (M)
LATITUDE:	LONGITUDE:	DATUM: NAD 83(92)	DATUM: NGVD '29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE:	ESTABLISHED BY (AGENCY):
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE:	ESTABLISHED BY (AGENCY):

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near SUN CITY (city), MARICOPA (county), ARIZONA (state)

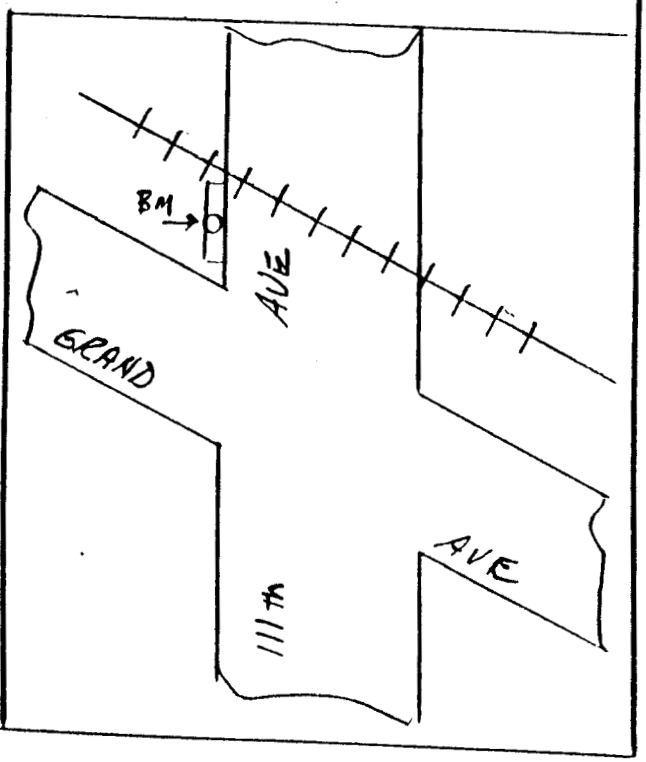
To [redacted] this station from the

This station is located at

NW COR OF THE INTERSECTION OF 111th AVE & GRAND AVE ON TOP OF HEADWALL OF DRAINAGE SE TO NW

This station is a

ALUM CAP



ERM 39

GPS
(7070)

COUNTRY	TYPE OF MARK	STATION	
USA	BRASS CAP	NE COR SEC 14 T3N R1W	H&V
	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) 1135.381 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
NORTHING(EASTING) (FT) (M) 949343.51	(EASTING)(NORTHING) (FT) (M) 575768.49	GRID AND ZONE	ESTABLISHED BY (AGENCY)
NORTHING(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

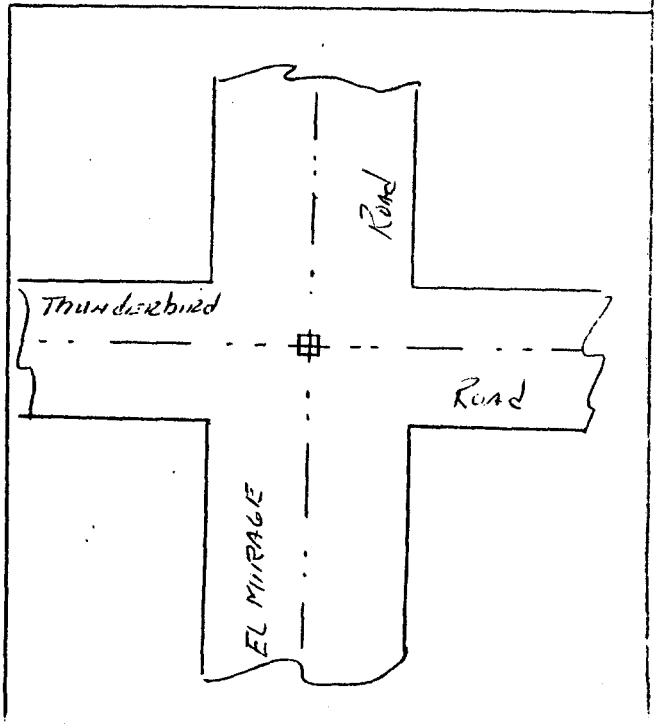
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near EL MIRAGE (city), MARICOPA (county), ARIZONA (state)

To reach this station from the Post Office in EL MIRAGE Go West ½ mile to EL MIRAGE Road.

This station is located at THE INTERSECTION OF EL MIRAGE Road & Thunderbird Road

This station is a BRASS Cap in Hand Hole GPS Pt



ERM 40

(228)

COUNTRY	TYPE OF MARK	STATION	
USA	½"RB & ALUM CAP	AF 28	H&V
ITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT)
	AF-28	AERIAL Mapping Co Inc	1153.907 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
			NGSL 29
(NORTHING)(EASTING) (FT)	(EASTING)(NORTHING) (FT)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
957253.789 (M)	577632.2036 (M)	AZ C	
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

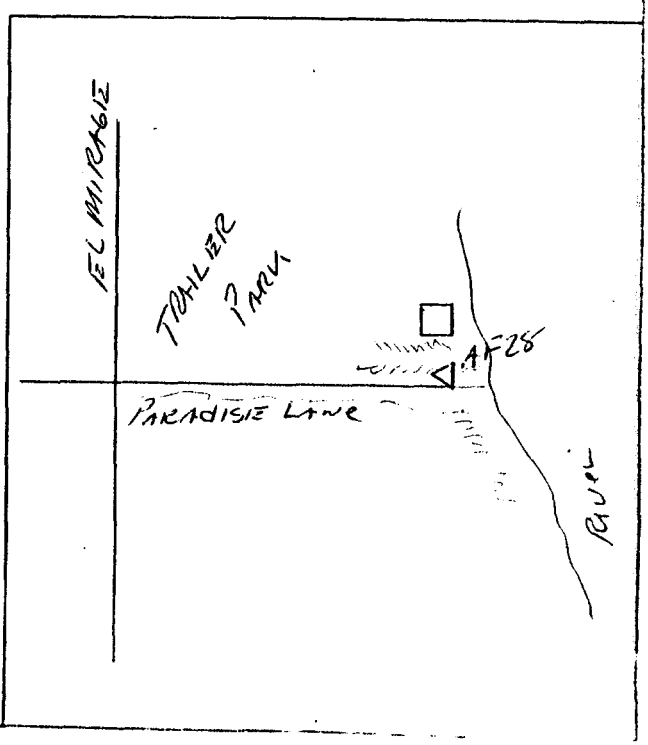
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near SUN CITY (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the Post Office at 99th Ave & Bell Rd go West 3 miles to EL MIRAGE Rd, then South ½ mile, then EAST ½ mile to West BANK of AGUA FRIA River

This station is located at 150' West of BANK of AGUA FRIA River 70' East of BIRM FOR EVAPORATION Pond.

This station is a ½" RB & Alum Cap



ERM41

GPS (7026)

COUNTRY USA	TYPE OF MARK BRASS CAP	STATION NE COR OF SEC 2 T3N R1W H & V	
COUNTY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION 1176.194 (FT) (M)
LATITUDE	LONGITUDE	DATUM	DATUM
NORTHING)(EASTING) (FT) 960152.94 (M)	(EASTING)(NORTHING) (FT) 575785.22 (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

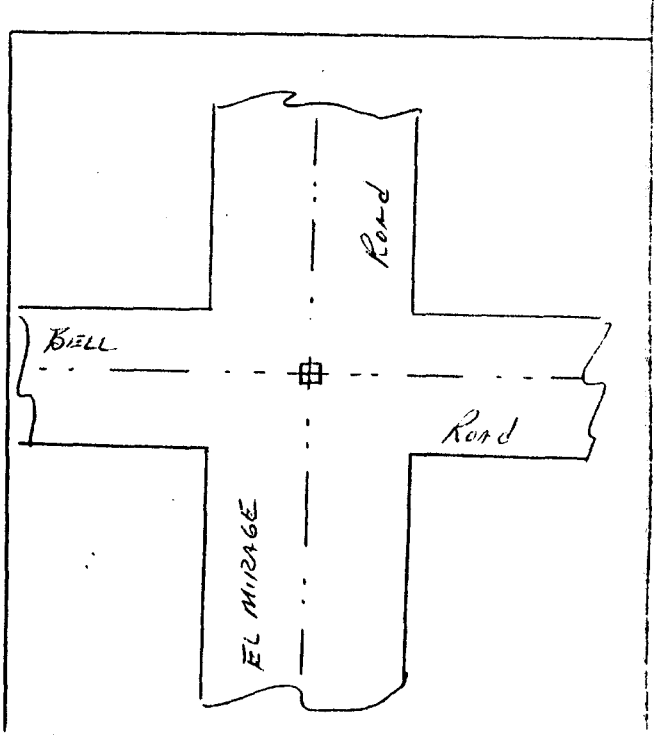
This station is located near SUN CITY (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the Post Office in Sun City at 99th Ave & Bell Rd, Go west 3 miles To EL MIRAGE Rd (123 Rd Ave)

This station is located at THE INTERSECTION OF Bell Rd & EL MIRAGE Rd (123 Rd Ave)

This station is a BRASS Cap in Hand Hole

GPS Pt



ERM42

(221)

COUNTRY	TYPE OF MARK	STATION	
	½"RB Alum Cap	AF 21	H & V
[redacted]ITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	AF 21	AERIAL MAPPING CO. INC	1172.344
LATITUDE	LONGITUDE	DATUM	DATUM
			MSL 29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
960302.9248	576811.4347	AZ C	
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

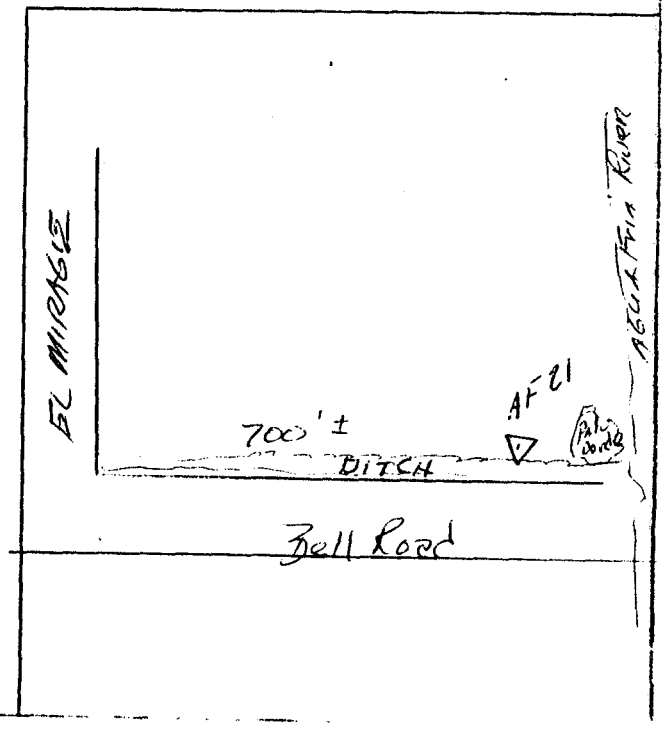
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near Sun City (city) . Maricopa (county) . Arizona (state)

To reach this station from the Post Office at 99th Ave & Bell Rd go west 3 miles to El Mirage Rd.

This station is located at 100 north of Bell Rd 700± east of El Mirage Rd north of Flood Control ditch

This station is a ½" RB ± Alum Cap.



ERM 43

(223)

COUNTRY	TYPE OF MARK	STATION	
	P.K.	AF 23	H & V
LITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT.) (M.)
	None	None	1163.118
LATITUDE	LONGITUDE	DATUM	DATUM
			NAD 29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
960140.09	579705.90		
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

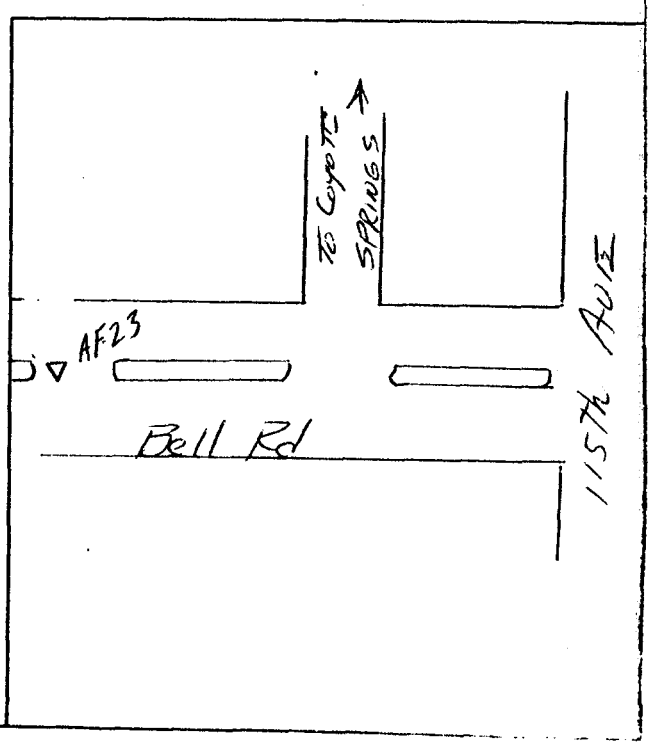
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near Sun City (city), Maricopa (county), Arizona (state)

To reach this station from the Post Office at 99th Ave & Ball Road go west ~~2~~ 2 miles to 115 Th Ave.

This station is located at the ball NOSE OF Med CURB 1/4 mile west of 115th AVE, JUST WEST OF ST intersection Entrance To Coyote Spring Subdivision

This station is a PK NAIL



ERM 44

(220)

COUNTRY	TYPE OF MARK	STATION	
USA	½" RB & Alum Cap	AF 20	V
QUALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	AF 20	Aerial Mapping Co Inc	1197.682
LATITUDE	LONGITUDE	DATUM	DATUM
			MSL 29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

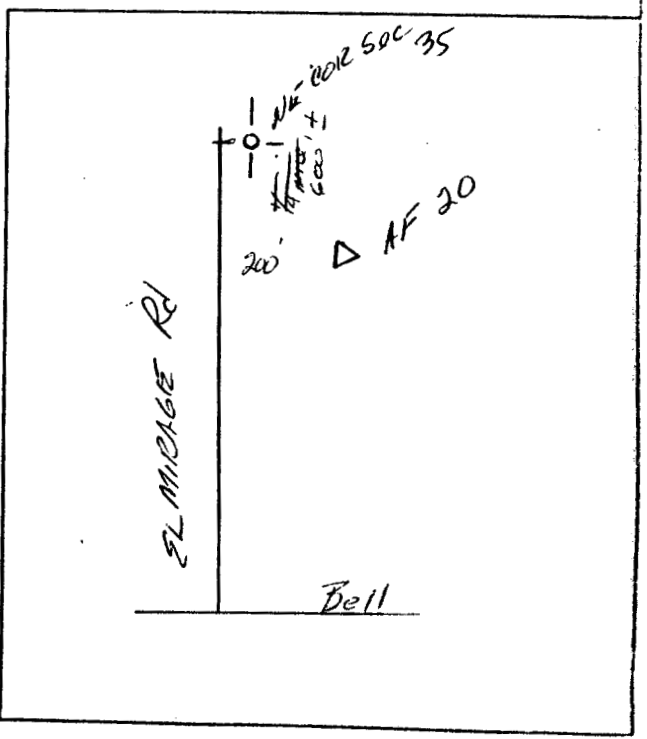
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near SUN CITY (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the POST OFFICE at 99th Ave & Ball Road go west 3 miles to EL MIRAGE Road, then north ¾ mile.

This station is located at 200' EAST OF EL MIRAGE Road

This station is a ½" RB & Alum Cap.



ERM 45

(224)

COUNTRY	TYPE OF MARK	STATION	
	1/2" IRB	AF 24	Y
CITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	None	None	1164.898
LATITUDE	LONGITUDE	DATUM	DATUM
			MSC 29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

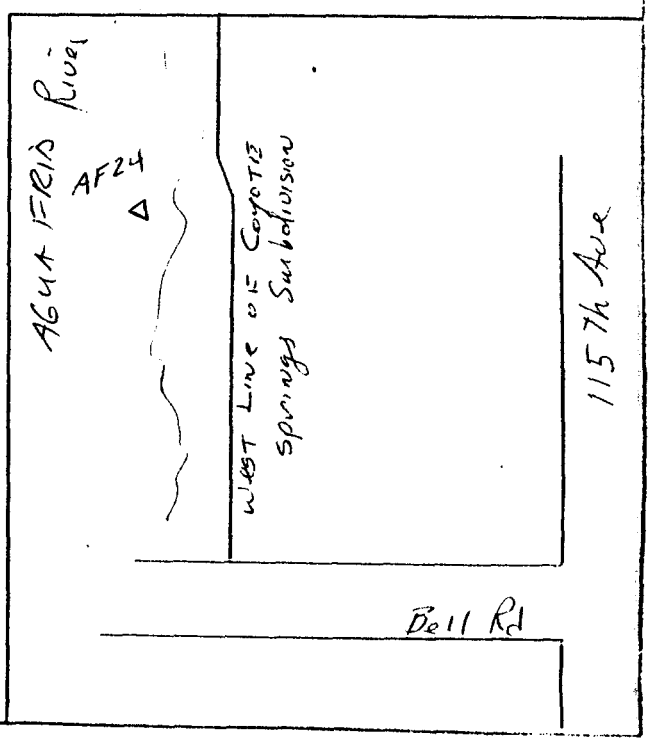
This station is located near Sun City (city) . Maricopa (county) . Arizona (state)

To reach this station from the Post Office at 99th Ave & Bell Rd go West ~~Two~~ Miles to 115th Ave

This station is located at 2000' North and 200' West of West Line of Coyotie Springs Subdivision.

This station is a

1/2" Re bar in river bed. Probably not Recoverable



ERM 46

(219)

COUNTRY	TYPE OF MARK	STATION	
USA	½" RB & Alum Cap	AF-19	Y
ITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	AF 19	Aerial Mapping Co Inc	1212.317
LATITUDE	LONGITUDE	DATUM	DATUM
			NGSL 29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

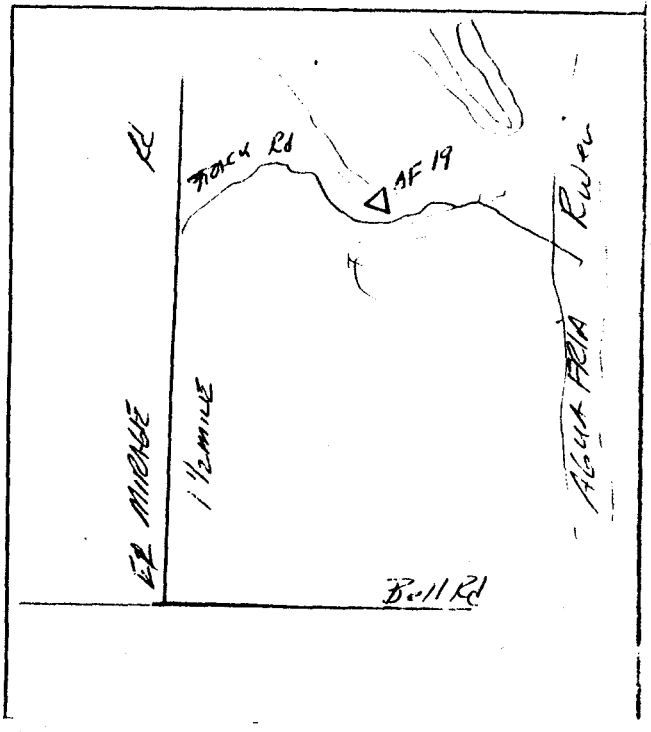
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near Sun City (city) . Maricopa (county) . Arizona (state)

To reach this station from the Post Office at 99th Ave & Bell Rd go West 3 miles to El Mirage Rd, Then North 1½ miles

This station is located at Pt East of El Mirage Road Aprox 800' on Finger Leading To River.

This station is a ½" RB & Alum Cap.



ERM 47

(227)

COUNTRY	TYPE OF MARK	STATION	
	½" 1203 Alum Cap	AF 27	H&V
CITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT)
	AF 27	AERIAL Mapping Co INC.	1176.560 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
			MSL 29
(NORTHING)(EASTING) (FT) 969 578.83 (M)	(EASTING)(NORTHING) (FT) 579 495.37 (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

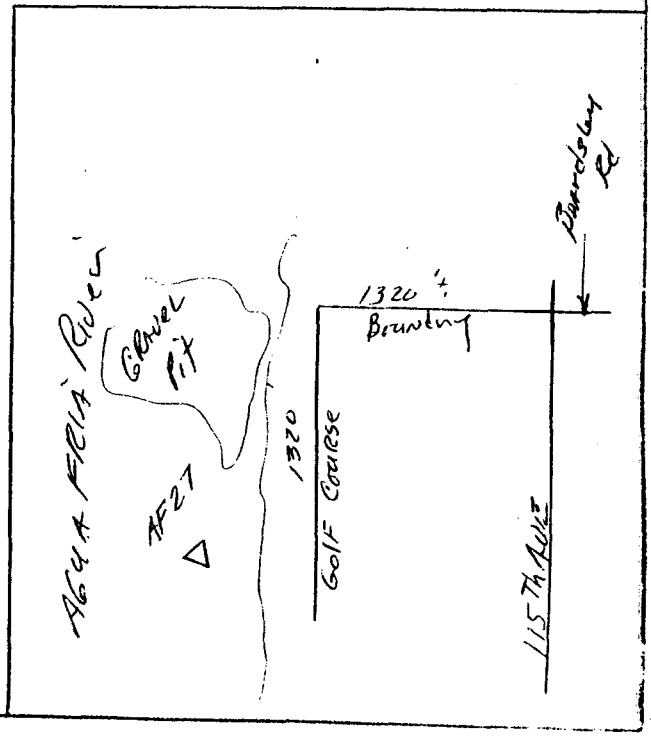
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near Sun City (city) . Maricopa (county) . Arizona (state)

To reach this station from the Post Office at Sun city 99th Ave & Bell Rd go North To Bandsley Rd (2mi4) Then west one and one half Miles To 115th Ave.

This station is located at a Pt ¼ mile West and ¼ South, Then 400' west of 115th Ave & Bandsley

This station is a ½" Rb & Alum Cap.



ERM 48

(216)

COUNTRY	TYPE OF MARK	STATION	
USA	1/2" 12 Bar - Alum Cap	AF16	V
CITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
			1201,976
LATITUDE	LONGITUDE	DATUM	DATUM
			MSL 29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

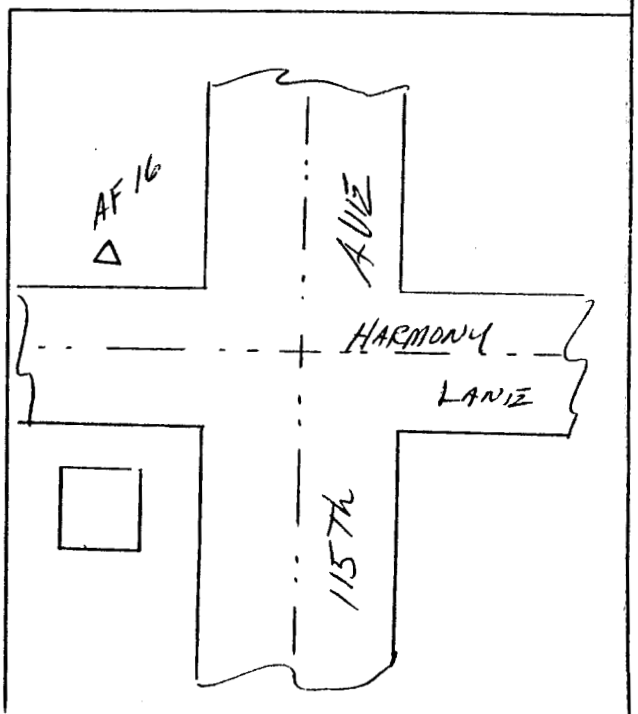
This station is located near Sun City (city) . Maricopa (county) . Arizona (state)

To reach this station from the Post Office at 99th Ave & Bell Rd go North 2½ miles to Rose Garden Ln Then West 1½ miles To 115th Ave Then North 1/16 mile To Harmony Ln.

This station is located at 100'± West of 115th Ave & 50' North of Harmony Ln.

This station is a

1/2" RB & Alum Cap.



ERM 49

(212)

COUNTRY	TYPE OF MARK	STATION	
USA	1/2" RB Alum Cap	AF 12 V	
CITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT)
	AF 12	AERIAL MAPPING Co Inc	1225.728 (M)
LATITUDE	LONGITUDE	DATUM	DATUM
			NGVD 29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

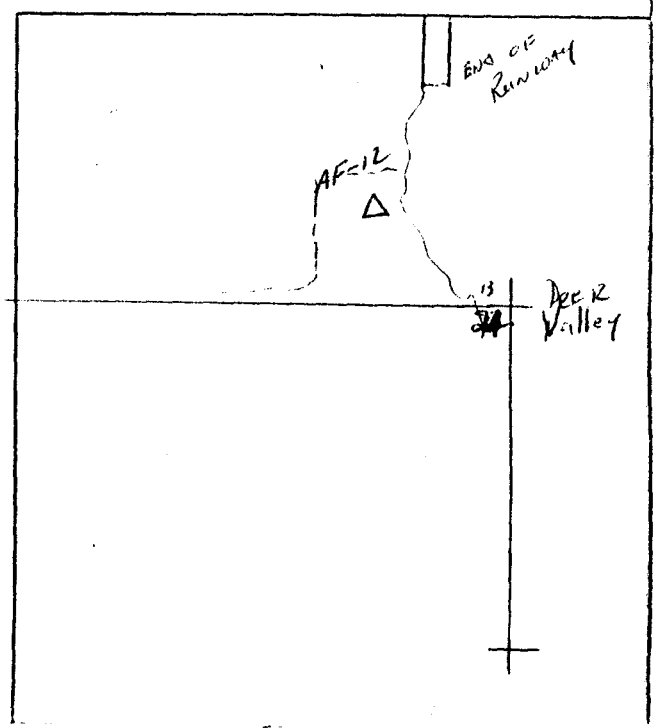
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near SUN CITY (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the Post OFFICE at 99th Ave & Bell Road go NORTH 2½ miles to ROSE GARDEN LANE Then West 1½ miles to 115TH AVE, Then North ¾ mile.

This station is located at 500' west of 115th Ave and ¼ mile North of Deer Valley Rd in RAW desert.

This station is a ½" RB and Alum Cap.



ERM 50

(214)

COUNTRY	TYPE OF MARK	STATION	
	½"RB ± Alum Cap	AF 14	V
QUALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	AF 14	Aerial Mapping Co Inc	1209.706
LATITUDE	LONGITUDE	DATUM	DATUM
			MSL 29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

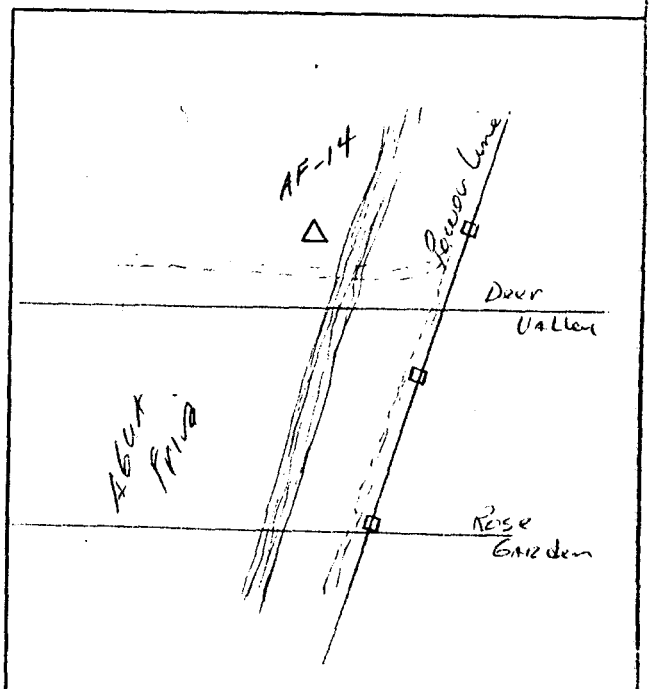
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near Sun City (city) . Maricopa (county) . Arizona (state)

To reach this station from the Post Office at 99th Ave & Bell Rd go North 2 miles To Boardsley Rd, Then West ½ West To 107th Ave, Then North ½ mile to Rose Garden, Then West ½ mile to Power Line Xing Road Then North along Power line 3/10 mile to old Road down To River

This station is located at in the bottom of Agua Fria River 500 west of Bank 300 north of old Road Xing River.

This station is a ½" Re Bar



ERM 51

(213)

COUNTRY: USA	TYPE OF MARK: ½"RB Alum Cap	STATION: AF 13 H & V	
CITY	STAMPING ON MARK: AF 13	AGENCY (CAST IN MARK): AERIAL MAPPING CO INC.	ELEVATION: 1221.921 (FT) (M)
LATITUDE	LONGITUDE	DATUM	DATUM: NGVD 29
(NORTHING)(EASTING) (FT) (M): 981069.51	(EASTING)(NORTHING) (FT) (M): 582846.28	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

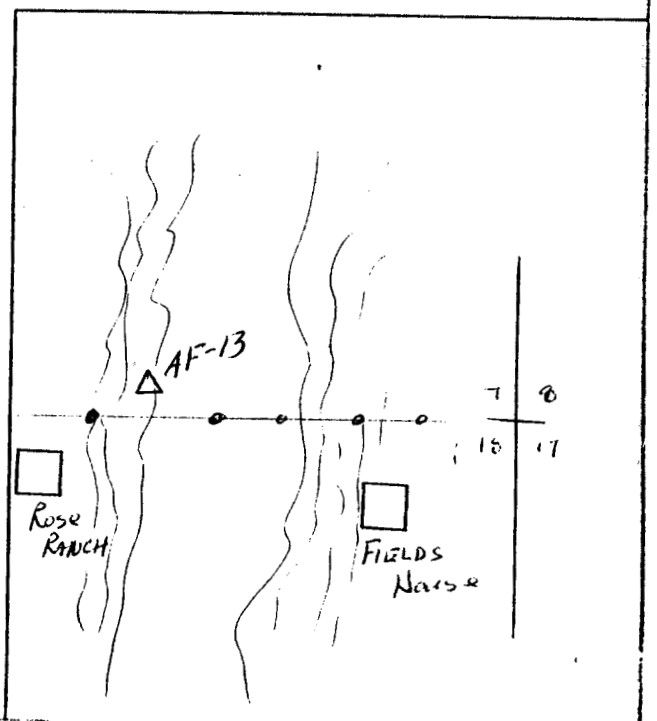
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near SUN CITY (city) . MARICOPA (county) . ARIZONA (state)

To reach this station from the Post Office at 99Th Ave & Ball Rd go North 2 miles to Boardsley Rd then west ½ mile To 107th Ave Then North 2 miles To Pinnacle Pk Rd.

This station is located at ~124 3/4 mile West of 107Th AVE 60' North of wooden Pole Power Line in the bottom of the Agua Fria River

This station is a ½" RB & Alum Cap.



ERM 52

(210)

COUNTRY	TYPE OF MARK	STATION	
USA	1/2" RB Alum Cap	AF 10	V
QUALITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	AF 10	Aerial Mapping Co Inc	1259.612
LATITUDE	LONGITUDE	DATUM	DATUM
			MSL 29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

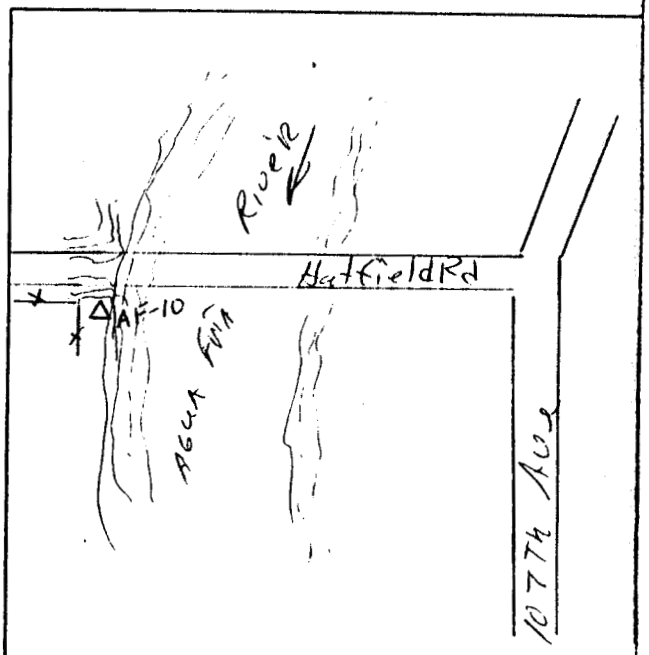
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near Sun City (city) . Maricopa (county) . ARIZONA (state)

To reach this station from the Post office at 99th Ave & Bell Rd go North 2 miles To Beardsley Rd Then West 1/2 mile To 107th Ave North 2 3/4 mile To Hatfield Rd.

This station is located at a point 4500'± West of 107th Ave on Hatfield Rd on West Bank of Agua Fria River 100' South of ℄ Hatfield road, East of Fence Aprox 40'.

This station is a 1/2" RB ± Alum Cap.



ERM 53

(209)

COUNTRY	TYPE OF MARK	STATION
USA	½" RB & Alum Cap	AF-9 V
QUALITY	STAMPING ON MARK	AGENCY (CAST IN MARK) / ELEVATION (FT) (M)
	AF-9	AERIAL MAPPING CO INC / 1232.374
LATITUDE	LONGITUDE	DATUM / DATUM
		MSL 29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE / ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE / ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

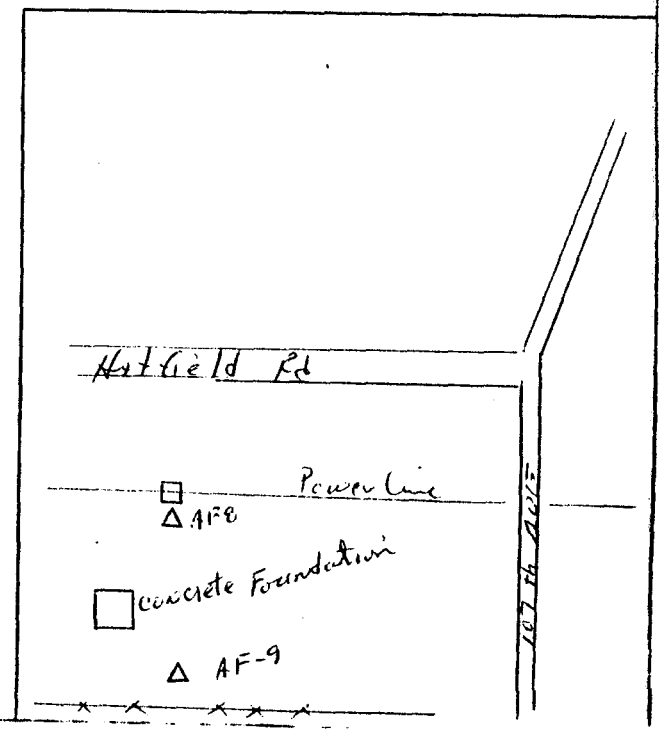
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

This station is located near Sun City (city) . Maricopa (county) . Arizona (state)

To reach this station from the Post Office at 99th Ave & Bell Rd, go NORTH 2 miles To Beardsley Rd then west ½ mile to 107th Ave, Then NORTH 2 ¾ miles to Hatfield Rd

This station is located at apprx 1500 SW of Hatfield Rd & 107th Ave 40' North of 4 STRand Barbed wire fence

This station is a ½" RB & Alum Cap.



ERM 54

(208)

COUNTRY	TYPE OF MARK	STATION	
	1/2" RB Alum Cap	AF 8 V	
CITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	AF 8	Aerial Mapping Co Inc	1236.18C
LATITUDE	LONGITUDE	DATUM	DATUM
			NAD 29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

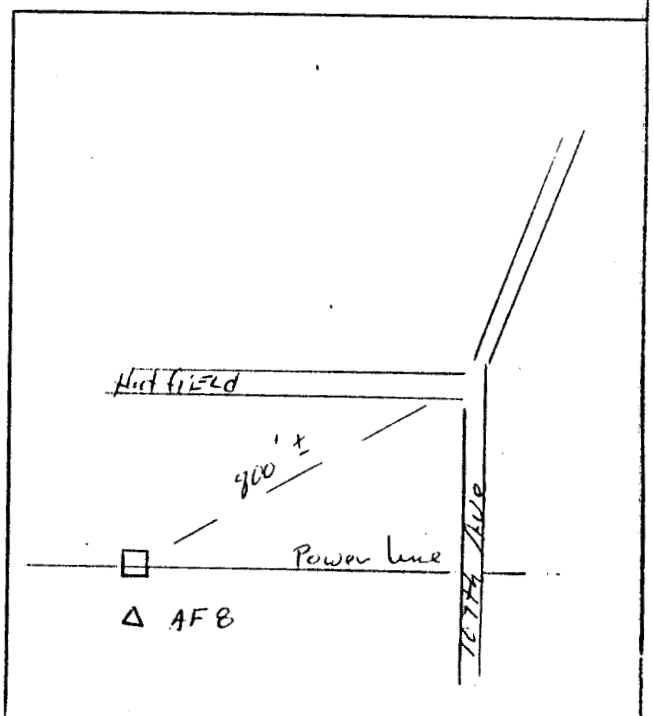
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near Sun City (city), Maricopa (county), Arizona (state)

To reach this station from the Post Office at 99th Ave & Bell Road, go North 2 miles to Beardsley Rd, then West 1/2 mile to 107th AVE, Then NORTH 2 3/4 mile to Hatfield Rd

This station is located at a point 900' SW of Hatfield & 107th Ave 50' South of Steel Elect Towerz.

This station is a 1/2" RB & Alum Cap



ERM 55

(207)

COUNTRY	TYPE OF MARK	STATION	
USA	½" RB Alum Cap	AF-7	V
STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)	
AF-7	AERIAL MAPPING Co INC	1245.359	
LATITUDE	LONGITUDE	DATUM	DATUM
			NGSL 29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD • • " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) • • " TO THE GEODETIC AZIMUTH

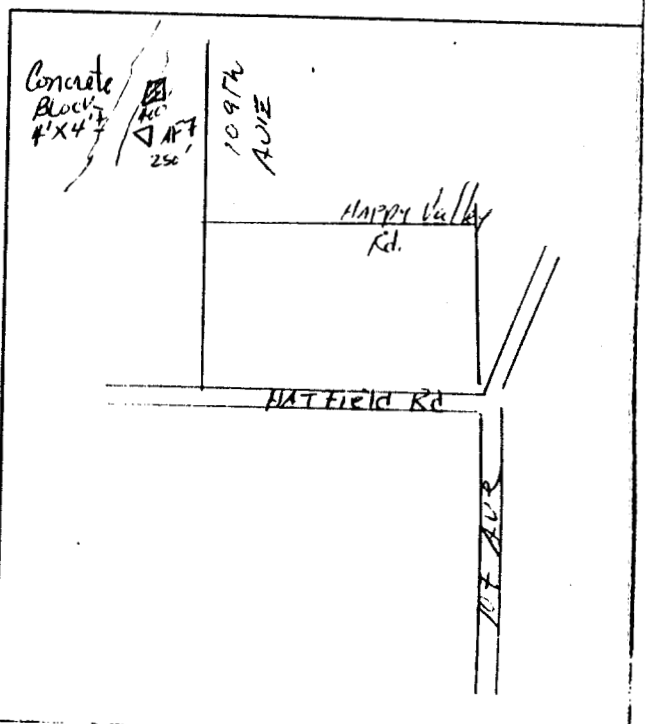
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	• • "	• • "		

This station is located near Sun City (city) . Maricopa (county) . Arizona (state)

To reach this station from the Post Office at 99th Ave & Bell Road go NORTH 2 miles To Beardsley Rd, then West ½ mile To 107th Ave, then North 2¾ mile To Hatfield Rd.

This station is located ~~at~~ 1/4 mile West & ½ mile North of the INTERSECTION OF 107th Ave & Hatfield Road, 250 west OF 109th Ave.

This station is a ½" RB and Alum Cap.



ERM 56

(206)

COUNTRY	TYPE OF MARK	STATION	
USA	½"RB Alum Cap	AF-6	V
CITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	AF-6	Aerial Mapping Co Inc	1291.860
LATITUDE	LONGITUDE	DATUM	DATUM
			NGVD 29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC) ° ' "	BACK AZIMUTH ° ' "	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)

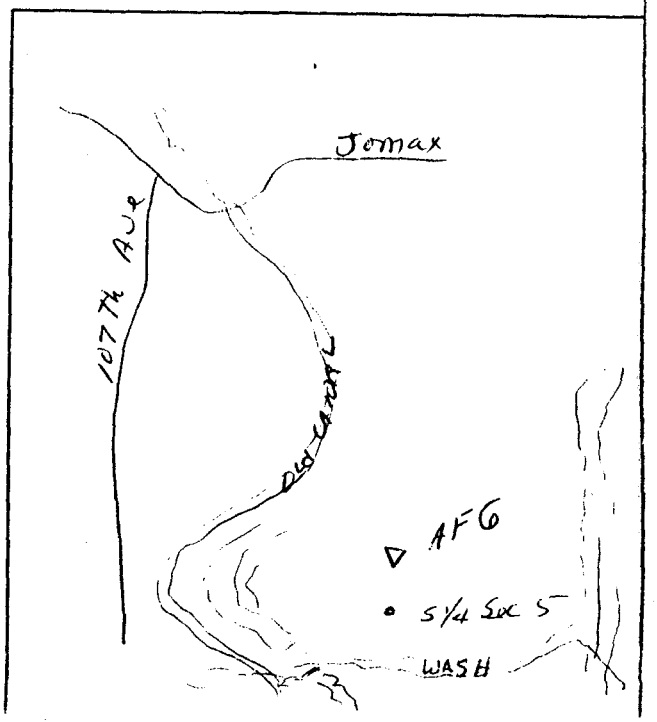
This station is located near Sun City (city) . Maricopa (county) . Arizona (state)

To reach this station from the Post Office at 99th Ave & Bell Road, go North six miles to Jomax Road. then West 1 ¼ mile to 107th Ave Then South one mile.

This station is located at Top of Ledge EAST OF 107th Ave Aprox 1000 ± 50' North of South ¼ cor of Sec 5.

This station is a

½"RB with Alum Cap.



ERM 57

(205)

COUNTRY	TYPE OF MARK	STATION	
USA	Alum Cap 1/2"rb	AF-5	V
[redacted]ITY	STAMPING ON MARK	AGENCY (CAST IN MARK)	ELEVATION (FT) (M)
	AF-5	AERIAL MAPPING CO. INC.	1257.152
LATITUDE	LONGITUDE	DATUM	DATUM
			NGSL 29
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)
(NORTHING)(EASTING) (FT) (M)	(EASTING)(NORTHING) (FT) (M)	GRID AND ZONE	ESTABLISHED BY (AGENCY)

TO OBTAIN GRID AZIMUTH, ADD ° ' " TO THE GEODETIC AZIMUTH

TO OBTAIN GRID AZ. (ADD)(SUB) ° ' " TO THE GEODETIC AZIMUTH

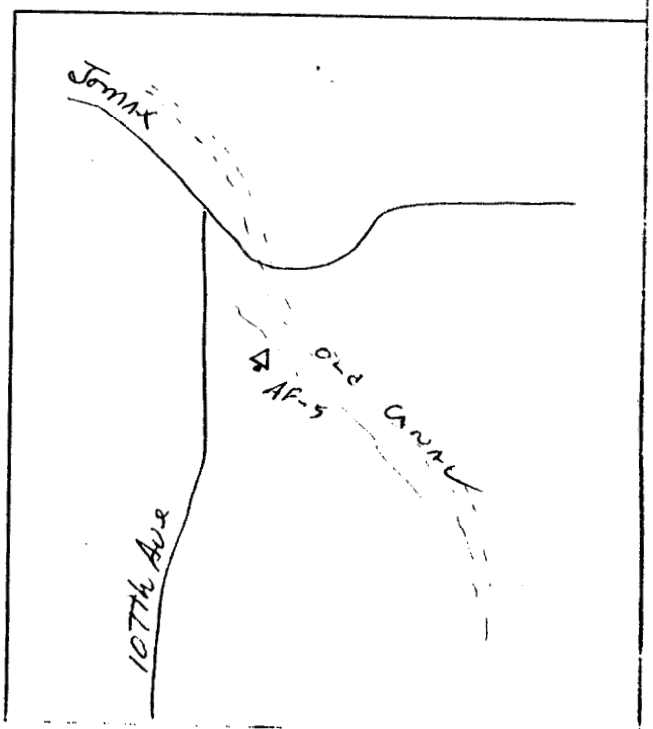
OBJECT	AZIMUTH OR DIRECTION (GEODETIC)(GRID) (MAGNETIC)	BACK AZIMUTH	GEOD. DISTANCE (METERS) (FEET)	GRID DISTANCE (METERS) (FEET)
	° ' "	° ' "		

This station is located near Sun City (city) . Maricopa (county) . Arizona (state)

To reach this station from the Post office at 99th Ave & Bell Road go north on 99th Ave 6 miles to Jomax Rd, Then West 1¼ miles To 107th Ave

This station is located at 500' ± SEAST OF INTERSECTION ON Jomax & 107th Ave S-West OF OLD CANAL By WELL FOUNDATION

This station is a 1/2" rb WITH Alum Cap.



Key to Cross-Section Labeling

KEY TO CROSS-SECTION LABELING

Community Name: Maricopa County, Arizona and Incorporated Areas

County: Maricopa County

State: Arizona

Prepared by: Coe & Van Loo Consultants, Inc.

Stream Name: Agua Fria River

Run Date: June 1996

Field Survey Section No.	XS Letter - Draft FIS	Computer Stationing	XS Letter - Final FIS
.160		.160	
.250		.250	
.350		.350	
.440		.440	
.540		.540	
.630		.630	
.730		.730	
.830		.830	
.920		.920	
1.010		1.010	
1.100		1.100	
1.170		1.170	
1.250		1.250	
1.330		1.330	
1.400		1.400	
1.480		1.480	
1.560		1.560	
1.640		1.640	
1.710		1.710	
1.790		1.790	
1.870		1.870	
1.940		1.940	
2.020		2.020	
2.100		2.100	
2.180		2.180	

Field Survey Section No.	XS Letter - Draft FIS	Computer Stationing	XS Letter - Final FIS
2.250		2.250	
2.330		2.330	
2.410		2.410	
2.510		2.510	
2.600		2.600	
2.700		2.700	
2.800		2.800	
2.890		2.890	
2.990		2.990	
3.080		3.080	
3.180		3.180	
3.270		3.270	
3.370		3.370	
3.400		3.400	
3.430		3.430	
3.470		3.470	
3.550		3.550	
3.640		3.640	
3.690		3.690	
3.734		3.734	
3.747		3.747	
3.767		3.767	
3.770		3.770	
3.780		3.780	
3.800		3.800	
3.810		3.810	
3.830		3.830	
3.930		3.930	
4.020		4.020	
4.040		4.040	
4.060		4.060	
4.092		4.092	
4.094		4.094	
4.160		4.160	
4.260		4.260	
4.270		4.270	

Field Survey Section No.	XS Letter - Draft FIS	Computer Stationing	XS Letter - Final FIS
4.300		4.300	
4.390		4.390	
4.480		4.480	
4.500		4.500	
4.520		4.520	
4.600		4.600	
4.700		4.700	
4.754		4.754	
4.790		4.790	
4.890		4.890	
4.980		4.980	
5.000		5.000	
5.020		5.020	
5.100		5.100	
5.150		5.150	
5.201		5.201	
5.203		5.203	
5.250		5.250	
5.270		5.270	
5.290		5.290	
5.305		5.305	
5.317		5.317	
5.328		5.328	
5.380		5.380	
5.480		5.480	
5.510		5.510	
5.540		5.540	
5.650		5.650	
5.689		5.689	
5.700		5.700	
5.750		5.750	
5.770		5.770	
5.790		5.790	
5.810		5.810	
5.900		5.900	
5.990		5.990	

Field Survey Section No.	XS Letter - Draft FIS	Computer Stationing	XS Letter - Final FIS
6.070		6.070	
6.160		6.160	
6.260		6.260	
6.350		6.350	
6.430		6.430	
6.520		6.520	
6.540		6.540	
6.560		6.560	
6.590		6.590	
6.610		6.610	
6.640		6.640	
6.660		6.660	
6.690		6.690	
6.710		6.710	
6.730		6.730	
6.770		6.770	
6.790		6.790	
6.820		6.820	
6.910		6.910	
6.930		6.930	
6.970		6.970	
6.990		6.990	
7.020		7.020	
7.060		7.060	
7.080		7.080	
7.100		7.100	
7.200		7.200	
7.290		7.290	
7.390		7.390	
7.490		7.490	
7.580		7.580	
7.670		7.670	
7.770		7.770	
7.870		7.870	
7.960		7.960	
7.990		7.990	

Field Survey Section No.	XS Letter - Draft FIS	Computer Stationing	XS Letter - Final FIS
8.000		8.000	
8.010		8.010	
8.030		8.030	
8.105		8.105	
8.198		8.198	
8.325		8.325	
8.433		8.433	
8.534		8.534	
8.646		8.646	
8.768		8.768	
8.875		8.875	
8.992		8.992	
9.098		9.098	
9.177		9.177	
9.191		9.191	
9.198		9.198	
9.266		9.266	
9.343		9.343	
9.435		9.435	
9.519		9.519	
9.605		9.605	
9.696		9.696	
9.790		9.790	
9.885		9.885	
9.981		9.981	
10.071		10.071	
10.167		10.167	
10.265		10.265	
10.343		10.343	
10.442		10.442	
10.538		10.538	
10.632		10.632	
10.752		10.752	
10.846		10.846	
10.942		10.942	
11.029		11.029	

Field Survey Section No.	XS Letter - Draft FIS	Computer Stationing	XS Letter - Final FIS
11.128		11.128	
11.224		11.224	
11.325		11.325	
11.410		11.410	
11.428		11.428	
11.460		11.460	
11.557		11.557	
11.653		11.653	
11.750		11.750	
11.847		11.847	
11.900		11.900	
11.943		11.943	
12.042		12.042	
12.141		12.141	
12.247		12.247	
12.359		12.359	
12.420		12.420	
12.470		12.470	
12.529		12.529	
12.630		12.630	
12.725		12.725	
12.816		12.816	
12.913		12.913	
13.007		13.007	
13.103		13.103	
13.200		13.200	
13.296		13.296	
13.395		13.395	
13.450		13.450	
13.467		13.467	
13.518		13.518	
13.565		13.565	
13.663		13.663	
13.760		13.760	
13.856		13.856	
13.952		13.952	

Field Survey Section No.	XS Letter - Draft FIS	Computer Stationing	XS Letter - Final FIS
14.049		14.049	
14.145		14.145	
14.240		14.240	
14.335		14.335	
14.430		14.430	
14.525		14.525	
14.619		14.619	
14.700		14.700	
14.809		14.809	
14.905		14.905	
15.000		15.000	
15.094		15.094	
15.188		15.188	
15.281		15.281	
15.374		15.374	
15.469		15.469	
15.564		15.564	
15.658		15.658	
15.719		15.719	
15.814		15.814	
15.909		15.909	
16.004		16.004	
16.099		16.099	
16.195		16.195	
16.289		16.289	
16.385		16.385	
16.471		16.471	
16.482		16.482	
16.506		16.506	
16.514		16.514	
16.518		16.518	
16.612		16.612	
16.707		16.707	
16.801		16.801	
16.895		16.895	
16.990		16.990	

Field Survey Section No.	XS Letter - Draft FIS	Computer Stationing	XS Letter - Final FIS
17.085		17.085	
17.180		17.180	
17.277		17.277	
17.370		17.370	
17.458		17.458	
17.548		17.548	
17.638		17.638	
17.730		17.730	
17.821		17.821	
17.910		17.910	
18.000		18.000	
18.093		18.093	
18.182		18.182	
18.275		18.275	
18.369		18.369	
18.464		18.464	
18.558		18.558	
18.653		18.653	
18.748		18.748	
18.839		18.839	
18.937		18.937	
18.962		18.962	
18.978		18.978	
19.066		19.066	
19.162		19.162	
19.256		19.256	
19.352		19.352	
19.446		19.446	
19.542		19.542	
16.635		16.635	
19.732		19.732	
19.827		19.827	
19.920		19.920	
20.015		20.015	
20.111		20.111	
20.207		20.207	

Field Survey Section No.	XS Letter - Draft FIS	Computer Stationing	XS Letter - Final FIS
20.294		20.294	
20.343		20.343	
20.388		20.388	
20.435		20.435	
20.483		20.483	
20.579		20.579	
20.675		20.675	
20.769		20.769	
20.864		20.864	
20.958		20.958	
21.061		21.061	
21.157		21.157	
21.245		21.245	
21.337		21.337	
21.431		21.431	
21.524		21.524	
21.621		21.621	
21.716		21.716	
21.798		21.798	
21.893		21.893	
21.986		21.986	
22.082		22.082	
22.177		22.177	
22.273		22.273	
22.368		22.368	
22.462		22.462	
22.558		22.558	
22.651		22.651	
22.745		22.745	
22.839		22.839	
22.935		22.935	
23.029		23.029	
23.124		23.124	
23.219		23.219	
23.314		23.314	
23.409		23.409	

Field Survey Section No.	XS Letter - Draft FIS	Computer Stationing	XS Letter - Final FIS
23.504		23.504	
23.598		23.598	
23.692		23.692	
23.790		23.790	
23.881		23.881	
23.974		23.974	
24.067		24.067	
24.165		24.165	
24.212		24.212	
24.260		24.260	
24.353		24.353	
24.449		24.449	
24.543		24.543	
24.631		24.631	
24.721		24.721	
24.816		24.816	
24.910		24.910	
24.996		24.996	
25.098		25.098	
25.192		25.192	
25.288		25.288	
25.382		25.382	
25.478		25.478	
25.526		25.526	
25.572		25.572	
25.666		25.666	
25.691		25.691	
25.720		25.720	
25.790		25.790	
25.860		25.860	
25.940		25.940	
26.030		26.030	
26.120		26.120	
26.200		26.200	
26.290		26.290	
26.370		26.370	

Field Survey Section No.	XS Letter - Draft FIS	Computer Stationing	XS Letter - Final FIS
26.470		26.470	
26.550		26.550	
26.630		26.630	
26.730		26.730	
26.830		26.830	
26.940		26.940	
27.030		27.030	
27.110		27.110	
27.190		27.190	
27.300		27.300	
27.390		27.390	
27.480		27.480	
27.580		27.580	
27.680		27.680	
27.770		27.770	
27.860		27.860	
27.940		27.940	
28.040		28.040	
28.120		28.120	
28.210		28.210	
28.310		28.310	
28.390		28.390	
28.450		28.450	
28.520		28.520	
28.580		28.580	
28.670		28.670	
28.760		28.760	
28.860		28.860	
28.950		28.950	
29.040		29.040	
29.140		29.140	
29.230		29.230	
29.300		29.300	
29.390		29.390	
29.470		29.470	
29.540		29.540	

Field Survey Section No.	XS Letter - Draft FIS	Computer Stationing	XS Letter - Final FIS
29.611		29.611	
29.624		29.624	
29.720		29.720	
29.800		29.800	
29.890		29.890	
29.990		29.990	
30.070		30.070	
30.170		30.170	
30.260		30.260	
30.360		30.360	
30.460		30.460	
30.550		30.550	
30.650		30.650	
30.730		30.730	
30.820		30.820	
30.920		30.920	
31.010		31.010	
31.110		31.110	
31.200		31.200	
31.290		31.290	
31.390		31.390	
31.490		31.490	
31.590		31.590	
31.670		31.670	
31.770		31.770	
31.860		31.860	
31.960		31.960	
32.050		32.050	
32.150		32.150	
32.240		32.240	
32.340		32.340	
32.430		32.430	
32.520		32.520	
32.580		32.580	
32.640		32.640	
32.720		32.720	

FEMA Forms

FEDERAL EMERGENCY MANAGEMENT AGENCY
REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

O.M.B. Burden No. 3067-0148
Expires July 31, 1997

FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2.13 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

1. OVERVIEW

1. The basis for this revision request is (are): *(check all that apply)*

- [X] Physical change
  - [X] Existing
  - [ ] Proposed
- [ ] Improved methodology
- [X] Improved data
- [ ] Floodway revision
- [ ] Other _____

Explain Reduced peak discharges due to construction of a new larger dam. New topographic mapping

2. Flooding Source: Agua Fria River
3. Project Name/Identifier: Agua Fria River Floodplain Re-Study
4. FEMA zone designations affected: AE, AH, A, X

(example: A, AH, AO, A1-A30, A99, AE, V, V1-30, VE, B, C, D, X)

5. The NFIP map panel(s) affected for all impacted communities is (are): See Attached Sheet

	Community No.	Community Name	County	State	Map No.	Panel No.	Effective Date
EX:	480301	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90

6. The area of revision encompasses the following types of flooding, structures, and associated disciplines: *(check all that apply)*

Types of Flooding
- [X] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [ ] Shallow Flooding *(e.g. Zones AO and AH*
- [ ] Lakes

Affected by wind/wave action
- [ ] Yes
- [X] No

- [ ] Other *(describe)* _____

Structures
- [ ] Channelization
- [ ] Levee/Floodwall
- [X] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [ ] Fill
- [ ] Pump Station
- [ ] None
- [ ] Channel Relocation
- [ ] Excavation
- [ ] Other *(describe)*

Disciplines*
- [X] Water Resources
  - [X] Hydrology
  - [X] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [X] Land Surveying
- [ ] Other *(describe)*

* **Attach completed "Certification by Registered Professional Engineer and/or Land Surveyor" Form for each discipline checked. (Form 2)**

2. FLOODWAY INFORMATION

7. Does the affected flooding source have a floodway designated on the effective FIRM or FBFM? [X] Yes [ ] No

Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM? [X] Yes [ ] No

If yes, give reason: The floodway was revised due to decreased flows

Attach copy of either a public notice distributed by the community stating the community's intent to revise the floodway or a statement by the community that it has notified all affected property owners and affected adjacent jurisdictions.

9. Does the State have jurisdiction over the floodway or its adoption by communities participating in the NFIP? ☐ Yes ☒ No

If yes, attach a copy of a letter notifying the appropriate State agency of the floodway revision and documentation of the approval the revised floodway by the appropriate State agency.

3. PROPOSED ENCROACHMENTS

10. With floodways:

1A. Does the revision request involve fill, new construction, substantial improvement, or other development in the floodway? ☐ Yes ☒ No

1B. If yes, does the development cause the 100-year water surface elevation to increase at any location by more than 0.000 feet? ☐ Yes ☐ No

11. Without floodways:

2A. Does the revision request involve fill, new construction, substantial improvement, or other development in the 100-year floodplain? ☐ Yes ☒ No

2B. If yes, does the cumulative effect of all development that has occurred since the effective SFHA was originally identified cause the 100-year water surface elevation to increase at any location by more than one foot *(or other surcharge limit if community or state has adopted more stringent criteria)*? ☐ Yes ☐ No

If the answer to either Items 1B or 2B is yes, please provide documentation that all requirements of Section 65.12 of the NFIP regulations have been met, regarding evaluation of alternatives, notice to individual legal property owners, concurrence of CEO, and certification that no insurable structures are impacted.

4. REVISION REQUESTOR ACKNOWLEDGEMENT

12. Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, and 72, I believe that the proposed revision ☒ is ☐ is not in compliance with the requirements of the aforementioned NFIP Regulations.

5. COMMUNITY OFFICIAL ACKNOWLEDGEMENT

13. Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? ☒ Yes ☐ No

14. Does this revision request have the endorsement of the community? ☒ Yes ☐ No

If no to either of the above questions, please explain: _____

Please note that community acknowledgement and/or notification is required for all requests as outlined in Section 65.4 (b) of the NFIP Regulations.

6. OPERATION AND MAINTENANCE

15. Does the physical change involve a flood control structure (e.g. levees, floodwalls, channelization, basins, dams)? ☒ Yes ☐ No (New Waddell Dam, a Federal Dam constructed by the Bureau of Reclamation for the Central Arizona Project)

If yes, please provide the following information for each of the new flood control structures:

A. Inspection of the flood control project will be conducted periodically by Central Arizona Water Conservation Dist., 23636 N. 7th (entity)
Phoenix , AZ 85002, Attn. David Gunn Ph. (602) 870-2233 with a maximum interval of 12 months between inspections.

B. Based on the results of scheduled periodic inspections, appropriate maintenance of the flood control facilities will be conducted by Central Arizona Water Conservation District (entity)
to ensure the integrity and degree of flood protection of the structure.

C. A formal plan of operation, including documentation of the flood warning system, specific actions and assignments of responsibility by individual name or title, and provisions for testing the plan at intervals not less than one year, ☒ has ☐ has not been prepared for the flood control structure.(Interim plan in effect, excerpts attached)

D. The community is willing to assume responsibility for ☐ performing ☐ overseeing compliance with the maintenance and operation plans of the (Not Applicable in this situation of a U.S.Federal Government Dam Project)
(Name)
flood control structure. If not performed promptly by an owner other than the community, the community will provide the necessary services without cost to the Federal government.

Attach operation and maintenance plans

7. REQUESTED RESPONSE FROM FEMA

16. After examining the pertinent NFIP regulations and reviewing the document entitled "Appeals, Revisions, and Amendments to Flood Insurance Maps: A Guide for Community Officials," dated January 1990, this request is for a:

____a. CLOMR A letter from FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision *(LOMR or PMR)*, or proposed hydrology changes *(see 44 CFR Ch. I, Parts 60, 65, and 72)*.

X b. LOMR A letter from FEMA officially revising the current NFIP map to show changes to floodplains, floodways, or flood elevations. LOMRs typically depict decreased flood hazards. *(See 44 CFR Ch. 1, Parts 60 and 65.)*

____c. PMR A reprinted NFIP map incorporating changes to floodplains, floodways, or flood elevations. Because of the time and cost involved to change, reprint, and redistribute an NFIP map, a PMR is usually processed when a revision reflects increased flood hazards or large-scope changes. *(See 44 CFR Ch. 1, Parts 60 and 65.)*

____d. Other: Describe _____

8. FORMS INCLUDED

17. Form 2 entitled "Certification by Registered Professional Engineer And/Or Land Surveyor" must be submitted.

e following forms should be included with this request if (check the included forms):

• Hydrologic analysis for flooding source differs from that used to develop FIRM	☒ Hydrologic Analysis Form (Form 3)
• Hydraulic analysis for riverine flooding differs from that used to develop FIRM	☒ Riverine Hydraulic Analysis Form (Form 4)
• The request is based on updated topographic information or a revised floodplain or floodway delineation is requested	☒ Riverine/Coastal Mapping Form (Form 5)
• The request involves any type of channel modification	☐ Channelization Form (Form 6)
• The request involves new bridge or culvert or revised analysis of an existing bridge or culvert	☒ Bridge/Culvert Form (Form 7)
• The request involves a new revised levee/floodwall system	☐ Levee/Floodwall System Analysis Form (Form 8)
• The request involves analysis of coastal flooding	☐ Coastal Analysis Form (Form 9)
• The request involves coastal structures credited as providing protection from the 100-year flood	☐ Coastal Structures (Form 10)
• The request involves an existing, proposed, or modified dam	☒ Dam Form (Form 11)
• The request involves structures credited as providing protection from the 100-year flood on an alluvial fan	☐ Alluvial Fan Flooding Form (Form 12)

9. INITIAL REVIEW FEE

FEDERAL EMERGENCY MANAGEMENT AGENCY
REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM (Continuation of Item 5.0)

5. The NFIP map panels affected for all impacted communities are:

Community No.	Community Name	County	State	Map No.	Panel No.	Effective Date
040037	Maricopa Co. Unincorp. Areas	Maricopa	AZ	04013C0735F	735	Dec 3 1993
040050	Peoria, City of	Maricopa	AZ	04013C0735F	735	Dec 3 1993
040037	Maricopa Co. Unincorp. Areas	Maricopa	AZ	04013C0745F	745	Dec 3 1993
040050	Peoria, City of	Maricopa	AZ	04013C0735F	745	Dec 3 1993
040037	Maricopa Co. Unincorp. Areas	Maricopa	AZ	04013C1160F	1160	Dec 3 1993
040050	Peoria, City of	Maricopa	AZ	04013C1160F	1160	Dec 3 1993
040041	El Mirage, Town of	Maricopa	AZ	04013C1165G	1165	Sept 30 1995
040037	Maricopa Co. Unincorp. Areas	Maricopa	AZ	04013C1165G	1165	Sept 30 1995
040053	Surprise, Town of	Maricopa	AZ	04013C1165G	1165	Sept 30 1995
040041	El Mirage, Town of	Maricopa	AZ	04013C1170F	1170	Sept 4 1991
040037	Maricopa Co. Unincorp. Areas	Maricopa	AZ	04013C1170F	1170	Sept 4 1991
040050	Peoria, City of	Maricopa	AZ	04013C1170F	1170	Sept 4 1991
040053	Surprise, Town of	Maricopa	AZ	04013C1170F	1170	Sept 4 1991
040041	El Mirage, Town of	Maricopa	AZ	04013C1605G	1605	Sept 30 1995
040045	Glendale, City of	Maricopa	AZ	04013C1605G	1605	Sept 30 1995
040037	Maricopa Co. Unincorp. Areas	Maricopa	AZ	04013C1605G	1605	Sept 30 1995
040053	Surprise, Town of	Maricopa	AZ	04013C1605G	1605	Sept 30 1995
040041	El Mirage, Town of	Maricopa	AZ	04013C1610G	1610	Dec 3 1993
040037	Maricopa Co. Unincorp. Areas	Maricopa	AZ	04013C1610G	1610	Dec 3 1993
040050	Peoria, City of	Maricopa	AZ	04013C1610G	1610	Dec 3 1993
040057	Youngtown,Town of	Maricopa	AZ	04013C1610G	1610	Dec 3 1993
040038	Avondale, City of	Maricopa	AZ	04013C1615H	1615	Sept 30 1995
040041	El Mirage, Town of	Maricopa	AZ	04013C1615H	1615	Sept 30 1995
040045	Glendale, City of	Maricopa	AZ	04013C1615H	1615	Sept 30 1995
040046	Goodyear, Town of	Maricopa	AZ	04013C1615H	1615	Sept 30 1995
040037	Maricopa Co. Unincorp. Areas	Maricopa	AZ	04013C1615H	1615	Sept 30 1995
040051	Phoenix, City of	Maricopa	AZ	04013C1615H	1615	Sept 30 1995
040045	Glendale, City of	Maricopa	AZ	04013C1620F	1620	Sept 4 1991
040037	Maricopa Co. Unincorp. Areas	Maricopa	AZ	04013C1620F	1620	Sept 4 1991
040050	Peoria, City of	Maricopa	AZ	04013C1620F	1620	Sept 4 1991
040051	Phoenix, City of	Maricopa	AZ	04013C1620F	1620	Sept 4 1991

Community No.	Community Name	County	State	Map No.	Panel No.	Effective Date
040038	Avondale, City of	Maricopa	AZ	04013C2080G	2080	Sept 30 1995
040046	Goodyear, Town of	Maricopa	AZ	04013C2080G	2080	Sept 30 1995
040037	Maricopa Co. Unincorp. Areas	Maricopa	AZ	04013C2080G	2080	Sept 30 1995
040051	Phoenix, City of	Maricopa	AZ	04013C2080G	2080	Sept 30 1995
040038	Avondale, City of	Maricopa	AZ	04013C2085E	2085	Sept 4 1991
040037	Maricopa Co. Unincorp. Areas	Maricopa	AZ	04013C2085E	2085	Sept 4 1991
040051	Phoenix, City of	Maricopa	AZ	04013C2085E	2085	Sept 4 1991
040038	Avondale, City of	Maricopa	AZ	04013C2090F	2090	Sept 30 1995
040046	Goodyear, Town of	Maricopa	AZ	04013C2090F	2090	Sept 30 1995
040037	Maricopa Co. Unincorp. Areas	Maricopa	AZ	04013C2090F	2090	Sept 30 1995

9. INITIAL REVIEW FEE

18. The minimum initial review fee for the appropriate request category has been included. ☐ Yes ☐ No

Initial fee amount: $ _____

Check or money order only. Make check or money order payable to : **National Flood Insurance Program.** If paying by Visa or Mastercard please refer to the credit card information form which follows this form.

or

19. This request is for a project that is for public benefit and is primarily intended for flood loss reduction to insurable structures in identified flood hazard areas which were in existence prior to the commencement of construction of the flood control project. ☒ Yes ☐ No

or

20. This request is to correct map errors, to include the effects of natural changes within the areas of special flood hazard, or solely to provide more detailed data. ☐ Yes ☐ No

Note: I understand that my signature indicates that all information submitted in support of this request is correct.

Stanley L. Smith

Signature of Revision Requester

Stanley L. Smith, Jr., P.E.
Interim Chief Engineer and General Manager

Printed Name and Title of Revision Requester

Flood Control District of Maricopa County

Company Name

(602) 506-1501 — 11-20-96

Telephone No. — Date

Note: Signature indicates that the community understands, from the revision requester, the impacts of the revision on flooding conditions in the community.

Raymond U. Acuña

Signature of Community Official

Raymond U. Acuña, FloodplainMgr

Printed Name and Title of Community Official

City of Phoenix

Community Name

Oct. 14, 1996

Date

Does this request impact any other communities? ☒ Yes ☐ No

If yes, attach letters from all affected jurisdictions acknowledging revision request and approving changes to floodway, if applicable.

Note: Although a photograph of physical changes is not required, it may be helpful for FEMA's review.

FEDERAL EMERGENCY MANAGEMENT AGENCY

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM (MT-2 FORM 1)

Note: Signature indicates that the community understands, from the revision requester, the impacts of the revision on flooding conditions in the community.

Signature of Community Official

Dan Nissen, Acting City Engineer

Printed Name and Title of Community Official

City of Peoria

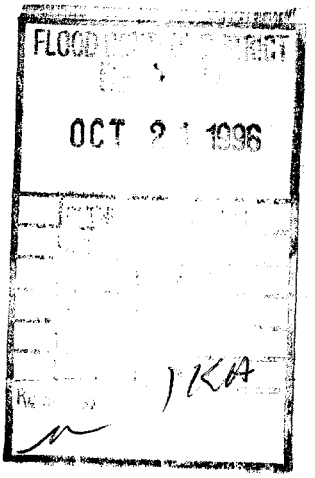
Community Name

11-20-96

Date

FEDERAL EMERGENCY MANAGEMENT AGENCY

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM
(MT-2 FORM 1)



Note: Signature indicates that the community understands, from the revision requester, the impacts of the revision on flooding conditions in the community.

Signature of Community Official

Jose G. Solarez, City Manager

Printed Name and Title of Community Official

City of El Mirage

Community Name

10/11/96

Date

FEDERAL EMERGENCY MANAGEMENT AGENCY

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM
(MT-2 FORM 1)

Note: Signature indicates that the community understands, from the revision requester, the impacts of the revision on flooding conditions in the community.

Signature of Community Official

Grant I. Anderson, P.E., City Engineer

Printed Name and Title of Community Official

City of Glendale

Community Name

October 16, 1996

Date

FEDERAL EMERGENCY MANAGEMENT AGENCY

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM (MT-2 FORM 1)

Note: Signature indicates that the community understands, from the revision requester, the impacts of the revision on flooding conditions in the community.

L Robinson

Signature of Community Official

LLoyce Robinson, Town Clerk

Printed Name and Title of Community Official

Town of Youngtown

Community Name

October 9, 1996

Date

FEDERAL EMERGENCY MANAGEMENT AGENCY

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM (MT-2 FORM 1)

Agua Fria Floodplain Re-Study

Note: Signature indicates that the community understands, from the revision requester, the impacts of the revision on flooding conditions in the community.

Signature of Community Official

Timothy A. Edwards
Public Works Director

Printed Name and Title of Community Official

City of Goodyear

Community Name

November 7, 1996

Date

FEDERAL EMERGENCY MANAGEMENT AGENCY

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM
(MT-2 FORM 1)

Note: Signature indicates that the community understands, from the revision requester, the impacts of the revision on flooding conditions in the community.

Signature of Community Official

Shirley Berg, Community Development Director

Printed Name and Title of Community Official

City of Surprise

Community Name

November 15, 1996

Date

FEDERAL EMERGENCY MANAGEMENT AGENCY

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM (MT-2 FORM 1)

AGUA FRIA RIVER FLOODPLAIN STUDY

Note: Signature indicates that the community understands, from the revision requester, the impacts of the revision on flooding conditions in the community.

Signature of Community Official

FLOOD PLAIN ADMINISTRATOR

Printed Name and Title of Community Official

City of Avondale

Community Name

11/15/96

Date

FEDERAL EMERGENCY MANAGEMENT AGENCY **CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR FORM**	*O.M.B. Burden No. 3067-0148* *Expires July 31, 1997*	*FEMA USE ONLY*

PUBLIC BURDEN DISCLOSURE NOTICE

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1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.
2. I am licensed with an expertise in Hydrology, hydraulics, interior drainage
   [example: water resources *(hydrology, hydraulics, sediment transport, interior drainage)**, structural, geotechnical, land surveying.]
3. I have 12 years experience in the expertise listed above.
4. I have ☒ prepared ☐ reviewed the attached supporting data and analyses related to my expertise.
5. I ☒ have ☐ have not visited and physically viewed the project.
6. In my opinion, the following analyses and/or designs, is/are being certified:
   Agua Fria River Floodplain Delineation Re-Study
7. Based upon the following review, the modifications in place have been constructed in general accordance with plans and specifications.

   Basis for above statement: (check all that apply)

   a. ☒ Viewed all phases of actual construction.
   b. ☐ Compared plans and specifications with as-built survey information.
   c. ☐ Examined plans and specifications and compared with completed projects.
   d. ☐ Other _____
8. All information submitted in support of this request is correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Jack K. Moody, P.E.
(please print or type)

Title: Project Manager
(please print or type)

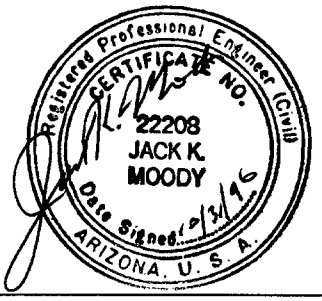
Registration No. 22208 Expiration Date: 9-30-97

State Arizona

Type of License Engineer/Civil

Jack K. Moody
Signature

10/31/96
Date



Seal
(Optional)

*Specify Subdiscipline

Note: Insert not applicable (N/A) when statement does not apply.

FEDERAL EMERGENCY MANAGEMENT AGENCY **CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR FORM**	*O.M.B. Burden No. 3067-0148* *Expires July 31, 1997*	***FEMA USE ONLY***

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1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.
2. I am licensed with an expertise in Land Surveying & Photogrammetry
   [example: water resources *(hydrology, hydraulics, sediment transport, interior drainage)**, structural, geotechnical, land surveying.]
3. I have 28 years experience in the expertise listed above.
4. I have ☐ prepared ☒ reviewed the attached supporting data and analyses related to my expertise.
5. I ☒ have ☐ have not visited and physically viewed the project.
6. In my opinion, the following analyses and/or designs, is/are being certified:
   Topographic Mapping and Survey Control Indian School Road to Jomax
7. Based upon the following review, the modifications in place have been constructed in general accordance with plans and specifications.

   Basis for above statement: (check all that apply)

   a. ☐ Viewed all phases of actual construction.
   b. ☐ Compared plans and specifications with as-built survey information.
   c. ☐ Examined plans and specifications and compared with completed projects.
   d. ☒ Other Prepard Survey & Mapping Data for Agua Fria River Reach 2
8. All information submitted in support of this request is correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

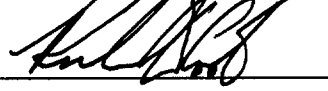
Name: Richard D. Cook
(please print or type)

Title: President Aerial Mapping Company, Inc.
(please print or type)

Registration No. 11890 Expiration Date: 6-30-99

State Arizona

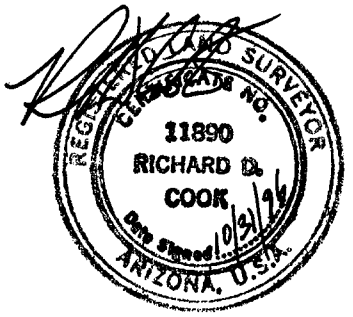
Type of License Land Surveyor



Signature

10/31/96

Date



Seal
(Optional)

Specify Subdiscipline

Note: Insert not applicable (N/A) when statement does not apply.

FEDERAL EMERGENCY MANAGEMENT AGENCY **HYDROLOGIC ANALYSIS FORM**	*O.M.B. Burden No. 3067-0148* *Expires July 31, 1997*	***FEMA USE ONLY***

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 3.67 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

Community Name: Maricopa County, Cities of Phoenix, Glendale, Avondale, El Mirage, Goodyear, Peoria, Surprise and Town of Youngtown

Flooding Source: Agua Fria River
(One form for each flooding source)

Project Name/Identifier: Agua Fria River Floodplain Re-Study

1. HYDROLOGIC ANALYSIS IN FIS

☒ Approximate study stream (Zone A)

☒ Detailed study stream (briefly explain methodology) Hydraulic Analysis using HEC-2 Water Surface Profile Analysis computer modeling and floodway delineation by the recommended equal conveyance encroachment method.

2. REASON FOR NEW HYDROLOGIC ANALYSIS

☐ No existing analysis

☐ Improved data *(see data revision on page 3)*

☒ Changed physical conditions of watershed *(explain)* A new dam (New Waddell Dam) constructed at the upper reaches of the river. This new dam has a larger storage volume that has resulted in reduced peak discharges downstream and therefore significantly changed the floodplain

☐ Alternative methodology *(justify why the revised model is better than model used in the effective FIS)*

☐ Evaluation of proposed conditions (CLOMRs only) (explain)

☐ Other

If a computer program/model was used in revising the hydrologic analysis, please provide a diskette with the input files for the 10-, 50-, 100- and 500-year recurrence intervals.

Only the 100-year recurrence interval need be included for SFHAs designated as Zone A.

3. APPROVAL OF ANALYSIS

☐ Approval of the hydrologic analysis, including the resulting peak discharge value(s) has been provided by the appropriate local, state, or Federal Agency. (i.e.,_____)

Attach evidence of approval.

☒ Approval of the hydrologic analysis is not required by any local, State or Federal Agency.

4. REVIEW OF RESULTS

Stream: Agua Fria River

Comparison of 100-year Discharges

Location:	Drainage area (Sq. mi.)	FIS (cfs):	Revised (cfs):
Upstrem of New Waddell Dam	1459	135,000	135,000
Downstream of New Waddell Dam	0	135,000	9000
At Bell Road (CP 1037)	171	115,000	37,500
At Grand Avenue (CP 1038)	183	109,000	34,500
Upstream of New River (CP 1039D)	231	90,000	30,000

* Continued on attached Sheet. Also see Table 1 on page 27 of the hydrology report, Ref. #1 on attached sheet

Note: When revised discharges are not significantly different than FIS discharges, FEMA may require a confidence limits analysis on attachment D at a later date to complete the review.

As is often the case with revision requests, only a portion of a stream may actually be revised or be affected by a revision. Therefore, transition to the unrevised portion is important to maintain the continuity of the study. NFIP regulations stipulate that such a transition must be assured. What is the transition from the proposed discharges to the effective discharges? Please explain how the transition was made *(attach separate sheet if necessary).*

Transistion between the revised and the unrevised floodplain not applicable in this case. This request is for the river downstream of the dam..

ATTACH A COMPLETED REVIEW OF RESULTS PAGE FOR EACH FLOODING SOURCE.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS *(i.e. no changed hydraulic conditions)?*

☒ Yes ☐ No

If yes, does the 100-year water surface elevation change by 1.0 foot or more? ☒ Yes ☐ No

FEMA does not normally revise NFIP maps solely due to insignificant flow changes where changes in 100-year water surface elevation are less than 1.0 foot.

5. HISTORICAL FLOODING INFORMATION

Is historical data available for the flooding source? ☒ Yes ☐ No

If yes, provide the following:

Location along flooding source: At New Waddell

Maximum peak discharge: (See Fig 3. of Ref. # 1) 105,000 cfs

Second highest peak discharge: (See Fig 3. of Ref. # 1) 105,000 cfs

Source of information: U.S. Army Corps of Engineers (Ref. # 1)

6. GAGE RECORD INFORMATION

Location of nearest gage to project site *(along flooding source or similar watershed; specify)*

Gaging Station: Various, See Table 6 (Ref. #2)

Drainage area at gage: 1459 mi^2

Number of years of data: 103 Years See Figure 3(Ref. #1)

7. DATA REVISION

Please use the following table to list all the data and/or parameters affected by this request and identify them as new data *(New)* or as revising existing data *(Revised). (If necessary, attach a separate sheet.)*

Data Parameter	New	Revised	Data Source
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	

- Data source can be from a Federal, State, or local government agency, or from a private source. Some State and local governments may have less strict data requirements than Federal agencies, in which case the hydrologic data may not be accepted by FEMA unless it is demonstrated that the data give a better estimate of the flood discharge.
- Attach documentation corroborating each data source *(i.e., certified statement, report, bibliographical reference to a published document)*. In the case of a published document or a government report, providing copies of the cover and pertinent pages may be helpful.

8. METHODOLOGY FOR NEW ANALYSIS

☒ Statistical Analysis of Gage Records *(use Attachment A)*

☐ Regional Regression Equations *(use Attachment B)*

☒ Precipitation/Runoff Model *(use Attachment C)*

☐ Other *(specify; attach backup computations and supporting data)* _____

ATTACHMENT A: STATISTICAL ANALYSIS OF GAGE RECORDS

Gaging Station: 09313500

Gage Location (latitude and longitude): Agua Fria at Waddell Dam (Lat:33 deg. 51 min. Long: 112 deg. 16 min) See Table 5 Ref # 2

		FIS:	Revised:
1.	Number of years of data	See Table 6 Ref. #2	See Ref. # 1 and 2
	Systematic		
	Historical		
2.	Homogeneous data	☐ Yes ☐ No	☐ Yes ☐ No
3.	Data adjustments	☐ Yes ☐ No	☐ Yes ☐ No
4.	Number of high outliers		
	Low outliers		
	Zero events		
5.	Generalized skew		
6.	Station skew		
7.	Adopted skew		
8.	Probability distribution used (justify if log-Pearson III was not used)		
9.	Transfer equations to ungaged sites.		☐ Yes ☐ No
	If yes, specify method		
10.	Expected probability*		☐ Yes ☐ No
11.	Comparison of results with other analyses.		☐ Yes ☐ No
	If yes, describe comparison		

* **FEMA** does not accept expected probability analyses for the purpose of reflecting flood hazard information in a FIS.

If any data is not available, indicate by N/A.

Attach analysis including plot of flood frequency curve.

ATTACHMENT B: REGIONAL REGRESSION EQUATIONS

1. Bibliographical Reference: NOT APPLICABLE

_____

_____

_____

(Attach a copy of title page, table of contents, and pertinent pages including equations.)

2. Gaged or ungaged stream: _____

3. Hydrologic region(s): _____
Attach backup map.

4. Provide parameters, values, and source of data used to define parameters.

_____

_____

_____

		FIS:	Revised:
5.	Urbanized conditions calculations	☐ Yes ☐ No	☐ Yes ☐ No
6.	Percent of watershed urbanization	_____	_____
7.	Is the watershed controlled?	☐ Yes ☐ No	☐ Yes ☐ No
	Comparison with other analyses	☐ Yes ☐ No	☐ Yes ☐ No

If the answer to 5, 7, or 8 is yes, explain methodology in Comments.

If data is not available, indicate by N/A.

Comments

_____

_____

_____

_____

Attach computation and supporting maps, delineating the watershed boundary and drainage area divides.

ATTACHMENT C: PRECIPITATION/RUNOFF MODEL

		FIS:	Revised:
1.	Method or model used:	See Ref. # 2	See Ref # 1
	Version:		
	Date:		
2.	Source of rainfall depth:		
3.	Source of rainfall distribution:		
4.	Rainfall duration:		
5.	Areal adjustment to precipitation (%):		
6.	Hydrograph development method:		
7.	Loss rate method:		
	Source of soils information:		
	Source of land use information:		
8.	Channel routing method:		
9.	Reservoir routing:	☐ Yes ☐ No	☐ Yes ☐ No
10.	Baseflow considerations:	☐ Yes ☐ No	☐ Yes ☐ No
	If yes, explain how baseflow was determined:		
11.	Snowmelt considerations:	☐ Yes ☐ No	☐ Yes ☐ No
12.	Model calibration:	☐ Yes ☐ No	☐ Yes ☐ No
	If yes, explain how calibration was performed		
13.	Future land use condition:		☐ Yes ☒ No
	If yes, explain why:		

Note: FEMA policy is to base flooding on existing conditions.

If data is not available, indicate by N/A.

Attach precipitation/runoff model, hydrologic model schematic, curve number calculations, time of concentration calculations, and supporting maps, delineating the watershed boundary and drainage area divides.

ATTACHMENT D: CONFIDENCE LIMITS EVALUATION

Stream: NOT APPLICABLE

Select one location for Confidence Limits Evaluation *(describe location):* _____

_____

Discharges for selected location:

Exceedance Probability		FIS		Revised	
10%	(10-year)	_____	cfs	_____	cfs
2%	(50-year)	_____	cfs	_____	cfs
1%	(100-year)	_____	cfs	_____	cfs
0.2%	(500-year)	_____	cfs	_____	cfs

1% (100-year) Flood Confidence Intervals

90% Confidence Interval:
5% limit _____ cfs
95% limit _____ cfs

50% Confidence Interval:
25% limit _____ cfs
75% limit _____ cfs

If the value of the 100-year frequency flood in the FIS is beyond the 50% confidence interval but within the 90% confidence interval, does the 100-year water surface elevation change by 1.0 foot or more?
☐ Yes ☐ No

An example of confidence limits analysis can be found in Appendix 9 of Bulletin 17B.

Attach Confidence Limits Analysis.

FEDERAL EMERGENCY MANAGEMENT AGENCY
HYDROLOGIC ANALYSIS FORM MT-2 FORM 3

Additional Information Sheet

4. REVIEW OF RESULTS (Continued)

Comparison of 100-year Discharges

Location:	Drainage area (Sq. mi.)	FIS (cfs):	Revised (cfs):
Downstream of New River (CP 1039U)	392	90,000	54,400
At I-10 Fwy (CP 1040)	474	91,000	52,000
At Avondale (CP 1042)	485	90,000	50,900
Above Gila River (CP 1043)	485	89,000	48,200

List of References Attached.

Reference # 1

Agua Fria River Study. New Waddell Dam to Gila River Confluence, Arizona
Hydrologic Evaluation of Impacts of New Waddell Dam on Peak Discharges in the Agua Fria River
U.S. Army Corps of Engineers, Los Angeles District. July 1995.

Reference # 2

Gila River Basin. Phoenix, Arizona & Vicinity (including New River)
Hydrology Part 2. Design Memorandum Part No. 2
U.S. Army Corps of Engineers, Los Angeles District. 1982

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE HYDRAULIC ANALYSIS FORM**	*O.M.B. Burden No. 3067-0148* *Expires July 31, 1997*	***FEMA USE ONLY***

PUBLIC BURDEN DISCLOSURE NOTICE

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Community Name: Maricopa County, Arizona and Incorporated Areas

Flooding Source: Agua Fria River
(One form for each flooding source)

Project Name/Identifier: Agua Fria Floodplain Delineation Re-Study

1. REACH TO BE REVISED

Downstream limit: Gila River

Upstream limit: New Waddell Dam

2. EFFECTIVE FIS

☐ Not studied

☐ Studied by approximate methods

Downstream limit of study _____

Upstream limit of study _____

☒ Studied by detailed methods

Downstream limit of study Gila River

Upstream limit of study New Waddell Dam

☒ Floodway delineated

Downstream limit of Floodway Gila River

Upstream limit of Floodway New Waddell Dam

3. HYDRAULIC ANALYSIS

Why is the hydraulic analysis different from that used to develop the FIRM? *(Check all that apply)*

☐ Not studied in FIS

☒ Improved hydrologic data/analysis. Explain: Reduced flows due to increased reservoir capacity behind New Waddell Dam.

☒ Improved hydraulic analysis. Explain: More detailed topography for reach between Indian School Road and Jomax Road.

☐ Flood control structure. Explain: _____

☐ Other. Explain: _____

3. RIVERINE HYDRAULIC ANALYSIS FORM
Models Submitted

For areas which have detailed flooding:

All input and output listings along with files on diskette *(if available)* for each of the models listed below (items 1, 2, 3, 4, and 5) and summary of the source of input parameters used in the models must be provided. The summary must include a complete description of any changes made from model to model (e.g. duplicate effective model to corrected effective model). At a minimum, the Duplicate Effective (item 1) and the Revised or Post-Project Conditions (item 4) models must be submitted. See instructions for directions on when other models may be required.

For areas which do not have detailed flooding:

Only the 100-year flood profile is required. A hydraulic model is not required for areas which do not have detailed flooding; however, BFEs may not be added to the revised FIRM. If a hydraulic model is developed for the area, items 3 and 4 described below must be submitted.

If hydraulic models are not developed, hydraulic analyses for existing or pre-project conditions and revised or post-project conditions must be submitted. All calculations must be submitted for these analyses. (See item 6 below)

1. Duplicate Effective Model — Natural ☐ Floodway ☐

Copies of the hydraulic analysis used in the effective FIS, referred to as the effective models *(10-, 50-, 100-, and 500-year multi-profile runs and the floodway run)* must be obtained and then reproduced on the requestor's equipment to produce the duplicate effective model. This is required to assure that the effective model input data has been transferred correctly to the requestor's equipment and to assure that the revised data will be integrated into the effective data to provide a continuous FIS model upstream and downstream of the revised reach.

2. Corrected Effective Model — Natural ☐ Floodway ☐

The corrected effective model is the model that corrects any errors that occur in the duplicate effective model, adds any additional cross sections to the duplicate effective model, or incorporates more detailed topographic information than that used in the currently effective model. The corrected effective model must not reflect any man-made physical changes since the date of the effective model. An error could be a technical error in the modeling procedures, or any construction in the floodplain that occurred prior to the date of the effective model but was not incorporated into the effective model.

3. Existing or Pre-Project Conditions Model — Natural ☐ Floodway ☐

The duplicate effective or corrected model is modified to produce the existing or pre-project conditions model to reflect any modifications that have occurred within the floodplain since the date of the effective model but prior to the construction of the project for which the revision is being requested. If no modification has occurred since the date of the effective model, then this model would be identical to the corrected effective or duplicate effective model.

4. Revised or Post-Project Conditions Model — Natural ☐ Floodway ☐

The existing or pre-project conditions model *(or duplicate effective or corrected effective model, as appropriate)* is revised to reflect revised or post-project conditions. This model must incorporate any physical changes to the floodplain since the effective model was produced as well as the effects of the project. When the request is for proposed project this model should reflect proposed conditions.

5. Other: Please attach a sheet describing all other models or calculations submitted. — Natural ☐ Floodway ☐

6. Hydraulic Analyses (Only if Hydraulic Models are not developed) — Natural ☐ Floodway ☐

Please attach all calculations for the existing or pre-project conditions and the revised or post-project conditions. Proceed to Form 5, "Riverine/Coastal Mapping Form".

4. MODEL PARAMETERS (from model used to revise 100-year water surface elevation)

1. Discharges:	Upstream Limit	Downstream Limit
10-year		
50-year		
100-year	9000 cfs	50,400 cfs
500-year		

Attach diagram showing changes in 100-year discharge See Table 1 in TDN

2. Explain how the starting water surface elevations were determined Slope Area Method - due to differences in timing with peak of Gila River.

3. Give range of friction loss coefficients *(Manning's "N")* Channel . . . . 0.030 to 0.050

Overbanks . . . 0.035 to 0.150

If friction loss coefficients are different anywhere along the revised reach from those used to develop the FIRM, give location, value used in the effective FIS, and revised values and an explanation as to how the revised values were determined.

Location	FIS	Revised

Explain: Mannings n values were determined in the field with the FCDMC. See Technical Data Notebook Section 4.

4. Describe how the cross section geometry data were determined *(e.g., field survey, topographic map, taken from previous study)* and list cross sections that were added.

Reach 1 (Gila River to Indian School Road) - taken from previous study.

Reach 2 (Indian School Road to Jomax Road) - Aerial topography, Digital Terrain Model.

Reach 3 (Jomax Road to New Waddell Dam) - taken from previous study.

5. Were natural channel banks selected as the location of the left and right channel banks in the model?

[X] Yes [ ] No If no, explain why not:

4. MODEL PARAMETERS (Cont'd)

6. Explain how reach lengths for channel and overbanks were determined:

Reach 1 and Reach 3 - reach length and channel banks were from the previous FIS.

Reach 2 - reach length were electronically measured from the topography. Channel banks were selected based on topographic mapping and aerial photographs.

5. RESULTS (from model used to revise 100-year water surface elevations)

1. Do the results indicate:

a. Water surface elevations higher than end points of cross sections? ☐ Yes ☒ No

b. Supercritical depth? ☐ Yes ☒ No

c. Critical depth? ☐ Yes ☒ No

d. Other unique situations? ☐ Yes ☒ No

If yes to any of the above, attach an explanation that discusses the situation and how it is presented on the profiles, tables, and maps.

2. What is the maximum change in energy gradient between cross-sections? 3.56'

Specify location Sec. 17.730

What is the distance between the cross-sections in 2 above? 486.34'

4. What is the maximum distance between cross-sections? 668.82'

Specify location 8.325

5. Floodway determination

a. What is the maximum surcharge allowed by the community or State? 1.0 foot

b. What is the maximum surcharge for the revised conditions? 1.0 foot

Specify location 23.881

c. What is the maximum velocity? 14.4 fps

Specify location 16.385

d. Are there any negative surcharge values at any cross-section? ☒ Yes ☐ No
If yes, the floodway may need to be widened. If it is not widened, please explain and indicate the maximum negative surcharge.

Explain: At some locations where the floodplain and floodway coincide the floodway WSEL is lower slightly.

6. Is the discharge value used to determine the floodway anywhere different from that used to determine the natural 100-year flood elevations? . . . . . ☐ Yes ☒ No

If Yes, explain:

_____

_____

_____

7. Do 100-year water surface elevations increase at any location? . . . . . ☒ Yes ☐ No

If yes, please attach a list of the locations where the increases occur, state whether or not the increases are located on the requestor's property, and provide an explanation of the reason for the increases. (For example: State if the increase is due to fill placed within the floodway fringe or placed within the currently adopted floodway limits)

Section 11.653 to 12.630 - Changes in the topography due to gravel mining operations.

_____

_____

Please attach a completed comparison table entitled: Water Surface Elevation Check (See page 6)

6. REVISED FIRM/FBFM AND FLOOD PROFILES

A. The revised water surface elevations tie into those computed by the effective FIS Model *(10-, 50-, 100-, and 500-year),* downstream of the project at cross-section N/A within _____ feet (vertical) and upstream of the project at cross section _____ within _____ feet (vertical).

B. The revised floodway elevations tie into those computed by the effective FIS model, downstream of the project at cross section N/A within _____ feet (vertical) and upstream of the project at cross section _____ within _____ feet (vertical).

C. Attach profiles, at the same vertical and horizontal scale as the profiles in the effective FIS report, showing stream bed and profiles of all floods studied (without encroachment). Also, label all cross sections, road crossings (including low chord and top-of-road data), culverts, tributaries, corporate limits, and study limits. If channel distance has changed, the stationing should be revised for all profile sheets.

D. Attach a Floodway Data Table showing data for each cross section listed in the published Floodway Data Table in the FIS report.

Proceed to Riverine/Coastal Mapping Form.

FEDERAL EMERGENCY MANAGEMENT AGENCY

WATER SURFACE ELEVATION CHECK

COMMUNITY NAME	FLOODING SOURCE	PROJECT NAME/IDENTIFIER

	EFFECTIVE			DUPLICATE EFFECTIVE			CORRECTED EFFECTIVE			EXISTING/PRE-PROJECT			REVISED/PROJECT		
SECNO	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]

COMMENTS:

1 - 100-year (natural) Water Surface Elevation 2 - Encroachment (floodway) Water Surface Elevation 3 - Surcharge Value

Include all cross sections in the models between tie-in points. Any interpolated values should be indicated in parentheses.

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE/COASTAL MAPPING FORM**	*O.M.B. Burden No. 3067-0148* *Expires July 31, 1997*	*FEMA USE ONLY*

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Community Name: Maricopa County, Arizona and Incorporated Areas

Flooding Source: Agua Fria River

Project Name/Identifier: Agua Fria Floodplain Delineation Re-Study

1. MAPPING CHANGES

1. A topographic work map of suitable scale, contour interval, and planimetric definition must be submitted showing *(indicate N/A when not applicable)*:

		Included		
A.	Revised approximate 100-year floodplain boundaries (Zone A)	☐ Yes	☐ No	☒ N/A
B.	Revised detailed 100- and 500-year floodplain boundaries	☒ Yes	☐ No	☐ N/A
C.	Revised 100-year floodway boundaries	☒ Yes	☐ No	☐ N/A
D.	Location and alignment of all cross sections used in the revised hydraulic model with stationing control indicated	☒ Yes	☐ No	☐ N/A
E.	Stream alignments, road and dam alignments	☒ Yes	☐ No	☐ N/A
F.	Current community boundaries	☒ Yes	☐ No	☐ N/A
G.	Effective 100- and 500-year floodplain and 100-year floodway boundaries from the FIRM/FBFM reduced or enlarged to the scale of the topographic work map	☐ Yes	☒ No	☐ N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	☒ Yes	☐ No	☐ N/A
I.	The requestor's property boundaries and community easements	☐ Yes	☒ No	☐ N/A
J.	The signed certification of a registered professional engineer	☒ Yes	☐ No	☐ N/A
K.	Location and description of reference marks	☒ Yes	☐ No	☐ N/A
L.	Vertical datum (example: NGVD, NAVD, etc.)	☒ Yes	☐ No	☐ N/A
M.	Coastal zone designations tie into adjacent areas not being revised	☐ Yes	☐ No	☒ N/A
N.	Location and alignment of all coastal transects used to revise the coastal analyses	☐ Yes	☐ No	☒ N/A

If any of the items above are marked no or N/A, please explain: G - New Floodplain and Floodway are shown on copies of FIRM. I - New FIS for Maricopa County Flood Control District.

2. What is the source and date of the updated topographic information *(example: orthophoto maps, July 1985; field survey, May 1979, beach profiles, June 1987, etc.)*? Reach 2 - Aerial Photogrammetry 2/26/95

3. What is the scale and contour interval of the following workmaps?

   a. Effective FIS 400 scale 4' Contour interval

   b. Revision Request Reach 1 & 3 400 scale 4' Contour interval

      Reach 2 200 scale 2' Contour interval

NOTE: Revised topographic information must be of equal or greater detail.

4. Attach an annotated FIRM and FBFM at the scale of the effective FIRM and FBFM showing the revised 100-year and 500-year floodplains and the 100-year floodway boundaries and how they tie into those shown on the effective FIRM and FBFM downstream and upstream of the revision or adjacent to the area of revision for coastal studies.

Attach additional pages if needed. See TDN Section 4

5. Flood Boundaries and 100-year water surface elevations:

Has the 100-year floodplain been shifted or increased or the 100-year water surface elevation increased at any location on property other than the requestor's or community's? ☐ Yes ☒ No

If yes, please give the location of shift or increase and an explanation for the increase.

a. Have the affected property owners been notified of this shift or increase and the effect it will have on their property? . . . . . ☐ Yes ☐ No

If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries if a LOMR is being requested.

b. What is the number of insurable structures that will be impacted by this shift or increase? _____

6. Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM? . . . . . ☒ Yes ☐ No

If yes, explain:

The floodway boundaries have decreased in width due to the decreased flow.

7. If a V-zone has been designated, has it been delineated to extend landward to the heel of the primary frontal dune? ☐ Yes ☐ No

If no, explain:

8. Manual or digital map submission:

☒ Manual
☐ Digital

Digital map submissions may be used to update digital FIRMs (DFIRMs). For updating DFIRMs, these submissions must be coordinated with FEMA Headquarters as far in advance of submission as possible.

2. EARTH FILL PLACEMENT

1. The fill is: ☐ Existing ☐ Proposed
N/A

Has fill been/will be placed in the regulatory floodway? . . . . . ☐ Yes ☐ No

If yes, please attach completed Riverine Hydraulic Analysis Form.

3. Has fill been/will be placed in floodway fringe *(area between the floodway and 100-year floodplain boundaries)*? . . . . . ☐ Yes ☐ No

If yes, then complete A, B, C, and D below.

A. Are fill slopes for granular materials steeper than one vertical on one-and-one-half horizontal? . . . . . ☐ Yes ☐ No

If yes, justify steeper slopes _____

_____

B. Is adequate erosion protection provided for fill slopes exposed to moving flood waters? *(Slopes exposed to flows with velocities of up to 5 feet per second (fps) during the 100-year flood must, at a minimum, be protected by a cover of grass, vines, weeds, or similar vegetation; slopes exposed to flows with velocities greater than 5 fps during the 100-year flood must, at a minimum, be protected by stone or rock riprap.)* . . . . . ☐ Yes ☐ No

If no, describe erosion protection provided _____

_____

C. Has all fill placed in revised 100-year floodplain been compacted to 95 percent of the maximum density obtainable with the Standard Proctor Test Method or acceptable equivalent method? . . . . . ☐ Yes ☐ No

D. Can structures conceivably be constructed on the fill at any time in the future? . . . . . ☐ Yes ☐ No

If yes, provide certification of fill compaction (item C. above) by the community's NFIP permit official, a registered professional engineer, or an accredited soils engineer.

4. Has fill been/will be placed in a V-zone? . . . . . ☐ Yes ☐ No

If yes, is the fill protected from erosion by a flood control structure such as a revetment or seawall? . . . . . ☐ Yes ☐ No

If yes, attach the coastal structures form.

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT FORM**	*O.M.B. Burden No. 3067-0148* *Expires July 31, 1997*	*FEMA USE ONLY*

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

Community Name: Maricopa County, Arizona and Incorporated Areas

Flooding Source: Agua Fria River

Project Name/Identifier: Agua Fria Floodplain Delineation Re-Study

1. IDENTIFIER

1. Name of roadway, railroad, etc.: Camelback Road

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):

   HEC-2 Cross Section 9.177

3. This revision reflects *(check one of the following)*:

   ☐ New bridge/culvert not modeled in the FIS

   ☐ Modified bridge/culvert previously modeled in the FIS

   ☒ New analysis of bridge/culvert previously modeled in the FIS

   (Explain why new analysis was performed) Revised Hydrology

2. BACKGROUND

Provide the following information about the structure:

1. Dimension, material, and shape (e.g. two 10 x 5 feet reinforced concrete box culvert; three 30-foot span bridge with 2 rows of two 3-foot diameter circular piers; 40-foot wide ogee shape spillway)

   Fifteen 115-foot span bridge with 3 rows of 4-foot diameter circular piers

2. Entrance geometry of culvert/type of bridge opening (e.g. 30°-75° wing walls with square top edge, sloping embankments and vertical abutments) Sloping embankments

3. Hydraulic model used to analyze the structure *(e.g., HEC-2 with special bridge routine, WSPRO, HY8)*

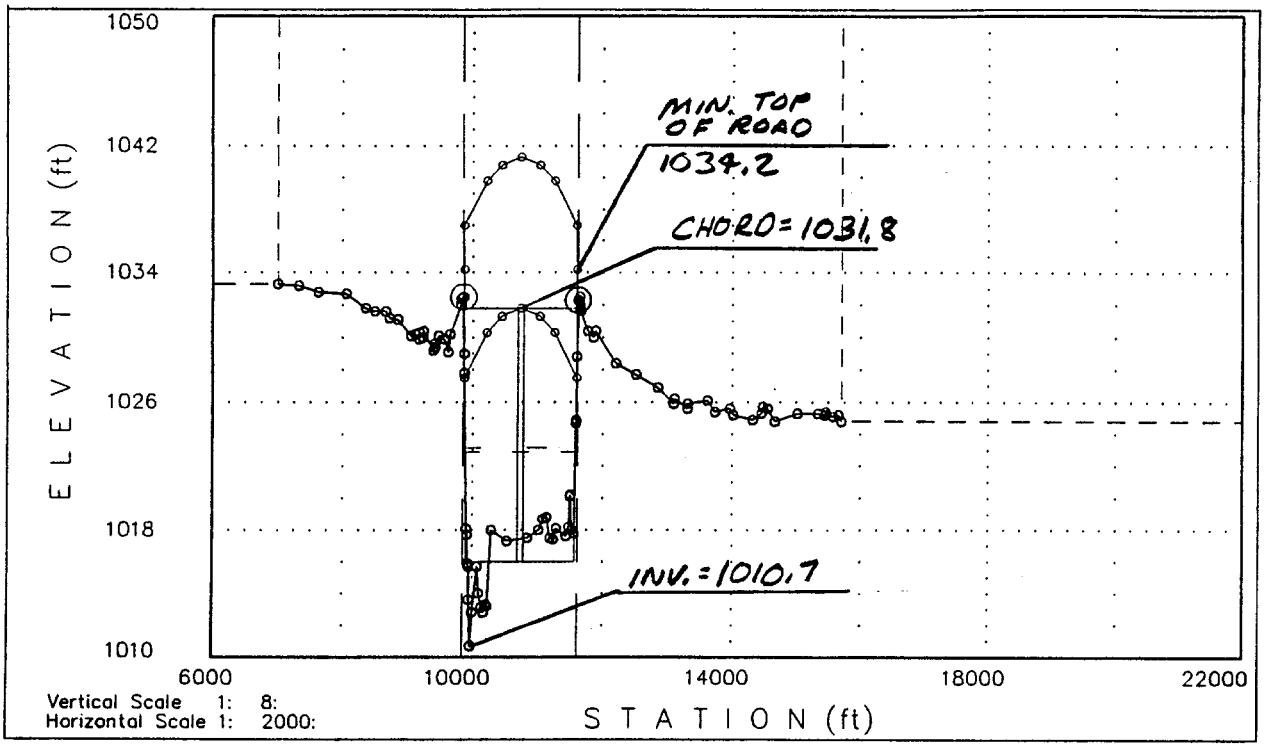
   HEC-2 with special bridge routine

   If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

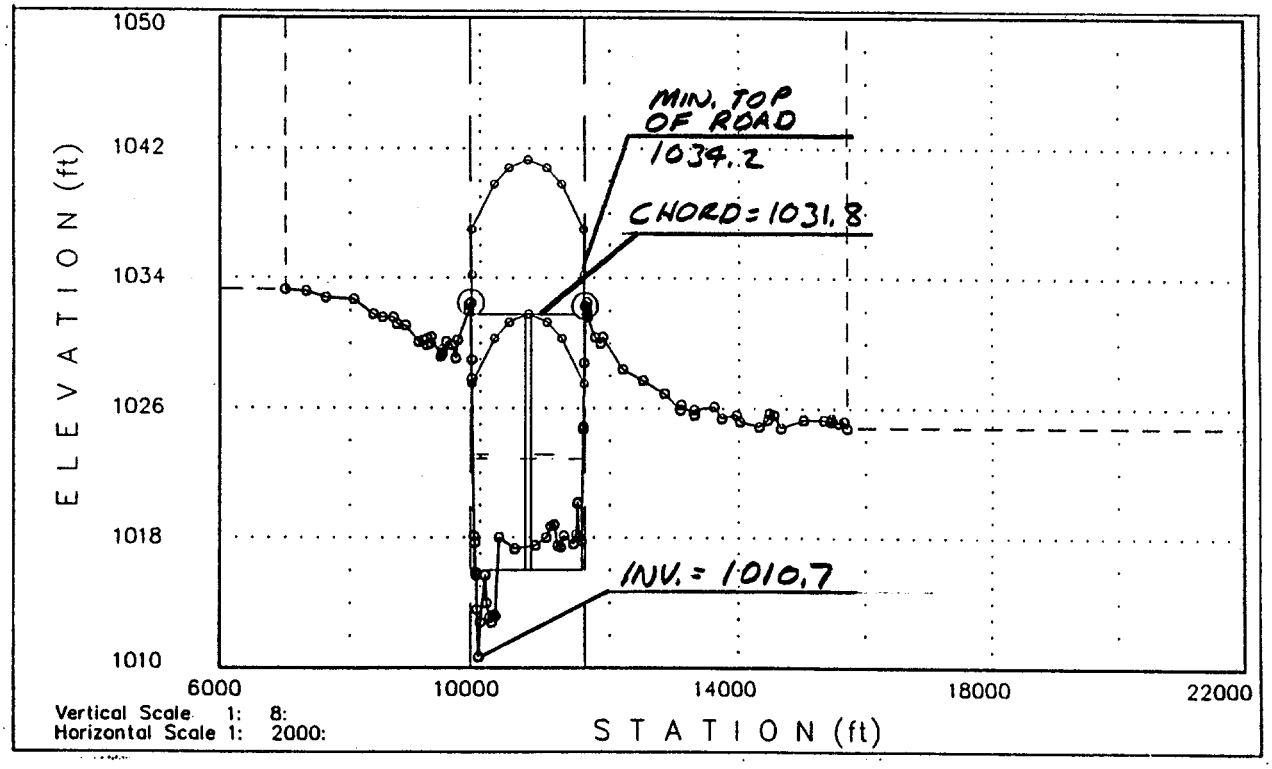
Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

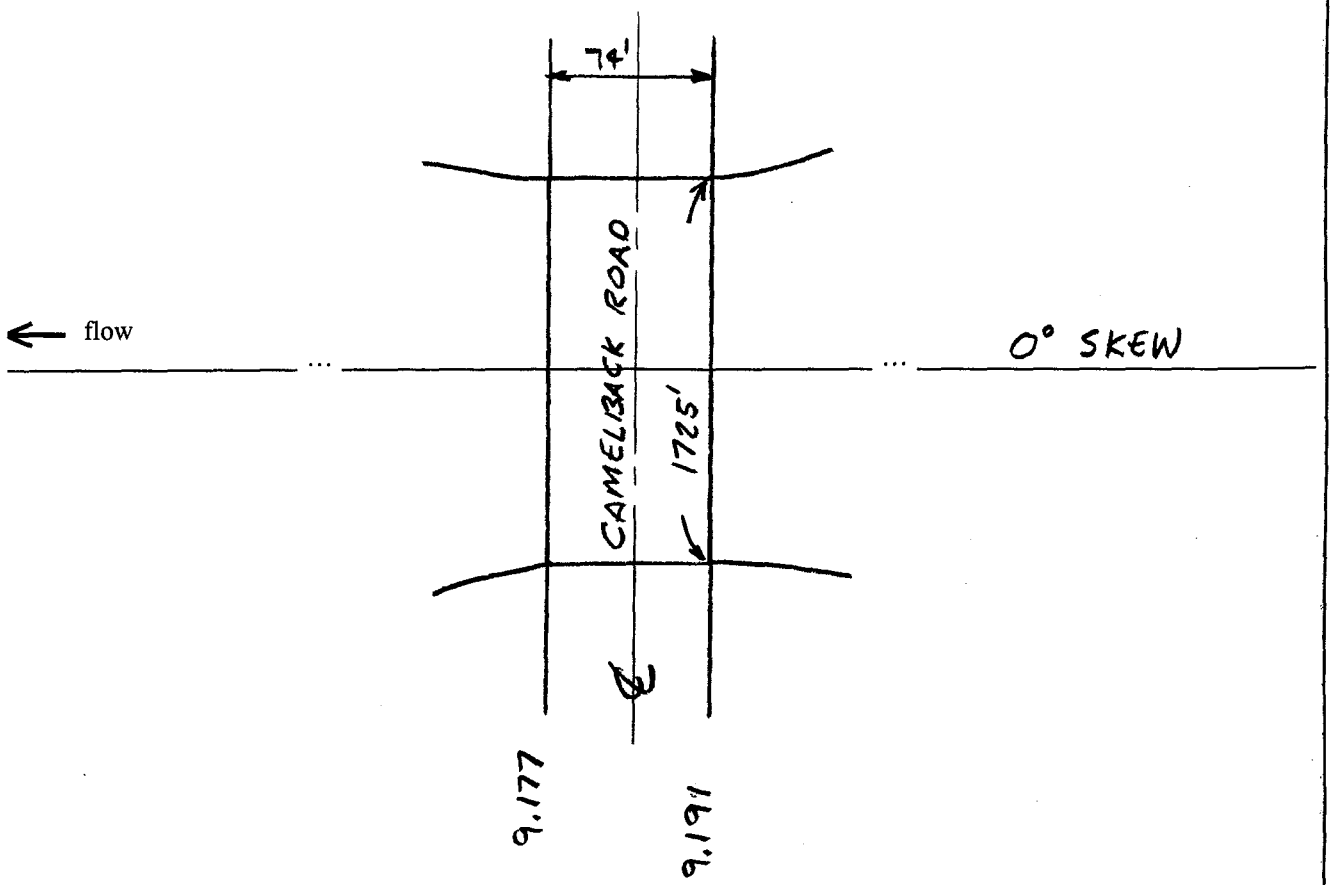
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, minimum top of road elevation, and ineffective flow widths.



Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



Sketch the plan view of the structure(s). Show, at a minimum, the skew angle, cross-section locations, distances between cross sections, and length of structure(s).



Attach plans of the structure(s) certified by a registered Professional Engineer.

Culvert length or bridge width (ft.)	74
Calculated culvert/bridge (ft^2) by the hydraulic model, if applicable	9687.1
Total culvert/bridge area (ft^2)	18351.5

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	1034.2	1034.2
Downstream face	1034.2	1034.2

100-Year Elevations

	Water-Surface Elevations	Energy Gradient Elevations
Upstream face	1022.88	1023.35
Downstream face	1022.82	1023.31

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	54,400	0	0	54,400
The maximum depth of flow over the roadway/railroad (ft.)			0	
Weir length (ft.)			0	

Top Widths

	Total Floodplain Width	Total Effective Flow Width	Floodway Width
Upstream face	1685.9	1685.9	1685.9
Downstream face	1692.8	1692.8	1692.8

3. ANALYSIS (Cont'd)

Loss Coefficients

Entrance loss coefficient	N/A
nning's "n" value assigned to the structure(s)	0.035
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	1.56
Weir coefficient	2.70
Pier coefficient	1.05
Contraction loss coefficient	0.3
Expansion loss coefficient	0.5

4. SEDIMENT TRANSPORT CONSIDERATIONS

1. A. Is there any indication from historical records that sediment transport *(including scour and deposition)* can affect the 100-year water surface elevations? . . . . . ☐ Yes ☒ No

   B. Based on the conditions *(such as geomorphology, vegetative cover and development of the watershed and stream bed, and bank conditions)*, is there a potential for debris and sediment transport *(including scour and deposition)* to affect the 100-year water surface elevations and/or conveyance capacity through the bridge/culvert? . ☐ Yes ☒ No

2. If the answer to either 1A or 1B is yes:

   A. What is the estimated sediment *(bed material)* load?

   _____ cfs *(attach gradation curve)*

   Explain method used to estimate the sediment transport and the depth of scour and/or deposition _____

   B. Will sediment accumulate anywhere through the bridge/culvert? ☐ Yes ☐ No

   If yes, explain the impact on the conveyance capacity through the bridge/culvert? _____

5. FLOODWAY ANALYSIS

Explain method of bridge encroachment

(floodway run) The river is encroached near the bridge, therefore, floodplain and floodway coincide under the bridge.

5. FLOODWAY ANALYSIS (Cont'd)

Comments *(explain any unusual situations)*:

Attach analysis.

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT FORM**	*O.M.B. Burden No. 3067-0148* *Expires July 31, 1997*	*FEMA USE ONLY*

PUBLIC BURDEN DISCLOSURE NOTICE

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Community Name: Maricopa County, Arizona and Incorporated Areas

Flooding Source: Agua Fria River

Project Name/Identifier: Agua Fria Floodplain Delineation Re-Study

1. IDENTIFIER

1. Name of roadway, railroad, etc.: Glendale Road

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):
HEC-2 Cross Section 11.410

3. This revision reflects *(check one of the following)*:

☐ New bridge/culvert not modeled in the FIS

☐ Modified bridge/culvert previously modeled in the FIS

☒ New analysis of bridge/culvert previously modeled in the FIS

(Explain why new analysis was performed) Revised Hydrology

2. BACKGROUND

Provide the following information about the structure:

1. Dimension, material, and shape (e.g. two 10 x 5 feet reinforced concrete box culvert; three 30-foot span bridge with 2 rows of two 3-foot diameter circular piers; 40-foot wide ogee shape spillway)
Six 100-foot span bridge with 20 inch wide continuous pier

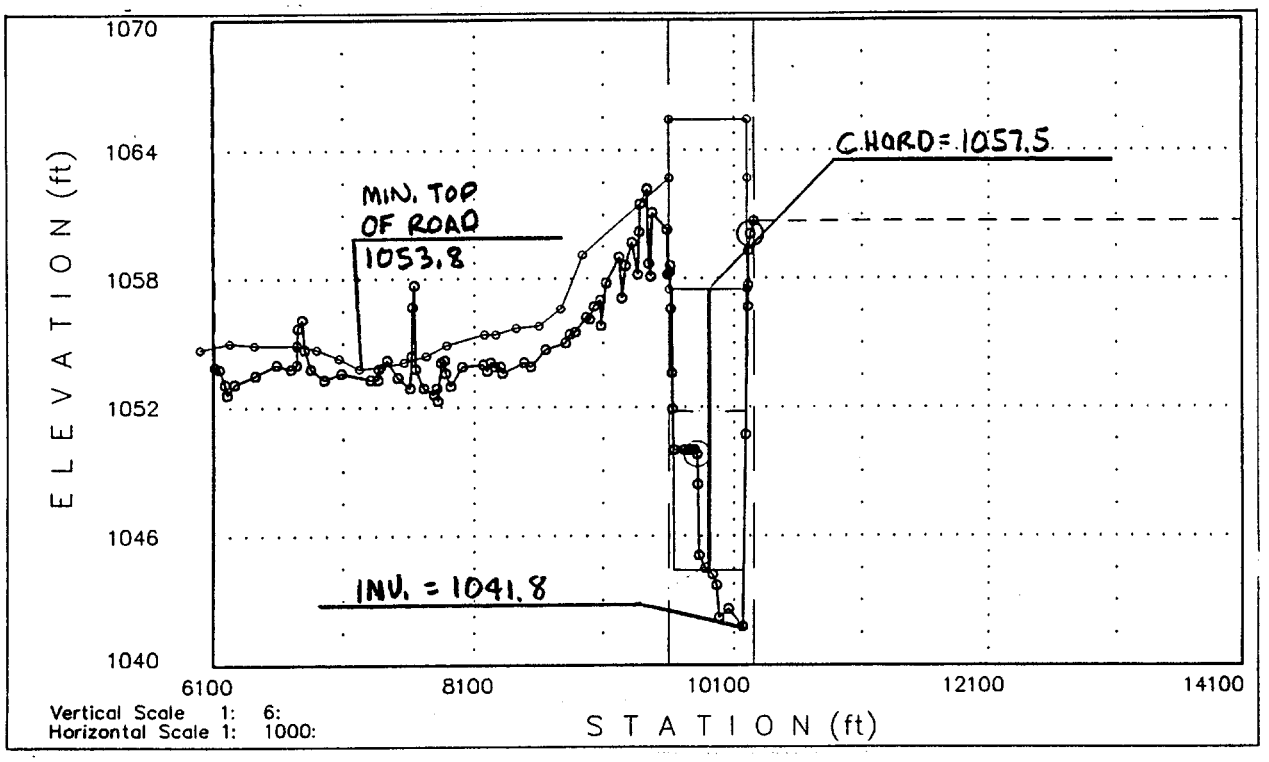
2. Entrance geometry of culvert/type of bridge opening (e.g. 30°-75° wing walls with square top edge, sloping embankments and vertical abutments) Sloping embankments

3. Hydraulic model used to analyze the structure *(e.g., HEC-2 with special bridge routine, WSPRO, HY8)*
HEC-2 with special bridge routine

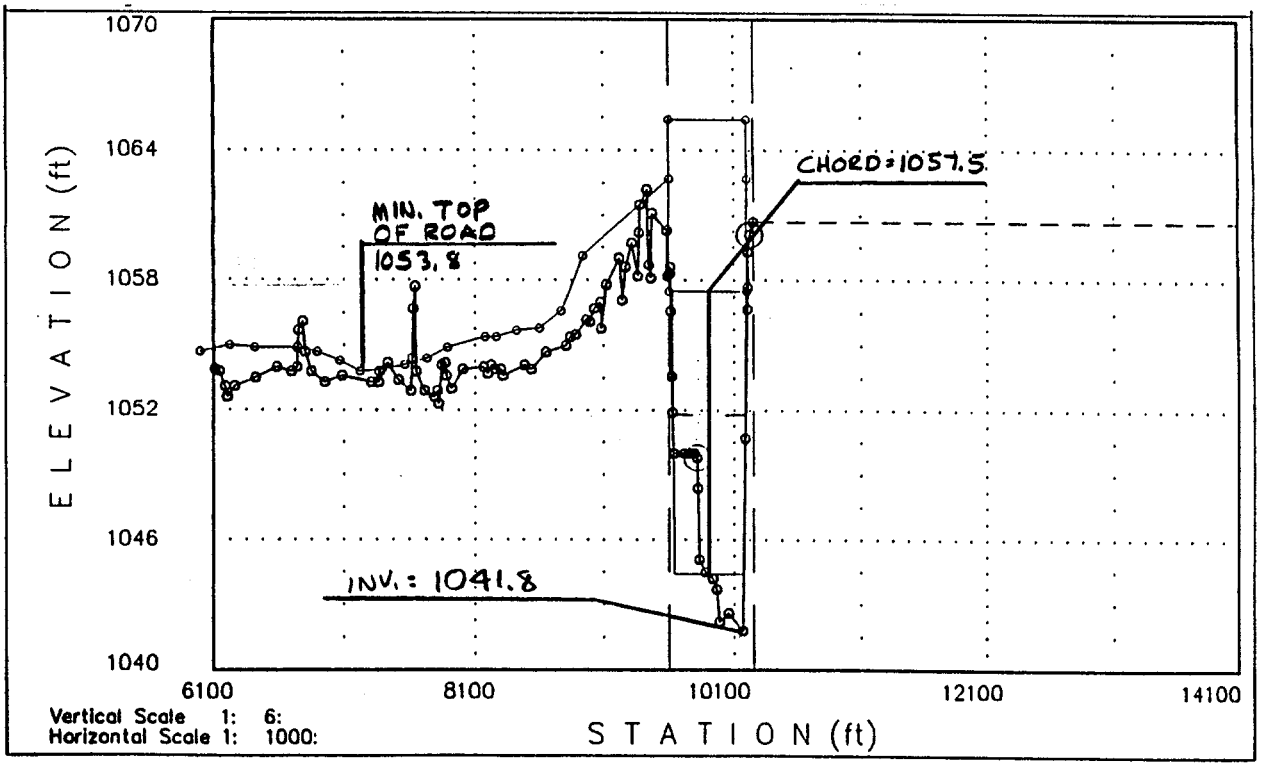
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A
*One form per new/revised bridge/culvert

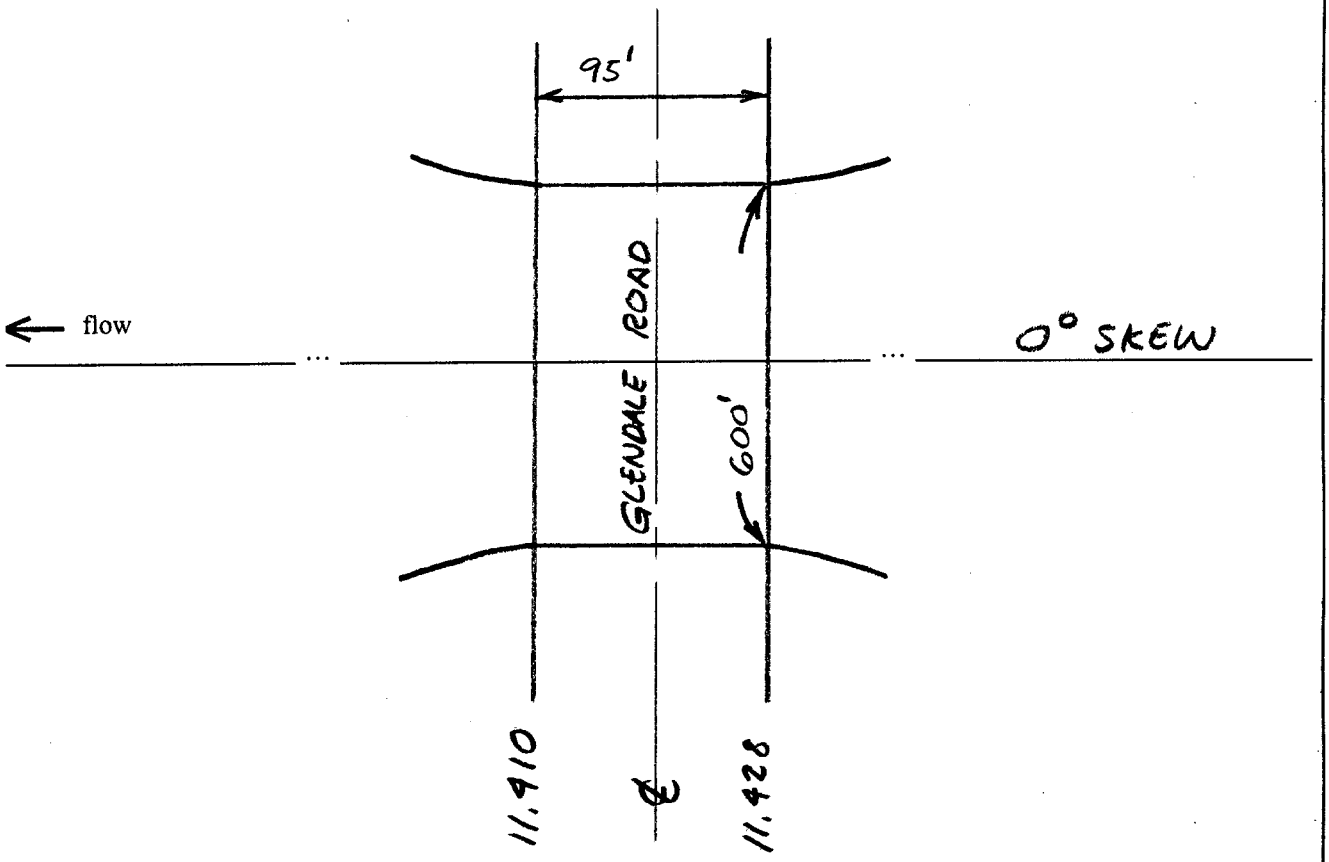
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, minimum top of road elevation, and ineffective flow widths.



Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



Sketch the plan view of the structure(s). Show, at a minimum, the skew angle, cross-section locations, distances between cross sections, and length of structure(s).



Attach plans of the structure(s) certified by a registered Professional Engineer.

Culvert length or bridge width (ft.)	95
Calculated culvert/bridge (ft^2) by the hydraulic model, if applicable	4169.6
Total culvert/bridge area (ft^2)	8201.1

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	1053.8	1065.4
Downstream face	1053.8	1065.4

100-Year Elevations

	Water-Surface Elevations	Energy Gradient Elevations
Upstream face	1051.78	1053.12
Downstream face	1051.71	1052.52

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	30,000	0	0	30,000

The maximum depth of flow over the roadway/railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Total Floodplain Width	Total Effective Flow Width	Floodway Width
Upstream face	566.4	566.4	566.4
Downstream face	577.3	577.3	577.3

3. ANALYSIS (Cont'd)

Loss Coefficients

Entrance loss coefficient	N/A
nning's "n" value assigned to the structure(s)	0.045
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	1.56
Weir coefficient	2.70
Pier coefficient	1.05
Contraction loss coefficient	0.3
Expansion loss coefficient	0.5

4. SEDIMENT TRANSPORT CONSIDERATIONS

1. A. Is there any indication from historical records that sediment transport *(including scour and deposition)* can affect the 100-year water surface elevations? . . . . . ☐ Yes ☒ No

   B. Based on the conditions *(such as geomorphology, vegetative cover and development of the watershed and stream bed, and bank conditions)*, is there a potential for debris and sediment transport *(including scour and deposition)* to affect the 100-year water surface elevations and/or conveyance capacity through the bridge/culvert? . ☐ Yes ☒ No

2. If the answer to either 1A or 1B is yes:

   A. What is the estimated sediment *(bed material)* load?

   _____ cfs *(attach gradation curve)*

   Explain method used to estimate the sediment transport and the depth of scour and/or deposition _____

   B. Will sediment accumulate anywhere through the bridge/culvert? ☐ Yes ☐ No

   If yes, explain the impact on the conveyance capacity through the bridge/culvert? _____

5. FLOODWAY ANALYSIS

Explain method of bridge encroachment

(floodway run) The river is encroached near the bridge, therefore, floodplain and floodway coincide under the bridge.

5. FLOODWAY ANALYSIS (Cont'd)

Comments *(explain any unusual situations)*:

Attach analysis.

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT FORM**	*O.M.B. Burden No. 3067-0148* *Expires July 31, 1997*	*FEMA USE ONLY*

PUBLIC BURDEN DISCLOSURE NOTICE

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Community Name: Maricopa County, Arizona and Incorporated Areas

Flooding Source: Agua Fria River

Project Name/Identifier: Agua Fria Floodplain Delineation Re-Study

1. IDENTIFIER

1. Name of roadway, railroad, etc.: Olive Avenue

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): HEC-2 Cross Section 13.45

3. This revision reflects *(check one of the following)*:

☐ New bridge/culvert not modeled in the FIS

☐ Modified bridge/culvert previously modeled in the FIS

☒ New analysis of bridge/culvert previously modeled in the FIS

(Explain why new analysis was performed) Revised Hydrology

2. BACKGROUND

Provide the following information about the structure:

1. Dimension, material, and shape (e.g. two 10 x 5 feet reinforced concrete box culvert; three 30-foot span bridge with 2 rows of two 3-foot diameter circular piers; 40-foot wide ogee shape spillway) Twelve 125-foot span bridge with 3 rows of 5 inch diameter circular piers

2. Entrance geometry of culvert/type of bridge opening (e.g. 30°-75° wing walls with square top edge, sloping embankments and vertical abutments) Sloping embankments

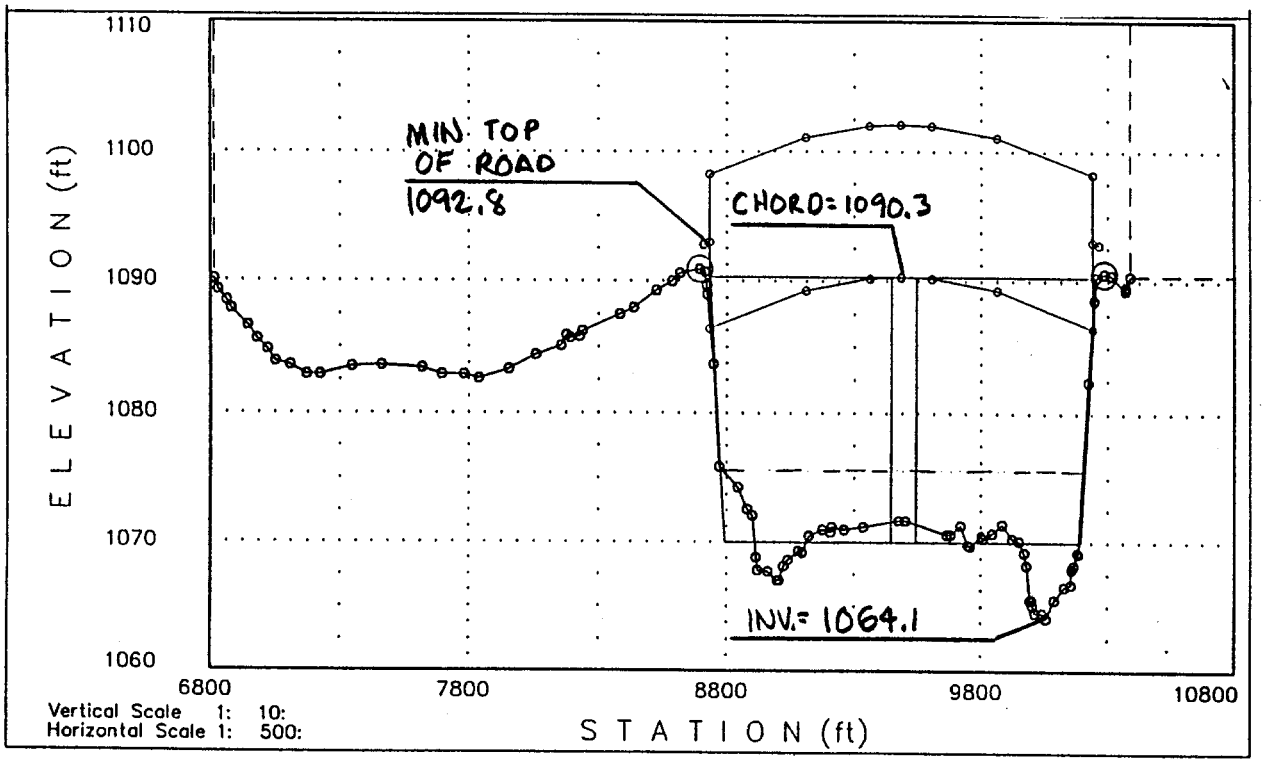
3. Hydraulic model used to analyze the structure *(e.g., HEC-2 with special bridge routine, WSPRO, HY8)* HEC-2 with special bridge routine

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

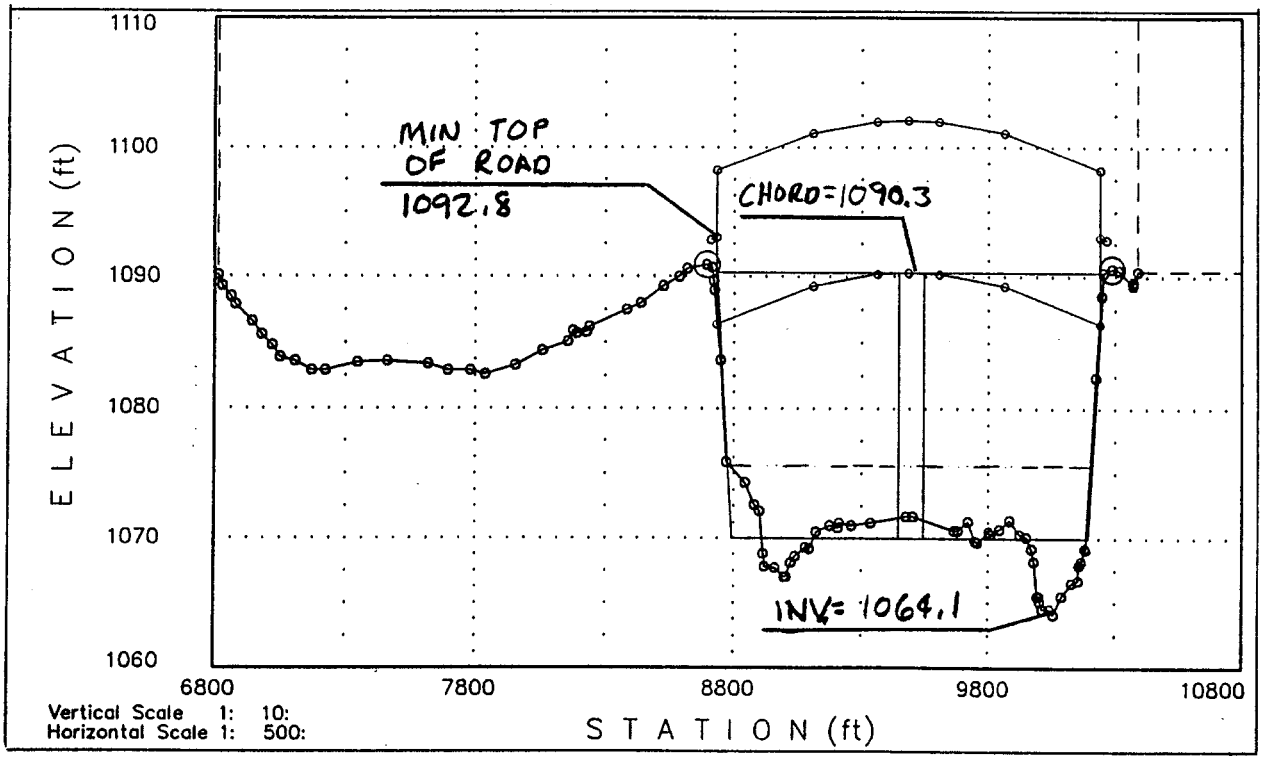
Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

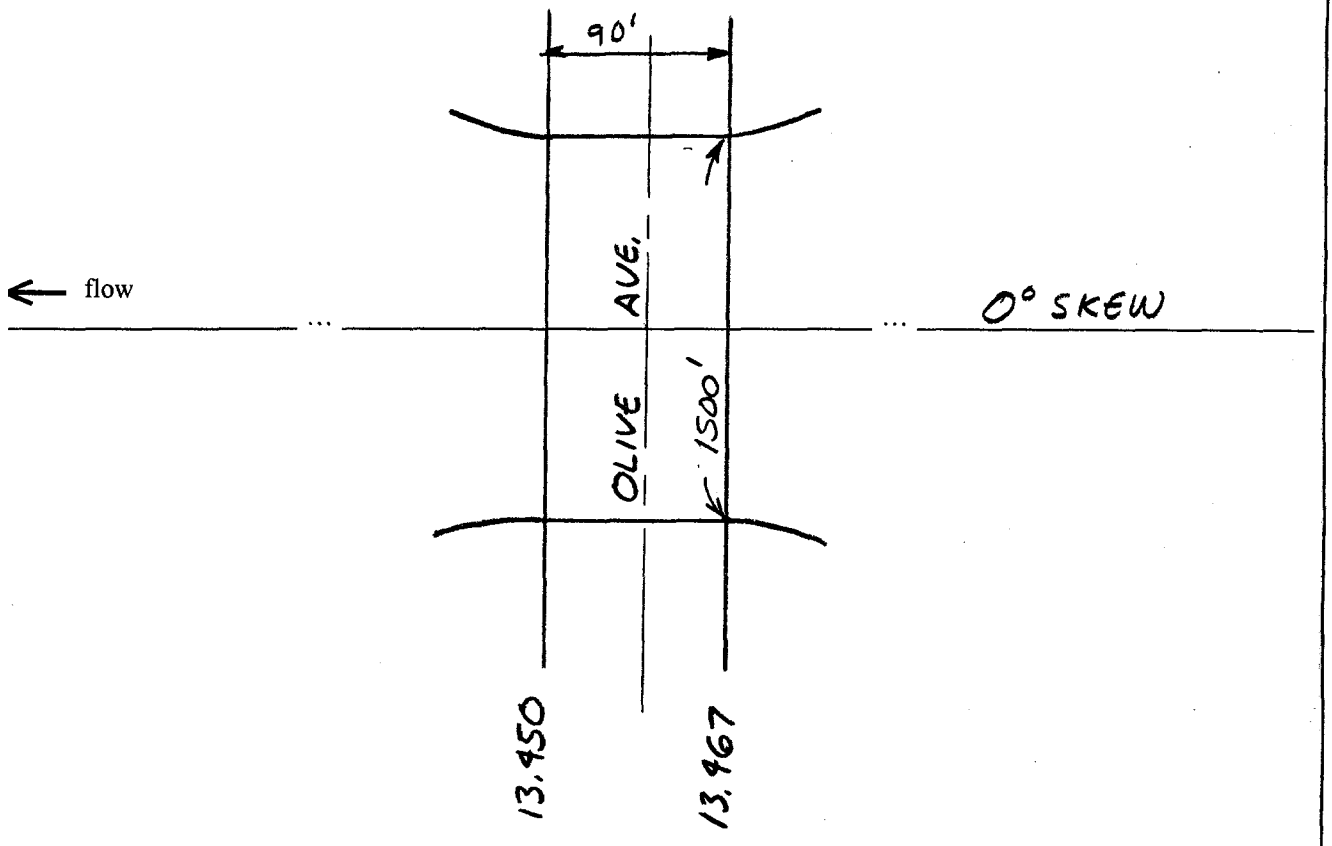
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, minimum top of road elevation, and ineffective flow widths.



Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



Sketch the plan view of the structure(s). Show, at a minimum, the skew angle, cross-section locations, distances between cross sections, and length of structure(s).



Attach plans of the structure(s) certified by a registered Professional Engineer.

Culvert length or bridge width (ft.)	90
Calculated culvert/bridge (ft^2) by the hydraulic model, if applicable	8072.0
Total culvert/bridge area (ft^2)	21608.3

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
stream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	1092.8	1092.8
Downstream face	1092.8	1092.8

100-Year Elevations

	Water-Surface Elevations	Energy Gradient Elevations
Upstream face	1075.59	1075.89
Downstream face	1075.55	1075.84

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow ough/over the cture(s) (cfs)	34,500	0	0	34,500

The maximum depth of flow over the roadway/railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Total Floodplain Width	Total Effective Flow Width	Floodway Width
Upstream face	1417.4	1417.4	1417.4
Downstream face	1382.2	1382.2	1382.2

3. ANALYSIS (Cont'd)

Loss Coefficients

Entrance loss coefficient	N/A
nning's "n" value assigned to the structure(s)	0.035
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	1.56
Weir coefficient	2.70
Pier coefficient	1.05
Contraction loss coefficient	0.3
Expansion loss coefficient	0.5

4. SEDIMENT TRANSPORT CONSIDERATIONS

1. A. Is there any indication from historical records that sediment transport *(including scour and deposition)* can affect the 100-year water surface elevations? . . . . . ☐ Yes ☒ No

   B. Based on the conditions *(such as geomorphology, vegetative cover and development of the watershed and stream bed, and bank conditions)*, is there a potential for debris and sediment transport *(including scour and deposition)* to affect the 100-year water surface elevations and/or conveyance capacity through the bridge/culvert? . ☐ Yes ☒ No

2. If the answer to either 1A or 1B is yes:

   A. What is the estimated sediment *(bed material)* load?

   _____ cfs *(attach gradation curve)*

   Explain method used to estimate the sediment transport and the depth of scour and/or deposition _____

   B. Will sediment accumulate anywhere through the bridge/culvert? ☐ Yes ☐ No

   If yes, explain the impact on the conveyance capacity through the bridge/culvert? _____

5. FLOODWAY ANALYSIS

Explain method of bridge encroachment

(floodway run) The river is encroached near the bridge, therefore, floodplain and floodway coincide under the bridge.

5. FLOODWAY ANALYSIS (Cont'd)

Comments *(explain any unusual situations)*:

Attach analysis.

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT FORM**	*O.M.B. Burden No. 3067-0148* *Expires July 31, 1997*	*FEMA USE ONLY*

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Community Name: Maricopa County, Arizona and Incorporated Areas

Flooding Source: Agua Fria River

Project Name/Identifier: Agua Fria Floodplain Delineation Re-Study

1. IDENTIFIER

1. Name of roadway, railroad, etc.: Grand Avenue

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):
   HEC-2 Cross Section 16.482

3. This revision reflects *(check one of the following)*:

   ☐ New bridge/culvert not modeled in the FIS

   ☐ Modified bridge/culvert previously modeled in the FIS

   ☒ New analysis of bridge/culvert previously modeled in the FIS

   (Explain why new analysis was performed) Revised Hydrology

2. BACKGROUND

Provide the following information about the structure:

1. Dimension, material, and shape (e.g. two 10 x 5 feet reinforced concrete box culvert; three 30-foot span bridge with 2 rows of two 3-foot diameter circular piers; 40-foot wide ogee shape spillway)
   Four 125-foot span bridge with 4 rows of 6 foot diameter circular piers

2. Entrance geometry of culvert/type of bridge opening (e.g. 30°-75° wing walls with square top edge, sloping embankments and vertical abutments) Sloping embankments

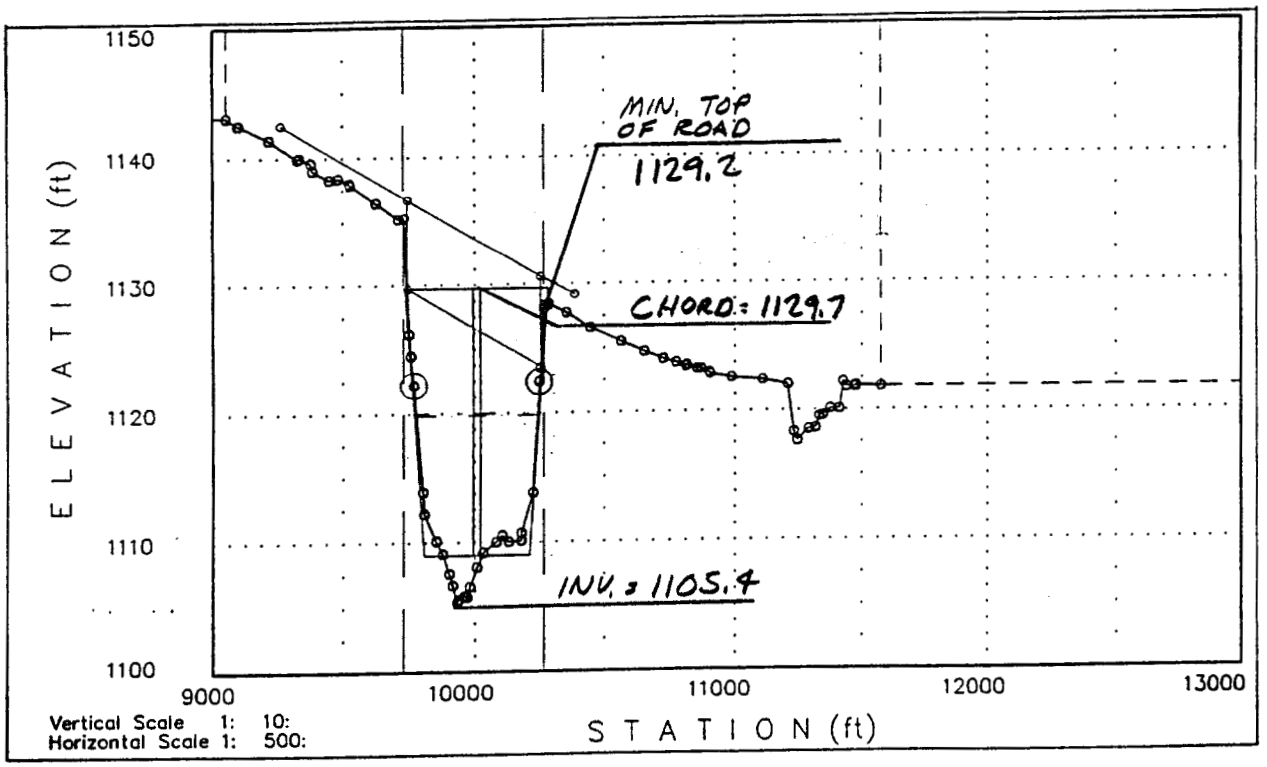
3. Hydraulic model used to analyze the structure *(e.g., HEC-2 with special bridge routine, WSPRO, HY8)*
   HEC-2 with special bridge routine

   If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

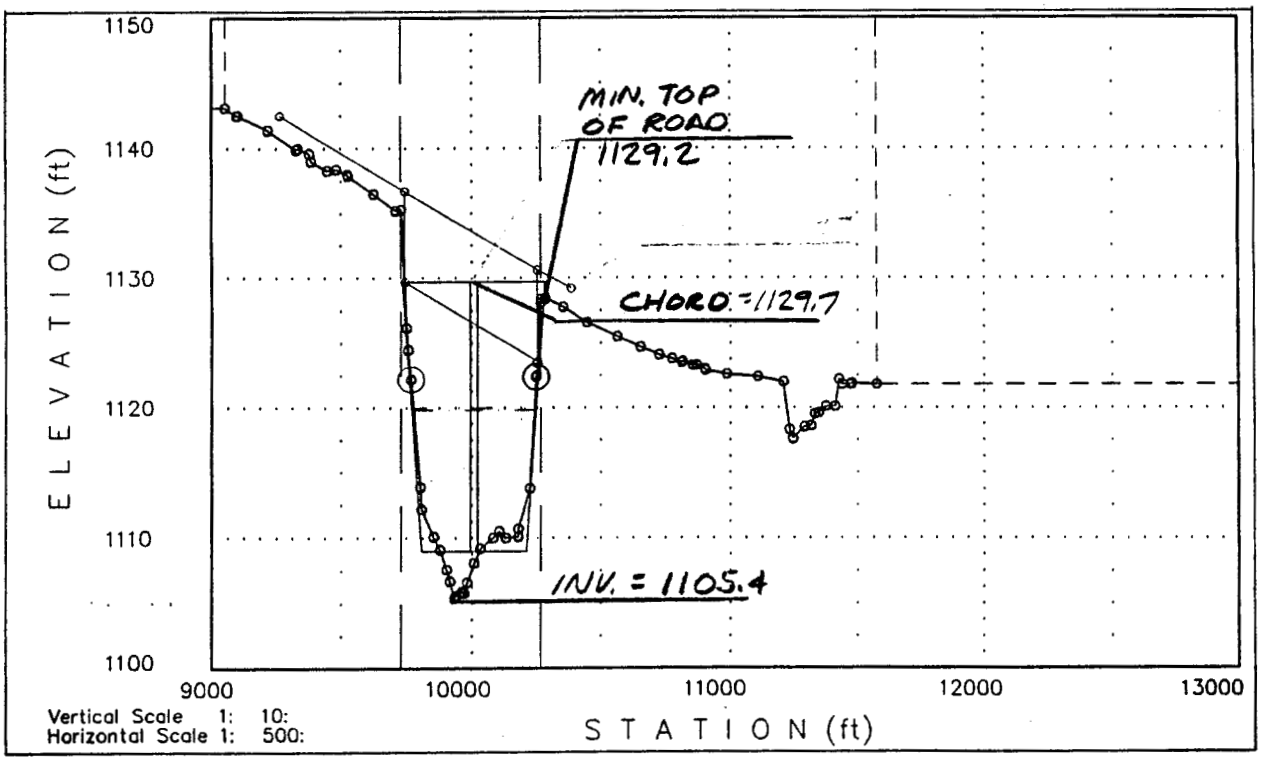
Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

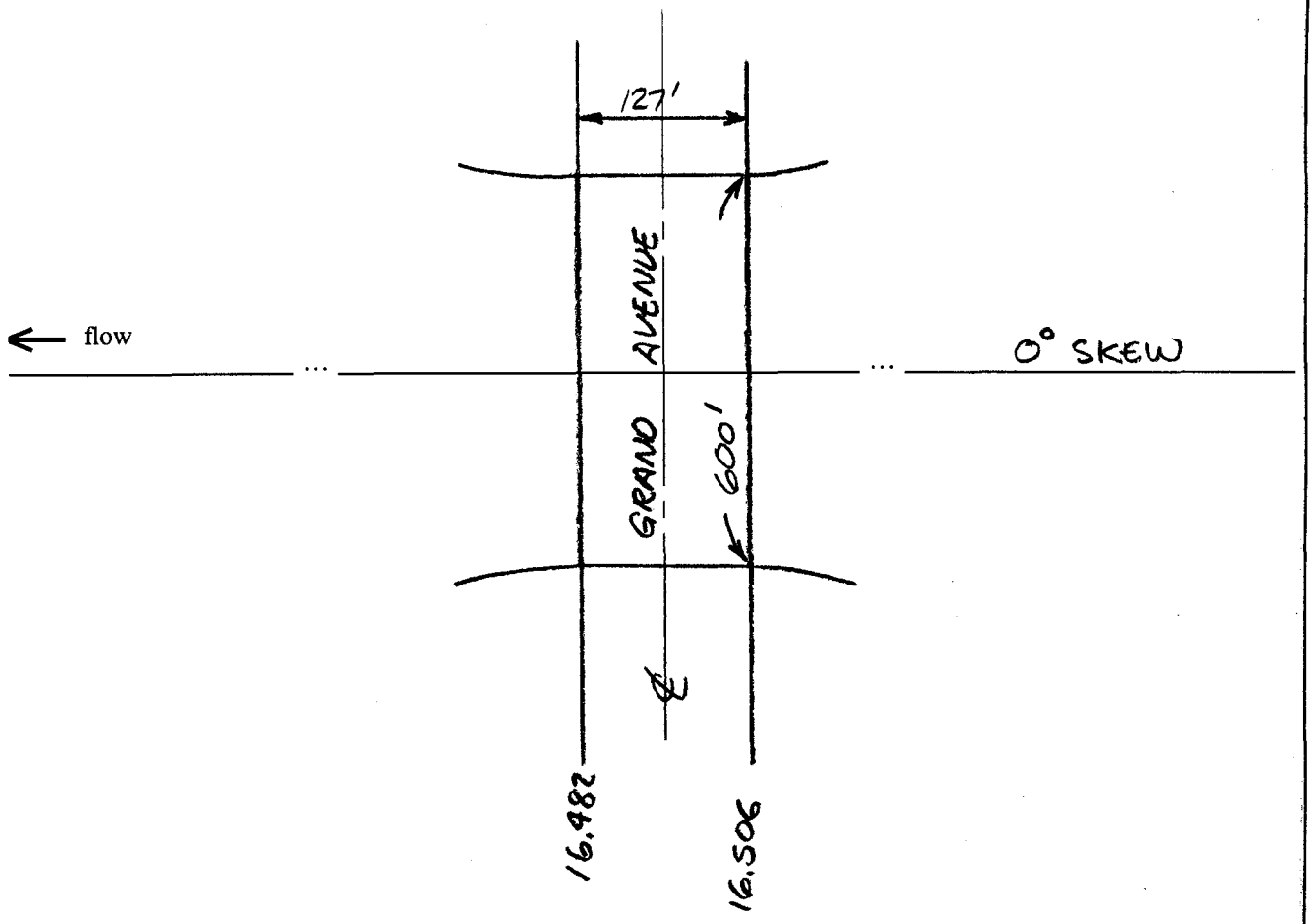
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, minimum top of road elevation, and ineffective flow widths.



Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



Sketch the plan view of the structure(s). Show, at a minimum, the skew angle, cross-section locations, distances between cross sections, and length of structure(s).



Attach plans of the structure(s) certified by a registered Professional Engineer.

Culvert length or bridge width (ft.)	127
Calculated culvert/bridge (ft^2) by the hydraulic model, if applicable	4569.8
Total culvert/bridge area (ft^2)	8080.2

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	1136.7	1129.2
Downstream face	1136.7	1129.2

100-Year Elevations

	Water-Surface Elevations	Energy Gradient Elevations
Upstream face	1119.82	1120.80
Downstream face	1119.65	1120.61

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	36,000	0	0	36,000

The maximum depth of flow over the roadway/railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Total Floodplain Width	Total Effective Flow Width	Floodway Width
Upstream face	460.3	460.3	460.3
Downstream face	438.0	438.0	438.0

3. ANALYSIS (Cont'd)

Loss Coefficients

Entrance loss coefficient	N/A
nning's "n" value assigned to the structure(s)	0.035
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	1.56
Weir coefficient	2.70
Pier coefficient	1.05
Contraction loss coefficient	0.3
Expansion loss coefficient	0.5

4. SEDIMENT TRANSPORT CONSIDERATIONS

1. A. Is there any indication from historical records that sediment transport *(including scour and deposition)* can affect the 100-year water surface elevations? . . . . . ☐ Yes ☒ No

   B. Based on the conditions *(such as geomorphology, vegetative cover and development of the watershed and stream bed, and bank conditions)*, is there a potential for debris and sediment transport *(including scour and deposition)* to affect the 100-year water surface elevations and/or conveyance capacity through the bridge/culvert? . ☐ Yes ☒ No

2. If the answer to either 1A or 1B is yes:

   A. What is the estimated sediment *(bed material)* load?

   _____ cfs *(attach gradation curve)*

   Explain method used to estimate the sediment transport and the depth of scour and/or deposition _____

   B. Will sediment accumulate anywhere through the bridge/culvert? ☐ Yes ☐ No

   If yes, explain the impact on the conveyance capacity through the bridge/culvert? _____

5. FLOODWAY ANALYSIS

Explain method of bridge encroachment

(floodway run) The river is encroached near the bridge, therefore, floodplain and floodway coincide under the bridge.

5. FLOODWAY ANALYSIS (Cont'd)

Comments *(explain any unusual situations)*:

Attach analysis.

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT FORM**	*O.M.B. Burden No. 3067-0148* *Expires July 31, 1997*	***FEMA USE ONLY***

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Community Name: Maricopa County, Arizona and Incorporated Areas

Flooding Source: Agua Fria River

Project Name/Identifier: Agua Fria Floodplain Delineation Re-Study

1. IDENTIFIER

1. Name of roadway, railroad, etc.: Santa Fe Railroad
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): HEC-2 Cross Section 16.514
3. This revision reflects *(check one of the following)*:

☐ New bridge/culvert not modeled in the FIS

☐ Modified bridge/culvert previously modeled in the FIS

☒ New analysis of bridge/culvert previously modeled in the FIS

(Explain why new analysis was performed) Revised Hydrology

2. BACKGROUND

Provide the following information about the structure:

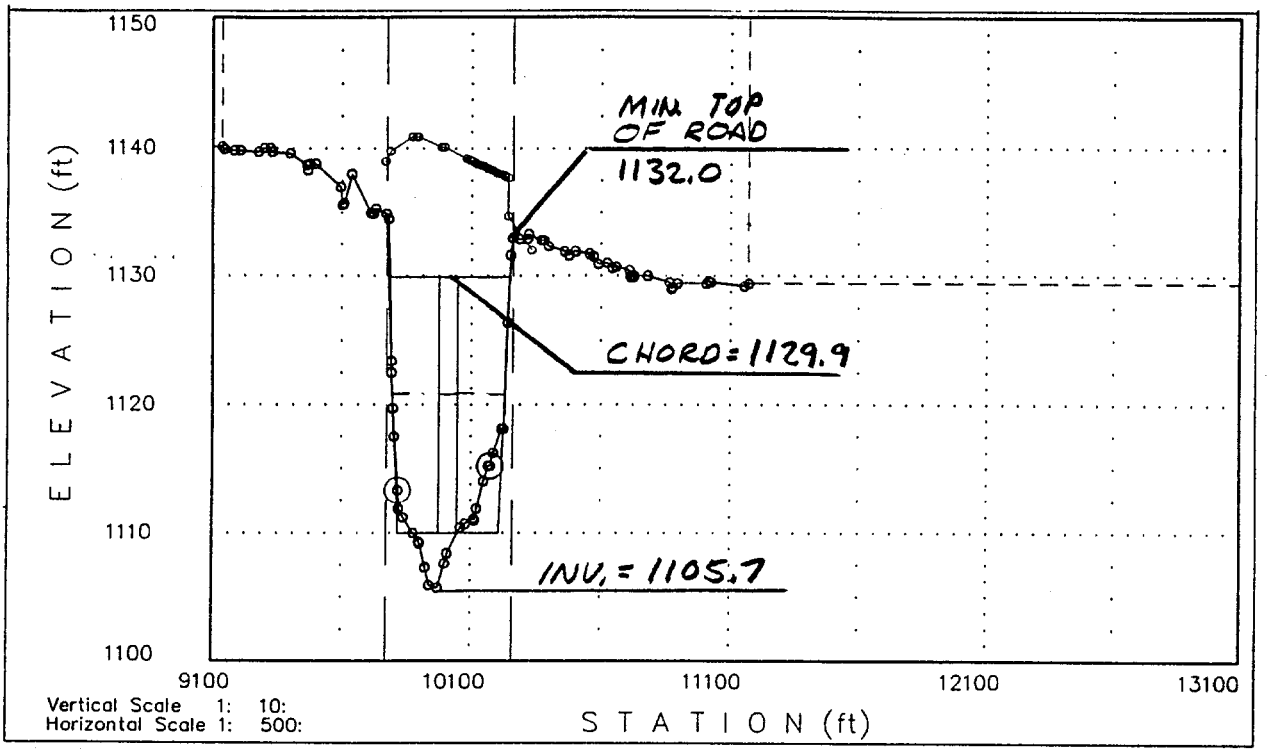
1. Dimension, material, and shape (e.g. two 10 x 5 feet reinforced concrete box culvert; three 30-foot span bridge with 2 rows of two 3-foot diameter circular piers; 40-foot wide ogee shape spillway) Ten 14-foot span with 1.5 foot steel piers, two 102-foot span, and one 127-foot spans with 7 foot wide continuous piers
2. Entrance geometry of culvert/type of bridge opening (e.g. 30°-75° wing walls with square top edge, sloping embankments and vertical abutments) Sloping embankments
3. Hydraulic model used to analyze the structure *(e.g., HEC-2 with special bridge routine, WSPRO, HY8)* HEC-2 with special bridge routine

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

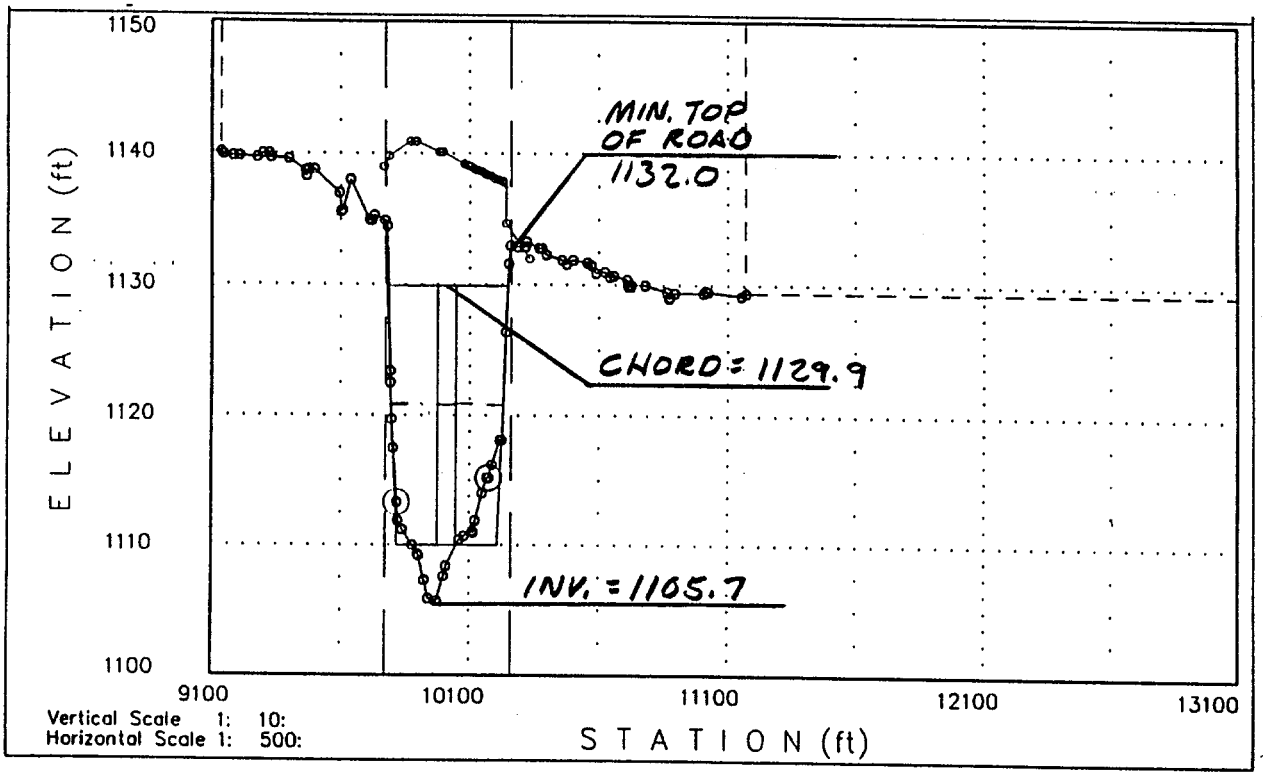
Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

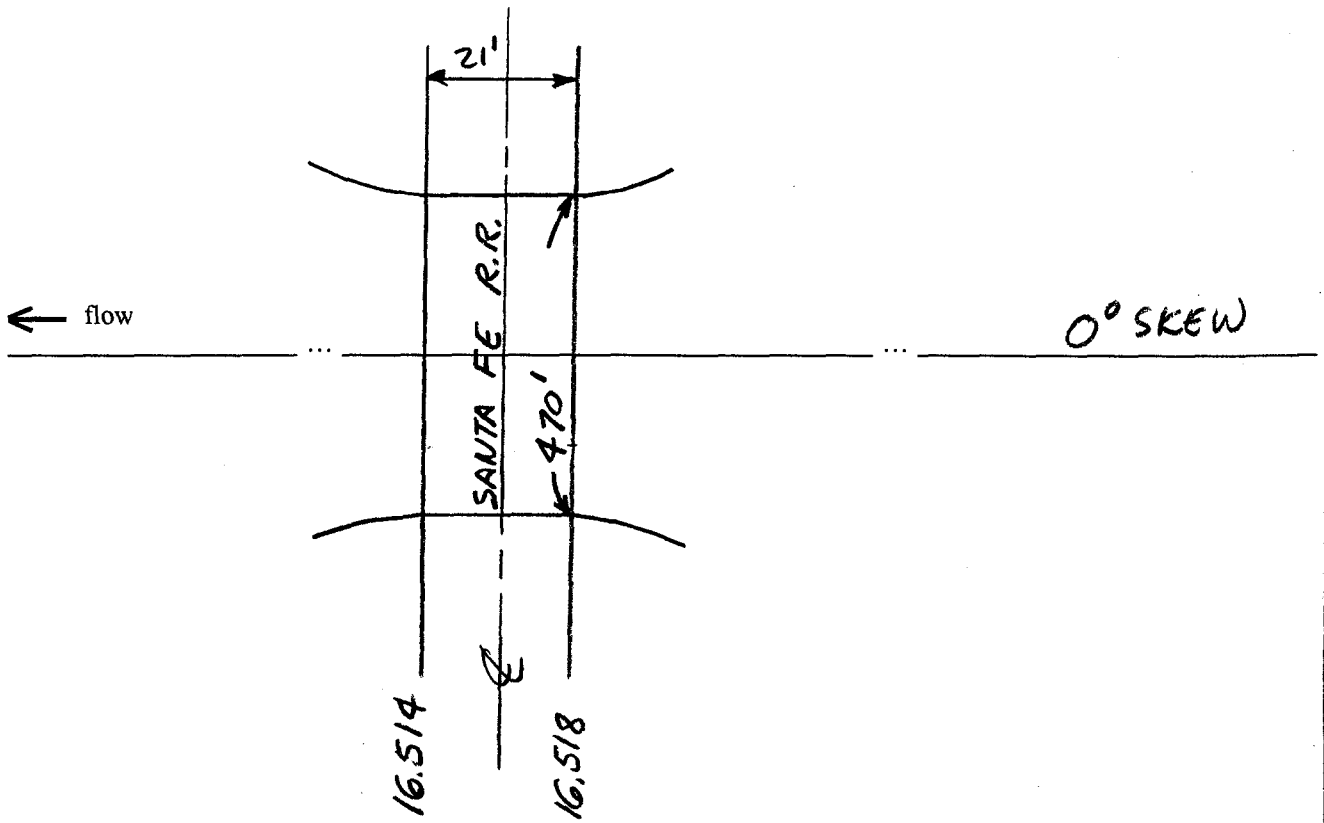
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, minimum top of road elevation, and ineffective flow widths.



Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



Sketch the plan view of the structure(s). Show, at a minimum, the skew angle, cross-section locations, distances between cross sections, and length of structure(s).



Attach plans of the structure(s) certified by a registered Professional Engineer.

Culvert length or bridge width (ft.)	21
Calculated culvert/bridge (ft^2) by the hydraulic model, if applicable	3794.6
Total culvert/bridge area (ft^2)	8080.7

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	1139.0	1132.0
Downstream face	1139.0	1132.0

100-Year Elevations

	Water-Surface Elevations	Energy Gradient Elevations
Upstream face	1120.80	1122.00
Downstream face	1119.67	1121.12

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	36,000	0	0	36,000
The maximum depth of flow over the roadway/railroad (ft.)			0	
Weir length (ft.)			0	

Top Widths

	Total Floodplain Width	Total Effective Flow Width	Floodway Width
Upstream face	434.1	434.1	434.1
Downstream face	425.3	425.3	425.3

3. ANALYSIS (Cont'd)

Loss Coefficients

Entrance loss coefficient	N/A
nning's "n" value assigned to the structure(s)	0.035
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	1.56
Weir coefficient	2.70
Pier coefficient	1.05
Contraction loss coefficient	0.3
Expansion loss coefficient	0.5

4. SEDIMENT TRANSPORT CONSIDERATIONS

1. A. Is there any indication from historical records that sediment transport *(including scour and deposition)* can affect the 100-year water surface elevations? . . . . . ☐ Yes ☒ No

   B. Based on the conditions *(such as geomorphology, vegetative cover and development of the watershed and stream bed, and bank conditions)*, is there a potential for debris and sediment transport *(including scour and deposition)* to affect the 100-year water surface elevations and/or conveyance capacity through the bridge/culvert? . ☐ Yes ☒ No

2. If the answer to either 1A or 1B is yes:

   A. What is the estimated sediment *(bed material)* load?

   _____ cfs *(attach gradation curve)*

   Explain method used to estimate the sediment transport and the depth of scour and/or deposition _____

   B. Will sediment accumulate anywhere through the bridge/culvert? ☐ Yes ☐ No

   If yes, explain the impact on the conveyance capacity through the bridge/culvert? _____

5. FLOODWAY ANALYSIS

Explain method of bridge encroachment

(floodway run) The river is encroached near the bridge, therefore, floodplain and floodway coincide under the bridge.

5. FLOODWAY ANALYSIS (Cont'd)

Comments *(explain any unusual situations)*:

Attach analysis.

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT FORM**	*O.M.B. Burden No. 3067-0148* *Expires July 31, 1997*	*FEMA USE ONLY*

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

Community Name: Maricopa County, Arizona and Incorporated Areas

Flooding Source: Agua Fria River

Project Name/Identifier: Agua Fria Floodplain Delineation Re-Study

1. IDENTIFIER

1. Name of roadway, railroad, etc.: Bell Road
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): HEC-2 Cross Section 18.962
3. This revision reflects *(check one of the following)*:

☐ New bridge/culvert not modeled in the FIS

☐ Modified bridge/culvert previously modeled in the FIS

☒ New analysis of bridge/culvert previously modeled in the FIS

(Explain why new analysis was performed) Revised Hydrology

2. BACKGROUND

Provide the following information about the structure:

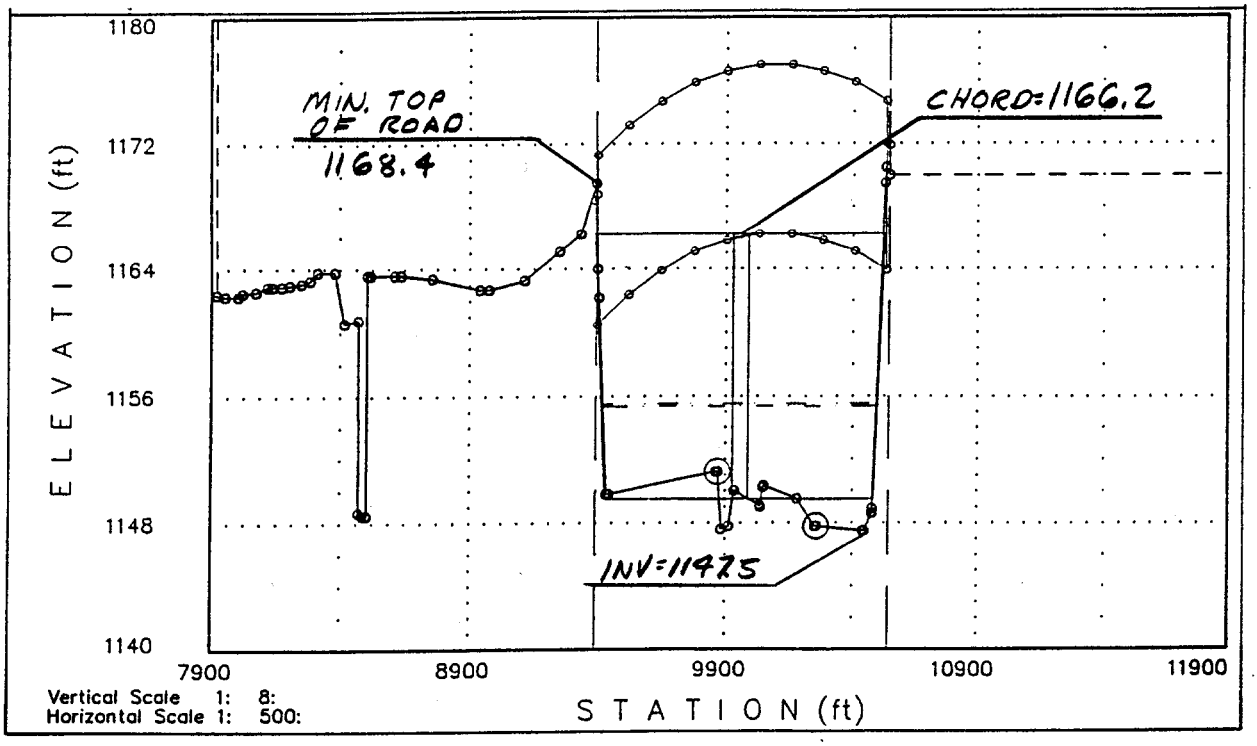
1. Dimension, material, and shape (e.g. two 10 x 5 feet reinforced concrete box culvert; three 30-foot span bridge with 2 rows of two 3-foot diameter circular piers; 40-foot wide ogee shape spillway) Nine 123-foot span bridge with 3 rows of 5 foot diameter circular piers
2. Entrance geometry of culvert/type of bridge opening (e.g. 30°-75° wing walls with square top edge, sloping embankments and vertical abutments) Sloping embankments
3. Hydraulic model used to analyze the structure *(e.g., HEC-2 with special bridge routine, WSPRO, HY8)* HEC-2 with special bridge routine

   If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

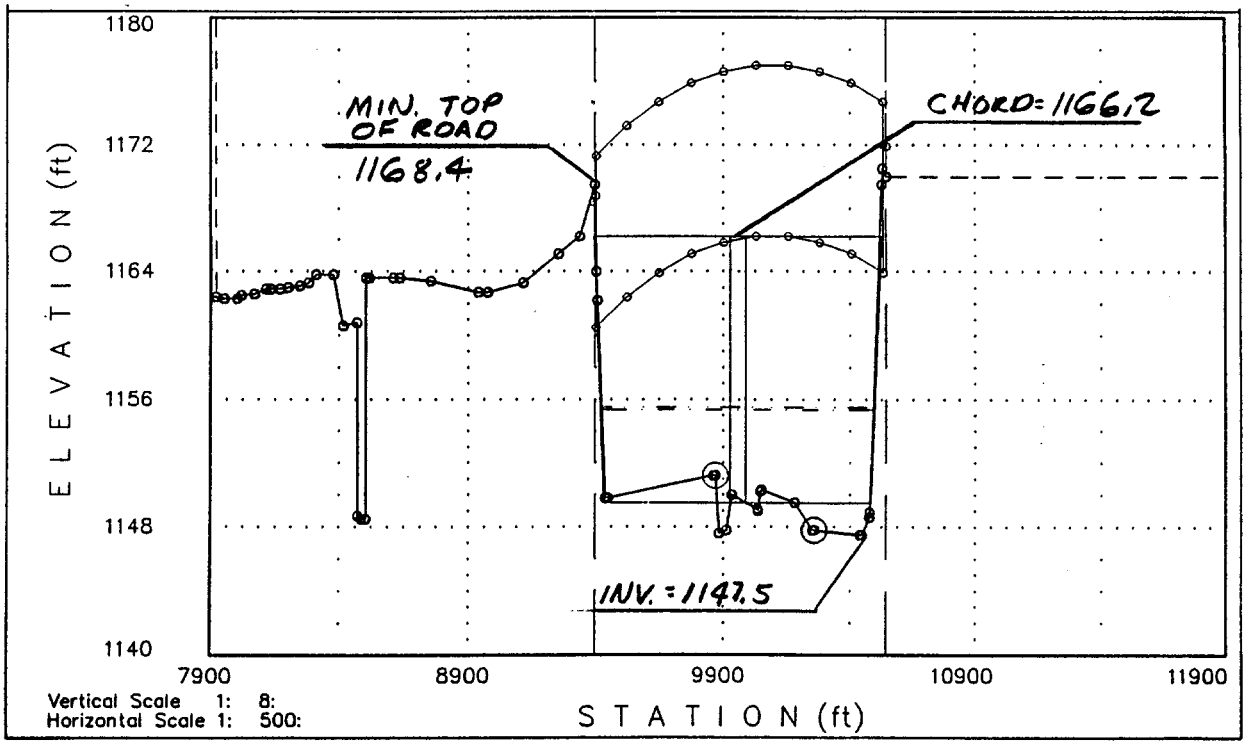
Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

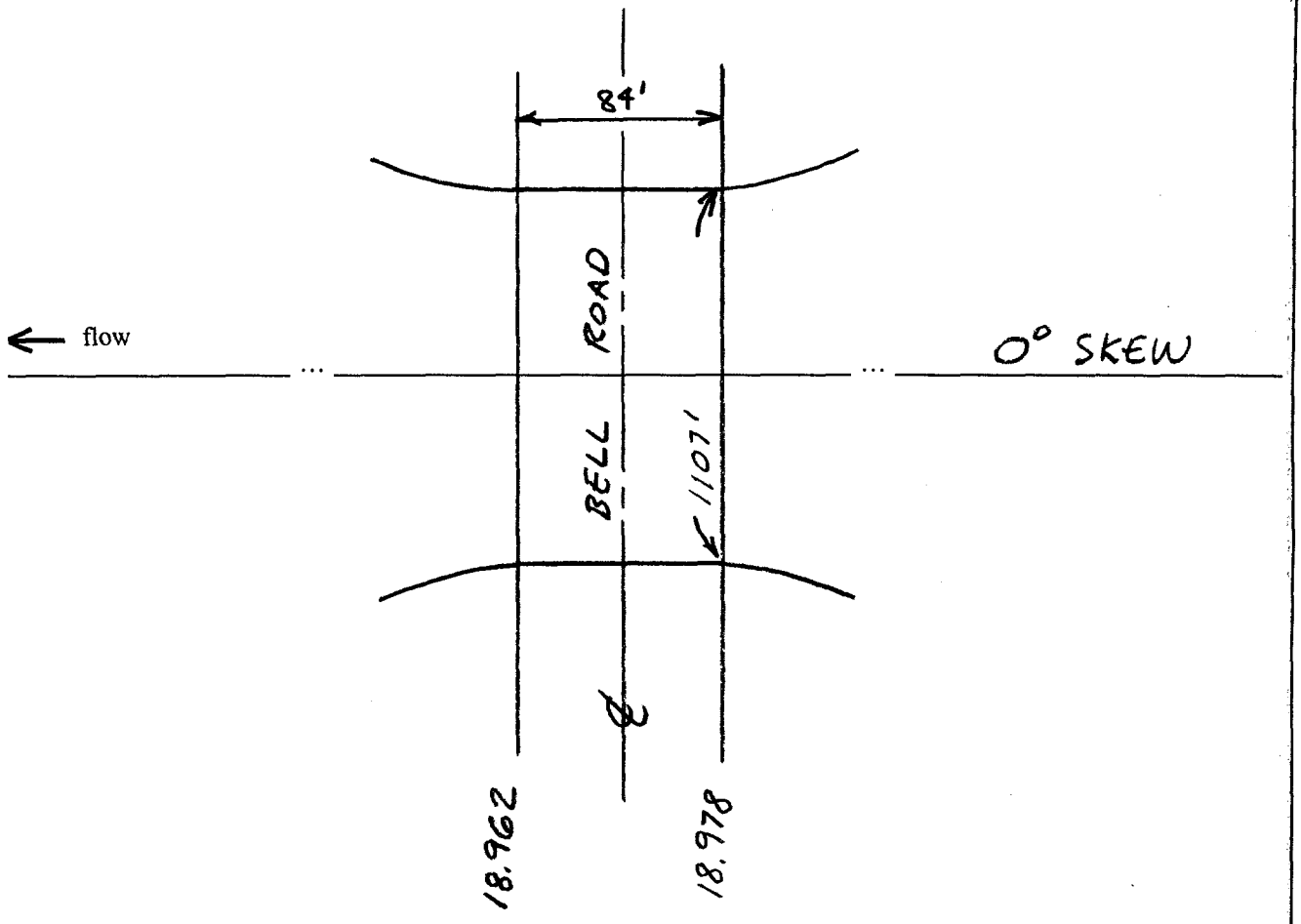
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, minimum top of road elevation, and ineffective flow widths.



Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



Sketch the plan view of the structure(s). Show, at a minimum, the skew angle, cross-section locations, distances between cross sections, and length of structure(s).



Attach plans of the structure(s) certified by a registered Professional Engineer.

Culvert length or bridge width (ft.)	84
Calculated culvert/bridge (ft^2) by the hydraulic model, if applicable	6690.1
Total culvert/bridge area (ft^2)	16107.4

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	1168.4	1171.9
Downstream face	1168.4	1171.9

100-Year Elevations

	Water-Surface Elevations	Energy Gradient Elevations
Upstream face	1155.36	1155.98
Downstream face	1155.28	1155.80

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	37,500	0	0	37,500
The maximum depth of flow over the roadway/railroad (ft.)			0	
Weir length (ft.)			0	

Top Widths

	Total Floodplain Width	Total Effective Flow Width	Floodway Width
Upstream face	1067.6	1067.6	1067.6
Downstream face	1065.1	1065.1	1065.1

3. ANALYSIS (Cont'd)

Loss Coefficients

Entrance loss coefficient	N/A
nning's "n" value assigned to the structure(s)	0.035
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	1.56
Weir coefficient	2.70
Pier coefficient	1.05
Contraction loss coefficient	0.3
Expansion loss coefficient	0.5

4. SEDIMENT TRANSPORT CONSIDERATIONS

1. A. Is there any indication from historical records that sediment transport *(including scour and deposition)* can affect the 100-year water surface elevations? . . . . . ☐ Yes ☒ No

   B. Based on the conditions *(such as geomorphology, vegetative cover and development of the watershed and stream bed, and bank conditions)*, is there a potential for debris and sediment transport *(including scour and deposition)* to affect the 100-year water surface elevations and/or conveyance capacity through the bridge/culvert? . ☐ Yes ☒ No

2. If the answer to either 1A or 1B is yes:

   A. What is the estimated sediment *(bed material)* load?

   _____ cfs *(attach gradation curve)*

   Explain method used to estimate the sediment transport and the depth of scour and/or deposition _____

   B. Will sediment accumulate anywhere through the bridge/culvert? ☐ Yes ☐ No

   If yes, explain the impact on the conveyance capacity through the bridge/culvert? _____

5. FLOODWAY ANALYSIS

Explain method of bridge encroachment

(floodway run) The river is encroached near the bridge, therefore, floodplain and floodway coincide under the bridge.

5. FLOODWAY ANALYSIS (Cont'd)

Comments *(explain any unusual situations)*:

Attach analysis.

FEDERAL EMERGENCY MANAGEMENT AGENCY **DAM FORM**	*O.M.B. Burden No. 3067-0148* *Expires July 31, 1997*	**FEMA USE ONLY**

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 0.5 hour per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

Community Name: Maricopa County

Flooding Source: Agua Fria River

Project Name/Identifier: Agua Fria River Floodplain Re-Study

IDENTIFIER

Name of Dam: New Waddell Dam

Location of dam along flood source (in terms of stream distance or cross section identifier):

Cross-section 33.82 (miles from the confluence with Gila River)

Check one of the following:

- ☐ Existing dam
- ☒ New dam
- ☐ Modifications of existing dam (describe modifications)

Was the dam designed by X Federal agency USBR ____State agency

____Local government agency ____Private organization?

BACKGROUND

Does the dam have dedicated flood control storage? ☐ Yes ☒ No

(See page 2 and Sec. 3.3 of page 8 of Hydrology Report, Ref #1)

Does the project involve revised hydrology? ☒ Yes ☐ No

If yes, complete Hydrologic Analysis Form and include calculations of the 100-year inflow flood hydrograph routed through the dam with the beginning pool at the normal pool elevation (spillway crest elevation for ungated spillway). Include any inflow hydrograph bulking by watershed sediment yield and provide necessary debris and sediment yield analysis.

Does the revised hydrology affect the 100-year water-surface elevation behind the dam or downstream of the dam? ☒ Yes ☐ No

If yes, complete the Riverine Hydraulic Analysis Form and complete the table shown on the following page.

Stillwater Elevation Behind the Dam

	FIS	* Revised
10-year	N/A	1695.8 NGVD
50-year	N/A	1702.2
100-year	1601	1706.2
500-year	N/A	1711.7
Normal Pool Elevation	1601	1694.0

* See Table 2, Page 28 of Hyd. Report, Ref #1

Was long term sediment accumulation taken into consideration in determining the normal pool elevation? ☒ Yes ☐ No

Was the dam designed to withstand the hydrostatic and hydrodynamic forces associated with floods greater than the 100-year flood? ☒ Yes ☐ No

If no, and the dam has a reasonable probability of failure during the 100-year flood, please attach dam break analysis.

Provide the following data on the dam:

Dimensional Height: .298 ft.

Crest Elevation of top of dam: 1728.

100-year flood storage capacity: 251400 ac-ft

Freeboard (measured from 100-year water surface elevation): 21.8 ft.

Spillway(s): (See Figure 7A of Ref #1)

Type: ☐ gated ☒ ungated

Dimensional Width: 650 ft Ogee Crest and

Dimensional Height: 350 ft wide Fuseplug Dike

Crest Elevation of top of spillway: 1706.5 Ogee Crest
1714.0 Fuseplug

Outlet(s):

Type: ☒ gated ☐ ungated

Width:

Height

Diameter: 14 ft x 2 Tunnels

Invert Elevation: N/A

Explain flow regulation plan: See Appendix C of Hydrology Report, Ref #1

Are the project features, including the emergency spillway, designed to accommodate the 100-year flood discharge without overtopping the dam? ☒ Yes ☐ No

Was the dam designed in accordance with all currently applicable local, State, and Federal regulations? ☒ Yes ☐ No

If no, please provide explanation.

FEMA may request a list of regulations that have been complied with and supporting documentation demonstrating compliance with these regulations.

Attach copy of formal operation and maintenance plan

Answer N/A to any questions which are not applicable