CAVE CREEK FLOODPLAIN REVISION

LOMR PACKAGE FOR ZONE AE FLOODPLAIN AND FLOODWAY

FCD Contract No. 1999C048 – Assignment 5

TECHNICAL DATA NOTEBOOK

Prepared for:

Flood Control District of Maricopa County

Prepared by:

WEST CONSULTANTS, INC.

WEST Consultants, Inc

Registered Professional Engineer (Civil)
CERTIFICATE NO. 21560
DENNIS L. RICHARDS
Date Signed 1-31-02
ARIZONA, U.S.A.

Dennis L. Richards

January ~~11~~, 200~~1~~
31 2

Federal Emergency Management Agency

Washington, D.C. 20472

APR 15 2002

FLOOD CONTROL DISTRICT
RECEIVED
APR 18 '02
TECH & GW | FINANCE
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ADMIN | O & M
REGR | P & PM
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Flood Control District of Maricopa County Library
Please Return to
2801 W. Durango
Phoenix, AZ 85009

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 02-09-241X

The Honorable Janice Brewer
Chairperson, Maricopa County
Board of Supervisors
301 West Jefferson, 10th Floor
Phoenix, AZ 85003

Community: Maricopa County, AZ
Community No.: 040037
Map Panels Affected: 04013C0414F, 0415 F, 0802 G, and 0805 G

116

Dear Ms. Brewer:

In a Letter of Map Revision dated December 7, 2001, you were notified of proposed modified flood elevation determinations affecting the Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for the Unincorporated Areas of Maricopa County, Arizona. These determinations were for the revised reach of Cave Creek. The 90-day appeal period that was initiated on January 3, 2002, when the Federal Emergency Management Agency (FEMA) published a notice of proposed Base Flood Elevations (BFEs) in the *Arizona Republic*, has elapsed.

FEMA received no valid requests for changes to the modified BFEs. Therefore, the modified BFEs that became effective on April 3, 2002, remain valid and revise the FIRM that was in effect prior to that date.

The modifications are pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are 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. The community number(s) and suffix code(s) are unaffected by this revision. The community number and appropriate suffix code as shown above will be used by the National Flood Insurance Program (NFIP) for all flood insurance policies and renewals issued for your community.

FEMA has developed criteria for floodplain management as required under the above-mentioned Acts of 1968 and 1973. To continue participation in the NFIP, your community must use the modified BFEs to carry out the floodplain management regulations for the NFIP. The modified BFEs will also be used to calculate the appropriate flood insurance premium rates for all new buildings and their contents and for the second layer of insurance on existing buildings and their contents.

If you have any questions regarding the necessary floodplain management measures for your community or the NFIP in general, please contact the Director, Mitigation Division of FEMA in San Francisco, at (415) 923-7184. If you have any questions regarding the LOMR, the proposed modified BFEs, or mapping issues in general, please contact the FEMA Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627).

Sincerely,

Matthew B. Miller

Matthew B. Miller, P.E., Chief
Hazards Study Branch
Federal Insurance and Mitigation Administration

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

Ms. Lynn Thomas, P.E.
Manager, Floodplain Management Branch
Flood Control District Maricopa County

Mr. Dennis L. Richards, P.E.
Vice President
West Consultants, Inc.

Federal Emergency Management Agency

Washington, D.C. 20472

APR 15 2002

CERTIFIED MAIL
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IN REPLY REFER TO:
Case No.: 02-09-241X

The Honorable Vincent Francia
Mayor, Town of Cave Creek
Cave Creek Town Hall
37622 North Cave Creek Road
Cave Creek, AZ 85331

Community: Town of Cave Creek, AZ
Community No.: 040129
Map Panels Affected: 04013C0414 F, 0415 F, 0802 G, and 0805 G

116

Dear Mayor Francia:

In a Letter of Map Revision dated December 7, 2001, you were notified of proposed modified flood elevation determinations affecting the Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for Town of Cave Creek, Maricopa County, Arizona. These determinations were for the revised reach of Cave Creek. The 90-day appeal period that was initiated on January 3, 2002, when the Federal Emergency Management Agency (FEMA) published a notice of proposed Base Flood Elevations (BFEs) in the *Arizona Republic,* has elapsed.

FEMA received no valid requests for changes to the modified BFEs. Therefore, the modified BFEs that became effective on April 3, 2002, remain valid and revise the FIRM that was in effect prior to that date.

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Sincerely,

Matthew B. Miller

Matthew B. Miller, P.E., Chief
Hazards Study Branch
Federal Insurance and Mitigation Administration

cc: Mr. Wayne E. Anderson, P.E.
Town Engineer
Town of Cave Creek

Mr. Michael Duncan, P.E.
Project Manager
Engineering Division
Flood Control District of Maricopa County

Mr. Dennis L. Richards, P.E.
Vice President
West Consultants, Inc.

Federal Emergency Management Agency

Washington, D.C. 20472

JAN 03 2002

FLOOD CONTROL DISTRICT
RECEIVED
JAN 07 '02
CH & GM
PIO
ADMIN
REC
✓ ENG
CONTRACTS
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MWD

CERTIFIED MAIL
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The Honorable Vince Francia
Mayor, Town of Cave Creek
Cave Creek Town Hall
37622 North Cave Creek Road
Cave Creek, AZ 85331

Community: Town of Cave Creek, AZ
Community No.: 040129
Panels Affected: 04013C0414 F, 0415 F, 0802 G, and 0805 G

Dear Mayor Francia:

In a Letter of Map Revision (LOMR) dated December 7, 2001 (Case No. 02-09-241X; copy enclosed), we notified you of revisions to the 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. The December 7 LOMR, which will become effective on April 3, 2002, listed the affected FIRM panels. The purpose of this letter is to correct the letter suffix of one of the affected FIRM panels enclosed with the December 7 LOMR.

FIRM Panel 04013C0415, which was listed in the December 7 LOMR and included in the annotated copy of the FIRM, was inadvertently given the suffix "G." The correct suffix is "F." The proposed modified Base (1-percent-annual-chance) Flood Elevations shown on affected FIRM Panels 04013C0414 F, 04013C0415 F, 04013C0802 G, and 04013C0805 G; Profile Panels 1020P through 1023P; and affected portions of the Floodway Data Table remain unchanged as of December 7, 2001, and all other requirements set forth in the December 7 LOMR remain unchanged.

We apologize for the error and trust that this will not cause any undue delays in enacting the required floodplain management regulations for your community. If you have any questions or concerns about the corrected FIRM panel suffix, we urge you to contact the Chief, Community Mitigation Programs Branch, Mitigation Division of FEMA in San Francisco, California, at (415) 923-7184 for assistance. If you have any questions concerning mapping issues in general, 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
Federal Insurance and
Mitigation Administration

For: Matthew B. Miller, P.E., Chief
Hazards Study Branch
Federal Insurance and
Mitigation Administration

Enclosures

cc: The Honorable Janice Brewer
Chairman, Maricopa County
Board of Supervisors

Mr. Michael Duncan, P.E.
Project Manager
Engineering Division
Flood Control District of
Maricopa County

Ms. Lynn Thomas, P.E.
Manager
Floodplain Management Branch
Flood Control District of
Maricopa County

Mr. Wayne E. Anderson, P.E.
Town Engineer
Town of Cave Creek

Mr. Dennis L. Richards, P.E.
Vice President
West Consultants, Inc.

Federal Emergency Management Agency

Washington, D.C. 20472

DEC 07 2001

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IN REPLY REFER TO:
Case No.: 02-09-241X

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

Community: Maricopa County, AZ
Community No.: 040037
Panels Affected: 04013C0414 F, 0415 G, 0802 G, and 0805 G
Effective Date of This Revision: APR 03 2002

102-I-A-C

Dear Ms. Brewer:

This responds to a request that the Federal Emergency Management Agency (FEMA) revise the effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for Maricopa County, Arizona and Incorporated Areas, in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated March 13, 2001, Mr. Michael Duncan, 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 a revised hydrologic analysis and correction of the discharge value in the effective hydrologic computer model for Cave Creek from its confluence with Cottonwood Creek to approximately 5,300 feet downstream. This request also included revised hydraulic analyses for Cave Creek from approximately 1,000 feet north of the intersection of Spur Cross Road and Sierra Vista Road to just upstream of Morning Star Road. A portion of the project area that is shown on the FIRM as in the unincorporated areas of Maricopa County was annexed by the Town of Cave Creek. In response to Mr. Duncan's request, we issued a Letter of Map Revision (LOMR) on November 30, 2001, that will become effective on April 3, 2002 (Case No. 01-09-551P). With that LOMR, we inadvertently attached the effective FIRM panels instead of the revised FIRM panels. This LOMR is a re-issuance of the November 30 LOMR, with the revised FIRM panels attached.

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

We have completed our review of the submitted data and the flood data shown on the effective FIRM and in the effective FIS report. We have revised the FIRM and FIS report to modify the elevations and floodplain and floodway boundary delineations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along the revised reach of Cave Creek. As a result of the modifications, the Base Flood Elevations (BFEs) for Cave Creek decreased, and the widths of the Special Flood Hazard Area (SFHA), the area that would be inundated by the base flood, and the regulatory floodway increased in some areas and decreased in other areas. The modifications are shown on the enclosed annotated copies of FIRM Panels 04013C0414 F, 04013C0415 G, 04013C0802 G, and 04013C0805 G; Profile Panels 1020P through 1023P; and affected portions of the Floodway Data Table. This LOMR hereby revises the above-referenced panels of the effective FIRM and the affected portions of the FIS report, all dated July 19, 2001.

Because this revision request also affects the Town of Cave Creek, a separate LOMR for that community was issued on the same date as this LOMR.

The modifications are effective as of the date shown above. The map panels 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)*
Approximately 4,200 feet downstream of confluence of Cottonwood Creek	2,249	2,248

*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 December 27, 2001, and January 3, 2002. 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*, any interested party 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 made by 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 will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panels and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

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:

Mr. Jack Eldridge
Chief, Community Mitigation Programs Branch
Federal Emergency Management Agency, Region IX
The Presidio of San Francisco, Building 105
San Francisco, CA 94129-1250
(415) 923-7184

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please call the CCO for your community at the telephone number cited above. If you have any questions regarding this LOMR, please call our Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627).

Sincerely,

MHL to Lynn

Max H. Yuan, P.E., Project Engineer
Hazards Study Branch
Federal Insurance and
Mitigation Administration

For: Matthew B. Miller, P.E., Chief
Hazards Study Branch
Federal Insurance and
Mitigation Administration

Enclosures

cc: The Honorable Vincent Francia
Mayor, Town of Cave Creek

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Engineering Division
Flood Control District of
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Flood Control District of
Maricopa County

Mr. Wayne E. Anderson, P.E.
Town Engineer
Town of Cave Creek

Mr. Dennis L. Richards, P.E.
Vice President
West Consultants, Inc.

CHANGES ARE MADE IN DETERMINATIONS OF BASE FLOOD ELEVATIONS FOR THE TOWN OF CAVE CREEK AND THE UNINCORPORATED AREAS OF MARICOPA COUNTY, ARIZONA, UNDER THE NATIONAL FLOOD INSURANCE PROGRAM

On July 19, 2001, the Federal Emergency Management Agency identified Special Flood Hazard Areas (SFHAs) in the Town of Cave Creek and in the unincorporated areas of Maricopa County, Arizona, through issuance of a Flood Insurance Rate Map (FIRM). The Federal Insurance and Mitigation Administration has determined that modification of the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) for certain locations in these communities is appropriate. The modified Base Flood Elevations (BFEs) revise the FIRM for the communities.

The changes are being made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are 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.

Revised hydrologic and hydraulic analyses were performed for Cave Creek from the Tonto National Forest boundary to just upstream of Morning Star Road. This revision also included correction of the discharge value in the effective hydrologic computer model for Cave Creek from its confluence with Cottonwood Creek to approximately 5,300 feet downstream. This has resulted in a revised delineation of the regulatory floodway, increases and decreases in SFHA width, and increased and decreased BFEs for Cave Creek. The table below indicates existing and modified BFEs for selected locations along the affected lengths of the flooding source(s) cited above.

Location	Existing BFE (feet)*	Modified BFE (feet)*
[1]Approximately 550 feet upstream of Morning Star Road	2,154	2,153
[2]Approximately 4,200 feet downstream of confluence of Cottonwood Creek	2,249	2,248
[1]Approximately 1,430 feet downstream of confluence of Cottonwood Creek	2,271	2,275
[1]Approximately 370 feet downstream of Tonto National Forest boundary	2,344	2,342

*National Geodetic Vertical Datum, rounded to nearest whole foot
[1]Town of Cave Creek
[2]Unincorporated areas of Maricopa County

Under the above-mentioned Acts of 1968 and 1973, the Federal Insurance and Mitigation Administration must develop criteria for floodplain management. To participate in the National Flood Insurance Program (NFIP), the community must use the modified BFEs to administer the floodplain management measures of the NFIP. These modified BFEs will also be used to calculate the appropriate flood insurance premium rates for new buildings and their contents and for the second layer of insurance on existing buildings and contents.

Upon the second publication of notice of these changes in this newspaper, any person has 90 days in which he or she can request, through the Chief Executive Officer of the community, that the Federal Insurance and Mitigation Administration reconsider the determination. Any request for reconsideration must be based on knowledge of changed conditions or new scientific or technical data. All interested

parties are on notice that until the 90-day period elapses, the Federal Insurance and Mitigation Administration's determination to modify the BFEs may itself be changed.

Any person having knowledge or wishing to comment on these changes should immediately notify:

The Honorable Vincent Francia
Mayor, Town of Cave Creek
Cave Creek Town Hall
37622 North Cave Creek Road
Cave Creek, AZ 85331

OR

The Honorable Janice Brewer
Chairperson, Maricopa County
Board of Supervisors
301 West Jefferson, 10th Floor
Phoenix, AZ 85003

Federal Emergency Management Agency

Washington, D.C. 20472

DEC 07 2001

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IN REPLY REFER TO:
Case No.: 02-09-241X

The Honorable Vincent Francia
Mayor, Town of Cave Creek
Cave Creek Town Hall
37622 North Cave Creek Road
Cave Creek, AZ 85331

Community: Town of Cave Creek, AZ
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Panels Affected: 04013C0414 F, 0415 G, 0802 G, and 0805 G
Effective Date of This Revision: APR 03 2002

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Chief, Community Mitigation Programs Branch
Federal Emergency Management Agency, Region IX
The Presidio of San Francisco, Building 105
San Francisco, CA 94129-1250
(415) 923-7184

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Sincerely,

Max H. Yuan, P.E., Project Engineer
Hazards Study Branch
Federal Insurance and
Mitigation Administration

For: Matthew B. Miller, P.E., Chief
Hazards Study Branch
Federal Insurance and
Mitigation Administration

Enclosures

cc: The Honorable Janice Brewer
Chairman, Maricopa County
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Project Manager
Engineering Division
Flood Control District of
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Ms. Lynn Thomas, P.E.
Manager
Floodplain Management Branch
Flood Control District of
Maricopa County

Mr. Wayne E. Anderson, P.E.
Town Engineer
Town of Cave Creek

Mr. Dennis L. Richards, P.E.
Vice President
West Consultants, Inc.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Cave Creek Wash (Cont'd)								
FK	40.20	191	1,871	12.4	2,157.5	2,157.5	2,158.5	1.0
FL	40.46	265	1,733	13.4	2,173.1	2,173.1	2,173.0	0.1
FM	40.69	205	1,528	15.2	2,181.1	2,181.1	2,181.1	0.0
FN	40.91	209	2,115	11.0	2,200.5	2,200.5	2,200.7	0.2
FO	41.12	141	2,034	11.4	2,217.8	2,217.8	2,218.4	0.6
FP	41.29	146	1,867	12.5	2,226.6	2,226.6	2,227.3	0.7
FQ	41.47	159	2,341	9.9	2,244.3	2,244.3	2,244.5	0.2
FR	41.71	195	2,031	11.5	2,257.5	2,257.5	2,258.1	0.6
FS	41.88	279	1,788	13.0	2,266.4	2,266.4	2,266.4	0.0
FT	42.08	498	2,546	9.1	2,274.1	2,274.1	2,274.5	0.4
FU	42.31	222	1,543	15.1	2,290.6	2,290.6	2,290.7	0.1
FV	42.44	205	1,772	11.7	2,296.0	2,296.0	2,296.8	0.8
FW	42.65	240	2,193	9.4	2,309.8	2,309.8	2,310.5	0.7
FX	42.94	514	2,740	7.5	2,324.1	2,324.1	2,324.8	0.7
FY	43.12	210	1,662	12.4	2,335.5	2,335.5	2,336.2	0.7
FZ	43.30	150	1,261	16.4	2,347.6	2,347.6	2,347.6	0.0

Revised data

REVISED TO REFLECT LOMR DATED APR 03 2002

[1]Miles Above Confluence With Salt River

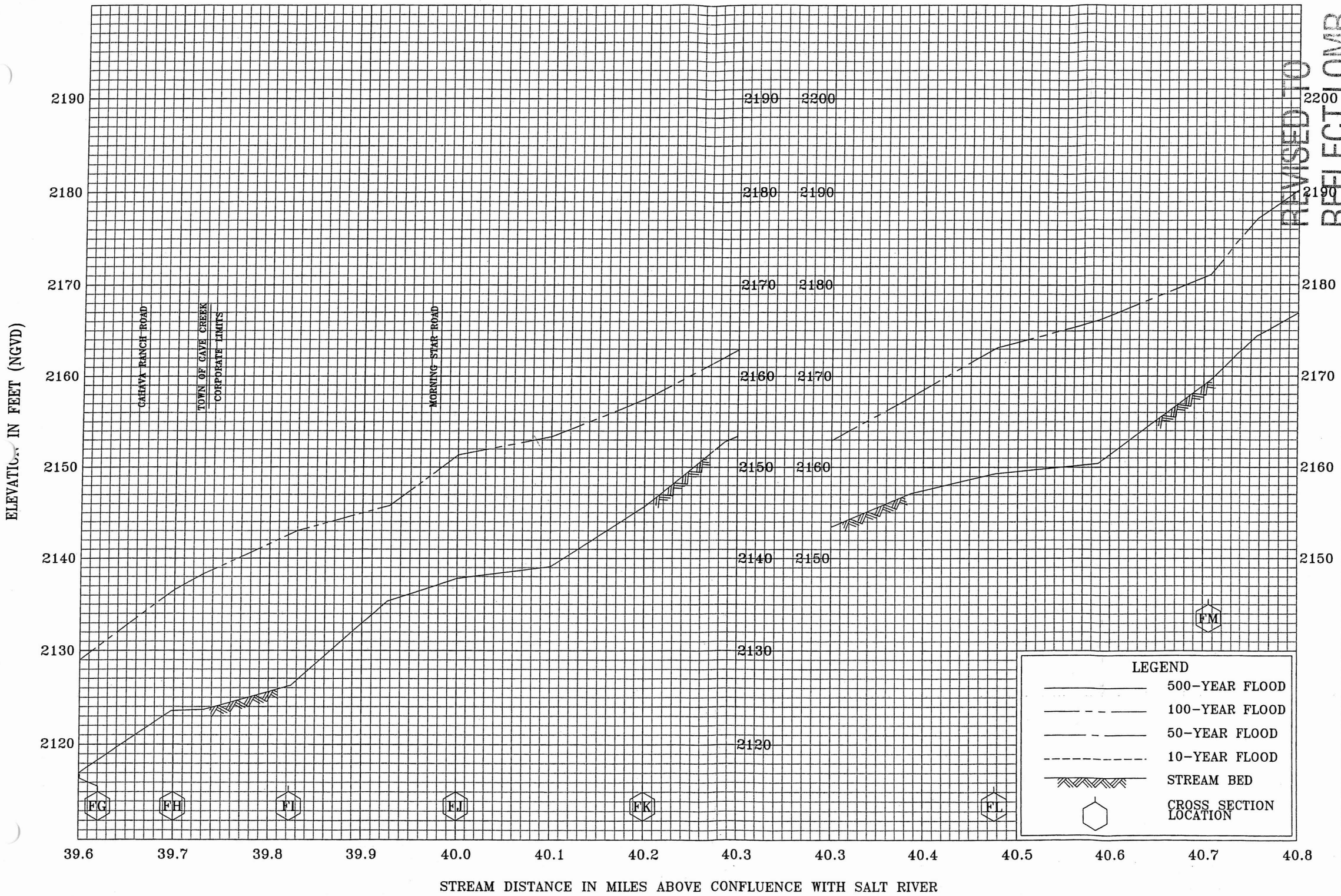
TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ AND INCORPORATED AREAS

FLOODWAY DATA

CAVE CREEK WASH



REVISED TO REFLECT LOMR DATED APR 03 2002

FLOOD PROFILES

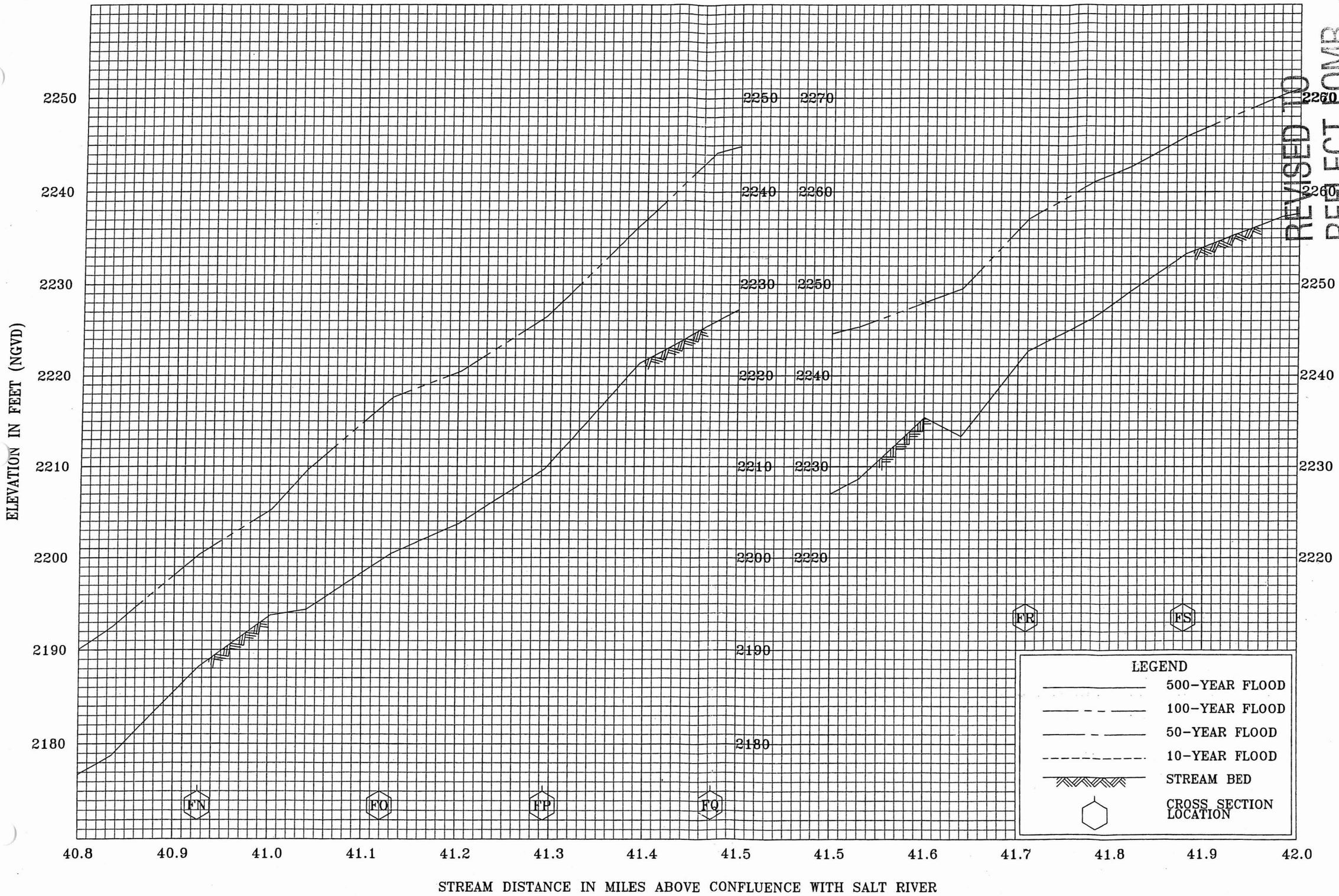
CAVE CREEK WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND INCORPORATED AREAS

1020P



REVISED TO REFLECT LOMR DATED APR 03 2002

FLOOD PROFILES

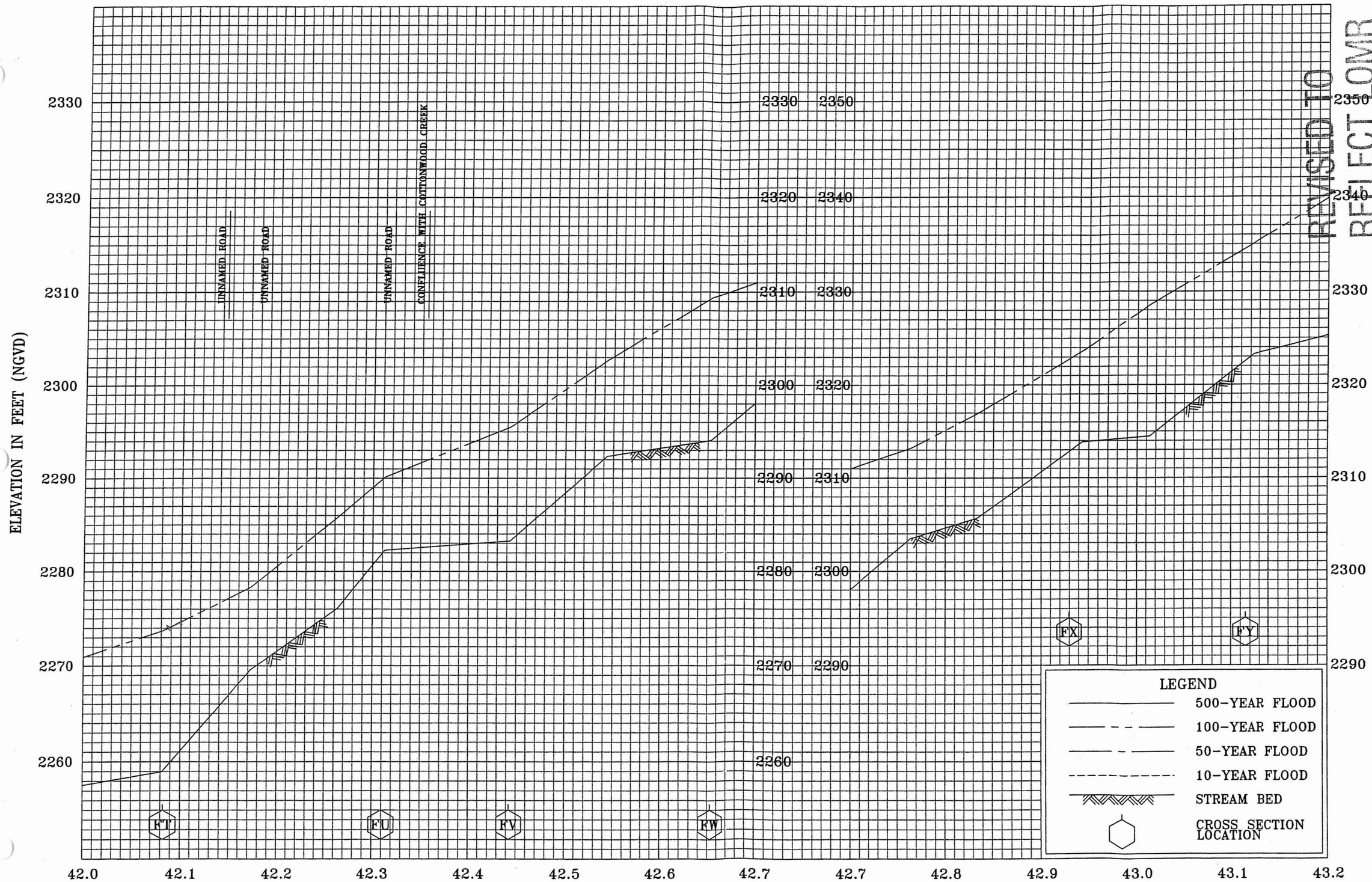
CAVE CREEK WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND INCORPORATED AREAS

1021P



REVISED TO REFLECT LOMR DATED APR 03 2002

FLOOD PROFILES

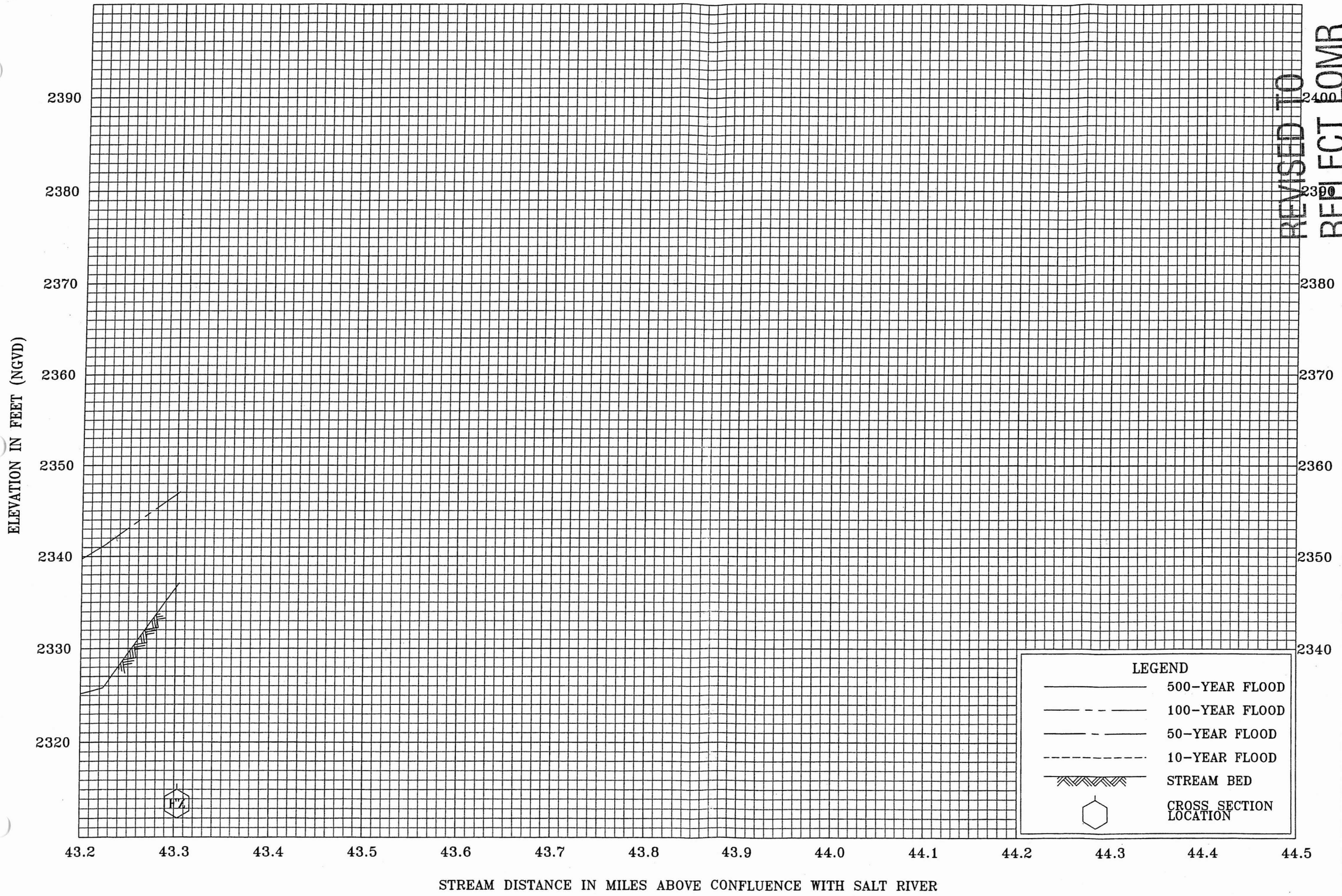
CAVE CREEK WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND INCORPORATED AREAS

1022P



REVISED TO REFLECT LOMR DATED APR 03 2002

FLOOD PROFILES

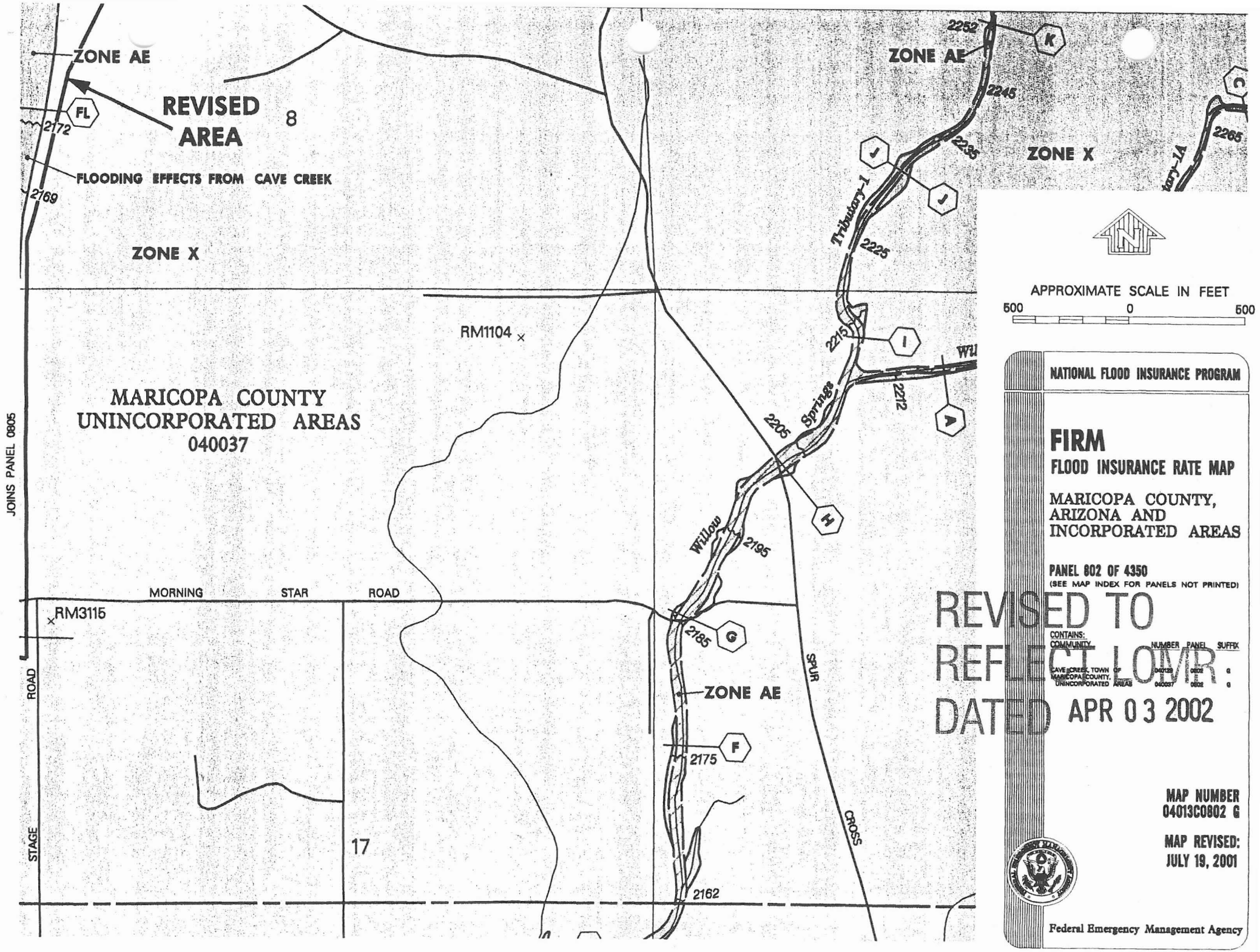
CAVE CREEK WASH

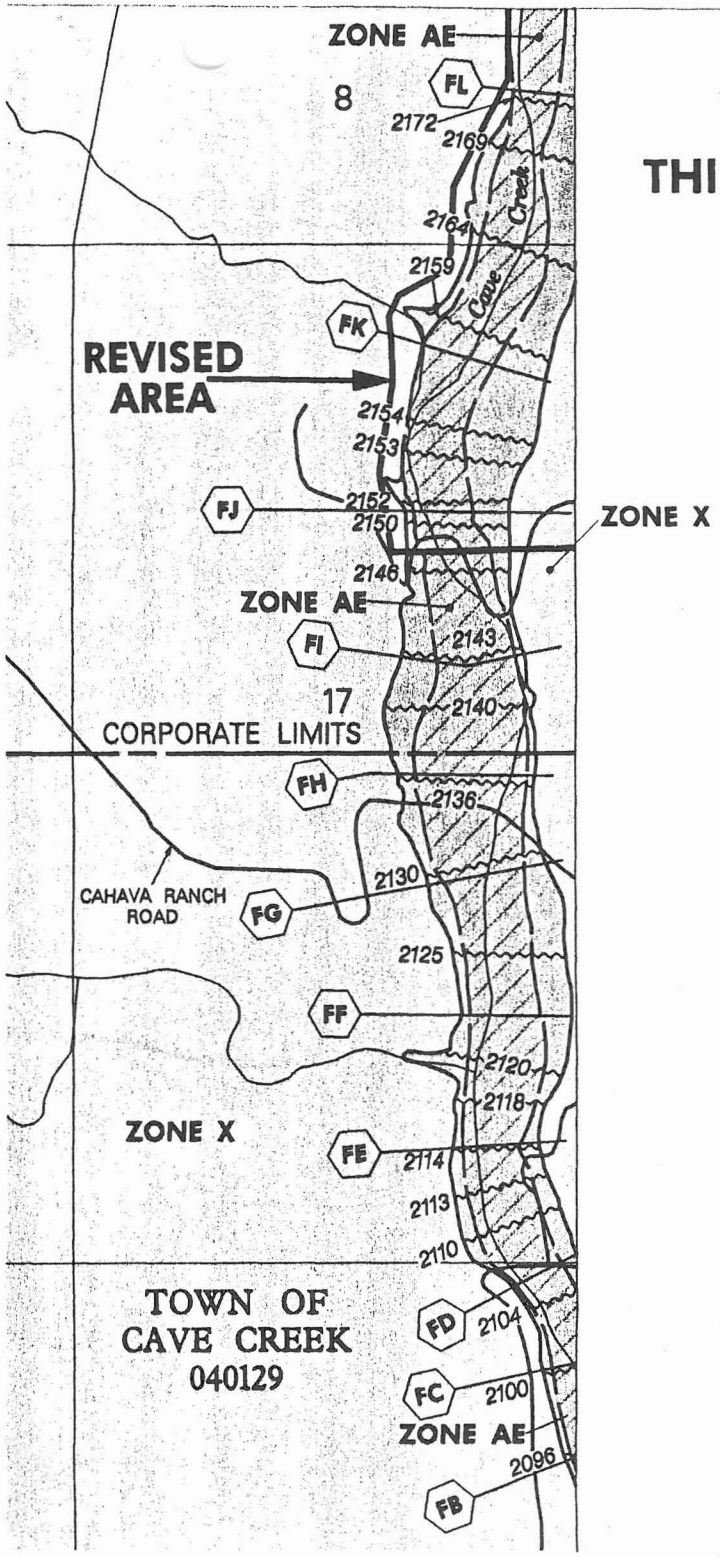
FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND INCORPORATED AREAS

1023P


ZONE AE
REVISED AREA
8
FLOODING EFFECTS FROM CAVE CREEK
2172
2169
FL
ZONE X
RM1104
MARICOPA COUNTY
UNINCORPORATED AREAS
040037
JOINS PANEL 0805
MORNING STAR ROAD
RM3115
ROAD
STAGE
17
2252
K
ZONE AE
2245
2235
J
ZONE X
Tributary-1
2225
2265
Tributary-14
C
2215
I
Willow Springs
2212
A
2205
H
Willow
2195
2185
G
ZONE AE
SPUR
2175
F
CROSS
2162
APPROXIMATE SCALE IN FEET
500 0 500
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS
PANEL 802 OF 4350
(SEE MAP INDEX FOR PANELS NOT PRINTED)
REVISED TO REFLECT LOMR: DATED APR 03 2002
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
CAVE CREEK, TOWN OF 040129 0802 G
MARICOPA COUNTY, UNINCORPORATED AREAS 040037 0802 G
MAP NUMBER
04013C0802 G
MAP REVISED:
JULY 19, 2001
Federal Emergency Management Agency



THIS AREA IS SHOWN ON MAP NUMBER 04013C0802

APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 805 OF 4350

(SEE MAP INDEX FOR PANELS NOT PRINTED)

REVISED TO REFLECT LOMR DATED APR 03 2002

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CAREFREE, TOWN OF	040129	0805	G
CAVE CREEK, TOWN OF	040129	0805	G
MARICOPA COUNTY, UNINCORPORATED AREAS	040037	0805	G

MAP NUMBER 04013C0805 G

MAP REVISED: JULY 19, 2001

Federal Emergency Management Agency

MARICOPA COUNTY
UNINCORPORATED AREAS
040037

6

APPROXIMATE SCALE IN FEET

00 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY,
ARIZONA AND
INCORPORATED AREAS

PANEL 415 OF 4350
(SEE MAP INDEX FOR PANELS NOT PRINTED)

REVISED TO
REFLECT LOMR
DATED APR 03 2002

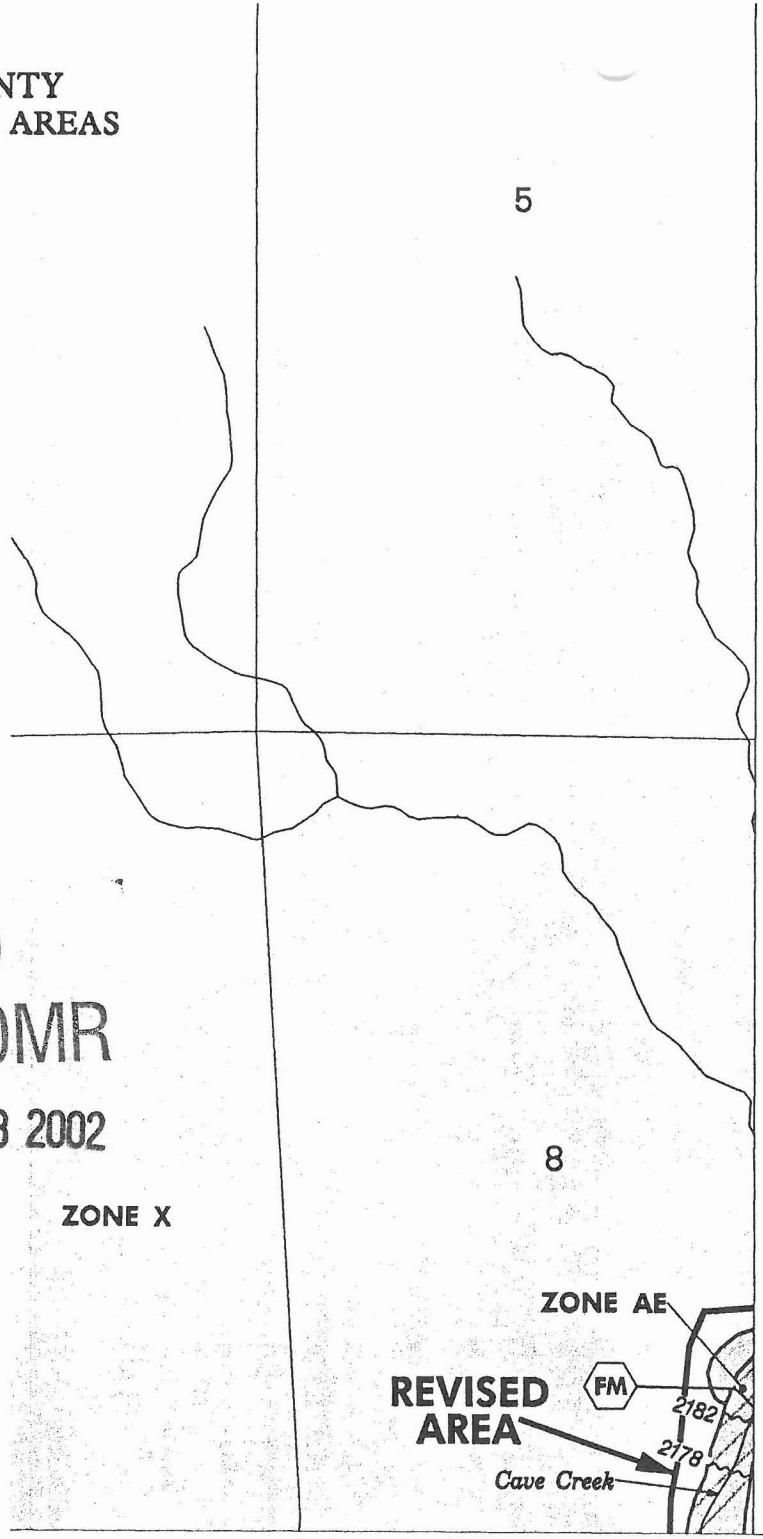
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY, UNINCORPORATED AREAS	040037	0415	F

MAP NUMBER
04013C0415 F

MAP REVISED:
JULY 19, 2001

Federal Emergency Management Agency



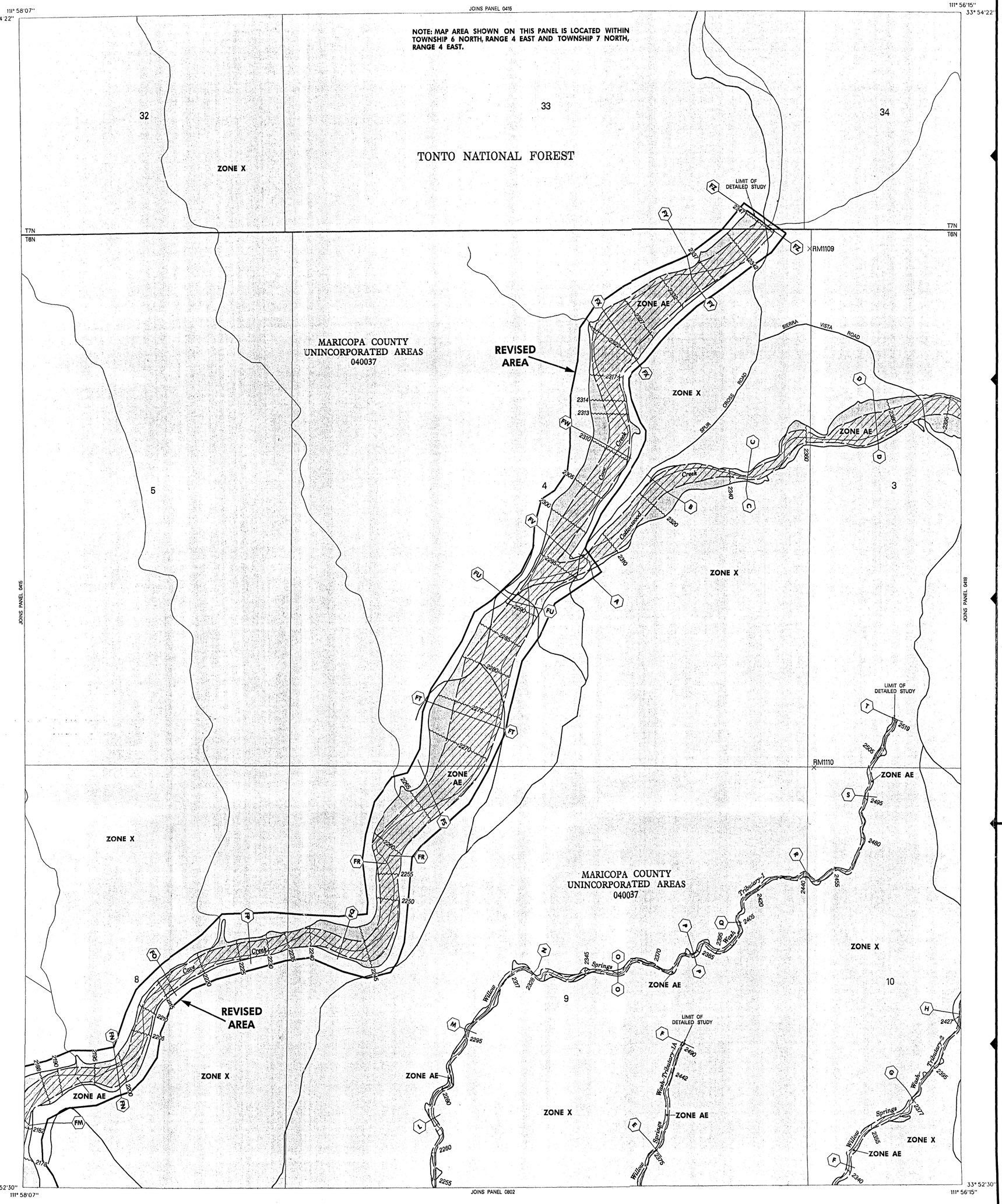
JOINS PANEL 0805

THIS AREA IS SHOWN
ON MAP NUMBER 04013C0414

JOINS PANEL 0802

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
RM1109	2345.75	Brass cap in concrete slab N20E, 225 feet to the approximate northeast corner of section 4, T6N, R4E.
RM1110	2547.25	Brass cap in stone S55W, 27 feet to the approximate corner of section 9, T6N, R4E.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED 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 (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 1990 — Otherwise Protected Areas

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

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.

513 — Base Flood Elevation Line; Elevation in Feet. See Map Index for Elevation Datum.

D — D — Cross Section Line

(EL 987) — Base Flood Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum.

RM7 × — Elevation Reference Mark

● M2 — River Mile

97° 07'30", 32° 22'30" — 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 all planimetric features outside Special Flood Hazard Areas. The community map repository should be consulted for more detailed data on BFE'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, A1–A30, AH, AO, A99, V, VE and V1–V30.

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 120 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 101-591).

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:
DECEMBER 3, 1993

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE IN FEET
500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 414 OF 4350
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY, UNINCORPORATED AREAS	040037	0414	F

REVISED TO REFLECT LOMR DATED APR 03 2002

MAP NUMBER
04013C0414 F

MAP REVISED:
JULY 19, 2001

Federal Emergency Management Agency

A FAX TO: Irwan Razak
fax no. 703-960-9125

Irwan Razak, Baker Corp., phone (703) 960-8800 ext.5213

FROM: Mike Duncan
Floodplain Delineation Branch
Phone 602-506-4732
FAX 602-506-4601
Email mwd@mail.maricopa.gov

~~~~~~
] Flood Control District of Maricopa County [
] 2801 West Durango Street [
] Phoenix, Arizona 85009 [
~~~~~~

2 sheets including cover

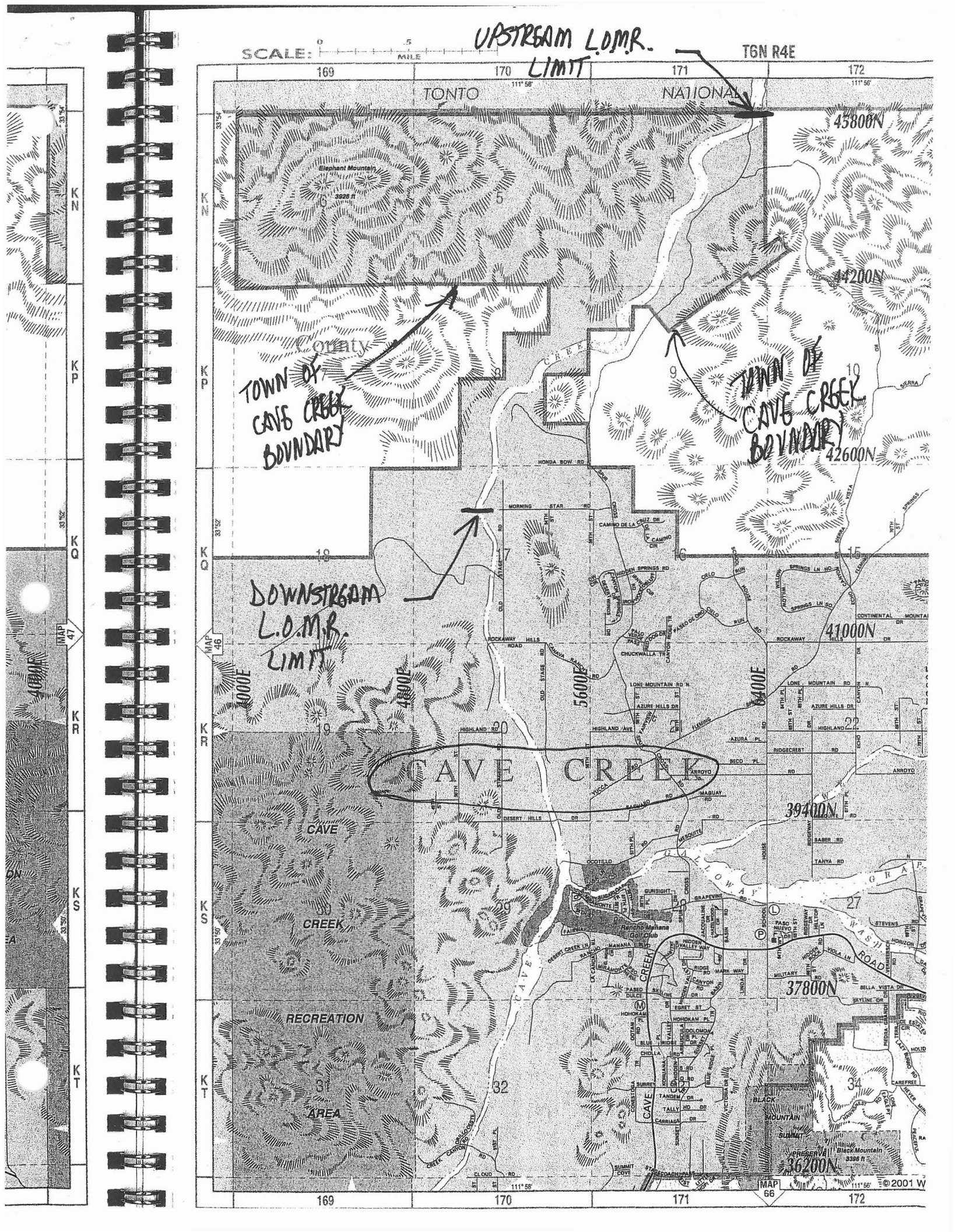
Date: 11-7-01

Project: FEMA case no. 01-09-551P
Cave Creek Correction LOMR

Irwan,

Here is a map that shows the Town of Cave Creek corporate limits, and the LOMR limits. Over 90% of the LOMR is within the Town of Cave Creek. As discussed in my email of this morning, we can send you an electronic coverage of the corporate limits. If you want this, please let me know what format you prefer.

Thank you for your help with this matter.


UPSTREAM L.O.M.R. LIMIT
T6N R4E
SCALE: 0 .5 MILE
TONTO NATIONAL
Elephant Mountain
3928 ft
TOWN OF CAVE CREEK BOUNDARY
TOWN OF CAVE CREEK BOUNDARY
DOWNSTREAM L.O.M.R. LIMIT
CAVE CREEK
CAVE CREEK RECREATION AREA
45800N
44200N
42600N
41000N
39400N
37800N
36200N
4000E
4800E
5600E
6400E
MAP 46
MAP 47
MAP 66
169
170
171
172
111° 56'
33°54'
33°52'
33°50'
KN
KP
KQ
KR
KS
KT
Rancho Manana Golf Club
Black Mountain
3386 ft
©2001 W

NATIONAL FLOOD INSURANCE PROGRAM

FEMA MAP COORDINATION CONTRACTOR

OCT 05 2001

FLOOD CONTROL DISTRICT
RECEIVED
OCT 09 '01

CH & GM	FINANCE
PIO	LANDS
ADMIN	O & M
REG	P & PM
ENG	FILE
CONTRACTS	
ROUTING	MWD

Mr. Michael Duncan, P.E.
Project Manager
Engineering Division
Flood Control District of
Maricopa County
2801 West Durango Street
Phoenix, AZ 85009-6399

IN REPLY REFER TO:
Case No.: 01-09-551P
Communities: Town of Cave Creek and
Maricopa County, AZ
Community Nos.: 040129 and 040037

316-INTc

Dear Mr. Duncan:

This is in regard to your March 13, 2001, request that the Federal Emergency Management Agency (FEMA) issue a Letter of Map Revision for the above-referenced communities. In our letter to you dated July 9, 2001, we indicated we were reviewing the data submitted in support of your request and, within 60 days of the date of that letter, we would notify you if we needed additional data or if we encountered delays. Because we have encountered such delays, we will need additional time to complete our review. Therefore, we will inform you of our findings within 30 days of the date of this letter.

If you have general questions about your request, FEMA policy, or the National Flood Insurance Program, please call the FEMA Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627). If you have specific questions concerning your request, please call the Revisions Coordinator for your State, Pernille Buch-Pedersen, who may be reached at (703) 317-6224.

Sincerely,

Monther S. Madanat, Director
Engineering Division
Michael Baker Jr., Inc.

cc: Mr. Wayne E. Anderson, P.E.
Town Engineer
Town of Cave Creek

Mr. Dennis L. Richards, P.E.
Vice President
West Consultants, Inc.

3601 Eisenhower Avenue, Suite 600, Alexandria, Virginia 22304-6425 PH: 703.960.8800 FX: 703.960.9125

Michael Baker Jr., Inc., under contract with the FEDERAL EMERGENCY MANAGEMENT AGENCY, is a Map Coordination Contractor for the National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FEMA MAP COORDINATION CONTRACTOR

FLOOD CONTROL DISTRICT
RECEIVED
JUL 16 '01
CH & GM | FINANCE
PIO | LANDS
ADMIN | O & M
REG | P & PM
✓ENG | FILE
CONTRACTS
ROUTING MWD

July 9, 2001

Mr. Michael Duncan, P.E.
Project Manager
Engineering Division
Flood Control District of
Maricopa County
2801 West Durango Street
Phoenix, AZ 85009-6399

IN REPLY REFER TO:
Case No.: 01-09-551P
Communities: Town of Cave Creek and
Maricopa County, AZ
Community Nos.: 040129 and 040037

316-ACK.FRQ

Dear Mr. Duncan:

This responds to your letter dated June 27, 2001, concerning a March 13, 2001, request that the Federal Emergency Management Agency (FEMA) issue a revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. Pertinent information about the request is listed below.

Identifier:	Cave Creek Floodplain Revision
Flooding Source:	Cave Creek
FIRM Panel(s) Affected:	04013C0414 E, 0415 E, 0802 F, and 0805 F

We have completed an inventory of the items that you submitted. We have received the data and the review and processing fee ($4,000) required to begin a detailed technical review of your request. If additional data are required, we will inform you within 60 days of the date of this letter.

If you have general questions about your request, FEMA policy, or the National Flood Insurance Program, please call the FEMA Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627). If you have specific questions concerning your request, please call the Revisions Coordinator for your State, Pernille Buch-Pedersen, who may be reached at (703) 317-6224.

Sincerely,

Monther S. Madanat, Director
Engineering Division
Michael Baker Jr., Inc.

cc: Mr. Wayne E. Anderson, P.E.
Town Engineer
Town of Cave Creek

Mr. Dennis L. Richards, P.E.
Vice President
West Consultants, Inc.

3601 Eisenhower Avenue, Suite 600, Alexandria, Virginia 22304-6425 PH: 703.960.8800 FX: 703.960.9125

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

June 27, 2001

Pernille Buch-Pedersen, Regional Manager
Baker Civil
3601 Eisenhower Avenue, Suite 600
Alexandria, Virginia 22304-6425

SUPPLEMENTAL INFORMATION FOR CASE NO. 01-09-551P

Community: Cave Creek, Town of and Maricopa County Unincorporated Areas, Arizona
Community No.: 040129 and 040037

Flooding Source: Cave Creek
Map No.: 04013C
FIRM Panels Affected: 0414E, 0415E, 0802F, and 0805F

Dear Ms. Buch-Pedersen:

In response to your letter of April 5, 2001, I herewith submit the requested supplemental information. A list of the submitted items is also enclosed. If you have any questions, please contact me at (602) 506-4732, or mwd@mail.maricopa.gov.

Sincerely,

Michael Duncan

Michael Duncan, P.E.
Engineering Division

Enclosure

Copies to: Wayne Anderson, P.E., Town Engineer
Town of Cave Creek
37622 N. Cave Creek Road
Cave Creek, Arizona 85331

Dennis Richards
WEST Consultants, Inc.
2151 East Broadway Road, Suite 116
Tempe, AZ 85282

LIST OF SUPPLEMENTAL ITEMS ENCLOSED

CASE NO. 01-09-551P CAVE CREEK FLOODPLAIN REVISION

<> Diskette of HEC-1 files from report entitled: Cave Creek Above Carefree Highway Floodplain Delineation Study, FCD 95-28, by George V. Sabol Consulting Engineers, July 1997
[I understand that a copy of this report has been located in the Baker Civil archives]

<> MT-2 Form 3 Pages 1 and 5 for Hydrologic Analysis

<> Copy of a public notification packet and mailing list

<> Floodway adoption/enforcement letter from Town of Cave Creek

<> Floodway adoption/enforcement letter for Unincorporated Maricopa County

<> Revised page 7 ((1))

<> Revised page 9 ((1))

<> Revised map sheets 1 through 3 ((1))

((1)) Previously submitted materials erroneously indicated a vertical datum of NAVD 1988. This has been corrected to NGVD 1929 on pages 7 and 9 and map sheets 1 through 3.

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

June 13, 2001

TOPIC: NOTICE OF FLOODPLAIN AND FLOODWAY CHANGE
Floodplain Revision for Cave Creek (wash)
In the northwest part of the Town of Cave Creek
Within sections 4, 8, 9, and 17 of Township 6 North and Range 4 East
From Tonto National Forest Boundary to approx. Morning Star Road alignment

Dear Landowner:

County Assessor records indicate that you may own property in the vicinity of a recently-studied floodplain revision for Cave Creek (wash). This revision covers approximately 3 miles of wash. This portion of the wash was last studied in 1990, while Cave Creek downstream of here was restudied in 1997. The purpose of this revision was to correct a floodwater flow rate error in the 1990 study that affected 1 mile of the wash. In addition, this mile and the other two miles were updated to the flow rate methodology of the 1997 study.

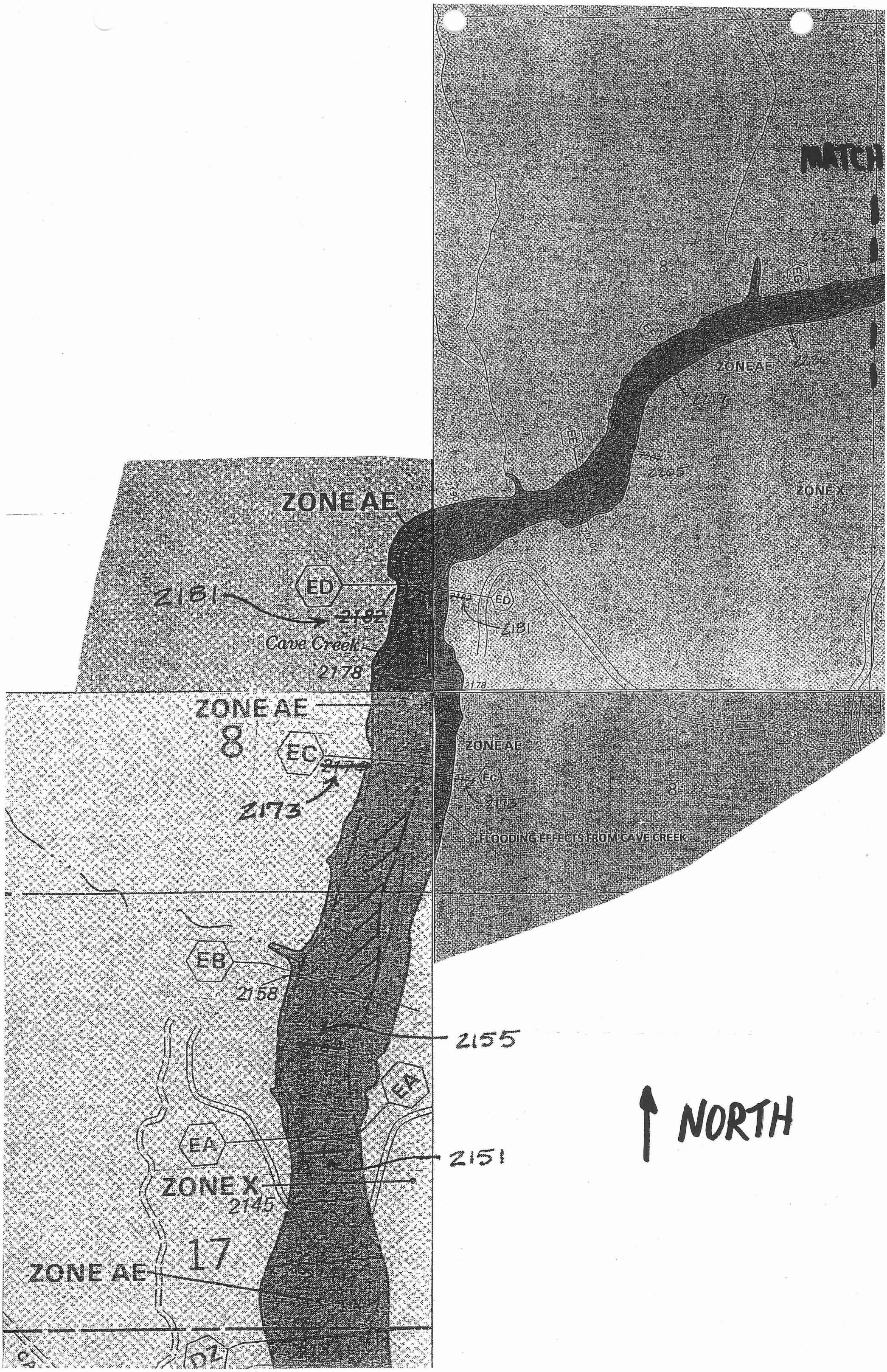
The changes to the floodplain are approximately shown on the two enclosed marked-up maps. The revised water surface elevations are approximately 3 feet higher at the two cross sections labeled EK and EL, and are lower at all of the other cross-sections.

This revision will be processed by the Federal Emergency Management Agency, and will become official when FEMA issues revised Flood Insurance Rate Maps for this revision. If you have any questions, please call me at 602-506-4732.

Sincerely,

Mike Duncan

Mike Duncan
Project Manager


MATCH
ZONE AE
8
EG
EF
ZONE AE
2200
2197
EE
2205
ZONE X
2190
2200
ZONE AE
ED
2181
2182
Cave Creek
2178
2182
ED
2181
2178
ZONE AE
8
EC
2173
ZONE AE
2177
EC
2173
8
FLOODING EFFECTS FROM CAVE CREEK
EB
2158
2155
EA
EA
2151
ZONE X
2145
17
ZONE AE
DZ
NORTH

TONTO NATIONAL FOREST

LIMIT OF DETAILED STUDY

ZONE X

MARICOPA COUNTY
UNINCORPORATED AREAS
040037

Unnamed Road

ZONE X

Unnamed Road

MATCH

NORTH

Springs

Note:
study

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY,
ARIZONA AND
INCORPORATED AREAS

CROSS FAMILY LLC
2530 EMERALD AVE
ANN ARBOR MI 48104

ELEANOR CROSS
PO BOX 1303
ANN ARBOR MI 48106

LARRY & LORRIE KEEN
33 1/2 THORNTON AVE
VENCIE CA 90291

NORMAN FOSTER
PO BOX 1322
CAREFREE AZ 85377

JOHN & DORIS NORTON
PO BOX 44015
PHOENIX AZ 85064

ARIZONA STATE LAND DEPT
1616 W ADAMS ST
PHOENIX AZ 85007

CAROLYN FABRICI
PO BOX 4708
CAVE CREEK AZ 85327

OWINGS FAMILY LTD PARTNERSHIP
PO BOX 4170
CAVE CREEK AZ 85327

JANE EKROM
PO BOX 468
CAVE CREEK AZ 85327

DANIEL REPONY
10207 N 39TH ST
PHOENIX AZ 85028

JOHN & RUTH GOODWIN
5416 E TIERRA BUENA LN
SCOTTSDALE AZ 85254

SPUR CROSS RANCH
PARK ADMINISTRATOR
MARICOPA COUNTY PARKS & REC DEPT
411 N CENTRAL SUITE 470
PHOENIX AZ 85004

CONNIE COLEMAN
11211 N TATUM BLVD #200
PHOENIX AZ 85028

CAHAVA SPRINGS CORP
8433 E CAREFREE DR
CAREFREE AZ 85377

JANE REED
4666 COUNTRY RD 311
NEW CASTLE CO 81647

KARLA NIGGL
42342 N 52ND ST
CAVE CREEK AZ 85331

MCCORMICK LIVING TRUST
42212 N OLD STAGE RD
CAVE CREEK AZ 85331

SUSAN PERTL
2626 N LAKEVIEW AVE #203
CHICAGO IL 60614

JAMES & CHARLOTTE WARD
PO BOX 4874
CAVE CREEK AZ 85327

BARKER ENTERPRISES
PO BOX 1503
CAVE CREEK AZ 85327

LISABETH WEIDEMAN
42502 N OLD STAGE RD
CAVE CREEK AZ 85331

CHERYL PERTL
2626 N LAKEVIEW AVE #203
CHICAGO IL 60614

HERBERT DREISESZUN
PO BOX 10775
PHOENIX AZ 85064

NO STREET DELIVERY
IN CA[illegible] PO
BOX NUMBER REQUIRED.

4 LETTERS
WERE
RETURNED
BY POST
OFFICE

LARRY & LORRIE KEEN
33 1/2 THORNTON AVE
VENCIE CA 90291

CAHAVA SPRINGS CORP
8433 E CAREFREE DR
CAREFREE AZ 85377

6-19-01

~~KEEN 033~~

NDAA

Please Forward
NOT AT THIS
Address

INIT ____
☐ Not Deliverable As Addressed
Unable To Forward
☐ Insufficient Address
☐ Moved, Left No Address
☐ Unclaimed ☐ Refused
☐ Attempted - Not Known
☐ No Such Street ☐ Number
☐ Vacant ☐ Illegible
☐ No Mail Receptacle
☐ Box Closed - No Order
☐ Returned for Better Address
CAVE CREEK AZ 85327

CONNIE COLEMAN
11211 N TATUM BLVD #200
PHOENIX AZ 85028

RETURNED TO SENDER
ATTEMPTED NOT KNOWN

BARKER ENTERPRISES
PO BOX 1503
CAVE CREEK AZ 85327

6-19-01

6-18-01

CAVE CREEK
ARIZONA

SETTLED 1870 · INCORPORATED 1986

June 27, 2001

Hazards Study Branch
Federal Emergency Management Agency
500 C Street SW
Washington, D.C. 20472

SUBJECT: **Floodplain Study for Cave Creek Wash and Modified Regulatory Floodway**

To Whom It May Concern:

I have reviewed our LOMR application package of the map revision by the Flood Control District of Maricopa County that describes the effects on the floodplain and floodway of Cave Creek Wash.

Concerning the portion of the LOMR that affects the Town of Cave Creek, as Floodplain Administrator for the Town, I will adopt and enforce the related, modified regulatory floodway.

Sincerely,

Wayne E Anderson

Wayne Anderson, P.E.
Town Engineer

37622 NORTH CAVE CREEK ROAD ★ CAVE CREEK, ARIZONA 85331

ADMINISTRATION	480/488-1400	BUILDING / SAFETY	480/488-1414
COURT / MARSHALL	480/488-1409	PLANNING & ZONING	480/595-1930
ENGINEERING	480/595-1935	FAX	480/488-2263

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

June 15, 2001

Hazards Study Branch
Federal Emergency Management Agency
500 C Street SW
Washington, D.C. 20472

SUBJECT: Cave Creek Floodplain Revision
Modified Regulatory Floodway

To Whom It May Concern:

I have reviewed our LOMR application package for revising 3 miles of the floodplain and floodway of Cave Creek. Concerning the portion of the LOMR that affects Unincorporated Maricopa County, as Floodplain Administrator for Unincorporated Maricopa County, I will adopt and enforce the related, modified regulatory floodway.

Sincerely,

Michael S. Ellegood, P.E.
Chief Engineer and General Manager

NATIONAL FLOOD INSURANCE PROGRAM
FEMA MAP COORDINATION CONTRACTOR

FLOOD CONTROL DISTRICT
RECEIVED
APR 10 '01
CH & SU | FINANCE
PID | LANDS
ADMIN | C & M
R&B | S & M
ENG | FILE
CONTRACTS MWD

April 5, 2001

Mr. Michael Duncan, P.E.
Project Manager
Engineering Division
Flood Control District of
Maricopa County
2801 West Durango Street
Phoenix, AZ 85009-6399

IN REPLY REFER TO:
Case No.: 01-09-551P
Communities: Town of Cave Creek and
Maricopa County, AZ
Community Nos.: 040129 and 040037

316-ACK.FRQ

Dear Mr. Duncan:

This responds to your request dated March 13, 2001, that the Federal Emergency Management Agency (FEMA) issue a revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. Pertinent information about the request is listed below.

Identifier:	Cave Creek Floodplain Revision
Flooding Source:	Cave Creek
FIRM Panel(s) Affected:	04013C0414 E, 0415 E, 0802 F, and 0805 F

FEMA has implemented a procedure to recover costs associated with reviewing and processing requests for modifications to published flood information and maps. Effective June 1, 2000, FEMA revised that fee schedule. A copy of the notice summarizing the current fee schedule, which was published in the *Federal Register*, is enclosed for your information. In accordance with this schedule, the fee for your request is $4,000 and must be submitted before we can continue processing your request. Payment of this fee must be made in the form of a check or money order, made payable in U.S. funds to the National Flood Insurance Program (NFIP), or credit card payment. For identification purposes, the case number referenced above must be included on the check or money order. We will not perform a detailed technical review of your request until we receive this payment.

Payment must be forwarded to one of the addresses listed below.

Using U.S. Postal Service:
Federal Emergency Management Agency
Fee-Charge System Administrator
P.O. Box 3173
Merrifield, VA 22116-3173

Using overnight service:
FEMA Fee-Charge System Administrator
c/o Dewberry & Davis
METS Division, Stop 19A
8401 Arlington Boulevard
Fairfax, VA 22031

On October 1, 1992, FEMA implemented the use of application/certification forms for requesting revisions or amendments to NFIP maps for two reasons. First, because the forms provide a step-by-step

process for requesters to follow and are comprehensive, requesters are assured of providing all of the necessary information to support their requests without having to go through an iterative process of providing additional information in a piecemeal fashion. Experience has shown this to be a time-consuming and cost-intensive process. Second, because use of the forms ensures that the requesters' submissions are complete and more logically structured, FEMA can complete its review in a shorter timeframe. While completing the forms may appear to be burdensome, we believe it is prudent to do so because of the advantages that result for the requester.

We have completed an inventory of the items that you submitted. The items identified below are required before we can begin a detailed review of your request.

1. Please submit a hydrologic analysis and all applicable backup information to support the discharges used in the submitted hydraulic analyses for Cave Creek. In addition, please submit Application/Certification Form 3, entitled "Hydrologic Analysis Form" (copy enclosed).

2. Please submit a copy of the public notice distributed by each community stating its intent to revise the regulatory floodway, or a statement by each community that it has notified all affected property owners and affected adjacent jurisdictions.

3. Please submit letters from each community stating that each community will adopt and enforce the modified regulatory floodway, OR, if the State has jurisdiction over either the regulatory floodway or its adoption by your community, a copy of each community's letter to the appropriate State agency notifying it of the modification to the regulatory floodway and a copy of the letter from that agency stating its approval of the modification.

All required items are to be submitted to us at the address shown at the bottom of the first page. If <u>all</u> required items are not submitted within 90 days of the date of this letter, we will treat any subsequent request as an original submittal, and it will be subject to all submittal/payment procedures.

If you are unable to meet the 90-day deadline for submittal of required items, and would like FEMA to continue processing your request, you must request an extension of the deadline. This request must be submitted to us in writing and must provide (1) the reason why the data cannot be submitted within the requested timeframe, and (2) a new date for the submittal of the data. FEMA receives a very large volume of requests and cannot maintain inactive requests for an indefinite period of time. Therefore, the fees will be forfeited for any request for which neither the requested data nor a written extension request is received within 90 days.

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

If you have general questions about your request, FEMA policy, or the NFIP, please call the FEMA Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627). If you have specific questions

concerning your request, please call the Revisions Coordinator for your State, Pernille Buch-Pedersen, who may be reached at (703) 317-6224.

Sincerely,

Monther S. Madanat, Director
Technical Services Division
Michael Baker Jr., Inc.

Enclosures

cc: Mr. Wayne E. Anderson
Town Engineer
Town of Cave Creek

Mr. Dennis L. Richards, P.E.
Vice President
West Consultants, Inc.

FEDERAL EMERGENCY MANAGEMENT AGENCY **HYDROLOGIC ANALYSIS**	O.M.B No. 3067-0148 Expires April 30, 2001

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 3.67 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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: _____

Flooding Source: _____

Project Name/Identifier: _____

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
☐ Statistical Analysis of Gage Records	Form 3 - Attachment A	☐ Yes ☐ No
☐ Regional Regression Equations	Form 3 - Attachment C	☐ Yes ☐ No
☐ Precipitation/Runoff Model	Form 3 - Attachment D	☐ Yes ☐ No
☐ Other	Back-up computations and supporting data	☐ Yes ☐ 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)

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	☐ Yes	☐ No	☐ Yes	☐ No
3. Data adjustments	☐ Yes	☐ No	☐ Yes	☐ No
4. Number of high outliers	_____		_____	
Low outliers	_____		_____	
Zero events	_____		_____	
5. Generalized skew	_____		_____	
6. Station skew	_____		_____	
7. Adopted skew	_____		_____	
8. Probability distribution used (justify if log-Pearson III was not used)	_____		_____	
9. Transfer equations to ungaged sites			☐ Yes	☐ No

If Yes, specify method

_____

_____

_____

10. Expected probability*	☐ Yes	☐ No
11. Comparison of results with other analyses	☐ Yes	☐ No

If Yes, describe comparison

_____

_____

_____

_____

_____

12. **Attach analysis including plot of flood-frequency curve. Analysis Attached?** ☐ Yes ☐ 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: _____

3. Hydrologic region(s): _____
Attach backup map.

4. Provide parameters, values, and source of data used to define parameters.

_____

_____

_____

	FIS:		Revised:	
5. Urbanized conditions calculations	☐ Yes	☐ No	☐ Yes	☐ No
6. Percent of watershed urbanization	_____		_____	
7. Is the watershed controlled?	☐ Yes	☐ No	☐ Yes	☐ No
8. Comparison with other analyses	☐ Yes	☐ No	☐ Yes	☐ 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:	_____		_____	
Version:	_____		_____	
Date:	_____		_____	
2. Source of rainfall depth:	_____		_____	
3. Source of rainfall distribution:	_____		_____	
4. Rainfall duration:	_____		_____	
5. Areal adjustment to precipitation (%):	_____		_____	
6. Maximum overland flow length	_____		_____	
7. Hydrograph development method:	_____		_____	
8. Loss rate method:	_____		_____	
Source of soils information:	_____		_____	
Source of land use information:	_____		_____	
9. Channel routing method:	_____		_____	
10. Reservoir routing:	☐ Yes	☐ No	☐ Yes	☐ No
11. Baseflow considerations:	☐ Yes	☐ No	☐ Yes	☐ No

If Yes, explain below how baseflow was determined:

_____

_____

_____

12. Snowmelt considerations:	☐ Yes	☐ No	☐ Yes	☐ No
13. Model calibration:	☐ Yes	☐ No	☐ Yes	☐ No

If Yes, explain below how calibration was performed

_____

_____

_____

14. Future land use condition:	☐ Yes	☐ No	☐ Yes	☐ No

If Yes, explain why below

_____

_____

_____

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? ☐ Yes ☐ No

NOTE: FEMA policy is to base flooding on existing conditions

Federal Emergency Management Agency

Washington, D.C. 20472

FEE SCHEDULE FOR PROCESSING REQUESTS FOR MAP CHANGES

This notice contains the revised fee schedule for processing certain types of requests for changes to National Flood Insurance Program (NFIP) maps. The change in the fee schedule will allow FEMA to further reduce the expenses to the NFIP by more fully recovering the costs associated with processing conditional and final map change requests. The revised fee schedule for map changes is effective for all requests dated June 1, 2000, or later and supersedes the current fee schedule, which was established on March 1, 1999.

To develop the revised fee schedule for conditional and final map change requests, FEMA evaluated the actual costs of reviewing and processing requests for Conditional Letters of Map Amendment (CLOMAs), Conditional Letters of Map Revision – based on Fill (CLOMR-Fs), Conditional Letters of Map Revision (CLOMRs), Letters of Map Revision – based on Fill (LOMR-Fs), Letters of Map Revision (LOMRs), and Physical Map Revisions (PMRs).

Fee Schedule for Requests for CLOMAs, CLOMR-Fs, and LOMR-Fs

Based on our review of actual cost data for Fiscal Year 1999, we are continuing to charge the following review and processing fees, which requesters must submit with all requests:

Request for single-lot/single-structure CLOMA, CLOMR-F, and LOMR-F	$400
Request for single-lot/single-structure LOMR-F based on as-built information (CLOMR-F previously issued by us)	$300
Request for multiple-lot/multiple-structure CLOMA	$700
Request for multiple-lot/multiple-structure CLOMR-F and LOMR-F	$800
Request for multiple-lot/multiple-structure LOMR-F based on as-built information (CLOMR-F previously issued)	$700

Fee Schedule for Requests for CLOMRs

Based on our review of actual cost data for Fiscal Year 1999, we are continuing to charge the following review and processing fees, which requesters must submit with all requests unless exempted by 44 CFR 72.5:

Request based on new hydrology, bridge, culvert, channel, or combination of any of these	$3,100
Request based on levee, berm, or other structural measure	$4,000

Fee Schedule for Requests for LOMRs and PMRs

Based on our review of actual cost data for Fiscal Year 1999, **we revised the review and processing fee for requests based on levees, berms, or other structural measures, from $4,700 to $6,000.** Therefore, unless 44 CFR 72.5 exempts the request, requesters must submit the review and processing fees shown below with requests for LOMRs and PMRs dated June 1, 2000, or later that are not based on structural measures or alluvial fans.

Request based on bridge, culvert, channel, or combination thereof	$4,000
Request based on levee, berm, or other structural measure	$6,000
Request based on as-built information submitted as followup to CLOMR	$3,400

Fees for CLOMRs, LOMRs, and PMRs Based on Structural Measures on Alluvial Fans

Based on our review of actual cost data for Fiscal Year 1999, we are continuing to charge $5,000 as the initial fee for requests for CLOMRs and LOMRs based on structural measures on alluvial fans. We also will continue to recover the remainder of the review and processing costs by invoicing the requester before issuing a determination letter, consistent with current practice. We will continue to use the prevailing private-sector labor rate charged to us ($50 per hour) to calculate the total reimbursable fees.

Payment Submission Requirements

Requesters must make fee payments for non-exempt requests before we render services. This payment must be in the form of a check or money order or by credit card payment. Please make all checks and money orders in U.S. funds payable to the *National Flood Insurance Program*. We will deposit all fees collected to the National Flood Insurance Fund, which is the source of funding for providing this service.

National Flood Insurance Program
NFIP
Administered by FEMA

Need Information on Flood Hazard Maps?

A wealth of information is only a click away at: **www.fema.gov/mit/tsd**

Homeowners will find:

- A helpful tutorial: "How to Challenge a Flood Risk Determination"
- Answers to Frequently Asked Questions, including, "Why do I need flood insurance?" "What are the different flood hazard zone designations and what do they mean?" and "What is a base flood elevation?

Insurance Agents and Bankers will find:

- Information on the National Flood Insurance Reform Act of 1994, which affects lenders
- Pages containing information on how to become a "Write Your Own" insurance agent
- Pages containing flood insurance rate information and a listing of map determination companies

Engineers and Surveyors will find:

- A listing of National Flood Insurance Program (NFIP) approved and test version software with links to free downloads
- Forms and fee schedules for requesting a map change or back-up study data
- A link to a listing of training courses and conferences related to emergency management

Floodplain Managers and Community Officials will find:

- The compendium of map change actions and the Guide for Community Officials
- A listing of key contacts at FEMA with direct e-mail links
- Forms necessary to initiate requests for back-up study data

All Four Constituent groups will find:

FEMA MAP ASSISTANCE CENTER
FMAC
1-877-FEMA MAP

- NFIP policies and regulations
- Forms for making map change requests
- The answers to over 80 Frequently Asked Questions
- Access to a database containing the status of recent requests for map changes
- Numerous reports and guidance documents in both Adobe Acrobat .PDF and MS Word formats
- Information on Map Modernization initiatives with direct e-mail links to FEMA Task Leaders
- A subscription service providing free news on the latest developments in flood hazard mapping via e-mail
- E-mail links to Map Specialists at the FEMA Map Assistance Center (1-877-FEMA MAP)

Questions and suggestions? Contact John Magnotti at 202-646-3932, or john.magnotti@fema.gov

Want to talk to a Map Specialist about Flood Hazard Mapping?

If your home or business is located in the floodplain, you will need to purchase and maintain flood insurance. If you have a mortgage, your bank will require it.

FEMA MAP ASSISTANCE CENTER

FMAC

1-877-FEMA MAP

For all your flood hazard map questions, call toll-free:

1-877-FEMA MAP (1-877-336-2627)

or visit our Web Site at www.fema.gov/mit/tsd

FEMA's flood hazard maps— also called Flood Insurance Rate Maps or FIRMs— are used to determine your property's flood risk. Increasing development, severe weather events, and other activities in the floodplain will change the flood risks shown on the maps. FEMA is working hard to update and modernize all of the flood hazard maps. However, with more than 18,000 communities participating in the National Flood Insurance Program (NFIP), this will take time. Meanwhile, the FEMA Map Assistance Center (FMAC) has a staff of trained professionals ready to help

Typical flood hazard map questions we answer:

Property Owner: "My home has never flooded. Why do I need flood insurance?"

Real Estate Agent: "I think the previous owner had an exemption from flood insurance— is there a record of this exemption?"

Developers and Engineers: "What is the status of my request for a map change? How long will it take?"

Community Officials: "How do I request a physical revision to a flood map?"

Lenders: "How can we help our customers whose homes are located in a flood zone?"

Other important National Flood Insurance Program toll-free numbers:

- To purchase flood hazard maps for a nominal fee... **1-800-358-9616**
- For general flood insurance information... **1-800-427-4661**
- To order any current FEMA publication... **1-800-480-2520**
- For lender questions on flood policy coverage and rates... **1-800-611-6125**
- For agent questions on policy coverage and rates... **1-800-720-1093**

National Flood Insurance Program

NFIP

Administered by FEMA

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

March 13, 2001

Pernille Buch-Pedersen, Regional Manager
Baker Civil
3601 Eisenhower Avenue, Suite 600
Alexandria, Virginia 22304

Community: Cave Creek, Town of and Maricopa County Unincorporated Areas, Arizona
Community No.: 040129 and 040037

Flooding Source: Cave Creek
Map No.: 04013C
FIRM Panels Affected: 0414E, 0415E, 0802F, and 0805F

Dear Ms. Buch-Pedersen:

I have enclosed a re-study of a portion of Cave Creek (in Sections 4, 8, 9, and 17, of Township 6 North, Range 4 East). This re-study corrects a grossly low error in the flowrate of the existing Flood Insurance Study for 1 river-mile of Cave Creek. In addition, 1.5 river-mile downstream and 0.8 river-mile upstream of this error-area were re-studied using newer hydrology.

A total of 3.3 river-miles of Cave Creek have been re-studied, using the newer hydrology of a downstream study, entitled: "Cave Creek Above Carefree Highway Floodplain Delineation," FCD 95-28, July 1997, by George V. Sabol Consulting Engineering, Inc., of LOMR dated August 5, 1997. The existing floodplain study for these 3.3 river-miles is "Cave Creek / Carefree Flood Delineation Study," FCD 88-53, March 1990, by CH2M HILL.

A Technical Support Data Notebook is enclosed. Since the re-studied floodplain has been hand-drawn, we do not have a digital copy of the work map. Please review and process a Letter of Map Revision for the re-studied portion of Cave Creek.

If you have any questions, please contact me at (602) 506-4732, or mwd@mail.maricopa.gov.

Sincerely,

Michael Duncan

Michael Duncan, P.E.
Engineering Division

Enclosure

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

Wayne Anderson, P.E., Town Engineer
Town of Cave Creek
37622 N. Cave Creek Road
Cave Creek, Arizona 85331

Spur Cross Ranch Park Administrator
Maricopa County Parks and Recreation Department
411 N. Central Av., Suite 470
Phoenix, AZ 85004

Terri Miller
Community Assistance Program Coordinator
Arizona Division of Emergency Management
5636 E. McDowell Road
Phoenix, AZ 85008

Dennis Richards
WEST Consultants, Inc.
2151 East Broadway Road, Suite 116
Tempe, AZ 85282

Coord: JH EAR DRJ

CAVE CREEK FLOODPLAIN REVISION

LOMR PACKAGE FOR ZONE AE FLOODPLAIN AND FLOODWAY

FCD Contract No. 1999C048 – Assignment 5

Prepared for:

Flood Control District of Maricopa County

2801 West Durango Street

Phoenix, AZ 85009-6399

Prepared by:

WEST Consultants, Inc

2151 East Broadway Road, Suite 116

Tempe, AZ 85282

Dennis L. Richards

Registered Professional Engineer (Civil)
CERTIFICATE NO.
21560
DENNIS L.
RICHARDS
Date Signed 1-31-02
ARIZONA, U.S.A.

January 11, 2001

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Registered Professional Engineer (Civil)
CERTIFICATE NO.
21560
DENNIS L.
RICHARDS
Date Signed 1-31-02
ARIZONA, U.S.A.

Dennis L. Richards

List of Appendices

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C.3 Survey Field Notes for Hydraulic Modeling

D Hydrologic Analysis Supporting Documentation

D.1 Precipitation Data

D.2 Physical Parameter Calculations

D.3 Hydrograph Routing Data

D.4 Reservoir Routing Data

D.5 Flow Splits and Diversions Data

D.6 Hydrologic Calculations

E Hydraulic Analysis Supporting Documentation

E.1 Roughness Coefficient Estimation

E.2 Cross Section Plots

E.3 Expansion and Contraction Coefficients

E.4 Analysis of Structures

E.5 Hydraulic Calculations

F Erosion and Sedimentation Transport Analysis Supporting Documentation

1. Introduction

The Flood Control District of Maricopa County contracted WEST Consultants, Inc. to perform a LOMR floodplain and floodway revision of a portion of Cave Creek. The project involves approximately three miles of rural wash in the northwest portion of Cave Creek, Arizona (T06N, R04E). The project boundaries are defined by Morning Star Road at the downstream edge (river station 35.49) and the Tonto National Forest boundary at the upstream edge (river station 38.79). See Figure 1.1 below. The project number with the Flood Control District of Maricopa County (hereafter referred to as the District) is 1999C048 – Assignment No. 5. The Project Manager with the District is Michael Duncan, P.E., with the assistance of Dave Degerness.

The current Flood Insurance Rate Map for this portion of Cave Creek, produced in a 1990 study by CH2M Hill, requires updating as a result of errors in the flowrates used in approximately one mile of the hydraulic modeling. In addition, a 1997 floodplain study by George V. Sabol Consulting Engineers, with an upstream limit 1.5 miles downstream of the errors, developed revised hydrology for the area. The purpose of this analysis was to correct the erroneous flow values, use the more current 1997 hydrology, and produce a revised delineation of the floodplain and floodway for this portion of Cave Creek.

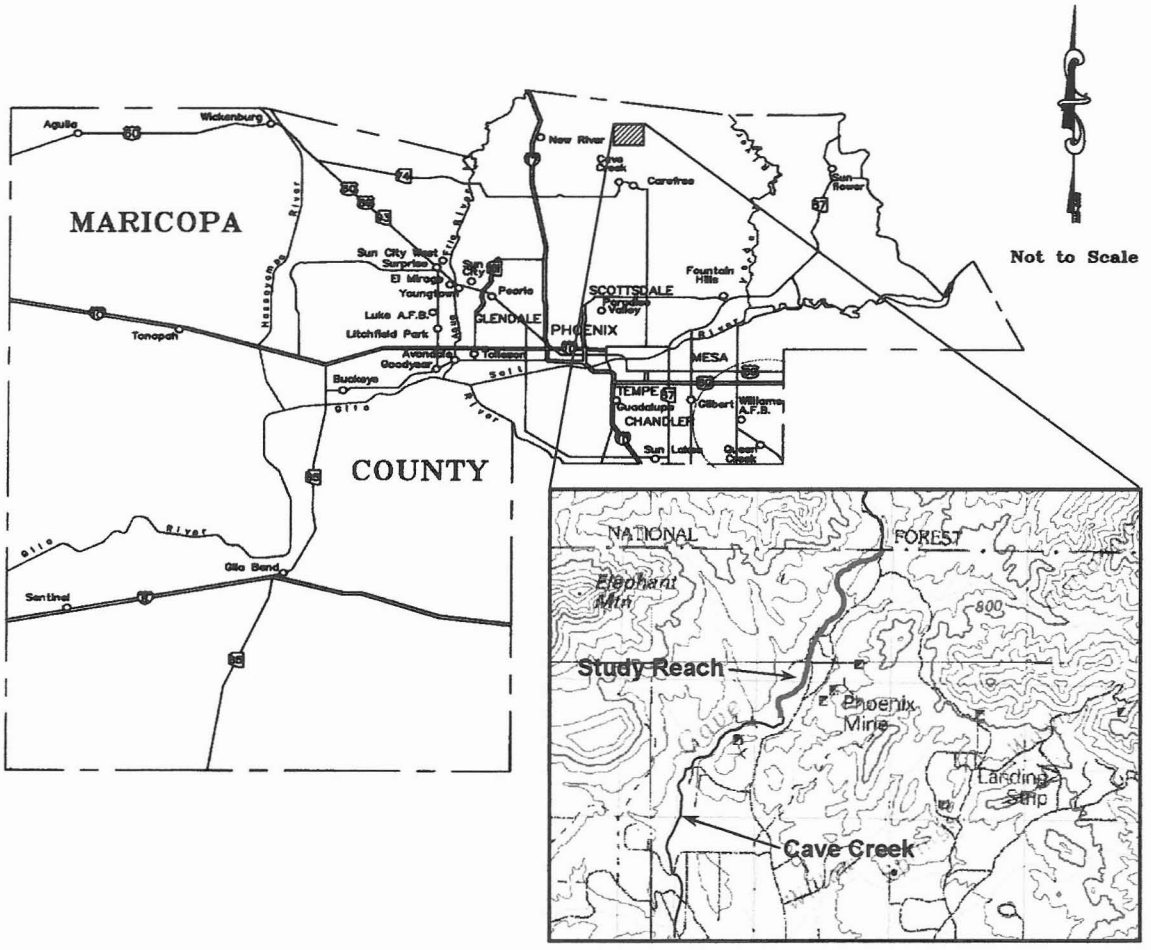

Figure 1.1 Index Map of Study Area

Analysis using the revised hydraulic model indicated that the use of the newer hydrologic data does not dramatically alter the delineation of either the floodplain or the floodway, except in several specific areas. This is largely a function of the relative steepness of the terrain which defines the wash. Despite the marked changes in water surface elevation, there was not significant plan view change in the floodplain delineation. The changes were more apparent, however, in the revised floodway delineation. Detailed results are discussed in Section 5.9, page 7 of this TDN.

2. ADWR/FEMA Forms

2.1 Study Documentation Abstracts for ADWR Submittals

All information related to Sections 2.1.1 through 2.1.10 of the State Standard Attachment SSA1-97, dated November 1997, are included following page 2.

2.2 FEMA Forms

Forms required by FEMA are included in the text of this TDN following the ADWR forms.

3. Surveying and Mapping Information

3.1 Field Survey Information

All survey data for this analysis was provided by the District. The survey data from the original 1990 study was used to define the geometry for the revised hydraulic model. Since no changes were to be made to the geometry of the hydraulic model, no further survey data was necessary.

3.2 Mapping

All mapping for this analysis was provided by the District in the form of paper copies from the 1990 CH2M Hill study as well as the 1997 Sabol study. There was no digital mapping available.

4. Hydrology

4.1 Method Description

All hydrology for this analysis was provided by the District. The results from the 1997 George V. Sabol study provided revised flow rates for use in the 1990 HEC-2 model created by CH2M Hill. The 1997 flows were based on a 24-hour, 100-year storm event.

4.2 Parameter Estimation

4.2.1 Drainage Area Boundaries

Not applicable.

Study Documentation Abstract for FEMA Submittals	Initial Study		Restudy		CLOMR		LOMR	X	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	WEST Consultants, Inc. Dennis L. Richards, P.E. 2151 East Broadway Road, Suite 116 Tempe, Arizona 85282 (480) 345-2155 254A05
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	Michael Duncan, P.E. - Flood Control District of Maricopa County (602) 506-4732
2.1.7	Reach Description	Cave Creek – Morning Star Road to Tonto National Forest Boundary. FIRMs: 04013C0805F, 0802F, 0414E, 0415E
2.1.8	USGS Quad Sheet(s) with original photo date & latest photo revision date	Cave Creek Quadrangle - Original Date 1965, Photorevised Date 1981; New River Mesa Quadrangle – Original Date 1964, Photoinspected 1978.
2.1.9	Unique Conditions and Problems	
2.1.10	Coordination of Q's (Agency, Date, Comments)	All hydrology was provided by the Flood Control District of Maricopa County

FEDERAL EMERGENCY MANAGEMENT AGENCY **REVISION REQUESTER AND COMMUNITY OFFICIAL**	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: _____

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

2. Flooding Source: Cave Creek

3. Project Name/Identifier: Cave Creek Floodplain Revision - LOMR Package for Zone AE Floodplain and Floodway

4. FEMA zone designations affected: AE
(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
040129	Town of Cave Creek	AZ	04013C	0802F	12/03/93
			04013C	0805F	12/03/93
040037	Unincorporated Areas		04013C	0414E	12/03/93
	Maricopa County		04013C	0415E	12/03/93

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

Types of Flooding	Structures
☒ Riverine	☐ Channelization
☐ Coastal	☐ Levee/Floodwall
☐ Alluvial fan	☐ Bridge/Culvert
☐ Shallow Flooding (e.g. Zones AO and AH)	☐ Dam
☐ Lakes	☐ Fill
☐ Other (describe)	☐ 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**

Michael Duncan
Signature of Revision Requester

Michael Duncan, P.E., Project Manager
Printed Name and Title of Revision Requester

Flood Control District of Maricopa County
Company Name

Telephone No.: (602) 506-4732 Date: 3-9-01

Note: **Signature indicates that the community understands, from the revision requester, the impacts of the revision on flooding conditions in the community.**

Wayne E Anderson
Signature of Community Official

Wayne E. Anderson - Town Engineer
Printed Name and Title of Community Official

Town of Cave Creek
Community Name

Telephone No. (480) 488-1400 Date: 3/9/01

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

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

Dennis L. Richards
Signature

Dennis L. Richards, P.E., Vice President
Printed Name and Title of Revision Requester

Registr No. 21560 Expires (Date) 03/31/2001 State Arizona

Type of License/Expertise: Civil Engineer

Check which forms have been included with this request

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

FEDERAL EMERGENCY MANAGEMENT AGENCY **HYDROLOGIC ANALYSIS**	O.M.B No. 3067-0148 Expires April 30, 2001

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average **3.67** hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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: Town of Cave Creek and Unincorporated Areas of Maricopa County

Flooding Source: Cave Creek

Project Name/Identifier: Cave Creek Floodplain Revision - LOMR Package for Zone AE Floodplain and Floodway

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
☐ Statistical Analysis of Gage Records	Form 3 - Attachment A	☐ Yes ☐ No
☐ Regional Regression Equations	Form 3 - Attachment C	☐ Yes ☐ No
☒ Precipitation/Runoff Model	Form 3 - Attachment D	☒ Yes ☐ No
☐ Other	Back-up computations and supporting data	☐ Yes ☐ 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)
xsec. 37930	60.21	27,603	61.6 20,679
37370	70.78	10,979	75.6 23,260
36780	71.70	28,381	75.6 23,260
36400	73.94	28,271	77.5 23,235
35770	75.13	28,319	77.5 23,235
35490	75.86	28,338	77.5 23,235

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 D: PRECIPITATION/RUNOFF MODEL

		FIS:		Revised:	
	Method or model used:	HEC-1		HEC-1	
	Version:			4.0.1E Dodson & Assoc.	
	Date:	1988		May 1991	
2.	Source of rainfall depth:	NOAA Atlas 2		NOAA Atlas 2I	
3.	Source of rainfall distribution:	SCS type II		SCS type II	
4.	Rainfall duration:	24 hr.		24 hr.	
5.	Areal adjustment to precipitation (%):	85 %		100 %	
6.	Maximum overland flow length			8.0 mile	
7.	Hydrograph development method:	SCS Dimensionless		local S-graphs & Clark U.H.	
8.	Loss rate method:	Initial and Uniform		Green & Ampt	
	Source of soils information:	SCS Aguila-Carefree		SCS Aguila-Carefree	
	Source of land use information:			Flood Control Dist. of M. C.	
9.	Channel routing method:	Muskingham method		normal depth of Modified Puls	
10.	Reservoir routing:	☐ Yes	☒ No	☐ Yes	☒ No
11.	Baseflow considerations: **If Yes, explain below how baseflow was determined:**	☐ Yes	☒ No	☐ Yes	☒ No
12.	Snowmelt considerations:	☐ Yes	☒ No	☐ Yes	☒ No
13.	Model calibration: **If Yes, explain below how calibration was performed**	☐ Yes	☒ No	☐ Yes	☒ No
14.	Future land use condition: **If Yes, explain why below**	☐ Yes	☒ No	☐ Yes	☒ 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? ☐ Yes ☐ No

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

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE HYDRAULIC ANALYSIS**	O.M.B No. 3067-0148 Expires April 30, 2001

PUBLIC BURDEN DISCLOSURE NOTICE

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: Town of Cave Creek, Maricopa County, Arizona

Flooding Source: Cave Creek

Project Name/Identifier: Cave Creek Floodplain Revision - LOMR Package for Zone AE Floodplain and Floodway

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: Morning Star Road - Approximate River Mile 35.49

Upstream Limit: Tonto National Forest Boundary - Approximate River Mile 38.79

2. MODELS SUBMITTED

Requirements: for areas which have detailed flooding:	**for areas which do not 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.	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** CC-fp.dat ☒ **Floodway** **File Name** CC-fw.dat
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 FIS model upstream and downstream of the revised reach.

2. Corrected Effective Model ☐ **Natural** **File Name** N/A ☐ **Floodway** **File Name** N/A
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 Correctly Effective model must not reflect any man-made physical changes since the date of the effective model. An error could be a technical error in the modeling procedures, or any construction in the floodplain that occurred prior to the date of the effective model but was not incorporated into the effective model.

3. Existing or Pre-Project Conditions Model ☐ **Natural** **File Name** N/A ☐ **Floodway** **File Name** N/A
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** CAVECR.dat ☒ **Floodway** **File Name** N/A
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 35.49 within 0.0 (feet) Upstream End N/A within N/A (feet)
Cross-Section # *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 35.49 within 0.04 (feet) Upstream End N/A within N/A (feet)
Cross-Section # *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 35.49 within 5.66 (feet) Upstream End N/A within N/A (feet)
Cross-Section # *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:

☒ Stream Name ☒ Community Name ☐ Corporate Limits labeled ☐ Study limits labeled

☐ Confluences labeled ☒ Channel Stationing ☒ Streambed profiled ☒ Cross Sections labeled

☐ Horizontal/Vertical Scales indicated ☒ 100-year elevs profiled*

☐ Road Crossings ☐ Labeled ☐ Low Chord Elevations ☐ 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**

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE / COASTAL MAPPING**	O.M.B No. 3067-0148 Expires April 30, 2001

PUBLIC BURDEN DISCLOSURE NOTICE

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: Town of Cave Creek, Maricopa County, Arizona

Flooding Source: Cave Creek

Project Name/Identifier: Cave Creek Floodplain Revision - LOMR Package for Zone AE Floodplain and Floodway

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.)? Photogrammetric topography from George V. Sabol Consulting Engineers, "Cave Creek Above Carefree Highway Floodplain Delineation Study FCD 95-28" dated July 1997; Photogrammetric topography from CH2M Hill, "Topographic Mapping and Flood Insurance Study - Cave Creek and Tributaries" dated March 1990.

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

Effective FIS	Scale 1" = 200'	Contour Interval 4'
Revision Request	Scale 1" = 200'	Contour Interval 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

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).

FEMA MT-2 Form 5 Riverine / Coastal Mapping
Additional Comments

Section 1.1 – Mapping Changes

a. This was a Zone AE analysis, no approximate floodplain boundaries (Zone A) were considered.
f. Current community boundaries were not available due to the lack of digital mapping.
g. Effective 100-year floodplain and floodway boundaries from FIRM/FBFM were not available due to the lack of digital mapping.
h. There is no effective 100- or 500- year floodway upstream of this analysis. On the downstream end of this analysis, there is no 500-year floodway delineated.
i. No property boundaries or community easements were available due to the lack of digital mapping.
m. This analysis is riverine in nature, not coastal.
n. This analysis is riverine in nature, not coastal.
o. This analysis is riverine in nature, not coastal.

4.2.2 Watershed Work Maps

Not applicable.

4.2.3 Gage Data

Not applicable.

4.2.4 Statistical Parameters

Not applicable.

4.2.5 Precipitation

Not applicable.

4.2.6 Physical Parameters

Not applicable.

4.3 Problems Encountered During Study

4.3.1 Special Problems and Solutions

Not applicable.

4.3.2 Modeling Warning and Error Messages

Not applicable.

4.4 Calibration

Not applicable.

4.5 Final Results

4.5.1 Hydrologic Analysis Results

Not applicable.

4.5.2 Verification of Results

Not applicable.

5. Hydraulics

5.1 Method Description

Cave Creek is a rural wash located in the northwest portion of the town of Cave Creek, Arizona in Maricopa County. The project involves approximately three miles of rural wash bounded by Morning Star Road at the downstream edge (river station 35.49) and the Tonto National Forest boundary at the upstream edge (river station 38.79). See Figure 1.1 on page 1.

Hydraulic modeling for this analysis was performed using the U.S. Army Corps of Engineers' HEC-2 and HEC-RAS computer models; specifically, HEC-2 Version 4.6.0, released February 1991, and HEC-RAS Version 2.2, released September 1998.

The analysis consisted of altering the flow rates in the 1990 HEC-2 model created by CH2M Hill to reflect the more recent hydrology developed in the 1997 George V. Sabol study. The Sabol study provided flow rates at four different concentration points along this reach of Cave Creek. At the direction of the District, the flow rates at each concentration point were applied in an upstream direction along the reach until the next concentration point. When the next concentration point was encountered, the flow rate was adjusted and applied upstream to the next point. By applying the flow rates between concentration points in an upstream direction, the model produces higher water surface elevations and more conservative results. This approach was applied for all concentration points except at cross section 37930 where Cottonwood Creek joins Cave Creek. The additional flow from Cottonwood Creek was not applied upstream from the confluence. Instead, the flow from the next upstream concentration point was applied downstream up to the concentration point. Following the production of a revised floodplain, a new floodway analysis was performed as described in detail in Section 5.6. A comparison of the flow rates used in the original CH2M Hill and the revised model of this study is provided in Table 5.1.

Table 5.1 - Comparison of HEC-2 Discharges

Cross Section	1990 Discharge (cfs)	Revised Discharge (cfs)
38710*	27,603	20,679
37930	27,603	20,679
37370	10,979	23,260
36780*	28,381	23,260
36400	28,271	23,235
35770	28,319	23,235
35490*	28,338	23,235

Note: * indicates a concentration point in the 1997 Sabol study

5.2 Work Study Maps

With the lack of digital mapping for the study area, the preparation of new work study maps relied entirely on the original paper maps produced by the 1990 CH2M Hill study. The cross sections that define the geometry for the hydraulic model were scaled relative to a 1000-foot grid appearing on the original work study maps. The layout of the cross sections were then digitally recreated in AutoCAD. The location of the thalweg at each cross section was also scaled from the original maps and marked in the new digital maps. Following the completion of the hydraulic modeling, the revised lateral extents of the floodplain and floodway could then be located. First, the station of the thalweg was determined for each of the cross sections. The

HEC-2 output parameters of 'SSTA' and 'ENDST', which define the stations where the computed water surface intersects the ground, could then be used to determine the relative distance from the thalweg station to the edge of the floodplain on each side of the cross section. Using this technique, the lateral extent of the floodplain was mapped at each of the cross sections. In like manner, the floodway was also mapped. To complete the floodplain and floodway delineation between the cross sections, the new digital maps were placed on top of the original CH2M Hill maps. By aligning the two using the 1000-foot grid, it was possible to get a clear picture of the wash's topography. It was then possible to trace the floodplain and floodway by following the contours of the topography.

A set of three work study maps were produced for this floodplain and floodway revision. The maps are at a scale of 1" = 200', with a 2' vertical contour interval. The 100-year floodplain boundary is shown as a heavy solid line, and the 100-year floodway boundary is shown as a heavy dashed line. A thin dashed line defines the thalweg. Each cross section is drawn in its true location and is labeled to match the cross sections in the HEC-2 model. The final computed water surface elevation is also displayed next to the cross section number for both the floodplain and the floodway. A table appears in each of the drawing display areas which lists the flow rate at each of the cross sections. The 1000-foot grid is shown and the grid numbering is shown near the edge of each display area. Two section corners are marked on the maps with a heavy cross. Major features, such as roads are also shown.

5.3 Parameter Estimation

5.3.1 Roughness Coefficients

The original roughness coefficients from the 1990 CH2M Hill model were retained. Comparison to field photographs provided by the District suggested that these original values were appropriate.

5.3.2 Expansion and Contraction Coefficients

There were no bridges or culverts in this analysis. Therefore, expansion and contraction coefficients were not necessary.

5.4 Cross Section Descriptions

The cross sections were not altered from the original 1990 CH2M Hill model. There are 40 total cross sections defining the model geometry. Each cross section contains between 10 and 20 survey points. Inspection of the work study maps suggests good placement of cross sections for properly modeling the hydraulics of the wash.

5.5 Modeling Considerations

5.5.1 Hydraulic Jump and Drop Analysis

None identified.

5.5.2 Bridges and Culverts

None identified.

5.5.3 Levees and Dikes

None identified.

5.5.4 Islands and Split Flows

The final model results revealed that at three cross sections the computed water surface elevation for the floodplain left small 'islands' where the channel geometry had a local high point. None of these 'islands' were indicative of a channel feature that would produce true split flow conditions. Therefore, after consulting with the District, it was decided that no further analysis was necessary at these locations.

5.5.5 Ineffective Flow Areas

No ineffective flow areas were defined for this analysis.

5.5.6 Supercritical Flow

None identified.

5.6 Floodway Modeling

Once the floodplain model was completed using the revised flow rates, the model was then imported to HEC-RAS for the floodway encroachment analysis. Due to the occurrence of critical depth at a large number of cross sections, the surcharge of one foot was evaluated using the change in energy grade instead of water surface elevation. This analysis consisted of an initial run using Encroachment Method 4, the results of which were later fine tuned in HEC-2 using Encroachment Method 1. The Method 4 analysis specifies a target surcharge and incrementally removes an equal amount of conveyance from either overbank until the target surcharge is achieved. This procedure is performed at each cross section, beginning at the downstream end of the reach and working upstream. In order to expedite the process, three identical flow profiles were executed, each with a different target surcharge close to the desired value. The most effective target was then fixed at successive cross sections and the analysis moved upstream. Once Method 4 yielded encroachment stations close enough to the desired surcharge – within 0.2 feet – the results were then exported for the final Method 1 iterations using HEC-2. In Method 1, the user fixes the bank stations manually, allowing for fine-tuning to achieve the desired results.

5.7 Problems Encountered During the Study

5.7.1 Special Problems and Solutions

The lack of digital mapping for the project presented an interesting dilemma as to how the results of the hydraulic modeling would then be transferred to work study maps. The solution to this problem was described in detail in Section 5.2.

5.7.2 Modeling Warning and Error Messages

There are multiple warning and caution messages in the final HEC-2 model. Critical depth assumptions were made by the model at 19 different cross sections. Nine different sections gave warnings that the conveyance change was outside the acceptable range.

5.8 Calibration

Calibration of the hydraulic model was beyond the scope of this analysis.

5.9 Final Results

5.9.1 Hydraulic Analysis Results

Summaries of hydraulic model results are presented in Table 5.2 below. The table summarizes the following variables by cross section: peak discharge, floodplain water surface elevation, critical water surface elevation, average channel velocity, top width, depth of flow, Froude number, and stations for left and right edges of the water surface.

Table 5.2 Summary of Hydraulic Results

Cross Section	Discharge (cfs)	Water Surface Elev. (ft)		Average Velocity (ft/s)	Topwidth (ft)	Depth of Flow (ft)	Froude Number	Station WS	
		Computed	Critical					Left	Right
35490	23235	2151.32	2148.31	9.0	544	13.5	0.47	9566	10109
35590	23235	2153.35	2153.35	14.2	616	14.3	0.74	9382	10039
35690	23235	2157.50	2156.29	12.0	497	11.8	0.67	9597	10233
35770	23235	2162.14	2162.14	13.7	541	9.3	0.88	9673	10214
35870	23235	2167.72	2167.31	13.3	492	10.6	0.80	9704	10262
35960	23235	2173.13	2173.13	14.6	488	13.8	0.77	9578	10066
36060	23235	2176.13	2175.71	14.3	534	15.7	0.70	9518	10052
36180	23235	2181.08	2181.08	15.2	243	11.6	0.96	9905	10149
36230	23235	2187.18	2186.18	12.3	325	12.8	0.71	9952	10277
36310	23235	2192.65	2192.65	18.8	220	13.8	0.94	9836	10056
36400	23235	2200.49	2197.97	10.7	297	12.2	0.60	9869	10166
36490	23235	2205.40	2205.11	15.2	226	11.5	0.89	9918	10144
36520	23235	2209.76	2209.76	17.5	187	15.3	0.92	9883	10070
36610	23235	2217.75	2213.71	11.9	195	17.2	0.53	9903	10098
36690	23235	2220.63	2218.93	14.7	195	16.7	0.69	9935	10130
36780	23260	2226.60	2223.59	12.8	183	16.7	0.62	9961	10144
36880	23260	2236.62	2236.62	19.4	135	15.1	0.94	9905	10041
36960	23260	2244.33	2238.51	9.2	286	18.3	0.40	9906	10192
37010	23260	2245.75	2242.50	10.2	393	16.8	0.51	9777	10199
37080	23260	2248.42	2245.26	10.6	260	12.6	0.56	9930	10190
37120	23260	2249.90	2249.90	16.5	227	16.2	0.92	9966	10194
37200	23260	2257.53	2255.52	12.4	266	14.4	0.65	9833	10100
37270	23260	2261.47	2258.79	10.2	391	14.8	0.55	9745	10135
37310	23260	2263.09	2261.81	12.1	374	13.5	0.69	9789	10163
37370	23260	2266.37	2266.37	15.3	351	12.7	0.88	9936	10287
37470	23260	2270.71	2270.17	14.0	584	13.0	0.75	9965	10548
37570	23260	2274.14	2274.14	14.4	708	14.7	0.79	9958	10665
37660	23260	2278.75	2278.75	13.6	484	8.8	0.95	9912	10396
37750	23260	2286.26	2286.26	13.6	431	9.8	0.96	9948	10379
37800	23260	2290.58	2290.58	14.1	387	7.9	0.94	9792	10178
37930	20679	2295.98	2295.48	13.9	320	12.3	0.77	9770	10091
38030	20679	2303.16	2303.16	14.5	329	10.4	0.89	9928	10256
38140	20679	2309.81	2308.02	11.2	436	15.3	0.55	9841	10277
38250	20679	2313.63	2313.14	12.6	404	9.7	0.80	9917	10320
38320	20679	2317.38	2317.38	15.8	358	11.3	0.97	9741	10099
38430	20679	2324.10	2322.74	10.9	584	9.8	0.76	9472	10056
38500	20679	2329.00	2329.00	16.4	413	14.1	0.88	9610	10035
38610	20679	2335.51	2335.29	16.3	264	11.8	0.87	9807	10071
38710	20679	2341.73	2341.63	16.1	289	15.4	0.82	9961	10249
38790	20679	2347.59	2347.59	14.7	318	10.0	0.88	9904	10222

Vertical Datum: NGVD29

Detailed model output can be reviewed in Appendix E.

Revision of the flow rates did not dramatically alter the delineation of either the floodplain or the floodway, except in several specific areas. This is largely a function of the relative steepness of the terrain which defines the wash. Despite some significant changes in water surface elevation, there was little plan view change in the floodplain delineation. The changes are more apparent, however, in the revised floodway delineation. As would be expected with lower flow rates, the floodway narrowed at the cross sections where the revised hydrology was applied.

5.9.2 Verification of Results

The results generated by this hydraulic model are reasonable and within expected parameters.

6. Erosion and Sediment Transport

Sediment transport and erosion are beyond the scope of this analysis.

7. Draft FIS Report Data

7.1 Summary of Discharges

Table 7.1 below summarizes the discharges of the revised model.

Table 7.1 - Summary of Revised Discharges

Cross Section	Description	Discharge (cfs)
38710	Concentration Point C200 from 1997 Sabol Study	20,679
36780	Concentration Point C220 from 1997 Sabol Study	23,260
35490	Concentration Point C230 from 1997 Sabol Study	23,235

7.2 Floodway Data

Floodway Data are listed in Table 7.2 on page 9.

7.3 Annotated Flood Insurance Rate Maps

Copies of annotated Flood Insurance Rate Maps are included in the Exhibit Maps section following the Appendices.

7.4 Flood Profiles

A draft Flood Profile is included in the Exhibit Maps section following the Appendices.

Table 7.2 - Floodway Data

Flooding Source	Floodway			Base Flood Energy Grade Elevation[1]		
Cross Section	Width (ft)	Section Area (sq ft)	Mean Velocity (ft/s)	Floodway (ft)	Floodplain (ft)	Increase (ft)
35490	355	3318	8.7	2153.19	2152.19	1.00
35590	317	1986	15.8	2156.59	2155.59	1.00
35690	329	2677	11.0	2160.08	2159.1	0.98
35770	337	1902	15.0	2165.43	2164.45	0.98
35870	252	2051	13.3	2170.92	2169.93	0.99
35960	265	1750	16.3	2176.62	2175.99	0.63
36060	281	2324	14.7	2179.51	2178.51	1.00
36180	198	1505	15.7	2184.79	2184.58	0.21
36230	210	1748	14.0	2190.19	2189.2	0.99
36310	190	1663	19.4	2196.7	2196.56	0.14
36400	209	2149	10.8	2202.68	2202.19	0.49
36490	169	1513	16.1	2209.64	2208.67	0.97
36520	140	1435	17.7	2214.63	2213.76	0.87
36610	141	2033	12.4	2220.48	2219.56	0.92
36690	143	1713	15.1	2224.38	2223.39	0.99
36780	146	1867	13.2	2229.89	2228.92	0.97
36880	135	1344	19.4	2241.69	2241.69	0.00
36960	159	2341	10.7	2246.13	2245.42	0.71
37010	211	2415	10.4	2248.02	2247.07	0.95
37080	192	2218	10.7	2250.97	2249.98	0.99
37120	190	1586	16.6	2254.31	2253.36	0.95
37200	195	2031	12.4	2260.21	2259.54	0.67
37270	237	2192	11.8	2263.76	2262.76	1.00
37310	228	2120	11.9	2265.99	2265.03	0.96
37370	279	1788	15.7	2269.74	2269.71	0.03
37470	419	2478	16.1	2273.65	2272.68	0.97
37570	498	2546	15.4	2277.34	2276.34	1.00
37660	413	2069	13.7	2282.08	2281.08	1.00
37750	326	1825	14.2	2289.71	2288.7	1.01
37800	222	1543	15.1	2294.17	2293.43	0.74
37930	205	1772	13.8	2299.48	2298.56	0.92
38030	206	1431	15.6	2306.5	2306.22	0.28
38140	240	2193	11.9	2312.11	2311.12	0.99
38250	230	1813	12.3	2316.69	2315.78	0.91
38320	297	1833	16.1	2321.1	2320.12	0.98
38430	514	2740	12.0	2326.12	2325.12	1.00
38500	364	2081	15.9	2332.69	2331.72	0.97
38610	210	1662	15.7	2338.99	2338.34	0.65
38710	217	1626	17.4	2345.77	2344.77	1.00
38790	150	1261	16.7	2351.66	2350.67	0.99

[1] Vertical Datum: NGVD29

A.1 Data Collection Summary

Not Applicable / Not Included

A.2 Referenced Documents

References

1. Arizona Department of Water Resources, Flood Mitigation Section, "Requirements for Flood Study Technical Documentation," State Standard SS1-97, November 1997.

2. George V. Sabol Consulting Engineers, "Cave Creek Above Carefree Highway Floodplain Delineation Study FCD 95-28," Technical Data Notebook – Hydrology, Existing Condition, Book 1 of 2, July 1997.

3. CH2M Hill, "Topographic Mapping and Flood Insurance Study," Cave Creek and Tributaries, Work Maps 1-3, March 1990.

4. U.S. Army Corps of Engineers, "HEC-RAS User's Manual," Version 2.2, September 1998.

5. U.S. Army Corps of Engineers, "HEC-RAS Hydraulic Reference Manual," Version 2.2, September 1998.

B.1 Special Problem Reports

Not Applicable / Not Included

B.2 Contact (telephone) Reports

Not Applicable / Not Included

B.3 Meeting Minutes or Reports

Not Applicable / Not Included

B.4 General Correspondence

WEST CONSULTANTS, INC.

California
11848 Bernardo Plaza Court,
Suite 140-B
San Diego, CA 92128-2418

858.487.9378
858.487.9448 Fax

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www.westconsultants.com

FLOOD CONTROL DISTRICT
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ENG	FILE
CONTRACTS	
ROUTING	

July 5, 2000

Mr. Michael W. Duncan, P.E.
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

Subject: **Cave Creek Wash Floodplain Revision from Morning Star Road to Tonto Forest Boundary**
FCD 199C048, Assignment #5

Dear Michael:

Enclosed please find the draft scope of work and fee proposal for the Cave Creek Wash Floodplain Revision from Morning Star Road to Tonto Forest Boundary. This work is to be Assignment #5 for FCD 1999C048.

If you have any questions regarding the fee proposal, please feel free to contact me at (480) 345-2155.

Sincerely,

Dennis L. Richards

Dennis L. Richards, P.E.
Vice President

Hydraulics

Hydrology

Sedimentation

Water Quality

Erosion Control

Environmental Services

EXHIBIT A

CONSULTANT/SUBCONSULTANT COST PROPOSAL SUMMARY

CONSULTANT/SUBCONSULTANT: WEST Consultants, Inc.

PROJECT NAME: On-Call Engineering and Surveying Services

CONTRACT NO.: FCD 1999C048

ASSIGNMENT NO.: 5 - Cave Creek Wash Floodplain Revision

DIRECT LABOR			
Classification	Hours	Hourly Rate	Total Cost
Principal	0	$ 47.40	$ -
Project Manager	16	$ 44.00	$ 704.00
Senior Engineer	44	$ 33.15	$ 1,458.60
Staff Engineer	152	$ 20.10	$ 3,055.20
Drafter/Technician	0	$ 17.40	$ -
Clerical	16	$ 11.00	$ 176.00

Subtotal Labor	$ 5,393.80
Overhead @ 155.7% of Labor	$ 8,398.15
Total Labor	$ 13,791.95

Salary Fringes _____%
G&A Overhead _____%

DIRECT AND OUTSIDE EXPENSES	
Item	Total Amount
Reproduction & Printing	$ 120.00
Mileage	$ 60.00

Total Expenses	$ 180.00

SUBCONSULTANTS		

Total Subconsultants	$ -
Total Labor	$ 13,791.95
Total Expenses	$ 180.00
Total Consultant Cost	$ 13,971.95
Net Fee (Total Labor x ___10___%)	$ 1,379.05
TOTAL PROPOSED FEE	**$ 15,351.00**

Dennis L. Richards
Signature

Vice President
Title

July 5, 2000
Date

EXHIBIT C
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
CONSULTANT/SUBCONSULTANT ESIMATED MANHOURS AND DIRECT LABOR

CONSULTANT/SUBCONSULTANT NAME: WEST Consultants, Inc. **CONTRACT NO:** FCD 1999C048

PROJECT NAME: On-Call Engineering and Survey Services

ASSIGNMENT NO.: 5 - Cave Creek Wash Floodplain Revision

DATE: July 5, 2000

DIRECT LABOR CLASSIFICATION

CONTRACT TASK/PHASE	PRINCIPAL/ QA/QC $ 47.40	PROJECT MANAGER $ 44.00	SENIOR ENGINEER $ 33.15	STAFF ENGINEER $ 20.10	DRAFTER/ TECHNICIAN $ 17.40	CLERICAL $ 11.00	($/HR)	($/HR)	TOTAL MANHOURS	TOTAL LABOR
1. Floodplain Delineation		6	16	64					86	$ 2,081
2. Floodplain Work Map - Draft		2	4	16					22	$ 542
3. TDN / HIS Data - Draft		4	12	32		4			52	$ 1,261
4. FEMA Submittal		2	8	24		8			42	$ 924
5. Final Deliverables		2	4	16		4			26	$ 586
TOTAL		16	44	152		16			228	$ 5,393.80

PAGE _____ OF _____

B.5 Contract Documents

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

COPY

NOTICE TO PROCEED

TO: Dennis Richards
West Consultants, Inc.
2151 E. Broadway Road, Suite 116
Tempe, AZ 85282-1705

July 6, 2000

SUBJECT: PCN 01495.26.70
FCD Contract No. 1999C048
Assignment No. 5
Cave Creek Wash Floodplain Revision

Your not-to-exceed cost estimate of $15,351.00 for Assignment No. 5 has been received and accepted for this project with a completion date of 2/6/01. You are hereby authorized to proceed with the work for the referenced project as originally described in the Scope of Work. Please specify the assignment number on all related correspondence. Invoices should be sent to the attention of Linda Hannan of our accounting department.

If at any time during the project assignment a material change in the scope of services to be provided occurs, causing an increase in the original cost estimate shown here, you must provide the District with a written explanation of the additional work along with an estimate of additional costs. No additional work shall commence prior to written authorization by the District. No claims for additional work shall be accepted that have not received prior District approval.

SIGNED: Mike Duncan
Mike Duncan
Project Manager

Michael S. Ellegood, P.E.
Chief Engineer and General Manager

Certificate of Performance of Engineering Open Order Contract and Payment of All Claims

I,_____, hereby certify to the Flood Control District of Maricopa County (FCDMC) that all lawful claims for labor, rental of equipment, material used, and any other claims by company, or its subcontractors in connection with the specific assignment described below and as authorized by the terms of the FCDMC Contract 1999C048 have been paid.

Company understands that with receipt of payment for previously invoiced amounts plus any retained funds, that this is a settlement of all claims of every nature and kind against the FCDMC arising out of the performance of the FCDMC's specific assignment through FCDMC Contract 1999C048 for Assignment No. 5 relating to the material, equipment, and work covered in and required by the contract.

The undersigned hereby certifies that to his/her knowledge, no contractual disputes exist in regard to this contract and that he/she has no knowledge of any pending or potential claims in regard to this contract.

Upon submission of this document and a separate invoice for any retained funds to the FCDMC, invoice processing will be completed within forty-five (45) calendar days.

Signed the _____ day of _____, 200__.

_____
Signature

Title: _____

SUBSCRIBED AND SWORN TO before me this_____ day of_____ , 200__ .

_____
Notary Public

My Commission Expires: _____

SCOPE OF ASSIGNMENT

CAVE CREEK WASH FLOODPLAIN REVISION

FROM MORNING STAR ROAD TO TONTO FOREST BOUNDARY

REVISE HEC-2 FLOWRATES, REVISE MAPS AND PREPARE

LOMR PACKAGE FOR ZONE AE FLOODPLAIN AND FLOODWAY

FCD Contract No. 1999C048
July 6, 2000
Assignment # 5

A. GENERAL

The existing Flood Insurance Rate Map for Cave Creek Wash from River Station 37.01 to 37.93 is based on erroneous flowrates. The errors occurred in the 1990 floodplain study for this area. In addition, a 1997 floodplain study for Cave Creek Wash developed revised hydrology for this area. The upstream limit of the delineated floodplain of the 1997 study is at about River Station 35.5

The extent of this floodplain revision will be from Morning Star Road (downstream end) to the Boundary of Tonto National Forest (upstream end), which is a total of 3.0 river miles. The basis materials for this revision are: hard copy work maps of the 1990 study, the HEC-2 model cross-sections of the 1990 study, the hydrology report of the 1997 study, and the Boundary Condition of the Computed Water Surface Elevation from the 1997 study.

Tasks 1 through 4 (which precede submittal to FEMA) under this Scope of Assignment shall be completed within 100 calendar days from the date of Notice to Proceed, including 30 calendar days for District review.

B. TASKS

1. Revise the existing HEC-2 hydraulic model for the main-stem of Cave Creek Wash to reflect the current hydrology, which was developed within a 1997 floodplain delineation by George V. Sabol Consulting Engineers. The limits of the revision are from River Station 35.5 to 38.8. The 100-year floodplain and the 100-year floodway are to be delineated.

2. Submit a diskette of the revised model and a paper copies of draft floodplain work study maps with a scale of 1 inch = 200 feet of the subject study area to the FCD project manager for review.

3. After approval of the items of Task 2 by the FCD project manager, prepare and submit the following to FCD:

    A. One copy of Technical Data Notebook (TDN), prepared according to ADWR State Standard SSA1-97.

    B. A CD or diskette of the floodplain information of the floodplain work study map in CADD format, according to FCD's CADD Data Delivery Specifications Rev. 1.0 January 2000.

4. After approval of the items of Task 3 by FCD, prepare and submit the following:

   A. Two (2) copies of the TDN, prepared according to ADWR State Standard SSA1-97 and the Flood Control District's Consultant Guideline (October 1, 1998). This submittal item should include two (2) copies of completed FEMA forms and two (2) copies of annotated FIRM(s) with the proposed delineation.

   B. Two (2) paper copies of the floodplain work study map with a scale of 1 inch = 200 feet.

   C. Two (2) electronic copies of revised hydraulic model on CD or diskette.

   D. Two (2) electronic copies of the floodplain work study maps in a digital CADD format on CD or diskette.

5. After issuance of the resulting LOMR by FEMA, the following shall be submitted for the Final Submittal:

   A. Three (3) complete copies of TDN, prepared according to ADWR State Standard SSA1-97. This submittal of the TDN shall include any correspondence and/or meeting 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 and the hydraulic analyses.

   B. Three (3) paper copies of the floodplain work study map with a scale of 1 inch = 200 feet.

   C. Three (3) electronic copies of the hydraulic model on CD or diskette.

   D. Three (3) electronic copies of the floodplain CADD information of the floodplain work study map on CD or diskette.

C Survey Field Notes

Not applicable / Not Included

D Hydrologic Analysis Supporting Documentation

Not applicable / Not Included

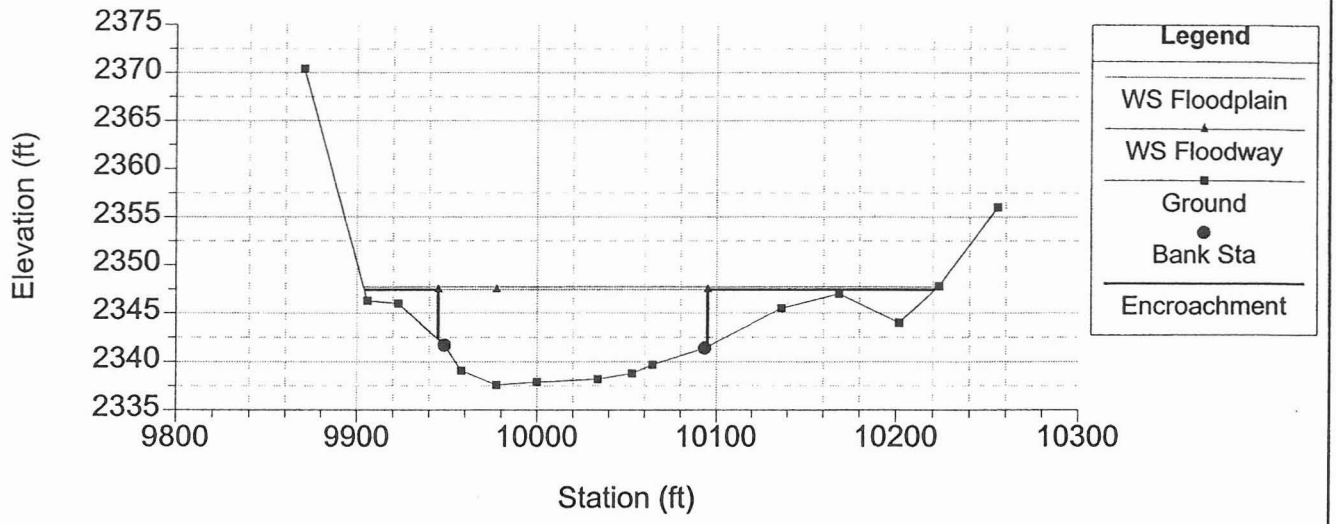
E.1 Roughness Coefficients Estimation

Not Applicable / Not Included

E.2 Cross Section Plots

Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 38790



Cave Creek FP / FW - imported HEC-2

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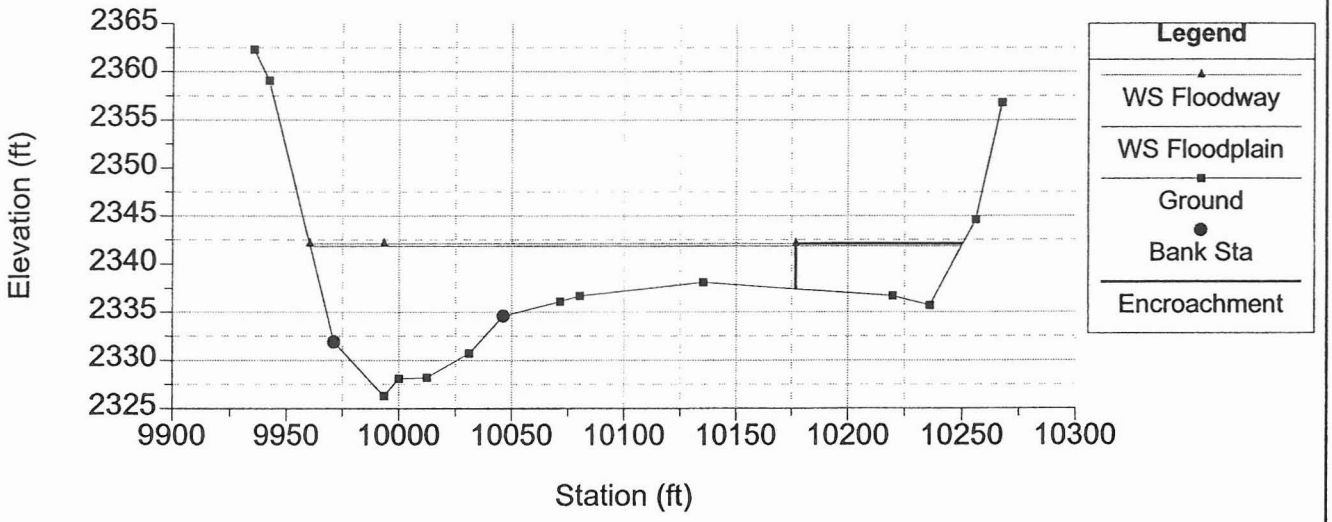

Cave Creek FP / FW - imported HEC-2

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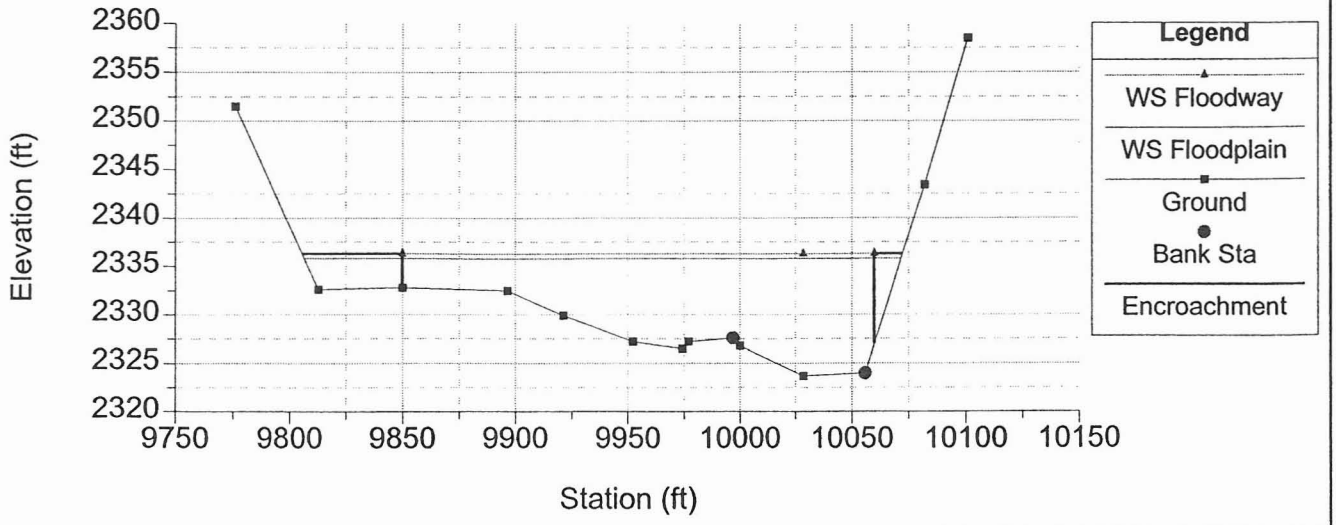

Cave Creek FP / FW - imported HEC-2

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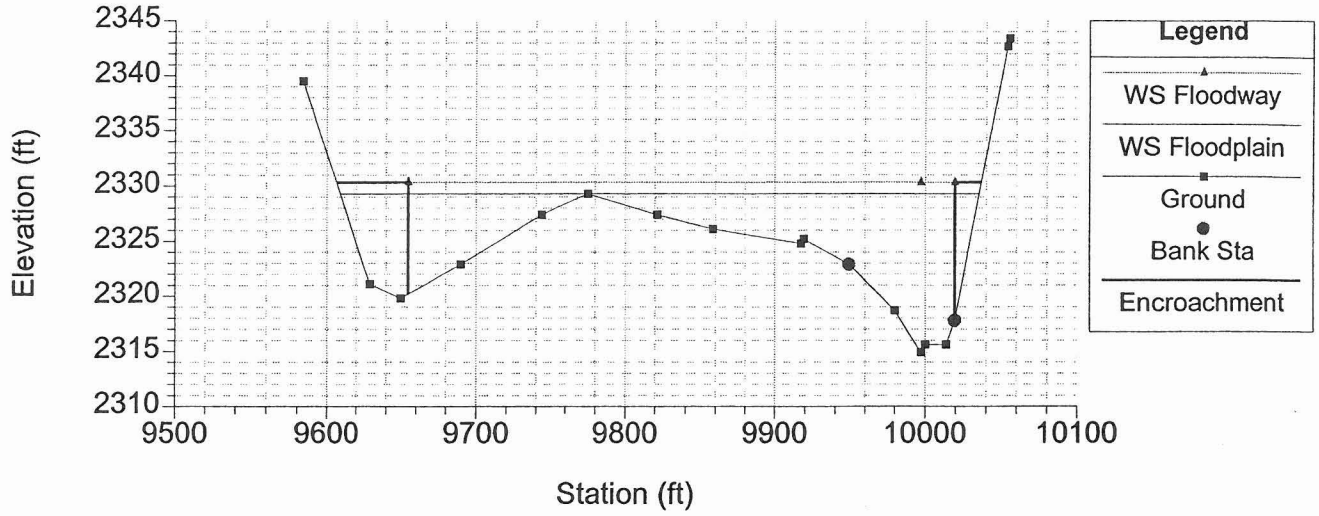

Cave Creek FP / FW - imported HEC-2

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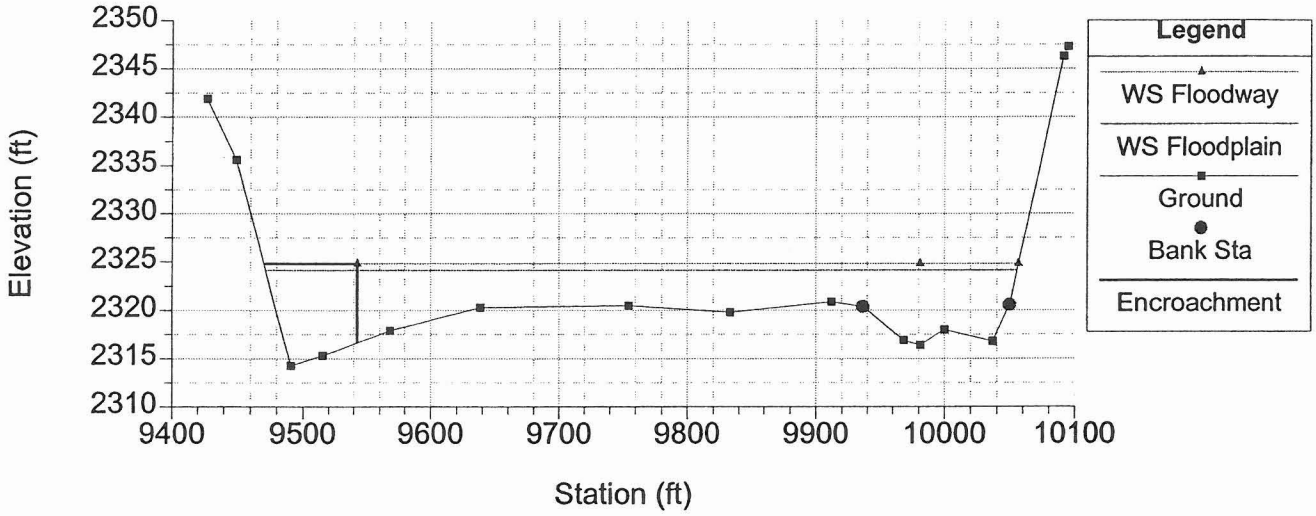

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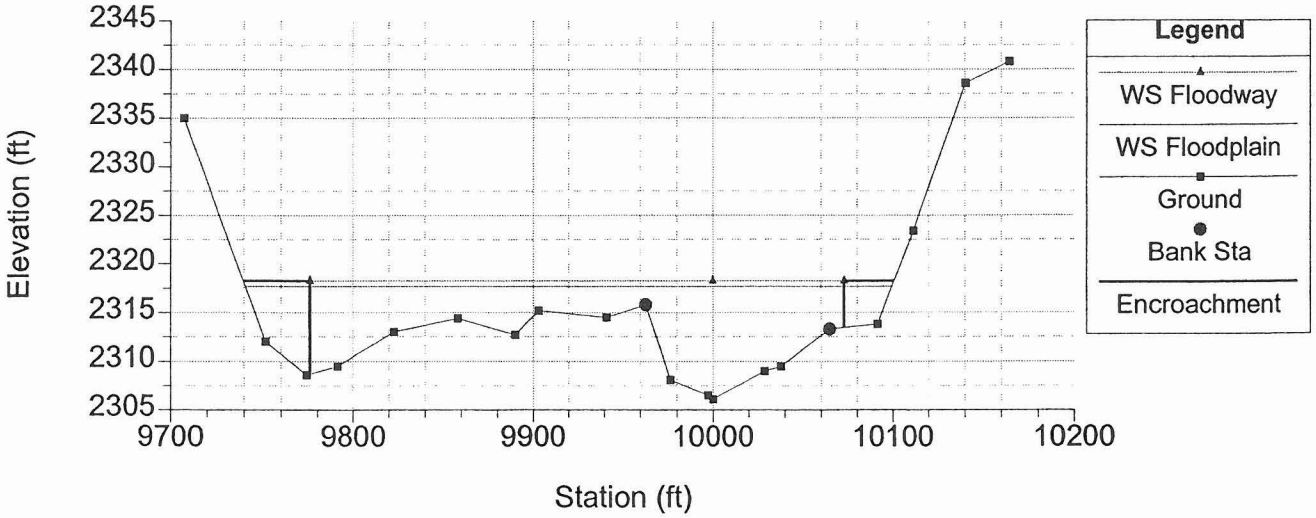

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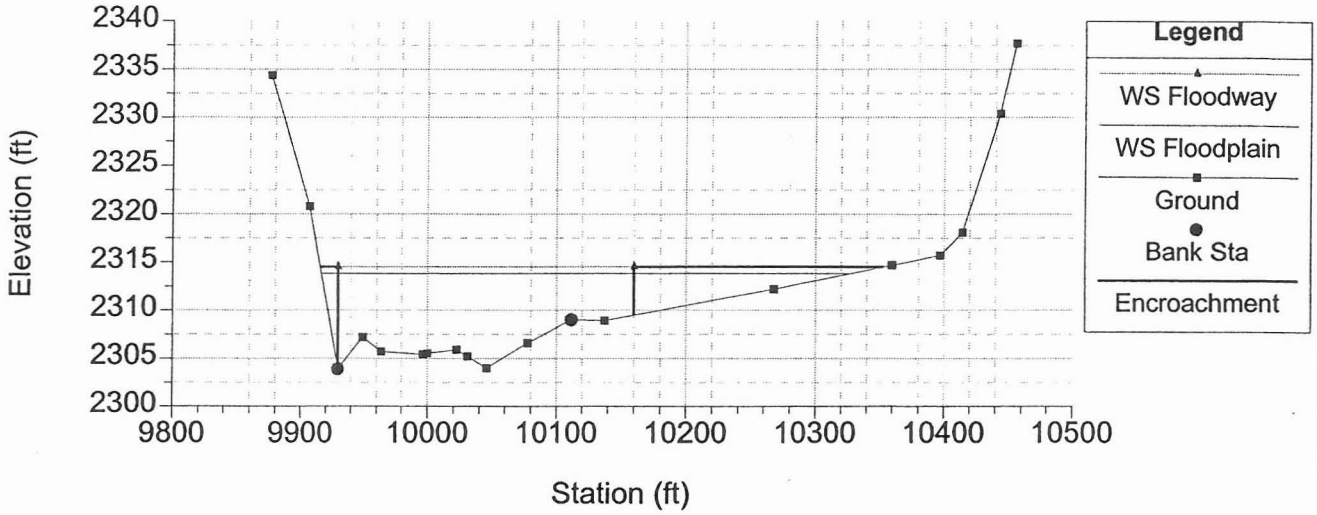

Cave Creek FP / FW - imported HEC-2

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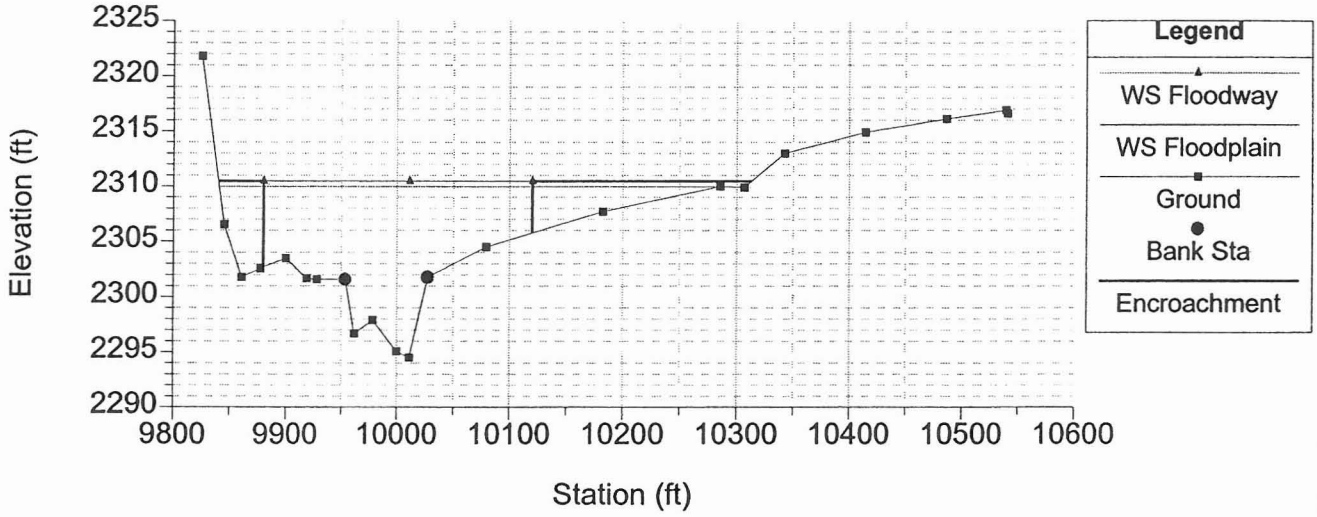

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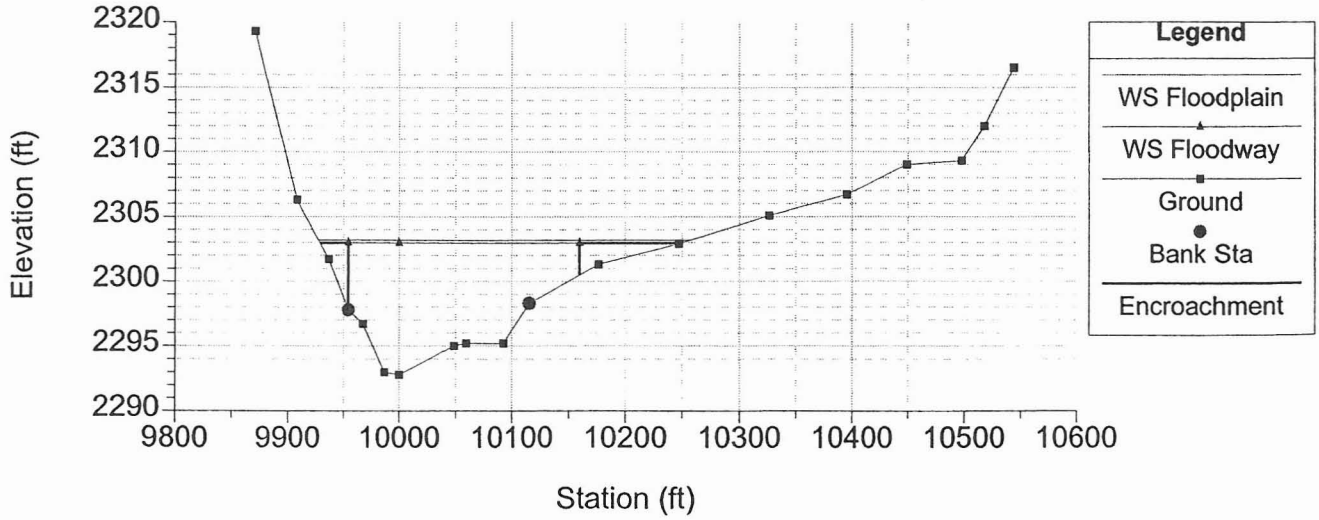
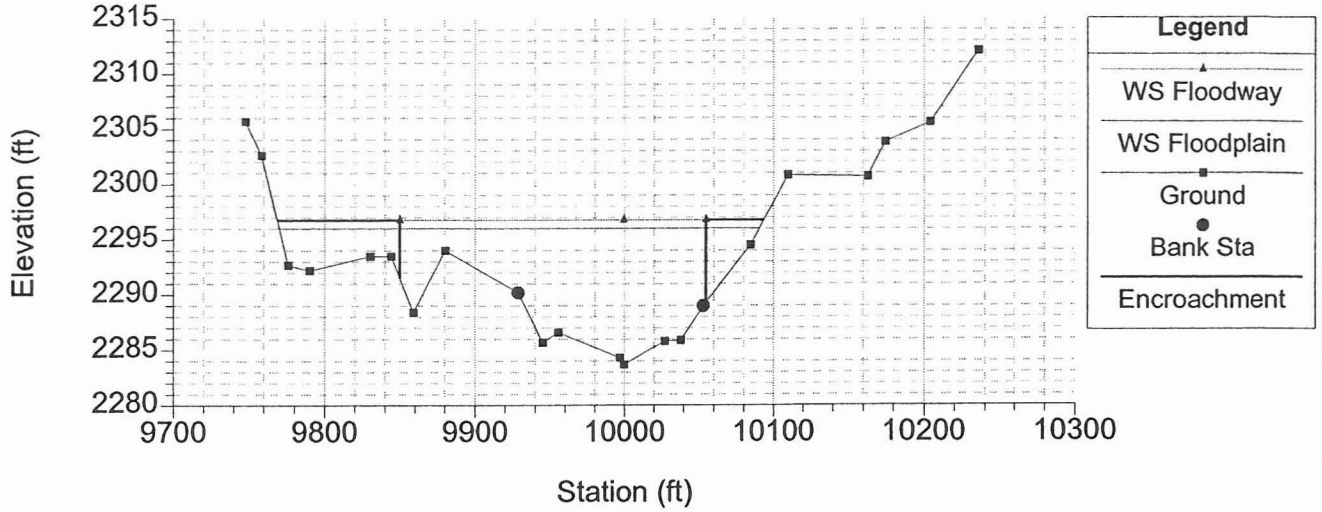
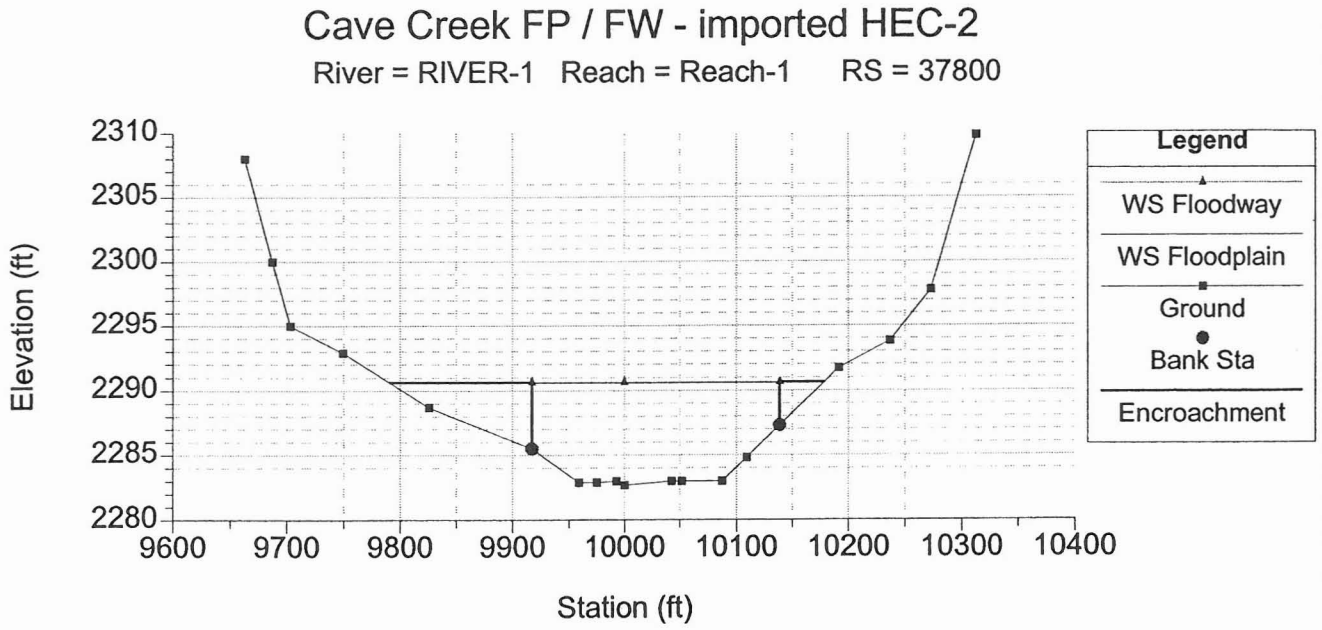
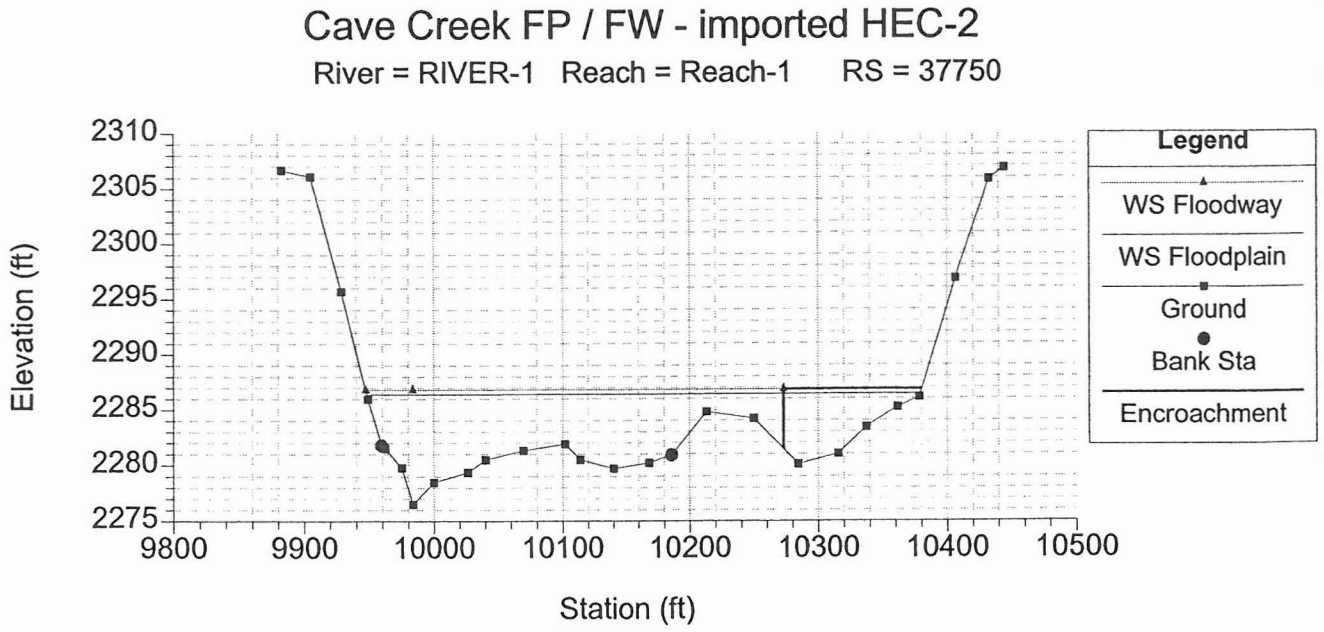


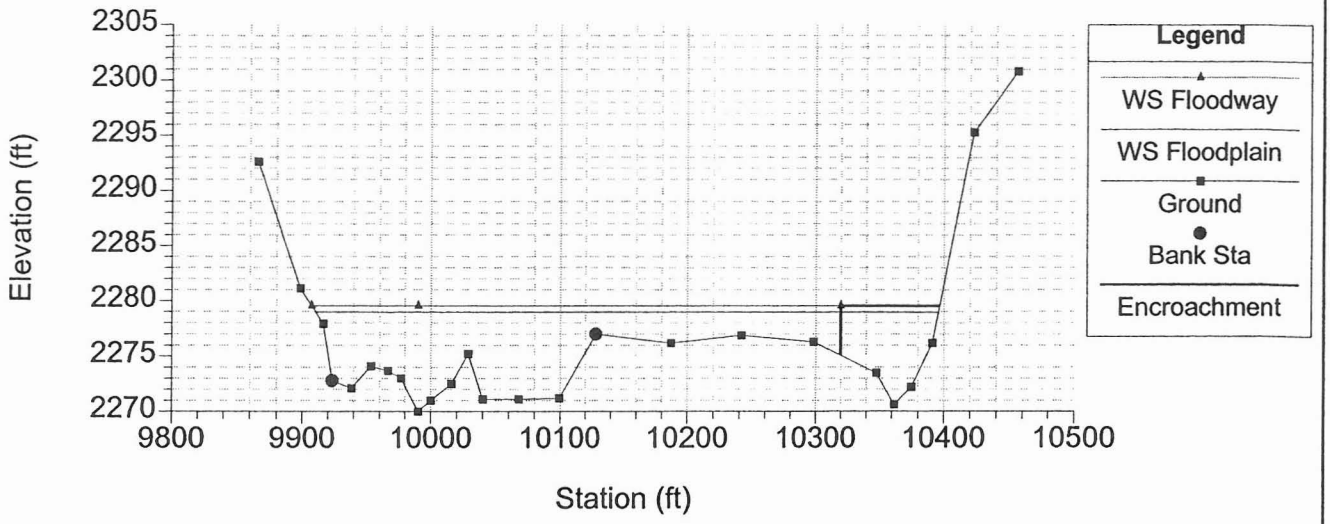

Cave Creek FP / FW - imported HEC-2
River = RIVER-1 Reach = Reach-1 RS = 37930
Elevation (ft)
2315
2310
2305
2300
2295
2290
2285
2280
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS Floodway
WS Floodplain
Ground
Bank Sta
Encroachment


Cave Creek FP / FW - imported HEC-2
River = RIVER-1 Reach = Reach-1 RS = 37800
Elevation (ft)
2310
2305
2300
2295
2290
2285
2280
9600
9700
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS Floodway
WS Floodplain
Ground
Bank Sta
Encroachment


Cave Creek FP / FW - imported HEC-2
River = RIVER-1 Reach = Reach-1 RS = 37750
Elevation (ft)
2310
2305
2300
2295
2290
2285
2280
2275
9800
9900
10000
10100
10200
10300
10400
10500
Station (ft)
Legend
WS Floodway
WS Floodplain
Ground
Bank Sta
Encroachment

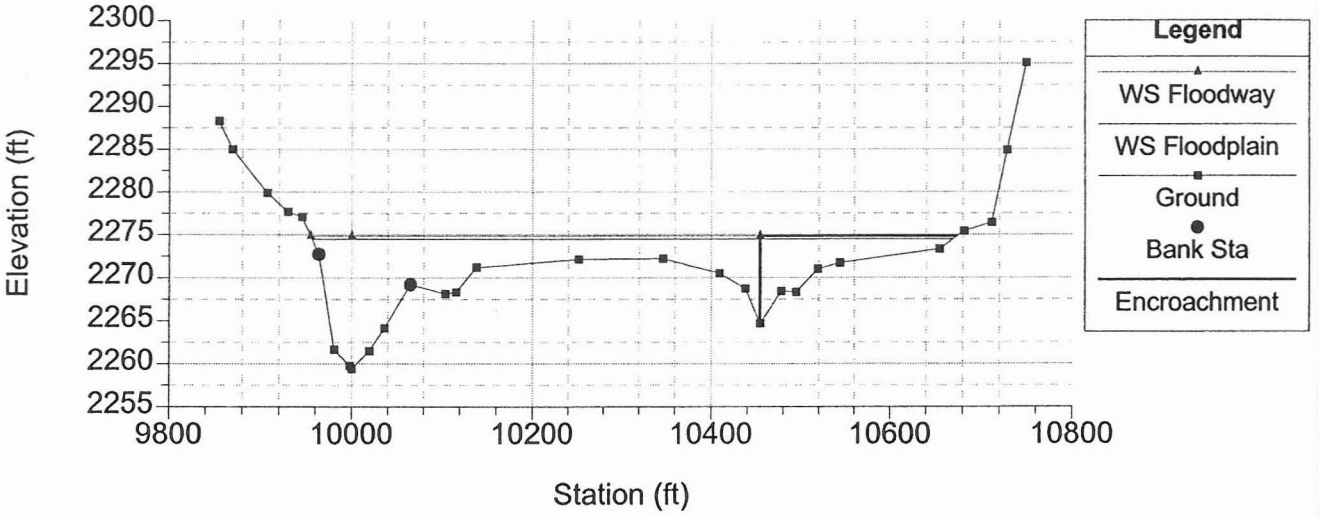
Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 37660



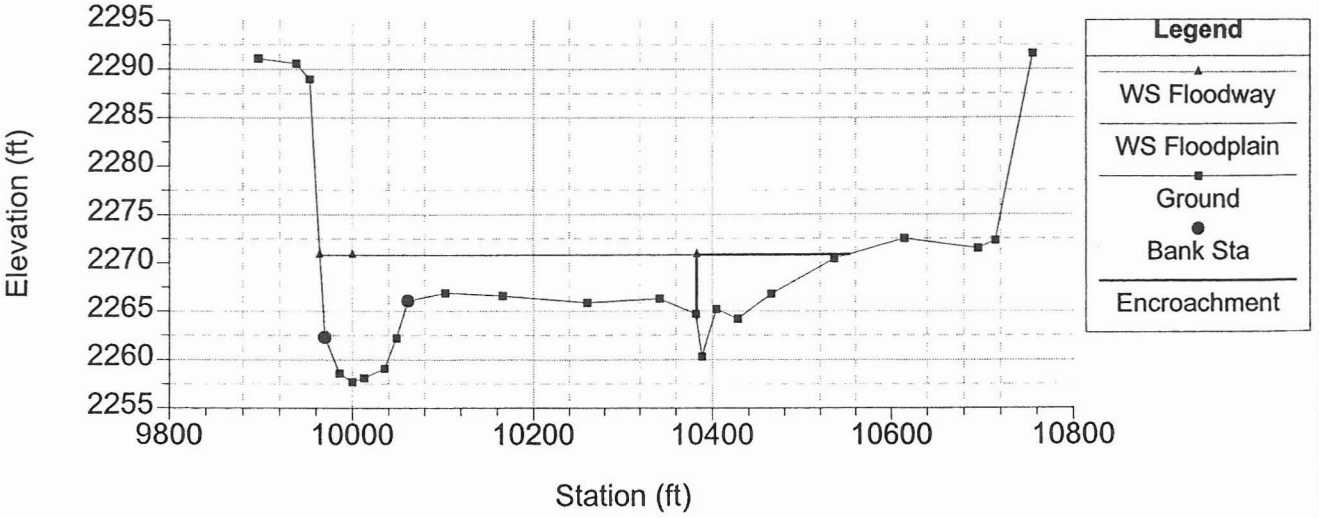
Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 37570



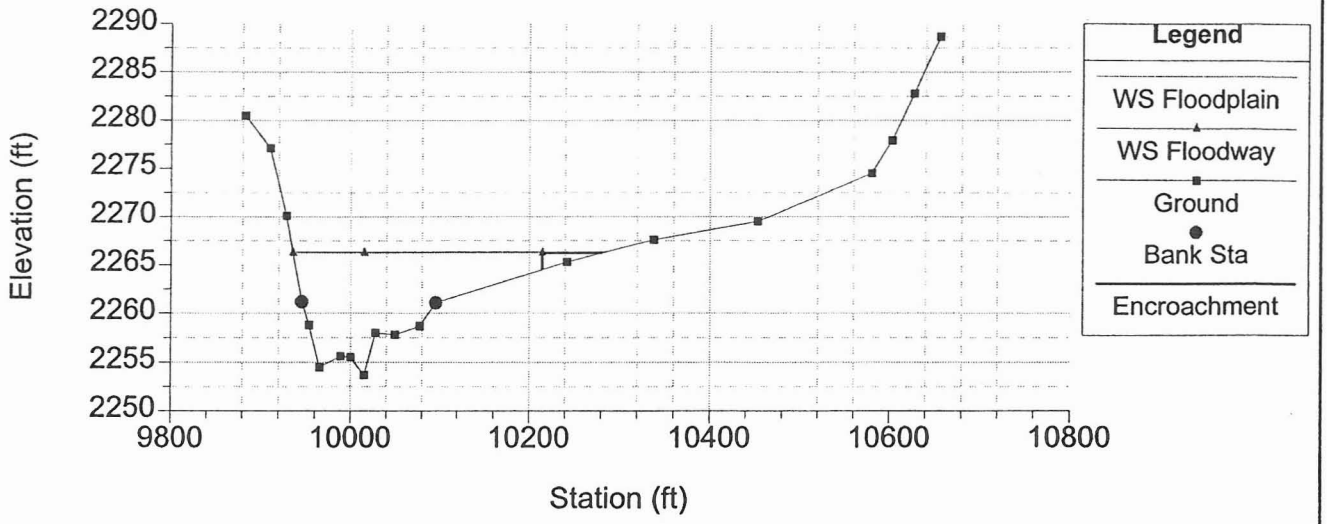
Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 37470



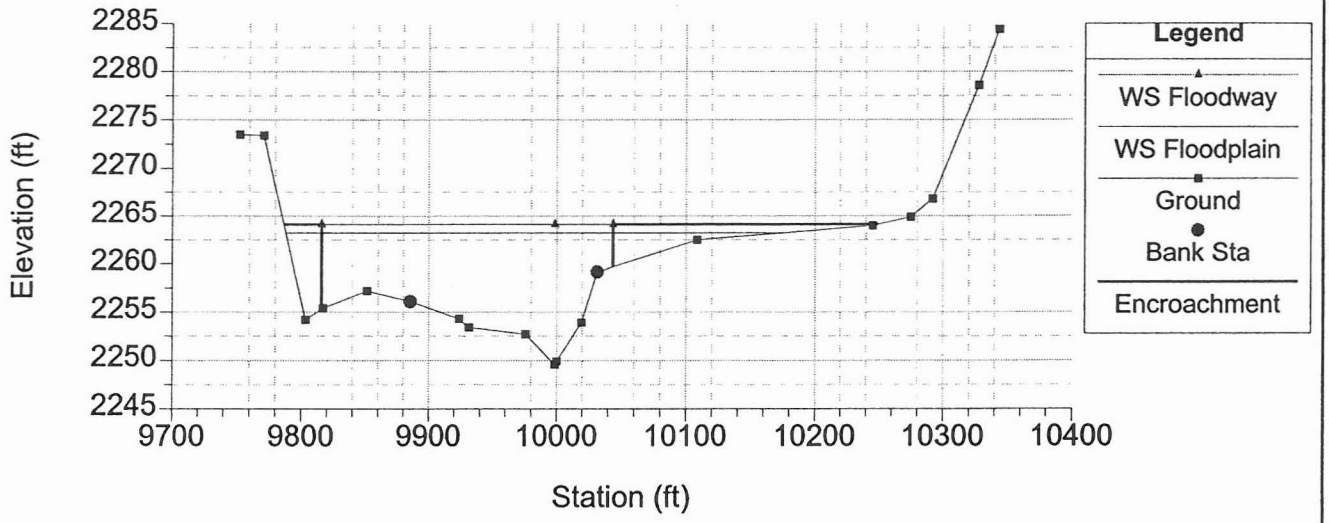
Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 37370



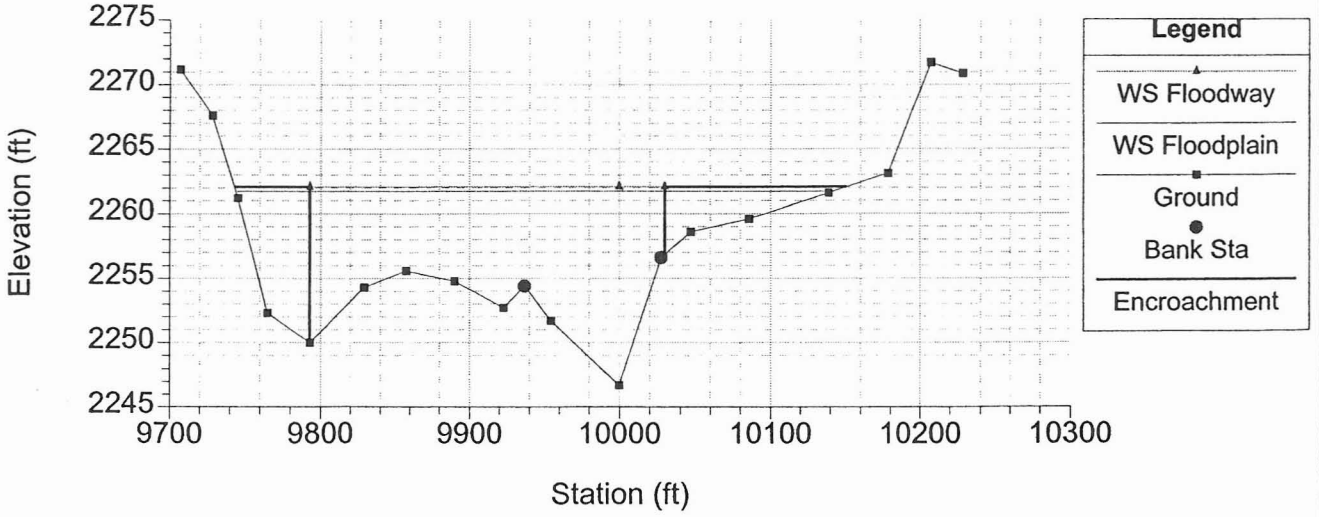
Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 37310



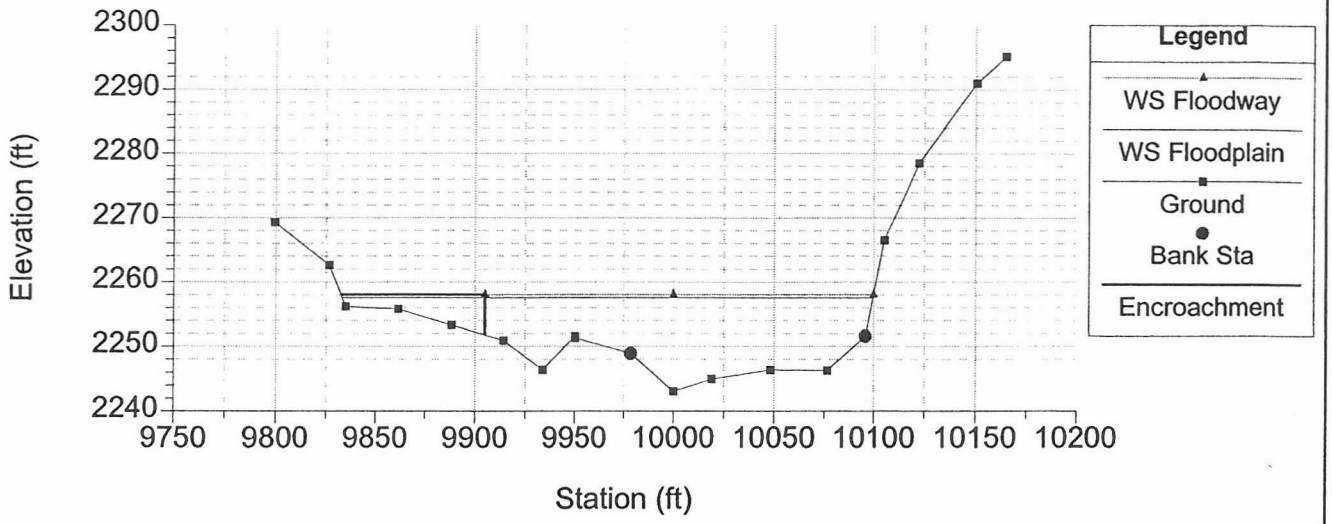
Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 37270



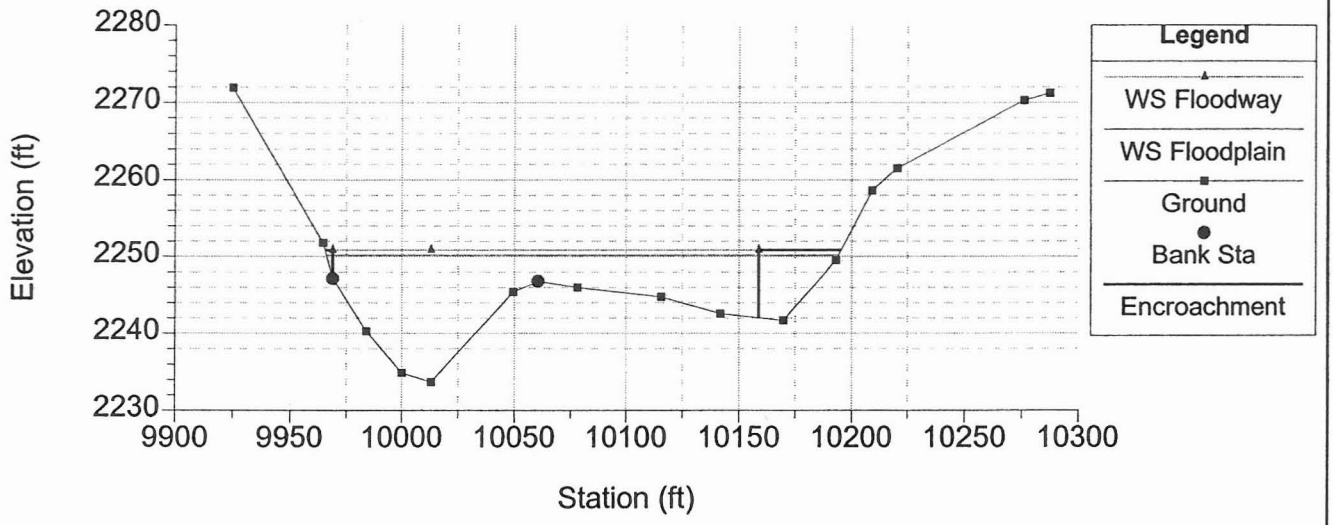
Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 37200



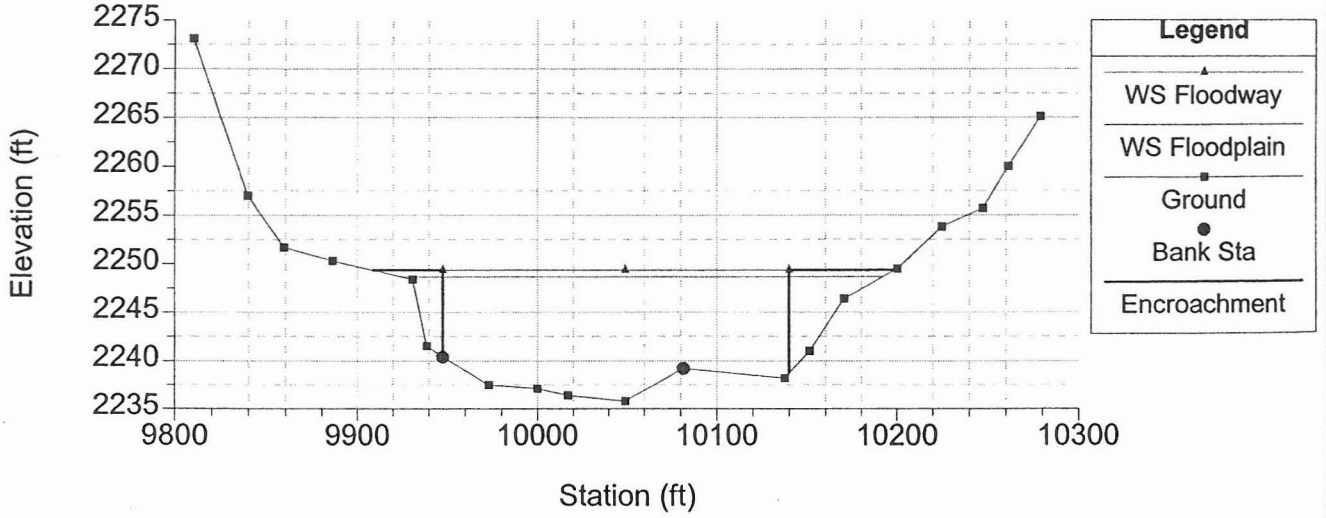
Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 37120



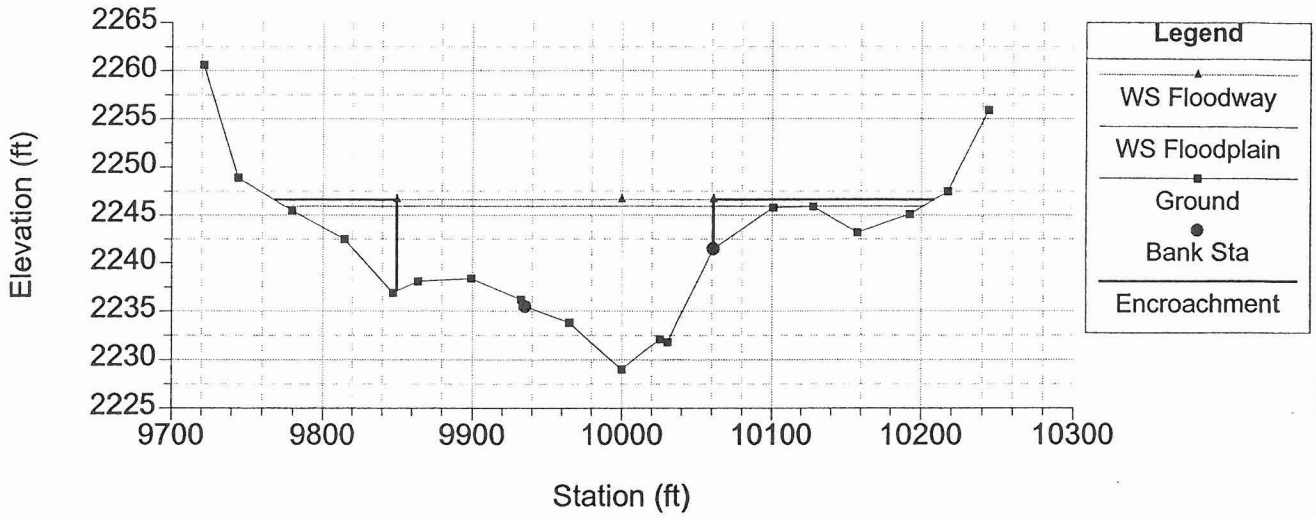
Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 37080



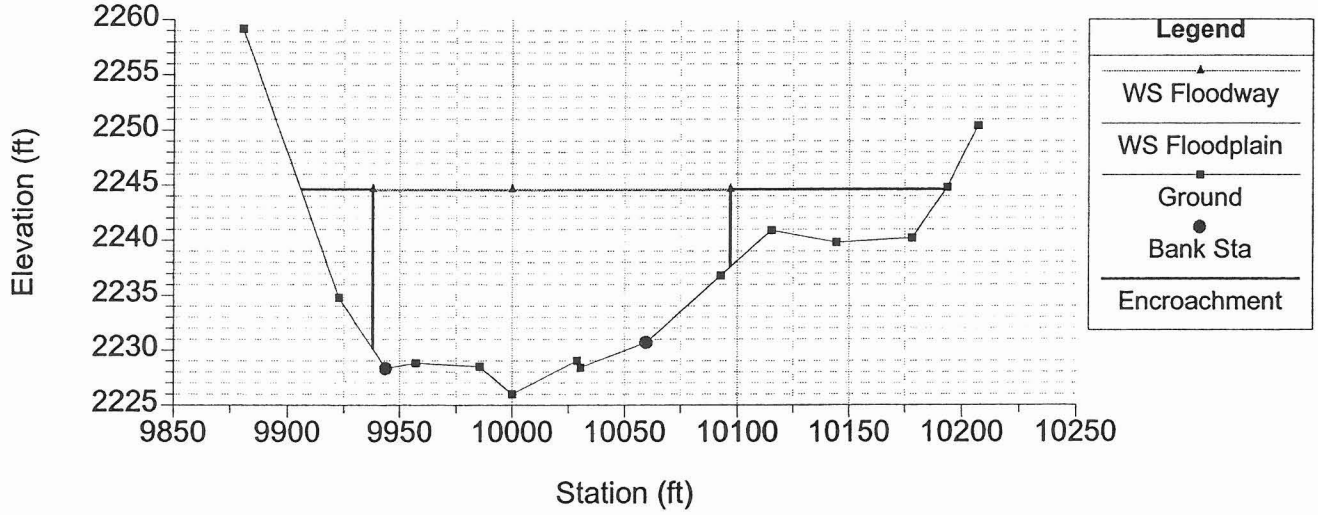
Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 37010



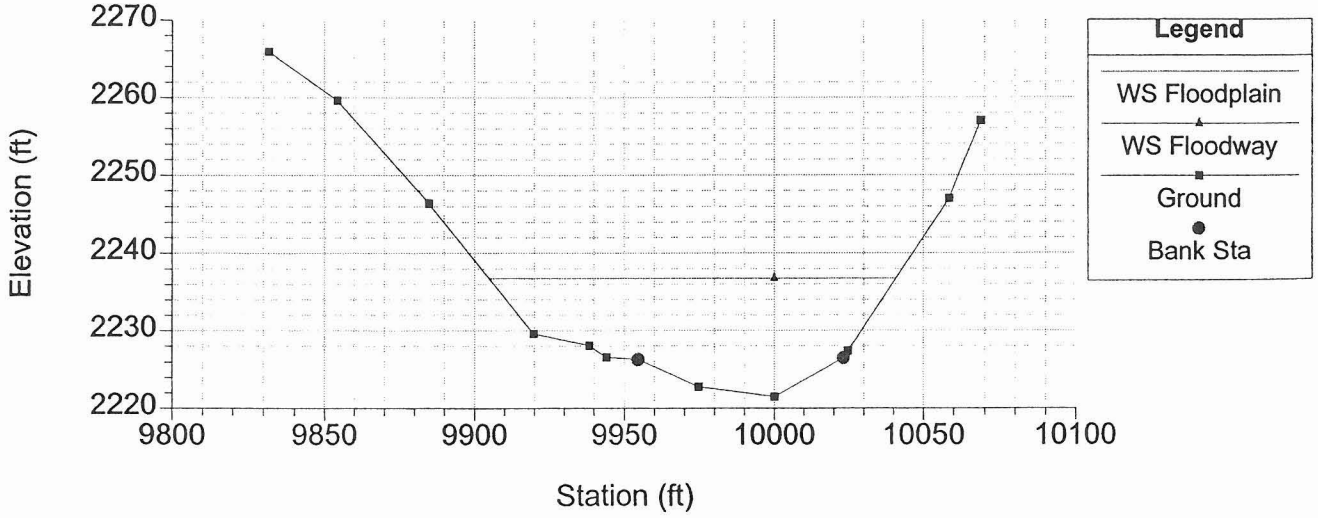
Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 36960



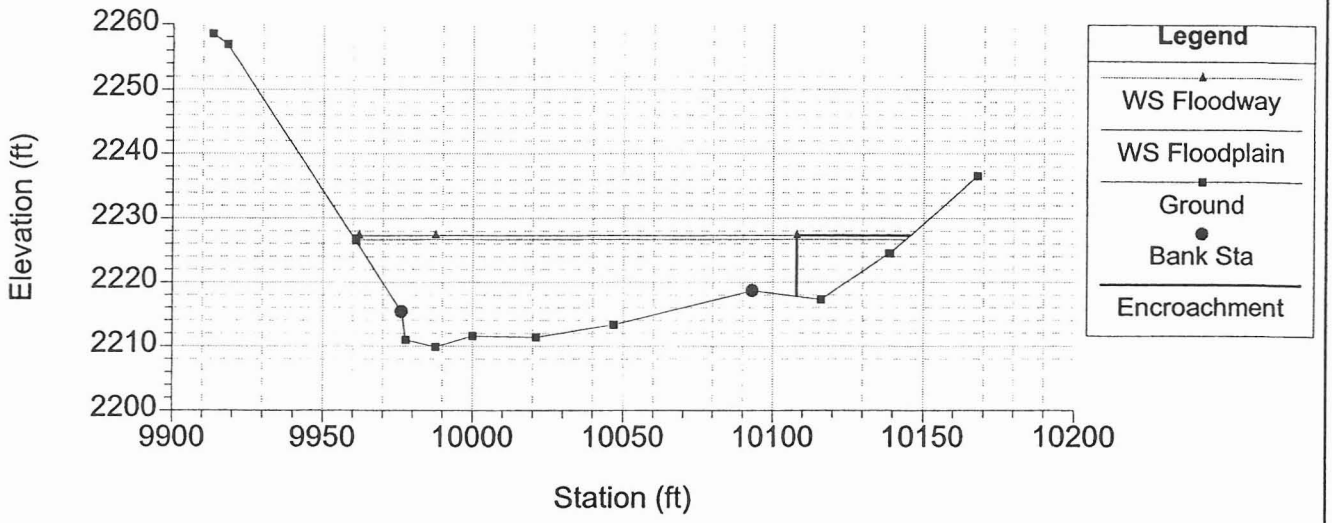
Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 36880



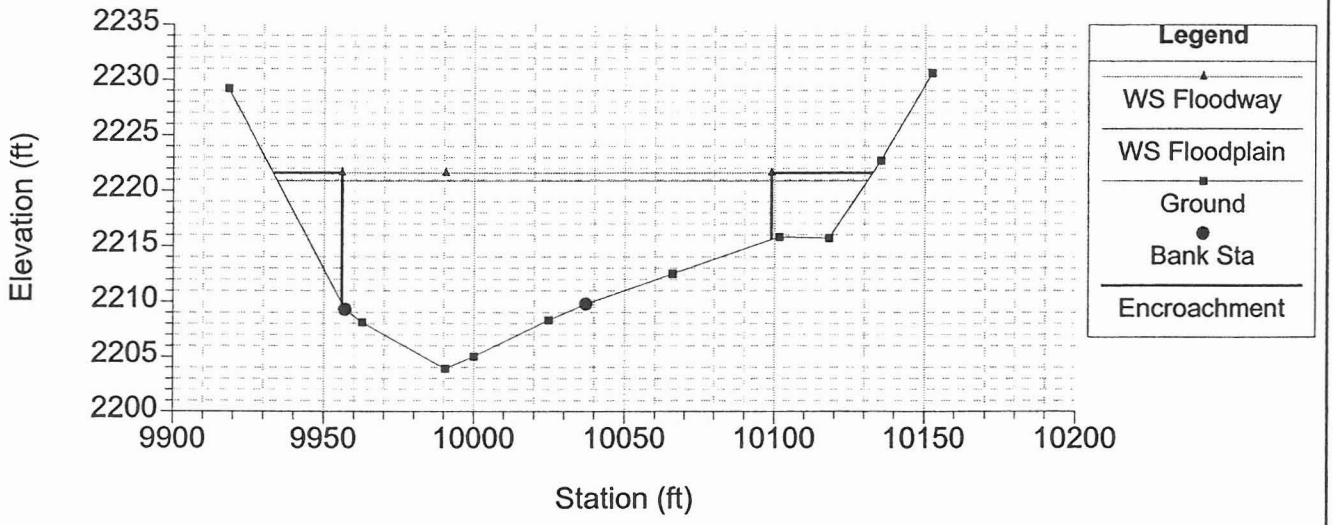
Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 36780



Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 36690



Cave Creek FP / FW - imported HEC-2

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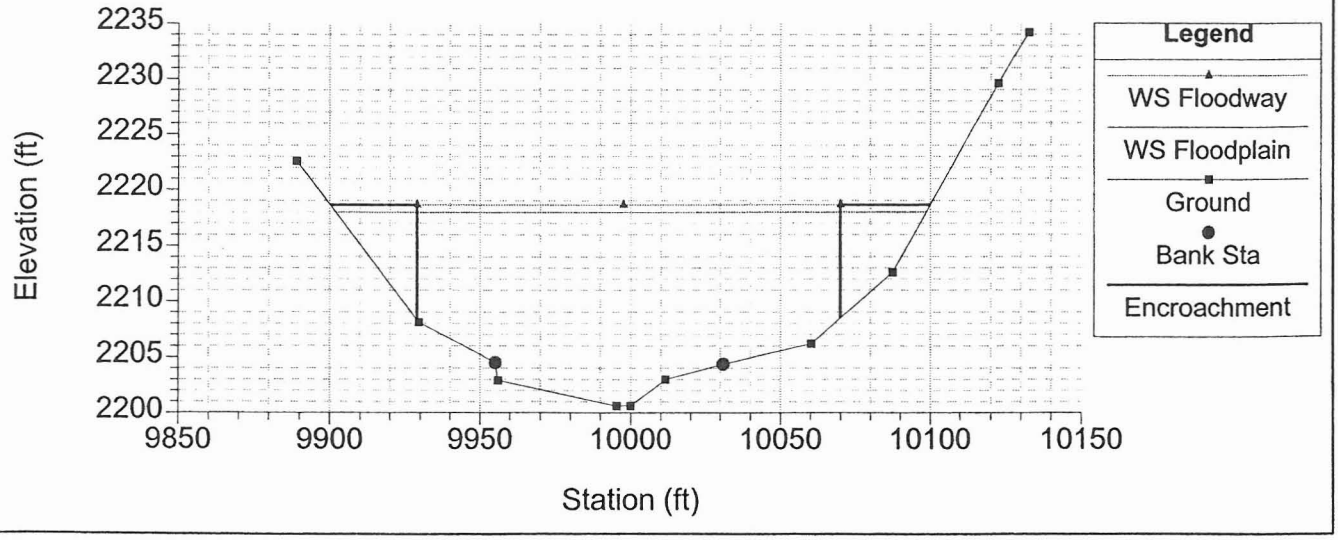
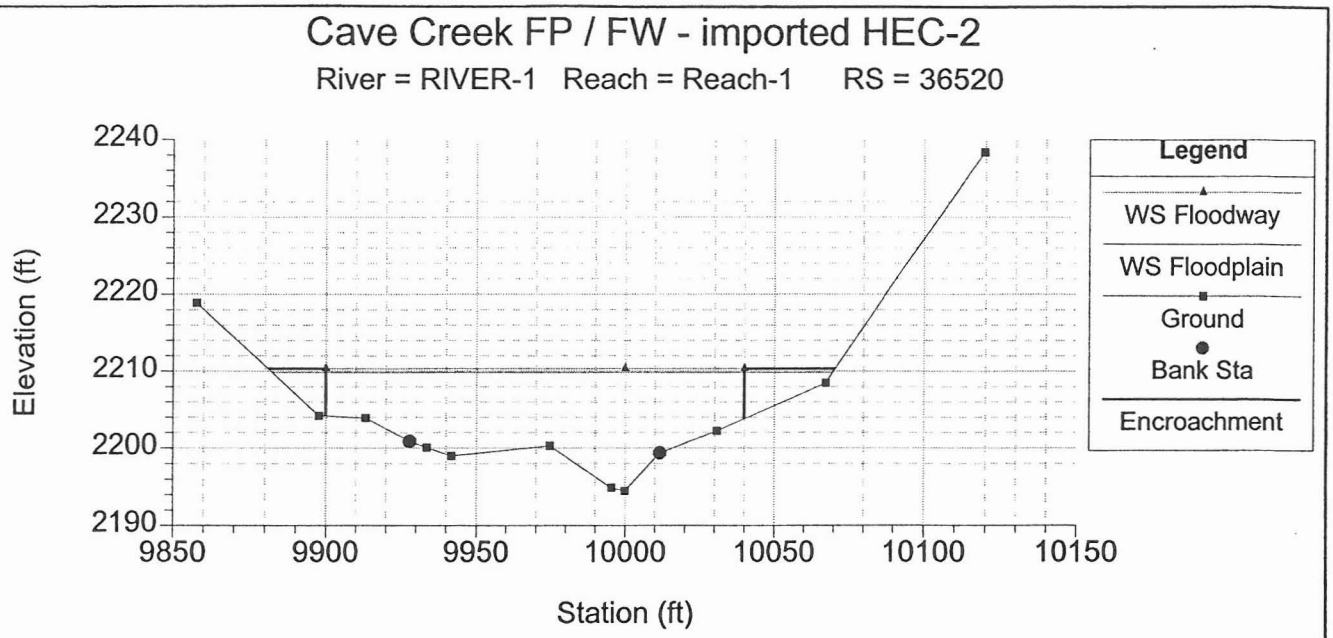
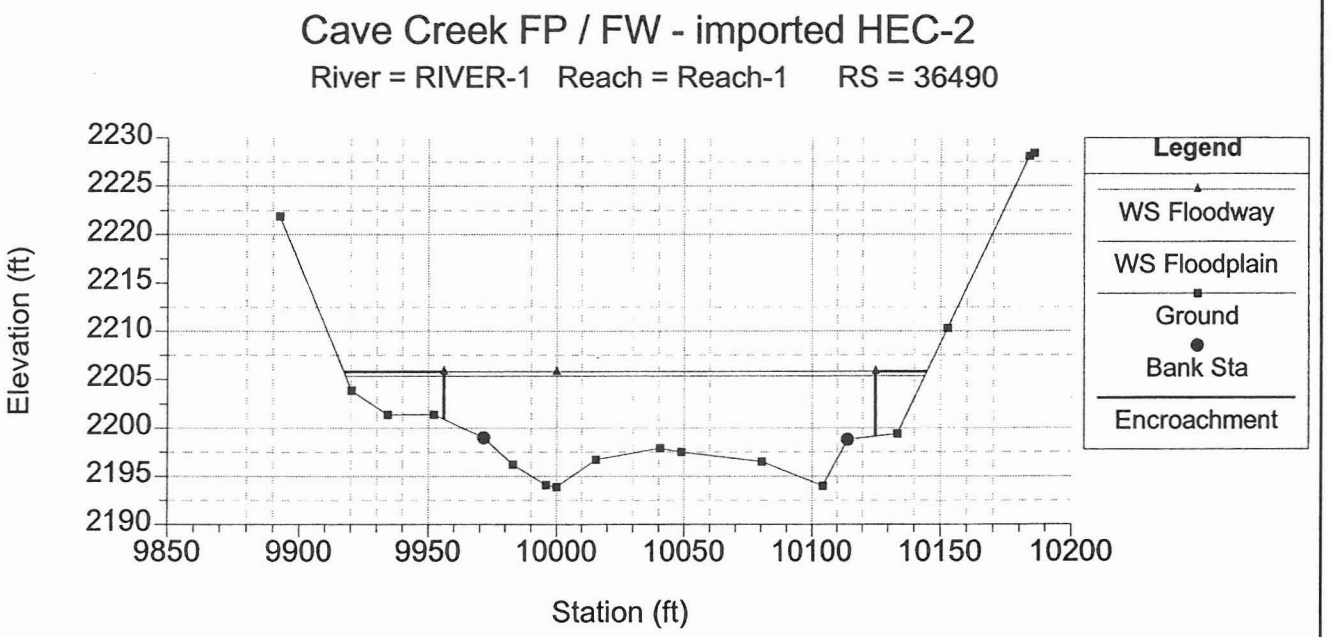
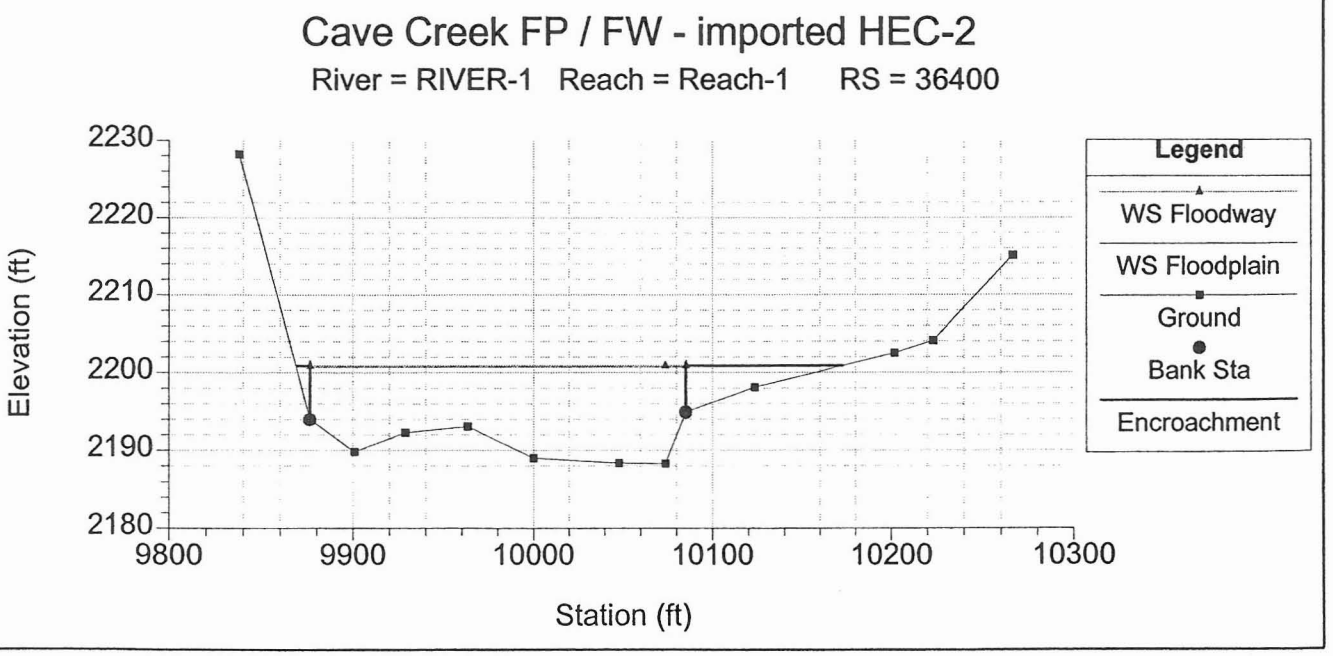
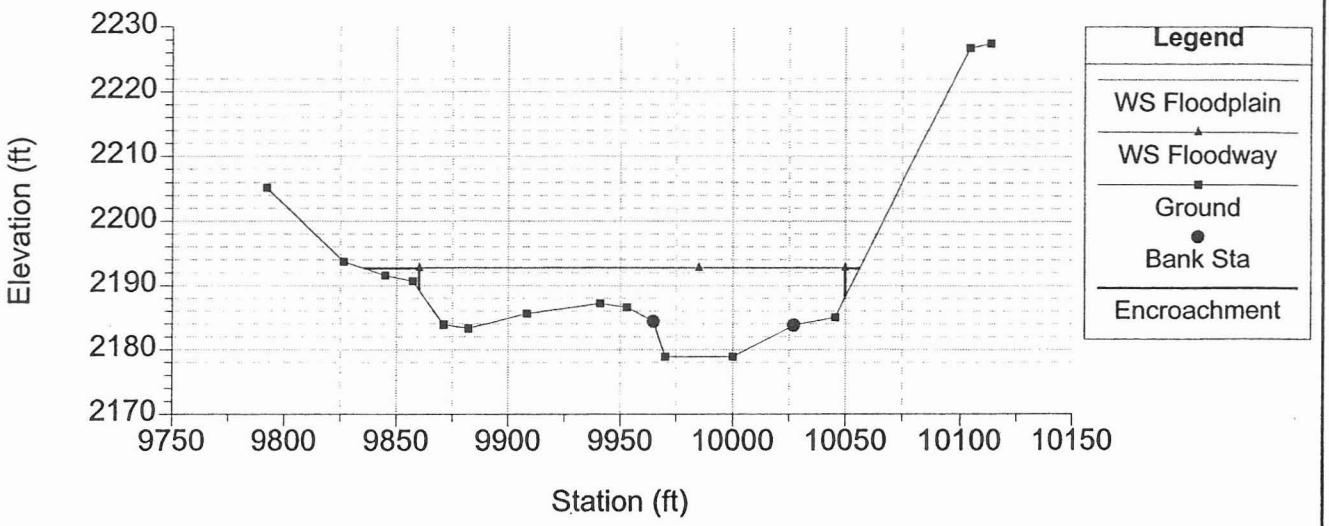
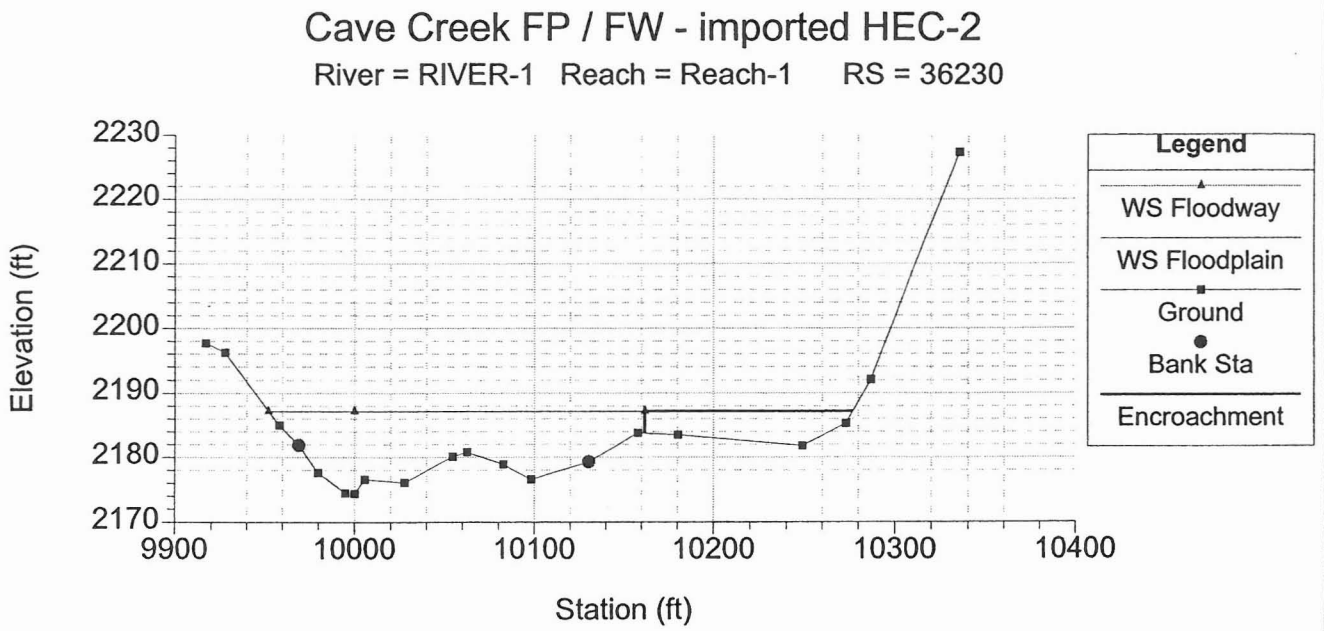


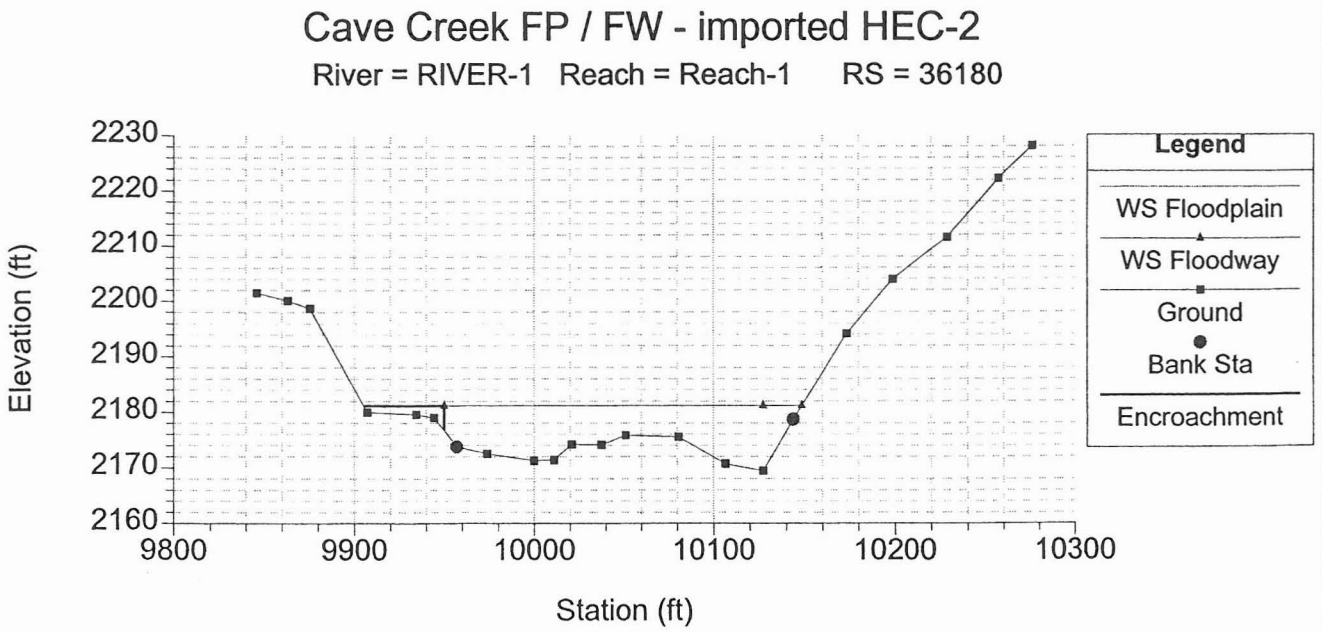

Cave Creek FP / FW - imported HEC-2
River = RIVER-1 Reach = Reach-1 RS = 36520
Elevation (ft)
2240
2230
2220
2210
2200
2190
9850
9900
9950
10000
10050
10100
10150
Station (ft)
Legend
WS Floodway
WS Floodplain
Ground
Bank Sta
Encroachment


Cave Creek FP / FW - imported HEC-2
River = RIVER-1 Reach = Reach-1 RS = 36490
Elevation (ft)
2230
2225
2220
2215
2210
2205
2200
2195
2190
9850
9900
9950
10000
10050
10100
10150
10200
Station (ft)
Legend
WS Floodway
WS Floodplain
Ground
Bank Sta
Encroachment


Cave Creek FP / FW - imported HEC-2
River = RIVER-1 Reach = Reach-1 RS = 36400
Elevation (ft)
2230
2220
2210
2200
2190
2180
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS Floodway
WS Floodplain
Ground
Bank Sta
Encroachment

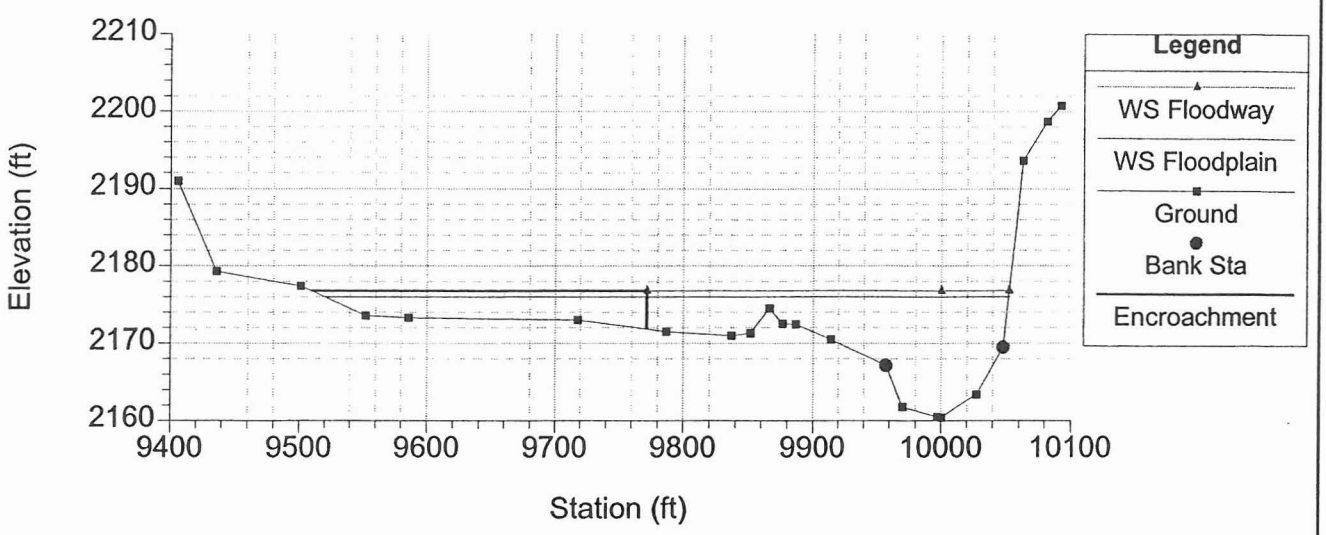

Cave Creek FP / FW - imported HEC-2
River = RIVER-1 Reach = Reach-1 RS = 36310
Elevation (ft)
2230
2220
2210
2200
2190
2180
2170
9750
9800
9850
9900
9950
10000
10050
10100
10150
Station (ft)
Legend
WS Floodplain
WS Floodway
Ground
Bank Sta
Encroachment


Cave Creek FP / FW - imported HEC-2
River = RIVER-1 Reach = Reach-1 RS = 36230
Elevation (ft)
2230
2220
2210
2200
2190
2180
2170
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS Floodway
WS Floodplain
Ground
Bank Sta
Encroachment


Cave Creek FP / FW - imported HEC-2
River = RIVER-1 Reach = Reach-1 RS = 36180
Elevation (ft)
2230
2220
2210
2200
2190
2180
2170
2160
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS Floodplain
WS Floodway
Ground
Bank Sta
Encroachment

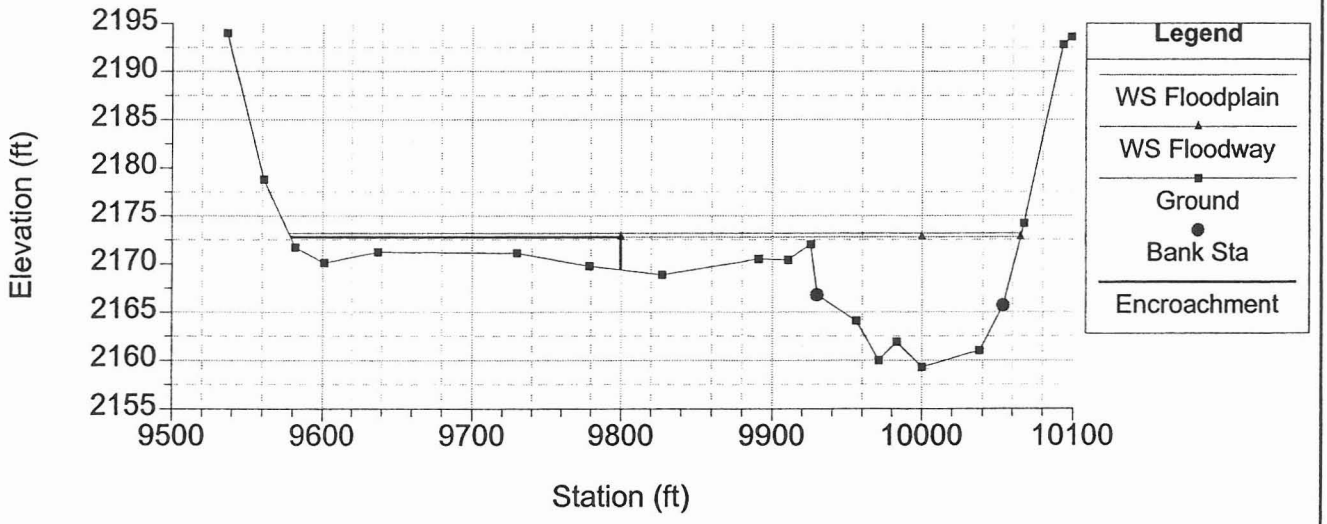
Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 36060



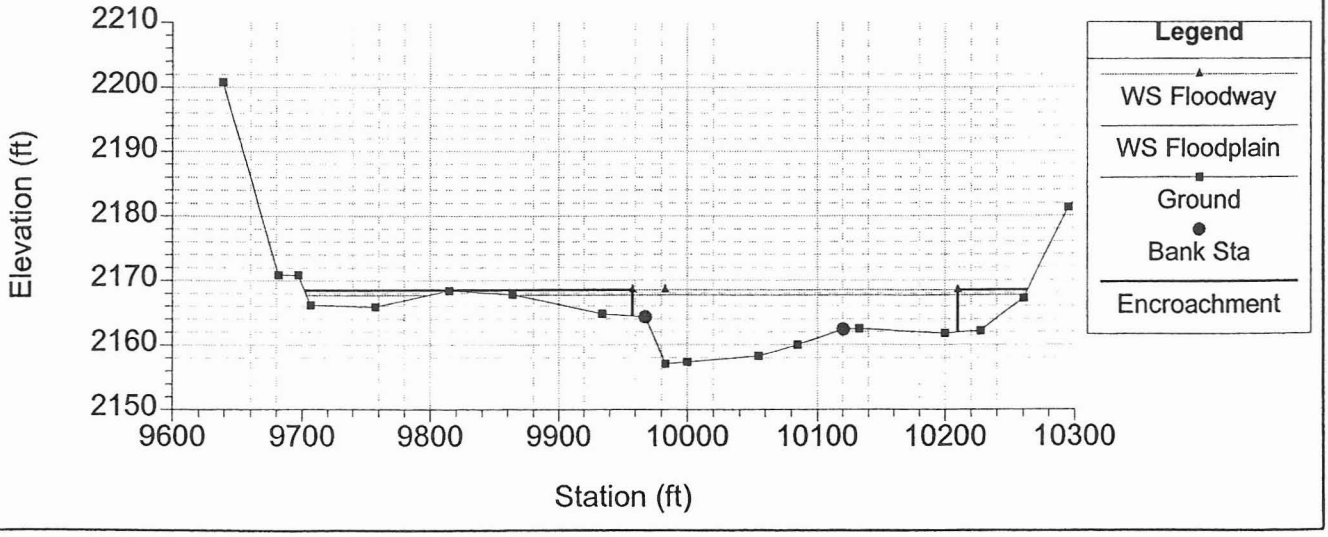
Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 35960



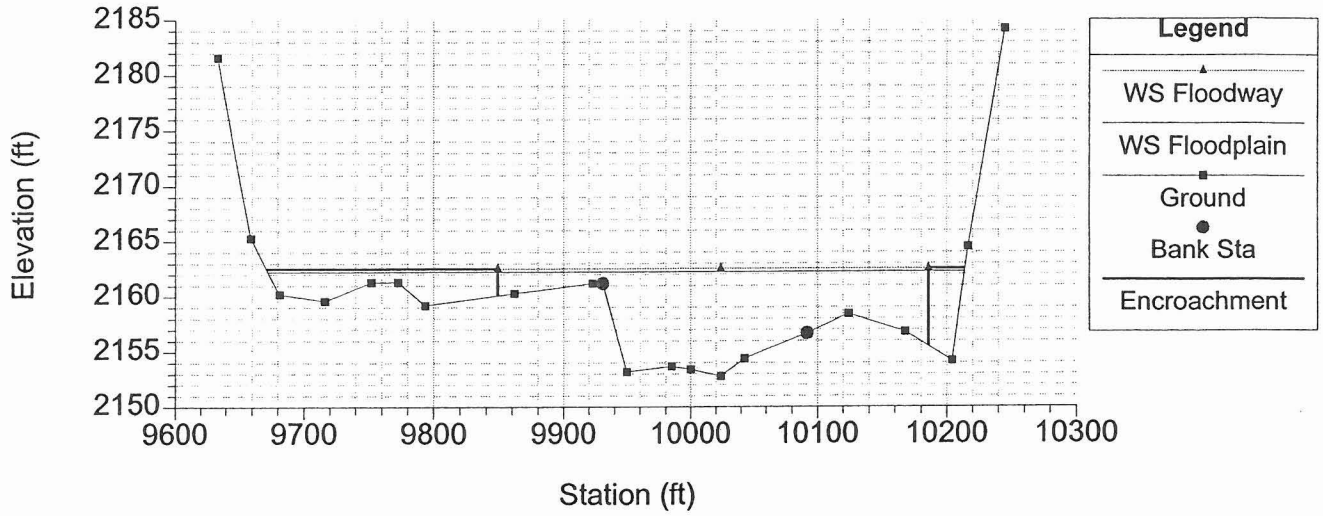
Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 35870



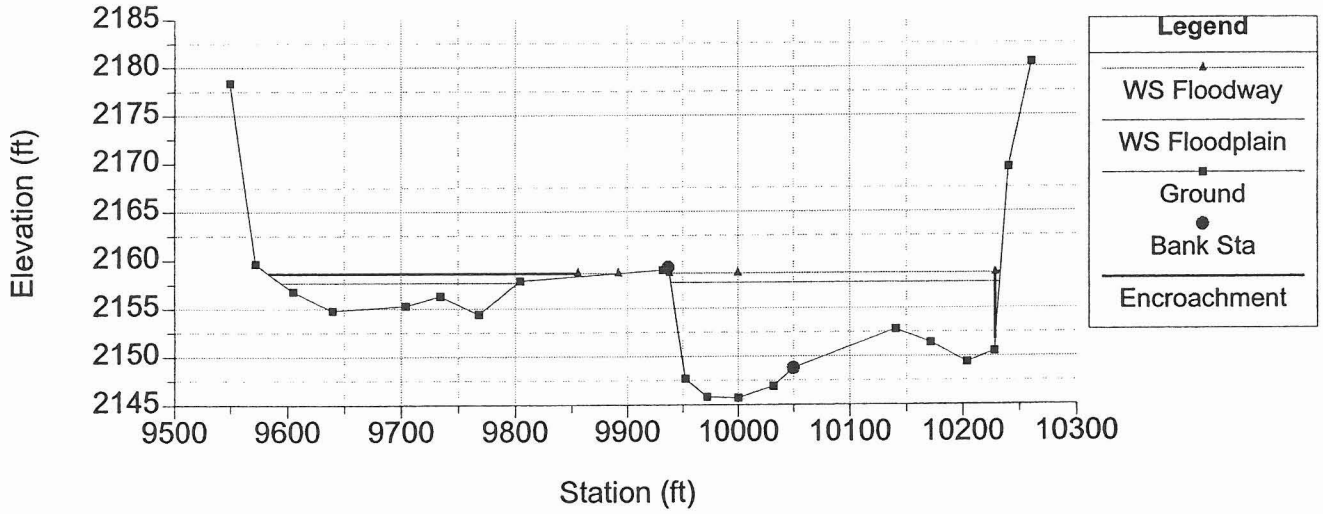
Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 35770



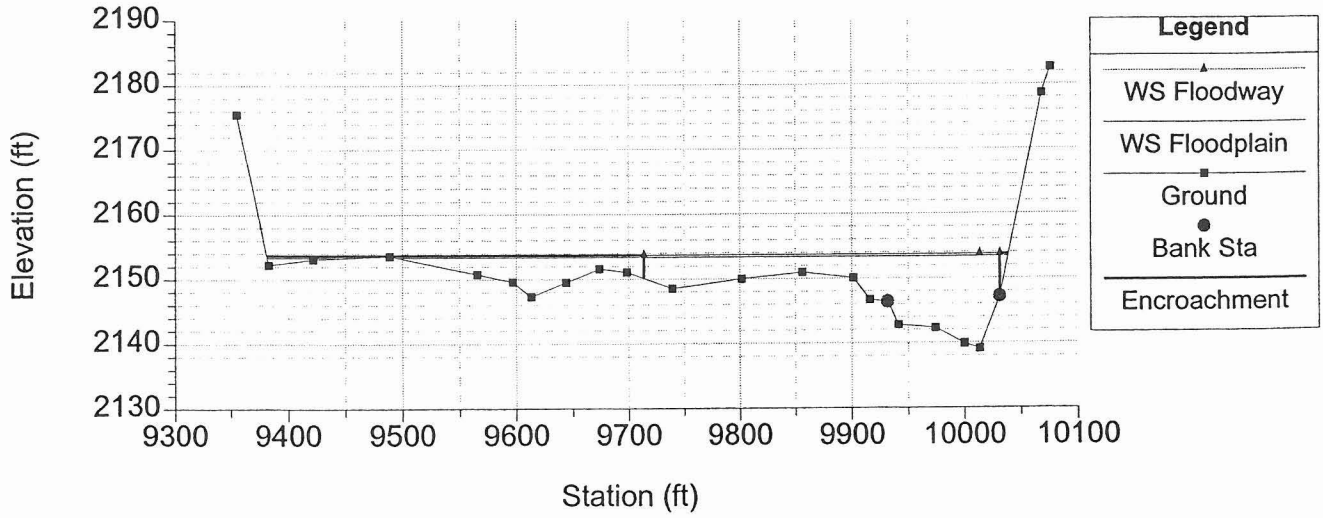
Cave Creek FP / FW - imported HEC-2

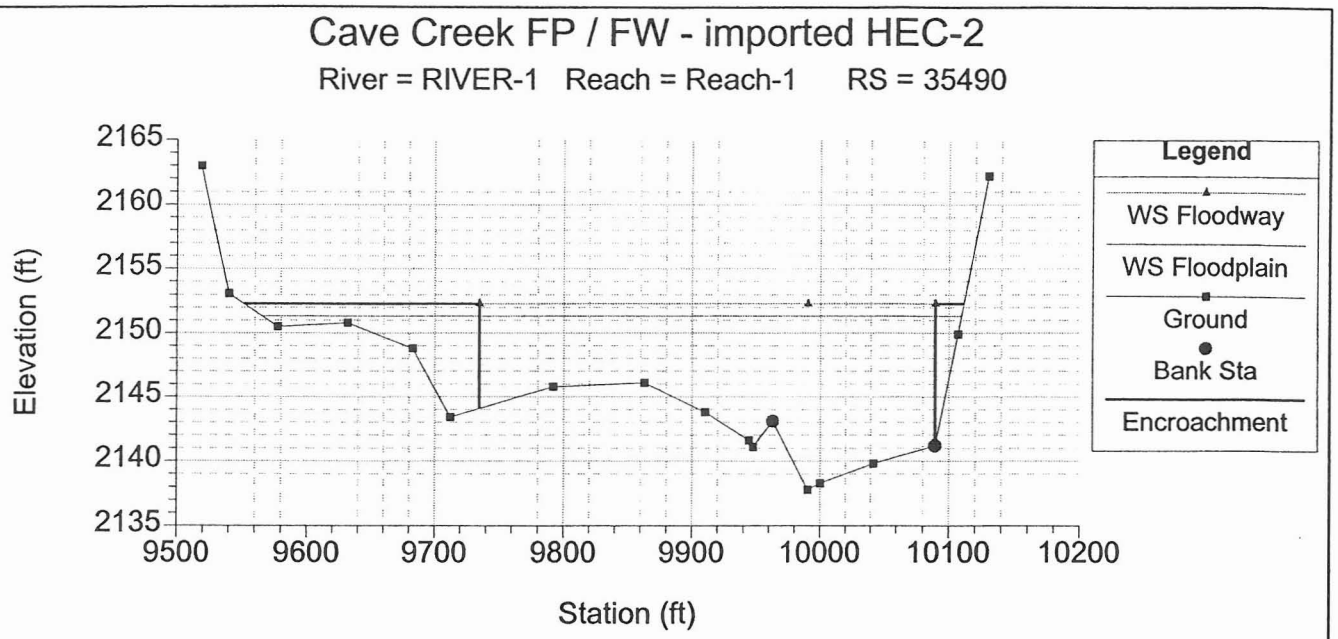
River = RIVER-1 Reach = Reach-1 RS = 35690



Cave Creek FP / FW - imported HEC-2

River = RIVER-1 Reach = Reach-1 RS = 35590




Cave Creek FP / FW - imported HEC-2
River = RIVER-1 Reach = Reach-1 RS = 35490
Elevation (ft)
2165
2160
2155
2150
2145
2140
2135
9500
9600
9700
9800
9900
10000
10100
10200
Station (ft)
Legend
WS Floodway
WS Floodplain
Ground
Bank Sta
Encroachment

E.3 Expansion and Contraction Coefficients

Not Applicable / Not Included

E.4 Analysis of Structures

Not Applicable / Not Included

E.5 Hydraulic Calculations

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*
*  CAVE CREEK FLOODPLAIN REVISION - CONTRACT NO. 1999C048 #5  AUGUST, 2000.
*  REVISION BY WEST CONSULTANTS, INC. FOR FLOOD CONTROL DISTRICT MARICOPA CNTY.
*  THIS MODEL IS TO CORRECT THE ERRONIOUS FLOW RATES BETWEEN RIVER STATIONS
*  37.01 AND 37.93 - AN ERROR WHICH ORIGINATED IN THE 1990 FLOODPLAIN STUDY
*  OF THE WATERSHED.  CORRECT HYDROLOGY WAS PROVIDED BY FLOOD CONTROL DISTRICT
*  OF MARICOPA COUNTY.  BOUNDARY CONDITIONS WILL ALSO BE ADJUSTED.  THE FLOODPLAIN
*  STARTING WATER SURFACE ELEVATION (WSE) AT STATION 35.49 WILL BE ESTABLISHED
*  USING THE STUDY BY GEORGE V. SABOL CONSULTING ENGINEERS, INC. DATED 7/97.
*  THE LOCATION OF RIVER STATION 35.54 IN THE 7/97 STUDY MATCHES ALMOST EXACTLY
*  WITH THE LOCATION OF RIVER STATION 35.49 IN THIS MODEL.  THEREFORE, THE
*  STARTING WATER SURFACE ELEVATION AT STATION 35.49 WILL BE 2151.32.  SIMILARLY,
*  THE STARTING ELEVATION FOR THE FLOODWAY WILL BE 2152.30 TO MATCH DOWNSTREAM.
*  FLOW RATES FOR THE REVISION WILL ALSO COME FROM THE GEORGE V. SABOL STUDY.
*  CROSS SECTION GEOMETRY IS FROM A CH2M HILL STUDY DATED 4/90.  THAT ORIGINAL
*  CH2M HILL HEC-2 MODEL USED TWO DIFFERENT FILES FOR FLOODPLAIN AND FLOODWAY, THEY
*  ARE INSTEAD CONDENSED INTO TWO RUNS IN THIS FILE.  THE ELEVATION DATUM IN THIS
*  MODEL IS NGVD 1929.
*
*  WEST ANALYSIS BY:  JAMES HEYEN, E.I.T., AND IWAN THOMAS
*  WEST PROJECT MANAGER:  DENNIS RICHARDS, P.E.
*  FCDMC PROJECT MANAGER:  MICHAEL DUNCAN, P.E.
*
*  ################# BEGIN ORIGINAL COMMENTS FROM CH2M HILL ####################
*
*     13
*  35490  ****** STREAM REACH DISTANCES REVISED 9-18-90
*  35490  BEGINNING WSEL's ARE FROM SEC. 35490 (CAVECREE.OUT - HTA FIS)
*  35490  COMMON SECTION IS SEC. 35490 FROM CAVE CREEK (HTA)
*  35490  STREAMFLOW DATA IS FROM CVCRK33.OUT (HEC-1 ; CH2M HILL)
*  35490  ******HEC-1 REVISED 1-4-90******
*  35490  POC 27 (SEC.35.49 - 35.69), POC 26 (SEC.35.77 - 36.31)
*  35490  POC 25 (SEC.36.40 - 36.69), POC 24 (SEC.36.78 - 37.31)
*  35490  POC "B" (SEC.37.37 - 37.80), POC 10 (SEC.37.93 - 38.79)
*  35770  SUBWATERSHED E7 & E8 CONC. PT.
*  36400  SUBWATERSHED E6 & E6A CONC. PT.
*  36780  SUBWATERSHED E2 & E3 CONC. PT.
*  37370  SUBWATERSHED B7 AND CONFLUENCE WITH COTTONWOOD WASH.
*  37930  SUBWATERSHED A7 CONC. PT. AND FLOW FROM UPPER BASIN.
*
*  ################# END ORIGINAL COMMENTS FROM CH2M HILL #######################


T1        CAVE CREEK WASH FLOODPLAIN REVISION - CONTRACT NO. 1999C048 ASSIGN #5
T2        PREPARED FOR FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
T3        MODEL BY WEST CONSULTANTS, INC., TEMPE, AZ  AUGUST, 2000

* FLOODPLAIN ANALYSIS
J1            2                                                   2151.32
J2     1      0      -1       0       0       0      -1
J3    38     43       1       2      26       4      68      53      54       8
* J3     4       5      51     150
* J3   110     150
* J3    38      53      54       4

QT     2   23235   23235

NC  .055    .055    .045      .1      .3
ET                   9.1                                          9735.0 10089.6
X1 35490      18  9962.8 10089.6   370.0   350.0   370.0
GR2163.0  9518.5  2153.1  9540.2  2150.5  9577.6  2150.8  9631.6  2148.8  9682.5
GR2143.4  9712.2  2145.8  9791.8  2146.1  9862.9  2143.8  9910.1  2141.6  9944.2
GR2141.1  9947.5  2143.1  9962.8  2137.8  9990.4  2138.3 10000.0  2139.8 10042.1
GR2141.2 10089.6  2149.9 10106.8  2162.2 10129.8

NC   .06     .06    .045
ET                   9.1                                          9714.0 10031.4
X1 35590      23  9932.1 10031.4   520.0   550.0   530.0
GR2175.5  9355.2  2152.3  9383.2  2153.1  9422.1  2153.6  9489.0  2150.8  9565.5
GR2149.6  9596.8  2147.3  9612.8  2149.5  9644.1  2151.6  9674.1  2151.1  9698.4
GR2148.5  9739.3  2150.0  9801.8  2151.0  9856.1  2150.1  9901.6  2146.7  9916.0
GR2146.4  9932.1  2142.8  9941.3  2142.3  9974.3  2139.9 10000.0  2139.1 10013.4
GR2147.2 10031.4  2178.6 10068.4  2182.6 10076.3

ET                   9.1                                          9856.0 10229.0
X1 35690      21  9937.0 10050.0   460.0   470.0   530.0
GR2178.4  9549.8  2159.7  9571.8  2156.8  9605.2  2154.8  9639.6  2155.3  9703.8
GR2156.3  9734.9  2154.4  9768.1  2157.9  9804.5  2159.0  9931.6  2159.3  9937.0
GR2147.7  9952.2  2145.8  9971.8  2145.7 10000.0  2146.9 10031.8  2148.8 10050.0
GR2152.8 10140.7  2151.4 10171.5  2149.4 10203.6  2150.5 10228.2  2169.6 10240.7
GR2180.5 10260.7

NC  .065    .065    .045
ET                   9.1                                            9849   10186
X1 35770      21  9931.1 10092.1   450.0   450.0   450.0
GR2181.6  9633.5  2165.3  9659.3  2160.2  9681.6  2159.6  9716.2  2161.3  9752.1
GR2161.3  9772.7  2159.2  9793.5  2160.3  9861.7  2161.2  9922.8  2161.2  9931.1
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GR2153.2  9949.6  2153.7  9984.7  2153.4 10000.0  2152.8 10023.9  2154.4 10042.7
GR2156.7 10092.1  2158.4 10124.4  2156.8 10167.8  2154.2 10204.0  2164.5 10216.5
GR2184.2 10245.1

ET                   9.1                                          9958.0 10210.0
X1 35870      19  9968.0 10120.8   520.0   520.0   530.0
GR2200.8  9639.0  2170.9  9681.8  2170.9  9697.1  2166.2  9706.8  2165.9  9757.3
GR2168.4  9814.7  2167.8  9863.8  2164.8  9934.0  2164.3  9968.0  2157.1  9983.3
GR2157.4 10000.0  2158.3 10054.9  2160.0 10085.0  2162.4 10120.8  2162.5 10132.7
GR2161.8 10199.7  2162.2 10227.1  2167.2 10260.7  2181.3 10295.1

ET                   9.1                                            9800 10090.0
NC  .065    .065    .035
X1 35960      21  9929.7 10054.2   450.0   450.0   480.0
GR2194.0  9536.6  2178.8  9560.9  2171.7  9581.7  2170.1  9601.2  2171.2  9637.4
GR2171.1  9730.1  2169.8  9778.9  2168.9  9827.3  2170.5  9891.1  2170.4  9910.4
GR2172.0  9925.5  2166.8  9929.7  2164.1  9956.0  2160.0  9971.3  2161.9  9983.2
GR2159.3 10000.0  2161.0 10038.0  2165.7 10054.2  2174.2 10067.5  2192.8 10093.2
GR2193.6 10098.6

ET                   9.1                                          9772.0 10100.0
X1 36060      22  9957.6 10048.3   560.0   560.0   580.0
GR2191.0  9405.7  2179.3  9435.6  2177.4  9501.1  2173.6  9552.2  2173.3  9585.6
GR2173.0  9718.0  2171.5  9786.7  2171.0  9836.8  2171.3  9851.7  2174.5  9866.0
GR2172.5  9876.3  2172.4  9886.6  2170.5  9914.1  2167.2  9957.6  2161.8  9970.2
GR2160.5  9997.2  2160.4 10000.0  2163.4 10027.2  2169.5 10048.3  2193.6 10062.9
GR2198.7 10081.5  2200.8 10091.8

ET                   9.1                                          9950.0 10150.0
NC  .065    .065     .06
X1 36180      22  9957.1 10144.0   580.0   630.0   630.0
GR2201.5  9846.0  2200.1  9863.1  2198.7  9875.8  2180.0  9907.2  2179.6  9934.3
GR2179.0  9944.4  2173.8  9957.1  2172.5  9973.8  2171.3 10000.0  2171.4 10011.3
GR2174.2 10020.8  2174.1 10037.5  2175.8 10051.4  2175.5 10080.7  2170.7 10106.6
GR2169.5 10127.2  2178.7 10144.0  2194.1 10173.6  2203.9 10198.7  2211.5 10228.7
GR2222.2 10257.0  2228.1 10276.0

ET                   9.1                                          9938.0 10162.0
X1 36230      20  9969.0 10130.4   240.0   250.0   260.0
GR2197.7  9917.0  2196.2  9927.9  2185.0  9958.2  2181.9  9969.0  2177.6  9979.9
GR2174.5  9994.9  2174.4 10000.0  2176.6 10005.7  2176.1 10027.6  2180.1 10054.6
GR2180.8 10062.6  2178.9 10082.7  2176.6 10098.2  2179.3 10130.4  2183.8 10158.1
GR2183.5 10180.4  2181.8 10249.0  2185.3 10273.2  2192.1 10286.9  2227.3 10335.2

ET                   9.1                                            9860   10050
NC  .065    .065    .045
X1 36310      16  9965.0 10027.1   350.0   430.0   420.0
GR2205.2  9792.2  2193.7  9826.5  2191.6  9844.9  2190.7  9857.1  2183.9  9871.1
GR2183.3  9882.2  2185.6  9908.1  2187.2  9940.9  2186.6  9953.0  2184.4  9965.0
GR2178.9  9970.2  2178.9 10000.0  2183.8 10027.1  2185.0 10045.5  2226.8 10104.0
GR2227.5 10113.1

ET                   9.1                                          9876.4 10085.3
NC  .065    .065    .065
X1 36400      13  9876.4 10085.3   510.0   490.0   480.0
GR2228.2  9837.8  2194.0  9876.4  2189.8  9900.8  2192.3  9928.8  2193.1  9963.1
GR2189.0 10000.0  2188.4 10047.9  2188.3 10073.8  2194.9 10085.3  2198.1 10123.6
GR2202.5 10201.9  2204.1 10223.1  2215.1 10266.5

ET                   9.1                                          9956.0 10125.0
X1 36490      18  9971.6 10114.1     420     330     400
GR2221.9  9892.6  2203.9  9920.3  2201.4  9934.3  2201.4  9952.1  2199.0  9971.6
GR2196.2  9983.0  2194.1  9996.0  2193.9 10000.0  2196.7 10015.5  2197.9 10040.6
GR2197.5 10048.8  2196.5 10080.3  2194.0 10104.4  2198.8 10114.1  2199.4 10133.6
GR2210.3 10152.5  2228.1 10183.8  2228.4 10185.6

ET                   9.1                                          9900.0 10040.0
X1 36520      13  9928.0 10011.7     200     210     200
GR2218.9  9857.6  2204.2  9897.7  2203.9  9913.2  2200.9  9928.0  2200.1  9933.5
GR2199.0  9941.7  2200.3  9974.7  2194.9  9995.5  2194.5 10000.0  2199.4 10011.7
GR2202.2 10030.7  2208.5 10067.3  2238.4 10119.6

ET                   9.1                                          9929.0 10070.0
X1 36610      12  9955.2 10031.1   400.0   470.0   480.0
GR2222.6  9889.2  2208.1  9929.5  2204.5  9955.2  2202.9  9956.1  2200.6  9995.3
GR2200.6 10000.0  2203.0 10011.6  2204.4 10031.1  2206.2 10060.2  2212.6 10087.5
GR2229.6 10122.6  2234.2 10132.7

ET                   9.1                                          9956.0 10099.0
X1 36690      12  9957.0 10037.3   380.0   390.0   380.0
GR2229.2  9918.3  2209.3  9957.0  2208.1  9962.7  2203.9  9990.5  2205.0 10000.0
GR2208.3 10024.8  2209.8 10037.3  2212.5 10066.0  2215.8 10101.6  2215.7 10118.1
GR2222.7 10135.5  2230.6 10152.3

QT     2   23260   23260

ET                   9.1                                          9962.0 10108.0
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X1 36780       13  9976.3 10093.2   470.0   500.0   480.0
GR2258.5  9913.2  2256.9  9918.2  2226.5  9960.8  2215.4  9976.3  2211.0  9977.6
GR2209.9  9987.7  2211.6 10000.0  2211.4 10021.1  2213.3 10046.9  2218.7 10093.2
GR2217.3 10116.0  2224.5 10138.9  2236.6 10167.9

ET                   9.1                                          9900.0 10060.0
X1 36880       13  9954.8 10023.3   550.0   560.0   530.0
GR2265.9  9831.8  2259.6  9854.4  2246.4  9885.0  2229.6  9919.8  2228.1  9938.4
GR2226.6  9944.1  2226.3  9954.8  2222.8  9974.7  2221.5 10000.0  2226.5 10023.3
GR2227.4 10024.7  2247.0 10058.6  2257.0 10068.9

ET                   9.1                                          9938.0 10097.0
X1 36960       15  9943.8 10059.8   380.0   420.0   420.0
GR2259.2  9880.5  2234.8  9922.8  2228.3  9943.8  2228.8  9957.0  2228.5  9985.5
GR2226.0 10000.0  2229.0 10028.9  2228.4 10030.4  2230.7 10059.8  2236.8 10092.7
GR2240.9 10115.2  2239.8 10144.4  2240.2 10178.1  2244.8 10193.5  2250.4 10206.9

ET                   9.1                                          9850.0 10061.1
X1 37010       20  9935.4 10061.1     320     300     300
GR2260.6  9721.3  2248.9  9744.1  2245.5  9779.3  2242.5  9814.5  2236.9  9847.1
GR2238.1  9863.7  2238.4  9899.3  2236.2  9932.6  2235.5  9935.4  2233.8  9964.8
GR2229.0 10000.0  2232.1 10025.3  2231.8 10030.5  2241.5 10061.1  2245.8 10100.7
GR2245.9 10127.8  2243.2 10157.5  2245.1 10192.4  2247.5 10217.3  2255.9 10244.0

ET                   9.1                                          9947.8 10140.0
X1 37080       20  9947.8 10081.6   400.0   320.0   370.0
GR2273.1  9810.2  2257.0  9839.7  2251.7  9859.2  2250.3  9886.1  2248.4  9930.8
GR2241.5  9938.8  2240.4  9947.8  2237.5  9972.9  2237.1 10000.0  2236.4 10017.0
GR2235.8 10049.3  2239.2 10081.6  2238.2 10137.6  2241.0 10151.1  2246.4 10170.5
GR2249.5 10200.4  2253.8 10225.0  2255.7 10247.2  2260.0 10261.3  2265.1 10278.9

ET                   9.1                                         9969.00   10159
X1 37120       17  9969.0 10060.6   210.0   180.0   210.0
GR2271.9  9925.0  2251.8  9964.5  2247.2  9969.0  2240.3  9984.1  2234.9 10000.0
GR2233.7 10013.1  2245.4 10049.4  2246.8 10060.6  2246.0 10078.1  2244.8 10115.6
GR2242.6 10141.9  2241.7 10169.7  2249.5 10193.1  2258.6 10209.2  2261.5 10220.4
GR2270.3 10275.9  2271.2 10287.2

ET                   9.1                                            9905 10100.0
X1 37200       19  9978.7 10095.8     380     320     370
GR2269.3  9799.5  2262.6  9826.6  2256.2  9835.0  2255.8  9861.6  2253.3  9888.5
GR2250.9  9914.3  2246.4  9934.0  2251.6  9950.3  2251.3  9950.4  2248.9  9978.7
GR2243.1 10000.0  2245.0 10018.9  2246.4 10048.2  2246.3 10076.6  2251.6 10095.8
GR2266.5 10105.3  2278.5 10122.3  2291.0 10150.5  2295.1 10165.0

ET                   9.1                                          9793.0 10030.0
X1 37270       19  9937.0 10027.7   240.0   350.0   370.0
GR2271.2  9707.2  2267.6  9728.4  2261.2  9745.4  2252.3  9764.9  2250.0  9793.1
GR2254.3  9829.1  2255.6  9857.4  2254.8  9890.0  2252.7  9922.8  2254.4  9937.0
GR2251.7  9954.5  2246.7 10000.0  2256.6 10027.7  2258.6 10047.0  2259.6 10085.8
GR2261.6 10138.9  2263.1 10178.6  2271.7 10207.3  2270.9 10228.4

NC  .065    .065     .06
ET                   9.1                                          9816.0 10044.0
X1 37310       19  9885.7 10031.9   200.0   220.0   210.0
GR2273.5  9752.5  2273.4  9771.1  2254.2  9803.6  2255.4  9816.9  2257.2  9851.3
GR2256.1  9885.7  2254.3  9924.0  2253.4  9931.6  2252.7  9975.7  2249.6  9998.7
GR2249.9 10000.0  2253.9 10019.4  2259.2 10031.9  2262.5 10108.7  2264.0 10245.4
GR2264.9 10275.1  2266.8 10292.0  2278.6 10327.5  2284.4 10343.5

NC  .065    .065    .035
ET                   9.1                                          9825.0 10215.0
X1 37370       20  9945.7 10095.8   320.0   340.0   320.0
GR2280.5  9883.0  2277.1  9910.6  2270.1  9928.4  2261.2  9945.7  2258.8  9953.8
GR2254.5  9965.3  2255.6  9988.8  2255.5 10000.0  2253.7 10015.2  2258.0 10027.5
GR2257.8 10049.7  2258.7 10077.4  2261.1 10095.8  2265.3 10242.3  2267.6 10338.1
GR2269.5 10452.6  2274.5 10580.0  2277.9 10603.0  2282.8 10627.0  2288.7 10655.7

ET                   9.1                                          9940.0 10383.0
X1 37470       24  9969.8 10062.0   480.0   450.0   530.0
GR2291.1  9896.5  2290.6  9938.2  2289.0  9953.0  2262.3  9969.8  2258.6  9985.8
GR2257.7 10000.0  2258.1 10012.8  2259.1 10035.3  2262.2 10048.8  2266.1 10062.0
GR2266.9 10103.0  2266.6 10166.1  2265.9 10260.4  2266.3 10341.6  2264.7 10382.1
GR2260.3 10388.8  2265.2 10404.5  2264.2 10427.8  2266.8 10465.3  2270.4 10536.4
GR2272.5 10614.9  2271.5 10695.2  2272.3 10714.4  2291.6 10755.4

ET                   9.1                                          9813.0 10454.0
X1 37570       29  9963.9 10065.5   520.0   490.0   530.0
GR2288.3  9854.8  2285.0  9869.5  2279.9  9906.8  2277.7  9929.7  2277.1  9945.0
GR2272.7  9963.9  2261.7  9980.4  2259.8  9997.9  2259.4 10000.0  2261.5 10019.5
GR2264.2 10036.1  2269.2 10065.5  2268.1 10103.9  2268.3 10115.7  2271.2 10138.2
GR2272.1 10251.7  2272.2 10346.5  2270.5 10409.2  2268.7 10437.4  2264.7 10454.1
GR2268.4 10477.6  2268.3 10494.5  2271.0 10518.8  2271.7 10544.1  2273.3 10654.6
GR2275.4 10681.4  2276.4 10711.4  2284.9 10728.5  2295.1 10749.3

NC  .065    .065    .045
ET                   9.1                                          9830.0 10320.0
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X1 37660      25  9923.4 10128.4   500.0   490.0   480.0
GR2292.6  9865.8  2281.1  9898.5  2277.9  9916.5  2272.8  9923.4  2272.1  9938.2
GR2274.1  9953.3  2273.7  9966.6  2273.0  9976.8  2270.0  9990.3  2271.0 10000.0
GR2272.5 10016.0  2275.2 10028.9  2271.1 10040.0  2271.1 10067.9  2271.2 10099.4
GR2277.0 10128.4  2276.2 10187.4  2276.9 10241.7  2276.3 10298.4  2273.5 10347.9
GR2270.6 10362.1  2272.2 10375.1  2276.2 10391.3  2295.3 10422.8  2300.8 10456.5

ET                   9.1                                             9877   10273
X1 37750      27  9959.6 10186.4   450.0   450.0   480.0
GR2306.7  9883.0  2306.1  9905.4  2295.7  9928.7  2286.0  9948.9  2281.8  9959.6
GR2281.5  9962.4  2279.8  9974.9  2276.5  9983.7  2278.5 10000.0  2279.4 10026.6
GR2280.5 10040.3  2281.3 10069.7  2281.9 10101.8  2280.5 10113.8  2279.7 10140.2
GR2280.2 10168.3  2280.9 10186.4  2284.8 10213.0  2284.2 10249.7  2280.1 10284.5
GR2281.0 10315.9  2283.4 10337.5  2285.2 10361.7  2286.1 10378.6  2296.8 10406.7
GR2305.8 10432.4  2306.8 10444.5

NC  .065    .065    .035
ET                   9.1                                         9917.10 10138.7
X1 37800      19  9917.1 10138.7   280.0   280.0   260.0
GR2308.0  9663.1  2300.0  9687.5  2295.0  9703.3  2292.9  9749.4  2288.7  9825.8
GR2285.5  9917.1  2282.9  9958.8  2282.9  9974.8  2283.0  9992.8  2282.7 10000.0
GR2283.0 10042.7  2283.0 10051.8  2283.0 10087.4  2284.8 10109.3  2287.3 10138.7
GR2291.7 10191.9  2293.8 10237.0  2297.8 10272.5  2309.8 10312.6

*  CONFLUENCE WITH COTTONWOOD CREEK

QT     2   20679   20679

NC  .065    .065    .040
ET                   9.1                                             9850   10055
X1 37930      22  9928.9 10053.2   670.0   730.0   690.0
GR2305.7  9747.6  2302.6  9758.5  2292.7  9776.0  2292.2  9790.3  2293.5  9830.3
GR2293.5  9844.3  2288.4  9858.8  2294.0  9880.3  2290.2  9928.9  2285.7  9945.0
GR2286.6  9955.4  2284.3  9997.2  2283.7 10000.0  2285.8 10027.5  2285.9 10038.4
GR2289.0 10053.2  2294.5 10084.7  2300.8 10109.7  2300.7 10163.2  2303.8 10175.0
GR2305.6 10204.1  2312.1 10235.8

ET                   9.1                                         9954.50   10160
X1 38030      19  9954.5 10115.4   520.0   520.0   530.0
GR2319.3  9870.7  2306.3  9908.3  2301.7  9936.6  2297.8  9954.5  2296.7  9967.4
GR2293.0  9986.7  2292.8 10000.0  2295.0 10048.7  2295.2 10059.4  2295.2 10092.6
GR2298.3 10115.4  2301.3 10176.7  2302.9 10247.1  2305.1 10326.4  2306.7 10395.5
GR2309.0 10449.0  2309.3 10497.9  2312.0 10517.9  2316.5 10544.1

NC  .065    .065     .06
ET                   9.1                                             9880   10120
X1 38140      22  9953.8 10027.7   590.0   560.0   580.0
GR2321.8  9825.2  2306.5  9845.3  2301.8  9860.8  2302.6  9877.2  2303.5  9899.9
GR2301.7  9918.9  2301.6  9927.9  2301.6  9953.8  2296.7  9961.9  2297.9  9978.2
GR2295.1 10000.0  2294.5 10011.3  2301.8 10027.7  2304.5 10079.3  2307.7 10182.7
GR2310.0 10285.7  2309.9 10306.6  2313.0 10342.2  2314.9 10414.3  2316.1 10486.3
GR2316.9 10539.5  2316.6 10540.9

NC  .065    .065    .045
ET                   9.1                                         9929.90   10160
X1 38250      19  9929.9 10111.7   470.0   390.0   580.0
GR2334.4  9876.6  2320.8  9907.0  2303.9  9929.9  2307.2  9949.2  2305.7  9963.9
GR2305.4  9996.5  2305.5 10000.0  2305.9 10022.4  2305.2 10031.1  2304.0 10045.7
GR2306.6 10077.4  2309.0 10111.7  2308.9 10137.3  2312.2 10267.6  2314.7 10359.8
GR2315.7 10396.6  2318.1 10414.3  2330.4 10443.6  2337.7 10456.0

NC  .065    .065     .04
ET                   9.1                                         9776.0 10073.0
X1 38320      20  9963.2 10064.8   360.0   400.0   370.0
GR2335.0  9707.6  2312.0  9751.6  2308.6  9773.9  2309.5  9791.2  2313.0  9822.9
GR2314.4  9858.0  2312.7  9890.1  2315.2  9903.0  2314.5  9941.3  2315.8  9963.2
GR2308.1  9976.4  2306.5  9997.2  2306.1 10000.0  2309.0 10028.8  2309.5 10037.9
GR2313.3 10064.8  2313.8 10091.4  2323.4 10111.5  2338.6 10140.4  2340.8 10164.4

ET                   9.1                                         9543.0 10209.0
X1 38430      17  9936.8 10050.1   480.0   590.0   580.0
GR2341.9  9426.7  2335.6  9449.4  2314.3  9490.7  2315.3  9515.5  2317.9  9568.5
GR2320.3  9638.6  2320.5  9754.6  2319.8  9833.3  2320.9  9911.9  2320.4  9936.8
GR2316.9  9968.5  2316.4  9981.3  2318.0 10000.0  2316.8 10036.8  2320.6 10050.1
GR2346.3 10091.1  2347.3 10094.5

ET                   9.1                                             9655 10019.4
X1 38500      18  9949.5 10019.4   370.0   360.0   370.0
GR2339.5  9583.9  2321.1  9629.1  2319.8  9650.0  2322.9  9689.9  2327.4  9743.8
GR2329.3  9775.1  2327.4  9821.6  2326.1  9858.2  2324.8  9917.4  2325.2  9919.3
GR2322.9  9949.5  2318.7  9979.9  2314.9  9997.1  2315.6 10000.0  2315.6 10013.8
GR2317.8 10019.4  2342.7 10054.2  2343.4 10055.5

NC  .065    .065     .06
ET                   9.1                                             9850   10060
X1 38610      14  9997.1 10056.0   520.0   570.0   580.0
GR2351.5  9776.0  2332.6  9812.7  2332.8  9850.0  2332.5  9896.5  2329.9  9921.3
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GR2327.2  9952.3  2326.5  9974.3  2327.2  9977.0  2327.6  9997.1  2326.8 10000.0
GR2323.7 10028.5  2324.0 10056.0  2343.4 10081.9  2358.5 10100.9

NC  .065    .065    .045
ET                   9.1                                            9888   10177
X1 38710      15  9971.2 10046.3   530.0   470.0   530.0
GR2362.3  9935.3  2359.1  9942.1  2331.9  9971.2  2326.3  9993.5  2328.1 10000.0
GR2328.2 10012.3  2330.7 10031.0  2334.6 10046.3  2336.1 10071.4  2336.7 10080.2
GR2338.1 10135.2  2336.7 10219.7  2335.7 10235.8  2344.6 10255.9  2356.8 10267.4

NC  .065    .065    .040
ET                   9.1                                         9945.0 10095.0
X1 38790      16  9948.5 10093.4   430.0   390.0   422.0
GR2370.4  9870.2  2346.3  9905.9  2346.0  9922.8  2341.7  9948.5  2339.1  9957.8
GR2337.6  9977.4  2337.9 10000.0  2338.2 10033.8  2338.8 10052.9  2339.7 10064.4
GR2341.4 10093.4  2345.5 10136.5  2347.0 10168.7  2344.0 10201.8  2347.8 10223.2
GR2356.0 10255.4

EJ
T1        CAVE CREEK WASH FLOODPLAIN REVISION - CONTRACT NO. 1999C048 ASSIGN #5
T2        PREPARED FOR FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
T3        MODEL BY WEST CONSULTANTS, INC., TEMPE, AZ  AUGUST, 2000
* FLOODWAY ANALYSIS
J1     0       3       0                                          2152.30
J2     2              -1                                  -1


ER
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1*****************************************
 *  HEC-2 WATER SURFACE PROFILES          *
 *                                        *
 *  Version   4.6.2;  May 1991            *
 *                                        *
 *  RUN DATE    09JAN01    TIME   16:53:37 *
 *****************************************
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*  U.S. ARMY CORPS
*  HYDROLOGIC ENGI
*  609 SECOND STRE
*  DAVIS, CALIFORN
*          (916) 7
******************
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X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
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THIS RUN EXECUTED 09JAN01

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

 Version   4.6.2;  May 1991
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CAVE CREEK FLOODPLAIN REVISION - CONTRACT NO. 1999C048 #5 AUGUST, 2000.
REVISION BY WEST CONSULTANTS, INC. FOR FLOOD CONTROL DISTRICT MARICOPA CNTY.
THIS MODEL IS TO CORRECT THE ERRONIOUS FLOW RATES BETWEEN RIVER STATIONS
37.01 AND 37.93 - AN ERROR WHICH ORIGINATED IN THE 1990 FLOODPLAIN STUDY
OF THE WATERSHED. CORRECT HYDROLOGY WAS PROVIDED BY FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY. BOUNDARY CONDITIONS WILL ALSO BE ADJUSTED. THE FLOODPLA
STARTING WATER SURFACE ELEVATION (WSE) AT STATION 35.49 WILL BE ESTABLISHED
USING THE STUDY BY GEORGE V. SABOL CONSULTING ENGINEERS, INC. DATED 7/97.
THE LOCATION OF RIVER STATION 35.54 IN THE 7/97 STUDY MATCHES ALMOST EXACTLY
WITH THE LOCATION OF RIVER STATION 35.49 IN THIS MODEL. THEREFORE, THE
STARTING WATER SURFACE ELEVATION AT STATION 35.49 WILL BE 2151.32. SIMILARLY
THE STARTING ELEVATION FOR THE FLOODWAY WILL BE 2152.30 TO MATCH DOWNSTREAM.
FLOW RATES FOR THE REVISION WILL ALSO COME FROM THE GEORGE V. SABOL STUDY.
CROSS SECTION GEOMETRY IS FROM A CH2M HILL STUDY DATED 4/90. THAT ORIGINAL
CH2M HILL HEC-2 MODEL USED TWO DIFFERENT FILES FOR FLOODPLAIN AND FLOODWAY, T
ARE INSTEAD CONDENSED INTO TWO RUNS IN THIS FILE. THE ELEVATION DATUM IN THI
MODEL IS NGVD 1929.

WEST ANALYSIS BY: JAMES HEYEN, E.I.T., AND IWAN THOMAS
WEST PROJECT MANAGER: DENNIS RICHARDS, P.E.
FCDMC PROJECT MANAGER: MICHAEL DUNCAN, P.E.

################# BEGIN ORIGINAL COMMENTS FROM CH2M HILL ####################

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   13
35490  ****** STREAM REACH DISTANCES REVISED 9-18-90
35490  BEGINNING WSEL's ARE FROM SEC. 35490 (CAVECREE.OUT - HTA FIS)
35490  COMMON SECTION IS SEC. 35490 FROM CAVE CREEK (HTA)
35490  STREAMFLOW DATA IS FROM CVCRK33.OUT (HEC-1 ; CH2M HILL)
35490  ******HEC-1 REVISED 1-4-90******
35490  POC 27 (SEC.35.49 - 35.69), POC 26 (SEC.35.77 - 36.31)
35490  POC 25 (SEC.36.40 - 36.69), POC 24 (SEC.36.78 - 37.31)
35490  POC "B" (SEC.37.37 - 37.80), POC 10 (SEC.37.93 - 38.79)
35770  SUBWATERSHED E7 & E8 CONC. PT.
36400  SUBWATERSHED E6 & E6A CONC. PT.
36780  SUBWATERSHED E2 & E3 CONC. PT.
37370  SUBWATERSHED B7 AND CONFLUENCE WITH COTTONWOOD WASH.
37930  SUBWATERSHED A7 CONC. PT. AND FLOW FROM UPPER BASIN.
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################# END ORIGINAL COMMENTS FROM CH2M HILL #####################

```
T1        CAVE CREEK WASH FLOODPLAIN REVISION - CONTRACT NO. 1999C048 ASSIGN #5
T2        PREPARED FOR FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
T3        MODEL BY WEST CONSULTANTS, INC., TEMPE, AZ  AUGUST, 2000
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FLOODPLAIN ANALYSIS

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		2							2151.32	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	1	0	-1	0	0	0	-1			

J3 VARIABLE CODES FOR SUMMARY PRINTOUT

	38	43	1	2	26	4	68	53	54	8
J3	4	5	51	150						
J3	110	150								
J3	38	53	54	4						

QT	2	23235	23235							
NC	.055	.055	.045	.1	.3					
ET			9.1						9735.0	10
X1	35490	18	9962.8	10089.6	370.0	350.0	370.0			
GR	2163.0	9518.5	2153.1	9540.2	2150.5	9577.6	2150.8	9631.6	2148.8	9
GR	2143.4	9712.2	2145.8	9791.8	2146.1	9862.9	2143.8	9910.1	2141.6	9
GR	2141.1	9947.5	2143.1	9962.8	2137.8	9990.4	2138.3	10000.0	2139.8	10
GR	2141.2	10089.6	2149.9	10106.8	2162.2	10129.8				
NC	.06	.06	.045							
ET			9.1						9714.0	10
X1	35590	23	9932.1	10031.4	520.0	550.0	530.0			
GR	2175.5	9355.2	2152.3	9383.2	2153.1	9422.1	2153.6	9489.0	2150.8	9
GR	2149.6	9596.8	2147.3	9612.8	2149.5	9644.1	2151.6	9674.1	2151.1	9
GR	2148.5	9739.3	2150.0	9801.8	2151.0	9856.1	2150.1	9901.6	2146.7	9
GR	2146.4	9932.1	2142.8	9941.3	2142.3	9974.3	2139.9	10000.0	2139.1	10
GR	2147.2	10031.4	2178.6	10068.4	2182.6	10076.3				
ET			9.1						9856.0	10
X1	35690	21	9937.0	10050.0	460.0	470.0	530.0			
GR	2178.4	9549.8	2159.7	9571.8	2156.8	9605.2	2154.8	9639.6	2155.3	9
GR	2156.3	9734.9	2154.4	9768.1	2157.9	9804.5	2159.0	9931.6	2159.3	9
GR	2147.7	9952.2	2145.8	9971.8	2145.7	10000.0	2146.9	10031.8	2148.8	10
GR	2152.8	10140.7	2151.4	10171.5	2149.4	10203.6	2150.5	10228.2	2169.6	10
GR	2180.5	10260.7								

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NC	.065	.065	.045							
ET			9.1						9849	
X1	35770	21	9931.1	10092.1	450.0	450.0	450.0			
GR	2181.6	9633.5	2165.3	9659.3	2160.2	9681.6	2159.6	9716.2	2161.3	9
GR	2161.3	9772.7	2159.2	9793.5	2160.3	9861.7	2161.2	9922.8	2161.2	9
GR	2153.2	9949.6	2153.7	9984.7	2153.4	10000.0	2152.8	10023.9	2154.4	10
GR	2156.7	10092.1	2158.4	10124.4	2156.8	10167.8	2154.2	10204.0	2164.5	10
GR	2184.2	10245.1								
ET			9.1						9958.0	10
X1	35870	19	9968.0	10120.8	520.0	520.0	530.0			
GR	2200.8	9639.0	2170.9	9681.8	2170.9	9697.1	2166.2	9706.8	2165.9	9
GR	2168.4	9814.7	2167.8	9863.8	2164.8	9934.0	2164.3	9968.0	2157.1	9
GR	2157.4	10000.0	2158.3	10054.9	2160.0	10085.0	2162.4	10120.8	2162.5	10
GR	2161.8	10199.7	2162.2	10227.1	2167.2	10260.7	2181.3	10295.1		
ET			9.1						9800	10
NC	.065	.065	.035							
X1	35960	21	9929.7	10054.2	450.0	450.0	480.0			
GR	2194.0	9536.6	2178.8	9560.9	2171.7	9581.7	2170.1	9601.2	2171.2	9
GR	2171.1	9730.1	2169.8	9778.9	2168.9	9827.3	2170.5	9891.1	2170.4	9
GR	2172.0	9925.5	2166.8	9929.7	2164.1	9956.0	2160.0	9971.3	2161.9	9
GR	2159.3	10000.0	2161.0	10038.0	2165.7	10054.2	2174.2	10067.5	2192.8	10
GR	2193.6	10098.6								
ET			9.1						9772.0	10
X1	36060	22	9957.6	10048.3	560.0	560.0	580.0			
GR	2191.0	9405.7	2179.3	9435.6	2177.4	9501.1	2173.6	9552.2	2173.3	9
GR	2173.0	9718.0	2171.5	9786.7	2171.0	9836.8	2171.3	9851.7	2174.5	9
GR	2172.5	9876.3	2172.4	9886.6	2170.5	9914.1	2167.2	9957.6	2161.8	9
GR	2160.5	9997.2	2160.4	10000.0	2163.4	10027.2	2169.5	10048.3	2193.6	10
GR	2198.7	10081.5	2200.8	10091.8						

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ET                          9.1                                                                  9950.0     10
NC     .065       .065       .06
X1    36180         22     9957.1    10144.0       580.0       630.0       630.0
GR   2201.5     9846.0     2200.1     9863.1      2198.7      9875.8      2180.0      9907.2     2179.6      9
GR   2179.0     9944.4     2173.8     9957.1      2172.5      9973.8      2171.3     10000.0     2171.4     10
GR   2174.2    10020.8     2174.1    10037.5      2175.8     10051.4      2175.5     10080.7     2170.7     10
GR   2169.5    10127.2     2178.7    10144.0      2194.1     10173.6      2203.9     10198.7     2211.5     10
GR   2222.2    10257.0     2228.1    10276.0

ET                          9.1                                                                  9938.0     10
X1    36230         20     9969.0    10130.4       240.0       250.0       260.0
GR   2197.7     9917.0     2196.2     9927.9      2185.0      9958.2      2181.9      9969.0     2177.6      9
GR   2174.5     9994.9     2174.4    10000.0      2176.6     10005.7      2176.1     10027.6     2180.1     10
GR   2180.8    10062.6     2178.9    10082.7      2176.6     10098.2      2179.3     10130.4     2183.8     10
GR   2183.5    10180.4     2181.8    10249.0      2185.3     10273.2      2192.1     10286.9     2227.3     10
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ET                          9.1                                                                   9860
NC     .065       .065       .045
X1    36310         16     9965.0    10027.1       350.0       430.0       420.0
GR   2205.2     9792.2     2193.7     9826.5      2191.6      9844.9      2190.7      9857.1     2183.9      9
GR   2183.3     9882.2     2185.6     9908.1      2187.2      9940.9      2186.6      9953.0     2184.4      9
GR   2178.9     9970.2     2178.9    10000.0      2183.8     10027.1      2185.0     10045.5     2226.8     10
GR   2227.5    10113.1

ET                          9.1                                                                  9876.4     10
NC     .065       .065       .065
X1    36400         13     9876.4    10085.3       510.0       490.0       480.0
GR   2228.2     9837.8     2194.0     9876.4      2189.8      9900.8      2192.3      9928.8     2193.1      9
GR   2189.0    10000.0     2188.4    10047.9      2188.3     10073.8      2194.9     10085.3     2198.1     10
GR   2202.5    10201.9     2204.1    10223.1      2215.1     10266.5

ET                          9.1                                                                  9956.0     10
X1    36490         18     9971.6    10114.1          420         330         400
GR   2221.9     9892.6     2203.9     9920.3      2201.4      9934.3      2201.4      9952.1     2199.0      9
GR   2196.2     9983.0     2194.1     9996.0      2193.9     10000.0      2196.7     10015.5     2197.9     10
GR   2197.5    10048.8     2196.5    10080.3      2194.0     10104.4      2198.8     10114.1     2199.4     10
GR   2210.3    10152.5     2228.1    10183.8      2228.4     10185.6

ET                          9.1                                                                  9900.0     10
X1    36520         13     9928.0    10011.7          200         210         200
GR   2218.9     9857.6     2204.2     9897.7      2203.9      9913.2      2200.9      9928.0     2200.1      9
GR   2199.0     9941.7     2200.3     9974.7      2194.9      9995.5      2194.5     10000.0     2199.4     10
GR   2202.2    10030.7     2208.5    10067.3      2238.4     10119.6

ET                          9.1                                                                  9929.0     10
X1    36610         12     9955.2    10031.1       400.0       470.0       480.0
GR   2222.6     9889.2     2208.1     9929.5      2204.5      9955.2      2202.9      9956.1     2200.6      9
GR   2200.6    10000.0     2203.0    10011.6      2204.4     10031.1      2206.2     10060.2     2212.6     10
GR   2229.6    10122.6     2234.2    10132.7

ET                          9.1                                                                  9956.0     10
X1    36690         12     9957.0    10037.3       380.0       390.0       380.0
GR   2229.2     9918.3     2209.3     9957.0      2208.1      9962.7      2203.9      9990.5     2205.0     10
GR   2208.3    10024.8     2209.8    10037.3      2212.5     10066.0      2215.8     10101.6     2215.7     10
GR   2222.7    10135.5     2230.6    10152.3

QT        2      23260      23260

ET                          9.1                                                                  9962.0     10
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X1    36780         13     9976.3    10093.2       470.0       500.0       480.0
GR   2258.5     9913.2     2256.9     9918.2      2226.5      9960.8      2215.4      9976.3     2211.0      9
GR   2209.9     9987.7     2211.6    10000.0      2211.4     10021.1      2213.3     10046.9     2218.7     10
GR   2217.3    10116.0     2224.5    10138.9      2236.6     10167.9

ET                          9.1                                                                  9900.0     10
X1    36880         13     9954.8    10023.3       550.0       560.0       530.0
GR   2265.9     9831.8     2259.6     9854.4      2246.4      9885.0      2229.6      9919.8     2228.1      9
GR   2226.6     9944.1     2226.3     9954.8      2222.8      9974.7      2221.5     10000.0     2226.5     10
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GR   2227.4    10024.7     2247.0    10058.6      2257.0     10068.9

ET                          9.1                                                  9938.0     10
X1    36960        15      9943.8    10059.8       380.0       420.0      420.0
GR   2259.2     9880.5     2234.8     9922.8      2228.3      9943.8     2228.8     9957.0     2228.5      9
GR   2226.0    10000.0     2229.0    10028.9      2228.4     10030.4     2230.7    10059.8     2236.8     10
GR   2240.9    10115.2     2239.8    10144.4      2240.2     10178.1     2244.8    10193.5     2250.4     10

ET                          9.1                                                  9850.0     10
X1    37010        20      9935.4    10061.1        320         300        300
GR   2260.6     9721.3     2248.9     9744.1      2245.5      9779.3     2242.5     9814.5     2236.9      9
GR   2238.1     9863.7     2238.4     9899.3      2236.2      9932.6     2235.5     9935.4     2233.8      9
GR   2229.0    10000.0     2232.1    10025.3      2231.8     10030.5     2241.5    10061.1     2245.8     10
GR   2245.9    10127.8     2243.2    10157.5      2245.1     10192.4     2247.5    10217.3     2255.9     10

ET                          9.1                                                  9947.8     10
X1    37080        20      9947.8    10081.6       400.0       320.0      370.0
GR   2273.1     9810.2     2257.0     9839.7      2251.7      9859.2     2250.3     9886.1     2248.4      9
GR   2241.5     9938.8     2240.4     9947.8      2237.5      9972.9     2237.1    10000.0     2236.4     10
GR   2235.8    10049.3     2239.2    10081.6      2238.2     10137.6     2241.0    10151.1     2246.4     10
GR   2249.5    10200.4     2253.8    10225.0      2255.7     10247.2     2260.0    10261.3     2265.1     10

ET                          9.1                                                 9969.00
X1    37120        17      9969.0    10060.6       210.0       180.0      210.0
GR   2271.9     9925.0     2251.8     9964.5      2247.2      9969.0     2240.3     9984.1     2234.9     10
GR   2233.7    10013.1     2245.4    10049.4      2246.8     10060.6     2246.0    10078.1     2244.8     10
GR   2242.6    10141.9     2241.7    10169.7      2249.5     10193.1     2258.6    10209.2     2261.5     10
GR   2270.3    10275.9     2271.2    10287.2

ET                          9.1                                                    9905     10
X1    37200        19      9978.7    10095.8        380         320        370
GR   2269.3     9799.5     2262.6     9826.6      2256.2      9835.0     2255.8     9861.6     2253.3      9
GR   2250.9     9914.3     2246.4     9934.0      2251.6      9950.3     2251.3     9950.4     2248.9      9
GR   2243.1    10000.0     2245.0    10018.9      2246.4     10048.2     2246.3    10076.6     2251.6     10
GR   2266.5    10105.3     2278.5    10122.3      2291.0     10150.5     2295.1    10165.0
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ET                          9.1                                                  9793.0     10
X1    37270        19      9937.0    10027.7       240.0       350.0      370.0
GR   2271.2     9707.2     2267.6     9728.4      2261.2      9745.4     2252.3     9764.9     2250.0      9
GR   2254.3     9829.1     2255.6     9857.4      2254.8      9890.0     2252.7     9922.8     2254.4      9
GR   2251.7     9954.5     2246.7    10000.0      2256.6     10027.7     2258.6    10047.0     2259.6     10
GR   2261.6    10138.9     2263.1    10178.6      2271.7     10207.3     2270.9    10228.4

NC     .065       .065       .06
ET                          9.1                                                  9816.0     10
X1    37310        19      9885.7    10031.9       200.0       220.0      210.0
GR   2273.5     9752.5     2273.4     9771.1      2254.2      9803.6     2255.4     9816.9     2257.2      9
GR   2256.1     9885.7     2254.3     9924.0      2253.4      9931.6     2252.7     9975.7     2249.6      9
GR   2249.9    10000.0     2253.9    10019.4      2259.2     10031.9     2262.5    10108.7     2264.0     10
GR   2264.9    10275.1     2266.8    10292.0      2278.6     10327.5     2284.4    10343.5

NC     .065       .065      .035
ET                          9.1                                                  9825.0     10
X1    37370        20      9945.7    10095.8       320.0       340.0      320.0
GR   2280.5     9883.0     2277.1     9910.6      2270.1      9928.4     2261.2     9945.7     2258.8      9
GR   2254.5     9965.3     2255.6     9988.8      2255.5     10000.0     2253.7    10015.2     2258.0     10
GR   2257.8    10049.7     2258.7    10077.4      2261.1     10095.8     2265.3    10242.3     2267.6     10
GR   2269.5    10452.6     2274.5    10580.0      2277.9     10603.0     2282.8    10627.0     2288.7     10

ET                          9.1                                                  9940.0     10
X1    37470        24      9969.8    10062.0       480.0       450.0      530.0
GR   2291.1     9896.5     2290.6     9938.2      2289.0      9953.0     2262.3     9969.8     2258.6      9
GR   2257.7    10000.0     2258.1    10012.8      2259.1     10035.3     2262.2    10048.8     2266.1     10
GR   2266.9    10103.0     2266.6    10166.1      2265.9     10260.4     2266.3    10341.6     2264.7     10
GR   2260.3    10388.8     2265.2    10404.5      2264.2     10427.8     2266.8    10465.3     2270.4     10
GR   2272.5    10614.9     2271.5    10695.2      2272.3     10714.4     2291.6    10755.4

ET                          9.1                                                  9813.0     10
X1    37570        29      9963.9    10065.5       520.0       490.0      530.0
GR   2288.3     9854.8     2285.0     9869.5      2279.9      9906.8     2277.7     9929.7     2277.1      9
GR   2272.7     9963.9     2261.7     9980.4      2259.8      9997.9     2259.4    10000.0     2261.5     10
GR   2264.2    10036.1     2269.2    10065.5      2268.1     10103.9     2268.3    10115.7     2271.2     10
GR   2272.1    10251.7     2272.2    10346.5      2270.5     10409.2     2268.7    10437.4     2264.7     10
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GR   2268.4    10477.6     2268.3    10494.5     2271.0    10518.8     2271.7    10544.1     2273.3    10
GR   2275.4    10681.4     2276.4    10711.4     2284.9    10728.5     2295.1    10749.3

NC     .065       .065       .045
ET                           9.1                                                                9830.0    10
X1    37660         25      9923.4    10128.4      500.0      490.0      480.0
GR   2292.6     9865.8     2281.1     9898.5     2277.9     9916.5     2272.8     9923.4     2272.1     9
GR   2274.1     9953.3     2273.7     9966.6     2273.0     9976.8     2270.0     9990.3     2271.0    10
GR   2272.5    10016.0     2275.2    10028.9     2271.1    10040.0     2271.1    10067.9     2271.2    10
GR   2277.0    10128.4     2276.2    10187.4     2276.9    10241.7     2276.3    10298.4     2273.5    10
GR   2270.6    10362.1     2272.2    10375.1     2276.2    10391.3     2295.3    10422.8     2300.8    10
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ET                           9.1                                                                 9877
X1    37750         27      9959.6    10186.4      450.0      450.0      480.0
GR   2306.7     9883.0     2306.1     9905.4     2295.7     9928.7     2286.0     9948.9     2281.8     9
GR   2281.5     9962.4     2279.8     9974.9     2276.5     9983.7     2278.5    10000.0     2279.4    10
GR   2280.5    10040.3     2281.3    10069.7     2281.9    10101.8     2280.5    10113.8     2279.7    10
GR   2280.2    10168.3     2280.9    10186.4     2284.8    10213.0     2284.2    10249.7     2280.1    10
GR   2281.0    10315.9     2283.4    10337.5     2285.2    10361.7     2286.1    10378.6     2296.8    10
GR   2305.8    10432.4     2306.8    10444.5

NC     .065       .065       .035
ET                           9.1                                                               9917.10    10
X1    37800         19      9917.1    10138.7      280.0      280.0      260.0
GR   2308.0     9663.1     2300.0     9687.5     2295.0     9703.3     2292.9     9749.4     2288.7     9
GR   2285.5     9917.1     2282.9     9958.8     2282.9     9974.8     2283.0     9992.8     2282.7    10
GR   2283.0    10042.7     2283.0    10051.8     2283.0    10087.4     2284.8    10109.3     2287.3    10
GR   2291.7    10191.9     2293.8    10237.0     2297.8    10272.5     2309.8    10312.6

    CONFLUENCE WITH COTTONWOOD CREEK


QT        2       20679      20679

NC     .065       .065       .040
ET                           9.1                                                                 9850
X1    37930         22      9928.9    10053.2      670.0      730.0      690.0
GR   2305.7     9747.6     2302.6     9758.5     2292.7     9776.0     2292.2     9790.3     2293.5     9
GR   2293.5     9844.3     2288.4     9858.8     2294.0     9880.3     2290.2     9928.9     2285.7     9
GR   2286.6     9955.4     2284.3     9997.2     2283.7    10000.0     2285.8    10027.5     2285.9    10
GR   2289.0    10053.2     2294.5    10084.7     2300.8    10109.7     2300.7    10163.2     2303.8    10
GR   2305.6    10204.1     2312.1    10235.8

ET                           9.1                                                               9954.50
X1    38030         19      9954.5    10115.4      520.0      520.0      530.0
GR   2319.3     9870.7     2306.3     9908.3     2301.7     9936.6     2297.8     9954.5     2296.7     9
GR   2293.0     9986.7     2292.8    10000.0     2295.0    10048.7     2295.2    10059.4     2295.2    10
GR   2298.3    10115.4     2301.3    10176.7     2302.9    10247.1     2305.1    10326.4     2306.7    10
GR   2309.0    10449.0     2309.3    10497.9     2312.0    10517.9     2316.5    10544.1

NC     .065       .065        .06
ET                           9.1                                                                 9880
X1    38140         22      9953.8    10027.7      590.0      560.0      580.0
GR   2321.8     9825.2     2306.5     9845.3     2301.8     9860.8     2302.6     9877.2     2303.5     9
GR   2301.7     9918.9     2301.6     9927.9     2301.6     9953.8     2296.7     9961.9     2297.9     9
GR   2295.1    10000.0     2294.5    10011.3     2301.8    10027.7     2304.5    10079.3     2307.7    10
GR   2310.0    10285.7     2309.9    10306.6     2313.0    10342.2     2314.9    10414.3     2316.1    10
GR   2316.9    10539.5     2316.6    10540.9

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NC     .065       .065       .045
ET                           9.1                                                               9929.90
X1    38250         19      9929.9    10111.7      470.0      390.0      580.0
GR   2334.4     9876.6     2320.8     9907.0     2303.9     9929.9     2307.2     9949.2     2305.7     9
GR   2305.4     9996.5     2305.5    10000.0     2305.9    10022.4     2305.2    10031.1     2304.0    10
GR   2306.6    10077.4     2309.0    10111.7     2308.9    10137.3     2312.2    10267.6     2314.7    10
GR   2315.7    10396.6     2318.1    10414.3     2330.4    10443.6     2337.7    10456.0

NC     .065       .065        .04
ET                           9.1                                                                9776.0    10
X1    38320         20      9963.2    10064.8      360.0      400.0      370.0
GR   2335.0     9707.6     2312.0     9751.6     2308.6     9773.9     2309.5     9791.2     2313.0     9
GR   2314.4     9858.0     2312.7     9890.1     2315.2     9903.0     2314.5     9941.3     2315.8     9
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GR   2308.1     9976.4     2306.5     9997.2     2306.1    10000.0     2309.0    10028.8     2309.5     10
GR   2313.3    10064.8     2313.8    10091.4     2323.4    10111.5     2338.6    10140.4     2340.8     10

ET                            9.1                                                              9543.0     10
X1    38430        17      9936.8    10050.1      480.0      590.0      580.0
GR   2341.9     9426.7     2335.6     9449.4     2314.3     9490.7     2315.3     9515.5     2317.9      9
GR   2320.3     9638.6     2320.5     9754.6     2319.8     9833.3     2320.9     9911.9     2320.4      9
GR   2316.9     9968.5     2316.4     9981.3     2318.0    10000.0     2316.8    10036.8     2320.6     10
GR   2346.3    10091.1     2347.3    10094.5

ET                            9.1                                                                 9655     10
X1    38500        18      9949.5    10019.4      370.0      360.0      370.0
GR   2339.5     9583.9     2321.1     9629.1     2319.8     9650.0     2322.9     9689.9     2327.4      9
GR   2329.3     9775.1     2327.4     9821.6     2326.1     9858.2     2324.8     9917.4     2325.2      9
GR   2322.9     9949.5     2318.7     9979.9     2314.9     9997.1     2315.6    10000.0     2315.6     10
GR   2317.8    10019.4     2342.7    10054.2     2343.4    10055.5

NC     .065       .065       .06
ET                            9.1                                                                 9850
X1    38610        14      9997.1    10056.0      520.0      570.0      580.0
GR   2351.5     9776.0     2332.6     9812.7     2332.8     9850.0     2332.5     9896.5     2329.9      9
GR   2327.2     9952.3     2326.5     9974.3     2327.2     9977.0     2327.6     9997.1     2326.8     10
GR   2323.7    10028.5     2324.0    10056.0     2343.4    10081.9     2358.5    10100.9

NC     .065       .065       .045
ET                            9.1                                                                 9888
X1    38710        15      9971.2    10046.3      530.0      470.0      530.0
GR   2362.3     9935.3     2359.1     9942.1     2331.9     9971.2     2326.3     9993.5     2328.1     10
GR   2328.2    10012.3     2330.7    10031.0     2334.6    10046.3     2336.1    10071.4     2336.7     10
GR   2338.1    10135.2     2336.7    10219.7     2335.7    10235.8     2344.6    10255.9     2356.8     10

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NC     .065       .065       .040
ET                            9.1                                                                 9945.0     10
X1    38790        16      9948.5    10093.4      430.0      390.0      422.0
GR   2370.4     9870.2     2346.3     9905.9     2346.0     9922.8     2341.7     9948.5     2339.1      9
GR   2337.6     9977.4     2337.9    10000.0     2338.2    10033.8     2338.8    10052.9     2339.7     10
GR   2341.4    10093.4     2345.5    10136.5     2347.0    10168.7     2344.0    10201.8     2347.8     10
GR   2356.0    10255.4

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

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS
0

CCHV=     .100 CEHV=     .300
*SECNO 35490.000
 35490.000     13.52   2151.32   2148.31   2151.32   2152.19       .87       .00       .00   2143.10
   23235.0    9703.6   13101.0     430.4    1958.7    1457.9     101.1        .0        .0   2141.20
       .00      4.95      8.99      4.26      .055      .045      .055      .000   2137.80   9565.80
   .002870      370.      370.      350.         0        18         0       .00    543.65  10109.46


*SECNO 35590.000

3265 DIVIDED FLOW


3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
 35590.000     14.25   2153.35   2153.35       .00   2155.59      2.24      2.31       .41   2146.40
   23235.0    7298.9   15851.9      84.2    1446.3    1120.6      22.3      36.8       7.0   2147.20
       .01      5.05     14.15      3.78      .060      .045      .060      .000   2139.10   9381.94
   .007498      520.      530.      550.         0         8         0       .00    615.92  10038.64


*SECNO 35690.000
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3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

35690.000	11.80	2157.50	2156.29	.00	2159.10	1.60	3.44	.06	2159.30
23235.0	1240.5	13691.5	8303.0	395.0	1138.0	1205.6	66.9	13.0	2148.80
.03	3.14	12.03	6.89	.060	.045	.060	.000	2145.70	9597.01
.006189	460.	530.	470.	2	16	0	.00	496.88	10232.79

*SECNO 35770.000

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

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

35770.000	9.34	2162.14	2162.14	.00	2164.45	2.31	3.73	.21	2161.20
23235.0	1737.7	16869.2	4628.0	457.8	1229.4	623.5	93.0	18.4	2156.70
.04	3.80	13.72	7.42	.065	.045	.065	.000	2152.80	9673.13
.011652	450.	450.	450.	0	15	0	.00	540.50	10213.63

*SECNO 35870.000

3265 DIVIDED FLOW

35870.000	10.62	2167.72	2167.31	.00	2169.93	2.21	5.48	.01	2164.30
23235.0	1146.4	17502.2	4586.5	333.4	1316.3	695.2	121.0	24.6	2162.40
.05	3.44	13.30	6.60	.065	.045	.065	.000	2157.10	9703.65
.009319	520.	530.	520.	2	8	0	.00	492.01	10261.98

*SECNO 35960.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

35960.000	13.83	2173.13	2173.13	.00	2175.99	2.87	3.11	.20	2166.80
23235.0	3014.4	20073.5	147.1	947.3	1378.1	43.1	146.3	29.7	2165.70
.06	3.18	14.57	3.41	.065	.035	.065	.000	2159.30	9577.52
.004860	450.	480.	450.	0	11	0	.00	488.29	10065.82

*SECNO 36060.000

36060.000	15.73	2176.13	2175.71	.00	2178.51	2.38	2.47	.05	2167.20
23235.0	6221.0	16987.0	27.0	1670.1	1186.5	13.3	180.6	36.4	2169.50
.07	3.72	14.32	2.02	.065	.035	.065	.000	2160.40	9518.14
.003807	560.	580.	560.	2	8	0	.00	534.18	10052.32

*SECNO 36180.000

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

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

36180.000	11.58	2181.08	2181.08	.00	2184.58	3.50	4.89	.33	2173.80
23235.0	811.1	22403.6	20.3	113.1	1471.7	5.4	211.8	41.7	2178.70
.09	7.17	15.22	3.73	.065	.060	.065	.000	2169.50	9905.39
.024703	580.	630.	630.	0	19	0	.00	243.19	10148.57

*SECNO 36230.000

3301 HV CHANGED MORE THAN HVINS

36230.000	12.78	2187.18	2186.18	.00	2189.20	2.02	4.47	.15	2181.90
23235.0	260.1	18507.8	4467.1	46.6	1505.5	636.1	223.0	43.4	2179.30
.09	5.58	12.29	7.02	.065	.060	.065	.000	2174.40	9952.32
.012779	240.	260.	250.	2	5	0	.00	324.66	10276.98

*SECNO 36310.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

36310.000	13.75	2192.65	2192.65	.00	2196.56	3.92	5.07	.57	2184.40
23235.0	6920.2	14551.0	1763.8	771.0	773.1	192.7	241.3	45.9	2183.80
.10	8.98	18.82	9.15	.065	.045	.065	.000	2178.90	9835.71
.011942	350.	420.	430.	0	8	0	.00	220.49	10056.20

*SECNO 36400.000

3301 HV CHANGED MORE THAN HVINS

36400.000	12.19	2200.49	2197.97	.00	2202.19	1.71	5.41	.22	2194.00
23235.0	100.0	22109.6	1025.4	23.7	2069.5	203.1	263.9	48.8	2194.90
.11	4.21	10.68	5.05	.065	.065	.065	.000	2188.30	9869.08
.010424	510.	480.	490.	2	19	0	.00	296.94	10166.02

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

*SECNO 36490.000

3301 HV CHANGED MORE THAN HVINS

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

36490.000	11.50	2205.40	2205.11	.00	2208.67	3.27	6.01	.47	2199.00
23235.0	1974.9	19569.3	1690.8	212.7	1287.0	154.0	281.8	51.1	2198.80
.12	9.28	15.20	10.98	.065	.065	.065	.000	2193.90	9917.99
.023971	420.	400.	330.	2	11	0	.00	226.01	10144.00

*SECNO 36520.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

36520.000	15.26	2209.76	2209.76	.00	2213.76	4.00	4.82	.22	2200.90
23235.0	2723.0	16406.5	4105.5	239.7	939.0	333.2	289.1	52.1	2199.40
.12	11.36	17.47	12.32	.065	.065	.065	.000	2194.50	9882.53
.023938	200.	200.	210.	0	11	0	.00	186.98	10069.51

*SECNO 36610.000

3301 HV CHANGED MORE THAN HVINS

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

36610.000	17.15	2217.75	2213.71	.00	2219.56	1.81	5.58	.22	2204.50
23235.0	3558.9	14041.6	5634.5	423.9	1179.8	617.9	308.9	54.1	2204.40
.14	8.40	11.90	9.12	.065	.065	.065	.000	2200.60	9902.67
.007145	400.	480.	470.	3	15	0	.00	195.48	10098.14

*SECNO 36690.000

3301 HV CHANGED MORE THAN HVINS

36690.000	16.73	2220.63	2218.93	.00	2223.39	2.76	3.54	.29	2209.30
23235.0	935.1	16440.0	5860.0	124.7	1119.4	613.0	326.9	55.8	2209.80
.14	7.50	14.69	9.56	.065	.065	.065	.000	2203.90	9934.98
.012463	380.	380.	390.	3	15	0	.00	195.36	10130.34

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

 *SECNO 36780.000
  36780.000     16.70    2226.60    2223.59        .00    2228.92       2.32       5.48        .04    2215.40
    23260.0     563.0    19832.9     2864.1       87.5     1552.3      331.8      348.2       57.9    2218.70
        .16      6.43      12.78       8.63       .065       .065       .065       .000    2209.90    9960.66
   .010370      470.       480.       500.          3         15          0        .00     183.26   10143.93

 *SECNO 36880.000

 3301 HV CHANGED MORE THAN HVINS

 7185 MINIMUM SPECIFIC ENERGY
 3720 CRITICAL DEPTH ASSUMED
  36880.000     15.12    2236.62    2236.62        .00    2241.69       5.07       8.02        .83    2226.30
    23260.0    4964.9    17453.5      841.6      357.3      900.4      87.1      368.6       59.9    2226.50
        .16     13.90      19.38       9.67       .065       .065       .065       .000    2221.50    9905.26
   .023564      550.       530.       560.          0         11          0        .00     135.39   10040.65

 *SECNO 36960.000

 3301 HV CHANGED MORE THAN HVINS

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.42

  36960.000     18.33    2244.33    2238.51        .00    2245.42       1.09       3.33        .40    2228.30
    23260.0    2357.2    16896.4     4006.4      347.2     1847.5     762.4      389.0       61.9    2230.70
        .18      6.79       9.15       5.26       .065       .065       .065       .000    2226.00    9906.27
   .004020      380.       420.       420.          3         11          0        .00     285.66   10191.93

 *SECNO 37010.000

 3265 DIVIDED FLOW

  37010.000     16.75    2245.75    2242.50        .00    2247.07       1.33       1.58        .07    2235.50
    23260.0    6884.8    15887.9      487.3      971.5     1565.6     176.5      408.8       64.3    2241.50
        .19      7.09      10.15       2.76       .065       .065       .065       .000    2229.00    9776.76
   .006974      320.       300.       300.          3         19          0        .00     393.03   10199.09
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     SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
     Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
     TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
     SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

 *SECNO 37080.000
  37080.000     12.62    2248.42    2245.26        .00    2249.98       1.55       2.84        .07    2240.40
    23260.0     654.8    15705.3     6899.9       95.0     1488.4     774.9      430.2       67.0    2239.20
        .20      6.89      10.55       8.90       .065       .065       .065       .000    2235.80    9930.28
   .008609      400.       370.       320.          2         11          0        .00     259.73   10190.00

 *SECNO 37120.000

 3301 HV CHANGED MORE THAN HVINS

 7185 MINIMUM SPECIFIC ENERGY
 3720 CRITICAL DEPTH ASSUMED
  37120.000     16.20    2249.90    2249.90        .00    2253.36       3.46       2.77        .57    2247.20
    23260.0      12.6    14991.4     8256.1        3.6      910.8     708.9      439.3       68.1    2246.80
        .20      3.53      16.46      11.65       .065       .065       .065       .000    2233.70    9966.36
   .025794      210.       210.       180.          0         11          0        .00     227.44   10193.80

 *SECNO 37200.000

 3301 HV CHANGED MORE THAN HVINS
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3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.49

 37200.000     14.43   2257.53   2255.52       .00   2259.54      2.01      6.04       .14   2248.90
   23260.0    6795.6   16426.6      37.8     787.4    1329.6      11.2     454.9      70.1   2251.60
       .21      8.63     12.35      3.37      .065      .065      .065      .000   2243.10   9833.25
   .011653      380.      370.      320.         3        15         0       .00    266.33  10099.58


*SECNO 37270.000

3301 HV CHANGED MORE THAN HVINS

 37270.000     14.77   2261.47   2258.79       .00   2262.76      1.30      3.15       .07   2254.40
   23260.0   12461.2    9968.4     830.4    1473.2     977.6     213.0     471.8      72.4   2256.60
       .22      8.46     10.20      3.90      .065      .065      .065      .000   2246.70   9744.68
   .008625      240.      370.      350.         3        15         0       .00    390.75  10135.43


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


*SECNO 37310.000

3301 HV CHANGED MORE THAN HVINS

 37310.000     13.49   2263.09   2261.81       .00   2265.03      1.94      2.07       .19   2256.10
   23260.0    5516.7   16992.8     750.5     632.4    1406.2     188.1     483.4      74.2   2259.20
       .23      8.72     12.08      3.99      .065      .060      .065      .000   2249.60   9788.55
   .011830      200.      210.      220.         2        14         0       .00    374.08  10162.63


*SECNO 37370.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
 37370.000     12.67   2266.37   2266.37       .00   2269.71      3.33      2.82       .42   2261.20
   23260.0      85.3   21256.1    1918.6      26.0    1391.4     488.9     498.7      76.9   2261.10
       .23      3.28     15.28      3.92      .065      .035      .065      .000   2253.70   9935.64
   .006775      320.      320.      340.         0        11         0       .00    351.37  10287.01


*SECNO 37470.000

3301 HV CHANGED MORE THAN HVINS

 37470.000     13.01   2270.71   2270.17       .00   2272.68      1.97      2.84       .14   2262.30
   23260.0      59.3   14065.0    9135.6      22.3    1001.5    2096.3     526.9      82.0   2266.10
       .25      2.67     14.04      4.36      .065      .035      .065      .000   2257.70   9964.51
   .004640      480.      530.      450.         3         5         0       .00    583.54  10548.04


*SECNO 37570.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
 37570.000     14.74   2274.14   2274.14       .00   2276.34      2.20      2.57       .07   2272.70
   23260.0       5.9   15164.8    8089.3       4.5    1052.8    1921.8     562.2      89.4   2269.20
       .26      1.33     14.40      4.21      .065      .035      .065      .000   2259.40   9957.70
   .005378      520.      530.      490.         0         8         0       .00    707.66  10665.36


*SECNO 37660.000
7185 MINIMUM SPECIFIC ENERGY
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   09JAN01       16:53:37

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


3720 CRITICAL DEPTH ASSUMED
 37660.000      8.75   2278.75   2278.75       .00   2281.08      2.34      4.03       .04   2272.80
   23260.0     129.7   17663.1    5467.2      25.5    1300.4     827.7     590.8      96.0   2277.00
       .27      5.09     13.58      6.61      .065      .045      .065      .000   2270.00   9911.74
   .014613      500.      480.      490.         0        14         0       .00    483.76  10395.50
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*SECNO 37750.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
 37750.000      9.76   2286.26   2286.26       .00   2288.70      2.45      7.04       .03   2281.80
   23260.0     119.8   18815.3    4325.0      25.3    1388.9     622.8     613.4     100.9   2280.90
       .28      4.73     13.55      6.94      .065      .045      .065      .000   2276.50   9948.36
   .015110      450.      480.      450.         0         8         0       .00    430.65  10379.02

*SECNO 37800.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
 37800.000      7.88   2290.58   2290.58       .00   2293.43      2.85      2.88       .12   2285.50
   23260.0    1585.0   21486.9     188.0     349.6    1529.8      64.9     625.5     103.4   2287.30
       .29      4.53     14.05      2.90      .065      .035      .065      .000   2282.70   9791.64
   .008339      280.      260.      280.         0        15         0       .00    386.69  10178.33

*SECNO 37930.000
 37930.000     12.28   2295.98   2295.48       .00   2298.56      2.58      5.10       .03   2290.20
   20679.0    2622.4   17411.4     645.2     584.7    1251.1     137.7     656.4     109.0   2289.00
       .30      4.48     13.92      4.68      .065      .040      .065      .000   2283.70   9770.20
   .006538      670.      690.      730.         2        11         0       .00    320.39  10090.59

*SECNO 38030.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
 38030.000     10.36   2303.16   2303.16       .00   2306.22      3.06      4.09       .14   2297.80
   20679.0     311.5   19179.3    1188.3      67.6    1320.7     281.8     678.4     112.9   2298.30
       .31      4.61     14.52      4.22      .065      .040      .065      .000   2292.80   9927.62
   .009277      520.      530.      520.         0        15         0       .00    328.86  10256.48

*SECNO 38140.000
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   09JAN01      16:53:37

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

3301 HV CHANGED MORE THAN HVINS

 38140.000     15.31   2309.81   2308.02       .00   2311.12      1.31      4.73       .17   2301.60
   20679.0    5803.1   10522.7    4353.2     796.2     941.2     826.9     706.5     117.9   2301.80
       .33      7.29     11.18      5.26      .065      .060      .065      .000   2294.50   9840.95
   .007243      590.      580.      560.         3        11         0       .00    436.22  10277.17

*SECNO 38250.000

3301 HV CHANGED MORE THAN HVINS

 38250.000      9.73   2313.63   2313.14       .00   2315.78      2.15      4.41       .25   2303.90
   20679.0     357.5   17594.8    2726.7      64.2    1397.7     559.2     732.9     122.4   2309.00
       .34      5.57     12.59      4.88      .065      .045      .065      .000   2303.90   9916.71
   .009621      470.      580.      390.         2        14         0       .00    403.69  10320.41

*SECNO 38320.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
 38320.000     11.28   2317.38   2317.38       .00   2320.12      2.74      3.87       .18   2315.80
   20679.0    6914.0   13112.5     652.6     966.3     830.4     115.3     749.7     125.6   2313.30
       .35      7.16     15.79      5.66      .065      .040      .065      .000   2306.10   9741.31
   .011348      360.      370.      400.         0        11         0       .00    357.59  10098.90

*SECNO 38430.000

3301 HV CHANGED MORE THAN HVINS

 38430.000      9.80   2324.10   2322.74       .00   2325.12      1.03      4.83       .17   2320.40
   20679.0   12861.3    7792.6      25.0    2192.7     715.6       9.8     778.2     131.1   2320.60
       .37      5.87     10.89      2.56      .065      .040      .065      .000   2314.30   9471.70
   .007430      480.      580.      590.         2        19         0       .00    583.99  10055.68
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 *SECNO 38500.000
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     SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
     Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
     TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
     SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


 3265 DIVIDED FLOW


 3301 HV CHANGED MORE THAN HVINS

 7185 MINIMUM SPECIFIC ENERGY
 3720 CRITICAL DEPTH ASSUMED
  38500.000     14.10   2329.00   2329.00       .00   2331.72      2.72      2.91       .51   2322.90
    20679.0    7837.8   12337.4     503.8    1270.1     752.8      87.7     799.6     135.4   2317.80
        .38      6.17     16.39      5.75      .065      .040      .065      .000   2314.90   9609.69
   .008370      370.      370.      360.         0        14         0       .00    413.08  10035.05


 *SECNO 38610.000

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

  38610.000     11.81   2335.51   2335.29       .00   2338.34      2.83      6.58       .03   2327.60
    20679.0    9567.8   10358.0     753.2     944.8     636.9      88.4     823.2     139.5   2324.00
        .39     10.13     16.26      8.52      .065      .060      .065      .000   2323.70   9807.06
   .018141      520.      580.      570.         2        15         0       .00    264.30  10071.36


 *SECNO 38710.000

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.44

  38710.000     15.43   2341.73   2341.63       .00   2344.77      3.04      6.37       .06   2331.90
    20679.0     260.1   14718.1    5700.8      51.7     911.8     941.4     844.3     142.7   2334.60
        .40      5.03     16.14      6.06      .065      .045      .065      .000   2326.30   9960.68
   .008806      530.      530.      470.         3        11         0       .00    288.74  10249.42


 *SECNO 38790.000
 7185 MINIMUM SPECIFIC ENERGY
 3720 CRITICAL DEPTH ASSUMED
  38790.000      9.99   2347.59   2347.59       .00   2350.67      3.08      3.67       .01   2341.70
    20679.0     559.6   18669.9    1449.5     121.6    1266.2     326.8     861.3     145.5   2341.40
        .41      4.60     14.74      4.44      .065      .040      .065      .000   2337.60   9903.99
   .008791      430.      422.      390.         0        14         0       .00    318.01  10222.01


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 T1        CAVE CREEK WASH FLOODPLAIN REVISION - CONTRACT NO. 1999C048 ASSIGN #5
 T2        PREPARED FOR FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
 T3        MODEL BY WEST CONSULTANTS, INC., TEMPE, AZ  AUGUST, 2000
   FLOODWAY ANALYSIS

 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

        0        3         0                                                        2152.30

 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

       2                  -1                                      -1


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


 *PROF 2

 CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS
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CCHV=      .100 CEHV=      .300
*SECNO 35490.000

3470 ENCROACHMENT STATIONS=      9735.0   10089.6  TYPE=       1  TARGET=       354.600
 35490.000      14.50   2152.30   2148.52   2151.32   2153.19       .89        .00        .00   2143.10
   23235.0     9417.1   13817.9        .0    1735.8    1582.2        .0         .0         .0 100000.00
       .00       5.43      8.73       .00      .055      .045      .000       .000    2137.80   9735.00
   .002717       370.      370.      350.         0        18         0        .00     354.60  10089.60


*SECNO 35590.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      9714.0   10031.4  TYPE=       1  TARGET=       317.400
 35590.000      14.39   2153.49   2153.49   2153.35   2156.59      3.11       2.47        .67   2146.40
   23235.0    5361.3   17873.7        .0     851.2    1134.4        .0       32.0        4.0 100000.00
       .01       6.30     15.76       .00      .060      .045      .000       .000    2139.10   9714.00
   .009912       520.      530.      550.         0         5         0        .00     317.40  10031.40


*SECNO 35690.000

3265 DIVIDED FLOW


3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.47


3470 ENCROACHMENT STATIONS=      9856.0   10229.0  TYPE=       1  TARGET=       373.000
 35690.000      12.98   2158.68   2155.92   2157.50   2160.08      1.40       3.31        .17   2159.30
   23235.0       3.2   13949.9    9281.9       6.3    1267.7    1403.2       58.7        7.6   2148.80
       .03       .50     11.00      6.61      .060      .045      .060       .000    2145.70   9856.00
   .004583       460.      530.      470.         2        19         0        .00     329.29  10229.00


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   09JAN01       16:53:37

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


*SECNO 35770.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      9849.0   10186.0  TYPE=       1  TARGET=       337.000
 35770.000       9.64   2162.44   2162.44   2162.14   2165.43      3.00       3.26        .48   2161.20
   23235.0      528.7   19117.1    3589.1     141.9    1278.1     482.4       82.3       11.1   2156.70
       .04       3.73     14.96      7.44      .065      .045      .065       .000    2152.80   9849.00
   .013146       450.      450.      450.         0        19         0        .00     337.00  10186.00


*SECNO 35870.000

3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=      9958.0   10210.0  TYPE=       1  TARGET=       252.000
 35870.000      11.44   2168.54   2167.20   2167.72   2170.92      2.38       5.43        .06   2164.30
   23235.0      178.0   19133.9    3923.1      41.6    1440.2     568.9      106.2       14.6   2162.40
       .05       4.28     13.29      6.90      .065      .045      .065       .000    2157.10   9958.00
   .008252       520.      530.      520.         2         8         0        .00     252.00  10210.00


*SECNO 35960.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
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3470 ENCROACHMENT STATIONS=      9800.0   10090.0  TYPE=       1  TARGET=       290.000
 35960.000      13.47   2172.77   2172.77   2173.13   2176.62      3.85      3.43       .44   2166.80
   23235.0     1387.7   21700.0     147.3     377.3    1333.9      39.1     126.8      17.4   2165.70
       .06       3.68     16.27      3.77      .065      .035      .065      .000   2159.30   9800.00
   .006331       450.      480.      450.         0         8         0       .00    265.26  10065.26


*SECNO 36060.000
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   09JAN01       16:53:37

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


3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=      9772.0   10100.0  TYPE=       1  TARGET=       328.000
 36060.000      16.39   2176.79   2175.48   2176.13   2179.51      2.72      2.77       .11   2167.20
   23235.0     4863.3   18337.3      34.5    1062.6    1245.6      16.1     153.6      21.0   2169.50
       .07       4.58     14.72      2.14      .065      .035      .065      .000   2160.40   9772.00
   .003772       560.      580.      560.         3         8         0       .00    280.71  10052.71


*SECNO 36180.000

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .38


3470 ENCROACHMENT STATIONS=      9950.0   10150.0  TYPE=       1  TARGET=       200.000
 36180.000      11.52   2181.02   2180.89   2181.08   2184.79      3.77      4.97       .31   2173.80
   23235.0      344.9   22870.7      19.4      40.9    1458.7       5.1     180.7      24.3   2178.70
       .08       8.44     15.68      3.78      .065      .060      .065      .000   2169.50   9950.00
   .026517       580.      630.      630.         1        19         0       .00    198.44  10148.44


*SECNO 36230.000

3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=      9938.0   10162.0  TYPE=       1  TARGET=       224.000
 36230.000      12.90   2187.30   2186.25   2187.18   2190.19      2.89      5.31       .09   2181.90
   23235.0      312.8   21381.4    1540.9      48.8    1526.2     173.1     190.3      25.5   2179.30
       .09       6.41     14.01      8.90      .065      .060      .065      .000   2174.40   9951.97
   .016299       240.      260.      250.         2         8         0       .00    210.03  10162.00


*SECNO 36310.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
1
   09JAN01       16:53:37

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


3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      9860.0   10050.0  TYPE=       1  TARGET=       190.000
 36310.000      13.60   2192.50   2192.50   2192.65   2196.70      4.20      5.91       .39   2184.40
   23235.0     6768.0   14780.2    1686.8     724.3     763.6     175.5     206.2      27.4   2183.80
       .09       9.34     19.36      9.61      .065      .045      .065      .000   2178.90   9860.00
   .012837       350.      420.      430.         0         8         0       .00    190.00  10050.00


*SECNO 36400.000

3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=      9876.4   10085.3  TYPE=       1  TARGET=       208.899
 36400.000      12.57   2200.87   2197.80   2200.49   2202.68      1.81      5.75       .24   2194.00
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   23235.0        .0   23235.0        .0        .0    2149.3        .0     227.5      29.6 100000.00
       .10       .00     10.81       .00      .000      .065      .000      .000   2188.30   9876.40
   .010979      510.      480.      490.         3        19         0       .00    208.90  10085.30

 *SECNO 36490.000

 3301 HV CHANGED MORE THAN HVINS

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

 3470 ENCROACHMENT STATIONS=     9956.0   10125.0  TYPE=      1  TARGET=      169.000
  36490.000     11.92   2205.82   2205.29   2205.40   2209.64      3.83      6.36       .60   2199.00
    23235.0     894.4   21630.5     710.1      91.4    1346.8      74.7     244.3      31.3   2198.80
        .11      9.79     16.06      9.51      .065      .065      .065      .000   2193.90   9956.00
   .025172      420.      400.      330.         2        11         0       .00    169.00  10125.00

 *SECNO 36520.000

 3470 ENCROACHMENT STATIONS=     9900.0   10040.0  TYPE=      1  TARGET=      140.000
  36520.000     15.82   2210.32   2209.73   2209.76   2214.63      4.31      4.84       .14   2200.90
    23235.0    2356.2   17457.0    3421.8     200.3     985.7     248.9     251.1      32.0   2199.40
        .12     11.77     17.71     13.75      .065      .065      .065      .000   2194.50   9900.00
   .023058      200.      200.      210.         2        11         0       .00    140.00  10040.00

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

 *SECNO 36610.000

 3301 HV CHANGED MORE THAN HVINS

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.77

 3470 ENCROACHMENT STATIONS=     9929.0   10070.0  TYPE=      1  TARGET=      141.000
  36610.000     17.79   2218.39   2213.60   2217.75   2220.48      2.10      5.64       .22   2204.50
    23235.0    3196.3   15238.2    4800.5     315.8    1227.9     489.1     269.6      33.5   2204.40
        .13     10.12     12.41      9.82      .065      .065      .065      .000   2200.60   9929.00
   .007365      400.      480.      470.         3        15         0       .00    141.00  10070.00

 *SECNO 36690.000

 3301 HV CHANGED MORE THAN HVINS

 3470 ENCROACHMENT STATIONS=     9956.0   10099.0  TYPE=      1  TARGET=      143.000
  36690.000     17.38   2221.28   2218.97   2220.63   2224.38      3.10      3.59       .30   2209.30
    23235.0      28.5   17705.6    5501.0      11.7    1171.8     529.8     286.1      34.8   2209.80
        .13      2.43     15.11     10.38      .065      .065      .065      .000   2203.90   9956.00
   .012411      380.      380.      390.         2        15         0       .00    143.00  10099.00

 *SECNO 36780.000

 3301 HV CHANGED MORE THAN HVINS

 3470 ENCROACHMENT STATIONS=     9962.0   10108.0  TYPE=      1  TARGET=      146.000
  36780.000     17.41   2227.31   2223.74   2226.60   2229.89      2.58      5.46       .05   2215.40
    23260.0     664.2   21622.2     973.6      97.1    1635.6     134.2     305.9      36.4   2218.70
        .14      6.84     13.22      7.26      .065      .065      .065      .000   2209.90   9962.00
   .010353      470.      480.      500.         3        15         0       .00    146.00  10108.00

 *SECNO 36880.000

 3301 HV CHANGED MORE THAN HVINS

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   09JAN01      16:53:37

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

 7185 MINIMUM SPECIFIC ENERGY
 3720 CRITICAL DEPTH ASSUMED

 3470 ENCROACHMENT STATIONS=     9900.0   10060.0  TYPE=      1  TARGET=      160.000
  36880.000     15.11   2236.61   2236.61   2236.62   2241.69      5.08       8.00        .75   2226.30
    23260.0    4962.8  17456.3     840.9     356.9     899.9      86.9      325.6       38.1   2226.50
        .15     13.91     19.40      9.67      .065      .065      .065       .000    2221.50   9905.27
   .023617      550.      530.      560.         0        15         0        .00     135.36  10040.64

 *SECNO 36960.000

 3301 HV CHANGED MORE THAN HVINS

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.09

 3470 ENCROACHMENT STATIONS=     9938.0   10097.0  TYPE=      1  TARGET=      159.000
  36960.000     18.50   2244.50   2238.68   2244.33   2246.13      1.63       4.10        .34   2228.30
    23260.0     395.8  19901.3    2962.9      88.8    1867.2     385.2      343.2       39.5   2230.70
        .16      4.46     10.66      7.69      .065      .065      .065       .000    2226.00   9938.00
   .005383      380.      420.      420.         3        15         0        .00     159.00  10097.00

 *SECNO 37010.000

 3470 ENCROACHMENT STATIONS=     9850.0   10061.1  TYPE=      1  TARGET=      211.100
  37010.000     17.51   2246.51   2242.52   2245.75   2248.02      1.50       1.87        .01   2235.50
    23260.0    5921.5  17338.5        .0     752.9    1662.2        .0      359.8       40.8 100000.00
        .17      7.86     10.43       .00      .065      .065      .000       .000    2229.00   9850.00
   .007161      320.      300.      300.         3        19         0        .00     211.10  10061.10

 *SECNO 37080.000

 3470 ENCROACHMENT STATIONS=     9947.8   10140.0  TYPE=      1  TARGET=      192.200
  37080.000     13.46   2249.26   2245.43   2248.42   2250.97      1.71       2.89        .06   2240.40
    23260.0        .0  17095.5    6164.5        .0    1600.6     617.4      379.4       42.5   2239.20
        .18       .00     10.68      9.99      .000      .065      .065       .000    2235.80   9947.80
   .008718      400.      370.      320.         2        11         0        .00     192.20  10140.00

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

 *SECNO 37120.000

 3301 HV CHANGED MORE THAN HVINS

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .59

 3470 ENCROACHMENT STATIONS=     9969.0   10159.0  TYPE=      1  TARGET=      190.000
  37120.000     17.00   2250.70   2250.36   2249.90   2254.31      3.62       2.77        .57   2247.20
    23260.0        .0  16332.2    6927.8        .0     984.4     601.4      388.1       43.4   2246.80
        .19       .00     16.59     11.52      .000      .065      .065       .000    2233.70   9969.00
   .024786      210.      210.      180.         2        11         0        .00     190.00  10159.00

 *SECNO 37200.000

 3301 HV CHANGED MORE THAN HVINS

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.50

 3470 ENCROACHMENT STATIONS=     9905.0   10100.0  TYPE=      1  TARGET=      195.000
  37200.000     14.99   2258.09   2255.37   2257.53   2260.21      2.12       5.75        .15   2248.90
    23260.0    5981.8  17231.7      46.5     623.5    1394.3      13.4      403.2       45.0   2251.60
        .20      9.59     12.36      3.46      .065      .065      .065       .000    2243.10   9905.00
   .010945      380.      370.      320.         3        19         0        .00     194.93  10099.93
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*SECNO 37270.000

3470 ENCROACHMENT STATIONS=      9793.0   10030.0  TYPE=       1  TARGET=       237.000
 37270.000      15.24   2261.94   2259.49   2261.47   2263.76      1.81      3.51       .03   2254.40
   23260.0    11194.2   12026.4      39.5    1159.4    1020.5      12.0     418.5      46.5   2256.60
       .20       9.66     11.78      3.29      .065      .065      .065      .000   2246.70   9793.00
   .010878       240.      370.      350.         2        15         0       .00    237.00  10030.00


*SECNO 37310.000

3470 ENCROACHMENT STATIONS=      9816.0   10044.0  TYPE=       1  TARGET=       228.000
 37310.000      14.40   2264.00   2261.71   2263.09   2265.99      1.99      2.18       .05   2256.10
   23260.0     4611.2   18364.4     284.4     525.5    1539.1      54.9     428.7      47.6   2259.20
       .21       8.77     11.93      5.18      .065      .060      .065      .000   2249.60   9816.00
   .010227       200.      210.      220.         2        15         0       .00    228.00  10044.00


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


*SECNO 37370.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      9825.0   10215.0  TYPE=       1  TARGET=       390.000
 37370.000      12.48   2266.18   2266.18   2266.37   2269.74      3.56      2.77       .47   2261.20
   23260.0       80.4   21421.6    1758.0      24.1    1362.4     401.8     443.1      49.5   2261.10
       .21       3.34     15.72      4.37      .065      .035      .065      .000   2253.70   9936.02
   .007383       320.      320.      340.         0        15         0       .00    278.98  10215.00


*SECNO 37470.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      9940.0   10383.0  TYPE=       1  TARGET=       443.000
 37470.000      13.06   2270.76   2270.76   2270.71   2273.65      2.89      3.43       .07   2262.30
   23260.0       68.7   16155.8    7035.5      22.5    1005.9    1450.0     467.3      53.3   2266.10
       .23       3.05     16.06      4.85      .065      .035      .065      .000   2257.70   9964.48
   .006032       480.      530.      450.         0         8         0       .00    418.52  10383.00


*SECNO 37570.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      9813.0   10454.0  TYPE=       1  TARGET=       641.000
 37570.000      15.17   2274.57   2274.57   2274.14   2277.34      2.77      3.08       .01   2272.70
   23260.0       12.3   16920.2    6327.5       7.5    1095.7    1442.6     496.6      58.6   2269.20
       .24       1.64     15.44      4.39      .065      .035      .065      .000   2259.40   9955.89
   .005861       520.      530.      490.         0        11         0       .00    498.11  10454.00


*SECNO 37660.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
1
   09JAN01       16:53:37

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


3470 ENCROACHMENT STATIONS=      9830.0   10320.0  TYPE=       1  TARGET=       490.000
 37660.000       9.50   2279.50   2279.50   2278.75   2282.08      2.58      4.03       .02   2272.80
   23260.0      181.9   19992.6    3085.5      35.8    1454.9     578.1     522.2      63.6   2277.00
       .25       5.07     13.74      5.34      .065      .045      .065      .000   2270.00   9907.50
   .012877       500.      480.      490.         0        14         0       .00    412.50  10320.00
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*SECNO 37750.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      9877.0   10273.0  TYPE=       1  TARGET=       396.000
 37750.000      10.30   2286.80   2286.80   2286.26   2289.71      2.91      6.56       .10   2281.80
   23260.0      167.7   21402.2    1690.1      31.7    1511.1     281.8     543.4      67.6   2280.90
       .26       5.30     14.16      6.00      .065      .045      .065      .000   2276.50   9947.24
   .014761       450.      480.      450.         0         8         0       .00    325.76  10273.00


*SECNO 37800.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      9917.1   10138.7  TYPE=       1  TARGET=       221.601
 37800.000       7.94   2290.64   2290.64   2290.58   2294.17      3.53      3.14       .19   2285.50
   23260.0         .0   23260.0        .0        .0    1543.0        .0     553.5      69.3 100000.00
       .26        .00     15.07       .00      .000      .035      .000      .000   2282.70   9917.10
   .009981       280.      260.      280.         0        15         0       .00    221.60  10138.70


*SECNO 37930.000

3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=      9850.0   10055.0  TYPE=       1  TARGET=       205.000
 37930.000      13.08   2296.78   2295.37   2295.98   2299.48      2.70      5.23       .08   2290.20
   20679.0     2019.5   18628.6      31.0     407.7    1350.4      13.7     579.7      72.6   2289.00
       .28       4.95     13.79      2.26      .065      .040      .065      .000   2283.70   9850.00
   .005802       670.      690.      730.         2        11         0       .00    205.00  10055.00


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


*SECNO 38030.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      9954.5   10160.0  TYPE=       1  TARGET=       205.500
 38030.000      10.08   2302.88   2302.88   2303.16   2306.50      3.62      4.22       .28   2297.80
   20679.0         .0   19829.1     849.9        .0    1275.2     155.5     599.1      75.1   2298.30
       .29        .00     15.55      5.47      .000      .040      .065      .000   2292.80   9954.50
   .011615       520.      530.      520.         0        15         0       .00    205.50  10160.00


*SECNO 38140.000

3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=      9880.0   10120.0  TYPE=       1  TARGET=       240.000
 38140.000      15.98   2310.48   2308.14   2309.81   2312.11      1.63      5.42       .20   2301.60
   20679.0     4744.9   11827.7    4106.4     606.1     990.9     596.1     623.1      78.1   2301.80
       .30       7.83     11.94      6.89      .065      .060      .065      .000   2294.50   9880.00
   .007709       590.      580.      560.         2        11         0       .00    240.00  10120.00


*SECNO 38250.000

3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=      9929.9   10160.0  TYPE=       1  TARGET=       230.100
 38250.000      10.58   2314.48   2313.10   2313.63   2316.69      2.21      4.40       .17   2303.90
   20679.0         .0   19064.2    1614.8        .0    1551.7     261.7     647.1      80.8   2309.00
       .32        .00     12.29      6.17      .000      .045      .065      .000   2303.90   9929.90
   .008594       470.      580.      390.         2        11         0       .00    230.10  10160.00
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*SECNO 38320.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
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   09JAN01       16:53:37

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

3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      9776.0   10073.0  TYPE=       1  TARGET=       297.000
 38320.000      11.98    2318.08    2318.08    2317.38    2321.10       3.02       3.51        .24    2315.80
   20679.0     5989.6   14500.8      188.7      893.2      901.4       38.6      662.6       83.0    2313.30
       .32       6.71      16.09       4.89       .065       .040       .065       .000    2306.10     9776.00
   .010557       360.       370.       400.          0          8          0        .00     297.00   10073.00

*SECNO 38430.000

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS=      9543.0   10209.0  TYPE=       1  TARGET=       666.000
 38430.000      10.52    2324.82    2323.95    2324.10    2326.12       1.30       4.84        .17    2320.40
   20679.0    11116.0    9521.0       42.1     1928.4      797.0       14.2      689.8       87.8    2320.60
       .34       5.76      11.95       2.96       .065       .040       .065       .000    2314.30     9543.00
   .007746       480.       580.       590.          1         14          0        .00     513.83   10056.83

*SECNO 38500.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      9655.0   10019.4  TYPE=       1  TARGET=       364.400
 38500.000      15.09    2329.99    2329.99    2329.00    2332.69       2.70       3.03        .42    2322.90
   20679.0     7593.1   13085.9         .0     1258.7      821.8         .0      710.3       91.5  100000.00
       .35       6.03      15.92        .00       .065       .040       .000       .000    2314.90     9655.00
   .008680       370.       370.       360.          0         11          0        .00     364.40   10019.40

*SECNO 38610.000

3470 ENCROACHMENT STATIONS=      9850.0   10060.0  TYPE=       1  TARGET=       210.000
 38610.000      12.53    2336.23    2335.38    2335.51    2338.99       2.76       6.28        .02    2327.60
   20679.0     9786.9   10637.8      254.3      938.9      679.7       42.9      733.7       95.0    2324.00
       .36      10.42      15.65       5.92       .065       .060       .065       .000    2323.70     9850.00
   .015405       520.       580.       570.          2         19          0        .00     210.00   10060.00

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

*SECNO 38710.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      9888.0   10177.0  TYPE=       1  TARGET=       289.000
 38710.000      15.67    2341.97    2341.97    2341.73    2345.77       3.81       6.40        .31    2331.90
   20679.0      294.4   16149.4     4235.2       54.2      929.4      642.2      753.2       97.5    2334.60
       .37       5.43      17.38       6.60       .065       .045       .065       .000    2326.30     9960.43
   .009946       530.       530.       470.          0         11          0        .00     216.57   10177.00

*SECNO 38790.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
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3470 ENCROACHMENT STATIONS= 9945.0 10095.0 TYPE= 1 TARGET= 150.000

38790.000	9.76	2347.36	2347.36	2347.59	2351.66	4.31	4.51	.15	2341.70
20679.0	77.9	20573.9	27.2	18.8	1232.5	9.4	767.0	99.2	2341.40
.38	4.15	16.69	2.90	.065	.040	.065	.000	2337.60	9945.00
.011682	430.	422.	390.	0	14	0	.00	150.00	10095.00

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THIS RUN EXECUTED 09JAN01

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HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

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

MODEL BY WEST CONSULTA

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	VCH	TOPWID	FRCH	SSTA	ENDST	DEPTH
	35490.000	23235.00	2151.32	2148.31	8.99	543.65	.47	9565.80	10109.46	13.52
	35490.000	23235.00	2152.30	2148.52	8.73	354.60	.44	9735.00	10089.60	14.50
*	35590.000	23235.00	2153.35	2153.35	14.15	615.92	.74	9381.94	10038.64	14.25
*	35590.000	23235.00	2153.49	2153.49	15.76	317.40	.82	9714.00	10031.40	14.39
	35690.000	23235.00	2157.50	2156.29	12.03	496.88	.67	9597.01	10232.79	11.80
*	35690.000	23235.00	2158.68	2155.92	11.00	329.29	.58	9856.00	10229.00	12.98
*	35770.000	23235.00	2162.14	2162.14	13.72	540.50	.88	9673.13	10213.63	9.34
*	35770.000	23235.00	2162.44	2162.44	14.96	337.00	.94	9849.00	10186.00	9.64
	35870.000	23235.00	2167.72	2167.31	13.30	492.01	.80	9703.65	10261.98	10.62
	35870.000	23235.00	2168.54	2167.20	13.29	252.00	.76	9958.00	10210.00	11.44
*	35960.000	23235.00	2173.13	2173.13	14.57	488.29	.77	9577.52	10065.82	13.83
*	35960.000	23235.00	2172.77	2172.77	16.27	265.26	.88	9800.00	10065.26	13.47
	36060.000	23235.00	2176.13	2175.71	14.32	534.18	.70	9518.14	10052.32	15.73
	36060.000	23235.00	2176.79	2175.48	14.72	280.71	.70	9772.00	10052.71	16.39
*	36180.000	23235.00	2181.08	2181.08	15.22	243.19	.96	9905.39	10148.57	11.58
*	36180.000	23235.00	2181.02	2180.89	15.68	198.44	.99	9950.00	10148.44	11.52
	36230.000	23235.00	2187.18	2186.18	12.29	324.66	.71	9952.32	10276.98	12.78
	36230.000	23235.00	2187.30	2186.25	14.01	210.03	.80	9951.97	10162.00	12.90
*	36310.000	23235.00	2192.65	2192.65	18.82	220.49	.94	9835.71	10056.20	13.75
*	36310.000	23235.00	2192.50	2192.50	19.36	190.00	.97	9860.00	10050.00	13.60
	36400.000	23235.00	2200.49	2197.97	10.68	296.94	.60	9869.08	10166.02	12.19
	36400.000	23235.00	2200.87	2197.80	10.81	208.90	.59	9876.40	10085.30	12.57

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	SECNO	Q	CWSEL	CRIWS	VCH	TOPWID	FRCH	SSTA	ENDST	DEPTH
*	36490.000	23235.00	2205.40	2205.11	15.20	226.01	.89	9917.99	10144.00	11.50
*	36490.000	23235.00	2205.82	2205.29	16.06	169.00	.92	9956.00	10125.00	11.92
*	36520.000	23235.00	2209.76	2209.76	17.47	186.98	.92	9882.53	10069.51	15.26
	36520.000	23235.00	2210.32	2209.73	17.71	140.00	.91	9900.00	10040.00	15.82
*	36610.000	23235.00	2217.75	2213.71	11.90	195.48	.53	9902.67	10098.14	17.15
*	36610.000	23235.00	2218.39	2213.60	12.41	141.00	.54	9929.00	10070.00	17.79
	36690.000	23235.00	2220.63	2218.93	14.69	195.36	.69	9934.98	10130.34	16.73
	36690.000	23235.00	2221.28	2218.97	15.11	143.00	.70	9956.00	10099.00	17.38
	36780.000	23260.00	2226.60	2223.59	12.78	183.26	.62	9960.66	10143.93	16.70
	36780.000	23260.00	2227.31	2223.74	13.22	146.00	.62	9962.00	10108.00	17.41
*	36880.000	23260.00	2236.62	2236.62	19.38	135.39	.94	9905.26	10040.65	15.12
*	36880.000	23260.00	2236.61	2236.61	19.40	135.36	.94	9905.27	10040.64	15.11

*	36960.000	23260.00	2244.33	2238.51	9.15	285.66	.40	9906.27	10191.93	18.33
*	36960.000	23260.00	2244.50	2238.68	10.66	159.00	.47	9938.00	10097.00	18.50
	37010.000	23260.00	2245.75	2242.50	10.15	393.03	.51	9776.76	10199.09	16.75
	37010.000	23260.00	2246.51	2242.52	10.43	211.10	.51	9850.00	10061.10	17.51
	37080.000	23260.00	2248.42	2245.26	10.55	259.73	.56	9930.28	10190.00	12.62
	37080.000	23260.00	2249.26	2245.43	10.68	192.20	.54	9947.80	10140.00	13.46
*	37120.000	23260.00	2249.90	2249.90	16.46	227.44	.92	9966.36	10193.80	16.20
*	37120.000	23260.00	2250.70	2250.36	16.59	190.00	.89	9969.00	10159.00	17.00
*	37200.000	23260.00	2257.53	2255.52	12.35	266.33	.65	9833.25	10099.58	14.43
*	37200.000	23260.00	2258.09	2255.37	12.36	194.93	.63	9905.00	10099.93	14.99
	37270.000	23260.00	2261.47	2258.79	10.20	390.75	.55	9744.68	10135.43	14.77
	37270.000	23260.00	2261.94	2259.49	11.78	237.00	.62	9793.00	10030.00	15.24
	37310.000	23260.00	2263.09	2261.81	12.08	374.08	.69	9788.55	10162.63	13.49
	37310.000	23260.00	2264.00	2261.71	11.93	228.00	.65	9816.00	10044.00	14.40
*	37370.000	23260.00	2266.37	2266.37	15.28	351.37	.88	9935.64	10287.01	12.67
*	37370.000	23260.00	2266.18	2266.18	15.72	278.98	.92	9936.02	10215.00	12.48
	37470.000	23260.00	2270.71	2270.17	14.04	583.54	.75	9964.51	10548.04	13.01
*	37470.000	23260.00	2270.76	2270.76	16.06	418.52	.86	9964.48	10383.00	13.06
*	37570.000	23260.00	2274.14	2274.14	14.40	707.66	.79	9957.70	10665.36	14.74
*	37570.000	23260.00	2274.57	2274.57	15.44	498.11	.83	9955.89	10454.00	15.17
*	37660.000	23260.00	2278.75	2278.75	13.58	483.76	.95	9911.74	10395.50	8.75
*	37660.000	23260.00	2279.50	2279.50	13.74	412.50	.91	9907.50	10320.00	9.50

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	SECNO	Q	CWSEL	CRIWS	VCH	TOPWID	FRCH	SSTA	ENDST	DEPTH
*	37750.000	23260.00	2286.26	2286.26	13.55	430.65	.96	9948.36	10379.02	9.76
*	37750.000	23260.00	2286.80	2286.80	14.16	325.76	.97	9947.24	10273.00	10.30
*	37800.000	23260.00	2290.58	2290.58	14.05	386.69	.94	9791.64	10178.33	7.88
*	37800.000	23260.00	2290.64	2290.64	15.07	221.60	1.01	9917.10	10138.70	7.94
	37930.000	20679.00	2295.98	2295.48	13.92	320.39	.77	9770.20	10090.59	12.28
	37930.000	20679.00	2296.78	2295.37	13.79	205.00	.74	9850.00	10055.00	13.08
*	38030.000	20679.00	2303.16	2303.16	14.52	328.86	.89	9927.62	10256.48	10.36
*	38030.000	20679.00	2302.88	2302.88	15.55	205.50	.97	9954.50	10160.00	10.08
	38140.000	20679.00	2309.81	2308.02	11.18	436.22	.55	9840.95	10277.17	15.31
	38140.000	20679.00	2310.48	2308.14	11.94	240.00	.57	9880.00	10120.00	15.98
	38250.000	20679.00	2313.63	2313.14	12.59	403.69	.80	9916.71	10320.41	9.73
	38250.000	20679.00	2314.48	2313.10	12.29	230.10	.74	9929.90	10160.00	10.58
*	38320.000	20679.00	2317.38	2317.38	15.79	357.59	.97	9741.31	10098.90	11.28
*	38320.000	20679.00	2318.08	2318.08	16.09	297.00	.95	9776.00	10073.00	11.98
	38430.000	20679.00	2324.10	2322.74	10.89	583.99	.76	9471.70	10055.68	9.80
	38430.000	20679.00	2324.82	2323.95	11.95	513.83	.79	9543.00	10056.83	10.52
*	38500.000	20679.00	2329.00	2329.00	16.39	413.08	.88	9609.69	10035.05	14.10
*	38500.000	20679.00	2329.99	2329.99	15.92	364.40	.82	9655.00	10019.40	15.09
*	38610.000	20679.00	2335.51	2335.29	16.26	264.30	.87	9807.06	10071.36	11.81
	38610.000	20679.00	2336.23	2335.38	15.65	210.00	.81	9850.00	10060.00	12.53
*	38710.000	20679.00	2341.73	2341.63	16.14	288.74	.82	9960.68	10249.42	15.43
*	38710.000	20679.00	2341.97	2341.97	17.38	216.57	.87	9960.43	10177.00	15.67
*	38790.000	20679.00	2347.59	2347.59	14.74	318.01	.88	9903.99	10222.01	9.99
*	38790.000	20679.00	2347.36	2347.36	16.69	150.00	1.01	9945.00	10095.00	9.76

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SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO= 35590.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 35590.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

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CAUTION SECNO=  35590.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=  35590.000  PROFILE=  2  MINIMUM SPECIFIC ENERGY

WARNING SECNO=  35690.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=  35770.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=  35770.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=  35770.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=  35770.000  PROFILE=  2  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=  35960.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=  35960.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=  35960.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=  35960.000  PROFILE=  2  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=  36180.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=  36180.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY
WARNING SECNO=  36180.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=  36310.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=  36310.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=  36310.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=  36310.000  PROFILE=  2  MINIMUM SPECIFIC ENERGY

WARNING SECNO=  36490.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=  36490.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=  36520.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=  36520.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=  36610.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=  36610.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=  36880.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=  36880.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=  36880.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=  36880.000  PROFILE=  2  MINIMUM SPECIFIC ENERGY

WARNING SECNO=  36960.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=  36960.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=  37120.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=  37120.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY
WARNING SECNO=  37120.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=  37200.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=  37200.000  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=  37370.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
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   09JAN01      16:53:37


CAUTION SECNO=  37370.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY
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Relating new hydro w/ HEC-2 stations

C230 = RS 35.49 Q = 23,235 cfs
C220 = RS 36.78 Q = 23,260 cfs
} attinuation
attenuation
~~attenuation~~ ↑ spelling

C210 = RS 37.80 Q = 23,119 cfs

C200 = RS 38.71 Q = 20,679 cfs

Adjusting for Cottonwood Creek Confluence

△ 35.49 Q = 23,235
36.69 Q = 23,235
△ 36.78 Q = 23,260
37.80 Q = 23,260 ← Enter Cottonwood Creek
△ 37.93 Q = 20,679
u/s end

38430

split flow @
35.59
35.69
35.87
37.01
38.50

National® Brand 42-182 100 SHEETS Made in U.S.A.

Concentration Pts

Cave Creek

George Sable - hydrology

~~36.610~~ - 220
~~37.660~~ - 210
~~38.500~~ - 200
CPt 200

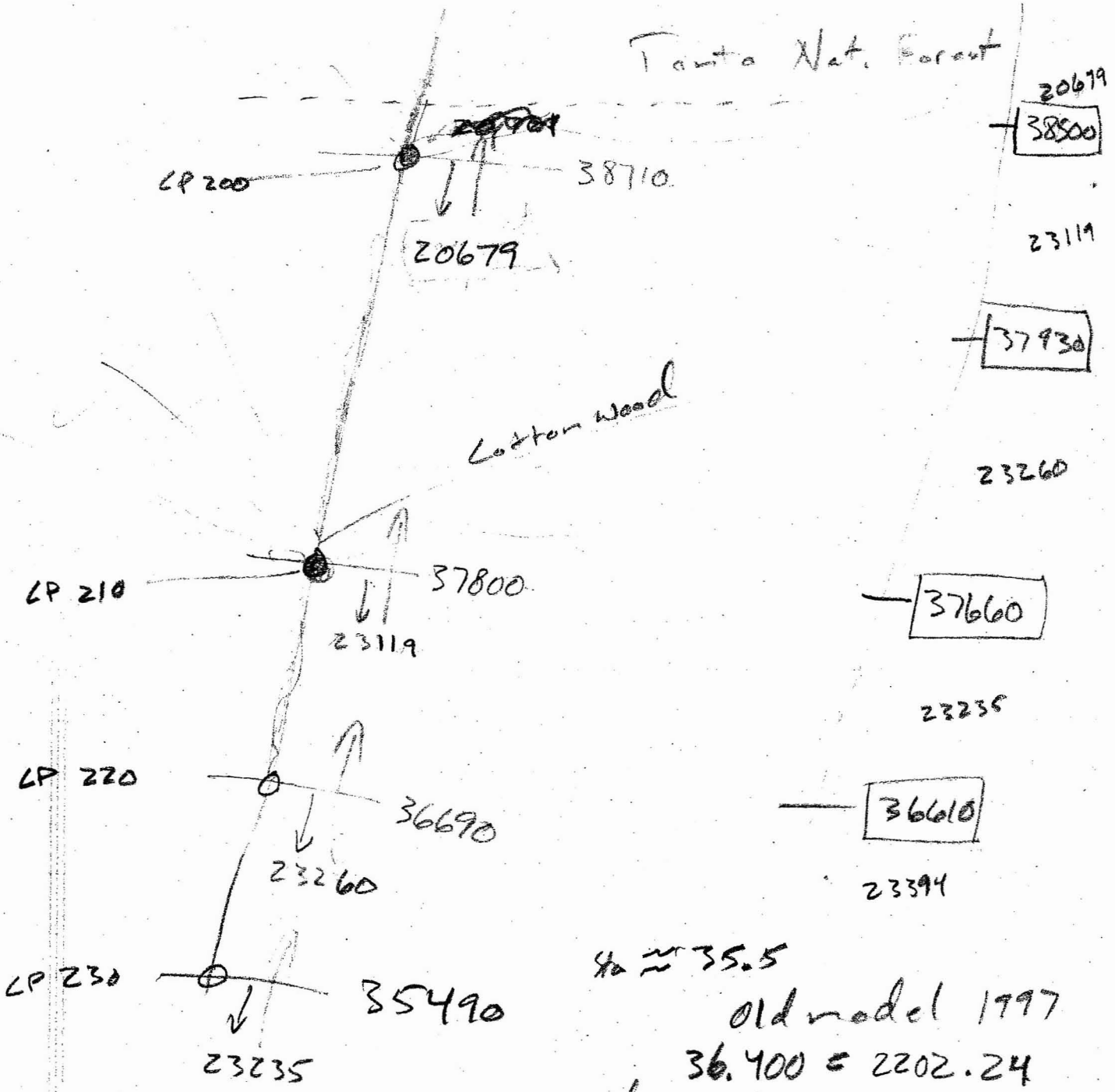
38710

CP 200 → 38.71

CP 210 → 37.80

STA	CP
36 610	230
37660	220
37930	210
38500	200

← not accurate



Sta ≈ 35.5

Old model 1997

36.400 = 2202.24

computed 35.54 = 2151.32

W.S. Elev.

Cave Creek

Confirmed from old model (1997) via phone conversation with David Degerness on 8/30/00
W.S. Elev at sta 35540 = 2151.32

Project: P:\254A05 Cave Creek...\WEST HEC-RAS

CC-fp.prj

latest plan: plan 090100 by IMT

36310
9871 10039
9885 37370 10155 2.19.07
1.22
max of EG 1.12 TW 4.30.1

fredelite

directed line date
PLG

HEC-RAS Plan: WEST1 River: Cave Creek Reach: Reach 1

Reach	River Sta	W.S. Elev (ft)	Crit W.S. (ft)	Prof Delta WS (ft)	Froude # XS	Top Width (ft)	Enc Sta L (ft)	Ch Sta L (ft)	Ch Sta R (ft)	Enc Sta R (ft)	Enc Val 1 (ft)	Enc Val 2 (ft)
Reach 1	35490	2152.12	2148.68	0.80	0.43	337.27	9752.33	9962.80	10089.60	10089.60	9752.33	10089.60
Reach 1	35590	2153.61	2153.61	0.21	0.79	336.40	9695.00	9932.10	10031.40	10031.40	9695.00	10031.40
Reach 1	35690	2158.46	2156.42	1.00	0.59	256.91	9890.00	9937.00	10050.00	10195.00	9890.00	10195.00
Reach 1	35770	2162.67	2162.67	0.49	0.90	309.00	9863.00	9931.10	10092.10	10172.00	9863.00	10172.00
Reach 1	35870	2168.68	2167.31	1.00	0.70	240.00	9965.00	9968.00	10120.80	10205.00	9965.00	10205.00
Reach 1	35960	2172.82	2172.82	-0.28	0.91	259.20	9795.00	9929.70	10054.20	10054.20	9795.00	10054.20
Reach 1	36060	2176.74	2175.59	0.59	0.68	224.30	9824.00	9957.60	10048.30	10048.30	9824.00	10048.30
Reach 1	36180	2182.10	2181.06	0.98	0.83	186.90	9957.10	9957.10	10144.00	10144.00	9957.10	10144.00
Reach 1	36230	2186.96	2186.34	-0.18	0.89	170.74	9969.00	9969.00	10130.40	10139.74	9969.00	10139.74
Reach 1	36310	2193.02	2193.02	0.34	0.82	168.47	9871.09	9965.00	10027.10	10039.56	9871.09	10039.56
Reach 1	36400	2201.41	2197.86	0.95	0.55	208.90	9876.40	9876.40	10085.30	10085.30	9876.40	10085.30
Reach 1	36490	2205.56	2205.56	0.15	0.98	156.00	9962.00	9971.60	10114.10	10118.00		
Reach 1	36520	2210.68	2210.12	0.93	0.90	124.00	9908.00	9928.00	10011.70	10032.00	9908.00	10032.00
Reach 1	36610	2218.75	2213.77	0.99	0.48	171.00	9917.00	9955.20	10031.10	10088.00	9917.00	10088.00
Reach 1	36690	2220.84	2219.02	0.21	0.72	147.00	9954.00	9957.00	10037.30	10101.00	9954.00	10101.00
Reach 1	36780	2227.50	2224.04	0.91	0.65	117.70	9976.30	9976.30	10093.20	10094.00	9976.30	10094.00
Reach 1	36880	2236.66	2236.66	0.00	0.96	135.54	9900.00	9954.80	10023.30	10060.00	9900.00	10060.00
Reach 1	36960	2244.48	2238.88	0.16	0.47	150.57	9942.20	9943.80	10059.80	10092.77	9942.20	10092.77
Reach 1	37010	2246.56	2242.73	0.82	0.52	197.43	9863.67	9935.40	10061.10	10061.10	9863.67	10061.10
Reach 1	37080	2249.42	2245.48	1.00	0.54	189.83	9947.80	9947.80	10081.60	10137.63	9947.80	10137.63
Reach 1	37120	2250.73	2250.73	0.84	0.93	182.59	9969.00	9969.00	10060.60	10151.59	9969.00	10151.59
Reach 1	37200	2258.51	2255.46	0.98	0.58	195.74	9900.06	9978.70	10095.80	10095.80	9900.06	10095.80
Reach 1	37270	2262.01	2259.61	0.54	0.61	234.00	9793.00	9937.00	10027.70	10027.00	9793.00	10027.00
Reach 1	37310	2264.07	2261.81	0.98	0.62	230.00	9815.00	9885.70	10031.90	10045.00	9815.00	10045.00
Reach 1	37370	2266.07	2266.07	-0.36	0.94	213.77	9890.00	9945.70	10095.80	10150.00	9890.00	10150.00
Reach 1	37470	2270.94	2270.94	0.27	0.68	398.64	9960.00	9969.80	10062.00	10363.00	9960.00	10363.00
Reach 1	37570	2275.09	2275.09	1.00	0.73	418.36	9895.00	9963.90	10065.50	10372.00	9895.00	10372.00
Reach 1	37660	2279.79	2279.79	1.00	0.96	246.00	9922.00	9923.40	10128.40	10168.00	9922.00	10168.00
Reach 1	37750	2287.08	2287.04	0.82	0.99	226.80	9959.60	9959.60	10186.40	10186.40	9959.60	10186.40
Reach 1	37800	2290.64	2290.64	0.05	1.01	221.60	9917.10	9917.10	10138.70	10138.70	9917.10	10138.70
Reach 1	37930	2296.88	2296.20	0.88	0.90	124.30	9928.90	9928.90	10053.20	10053.20	9928.90	10053.20
Reach 1	38030	2303.54	2303.54	-0.23	0.94	214.44	9954.50	9954.50	10115.40	10168.94	9954.50	10168.94
Reach 1	38140	~~2344.05~~	2308.61	~~0.72~~	~~0.56~~	~~243.32~~	9879.61	9953.80	10027.70	10122.93	9879.61	10122.93
Reach 1	38250	2315.07	2313.75	0.99	0.76	207.40	9929.90	9929.90	10111.70	10137.30	9929.90	10137.30
Reach 1	38320	2318.75	2318.75	0.87	0.79	290.00	9780.00	9963.20	10064.80	10070.00	9780.00	10070.00
Reach 1	38430	~~2325.53~~	2324.57	~~1.00~~	~~0.80~~	~~470.10~~	~~9580.00~~	~~9936.80~~	10050.10	10050.10	9580.00	10050.10
Reach 1	38500	2330.56	2330.56	1.00	0.72	360.97	[illegible]	9949.50	10019.40	10019.40	9658.43	10019.40
Reach 1	38610	2336.83	2336.12	0.91	0.80	213.19	[illegible]	9997.10	10056.00	10056.36	9843.17	10056.36
Reach 1	38710	~~2342.96~~	~~2342.94~~	~~0.62~~	~~0.86~~	~~456.84~~	[illegible]	~~9971.20~~	~~10046.30~~	[illegible]	~~9971.20~~	10128.01
Reach 1	38790	2348.62	2347.44	1.00	0.82	144.90	[illegible]	9948.50	10093.40	[illegible]	9948.50	10093.40

SECTION	THALWEG	SEC-R	SEC-L
35.49	(N1,043,220 E683,197)	(N1,043,171 E682,781)	(N1,043,284 E683,795)
35.59	(N1,043,755 E683,102)	(N1,043,756 E683,040)	(N1,043,647 E683,720)
35.69	(N1,044,127 E683,348)	(N1,044,215 E683,095)	(N1,044,008 E683,810)
35.77	(N1,044,533 E683,582)	(N1,044,630 E683,281)	(N1,044,422 E683,921)
35.87	(N1,045,032 E683,728)	(N1,045,080 E683,450) (N1,045,032 E684,095)	(N1,045,032 E683,642)
35.96	(N1,045,487 E683,690)	(N1,045,498 E683,608)	(N1,045,439 E684,158)
36.06	(N1,046,052 E683,682)	(N1,046,064 E683,600)	(N1,045,970 E684,260)
36.18	(N1,046,600 E683,970)	(N1,046,607 E683,722) (N1,046,578 E684,025)	(N1,046,639 E683,918) (N1,046,585 E684,093)
36.23	(N1,046,805 E684,115)	(N1,047,092 E683,990) (N1,046,792 E684,138)	(N1,046,831 E684,059) (N1,046,735 E684,155)
36.31	(N1,047,052 E684,400)	(N1,047,102 E684,395) (N1,046,878 E684,468)	(N1,047,008 E684,402)
36.40	(N1,047,138 E684,896)	(N1,047,375 E684,850)	(N1,046,961 E684,929)
36.49	(N1,047,420 E685,149)	(N1,047,475 E684,973) (N1,047,405 E685,238)	(N1,047,428 E685,093)
36.52	(N1,047,628 E685,145)	(N1,047,655 E685,018)	(N1,047,598 E685,248)
36.61	(N1,047,962 E685,397)	(N1,048,062 E685,351)	(N1,047,870 E685,471)

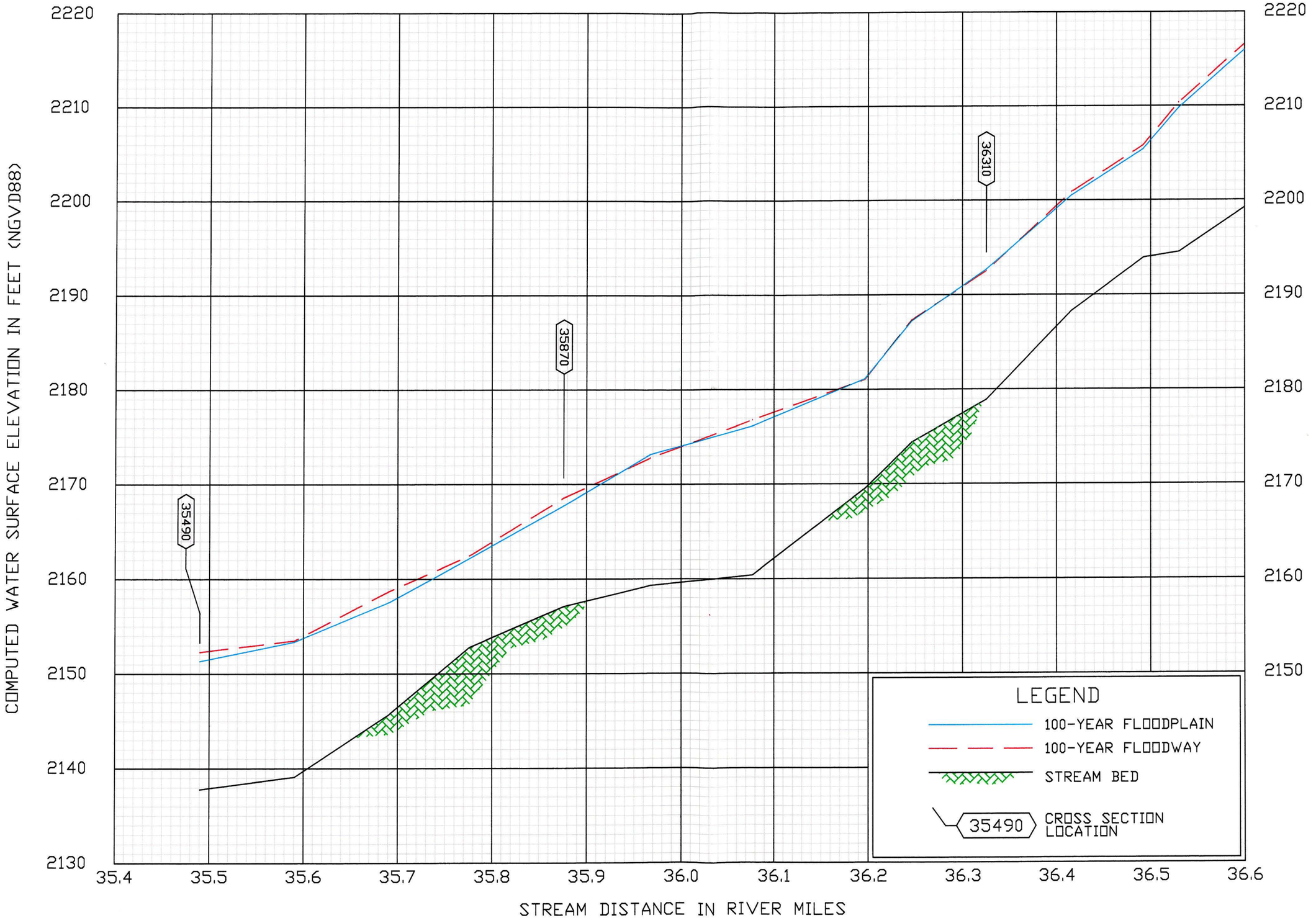
National® Brand 42-182 100 SHEETS Made in U.S.A.

HEC-RAS Plan: WEST1 River: Cave Creek Reach: Reach 1

Reach	River Sta	Q Total	W.S. Elev	Vel Left	Vel Chnl	Vel Right	Flow Area L	Flow Area	Flow Area R
		(cfs)	(ft)	(ft/s)	(ft/s)	(ft/s)	(sq ft)	(sq ft)	(sq ft)
Reach 1	35490	23235.00	2151.32	4.95	8.99	4.26	1958.72	3517.78	101.13
Reach 1	35590	23235.00	2153.40	5.01	14.00	3.76	1473.34	2621.84	22.65
Reach 1	35690	23235.00	2157.46	3.13	12.13	6.93	384.74	2713.52	1196.41
Reach 1	35770	23235.00	2162.18	3.80	13.61	7.37	468.42	2332.93	628.48
Reach 1	35870	23235.00	2167.68	3.45	13.40	6.64	324.36	2322.43	688.75
Reach 1	35960	23235.00	2173.10	3.18	14.61	3.42	939.84	2358.15	42.89
Reach 1	36060	23235.00	2176.15	3.72	14.29	2.02	1676.04	2877.11	13.38
Reach 1	36180	23235.00	2181.12	7.15	15.13	3.73	115.32	1600.78	5.64
Reach 1	36230	23235.00	2187.15	5.59	12.34	7.04	46.17	2179.21	632.02
Reach 1	36310	23235.00	2192.68	8.95	18.75	9.12	775.24	1743.99	193.66
Reach 1	36400	23235.00	2200.46	4.22	10.71	5.06	23.58	2290.50	201.53
Reach 1	36490	23235.00	2205.41	9.28	15.19	10.97	213.12	1655.38	154.22
Reach 1	36520	23235.00	2209.75	11.37	17.49	12.33	239.29	1510.22	332.64
Reach 1	36610	23235.00	2217.76	8.39	11.90	9.12	424.14	2222.51	618.24
Reach 1	36690	23235.00	2220.63	7.50	14.68	9.56	124.82	1858.16	613.48
Reach 1	36780	23260.00	2226.59	6.43	12.78	8.63	87.50	1971.09	331.64
Reach 1	36880	23260.00	2236.66	13.85	19.31	9.63	359.18	1349.97	87.75
Reach 1	36960	23260.00	2244.32	6.80	9.15	5.26	346.78	2953.89	760.92
Reach 1	37010	23260.00	2245.74	7.09	10.15	2.76	970.71	2711.67	175.93
Reach 1	37080	23260.00	2248.42	6.89	10.55	8.91	95.01	2357.96	774.74
Reach 1	37120	23260.00	2249.90	3.53	16.46	11.65	3.56	1623.05	708.77
Reach 1	37200	23260.00	2257.53	8.63	12.35	3.37	787.65	2128.65	11.23
Reach 1	37270	23260.00	2261.47	8.46	10.20	3.90	1473.26	2663.97	213.05
Reach 1	37310	23260.00	2263.09	8.73	12.09	3.99	632.11	2225.54	187.68
Reach 1	37370	23260.00	2266.43	3.26	15.16	3.91	26.55	1924.93	499.05
Reach 1	37470	23260.00	2270.67	2.68	14.14	4.38	22.05	3096.86	2076.99
Reach 1	37570	23260.00	2274.09	1.31	14.56	4.24	4.13	2939.17	1887.96
Reach 1	37660	23260.00	2278.79	5.05	13.46	6.56	25.96	2174.40	839.18
Reach 1	37750	23260.00	2286.26	4.74	13.54	6.94	25.35	2038.84	623.61
Reach 1	37800	23260.00	2290.60	4.52	14.00	2.89	352.25	1952.52	65.79
Reach 1	37930	23119.00	2296.00	5.01	15.53	5.23	586.90	1977.94	138.23
Reach 1	38030	23119.00	2303.76	4.85	14.84	4.48	84.93	1876.15	373.46
Reach 1	38140	23119.00	2310.33	7.63	11.51	5.48	855.53	2805.87	970.38
Reach 1	38250	23119.00	2314.08	5.73	13.06	5.18	70.21	2205.65	656.38
Reach 1	38320	23119.00	2317.87	7.45	16.25	6.03	1075.52	2088.15	132.33
Reach 1	38430	23119.00	2324.53	6.07	11.22	2.73	2391.74	3168.09	12.31
Reach 1	38500	23119.00	2329.56	6.37	16.75	5.87	1458.98	2347.57	96.64
Reach 1	38610	23119.00	2335.92	10.73	17.06	8.93	1024.02	1780.32	94.88
Reach 1	38710	23119.00	2342.34	5.21	16.60	6.50	58.29	2080.89	1065.21
Reach 1	38790	20679.00	2347.62	4.59	14.68	4.43	122.94	1724.20	330.68

F Erosion and Sediment Transport Analysis Supporting Documentation

Not applicable / Not Included



FLOOD PROFILES

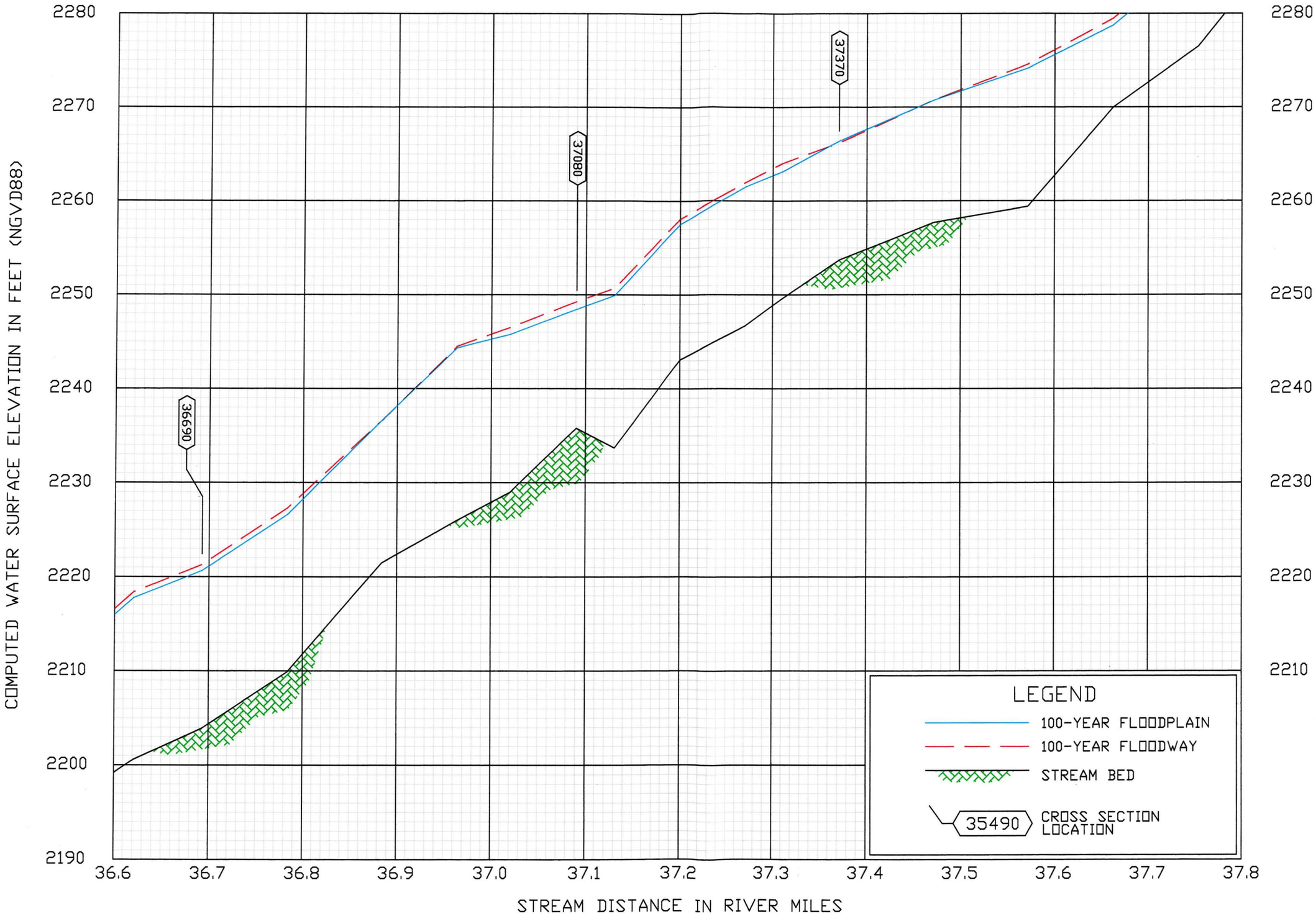
CAVE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CAVE CREEK, AZ

MARICOPA

01P



FLOOD PROFILES

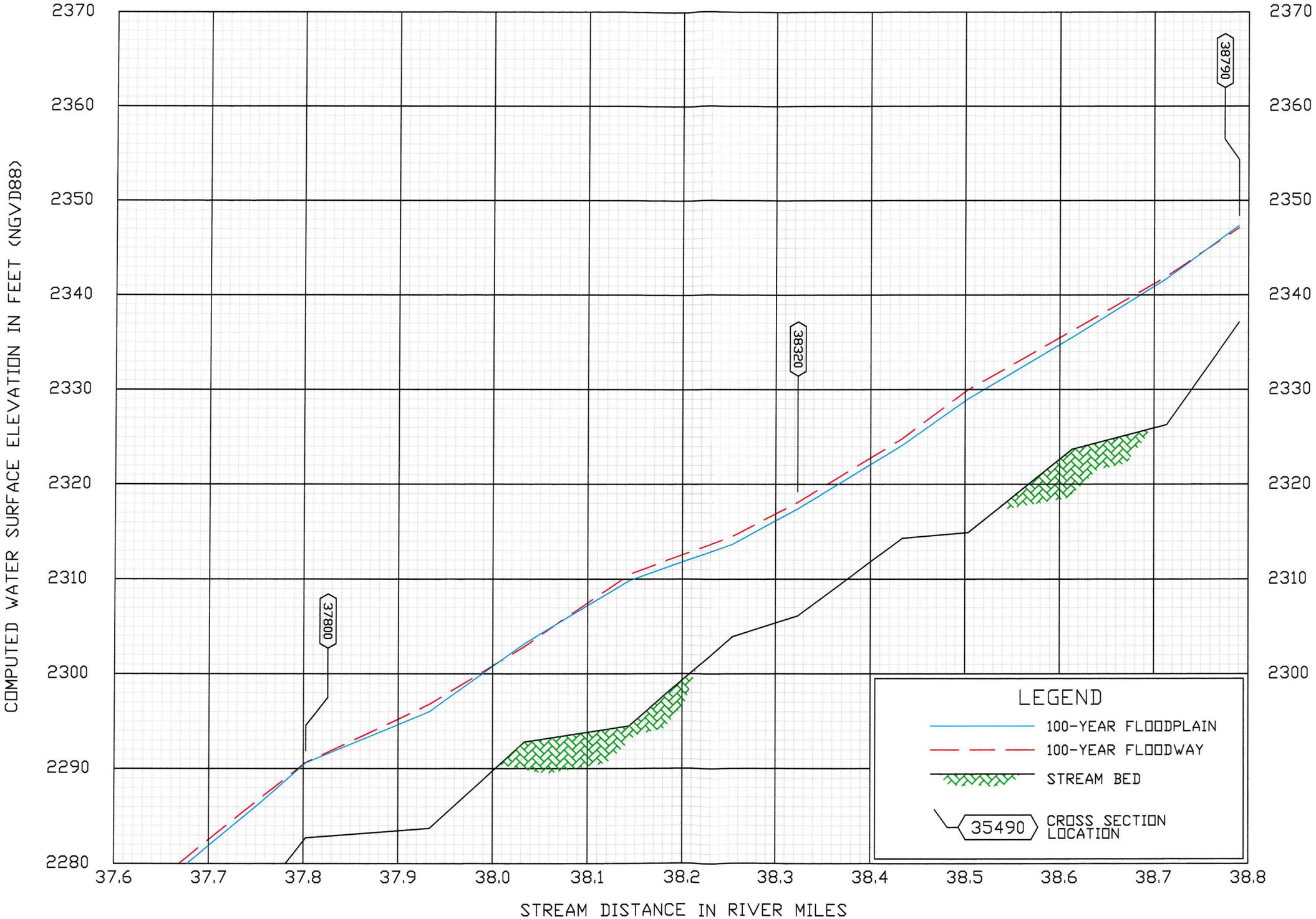
CAVE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CAVE CREEK, AZ

MARICOPA

02P

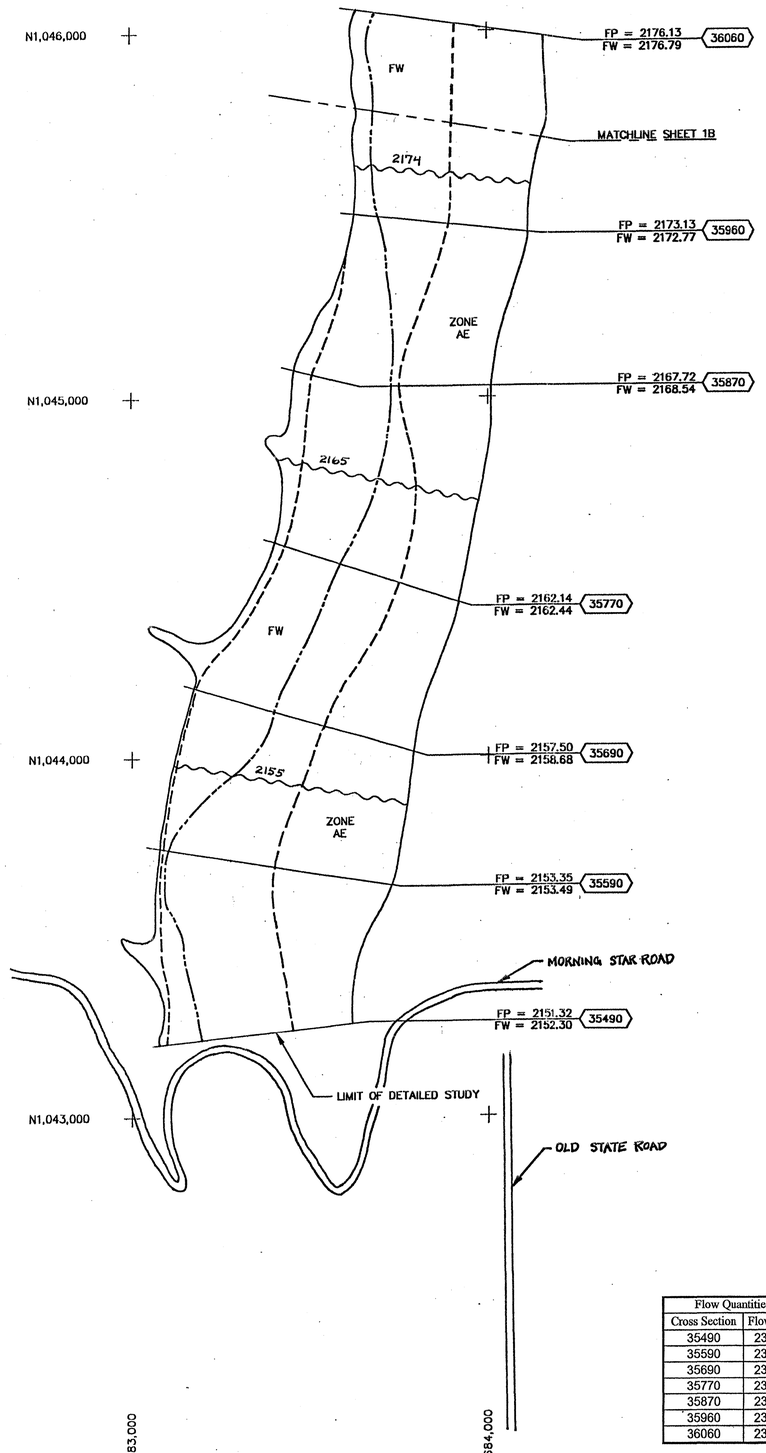


FLOOD PROFILES

CAVE CREEK

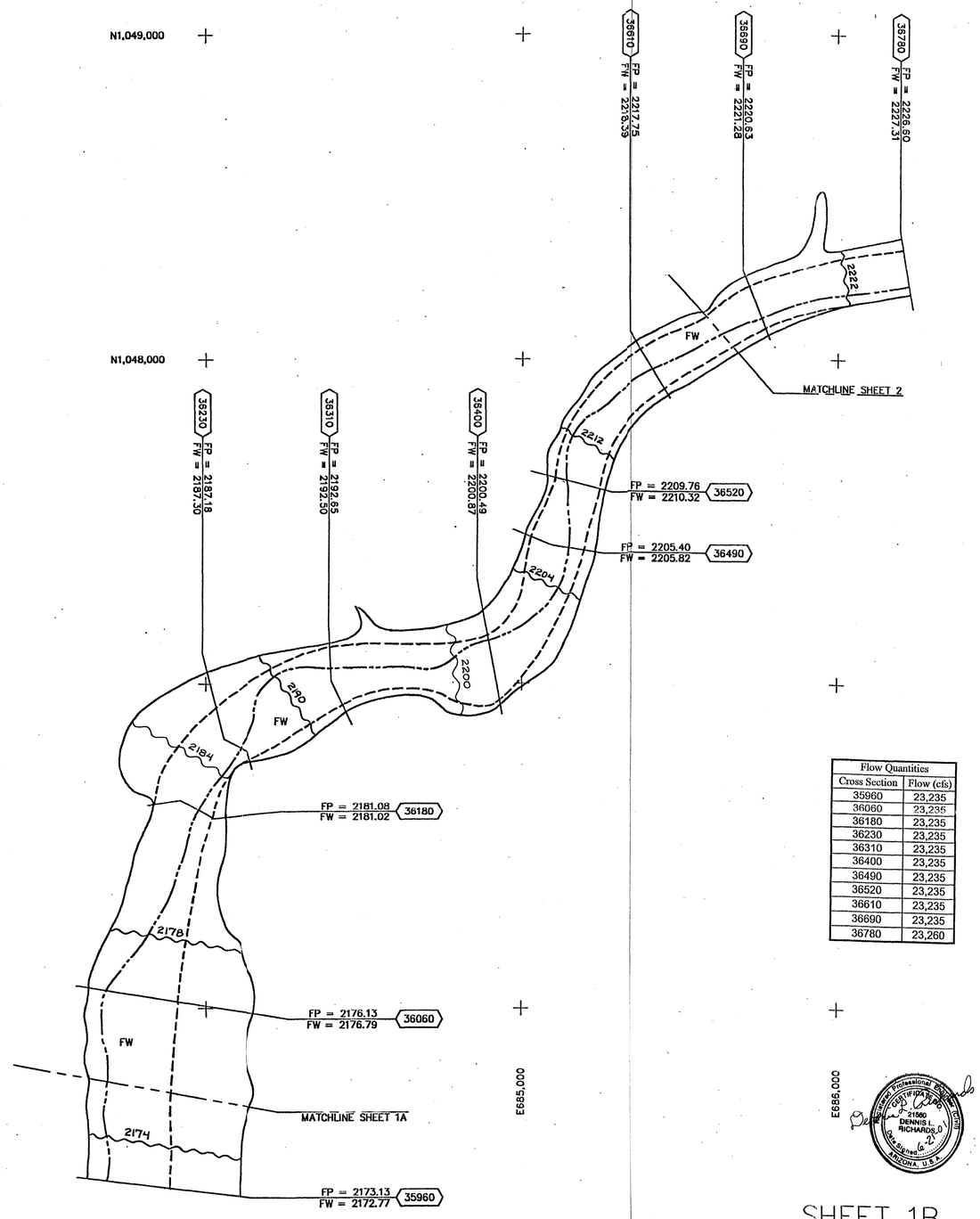
FEDERAL EMERGENCY MANAGEMENT AGENCY
CAVE CREEK, AZ
MARICOPA

03P



Flow Quantities	
Cross Section	Flow (cfs)
35490	23,235
35590	23,235
35690	23,235
35770	23,235
35870	23,235
35960	23,235
36060	23,235

SHEET 1A



Flow Quantities	
Cross Section	Flow (cfs)
35960	23,235
36060	23,235
36180	23,235
36230	23,235
36310	23,235
36400	23,235
36490	23,235
36520	23,235
36610	23,235
36690	23,235
36780	23,260

SHEET 1B

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CAVE CREEK
FLOODPLAIN REVISION
WORK MAP

F.C.D. CONTRACT NO. 1999C048
ASSIGNMENT NO. 5

LEGEND

STREAM CENTERLINE

100-YR FLOODPLAIN BOUNDARY

100-YR FLOODWAY BOUNDARY

CROSS SECTION — FP = 100 YR WSE / FW = FLOODWAY WSE (2)

BASE FLOOD ELEVATIONS — 1224

ZONE DESIGNATIONS — ZONE AE

ELEVATION REFERENCE MARKS — ERM 1

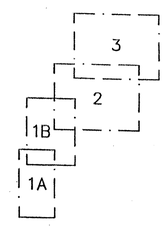
ELEVATION REFERENCE MARKS

NONE THIS SHEET

NOTES

ALL ELEVATIONS BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

INDEX MAP



200' 0' 200' 400'
SCALE: 1" = 200'
VERTICAL CONTOUR INTERVAL = 2 FEET

WEST Consultants, Inc.

	BY	DATE
DESIGN	---	---
DESIGN CHECK	---	---
PLANS	JEH	11/00
PLANS CHECK	DLR	11/00

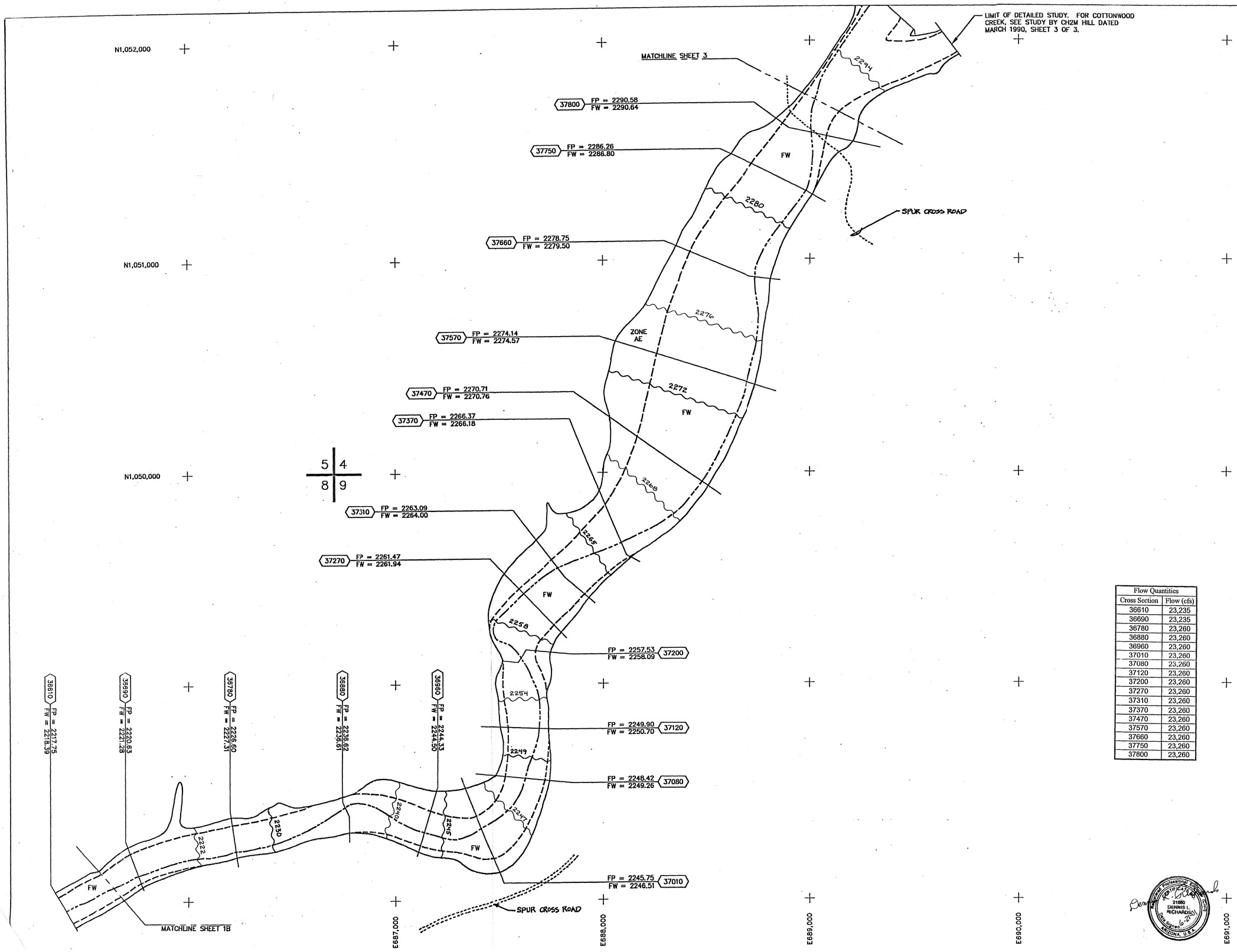
SUBMITTED BY: DATE

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 3



Flow Quantities	
Cross Section	Flow (cfs)
36610	23,235
36690	23,235
36780	23,260
36880	23,260
36960	23,260
37010	23,260
37080	23,260
37120	23,260
37200	23,260
37270	23,260
37310	23,260
37370	23,260
37470	23,260
37570	23,260
37660	23,260
37750	23,260
37800	23,260

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CAVE CREEK
FLOODPLAIN REVISION
WORK MAP

F.C.D. CONTRACT NO. 1999C048
ASSIGNMENT NO. 5

LEGEND

STREAM CENTERLINE

100-YR FLOODPLAIN BOUNDARY

100-YR FLOODWAY BOUNDARY

CROSS SECTION — FP = 100 YR WSE / FW = FLOODWAY WSE (2)

BASE FLOOD ELEVATIONS — 1224

ZONE DESIGNATIONS — ZONE AE

ELEVATION REFERENCE MARKS — ERM 1

ELEVATION REFERENCE MARKS

NONE THIS SHEET

NOTES

ALL ELEVATIONS BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

INDEX MAP

3
2
1B
1A

200' 0' 200' 400'
SCALE: 1" = 200'
VERTICAL CONTOUR INTERVAL = 2 FEET

WEST Consultants, Inc.

	BY	DATE
DESIGN	---	---
DESIGN CHECK	---	---
PLANS	JEH	11/00
PLANS CHECK	DLR	11/00

SUBMITTED BY: DATE

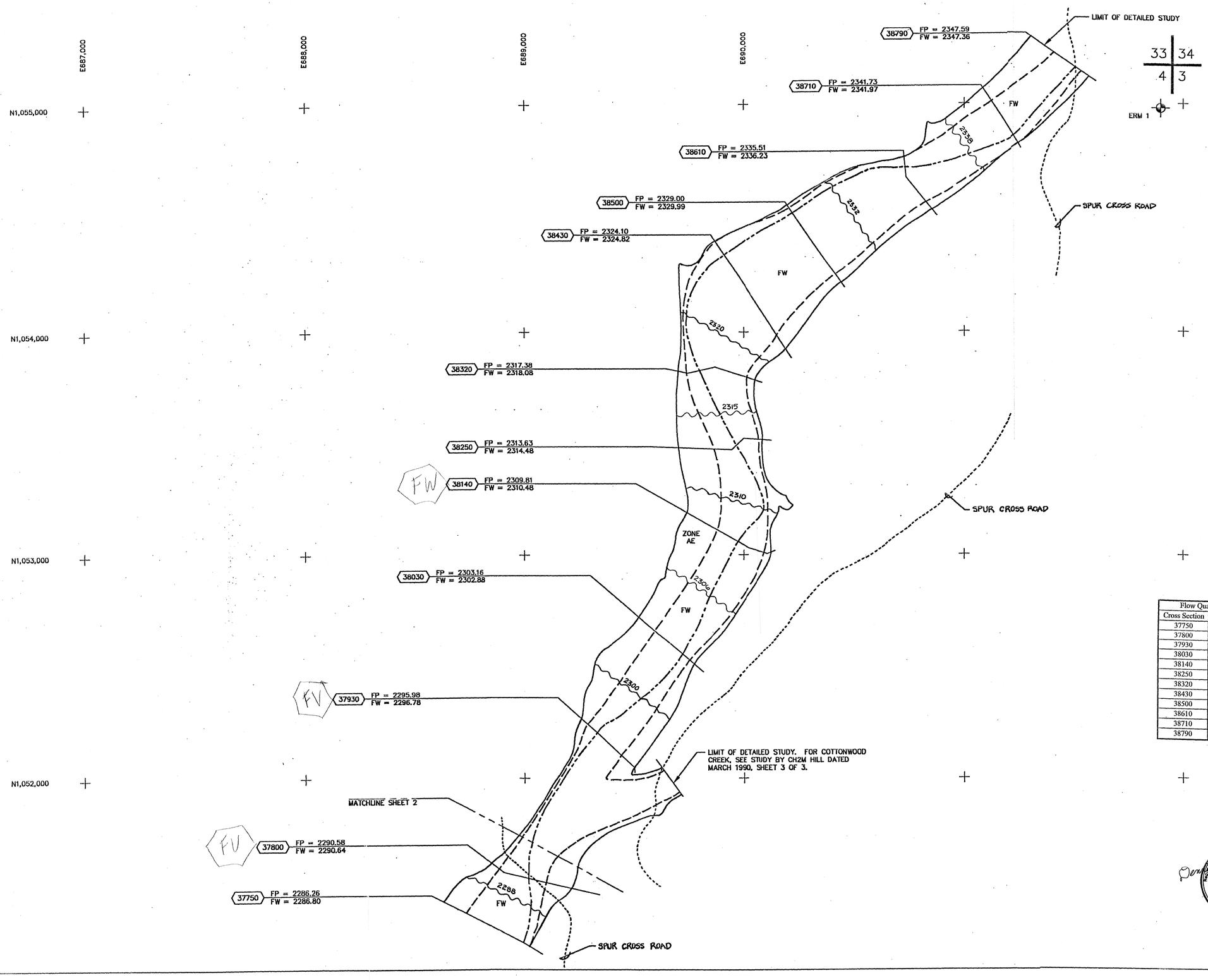
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 2 OF 3



Flow Quantities	
Cross Section	Flow (cfs)
37750	23260
37800	23260
37930	20679
38030	20679
38140	20679
38250	20679
38320	20679
38430	20679
38500	20679
38610	20679
38710	20679
38790	20679

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CAVE CREEK
FLOODPLAIN REVISION
WORK MAP

F.C.D. CONTRACT NO. 1999C048
ASSIGNMENT NO. 5

LEGEND

STREAM CENTERLINE

100-YR FLOODPLAIN BOUNDARY

100-YR FLOODWAY BOUNDARY

CROSS SECTION — FP = 100 YR WSE / FW = FLOODWAY WSE (2)

BASE FLOOD ELEVATIONS — 1224

ZONE DESIGNATIONS — ZONE AE

ELEVATION REFERENCE MARKS — ERM 1

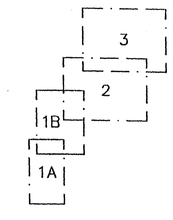
ELEVATION REFERENCE MARKS

ERM 1 [ELEVATION = 2345.75]
BRASS CAP IN CONCRETE SLAB N20E, APPROXIMATELY 225 FEET SOUTH AND EAST OF NORTHEAST CORNER OF SECTION 4 T6N R4E.

NOTES

ALL ELEVATIONS BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

INDEX MAP



200' 0' 200' 400'
SCALE: 1" = 200'
VERTICAL CONTOUR INTERVAL = 2 FEET

WEST Consultants, Inc.

	BY	DATE
DESIGN	---	---
DESIGN CHECK	---	---
PLANS	JEH	11/00
PLANS CHECK	DLR	11/00

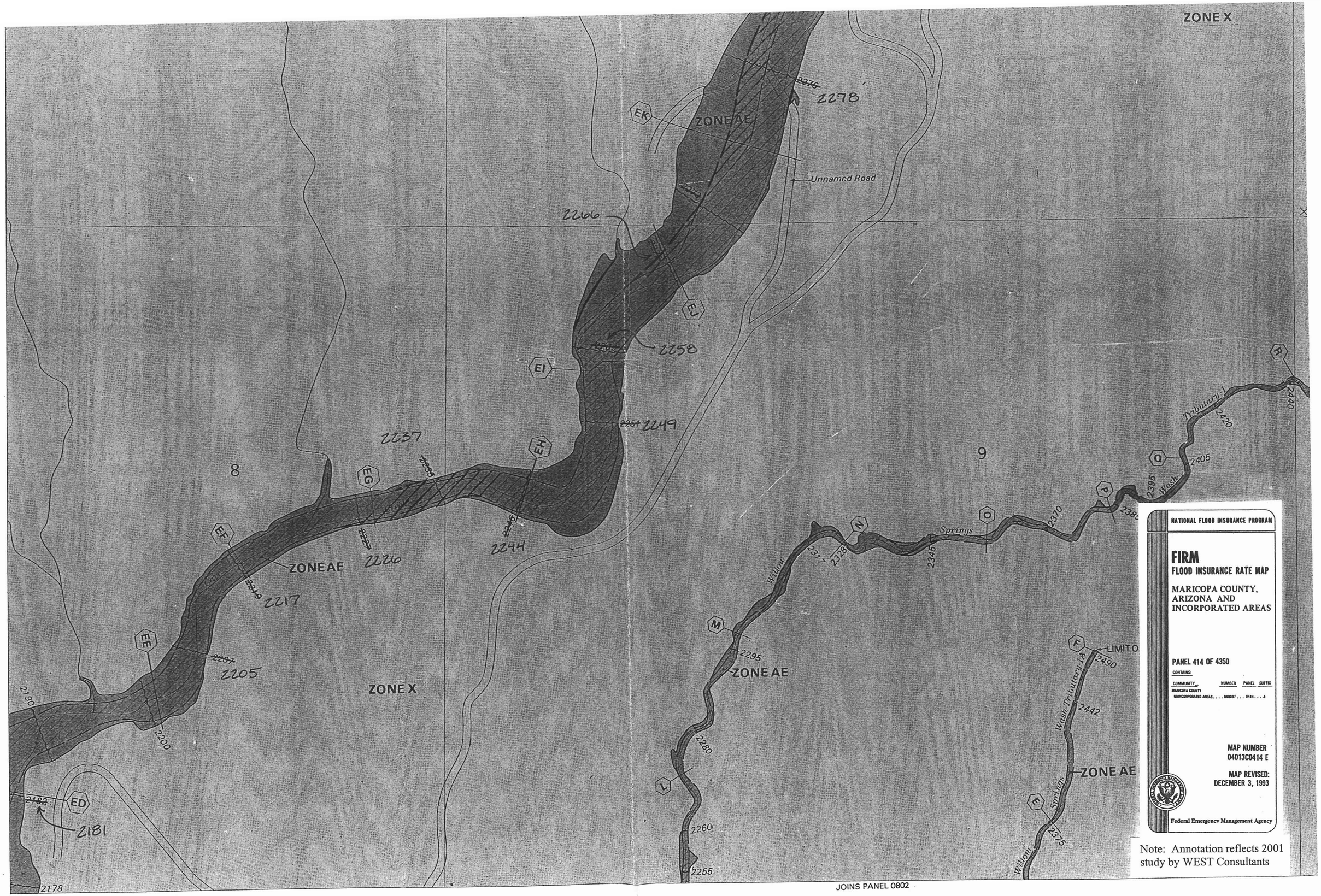
SUBMITTED BY: DATE

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

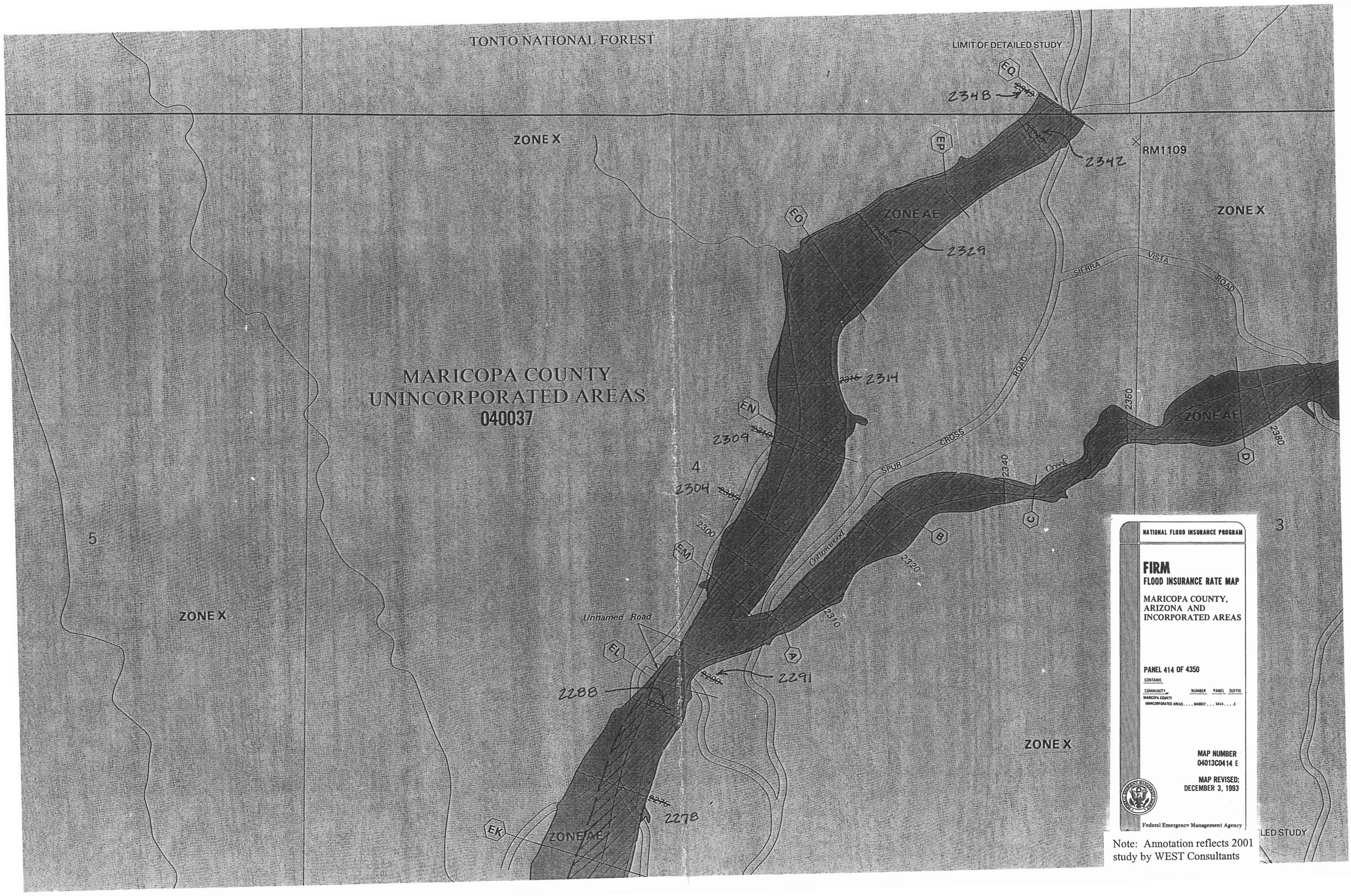
RECOMMENDED BY: DATE

APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 3 OF 3



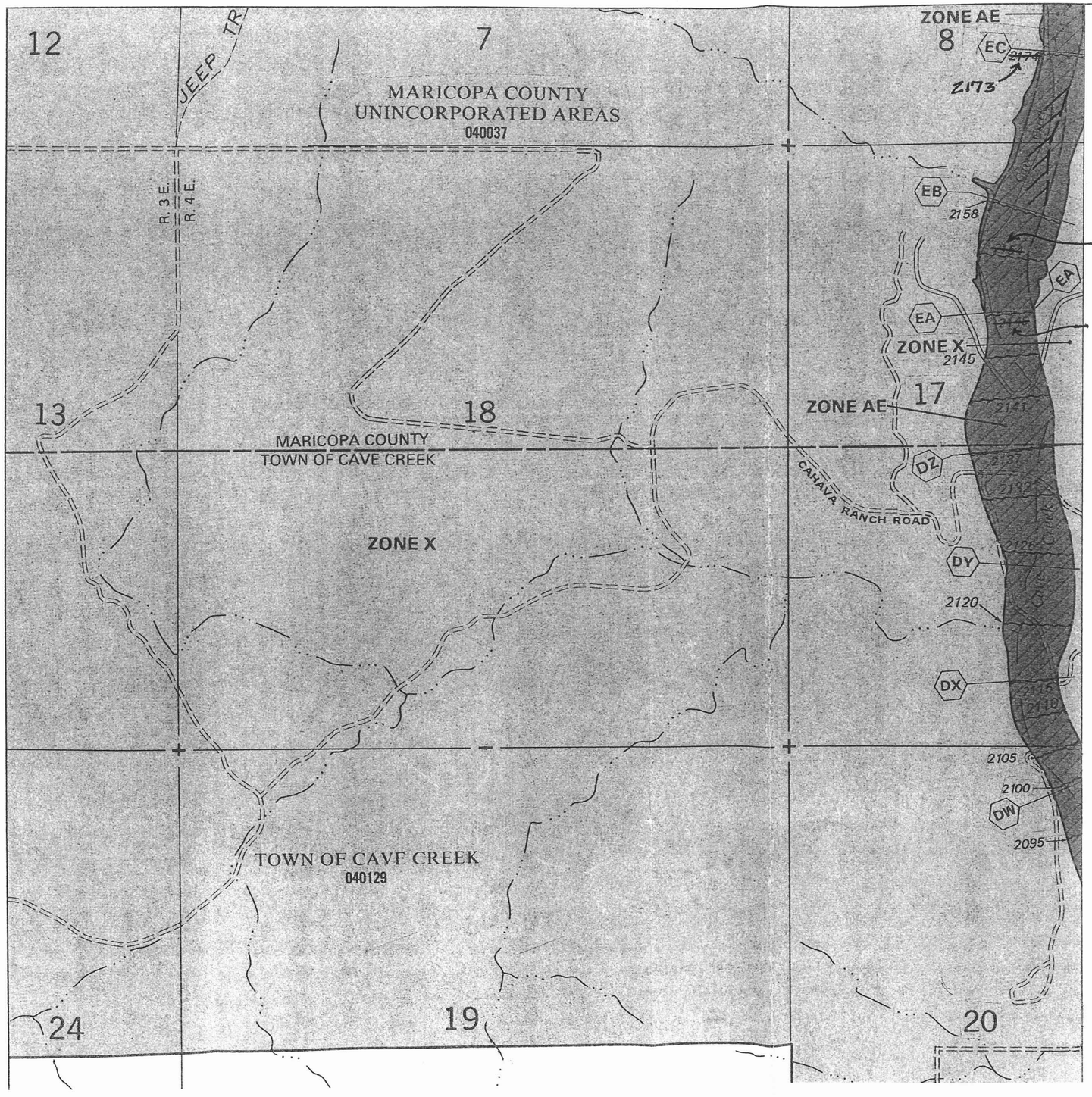
Note: Annotation reflects 2001 study by WEST Consultants



Note: Annotation reflects 2001 study by WEST Consultants

JOINS PANEL 0415

JOINS PANEL 0414



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 805 OF 4350

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CAVE CREEK, TOWN OF	040129	0805	F
CAREFREE, TOWN	040126	0805	F
MARICOPA COUNTY UNINCORPORATED AREAS	040037	0805	F

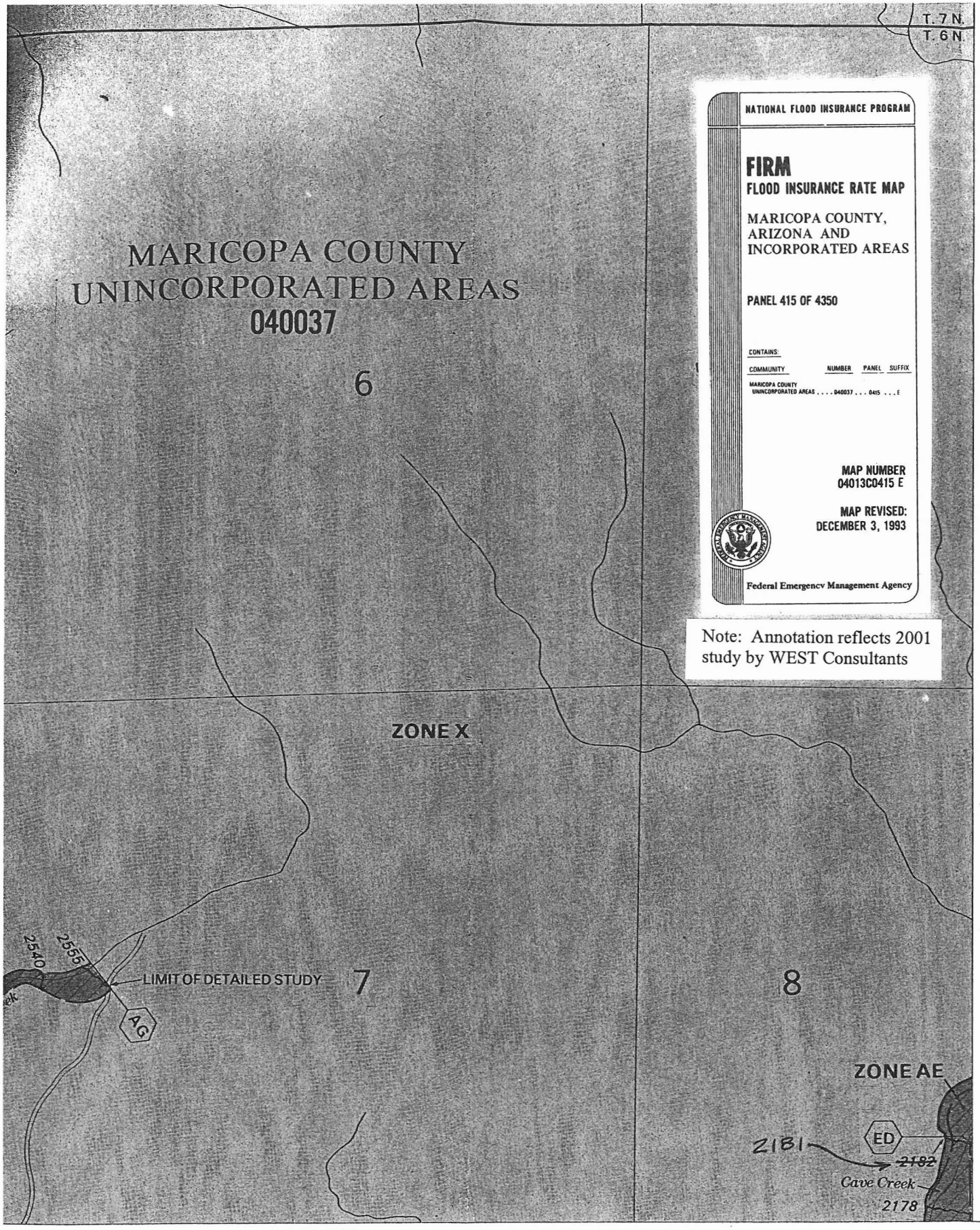
MAP NUMBER
04013C0805 F

MAP REVISED:
DECEMBER 3, 1993

Federal Emergency Management Agency

Note: Annotation reflects 2001 study by WEST Consultants

THIS AREA IS SHOWN ON MAP N



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 415 OF 4350

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY UNINCORPORATED AREAS	040037	0415	E

MAP NUMBER
04013C0415 E

MAP REVISED:
DECEMBER 3, 1993

Federal Emergency Management Agency

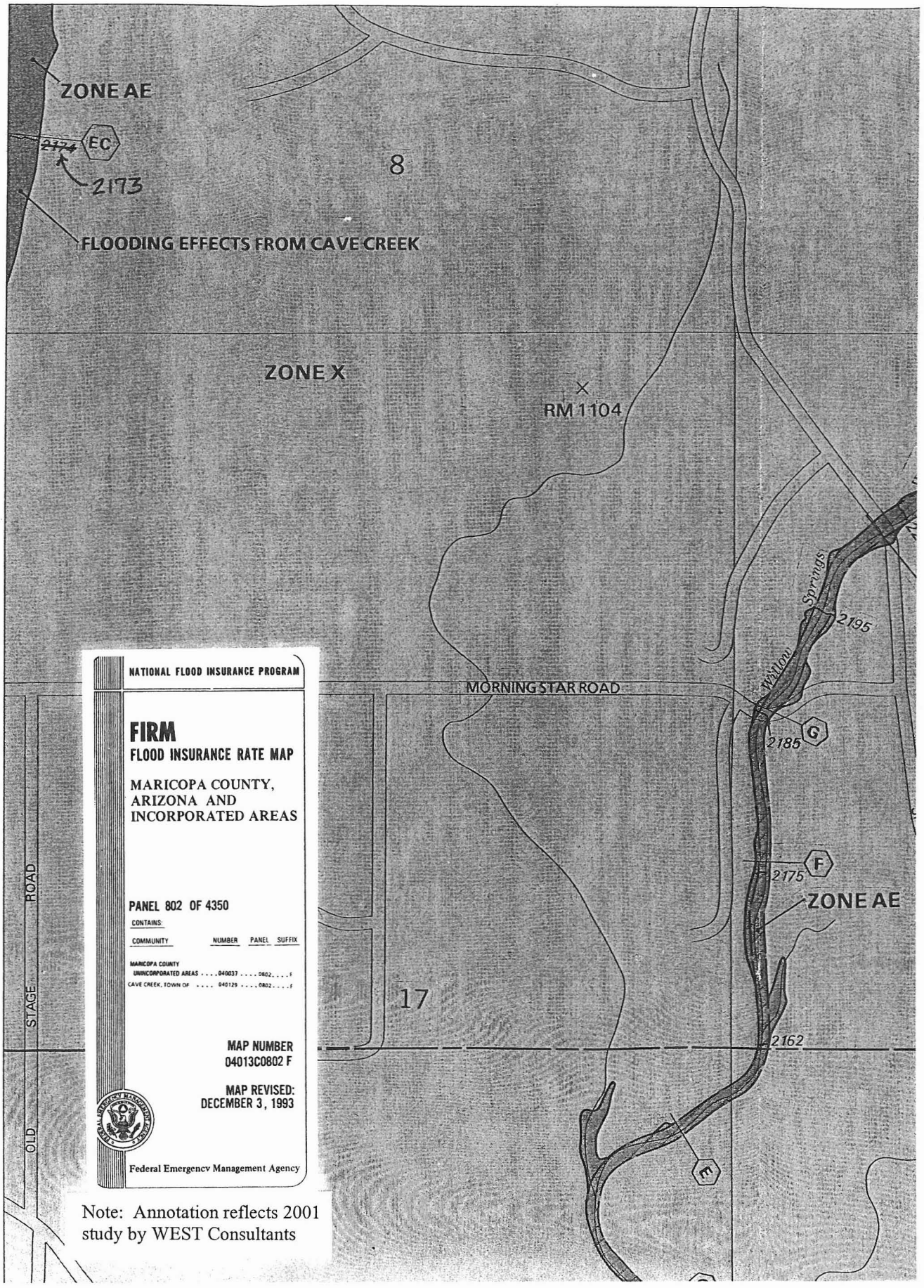
Note: Annotation reflects 2001 study by WEST Consultants

TH

JOINS PANEL 0805

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FT. NGVD)	DESCRIPTION OF LOCATION
RM138	2212.70	Rim of handhole at centerline intersection of School House Road and Highland Road.
RM139	2143.00	Top of pavement at centerline intersection of Spur Cross Road and Fleming Springs Road.
RM140	2146.97	Top of 3-inch angle iron at ground level, 209 feet south of stop sign at the southeast corner of Cahara Ranch Road and Spur Cross Road.



Note: Annotation reflects 2001 study by WEST Consultants