

TECHNICAL DATA NOTEBOOK

Volume I Introduction/FEMA forms

for

SWEAT CANYON WASH FLOOD INSURANCE STUDY

January, 1999

Prepared for:

Federal Emergency Management Agency
Risk Studies Division
Federal Insurance Administration
500 C Street, SW Room 422
Washington, DC 20472

Submitted by:

David Evans and Associates, Inc.
7878 North 16th Street, Suite 250
Phoenix, Arizona 85020
(602) 678-5151

on behalf of:

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



Federal Emergency Management Agency

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CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Andrew Kunasek
Chairman, Maricopa County
Board of Supervisors
301 West Jefferson, 10th Floor
Phoenix, AZ 85003

IN REPLY REFER TO:
Case No.: 00-09-156P
Community: Maricopa County, Arizona
Community No.: 040037
Panels Affected: 04013C0365 E, 0310 E
and 0755 E
Effective Date of
This Revision: **APR 12 2000**

102-I-A-C

Dear Mr. Kunasek:

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 (the effective FIRM and FIS report for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated November 2, 1999, Mr. Michael W. Duncan, P.E., Project Manager, Flood Control District of Maricopa County, requested that FEMA revise a Letter of Map Revision (LOMR) dated September 30, 1999, which became effective February 17, 2000 (Case No. 99-09-423P), to correct the floodway boundary delineations along Sweat Canyon Wash from approximately 1,500 feet upstream to approximately 28,500 feet upstream of New River Road; along Doe Peak Wash from approximately 3,000 feet upstream to approximately 3,200 feet upstream of the confluence with Sweat Canyon Wash and from approximately 20,300 feet upstream to approximately 20,700 feet upstream of the confluence with Sweat Canyon Wash; and along East Fork Doe Peak Wash from approximately 2,300 feet upstream to approximately 2,700 feet upstream of the confluence with Doe Peak Wash and to correct a note on FIRM Panel 04013C0365 E regarding channel migration and stream erosion. This LOMR also is being revised to correct the floodway boundary delineations along Doe Peak Wash from approximately 800 feet upstream to approximately 1,500 feet upstream of the confluence with Sweat Canyon Wash and from approximately 14,000 feet upstream to approximately 15,000 feet upstream of the confluence with Sweat Canyon Wash; to correct the mislabeled elevation of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along Doe Peak Wash approximately 7,800 feet upstream of the confluence with Sweat Canyon Wash; and to correct the profile panel numbering. The determination made in the February 17 LOMR remains valid.

All data required to complete our review of this request were submitted with letters from Mr. Duncan. Because this LOMR is being issued to correct a mapping or study analysis error, fees were not assessed for the review.

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 floodway boundary delineations of the base flood to include the backwater areas for tributaries to Sweat Canyon Wash from approximately 3,000 feet upstream to approximately 28,000 feet upstream of New River Road along Sweat Canyon Wash; to correct mapping errors in the floodway boundary delineations along Sweat Canyon Wash from

approximately 1,400 feet upstream to approximately 2,200 feet upstream of New River Road, from approximately 3,600 feet upstream to approximately 3,900 feet upstream of New River Road, from approximately 4,800 feet upstream to approximately 5,800 feet upstream of New River Road, from approximately 7,000 feet upstream to approximately 7,600 feet upstream of New River Road, and from approximately 27,100 feet upstream to approximately 27,400 upstream of New River Road; to correct the floodway boundary delineations to include an area along Doe Peak Wash that was inadvertently delineated as a floodway fringe area in the aforementioned LOMR from approximately 2,900 feet upstream to approximately 3,100 feet upstream of the confluence with Sweat Canyon Wash; to add the floodway fringe area along Doe Peak Wash that was inadvertently included in the floodway in the aforementioned LOMR from approximately 700 feet upstream to approximately 1,500 feet upstream of the confluence with Sweat Canyon Wash; to correct a mislabeled base flood elevation (BFE) along Doe Peak Wash approximately 7,800 feet upstream of the confluence with Sweat Canyon Wash from 1,830 feet to 1,815 feet; to correct the floodway boundary delineations along Doe Peak Wash from approximately 14,000 feet upstream to approximately 15,000 feet upstream of the confluence with Sweat Canyon Wash; to add the floodway fringe area along Doe Peak Wash that was inadvertently included in the floodway in the aforementioned LOMR from approximately 20,300 feet upstream to approximately 20,800 feet upstream of the confluence with Sweat Canyon Wash; to correct the floodway boundary delineations to include an area along East Fork Doe Peak Wash that was inadvertently delineated as a floodway fringe area in the aforementioned LOMR from approximately 2,200 feet upstream to approximately 2,500 feet upstream of the confluence with Doe Peak Wash; to correct a note on FIRM Panel 04013C0365 E regarding channel migration and stream erosion; and to correct the profile panel numbering in the aforementioned LOMR for Sweat Canyon Wash, Doe Peak Wash, South Fork Doe Peak Wash, and East Fork Doe Peak Wash.

As a result of the modifications, the widths of the regulatory floodways for Sweat Canyon Wash and East Fork Doe Peak Wash increased, and the width of the regulatory floodway for Doe Peak Wash increased in some areas and decreased in other areas. The modifications are shown on the enclosed annotated copies of FIRM Panel(s) 04013C0365 E, 04013C0370 E, and 04013C0755 E. Because Profile Panels 867P through 876P were assigned to a LOMR dated August 5, 1997, the profile panels for this LOMR were renumbered to Profile Panels 1094P through 1103P for Sweat Canyon Wash, Doe Peak Wash, South Fork Doe Peak Wash, and East Fork Doe Peak Wash. This LOMR hereby revises the above-referenced panel(s) of the effective FIRM dated February 17, 2000, and the affected portions of the FIS report dated September 30, 1995, for the revised reaches along Sweat Canyon Wash, Doe Peak Wash, and East Fork Doe Peak Wash.

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.

In the February 17 LOMR, you were notified of proposed modified BFE determinations affecting the above-referenced FIRM and FIS report. FEMA received no valid requests for changes to the modified BFEs. Because the 90-day appeal period has elapsed, we will not republish the public notification of the proposed modified BFEs.

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 processing a revised FIRM and FIS report for Maricopa County 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 countywide FIRM and FIS report, which present information from the effective FIRMs and FIS reports for your community and incorporated communities in Maricopa County, were submitted to your community for review on December 23, 1997. Revised preliminary copies of the FIRM and FIS report were submitted to your community for review on May 29, 1998. We will incorporate the modifications made by this LOMR into the revised FIRM and FIS report before they become 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. Sally Ziolkowski
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
The Presidio of San Francisco, Building 105
San Francisco, California 94129-1250
(415) 923-7177

FEMA makes flood insurance available in participating communities; in addition, we encourage communities to develop their own loss reduction and prevention programs. Through the *Project Impact: Building Disaster Resistant Communities* initiative, launched by FEMA Director James Lee Witt in 1997, we seek to focus the energy of businesses, citizens, and communities in the United States on the importance of reducing their susceptibility to the impact of all natural disasters, including floods, hurricanes, severe storms, earthquakes, and wildfires. Natural hazard mitigation is most effective when it is planned for and implemented at the local level, by the entities who are most knowledgeable of local conditions and whose economic stability and safety are at stake. For your information, we are enclosing a copy of a pamphlet describing this nationwide initiative. For additional information on *Project Impact*, please visit our Web site at www.fema.gov/impact.

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 questions regarding this LOMR, please contact the FEMA Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627).

Sincerely,



Max H. Yuan, P.E., Project Engineer
Hazards Study Branch
Mitigation Directorate

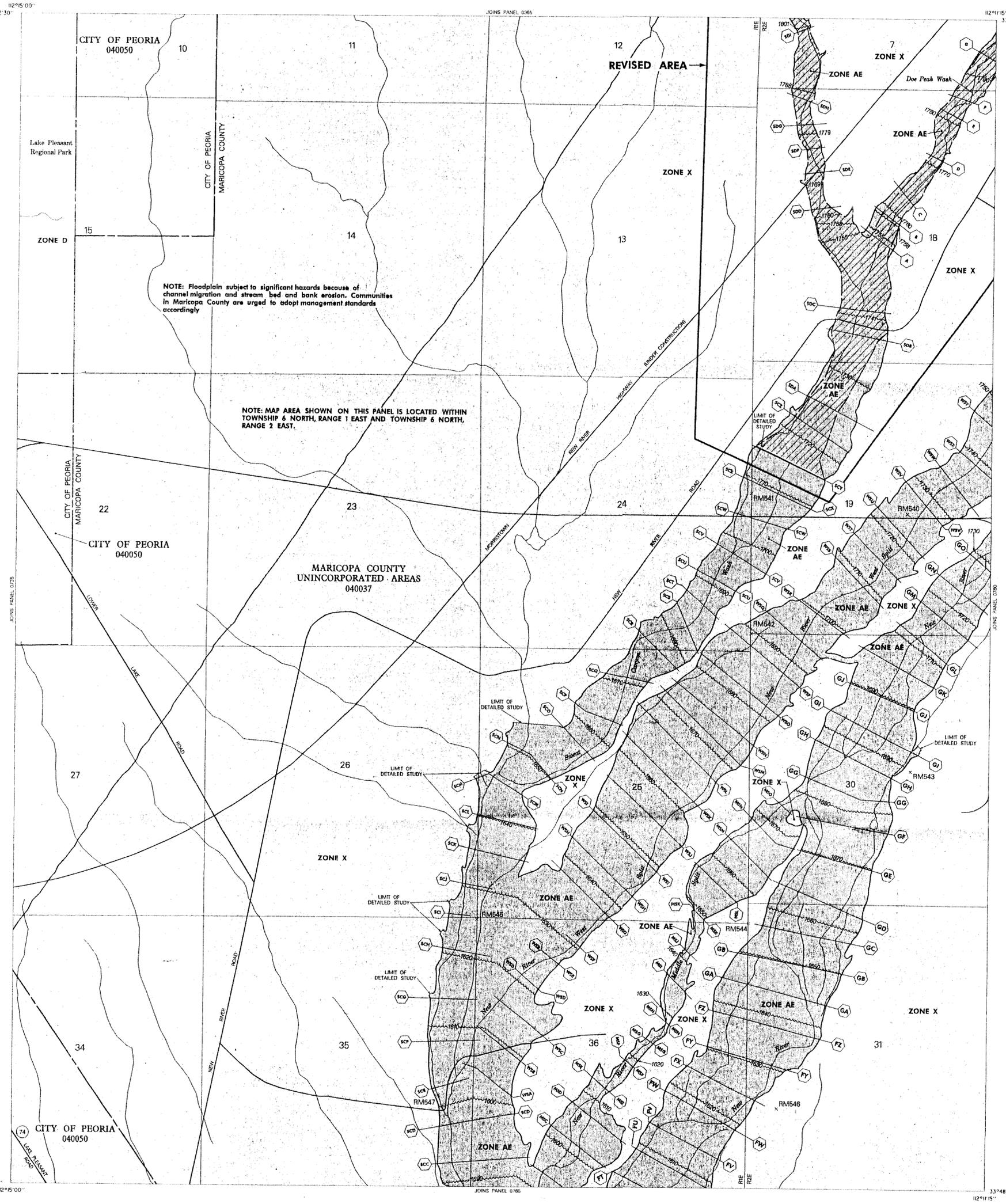
For: Matthew B. Miller, P.E., Chief
Hazards Study Branch
Mitigation Directorate

Enclosures

cc: Mr. Michael W. Duncan, P.E.
Project Manager
Flood Control District of Maricopa County

Ms. Teri S. Mintz, P.E.
Project Engineer
David Evans and Associates, Inc.

MARK (F&T NGVD)	ELEVATION	DESCRIPTION OF LOCATION
RM540	1725.35	A 1/4-inch rebar with an aluminum cap stamped N.R. 5126, 75 feet S of an abandoned power line, 50 feet S of the intersection of two leap trails, 2400 feet N of the southeast corner of section 19, T4N, R2E.
RM541	1701.93	A standard U.S. GLOS brass cap at the east quarter corner of section 24, T4N, R2E.
RM542	1689.88	A standard U.S. GLOS brass cap at the northwest corner of section 30, T4N, R2E.
RM543	1694.52	A 1/4-inch rebar with aluminum cap stamped N.R. 5112, 0.7 mile southwest along a leap trail from a windmill at the northeast corner of section 30, T4N, R2E, 25 feet S of a sharp bend in the trail, 2400 feet S of the southeast corner of section 30, T4N, R2E.
RM544	1658.91	A standard U.S. GLOS brass cap at the northwest corner of section 31, T4N, R2E.
RM545	1622.50	A stone with appropriate chisel marks found at the northeast corner of section 35, T4N, R2E.
RM546	1621.78	A 1/4-inch rebar with an aluminum cap stamped N.R. 8117, 35 feet E of a leap trail in line with a trail heading west across New River, 1300 feet N of the northeast corner of section 1, T5N, R2E.
RM547	1621.74	The mark WHITE is a standard USCGS brass cap set in bedrock as described by the National Geodetic Survey Quadrangle 1800 feet N and 800 feet E of the southeast corner, section 35, T4N, R2E.



NOTE: Floodplain subject to significant hazards because of channel migration and stream bed and bank erosion. Communities in Maricopa County are urged to adopt management standards accordingly.

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 6 NORTH, RANGE 1 EAST AND TOWNSHIP 6 NORTH, RANGE 2 EAST.

LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDED BY 100-YEAR FLOOD

- ZONE A** No base flood elevations determined.
- ZONE AE** Base flood elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet usually areas of ponding; base flood elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet usually sheet flow on sloping terrain; average depths determined for areas of sheet flow flooding; velocities also determined.
- ZONE A99** To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.
- ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- ZONE X** Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.
- OTHER AREAS**
- ZONE X** Areas determined to be outside 500-year floodplain.
- ZONE D** Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

- Identified 1983
- Identified 1996
- Projected Area

Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

BOUNDARIES

- Floodplain Boundary
- Zone D Boundary
- Boundary Dividing Special Flood Hazard Zones and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones

ELEVATION

- Base Flood Elevation Line: Elevation in Feet. See Map Index for Elevation Datum.
- Cross Section Line: Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum, Elevation Reference Mark.
- RM2
- RM7

Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection.

NOTES

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size or of plastic nature. Features outside Special Flood Hazard Areas. The community map repository should be consulted for more detailed data on FEMA's and for any information on floodway delineations prior to use of this map for property purchase or construction purposes.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, AH, AO, AV, VE, V, X, and D.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Refer to Floodway Data Table where floodway width is shown at 5/8 inch.

Coastal base flood elevations apply only landward of 0.0 NGVD and include the effects of wave action. Wave elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

This map may incorporate approximate boundaries of Coastal Barrier Resource System Units and/or Otherwise Protected Areas established under the Coastal Barrier Improvement Act of 1990 (PL 101-681).

For community map revision history prior to countywide mapping, see Section B.6 of the Flood Insurance Study Report.

For adjoining map panels and base map source see separately printed Map Index.

MAP REPOSITORY
Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
APRIL 15, 1989

EFFECTIVE DATES OF REVISIONS TO THIS PANEL:
SEPTEMBER 29, 1989

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at 1-800-838-6620.

APPROXIMATE SCALE IN FEET
1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 755 OF 4350
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY UNINCORPORATED AREAS	040037	0755	1
PEORIA CITY OF	040050	0755	1

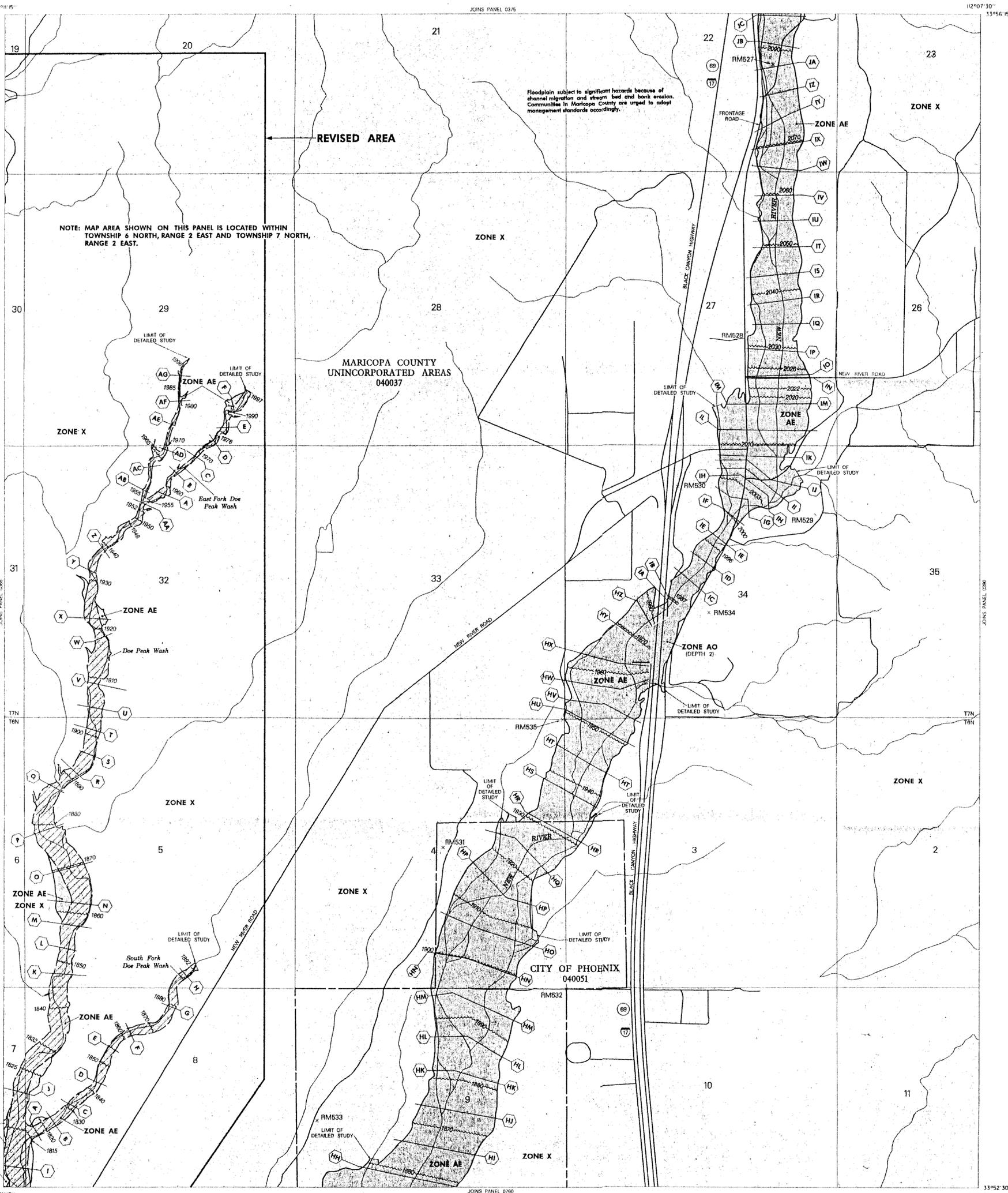
MAP NUMBER 040130755 E

MAP REVISED:

APR 15 1989

Federal Emergency Management Agency

MARK	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
RM527	2079.46	A 1-inch rebar set flush 0.7 q miles north of New River School along old SR 61 by a lone tree 150 feet q north of New River crossing, 2400 feet q northwest of the southeast corner of section 22, T7N, R2E.
RM528	2034.77	The mark J-343, 1958, is a found USCGS brass cap in a concrete post as described by the National Geodetic Survey Quadrangle 2300 feet q northwest of the southeast corner of section 27, T7N, R2E.
RM529	2048.03	A 1/2-inch rebar set halfway up north slope of a small knoll 200 feet q east of a road intersection reached from the intersection of New River Road and old SR 69 by traveling 0.8 mile then east 0.4 mile, 1400 feet q south of the northeast corner of section 34, T7N, R2E.
RM530	1949.52	A found A.D.O.T. brass cap on east headwall of bridge on old SR 69 approximately 1400 feet q south of the old New River Gas Station, 2100 feet q westerly from the southwest corner of section 34, T7N, R2E.
RM531	1973.86	A 1/2-inch rebar with an aluminum cap stamped N.E. 5101, set 35 feet west of a leap trail, 21 feet q north of a wire fence and 300 feet q north of the center of section 4, T6N, R2E.
RM532	1938.57	A standard U.S. GLOS brass cap of the northeast corner of section 9, T6N, R2E.
RM533	1897.99	A 1/2-inch rebar with an aluminum cap stamped N.E. 5103, reached by traveling west 1.1 q miles from 1-17 along Lake Pleasant Road, then south 0.3 q miles along 47th Avenue then east 600 feet q to a leap trail, then southerly 700 feet q, located 25 feet q east of the leap trail in an open area 2450 feet q north of the southwest corner of section 9, T6N, R2E.
RM534	2104.15	The mark New River is a found USCGS brass cap in a drill hole as described by the National Geodetic Survey Quadrangle 3100 feet q northwest of the southeast corner of section 34, T7N, R2E.
RM535	1951.67	A found 3-inch iron pipe with a standard U.S. GLOS brass cap of the northeast corner of section 4, T6N, R2E.



Floodplain subject to significant hazards because of channel migration and stream bed and bank erosion. Communities in Maricopa County are urged to adopt management standards accordingly.

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 8 NORTH, RANGE 2 EAST AND TOWNSHIP 7 NORTH, RANGE 2 EAST.

LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDED BY 100-YEAR FLOOD

- ZONE A** No base flood elevations determined.
- ZONE AE** Base flood elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet usually areas of ponding; base flood elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet usually sheet flow on sloping terrain; average depths determined; for areas of alluvial fan flooding, velocities also determined.
- ZONE A99** To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.
- ZONE V** Coastal flood with velocity hazard have actions; no base flood elevations determined.
- ZONE VE** Coastal flood with velocity hazard have actions; base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

- ZONE X** Areas of 500 year flood areas of 100 year flood with average depths of less than 1 feet or with drainage areas less than 1 square mile and areas protected by levees from 100-year flood.

OTHER FLOOD AREAS

- ZONE X** Areas determined to be suitable 500-year floodplain.
- ZONE D** Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

- Identified 1983
- Identified 1993
- Otherwise Protected Area

Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Boundaries

- Floodplain Boundary
- Floodway Boundary
- Zone D Boundary
- Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones

Lines

- Base Flood Elevation Line: Elevation in Feet. See Map Index for Elevation Datum.
- Cross Section Line
- Base Flood Elevation in Feet Where Uniform Within Zone: See Map Index for Elevation Datum, Elevation Reference Mark.
- Flow Mile
- Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection.

NOTES

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size or alluvial fans, nor does it identify Special Flood Hazard Areas. The community map repository should be consulted for more detailed data on FLE's, and for any information on floodway dimensions prior to use of this map for property purchase or construction purposes.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, AH, AO, AV, A99, V, VE and VI-V20.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the Floodways were computed at cross sections and interpolated between cross sections. The Floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Refer to Floodway Data table where floodway width is shown at 1/20 inch.

Coastal base flood elevations apply only landward of 0.0 NGVD, and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

This map may incorporate approximate boundaries of Coastal Barrier Resource System Units and/or Otherwise Protected Areas established under the Coastal Barrier Improvement Act of 1990 (PL 101-691).

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For adjoining map panels and base map source see separately printed Map Index.

MAP REPOSITORY
Refer to Repository Listing on Map Index.

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP:
APRIL 15, 1988

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL:
SEPTEMBER 29, 1989

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6629.

APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 370 OF 4350
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

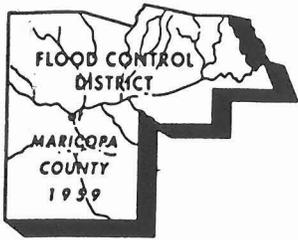
COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY UNINCORPORATED AREAS	040037	0370	E
PHOENIX CITY OF	040051	0370	E

MAP NUMBER 040130370 E

MAP REVISION:

APR 13 2000

Federal Emergency Management Agency



FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009-6399
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5897

BOARD OF DIRECTORS
Jan Brewer
Fulton Brock
Andrew Kunasek
Don Stapley
Mary Rose Garrido Wilcox

November 2, 1999

Max H. Yuan, P.E., Project Engineer
Hazards Study Branch
Mitigation Directorate
Federal Emergency Management Agency
500 C Street SW
Washington, DC 20472-0001

Case No.: 99-09-423P
LOMR
Effective February 17, 2000
Community: Maricopa County, AZ
Community No.: 040037
Panels Affected: 04013C0365 E, 0370 E,
0375 E, 0755 E, and 0760 E

Re: Technical Problems with Revised FIRM Panels resulting from
Sweat Canyon Wash Floodplain Delineation Study
(FCD Contract No. 97-12)

Dear Mr. Yuan:

In the revised FIRM panels enclosed with your Letter of Map Revision dated September 30, 1999, we found the following problems:

1. The following floodplain fringe areas are on the revised FIRM panels, but are not on the Work Maps and Annotated FIRM panels that we submitted on May 26, 1999 for this LOMR:
 - a. Panel 0365 E: Upstream of cross section SDJ on east side
Upstream of cross section SDS on west side
Upstream and downstream of cross section SDU on west side
Downstream of cross section SDV on west side
 - b. Panel 0370 E: In section 29, at cross section E of East Fork Doe Peak Wash, on west side
 - c. Panel 0755 E: Near cross section D on west and east sides
Downstream of cross section SDE on west side
At cross section SDF on west side
Between cross sections SDH and SDI, one area on west side and
two areas on east side
Upstream of cross section SDI on east side
2. On revised FIRM panel 0755 E, downstream of cross section SDD, the fringe area on the east side has been extended by approximately 450 feet when compared to the items we submitted on May 26, 1999.

sheet 2

3. On revised FIRM panel 0370 E, 300 feet downstream of cross section Y, on the west side, the fringe area is missing.
4. On panel 0365 E, the note at section 25 concerning channel migration and stream erosion is not needed. This note is for the New River floodplain (zone AE without floodway), and New River is not on this panel.

We appreciate your attention on this matter. If you have any questions, you can call me at (602) 506-4732, or fax me at (602) 506-4601.

Sincerely,



Michael W. Duncan, P.E.
Project Manager

COORD:

JIT, ~~DRA~~

INFO:

MWD ~~MWD~~

FILE:

FCD 97-12



Federal Emergency Management Agency

Washington, D.C. 20472

SEP 30 1999

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 99-09-423P

The Honorable Fulton Brock
Chairman, Maricopa County
Board of Supervisors
301 West Jefferson, 10th Floor
Phoenix, AZ 85003

Community: Maricopa County, Arizona
Community No.: 040037
Panels Affected: 04013C0370 E, 0375 E,
0755 E, and 0760 E

Effective Date of **FEB 17 2000**
This Revision:

102-I-A-C

Dear Mr. Brock:

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 (the effective FIRM and FIS report for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated January 27, 1999, Hasan Mushtaq, Ph.D., P.E., Project Manager, Engineering Division, Flood Control District of Maricopa County, requested that FEMA revise the FIRM and FIS report to show the effects of detailed hydrologic and hydraulic analyses and updated topographic information for Sweat Canyon Wash, Doe Peak Wash, South Fork, and East Fork.

All data required to complete our review of this request were submitted with letters from Dr. Mushtaq and Ms. Teri S. Mintz, P.E., Project Engineer, David Evans and Associates, Inc. Because this Letter of Map Revision (LOMR) is based on a detailed hydrologic or hydraulic study conducted by a Federal, State, or local agency to replace an approximate study conducted by FEMA, fees were not assessed for the review.

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 add elevations, floodplain and floodway boundary delineations, and zone designations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along Sweat Canyon Wash from approximately 3,000 feet downstream to approximately 31,000 feet upstream of New River Road; along Doe Peak Wash from approximately 1,000 feet upstream to approximately 26,000 feet upstream of its confluence with Sweat Canyon Wash; along South Fork from approximately 1,500 feet upstream to approximately 6,500 feet upstream of its confluence with Doe Peak Wash; and along East Fork from approximately 500 feet upstream to approximately 3,500 feet upstream of its confluence with Doe Peak Wash. The modifications are shown on the enclosed annotated copies of FIRM Panel(s) 04013C0370 E, 04013C0375 E, 04013C0755 E, and 04013C0760 E and affected portions of the Summary of Discharges Table and Floodway Data Table. On FIRM Panel 04013C0375 E, the southwest quadrant was renumbered FIRM Panel 04013C0365 E and rescaled to 1 inch equals 1,000 feet. FIRM Panel 04013C0375 E was divided into halves. Profile Panels 867P through 876P for the above-mentioned flooding sources were added to the FIS report. A revised map index is included for informational purposes only. This LOMR hereby

revises the above-referenced panel(s) of the effective FIRM dated September 29, 1989, and the affected portions of the FIS report dated September 30, 1995.

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)*
Sweat Canyon Wash:		
Approximately 200 feet upstream of New River Road	None	1,741
Approximately 31,100 feet upstream of New River Road	None	2,082
Doe Peak Wash:		
Approximately 1,100 feet upstream of confluence with Sweat Canyon Wash	None	1,755
Approximately 25,300 feet upstream of confluence with Sweat Canyon Wash	None	1,985
South Fork:		
Approximately 1,700 feet upstream of confluence with Doe Peak Wash	None	1,820
Approximately 6,400 feet upstream of confluence with Doe Peak Wash	None	1,893
East Fork:		
Approximately 650 feet upstream of confluence with Doe Peak Wash	None	1,960
Approximately 3,000 feet upstream of confluence with Doe Peak Wash	None	1,990

*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 November 12 and November 19, 1999. 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 processing a revised FIRM and FIS report for Maricopa County and Incorporated Areas; therefore, we will not physically revise and republish the FIRM and FIS report to incorporate the modifications made by this LOMR at this time. Preliminary copies of the FIRM and FIS report were submitted to your community for review on December 23, 1997. Revised preliminary copies of the FIRM and FIS report were submitted to your community for review on May 29, 1998. We will incorporate the modifications made by this LOMR into the revised FIRM and FIS report before they become 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. Sally Ziolkowski
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
The Presidio of San Francisco, Building 105
San Francisco, California 94129-1250
(415) 923-7177

FEMA makes flood insurance available in participating communities; in addition, we encourage communities to develop their own loss reduction and prevention programs. Our Project Impact initiative, developed by FEMA Director James Lee Witt, seeks to focus the energy of businesses, citizens, and communities in the United States on the importance of reducing their susceptibility to the impact of all natural disasters, including floods, hurricanes, severe storms, earthquakes, and wildfires. Natural hazard mitigation is most effective when it is planned for and implemented at the local level, by the entities who are most knowledgeable of local conditions and whose economic stability and safety are at stake. For your information, we are enclosing a Project Impact Fact Sheet. For additional information on Project Impact, please visit our Web site at www.fema.gov.

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. Max Yuan of our staff in Washington, DC, either by telephone at (202) 646-3843 or by facsimile at (202) 646-4596.

Sincerely,



Max H. Yuan, P.E., Project Engineer
Hazards Study Branch
Mitigation Directorate

For: Matthew B. Miller, P.E., Chief
Hazards Study Branch
Mitigation Directorate

Enclosure(s)

cc: Hasan Mushtaq, Ph.D., P.E. ✓
Project Manager
Engineering Division
Flood Control District of Maricopa County

Ms. Teri S. Mintz, P.E.
Project Engineer
David Evans and Associates, Inc.

TECHNICAL DATA NOTEBOOK

Volume I Introduction/FEMA forms

for

SWEAT CANYON WASH FLOOD INSURANCE STUDY

September, 1998

Prepared for:

Federal Emergency Management Agency
Risk Studies Division
Federal Insurance Administration
500 C Street, SW Room 422
Washington, DC 20472

Submitted by:

David Evans and Associates, Inc.
7878 North 16th Street, Suite 250
Phoenix, Arizona 85020
(602) 678-5151

on behalf of:
Maricopa County Flood Control District
2801 West Durango Street
Phoenix, AZ 85009
(602) 506-1501



TECHNICAL DATA NOTEBOOK

Volume I Introduction/FEMA forms

for

SWEAT CANYON WASH FLOOD INSURANCE STUDY

January, 1999

Prepared for:

Federal Emergency Management Agency
Risk Studies Division
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500 C Street, SW Room 422
Washington, DC 20472

Submitted by:

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2801 West Durango Street
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SECTION 1: INTRODUCTION

1.1 Purpose of study

The purpose of this flood insurance study is to delineate the 100-year floodplain for Sweat Canyon and Doe Peak Wash, a tributary to Sweat Canyon Wash. In order for municipalities to qualify for the Federal Flood Insurance Program, the Federal Emergency Management Agency (FEMA) requires that such an analysis be conducted to delineate floodplains and floodways through major washes. This report details the results of a study undertaken by the Flood Control District of Maricopa County (FCDMC) to determine the estimated 100-year peak flows at points along Sweat Canyon and Doe Peak Washes. A portion of the Sweat Canyon Wash was delineated as part of the *New River Floodplain Delineation, New River Dam Reservoir to Rock Springs, 1987*. Approximately three and a half miles of the Sweat Canyon Wash were delineated upstream of the confluence with New River. The Sweat Canyon Wash Topographic Mapping and Floodplain Delineation Study incorporates thirteen additional miles of study area.

Both the 6-hour and 24-hour storms were analyzed, as part of this study. As expected, the 24-hour storm event resulted in higher peak discharges. The existing Flood Insurance Study (FIS) used a discharge value of 12,400 cfs at the most upstream end of the Sweat Canyon Wash. The 100 year, 24 hour discharge value as determined from this study is 13,034 cfs, resulting in insignificant increases (less than 0.5') of computed water surface elevation at cross-section 3.873-4.129. Additionally, the differences in floodplain widths for the same cross-sections were also determined to be less than 10% of the effective FIRM map scale of 1"=1000'.

The water surface elevations and cross sectional information for the upper three cross sections of the existing Flood Insurance Study were used as the downstream conditions of this Sweat Canyon Wash study. Cross sections were placed approximately every 500' along the thirteen river miles delineated in this study. The study includes delineation of 6.5 miles of Sweat Canyon Wash, 5 miles of Doe Peak Wash, 0.5 miles of East Fork Doe Peak Wash, and 1 mile of South Fork Doe Peak Wash.

1.2 Authority for study

David Evans and Associates has been contracted by FCDMC to perform a Topographic Mapping and Floodplain Delineation Study of Sweat Canyon Wash, upstream of its confluence with New River. DEA's Project Manager for this project is Burke Lokey, P.E. The contract number is FCD 97-12. FCDMC is located at 2801 West Durango Street, Phoenix, AZ 85009 (602)506-1501. The Project Manager for the FCDMC is Hasan Mushtaq, Ph.D., P.E.

1.3 Location of study reach

Sweat Canyon Wash is located in north central Maricopa County, Arizona (see Location Map, Figure 1). The total watershed encompasses approximately 15.5 square miles and generally flows in a south/southwesterly direction. The vicinity map, Figure 2, shows the study area in relationship to the City of Phoenix area. The floodplain delineation covers Sections 19, 20, 29, 30, 31, and 32 of Township 7 North, Range 2 East, Sections 5, 6, 7, 8, 18 and 19 of Township 6 North, Range 2 East, and Section 24 of Township 6 North, Range 1 East as shown on 1:24000 scale New River and Biscuit Flat Quadrangle maps (References 6 & 7). The study joins the New River FIS previously mentioned in Section 1.1.

The climate in the area is semi-arid desert with an annual precipitation in the range of 7 to 11 inches. Precipitation is typically divided into two seasons of comparative rainfall depths: summer and winter. The summer storms are associated with warm, moist tropical air masses that enter the state from the Gulf of Mexico producing moderate to intense afternoon and evening thundershowers. Winter precipitation originates from the Pacific Ocean and produces light to moderate precipitation over relatively large areas.

1.4 Methodology

1.4.1 Hydrology

The U.S. Army Corps of Engineers HEC-1 computer program was utilized to determine peak flows at various locations within the watershed. The preparation of the input data necessary for the analysis included sub-basin delineation, determination of drainage path lengths, precipitation calculations, soil texture classification for the calculation of rainfall losses, and overland and channel flow lengths and slopes to generate the hydrographs. The sub-basin delineation was based on new topographic mapping generated as part of this study. Rainfall depths for the 100-year, 6 and 24 hour storm were determined from NOAA Atlas 2. The Desert/Rangeland and Phoenix Mountain S-graphs were utilized to develop the unit hydrographs. Soil classifications were utilized to determine rainfall losses using the Green and Ampt Loss procedures. Normal-Depth Routing was applied for routing of collector channels and the main channel. Due to the size of the watershed, JD records were applied to simulate a consistent depth/area relationship for each sub-basin.

1.4.2 Hydraulics

Haestad Method's HEC-RAS computer program, Version 2.1, was used to determine the 100-year floodplain limits and water surface elevations. Cross sections for the backwater analysis were generated using AutoCad Softdesk (Reference 5). Cross section locations and Elevation Reference Marks are shown on the work study maps found in the back pockets of Section 5.

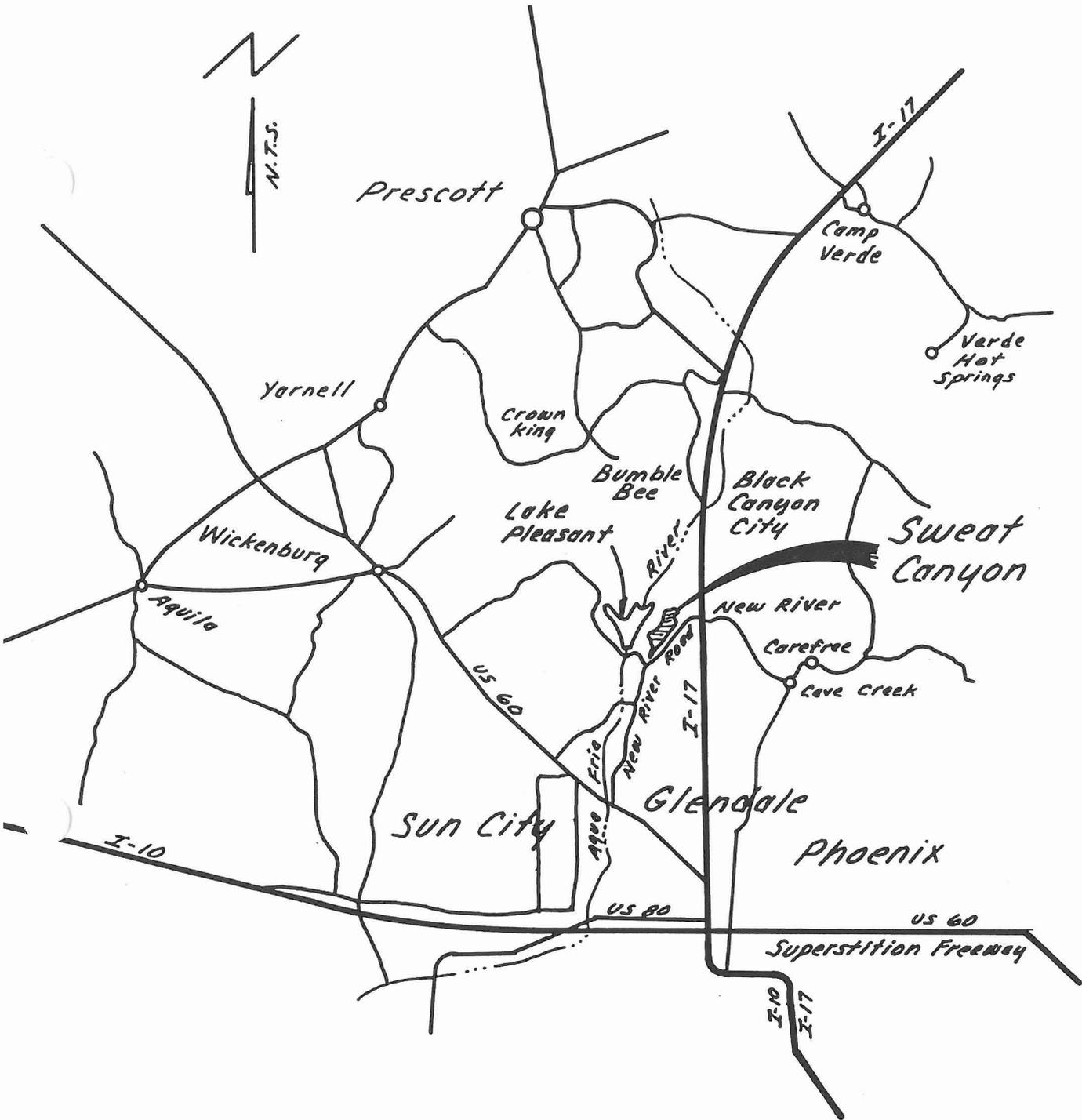
The starting water surface elevations for the three most downstream cross sections for Sweat Canyon Wash were consistent with the water surface elevations developed from the New River FIS for the same three cross sections.

1.5 Acknowledgment

The primary references used for this study are the Hydrology and Hydraulics Manuals (Volumes I and II) developed by the Flood Control District of Maricopa County. Another source was the New River Flood Insurance Study, previously referred to in Section 1.1

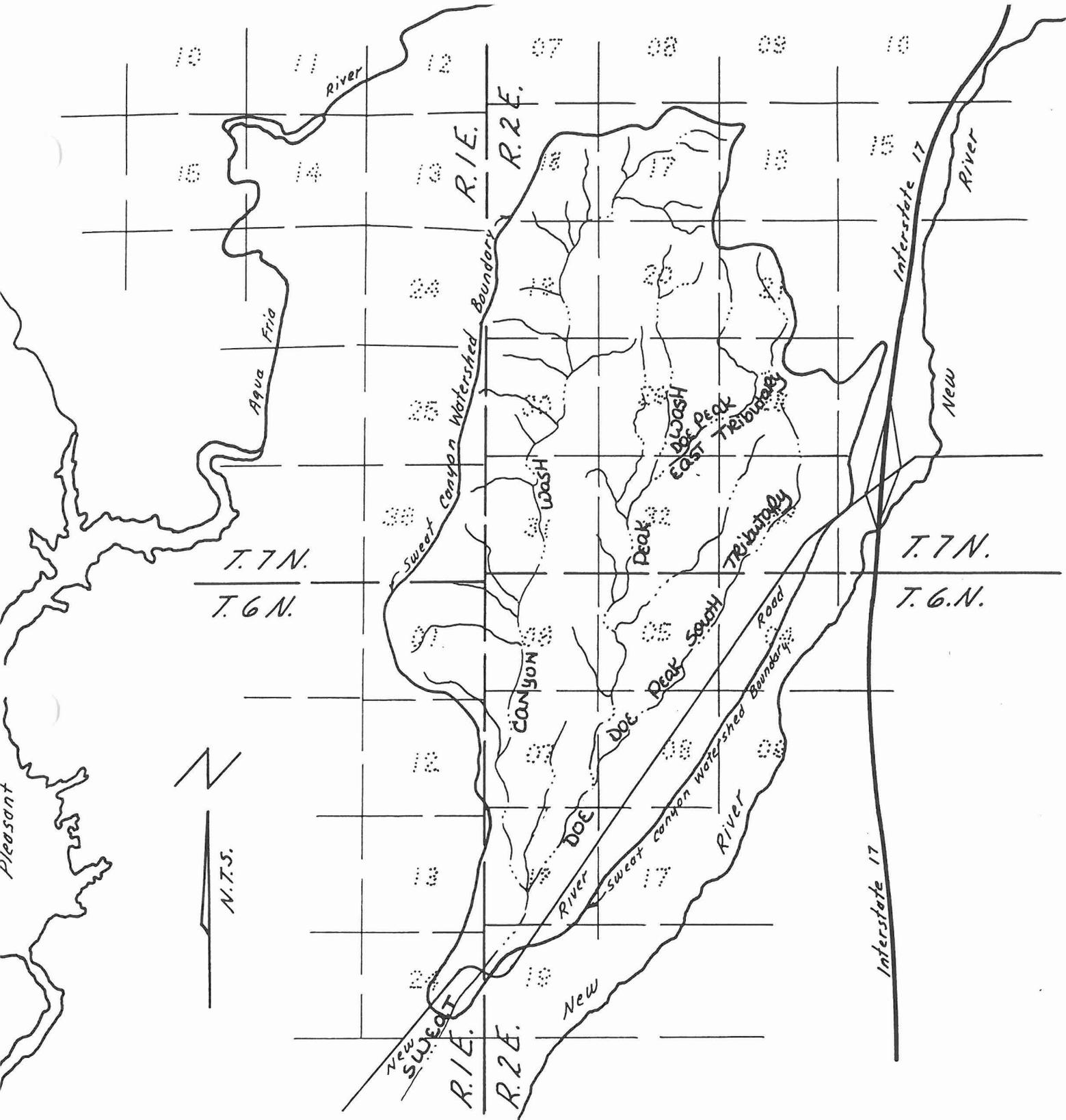
1.6 Study Results

The 100-year models were generated for the 6 and 24 hour storms as per the scope of work. The 6-hour model resulted in a peak discharge of 11,090 cfs. at the most downstream end of the study area. The 24-hour analysis resulted in a peak discharge of 13,034 cfs. The effective FIRM is based off a 24-hour peak flow of 12,400 cfs. Although it should be noted that modeling methods differed between the previous study and this current study. In particular, curve numbers were used to estimate soil losses and the routing method applied to the flows was Muskingum routing. These methods are no longer recommended by FCDMC. In addition, an areal reduction factor based on the entire New River watershed was used to reduce point rainfall data. Due to the size of the Sweat Canyon Wash watershed, it was decided that a consistent depth/area relationship would be more appropriate. The 24-hour storm was chosen to delineate the floodplain and floodway, which is consistent with the previous study.



Location Map

FIGURE 1



VICINITY MAP

FIGURE 2

Section 2.2 FEMA Forms

SECTION 2: ADWR/FEMA FORMS

Section 2.1 Study Documentation Abstract for FEMA Submittals

Study Documentation Abstract for FEMA Submittals	Initial Study	<input checked="" type="checkbox"/> Restudy	CLOMR	LOMR	Other
Section 2.1: Study Documentation Abstract for FEMA Submittals					
2.1.1	Date Study Accepted				
2.1.2	Study Contractor				
	Contact(s)				
	Address				
	Phone				
	Internal Reference Number				
2.1.3	FEMA Technical Review Contractor				
	Contact(s)				
	Address				
	Phone				
	Internal Reference Number				
2.1.4	FEMA Regional Reviewer				
	Phone				
2.1.5	State Technical Reviewer				
	Phone				
2.1.6	Local Technical Reviewer				
	Phone				
2.1.7	Reach Description				
2.1.8	USGS Quad Sheet(s) with original photo date & latest photo revision date				
2.1.9	Unique Conditions and Problems				
2.1.10	Coordination of Q's				
	Discharges				
	(Agency, Date, Comments)				

Section 2.2 FEMA

**FEDERAL EMERGENCY MANAGEMENT AGENCY
REVISION REQUESTER AND COMMUNITY OFFICIAL FORM**

O.M.B No. 3067-0148
Expires April 30, 2001

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.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

1. REQUESTED RESPONSE FROM FEMA

This request is for a:

- CLOMR A letter from FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60,65 & 72).
- LOMR A letter from FEMA officially revising the current NFIP map to show the changes to floodplains, floodway or flood elevations. LOMRs typically decrease flood hazards. (See 44 CFR Ch. 1 Parts 60 & 65.)
- Other Describe: _____

2. OVERVIEW

1. The basis for this revision request is (are): (check all that apply)

- Physical Change
- Improved Methodology/Data
- Floodway Revision
- Other Describe: New Flood Insurance Study

Note: A photograph is not required, but is very helpful during review.

2. Flooding Source: Sweat Canyon Wash

3. Project Name/Identifier: Sweat Canyon Wash FIS

4. FEMA zone designations affected: X
(example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, VE, B, C, D, X)

5. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Ex: 480301	Katy, City	TX	480301	0005D	02/08/83
480287	Harris County	TX	48201C	0220G	09/28/90
040037	Unincorporated Maricopa County	AZ	04013C	375E	9/29/89
040037	Unincorporated Maricopa County	AZ	04013C	755E	9/29/89

6. The area of revision encompasses the following types of flooding and structures. Check all that apply.

<u>Types of Flooding</u>		<u>Structures</u>	
<input checked="" type="checkbox"/> Riverine	<input type="checkbox"/> Channelization	<input type="checkbox"/> Levee/Floodwall	
<input type="checkbox"/> Coastal	<input type="checkbox"/> Bridge/Culvert	<input type="checkbox"/> Dam	
<input type="checkbox"/> Alluvial fan	<input type="checkbox"/> Fill	<input type="checkbox"/> Other (describe)	
<input type="checkbox"/> Shallow Flooding (e.g. Zones AO and AH)			
<input type="checkbox"/> Lakes			
<input type="checkbox"/> Other (describe)			

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

4. ENCROACHMENT INFORMATION

1. 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 of the revised floodway by the appropriate State agency.
2. Does the development in the floodway cause the 1% annual chance (base) elevation to increase at any location by more than 0.000 feet? Yes No N/A
3. Does the cumulative effect of all development that has occurred since the effective SFHA was originally identified cause the base flood elevation to increase at any location by more than one foot (or other increase limit if community or state has adopted more stringent criteria - even if a floodway has not been delineated by FEMA)? Yes No

If the answer to either items is Yes, please attach 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.

5. MAINTENANCE RESPONSIBILITY

The community is willing to assume responsibility for performing overseeing compliance with the maintenance and operation plans of the _____

(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.

Operation and maintenance plans are attached. Yes No N/A

6. REVIEW FEE

The review fee for the appropriate request category has been included. Yes Fee amount: \$ _____
OR

This request is based on a federally sponsored flood-control project where 50 percent or more of the project's cost is federally sponsored, or the request is based on detailed hydrologic and hydraulic studies conducted by Federal, State, or local agencies to replace approximate studies conducted by FEMA and shown on the effective FIRM; thus the project is fee exempt.
 Yes

Please see Instructions for Fee Amounts

7. SIGNATURE

Note: I understand that my signature indicates that all information submitted in support of this request is correct

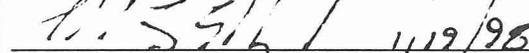

 Signature of Revision Requester

Burke Lokey, P.E., Water Resources Manager
 Printed Name and Title of Revision Requester

David Evans and Associates
 Company Name

Telephone No.: (602)678-5151 Date: 12/31/98

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

Michael S. Ellegood, Chief Engineer and General Manager
 Printed Name and Title of Community Official

Flood Control District of Maricopa County
 Community Name

Telephone No.: (602)506-4700 Date: 12/31/98

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is in accordance with 44 CFR Ch. 1, Sect 65.2


 Signature

Teri S. Mintz, Water Resources Engineer
 Printed Name and Title of Revision Requester

Registr. No. 30013 Expires (Date) 3/31/99 State AZ

Type of License/Expertise: Civil

Check which forms have been included with this request

Form Name and (Number)	Required if
<input checked="" type="checkbox"/> Hydrologic (3)	new or revised discharges
<input checked="" type="checkbox"/> Hydraulic (4)	new or revised water-surface elevations
<input checked="" type="checkbox"/> Mapping (5)	floodplain/floodway changes
<input type="checkbox"/> Channelization (6)	channel is modified
<input type="checkbox"/> Bridge/Culvert (7)	addition/revision of bridge/culvert
<input type="checkbox"/> Levee/Floodwall (8)	addition/revision of levee/floodwall
<input type="checkbox"/> Coastal (9)	new or revised coastal elevations
<input type="checkbox"/> Coastal Structures (10)	addition/revision of coastal structure
<input type="checkbox"/> Dam (11)	addition/revision of dam
<input type="checkbox"/> Alluvial Fan (12)	structures proposed on alluvial fan

FEDERAL EMERGENCY MANAGEMENT AGENCY
HYDROLOGIC ANALYSIS FORM

O.M.B No. 3067-0148
Expires April 30, 2001

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.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Note: Fill out one form for each flooding source studied

Community Name: Unincorporated Maricopa County

Flooding Source: Sweat Canyon Wash

Project Name/Identifier: Sweat Canyon Wash FIS

1. REASON FOR NEW HYDROLOGIC ANALYSIS

- No existing analysis Improved data Changed physical condition of watershed
 Alternative methodology Proposed Conditions (CLOMR) Other

For the reason stated above, please attach a detailed explanation. If a computer program/model was used in revising the hydrologic analysis, please provide a diskette with the input files for the same flood recurrence intervals contained in the FIS for that stream; and at least for the 1% annual chance (base) flood where no detailed study exists.

Explanation provided: Yes No Diskettes provided: Yes No

2. METHODOLOGY FOR NEW ANALYSIS

Indicate Method	Required Data	Data Included
<input type="checkbox"/> Statistical Analysis of Gage Records	Form 3 - Attachment A	<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/> Regional Regression Equations	Form 3 - Attachment C	<input type="checkbox"/> Yes <input type="checkbox"/> No
<input checked="" type="checkbox"/> Precipitation/Runoff Model	Form 3 - Attachment D	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/> Other	Back-up computations and supporting data	<input type="checkbox"/> Yes <input type="checkbox"/> No

3. APPROVAL OF ANALYSIS

The hydrologic analysis has already been approved by a local, state, or Federal Agency. Yes No Not Required

If Yes, attach evidence of approval. Approval attached. If No, attach explanation. Explanation attached.

4. COMPARISON OF BASE FLOOD DISCHARGES

Location:	Drainage Area (SqMi)	FIS(cfs)	Revised (cfs)
<u>Sweat Canyon Wash</u>	<u>15.5</u>	<u>12,400</u>	<u>13,034</u>

Note: When revised discharges are not significantly different than the FIS discharges, FEMA may require a confidence limits analysis (see attachment B) at a later date to complete the review.

If only a portion of a detailed study area was revised please attach an explanation describing the transition from the proposed discharges to the effective discharges. Explanation Included Explanation Not Required

5. HISTORICAL FLOODING INFORMATION

If historical data are available for the flooding source please provide: Location, peak discharges/water-surface elevations and dates, and source of information. Data Attached Data Not Available

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

ATTACHMENT A: STATISTICAL ANALYSIS OF GAGE RECORDS

Gaging Station: _____

Gage Location (latitude and longitude): _____

	FIS:		Revised:	
1. Number of years of data				
Systematic				
Historical				
2. Homogeneous data	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
3. Data adjustments	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> 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			<input type="checkbox"/> Yes	<input type="checkbox"/> No
If Yes, specify method				
10. Expected probability*			<input type="checkbox"/> Yes	<input type="checkbox"/> No
11. Comparison of results with other analyses			<input type="checkbox"/> Yes	<input type="checkbox"/> No
If Yes, describe comparison				
12. Attach analysis including plot of flood-frequency curve. Analysis Attached?	<input type="checkbox"/> Yes		<input type="checkbox"/> No	

*FEMA does not accept expected probability analyses for the purpose of reflecting flood hazard information in a FIS.

If any data are not available, indicate by N/A.

ATTACHMENT B: CONFIDENCE LIMITS EVALUATION

Stream: ____

Select one location for Confidence Limits Evaluation (*describe location*): ____

1. Discharges for selected location:

Exceedence Probability	FIS:	Revised:
10% (10-year)	__ cfs	__ cfs
2% (50-year)	__ cfs	__ cfs
1% (100-year)	__ cfs	__ cfs
0.2% (500-year)	__ cfs	__ cfs

2. 1% Annual Chance (Base) Flood Confidence Intervals

90% Confidence Interval:	5% limit	__ cfs
	95% limit	__ cfs
50% Confidence Interval:	25% limit	__ cfs
	75% limit	__ cfs

3. If the discharge of the base flood in the FIS is beyond the 50% confidence interval but within the 90% confidence interval, does the base flood 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.

4. Confidence Limits Analysis Attached? Yes No

ATTACHMENT C: REGIONAL REGRESSION EQUATIONS

1. Bibliographical Reference:

(Attach a copy of title page, table of contents, and pertinent pages including equations.)

2. Gaged or ungaged stream: Ungaged

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	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
6.	Percent of watershed urbanization				
7.	Is the watershed controlled?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
8.	Comparison with other analyses	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No

If the answer to 5, 7, or 8 is Yes, explain methodology below. If data are not available, indicate with N/A.

Comments

9. **Attach computation and supporting maps, delineating the watershed boundary and drainage area divides.**

Computation and Supporting Maps provided? Yes No

ATTACHMENT D: PRECIPITATION/RUNOFF MODEL

	FIS:	Revised:
1.	Method or model used: _____	<u>Dodson ProHEC-1 plus</u>
	Version:	<u>V. 4.01PF</u>
	Date:	<u>April 1996</u>
2.	Source of rainfall depth:	<u>NOAA Atlas 2</u>
3.	Source of rainfall distribution:	<u>SCS Type II</u>
4.	Rainfall duration:	<u>24-hour</u>
5.	Areal adjustment to precipitation (%):	<u>Depth/Area Reduction used (JD)</u>
6.	Maximum overland flow length	
7.	Hydrograph development method:	<u>S-graphs</u>
8.	Loss rate method:	<u>Green and Ampt</u>
	Source of soils information:	<u>SCS Soil Survey of Aguila-Carefree Area</u>
	Source of land use information:	<u>Undeveloped</u>
9.	Channel routing method:	<u>Normal Depth</u>
10.	Reservoir routing: <input type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
11.	Baseflow considerations: <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, explain below how baseflow was determined:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
12.	Snowmelt considerations: <input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
13.	Model calibration: <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, explain below how calibration was performed	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
14.	Future land use condition: <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, explain why below	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
15.	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.	
	Information and Maps provided? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

NOTE: FEMA policy is to base flooding on existing conditions.

Explanation for *REASON FOR NEW HYDROLOGIC ANALYSIS*:

The Flood Control District of Maricopa County undertook the study to delineate the 100-year floodplain upstream of a previously studied area, *New River From New River Dam to Rock Springs*.

Explanation of *COMPARISON OF BASE FLOOD DISCHARGES*:

This study ties in with a previous FIS, *New River from New River Dam to Rock Springs*, specifically at cross section 4.129 and continues upstream along the Sweat Canyon Tributary. The peak discharge from the previous study is 12,400 at this cross section. The peak discharge for the new Sweat Canyon FIS at the same cross section is 13,034 cfs. The difference in water surface elevations at the tie-in cross-section for the two studies is less than 0.5 feet. The difference in the floodplain widths is less than 100 feet.

Attachment D, Item #15

Precipitation/runoff model (HEC-1) located in Volume III (Hydrologic Analysis) notebook. Hydrologic model schematic (Figure 4) located in Volume III on page 3. The remaining hydrologic data also included in Volume III.

FEDERAL EMERGENCY MANAGEMENT AGENCY
RIVERINE HYDRAULIC ANALYSIS FORM

O.M.B No. 3067-0148
Expires April 30, 2001

Public reporting burden for this form is estimated to average 2.25 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.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Note: Fill out one form for each flooding source studied

Community Name: Unincorporated Maricopa County

Flooding Source: Sweat Canyon Wash

Project Name/Identifier: Sweat Canyon Wash FIS

1. REACH TO BE REVISED

Describe the limits of the revision OR submit a copy of the FIRM with the revision area clearly highlighted. Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? Yes

Downstream Limit: River mile 4.129

Upstream Limit: River mile 10.711

2. MODELS SUBMITTED

Requirements: for areas which have detailed flooding:

Full input and output listings along with files on diskette for each of the models listed below (items 1-4) and a summary of the source of input parameters used in the models must be provided. The summary must include a 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 (Base) 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 (including all calculations) for existing or pre-project conditions and revised or post-project conditions must be submitted.

1. Duplicate Effective Model Natural File Name Floodway File Name

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 requester's equipment to produce the Duplicate Effective model. This is required to assure that the effective models input data has been transferred correctly to the requester's equipment and to assure that the revised data will be integrated into the effective data to provide a continuous FIRM model upstream and downstream of the revised reach.

2. Corrected Effective Model Natural File Name Floodway File Name

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 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 File Name SW1.prj Floodway File Name SW1.prj

The Duplicate Effective model or Corrective Effective 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 model or Duplicate Effective model.

4. Revised or Post-Project Conditions Model **Natural** File Name ___ **Floodway** File Name ___

The Existing or Pre-Project Conditions model (or Duplicate Effective model 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 the proposed project this model must reflect proposed conditions.

5. Other - Please attach a sheet describing all other models submitted along with the file names. **Natural** **Floodway**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

3. STARTING WATER-SURFACE ELEVATIONS

Explain how they were determined.

Explanation Attached?

Yes

No

NOTE: If the effective study is an approximate study, the slope/area method is recommended.

For detailed analysis studies, using a known water-surface elevation is recommended.

4. RESULTS (from the model used to revise the 100-year water surface elevations)

If the results indicate any of the following, attach an explanation - to this form, or to the hydraulic model printout- as to the reasonableness of the situation.

Supercritical depth Critical Depth Drawdowns Negative Floodway Surcharges

Floodway Surcharges Greater Than Maximum Allowed by Community/State

Water surface elevations higher than the end points of cross sections.

Floodway discharge is different than the Natural 100-year (base) flood discharge.

Project causes 100-year floodplain or floodway elevations to increase (state if increases are located off the requester's property)

Explanation attached with Form

Explanation provided on attached printout

If Hydraulic model used is HEC-2, has it been checked with FEMA'S CHECK-2 computer program Yes

No

(see instructions for information on how to obtain CHECK-2)

5. REVISED FIRM/FBFM AND FLOOD PROFILES

1. Profile Transition

- a. 100-Year Water-Surface Elevations - indicate the difference in water surface elevations where the project 100-year elevations tie into the existing 100-year water surface elevations at each end of the project.

Downstream End 4.129 within 0.5 (feet)
Cross-Section #

Upstream End ___ within ___ (feet)
Cross-Section #

- b. Floodway Elevations - indicate the difference in water surface elevations where the project floodway elevations tie into the existing floodway water surface elevations at each end of the project.

Downstream End 4.129 within 0.5 (feet)
Cross-Section #

Upstream End ___ within ___ (feet)
Cross-Section #

- c. Floodway widths - indicate the difference in floodway widths where the project floodway widths tie into the existing floodway width at each end of the project.

Downstream End 4.129 within 100 (feet)
Cross-Section #

Upstream End ___ within ___ (feet)
Cross-Section #

2. Profile Checklist (check box if information has been provided on profile)

The following information (unless in parentheses) must be included at the same scale as the existing profiles for this project:

- | | | | |
|--|--|--|--|
| <input checked="" type="checkbox"/> Stream Name | <input checked="" type="checkbox"/> Community Name | <input checked="" type="checkbox"/> Corporate Limits labeled | <input checked="" type="checkbox"/> Study limits labeled |
| <input checked="" type="checkbox"/> Confluences labeled | <input checked="" type="checkbox"/> Channel Stationing | <input checked="" type="checkbox"/> Streambed profiled | <input checked="" type="checkbox"/> Cross Sections labeled |
| <input checked="" type="checkbox"/> Horizontal/Vertical Scales indicated | | <input checked="" type="checkbox"/> 100-year elevs profiled* | |
| <input checked="" type="checkbox"/> Road Crossings | <input checked="" type="checkbox"/> Labeled | <input checked="" type="checkbox"/> Low Chord Elevations | <input checked="" type="checkbox"/> Top of Road Elevations |

*All recurrence intervals in the effective study must also be profiled.

Floodway Data Table

Attach a Floodway Data Table for each cross section listed in the published Floodway Data table in the FIS report.

Floodway Data Table Attached Yes Not Required

Explanation of *STARTING WATER-SURFACE ELEVATIONS*:

The starting water surface elevation for *the Flood Delineation Study for Sweat Canyon Wash* was determined using the water surface elevation as listed in the existing Flood Insurance Study, *New River Floodplain Delineation, New River Dam Reservoir to Rock Springs, 1987*.

Explanation of reasonableness of critical depth flow regime in hydraulic analysis:

The floodplain analysis was modeled as a subcritical flow regime. The resulting water surface elevations revealed that approximately 22% of the cross sections defaulted to critical depth. Most of the cross sections that defaulted were isolated, showing some instability in flow. Cross sections were added in an attempt to stabilize the model. In most cases, the model continued to default to critical, showing that a hydraulic drop and subsequent jump occurs.

It is reasonable for the analysis to default to critical depth for this study area. The channels in the study area are mostly well-defined with some bed slopes greater than 2%.

FEDERAL EMERGENCY MANAGEMENT AGENCY
RIVERINE / COASTAL MAPPING FORM

O.M.B No. 3067-0148
Expires April 30, 2001

Public reporting burden for this form is estimated to average 1.5 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.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Note: Fill out one form for each flooding source studied

Community Name: Unincorporated Maricopa County

Flooding Source: Sweat Canyon Wash

Project Name/Identifier: Sweat Canyon Wash FIS

This is a Manual Digital submission. *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 as possible.*

1. MAPPING CHANGES

1. A topographic workmap must be submitted showing the following information (check N/A when not applicable):

- 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 floodway boundaries..... Yes No N/A
- d. Location and alignment of all cross sections with stationing control indicated. Yes No N/A
- e. Stream alignments, road alignments and dam alignments. Yes No N/A
- f. Current community boundaries. Yes No N/A
- g. Effective 100- year floodplain and floodway boundaries from FIRM/FBFM reduced or enlarged to the scale of the topographic workmap..... Yes No N/A
- h. Tie-ins between the effective and revised 100-, 500-year and floodway boundaries..... Yes No N/A
- i. The requester'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) 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 analyze..... Yes No N/A
- o. V-zone has been delineated to extend landward to the heel of the primary frontal dune..... Yes No N/A

If any items are marked No or N/A please attach an explanation.

2. What is the source and date of the updated topographic information (example: orthophoto maps, July 1985; filed survey, May 1979, beach profile, June 1987 etc.)? Aerial mapping, flown 9/23/97 & 11/7/97

3. What is the scale and contour interval of the following workmaps?

Effective FIS Scale 1" = 400' Contour Interval 4'

Revision Request Scale 1" = 200' Contour Interval 2' & 4'

NOTE: Revised topographic information must be of equal or greater detail than effective.

4. Attach an annotated FIRM/FBFM at the scale of the effective FIRM/FBFM showing the revised 100- and 500-year floodplain and the floodway boundaries and how they tie into those shown on the effective FIRM/FBFM downstream and upstream of the revisions or adjacent to the area of revision for coastal studies. FIRM/FBFM attached? Yes No

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. EARTH FILL PLACEMENT

1. The fill is: Existing Proposed N/A
2. Has fill been/will be placed in the regulatory floodway? Yes No
If Yes, please attach completed Riverine Hydraulic Analysis Form (Form 4).
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, attach certification of fill compaction (item 3c. above) by the community's NFIP permit official, a registered professional engineer, or an accredited soils engineer in accordance with Subparagraph 65.5(a)(6) of the NFIP regulations.

Fill certification attached Yes No

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 (Form 10).

Explanation for *MAPPING CHANGES, 1A*

This is a detailed study, no Zone A boundaries

Explanation for *MAPPING CHANGES, 1M, 1N, & 1O*

No coastal or V- zones

APPENDIX A: REFERENCES

A.1 Data collection summary

November 17, 1997

As part of the Scope of Work for the Floodplain Delineation and Topographic Mapping for Sweat Canyon Wash, data collection and review were performed. Many reference sources were obtained from various agencies. The results of these previous studies and other pertinent data will be used to support development of this study. This report is a summary of the data collected or reviewed.

From the Maricopa County Flood Control District's Engineering Library

1. *Floodplain Information Study for Maricopa County, Arizona, Volume V, New River Report*
US Army Corps of Engineers, Los Angeles District, April, 1967
2. *Standard Project Flood Agua Fria River*
Army Corps of Engineers, Los Angeles District, January, 1989
3. *Hydraulic and Geotechnical Engineering Studies. Channel Bank Stabilization & Protection. New River and Skunk Creek*
Army Corps of Engineers, Los Angeles District, 1976
4. *Phoenix, Arizona and Vicinity (including New River) Hydrology Report. Design Memorandum 2*
US Army Corps of Engineers, Los Angeles District, 1982
5. *New River, Skunk Creek, and Agua Fria River, Flood Control Master Plan*
Maricopa County Flood Control District, May, 1983
6. *Hydrology Report For New River Upstream of New River Dam*
US Army Corps of Engineers, Los Angeles District, January 21, 1987
7. *Aerial Mapping and Floodplain Delineation of New River*
Coe and Van Loo Consultants, 1987
8. *Deadman Wash Technical Data for Data for Hydraulic Analysis*
Howard, Needles, Tammen & Bergendoff
9. *New River, Skunk Creek Flood Control Plan*
Willdan Associates, 1982
10. *Phoenix Arizona and Vicinity (including New River)*
US Army Corps of Engineers, Los Angeles District, 1964
11. *New River Floodplain Delineation, New River Dam Reservoir to Rock Springs,*
Coe and Van Loo Consultants, 1987

From the Maricopa County Flood Control District's Hydrology Branch Library.

12. *Drainage Report for New River Bridge Project. HEC-2 Model*
Kaminski-Hubbard, April 8, 1994

From Arizona State University Engineering Library

13. *New River & Phoenix City Streams, Maricopa County, Arizona.*
Army Corps of Engineers, Los Angeles District, March, 1976
14. *Maricopa County Land Use Plan*
Maricopa County Dept. of Planning and Development, June, 1990
15. *New River Dam Embankment Criteria and Performance Report. Gila River Basin: Phoenix Arizona and Vicinity (including New River)*
US Army Corps of Engineers, Los Angeles District, February, 1987

Alternate Sources

16. *USGS, 7.5' Quadrangle Maps for: Governor's Peak, New River, Biscuit Flat, and Baldy Mountain*
US Department of the Interior, Geologic Survey, 1965
17. *Flood Insurance Rate Map, Maricopa County, Arizona and Incorporated Areas*
Federal Emergency Management Agency. September 30, 1995
Panels 04013C0755E, 04013C0760E, 04013C0765E, and 04013C0770E
18. *Soil Survey of Aguila-Carefree Area, Parts of Maricopa and Pinal Counties, Arizona*
US Department of Agriculture, Soil Conservation Service. April 1986

List of Agencies Contacted.

Maricopa County Flood Control District
Hydrology Branch. Hasan Mushtaq, Kathryn Gross.
Phoenix, Arizona

State Library and Archival Library
1700 W. Washington
Phoenix, Arizona

Department of Water Resources
2810 S. 24th St.
Phoenix, Arizona

State Land Office
1616 W. Adams
Phoenix, Arizona

Natural Resources Conservation Service
3003 N. Central Ave.
Phoenix, Arizona

Salt River Project
Phoenix, Arizona

US Army Corps of Engineers
Regulatory Branch
Planning Section

Bureau of Reclamation

US Geologic Survey
Water Resources Division Subdistrict Office
Tempe Arizona

Arizona State University Engineering Library
Tempe, Arizona

A.2 Referenced documents

Methods for Estimating Magnitude and Frequency of Floods in the Southwestern United States

United States
Geological
Survey
Water-Supply
Paper 2433

Prepared in cooperation with
the Colorado Department of
Highways, Arizona Depart-
ment of Transportation,
California Department of
Transportation, Idaho Depart-
ment of Transportation,
Nevada Department of
Transportation, New Mexico
State Highway and Trans-
portation Department,
Oregon Department of
Transportation, Texas Depart-
ment of Transportation, and
Utah Department of
Transportation



Methods for Estimating Magnitude and Frequency of Floods in the Southwestern United States

By BLAKEMORE E. THOMAS, H.W. HJALMARSON, and
S.D. WALTEMEYER

Prepared in cooperation with the Colorado Department of
Highways, Arizona Department of Transportation, California
Department of Transportation, Idaho Department of
Transportation, Nevada Department of Transportation,
New Mexico State Highway and Transportation Department,
Oregon Department of Transportation, Texas Department of
Transportation, and Utah Department of Transportation

U.S. GEOLOGICAL SURVEY WATER-SUPPLY PAPER 2433

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CONVERSION FACTORS AND VERTICAL DATUM

	Multiply	By	To obtain
	inch (in.)	25.40	millimeter
	foot (ft)	0.3048	meter
	square mile (mi ²)	2.590	square kilometer
	cubic foot per second (ft ³ /s)	0.02832	cubic meter per second
	cubic foot per second per square mile [(ft ³ /s)/mi ²]	0.01093	cubic meter per second per square kilometer

Air temperatures are given in degrees Fahrenheit (°F), which can be converted to degrees Celsius (°C) by the following equation:

$$^{\circ}\text{C} = 5/9(^{\circ}\text{F}) - 32$$

Sea level: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)—a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

variables. The regional regression analysis is discussed in the section entitled "Regional Analysis."

Models

Three models were used in this study to express the relation between peak discharge and basin and climatic characteristics. The most common relation is in the multiplicative form:

$$Q_T = aA^bB^c. \quad (3A)$$

The following linear relation is obtained by logarithmic transformation:

$$\log Q_T = \log a + b \log A + c \log B + \dots, \quad (3B)$$

where

- Q_T = peak discharge, in cubic feet per second, for T -year recurrence interval;
- A and B = explanatory variables; and
- a, b, c = regression coefficients.

Throughout the study area, drainage area is the most significant explanatory variable and is used as the first explanatory variable in all regional models. In a few parts of the study area, however, the relation between the logarithm of Q_T and the logarithm of drainage area is not linear as is expressed in equation 3B. In those areas, therefore, another model was used in which drainage area is transformed to produce a linear relation. The following equations perform that function:

$$Q_T = 10^{(a+b\text{AREA}^x)}B^c, \quad (4A)$$

or the logarithmic transformation:

$$\log Q_T = a + b\text{AREA}^x + c \log B + \dots, \quad (4B)$$

where

- AREA = drainage area;
- B = other basin or climatic characteristic; and
- x = exponent for AREA for which the relation is made linear.

The third model used in the study is another method of accounting for a nonlinear relation. In this case, the nonlinear relation is between the regional from the Q_T and AREA relation and a second

explanatory variable. The following equations were used to transform the second explanatory variable to yield a linear equation:

$$Q_T = a\text{AREA}^b(B-d)^c, \quad (5A)$$

or the logarithmic transformation:

$$\log Q_T = \log a + b \log \text{AREA} + c \log (B-d) + \dots, \quad (5B)$$

where

d = a constant, which is less than the minimum value of B , for which the relation is made linear.

Explanatory Variables

For purposes of this report, six basin and climatic characteristics are referred to as explanatory variables and are used as terms in the model equations. Additional explanatory variables that are described in the section entitled "Explanatory Variables Investigated" were considered but were not used. The six explanatory variables that were used are shown for each site in the data section. The abbreviation for each variable and method of measuring the variable are as follows.

1. **AREA** is the drainage area, in square miles, and is determined by planimetry of the contributing drainage area on the largest scale topographic map available.
2. **ELEV** is the mean basin elevation, in feet above sea level, and is determined by placing a transparent grid over the drainage-basin area, which is drawn on the largest scale topographic map available. The elevations of a minimum of 20 equally spaced points are determined, and the average of the points is taken. As many as 100 points may be needed for large basins.
3. **PREC** is the mean annual precipitation, in inches, and is determined by placing a transparent grid over an isohyetal map of mean annual precipitation. The drainage-area boundary is drawn on the map, the mean annual precipitation is determined at each grid intersection, and the values are averaged for the basin.

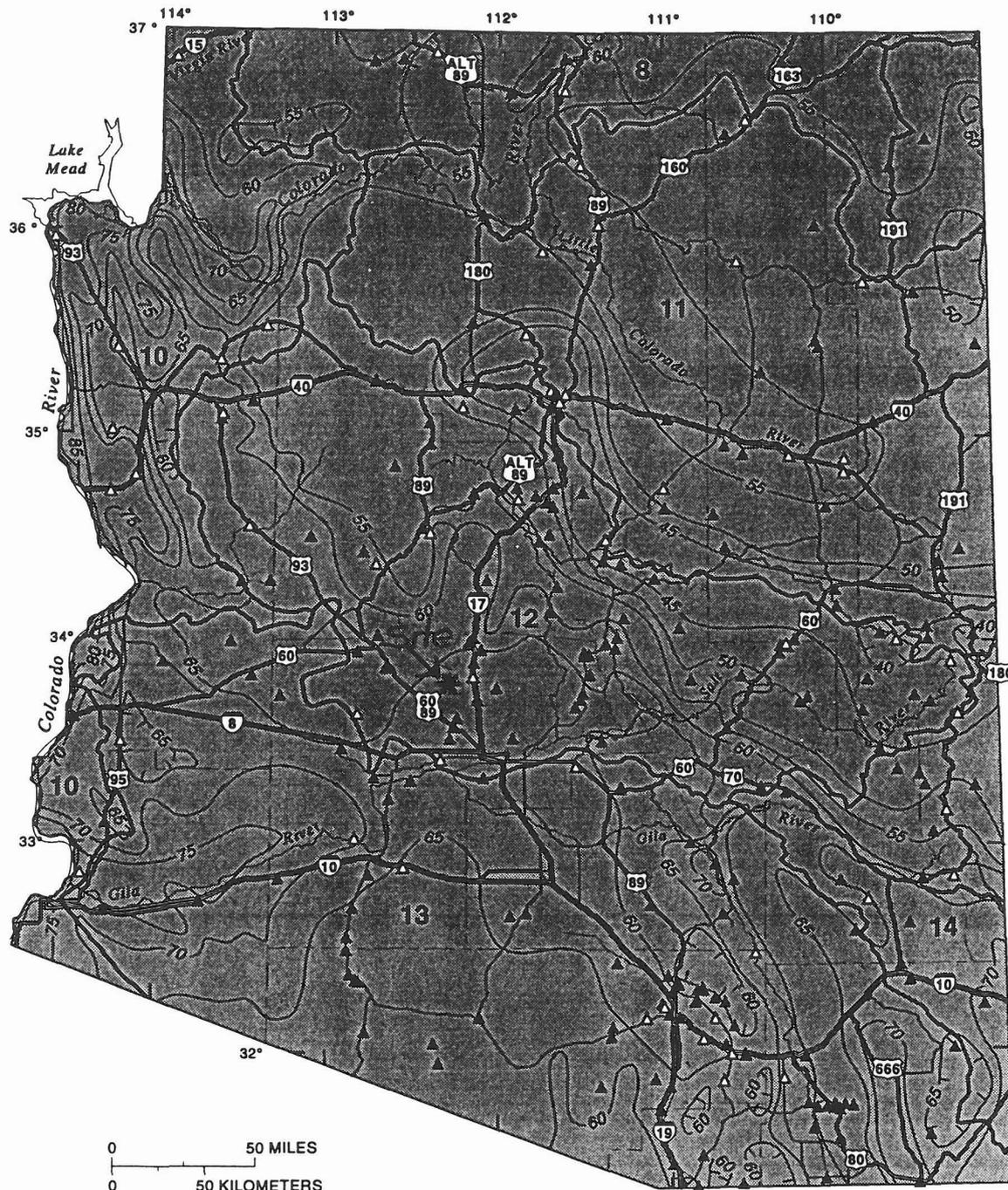
A single source of isohyetal maps is not available. To use the regression equations in

Table 4. Summary of selected characteristics of flood regions in the southwestern United States

[Numbers in parentheses in table heading are for references in text. DA, drainage area; MAP, mean annual precipitation; MBE, mean basin elevation; MAE, mean annual evaporation; LAT, latitude; LONG, longitude. Dashes indicate no data]

[Numbers in parentheses in table heading are for references in text. DA, drainage area; MAP, mean annual precipitation; MBE, mean basin elevation; MAE, mean annual evaporation; LAT, latitude; LONG, longitude. Dashes indicate no data]

Flood region number (1)	Flood region name (2)	Number of stations		Average percentage of peak discharges in gaging-station records			Explanatory variables used in regional relations (3)	Regional relations		Plots of explanatory variables (figure number) (6)	Regional 100-year peak discharge compared with 100-year peak discharge for study area (7)
		Available	Used in regional relations	Spring	Summer	Fall-winter		Table number (4)	Figure number (5)		
				April-June	July-September	October-March					
1	High Elevation	184	165	84	13	3	DA, MAP	5	19	18	Much less
2	Northwest	139	108	53	5	42	DA, MBE	6	21	20	Less
3	South-Central Idaho	40	35	80	4	16	DA, MAP	7	23	22	Less
4	Northeast	123	108	79	15	6	DA, MBE	8	25	24	Less
5	Eastern Sierras	52	37	47	16	37	DA, MBE, LAT	9	28	26,27	About the same
6	Northern Great Basin	80	80	28	50	22	DA, MBE	10	30	29	About the same
7	South-Central Utah	31	28	67	27	6	DA, MBE	11	32	31	Less
8	Four Corners	130	108	25	61	14	DA, MBE	12	34	33	More
9	Western Colorado	53	43	75	20	5	DA, MBE	13	36	35	Less
10	Southern Great Basin	104	104	8	50	42	DA	14	37	---	More
11	Northeastern Arizona	46	46	10	61	29	DA, MAE	15	39	38	More
12	Central Arizona	82	68	6	46	48	DA, MBE	16	41	40	More
13	Southern Arizona	90	73	2	78	20	DA	17	42	---	More
14	Upper Gila Basin	29	22	4	67	30	DA, MBE	18	44	43	More
15	Upper Rio Grande Basin	20	17	54	41	5	DA, MBE, LONG	19	47	45,46	About the same
16	Southeast	120	120	21	71	8	DA, MAE	20	49	48	More
1-16	All	1,323	-----	42	38	20	-----	-----	-----	-----	-----



EXPLANATION			
	BOUNDARY OF FLOOD REGIONS	 INTERSTATE HIGHWAY	 STREAMFLOW-GAGING STATION
11	FLOOD-REGION NUMBER	 U.S. HIGHWAY	 Station relation defined
		 STATE HIGHWAY	 Station relation undefined
		 LINE OF EQUAL FREE WATER-SURFACE EVAPORATION—Interval 5 inches (Farnsworth and others, 1982)	

Figure 7. Flood regions in Arizona.

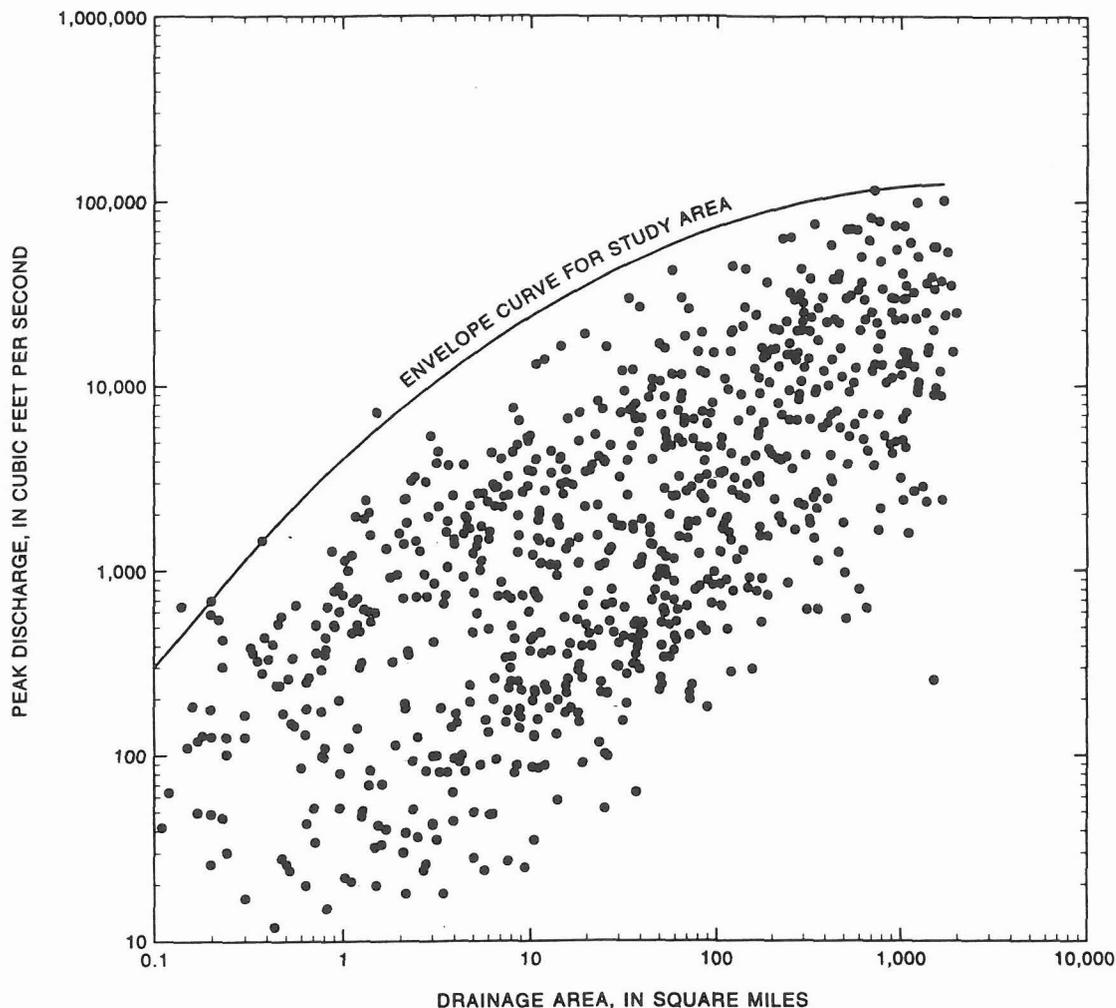


Figure 17. Relation between maximum peak discharge of record and drainage area for gaged sites in the study area.

near the limits of the range of sample values may result in a combination of values that is outside the sample range. Such extrapolations are subject to large potential errors, and the results may be misleading.

Predicted floods from regression models are an average for an entire area; therefore, a particular site may have smaller or larger floods depending on basin, climatic, and channel characteristics that are not used in the regression equations. The user of the regression models should be aware of the characteristics of the basin to which the model is applied. Because of the averaging characteristic of the regression models in this study, another limitation of their application is that estimated peak discharges near many of the flood-region boundaries may be quite different using two adjacent regional models.

APPLICATION OF METHODS

To estimate flood-frequency relations at a study site, the user should use the following steps. Examples are given for sites in one region and for sites near flood-region boundaries.

1. Using latitude and elevation of the study site, determine if the study site is in High-Elevation Region 1 or in a low- to middle-elevation region (fig. 5). If the study site is in a low- to middle-elevation region, determine the flood region of the study site using figures 6-16.
2. Using the flood region and the data section determine if the study site is on a gaged stream.

3. If the study site is at a gaged site, use the listed weighted flood-frequency values for that site in the data section.
4. If the study site is near a gaged site on the same stream, use the method described in the section that follows entitled "Sites Near Gaged Sites on the Same Stream."
5. If the study site is on an ungaged stream, use the method described in the section that follows entitled "Ungaged Sites."

$$Q_{10(g)} = 1,480 \text{ ft}^3/\text{s}, \text{ and}$$

$$Q_{100(g)} = 3,250 \text{ ft}^3/\text{s}.$$

3. Compute the peak discharges at the ungaged site:

$$Q_{10(u)} = 1,480 \left(\frac{165}{189} \right)^{0.8} = 1,330 \text{ ft}^3/\text{s},$$

$$Q_{100(u)} = 3,250 \left(\frac{165}{189} \right)^{0.8} = 2,920 \text{ ft}^3/\text{s}.$$

The computed 100-year peak discharge appears reasonable in comparison to the plot of maximum peak discharge of record and drainage area for the region (fig. 19).

Sites Near Gaged Sites on the Same Stream

Flood-frequency relations for sites near gaged sites on the same stream can be computed using the drainage-area ratio of ungaged site to gaged site. If the ratio is between 0.5 and 1.5 and the ungaged and gaged sites are draining similar basins, equation 2 should be used to compute the required peak discharges. If the ratio is outside that range or the basins are significantly different, the method for ungaged sites should be used. Flood-frequency relations for sites between gaged sites on the same stream can be determined by interpolating between values of drainage areas for gaged sites in the data section.

The following is an example of determination of the 10- and 100-year peak discharges for the Pecos River in New Mexico at an ungaged site. The drainage area (A_u) is 165 mi². In the data section, the station, 08378500 Pecos River near Pecos, New Mexico (drainage area $A_g=189$ mi²), is in High-Elevation Region 1 and is downstream from the study site.

1. Check that the drainage-area ratio A_u/A_g is between 0.5 and 1.5. That ratio is as follows:

$$A_u/A_g = \frac{165 \text{ mi}^2}{189 \text{ mi}^2} = 0.87,$$

which meets the ratio requirement. Equation 2 is used.

$$Q_{T(u)} = Q_{T(g)}(A_u/A_g)^x,$$

where

$Q_{T(g)}$ = weighted peak discharge from the data section, and

$x = 0.8$ for the High-Elevation Region 1.

2. Obtain the weighted peak discharges at the gaged site from the data section:

Ungaged Sites

Flood-frequency relations at ungaged sites can be determined using one of the following procedures, depending on the location of the site and its relation to the flood-region boundaries. The first procedure is for sites with a drainage area in one region. The second procedure is for sites with a drainage area in two low- to middle-elevation regions. The third procedure is for sites in a low- to middle-elevation region with an elevation that is within 700 ft of the lower boundary of High-Elevation Region 1.

Use the following step-by-step procedure to compute flood-frequency relations at ungaged sites.

1. If the drainage area of the study site is entirely within one flood region, compute the required information for one region. If the drainage area of the study site is in two low- to middle-elevation regions or if the elevation of the study site is within 700 ft of the lower boundary of the High-Elevation Region 1, a weighted flood-frequency relation is needed and the required information for the two adjacent regions should be computed.
2. Use table 4 and the flood region(s) of the study site to find the tables and figures containing the required information. The explanatory variables required for each region are in column 3. The numbers of the tables of equations for estimating regional

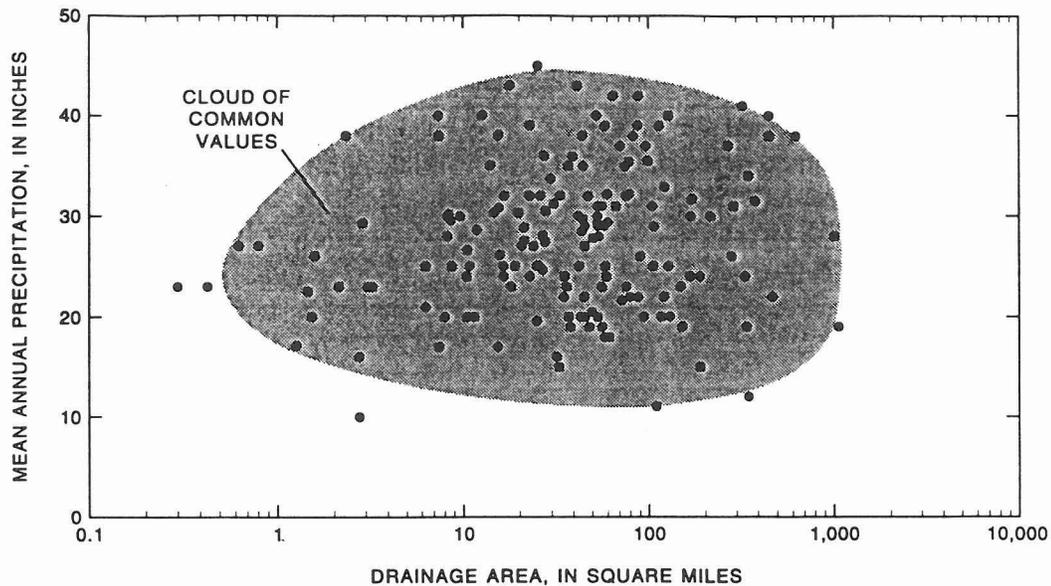


Figure 18. Joint distribution of mean annual precipitation and drainage area for gaged sites in the High-Elevation Region 1.

Table 5. Generalized least-squares regression equations for estimating regional flood-frequency relations for the High-Elevation Region 1

[Equation: Q , peak discharge, in cubic feet per second; AREA, drainage area, in square miles; PREC, mean annual precipitation, in inches. Data were based on 165 stations, Average number of years of systematic record is 28]

Recurrence interval, in years	Equation	Average standard error of prediction, in percent	Equivalent years of record
2	$Q=0.124\text{AREA}^{0.845}\text{PREC}^{1.44}$	59	0.16
5	$Q=0.629\text{AREA}^{0.807}\text{PREC}^{1.12}$	52	.62
10	$Q=1.43\text{AREA}^{0.786}\text{PREC}^{0.958}$	48	1.34
25	$Q=3.08\text{AREA}^{0.768}\text{PREC}^{0.811}$	46	2.50
50	$Q=4.75\text{AREA}^{0.758}\text{PREC}^{0.732}$	46	3.37
100	$Q=6.78\text{AREA}^{0.750}\text{PREC}^{0.668}$	46	4.19

flood-frequency relations are in column 4. Figures showing the relation between maximum peak discharges of record and drainage area are in column 5. Figures showing plots of explanatory variables and their cloud of common values are in column 6.

3. Compute the required explanatory variables using the methods described on pages 15 and 16.
4. Determine if the values of explanatory variables are within the cloud(s) of common

values shown in the figures listed in column 6 of table 4. If they are within the cloud(s) of common values, then proceed to step 5. If they are outside the cloud(s), the methods are not defined for the study site, and the methods should be used with extreme caution.

5. Use the equations for the appropriate region(s) (tables 5–20) to compute the flood-frequency relation at the study site. See the following examples for sites using equations for one region or two regions.

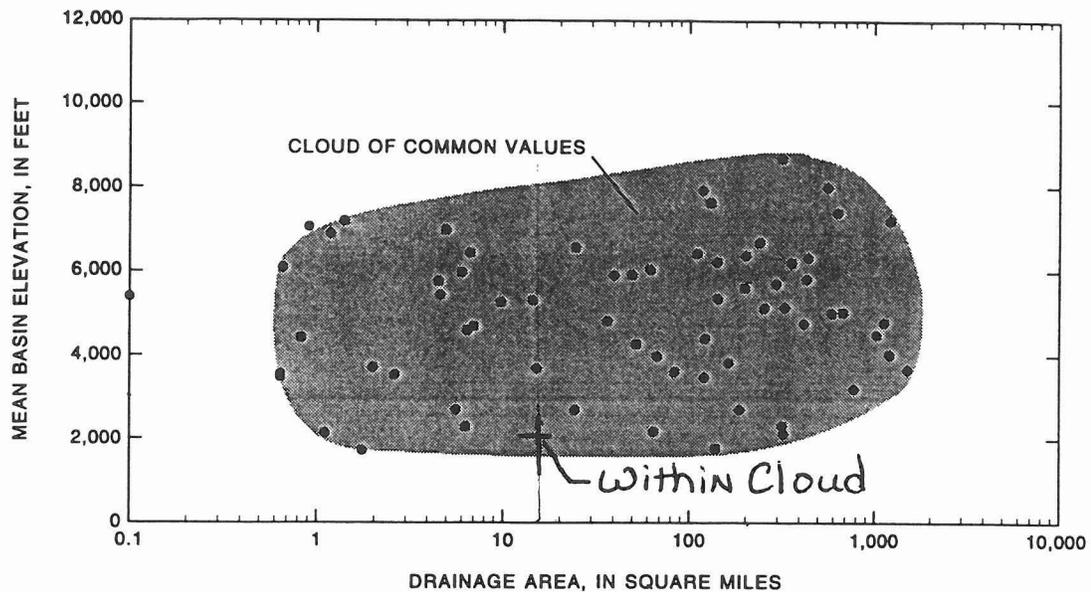


Figure 40. Joint distribution of mean basin elevation and drainage area for gaged sites in the Central Arizona Region 12.

Table 16. Generalized least-squares regression equations for estimating regional flood-frequency relations for the Central Arizona Region 12

[Equation: Q , peak discharge, in cubic feet per second; AREA, drainage area, in square miles; ELEV, mean basin elevation, in feet. Data were based on 68 stations. Average number of years of systematic record is 21]

Recurrence Interval, in years	Equation	Average standard error of prediction, in percent	Equivalent years of record
2	$Q=41.1\text{AREA}^{0.629}$	105	0.23
5	$Q=238\text{AREA}^{0.687}(\text{ELEV}/1,000)^{-0.358}$	68	1.90
10	$Q=479\text{AREA}^{0.661}(\text{ELEV}/1,000)^{-0.398}$	52	6.24
25	$Q=942\text{AREA}^{0.630}(\text{ELEV}/1,000)^{-0.383}$	40	17.8
50	$Q=10^{(7.36-4.17\text{AREA}^{-0.08})}(\text{ELEV}/1000)^{-0.440}$	37	27.5
100	$Q=10^{(6.55-3.17\text{AREA}^{-0.11})}(\text{ELEV}/1,000)^{-0.454}$	39	32.1

$\text{Area} = 15.52 \text{ SQ Mi}$ $\text{ELEV} = 2100$
 $Q = 10^{(6.55 - (3.17 \times 15.52^{-0.11}))} (2100/1000)^{-0.454} = 11,459 \text{ cfs}$

The following two examples of gaging-station records with low outliers show the effect on computed relations of using all peaks in the record compared with using the low-discharge threshold. At streamflow-gaging station 09480000, Santa Cruz River near Lochiel, Arizona, the 100-year peak discharge for an unadjusted relation is 5,200 ft³/s, which is about one-half of the discharge for the relation with the low-discharge threshold adjustment (fig. 52). The

unadjusted relation is far below the two largest annual peaks. No known physical characteristic of the drainage basin can explain the flattening of the flood-frequency relation for large floods. Also, the unadjusted relation has a 100-year discharge that is about one-quarter of the discharge using a regional estimation procedure (Reich, 1988, p. 30). The use of the low-discharge threshold of 450 ft³/s, which is greater than 5 of the 41 annual peaks, results in a

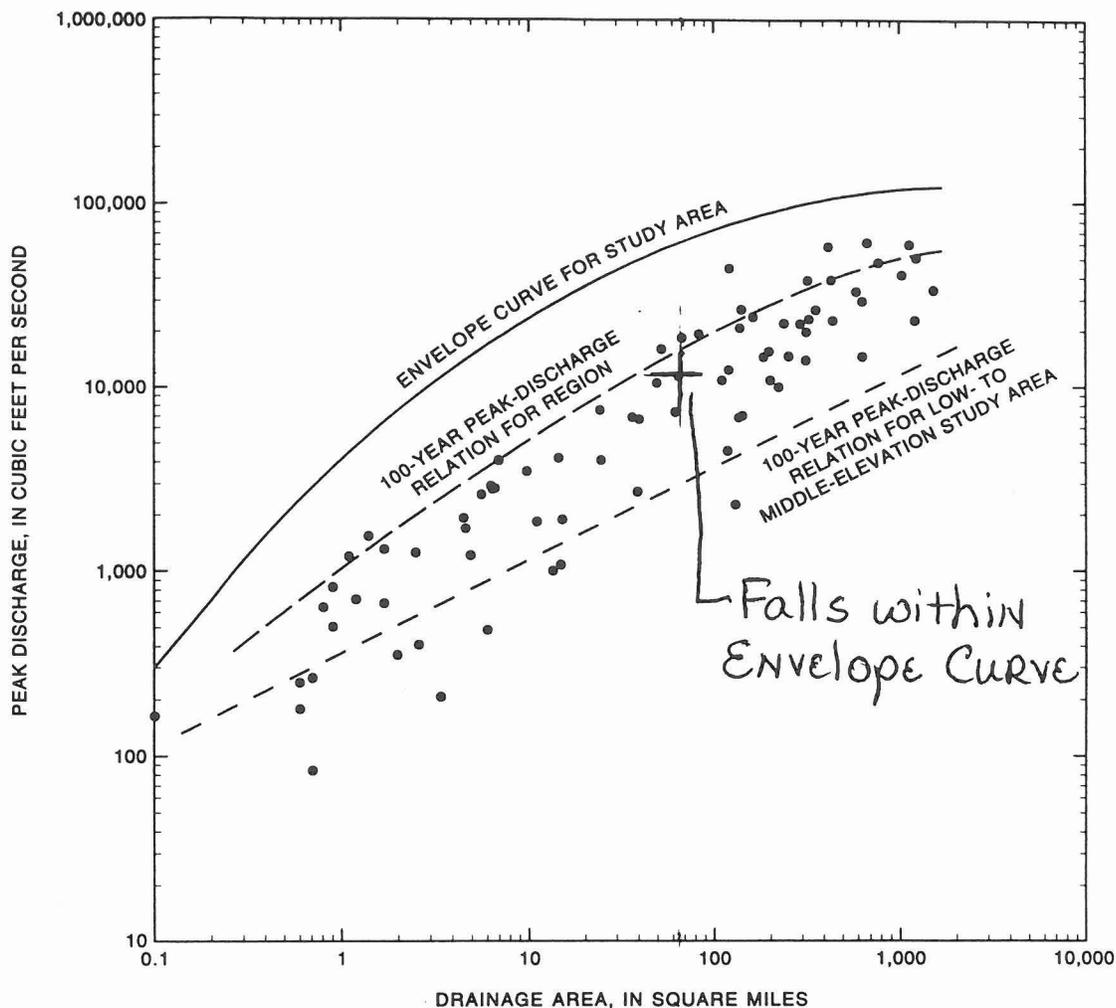


Figure 41. Relations between 100-year peak discharge and drainage area and plot of maximum peak discharge of record and drainage area for gaged sites in the Central Arizona Region 12.

flood-frequency relation that better fits the data using a Cunnane plotting position. The default statistical adjustment for this station produced a satisfactory relation for the 2- to 100-year floods (Interagency Advisory Committee on Water Data, 1982, appendix 5); however, the computed skew coefficient was considered too negative, and the low-discharge threshold of 450 ft³/s was used.

At streamflow-gaging station 09513910, New River near Glendale, Arizona, use of a low-discharge threshold of 2,500 ft³/s results in a change in the 100-year peak discharge from 75,100 ft³/s to 58,800 ft³/s (fig. 53). The channel bed is permeable sand, and a large percentage of small peaks is lost to infiltration. No peaks were below the statistical threshold for the unadjusted relation, and six peaks were below the low-discharge threshold of 2,500 ft³/s for the adjusted relation. The adjusted relation more closely fits the

large annual peaks, including the historic peak that was outside the period of systematic record.

High Outliers and Historical Periods

High outliers can have a significant effect on computed flood-frequency relations at gaged sites. High outliers are large peak discharges that depart from the high end of a fitted flood-frequency relation. Gaging-station records with high outliers usually have a large positive skew coefficient and a large variance. Many large peaks that are part of the systematic record at gaging stations are high outliers because the large peak is the maximum for an extended period of time that is much longer than the period of systematic record. Flood-frequency relations fit to those samples often have large computed discharges for the infre-

APPENDIX B: GENERAL DOCUMENTATION AND CORRESPONDENCE

B.1 Special Problem Reports

B.2 Contact (telephone) reports

CONVERSATION RECORD

DATE: 3/21/98 TIME: 9 am BY: Teri Mintz
INDIVIDUAL CONTACTED Hasan Mushtaq PROJECT NO: MARI0029
COMPANY/ AGENCY: Maricopa Flood Control District PROJECT NAME: Sweat Canyon FIS
ADDRESS: _____ PHONE: 506-4528
FAX: _____

X TELEPHONE CALL MEETING MEMORANDUM TO FILE OTHER: _____

SUBJECT OF CONTACT: Difference in peak discharge compared to New River study

Based on conversations with Sheila Norland with Baker and Associates, because the 14,441 cfs determined from the Sweat Canyon study raises the water surface elevation less than 0.5' and widens the floodplain less than 100' at the tie-in cross sections, the 100-year, 24-hour results will be used in the hydraulic analysis.

DEA will use 14,441 cfs in the three or four most upstream cross sections of the New River study, which is also the downstream condition for the Sweat Canyon study. I should explain in the TDN that the reason for the increase is primarily due to the incorrect areal reduction factor used in the New River study (.94 for a 77 square mile watershed, not applicable to much smaller Sweat Canyon watershed). Note in the TDN other items, such as differences in rainfall loss and routing methods, that could also account for difference.

ACTION REQUIRED: Document in TDN

COPY TO: _____

PAGE 1 OF 1

CONVERSATION RECORD

DATE: 6/24/98 TIME: 7 am

BY: Teri Mintz

INDIVIDUAL CONTACTED Hasan Mushtaq

PROJECT NO: MARI0029

PROJECT NAME: Sweat Canyon FIS

COMPANY/ AGENCY: Maricopa Flood Control District

ADDRESS: _____

PHONE: 506-4528

FAX: _____

X TELEPHONE CALL MEETING MEMORANDUM TO FILE OTHER: _____

SUBJECT OF CONTACT: Order of Technical Data Notebook (TDN)

The telephone conversation included a discussion on how many notebooks are required, size of notebooks, and which sections should be included in each notebook. Sections 1 & 2 will be included in the first notebook called *TDN*, Section 3 *Survey* will be in a separate notebook, Section 4 *Hydrology* and its associated maps will be in a separate notebook, and Section 5 *Hydraulics* and its associated maps in another notebook. The notebooks should be no wider than 2" and each contain a Table of Contents. The Table on Contents should state, on the same line, "(Under separate notebook)" for the sections that are not included in that particular notebook. To reduce the number of pages, double-sided pages can be used.

ACTION REQUIRED: Document in TDN

COPY TO: _____

B.3 Meeting minutes or reports

Meeting Notes

Project: Sweat Canyon Flood Insurance Study

Project No: DEA #MARI0029

Date: July 16, 1998

Notes By: Teri S. Mintz

Location: Flood Control District of Maricopa County (FCDMC) Offices
2801 West Durango Street

Attendees: (HM) Hasan Mushtaq, FCDMC
(PC) Pedro Calza FCDMC
(TM) Teri Mintz, DEA
(TC) Tami Clifton DEA

Distribution: Attendees

Items Discussed:

1. Review of Sweat Canyon FIS included discussion on the HEC-RAS model defaulting to critical depth for much of the run while the hydrologic analysis showed subcritical regime. It was decided that more analysis will be prepared to verify the n values used throughout the analysis. Sensitivity analysis, ineffective flow area, and other sources will be used as well as checking the hydrologic analysis.
2. A few comments were made on linetypes and font styles on the work study drawings. Hasan gave DEA an example that he would like followed.
3. There were several items discussed pertaining to the Rio Verde FIS. The main issue was the fee proposal. Pedro felt that the survey and floodplain portions were too high.
4. Also regarding the Rio Verde FIS, it was decided that the new mapping would be used for the hydrology for the northern portion east of 136th St and COS GIS topo for west of 136th St. This would affect the schedule, specifically the start time for the hydrologic portion of the study. The other possible problem with doing this is that the common boundary for the north and south watershed may not be the same. The previously studied hydrology for the southern watershed will still be used for the FIS (i.e. this contract will include the 16 square miles of hydrology to the north)
5. Pedro pointed out that 2' contouring exists for the lower reach of the southern watershed that was used to delineate the floodplain. This mapping needs to tie into the new mapping and floodplain mapping.
6. Pedro also explained that the FCD would be responsible for the property research, specifically the name and address for each property owner within the watershed for purposes of access. DEA would be responsible for sending out the notices and rights-of-entry.

If there should be any changes to these items, please notify me.

Meeting Notes

Project: Sweat Canyon Flood Insurance Study

Project No: DEA #MARI0029

Date: April 21, 1998

Notes By: Teri S. Mintz

Location: Flood Control District of Maricopa County (FCDMC) Offices
2801 West Durango Street

Attendees: (PC) Pedro Calza, FCDMC
(HM) Hasan Mushtaq, FCDMC
(KG) Kathryn Gross, FCDMC
(TM) Teri Mintz, DEA

Distribution: Attendees

Items Discussed:

1. KG submitted her review comments, dated April 21, 1998. The comments were reviewed with the attendees.
2. TM requested if public review was required for the procedure required for the naming of the washes. HM said that no public review was necessary for the naming. TM will fill out forms and return them to HM.

If there should be any changes to these items, please notify me.

Meeting Notes

Project: Sweat Canyon Flood Insurance Study

Project No: DEA #MARI0029

Date: March 5, 1998

Notes By: Teri S. Mintz

Location: Flood Control District of Maricopa County (FCDMC) Offices
2801 West Durango Street

Attendees: (HM) Hasan Mushtaq, FCDMC
(PC) Pedro Calza, FCDMC
(KG) Kathryn Gross, FCDMC
(AA) Afshin Ahouraiyan, FCDMC
(TM) Teri Mintz, DEA

Distribution: Attendees, Aerial Mapping, Tom Lute DEA

Items Discussed:

1. KG submitted her review comments, dated March 5, 1998. The comments were reviewed with the attendees.
2. TM discussed the status of the mapping submittal. Aerial Mapping is to resubmit the mapping HIS early next week. This is per Mike Vine at Aerial Mapping. DEA at Portland is currently working on the survey portion of the HIS and estimate submittal in three weeks. The survey portion of Technical Data Notebook (TDN) will be submitted about the same time.
3. There was discussion as to how to resolve the issue of the 24-hour storm event having a higher peak than the 6-hour storm event. It will need to be determined which storm event was used as the basis for the New River hydraulic analysis. According to the Drainage Design Manual Volume I, a 6-hour duration should be used for drainage areas less than 20 square miles.
4. TM said that the second Public Notice will be published in the Sonoran News. No response was received from the Desert Advocate.
5. TM discussed Section 4.2.4 in the TDN. This section addresses the statistical parameters used in the frequency analysis. Because there are no gages located on Sweat Canyon Wash, this analysis will not be done. This will be explained in that section of the TDN. Section 4.5.2 addresses the verification of results using indirect methods. Regression equations set forth by the USGS will be used in the analysis.

If there should be any changes to these items, please notify me.

Meeting Notes

Project: Sweat Canyon Flood Insurance Study

Project No: DEA #MARI0029

Date: January 30, 1998

Notes By: Teri S. Mintz

Location: Flood Control District of Maricopa County (FCDMC) Offices
2801 West Durango Street

Attendees: (AA) Afshin Ahouraiyan, FCDMC
(KG) Kathryn Gross, FCDMC
(TM) Teri Mintz, DEA

Distribution: Attendees

Items Discussed:

1. A review of the FCD's comments on the sub-basin delineation map. More detailed topo was provided to FCD to explain why several items were not changed. Agreement was made on the reason why the changes were not made.
2. After a field visit, the culverts on Lake Pleasant Road were found to contain silt, clay sand, and cobbles. After discussions with Afshin, it was decided that separate analyses would be performed for each culvert or set of culverts based on the existing conditions. The resulting rating tables will be incorporated into the HEC-1 models.
3. I inquired if there were particular tables that summarize the hydrologic information that FCD would like used. They said that there were not established tables, just that the tables needed to include the information required as part of the TDN.

If there should be any changes to these items, please notify me.

Meeting Notes

Project: Sweat Canyon Flood Insurance Study

Project No: DEA #MARI0029

Date: January 8, 1998

Notes By: Teri S. Mintz

Location: Flood Control District of Maricopa County (FCDMC) Offices
2801 West Durango Street

Attendees: (HM) Hasan Mushtaq, FCDMC
(BL) Burke Lokey, DEA
(TM) Teri Mintz, DEA

Distribution: Attendees

Items Discussed:

1. The mapping submittal should be in hard copy format (scale 1"=1000') and digital format. This will be submitted to FCD Friday (January 9, 1998). The GIS portion of the mapping will be submitted to Marta directly, week of 1/12/98. A copy of transmittal will be sent to Hasan.
2. The decision to include or exclude transmission losses for project is to be made by Primatch Engineering, who prepared the study, with DEA concurrence. Primatch will be notified and decision will be reflected in hydrologic analysis. Copy of transmission losses report was given to Hasan.
3. Hasan was given copy of affidavit from Arizona Republic. Four calls have been made to the Desert Advocate to obtain affidavit with no response yet.
4. Hasan was given monthly status report for December.
5. Hasan will be out of office beginning January 19th. Kathryn Kromer-Gross is hydrologic contact while Hasan is out of office. Interim hydrology review is scheduled for submittal mid-February with final submittal scheduled for mid-April.

If there should be any changes to these items, please notify me.

Meeting Notes

Project: Sweat Canyon Flood Insurance Study

Project No: DEA #MARI0029

Date: November 13, 1997

Notes By: Teri S. Mintz

Location: Flood Control District of Maricopa County (FCDMC) Offices
2801 West Durango Street

Attendees: (HM) Hasan Mushtaq, FCDMC
(BL) Burke Lokey, DEA
(TM) Teri Mintz, DEA

Distribution: Attendees

Items Discussed:

1. Survey portion of the Technical Data Notebook (TDN) and the DTM is scheduled for submittal to FCD January 9, 1998. This should not be affected by portion of watershed that was reflowed due to panels not being visible.
2. HM will be leaving on vacation at the end of January and be back first week in March.
3. HM will find out who is the contact for the hydrologic portion of contract.
4. Data collection report should be delivered to FCD first week of December.
5. HM will send copies of TDN for survey.
6. Field visit for determination of 'n' value should be set up after cross section locations for HEC-RAS are determined. Notification to ADWR (Dave Creighton), State Lands, Phoenix, Primatech, and of course, FCD should be made.
7. The required check plots utilizing HIS format has been deleted from scope. Instead use the check list given to DEA from Marta.

If there should be any changes to these items, please notify me.

Meeting Notes

Project: Sweat Canyon Flood Insurance Study

Project No: DEA #MARI0029

Date: September 17, 1997

Notes By: Teri S. Mintz

Location: Flood Control District of Maricopa County (FCDMC) Offices
2801 West Durango Street

Attendees: (PC) Pedro Calza, FCDMC
(HM) Hasan Mushtaq, FCDMC
(BL) Burke Lokey, DEA
(TM) Teri Mintz, DEA

Distribution: Attendees

Items Discussed:

1. **Task 1** - Notice to proceed was sent to Roger at DEA 9/2/97 and ends 4/25/99. Coordination meetings shall be held once a month, starting after the mapping is complete or before public meeting is held. This meeting may not be required if it is determined that State Lands is the primary landowner along the wash. HM to check with FCD GIS department to determine ownership. The coordination meetings should be held in conjunction with all review meetings.
2. Quarterly estimates should use real dollars spent. DEA will need to update quarterly projection on the monthly billing if schedule is changing.
3. DEA will submit legal advertisement twice - once ASAP and the second just before FEMA submittal. HM will send example of legal advertisement.
4. Evaluation will be performed at the end of hydrologic acceptance and after FEMA review. The evaluation is a two way review that looks for methods to improve process.
5. **Task 2** - FCD will request any existing data submitted to FEMA
6. DEA will perform local research. This will include, but not limited to, FCD, MCDOT, State Lands.
7. Draft report documenting Data Collection should be prepared by DEA within 90 days of Notice to Proceed.
8. **Task 3** - Most of the items in the topographic mapping task have been discussed and already performed, although it was stressed that the HIS documentation will need to be approved before hydrology can be submitted to FCD.
9. HM will send an example for monthly billing.
10. **Task 4** - The latest FEMA Document 37 is dated January 1996. DEA is to check if a copy is required.
11. **Task 5** - Most items have been discussed in July 29th meeting. However, HM will send DEA copy of Technical Data Notebook (TDN) and S-190 examples.
12. HIS data for hydrology to be completed and approved by FCD at this time.

13. Hydrologic analysis must be approved by FCD before hydraulic submittals.
14. **Task 6** - HM will send DEA sample of 'n' value determination and field reconnaissance report.
15. FCD requires documentation of lisp routines, including testing, used in hydraulic analyses.
16. **Task 7** - DEA has received copy of HIS Data Specification, Revision 2.2. The specifications may be revised and DEA has option which Specification will be used in submittal.
17. **Task 8** - Two copies of TDN will be required for FEMA submittal. After FEMA acceptance, four copies of TDN will be submitted for FCD.

Meeting Notes

Project: Sweat Canyon Flood Insurance Study

Project No: DEA #MARI0029

Date: July 29, 1997

Notes By: Teri S. Mintz

Location: Flood Control District of Maricopa County (FCDMC) Offices
2801 West Durango Street
Phoenix, AZ 85009

Attendees: (KK) Kathryn Kromer, FCDMC
(AA) Afshin Ahouraiyan, FCDMC
(HM) Hasan Mushtaq, FCDMC
(BL) Burke Lokey, DEA
(TM) Teri Mintz, DEA

Distribution: Attendees

Items Discussed:

1. Tie-in for hydraulic study for Sweat Canyon Study will be cross section 4.129 from Sweat Canyon Wash Tributary that is part of New River study. Two additional cross sections, for a total of three, will be included in Sweat Canyon HEC-RAS model. The peak discharge for these cross sections is 12,400 cfs. Peak discharge of 20,600 cfs occurs at the confluence of the Sweat Canyon Wash Tributary and New River. Very preliminary HEC-1 results at this time, show a peak discharge of 16,400 cfs, raising the issue of resolving any difference in discharges between the two studies. This will have to be resolved at a later date when the final numbers are determined.
2. The method for developing the unit hydrograph was discussed and it was decided that S-graphs will be utilized. Specifically the Phoenix Mountain and Desert/Rangeland S-graphs will be used based on criteria laid out in the Hydrology Manual that is Phoenix Mountain used for watersheds that drain predominantly mountainous terrain, Desert/Rangeland for natural areas with little to moderate relief, such as foothills, distributary flow areas, and other undeveloped desert areas.
3. Either Normal Depth or Muskingum-Cunge Method will be used for channel routing. Both of these methods utilize an 8 point cross section with applicable n coefficients. The New River Study used the Muskingum Routing Method, however, scope specifies Muskingum-Cunge or Normal-Depth.
4. Precipitation values will be taken from the 100-year, 6-hour and 100-year, 24-hour NOAA Atlas 2 isopluvials. One value, taken from the mid-range of the watershed, will be used in the HEC-1 analysis. The analysis that produces the highest peak discharges will be used in the hydraulic analysis.
5. The version of HEC-1 that will be used in the hydrologic analysis was discussed. The extended version, allowing 2000 ordinates will be required. This is the version that DEA has and will be using. This will allow the entire 24 hour storm to be analyzed.

6. The soil condition for calculating the Dtheta was discussed. An analysis using both dry and normal conditions can be done and compared. Some type of analysis will be performed to determine the soil condition from the New River Study for sub-basins in the vicinity of the Sweat Canyon Wash Study.
7. A Land Use Map will be required as part of the study. TM will request this from Steve Bruffy at FCDMC.
8. The topographic base map showing sub-basins, routing reaches, centroid path, etc. will be presented for review at the working drawing scale. The final map submitted with the report will be 1"=2000' scale

If you have any changes to these meeting notes, please let me know. Otherwise I'll continue with the project based on this information.

B.4 General Correspondence



DAVID EVANS AND ASSOCIATES, INC.

7878 N. 16th Street

Suite 250

Phoenix, Arizona 85020

Tel: 602.678.5151

Fax: 602.678.5155

T R A N S M I T T A L

TO: Hasan Mushtaq
Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

DATE: January 05, 1999 November 08, 1996

FROM: Teri S. Mintz

PROJECT: Sweat Canyon FIS

PROJ. #: MARI0029

Table with 4 columns: ITEM, COPIES, DATE, DESCRIPTION. Row 1: 1, 2, Volumes I-V TDN Sweat Canyon. Row 2: 2, 1, FCD's redline comments.

- AS YOU REQUESTED, FOR YOUR APPROVAL, RETURN REQUESTED, DOCUMENT CONTROL, FOR YOUR INFORMATION, FOR YOUR REVIEW

COMMENTS:

The only changes I have made, besides your minor comments were slight changes to floodway run to correct the -.07' delta for xsec .283 on East Fork and improper encroachment between xsec's .206-.302, 1.624-1.910, and 3.380-3.427 (see attached HEC-RAS output). I have sent out the original work drawings to Aerial Mapping for their seal and two sets of blueines will be sent to you to replace those I am sending you now. That will be the only change to the drawings so you can use these for your final review. Also included is the Survey notebook from Tom Lute. Let me know if there is anything else we need for the FEMA submittal. It's been fun!!! Now we're ready for more fun with Rio Verde.

Handwritten signature: Teri



FLOOD CONTROL DISTRICT
of
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TT (602) 506-5897

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December 30, 1998

Burke Lokey, P.E.
David Evans and Associates, Inc
7878 North 16th Street, Suite # 250
Phoenix, Arizona 85020

Re: Review comments on Sweat Canyon Wash FIS
FCD Contract No. 97-12

Dear Mr. Lokey:

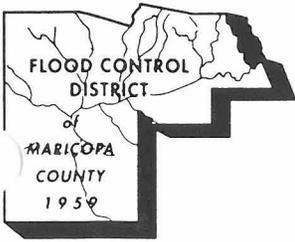
I have completed reviewing the latest submittal on the above-mentioned study, dated December 24, 1998. Please find the required minor corrections as marked in the Notebooks. However, the review comments on the Technical Data Notebook, Volume II, Survey and Mapping Information, dated December 7, 1998, have not been addressed.

Please make an attempt to finalize all Technical Data Notebooks and prepare the FEMA submittal package according to Task 8.1 of the scope of work.

Should you have further questions, please feel free to contact me at (602) 506-4528.

Sincerely,

Hasan Mushtaq, Ph.D., P.E.
Engineering Division



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of
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December 7, 1998

Burke Lokey, P.E.
David Evans and Associates, Inc
7878 North 16th Street, Suite # 250
Phoenix, Arizona 85020

Re: **Review comments on Sweat Canyon Wash FIS - Technical Data Notebook, Volumes I, II, and V, FCD Contract No. 97-12**

Dear Mr. Lokey:

The review of the Technical Data Notebook, Volumes I, II, and V, on the above-mentioned study, has been completed. The review comments on the subject matter are listed below:

Technical Data Notebook, Volume I

- (1) Please address comments as marked in the text.
- (2) Some FEMA forms are incomplete. Please completely fill the required FEMA forms.
- (3) Riverine/Coastal Mapping Form MT 2 Form 5 is required for the Flood Insurance Study.

Technical Data Notebook, Volume II

- (1) The mapping accuracy limits, as described in the FEMA 37, Flood Insurance Study, Guidelines and Specifications for Study Contractors, Federal Emergency Management Agency, January 1995, are not satisfied. Please provide acceptable mapping accuracy limits for the study.

Technical Data Notebook, Volume V

None

Should you have further questions, please feel free to contact me at (602) 506-4528.

Sincerely,

Hasan Mushtaq, Ph.D., P.E.
Engineering Division



DAVID EVANS AND ASSOCIATES, INC.

TRANSMITTAL

7878 N. 16th Street

TO: Hasan Mushtaq
Flood Control District of Maricopa County
2801 W Durango Street
Phoenix, AZ 85009

Suite 250

Phoenix, Arizona 85020

DATE: December 01 1998 November 08, 1996

Tel: 602.678.5151
Fax: 602.678.5155

FROM: Teri S. Mintz

PROJECT: Sweat Canyon FIS

PROJ. #: MARI0029

Table with 4 columns: ITEM, COPIES, DATE, DESCRIPTION. Contains 4 rows of data regarding FEMA Forms, Draft FIS Data, Table of Contents, and Survey notebook.

- Checkboxes for AS YOU REQUESTED, FOR YOUR APPROVAL, RETURN REQUESTED, DOCUMENT CONTROL, FOR YOUR INFORMATION, FOR YOUR REVIEW.

COMMENTS:

Missing from the FEMA Forms is an approval letter from the District regarding the study. Discard the previous profile submittal. I have included a replacement set of profiles that show the page numbers now that the rest of the notebook is complete. This completes the submittal package. Let me know if you have any comments or adjustments. Thanks

Handwritten signature: TERI



DAVID EVANS AND ASSOCIATES, INC.

T R A N S M I T T A L

7878 N. 16th Street

TO: Hasan Mushtaq
FCDMC
2801 West Durango St
Phoenix, AZ 85009

Suite 250

Phoenix, Arizona 85020

DATE: November 24, 1998

Tel: 602.67.5151

FROM: Teri Mintz

Fax: 602.678.5155

PROJECT: Sweat Canyon FIS

PROJ. #: FCD 97-12, DEA MARI0029

ITEM	COPIES	DATE	DESCRIPTION
1	1		Flood Profiles for Sweat Canyon FIS
2	1		Updated photo documents for E.1. Roughness Coefficient Estimation (Volume III)

- AS YOU REQUESTED
- FOR YOUR APPROVAL
- RETURN REQUESTED
- DOCUMENT CONTROL
- FOR YOUR INFORMATION
- FOR YOUR REVIEW
- _____

COMMENTS:

HEC-RAS disk delivered 11/30/98



DAVID EVANS AND ASSOCIATES, INC.

T R A N S M I T T A L

7878 N. 16th Street

TO: Hasan Mushtaq
FCDMC
2801 West Durango St
Phoenix, AZ 85009

Suite 250

Phoenix, Arizona 85020

DATE: November 19, 1998

Tel: 602.678.5151
Fax: 602.678.5155

FROM: Teri S. Mintz

PROJECT: Sweat Canyon

PROJ. #: MARI0029

Table with 4 columns: ITEM, COPIES, DATE, DESCRIPTION. Contains 6 rows of project details.

- AS YOU REQUESTED, FOR YOUR APPROVAL, RETURN REQUESTED, DOCUMENT CONTROL, FOR YOUR INFORMATION, FOR YOUR REVIEW

COMMENTS:

The profiles and FEMA forms are still being processed, but I thought you might want the floodplain and floodway analyses and maps to check. Also, a few corrections are required in the color photos for the n value report. These are being made now and will be included in the next submittal. The profiles, FEMA forms, and Survey notebook should be to you by Wednesday (11/25/98). Thank you.



FLOOD CONTROL DISTRICT
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OCT 29 1998

Burke Lokey, P.E.
David Evans and Associates, Inc
7878 North 16th Street
Suite # 250
Phoenix, Arizona 85020

Re: Sweat Canyon Wash FIS Hydrology - Technical Data Notebook Volume III
FCD Contract No. 97-12

Dear Mr. Lokey:

The review of the above-mentioned report has been completed. As per staff recommendation, the Hydrology report is approved and accepted as of the date of this letter.

Should you have further questions, please feel free to contact me at (602) 506-4528.

Sincerely,

Hasan Mushtaq, Ph.D., P.E.
Engineering Division



DAVID EVANS AND ASSOCIATES, INC.

TRANSMITTAL

929 East Camelback Road

TO: Hasan Mushtaq
FCDMC
2801 West Durango St
Phoenix, AZ 85009

Suite 240

Phoenix, Arizona 85016

DATE: October 15, 1998

Tel: 602.956.9850

FROM: Tami Clifton

Fax: 602.956.9853

PROJECT: Sweat Canyon FIS

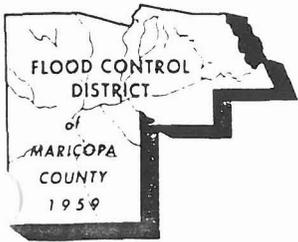
PROJ. #: FCD 97-12, DEA MARI0029

Table with 4 columns: ITEM, COPIES, DATE, DESCRIPTION. Contains 4 rows of document details.

- AS YOU REQUESTED, FOR YOUR INFORMATION, FOR YOUR APPROVAL, FOR YOUR REVIEW, RETURN REQUESTED, DOCUMENT CONTROL

COMMENTS: Enclosed is the hydraulic analysis for Sweat Canyon Wash and its tributaries. This submittal includes the natural floodplain delineation and its associated documentation (TDN). All redline comments have been addressed.

If you have any questions, let me know. Thanks,



FLOOD CONTROL DISTRICT

of

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October 1, 1998

Burke Lokey, P.E.
David Evans and Associates, Inc
7878 North 16th Street
Suite # 250
Phoenix, Arizona 85020

Re: Review comments on Sweat Canyon Wash FIS - Technical Data Notebook, Volumes II, and IV, FCD Contract No. 97-12

Dear Mr. Lokey:

The review of the Technical Data Notebook, Volumes, II, and IV on the above-mentioned study is complete. Please find the review comments as listed below:

Technical Data Notebook, Volume II

- (1) The final coordinates for the Elevation Reference marks (ERMs) are provided in the North American Vertical Datum 88 (NAVD 88). However, the topographic mapping with floodplain information is based on the National Geodetic Vertical Datum 1929 (NGVD 29). A conversion factor, for the study area, from NAVD 88 to NGVD 29 and vice versa needs to be calculated in the TDN, Volume II. Additionally, this conversion factor needs to be shown under "NOTES" on the FP/FW maps also.
- (2) The Root Mean Square Error (RMSE) calculations shown on spreadsheets, titled FLDCHKS.XLS and XSECCHKS.XLS, in section C.1B, Field Survey procedures, have been found to be in error. Please correctly calculate these values to show proper accuracy of the topographic mapping.

For definition of proper accuracy limits, please refer to FEMA 37, Flood Insurance Study, Guidelines and Specifications for Study Contractors, Federal Emergency Management Agency, January 1995.

Technical Data Notebook, Volume IV

- (3) The first level title "1.6 Study Results" in the Table of Contents should be in *Italic*, to be consistent with other first level titles.

- (4) Section 5.1 Method Description should include a Table listing 100 year 24 hour discharges at key locations along the study reaches.
- (5) Include detailed description of the study area, i.e., sections, townships and ranges, location in relation to the New River confluence, etc., in Section 5.1.
- (6) Describe the characteristics of the wash/stream related to slope, vegetation, flow regime, flow obstructions, meandering, etc., in Section 5.1. The detailed description of Soil Types for the study area should be included under the Hydrologic Analysis, Technical Data Notebook, Volume III.
- (7) Please re-write paragraph 4 of Section 5.1 as suggested in Attachment A.
- (8) Please re-write paragraphs 1 and 2 of Section 5.2 as suggested in Attachment A.
- (9) Title 5.3 Parameter Estimation (page 16) should be aligned properly.
- (10) A reference section should be added to the Hydraulic Analysis, Technical Data Notebook, Volume IV.
- (11) Please modify portions of the text on pages 16-21, as suggested.
- (12) Detailed HEC-RAS output should include the Depth of Flow, and Froude #.
- (13) References listed at the bottom of the n-value determination Tables should be included in the reference section as suggested in Item 10.
- (14) Cross-section Plots in Appendix E.2, should include the Critical Water Surface Elevations.
- (15) Please verify that the Top Widths at cross-sections with high grounds are properly represented on the floodplain/floodway maps.
- (16) Please verify that there are no cross-sections with ineffective flow areas and or blocked obstructions. And update Section 5.5.5 Ineffective Flow Areas, as necessary.

HEC-RAS Modeling and Mapping

- (17) While opening the related files from the directory, a warning message regarding missing files is generated. Please provide other necessary files as needed to eliminate the warning message.
- (18) Please include comment records in Junction Data regarding junction location, reference, etc.
- (19) For Reach Boundary Conditions, normal depth calculations for the upstream end of the main stream and the tributaries need to be documented in the Hydraulic Analysis, Technical Data Notebook, Volume IV.
- (20) Flow Change Locations in the Steady Flow Data are confusing. Please clarify. Also, according to the floodplain/floodway maps, cross-section 4.138 should be in Reach 2 of Doe Peak Wash and cross-section 1.231 should be in Reach 3 of Doe Peak Wash. Please make corrections accordingly.
- (21) Please include comment records in the Cross Section Editor in the Geometric Data to identify the start and end of junction locations in reference to the Junction Data comment records.
- (22) Downstream Reach Lengths for the first cross-section upstream of a junction must be zero. However, cross-sections 1.231 and 4.138 on Doe Peak Wash, 0.083 on South Fork Doe Peak

Wash, and 0.094 on East Fork Doe Peak Wash have non-zero Downstream Reach Lengths specified in the cross-section data.

- (23) Please clarify the Modified n-value condition under the Steady Flow Analysis.
- (24) The starting cross-section 3.873 is not shown on the floodplain/floodway map. Please include the starting cross-section on the maps.
- (25) Please be consistent on the orientation of the cross-section IDs, FP/FW/discharge information, whole number water surface elevations, etc. must be oriented such that they are readable looking upstream.
- (26) Several cross-sections on Sweat Canyon Wash have top widths that do not match with the HEC-RAS output. Please verify and make corrections as necessary.
- (27) An item listing the section lines needs to be included in the "Legend."
- (28) The conversion factor from NGVD 29 to NAVD88 or vice versa must be listed in "Notes".
- (29) Information on the mapping accuracy, methods, scale, contour interval, company name, etc. must be shown at the bottom of the floodplain/floodway maps.
- (30) The index map shown on the floodplain/floodway maps are too busy. Please make necessary adjustments to the index map.

Should you have further questions, please feel free to contact me at (602) 506-4528.

Sincerely,



Hasan Mushtaq, Ph.D., P.E.
Engineering Division

ATTACHMENT A

Section 5.1, paragraph 4

The HEC-RAS (River Analysis System), Version 2.1, dated October 1997, by Haested Methods was used to develop the Water Surface Profile for the Sweat Canyon Wash Topographic Mapping and Floodplain Delineation Study. The starting water surface elevation was selected from the existing Flood Insurance Study (New River Floodplain Delineation, from New River Dam Reservoir to Rock Springs, Coe & Van Loo, 1988). The first three (3) cross sections (3.873-4.129) of this study were taken from the New River Floodplain Delineation Study (Ref. XX). The starting water surface elevation for study was selected as 1704.15' MSL at cross-section 3.873. The 100 year 24 hour storm for this study produces a discharge of 13,034 cfs., which is greater than that (12,400 cfs.) used for the New River Floodplain Delineation Study (Ref. XX). However, the use of the new 100 year 24 hour discharge from this study results insignificant increase (less than 0.5') of computed water surface elevations at cross-sections 3.873-4.129. Additionally, the difference in floodplain width for the same cross-sections were also determined to be less than 10% of the effective FIRM map scale of 1"=1000'.

Representative 100 year 24 hour storm discharges at key location within the study area are listed in Table XX.

Section 5.2, paragraph 1

The includes topographic mapping and floodplain delineation of the Sweat Canyon Wash and its main tributary Doe Peak Wash. Two additional tributaries, South Fork Doe Peak Wash and East Fork Doe Peak Wash, collect the flood waters from the contributing drainage area and confluence with the Doe Peak Wash. The 100 year 24 hour discharge from he South Fork Doe Peak Wash is approximately 2,000 cfs., while the East Fork Doe Peak Wash contributes approximately 1,500 cfs to the main stream of the Doe Peak Wash.

Section 5.2, paragraph 2

Figure 7 (Sheets 1 through 12) shows the location of the cross-sections, floodplain/floodway boundaries, and the computed water surface elevations for the Sweat Canyon Wash Topographic Mapping and Floodplain Delineation Study. The full size (24" X 36") work study maps are located in the map pockets in Exhibit E.

September 24, 1998

Hasan Mushtaq
Flood Control District
2801 West Durango Street
Phoenix, AZ 85009

SUBJECT: STATUS OF SWEAT CANYON FIS

Dear Hasan:

I have reviewed the progress of our Sweat Canyon FIS in terms of how we stand regarding the schedule. I am becoming concerned that we may not meet the projected submittal date to FEMA (mid-October) at the rate we are going. I think we all understand the impact that the n-value analysis had to the schedule and I am looking for ways that we can make up the time.

The following is a brief recap of our submittal history. As you can see, we are close to 2 months behind our original schedule. However, if you can expedite your review and there are no more surprises, we can almost catch up with the FEMA submittal.

TASK	SUBMITTAL BY DEA	FCD COMMENTS	SCHEDULE
Hydrologic submittal			
Estimated values	1/7	1/22	mid-Dec
1st	2/17	3/5	mid-Feb
2nd	4/1	4/21	
3rd	5/9	5/18	
4th	5/19	'approved'	
5th	9/4	not rec'd yet	
Manning report			
1st	5/8	phone call	mid-April
2nd	6/1	phone call 6/20	
3rd	7/22	8/18	
4th	9/17	not rec'd yet	
Hydraulic submittal			
1st	6/18	phone call re- n value	mid-June
2nd	7/22	8/18	
3rd	9/17	not rec'd yet	
Floodway submittal	9/30(projected, waiting for nat'l run approval)		mid-July
TDN	75% complete		mid-August
Complete hydraulics			mid-September
Submit to FEMA			mid-October
FEMA review complete			mid-April '99
Final FCD review complete			mid-May

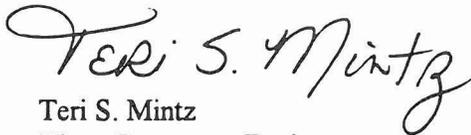
Hasan Mushtaq
September 24, 1998
Page 2

Currently we are working on the floodway analysis even though the natural run has not been approved. I know this is taking a chance because the entire model may have to be reanalyzed if you require substantial changes but we have taken the chance in order to facilitate the project.

Let me know if there is anything I can do to help. I know how important it is for you and Pedro to have your projects completed on time, and that is also my priority.

Sincerely,

DAVID EVANS AND ASSOCIATES, INC.



Teri S. Mintz
Water Resources Engineer

c: Pedro Calza

s:\adm\mari0029\corres\lthasan.doc
MARI0029



DAVID EVANS AND ASSOCIATES, INC.

TRANSMITTAL

929 East Camelback Road

TO: Hasan Mushtaq
FCDMC
2801 West Durango St
Phoenix, AZ 85009

Suite 240

Phoenix, Arizona 85016

DATE: September 18, 1998

Tel: 602.956.9850

FROM: Teri Mintz

Fax: 602.956.9853

PROJECT: Sweat Canyon FIS

PROJ. #: FCD 97-12, DEA MARI0029

Table with 4 columns: ITEM, COPIES, DATE, DESCRIPTION. Row 1: 1, 1, [blank], Replace pages 20 & 21 of Volume IV. Row 2: 2, 1, [blank], Add Depth/Velocity comparison to Section E.5 of Volume IV. Row 3: 3, 1, [blank], Replace Sweat Canyon N Value sheet (1st 2 pages in Section E.1 of Volume IV).

- AS YOU REQUESTED, FOR YOUR APPROVAL, RETURN REQUESTED, DOCUMENT CONTROL, FOR YOUR INFORMATION, FOR YOUR REVIEW

COMMENTS:

I did some more work on Friday to TDN, specifically discussion of the process we went through to come up with the n values used in the HEC-RAS. Could you just simply replace pages 20 & 21 to include this discussion. Also, the discussion makes reference to a spreadsheet and associated map which I've also included. This should simply go into Section E.5 of Volume IV. Also, please replace the first two pages in Section E.1 which show the n values for Sweat Canyon. An older version was put into the notebook by mistake (sorry about that). If you have any questions, please call

Thanks, Teri



DAVID EVANS AND ASSOCIATES, INC.

TRANSMITTAL

929 East Camelback Road

TO: Hasan Mushtaq
FCDMC
2801 West Durango St
Phoenix, AZ 85009

Suite 240

Phoenix, Arizona 85016

DATE: September 17, 1998

Tel: 602.956.9850

FROM: Teri Mintz

Fax: 602.956.9853

PROJECT: Sweat Canyon FIS

PROJ. #: FCD 97-12, DEA MARI0029

Table with 4 columns: ITEM, COPIES, DATE, DESCRIPTION. Contains 5 rows of item details.

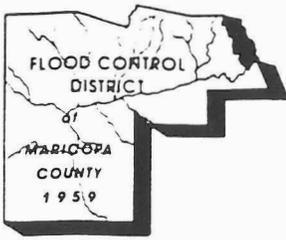
- AS YOU REQUESTED, FOR YOUR APPROVAL, RETURN REQUESTED, DOCUMENT CONTROL, FOR YOUR INFORMATION, FOR YOUR REVIEW

COMMENTS:

Enclosed is the hydraulic analysis for Sweat Canyon Wash and its tributaries. This submittal includes the natural floodplain delineation and it's associated documentation (TDN). We are continuing work on the floodway analysis.

If you have any questions, let me know.

Thanks, Teri



FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009-6399
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

BOARD OF DIRECTORS
Betsey Bayless
Jan Brewer
Fulton Brock
Don Stapley
Mary Rose Garrido Wilcox

August 18, 1998

Burke Lokey, P.E.
David Evans and Associates, Inc
7878 North 16th Street
Suite # 250
Phoenix, Arizona 85020

Attn: Teri Mintz, P.E.

Re: Sweat Canyon Wash FIS n-value report FCD Contract No. 97-12

Dear Mr. Lokey:

District staff has completed reviewing the n-value report on the above-mentioned study dated July 22, 1998. The report was also reviewed by our on-call consultant for accuracy, consistency, procedure, and methodology. The review comments from the on-call consultant is included in this correspondence for your review.

Based on the review comments from the District staff and the on-call consultant, it is suggested that the base n-value (nb) may be increased by 0.005, assuming that the average depths of flow in the streams are approximately 5.0'.

Should you have further questions, please feel free to contact Mr. Timothy P. Landis, WEST Consultants at (619) 487-9378 or me at (602) 506-4528.

Sincerely,

Hasan Mushtaq, Ph.D., P.E.
Engineering Division



August 18, 1998

Hasan Mushtaq, Ph.D., P.E.
Flood Control District of Maricopa County
2801 West Durango St
Phoenix, AZ 85009

California
11848 Bernardo Plaza Court,
Suite 140-B
San Diego, CA 92128-2417

619.487.9378
619.487.9448 Fax

Subject: FCD Contract No. 96-12, Assignment 2 - Review N-Value Report (JN200A03)

Dear Mushtaq:

WEST Consultants, Inc (WEST) was given the Assignment (# 2) to review an n-value report prepared for a Floodplain Delineation Study and provide recommendations to revise the roughness coefficients as necessary.

Washington
12509 Bel-Red Road
Suite 100
Bellevue, WA 98005-2535

425.646.8806
425.646.0570 Fax

Background information and data developed by David Evans and Associates, Inc (DEA), furnished by the Flood Control District of Maricopa County (FCDMC) was as follows:

1. Tables of n-Value Determinations made for Sweat Canyon Wash (Sweat Cyn), Doe Peak Wash (Doe Pk), East Fork Doe Peak Wash (EF Doe Pk) and South Fork, Doe Peak Wash (SF Doe Pk).
2. Photos of selected reaches for the four washes
3. Figure Sheets 1 – 3 showing plan views (1 inch = 1000ft) and 10 ft contours of the four washes.
4. Selected text discussing DEA n-value estimating procedures

These materials, along with WEST in-house references and collective staff experience, were used to perform the n-value review and recommendations.

Review Methodology

A quick regional orientation was made, using the furnished plan views, USGS quads (New River and Biscuit Flat 1:24000) and the USGS report, "Estimated Manning's Roughness Coefficients for Channels in Maricopa County". This orientation gave us a range of suggested n-values for this location.

Detailed reviews and notes were then made on each of the four washes, using the cross sections plotted on Figures 1-3 and carefully locating the section photos. The two main washes were reviewed first, followed by the East and South Forks of Doe Peak.

Hydraulics

Hydrology

Sedimentation

Water Quality

Erosion Control

Environmental Services

Letter to Hasan Mushtaq
August 17, 1998
Page 2

For this detailed review, the following parameters were noted:

- Consistency across each cross section with observed sub n-values.
- Consistency of the upstream and downstream reaches in sub n-values
- Overall consistency in the base n-values across all four reaches
- Overall consistency in the rounded n-values both along the wash profiles and in a general horizontal location across all the washes.

Finally discussions were held with other WEST staff, Dr. David Williams and Mr. Martin Teal, to compare independent estimates of the rounded n-values randomly along the profiles and over-bank sections in each of the washes.

Study Conclusions and Recommendations

Overall, WEST agrees with the estimated rounded n-values of the study. This finding is based on the assumption that the main channels' cross sections were located beginning at the top of the main channel banks and include the bank slopes for these reaches. WEST also assumed that the main channel contained approximately the 5 to 10 yr. flows.

However, we suggest that the base values could be raised 0.005, using the assumption that the average depth of flows was approximately 5 feet and the roughness elements were on the same order of magnitude. It is difficult to estimate any specific cross section n-values without the HEC-RAS results.

If you should have any questions or need additional information, please call Mr. Martin Teal or me at (619) 487-9378. We look forward to working with you again in the future.

Sincerely,



Timothy P. Landis
Sr Hydrologist



DAVID EVANS AND ASSOCIATES, INC.

T R A N S M I T T A L

929 East Camelback Road

TO: Hasan Mushtaq
FCDMC
2801 West Durango St
Phoenix, AZ 85009

Suite 240

Phoenix, Arizona 85016

DATE: July 22, 1998

Tel: 602.956.9850

FROM: Tami Clifton

Fax: 602.956.9853

PROJECT: Sweat Canyon FIS

PROJ. #: FCD 97-12, DEA MARI0029, FDC 98-21

Table with 4 columns: ITEM, COPIES, DATE, DESCRIPTION. Contains 4 rows of data regarding computer disks and tables for HEC-RAS runs.

X AS YOU REQUESTED

FOR YOUR APPROVAL

RETURN REQUESTED

DOCUMENT CONTROL

FOR YOUR INFORMATION

FOR YOUR REVIEW

COMMENTS:



DAVID EVANS AND ASSOCIATES, INC.

T R A N S M I T T A L

929 East Camelback Road

TO: Hasan Mushtaq
FCDMC
2801 West Durango St
Phoenix, AZ 85009

Suite 240

Phoenix, Arizona 85016

DATE: July 9, 1998

Tel: 602.956.9850

FROM: Tami Clifton

Fax: 602.956.9853

PROJECT: Sweat Canyon FIS

PROJ. #: FCD 97-12, DEA MARI0029, FDC 98-21

Table with 4 columns: ITEM, COPIES, DATE, DESCRIPTION. Row 1: 1, 1, [blank], Sweat Canyon FIS Volume II - Survey

- X AS YOU REQUESTED FOR YOUR APPROVAL
[] FOR YOUR INFORMATION FOR YOUR REVIEW
[] RETURN REQUESTED
[] DOCUMENT CONTROL

COMMENTS:



DAVID EVANS AND ASSOCIATES, INC.

T R A N S M I T T A L

929 East Camelback Road

TO: Hasan Mushtaq
FCDMC
2801 West Durango St
Phoenix, AZ 85009

Suite 240

Phoenix, Arizona 85016

DATE: July 7, 1998

Tel: 602.956.9850

FROM: Tami Clifton

Fax: 602.956.9853

PROJECT: Sweat Canyon FIS

PROJ. #: FCD 97-12, DEA MARI0029, FDC 98-21

Table with 4 columns: ITEM, COPIES, DATE, DESCRIPTION. Row 1 contains handwritten text: 'Sweat Canyon FIS Volume I - TDN, Volume III Hydrology'.

- X AS YOU REQUESTED
FOR YOUR APPROVAL
FOR YOUR INFORMATION
FOR YOUR REVIEW
RETURN REQUESTED
DOCUMENT CONTROL

COMMENTS:



DAVID EVANS AND ASSOCIATES, INC.

T R A N S M I T T A L

929 East Camelback Road

TO: Hasan Mushtaq
FCDMC
2801 West Durango St
Phoenix, AZ 85009

Suite 240

Phoenix, Arizona 85016

DATE: June 18, 1998

Tel: 602.956.9850

FROM: Teri Mintz

Fax: 602.956.9853

PROJECT: Sweat Canyon FIS

PROJ. #: FCD 97-12, DEA MARI0029

Table with 4 columns: ITEM, COPIES, DATE, DESCRIPTION. Contains 7 rows of itemized descriptions including HEC-RAS model, TDN Section 5.3.1, N value report, HEC-RAS cross sections, Floodplain maps, Diskette containing Hydrologic HIS, and New dividers for Hydrologic section.

- AS YOU REQUESTED, FOR YOUR APPROVAL, RETURN REQUESTED, DOCUMENT CONTROL, FOR YOUR INFORMATION, FOR YOUR REVIEW

COMMENTS:

Enclosed is the hydraulic analysis for Sweat Canyon Wash and its tributaries. This is the first submittal, showing the analysis. We are continuing to work on the TDN sections 5.1, 5.2, 5.3.2, and 5.4 which will be submitted soon. We are also updating the hydrology section of the notebook to show the revised wash naming. We'll send you updated copies when this process is complete.

I've also included a disk containing the hydrologic HIS information. Agnus Lut, with our Portland office, included a very important README.TXT file that your HIS department is aware of and is expecting. If you have any questions, let me know.

Thanks, Teri

Outstanding Professionals... Outstanding Quality



DAVID EVANS AND ASSOCIATES, INC.

929 East Camelback Road

Suite 240

Phoenix, Arizona 85016

Tel: 602.956.9850

Fax: 602.956.9853

TRANSMITTAL

TO: Hasan Mushtaq
FCDMC
2801 West Durango St
Phoenix, AZ 85009

DATE: June 3, 1998

FROM: Burke Lokey

PROJECT: Sweat Canyon FIS

PROJ. #: FCD 97-12, DEA MARI0029

FLOOD CONTROL DISTRICT RECEIVED JUN 04 1998
CHENG P & PM
PIO REG
ADMIN PWLMGT
FINANCE FILE
O & M
ENGR
REMARKS HSM

Table with 4 columns: ITEM, COPIES, DATE, DESCRIPTION. Contains 6 rows of item details including TDN Section 3, TDN Appendix C.1, and various HIS mapping documents.

- AS YOU REQUESTED FOR YOUR APPROVAL RETURN REQUESTED DOCUMENT CONTROL
FOR YOUR INFORMATION FOR YOUR REVIEW

COMMENTS: Here are the final HIS mapping submittals and the survey documentation. Teri also sent some revised hydrology sheets.

Thanks.



DAVID EVANS AND ASSOCIATES, INC.

T R A N S M I T T A L

929 East Camelback Road

TO: Hasan Mushtaq
FCDMC
2801 West Durango St
Phoenix, AZ 85009

Suite 240

Phoenix, Arizona 85016

DATE: May 29, 1998

Tel: 602.956.9850

FROM: Teri Mintz

Fax: 602.956.9853

PROJECT: Sweat Canyon FIS

PROJ. #: MARI0029

Table with 4 columns: ITEM, COPIES, DATE, DESCRIPTION. Contains 5 rows of data regarding HEC-RAS outputs and floodplain drawings.

- AS YOU REQUESTED, FOR YOUR APPROVAL, RETURN REQUESTED, DOCUMENT CONTROL, FOR YOUR INFORMATION, FOR YOUR REVIEW

COMMENTS:

These are the results of the preliminary HEC-RAS analyses. We were not able to combine all four washes into one model with our version 2.0. We are to receive Version 2.1 today or Monday and will see if it is possible for a model to contain all of the tributaries. When you pull up the HEC-RAS file, it will say 'files missing'. Just 'OK' through until you'll get to 'SWT.*05' (Sweat/Doe Peak Washes) and 'SWT.*06' (Doe Peak/East & South Washes). We are currently working on the calibration and fine tuning of the model for projected submittal to you on June 15th, after addressing your comments. Thank you

Teri



DAVID EVANS AND ASSOCIATES, INC.

T R A N S M I T T A L

2929 East Camelback Road

TO: Hasan Mushtaq
FCDMC
2801 West Durango St
Phoenix, AZ 85009

Suite 240

Phoenix, Arizona 85016

DATE: May 19, 1998

Tel: 602.956.9850

FROM: Teri Mintz

Fax: 602.956.9853

PROJECT: Sweat Canyon FIS

PROJ. #: MARI0029

Table with 4 columns: ITEM, COPIES, DATE, DESCRIPTION. Row 1: 1, 1, (blank), TDN. Row 2: 2, 1, (blank), CD Rom with all electronic information.

- AS YOU REQUESTED, FOR YOUR APPROVAL, RETURN REQUESTED, DOCUMENT CONTROL, FOR YOUR INFORMATION, FOR YOUR REVIEW

COMMENTS:

Enclosed is the TDN with the final corrections. All items in your (David Degerness) letter dated 5/18/98 were corrected, with the following exceptions/explanations: I did not change routing 20-21 on Table 4.2.6.4 because sub-basin 20 does route to concentration point 21 and then combines with CP24 to then be routed to CP25. Regarding including the HEC-RAS output, I included a table summarizing the reaches like we discussed. Thanks,

Handwritten signature of Teri Mintz



Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009-6399
(602) 506-1501
FAX: (602) 506-4601
TT: (602) 506-5859

5/18/1998

MEMO TO: Hasan Mushtaq, Civil Engineer

FROM: David Degerness, Hydrologist

SUBJECT: Sweat Canyon FIS submittal of 5/11/98

I have reviewed the latest submittal of the Sweat Canyon FIS and have the following comments:

1. Regarding Table 4.2.6.4 on page 16 of the report:

Column heading for Routing ID should be changed to From CP- To CP. The identification of CP? –CP? does not look right for the table in question.

NSTPS identified as zero in the NSTPS column should be changed to 1 as is shown in the HEC-1 model.

For routing reaches in which the velocity was obtained by the HEC-RAS model, the individual velocity should be asterisked or identified somehow instead of the whole column being identified as is the case now.

Routings 17-18, 20-21 and 34B-17 should be removed from the table since they are no longer in the model.

For routings in which velocity was obtained by HEC-RAS the worksheets should be omitted from Section D3. A HEC-RAS output could be used in its place indicating velocity for the reach in question.

2. Regarding Table 4.2.6.5 on page 17 of the report:

Why is this table even placed in the report. The text of the report has indicated that infiltration was negligible in the routing reaches.

3. Regarding Table 4.5.1.1 on page 20 of the report:

Make corrections to the specified values that are indicated on the page. They do not match the model outputs as provided.

4. Regarding Section D3 of the report (Flowmaster v5.11 output):

Worksheet for routing CP9 to CP10 should become CP9 to CP11.

Worksheet for CP10 to CP11 should be removed because it is no longer in the HEC-1 model.

Routing CP11 to CP12 should be removed because it no longer exists.

Routing CP12 to CP13 should be identified or replaced by the routing CP11 to CP12

Routing CP13 to CP 14 should be identified or replaced by routing CP12 to CP14

5. Regarding the 100yr-6hr and 100yr-24hr models:

Place routing reach R35-18 in Table 4.2.6.4. It does not exist in the current formatted table.



DAVID EVANS AND ASSOCIATES, INC.

T R A N S M I T T A L

2929 East Camelback Road

TO: Hasan Mushtaq
FCDMC
2801 West Durango St
Phoenix, AZ 85009

Suite 240

Phoenix, Arizona 85016

DATE: May 11, 1998

Tel: 602.956.9850

FROM: Teri Mintz

Fax: 602.956.9853

PROJECT: Sweat Canyon FIS

PROJ. #: MARI0029

Table with 4 columns: ITEM, COPIES, DATE, DESCRIPTION. Contains 4 rows of data regarding hydrology submittal, supporting documentation, and comments.

- AS YOU REQUESTED, FOR YOUR APPROVAL, RETURN REQUESTED, DOCUMENT CONTROL, FOR YOUR INFORMATION, X FOR YOUR REVIEW

COMMENTS:

The only, somewhat major, change I made was to delete Sub-basins 10 & 13. This was necessary with the change in time increment i.e. 1 minute to 5 minutes. With the sub-basins 10 & 13 in-place, oscillation occurred in the HEC-1 resulting in increase of flow through the route. By combining sub-basins 9 & 10 and sub-basins 12 & 13, the flows attenuated. The resulting drawings and tables were adjusted accordingly. In the meanwhile, we are working on the HEC-2 analysis and N-value report. Keep in touch.

Handwritten signature: Teri

Review of Comments (April 21 1998)

To: Hasan Mushtaq
From: Teri S. Mintz
Date: May 1, 1998
Subject: Review Comments dated April 21, 1998

Comment Item

Subbasin Characteristic Comments

#1 The Kn values chosen by the DDMS data may be too low for certain basins in the more mountainous area with canyons.

Kn values for basins 2, 3, 5, and 21 were changed to .050. Basins 4, 6, 20, and 25 were changed to .040. These changes were based on the steepness within the sub-basin as well as percentage of rock outcropping.

#2 The RTIMP given for a few basins may be too high.

The sub-basins in question were verified for percentage of rock outcropping and it was found that the outcropping is connected to the concentration point; therefore, the RTIMP remained unchanged.

HEC-1 modeling comments

#1 The District recommends increasing the IT time ordinate to 5 minutes instead of 1 minute.

The HEC-1 models were changed to reflect the 5 minute time increment. This resulted in more attenuation of flow, thus producing a more comparable discharge at the tie-in point with the New River FIS.

#2 For KK block 32-34B, correct the RX and RY cards.

The correction was made to the routing set of records.

#3 For KK block S33B, correct the SQ value of 90.

The correction was made, i.e. 47 cfs

Tables

For Table 4.5.1.1 Peak Runoff

The table was updated to reflect the changes due to the revised HEC-1 models.

Figures

#1 Figure 4

'Tc' was changed to 'lag'

Various changes were made to top widths. The top widths for stretches of the washes that are part of the floodplain delineation were used in the table, otherwise, the Mannings analysis was used.

Exhibits

#1 Exhibit A Cannot find field cross section #13 on either sheet. Please verify.

Cross section #13 derived from field visit was not used due to a much wider floodplain than originally expected. The cross section information was derived from the topographic map instead.

#2 Exhibit B Match line text changes

Changes were made to Exhibits

#3 Exhibit D Match line text changes

Changes were made to Exhibits

Report

#1 For Sections 4.2.5, 4.2.6, & 4.3.1 consider providing subheadings for each of these sections based on the different subjects discussed in the section.

It was decided to leave them unchanged to follow guidelines in ADWR State Standards Attachment 1-97.

#2 Provide a heading for the Routing information.

Again it was decided to leave it unchanged following ADWR standards

#3 For Section 4.1, possibly include more of a summary of all the modeling methods used as well as the model type.

Additional discussion added to Section 4.1

#4 For Section 4.2.5 Precipitation, rephrase both the first and third paragraphs.

Both paragraphs updated.

#5 For Section 4.2.1, address the New River Study by its report title.

This was done in the Introduction (Section 1.1). I took discussion of New River study out of 4.2.1 (Drainage area boundaries).

#6 For Section 4.2.6

A discussion of land uses was added to this section as well as further description on SCS soil survey.

#7 In the routing section, provide a discussion of the storage routing method used for the culverts.

Discussion was added to section.

#8 In the transmission loss paragraph, include a sentence stating where the calculations for the transmission losses can be found.

Sentence added.

#9 For Section 4.5 Results, include a paragraph similar to the one in Section 1.6 that summarizes the peak flows for the models.

Discussion added.



Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009-6399
(602) 506-1501
FAX: (602) 506-4601
TT: (602) 506-5897

Verify @ East Fork

April 21, 1998

MEMO TO: Hasan Mushtaq P.E.
FROM: Kathryn Gross, Hydrologist *KG*
VIA: Amir Motamedi, Hydrology Branch Manager *AM*
SUBJECT: Sweat Canyon Hydrology Submittal of 4/2/98

I have reviewed the above submittal and have the following comments:

Subbasin Characteristics

1. The Kn values chosen by the DDMS data may be too low for certain basins in the more mountainous areas with canyons. When dealing with a canyon environment using the Phoenix Mountain S-graph, Kn values of .05 maybe more appropriate. Basins that may be affected are 1-13, 20-23, and 25.
2. *4 4 4*
The RTIMP given for a few basins may be too high. Re-evaluate the RTIMP value for basins 2,5,21 where the RTIMP value is greater than 20. Determine if the rock outcrop- the basis for the RTIMPs- is directly connected to the basin outlet. If yes, keep the given RTIMP value, if not, alter the RTIMP value so that it only involves the percentage of rock outcrop that is directly connected to the outlet.

*Keep,
don't
change*

HEC-1 Modeling

1. The District recommends increasing the IT time ordinate to 5 minutes instead of 1 minute. Having the low time ordinate creates detailed hydrographs that are unnecessary for the purposes of this study. Also, the low ordinate creates NSTPS values that do not allow proper attenuation of the routed hydrographs.
2. For KK block 32-34B, correct the RX and RY cards. The RX and RY cards do not match the values given for cross-section #20, the velocity worksheet for 32-34B and Table 4.2.6.3. (100 year 6-hour model only)

- 3. For KK block S33B, correct the SQ value of 90. According to the culvert chart for S33B, 90 cfs is too high for the elevation of 1886 ft. (both models)

Tables

1. For Table 4.5.1.1- Peak Runoff

- Correct the volume given for Basin 21. The table lists the volume as being 41 ac-ft while the model gives the volume of 49 ac-ft. (100 year 6-hour model only)
- Correct the volume given for Basin 13. The table lists the volume as being 450 ac-ft while the model gives a volume of 476 ac-ft. (100 year 24-hour model only)

Figures

1. The following comments refer to Figure 4:

- The Tc column title for the table in the upper portion of Figure 4 is not correct. The values listed are lag times not times of concentration. Please correct the title with Lag instead of Tc.
- Correct the top width value for CP24-CP25. The table lists the value as 137 while the velocity worksheets list the value at 135.

*update
r's based
on HEC-2*

Exhibits

1. Exhibit A - Cannot find field cross-section #13 on either sheet. Please verify.

That's right

2. Exhibit B

- Sheet 1 of 2 - Correct the match line text to read "... Sheet 2" instead of "... Sheet B".
- Sheet 2 of 2 - Correct the match line text to read "... Sheet 1" instead of "... Sheet A".

3. Exhibit D

- Sheet 1 of 6 - A match line needs to be provided for Sheet 3 as well as Sheet 2.
- Sheet 2 of 6 - Correct the match line to read "... Sheet 5" instead of "... Sheet 4".
- Sheet 6 of 6 - A match line needs to be provided for Sheet 5 as well as Sheet 4.

*R24-25 11 12
28A-32 19 15*

IO use 5



Report

1. For Sections 4.2.5 Precipitation, 4.2.6 Physical Parameters, and 4.3.1 Special Problems, consider providing subheadings for each of these sections based on the different subjects discussed in the section e.g. the Precipitation section can be further subdivided by rainfall depth, rainfall distribution, and areal reduction with individual subheadings. NO
2. Provide a heading for the Routing information (e.g. 4.2.7). *Summarize more on parameters*
3. For Section 4.1, possibly include more of a summary of all the modeling methods used as well as the model type. ↙
4. For Section 4.2.5 Precipitation, rephrase both the first and third paragraphs.
5. For Section 4.2.1, address the New River Study by its report title.
6. For Section 4.2.6
 - Provide a section on land uses.
 - In the soils/initial losses paragraph, provide the title of the soil survey the soils data was taken from. The soils data were taken from Soil Survey of Aguila-Carefree Area, Parts of Maricopa and Pinal Counties, AZ 1986 by the SCS.
7. In the routing section, provide a discussion on the storage routing method used for the culverts.
8. In the transmission loss paragraph, include a sentence stating where the calculations for the transmission losses can be found.
9. For Section 4.5 Results, include a paragraph similar to the one in Section 1.6 that summarizes the peak flows for the models.

I have no further comments at this time. If you or the consultant have any questions feel free to contact me at 506-4837.

Reference Verification



DAVID EVANS AND ASSOCIATES, INC.

T R A N S M I T T A L

2929 East Camelback Road

TO: Hasan Mushtaq
FCDMC
2801 West Durango St
Phoenix, AZ 85009

Suite 240

Phoenix, Arizona 85016

DATE: April 1, 1998

Tel: 602.956.9850

FROM: Teri Mintz

Fax: 602.956.9853

PROJECT: Sweat Canyon FIS

PROJ. #: MARI0029

Table with 4 columns: ITEM, COPIES, DATE, DESCRIPTION. Row 1: 1, 1, [blank], Technical Data Report. Row 2: 2, 1, [blank], Disk containing all electronic files. Row 3: 3, 1, [blank], Letter addressing comments.

- AS YOU REQUESTED, FOR YOUR APPROVAL (checked), RETURN REQUESTED, DOCUMENT CONTROL, FOR YOUR INFORMATION, FOR YOUR REVIEW

COMMENTS:

Enclosed is the Technical Date Report for the Sweat Canyon FIS for your review. We will need to set up a monthly status meeting and a hydrology review meeting, so give me a call.

Handwritten signature: Teri



DAVID EVANS AND ASSOCIATES, INC.

TELECOPY TRANSMITTAL

2929 East Camelback
Road

TO: Hasan Mushtaq

FAX NO: 506-4601

Suite 240

PHONE NO: 506-4528

FIRM: FCDMC

OF PAGES: 2

Phoenix, Arizona 85016

FROM: Teri Mintz

PROJ. #: MARI0029

Tel: 602.956.9850

DATE: March 24, 1998

REGARDING: Q for HEC-RAS

Fax: 602.956.9853

COPIES:

FAX NO:

ORIGINAL TO FOLLOW: REGULAR MAIL OVERNIGHT MAIL COURIER N/A

COMMENTS:

I have 'finalized' the HEC-1 models and found that the 6-hr discharge is 12,238 cfs and the 24-hr discharge is 14,439 cfs. I copied the four upstream most cross sections from the previous Sweat Canyon HEC-2 and used the 14,439 cfs in the model. Enclosed are the outputs from the two models showing the water surface elevations, top width, etc. As can be seen by the output, the WSEL's increase only .3' and top width by approximately 50'. Do you think this is close enough to use my HEC-1? Let me know so I can finish the Hydrology portion of the FIS.

Review of Comments (March 5, 1998)

To: Hasan Mushtaq
From: Teri S. Mintz
Date: April 1, 1998
Subject: Review Comments dated March 5, 1998

Comment Item #:

Subbasin Characteristic Comment

1. *High elevations reported in Table 4.2.6.1 may be incorrect for the following subbasins. Please verify*
Basin 7 Elevation 2725 is not the most hydraulically remote point to the CP
Basin 30 Elevation 2065 is the elevation at the top of the roadside ditch (thin strip along Lake Pleasant Road).

Routing Calculation Comments

1. *Correct the given RX value in the velocity worksheet for CP10 to CP11.*
This was done..
2. *Verify the velocities for CP24 to CP25 and CP32 to CP34B in the velocity worksheets.*
Mannings analysis based off topographic cross section for CP24 to CP25 and off actual field data for CP32 to CP34B.
3. *Add transmission losses for all major tributary routes instead of the original 4 routes.*
Because the transmission losses were so minor at the routings that carried the largest amount of flow, we chose not to consider the losses at all.
4. *Regarding the culvert calculations, use a check number above the design discharge for each culvert to ensure a correct performance curve.*
The rating tables were updated to include, at a minimum, flows generated from the 24-hour storm.

HEC-1 Modeling

1. *Correct the areal reduction value given in the ID cards at the beginning of each HEC-1 model with the correct value given in the first KK block.*
The reduction factor was not used due to the presence of JD records.
2. *Please include JD cards for areal reduction of rainfall in both models.*
JD records were used in models.

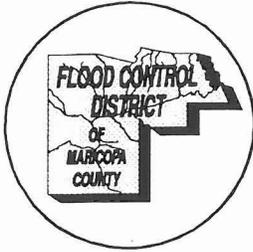
3. *The following comments are for both the 24 hour and the 6 hour models:*
Correct the length for routing 2 to 3. The model was corrected.
Correct the RX card for CP10 to CP11. Table and models were corrected.
Correct the RX card values for CP11 to CP12. Models were corrected.
Correct the RY card values for CP11 to CP12. Models were corrected.
Verify the RY card values for CP18 to CP19A. Table 4.2.6.3 & 4 & HEC1 updated.
Correct the channel manning's n for routing reach CP34B to CP17. Models were corrected
Include RL cards for the transmission losses. Losses were so low, they were not included in models.
4. *The following comments are for the 24 hr model only:*
Correct subbasin 1's lag time from 10.5 to 8.7. Correction made (should be 10.5).
Possible instabilities exist in the following routes. Inconsistencies no longer present.
5. *For future submittals, please include a copy of the HEC-1 models on disk. Included with submittal.*

Tables

- 1 4.2.6.1 Changes made to table (rounding issue).
- 2 4.2.6.2 Table changed.
- 3 4.2.6.3 CP10 to CP11 Table corrected
- 4 CP18 to CP19A Revised cross section based on topography.

Maps

- 1 *Figure 3* Change made to Figure 2
- 2 *Figure 4* Table on figure changed
- 4 *Exhibits A & B, split into four separate maps* Exhibit D divided into six maps.
- 5 *Submit Land Use* Included as Exhibit C



*Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009-6399
(602) 506-1501
FAX: (602) 506-4601
TT: (602) 506-5897*

March 5, 1998

MEMO TO: Hasan Mustaq, Phd. P.E. Civil Engineer
FROM: Kathryn Gross, Hydrologist *KG*
VIA: Afshin Ahouraiyan, Hydrologist
SUBJECT: Sweat Canyon Hydrology Submittal of 2/17/98

I have reviewed the referenced submittal and have the following comments:

Subbasin Characteristic Comments

1. High elevations reported in Table 4.2.6.1 may be incorrect for the following subbasins. Please verify.
 - Basin 7 - Table reads 2500 vs. 2725 on the map *CK*
 - Basin 30 - Table reads 2065 vs. 2022 on the map.

Routing Calculation Comments

1. Correct the given RX value in the velocity worksheet for CP10 to CP11. The 28 should be an 8. Update the time-step calculations in Table 4.2.6.4 using the new information.
2. Verify the velocities for CP24 to CP25 and CP32 to CP34B in the velocity worksheets. The velocities appear high in comparison to the surrounding basins.
3. Add transmission losses for all major tributary routes instead of the original 4 routes.
4. Regarding the culvert calculations, use a check number above the design discharge for each culvert to ensure a correct performance curve.

HEC-1 Modeling

1. Correct the areal reduction value given in the ID cards at the beginning of each HEC-1 model (.992) with the correct value given in the first KK block (.922).
2. Please include JD cards for areal reduction of rainfall in both models. The areal reduction of .922 is too low for some of the smaller subbasins. The resultant Q will not be accurate.
3. The following comments are for both the 24 hour and the 6 hour model:
 - Correct the length for routing 2 to 3. In the models it is 3692 while in Table 4.2.6.3 it is 3675.
 - Correct the RX card for CP 10 to CP 11. Replace 28 with 8.
 - Correct the RX card values for CP 11 to CP 12. The RX values of 158 and 180 do not match the values given in Table 4.2.6.3 of 180 and 250.
 - Correct the RY card values for CP 11 to CP 12. The RY values of 4 and 6 do not match the values given in Table 4.2.6.3 of 6 and 7.5.
 - Verify the RY card values for CP 18 to CP 19A. Check to see if the RY values 8 0 7 are correct.
 - Correct the channel manning's "n" for routing reach CP 34B to CP17. The model has a value of .05 while Table 4.2.6.3 has a value of .04.
 - Include RL cards for the transmission losses for the following routes:
 - 11 to 12
 - 17 to 18
 - 18 to 19A
 - 34B to 17
4. The following comments are for the 24hour model only:
 - Correct Subbasin 1's lag time from 10.5 to 8.7.
 - Possible instabilities exist in the following routes. Please check their hydrographs for inconsistencies.
 - CP 30 A to CP 33
 - CP 33 C to CP 34
 - CP 34 to CP 34B
5. For future submittals, please include a copy of the HEC-1 models on disk.

Tables

Table 4.2.6.1

1. Several inconsistencies exist in basin flow path slopes between Table 4.2.6.1 and the MCHUP2 data report as well as the soil loss parameters report. Please correct the errors in the table.

Table 4.2.6.2

2. Correct the area value for Basin 3. The value is listed as .429 in Table 4.2.6.2 and .431 in the HEC-1 models and MCHUP data.

Table 4.2.6.3

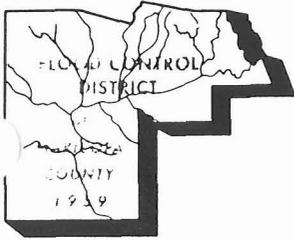
3. Correct the RX value for CP10 to CP11 in Table 4.2.6.3. The 28 should be an 8.
4. Verify the RY values for CP18 to 19A in Table 4.2.6.3. Should the numbers read 8 0 7?

Maps

1. For Figure 2, redraw the eastern boundary so that portions of New River Road are included.
2. For Figure 3, in the Tables please correct the area for Subbasin 3 if it is .431 instead of .429.
3. For Figure 3, 4, and Exhibit A, only label the true concentration points.
4. For Exhibits A and B, possibly split the study area into four separate maps so that it is easier to read the topography and the concentration points within a basin.
5. Please include a land use map with the subbasin overlay in the same format as Exhibits A and B.

For future submittals, please include a hydrology report as stated in the scope with the necessary supporting calculations and HEC-1 models.

I have no further comments at this time. Please feel free to call me at 506-4837 if you have any questions.



FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009-6399
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5897

BOARD OF DIRECTORS
Betsey Bayless
Jan Brewer
Fulton Brock
Don Stapley
Mary Rose Garrido Wilcox

February 17, 1998

Teri Mintz, P.E.
Water Resources Engineer
David Evans and Associates, Inc.
2929 East Camelback Road, Suite 240
Phoenix, Arizona 85016

RE: Sweat Canyon Estimate of Transmission Loss Phase I, Task 2 Submittal of February 10, 1998

Dear Ms. Mintz:

I have received Primatech's re-submittal of the Transmission Loss estimates and have the following comments:

- The values given for the available water capacity and permeability for each soil complex agree with values given in the *SCS Soil Survey of Aguila-Carefree, Parts of Maricopa and Pinal Counties, Arizona*.
- The Q_{loss} calculations for each soil complex are correct.

Therefore, the District approves the transmission loss methodology and calculations for the Sweat Canyon Floodplain Delineation Study.

I have no further comments regarding this submittal. If you have any questions, please feel free to call me at 506-4837.

Sincerely,

Kathryn Gross

COPY
COPY



DAVID EVANS AND ASSOCIATES, INC.

TRANSMITTAL

2929 East Camelback Road

TO: ~~Katherine Gross~~ Copy for Pedro
Flood Control District of Maricopa County
2801 West Durango St
Phoenix, AZ 85009

Suite 240

Phoenix, Arizona 85016

DATE: February 17, 1998

Tel: 602.956.9850

FROM: Teri Mintz

Fax: 602.956.9853

PROJECT: Sweat Canyon FIS

PROJ. #: MARI0029

Post-it* Fax Note	7671	Date	2/17/98	# of pages	1
To	Pedro	From	TERI MINTZ		
Co./Dept.		Co.	DEA		
Phone #		Phone #			
Fax #	506-4601	Fax #			

ITEM	COPIES	DATE	DESCRIPTION
1	1		Precipitation data used for HEC-1
2	1		Table 4.2.6.1 (Sub-basin Characteristics) & DDMS output for each sub-basin
3	1		Table 4.2.6.2 (Sub-basin Soil Types) & DDMS output for each sub-basin
4	1		Table 4.2.6.3 (Routing Characteristics) & field notes to determine typical cross sections
5	1		Table 4.2.6.4 (Time Step Calculations for HEC-1 RS Record) & Mannings analyses to determine velocity for time step calculations
6	1		Rating tables and photos for existing culverts (resulted in SE & SQ HEC-1 records)
7	1		Transmission Loss Report, Table 4.2.6.5 (Transmission Losses), & Mannings analyses to determine top width of 6-hour average flow. Not included in HEC-1.
8	1		HEC-1 (100-yr, 24-hr storm) 12,327 cfs
9	1		HEC-1 (100-yr, 24-hr storm) 14,522 cfs
10	1		Figures 1, 2, 3, & 4 and Exhibits A & B

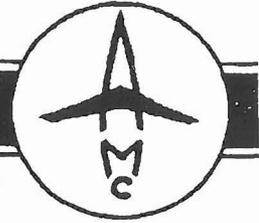
- AS YOU REQUESTED
 FOR YOUR APPROVAL
 RETURN REQUESTED
 DOCUMENT CONTROL
 FOR YOUR INFORMATION
 FOR YOUR REVIEW

COMMENTS:

Enclosed is the interim hydrologic submittal. Call me at you convenience to set up a meeting to address any concerns on the submittal. The original schedule shows a two week review period with our report (TDN) and GIS submittal to follow six week after you review. Let us know if there is problem with this.

Pedro,
This is just to keep you in the loop on our submittals.
Thanks Teri

aerial mapping company, inc.



3141 west clarendon avenue, phoenix, arizona 85017, (602) 263-5728 fax (602) 263-0165

Richard D. Cook, R.L.S. - President

Gerald E. Francis - Director

Robert G. Parks - Vice President

To: Burke Lokey
David Evans & Associates
2929 East Camelback Road, Suite 240
Phoenix, AZ 85016-3446

December 31, 1997

Re: Additional Topographic Mapping Services for Sweatt Creek.

Mr. Lokey:

As per your instructions, we will extend the mapping for Sweatt Creek, at the southeast end, over to the New River mapping boundaries. We will extend as far as the photography allows, to join the existing New River mapping, or as far as your approximate limits show. We understand that the maps must determine the limits of the basins along the New River Channel.

We will need to reset four stereo models on two adjacent flight lines to compile the changes. The additional data will be collected, edited for continuity with the existing Sweatt Creek mapping, checked for accuracy of the ties with the New River mapping and added to the existing data. It will also be included in the GIS mapping conversions, although it may be necessary to submit the added data as a supplemental delivery, due to the time constraints on the original delivery date.

Our fee for adding the extended topographic mapping will be One Thousand Seven Hundred (\$1,700.00) Dollars.

Aerial mapping Company, Inc thanks you for this opportunity to provide our quality photogrammetric services for this project. If we may assist your efforts in any other ways, please contact us at our offices.

Sincerely yours,

Robert G. Parks
Vice President
Aerial Mapping Company, Inc.

RGP /bp \docs\dearwadd

Sweat Canyon Wash Topographic Mapping and Floodplain Delineation Study
FCD Contract No. 97-12

Kickoff Meeting on September 16, 1997.

AGENDA

General

Introduction
Limits of Study
Phasing
 Surveying and Mapping
 Hydrology
 Hydraulics

Task 1 COORDINATION

Notice to Proceed
Coordination Meeting
Quarterly estimates and monthly billings
Legal Advertisement
Public Meeting
Evaluation forms and Quality control

Task 2 DATA COLLECTION

FCDMC request from FEMA Library
Consultant research
Draft report

Task 3 TOPOGRAPHIC MAPPING

Aerial Mapping
Ground Control
Conversion between NGVD 1929 and NAVD 1988
Accuracy

Task 4 FIELD SURVEY

Meet or exceed FEMA Document 37
Horizontal and vertical control
Special features

Task 5 HYDROLOGY

Coordination
Hydrologic techniques
Meetings
HEC-1 modeling
Hydrologic report

Task 6 FLOODPLAIN DELINEATION

Meet or exceed FEMA Document 37, FIA Document 12
n-value report
x-section locations and alignment
HEC-2 modeling (natural floodplain)
Floodway delineation using Method 4 and Method 1

Task 7 HIS Conversion

HIS Data Delivery Specifications, Revision 2.2, April 25, 1997

Task 8 DELIVERABLES

FEMA submittal
Final submittal

ARIZONA BUSINESS GAZETTE

PO BOX 194
Phoenix, Arizona 85001-0194
(602) 271-7300

**PUBLIC NOTICE
YOUR RIGHT TO KNOW
ANNOUNCEMENT OF
FLOOD HAZARD STUDY**

The Flood Control District of Maricopa County, under 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 study for Sweet Canyon Wash in Maricopa County, Arizona. The study limit begins near the wash crossing of New River Road (Lake Pleasant Road), west of the Black Canyon Freeway, and ends approximately six miles north.

The study is being performed for the Flood Control District by David Evans and Associates. The purpose of this study is to examine and evaluate flood hazards in areas which are likely to be developed and to determine flood elevations for those areas. These flood elevations will be used by Maricopa County to carry out floodplain management and by the Federal Emergency Management Agency to determine flood insurance rates under the National Flood Insurance Program.

This announcement is intended to notify all interested persons of the commencement of this study so that they may have an opportunity to bring any relevant facts and technical data concerning local flood hazards to the attention of

the Flood Control District for consideration in the course of this study. Such information should be addressed to Mr. Hasan Mushiaq, Flood Control District of Maricopa County, 2801 W. Durango Street, Phoenix, AZ 85009, telephone (602)506-4528. Published: November 13, 20, 1997

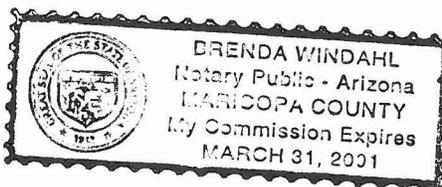
STATE OF ARIZONA }
COUNTY OF MARICOPA } SS.

TOM BIANCO, being first duly sworn, upon oath deposes and says: That he is the legal advertising manager of the Arizona Business Gazette, a newspaper of general circulation in the county of Maricopa, State of Arizona, published at Phoenix, Arizona, and that the copy hereto attached is a true copy of the advertisement published in the said paper on the dates indicated.

11/13/97
11/20/97



Sworn to before me this
20TH day of
NOVEMBER A.D. 1997



Brenda Windahl
Notary Public

AFFIDAVIT OF PUBLICATION

State of Arizona

SS

County of Maricopa

I, Glen Birchfield, editor of

The Gila Bend Sun,

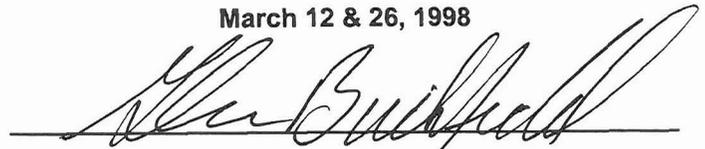
a newspaper in general circulation, printed and published in the Town of Gila Bend, County of Maricopa, State of Arizona, do solemnly swear that a copy of the above notice is the matter of

Public Notice
for

Announcement of
Flood Hazard Study

as per clipping attached, was published weekly in the regular and entire edition of the said newspaper, and not in any supplement hereof, for a period of two consecutive week(s) as follows, to-wit

March 12 & 26, 1998



Glen Birchfield

Subscribed and sworn to before me,

this 26 day of Mar 1998



Notary Public

My Commission expires:

May 29, 2001



LEGAL NOTICE

**PUBLIC NOTICE
YOUR RIGHT TO KNOW**

**ANNOUNCEMENT OF
FLOOD HAZARD STUDY**

The Flood Control District of Maricopa County, under 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 study for Sweat Canyon Wash in Maricopa County, Arizona. The study limit begins near the wash crossing of New River Road (Lake Pleasant Road), west of the Black Canyon Freeway, and ends approximately six miles north.

The study is being performed for the Flood Control District by David Evans and Associates. The purpose of this study is to examine and evaluate flood hazards in areas which are likely to be developed and to determine flood elevations for those areas. These flood elevations will be used by Maricopa County to carry out floodplain management and by the Federal Emergency Management Agency to determine flood insurance rates under the National Flood Insurance Program.

This announcement is intended to notify all interested persons of the commencement of this study so that they may have an opportunity to bring any relevant facts and technical data concerning local flood hazards to the attention of the Flood Control District for consideration in the course of this study. Such information should be addressed to Mr. Hasan Mushtaq, Flood Control District of Maricopa County, 2801 W. Durango Street, Phoenix, AZ 85009, telephone (602) 506-4528.

Published in Sonoran News March 11, 25, 1998
Published in Gila Bend Sun March 12, 26, 1998

B.5 Contract Documents

**SCOPE OF WORK
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FLOODPLAIN DELINEATION AND TOPOGRAPHIC MAPPING
FOR SWEAT CANYON WASH
FCD 97-12**

GENERAL

The project consists of approximately **thirteen (13) river miles** of floodplain delineations for **Sweat Canyon Wash**. The limits of the delineation are going to range from section 19 of Township 6N Range 2E to section 17 of Township 7N Range 2E, as shown in the Exhibit 1. This will require topographic mapping of approximately **14 square miles**, and the development of the necessary watershed hydrology using the new topographic mapping. The consultant will develop the hydrology using the Corps of Engineer's HEC-1 computer model, and the floodplain and floodway delineations using the HEC-RAS computer model, if appropriate. The consultant must use sound engineering judgement in the development of the hydrologic and hydraulic models. The results of the models 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 600 calendar days from the date of Notice to Proceed, including 60 days for District reviews and 180 days for FEMA reviews.

TASK 1 - COORDINATION

- 1.1 The consultant shall 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 once every four weeks) with the District's Project Manager and in milestone coordination meetings in the development of the hydrologic and hydraulic analyses. The consultant is responsible for the minutes of any meetings. Whenever possible, coordination and milestone meetings should be combined.
- 1.3 The consultant shall 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.
- 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 in a widely circulated newspaper two times, with approximately one week between runs. The ad must also be run two times in a local newspaper that serves 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 shall notify all property owners and obtain any necessary Rights of Entry for the study area. The consultant shall 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 local public works department. 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 shall 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 consultant/District shall be responsible for the preparation of the graphic displays for these meetings. One representative from the consultant shall attend **one** of the meetings. The consultant shall 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 hydrologic analysis. 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 shall 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 shall 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 An aerial survey subcontractor shall be retained by the consultant as part of this contract. The new

topographic mapping would cover the entire approximate contributing watershed to the Sweat Canyon Wash.

- 3.2 The consultant shall coordinate all the aerial surveying work with the aerial surveying subcontractor to ensure that the specifications of the aerial surveying work are met. The consultant is responsible for ensuring that the topographic mapping covers the area of delineation. Quality control on surveys will be per FEMA Document 37, Flood Insurance Study Guidelines and Specifications for Study Contractors, January, 1995.
- 3.3 Digital contour and planimetric data developed for this study shall be delivered according to the District's HIS specifications.
- 3.4 Digital Terrain Models shall be delivered following the guidelines stated in district's HIS data Delivery Specifications, Rev 2.2, April 25, 1997.
- 3.5 Prepare topographic mapping to a 2-foot contour interval, with a scale of 1 inch = 200 feet, with spot elevations and/or 1-foot contours on all section line and mid-section line roads.
- 3.6 Ground Control:
 - a. The consultant shall provide all survey control using 1983 NAD.
 - b. The consultant shall systematically set panel points and establish horizontal and vertical control throughout the areas to be mapped for use in compilation by the aerial survey contractor. Where readily available, surveys will tie into the State Plane Coordinate System. Field control shall be sufficient to readily allow for compilation of maps by the aerial survey contractor at the desired map scale and contour interval, and will be based on the National Geodetic Vertical Data of 1929 (NGVD). A conversion factor, including documentation of how it was derived, will be provided by the consultant to allow comparison of NGVD 29 elevations to NAVD 88 elevations and will be included in the Technical Data Notebook.
 - c. The horizontal and vertical control points shall be located and marked by the consultant. The controls for the aerial mapping shall be in sufficient numbers and shall be in locations which will be compatible with the accuracy of the mapping requirements. The controls shall be of at least third order accuracy. Section corners, quarter corners, and mid-section points shall be used for control points wherever possible.
- 3.7 The consultant shall provide permanent non-erasable topographic mylars of the work study drawings. The drawings shall be 24" X 36" in size, with a scale of 1 inch = 200 feet and a contour interval of 2 foot for all mapping with the exception of section line roads which will have a contour interval of 1 foot. A cover sheet will be provided with the project title, date of topographic mapping, and a location map showing geographic range covered by each specific mapping sheet. Each drawing shall include the floodplain and floodway delineations and a minimum of a north arrow, scale, section corners and quarter corners, current and proposed streets and highway names, State Plane Coordinate System, major drainage features, corporate boundaries, cross section lines, channel station center line, index map, and description and elevation of elevation reference marks (ERMs). A note explaining the proper means to convert the NGVD 29 elevations to NAVD 88 elevations shall be included in "NOTES" in the map border. The mapping will have an accuracy such that ninety percent (90%) of all contours shall be

within one-half contour of the true elevations and the remaining ten percent (10%) of the contours shall not be in error by more than one contour interval.

TASK 4 - FIELD SURVEY

- 4.1 Prepare topographic mapping to a 2 foot contour interval with a scale of 1 inch = 200 feet, with spot elevations or 1 foot contours on all section line and mid-section line roads, for floodplain/floodway delineation areas as identified in Task 6 or FEMA criteria, whichever is more stringent.
- 4.2 Ground Control for Floodplain Delineations:
 - 4.2.1 All topographic mapping and survey work shall meet or exceed Federal Emergency Management Agency (FEMA) minimum criteria as defined in FEMA Document 37, Flood Insurance Study Guidelines and Specifications for Study Contractors, March 1993. This would include, but is not limited to: the establishment of "permanent" elevation reference marks (ERMs); field control; and verification of profiles by the ground survey profile procedure.
 - 4.2.2 Horizontal and Vertical Control: Systematically set panel points and establish horizontal and vertical control throughout the area to be mapped for use in compilation by the aerial survey contractor. Where readily available, surveys will tie into State Plane Coordinate System 1983 NAD. Field control shall be sufficient, at least one "permanent" point per mile, such point(s) being used as Elevation Reference Marks (ERMs). Surveys will be based on National Geodetic Vertical Datum (NGVD) 1929, per FEMA guidelines. A conversion factor, including documentation of how it was derived, will be provided by the consultant to allow comparison of NGVD 29 elevations to NAVD 88 elevations and will be included in the Technical Data Notebook. "Permanent" survey points shall consist of existing monument, such as brass caps or similar survey monuments. Where additional monument is needed, survey markers conforming to Maricopa Association of Governments (MAG) Uniform Standard Detail for Public Works Construction, detail 120-1, Type C, shall be placed 2" +/- above grade, and topped with a brass cap. Elevation Reference Marks will be labeled on available maps and described in a manner which allow them to be readily located in the field.
 - 4.2.3 All aerial targets are to be removed following completion of the topographic mapping.
- 4.3 The consultant shall verify the accuracy of the mapping by the procedures called for in FEMA Document 37 or other methods approved by FEMA. This shall include the verification of cross sections used in the floodplain delineation.
- 4.4 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. Field surveys of bridges, culverts, hydraulic structures, and routing reaches must also be obtained where necessary for proper hydrologic modeling. It may be necessary to field survey some structures since the as-built plans may not be on 1929 NGVD.

TASK 5 - HYDROLOGY

- 5.1 The hydrologic study of the watershed shall be delivered to the District under separate cover from the hydraulic analysis. The consultant shall use the U.S. Army Corps of Engineers computer program HEC-1, 1990 Version 4.0, to develop a hydrologic model for the area. Using appropriate hydrologic judgement, sub-basins are to be identified that provide reasonable depiction of the watershed condition. The sub-basins must be as homogeneous as possible, using watershed area, watershed type (mountainous and flat lands or urban and undeveloped areas), and time of concentration as criteria. Sub-basin break-downs will be done in sufficient detail to provide peak discharges at structures, major road crossings, confluences, and at boundary lines. An appropriate time step and number of ordinates is to be selected that allows for complete calculation of the flood hydrograph without sacrificing resolution of the flood peak. All calculations, or assumptions used in developing sub-basin and routing parameters shall be documented and made a part of the appendix for the hydrology report. Field surveys may need to be taken for HEC-1 modeling purposes.
- 5.2 Four meetings associated with four tasks, and two field trips shall be held with the Flood Control District staff at the following milestones:
- a. One field trip at the start of the project to scope out the critical points of the watershed and problem areas.
 - b. Meeting number 1: as soon as basic data are gathered and the sub-basins have been delineated. Sample HEC-1 parameter estimations should also be presented and discussed at this meeting. A copy of the draft maps of the sub-basins must be delivered to the District at this meeting.
 - c. Meeting number 2: after all the parameters have been estimated. A draft copy of the parameters must be delivered to the District at least one week prior to this meeting.
 - d. Meeting number 3: after the preliminary HEC-1 results have been obtained and a draft report has been prepared. A copy of the draft report and the copy of the HEC-1 on a floppy disc, compatible with the District's computer, must be delivered two weeks prior to the meeting.
 - e. Meeting number 4: to review comments by the District. A second field trip may be scheduled for the same day so the results obtained could be discussed.
- 5.3 The specific hydrologic techniques to be used in this study are:
- a. Rainfall Depth: Point precipitation values shall be determined using the information and procedures described in the Drainage Design Manual for Maricopa County, Arizona: Volume I - Hydrology.

Rainfall Distribution: Peak discharges and peak volumes for the 100-year 6-hour storm shall be estimated using the District's Distribution(s). Peak discharges and peak volumes for the 100-year 24-hour storm shall be estimated using the SCS Type II rainfall distribution.
 - b. Areal Reduction: The point precipitation values shall be aerial reduced for critical concentration points. Areal reduction for the 6 hour rainfall duration shall be applied using the curves in the Drainage Design Manual for Maricopa County, Arizona: Volume I - Hydrology. NOAA

HYDRO-40 shall be used with the 24 hour rainfall reduction. Copies can be obtained from the District.

- c. Rainfall Excess: The Green and Ampt methodology shall be utilized for estimation of rainfall losses. The Lotus spreadsheet and procedures, provided by the District, shall be used to determine composite parameter values for each sub-basin.
- d. Unit Hydrograph: The Clark and S-Graph method shall be used following the procedures outlined in the Drainage Design Manual for Maricopa County, Arizona: Volume I - Hydrology. The choices in methodology shall be at the discretion of the consultant, with consent from the District.
- e. Time of Concentration and S-Graph Lag Equation: The Papadakis method shall be used with the Clark unit hydrograph, along with the MCUHP1 computer program, to determine the time of concentration. If this method results in unsuitable times of concentration, other method(s) must be used and compared for the most realistic result. The S-graph lag equation, along with the MCUHP2 computer program, shall be used with the appropriate S-graph (Phoenix mountain or Phoenix Valley).
- f. Channel Routing: Channel routing shall be accomplished using either the Muskingum-Cunge or the Normal-Depth option of HEC-1. The choice of methodology shall be at the discretion of the consultant, with consent from the District. Average cross sections shall be developed utilizing available mapping and field reconnaissance data. Sufficient field cross sections shall be taken to ensure that routing reaches are reasonable and representative of field conditions.

The HEC-1 routing parameters for the reaches modeled using HEC-2 shall be adjusted after the HEC-2 cross sections are available. The resulting velocities and depths, for all reaches, must be assessed for realistic values.

- g. Reservoir Routing: Detailed analysis of structures and ponding areas shall be accomplished using the Modified Puls reservoir routing option of HEC-1. Stage versus discharge tables for hydraulic structures shall be estimated using appropriate hydraulic methodology.
- h. Channel Transmission Losses: Attempts shall be made to estimate infiltration losses through channel bottoms based on existing field data or literature. If sufficient data is not available, the final report must acknowledge so and explain how the peaks and volumes of flow are affected by not including the transmission losses.

5.4 The District shall provide appropriate references to facilitate parameter estimation.

5.5 Output of the computer model shall be reviewed to see if the peak flows and volumes are realistic. Flows will be tested for reasonableness using approximate methods, including ADWR regional regression equations, District's unit discharge relationships, and agreement with other hydrologic studies in the area.

5.6 Every attempt must be made to recover historic stream gage data and use it to compare with the results obtained by the hydrologic model. Major differences must be discussed in the final report.

5.7 It is required that the consultant obtain the approval of the District at each of the following steps:

- a. Soil maps, watershed boundary maps, and land use maps.
- b. HEC-1 parameter estimation.
- c. HEC-1 flow diagram and input parameters.
- d. HEC-1 results.

5.8 The Hydrologic Report

5.8.1 The findings of the hydrologic study shall be presented in Section 3 of the Technical Data Notebook and shall be prepared in accordance with ADWR State Standards Attachment 1-90 (SSA 1-90). The report shall be organized as specified by the District, following SSA 1-90 format.

5.8.2 Tables and Figures for the appendices:

- a. Topographic base map(s) showing the sub-basins, routing reaches, Tc flow paths or lag flow paths, major man-made structures, and references (i.e. street names, Township, Range, Section, etc.) at a scale of 1 inch = 2000 feet.
- b. Soils map(s) at the same scale as the base map.
- c. Land use map(s) at the same scale as above.
- d. Schematic map for the HEC-1 showing the sub-basins (area, Tc), the flow paths, the routing reaches (length, slope, friction, width, velocities, transmission losses, etc.), order of combining the hydrographs, channel, pipe or culvert dimensions (where appropriate).
- e. Pertinent data on all the structures in the watershed (such as spillway elevation, rating curves, etc.).
- f. One set of study maps (i.e. sub-basin boundary maps, flow path maps, soils maps, land use maps) to be folded and delivered in a binder.

Specific deviations from this hydrologic scope shall not be undertaken without the specific written concurrence from the Flood Control District.

TASK 6 - FLOODPLAIN DELINEATION

6.1 Floodplain delineations must be obtained 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. 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 shall 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.
- 6.3 The delineation study shall be based on the final results of the hydrologic study as directed by the District.
- 6.4 The consultant is to make refinements to the HEC-2 model based on review of the model results by the District, ADWR, 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.
- 6.5 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.
- 6.6 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 shall 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 shall be submitted to the District for review and approval prior to beginning the HEC-2 modeling. The report shall present the determination of channel and overbank "n" values using captioned color photographs or color photocopies. The report shall 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 shall 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 shall be submitted for the District's review and approval prior to digitizing the cross section data. Cross section stationing shall 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 shall extend the full width of the area inundated by 100-year flood waters. Identification of cross sections shall be in river miles, increasing upstream. The stationing shall 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 shall be plotted using a pen, laser, or electrostatic plotter. The cross section plots shall 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 shall 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 For floodplains identified as ponding areas, it is preferable to analyze the area by using the HEC-2 model, which shall provide the District with water surface elevations. If appropriate, the consultant shall identify in the ponded floodplains a floodway. The purpose of this floodway is to allow the pond to seek a constant stage throughout the areal extent of the ponds, versus the creation of two independent ponds.
- 6.11 Flood zones must be determined according to FEMA criteria and clearly labeled 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 shall be presented in Section 4 of the Technical Data Notebook and shall be prepared in accordance with ADWR State Standards Attachment

1-90 (SSA 1-90). The report shall be organized as specified by the District standards, following SSA 1-90 format.

TASK 7 - HIS DATA

Digital data will be prepared in conformance with the district's HIS Data Delivery Specifications, Rev 2.2, April 25, 1997, for the following themes:

Name	Page No.	Description
NDXPRJ	LP-40	Shows the map sheet boundaries of the project
PRJ	LP-60	Defines the boundary of the project
CARTO	LP-110	Planimetric features captured but not used by HIS (Fences, tree lines, etc)(if any)
CORNERS	LP-210	Section corners as defined by the PLSS (Public Land Survey System)
CTRL	LP-215	Other control points that are not corners
AGRCLTR	LP-305	Dairy and Agricultural Areas
STRCT	LP-360	Structures like building footprints (if any)
DQ	LP-410	Data Quality of Data: Scale, date, Vertical Datum, Projection
PRJ.REL	LP-430	Contractor name, Project Name, Project ID
FPBLN	LP-520	Floodway center line
FPCTLFCD	LP-523	Elevation Reference Marks
FPSRFFCD	LP-535	Surface Water Elevation
FPXFCD	LP-540	Cross sections used in HEC 2
FPZNFCD	LP-550	Floodplain Zones
FPZNHZ	LP-560	Floodplain Hazard Zones
CNL	LP-610	Canals (If any)
FLTY	LP-620	FCD Project in the area (if any)
RR	LP-650	Railroads in the area (if any)
STRTCLN	LP-655	Street Centerlines
STRTDTL	LP-660	Edge of Pavement (if any)
UTLTY	LP-670	Utilities, Power poles, etc (if any)
ELV	LP-710	Contours and spot elevations

BRIDGE	LP-608	Bridges, including any headwalls or wing walls
CULVERT	LP-612	Culverts, including any headwalls or wing walls
VEG	LP-775	Areas of similar vegetative mix
DRNBSN	LP-920	Drainage basins
DRNPTH	LP-930	Drainage Path
LAKE	LP-950	Lakes are in the area (if any)
RIVER	LP-960	Washes or streams in the area (if any)
DRNTOC	LP-932	Time of Concentration path

This is a comprehensive listing of possible features. If there are no features collected under one of the categories mentioned, then the theme does not need to be delivered. Mapping should be done according to the district's HIS Data Delivery Specifications, Rev 2.2, April 25, 1997.

The HIS data submittal under Task 7 will be subject to a quality control (QC) check by the District staff. The District makes use of a checklist and a computer program to document and automate the QC process. A hardcopy of the checklist is enclosed with this scope of work. The consultant shall use the checklist to review each HIS data submittal for compliance and deliver a completed copy of the checklist to the district along with the data submittal.

The computerized application that automates the QC process is available upon request at no charge to the Consultant. The Consultant is recommended to make use of the computer application to review the data prior to the HIS submittal. The application is available for Arc/Info on all UNIX platforms.

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:

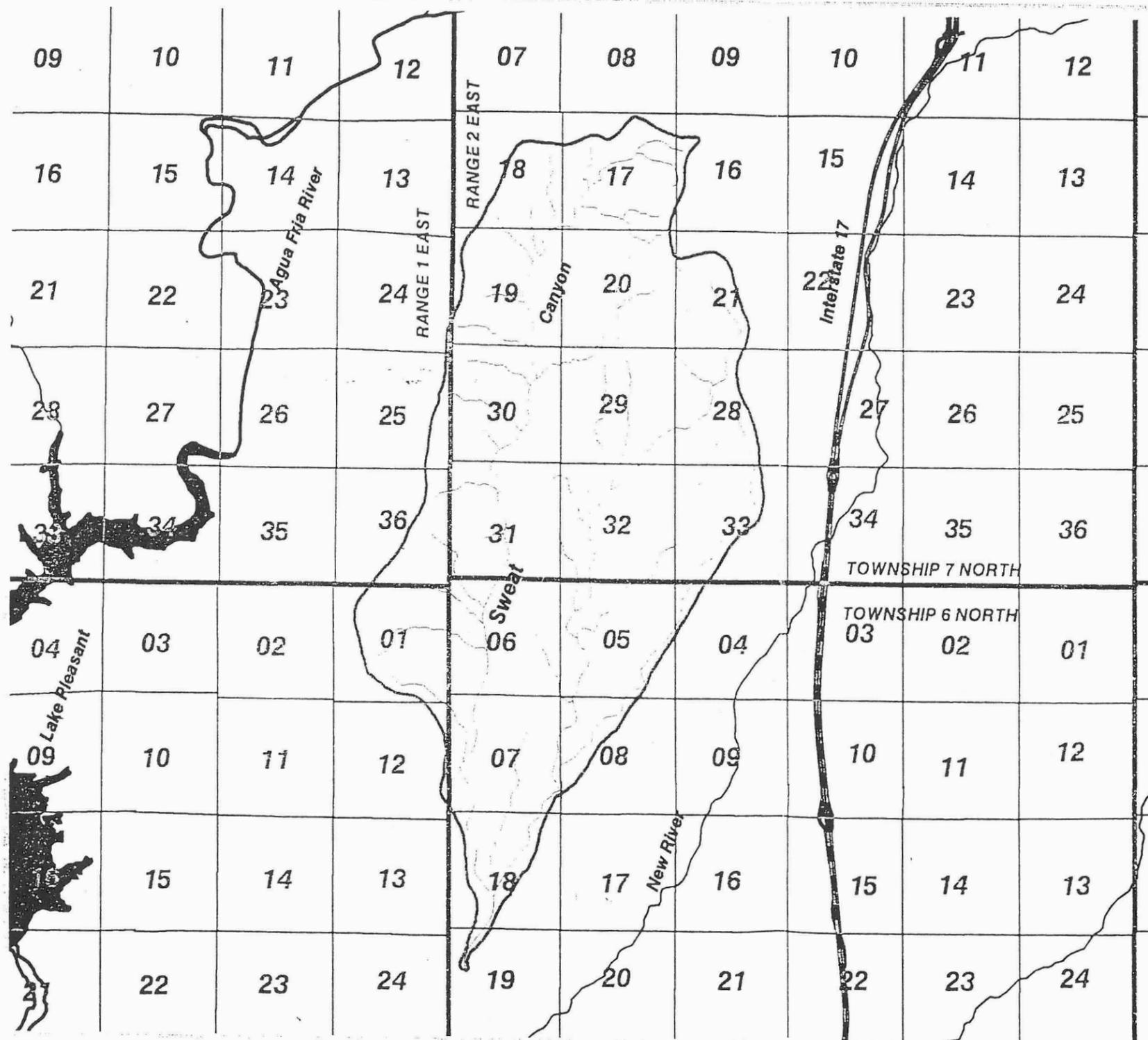
8.1.1 Original Affidavits of Publication.

8.1.2 Two (2) complete sets of blue-line topographic base maps with the floodplain/floodway delineations shown. All drawings shall be signed and sealed by persons of appropriate professional registration(s). Each registrant shall provide a specific statement as to what service they performed.

8.1.3 Two (2) complete copies of the Technical Data Notebook, including HEC-1 and HEC-2 input/output files on diskettes. The Technical Data Notebook shall be prepared in accordance with ADWR State Standards Attachment 1-90 (SSA 1-90). The notebook shall be organized as specified by the District, following SSA 1-90 format.

- 8.1.4 Two (2) sets of completed FEMA forms shall be submitted in a notebook separate from the Final Report.
- 8.1.5 One (1) copy of the Digital Terrain Model (DTM) shall be submitted following the guidelines stated in the District's HIS data Delivery Specifications, Rev 2.2, April 25, 1997.
- 8.1.6 Three (3) sets of complete survey notes shall be submitted in a notebook separate from the Final Report.
- 8.1.7 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 set of non-erasable topographic mylars of the work study drawings. Sheets shall be 24" X 36" in size and numbered to correspond to the delineation maps.
 - 8.2.2 One (1) complete sets of mylars and four (4) complete sets of sealed blue-line topographic base maps with the floodplain/floodway delineations shown. All drawings shall be signed and sealed by persons of appropriate professional registration(s). Each registrant will provide a specific statement as to what service they performed.
 - 8.2.3 One (1) complete set of transparent overlays of photo-mylars. Sheet size, numbering, and layout shall correspond to the delineation work maps.
 - 8.2.4 One (1) complete set of 9" X 9" contact prints of the aerial stereo photographs sequentially numbered and catalogued.
 - 8.2.5 Digitized topographic data and floodplain/floodway data in conformance with the District's HIS data Delivery Specifications, Rev 2.2, April 25, 1997.
 - 8.2.6 Four (4) complete copies of the Technical Data Notebook including HEC-1 and HEC-2 input/output files on diskettes. The Technical Data Notebook shall be prepared in accordance with ADWR State Standards Attachment 1-90 (SSA 1-90). The notebook shall 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-1 model, the HEC-2 model, and/or the Final Report.

Sweat Canyon Watershed



 **Sweat Canyon**
 **Township & Range**
Hydrography

 **Rivers**
 **Streams**

 **Lakes**
 **Interstate 17**
 **Watershed**

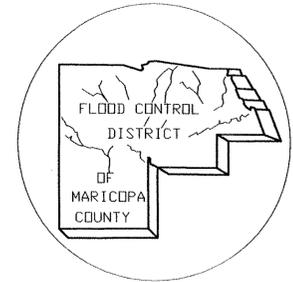


EXHIBIT 1

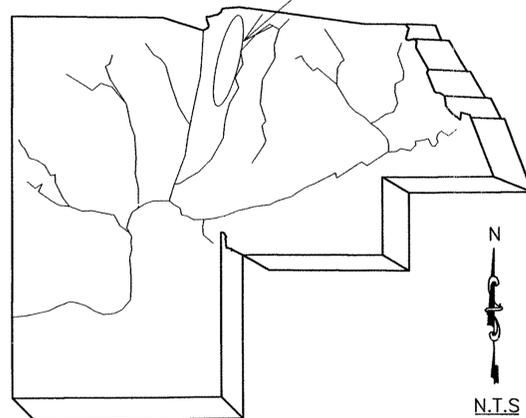
APPENDIX D: HYDROLOGIC ANALYSIS SUPPORTING DOCUMENTATION

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY SWEAT CANYON WASH

FLOOD DELINEATION STUDY
F.C.D. CONTRACT NO. 97-12



PROJECT LOCATION



LOCATION MAP

DATUM

All elevations are based on National Geodetic Vertical Datum of 1929.

STATEMENTS BY PROFESSIONAL REGISTRANTS

The ground control survey was prepared under my direct supervision:

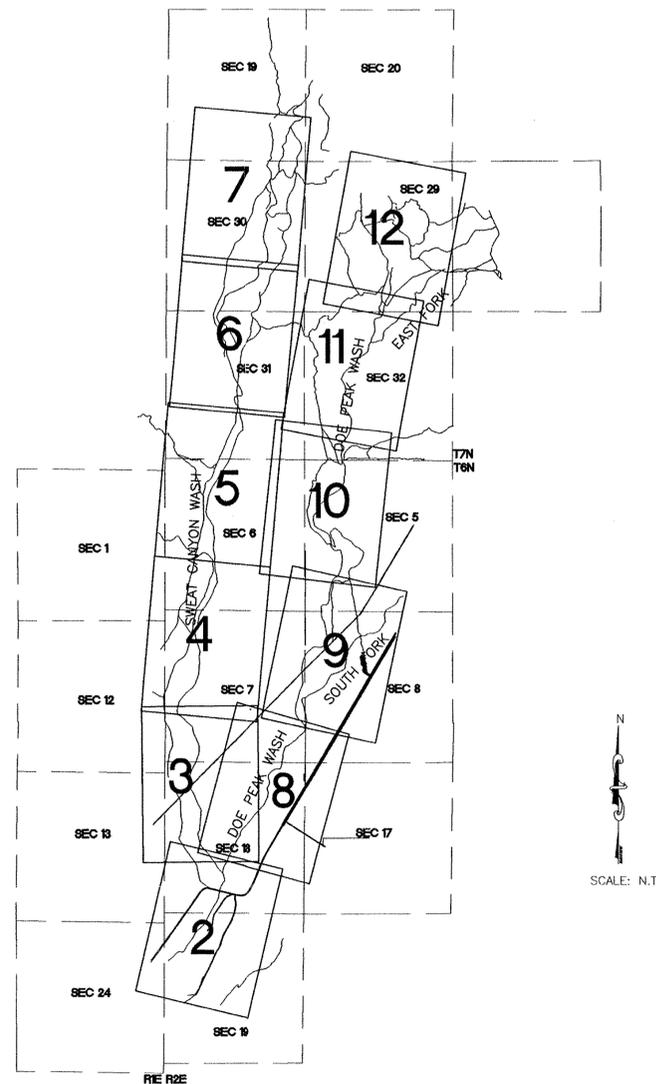


The following statements apply to the individual seals affixed to each of the maps following this cover sheet.

The photogrammetry and topographic mapping were prepared under my direct supervision:



The floodplain and floodway delineation were prepared under my direct supervision:



STUDY AREA MAP AND SHEET INDEX

SHEET INDEX

Sheet 2-12 Flood Delineation Study

AERIAL MAPPING

Aerial Mapping Company, Inc.
3141 W. Clarendon Ave.
Phoenix, AZ 85017 (602) 263-5728

Fight Date: 9/23/97 and 11/7/97
Contour Interval: 2 Feet

GROUND CONTROL

David Evans and Associates, Inc.
7878 N. 16th St., Ste. 250
Phoenix, AZ 85320 (602) 678-5151

ADDITIONAL SURVEY

David Evans and Associates, Inc.
7878 N. 16th St., Ste. 250
Phoenix, AZ 85320 (602) 678-5151

HYDROLOGY

David Evans and Associates, Inc.
7878 N. 16th St., Ste. 250
Phoenix, AZ 85320 (602) 678-5151

HYDRAULICS

David Evans and Associates, Inc.
7878 N. 16th St., Ste. 250
Phoenix, AZ 85320 (602) 678-5151

LEGEND

Section Label	SEC 5
Sheet Limits	_____
Sheet Number	8
Study Wash	_____
Section Line	-----

DAVID EVANS AND ASSOCIATES, INC. 7878 N. 16TH ST., STE. 250 PHOENIX, AZ 85020			
DESIGN	BY TJCL	DATE 11/98	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.	FCDMC	11/98	RECOMMENDED BY:
PLANS	TJCL	11/98	APPROVED BY: DATE
PLANS CHK.	TSM	11/98	DATE
SUBMITTED BY:	DATE:		CHEF ENGINEER AND GENERAL MANAGER
SHEET			1 OF 12

**FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY**
FLOOD DELINEATION STUDY OF
SWEAT CANYON WASH

F.C.D. CONTRACT NO. 97-12

LEGEND

100-YR FLOODPLAIN BOUNDARY	---
FLOODWAY BOUNDARY	---
HYDRAULIC BASE LINE WITH RIVER MILE	M12.0 M13.0
CROSS SECTION	(A) FP=100 Yr WSE (A) FW=Floodway WSE
ELEVATION REFERENCE MARK	ERM3 X
BASE FLOOD ELEVATIONS	1221
ZONE DESIGNATIONS	ZONE AE
CORPORATE LIMITS	Corporate Limits
COUNTY, PARISH, STATE OR INTERNATIONAL BOUNDARY	County Boundary
SECTION LINES	---

ELEVATION REFERENCE MARKS

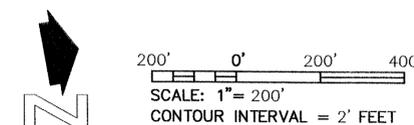
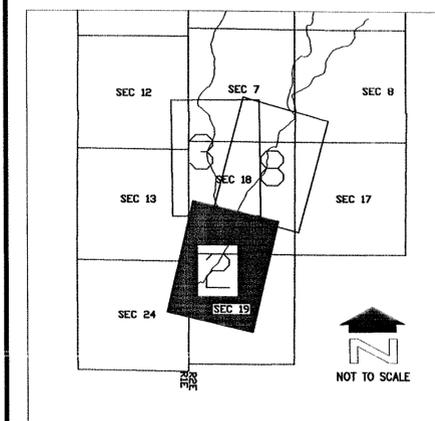
NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
2000	1735.04	GLO BC UP 1.50' / 1/4 COR SEC 18 & 19, T 6N, R 2E
2001	1704.82	GLO BC UP 1.00' / W 1/4 COR, SEC 19, T 6N, R 2E
2002	1736.55	GLO BC UP 1.50' / 1/4 COR SEC 12 & 13, T 6N, R 1E
2003	1741.12	GLO BC UP 1.50' / 1/4 COR SEC 18 & 19, T 6N, R 2E
2005	1768.11	GLO BC UP 1.50' / E 1/4 COR, SEC 13, T 6N, R 1E

NOTES

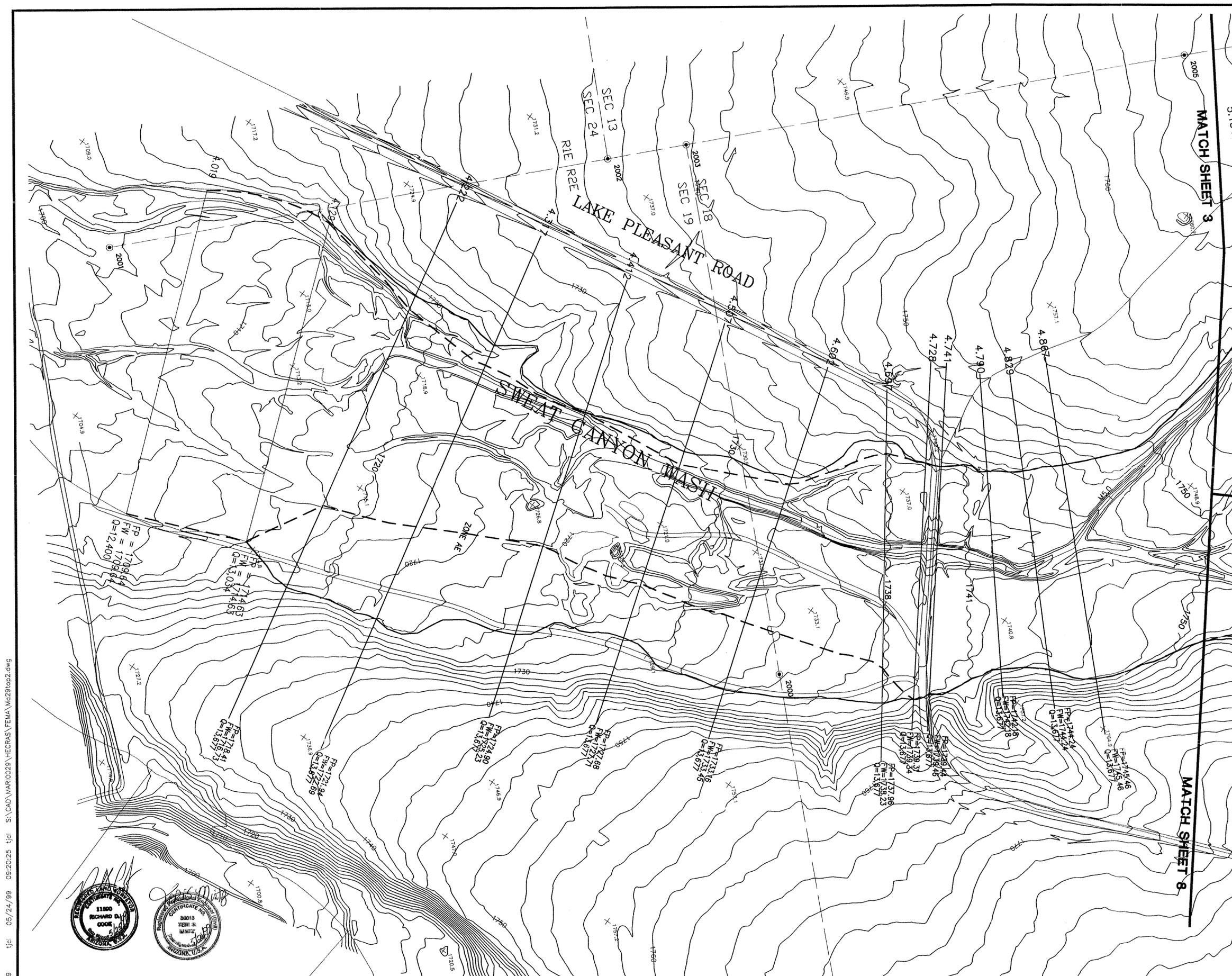
- REBAR
 - ⊙ BRASS CAP
 - ⊙ STONES
- NAVD88 ELEVATION = NGVD29 ELEVATION + 2ft

INDEX MAP



DAVID EVANS AND ASSOCIATES, INC.
7878 N. 16TH ST., STE. 250
PHOENIX, AZ 85020

DESIGN	BY TJCL	DATE 11/98	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.	FCDMC	11/98	RECOMMENDED BY: DATE
PLANS	TJCL	11/98	APPROVED BY: DATE
PLANS CHK.	TSM	11/98	CHEF ENGINEER AND GENERAL MANAGER
SUBMITTED BY:		DATE:	SHEET 2 OF 12



MARI0029 05/24/99 09:20:25 tjc S:\CAD\MARI0029\HECRAS\FEMA\Ma29top2.dwg



THIS MAP WAS PREPARED BY PHOTODIAGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 600' AND 1" = 1583' HORIZONTAL SCALE AND 2' AND 10' CONTOUR INTERVALS AND BASED ON GROUND
CONTROL SURVEY DATA PROVIDED BY DAVID EVANS AND ASSOCIATES