Federal Emergency Management Agency

LETTER OF MAP REVISION

ECHO CANYON WASH

Prepared by

DAVID EVANS AND ASSOCIATES, INC.
2929 East Camelback Road, Suite 240
Phoenix, Arizona 85016

Submitted by

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
2801 West Durango Street
Phoenix, Arizona 85009

Property of
Flood Control District of MC Library
Please Return to
2801 W. Durango
Phoenix, AZ 85009

Federal Emergency Management Agency

Washington, D.C. 20472

Property of
Flood Control District of MC Library
Please Return to
2801 W. Durango
Phoenix, AZ 85009

FLOOD CONTROL
RECEIVED
AUG 9 1996
DIR DE
ADMIN MGT
FINANCE FILE
C&M 1 UM
REMARKS

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Ed King
Chairman, Maricopa County
Board of Supervisors
301 West Jefferson Street, 10th Floor
Phoenix, Arizona 85003

IN REPLY REFER TO:
Case No.: 96-09-694P

Community: Maricopa County, Arizona
Community No.: 040037
Panels Affected: 04013C1670 E and
04013C1690 E
Effective Date of
This Revision: AUG 07 1996

102-D-A

Dear Mr. King:

This responds to a request for a revision to the effective Flood Insurance Study (FIS) and National Flood Insurance Program (NFIP) map for your community. Specifically, this responds to a letter dated July 17, 1996, from Mr. Hasan Mushtaq, Engineering Division, Flood Control District of Maricopa County, regarding the effective FIS report and Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. With his letter, Mr. Mushtaq provided additional information to support his April 15, 1996, request for a Letter of Map Revision (LOMR). Mr. Mushtaq requested that the Federal Emergency Management Agency (FEMA) revise the effective FIRM to show the effects of channel modifications along Echo Canyon Wash from approximately 1,650 feet upstream of 40th Street to its confluence with the Arizona Canal Diversion Channel.

All data required to complete our review of this request were submitted with Mr. Mushtaq's letters dated April 15, June 6, July 5, and July 17, 1996. Because this LOMR shows the effects of a publicly sponsored flood-control project that reduces flooding to existing development, fees were not assessed for the review.

We have completed our review of the submitted data and the flood data shown on the effective FIRM, and have revised the FIRM to modify the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along Echo Canyon Wash from approximately 50 feet upstream of 40th Street to approximately 50 feet downstream of 40th Street.

The width of the Special Flood Hazard Area and regulatory floodway remained the same along the above-described reach. The base flood elevations (BFEs) decreased along the above-described reach, with a maximum decrease of 1.5 feet occurring approximately 50 feet upstream of 40th Street.

The modification is shown on the enclosed annotated copies of FIRM Panels 04013C1670 E and 04013C1690 E; Profile Panels 134P, 134PA, 135P, 136P, and 137P; and the Floodway Data Table for Echo Canyon Wash. This LOMR hereby revises these panels of the effective FIRM and the Flood Profiles and Floodway Data Table in the FIS report, both dated September 30, 1995

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

Location	Existing BFE (feet)*	Modified BFE (feet)*
Echo Canyon Wash:		
Approximately 50 feet upstream of 40th Street	1,267	1,266
Approximately 50 feet downstream of 40th Street	1,266	1,265

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

Public notification of the proposed modified BFEs will be given in the *Arizona Republic* on or about August 22 and August 29, 1996. A copy of this notification is enclosed. In addition, a notice of changes will be published in the *Federal Register*.

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.

The revisions are effective as of the date of this letter; however, within 90 days of the second publication in the *Arizona Republic*, a citizen may request that FEMA reconsider the determination made by this LOMR. Any request for reconsideration must be based on scientific or technical data. All interested parties are on notice that, until the 90-day period elapses, the determination to modify the BFEs presented in this LOMR may itself be modified.

Because this project also affects the Town of Paradise Valley and the City of Phoenix, Arizona, separate LOMRs were issued on the same date as this LOMR for those communities.

The projected date for the next preliminary FIRM and FIS report for Maricopa County, Arizona and Incorporated Areas is fall 1996. The modifications of this LOMR will be incorporated at that time into FIRM Panels 04013C1670 E and 04013C1690 E.

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 response to Mr. Mushtaq's request is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development, including this request, and for ensuring that necessary permits required by Federal or State law have been received. With knowledge of local conditions and in the interest of safety, State and community officials may set higher standards for construction, or may limit development in floodplain areas. If the State of Arizona or your community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence.

The basis of this LOMR is, in whole or in part, a channel-modification project. NFIP regulations, as cited in Paragraph 60.3(b)(7), require that communities assure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management regulations. Consequently, the ultimate responsibility for maintenance of the modified channel rests with your community.

The map panels as listed above and as revised by this letter will be used for all flood insurance policies and renewals issued for your community.

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 NFIP criteria. These criteria are the minimum requirements and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM and FIS report to which the regulations apply and the modifications described in this LOMR.

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the Consultation Coordination Officer (CCO) for your community. Information on the CCO for your community may be obtained by contacting the Director, Mitigation Division of FEMA in San Francisco, California, at (415) 923-7177. If you have any technical questions regarding this LOMR, please contact Mr. John Magnotti of our staff in Washington, DC, either by telephone at (202) 646-3932 or by facsimile at (202) 646-4596.

Sincerely,

J. F. Magnotti III

Michael K. Buckley, P.E., Chief
for Hazard Identification Branch
Mitigation Directorate

Enclosures

cc: Mr. Hasan Mushtaq
Engineering Division
Flood Control District of Maricopa County

Mr. Raymond U. Acuña, P.E.
Floodplain Manager
City of Phoenix Street Transportation Department

Ms. Terri Miller
Program Coordinator
Engineering Division
Arizona Department of Water Resources

Mr. David George
Engineering Manager
David Evans & Associates, Inc.

CHANGES ARE MADE IN DETERMINATIONS OF BASE FLOOD ELEVATIONS FOR MARICOPA COUNTY, ARIZONA, UNDER THE NATIONAL FLOOD INSURANCE PROGRAM

On September 30, 1995, the Federal Emergency Management Agency (FEMA) identified Special Flood Hazard Areas in Maricopa County, Arizona, through issuance of a Flood Insurance Rate Map (FIRM).

The Mitigation Directorate 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 Maricopa County is appropriate. The modified base flood elevations (BFEs) revise the FEMA FIRM for the community.

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.

A hydraulic analysis was performed to incorporate channel modifications along Echo Canyon Wash and has resulted in lower BFEs along Echo Canyon Wash from approximately 50 feet upstream of 40th Street to approximately 50 feet downstream of 40th Street. The table below indicates the modified BFEs for two locations along the affected length of Echo Canyon Wash.

Location	Existing BFE (feet)*	Modified BFE (feet)*
Approximately 50 feet upstream of 40th Street	1,267	1,266
Approximately 50 feet downstream of 40th Street	1,266	1,265

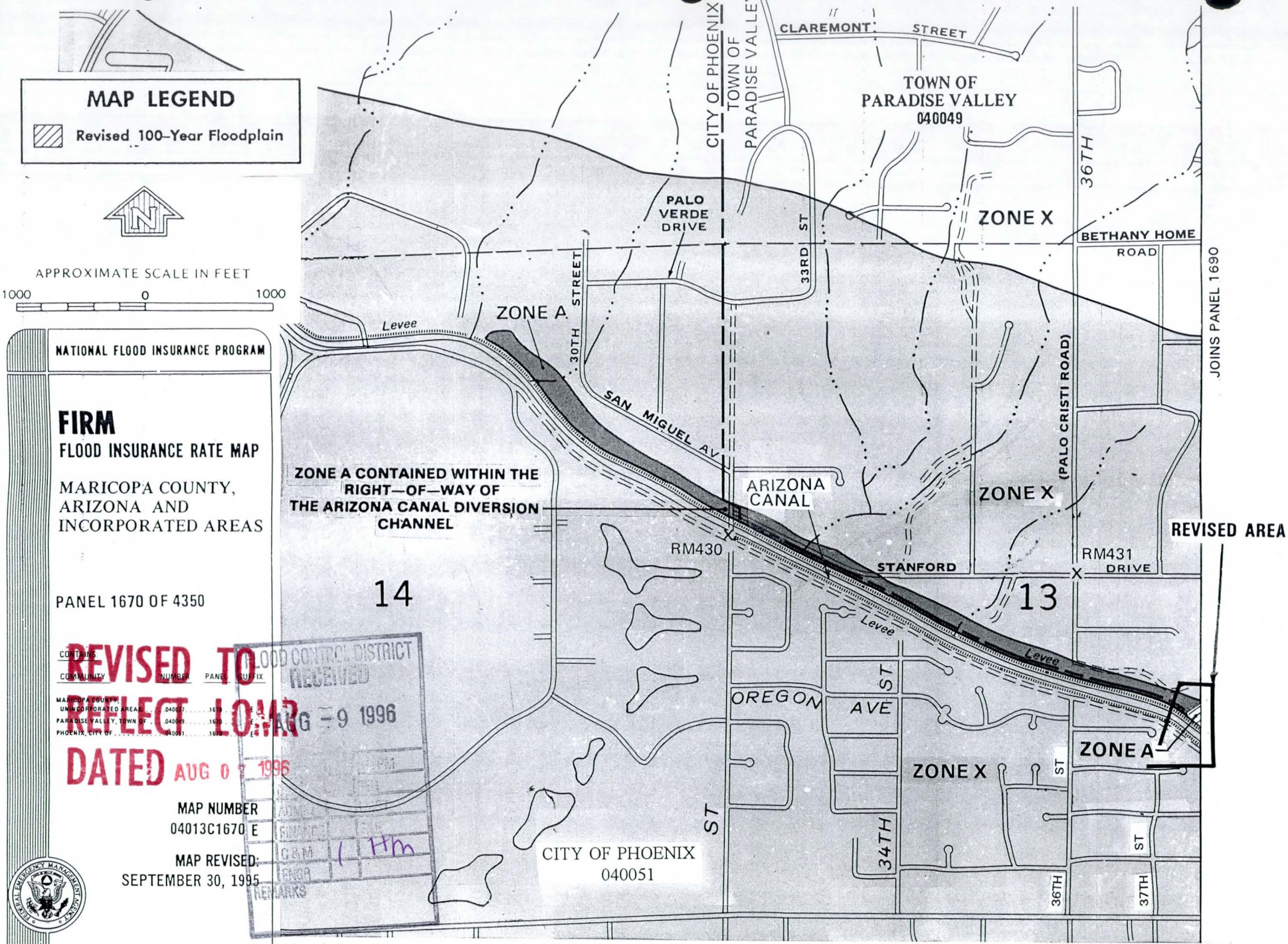
*National Geodetic Vertical Datum, rounded to nearest whole foot

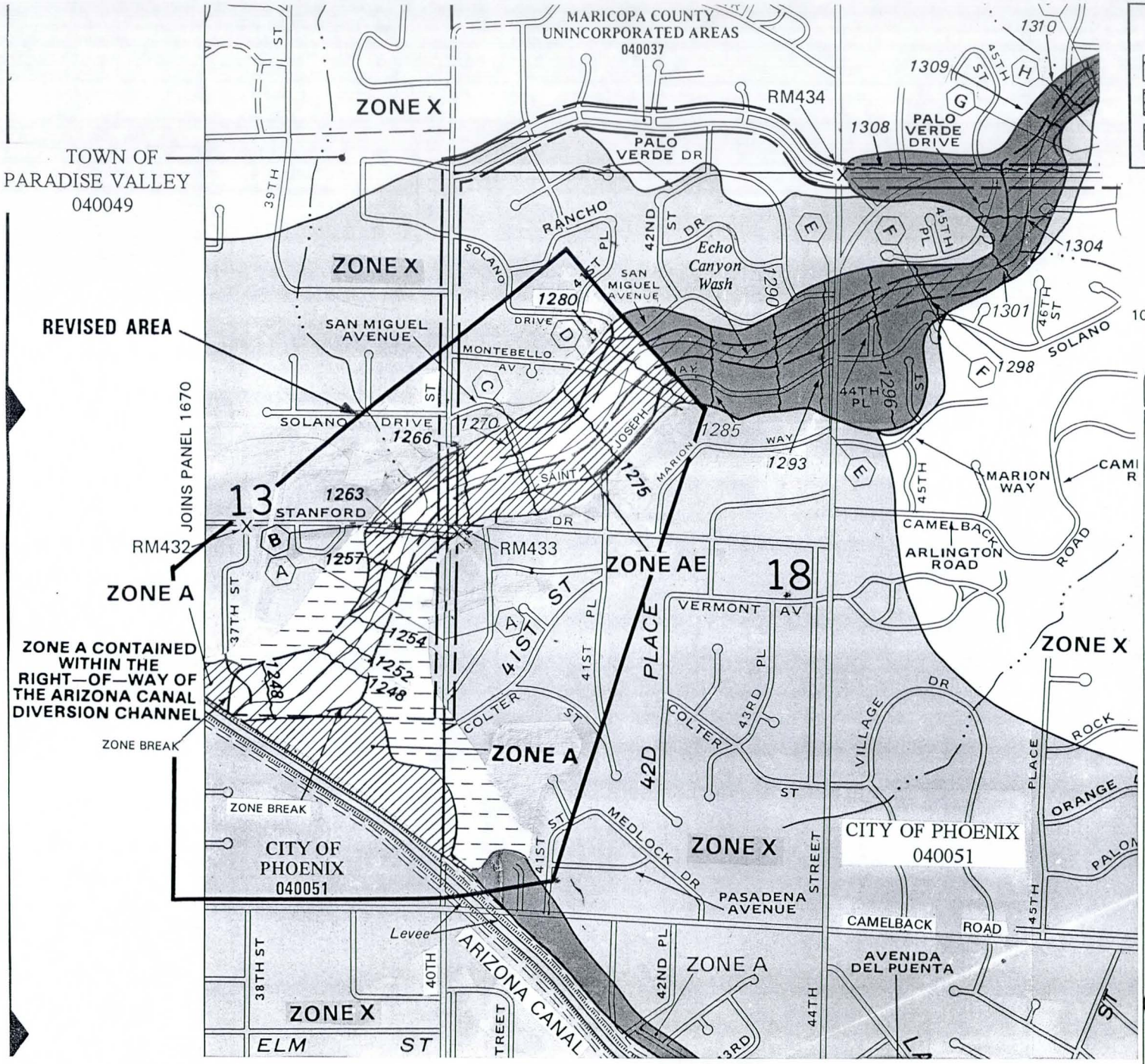
Under the above-mentioned Acts of 1968 and 1973, the Mitigation Directorate must develop criteria for floodplain management. For the community to participate in the National Flood Insurance Program (NFIP), the community must use the modified BFEs to administer the floodplain management measures of the 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 Mitigation Directorate 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 Mitigation Directorate'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 Ed King
Chairman, Maricopa County
Board of Supervisors
301 West Jefferson Street, 10th Floor
Phoenix, Arizona 85003


MAP LEGEND
Revised 100-Year Floodplain
APPROXIMATE SCALE IN FEET
1000 0 1000
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS
PANEL 1670 OF 4350
REVISED TO REFLECT LOMR DATED AUG 07 1996
MAP NUMBER
04013C1670 E
MAP REVISED:
SEPTEMBER 30, 1995
Federal Emergency Management Agency
CITY OF PHOENIX
TOWN OF PARADISE VALLEY
CLAREMONT STREET
TOWN OF PARADISE VALLEY
040049
PALO VERDE DRIVE
ZONE X
BETHANY HOME ROAD
36TH
33RD ST
30TH STREET
ZONE A
Levee
SAN MIGUEL AV
(PALO CRISTI ROAD)
JOINS PANEL 1690
ZONE A CONTAINED WITHIN THE RIGHT—OF—WAY OF THE ARIZONA CANAL DIVERSION CHANNEL
ARIZONA CANAL
ZONE X
REVISED AREA
RM430
STANFORD
RM431
DRIVE
14
13
Levee
OREGON AVE
ZONE A
ZONE X
34TH ST
CITY OF PHOENIX
040051
36TH ST
37TH ST
FLOOD CONTROL DISTRICT RECEIVED AUG 9 1996



MAP LEGEND

- Revised Floodway
- Revised 100–Year Floodplain
- Revised 500–Year Floodplain

APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 1690 OF 4350

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY UNINCORPORATED AREAS	040037	1690	E
PARADISE VALLEY, TOWN OF	040049	1690	E
PHOENIX, CITY OF	040051	1690	E
SCOTTSDALE, CITY OF	045012	1690	E

REVISED TO REFLECT LOMR DATED AUG 07 1996

MAP NUMBER
04013C1690 E

MAP REVISED:
SEPTEMBER 30, 1995

Federal Emergency Management Agency

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)			
Dreamy Draw Wash East								
A	0.04	250[2]	--[3]	--[3]	1,242.0	1,242.0	1,242.9	0.9
Echo Canyon Wash								
A	0.27	157	1,035	6.4	1.256.2	1.256.2	1,257.1	0.9
B	0.37	170	615	10.7	1,263.4	1,263.4	1,264.0	0.6
C	0.56	73	618	9.5	1,270.4	1,270.4	1,271.4	1.0
D	0.74[4]	205	1,172	5.0	1,278.7	1,278.7	1,279.6	0.9
E	1.04	210	1,501	3.9	1,293.1	1,293.1	1,293.5	0.4
F	1.19	180	1,169	5.0	1,298.0	1,298.0	1,298.3	0.3
G	1.43	150	635	7.8	1,308.4	1,308.4	1,308.9	0.5
H	1.49	150	377	11.9	1,310.2	1,310.2	1,310.7	0.5
I	1.54	150	734	6.1	1,314.4	1,314.4	1,314.4	0.0
J	1.60	150	774	5.8	1,316.1	1,316.1	1,316.1	0.0
K	1.71	150	729	6.2	1,317.6	1,317.6	1,318.0	0.4
L	1.86	150	451	8.0	1,321.9	1,321.9	1,322.8	0.9
M	2.02	150	609	4.9	1,327.5	1,327.5	1,327.5	0.0
Flynn Lane Wash								
A	0.05	350	--[3]	--[3]	1,244.3	1,244.3	1,244.7	0.4
B	0.21	250	--[3]	--[3]	1,259.8	1,259.8	1,259.9	0.1
C	0.34	200	--[3]	--[3]	1,272.5	1,272.5	1,273.0	0.5
D	0.53	400	--[3]	--[3]	1,290.1	1,290.1	1,291.1	1.0

REVISED DATA

[1]Miles Above Mouth [2]Combined Floodway for Dreamy Draw Wash East and Myrtle Avenue Wash
[3]Data Not Available
[4]Station 0.740 previously shown as station 0.710; subsequent cross sections require addition of 0.030 miles

REVISED TO REFLECT LOMR DATED AUG 07 1996

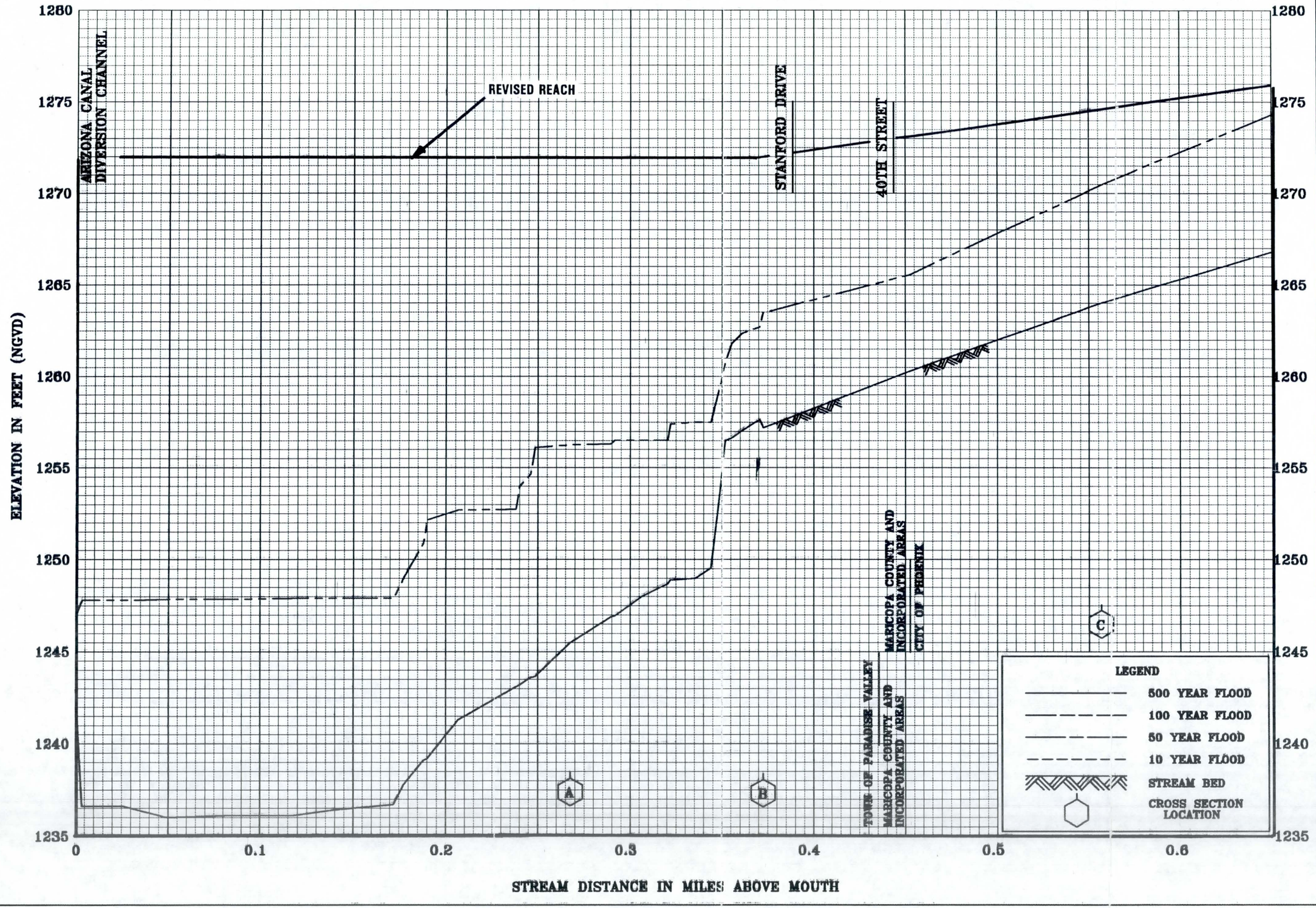
TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

DREAMY DRAW WASH EAST - ECHO CANYON WASH - FLYNN LANE WASH



REVISED TO REFLECT LOMR DATED AUG 07 1996

FLOOD PROFILES

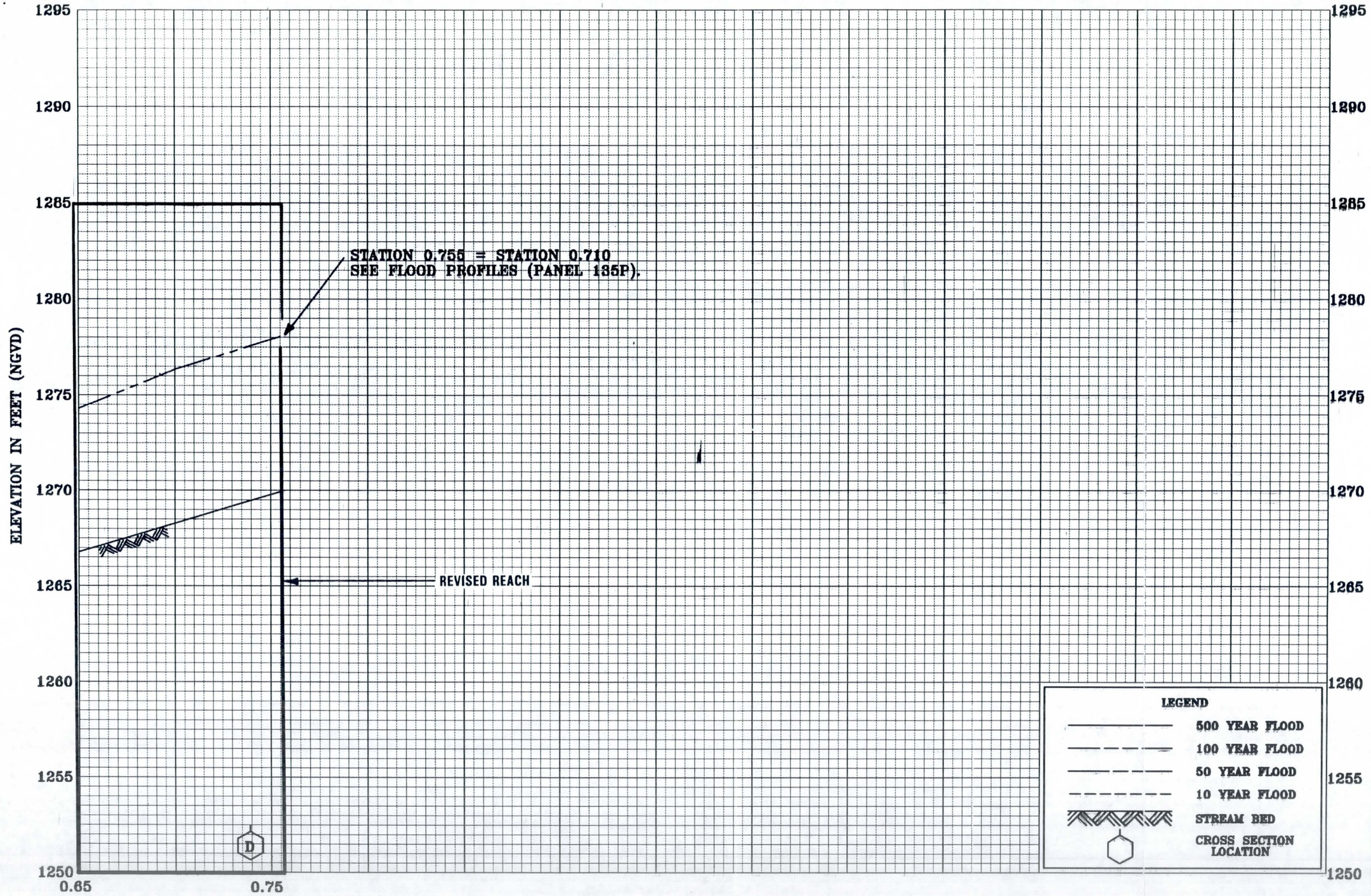
ECHO CANYON WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND UNINCORPORATED AREAS

134P



REVISED TO REFLECT LOMR DATED AUG 07 1996

FLOOD PROFILES

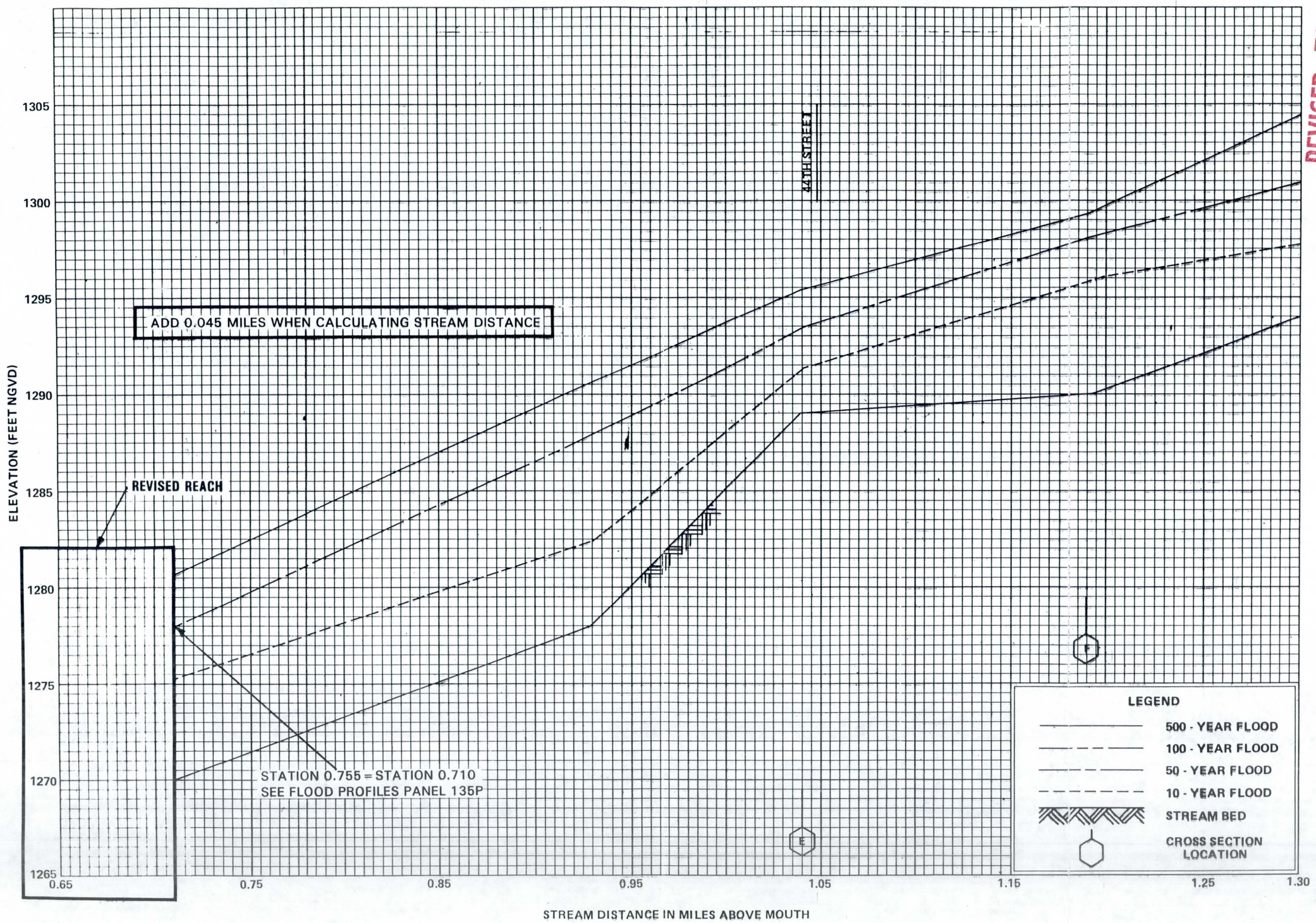
ECHO CANYON WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND UNINCORPORATED AREAS

134PA



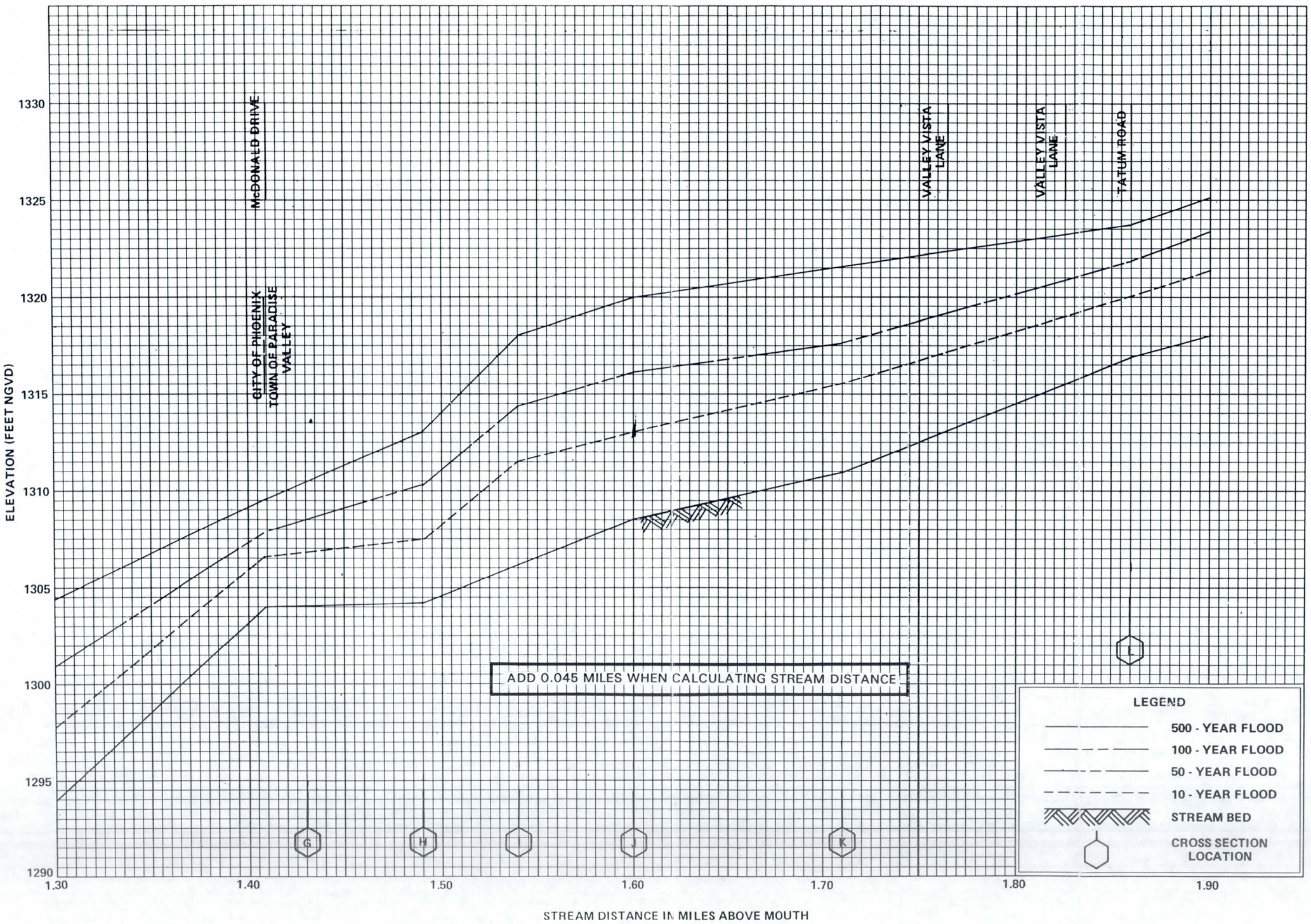
REVISED TO REFLECT LOMR DATED AUG 07 1996

FLOOD PROFILES

ECHO CANYON WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS



REVISED TO REFLECT LOMR DATED AUG 07 1996

FLOOD PROFILES

ECHO CANYON WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

REVISED TO REFLECT LOMR DATED AUG 07 1996

FLOOD PROFILES

ECHO CANYON WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

Introduction

David Evans and Associates was contracted by the Flood Control District of Maricopa County (FCDMC) to analyze a portion of Echo Canyon Wash and revise the Flood Insurance Rate Map (FIRM) as necessary. This new analysis has been performed due to the construction of the Arizona Canal/Diversion Channel (AC/DC) and the Echo Canyon Wash junction with the AC/DC. The improvements were constructed in 1994 by the US Corps of Engineers.

Area Studied

Detailed hydraulic analysis was performed at the Cudia City Sediment Basin which is located at the downstream portion of a previously studied reach of Echo Canyon Wash.

The AC/DC was constructed to convey runoff that ponds upstream of the Arizona Canal, an irrigation distribution canal in Phoenix. The Cudia City Sediment Basin, constructed at the upstream end of the AC/DC, is comprised of a large earthen detention facility, a concrete and rip-rap low flow channel with grassed overbank area, and an energy dissipation basin. The improvements extend to Stanford Drive, located approximately 2000 feet upstream of the entrance into the AC/DC.

More than one mile of natural or previously improved Echo Canyon Wash exists upstream of the Stanford Drive roadway crossing. This portion of the wash was not included in this restudy

Hydraulic Analysis

A duplicate effective model was prepared using the data available from FEMA. The effective HEC-2 model was provided to FCDMC on microfiche, however, the ground data (GR cards) for the three cross sections at the uppermost reach were not available. The missing cross sections are located 0.7 to 1.1 miles from the channel improvements.

The Manning 'n' coefficients utilized in the new analysis are 0.016 for the roadway and the concrete low flow channel, 0.035 for rip-rap side slopes, 0.03 for the grassed overbank, 0.03 for the earthen detention basin, and 0.04 and 0.10 for the natural wash bottom and overbank, respectively.

Changes were made to the Revised Conditions HEC-2 model to reflect an increase in GR information to cross sections 0.352 and 0.46 to eliminate or reduce the vertical extensions. The additional topographic information was obtained from the aerial photograph used in the construction of the ACDC. Exhibit A shows cross section 0.46 and Exhibit B shows cross section 0.352. The change resulted in a substantial reduction

in the vertical extension warnings. The Revised model does not contain any vertical extensions greater than 0.4 feet.

A revision was made to the Manning 'n' coefficient at cross section 0.46 determined from field investigation. The change was made from 0.08 in the overbank to 0.10 due to the extremely dense vegetation contained in the overbank.

Boundary Conditions

The starting water surface elevation for the HEC-2 model was established as the critical depth for the weir structure that forms the entrance to the ACDC. This elevation was 1248 (MSL). Due to better topographic information, 28 cross sections were modeled in the new analysis as compared to the three in the effective model. However, due to the configuration of the improvements, the revised sections do not line up with those in the previous study. The '0.373' cross section for the revised model is approximately 170' (0.032 miles) **downstream** of the '.37' cross section in the duplicate effective model. The reason for this is that the revised model began at cross section 0 which is at the inlet to the ACDC. Due to rechannelization, the channel for the detailed study is approximately 170' longer than the wash previously analyzed.

Results

A flood profile is included in the submittal package which shows that the revised profile ties into the duplicate effective profile between cross sections 0.51 and 0.71. The vertical difference at cross section 0.71 is 0.09' (1 inches).

FEDERAL EMERGENCY MANAGEMENT AGENCY **REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM**	*O.M.B. Burden No. 3067-0148* *Expires July 31, 1997*	*FEMA USE ONLY*

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2.13 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

1. OVERVIEW

1. The basis for this revision request is (are): *(check all that apply)*
   - ☒ Physical change
     - ☒ Existing
     - ☐ Proposed
   - ☐ Improved methodology
   - ☐ Improved data
   - ☒ Floodway revision
   - ☐ Other _____

   Explain _____

2. Flooding Source: Echo Canyon Wash
3. Project Name/Identifier: Cudia City Wash, Sediment Basin
4. FEMA zone designations affected: A4
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-30, VE, B, C, D, X)
5. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	County	State	Map No.	Panel No.	Effective Date
EX: 480301	Katy,City	Harris, Fort Bend	TX	480301	0005D	02/08/83
480287	Harris County	Harris	TX	48201C	0220G	09/28/90
040051	Phoenix, City	Maricopa	AZ	04013C	1690D	04/15/88
040049	Paradise Valley, Town	Maricopa	AZ	04013C	1690D	04/15/88

6. The area of revision encompasses the following types of flooding, structures, and associated disciplines: *(check all that apply)*

Types of Flooding
- ☒ Riverine
- ☐ Coastal
- ☐ Alluvial Fan
- ☐ Shallow Flooding *(e.g. Zones AO and AH)*
- ☐ Lakes

Affected by wind/wave action
- ☐ Yes
- ☐ No

Structures
- ☒ Channelization
- ☐ Levee/Floodwall
- ☐ Bridge/Culvert
- ☐ Dam
- ☐ Coastal
- ☐ Fill
- ☐ Pump Station
- ☐ None
- ☐ Channel Relocation
- ☐ Excavation
- ☐ Other *(describe)*

Disciplines*
- ☒ Water Resources
  - ☐ Hydrology
  - ☒ Hydraulics
  - ☐ Sediment Transport
  - ☐ Interior Drainage
- ☐ Structural
- ☐ Geotechnical
- ☐ Land Surveying
- ☐ Other *(describe)*

☐ Other(describe) _____

* Attach completed "Certification by Registered Professional Engineer and/or Land Surveyor" Form for each discipline checked. (Form 2)

2. FLOODWAY INFORMATION

7. Does the affected flooding source have a floodway designated on the effective FIRM or FBFM? ☐ Yes ☒ No
8. Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM ☐ Yes ☒ No

   If yes, give reason: _____

Attach copy of either a public notice distributed by the community stating the community's intent to revise the floodway or a statement by the community that it has notified all affected property owners and affected adjacent jurisdictions.

9. Does the State have jurisdiction over the floodway or its adoption by communities participating in the NFIP? ☐ Yes ☒ N

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.

3. PROPOSED ENCROACHMENTS

10. With floodways:

1A. Does the revision request involve fill, new construction, substantial improvement, or other development in the floodway? ☐ Yes ☐ No

1B. If yes, does the development cause the 100-year water surface elevation to increase at any location by more than 0.000 feet? ☐ Yes ☐ No

11. Without floodways:

2A. Does the revision request involve fill, new construction, substantial improvement, or other development in the 100-year floodplain? ☒ Yes ☐ No

2B. If yes, does the cumulative effect of all development that has occurred since the effective SFHA was originally identified cause the 100-year water surface elevation to increase at any location by more than one foot (*or other surcharge limit if community or state has adopted more stringent criteria*)? ☐ Yes ☒ No

If the answer to either Items 1B or 2B is yes, please provide documentation that all requirements of Section 65.12 of the NFIP regulations have been met, regarding evaluation of alternatives, notice to individual legal property owners, concurrence of CEO, and certification that no insurable structures are impacted.

4. REVISION REQUESTOR ACKNOWLEDGMENT

12. Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, and 72, I believe that the proposed revision ☒ is ☐ is not in compliance with the requirements of the aforementioned NFIP Regulations.

5. COMMUNITY OFFICIAL ACKNOWLEDGMENT

13. Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? ☒ Yes ☐ No

14. Does this revision request have the endorsement of the community? ☒ Yes ☐ No

If no to either of the above questions, please explain: _____

Please note that community acknowledgment and /or notification is required for all requests as outlined in Section 65.4 (b) of the NFIP Regulations.

6. OPERATION AND MAINTENANCE

15. Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☒ Yes ☐ No

If yes, please provide the following information for each of the new flood control structures:

A. Inspection of the flood control project will be conducted periodically by Flood Control District of (entity) Maricopa County with a maximum interval of three months between inspections.

B. Based on the results of scheduled periodic inspections, appropriate maintenance of the flood control facilities will be conducted by Flood Control District of Maricopa County (entity) to ensure the integrity and degree of flood protection of the structure.

C. A formal plan of operation, including documentation of the flood warning system, specific actions and assignments of responsibility by individual name or title, and provisions for testing the plan at intervals not less than one year, ☐ has ☐ has not been prepared for the flood control structure.

D. The community is willing to assume responsibility for ☒ performing ☐ overseeing compliance with the maintenance and operation plans of the Cudia City Wash Sediment Basin
(Name)

flood control structure. If not performed promptly by an owner other than the community, the community will provide the necessary services without cost to the Federal government.

Attach operation and maintenance plans See Attached

7. REQUESTED RESPONSE FROM FEMA

16. After examining the pertinent NFIP regulations and reviewing the document entitled "Appeals, Revisions, and Amendments to Flood Insurance Maps: A guide for Community Officials," dated January 1990, this request is for a:

_____a.	CLOMR	A letter from FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision *(LOMR or PMR)*, or proposed hydrology changes *(see 44 CFR Ch. I, Parts 60, 65, and 72)*.
XX b.	LOMR	A letter from FEMA officially revising the current NFIP map to show changes to floodplains, floodways, or flood elevations. LOMRs typically depict decreased flood hazards. *(See 44 CFR Ch. I Parts 60 and 65.)*
_____c.	PMR	A reprinted NFIP map incorporating changes to floodplains, floodways, or flood elevations. Because of the time and cost involved to change, reprint, and redistribute an NFIP map, a PMR is usually processed when a revision reflects increased flood hazards or large-scope changes. *(See 44 CFR Ch. I, Parts 60 and 65.)*
_____d.	Other:	Describe_____

8. FORMS INCLUDED

17. Form 2 entitled, "Certification By Registered Professional Engineer and/or Land Surveyor" must be submitted.

The following forms should be included with this request if (check the included forms):

• Hydrologic analysis for flooding source differs from that used to develop FIRM	☐ Hydrologic Analysis Form (Form 3)
• Hydraulic analysis for riverine flooding differs from that used to develop FIRM	☒ Riverine Hydraulic Analysis Form (Form 4)
• The request is based on updated topographic information or a revised floodplain or floodway delineation is requested	☒ Riverine /Coastal Mapping Form (Form 5)
• The request involves any type of channel modification	☒ Channelization Form (Form 6)
• The request involves new bridge or culvert or revised analysis of an existing bridge or culvert	☒ Bridge/Culvert Form (Form 7)
• The request involves a new revised levee/floodwall system	☐ Levee/Floodwall System Analysis Form (Form 8)
• The request involves analysis of coastal flooding	☐ Coastal Analysis Form (Form 9)
• The request involves coastal structures credited as providing protection from the 100-year flood	☐ Coastal Structures (Form 10)
• The request involves an existing, proposed, or modified dam	☐ Dam Form (Form 11)
• The request involves structures credited as providing protection from the 100-year flood on an alluvial fan	☐ Alluvial Fan Flooding Form (Form 12)

9. INITIAL REVIEW FEE

18. The minimum initial review fee for the appropriate request category has been included. ☐ Yes ☒ No

Initial fee amount: $ _____

Check or money order only. Make check or money order payable to : **National Flood Insurance Program.** .. paying by Visa or Mastercard please refer to the credit card information form which follows this form.

or

19. This request is for a project that is for public benefit and is primarily intended for flood loss reduction to insurable structures in identified flood hazard areas which were in existence prior to the commencement of construction of the flood control project. ☒ Yes ☐ No

or

20. This request is to correct map errors, to include the effects of natural changes within the areas of special flood hazard, or solely to provide more detailed data. ☐ Yes ☒ No

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

Signature of Revision Requester

Printed Name and Title of Revision Requester

Company Name

Telephone No. Date

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

William C. Mead

Signature of Community Official

WILLIAM C. MEAD P.E.
TOWN ENGINEER

Printed Name and Title of Community Official

TOWN OF PARADISE VALLEY

Community Name

MAY 7, 1996

Date

Does this request impact any other communities? ☒ Yes ☐ No

If yes, attach letters from all affected jurisdictions acknowledging revision request and approving changes to floodway, if applicable.

An additional Form 1, Page 4 of 4 is included as acknowledgement.

Note: Although a photograph of physical changes is not required, it may be helpful for FEMA's review.

9. INITIAL REVIEW FEE

18. The minimum initial review fee for the appropriate request category has been included. ☐ Yes ☐ No

Initial fee amount: $ _____

Check or money order only. Make check or money order payable to : **National Flood Insurance Program.** If paying by Visa or Mastercard please refer to the credit card information form which follows this form.

or

19. This request is for a project that is for public benefit and is primarily intended for flood loss reduction to insurable structures in identified flood hazard areas which were in existence prior to the commencement of construction of the flood control project. ☐ Yes ☐ No

or

20. This request is to correct map errors, to include the effects of natural changes within the areas of special flood hazard, or solely to provide more detailed data. ☐ Yes ☐ No

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

Signature of Revision Requester

Printed Name and Title of Revision Requester

Company Name

Telephone No. Date

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

Signature of Community Official

Printed Name and Title of Community Official

Community Name

Date

Does this request impact any other communities? ☐ Yes ☐ No

If yes, attach letters from all affected jurisdictions acknowledging revision request and approving changes to floodway, if applicable.

Note: Although a photograph of physical changes is not required, it may be helpful for FEMA's review.

FEDERAL EMERGENCY MANAGEMENT AGENCY

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR FORM

O.M.B. Burden No. 3067-0148
Expires July 31, 1997

FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average . 23 hour per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2
2. I am licensed with an expertise in Hydraulics
   [example: water resources *(hydrology, hydraulics, sediment transport, interior drainage)** structural, geotechnical, land surveying.]
3. I have 11 years experience in the expertise listed above.
4. I have ☐ prepared ☒ reviewed the attached supporting data and analyses related to my expertise.
5. I ☒ have ☐ have not visited and physically viewed the project.
6. In my opinion, the following analyses and /or designs, is/are being certified:
   Revised floodplain due to channelization and retention structure
7. Base upon the following review, the modifications in place have been constructed in general accordance with plans and specifications.

   Basis for above statement: (check all that apply)

   a. ☐ Viewed all phases of actual construction.
   b. ☐ Compared plans and specifications with as-built survey information.
   c. ☐ Examined plans and specifications and compared with completed projects.
   d. ☒ Other performed topographic survey to verify construction plans for use in floodplain delineation
8. All information submitted in support of this request is correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: David W. George
(please print or type)

Title: Engineering Manager
(please print or type)

Registration No. 23227 Expiration Date: 12/31/96

State Arizona

Type of License Civil Engineer

David W. George
Signature

12/20/95
Date

Registered Professional Engineer (Civil) CERTIFICATE NO 23227 DAVID W. GEORGE Date signed 12/20/95 ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

Note: Insert not applicable (N/A) when statement does not apply.

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE HYDRAULIC ANALYSIS FORM**	*O.M.B. Burden No. 3067-0148* *Expires July 31, 1997*	**FEMA USE ONLY**

PUBLIC BURDEN DISCLOSURE NOTICE

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.

Community Name: Maricopa County

Flooding Source: Echo Canyon Wash
(One form for each flooding source)

Project Name/Identifier: Cudia City Wash, Sediment Basin

1. REACH TO BE REVISED

Downstream limit: 0

Upstream limit: Half way between section .23 and .37 (Stanford Drive)

2. EFFECTIVE FIS

☐ Not studied

☐ Studied by approximate methods

Downstream limit of study _____

Upstream limit of study _____

☒ Studied by detailed methods

Downstream limit of study 00

Upstream limit of study 1.41

☐ Floodway delineated

Downstream limit of Floodway _____

Upstream limit of Floodway _____

3. HYDRAULIC ANALYSIS

Why is the hydraulic analysis different from that used to develop the FIRM. *(Check all that apply)*

☐ Not studied in FIS

☐ Improved hydrologic data/analysis. Explain: _____

☐ Improved hydraulic analysis. Explain: _____

☒ Flood control structure. Explain: Channelization and retention facility constructed as part of Cudia City Wash, Sediment Basin project

☐ Other. Explain: _____

For areas which have detailed flooding:

Full input and output listings along with files on diskette (if available) for each of the models listed below (items 1, 2, 3, 4, and 5) and summary of the source of input parameters used in the models must be provided. The summary must include a complete description of any changes made from model to model (e.g. duplicate effective model to corrected effective model) At a minimum, the Duplicate Effective (item 1) and the Revised or Post-Project Conditions (item 4) models must be submitted. See instructions for directions on when other models may be required.

For areas which do not have detailed flooding:

Only the 100-year flood profile is required. A hydraulic model is not required for areas which do not have detailed flooding; however, BFEs may not be added to the revised FIRM. If a hydraulic model is developed for the area, items 3 and 4 described below must be submitted.

If hydraulic models are not developed, hydraulic analyses for existing or pre-project conditions and revised or post-project conditions must be submitted. All calculations must be submitted for these analyses. (See item 6 below)

1. Duplicate Effective Model — Natural ☒ Floodway ☒

Copies of the hydraulic analysis used in the effective FIS, referred to as the effective models *(10-, 50-, 100-, and 500-year multi-profile runs and the floodway run)* must be obtained and then reproduced on the requestor's equipment to produce the duplicate effective model. This is required to assure that the effective model input data has been transferred correctly to the requestor's equipment and to assure that the revised data will be integrated into the effective data to provide a continuous FIS model upstream and downstream of the revised reach.

2. Corrected Effective Model — Natural ☐ Floodway ☐

The corrected effective model is the model that corrects any errors that occur in the duplicate effective model, adds any additional cross sections to the duplicate effective model, or incorporates more detailed topographic information than that used in the currently effective model. The corrected effective model must not reflect any man-made physical changes since the date of the effective model. An error could be a technical error in the modeling procedures, or any construction in the floodplain that occurred prior to the date of the effective model but was not incorporated into the effective model.

3. Existing or Pre-Project Conditions Model — Natural ☐ Floodway ☐

The duplicate effective or corrected model is modified to produce the existing or pre-project conditions model to reflect any modifications that have occurred within the floodplain since the date of the effective model but prior to the construction of the project for which the revision is being requested. If no modification has occurred since the date of the effective model, then this model would be identical to the corrected effective or duplicate effective model.

4. Revised or Post-Project Conditions Model — Natural ☒ Floodway ☒

The existing or pre-project conditions model *(or duplicate effective or corrected effective model, as appropriate)* is revised to reflect revised or post-project conditions. This model must incorporate any physical changes to the floodplain since the effective model was produced as well as the effects of the project. When the request is for proposed project this model should reflect proposed conditions.

5. Other: Please attach a sheet describing all other models submitted. — Natural ☐ Floodway ☐

6. Hydraulic Analyses (Only if Hydraulic Models are not developed)

Please attach all calculations for the existing or pre-project conditions and the revised or post-project conditions. Proceed to Form 5, "Riverine/Coastal Mapping Form".

4. MODEL PARAMETERS *(from model used to revise 100-year water surface elevation)*

1. Discharges:

	Upstream Limit	Downstream Limit
10-year		
50-year		
100-year	6600 cfs	6600 cfs
500-year		

Attach diagram showing changes in 100-year discharge – no changes

2. Explain how the starting water surface elevations were determined critical depth was utilized at weir structure

3. Give range of friction loss coefficients (*Manning's "N"*) Channel ..... 0016 – 0.035

Overbanks ..... 0.016 – 0.035

If friction loss coefficients are different anywhere along the revised reach from those used to develop the FIRM, give location, value used in the effective FIS, and revised values and an explanation as to how the revised values were determined.

Location	FIS	Revised
0.0	0.05	0.03 to 0.035
0.02	0.05	0.03
0.23	0.05	0.016 to 0.035
0.37	0.05 to 0.16	0.016 to 0.035

Explain: Channel composed of concrete bottom, riprap side slopes, and grassed overbank. Retention basin composed of excavated earth. The cross-section ID's do not match exactly between effective model & post-project conditions model due to rechannelization.

4. Describe how the cross section geometry data were determined *(e.g., field survey, topographic map, taken from previous study)* and list cross sections that were added.

Topographic maps and detailed field survey data

5. Were natural channel banks selected as the location of the left and right channel banks in the model?

☒ Yes ☐ No If no, explain why not:

6. Explain how reach lengths for channel and overbanks were determined:

Measured from survey maps, channel and overbanks are well defined

5. RESULTS (*from model used to revise 100-year water surface elevations*)

1. Do the results indicate:

a. Water surface elevations higher than end points of cross sections? ☒ Yes ☐ No

b. Supercritical depth? ☒ Yes ☐ No

c. Critical depth? ☒ Yes ☐ No

d. Other unique situations ☐ Yes ☐ No

If yes to any of the above, attach an explanation that discusses the situation and how it is presented on the profiles, tables, and maps.

2. What is the maximum change in energy gradient between cross-sections? 5.41

Specify location 0.51

3. What is the distance between the cross-sections in 2 above? 550'

4. What is the maximum distance between cross-sections? 550'

Specify location 0.51

5. Floodway determination

a. What is the maximum surcharge allowed by the community or State? 1.0 foot

b. What is the maximum surcharge for the revised conditions? 2.18 foot

Specify location 0.51

c. What is the maximum velocity? 1287 fps

Specify location 0.248

d. Are there any negeative surcharge values at any cross-section? ☒ Yes ☐ No

If yes, the floodway may need to be widened. If it is not widened, please explain and indicate the maximum negative surcharge.

Explain: The negative surcharges are negligible (-0.04')

6. Is the discharge value used to determine the floodway anywhere different from that used to determine the natural 100-year flood elevations? ..... ☐ Yes ☐ No

If Yes, explain:

7. Do 100-year water surface elevations increase at any location? ..... ☐ Yes ☒ No

If yes, please attach a list of the locations where the increases occur, state whether or not the increases are located on the requestor's property, and provide an explanation of the reason for the increases. *(For example: State if the increase is due to fill placed within the floodway fringe or placed within the currently adopted floodway limits)*

Please attach a completed comparison table entitled: Water Surface Elevation Check (See page 6)

6. REVISED FIRM/FBFM AND FLOOD PROFILES

A. The revised water surface elevations tie into those computed by the effective FIS Model *(10-, 50-, 100-, and 500-year)*, downstream of the project at cross-section revision begins @ D/S end of study area within _____ feet *(vertical)* and upstream of the project at cross section 530 d/s of x-section 0.51 within 0.0 feet *(vertical)*.

B. The revised floodway elevations tie into those computed by the effective FIS model, dowstream of the project at cross section revision begins @ d/s end of study area within _____ feet *(vertical)* and upstream of the project at cross section 0.51 within 0.66 feet *(vertical)*.

Note: The duplicate effective model has a surcharge value of 3.35' @ 0.51

C. Attach profiles, at the same vertical and horizontal scale as the profiles in the effective FIS report, showing stream bed and profiles of all floods studied (without encroachment). Also, label all cross sections, road crossings (including low chord and top-of-road data), culverts, tributaries, corporate limits, and study limits. If channel distance has changed, the stationing should be revised for all profile sheets.

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

Proceed to Riverine /Coastal Mapping Form

FEDERAL EMERGENCY MANAGMENT AGENCY

WATER SURFACE ELEVATION CHECK

COMMUNITY NAME	FLOODIND SOURCE	PROJECT NAME /IDENTIFIER
Maricopa County	Echo Canyon Wash	Cudia City Wash, Sediment Basi

	EFFECTIVE			DUPLICATE EFFECTIVE			CORRECTED EFFECTIVE			EXISTING/PRE-PROJECT			REVISED/PROJECT		
SECNO	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]
0				50.05	50.10	0.05							46.90	41.90	1.00
0.003													47.78	48.41	0.64
0.02				51.29	51.26	-0.03									
0.026													47.81	48.44	0.63
0.049													47.85	48.47	0.63
0.081													47.87	48.49	0.62
0.117													47.89	48.51	0.62
0.139													47.89	48.51	0.62
0.172													47.87	48.49	0.62
0.178													49.07	49.03	-0.04
0.188													50.89	50.88	-0.01
0.190													52.17	52.16	-0.01
0/206													52.72	52.72	0.00

COMMENTS:

1-100-year (natural) Water Surface Elevation 2-Encroachment (floodway) Water Surface Elevation 3-Surcharge Value

Include all cross sections in the models between tie-in points. Any interpolated values should be indicated in parentheses.

FEDERAL EMERGENCY MANAGMENT AGENCY

WATER SURFACE ELEVATION CHECK

COMMUNITY NAME	FLOODIND SOURCE	PROJECT NAME /IDENTIFIER
Maricopa County	Echo Canyon Wash	Cudia City Wash, Sediment Basin

	EFFECTIVE			DUPLICATE EFFECTIVE			CORRECTED EFFECTIVE			EXISTING/PRE-PROJECT			REVISED/PROJECT		
SECNO	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]
0.23				57.07	58.63	1.56									
0.238													52.75	52.74	-0.01
0.240													54.00	53.96	-0.03
0.246													54.67	54.83	0.16
0.248													56.09	57.06	0.97
0.268													56.23	57.18	0.95
0.289													56.28	57.19	0.91
0.291													56.50	57.96	0.96
0.307													56.20	56.89	0.69
0.320													56.37	57.12	0.76
0.322													57.40	58.36	0.96
0.336													57.52	58.49	0.98
0.344													57.49	58.50	1.01

COMMENTS:

1-100-year (natural) Water Surface Elevation 2-Encroachment (floodway) Water Surface Elevation 3-Surcharge Value

Include all cross sections in the models between tie-in points. Any interpolated values should be indicated in parentheses.

FEDERAL EMERGENCY MANAGMENT AGENCY

WATER SURFACE ELEVATION CHECK

COMMUNITY NAME	FLOODIND SOURCE	PROJECT NAME /IDENTIFIER
Maricopa County	Echo Canyon Wash	Cudia City Wash, Sediment Basin

	EFFECTIVE			DUPLICATE EFFECTIVE			CORRECTED EFFECTIVE			EXISTING/PRE-PROJECT			REVISED/PROJECT		
SECNO	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]
0.352													60.79	61.31	0.52
0.356													61.81	61.89	0.08
0.361													62.37	62.61	0.24
0.37				65.67	64.54	-1.13									
0.370													62.71	63.03	0.32
0.373													63.45	64.32	0.88
0.46													65.61	66.42	0.81
0.51				70.58	73.93	3.35							71.09	73.27	2.18

COMMENTS:

Cross-section 0.37 on duplicate effective model is approximately 170' upstream of cross-sectiomn 0.373 on revised model

The revised HEC-2 model used the same floodway width of 73.0 at x-section 0.51 which resulted in a surcharge of 2.18'.

1-100-year (natural) Water Surface Elevation 2-Encroachment (floodway) Water Surface Elevation 3-Surcharge Value

Include all cross sections in the models between tie-in points. Any interpolated values should be indicated in parentheses.

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE/COASTAL MAPPING FORM**	*O.M.B. Burden No. 3067-0148* *Expires July 31, 1997*	*FEMA USE ONLY*

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.

Community Name: Maricopa County

Flooding Source: Echo Canyon Wash

Project Name/Identifier: Cudia City Wash, Sediment Basin

1. MAPPING CHANGES

1. A topographic work map of suitable scale, contour interval, and planimetric definition must be submitted showing *(indicate N/A when not applicable)*:

		Included		
A.	Revised approximate 100-year floodplain boundaries (Zone A)	☒ Yes	☐ No	☐ N/A
B.	Revised detailed 100- and 500-year floodplain boundaries	☐ Yes	☐ No	☒ N/A
C.	Revised 100-year floodway boundaries	☐ Yes	☐ No	☒ N/A
D.	Location and alignment of all cross sections used in the revised hydraulic model with stationing control indicated	☒ Yes	☐ No	☐ N/A
E.	Stream alignments, road and dam alignments	☒ Yes	☐ No	☐ N/A
F.	Current community boundaries	☐ Yes	☐ No	☒ N/A
G.	Effective 100- and 500-year floodplain and 100-year floodway boundaries from the FIRM/FBFM reduced or enlarged to the scale of the topographic work map	☒ Yes	☐ No	☐ N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	☒ Yes	☐ No	☐ N/A
I.	The requestor's property boundaries and community easements	☐ Yes	☐ No	☒ N/A
J.	The signed certification of a registered professional engineer	☒ Yes	☐ No	☐ N/A
K.	Location and description of reference marks	☒ Yes	☐ No	☐ N/A
L.	Vertical datum (example: NGVD, NAVD etc.)	☒ Yes	☐ No	☐ N/A
M.	Coastal zone designations tie into adjacent areas not being revised	☐ Yes	☐ No	☒ N/A
N.	Location and alignment of all coastal transects used to revise the coastal analyses	☐ Yes	☐ No	☒ N/A

If any of the items above are marked no or N/A, please explain: Zone A (500-yr floodplain not delineated),

2. What is the source and date of the updated topographic information *(example: orthophoto maps, July 1985; field survey, May 1979, beach profiles, June 1987, etc.)*? _____

3. What is the scale and contour interval of the following workmaps?
   a. Effective FIS 1"= 1000' scale _____ Contour interval
   b. Revision Request 1"= 40' scale _____ Contour interval

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

4. Attach an annotated FIRM and FBFM at the scale of the effective FIRM and FBFM showing the revised 100-year and 500-year floodplains and the 100-year floodway boundaries and how they tie into those shown on the effective FIRM and FBFM downstream and upstream of the revision or adjacent to the area of revision for coastal studies.

   Attach additional pages if needed.

5. Flood Boundaries and 100-year water surface elevations:

Has the 100-year floodplain been shifted or increased or the 100-year water surface elevation increased at any location on property other than the requestor's or community's? ☐ Yes ☒ No

If yes, please give the location of shift or increase and an explanation for the increase.

a. Have the affected property owners been notified of this shift or increase and the effect it will have on their property? ☐ Yes ☐ No

If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries if a LOMR is being requested.

b. What is the number of insurable structures that will be impacted by this shift or increase? _____

6. Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM? ☐ Yes ☒ No

If yes, explain:

With the construction of the Cudia City Wash Sediment Basin, the floodway is directed to the westerly direction in the lower portion, instead of south-westerly direction as shown on the current FIRM.

7. If a V- zone has been designated, has it been delineated to extend landward to the heel of the primary frontal dune? ☐ Yes ☐ No N/A

If no, explain:

8. Manual or digital map submission:

☐ Manual

☒ Digital

Digital map submissions may be used to update digital FIRMs (DFIRMs). For updating DFIRMs, these submissions must be coordinated with FEMA Headquarters as far in advance of submission as possible.

2. EARTH FILL PLACEMENT No fill placed

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.

3. Has fill been/will be placed in floodway fringe *(area between the floodway and 100-year floodplain boundaries)*? ..... ☐ Yes ☐ No

   If yes, then complete A, B, C, and D below.

   A. Are fill slopes for granular materials steeper than one vertical on one-and-one-half horizontal? ..... ☐ Yes ☐ No

      If yes, justify steeper slopes_____

      _____

   B. Is adequate erosion protection provided for fill slopes exposed to moving flood waters? *(Slopes exposed to flows with velocities of up to 5 feet per second (fps) during the 100-year flood must, at a minimum, be protected by a cover of grass, vines, weeds, or similar vegetation; slopes exposed to flows with velocities greater than 5 fps during the 100-year flood must, at a minimum, be protected by stone or rock riprap.)* ..... ☐ Yes ☐ No

      If no, describe erosion protection provided_____

      _____

   C. Has all fill placed in revised 100-year floodplain been compacted to 95 percent of the maximum density obtainable with the Standard Proctor Test Method or acceptable equivalent method? ☐ Yes ☐ No

   D. Can structures conceivably be constructed on the fill at any time in the future? ☐ Yes ☐ No

   If yes, provide certification of fill compaction (item C. above) by the community's NFIP permit official, a registered professional engineer, or an accredited soils engineer.

4. Has fill been/will be placed in a V-zone? ☐ Yes ☐ No

   If yes, is the fill protected from erosion by a flood control structure such as a revetment or seawall? ☐ Yes ☐ No

   If yes, attach the coastal structures form.

FEDERAL EMERGENCY MANAGEMENT AGENCY **CHANNELIZATION FORM**	*O.M.B. Burden No. 3067-0148* *Expires July 31, 1997*	FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1.75 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

Community Name: Maricopa County

Flooding Source: Echo Canyon Wash

Project Name/Identifier: Cudia City Wash, Sediment Basin

1. EXTENT OF CHANNELIZATION

Downstream limit: 0

Upstream limit: Halfway between section .23 and .37 (Stanford Drive)

2. CHANNEL DESCRIPTION

1. Describe the inlet to the channel Rip Rap embankment into a retention basin which then outlets into the low flow channel and overbank soccer fields

2. Briefly describe the shape of the channel *(both cross sectional and planimetric configuration)* and its lining *(channel bottom and sides)* The low flow channel has 20' concrete bottom, 3:1 rip rap side slopes to depth of approximately 8', grassed overbank approximately 100' to 220' wide

3. Describe the outlet from the channel The channel outlets into a 650' by 300' retention basin that has a low flow culvert and weir structure that leads to a concrete diversion channel (the Arizona Canal Diversion Channel-ACDC)

4. The channelization includes:

   - ☐ Levees *(Attach Levee Form)*
   - ☐ Drop structures
   - ☐ Superelevated sections
   - ☒ Transitions in cross sectional geometry
   - ☒ Debris basin/detention basin
   - ☐ Energy dissipater
   - ☐ Other

5. Attach the following:

   a. Certified engineering drawings showing channel alignment and locations of inlet, outlet, and items checked in item 4

   b. Typical cross sections and profiles of channel banks and invert

3. HYDRAULIC CONSIDERATIONS

1. What is the 100-year discharge? ..... 6600 cfs
2. Do the cross sections in the hydraulic model match the typical cross sections in the plans? ☒ Yes ☐ No
3. Are the channel banks higher than the 100- year flood elevations everywhere? ..... ☐ Yes ☒ No
4. Are the channel banks higher than the 100-year flood energy grade lines everywhere? .. ☐ Yes ☒ No
5. Is the land on both sides of the channel above the adjacent 100-year flood elevation at all points along the channel? ..... ☐ Yes ☒ No
6. What is the range of freeboard? ..... 0 — 5.6 feet
7. What is the range of the 100-year flood velocities? ..... 1.41 - 11.22 ft/sec
8. What is the lining type? (both bottom and sides) concrete, rip rap

   Explain how the channel lining prevents erosion and maintains channel stability *(attach documentation)*

   concrete and rip rap linings provide ample protection from design velocities

9. What is the design elevation in the channel based on?

   ☒ Subcritical flow
   ☐ Critical flow
   ☐ Supercritical flow
   ☐ Energy grade line

   Is 100-year flood profile based on the above type of flow? ..... ☒ Yes ☐ No

   If no, explain:

10. Is there the potential for a hydraulic jump at the following locations?

    Inlet to channel ..... ☒ Yes ☐ No
    Outlet of channel ..... ☐ Yes ☒ No
    At Drop Structures ..... ☐ Yes ☐ No N/A
    At Transitions ..... ☐ Yes ☒ No
    Other locations. Explain: at bridges

    If the answer to any of the above is yes, please explain how the hydraulic jump is controlled and the effects of the hydraulic jump on the stability of the channel.

    Explain: A hydraulic jump is expected to occur at cross section 0.356 and the channel is protected by rip rap lining and a 100' x 100' sediment basin. Hydraulic jumps could occur at the bridge crossings but will quickly revert to subcritical flow D/S of crossing due to continuous slope. Channel is protected between the two retention basins by use of concrete and rip rap.

4. SEDIMENT TRANSPORT CONSIDERATIONS

1. A. Is there any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year water surface elevations and/or the capacity of the channel? ..... ☐ Yes ☒ No

   B. Based on the conditions of the watershed and stream bed, is there a potential for sediment transport (including scour and deposition) to affect the 100-year water surface elevations and /or the capacity of the channel? ..... ☐ Yes ☒ No

2. If the answer to either 1A or 1B is yes:

   A. What is the estimated sediment (bed) load?
   _____cfs (attach gradation curve)

   Explain method used to estimate load_____

   _____

   _____

   _____

   _____

   B. Is the 100-year flood velocity anywhere within the channel less than the 100-year flood velocity of the inlet? ☐ Yes ☐ No

   C. Will sediment accumulate anywhere within the channel? ☐ Yes ☐ No

   D. Will deposition or scour occur at or near the inlet? ☐ Yes ☐ No

   E. Will deposition or scour occur at or near the outlet? ☐ Yes ☐ No

Attach documentation showing affects on the Hydrologic and Hydraulic analyses

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT FORM**	*O.M.B. Burden No. 3067-0148* *Expires July 31, 1997*	FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

Community Name: Maricopa County

Flooding Source: Echo Canyon Wash

Project Name/Identifier: Cudia City Wash, Sediment Basin

1. IDENTIFIER

1. Name of roadway, railroad, etc.: Pedestrian bridges over channel improvements
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): Cross section 0.190
3. This revision reflects *(check one of the following)*:
   - [x] New bridge/culvert not modeled in the FIS
   - [ ] Modified bridge/culvert previously modeled in the FIS
   - [ ] New analysis of bridge/culvert previously modeled in the FIS

   (Explain why new analysis was performed)

2. BACKGROUND

Provide the following information about the structure:

1 Dimension, material, and shape (e.g. two 10 x 5 feet reinforced concrete box culvert; three 30-foot span bridge with 2 rows of two 3- foot diameter circular piers; 40-foot wide ogee shape spillway) One 67-foot span bridge.

2. Entrance geometry of culvert/type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments) Sloping embankments, 0° skew.

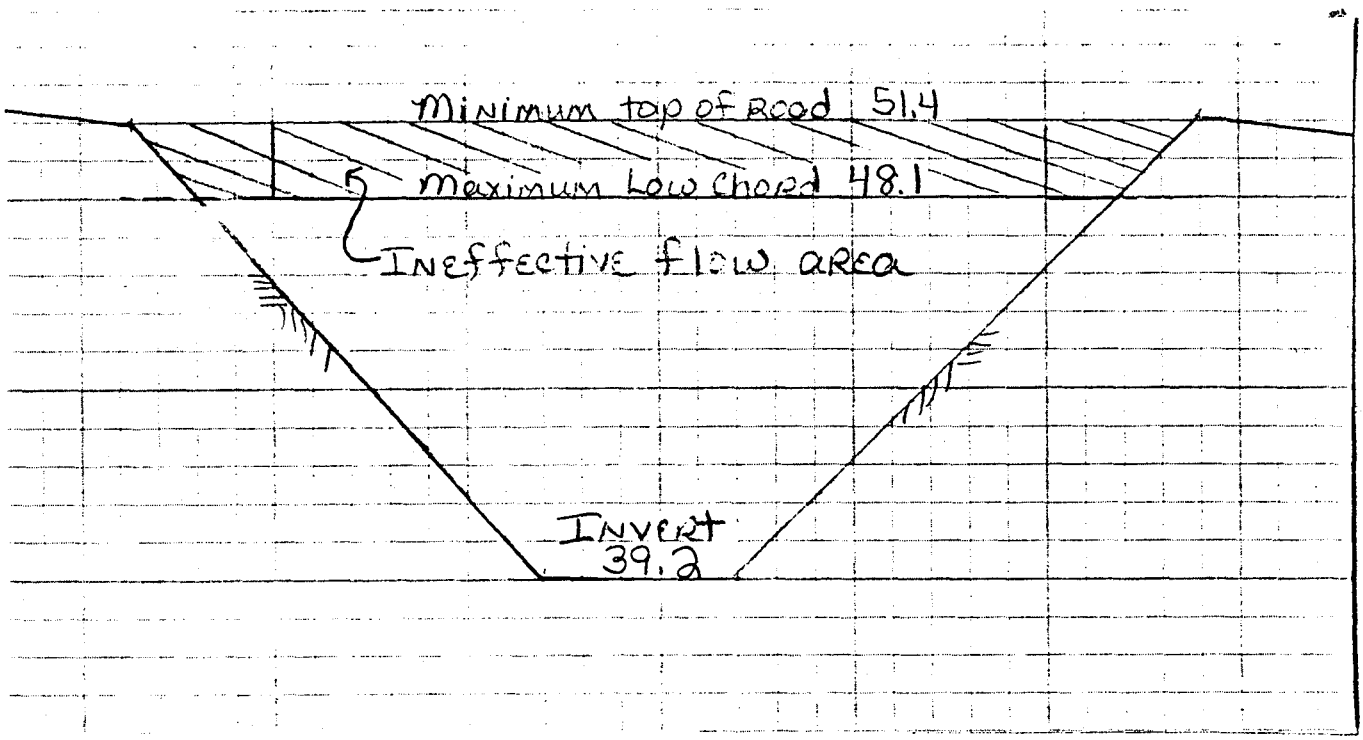
3. Hydraulic model used to analyze the structure (*e.g., HEC-2 with special bridge routine, WSPRO, HY8*) HEC - 2 with special bridge routine.

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*
The pedestrian bridges had not been constructed when effective model was prepared.

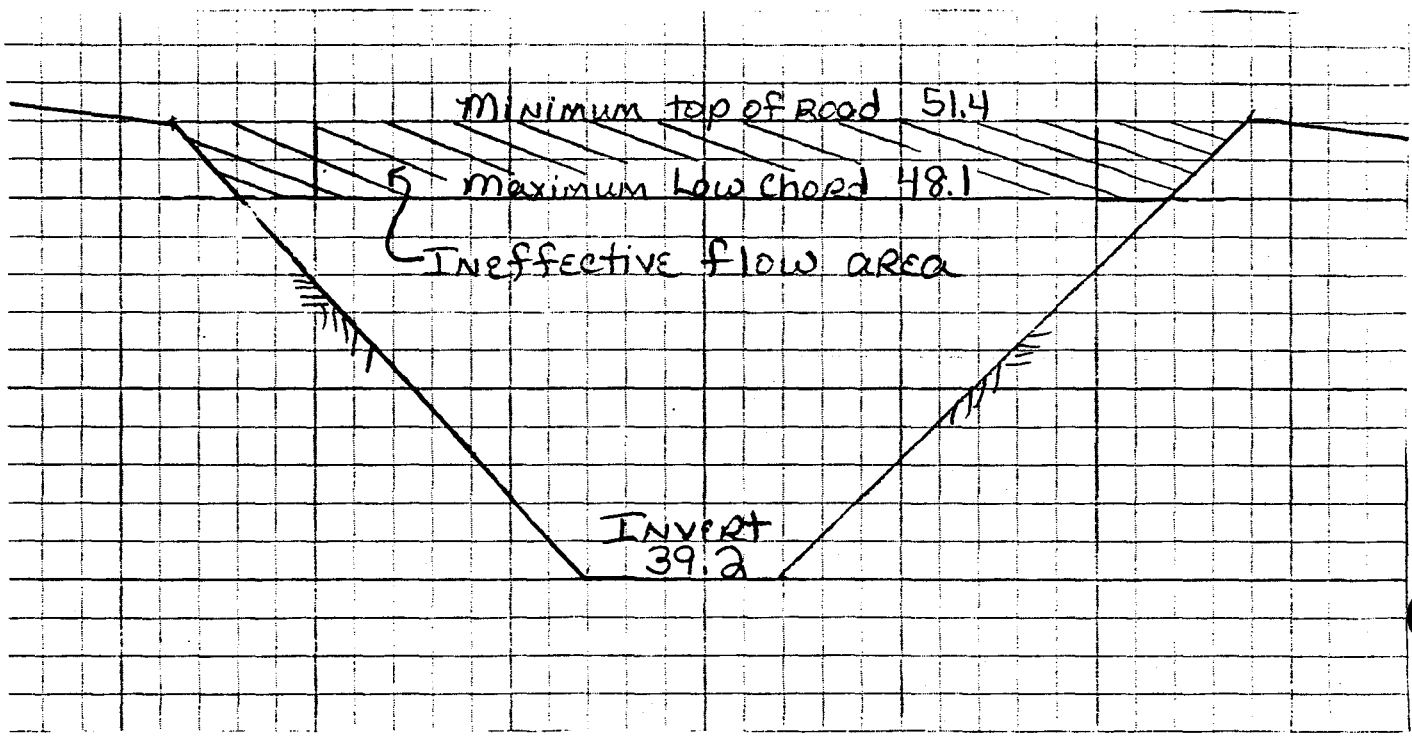
Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A
*** One form per new/revised bridge/culvert**

3. ANALYSIS

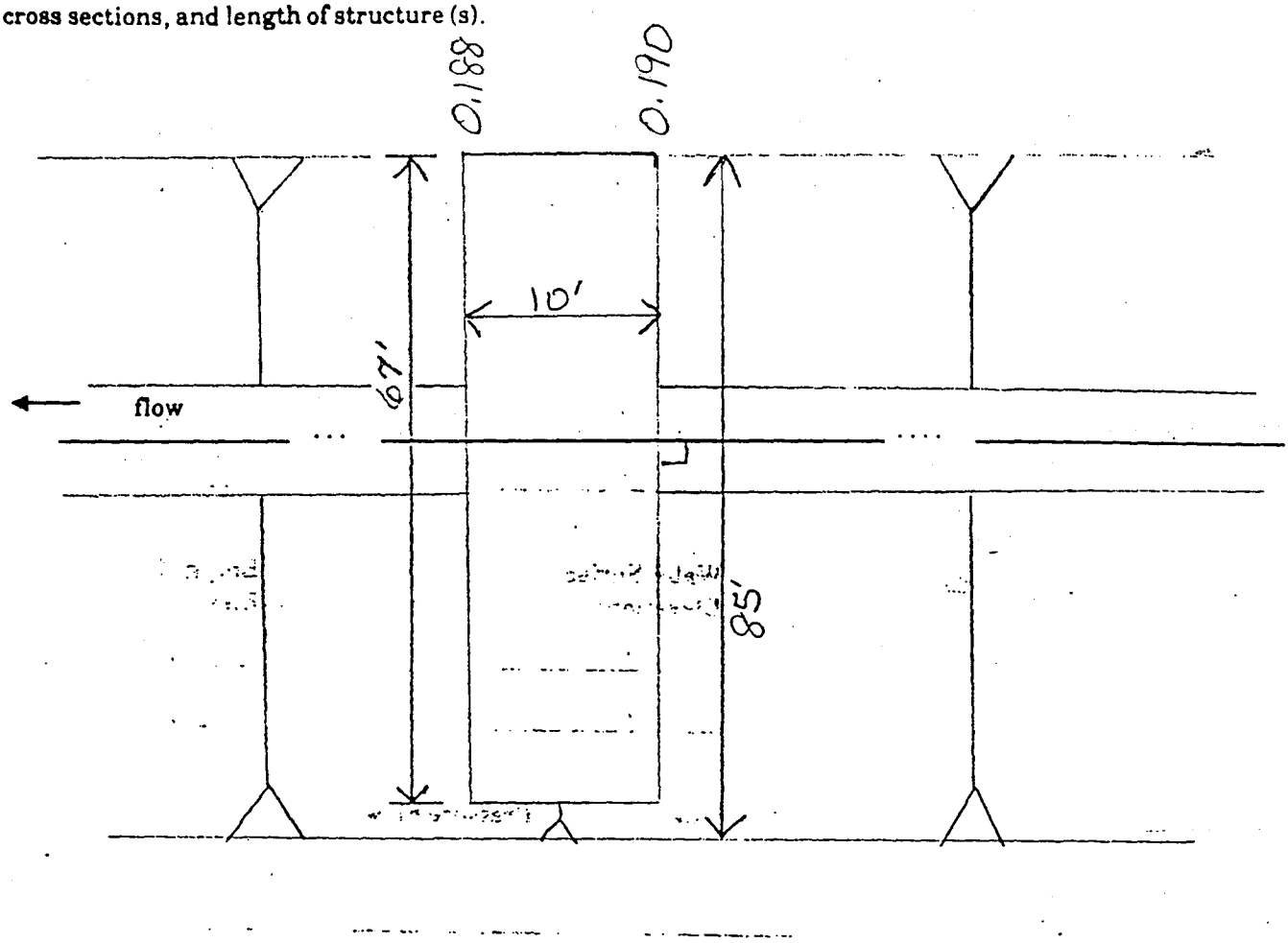
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, minimum top of road elevation, and ineffective flow widths.



Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



Sketch the plan view of the structure(s) Show, at a minimum, the skew angle, cross-section locations, distances between cross sections, and length of structure (s).



Attach plans of the structure (s) certified by a registered Professional Engineer.

Culvert length or bridge width (ft)	67'
Calculated culvert/bridge area (ft²) by the hydraulic model, if applicable	360
Total culvert/bridge area (ft²)	352

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	53.2	51.4
Downstream face	53.3	50.9

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	53.2	51.4
Downstream face	53.3	50.9

100-Year Elevations	Water Surface Elevations	Energy Gradient Elevations
Upstream face	52.17	52.91
Downstream face	50.89	52.31

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure (s) (cfs)		3289	3314	6603

The maximum depth of flow over the roadway/railroad (ft.) ..... 1.47 See explanation sheet

Weir length (ft.) ..... using GR record

Top Widths	Total Floodplain Width	Total Effective Flow Width	Floodway Width
Upstream face	315.59	389	315.59
Downstream face	307.39	335	307.39

Loss Coefficients

Entrance loss coefficient	N/A
Manning's "n" value assigned to the structure(s)	N/A
Friction loss coefficient through structure (s)	N/A
Other loss coefficients (e.g., bend manhole, etc.)	N/A
Total loss coefficient	1.56
Weir coefficient	2.6
Pier coefficient	1.25
Contraction loss coefficient	.3
Expansion loss coefficient	.5

4. SEDIMENT TRANSPORT CONSIDERATIONS N/A

1. A. Is there any indication from historical records that sediment transport (*including scour and deposition*) can affect the 100-year water surface elevations? ..... ☐ Yes ☐ No

   B Based on the conditions (*such as geomorphology, vegetative cover and development of the watershed and stream bed, and bank conditions*), is there a potential for debris and sediment transport (*including scour and deposition*) to affect the 100-year water surface elevations and/or conveyance capacity through the bridge/culvert? ..... ☐ Yes ☐ No

2. If the answer to either 1A or 1B is yes:

   A. What is the estimated sediment (*bed material*) load?
   _____cfs (*attach gradation curve*)

   Explain method used to estimate the sediment transport and the depth of scour and/or deposition_____

   B. Will sediment accumulate anywhere through the bridge/culvert? ☐ Yes ☐ No

   If yes, explain the impact on the conveyance capacity through the bridge/culvert?_____

5. FLOODWAY ANALYSIS

Explain method of bridge encroachment (floodway run) Floodway set at floodplain boundary.

Comments *(explain any unusual situations)*:

Attach analysis.

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT FORM**	O.M.B. Burden No. 3067-0148 Expires July 31, 1997	FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

Community Name: Maricopa County

Flooding Source: Echo Canyon Wash

Project Name/Identifier: Cudia City Wash, Sediment Basin

1. IDENTIFIER

1. **Name of roadway, railroad, etc.:** Pedestrian bridges over channel improvements.
2. **Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):** Cross section 0.248
3. **This revision reflects *(check one of the following)*:**
   - ☒ New bridge/culvert not modeled in the FIS
   - ☐ Modified bridge/culvert previously modeled in the FIS
   - ☐ New analysis of bridge/culvert previously modeled in the FIS

   (Explain why new analysis was performed)

2. BACKGROUND

Provide the following information about the structure:

1 **Dimension, material, and shape (e.g. two 10 x 5 feet reinforced concrete box culvert; three 30-foot span bridge with 2 rows of two 3- foot diameter circular piers; 40-foot wide ogee shape spillway)** One 67-foot span bridge.

2. **Entrance geometry of culvert/type of bridge opening (e.g. 30°-75° wing walls with square top edge, sloping embankments and vertical abutments)** Sloping embankments, 0° skew.

3. **Hydraulic model used to analyze the structure *(e.g., HEC-2 with special bridge routine, WSPRO, HY8)*** HEC-2 with special bridge routine.

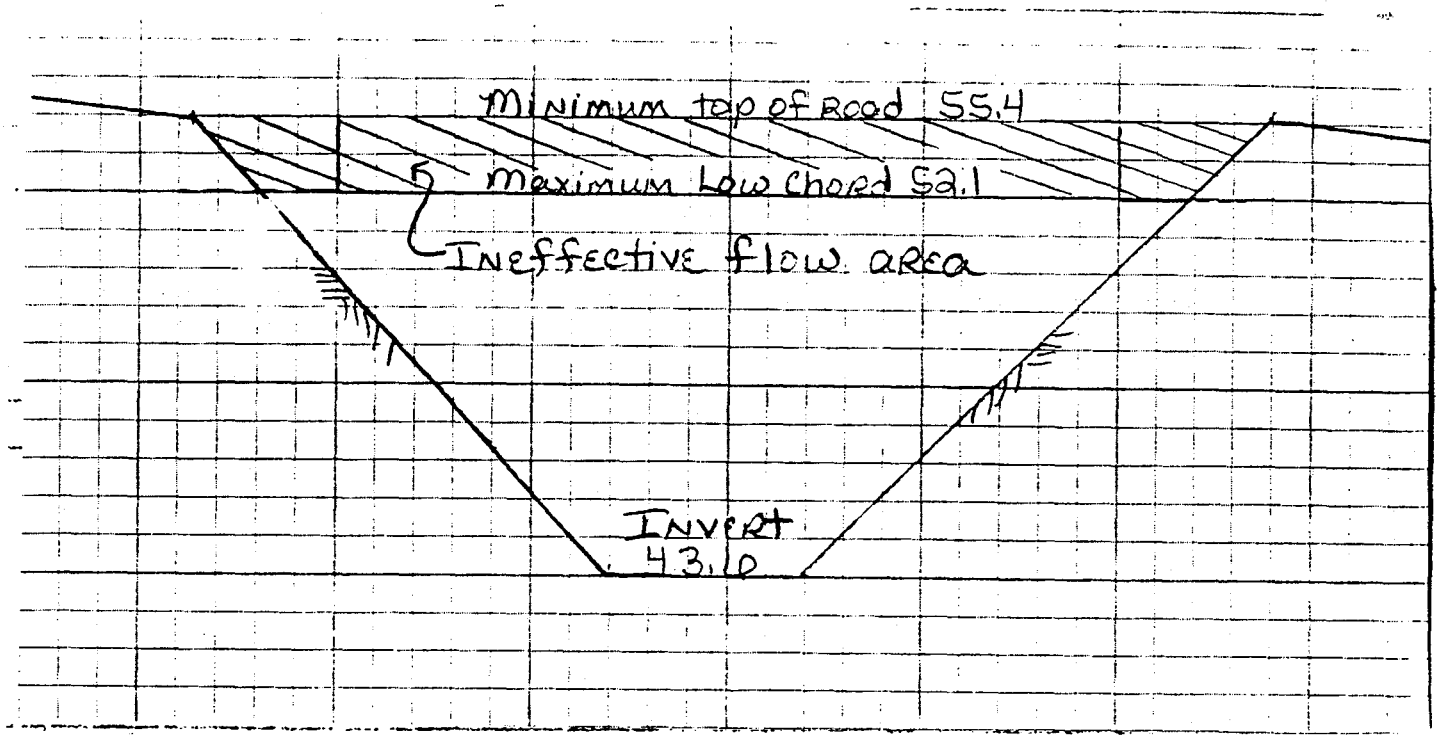
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

The pedestrian bridges had not been constructed when effective model was prepared.

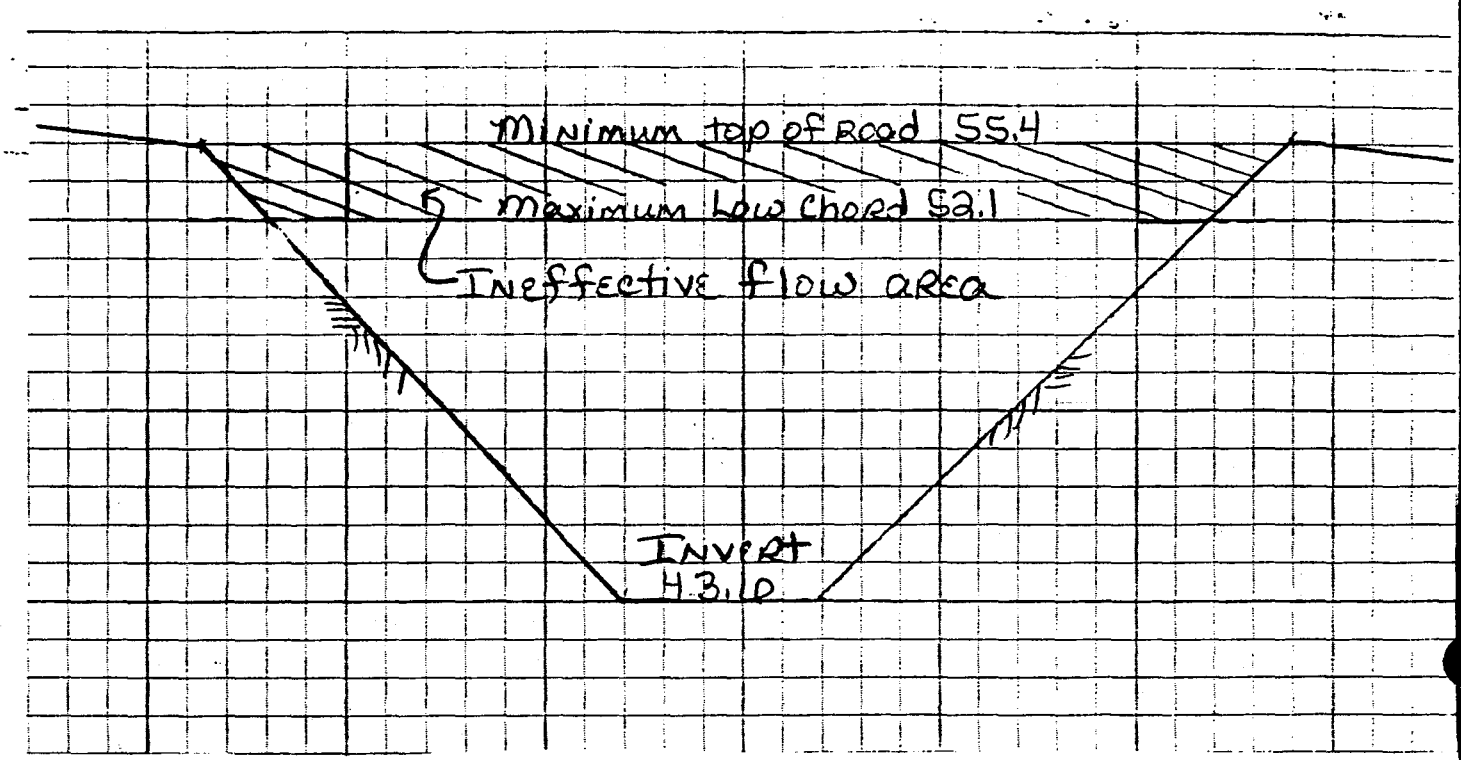
Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A
*** One form per new/revised bridge/culvert**

3. ANALYSIS

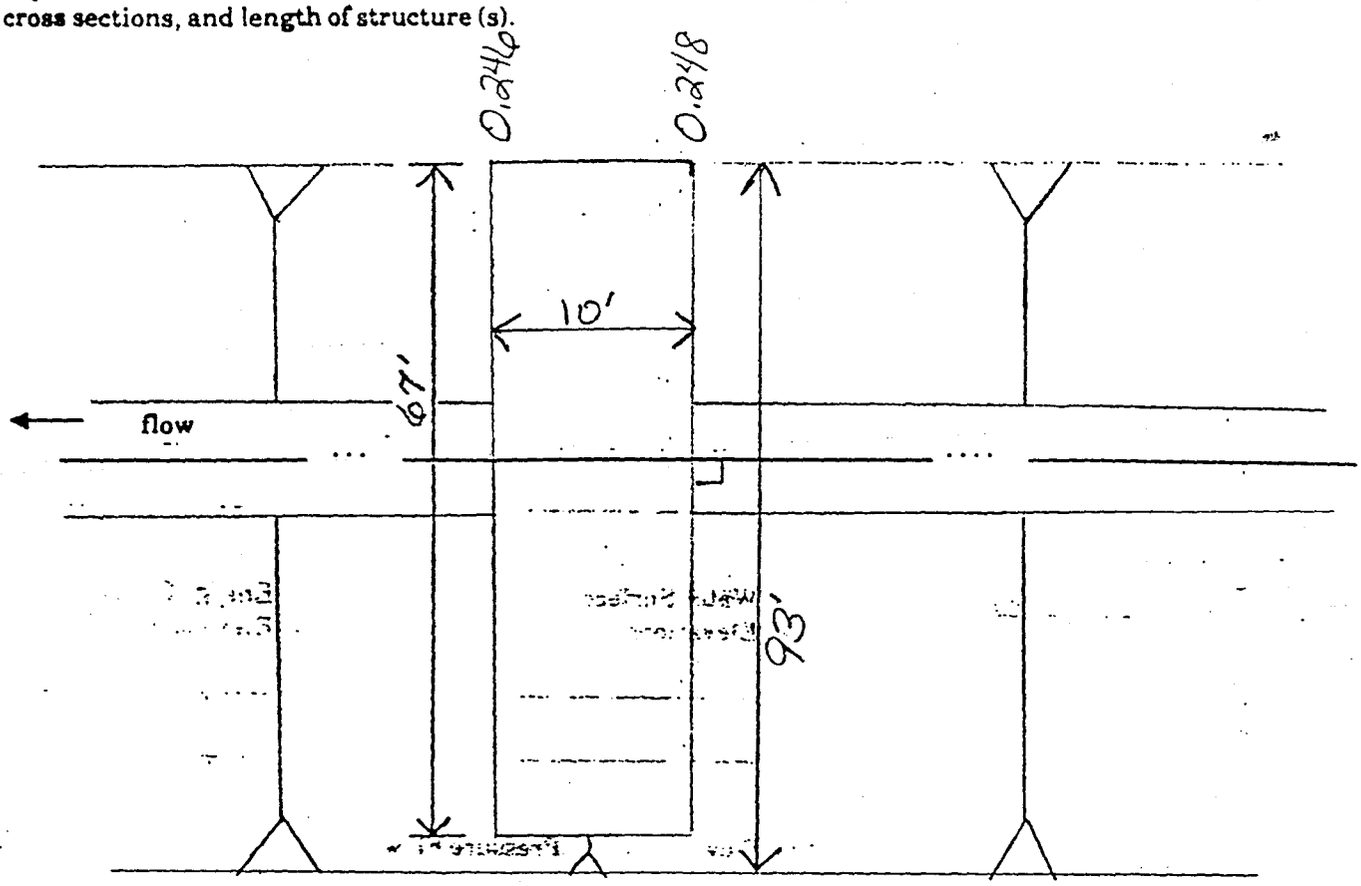
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, minimum top of road elevation, and ineffective flow widths.



Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



Sketch the plan view of the structure(s) Show, at a minimum, the skew angle, cross-section locations, distances between cross sections, and length of structure (s).



Attach plans of the structure (s) certified by a registered Professional Engineer.

Culvert length or bridge width (ft)	67'
Calculated culvert/bridge area (ft²) by the hydraulic model, if applicable	329
Total culvert/bridge area (ft²)	299

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	57.1	55.4
Downstream face	57.85	53.6

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	57.1	55.4
Downstream face	57.85	53.6

100-Year Elevations	Water Surface Elevations	Energy Gradient Elevations
Upstream face	56.09	56.59
Downstream face	54.67	56.10

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure (s) (cfs)		2934	3692	6626

The maximum depth of flow over the roadway/railroad (ft.) ..... 1.49 See explanation sheet

Weir length (ft.) ..... 470 using GR records

Top Widths	Total Floodplain Width	Total Effective Flow Width	Floodway Width
Upstream face	257.79	470	166.87
Downstream face	232.83	276	122.43

Loss Coefficients

Entrance loss coefficient	N/A
Manning's "n" value assigned to the structure(s)	N/A
Friction loss coefficient through structure (s)	N/A
Other loss coefficients (e.g., bend manhole, etc.)	N/A
Total loss coefficient	1.56
Weir coefficient	2.6
Pier coefficient	1.25
Contraction loss coefficient	.3
Expansion loss coefficient	.5

4. SEDIMENT TRANSPORT CONSIDERATIONS N/A

1. A. Is there any indication from historical records that sediment transport *(including scour and deposition)* can affect the 100-year water surface elevations? ..... ☐ Yes ☐ No

   B Based on the conditions *(such as geomorphology, vegetative cover and development of the watershed and stream bed, and bank conditions)*, is there a potential for debris and sediment transport *(including scour and deposition)* to affect the 100-year water surface elevations and/or conveyance capacity through the bridge/culvert? ..... ☐ Yes ☐ No

2. If the answer to either 1A or 1B is yes:

   A. What is the estimated sediment *(bed material)* load?
   _____cfs *(attach gradation curve)*

   Explain method used to estimate the sediment transport and the depth of scour and/or deposition_____

   B. Will sediment accumulate anywhere through the bridge/culvert? ☐ Yes ☐ No

   If yes, explain the impact on the conveyance capacity through the bridge/culvert?_____

5. FLOODWAY ANALYSIS

Explain method of bridge encroachment (floodway run) Left encroachment station matches w/floodplain boundary. The right encroachment station is less than the floodplain limit.

Comments *(explain any unusual situations)*:

Attach analysis.

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT FORM**	O.M.B. Burden No. 3067-0148 Expires July 31, 1997	FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

Community Name: Maricopa County

Flooding Source: Echo Canyon Wash

Project Name/Identifier: Cudia City Wash, Sediment Basin

1. IDENTIFIER

1. **Name of roadway, railroad, etc.:** Pedestrian bridges over channel improvements.
2. **Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):** Cross section 0.291
3. **This revision reflects *(check one of the following)*:**
   - ☒ New bridge/culvert not modeled in the FIS
   - ☐ Modified bridge/culvert previously modeled in the FIS
   - ☐ New analysis of bridge/culvert previously modeled in the FIS

   (Explain why new analysis was performed)

2. BACKGROUND

Provide the following information about the structure:

1 **Dimension, material, and shape (e.g. two 10 x 5 feet reinforced concrete box culvert; three 30-foot span bridge with 2 rows of two 3- foot diameter circular piers; 40-foot wide ogee shape spillway)** 245-foot span bridge with two 3' wide piers.

2. **Entrance geometry of culvert/type of bridge opening (e.g. 30°- 75° wing walls with square top edge, sloping embankments and vertical abutments)** Sloping embankment, 0° skew.

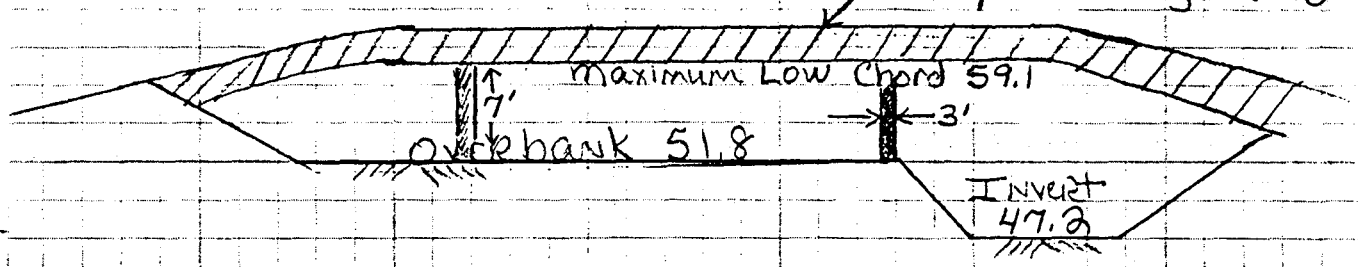
3. **Hydraulic model used to analyze the structure (*e.g., HEC-2 with special bridge routine, WSPRO, HY8*)** HEC-2 with normal bridge routine.

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

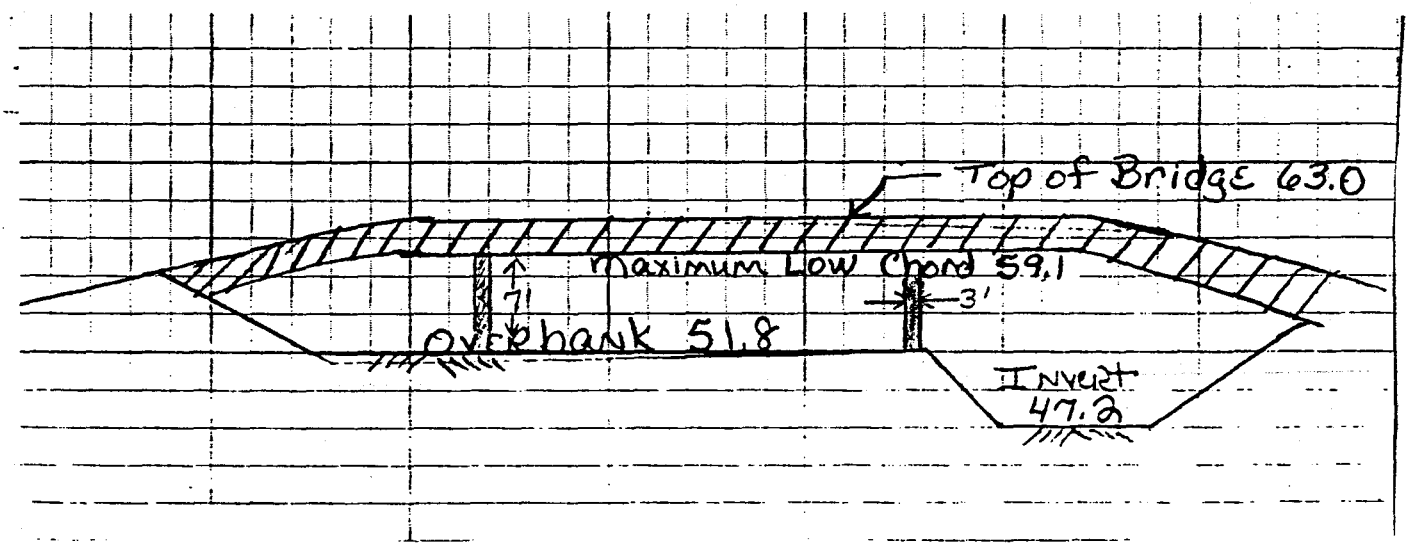
The pedestrian bridges had not been constructed when effective model was prepared.

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A
*** One form per new/revised bridge/culvert**

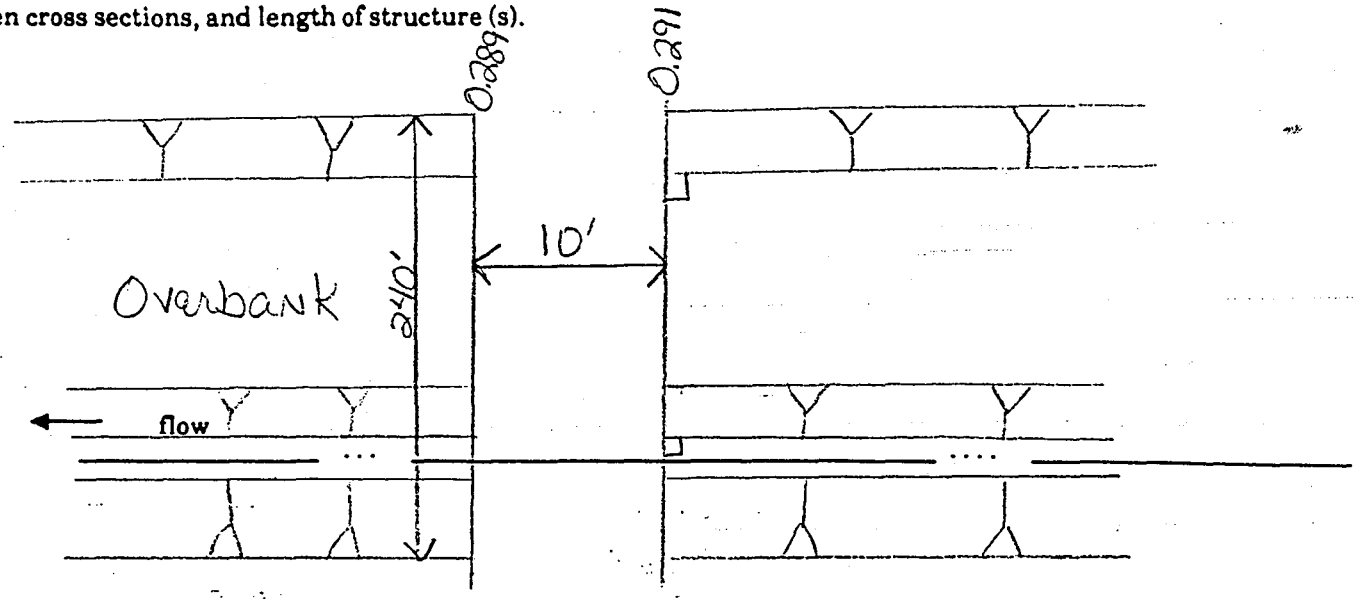
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, minimum top of road elevation, and ineffective flow widths.



Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



Sketch the plan view of the structure(s) Show, at a minimum, the skew angle, cross-section locations, distances between cross sections, and length of structure (s).



Attach plans of the structure (s) certified by a registered Professional Engineer.

Culvert length or bridge width (ft)	240'
Calculated culvert/bridge area (ft²) by the hydraulic model, if applicable	1660
Total culvert/bridge area (ft²)	1660

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	60.6	51.8
Downstream face	60.6	51.8

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	60.6	62.8
Downstream face	60.6	63.0

100-Year Elevations	Water Surface Elevations	Energy Gradient Elevations
Upstream face	56.50	57.14
Downstream face	56.28	57.07

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure (s) (cfs)	6600			6600

The maximum depth of flow over the roadway/railroad (ft.) ..... Ø

Weir length (ft.) 242

Top Widths	Total Floodplain Width	Total Effective Flow Width	Floodway Width
Upstream face	212.95	232	140.85
Downstream face	203.31	242	133.31

Loss Coefficients

Entrance loss coefficient	N/A
Manning's "n" value assigned to the structure(s)	N/A
Friction loss coefficient through structure (s)	N/A
Other loss coefficients (e.g., bend manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	N/A
Pier coefficient	N/A
Contraction loss coefficient	.3
Expansion loss coefficient	.5

4. SEDIMENT TRANSPORT CONSIDERATIONS N/A

1. A. Is there any indication from historical records that sediment transport (*including scour and deposition*) can affect the 100-year water surface elevations? ..... ☐ Yes ☐ No

   B Based on the conditions (*such as geomorphology, vegetative cover and development of the watershed and stream bed, and bank conditions*), is there a potential for debris and sediment transport (*including scour and deposition*) to affect the 100-year water surface elevations and/or conveyance capacity through the bridge/culvert? ..... ☐ Yes ☐ No

2. If the answer to either 1A or 1B is yes:

   A. What is the estimated sediment (*bed material*) load?
   _____cfs (*attach gradation curve*)

   Explain method used to estimate the sediment transport and the depth of scour and/or deposition_____

   B. Will sediment accumulate anywhere through the bridge/culvert? ☐ Yes ☐ No

   If yes, explain the impact on the conveyance capacity through the bridge/culvert?_____

5. FLOODWAY ANALYSIS

Explain method of bridge encroachment (floodway run) Left encroachment station matches w/floodplain boundary. The right encroachment station is less than the floodplain limit.

Comments *(explain any unusual situations)*:

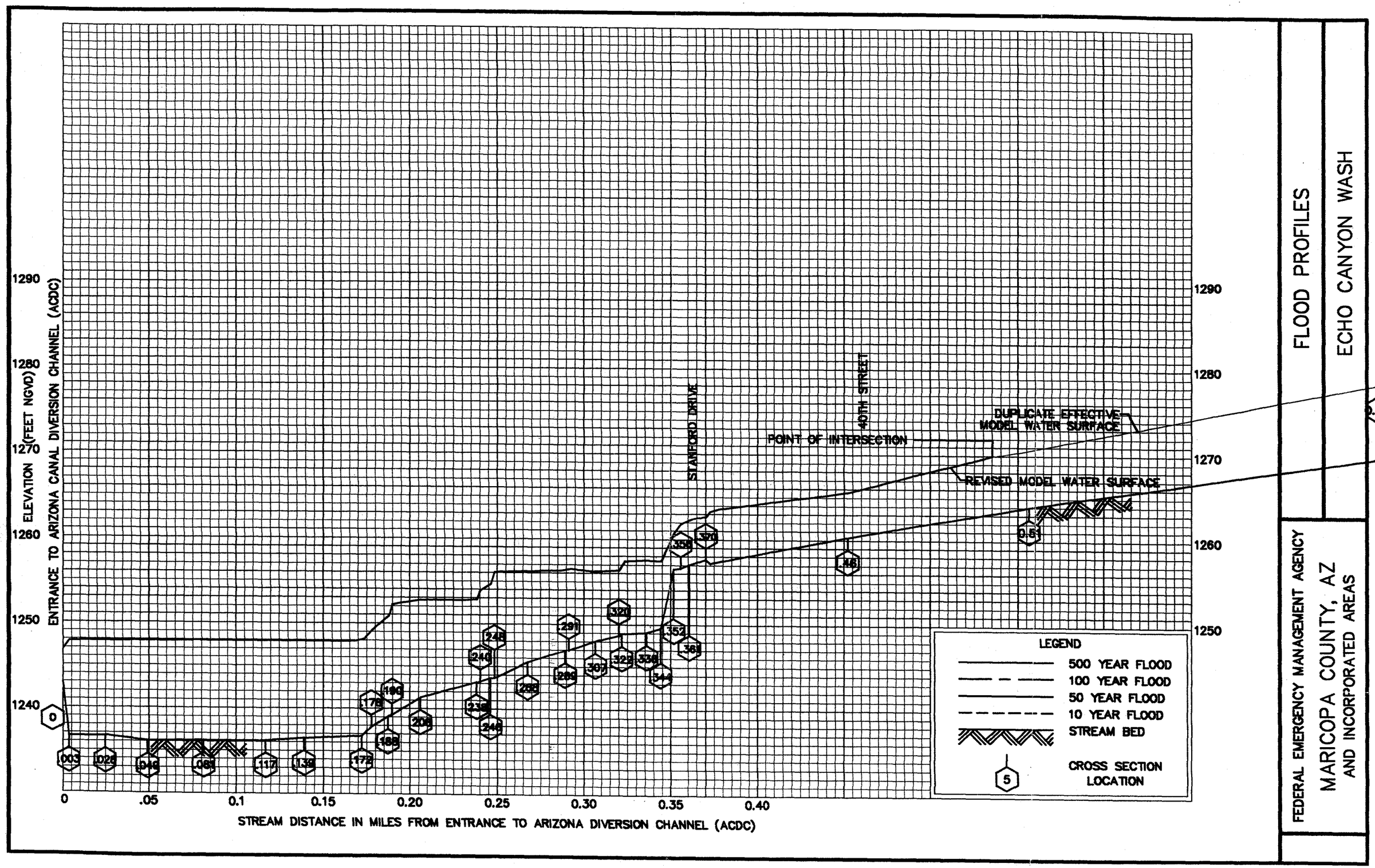
Attach analysis.

OPERATIONAL INSPECTIONS SCHEDULE - 1996				
O&M INSPECTION	1/17/96 OPER. INSP.	4/17/96 OPER. INSP.	7/17/96 OPER. INSP.	10/16/96 OPER. INSP.
SADDLEBACK FRS		X	X	X
SADDLEBACK FLOODWAY		X	X	X
HARQUAHALA FRS		X	X	X
HARQUAHALA FLOODWAY		X	X	X
CENTENNIAL DIVERSION		X	X	X
DYSART DRAIN		X	X	X
ELMIRAGE DRAIN		X	X	X
48TH STREET DRAIN		X	X	X
ALMA SCHOOL DRAIN		X	X	X
AGUA FRIA FLOODWAY		X	X	X
INDIAN SCHOOL DRAIN		X	X	X
ADOBE DAM		X	X	X
DREAMY DRAW DAM		X	X	X
CAVE BUTTES AND CAVE CREEK DAMS		X	X	X
SCATTER WASH (BEARDSLEY TO 43RD AVE)		X	X	X
NEW RIVER DAM		X	X	X
SKUNK CREEK AT I-17		X	X	X
McMICKEN DAM	X		X	X
McMICKEN FLOODWAY	X		X	X
SUNSET FRS	X		X	X
SUNNY COVE FRS	X		X	X
SUNSET/SUNNY COVE PIPELINE	X		X	X
OLD CROSS-CUT CANAL	X		X	X
IBW INLET AND INTERCEPTOR	X		X	X
IBW OUTLET	X		X	X
IBW SIDE DRAINS	X		X	X
IBW GREENBELT	X		X	X
BUCKEYE #1	X		X	X
BUCKEYE #2	X		X	X
BUCKEYE #3	X		X	X
WHITE TANKS #3	X		X	X
WHITE TANKS #4	X		X	X
POWERLINE FRS	X	X		X
POWERLINE FLOODWAY	X	X		X
VINEYARD FRS	X	X		X
RITTENHOUSE FRS	X	X		X
SOSSAMAN DRAIN	X	X		X
GUADALUPE ROAD CHANNEL AND BOX	X	X		X
SPOOK HILL FRS	X	X		X
GUADALUPE DAM	X	X		X
SIGNAL BUTTE FRS	X	X		X
PASS MTN. DIVERSION AND FLOODWAY	X	X		X
APACHE JUNCTION FRS	X	X		X
E.M.F. & UNIVERSITY DET. BASIN	X	X		X
SIGNAL BUTTE FLOODWAY	X	X		X
BULLDOG FLOODWAY	X	X		X
APACHE JUNCTION FLOODWAY	X	X		X
SPOOKHILL FLOODWAY AND SED. BASIN	X	X		X
HOLLY ACRES	X	X	X	
PERYVILLE RIPRAP	X	X	X	
SALT/GILA CLEARING	X	X	X	
SALT/GILA LOW FLOW	X	X	X	
SALT RIVER CHANNEL (ADOT)	X	X	X	
SALT RIVER CHANNEL- RIO SALADO	X	X	X	
SALT RIVER CHANNEL - WARNING SIGNS	X	X	X	X
ACDC	X	X	X	
EAST FORK/ CAVE CREEK/ BASIN #4	X	X	X	
NEW RIVER CHANNEL	X	X	X	
SUN CITY DRAINS	X	X	X	
SUN CITY WEST DRAINS	X	X	X	
SKUNK CREEK CHANNELIZATION	X	X	X	
10TH STREET BASIN	X	X	X	X

INSPECTION SCHEDULE FOR 1996
FCDMC DAMS, FLOODWAYS AND DIVERSIONS

STATE DAM#		LAST INSPECTION 95	ANNUAL INSPECTION 96	INFORMAL INSPECTION 96
	COE STRUCTURES (DAM)			
#07.57	ADOBE	5/24/95	5/22/96	12/18/96
#07.58	CAVE BUTTES/CAVE CREEK	5/24/95	5/22/96	12/18/96
#07.56	DREAMY DRAW	5/24/95	5/22/96	12/18/96
#07.55	NEW RIVER DAM	5/24/95	5/22/96	12/18/96
	COE CHANNELS AND FLOODWAYS			
	ACDC (AND CAVE CREEK)	5/25/95	5/23/96	12/19/96
	SKUNK CREEK (I-17) CHAN.	5/25/95	5/23/96	12/19/96
	SKUNK CREEK/NEW RIV. FDY.	5/25/95	5/23/96	12/19/96
	SCS STRUCTURES (FRS)			
#07.52	SADDLEBACK	3/22/95	3/21/96	
#07.53	HARQUAHALA	3/22/95	3/21/96	
#07.48	SUNNY COVE	9/28/95	9/26/96	
#07.49	SUNSET	9/28/95	9/26/96	
#07.28	WHITE TANKS#3	9/28/95	9/26/96	
#07.29	WHITE TANKS#4	9/28/95	9/26/96	
#07.42	BUCKEYE #1	8/24/95	8/22/96	
#07.44	BUCKEYE #2	8/24/95	8/22/96	
#07.45	BUCKEYE #3	8/24/95	8/22/96	
#11.02	POWERLINE	6/22/95	6/27/96	
#11.12	RITTENHOUSE	6/22/95	6/27/96	
#11.11	VINEYARD	6/22/95	6/27/96	
#07.43	GUADALUPE	10/26/95	10/24/96	
#07.50	SPOOK HILL	10/26/95	10/24/96	
#07.60	SIGNAL BUTTE	10/26/95	10/24/96	
	APACHE JUNCTION	10/26/95	10/24/96	
	SCS FLOODWAYS			
	HARQUAHALA	3/23/95	3/21/96	
	SADDLEBACK	3/23/95	3/21/96	
	POWERLINE	6/22/95	6/27/96	
	SPK HILL FDWY AND SD BASIN	11/30/95	11/21/96	
	E.M.F.	11/30/95	11/21/96	
	SIGNAL BUTTE	11/30/95	11/21/96	
	PASS MOUNTAIN	11/30/95	11/21/96	
	BULLDOG	11/30/95	11/21/96	
	SCS DIVERSIONS			
N.A.	CENTENNIAL LEVEE #1	3/23/95	3/21/96	
N.A.	PASS MOUNTAIN	11/30/95	11/21/96	
	FCD STRUCTURES, CHANNELS, AND FLOODWAYS*			
	HOLLY ACRES RIPRAP	1/26/95	1/25/96	
	PERRYVILLE RIPRAP	1/26/95	1/25/96	
	SALT/GILA LOW FLOW	1/26/95	1/25/96	
	COLTER CHANNEL	1/26/95	1/25/96	
	RIO SALADO	1/26/95	1/25/96	
	ALMA SCHOOL DRAIN	4/27/95	4/25/96	
	AGUA FRIA FLOODWAY	4/27/95	4/25/96	
	INDIAN SCHOOL RD. DRAIN	4/27/95	4/25/96	
	48TH ST. DRAIN	4/27/95	4/25/96	
	DYSART DRAIN	4/27/95	4/25/96	
	EL MIRAGE DRAIN	4/27/95	4/25/96	
#07.21	McMICKEN DAM**	6/29/95	6/20/96	
	McMICKEN FLOODWAY	6/29/95	6/20/96	
	INDIAN BEND WASH (COE)	7/27/95	7/25/96	
	SCATTERWASH	7/27/95	7/25/96	
	EAST FORK/ CAVE CREEK	7/27/95	7/25/96	
	OLD CROSS CUT CANAL	7/27/95	7/25/96	
	SOSSMAN ROAD DRAIN	6/22/95	6/27/96	
	GUADALUPE CHNL AND BOX	6/22/95	6/27/96	
	SALT/GILA CREARING	1/26/95	1/25/96	
	SUN CITY DRAINS	2/23/95	2/22/96	
	SUN CITY WEST DRAINS	2/23/95	2/22/96	
	PARADISE VALY RETN BSN	2/23/95	2/22/96	

*FCD C&O DIV. ONLY **FCD & ADWR ONLY



MARI0008 PH014 07/02/96 13:13:08 TSM S:\CAD\MARI0008\MA08FEMA

Post-it® Fax Note 7671	Date 7/15/96	# of pages ▶ 1
To Hasan	From Teri Mintz	
Co./Dept.	Co.	
Phone #	Phone # 956-9850	
Fax # 506-4601	Fax # 956-9853	

July 12, 1996

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

SUBJECT: Elevations of canal used to delineate Zone A Floodplain

Dear Hasan:

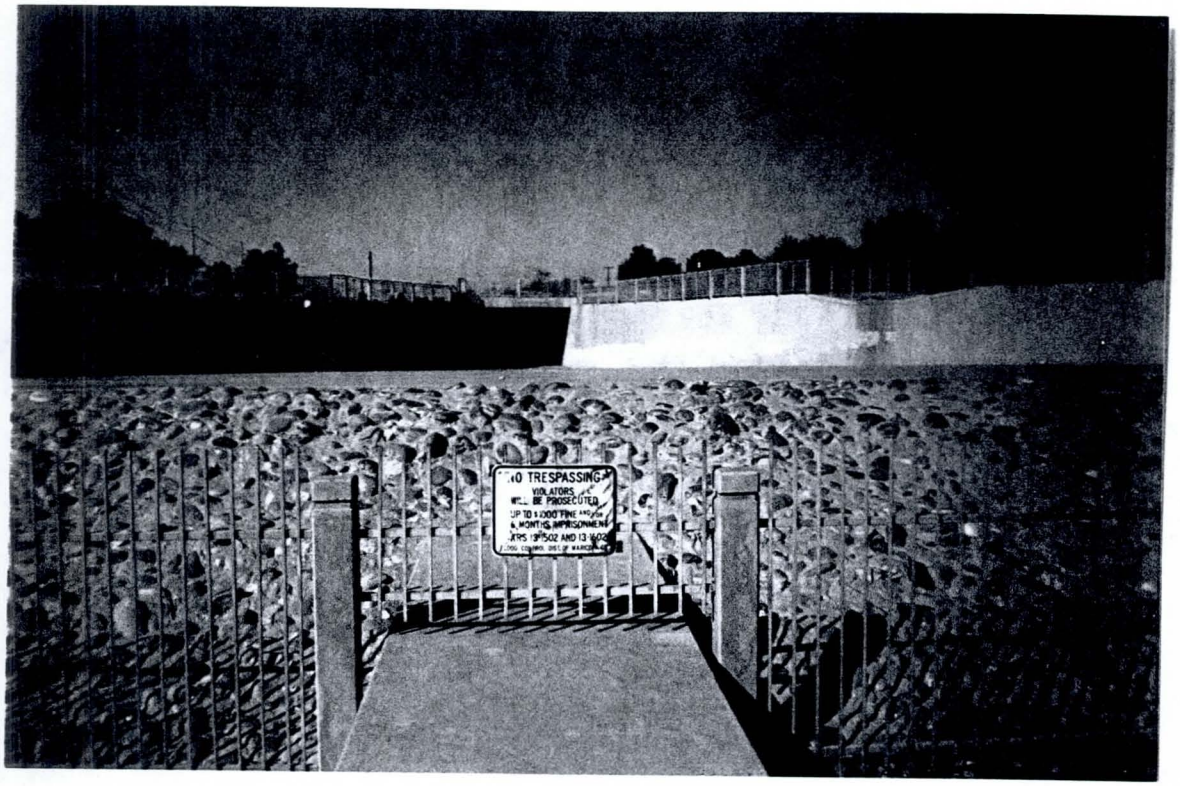
The elevations of the canal used to delineate the Zone A floodplain between Camelback Road and the Cudia City Wash, Sediment Basin were derived from the 400 scale ACDC topographic map. The elevation obtained from the topographic map was 1250 based on contour and spot elevation data. The buildings on the northeast side of the ACDC were avoided due to contour information.

Let me know if there are any other comments.

Sincerely,

Teri S. Mintz

Teri S. Mintz, P.E.

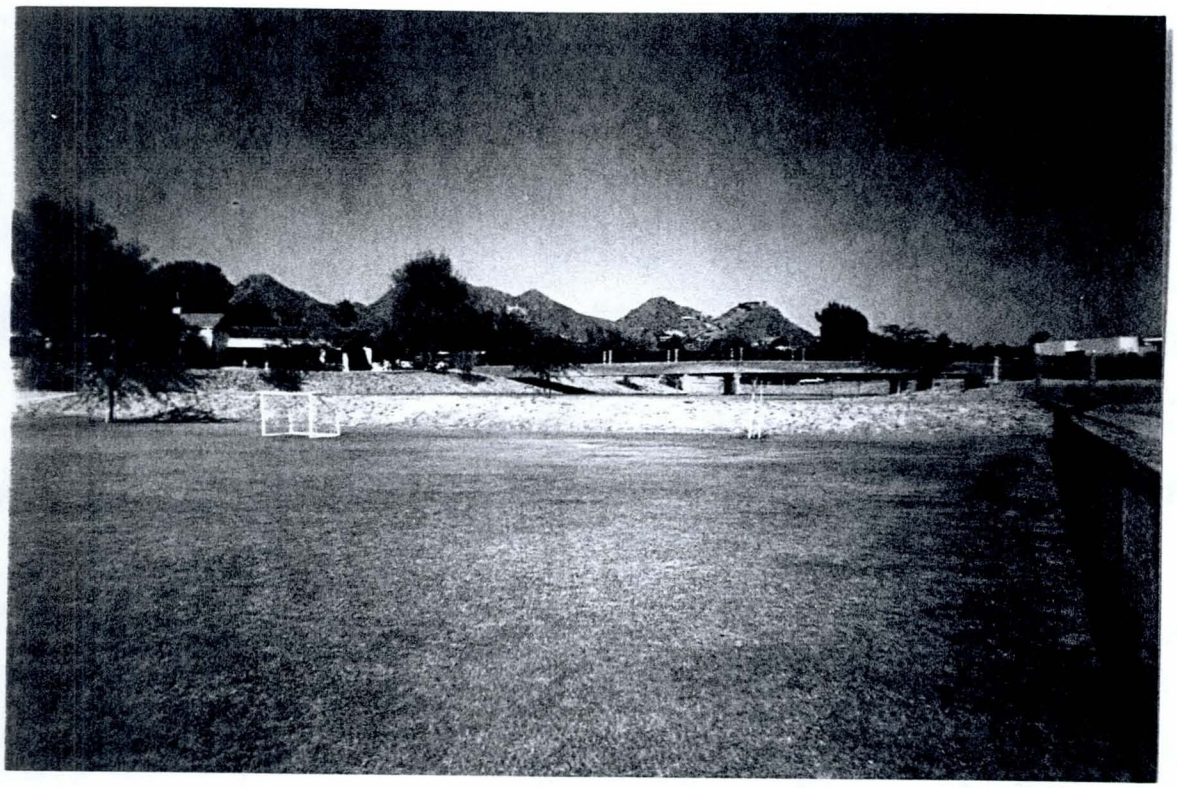


WEIR OUTLET STRUCTURE
(LOOKING WEST)

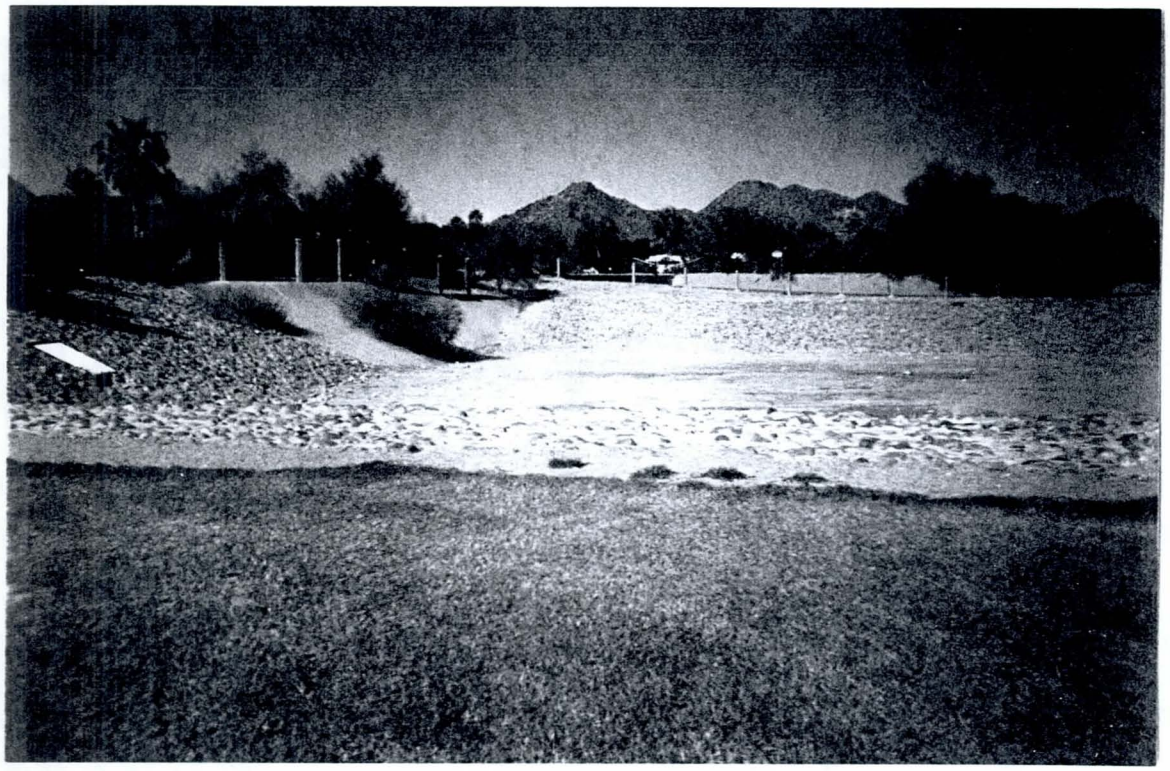
LARGEST RETENTION STRUCTURE
(LOOKING SOUTHWEST)

CHANNEL OUTLET INTO LARGE RETENTION FACILITY
(LOOKING NORTHWEST)

MAIN CHANNEL AND OVERBANK TO WEST
(LOOKING NORTH)



TIERED OVERBANK AREA
(LOOKING NORTH)



INLET INTO SMALLER RETENTION BASIN
AT NORTH END OF PROJECT
(LOOKING NORTH)

US Army Corps of Engineers
Los Angeles District

Gila River Basin

Phoenix, Arizona, and Vicinity (Including New River)

219

Arizona Canal Diversion Channel

-40th Street to Cactus Road (Including Cudia City Wash Sediment Basin, Cave Creek Sediment Basin, and Cave Creek Channel)

FINAL
April 1986

Design Memorandum No. 12
Feature Design for Arizona Canal Diversion Channel - 40th Street to Cactus Road

Explanations

Form 4, Section 5, Part 1A

Water surface elevations extend less than 1 foot in 12 locations, in the vicinity where the floodplain boundary is being revised. (Between sections 0 to .373)

Form 4, Section 5, Part 1B & 1C

Critical depth is assumed at the downstream section and at one of the pedestrian crossings.

Form 5, Section 1, Part 1K

Horizontal and vertical survey control

Form 5, Section 1, Part 1L

Based on Army Corps of Engineers Plan Number 252-842 (Sheet 3 of 90). Points #24 & #25 held for horizontal positions; sheet is undated. Vertical Control is based on the National Geodetic Vertical Datum of 1929

Form 5, Section 1, Part 2

Field survey based on horizontal and vertical control as stated in Part 1K and 1L (above) on November of 1995 by David Evans and Associates, Inc.

Form 7, Section 3

The maximum depth of flow over the pedestrian bridge is based on the elevation of the deck, not the 10-inch concrete walls the are on either side of the walkway. The elevation of the concrete walls were used in the hydraulic analysis for weir computations.

Form 4, Section 5, Part 5b

The maximum surcharge occurs at cross section 0.51 which is upstream of the vertical tie-in. This surcharge is actually less than the surcharge from the duplicate effective model which is 3.35'.

80159
1294.64

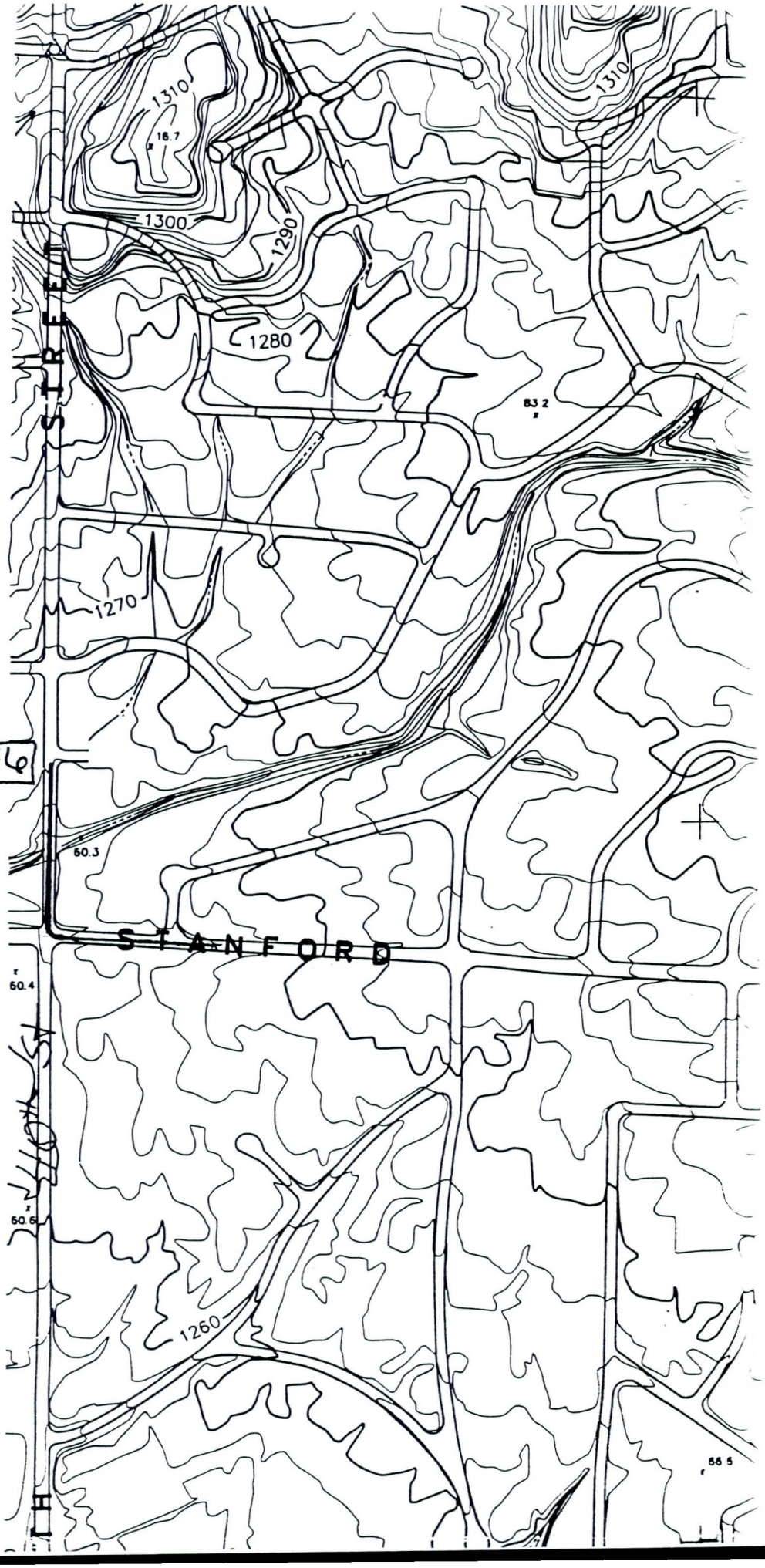
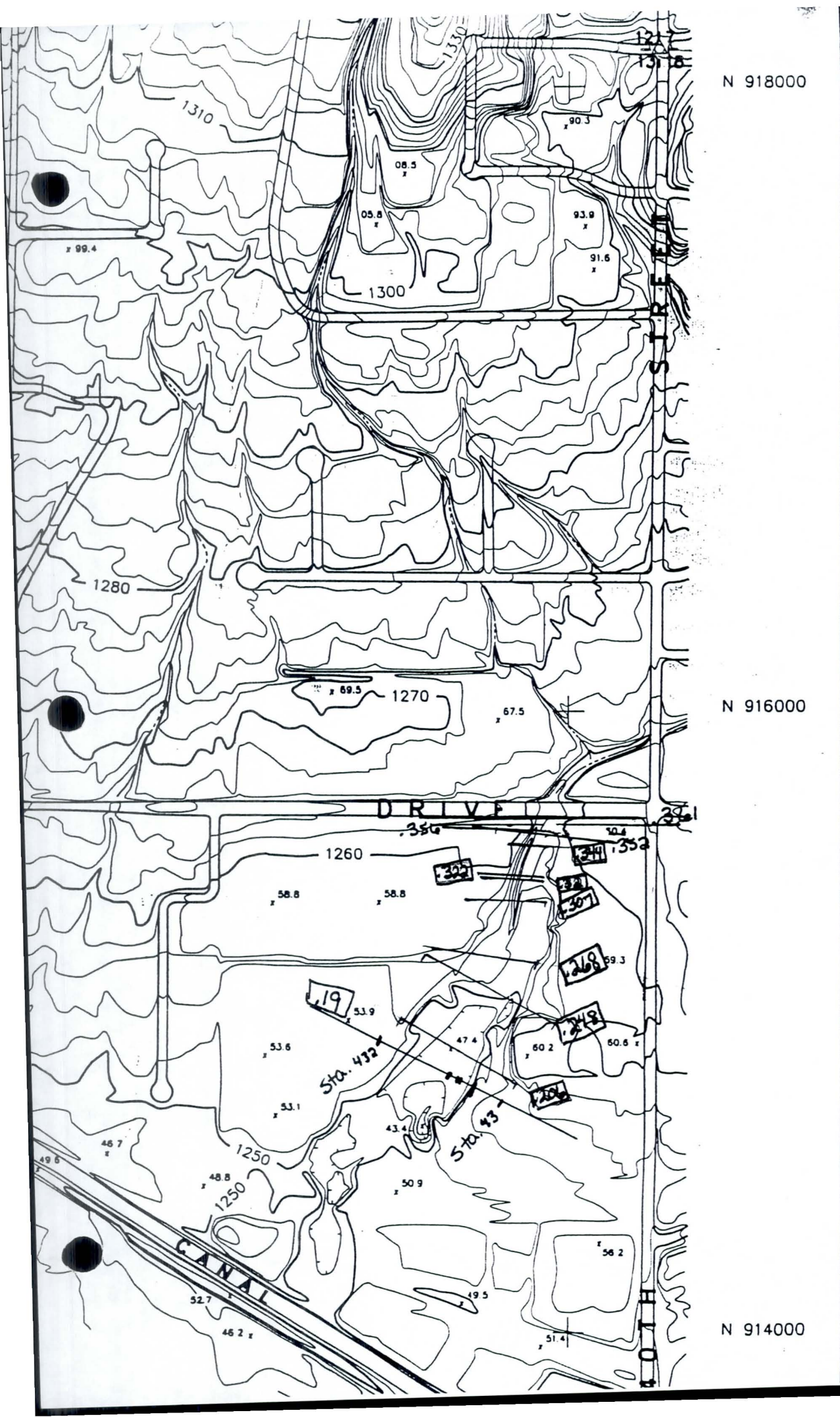


Exhibit A



N

1" = 400'

Exhibit B

	11	12
	14	13
PEORIA AVE.	23	24
DUNLAP AVE.	26	25
	35	36
GLENDALE AVE.	2	1
BETHANY HOME RD.	11	12
CAMELBACK RD.	14	13

1690

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 1690 OF 4350

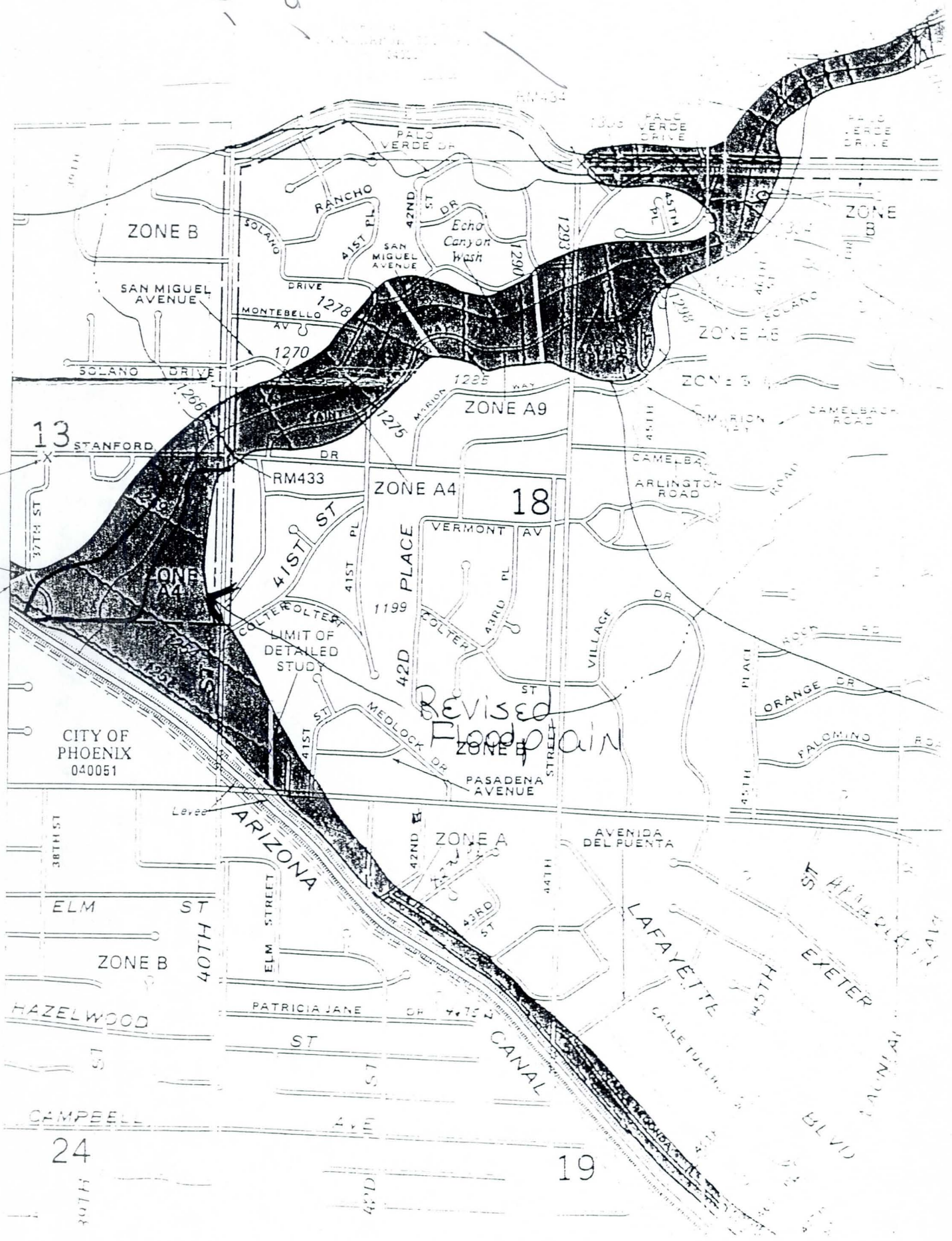
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY, UNINCORPORATED AREAS	040037	1690	D
PARADISE VALLEY, TOWN OF	040049	1690	D
PHOENIX, CITY OF	040051	1690	D
SCOTTSDALE, CITY OF	045012	1690	D

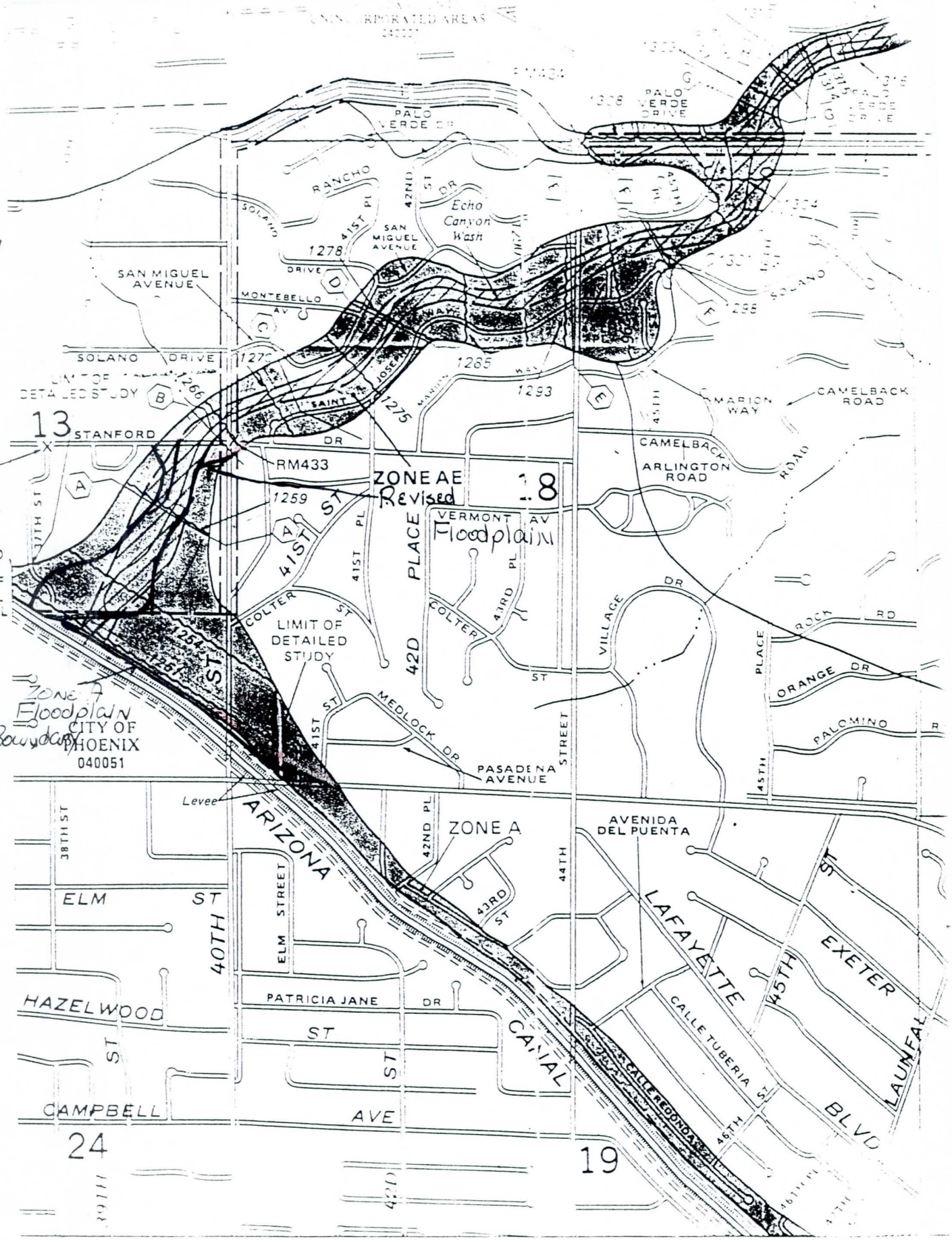
MAP NUMBER
04013C1690 D

EFFECTIVE DATE:
APRIL 15, 1988

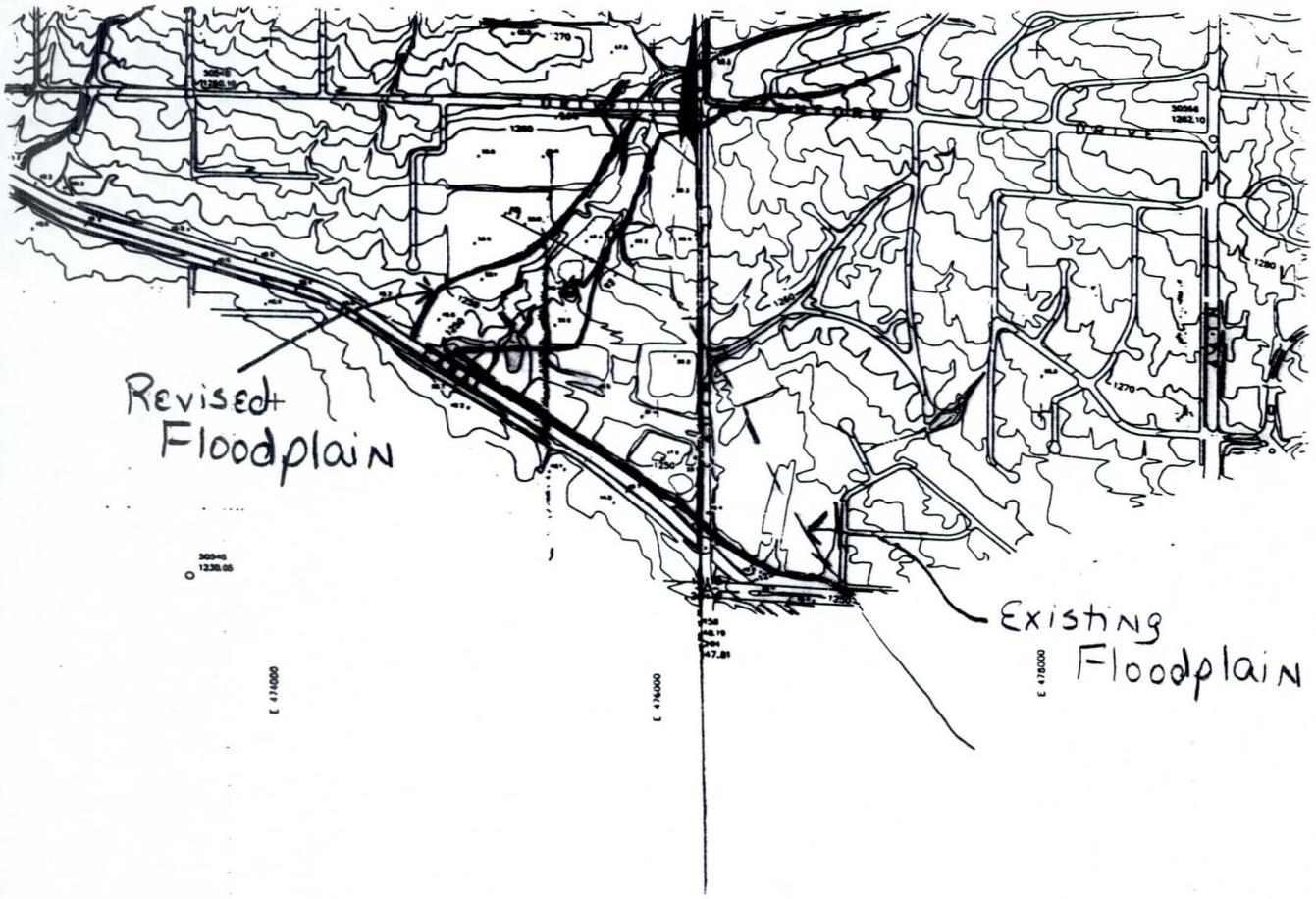
Federal Emergency Management Agency

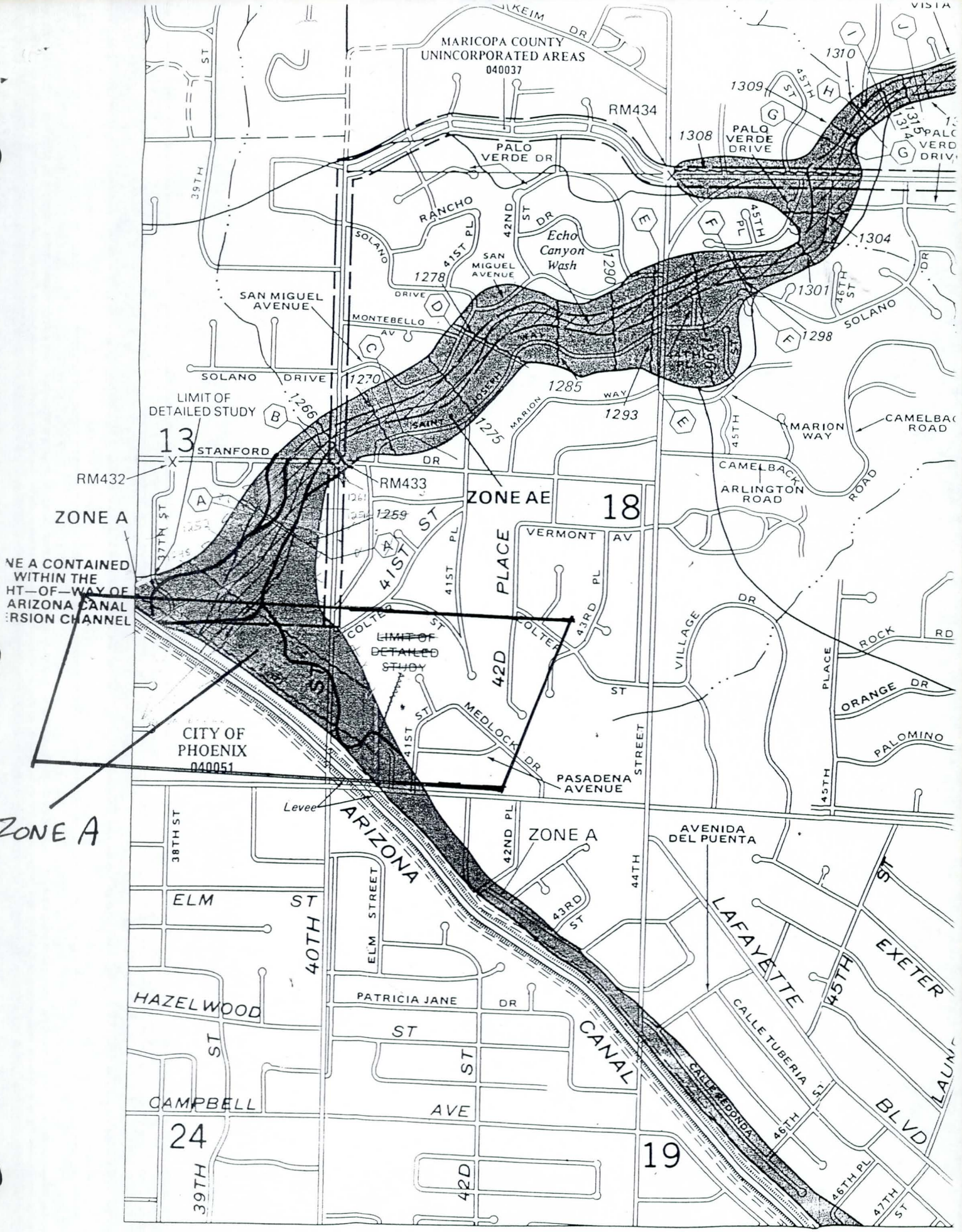

PALO VERDE DR
PALO VERDE DRIVE
RANCHO
42ND ST
DR
45TH PL
ZONE B
SOLANO
41ST PL
SAN MIGUEL AVENUE
Echo Canyon Wash
1293
1290
SAN MIGUEL AVENUE
DRIVE
MONTEBELLO AV
1278
1270
SOLANO DRIVE
1266
1285
WAY
ZONE A8
ZONE A9
1275
MARION
CAMELBACK ROAD
13
STANFORD
DR
RM432
RM433
ZONE A4
18
CAMELBACK
ARLINGTON ROAD
37TH ST
41ST ST
PL
VERMONT AV
ZONE A
LIMIT OF DETAILED STUDY
ZONE A4
41ST PL
42D PLACE
1199
COLTER
43RD PL
VILLAGE DR
LIMIT OF DETAILED STUDY
ORANGE DR
Revised Flood Plain
CITY OF PHOENIX 040051
41ST ST
MEDLOCK DR
ZONE B
PASADENA AVENUE
PALOMINO
Levee
ARIZONA
ZONE A
AVENIDA DEL PUENTA
38TH ST
42ND
44TH
ELM ST
ELM STREET
43RD ST
LAFAYETTE
EXETER
ZONE B
40TH
HAZELWOOD ST
PATRICIA JANE DR
CANAL
CAMPBELL AVE
24
19
BLVD

1"=1000'


UNINCORPORATED AREAS
040037
PALO VERDE DR
PALO VERDE DRIVE
RANCHO SOLANO DR
42ND ST
41ST PL
SAN MIGUEL AVENUE
Echo Canyon Wash
1278
SAN MIGUEL AVENUE
MONTEBELLO AV
SOLANO DRIVE
1275
1285
1293
1298
LIMIT OF DETAILED STUDY
13
STANFORD DR
RM432
RM433
ZONE AE
Revised
18
ZONE A
1259
41ST ST
41ST PL
VERMONT AV
Floodplain
42D PLACE
ZONE A CONTAINED WITHIN THE RIGHT-OF-WAY OF THE ARIZONA CANAL DIVERSION CHANNEL
COLTER ST
43RD PL
LIMIT OF DETAILED STUDY
1254
1251
ZONE A
Floodplain Boundary
CITY OF PHOENIX
040051
MEDLOCK DR
PASADENA AVENUE
VILLAGE DR
MARION WAY
CAMELBACK ROAD
ARLINGTON ROAD
ROCK RD
ORANGE DR
PALOMINO
45TH PLACE
Levee
ARIZONA CANAL
ZONE A
42ND PL
43RD ST
44TH STREET
AVENIDA DEL PUENTA
38TH ST
ELM ST
ELM STREET
40TH ST
HAZELWOOD ST
PATRICIA JANE DR
CALLE REDONDA
CALLE TUBERIA
LAFAYETTE
45TH ST
EXETER BLVD
LAUNFAL
CAMPBELL AVE
46TH ST
24
19

1" = 1000'


Revised Floodplain
Existing Floodplain
E 474000
E 476000
E 478000


MARICOPA COUNTY
UNINCORPORATED AREAS
040037
RM434
PALO VERDE DR
PALO VERDE DRIVE
RANCHO
SOLANO
DRIVE
SAN MIGUEL AVENUE
MONTEBELLO AV
Echo Canyon Wash
SOLANO DRIVE
LIMIT OF DETAILED STUDY
13
STANFORD DR
RM432
RM433
ZONE AE
18
ZONE A
NE A CONTAINED WITHIN THE HT—OF—WAY OF ARIZONA CANAL ERSION CHANNEL
41ST ST
PLACE
VERMONT AV
COLTER ST
LIMIT OF DETAILED STUDY
42D ST
MEDLOCK DR
PASADENA AVENUE
CITY OF PHOENIX
040051
ZONE A
Levee
ARIZONA CANAL
ZONE A
AVENIDA DEL PUENTA
LAFAYETTE BLVD
CALLE REDONDA
CALLE TUBERIA ST
ELM ST
40TH ST
ELM STREET
HAZELWOOD ST
PATRICIA JANE DR
CAMPBELL AVE
24
19
39TH ST
42D
MARION WAY
CAMELBACK ROAD
ARLINGTON ROAD
VILLAGE DR
ROCK RD
ORANGE DR
PALOMINO
EXETER
45TH ST
46TH ST
47TH ST
1310
1309
1308
1304
1301
1298
1293
1285
1278
1270
1266
1275
1259
1290

ZONE A

Baker

Michael Baker Jr., Inc.
A Unit of Michael Baker Corporation

3601 Eisenhower Avenue, Suite 600
Alexandria, Virginia 22304

(703) 960-8800
FAX (703) 960-9125

Letter of Transmittal

Engineering Division	DATE 7/31/96
Flood Control District of Maricopa County	RE:
Phoenix, Arizona 85009	Case No. 96-09-694P
	Echo Canyon Wash, AZ
ATTENTION: Mr. Hasan Mushtaq	

THE INFORMATION DESCRIBED BELOW IS BEING SENT TO YOU VIA:

☒ **MAIL** ☐ **BY HAND** ☐ **MESSENGER** ☐ **FEDERAL EXPRESS**

NO. OF COPIES	DATE	DESCRIPTION
1		Partially annotated copy of FIRM panel with Zone A delineation
1		HEC-2 output file

FLOOD CONTROL DISTRICT
RECEIVED
AUG 5 1996
REMARKS

THIS INFORMATION IS TRANSMITTED AS CHECKED BELOW:

☐ **FOR REVIEW** x **FOR YOUR USE**
☐ **FOR APPROVAL** ☐ **AS REQUESTED BY** _____
☐ **FOR SIGNATURE** ☐ **AS APPROVED BY** _____

REMARKS:

Hasan:

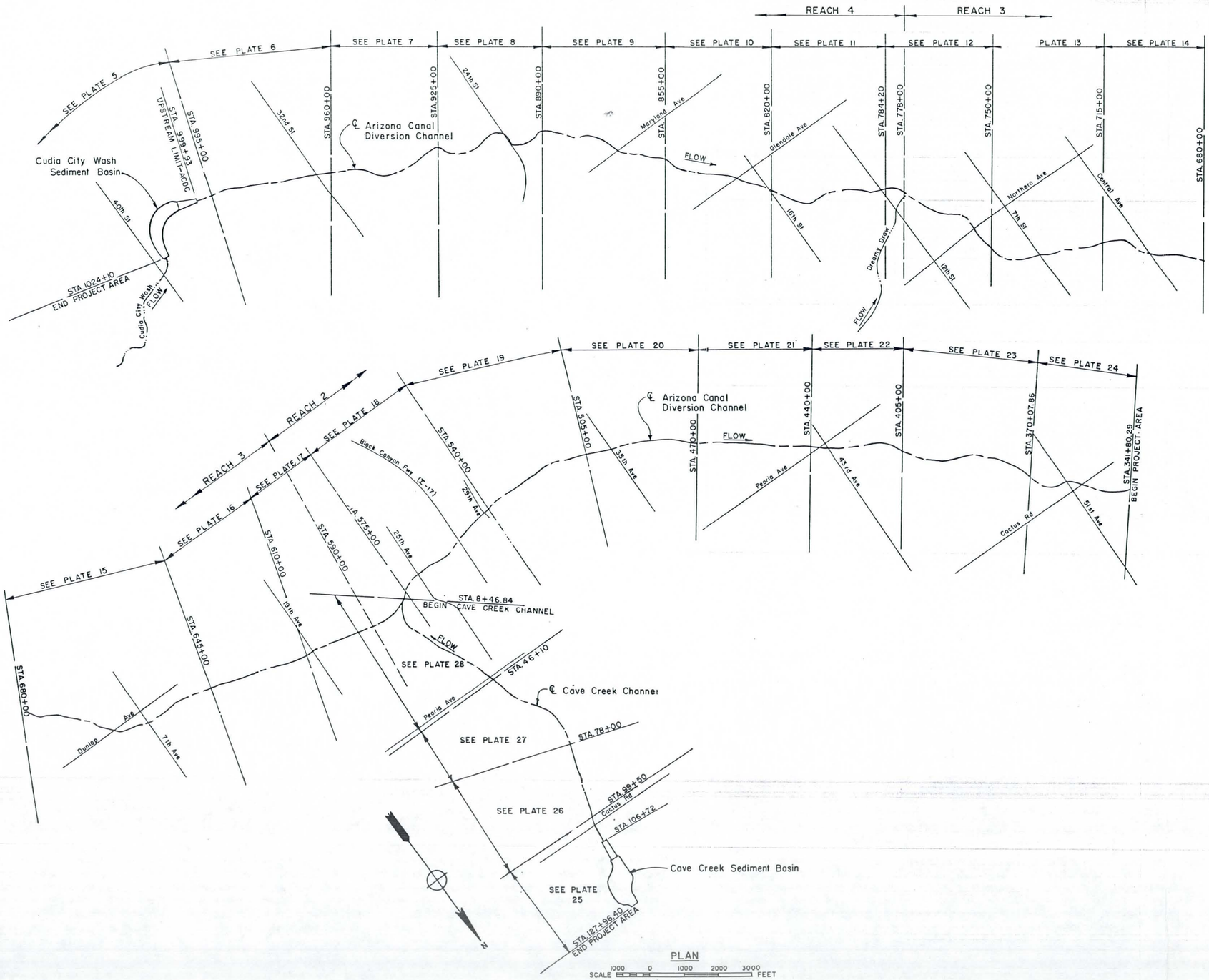
Please find the enclosed copy of the partially annotated FIRM with the Zone A delineation and the revised output file for the HEC-2. As we discussed, the Zone A was delineated based on the 1252 foot contour and the HEC-2 was revised to add cross-section 0.71 upstream in order to tie into the effective information. Please make the appropriate changes to your files and call me at (703) 317-6239 with any questions. As you requested, copies of the enclosed FIRM and HEC-2 have been forwarded to your subcontractor, David George.

Sincerely,

Massoud Rezakhani

IF THE ENCLOSURES ARE NOT AS DESCRIBED, PLEASE NOTIFY US AT ONCE.

A Total Quality Corporation



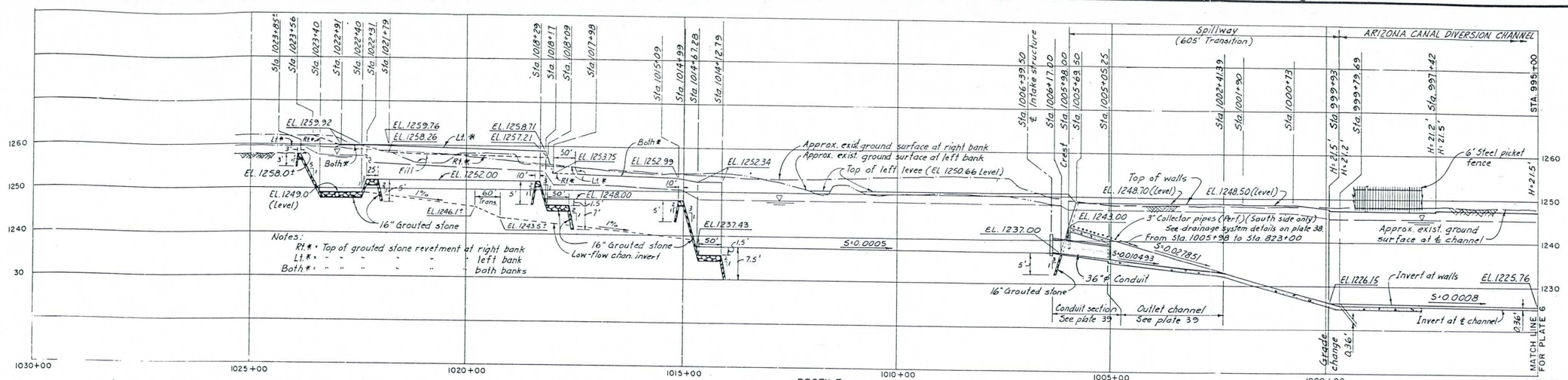
DATUM IS NATIONAL GEODETIC VERTICAL DATUM OF 1929

GILA RIVER BASIN
PHOENIX, ARIZONA AND VICINITY (INCLUDING NEW RIVER)

ARIZONA CANAL DIVERSION CHANNEL

PROJECT
KEY MAP OF HYDRAULIC PLAN AND PROFILE
STA. 1024+10 TO STA. 341+80.29

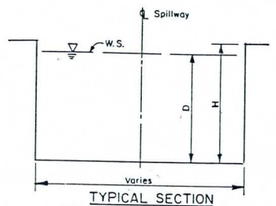
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT



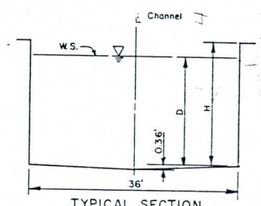
PROFILE

HORIZ. SCALE 100 0 100 200 300 FEET

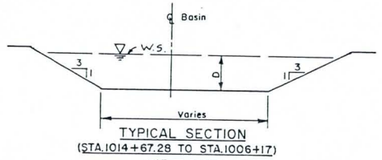
VERT. SCALE 10 0 10 20 30 FEET



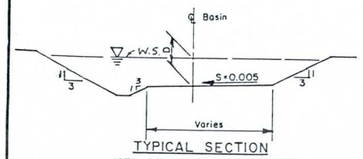
TYPICAL SECTION
(STA. 1005+98 TO STA. 999+93)
NOT TO SCALE



TYPICAL SECTION
(STA. 999+79.69 TO STA. 995+00)
NOT TO SCALE



TYPICAL SECTION
(STA. 1014+67.28 TO STA. 1006+17)
NOT TO SCALE



TYPICAL SECTION
(STA. 1022+31 TO STA. 1014+99)
NOT TO SCALE

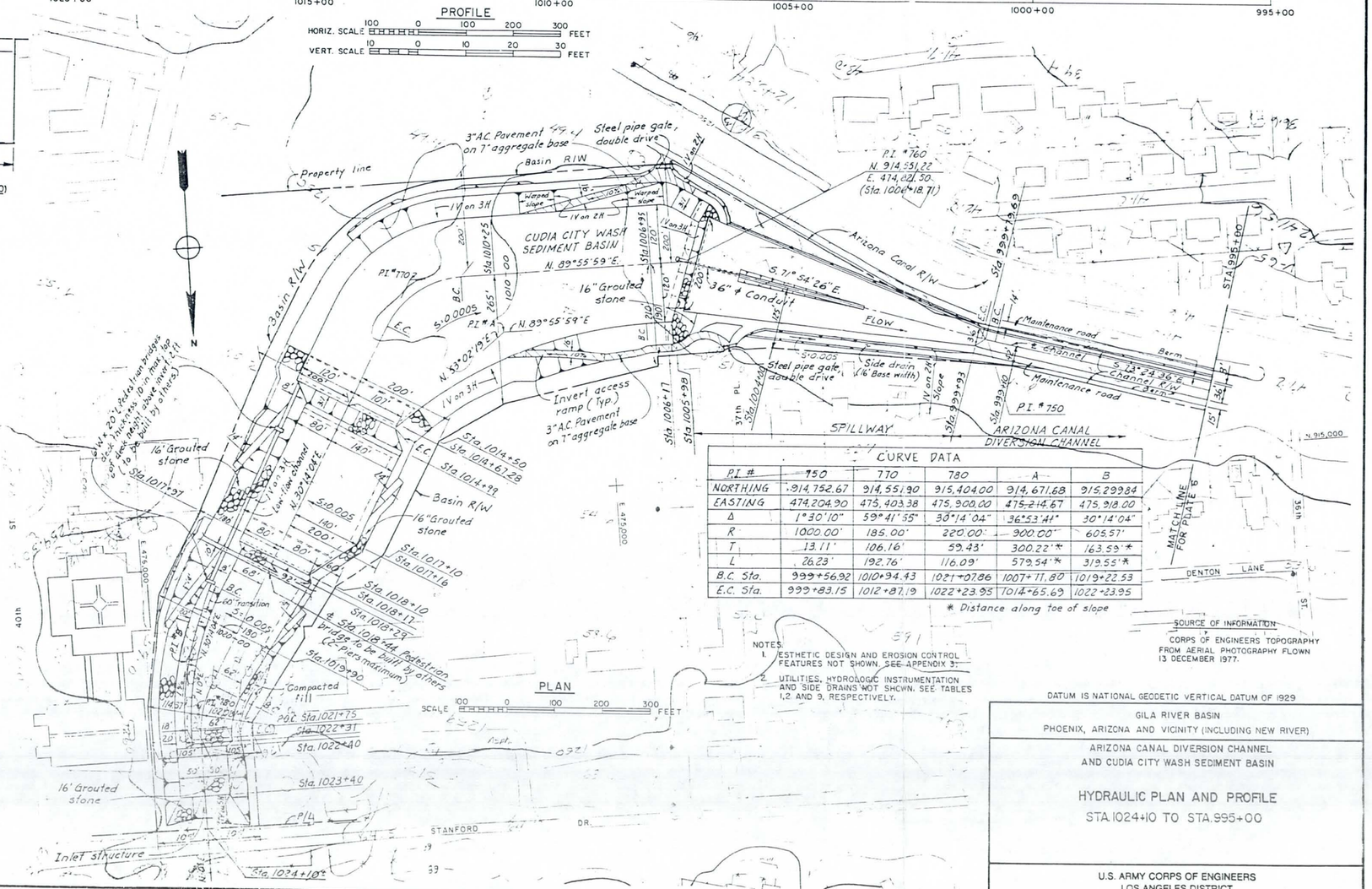
HYDRAULIC ELEMENTS FOR THE SEDIMENT BASIN

STATION	TO STATION	SECTION	SLOPE	Q (cfs)	Dc (ft)	UPSTREAM d	UPSTREAM v	DOWNSTREAM d	DOWNSTREAM v	n VALUES
1023+85	1023+40	Inlet chute	0.20	6800	Varies	3.7	10.9	8.4	6.4	.026
1023+40	1022+40	Stilling basin	0.0	"	4.9	8.4	6.4	8.4	6.2	
1022+40	1022+31	Reverse slope	-0.333333	"	Varies	8.4	6.2	3.8	10.2	
1022+31	1018+29	Upper basin	0.0	"	"	3.8	10.2	2.2	5.2	
1018+29	1018+17	4' Drop	0.333333	"	"	2.2	5.2	3.0	8.2	
1018+17	1014+99	Middle basin	0.0	"	"	3.0	8.2	2.1	5.3	.027
1014+99	1014+67.28	10.57' Drop	0.333333	"	"	2.1	5.3	12.4	2.0	
1014+67.28	1006+17	Main basin	0.0005	"	"	10.2	3.1	11.1	2.7	.028
1006+17	1005+98	Reverse slope	-0.333333	"	"	11.1	2.7	3.9	8.8	
1005+98	999+93	Outlet transition	0.027851	"	"	3.9	8.8	19.4	9.8	.014

HYDRAULIC ELEMENTS

STATION	TO STATION	SECTION	SLOPE	Q (cfs)	Dc (ft.)	K = .007 ft. n	K = .007 ft. dᵃ	K = .007 ft. Vel	K = .002 ft. n	K = .002 ft. Dᵇ	K = .002 ft. Vel
999+93	995+00	Rect. b = 36'	0.0008	6870	10.1	0.016	21.2	8.9	0.014	19.4	9.7

a. Used to determine wall heights.
b. Used to compute plotted water surface profile



PLAN

SCALE 100 0 100 200 300 FEET

CURVE DATA

P.I. #	750	770	780	A	B
NORTHING	914,752.67	914,551.90	915,404.00	914,671.68	915,299.84
EASTING	474,204.90	475,403.38	475,900.00	475,214.67	475,918.00
Δ	1°30'10"	59°41'55"	30°14'04"	36°53'41"	30°14'04"
R	1000.00'	185.00'	220.00'	300.00'	605.57'
T	13.11'	106.16'	59.43'	300.22'*	163.59'*
L	26.23'	192.76'	116.09'	579.54'*	319.55'*
B.C. Sta.	999+56.92	1010+94.43	1021+07.86	1007+11.80	1019+22.53
E.C. Sta.	999+83.15	1012+87.19	1022+23.95	1014+65.69	1022+23.95

* Distance along toe of slope

NOTES:
1. ESTHETIC DESIGN AND EROSION CONTROL FEATURES NOT SHOWN. SEE APPENDIX 3.
2. UTILITIES, HYDROLOGIC INSTRUMENTATION AND SIDE DRAINS NOT SHOWN. SEE TABLES 1,2 AND 9, RESPECTIVELY.

SOURCE OF INFORMATION
CORPS OF ENGINEERS TOPOGRAPHY FROM AERIAL PHOTOGRAPHY FLOWN 13 DECEMBER 1977.

DATUM IS NATIONAL GEODETIC VERTICAL DATUM OF 1929

GILA RIVER BASIN
PHOENIX, ARIZONA AND VICINITY (INCLUDING NEW RIVER)

ARIZONA CANAL DIVERSION CHANNEL
AND CUDIA CITY WASH SEDIMENT BASIN

HYDRAULIC PLAN AND PROFILE
STA. 1024+10 TO STA. 995+00

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2711
LOS ANGELES, CALIFORNIA 90053-2325

FLOOD CONTROL DISTRICT
RECEIVED
SEP 26 1994

	CHENG		P & PM
	DEP		HYDRO
	ADMIN		LMGT
	FINANCE		FILE
	C & O		
	ENGR		

REMARKS

REPLY TO
ATTENTION OF:

September 19, 1994

Office of the Chief
Design Branch

Mr. Donald J. Rerick
Project Manager
Flood Control District of Maricopa County
3335 West Durango Street
Phoenix, Arizona 85009

Note:
19 Sheets NOT in
full size set.

Dear Mr. Rerick:

We have completed As-Built drawings for the flood control channel, appendix 'A' (Geotechnical reference drawings), and appendix B (Landscape drawings) of Reach 4 entitled "Arizona Canal Diversion Channel (Cudia City Wash to Dreamy Draw including Cudia City Wash Sediment Basin)." We have also revised 10 As-Built drawings of Reach 3 (Arizona Canal Diversion Channel from Dreamy Draw to Cave Creek), and 19 As-Built drawings of Reach 2C (Arizona Canal Diversion Channel from Cave Creek to 29th Avenue). Please replace above drawings of Reach 3 and 2C with the drawings previously sent to you.

As per our requirements, we are sending you one set of full size drawings, one set of half-size reproducibles, and one set of half size prints for the above reaches of the Arizona Canal Diversion Channel.

If you have any questions, please call Mr. Desai (213/894-3702) of my staff.

Sincerely,

Robert E. Koplin, PE
Chief, Engineering Division

48th St.
44th St.
Camelback Rd.
40th St.
Indian School Rd.
Arizona Canal
32nd St.

DUPLICATE EFFECTIVE HEC-2 MODEL

HEC2 S/N: 1363000967 HMVersion:

```
*********************************************
*  HEC-2 WATER SURFACE PROFILES             *
*                                           *
*  Version   4.6.2;  May 1991               *
*                                           *
*  RUN DATE     5MAR96    TIME    9:11:04   *
*********************************************
```

```
****************************************
*  U.S. ARMY CORPS OF ENGINEERS        *
*  HYDROLOGIC ENGINEERING CENTER       *
*  609 SECOND STREET, SUITE D          *
*  DAVIS, CALIFORNIA 95616-4687        *
*          (916) 756-1104              *
****************************************
```

Duplicate Effective Model

```
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
```

```
::::::::::::::::::::::::::::::::::::::::::::
::::::::::::::::::::::::::::::::::::::::::::
:::                                      :::
:::   FULL MICRO-COMPUTER IMPLEMENTATION  :::
:::                                      :::
::::::::::::::::::::::::::::::::::::::::::::
::::::::::::::::::::::::::::::::::::::::::::
```

```
============================
H A E S T A D   M E T H O D S
============================
```

37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

```
T1          DUPLICATE EFFECTIVE MODEL FOR ECHO CANYON WASH
T2          FILE:FEMA100Y.HC2  10, 25, 50, 500, 100, & 100 W/ 1' ENCROACHMENT
T3       10 YR STORMS
J1    -1      2      0      0      0      0      0      0 49.250      0
J2   1.0      0      0      0      0      0      0      0      0      0
[illegible].0   34.0   27.0   28.0   31.0   32.0   33.0      0      0      0
NC  0.05   0.05   0.05   0.10    0.3
QT   6.0   2000   3200   4600  18000   6600   6600      0      0      0
ET                                           10.4
X1   0.0     20   1135   4400
GR    52   1000     50   1135     48   1423     48   1475     49   1500
GR    49   1980     48   2230   47.5   2250     48   2270     50   2450
GR    50   3020   48.5   3050     50   3060     50   3575   48.5   3610
GR    50   3680     51   3740     51   4220     50   4350     52   4400
X1  0.02     13   1470   3660   1400    400     85
GR    58   1000     56   1370     54   1470     52   1730     50   1765
GR    50   2570     52   2575     54   2600     52   2760     50   2820
GR    50   3510     52   3660     54   3780
X1 0.230     11   1460   1900    320    900   1120
GR    62   1000     60   1180     58   1460     56   1500     54   1600
GR    53   1650     54   1685     56   1800     58   1900     60   2220
GR    62   2950
NC   .16    .16    .05     .1     .3
QT     6   1900   3000   4200  14000   5900   5900
X1  0.37     14   1725   1810    850   1080    710
GR    70   1000     68   1270     66   1510     64   1555     62   1725
GR    60   1750     58   1762     58   1792     60   1810     62   1915
GR    64   2010     66   2255     68   2510     70   2850
X1  0.51     14   1922   1995   1020    600    800
GR    80   1000     70   1810     68   1870     66   1922     64   1930
G[illegible]64   1976     66   1995     68   2105     70   2155     72   2440
G[illegible]74   2840     76   3150     78   3380     80   3510
X1  0.71     10   1700   1775    700    800   1060
GR    80   1000     76   1660     74   1700     72   1712     70   1730
GR    72   1760     74   1775     76   1840     78   1920     80   2050
X1  0.93     12   1165   1240   1520    800   1150
GR    88   1000     86   1075     84   1145     82   1165     80   1175
GR    78   1200     80   1220     82   1230     84   1240     86   1260
GR    88   1520     90   1820
NC   .08    .08    .05     .1     .3
X1  1.04     17   1590   1905    530    750    550
GR   100   1000     98   1030     96   1100     94   1345     92   1590
GR    90   1665     89   1730     90   1800   92.5   1905     93   2070
GR    94   2135     92   2400     92   2630     94   2840     96   2865
GR    98   2950    100   2990
EJ
T1          25 YEAR STORM
T3       25 YEAR STORM
J1            3                                   1          49.4
J2     2
T1          50 YEAR STORM
T3       50 YEAR STORM
J1            4                                   1          49.75
J2     3
T1          500 YEAR STORM
T3       500 YEAR STORM
J[illegible]  5                                   1          51.25
J2     4
T1          100 YEAR STORM
T3       100 YEAR STORM
```

```
J1          6                                   1          50.05
J2    5
T1        100 YEAR STORM - ONE FOOT ENCROACHMENT
T3     100 YEAR STORM 1' ENCHR
J1          7                                   1          50.1
[illegible] 6                                                        15
EK
```

THIS RUN EXECUTED 5MAR96 9:11:04

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

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

```
T1          DUPLICATE EFFECTIVE MODEL FOR ECHO CANYON WASH
T2          FILE:FEMA100Y.HC2  10, 25, 50, 500, 100, & 100 W/ 1' ENCROACHMENT
T3      10 YR STORMS

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

     -1        2        0        0        0        0        0        0     49.250     0

J2  NPROF     IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE

    1.0        0        0        0        0        0        0        0        0        0


J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    1.0      34.0     27.0     28.0     31.0     32.0     33.0        0        0        0

NC     0.05     0.05     0.05     0.10     0.3
QT     6.0      2000     3200     4600     18000    6600     6600     0        0        0
ET                                                            10.4
X1     0.0      20       1135     4400
GR     52       1000     50       1135     48       1423     48       1475     49       1500
GR     49       1980     48       2230     47.5     2250     48       2270     50       2450
GR     50       3020     48.5     3050     50       3060     50       3575     48.5     3610
GR     50       3680     51       3740     51       4220     50       4350     52       4400

X1     0.02     13       1470     3660     1400     400      85
GR     58       1000     56       1370     54       1470     52       1730     50       1765
GR     50       2570     52       2575     54       2600     52       2760     50       2820
GR     50       3510     52       3660     54       3780

X1     0.230    11       1460     1900     320      900      1120
GR     62       1000     60       1180     58       1460     56       1500     54       1600
GR     53       1650     54       1685     56       1800     58       1900     60       2220
GR     62       2950

NC     .16      .16      .05      .1       .3
QT     6        1900     3000     4200     14000    5900     5900
X1     0.37     14       1725     1810     850      1080     710
GR     70       1000     68       1270     66       1510     64       1555     62       1725
GR     60       1750     58       1762     58       1792     60       1810     62       1915
GR     64       2010     66       2255     68       2510     70       2850
```

X1	0.51	14	1922	1995	1020	600	800			
GR	80	1000	70	1810	68	1870	66	1922	64	1930
GR	64	1976	66	1995	68	2105	70	2155	72	2440
GR	74	2840	76	3150	78	3380	80	3510		
X1	0.71	10	1700	1775	700	800	1060			
GR	80	1000	76	1660	74	1700	72	1712	70	1730
GR	72	1760	74	1775	76	1840	78	1920	80	2050
X1	0.93	12	1165	1240	1520	800	1150			
GR	88	1000	86	1075	84	1145	82	1165	80	1175
GR	78	1200	80	1220	82	1230	84	1240	86	1260
GR	88	1520	90	1820						
NC	.08	.08	.05	.1	.3					
X1	1.04	17	1590	1905	530	750	550			
GR	100	1000	98	1030	96	1100	94	1345	92	1590
GR	90	1665	89	1730	90	1800	92.5	1905	93	2070
GR	94	2135	92	2400	92	2630	94	2840	96	2865
GR	98	2950	100	2990						

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
	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

CCHV= 0.100 CEHV= 0.300
*SECNO 0.000

3265 DIVIDED FLOW

0.000	1.75	49.25	0.00	49.25	49.39	0.14	0.00	0.00	50.00
2000.0	0.0	2000.0	0.0	0.0	661.3	0.0	0.0	0.0	52.00
0.00	0.00	3.02	0.00	0.000	0.050	0.000	0.000	47.50	1243.00
0.023236	0.	0.	0.	0	0	0	0.00	1212.00	3645.00

*SECNO 0.020

3265 DIVIDED FLOW

3[illegible]ARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.48

0.020	0.61	50.61	0.00	0.00	50.68	0.07	1.28	0.01	54.00
2000.0	0.0	2000.0	0.0	0.0	928.8	0.0	1.6	2.7	52.00
0.01	0.00	2.15	0.00	0.000	0.050	0.000	0.000	50.00	1754.40
0.010577	1400.	85.	400.	8	0	0	0.00	1570.74	3555.45

*SECNO 0.230

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.74

0.230	3.88	56.88	0.00	0.00	57.00	0.12	6.31	0.01	58.00
2000.0	0.0	2000.0	0.0	0.0	720.1	0.0	22.8	27.6	58.00
0.12	0.00	2.78	0.00	0.000	0.050	0.000	0.000	53.00	1482.32
0.003490	320.	1120.	900.	6	0	0	0.00	361.90	1844.21

CCHV= 0.100 CEHV= 0.300
*SECNO 0.370

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
	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

0.370	3.71	61.71	61.71	0.00	62.79	1.08	5.11	0.29	62.00
1900.0	0.0	1802.1	97.9	0.0	210.7	76.6	31.3	32.3	60.00
0.15	0.00	8.55	1.28	0.000	0.050	0.160	0.000	58.00	1728.65
0.023406	850.	710.	1080.	3	8	0	0.00	171.02	1899.67

*SECNO 0.510

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.43

0.510	4.81	68.81	0.00	0.00	69.16	0.34	6.30	0.07	66.00
1900.0	85.4	1637.9	176.7	104.4	324.6	208.1	39.4	36.1	66.00
0.20	0.82	5.05	0.85	0.160	0.050	0.160	0.000	64.00	1845.51
0.003968	1020.	800.	600.	6	0	0	0.00	279.90	2125.41

*S[illegible] 0.710

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 0.57

0.710	5.12	75.12	0.00	0.00	75.95	0.83	6.65	0.15	74.00
1900.0	8.8	1877.0	14.3	12.6	255.3	20.5	49.5	40.2	74.00
0.24	0.69	7.35	0.69	0.160	0.050	0.160	0.000	70.00	1677.51
0.012047	700.	1060.	800.	3	0	0	0.00	134.03	1811.54

*SECNO 0.930

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

0.930	6.40	84.40	0.00	0.00	84.91	0.51	8.93	0.03	82.00
1900.0	24.6	1875.3	0.2	30.9	325.1	0.8	58.1	43.6	84.00
0.29	0.80	5.77	0.23	0.160	0.050	0.160	0.000	78.00	1130.94
0.005401	1520.	1150.	800.	2	0	0	0.00	113.08	1244.02

CCHV= 0.100 CEHV= 0.300
*SECNO 1.040
7185 MINIMUM SPECIFIC ENERGY

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
	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

1.040	2.23	91.23	91.23	0.00	91.88	0.65	6.10	0.04	92.00
1900.0	0.0	1900.0	0.0	0.0	294.3	0.0	62.2	45.8	92.50
0.32	0.00	6.46	0.00	0.000	0.050	0.000	0.000	89.00	1618.78
0.034583	530.	550.	750.	12	22	0	0.00	232.98	1851.76

PROFILE FOR STREAM 10 YR STORMS

F[illegible]ED POINTS (BY PRIORITY) E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA

```
ELEVATION   48.      58.      68.      78.      88.      98.     108.     118.     128.     138.
   SECNO  CUMDIS

    0.00     0.  I EL R   .        .        .        .        .        .        .        .        .
    0.02   100.  C  E R L  .        .        .        .        .        .        .        .        .
           200.  C  IER L  .        .        .        .        .        .        .        .        .
           300.  C  IE RLM .        .        .        .        .        .        .        .        .
           400.  C  I ER LM.        .        .        .        .        .        .        .        .
           500.  C   IE RLM.        .        .        .        .        .        .        .        .
           600.  C   I ERL M        .        .        .        .        .        .        .        .
           700.  C   I WERL.M       .        .        .        .        .        .        .        .
           800.  C   I  ERL. M      .        .        .        .        .        .        .        .
           900.  C    I  EL. M      .        .        .        .        .        .        .        .
          1000.  C    I  ERL  M     .        .        .        .        .        .        .        .
          1100.  C    I   EL   M    .        .        .        .        .        .        .        .
          1200.  C    I   EL   M    .        .        .        .        .        .        .        .
    0.23  1300.  C     I  WEL   M   .        .        .        .        .        .        .        .
          1400.  C     I   EL    M  .        .        .        .        .        .        .        .
          1500.  C      I  .EL    M .        .        .        .        .        .        .        .
          1600.  C       I .WE     M.        .        .        .        .        .        .        .
          1700.  C       I . WE     M.       .        .        .        .        .        .        .
          1800.  C        I. RWE     M       .        .        .        .        .        .        .
          1900.  .    C    I RWE     .M      .        .        .        .        .        .        .
    0.37  2000.  .         .I RWE    . M     .        .        .        .        .        .        .
          2100.  .     C   .I R WE   .  M    .        .        .        .        .        .        .
          2200.  C         . I R WE  .   M   .        .        .        .        .        .        .
          2300.  C         .  I RLWE .    M  .        .        .        .        .        .        .
          2400.  C         .   I RLE .      M.        .        .        .        .        .        .
          2500.  C         .   I RL E.       M.       .        .        .        .        .        .
          2600.  C         .    I RL E        M       .        .        .        .        .        .
          2700.  C         .     I L WE       .M      .        .        .        .        .        .
    0.51  2800.  C         .      I L.WE      . M     .        .        .        .        .        .
          2900.  C         .      I L. E      . M     .        .        .        .        .        .
          3000.  C         .       I L  E     . M     .        .        .        .        .        .
          3100.  C         .       I .L WE    . M     .        .        .        .        .        .
          3200.  C         .        I. L E    . M     .        .        .        .        .        .
          3300.  C         .        I. L WE   . M     .        .        .        .        .        .
          3400.  C         .         I  L WE  . M     .        .        .        .        .        .
          3500.  C         .         I   LWE  . M     .        .        .        .        .        .
          3600.  C         .         .I   LWE . M     .        .        .        .        .        .
          3700.  C         .         . I  L E . M     .        .        .        .        .        .
    0.71  3800.  C         .         . I   LE . M     .        .        .        .        .        .
          3900.  C         .         . I   LWE. M     .        .        .        .        .        .
          4000.  C         .         .  I   LWE  M    .        .        .        .        .        .
          4100.  C         .         .   I  LWE  M    .        .        .        .        .        .
          4200.  C         .         .   I  LRWE M    .        .        .        .        .        .
          4300.  C         .         .    I  LRE  M   .        .        .        .        .        .
          4400.  C         .         .     I  .LWE  M .        .        .        .        .        .
          4500.  C         .         .     I  .L WE M .        .        .        .        .        .
          4600.  C         .         .      I . LRWE M .       .        .        .        .        .
          4700.  C         .         .       I.  LRE  M.       .        .        .        .        .
```

```
      4800.  C        .        .       I.  L RE  M.        .        .        .        .        .        .
      4900.  C        .        .        I   L WE  M        .        .        .        .        .        .
0.93  5000.  C        .        .        .I   L E  .M       .        .        .        .        .        .
      5100.  C        .        .        .  I  L WE.  M     .        .        .        .        .        .
      5200.  C        .        .        .    I  LWE    M   .        .        .        .        .        .
      5300.  . C      .        .        .      I  LE     M .        .        .        .        .        .
      5400.  .        .       C.        .        I. ER     M.        .        .        .        .        .
1.04  5500.  .        .        .        .         . I EL    . M      .        .        .        .        .
```

T1 25 YEAR STORM
T 25 YEAR STORM

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		3					1		49.4	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	2									

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
	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

CCHV= 0.100 CEHV= 0.300
*SECNO 0.000

3265 DIVIDED FLOW

0.000	1.90	49.40	0.00	49.40	49.62	0.22	0.00	0.00	50.00
3200.0	0.0	3200.0	0.0	0.0	846.8	0.0	0.0	0.0	52.00
0.00	0.00	3.78	0.00	0.000	0.050	0.000	0.000	47.50	1221.40
0.027519	0.	0.	0.	0	0	0	0.00	1261.60	3652.00

*SECNO 0.020

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.70

0.020	0.82	50.82	0.00	0.00	50.92	0.10	1.28	0.01	54.00
3200.0	0.0	3200.0	0.0	0.0	1280.7	0.0	2.1	2.8	52.00
0.01	0.00	2.50	0.00	0.000	0.050	0.000	0.000	50.00	1750.51
0.009500	1400.	85.	400.	4	0	0	0.00	1598.50	3572.10

*SECNO 0.230

1645 INT SEC ADDED BY RAISING SEC 0.23, -2.250 FT AND MULTIPLYING BY 33.956

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.94

1.010	1.39	52.14	0.00	0.00	52.16	0.02	1.23	0.01	55.75
3200.0	0.0	3200.0	0.0	0.0	2826.6	0.0	15.3	21.7	55.75
0.08	0.00	1.13	0.00	0.000	0.050	0.000	0.000	50.75	20719.24
0.002533	80.	280.	225.	4	0	0	0.00	4293.08	25012.32

1645 INT SEC ADDED BY RAISING SEC 1.01, 0.750 FT AND MULTIPLYING BY 0.676

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
	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
1.020	1.49	52.99	0.00	0.00	53.02	0.03	0.86	0.00	56.50
3200.0	0.0	3200.0	0.0	0.0	2218.8	0.0	31.5	45.7	56.50
0.13	0.00	1.44	0.00	0.000	0.050	0.000	0.000	51.50	14223.48
0.003764	80.	280.	225.	2	0	0	0.00	3154.15	17377.63

1645 INT SEC ADDED BY RAISING SEC 1.02, 0.750 FT AND MULTIPLYING BY 0.522

1.030	1.84	54.09	0.00	0.00	54.14	0.05	1.12	0.00	57.25
3200.0	0.0	3200.0	0.0	0.0	1819.3	0.0	44.5	62.6	57.25
0.18	0.00	1.76	0.00	0.000	0.050	0.000	0.000	52.25	7687.92
0.004243	80.	280.	225.	3	0	0	0.00	2100.79	9788.71

1645 INT SEC ADDED BY RAISING SEC 1.03, 0.750 FT AND MULTIPLYING BY 0.083

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 0.37

0.230	3.14	56.14	56.10	0.00	56.87	0.73	2.52	0.20	58.00
3200.0	0.0	3200.0	0.0	0.0	467.4	0.0	51.8	70.3	58.00
0.19	0.00	6.85	0.00	0.000	0.050	0.000	0.000	53.00	1497.38
0.030602	80.	280.	225.	9	14	0	0.00	309.16	1806.54

CCHV= 0.100 CEHV= 0.300
*SECNO 0.370

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.36

0.370	6.03	64.03	0.00	0.00	64.46	0.43	7.56	0.03	62.00
3000.0	115.7	2389.1	495.2	175.5	407.7	416.5	65.8	77.7	60.00
0.23	0.66	5.86	1.19	0.160	0.050	0.160	0.000	58.00	1554.27
0.004831	850.	710.	1080.	5	0	0	0.00	459.68	2013.95

*SECNO 0.510

0.510	4.88	68.88	0.00	0.00	69.70	0.82	5.12	0.12	66.00
3000.0	139.7	2572.5	287.8	109.4	329.3	216.6	80.3	84.4	66.00
0.26	1.28	7.81	1.33	0.160	0.050	0.160	0.000	64.00	1843.57
0.009328	1020.	800.	600.	3	0	0	0.00	283.45	2127.02

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
	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 0.710

0.710	6.88	76.88	0.00	0.00	77.59	0.71	7.89	0.01	74.00
3000.0	112.5	2742.5	145.0	138.6	386.8	137.4	94.2	90.4	74.00
0.30	0.81	7.09	1.06	0.160	0.050	0.160	0.000	70.00	1515.19
0.006440	700.	1060.	800.	4	0	0	0.00	359.91	1875.10

*SECNO 0.930

0.930	7.06	85.06	0.00	0.00	85.99	0.92	8.33	0.06	82.00
3000.0	67.4	2929.5	3.2	61.4	375.3	5.7	109.1	97.7	84.00
0.35	1.10	7.81	0.55	0.160	0.050	0.160	0.000	78.00	1107.54
0.008172	1520.	1150.	800.	2	0	0	0.00	143.16	1250.70

CCHV= 0.100 CEHV= 0.300
*SECNO 1.040

3265 DIVIDED FLOW

332 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 0.66

1.040	3.04	92.04	91.73	0.00	92.58	0.54	6.55	0.04	92.00
3000.0	0.0	2996.7	3.3	0.1	509.5	10.3	115.2	102.5	92.50
0.37	0.20	5.88	0.32	0.080	0.050	0.080	0.000	89.00	1584.61
0.018981	530.	550.	750.	7	18	0	0.00	541.69	2634.62

PROFILE FOR STREAM 25 YEAR STORM

PLOTTED POINTS (BY PRIORITY) E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA

```
ELEVATION   48.      58.      68.      78.      88.      98.      108.     118.     128.     138.
   SECNO   CUMDIS

   0.00      0.  I EL R   .        .        .        .        .        .        .        .        .
   0.02    100.  C  E R L  .        .        .        .        .        .        .        .        .
           200.  C  IE RL M.        .        .        .        .        .        .        .        .
           300.  C  IE  RL .M       .        .        .        .        .        .        .        .
   1.01    400.  C  I E  L . M      .        .        .        .        .        .        .        .
           500.  C   IE   L.  M     .        .        .        .        .        .        .        .
           600.  C   IE   L.  M     .        .        .        .        .        .        .        .
   1.02    700.  C   IWE  L.  M     .        .        .        .        .        .        .        .
           800.  C   I E  L.  M     .        .        .        .        .        .        .        .
           900.  C    IE   L   M    .        .        .        .        .        .        .        .
   1.03   1000.  C    I E  L   M    .        .        .        .        .        .        .        .
          1100.  C    I WE L   M    .        .        .        .        .        .        .        .
          1200.  C    I  WEL   M    .        .        .        .        .        .        .        .
   0.23   1300.  .     I  E.L   M    .        .        .        .        .        .        .        .
          1400.  .C    I   EL    M  .        .        .        .        .        .        .        .
          1500.  C      I  .WE    M .        .        .        .        .        .        .        .
          1600.  C       I .RWE    M .        .        .        .        .        .        .        .
          1700.  C       I . RWE    M.        .        .        .        .        .        .        .
          1800.  C        I. RLWE    M        .        .        .        .        .        .        .
          1900.  C         I R LWE   .M       .        .        .        .        .        .        .
   0.37   2000.  C         .I R L E  .  M     .        .        .        .        .        .        .
          2100.  C         .I R L WE .   M    .        .        .        .        .        .        .
          2200.  C         . I R L E .    M   .        .        .        .        .        .        .
          2300.  C         .  I RL WE.     M  .        .        .        .        .        .        .
          2400.  C         .   I RL WE       M .        .        .        .        .        .        .
          2500.  C         .   I RL  E        M.        .        .        .        .        .        .
          2600.  C         .    I RL WE        M        .        .        .        .        .        .
          2700.  C         .     I L .WE       .M       .        .        .        .        .        .
   0.51   2800.  C         .      I L.WE       .  M     .        .        .        .        .        .
          2900.  C         .      I L. WE      .  M     .        .        .        .        .        .
          3000.  C         .       I L  WE     .  M     .        .        .        .        .        .
          3100.  C         .       I .L  E     .  M     .        .        .        .        .        .
          3200.  C         .        I. L WE    .  M     .        .        .        .        .        .
          3300.  C         .        I. L  WE   .  M     .        .        .        .        .        .
          3400.  C         .         I  L  WE  .  M     .        .        .        .        .        .
          3500.  C         .         I   L  E  .  M     .        .        .        .        .        .
          3600.  C         .         .I   L WE .  M     .        .        .        .        .        .
          3700.  C         .         . I  L  WE. M      .        .        .        .        .        .
   0.71   3800.  C         .         .  I   L WE  M     .        .        .        .        .        .
          3900.  C         .         .  I   L  WE M     .        .        .        .        .        .
          4000.  C         .         .   I   L .WE M    .        .        .        .        .        .
          4100.  C         .         .    I   L. E  M   .        .        .        .        .        .
          4200.  C         .         .    I   LR WE M   .        .        .        .        .        .
          4300.  C         .         .     I   LR WE M  .        .        .        .        .        .
          4400.  C         .         .      I  .LR E  M .        .        .        .        .        .
          4500.  C         .         .      I  .L RWE M .        .        .        .        .        .
          4600.  C         .         .       I . LR WE M .       .        .        .        .        .
          4700.  C         .         .        I.  LR WE M.       .        .        .        .        .
```

```
      4800.  C        .        .       I.  L R E M.        .        .        .        .        .        .
      4900.  C        .        .        I   L RWE M        .        .        .        .        .        .
0.93  5000.  C        .        .       .I   L RE .M        .        .        .        .        .        .
      5100.  C        .        .       .  I  L RWE  M      .        .        .        .        .        .
      5200.  C        .        .       .    I  L WE   M    .        .        .        .        .        .
      5300.  .  C     .        .       .      I  LWE    M  .        .        .        .        .        .
      5400.  .        .       C.       .        I. LE     M.        .        .        .        .        .
1.04  5500.  .        .        .       .         . I CE    .  M     .        .        .        .        .
```

T1 50 YEAR STORM
T2 50 YEAR STORM

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		4					1		49.75	

MULTIPLE PROFILE RUN WITH INTERPOLATED CROSS SECTIONS

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	3									

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
	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 3

CCHV= 0.100 CEHV= 0.300
*SECNO 0.000

3265 DIVIDED FLOW

0.000	2.25	49.75	0.00	49.75	49.94	0.19	0.00	0.00	50.00
4600.0	0.0	4600.0	0.0	0.0	1308.6	0.0	0.0	0.0	52.00
0.00	0.00	3.52	0.00	0.000	0.050	0.000	0.000	47.50	1171.00
0.014982	0.	0.	0.	0	0	0	0.00	1377.33	3668.33

*SECNO 0.020

3265 DIVIDED FLOW

0.020	0.95	50.95	0.00	0.00	51.10	0.15	1.15	0.00	54.00
4600.0	0.0	4600.0	0.0	0.0	1479.5	0.0	2.7	2.9	52.00
0.01	0.00	3.11	0.00	0.000	0.050	0.000	0.000	50.00	1748.34
0.012293	1400.	85.	400.	4	0	0	0.00	1613.97	3581.38

*SECNO 0.230

1645 INT SEC ADDED BY RAISING SEC 0.23, -2.250 FT AND MULTIPLYING BY 29.384

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.21

1.010	1.67	52.42	0.00	0.00	52.45	0.03	1.34	0.01	55.75
4600.0	0.0	4600.0	0.0	0.0	3616.1	0.0	19.1	22.9	55.75
0.07	0.00	1.27	0.00	0.000	0.050	0.000	0.000	50.75	17650.88
0.002528	80.	280.	225.	4	0	0	0.00	4603.65	22254.52

1645 INT SEC ADDED BY RAISING SEC 1.01, 0.750 FT AND MULTIPLYING BY 0.678

1.020	1.78	53.28	0.00	0.00	53.32	0.04	0.86	0.00	56.50
4600.0	0.0	4600.0	0.0	0.0	2809.6	0.0	39.7	48.5	56.50
0.12	0.00	1.64	0.00	0.000	0.050	0.000	0.000	51.50	12179.45
0.003849	80.	280.	225.	2	0	0	0.00	3357.88	15537.33

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
	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

1645 INT SEC ADDED BY RAISING SEC 1.02, 0.750 FT AND MULTIPLYING BY 0.525

1.030	2.18	54.43	0.00	0.00	54.49	0.06	1.17	0.01	57.25
4600.0	0.0	4600.0	0.0	0.0	2266.4	0.0	56.1	66.4	57.25
0.15	0.00	2.03	0.00	0.000	0.050	0.000	0.000	52.25	6662.05
0.004512	80.	280.	225.	3	0	0	0.00	2210.94	8872.99

1645 INT SEC ADDED BY RAISING SEC 1.03, 0.750 FT AND MULTIPLYING BY 0.096

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

0.230	3.55	56.55	56.55	0.00	57.45	0.91	2.64	0.25	58.00
4600.0	0.0	4600.0	0.0	0.0	602.5	0.0	65.3	74.6	58.00
0.16	0.00	7.63	0.00	0.000	0.050	0.000	0.000	53.00	1489.03
0.030586	80.	280.	225.	6	14	0	0.00	338.38	1827.42

CC[illegible] 0.100 CEHV= 0.300
*S[illegible] 0.370

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.28

0.370	6.81	64.81	0.00	0.00	65.30	0.49	7.81	0.04	62.00
4200.0	298.8	3088.0	813.2	314.4	473.6	611.2	84.7	83.6	60.00
0.21	0.95	6.52	1.33	0.160	0.050	0.160	0.000	58.00	1536.85
0.004901	850.	710.	1080.	5	0	0	0.00	571.96	2108.81

*SECNO 0.510

0.510	5.67	69.67	0.00	0.00	70.64	0.97	5.19	0.14	66.00
4200.0	274.3	3387.9	537.7	180.4	386.7	328.1	104.9	91.5	66.00
0.23	1.52	8.76	1.64	0.160	0.050	0.160	0.000	64.00	1819.98
0.009469	1020.	800.	600.	3	0	0	0.00	326.70	2146.68

*SECNO 0.710

0.710	7.72	77.72	0.00	0.00	78.56	0.84	7.91	0.01	74.00
4200.0	326.6	3573.1	300.4	353.1	450.1	236.1	124.5	99.4	74.00
0.28	0.92	7.94	1.27	0.160	0.050	0.160	0.000	70.00	1376.09
0.006599	700.	1060.	800.	4	0	0	0.00	532.74	1908.83

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
	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 0.930

0.930	8.06	86.06	0.00	0.00	87.24	1.18	8.58	0.10	82.00
4200.0	175.0	4006.3	18.7	135.6	449.6	21.5	147.3	110.1	84.00
0.31	1.29	8.91	0.87	0.160	0.050	0.160	0.000	78.00	1072.70
0.008368	1520.	1150.	800.	3	0	0	0.00	195.27	1267.97

CCHV= 0.100 CEHV= 0.300
*SECNO 1.040

3265 DIVIDED FLOW

1.040	3.61	92.61	0.00	0.00	93.09	0.48	5.78	0.07	92.00
4200.0	22.1	3918.7	259.2	22.8	683.4	186.5	157.2	117.4	92.50
0.34	0.97	5.73	1.39	0.080	0.050	0.080	0.000	89.00	1515.28
0.013258	530.	550.	750.	4	0	0	0.00	800.88	2694.05

PROFILE FOR STREAM 50 YEAR STORM

PLOTTED POINTS (BY PRIORITY) E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA

```
ELEVATION   48.      58.      68.      78.      88.      98.      108.     118.     128.     138.
   SECNO   CUMDIS

    0.00      0.  I EL R   .        .        .        .        .        .        .        .        .
    0.02    100.  C  WER L  .        .        .        .        .        .        .        .        .
            200.  C  IE RL M.        .        .        .        .        .        .        .        .
            300.  C  I E RL .M       .        .        .        .        .        .        .        .
    1.01    400.  C  I E  L . M      .        .        .        .        .        .        .        .
            500.  C   IE   L.  M     .        .        .        .        .        .        .        .
            600.  C   I E  L.  M     .        .        .        .        .        .        .        .
    1.02    700.  C   I E  L.  M     .        .        .        .        .        .        .        .
            800.  C   I E  L.  M     .        .        .        .        .        .        .        .
            900.  C    I E  L   M    .        .        .        .        .        .        .        .
    1.03   1000.  C    I E  L   M    .        .        .        .        .        .        .        .
           1100.  C    I  E L   M    .        .        .        .        .        .        .        .
           1200.  C    I  WEL   M    .        .        .        .        .        .        .        .
    0.23   1300.  .     I  WEL   M    .        .        .        .        .        .        .        .
           1400.  .C    I   WE    M   .        .        .        .        .        .        .        .
           1500.  C      I  .WE    M  .        .        .        .        .        .        .        .
           1600.  C       I .RLE    M .        .        .        .        .        .        .        .
           1700.  C       I . RLE    M.        .        .        .        .        .        .        .
           1800.  C        I. RL E    M        .        .        .        .        .        .        .
           1900.  C         I R L WE  .M       .        .        .        .        .        .        .
    0.37   2000.  C         .I R L WE .  M     .        .        .        .        .        .        .
           2100.  C         .I R L  E .   M    .        .        .        .        .        .        .
           2200.  C         . I R L  E.    M   .        .        .        .        .        .        .
           2300.  C         .  I RL  WE     M  .        .        .        .        .        .        .
           2400.  C         .   I RL  E       M .        .        .        .        .        .        .
           2500.  C         .   I RL  WE       M.        .        .        .        .        .        .
           2600.  C         .    I RL .WE       M        .        .        .        .        .        .
           2700.  C         .     I L . E       .M       .        .        .        .        .        .
    0.51   2800.  C         .      I L. WE      .  M     .        .        .        .        .        .
           2900.  C         .      I L.  WE     .  M     .        .        .        .        .        .
           3000.  C         .       I L   WE    .  M     .        .        .        .        .        .
           3100.  C         .       I .L  WE    .  M     .        .        .        .        .        .
           3200.  C         .        I. L  WE   .  M     .        .        .        .        .        .
           3300.  C         .        I. L   WE  .  M     .        .        .        .        .        .
           3400.  C         .         I  L   WE . M      .        .        .        .        .        .
           3500.  C         .         I   L  WE . M      .        .        .        .        .        .
           3600.  C         .         .I   L  WE. M      .        .        .        .        .        .
           3700.  C         .         . I  L   WE M      .        .        .        .        .        .
    0.71   3800.  C         .         .  I   L  WE M     .        .        .        .        .        .
           3900.  C         .         .  I   L  .WEM     .        .        .        .        .        .
           4000.  C         .         .   I   L . WEM    .        .        .        .        .        .
           4100.  C         .         .    I   L. WE M   .        .        .        .        .        .
           4200.  C         .         .    I   LR  WEM   .        .        .        .        .        .
           4300.  C         .         .     I   LR  WEM  .        .        .        .        .        .
           4400.  C         .         .      I  .LR  WEM .        .        .        .        .        .
           4500.  C         .         .      I  .L R WEM .        .        .        .        .        .
           4600.  C         .         .       I . LR  WEM .       .        .        .        .        .
           4700.  C         .         .        I.  LR  WEM.       .        .        .        .        .
```

```
       4800.  C      .      .      I.  L R W E.      .      .      .      .      .      .
       4900.  C      .      .       I   L R WEM      .      .      .      .      .      .
  0.93 5000.  C      .      .      .I   L R WEM      .      .      .      .      .      .
       5100.  C      .      .      .  I  L R WE M    .      .      .      .      .      .
       5200.  C      .      .      .   I  L RWE  M   .      .      .      .      .      .
       5300.  C      .      .      .     I  LRWE   M .      .      .      .      .      .
       5400.  C      .      .      .       I. LWE    M.      .      .      .      .      .
  1.04 5500.  C      .      .      .        . I  WE  . M     .      .      .      .      .
```

T1 500 YEAR STORM
T[illegible] 500 YEAR STORM

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		5					1		51.25	

MULTIPLE PROFILE RUN WITH INTERPOLATED CROSS SECTIONS

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	4									

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
	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 4

CCHV= 0.100 CEHV= 0.300

*SECNO 0.000

0.000	3.75	51.25	0.00	51.25	51.44	0.19	0.00	0.00	50.00
18000.0	99.3	17900.7	0.0	52.7	5126.5	0.0	0.0	0.0	52.00
0.00	1.88	3.49	0.00	0.050	0.050	0.000	0.000	47.50	1050.63
0.007507	0.	0.	0.	0	0	0	0.00	3330.63	4381.25

*SECNO 0.020

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 0.69

0.020	1.97	51.97	0.00	0.00	52.47	0.49	0.94	0.09	54.00
18000.0	0.0	18000.0	0.0	0.0	3196.6	0.0	9.0	6.2	52.00
0.00	0.00	5.63	0.00	0.000	0.050	0.000	0.000	50.00	1730.44
0.015982	1400.	85.	400.	3	0	0	0.00	1741.89	3658.13

*SECNO 0.230

1645 INT SEC ADDED BY RAISING SEC 0.23, -2.250 FT AND MULTIPLYING BY 13.846

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.23

1.010	3.39	54.14	0.00	0.00	54.22	0.09	1.72	0.04	55.75
18000.0	0.0	18000.0	0.0	0.0	7572.4	0.0	43.6	26.4	55.75
0.04	0.00	2.38	0.00	0.000	0.050	0.000	0.000	50.75	7817.72
0.003218	80.	280.	225.	4	0	0	0.00	4523.23	12340.94

1645 INT SEC ADDED BY RAISING SEC 1.01, 0.750 FT AND MULTIPLYING BY 0.691

1.020	3.65	55.15	0.00	0.00	55.28	0.14	1.05	0.01	56.50
18000.0	0.0	18000.0	0.0	0.0	6084.7	0.0	87.5	51.5	56.50
0.06	0.00	2.96	0.00	0.000	0.050	0.000	0.000	51.50	5658.43
0.004386	80.	280.	225.	2	0	0	0.00	3302.33	8960.76

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
	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

1645 INT SEC ADDED BY RAISING SEC 1.02, 0.750 FT AND MULTIPLYING BY 0.552

1.030	4.26	56.51	0.00	0.00	56.76	0.24	1.44	0.03	57.25
18000.0	0.0	18000.0	0.0	0.0	4548.9	0.0	121.6	68.7	57.25
0.08	0.00	3.96	0.00	0.000	0.050	0.000	0.000	52.25	3507.93
0.006127	80.	280.	225.	2	0	0	0.00	2050.65	5558.58

1645 INT SEC ADDED BY RAISING SEC 1.03, 0.750 FT AND MULTIPLYING BY 0.189

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

0.230	6.32	59.32	59.32	0.00	60.77	1.45	2.69	0.36	58.00
18000.0	360.7	17227.1	412.2	121.2	1746.4	138.5	142.4	77.4	58.00
0.09	2.98	9.86	2.98	0.050	0.050	0.050	0.000	53.00	1275.81
[illegible]17536	80.	280.	225.	4	14	0	0.00	834.69	2110.50

CCHV= 0.100 CEHV= 0.300
*SECNO 0.370

0.370	10.07	68.07	0.00	0.00	68.89	0.83	8.06	0.06	62.00
14000.0	2241.0	7404.3	4354.7	1254.8	750.5	2245.8	205.7	99.5	60.00
0.13	1.79	9.87	1.94	0.160	0.050	0.160	0.000	58.00	1261.23
0.006071	850.	710.	1080.	3	0	0	0.00	1259.80	2521.04

*SECNO 0.510

0.510	9.38	73.38	0.00	0.00	74.71	1.33	5.67	0.15	66.00
14000.0	2195.8	7977.4	3826.8	1057.4	657.8	1789.8	273.5	120.7	66.00
0.15	2.08	12.13	2.14	0.160	0.050	0.160	0.000	64.00	1536.19
0.008937	1020.	800.	600.	2	0	0	0.00	1179.88	2716.07

*SECNO 0.710
3280 CROSS SECTION 0.71 EXTENDED 1.07 FEET

0.710	11.07	81.07	0.00	0.00	82.21	1.13	7.48	0.02	74.00
14000.0	4050.4	7896.5	2053.1	2271.0	701.5	990.0	342.3	140.4	74.00
0.19	1.78	11.26	2.07	0.160	0.050	0.160	0.000	70.00	1000.00
0.007341	700.	1060.	800.	4	0	0	0.00	1050.00	2050.00

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
	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 0.930
3280 CROSS SECTION 0.93 EXTENDED 2.14 FEET

0.930	12.14	90.14	90.01	0.00	92.09	1.95	9.64	0.25	82.00
14000.0	1864.4	9976.4	2159.2	737.4	755.2	1258.8	434.7	165.3	84.00
0.22	2.53	13.21	1.72	0.160	0.050	0.160	0.000	78.00	1000.00
0.009211	1520.	1150.	800.	4	8	0	0.00	820.00	1820.00

CCHV= 0.100 CEHV= 0.300
*SECNO 1.040

1645 INT SEC ADDED BY RAISING SEC 1.04, -5.500 FT AND MULTIPLYING BY 0.612

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 3.02

1.010	9.34	92.84	0.00	0.00	92.96	0.12	0.69	0.18	86.50
00.0	2156.5	5721.8	6121.7	1362.9	1524.9	3329.9	468.0	173.0	87.00
0.26	1.58	3.75	1.84	0.080	0.050	0.080	0.000	83.50	1015.15
0.001012	265.	275.	375.	3	0	0	0.00	1182.69	2197.84

1645 INT SEC ADDED BY RAISING SEC 1.01, 5.500 FT AND MULTIPLYING BY 1.634

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

1.040	5.03	94.03	94.03	0.00	94.90	0.87	0.79	0.23	92.00
14000.0	599.4	9864.3	3536.3	252.7	1131.0	1202.8	500.8	183.2	92.50
0.27	2.37	8.72	2.94	0.080	0.050	0.080	0.000	89.00	1341.19
0.015666	265.	275.	375.	20	11	0	0.00	1499.19	2840.39

PROFILE FOR STREAM 500 YEAR STORM

[illegible]ED POINTS (BY PRIORITY) E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA

```
ELEVATION   48.      58.      68.      78.      88.      98.      108.     118.     128.     138.
   SECNO  CUMDIS

    0.00     0.  I LER   .        .        .        .        .        .        .        .        .
    0.02   100.  C IWE L .        .        .        .        .        .        .        .        .
           200.  C I WEL M.       .        .        .        .        .        .        .        .
           300.  C I  ERL .M      .        .        .        .        .        .        .        .
    1.01   400.  C I   EL . M     .        .        .        .        .        .        .        .
           500.  C  I  E L.  M    .        .        .        .        .        .        .        .
           600.  C  I  E L.  M    .        .        .        .        .        .        .        .
    1.02   700.  C  I   EL.  M    .        .        .        .        .        .        .        .
           800.  C  I   EL.  M    .        .        .        .        .        .        .        .
           900.  C   I   EL   M   .        .        .        .        .        .        .        .
    1.03  1000.  C   I   EL   M   .        .        .        .        .        .        .        .
          1100.  C   I    WE  M   .        .        .        .        .        .        .        .
          1200.  C   I    LWE M   .        .        .        .        .        .        .        .
    0.23  1300.  .    I   .LWE M  .        .        .        .        .        .        .        .
          1400.  . C I   .L WE M  .        .        .        .        .        .        .        .
          1500.  C     I  .RL W EM .        .        .        .        .        .        .        .
          1600.  C      I .RL   WEM .       .        .        .        .        .        .        .
          1700.  C      I . RL   WEM.       .        .        .        .        .        .        .
          1800.  C       I. RL    WEM       .        .        .        .        .        .        .
          1900.  C        I R L    WEM      .        .        .        .        .        .        .
    0.37  2000.  C        .I R L    .E M    .        .        .        .        .        .        .
          2100.  C        .I R L    .WE M   .        .        .        .        .        .        .
          2200.  C        . I R L   . WE M  .        .        .        .        .        .        .
          2300.  C        .  I RL   .  WE M .        .        .        .        .        .        .
          2400.  C        .   I RL  .  WE   M .      .        .        .        .        .        .
          2500.  C        .   I RL  .   WE   M.      .        .        .        .        .        .
          2600.  C        .    I RL .    WE   M      .        .        .        .        .        .
          2700.  C        .     I L .    WE   .M     .        .        .        .        .        .
    0.51  2800.  C        .      I L.     WE  . M    .        .        .        .        .        .
          2900.  C        .      I L.      WE . M    .        .        .        .        .        .
          3000.  C        .       I L      W E.  M   .        .        .        .        .        .
          3100.  C        .       I .L      WE.  M   .        .        .        .        .        .
          3200.  C        .        I. L      WE  M   .        .        .        .        .        .
          3300.  C        .        I. L       WE M   .        .        .        .        .        .
          3400.  C        .         I  L      WE M   .        .        .        .        .        .
          3500.  C        .         I   L     .WEM   .        .        .        .        .        .
          3600.  C        .         .I   L    . WE   .        .        .        .        .        .
          3700.  C        .         . I  L    . WME  .        .        .        .        .        .
    0.71  3800.  C        .         .  I   L  .  MWE .        .        .        .        .        .
          3900.  C        .         .  I   L  .  MW E .        .        .        .        .        .
          4000.  C        .         .   I   L .   MWE .        .        .        .        .        .
          4100.  C        .         .    I   L.    MWE .       .        .        .        .        .
          4200.  C        .         .    I   LR    M WE .      .        .        .        .        .
          4300.  C        .         .     I   LR    M WE.      .        .        .        .        .
          4400.  C        .         .      I  .LR    MW E      .        .        .        .        .
          4500.  .     C  .         .      I  .L R   M W.E     .        .        .        .        .
          4600.  .        .    C    .       I . LR    M W E    .        .        .        .        .
          4700.  .        .         . C     I.  LR    M.WE     .        .        .        .        .
```

```
      4800.  .        .        .       I.C L R   M.W E     .        .        .        .        .        .
      4900.  .        .        .        I   L R  CM W E    .        .        .        .        .        .
 0.93 5000.  .        .        .        .I   L R  .M W E   .        .        .        .        .        .
      5100.  .        C        .        .  I  L R .  MWE   .        .        .        .        .        .
 1.01 5200.  C        .        .        .    I  LR    E M  .        .        .        .        .        .
      5300.  C        .        .        .      I .LR   E  M.        .        .        .        .        .
      5400.  .        .        .C       .        I  LR WE  .M       .        .        .        .        .
 1.04 5500.  .        .        .        .        . I  L E  .  M     .        .        .        .        .
```

T1 100 YEAR STORM
T 100 YEAR STORM

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		6					1		50.05	

MULTIPLE PROFILE RUN WITH INTERPOLATED CROSS SECTIONS

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	5									

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
	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 5

CCHV= 0.100 CEHV= 0.300
*SECNO 0.000

3265 DIVIDED FLOW

0.000	2.55	50.05	0.00	50.05	50.26	0.21	0.00	0.00	50.00
6600.0	0.0	6600.0	0.0	0.1	1790.8	0.0	0.0	0.0	52.00
0.00	0.05	3.69	0.00	0.050	0.050	0.000	0.000	47.50	1131.63
0.024714	0.	0.	0.	0	0	0	0.00	2559.13	4351.25

*SECNO 0.020

3265 DIVIDED FLOW

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

0.020	1.29	51.29	0.00	0.00	51.45	0.16	1.19	0.00	54.00
6600.0	0.0	6600.0	0.0	0.0	2039.9	0.0	3.7	4.2	52.00
0.01	0.00	3.24	0.00	0.000	0.050	0.000	0.000	50.00	1742.35
0.008983	1400.	85.	400.	4	0	0	0.00	1656.81	3607.08

*SECNO 0.230

1645 INT SEC ADDED BY RAISING SEC 0.23, -2.250 FT AND MULTIPLYING BY 21.529

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.70

1.010	2.05	52.80	0.00	0.00	52.84	0.04	1.38	0.01	55.75
6600.0	0.0	6600.0	0.0	0.0	4092.7	0.0	23.4	23.1	55.75
0.06	0.00	1.61	0.00	0.000	0.050	0.000	0.000	50.75	12792.00
0.003095	80.	280.	225.	3	0	0	0.00	4249.44	17041.44

1645 INT SEC ADDED BY RAISING SEC 1.01, 0.750 FT AND MULTIPLYING BY 0.682

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
	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
1.020	2.25	53.75	0.00	0.00	53.81	0.06	0.96	0.01	56.50
6600.0	0.0	6600.0	0.0	0.0	3436.1	0.0	47.6	47.2	56.50
0.10	0.00	1.92	0.00	0.000	0.050	0.000	0.000	51.50	8889.55
0.003847	80.	280.	225.	2	0	0	0.00	3230.63	12120.18

1645 INT SEC ADDED BY RAISING SEC 1.02, 0.750 FT AND MULTIPLYING BY 0.534

1.030	2.69	54.94	0.00	0.00	55.04	0.09	1.21	0.01	57.25
6600.0	0.0	6600.0	0.0	0.0	2685.0	0.0	67.3	64.3	57.25
0.13	0.00	2.46	0.00	0.000	0.050	0.000	0.000	52.25	5039.12
0.004929	80.	280.	225.	2	0	0	0.00	2099.97	7139.09

1645 INT SEC ADDED BY RAISING SEC 1.03, 0.750 FT AND MULTIPLYING BY 0.128

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

.230	4.07	57.07	57.07	0.00	58.16	1.08	2.78	0.30	58.00
00.0	0.0	6600.0	0.0	0.0	789.7	0.0	78.5	72.3	58.00
0.14	0.00	8.36	0.00	0.000	0.050	0.000	0.000	53.00	1478.54
0.029316	80.	280.	225.	4	14	0	0.00	375.11	1853.65

CCHV= 0.100 CEHV= 0.300
*SECNO 0.370

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.15

0.370	7.67	65.67	0.00	0.00	66.23	0.57	8.02	0.05	62.00
5900.0	593.5	3982.7	1323.8	484.4	546.6	913.0	105.4	83.1	60.00
0.18	1.23	7.29	1.45	0.160	0.050	0.160	0.000	58.00	1517.52
0.005055	850.	710.	1080.	5	0	0	0.00	696.51	2214.04

*SECNO 0.510

0.510	6.58	70.58	0.00	0.00	71.71	1.13	5.31	0.17	66.00
5900.0	517.5	4438.9	943.6	294.3	453.2	496.4	133.4	93.2	66.00
0.20	1.76	9.79	1.90	0.160	0.050	0.160	0.000	64.00	1763.16
0.009578	1020.	800.	600.	2	0	0	0.00	474.25	2237.41

```
   SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
             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 0.710
    0.710     8.63     78.63      0.00      0.00     79.56      0.93      7.83      0.02     74.00
   5900.0    782.5    4551.6     565.8     717.8     518.6     380.0     161.4     104.1     74.00
     0.24     1.09      8.78      1.49     0.160     0.050     0.160     0.000     70.00   1225.38
 0.006678     700.     1060.      800.         4         0         0      0.00    735.83   1961.21

*SECNO 0.930
    0.930     9.13     87.13     86.03      0.00     88.59      1.46      8.87      0.16     82.00
   5900.0    412.2    5377.6     110.2     255.7     529.8     125.6     196.9     119.9     84.00
     0.28     1.61     10.15      0.88     0.160     0.050     0.160     0.000     78.00   1032.61
 0.008725    1520.     1150.      800.         6        11         0      0.00    374.32   1406.94

CCHV=    0.100 CEHV=    0.300
*SECNO 1.040

1645 INT SEC ADDED BY RAISING SEC      1.04,  -5.500 FT AND MULTIPLYING BY   0.609

3302 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.10

    1.010     6.15     89.65      0.00      0.00     89.79      0.14      1.06      0.13     86.50
   5900.0    470.0    3354.3    2075.7     370.7     904.3    1376.4     209.8     125.1     87.00
     0.31     1.27      3.71      1.51     0.080     0.050     0.080     0.000     83.50   1124.26
 0.001974     265.      275.      375.         4         0         0      0.00   1005.72   2129.98

1645 INT SEC ADDED BY RAISING SEC      1.01,   5.500 FT AND MULTIPLYING BY   1.641

3265 DIVIDED FLOW

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
    1.040     3.80     92.80     92.80      0.00     93.53      0.73      1.33      0.18     92.00
   5900.0     53.5    5332.9     513.7      38.9     742.4     273.4     223.3     132.4     92.50
     0.32     1.37      7.18      1.88     0.080     0.050     0.080     0.000     89.00   1492.35
 0.018633     265.      275.      375.        20        11         0      0.00    930.05   2713.70
```

PROFILE FOR STREAM 100 YEAR STORM

ED POINTS (BY PRIORITY) E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA

```
ELEVATION   48.      58.      68.      78.      88.      98.      108.     118.     128.     138.
   SECNO  CUMDIS

    0.00     0.  I  E R   .        .        .        .        .        .        .        .        .
    0.02   100.  C  IER L  .        .        .        .        .        .        .        .        .
           200.  C  IE RL M.        .        .        .        .        .        .        .        .
           300.  C  I E RL .M       .        .        .        .        .        .        .        .
    1.01   400.  C  I E  L . M      .        .        .        .        .        .        .        .
           500.  C   I E  L.  M     .        .        .        .        .        .        .        .
           600.  C   I E  L.  M     .        .        .        .        .        .        .        .
    1.02   700.  C   I E  L.  M     .        .        .        .        .        .        .        .
           800.  C   I  E L.  M     .        .        .        .        .        .        .        .
           900.  C    I E  L   M    .        .        .        .        .        .        .        .
    1.03  1000.  C    I WE L   M    .        .        .        .        .        .        .        .
          1100.  C    I  WEL   M    .        .        .        .        .        .        .        .
          1200.  C    I   WE   M    .        .        .        .        .        .        .        .
    0.23  1300.  .     I   WE   M    .        .        .        .        .        .        .        .
          1400.  . C   I   .WE   M   .        .        .        .        .        .        .        .
          1500.  C      I  .RWE   M .        .        .        .        .        .        .        .
          1600.  C       I .RLWE   M .       .        .        .        .        .        .        .
          1700.  C       I . RLWE   M.       .        .        .        .        .        .        .
          1800.  C        I. RL  E   M       .        .        .        .        .        .        .
          1900.  C         I R L  E  .M      .        .        .        .        .        .        .
    0.37  2000.  C         .I R L  WE.  M    .        .        .        .        .        .        .
          2100.  C         .I R L   E.   M   .        .        .        .        .        .        .
          2200.  C         . I R L  WE    M  .        .        .        .        .        .        .
          2300.  C         .  I RL   WE    M .        .        .        .        .        .        .
          2400.  C         .   I RL  .E     M .       .        .        .        .        .        .
          2500.  C         .   I RL  .WE     M.       .        .        .        .        .        .
          2600.  C         .    I RL . WE     M       .        .        .        .        .        .
          2700.  C         .     I L . W E    .M      .        .        .        .        .        .
    0.51  2800.  C         .      I L.  WE    . M     .        .        .        .        .        .
          2900.  C         .      I L.   WE   . M     .        .        .        .        .        .
          3000.  C         .       I L    WE  . M     .        .        .        .        .        .
          3100.  C         .       I .L   WE  . M     .        .        .        .        .        .
          3200.  C         .        I. L   WE . M     .        .        .        .        .        .
          3300.  C         .        I. L    WE . M    .        .        .        .        .        .
          3400.  C         .         I  L    WE. M    .        .        .        .        .        .
          3500.  C         .         I   L   WE. M    .        .        .        .        .        .
          3600.  C         .         .I   L   WE M    .        .        .        .        .        .
          3700.  C         .         . I  L    WE M   .        .        .        .        .        .
    0.71  3800.  C         .         .  I   L  .WEM   .        .        .        .        .        .
          3900.  C         .         .  I   L  . WE   .        .        .        .        .        .
          4000.  C         .         .   I   L . WE   .        .        .        .        .        .
          4100.  C         .         .    I   L. WEM  .        .        .        .        .        .
          4200.  C         .         .    I   LR  WE  .        .        .        .        .        .
          4300.  C         .         .     I   LR  WE .        .        .        .        .        .
          4400.  C         .         .      I  .LR  WE .        .        .        .        .        .
          4500.  .    C    .         .      I  .L R WME .       .        .        .        .        .
          4600.  .         . C       .       I . LR  WE .       .        .        .        .        .
          4700.  .         .         C        I.  LR  WE.       .        .        .        .        .
```

```
       4800.  .        .        .     C I.  L R   WE        .        .        .        .        .        .
       4900.  .        .        .        I   LCR  WME       .        .        .        .        .        .
0.93   5000.  .        .        .        .I   L R CWE       .        .        .        .        .        .
       5100.  .     C  .        .        .  I  L R .WEM     .        .        .        .        .        .
1.01   5200.  C        .        .        .     I  LR E    M .        .        .        .        .        .
       5300.  C        .        .        .       I .LRWE    M.        .        .        .        .        .
       5400.  .        .        C        .         I  LWE    .M       .        .        .        .        .
1.04   5500.  .        .        .        .         . I  WE   .  M     .        .        .        .        .
```

T1 100 YEAR STORM - ONE FOOT ENCROACHMENT
T 100 YEAR STORM 1' ENCHR

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		7					1		50.1	

MULTIPLE PROFILE RUN WITH INTERPOLATED CROSS SECTIONS

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	6									15

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
	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 6

CCHV= 0.100 CEHV= 0.300
*SECNO 0.000
2800 NAT Q1= 131.20 WSELK= 49.25 ENC Q1= 632.91 WSEL= 50.25 RATIO= -3.8239
NAT Q1= 633. RATIOS LOB, CH, ROB= 0.0002 0.9998 0.0000 WSEL= 50.25

3265 DIVIDED FLOW

3470 ENCROACHMENT STATIONS= 1135.0 4400.0 TYPE= 4 TARGET= 0.000

0.000	2.60	50.10	0.00	49.25	50.28	0.18	0.00	0.00	50.00
6600.0	0.0	6600.0	0.0	0.0	1918.8	0.0	0.0	0.0	52.00
0.00	0.00	3.44	0.00	0.000	0.050	0.000	0.000	47.50	1135.00
0.019743	0.	0.	0.	0	0	0	0.00	2566.50	4352.50

FLOW DISTRIBUTION FOR SECNO= 0.00 CWSEL= 50.10

S 1135. 4400.
PER Q= 100.0
AREA= 1918.8
VEL= 3.4
DEPTH= 0.7

*SECNO 0.020
2800 NAT Q1= 194.47 WSELK= 50.61 ENC Q1= 1006.03 WSEL= 51.61 RATIO= -4.1732
NAT Q1= 1006. RATIOS LOB, CH, ROB= 0.0000 1.0000 0.0000 WSEL= 51.61

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.42

3470 ENCROACHMENT STATIONS= 1470.0 3660.0 TYPE= 4 TARGET= 0.000

0.020	1.26	51.26	0.00	50.61	51.43	0.17	1.14	0.00	54.00
6600.0	0.0	6600.0	0.0	0.0	1988.2	0.0	3.8	4.1	52.00
0.01	0.00	3.32	0.00	0.000	0.050	0.000	0.000	50.00	1742.89
0.009755	1400.	85.	400.	4	0	0	0.00	1652.90	3604.74

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


FLOW DISTRIBUTION FOR SECNO=      0.02          CWSEL=     51.26

STA=    1743.    3660.
  PER Q=    100.0
   AREA=   1988.2
    VEL=      3.3
  DEPTH=      1.2

*SECNO 0.230
 2800 NAT Q1=     338.54  WSELK=      56.88  ENC Q1=     625.14  WSEL=      57.88  RATIO=  -0.8466
 NAT Q1=     625.  RATIOS LOB, CH, ROB=   0.0000  1.0000  0.0000  WSEL=      57.88

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.42


3470 ENCROACHMENT STATIONS=     1460.0    1900.0  TYPE=      4  TARGET=        0.000
     0.230      5.63     58.63     57.09     56.88     58.95      0.32      7.48      0.05     58.00
    6600.0       0.0    6600.0       0.0       0.0    1445.5       0.0      48.0      31.0     58.00
      0.08      0.00      4.57      0.00     0.000     0.050     0.000     0.000     53.00   1460.00
  0.004853      320.     1120.      900.        14        23         0      0.00    440.00   1900.00


FLOW DISTRIBUTION FOR SECNO=      0.23          CWSEL=     58.63

STA=    1460.    1900.
  PER Q=    100.0
   AREA=   1445.5
    VEL=      4.6
  DEPTH=      3.3

CCHV=    0.100 CEHV=    0.300
*SECNO 0.370
 2800 NAT Q1=     124.19  WSELK=      61.71  ENC Q1=     200.63  WSEL=      62.71  RATIO=  -0.6155
 NAT Q1=     226.  RATIOS LOB, CH, ROB=   0.0044  0.8879  0.1078  WSEL=      62.71

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=     1725.0    1810.0  TYPE=      4  TARGET=        0.112
```

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
	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
0.370	6.54	64.54	64.54	61.71	67.20	2.65	6.24	0.70	62.00
5900.0	0.0	5900.0	0.0	0.0	451.2	0.0	63.4	35.3	60.00
0.09	0.00	13.07	0.00	0.000	0.050	0.000	0.000	58.00	1725.00
0.023371	850.	710.	1080.	2	8	0	0.00	85.00	1810.00

FLOW DISTRIBUTION FOR SECNO= 0.37 CWSEL= 64.54

STA= 1725. 1810.
PER Q= 100.0
AREA= 451.2
VEL= 13.1
DEPTH= 5.3

*SECNO 0.510
2800 NAT Q1= 301.64 WSELK= 68.81 ENC Q1= 364.25 WSEL= 69.81 RATIO= -0.2076
NAT Q1= 456. RATIOS LOB, CH, ROB= 0.0687 0.7981 0.1333 WSEL= 69.81

3301 HV CHANGED MORE THAN HVINS

3[illegible]ARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.12

3470 ENCROACHMENT STATIONS= 1922.0 1995.0 TYPE= 4 TARGET= 0.202

0.510	9.93	73.93	0.00	68.81	75.04	1.11	7.69	0.15	66.00
5900.0	0.0	5900.0	0.0	0.0	698.0	0.0	74.0	36.8	66.00
0.12	0.00	8.45	0.00	0.000	0.050	0.000	0.000	64.00	1922.00
0.005206	1020.	800.	600.	3	0	0	0.00	73.00	1995.00

FLOW DISTRIBUTION FOR SECNO= 0.51 CWSEL= 73.93

STA= 1922. 1995.
PER Q= 100.0
AREA= 698.0
VEL= 8.5
DEPTH= 9.6

*SECNO 0.710

```
   SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
             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

 2800 NAT Q1=     173.11  WSELK=      75.12  ENC Q1=     262.51  WSEL=      76.12  RATIO=  -0.5165
 NAT Q1=     274.  RATIOS LOB, CH, ROB=   0.0165  0.9568  0.0267  WSEL=      76.12
3280 CROSS SECTION      0.71 EXTENDED      0.16 FEET


3470 ENCROACHMENT STATIONS=     1700.0    1775.0  TYPE=      4  TARGET=        0.043
     0.710     10.16     80.16      0.00     75.12     81.51      1.35      6.39      0.07     74.00
    5900.0       0.0    5900.0       0.0       0.0     632.8       0.0      90.2      38.6     74.00
      0.15      0.00      9.32      0.00     0.000     0.050     0.000     0.000     70.00   1700.00
  0.007068      700.     1060.      800.         2         0         0      0.00     75.00   1775.00


FLOW DISTRIBUTION FOR SECNO=      0.71          CWSEL=     80.16

STA=    1700.    1775.
  PER Q=    100.0
   AREA=    632.8
    VEL=      9.3
  DEPTH=      8.4

*SECNO 0.930
 2800 NAT Q1=     258.54  WSELK=      84.40  ENC Q1=     360.58  WSEL=      85.40  RATIO=  -0.3947
 NAT Q1=     372.  RATIOS LOB, CH, ROB=   0.0282  0.9699  0.0019  WSEL=      85.40
3280 CROSS SECTION      0.93 EXTENDED      0.38 FEET


3470 ENCROACHMENT STATIONS=     1165.0    1240.0  TYPE=      4  TARGET=        0.030
     0.930     10.38     88.38      0.00     84.40     89.77      1.39      8.25      0.01     82.00
    5900.0       0.0    5900.0       0.0       0.0     623.5       0.0     106.7      40.5     84.00
      0.18      0.00      9.46      0.00     0.000     0.050     0.000     0.000     78.00   1165.00
  0.007283     1520.     1150.      800.         2         0         0      0.00     75.00   1240.00


FLOW DISTRIBUTION FOR SECNO=      0.93          CWSEL=     88.38

STA=    1165.    1240.
  PER Q=    100.0
   AREA=    623.5
    VEL=      9.5
  DEPTH=      8.3
```

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
	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

```
CCHV=    0.100 CEHV=    0.300
*SECNO 1.040
 2800 NAT Q1=     102.17  WSELK=      91.23  ENC Q1=     254.66  WSEL=      92.23  RATIO=  -1.4925
 NAT Q1=     259.  RATIOS LOB, CH, ROB=   0.0006  0.9838  0.0156  WSEL=      92.23

3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=     1590.0    1905.0  TYPE=      4  TARGET=        0.016
     1.040      4.63     93.63      0.00     91.23     94.16      0.54      4.31      0.09     92.00
    5900.0       0.0    5900.0       0.0       0.0    1003.4       0.0     117.0      43.0     92.50
      0.21      0.00      5.88      0.00     0.000     0.050     0.000     0.000     89.00   1590.00
  0.008450      530.      550.      750.         5         0         0      0.00    315.00   1905.00


FLOW DISTRIBUTION FOR SECNO=      1.04          CWSEL=     93.63

STA=    1590.    1905.
  PER Q=     100.0
   AREA=    1003.4
   VEL=       5.9
   H=         3.2
```

PROFILE FOR STREAM 100 YEAR STORM 1' ENCHR

P[illegible]D POINTS (BY PRIORITY) E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA

```
ELEVATION   48.      58.      68.      78.      88.      98.     108.     118.     128.     138.
   SECNO  CUMDIS

    0.00     0.  I  E R   .        .        .        .        .        .        .        .        .        .
    0.02   100.  C  IER L  .        .        .        .        .        .        .        .        .        .
           200.  C  IWE L  .        .        .        .        .        .        .        .        .        .
           300.  C  I ERLM .        .        .        .        .        .        .        .        .        .
           400.  C  I  E LM.        .        .        .        .        .        .        .        .        .
           500.  C   I WELM.        .        .        .        .        .        .        .        .        .
           600.  C   I  EL M        .        .        .        .        .        .        .        .        .
           700.  C   I   EL.M       .        .        .        .        .        .        .        .        .
           800.  C   I   WE. M      .        .        .        .        .        .        .        .        .
           900.  C    I   E. M      .        .        .        .        .        .        .        .        .
          1000.  C    I   RE  M     .        .        .        .        .        .        .        .        .
          1100.  .  C I    WE  M    .        .        .        .        .        .        .        .        .
          1200.  .    I   CLE  M    .        .        .        .        .        .        .        .        .
    0.23  1300.  .     I   CE   M   .        .        .        .        .        .        .        .        .
          1400.  .     I   .CWE  M  .        .        .        .        .        .        .        .        .
          1500.  .      I  .RCWE  M .        .        .        .        .        .        .        .        .
          1600.  .       I .RLCWE  M .       .        .        .        .        .        .        .        .
          1700.  .       I . RLW E  M.       .        .        .        .        .        .        .        .
          1800.  .        I. RL W E  M       .        .        .        .        .        .        .        .
          1900.  .         I R L W E .M      .        .        .        .        .        .        .        .
    0.37  2000.  .         .I R L W  E  M    .        .        .        .        .        .        .        .
          2100.  .        C.I R L  W .E  M   .        .        .        .        .        .        .        .
          2200.  .C        . I R L  W. E  M  .        .        .        .        .        .        .        .
          2300.  C         .  I RL   .W E  M .        .        .        .        .        .        .        .
          2400.  C         .   I RL  . W E  M .       .        .        .        .        .        .        .
          2500.  C         .   I RL  .  W E  M.       .        .        .        .        .        .        .
          2600.  C         .    I RL .   W E  M       .        .        .        .        .        .        .
          2700.  C         .     I L .    W E  .M     .        .        .        .        .        .        .
    0.51  2800.  C         .      I L.     W E .  M   .        .        .        .        .        .        .
          2900.  C         .      I L.      WE .  M   .        .        .        .        .        .        .
          3000.  C         .       I L       WE.  M   .        .        .        .        .        .        .
          3100.  C         .       I .L      WE.  M   .        .        .        .        .        .        .
          3200.  C         .        I. L      WE  M   .        .        .        .        .        .        .
          3300.  C         .        I. L      W.E M   .        .        .        .        .        .        .
          3400.  C         .         I  L      WE M   .        .        .        .        .        .        .
          3500.  C         .         I   L     .WEM   .        .        .        .        .        .        .
          3600.  C         .         .I   L    .WEM   .        .        .        .        .        .        .
          3700.  C         .         . I  L    . WE   .        .        .        .        .        .        .
    0.71  3800.  C         .         .  I   L  .  WE   .        .        .        .        .        .        .
          3900.  C         .         .  I   L  .  W E  .        .        .        .        .        .        .
          4000.  C         .         .   I   L .   WE  .        .        .        .        .        .        .
          4100.  C         .         .    I   L.    WE .        .        .        .        .        .        .
          4200.  C         .         .    I   LR    MWE .       .        .        .        .        .        .
          4300.  C         .         .     I   LR    W E .      .        .        .        .        .        .
          4400.  C         .         .      I  .LR    WE .      .        .        .        .        .        .
          4500.  C         .         .      I  .L R   MWE.      .        .        .        .        .        .
          4600.  C         .         .       I . LR    W E      .        .        .        .        .        .
          4700.  C         .         .        I.  LR    WE      .        .        .        .        .        .
```

```
       4800.  C     .     .     I.  L R   MWE     .     .     .     .     .     .
       4900.  C     .     .      I   L R   MWE    .     .     .     .     .     .
  0.93 5000.  C     .     .     .I   L R  .WE     .     .     .     .     .     .
       5100.  C     .     .     .  I  L R . WE    .     .     .     .     .     .
       5200.  C     .     .     .    I  L R  WEM  .     .     .     .     .     .
       5300.  C     .     .     .      I  LR  WE M .     .     .     .     .     .
       5400.  C     .     .     .        I. LR E   M.     .     .     .     .     .
  1.04 5500.  C     .     .     .         . I  LWE  .  M  .     .     .     .     .
```

THIS RUN EXECUTED 5MAR96 9:11:07

****
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

10 YR STORMS

SUMMARY PRINTOUT

	CWSEL	.01K	STENCL	STENCR	ELENCL	ELENCR	K*CHSL
	49.250	131.20	0.00	0.00	0.00	0.00	0.00
	49.400	192.90	0.00	0.00	0.00	0.00	0.00
	49.750	375.82	0.00	0.00	0.00	0.00	0.00
	51.250	2077.54	0.00	0.00	0.00	0.00	0.00
	50.050	419.83	0.00	0.00	0.00	0.00	0.00
	50.100	469.72	1135.00	4400.00	100000.00	100000.00	0.00
*	50.609	194.47	0.00	0.00	0.00	0.00	29.41
*	50.819	328.32	0.00	0.00	0.00	0.00	29.41
	50.947	414.89	0.00	0.00	0.00	0.00	29.41
*	51.974	1423.81	0.00	0.00	0.00	0.00	29.41
*	51.292	696.37	0.00	0.00	0.00	0.00	29.41
*	51.258	668.23	1470.00	3660.00	100000.00	100000.00	29.41
*	56.883	338.54	0.00	0.00	0.00	0.00	2.68
*	56.140	182.93	0.00	0.00	0.00	0.00	2.68
*	56.548	263.03	0.00	0.00	0.00	0.00	2.68
*	59.316	1359.26	0.00	0.00	0.00	0.00	2.68
*	57.073	385.47	0.00	0.00	0.00	0.00	2.68
*	58.627	947.39	1460.00	1900.00	100000.00	100000.00	2.68
*	61.708	124.19	0.00	0.00	0.00	0.00	7.04
*	64.034	431.63	0.00	0.00	0.00	0.00	7.04
*	64.810	599.94	0.00	0.00	0.00	0.00	7.04
	68.069	1796.82	0.00	0.00	0.00	0.00	7.04
*	65.668	829.87	0.00	0.00	0.00	0.00	7.04
*	64.544	385.93	1725.00	1810.00	100000.00	100000.00	7.04
*	68.813	301.64	0.00	0.00	0.00	0.00	7.50
	68.880	310.61	0.00	0.00	0.00	0.00	7.50
	69.667	431.61	0.00	0.00	0.00	0.00	7.50
	73.380	1480.91	0.00	0.00	0.00	0.00	7.50
	0.577	602.86	0.00	0.00	0.00	0.00	7.50
*	73.933	817.69	1922.00	1995.00	100000.00	100000.00	7.50

	CWSEL	.01K	STENCL	STENCR	ELENCL	ELENCR	K*CHSL
*	75.123	173.11	0.00	0.00	0.00	0.00	5.66
	76.877	373.85	0.00	0.00	0.00	0.00	5.66
	77.720	517.03	0.00	0.00	0.00	0.00	5.66
	81.073	1633.97	0.00	0.00	0.00	0.00	5.66
	78.632	722.01	0.00	0.00	0.00	0.00	5.66
	80.157	701.77	1700.00	1775.00	100000.00	100000.00	5.66
*	84.401	258.54	0.00	0.00	0.00	0.00	6.96
	85.061	331.87	0.00	0.00	0.00	0.00	6.96
	86.061	459.14	0.00	0.00	0.00	0.00	6.96
	90.136	1458.76	0.00	0.00	0.00	0.00	6.96
	87.130	631.65	0.00	0.00	0.00	0.00	6.96
	88.379	691.36	1165.00	1240.00	100000.00	100000.00	6.96
*	91.232	102.17	0.00	0.00	0.00	0.00	20.00
*	92.042	217.75	0.00	0.00	0.00	0.00	20.00
	92.611	364.76	0.00	0.00	0.00	0.00	20.00
*	94.031	1118.54	0.00	0.00	0.00	0.00	20.00
*	92.797	432.22	0.00	0.00	0.00	0.00	20.00
	93.627	641.82	1590.00	1905.00	100000.00	100000.00	20.00

REVISED OR POST-DEVELOPED HEC-2 MODEL

```
1*****************************************
 *  HEC-2 WATER SURFACE PROFILES          *
 *                                        *
 *  Version   4.6.2;  May 1991            *
 *                                        *
 *  RUN DATE    31JUL96    TIME   10:56:21 *
 *****************************************
```

```
*************************************
*  U.S. ARMY CORPS OF ENGINEERS     *
*  HYDROLOGIC ENGINEERING CENTER    *
*  609 SECOND STREET, SUITE D       *
*  DAVIS, CALIFORNIA 95616-4687     *
*          (916) 756-1104           *
*************************************
```

```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                  X     X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX              XXXXXXX
```

1

31JUL96 10:56:21 PAGE 1

THIS RUN EXECUTED 31JUL96 10:56:21

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

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

```
T1          ECHO CANYON WASH FLOODPLAIN DELINEATION   MA08100H.HC2
T2          BASED ON PEAK FLOWS AS DETERMINED BY FIRM STUDY
T3      ECHO CANYON WASH 100 YR REVISED CONDITIONS MODEL
     REVISED BY BAKER 7/96 TO INCLUDE UPSTREAM CROSS SECTION 0.71

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

       0         2         0         0         0         0         0         0      46.9         0

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      1         0         0         0         0         0        -1

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    1.0       34.0      27.0      28.0      31.0      32.0      33.0      150       200

QT        2       6600       6600
```

```
NC      .035       .035       .035        .1         .3
ET                            9.1                                                          8.41      248.85
X1         0          5          0       264          0          0          0
GR        50          0         43        19       42.9        119         43        222      49.1        264

ET                            9.1                                                          4.20      278.06
X1     0.003          6          0       282         20         24         18
GR      50.2          0       37.5        22       36.6        119       37.3        224      37.2        244
GR        49        282

NC       .03        .03        .03        .1         .3
ET                            9.1                                                         31.63      349.90
X1     0.026          5          0       364        177         68        118
GR        55          0       36.6        81         37        210       37.2        315      52.1        364

ET                            9.1                                                         18.92      399.92
X1     0.049          6          0       429        130        150        125
GR      52.5          0         36        67         37         80       37.1        209        37        340
GR      53.1        429

ET                            9.1                                                          9.54      435.17
X1     0.081          7          0       459        184        150        167
GR        50          0       36.1        62         37         80       37.2        148      37.1        256
GR      37.1        388       53.3       459
1
   31JUL96      10:56:21                                                                                PAGE     2


ET                            9.1                                                         17.09      502.04
X1     0.117          6          0       525        248        140        191
GR        52          0       36.1        66       37.3         91       37.1        271      37.4        455
GR        53        525

ET                            9.1                                                         30.02      497.00
X1     0.139          6          0       522        234         13        115
GR      52.5          0       36.4       105       37.9        140       37.5        435      37.7        448
GR      53.1        522

NH         3       .035         52       .03        278       .035        343
ET                            9.1                                                         17.32      320.16
X1     0.172          7          0       343        263         60        174
GR      53.3          0         37        52       36.7         71       37.3         80      37.4        186
GR      37.3        278       53.6       343

NH         3       .035         47      .016         62       .035        322
ET                            9.1                                                         12.82      302.69
X1     0.178          7          0        92         33        245         30
GR      53.3          0       37.8        47       37.8         62       47.3         92      47.9        201
GR      48.9        302       53.9       322

NC                                        .3         .5
           70' LONG PEDESTRIAN WALKWAY
NH         5       .035         48      .016         61       .035         87        .03       303       .025
```

```
NH      335
ET                          9.1                                                                   7.23      315.78
X1    0.188          7          0          87          51          55          54
X3       10          0          0           0           0           0           0        48.1        48.1
      10                       0    53.3      87    50.9
GR     53.3          0       46.6          20        39.1          48        39.1          61        50.9          87
GR     48.6        303       54.3         335
            SPECIAL BRIDGE ROUTINE TO DETERMINE LOW AND WEIR FLOW
            LOW POINT OF CONCRETE WALL ON EDGES OF BRIDGE IS 51.4, HOWEVER
     LOW POINT OF DECK IS 50.7. BT RECORDS UTILIZED CONCRETE WALL ELEVATIONS.
     MAXIMUM DEPTH IS BASED ON DECK ELEVATION.

SB     1.25       1.56        2.6          0          13          .1         360          3        39.2        39.1
NH        5       .035        147       .016         160        .035         185        .03         400        .035
NH      432
ET                          9.11                                                                 104.37      420.05
X1    0.190         10        100         185          10          10          10
            INPUT FOR SPECIAL BRIDGE, MAX AND LOW CHORD ELEV & MIN TOP OF ROAD
X2        0          0          1        48.1        51.4
            EFFECTIVE AREA OPTION TO CONTROL FLOW TO BRIDGE UP TO ELEV 48.1
X3       10                                                                                 48.1        48.1
      10                     100    53.2     185    51.4
            BRIDGE TABLE TO DEFINE TOP OF ROAD PROFILE

BT      -10         43       55.0        55.0         63        54.0        54.0         90        53.5        53.5
BT                 100       53.2        53.2        120        51.4        48.1        147        51.4        48.1
BT                 180       51.4        48.1        185        51.4        51.4        400        48.6        48.6
BT                 432       54.3        54.3
```



```
GR      55         43         54         63        53.5         90        53.2        100        49.2         117
GR    39.2        147       39.2        160        51.4        185        48.6        400        54.3         432

NC                                       .1          .3
NH        6       .035        136       .016         150        .035         171        .03         383        .035
NH      398        .03        445
ET                          9.1                                                                   98.23      392.06
X1    0.206         11        100         171         87          87          87
GR      56         41         55         66          54          80        52.6        100        41.3         136
GR    41.5        150       48.1        171        48.4         272        49.1        383        55.1         398
GR    55.4        445

NH        5       .035         47       .016         60        .035         78        .03         220        .035
NH      267
ET                          9.1                                                                    9.52      241.35
X1    0.238          7          0         78         173         168         168
GR    55.2           0       43.1         47        43.5         60        48.8         78        48.4         160
GR   49.21        220       57.0        267

NH        5       .035         48       .016         62        .035         86        .03         248        .035
NH      264
ET                          9.1                                                                   10.56      252.30
```

```
X1    0.240          7          0         86         10         12         11
GR       57          0       43.2         48       43.3         62       51.9         86       52.6        172
GR     52.7        248       57.4        264

NC                                        .3         .5
            67' LONG PEDESTRIAN WALKWAY
NH        5       .035         54       .016         68       .035         93        .03        247       .035
NH      276
ET                            9.1                                                                25.94     148.37
X1    0.246          8          0         93         34         33         32
X3       10          0          0          0          0          0          0       52.1       52.1
      10                       0   57.85      93    53.6
GR    57.85          0      54.66         26      43.62         54       43.6         68       53.6         93
GR    52.18        173       52.6        247      57.69        276
            SPECIAL BRIDGE ROUTINE TO DETERMINE LOW AND WEIR FLOW

SB     1.25       1.56        2.6          0         14         .1        329        2.5       43.6       43.6
NH        6       .035        253       .016        267       .035        293        .03        445       .035
NH      471       0.03        540
ET                           9.11                                                               205.20     372.07
X1    0.248         13        200        293         11         12         11

            INPUT FOR SPECIAL BRIDGE, MAX AND LOW CHORD ELEV & MIN TOP OF ROAD
      LOW POINT OF CONCRETE WALL ON EDGES OF BRIDGE IS 55.4, HOWEVER
      LOW POINT OF DECK IS 54.6. BT RECORDS UTILIZED CONCRETE WALL ELEVATIONS.
      MAXIMUM DEPTH IS BASED ON DECK ELEVATION.
X2        0          0          1       52.1       55.4
            EFFECTIVE AREA OPTION TO CONTROL FLOW TO BRIDGE UP TO ELEVATION 52.1
X3       10          0          0          0          0          0          0       52.1       52.1
      10                     200    57.1     293    55.4
            BRIDGE TABLE TO DEFINE TOP OF ROAD PROFILE
BT      -13         70       60.0       60.0         79       59.0       59.0        185       58.9       58.9
1
   31JUL96      10:56:21                                                                                    PAGE    4

BT                  200       57.1       57.1        226       55.4       52.1        253       55.4       52.1
BT                  267       55.4       52.1        287       55.4       52.1        293       55.4       55.4
BT                  320       52.0       52.0        445       52.5       52.5        471       57.7       57.7
BT                  540       59.0       59.0
GR       60         70         59         79       58.9        185       57.1        200       52.1        226
GR    43.63        253      43.66        267       52.1        290       55.4        293       52.0        320
GR     52.5        445       57.7        471         59        540

NC                                        .1         .3
NH        6       .035         58       .016         76       .035         95        .03        252       .035
NH      273        .03        358
ET                            9.1                                                                13.56     170.57
X1    0.268          8          0         95        126         95        102
GR     59.5          0       45.5         58       45.6         76      51.84         95       52.9        252
GR     57.9        273         58        290         59        358

NC                                        .3         .5
            240' LONG PEDESTRIAN WALKWAY USING NORMAL BRIDGE ROUTINE
```

```
NH        5       .035        37       .016        60       .035        73        .03       214       .035
NH      242
ET                            9.11                                                          21.72     155.03
X1    0.289         16           0        73       125       112       115
BT      -16          0        60.6      60.6        20      61.2      57.3         37      61.8      57.9
BT                  60        62.6      58.7        73      63.0      59.1         80      63.0      59.1
BT                  81        63.0      51.8      82.3      63.0      51.8         83      63.0      59.1
BT                 158        63.0      59.1       159      63.0      51.9      160.3      63.0      51.9
BT                 161        63.0      59.1       214      61.4      57.5        228      61.0      57.3
BT                 242        60.6      60.6
GR     60.6          0        57.3        20      47.2        37      46.9         60      51.8        73
GR     51.8         80        51.8        81      51.8      82.3      51.8         83      51.9       158
GR     51.9        159        51.9     160.3      51.9       161      52.5        214      57.3       228
GR     60.6        242

NH        5       .035        36       .016        60       .035        73        .03       209       .035
NH      232
ET                            9.11                                                           9.15       150
X1    0.291         16           0        73        10        12        10
BT      -16          0        60.6      60.6         8     60.84      56.9         36      61.7      57.8
BT                  60        62.4      58.5        73      62.8      58.9         78     62.97     59.07
BT                  79       62.97     51.85      80.3     62.97     51.85         81     62.97     59.07
BT                 157       63.01     59.11       158     63.01      51.9     159.33     63.01      51.9
BT                 160       63.01     59.11       209     61.39      57.5        224     60.96      57.1
BT                 232        60.5      60.5
GR     60.6          0        56.9         8     47.23        36     46.95         60      51.8        73
GR    51.85         78       51.85        79     51.85      80.3     51.85         81     51.85       157
GR     51.9        158        51.9    159.33      51.9       160      52.4        209      57.1       224
GR     60.5        232

NC                                        .1        .3
NH        6       .035        36       .016        57       .035        67        .03       160       .035
NH      203        .03       260
ET                            9.1                                                           11.20     117.73
1
   31JUL96      10:56:21                                                                                PAGE     5

X1    0.307          7           0        67        79        80        81
GR     59.9          0        48.0        36        48        57     52.24         67     52.44       160
GR     58.9        203          59       260

NH        6       .035        34       .016        57       .035        65        .03       143       .035
NH      162        .03       206
ET                            9.1                                                           10.52     109.85
X1    0.320          7           0        65        68        74        73
GR     59.8          0        48.7        34        49        57      52.1         65      52.0       143
GR     59.0        162        59.3       206

NH        4       .035        33       .035       137       .035       162        .03       210
ET                            9.1                                                              35       125
X1    0.322          6           0       162         7         7         7
GR    59.82          0        48.9        33      49.1        57      49.9        137     59.04       162
GR     59.3        210
```

```
NH        3       .035        34       .022       135       .035       167
ET                            9.1                                                   35       125
X1    0.336         5         0        167        62        53        73
GR     59.9         0      49.0         34     49.37        86      49.9       135      59.7       167

NH        5       .03         60       .035       134       .03       233      .035       247       .03
NH      260
ET                            9.1                                                  135       225
X1    0.344         8       100        247        44        56        45
GR       60        60      59.5         90      58.3       100     49.54       134     49.87       233
GR     59.1       247        60        250        61       260

NC     .035      .035      .035
ET                            9.1                                                  200       339
X1    0.352         6       200        339        39        43        41
GR     60.4         0     58.75        200      57.4       222     56.52       263     57.67       339
GR     61.4       495

NC      .03       .03      .035
ET                            9.1                                                  212       352
X1    0.356        15       220        350        26        18        20
GR     62.0         0      61.3         57     60.83       111      60.8       160      58.3       220
GR    57.82       234     56.63        268     56.64       301     57.75       335      59.4       350
GR    61.35       388     61.17        432     61.37       485     61.44       521        62       600

NC     .035      .035      .035
ET                            9.1                                                  220       334
X1    0.361        14       220        334        24        30        27
GR    62.29         0     61.81         56      61.4       111     60.71       161     59.71       195
GR    58.72       220     57.68        243     57.07       267     57.57       297     59.64       334
GR    61.79       384     62.49        431     62.71       484     62.85       520
```

1


```
NC     .016      .016      .016
ET                            9.1                                                  205       320
X1    0.370        13       226        327        50        48        50
GR    62.63         0     62.04         56     61.46       109     60.96       159     60.21       173
GR    58.88       226     57.64        267     58.03       300     59.07       327     61.77       384
GR    62.47       430     62.73        483     62.83       517

NC     .016      .016      .016
ET                            9.1                                                  185       355
X1    0.373        12       227        335        12        14        13
GR    63.14         0     62.39         54     61.88       107     61.65       157      60.5       193
GR    57.55       227     57.22        268      62.8       288     63.22       335     63.33       382
GR    63.94       430     64.05        483

NC      .10       .10       .04
QT        2      5900      5900
ET                            9.1                                                  793       923
```

```
X1      0.46        10       840       915       440       400       420
GR        66       200        64       580        63       650        62       840        61       860
GR      60.3       870        61       900        62       915        64      1000        66      1100

NC       .16       .16       .05
ET                           9.1                                                           1922      1995
X1      0.51        14      1922      1995       650       450       550
GR        80      1000        70      1810        68      1870        66      1922        64      1930
GR        64      1976        66      1995        68      2105        70      2155        72      2440
GR        74      2840        76      3150        78      3380        80      3510

ET                           9.1                                                           1635      1840
X1      0.71        10      1700      1775       700       800      1060
GR        80      1000        76      1660        74      1700        72      1712        70      1730
GR        72      1760        74      1775        76      1840        78      1920        80      2050
1
   31JUL96      10:56:21                                                                          PAGE     7

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

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS
0

CCHV=     .100 CEHV=     .300
*SECNO  .000
      .000      4.00     46.90     46.06     46.90     47.78       .88       .00       .00     50.00
    6600.0        .0    6600.0        .0        .0     874.9        .0        .0        .0     49.10
       .00       .00      7.54       .00      .000      .035      .000      .000     42.90      8.41
   .005672        0.        0.        0.         0        14         0       .00    240.44    248.85

*SECNO  .003

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  5.80

      .003     11.18     47.78     40.00       .00     47.87       .10       .01       .08     50.20
    6600.0        .0    6600.0        .0        .0    2659.4        .0        .7        .1     49.00
       .00       .00      2.48       .00      .000      .035      .000      .000     36.60      4.20
   .000168       20.       18.       24.         2        15         0       .00    273.86    278.06

CCHV=     .100 CEHV=     .300
*SECNO  .026
      .026     11.21     47.81     39.79       .00     47.89       .07       .02       .00     55.00
```

```
    6600.0        .0    6600.0        .0        .0    3007.8        .0       8.4        .9     52.10
       .02       .00      2.19       .00      .000      .030      .000      .000     36.60     31.63
   .000099      177.      118.       68.         2        14         0       .00    318.27    349.90

 *SECNO  .049
      .049     11.85     47.85     39.56       .00     47.90       .05       .01       .00     52.50
    6600.0        .0    6600.0        .0        .0    3562.1        .0      17.8       1.9     53.10
       .04       .00      1.85       .00      .000      .030      .000      .000     36.00     18.92
   .000072      130.      125.      150.         1        17         0       .00    381.00    399.92

 *SECNO  .081
      .081     11.77     47.87     39.36       .00     47.91       .04       .01       .00     50.00
    6600.0        .0    6600.0        .0        .0    4075.3        .0      32.5       3.5     53.30
       .06       .00      1.62       .00      .000      .030      .000      .000     36.10      9.54
   .000053      184.      167.      150.         0        14         0       .00    425.63    435.17

1
   31JUL96      10:56:21                                                                          PAGE     8

    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  .117
      .117     11.79     47.89     39.21       .00     47.92       .03       .01       .00     52.00
    6600.0        .0    6600.0        .0        .0    4694.1        .0      51.7       5.5     53.00
       .10       .00      1.41       .00      .000      .030      .000      .000     36.10     17.09
   .000039      248.      191.      140.         0        14         0       .00    484.96    502.04

 *SECNO  .139
      .139     11.49     47.89     39.80       .00     47.93       .04       .01       .00     52.50
    6600.0        .0    6600.0        .0        .0    4199.0        .0      63.4       6.7     53.10
       .12       .00      1.57       .00      .000      .030      .000      .000     36.40     30.02
   .000054      234.      115.       13.         0        17         0       .00    466.98    497.00

 1490 NH CARD USED
 *SECNO  .172

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =    .65

      .172     11.17     47.87     40.20       .00     47.96       .09       .01       .01     53.30
    6600.0        .0    6600.0        .0        .0    2802.0        .0      77.4       8.2     53.60
       .14       .00      2.36       .00      .000      .031      .000      .000     36.70     17.32
   .000129      263.      174.       60.         2        17         0       .00    302.84    320.16
```

1490 NH CARD USED
*SECNO .178

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

.178	11.27	49.07	49.07	.00	50.64	1.57	.02	.44	53.30
6600.0	.0	5897.6	702.4	.0	557.3	228.3	79.2	9.0	47.30
.14	.00	10.58	3.08	.000	.032	.035	.000	37.80	12.82
.004063	33.	30.	245.	0	5	0	.00	289.87	302.69

CCHV= .300 CEHV= .500
1490 NH CARD USED
*SECNO .188
1
31JUL96 10:56:21 PAGE 9

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

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

.188	11.79	50.89	50.89	.00	52.31	1.42	.22	.04	53.30
6600.0	.0	5702.1	897.9	.0	558.8	260.3	80.2	9.3	50.90
.15	.00	10.20	3.45	.000	.032	.030	.000	39.10	7.20
.003971	51.	54.	55.	0	8	0	.00	307.39	315.84

SPECIAL BRIDGE

SB	XK	XKOR	COFQ	RDLEN	BWC	BWP	BAREA	SS	ELCHU	ELCHD
	1.25	1.56	2.60	.00	13.00	.10	360.00	3.00	39.20	39.10

1490 NH CARD USED
*SECNO .190

3301 HV CHANGED MORE THAN HVINS

PRESSURE AND WEIR FLOW, Weir Submergence Based on TRAPEZOIDAL Shape

EGPRS	EGLWC	H3	QWEIR	QPR	BAREA	TRAPEZOID AREA	ELLC	ELTRD	WEIRLN
59.03	52.72	.01	3314.	3289.	360.	352.	48.10	51.40	321.

```
      .190     12.97     52.17       .00       .00     52.91       .74       .60       .00     53.20
    6600.0        .0    4678.1    1921.9        .0     598.9     504.2      80.4       9.4     51.40
      .15       .00      7.81      3.81      .000      .033      .030      .000     39.20    104.34
   .002176       10.       10.       10.         3         0         4       .00    315.74    420.09

CCHV=     .100 CEHV=     .300
1490 NH CARD USED
*SECNO  .206

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

      .206     11.42     52.72     50.61       .00     53.07       .35       .12       .04     52.60
    6600.0        .0    2925.5    3674.5        .1     533.0     909.9      83.0      10.0     48.10
      .15       .21      5.49      4.04      .035      .032      .030      .000     41.30     98.19
   .000992       87.       87.       87.         2        14         0       .00    293.87    392.07

1
   31JUL96      10:56:21                                                                          PAGE   10

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

1490 NH CARD USED
*SECNO  .238

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .67

      .238      9.65     52.75     51.26       .00     53.40       .65       .24       .09     55.20
    6600.0        .0    3057.1    3542.9        .0     422.6     614.9      87.8      11.0     48.80
      .16       .00      7.23      5.76      .000      .032      .030      .000     43.10      9.51
   .002222      173.      168.      168.         2        13         0       .00    231.85    241.36

1490 NH CARD USED
*SECNO  .240

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
      .240     10.80     54.00     54.00       .00     55.54      1.54       .03       .27     57.00
    6600.0        .0    5456.3    1143.7        .0     506.7     255.3      88.0      11.1     51.90
      .16       .00     10.77      4.48      .000      .032      .030      .000     43.20     10.45
   .004498       10.       11.       12.         0         8         0       .00    241.96    252.41

CCHV=     .300 CEHV=     .500
```

1490 NH CARD USED
*SECNO .246
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

.246	11.07	54.67	54.67	.00	56.10	1.43	.14	.03	57.85
6600.0	.0	4937.0	1663.0	.0	461.2	322.8	88.6	11.3	53.60
.16	.00	10.70	5.15	.000	.032	.030	.000	43.60	25.94
.004320	34.	32.	33.	0	5	0	.00	232.83	258.78

SPECIAL BRIDGE

5227 DOWNSTREAM ELEV IS 54.23 , NOT 54.67 HYDRAULIC JUMP OCCURS DOWNSTREAM (IF LOW FLOW CONTROLS)

1

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

SB	XK	XKOR	COFQ	RDLEN	BWC	BWP	BAREA	SS	ELCHU	ELCHD
	1.25	1.56	2.60	.00	14.00	.10	329.00	2.50	43.60	43.60

1490 NH CARD USED
*SECNO .248

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.70

PRESSURE AND WEIR FLOW, Weir Submergence Based on TRAPEZOIDAL Shape

EGPRS	EGLWC	H3	QWEIR	QPR	BAREA	TRAPEZOID AREA	ELLC	ELTRD	WEIRLN
64.42	56.10	.00	3692.	2934.	329.	299.	52.10	55.40	258.

.248	12.46	56.09	.00	.00	56.59	.50	.49	.00	57.10
6600.0	.0	4042.1	2557.9	.0	634.3	578.3	88.8	11.3	55.40
.16	.00	6.37	4.42	.000	.033	.030	.000	43.63	205.20
.001490	11.	11.	12.	2	0	4	.00	257.79	463.00

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO .268

.268	10.73	56.23	54.41	.00	56.74	.51	.15	.00	59.50

```
    6600.0        .0    3730.3    2869.7        .0     573.2     628.9      91.6      11.9     51.84
       .17       .00      6.51      4.56      .000      .031      .030      .000     45.50     13.56
   .001458      126.      102.       95.         2        13         0       .00    252.42    265.98

CCHV=     .300 CEHV=     .500
1490 NH CARD USED
*SECNO  .289

3370 NORMAL BRIDGE, NRD=  16 MIN ELTRD=    60.60 MAX ELLC=    60.60

      .289      9.38     56.28     55.07       .00     57.07       .79       .19       .14     60.60
    6600.0        .0    3158.7    3441.3        .0     371.8     611.3      94.4      12.5     51.80
       .17       .00      8.50      5.63      .000      .028      .030      .000     46.90     21.72
   .001965      125.      115.      112.         2        19         0    -16.12    203.31    225.03
```

1

31JUL96 10:56:21 PAGE 12

```
    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

1490 NH CARD USED
*SECNO  .291

3370 NORMAL BRIDGE, NRD=  16 MIN ELTRD=    60.50 MAX ELLC=    60.60

      .291      9.55     56.50     54.76       .00     57.14       .64       .02       .05     60.60
    6600.0        .0    3270.4    3329.6        .0     443.1     627.8      94.7      12.6     51.80
       .17       .00      7.38      5.30      .000      .029      .030      .000     46.95      9.15
   .001635       10.       10.       12.         2        15         0    -17.18    212.95    222.10

CCHV=     .100 CEHV=     .300
1490 NH CARD USED
*SECNO  .307

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .63

      .307      8.20     56.20     55.67       .00     57.55      1.36       .20       .22     59.90
    6600.0        .0    3579.7    3020.3        .0     334.6     405.7      96.3      12.9     52.24
       .17       .00     10.70      7.44      .000      .029      .030      .000     48.00     11.20
   .004179       79.       81.       80.         3        15         0       .00    173.81    185.01

1490 NH CARD USED
```

```
*SECNO  .320
      .320      7.67     56.37     55.86       .00     57.94      1.58       .32       .07     59.80
    6600.0        .0    3472.5    3127.5        .0     309.4     362.5      97.5      13.2     52.10
      .17       .00     11.22      8.63      .000      .028      .030      .000     48.70     10.52
   .004627       68.       73.       74.         2        15         0       .00    144.33    154.85

1490 NH CARD USED
*SECNO  .322

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.58

      .322      8.50     57.40     54.14       .00     58.05       .65       .02       .09     59.82
    6600.0        .0    6600.0        .0        .0    1020.2        .0      97.7      13.2     59.04
      .18       .00      6.47       .00      .000      .035      .000      .000     48.90      7.30
   .001848        7.        7.        7.         3        14         0       .00    150.22    157.52
```



```
    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

1490 NH CARD USED
*SECNO  .336
      .336      8.52     57.52     54.22       .00     58.16       .64       .10       .00     59.90
    6600.0        .0    6600.0        .0        .0    1027.2        .0      99.4      13.5     59.70
      .18       .00      6.43       .00      .000      .027      .000      .000     49.00      7.44
   .001084       62.       73.       53.         2        14         0       .00    152.43    159.87

1490 NH CARD USED
*SECNO  .344
      .344      7.95     57.49     54.61       .00     58.26       .77       .06       .04     58.30
    6600.0        .0    6600.0        .0        .0     937.2        .0     100.4      13.6     59.10
      .18       .00      7.04       .00      .000      .032      .000      .000     49.54    103.15
   .001860       44.       45.       56.         2        14         0       .00    141.41    244.56

*SECNO  .352
3280 CROSS SECTION       .35 EXTENDED       .39 FEET

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
      .352      4.27     60.79     60.79       .00     61.76       .97       .14       .06     58.75
    6600.0    1063.4    4482.7    1053.9     242.9     497.5     203.5     101.3      13.9     57.67
```

```
      .18       4.38       9.01       5.18       .035       .035       .035       .000      56.52       .00
   .008231       39.        41.        43.          0         11          0        .00     469.46    469.46

*SECNO  .356
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
     .356       5.18      61.81      61.81        .00      62.75        .94        .14        .00     58.30
   6600.0     1172.6     5001.7      425.7      235.6      584.9      132.1      101.8       14.2     59.40
      .18       4.98       8.55       3.22       .030       .035       .030       .000      56.63     15.28
   .005469       26.        20.        18.          0         11          0        .00     558.24    573.52

*SECNO  .361
3280 CROSS SECTION       .36 EXTENDED       .08 FEET

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
     .361       5.30      62.37      62.37        .00      63.46       1.09        .16        .04     58.72
   6600.0     1437.7     4744.1      418.2      278.1      506.6       94.0      102.3       14.5     59.64
      .18       5.17       9.36       4.45       .035       .035       .035       .000      57.07       .00
   .006666       24.        27.        30.          0          5          0        .00     422.94    422.94
```



```
   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  .370
3280 CROSS SECTION       .37 EXTENDED       .07 FEET

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.35

     .370       5.07      62.71      62.50        .00      63.60        .89        .12        .02     58.88
   6600.0     1818.5     3993.2      788.3      341.8      454.5      161.8      103.4       15.0     59.07
      .18       5.32       8.79       4.87       .016       .016       .016       .000      57.64       .00
   .001205       50.        50.        48.          0         11          0        .00     476.64    476.64

*SECNO  .373
3280 CROSS SECTION       .37 EXTENDED       .31 FEET

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
     .373       6.23      63.45      63.45        .00      64.62       1.17        .02        .08     57.55
   6600.0     3441.5     3147.4       11.1      425.8      337.6        8.5      103.6       15.1     63.22
      .19       8.08       9.32       1.30       .016       .016       .016       .000      57.22       .00
```

.002225	12.	13.	14.	0	11	0	.00	391.06	391.06

*SECNO .460

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .46

.460	5.23	65.53	65.21	.00	66.26	.73	1.60	.04	62.00
5900.0	2193.3	3099.9	606.8	936.9	335.8	272.6	115.0	20.9	62.00
.21	2.34	9.23	2.23	.100	.040	.100	.000	60.30	290.42
.008379	440.	420.	400.	3	16	0	.00	785.79	1076.21

*SECNO .510

.510	6.44	70.44	69.83	.00	71.66	1.23	5.25	.15	66.00
5900.0	496.2	4489.2	914.6	272.8	442.9	463.6	132.8	29.0	66.00
.22	1.82	10.13	1.97	.160	.050	.160	.000	64.00	1774.56
.010574	650.	550.	450.	2	8	0	.00	442.79	2217.35

*SECNO .710

.710	8.72	78.72	77.73	.00	79.60	.88	7.90	.03	74.00
5900.0	815.1	4505.7	579.2	760.2	525.2	396.7	160.8	39.7	74.00
.26	1.07	8.58	1.46	.160	.050	.160	.000	70.00	1210.85
.006273	700.	1060.	800.	3	11	0	.00	756.08	1966.94

1
PROFILE FOR STREAM ECHO CANYON WASH 100 YR

PLOTTED POINTS (BY PRIORITY) E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA

```
ELEVATION    36.       41.       46.       51.       56.       61.       66.       71.       76.       81.
    SECNO   CUMDIS

     .00      0.  .         .  I     C W E R L .         .         .         .         .         .         .
     .00     20.  .I      C .         .   E R L .         .         .         .         .         .         .
             40.  .I      C .         .   E  R  L         .         .         .         .         .         .
             60.  .I      C .         .   E   R . L       .         .         .         .         .         .
             80.  .I      C .         .   E    R.  L      .         .         .         .         .         .
            100.  .I      C .         .   E     R    L    .         .         .         .         .         .
            120.  .I      C .         .   E     .R     L  .         .         .         .         .         .
     .03    140.  .I      C .         .   E     . R     L .         .         .         .         .         .
            160.  .I      C .         .   E     . MR   L  .         .         .         .         .         .
            180.  .I     C  .         .   E     . MR  L   .         .         .         .         .         .
            200.  .I     C  .         .   E     .  R  L   .         .         .         .         .         .
            220.  I      C  .         .   E     .  R L    .         .         .         .         .         .
            240.  I      C  .         .   E     .  ML     .         .         .         .         .         .
            260.  I      C  .         .   E     .  LR     .         .         .         .         .         .
     .05    280.  I      C  .         .   E     .  LR     .         .         .         .         .         .
```

```
       300.  I      C  .         .  E     . L R    .         .         .         .         .         .
       320.  I      C  .         .  E     . L R    .         .         .         .         .         .
       340.  I      C  .         .  E     .L  R    .         .         .         .         .         .
       360.  I      C  .         .  E     .L  R    .         .         .         .         .         .
       380.  I      C  .         .  E     L   R    .         .         .         .         .         .
       400.  I      C  .         .  E    L.   R    .         .         .         .         .         .
       420.  I      C  .         .  E    L.    R   .         .         .         .         .         .
.08    440.  I      C  .         .  E   L .    R   .         .         .         .         .         .
       460.  I      C  .         .  E   L .    R   .         .         .         .         .         .
       480.  I      C  .         .  E    L.   R    .         .         .         .         .         .
       500.  I      C  .         .  E    L.   R    .         .         .         .         .         .
       520.  I      C  .         .  E     L   R    .         .         .         .         .         .
       540.  I      C  .         .  E     L   R    .         .         .         .         .         .
       560.  I      C  .         .  E     .L  R    .         .         .         .         .         .
       580.  I      C  .         .  E     .L  R    .         .         .         .         .         .
       600.  I     C   .         .  E     .L  R    .         .         .         .         .         .
.12    620.  I     C   .         .  E     . L R    .         .         .         .         .         .
       640.  I      C  .         .  E     . L R    .         .         .         .         .         .
       660.  I      C  .         .  E     . L R    .         .         .         .         .         .
       680.  .I     C  .         .  E     .  LR    .         .         .         .         .         .
       700.  .I     C  .         .  E     .  LR    .         .         .         .         .         .
       720.  .I     C  .         .  E     .  LR    .         .         .         .         .         .
.14    740.  .I      C .         .  E     .  LR    .         .         .         .         .         .
       760.  .I      C .         .  E     .  LR    .         .         .         .         .         .
       780.  .I      C .         .  E     .  LR    .         .         .         .         .         .
       800.  .I      C .         .  E     .   LR   .         .         .         .         .         .
       820.  .I      C .         .  E     .   LR   .         .         .         .         .         .
       840.  .I      C .         .  E     .   LR   .         .         .         .         .         .
       860.  .I      C .         .  E     .   LR   .         .         .         .         .         .
       880.  .I      C .         .  E     .   LR   .         .         .         .         .         .
       900.  .I      C .         .  E     .   LR   .         .         .         .         .         .
.17    920.  .I      C .         .  E     .    L   .         .         .         .         .         .
.18    940.  .   I     .         .  R  W  E.    L   .         .         .         .         .         .
       960.  .    I    .         .   R W  .E   L   .         .         .         .         .         .
       980.  .     I   .         .      RW. E  L   .         .         .         .         .         .
.19   1000.  .     I   .         .        W  E L   .         .         .         .         .         .
.19   1020.  C     I   .         .        .RW E  M .         .         .         .         .         .
      1040.  C      I  .         .       R.  WE  M .         .         .         .         .         .
      1060.  C       I .         .      R .  WE   M .         .         .         .         .         .
      1080.  C        I.         .    R   .  WE   M .         .         .         .         .         .
.21   1100.  .         .I        .  R    C.  WE    M.         .         .         .         .         .
      1120.  .         .I        .  R    C.  WE    M.         .         .         .         .         .
      1140.  .         .I        .   R    C  WE    M.         .         .         .         .         .
      1160.  .         . I       .   R    C  WEL   M.         .         .         .         .         .
      1180.  .         . I       .   R    C  WE L  M.         .         .         .         .         .
      1200.  .         .  I      .   R    C  W EL  M.         .         .         .         .         .
      1220.  .         .  I      .   R    C  W E L M.         .         .         .         .         .
      1240.  .         .   I     .   R    C  W E  L .         .         .         .         .         .
.24   1260.  .         .   I     .    R   .C  WE  L .         .         .         .         .         .
.24   1280.  .         .   I     .        . R   W  E. L       .         .         .         .         .
.25   1300.  .         .    I    .        .    R W  E  ML     .         .         .         .         .
.25   1320.  C         .    I    .        .        RWEL   M   .         .         .         .         .
      1340.  C         .     I   .        .      R  WE L  M   .         .         .         .         .
      1360.  C         .      I  .        .     R   WE  L M   .         .         .         .         .
```

```
     1380. C         .     I .         .   R    WE   LM   .         .         .         .         .         .
     1400. .         . C    I .         . R      WE    L   .         .         .         .         .         .
.27  1420. .         .       I.         . R    C WE    ML  .         .         .         .         .         .
     1440. .         .       I.         . R    C W E    L  .         .         .         .         .         .
     1460. .         .        I         . R    C W E    ML .         .         .         .         .         .
     1480. .         .        I         . R     C .WE     L .         .         .         .         .         .
     1500. .         .        .I        . R     C .WE     ML.         .         .         .         .         .
     1520. .         .        .I        . R     C .WE      L.         .         .         .         .         .
.29  1540. .         .        . I       . R     C .WE      L.         .         .         .         .         .
.29  1560. .         .        . I       . R     C .WE      L.         .         .         .         .         .
     1580. .         .        . I       . R     C .WE     ML.         .         .         .         .         .
     1600. .         .        .  I      . R     C .W E    ML.         .         .         .         .         .
.31  1620. .         .        .   I     . R      CW  E  M L .         .         .         .         .         .
     1640. .         .        .   I     . R      CW  E  M L .         .         .         .         .         .
     1660. .         .        .    I    . R       CW  E M L .         .         .         .         .         .
     1680. .         .        .    I    . R       CW  E M L .         .         .         .         .         .
.32  1700. .         .        .    I    . R       CW  E  ML .         .         .         .         .         .
.32  1720. .         .        .     I   .     C   .  WE RML .         .         .         .         .         .
     1740. .         .        .     I   .     C   .  WE RML .         .         .         .         .         .
     1760. .         .        .     I   .     C   .  WE  RL .         .         .         .         .         .
.34  1780. .         .        .     I   .     C   .  WE  RL .         .         .         .         .         .
     1800. .         .        .     I   .      C  .  WE LRM .         .         .         .         .         .
.34  1820. .         .        .      I  .      C  .  W ER M .         .         .         .         .         .
     1840. .         .        .         .   I     .  C LW E .         .         .         .         .         .
.35  1860. .         .        .         .         .I R  L  MW E        .         .         .         .         .
.36  1880. .         .        .         .         .I   L R  . W E      .         .         .         .         .
     1900. .         .        .         .         . I  L R  . W  E     .         .         .         .         .
.36  1920. .         .        .         .         . I  L R  .  W E     .         .         .         .         .
     1940. .         .        .         .         .  I  LR  .  W E     .         .         .         .         .
.37  1960. .         .        .         .         .  I  L   .  W E     .         .         .         .         .
.37  1980. .         .        .         .         . IL      .   RW E   .         .         .         .         .
     2000. .         .        .         .         .  IL     .   RW E   .         .         .         .         .
     2020. .         .        .         .         .  IL     .   RW  E  .         .         .         .         .
     2040. .         .        .         .         .  IL     .   RW  E  .         .         .         .         .
     2060. .         .        .         .         .   IL    .   RMW E  .         .         .         .         .
     2080. .         .        .         .         .   IL    .   R W E  .         .         .         .         .
     2100. .         .        .         .         .   I L   .   R W E  .         .         .         .         .
     2120. .         .        .         .         .   I L   .   R W E  .         .         .         .         .
     2140. .         .        .         .         .    IL   .   R W E  .         .         .         .         .
     2160. .         .        .         .         .    I L  .  R  CW E.         .         .         .         .
     2180. .         .        .         .         .    I L  .  R   W E.         .         .         .         .
     2200. .         .        .         .         .     I L .  R   W E.         .         .         .         .
     2220. .         .        .         .         .     I L .  R   WME.         .         .         .         .
     2240. .         .        .         .         .     I  L.  R   WME.         .         .         .         .
     2260. .         .        .         .         .      I L.  R   CWE.         .         .         .         .
     2280. .         .        .         .         .      I L.  R   CW E         .         .         .         .
     2300. .         .        .         .         .      I  L  R    WME         .         .         .         .
     2320. .         .        .         .         .      I  L R     WME         .         .         .         .
     2340. .         .        .         .         .       I .LR     WME         .         .         .         .
     2360. .         .        .         .         .       I .LR     CWE         .         .         .         .
     2380. .         .        .         .         .       I . L     CWE         .         .         .         .
.46  2400. .         .        .         .         .        I. L     CWME        .         .         .         .
     2420. .         .        .         .         .        I. L      W.E        .         .         .         .
     2440. .         .        .         .         .        I.  L     CWEM       .         .         .         .
```

```
     2460.  .         .         .         .         .        I.  L     CW EM      .         .         .         .
     2480.  .         .         .         .         .         I  L      W E M     .         .         .         .
     2500.  .         .         .         .         .         I  L      CWE  M    .         .         .         .
     2520.  .         .         .         .         .         I   L     CW E  M   .         .         .         .
     2540.  .         .         .         .         .         I   L     .CWE   M  .         .         .         .
     2560.  .         .         .         .         .        .I  L     .CW E   M .         .         .         .
     2580.  .         .         .         .         .        .I   L    .CW E    M.         .         .         .
     2600.  .         .         .         .         .        .I   L    . CWE     M         .         .         .
     2620.  .         .         .         .         .        . I  L    . CW E    .M        .         .         .
     2640.  .         .         .         .         .        . I  L    . CW E    . M       .         .         .
     2660.  .         .         .         .         .        . I   L   .  CW E   .  M      .         .         .
     2680.  .         .         .         .         .        . I   L   .  CW E   .   M     .         .         .
     2700.  .         .         .         .         .        .  I  L   .  CW E   .    M    .         .         .
     2720.  .         .         .         .         .        .  I   L  .   CW E  .     M   .         .         .
     2740.  .         .         .         .         .        .  I   L  .   CW E  .      M  .         .         .
     2760.  .         .         .         .         .        .  I   L  .   CW  E .       M .         .         .
     2780.  .         .         .         .         .        .   I   L .    CW E .        M.         .         .
     2800.  .         .         .         .         .        .   I   L .    CW E .         M         .         .
     2820.  .         .         .         .         .        .   I   L .    C W E.         .M        .         .
     2840.  .         .         .         .         .        .    I  L .     CW E.         . M       .         .
     2860.  .         .         .         .         .        .    I   L.     CW  E         .  M      .         .
     2880.  .         .         .         .         .        .    I   L.     C W E         .   M     .         .
     2900.  .         .         .         .         .        .    I   L.      CW E         .    M    .         .
     2920.  .         .         .         .         .        .     I   L      CW .E        .     M   .         .
.51  2940.  .         .         .         .         .        .     I   L       CW.E        .       M .         .
     2960.  .         .         .         .         .        .     I   L       CW. E       .       M .         .
     2980.  .         .         .         .         .        .     I   .L      C W E       .       M .         .
     3000.  .         .         .         .         .        .      I  .L       CW E       .       M .         .
     3020.  .         .         .         .         .        .      I  .L       CW  E      .       M .         .
     3040.  .         .         .         .         .        .      I  . L      CW  E      .       M .         .
     3060.  .         .         .         .         .        .      I  . L      C.W E      .       M .         .
     3080.  .         .         .         .         .        .       I . L       CW E      .       M .         .
     3100.  .         .         .         .         .        .       I . L       CW  E     .       M .         .
     3120.  .         .         .         .         .        .       I .  L      C W E     .       M .         .
     3140.  .         .         .         .         .        .       I .  L      .CW E     .       M .         .
     3160.  .         .         .         .         .        .       I .  L      .CW  E    .       M .         .
     3180.  .         .         .         .         .        .        I.   L     .C W E    .       M .         .
     3200.  .         .         .         .         .        .        I.   L     . CW E    .       M .         .
     3220.  .         .         .         .         .        .        I.   L     . CW  E   .       M .         .
     3240.  .         .         .         .         .        .        I.    L    . C W E   .       M .         .
     3260.  .         .         .         .         .        .         I    L    . C W E   .       M .         .
     3280.  .         .         .         .         .        .         I    L    .  CW E   .       M .         .
     3300.  .         .         .         .         .        .         I    L    .  C W E  .       M .         .
     3320.  .         .         .         .         .        .         I     L   .  C W E  .       M .         .
     3340.  .         .         .         .         .        .         .I    L   .   CW E  .       M .         .
     3360.  .         .         .         .         .        .         .I    L   .   CW  E .       M .         .
     3380.  .         .         .         .         .        .         .I     L  .   C W E .       M .         .
     3400.  .         .         .         .         .        .         .I     L  .    CW E .       M .         .
     3420.  .         .         .         .         .        .         .I     L  .    CW  E.       M .         .
     3440.  .         .         .         .         .        .         . I     L .    C W E.       M .         .
     3460.  .         .         .         .         .        .         . I     L .    C W E.       M .         .
     3480.  .         .         .         .         .        .         . I     L .     CW E.       M .         .
     3500.  .         .         .         .         .        .         . I     L .     C W E       M .         .
     3520.  .         .         .         .         .        .         .  I     L.     C W E       M .         .
```

```
          3540.  .         .         .         .         .         .         . I     L.      CW E      M .         .
          3560.  .         .         .         .         .         .         . I     L.      C W.E     M .         .
          3580.  .         .         .         .         .         .         . I      L      C W.E     M .         .
          3600.  .         .         .         .         .         .         . I      L      C W.E     M .         .
          3620.  .         .         .         .         .         .         .  I     L       C W E    M .         .
          3640.  .         .         .         .         .         .         .  I     .L      C W E    M .         .
          3660.  .         .         .         .         .         .         .  I     .L      C W E    M .         .
          3680.  .         .         .         .         .         .         .  I     .L       CW E    M .         .
          3700.  .         .         .         .         .         .         .   I    .L       C.W E   M .         .
          3720.  .         .         .         .         .         .         .   I    . L      C.W E   M .         .
          3740.  .         .         .         .         .         .         .   I    . L       CW E   M .         .
          3760.  .         .         .         .         .         .         .   I    . L       C W E  M .         .
          3780.  .         .         .         .         .         .         .    I   .  L      C W E  M .         .
          3800.  .         .         .         .         .         .         .    I   .  L      C W E  M .         .
          3820.  .         .         .         .         .         .         .    I   .  L      .C W E M .         .
          3840.  .         .         .         .         .         .         .    I   .   L     .C W E M .         .
          3860.  .         .         .         .         .         .         .    I   .   L     .C W E M .         .
          3880.  .         .         .         .         .         .         .     I  .   L     . C WE  M .         .
          3900.  .         .         .         .         .         .         .     I  .   L     . C W E M .         .
          3920.  .         .         .         .         .         .         .     I  .    L    . C W E M .         .
          3940.  .         .         .         .         .         .         .     I  .    L    .  C WE M .         .
          3960.  .         .         .         .         .         .         .      I .    L    .  C W EM .         .
          3980.  .         .         .         .         .         .         .      I .     L   .  C W EM .         .
     .71  4000.  .         .         .         .         .         .         .      I .     L   .  C W EM .         .
1
 PROFILE FOR STREAM  ECHO CANYON WASH 100 YR


 PLOTTED POINTS (BY PRIORITY) E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA


 ELEVATION    36.       41.       46.       51.       56.       61.       66.       71.       76.       81.
     SECNO   CUMDIS

1
    31JUL96      10:56:21                                                                                    PAGE   15


 T1  ECHO CANYON WASH FLOODPLAIN DELINEATION  MA08100S.HC2
 T2  BASED ON PEAK FLOWS AS DETERMINED BY FIRM STUDY
 T3  ECHO CANYON WASH 100 YR REVISED CONDITIONS W/ 1' ENCROACHMENT

 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

       0         3         0         0         0         0         0         0       47.9        0

 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

       2         0         0         0         0         0        -1
```

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

*PROF 2

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS
0

CCHV=     .100 CEHV=     .300
*SECNO  .000

3470 ENCROACHMENT STATIONS=        8.4     248.9  TYPE=      1  TARGET=      240.440
      .000      5.00     47.90     46.06     46.90     48.44       .54       .00       .00 100000.00
    6600.0        .0    6600.0        .0        .0    1115.3        .0        .0        .0 100000.00
      .00       .00      5.92       .00      .000      .035      .000      .000     42.90      8.41
   .002553        0.        0.        0.         0        13         0       .00    240.44    248.85

*SECNO  .003

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  4.31

3470 ENCROACHMENT STATIONS=        4.2     278.1  TYPE=      1  TARGET=      273.860
      .003     11.81     48.41     40.01     47.78     48.50       .08       .01       .05 100000.00
    6600.0        .0    6600.0        .0        .0    2833.5        .0        .8        .1 100000.00
      .00       .00      2.33       .00      .000      .035      .000      .000     36.60      4.20
   .000137       20.       18.       24.         2        14         0       .00    273.86    278.06

CCHV=     .100 CEHV=     .300
*SECNO  .026

3470 ENCROACHMENT STATIONS=       31.6     349.9  TYPE=      1  TARGET=      318.270
      .026     11.84     48.44     39.78     47.81     48.51       .07       .01       .00 100000.00
    6600.0        .0    6600.0        .0        .0    3208.5        .0       9.0        .9 100000.00
      .02       .00      2.06       .00      .000      .030      .000      .000     36.60     31.63
   .000081      177.      118.       68.         2        14         0       .00    318.27    349.90

*SECNO  .049

3470 ENCROACHMENT STATIONS=       18.9     399.9  TYPE=      1  TARGET=      381.000
      .049     12.47     48.47     39.56     47.85     48.52       .05       .01       .00 100000.00
    6600.0        .0    6600.0        .0        .0    3800.9        .0      19.1       1.9 100000.00
      .04       .00      1.74       .00      .000      .030      .000      .000     36.00     18.92
```

```
   .000058      130.      125.      150.         1        17         0       .00    381.00    399.92

1
   31JUL96      10:56:21                                                                                PAGE   17

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

*SECNO  .081

3470 ENCROACHMENT STATIONS=        9.5     435.2  TYPE=      1  TARGET=      425.630
      .081     12.39     48.49     39.35     47.87     48.53       .04       .01       .00 100000.00
    6600.0        .0    6600.0        .0        .0    4340.6        .0      34.7       3.5 100000.00
      .07       .00      1.52       .00      .000      .030      .000      .000     36.10      9.54
   .000043      184.      167.      150.         0        14         0       .00    425.63    435.17

*SECNO  .117

3470 ENCROACHMENT STATIONS=       17.1     502.0  TYPE=      1  TARGET=      484.950
      .117     12.41     48.51     39.23     47.89     48.54       .03       .01       .00 100000.00
    6600.0        .0    6600.0        .0        .0    4994.8        .0      55.1       5.5 100000.00
      .11       .00      1.32       .00      .000      .030      .000      .000     36.10     17.09
   .000032      248.      191.      140.         0        11         0       .00    484.95    502.04

*SECNO  .139

3470 ENCROACHMENT STATIONS=       30.0     497.0  TYPE=      1  TARGET=      466.980
      .139     12.11     48.51     39.81     47.89     48.54       .03       .00       .00 100000.00
    6600.0        .0    6600.0        .0        .0    4487.7        .0      67.6       6.7 100000.00
      .13       .00      1.47       .00      .000      .030      .000      .000     36.40     30.02
   .000044      234.      115.       13.         0        14         0       .00    466.98    497.00

1490 NH CARD USED
*SECNO  .172

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .65

3470 ENCROACHMENT STATIONS=       17.3     320.2  TYPE=      1  TARGET=      302.840
      .172     11.79     48.49     40.22     47.87     48.57       .08       .01       .01 100000.00
    6600.0        .0    6600.0        .0        .0    2989.9        .0      82.6       8.2 100000.00
      .15       .00      2.21       .00      .000      .031      .000      .000     36.70     17.32
   .000104      263.      174.       60.         2        14         0       .00    302.84    320.16

1490 NH CARD USED
```

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

3470 ENCROACHMENT STATIONS= 12.8 302.7 TYPE= 1 TARGET= 289.870

.178	11.23	49.03	49.03	49.07	50.64	1.61	.01	.46	100000.00
6600.0	.0	5930.5	669.5	.0	553.9	219.1	84.4	9.0	47.30
.15	.00	10.71	3.06	.000	.032	.035	.000	37.80	12.95
.004184	33.	30.	245.	0	11	0	.00	289.56	302.51

CCHV= .300 CEHV= .500
1490 NH CARD USED
*SECNO .188

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= 7.2 315.8 TYPE= 1 TARGET= 308.550

.188	11.78	50.88	50.88	50.89	52.31	1.43	.22	.05	100000.00
6600.0	.0	5709.7	890.3	.0	558.0	258.0	85.4	9.3	50.90
.16	.00	10.23	3.45	.000	.032	.030	.000	39.10	7.23
.003997	51.	54.	55.	0	8	0	.00	306.34	315.78

SPECIAL BRIDGE

SB	XK	XKOR	COFQ	RDLEN	BWC	BWP	BAREA	SS	ELCHU	ELCHD
	1.25	1.56	2.60	.00	13.00	.10	360.00	3.00	39.20	39.10

1490 NH CARD USED
*SECNO .190
BTCARD, BRIDGE STENCL= 104.37 STENCR= 420.05

3301 HV CHANGED MORE THAN HVINS

PRESSURE AND WEIR FLOW, Weir Submergence Based on TRAPEZOIDAL Shape

```
 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


EGPRS     EGLWC     H3        QWEIR     QPR       BAREA   TRAPEZOID     ELLC      ELTRD     WEIRLN
                                                            AREA
  59.02     52.72      .01     3310.     3291.      360.     352.       48.10     51.40      316.


3470 ENCROACHMENT STATIONS=      104.4     420.0  TYPE=      1  TARGET=      315.680
      .190     12.96     52.16       .00     52.17     52.90       .75       .59       .00 100000.00
    6600.0        .0    4690.4    1909.6        .0     597.6     500.6      85.6       9.4     51.40
      .16       .00      7.85      3.81      .000      .032      .030      .000     39.20    104.41
   .002200       10.       10.       10.         3         0         4       .00    315.59    420.00


CCHV=     .100 CEHV=     .300
1490 NH CARD USED
*SECNO  .206

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


3470 ENCROACHMENT STATIONS=       98.2     392.1  TYPE=      1  TARGET=      293.830
      .206     11.42     52.72     50.60     52.72     53.06       .35       .12       .04     52.60
    6600.0        .0    2927.6    3672.4        .1     532.4     908.3      88.2      10.0     48.10
      .16       .20      5.50      4.04      .035      .032      .030      .000     41.30     98.30
   .000996       87.       87.       87.         2        14         0       .00    293.75    392.05


1490 NH CARD USED
*SECNO  .238

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .67


3470 ENCROACHMENT STATIONS=        9.5     241.4  TYPE=      1  TARGET=      231.830
      .238      9.64     52.74     51.27     52.75     53.40       .66       .24       .09 100000.00
    6600.0        .0    3059.4    3540.6        .0     422.1     613.8      92.9      11.0     48.80
      .17       .00      7.25      5.77      .000      .032      .030      .000     43.10      9.54
   .002233      173.      168.      168.         2        13         0       .00    231.78    241.32


1490 NH CARD USED
```

```
    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  .240

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=       10.6     252.3  TYPE=      1  TARGET=      241.740
      .240     10.76     53.96     53.96     54.00     55.54      1.58       .04       .28 100000.00
    6600.0        .0    5484.1    1115.9        .0     504.1     249.6      93.2      11.1     51.90
       .17       .00     10.88      4.47      .000      .032      .030      .000     43.20     10.57
   .004611       10.       11.       12.         0         8         0       .00    241.73    252.29


CCHV=     .300 CEHV=     .500
1490 NH CARD USED
*SECNO  .246

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=       25.9     148.4  TYPE=      1  TARGET=      122.430
      .246     11.23     54.83     54.83     54.67     57.24      2.41       .17       .42 100000.00
    6600.0        .0    6084.3     515.7        .0     472.2      95.3      93.7      11.2     53.60
       .17       .00     12.89      5.41      .000      .032      .030      .000     43.60     25.94
   .006090       34.       32.       33.         0         8         0       .00    122.43    148.37


SPECIAL BRIDGE

5227 DOWNSTREAM ELEV IS      54.23 , NOT      54.83 HYDRAULIC JUMP OCCURS DOWNSTREAM (IF LOW FLOW CONTROLS)

SB  XK        XKOR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
     1.25      1.56      2.60       .00     14.00       .10    329.00      2.50     43.60     43.60

1490 NH CARD USED
*SECNO  .248
BTCARD, BRIDGE STENCL=     205.20   STENCR=     372.07

3301 HV CHANGED MORE THAN HVINS
```

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

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.05

PRESSURE AND WEIR FLOW, Weir Submergence Based on TRAPEZOIDAL Shape

EGPRS	EGLWC	H3	QWEIR	QPR	BAREA	TRAPEZOID AREA	ELLC	ELTRD	WEIRLN
64.58	57.24	.00	3053.	3570.	329.	299.	52.10	55.40	167.

3470 ENCROACHMENT STATIONS= 205.2 372.1 TYPE= 1 TARGET= 166.870

.248	13.43	57.06	.00	56.09	57.68	.63	.44	.00	100000.00
6600.0	.0	4880.2	1719.8	.0	719.2	349.2	93.9	11.3	55.40
.17	.00	6.79	4.92	.000	.033	.030	.000	43.63	205.20
.001452	11.	11.	12.	2	0	3	.00	166.87	372.07

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO .268

3470 ENCROACHMENT STATIONS= 13.6 170.6 TYPE= 1 TARGET= 157.010

.268	11.68	57.18	54.60	56.23	57.84	.66	.14	.01	100000.00
6600.0	.0	4547.7	2052.3	.0	650.6	384.1	96.3	11.6	51.84
.17	.00	6.99	5.34	.000	.031	.030	.000	45.50	13.56
.001446	126.	102.	95.	3	20	0	.00	157.01	170.57

CCHV= .300 CEHV= .500
1490 NH CARD USED
*SECNO .289
BTCARD, BRIDGE STENCL= 21.72 STENCR= 155.03

3370 NORMAL BRIDGE, NRD= 16 MIN ELTRD= 60.60 MAX ELLC= 60.60

3470 ENCROACHMENT STATIONS= 21.7 155.0 TYPE= 1 TARGET= 133.310

.289	10.29	57.19	55.34	56.28	58.22	1.03	.19	.18	100000.00
6600.0	.0	3837.4	2762.6	.0	418.6	428.6	98.7	12.0	51.80
.18	.00	9.17	6.45	.000	.028	.030	.000	46.90	21.72
.002015	125.	115.	112.	11	20	0	-10.40	133.31	155.03

```
    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

1490 NH CARD USED
*SECNO  .291
BTCARD, BRIDGE STENCL=       9.15   STENCR=     150.00

3370 NORMAL BRIDGE, NRD=  16 MIN ELTRD=    60.50 MAX ELLC=    60.60

3470 ENCROACHMENT STATIONS=        9.1     150.0  TYPE=      1  TARGET=      140.850
      .291     10.51      57.46      55.14      56.50      58.29       .84       .02       .06 100000.00
    6600.0        .0    4058.2     2541.8         .0      504.0     420.9      99.0      12.1     51.80
       .18       .00       8.05       6.04       .000       .029      .030      .000     46.95      9.15
   .001681       10.        10.        12.          8         20         0    -10.99    140.85    150.00

CCHV=     .100 CEHV=     .300
1490 NH CARD USED
*SECNO  .307

3301 HV CHANGED MORE THAN HVINS

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .60

3470 ENCROACHMENT STATIONS=       11.2     117.7  TYPE=      1  TARGET=      106.530
      .307      8.89      56.89      56.26      56.20      58.84      1.95       .21       .33 100000.00
    6600.0        .0    4524.7     2075.3         .0      373.3     233.2     100.4      12.3     52.24
       .18       .00      12.12       8.90       .000       .029      .030      .000     48.00     11.20
   .004732       79.        81.        80.          3         19         0       .00    106.53    117.73

1490 NH CARD USED
*SECNO  .320

3470 ENCROACHMENT STATIONS=       10.5     109.8  TYPE=      1  TARGET=       99.330
      .320      8.42      57.12      56.56      56.37      59.25      2.13       .36       .05 100000.00
    6600.0        .0    4414.5     2185.5         .0      350.4     226.4     101.4      12.5     52.10
       .18       .00      12.60       9.65       .000       .028      .030      .000     48.70     10.52
   .005060       68.        73.        74.          0         15         0       .00     99.33    109.85

1490 NH CARD USED
1
   31JUL96      10:56:21                                                                                    PAGE   23

    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  .322

 3301 HV CHANGED MORE THAN HVINS


 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.43


 3470 ENCROACHMENT STATIONS=       35.0     125.0  TYPE=      1  TARGET=       90.000
      .322      9.46     58.36     54.82     57.40     59.39      1.03       .02       .11 100000.00
    6600.0        .0    6600.0        .0        .0     812.0        .0     101.5      12.5 100000.00
      .18       .00      8.13       .00      .000      .035      .000      .000     48.90     35.00
   .002489        7.        7.        7.         3        19         0       .00     90.00    125.00


 1490 NH CARD USED
 *SECNO  .336

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.62


 3470 ENCROACHMENT STATIONS=       35.0     125.0  TYPE=      1  TARGET=       90.000
      .336      9.49     58.49     54.84     57.52     59.49      1.00       .11       .00 100000.00
    6600.0        .0    6600.0        .0        .0     822.1        .0     102.9      12.6 100000.00
      .18       .00      8.03       .00      .000      .022      .000      .000     49.00     35.00
   .000945       62.       73.       53.         2        14         0       .00     90.00    125.00


 1490 NH CARD USED
 *SECNO  .344

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


 3470 ENCROACHMENT STATIONS=      135.0     225.0  TYPE=      1  TARGET=       90.000
      .344      8.96     58.50     55.18     57.49     59.58      1.08       .06       .02 100000.00
    6600.0        .0    6600.0        .0        .0     792.5        .0     103.7      12.7 100000.00
      .19       .00      8.33       .00      .000      .030      .000      .000     49.54    135.00
   .001972       44.       45.       56.         2        14         0       .00     90.00    225.00


 *SECNO  .352
1
    31JUL96      10:56:21                                                                          PAGE    24

    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

3470 ENCROACHMENT STATIONS=      200.0     339.0  TYPE=      1  TARGET=      139.000
      .352      4.79     61.31     61.31     60.79     63.39      2.08       .16       .30     58.75
    6600.0        .0    6600.0        .0        .0     570.2        .0     104.3      12.8 100000.00
      .19       .00     11.58       .00      .000      .035      .000      .000     56.52    200.00
   .012003       39.       41.       43.         0        11         0       .00    139.00    339.00


*SECNO  .356

3470 ENCROACHMENT STATIONS=      212.0     352.0  TYPE=      1  TARGET=      140.000
      .356      5.26     61.89     61.52     61.81     63.63      1.73       .20       .03     58.30
    6600.0     224.1    6352.3      23.7      27.5     596.4       4.9     104.6      12.9     59.40
      .19      8.16     10.65      4.84      .030      .035      .030      .000     56.63    212.00
   .008267       26.       20.       18.         5         5         0       .00    140.00    352.00


*SECNO  .361

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      220.0     334.0  TYPE=      1  TARGET=      114.000
      .361      5.54     62.61     62.61     62.37     64.98      2.38       .26       .19     58.72
    6600.0        .0    6600.0        .0        .0     533.5        .0     105.0      13.0 100000.00
      .19       .00     12.37       .00      .000      .035      .000      .000     57.07    220.00
   .011738       24.       27.       30.         0         8         0       .00    114.00    334.00


*SECNO  .370
3280 CROSS SECTION       .37 EXTENDED       .20 FEET

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      205.0     320.0  TYPE=      1  TARGET=      115.000
1
   31JUL96      10:56:21                                                                                                    PAGE   25

    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
```

```
      .370      5.39     63.03     63.03     62.71     65.38      2.35       .22       .00     58.88
    6600.0     816.9    5783.1        .0      81.5     458.9        .0     105.6      13.1 100000.00
      .19     10.02     12.60       .00      .016      .016      .000      .000     57.64    205.00
   .002358       50.       50.       48.         0         8         0       .00    115.00    320.00


*SECNO  .373
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      185.0     355.0  TYPE=      1  TARGET=      170.000
      .373      6.82     64.04     64.04     63.45     65.90      1.86       .03       .05     57.55
    6600.0    2375.6    4166.6      57.8     197.7     401.7      15.9     105.8      13.1     63.22
      .19     12.01     10.37      3.63      .016      .016      .016      .000     57.22    185.00
   .002185       12.       13.       14.         0        11         0       .00    170.00    355.00


*SECNO  .460
3280 CROSS SECTION       .46 EXTENDED       .06 FEET


3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=      793.0     923.0  TYPE=      1  TARGET=      130.000
      .460      5.76     66.06     66.06     65.53     68.42      2.36      1.85       .15     62.00
    5900.0     794.6    4994.5     110.9     184.8     375.7      31.7     111.6      14.6     62.00
      .20      4.30     13.29      3.50      .100      .040      .100      .000     60.30    793.00
   .014957      440.      420.      400.         0        15         0       .00    130.00    923.00


*SECNO  .510

3301 HV CHANGED MORE THAN HVINS


3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  1.41


3470 ENCROACHMENT STATIONS=     1922.0    1995.0  TYPE=      1  TARGET=       73.000
      .510      8.84     72.84     70.22     70.44     74.25      1.41      5.74       .10     66.00
    5900.0        .0    5900.0        .0        .0     618.2        .0     119.5      15.9 100000.00
      .22       .00      9.54       .00      .000      .050      .000      .000     64.00   1922.00
   .007549      650.      550.      450.         3         8         0       .00     73.00   1995.00
```



```
SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
```

```
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST

*SECNO  .710

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS=     1635.0    1840.0  TYPE=      1  TARGET=      205.000
      .710      9.65     79.65     77.42     78.72     80.54       .89      6.23       .05     74.00
    5900.0     461.9    4909.4     528.7     275.3     594.7     302.2     139.2      18.8     74.00
       .26      1.68      8.26      1.75      .160      .050      .160      .000     70.00   1635.00
   .004920      700.     1060.      800.         3        15         0       .00    205.00   1840.00

1
PROFILE FOR STREAM   CANYON WASH 100 YR REVI


PLOTTED POINTS (BY PRIORITY) E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA


ELEVATION    36.       41.       46.       51.       56.       61.       66.       71.       76.       81.
    SECNO   CUMDIS

      .00      0.  .         .  I     C  WEM   .         .         .         .         .         .         .         L
      .00     20.  .I      C .         .   EM   .         .         .         .         .         .         .         L
              40.  .I      C .         .   E M  .         .         .         .         .         .         .         L
              60.  .I      C .         .   E  M .         .         .         .         .         .         .         L
              80.  .I      C .         .   E   M.         .         .         .         .         .         .         L
             100.  .I      C .         .   E    M         .         .         .         .         .         .         L
             120.  .I      C .         .   E    .M        .         .         .         .         .         .         L
      .03    140.  .I      C .         .   E    . M       .         .         .         .         .         .         L
             160.  .I     C  .         .   E    .  M      .         .         .         .         .         .         L
             180.  .I     C  .         .   E    .  M      .         .         .         .         .         .         L
             200.  .I     C  .         .   E    .  M      .         .         .         .         .         .         L
             220.  I      C  .         .   E    .  M      .         .         .         .         .         .         L
             240.  I      C  .         .   E    .   M     .         .         .         .         .         .         L
             260.  I      C  .         .   E    .   M     .         .         .         .         .         .         L
      .05    280.  I      C  .         .   E    .   M     .         .         .         .         .         .         L
             300.  I      C  .         .   E    .   M     .         .         .         .         .         .         L
             320.  I      C  .         .   E    .   M     .         .         .         .         .         .         L
             340.  I      C  .         .   E    .   M     .         .         .         .         .         .         L
             360.  I      C  .         .   E    .   M     .         .         .         .         .         .         L
             380.  I      C  .         .   E    .   M     .         .         .         .         .         .         L
             400.  I      C  .         .   E    .   M     .         .         .         .         .         .         L
             420.  I      C  .         .   E    .    M    .         .         .         .         .         .         L
      .08    440.  I      C  .         .   E    .    M    .         .         .         .         .         .         L
             460.  I      C  .         .   E    .    M    .         .         .         .         .         .         L
             480.  I      C  .         .   E    .   M     .         .         .         .         .         .         L
             500.  I      C  .         .   E    .   M     .         .         .         .         .         .         L
```

```
      520.  I      C .         .   E    .  M     .         .         .         .         .         L
      540.  I      C .         .   E    .  M     .         .         .         .         .         L
      560.  I      C .         .   E    .  M     .         .         .         .         .         L
      580.  I      C .         .   E    .  M     .         .         .         .         .         L
      600.  I     C  .         .   E    .  M     .         .         .         .         .         L
.12   620.  I     C  .         .   E    .  M     .         .         .         .         .         L
      640.  I      C .         .   E    .  M     .         .         .         .         .         L
      660.  I      C .         .   E    .  M     .         .         .         .         .         L
      680.  .I     C .         .   E    .  M     .         .         .         .         .         L
      700.  .I     C .         .   E    .  M     .         .         .         .         .         L
      720.  .I     C .         .   E    .  M     .         .         .         .         .         L
.14   740.  .I      C .        .   E    .  M     .         .         .         .         .         L
      760.  .I      C .        .   E    .  M     .         .         .         .         .         L
      780.  .I      C .        .   E    .  M     .         .         .         .         .         L
      800.  .I      C .        .   E    .   M    .         .         .         .         .         L
      820.  .I      C .        .   E    .   M    .         .         .         .         .         L
      840.  .I      C .        .   E    .   M    .         .         .         .         .         L
      860.  .I      C .        .   E    .   M    .         .         .         .         .         L
      880.  .I      C .        .   E    .   M    .         .         .         .         .         L
      900.  .I      C .        .   E    .   M    .         .         .         .         .         L
.17   920.  .I      C .        .   E    .   M    .         .         .         .         .         L
.18   940.  .   I     .        . R  W  E.     M  .         .         .         .         .         L
      960.  .    I    .        .   R W  .E    M  .         .         .         .         .         L
      980.  .     I   .        .      RW. E   M  .         .         .         .         .         L
.19  1000.  .     I   .        .        W  E   M .         .         .         .         .         L
.19  1020.  C     I   .        .        .RW E  M .         .         .         .         .         L
     1040.  C      I  .        .       R.  WE  M .         .         .         .         .         L
     1060.  C       I .        .      R .  WE   M.         .         .         .         .         L
     1080.  C        I.        .    R   .  WE   M.         .         .         .         .         L
.21  1100.  .         .I       .   R    C.  WE    M.       .         .         .         .         .
     1120.  .         .I       .   R    C.  WE    M.       .         .         .         .         L
     1140.  .         .I       .    R    C  WE     M       .         .         .         .         L
     1160.  .         . I      .    R    C  WE     M       .         .         .         .         L
     1180.  .         . I      .    R    C  WE     M       .         .         .         .         L
     1200.  .         .  I     .    R    C  W E    .M      .         .         .         .         L
     1220.  .         .  I     .    R    C  W E    .M      .         .         .         .         L
     1240.  .         .   I    .    R    C  W E    .M      .         .         .         .         L
.24  1260.  .         .   I    .     R   .C W E    . M     .         .         .         .         L
.24  1280.  .         .   I    .         . R   W  E.  M    .         .         .         .         L
.25  1300.  .         .    I   .         .    R  W . EM    .         .         .         .         L
.25  1320.  C         .    I   .         .        R. WE  M .         .         .         .         L
     1340.  C         .     I  .         .      R  . WE  M .         .         .         .         L
     1360.  C         .      I .         .     R   . WE  M .         .         .         .         L
     1380.  C         .      I .         .    R    . W E M .         .         .         .         L
     1400.  .         .   C  I .         .  R       . W E M .         .         .         .         L
.27  1420.  .         .       I.         . R    C  . W E M .         .         .         .         L
     1440.  .         .       I.         . R    C  . W E  M .        .         .         .         L
     1460.  .         .        I         . R     C . W E  M .        .         .         .         L
     1480.  .         .        I         . R     C . W E   M .       .         .         .         L
     1500.  .         .        .I        . R     C . W E   M .       .         .         .         L
     1520.  .         .        .I        . R     C . W E    M.       .         .         .         L
.29  1540.  .         .        . I       . R      C. W E    M.       .         .         .         L
.29  1560.  .         .        . I       . R     C .  W E   M.       .         .         .         L
     1580.  .         .        . I       . R      C.  W E  M .       .         .         .         L
```

```
     1600.  .         .         . I      . R      C. W  E  M .         .         .         .         .         L
.31  1620.  .         .         .  I     . R       .CW   E   .         .         .         .         .         L
     1640.  .         .         .  I     . R       .CW   E   .         .         .         .         .         L
     1660.  .         .         .   I    . R       .CW   E   .         .         .         .         .         L
     1680.  .         .         .   I    . R       .CW   E   .         .         .         .         .         L
.32  1700.  .         .         .   I    . R       .CW    E  .         .         .         .         .         L
.32  1720.  .         .         .    I   .       C .    W E  .         .         .         .         .         L
     1740.  .         .         .    I   .       C .    W E  .         .         .         .         .         L
     1760.  .         .         .    I   .       C .    W E  .         .         .         .         .         L
.34  1780.  .         .         .    I   .       C .    W E  .         .         .         .         .         L
     1800.  .         .         .    I   .       C .    W E M.         .         .         .         .         L
.34  1820.  .         .         .     I  .       C .    W E  M         .         .         .         .         L
     1840.  .         .         .        .   I     .   C   W ME        .         .         .         .         L
.35  1860.  .         .         .        .         .I    L   .W   E    .         .         .         .         R
.36  1880.  .         .         .        .         .I   L R  .CW  E    .         .         .         .         .
     1900.  .         .         .        .         . I  L    .  W   E  .         .         .         .         R
.36  1920.  .         .         .        .         . I  L    .  WM   E .         .         .         .         R
     1940.  .         .         .        .         .  I  L   .  W   E .         .         .         .         R
.37  1960.  .         .         .        .         .  I  L   .  W    E.         .         .         .         R
.37  1980.  .         .         .        .         . IL      .  R W   E         .         .         .         .
     2000.  .         .         .        .         .  IL     .  R W   E         .         .         .         .
     2020.  .         .         .        .         .  IL     .  R W   E         .         .         .         .
     2040.  .         .         .        .         .  IL     .  R  W  .E        .         .         .         .
     2060.  .         .         .        .         .   IL    .  R  W  .E        .         .         .         .
     2080.  .         .         .        .         .   IL    .  R  W  .E        .         .         .         .
     2100.  .         .         .        .         .   I L   .  R  W  .E        .         .         .         .
     2120.  .         .         .        .         .   I L   .  R  W  .E        .         .         .         .
     2140.  .         .         .        .         .    IL   .  R   W . E       .         .         .         .
     2160.  .         .         .        .         .    I L  . R    W . E       .         .         .         .
     2180.  .         .         .        .         .    I L  . R    W . E       .         .         .         .
     2200.  .         .         .        .         .     I L . R    W . E       .         .         .         .
     2220.  .         .         .        .         .     I L . R    W .  E      .         .         .         .
     2240.  .         .         .        .         .     I  L. R     W.  E      .         .         .         .
     2260.  .         .         .        .         .      I L. R     W.  E      .         .         .         .
     2280.  .         .         .        .         .      I L. R     W.  E      .         .         .         .
     2300.  .         .         .        .         .      I  L R     W.   E     .         .         .         .
     2320.  .         .         .        .         .      I  L R     W.   E     .         .         .         .
     2340.  .         .         .        .         .       I .LR     MW   E     .         .         .         .
     2360.  .         .         .        .         .       I .LR      W   E     .         .         .         .
     2380.  .         .         .        .         .       I . L      W    E    .         .         .         .
.46  2400.  .         .         .        .         .        I. L      W    E    .         .         .         .
     2420.  .         .         .        .         .        I. L      CW   E    .         .         .         R
     2440.  .         .         .        .         .        I.  L     .WM   E    .         .         .         R
     2460.  .         .         .        .         .        I.  L     .CWM  E    .         .         .         R
     2480.  .         .         .        .         .         I  L     .CW M  E   .         .         .         R
     2500.  .         .         .        .         .         I  L     . CW M E   .         .         .         R
     2520.  .         .         .        .         .         I   L    . CW  ME   .         .         .         R
     2540.  .         .         .        .         .         I   L    . C W  ME  .         .         .         R
     2560.  .         .         .        .         .         .I  L    .  CW   E  .         .         .         R
     2580.  .         .         .        .         .         .I   L   .  C W   E.         .         .         R
     2600.  .         .         .        .         .         .I   L   .  C W   EM         .         .         R
     2620.  .         .         .        .         .         . I  L   .  C  W   EM        .         .         R
     2640.  .         .         .        .         .         . I  L   .   C W   E M      .         .         R
     2660.  .         .         .        .         .         . I   L  .   C  W  E  M     .         .         R
```

```
     2680.  .         .         .         .         .         . I   L   .   C  W  .E  M     .         .         R
     2700.  .         .         .         .         .         .  I  L   .    C  W .E   M    .         .         R
     2720.  .         .         .         .         .         .  I   L  .    C  W . E   M   .         .         R
     2740.  .         .         .         .         .         .  I   L  .    C   W. E    M  .         .         R
     2760.  .         .         .         .         .         .  I   L  .     C  W. E     M .         .         R
     2780.  .         .         .         .         .         .   I   L .     C  W.  E     M.         .         R
     2800.  .         .         .         .         .         .   I   L .     C   W  E      M         .         R
     2820.  .         .         .         .         .         .   I   L .     C   W   E     .M         .         R
     2840.  .         .         .         .         .         .    I  L .      C  .W  E     . M         .         R
     2860.  .         .         .         .         .         .    I   L.      C  .W   E    .  M         .         R
     2880.  .         .         .         .         .         .    I   L.      C  . W  E    .   M         .         R
     2900.  .         .         .         .         .         .    I   L.       C . W  E    .    M         .         R
     2920.  .         .         .         .         .         .     I   L       C .  W  E   .     M         .         R
.51  2940.  .         .         .         .         .         .     I   L       C .   W  E  .       M .         R
     2960.  .         .         .         .         .         .     I   L        C.   W  E  .       M .         R
     2980.  .         .         .         .         .         .     I   .L       C.   W  E  .       M .         R
     3000.  .         .         .         .         .         .      I  .L       C.   W  E  .       M .         R
     3020.  .         .         .         .         .         .      I  .L        C    W E  .       M .         R
     3040.  .         .         .         .         .         .      I  . L       C    W  E .       M .         R
     3060.  .         .         .         .         .         .      I  . L       C    W  E .       M .         R
     3080.  .         .         .         .         .         .       I . L       C    W  E .       M .         R
     3100.  .         .         .         .         .         .       I . L       .C    W E .       M .         R
     3120.  .         .         .         .         .         .       I .  L      .C    W  E.       M .         R
     3140.  .         .         .         .         .         .       I .  L      .C    W  E.       M .         R
     3160.  .         .         .         .         .         .       I .  L      .C     W E.       M .         R
     3180.  .         .         .         .         .         .        I.   L     . C    W E.       M .         R
     3200.  .         .         .         .         .         .        I.   L     . C    W  E       M .         R
     3220.  .         .         .         .         .         .        I.   L     . C    W  E       M .         R
     3240.  .         .         .         .         .         .        I.    L    .  C    W E       M .         R
     3260.  .         .         .         .         .         .         I    L    .  C    W E       M .         R
     3280.  .         .         .         .         .         .         I    L    .  C    W .E      M .         R
     3300.  .         .         .         .         .         .         I    L    .  C    W .E      M .         R
     3320.  .         .         .         .         .         .         I     L   .   C    W.E      M .         R
     3340.  .         .         .         .         .         .         .I    L   .   C    W.E      M .         R
     3360.  .         .         .         .         .         .         .I    L   .   C    W.E      M .         R
     3380.  .         .         .         .         .         .         .I     L  .   C    W. E     M .         R
     3400.  .         .         .         .         .         .         .I     L  .    C    W E     M .         R
     3420.  .         .         .         .         .         .         .I     L  .    C    W E     M .         R
     3440.  .         .         .         .         .         .         . I     L .    C    W E     M .         R
     3460.  .         .         .         .         .         .         . I     L .     C   W  E    M .         R
     3480.  .         .         .         .         .         .         . I     L .     C   .W E    M .         R
     3500.  .         .         .         .         .         .         . I     L .     C   .W E    M .         R
     3520.  .         .         .         .         .         .         .  I     L.     C   .W E    M .         R
     3540.  .         .         .         .         .         .         .  I     L.      C  .W  E   M .         R
     3560.  .         .         .         .         .         .         .  I     L.      C  . W E   M .         R
     3580.  .         .         .         .         .         .         .  I      L      C  . W E   M .         R
     3600.  .         .         .         .         .         .         .  I      L      C  . W E   M .         R
     3620.  .         .         .         .         .         .         .   I     L       C . W  E  M .         R
     3640.  .         .         .         .         .         .         .   I     .L      C .  W E  M .         R
     3660.  .         .         .         .         .         .         .   I     .L      C .  W E  M .         R
     3680.  .         .         .         .         .         .         .   I     .L      C .  W E  M .         R
     3700.  .         .         .         .         .         .         .    I    .L       C.  W  E M .         R
     3720.  .         .         .         .         .         .         .    I    . L      C.   W E M .         R
     3740.  .         .         .         .         .         .         .    I    . L      C.   W E M .         R
```

```
          3760.  .         .         .         .         .         .         .    I    . L      C   W E M .         R
          3780.  .         .         .         .         .         .         .     I   .  L     C   W E M .         R
          3800.  .         .         .         .         .         .         .     I   .  L     C    W EM .         R
          3820.  .         .         .         .         .         .         .     I   .  L     C    W EM .         R
          3840.  .         .         .         .         .         .         .     I   .   L    .C   W EM .         R
          3860.  .         .         .         .         .         .         .     I   .   L    .C    WEM .         R
          3880.  .         .         .         .         .         .         .      I  .   L    .C    W E .         R
          3900.  .         .         .         .         .         .         .      I  .   L    .C    W E .         R
          3920.  .         .         .         .         .         .         .      I  .    L   . C   W E .         R
          3940.  .         .         .         .         .         .         .      I  .    L   . C    WE .         R
          3960.  .         .         .         .         .         .         .       I .    L   . C    WME.         R
          3980.  .         .         .         .         .         .         .       I .     L  .  C   WME.         R
      .71 4000.  .         .         .         .         .         .         .       I .     L  .  C   WME.         .
1
 PROFILE FOR STREAM   CANYON WASH 100 YR REVI


 PLOTTED POINTS (BY PRIORITY) E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA


 ELEVATION    36.       41.       46.       51.       56.       61.       66.       71.       76.       81.
     SECNO   CUMDIS

1
    31JUL96      10:56:21                                                                                    PAGE   27


                                                                                THIS RUN EXECUTED 31JUL96    10:56:26
 ************************************
  HEC-2 WATER SURFACE PROFILES

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


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


 ECHO CANYON WASH 100 YR

 SUMMARY PRINTOUT


       CWSEL     .01K     STENCL    STENCR    ELENCL    ELENCR    K*CHSL

       46.900    876.37      .00       .00       .00       .00       .00
       47.900   1306.34     8.41    248.85 100000.00 100000.00       .00

 *     47.776   5085.84      .00       .00       .00       .00   -350.00
 *     48.412   5635.51     4.20    278.06 100000.00 100000.00   -350.00
```

	47.814	6620.66	.00	.00	.00	.00	.00
	48.445	7354.20	31.63	349.90	100000.00	100000.00	.00
	47.848	7797.87	.00	.00	.00	.00	-4.80
	48.474	8669.57	18.92	399.92	100000.00	100000.00	-4.80
	47.872	9066.73	.00	.00	.00	.00	.60
	48.494	10052.21	9.54	435.17	100000.00	100000.00	.60
	47.892	10524.03	.00	.00	.00	.00	.00
	48.511	11651.71	17.09	502.04	100000.00	100000.00	.00
	47.891	8969.44	.00	.00	.00	.00	2.61
	48.511	10003.16	30.02	497.00	100000.00	100000.00	2.61
*	47.872	5817.08	.00	.00	.00	.00	1.72
*	48.492	6461.07	17.32	320.16	100000.00	100000.00	1.72
*	49.072	1035.47	.00	.00	.00	.00	36.67
*	49.028	1020.38	12.82	302.69	100000.00	100000.00	36.67
*	50.887	1047.32	.00	.00	.00	.00	24.07
*	50.877	1043.95	7.23	315.78	100000.00	100000.00	24.07
	52.172	1414.83	.00	.00	.00	.00	10.00
	52.156	1407.02	104.37	420.05	100000.00	100000.00	10.00

	CWSEL	.01K	STENCL	STENCR	ELENCL	ELENCR	K*CHSL
*	52.723	2096.02	.00	.00	.00	.00	24.14
*	52.715	2091.06	98.23	392.06	100000.00	100000.00	24.14
*	52.749	1400.04	.00	.00	.00	.00	10.71
*	52.742	1396.74	9.52	241.35	100000.00	100000.00	10.71
*	53.996	984.08	.00	.00	.00	.00	9.09
*	53.962	971.93	10.56	252.30	100000.00	100000.00	9.09
*	54.667	1004.10	.00	.00	.00	.00	12.50
*	54.830	845.76	25.94	148.37	100000.00	100000.00	12.50
*	56.090	1709.69	.00	.00	.00	.00	2.73
*	57.057	1732.22	205.20	372.07	100000.00	100000.00	2.73
	56.230	1728.62	.00	.00	.00	.00	18.33
	57.178	1735.61	13.56	170.57	100000.00	100000.00	18.33
	56.281	1488.75	.00	.00	.00	.00	12.17
	57.187	1470.20	21.72	155.03	100000.00	100000.00	12.17

	56.500	1632.45	.00	.00	.00	.00	5.00
	57.456	1609.92	9.15	150.00	100000.00	100000.00	5.00
*	56.196	1020.95	.00	.00	.00	.00	12.96
*	56.889	959.46	11.20	117.73	100000.00	100000.00	12.96
	56.366	970.26	.00	.00	.00	.00	9.59
	57.124	927.82	10.52	109.85	100000.00	100000.00	9.59
*	57.405	1535.09	.00	.00	.00	.00	28.57
*	58.360	1323.04	35.00	125.00	100000.00	100000.00	28.57
	57.516	2004.81	.00	.00	.00	.00	1.37
*	58.493	2146.48	35.00	125.00	100000.00	100000.00	1.37
	57.488	1530.47	.00	.00	.00	.00	12.00
*	58.499	1486.11	135.00	225.00	100000.00	100000.00	12.00
*	60.789	727.46	.00	.00	.00	.00	170.24
*	61.312	602.41	200.00	339.00	100000.00	100000.00	170.24
*	61.812	892.48	.00	.00	.00	.00	5.50
	61.894	725.89	212.00	352.00	100000.00	100000.00	5.50
*	62.370	808.38	.00	.00	.00	.00	16.30
*	62.606	609.18	220.00	334.00	100000.00	100000.00	16.30
*	62.707	1901.33	.00	.00	.00	.00	11.40
*	63.026	1359.30	205.00	320.00	100000.00	100000.00	11.40

	CWSEL	.01K	STENCL	STENCR	ELENCL	ELENCR	K*CHSL
*	63.445	1399.22	.00	.00	.00	.00	-32.31
*	64.038	1412.00	185.00	355.00	100000.00	100000.00	-32.31
*	65.527	644.54	.00	.00	.00	.00	7.33
*	66.057	482.43	793.00	923.00	100000.00	100000.00	7.33
	70.435	573.76	.00	.00	.00	.00	6.73
*	72.839	679.05	1922.00	1995.00	100000.00	100000.00	6.73
	78.722	744.92	.00	.00	.00	.00	5.66
	79.649	841.12	1635.00	1840.00	100000.00	100000.00	5.66

ECHO CANYON WASH 100 YR

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	.000	.00	.00	.00	42.90	6600.00	46.90	46.06	47.78	56.72	7.54	874.85	876.37
	.000	.00	.00	.00	42.90	6600.00	47.90	46.06	48.44	25.53	5.92	1115.29	1306.34
*	.003	18.00	.00	.00	36.60	6600.00	47.78	40.00	47.87	1.68	2.48	2659.42	5085.84
*	.003	18.00	.00	.00	36.60	6600.00	48.41	40.01	48.50	1.37	2.33	2833.48	5635.51
	.026	118.00	.00	.00	36.60	6600.00	47.81	39.79	47.89	.99	2.19	3007.75	6620.66
	.026	118.00	.00	.00	36.60	6600.00	48.44	39.78	48.51	.81	2.06	3208.51	7354.20
	.049	125.00	.00	.00	36.00	6600.00	47.85	39.56	47.90	.72	1.85	3562.12	7797.87
	.049	125.00	.00	.00	36.00	6600.00	48.47	39.56	48.52	.58	1.74	3800.92	8669.57
	.081	167.00	.00	.00	36.10	6600.00	47.87	39.36	47.91	.53	1.62	4075.29	9066.73
	.081	167.00	.00	.00	36.10	6600.00	48.49	39.35	48.53	.43	1.52	4340.59	10052.21
	.117	191.00	.00	.00	36.10	6600.00	47.89	39.21	47.92	.39	1.41	4694.13	10524.03
	.117	191.00	.00	.00	36.10	6600.00	48.51	39.23	48.54	.32	1.32	4994.80	11651.71
	.139	115.00	.00	.00	36.40	6600.00	47.89	39.80	47.93	.54	1.57	4199.03	8969.44
	.139	115.00	.00	.00	36.40	6600.00	48.51	39.81	48.54	.44	1.47	4487.75	10003.16
*	.172	174.00	.00	.00	36.70	6600.00	47.87	40.20	47.96	1.29	2.36	2801.98	5817.08
*	.172	174.00	.00	.00	36.70	6600.00	48.49	40.22	48.57	1.04	2.21	2989.87	6461.07
*	.178	30.00	.00	.00	37.80	6600.00	49.07	49.07	50.64	40.63	10.58	785.66	1035.47
*	.178	30.00	.00	.00	37.80	6600.00	49.03	49.03	50.64	41.84	10.71	772.94	1020.38
*	.188	54.00	.00	.00	39.10	6600.00	50.89	50.89	52.31	39.71	10.20	819.06	1047.32
*	.188	54.00	.00	.00	39.10	6600.00	50.88	50.88	52.31	39.97	10.23	815.97	1043.95
	.190	10.00	51.40	48.10	39.20	6600.00	52.17	.00	52.91	21.76	7.81	1103.08	1414.83
	.190	10.00	51.40	48.10	39.20	6600.00	52.16	.00	52.90	22.00	7.85	1098.16	1407.02
*	.206	87.00	.00	.00	41.30	6600.00	52.72	50.61	53.07	9.92	5.49	1443.02	2096.02
*	.206	87.00	.00	.00	41.30	6600.00	52.72	50.60	53.06	9.96	5.50	1440.84	2091.06
*	.238	168.00	.00	.00	43.10	6600.00	52.75	51.26	53.40	22.22	7.23	1037.48	1400.04
*	.238	168.00	.00	.00	43.10	6600.00	52.74	51.27	53.40	22.33	7.25	1035.82	1396.74
*	.240	11.00	.00	.00	43.20	6600.00	54.00	54.00	55.54	44.98	10.77	761.99	984.08
*	.240	11.00	.00	.00	43.20	6600.00	53.96	53.96	55.54	46.11	10.88	753.67	971.93
*	.246	32.00	.00	.00	43.60	6600.00	54.67	54.67	56.10	43.20	10.70	784.07	1004.10
*	.246	32.00	.00	.00	43.60	6600.00	54.83	54.83	57.24	60.90	12.89	567.53	845.76
*	.248	11.00	55.40	52.10	43.63	6600.00	56.09	.00	56.59	14.90	6.37	1212.63	1709.69
*	.248	11.00	55.40	52.10	43.63	6600.00	57.06	.00	57.68	14.52	6.79	1068.45	1732.22

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	.268	102.00	.00	.00	45.50	6600.00	56.23	54.41	56.74	14.58	6.51	1202.18	1728.62
	.268	102.00	.00	.00	45.50	6600.00	57.18	54.60	57.84	14.46	6.99	1034.69	1735.61
	.289	115.00	60.60	60.60	46.90	6600.00	56.28	55.07	57.07	19.65	8.50	983.11	1488.75
	.289	115.00	60.60	60.60	46.90	6600.00	57.19	55.34	58.22	20.15	9.17	847.17	1470.20
	.291	10.00	60.50	60.60	46.95	6600.00	56.50	54.76	57.14	16.35	7.38	1070.94	1632.45
	.291	10.00	60.50	60.60	46.95	6600.00	57.46	55.14	58.29	16.81	8.05	924.84	1609.92
*	.307	81.00	.00	.00	48.00	6600.00	56.20	55.67	57.55	41.79	10.70	740.28	1020.95
*	.307	81.00	.00	.00	48.00	6600.00	56.89	56.26	58.84	47.32	12.12	606.56	959.46
	.320	73.00	.00	.00	48.70	6600.00	56.37	55.86	57.94	46.27	11.22	671.91	970.26
	.320	73.00	.00	.00	48.70	6600.00	57.12	56.56	59.25	50.60	12.60	576.83	927.82
*	.322	7.00	.00	.00	48.90	6600.00	57.40	54.14	58.05	18.48	6.47	1020.19	1535.09
*	.322	7.00	.00	.00	48.90	6600.00	58.36	54.82	59.39	24.89	8.13	812.00	1323.04
	.336	73.00	.00	.00	49.00	6600.00	57.52	54.22	58.16	10.84	6.43	1027.23	2004.81
*	.336	73.00	.00	.00	49.00	6600.00	58.49	54.84	59.49	9.45	8.03	822.12	2146.48
	.344	45.00	.00	.00	49.54	6600.00	57.49	54.61	58.26	18.60	7.04	937.22	1530.47
*	.344	45.00	.00	.00	49.54	6600.00	58.50	55.18	59.58	19.72	8.33	792.54	1486.11
*	.352	41.00	.00	.00	56.52	6600.00	60.79	60.79	61.76	82.31	9.01	943.82	727.46
*	.352	41.00	.00	.00	56.52	6600.00	61.31	61.31	63.39	120.03	11.58	570.19	602.41
*	.356	20.00	.00	.00	56.63	6600.00	61.81	61.81	62.75	54.69	8.55	952.65	892.48
	.356	20.00	.00	.00	56.63	6600.00	61.89	61.52	63.63	82.67	10.65	628.76	725.89
*	.361	27.00	.00	.00	57.07	6600.00	62.37	62.37	63.46	66.66	9.36	878.68	808.38
*	.361	27.00	.00	.00	57.07	6600.00	62.61	62.61	64.98	117.38	12.37	533.45	609.18
*	.370	50.00	.00	.00	57.64	6600.00	62.71	62.50	63.60	12.05	8.79	958.20	1901.33
*	.370	50.00	.00	.00	57.64	6600.00	63.03	63.03	65.38	23.58	12.60	540.48	1359.30
*	.373	13.00	.00	.00	57.22	6600.00	63.45	63.45	64.62	22.25	9.32	771.92	1399.22
*	.373	13.00	.00	.00	57.22	6600.00	64.04	64.04	65.90	21.85	10.37	615.33	1412.00
*	.460	420.00	.00	.00	60.30	5900.00	65.53	65.21	66.26	83.79	9.23	1545.37	644.54
*	.460	420.00	.00	.00	60.30	5900.00	66.06	66.06	68.42	149.57	13.29	592.28	482.43
	.510	550.00	.00	.00	64.00	5900.00	70.44	69.83	71.66	105.74	10.13	1179.34	573.76
*	.510	550.00	.00	.00	64.00	5900.00	72.84	70.22	74.25	75.49	9.54	618.24	679.05
	.710	1060.00	.00	.00	70.00	5900.00	78.72	77.73	79.60	62.73	8.58	1682.00	744.92
	.710	1060.00	.00	.00	70.00	5900.00	79.65	77.42	80.54	49.20	8.26	1172.21	841.12

1

ECHO CANYON WASH 100 YR

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	.000	6600.00	46.90	.00	.00	.00	240.44	.00
	.000	6600.00	47.90	1.00	.00	1.00	240.44	.00
*	.003	6600.00	47.78	.00	.88	.00	273.86	18.00
*	.003	6600.00	48.41	.64	.51	.64	273.86	18.00
	.026	6600.00	47.81	.00	.04	.00	318.27	118.00
	.026	6600.00	48.44	.63	.03	.63	318.27	118.00
	.049	6600.00	47.85	.00	.03	.00	381.00	125.00
	.049	6600.00	48.47	.63	.03	.63	381.00	125.00
	.081	6600.00	47.87	.00	.02	.00	425.63	167.00
	.081	6600.00	48.49	.62	.02	.62	425.63	167.00
	.117	6600.00	47.89	.00	.02	.00	484.96	191.00
	.117	6600.00	48.51	.62	.02	.62	484.95	191.00
	.139	6600.00	47.89	.00	.00	.00	466.98	115.00
	.139	6600.00	48.51	.62	.00	.62	466.98	115.00
*	.172	6600.00	47.87	.00	-.02	.00	302.84	174.00
*	.172	6600.00	48.49	.62	-.02	.62	302.84	174.00
*	.178	6600.00	49.07	.00	1.20	.00	289.87	30.00
*	.178	6600.00	49.03	-.04	.54	-.04	289.56	30.00
*	.188	6600.00	50.89	.00	1.82	.00	307.39	54.00
*	.188	6600.00	50.88	-.01	1.85	-.01	306.34	54.00
	.190	6600.00	52.17	.00	1.28	.00	315.74	10.00
	.190	6600.00	52.16	-.02	1.28	-.02	315.59	10.00
*	.206	6600.00	52.72	.00	.55	.00	293.87	87.00
*	.206	6600.00	52.72	-.01	.56	-.01	293.75	87.00
*	.238	6600.00	52.75	.00	.03	.00	231.85	168.00
*	.238	6600.00	52.74	-.01	.03	-.01	231.78	168.00
*	.240	6600.00	54.00	.00	1.25	.00	241.96	11.00
*	.240	6600.00	53.96	-.03	1.22	-.03	241.73	11.00
*	.246	6600.00	54.67	.00	.67	.00	232.83	32.00
*	.246	6600.00	54.83	.16	.87	.16	122.43	32.00

*	.248	6600.00	56.09	.00	1.42	.00	257.79	11.00
*	.248	6600.00	57.06	.97	2.23	.97	166.87	11.00

1

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	.268	6600.00	56.23	.00	.14	.00	252.42	102.00
	.268	6600.00	57.18	.95	.12	.95	157.01	102.00
	.289	6600.00	56.28	.00	.05	.00	203.31	115.00
	.289	6600.00	57.19	.91	.01	.91	133.31	115.00
	.291	6600.00	56.50	.00	.22	.00	212.95	10.00
	.291	6600.00	57.46	.96	.27	.96	140.85	10.00
*	.307	6600.00	56.20	.00	-.30	.00	173.81	81.00
*	.307	6600.00	56.89	.69	-.57	.69	106.53	81.00
	.320	6600.00	56.37	.00	.17	.00	144.33	73.00
	.320	6600.00	57.12	.76	.23	.76	99.33	73.00
*	.322	6600.00	57.40	.00	1.04	.00	150.22	7.00
*	.322	6600.00	58.36	.96	1.24	.96	90.00	7.00
	.336	6600.00	57.52	.00	.11	.00	152.43	73.00
*	.336	6600.00	58.49	.98	.13	.98	90.00	73.00
	.344	6600.00	57.49	.00	-.03	.00	141.41	45.00
*	.344	6600.00	58.50	1.01	.01	1.01	90.00	45.00
*	.352	6600.00	60.79	.00	3.30	.00	469.46	41.00
*	.352	6600.00	61.31	.52	2.81	.52	139.00	41.00
*	.356	6600.00	61.81	.00	1.02	.00	558.24	20.00
	.356	6600.00	61.89	.08	.58	.08	140.00	20.00
*	.361	6600.00	62.37	.00	.56	.00	422.94	27.00
*	.361	6600.00	62.61	.24	.71	.24	114.00	27.00
*	.370	6600.00	62.71	.00	.34	.00	476.64	50.00
*	.370	6600.00	63.03	.32	.42	.32	115.00	50.00
*	.373	6600.00	63.45	.00	.74	.00	391.06	13.00
*	.373	6600.00	64.04	.59	1.01	.59	170.00	13.00
*	.460	5900.00	65.53	.00	2.08	.00	785.79	420.00
*	.460	5900.00	66.06	.53	2.02	.53	130.00	420.00
	.510	5900.00	70.44	.00	4.91	.00	442.79	550.00
*	.510	5900.00	72.84	2.40	6.78	2.40	73.00	550.00

.710	5900.00	78.72	.00	8.29	.00	756.08	1060.00
.710	5900.00	79.65	.93	6.81	.93	205.00	1060.00

SUMMARY OF ERRORS AND SPECIAL NOTES

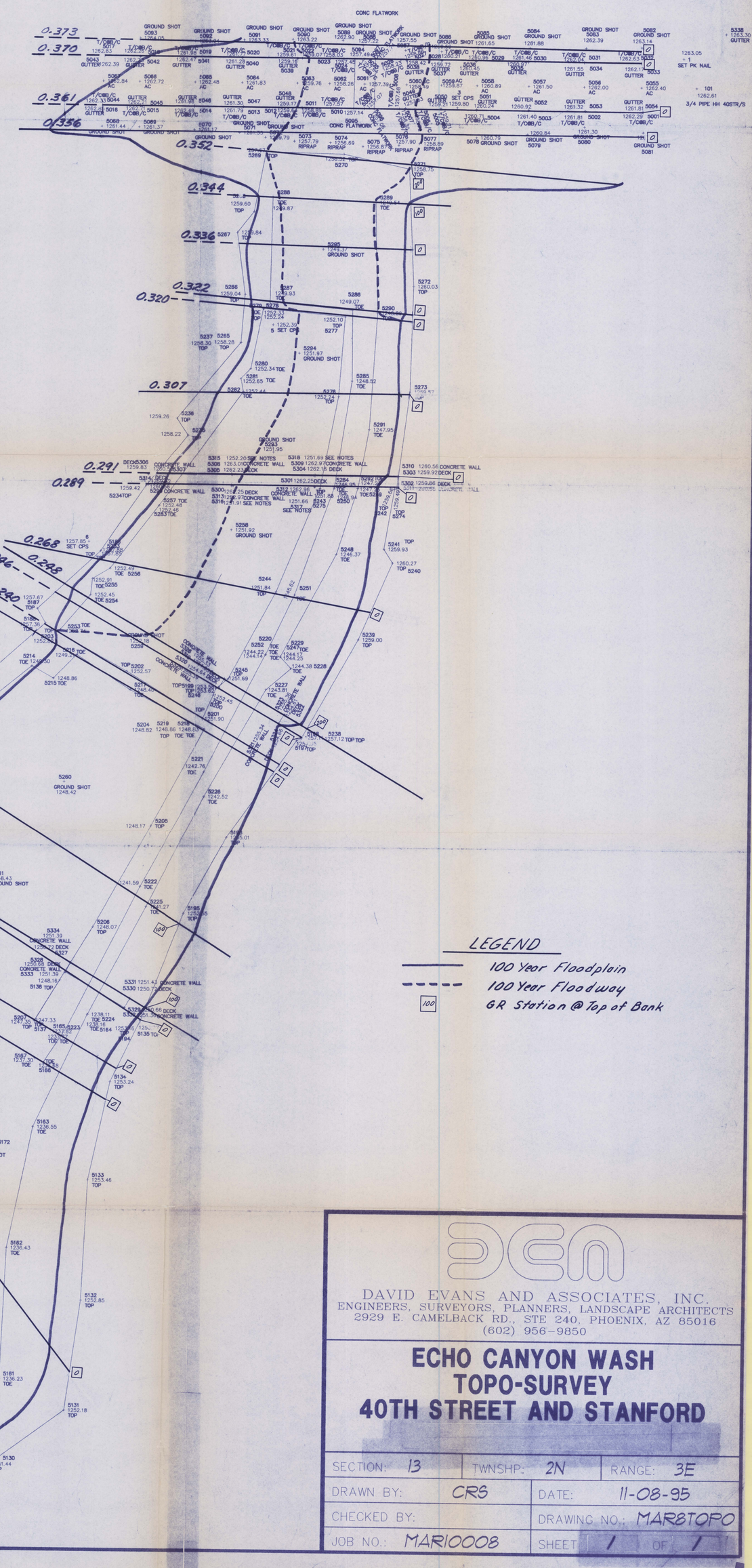
```
WARNING SECNO=      .003  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      .003  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      .172  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      .172  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=      .178  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      .178  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=      .178  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      .178  PROFILE=  2  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=      .188  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      .188  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=      .188  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      .188  PROFILE=  2  MINIMUM SPECIFIC ENERGY

WARNING SECNO=      .206  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      .206  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      .238  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      .238  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=      .240  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      .240  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=      .240  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      .240  PROFILE=  2  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=      .246  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      .246  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=      .246  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      .246  PROFILE=  2  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=      .248  PROFILE=  1  HYDRAULIC JUMP D.S.
WARNING SECNO=      .248  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
CAUTION SECNO=      .248  PROFILE=  2  HYDRAULIC JUMP D.S.
WARNING SECNO=      .248  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      .307  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
WARNING SECNO=      .307  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      .322  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
```

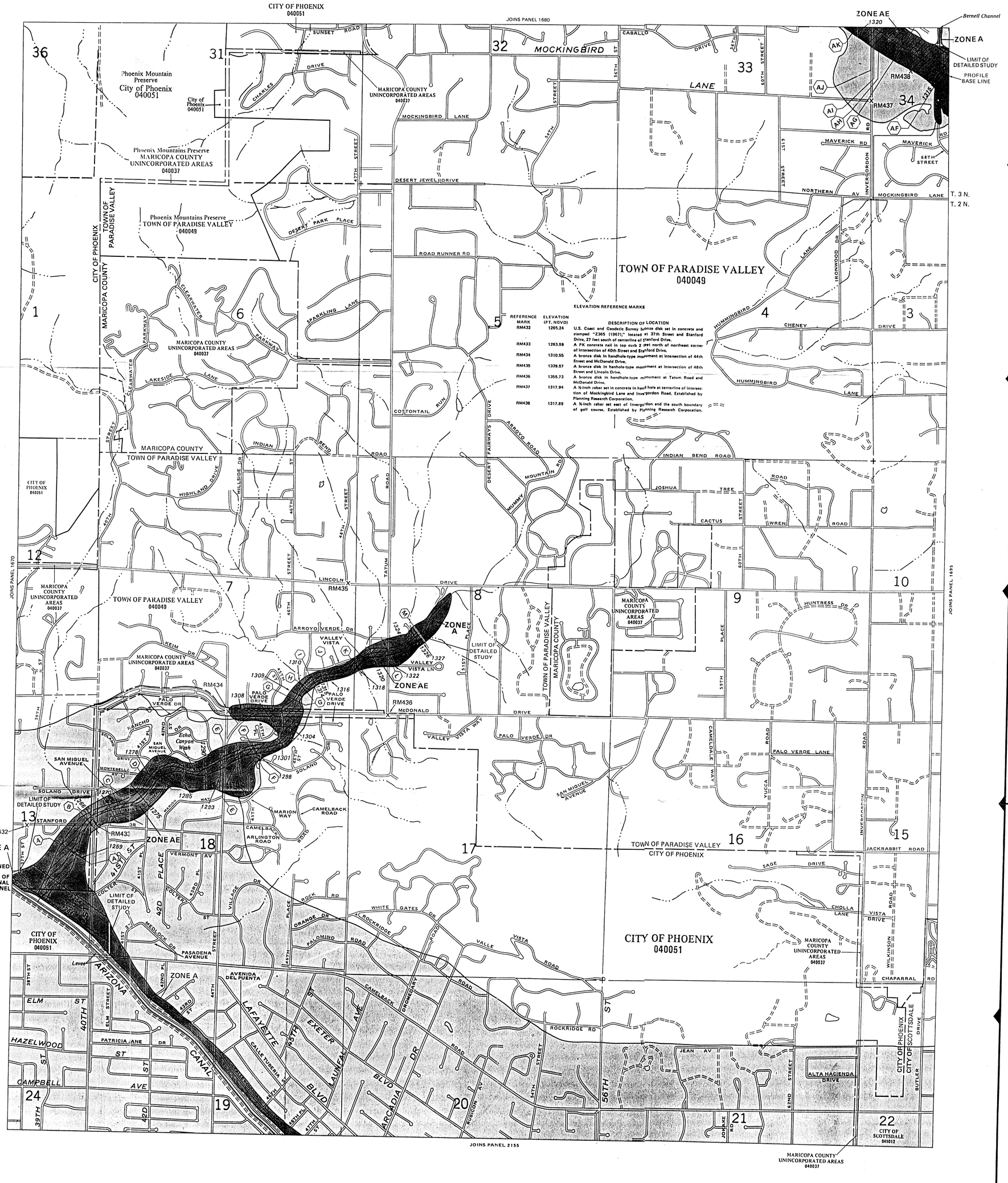
```
WARNING SECNO=       .322  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=       .336  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=       .344  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=       .352  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=       .352  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=       .352  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=       .352  PROFILE=  2  MINIMUM SPECIFIC ENERGY
1
   31JUL96      10:56:21                                                                    PAGE   35


CAUTION SECNO=       .356  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=       .356  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=       .361  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=       .361  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=       .361  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=       .361  PROFILE=  2  MINIMUM SPECIFIC ENERGY

WARNING SECNO=       .370  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
CAUTION SECNO=       .370  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=       .370  PROFILE=  2  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=       .373  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=       .373  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=       .373  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=       .373  PROFILE=  2  MINIMUM SPECIFIC ENERGY

WARNING SECNO=       .460  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
CAUTION SECNO=       .460  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=       .460  PROFILE=  2  MINIMUM SPECIFIC ENERGY

WARNING SECNO=       .510  PROFILE=  2  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

1
   31JUL96      10:56:21                                                                    PAGE   36


FLOODWAY DATA,   ECHO CANYON WASH 100 YR
PROFILE NO.  2

             ------- FLOODWAY -------      WATER SURFACE ELEVATION
  STATION    WIDTH    SECTION    MEAN      WITH    WITHOUT  DIFFERENCE
                       AREA    VELOCITY  FLOODWAY  FLOODWAY


      .000    240.      1115.     5.9       47.9      46.9      1.0
      .003    274.      2833.     2.3       48.4      47.8       .6
```

.026	318.	3209.	2.1	48.4	47.8	.6
.049	381.	3801.	1.7	48.4	47.8	.6
.081	426.	4341.	1.5	48.5	47.9	.6
.117	485.	4995.	1.3	48.5	47.9	.6
.139	467.	4488.	1.5	48.5	47.9	.6
.172	303.	2990.	2.2	48.5	47.9	.6
.178	290.	773.	8.5	49.1	49.1	.0
.188	309.	816.	8.1	50.9	50.9	.0
.190	316.	1098.	6.0	52.2	52.2	.0
.206	294.	1441.	4.6	52.7	52.7	.0
.238	232.	1036.	6.4	52.7	52.7	.0
.240	242.	754.	8.8	54.0	54.0	.0
.246	122.	568.	11.6	54.9	54.7	.2
.248	167.	1068.	6.2	57.1	56.1	1.0
.268	157.	1035.	6.4	57.1	56.2	.9
.289	133.	847.	7.8	57.2	56.3	.9
.291	141.	925.	7.1	57.5	56.5	1.0
.307	107.	607.	10.9	56.9	56.2	.7
.320	99.	577.	11.4	57.2	56.4	.8
.322	90.	812.	8.1	58.4	57.4	1.0
.336	90.	822.	8.0	58.5	57.5	1.0
.344	90.	793.	8.3	58.5	57.5	1.0
.352	139.	570.	11.6	61.3	60.8	.5
.356	140.	629.	10.5	61.9	61.8	.1
.361	114.	533.	12.4	62.6	62.4	.2
.370	115.	540.	12.2	63.0	62.7	.3
.373	170.	615.	10.7	64.0	63.4	.6
.460	130.	592.	10.0	66.0	65.5	.5
.510	73.	618.	9.5	72.8	70.4	2.4
.710	205.	1172.	5.0	79.6	78.7	.9

COORDINATES AND ELEVATION BASED ON U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS

OF ENGINEERS, SHEET 3 OF 90 PROJECT CONTROL DISTRICT FILE NOL 252-842.





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 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 flood plain.
- **ZONE D** Areas in which flood hazards are undetermined.

Flood 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*

D — D Cross Section Line

(EL 987) Base Flood Elevation in Feet Where Uniform Within Zone*

RM7X Elevation Reference Mark

*Referenced to the National Geodetic Vertical Datum of 1929

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.

Areas of special flood hazard (100-year flood) include Zones A, A1-30, AE, AH, AO, A99, V, V1-30 AND VE.

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. Floodway widths are provided in the Flood Insurance Study Report.

Coastal base flood elevations apply only landward of the shoreline.

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

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

For adjoining map panels see separately printed Map Index

MAP REPOSITORY
Refer to Repository Listing on Index Map

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

EFFECTIVE DATE (S) OF REVISION (S) TO THIS PANEL:

Map revised SEPTEMBER 30, 1995 to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to change zone designations, to add and update roads and road names, to reflect updated topographic information, to incorporate previously issued letters of map revision, and to incorporate previously issued letters of map amendment.

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
1000 0 1000

1690 E

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 1690 OF 4350

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY UNINCORPORATED AREAS	040037	1690	E
PARADISE VALLEY, TOWN OF	040049	1690	E
PHOENIX, CITY OF	040051	1690	E
SCOTTSDALE, CITY OF	045012	1690	E

MAP NUMBER
04013C1690 E

MAP REVISED:
SEPTEMBER 30, 1995

Federal Emergency Management Agency

SEC. 14, 13 T. 2 N. R. 3 E.

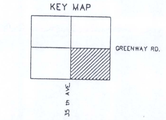
REGISTERED LAND SURVEYOR
16559
DANIEL L. KAMINSKI
ARIZONA U.S.A.

KAMINSKI HUBBARD engineering, inc.
SURVEYING • CIVIL • HYDROLOGY
4550 N. BLACK CANYON HWY., SUITE C
PHOENIX, ARIZONA 85017
(602) 242-5588

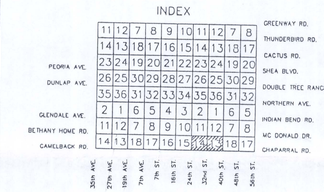
PHOTOGRAMMETRIC SURVEY CERTIFICATION

I, Daniel L. Kaminski, of KAMINSKI-HUBBARD Engineering, Inc., Arizona Registered Land Surveyor #16559, Certify That The Survey Control Used To Complete Photogrammetric Maps For This Project Is Correct And Accurate Within Contract Specifications.

KEY MAP



INDEX



DATE FLOWN : 11-15-1990

NORTH

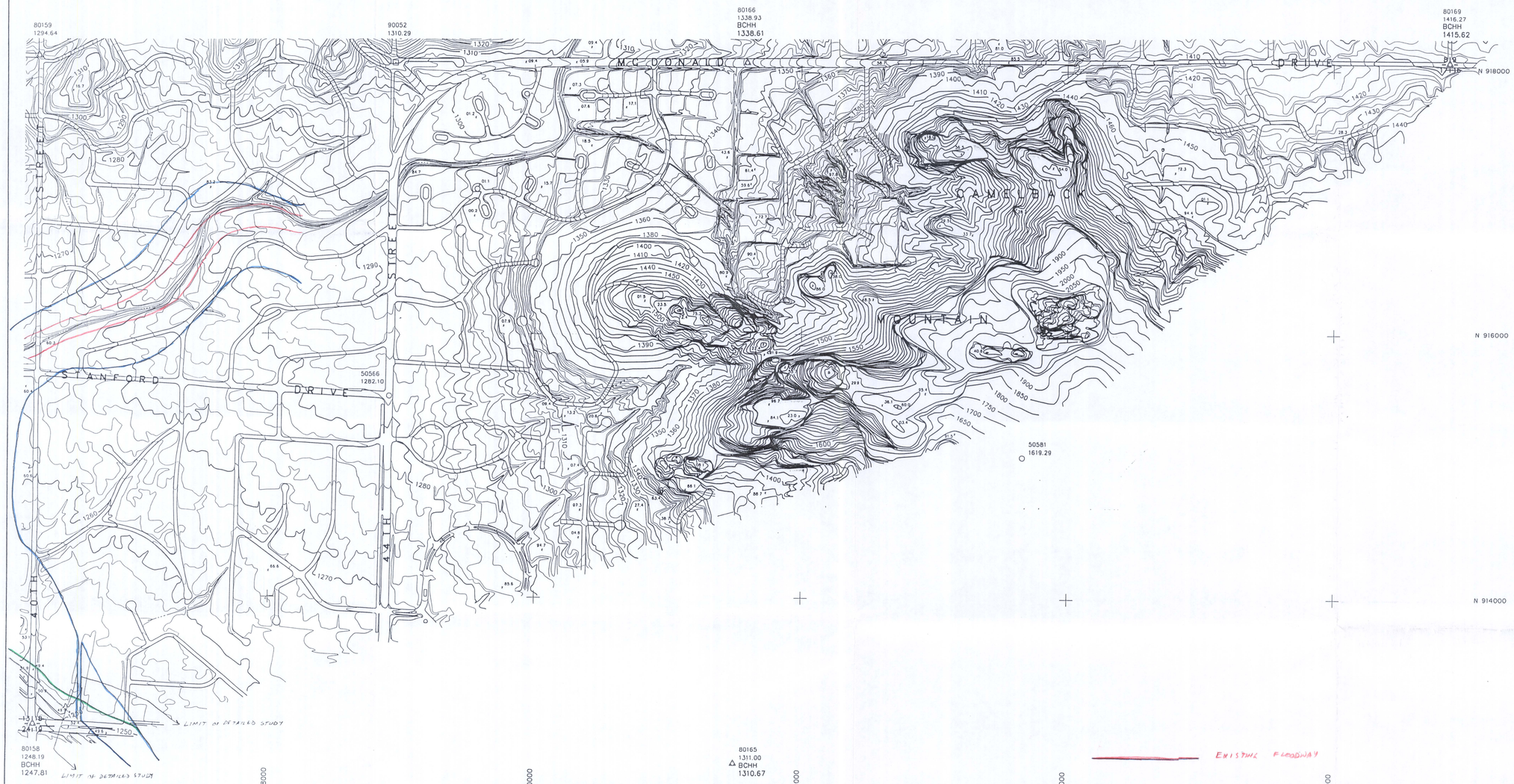
0 200' 400' 800'

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ARIZONA CANAL DIVERSION CHANNEL AREA DRAINAGE MASTER STUDY PHASE 1

DRN:	DATE:	SCALE:	JOB NO.	SHEET
DES:	DATE:	1" = 400' HORIZ.	0146	89 OF 111
CHD:	DATE:	1" = ___ VERT.		

KENNEY AERIAL MAPPING INC.
PHOENIX, ARIZONA



EXISTING FLOODWAY

EXISTING FLOODPLAIN

REVISED FLOODPLAIN

REVISED FLOODWAY

SEC. 18, 17 T. 2 N. R. 4 E.

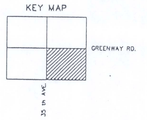
REGISTERED LAND SURVEYOR CERTIFICATE NO. 16559 DANIEL L. KAMINSKI MARICOPA, ARIZONA

KAMINSKI HUBBARD engineering, inc.
SURVEYING • CIVIL • HYDROLOGY
4550 N. BLACK CANYON HWY., SUITE C
PHOENIX, ARIZONA 85017
(602) 242-5588

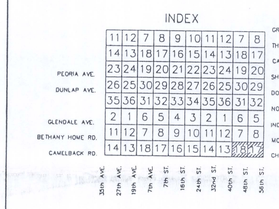
PHOTOGRAMMETRIC SURVEY CERTIFICATION

I, Daniel L. Kaminski, of KAMINSKI-HUBBARD Engineering, Inc., Arizona Registered Land Surveyor #16559, Certify That The Survey Control Used To Complete Photogrammetric Maps For This Project Is Correct And Accurate Within Contract Specifications.

KEY MAP



INDEX



DATE FLOWN : 8 - 23 - 1991

NORTH

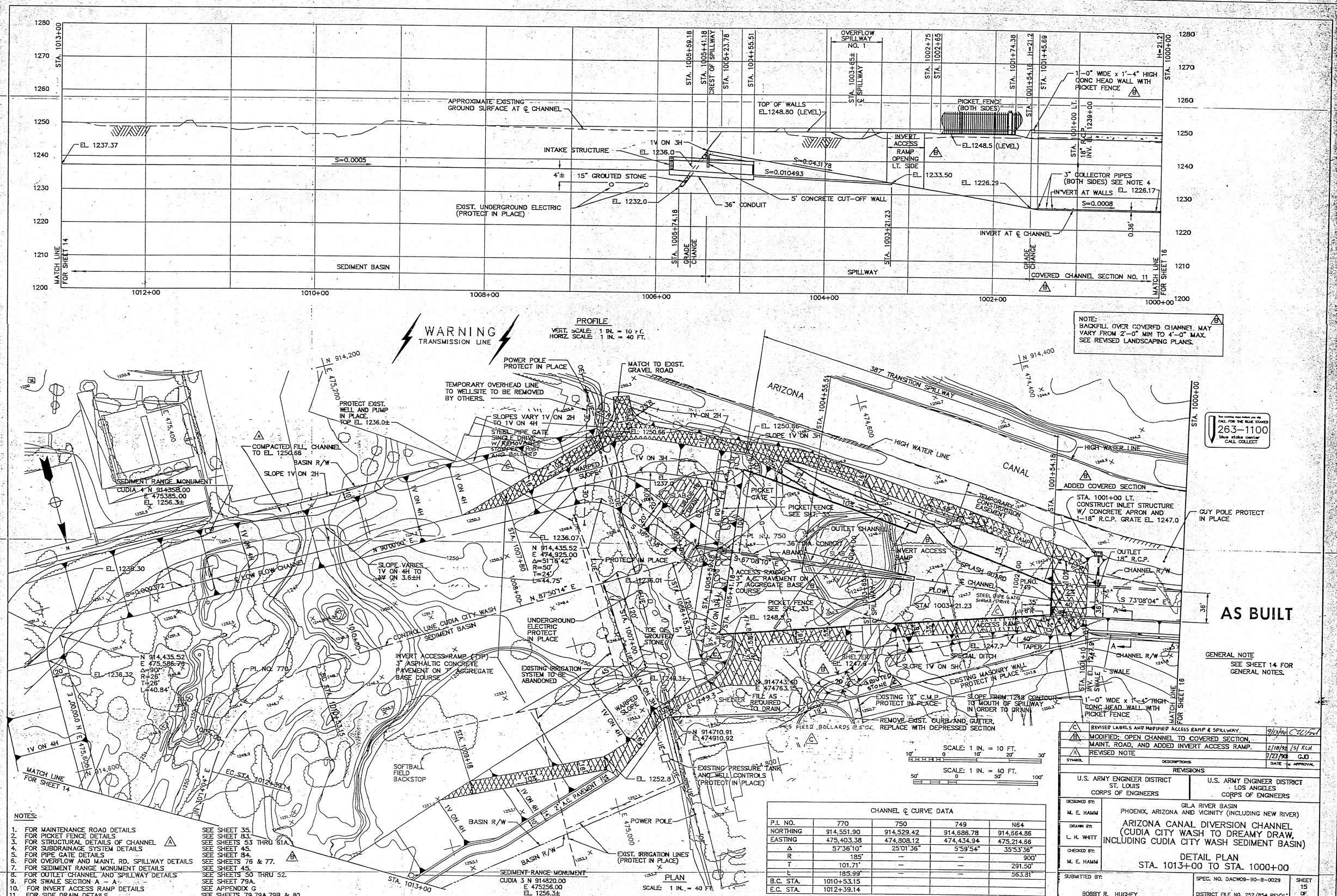
0 200' 400' 800'

FLOOD CONTROL DISTRICT
OF
MARICOPA COUNTY

ARIZONA CANAL DIVERSION CHANNEL
AREA DRAINAGE MASTER STUDY
PHASE 1

DRN: DATE:	SCALE:	JOB NO.	SHEET
DES: DATE:	1" = 400' HORIZ.	0146	04 OF 111
CHD: DATE:	1" = ____ VERT.		

KENNEY AERIAL MAPPING INC. PHOENIX, ARIZONA



NOTES:

1. FOR MAINTENANCE ROAD DETAILS — SEE SHEET 35.
2. FOR PICKET FENCE DETAILS — SEE SHEET 83.
3. FOR STRUCTURAL DETAILS OF CHANNEL (A) — SEE SHEETS 53 THRU 81A.
4. FOR SUBDRAINAGE SYSTEM DETAILS — SEE SHEET 45.
5. FOR PIPE GATE DETAILS — SEE SHEET 84.
6. FOR OVERFLOW AND MAINT. RD. SPILLWAY DETAILS (B) — SEE SHEETS 76 & 77.
7. FOR SEDIMENT RANGE MONUMENT DETAILS — SEE SHEET 45.
8. FOR OUTLET CHANNEL AND SPILLWAY DETAILS — SEE SHEETS 50 THRU 52.
9. FOR SWALE SECTION A → A' — SEE SHEET 79A.
10. FOR INVERT ACCESS RAMP DETAILS — SEE APPENDIX G.
11. FOR SIDE DRAIN DETAILS — SEE SHEETS 79,79A,79B & 80.

CHANNEL ℄ CURVE DATA

P.I. NO.	770	750	749	N64
NORTHING	914,551.90	914,529.42	914,686.78	914,664.86
EASTING	475,403.38	474,808.12	474,434.94	475,214.66
Δ	57°36'10"	25°01'36"	5°59'54"	35°53'36"
R	185'	—	—	900'
T	101.71'	—	—	291.50'
L	185.99'	—	—	563.81'
B.C. STA.	1010+53.15			
E.C. STA.	1012+39.14			

GENERAL NOTE
SEE SHEET 14 FOR GENERAL NOTES.

SYMBOL	DESCRIPTIONS	DATE	APPROVAL
C	REVISED LABELS AND MODIFIED ACCESS RAMP & SPILLWAY.	9/13/90	CDL/Final
B	MODIFIED: OPEN CHANNEL TO COVERED SECTION, MAINT. ROAD, AND ADDED INVERT ACCESS RAMP.	2/18/97	JS/RLH
A	REVISED NOTE	7/27/90	GJD

REVISIONS

U.S. ARMY ENGINEER DISTRICT ST. LOUIS CORPS OF ENGINEERS

U.S. ARMY ENGINEER DISTRICT LOS ANGELES CORPS OF ENGINEERS

DESIGNED BY: M. E. HAMM
DRAWN BY: L. H. WHITT
CHECKED BY: M. E. HAMM

GILA RIVER BASIN
PHOENIX, ARIZONA AND VICINITY (INCLUDING NEW RIVER)

ARIZONA CANAL DIVERSION CHANNEL (CUDIA CITY WASH TO DREAMY DRAW, INCLUDING CUDIA CITY WASH SEDIMENT BASIN)

DETAIL PLAN
STA. 1013+00 TO STA. 1000+00

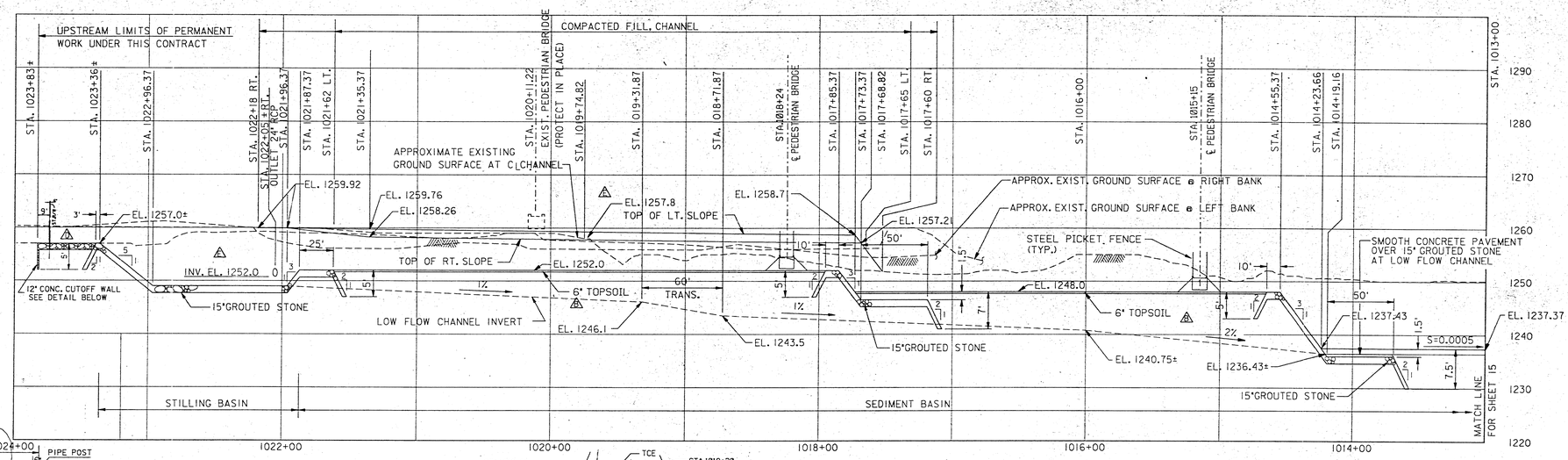
SUBMITTED BY:
BOBBY R. HUGHEY
CHIEF, DESIGN BRANCH
ST. LOUIS DISTRICT

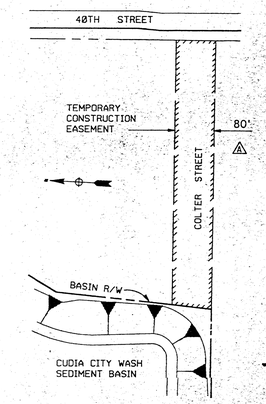
SPEC. NO. DACW09-90-B-0029
DISTRICT FILE NO. 252/854 REV'C'

SHEET 15 OF 90 SHEETS

NOTE
FOR TREE WELL DETAIL, SEE SHEET 45.

TREE WELL (48"DIA.) TABULATION			
NO.	STATION	OFFSET, SIDE	
1	1022+78	76.0 LT	
2	1022+75	58.5 RT	
3	1022+57	69.0 LT	
4	1022+49	70.0 RT	
5	1022+33	72.5 LT	
6	1021+77	70.0 RT	
7	1021+59	79.0 LT	
8	1021+41	75.0 LT	
9	1021+23	88.0 LT	
10	1021+04	70.5 RT	
11	1020+94	95.0 LT	
12	1020+28	70.0 RT	117.0 LT
13	1020+02	122.0 LT	
14	1019+33	83.0 RT	
15	1018+89	154.0 LT	
16	1018+70	134.5 LT	
17	1018+58	97.0 RT	
18	1018+48	154.5 LT	
19	1018+32	109.0 RT	
20	1018+08	135.0 LT	
21	1017+94	147.5 LT	
22	1017+92	98.0 RT	
23	1017+69	104.5 RT	
24	1017+67	148.0 LT	
25	1017+43	138.0 LT	
26	1017+22	123.0 RT	
27	1016+58	150.0 RT	
28	1016+18	143.0 LT	
29	1015+82	138.5 LT	
30	1015+72	161.5 RT	
31	1015+39	150.0 LT	
32	1014+94	149.0 RT	
33	1014+71	153.0 LT	
34	1014+70	153.0 RT	
35	1014+40	163.0 LT	

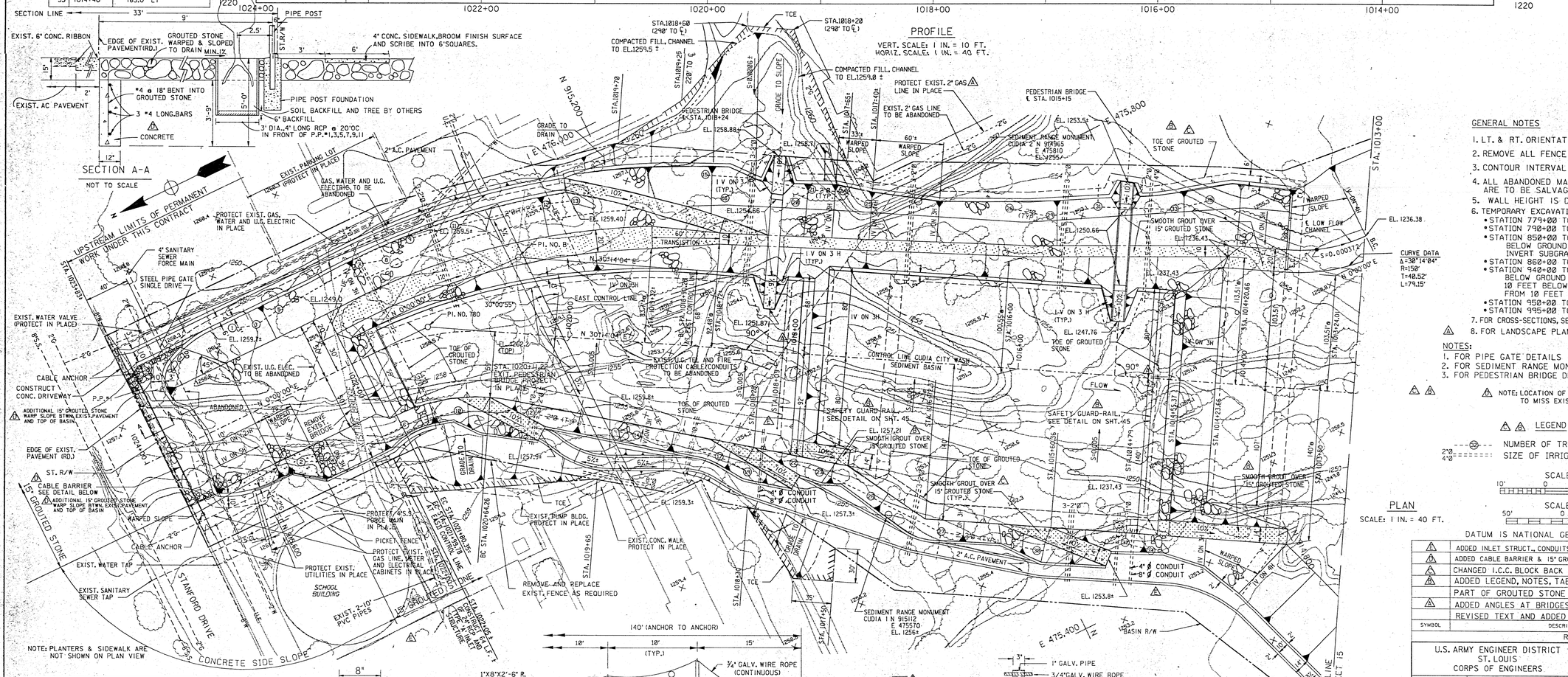




PLAN
N.T.S.

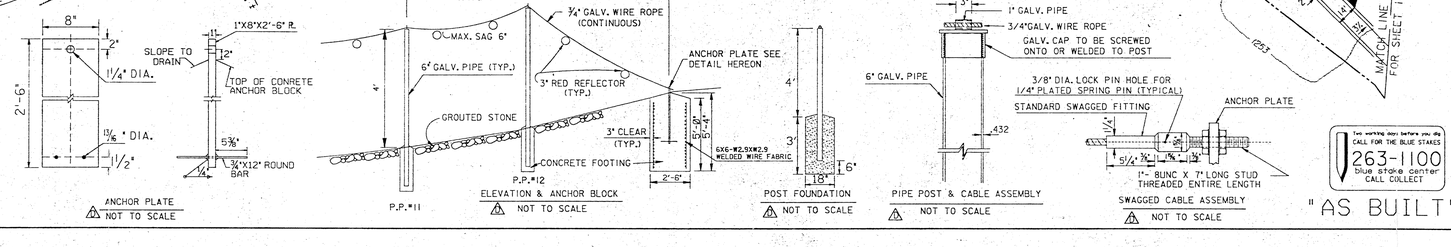
PROFILE
VERT. SCALE: 1 IN. = 10 FT.
HORIZ. SCALE: 1 IN. = 40 FT.

SECTION A-A
NOT TO SCALE



NOTE: PLANTERS & SIDEWALK ARE NOT SHOWN ON PLAN VIEW

CHANNEL ℄ CURVE DATA		
P.I. NO.	780	B
NORTHING	915,404.00	915,304.99
EASTING	475,920.00	475,921.00
Δ	30°14'04"	30°14'04"
R	220'	586.52'
T	59.43'	158.44'
L	116.09'	309.50'
B.C. STA.	1020+64.26	1018+90.28
E.C. STA.	1021+80.35	1021+99.78



ANCHOR PLATE — NOT TO SCALE
ELEVATION & ANCHOR BLOCK — NOT TO SCALE
POST FOUNDATION — NOT TO SCALE
PIPE POST & CABLE ASSEMBLY — NOT TO SCALE
SWAGGED CABLE ASSEMBLY — NOT TO SCALE

GENERAL NOTES
1. LT. & RT. ORIENTATION IS LOOKING DOWNSTREAM
2. REMOVE ALL FENCE WITHIN CHANNEL R/W
3. CONTOUR INTERVAL IS 1 FOOT
4. ALL ABANDONED MANHOLE COVERS AND FRAMES ARE TO BE SALVAGED FOR THE CITY OF PHOENIX
5. WALL HEIGHT IS DESIGNATED ON PROFILES BY "H".
6. TEMPORARY EXCAVATION SLOPES AS FOLLOWS:
   - STATION 779+00 TO 790+00: 4V ON 3H
   - STATION 790+00 TO 850+00: 2V ON 1H
   - STATION 850+00 TO 860+00: 4V ON 3H FROM 0 TO 20 FEET BELOW GROUND SURFACE, 2V ON 1H FROM 20 FEET TO INVERT SUBGRADE
   - STATION 860+00 TO 940+00: 2V ON 1H (4V ON 1H IN BEDROCK)
   - STATION 940+00 TO 950+00: 4V ON 3H FROM 0 TO 10 FEET BELOW GROUND SURFACE (RIGHT SIDE), 1V ON 3H FROM 0 TO 10 FEET BELOW GROUND SURFACE (LEFT SIDE); 2V ON 1H FROM 10 FEET TO INVERT SUBGRADE (BOTH SIDES)
   - STATION 950+00 TO 995+00: 2V ON 1H
   - STATION 995+00 TO 1001+54: 4V ON 3H
7. FOR CROSS-SECTIONS, SEE SHEETS 33, 34 AND 41
8. FOR LANDSCAPE PLANS, SEE APPENDIX B.

NOTES:
1. FOR PIPE GATE DETAILS — SEE SHEET 84.
2. FOR SEDIMENT RANGE MONUMENT DETAILS SEE SHEET 45.
3. FOR PEDESTRIAN BRIDGE DETAILS, SEE APPENDIX 'F'

NOTE: LOCATION OF CUTOFF WALL CAN BE MODIFIED SLIGHTLY TO MISS EXISTING UTILITIES.

LEGEND
---(12)--- NUMBER OF TREE WELL, SEE TABULATION HEREON
2"Ø 4"Ø ======== SIZE OF IRRIGATION PIPE

SCALE: 1 IN. = 10 FT.
SCALE: 1 IN. = 40 FT.

PLAN
SCALE: 1 IN. = 40 FT.

DATUM IS NATIONAL GEODETIC VERTICAL DATUM OF 1929

SYMBOL	DESCRIPTIONS	DATE	APPROVAL
	REVISIONS		
4	ADDED INLET STRUCT., CONDUITS, AND LABELS.	9/14/94	CWF
3	ADDED CABLE BARRIER & 15" GROUTED STONE	3/16/93	/S/CWF
2	CHANGED I.C.C. BLOCK BACK TO 15"GROUTED STONE	6/19/92	/S/CWF
1	ADDED LEGEND, NOTES, TABULATION AND CHANGED	6/19/92	/S/CWF
	PART OF GROUTED STONE TO I.C.C. BLOCK.	3/3/92	/S/CWF
0	ADDED ANGLES AT BRIDGES WIDTH OF COLTER STREET		
	REVISED TEXT AND ADDED NOTE	7/27/90	/S/GJD

U.S. ARMY ENGINEER DISTRICT
ST. LOUIS
CORPS OF ENGINEERS

U.S. ARMY ENGINEER DISTRICT
LOS ANGELES
CORPS OF ENGINEERS

DESIGNED BY: M. E. HAMM
DRAWN BY: G. H. WHITT
CHECKED BY: M. E. HAMM

GILA RIVER BASIN
PHOENIX, ARIZONA AND VICINITY (INCLUDING NEW RIVER)

ARIZONA CANAL DIVERSION CHANNEL
(CUDIA CITY WASH TO DREAMY DRAW, INCLUDING CUDIA CITY WASH SEDIMENT BASIN)

DETAIL PLAN
STA. 1023+83 TO STA. 1013+00

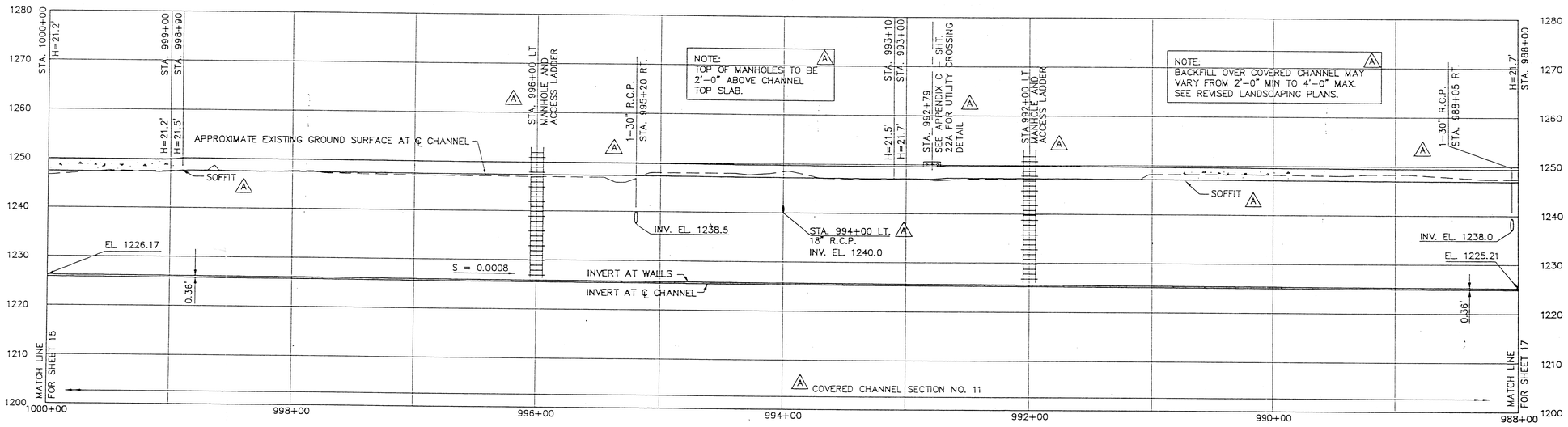
Two working days before you dig CALL FOR THE BLUE STAKES 263-1100 blue stake center CALL COLLECT

"AS BUILT"

SUBMITTED BY:
BOBBY R. HUGHEY
CHIEF, DESIGN BRANCH
ST. LOUIS DISTRICT

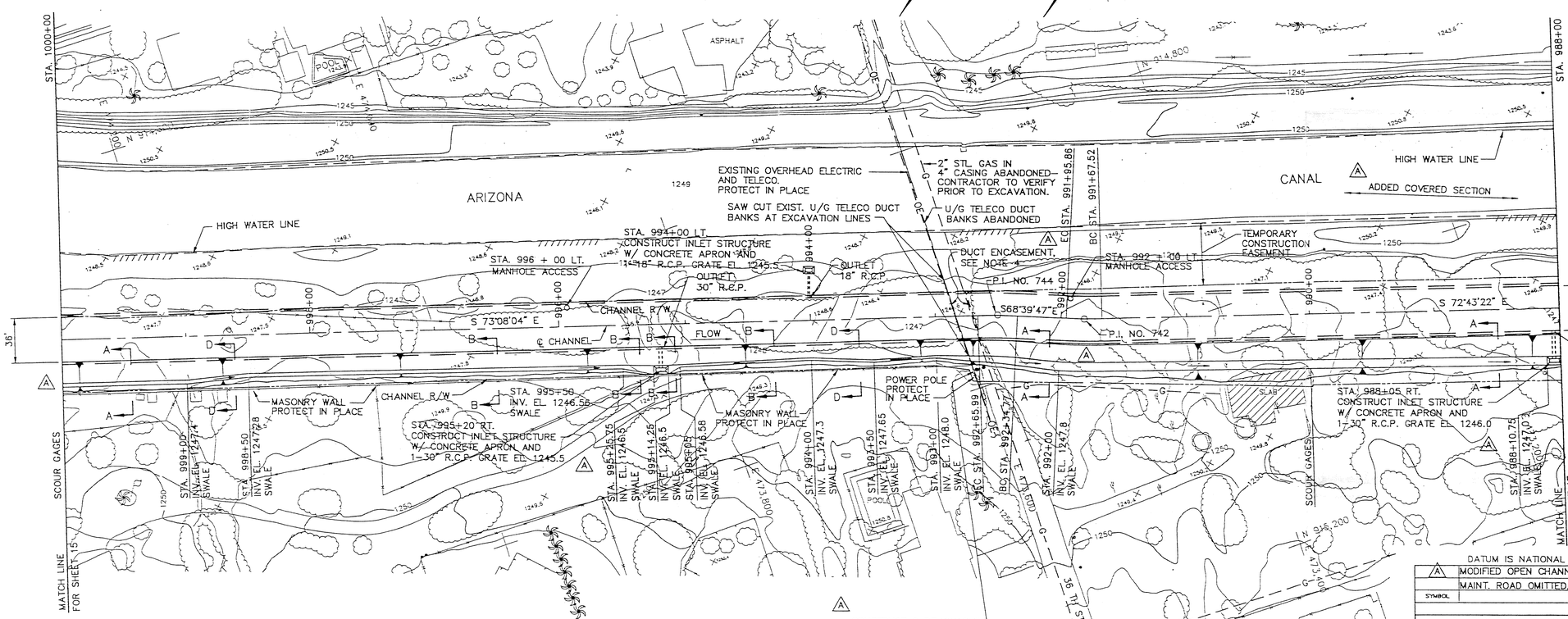
SPEC. NO. DACW09-90-B-0029
DISTRICT FILE NO. 252/853 REV."E"

SHEET 14 OF 90 SHEETS



PROFILE
VERT. SCALE: 1 IN. = 10 FT.
HORIZ. SCALE: 1 IN. = 40 FT.

WARNING
TRANSMISSION LINE



GENERAL NOTE
SEE SHEET 14 FOR GENERAL NOTES.

CHANNEL ℄ CURVE DATA		
P.I. NO.	744	742
NORTHING	914,949.00	914,974.00
EASTING	473,570.00	473,506.00
Δ	4°28'17"	4°03'35"
R	400'	400'
T	15.62'	14.18'
L	31.22'	28.34'
B.C. STA.	922+34.77	991+67.52
E.C. STA.	992+65.99	991+95.86

NOTES: A

1. FOR STRUCTURAL DETAILS OF CHANNEL — SEE SHEETS 53 THRU 61A.
2. FOR SIDE DRAIN DETAILS — SEE SHEET 79,79A,79B & 80.
3. FOR SCOUR GAGE DETAILS — SEE SHEET 45.
4. FOR TELEPHONE DUCTS ENCASEMENT DETAILS — SEE APPENDIX C, SHEET 22A, OMIT SHEETS 22 THRU 24
5. FOR SWALE SECTIONS " A-A , B-B , & D-D" — SEE SHEETS 79A & 79B.
6. FOR MANHOLE AND ACCESS LADDER DETAILS — SEE SHEET 86

PLAN
SCALE: 1 IN. = 40 FT.

AS BUILT

DATUM IS NATIONAL GEODETIC VERTICAL DATUM OF 1929

SYMBOL	DESCRIPTIONS	DATE	APPROVAL
A	MODIFIED OPEN CHANNEL TO COVERED SECTION, MAINT. ROAD OMITTED, PED. BRIDGE OMITTED.		

REVISIONS

U.S. ARMY ENGINEER DISTRICT
ST. LOUIS
CORPS OF ENGINEERS

U.S. ARMY ENGINEER DISTRICT
LOS ANGELES
CORPS OF ENGINEERS

DESIGNED BY: M. E. HAMM
DRAWN BY: L. H. WHITT
CHECKED BY: M. E. HAMM

GILA RIVER BASIN
PHOENIX, ARIZONA AND VICINITY (INCLUDING NEW RIVER)

ARIZONA CANAL DIVERSION CHANNEL
(CUDIA CITY WASH TO DREAMY DRAW, INCLUDING CUDIA CITY WASH SEDIMENT BASIN)

DETAIL PLAN
STA. 1000+00 TO STA. 988+00

SUBMITTED BY:
BOBBY R. HUGHEY
CHIEF, DESIGN BRANCH
ST. LOUIS DISTRICT

SPEC. NO. DACW09-90-B-0029
DISTRICT FILE NO. 252/855 REV "A"

SHEET 16 OF 90 SHEETS

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
2801 West Durango Street
Phoenix, Arizona 85009

(602) 506-1501

LETTER OF TRANSMITTAL

DATE	JOB NO.
8/20/96	
ATTENTION: Keri Mintz	
RE:	

TO David Evans & Associates, Inc.
2929 East Camelback Road, Suite 240
Phoenix, AZ 85016-3446

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☒ Disc

COPIES	DATE	NO.	DESCRIPTION
1			Echo Canyon Wash HEC-2 files

THESE ARE TRANSMITTED as checked below:

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

REMARKS _____

COPY TO _____

SIGNED: Hasan Mushtaq

6910-009 R8-93

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

Baker

Michael Baker Jr., Inc.
A Unit of Michael Baker Corporation

3601 Eisenhower Avenue, Suite 600
Alexandria, Virginia 22304

(703) 960-8800
FAX (703) 960-9125

Letter of Transmittal

Flood Control District of Maricopa County	DATE 8/16/96
Engineering Division	RE: Case No. 96-09-694P
2801 West Durango Street	Maricopa County, AZ, City of Paradise Valley, AZ, and
Phoenix, AZ 85009	City of Phoenix, AZ
ATTENTION: Mr. Hasan Mushtaq	

THE INFORMATION DESCRIBED BELOW IS BEING SENT TO YOU VIA:

X MAIL ☐ **BY HAND** ☐ **MESSENGER** ☐ **FEDERAL EXPRESS**

NO. OF COPIES	DATE	DESCRIPTION
1	8/16/96	3-1/2" diskette containing HEC-2 files

FLOOD CONTROL DISTRICT
RECEIVED
AUG 20 1996
P.A.P.M.
REG.
FILE
C.R.M.
ENGR.
REMARKS

THIS INFORMATION IS TRANSMITTED AS CHECKED BELOW:

☐ **FOR REVIEW**
☐ **FOR APPROVAL**
☐ **FOR SIGNATURE**

x **FOR YOUR USE**
☐ **AS REQUESTED BY** _____
☐ **AS APPROVED BY** _____

REMARKS:

Hasan:

Per your request, please find the enclosed diskette containing the HEC-2 files.

Sincerely,
Massoud Rezakhani

IF THE ENCLOSURES ARE NOT AS DESCRIBED, PLEASE NOTIFY US AT ONCE.

Signed:

A Total Quality Corporation

FLOOD CONTROL DISTRICT
of
Maricopa County

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

BOARD OF DIRECTORS
Betsey Bayless
Ed King
Tom Rawles
Don Stapley
Mary Rose Garrido Wilcox

Raymond U. Acuña, P.E.
Floodplain Manager
City of Phoenix, Street Transportation Department
200 West Washington Street
Phoenix, Arizona 85003

Re : Approval for LOMR Request for Echo Canyon Wash (Case No. 96-09-694P)
FIRM Map Panel 1690 E (9-30-95).

Dear Mr.Acuña :

Please find attached approval to a request for a revision to the effective Flood Insurance Study (FIS) and the National Flood Insurance Program (NFIP) map for your community. The Letter of Map Revision (LOMR) request, dated April 15, 1996, was further supported by providing additional information to the Federal Emergency Management Agency (FEMA) on the June 6, July 5, and July 17, 1996. The revisions, as shown on the annotated copies of the FIRM Panels, Profile Panels, and the Floodway Data Tables for the Echo Canyon Wash, are also included in this package. These modifications are effective as of the date of the attached letter (August 7, 1996).

Should you need further information, please do not hesitate to contact me at 506-1501.

Sincerely,

Hasan Mushtaq, P.E.
Engineering Division

Coord : PAC HM

Info : HM

Federal Emergency Management Agency

Washington, D.C. 20472

JUL 23 1996

Mr. Hasan Mushtaq
Engineering Division
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

IN REPLY REFER TO:
Case No.: 96-09-694P
Community: City of Phoenix, Arizona
Community No.: 040051

316-INTa

Dear Mr. Mushtaq:

This is in regard to your April 15, 1996, request for a Letter of Map Revision for the above-referenced community. In our letter dated June 21, 1996, we indicated we were reviewing the data submitted in support of your request and, within 30 days of the date of that letter, we would notify you if we needed additional data or if we encountered delays. However, with your letter dated July 17, 1996, we received the following additional data: a topographic work map entitled "Arizona Canal Diversion Channel Area Drainage Study, Phase 1," Sheets 89 and 104 of 111, prepared by Kaminski Hubbard Engineering, Inc., dated July 11, 1994, showing the existing floodplain/floodway and the revised floodplain/floodway delineations. We will review the additional data and will inform you of our findings within 15 days of the date of this letter.

If you write to us about your request, please include the case number shown above in your letter. If you have any questions regarding this matter, please contact Mr. John Magnotti of our staff in Washington, DC, either by telephone at (202) 646-3932 or by facsimile at (202) 646-4596.

Sincerely,

Michael Buckley

Michael K. Buckley, P.E., Chief
Hazard Identification Branch
Mitigation Directorate

cc: Mr. Raymond U. Acuña, P.E.
Floodplain Manager
City of Phoenix Street
Transportation Department

Ms. Terri Miller
Program Coordinator
Engineering Division
Arizona Department of Water Resources

Mr. David George
Engineering Manager
David Evans and Associates, Inc.

FLOOD CONTROL DISTRICT
RECEIVED
JUL 26 1996
REMARKS
HM

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

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

COVER SHEET

TO: KIRA CROCKET

Company or Department: MICHAEL BAKER JR., INC. Fax # 91 703 329-3023

FROM: HASAN MUSHTAQ

Number of pages being sent including Cover Sheet: 2 (TWO).

Comments:

I MAY HAVE FORGOTTEN TO ATTACH THE FOLLOWING LETTER FROM THE CONSULTANT, IN MY PREVIOUS SUBMITTAL.

THANKS.

Hasan Mushtaq

Post-it® Fax Note 7671	Date 7/15/96	# of pages ▶ 1
To Hasan	From Teri Mintz	
Co./Dept.	Co.	
Phone #	Phone # 956-9850	
Fax # 506-4601	Fax # 956-9853	

July 12, 1996

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

SUBJECT: Elevations of canal used to delineate Zone A Floodplain

Dear Hasan:

The elevations of the canal used to delineate the Zone A floodplain between Camelback Road and the Cudia City Wash, Sediment Basin were derived from the 400 scale ACDC topographic map. The elevation obtained from the topographic map was 1250 based on contour and spot elevation data. The buildings on the northeast side of the ACDC were avoided due to contour information.

Let me know if there are any other comments.

Sincerely,

Teri S. Mintz

Teri S. Mintz, P.E.

****
*** ACTIVITY REPORT ***
****

TRANSMISSION OK

TX/RX NO.	9617
CONNECTION TEL	917033293023
CONNECTION ID	
START TIME	07/22 10:31
USAGE TIME	00'47
PAGES	2
RESULT	OK

JUL 1 7 1996

Michael Baker Jr., Inc.
3601 Eisenhower Avenue, Suite 600
Alexandria, Virginia 22304

Attn : Mr. Massoud Rezakhani

Re : LOMR Request for Echo Canyon Wash (Case No. 96-09-694P)
FCD Contract No. FCD 94-51
FIRM Map Panel 1690 E (9-30-95)

Dear Mr. Rezakhani :

This is in response to a telephone conversation with yourself, on July 16, 1996, for additional technical information to continue reviewing the LOMR application. This request is for 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 :	Cudia City Wash Sediment Basin
Flooding Source :	Echo Canyon Wash
FIRM Panel Affected :	04013C1690 E

Following responses correspond to the items mentioned during the telephone conversation requesting additional information :

ITEM

1. The existing floodplain/floodway and the revised floodplain/floodway are delineated on the 1"=400' scale topographic mapping. These delineation are also color coded for review purposes.

Should you need further assistance, please do not hesitate to contact me for further information at (602)-506-1501.

Sincerely,

Hasan Mushtaq
Engineering Division

Coord : ~~HM~~ PAC
Info : HM

FLOOD CONTROL DISTRICT
of
Maricopa County

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

BOARD OF DIRECTORS
Betsey Bayless
Ed King
Tom Rawles
Don Stapley
Mary Rose Garrido Wilcox

JUL 0 5 1996

Michael Baker Jr., Inc.
3601 Eisenhower Avenue, Suite 600
Alexandria, Virginia 22304

Attn : Mr. Massoud Rezakhani

Re : LOMR Request for Echo Canyon Wash (Case No. 96-09-694P)
FCD Contract No. FCD 94-51
FIRM Map Panel 1690 E (9-30-95)

Dear Mr. Rezakhani :

This is in response to a telephone conversation with Mr. Joseph Bellani, for additional technical information to continue reviewing the LOMR application. This request is for 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 :	Cudia City Wash Sediment Basin
Flooding Source :	Echo Canyon Wash
FIRM Panel Affected :	04013C1690 E

Following responses correspond to the items mentioned during the telephone conversation requesting additional information :

ITEM

1. The AS-BUILT plans for the different reaches of the ACDC was prepared by the US Army Corps of Engineers. As such the previously submitted AS-BUILT plans and an additional (sheet 16, Exhibit 1), submitted with this package, are not certified by any registered professional engineer. A copy of the letter from the US Corps of Engineers, stating that these AS-BUILT plans were prepared by the COE, is also attached (Exhibit 2) in this submittal.

2. This item addresses the starting water surface elevation for the hydraulic analysis model (HEC-2). Based on the information from Arizona Canal Diversion Channel, 40th Street to Cactus Road (including Cudia City Wash Sediment Basin, Cave Creek Sediment Basin, and

Cave Creek Channel), Design Memorandum No. 12, April 1986, by the US Army Corps of Engineers, Los Angeles District (Exhibit 3), the starting water surface elevation for the revised HEC-2 model is set at 1246.9'. The first surveyed cross section (x-section 0.0) in the revised hydraulic analysis model is approximately at station 1005+98. Exhibit 4, shows that the invert elevation at station 1005+98 is 1243.00', and the depth of flow at that location is 3.9'. Therefore, the starting water surface elevation of the HEC-2 model is set at 1246.9' to match with the design water surface profile for the ACDC.

3. The ponding behind the Arizona Canal is determined using an approximate method. The top of the higher embankment elevation was extended horizontally to define the floodplain limits. Since this determination is approximate, the flooding zone is characterized as Zone A. This A zone is extended to the south-easterly direction to match with the existing Zone A designations (Exhibit 5).

4. A complete and revised hydraulic analysis model using HEC-2, is included in this package. This model includes the floodway run utilizing encroachment method 1. Encroachment method 4 was used for the initial analysis. Hard copy of the final Input/Output files are included in this package (Exhibit 6).

5. There is an inlet structure, downstream of the Stanford Drive, to guide floodwater flowing across the roadway, into the flood control channel. This is also shown in Exhibit 4. The hydraulic analysis, based on the HEC-2 modeling shows that there are negligible breakouts (0.07' at x-section 0.370 and 0.08' at x-section 0.361) at the Stanford Drive alignment. The hydraulic analysis also shows that the cross section 0.356, immediately downstream of the Stanford Drive, contains the 100-year flow. However, at cross-section 0.352, approximately 0.39' of floodwater breaks out in the left overbank, which is assumed create a sheet flow in the southerly direction, and contribute to the ponding behind the Arizona Canal in the Zone A.

Following is a list of items submitted as additional information and to support the revised HEC-2 modeling.

(a) A copy of the additional AS-BUILT plan (sheet 16) (Exhibit 1).
(b) A copy of the letter from the Corp's of Engineers (Exhibit 2).
(c) Cover page of the Design Memorandum 12, US Army Corps of Engineers (Exhibit 3).
(d) A copy of plan profile from the Arizona Canal Diversion Channel, 40th Street to Cactus Road (including Cudia City Wash Sediment Basin, Cave Creek Sediment Basin, and Cave Creek Channel), Design Memorandum No. 12, April 1986, by the US Army Corps of Engineers, Los Angeles District (Exhibit 4).
(e) Revised floodplain and floodway boundary, at FIRM scale (1"=1000') (Exhibit 5).
(f) Hardcopy of the HEC-2 Input/Output files (Exhibit 6).
(g) A set of revised FEMA forms to be replaced in the application package.
(h) Revised flood profile plot.
(i) Revised floodplain/floodway boundary (1"=40' scale, and 1"=400').
(j) One 3-1/2" diskette with floodway run for the Echo Canyon Wash.

Should you need further assistance, please do not hesitate to contact me for further information at (602)-506-1501.

Sincerely,

Hasan Mushtaq
Engineering Division

Enclosures

Copy to : Terri Miller, State Coordinator, NFIP
Arizona Department of Water Resources
500 North 3rd Street, Phoenix, Arizona 85004

Ray Acuna, Floodplain Administrator
City of Phoenix
200 West Washington Street, Phoenix, Arizona 85003

David George, Engineering Manager
David Evans and Associates, Inc.
2929 East Camelback Road, Suite 240, Phoenix, Arizona 85016

FLOOD CONTROL DISTRICT
of
Maricopa County

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

BOARD OF DIRECTORS
Betsey Bayless
Ed King
Tom Rawles
Don Stapley
Mary Rose Garrido Wilcox

Michael Baker Jr., Inc.
3601 Eisenhower Avenue, Suite 600
Alexandria, Virginia 22304

Attn : Mr. Massoud Rezakhani

Re : LOMR Request for Echo Canyon Wash (Case No. 96-09-694P)
FCD Contract No. FCD 94-51
FIRM Map Panel 1690 E (9-30-95)

Dear Mr. Rezakhani :

This is in response to a telephone conversation with Mr. Joseph Bellani, for additional technical information to continue reviewing the LOMR application. This request is for 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 :	Cudia City Wash Sediment Basin
Flooding Source :	Echo Canyon Wash
FIRM Panel Affected :	04013C1690 E

Following responses correspond to the items mentioned during the telephone conversation requesting additional information :

ITEM

1. The AS-BUILT plans for the different reaches of the ACDC was prepared by the US Army Corps of Engineers. As such the previously submitted AS-BUILT plans and an additional (sheet 16, Exhibit 1), submitted with this package, are not certified by any registered professional engineer. A copy of the letter from the US Corps of Engineers, stating that these AS-BUILT plans were prepared by the COE, is also attached (Exhibit 2) in this submittal.

2. This item addresses the starting water surface elevation for the hydraulic analysis model (HEC-2). Based on the information from Arizona Canal Diversion Channel, 40th Street to Cactus Road (including Cudia City Wash Sediment Basin, Cave Creek Sediment Basin, and

Cave Creek Channel), Design Memorandum No. 12, April 1986, by the US Army Corps of Engineers, Los Angeles District (Exhibit 3), the starting water surface elevation for the revised HEC-2 model is set at 1246.9'. The first surveyed cross section (x-section 0.0) in the revised hydraulic analysis model is approximately at station 1005+98. Exhibit 4, shows that the invert elevation at station 1005+98 is 1243.00', and the depth of flow at that location is 3.9'. Therefore, the starting water surface elevation of the HEC-2 model is set at 1246.9' to match with the design water surface profile for the ACDC.

3. The ponding behind the Arizona Canal is determined using an approximate method. The top of the higher embankment elevation was extended horizontally to define the floodplain limits. Since this determination is approximate, the flooding zone is characterized as Zone A. This A zone is extended to the south-easterly direction to match with the existing Zone A designations (Exhibit 5).

4. A complete and revised hydraulic analysis model using HEC-2, is included in this package. This model includes the floodway run utilizing encroachment method 1. Encroachment method 4 was used for the initial analysis. Hard copy of the final Input/Output files are included in this package (Exhibit 6).

5. There is an inlet structure, downstream of the Stanford Drive, to guide floodwater flowing across the roadway, into the flood control channel. This is also shown in Exhibit 4. The hydraulic analysis, based on the HEC-2 modeling shows that there are negligible breakouts (0.07' at x-section 0.370 and 0.08' at x-section 0.361) at the Stanford Drive alignment. The hydraulic analysis also shows that the cross section 0.356, immediately downstream of the Stanford Drive, contains the 100-year flow. However, at cross-section 0.352, approximately 0.39' of floodwater breaks out in the left overbank, which is assumed create a sheet flow in the southerly direction, and contribute to the ponding behind the Arizona Canal in the Zone A.

Following is a list of items submitted as additional information and to support the revised HEC-2 modeling.

(a) A copy of the additional AS-BUILT plan (sheet 16) (Exhibit 1).
(b) A copy of the letter from the Corp's of Engineers (Exhibit 2).
(c) Cover page of the Design Memorandum 12, US Army Corps of Engineers (Exhibit 3).
(d) A copy of plan profile from the Arizona Canal Diversion Channel, 40th Street to Cactus Road (including Cudia City Wash Sediment Basin, Cave Creek Sediment Basin, and Cave Creek Channel), Design Memorandum No. 12, April 1986, by the US Army Corps of Engineers, Los Angeles District (Exhibit 4).
(e) Revised floodplain and floodway boundary, at FIRM scale (1"=1000') (Exhibit 5).
(f) Hardcopy of the HEC-2 Input/Output files (Exhibit 6).
(g) A set of revised FEMA forms to be replaced in the application package.
(h) Revised flood profile plot.
(i) Revised floodplain/floodway boundary (1"=40' scale, and 1"=400').
(j) One 3-1/2" diskette with floodway run for the Echo Canyon Wash.

Should you need further assistance, please do not hesitate to contact me for further information at (602)-506-1501.

Sincerely,

Hasan Mushtaq
Engineering Division

COORD : PAC Hayes
INFO : HM RGN

Coord :	HM	PAC	EAR
Info :	HM		

TRANSMITTAL

Date 7/3/96

File MARI0008

To MCFCD
2801 W. Durango St
Phoenix, AZ 85009
ATTN: Hasan

Project Echo Canyon

Subject LOMR submittal

Item	Copies	Date	Description
1	2		Flood profile
2	2		FIRM showing Revised floodplain
3	2		Revised 'Explanations' Page
4	2		Revised Exhibit B
5	2		Revised HEC-2 (MA08100H.HC2)
6	1		Items from ACDC Report
7	2		40 scale dwg of Floodplain + Floodway
8	2		400 + 1000 scale dwg showing floodplain

Remarks Anything else, let me know.

- [x] As you requested
- [ ] For your information
- [ ] For your approval
- [ ] For your review
- [ ] Return requested
- [ ] _____

From Teri Muntz

DAVID EVANS AND ASSOCIATES, INC.
A PROFESSIONAL SERVICES CONSULTING FIRM
IN OREGON, WASHINGTON, CALIFORNIA AND ARIZONA
2929 E. CAMELBACK ROAD, SUITE 240
PHOENIX, ARIZONA 85016-3446
(602) 956-9850 FAX (602) 956-9853

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

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

COVER SHEET

TO: TERI S. MINTZ, P.E.

Company or Department: DAVID EVANS & ASSOCIATES Fax # 9-1-602-952-9853

FROM: HASAN MUSHTAQ

Number of pages being sent including Cover Sheet: 3 (THREE).

Comments:

PL. CALL ME WHEN YOU RECEIVE THIS FAX.

THANKS.

Hasan Mushtaq

Michael Baker Jr., Inc.
3601 Eisenhower Avenue, Suite 600
Alexandria, Virginia 22304

Attn : Mr. Massoud Rezakhani

Re : LOMR Request for Echo Canyon Wash (Case No. 96-09-694P)
FCD Contract No. FCD 94-51
FIRM Map Panel 1690 E (9-30-95)

Dear Mr. Rezakhani :

This is in response to a telephone conversation with Mr. Joseph Bellani, for additional technical information to continue reviewing the LOMR application. This request is for 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 :	Cudia City Wash Sediment Basin
Flooding Source :	Echo Canyon Wash
FIRM Panel Affected :	04013C1690 E

Following responses correspond to the items mentioned during the telephone conversation requesting additional information :

ITEM

1. The AS-BUILT plans for the different reaches of the ACDC was prepared by the US Army Corps of Engineers. As such the previously submitted AS-BUILT plans and an additional (sheet 16, Exhibit A), submitted with this package, are not certified by any registered professional engineer. A copy of the letter from the US Corps of Engineers, stating that these AS-BUILT plans were prepared by the COE, is also attached (Exhibit B) in this submittal.

2. This item addresses the starting water surface elevation for the hydraulic analysis model (HEC-2). Based on the information from Arizona Canal Diversion Channel, 40th Street to Cactus Road (including Cudia City Wash Sediment Basin, Cave Creek Sediment Basin, and

Cave Creek Channel), Design Memorandum No. 12, April 1986, by the US Army Corps of Engineers, Los Angeles District (Exhibit C), the starting water surface elevation for the revised HEC-2 model is set at 1246.9'. The first surveyed cross section (x-section 0.0) in the revised hydraulic analysis model is approximately at station 1005+98. Exhibit D, shows that the invert elevation at station 1005+98 is 1243.00', and the depth of flow at that location is 3.9'. Therefore, the starting water surface elevation of the HEC-2 model is set at 1246.9' to match with the design water surface profile for the ACDC.

3. The ponding behind the Arizona Canal is determined using an approximate method. The top of the higher embankment elevation was extended horizontally to define the floodplain limits. Since this determination is approximate, the flooding zone is characterized as Zone A. This A zone is extended to the south-easterly direction to match with the existing Zone A designations (Exhibit E).

4. A complete and revised hydraulic analysis model using HEC-2, is included in this package. This model includes the floodway run utilizing encroachment method 1. Encroachment method 4 was used for the initial analysis. Hard copy of the final Input/Output files are included in this package (Exhibit F).

5. There is an inlet structure, downstream of the Stanford Drive, to guide floodwater flowing across the roadway, into the flood control channel. This is also shown in Exhibit C. The hydraulic analysis, based on the HEC-2 modeling shows that there are negligible breakouts (0.07' at x-section 0.370 and 0.08' at x-section 0.361) at the Stanford Drive alignment. The hydraulic analysis also shows that the cross section 0.356, immediately downstream of the Stanford Drive, contains the 100-year flow. However, at cross-section 0.352, approximately 0.39' of floodwater breaks out in the left overbank, which is assumed create a sheet flow in the southerly direction, and contribute to the ponding behind the Arizona Canal in the Zone A.

Following is a list of items submitted as additional information and to support the revised HEC-2 modeling.

(a) A copy of the additional AS-BUILT plan (sheet 16) (Exhibit A).
(b) A copy of the letter from the Corp's of Engineers (Exhibit B).
(c) Cover page of the Design Memorandum 12, US Army Corps of Engineers (Exhibit C).
(d) A copy of plan profile from the Arizona Canal Diversion Channel, 40th Street to Cactus Road (including Cudia City Wash Sediment Basin, Cave Creek Sediment Basin, and Cave Creek Channel), Design Memorandum No. 12, April 1986, by the US Army Corps of Engineers, Los Angeles District (Exhibit D).
(e) Revised floodplain and floodway boundary, at FIRM scale (Exhibit E).
(f) Hardcopy of the HEC-2 Input/Output files (Exhibit F).
(g) A set of revised FEMA forms to be replaced in the application package.
(h) Revised flood profile plot.
(I) Revised floodplain/floodway boundary (1"=40' scale).
(j) One 3-1/2" diskette with floodway run for the Echo Canyon Wash.

Should you need further assistance, please do not hesitate to contact me for further information at (602)-506-1501.

Sincerely,

Hasan Mushtaq
Engineering Division

Enclosures

Copy to : Terri Miller, State Coordinator, NFIP
Arizona Department of Water Resources
500 North 3rd Street, Phoenix, Arizona 85004

Ray Acuna, Floodplain Administrator
City of Phoenix
200 West Washington Street, Phoenix, Arizona 85003

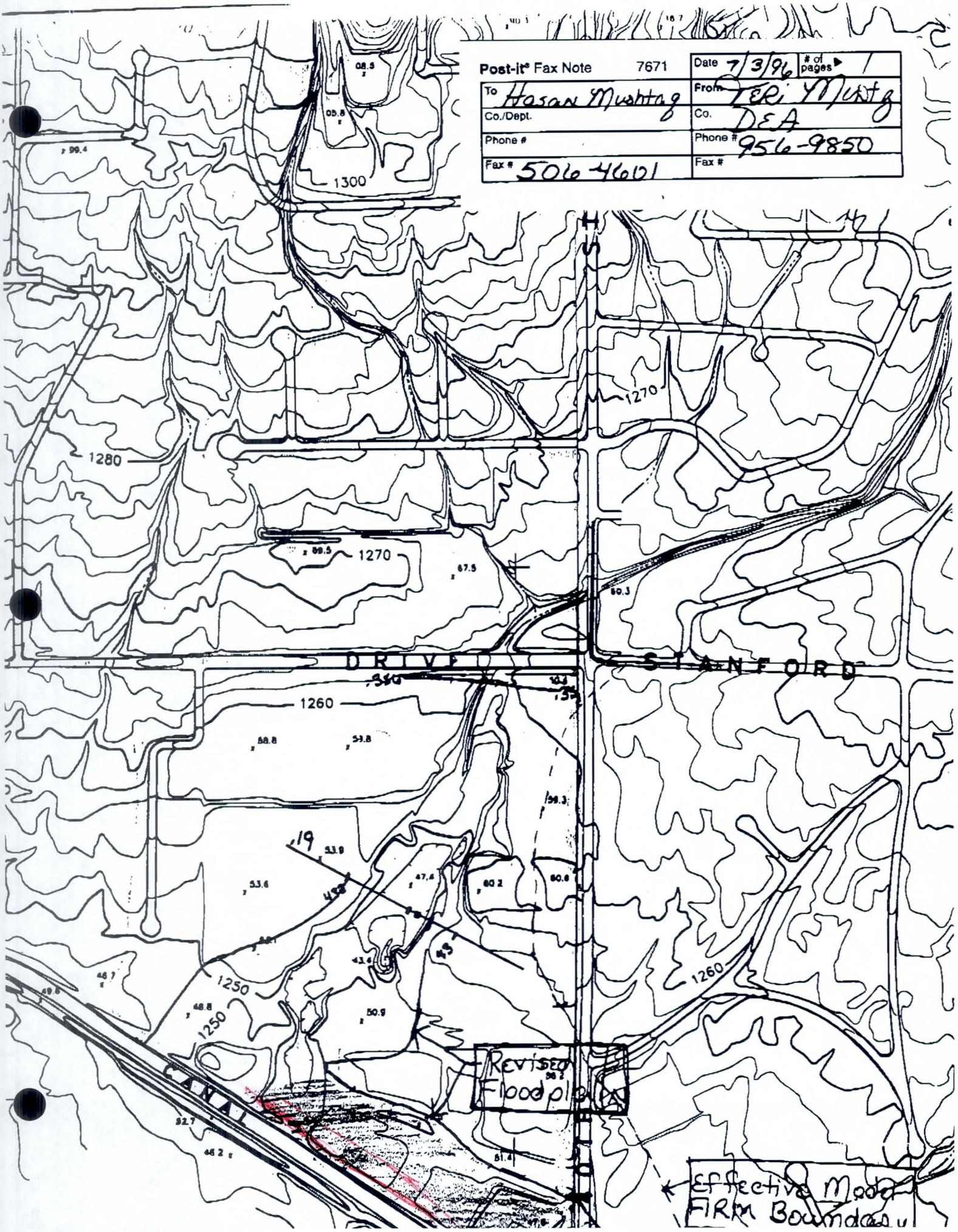
David George, Engineering Manager
David Evans and Associates, Inc.
2929 East Camelback Road, Suite 240, Phoenix, Arizona 85016

****
*** ACTIVITY REPORT ***
****

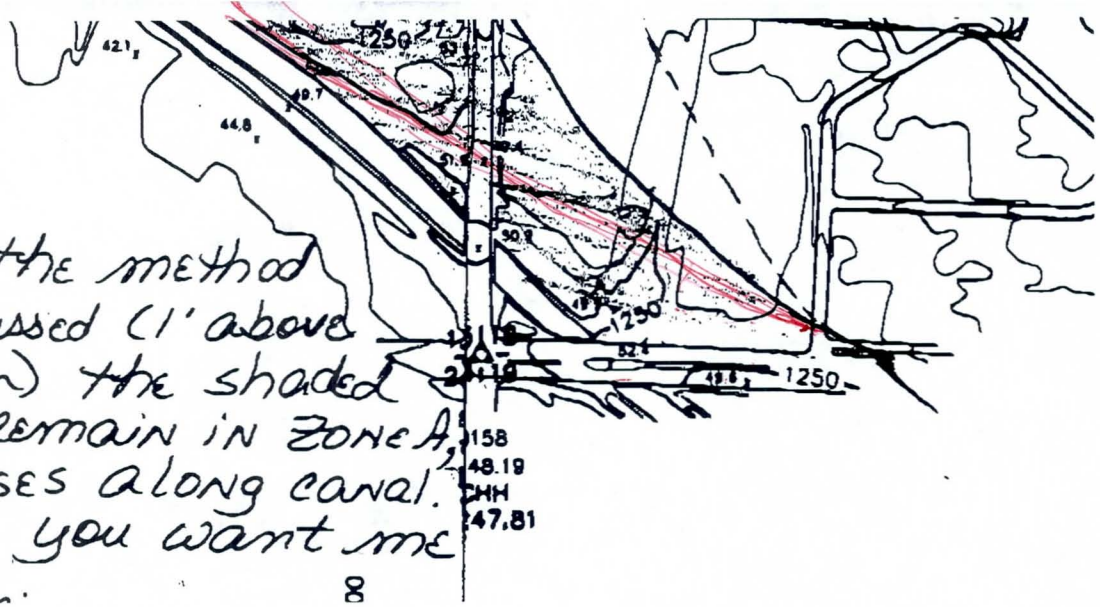
TRANSMISSION OK

TX/RX NO.	9020
CONNECTION TEL	916029569853
CONNECTION ID	
START TIME	07/03 12:25
USAGE TIME	01'56
PAGES	3
RESULT	OK

Post-it® Fax Note 7671	Date 7/3/96	# of pages ▶ 1
To Hasan Mushtaq	From Teri Musto	
Co./Dept.	Co. DEA	
Phone #	Phone # 956-9850	
Fax # 506-4601	Fax #	



1" = 400'



Hasan, Using the method previously discussed (1' above canal elevation) the shaded area would remain in Zone A, ie the businesses along canal. Is this what you want me to show?

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)			
Dreamy Draw Wash East								
A	0.04	250[2]	--[3]	--[3]	1,242.0	1,242.0	1,242.9	0.9
Echo Canyon Wash								
A	0.23	400	750	7.9	1,258.7	1,258.7	1,258.7	0.0
B	0.37	200	680	8.8	1,264.3	1,264.3	1,264.6	0.3
C	0.51	150	1,432	4.1	1,271.7	1,271.7	1,272.7	1.0
D	0.71	180	1,466	4.0	1,278.0	1,278.0	1,278.8	0.8
E	1.04	210	1,501	3.9	1,293.1	1,293.1	1,293.5	0.4
F	1.19	180	1,169	5.0	1,298.0	1,298.0	1,298.3	0.3
G	1.43	150	635	7.8	1,308.4	1,308.4	1,308.9	0.5
H	1.49	150	377	11.9	1,310.2	1,310.2	1,310.7	0.5
I	1.54	150	734	6.1	1,314.4	1,314.4	1,314.4	0.0
J	1.60	150	774	5.8	1,316.1	1,316.1	1,316.1	0.0
K	1.71	150	729	6.2	1,317.6	1,317.6	1,318.0	0.4
L	1.86	150	451	8.0	1,321.9	1,321.9	1,322.8	0.9
M	2.02	150	609	4.9	1,327.5	1,327.5	1,327.5	0.0
Flynn Lane Wash								
A	0.05	350	--[3]	--[3]	1,244.3	1,244.3	1,244.7	0.4
B	0.21	250	--[3]	--[3]	1,259.8	1,259.8	1,259.9	0.1
C	0.34	200	--[3]	--[3]	1,272.5	1,272.5	1,273.0	0.5
D	0.53	400	--[3]	--[3]	1,290.1	1,290.1	1,291.1	1.0

[1]Miles Above Mouth
[2]Combined Floodway for Dreamy Draw Wash East and Myrtle Avenue Wash
[3]Data Not Available

Federal Emergency Management Agency

Washington, D.C. 20472

FLOOD CONTROL DISTRICT
RECEIVED
JUN 28 1996
CHENG | P.&PM
DEF | DER
ADMIN | DIRECT
BRANDES | FILE
PMM | 1 HM
DER

June 21, 1996

Mr. Hasan Mushtaq
Project Manager
Engineering Division
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

IN REPLY REFER TO:
Case No.: 96-09-694P
Communities: City of Phoenix and Town of Paradise Valley, Arizona
Community Nos.: 040051 and 040049

316-ACK.FEX

Dear Mr. Mushtaq:

This is in response to your letter dated June 6, 1996, concerning an April 15, 1996, request for 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:	Cudia City Wash Sediment Basin
Flooding Source:	Echo Canyon Wash
FIRM Panel Affected:	04013C1690 E

As you may know, the Federal Emergency Management Agency (FEMA) has implemented a procedure to recover costs associated with reviewing and processing requests for modifications to published flood information and maps. However, because your request is intended to show the effects of a publicly sponsored flood-control project that reduces flooding to existing development, no fees will be assessed for our review.

We have completed an inventory of the items that you submitted. We have received all of the data we require to begin a detailed technical review of your request. If additional data are required, we will inform you within 30 days of the date of this letter.

Please direct all questions concerning your request to our Technical Evaluation Contractor at the following address:

Michael Baker Jr., Inc.
3601 Eisenhower Avenue, Suite 600
Alexandria, Virginia 22304

Attention: Mr. Massoud Rezakhani
(703) 317-6239

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

If you have any questions concerning FEMA policy, or the National Flood Insurance Program (NFIP) in general, please contact Mr. John Magnotti of our staff in Washington, DC, either by telephone at (202) 646-3932 or by facsimile at (202) 646-4596.

Sincerely,

Michael Buckley

Michael K. Buckley, P.E., Chief
Hazard Identification Branch
Mitigation Directorate

cc: Ms. Terri Miller
Program Coordinator
Engineering Division
Arizona Department of Water Resources

Mr. Raymond U. Acuña, P.E.
Floodplain Manager
City of Phoenix Street Transportation Department

Mr. David George
Engineering Manager
David Evans & Associates, Inc.

JUN 6 1996

Michael Baker Jr., Inc.
3601 Eisenhower Avenue, Suite 600
Alexandria, Virginia 22304

Attn : Mr. Massoud Rezakhani

Re : LOMR Request for Echo Canyon Wash (Case No. 96-09-694P)
FCD Contract No. FCD 94-51
FIRM Map Panel 1690 E (9-30-95)

Dear Mr. Rezakhani :

This is in response to a letter, from Michael K. Buckley, P.E., Chief, Hazard Identification Branch, Mitigation Directorate, FEMA, dated May 6, 1996, for additional items required to complete the inventory of submitted materials. This request is for 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 :	Cudia City Wash Sediment Basin
Flooding Source :	Echo Canyon Wash
FIRM Panel Affected :	04013C1690 E

Following responses correspond to the items mentioned in the letter requesting additional information :

ITEM

1. An additional copy of the Application/Certification Form 1 (MT-2 Form 1, page 4 of 4), signed by the appropriate Town Official from the Town of Paradise Valley is submitted.

2. As-built plans for the following elements of the flood control project is included in this package : (1) Sediment Basin and the outlet structure, (2) Channel from Stanford drive to the sediment basin, (3) Pedestrian Bridges (three).

3. Based on the comments in ITEM (3) of your letter, the cross-sections in question have

been reviewed and revised accordingly. Mostly, the cross-sections were extended using the topographic information in conjunction with the survey details. Both the bridges at cross-sections 0.19 and 0.248 have flows in the overbank areas. To model this situation correctly, the BT records were extended, matching the GR data points on both right and left overbanks. As a result of these modifications, most of the cross-section extensions were eliminated, while others were reduced below 0.4 feet.

4. There are no structural measures to guide the floodwater into the channel downstream of the Stanford Drive. Topographic information covering the Stanford Drive and Echo Canyon Wash confluence is submitted for the purposes of evaluation. Additionally, a series of photographs of the confluence is submitted. The results from the hydraulic analysis using HEC-2 also shows that there is negligible breakouts (< 0.1 feet) before and after the Stanford Drive. At cross-section 0.373, upstream of Stanford Drive, shows that approximately 0.3 feet of water breaks out in the overbank area.

Following is a list of items submitted as additional information and to support the revised Hec-2 modeling.

(a) One copy of the Application/Certification Form 1 (MT-2 Form 1, page 4 of 4).
(b) Bridge/Culvert Form (MT-2 Form 7) pedestrian crossings (three).
(c) Packet of forms to be replaced and/or inserted due to the revised HEC-2 modeling.
(d) Revised flood profile plot.
(e) Hard copy input/output of the HEC-2 modeling.
(f) One 3-1/2" diskette with HEC-2 input, output files.
(g) Series of photograph to show the fact how water is carried across the Stanford Drive.
(h) Topographic mapping information on the project area.
(i) As-built plans for the following elements of the flood control project : (1) sediment basin and the outlet structure, (2) channel from Stanford Drive to the sediment basin, and (3) pedestrian bridges (three).

Please do not hesitate to contact me for further information at (602)-506-1501.

Sincerely,

Hasan Mushtaq
Engineering Division

Coord : ~~HM~~ ~~RAC~~ ~~EAR~~ For Dave ~~DRJ~~ ~~RGN~~
Info : HM

FLOOD CONTROL DISTRICT
of
Maricopa County

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

BOARD OF DIRECTORS
Betsey Bayless
Ed King
Tom Rawles
Don Stapley
Mary Rose Garrido Wilcox

Michael Baker Jr., Inc.
3601 Eisenhower Avenue, Suite 600
Alexandria, Virginia 22304

Attn : Mr. Massoud Rezakhani

Re : LOMR Request for Echo Canyon Wash (Case No. 96-09-694P)
FCD Contract No. FCD 94-51
FIRM Map Panel 1690 E (9-30-95)

Dear Mr. Rezakhani :

This is in response to a letter, from Michael K. Buckley, P.E., Chief, Hazard Identification Branch, Mitigation Directorate, FEMA, dated May 6, 1996, for additional items required to complete the inventory of submitted materials. This request is for 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 :	Cudia City Wash Sediment Basin
Flooding Source :	Echo Canyon Wash
FIRM Panel Affected :	04013C1690 E

Following responses correspond to the items mentioned in the letter requesting additional information :

ITEM

1. An additional copy of the Application/Certification Form 1 (MT-2 Form 1, page 4 of 4), signed by the appropriate Town Official from the Town of Paradise Valley is submitted.

2. As-built plans for the following elements of the flood control project is included in this package : (1) Sediment Basin and the outlet structure, (2) Channel from Stanford drive to the sediment basin, (3) Pedestrian Bridges (three).

3. Based on the comments in ITEM (3) of your letter, the cross-sections in question have

been reviewed and revised accordingly. Mostly, the cross-sections were extended using the topographic information in conjunction with the survey details. Both the bridges at cross-sections 0.19 and 0.248 have flows in the overbank areas. To model this situation correctly, the BT records were extended, matching the GR data points on both right and left overbanks. As a result of these modifications, most of the cross-section extensions were eliminated, while others were reduced below 0.4 feet.

4. There are no structural measures to guide the floodwater into the channel downstream of Stanford Drive. Topographic information covering the Stanford Drive and Echo Canyon Wash confluence is submitted for the purposes of evaluation. Additionally, a series of photographs of the confluence is submitted. The results from the hydraulic analysis using HEC-2 also shows that there is negligible breakouts (< 0.1 feet) before and after the Stanford Drive. At cross-section 0.373, upstream of Stanford Drive, shows that approximately 0.3 feet of water breaks out in the overbank area.

Following is a list of items submitted as additional information and to support the revised Hec-2 modeling.

(a) One copy of the Application/Certification Form 1 (MT-2 Form 1, page 4 of 4).
(b) Bridge/Culvert Form (MT-2 Form 7) pedestrian crossings (three).
(c) Packet of forms to be replaced and/or inserted due to the revised HEC-2 modeling.
(d) Revised flood profile plot.
(e) Hard copy input/output of the HEC-2 modeling.
(f) One 3-1/2" diskette with HEC-2 input, output files.
(g) Series of photograph to show the fact how water is carried across the Stanford Drive.
(h) Topographic mapping information on the project area.
(i) As-built plans for the following elements of the flood control project : (1) sediment basin and the outlet structure, (2) channel from Stanford Drive to the sediment basin, and (3) pedestrian bridges (three).

Please do not hesitate to contact me for further information at (602)-506-1501.

Sincerely,

Hasan Mushtaq
Engineering Division

Enclosures

Copy to : Terri Miller, State Coordinator, NFIP
Arizona Department of Water Resources
500 North 3rd Street, Phoenix, Arizona 85004

Ray Acuna, Floodplain Administrator
City of Phoenix
200 West Washington Street, Phoenix, Arizona 85003

David George, Engineering Manager
David Evans and Associates, Inc.
2929 East Camelback Road, Suite 240, Phoenix, Arizona 85016

TRANSMITTAL

Date 5/31/96

To Hasan

File MARI 0008

Project Echo Canyon Wash

Subject

Item	Copies	Date	Description
1	2		Hard copy of Revised model HEC-2
2	1		Autocad plot of profile
3	1		Diskette

Remarks Hope this is everything

☑ As you requested
☐ For your information
☑ For your approval
☐ For your review
☐ Return requested
☐

From Teri Mintz

DAVID EVANS AND ASSOCIATES, INC.
A PROFESSIONAL SERVICES CONSULTING FIRM
IN OREGON, WASHINGTON, CALIFORNIA AND ARIZONA
2929 E. CAMELBACK ROAD, SUITE 240
PHOENIX, ARIZONA 85016-3446
(602) 956-9850 FAX (602) 956-9853

TRANSMITTAL

Date 5-16-96

To Hasan
MCFCD
2801 W. Durango St
Phoenix, AZ 85009

File MARI0008

Project Echo Canyon Wash

Subject

Item	Copies	Date	Description
1	1		Notebook (extra copy for you) containing updated pgs.
2	1		Set of updated pgs for FEMA
3	1		Your comments on Form 7
4	1		As-built dwg for D/S ped. crossing
5	1		Disk containing HEC-2, cover letter, & profile DWG

Remarks

FLOOD CONTROL DISTRICT
RECEIVED
MAY 16 1996

	CHENG		P & PM
	DEF		REG
	ADMIN		LMGT
	FINANCE		FILE
	C & M	1	HM
	ENGR		

REMARKS

☐ As you requested
☐ For your information
☑ For your approval
☐ For your review
☐ Return requested
☐

From Teri Mintz

DAVID EVANS AND ASSOCIATES, INC.
A PROFESSIONAL SERVICES CONSULTING FIRM
IN OREGON, WASHINGTON, CALIFORNIA AND ARIZONA
2929 E. CAMELBACK ROAD, SUITE 240
PHOENIX, ARIZONA 85016-3446
(602) 956-9850 FAX (602) 956-9853

TRANSMITTAL

Date 5/8/96

To Hasan
MCFCD

File MARI0008

Project Echo Canyon Wash

Subject Form 7

Item	Copies	Date	Description
1	1		Form 7 for each of the 3 bridges
2	1		Stamped 'As-built' plans for 2 smaller bridges

Remarks

☑ As you requested
☐ For your information
☑ For your approval
☐ For your review
☐ Return requested
☐

From Peri Muntz

DAVID EVANS AND ASSOCIATES, INC.
A PROFESSIONAL SERVICES CONSULTING FIRM
IN OREGON, WASHINGTON, CALIFORNIA AND ARIZONA
2929 E. CAMELBACK ROAD, SUITE 240
PHOENIX, ARIZONA 85016-3446
(602) 956-9850 FAX (602) 956-9853

FLOOD CONTROL DISTRICT
RECEIVED
MAY 08 1996
REMARKS

TRANSMITTAL

Date 5/7/96

To Hasan
MCFCD

File MARI0008

Project Echo Canyon Wash

Subject LOMR

Item	Copies	Date	Description
1	1		Forms 1, 2, 4, 5 + 6 and additional Form 1 pg 4 of 4 to add to another notebook to present to Paradise Valley for approval.
2	1		A 'better' copy of revised floodplain delineation.

Remarks

☑ As you requested
☐ For your information
☐ For your approval
☐ For your review
☐ Return requested
☐

From Teri Mintz

DAVID EVANS AND ASSOCIATES, INC.
A PROFESSIONAL SERVICES CONSULTING FIRM
IN OREGON, WASHINGTON, CALIFORNIA AND ARIZONA
2929 E. CAMELBACK ROAD, SUITE 240
PHOENIX, ARIZONA 85016-3446
(602) 956-9850 FAX (602) 956-9853

Federal Emergency Management Agency

Washington, D.C. 20472

FLOOD CONTROL DISTRICT
RECEIVED
MAY 10 1996
ENGRG | P&PM
OPS | REG
ADMIN | MAGT
FINANCE | FILE
HM
REMARKS
B

May 6, 1996

Mr. Hasan Mushtag
Project Manager
Engineering Division
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

IN REPLY REFER TO:
Case No.: 96-09-694P
Community: City of Phoenix, Arizona
Community No.: 040051

316-ACK

Dear Mr. Mushtag:

This is in response to your request dated April 15, 1996, for 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:	Cudia City Sediment Basin
Flooding Source:	Echo Canyon Wash
FIRM Panel Affected:	04013C2155 E wrong!

On October 1, 1992, the Federal Emergency Management Agency (FEMA) implemented the use of forms for requesting revisions or amendments to National Flood Insurance Program (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 assures that the requesters' submissions are complete and more logically structured, FEMA can complete its review in a shorter timeframe and at a lesser cost to the requester. While completion of the forms may appear to be burdensome, we believe it is prudent to do so because of the advantages that result for the requester.

As you may know, FEMA has implemented a procedure to recover costs associated with reviewing and processing requests for modifications to published flood information and maps. However, because your request is intended to show the effects of a publicly sponsored flood-control project that reduces flooding to existing development, no fees will be assessed for our review.

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

<u>ITEM</u>

1. Our review of the submitted information and the FIRM indicates that the proposed revisions will affect the Town of Paradise Valley, Arizona. A letter from a designated official from the Town acknowledging the revision request along Echo Canyon Wash

must be submitted. In lieu of a letter, the Town official may sign a copy of the submitted Application/Certification Form 1, entitled "Revision Requester and Community Official Form."

2. Please submit as-built plans, certified by a registered professional engineer, of all elements of the flood-control project including the sediment basin and its outlet structure, channel, and pedestrian bridges.

3. The output of the submitted post-project HEC-2 model shows "Cross Section Extended" messages at several cross sections upstream of the sediment basin. The cross-sectional geometry in the HEC-2 model should be extended to eliminate these messages. Topographic information must be provided in the overbank areas with adequate coverage to show whether the elevations in the overbank areas are higher or lower than the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) and whether areas of high ground separate the constructed channel and the overbank areas. If the ground elevations in the overbank areas are lower than the base flood elevations, then the high ground may be functioning as a levee. If this is the case, information must be submitted demonstrating that the levee meets the requirements of Section 65.10 of the NFIP regulations (copy enclosed). Also, if areas exist where floodwaters break out of the constructed channel, such as along the pedestrian walkways or other low-lying areas, information must be submitted quantifying the flood hazards associated with this breakout flooding.

4. Information must be submitted showing how the constructed channel collects floodwaters just downstream of Stanford Street. Such information may include topographic data that show the natural ground directs floodwaters into the channel. If structural measures are used to direct floodwaters into the channel, such as a diversion dike or floodwall, as-built plans, certified by a registered professional engineer, must be submitted. Information must be submitted showing that such structures meet the requirements of Section 65.10 of the NFIP regulations.

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 procedures.

Please direct all required data and questions concerning your request to our Technical Evaluation Contractor at the following address:

Michael Baker Jr., Inc.
3601 Eisenhower Avenue, Suite 600
Alexandria, Virginia 22304

Attention: Mr. Massoud Rezakhani
(703) 317-6239

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

If you have any questions concerning FEMA policy, or the NFIP in general, please contact Mr. John Magnotti of our staff in Washington, DC, either by telephone at (202) 646-3932 or by facsimile at (202) 646-4596.

Sincerely,

Michael Buckley

Michael K. Buckley, P.E., Chief
Hazard Identification Branch
Mitigation Directorate

Enclosure

cc: Ms. Terri Miller
Program Coordinator
Engineering Division
Arizona Department of Water Resources

Mr. Raymond U. Acuña, P.E.
Floodplain Manager
City of Phoenix Street Transportation Department

Mr. David George
Engineering Manager
David Evans & Associates, Inc.

MAY 0 3 1996

Michael K. Buckley, P.E., Chief
Hazard Identification Branch
Mitigation Directorate
Federal Emergency Management Agency
Washington, D.C. 20472

Attn : Mr. Joseph Bellini

Re : LOMR Request for Echo Canyon Wash (Case No. 96-09-694P)
FCD Contract No. FCD 94-51
FIRM Map Panel 1690 E (9-30-95)

Dear Mr. Bellini :

Please find attached document of "EASEMENT AND AGREEMENT FOR FLOOD CONTROL PURPOSES". The Phoenix Country Day School, an Arizona Corporation, is the owner of the property on which the Sediment basin and the Channel to convey flood water to the basin, in concern, is built. The Flood Control District of Maricopa County (District), has obtained a permanent easement and right-of-way. The specific purposes for which the right-of-way was obtained is described in the attached document. This document is being provided to you as per your verbal request on May 2, 1996.

Please do not hesitate to contact me further information at (602)-506-1501.

Sincerely,

Hasan Mushtaq
Engineering Division

Coord : HM PAC EAR
Info : HM

FLOOD CONTROL DISTRICT
of
Maricopa County

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

BOARD OF DIRECTORS
Betsey Bayless
Ed King
Tom Rawles
Don Stapley
Mary Rose Garrido Wilcox

APR 2 4 1996

April 15, 1996

Michael K. Buckley, P.E., Chief
Hazard Identification Branch
Mitigation Directorate
Federal Emergency Management Agency
Washington, D.C. 20472

Attn : Mr. John Magnotti

Re : LOMR Request for Echo Canyon Wash
FCD Contract No. FCD 94-51
FIRM Map Panel 1690 E (9-30-95)

Dear Mr. Buckley :

This is a request for a LOMR for the Echo Canyon Wash which flows in the south-westerly direction through the Town of Paradise Valley and the City of Phoenix and discharges into the Arizona Canal Diversion Channel (ACDC). The Echo Canyon Wash is currently delineated as AE zones.

The above referenced study contract was undertaken by David Evans & Associates, Inc., on behalf of the Flood Control District of Maricopa County

The following information is submitted in support of the LOMR request :

1. FEMA application form with annotated FIRM panel 1690 E.
2. A complete set of LOMR application forms.
3. A separate set of survey notes.
4. Flood insurance study work maps including the showing of the previous approximate delineation the Echo Canyon Wash.
5. Revised profile plot showing the match point location.
6. One copy of the reduced map at FIRM map scale (1 : 1000).
7. Hardcopy output of the duplicate effective and the revised HEC-2 models.

8. One 3-1/2" diskette with Duplicate effective HEC-2 model and the Revised HEC-2 model.

Since the study indicates that several residential and business properties within the current AE Zone will be removed from the redelineated floodplain, we request that an actual Letter of Map Revision with revised area map be issued.

Should additional information be required, please contact either Mr. David George, P.E., Engineering Manager, David Evans & Associates, Inc., at (602)-956-9850 or Hasan Mushtaq, Project Manager, Engineering Division of the Flood Control District of Maricopa County at (602)-506-1501.

Sincerely,

Hasan Mushtaq
Engineering Division

Enclosures

Copy to : Terri Miller, State Coordinator, NFIP
Arizona Department of Water Resources
500 North 3rd Street, Phoenix, Arizona 85004

Ray Acuna, Floodplain Administrator
City of Phoenix
200 West Washington Street, Phoenix, Arizona 85003

David George, Engineering Manager
David Evans & Associates, Inc.
2929 East Camelback Road, Suite 240, Phoenix, Arizona 85016

8. One 3-1/2" diskette with Duplicate effective HEC-2 model and the Revised HEC-2 model.

Since the study indicates that several residential and business properties within the current AE Zone will be removed from the redelineated floodplain, we request that an actual Letter of Map Revision with revised area map be issued.

Should additional information be required, please contact either Mr. David George, P.E., Engineering Manager, David Evans & Associates, Inc., at (602)-956-9850 or Hasan Mushtaq, Project Manager, Engineering Division of the Flood Control District of Maricopa County at (602)-506-1501.

Sincerely,

Hasan Mushtaq
Engineering Division

Enclosures

Copy to : Terri Miller, State Coordinator, NFIP
Arizona Department of Water Resources
500 North 3rd Street, Phoenix, Arizona 85004

Ray Acuna, Floodplain Administrator
City of Phoenix
125 East Washington Street, Phoenix, Arizona 85004

David George, Engineering Manager
David Evans & Associates, Inc.
2929 East Camelback Road, Suite 240, Phoenix, Arizona 85016

Coord : EAR PAC HM
Info : HM

4/24

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
2801 West Durango Street
Phoenix, Arizona 85009

(602) 506-1501

LETTER OF TRANSMITTAL

DATE 4/12/96	JOB NO.
ATTENTION TERRY MINTZ	
RE: FLYNN LANE WASH.	

TO DAVID EVANS & ASSOCIATES
2929 E. CAMELBACK RD.
210
PHOENIX, AZ 85016

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☑ AS BUILT

COPIES	DATE	NO.	DESCRIPTION
1	4/12/96	6	"AS BUILT" PLANS FOR ~~[illegible]~~ ACDC FROM MARYLAND TO OCCOTILLO RD.

THESE ARE TRANSMITTED as checked below:

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

REMARKS _____

COPY TO PAC.

SIGNED: [signature]

6910-009 R8-93

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

TRANSMITTAL

Date 4/9/96

To Hassan
FCDMC

File MAR10008

Project Echo Canyon Wash

Subject

Item	Copies	Date	Description
1	1		1" = 2000' Survey dwg

Remarks

FLOOD CONTROL DISTRICT
RECEIVED
APR 10 1996

	CHENG		P & PM
	DEF		DEG
	ADMIN		LMGT
	FINANCE		FLE
	O & M	1	Am
	ENGR		

REMARKS

- [x] As you requested
- [ ] For your information
- [ ] For your approval
- [ ] For your review
- [ ] Return requested
- [ ]

From Teri Mintz

DAVID EVANS AND ASSOCIATES, INC.
A PROFESSIONAL SERVICES CONSULTING FIRM
IN OREGON, WASHINGTON, CALIFORNIA AND ARIZONA
2929 E. CAMELBACK ROAD, SUITE 240
PHOENIX, ARIZONA 85016-3446
(602) 956-9850 FAX (602) 956-9853

TRANSMITTAL

Date 3/27/96

To Flood Control Dist. of MC
2801 W. Durango St
Phoenix, AZ 85009
Attn: Hasan

File MARI0011

Project Echo Canyon Wash
FCD Contract No. 94-51*3

Subject LOMR Submittal

Item	Copies	Date	Description
1	1		LOMR Package w/ Disk
2	1		Explanation of procedures
3	1		Previous 'Red Line' Comments

Remarks I hope this does it. If you have any more concerns, just call.

☐ As you requested
☐ For your information
☑ For your approval
☐ For your review
☐ Return requested
☐ _____

From Teri Mustiz

DAVID EVANS AND ASSOCIATES, INC.
A PROFESSIONAL SERVICES CONSULTING FIRM
IN OREGON, WASHINGTON, CALIFORNIA AND ARIZONA
2929 E. CAMELBACK ROAD, SUITE 240
PHOENIX, ARIZONA 85016-3446
(602) 956-9850 FAX (602) 956-9853

****
*** ACTIVITY REPORT ***
****

TRANSMISSION OK

TX/RX NO.	5469
TTI	ENGINEERING
CONNECTION TEL	916029569853
CONNECTION ID	
START TIME	03/26 10:35
USAGE TIME	01'34
PAGES	2
RESULT	OK

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

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

COVER SHEET

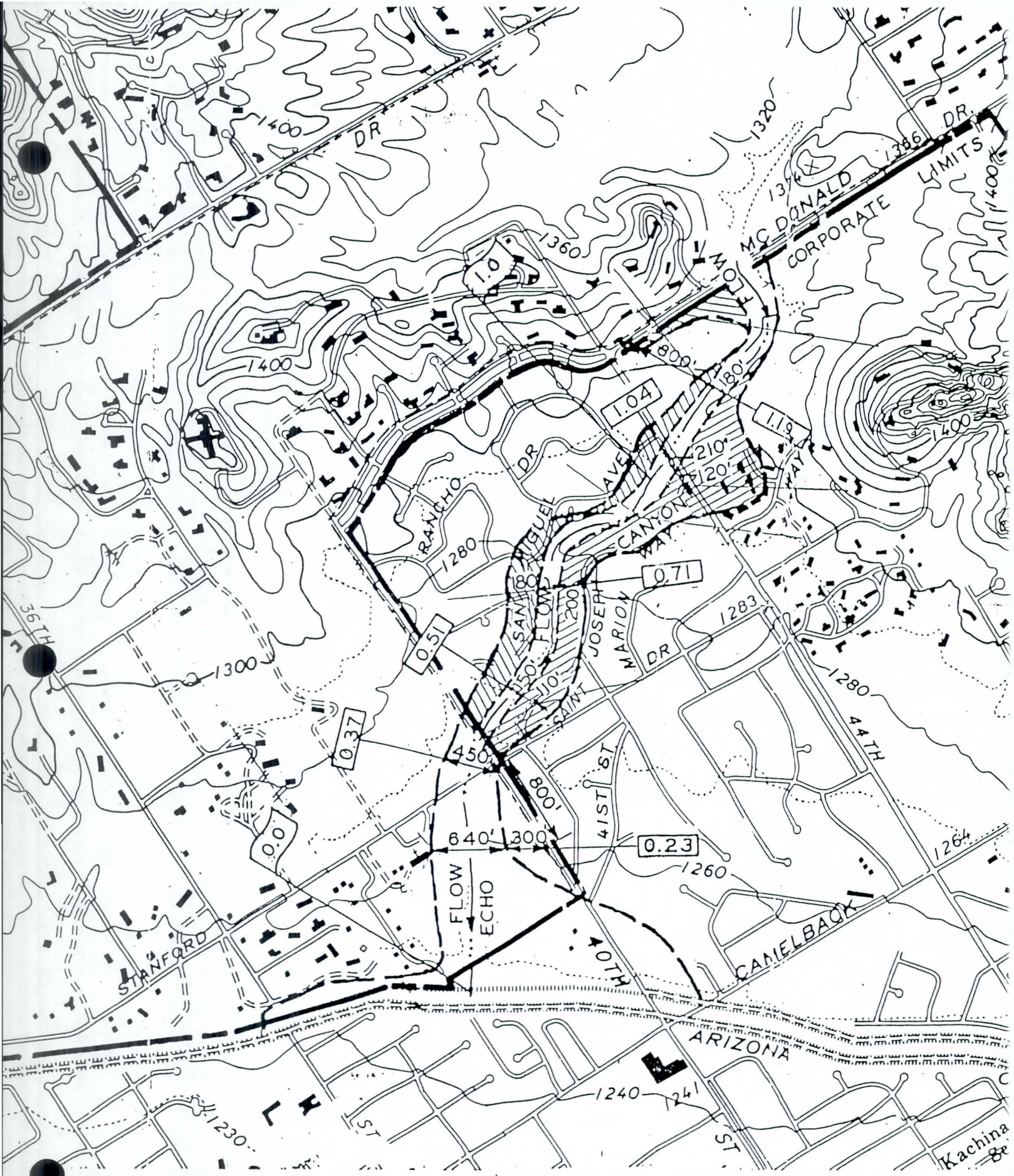
TO: TERRY MINTZ

Company or Department: DAVID EVANS & ASSOCIATES **Fax #** 9-1-602-957-9853

FROM: HASAN MUSHTAQ

Number of pages being sent including Cover Sheet: TWO (2)

Comments:


DR
1400
1320
1376
1366
DR.
MC DONALD
CORPORATE
LIMITS
1400
1360
1.0
MOUNT
1400
800'
180'
1.04
1.18
210'
120'
1400
DR
AVE
RANCHO
1280
SAN MIGUEL
CANYON
WAY
0.71
180'
200'
FLOW
JOSEPH
MARION
DR
1283
0.51
150'
110'
SAINT
36TH
1300
0.37
450'
1280
44TH
ST
41ST
800'
640'
300'
0.23
0.0
1264
1260
FLOW
ECHO
40TH
CAMELBACK
STANFORD
ARIZONA
1240
1241
1230
ST
ST
Kachina

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
2801 West Durango Street
Phoenix, Arizona 85009

(602) 506-1501

LETTER OF TRANSMITTAL

DATE	JOB NO.
3/21/96	FCD #
ATTENTION	TOM LUTE
RE:	RIO VERDE SOUTH

TO DAVID EVANS & ASSOC.
2929 E. CAMELBACK RD. # 240
PHOENIX AZ 85016

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☒ DIGITAL FLOODPLAIN / FLOODWAY INFORMATION.

COPIES	DATE	NO.	DESCRIPTION
1	3/21/96	1	3½ DISKETTE W/ FLOODPLAIN & FLOODWAY INFORMATION

THESE ARE TRANSMITTED as checked below:

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

REMARKS _____

COPY TO PAC

SIGNED: [signature]

6910-009 R8-93

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

TRANSMITTAL

Date 12/21/95 File MARI0008

To Maricopa County Flood Control
2801 West Durango St.
Phoenix, AZ 85009
ATTN: Pedro or Hassain

Project Echo Canyon Wash
Floodplain Delineation
FCD Contract No. 94-57

Subject Assignment No. #3
FEMA submittal

Item	Copies	Date	Description
1	1		FEMA Submittal Package
2	1		HEC-1 model & Watershed Map - For your information
3	1		Disk containing HEC-1 & 2 models

Remarks: Items that need to be done:

1) Operation & Maintenance Section (Form 1, Section 6) needs to be completed
2) Signature & Title of Revision Requestor & Community Official. Form 1, Pg 4 of 4
3) Make corrections to Input file for Duplicate Effective HEC-2 Model. I couldn't read #'s on our copy
4) Include 'best' Available copy of map showing previous study section locations. Our copy won't Reproduce well.
5) Include a copy of grading plans for Cudia City Wash Sediment Basin.
6) More input is needed for Form 6, Section 4 — Sediment Transport. These issues should have been addressed in design of sediment basin.

Remarks

☐ As you requested ☒ For your approval ☐ Return requested
☐ For your information ☒ For your review ☐

From Peri Mintz

DAVID EVANS AND ASSOCIATES, INC.
A PROFESSIONAL SERVICES CONSULTING FIRM
IN OREGON, WASHINGTON, CALIFORNIA AND ARIZONA
2929 E. CAMELBACK ROAD, SUITE 240
PHOENIX, ARIZONA 85016-3446
(602) 956-9850 FAX (602) 956-9853

RECEIVED
JUL 3 1 1996

INVOICE NO. 17-2807Revised

Client:	Flood Control District of Maricopa County 2801 West Durango Street Phoenix AZ 85009	Engineer:	David Evans and Associates, Inc. 2929 E Camelback Suite 240 Phoenix AZ 85016
Attn:	Richard P Harris		
	Invoice Date: July 10 1996	Phone:	(602) 956-9850
		Fax:	(602) 956-9853
Proj. Name:	Echo Canyon Wash Floodplain Delineation Study	Contact:	Roger E Baele
Project No:	MARI0008		

Period From May 26 1996 through June 29 1996

FCD Contract No. 94-51
FDC Activity No. 450-699-0450-4506

Fixed Fee Services		Contract	Prior Billing		Current Billing		Billing Total		Amount
	Task Description	Amount	% Com	Amount	% Com	Amount	% Com	Amount	Remaining
A. Survey	Supplemental Topo Survey	$ 2,595.00	100%	$ 2,595.00	0%	$ -	100%	$ 2,595.00	$ -
B. Engineering	N-Value Confirm/Field Trip	$ 560.00	100%	$ 560.00	0%	$ -	100%	$ 560.00	$ -
C.	HEC2 Model Development	$ 4,694.00	100%	$ 4,694.00	0%	$ -	100%	$ 4,694.00	$ -
D.	HEC1 Model Development	$ 1,629.00	100%	$ 1,629.00	0%	$ -	100%	$ 1,629.00	$ -
E.	Deliverables	$ 4,493.00	100%	$ 4,493.00	0%	$ -	100%	$ 4,493.00	$ -
		$ -	0%	$ -	0%	$ -	0%	$ -	$ -
	Subtotal: Fixed Fee	$ 13,971.00	100%	$ 13,971.00	0%	$ -	100%	$ 13,971.00	$ -

Non-Fixed Fee Services		Contract Upset Limit	Prior Billing		Current Billing		Billing Total		Amount
	Task Description	Amount	% Com	Amount	% Com	Amount	% Com	Amount	Remaining
	Addressed FEMA comments		0%	$ 1,251.74	0%	$ -	0%	$ 1,251.74	$ -
			0%	$ -	0%	$ -	0%	$ -	$ -
			0%	$ -	0%	$ -	0%	$ -	$ -
	Subtotal: Non-Fixed Fee	$ -	0%	$ 1,251.74	0%	$ -	0%	$ 1,251.74	$ -

Reimbursable Expenses			Prior Billing		Current Billing		Billing Total		
	Task Description	Amount	% Com	Amount	% Com	Amount	% Com	Amount	
	Printing			$ 28.62		$ 25.50		$ 54.12	
	Deliveries			$ 28.38		$ 7.29		$ 35.67	
	Mileage			$ 27.50		$ -		$ 27.50	
NTE $500.00	Subtotal: Reimbursable	$ -		$ 84.50		$ 32.79		$ 117.29	

Payment History		
	-	
This Period	$	32.79
1-30 Days	$	-
31-60 Days	$	-
61-90 Days		
Over 90 Days		
Total Due and Payable	$	32.79

Total Earned to Date	$15,340.03		
Previous Billings	$15,307.24		
Total Due this Period	$ -	$	32.79
Prior unpaid Balance	$ 1,355.87		
Payments this Period	$ 1,355.87		
Balance from prior Periods		$	-
Total Now Due and Payable		$	32.79

FLOOD CONTROL DISTRICT
RECEIVED
JUL 3 1 1996
REMARKS

Approved: CM	
PM	OM

INVOICE NO. 17-2807

Client:	Flood Control District of Maricopa County 2801 West Durango Street Phoenix AZ 85009	Engineer:	David Evans and Associates, Inc. 2929 E Camelback Suite 240 Phoenix AZ 85016
Attn:	Richard P Harris		
	Invoice Date: July 10 1996	Phone:	(602) 956-9850
		Fax:	(602) 956-9853
Proj. Name:	Echo Canyon Wash Floodplain Delineation Study	Contact:	Roger E Baele
Project No:	MARI0008		

Assign #3

Period From May 26 1996 through June 29 1996

FCD Contract No. 94-51

FDC Activity No. 450-699-0450-4506

Fixed Fee Services	Task Description	Contract Amount	Prior Billing % Com	Prior Billing Amount	Current Billing % Com	Current Billing Amount	Billing Total % Com	Billing Total Amount	Amount Remaining
A. Survey	Supplemental Topo Survey	$ 2,595.00	100%	$ 2,595.00	0%	$ -	100%	$ 2,595.00	$ -
B. Engineering	N-Value Confirm/Field Trip	$ 560.00	100%	$ 560.00	0%	$ -	100%	$ 560.00	$ -
C.	HEC2 Model Development	$ 4,694.00	100%	$ 4,694.00	0%	$ -	100%	$ 4,694.00	$ -
D.	HEC1 Model Development	$ 1,629.00	100%	$ 1,629.00	0%	$ -	100%	$ 1,629.00	$ -
E.	Deliverables	$ 4,493.00	100%	$ 4,493.00	0%	$ -	100%	$ 4,493.00	$ -
		$ -	0%	$ -	0%	$ -	0%	$ -	$ -
	Subtotal: Fixed Fee	$ 13,971.00	100%	$ 13,971.00	0%	$ -	100%	$ 13,971.00	$ -

Non-Fixed Fee Services	Task Description	Contract Upset Limit Amount	Prior Billing % Com	Prior Billing Amount	Current Billing % Com	Current Billing Amount	Billing Total % Com	Billing Total Amount	Amount Remaining
	Addressed FEMA comments		0%	$ 1,251.74	0%	$ 342.00	0%	$ 1,593.74	$ -
			0%	$ -	0%	$ -	0%	$ -	$ -
			0%	$ -	0%	$ -	0%	$ -	$ -
	Subtotal: Non-Fixed Fee	$ -	0%	$ 1,251.74	0%	$ 342.00	0%	$ 1,593.74	$ -

Reimbursable Expenses	Task Description	Amount	Prior Billing % Com	Prior Billing Amount	Current Billing % Com	Current Billing Amount	Billing Total % Com	Billing Total Amount	
	Printing		34.14	$ ~~28.62~~		$ 25.50		$ ~~54.12~~	57.64
	Deliveries			$ 28.38		$ 7.29		$ 35.67	
	Mileage			$ 27.50		$ -		$ 27.50	
NTE $500.00	Subtotal: Reimbursable	$ -		$ ~~84.50~~ 90.02		$ 32.79		$ ~~117.29~~ 122.81	

Payment History	
This Period	$ 374.79
1-30 Days	$ 1,355.87
31-60 Days	$ -
61-90 Days	
Over 90 Days	
Total Due and Payable	$ 1,730.66

Total Earned to Date	~~$15,682.03~~ 15,687.55	
Previous Billings	~~$15,307.24~~ 15,312.76	
Total Due this Period	$ -	$ 374.79
Prior unpaid Balance	$ 1,355.87	
Payments this Period	$ -	
Balance from prior Periods		$ 1,355.87
Total Now Due and Payable		$ 1,730.66

JUL 15 1996

RECEIVED
JUL 15 1996

Approved: CM	
PM	OM

JUL 10 1996

Roger E. Baele, P.E.
David Evans and Associates, Inc.
2929 East Camelback Road
Suite # 240
Phoenix, Arizona 85016-3446

SUBJECT : Echo Canyon Wash Floodplain Delineation FCD 94-51.

Dear Mr. Baele :

It is my understanding that the Flood Control District (DISTRICT) has been billed, by David Evans and Associates (CONSULTANT), in excess of the contracted amount ($14,471.00), for the above mentioned project. The grand total of the billings is exceeded by approximately $841.47. Based on the explanation provided in support of the additional work, I have forwarded my recommendation for this fund to be disbursed.

However, I would like to draw your attention to, Section V - Alteration in Scope of Work (pg. 2 of 7), of the contract FCD 94-51. It is specifically mentioned in this section that no additional work done or materials furnished, by the Consultant, shall commence prior to District approval, nor shall the Consultant claim for such items, unless authorized in writing in accordance with the Procurement Code. At the end of Section V it is also mentioned that "Any such work or materials furnished without prior authorization shall be at his own risk, cost, and expense and he hereby agrees that without such authorization he will make no claim for compensation for such work or materials furnished."

It is expected that both the CONSULTANT and the DISTRICT shall abide by the contract as specified and help avoid any possible violation of the contract terms in future. Thank you very much for your time and cooperation. Please do not hesitate to contact me at 506-1501 for further information.

Sincerely,

Richard Harris, P.E.
Engineering Division

Coord : RPH HM PAC EAR
Info : RPH HM

File: FCD 94-51

DAVID EVANS AND ASSOCIATES, INC.

TELECOPY TRANSMITTAL

2929 East Camelback Road
Suite 240
Phoenix, Arizona 85016
Tel: 602.956.9850
Fax: 602.956.9853

TO: HASAN MUSHTAQ
FAX NO: 506-4601
PHONE NO:
FIRM: FCDMC
OF PAGES: 3
FROM: DAVID GEORGE
REGARDING: ECHO CANYON WASH
DATE: 6/27/96

COPIES:

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

COMMENTS: LETTER EXPLAINING ADDITIONAL CHARGES TO PROJECT

INVOICE NO. 17-2733

Client: Flood Control District of Maricopa County
2801 West Durango Street
Phoenix AZ 85009
Attn: Richard P Harris

Engineer: David Evans and Associates, Inc.
2929 E Camelback Suite 240
Phoenix AZ 85016
Phone: (602) 956-9850
Fax: (602) 956-9853
Contact: Roger E Baele

Invoice Date: June 10 1996

Proj. Name: Echo Canyon Wash Floodplain Delineation Study
Project No: MARI0008

Assign # 3

Period From April 28 1996 through May 25 1996

FCD Contract No. 94-51
FDC Activity No. 450-699-0450-4506

Fixed Fee Services	Task Description	Contract Amount	Prior Billing % Com	Prior Billing Amount	Current Billing % Com	Current Billing Amount	Billing Total % Com	Billing Total Amount	Amount Remaining
A. Survey	Supplemental Topo Survey	$ 2,595.00	100%	$ 2,595.00	0%	$ -	100%	$ 2,595.00	$ -
B. Engineering	N-Value Confirm/Field Trip	$ 560.00	100%	$ 560.00	0%	$ -	100%	$ 560.00	$ -
C.	HEC2 Model Development	$ 4,694.00	100%	$ 4,694.00	0%	$ -	100%	$ 4,694.00	$ -
D.	HEC1 Model Development	$ 1,629.00	100%	$ 1,629.00	0%	$ -	100%	$ 1,629.00	$ -
E.	Deliverables	$ 4,493.00	98%	$ 4,403.14	2%	$ 89.86	100%	$ 4,493.00	$ -
		$ -	0%	$ -	0%	$ -	0%	$ -	$ -
	Subtotal: Fixed Fee	$ 13,971.00	99%	$ 13,881.14	1%	$ 89.86	100%	$ 13,971.00	$ -

Non-Fixed Fee Services	Task Description	Contract Upset Limit Amount	Prior Billing % Com	Prior Billing Amount	Current Billing % Com	Current Billing Amount	Billing Total % Com	Billing Total Amount	Amount Remaining
	Addressed FEMA comments		0%	$ -	0%	$ 1,251.74	0%	$ 1,251.74	$ -
			0%	$ -	0%	$ -	0%	$ -	$ -
			0%	$ -	0%	$ -	0%	$ -	$ -
	Subtotal: Non-Fixed Fee	$ -	0%	$ -	0%	$ 1,251.74	0%	$ 1,251.74	$ -

Reimbursable Expenses	Task Description	Amount	Prior Billing % Com	Prior Billing Amount	Current Billing % Com	Current Billing Amount	Billing Total % Com	Billing Total Amount	
	Printing			$ 28.62		$ 5.52		$ 34.14	
	Deliveries			$ 28.38		$ -		$ 28.38	
	Mileage			$ 18.75		$ 8.75		$ 27.50	
NTE $500.00	Subtotal: Reimbursable	$ -		$ 75.75		$ 14.27		$ 90.02	

Payment History	-
This Period	$ 1,355.87
1-30 Days	$ -
31-60 Days	$ -
61-90 Days	
Over 90 Days	
Total Due and Payable	**$ 1,355.87**

Total Earned to Date	$15,312.76	
Previous Billings	$13,956.89	
Total Due this Period	$ -	$ 1,355.87
Prior unpaid Balance	$ 854.26	
Payments this Period	$ 854.26	
Balance from prior Periods		$ -
Total Now Due and Payable		$ 1,355.87

FLOOD CONTROL DISTRICT
RECEIVED
JUN 07 1996

	CHENG		P & PM
	DEF		REG
	ADMIN		LMGT
	FINANCE		FILE
	OMM		
	OTHER		

REMARKS

RECEIVED
JUN 07 1996

Approved: CM	
PM	OM

May 19, 1996

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

RE: Echo Canyon Wash
Floodplain Delineation
DEA Job No. MARI0008

Dear Pedro,

The purpose of this letter is to explain the additional charges for work that was performed regarding the floodplain delineation of Echo Canyon Wash. As the contract between Flood Control District of Maricopa County and David Evans & Associates states, *DEA will prepare the floodplain work maps, technical analysis, design report, FEMA LOMR application forms, and submittal package to FEMA. These deliverables will be submitted to the Client for their review and comment. It is assumed the Client will submit the final package to FEMA.*

Changes that were made to the original LOMR application were addressed 4 times prior to the submittal to FEMA. The changes were from December 1995 to March 1996. The *additional* work that was performed was in response to comments received from FEMA. This additional work included:

1. Preparation of another LOMR submittal package which included an additional community acknowledgment form for the Town of Paradise Valley
2. Preparation of Form 7 (Bridge/Culvert Form) for each pedestrian crossing
3. Sealed As-built drawings for the pedestrian crossings
4. Revision of HEC-2 model to reduce vertical extension warnings to less than 0.5'
5. Update LOMR based on revisions to HEC-2 model
6. Update profile drawing based on revisions to HEC-2 model
7. Two meetings with Hasan to review comments

DAVID EVANS AND ASSOCIATES, INC.
A PROFESSIONAL SERVICES CONSULTING FIRM
OFFICES IN OREGON, WASHINGTON, CALIFORNIA AND ARIZONA
2929 E. CAMELBACK ROAD, SUITE 240
PHOENIX, ARIZONA 85016-3416
(602) 956-9850 FAX (602) 956-9853

The above work resulted in the following additional hours of work:

Project Engineer	25.5 Hrs
Drafter	2.5 Hrs
Total	28.0 Hrs

Should you have additional questions or concerns, please call Teri Mintz or myself. We will promptly address them for you.

Sincerely,
David Evans & Associates, Inc.

David W. George, P.E.
Project Manager

DAVID EVANS AND ASSOCIATES, INC.
A PROFESSIONAL SERVICES CONSULTING FIRM
OFFICES IN OREGON, WASHINGTON, CALIFORNIA AND ARIZONA
2929 E. CAMELBACK ROAD, SUITE 240
PHOENIX, ARIZONA 85016-3446
(602) 956-9850 FAX (602) 956-9853

STANDARD TASK ORDER FORM
TASK ORDER NO. 2
CONTRACT FCD 94-51

Re: General Surveying and Engineering Services between the

Flood Control District of Maricopa County (CLIENT) and

David Evans and Associates, Inc. (DEA) dated ~~March 13~~ OCTOBER 12, 1995.

Execution of this Task Order by CLIENT and DEA will serve as authorization for DEA to carry out and complete the services as set forth below in accordance with the referenced Agreement between CLIENT and DEA.

1. Scope of Services:
   See enclosed Exhibit "Scope of Services" for Echo Canyon Wash at AC/DC Floodplain Delineation Study.

2. Time Schedule for Performance of Services:
   The FEMA submittal package will be ready for submittal 60 days after notice to proceed, excluding Client review time.

3. Fees for Services: $14,471.00
   Not to Exceed ~~$16,275.00~~ per fee schedule in the Contract for Consulting Services. See enclosed Exhibit A for break-down of fee per task and resource.

4. Additional Provisions:
   In preparation of this Task Order, the following items were considered:

   A) Client is the Owner of the property or Agent for same.
   B) Client is to provide the best available Topographic Surveys to DEA.
   C) Client has requested and received from FEMA, all available existing data for the Echo Canyon Wash FEMA floodplain and has made that information available to DEA.
   D) Client is to provide As-Built data for the AC/DC improvements to DEA.

SCOPE OF SERVICES
ECHO CANYON WASH AT AC/DC
FLOODPLAIN DELINEATION STUDY
Phoenix, Arizona
DEA Proposal No. 95-188
October 12, 1995

ENGINEERING SERVICES

A) Supplemental Topographic Survey

The new HEC2 models will be developed based on the As-Built data for the AC/DC Cudia City Wash project and topographic mapping of the AC/DC Area Drainage Master Study. However, additional topography will be needed at the 40th Street and Stanford Drive wash crossings to clarify the existing conditions as well as such items as bridge deck elevations and thickness, pier locations and size, and toe of slope and top of blank elevations in the over bank area upstream of the sediment basin.

B) N-Value Confirmation/Field Trip

DEA will conduct a "field trip" to determine the appropriate Manning "n" value to be used in the preparation of the HEC2 model. The "field trip" will be documented with photographs and field notes.

C) HEC2 Model Development

DEA will prepare a HEC2 model using existing As-Built data and topographic information provided by the Client and existing FEMA data. The model will include the undeveloped reach starting at about 40th Street and ending at Stanford Drive. Downstream of Stanford Drive the balance of the wash has been improved as part of AC/DC Cudia City Wash project. The model will reflect the improvements including the lined low flow channel, grass playground facilities in the overbank area, the pedestrian bridges, the sediment basin, and the weir structure at the inlet to AC/DC spillway. Using the 100-year event peak flow value from the current FEMA floodplain model, a new model will be prepared based on the new topographic data and AC/DC improvements.

D) HEC1 Model Development

The sediment basin will function somewhat like a detention basin and use of HEC2 may not adequately analyze the floodplain conditions. DEA will prepare a HEC1 model for the sediment basin based on the 100-year, 6-hour event to estimate the limits of ponding. This will serve as a check to the HEC2 analysis or as the primary analysis depending on the results. The HEC1 model will use a stage-discharge relationship for the weir and pipe outlet structure. With the inflow hydrograph, the ponding limits can then be determined.

E) Deliverables

DEA will prepare the floodplain work maps, technical analysis, design report, FEMA LOMR application forms, and submittal package to FEMA. These deliverables will be submitted to the Client for their review and comment. It is assumed the Client will submit the final package to FEMA. It is understood that the Client will act as the FEMA coordinator for this project, responsible for all communications with FEMA with regards to this project.

EXHIBIT 'A'
FEE SCHEDULE
ECHO CANYON WASH AT AC/DC
FEMA FLOODPLAIN DELINEATION STUDY

DEA Proposal No. 95-188
October 17, 1995

TASK		PROJECT MANAGER	PROJECT SURVEYOR	2-MAN CREW	PROJECT ENGINEER	TECHNICIAN	DRAFTER	TASK TOTAL
Supplemental Topographic Survey		$240	$780	$1,575				$2,595
	Hours	*3.00*	*13.00*	*21.00*				*37.00*
N-Value Confirmation/Field Trip		$80			$480			$560
	Hours	*1.00*			*8.00*			*9.00*
HEC2 Model Development		$800			$3,300	$594		$4,694
	Hours	*10.00*			*55.00*	*18.00*		*83.00*
HEC1 Model Development		$240			$960	$429		$1,629
	Hours	*3.00*			*16.00*	*13.00*		*32.00*
Deliverables		$480			$1,920	$693	$1,400	$4,493
	Hours	*6.00*			*32.00*	*21.00*	*40.00*	*99.00*
COLUMN TOTALS		**$1,840**	**$780**	**$1,575**	**$6,660**	**$1,716**	**$1,400**	**$13,971**
	Hours	***23.00***	***13.00***	***21.00***	***111.00***	***52.00***	***40.00***	***260.00***

Allowance for Blueprinting, Xeroxing, and other incidental cost - Not to Exceed Fee (based on DEA cost plus 15% markup) $500

TOTAL FEE FOR PROJECT - Not to Exceed Fee **$14,471**

The above fees do not include agency review fee costs which are the responsibility of the Client to provide.

LETTER OF TRANSMITTAL

TO: Mr. Roger E. Baele, P.E.
David Evans and Associates, Inc.
2929 E. Camelback Rd., Ste.240
Phoenix, AZ 85016

DATE: October 23, 1995

RE: FCD Contract no. 94-51
Assignment no. 3: Echo Canyon Wash Floodplain Delineation Study

WE ARE SENDING YOU THE FOLLOWING ITEMS:
(X) Enclosed ( ) Under separate cover

	Shop Drawings		Prints		Legal Descriptions		Samples
	Specifications		Change Order		Copy of Letter		Plans
X	Notice to Proceed						
X	Certificate of Performance						
X	Floodplain Maps						

THESE ARE TRANSMITTED:

	For approval		Approved as submitted
X	For your use		Approved as Noted
	As requested		Returned for corrections
	Resubmit ___ copies for approval		For review and comments
	Submit ___ copies for distribution		Return ___ corrected prints
	FOR ESTIMATE DUE _____		Borrowed prints being returned

REMARKS: This transmittal is in regards to the Scope of Services dated 09/25/95 and Fee Schedule dated 10/17/95 (copies attached). The assignment number is now #3. Please specify assignment number on all correspondence.

SIGNED: Richard P. Harris
Richard P. Harris, P.E.

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

NOTICE TO PROCEED

TO: Mr. Roger E. Baele, P.E.
David Evans and Associates, Inc.
2929 E. Camelback Road, Suite 240
Phoenix, Arizona 85016

DATE: October 23, 1995

PROJECT: Assignment No. 3
TITLE: Echo Canyon Wash Floodplain Delineation Study
FCD CONTRACT NUMBER: 94-51
FCD ACTIVITY NUMBER: 450-699-0450-4506

Your Not-to-Exceed cost estimate of $14,471.00 for Assignment No. 3: Echo Canyon Wash Floodplain Delineation Study has been received and accepted for this project. You are hereby authorized to commence with the consulting work for the above referenced project as originally described in the Scope of Services dated September 25, 1995, and Fee Schedule dated October 17, 1995 (copies attached) as discussed with Pedro A. Calza of the District.

If at any time during the project you anticipate an increase above the original cost estimate shown here, you must provide the Flood Control District of Maricopa County with a detailed written explanation for your request for additional funds. The request will be reviewed and must be approved by authorized Flood Control District personnel before any additional payment amount is made.

I have enclosed a Certificate of Performance (C.O.P.) for this assignment. All deliverables should be directed to me for verification. When you have completed all the duties related to this assignment, the completed C.O.P. shall be returned with your invoice to Lovetta Henry.

Please contact me immediately if you have any questions or comments regarding the above information. Thank you for your cooperation and assistance in providing survey services for this project.

SIGNED: Richard P. Harris
Richard P. Harris, P.E.

coord: ma

cc: lh

file: rph

LETTER OF TRANSMITTAL

TO: Mr. Roger E. Baele, P.E.
David Evans and Associates, Inc.
2929 E. Camelback Rd., Ste.240
Phoenix, AZ 85016

DATE: October 23, 1995

RE: FCD Contract no. 94-51
Assignment no. 3 Echo Canyon Wash Floodplain Delineation Study

WE ARE SENDING YOU THE FOLLOWING ITEMS:
(X) Enclosed ( ) Under separate cover

	Shop Drawings		Prints		Legal Descriptions		Samples
	Specifications		Change Order		Copy of Letter		Plans
X	Notice to Proceed						
X	Certificate of Performance						
X	Floodplain Maps						

THESE ARE TRANSMITTED:

	For approval		Approved as submitted
X	For your use		Approved as Noted
	As requested		Returned for corrections
	Resubmit ___ copies for approval		For review and comments
	Submit ___ copies for distribution		Return ___ corrected prints
	FOR ESTIMATE DUE _____		Borrowed prints being returned

REMARKS: This transmittal is in regards to the Scope of Services dated 09/25/95 and Fee Schedule dated 10/17/95 (copies attached). The assignment number is now #3. Please specify assignment number on all correspondence.

SIGNED: Richard P. Harris
Richard P. Harris, P.E.

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

NOTICE TO PROCEED

TO: Mr. Roger E. Baele, P.E.
David Evans and Associates, Inc.
2929 E. Camelback Road, Suite 240
Phoenix, Arizona 85016

DATE: October 23, 1995

PROJECT: Assignment No. 3
TITLE: Echo Canyon Wash Floodplain Delineation Study
FCD CONTRACT NUMBER: 94-51
FCD ACTIVITY NUMBER: 450-699-0450-4506

Your Not-to-Exceed cost estimate of $14,471.00 for Assignment No. 3: Echo Canyon Wash Floodplain Delineation Study has been received and accepted for this project. You are hereby authorized to commence with the consulting work for the above referenced project as originally described in the Scope of Services dated September 25, 1995, and Fee Schedule dated October 17, 1995 (copies attached) as discussed with Pedro A. Calza of the District.

If at any time during the project you anticipate an increase above the original cost estimate shown here, you must provide the Flood Control District of Maricopa County with a detailed written explanation for your request for additional funds. The request will be reviewed and must be approved by authorized Flood Control District personnel before any additional payment amount is made.

I have enclosed a Certificate of Performance (C.O.P.) for this assignment. All deliverables should be directed to me for verification. When you have completed all the duties related to this assignment, the completed C.O.P. shall be returned with your invoice to Lovetta Henry.

Please contact me immediately if you have any questions or comments regarding the above information. Thank you for your cooperation and assistance in providing survey services for this project.

SIGNED: Richard P. Harris
Richard P. Harris, P.E.

coord: ma

cc: lh

file: rph

STANDARD TASK ORDER FORM
TASK ORDER NO. 2
CONTRACT FCD 94-51

Re: General Surveying and Engineering Services between the

Flood Control District of Maricopa County (CLIENT) and

David Evans and Associates, Inc. (DEA) dated ~~March 13~~ OCTOBER 12, 1995.

Execution of this Task Order by CLIENT and DEA will serve as authorization for DEA to carry out and complete the services as set forth below in accordance with the referenced Agreement between CLIENT and DEA.

1. Scope of Services:
   See enclosed Exhibit "Scope of Services" for Echo Canyon Wash at AC/DC Floodplain Delineation Study.

2. Time Schedule for Performance of Services:
   The FEMA submittal package will be ready for submittal 60 days after notice to proceed, excluding Client review time.

3. Fees for Services: $14,171.00
   Not to Exceed ~~$16,275.00~~ per fee schedule in the Contract for Consulting Services. See enclosed Exhibit A for break-down of fee per task and resource.

4. Additional Provisions:
   In preparation of this Task Order, the following items were considered:

   A) Client is the Owner of the property or Agent for same.
   B) Client is to provide the best available Topographic Surveys to DEA.
   C) Client has requested and received from FEMA, all available existing data for the Echo Canyon Wash FEMA floodplain and has made that information available to DEA.
   D) Client is to provide As-Built data for the AC/DC improvements to DEA.

SCOPE OF SERVICES
ECHO CANYON WASH AT AC/DC
FLOODPLAIN DELINEATION STUDY
Phoenix, Arizona
DEA Proposal No. 95-188
September 25, 1995

ENGINEERING SERVICES

A) Supplemental Topographic Survey

The new HEC2 models will be developed based on the As-Built data for the AC/DC Cudia City Wash project and topographic mapping of the AC/DC Area Drainage Master Study. However, additional topography will be needed at the 40th Street and Stanford Drive wash crossings to clarify the existing conditions as well as such items as bridge deck elevations and thickness, pier locations and size, and toe of slope and top of blank elevations in the over bank area upstream of the sediment basin.

B) N-Value Confirmation/Field Trip

DEA will conduct a "field trip" to determine the appropriate Manning "n" value to be used in the preparation of the HEC2 model. The "field trip" will be documented with photographs and field notes.

C) HEC2 Model Development

DEA will prepare a HEC2 model using existing As-Built data and topographic information provided by the Client and existing FEMA data. The model will include the undeveloped reach starting at about 40th Street and ending at Stanford Drive. Downstream of Stanford Drive the balance of the wash has been improved as part of AC/DC Cudia City Wash project. The model will reflect the improvements including the lined low flow channel, grass playground facilities in the overbank area, the pedestrian bridges, the sediment basin, and the weir structure at the inlet to AC/DC spillway.

D) HEC1 Model Development

The sediment basin will function somewhat like a detention basin and use of HEC2 may not adequately analyze the floodplain conditions. DEA will prepare a HEC1 model for the sediment basin based on the 100-year,

6-hour event to estimate the limits of ponding. This will serve as a check to the HEC2 analysis or as the primary analysis depending on the results. The HEC1 model will use a stage-discharge relationship for the weir and pipe outlet structure. With the inflow hydrograph, the ponding limits can then be determined.

E) Deliverables

DEA will prepare the floodplain work maps, technical analysis, design report, FEMA LOMR application forms, and submittal package to FEMA. These deliverables will be submitted to the Client for their review and comment. It is assumed the Client will submit the final package to FEMA. It is understood that the Client will act as the FEMA coordinator for this project, responsible for all communications with FEMA with regards to this project.

EXHIBIT 'A'
FEE SCHEDULE
ECHO CANYON WASH AT AC/DC
FEMA FLOODPLAIN DELINEATION STUDY

DEA Proposal No. 95-188
October 17, 1995

TASK		PROJECT MANAGER	PROJECT SURVEYOR	2-MAN CREW	PROJECT ENGINEER	TECHNICIAN	DRAFTER	TASK TOTAL
Supplemental Topographic Survey		$240	$780	$1,575				$2,595
	Hours	*3.00*	*13.00*	*21.00*				*37.00*
N-Value Confirmation/Field Trip		$80			$480			$560
	Hours	*1.00*			*8.00*			*9.00*
HEC2 Model Development		$800			$3,300	$594		$4,694
	Hours	*10.00*			*66.00*	*18.00*		*83.00*
HEC1 Model Development		$240			$960	$429		$1,629
	Hours	*3.00*			*16.00*	*13.00*		*32.00*
Deliverables		$480			$1,920	$693	$1,400	$4,493
	Hours	*6.00*			*32.00*	*21.00*	*40.00*	*99.00*
COLUMN TOTALS		$1,840	$780	$1,575	$6,660	$1,716	$1,400	$13,971
	Hours	*23.00*	*13.00*	*21.00*	*111.00*	*52.00*	*40.00*	*260.00*

Allowance for Blueprinting, Xeroxing, and other incidental cost - Not to Exceed Fee (based on DEA cost plus 15% markup) $500

TOTAL FEE FOR PROJECT - Not to Exceed Fee **$14,471**

The above fees do not include agency review fee costs which are the responsibility of the Client to provide.

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

I, Roger E. Baele,P.E, 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 David Evans and Associates, Inc. or its subcontractors in connection with the specific assignment described below and as authorized by the terms of the FCDMC contract 94-51 have been paid.

David Evans and Associates, Inc. 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 94-51 for Assignment No. 3: Echo Canyon Wash Floodplain Delineaton Study 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 _____, 1995.

_____

Signature

Title:_____

SUBSCRIBED AND SWORN TO before me this _____ day of _____, 199__.

_____

Notary Public

My Commission Expires:

ACCT INFO: 450-699-0450-4506

MESSAGE DISPLAY FOR RICHARD HARRIS

To: PAC
Cc: RPH
BML
MAL

F[redacted]: Richard Harris:TALOS
[redacted]mark: 02/22/96 11:08AM
Status: Previously read

Host: TALOS
Delivered: 02/22/96 11:08AM

Subject: Echo Canyon Wash FP Study

Message:
This is to confirm agreement with PAC regarding holding final payment for the subject work until FEMA grants the respective LOMA. This is being done to ensure that the consultant will adequately address any comments that FEMA may have. The total available for the assignment as of 2-22-96 is $1,368.37, less than %10 of the total cost. I spoke with David George, Manager, of the related consulting firm this morning and related our intentions. I assured him that if FEMA comments became extensive, that it may be possible to allot more money towards completion of the project. Please keep me posted regarding the status of this project. Let me know if you have any questions. THX!
Richard

LETTER OF TRANSMITTAL

TO: Mr. Roger E. Baele, P.E.
David Evans and Associates, Inc.
2929 E. Camelback Rd., Ste. 240
Phoenix, AZ 85016

DATE: January 25, 1996

RE: FCD Contract no. 94-51
Assignment no. 6: Flynn Lane Wash Floodplain Delineation Study

WE ARE SENDING YOU THE FOLLOWING ITEMS:
(X) Enclosed ( ) Under separate cover

	Shop Drawings		Prints		Legal Descriptions		Samples
	Specifications		Change Order		Copy of Letter		Plans
X	Notice to Proceed						
X	Certificate of Performance						

THESE ARE TRANSMITTED:

	For approval		Approved as submitted
X	For your use		Approved as Noted
	As requested		Returned for corrections
	Resubmit ___ copies for approval		For review and comments
	Submit ___ copies for distribution		Return ___ corrected prints
	FOR ESTIMATE DUE _____		Borrowed prints being returned

REMARKS: **Please specify assignment number on all correspondence.**
Floodplain work maps were provided on October 2, 1995
Work to be completed by March 25, 1996.

SIGNED: _____
Richard P. Harris, P.E.

When recorded mail to:

7-557

OFFICIAL RECORDS OF
MARICOPA COUNTY RECORDER
HELEN PURCELL
Recording Number
91-0461653

10/01/91 10:31

1 of 1 LARRY

This space reserved for recording

CAPTION HEADING:_____

DO NOT REMOVE

This is part of the official document.

(2) 273047-90

This document is being recorded to correct the legal description and cadastral map.

Revised: 3/8/88
When recorded, return to:

TITLE USA Company of Arizona 91 461653

88 319481

Flood Control District
of Maricopa County
3335 West Durango Street
Phoenix, Arizona 85009

EASEMENT AND AGREEMENT FOR FLOOD CONTROL PURPOSES

Project: Arizona Canal Diversion Channel
Item: T-557
Assessor Parcel No.: 170-09-001A and 001B

Phoenix Country Day School, an Arizona Corporation, GRANTOR, FOR AND IN CONSIDERATION of the sum of Six Hundred Sixty-Four Thousand One Hundred and no/100 Dollars ($664,100), and other valuable consideration, the receipt and sufficiency of which are hereby acknowledged, does hereby grant and convey to the FLOOD CONTROL DISTRICT OF MARICOPA COUNTY, a municipal corporation and political subdivision of the State of Arizona, GRANTEE, its agent(s), contractor(s), successor(s) and assign(s), a permanent easement and right-of-way for the following purposes, namely: The right to enter upon the hereinafter described land and survey, clear, grade, level, fill, inundate, drain; and to build, operate and maintain a flood control project, including incidental flood control and drainage purposes, together with such roads, pipes, culverts, ramps, cuts and service utilities as may be necessary, on, over, under, and across the ground embraced within the right-of-way situated in the County of Maricopa, State of Arizona, and described as follows:

See Exhibit "A"

To have and to hold the said easement and right-of-way unto the GRANTEE, its agent(s), contractor(s), successor(s) and assign(s) forever, together with the right of ingress and egress to permit the operation and maintenance of said flood control project and all incidents thereto, and together with the express and implied right to authorize, permit, and license

This document needs to be re-recorded to correct the legal description and cadastral map.

RECORDED IN OFFICIAL RECORDS
OF MARICOPA COUNTY, ARIZONA
JUN 30 '88 -10 00
KEITH POLETIS, County Recorder
FEE N/C PGS 6 I.G.

the use thereof, in whole or in part, for incidental flood control and drainage purposes as solely determined by the GRANTEE and to exclude all other uses not agreed to in writing by GRANTEE;

RESERVING, however, to the GRANTOR their heirs and assigns, such rights and privileges as may be used and enjoyed without interfering with or abridging the rights and easement hereby granted; provided that any use of the land by the GRANTOR, their heirs and assigns shall be subject to all applicable Federal, State, and local laws and ordinances with respect to pollution and land use including but not limited to floodplain regulations.

The GRANTOR hereby covenants and warrants that it is lawfully seized and possessed on this aforementioned tract or parcel of land; that it has a good and lawful title and right to sell and convey it; and that it shall warrant the title and quiet possession thereto against the lawful or unlawful claim of all persons, subject to non-conflicting easements of record.

GRANTOR acknowledges its intention to install recreational, landscape, and aesthetic improvements to the subject property. GRANTOR shall be responsible for all repair and maintenance of its improvements and all routine maintenance and clean up of the subject property. GRANTOR agrees that no structures for human habitation shall be constructed or maintained on the land; and, that no other structures shall be constructed and no excavation shall be conducted and no landfill placed on the land except as may be approved in writing by the GRANTEE.

GRANTEE shall be responsible for removal of significant accumulated silt deposits and debris resultant from major flows for the effective functioning of the project. GRANTEE is expressly held harmless for any damage to improvements of the GRANTOR, installed subsequent to completion of construction of the flood control project, or other costs, caused solely as a result of flows negligently diverted by GRANTEE on or across the subject property or caused by the proper functioning of the flood control project.

GRANTOR agrees to and shall indemnify and save harmless GRANTEE, its officers and employees from and against all loss, expense, damage or claims of any nature or description, whatsoever, arising from any injuries to or death of persons, or damages to or destruction of any property which may occur on the subject property or in any way connected with the performance or nonperformance of the Easement, except such injury or damage as shall have been occasioned solely by the negligence of GRANTEE.

The said easement includes the right to remove trees and other vegetation and to cut back and trim such portion of the branches and tops of the trees now growing or that may hereafter grow upon the above described premises, or cut back and trim those which may extend over said flood control project, so as to prevent the same from interfering with the efficient maintenance and operation of said flood control project.

NOW, THEREFORE, in consideration of the same and further consideration hereinafter set forth, it is agreed that this instrument contains the entire agreement between the parties hereto, there being no further consideration paid than herein specified.

GRANTOR:

Robert L. Matia, President Bd. of Trustees
Phoenix Country Day School, an Arizona Corporation

STATE OF ARIZONA)
) ss
COUNTY OF MARICOPA)

The foregoing instrument was acknowledged before me this 2nd day of June, 1988 by ROBERT L. MATIA whose title is PRESIDENT, BOARD OF TRUSTEES, of Phoenix Country Day School, an Arizona Corporation, on behalf of the corporation.

My Commission Expires July 23, 1990

Ralph F. Scism
Notary Public

91 461603

88 319481

RECOMMENDED FOR APPROVAL

D. E. Sagramoso 6-3-88

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

Edward D. Opstein 6-3-88

Edward D. Opstein, Chief Date
Land Management Division

ACCEPTED AND APPROVED
BOARD OF DIRECTORS
FLOOD CONTROL DISTRICT OF
MARICOPA COUNTY

Thomas L. Freestone

Chairman of the Board

ATTEST: Irene Pennington

Clerk of the Board

Date JUN 06 1988

91 461653

FINAL
4-19-88

ARIZONA CANAL DIVERSION CHANNEL
T-557; 170-9-1A, 1B
Phoenix Country Day School

88 319451

FCD Booked
FANNIN
11/5/87
Checked
11/5/87
Approved
11/5/87

A portion of the Northeast quarter of the Southeast quarter (NE4SE4) of Section 13, T2N, R3E, G&SRB&M, Maricopa County, Arizona, described as follows; Beginning at the Southwest corner of said NE4SE4; thence along the South line of said NE4SE4 North 89°53'30" East 394.27' to a point of curve; thence Northeasterly along a tangential curve to the left, having a radius of 354.45' an arc distance of 369.31' to a point of tangency; thence North 30°11'35" East 215.09'; thence North 26°53'40" East 347.58'; thence North 30°11'35" East 193.00'; thence North 10°09'24" East 218.90'; thence North 00°02'29" West 286.82' to the North line of said NE4SE4; thence along said North line South 89°47'40" West 210.00'; thence South 00°02'29" East 229.49'; thence South 36°16'01" West 194.47'; thence South 27.26'; thence West 20.00'; thence South 36°16'01" West 102.50'; thence South 61°09'25" West 116.62'; thence South 30°11'35" West 260.00'; thence South 63°43'02" West 154.46'; thence South 80°15'28" West 328.65' to a point on the West line of said NE4SE4 which bears North 440.00' from the Southwest corner of said NE4SE4; thence along said West line South 440.00' to the Point of Beginning.

CONTAINING 633,050 square feet or 14.5328 acres more or less.

11/05/87

T-557

T-557

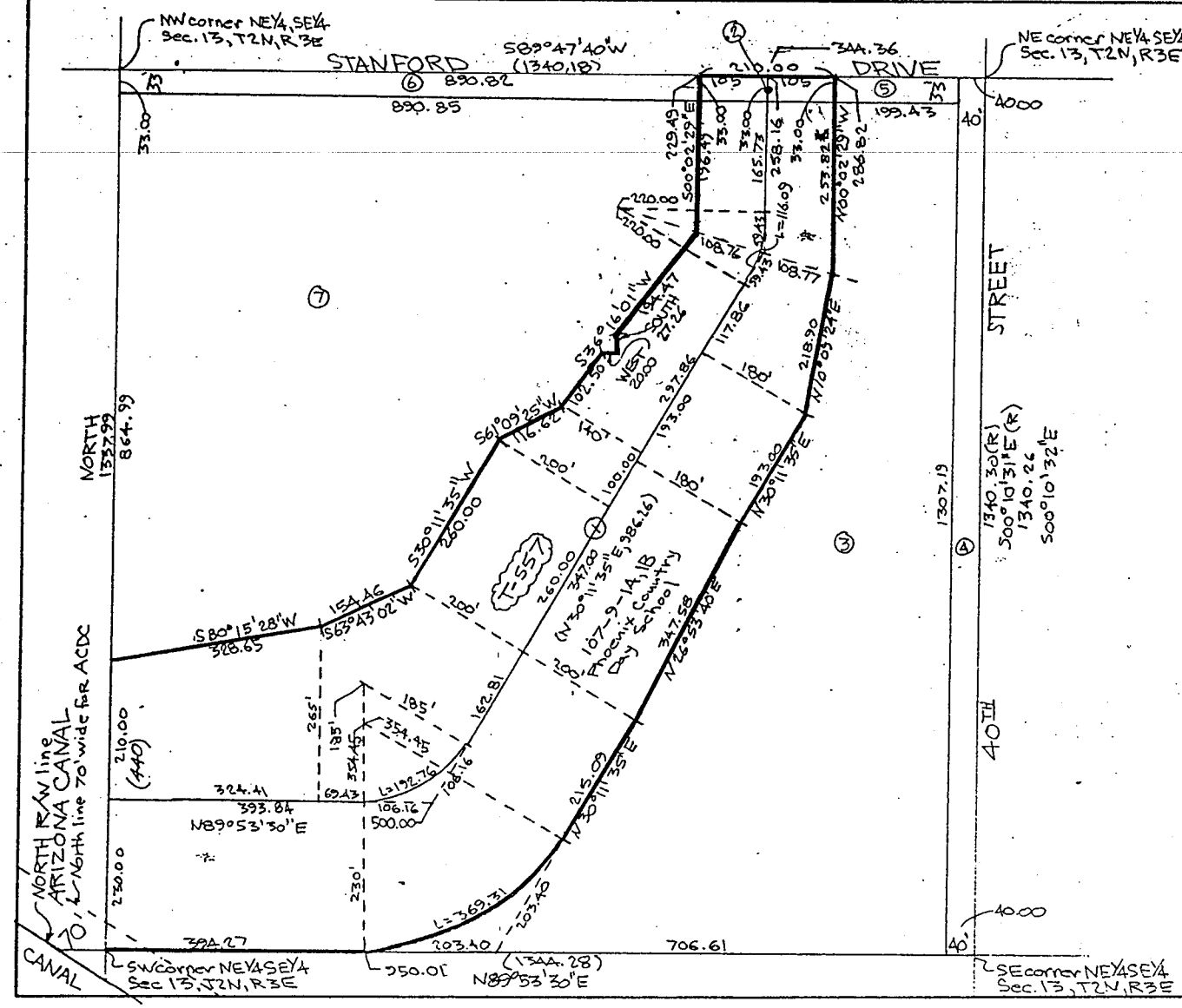
NE¼ SE¼ Sec. 13, T2N, R3E

FINAL

4-19-88

SCALE 1" = 200'

N



	Parcel	Sq. ft.	Acres
①	EXCEPT N.33' T-557	626,120	14.37
②	N.33' of T-557	6,930	0.1591
①-②	Total T-557	633,050	14.5328
③	E. side EXCEPT N33' E40'	498,589	11.4460
④	E.40'	53,609	1.2307
⑤	N.33' E side of T-557	6,580	0.1511
⑥	N.33' W. side of T-557	29,397	0.6749
⑦	W. side EXCEPT N.33'	576,186	13.2274
③⑦	Total Remainder	1,164,361	26.7301

FLOOD CONTROL DISTRICT of Maricopa Coun

ARIZONA CANAL DIVERSION CHANNEL

NE¼ SE¼ Sec. 13, T2N, R3E

T-557

170-9-1A, 1B

Phoenix Country Day School

drawn by: FANJN	checked:	approved:	sheet 1 of 1
date: 11-5-87	date:	date:	

Exhibit "A"
Page 2 of 2

88 319451

91 461653

Its Board of Trustees
Phoenix Country Day School, an
Arizona Corporation.

has been corrected and attached to Easement and
Agreement (Recorders #88-319481) for re-recording.

ARIZONA CANAL DIVERSION CHANNEL
T-557-PCE; 170-9-1A,1B
Phoenix Country Day School

91 461653

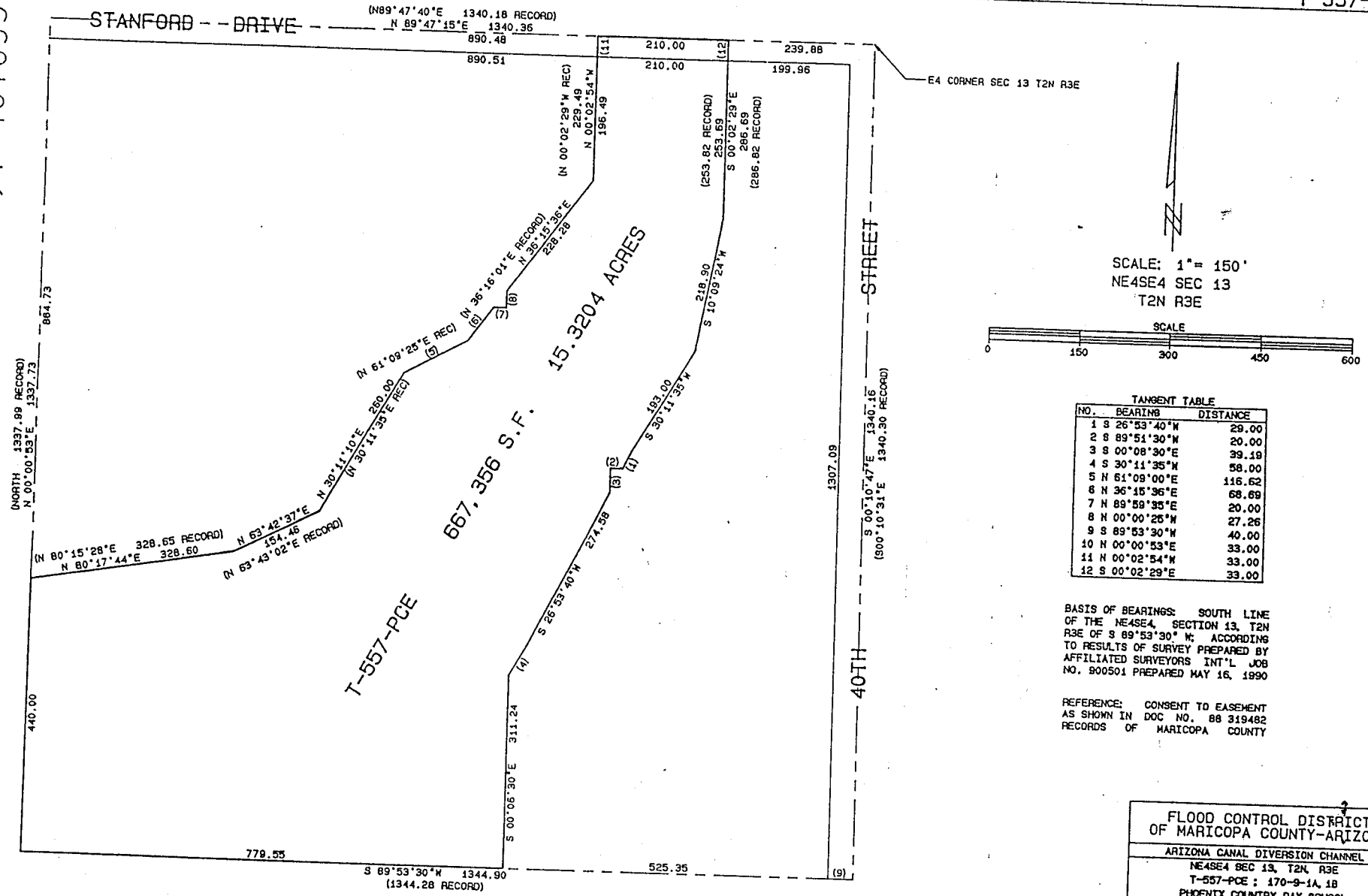
That portion of the Northeast quarter of the Southeast quarter (NE4SE4) of Section 13, T2N, R3E, G&SRB&M, Maricopa County, Arizona, described as follows: Commencing at the East quarter corner of said section; thence along the North line of said NE4SE4 South 89°47'15" West (S 89°47'40" W according to Consent to Easement shown in Document Number 88 319482, records of Maricopa County) 239.88' to the TRUE POINT OF BEGINNING; thence South 00°02'29" East 286.69' (286.82' record); thence South 10° 09'24" West 218.90'; thence South 30°11'35" West 193.00'; thence South 26°53'40" West 29'; thence South 89°51'30" West 20.00'; thence South 00°08'30" East 39.19'; thence South 26°53'40" West 274.58'; thence South 30°11'35" West 58'; thence South 00°06'30" East 311.24' to the South line of said NE4SE4; thence along said South line, South 89°53'30" West 779.55' to the Southwest corner of said NE4SE4; thence along the West line of said NE4SE4, North 00°00'53" East (North record) 440.00'; thence North 80°17'44" East 328.60' (N 80°15'28" E 328.65 record); thence North 63°42'37" East (N 63°43'02" E record) 154.46'; thence North 30°11'10" East (N 30°11'35" E record) 260.00'; thence North 61°09'00" East (N 61°09'25" E record) 116.62'; thence North 36°15'36" East (N 36°16'01" E record) 68.69'; thence North 89°59'35" East 20.00'; thence North 00°00'25" West 27.26'; thence North 36°15'36" East (N 36°16'01" E record) 228.28'; thence North 00°02'54" West (N 00°02'29" W record) 229.49' to the North line of said NE4SE4; thence along said North line, North 89°47'15" East (N 89°47'40" E record) 210.00' to the TRUE POINT OF BEGINNING. Containing 667,356 square feet or 15.3204 acres, more or less.

Flood Control District of Maricopa County; AZ			
PRELIMINARY: 11/05/87 Revised: 10/12/89; 06/07/90		**FINAL:**	

Exhibit "A"

T-557-PCE

Exhibit "A" Page 2 of 2



SCALE: 1"= 150'
NE4SE4 SEC 13
T2N R3E

SCALE
0 150 300 450 600

TANGENT TABLE

NO.	BEARING	DISTANCE
1	S 26°53'40"W	29.00
2	S 89°51'30"W	20.00
3	S 00°08'30"E	39.19
4	S 30°11'35"W	58.00
5	N 61°09'00"E	116.62
6	N 36°15'36"E	68.69
7	N 89°59'35"E	20.00
8	N 00°00'25"W	27.26
9	S 89°53'30"W	40.00
10	N 00°00'53"E	33.00
11	N 00°02'54"W	33.00
12	S 00°02'29"E	33.00

BASIS OF BEARINGS: SOUTH LINE OF THE NE4SE4, SECTION 13, T2N R3E OF S 89°53'30" W; ACCORDING TO RESULTS OF SURVEY PREPARED BY AFFILIATED SURVEYORS INT'L JOB NO. 900501 PREPARED MAY 16, 1990

REFERENCE: CONSENT TO EASEMENT AS SHOWN IN DOC NO. 88 319482 RECORDS OF MARICOPA COUNTY

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY-ARIZONA

ARIZONA CANAL DIVERSION CHANNEL
NE4SE4 SEC 13, T2N, R3E
T-557-PCE : 170-9-1A, 1B
PHOENIX COUNTRY DAY SCHOOL

PRELIMINARY: 06-07-90 JOHN SVECHOVSKY
REVISED:
FINAL:

91 461653

has been corrected and attached to Easement and Agreement (Recorders #88-319481) for Re-recording.

Its Vice President, Board of Trustees of Phoenix Country Day School, an Arizona Corporation.

Embankment and Reservoir Area

10. Inspection and maintenance.-- The superintendent shall perform periodic inspections and maintenance and shall complete inspection checklist as shown in Exhibit E. Maintenance work is described in the following paragraphs.

a. Embankment.-- Maintenance methods for repair or reconstruction of the embankments shall depend upon the nature and extent of the damaged section. If the embankment damage is small, sand and gravel or other coarse granular material may be placed in 6-inch layers to restore the embankment. If the damage is large, the fill shall be made in the same manner as the original construction. Homogenous material from borrow pits approved for the project shall be placed in uniform horizontal layers not more than 6 inches in depth and compacted to a density equal to the original embankment section. (See Exhibit C.)

b. Stonework.-- Stonework on the upstream and downstream side and the toes and rock paved gutters shall be repaired promptly. An indication of settlement, uplift, or failure of the stonework structures shall be reported to the Corps of Engineers, for recommendation on remedial action.

c. Burrowing animals.-- Burrowing animals in or near the dam shall be exterminated. Their runways and dens shall be opened, backfilled and the backfill thoroughly compacted. Trapping and poisoning may be used for extermination of burrowing animals. Information about the best methods of animal extermination may be obtained from the County Agricultural Agent.

d. Access and service roads.-- Access and service roads shall be adequately maintained for vehicular travel so that maintenance of the project and flood-fighting operations will be facilitated.

e. Fences.-- Maintenance of the safety guard fences shall include:

(1) Line posts to be firmly set and gates hung in good alignment.

(2) Barbed wire tight and broken strands repaired.

(3) Corner posts, gate posts, and braces firmly set.

(4) All barricades shall be kept intact to prevent unauthorized traffic from traversing the maintenance roads and rights-of-way.

f. Hazardous obstructions.-- Dam area used by authorized personnel shall be kept free from obstructions that may cause injury or impede inspection, maintenance, or flood-fighting operations. Material and equipment shall be stored in such a way that they are not hazardous to personnel.

Outlet Works and Spillway

11. Inspection and maintenance.-- The Superintendent or his assistant shall periodically inspect the full length of the outlet pipe and shall complete an inspection checklist shown as Exhibit E. Any cracks in the pipe shall be reported in relation to the nearest station. Damaged concrete or stonework structures shall be reported and repaired. Broken concrete surfaces and exposed reinforcement steel shall be thoroughly cleaned by chipping or sandblasting and shall be restored to the original dimensions. Any indication of settlement, uplift, failure of concrete structure shall be immediately reported to the Corps of Engineers. Channels shall be kept reasonably free of driftwood, trash, silt, and other debris. Driftwood, brush, weeds, and other combustible trash on the project, expecially around the entrance to the intake structure, shall be removed from the intake structure.

12. Landscaping.-- The dam has been landscaped to enhance its appearence. A screen of plants in groups along Northern Avenue frames and gives a window effect to passing motorists. A scattering of plant materials along the access road and along the mountains on the right and left abutment was designed soley for the enhancement of the area. Trees, shrubs, and cacti are native to Arizona, when adapted to the present location will need no maintenance.

Flood Control District of Maricopa County

Operations and Maintenance Branch
Operational Inspection Report

Structure: ACDC Reach 10

Inspection Date: 7-18-95

Inspector: C. Darke

Recent Rainfall: Yes [ ] No [X]

1.	Principal Outlet clear and free of debris?	Yes [X]	No [ ]	N/A [X]
2.	Were all side and drop inlets clear and free of debris?	Yes [X]	No [X] ?	N/A [X]
3.	Were all vegetative outlets clear and free of debris?	Yes [ ]	No [ ]	N/A [X]
4.	Were all valves operated, lubricated, and free of debris?	Yes [ ]	No [ ]	N/A [X]

Station of valves checked:

5. Position valves were left in: [ ] Open [ ] Closed [ ] Partial. If partial

How much? [ ] ¼ [ ] ⅓ [ ] ½ [ ] ⅔

Kevin Dubose is aware + has documentation

	No.	Yes
Surface cracks?	[ ]	[X]
Slumping or cracking on the upstream or downstream side?	[X]	[ ]
Erosion from runoff, wave action, or traffic?	[X]	[X]
Embankment/spillway seepage? Muddy water?	[X]	[ ]
Top of the dam settled?	[X]	[ ]
Loss of rip rap?	[X]	[ ]
Pipe joint separation?	[X]	[ ]
Signs, missing, damaged, or additional signs needed?	[ ]	[X]
[illegible]ng damaged?	[X]	[ ]

	No.	Yes
Spillways blocked?	[X]	[ ]
Trees or unwanted vegetation on embankment or crest?	[X]	[ ]
Signs of gopher/ant activity?	[X]	[ ]
Concrete deterioration or cracks?	[ ]	[X]
Exposed metal rusty?	[X]	[ ]
Cracks or uneven movement?	[ ]	[X]
Scour?	[X]	[ ]
Access gates damaged?	[X]	[ ]
Any hazardous conditions noticed?	[X]	[X]

Kevin Aware of it

List comments on reverse side

Comments: 19th ST N. BANK — CURBING NEEDS TO BE FINISHED AS PER W.O.

Between 16th - 17th ST BRIDGE OVER ACDC - PAVEMENT SLUMPING UNDER IT'S OWN WEIGHT - SEVERE CRACKING IN BIKE PATHS. NEED SOME KIND OF WARNING SIGNS TO LET SWEEPERS etc KNOW CHANNEL BOTTOM ENDS AT 40th ST. BASIN: ALSO WARNING SIGNS AROUND CHANNEL BOTTOM INLET AT 40th ST.

G. Drake
Signature (Team Leader)

mlt/dms

Rev. 10/92

Flood Control District of Maricopa County

Operations and Maintenance Branch
Operational Inspection Report

Structure: _____

Inspection Date: _____

Inspector: _____

Recent Rainfall: Yes [ ] No [ ]

1.	Principal Outlet clear and free of debris?	Yes [ ]	No [ ]	N/A [ ]
2.	Were all side and drop inlets clear and free of debris?	Yes [ ]	No [ ]	N/A [ ]
3.	Were all vegetative outlets clear and free of debris?	Yes [ ]	No [ ]	N/A [ ]
4.	Were all valves operated, lubricated, and free of debris?	Yes [ ]	No [ ]	N/A [ ]

Station of valves checked:

5. Position valves were left in: [ ] Open [ ] Closed [ ] Partial. If partial

How much? [ ] ¼ [ ] ⅓ [ ] ½ [ ] ⅔

	No.	Yes
Surface cracks?	[ ]	[ ]
Slumping or cracking on the upstream or downstream side?	[ ]	[ ]
Erosion from runoff, wave action, or traffic?	[ ]	[ ]
Embankment/spillway seepage? Muddy water?	[ ]	[ ]
Top of the dam settled?	[ ]	[ ]
Loss of rip rap?	[ ]	[ ]
Pipe joint separation?	[ ]	[ ]
Signs, missing, damaged, or additional signs needed?	[ ]	[ ]
Fencing damaged?	[ ]	[ ]

	No.	Yes
Spillways blocked?	[ ]	[ ]
Trees or unwanted vegetation on embankment or crest?	[ ]	[ ]
Signs of gopher/ant activity?	[ ]	[ ]
Concrete deterioration or cracks?	[ ]	[ ]
Exposed metal rusty?	[ ]	[ ]
Cracks or uneven movement?	[ ]	[ ]
Scour?	[ ]	[ ]
Access gates damaged?	[ ]	[ ]
Any hazardous conditions noticed?	[ ]	[ ]

List comments on reverse side

6. Comments:

_____

_____

_____

_____

_____

_____

_____

_____
Signature (Team Leader)

mlt/dms

Rev. 10/92

OPERATIONAL INSPECTIONS SCHEDULE - 1996				
O&M INSPECTION	1/17/96 OPER. INSP.	4/17/96 OPER. INSP.	7/17/96 OPER. INSP.	10/16/96 OPER. INSP.
SADDLEBACK FRS		X	X	X
SADDLEBACK FLOODWAY		X	X	X
HARQUAHALA FRS		X	X	X
HARQUAHALA FLOODWAY		X	X	X
CENTENNIAL DIVERSION		X	X	X
DYSART DRAIN		X	X	X
ELMIRAGE DRAIN		X	X	X
48TH STREET DRAIN		X	X	X
ALMA SCHOOL DRAIN		X	X	X
AGUA FRIA FLOODWAY		X	X	X
INDIAN SCHOOL DRAIN		X	X	X
ADOBE DAM		X	X	X
DREAMY DRAW DAM		X	X	X
CAVE BUTTES AND CAVE CREEK DAMS		X	X	X
SCATTER WASH (BEARDSLEY TO 43RD AVE)		X	X	X
NEW RIVER DAM		X	X	X
SKUNK CREEK AT I-17		X	X	X
McMICKEN DAM	X		X	X
McMICKEN FLOODWAY	X		X	X
SUNSET FRS	X		X	X
SUNNY COVE FRS	X		X	X
SUNSET/SUNNY COVE PIPELINE	X		X	X
OLD CROSS-CUT CANAL	X		X	X
IBW INLET AND INTERCEPTOR	X		X	X
IBW OUTLET	X		X	X
IBW SIDE DRAINS	X		X	X
IBW GREENBELT	X		X	X
BUCKEYE #1	X		X	X
BUCKEYE #2	X		X	X
BUCKEYE #3	X		X	X
WHITE TANKS #3	X		X	X
WHITE TANKS #4	X		X	X
POWERLINE FRS	X	X		X
POWERLINE FLOODWAY	X	X		X
VINEYARD FRS	X	X		X
RITTENHOUSE FRS	X	X		X
SOSSAMAN DRAIN	X	X		X
GUADALUPE ROAD CHANNEL AND BOX	X	X		X
SPOOK HILL FRS	X	X		X
GUADALUPE DAM	X	X		X
SIGNAL BUTTE FRS	X	X		X
PASS MTN. DIVERSION AND FLOODWAY	X	X		X
APACHE JUNCTION FRS	X	X		X
E.M.F. & UNIVERSITY DET. BASIN	X	X		X
SIGNAL BUTTE FLOODWAY	X	X		X
BULLDOG FLOODWAY	X	X		X
APACHE JUNCTION FLOODWAY	X	X		X
SPOOKHILL FLOODWAY AND SED. BASIN	X	X		X
HOLLY ACRES	X	X	X	
PERYVILLE RIPRAP	X	X	X	
SALT/GILA CLEARING	X	X	X	
SALT/GILA LOW FLOW	X	X	X	
SALT RIVER CHANNEL (ADOT)	X	X	X	
SALT RIVER CHANNEL- RIO SALADO	X	X	X	
SALT RIVER CHANNEL - WARNING SIGNS	X	X	X	X
ACDC	X	X	X	
EAST FORK/ CAVE CREEK/ BASIN #4	X	X	X	
NEW RIVER CHANNEL	X	X	X	
SUN CITY DRAINS	X	X	X	
SUN CITY WEST DRAINS	X	X	X	
SKUNK CREEK CHANNELIZATION	X	X	X	
10TH STREET BASIN	X	X	X	X

INSPECTION SCHEDULE FOR 1996 FCDMC DAMS, FLOODWAYS AND DIVERSIONS				
STATE DAM#		LAST INSPECTION 95	ANNUAL INSPECTION 96	INFORMAL INSPECTION 96
	COE STRUCTURES (DAM)			
#07.57	ADOBE	5/24/95	5/22/96	12/18/96
#07.58	CAVE BUTTES/CAVE CREEK	5/24/95	5/22/96	12/18/96
#07.56	DREAMY DRAW	5/24/95	5/22/96	12/18/96
#07.55	NEW RIVER DAM	5/24/95	5/22/96	12/18/96
	COE CHANNELS AND FLOODWAYS			
	ACDC (AND CAVE CREEK)	5/25/95	5/23/96	12/19/96
	SKUNK CREEK (I-17) CHAN.	5/25/95	5/23/96	12/19/96
	SKUNK CREEK/NEW RIV. FDY.	5/25/95	5/23/96	12/19/96
	SCS STRUCTURES (FRS)			
#07.52	SADDLEBACK	3/22/95	3/21/96	
#07.53	HARQUAHALA	3/22/95	3/21/96	
#07.48	SUNNY COVE	9/28/95	9/26/96	
#07.49	SUNSET	9/28/95	9/26/96	
#07.28	WHITE TANKS#3	9/28/95	9/26/96	
#07.29	WHITE TANKS#4	9/28/95	9/26/96	
#07.42	BUCKEYE #1	8/24/95	8/22/96	
#07.44	BUCKEYE #2	8/24/95	8/22/96	
#07.45	BUCKEYE #3	8/24/95	8/22/96	
#11.02	POWERLINE	6/22/95	6/27/96	
#11.12	RITTENHOUSE	6/22/95	6/27/96	
#11.11	VINEYARD	6/22/95	6/27/96	
#07.43	GUADALUPE	10/26/95	10/24/96	
#07.50	SPOOK HILL	10/26/95	10/24/96	
#07.60	SIGNAL BUTTE	10/26/95	10/24/96	
	APACHE JUNCTION	10/26/95	10/24/96	
	SCS FLOODWAYS			
	HARQUAHALA	3/23/95	3/21/96	
	SADDLEBACK	3/23/95	3/21/96	
	POWERLINE	6/22/95	6/27/96	
	SPK HILL FDWY AND SD BASIN	11/30/95	11/21/96	
	E.M.F.	11/30/95	11/21/96	
	SIGNAL BUTTE	11/30/95	11/21/96	
	PASS MOUNTAIN	11/30/95	11/21/96	
	BULLDOG	11/30/95	11/21/96	
	SCS DIVERSIONS			
N.A.	CENTENNIAL LEVEE #1	3/23/95	3/21/96	
N.A.	PASS MOUNTAIN	11/30/95	11/21/96	
	FCD STRUCTURES, CHANNELS, AND FLOODWAYS*			
	HOLLY ACRES RIPRAP	1/26/95	1/25/96	
	PERRYVILLE RIPRAP	1/26/95	1/25/96	
	SALT/GILA LOW FLOW	1/26/95	1/25/96	
	COLTER CHANNEL	1/26/95	1/25/96	
	RIO SALADO	1/26/95	1/25/96	
	ALMA SCHOOL DRAIN	4/27/95	4/25/96	
	AGUA FRIA FLOODWAY	4/27/95	4/25/96	
	INDIAN SCHOOL RD. DRAIN	4/27/95	4/25/96	
	48TH ST. DRAIN	4/27/95	4/25/96	
	DYSART DRAIN	4/27/95	4/25/96	
	EL MIRAGE DRAIN	4/27/95	4/25/96	
#07.21	McMICKEN DAM**	6/29/95	6/20/96	
	McMICKEN FLOODWAY	6/29/95	6/20/96	
	INDIAN BEND WASH (COE)	7/27/95	7/25/96	
	SCATTERWASH	7/27/95	7/25/96	
	EAST FORK/ CAVE CREEK	7/27/95	7/25/96	
	OLD CROSS CUT CANAL	7/27/95	7/25/96	
	SOSSMAN ROAD DRAIN	6/22/95	6/27/96	
	GUADALUPE CHNL AND BOX	6/22/95	6/27/96	
	SALT/GILA CREARING	1/26/95	1/25/96	
	SUN CITY DRAINS	2/23/95	2/22/96	
	SUN CITY WEST DRAINS	2/23/95	2/22/96	
	PARADISE VALY RETN BSN	2/23/95	2/22/96	

*FCD C&O DIV. ONLY **FCD & ADWR ONLY

Inspection Prep For Month Of Due Date	East (Meng)	West (Smith)	North (DuBose)
January Due February		Sun City Drains Sun City Drains West	P.V.C.C. Basin # 4
February Due March		Harquahala FRS Harquahala Floodway Saddle Back FRS Saddle Back Floodway Centennial Levee	
March Due April	Alma School Drain 48th Street Drain	Agua Fria Floodway Indian School Rd Drain Dysart Drain El Mirage Drain	
April Due May	A.C.D.C Reach 3 & 4	A.C.D.C Reach 1	Adobe Dam..... A.C.D.C Reach 2&3 Cave Buttes Dam..... Cave Creek Arm Dramy Draw Dam New River Dam Skunk Creek I-17 New River Channel
Due June	Powerline FRS. Powerline Floodway Sossaman Drain Guadalupe Rd Channel and Box Vineyard FRS. Rittenhouse FRS.	McMicken Dam McMicken Floodway	
June Due July	Indian Bend Wash Old Cross Cut Canal	Scatter Wash	East Fork Cave Creek
July Due August		Buckeye I Buckeye II Buckeye III	
August Due September		White Tanks # 3 White Tanks # 4 Sunset FRS. Sunny Cove FRS. Sunset/Sunny Cove Pipe line	

	East (Meng)	West (Smith)	North (DuBose)
mber *Due October*	Guadalupe FRS. Spook Hill FRS. Signal Butte FRS. Apache Junction FRS.		
October *Due November*			
November *Due December*	Signal Butte Floodway Bulldog Floodway E.M.F. (All Reaches) Pass Mountain Diversion Channel Spookhill Floodway and Sed Basin		
December *Due January*	Rio Salado	Holly Acres RipRap Perryville RipRap Colter Channel	

East (Meng)	West (Smith)	North (DuBose)

On Going Maintenance Work

East Mesa Drains (Quarterly) A.C.D.C. Reach 3&4 (Weekly) EMF Reach 6 (Weekly) 10th St Wash (Weekly)	A.C.D.C. Reach 1 (Weekly) Agua Fria Reach 4 (Bi-Weekly)	A.C.D.C Reach 2&3 (Daily) Cave Creek Arm (Weekly) E.F.C.C. (Weekly) New River Channel (Weekly) Durango Complex (Bi-Weely)

Variables that may affect Work Schedule

Citizen Complaints
RWM Requests
Special Projects Or Requests
Vandalism
Storm Damage
Flood Watch

FLOOD CONTROL DISTRICT of MARICOPA COUNTY 1959

FLOOD CONTROL DISTRICT
of
Maricopa County

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

BOARD OF DIRECTORS
Betsey Bayless
Ed King
Tom Rawles
Don Stapley
Mary Rose Garrido Wilcox

JAN 0 9 1996

Corps of Engineers L.A. District Office
Engineering Evaluation Section
Attn: Terry Wotherspoon
P.O. Box 2711
Los Angeles, California 90053

REFERENCE: COE Structures - FCD In-House Inspection

Dear Terry:

On Thursday, December 28, 1995, Kevin Dubois and Ernie Hamer of my staff conducted an informal inspection of the following Corps structures:

Cave Buttes Dam
New River Dam
Adobe Dam
Dreamy Draw Dam
Skunk Creek at I-17
New River Channelization
ACDC
Cave Creek Arm

RESULTS:

The dams and channels are in the same condition as they were during the last annual inspection in May of 1995. Routine maintenance was performed on all the projects to achieve those results. The next scheduled annual inspection is to take place in May of 1996.

If you have any question or further information is needed, please contact either me or Ernie Hamer at 602-506-4074.

Sincerely,

Thomas D. Johnson, P.E., R.L.S.
Construction and Maintenance Division Manager

ANNUAL INSPECTION REPORT
Arizona Canal Diversion Channel (ACDC)
and Cave Creek Detention Basin and Channel

1. **Inspection Team:**

The annual inspection of the ACDC & Cave Creek Detention Basin and Channel was conducted on May 25, 1995. The inspection team consisted of:

Terry Wotherspoon - Corps of Engineers, L.A. District
Ernie Hamer - Work Control Center, FCDMC

2. **Project Conditions:**

The weather was clear and warm. The temperature reported at Phoenix Sky Harbor International Airport was 88°.

3. **Flow Observation:**

The maximum flow occurred in January 1995 and was recorded at a depth of 3.6 feet at the 67th Avenue bridge.

4. **Inspection Observations:**

A. **Reach 1:** Maintenance of landscaped areas continues under regular maintenance program. Erosion and rilling on slopes is minimal.

B. **Reach IIA:** Hairline "spider" cracking is evident, as before, along sloped sides entire length and needs continued monitoring. (No obvious change since last inspection)

C. **Reach III:** Routine daily maintenance and repairs continue throughout reach.

D. **Reach IV:** Minor seepage in tunnel of Reach IV was less evident than in past inspections (continue to monitor). Some settling of concrete access ramps and wall deflection has occurred in upper areas of ramps at approximately sta. # 750+00 and 800+00 on the north bank. Terry Wotherspoon will inform their Engineering Department and suggest that someone from the Corps of Engineers come out and evaluate the situation and at the same time look at some of the other wall rotation existing, usually at bridge crossing areas.

E. Cave Creek Detention Basin and Channelization is in good condition overall. Spider cracks in concrete slopes need continued monitoring as well as cracks in invert at confluence area of the ACDC. (no obvious change since last inspection). A small area of seepage was noticed on the bottom of the wall at the invert on the east bank at sta. # 15+00 and needs to be monitored.

5. **Maintenance Cost:**

The accounting records of the Flood Control District show maintenance costs for the project from January 1, 1995 through May 31, 1995 to be $235,872.00.

6. **Conclusion:**

The overall condition of this structure is very good and should function as designed.

7. **Required Action:**

Continue with the regular maintenance program. Continue to monitor cracks, seepage and wall rotation.

Thomas D. Johnson, P.E., RLS
Construction and Maintenance Division Manager

cc: Terry Wotherspoon, Corps of Engineers, L.A. District
Ken Hussain, Arizona Department of Water Quality

EH/crs

ECHO WASH

FLOOD CONTROL DISTRICT
RECEIVED
OCT 10 1995
CHENG
DEP
ADMIN
FINANCE
C&M
ENGR
REMARKS
DM
DIST
FILE

```
T1      ECHO WASH
T2      STA LT TO RT ADD 1200 TO EL
T3      100 YEAR STORM - ONE FOOT ENCROACHMENT

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ
     0.       7.       0.       0.  0.0           0.0      -1.0     0.       50.100   0.0
J2  NPROF     IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE
    15.000    0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      15.000

CCHV=   0.100 CEHV=   0.300

IKC288I IBCOM - PROGRAM INTERRUPT (P) -  UNDERFLOW   OLD PSW IS  FFC5000D821DBAE2 , REGISTER CONTAINED   FF26B                E14
TRACEBACK  ROUTINE  CALLED FROM ISN   REG.  14   REG.  15   REG.   0   REG.   1
           CARD                 0466   421A9532  001DA390   00000007   00000000
           MAIN                        00011822  011A5258   FD000008   001F47F8
ENTRY POINT=  011A5258

STANDARD FIXUP TAKEN , EXECUTION CONTINUING
 2800 NAT Q1=    631.87  WSEL=      50.05  ENC Q1=     631.87  WSEL=      51.05  RATIO=  0.0
 NAT Q1=   2046.  RATIOS LOB,CH,ROB=  0.7626  0.1037  0.1337  WSEL=      51.05
3720 ASSUMED CRITICAL DEPTH

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

3470 ENCROACHMENT STATIONS=    2119.9    3060.0  TYPE=     4  TARGET=      0.691
     0.0      3.24     50.74    50.74    50.05    51.35    0.61     0.0      0.0      50.00
   6600.    4933.     1667.      0.      710.     481.      0.       0.       0.       50.00
     0.0      6.94     3.46     0.0      0.050    0.050    0.050    0.0      47.50  2119.87
 0.018652     0.       0.       0.       0        10       1        0.0    940.13  3060.00

FLOW DISTRIBUTION

STA=    2120.    2230.    2250.    2270.    2450.    3060.
 PER Q=    31.6      7.6      7.6     27.9     25.3
  AREA=   277.5     59.8     59.8    313.2    481.5
   VEL=     7.5      8.4      8.4      5.9      3.5

 2800 NAT Q1=   3977.53  WSEL=      53.49  ENC Q1=    3977.53  WSEL=      54.49  RATIO=  0.0
 NAT Q1=   6339.  RATIOS LOB,CH,ROB=  0.0001  0.0344  0.9655  WSEL=      54.49
3280 CROSS SECTION        0.02 EXTENDED        0.55 FEET

3301 HV CHANGED MORE THAN HVINS

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

3470 ENCROACHMENT STATIONS=    1470.0    2977.9  TYPE=     4  TARGET=      0.372
     0.02     4.55     54.55    0.0      53.49    54.57    0.02     3.17     0.06     54.00
   6600.      0.       373.     6227.     0.      527.     4898.    237.     62.      50.00
     0.85     0.00     0.71     1.27     0.050    0.050    0.050    0.001    50.00  1470.00
 0.000262   1400.      85.      4000.     7        0        1        0.0    1507.91  2977.92

FLOW DISTRIBUTION

STA=    1470.    1765.    2570.    2575.    2600.    2760.    2820.    2978.
 PER Q=     5.7     73.3      0.3      0.4      2.4      3.6     14.4
  AREA=   527.0   3661.9     17.7     38.7    247.8    212.9    718.4
   VEL=     0.7      1.3      1.1      0.6      0.6      1.1      1.3

 2800 NAT Q1=    472.62  WSEL=      57.20  ENC Q1=     472.62  WSEL=      58.20  RATIO=  0.0
 NAT Q1=    835.  RATIOS LOB,CH,ROB=  0.2672  0.3993  0.3334  WSEL=      58.20
3685 20 TRIALS USED WSEL,CWSEL

7185 MIN SPECIFIC ENERGY

3720 ASSUMED CRITICAL DEPTH

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

3470 ENCROACHMENT STATIONS=    1579.7    1732.1  TYPE=     4  TARGET=      0.434
     0.23     4.77     57.77    57.77    57.20    59.72    1.95     0.87     0.0      58.00
   6600.      755.     4263.    1583.     72.      363.     158.     302.     80.      54.00
     0.87    10.43     11.76    10.02    0.050    0.050    0.050    0.013    53.00  1579.68
 0.022623    720.      1120.    900.     30       8        1        0.0    152.17  1732.05

FLOW DISTRIBUTION

STA=    1580.    1600.    1685.    1732
```

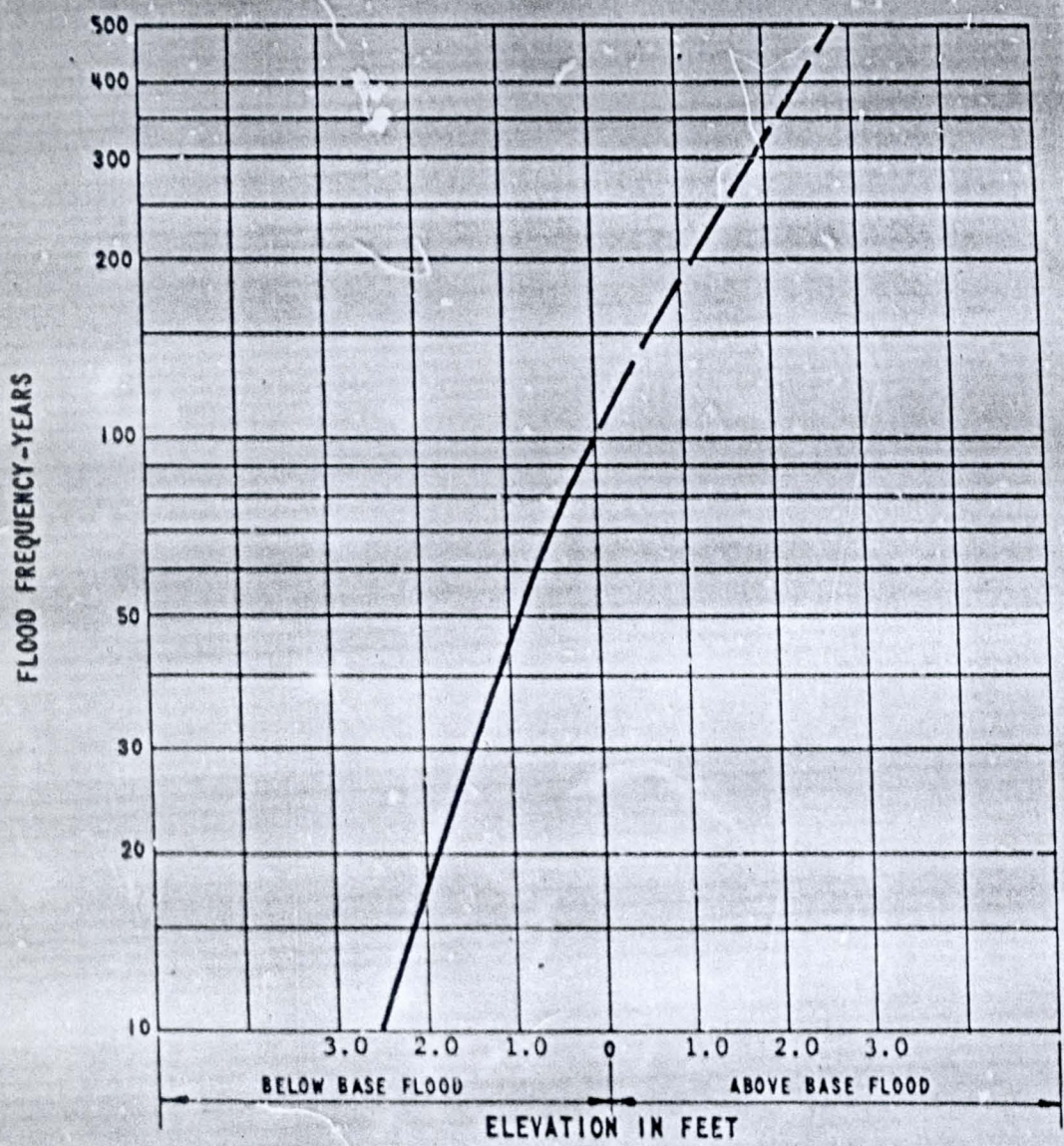
3060
2450
2820

```
   TIME      VLOB      VCH       VROB      XNL       XNCH      AROB      VOL       TWA    LEFT/RIGHT
   SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       XNR       WTN       ELMIN     SSTA
                                                                ICONT     CORAR     TOPWID    ENDST

3470 ENCROACHMENT STATIONS=    2119.9    3060.0  TYPE=     4  TARGET=        0.691
       0.0      3.24     50.74     50.74     50.05     51.35     0.61      0.0       0.0      50.00
      6600.     4933.     1667.      0.       710.      481.      0.        0.        0.       50.00
       0.0      6.94      3.46      0.0      0.050     0.050     0.050     0.0      47.50    2119.87
  0.018652      0.        0.        0.        0         10       1         0.0     940.13    3060.00

FLOW DISTRIBUTION

STA=    2120.     2230.     2250.     2270.     2450.     3060.
  PER Q=     31.6      7.6       7.6      27.9      25.3
  AREA=     277.5     59.8      59.8     313.2     481.5
   VEL=       7.5      8.4       8.4       5.9       3.5

2800 NAT Q1=    3977.53  WSEL=     53.49  ENC Q1=    3977.53  WSEL=     54.49  RATIO=  0.0
 NAT Q1=    6339.  RATIOS LOB,CH,ROB=  0.0001  0.0344  0.9655  WSEL=     54.49
3280 CROSS SECTION       0.02 EXTENDED       0.55 FEET

3301 HV CHANGED MORE THAN HVINS

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

3470 ENCROACHMENT STATIONS=    1470.0    2977.9  TYPE=     4  TARGET=        0.372
       0.02     4.55     54.55      0.0      53.49     54.57     0.02      3.17      0.06     54.00
      6600.      0.       373.     6227.       0.       527.     4898.     237.      62.      50.00
       0.85     0.00      0.71     1.27      0.050     0.050     0.050     0.001    50.00    1470.00
   0.000262    1400.      85.     4000.        7         0        1       0.0     1507.91   2977.92

FLOW DISTRIBUTION

STA=    1470.     1765.     2570.     2575.     2600.     2760.     2820.     2978.
  PER Q=      5.7      73.3       0.3       0.4       2.4       3.6      14.4
  AREA=     527.0    3661.9      17.7      38.7     247.8     212.9     718.4
   VEL=       0.7       1.3       1.1       0.6       0.6       1.1       1.3

2800 NAT Q1=     472.62  WSEL=     57.20  ENC Q1=     472.62  WSEL=     58.20  RATIO=  0.0
 NAT Q1=     835.  RATIOS LOB,CH,ROB=  0.2672  0.3993  0.3334  WSEL=     58.20
3685 20 TRIALS USED WSEL,CWSEL

7185 MIN SPECIFIC ENERGY

3720 ASSUMED CRITICAL DEPTH

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

3470 ENCROACHMENT STATIONS=    1579.7    1732.1  TYPE=     4  TARGET=        0.434
       0.23     4.77     57.77     57.77     57.20     59.72     1.95      0.87      0.0      58.00
      6600.     755.     4263.     1583.      72.      363.      158.      302.      80.      54.00
       0.87    10.43     11.76     10.82     0.050     0.050     0.050     0.013    53.00    1579.68
   0.022623    720.      1120.      900.       30         8        1       0.0      152.37   1732.06

FLOW DISTRIBUTION

STA=    1580.     1600.     1685.     1732.
  PER Q=     11.4      64.6      24.0
  AREA=      72.4     362.6     157.9
   VEL=      10.4      11.8      10.0

CCHV=   0.100 CEHV=   0.300
2800 NAT Q1=     709.26  WSEL=     65.38  ENC Q1=     709.26  WSEL=     66.38  RATIO=  0.0
 NAT Q1=    1004.  RATIOS LOB,CH,ROB=  0.0672  0.6658  0.2669  WSEL=     66.38

3301 HV CHANGED MORE THAN HVINS

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

3470 ENCROACHMENT STATIONS=    1725.0    1836.7  TYPE=     4  TARGET=        0.293
       0.37     8.33     66.33      0.0      65.38     67.53     1.20      7.73      0.08     62.00
      5900.      0.      5483.      417.       0.       603.      162.      314.      82.      60.00
       0.90     0.01      9.10     2.57      0.160     0.050     0.160     0.017    58.00    1725.00
   0.006913    850.       710.    1030.        6         0        1       0.0      111.69   1836.69
```

3060
2.4

```
T1      ECHO WASH
T2      STA IS LT TO RT ADD 1200 TO EL
T3      100 YEAR STORM

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
       0.       6.        0.        0.      0.0        0.0      -1.0        0.     50.050      0.0

J2  NPROF     IPLOT     PHFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
     1.000      0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0

J3  VAR(I),I=1,10
       1.      34.       27.       28.       31.       32.       33.        0.        0.       0.0

CCHV=   0.100 CEHV=   0.300

3265 DIVIDED FLOW

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

     0.0      2.55     50.05       0.0     50.05     50.27      0.22       0.0       0.0     50.00
    6600.     6324.       40.      236.     1673.       60.      110.        0.        0.     50.00
     0.0      3.78      0.66      2.14     0.050     0.050     0.050       0.0     47.50   1131.63
0.010910        0.        0.        0.         0         0         1       0.0   2559.12   4351.25

3265 DIVIDED FLOW

    0.02      3.49     53.49       0.0       0.0     53.51      0.02      3.22      0.02     54.00
    6600.        0.       116.     6484.        0.      232.     5929.      304.      140.     50.00
    1.01       0.0      0.50      1.09     0.050     0.050     0.050     0.001     50.00   1535.86
0.000275     1400.       85.     4000.         7         0         1       0.0   2166.88   3749.60

3685 20 TRIALS USED WSEL,CWSEL

7185 MIN SPECIFIC ENERGY

3720 ASSUMED CRITICAL DEPTH

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

    0.23      4.20     57.20     57.20       0.0     58.29      1.09      0.85       0.0     54.00
    6600.     1589.     3125.     1886.      235.      315.      289.      378.      167.     54.00
    1.04      6.77      9.93      6.52     0.050     0.050     0.050     0.012     53.00   1475.96
0.019502      720.     1120.      900.        30        11         1       0.0    384.15   1860.10

CCHV=   0.100 CEHV=   0.300
    0.37      7.38     65.38       0.0       0.0     66.17      0.79      7.86      0.03     62.00
    5900.      242.     4323.     1335.      217.      523.      804.      402.      177.     60.00
    1.07      1.11      8.27      1.66     0.160     0.050     0.160     0.017     58.00   1557.83
0.006920      850.      710.     1030.         5         0         1       0.0    621.56   2179.39

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

    0.51      6.95     70.95       0.0       0.0     71.87      0.92      5.66      0.04     66.00
    5900.      575.     4302.     1023.      358.      479.      595.      427.      188.     66.00
    1.11      1.61      8.98      1.72     0.160     0.050     0.160     0.021     64.00   1733.38
0.007476      1020.      800.      600.         4         0         1       0.0    556.42   2289.80

    0.71      8.42     78.42     77.74       0.0     79.48      1.06      7.57      0.04     74.00
    5900.      705.     4662.      533.      621.      503.      342.      456.      199.     74.00
    1.14      1.13      9.27      1.56     0.160     0.050     0.160     0.025     70.00   1260.30
0.007771      700.     1060.      800.         8         8         1       0.0    687.15   1947.46

    0.93      9.33     87.33     86.03       0.0     88.67      1.34      9.10      0.08     82.00
    5900.      443.     5319.      138.      282.      545.      161.      490.      214.     84.00
    1.18      1.57      9.77      0.86     0.160     0.050     0.160     0.029     78.00   1025.22
0.007788      1520.     1150.      800.         4         8         1       0.0    407.33   1432.56

CCHV=   0.100 CEHV=   0.300

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

    1.04      4.22     93.22       0.0       0.0     93.63      0.41      4.88      0.09     92.00
    5900.      116.     4904.      875.       91.      875.      535.      507.      226.     92.50
    1.21      1.28      5.61      1.64     0.080     0.050     0.080     0.030     89.00   1440.76
0.004127      530.      550.      750.         3         0         1       0.0   1162.77   2757.42
```

```
                 ALCH     ALOBR    ITRIAL    IDC      ICONT    CORAR    ELMIN    SSTA
                                                                         TOPWID   ENDST
     0.0       2.55     50.05     0.0      50.05    50.27    0.22     0.0      0.0      50.00
    6600.      6324.     40.      236.     1673.     60.      110.     0.       0.       50.00
     0.0       3.78      0.66    2.14      0.050    0.050    0.050    0.0      47.50   1131.63
 0.010910      0.        0.       0.       0        0        1        0.0    2559.12   4351.25

3265 DIVIDED FLOW

     0.02      3.49     53.49     0.0      0.0      53.51    0.02     3.22     0.02     54.00
    6600.      0.       116.     6484.     0.       232.     5929.    304.     140.     50.00
     1.01      0.0       0.50    1.09      0.050    0.050    0.050    0.001    50.00   1535.86
 0.000275     1400.     85.      6000.     7        0        1        0.0    2166.88   3749.60

3685 20 TRIALS USED WSEL,CWSEL

7185 MIN SPECIFIC ENERGY

3720 ASSUMED CRITICAL DEPTH

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

     0.23      4.20     57.20    57.20    0.0      58.29    1.09     0.85     0.0      54.00
    6600.      1589.    3125.    1886.    235.     315.     289.     378.     167.     54.00
     1.04      6.77     9.93     6.52     0.050    0.050    0.050    0.012    53.00   1475.96
 0.019502      720.     1120.    900.     30       11       1        0.0    384.15   1860.10

CCHV=   0.100 CEHV=   0.300
     0.37      7.38     65.38    0.0      0.0      66.17    0.79     7.86     0.03     62.00
    5900.      242.     4323.    1335.    217.     523.     804.     402.     177.     60.00
     1.07      1.11     8.27     1.66     0.160    0.050    0.160    0.017    58.00   1557.83
 0.006920      850.     710.     1030.    5        0        1        0.0    621.56   2179.39

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

     0.51      6.95     70.95    0.0      0.0      71.87    0.92     5.66     0.04     66.00
    5900.      575.     4302.    1023.    358.     479.     595.     427.     188.     66.00
     1.11      1.61     8.98     1.72     0.160    0.050    0.160    0.021    64.00   1733.38
 0.007476      1020.    800.     600.     4        0        1        0.0    556.42   2289.80

     0.71      8.42     78.42    77.74    0.0      79.46    1.06     7.57     0.04     74.00
    5900.      705.     4662.    533.     621.     503.     342.     456.     199.     74.00
     1.14      1.13     9.27     1.56     0.160    0.050    0.160    0.025    70.00   1260.30
 0.007771      700.     1060.    800.     8        8        1        0.0    687.15   1947.46

     0.93      9.33     87.33    86.03    0.0      88.67    1.34     9.10     0.08     82.00
    5900.      443.     5319.    138.     282.     545.     161.     490.     214.     84.00
     1.18      1.57     9.77     0.86     0.160    0.050    0.160    0.029    78.00   1025.22
 0.007788      1520.    1150.    800.     4        8        1        0.0    407.33   1432.56

CCHV=   0.100 CEHV=   0.300

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

     1.04      4.22     93.22    0.0      0.0      93.63    0.41     4.88     0.09     92.00
    5900.      116.     4909.    875.     91.      875.     535.     507.     226.     92.50
     1.21      1.28     5.61     1.64     0.080    0.050    0.080    0.030    89.00   1440.76
 0.009127      530.     550.     750.     3        0        1        0.0   1162.77   2757.92

     1.19      7.87     97.87    0.9      0.0      98.36    0.49     4.70     0.02     94.00
    5900.      394.     5506.    0.       217.     952.     0.       530.     237.     100.00
     1.25      1.82     5.79     0.0      0.080    0.050    0.080    0.031    90.00   1455.09
 0.004236      570.     800.     570.     3        0        1        0.0    323.32   1778.41

3301 HV CHANGED MORE THAN HVINS

     1.38      6.97     108.97   0.0      0.0      102.48   1.51     3.81     0.31     98.00
    5900.      298.     5602.    0.       108.     554.     0.       541.     240.     108.00
     1.27      2.75     10.10    0.0      0.080    0.050    0.080    0.032    94.00   1443.86
 0.011275      300.     600.     740.     2        0        1        0.0    181.07   1624.93

3301 HV CHANGED MORE THAN HVINS

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

     1.41      3.21     107.71   0.0      0.0      107.81   0.10     5.19     0.14     107.00
    5900.      3094.    2713.    93.      1400.    903.     77.      565.     253.     108.00
     1.34      2.21     3.81     1.21     0.080    0.050    0.080    0.033    104.50   1144.08
 0.005281      800.     580.     720.     4        0        1        0.0   1396.77   2540.86
```



NOTES: CURVE CORRESPONDS TO FLOOD HAZARD FACTOR 025 D
CURVE DEVELOPED FOR INDEX STATION AT MILE 0.37
ZONE AND REACH LOCATIONS SHOWN ON PLATE 26
WATER SURFACE PROFILE SHOWN ON PLATE 102

PLOTTING DATA	
FREQUENCY IN YEARS	FLOOD ELEVATION
500	1267.0
250	1265.7
100	1264.2
50	1263.3
25	1262.6
10	1261.7

ECHO CANYON

REACH 30

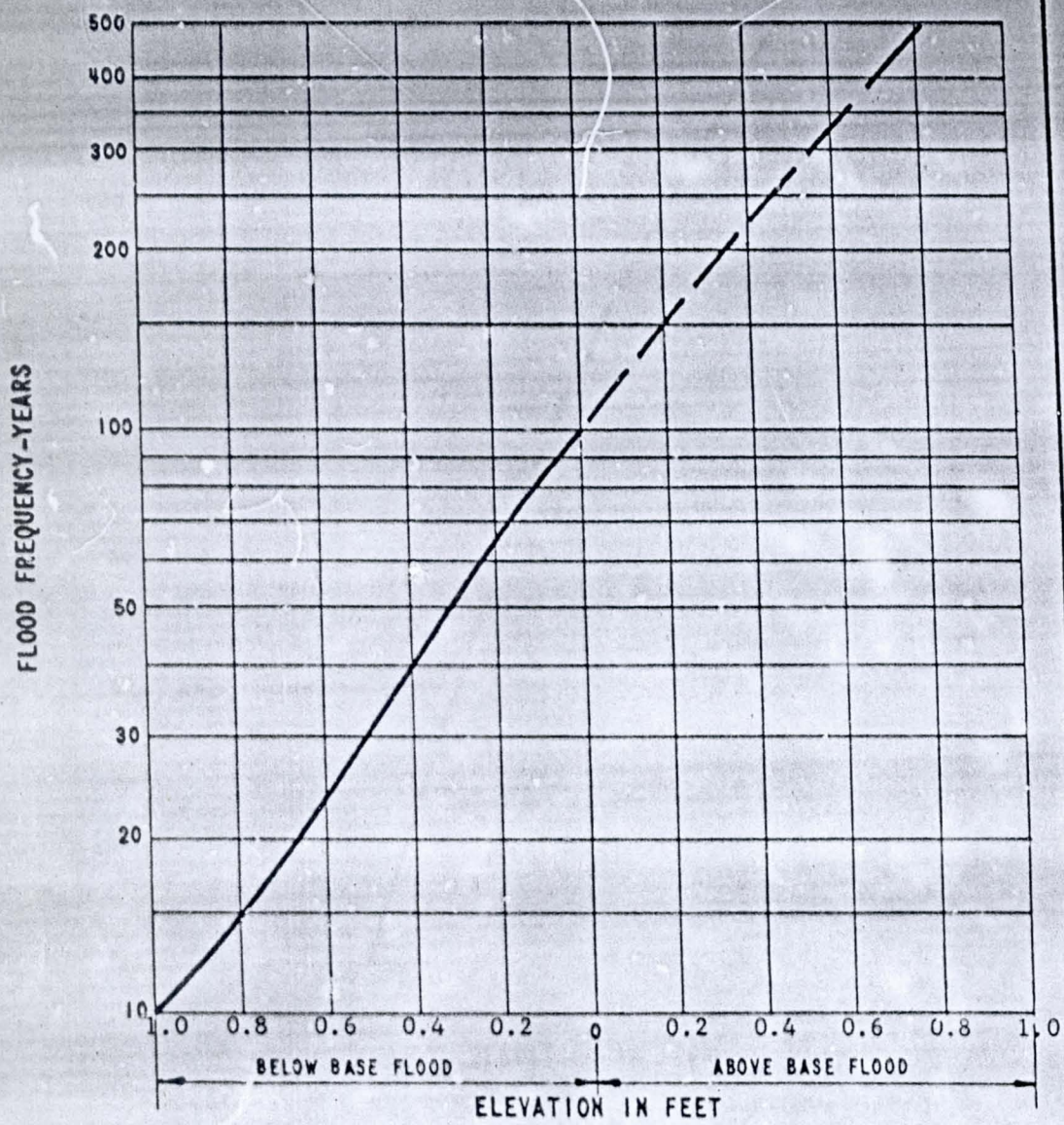
FLOOD INSURANCE STUDY

PHOENIX, ARIZONA

ELEVATION FREQUENCY RELATIONSHIP

CORPS OF ENGINEERS, U. S. ARMY
LOS ANGELES DISTRICT, CALIFORNIA
PREPARED FOR
FEDERAL INSURANCE ADMINISTRATION
DECEMBER 1973

EXHIBIT 30



NOTES: CURVE CORRESPONDS TO FLOOD HAZARD FACTOR 010 E
CURVE DEVELOPED FOR INDEX STATION AT MILE 0.34
ZONE AND REACH LOCATIONS SHOWN ON PLATES 21 AND 25
WATER SURFACE PROFILE SHOWN ON PLATE 101

PLOTTING DATA	
FREQUENCY IN YEARS	FLOOD ELEVATION
500	1273.3
250	1272.9
100	1272.5
50	1272.2
25	1271.9
10	1271.5

FLYNN LANE WASH
REACH 29

FLOOD INSURANCE STUDY

PHOENIX, ARIZONA

ELEVATION FREQUENCY RELATIONSHIP

CORPS OF ENGINEERS, U. S. ARMY
LOS ANGELES DISTRICT, CALIFORNIA
PREPARED FOR
FEDERAL INSURANCE ADMINISTRATION
DECEMBER 1973

EXHIBIT 29

T1 ECHO WASH
T2 STA IS LT TO RT AND 1200 TO EL
T3 10 YEAR STORM

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HYINS	Q	WSEL	FW
	-1.	2.	0.	0.	0.0	0.0	-1.0	0.	49.150	0.0

J2	NPROF	IPLOT	PREVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	1.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

J3										
	1.000	34.000	27.000	28.000	31.000	32.000	33.000	0.0	0.0	0.0

J5 AR(I),I=1,10

	1.	34.	27.	28.	31.	32.	33.	0.	0.	0.0
NC	0.050	0.050	0.050	0.100	0.300	0.0	0.0	0.0	0.0	0.0
QI	6.000	2000.000	3200.000	4500.000	16000.000	6600.000	6600.000	0.0	0.0	0.0
EI	0.0	0.0	0.0	0.0	0.0	0.0	10.400	0.0	0.0	0.0
X1	0.0	20.000	1135.000	4400.000	0.0	0.0	0.0	0.0	0.0	0.0
GK	52.000	1000.000	50.000	1135.000	48.000	1420.000	48.000	1475.000	49.000	1500.000
GK	49.000	1480.000	48.000	2230.000	47.500	2250.000	48.000	2270.000	50.000	2450.000
GK	50.000	3320.000	48.500	3350.000	50.000	3060.000	50.000	3575.000	48.500	3510.000
GK	50.000	3680.000	51.000	3740.000	51.000	4220.000	50.000	4350.000	52.000	4400.000
X1	0.020	13.000	1470.000	3550.000	1400.000	400.000	85.000	0.0	0.0	0.0
GK	58.000	1000.000	56.000	1370.000	54.000	1470.000	52.000	1750.000	50.000	1765.000
GK	50.000	2570.000	52.000	2575.000	54.000	2600.000	52.000	2760.000	53.000	2320.000
GK	50.000	3510.000	52.000	3550.000	54.00	3750.000	0.0	0.0	0.0	0.0
X1	0.230	14.000	1450.000	1300.000	720.000	900.000	1120.000	0.0	0.0	0.0
GK	62.000	1000.000	60.000	1180.000	58.000	1400.000	56.000	1500.000	54.000	1600.000
GK	53.000	1550.000	54.000	1535.000	56.000	1800.000	58.000	1900.000	60.000	2220.000
GK	62.000	2950.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.160	0.160	0.050	0.100	0.300	0.0	0.0	0.0	0.0	0.0
QI	6.000	1900.000	3000.000	4200.000	14000.000	5900.000	5900.000	0.0	0.0	0.0
X1	0.370	14.000	1725.000	1810.000	850.000	1040.000	710.000	0.0	0.0	0.0
GK	70.000	1200.000	68.000	1270.000	66.000	1510.000	64.000	1665.000	62.000	1725.000
GK	60.000	1750.000	58.000	1762.000	60.000	1792.000	60.000	1810.000	62.000	1915.000
GK	64.000	2010.000	66.000	2255.000	68.000	2510.000	70.000	2850.000	0.0	0.0
X1	0.510	14.000	1922.000	1995.000	1000.000	600.000	800.000	0.0	0.0	0.0
GK	80.000	1200.000	70.000	1810.000	68.000	1870.000	66.000	1922.000	64.000	1930.000
GK	64.000	1975.000	66.000	1995.000	68.000	2105.000	70.000	2165.000	72.000	2440.000
GK	74.000	2340.000	76.000	3150.000	78.000	3360.000	80.000	3510.000	0.0	0.0
X1	0.710	10.000	1700.000	1775.000	700.000	800.000	1060.000	0.0	0.0	0.0
GK	80.000	1000.000	76.000	1650.000	74.000	1700.000	72.000	1712.000	70.000	1730.000
GK	72.000	1760.000	74.000	1775.000	76.000	1840.000	78.000	1920.000	80.000	2350.000
X1	0.930	12.000	1165.000	1240.000	1520.000	800.000	1150.000	0.0	0.0	0.0
GK	68.000	1000.000	66.000	1075.000	64.000	1145.000	62.000	1165.000	60.000	1175.000
GK	78.000	1200.000	80.000	1220.000	82.000	1230.000	84.000	1240.000	86.000	1250.000
GK	88.000	1320.000	90.000	1320.000	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.080	0.080	0.050	0.100	0.300	0.0	0.0	0.0	0.0	0.0
X1	1.040	17.000	1590.000	1935.000	550.000	750.000	550.000	0.0	0.0	0.0
GK	100.000	1300.000	98.000	1320.000	96.000	1100.000	94.000	1345.000	92.000	1590.000
GK	90.000	1665.000	89.000	1750.000	90.000	1800.000	92.500	1905.000	93.000	2070.000
GK	94.000	2135.000	92.000	2400.000	92.000	2630.000	94.000	2840.000	95.000	2865.000
GK	98.000	2950.000	100.000	2990.000	0.0	0.0	0.0	0.0	0.0	0.0

3300
330
1850

068144

```
T1      ECHO WASH
T2      STA LT TO RT ADD 1200 TO EL
T3      25 YEAR STORM

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ

      0.       3.       0.       0.  0.0          0.0     -1.0      0.     49.400    0.0

J2  NPROF     IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHVIM    ITRACE

      2.000    0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0


CCHV=   0.100 CEHV=   0.300

3265 DIVIDED FLOW

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

     .
     0.0      1.90     49.40    0.0      49.40    49.60    0.20     0.0      0.0      50.00
   3200.       0.     3200.       0.       0.     899.       0.       0.       0.     52.00
     0.0      0.0      3.56     0.0     0.050    0.050    0.050     0.0     47.50   1220.50
0.022522       0.       0.       0.        0        0        1      0.0   1262.49   3552.00


3265 DIVIDED FLOW

    0.02     0.79     50.79     0.0      0.0     50.89     0.11     1.29     0.01     54.00
   3200.       0.     3200.       0.       0.   1229.       0.       2.       3.     52.00
    0.01     0.0      2.50     0.0     0.050    0.050    0.050    0.049    50.00   1761.07
0.010852    1400.      85.     400.        5        0        1      0.0   1594.47   3559.54


    0.23     4.53     57.53     0.0      0.0     57.70     0.17     6.79     0.02     59.00
   3200.       0.     3200.       0.       0.     971.       0.      33.      29.     56.00
    0.10     0.0      3.30     0.0     0.050    0.050    0.050    0.050    53.00   1459.27
0.003865     720.    1120.     900.        5        0        1      0.0    407.54   1876.82

CCHV=   0.100 CEHV=   0.300

7185 MIN SPECIFIC ENERGY


3720 ASSUMED CRITICAL DEPTH

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

    0.37     4.56     62.56    62.56     0.0     63.84     1.27     5.12     0.0      62.00
   3000.       3.     2697.     331.       5.     283.     172.      43.      34.     63.00
    0.13     0.56     9.53     1.75     0.150    0.050    0.150    0.049    53.00   1708.28
0.020804     850.     710.     1030.        3        5        1      0.0    233.71   1941.79
```

B688138

T1 ECHO WASH
T2 STA LT TO RT ADD 1200 TO EL
T3 50 YEAR STORM

J1	ICHECK	IWQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FW
	0.	4.	0.	0.	0.0	0.0	-1.0	0.	49.750	0.0

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHVIM	ITRACE
	3.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CCHV= 0.100 CEHV= 0.300

3265 DIVIDED FLOW

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	WCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTR	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	IDPWID	ENDST
0.0	2.25	49.75	0.0	49.75	49.93	0.18	0.0	0.0	50.00
4600.	0.	4600.	0.	0.	1352.	0.	0.	0.	52.00
0.0	0.0	3.38	0.0	0.050	0.050	0.050	0.0	47.50	1170.68
0.013130	0.	0.	0.	0	0	1	0.0	1377.71	3668.35

3265 DIVIDED FLOW

0.02	0.91	50.91	0.0	0.0	51.07	0.16	1.15	0.00	54.00
4600.	0.	4600.	0.	0.	1426.	0.	0.	0.	52.00
0.01	0.0	3.23	0.0	0.050	0.050	0.050	0.049	50.00	1748.92
0.013540	1400.	85.	400.	5	0	1	0.0	1609.84	3578.91
0.23	5.19	55.19	0.0	0.0	58.40	0.21	7.31	0.01	58.00
4600.	1.	4598.	1.	3.	1252.	0.	37.	30.	58.00
0.09	0.36	3.67	0.35	0.050	0.050	0.050	0.050	53.00	1433.11
0.003768	720.	1120.	900.	4	0	1	0.0	497.63	1930.75

CCHV= 0.100 CEHV= 0.300
3685 20 TRIALS USED WSEL,CWSEL

7185 MIN SPECIFIC ENERGY

3720 ASSUMED CRITICAL DEPTH

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	WCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTR	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	IDPWID	ENDST
0.37	5.25	63.29	63.29	0.0	64.75	1.46	4.83	0.0	62.00
4200.	24.	3600.	576.	25.	345.	280.	54.	37.	60.00
0.11	0.96	10.45	2.05	0.160	0.050	0.160	0.049	56.00	1686.31
0.019221	850.	710.	1030.	30	5	1	0.0	289.94	1976.25

T1 ECHO #454
T2 STA LT TO RT ADD 1200 TO EL
T3 500 YEAR STORM

J1	ICHECK	INQ	NINV	IJTR	SIRT	METRIC	HVINS	Q	WSEL	FQ
	0.	5.	0.	0.	0.0	0.0	-1.0	0.	51.250	0.0

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLOC	IBW	CHVIM	ITRACE
	4.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CEHV= 0.100 CEHV= 0.300

SELNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	DLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	WOL	TW4	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTR	ELMIN	SSTA
SLOPE	XLOBL	ALCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	IDPRID	ENDST
0.0	3.75	51.25	0.0	51.25	51.49	0.19	0.0	0.0	52.00
18000.	98.	17902.	0.	53.	5150.	0.	0.	0.	52.00
0.0	1.83	3.46	0.0	0.050	0.050	0.050	0.0	47.00	1337.34
0.007255	0.	0.	0.	0	0	1	0.0	3130.63	4381.29

3265 DIVIDED FLOW

0.02	1.95	51.93	0.0	0.0	52.44	0.52	0.91	0.10	54.00
18000.	0.	18000.	0.	0.	5138.	0.	0.	0.	52.00
0.00	0.0	5.78	0.0	0.050	0.050	0.050	0.049	50.00	1781.24
0.017319	1400.	85.	400.	3	2	1	0.0	1 38.67	2557.37
0.23	7.71	60.71	0.0	0.0	51.24	0.53	8.79	8.80	58.00
18000.	1429.	14067.	1701.	501.	2359.	636.	90.	48.	58.00
0.06	2.85	6.30	2.67	0.050	0.050	0.050	0.052	53.00	2115.29
0.004785	720.	1120.	900.	5	3	1	0.0	1362.57	2478.89

CEHV= 0.100 CEHV= 0.300
3685 20 TRIALS USED WSEL,CWSEL

7165 MIN SPECIFIC ENERGY

3720 ASSUMED CRITICAL DEPTH

SELNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	DLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	WOL	TW4	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTR	ELMIN	SSTA
SLOPE	XLOBL	ALCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	IDPRID	ENDST
0.37	8.95	66.96	65.96	0.0	58.73	1.77	4.37	0.0	62.00
14000.	1182.	8765.	4053.	597.	657.	1541.	151.	67.	60.00
0.08	1.96	13.35	2.63	3.150	0.050	0.150	0.049	58.00	1394.94
0.013286	850.	710.	1730.	33	6	1	0.0	982.53	2377.35

3301 HV CHANGED MORE THAN HVINS

868128

T1 ECHO WASH
T2 STA 15 LT TO RT AND 1206 TO EL
T3 100 YEAR STORM

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FC
	0.	6.	0.	0.	0.0	0.0	-1.0	0.	50.050	0.0

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIK	ITRACE
	1.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

J3 VAR(I),I=1,10

1.	24.	27.	28.	31.	32.	33.	0.	0.	0.

CCHV= 0.100 CEHV= 0.300

3265 DIVIDED FLOW

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	FLMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST
0.0	2.55	50.05	0.0	50.05	50.25	0.20	0.0	0.0	50.00
6600.	0.	6600.	0.	0.	1844.	0.	0.	0.	52.00
0.0	0.04	3.56	0.0	0.050	0.050	0.050	0.0	47.56	1331.63
0.022426	0.	0.	0.	0	0	1	0.0	2459.12	6351.24

3265 DIVIDED FLOW

0.02	1.27	51.27	0.0	0.0	51.44	0.17	1.19	0.00	54.00
6600.	0.	6600.	0.	0.	2000.	0.	4.	4.	52.00
0.01	0.0	3.30	0.0	0.050	0.050	0.050	0.049	50.00	1742.77
0.004569	1400.	85.	400.	7	0	1	0.0	1653.80	8405.28
0.23	5.60	58.60	0.0	0.0	58.59	0.32	7.44	0.05	58.00
6600.	24.	6549.	27.	26.	1493.	29.	48.	33.	58.00
0.08	0.94	4.57	0.94	0.050	0.050	0.050	0.050	53.00	1375.39
0.004695	720.	1120.	900.	6	0	3	0.0	621.31	1996.70

CCH= 0.100 CEHV= 0.300

7185 MIN SPECIFIC ENERGY

3720 ASSUMED CRITICAL DEPTH

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	FLMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST
0.37	6.19	64.19	64.19	0.0	65.81	1.62	5.59	0.0	62.00
5900.	58.	4763.	1035.	73.	421.	449.	70.	42.	60.00
0.10	1.35	11.32	2.31	0.100	0.050	0.160	0.046	58.00	1650.54

```
T1      ECHO WASH
T2      STA LT TO RT ADD 1200 TO FL
T3      100 YEAR STORM - ONE FOOT ENCROACHMENT

J1  ICHECK    IND     NTRV     IDIM     STRT     RETRIC    HVINS     Q       WSEL     FD

      0.       2.       0.       0.    0.0       0.0      -1.0      0.     50.100    0.0

J2  KPROF    IPLOT    PREVS    XSECV    XSECH     FN      ALTDC     IBW     CHAIN    ITRACE

    15.000    0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0     15.000


CCEV=   0.100 CEH=   0.300
 2800 NAT Q1=    440.33  WSEL=     50.05  ENC Q1=   1683.23  WSEL=     51.05  RATIO= -2.8192
 NAT Q1=   1690.  RATIOS (DR,CH,ROB=  0.0043  0.9957  0.0     WSEL=     51.05

3265 DIVIDED FLOW

   SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HI       QLOSS    BANK ELEV
   Q        QLOB     QCH      QROB     ELOB     ACH      AROB     WDL      TWZ      LEFT/RIGHT
   TIME     VLOB     VCH      VROB     XIB      XNCH     XIW      WTB      FLMIN    STA
   SLOPE    XLOBI    XLCH     XLOBR    ITMIAL   IDC      ICONT    CORAR    TOPWID   FADST


3470 ENCROACHMENT STATIONS=    1135.0     4400.0   TYPE=     4  TARGET=      0.000
     0.0      2.60     50.10     0.0      50.05     50.27     0.17     0.0      0.0      50.00
   6600.       0.     6600.       0.        0.     1972.       0.       0.       0.  100000.00
     0.0      0.04     3.35     0.0      0.050     0.050    0.050     0.0     47.50    1135.00
 0.016029      0.       0.       0.         0         0        1      0.0   2566.49    4352.50


FLOW DISTRIBUTION

STA=    1135.    4400.
  PER Q=    100.0
  AREA=   1971.8
   VEL=      3.3

2800 NAT Q1=    674.30  WSEL=     51.27  ENC Q1=   1794.68  WSEL=     52.27  RATIO= -1.6585
NAT Q1=   1794.  RATIOS (DR,CH,ROB=  0.0     0.9999  0.0001  WSEL=     52.27

3265 DIVIDED FLOW


3470 ENCROACHMENT STATIONS=    1470.0     3660.0   TYPE=     4  TARGET=      0.000
     0.02     1.24    51.24     0.0      51.27     51.42     0.18     1.24     0.00     54.00
   6600.       0.     6600.       0.        0.     1948.       0.       4.       4.      52.00
     0.01     0.0      3.39     0.0      0.050     0.050    0.050    0.049    50.00    1743.32
 0.010419    1400.     85.     400.         6         0        1      0.0   1649.84    3602.91


FLOW DISTRIBUTION

STA=    1749.    3660.
  PER Q=    100.0
  AREA=   1947.9
   VEL=      3.4

2800 NAT Q1=    943.38  WSEL=     58.60  ENC Q1=   1462.33  WSEL=     59.60  RATIO= -0.5501
NAT Q1=   1561.  RATIOS (DR,CH,ROB=  0.0296  0.9366  0.0338  WSEL=     59.60
   SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HI       QLOSS    BANK ELEV
```

SUMMARY PRINTOUT FOR MULTIPLE PROFILES

100 YEAR STORM - ONE FEE

SECTION NUMBER	CHANNEL LENGTH	MIN EL OF RC DSAY	MAX EL OF LOW CHORD	MIN EL GROUND	DISCHARGE (CFS)	CWSEL	TC	STENCL	STENCR	ELENCL	ELENCR	CHSLOP
0.0	0.0	0.0	0.0	47.50	6600.00	50.05	440.73	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	47.50	6600.00	50.10	491.54	1135.00	4400.00100000	.00100000	.00	0.0
0.02	85.00	0.0	0.0	50.00	6600.00	51.27	674.[illegible]	0.0	0.0	0.0	0.0	45.04
0.02	85.00	0.0	0.0	50.00	6600.00	51.24	[illegible]	1430.00	3660.00100000	.00100000	.00	49.44
0.23	1120.00	0.0	0.0	53.00	6600.00	58.60	943.38	0.0	0.0	0.0	0.0	52.96
0.23	1120.00	0.0	0.0	53.00	6600.00	58.66	944.14	1400.00	1500.00100000	.00100000	.00	52.96
0.37	710.00	0.0	0.0	58.00	5900.00	64.19	448.86	0.0	0.0	0.0	0.0	57.93
0.37	710.00	0.0	0.0	58.00	5900.00	64.54	406.29	1725.00	3210.00100000	.00100000	.00	57.93
0.51	800.00	0.0	0.0	64.00	5900.00	71.65	862.05	0.0	0.0	0.0	0.0	63.93
0.51	800.00	0.0	0.0	64.00	5900.00	72.80	902.83	1428.56	2030.40100000	.00100000	.00	63.93
0.71	1060.00	0.0	0.0	70.00	5900.00	77.97	566.15	0.0	0.0	0.0	0.0	65.94
0.71	1060.00	0.0	0.0	70.00	5900.00	78.78	531.64	1700.00	1775.00100000	.00100000	.00	69.94
0.93	1150.00	0.0	0.0	78.00	5900.00	87.32	743.64	0.0	0.0	0.0	0.0	77.94
0.93	1150.00	0.0	0.0	78.00	5900.00	88.38	754.42	1165.00	3240.00100000	.00100000	.00	77.94
1.04	550.00	0.0	0.0	89.00	5900.00	93.10	562.12	0.0	0.0	0.0	0.0	88.86
1.04	550.00	0.0	0.0	89.00	5900.00	93.46	591.91	1590.00	1905.00100000	.00100000	.00	88.86
1.19	800.00	0.0	0.0	90.00	5900.00	97.98	937.30	0.0	0.0	0.0	0.0	89.89
1.19	800.00	0.0	0.0	90.00	5900.00	98.29	962.07	1595.00	1810.00100000	.00100000	.00	89.89
1.30	600.00	0.0	0.0	94.00	5900.00	100.92	548.62	0.0	0.0	0.0	0.0	93.85
1.30	600.00	0.0	0.0	94.00	5900.00	101.20	560.90	1530.00	1640.00100000	.00100000	.00	93.85
1.41	580.00	0.0	0.0	104.50	5900.00	107.33	817.03	0.0	0.0	0.0	0.0	104.34
1.41	580.00	0.0	0.0	104.50	5900.00	108.50	828.59	1900.00	2450.00100000	.00100000	.00	104.34

SECTION NUMBER	DISCHARGE CFS	CWSEL	CWSEL DIFF EACH Q	CWSEL DIFF EACH SECTION	CWSEL-WSELK	TOPWID	T.W. DIFF	LENGTH
0.0	6600.000	50.050	0.0	0.0	0.0	0.0	0.0	0.0
0.0	6600.000	50.100	0.050	0.0	0.0	0.0	0.0	0.0
0.020	6600.000	51.273	0.0	1.223	0.0	0.0	0.0	85.000
0.020	6600.000	51.240	-0.033	1.140	0.0	0.0	0.0	85.000
0.230	6600.000	58.604	0.0	7.331	0.0	0.0	0.0	1120.000
0.230	6600.000	58.664	0.060	7.424	0.0	0.0	0.0	1120.000
0.370	5900.000	64.187	0.0	5.582	0.0	0.0	0.0	710.000
0.370	5900.000	64.542	0.355	5.877	0.0	0.0	0.0	710.000
0.510	5900.000	71.647	0.0	7.461	0.0	0.0	0.0	800.000
0.510	5900.000	72.796	1.148	8.254	0.0	0.0	0.0	800.000
0.710	5900.000	77.965	0.0	6.318	0.0	0.0	0.0	1060.000
0.710	5900.000	78.776	0.811	5.981	0.0	0.0	0.0	1060.000
0.930	5900.000	87.723	0.0	9.758	0.0	0.0	0.0	1150.000
0.930	5900.000	88.381	0.657	9.604	0.0	0.0	0.0	1150.000

1.040	5900.000	93.102	0.0	5.379		0.0	0.0	550.000
1.040	5900.000	93.464	0.362	5.084	0.0	0.0	0.0	550.000
1.190	5900.000	97.977	0.0	4.875	0.0	0.0	0.0	800.000
1.190	5900.000	98.286	0.308	4.821	0.0	0.0	0.0	800.000
1.300	5900.000	100.917	0.0	2.939	0.0	0.0	0.0	600.000
1.300	5900.000	101.199	0.282	2.914	0.0	0.0	0.0	600.000
1.410	5900.000	107.705	0.0	6.789	0.0	0.0	0.0	580.000
1.410	5900.000	108.304	0.599	7.105	0.0	0.0	0.0	580.000

DATA FOR LAST CROSS SECTION

PROFILE	TYPE ENC	TARGET	TOP WIDTH AREA-ACRES	TOP WIDTH AREA-DIFF
1	0.0	0.0	116.362	0.0
2	4.000	0.517	55.125	-61.237

DISCHARGE IN CFS

PHOENIX, FLS

COMPUTED BY

CHECKED BY

DATE 19 June 73

DATE

Check Point No	10 YR	25 YR	50 YR	100 YR	500 YR
Echo Canyon, #1	2000	3200	4600	6600	18,000
Echo Canyon, #2	1900	3000	4200	5300	14,000
Flynn Lane Wash, #3	400	600	800	1100	2300
Flynn Lane Wash, #4	700	1000	1300	1700	3300
Myrtle Ave Wash #5	600	800	1000	1300	2800
Dreamy Draw East, #6	300	550	750	1000	1700
Dreamy Draw #7	350	550	800	1100	1800
Dreamy Draw, #8	550	1000	1400	1800	3200
Northern Ave Wash, #9	500	700	900	1150	2100
Northern Ave Wash, #10	650	950	1200	1600	2900
Tenth St Wash #11	1500	2600	3700	5500	12,000
Tenth St West #12	800	1250	1700	2200	4500
Moon Valley #13	2000	3300	5000	7300	21,000
Moon Valley, #14	1650	2900	4300	6200	15,000
Moon Valley, #15	750	1200	1600	2100	3600
East Fork Cave Creek, #16	3100	5800	9000	13,300	33,000
North Fork Cave Creek, #17	500	650	800	1000	2300

This is the HEC-1 printout that includes the intermediate summaries. It shows that the "routed outflow" warning occurs in the routing of flows from CP10 to CP11. This is between 40th Street and Standford Drive. The overflowing of the channel appears to occur during the 100-year storm, primarily to the west. This determination is based on field investigation. This is also substantiated by the boundary shown on the FIRM.

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              MAY   1991              *
 *            VERSION 4.0.1E            *
 *     Lahey F77L-EM/32 version 5.01    *
 *       Dodson & Associates, Inc.      *
 *  RUN DATE  03/20/97  TIME  09:47:32  *
 ****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 551-1748             *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
1                                          HEC-1 INPUT                                                    PAGE  1

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        1           ID        ECHO CANYON WASH FLOODPLAIN STUDY
        2           ID        FILE NAME: MARI0008.DAT PREPARED NOVEMBER 22, 1995
        3           ID        PRECIPITATION BASED ON A 100-YR, 6-HR HYPOTHETICAL STORM
        4           ID        NOAA ATLAS USED FOR RAINFALL DATA
        5           ID        GREEN-AMPT INFILTRATION EQUATION UTILIZED FOR ESTIMATING RAINFALL LOSSES
        6           ID        CLARK UNIT HYDROGRAPH UTLIZED TO ROUTE RAINFALL EXCESSES
        7           ID        CHANNEL ROUTING - NORMAL-DEPTH METHOD
                    *DIAGRAM
        8           IT       1                    300
        9           IO       3
                    * DDM   ***** Updated *****

       10           KK    SUB1
       11           KM        RUNOFF GENERATED FROM SUB-BASIN 1
       12           KM        6-HOUR RAINFALL, PATTERN NO. 2.33 WAS USED TO FIND TC & R
       13           KM        RAINFALL REDUCTION FACTOR OF .96 WAS UTILIZED FOR ALL BASINS
       14           KM     L = 1.89  Kb = .037  Adj. Slope =  315.0
       15           BA    .874
       16           IN      15
       17           KM        RAINFALL DEPTH OF 3.18 WAS SPACIALLY REDUCED AS SHOWN ON THE PB RECORD
       18           PB   3.053
       19           KM        THE FOLLOWING PC RECORD USED A 6-HOUR STORM WITH A PATTERN NO. OF 2.33
       20           PC    .000    .011    .017    .027    .039    .049    .059    .069    .080    .090
       21           PC    .103    .117    .138    .183    .269    .458    .686    .823    .889    .929
       22           PC    .949    .962    .974    .988   1.000
       23           LG      .1    .280   4.250    .510   58.00
       24           UC    .367    .242
       25           UA       0       5      16      30      65      77      84      90      94      97
       26           UA     100
                    * DDM   ***** Updated *****

       27           KK    SUB2
       28           KM        RUNOFF GENERATED FROM SUB-BASIN 2
       29           KM     L =  .95  Kb = .055  Adj. Slope =  315.0
       30           BA    .262
       31           LG     .15    .270   4.200    .560  45.000
       32           UC    .321    .233
       33           UA       0       5      16      30      65      77      84      90      94      97
       34           UA     100

       35           KK     CP2
       36           KM        COMBINED RUNOFF FROM SUB1 & SUB2
       37           HC       2

       38           KK    RCP2
       39           KM        ROUTE FLOWS FROM CP2 TO CP3
       40           RS       1    FLOW      -1
       41           RC     .03     .03     .03     800    .008
       42           RX       0       5      11      15      25      30      35      40
       43           RY     6.5       5       3       0       0       3       5     6.5
                    * DDM   ***** Updated *****
1                                          HEC-1 INPUT                                                    PAGE  2

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

       44           KK    SUB3
       45           KM        RUNOFF GENERATED FROM SUB-BASIN 3
       46           KM     L = 1.33  Kb = .048  Adj. Slope =  315.0
       47           BA    .150
       48           LG      .1    .280   4.350    .470  59.000
       49           UC    .346    .456
       50           UA       0       5      16      30      65      77      84      90      94      97
       51           UA     100

       52           KK     CP3
       53           KM        COMBINED RUNOFF FROM SUB3 & CP2
       54           HC       2

       55           KK    RCP3
       56           KM        ROUTED FLOWS FROM CP3 TO CP4
       57           RS       1    FLOW      -1
       58           RC    .030    .022    .030    1000    .008
       59           RX       0       1       3       9      21      27      29      30
       60           RY       6       5       4       0       0       4       5       6
                    * DDM   ***** Updated *****

       61           KK    SUB4
       62           KM        RUNOFF GENERATED FORM SUB-BASIN 4
       63           KM     L = 1.51  Kb = .048  Adj. Slope =  315.0
       64           BA    .304
       65           LG      .1    .280   4.450    .470  69.000
       66           UC    .363    .367
       67           UA       0       5      16      30      65      77      84      90      94      97
       68           UA     100

       69           KK     CP4
       70           KM        COMBINED FLOWS FLOWS FROM SUB4 & CP3
       71           HC       2
```

```
 72          KK    RCP4
 73          KM        ROUTED FLOWS FROM CP4 TO CP5
 74          RS       1    FLOW      -1
 75          RC     .05    .022     .05     200    .008
 76          RX       0       2       6      13      38      45      48      50
 77          RY       5     3.5     3.5       0       0     3.5     3.5       5
             * DDM   ***** Updated *****

 78          KK    SUB5
 79          KM        RUNOFF GENERATED FROM SUB-BASIN 5
 80          KM     L = 1.89  Kb = .048  Adj. Slope =  280.0
 81          BA    .653
 82          LG     .15    .280   4.250    .540  54.000
 83          UC    .450    .361
 84          UA       0       5      16      30      65      77      84      90      94      97
 85          UA     100
1                                          HEC-1 INPUT                                                    PAGE  3

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 86          KK     CP5
 87          KM        COMBINED FLOWS FROM SUB5 & CP4
 88          HC       2

 89          KK    RCP5
 90          KM        ROUTED FLOWS FROM CP5 TO CP6
 91          RS       1    FLOW      -1
 92          RC     .05     .03     .05    1200    .007
 93          RX       0       7      12      31      39      58      63      70
 94          RY       7       5     2.5       0       0     2.5       5       7
             * DDM   ***** Updated *****

 95          KK    SUB6
 96          KM        RUNOFF GENERATED FROM SUB-BASIN 6
 97          KM     L = 1.33  Kb = .043  Adj. Slope =  113.0
 98          BA    .441
 99          LG      .1    .270   4.100    .540  45.000
100          UC    .475    .362
101          UA       0       5      16      30      65      77      84      90      94      97
102          UA     100

103          KK     CP6
104          KM        COMBINED FLOWS FROM SUB6 & CP5
105          HC       2

106          KK    RCP6
107          KM        ROUTED FLOWS FROM CP6 TO CP7
108          RS       1    FLOW      -1
109          RC     .05     .03     .05     400    .008
110          RX       0      10      16      28      38      50      56      66
111          RY       9       7       6       0       0       6       7       9
             * DDM   ***** Updated *****

112          KK    SUB7
113          KM        RUNOFF GENERATED FROM SUB-BASIN 7
114          KM     L = 2.65  Kb = .038  Adj. Slope =  297.8
115          BA    .738
116          LG      .1    .290   4.000    .550  66.000
117          UC    .454    .445
118          UA       0       5      16      30      65      77      84      90      94      97
119          UA     100

120          KK     CP7
121          KM        COMBINED FLOWS FROM SUB7 & CP6
122          HC       2

123          KK    RCP7
124          KM        ROUTED FLOWS FROM CP7 TO CP8
125          RS       1    FLOW      -1
126          RC     .05     .03     .05    1150    .007
127          RX       0      .5     8.5    18.5    31.5    41.5    49.5      50
128          RY      14      12      12       0       0      12      12      14
             * DDM   ***** Updated *****
1                                          HEC-1 INPUT                                                    PAGE  4

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

129          KK    SUB8
130          KM        RUNOFF GENERATED FROM SUB-BASIN 8
131          KM     L = 1.42  Kb = .043  Adj. Slope =  298.7
132          BA    .661
133          LG      .1    .270   4.150    .530  44.000
134          UC    .354    .219
135          UA       0       5      16      30      65      77      84      90      94      97
136          UA     100

137          KK     CP8
138          KM        COMBINED FLOWS FROM SUB8 & CP7
139          HC       2

140          KK    RCP8
141          KM        ROUTED FLOWS FROM CP8 TO CP9
142          RS       1    FLOW      -1
143          RC     .05    .022     .05    1300    .006
144          RX       0       1       5      23      51      69      70      71
145          RY      12      10      10       0       0      10      10      12
             * DDM   ***** Updated *****

146          KK    SUB9
147          KM        RUNOFF GENERATED FROM SUB-BASIN 9
148          KM     L =  .85  Kb = .041  Adj. Slope =  315.0
149          BA    .257
150          LG      .1    .300   4.200    .510  81.000
151          UC    .242    .162
152          UA       0       5      16      30      65      77      84      90      94      97
153          UA     100

154          KK     CP9
155          KM        COMBINED FLOWS FROM SUB9 & CP8
156          HC       2

157          KK    RCP9
158          KM        ROUTED FLOWS FROM CP9 TO CP10
159          RS       1    FLOW      -1
160          RC     .03    .022     .03    4900    .007
161          RX       0       1       6      13      51      58      63      64
162          RY       8       7       7       0       0       7       7       8
             * DDM   ***** Updated *****

163          KK   SUB10
164          KM        RUNOFF GENERATED FROM SUB-BASIN 10
165          KM     L =  .76  Kb = .045  Adj. Slope =  209.6
166          BA    .512
167          LG      .1    .260   4.150    .530  33.000
168          UC    .296    .126
169          UA       0       5      16      30      65      77      84      90      94      97
```

```
 170          UA     100
1                                          HEC-1 INPUT                                                    PAGE  5

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 171          KK    CP10
 172          KM        COMBINED FLOW FROM SUB10 & CP9
 173          HC       2

 174          KK   RCP10
 175          KM        ROUTED FLOWS FROM CP10 TO CP11
 176          RS       1    FLOW      -1
 177          RC     .03    .022     .03     250    .006
 178          RX       0       1       6      13      37      44      49      50
 179          RY       6       5       5       0       0       5       5       6
              * DDM   ***** Updated *****

 180          KK   SUB20
 181          KM        RUNOFF GENERATED FROM SUB-BASIN 20
 182          KM     L =   .85  Kb = .050  Adj. Slope =  284.0
 183          BA    .111
 184          LG      .1    .260   4.100    .550  41.000
 185          UC    .296    .328
 186          UA       0       5      16      30      65      77      84      90      94      97
 187          UA     100
              * DDM   ***** Updated *****

 188          KK   SUB21
 189          KM        RUNOFF GENERATED FROM SUB-BASIN 21
 190          KM     L = 1.89  Kb = .036  Adj. Slope =  305.6
 191          BA    .430
 192          LG      .1    .330   4.650    .370  94.000
 193          UC    .329    .324
 194          UA       0       5      16      30      65      77      84      90      94      97
 195          UA     100

 196          KK    CP20
 197          KM        COMBINED FLOWS FROM SUB20 & SUB21
 198          HC       2

 199          KK    CP20
 200          KM        ROUTE FLOWS FROM CP20 TO CP11
 201          RS       1    FLOW      -1
 202          RC     .03    .022     .03    4000     .01
 203          RX       0       1       3      11      24      32      34      35
 204          RY       5       4       4       0       0       4       4       5
              * DDM   ***** Updated *****

 205          KK   SUB11
 206          KM        RUNOFF GENERATED FROM SUB-BASIN 11
 207          KM     L =   .76  Kb = .058  Adj. Slope =  105.0
 208          BA    .059
 209          LG      .1    .260   3.950    .580  24.000
 210          UC    .450    .683
 211          UA       0       5      16      30      65      77      84      90      94      97
 212          UA     100
1                                          HEC-1 INPUT                                                    PAGE  6

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 213          KK    CP11
 214          KM        COMBINED FLOWS FROM SUB11, CP20, & CP10
 215          HC       3

 216          KK   RCP11
 217          KM        ROUTED FLOWS FROM CP11 TO CP12
 218          RS       1    FLOW      -1
 219          RC     .03     .02     .03    1900    .006
 220          RX       0       1       2      58      76      95     252     273
 221          RY      15      14      14       0       0       6       7      13
              * DDM   ***** Updated *****

 222          KK   SUB12
 223          KM        RUNOFF GENERATED FROM SUB-BASIN 12
 224          KM     L = 1.23  Kb = .052  Adj. Slope =  239.0
 225          BA    .464
 226          LG     .15    .260   5.300    .300  25.000
 227          UC    .383    .260
 228          UA       0       5      16      30      65      77      84      90      94      97
 229          UA     100

 230          KK    CP12
 231          KM        COMBINED FLOWS FROM SUB12 & CP11
 232          HC       2

 233          KK   RETEN
 234          KM        FLOW ROUTED THROUGH RETENTION FACILITY
 235          RS       1    ELEV  1236.5
 236          SV       0    1.49    6.21    6.66    6.95    7.20    7.49    7.79    8.10    8.42
 237          SV    8.76    9.11    9.57   10.05
 238          SE  1236.5    1237    1238    1239    1240    1241    1242    1243    1244    1245
 239          SE    1246    1247    1248    1249
 240          SS    1243     200    2.63     1.5
 241          SL  1236.5    7.07     0.8     0.5
 242          ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   10       SUB1
              .
              .
   27         .        SUB2
              .           .
              .           .
   35      CP2............
             V
             V
   38      RCP2
              .
              .
   44         .        SUB3
              .           .
              .           .
   52      CP3............
             V
             V
   55      RCP3
              .
              .
   61         .        SUB4
              .           .
              .           .
```

```
 69          CP4............
               V
               V
 72         RCP4
               .
               .
 78            .        SUB5
               .          .
               .          .
 86          CP5............
               V
               V
 89         RCP5
               .
               .
 95            .        SUB6
               .          .
               .          .
103          CP6............
               V
               V
106         RCP6
               .
               .
112            .        SUB7
               .          .
               .          .
120          CP7............
               V
               V
123         RCP7
               .
               .
129            .        SUB8
               .          .
               .          .
137          CP8............
               V
               V
140         RCP8
               .
               .
146            .        SUB9
               .          .
               .          .
154          CP9............
               V
               V
157         RCP9
               .
               .
163            .       SUB10
               .          .
               .          .
171         CP10............
               V
               V
174        RCP10
               .
               .
180            .       SUB20
               .          .
               .          .
188            .          .       SUB21
               .          .          .
               .          .          .
196            .        CP20............
               .          V
               .          V
199            .        CP20
               .          .
               .          .
205            .          .       SUB11
               .          .          .
               .          .          .
213         CP11........................
               V
               V
216        RCP11
               .
               .
222            .       SUB12
               .          .
               .          .
230         CP12............
               V
               V
233        RETEN
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             MAY   1991                *
*          VERSION 4.0.1E               *
*     Lahey F77L-EM/32 version 5.01     *
*       Dodson & Associates, Inc.       *
*  RUN DATE  03/20/97  TIME  09:47:32   *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 551-1748              *
*                                       *
*****************************************
```

ECHO CANYON WASH FLOODPLAIN STUDY
FILE NAME: MARI0008.DAT PREPARED NOVEMBER 22, 1995
PRECIPITATION BASED ON A 100-YR, 6-HR HYPOTHETICAL STORM
NOAA ATLAS USED FOR RAINFALL DATA
GREEN-AMPT INFILTRATION EQUATION UTILIZED FOR ESTIMATING RAINFALL LOSSES
CLARK UNIT HYDROGRAPH UTLIZED TO ROUTE RAINFALL EXCESSES
CHANNEL ROUTING - NORMAL-DEPTH METHOD

```
 9 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          3  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                      NMIN          1  MINUTES IN COMPUTATION INTERVAL
                     IDATE      1    0  STARTING DATE
                     ITIME       0000  STARTING TIME
                        NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE      1    0  ENDING DATE
                    NDTIME       0459  ENDING TIME
                     ICENT         19  CENTURY MARK

               COMPUTATION INTERVAL    0.02 HOURS
                    TOTAL TIME BASE    4.98 HOURS
```

```
ENGLISH UNITS
     DRAINAGE AREA          SQUARE MILES
     PRECIPITATION DEPTH    INCHES
     LENGTH, ELEVATION      FEET
     FLOW                   CUBIC FEET PER SECOND
     STORAGE VOLUME         ACRE-FEET
     SURFACE AREA           ACRES
     TEMPERATURE            DEGREES FAHRENHEIT

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
          *            *
 10 KK    *     SUB1   *
          *            *
          **************
                         RUNOFF GENERATED FROM SUB-BASIN 1
                         6-HOUR RAINFALL, PATTERN NO. 2.33 WAS USED TO FIND TC & R
                         RAINFALL REDUCTION FACTOR OF .96 WAS UTILIZED FOR ALL BASINS
                       L = 1.89  Kb = .037  Adj. Slope =  315.0
                         RAINFALL DEPTH OF 3.18 WAS SPACIALLY REDUCED AS SHOWN ON THE PB RECORD
                         THE FOLLOWING PC RECORD USED A 6-HOUR STORM WITH A PATTERN NO. OF 2.33

 16 IN        TIME DATA FOR INPUT TIME SERIES
                  JXMIN          15  TIME INTERVAL IN MINUTES
                 JXDATE     1    0  STARTING DATE
                 JXTIME          0  STARTING TIME

            SUBBASIN RUNOFF DATA

 15 BA        SUBBASIN CHARACTERISTICS
                  TAREA        0.87  SUBBASIN AREA

              PRECIPITATION DATA

 19 PB            STORM        3.05  BASIN TOTAL PRECIPITATION

 19 PI          INCREMENTAL PRECIPITATION PATTERN
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01
                 0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                 0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                 0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.02      0.02      0.02
                 0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02
                 0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                 0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 23 LG        GREEN AND AMPT LOSS RATE
                 STRTL        0.10  STARTING LOSS
                   DTH        0.28  MOISTURE DEFICIT
                  PSIF        4.25  WETTING FRONT SUCTION
                 XKSAT        0.51  HYDRAULIC CONDUCTIVITY
                 RTIMP       58.00  PERCENT IMPERVIOUS AREA

 24 UC        CLARK UNITGRAPH
                    TC        0.37  TIME OF CONCENTRATION
                     R        0.24  STORAGE COEFFICIENT

 25 UA        ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                   0.0       5.0      16.0      30.0      65.0      77.0      84.0      90.0      94.0      97.0
                 100.0

                                                  ***

                                          UNIT HYDROGRAPH PARAMETERS
                                   CLARK   TC=  0.37 HR,       R=  0.24 HR
                                  SNYDER   TP=  0.19 HR,      CP=  0.44

                                          UNIT HYDROGRAPH
                                   87 END-OF-PERIOD ORDINATES
            26.       75.      146.      242.      348.      462.      617.      869.     1146.     1288.
          1325.     1334.     1317.     1297.     1273.     1244.     1206.     1165.     1121.     1077.
          1036.      998.      947.      884.      825.      771.      719.      671.      627.      585.
           546.      510.      476.      444.      414.      387.      361.      337.      315.      294.
           274.      256.      239.      223.      208.      194.      181.      169.      158.      147.
           138.      128.      120.      112.      104.       98.       91.       85.       79.       74.
            69.       65.       60.       56.       52.       49.       46.       43.       40.       37.
            35.       32.       30.       28.       26.       25.       23.       21.       20.       19.
            17.       16.       15.       14.       13.       12.       12.

    ***            ***            ***            ***            ***

                     HYDROGRAPH AT STATION     SUB1

   TOTAL RAINFALL =    3.05, TOTAL LOSS =    0.86, TOTAL EXCESS =    2.19

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR       4.98-HR
+   (CFS)       (HR)
                                    (CFS)
+   1125.       4.13                234.         234.         234.         234.
                                 (INCHES)      2.068        2.068        2.068        2.068
                                 (AC-FT)        96.          96.          96.          96.

                     CUMULATIVE AREA =    0.87 SQ MI

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

```
              **************
              *            *
  27 KK       *     SUB2   *
              *            *
              **************
                                  RUNOFF GENERATED FROM SUB-BASIN 2
                              L =  .95  Kb = .055  Adj. Slope =  315.0

                SUBBASIN RUNOFF DATA

  30 BA           SUBBASIN CHARACTERISTICS
                        TAREA          0.26  SUBBASIN AREA

                  PRECIPITATION DATA

  19 PB                 STORM          3.05  BASIN TOTAL PRECIPITATION

  19 PI             INCREMENTAL PRECIPITATION PATTERN
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                       0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                       0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.02      0.02      0.02
                       0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02
                       0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                       0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

  31 LG           GREEN AND AMPT LOSS RATE
                        STRTL          0.15  STARTING LOSS
                          DTH          0.27  MOISTURE DEFICIT
                         PSIF          4.20  WETTING FRONT SUCTION
                        XKSAT          0.56  HYDRAULIC CONDUCTIVITY
                        RTIMP         45.00  PERCENT IMPERVIOUS AREA

  32 UC           CLARK UNITGRAPH
                           TC          0.32  TIME OF CONCENTRATION
                            R          0.23  STORAGE COEFFICIENT

  33 UA           ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                       0.0       5.0      16.0      30.0      65.0      77.0      84.0      90.0      94.0      97.0
                     100.0
                                                          ***

                                                   UNIT HYDROGRAPH PARAMETERS
                                          CLARK   TC=  0.32 HR,       R=  0.23 HR
                                         SNYDER   TP=  0.17 HR,      CP=  0.43

                                                      UNIT HYDROGRAPH
                                                 83 END-OF-PERIOD ORDINATES
                       9.       27.       55.       92.      132.      183.      268.      364.      412.      424.
                     426.      421.      415.      406.      394.      381.      366.      352.      338.      322.
                     301.      280.      261.      243.      226.      210.      196.      182.      170.      158.
                     147.      137.      128.      119.      111.      103.       96.       89.       83.       77.
                      72.       67.       62.       58.       54.       50.       47.       44.       41.       38.
                      35.       33.       30.       28.       26.       25.       23.       21.       20.       18.
                      17.       16.       15.       14.       13.       12.       11.       10.       10.        9.
                       8.        8.        7.        7.        6.        6.        5.        5.        5.        4.
                       4.        4.        4.

      ***             ***             ***             ***             ***

                          HYDROGRAPH AT STATION     SUB2

     TOTAL RAINFALL =     3.05, TOTAL LOSS =     1.16, TOTAL EXCESS =     1.89

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+    (CFS)       (HR)
                            (CFS)
+     314.      4.10                61.         61.         61.         61.
                         (INCHES)   1.801       1.801       1.801       1.801
                          (AC-FT)    25.         25.         25.         25.

                          CUMULATIVE AREA =    0.26 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


              **************
              *            *
  35 KK       *     CP2    *
              *            *
              **************
                                  COMBINED RUNOFF FROM SUB1 & SUB2

  37 HC           HYDROGRAPH COMBINATION
                        ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                          ***

      ***             ***             ***             ***             ***

                          HYDROGRAPH AT STATION      CP2

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+    (CFS)       (HR)
                            (CFS)
+    1438.      4.12                295.        295.        295.        295.
                         (INCHES)   2.006       2.006       2.006       2.006
                          (AC-FT)   122.        122.        122.        122.
```

CUMULATIVE AREA = 1.14 SQ MI

*** ***

```
              **************
              *            *
   38 KK      *     RCP2   *
              *            *
              **************
                          ROUTE FLOWS FROM CP2 TO CP3

                HYDROGRAPH ROUTING DATA

   40 RS          STORAGE ROUTING
                       NSTPS          1  NUMBER OF SUBREACHES
                        ITYP       FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC      -1.00  INITIAL CONDITION
                           X       0.00 WORKING R AND D COEFFICIENT

   41 RC          NORMAL DEPTH CHANNEL
                         ANL      0.030  LEFT OVERBANK N-VALUE
                        ANCH      0.030  MAIN CHANNEL N-VALUE
                         ANR      0.030  RIGHT OVERBANK N-VALUE
                       RLNTH       800.  REACH LENGTH
                         SEL     0.0080  ENERGY SLOPE
                       ELMAX        0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                      CROSS-SECTION DATA
                            --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
   43 RY        ELEVATION      6.50      5.00      3.00      0.00      0.00      3.00      5.00      6.50
   42 RX        DISTANCE       0.00      5.00     11.00     15.00     25.00     30.00     35.00     40.00

                                                          ***

                                      COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE       0.00      0.07      0.14      0.22      0.30      0.39      0.49      0.60      0.71      0.83
            OUTFLOW       0.00      7.48     23.97     47.73     78.26    115.41    159.17    209.64    266.91    334.07
          ELEVATION       0.00      0.34      0.68      1.03      1.37      1.71      2.05      2.39      2.74      3.08

            STORAGE       0.95      1.09      1.25      1.41      1.59      1.77      1.97      2.19      2.42      2.66
            OUTFLOW     419.03    513.53    618.34    734.12    861.47   1000.58   1152.17   1317.64   1497.64   1692.84
          ELEVATION       3.42      3.76      4.11      4.45      4.79      5.13      5.47      5.82      6.16      6.50

      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION     RCP2

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR       4.98-HR
+   (CFS)       (HR)
                           (CFS)
+    1435.      4.13          293.         293.         293.         293.
                        (INCHES)        1.994        1.994        1.994        1.994
                         (AC-FT)         121.         121.         121.         121.

 PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
                                    6-HR        24-HR        72-HR       4.98-HR
+  (AC-FT)      (HR)
       2.       4.13            1.           1.           1.           1.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                    6-HR        24-HR        72-HR       4.98-HR
+   (FEET)      (HR)
     6.04       4.13           2.14         2.14         2.14         2.14

                        CUMULATIVE AREA =    1.14 SQ MI
```

*** ***

```
              **************
              *            *
   44 KK      *     SUB3   *
              *            *
              **************
                          RUNOFF GENERATED FROM SUB-BASIN 3
                       L = 1.33  Kb = .048  Adj. Slope =  315.0

                SUBBASIN RUNOFF DATA

   47 BA          SUBBASIN CHARACTERISTICS
                       TAREA        0.15  SUBBASIN AREA

                  PRECIPITATION DATA

   19 PB                STORM        3.05  BASIN TOTAL PRECIPITATION

   19 PI            INCREMENTAL PRECIPITATION PATTERN
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01
                      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                      0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.02      0.02      0.02
                      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02
                      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                      0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
```

```
48 LG          GREEN AND AMPT LOSS RATE
                     STRTL        0.10  STARTING LOSS
                       DTH        0.28  MOISTURE DEFICIT
                      PSIF        4.35  WETTING FRONT SUCTION
                     XKSAT        0.47  HYDRAULIC CONDUCTIVITY
                     RTIMP       59.00  PERCENT IMPERVIOUS AREA

49 UC          CLARK UNITGRAPH
                        TC        0.35  TIME OF CONCENTRATION
                         R        0.46  STORAGE COEFFICIENT

50 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                     0.0       5.0      16.0      30.0      65.0      77.0      84.0      90.0      94.0      97.0
                   100.0

                                                   ***

                                                UNIT HYDROGRAPH PARAMETERS
                                          CLARK   TC=  0.35 HR,       R=  0.46 HR
                                         SNYDER   TP=  0.24 HR,      CP=  0.36

                                                UNIT HYDROGRAPH
                                          154 END-OF-PERIOD ORDINATES
                3.        7.       15.       25.       37.       49.       70.      100.      123.      135.
              140.      143.      145.      146.      146.      145.      144.      142.      140.      138.
              136.      132.      127.      123.      118.      114.      110.      106.      102.       99.
               95.       92.       88.       85.       82.       79.       76.       74.       71.       68.
               66.       64.       61.       59.       57.       55.       53.       51.       49.       47.
               46.       44.       43.       41.       40.       38.       37.       35.       34.       33.
               32.       31.       30.       28.       27.       26.       25.       25.       24.       23.
               22.       21.       20.       20.       19.       18.       18.       17.       16.       16.
               15.       15.       14.       14.       13.       13.       12.       12.       11.       11.
               11.       10.       10.       10.        9.        9.        9.        8.        8.        8.
                7.        7.        7.        7.        6.        6.        6.        6.        5.        5.
                5.        5.        5.        5.        4.        4.        4.        4.        4.        4.
                4.        3.        3.        3.        3.        3.        3.        3.        3.        3.
                2.        2.        2.        2.        2.        2.        2.        2.        2.        2.
                2.        2.        2.        2.        1.        1.        1.        1.        1.        1.
                1.        1.        1.        1.

     ***            ***            ***            ***            ***

                        HYDROGRAPH AT STATION      SUB3

    TOTAL RAINFALL =     3.05, TOTAL LOSS =     0.82, TOTAL EXCESS =     2.23

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR       4.98-HR
+   (CFS)       (HR)
                          (CFS)
+     157.      4.18                37.          37.          37.          37.
                        (INCHES)    1.909        1.909        1.909        1.909
                         (AC-FT)     15.          15.          15.          15.

                        CUMULATIVE AREA =     0.15 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
52 KK       *      CP3   *
            *            *
            **************
                                COMBINED RUNOFF FROM SUB3 & CP2

54 HC          HYDROGRAPH COMBINATION
                     ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                   ***

     ***            ***            ***            ***            ***

                        HYDROGRAPH AT STATION      CP3

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR       4.98-HR
+   (CFS)       (HR)
                          (CFS)
+    1591.      4.13                330.         330.         330.         330.
                        (INCHES)    1.984        1.984        1.984        1.984
                         (AC-FT)     136.         136.         136.         136.

                        CUMULATIVE AREA =     1.29 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
55 KK       *      RCP3  *
            *            *
            **************
                                ROUTED FLOWS FROM CP3 TO CP4

               HYDROGRAPH ROUTING DATA

57 RS          STORAGE ROUTING
                     NSTPS           1  NUMBER OF SUBREACHES
                      ITYP        FLOW  TYPE OF INITIAL CONDITION
                     RSVRIC       -1.00  INITIAL CONDITION
                          X        0.00 WORKING R AND D COEFFICIENT

58 RC          NORMAL DEPTH CHANNEL
                       ANL       0.030  LEFT OVERBANK N-VALUE
                      ANCH       0.022  MAIN CHANNEL N-VALUE
                       ANR       0.030  RIGHT OVERBANK N-VALUE
                     RLNTH       1000.  REACH LENGTH
                       SEL      0.0080  ENERGY SLOPE
                     ELMAX         0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                     CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
60 RY        ELEVATION      6.00      5.00      4.00      0.00      0.00      4.00      5.00      6.00
59 RX        DISTANCE       0.00      1.00      3.00      9.00     21.00     27.00     29.00     30.00

                                                   ***

                                     COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE        0.00      0.09      0.19      0.29      0.40      0.52      0.65      0.78      0.92      1.06
            OUTFLOW        0.00     10.69     34.16     67.74    110.55    162.21    222.57    291.59    369.34    455.89
```

ELEVATION	0.00	0.32	0.63	0.95	1.26	1.58	1.89	2.21	2.53	2.84
STORAGE	1.21	1.37	1.54	1.71	1.89	2.08	2.28	2.49	2.70	2.92
OUTFLOW	551.39	655.97	769.80	901.26	1059.64	1229.33	1410.70	1603.89	1808.30	2023.80
ELEVATION	3.16	3.47	3.79	4.11	4.42	4.74	5.05	5.37	5.68	6.00

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

                    HYDROGRAPH AT STATION     RCP3

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+    1589.      4.15                328.        328.        328.        328.
                        (INCHES)    1.970       1.970       1.970       1.970
                         (AC-FT)    135.        135.        135.        135.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR      4.98-HR
+  (AC-FT)      (HR)
       2.       4.15                 1.          1.          1.          1.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR      4.98-HR
+   (FEET)      (HR)
     5.34       4.15                1.81        1.81        1.81        1.81

                        CUMULATIVE AREA =    1.29 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
  61 KK     *     SUB4   *
            *            *
            **************
                          RUNOFF GENERATED FORM SUB-BASIN 4
                     L = 1.51  Kb = .048  Adj. Slope =  315.0

            SUBBASIN RUNOFF DATA

  64 BA       SUBBASIN CHARACTERISTICS
                 TAREA        0.30  SUBBASIN AREA

              PRECIPITATION DATA

  19 PB            STORM        3.05  BASIN TOTAL PRECIPITATION

  19 PI         INCREMENTAL PRECIPITATION PATTERN
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01
                  0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                  0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                  0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.02      0.02      0.02
                  0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02
                  0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                  0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

  65 LG       GREEN AND AMPT LOSS RATE
                 STRTL        0.10  STARTING LOSS
                  DTH         0.28  MOISTURE DEFICIT
                 PSIF         4.45  WETTING FRONT SUCTION
                XKSAT         0.47  HYDRAULIC CONDUCTIVITY
                RTIMP        69.00  PERCENT IMPERVIOUS AREA

  66 UC       CLARK UNITGRAPH
                   TC         0.36  TIME OF CONCENTRATION
                    R         0.37  STORAGE COEFFICIENT

  67 UA       ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                 0.0       5.0      16.0      30.0      65.0      77.0      84.0      90.0      94.0      97.0
               100.0

                                                  ***

                                          UNIT HYDROGRAPH PARAMETERS
                                   CLARK   TC=  0.36 HR,       R=  0.37 HR
                                  SNYDER   TP=  0.23 HR,      CP=  0.39

                                          UNIT HYDROGRAPH
                                   126 END-OF-PERIOD ORDINATES
            6.       18.       35.       58.       85.      113.      153.      217.      284.      319.
          333.      341.      342.      343.      342.      340.      335.      329.      322.      315.
          308.      301.      290.      277.      265.      253.      242.      231.      221.      211.
          202.      193.      184.      176.      168.      161.      154.      147.      140.      134.
          128.      122.      117.      112.      107.      102.       98.       93.       89.       85.
           81.       78.       74.       71.       68.       65.       62.       59.       57.       54.
           52.       49.       47.       45.       43.       41.       39.       38.       36.       34.
           33.       31.       30.       29.       27.       26.       25.       24.       23.       22.
           21.       20.       19.       18.       17.       17.       16.       15.       14.       14.
           13.       13.       12.       12.       11.       11.       10.       10.        9.        9.
            8.        8.        8.        7.        7.        7.        6.        6.        6.        6.
            5.        5.        5.        5.        4.        4.        4.        4.        4.        4.
            3.        3.        3.        3.        3.        3.

     ***             ***             ***             ***             ***

                    HYDROGRAPH AT STATION     SUB4

   TOTAL RAINFALL =    3.05, TOTAL LOSS =    0.62, TOTAL EXCESS =    2.43
```

```
  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+     365.      4.15                85.         85.         85.         85.
                        (INCHES)    2.166       2.166       2.166       2.166
                         (AC-FT)     35.         35.         35.         35.

                       CUMULATIVE AREA =    0.30 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
  69 KK     *     CP4    *
            *            *
            **************
                          COMBINED FLOWS FLOWS FROM SUB4 & CP3

  71 HC          HYDROGRAPH COMBINATION
                      ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                          ***

      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION      CP4

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+    1954.      4.15                413.        413.        413.        413.
                        (INCHES)    2.008       2.008       2.008       2.008
                         (AC-FT)    170.        170.        170.        170.

                       CUMULATIVE AREA =    1.59 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
  72 KK     *     RCP4   *
            *            *
            **************
                          ROUTED FLOWS FROM CP4 TO CP5

               HYDROGRAPH ROUTING DATA

  74 RS          STORAGE ROUTING
                      NSTPS          1  NUMBER OF SUBREACHES
                       ITYP       FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC     -1.00  INITIAL CONDITION
                          X       0.00 WORKING R AND D COEFFICIENT

  75 RC          NORMAL DEPTH CHANNEL
                        ANL      0.050  LEFT OVERBANK N-VALUE
                       ANCH      0.022  MAIN CHANNEL N-VALUE
                        ANR      0.050  RIGHT OVERBANK N-VALUE
                      RLNTH       200.  REACH LENGTH
                        SEL     0.0080  ENERGY SLOPE
                      ELMAX        0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  77 RY       ELEVATION     5.00      3.50      3.50      0.00      0.00      3.50      3.50      5.00
  76 RX       DISTANCE      0.00      2.00      6.00     13.00     38.00     45.00     48.00     50.00

                                                          ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE       0.00      0.03      0.06      0.10      0.13      0.17      0.20      0.24      0.28      0.32
          OUTFLOW       0.00     16.43     52.42    103.57    168.25    245.55    334.91    435.99    548.55    672.46
        ELEVATION       0.00      0.26      0.53      0.79      1.05      1.32      1.58      1.84      2.11      2.37

          STORAGE       0.37      0.41      0.45      0.50      0.55      0.61      0.67      0.73      0.78      0.84
          OUTFLOW     807.62    954.01   1111.63   1280.50   1480.05   1702.14   1938.11   2187.47   2449.87   2725.05
        ELEVATION       2.63      2.89      3.16      3.42      3.68      3.95      4.21      4.47      4.74      5.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN       52. TO      2725.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION     RCP4

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+    1954.      4.15                413.        413.        413.        413.
                        (INCHES)    2.005       2.005       2.005       2.005
                         (AC-FT)    170.        170.        170.        170.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR      4.98-HR
+  (AC-FT)      (HR)
       1.       4.15                 0.          0.          0.          0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR      4.98-HR
+   (FEET)      (HR)
     4.23       4.15                1.40        1.40        1.40        1.40

                       CUMULATIVE AREA =    1.59 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
  78 KK     *     SUB5   *
            *            *
```

```
**************
                    RUNOFF GENERATED FROM SUB-BASIN 5
                L = 1.89  Kb = .048  Adj. Slope =  280.0

          SUBBASIN RUNOFF DATA

 81 BA      SUBBASIN CHARACTERISTICS
                TAREA        0.65  SUBBASIN AREA

            PRECIPITATION DATA

 19 PB          STORM        3.05  BASIN TOTAL PRECIPITATION

 19 PI        INCREMENTAL PRECIPITATION PATTERN
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01
                0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.02      0.02      0.02
                0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02
                0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00

 82 LG      GREEN AND AMPT LOSS RATE
               STRTL        0.15  STARTING LOSS
                DTH         0.28  MOISTURE DEFICIT
               PSIF         4.25  WETTING FRONT SUCTION
              XKSAT         0.54  HYDRAULIC CONDUCTIVITY
              RTIMP        54.00  PERCENT IMPERVIOUS AREA

 83 UC      CLARK UNITGRAPH
                TC          0.45  TIME OF CONCENTRATION
                 R          0.36  STORAGE COEFFICIENT

 84 UA      ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                0.0       5.0      16.0      30.0      65.0      77.0      84.0      90.0      94.0      97.0
              100.0

                                                  ***

                                          UNIT HYDROGRAPH PARAMETERS
                                   CLARK   TC=  0.45 HR,       R=  0.36 HR
                                  SNYDER   TP=  0.25 HR,      CP=  0.41

                                          UNIT HYDROGRAPH
                                   127 END-OF-PERIOD ORDINATES
            11.       31.       55.       90.      132.      177.      225.      274.      361.      488.
           604.      667.      687.      702.      705.      703.      699.      693.      687.      676.
           663.      649.      634.      618.      603.      588.      574.      555.      530.      506.
           483.      461.      440.      420.      401.      383.      366.      349.      334.      319.
           304.      291.      277.      265.      253.      242.      231.      220.      210.      201.
           192.      183.      175.      167.      159.      152.      145.      139.      133.      127.
           121.      115.      110.      105.      100.       96.       92.       87.       84.       80.
            76.       73.       69.       66.       63.       60.       58.       55.       53.       50.
            48.       46.       44.       42.       40.       38.       36.       35.       33.       32.
            30.       29.       28.       26.       25.       24.       23.       22.       21.       20.
            19.       18.       17.       17.       16.       15.       14.       14.       13.       13.
            12.       11.       11.       10.       10.       10.        9.        9.        8.        8.
             8.        7.        7.        7.        6.        6.        6.

    ***       ***       ***       ***       ***

                    HYDROGRAPH AT STATION     SUB5

   TOTAL RAINFALL =    3.05, TOTAL LOSS =    0.97, TOTAL EXCESS =    2.08

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+     700.      4.20        156.        156.        156.        156.
                       (INCHES)      1.848       1.848       1.848       1.848
                        (AC-FT)        64.         64.         64.         64.

                    CUMULATIVE AREA =    0.65 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
 86 KK    *      CP5   *
          *            *
          **************
                    COMBINED FLOWS FROM SUB5 & CP4

 88 HC      HYDROGRAPH COMBINATION
               ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                  ***

    ***       ***       ***       ***       ***

                    HYDROGRAPH AT STATION      CP5

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+    2651.      4.17        569.        569.        569.        569.
                       (INCHES)      1.959       1.959       1.959       1.959
                        (AC-FT)       234.        234.        234.        234.
```

CUMULATIVE AREA = 2.24 SQ MI

*** ***

```
              **************
              *            *
  89 KK       *     RCP5   *
              *            *
              **************
```

ROUTED FLOWS FROM CP5 TO CP6

HYDROGRAPH ROUTING DATA

```
  91 RS        STORAGE ROUTING
                    NSTPS          1  NUMBER OF SUBREACHES
                     ITYP       FLOW  TYPE OF INITIAL CONDITION
                   RSVRIC      -1.00  INITIAL CONDITION
                        X       0.00 WORKING R AND D COEFFICIENT

  92 RC        NORMAL DEPTH CHANNEL
                      ANL      0.050  LEFT OVERBANK N-VALUE
                     ANCH      0.030  MAIN CHANNEL N-VALUE
                      ANR      0.050  RIGHT OVERBANK N-VALUE
                    RLNTH      1200.  REACH LENGTH
                      SEL     0.0070  ENERGY SLOPE
                    ELMAX        0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION
```

CROSS-SECTION DATA

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL -------			+ --- RIGHT OVERBANK ---		
94 RY	ELEVATION	7.00	5.00	2.50	0.00	0.00	2.50	5.00	7.00
93 RX	DISTANCE	0.00	7.00	12.00	31.00	39.00	58.00	63.00	70.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	0.11	0.28	0.50	0.78	1.12	1.51	1.96	2.44	2.93
OUTFLOW	0.00	7.27	26.90	60.88	111.61	181.43	272.56	393.40	562.05	754.85
ELEVATION	0.00	0.37	0.74	1.11	1.47	1.84	2.21	2.58	2.95	3.32
STORAGE	3.44	3.96	4.50	5.05	5.62	6.21	6.83	7.47	8.15	8.84
OUTFLOW	971.00	1209.85	1470.92	1753.82	2057.46	2382.18	2729.37	3099.13	3491.61	3906.98
ELEVATION	3.68	4.05	4.42	4.79	5.16	5.53	5.89	6.26	6.63	7.00

*** *** *** *** ***

HYDROGRAPH AT STATION RCP5

			MAXIMUM AVERAGE FLOW			
PEAK FLOW	TIME		6-HR	24-HR	72-HR	4.98-HR
+ (CFS)	(HR)	(CFS)				
+ 2642.	4.18		562.	562.	562.	562.
		(INCHES)	1.934	1.934	1.934	1.934
		(AC-FT)	231.	231.	231.	231.

		MAXIMUM AVERAGE STORAGE			
PEAK STORAGE	TIME	6-HR	24-HR	72-HR	4.98-HR
+ (AC-FT)	(HR)				
7.	4.18	2.	2.	2.	2.

		MAXIMUM AVERAGE STAGE			
PEAK STAGE	TIME	6-HR	24-HR	72-HR	4.98-HR
+ (FEET)	(HR)				
5.80	4.18	2.29	2.29	2.29	2.29

CUMULATIVE AREA = 2.24 SQ MI

*** ***

```
              **************
              *            *
  95 KK       *     SUB6   *
              *            *
              **************
```

RUNOFF GENERATED FROM SUB-BASIN 6
L = 1.33 Kb = .043 Adj. Slope = 113.0

SUBBASIN RUNOFF DATA

```
  98 BA        SUBBASIN CHARACTERISTICS
                    TAREA       0.44  SUBBASIN AREA

               PRECIPITATION DATA

  19 PB              STORM       3.05  BASIN TOTAL PRECIPITATION

  19 PI          INCREMENTAL PRECIPITATION PATTERN
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.02      0.02      0.02
                   0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
```

```
 99 LG          GREEN AND AMPT LOSS RATE
                      STRTL        0.10  STARTING LOSS
                        DTH        0.27  MOISTURE DEFICIT
                       PSIF        4.10  WETTING FRONT SUCTION
                      XKSAT        0.54  HYDRAULIC CONDUCTIVITY
                      RTIMP       45.00  PERCENT IMPERVIOUS AREA

100 UC          CLARK UNITGRAPH
                         TC        0.47  TIME OF CONCENTRATION
                          R        0.36  STORAGE COEFFICIENT

101 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                     0.0      5.0      16.0      30.0      65.0      77.0      84.0      90.0      94.0      97.0
                   100.0

                                                  ***

                                                UNIT HYDROGRAPH PARAMETERS
                                          CLARK   TC=  0.47 HR,       R=  0.36 HR
                                         SNYDER   TP=  0.26 HR,      CP=  0.41

                                                UNIT HYDROGRAPH
                                          128 END-OF-PERIOD ORDINATES
                 7.       20.       34.       55.       82.      109.      139.      171.      214.      283.
               364.      424.      450.      462.      468.      468.      465.      462.      458.      453.
               446.      437.      428.      418.      407.      397.      387.      378.      367.      352.
               336.      321.      307.      293.      280.      267.      255.      244.      233.      222.
               212.      203.      194.      185.      177.      169.      161.      154.      147.      140.
               134.      128.      122.      117.      111.      106.      102.       97.       93.       88.
                84.       81.       77.       74.       70.       67.       64.       61.       58.       56.
                53.       51.       49.       46.       44.       42.       40.       39.       37.       35.
                34.       32.       31.       29.       28.       27.       26.       24.       23.       22.
                21.       20.       19.       18.       18.       17.       16.       15.       15.       14.
                13.       13.       12.       12.       11.       11.       10.       10.        9.        9.
                 8.        8.        8.        7.        7.        7.        6.        6.        6.        6.
                 5.        5.        5.        5.        4.        4.        4.        4.

     ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION      SUB6

    TOTAL RAINFALL =     3.05, TOTAL LOSS =     1.14, TOTAL EXCESS =     1.92

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+     451.      4.20                  97.         97.         97.         97.
                        (INCHES)    1.699       1.699       1.699       1.699
                         (AC-FT)     40.         40.         40.         40.

                        CUMULATIVE AREA =     0.44 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
103 KK      *      CP6   *
            *            *
            **************
                                COMBINED FLOWS FROM SUB6 & CP5

105 HC          HYDROGRAPH COMBINATION
                      ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                  ***

     ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION      CP6

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+    3092.      4.18                 659.        659.        659.        659.
                        (INCHES)    1.895       1.895       1.895       1.895
                         (AC-FT)     271.        271.        271.        271.

                        CUMULATIVE AREA =     2.68 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
106 KK      *      RCP6  *
            *            *
            **************
                                ROUTED FLOWS FROM CP6 TO CP7

              HYDROGRAPH ROUTING DATA

108 RS          STORAGE ROUTING
                      NSTPS          1  NUMBER OF SUBREACHES
                       ITYP       FLOW  TYPE OF INITIAL CONDITION
                     RSVRIC      -1.00  INITIAL CONDITION
                          X       0.00 WORKING R AND D COEFFICIENT

109 RC          NORMAL DEPTH CHANNEL
                        ANL      0.050  LEFT OVERBANK N-VALUE
                       ANCH      0.030  MAIN CHANNEL N-VALUE
                        ANR      0.050  RIGHT OVERBANK N-VALUE
                      RLNTH       400.  REACH LENGTH
                        SEL     0.0080  ENERGY SLOPE
                      ELMAX        0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
111 RY        ELEVATION      9.00      7.00      6.00      0.00      0.00      6.00      7.00      9.00
110 RX        DISTANCE       0.00     10.00     16.00     28.00     38.00     50.00     56.00     66.00

                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE       0.00      0.05      0.10      0.17      0.24      0.32      0.41      0.51      0.61      0.73
            OUTFLOW       0.00     13.08     42.83     87.21    146.24    220.42    310.43    417.04    541.03    683.22
          ELEVATION       0.00      0.47      0.95      1.42      1.89      2.37      2.84      3.32      3.79      4.26

            STORAGE       0.85      0.98      1.12      1.26      1.43      1.62      1.84      2.07      2.33      2.61
```

OUTFLOW	844.41	1025.40	1227.00	1467.64	1768.33	2097.98	2459.03	2852.60	3280.15	3743.10
ELEVATION	4.74	5.21	5.68	6.16	6.63	7.11	7.58	8.05	8.53	9.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 1025. TO 3743.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** *** *** *** ***

HYDROGRAPH AT STATION RCP6

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	4.98-HR
+ (CFS)	(HR)	(CFS)				
+ 3091.	4.20		656.	656.	656.	656.
		(INCHES)	1.888	1.888	1.888	1.888
		(AC-FT)	270.	270.	270.	270.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	4.98-HR
+ (AC-FT)	(HR)				
2.	4.20	1.	1.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	4.98-HR
+ (FEET)	(HR)				
8.32	4.20	3.10	3.10	3.10	3.10

CUMULATIVE AREA = 2.68 SQ MI

*** ***

```
              **************
              *            *
112 KK        *     SUB7   *
              *            *
              **************
```

RUNOFF GENERATED FROM SUB-BASIN 7
L = 2.65 Kb = .038 Adj. Slope = 297.8

SUBBASIN RUNOFF DATA

115 BA SUBBASIN CHARACTERISTICS
TAREA 0.74 SUBBASIN AREA

PRECIPITATION DATA

19 PB STORM 3.05 BASIN TOTAL PRECIPITATION

19 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

116 LG GREEN AND AMPT LOSS RATE

STRTL	0.10	STARTING LOSS
DTH	0.29	MOISTURE DEFICIT
PSIF	4.00	WETTING FRONT SUCTION
XKSAT	0.55	HYDRAULIC CONDUCTIVITY
RTIMP	66.00	PERCENT IMPERVIOUS AREA

117 UC CLARK UNITGRAPH

TC	0.45	TIME OF CONCENTRATION
R	0.44	STORAGE COEFFICIENT

118 UA ACCUMULATED-AREA VS. TIME, 11 ORDINATES

0.0	5.0	16.0	30.0	65.0	77.0	84.0	90.0	94.0	97.0
100.0									

***

UNIT HYDROGRAPH PARAMETERS
CLARK TC= 0.45 HR, R= 0.44 HR
SNYDER TP= 0.28 HR, CP= 0.39

UNIT HYDROGRAPH
153 END-OF-PERIOD ORDINATES

10.	29.	50.	82.	122.	163.	208.	255.	333.	448.
562.	628.	651.	670.	678.	680.	681.	680.	678.	672.
663.	654.	643.	631.	619.	608.	597.	583.	562.	542.
522.	503.	484.	466.	449.	433.	417.	402.	387.	373.
359.	346.	333.	321.	309.	298.	287.	276.	266.	256.
247.	238.	229.	221.	212.	205.	197.	190.	183.	176.
170.	163.	157.	152.	146.	141.	136.	131.	126.	121.
117.	112.	108.	104.	100.	97.	93.	90.	86.	83.
80.	77.	74.	72.	69.	67.	64.	62.	59.	57.
55.	53.	51.	49.	47.	46.	44.	42.	41.	39.
38.	37.	35.	34.	33.	31.	30.	29.	28.	27.
26.	25.	24.	23.	22.	22.	21.	20.	19.	19.
18.	17.	17.	16.	15.	15.	14.	14.	13.	13.
12.	12.	11.	11.	11.	10.	10.	9.	9.	9.
8.	8.	8.	8.	7.	7.	7.	7.	6.	6.
6.	6.	5.							

*** *** *** *** ***

```
                    HYDROGRAPH AT STATION     SUB7

    TOTAL RAINFALL =    3.05, TOTAL LOSS =    0.71, TOTAL EXCESS =    2.34

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+    789.       4.25                189.        189.        189.        189.
                       (INCHES)    1.978       1.978       1.978       1.978
                        (AC-FT)     78.         78.         78.         78.

                     CUMULATIVE AREA =    0.74 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
  120 KK    *      CP7   *
            *            *
            **************
                      COMBINED FLOWS FROM SUB7 & CP6

  122 HC          HYDROGRAPH COMBINATION
                       ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

      ***             ***             ***             ***             ***

                    HYDROGRAPH AT STATION      CP7

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+   3878.       4.20                845.        845.        845.        845.
                       (INCHES)    1.908       1.908       1.908       1.908
                        (AC-FT)     348.        348.        348.        348.

                     CUMULATIVE AREA =    3.42 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
  123 KK    *      RCP7  *
            *            *
            **************
                      ROUTED FLOWS FROM CP7 TO CP8

                HYDROGRAPH ROUTING DATA

  125 RS          STORAGE ROUTING
                       NSTPS          1  NUMBER OF SUBREACHES
                        ITYP       FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC      -1.00  INITIAL CONDITION
                           X       0.00 WORKING R AND D COEFFICIENT

  126 RC          NORMAL DEPTH CHANNEL
                         ANL      0.050  LEFT OVERBANK N-VALUE
                        ANCH      0.030  MAIN CHANNEL N-VALUE
                         ANR      0.050  RIGHT OVERBANK N-VALUE
                       RLNTH      1150.  REACH LENGTH
                         SEL     0.0070  ENERGY SLOPE
                       ELMAX        0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  128 RY        ELEVATION    14.00     12.00     12.00      0.00      0.00     12.00     12.00     14.00
  127 RX        DISTANCE      0.00      0.50      8.50     18.50     31.50     41.50     49.50     50.00

                                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE       0.00      0.26      0.55      0.87      1.20      1.56      1.95      2.36      2.79      3.24
          OUTFLOW       0.00     31.99    100.85    197.93    320.55    467.65    638.91    834.37   1054.32   1299.17
        ELEVATION       0.00      0.74      1.47      2.21      2.95      3.68      4.42      5.16      5.89      6.63

          STORAGE       3.72      4.23      4.75      5.31      5.88      6.48      7.10      7.97      8.93      9.90
          OUTFLOW    1569.41   1865.59   2188.31   2538.17   2915.81   3321.85   3756.95   4316.10   4968.50   5670.57
        ELEVATION       7.37      8.11      8.84      9.58     10.32     11.05     11.79     12.53     13.26     14.00

      ***             ***             ***             ***             ***

                    HYDROGRAPH AT STATION     RCP7

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+   3871.       4.22                837.        837.        837.        837.
                       (INCHES)    1.889       1.889       1.889       1.889
                        (AC-FT)     345.        345.        345.        345.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR      4.98-HR
+  (AC-FT)      (HR)
       7.       4.22                  2.          2.          2.          2.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR      4.98-HR
+   (FEET)      (HR)
    11.94       4.22                3.97        3.97        3.97        3.97

                     CUMULATIVE AREA =    3.42 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
  129 KK    *      SUB8  *
            *            *
```

```
**************
                    RUNOFF GENERATED FROM SUB-BASIN 8
                 L = 1.42  Kb = .043  Adj. Slope =  298.7

          SUBBASIN RUNOFF DATA

 132 BA        SUBBASIN CHARACTERISTICS
                    TAREA        0.66  SUBBASIN AREA

               PRECIPITATION DATA

 19 PB               STORM        3.05  BASIN TOTAL PRECIPITATION

 19 PI           INCREMENTAL PRECIPITATION PATTERN
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.02      0.02      0.02
                   0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 133 LG        GREEN AND AMPT LOSS RATE
                    STRTL        0.10  STARTING LOSS
                      DTH        0.27  MOISTURE DEFICIT
                     PSIF        4.15  WETTING FRONT SUCTION
                    XKSAT        0.53  HYDRAULIC CONDUCTIVITY
                    RTIMP       44.00  PERCENT IMPERVIOUS AREA

 134 UC        CLARK UNITGRAPH
                       TC        0.35  TIME OF CONCENTRATION
                        R        0.22  STORAGE COEFFICIENT

 135 UA        ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                     0.0       5.0      16.0      30.0      65.0      77.0      84.0      90.0      94.0      97.0
                   100.0

                                                  ***

                                          UNIT HYDROGRAPH PARAMETERS
                                   CLARK   TC=  0.35 HR,       R=  0.22 HR
                                  SNYDER   TP=  0.19 HR,      CP=  0.46

                                          UNIT HYDROGRAPH
                                   79 END-OF-PERIOD ORDINATES
                 22.       65.      127.      212.      303.      402.      554.      788.      988.     1072.
               1091.     1087.     1068.     1046.     1021.      989.      952.      913.      873.      835.
                800.      758.      706.      654.      606.      562.      520.      482.      447.      414.
                384.      356.      330.      305.      283.      262.      243.      225.      209.      193.
                179.      166.      154.      143.      132.      122.      114.      105.       97.       90.
                 84.       78.       72.       67.       62.       57.       53.       49.       46.       42.
                 39.       36.       34.       31.       29.       27.       25.       23.       21.       20.
                 18.       17.       16.       15.       13.       12.       12.       11.       10.

      ***            ***            ***            ***            ***

                        HYDROGRAPH AT STATION     SUB8

    TOTAL RAINFALL =    3.05, TOTAL LOSS =    1.15, TOTAL EXCESS =    1.90

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+    812.       4.12                156.        156.        156.        156.
                        (INCHES)    1.817       1.817       1.817       1.817
                         (AC-FT)     64.         64.         64.         64.

                        CUMULATIVE AREA =    0.66 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
 137 KK   *       CP8  *
          *            *
          **************
                        COMBINED FLOWS FROM SUB8 & CP7

 139 HC        HYDROGRAPH COMBINATION
                    ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                  ***

      ***            ***            ***            ***            ***

                        HYDROGRAPH AT STATION      CP8

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+   4633.       4.20                993.        993.        993.        993.
                        (INCHES)    1.878       1.878       1.878       1.878
                         (AC-FT)     409.        409.        409.        409.

                        CUMULATIVE AREA =    4.08 SQ MI
```

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

              **************
              *            *
 140 KK       *     RCP8   *
              *            *
              **************
                                  ROUTED FLOWS FROM CP8 TO CP9

                HYDROGRAPH ROUTING DATA

 142 RS           STORAGE ROUTING
                       NSTPS          1  NUMBER OF SUBREACHES
                        ITYP       FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC      -1.00  INITIAL CONDITION
                           X       0.00 WORKING R AND D COEFFICIENT

 143 RC           NORMAL DEPTH CHANNEL
                         ANL      0.050  LEFT OVERBANK N-VALUE
                        ANCH      0.022  MAIN CHANNEL N-VALUE
                         ANR      0.050  RIGHT OVERBANK N-VALUE
                       RLNTH      1300.  REACH LENGTH
                         SEL     0.0060  ENERGY SLOPE
                       ELMAX        0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                      CROSS-SECTION DATA
                            --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 145 RY        ELEVATION     12.00     10.00     10.00      0.00      0.00     10.00     10.00     12.00
 144 RX        DISTANCE       0.00      1.00      5.00     23.00     51.00     69.00     70.00     71.00

                                                                  ***

                                      COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE       0.00      0.55      1.14      1.78      2.45      3.17      3.94      4.74      5.59      6.49
            OUTFLOW       0.00     68.78    220.43    438.13    716.57   1053.55   1448.25   1900.64   2411.17   2980.58
          ELEVATION       0.00      0.63      1.26      1.89      2.53      3.16      3.79      4.42      5.05      5.68

            STORAGE       7.42      8.40      9.42     10.48     11.59     12.74     13.95     15.25     16.57     17.91
            OUTFLOW    3609.79   4299.90   5052.06   5867.52   6747.55   7693.48   8742.62  10046.81  11426.94  12880.17
          ELEVATION       6.32      6.95      7.58      8.21      8.84      9.47     10.11     10.74     11.37     12.00

      ***             ***             ***             ***             ***

                          HYDROGRAPH AT STATION     RCP8

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR       4.98-HR
+   (CFS)       (HR)
                          (CFS)
+    4626.      4.22                983.         983.         983.         983.
                        (INCHES)    1.858        1.858        1.858        1.858
                         (AC-FT)    405.         405.         405.         405.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                     6-HR        24-HR        72-HR       4.98-HR
+  (AC-FT)      (HR)
       9.       4.22                  2.           2.           2.           2.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR        24-HR        72-HR       4.98-HR
+   (FEET)      (HR)
     7.22       4.22                 2.33         2.33         2.33         2.33

                        CUMULATIVE AREA =    4.08 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
 146 KK       *     SUB9   *
              *            *
              **************
                                  RUNOFF GENERATED FROM SUB-BASIN 9
                              L =  .85  Kb = .041  Adj. Slope =  315.0

                SUBBASIN RUNOFF DATA

 149 BA           SUBBASIN CHARACTERISTICS
                       TAREA        0.26  SUBBASIN AREA

                  PRECIPITATION DATA

  19 PB                STORM        3.05  BASIN TOTAL PRECIPITATION

  19 PI             INCREMENTAL PRECIPITATION PATTERN
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01
                       0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                       0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                       0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.02      0.02      0.02
                       0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02
                       0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                       0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 150 LG           GREEN AND AMPT LOSS RATE
                       STRTL        0.10  STARTING LOSS
                         DTH        0.30  MOISTURE DEFICIT
                        PSIF        4.20  WETTING FRONT SUCTION
                       XKSAT        0.51  HYDRAULIC CONDUCTIVITY
```

```
                    RTIMP       81.00  PERCENT IMPERVIOUS AREA

 151 UC          CLARK UNITGRAPH
                      TC        0.24  TIME OF CONCENTRATION
                       R        0.16  STORAGE COEFFICIENT

 152 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                     0.0       5.0      16.0      30.0      65.0      77.0      84.0      90.0      94.0      97.0
                   100.0

                                                   ***

                                                UNIT HYDROGRAPH PARAMETERS
                                          CLARK   TC=  0.24 HR,       R=  0.16 HR
                                         SNYDER   TP=  0.13 HR,      CP=  0.45

                                                UNIT HYDROGRAPH
                                            58 END-OF-PERIOD ORDINATES
                17.       60.      119.      193.      313.      477.      573.      585.      578.      564.
               544.      517.      489.      461.      431.      394.      356.      321.      289.      261.
               236.      213.      192.      173.      156.      141.      127.      115.      103.       93.
                84.       76.       68.       62.       56.       50.       45.       41.       37.       33.
                30.       27.       24.       22.       20.       18.       16.       15.       13.       12.
                11.       10.        9.        8.        7.        6.        6.        5.

      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION     SUB9

    TOTAL RAINFALL =     3.05, TOTAL LOSS =     0.39, TOTAL EXCESS =     2.66

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+     410.      4.07                   86.         86.         86.         86.
                        (INCHES)     2.575       2.575       2.575       2.575
                         (AC-FT)      35.         35.         35.         35.

                       CUMULATIVE AREA =    0.26 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 154 KK     *      CP9   *
            *            *
            **************
                                COMBINED FLOWS FROM SUB9 & CP8

 156 HC          HYDROGRAPH COMBINATION
                      ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                   ***

      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION      CP9

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+    4969.      4.22                 1068.       1068.       1068.       1068.
                        (INCHES)     1.901       1.901       1.901       1.901
                         (AC-FT)      440.        440.        440.        440.

                       CUMULATIVE AREA =    4.34 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 157 KK     *     RCP9   *
            *            *
            **************
                                ROUTED FLOWS FROM CP9 TO CP10

               HYDROGRAPH ROUTING DATA

 159 RS          STORAGE ROUTING
                      NSTPS           1  NUMBER OF SUBREACHES
                       ITYP        FLOW  TYPE OF INITIAL CONDITION
                     RSVRIC       -1.00  INITIAL CONDITION
                          X        0.00 WORKING R AND D COEFFICIENT

 160 RC          NORMAL DEPTH CHANNEL
                        ANL       0.030  LEFT OVERBANK N-VALUE
                       ANCH       0.022  MAIN CHANNEL N-VALUE
                        ANR       0.030  RIGHT OVERBANK N-VALUE
                      RLNTH       4900.  REACH LENGTH
                        SEL      0.0070  ENERGY SLOPE
                      ELMAX         0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                          CROSS-SECTION DATA
                              --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 162 RY        ELEVATION       8.00      7.00      7.00      0.00      0.00      7.00      7.00      8.00
 161 RX        DISTANCE        0.00      1.00      6.00     13.00     51.00     58.00     63.00     64.00
                                                   ***

                                          COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE       0.00      1.82      3.68      5.58      7.52      9.50     11.52     13.58     15.67     17.81
            OUTFLOW       0.00     50.82    161.05    316.11    510.06    739.30   1001.41   1294.59   1617.49   1969.07
          ELEVATION       0.00      0.42      0.84      1.26      1.68      2.11      2.53      2.95      3.37      3.79

            STORAGE      19.99     22.21     24.47     26.77     29.11     31.48     33.90     36.54     39.51     42.52
            OUTFLOW    2348.48   2755.07   3188.28   3647.69   4132.94   4643.76   5179.90   5771.90   6452.62   7172.12
          ELEVATION       4.21      4.63      5.05      5.47      5.89      6.32      6.74      7.16      7.58      8.00

      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION     RCP9

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
```

```
+    4903.      4.27                    1027.       1027.       1027.       1027.
                          (INCHES)     1.827       1.827       1.827       1.827
                           (AC-FT)      423.        423.        423.        423.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                        6-HR       24-HR       72-HR      4.98-HR
+  (AC-FT)      (HR)
      33.       4.27                     9.          9.          9.          9.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                        6-HR       24-HR       72-HR      4.98-HR
+   (FEET)      (HR)
     6.52       4.27                    1.98        1.98        1.98        1.98

                          CUMULATIVE AREA =    4.34 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 163 KK     *     SUB10  *
            *            *
            **************
                                RUNOFF GENERATED FROM SUB-BASIN 10
                             L =  .76  Kb = .045  Adj. Slope =  209.6

              SUBBASIN RUNOFF DATA

 166 BA          SUBBASIN CHARACTERISTICS
                       TAREA        0.51  SUBBASIN AREA

                 PRECIPITATION DATA

  19 PB                STORM        3.05  BASIN TOTAL PRECIPITATION

  19 PI            INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.02      0.02      0.02
                     0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 167 LG          GREEN AND AMPT LOSS RATE
                       STRTL        0.10  STARTING LOSS
                         DTH        0.26  MOISTURE DEFICIT
                        PSIF        4.15  WETTING FRONT SUCTION
                       XKSAT        0.53  HYDRAULIC CONDUCTIVITY
                       RTIMP       33.00  PERCENT IMPERVIOUS AREA

 168 UC          CLARK UNITGRAPH
                          TC        0.30  TIME OF CONCENTRATION
                           R        0.13  STORAGE COEFFICIENT

 169 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                       0.0       5.0      16.0      30.0      65.0      77.0      84.0      90.0      94.0      97.0
                     100.0

                                                          ***

                                                   UNIT HYDROGRAPH PARAMETERS
                                            CLARK   TC=  0.30 HR,       R=  0.13 HR
                                           SNYDER   TP=  0.14 HR,      CP=  0.54

                                                      UNIT HYDROGRAPH
                                                 49 END-OF-PERIOD ORDINATES
                 35.      109.      215.      350.      489.      720.     1068.     1277.     1298.     1264.
               1202.     1140.     1074.     1002.      928.      856.      791.      729.      655.      573.
                502.      440.      385.      338.      296.      259.      227.      199.      174.      152.
                134.      117.      102.       90.       79.       69.       60.       53.       46.       41.
                 36.       31.       27.       24.       21.       18.       16.       14.       12.

      ***             ***             ***             ***             ***

                          HYDROGRAPH AT STATION    SUB10

    TOTAL RAINFALL =    3.05, TOTAL LOSS =    1.37, TOTAL EXCESS =    1.68

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                                       (CFS)
+     674.      4.07                     109.        109.        109.        109.
                          (INCHES)     1.650       1.650       1.650       1.650
                           (AC-FT)       45.         45.         45.         45.

                          CUMULATIVE AREA =    0.51 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 171 KK     *      CP10  *
            *            *
            **************
                                COMBINED FLOW FROM SUB10 & CP9
```

```
173 HC          HYDROGRAPH COMBINATION
                     ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

     ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION     CP10

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                              (CFS)
+    5402.      4.25                1136.       1136.       1136.       1136.
                          (INCHES)  1.808       1.808       1.808       1.808
                           (AC-FT)   468.        468.        468.        468.

                        CUMULATIVE AREA =    4.85 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 174 KK     *     RCP10  *
            *            *
            **************
                              ROUTED FLOWS FROM CP10 TO CP11

               HYDROGRAPH ROUTING DATA

 176 RS          STORAGE ROUTING
                      NSTPS          1  NUMBER OF SUBREACHES
                       ITYP       FLOW  TYPE OF INITIAL CONDITION
                     RSVRIC      -1.00  INITIAL CONDITION
                          X       0.00 WORKING R AND D COEFFICIENT

 177 RC          NORMAL DEPTH CHANNEL
                        ANL      0.030  LEFT OVERBANK N-VALUE
                       ANCH      0.022  MAIN CHANNEL N-VALUE
                        ANR      0.030  RIGHT OVERBANK N-VALUE
                      RLNTH       250.  REACH LENGTH
                        SEL     0.0060  ENERGY SLOPE
                      ELMAX        0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 179 RY        ELEVATION     6.00      5.00      5.00      0.00      0.00      5.00      5.00      6.00
 178 RX        DISTANCE      0.00      1.00      6.00     13.00     37.00     44.00     49.00     50.00

                                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE       0.00      0.04      0.09      0.14      0.19      0.24      0.29      0.34      0.40      0.46
          OUTFLOW       0.00     18.45     58.68    115.60    187.25    272.49    370.62    481.16    603.77    738.23
        ELEVATION       0.00      0.32      0.63      0.95      1.26      1.58      1.89      2.21      2.53      2.84

          STORAGE       0.52      0.58      0.64      0.70      0.77      0.83      0.90      0.99      1.08      1.17
          OUTFLOW     884.37   1042.10   1211.36   1392.11   1584.37   1788.16   2009.57   2278.95   2567.15   2872.66
        ELEVATION       3.16      3.47      3.79      4.11      4.42      4.74      5.05      5.37      5.68      6.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      116. TO     2873.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

WARNING --- ROUTED OUTFLOW (   2905.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   3073.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   3239.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   3404.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   3571.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   3734.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   3898.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   4060.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   4217.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   4372.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   4522.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   4664.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   4795.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   4916.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   5022.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   5111.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   5188.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   5254.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   5308.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   5350.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   5379.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   5396.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   5402.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   5397.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   5381.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   5356.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   5322.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   5280.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   5229.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
```

```
WARNING --- ROUTED OUTFLOW (   5168.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   5097.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   5020.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   4938.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   4853.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   4764.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   4669.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   4570.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   4466.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   4360.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   4253.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   4146.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   4037.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3928.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3819.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3713.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3609.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3505.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3404.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3305.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3210.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3117.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3025.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   2935.) IS GREATER THAN MAXIMUM OUTFLOW (   2873.) IN STORAGE-OUTFLOW TABLE
      ***             ***             ***             ***             ***

                    HYDROGRAPH AT STATION    RCP10

 PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                   6-HR        24-HR       72-HR       4.98-HR
+   (CFS)       (HR)
                          (CFS)
+    5402.      4.25      1134.       1134.       1134.       1134.
                     (INCHES)  1.805       1.805       1.805       1.805
                      (AC-FT)   467.        467.        467.        467.

 PEAK STORAGE  TIME                       MAXIMUM AVERAGE STORAGE
                                   6-HR        24-HR       72-HR       4.98-HR
+  (AC-FT)      (HR)
       2.      4.25                 1.          1.          1.          1.

  PEAK STAGE   TIME                       MAXIMUM AVERAGE STAGE
                                   6-HR        24-HR       72-HR       4.98-HR
+   (FEET)      (HR)
     8.61      4.25                2.74        2.74        2.74        2.74

                    CUMULATIVE AREA =    4.85 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 180 KK     *     SUB20  *
            *            *
            **************
                        RUNOFF GENERATED FROM SUB-BASIN 20
                     L =  .85  Kb = .050  Adj. Slope =  284.0

              SUBBASIN RUNOFF DATA

 183 BA         SUBBASIN CHARACTERISTICS
                     TAREA        0.11  SUBBASIN AREA

                PRECIPITATION DATA

  19 PB               STORM        3.05  BASIN TOTAL PRECIPITATION

  19 PI           INCREMENTAL PRECIPITATION PATTERN
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.02      0.02      0.02
                    0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
```

```
184 LG          GREEN AND AMPT LOSS RATE
                      STRTL        0.10  STARTING LOSS
                        DTH        0.26  MOISTURE DEFICIT
                       PSIF        4.10  WETTING FRONT SUCTION
                      XKSAT        0.55  HYDRAULIC CONDUCTIVITY
                      RTIMP       41.00  PERCENT IMPERVIOUS AREA

185 UC          CLARK UNITGRAPH
                         TC        0.30  TIME OF CONCENTRATION
                          R        0.33  STORAGE COEFFICIENT

186 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                      0.0       5.0      16.0      30.0      65.0      77.0      84.0      90.0      94.0      97.0
                    100.0

                                                   ***

                                                UNIT HYDROGRAPH PARAMETERS
                                          CLARK   TC=  0.30 HR,       R=  0.33 HR
                                         SNYDER   TP=  0.20 HR,      CP=  0.38

                                                UNIT HYDROGRAPH
                                          112 END-OF-PERIOD ORDINATES
                 3.       10.       20.       33.       47.       70.      104.      129.      138.      142.
               143.      144.      143.      141.      138.      135.      132.      129.      124.      118.
               112.      106.      101.       96.       91.       87.       82.       78.       74.       71.
                67.       64.       61.       58.       55.       52.       50.       47.       45.       43.
                40.       38.       37.       35.       33.       31.       30.       28.       27.       26.
                24.       23.       22.       21.       20.       19.       18.       17.       16.       15.
                15.       14.       13.       13.       12.       11.       11.       10.       10.        9.
                 9.        8.        8.        8.        7.        7.        6.        6.        6.        6.
                 5.        5.        5.        5.        4.        4.        4.        4.        4.        3.
                 3.        3.        3.        3.        3.        2.        2.        2.        2.        2.
                 2.        2.        2.        2.        2.        1.        1.        1.        1.        1.
                 1.        1.

     ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION    SUB20

    TOTAL RAINFALL =    3.05, TOTAL LOSS =    1.22, TOTAL EXCESS =    1.83

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+     119.      4.12                24.         24.         24.         24.
                        (INCHES)   1.690       1.690       1.690       1.690
                         (AC-FT)    10.         10.         10.         10.

                        CUMULATIVE AREA =    0.11 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
188 KK      *    SUB21   *
            *            *
            **************
                                RUNOFF GENERATED FROM SUB-BASIN 21
                             L = 1.89  Kb = .036  Adj. Slope =  305.6

                SUBBASIN RUNOFF DATA

191 BA          SUBBASIN CHARACTERISTICS
                      TAREA        0.43  SUBBASIN AREA

                PRECIPITATION DATA

 19 PB                STORM        3.05  BASIN TOTAL PRECIPITATION

 19 PI            INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.02      0.02      0.02
                     0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

192 LG          GREEN AND AMPT LOSS RATE
                      STRTL        0.10  STARTING LOSS
                        DTH        0.33  MOISTURE DEFICIT
                       PSIF        4.65  WETTING FRONT SUCTION
                      XKSAT        0.37  HYDRAULIC CONDUCTIVITY
                      RTIMP       94.00  PERCENT IMPERVIOUS AREA

193 UC          CLARK UNITGRAPH
                         TC        0.33  TIME OF CONCENTRATION
                          R        0.32  STORAGE COEFFICIENT

194 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                      0.0       5.0      16.0      30.0      65.0      77.0      84.0      90.0      94.0      97.0
                    100.0

                                                   ***

                                                UNIT HYDROGRAPH PARAMETERS
                                          CLARK   TC=  0.33 HR,       R=  0.32 HR
                                         SNYDER   TP=  0.20 HR,      CP=  0.39
```

```
                                        UNIT HYDROGRAPH
                                   112 END-OF-PERIOD ORDINATES
      11.     32.     64.    108.    156.    210.    307.    435.    507.    531.
     543.    545.    545.    542.    536.    525.    513.    500.    488.    474.
     455.    432.    411.    390.    371.    352.    334.    318.    302.    287.
     272.    258.    246.    233.    222.    210.    200.    190.    180.    171.
     163.    155.    147.    139.    132.    126.    119.    113.    108.    102.
      97.     92.     88.     83.     79.     75.     71.     68.     64.     61.
      58.     55.     52.     50.     47.     45.     43.     41.     39.     37.
      35.     33.     31.     30.     28.     27.     26.     24.     23.     22.
      21.     20.     19.     18.     17.     16.     15.     14.     14.     13.
      12.     12.     11.     11.     10.     10.      9.      9.      8.      8.
       7.      7.      7.      6.      6.      6.      5.      5.      5.      5.
       4.      4.

   ***             ***             ***             ***             ***

                    HYDROGRAPH AT STATION    SUB21

  TOTAL RAINFALL =    3.05, TOTAL LOSS =    0.11, TOTAL EXCESS =    2.94

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+     611.      4.13                149.        149.        149.        149.
                        (INCHES)    2.672       2.672       2.672       2.672
                         (AC-FT)     61.         61.         61.         61.

                        CUMULATIVE AREA =    0.43 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 196 KK     *     CP20   *
            *            *
            **************
                         COMBINED FLOWS FROM SUB20 & SUB21

 198 HC          HYDROGRAPH COMBINATION
                      ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                                  ***

   ***             ***             ***             ***             ***

                    HYDROGRAPH AT STATION     CP20

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+     729.      4.12                173.        173.        173.        173.
                        (INCHES)    2.471       2.471       2.471       2.471
                         (AC-FT)     71.         71.         71.         71.

                        CUMULATIVE AREA =    0.54 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 199 KK     *     CP20   *
            *            *
            **************
                         ROUTE FLOWS FROM CP20 TO CP11

            HYDROGRAPH ROUTING DATA

 201 RS          STORAGE ROUTING
                      NSTPS           1  NUMBER OF SUBREACHES
                       ITYP        FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC       -1.00  INITIAL CONDITION
                          X        0.00 WORKING R AND D COEFFICIENT

 202 RC          NORMAL DEPTH CHANNEL
                        ANL       0.030  LEFT OVERBANK N-VALUE
                       ANCH       0.022  MAIN CHANNEL N-VALUE
                        ANR       0.030  RIGHT OVERBANK N-VALUE
                      RLNTH       4000.  REACH LENGTH
                        SEL      0.0100  ENERGY SLOPE
                      ELMAX         0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 204 RY        ELEVATION     5.00      4.00      4.00      0.00      0.00      4.00      4.00      5.00
 203 RX        DISTANCE      0.00      1.00      3.00     11.00     24.00     32.00     34.00     35.00
                                                                  ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE       0.00      0.33      0.68      1.06      1.46      1.89      2.34      2.82      3.33      3.86
            OUTFLOW       0.00      9.59     30.78     61.24    100.23    147.46    202.82    266.31    337.99    417.97
          ELEVATION       0.00      0.26      0.53      0.79      1.05      1.32      1.58      1.84      2.11      2.37

            STORAGE       4.41      4.99      5.60      6.23      6.89      7.57      8.36      9.17     10.00     10.84
            OUTFLOW     506.39    603.38    709.13    823.80    947.58   1080.66   1247.37   1432.37   1629.11   1837.21
          ELEVATION       2.63      2.89      3.16      3.42      3.68      3.95      4.21      4.47      4.74      5.00

   ***             ***             ***             ***             ***

                    HYDROGRAPH AT STATION     CP20

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+     712.      4.22                166.        166.        166.        166.
                        (INCHES)    2.372       2.372       2.372       2.372
                         (AC-FT)     68.         68.         68.         68.

 PEAK STORAGE  TIME                          MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR      4.98-HR
+  (AC-FT)      (HR)
       6.      4.20                  2.          2.          2.          2.

 PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
```

```
                                    6-HR       24-HR       72-HR      4.98-HR
+   (FEET)      (HR)
     3.17       4.22                1.11        1.11        1.11        1.11

                        CUMULATIVE AREA =    0.54 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 205 KK     *    SUB11   *
            *            *
            **************
                                RUNOFF GENERATED FROM SUB-BASIN 11
                            L =  .76  Kb = .058  Adj. Slope =  105.0

              SUBBASIN RUNOFF DATA

 208 BA         SUBBASIN CHARACTERISTICS
                      TAREA        0.06  SUBBASIN AREA

                PRECIPITATION DATA

  19 PB               STORM        3.05  BASIN TOTAL PRECIPITATION

  19 PI           INCREMENTAL PRECIPITATION PATTERN
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.02      0.02      0.02
                    0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 209 LG         GREEN AND AMPT LOSS RATE
                      STRTL        0.10  STARTING LOSS
                        DTH        0.26  MOISTURE DEFICIT
                       PSIF        3.95  WETTING FRONT SUCTION
                      XKSAT        0.58  HYDRAULIC CONDUCTIVITY
                      RTIMP       24.00  PERCENT IMPERVIOUS AREA

 210 UC         CLARK UNITGRAPH
                         TC        0.45  TIME OF CONCENTRATION
                          R        0.68  STORAGE COEFFICIENT

 211 UA         ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                      0.0       5.0      16.0      30.0      65.0      77.0      84.0      90.0      94.0      97.0
                    100.0

                                                  ***

                                          UNIT HYDROGRAPH PARAMETERS
                                   CLARK   TC=  0.45 HR,       R=  0.68 HR
                                  SNYDER   TP=  0.33 HR,      CP=  0.33

                                          UNIT HYDROGRAPH
                                     229 END-OF-PERIOD ORDINATES
                 1.        2.        3.        4.        7.        9.       11.       14.       18.       25.
                31.       35.       36.       37.       38.       39.       39.       39.       40.       40.
                40.       39.       39.       39.       38.       38.       38.       37.       36.       35.
                35.       34.       33.       32.       31.       31.       30.       29.       28.       28.
                27.       26.       26.       25.       25.       24.       23.       23.       22.       22.
                21.       21.       20.       20.       19.       19.       18.       18.       17.       17.
                17.       16.       16.       15.       15.       15.       14.       14.       14.       13.
                13.       13.       12.       12.       12.       12.       11.       11.       11.       10.
                10.       10.       10.       10.        9.        9.        9.        9.        8.        8.
                 8.        8.        8.        7.        7.        7.        7.        7.        7.        6.
                 6.        6.        6.        6.        6.        6.        5.        5.        5.        5.
                 5.        5.        5.        5.        4.        4.        4.        4.        4.        4.
                 4.        4.        4.        4.        3.        3.        3.        3.        3.        3.
                 3.        3.        3.        3.        3.        3.        3.        3.        2.        2.
                 2.        2.        2.        2.        2.        2.        2.        2.        2.        2.
                 2.        2.        2.        2.        2.        2.        2.        2.        2.        1.
                 1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
                 1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
                 1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
                 1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
                 1.        1.        1.        1.        0.        0.        0.        0.        0.        0.
                 0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
                 0.        0.        0.        0.        0.        0.        0.        0.        0.

     ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION    SUB11

    TOTAL RAINFALL =    3.05, TOTAL LOSS =    1.59, TOTAL EXCESS =    1.46

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+     39.       4.33                 8.          8.          8.          8.
                        (INCHES)    1.084       1.084       1.084       1.084
                        (AC-FT)      3.          3.          3.          3.

                        CUMULATIVE AREA =    0.06 SQ MI


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

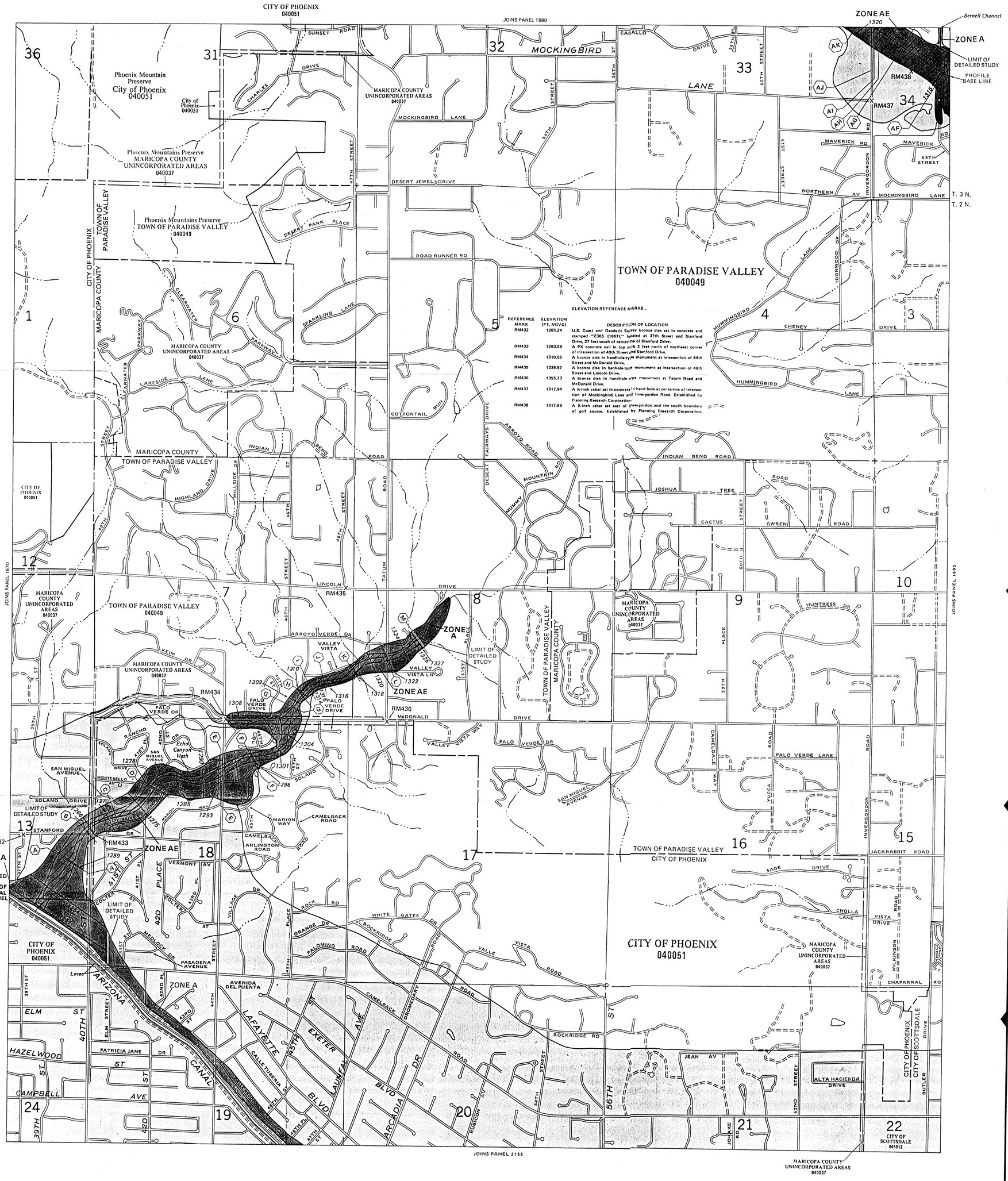
```
                **************
                *            *
  213 KK        *      CP11  *
                *            *
                **************
                                COMBINED FLOWS FROM SUB11, CP20, & CP10

  215 HC            HYDROGRAPH COMBINATION
                          ICOMP           3  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

       ***              ***              ***              ***              ***

                            HYDROGRAPH AT STATION     CP11

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR       4.98-HR
+   (CFS)       (HR)
                           (CFS)
+    6149.      4.25                1308.        1308.        1308.         1308.
                         (INCHES)   1.853        1.853        1.853         1.853
                          (AC-FT)    539.         539.         539.          539.

                         CUMULATIVE AREA =    5.45 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


                **************
                *            *
  216 KK        *     RCP11  *
                *            *
                **************
                                ROUTED FLOWS FROM CP11 TO CP12

                  HYDROGRAPH ROUTING DATA

  218 RS            STORAGE ROUTING
                          NSTPS           1  NUMBER OF SUBREACHES
                           ITYP        FLOW  TYPE OF INITIAL CONDITION
                         RSVRIC       -1.00  INITIAL CONDITION
                              X        0.00 WORKING R AND D COEFFICIENT

  219 RC            NORMAL DEPTH CHANNEL
                            ANL       0.030  LEFT OVERBANK N-VALUE
                           ANCH       0.020  MAIN CHANNEL N-VALUE
                            ANR       0.030  RIGHT OVERBANK N-VALUE
                          RLNTH       1900.  REACH LENGTH
                            SEL      0.0060  ENERGY SLOPE
                          ELMAX         0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                        CROSS-SECTION DATA
                            --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  221 RY        ELEVATION     15.00      14.00      14.00       0.00       0.00       6.00       7.00      13.00
  220 RX        DISTANCE       0.00       1.00       2.00      58.00      76.00      95.00     252.00     273.00

                                                                  ***

                                        COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE       0.00       0.72       1.63       2.74       4.04       5.53       7.23       9.11      11.53      17.53
            OUTFLOW       0.00      74.00     250.87     527.84     911.97    1412.02    2037.10    2796.32    3743.95    5134.37
          ELEVATION       0.00       0.79       1.58       2.37       3.16       3.95       4.74       5.53       6.32       7.11

            STORAGE      25.30      33.28      41.46      49.85      58.44      67.23      76.23      85.42      94.73     104.12
            OUTFLOW    7203.36    9799.69   12873.77   16398.74   20357.77   24739.70   29536.88   34825.08   40727.45   47399.93
          ELEVATION       7.89       8.68       9.47      10.26      11.05      11.84      12.63      13.42      14.21      15.00

       ***              ***              ***              ***              ***

                            HYDROGRAPH AT STATION    RCP11

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR       4.98-HR
+   (CFS)       (HR)
                           (CFS)
+    6102.      4.30                1289.        1289.        1289.         1289.
                         (INCHES)   1.826        1.826        1.826         1.826
                          (AC-FT)    531.         531.         531.          531.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                     6-HR        24-HR        72-HR       4.98-HR
+  (AC-FT)      (HR)
      21.       4.30                  5.           5.           5.            5.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR        24-HR        72-HR       4.98-HR
+   (FEET)      (HR)
     7.47       4.30                 2.71         2.71         2.71          2.71

                         CUMULATIVE AREA =    5.45 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


                **************
                *            *
  222 KK        *     SUB12  *
                *            *
                **************
                                RUNOFF GENERATED FROM SUB-BASIN 12
                              L = 1.23  Kb = .052  Adj. Slope =  239.0

                  SUBBASIN RUNOFF DATA

  225 BA            SUBBASIN CHARACTERISTICS
                          TAREA        0.46  SUBBASIN AREA

                    PRECIPITATION DATA

   19 PB                STORM        3.05  BASIN TOTAL PRECIPITATION

   19 PI              INCREMENTAL PRECIPITATION PATTERN
                        0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                        0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                        0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                        0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
                        0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00
```

```
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.02      0.02      0.02      0.02      0.02
                    0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02      0.02
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 226 LG          GREEN AND AMPT LOSS RATE
                       STRTL        0.15  STARTING LOSS
                         DTH        0.26  MOISTURE DEFICIT
                        PSIF        5.30  WETTING FRONT SUCTION
                       XKSAT        0.30  HYDRAULIC CONDUCTIVITY
                       RTIMP       25.00  PERCENT IMPERVIOUS AREA

 227 UC          CLARK UNITGRAPH
                          TC        0.38  TIME OF CONCENTRATION
                           R        0.26  STORAGE COEFFICIENT

 228 UA          ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                       0.0       5.0      16.0      30.0      65.0      77.0      84.0      90.0      94.0      97.0
                     100.0

                                                   ***

                                                UNIT HYDROGRAPH PARAMETERS
                                         CLARK   TC=  0.38 HR,       R=  0.26 HR
                                        SNYDER   TP=  0.20 HR,      CP=  0.44

                                                UNIT HYDROGRAPH
                                           93 END-OF-PERIOD ORDINATES
                 12.       36.       68.      113.      162.      216.      276.      383.      529.      621.
                652.      663.      662.      654.      645.      634.      619.      600.      581.      561.
                540.      521.      503.      479.      449.      422.      395.      371.      348.      326.
                306.      287.      269.      252.      237.      222.      208.      195.      183.      172.
                161.      151.      142.      133.      125.      117.      110.      103.       96.       90.
                 85.       80.       75.       70.       66.       62.       58.       54.       51.       48.
                 45.       42.       39.       37.       35.       32.       30.       29.       27.       25.
                 24.       22.       21.       19.       18.       17.       16.       15.       14.       13.
                 12.       12.       11.       10.       10.        9.        8.        8.        7.        7.
                  7.        6.        6.

     ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION    SUB12

    TOTAL RAINFALL =    3.05, TOTAL LOSS =    1.30, TOTAL EXCESS =    1.75

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+    544.       4.13                100.        100.        100.        100.
                        (INCHES)    1.658       1.658       1.658       1.658
                        (AC-FT)      41.         41.         41.         41.

                        CUMULATIVE AREA =    0.46 SQ MI


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 230 KK     *     CP12   *
            *            *
            **************
                                COMBINED FLOWS FROM SUB12 & CP11

 232 HC          HYDROGRAPH COMBINATION
                       ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                   ***

     ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION     CP12

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                          (CFS)
+    6602.      4.28                1389.       1389.       1389.       1389.
                        (INCHES)    1.813       1.813       1.813       1.813
                        (AC-FT)      572.        572.        572.        572.

                        CUMULATIVE AREA =    5.92 SQ MI


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 233 KK     *    RETEN   *
            *            *
            **************
                                FLOW ROUTED THROUGH RETENTION FACILITY

                HYDROGRAPH ROUTING DATA

 235 RS          STORAGE ROUTING
                       NSTPS           1  NUMBER OF SUBREACHES
                        ITYP        ELEV  TYPE OF INITIAL CONDITION
                       RSVRIC     1236.50  INITIAL CONDITION
                            X        0.00 WORKING R AND D COEFFICIENT
```

```
236 SV          STORAGE        0.0       1.5       6.2       6.7       6.9       7.2       7.5       7.8       8.1       8.4
                               8.8       9.1       9.6      10.1

238 SE        ELEVATION     1236.50   1237.00   1238.00   1239.00   1240.00   1241.00   1242.00   1243.00   1244.00   1245.00
                            1246.00   1247.00   1248.00   1249.00

241 SL        LOW-LEVEL OUTLET
                   ELEVL     1236.50  ELEVATION AT CENTER OF OUTLET
                   CAREA        7.07  CROSS-SECTIONAL AREA
                    COQL        0.80  COEFFICIENT
                    EXPL        0.50  EXPONENT OF HEAD

240 SS        SPILLWAY
                    CREL     1243.00  SPILLWAY CREST ELEVATION
                   SPWID      200.00  SPILLWAY WIDTH
                    COQW        2.63  WEIR COEFFICIENT
                    EXPW        1.50  EXPONENT OF HEAD

                                                    ***

                                   COMPUTED OUTFLOW-ELEVATION DATA

          OUTFLOW       0.00     54.46     58.32     62.77     67.94     74.05     81.37     90.29    101.41    115.65
        ELEVATION    1236.50   1237.94   1238.15   1238.41   1238.74   1239.17   1239.72   1240.46   1241.50   1243.00

          OUTFLOW     124.96    183.17    335.98    629.08   1108.14   1818.82   2806.77   4117.67   5797.17   7890.96
        ELEVATION    1243.07   1243.25   1243.55   1243.97   1244.51   1245.17   1245.95   1246.85   1247.86   1249.00

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE       0.00      1.49      5.93      6.21      6.28      6.40      6.54      6.66      6.71      6.87
          OUTFLOW       0.00     32.08     54.46     55.56     58.32     62.76     67.94     71.72     74.05     81.37
        ELEVATION    1236.50   1237.00   1237.94   1238.00   1238.15   1238.41   1238.74   1239.00   1239.17   1239.72

          STORAGE       6.95      7.07      7.20      7.34      7.49      7.79      7.81      7.87      7.96      8.09
          OUTFLOW      84.86     90.29     96.23    101.41    106.38    115.65    124.96    183.16    335.96    629.05
        ELEVATION    1240.00   1240.46   1241.00   1241.50   1242.00   1243.00   1243.07   1243.25   1243.55   1243.97

          STORAGE       8.10      8.26      8.42      8.48      8.74      8.76      9.06      9.11      9.51      9.57
          OUTFLOW     650.23   1108.09   1620.00   1818.75   2806.84   2872.99   4117.72   4354.99   5797.20   6034.69
        ELEVATION    1244.00   1244.51   1245.00   1245.17   1245.95   1246.00   1246.85   1247.00   1247.86   1248.00

          STORAGE      10.05
          OUTFLOW    7890.97
        ELEVATION    1249.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      183. TO     7891.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

     ***            ***            ***            ***            ***

                         HYDROGRAPH AT STATION    RETEN

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR      4.98-HR
+   (CFS)       (HR)
                           (CFS)
+    6601.      4.28       1368.      1368.       1368.       1368.
                      (INCHES)      1.785      1.785       1.785       1.785
                       (AC-FT)       563.       563.        563.        563.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR      4.98-HR
+  (AC-FT)      (HR)
      10.       4.28                 7.         7.          7.          7.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR      4.98-HR
+   (FEET)      (HR)
   1248.30      4.28            1242.68    1242.68     1242.68     1242.68

                         CUMULATIVE AREA =    5.92 SQ MI

1
                                          RUNOFF SUMMARY
                                   FLOW IN CUBIC FEET PER SECOND
                                   TIME IN HOURS,  AREA IN SQUARE MILES

                                   PEAK   TIME OF    AVERAGE FLOW FOR MAXIMUM PERIOD    BASIN    MAXIMUM    TIME OF
          OPERATION     STATION    FLOW    PEAK                                       AREA     STAGE     MAX STAGE
+                                                     6-HOUR     24-HOUR     72-HOUR
          HYDROGRAPH AT
+                          SUB1    1125.    4.13        234.        234.        234.     0.87
          HYDROGRAPH AT
+                          SUB2     314.    4.10         61.         61.         61.     0.26
          2 COMBINED AT
+                           CP2    1438.    4.12        295.        295.        295.     1.14
          ROUTED TO
+                          RCP2    1435.    4.13        293.        293.        293.     1.14
+                                                                                          6.04       4.13
          HYDROGRAPH AT
+                          SUB3     157.    4.18         37.         37.         37.     0.15
          2 COMBINED AT
+                           CP3    1591.    4.13        330.        330.        330.     1.29
          ROUTED TO
+                          RCP3    1589.    4.15        328.        328.        328.     1.29
+                                                                                          5.34       4.15
          HYDROGRAPH AT
+                          SUB4     365.    4.15         85.         85.         85.     0.30
          2 COMBINED AT
+                           CP4    1954.    4.15        413.        413.        413.     1.59
          ROUTED TO
+                          RCP4    1954.    4.15        413.        413.        413.     1.59
+                                                                                          4.23       4.15
          HYDROGRAPH AT
+                          SUB5     700.    4.20        156.        156.        156.     0.65
          2 COMBINED AT
+                           CP5    2651.    4.17        569.        569.        569.     2.24
          ROUTED TO
+                          RCP5    2642.    4.18        562.        562.        562.     2.24
+                                                                                          5.80       4.18
```

	HYDROGRAPH AT								
+		SUB6	451.	4.20	97.	97.	97.	0.44	
	2 COMBINED AT								
+		CP6	3092.	4.18	659.	659.	659.	2.68	
	ROUTED TO								
+		RCP6	3091.	4.20	656.	656.	656.	2.68	
+									8.32 4.20
	HYDROGRAPH AT								
+		SUB7	789.	4.25	189.	189.	189.	0.74	
	2 COMBINED AT								
+		CP7	3878.	4.20	845.	845.	845.	3.42	
	ROUTED TO								
+		RCP7	3871.	4.22	837.	837.	837.	3.42	
+									11.94 4.22
	HYDROGRAPH AT								
+		SUB8	812.	4.12	156.	156.	156.	0.66	
	2 COMBINED AT								
+		CP8	4633.	4.20	993.	993.	993.	4.08	
	ROUTED TO								
+		RCP8	4626.	4.22	983.	983.	983.	4.08	
+									7.22 4.22
	HYDROGRAPH AT								
+		SUB9	410.	4.07	86.	86.	86.	0.26	
	2 COMBINED AT								
+		CP9	4969.	4.22	1068.	1068.	1068.	4.34	
	ROUTED TO								
+		RCP9	4903.	4.27	1027.	1027.	1027.	4.34	
+									6.52 4.27
	HYDROGRAPH AT								
+		SUB10	674.	4.07	109.	109.	109.	0.51	
	2 COMBINED AT								
+		CP10	5402.	4.25	1136.	1136.	1136.	4.85	
	ROUTED TO								
+		RCP10	5402.	4.25	1134.	1134.	1134.	4.85	
+									8.61 4.25
	HYDROGRAPH AT								
+		SUB20	119.	4.12	24.	24.	24.	0.11	
	HYDROGRAPH AT								
+		SUB21	611.	4.13	149.	149.	149.	0.43	
	2 COMBINED AT								
+		CP20	729.	4.12	173.	173.	173.	0.54	
	ROUTED TO								
+		CP20	712.	4.22	166.	166.	166.	0.54	
+									3.17 4.22
	HYDROGRAPH AT								
+		SUB11	39.	4.33	8.	8.	8.	0.06	
	3 COMBINED AT								
+		CP11	6149.	4.25	1308.	1308.	1308.	5.45	
	ROUTED TO								
+		RCP11	6102.	4.30	1289.	1289.	1289.	5.45	
+									7.47 4.30
	HYDROGRAPH AT								
+		SUB12	544.	4.13	100.	100.	100.	0.46	
	2 COMBINED AT								
+		CP12	6602.	4.28	1389.	1389.	1389.	5.92	
	ROUTED TO								
+		RETEN	6601.	4.28	1368.	1368.	1368.	5.92	
+									1248.30 4.28

*** NORMAL END OF HEC-1 ***



ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FT. NGVD)	DESCRIPTION OF LOCATION
RM432	1265.24	U.S. Coast and Geodetic Survey bronze disk set in concrete and stamped "Z365 (1967)," located at 37th Street and Stanford Drive, 27 feet south of centerline of Stanford Drive.
RM433	1263.59	A PK concrete nail in top girth 2 feet north of northeast corner of intersection of 40th Street and Stanford Drive.
RM434	1310.55	A bronze disk in handhole-type monument at intersection of 44th Street and McDonald Drive.
RM435	1339.57	A bronze disk in handhole-type monument at intersection of 48th Street and Lincoln Drive.
RM436	1355.73	A bronze disk in handhole-type monument at Tatum Road and McDonald Drive.
RM437	1317.94	A ¾-inch rebar set in concrete in hand hole at centerline of intersection of Mockingbird Lane and Invergordon Road. Established by Planning Research Corporation.
RM438	1317.89	A ¾-inch rebar set east of Invergordon and the south boundary of golf course. Established by Planning Research Corporation.

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 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 flood plain.
- **ZONE D** Areas in which flood hazards are undetermined.

Flood 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*

D — D Cross Section Line

(EL 987) Base Flood Elevation in Feet Where Uniform Within Zone*

RM7X Elevation Reference Mark

*Referenced to the National Geodetic Vertical Datum of 1929

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.

Areas of special flood hazard (100-year flood) include Zones A, A1-30, AE, AH, AO, A99, V, V1-30 AND VE.

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. Floodway widths are provided in the Flood Insurance Study Report.

Coastal base flood elevations apply only landward of the shoreline.

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

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

For adjoining map panels see separately printed Map Index

MAP REPOSITORY
Refer to Repository Listing on Index Map

EFFECTIVE DATE OF
COUNTYWIDE FLOOD INSURANCE RATE MAP:
APRIL 15, 1988
EFFECTIVE DATE (S) OF REVISION (S) TO THIS PANEL:

Map revised SEPTEMBER 30, 1995 to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to change zone designations, to add and update roads and road names, to reflect updated topographic information, to incorporate previously issued letters of map revision, and to incorporate previously issued letters of map amendment.

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
1000 0 1000

1690 E

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 1690 OF 4350

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY UNINCORPORATED AREAS	040037	1690	E
PARADISE VALLEY, TOWN OF	040049	1690	E
PHOENIX, CITY OF	040051	1690	E
SCOTTSDALE, CITY OF	045012	1690	E

MAP NUMBER
04013C1690 E

MAP REVISED:
SEPTEMBER 30, 1995

Federal Emergency Management Agency

FLOOD CONTROL DISTRICT
RECEIVED
SEP 10 6 1995
DIRECTOR | P&PM
DEP | REG
ADMIN | MAINT
ENGINEER | CAE
SUPT.

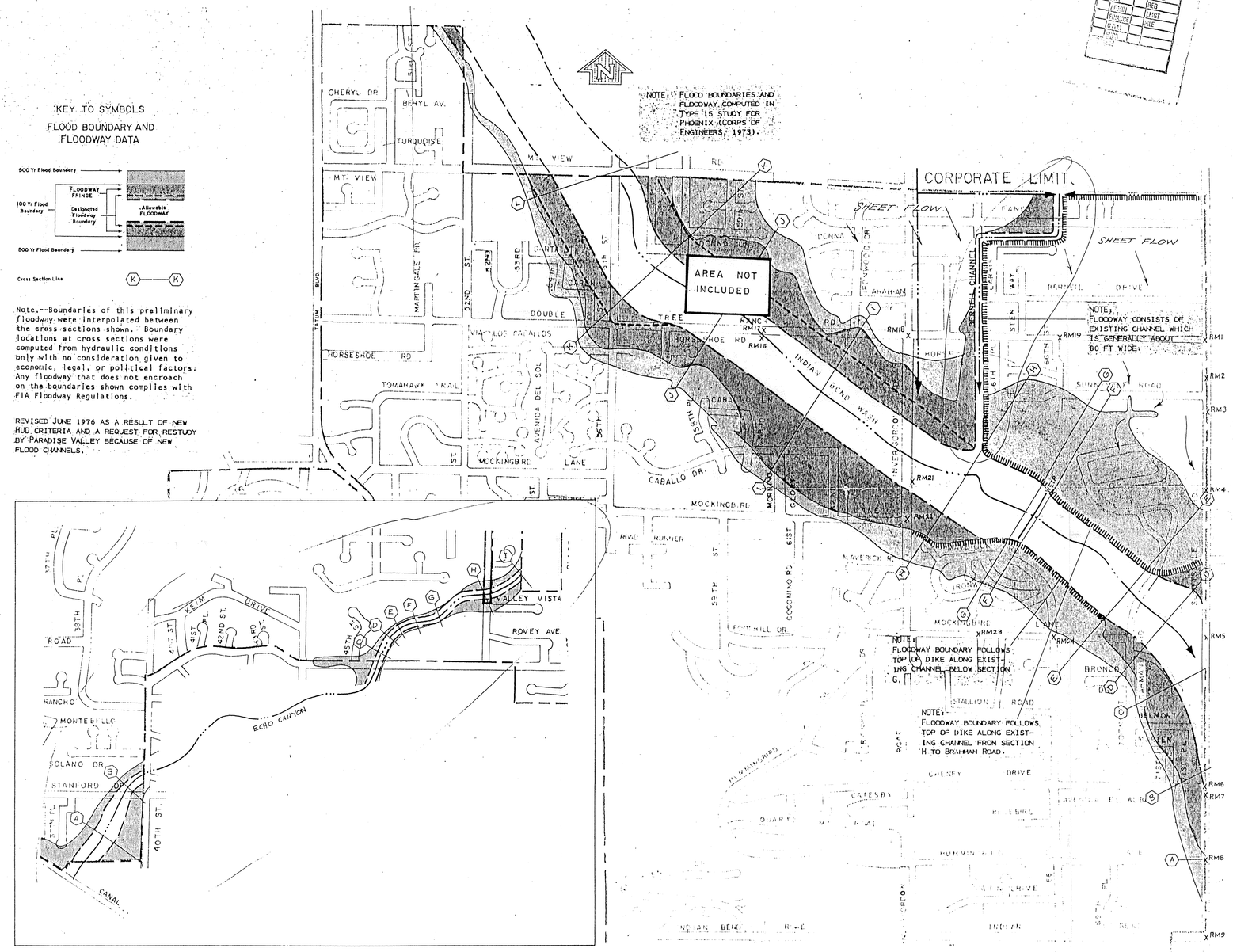
KEY TO SYMBOLS

FLOOD BOUNDARY AND FLOODWAY DATA

Note.--Boundaries of this preliminary floodway were interpolated between the cross sections shown. Boundary locations at cross sections were computed from hydraulic conditions only with no consideration given to economic, legal, or political factors. Any floodway that does not encroach on the boundaries shown complies with FIA Floodway Regulations.

REVISED JUNE 1976 AS A RESULT OF NEW HUD CRITERIA AND A REQUEST FOR RESTUDY BY PARADISE VALLEY BECAUSE OF NEW FLOOD CHANNELS.

NOTE: FLOOD BOUNDARIES AND FLOODWAY COMPUTED IN TYPE 15 STUDY FOR PHOENIX (CORPS OF ENGINEERS, 1973).

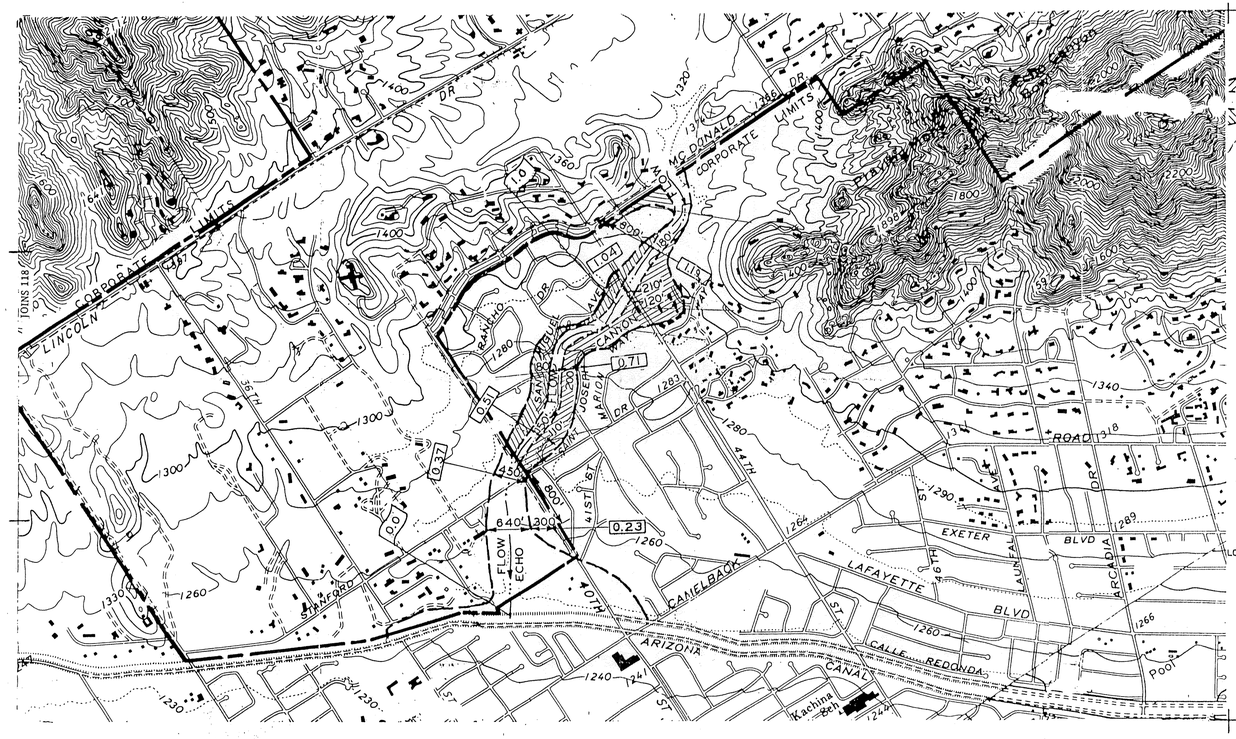


PARADISE VALLEY, AZ.

FLOOD BOUNDARY AND FLOODWAY MAP

APPROXIMATE SCALE
0 1000 2000 3000 4000 FEET

EXHIBIT 3



LEGEND

OVERFLOW LIMITS

FLOODWAY FRINGE
PRELIMINARY FLOODWAY } 100 YEAR FLOOD
FLOODWAY FRINGE

10 — CROSS SECTION NUMBER AND RIVER MILE.

102 — RIVER MILE.

8840 — GROUND ELEVATION IN FEET ABOVE MEAN SEA LEVEL.

SCALE IN FEET

1000 0 1000

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
LOS ANGELES, CALIFORNIA

FLOOD INSURANCE STUDY

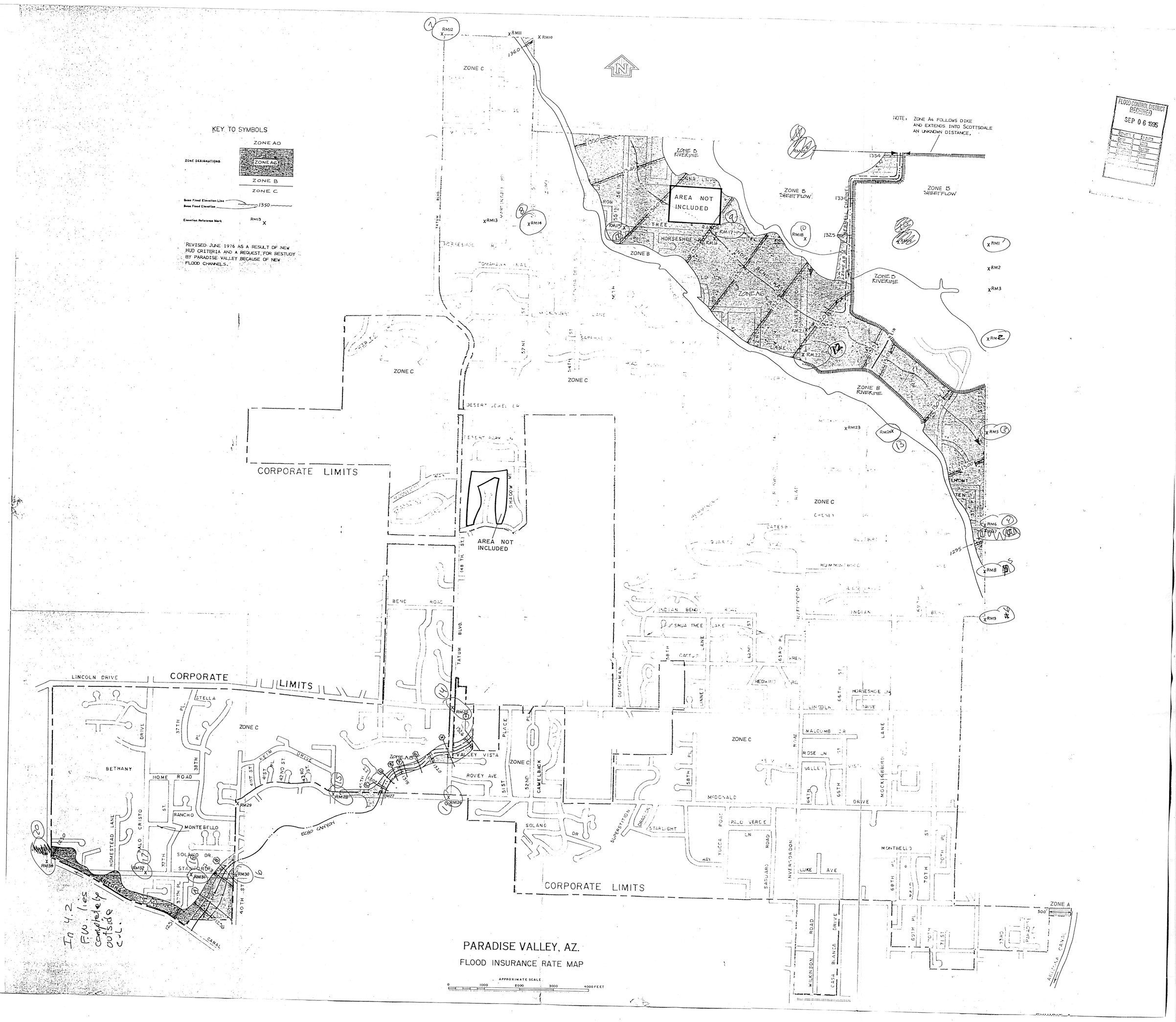
PHOENIX, ARIZONA

PRELIMINARY FLOODWAY

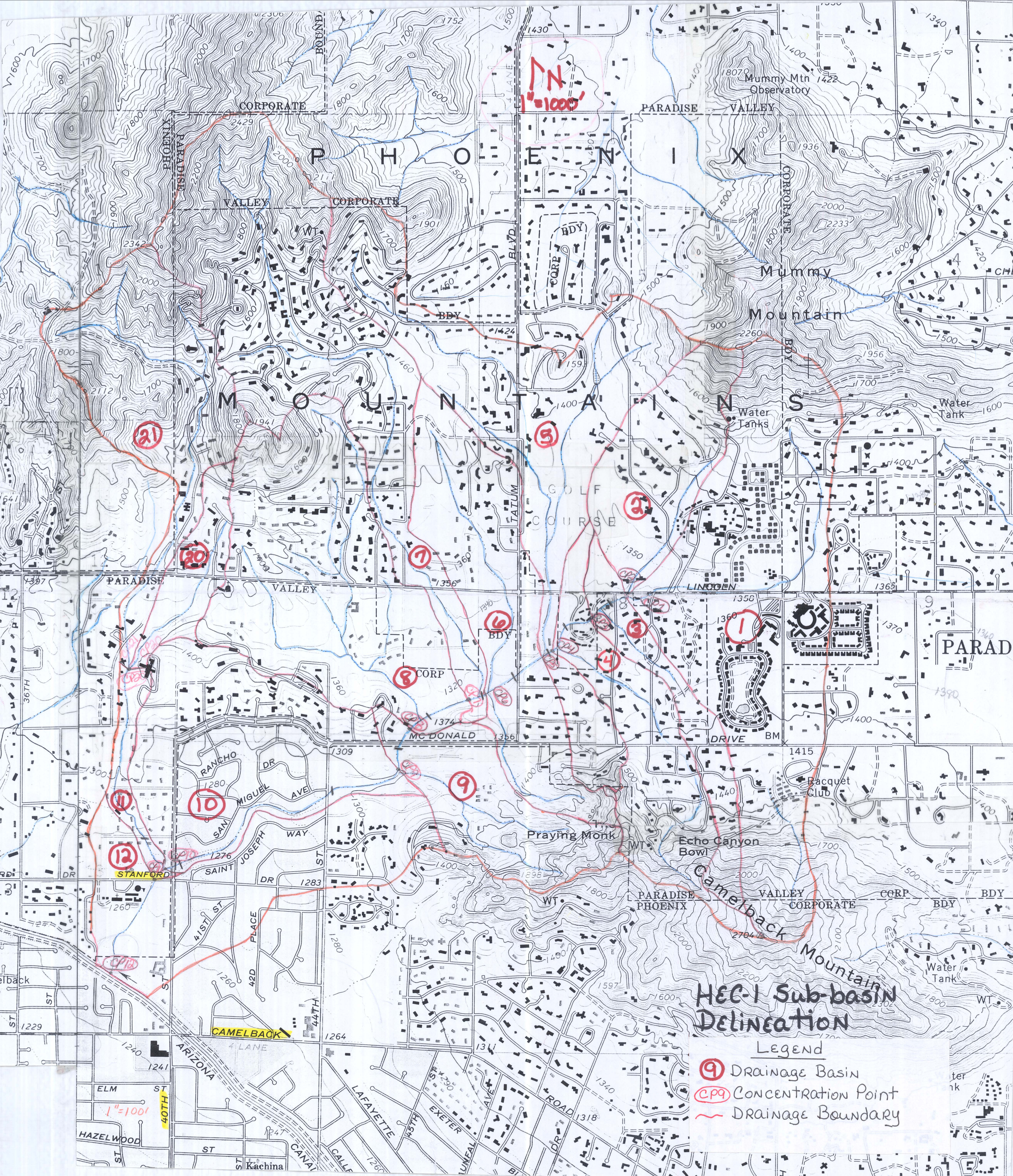
ECHO CANYON

PREPARED FOR
FEDERAL INSURANCE ADMINISTRATION

SEPTEMBER 1973



FLOOD CONTROL DISTRICT RECEIVED SEP 06 1995


HEC-1 Sub-basin Delineation
Legend
9 Drainage Basin
CP9 Concentration Point
Drainage Boundary
1"=1000'
PHOENIX MOUNTAINS
Mummy Mountain
Camelback Mountain
Mummy Mtn Observatory
Praying Monk
Echo Canyon Bowl
Water Tanks
Water Tank
Racquet Club
GOLF COURSE
PARADISE VALLEY
PHOENIX
CORPORATE
BDY
CORP
WT
LINCOLN DRIVE
McDONALD
STANFORD
CAMELBACK
ARIZONA
LAFAYETTE
EXETER
ROAD
SAN MIGUEL AVE
SAINT JOSEPH WAY
RANCHO DR
ELM ST
HAZELWOOD ST
Kachina